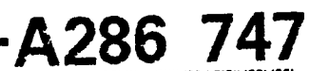
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# DCAA CONTRACT AUDIT MANUAL

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Appendixes A-I
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DEPARTMENT OF DEFENSE
DEFENSE CONTRACT AUDIT AGENCY

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# DCAA CONTRACT AUDIT MANUAL

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DEPARTMENT OF DEFENSE
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# CHAPTER 12

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# CHAPTER 12

# 12-000 AUDITING CONTRACT TERMINATION, DELAY/DISRUPTION, AND OTHER PRICE ADJUSTMENT SUBMISSIONS

## 12-001 Contract Terminations and Equitable Price Adjustments

This chapter describes procedures for reviewing cost submissions under contracts and subcontracts which have been partially or fully terminated before completion. This chapter also provides guidance for contract price adjustments resulting from the following situations: changes in the work made by the contracting officer within the general scope of the contract; changes in the work resulting from abnormal conditions, such as delay/disruption; or extraordinary relief under 50 U.S.C. 1431-1435.

## 12-100 Section 1—Contract Termination Procedures—Overview

### 12-101 Introduction

a. This section provides general information on contract terminations. It also discusses the principles and procedures governing audit reviews of settlement proposals submitted under terminated contracts and subcontracts. These principles and procedures serve as a guide and are not meant to limit professional judgment. The purpose is not to restate information contained in FAR Parts 31, 45.6, and 49 except when necessary for clarity. A knowledge and understanding of these FAR sections is essential in performing an adequate audit of terminated contracts. Refer, as necessary, to applicable FAR Supplements issued by the various agencies that relate to terminated contracts. As used in the termination sections of this chapter, the term "contracting officer" usually means termination contracting officer (TCO).

b. The right of the Department of Defense to terminate government contracts is important in maintaining military procurement flexibility and obtaining the maximum use of procurement funds. Each DoD contract must include a termination clause.

c. When terminating a contract, one of the government's basic objectives is to promptly negotiate a settlement which will pay the contractor for the preparations made and the work done under the terminated portions of the contract. When appropriate, the government allows a reasonable profit on work performed. However, if analysis indicates a loss would have occurred if the contract had been completed, the government adjusts the contractor's proposal accordingly. When the contractor does not present a settlement proposal within time limits provided, the contracting officer may determine the amount to be paid to the contractor. The same is true when the government and contractor cannot settle on an amount. When authorized by the contract, the government can make partial payments pending settlement of the claim.

d. A termination may be at the convenience of the government or for default. The amount a contractor is entitled to receive depends in part on the cause for termination and the type of contract involved. FAR 49.403 discusses termination of cost-reimbursement-type contracts for default. Terminations of fixed-price contracts for default do not usually require audit services.

e. A termination may be either partial or complete. A contract is completely terminated when the termination notice directs the immediate cessation of all remaining contract work. Under a partial termination, the contractor continues to perform on the unterminated portions of the contract following the existing contract terms.

f. No-cost settlements occur when (1) the contractor has not incurred any costs for the terminated portion of the contract, (2) the costs incurred are not significant and the contractor is willing to waive payment, (3) the contractor can divert all costs including termination inventory to other orders, or (4) for some other reason the contractor agrees to a no-cost settlement.

g. The "Truth in Negotiations Act" (10 U.S.C. 2306a), and FAR 15.804-2 Cost or Pricing Data, apply to termination actions. For termination settlement proposals on DoD contracts exceeding $500,000, ($100,000 threshold for civilian agencies), the contractor must certify that the cost or pricing data submitted was accurate, complete, and current as of the date of agreement on the settlement.

## 12-102 Contract Modifications Causing Subcontract Terminations

a. Not all termination settlements result from contract termination. Modification of a contract, according to the changes clause, may require a termination adjustment. A change in specification, for instance, may make unnecessary the particular materials or parts that a prime contractor has on order. As a result, the prime contractor may need to cancel one or more subcontracts. This, in effect, is similar to a termination of the prime contract for the convenience of the government. The standard subcontract termination clause (FAR 49.502(e)(1)) gives the prime contractor the right to cancel subcontracts for its own convenience. It also defines the rights and obligations of the subcontractor. When modifying a prime contract according to the changes clause of the contract, the contracting office may ask the auditor to review the prime contractor's proposal for an equitable adjustment in the contract price or the estimated cost and fee. In these instances, follow the procedures set forth in 6-800 to ensure that any subcontract settlements resulting from the change are reasonable.

## 12-103 Partial Termination

a. A partial termination of a contract may require a separate equitable price adjustment of the continuing portion of the contract as provided in the standard termination clause for fixed-price contracts. The contractor must file the request before settling the terminated portion of the contract. Examples of partial termination situations normally considered acceptable for an equitable adjustment on the continuing portion of the contract follow:

(1) A volume decrease that increases material, labor, or indirect unit costs. The contractor may no longer be able to take advantage of quantity discounts. Direct labor unit costs may increase because the work reduction may prevent the contractor from realizing labor improvement (learning) curve benefits projected in the negotiated price. Labor unit costs may also increase because there are fewer units over which to distribute setup costs. Indirect cost rates may increase when assigning fixed overhead charges over a lesser volume.

(2) Initial (starting load) costs may not be recovered due to the partial termination.

b. Ensure that equitable adjustment claims do not include costs already covered by the termination settlement or costs not caused by the partial termination.

## 12-104 Applicable Cost Principles

a. For fixed-price contracts, the government settles terminations for convenience using the "termination for convenience" contract clause, other applicable contract clauses, and the contract cost principles contained in FAR Part 31, in effect on the date of the contract. Cost provisions of the subpart of FAR Part 31 referenced in the allowable cost and payment contract clause govern cost-type contract settlements.

b. The auditor may find references to cost principles other than FAR 31, particularly DAR XV. When found, the referenced cost principles and regulations apply and must be used.

## 12-105 Influence of Cost Accounting Standards

a. CAS 401 requires the contractor to accumulate and report costs in the same

way as estimated. Cost estimates used in a prospective contract normally anticipate the contract going to completion. Cost arrangement in a termination claim may differ significantly from the cost presentation contained in the original estimate. A contract termination in essence creates a situation that is totally unlike a contract completion. Therefore, it is not reasonable to extend the consistency requirement to an event not anticipated in the original estimate.

b. While termination procedures usually comply with CAS 401 a contractor would breach the consistency requirement if it had several similar terminations and handled them differently. Review the contractor's termination procedures for consistency.

c. CAS 402 requires a contractor to classify consistently all like costs in like circumstances as either direct or indirect. Termination claims often include as direct charges costs or functions which would have been charged indirect if the contract had been completed (FAR 31.205-42). Examples are settlement expenses and unexpired lease costs. These circumstances do not breach CAS 402 requirements since the like circumstances referred to in the Standard are lacking.

d. CAS 406 requires that a contractor use its full fiscal year for its cost accounting period. Although FAR 31.203(e) suggests that a shorter period might be proper for indirect cost computations when contract performance involves a minor part of the year, a contractor should use its full fiscal year for CAS-covered contracts

## 12-200 Section 2—General Audit Guidance For Contract Terminations

### 12-201 Introduction

a. This section provides audit guidance which applies regardless of the cause of termination, the type of contract, or the type of claim submitted.

b. FAR 49.107 requires the TCO to submit prime contractor settlement proposals over $100,000 to the contract auditor for review and recommendations. It also requires the TCO to request audit of certain subcontractor proposals before approving their settlement (see 12-203). The TCO may also request audit for other prime or subcontract proposals at his or her discretion. In certain conditions, the auditor may also initiate an audit, when warranted as provided in 12-204 and 6-802.5.

#### 12-201.1 Scope of Audit

a. Establishing audit scope depends on various factors including (1) the termination proposal or claim amount; (2) whether the contractor used the inventory or total cost basis; (3) the condition of the contractor's books and records; (4) prior experience with the contractor; (5) effectiveness of the contractor's internal controls, management decisions, and policies; (6) how effective contractor personnel are in implementing policies before and after the termination; (7) the expressed desires of the contracting officer; and (8) the provisions of the termination clauses in the contract.

b. In determining audit scope, review the contractor's accounting and termination policies, practices, and internal controls. Also evaluate whether the costs claimed in the settlement proposal are consistent with the contractor's normal accounting and termination procedures. Review fundamental contract data to initially test the contractor's proposal. Fundamental contract data includes the price proposal, cost estimates, bills of material, production schedules and records, shipping documents, purchase orders, and cost and profit forecasts. Other sources of information useful in determining audit scope are copies of financial statements audited by the contractor's public accountants, tax returns, reports submitted to government regulatory agencies, and information from government technical personnel who have a direct interest and knowledge of the various phases of the contractor's operation.

c. A need for extending the audit scope and performing a more detailed examination of the proposal may be indicated when (1) the unit cost level of the quantities shown in the inventory or the quantities themselves do not follow the pattern normally experienced by the contractor, (2) overhead and administrative expense rates used in the proposal are not typical of past or current experience, (3) previous audits questioned or disapproved significant costs, (4) the proposal includes substantial amounts for nonrecurring or other unusual costs, (5) there appear to be procedural differences between the costing of the completed work and the termination claim, or (6) inconsistencies are noted in the contractor's costing of termination claims.

d. The auditor should address the express requests contained in a contracting officer's audit request. However, it is the auditor's responsibility to determine audit scope. In some instances, (for example, where the termination claim consists principally of unprocessed material), a desk review of the required documentation may be adequate. When available information suggests that the audit scope should be less than requested, inform the contracting officer and put appropriate comments in the report.

### 12-202 Auditing Terminated Subcontracts

a. Settling subcontractors' termination claims is a prime contractor responsibility. However, the government has an interest in these settlements when it affects the cost of a prime contract with the government. The contracting officer must approve or ratify each subcontract termination settlement. An exception to this occurs when the TCO authorizes the contractor to settle subcontracts under

$100,000 without his or her approval or ratification.

b. Before approving or ratifying each subcontract termination settlement of $100,000 or more, the contracting officer must request a DCAA audit review or an analysis of the audit performed by the prime contractor or higher-tier subcontractor (see 12-310). He or she may also request audits of smaller settlements (see 6-802.5). Careful planning and close coordination among the prime contractor, the contracting officer, and the auditor are necessary to ensure efficient and timely settlement of subcontract termination proposals. This is particularly important when the termination action involves a large and complex prime contract (such as for a major weapon system).

## 12-203 Responsibility of DCAA Auditor at Prime Contractor Location

The DCAA auditor of the prime contractor is responsible for ensuring that the prime contractor performs adequate audits of subcontract termination claims. The auditor will inform the contracting officer of instances where the contractor failed to properly consider audit findings in settling subcontract termination claims.

## 12-204 Preliminary Conference with Contractor

a. The contracting officer usually arranges for an initial conference with the contractor. He or she normally holds this meeting after the termination notice, but before the contractor submits its settlement proposal. When possible, the auditor should attend the conference and determine the basis and method the contractor plans to use in preparing and costing the proposal. Assist the contracting officer by explaining the cost principles that apply and if necessary furnishing the contractor information on preparing a termination claim (see 1-507). Discuss with the contractor during the preliminary conference any specific problems and questions concerning the termination claim.

b. The preliminary conference also provides the auditor an opportunity to (1) arrange for access to the contractor's books and records, (2) determine the contractor's knowledge and experience in preparing termination claims, (3) discuss the contractor's plans for settling any subcontractor's claims, and (4) make a preliminary review of the contractor's records to determine whether the contractor can submit a proposal on an inventory basis (see paragraph 12-301.1).

c. Timely planning is essential to ensure that minimal settlement expenses will be incurred and charged to the terminated contract. For example, in large and complex contracts involving a complete or substantial partial termination, the termination contracting officer normally requests the contractor to submit a projected statement of work involved in contract settlement (see FAR 49.105-1). This statement usually identifies personnel requirements to specific work phases and target completion dates for each work phase. If the contracting officer tells the contractor that using separate work orders or codes is necessary to document settlement costs, obtain a copy of the statement.

d. Obtain a copy of any report that the contracting officer prepares as a result of the preliminary conference. If the meeting includes discussions on accounting or auditing matters, the auditor may wish to prepare a supplemental memorandum of the meeting.

e. When the contracting officer does not arrange for a preliminary conference and the auditor considers it appropriate, he or she should arrange for a meeting. Meet with the contractor and other government representatives as appropriate. Prepare a memorandum of the meeting and retain it in the audit working papers.

## 12-205 Unadjusted Pricing Actions

The contractor may have other outstanding pricing actions related to a terminated contract. These may be due to specification changes, redetermination, incentive provisions, or escalation provisions not completed at the time of termination. The contractor should not submit pending price adjustments as an integral

part of the termination settlement proposal. However, the government cannot review and evaluate the settlement proposal without their concurrent consideration. Personnel responsible for negotiating the price adjustment may not be the same as those responsible for negotiating the termination settlement. Bring any unadjusted pricing actions noted to the contracting officer's attention so that he or she may consider them in the termination settlement. Large outstanding actions may prevent the auditor from reaching a conclusion on the contractor's profit or loss potential under the terminated contract. Base the audit report on the contract prices in effect at the time of the audit. Give the contracting officer full particulars on any pending price adjustments. This allows the contracting officer to provide for a recomputation of the profit or loss allowance after settling the outstanding pricing actions.

## 12-206 Determinations of Settlement Review Boards

For all major termination settlements and other settlements known to contain problems of an unusual nature, obtain information concerning any settlement review board's determinations (see FAR 49.110 and 49.111), which relate to the audit recommendations. While obtaining the review board's decisions may not alter the auditor's position in subsequent reports, this information may assist him or her in presenting findings so future reports will be more useful.

## 12-300 Section 3—Auditing Terminated Fixed-Price Contracts

### 12-301 Introduction

a. This section presents guidance on auditing fixed-price contracts terminated for convenience of the government.

b. Contractors may submit settlement proposals under terminated fixed-price contracts on an inventory basis (Standard Form (SF) 1435) or, when approved in advance by the contracting officer (see FAR 49.206-2), on a total cost basis (Standard Form 1436). Under unusual circumstances, the contracting officer may approve some other basis.

#### 12-301.1 Inventory Basis

The inventory basis requires that the contractor directly associate the costs and profit in the settlement proposal with units or services terminated. It limits the proposal to those items which are residual due to the termination action. Using the inventory basis for submitting settlement proposals is the method preferred by the government.

#### 12-301.2 Total Cost Basis

a. In contrast, a settlement proposal on a total cost basis is for total costs incurred under the entire contract until termination, by elements such as labor, material, and indirect costs plus settlement expenses and profit, less the contract price of delivered items. The auditor's main interest in the termination inventory is not its value, but whether all inventory items are properly identified and made available to the government.

b. The government normally gives approval to use the total cost basis only when the inventory basis is not feasible or would unduly delay the settlement. The following examples are situations where the contracting officer might permit using the total cost basis:

(1) If production has not started and the accumulated costs represent planning and preproduction or "get ready" expenses.

(2) If the contractor's accounting system will not readily lend itself to establishing unit costs for work in process and finished products.

(3) If the contract does not specify unit prices.

(4) If the termination is complete and involves a letter contract.

c. If requested by the contracting officer, furnish an opinion on the feasibility of using the inventory basis. Base the opinion on a limited review of the information obtained during the preliminary conference. If the auditor receives a request to audit a termination settlement proposal prepared on the total cost basis and the contractor presents no evidence of approval, contact the TCO. If the auditor, based on his or her review of the contractor's records, believes the contractor should use the inventory rather than the total cost basis, inform the contracting officer.

d. The contractor should prepare a total cost basis settlement proposal for a partial termination the same way as one prepared for a complete termination. It should include all costs incurred to the completion date of the continued portion of the contract. A total cost claim is therefore not submitted until completion of the continued portion of the contract. Settlement proposals for partial terminations submitted on the inventory basis do not depend on completion of the continuing portion of the contract.

### 12-302 Preliminary Audit Steps

a. Upon receipt, make a general review of the terminated contract, the termination notice, and the contractor's settlement proposal and supporting schedules. The purpose is to determine whether the proposal contains the information and data needed to plan and perform the audit. A proper initial review of a settlement proposal determines whether (1) the proposal generally conforms with requirements, (2) each cost item claimed is allowable according to contract provisions, (3) the amount claimed is reasonable considering the contract price of the physical units represented by the claim, including whether the contract would have resulted in a loss, or reduced profit if it had been completed, (4) there is any

duplication of charges, (5) each subcontractor's claim applies to the government's termination action and not to changes or cancellations for the contractor's convenience, and (6) the contractor promptly complied with the termination notice by stopping all in-house contract effort promptly and by immediately notifying subcontractors to stop work (see 12-305.7)

b. The introductory portion and Section I of settlement proposals prepared on the inventory basis or total cost basis, are essentially the same. Section I gives the contract status as of the cut-off point or effective termination date. Comparing this section with the contractor's proposed settlement amount, as shown in Section II, may disclose inequities or areas requiring further review. To verify the accuracy of the data contained in Section I, examine (1) the contract to determine the materials or services to be supplied, the prices to be paid, and the delivery schedule, (2) the termination notice and its effect on the contract, (3) shipping records and invoices for the delivered items, (4) specific termination instructions given by the contracting officer, (5) the contractor actions taken to comply with the termination notice to minimize termination costs, and (6) the projected profit or loss on the contract.

c. Computing the net claim in Section II of a settlement proposal prepared on an inventory basis (Standard Form 1435) differs substantially from that used on a total cost basis (Standard Form 1436). The main difference is that Standard Form 1435 includes only the cost of residual inventory, plus appropriate "other costs" (12-305). Standard Form 1436 shows total costs incurred in performing the entire terminated contract. To compute these total costs shown on Standard Form 1436 the contractor first adds applicable profits to the total costs. The contractor then reduces the amount by the contract price of delivered (or expected deliveries) finished products.

d. Compare the contractor's costs listed in Section II, plus any subcontract settlements, with the information in Section I. The results may indicate a possible overstatement of the claim or evidence of a loss situation. The contractor should not use the termination settlement proposal as a means to recover losses or expected reduced profit on the contract. Review contract costs and the reasonableness and accuracy of the estimate or budget to complete to determine whether a loss or reduced profit would have been incurred if the contract had not been terminated.

e. Compare Section II amounts with the related totals on the inventory schedules and with Schedules A through H of the proposal. When the proposal is on the total cost basis, confirm that the contractor properly credited the proposal for finished units. A review of the supporting schedules may suggest areas requiring further analysis.

f. Verify that the contractor did not exceed the limitations described in FAR 49.207.

g. Determining whether a loss would have occurred depends, in most cases, on the stage of completion at termination. For contracts with little work completed when terminated, it may be necessary to assume no loss would have occurred unless evidence suggests otherwise. For contracts with substantial effort already completed, verify that the termination proposal includes a cost estimate to complete the contract. The estimate should help the auditor decide if the contract would have resulted in a loss if completed. Make the request for an estimate to complete through the contracting officer. Use the guidance in 9-306 in deciding whether to use technical specialist assistance when evaluating the estimate to complete.

## 12-303 Preparing the Audit Program

After completing the preliminary review of the settlement proposal, prepare an audit program and begin the review of amounts contained in Section II. The comments which follow contrast the usual approach to the audit of a proposal prepared on the inventory basis with a proposal prepared on a total cost basis.

### 12-303.1 Proposals Using the Inventory Basis

The audit effort on an inventory basis proposal mainly deals with reviewing items listed in the inventory schedules

supporting the proposal. Make sure the claim includes only items allocable to the terminated portion of the contract. Guidance for the review of the various classes of inventory items follows:

a. Metals, raw materials, and purchased parts included in inventory represent items the contractor has not placed into fabrication or assembly operations. The cost claimed for these items in termination usually should not include amounts for labor or manufacturing overhead. Review the material cost and any material handling charge included by the contractor. Perform tests of the inventory pricing and determine if material qualities apply to the terminated portion of the contract. Make this determination by examining supporting bills of material, cost records, invoices, and purchase orders. Determine whether the contractor screened and removed from inventory all items usable on other work without loss and all items returnable to suppliers (see 12-304.5).

b. Finished components and work-in-process are termination inventory items fabricated, processed, or otherwise changed by the contractor through its manufacturing processes. Work-in-process inventories may present problems in verifying direct material, direct labor, and overhead costs applied to units and components in various stages of production. The contractor may have calculated prices using actual or standard cost or it may have been necessary to use estimated cost (see FAR 49.206-1(c)).

(1) Review extensively statistical type cost data, not controlled by general ledger accounts. Include in this review available cost data, cost reports, cost standards, engineering and bid estimates, bills of material, and other information influencing the cost. Resolve whether the contractor can retain work-in-process or finished components for use on other work without loss. Also be alert to raw material and purchased parts being improperly classified as work-in-process and finished components due to the greater profit rates allowed on these termination inventory categories. Additionally, the contractor might have overlooked raw material or purchased parts improperly classified when screening items returnable to vendors or diverted to other contracts (see 12-304.5).

(2) Some accounting systems do not provide enough detail on parts or lot costs. In these cases, the use of estimates may become necessary. One acceptable method for developing labor cost is to estimate hours expended on the work-in-process inventory by each labor category at each step in the production process. The estimated hours are then costed at the hourly rates applicable during the performance period. Close liaison with government technical personnel is required to ensure that the method used and the resultant costs are reasonable.

c. Miscellaneous inventory usually includes items and supplies which do not fit into the above categories. The contractor should limit cost claimed for miscellaneous inventory to material cost, plus handling charges when applicable. Of main concern to the auditor is whether the contractor can use the miscellaneous inventory items without loss or return it to suppliers.

d. Acceptable finished product represent completed end items accepted by the government but, on instructions from the contracting officer, are not delivered. The contractor may include completed items in the termination schedules. The contractor, however, should list them at the contract price, adjusted for any savings in freight or other charges, together with any credits for their purchase, retention, or sale. Test the adequacy of adjustments made by the contractor. Determine whether completed items are fully acceptable by referring to the inventory verification report (see 12-304.1) or by requesting assistance from government technical personnel. When rework is necessary to make otherwise completed items fully acceptable, question the estimated rework costs (see 12-304.7).

### 12-303.2 Settlement Proposals Using the Total Cost Basis

A total cost proposal eliminates the need to evaluate the cost allocation between the completed and terminated portions of the contract. The audit will usually start by examining the total cost incurred under both the completed and partially completed portions of the con-

tract. Audit objectives are to determine whether (1) the totals included in the proposal for material, labor, and overhead have been reliably computed, (2) the costs are allocable and reasonable, and (3) acceptable accounting evidence is available to support the charges. Chapter 6 discusses procedures for auditing incurred cost. These procedures also apply to the audit of costs appearing in Section II of Standard Form 1436.

a. Examining inventory schedules becomes important, not so much for the cost of residual inventory, but in determining if the contractor has scheduled all inventory and made it available to the government for retention, sale, or other disposition. Under a claim submitted on the inventory basis, the government only pays for residual inventory when listed and priced on the inventory schedules supporting Standard Form 1435. However, a claim submitted on Standard Form 1436 is for total contract costs; thus, all costs applicable to contract inventory are being claimed. It is important to ensure that the termination inventory schedules show all inventory costs billed to the government. Comparing these schedules with the most recent physical inventory may help in deciding if inventory quantities reported are reasonable. Evaluate any discrepancies between the two inventories.

b. The contractor's total cost claim should include a credit for any common items which have been diverted to other production and for money received from disposing of nonreworkable rejects.

## 12-304 Auditing Termination Inventory

a. The comments contained in the following subparagraphs apply whether the contractor prepared the settlement proposal on Standard Form 1435 or 1436.

b. Evaluating termination inventory requires coordination between audit and technical personnel. Objectives are to (1) verify the inventory quantities, quality, and usefulness; (2) examine reasonableness of the cost and price data; and (3) determine whether the contractor considered common items and material returnable to vendors. Verifying inventory quantities, quality, and usefulness are primarily the responsibility of technical personnel. Evaluating inventory pricing and contract costing are primarily the responsibility of the auditor. Do not needlessly duplicate the efforts of the technical inspector.

### 12-304.1 Inventory Verification Report

a. As part of the settlement procedures, the contracting officer usually arranges for technical representatives to review the termination inventory and to submit an inventory verification report. The plant clearance officer or technical inspector prepares the inventory verification report for the contracting officer's use in achieving an equitable settlement. The purpose of the report is to

(1) verify that the inventory exists; (2) determine its qualitative and quantitative allocability to the terminated portion of the contract; (3) make recommendations on its serviceability and quantitative reasonableness compared to contract production lead times, delivery schedules, and material availability; and (4) determine whether any of the items are the type and quantity reasonably used by the contractor without loss.

b. Obtain a copy of the inventory verification report from the contracting officer when possible since it is normally useful in establishing audit scope. When the inventory verification report is not immediately available but will become available within a reasonably short period, delay issuing the report until receipt of the inventory verification report. When the inventory verification report is not available, state in the audit report that recommendations were made without examining the inventory verification report.

### 12-304.2 Termination Inventory Schedules

a. When appropriate, review the termination inventory schedules for evidence of nonallocability and make selective physical counts of items listed in the termination inventory schedules. Under the total cost basis it may be appropriate to include usage tests to determine whether the contractor actually used ma-

terials charged in production. If material is not completely used in producing delivered units, determine whether the inventory schedules list residual items in the correct quantities.

b. The contractor must list on separate inventory schedules all government-furnished property included in the termination inventory. The contractor may not withdraw government-furnished property from the inventory for its own use without contracting officer approval. Examining government-furnished property and submitting a report to the contracting officer is the responsibility of the property administrator. The auditor's review of government-furnished property complements rather than duplicates the property administrator's review. When the audit discloses irregularities in government-furnished property use or in the inventory listing, include appropriate comments in the audit report.

**12-304.3 Material Acquired Before the Date of Contract**

a. Material acquired before the effective contract date is usually not allocable to the terminated portion of the contract, on the premise the contractor did not acquire the material for the contract. Exceptions occur when the contractor (1) acquired the material as a direct result of the negotiation and in anticipation of the contract award to meet the proposed delivery schedules; (2) properly placed the material into production on the terminated contract and cut, shaped, built-in, or changed in such a way that it cannot be returned to stock or reasonably used on the contractor's other work; or (3) acquired the material under a previously terminated contract and treated it as a common item in settling that contract for use on the contract now terminated.

b. Under certain circumstances, the contractor may claim that material acquired before the effective contract date was reserved for contract use, that retention of the material prevented the contractor from using it on other work, and, therefore, the government should accept the material as part of the termination inventory. Review the validity of the contractor's claim in these instances.

**12-304.4 Material Acquired or Produced in Anticipation of Delivery Schedule Requirements**

a. In general, the quantities acceptable in termination inventories may include net bill of material requirements for the terminated work plus a reasonable amount for scrap loss. Contract provisions or prudent business practice may suggest, however, that although otherwise acceptable, the on-hand quantities included in termination inventory schedules are larger than expected at the termination date. This condition may have been caused by the contractor acquiring or producing items by unreasonably anticipating delivery requirements. Excessive materials on-hand resulting from this condition are not allocable to the termination claim. Reviewing the contractor's purchasing policies and practices should assist in determining if this condition exists and in making recommendations to the contracting officer regarding excessive material. In reaching a conclusion, however, consider whether the contractor purchased large quantities of materials due to quantity discounts, favorable market conditions, or the need to have all materials on-hand before starting production. As a pricing factor in quoting the contract price, the contractor may have planned to produce items in large quantities to achieve production economies. Ask for technical personnel assistance when necessary to determine whether procurement or production was unreasonably accelerated.

b. A contract may specify that the government must approve a preproduction model before delivery of any production units. The contract may also prohibit the contractor from obtaining materials or proceeding with production before the government can test and approve the preproduction model. When the government terminates a contract containing these restrictions before preproduction model approval, only allowable design costs and costs incurred for the preproduction model are acceptable as termination costs. The presence of inventory items and costs for making deliverable items may suggest that the contractor unreasonably accelerated production. Or-

dinarily, these costs would be unallowable.

c. For certain production contracts, the schedule to purchase quantities of basic materials requires contracting officer approval to minimize inventory accumulation. Where these purchasing restrictions exist, determine if the termination inventory quantities agree with the purchasing schedule approved by the contracting officer.

**12-304.5 Common Items**

a. Common items are material items which are common to both the terminated contract and other work of the contractor. FAR 45.606-2 states that, except for property, delivery of which has been required by the government, and except for government-furnished property, the contractor's inventory schedules should not include any items reasonably usable without loss to the contractor on its other work. Also, FAR 31.205-42(a) states that the cost of items reasonably usable on the contractor's other work shall not be allowable unless the contractor submits evidence that it could not retain the items without suffering a loss.

b. In determining whether common items are reasonably usable by the contractor on other work, review the contractor's plans and orders for current/scheduled production and for current purchases of common items. Also determine whether the contractor properly classified inventory items as common items. Do this by reviewing stock records to see if the items are being used for other work and by reviewing bills of material and procurement scheduled for products similar to those included in the termination inventory. Limit acceptance of common items as part of termination inventory to the quantities on hand, in transit, and on order which exceed reasonable quantities required by the contractor for work on other than the terminated contract. In determining whether the inventory contains common items, the contractor should first assign total available quantity (inventory on-hand, in transit, and on order) to continuing or anticipated government or commercial production and assign the remainder, if any, to the terminated contract. The contractor, therefore, should assign to the terminated contract (1) the least processed inventory, and (2) those purchase commitments that result in the least cost when terminated.

c. Under certain circumstances, complex or specialized items may qualify as common items. For example, the compressor unit of a military jet engine might qualify as a common item if the contractor also uses the unit in commercial jet engine production. Or the memory unit of a computer might qualify if the contractor also uses the unit in a commercial computer. The test is whether the contractor can divert the item to other work without loss.

d. Common items need not be so classified if the contractor can show that eliminating the item from termination inventory would cause financial hardship. For example, when raw materials are common to the contractor's other work but the amount resulting from the termination equals a year's supply, or an amount far exceeding thecontractor's usual inventory, retaining the material might unfavorably affect the contractor's cash or working capital position and result in a financial hardship. Retaining a large inventory does not in itself, however, permit the contractor to claim an amount for excess inventory. When the contractor can use the inventory within a reasonable period, regardless of size, the excess inventory claim would not be allowable.

e. After submitting the termination settlement proposal, the contractor may receive additional contracts or commercial orders on which it can use the termination inventory items. In these cases, the contractor should withdraw the items it plans to use on the new work, (except for government property or other items reserved by the contracting officer), adjust the claim accordingly, and notify the contracting officer.

f. Bring to the contracting officer's attention reworkable rejects in the termination inventory which the contractor can divert to other work. The contracting officer may find it in the government's interest to allow the reworking costs in order to obtain credit for items reworked and diverted.

### 12-304.6 Production Losses

a. The cost of direct materials for parts, components or end items usually includes the cost of scrap such as trimmings, turnings, clippings or unusable remnants. Other production losses may occur due to testing, obsolescence, or actual physical loss of the components, subassemblies or end items. Depending on which stage in production the loss occurs, the cost involved may be for material or it may include material, labor, and applicable burden. Make sure the contractor credits the value realized from the sale or other disposition of scrap or other production losses either to (1) the material cost for the product scrapped or (2) the overhead allocable to the end product.

b. Review production losses for reasonableness and allocability to the terminated portion of the contract. Allocability is particularly important when the contractor submits the settlement proposal on the inventory basis since a portion of production losses applies to end items completed and shipped. The claim for units terminated should exclude all costs allocable to units shipped. Question unreasonable production losses, evidenced by a significant physical loss of components or subassemblies or by comparison with the loss rate on similar products.

### 12-304.7 Rejected Items

a. Reworkable Rejects. This type reject includes completed end items that did not meet contract specifications but the contractor would have reworked into acceptable completed articles if not stopped by the termination. The contractor should list these items on termination inventory schedules at their contract prices less the estimated cost to rework them (see 12-304.5f). To avoid possibly duplicating G&A expense and profit, the contractor should not claim reworkable rejects as work-in-process. The auditor normally reviews the estimated cost to rework these rejects to test for proper treatment by the contractor.

b. Nonreworkable Rejects. The contractor usually scraps nonreworkable rejects and does not include them in its inventory schedules. However, the contractor can recover their costs as part of the termination settlement when the costs apply to the terminated portion of the contract. Question any claimed amounts which are allocable to delivered items.

### 12-304.8 Returning Material to Suppliers

FAR authorizes and encourages contractors to return contractor-acquired termination inventory to suppliers for full credit less the lower of either (1) the supplier's normal restocking charge or (2) the maximum authorized restocking percentage (see FAR 45.605-2). The contractor may not include the cost of returned property in the settlement proposal but may include the transportation, handling, and restocking charges for the returned property. Except for diversion to other work of the contractor or retention by the government, this is the preferred method for disposing of termination inventory. Review the termination inventory listing for any items of inventory subject to return. For any items so noted, compute an amount as if the contractor had returned the items to suppliers. Question any resulting differences.

### 12-304.9 Intracompany Transactions

The cost principles govern allowable charges for materials, services, and supplies sold or transferred between plants, divisions, or organizations under common control. Question any excess charges resulting from the contractor pricing intracompany transactions inconsistently with the provisions of FAR 31.205-26(e).

### 12-304.10 Termination Inventory Undeliverable to the Government

Termination inventory may not be deliverable to the government because it was damaged, destroyed, or lost. Treat undeliverable inventory as material purchased and retained by the contractor. Unless the contract provides otherwise or the government has assumed the risk for loss and damage, deduct the fair value of undeliverable material from the termination settlement proposal.

### 12-304.11 Completion Stage of Terminated Work

a. As a step in their review of termination inventory, government technical personnel may determine the overall stage of contract completion at termination. When this is done, compare the relationship between incurred cost and contract price to the physical stage of completion. Although there may not always be a direct correlation between cost incurred and percentage of physical completion, a significant disparity may suggest that a loss-contract situation exists. In these cases, obtain an estimate to complete and compute a loss adjustment (see 12-308).

b. Where the government terminates only part of the units to be produced under the contract, the contractor should assign the least processed items to the termination inventory. By doing this the contractor keeps its proposal to a minimum (other factors being equal). The contractor might decide, however, to include items in the proposal which are in more advanced stages of production to increase the termination cost and the physical completion percentage of the terminated inventory and thereby earn a higher profit. Make sure the contractor assigns the least processed inventory items to the termination inventory. Two specific test procedures normally used follow:

(1) When termination inventory items are partially complete, determine whether similar items were put into production after the effective termination date, or whether the contractor performed any production steps on similar items preceding the stage of completion of the items included in the termination inventory.

(2) When termination inventory items are complete units or subunits (finished components, subassemblies, etc.), determine whether the contractor worked on them after the effective termination date.

c. A yes answer to either of the above situations would normally suggest the contractor did not assign items which were in the least stage of completion to the termination inventory. Question any excess costs resulting from the contractor's failure to assign the least processed items to the termination inventory.

### 12-304.12 Obsolete Materials and Tooling

Where the government made a previous change in the design or specifications of the end products terminated under a contract and the proposed settlement is on an inventory basis, review the termination inventory items to determine whether the inventory includes items that may have become obsolete due to the contract change. Do not accept obsolete materials and tooling costs as part of the termination inventory if the contractor received consideration for costs attributable to obsolescence by negotiating an equitable change in contract price of items delivered. Where the contractor waived adjustment of the contract price because there was enough in the original price for the contractor to absorb the cost of the obsolete material and the government later terminates the contract, the contractor may not then make claim for the obsolete materials in its termination settlement proposal. The contractor's previous decision to absorb the costs is binding.

### 12-304.13 Special Tooling

a. Verify that items the contractor claims as special tooling agree with the definition of special tooling in FAR 45.101. When the contractor can use the tooling on other work, it does not qualify as special tooling, and the costs are not allocable to the terminated portion of the contract. In many cases, obtaining a technical opinion on whether claimed special tooling meets the criteria contained in FAR may be appropriate.

b. The contract clause covering special tooling is provided at FAR 52.245-17. By memoranda dated 16 October 1990, 9 October 1992, and 14 October 1993, the Director of Defense Procurement (DDP) approved one year class deviations from the FAR 45.306-5 requirement to use the Special Tooling clause at FAR 52.245-17 and directed the use of the April 1984 edition of the Special Tooling clause in place of the current clause. Auditors should determine which clause applies to the contract under review. See 9-605.2.

c. The contractual intent of the government and the contractor on reimbursing special tooling costs affects their allowability. The government may intend to reimburse the contractor as part of the product price or as a separate contract line item.

(1) When there is no indication on the method for reimbursing special tooling costs, assume reimbursement through the product price. Thus, the costs are allocable to both the terminated and nonterminated portions of the contract.

(2) If special tooling represents a separate, nondeliverable contract line item, the contractor may claim tooling costs only if it has not previously received payment for the tooling. In this case, regardless of the amount expended on tooling, the government would limit recovery in the termination settlement to the line item price less any payments previously received for tooling.

(3) When special tooling is a contract deliverable item, the contractor is paid the contract price only if the tooling is available. If portions of the tooling have been consumed, lost, or are otherwise unavailable, the government reduces the contract price of the tooling for this as well as for previous payments.

(4) If production special tooling and production special test equipment (PST/PSTE) exceeding $1 million have been charged to the contract, ascertain that the requirements outlined in DFARS 215.871 have been met. See 9-605.2.

d. Question special tooling costs when:

(1) The contractor acquired the special tooling before the date of the contract, or as a replacement of items so acquired.

(2) The special tooling claimed is actually consumable small tools or items more appropriately classified as capital goods.

(3) The special tooling exceeds the contract requirements. For example, when the contract is for designing and producing a prototype unit and only a few experimental parts are needed, the contractor should normally not purchase special tooling intended for mass production. The contractor may have exceeded requirements based on expected future contracts.

e. The usefulness of the special tooling may have been expended during the production of the finished and delivered units. No part of such tooling costs would be allocable to the terminated portion of the contract. All or a portion of the special tooling required may relate only to the terminated units not entered into production. Therefore, all or a portion of the tooling cost incurred to the termination date would be allocable to the completed portion of the contract.

**12-304.14 Special Machinery and Equipment**

a. Auditing special machinery and equipment costs included in termination settlement proposals is similar to auditing special tooling costs. Determining that a particular item of machinery or equipment is "special" is usually a technical matter. Also, a legal opinion on the intent of the contracting parties may be needed. To qualify as "special," the equipment or machinery must be of a type rarely used in the contractor's industry (i.e., peculiar to the needs of the government). Do not consider machinery or equipment special when it is (1) ordinary or normal-type equipment in the contractor's industry, (2) similar to other facilities owned by a contractor, or (3) usable on other work without loss to the contractor.

b. Allowability of loss on special machinery or equipment depends on the original intentions of the contracting parties. When a contract requires that a contractor purchase certain special machinery or equipment to perform the contract, and the government considered the cost when setting the contract price, the contractor can recover the loss of useful value of the special equipment at termination. The maximum allowance for loss of useful life, however, should not exceed that portion of the equipment cost considered in establishing the contract price which applies to the terminated units.

c. When the special equipment purchase was not specifically considered during the contract negotiations, reimbursement for loss of its useful value is not automatically discounted, though it may raise a question about the "special"

nature of the equipment. A usual consideration in granting a contract is that the contractor has the equipment to do the work required and meet delivery schedules. The auditor may have good reason to question the cost when, for example, (1) the contractor continues to use the machinery on other work, (2) the contractor owned the machinery before the contract date, or (3) the contractor is unwilling to transfer title to the government if the transfer is required upon honoring the termination claim.

### 12-304.15 Indirect Costs

a. Review the makeup of the indirect cost pools and how the contractor distributes them to determine the propriety of indirect costs assigned to the termination inventory. Section 6-600 provides the techniques for reviewing indirect cost pools and indirect cost allocation. In reviewing indirect costs assigned to the termination inventory, determine that the amount does not include allocations for indirect cost items which are the same or similar to those claimed elsewhere in the settlement proposal as direct charges under other direct costs, settlement expenses, material handling charges, or other cost categories. Confirm that the termination inventory excludes indirect costs not properly allocable because of the completion stage of the terminated inventory. For example, packing, shipping, and inspection costs would not apply to undelivered items.

b. In some cases, the contractor may need to deviate from its normal costing practices to properly assign certain indirect costs to the termination inventory. Section 12-105 discusses the influence of Cost Accounting Standards.

c. Contractors may request permission to leave packing and shipping expenses in overhead pools. In return the contractor will pack and ship the termination inventory without any other specific charge. If such arrangements increase the claim, question the additional costs.

## 12-305 Auditing Other Costs

a. Costs other than settlement expenses applicable to the terminated portion of the contract, which are not claimed in other cost categories, may be claimed under "Other Costs." Other costs (see 6-500) frequently include such items as initial costs, engineering costs, royalties, severance pay, rental costs under unexpired leases, travel costs, and costs continuing after termination. Perform tests to ensure that the contractor has not claimed other costs on a direct charge basis while treating the same or similar items as indirect charges.

b. One problem facing the auditor in auditing other costs such as severance pay or rental costs under unexpired leases, is determining the reasonableness of the amounts claimed. Since there may not be any direct relationships between the amounts claimed for these types of items with the cost of material, labor, and overhead in the termination inventory examine the basic agreements under which these costs were incurred. Also review their allocation to the terminated portion of the contract, and determine whether the contractor gave proper consideration to their residual value. A technique used to indicate possible excessive claims for these items is to determine whether including the claimed amounts in the total estimated cost to complete the contract would have resulted in an overall loss. Where the auditor cannot reach a conclusion on the reasonableness of other cost items, classify these costs as unresolved (see 12-313b). Include in the audit report appropriate available information and comments giving your best judgment on their propriety.

c. Proper classification between other costs (costs which would have been incurred under the contract if it had not been terminated) and settlement expenses (costs incurred as a direct result of the termination) is essential because profit is not applied to settlement expenses (see 12-307).

### 12-305.1 Initial Costs

a. Initial costs include starting load costs and preparatory costs. The allowability criteria for initial costs are in FAR 31.205-42(c).

b. The two major areas considered in the contractor's determination and the auditor's review of initial costs are the (1) identification of total dollars, and (2)

allocation of these dollars to the terminated portion of the contract. Regarding identification, FAR 31.205-42(c)(4) provides, "if initial costs are claimed and have not been segregated on the contractor's books, segregation for settlement purposes shall be made from cost reports and schedules which reflect the high unit cost incurred during the early stages of the contract." To be considered, the contractor must submit the claim for initial costs and be able to support it with reliable data taken from formal or informal records. Contractors rarely segregate initial costs in their formal records or books of account, and, therefore, claims normally involve informal records, cost reports, production data, etc., as well as judgmental estimates. In these cases, evaluate the supporting documentation, the reasonableness of the total amount claimed, and the allocation to the terminated work.

c. One area usually identified with initial costs is the rate of production loss during the early production stages. The contractor should have scrap reports, efficiency reports, spoilage tickets, etc., available to develop and support a claim for a high initial production loss. Another initial cost category that is often readily identifiable is initial plant rearrangement and alterations. The contractor usually sets up a work order or service order to perform this work and accumulates costs against the work order. Management and personnel organization and production planning costs may be difficult to evaluate. If claimed, the contractor will probably base these costs on estimates, and help from technical specialists may be necessary.

d. The remaining elements of initial costs are defined in FAR 31.205-42(c)(1). They include items such as idle time, subnormal production, employee training, and unfamiliarity or lack of experience with the product, materials or processes involved. Although the FAR states that these costs are nonrecurring in nature, they may occur periodically throughout the life of the contract. As production continues and learning takes effect, these costs should lessen. This learning process may be expressed using an improvement curve as discussed in Appendix F. Distinguishing between normal production labor and labor due to idle time, subnormal production, employee training, or lack of experience may be difficult. However, many contractors maintain data on these factors in the form of efficiency reports, equivalent units produced, etc. This data is often acceptable for supporting starting load costs.

e. Once identified, the second consideration is that of assigning the initial costs to the terminated and nonterminated portions of the contract. Usually the contractor can assign initial costs to delivered and terminated units in proportion to their respective quantities. Initial costs which cannot be directly identified but which constitute diminishing costs discussed earlier can be assigned by using an improvement curve (see Appendix F). For instance, the contractor can use the learning curve technique to project total direct labor hours if the contract had been completed. Average direct labor hours per unit can then be determined and applied to the delivered units. The quantity so assigned would then be deducted from the total labor hours required to produce the delivered items. The difference can then be costed using historical labor and indirect cost rates, to determine the initial costs allocable to the terminated portion of the contract.

f. Determining if initial costs are reasonable usually involves analyzing the causes of initial costs as well as comparing these costs to those experienced on similar programs. High initial costs may indicate that a loss would have occurred had the contract gone to completion.

**12-305.2 Engineering Costs**

a. Engineering costs may be claimed as other costs that apply to the terminated portion of the contract. The allocability of engineering costs to a termination claim depends on why they were incurred, whether the contract was completely or partially terminated, and whether the engineering work had been completed by the termination date. Allocability may also be influenced by the type of engineering involved; i.e., whether it was (1) for designing and developing the end products, (2) for preparing draw-

ings or technical manuals, (3) for production planning or plant rearrangement, or (4) for designing and developing special tooling, special machinery, or equipment.

b. When the contractor's claim for engineering costs applies to designing and developing the end product, find out whether engineering costs were included in the end product price, or whether the design work is covered by a separate item in the current contract or by another contract. If the costs were included in the end product price and the engineering work is complete, the engineering costs may partially be properly allocable to the terminated portion of the contract. In this case, recommend acceptance of the properly allocable portion of engineering cost provided the government's interests and rights to the design are properly protected. If the engineering work is not complete, and there is a continuing portion of the contract to which it pertains, the contractor should not allocate engineering costs to the terminated portion of the contract. As compensation for unrecovered engineering cost, the contractor should apply for an equitable adjustment of the price of the continued items. This latter procedure was adopted to simplify the government's consideration of these costs.

c. Costs for drawing or technical manuals are usually priced separately from other contract items. Engineering costs for these items are therefore not allocable to the partial termination of other end products.

d. Allocable engineering costs for plant rearrangement and production planning usually are acceptable in a complete termination. However, if the work is not complete at the partial termination date, the contractor's claim should be for an equitable adjustment of the contract price of the continued portion of the contract, rather than against the terminated portion of the contract.

e. When the engineering work is for designing special tooling, machinery, or equipment, consider the costs as allocable to or part of the special tooling or equipment, rather than to the end product. When the contract contains a separate item for special tooling or equipment, or when there are diverse end products, considering the design costs as applying to the tooling or equipment rather than to the end products can result in a significantly different allocation to the terminated portion of the contract.

f. The contractor's accounting records may not show the engineering time spent on the contract. The contractor may, therefore, base its claim for engineering performed on estimates. A method to test the accuracy of these estimates is the "rate of effort" technique. In applying this technique, divide the contractor's total claim for engineering cost by the contractor's average staff-month wage cost for engineering to determine a comparative number of full-time engineers depicted by the contractor's claim. For example, if engineering costs claimed are $18 thousand and the contractor's average engineering wage cost is $1 thousand per staff-month, the claim would represent 18 staff-months of engineering effort. If the period between the contract date and the termination date was three months, the claim would represent the full-time services of six engineers ($18 thousand divided by $1 thousand equals 18; divided by 3 equals 6). This technique may suggest that the contractor's claim represents several times the effort that available engineering personnel were capable of performing. Whenever possible, state in the audit report whether the claimed estimate approximates the "rate of effort" required to achieve the engineering work actually performed.

### 12-305.3 Royalties and Other Costs for Using Patents

a. Contract terms and the FAR provisions incorporated in the contract determine the allowability of royalties, license fees, patent or license amortization costs. These costs are usually allowable if necessary for contract performance unless: (1) the government has a license or the rights to free use of the patent, (2) the patent has been ruled invalid, (3) the patent is considered to be unenforceable, or (4) the patent has expired.

b. The contractor's right to use a patent may benefit the terminated contract only or the terminated contract and other work. Determine whether there is benefit to other work, and whether costs are

properly allocated between the terminated contract and the other benefiting work. For a claim prepared on the inventory basis, determine that the cost or fee claimed is properly allocable to the terminated portion of the contract.

c. Where the agreement for patent use provides for royalties or fees only on delivered contract end items, no payments are allocable to the terminated portion of the contract.

### 12-305.4 Severance Pay

a. Severance pay is payment in addition to regular salaries and wages to employees whose services are being terminated. Such costs are allowable only when payment is required by (1) law, (2) employer-employee agreement, (3) established policy that is, in effect, an implied agreement on the contractor's part, or (4) circumstance of the particular employment. Normal severance pay relates to recurring, partial layoffs, cutbacks, and involuntary separations and is an allowable cost when properly allocated. A termination, however, may result in a significant employee layoff and the resultant severance pay amount may be substantial. FAR 31.205-6(g)(2)(iii) provides that periodic or annual accruals for abnormal or mass severance pay are not allowable, but the costs are considered on a case-by-case basis when incurred.

b. In considering the allowability and allocability of mass severance pay, determine:

(1) The impact of termination on the contractor's work force. A termination claim should not be a way to recover severance pay generated by an employee layoff resulting from other conditions.

(2) The rights of employees and whether the contractor can use the employees on other work.

(3) The government's share of the contractor's business during the period the severance pay was earned. Employees may have earned the right to severance pay over an extended period during which the contractor's business was commercial rather than government. Allocating total severance pay to government work, in such a case, would not be equitable.

(4) The method by which the contractor computed severance pay and the proposed payment method. The contractor's plan may provide for severance payments over an extended period, but payments stop if the employees obtain other positions.

(5) The effect of mass severance on existing reserves for normal severance, supplemental unemployment benefits, and pension funds. Substantial credits may result from nonvested rights in pension funds or other sources which the contractor may not have considered.

c. The conditions under which terminated employees will receive severance pay vary from one contractor to another. Depending on the contractor's policy or employer-employee agreement, the contractor may tie the liability for severance pay to the supplemental unemployment benefits plan. In this event, the final liability is unknown for an extended period. When some part of mass severance pay appears allocable but the total amount is unknown when reviewed by the auditor, report the amount as unresolved. Furnish pertinent details and recommend that the contracting officer put an appropriate reservation in the settlement pending the subsequent determination of the actual amount (see 12-313b).

d. Exclude mass severance pay amounts from any computations made to determine whether the contractor would have suffered a loss had the contract run to completion, unless the contractor would have experienced the layoffs anyway.

### 12-305.5 Rental Costs Under Unexpired Leases

a. Rental costs under unexpired leases are usually allowable where supporting records show that the lease was reasonably necessary to perform the terminated contract if:

(1) the rental amount claimed does not exceed the reasonable value of the property leased for the period of the contract and any future period as may be reasonable, and

(2) the contractor makes reasonable efforts to terminate, assign, settle, or otherwise reduce the cost of the lease.

b. The cost of leased property alterations necessary to perform the contract and the cost of reasonable restoration required by the lease provisions are also allowable. Adjust unexpired lease costs by any residual value of the lease due to the termination, assignment, or settlement of the lease agreement.

c. Verify that the length of the lease was not significantly longer than the anticipated contract performance period, and that the lease cost was not significantly higher than comparable space in the same general area. FAR 31.205-36(b) limits lease costs between organizations under common control to the normal ownership costs such as depreciation, taxes, insurance, and maintenance.

d. Where a terminated contract effects only a part of the effort at a leased facility, the contractor might submit a claim because other work will now have to absorb lease cost otherwise absorbed by the terminated contract had it run to completion. In this case, determine whether the contractor leased the space due to receiving the contract now terminated, or if the contractor leased the facility before receiving the contract. If the former condition exists, the allocable portion of the cost may be acceptable if it otherwise meets the above criteria. If the latter is true, the premises are a part of the contractor's normal plant facilities and no amount for unexpired rental cost would be acceptable.

### 12-305.6 Travel Costs

Reasonable travel costs allocable to the terminated portion of the contract are allowable. When a settlement proposal includes travel costs, determine whether they benefit the entire contract or only items completed and delivered. For example, if travel cost relates directly to installing or interfacing end items, no travel cost would be allocable to the terminated portion of the contract. Normally the auditor would question any amount so claimed. Reasonable travel costs incurred in termination activities are settlement expenses. If included as Other Costs, reclassify them.

### 12-305.7 Costs Continuing After Termination

a. Costs continuing after the effective termination date due to the contractor's negligent or willful failure to discontinue them are unallowable. The effective termination date is the date the termination notice first requires the contractor to stop performance, or the date the contractor receives the notice, if the contractor receives the termination notice after the date fixed for termination.

(1) Reasonable costs associated with termination activities are allowable. FAR 31.205-42(b) recognizes there may be instances where costs incurred after termination may be allowable. For example, the contractor may have contract personnel at a remote or foreign location or there may be personnel in transit to or from these sites. The cost of their salaries or wages would be allocable to the terminated contract for a reasonable period required to transfer the personnel to sites for termination or used on the contractor's other work. In another example, components or end items may be in a heat-treating or electroplating process when termination occurs and the contractor may elect to complete rather than disrupt the process and risk complete loss of the items.

(2) In cases such as the above example, make sure that the contractor's decision did not increase the government's costs. Also make sure these costs (i) are classified as costs of contract performance rather than settlement expenses (see 12-305(c)), and (ii) do not represent efforts by the contractor to convert raw materials and purchased parts to work-in-process, or to convert work-in-process to finished items solely to advance the completion stage to increase costs and/or profit recoverable by the claim.

(3) After receiving the termination notice, the prime contractor may decide not to immediately terminate its subcontracts. The prime may first have to determine the scope of the termination, review the completion stage of subcontracts, and determine requirements on other contracts to consider diverting components to other work. This may take time during which subcontractors are continuing to

work. Overall, however, the efforts of the prime contractor may result in subcontract claims far less than would otherwise have occurred. Work closely with knowledgeable technical personnel when reviewing the reasons why the prime contractor failed to immediately terminate its subcontracts.

(4) Floor checks and plant perambulations performed immediately following a contract termination in the physical area(s) affected will usually show whether the contractor is taking necessary steps to stop work and to divert personnel to other assignments. Where appropriate, request technical help from government personnel familiar with the production areas and processes.

b. Question amounts claimed as unabsorbed overhead, under whatever name, representing expected overhead or parts of it absorbed by the contract if not terminated (see FAR 31.205-42).

(1) The Armed Services Board of Contract Appeals (ASBCA) has issued decisions stating that unabsorbed overhead is not recoverable in a termination claim. In Technology, Inc., ASBCA No. 14083, 71-2 BCA 8956 and 72-1 BCA 9281, the Board held that unabsorbed overhead relates to the contractor's existence as an ongoing organization and is not a continuing cost of a terminated contract. Further, the government is not a guarantor of the contractor's continuing overhead nor is this intended by the language in the termination clause. In Chamberlain Manufacturing Corp., ASBCA No. 16877, 73-2 BCA 10,139, the Board affirmed the previous decision using similar reasoning. The Board stated further that a loss of business, whether in the guise of post-termination G&A expense or otherwise, is not recoverable in a termination claim. The decision also reads that the continuing costs to which FAR 31.205-42 refers clearly are only those costs directly related to the terminated contract and if the drafters of the regulation had intended to allow unabsorbed overhead they could have done so simply and clearly as they did for rental costs.

(2) The Defense Logistics Agency's position on unabsorbed overhead is in the DLAM Manual 8110.1, Termination Manual for Contract Administration Services. This manual states: "Unabsorbed overhead claimed as a direct charge to a terminated contract is not allowable. Paying for unabsorbed overhead would be the same as recognizing claims for loss of business, which are unallowable in a termination for the convenience of the government."

c. While unabsorbed overhead is not allowable as part of a termination settlement, it may be appropriate for an equitable adjustment resulting from a partial termination. See treatment of unabsorbed overhead in Figure 10-11-1a.

## 12-306 Auditing General and Administrative Expenses

a. Determine whether (1) the individual items in the G&A pool are allowable, (2) the allocation base is equitable, and (3) the amount allocated to the termination claim is reasonable. In reviewing this area, use the appropriate FAR Part 31 cost principles, and the audit guidance in 6-600.

b. Including the subcontract settlement amounts in the allocation base for G&A is acceptable if including them otherwise satisfies the allocability criteria in FAR 31.201-4, 31.203, and 31.205-42(h).

c. Contractors often direct charge G&A type expenses as part of settlement expenses in addition to the G&A allocated to the rest of the claim. When the contractor uses this procedure, ensure that any G&A allocated to the rest of the claim does not include costs charged directly as settlement expenses and that these direct charges are excluded from the G&A allocated to continuing contracts. As an alternate procedure, the contractor may choose to recover G&A type settlement expenses by applying normal G&A. This procedure is acceptable provided the method does not result in an inequitable allocation to other contracts (also see 12-309).

d. Sometimes applying a full G&A expense rate to the amounts included in a termination claim is not appropriate. The contractor should limit developing a special (less than full) G&A rate to those rare situations where the termination inventory is significant and its cost pattern is

clearly different from that of any other contracts or work segments in the normal allocation base. For example, a contractor's normal allocation base for G&A expenses may be cost input, but the settlement proposal includes only unprocessed material costs. In this case, it may be appropriate to develop a special G&A expense rate based on eliminating from the expense pool those items which relate exclusively to labor, overhead, and finished items.

## 12-307 Evaluating Profit or Loss

a. Profit is allowed for preparations made and work done by the contractor on the terminated portion of the contract. The claim should not include profit on work not performed due to the termination. Profit based on the contractor's settlement expenses and settlements with subcontractors is unallowable although the contracting officer will consider the contractor's settlement efforts and the character and difficulty of subcontracting in arriving at a profit objective (see FAR 49.202).

(1) Determine whether a terminated contract would have resulted in a loss if it had gone to completion. Determining this is important because (A) no profit is allowable if it appears that the contractor would have incurred a loss had the contract been completed, and (B) termination claims are reduced by an amount equal to the pro rata share of any reduced profit that would have occurred had the contract been completed.

(2) An auditor can usually determine the anticipated profit rate with reasonable accuracy if the contract was substantially complete at the time of termination. Or, for a partial termination, if cost information is available on the continued portion of the contract. Request the contractor, through the contracting officer, to furnish an estimate of the cost required to complete the terminated portion of the contract. Review the estimate with necessary help from technical representatives (see 12-302g). The contractor's estimate to complete may be conservative and show that no loss would have occurred. Make a concerted effort to evaluate the contractor's projected profit.

(3) There is no contractual requirement for the contractor to furnish an estimate to complete. If the contractor declines to submit an estimate to complete or states that a cursory review found that no loss would have occurred, technical personnel with auditor assistance can prepare the estimate to complete. Developing data that shows a loss in this situation may place the burden on the contractor to submit data regarding its profit or loss position.

b. When evaluating a contractor's projected profit rate, consider what allowable costs would have been incurred without the termination. In cases where common items may have been diverted from the terminated portion of a contract to the contractor's other work or if the contractor has not claimed all costs that would be allowable under a contract, include them in projections of costs to complete the contract.

c. Where there is no reasonable basis for the contractor to determine the profit rate had the contract gone to completion or the auditor cannot make a realistic evaluation of the contractor's projection, include in the audit report information and comments that may prove helpful to the negotiator. This might include comments such as (1) the profit rate realized on the end products completed to date of termination, (2) the contractor's average experienced profit rate on similar products, (3) the profit rate both parties intended when the contract was negotiated, and (4) the profit amount the contractor would receive under a formula settlement if the contract termination clause provides for its use.

d. Quantitative methods are useful tools when reviewing termination settlement proposals. For example, applying statistical sampling to inventory costing or to incurred costs can save considerable time. Also, an understanding of improvement (learning) curve techniques (Appendix F) is essential, particularly when evaluating contractor's and subcontractors' estimates to complete the contract. While most auditors normally associate using an improvement curve with evaluating direct labor hour estimates, auditors may also use it in evaluating the estimated prices of direct material parts

and components. Factors considered when evaluating the cost estimate to complete include (1) cost experience data available before the government terminated the contract, (2) directly applicable experience for an entire product line previously produced, or (3) other similar experience from other products or components. When applying improvement curve techniques, follow the audit guidance in Appendix F.

## 12-308 Adjusting for Loss Contracts

a. For terminated "loss" contracts, FAR 49.203(b) and (c) state the methods for determining the maximum to be paid on inventory and total cost settlements. Fundamentally, these methods are intended to adjust the contractor's termination claim. The government does this by applying to the amount claimed a percentage calculated using the total contract price compared to the total estimated cost incurred had the contract been completed. The following examples illustrate the loss adjustment under the inventory basis and the total cost basis.

(1) Assume a termination having the following conditions:

| | |
|---|---|
| Total contract price (50 units @ $2,400 each) | $120,000 |
| Total amount invoiced for completed units (35 units @ $2,400 each) | $ 84,000 |
| Total costs incurred under the contract | $135,000 |
| Estimate of cost to complete contract, including $ 10,000 subcontract settled for $5,000 | $ 15,000 |
| Settlement with subcontractor | $ 5,000 |
| Settlement expenses | $ 1,000 |
| Disposal credits | $ 5,000 |
| Units completed and delivered prior to termination | 35 |
| Units completed and on hand and not to be delivered | 5 |
| Units terminated. | 10 |

(2) Assume also that the contractor submitted a settlement proposal on the inventory basis as follows:

| | | |
|---|---|---|
| Finished components | $ 7,000 | |
| Work in progress | 3,250 | |
| Dies, jigs, fixtures, and special tools | 2,000 | |
| General and administrative expenses | 1,000 | |
| Other costs | 3,000 | $ 16,250 |
| Profit | | 2,000 |
| Settlement expenses | | 1,000 |
| Settlements with subcontractors | | 5,000 |
| Acceptable finished product (adjusted for freight and packaging savings) | | 11,000 |
| Less disposal credit | | (5,000) |
| Net payment requested | | $ 30,250 |

The amount recommended for settlement, assuming all claimed costs are otherwise acceptable, would be computed as follows based on FAR 49.203:

| | |
|---|---|
| Settlement expenses | $ 1,000 |
| Contract price, as adjusted, for acceptable completed end item | 11,000 |
| Total settlement amount otherwise agreed to or determined, adjusted for estimated loss | 17,000* |
| Less disposal credit | (5,000) |
| Recommended settlement amount | $ 24,000 |

*Computed by multiplying the sum of the contractor's own costs of $16,250 plus settlements with subcontractors of $5,000 by the ratio of the total contract price of $120,000 to the total indicated cost of $150,000. Total indicated cost is composed of the total cost of $135,000 incurred prior to termination plus the estimated cost of $15,000 to complete the entire contract:

$$\$21,250 \times \frac{\$120,000}{\$150,000} \text{ or } \$21,250 \times 80\% = \$17,000$$

(3) Assume that the contractor submitted a proposal on the total cost basis as follows:

| | | | |
|---|---|---|---|
| Direct material | $24,000 | | |
| Direct labor | 30,000 | | |
| Indirect factory expense | 50,000 | | |
| Dies, jigs, fixtures, and special tools | 10,000 | | |
| Other costs | 15,000 | | |
| General and administrative expenses | 6,000 | $135,000 | |
| Less finished product invoiced or to be invoiced | | (84,000) | $ 51,000 |
| Profit | | | 0[1] |
| Settlement expenses | | | 1,000 |
| Settlement with subcontractors | | | 5,000 |
| Disposal and other credits | | | ( 5,000) |
| Advance, progress and partial payments | | | ( 0) |
| Net payment requested | | | $ 52,000 |

The amount recommended for settlement, assuming all claimed costs are otherwise acceptable, would be computed as follows based on FAR 49.203:

| | |
|---|---|
| Settlement expenses | $ 1,000 |
| The total settlement amount otherwise agreed to or determined, adjusted for estimated loss | 112,000[2] |
| Less disposal credit | (5,000) |
| Less amount previously paid contractor | (84,000) |
| Recommended settlement amount | $ 24,000 |

[1]No claim for profit made by contractor because the contract price has been exceeded.

[2]Computed by multiplying the sum of the contractor's own costs of $135,000 plus settlements with subcontractors of $5,000 by the ratio of the total contract price of $120,000 to the total indicated costs of $150,000. Total indicated cost is composed of the total costs of $135,000 incurred prior to termination plus the estimated cost of $15,000 to complete the entire contract:

$$\$140,000 \times \frac{\$120,000}{\$150,000} \text{ or } \$140,000 \times 80\% = \$112,000$$

b. When there are unpriced changes existing at the time of the audit, inform the contracting officer that the loss adjustment is tentative and will require recomputation if the changes result in upward or downward revisions of the total contract price. Similarly, where the contractor uses estimates for subcontract settlement amounts, advise the contracting officer that the loss adjustment will require recomputation if negotiated settlements differ from the estimated amounts.

## 12-309 Auditing Settlement Expenses

a. For ease in settling a termination proposal, the contractor should establish

a separate job order or code to which settlement expenses can be directly charged. Allowable settlement expenses in a termination claim may include the following.

(1) Accounting, legal, clerical, and similar costs reasonably necessary for the preparation and presentation of settlement claims and supporting data and for the termination and settlement of subcontracts.

(2) Reasonable costs for the storage, transportation, protection, and disposition of property and inventory acquired or produced for the contract.

b. Methods of accumulating settlement expenses vary. Contractors may charge only for the costs of direct labor and material expended, or the labor charges may include an amount for related overhead costs such as supervision, space, fringe benefits, and other costs. When a contractor has established a special termination department, all direct costs on termination activities may be accumulated and overhead burden added to cover other costs of the termination department. Costs may then be equitably distributed to specific settlements. Auditing settlement expenses requires a decision on the accuracy, reliability, and reasonableness of the claimed amounts. Audit procedures outlined for examining the contractor's other costs equally apply to verifying settlement expenses.

c. When the contractor accounts for settlement expenses as direct charges, it should maintain labor time cards and distribute labor costs to the terminated work. Confirm that the contractor has not assigned highly paid personnel to routine work. When possible, contractor's employee time records covering settlement activities should describe the particular work performed. Perform tests to ensure that indirect allocations do not duplicate other claimed costs.

d. The functions performed by the contractor in settling terminated contracts are different from those required for normal business operations. For this reason, the contractor's normal indirect cost rates usually will not apply to settlement costs. The government recognizes this in FAR 31.205-42(g)(1)(iii) which provides that indirect costs associated with settlement activities will normally be limited to payroll taxes, fringe benefits, occupancy cost, and immediate supervision. For the government to consider other items of indirect costs, the contractor must show that these costs benefited and directly related to the labor expended on termination activities.

e. Determine whether personnel compensation cost directly included in the settlement expenses reasonably relates to the time required for termination activities. This is particularly important when settlement expenses include the time of officers and executive personnel. The contractor should normally have records to support the amounts claimed.

f. When the contractor identifies and charges settlement expenses directly to termination claims, the contractor should absorb settlement expenses applicable to no-cost settlements.

g. Question costs beyond those considered reasonably appropriate for the termination settlement such as for unnecessary work, unrealistic professional fees, etc. Where the auditor cannot resolve the reasonableness of an amount, refer the amount to the contracting officer as unresolved cost, furnishing factual information and comments which may be useful to the contracting officer in deciding if the costs are acceptable (see 12-313b).

h. A contractor may decide to obtain professional accounting services to help settlement proceedings. Reasonable costs of these services, including preparing the settlement proposal, may be reimbursed to the contractor. Evaluate the reasonableness of accounting service charges by considering the complexity of the proposal compared to the number of staff-days represented by the fee amount.

i. Where the contractor claims legal expenses, evaluate their reasonableness considering the time charged, the nature of the services provided, and the relationship of the legal expenses to the total termination settlement amount. Include appropriate comments in the report. For contingent fee arrangements, i.e. where the legal fee is based on the negotiated settlement amount, clearly describe this arrangement in the report. Legal expenses or other costs connected to an appeal of a

settlement decision made by the contracting officer are not allowable.

j. Settlement expenses may include reasonable storage costs incurred in protecting termination inventory, but these are allowable as settlement expenses only during the plant clearance period as defined in (FAR 45.601). Allowable storage costs should not exceed the cost that would normally be incurred to care for and protect the inventory and should represent an equitable allocation of the contractor's total storage costs. As discussed in FAR 45.612-2, 45.612-3, and DFARS 245.612-3, when a contractor stores termination inventory in a special warehouse or other special storage location, on or off its own premises, it must absorb the additional (above normal) storage expense, including any related removal expenses. This is unless the contracting officer has determined that such removal or storage is for the convenience of the government. Undue delay by the contractor in submitting acceptable inventory schedules or prolonging the plant clearance period should not increase storage charges to the government. Following the plant clearance period, the contractor may request the contracting officer to remove the inventory items, or to enter into a separate storage agreement covering them.

k. As noted above, settlement costs may include, as a direct charge to the termination settlement, costs the contractor has disclosed or established as indirect costs. At contractors where there is continuing auditable work ensure that the contractor credits expense pools for the costs allowed as a part of settlement expenses before developing rates to be applied to other contract effort.

## 12-310 Reviewing Subcontractor Settlements

a. Termination settlements with subcontractors follow, in general, the principles on prime contract settlements. A subcontractor does not have contractual rights against the government when its subcontract is terminated. A subcontractor's rights are against the prime contractor or higher-tier subcontractor with which it has contracted. The prime contractor and each subcontractor is responsible for settling termination proposals of its immediate subcontractors based upon the contract terms and applicable regulations (see also 12-203).

b. When DCAA did not perform the review of a subcontractor's termination claim, the auditor at the prime location will evaluate the review done by the prime contractor. The auditor should particularly review, on a selective basis, settlements made by the contractor without contracting officer approval or ratification using the authority granted to the contractor under FAR 49.108-4. The auditor should have available the prime contractor's complete case file. The file should contain, as a minimum, a complete copy of the subcontract; a copy of the subcontractor's settlement proposal, with any amendments or revisions; audit and technical evaluations; minutes of all settlement negotiations; and related correspondence.

c. Where deficiencies exist, discuss them with the contractor and explain them in the report issued on the prime contract termination settlement proposal. If additional independent verification is required, send a request for an assist audit to the cognizant auditor. The request should fully explain the areas of apparent deficiencies to prevent duplication of effort. Call the contracting officer's attention to any pattern of settlements which appear questionable or which suggest that the contracting officer should restrict or withdraw settlement authority granted.

d. The government and subcontractors can make direct settlements under unusual circumstances by having the prime contractor assign the subcontract to the government. The standard prime contract termination clause allows subcontract assignment. Direct settlements with subcontractors, however, are only done when the contracting officer determines that they are in the best interest of the government.

## 12-311 Reviewing Disposal and Other Credits

Credit amounts included in a settlement proposal normally represent (1) an

offer by the contractor to purchase inventory at less than cost, (2) the proceeds from the sale of termination inventory, or (3) a combination of (1) and (2). A contractor's offer to purchase inventory at less than cost is subject to review by plant clearance personnel and to negotiation between the contractor and the contracting officer. When the offer is to purchase for a percentage of cost, verify that the contractor has considered the full cost of the material including any applicable labor and burden rather than just the purchase cost of the material. Also verify that the contractor made all sales of termination inventory at prices not less than those approved by the plant clearance officer (FAR 45.610).

## 12-312 Reviewing Advance, Progress, or Partial Payments

a. Advance, progress, and partial payments are amounts paid to the contractor before, during or after contract performance/termination. The amounts do not represent payments for completed items invoiced at the contract price. Any unliquidated amounts paid to the contractor under advance, progress, or partial payments must be offset against the final settlement proposal. Final accounting for all advance, progress, and partial payments is part of the final settlement and is verified by the finance or disbursing officer before final payment. The audit report should note any inaccuracies in the amount reported by the contractor to prevent unnecessary complications in the final accounting for termination payments.

b. The contracting officer may request an audit of interim settlement proposals submitted to support requests for partial payments on terminated contracts. The auditor should honor these requests. However, since an audit will typically be performed on the final settlement proposal, a detailed review of interim proposals usually need not be done. Make sure that the claimed costs have been incurred and that the accumulated partial payment amount does not exceed the total amount the contractor is expected to receive in final settlement of the termination claim.

## 12-313 Format, Content, and Distribution of Audit Reports

a. Use the guidance in 10-700 and Figures 10-7-1 and 10-7-2 of Chapter 10 in preparing and issuing audit reports on termination settlement proposals.

b. Use the criteria and guidance in 10-308.1 in determining questioned costs. Section 10-308.3 provides the criteria for unresolved costs. However, because of the particular nature of termination actions, the unresolved costs category is extended to include amounts applicable to those types of items on which the auditor is unable to reach a conclusion because the contractor's net cost or liability will not be firmly established until a later date. Examples of these items are severance pay and the cost of unexpired leases.

## 12-400 Section 4—Auditing Terminated Cost-Type Contracts

### 12-401 Introduction

a. The purpose of this section is to furnish guidance for auditing terminated cost-type contracts.

b. The contract cost principles relevant to the contract involved still govern the allowability of costs if the contract is terminated. Under terminated cost-type contracts, the contractor has various options for claiming costs after the termination date. Paragraphs 12-402 and 12-404 below discuss these options. These paragraphs also advise whether only a contract audit closing statement is necessary or whether a contract audit closing statement and an audit report are required.

### 12-402 Options Available

a. When the government has completely terminated a cost-type contract, the contractor is given the option of either vouchering out costs incurred both before and after the contract termination date (continuing to request reimbursement for incurred costs on standard public voucher forms) or submitting a settlement proposal. The government limits the option to voucher out costs to six months, after which the contractor must claim unvouchered costs associated with the terminated contract on Standard Form (SF) 1437, Settlement Proposal for Cost-Reimbursement Type Contracts. The contractor's exercise of its option to claim costs on SF 1437 is irrevocable. Once selected, all unvouchered costs must be submitted on the settlement proposal form. The last voucher submitted under the vouchering out procedure is considered the "completion voucher." The contractor should specifically identify it as such, even though there may be unvouchered costs which the contractor plans to submit in the settlement proposal. Process this voucher as set forth in 10-900. The contractor must submit its proposal to determine the final fee amount under the contract by letter or by SF 1437.

b. When the government partially terminates a cost-type contract, FAR 49.304 limits with certain minor exceptions, the settlement to a fee adjustment, if any. The contractor shall submit a settlement proposal covering this adjustment. The contractor shall continue to submit SF 1034 for all reimbursable costs requested under the contract, including (1) its own costs allocable to the terminated portion of the contract, (2) settlement costs for subcontractors, and (3) applicable settlement expenses (see 12-402.1a).

c. Normally, a selection to voucher out means the auditor will issue a contract audit closing statement (using the guidance in 10-900) once he or she has completed the audit. A selection to submit a settlement proposal usually means the auditor will also issue an audit report (in addition to the closing statement) using the guidance in 10-700. Further comments on this are in 12-404.

#### 12-402.1 Costs and Fee Vouchered Out

a. When the contractor decides to continue vouchering out, it submits contract costs in the usual manner on Standard Form 1034. Costs submitted on vouchers may include all contract costs, including settlement expenses and settlements with subcontractors. For terminated contracts under the cognizance of DLA, contractors must submit separate properly identified vouchers for subcontract settlements and for settlement expenses. Such contractors must also submit all subcontract termination settlements to the TCO for prior approval and ratification, except those settlements under FAR 49.108-4. The contractor must furnish evidence of the approval with the SF 1034 voucher. When the contractor has vouchered out all costs within the six month period, it may submit its claim for fee, if any, on SF 1437 or by letter appropriately certified.

b. Disapprove costs submitted on SF 1034 that are similar to those covered by a GAO formal exception or presented on a "reclaim voucher."

#### 12-402.2 Costs and Fee Submitted in a Settlement Proposal

The contractor should submit settlement proposals to the contracting officer

within 1 year from the effective termination date unless contract terms or agreement extends the period. The auditor's function in reviewing the settlement proposal is advisory and is primarily to help the contracting officer negotiate an equitable settlement. Perform the audit of costs included in the settlement proposal under a cost-type contract using the guidance contained in Chapter 6 and 12-300, as appropriate. Verify that the contractor has excluded previously reimbursed costs from the proposal. When the contractor includes costs previously disapproved by a DCAA Form 1, or costs disapproved under a GAO exception (or are of a similar nature), question the amount. When the settlement proposal covers a contract termination for default, question costs incurred in preparing the proposal.

## 12-403 Fee

The termination clause of the contract governs the adjusted fee, if any. It usually is based on the percentage of completion of the contract or the terminated portion, compared to the total fee provided in the contract for complete performance. In determining the contract completion percentage, the government gives consideration to the work done by the contractor in handling the termination notice, settling subcontractors' claims, and disposing of the termination inventory. To help the contracting officer adjust the fee, provide comments on the total estimated cost to complete the contract. Also provide comments on the relationship between the physical percentage of completion and the percentage of costs incurred to the total estimated cost of performing the contract.

## 12-404 Contract Audit Closing Statements on Vouchered Costs and Fee

Auditors must prepare a contract audit closing statement or final audit report, showing the costs and fee billed on public vouchers (Standard Form 1034) for each terminated cost-type contract. Follow the procedures contained in Chapters 6 and 10 to prepare and distribute contract audit closing statements. Closing statements should address (1) any disapproved costs the contractor intends to appeal, (2) the fixed fee amount paid through the last voucher, and (3) whether the fee is subject to a final settlement adjustment. When all costs incurred under the terminated contract have been vouchered out, the contractor should submit all enclosures that regularly accompany contract audit closing statements. Also follow this procedure when the contractor has stopped using vouchers and the settlement proposal includes other unvouchered costs, except the "Assignment of Refunds, Rebates and Other Credits" is not required. The government will incorporate this document into the settlement agreement after negotiations.

## 12-405 Terminated Cost-Type Subcontracts

A prime contractor or upper-tier subcontractor may terminate cost-type subcontracts. Termination may be for convenience of the government or for default. Audit concerns for a terminated subcontract are similar to a terminated prime contract. When auditing subcontract settlement proposals, follow the guidance provided for auditing terminated prime contracts. Unless the auditor receives a specific request through government channels, he or she should not normally review and report on settlement proposals prepared by subcontractors since this is a prime contractor responsibility. Be alert, however, to situations where an audit may be desirable and where the interested procurement activity should be informed (see 12-204 and 12-406).

## 12-406 Terminating Subcontracts for the Convenience of the Contractor Under Cost-Type Contracts

The contractor or the government may find it necessary to adopt changes in the manufacturing or engineering effort or in material requirements while performing a cost-type contract. After receiving a contract change, the prime or upper-tier sub- contractor must terminate orders or subcontracts that become unnecessary due to the contract change. The contrac-

tor should carry this out by using the termination clause in the subcontract. It should base settlements on the cost principles incorporated in the terminated subcontract. In some instances, the government may allow an equitable adjustment of the prime contract price under the changes clause in the contract. The auditor of the prime contractor involved in such adjustments is responsible for ensuring that subcontracts terminated under these circumstances are settled in the government's interest since the settlement amount becomes part of the prime contractor's claim for an equitable adjustment. The auditor should therefore establish a means for the contractor to notify the audit activity of such subcontract terminations. When a terminated subcontract settlement appears to have been based on inadequate review by the prime contractor, the DCAA auditor at the prime or upper-tier subcontractor should request an audit of the subcontractor's termination proposal.

## 12-407 Expediting Indirect Costs Settlement

a. Final settlement of a terminated cost-type contract may be unduly delayed if settlement is withheld until indirect cost rates are established using FAR 42.705 for the final period in which the contract was performed. To prevent these delays, FAR 49.303-3(a) permits the contracting officer, after receiving the audit recommendations, to negotiate an indirect cost amount for the final period of contract performance and thus promptly produce a final settlement of the contract (see 6-711.2).

b. Normally, the auditor provides final determined indirect cost rates for the entire contract performance period. If prompt final determination is not possible, authority to expedite indirect cost settlement and contract close out is discussed in 6-711.1 and 6-1009. As a further factor, note that FAR 49.303-3(b) requires the contractor prepare its indirect cost proposal for other contracts completed during the period by eliminating from the total pools and allocation bases the corresponding indirect costs and related direct costs applied to the terminated contract.

## 12-500 Section 5—Equitable Price Adjustment Submissions—Overview

### 12-501 Introduction

This section provides general information and guidance for reviewing contractor equitable adjustment submissions.

### 12-502 Equitable Price Adjustments

a. Equitable price adjustments result from changes made by the Contracting Officer that are within the general scope of the contract. When changes made within the general scope of the contract cause an increase or decrease in the contractor's costs or the period of performance, there is an equitable adjustment in the contract price and the contract is modified. Equitable adjustment submissions include both proposals and claims (see 12-504(b)).

b. Delay/disruption represents a unique type of equitable price adjustment.Delay/Disruption submissions are requests to recoup costs as a result of government caused delay/disruption.Depending upon the type of contract and the circumstances underlying the delay/disruption, such requests may be made under FAR 52.243 (standard change clauses), FAR 52.212-12 (suspension of work clause for construction contracts), FAR 52.212-13 (stop-work order clause for supply and service contracts), FAR 52.212-14 (stop-work order clause for facilities acquisition contracts), FAR 52.212-15 (government delay of work for supply and service contracts), or 52.236-2 (differing site conditions for fixed price construction and demolition contracts).

c. Extraordinary relief represents another unique type of equitable price adjustment. Submissions for extraordinary relief represent requests for contract price adjustments submitted pursuant to the provisions of 50 U.S.C. 1431-1435.

### 12-503 Adequacy of Submissions

The adequacy of the submission should be determined before beginning the audit. Immediately notify the contracting officer of inadequate submissions to facilitate the decision on acceptability. The written notification should describe the specific inadequacies, the cost impact of the inadequacies, and the data needed to correct the deficiencies. If, after FAO Manager and/or RAM involvement with contract administration management, the contracting officer insists that an audit be performed on the inadequate submission, confirm this in writing and advise the contracting officer that an audit cannot be performed on unsupported items, and, as a result, all unsupported items will be questioned and an adverse audit opinion will be expressed on the submission. The following are some items to consider when determining adequacy of the submission.

a. When equitable adjustment submissions are for work completed or substantially complete, allowable costs should be determined based on actual cost data reflected in the accounting and performance records.

b. While circumstances may require judgmental estimates, contractors must make full disclosure of all data used to prepare estimates, including any cost data that is factual and verifiable. In the case of a small contractor who was not required to have a suitable cost accounting system because the contract was awarded based on price competition, obtain, at a minimum, a summary of the requested price adjustments and provide specific reference to the source accounting documents.

c. Equitable adjustment proposals exceeding $100,000 under DoD contracts must be submitted with appropriate certification (see 12-505c).If contractor proposals do not include certification, they are considered inadequate. Coordinate with the requestor or the contractor to obtain the necessary certification. If timely certification is not obtained, the proposal should be returned.

d. Equitable adjustment proposals exceeding the FAR 15.804-2/DFARS 215.804-2 thresholds must include a properly completed Standard Form (SF) 1411.Contractors are required to comply with the supporting documentation requirements of Table 15-2 included in

FAR 15.804-6. If contractor proposals exceeding the thresholds do not include a properly completed SF 1411, they are considered inadequate. Coordinate with the requestor or the contractor to obtain a properly completed SF 1411. If a timely and properly completed SF 1411 is not obtained, the proposal should be returned.

e. For equitable adjustment claims and proposals not exceeding the FAR 15.804-2/DFARS 215.804-2 thresholds, the contractor is not required to execute a SF 1411, but is required to certify that the supporting data included in the claim is accurate and complete (see 12-505(a)). To be complete (and auditable), the data must be in substantially the same format as the supporting data required for a properly completed SF 1411. If contractor claims or proposals do not include supporting data in a format that is substantially the same as that required by the SF 1411 and, as a result, are unauditable, they are considered inadequate. Coordinate quickly with the requestor or the contractor to obtain the necessary data. If timely and complete data is not obtained, the claim or proposal should be returned to the contracting officer with a request that the contractor provide the necessary support so that the audit can proceed. If the contracting officer insists that the audit be performed on the inadequate claim or proposal, follow the guidance discussed in the lead-in paragraph to this section.

## 12-504 Contract Disputes Act

a. The Contract Disputes Act (CDA) of 1978 (41 U.S.C. 601-613), effective 1 March 1979, provides a comprehensive statutory procedure for resolving claims. The CDA requires that all claims by a contractor against the government be first submitted to the contracting officer for decision. A claim, as defined in FAR 33.201, is a written assertion seeking payment of money in a sum certain, an adjustment or interpretation of the contract terms, or other relief arising under or relating to the contract.

b. FAR 33.201 provides that the contractor's proposal for equitable adjustment may be converted to a claim by written notice to the contracting officer, if it is disputed either as to liability or amount or if it is not acted upon in a reasonable time. Therefore, a contractor and the government contracting agency must already be in dispute, or a timely decision not rendered, in order for the request to be considered a claim.FAR Part 33 sets the policies and procedures for processing contract disputes and appeals.

c. The Contract Disputes Act requires that the government pay interest on amounts found due on the claim at the rate established by the Secretary of Treasury. Interest on contract claims accumulates from the date the contracting officer receives an acceptable claim until the payment date.Accordingly, it is critical to provide timely audits of claims.When the contractor submits an inadequate claim, it should be returned immediately using the procedures in 12-503.

d. The contractor may also elect to pursue claims under this act for contracts entered into prior to 1 March 1979, the effective date of the act. In those cases when a contractor does not make such an election, applicable interest (if any) is payable at the rate established by the specific terms of the contract.

## 12-505 Certification Requirements

a. For claims over $50,000, the Contract Disputes Act requires the prime contractor to certify that the claim is made in good faith, the supporting data are accurate and complete to the best of its knowledge and belief, the amount requested accurately reflects the contract adjustment for which the contractor believes the government is liable, and the person signing the certificate is authorized to bind the contractor.

b. A contracting officer must issue his or her final decision on a certified claim of over $50,000 within 60 days of receipt or notify the contractor when the decision will be issued. A claim received but not evaluated for adequacy and/or audited in a timely manner could cause a contracting officer to fail to comply with the statutory time limit. Thus, a delay in the audit of a certified claim may force

the government i· to unnecessary litigation.

c. For DoD contracts exceeding $100,000, DFARS 252.233-7000 requires that prime contractors certify that the contract claim, request for equitable adjustment, or request for relief under Public Law 85-804 is made in good faith, the supporting data are accurate and complete to the best of its knowledge and belief, the amount requested accurately reflects the contract adjustment for which the contractor believes the government is liable, and the person signing the certificate is authorized to bind the contractor.

d. When a certification has not been submitted prior to the inception of a contract dispute, DFARS 252.233-7000(d) allows for a single certification, using the language in the Contract Disputes Act (12-505a) to satisfy the requirements of both DFARS 252.233-7000 and the Contract Disputes Act.

e. When the request for equitable adjustment is made under a substantially completed contract or completed contract, DFARS 252.233-7000(e) requires that the contractor certify, in addition to the items noted in 12-505d, that the request includes only cost for performing the alleged change and does not include any costs that have already been reimbursed or have been separately claimed. The contractor must also certify that all indirect costs claimed are properly allocable to the alleged change in accordance with applicable acquisition regulations.

## 12-600 Section 6—Equitable Price Adjustment Submissions—General Audit Guidance

### 12-601 Introduction

This section provides guidance that applies to contractor submissions for price adjustments under the delay/disruption or the standard changes clauses of the FAR.

### 12-602 Scope of Audit

Depending upon when the equitable price adjustment was prepared, contractor price adjustment submissions may contain forecasted costs, actual costs, or a combination of both.For example, equitable price adjustment submissions that result from a government-directed change and are submitted prior to implementation of that change would be based on estimated costs.Equitable adjustment submissions that result from alleged abnormal conditions such as delay/disruption are usually submitted after the work is complete and therefore should be based on costs incurred. Guidance for auditing forecasted costs is contained in Chapter 9, while guidance for incurred costs is in Chapter 6.

### 12-603 Extended Overhead versus Unabsorbed Overhead

Many courts have used the terms "extended overhead" and "unabsorbed overhead" interchangeably, but careful examination and comparison of their meanings reveal their difference. Unabsorbed overhead occurs if there are increased costs because of work stoppage occurring on a delayed contract. Extended overhead applies to contract changes that usually extend the period of performance.

### 12-604 Prior Contract Briefing

Prior contract modifications may contain provisions that waive contractor rights to future price adjustments that arise from the same facts and circumstances. Whether or not a contractor has waived its rights is a legal question; however, the auditor should provide the requestor with any meaningful observations regarding prior contract-modification waivers. Therefore, the auditor should brief prior contract modifications to determine if any such waivers exist.

### 12-605 Subcontractor Equitable Price Adjustment Submissions

The prime contractor has the responsibility to review the subcontractor submission before inclusion in the prime submission and include the results of that review in its submission.The guidance contained in 9-104 and 6-802 applies to these subcontracts.

### 12-606 Chronology of Significant Events

Prepare a chronology of significant events to highlight potential key issues (an example is shown in Figure 10-11-1c). Such a chronology enhances understanding of significant events leading up to or having a bearing on the submission. Use basic existing contract information, supplemented by any data available from the contracting officer and contractor records, as listed below:

a. date(s) of contract award and/or modifications and amounts

b. date of initial submission and amount

c. period(s) of each cited abnormal condition

d. key performance dates (deliveries or other major milestones) as planned at date of award

e. actual performance dates

f. date entitlement was determined or contracting officer decision was made

g. date certification submitted under the Contract Disputes Act or other regulatory requirement

h. dates of government and contractor actions and other key events affecting contract performance

## 12-607 Format, Content, and Distribution of Audit Report

a. Use the guidance in 10-1100 and Figures 10-11-1a, 10-11-1b, and 10-11-1c of Chapter 10 in preparing and issuing audit reports on equitable price adjustment submissions. Sufficient narrative information should be included to provide the reader with a comprehensive understanding of the basis of the contractor's submission and the audit results. Include the contractor's reaction on all factual differences and the related auditor comments.

b. Despite the need to provide a basis for settlement, qualify the report (or render an adverse opinion) whenever the contractor's supporting documentation is not sufficient to support a conclusion on the acceptability of the submitted costs and question the costs. Include a description of the documentation required to remove the report qualification.

## 12-700 Section 7—Auditing Submissions Under the Changes Clause

### 12-701 Introduction

FAR 52.243 provides the basis for price adjustments resulting from contract changes. Entitlement is a legal question; however, the auditor should provide the requestor with any meaningful observations regarding the question of entitlement.

### 12-702 Special Audit Considerations

a. Auditors should review the effort required by the contract and related modifications to determine if costs included in the submission are not already provided for under existing contract provisions. The auditor should also similarly review proposals submitted for the contract which have not yet been negotiated.

b. For construction-type contractors, there are unique types of records that need to be considered, such as job site diaries, equipment utilization and maintenance records, and project status reports.These records include important information that should help substantiate the submitted costs.

## 12-800 Section 8—Auditing Delay/Disruption Submissions

### 12-801 Introduction

a. A submission for delay/disruption is an assertion by a contractor that its costs were increased because of a government-caused delay/disruption of its contract performance.

b. Delay/disruption can cause the contractor to slow down or stop work, or perform work in an uneconomical manner. For example, some reasons for government-caused delay/disruption include late delivery of or defects in government-furnished material, equipment, or plans, or unusual conditions not known or anticipated when establishing the contract price.

c. Except as permitted under 50 U.S.C. 1431-1435 (see 12-900), the contract price adjustment caused by delay/disruption should not increase or decrease a contractor's profit or loss position that would otherwise have been experienced on the contract. Therefore, the auditor should analyze the contractor's profit position on the contract prior to the alleged abnormal condition.

### 12-802 Special Audit Considerations

Because of the unique nature of delay/disruption submissions, it is important to closely coordinate in writing with government technical personnel using Appendix D for guidance. Request technical assistance as needed to understand the nature of the alleged abnormal condition (e.g., the causes, particularly the government's participation, the duration, and the impact on work performance).

#### 12-802.1 Entitlement

The contractor has the burden of proving its entitlement to an adjustment as well as the validity of the amount submitted.Entitlement is a legal question; however, the auditor should provide the requestor with any meaningful observations regarding the question of entitlement. The auditor should be alert to any facts or circumstances that could assist the contracting officer in determining entitlement such as (1) failure to mitigate damages, (2) availability of substitute work during the delay period, or (3) indications that the contractor was aware of differing site conditions or other causes prior to the original bid submission.

#### 12-802.2 Bonding Costs

The Miller Act requires performance and payment bonds for any construction contract exceeding $25,000 (FAR 28.102-1) or when necessary to protect the government's interest. Costs of bonding required pursuant to the terms of the contract are allowable.

#### 12-802.3 Labor

Some examples of reasons for adjustments to labor costs resulting from delay/disruption includes (1) changes in labor rates because scheduled work was performed in another period or by different personnel than proposed, (2) changes in the number of hours required for maintenance or standby labor and/or changes in efficiency or learning, and (3) changes in required hours because of slow down or stoppage of work or work performed in an uneconomical manner. Changes in rates can normally be verified to the contractor's payroll records. The auditor should consider the use of improvement curve analysis to evaluate proposed adjustments in labor costs. Technical assistance may be particularly helpful in this area.

#### 12-802.4 Indirect Costs

Indirect costs applicable to direct costs incurred as a result of the delay are allowable when computed in accordance with the contractor's established accounting practices. The indirect cost rates applicable to the delay/disruption submission should be computed exclusive of any indirect costs that were submitted as direct costs.In addition, for purposes of determining overhead rates for flexibly priced contracts, the applicable indirect cost pool should be reduced for those expenses normally charged as indirect costs but charged as direct costs under this delay/disruption submission.Failure

to make these adjustments will result in a duplicate recovery of costs.

### 12-802.5 Costs of Preparing the Submission

Cost incurred to prepare a claim against the government are unallowable (see FAR 31.205-47(f)). However, prior to being converted to a claim, the costs incurred to prepare a request for an equitable adjustment (see 12-502) are allowable.

### 12-802.6 Profit

Profit is specifically excluded under the provisions of FAR 52.212-12 and 15. Profit is not specifically excluded for requests submitted under FAR 52.212-13, 52.212-14, FAR 52.243, or FAR 52.236-2.

## 12-803 Auditing Unabsorbed Overhead

a. Inclusion of unabsorbed overhead in a delay/disruption submission represents a request to recoup increased overhead costs allocated to other work because of the work stoppage on the delayed contract. The term is actually a misnomer because all overhead costs are allocated to, and absorbed by, contracts in process. What the term actually means is the reallocation of overhead costs among contracts because of the delay.The delay results in a contract(s) being allocated too little in overhead costs (these contracts underabsorb) while other contract(s) are allocated too much overhead costs (these contracts overabsorb). To be recoverable as part of an equitable price adjustment, there must have been an inequitable allocation of indirect costs resulting from the delay.

b. In order to recover costs, the contractor must show that it necessarily suffered actual damage because the nature of the delay made it impractical to undertake the performance of other work. A contractor would initially meet this requirement by demonstrating that the delay was sudden and of an unpredictable duration. However, a contractor faced with a suspension of work has the duty to mitigate damages as soon as practically possible. A contractor is expected to shift its work force to other work or to other contracts if the transfer can be accomplished in a practicable manner.Thus, it is important for the auditor to provide the contracting officer with all available data regarding any lack of contractor effort to mitigate damages.

c. Unabsorbed overhead costs recovered under a delay/disruption submission should be removed from the pool used to determine overhead rates for flexibly priced contracts. If unabsorbed overhead is significant, the auditor should not render closeout reports on contracts for periods in which an equitable adjustment submission is pending. After the submission is settled, the amounts collected for unabsorbed overhead should be subtracted from the expense pool(s) to preclude duplicate recovery.

## 12-804 Eichleay Method

a. The question of the proper method to measure unabsorbed overhead has been addressed in numerous board and court cases. The Boards of Contract Appeals (excluding the ASBCA) and courts have generally ruled that the Eichleay method is the acceptable method for computing unabsorbed overhead resulting from government-caused delay. The ASBCA has ruled that the basic Eichleay applies only to construction contracts, but has accepted modified versions of the Eichleay for supply and service contracts.

b. If the basic Eichleay method or a modified version thereof produce inequitable results, the auditor should make every attempt to adjust the method to fit the given situation. However, in some cases, the circumstances are such that no matter what adjustments are made to the Eichleay method it will not produce equitable results. If the use of the Eichleay method is not appropriate, it is important that the auditor demonstrate why the method should be adjusted or why an alternative method clearly yields a more reasonable result. If another method is proposed, the auditor should still provide information in the report to properly apply the Eichleay method, including any necessary adjustments, in the event its use is sustained.

c. The basic Eichleay method was originally developed to allocate home office expenses on construction contracts, when there is an assumption that almost all overhead is fixed rather than variable. Under the basic Eichleay method, the normal fixed overhead allocable to a contract is identified and expressed in terms of a daily rate. The daily rate is then multiplied by the days of delay to arrive at the total amount of unabsorbed overhead. The formula is as follows:

Fixed overhead allocable to contract =

$$\frac{\text{Contract billings}}{\text{Total billings for contract period}} \times \text{Total fixed overhead for contract period}$$

Daily contract fixed overhead rate =

$$\frac{\text{Fixed overhead allocable to contract}}{\text{Days of performance}}$$

Unabsorbed overhead =

Daily contract fixed overhead rate X Number of delay days

## 12-805 Adjustments to the Eichleay Method

a. The Eichleay method includes the following key assumptions: (1) the overhead costs include only fixed costs, (2) the suspended work cannot be replaced by other work, (3) there is a total work stoppage, (4) the cost of the delay is the same regardless of the percentage of contract completion (the method will produce the same result if the contract is 1 percent complete or 99 percent complete), and (5) the plant is operating at or near production capacity.

b. Fixed costs should be used under the Eichleay method rather than total costs, since variable costs, by definition, vary with the amount of work performed. Therefore, it is important that the overhead be thoroughly analyzed to remove all variable cost items. Variable costs are those operating expenses that vary directly, sometimes proportionately with production volume, facility utilization, or other measure of activity. Examples are materials consumed, power, small-tools expense, factory supplies, and fringe benefits. The price adjustment should cover only fixed overhead, since the variable overhead costs were not incurred during the delay period and for that reason are not part of an equitable adjustment.

c. When a contractor is able to completely replace the suspended work with other work, no unabsorbed overhead would exist, because the replaced work would absorb the overhead instead. While unabsorbed overhead will still exist when only part of the suspended work is replaced by other work, the amount of unabsorbed overhead computed under Eichleay will still be excessive. In these cases, the Eichleay method must be adjusted by reducing the number of delay days to reflect the percentage of work replaced. For example, assume that there is a 40-day delay period, and that 75 percent of the work is not replaced while 25 percent is replaced. Using the basic Eichleay method, the number of delay days would be 40. However, adjusting for the fact that there has been a partial work replacement, the number of delay days would be 30 (75 percent x 40 days) rather than 40.

d. The Eichleay method assumes a total work stoppage. It does not take into account the extent of the delay (i.e., total versus partial work stoppage). Unabsorbed overhead for total work stoppage will be greater than for partial work stoppage. In cases of a partial work stoppage the number of days should be adjusted. For example, assume that there is a 30-day delay with a 50 percent work stoppage. Using the basic Eichleay method, the number of delay days would be 30. However, adjusting for the fact that there is a partial work stoppage, the delay days would be 15 (50 percent x 30 days) rather than 30.

e. The assumption that the plant is operating at or near anticipated production should be carefully reviewed before accepting the Eichleay method. For example, assume that a contractor who had already begun work on a government contract completes a large commercial contract and bids on, but fails to get, a replacement contract. The government

contract is then delayed. Because the contractor failed to get a replacement contract for its commercial project, the government's share of the contractor's total billings for the period of contract performance is increased, possibly by a substantial amount. Because the Eichleay method computes unabsorbed overhead as a percentage of total billings, the contractor's recovery from the government is also increased. In such cases, the total billings should be adjusted to reflect the billings that would have existed had the contractor received the commercial replacement contract.

## 12.806 Other Considerations

a. Prior court decisions may make Boards of Contract Appeals and courts reluctant to find the Eichleay method improper for the calculation of unabsorbed overhead. However, this should not be interpreted as an unqualified endorsement of this method. A BCA or court, recognizing that one of the assumptions of the Eichleay method may cause an inequitable result, may adjust the computation of the Eichleay method or find the Eichleay method to be inappropriate.

b. The closer a contract is to completion, the more possible it is for the Eichleay method to yield an inequitable result. One alternative is to apply the Allegheny method discussed in 12-806.1, provided that the two assumptions that underlie this method are valid. Additional solutions may be presented by the auditor based upon the facts and circumstances of each case. The key is to show that the Eichleay method results in an inequitable solution and that the alternative method yields a reasonable result.

c. The Eichleay method is inappropriate where it clearly produces excessive results, which will usually happen when one of the assumptions underlying the method is invalid. Excessiveness may be demonstrated by comparison of Eichleay to other methods, or by comparing the basic Eichleay to an appropriately modified Eichleay method. The key is to show that the basic Eichleay method y elds inequitable results and to present a reasonable alternative.

## 12-807 Alternative Methods to Eichleay

If it is determined that the basic Eichleay method or a modification thereof will not yield an equitable result, the auditor could consider an alternative method to support the government position. Any recommendation to use another method should include an explanation of why the alternative method is equitable and why the contractor's method is not.

### 12-807.1 Allegheny Method

a. The Allegheny method visualizes the impact of a delay as a time line. It involves a shifting of the delayed effort from right to left on the time line to "recreate" what would have happened had the delay not occurred. The difference between the recreated overhead rate and the rate actually experienced demonstrates the effect of overhead expense on contract performance caused by the government delay.

b. One advantage of the Allegheny method is that, by considering the entire period of contract performance, the method includes the effect of out-of-period performance on contract cost. Another advantage is that it does not require a determination of the "delay period" in terms of the number of days.

c. The Allegheny method is only appropriate for use in situations where (1) the contractor has the capacity to perform the delayed work simultaneously with other scheduled work, and (2) the contractor did not turn down other work that would have been performed (and would have absorbed fixed overhead) during the period of extended contract performance. The auditor and technical specialists should review all available evidence to determine the validity of these assumptions. These assumptions must be valid for the Allegheny method to provide an equitable result.

### 12-807.2 Simulation Method

a. The simulation method divides contract billings by the actual days worked to determine average contract billings per day worked. The daily average is then

multiplied by the number of days of delay to simulate the work that would have been performed had the delay not occurred. This amount is added to both contract billings and total billings, and the resulting ratio is used to allocate total overhead to the contract. The total amount so allocated, less the amount allocated to actual work performed, yields the cost of the delay/disruption.

b. This method is a variation on the Eichleay method. As such, each of the assumptions underlying the Eichleay method also underlie this method.These assumptions must be valid for the simulation method to yield an equitable result.

**12-807.3 Burden Fluctuation Method**

a. Under the burden fluctuation method the difference between the experienced burden rates and the burden rates used by the contractor in its bid proposal is determined and this difference is multiplied by the value of "residual" labor costs. The "residual" labor costs represent the difference between the incurred total direct labor dollars and the labor dollars incurred on the contract. The result is designated as "unabsorbed overhead."

b. This method does not consider that the contractor's bid may have been understated, or that the increase in burden rates may be owing to other factors that are under the contractor's control and are not related to any government caused delay/disruption. Therefore, the auditor should evaluate the reasonableness of the initial bid rates by reference to the initial proposal, audit reports, prior experience, and budgetary data in determining the appropriateness of this method.

**12-807.4 Total Cost**

a. Under the total cost method, a price adjustment would represent the difference between the total cost upon which the contract price was based and the costs actually incurred in contract performance. This method does not consider that the bid may have been too low or that the additional costs may have been for reasons which are the responsibility of the contractor.To consider this method, the contractor would have to prove that (1) the nature of the delay/disruption makes it impossible or highly impracticable to directly determine actual delay costs with a reasonable degree of accuracy, (2) the bid was realistic, (3) the actual incurred costs were reasonable, and (4) the government was responsible for the differences between bid and incurred costs.

b. "Total Cost" awards are seldom made by the BCAs. In the rare cases where this method must be used, the auditor should, as a minimum, attempt to determine whether the original bid amounts were reasonable, the costs were actually incurred, and the differences in costs were not caused by unrelated actions on the part of the contractor.

## 12-900 Section 9—Claims for Extraordinary Relief

This section discusses claims seeking extraordinary relief under 50 U.S.C. 1431-1435 (Public Law 85-804, as amended).

a. The provisions of 50 U.S.C. 1431-1435 give the President power to authorize government departments and agencies to enter into, amend, or modify contracts, without regard to other laws related to making, performing, amending, or modifying contracts, whenever such action would facilitate the national defense.

b. Executive Order 10789, 14 November 1958, authorizes government departments and agencies to exercise the contracting authority given by 50 U.S.C. 1431-1435.

c. FAR Part 50 sets forth the policies and procedures for contract adjustments under 50 U.S.C. 1431-1435.

d. Examples of contract adjustments previously made under 50 U.S.C. 1431-1435 include:

(1) When loss under a contract impairs the contractor's ability to perform or act as a source of supply under a contract that is essential to the national defense, there may be an amendment without consideration.

(2) Amendment or modification to correct or mitigate a mistake.

(3) Amendment to formalize informal commitments to a person who took action without a formal contract.

e. In addition to the specific cost information required for individual submissions, consider the following for use in the audit and/or report, particularly for claims brought under 50 U.S.C. 1431-1435:

(1) The contractor's financial position based on the most current information available, and the potential effect on that position if contract performance continued to completion.

(2) Net working capital changes and changes in financial position since starting the contract.

(3) A comparative statement of costs experienced under the contract and other similar production.

(4) The estimated costs to complete the contract.

(5) The compensation paid to the contractor's key personnel.

(6) The extent of financial assistance furnished by the government (such as V-loans, advances, progress payments, and facilities).

(7) Segregation of the profit-and-loss statement between commercial and government business.

(8) Any legal proceedings pending against the contractor.

(9) Any unusual factors which may impair the contractor's ability (financial or other) to perform the contract.

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# CHAPTER 13

## 13-000 Contract Audits at Educational and Nonprofit Institutions

### 13-001 Scope of Chapter

This chapter presents audit guidance for auditing projected and incurred costs at educational and nonprofit institutions. Sections 1 through 7 provides an overview of the Office of Management and Budget (OMB) Circular No. A-133, "Audits of Institutions of Higher Education and Other Nonprofit Institutions." Section 8 introduces OMB Circular A-122, "Cost Principles for Nonprofit Organizations." Chapter Supplement 13-S1 contains the complete text of OMB Circular A-21, "Principles for Determining Costs Applicable to Grants, Contracts, and Other Agreements with Educational Institutions."

## 13-100 Section 1 — Federal Audit Agency Cognizance at Educational Institutions

### 13-101 Introduction

a. This section describes how audit cognizance for each educational institution is assigned to a single Federal department or agency. It identifies the institutions for which DoD is the cognizant department for contract audit purposes, and the DCAA region responsible for contract audit at those institutions.

b. This section also explains the effect of the Single Audit Act of 1984 on audit responsibilities and audit cognizance.

### 13-102 OMB Circular A-88 on Cognizance Assignments

a. The Office of Management and Budget (OMB), in the Executive Office of the President, controls interagency arrangements for assignment of contract audit and negotiation cognizance at educational institutions.

b. OMB Circular A-88 contains the following guidelines for audit cognizance: "The cognizant agency will do all the necessary Federal auditing at a single institution. Agencies that have special considerations affecting their sponsored agreements will inform the cognizant agency so that appropriate attention may be given to them in developing the audit program. Results of the audit will be furnished by the cognizant agency to the other organizations concerned."

c. Educational institutions assigned to DCAA as the cognizant audit agency under OMB Circular A-88 are listed by DCAA region in Table 13-1-1.

TABLE 13-1-1(Ref. 13-102)

EDUCATIONAL INSTITUTIONS ASSIGNED TO DCAA AUDIT COGNIZANCE
by OMB Circular A-88

DCAA CENTRAL REGION
College of Lake County
Colorado School of Mines
New Mexico Institute of Mining and Technology
New Mexico State University
University of Denver
University of Illinois-Chicago
University of Illinois-Urbana
University of New Mexico

DCAA EASTERN REGION
College of William and Mary
Southeastern Ctr. for Electrical Engineering Education
Georgia Institute of Technology
University of Dayton
University of Notre Dame
Virginia Institute of Marine Sciences
Virginia Military Institute
Wright State University

DCAA MID-ATLANTIC REGION
Carnegie-Mellon University
Cornell University-Main
Smithsonian Institution (Astrophysical Observatory)
Smithsonian Institution
Pennsylvania State University
Stevens Institute of Technology

DCAA NORTHEASTERN REGION
Brown University
Columbia University
Cornell University-Medical
Emmanuel College
Massachusetts Institute of Technology
Polytechnic Institute of New York
Regis College
Syracuse University
University of Rhode Island
University of Rochester
Wentworth Institute of Technology

DCAA WESTERN REGION
California Institute of Technology
Stanford University
University of Alaska
University of Hawaii

## 13-103 OMB Circular A-128 on the Single Audit Act of 1984

a. OMB Circular A-128, "Audits of State and Local Governments," implements P.L. 98-502, the Single Audit Act of 1984. The Act provides that an independent state or local government auditor or public accountant may perform an audit in accordance with Circular A-128 that covers the entire operations of the state or local government. However, that government has the option to exclude public colleges and universities from the audit. Should a state elect not to include the college or university as part of its statewide audit conducted under Circular A-128, then Circulars A-133 or A-110 will govern the audit requirements. OMB Circular A-133, "Audits of Institutions of Higher Education and Other Nonprofit Institutions," applies to audits of entities for fiscal years that begin on or after 1 January 1990. The OMB Circular A-110, "Uniform Administrative Requirements for Grants and Other Agreements with Institutions of Higher Education, Hospitals, and Other Nonprofit Organizations," applies to audits of fiscal years until A-133 is implemented. (see 13-203 and 13-205).

b. The Single Audit Act provides that an audit made in accordance with Circular A-128 shall be in lieu of any financial or financial compliance audit required under Federal assistance programs. Circular A-128 also states that: "To the extent that a single audit provides Federal agencies with information and assurances they need to carry out their overall responsibilities, they shall rely upon and use such information. However, a Federal agency shall make any additional audits which are necessary to carry out its responsibilities under Federal law and regulations. Any additional audit effort shall be planned and carried out in such a way as to avoid duplication." Guidance in 4-202 b. and c. and 4-1000 on accepting the work of a contractor's internal auditors and external auditors is applicable to acceptance of work performed by independent auditors at public colleges and universities.

c. DCAA auditors with cognizance of educational institutions would continue to be involved in activities such as processing public vouchers and proposal evaluations. Typically this would require the auditor's continued involvement in setting forth applicable indirect expense rates necessary to satisfy contractual agreements.

## 13-200 Section 2 — Contract Regulations Applicable to Educational Institutions

### 13-201 Introduction

a. This section introduces the principal provisions of Office of Management and Budget (OMB) Circulars and other regulations which are most often incorporated into contracts and other agreements with educational institutions as criteria for financial management and cost determinations.

b. It also recapitulates some of the arrangements involved in auditing non-DoD programs at educational institutions where DCAA is cognizant.

### 13-202 OMB Circular A-21

This circular contains principles to be implemented by each government agency in determining the costs of grants and contracts awarded to educational institutions for research and development or education services. These principles have been implemented in FAR Subpart 31.3, which is, in turn, incorporated by reference as a governing provision of each applicable DoD contract and grant. Contracts and grants awarded by non-DoD agencies generally incorporate this circular as implemented in FAR Subpart 31.3, or, on occasion, in the form prescribed by implementing instructions of the agency making the award. In DCAA reviews of non-DoD contracts and grants, the cost principles provided for in the agreement should be cited as an authoritative regulation in audit report comments or correspondence.

### 13-203 OMB Circular A-110

a. This circular, among other pertinent financial management requirements, contains guidelines for the administration of cost sharing by educational institutions when (1) cost sharing is required by statute, or (2) the organization should be requested to participate in the cost of research even though cost sharing is not required by statute (the circular also contains guidelines on the amount of participation which should be requested in this situation).

b. Although applicable to research agreements, agencies may also apply the circular's guidelines to DoD development projects (projects for which the principal purpose is the production, design, testing, or improvement of, products, materials, devices, systems, or methods). (See FAR 35.003.)

### 13-204 OMB Circular A-128

This Circular contains guidelines for performance of audits of public universities and colleges when they are included in the single audit of a state or local government. When such entities are excluded by that government in its single audit, the requirements in Circulars A-133 or A-110 will apply to the audit of the college or university (see 13-103).

### 13-205 OMB Circular A-133

a. This Circular establishes audit requirements for institutions of higher education and other nonprofit institutions that receive Federal awards. A Circular A-133 audit is an entity-wide audit and not an award by award review.

b. Circular A-133 issued by OMB in March 1990, supersedes the audit requirements in Attachment F, Subparagraph 2h of OMB Circular A-110. The provisions of A-133 are effective for audits of fiscal years beginning on or after 1 January 1990. However, earlier implementation is encouraged. Auditors should contact the institution or the cognizant contract administration office to determine the implementation date. Institutions of higher education audited under OMB Circular A-128 are exempted (See 13-203, 13-204, and 13-307.2).

c. The OMB "Compliance Supplement for Audits of Institutions of Higher Learning and Other Nonprofit Institutions," sets forth the compliance requirements the auditor uses in determining whether or not the organization has complied with laws and regulations that have a direct and material effect on any of its major programs. The compliance supplement is to be used when an organization-wide audit is conducted in accordance with Circular A-133.

## 13-206 Cost Accounting Standards

Educational institutions subject to OMB Circular A-21 are exempt from the rules and regulations of the Cost Accounting Standards Board (CAS 331.30(b)). The exemption does not apply with respect to any costs incurred within a Federally Funded Research and Development Center (FFRDC) even if the center is operated by an educational institution.

## 13-207 Federal and DoD Regulations

a. FAR Subpart 31.3 applies the cost principles contained in OMB Circular A-21 to the determination of costs of research and development, training and other sponsored work performed by educational institutions.

b. DFARS 231.3 makes certain statutorily prohibited costs unallowable for contracts with educational institutions. The revision is limited to DoD contracts entered into after 15 November 1990. Awards such as grants, cooperative agreements, and loans are excluded from coverage. These revisions are intended to supplement the OMB Circular A-21 until OMB has updated the Circular.

c. DoD Directive 7600.10 establishes audit requirements for state and local governments, institutions of higher education, and other nonprofit institutions that receive Federal financial assistance. The Directive implements the Single Audit Act of 1984 (see 13-103), OMB Circular A-128 (see 13-204), and OMB Circular A-133 (see 13-205).

d. FAR Part 35/DFARS Part 235 contain information and procurement procedures of special application to Federal and DoD research and development contracts. FAR 35.003(b) implements the provisions of OMB Circular A-110 on cost sharing for both profit and nonprofit DoD contractors. DFARS 235.015-70 provides guidance on special use allowances for research facilities acquired by educational institutions which constitute an exception under limited and rare circumstances to FAR 31.311-10. FAR 35.014 provide for the transfer of title to equipment to nonprofit educational or research organizations. Title to equipment purchased with scientific research funds shall be vested in the contractor (or DoD grantee organization per DoD Directive 3210.2) in accordance with the guidelines contained in FAR 35.014. The regulations allow the contractor to automatically acquire and retain title to equipment costing less than $5,000 (or a lesser amount established by agency regulation) when the contractor has the advance approval of the contracting officer. When title to equipment is vested to it, the contractor must agree, as a condition to taking title, that no charge will be made to the government for any depreciation, amortization, or use charge with respect to such equipment under any existing or future government grant or contract. FAR Subpart 45.5/DFARS Subpart 245.5 provides guidance, related to OMB Circular A-110, for handling of property to which the Federal government will retain title.

e. DoD Directive 3210.2 establishes for DoD the criteria and requirements necessary in (1) making grants for the support of scientific research, and (2) vesting title under grants to equipment purchased with research funds. The directive also implements the provisions of OMB Circular A-110 on cost sharing.

f. DFARS 242.770 requires DoD contractors to certify proposals for billing rates or final indirect cost rates. However, for educational institutions subject to OMB Circular A-21, this requirement may be waived by the Secretary of Defense or the Secretary of the Military Department concerned.

g. DFARS 242.705-3 was changed in October 1994 to allow for the use of multi-year predetermined indirect cost rates for DoD contracts with educational institutions. The multi-year rate can be used for a period of two to four years. See CAM 13-604.b for additional guidance on advising the contracting officer regarding the suitability of an institution for multi-year predetermined fixed rates.

## 13-208 Arrangements for DCAA Audits of Non-DoD Programs at Educational Institutions

a. Policies relating to audit services rendered to non-Defense agencies at locations other than educational institutions are set forth in 1-300. Under the requirements of OMB Circular A-88 described in 13-102, DCAA auditors with cogni-

zance of educational institutions may be faced with numerous auditable agreements from a number of different Federal agencies including Department of Agriculture Research Station and Extension Service programs, Department of Health and Human Services (DHHS) Workstudy, Defense Student Loan, Construction Grant, Educational Opportunity Grant, and National Science Foundation Grant programs. The audit procedures followed at the institutions will include an identification of the agreements subject to audit and a review of contract terms, grant brochures and other directives available from the institution in order to develop a suitable audit program.

b. For audits of institutions of higher education, and other nonprofit institutions, DCAA is to furnish the DoD Inspector General Office, photocopies of requests from other Federal Agencies for audits in addition to those required by OMB Circulars A-128 (see 13-204) and A-133 (see 13-205).

c. DCAA has arranged for distribution of some audit instructions and guidelines issued by non-DoD agencies to be made directly to regional and audit offices, without advance coordination. These are provided for informational and planning purposes and should not be regarded as directive, particularly if they contradict DCAA authorized guidance. Administrative procedures of non-DoD agencies for the processing of public vouchers are summarized in 6-1000. These should be followed on cost reimbursable contracts with educational institutions.

d. DHHS will furnish DCAA audit offices cognizant of educational institutions having DHHS grants the following information:

(1) Copies of grantors' manuals and policy statements applicable to the various research and training grants.

(2) DHHS Guidelines for Audits of Federal Awards to Educational Institutions which have been issued covering audits of universities and nonprofit organizations performed by DHHS auditors. These are for informational purposes.

(3) Any other information deemed pertinent to audits being conducted by DCAA auditors on behalf of DHHS, such as previous audit reports, working papers, copies of correspondence, and either copies of the individual grant awards or monthly listings thereof.

e. On occasion, DHHS auditors may visit the audit site to discuss any problem matters with the DCAA auditor-in-charge relative to DHHS grants and to assist in resolving any policy matters. The DHHS regional auditor will advise the DCAA regional director of all such forthcoming visits.

f. Close coordination should exist between the DCAA regional director and the DHHS regional auditor. The DCAA regional director should contact the DHHS counterpart for purposes of obtaining any information or clarification concerning provisions of grantors' manuals and policy statements which would be of assistance in performing the audit.

g. General audit guidance and special reporting requirements for contracts awarded by the Agency for International Development (AID) are set forth in 13-300 and 13-700. Although primarily applicable to contracts awarded to educational institutions, these procedures are also substantially applicable to contracts awarded to other nonprofit and commercial contractors. Area Auditor General (AAG) Offices of AID located in the various regions of the world are responsible for auditing AID contractors' activities in the host country as well as special examinations at the request of the Office of Audit (AG/AUD), AID/Washington (AID/W). Reports prepared by the AAG Office staff may contain recommendations for action to be taken by AID contractors at their home office or main campus locations or for follow-up audit information to be obtained from these same locations which would permit AG/AUD to evaluate their programs on an overall basis. Arrangements have therefore been made for the DCAA auditor cognizant of the contractor's home office or main campus location to be furnished a copy of each AAG audit report so that necessary follow-up audit action can be accomplished when and as required. Conversely, DCAA auditors may require assist audit information from an AAG Office regarding the contractor's activities in host countries. Submit such assist requests to the Office of Audit (AG/AUD), Washington, DC 20523.

# 13-300 Section 3 — General Concepts for Audit of Costs at Educational Institutions

## 13-301 Introduction

This section presents general concepts in the audit of costs and the evaluation of related managerial policies, procedures, and practices at universities which influence and control the level of costs.

## 13-302 Audit Objective

The audit objective in the DCAA review of an educational institution is to ascertain that costs included in claims and financial reports under government agreements are reasonable, fairly presented, appropriately charged or allocated, and determined in accordance with the terms of the agreements and applicable regulations.

## 13-303 Educational Institution Accounting Systems

a. A major difference between the accounting systems of industrial organizations and educational institutions is the emphasis in the latter on fund accountability and on maintenance of identity of restricted vs. general operating funds. Nevertheless, the auditor should expect to find modern accounting techniques and management practices being used by institutions in keeping with their responsibilities for recording the costs of individual government grants and contracts.

b. Institutional balance sheets are normally set up by basic fund groups. Income statements reflect sources of income, such as tuition, gifts, investments, sponsored research, dining, student housing, etc. Expense statements show costs of operations generally segregated by academic departments, general and administrative, plant operations, auxiliary services, and organized research. The latter grouping does not include unsponsored, non-budgeted departmental research activities. These are not separately accounted for and are treated as part of departmental instructional activities.

c. In addition to the general standards for selected items of cost in OMB Circular A-21, some agreements specify which types of expenditures may be treated as direct costs or establish limitations on the allowable amount of certain direct cost items. The institutions are responsible for the proper preparation of claims under contracts and reports of expenditures required under grants. Accounting systems and related administrative practices and controls must be adequate so that the institution recognizes and complies with the provisions on its various government agreements.

d. The institution's accounting system must also be adequate to meet the requirement for documentation of the institution's contributions under cost-sharing provisions of grants.

## 13-304 Audit Planning Data

a. To plan the audit adequately, the auditor should:

(1) Become acquainted with the total volume of auditable agreements, the magnitude and type of various sponsored programs, and the extent to which various schools, departments, or other cost centers of the institution are involved.

(2) Solicit a list of the institution's open agreements indicating the type of contract or grant, the amount, and the awarding agency.

(3) Arrange for the grantee to furnish, for each fiscal year, a statement of fund transactions, a summary statement of costs incurred on grants by cost element or category as reflected in the grantee's records, and a listing of grants in effect during the fiscal year.

b. Where a listing of contracts and grants would be voluminous or unduly time consuming for the institution to extract from its records, a summary would be sufficient. If the institution does not agree to furnish the foregoing, the auditor should prepare the data from the institution's records if this can be done with a minimum of audit effort. Otherwise, in the case of grants, the

auditor should promptly notify the cognizant regional auditor to take appropriate action through DHHS channels to obtain the required information.

c. Under AID contracts, if the contractor does not furnish the data, and more than minimum effort is required to obtain it from the records, the auditor should promptly notify the Office of Audit (AG/AUD), Washington, DC 20523, to take appropriate action through AID channels to obtain the required information. In this instance, the auditor will not attempt to perform the audit until the information is obtained from the contractor.

d. As a minimum, the auditor should obtain some approximate estimate of the foregoing information for planning an all-inclusive audit scope and for measuring materiality and to satisfy certain reporting requirements as discussed in 13-700. The auditor would also use this information to ascertain the extent to which audit conclusions reached on the adequacy of internal controls, reliability of the accounting system, etc., can be applied to the various areas of performance; for example, whether previous audit opinions concerning an institution's centralized procurement system are applicable to a laboratory with autonomous responsibility for purchasing extensive specialized research materials or equipment, or whether additional audit steps should be provided in the program.

## 13-305 Observation of Performance Areas

### 13-305.1 Areas of Research Performance

a. The auditor should visit the major areas of research performance accompanied by a technical representative of the educational institution and a representative from the government technical office. By observation and inquiry the auditor should acquire an understanding of the types of research performed and the schools involved, with the view of establishing the relative percentages of space and facility utilization as between instruction (including departmental research) and organized research. Space utilization applicable to other institutional activities is usually readily determinable.

b. The knowledge so acquired will be a factor in the auditor's later review of the reliability of the organized research and instructional space utilization data used by the institution to support the allocation of (1) use charges and (2) plant operation and maintenance costs. Where a previously prepared schedule of space utilization is available, the reasonableness of the institution's determinations may be tested during the auditor's physical inspection of the research facilities.

c. The auditor's visit should be scheduled or repeated so that the observation takes place when representative activities are in process. For example, do not visit the research facility for this purpose during the summer vacation period, if the level of research activity is not typical of the normal academic period.

### 13-305.2 Areas of Nonresearch Performance

a. Similar observations should be made at institutional locations where a significant amount of work under nonresearch agreements is being performed.

b. Many on-campus costs will not apply to government agreements performed off-campus. This may also be true in the case of agreements performed in certain on-campus or near-campus laboratories or research areas which are practically autonomous in that their research activities are not supervised by deans or instructional department heads, and they maintain their own administrative, purchasing, personnel, and accounting staffs.

## 13-306 Treatment of Costs Applicable to Instruction

It is implicit throughout the OMB Circular A-21 cost principles dealing with identification, apportionment and allocation of costs that instructional costs, including departmental research, are to be differentiated from the costs of sponsored, organized research. The auditor should treat instructional costs as not allowable under research agreements, except as they may be specifically provided for by the terms of a research agreement.

## 13-307 Audit Approach

### 13-307.1 General Audit Approach

a. DCAA audits at educational institutions should be performed on a comprehensive basis in the depth and scope required by the materiality of the total group of auditable government agreements. At many larger institutions, considerable audit complexity may arise from diversity in the services procured or activities sponsored through the government agreements and differences in the types and provisions of the agreements themselves. Even in such circumstances, the best application of audit resources would normally be (1) the evaluation of the reliability of the centralized administrative and financial controls, including the accounting system, which affect the incurrence and recording of costs, and (2) the testing of selected transactions.

b. As an example, various agreements may have different provisions requiring prior approval by the awarding agency before the institution makes designated types of expenditures, or they may set other limitations on certain transactions. It is not desirable for the audit program to include an exhaustive review of research grants to determine what special provisions exist. Instead, the focus should be on the adequacy of the institution's own procedures and controls for ascertaining its obligations under any special provisions in the agreements and for assuring compliance. This may be an appropriate auditable area for purposes of audit planning (as discussed in H-300).

c. The foregoing example is not intended to preclude the briefing of contracts (3-200) or any other agreements where specific individual attention is required in other parts of this manual.

### 13-307.2 Coordinated Audit Approach

a. Under OMB Circular A-133, audits are to be made by independent auditors in accordance with Government Auditing Standards. Independent auditors include DCAA and other Federal auditors, local, State, the recipient's internal auditors and other independent auditors. The circular contains a provision for participating in a coordinated audit approach, whereby each independent auditor would rely upon the work of the others. By participating in coordinated audits, and relying upon the work of others, DCAA should be able to perform it's work more efficiently.

b. A coordinated audit is where the independent auditor and the other Federal and non-Federal auditors consider each other's work in determining the nature, timing, and extent of their audit procedures. The objective of the coordinated audit is to minimize duplication of audit effort, but not to limit audit scope.

c. Field Audit Offices are encouraged to participate in coordinated audits. Audits under A-133 are normally to be completed and reports submitted no later than 13 months after the end of the institutions fiscal year. Therefore, for an FAO to participate in coordinated audits, the FAO work at an institution should be reasonably current. Participation in a coordinated audit approach requires ongoing audit planning and progress conferences to ensure that the individual audit plans will result in effective audits with minimal duplication. The FAO should seek the views of other interested Federal agencies when a coordinated audit approach is to be used. The implementation of this audit approach will generally proceed along the following line:

(1) A coordination meeting is held with the cognizant agency, university representative, and audit entities in attendance. At this meeting the audit entities will identify and compare their individual audit requirements and identify areas of duplication. Out of this meeting will come an audit planning matrix identifying the audits to be performed by audit entity, or entities, required audit coverage and estimated report dates. Duplicate audit effort will be eliminated to the maximum extent feasible.

(2) Following the development and acceptance of the matrix, the audits will be performed by the respective audit entities.

(3) Auditors will make arrangements to obtain access to audit programs and working papers for the work being relied upon. Each of the reports will address only the segment of audit it covers. At the end of the audit assignment the report is issued to the cognizant agency.

d. Whether or not an FAO participates in a coordinated audit, audit planning and execution should consider the extent to which reliance can be placed on the work performed by the institution's other independent auditors. (See CAM 4-1000 for guidance when relying upon the work of others).

e. An audit made in accordance with Circular A-133 is to be in lieu of any financial audit required under individual Federal awards. Accordingly, to the extent that an A-133 audit provides an FAO with the information and assurances needed to carry out its overall responsibilities, the FAO is to rely upon and use such information. FAOs can make additional audits if needed to carry out their responsibilities under Federal law and regulation. Such additional audits, however, must be planned and executed so that they build upon the work already performed under the A-133 audit.

f. With regard to the specific requirements contained in the OMB Circular A-133 Compliance Supplement, DCAA generally covers the specific requirements of the Davis-Bacon Act as a part of the audit of direct and indirect labor costs and the verification of the appropriate labor rates from the Act. DCAA also reviews political activity as part of the audit of compliance with the Lobby cost principles in A-21 J.24 and FAR 31.205-22. DCAA does not perform compliance work relating to Civil Rights or the Drug-Free Workplace Act. These items should be discussed during the audit coordination meeting and covered by the institution's external auditors.

g. The circular does not limit the authority of DCAA from making audits and evaluations of Federal awards, nor does it authorize any institution or subrecipient thereof to constrain DCAA, in any manner, from carrying out additional audits or evaluations.

## 13-308 Basic Audit Procedures

### 13-308.1 Use of Permanent Files

As a preliminary step in performing the audit, review the information contained in the permanent file (see 4-405). Update this information as necessary on the basis of the current review and evaluation of the accounting and financial procedures for recording and reporting costs and activities relating to agreements.

### 13-308.2 Comparison of Agreement Provisions with Institution Policies

a. To determine whether the institution's system provides for the proper recording of costs, the auditor should review the agreements in effect and related policy statements and policy manuals of the activity awarding the agreement. These policies, in most instances, specify that direct costs will be allowed in accordance with the principles contained in OMB Circular A-21 (see 13-S1). However, there may be some exceptions and, in addition, institutions may incur costs which are not specifically covered by those provisions. Where the costs are not specifically covered in the circular or in the manuals of the awarding activity, the auditor should determine their allowability to the agreements being performed on the basis of the general principles included in the circular.

b. While changes in an approved budget applicable to an agreement generally require prior approval, the awarding activities' policy manual generally affords the institution some latitude in rebudgeting expense items.

### 13-308.3 Review of Cost Sharing and Matching Compliance

a. Direct audit effort in connection with cost-sharing provisions of research agreements should be directed toward determining whether the institution's procedures provide for the identification and proper accountability of its cost-sharing obligations under each agreement and that controls are established to assure that the institution contributes its share of the costs of performance of the agreement (OMB Circular A-110). Test the effectiveness of the accounting and internal controls established with respect to cost-sharing by examining expenditures under selected grants.

b. The auditor should ascertain that the costs applicable to the grantee's contribution are not charged directly or indirectly to other government agreements. Costs which are not allowable under cost principles applicable to the agreement may

not be included in the institution's cost contribution (FAR 35.003(b), DoDI 3210.2, and OMB Circular A-110).

### 13-308.4 Use of Statistical Sampling

Statistical sampling techniques are particularly useful under the comprehensive approach. All agreements affected by the particular auditable area under review should generally be considered as a single universe for the purposes of sampling, whether contract or grant, DoD or non-DoD. For developing appropriate audit recommendations and follow-up actions, appraise the results of the tests carefully to determine whether the deficiencies disclosed: (1) represent a specific procedural weakness which applies across the board to all agreements, including grants, or to particular categories of agreements, (2) indicate that the institution's records cannot generally be considered accurate or reliable, or (3) represent isolated errors applicable only to the individual transactions tested or to the individual agreement(s) represented by the deficient transactions.

## 13-309 Special Procedures Relating to Grants

a. Audit procedures relating to grants and other agreements with educational institutions are the same and should be integrated where practical into a comprehensive audit of the institution. Supplement audit coverage to the extent that specific audit emphasis is requested or that special provisions are contained in the agreement or outlined in any manuals on cost determination that grantors or contracting organizations might provide.

b. Issue reports on grants only on request or in accordance with the agreements with other agencies. (13-700 contains guidance on special reporting procedures applicable to grants.) There is an exception. A report will be issued when the auditor becomes aware, during the performance of normal audit procedures, of deficiencies on the part of the institution which have a significant effect on the cost of one or more grants even though a request for audit has not been made. For example, in review of the accounting system, the auditor may have encountered a deficient practice in the allocation of indirect costs which tends to produce inequities in the costing of grants. Or, the auditor may have noted erroneous charges to particular grants in a random sample of transactions performed to test voucher distribution controls. In such cases, notify the grantor promptly of significant deficiencies or errors by a report which also includes an estimate of the financial effect of the deficiencies on the grants and the amount of questionable costs on particular grants, if this can be readily computed.

## 13-310 Cost Principles and Procedures for AID Contracts

a. Agency for International Development (AID) contracts incorporate cost principles in the FAR which should be used as the framework for determining contract costs, although the services rendered may not always be in the nature of research. In AID contracts which do not contain the CAS clause, special provisions may allow as direct costs certain items normally included in indirect costs. Special cost determination procedures in AID contracts are summarized as follows:

(1) For AID contracts, indirect costs are provisionally reimbursed at rates as provided in the contract. However, final adjustment to actual allowable indirect costs is based on rates negotiated by the AID Office of Contract Management of the Bureau for Program and Management Services after receiving the auditor's advisory comments on the contractor's proposed final rates for AID contracts. The rates negotiated by AID are the authorized new provisional rates for subsequent periods until new rates are negotiated.

(2) AID contracts may also provide for reimbursement of indirect costs through the use of predetermined fixed rates.

(3) Since the basic audit data developed for the annual indirect cost report on DoD contracts is used to determine costs applicable to AID work, the auditor should ascertain that the contractor has made all adjustments required because of any special provisions of AID contracts.

## 13-400 Section 4 — Audit of Direct Costs at Educational Institutions

### 13-401 Introduction

This section presents audit guidance for reviewing direct costs distributed to organized research, instruction, and other institutional activities.

### 13-402 Definition of Direct Costs

Direct costs are defined in OMB Circular A-21 Section D as those costs that can be identified specifically with a particular sponsored project, an instructional activity, or any other institutional activity, or that can be directly assigned to such activities relatively easily with a high degree of accuracy. Identifiable benefit to the sponsored work, rather than the nature of the goods and services involved, is the determining factor in distinguishing direct from indirect costs of sponsored agreements.

### 13-403 Direct Costs by Agreement or by Group of Agreements

a. When a particular project is an individual government agreement, accounting complexity is at a minimum. The main audit considerations are adequacy of documentation, correct account coding, reasonableness of cost, and conformity with terms of the agreement and provisions of applicable regulations.

b. Occasionally, an institution's accounting system may provide for cost objectives which accumulate the direct costs of more than one related agreement. A further distribution is made to the individual agreements as direct costs. Examples are special facility or scientific discipline level project costs. These costs might include such items as salaries and wages, common materials and supplies, etc., used in connection with a project which is comprised of more than one agreement. Additional audit considerations, besides those mentioned in the preceding paragraph, are the equity of the method of distributing the project costs to individual agreements; the consistency of the institution's treating similar common costs by the same distribution methods; and the preservation of the identity of any kinds of costs which are subject to limitation or exclusion by the terms of the agreements.

### 13-404 Treatment of Certain Common Costs as Direct

a. Some types of expense which are traditionally regarded as indirect in nature can be treated as direct costs when a benefit to individual government agreements can be specifically identified and an equitable method of charging the cost is followed consistently. The cost of fringe benefits and pension plans is an example. These should be applied to direct costs as well as to the various indirect cost groupings to which salaries and wages are charged. The portion applied to direct salaries and wages may also be treated as direct costs.

b. Assure that any special distribution methods applied do not tend to produce a recovery of more than actual costs and that any limitations on indirect costs are not circumvented. Sabbatical leave costs may require special consideration (see OMB Circular A-21 Section J.40).

### 13-405 Basic Tests of Direct Costs

Perform audit tests of direct costs in accordance with Chapter 6.

a. Test items of direct costs to ascertain whether the institution has complied with the policy and principles set forth in the awarding activity's manuals and in the terms of the agreements, with regard to the control, incurrence, and recording of these costs. If these tests disclose instances of inadequate controls, incurrence of unallowable costs or inaccurate recording, make further tests sufficient to reach a definitive conclusion as to the nature and extent of the deficiencies.

b. The audit tests may indicate a lack of adequate supporting data if the auditor cannot assure the validity or accuracy of the accounting records relating to a particular element of cost under all agreements or specific categories of agreements. In such instances, obtain suffi-

cient information to clearly show the nature and applicability of the deficiencies and the action recommended to correct the conditions.

c. The results of the test, coupled with the use of statistical projection techniques, may permit the auditor to determine a dollar amount or percentage disapproval which can be applied to an element of cost incurred under all agreements generally, or under agreements in a specific category. This is usually feasible where the cost disapproval is related to a procedural weakness in the institution's accounting controls or system which causes a definite pattern of unallowable costs to be recorded in a fairly uniform manner to all agreements, or a particular category of agreements. An example of this type of weakness would be the contractor's failure to credit material costs with purchase discounts, either actually taken or reasonably available but not actually taken.

d. As a further possibility in some instances, the deficiencies disclosed may not be related to a prevalent procedural weakness, but may occur in irregular fashion as isolated recording errors without any particular pattern being evident. In such a case, make sufficient tests to conclude whether the unallowable costs disclosed by the tests relate only to isolated agreements.

## 13-406 Audit of Compensation for Personal Services

### 13-406.1 Audit Objective

Generally, compensation for personal services, including fringe benefits and pension plan costs, is a significant percentage of total costs. The basic audit objective is to determine that the total compensation to individual employees, including fringe benefits and pension plan costs, is reasonable for the services rendered, conforms to the established policy of the institution, and is charged to government agreements in an equitable manner consistent with the provisions of OMB Circular A-21 Section J.8.

### 13-406.2 Basic Audit Procedures

In accomplishing the audit objective, the auditor should be guided by the procedures which are briefly described below:

a. Lack of an acceptable written policy on personnel classification, qualification requirements, promotions, salary scales, outside activities, vacation, and sick leave is a deficiency which should be remedied promptly by the institution.

b. Amounts charged directly or indirectly to organized research for personal services, except stipulated salary support, should be based on institutional payrolls which have been approved and documented in accordance with institutional practices. Stipulated salary support is a fixed or a stated dollar amount of the salary of professional or other professional staff involved in the conduct of research which the government agency agrees in advance to reimburse an educational institution as a part of sponsored research costs. The amounts stipulated for salary support will be treated as a direct cost. The provision for stipulated salary support will not be used for educational service agreements.

c. Determine that salary charges for work performed by faculty members on government sponsored agreements within the regular academic year do not exceed a proportionate share of each individual faculty member's base salary. Similarly, for work performed outside the academic year or during the regular academic year but in excess of the regular departmental workload, salary charges for individual faculty members should be at rates not in excess of their base salary rates, unless provided for by the agreement or by written approval of the sponsoring agency. For example, if the academic year at an institution is established as a nine-month period and a member of the faculty is authorized to work on sponsored agreements on a full-time basis for two of the three summer months, the monthly salary charge should not exceed one-ninth of the base salary for the academic year.

d. In the case of those personnel covered by stipulated salary support, the auditors are no longer required to review

the precise accuracy of time or effort devoted to research projects. Rather, the reviews should incl· steps to determine on a sample .hat an institution is not reimbursec .or more than 100 percent of each faculty member's salary and that the amount charged to government-sponsored research is reasonable in view of his or her university workload and other commitments. The stipulated salary method may also be agreed upon for that portion of a professional's salary that represents cost sharing by the institution.

e. Solicit the assistance of cognizant government technical representatives where appropriate in making evaluations of reasonableness. Guidance on requesting and using the work of technical specialists is in Appendix D.

# 13-500 Section 5 — Audit of Indirect Costs at Educational Institutions

## 13-501 Introduction

This section presents audit guidance for review of indirect costs distributed to organized research, instruction, and other institutional activities.

## 13-502 Audit Objective

The basic objective is to ascertain whether indirect costs are reasonably incurred, reliably recorded, and thereafter assembled in appropriate cost groupings for equitable distribution to benefiting government agreements.

## 13-503 Basic Provisions

a. OMB Circular A-21 Section E.1. defines indirect costs as those that have been incurred for common or joint objectives and therefore cannot be identified specifically with a particular sponsored project, instructional activity, or other institutional activity. At educational institutions, such costs normally are classified under the following indirect cost categories: general administration and general expenses, sponsored projects administration expenses, operation and maintenance expenses, library expenses, departmental administration expenses, depreciation and use allowances, and student administration and services.

b. OMB Circular A-21 Section E.2. prescribes the criteria for apportionment and allocation of indirect costs to organized research and instruction.

c. DFARS 242.770-2 requires contractors, which include educational institutions, with DoD agreements to certify proposals for billing rates or final indirect cost rates unless a waiver has been obtained from the Secretary of Defense or the Secretary of the Military Department concerned.

## 13-504 Reconciliation and Account Analysis

a. If the educational institution is required to certify its overhead proposals (see DFARS 242.770-2), the auditor should follow the audit guidance in 6-700 pertaining to such certification.

b. Because of the multitude of income, expense, and fund accounts maintained by educational institutions, an institution's proposal for an indirect cost rate should be reconciled with its financial books of account and published annual statement. Bases for allocations should be reconciled as well as indirect cost account groupings. The auditor should assure that all incurred costs, income, and credit items relevant to the government agreements have been reflected appropriately in the institution's indirect cost.

c. Analyze the individual accounts to the extent deemed necessary to determine their allocability, reasonableness and allowability. The auditor should be guided by the auditing concepts and techniques set forth throughout this manual and the special audit considerations discussed in this chapter.

## 13-505 Treatment of Off-Campus Locations

The auditor's review of performance areas (see 13-300) may disclose that certain agreements are performed off-campus at locations considerably removed from the institution. Such agreements may not involve the use of the institution's plant facility or the incurrence of costs for operation and maintenance of plant, use charges for building and equipment, library and possibly indirect departmental expenses. In such instances, the auditor should recommend that the institution compute an appropriate off-campus indirect cost rate which will reflect the elimination of costs not applicable to off-campus work. The institution's records should show the agreements to which the off-campus rate applies.

## 13-506 Treatment of Educational Institution Hospitals

### 13-506.1 Relationship of Hospital Operations to Institutional Activities

a. Many educational institutions operate hospitals as an adjunct to their medical schools and as a public service to their communities. This may introduce com-

plexities in indirect cost allocations. The relationship of the hospital to the institution must be carefully understood. Experience has indicated that, except for certain general administration and general expenses, such hospitals are generally operated as autonomous subdivisions.

b. Cross-servicing activities between the hospital and other segments of the institution are usually conducted on a reimbursable basis so as to permit the proper determination of hospital patient care costs. Typical examples are the operation of utility and power facilities by the institution and the laundry by the hospi tal. The auditor should review such cross-servicing costs to assure that the reimbursement rates are equitable.

c. With respect to general administration and general expenses, the hospital organization may itself perform some of these functions, the costs of which are included in their own accounts. Examples of such functions are purchasing, accounts payable, patient billing, cost accounting, etc.

### 13-506.2 Allocating Institution General Expenses to the Hospital

a. The most frequently used base for apportioning the institution's general administration and general expenses is total expenditures. Because the hospital performs many general expense functions for its own account and the total expenditure base for the hospital is relatively large in relation to the institution's other activities, the apportionment of the institution's general administration and general expenses on a total expenditure base, which includes the hospital, may not be equitable.

b. In such instances the following alternative methods for distributing general administration and general expenses are suggested in order of preference:

(1) The institution's general administration and general expenses should be carefully reviewed to determine whether any are directly applicable only to hospital operations. Any such amounts should be included as part of the hospital costs and deducted from the pool of general administration and general expenses to be apportioned to organized research, instruction and other institutional activities on the basis of total expenditures.

(2) The apportionment can be accomplished in two stages by separating the items in this indirect cost category into two groups: one representing those items applicable to organized research, instruction and other institutional activities, and a second group representing common service functions applicable to the hospital as well as the other activities mentioned above. Dependent upon the extent of the hospital's autonomy, this second group may thus include such items as the president's office, data processing department, board of trustees, etc. The apportionment of the total acceptable cost of each group would be accomplished by relating each group total to the total expenditure base applicable to the activities serviced by the group.

(3) If neither of the above methods is practical, all general administration and general expenses incurred by the hospital and the institution can be combined and apportioned on a total expenditure basis to organized research, instruction and other institutional activities and to the hospital. This procedure, however, is theoretically incorrect because, while general expenses of the institution are applicable in part to the hospital, it is rarely true that hospital general expenses are properly apportionable to the institution. This method should, therefore, be used only if no other approach is practical.

## 13-507 Treatment of Student Work Study Grants

a. At many institutions, part-time students receive Federal support through student work study program grants. When any students who are covered by the program work directly on research agreements, their total salaries for such work, whether fully or partially funded by Federal grants, should be included in the research labor base for determining and allocating applicable indirect costs. The amount of their salaries which is covered by the work study grants may not, however, be charged to government agreements as an allowable cost.

b. Where students are performing indirect functions, the portion of salary supported under these work study grants is similarly not allowable as indirect costs of agreements.

## 13-508 Treatment of Dining Hall Gains and Losses

OMB Circular A-21 Section B.1.d. states that dining halls will be treated as "other institutional activities." However, in some institutions where the dining halls are open to and patronized by students, faculty, and research employees, an appropriate share of reasonable losses from the operation of such dining halls may be accepted as an employee morale and welfare expense (OMB Circular A-21 Section J.14). Conversely, a share of any gains from the operation of such dining halls should be credited to the cost of sponsored agreements.

## 13-509 Treatment of Fringe Benefit Costs Including Pension Plans

### 13-509.1 Base or Pool Treatment of Fringe Benefit Costs

a. An institution should treat fringe benefits (including pension plan) as a loading factor to be added to salaries and wages of the particular cost objectives (e.g., organized research, library, etc.) for which they were incurred rather than as an indirect cost to be distributed in total, as part of general administration and general expenses. They would be considered as part of the direct salaries and wages applicable to each cost objective. Therefore, when direct salaries and wages of organized research, instruction, and other institutional activities are used as an allocation base to distribute in direct costs, the base amounts should include applicable fringe benefits.

b. However, if the institution's submission does not include fringe benefits as part of the allocation base, this method may be accepted if the auditor determines that substantially the same results are achieved.

### 13-509.2 State-Wide Benefits for University Employees

a. Special audit attention may be necessary with respect to State universities for which fringe benefit costs are paid and administered by the respective State governments. If the allowability of these costs can be substantiated through the audit of other documentation provided by the institution, the costs should not be questioned solely on the basis of not being paid by the university or recorded on its books.

b. If the institution substantiates fringe benefit costs and includes them in the allocation base for contracts and grants, the auditor should ascertain that a similar adjustment is made to all other salaries and wages included in bases for allocating indirect costs and in indirect expense pools. Accordingly, the auditor should obtain from the institution all information necessary to make these adjustments.

c. Determine the need for such adjustments early in the audit, after review of pertinent files available at the institution, and obtain the necessary information promptly in order to avoid delay in completing the audit. The auditor should urge the university to include the necessary adjustments in future indirect cost submissions.

## 13-510 Treatment of Other Costs and Functions

### 13-510.1 Student Health Services

All student health services, including hospitals, should be treated as "other institutional activities" for the purpose of apportioning indirect costs. However, where the health services are made available to students and all employees, an appropriate share of the cost of the operation of the activity may, in accordance with OMB Circular A-21 Section J.14, be distributed to sponsored agreements on a basis equitable under the circumstances. Population may provide such a basis where services are made available to the same extent to all categories.

### 13-510.2 Television and Radio Stations

Such activities owned and/or operated by an educational institution should be treated as "other institutional activities" for the purpose of apportioning indirect costs.

### 13-510.3 Planning and Development for the Institution

The auditor should ascertain that all preliminary planning and development costs pertaining to contemplated new construction are being deferred for future incorporation in the cost of the new construction. General institution planning and development expense may be accepted for distribution to all activities of the institution, including sponsored agreements.

### 13-510.4 Scholarships and Student Aid Costs

Any remission of tuition to students for research work performed is allocable as a cost of the research and should be included in the base for allocation of indirect costs in the same manner as compensation of regular employees engaged in organized research. The costs of scholarships, fellowships, and other forms of student aid apply only to instruction. The costs of administering scholarships and student aid may be allocable in part to research in cases where the students perform services under research agreements. (See OMB Circular A-21 Section J.41).

### 13-510.5 Grant Support for Computer Facilities

The National Science Foundation (NSF) awards certain grants to educational institutions for the purpose of defraying part of the cost of acquiring or operating computer facilities. Such grants are for the purpose of supporting educational usage and nonsponsored research. No part of the grant is intended to be used to reduce the cost of sponsored research, whether sponsored by the government or by others. NSF grants will clearly indicate if it is intended that the benefits of the grant be restricted in any way. Where the grant does not specify such an intention, the auditor may properly apply the grant funds to reduce the overall cost of acquiring or operating the computer facility for the purpose of determining sponsored research costs.

## 13-511 Bases for Distributing Indirect Costs

### 13-511.1 Base Period and General Criteria for Distribution

Because educational institutions generally close their books of account annually, the base period for distribution of indirect costs should be the fiscal year. As in the case of any apportionment and allocation, the overall objective should be to select the method for each indirect cost category which will distribute the costs to all of the benefiting activities of the educational institution. Each indirect cost category should be apportioned and allocated separately using the most appropriate base for distribution (see OMB Circular A-21 Section E.2). Actual conditions must be taken into account in selecting the method or base to be used in distributing individual cost groupings to applicable cost objectives.

### 13-511.2 University "Cross Allocation" Method

Prior to apportionment, there normally should be added to allowable expenses appropriate shares of employee fringe benefit expenses applicable to salaries and wages. OMB Circular A-21 Section E.2.e. lists an order of allocation for indirect cost categories. However, a cross allocation of costs between two or more indirect cost categories may be used if such allocation will result in a more equitable allocation of costs in which case the specified order of allocation would not apply. The distribution of a portion of one indirect cost category to another does not change the nature of the item, as defined, although its initial identity may be lost in the distribution process. Figure 13-5-1 illustrates this process.

### 13-511.3 Methods of Selecting Bases

a. Cost analysis studies may be used when they result in more accurate and equitable distribution of costs. Such studies may more appropriately consider weighting factors, population, or space occupied.

b. The essential consideration in selecting the distribution base in each instance is that it be the one best suited for assigning the pool of costs to cost objectives in accordance with the relative benefits derived; a traceable cause-and-effect relationship; or logic and reason, where neither benefit nor cause-and-effect relationship is determinable. The following paragraphs explain the bases more commonly used.

### 13-511.4 Total Expenditures Base

a. This term means the sum of all expenditures for a given cost objective, such as for the institution as a whole, instruction, organized research, other institutional activities, etc. When used to denote a base for distribution of indirect costs, the term "total expenditures" should be exclusive of the indirect costs to be apportioned and/or allocated.

b. Any expenditures included in the general administration and general expenses pool that are applicable solely to functions or activities which are properly categorized as "other institutional activities" (see OMB Circular A-21 Section B.1.), should be reclassified from such pool to the total expenditures base. This reclassification is necessary in order to apportion to such functions and activities their proper share of general administration and general expenses.

c. The expenses for operation and maintenance of the library, exclusive of any portion of such expenses that are applicable to general administration and general expenses, should be included in the total expenditures base.

d. When total expenditures is used as a base for distributing indirect costs, total expenditures should be exclusive of capital expenditures.

### 13-511.5 Direct Salaries and Wages Base

When used, this base should include all salaries and wages and their equivalents (e.g., tuition remissions) applicable to instruction, including departmental research, and to organized research. The auditor should ascertain that the base includes all salaries incurred under grants and cost-reimbursement and fixed-price contracts and subcontracts. See 13-509 for discussion of application of fringe benefit costs to base.

### 13-511.6 Space Utilization Base

Whenever space utilization is used as a base for apportionment and allocation of indirect expenses to a cost objective, it should be supported by detailed records. The period used to develop the space utilization base should be representative of the usage during the entire period (see 13-512.3). Whenever appropriate, the services of government technical personnel should be solicited to assist the auditor. Guidance on requesting and using the work of technical specialists is in Appendix D.

### 13-511.7 Population Served Base

Whenever population served is used as a base, the auditor should ascertain that all personnel served, including evening, summer, extension, and part-time students as well as the general public, are represented in the total and are appropriately weighted.

### 13-511.8 Modified Total Cost Base

Modified total costs consist of salaries and wages, fringe benefits, materials and supplies, services, travel, and subgrants and subcontracts up to $25,000 each. This is an alternative base for allocating some indirect cost categories to serviced or benefited functions. This base shall be used to distribute indirect cost pools to applicable sponsored agreements unless it can be demonstrated that another base would produce more equitable results (see OMB Circular A-21 Section G.2.)

## 13-512 Indirect Cost Classification

The following guidance is furnished for use in the review of indirect cost functional categories.

### 13-512.1 General Administration and General Expenses

a. General administration and general expenses are defined in OMB Circular A-21 Section F.3. Expenses in the general administration and general expense pool should be excluded when comparable expenses are authorized as direct costs to sponsored agreements.

b. The most commonly used base for apportioning general administration and general expenses to instruction (including departmental research), organized research, and other institutional activities, is total expenditures. However, purchases of disproportionately large amounts of direct material for government sponsored contracts, or other similar significant factors may cause the use of a total expenditure base to be inequitable. In such cases a different base which will eliminate the inequity should be used (see OMB Circular A-21 Section E.2.).

**13-512.2 Sponsored Projects Administration Expenses**

a. These expenses are defined in OMB Circular A-21 Section F.5. They represent costs allocable to the major functions of the institution under which the sponsored projects are conducted. Most institutions, particularly those that do not maintain a separate research office, do not provide separate accounting classification for this type of expense, but include these items in departmental administration or general administration and general expenses. Unless there is sufficient justification for doing so, the auditor should not attempt to segregate and establish a separate expense pool for these items.

b. Sponsored projects administration expenses are generally limited to those incurred by the separate organization(s) (see OMB Circular A-21 Section F.5.a.) Pursuant to OMB Circular A-21 F.5.c., where sponsored projects are separately administered, it may be necessary to exclude a portion of the normal institutional general administration expenses from allocation to sponsored agreements; e.g., purchasing or receiving, in order to avoid duplication.

**13-512.3 Plant Operation and Maintenance Expenses**

a. Usually, plant operation and maintenance expenses (see OMB Circular A-21 Section F.2.) fall into three main categories; i.e., (1) utility services, (2) custodial services, and (3) ordinary or normal repairs and maintenance. If the institution distributes these costs separately, the auditor should evaluate the basis of such distribution to all applicable cost objectives. Custodial services and utility services may properly be related to space utilization. On the other hand, where a work order system is in effect, the information ascertainable from the work orders is the most accurate method of determining the proper cost objective of repair and maintenance costs. If a work order system is not in effect, space utilization or other base which will provide the most equitable distribution of the costs may be used.

b. Some institutions charge operation and maintenance expenses initially to other institutional activities, buildings, groups of buildings, departments or subdivisions. Such charges should be evaluated to determine whether they reflect fairly the services involved.

c. Some institutions use weighting factors in distributing plant operation and maintenance costs which result in a larger cost per foot for space used for organized research than for other uses. Such use of weighting factors should be supported by a well documented comprehensive study. The auditor should review the justification and ascertain whether the results are equitable.

d. The apportionment and allocation to their proper cost objectives of plant operation and maintenance costs and use and/or depreciation charges applicable to buildings and equipment, should ordinarily be on the basis of space utilization. Emphasis should be placed on assuring an equitable distribution to other institutional activities, classrooms, auditoriums, laboratories, and other instruction areas where organized research is not conducted. Some of the space may be applicable entirely to organized research or jointly to instruction and organized research. Commonality to both instruction and organized research results principally from graduate students who perform basic research under government agreements aimed at obtaining advanced degrees.

e. Some institutions treat plant operation and maintenance costs and use allowance and/or depreciation applicable to buildings and equipment for organized research and instruction as a combined amount which is allocated to research and instruction on the basis of respective salaries and wages. Such allocation is unacceptable as it fails to provide for student usage of space and facilities. To be acceptable the total cost being allocated should be reduced in an amount sufficient to cover student space usage of classrooms, auditoriums, laboratories, etc.

**13-512.4 Library Expenses**

a. These expenses (see OMB Circular A-21 Section F.6.) relate to the operation of a single central facility and individual specialized facilities located in various

schools, departments, and laboratories which provide a variety of services to the entire institution. The facilities utilizing floor space, light, heat, furniture, carpeting, book shelves, tables, periodicals, books, microfilming and storage, technical reports, personnel, etc., are available to the total population for the institution. Consequently, the proper base for expense allocation is total population. In developing a population base, all users of the library ordinarily should be included and properly weighted. This would include evening, summer, extension, and other part-time students as well as the general public to the extent that such usage can be determined or reasonably estimated. The basis proposed by the institution must be supported by data developed periodically on actual experience for representative periods.

b. Where the institution has a more complex library system, the auditor should determine whether a more refined process of allocation is required. For example, if several autonomous, specialized libraries exist, or if there is more than one centralized facility, and if the relative benefits derived from the libraries by the government agreements vary, a distribution such as in a. above should be made for each of the libraries. The extent of audit analysis warranted depends upon the materiality of the share of the library costs which is allocable to the government agreements and the degree of difference among the libraries in benefits received on government sponsored work vs. other institution functions and activities.

c. The cost of books, periodicals, and materials should be reviewed for reasonableness. The cost of large and unusual purchases of books which in effect constitute an expansion of the library, should be reviewed for applicability to the period under review. Consideration should be given to spreading the cost of unusually large purchases of books over a period of several years. Rare book purchases should be examined for reasonableness and allocability to research agreements. Costs incurred in the purchase of rare books (museum type) with no value to sponsored agreements should not be allocated to them (OMB Circular A-21 Section F.6.a.).

### 13-512.5 Departmental Administration Expenses

a. Departmental administration expenses are expenses incurred for administrative and supporting services that benefit common or joint departmental activities or objectives in academic deans' offices, academic departments and divisions, and organized research units (OMB Circular A-21 Section F.4.). Acceptance of these expenses must be based upon a determination that the department is engaged in organized research, and the departmental administrative personnel perform functions benefiting organized research. Functions benefiting organized research include programming, recruiting personnel, supervising sponsored research, reviewing work progress, and engaging in the administration of sponsored agreements. Where organized research is performed in a separate facility with its own administrative organization, evaluate the allocation of departmental administration expenses to such organized research to determine if it is equitable based on the benefits derived.

b Give particular attention to any allocation of a portion of the salaries of the institution's department heads and faculty to academic administration expenses. Such allocation is limited to amounts attributable to administrative duties. However, section F.4.a.(2)(a) of OMB Circular A-21 allows recovery of salaries and fringe benefits for the administrative work of certain professionals at a rate of 3.6% of modified total direct costs. (Section G.2 of the Circular (see 13-S1) defines modified total direct costs.) Expenses covered by the allowance are to be excluded from the departmental administration indirect cost pool. No documentation is required to support this allowance. This section is sufficiently vague as to invite misinterpretations which may result in significant excess cost allocations to the government. Accordingly, carefully review forward pricing and incurred cost submissions to determine whether the allowance, if claimed, is questionable. Question the allowance if it results in unjustified or

inequitable cost allocations (e.g., if it is proposed or claimed for departments not incurring expenses covered by the allowance or which charge such expenses as a direct cost).

c. Exclude expenses treated as departmental administration expenses when similar expenses are charged as direct costs to organized research and to instruction. Most department heads, divisional heads, and deans, may spend some portion of their time teaching. When, for example, a department head devotes one-fifth of the time to teaching and the remainder to departmental administration, his or her salary should be distributed accordingly. The 20% charged to instruction should be included in the instruction direct salary base. The remaining 80% should be charged to the departmental administration expense pool and ultimately allocated to both organized research and instruction.

d. OMB Circular A-21 Section F.4.b. provides that these expenses should be distributed through bases applied to cost groupings in accordance with OMB Circular A-21 Section E.2. In many cases the total cost of direct salaries and wages of organized research and instruction will be an appropriate base for the allocation of departmental administration expenses to organized research. Because organized research may not be conducted in all departments and schools within an educational institution, it would be inequitable to allocate departmental administration expenses on the basis of a composite rate. In such cases, the expenses of offices of the deans of the schools should first be allocated to the departmental administration offices within the school. Then the expenses of each departmental administration office can be allocated to organized research and instruction. Adoption of this procedure will result in an equitable allocation of the expenses of offices of deans and departmental administration expenses to organized research.

### 13-512.6 Depreciation and Use Allowances

a. Depreciation or use allowances (see OMB Circular A-21 Section F.1.) compensate an educational institution for the loss of useful value of buildings, capital improvements, and equipment resulting from their use in the performance of sponsored agreements. It should be remembered that a combination of the two methods may not be used in connection with a single class of fixed assets.

b. The following procedures should be used in the review of depreciation and use allowances:

(1) Ascertain that the institution's proposal does not include the cost of land and that the cost of buildings and equipment purchased or donated by the government have been excluded.

(2) Review the institution's records and determine that the value placed on buildings and equipment represents actual or reasonable estimate of acquisition cost and not replacement cost.

(3) Ascertain that the equipment for which depreciation or use allowances is proposed is being used on sponsored agreements.

(4) When depreciation is proposed, the service lives placed on the properties by the institution must be reviewed. If needed, assistance from the cognizant government technical personnel should be sought (see Appendix D). The institution's replacement policy may be an important factor in establishing proper service lives.

(5) The allocation and apportionment of depreciation or use allowances for buildings and equipment to their proper cost objectives should ordinarily be on the basis of space utilization. The audit guidance contained in 13-512.3 is helpful in the review of depreciation and use charges.

**Figure 13-5-1**

## FORMAT FOR ALLOCATION OF INDIRECT COSTS

| Indirect Costs | Indirect Cost Categories | | | | | Major Activities | | |
|---|---|---|---|---|---|---|---|---|
| | Operation & Maintenance | Gen. Admin & Gen. Exp. | Dept. Admin. | Sponsored Projects Admin. | Library Expense | Organized Research | Instruction | Other Institutional |
| 1 Salaries and other indirect expenses incurred by functional categories | $663,00 | $104,000 | $278,000 | $ 12,000 | $386,000 | $ 40,000 | $140,000 | $ 79,000 |
| 2. Fringe benefit and pension plan costs—$74,000 total indirect | 14,000 | 6,000 | 15,000 | 1,000 | 18,000 | 4,000 | 14,000 | 2,000 |
| 3. Equipment use/depreciation charges—$172,000 total | 11,000 | 5,000 | 4,000 | 1,000 | 4,000 | 19,000 | 117,000 | 11,000 |
| 4. Building use/depreciation charges—$217,000 total | 11,000 | 8,000 | 1,000 | 1,000 | 3,000 | 29,000 | 144,000 | 20,000 |
| 5 Operation and maintenance | (699,000) | 26,000 | 2,000 | 1,000 | 15,000 | 59,000 | 492,000 | 104,000 |
| 6 General administration and general expenses | | (149,000) | 100 | 200 | 9,000 | 6,000 | 128,000 | 5,700 |
| 7. Departmental administration expense | | | (300,100) | — | — | 74,000 | 191,000 | 35,100 |
| 8 Sponsored projects administration expense | | | | (16,200) | — | 16,200 | — | — |
| 9. Library expenses | | | | | (435,000) | 79,000 | 255,000 | 101,000 |
| 10. Total indirect expense | | | | | | $326,200 | $1,481,000 | $357,800 |

NOTE. The above format is intended only to illustrate the process and sequence of allocation. It does not imply reasonable expense levels or ratios nor mandatory accounting methods When appropriate for use as an audit worksheet or audit report exhibit, the basis and methods of apportionment should be adequately explained in footnotes or supporting schedules cross referenced as required

# 13-600 Section 6 — Administrative Procedures for Establishing Indirect Cost Rates at Educational Institutions

## 13-601 Introduction

This section describes the various methods by which government agencies predetermine, and/or retroactively settle, the indirect cost rates to be used for costing grants and contracts with an educational institution, along with the contract audit responsibilities involved in this process.

## 13-602 Indirect Cost Rates for Sponsored Agreements

Unless significant inequities would result, a single uniform rate should be used to distribute to individual sponsored agreements the indirect expenses apportioned to organized research. OMB Circular A-21 Section G.1.b. discusses conditions under which use of a single rate would not be appropriate. Dependent upon the conditions, off-site rates or separate rates for different segments of the institution may be appropriate.

### 13-602.1 Rates for Educational Service Agreements

Educational service agreements may be performed as part of general instructional activities. If these agreements require the determination of actual indirect cost rates (some grants contain administrative ceilings on these rates), additional analysis would be required. Not all the expenses associated with the general instructional activities would be allocable to particular services being performed under these agreements under the cost principles of OMB Circular A-21, and the policies of the agencies concerned. Many instructional expenses may be related to the education of the general student body and may be unrelated to specialized educational services rendered under government agreements.

## 13-603 Simplified Procedure for Small Institutions

Where the total direct cost of Federal work does not exceed $3 million in a fiscal year, OMB Circular A-21 Section H. provides a simplified method for computing indirect cost rates which the institutions may elect to use. The auditor should encourage the use of this method where appropriate, since audit scope could be reduced and resources conserved. However, the auditor may find, from prior experience or from a cursory review of the institution's financial reports and supporting information, that the results would not be equitable, or that the accounting information required for use of the abbreviated procedure is not available. If so, notify the institution and recommend to the government administrative activity that the institution should be required to use the regular procedure.

## 13-604 Predetermined Fixed Rates for Indirect Costs

a. OMB Circular A-21 Section G.4. cites the authority for the negotiation of predetermined fixed indirect cost rates for cost reimbursement type contracts for research and development. A further provision of FAR 42.705-3(b), is that a predetermined rate should be used only if the same basis is used on all government contracts with the institution. Depending upon the circumstance, a rate may be negotiated at the beginning of a fiscal year for application in ensuing contracts performed during the year, or, it may be established during the pricing negotiations of an individual contract.

b. DFARS 216.307(i), 242.705-3(b), and 252.216-7002 (Alternate) were changed in October 1994 to allow for the use of multi-year predetermined indirect cost rates for DoD contracts with educational institutions. The multi-year rate can be used for a period of two to four years. The pertinent factors that the auditor should consider when providing advice on the use of multi-year rates include: (1) the stability of the indirect cost rates from year to year, (2) the accuracy of the estimating system to forecast indirect cost rates (compare forecasted rates to actual rates for the last 3-5

years), (3) the adequacy of the internal control systems—especially the university's internal controls for identifying and segregating unallowable costs and for ensuring that intermediate and final cost allocations are equitable, and (4) the amount of questioned costs reported in the last 2-3 annual audits of the university's incurred cost and forward pricing proposals.

c. The auditor will review an institution's proposals for predetermined rates when requested to do so by the cognizant administrative agency. The same attention should be given to the equity and propriety of the methods for allocating and applying indirect costs used in these proposals as for the review of historical indirect costs discussed earlier in this chapter.

d. Where predetermined indirect cost rates are negotiated, the auditor will apply the rates in subsequent audit determinations where indirect costs of the same period are includable. However, if the auditor finds that the predetermined rates are not applied consistently to all the contracts affected, for example, as to uniform treatment of the institution's direct and indirect cost classifications, inform the interested contracting officers promptly and recommend appropriate changes.

## 13-605 Negotiated Fixed Rates with Carry Forward of Under- or Over-Recovery

a. As explained in OMB Circular A-21 Section G.5., when fixed rates are negotiated in advance for a certain time period, the over (or under) recovery may be included as an adjustment to the indirect cost for the next rate period. When the rate is negotiated before the carry-forward adjustment is determined due to delay in audit, the carry-forward may be applied to the next rate negotiation.

b. Unrecovered amounts under lump-sum agreements or cost-sharing provisions of prior years shall not be carried forward for consideration in the new rate negotiation.

c. The carry-forward procedure does not apply to cost-type research agreements covering work performed in wholly or partially government-owned facilities.

## 13-606 Indirect Rates for Training and Other Non-Research Agreements

a. Increasingly, educational institutions are being awarded contracts and grants for conducting training and other programs not of a research and development nature. The types of services rendered under these agreements may vary greatly. Some of these programs may utilize the institution's instructional and other related facilities, while others may be completely separate from all campus activities and facilities. These differences may necessitate a careful consideration of the institution's activities and related indirect costing structure. In rate determinations, the auditor should maintain a balance between the undesirable effects of inequitable distributions of particular indirect cost items on the one hand, and fragmentation or proliferation of indirect cost rates on the other. The auditor must evaluate the circumstances at each institution in terms of the relationship of cost benefits for the programs involved and the materiality of the items.

b. In some cases, indirect cost rates developed primarily for research and development agreements have been incorporated as provisional rates in contracts for training or other programs. If the auditor believes the provisional rates are inappropriate and are contributing to a significant inequity in accordance with the preceding paragraph, the auditor should notify the contracting officer setting forth the reasons and recommended rates.

# 13-700 Section 7 — Audit Reports on Educational Institutions

## 13-701 Introduction

This section discusses special procedures for preparing reports relating to the audits of contracts and financial assistance, and supplements the guidance in Chapter 10. Where non-DoD contracts are involved, the applicable provisions of 15-100 should be followed.

## 13-702 Reporting Under Financial Assistance

### 13-702.1 Reporting in General

a. Reports on financial assistance will be issued only on request or in accordance with other agency agreements (see 1-300). When a request for audit is received, it should be acknowledged promptly with a statement of the approximate date the audit report will be submitted. If any uncertainty exists as to the grantor's time requirements, the matter should be clarified with the requesting office. Clarification should be confirmed in writing.

b. The format which is outlined below for preparing DHHS reports should be adapted to other agency reports when requests for them have been received and special reporting instructions have not been provided by the grantor. Additional special procedures applicable to reports of audits performed for the Agency for International Development (AID) are contained in paragraph 13-704. Departure from the outline presented below as well as additional requirements as set forth in Circular A-133 are presented in paragraph 13-702.2.

c. An exhibit substantially in the format shown in Figure 13-7-1 for DHHS grants and discussed in 13-703 should be prepared for non-DHHS audit reports; however, one exhibit will be prepared for each grant audited rather than the single exhibit summarizing all grants as required by the DHHS instructions. If the number of grants is so large that preparing individual exhibits becomes an administrative burden, the auditor should contact the agency representative and arrange for the exhibit data to be submitted in consolidated form. Any deficiencies disclosed by the audit will be reported as (1) system deficiencies, (2) isolated errors or deficiencies, or (3) deficiencies which indicate inaccurate or unreliable records.

d. The audit report should comment on all instances where actual expenditures by grantees of non-Federal funds for performance of any grant are less than the cost contribution specified in the grant. In such cases the amounts involved and other pertinent data should be furnished together with any explanation by the grantee, and comments on the validity of such explanations.

### 13-702.2 Reporting Requirements Under Circular A-133

a. Circular A-133 includes audit and reporting requirements both within and outside DCAA's normal mission. Only those requirements within DCAA's mission (see CAM Chapter 1) should be covered by DCAA.

b. For an institution to comply with the audit report requirements set forth in paragraph 15 of Circular A-133, the university must have reports issued on the following three parts: (1) the financial statements of the institution; (2) the independent auditor's understanding of the internal control structure and the assessment of control risk; and (3) a report on compliance with applicable laws and regulations. These three parts may be bound into a single document, or presented as separate documents. DCAA's audit reports on incurred costs will partially fulfill the requirements of 2 and 3 above.

## 13-703 Reporting Under DHHS Programs

### 13-703.1 General Content and Format

a. The following comments pertain to audit reports for DHHS; however, the same format should be adapted to other agency audit reports when requests for them are received and other reporting instructions are not provided by the grantor. Figure 13-7-1 is a pro forma

Exhibit A presentation of grant audit findings.

b. The report will be prepared in accordance with Chapter 10. The audit report will contain a narrative section consisting of paragraphs covering the purpose and scope of the audit, comments relating to grant activities, and appropriate concluding remarks. A statement should be included on the propriety and adequacy of the grantee's policies and procedures for recording and reporting costs of performing DHHS research and training grants and the effectiveness of the grantee's management practices affecting the reasonableness of these costs.

### 13-703.2 Special Information on Letter of Credit

a. The majority of institutions which have DHHS grants are financed under a letter of credit system. This system permits the grantee to draw funds from the U.S. Treasury monthly up to a stipulated limit for all grant expenditures incurred by the institution during the month.

b. The auditor should obtain from the grantee for inclusion in the narrative section of the audit report a statement in the following format for the period audited:

| | |
|---|---|
| Total DHHS funds carried over from prior fiscal year | $XXXXX |
| Total DHHS funds received during the current fiscal year | $XXXXX |
| Funds available | $XXXXX |
| Less costs incurred during the current fiscal year | $XXXXX |
| Total funds available at end of the current fiscal year | $XXXXX |

c. This statement is for use by DHHS in determining whether excess funds are being held by the institution. The total amount shown for funds received during the fiscal year should represent only the cash actually drawn by the grantee under the letter of credit system, not the total of grants awarded during the year. Consequently, the total funds available at the end of the current fiscal year should represent the excess of the cumulative amounts of cash drawn over the corresponding costs incurred. The total amount shown above for the costs incurred should agree with the total of the submitted costs (exclusive of the grantee's contribution) as shown in Exhibit A, illustrated in Figure 13-7-1. The amount shown should also be cross referenced to Exhibit A, when costs are questioned.

d. The auditor should make selective tests sufficient to satisfy himself or herself as to the reliability of the figures shown with respect to DHHS funds carried over from the prior fiscal year and received during the current fiscal year. If this cannot be done with a minimum of audit effort, the audit report should contain an appropriate comment that the statement was prepared from information supplied by the grantee and was not verified by audit.

### 13-703.3 Reporting on an Unreliable Expense Statement

When deficiencies are numerous and significant and the auditor is unable to rely on the accuracy of the statement of expenses provided by the grantee as the basis for Exhibit A, the audit report will be issued as follows:

a. Deficiencies will be clearly presented together with specific recommendations on the action required by the grantee to correct the deficient conditions.

b. DHHS personnel will be requested to refer the deficiencies to the grantee for corrective action and to obtain, if applicable, a corrected statement of expenses for each grant.

c. The Exhibit A, illustrated in Figure 13-7-1, will not be included.

### 13-703.4 Report Exhibit A

a. An Exhibit A should be included in the report substantially in the format illustrated in Figure 13-7-1. The amounts shown in the Costs Submitted column should be obtained from the grantee, and should represent the total for all grants. See 13-702 for non-DHHS grants. Costs questioned as disclosed by the audit will be explained in footnotes, and identified to grants or categories of grants, when feasible.

b. Any unacceptable direct costs disclosed in the audit will be identified to the grant to which applicable. In addition, the audit report will, if possible, contain the projection of unacceptable costs, or will present the total amount of

unacceptable costs for each grant, as described in 13-405.

c. A statement concerning indirect cost rates for the period covered by the report will be included, cross referenced to any applicable costs questioned. For research grants, the overhead rate should be the rate as developed from the overhead rate audit on DoD research contracts for the fiscal year(s) involved or the negotiated rates or finally determined rates, if available.

### 13-703.5 Exhibit on Grants in Effect During the Fiscal Year

The auditor should obtain from the grantee and include in the audit report an exhibit, designated Exhibit B, listing grants in effect during and at the close of the fiscal year covered by the audit report, and showing for each division and subdivision of DHHS, the grant number and dollar amount of expenditures for each grant during the fiscal year.

### 13-703.6 Report Frequency and Distribution

a. The report, setting forth the results of the audit of the grantee's policies, procedures, and management practices, will be submitted in an original and 14 copies to the appropriate DHHS audit office as determined from the listing in Chapter 10-507c and Supplement 15-1S3. Indirect cost reports will continue to be submitted in accordance with instructions in 10-500.

b. A separate audit report will be submitted promptly to the DHHS regional audit office when it is determined that controls are inadequate, or when there are any other unusual circumstances which will have an immediate and significant impact on costs incurred under DHHS grants and contracts.

c. Departures from procedures described above may be arranged between the DCAA regional director and regional auditor to meet the special needs of the local situations.

## 13-704 Reporting Under AID Programs

a. A report will be issued annually on each AID contractor to cover all AID contracts in effect during the contractor's fiscal year. Annual audit reports should cover indirect costs for the audit period and should be considered as interim reports. AID has requested that the audit of direct costs be included in the final audit report for each contract.

b. The contract cost summary, required by the terms of the contract to be prepared by the contractor, should be included in the audit report. The contracts require these summaries to show:

(1) The major cost categories as listed in the contract budget and the funds budgeted for each category.

(2) Cumulative contract costs billed by major cost categories to the beginning of the audit period or adjusted for recommended audit disapprovals or suspensions as accepted by AID.

(3) Cumulative contract costs billed by major cost categories during the audit period (corresponding to invoiced incurred costs).

c. Any recommended audit adjustments or costs questioned for the audit period will be reported by major cost categories. The explanatory notes for these items should be sufficiently detailed to enable AID to fully inform the contractor of the basis for the cost adjustments or disapprovals. In this regard, the audit report should contain a request that the auditor be notified of the contracting officer's determination relative to costs questioned.

d. Comments also should be included regarding any major cost categories in which the actual costs incurred exceed the budgetary limitations by more than the permissible variation (usually 15 percent of the amount budgeted) provided for by the contract.

e. In the event advances have been made under AID contracts, the audit report should contain comments on the reasonableness of the amounts considering the periodic needs of the contractor to finance performance of the contracts.

f. The audit report should include a statement of the extent of contractor's compliance with the nonfinancial requirements of the AID university contracts. These usually relate to the contractor's procurement of equipment, the use of U.S. flag carriers (ships and aircraft)

and personnel travel by economy class and by the most direct routing.

g. DCAA comments on contractor action to implement recommendations contained in AAG audit reports should be included together with any assist audit information requested.

h. During the course of the annual audit, the auditor should ascertain those AID contracts for which a final voucher was submitted during the audit period. In addition to the reporting requirements stated above, the auditor will issue a final audit report for each such completed contract conforming generally to the format and content prescribed for contract audit closing statements in 10-900 but modified to include the contract cost summary and, to the extent appropriate, the other data discussed in the above paragraphs. All periods for which final indirect cost rates have not been determined or negotiated by AID will be stated in the report, and the report will be qualified accordingly.

i. Audit reports issued on AID contracts should be submitted in an original and two copies addressed to Office of Regional Inspector General/Audit/Washington, Room 514 RPE, Agency for International Development, Washington, DC 20523.

**Figure 13-7-1**

**Sample Audit Report Exhibit A on DHHS Grants**



**STATE UNIVERSITY**
**JONESVILLE, VIRGINIA**
**STATEMENT OF COSTS INCURRED ON DHHS RESEARCH GRANTS AND RESULTS OF AUDIT**
**YEAR ENDED JUNE 30, 1965**

| Element of Cost | Amount Submitted by Grantee* | Results of Audit | |
|---|---|---|---|
| | | Costs Questioned | Note Ref. |
| Salaries and wages | | | |
| Materials and supplies | | | |
| Consultant fees | | | |
| Travel expenses | | | |
| Communication expense (toll charges) | | | |
| Equipment | | | |
| Total direct costs | | | |
| Indirect costs | | | |
| Total costs | | | |
| Less grantee's contribution* | | | |
| Net reimbursable costs | | | |

*Dependent on the institution's accounting system, this column may represent either gross costs incurred for each cost element or the net amount exclusive of the institutions contribution under grants with cost-sharing provisions The line designated "Less Grantee's contribution" is necessary only where gross costs are shown

## 13-800 Section 8 — OMB Circular A-122 Cost Principles for Audits of Nonprofit Organizations

### 13-801 Introduction

a. This subsection introduces Office of Management and Budget (OMB) Circular A-122 "Cost Principles for Nonprofit Organizations." For guidance on contract audits at educational institutions see 13-100 through 13-700.

b. The cost principles described in this chapter and contained in OMB Circular A-122 should be used in conjunction with the guidance contained in other sections of this manual for reviewing specific areas of cost at applicable nonprofit organizations. A current copy of OMB Circular A-122 should be available at each field audit office (FAO). FAOs which do not have a current and complete copy should contact the regional office.

### 13-802 Applicability

a. OMB Circular A-122 establishes principles to be used by all Federal agencies for determining costs of grants, contracts and other agreements with nonprofit organizations as defined by the Circular (see 13-803). The principles do not apply to awards under which an organization is not required to account to the government for actual costs incurred. Provision for profit or other increment above cost is outside the scope of the Circular.

b. Cost reimbursable subawards (i.e., subgrants, subcontracts, etc.) are subject to the Federal cost principles applicable to the organization to which they were awarded. Thus, for subawards to nonprofit organizations, OMB Circular A-122 applies; for subawards to commercial organizations, the cost principles applicable to commercial concerns apply; for subawards to colleges or universities, OMB Circular A-21 applies; and for subawards to State, local or federally recognized Indian tribal governments, OMB Circular A-87 applies.

c. DFARS 231.7 makes certain statutorily prohibited costs unallowable for contracts with nonprofit organizations. The revision applies to DoD contracts entered into after 15 November 1990. OMB will revise Circular A-122 to incorporate DFARS 231.7.

### 13-803 Nonprofit Organizations

a. Circular A-122 defines nonprofit organizations as any corporation, trust, association, cooperative, or other organization which (1) is operated primarily for scientific, educational, service, charitable, or similar purposes in the public interest; (2) is not organized primarily for profit; and (3) uses its net proceeds to maintain, improve, and/or expand its operations. Excluded from this definition are (1) colleges and universities; (2) hospitals; (3) state, local and federally recognized Indian tribal governments; and (4) other nonprofit organizations which because of their size and nature of their operations are considered similar to commercial concerns.

b. Nonprofit organizations with the characteristics described in (4) above are subject to Federal cost principles applicable to commercial concerns. A listing of these firms is contained in Attachment C of the Circular, but other organizations not listed in the Circular may be added from time to time.

### 13-804 Basic Audit Approach

a. The same basic audit approach described in the other chapters of this manual are to be applied to nonprofit organizations. Audit problems specific to nonprofit organizations not adequately covered in other sections of this manual may be referred to Headquarters, DCAA (Attn: PFD).

b. OMB Circular A-122, Attachment A, Section A.2.e., requires the nonprofit organization to compute allowable costs in accordance with Generally Accepted Accounting Principles (GAAP). To be compliant with GAAP, a nonprofit's incurred cost submission usually has to be based on accrual accounting. GAAP allows the use of cash basis accounting only

if the nonprofit organization demonstrates that the results of the cash basis do not differ significantly from the results of the accrual basis. It is the responsibility of the nonprofit (not the auditor) to make this demonstration.

## 13-S1 Supplement — Cost Principles for Educational Institutions

[Reformatted for CAM Publication]
EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
[Seal] WASHINGTON, D.C. 20503

CIRCULAR NO. A-21
FEB 26 1979 Revised

TO THE HEADS OF EXECUTIVE DEPARTMENTS AND ESTABLISHMENTS

SUBJECT: Cost principles for educational institutions

1. Purpose. This Circular establishes principles for determining costs applicable to grants, contracts, and other agreements with educational institutions. The principles deal with the subject of cost determination, and make no attempt to identify the circumstances or dictate the extent of agency and institutional participation in the financing of a particular project. The principles are designed to provide that the Federal Government bear its fair share of total costs, determined in accordance with generally accepted accounting principles, except where restricted or prohibited by law. Agencies are not expected to place additional restrictions on individual items of cost. Provision for profit or other increment above cost is outside the scope of this Circular.

2. Supersession. The Circular supersedes Federal Management Circular 73-8, dated December 19, 1973. FMC 73-8 is revised and reissued under its original designation of OMB Circular No. A-21.

3. Applicability.

a. All Federal agencies that sponsor research and development, training, and other work at educational institutions shall apply the provisions of this Circular in determining the costs incurred for such work. The principles shall also be used as a guide in the pricing of fixed price or lump sum agreements.

b. In addition, Federally Funded Research and Development Centers associated with educational institutions shall be required to comply with the Cost Accounting Standards, rules and regulations issued by the Cost Accounting Standards Board, and set forth in 4 CFR. Ch. III; provided that they are subject thereto under defense related contracts.

4. Responsibilities. The successful application of cost accounting principles requires development of mutual understanding between representatives of educational institutions and of the Federal Government as to their scope, implementation, and interpretation.

5. Attachment. The principles and related policy guides are set forth in the Attachment, "Principles for determining costs applicable to grants, contracts, and other agreements with educational institutions."

6. Effective date. The provisions of this Circular shall be effective October 1, 1979. The provisions shall be implemented by institutions as of the start of their first fiscal year beginning after that date. Earlier implementation, or a delay in implementation of individual provisions, is permitted by mutual agreement between an institution and the cognizant Federal agency.

7. Inquiries. Further information concerning this Circular may be obtained by contacting the Financial Management Branch, Budget Review Division, Office of Management and Budget, Washington, D.C. 20503, telephone (202) 395-6823.

[Signed]
Director

Attachment

Notes:
1. Five revisions to Circular No. A-21 have been made subsequent to 26 February 1979. This edition of OMB Circular A-21 reflects revisions made through transmittal memorandum number 4, dated 1 October 1991.
2. Transmittal memorandum number 5 to OMB Circular A-21 dated 15 July 1993 has not yet been interwoven into OMB Circular A-21. It has been included at the end of this CAM section (13-S1) for your use in reviewing indirect cost rates for fiscal years beginning on or after 1 January 1994.

# Principles for Determining Costs Applicable to Grants, Contracts, and Other Agreements with Educational Institutions

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## Principles for Determining Costs Applicable to Grants, Contracts, and Other Agreements With Educational Institutions

### A. Purpose and scope.

1. Objectives. This Attachment provides principles for determining the costs applicable to research and development, training, and other sponsored work performed by colleges and universities under grants, contracts, and other agreements with the Federal Government. These agreements are referred to as sponsored agreements.

2. Policy guides. The successful application of these cost accounting principles requires development of mutual understanding between representatives of universities and of the Federal Government as to their scope, implementation, and interpretation. It is recognized that-

a. The arrangements for Federal agency and institutional participation in the financing of a research, training, or other project are properly subject to negotiation between the agency and the institution concerned, in accordance with such Government-wide criteria or legal requirements as may be applicable.

b. Each institution, possessing its own unique combination of staff, facilities, and experience, should be encouraged to conduct research and educational activities in a manner consonant with its own academic philosophies and institutional objectives.

c. The dual role of students engaged in research and the resulting benefits to sponsored agreements are fundamental to the research effort and shall be recognized in the application of these principles.

d. Each institution, in the fulfillment of its obligations, should employ sound management practices.

e. The application of these cost accounting principles should require no significant changes in the generally accepted accounting practices of colleges and universities. However, the accounting practices of individual colleges and universities must support the accumulation of costs as required by the principles, and must provide for adequate documentation to support costs charged to sponsored agreements.

f. Cognizant Federal agencies involved in negotiating indirect cost rates and auditing should assure that institutions are generally applying these cost accounting principles on a consistent basis. Where wide variations exist in the treatment of a given cost item among institutions, the reasonableness and equitableness of such treatments should be fully considered during the rate negotiations and audit.

3. Application. These principles shall be used in determining the allowable costs of work performed by colleges and universities under sponsored agreements. The principles shall also be used in determining the costs of work performed by such institutions under subgrants, cost-reimbursement subcontracts, and other awards made to them under sponsored agreements. They also shall be used as a guide in the pricing of fixed-price contracts and subcontracts where costs are used in determining the appropriate price. The principles do not apply to:

a. Arrangements under which Federal financing is in the form of loans, scholarships, fellowships, traineeships, or other fixed amounts based on such items as education allowance or published tuition rates and fees of an institution.

b. Capitation awards.

c. Other awards under which the institution is not required to account to the Government for actual costs incurred.

### B. Definition of Terms.

1. Major functions of an institution refers to instruction, organized research, other sponsored activities, and other institutional activities as defined below:

a. Instruction means the teaching and training activities of an institution. Except for research training as provided in c. below, this term includes all teaching and training activities, whether they are offered for credits toward a degree or certificate or on a non-credit basis, and whether they are offered through regular

academic departments or separate divisions, such as a summer school division or an extension division. Also considered part of this major function are departmental research, and, where agreed to, university research.

(1) Sponsored instruction and training means specific instructional or training activity established by grant, contract, or cooperative agreement. For purposes of the cost principles, this activity may be considered a major function even though an institution's accounting treatment may include it in the instruction function.

(2) Departmental research means research development and scholarly activities that are not organized research and, consequently, are not separately budgeted and accounted for. Departmental research, for purposes of this document, is not considered as a major function, but as a part of the instruction function of the institution.

b. Organized research means all research and development activities of an institution that are separately budgeted and accounted for. It includes:

(1) Sponsored research means all research and development activities that are sponsored by Federal and non-Federal agencies and organizations. This term includes activities involving the training of individuals in research techniques (commonly called research training) where such activities utilize the same facilities as other research and development activities and where such activities are not included in the instruction function.

(2) University research means all research and development activities that are separately budgeted by the institution under an internal application of institutional funds. University research, for purposes of this document, may be considered a part of the instruction function, or may be combined with sponsored research under the function of organized research, or may be treated as a separate major function, as agreed to with the cognizant agency.

c. Other sponsored activities means programs and projects financed by Federal and non-Federal agencies and organizations which involve the performance of work other than instruction and organized research. Examples of such programs and projects are health service projects, and community service programs. However, when any of these activities are undertaken by the institution without outside support, they may be classified as other institutional activities.

d. Other institutional activities means all activities of an institution except: (1) instruction, departmental research, organized research, and other sponsored activities, as defined above; (2) indirect cost activities identified in Section F; and (3) specialized service facilities described in Section J.44. Other institutional activities include operation of residence halls, dining halls, hospitals and clinics, student unions, intercollegiate athletics, bookstores, faculty housing, student apartments, guest houses, chapels, theaters, public museums, and other similar auxiliary enterprises. This definition also includes any other categories of activities, costs of which are "unallowable" to sponsored agreements, unless otherwise indicated in the agreements.

2. Sponsored agreement, for purposes of this Circular, means any grant, contract, or other agreement between the institution and the Federal Government.

3. Allocation means the process of assigning a cost, or a group of costs, to one or more cost objective, in reasonable and realistic proportion to the benefit provided or other equitable relationship. A cost objective may be a major function of the institution, a particular service or project, a sponsored agreement, or an indirect cost activity, as described in Section F. The process may entail assigning a cost(s) directly to a final cost objective or through one or more intermediate cost objectives.

## C. Basic considerations.

1. Composition of total costs. The cost of a sponsored agreement is comprised of the allowable direct costs incident to its performance, plus the allocable portion of the allowable indirect costs of the institution, less applicable credits as described in 5 below.

2. Factors affecting allowability of costs. The tests of allowability of costs

under these principles are: (a) they must be reasonable; (b) they must be allocable to sponsored agreements under the principles and methods provided herein; (c) they must be given consistent treatment through application of those generally accepted accounting principles appropriate to the circumstances; and (d) they must conform to any limitations or exclusions set forth in these principles or in the sponsored agreement as to types or amounts of cost items.

3. Reasonable costs. A cost may be considered reasonable if the nature of the goods or services acquired or applied, and the amount involved therefor, reflect the action that a prudent person would have taken under the circumstances prevailing at the time the decision to incur the cost was made. Major considerations involved in the determination of the reasonableness of a cost are: (a) whether or not the cost is of a type generally recognized as necessary for the operation of the institution or the performance of the sponsored agreement; (b) the restraints or requirements imposed by such factors as arm's-length bargaining, Federal and State laws and regulations, and sponsored agreement terms and conditions; (c) whether or not the individuals concerned acted with due prudence in the circumstances, considering their responsibilities to the institution, its employees, its students, the Government, and the public at large; and (d) the extent to which the actions taken with respect to the incurrence of the cost are consistent with established institutional policies and practices applicable to the work of the institution generally, including sponsored agreements.

4. Allocable costs.

a. A cost is allocable to a particular cost objective (i.e., a specific function, project, sponsored agreement, department, or the like) if the goods or services involved are chargeable or assignable to such cost objective in accordance with relative benefits received or other equitable relationship. Subject to the foregoing, a cost is allocable to a sponsored agreement if (1) it is incurred solely to advance the work under the sponsored agreement; (2) it benefits both the sponsored agreement and other work of the institution, in proportions that can be approximated through use of reasonable methods, or (3) it is necessary to the overall operation of the institution and, in light of the principles provided in this Circular, is deemed to be assignable in part to sponsored projects. Where the purchase of equipment or other capital items is specifically authorized under a sponsored agreement, the amounts thus authorized for such purchases are assignable to the sponsored agreement regardless of the use that may subsequently be made of the equipment or other capital items involved.

b. Any costs allocable to a particular sponsored agreement under the standards provided in this Part may not be shifted to other sponsored agreements in order to meet deficiencies caused by overruns or other fund considerations, to avoid restrictions imposed by law or by terms of the sponsored agreement, or for other reasons of convenience.

c. Any costs allocable to activities sponsored by industry, foreign governments or other sponsors may not be shifted to Federally sponsored agreements.

5. Applicable credits.

a. The term applicable credits refers to those receipts or negative expenditures that operate to offset or reduce direct or indirect cost items. Typical examples of such transactions are: purchase discounts, rebates, or allowances; recoveries or indemnities on losses; and adjustments of overpayments or erroneous charges. This term also includes "educational discounts" on products or services provided specifically to educational institutions, such as discounts on computer equipment, except where the arrangement is clearly and explicitly identified as a gift by the vendor.

b. In some instances, the amounts received from the Federal Government to finance institutional activities or service operations should be treated as applicable credits. Specifically, the concept of netting such credit items against related expenditures should be applied by the institution in determining the rates or amounts to be charged to sponsored agreements for services rendered whenever the facilities or other resources used in providing such services have been

financed directly, in whole or in part, by Federal funds. (See Sections F8, J.12a, and J.44 for areas of potential application in the matter of direct Federal financing.)

6. Costs incurred by State and local governments. Costs incurred or paid by State or local governments on behalf of their colleges and universities for fringe benefit programs such as pension costs and FICA and any other costs specifically incurred on behalf of, and in direct benefit to, the institutions are allowable costs of such institutions whether or not these costs are recorded in the accounting records of the institutions, subject to the following:

a. The costs meet the requirements of C1 through 5 above.

b. The costs are properly supported by cost allocation plans in accordance with applicable Federal cost accounting principles.

c. The costs are not otherwise borne directly or indirectly by the Federal Government.

7. Limitations on allowance of costs. Sponsored agreements may be subject to statutory requirements that limit the allowance of costs. When the maximum amount allowable under a limitation is less than the total amount determined in accordance with the principles in this Circular, the amount not recoverable under a sponsored agreement may not be charged to other sponsored agreements.

8. Collection of unallowable costs. Costs specifically identified as unallowable in Section J and charged to the government, either directly or indirectly, will be refunded (including interest chargeable in accordance with applicable Federal agency regulations).

9. Adjustment of previously negotiated indirect cost rates containing unallowable costs. Negotiated indirect cost rates based on a proposal later found to have included costs that (a) are unallowable as specified by (i) law or regulation, (ii) section J of this Circular, (iii) terms and conditions of sponsored agreements or (b) are unallowable because they are clearly not allocable to sponsored agreements, shall be adjusted, or a refund shall be made, in accordance with the requirements of this section. These adjustments or refunds are designed to correct the proposals used to establish the rates and do not constitute a reopening of the rate negotiation. The adjustments or refunds will be made regardless of the type of rate negotiated (predetermined, final, fixed, or provisional).

a. For rates covering a future fiscal year of the institution, the unallowable costs will be removed from the indirect cost pools and the rates appropriately adjusted.

b. For rates covering a past period, the Federal share of the unallowable costs will be computed for each year involved and a cash refund (including interest chargeable in accordance with applicable regulations) will be made to the Federal Government. If cash refunds are made for past periods covered by provisional or fixed rates, appropriate adjustments will be made when the rates are finalized to avoid duplicate recovery of the unallowable costs by the Federal Government.

c. For rates covering the current period, either a rate adjustment or a refund, as described in subsections a and b, shall be required by the cognizant agency. The choice of method shall be at the discretion of the cognizant agency, based on its judgment as to which method would be most practical.

d. The amount or proportion of unallowable costs included in each year's rate will be assumed to be the same as the amount or proportion of unallowable costs included in the base year proposal used to establish the rate.

## D. Direct costs.

1. General. Direct costs are those costs that can be identified specifically with a particular sponsored project, an instructional activity, or any other institutional activity; or that can be directly assigned to such activities relatively easily with a high degree of accuracy.

2. Application to sponsored agreements. Identification with the sponsored work rather than the nature of the goods and services involved is the determining factor in distinguishing direct from indirect costs of sponsored agreements. Typical costs charged directly to a sponsored agreement are the compensation of employees for performance of work under

the sponsored agreement, including related fringe benefit costs to the extent they are consistently treated, in like circumstances, by the institution as direct rather than indirect costs; the costs of materials consumed or expended in the performance of the work; and other items of expense incurred for the sponsored agreement, including extraordinary utility consumption. The cost of materials supplied from stock or services rendered by specialized facilities or other institutional service operations may be included as direct costs of sponsored agreements, provided such items are consistently treated, in like circumstances, by the institution as direct rather than indirect costs, and are charged under a recognized method of computing actual costs, and conform to generally accepted cost accounting practices consistently followed by the institution.

## E. Indirect costs.

1. General. Indirect costs are those that are incurred for common or joint objectives and therefore cannot be identified readily and specifically with a particular sponsored project, an instructional activity, or any other institutional activity. At educational institutions such costs normally are classified under the following indirect cost categories: depreciation and use allowances, general administration and general expenses, sponsored projects administration expenses, operation and maintenance expenses, library expenses, departmental administration expenses, and student administration and services.

2. Criteria for distribution.

a. Base period. A base period for distribution of indirect costs is the period during which the costs are incurred. The base period normally should coincide with the fiscal year established by the institution, but in any event the base period should be so selected as to avoid inequities in the distribution of costs.

b. Need for cost groupings. The overall objective of the indirect cost allocation process is to distribute the indirect costs described in Section F to the major functions of the institution in proportions reasonably consistent with the nature and extent of their use of the institution's resources. In order to achieve this objective, it may be necessary to provide for selective distribution by establishing separate groupings of cost within one or more of the indirect cost categories referred to in E1 above. In general, the cost groupings established within a category should constitute, in each case, a pool of those items of expense that are considered to be of like nature in terms of their relative contribution to (or degree of remoteness from) the particular cost objectives to which distribution is appropriate. Cost groupings should be established considering the general guides provided in c below. Each such pool or cost grouping should then be distributed individually to the related cost objectives, using the distribution base or method most appropriate in the light of the guides set forth in d below.

c. General considerations on cost groupings. The extent to which separate cost groupings and selective distribution would be appropriate at an institution is a matter of judgment to be determined on a case-by-case basis. Typical situations which may warrant the establishment of two or more separate cost groupings (based on account classification or analysis) within an indirect cost category include but are not limited to the following:

(1) Where certain items or categories of expense relate solely to one of the major functions of the institution or to less than all functions, such expenses should be set aside as a separate cost grouping for direct assignment or selective allocation in accordance with the guides provided in E2b and d.

(2) Where any types of expense ordinarily treated as general administration or departmental administration are charged to sponsored agreements as direct costs, expenses applicable to other activities of the institution when incurred for the same purposes in like circumstances must, through separate cost groupings, be excluded from the indirect costs allocable to those sponsored agreements and included in the direct cost of other activities for cost allocation purposes.

(3) Where it is determined that certain expenses are for the support of a service

unit or facility whose output is susceptible of measurement on a workload or other quantitative basis, such expenses should be set aside as a separate cost grouping for distribution on such basis to organized research, instructional, and other activities at the institution or within the department.

(4) Where activities provide their own purchasing, personnel administration, building maintenance or similar service, the distribution of general administration and general expenses, or operation and maintenance expenses to such activities should be accomplished through cost groupings which include only that portion of central indirect costs (such as for overall management) which are properly allocable to such activities.

(5) Where the institution elects to treat fringe benefits as indirect charges, such costs should be set aside as a separate cost grouping for selective distribution to related cost objectives.

(6) The number of separate cost groupings within a category should be held within practical limits, after taking into consideration the materiality of the amounts involved and the degree of precision attainable through less selective methods of distribution.

d. Selection of distribution method.

(1) Actual conditions must be taken into account in selecting the method or base to be used in distributing individual cost groupings. The essential consideration in selecting a base is that it be the one best suited for assigning the pool of costs to cost objectives in accordance with benefits derived; a traceable cause and effect relationship; or logic and reason, where neither benefit nor cause and effect relationship is determinable.

(2) Where a cost grouping can be identified directly with the cost objective benefited, it should be assigned to that cost objective.

(3) Where the expenses in a cost grouping are more general in nature, the distribution may be based on a cost analysis study which results in an equitable distribution of the costs. Such cost analysis studies may take into consideration weighting factors, population, or space occupied if appropriate. Cost analysis studies, however, must (a) be appropriately documented in sufficient detail for subsequent review by the cognizant Federal agency, (b) distribute the costs to the related cost objectives in accordance with the relative benefits derived, (c) be statistically sound, (d) be performed specifically at the institution at which the results are to be used, and (e) be reviewed periodically, but not less frequently than every two years, updated if necessary, and used consistently. Any assumptions made in the study must be stated and explained. The use of cost analysis studies and periodic changes in the method of cost distribution must be fully justified.

(4) If a cost analysis study is not performed, or if the study does not result in an equitable distribution of the costs, the distribution shall be made in accordance with the appropriate base cited in Section F., unless one of the following conditions is met: (a) it can be demonstrated that the use of a different base would result in a more equitable allocation of the costs, or that a more readily available base would not increase the costs charged to sponsored agreements, or (b) the institution qualifies for, and elects to use, the simplified method for computing indirect cost rates described in Section H.

e. Order of Distribution.

(1) Indirect cost categories consist of depreciation and use allowance, operation and maintenance, general administration and general expenses, departmental administration, sponsored projects administration, library, and student administration and services, as described in Section F.

(2) Depreciation and use allowances, operation and maintenance expenses, and general administrative and general expenses should be allocated in that order to the remaining indirect cost categories as well as to the major functions and specialized service facilities of the institution. Other cost categories may be allocated in the order determined to be most appropriate by the institutions. When cross allocation of costs is made as provided in (3) below, this order of allocation does not apply.

(3) Normally an indirect cost category will be considered closed once it has been allocated to other cost objectives, and

costs may not be subsequently allocated to it. However, a cross allocation of costs between two or more indirect cost categories may be used if such allocation will result in a more equitable allocation of costs. If a cross allocation is used, an appropriate modification to the composition of the indirect cost categories described in Section F is required.

**F. Identification and assignment of indirect costs.**

1. Depreciation and use allowances.

a. The expenses under this heading are the portion of the costs of the institution's buildings, capital improvements to land and buildings, and equipment which are computed in accordance with Section J.12.

b. In the absence of the alternatives provided for in Section E2d, the expenses included in this category shall be allocated in the following manner:

(1) Depreciation or use allowances on buildings used exclusively in the conduct of a single function, and on capital improvements and equipment used in such buildings, shall be assigned to that function.

(2) Depreciation or use allowances on buildings, used for more than one function, and on capital improvements and equipment used in such buildings, shall be allocated to the individual functions performed in each building on the basis of usable square feet of space, excluding common areas such as hallways, stairwells, and restrooms.

(3) Depreciation or use allowances on buildings and capital improvements where space is used jointly, and on equipment used jointly, shall be allocated to benefiting functions in proportion to the total salaries and wages applicable to the joint functions.

(4) Depreciation or use allowances on buildings, capital improvements, and equipment used predominantly for one function and only incidentally for other(s), may be assigned to the function in which it is used predominantly.

(5) Depreciation or use allowances on certain capital improvements to land, such as paved parking areas, fences, sidewalks, and the like, not included in the cost of buildings, shall be allocated to user categories of students and employees on a full-time equivalent basis. The amount allocated to the student category shall be assigned to the instruction function of the institution. The amount allocated to the employee category shall be further allocated to the major functions of the institution in proportion to the salaries and wages of all employees applicable to those functions.

2. Operation and maintenance expenses.

a. The expenses under this heading are those that have been incurred by a central service organization or at the departmental level for the administration, supervision, operation, maintenance, preservation, and protection of the institution's physical plant. They include expenses normally incurred for such items as janitorial and utility services; repairs and ordinary or normal alterations of buildings, furniture and equipment; and care of grounds and maintenance and operation of buildings and other plant facilities. The operation and maintenance expense category should also include the fringe benefit costs applicable to the salaries and wages included therein, and depreciation and use allowance.

b. In the absence of the alternatives provided for in Section E2d, the expenses included in this category shall be allocated in the same manner as described in Section F1b for depreciation and use allowances.

3. General administration and general expenses.

a. The expenses under this heading are those that have been incurred for the general executive and administrative offices of educational institutions and other expenses of a general character which do not relate solely to any major function of the institution; i.e., solely to (1) instruction, (2) organized research, (3) other sponsored activities, or (4) other institutional activities. The general administration and general expense category should also include the fringe benefit costs applicable to the salaries and wages included therein, an appropriate share of operation and maintenance expense, and depreciation and use allowances. General administration and general expenses shall

not include expenses incurred within non-university-wide deans' offices, academic departments, organized research units, or similar organizational units. (See section F.4., departmental administration expenses.)

b. In the absence of the alternatives provided for in Section E2d, the expenses included in this category shall be grouped first according to common major functions of the institution to which they render services or provide benefits. The aggregate expenses of each group shall then be allocated to serviced or benefited functions on the modified total cost basis. Modified total costs consist of salaries and wages, fringe benefits, materials and supplies, services, travel, and subgrants and subcontracts up to $25,000 each. When an activity included in this indirect cost category provides a service or product to another institution or organization, an appropriate adjustment must be made to either the expenses or the basis of allocation or both, to assure a proper allocation of costs.

4. Departmental administration expenses.

a. The expenses under this heading are those that have been incurred for administrative and supporting services that benefit common or joint departmental activities or objectives in academic deans' offices, academic departments and divisions, and organized research units. Organized research units include such units as institutes, study centers, and research centers. Departmental administration expenses are subject to the following limitations.

(1) Academic deans' offices. Salaries and operating expenses are limited to those attributable to administrative functions.

(2) Academic departments:

(a) Salaries and fringe benefits attributable to the administrative work (including bid and proposal preparation) of faculty (including department heads), and other professional personnel conducting research and/or instruction, shall be allowed at a rate of 3.6 percent of modified total direct costs. This category does not include professional business or professional administrative officers. This allowance shall be added to the computation of the indirect cost rate for major functions in section G; the expenses covered by the allowance shall be excluded from the departmental administration cost pool. No documentation is required to support this allowance.

(b) Other administrative and supporting expenses incurred within academic departments are allowable provided they are treated consistently in like circumstances. This would include expenses such as the salaries of secretarial and clerical staffs, the salaries of administrative officers and assistants, travel, office supplies, stockrooms, and the like.

(3) Other fringe benefit costs applicable to the salaries and wages included in (1) and (2) above are allowable, as well as an appropriate share of general administration and general expenses, operation and maintenance expenses, and depreciation and/or use allowances.

b. In the absence of the alternatives provided for in Section E2d, the expenses included in this category shall be allocated as follows:

(1) The administrative expenses of the dean's office of each college and school shall be allocated to the academic departments within that college or school on the modified total cost basis.

(2) The administrative expenses of each academic department, and the department's share of the expenses allocated in (1) above shall be allocated to the appropriate functions of the department on the modified total cost basis.

5. Sponsored projects administration.

a. The expenses under this heading are limited to those incurred by a separate organization(s) established primarily to administer sponsored projects, including such functions as grant and contract administration (Federal and non-Federal), special security, purchasing, personnel administration, and editing and publishing of research and other reports. They include the salaries and expenses of the head of such organization, assistants, and immediate staff, together with the salaries and expenses of personnel engaged in supporting activities maintained by the organization, such as stock rooms, stenographic pools and the like. This category also includes an allocable share of fringe benefit costs, general adminis-

tration and general expenses, operation and maintenance expenses, and depreciation/use allowances. Appropriate adjustments will be made for services provided to other functions or organizations.

b. In the absence of the alternatives provided for in Section E2d, the expenses included in this category shall be allocated to the major functions of the institution under which the sponsored projects are conducted on the basis of the modified total cost of sponsored projects.

c. An appropriate adjustment shall be made to eliminate any duplicate charges to sponsored agreements when this category includes similar or identical activities as those included in the general administration and general expense category or other indirect cost items, such as accounting, procurement, or personnel administration.

6. Library expenses.

a. The expenses under this heading are those that have been incurred for the operation of the library, including the cost of books and library materials purchased for the library, less any items of library income that qualify as applicable credits under Section C5. The library expense category should also include the fringe benefits applicable to the salaries and wages included therein, an appropriate share of general administration and general expense, operation and maintenance expense, and depreciation and use allowances. Costs incurred in the purchases of rare books (museum-type books) with no value to sponsored agreements should not be allocated to them.

b. In the absence of the alternatives provided for in Section E2d, the expenses included in this category shall be allocated first on the basis of primary categories of users, including students, professional employees, and other users.

(1) The student category shall consist of full-time equivalent students enrolled at the institution, regardless of whether they earn credits toward a degree or certificate.

(2) The professional employee category shall consist of all faculty members and other professional employees of the institution, on a full-time equivalent basis.

(3) The other users category shall consist of all other users of library facilities.

c. Amounts allocated in b above shall be assigned further as follows:

(1) The amount in the student category shall be assigned to the instruction function of the institution.

(2) The amount in the professional employee category shall be assigned to the major functions of the institution in proportion to the salaries and wages of all faculty members and other professional employees applicable to those functions.

(3) The amount in the other users category shall be assigned to the other institutional activities function of the institution.

7. Student administration and services.

a. The expenses under this heading are those that have been incurred for the administration of student affairs and for services to students, including expenses of such activities as deans of students, admissions, registrar, counseling and placement services, student advisers, student health and infirmary services, catalogs, and commencements and convocations. The salaries of members of the academic staff whose responsibilities to the institution require administrative work that benefits sponsored projects may also be included to the extent that the portion charged to Student Administration is determined in accordance with Section J.6. This expense category also includes the fringe benefit costs applicable to the salaries and wages included therein, an appropriate share of general administration and general expenses, operation and maintenance, and use allowances and/or depreciation.

b. In the absence of the alternatives provided for in Section E2d, the expenses in this category shall be allocated to the instruction function, and subsequently to sponsored agreements in that function.

8. Offset for indirect expenses otherwise provided for by the Government.

a. The items to be accumulated under this heading are the reimbursements and other payments from the Federal Government which are made to the institution to support solely, specifically, and directly, in whole or in part, any of the administrative or service activities described in F1 through 7 above.

b. The items in this group shall be treated as a credit to the affected individ-

ual indirect cost category before that category is allocated to benefiting functions.

## G. Determination and application of indirect cost rate or rates.

1. Indirect cost pools.

a. (1) Subject to subsection b, the separate categories of indirect costs allocated to each major function of the institution as prescribed in Section F shall be aggregated and treated as a common pool for that function. The amount in each pool shall be divided by the distribution base described in Section G.2 below to arrive at a single indirect cost rate for each function.

(2) The rate for each function is used to distribute indirect costs to individual sponsored agreements of that function. Since a common pool is established for each major function of the institution, a separate indirect cost rate would be established for each of the major functions described in Section B.1 under which sponsored agreements are carried out.

(3) Each institution's indirect cost rate process must be appropriately designed to ensure that Federal sponsors do not in any way subsidize the indirect costs of other sponsors, specifically activities sponsored by industry and foreign governments. Accordingly, each allocation method used to identify and allocate the indirect cost pools, as described in sections E.2 and F.1 through F.7, must contain the full amount of the institutions modified total costs or other appropriate units of measurement used to make the computations. In addition, the final rate distribution base (as defined in section G.2) for each major function (organized research, instruction, etc., as described in section B.1) shall contain all the programs or activities which utilize the indirect costs allocated to that major function. At the time an indirect cost proposal is submitted to a Federal cognizant agency, each institution must describe the process it uses to ensure that Federal funds are not used to subsidize industry and foreign government funded programs.

b. In some instances a single rate basis for use across the board on all work within a major function at an institution may not be appropriate. A single rate for research, for example, might not take into account those different environmental factors and other conditions which may affect substantially the indirect costs applicable to a particular segment of research at the institution. A particular segment of research may be that performed under a single sponsored agreement or it may consist of research under a group of sponsored agreements performed in a common environment. The environmental factors are not limited to the physical location of the work. Other important factors are the level of the administrative support required, the nature of the facilities or other resources employed, the scientific disciplines or technical skills involved, the organizational arrangements used, or any combination thereof. Where a particular segment of a sponsored agreement is performed within an environment which appears to generate a significantly different level of indirect costs, provision should be made for a separate indirect cost pool applicable to such work. The separate indirect cost pool should be developed during the regular course of the rate determination process and the separate indirect cost rate resulting therefrom should be utilized; provided it is determined that (1) such indirect cost rate differs significantly from that which would have been obtained under a. above, and (2) the volume of work to which such rate would apply is material in relation to other sponsored agreements at the institution.

2. The distribution basis. Indirect costs shall be distributed to applicable sponsored agreements on the basis of modified total direct costs, consisting of salaries and wages, fringe benefits, materials and supplies, services, travel, and subgrants and subcontracts up to $25,000 each. For this purpose, an indirect cost rate should be determined for each of the separate indirect cost pools developed pursuant to G1, above. The rate in each case should be stated as the percentage which the amount of the particular indirect cost pool is of the modified total direct costs identified with such pool. Other bases may be used where it can be

demonstrated that they produce more equitable results.

3. Negotiated lump sum for indirect costs. A negotiated fixed amount in lieu of indirect costs may be appropriate for self-contained, off-campus, or primarily subcontracted activities where the benefits derived from an institution's indirect services cannot be readily determined. Such negotiated indirect costs will be treated as an offset before allocation to instruction, organized research, other sponsored activities, and other institutional activities. The base on which such remaining expenses are allocated should be appropriately adjusted.

4. Predetermined fixed rates for indirect costs. Public Law 87-638 (76 Stat. 437) authorizes the use of predetermined fixed rates in determining the indirect costs applicable under research agreements with educational institutions. The stated objectives of the law are to simplify the administration of cost-type research and development contracts (including grants) with educational institutions, to facilitate the preparation of their budgets, and to permit more expeditious closeout of such contracts when the work is completed. In view of the potential advantages offered by this procedure, consideration should be given to the negotiation of predetermined fixed rates for indirect costs in those situations where the cost experience and other pertinent facts available are deemed sufficient to enable the parties involved to reach an informed judgment as to the probable level of indirect costs during the ensuing accounting period.

5. Negotiated fixed rates and carry-forward provisions. When a fixed rate is negotiated in advance for a fiscal year (or other time period), the over- or under-recovery for that year may be included as an adjustment to the indirect cost for the next rate negotiation. When the rate is negotiated before the carry-forward adjustment is determined, the carry-forward amount may be applied to the next subsequent rate negotiation. When such adjustments are to be made, each fixed rate negotiated in advance for a given period will be computed by applying the expected indirect costs allocable to sponsored agreements for the forecast period plus or minus the carry-forward adjustment (over- or under-recovery) from the prior period, to the forecast distribution base. Unrecovered amounts under lump-sum agreements or cost-sharing provisions of prior years shall not be carried forward for consideration in the new rate negotiation. There must, however, be an advance understanding in each case between the institution and the cognizant Federal agency as to whether these differences will be considered in the rate negotiation rather than making the determination after the differences are known. Further, institutions electing to use this carry-forward provision may not subsequently change without prior approval of the cognizant Federal agency. In the event that an institution returns to a postdetermined rate, any over- or under-recovery during the period in which negotiated fixed rates and carry-forward provisions were followed will be included in the subsequent post deter mined rates. Where multiple rates are used, the same procedure will be applicable for determining each rate.

6. Limitation on reimbursement of administrative costs.

a. Notwithstanding the provisions of G.1.a, the administrative costs charged to sponsored agreements awarded or amended (including continuation and renewal awards) with effective dates beginning on or after the start of the institution's first fiscal year which begins on or after October 1, 1991, shall be limited to 26% of modified total direct costs (as defined in section G.2) for the total of General Administration and General Expenses, Departmental Administration and Sponsored Projects Administration (including their allocable share of depreciation and/or use allowances, operation and maintenance expenses, and fringe benefit costs as provided by sections F.3.a., f.4.a.(3), and F.5.a).

b. Existing indirect cost rates that affect institutions' fiscal years which begin on or after October 1, 1991, shall be unilaterally amended by the cognizant Federal agency to reflect the cost limitation in subsection a above.

c. Permanent rates established prior to this revision which have been amended in accordance with subsection b may be

renegotiated. However, no such renegotiated rate may exceed the rate which would have been in effect if the agreement had remained in effect; nor may the administrative portion of any renegotiated rate exceed the limitation in subsection a.

d. Institutions should not change their accounting or cost allocation methods which were in effect on May 1, 1991, if the effect is to: (i) Change the charging of a particular type of cost from indirect to direct, or (ii) reclassify costs, or increase allocations, from the administrative pools identified in subsection a above to the other indirect cost pools or fringe benefits. Cognizant Federal agencies are authorized to permit changes where an institution's charging practices are at variance with acceptable practices followed by a substantial majority of other institutions.

7. Individual rate components. In order to satisfy the requirements of Section J.12.f and to provide mutually agreed upon information for management purposes, each indirect cost rate negotiation or determination shall include development of a rate for each indirect cost pool as well as the overall indirect cost rate.

## H. Simplified method for small institutions.

1. General.

a. Where the total direct cost of work covered by this Circular at an institution does not exceed $3,000,000 in a fiscal year, the use of the simplified procedure described in 2, below, may be used in determining allowable indirect costs. Under this simplified procedure, the institution's most recent annual financial report and immediately available supporting information with salaries and wages segregated from other costs, will be utilized as a basis for determining the indirect cost rate applicable to all sponsored agreements.

b. The simplified procedure should not be used where it produces results which appear inequitable to the Government or the institution. In any such case, indirect costs should be determined through use of the regular procedure.

2. Simplified procedure.

a. Establish the total amount of salaries and wages paid to all employees of the institution.

b. Establish an indirect cost pool consisting of the expenditures (exclusive of capital items and other costs specifically identified as unallowable) which customarily are classified under the following titles or their equivalents:

(1) General administration and general expenses (exclusive of costs of student administration and services, student activities, student aid, and scholarships).

(2) Operation and maintenance of physical plant; and depreciation and use allowances; after appropriate adjustment for costs applicable to other institutional activities.

(3) Library.

(4) Department administration expenses, which will be computed as 20 percent of the salaries and expenses of deans and heads of departments. In those cases where expenditures classified under (1) above have previously been allocated to other institutional activities, they may be included in the indirect cost pool. The total amount of salaries and wages included in the indirect cost pool must be separately identified.

c. Establish a salary and wage distribution base, determined by deducting from the total of salaries and wages as established in a above the amount of salaries and wages included under b above.

d. Establish the indirect cost rate, determined by dividing the amount in the indirect cost pool, b above, by the amount of the distribution base, c above.

e. Apply the indirect cost rate to direct salaries and wages for individual agreements to determine the amount of indirect costs allocable to such agreements.

## J. General provisions for selected items of cost.

Sections 1 through 50 below provide principles to be applied in establishing the allowability of certain items involved in determining cost. These principles should apply irrespective of whether a particular item of cost is properly treated as direct cost or indirect cost. Failure to mention a particular item of cost is not

intended to imply that it is either allowable or unallowable; rather determination as to allowability in each case should be based on the treatment provided for similar or related items of cost. In case of a discrepancy between the provisions of a specific sponsored agreement and the provisions below, the agreement should govern.

1. Advertising and public relations costs.

a. The term advertising costs means the costs of advertising media and corollary administrative costs. Advertising media include magazines, newspapers, radio and television programs, direct mail, exhibits, and the like.

b. The term public relations includes community relations and means those activities dedicated to maintaining the image of the institution or maintaining or promoting understanding and favorable relations with the community or public at large or any segment of the public.

c. The only allowable advertising costs are those which are solely for: (1) the recruitment of personnel required for the performance by the institution of obligations arising under the sponsored agreement, when considered in conjunction with all other recruitment costs, as set forth in Section J.37; (2) the procurement of goods and services for the performance of the sponsored agreement; (3) the disposal of scrap or surplus materials acquired in the performance of the sponsored agreement except when institutions are reimbursed for disposal costs at a predetermined amount in accordance with Attachment N, OMB Circular No. A-110; or (4) other specific purposes necessary to meet the requirements of the sponsored agreement.

d. The only allowable public relations costs are: (1) Costs specifically required by sponsored agreements; (2) Costs of communicating with the public and press pertaining to specific activities or accomplishments which result from performance of sponsored agreements; or (3) Costs of conducting general liaison with news media and government public relations officers, to the extent that such activities are limited to communication and liaison necessary to keep the public informed on matters of public concern such as notices of contract/grant awards, financial matters, etc.

e. Costs identified in c through d, if incurred for more than one sponsored agreement or for both sponsored work and other work of the institution, are allowable to the extent that the principles in section D and E are observed.

f. Unallowable advertising and public relations costs include the following: (1) All advertising and public relations costs other than as specified in subsections c, d, and e above; (2) Costs of convocations or other events related to instruction or other institutional activities including: (i) Costs of displays, demonstrations, and exhibits; (ii) Costs of meeting rooms, hospitality suites, and other special facilities used in conjunction with shows and other special events; and (iii) Salaries and wages of employees engaged in setting up and displaying exhibits, making demonstrations, and providing briefings; (3) Costs of promotional items and memorabilia, including models, gifts, and souvenirs; (4) Costs of advertising and public relations designed solely to promote the institution.

2. Alcoholic beverages. Costs of alcoholic beverages are unallowable.

3. Alumni activities. Costs incurred for, or in support of, alumni activities and similar services are unallowable.

4. Bad debts. Any losses, whether actual or estimated, arising from uncollectible accounts and other claims, related collections costs, and related legal costs, are unallowable.

5. Civil defense costs. Civil defense costs are those incurred in planning for, and the protection of life and property against the possible effects of enemy attack. Reasonable costs of civil defense measures (including costs in excess of normal plant protection costs, first-aid training and supplies, firefighting training, posting of additional exit notices and directions, and other approved civil defense measures) undertaken on the institution's premises pursuant to suggestions or requirements of civil defense authorities are allowable when distributed to all activities of the institution. Capital expenditures for civil defense purposes will not be allowed, but a use allowance or depreciation may be permitted in accor-

dance with provisions set forth in Section J.12. Costs of local civil defense projects not on the institution's premises are unallowable.

6. Commencement and convocation costs. Costs incurred for commencements and convocations are unallowable, except as provided for in Section F7.

7. Communication costs. Costs incurred for telephone services, local and long distance telephone calls, telegrams, radiograms, postage and the like, are allowable.

8. Compensation for personal services.

a. General. Compensation for personal services covers all amounts paid currently or accrued by the institution for services of employees rendered during the period of performance under sponsored agreements. Such amounts include salaries, wages, and fringe benefits. These costs are allowable to the extent that the total compensation to individual employees conforms to the established policies of the institution, consistently applied, and provided that the charges for work performed directly on sponsored agreements and for other work allocable as indirect costs are determined and supported as provided below. Charges to sponsored agreements may include reasonable amounts for activities contributing and intimately related to work under the agreements, such as delivering special lectures about specific aspects of the ongoing activity, writing reports and articles, participating in appropriate seminars, consulting with colleagues and graduate students, and attending meetings and conferences. Incidental work (that in excess of normal for the individual), for which supplemental compensation is paid by an institution under institutional policy, need not be included in the payroll distribution systems described below, provided such work and compensation are separately identified and documented in the financial management system of the institution.

b. (1) General Principles

(a) The distribution of salaries and wages, whether treated as direct or indirect costs, will be based on payrolls documented in accordance with the generally accepted practices of colleges and universities. Institutions may include in a residual category all activities that are not directly charged to sponsored agreements, and that need not be distributed to more than one activity for purposes of identifying indirect costs and the functions to which they are allocable. The components of the residual category are not required to be separately documented.

(b) The apportionment of employees' salaries and wages which are chargeable to more than one sponsored agreement or other cost objective will be accomplished by methods which will (1) be in accordance with Sections A-2 and C above, (2) produce an equitable distribution of charges for employees' activities, and (3) distinguish the employees' direct activities from their indirect activities.

(c) In the use of any methods for apportioning salaries, it is recognized that, in an academic setting, teaching, research, service, and administration are often inextricably intermingled. A precise assessment of factors that contribute to costs is not always feasible, nor is it expected. Reliance, therefore, is placed on estimates in which a degree of tolerance is appropriate.

(d) There is no single best method for documenting the distribution of charges for personal services. Methods for apportioning salaries and wages, however, must meet the criteria specified in J.8.b.[2] below. Examples of acceptable methods are contained in J.8.c. below. Other methods which meet the criteria specified in J.8.b.[2] below also shall be deemed acceptable, if a mutually satisfactory alternative agreement is reached.

(2) Criteria for Acceptable Methods

(a) The payroll distribution system will (i) be incorporated into the official records of the institution, (ii) reasonably reflect the activity for which the employee is compensated by the institution, and (iii) encompass both sponsored and all other activities on an integrated basis, but may include the use of subsidiary records. (Compensation for incidental work described in J.8.a. need not be included.)

(b) The method must recognize the principle of after-the-fact confirmation or determination so that costs distributed represent actual costs, unless a mutually

satisfactory alternative agreement is reached. Direct cost activities and indirect cost activities may be confirmed by responsible persons with suitable means of verification that the work was performed. Confirmation by the employee is not a requirement for either direct or indirect cost activities if other responsible persons make appropriate confirmations.

(c) The payroll distribution system will allow confirmation of activity allocable to each sponsored agreement and each of the categories of activity needed to identify indirect costs and the functions to which they are allocable. The activities chargeable to indirect cost categories or the major functions of the institution for employees whose salaries must be apportioned (see J.8.b.1.[b] above), if not initially identified as separate categories, may be subsequently distributed by any reasonable method mutually agreed to, including, but not limited to, suitably conducted surveys, statistical sampling procedures, or the application of negotiated fixed rates.

(d) Practices vary among institutions and within institutions as to the activity constituting a full workload. Therefore, the payroll distribution system may reflect categories of activities expressed as a percentage distribution of total activities.

(e) Direct and indirect charges may be made initially to sponsored agreements on the basis of estimates made before services are performed. When such estimates are used, significant changes in the corresponding work activity must be identified and entered into the payroll distribution system. Short-term (such as one or two months) fluctuation between workload categories need not be considered as long as the distribution of salaries and wages is reasonable over the longer term, such as an academic period.

(f) The system will provide for independent internal evaluations to ensure the system's effectiveness and compliance with the above standards.

(g) For systems which meet these standards, the institution will not be required to provide additional support or documentation for the effort actually performed.

c. Examples of Acceptable Methods for Payroll Distribution.

1. Plan-Confirmation: Under this method, the distribution of salaries and wages of professorial or professional staff applicable to sponsored agreements is based on budgeted, planned, or assigned work activity, updated to reflect any significant changes in work distribution. A plan-confirmation system used for salaries and wages charged directly or indirectly to sponsored agreements will meet the following standards:

(a) A system of budgeted, planned, or assigned work activity will be incorporated into the official records of the institution and encompass both sponsored and all other activities on an integrated basis. The system may include the use of subsidiary records.

(b) The system will reasonably reflect only the activity for which the employee is compensated by the institution (compensation for incidental work described in J.8.a. need not be included). Practices vary among institutions and within institutions as to the activity constituting a full workload. Hence, the system will reflect categories of activities expressed as a percentage distribution of total activities. (But see Section H for treatment of indirect costs under the simplified method for small institutions.)

(c) The system will reflect activity applicable to each sponsored agreement and to each category needed to identify indirect costs and the functions to which they are allocable. The system may treat indirect cost activities initially within a residual category and subsequently determine them by alternate methods as discussed in J.8.b.[2][c].

(d) The system will provide for modification of an individual's salary or salary distribution commensurate with any significant change in the employee's work activity. Short-term (such as one or two months) fluctuation between workload categories need not be considered as long as the distribution of salaries and wages is reasonable over the longer term such as an academic period. Whenever it is apparent that a significant change in work activity which is directly or indirectly charged to sponsored agreements will occur or has occurred, the change will be

documented over the signature of a responsible official and entered into the system.

(e) At least annually a statement will be signed by the employee, principal investigator, or responsible official(s) using suitable means of verification that the work was performed, stating that salaries and wages charged to sponsored agreements as direct charges, and to residual, indirect cost or other categories are reasonable in relation to work performed.

(f) The system will provide for independent internal evaluation to ensure the system's integrity and compliance with the above standards.

(g) In the use of this method, an institution shall not be required to provide additional support or documentation for the effort actually performed.

2. After-the-fact Activity Records: Under this system the distribution of salaries and wages by the institution will be supported by activity reports as prescribed below.

(a) Activity reports will reflect the distribution of activity expended by employees covered by the system (compensation for incidential work as described in J.8.a. need not be included).

(b) These reports will reflect an after-the-fact reporting of the percentage distribution of activity of employees. Charges may be made initially on the basis of estimates made before the services are performed, provided that such charges are promptly adjusted if significant differences are indicated by activity records.

(c) Reports will reasonably reflect the activities for which employees are compensated by the institution. To confirm that the distribution of activity represents a reasonable estimate of the work performed by the employee during the period, the reports will be signed by the employee, principal investigator, or responsible official(s) using suitable means of verification that the work was performed.

(d) The system will reflect activity applicable to each sponsored agreement and to each category needed to identify indirect costs and the functions to which they are allocable. The system may treat indirect cost activities initially within a residual category and subsequently determine them by alternate methods as discussed in J.8.b.[2][c].

(e) For professorial and professional staff, the reports will be prepared each academic term, but no less frequently than every six months. For other employees, unless alternate arrangements are agreed to, the reports will be prepared no less frequently than monthly and will coincide with one or more pay periods.

(f) Where the institution uses time cards or other forms of after-the-fact payroll documents as original documentation for payroll and payroll charges, such documents shall qualify as records for this purpose provided that they meet the requirements in (a) through (e) above.

3. Multiple Confirmation Records: Under this system the distribution of salaries and wages of professorial and professional staff will be supported by records which certify separately for direct and indirect cost activities as prescribed below.

(a) For employees covered by the system, there will be direct cost records to reflect the distribution of that activity expended which is to be allocable as direct cost to each sponsored agreement. There will also be indirect cost records to reflect the distribution of that activity to indirect costs. These records may be kept jointly or separately (but are to be certified separately, see below).

(b) Salary and wage charges may be made initially on the basis of estimates made before the services are performed provided that such charges are promptly adjusted if significant differences occur.

(c) Institutional records will reasonably reflect only the activity for which employees are compensated by the institution (compensation for incidental work as described in J.8.a. need not be included).

(d) The system will reflect activity applicable to each sponsored agreement and to each category needed to identify indirect costs and the functions to which they are allocable.

(e) To confirm that the distribution of activity represents a reasonable estimate of the work performed by the employee during the period, the record for each employee will include:

(1) The signature of the employee or of a person having direct knowledge of the work, confirming that the record of activities allocable as direct costs of each sponsored agreement is appropriate.

(2) The record of indirect costs will include the signature of responsible person(s) who use suitable means of verification that the work was performed and is consistent with the overall distribution of the employee's compensated activities. These signatures may all be on the same document.

(f) The reports will be prepared each academic term, but no less frequently than every six months.

(g) Where the institution uses time cards or other forms of after-the-fact payroll documents as original documentation for payroll and payroll charges, such documents shall qualify as records for this purpose provided they meet the requirements in (a) through (f) above.

d. Salary rates for faculty members.

(1) Salary rates for academic year. Charges for work performed on sponsored agreements by faculty members during the academic year will be based on the individual faculty member's regular compensation for the continuous period which, under the policy of the institution concerned, constitutes the basis of his salary. Charges for work performed on sponsored agreements during all or any portion of such period are allowable at the base salary rate. In no event will charges to sponsored agreements, irrespective of the basis of computation, exceed the proportionate share of the base salary for that period. This principle applies to all members of the faculty at an institution. Since intra-university consulting is assumed to be undertaken as a university obligation requiring no compensation in addition to full-time base salary, the principle also applies to faculty members who function as consultants or otherwise contribute to a sponsored agreement conducted by another faculty member of the same institution. However, in unusual cases where consultation is across departmental lines or involves a separate or remote operation, and the work performed by the consultant is in addition to his regular departmental load, any charges for such work representing extra compensation above the base salary are allowable provided that such consulting arrangements are specifically provided for in the agreement or approved in writing by the sponsoring agency.

(2) Periods Outside the Academic Year.

(a) Except as otherwise specified for teaching activity in (b) below, charges for work performed by faculty members on sponsored agreements during the summer months or other period not included in the base salary period will be determined for each faculty member at a rate not in excess of the base salary divided by the period to which the base salary relates, and will be limited to charges made in accordance with other parts of this section. The base salary period used in computing charges for work performed during the summer months will be the number of months covered by the faculty member's official academic year appointment

(b) Charges for teaching activities performed by faculty members on sponsored agreements during the summer months or other periods not included in the base salary period will be based on the normal policy of the institution governing compensation to faculty members for teaching assignments during such periods.

(3) Part-time faculty. Charges for work performed on sponsored agreements by faculty members having only part-time appointments will be determined at a rate not in excess of that regularly paid for the part-time assignments; e.g., an institution pays $5,000 to a faculty member for half-time teaching during the academic year. He devoted one-half of his remaining time to a sponsored agreement. Thus, his additional compensation, chargeable by the institution to the agreement, would be one-half of $5,000, or $2,500.

e. Noninstitutional professional activities. Unless an arrangement is specifically authorized by a Federal sponsoring agency, an institution must follow its institution-wide policies and practices concerning the permissible extent of professional services that can be provided outside the institution for noninstitutional compensation. Where such institution-wide poli-

cies do not exist or do not adequately define the permissible extent of consulting or other noninstitutional activities undertaken for extra outside pay, the Government may require that the effort of professional staff working on sponsored agreements be allocated between (1) institutional activities, and (2) noninstitutional professional activities. If the sponsoring agency considers the extent of noninstitutional professional effort excessive, appropriate arrangements governing compensation will be negotiated on a case-by-case basis.

f. Fringe benefits.

(1) Fringe benefits in the form of regular compensation paid to employees during periods of authorized absences from the job, such as for annual leave, sick leave, military leave, and the like, are allowable, provided such costs are distributed to all institutional activities in proportion to the relative amount of time or effort actually devoted by the employees. See Section J.40 for treatment of sabbatical leave.

(2) Fringe benefits in the form of employer contributions or expenses for social security, employee insurance, workmen's compensation insurance, tuition or remission of tuition for individual employees or their families and the like are allowable, provided such benefits are granted in accordance with established institutional policies, and are distributed to all institutional activities on an equitable basis. See Section J.41 for treatment of tuition remission provided to students.

(3) Rules for pension plan costs are as follows:

(a) Costs of the institution's pension plan which are incurred in accordance with the established policies of the institution are allowable, provided: (i) such policies meet the test of reasonableness, (ii) the methods of cost allocation are equitable for all activities, (iii) the amount of pension cost assigned to each fiscal year is determined in accordance with (b) below, and (iv) the cost assigned to a given fiscal year is paid or funded for all plan participants within six months after the end of that year. However, increases to normal and past service pension costs caused by a delay in funding the actuarial liability beyond 30 days after each quarter of the year to which such costs are assignable are unallowable.

(b) The amount of pension cost assigned to each fiscal year shall be determined in accordance with generally accepted accounting principles. Institutions may elect to follow the "Cost Accounting Standard for Composition and Measurement of Pension Cost" (4 CFR Part 412).

(3) Premiums paid for pension plan termination insurance pursuant to the Employee Retirement Income Security Act of 1974 (Public Law 93-406) are allowable. Late payment charges on such premiums are unallowable. Excise taxes on accumulated funding deficiencies and prohibited transactions of pension plan fiduciaries imposed under the Employee Retirement Income Security Act are also unallowable.

d. Fringe benefits may be assigned to cost objectives by identifying specific benefits to specific individual employees or by allocating on the basis of the salaries and wages of the employees receiving the benefits. When the allocation method is used, separate allocations must be made to selective groupings of employees, if the costs in relationship to salaries and wages differ significantly for different groups of employees. Also fringe benefits related to institutional salaries and wages treated as direct costs may be treated as direct costs.

g. Institution-furnished automobiles. That portion of the cost of institution-furnished automobiles that relates to personal use by employees (including transportation to and from work) is unallowable regardless of whether the cost is reported as taxable income to the employees.

9. Contingency provisions. Contributions to a contingency reserve or any similar provision made for events, the occurrence of which cannot be foretold with certainty as to time, intensity, or with an assurance of their happening, are unallowable. (But see also Section J.21.c)

10. Deans of faculty and graduate schools. The salaries and expenses of deans of faculty and graduate schools, or their equivalents, and their staffs, are allowable.

11. Defense and prosecution of criminal and civil proceedings, claims, appeals and patent infringement.

a. Definitions.

"Conviction," as used herein, means a judgment or conviction of a criminal offense by any court of competent jurisdiction, whether entered upon verdict or a plea including a conviction, due to a plea of nolo contendere.

"Costs," include, but are not limited to, administrative and clerical expenses; the cost of legal services, whether performed by in-house or private counsel; the costs of the services of accountants, consultants, or others retained by the institution to assist it; costs of employees, officers and trustees, and any similar costs incurred before, during, and after commencement of a judicial or administrative proceeding that bears a direct relationship to the proceedings.

"Fraud," as used herein, means (i) acts of fraud or corruption or attempts to defraud the government or to corrupt its agents, (ii) acts that constitute a cause for debarment or suspension (as specified in agency regulations), and (iii) acts which violate the False Claims Act, 31 U.S.C., sections 3729-3731, or the Anti-kickback Act, 41 U.S.C., sections 51 and 54.

"Penalty," does not include restitution, reimbursement, or compensatory damages.

"Proceeding," includes an investigation.

b. (1) Except as otherwise described herein, costs incurred in connection with any criminal, civil or administrative proceeding (including filing of a false certification) commenced by the Federal Government, or a State, local or foreign government, are not allowable if the proceeding (1) relates to a violation of, or failure to comply with, a Federal, State, local or foreign statute or regulation, by the institution (including its agents and employees); and (2) results in any of the following dispositions:

(a) In a criminal proceeding, a conviction.

(b) In a civil or administrative proceeding involving an allegation of fraud or similar misconduct, a determination of institutional liability.

(c) In the case of any civil or administrative proceeding, the imposition of a monetary penalty.

(d) A final decision by an appropriate Federal official to debar or suspend the institution, to rescind or void an award, or to terminate an award for default by reason of a violation or failure to comply with a law or regulation.

(e) A disposition by consent or compromise, if the action could have resulted in any of the dispositions described in (a), (b), (c) or (d) of b.(1) above.

(2) If more than one proceeding involves the same alleged misconduct, the costs of all such proceedings shall be unallowable if any one of them results in one of the dispositions shown in b(1) above.

c. If a proceeding referred to in paragraph b. is commenced by the Federal Government and is resolved by consent or compromise pursuant to an agreement entered into by the institution and the Federal Government, then the costs incurred by the institution in connection with such proceedings that are otherwise not allowable under paragraph b. may be allowed to the extent specifically provided in such agreement.

d. If a proceeding referred to in paragraph b is commenced by a State, local or foreign government, the authorized Federal official may allow the costs incurred by the institution for such proceedings, if such authorized official determines that the costs were incurred as a result of (1) a specific term or condition of a Federally sponsored agreement, or (2) specific written direction of an authorized official of the sponsoring agency.

e. Costs incurred in connection with proceedings described in paragraph b., but which are not made unallowable by that paragraph, may be allowed by the Government but only to the extent that:

(1) The costs are reasonable in relation to the activities required to deal with the proceeding and the underlying cause of action;

(2) Payment of the costs incurred, as allowable and allocable costs, is not prohibited by any other provision(s) of the sponsored agreement;

(3) The costs are not otherwise recovered from the Federal Government or a

third party, either directly as a result of the proceeding or otherwise; and

(4) The percentage of costs allowed does not exceed the percentage determined by an authorized Federal official to be appropriate considering the complexity of procurement litigation, generally accepted principles governing the award of legal fees in civil actions involving the United States as a party, and such other factors as may be appropriate. Such percentage shall not exceed 80 percent. However, if an agreement reached under paragraph c. has explicitly considered this 80 percent limitation and permitted a higher percentage, then the full amount of costs resulting from that agreement shall be allowable.

f. Costs incurred by the institution in connection with the defense of suits brought by its employees or ex-employees under section 2 of the Major Fraud Act of 1988 (Pub. L. 100-700), including the cost of all relief necessary to make such employee whole, where the institution was found liable or settled, are unallowable.

g. Costs of legal, accounting, and consultant services, and related costs, incurred in connection with defense against Government claims or appeals, or the prosecution of claims or appeals against the Government, are unallowable.

h. Costs of legal, accounting, and consultant services, and related costs, incurred in connection with patent infringement litigation, are unallowable unless otherwise provided for in the sponsored agreements.

i. Costs which may be unallowable under this section, including directly associated costs, shall be segregated and accounted for by the institution separately. During the pendency of any proceeding covered by paragraph b. and f. of this section, the Government shall generally withhold payment of such costs. However, if in the best interests of the Government, the Government may provide for conditional payment upon provision of adequate security, or other adequate assurance, and agreement by the institution to repay all unallowable costs, plus interest, if the costs are subsequently determined to be unallowable.

12. Depreciation and use allowances. Institutions may be compensated for the use of their buildings, capital improvements, and equipment; provided that they are used, needed in the institutions' activities, and properly allocable to sponsored agreements. Such compensation shall be made by computing either depreciation or use allowance. Use allowances are the means of providing such compensation when depreciation or other equivalent costs are not computed. The allocation for depreciation or use allowance shall be made in accordance with Section F1. Depreciation and use allowances are computed applying the following rules:

a. The computation of depreciation or use allowances shall be based on the acquisition cost of the assets involved. For this purpose, the acquisition cost will exclude (1) the cost of land; (2) any portion of the cost of buildings and equipment borne by or donated by the Government, irrespective of where title was originally vested or where it is presently located; and (3) any portion of the cost of buildings and equipment contributed by or for the institution where law or agreement prohibit recovery. For an asset donated to the institution by a third party, its fair market value at the time of the donation shall be considered as the acquisition cost.

b. In the use of the depreciation method, the following shall be observed:

(1) The period of useful service or useful life established in each case for usable capital assets must take into consideration such factors as type of construction, nature of the equipment, technological developments in the particular area, and the renewal and replacement policies followed for the individual items or classes of assets involved.

(2) The depreciation method used to charge the cost of an asset (or group of assets) to accounting periods shall reflect the pattern of consumption of the asset during its useful life. In the absence of clear evidence indicating that the expected consumption of the asset will be significantly greater in the early portions than in the later portions of its useful life, the straight-line method shall be presumed to be the appropriate method. Depreciation methods once used shall

not be changed unless approved in advance by the cognizant Federal agency.

(3) Where the depreciation method is introduced for application to assets for which use allowance was previously charged, the aggregate amount of use allowances and depreciation applicable to such assets must not exceed the total acquisition cost of the assets.

(4) When the depreciation method is used for buildings, a building "shell" may be treated separately from other building components, such as plumbing system and heating and air conditioning system. Each component item may then be depreciated over its estimated useful life. On the other hand, the entire building, including the shell and all components, may be treated as a single asset and depreciated over a single useful life.

(5) Where the depreciation method is used for a particular class of assets, no depreciation may be allowed on any such assets that have outlived their depreciable lives. (But see also c(3), below.)

c. Under the use allowance method, the following shall be observed:

(1) The use allowance for buildings and improvements (including improvements such as paved parking areas, fences, and sidewalks) will be computed at an annual rate not exceeding two percent of acquisition cost. The use allowance for equipment will be computed at an annual rate not exceeding six and two-thirds percent of acquisition cost.

(2) In contrast to the depreciation method, the entire building must be treated as a single asset without separating its "shell" from other building components under the use allowance method. The entire building must be treated as a single asset, and the two-percent use allowance limitation must be applied to all parts of the building. The two-percent limitation, however, need not be applied to equipment or other assets that are merely attached or fastened to the building but not permanently fixed and are used as furnishings, decorations or for specialized purposes (e.g., dentist chairs and dental treatment units, counters, laboratory benches bolted to the floor, dishwashers, and carpeting). Such equipment and assets will be considered as not being permanently fixed to the building if they can be removed without the need for costly or extensive alterations or repairs to the building to make the space usable for other purposes. Equipment and assets which meet these criteria will be subject to the six and two-thirds percent equipment use allowance.

(3) A reasonable use allowance may be negotiated for any assets that are considered to be fully depreciated, after taking into consideration the amount of depreciation previously charged to the Government, the estimated useful life remaining at the time of negotiation, the effect of any increased maintenance charges, decreased efficiency due to age, and any other factors pertinent to the utilization of the asset for the purpose contemplated.

d. Except as otherwise provided in b and c above, a combination of the depreciation and use allowance methods may not be used, in like circumstances, for a single class of assets (e.g., buildings, office equipment, and computer equipment).

e. Charges for use allowances or depreciation must be supported by adequate property records, and physical inventories must be taken at least once every two years to ensure that the assets exist and are usable, used, and needed. Statistical sampling techniques may be used in taking these inventories. In addition, when the depreciation method is used, adequate depreciation records showing the amount of depreciation taken each period must also be maintained.

f. This section applies to the largest college and university recipients of federal research and development funds as displayed in Exhibit A.

(1) Institutions shall expend currently, or reserve for expenditure within the next five years, the portion of indirect cost payments made for depreciation or use allowances under sponsored research agreements, consistent with section G.7, to acquire or improve research facilities. This provision applies only to Federal agreements which reimburse indirect costs at a full negotiated rate. These funds may only be used for: (a) liquidation of the principal of debts incurred to acquire assets that are used directly for organized research activities, or (b) pay-

ments to acquire, repair, renovate, or improve buildings or equipment directly used for organized research. For buildings or equipment not exclusively used for organized research activity, only appropriately proportionate amounts will be considered to have been expended for research facilities.

(2) An assurance that an amount equal to the Federal reimbursements has been appropriately expended or reserved to acquire or improve research facilities shall be submitted as part of each indirect cost proposal submitted to the cognizant Federal agency which is based on costs incurred on or after October 1, 1991. This assurance will cover the cumulative amounts of funds received and expended during the period beginning after the period covered by the previous assurance and ending with the fiscal year on which the proposal is based. The assurance shall also cover any amounts reserved from a prior period in which the funds received exceeded the amounts expended.

13. Donations and Contributions.

a. The value of donated services and property are not allowable either as a direct or indirect cost, except that depreciation or use allowances on donated assets are permitted in accordance with Section J.12.a. The value of donated services and property may be used to meet cost sharing or matching requirements, in accordance with OMB Circular No. A-110.

b. Donations or contributions made by the institution, regardless of the recipient, are unallowable.

14. Employee morale, health, and welfare costs and credits. The costs of house publications, health or first-aid clinics and/or infirmaries, recreational activities, food services, employees' counseling services, and other expenses incurred in accordance with the institution's established practice or custom for the improvement of working conditions, employer-employee relations, employee morale, and employee performance, are allowable. Such costs will be equitably apportioned to all activities of the institution. Income generated from any of these activities will be credited to the cost thereof unless such income has been irrevocably set over to employee welfare organizations. Losses resulting from operating food services are allowable only if the institution's objective is to operate such services on a break-even basis. Losses sustained because of operating objectives other than the above are allowable only (a) where the institution can demonstrate unusual circumstances, and (b) with the approval of the cognizant Federal agency.

15. Entertainment costs. Costs of entertainment, including amusement, diversion, and social activities and any costs directly associated with such costs (such as tickets to shows or sports events, meals, lodging, rentals, transportation, and gratuities) are unallowable.

16. Equipment and other capital expenditures

a. For purposes of this paragraph, the following definitions apply:

(1) Equipment means an article of nonexpendable tangible personal property having a useful life of more than two years, and an acquisition cost of $500 or more per unit. However, consistent with institutional policy, lower limits may be established.

(2) Capital expenditure means the cost of the asset including the cost to put it in place. Capital expenditure for equipment, for example, means the net invoice price of the equipment, including the cost of any modifications, attachments, accessories, or auxiliary apparatus necessary to make it usable for the purpose for which it is acquired. Ancillary charges, such as taxes, duty, protective intransit insurance, freight, and installation may be included in, or excluded from, capital expenditure cost in accordance with the institution's regular accounting practices.

(3) Special purpose equipment means equipment which is used only for research, medical, scientific, or other technical activities.

(4) General purpose equipment means equipment, the use of which is not limited only to research, medical, scientific or other technical activities. Examples of general purpose equipment include office equipment and furnishings, air conditioning equipment, reproduction and printing equipment, motor vehicles, and automatic data processing equipment.

b. The following rules of allowability shall apply to equipment and other capital expenditures:

(1) Capital expenditures for general purpose equipment, buildings, and land are unallowable as direct charges, except where approved in advance by the sponsoring agency.

(2) Capital expenditures for special purpose equipment are allowable as direct charges, provided that the acquisition of items having a unit cost of $1,000 or more is approved in advance by the sponsoring agency.

(3) Capital expenditures for improvements to land, buildings, or equipment which materially increase their value or useful life are unallowable as direct charges, except where approved in advance by the sponsoring agency.

(4) Capital expenditures are unallowable as indirect costs. But see Section J.12 for allowability of depreciation or use allowance on buildings, capital improvements, and equipment. Also see Section J.38 for allowability of rental costs on land, buildings, and equipment.

17. Executive lobbying costs. Costs incurred in attempting to improperly influence either directly or indirectly, an employee or officer of the executive branch of the Federal Government to give consideration or to act regarding a sponsored agreement or a regulatory matter are unallowable. Improper influence means any influence that induces or tends to induce a Government employee or officer to give consideration or to act regarding a Government-sponsored agreement or regulatory matter on any basis other than the merits of the matter.

18. Fines and penalties. Costs resulting from violations of, or failure of the institution to comply with, Federal, State, and local or foreign laws and regulations are unallowable, except when incurred as a result of compliance with specific provisions of the sponsored agreement, or instructions in writing from the authorized official of the sponsoring agency authorizing in advance such payments.

19. Goods or services for personal use. Costs of goods or services for personal use of the institution's employees are unallowable regardless of whether the cost is reported as taxable income to the employees.

20. Housing and personal living expenses.

a. Costs of housing (e.g., depreciation, maintenance, utilities, furnishings, rent, etc.), housing allowances and personal living expenses for/of the institution's officers are unallowable regardless of whether the cost is reported as taxable income to the employees.

b. The term officers includes current and past officers.

21. Insurance and indemnification.

a. Costs of insurance required or approved, and maintained, pursuant to the sponsored agreement, are allowable.

b. Costs of other insurance maintained by the institution in connection with the general conduct of its activities, are allowable subject to the following limitations: (1) types and extent and cost of coverage must be in accordance with sound institutional practice; (2) costs of insurance or of any contributions to any reserve covering the risk of loss of or damage to Government-owned property are unallowable, except to the extent that the Government has specifically required or approved such costs; and (3) costs of insurance on the lives of officers or trustees are unallowable except where such insurance is part of an employee plan which is not unduly restricted.

c. Contributions to a reserve for a self-insurance program are allowable to the extent that the types of coverage, extent of coverage, and the rates and premiums would have been allowed had insurance been purchased to cover the risks.

d. Actual losses which could have been covered by permissible insurance (whether through purchased insurance or self-insurance) are unallowable, unless expressly provided for in the sponsored agreement, except that costs incurred because of losses not covered under existing deductible clauses for insurance coverage provided in keeping with sound management practice as well as minor losses not covered by insurance, such as spoilage, breakage and disappearance of small hand tools, which occur in the ordinary course of operations, are allowable.

e. Indemnification includes securing the institution against liabilities to third persons and other losses not compensated by insurance or otherwise. The Government is obligated to indemnify the institution only to the extent expressly provided for in the sponsored agreement, except as provided in d above.

f. Insurance against defects. Costs of insurance with respect to any costs incurred to correct defects in the institution's materials or workmanship are unallowable.

22. Interest, fund raising, and investment management costs.

a. Costs incurred for interest on borrowed capital or temporary use of endowment funds, however represented, are unallowable, except as indicated in e. below.

b. Costs of organized fund raising, including financial campaigns, endowment drives, solicitation of gifts and bequests, and similar expenses incurred solely to raise capital or obtain contributions, are unallowable.

c. Costs of investment counsel and staff and similar expenses incurred solely to enhance income from investments are unallowable.

d. Costs related to the physical custody and control of monies and securities are allowable.

e. The cost of interest paid to an external party is allowable where associated with the following assets, provided the assets are used in support of sponsored agreements, and the total cost (including depreciation or use allowance, operation and maintenance costs, interest, etc.,) does not exceed the rental cost of comparable assets in the same locality.

(1) Buildings acquired or completed on or after July 1, 1982.

(2) Major reconstruction and remodeling of existing buildings completed on or after July 1, 1982.

(3) Acquisition or fabrication of capital equipment (as defined in paragraph J.16, "Equipment and other capital expenditures") completed on or after July 1, 1982, costing $10,000 or more, if agreed to by the Government.

23. Labor relations costs. Costs incurred in maintaining satisfactory relations between the institution and its employees, including costs of labor management committees, employees' publications, and other related activities, are allowable.

24. Lobbying. Reference is made to the common rule published at 55 FR 6736 (2/26/90) and the Office of Management and Budget governmentwide guidance and notice published at 54 FR 52306 (12/20/89) and 55 FR 24540 (6/15/90), respectively. In addition, the following restrictions shall apply:

a. Notwithstanding other provisions of this Circular, costs associated with the following activities are unallowable:

(1) Attempts to influence the outcomes of any Federal, State, or local election, referendum, initiative, or similar procedure, through in kind or cash contributions, endorsements, publicity, or similar activity;

(2) Establishing, administering, contributing to, or paying the expenses of a political party, campaign, political action committee, or other organization established for the purpose of influencing the outcomes of elections;

(3) Any attempt to influence (i) the introduction of Federal or State legislation (ii) the enactment or modification of any pending Federal or State legislation through communication with any member or employee of the Congress or State legislature (including efforts to influence State or local officials to engage in similar lobbying activity) or (iii) any Government official or employee in connection with a decision to sign or veto enrolled legislation;

(4) Any attempt to influence (i) the introduction of Federal or State legislation; or (ii) the enactment or modification of any pending Federal or State legislation by preparing, distributing or using publicity or propaganda, or by urging members of the general public, or any segment thereof, to contribute to or participate in any mass demonstration, march, rally, fund raising drive, lobbying campaign or letter writing or telephone campaign; or

(5) Legislative liaison activities, including attendance at legislative sessions or committee hearings, gathering information regarding legislation, and analyzing the effect of legislation, when such activi-

ties are carried on in support of or in knowing preparation for an effort to engage in unallowable lobbying.

b. The following activities are excepted from the coverage of subsection a:

(1) Technical and factual presentations on topics directly related to the performance of a grant, contract or other agreement (through hearing testimony, statements, or letters to the Congress or a State legislature, or subdivision, member, or cognizant staff member thereof), in response to a documented request (including a Congressional Record notice requesting testimony or statements for the record at a regularly scheduled hearing) made by the recipient member, legislative body or subdivision, or a cognizant staff member thereof; provided such information is readily obtainable and can be readily put in deliverable form; and further provided that costs under this section for travel, lodging or meals are unallowable unless incurred to offer testimony at a regularly scheduled Congressional hearing pursuant to a written request for such presentation made by the Chairman or Ranking Minority Member of the Committee or Subcommittee conducting such hearing;

(2) Any lobbying made unallowable by section a.(3) to influence State legislation in order to directly reduce the cost, or to avoid material impairment of the institution's authority to perform the grant, contract, or other agreement; or

(3) Any activity specifically authorized by statute to be undertaken with funds from the grant, contract, or other agreement.

c. When an institution seeks reimbursement for indirect costs, total lobbying costs shall be separately identified in the indirect cost rate proposal, and thereafter treated as other unallowable activity costs in accordance with the procedures of subsection B.1.e.

d. Institutions shall submit as part of their annual indirect cost rate proposal a certification that the requirements and standards of this section have been complied with.

e. Institutions shall maintain adequate records to demonstrate that the determination of costs as being allowable or unallowable pursuant to this section J.24 complies with the requirements of this Circular.

f. Time logs, calendars, or similar records shall not be required to be created for purposes of complying with this section during any particular calendar month when: (1) the employee engages in lobbying (as defined in subsections a and b above) 25 percent or less of the employees compensated hours of employment during that calendar month, and (2) within the preceding five-year period, the institution has not materially misstated allowable or unallowable costs of any nature, including legislative lobbying costs. When conditions (1) and (2) are met, institutions are not required to establish records to support the allowability of claimed costs in addition to records already required or maintained. Also, when conditions (1) and (2) are met, the absence of time logs, calendars, or similar records will not serve as a basis for disallowing costs by contesting estimates of lobbying time spent by employees during a calendar month.

g. Agencies shall establish procedures for resolving in advance, in consultation with OMB, any significant questions or disagreements concerning the interpretation or application of this section J.24. Any such advance resolutions shall be binding in any subsequent settlements, audits or investigations with respect to that grant or contract for purposes of interpretation of this Circular; provided, however, that this shall not be construed to prevent a contractor or grantee from contesting the lawfulness of such a determination.

25. Losses on other sponsored agreements or contracts. Any excess of costs over income under any other sponsored agreement or contract of any nature is unallowable. This includes, but is not limited to, the institution's contributed portion by reason of cost-sharing agreements or any under-recoveries through negotiation of flat amounts for indirect costs.

26. Maintenance and repair costs. Costs incurred for necessary maintenance, repair or upkeep of property (including Government property unless otherwise provided for) which neither add to the permanent value of the property nor

appreciably prolong its intended life but keep it in an efficient operating condition, are allowable.

27. Material costs. Costs incurred for purchased materials, supplies, and fabricated parts directly or indirectly related to the sponsored agreement, are allowable. Purchases made specifically for the sponsored agreement should be charged thereto at their actual prices after deducting all cash discounts, trade discounts, rebates, and allowances received by the institution. Withdrawals from general stores or stockrooms should be charged at their cost under any recognized method of pricing stores withdrawals conforming to sound accounting practices consistently followed by the institution. Incoming transportation charges are a proper part of material cost. Direct material cost should include only the materials and supplies actually used for the performance of the sponsored agreement, and due credit should be given for any excess materials retained, or returned to vendors. Due credit should be given for all proceeds or value received for any scrap resulting from work under the sponsored agreement. Where Government-donated or furnished material is used in performing the sponsored agreement, such material will be used without charge.

28. Memberships, subscriptions, and professional activity costs.

a. Costs of the institution's membership in business, technical, and professional organizations are allowable.

b. Costs of the institution's subscriptions to business, professional, and technical periodicals are allowable.

c. Costs of meetings and conferences, when the primary purpose is the dissemination of technical information, are allowable. This includes costs of meals, transportation, rental of facilities, and other items incidental to such meetings or conferences.

d. Costs of membership in any civic or community organization are unallowable.

e. Costs of membership in any country club or social or dining club or organization are unallowable.

29. Patent costs. Costs of preparing disclosures, reports, and other documents required by the sponsored agreement, and of searching the art to the extent necessary to make such invention disclosures, are allowable. In accordance with the clauses of the sponsored agreement relating to patents, costs of preparing documents and any other patent costs, in connection with the filing of a patent application where title is conveyed to the Government, are allowable. (See also Section J.39).

30. Plant security costs. Necessary expenses incurred to comply with security requirements, including wages, uniforms and equipment of personnel engaged in plant protection, are allowable.

31. Preagreement costs. Costs incurred prior to the effective date of the sponsored agreement, whether or not they would have been allowable thereunder if incurred after such date, are unallowable unless approved by the sponsoring agency.

32. Professional services costs.

a. Costs of professional and consulting services, including legal services rendered by the members of a particular profession who are not employees of the institution, are allowable, subject to J.32.b and section J.11, when reasonable in relation to the services rendered and when not contingent upon recovery of the costs from the Federal Government. Retainer fees, to be allowable, must be reasonably supported by evidence of services rendered.

b. Factors to be considered in determining the allowability of costs in a particular case include (1) the past pattern of such costs, particularly in the years prior to the award of sponsored agreements; (2) the impact of sponsored agreements on the institution's total activity;

(3) the nature and scope of managerial services expected of the institution's own organizations; and (4) whether the proportion of Government work to the institution's total activity is such as to influence the institution in favor of incurring the cost, particularly where the services rendered are not of a continuing nature and have little relationship to work under sponsored agreements.

33. Profits and losses on disposition of plant equipment or other capital assets. Profits or losses arising from the sale or exchange of plant, facilities, equipment

or other capital assets, including sale or exchange of either short-term or long-term investments, shall not be considered in computing the costs of sponsored agreements except for pension plans as provided in Section J.8.f. When assets acquired with Federal funds, in part or wholly, are disposed of, the distribution of the proceeds shall be made in accordance with Attachment N, OMB Circular No. A-110.

34. Proposal costs. Proposal costs are the costs of preparing bids or proposals on potential Government and nongovernment sponsored agreements or projects, including the development of data necessary to support the institution's bids or proposals. Proposal costs of the current accounting period of both successful and unsuccessful bids and proposals normally should be treated as indirect costs and allocated currently to all activities of the institution, and no proposal costs of past accounting periods will be allocable to the current period. However, the institution's established practices may be to treat proposal costs by some other recognized method. Regardless of the method used, the results obtained may be accepted only if found to be reasonable and equitable.

35. Rearrangement and alteration costs. Cost incurred for ordinary or normal rearrangement and alteration of facilities are allowable. Special arrangement and alteration costs incurred specifically for the project are allowable when such work has been approved in advance by the sponsoring agency.

36. Reconversion costs. Costs incurred in the restoration or rehabilitation of the institution's facilities to approximately the same condition existing immediately prior to commencement of a sponsored agreement, fair wear and tear excepted, are allowable.

37. Recruiting costs.

a. Subject to b, c, and d below, and provided that the size of the staff recruited and maintained is in keeping with workload requirements, costs of "help wanted" advertising, operating costs of an employment office necessary to secure and maintain an adequate staff, costs of operating an aptitude and educational testing program, travel costs of employees while engaged in recruiting personnel, travel costs of applicants for interviews for prospective employment, and relocation costs incurred incident to recruitment of new employees, are allowable to the extent that such costs are incurred pursuant to a well managed recruitment program. Where the institution uses employment agencies, costs not in excess of standard commercial rates for such services are allowable.

b. In publications, costs of help wanted advertising that includes color, includes advertising material for other than recruitment purposes, or is excessive in size (taking into consideration recruitment purposes for which intended and normal institutional practices in this respect), are unallowable.

c. Costs of help wanted advertising, special emoluments, fringe benefits, and salary allowances incurred to attract professional personnel from other institutions that do not meet the test of reasonableness or do not conform with the established practices of the institution, are unallowable.

d. Where relocation costs incurred incident to recruitment of a new employee have been allowed either as an allocable direct or indirect cost, and the newly hired employee resigns for reasons within his control within twelve months after hire, the institution will be required to refund or credit such relocation costs to the Government.

38. Rental cost of buildings and equipment.

a. Rental costs of buildings or equipment are allowable to the extent that the decision to rent or lease is in accord with Section C-3. Rental arrangements should be reviewed periodically to determine if circumstances have changed and other options are available.

b. Rental costs under "sale and lease back" arrangements are allowable only up to the amount that would be allowed if the institution continued to own the property.

c. Rental costs under "less-than-arms-length" leases are allowable only up to the amount that would be allowed if the institution owned the property. For this purpose, a less-than-arms-length lease is one under which one party to the lease

agreement is able to control or substantially influence the actions of the other.

d. Where significant rental costs are incurred under leases which create a material equity in the leased property, they are allowable only up to the amount that would be allowed if the institution purchased the property on the date the lease agreement was executed. For this purpose, a material equity in the property exists when the lease:

(1) is noncancelable or is cancelable only upon the occurrence of some remote contingency, and

(2) has one or more of the following characteristics:

(a) Title to the property passes to the institution at some time during or after the lease period.

(b) The term of the lease corresponds substantially to the estimated useful life of the property (i.e., the period of economic usefulness to the legal owner of the property).

(c) The initial term is less than the useful life of the property and the institution has the option to renew the lease for the remaining useful life at substantially less than fair rental value.

(d) The property was acquired by the leasor to meet the special needs of the institution and will probably be usable only for that purpose and only by the institution.

(e) The institution has the right, during or at the expiration of the lease, to purchase the property at a price which at the inception of the lease appears to be substantially less than the probable fair market value at the time it is permitted to purchase the property (commonly called a lease with a bargain purchase option), except for any discount normally given to educational institutions.

39. Royalties and other costs for use of patents. Royalties on a patent or amortization of the cost of acquiring a patent or invention or rights thereto, necessary for the proper performance of the sponsored agreement and applicable to tasks or processes thereunder, are allowable unless the Government has a license or the right to free use of the patent, the patent has been adjudicated to be invalid or has been administratively determined to be invalid, the patent is considered to be unenforceable, or the patent has expired.

40. Sabbatical leave costs. Costs of leave of absence by employees for performance of graduate work or sabbatical study, travel, or research are allowable provided the institution has a uniform policy on sabbatical leave for persons engaged in instruction and persons engaged in research. Such costs will be allocated on an equitable basis among all related activities of the institution. Where sabbatical leave is included in fringe benefits for which a cost is determined for assessment as a direct charge, the aggregate amount of such assessments applicable to all work of the institution during the base period must be reasonable in relation to the institution's actual experience under its sabbatical leave policy.

41. Scholarships and student aid costs.

a. Costs of scholarships, fellowships, and other programs of student aid are allowable only when the purpose of the sponsored agreement is to provide training to selected participants and the charge is approved by the sponsoring agency. However, tuition remission and other forms of compensation paid as, or in lieu of, wages to students performing necessary work are allowable provided that (1) there is a bonafide employer-employee relationship between the student and the institution for the work performed, (2) the tuition or other payments are reasonable compensation for the work performed and are conditioned explicitly upon the performance of necessary work, and (3) it is the institution's practice to similarly compensate students in nonsponsored as well as sponsored activities.

b. Charges for tuition remission and other forms of compensation paid to students as, or in lieu of, salaries and wages shall be subject to the reporting requirements stipulated in Section J6, and shall be treated as direct or indirect cost in accordance with the actual work being performed. Tuition remission may be charged on an average rate basis.

42. Selling and marketing. Costs of selling and marketing any products or services of the institution (unless allowed

under sections J.1.c or J.34) are unallowable.

43. Severance pay.

a. Severance pay is compensation in addition to regular salary and wages which is paid by an institution to employees whose services are being terminated. Costs of severance pay are allowable only to the extent that such payments are required by law, by employer-employee agreement, by established policy that constitutes in effect an implied agreement on the institution's part, or by circumstances of the particular employment.

b. Severance payments that are due to normal recurring turnover and which otherwise meet the conditions of a above may be allowed provided the actual costs of such severance payments are regarded as expenses applicable to the current fiscal year and are equitably distributed among the institution's activities during that period.

c. Severance payments that are due to abnormal or mass terminations are of such conjectural nature that allowability must be determined on a case-by-case basis. However, the Government recognizes its obligation to participate, to the extent of its fair share, in any specific payment.

d. Costs incurred in excess of the institution's normal severance pay policy applicable to all persons employed by the institution upon termination of employment are unallowable.

44. Specialized service facilities.

a. The costs of institutional services involving the use of highly complex or specialized facilities such as electronic computers, wind tunnels, and reactors are allowable, provided the charge for the service meets the conditions of b through d below.

b. The cost of each service normally shall consist of both its direct costs and its allocable share of indirect costs with deductions for appropriate income or Federal financing as described in Section C5.

c. The cost of such institutional services when material in amount will be charged directly to users, including sponsored agreements based on actual use of the services and a schedule of rates that does not discriminate between federally and nonfederally supported activities of the institution, including use by the institution for internal purposes. Charges for the use of specialized facilities should be designed to recover not more than the aggregate cost of the services over a long-term period agreed to by the institution and the cognizant Federal agency. Accordingly, it is not necessary that the rates charged for services be equal to the cost of providing those services during any one fiscal year as long as rates are reviewed periodically for consistency with the long-term plan and adjusted if necessary.

d. Where the costs incurred for such institutional services are not material, they may be allocated as indirect costs. Such arrangements must be agreed to by the institution and the cognizant Federal agency.

e. Where it is in the best interest of the Government and the institution to establish alternative costing arrangements, such arrangements may be worked out with the cognizant Federal agency.

45. Student activity costs. Costs incurred for intramural activities, student publications, student clubs, and other student activities, are unallowable, unless specifically provided for in the sponsored agreements.

46. Taxes.

a. In general, taxes which the institution is required to pay and which are paid or accrued in accordance with generally accepted accounting principles are allowable. Payments made to local governments in lieu of taxes which are commensurate with the local government services received are allowable, except for (1) taxes from which exemptions are available to the institution directly or which are available to the institution based on an exemption afforded the Government, and in the latter case when the sponsoring agency makes available the necessary exemption certificates; and (2) special assessments on land which represent capital improvements.

b. Any refund of taxes, interest, or penalties, and any payment to the institution of interest thereon, attributable to taxes, interest, or penalties which were allowed as sponsored agreement costs,

will be credited or paid to the Government in the manner directed by the Government. However, any interest actually paid or credited to an institution incident to a refund of tax, interest, and penalty will be paid or credited to the Government only to the extent that such interest accrued over the period during which the institution had been reimbursed by the Government for the taxes, interest, and penalties.

47. Transportation costs. Costs incurred for freight, express, cartage, postage, and other transportation services relating either to goods purchased, in process, or delivered, are allowable. When such costs can readily be identified with the items involved, they may be charged directly as transportation costs or added to the cost of such items. Where identification with the materials received cannot readily be made, inbound transportation costs may be charged to the appropriate indirect cost accounts if the institution follows a consistent, equitable procedure in this respect. Outbound freight, if reimbursable under the terms of the sponsored agreement, should be treated as a direct cost.

48. Travel costs.

a. General. Travel costs are the expenses for transportation, lodging, subsistence, and related items incurred by employees who are in travel status on official business of the institution. Such costs may be charged on an actual basis, on a per diem or mileage basis in lieu of actual costs incurred, or on a combination of the two, provided the method used is applied to an entire trip and not to selected days of the trip, and results in reasonable charges, and is in accordance with the institution's travel policy and practices consistently applied to all institutional travel activities.

b. Lodging and subsistence. Costs incurred by employees and officers for travel, including costs of lodging, other subsistence, and incidental expenses, shall be considered reasonable and allowable only to the extent such costs do not exceed charges normally allowed by the institution in its regular operations as a result of an institutional policy and the amounts claimed under sponsored agreements represent reasonable and allocable costs. In the absence of an acceptable institutional policy regarding travel costs, the rates and amounts established under subchapter I of chapter 57 of title 5, United States Code, or by the Administrator of General Services, or the President (or his designee) pursuant to any provisions of such subchapter shall apply to sponsored agreements (41 U.S.C. 420).

c. Commercial Air Travel. Airfare costs in excess of the lowest available commercial discount airfare, Federal Government contract airfare (where authorized and available), or customary standard (coach or equivalent) airfare, are unallowable except when such accommodations would: Require circuitous routing; require travel during unreasonable hours; excessively prolong travel; greatly increase the duration of the flight; result in increased cost that would offset transportation savings; or offer accommodations not reasonably adequate for the medical needs of the traveler. Where an institution can reasonably demonstrate to the sponsoring agency either the nonavailability of discount airfare or government contract airfare for individual trips or, on an overall basis, that it is the institution's practice to make routine use of such airfare, specific determinations of nonavailability will generally not be questioned by the Government, unless a pattern of avoidance is detected. However, in order for airfare costs in excess of the customary standard commercial airfare to be allowable, e.g., use of first-class airfare, the institution must justify and document on a case-by-case basis the applicable condition(s) set forth above.

d. Air travel by other than commercial carrier. "Costs of travel by institution-owned, -leased, or -chartered aircraft," as used in this paragraph, includes the cost of lease, charter, operation (including personnel costs), maintenance, depreciation, insurance, and other related costs. Costs of travel via institution-owned, -leased, or -chartered aircraft shall not exceed the cost of allowable commercial air travel, as provided for in section c. above.

49. Termination costs applicable to sponsored agreements.

a. Termination of sponsored agreements generally gives rise to the incur-

rence of costs or to the need for special treatment of costs, which would not have arisen had the agreement not been terminated. Items peculiar to termination are set forth below. They are to be used in conjunction with all other provisions of this Circular in the case of termination.

b. The cost of common items of material reasonably usable on the institution's other work will not be allowable unless the institution submits evidence that it could not retain such items at cost without sustaining a loss. In deciding whether such items are reasonably usable on other work of the institution, consideration should be given to the institution's plans and orders for current and scheduled work. Contemporaneous purchases of common items by the institution will be regarded as evidence that such items are reasonably usable on the institution's other work. Any acceptance of common items as allowable to the terminated portion of the agreement should be limited to the extent that the quantities of such items on hand, in transit, and on order are in excess of the reasonable quantitative requirements of other work.

c. If in a particular case, despite all reasonable efforts by the institution, certain costs cannot be discontinued immediately after the effective date of termination, such costs are generally allowable within the limitations set forth in this circular, except that any such costs continuing after termination due to the negligent or willful failure of the institution to discontinue such costs will be considered unacceptable.

d. Loss of useful value of special tooling, and special machinery and equipment is generally allowable, provided (1) such special tooling, machinery, or equipment is not reasonably capable of use in the other work of the institution; (2) the interest of the Government is protected by transfer of title or by other means deemed appropriate by the contracting officer or equivalent; and (3) the loss of useful value as to any one terminated agreement is limited to that portion of the acquisition cost which bears the same ratio to the total acquisition cost as the terminated portion of the agreement bears to the entire terminated agreement and other Government agreements for which the special tooling, special machinery, or equipment was acquired.

e. Rental costs under unexpired leases are generally allowable where clearly shown to have been reasonably necessary for the performance of the terminated agreement, less the residual value of such leases, if (1) the amount of such rental claimed does not exceed the reasonable use value of the property leased for the period of the agreement and such further period as may be reasonable; and (2) the institution makes all reasonable efforts to terminate, assign, settle, or otherwise reduce the cost of such lease. There also may be included the cost of alterations of such leased property, provided such alterations were necessary for the performance of the agreement, and of reasonable restoration required by the provisions of the lease.

f. Settlement expenses including the following are generally allowable: (1) accounting, legal, clerical, and similar costs reasonably necessary for the preparation and presentation to contracting officers or equivalent of settlement claims and supporting data with respect to the terminated portion of the agreement, and the termination and settlement of subagreements; and (2) reasonable costs for the storage, transportation, protection, and disposition of property provided by the Government or acquired or produced by the institution for the agreement, except when the institution is reimbursed for disposals at a predetermined amount in accordance with the provisions of Circular No. A-110.

g. Claims under subagreements, including the allocable portion of claims which are common to the agreement and to other work of the institution, are generally allowable.

50. Trustees. Travel and subsistence costs of trustees, regardless of the purpose of the trip, are unallowable.

## K. Certification of charges

1. To assure that expenditures for sponsored agreements are proper and in accordance with the agreement documents and approved project budgets, the annual and/or final fiscal reports or vouchers requesting payment under the

agreements will include a certification, signed by an authorized official of the university, which reads essentially as follows: "I certify that all expenditures reported (or payment requested) are for appropriate purposes and in accordance with the provisions of the application and award documents."

2. Certification of indirect costs.

a. Policy.

(1) No proposal to establish indirect cost rates shall be acceptable unless such costs have been certified by the educational institution using the Certificate of Indirect Costs set forth in paragraph b below. The certificate must be signed on behalf of the institution by an individual at a level no lower than vice president or chief financial officer of the institution that submits the proposal.

(2) No indirect cost rate shall be binding upon the Federal Government if the most recent required proposal from the institution has not been certified. Where it is necessary to establish indirect cost rates, and the institution has not submitted a certified proposal for establishing such rates in accordance with the requirements of this section, the Federal Government shall unilaterally establish such rates. Such rates may be based upon audited historical data or such other data that have been furnished to the cognizant Federal agency and for which it can be demonstrated that all unallowable costs have been excluded. When indirect cost rates are unilaterally established by the Federal Government because of failure of the institution to submit a certified proposal for establishing such rates in accordance with this section, the rates established will be set at a level low enough to ensure that potentially unallowable costs will not be reimbursed.

b. Certificate. The certificate required by this section shall be in the following form:

Certificate of Indirect Costs

This is to certify that to the best of my knowledge and belief:

(1) I have reviewed the indirect cost proposal submitted herewith;

(2) All costs included in this proposal [identify date] to establish billing or final indirect costs rate for [identify period covered by rate] are allowable in accordance with the requirements of the Federal agreement(s) to which they apply and with the cost principles applicable to those agreements.

(3) This proposal does not include any costs which are unallowable under applicable cost principles such as (without limitation): advertising and public relations costs, contributions and donations, entertainment costs, fines and penalties, lobbying costs, and defense of fraud proceedings; and

(4) All costs included in this proposal are properly allocable to Federal agreements on the basis of a beneficial or causal relationship between the expenses incurred and the agreements to which they are allocated in accordance with applicable requirements.

I declare under penalty of perjury that the foregoing is true and correct.

Institution: _____
Signature: _____
Name of Official: _____
Title: _____
Date of Execution: _____

Exhibit A

# List of Colleges and Universities Subject to Section J.12.F. of Circular A-21

1. Johns Hopkins University
2. Stanford University
3. Massachusetts Institute of Technology
4. University of Washington
5. University of California-Los Angeles
6. University of Michigan
7. University of California-San Diego
8. University of California-San Francisco
9. University of Wisconsin-Madison
10. Columbia University
11. Yale University
12. Harvard University
13. Cornell University
14. University of Pennsylvania
15. University of California-Berkeley
16. University of Minnesota
17. Pennsylvania State University
18. University of Southern California
19. Duke University
20. Washington University
21. University of Colorado
22. University of Illinois-Urbana
23. University of Rochester
24. University of North Carolina-Chapel Hill
25. University of Pittsburgh
26. University of Chicago
27. University of Texas-Austin
28. University of Arizona
29. New York University
30. University of Iowa
31. Ohio State University
32. University of Alabama-Birmingham
33. Case Western Reserve
34. Baylor College of Medicine
35. California Institute of Technology
36. Yeshiva University
37. University of Massachusetts
38. Vanderbilt University
39. Purdue University
40. University of Utah
41. Georgia Institute of Technology
42. University of Maryland-College Park
43. University of Miami

44. University of California-Davis
45. Boston University
46. University of Florida
47. Carnegie-Mellon University
48. Northwestern University
49. Indiana University
50. Michigan State University
51. University of Virginia
52. University of Texas-SW Medical Center Dallas
53. University of California-Irvine
54. Princeton University
55. Tulane University of Louisiana
56. Emory University
57. University of Georgia
58. Texas A & M University all campuses
59. New Mexico State University
60. North Carolina State University-Raleigh
61. University of Illinois-Chicago
62. Utah State University
63. Virginia Commonwealth University
64. Oregon State University
65. SUNY-Stony Brook
66. University of Cincinnati
67. CUNY-Mount Sinai School of Medicine
68. University of Connecticut
69. Louisiana State University
70. Tufts University
71. University of California-Santa Barbara
72. University of Hawaii-Manoa

73. Rutgers State University of New Jersey
74. Colorado State University
75. Rockefeller University
76. University of Maryland-Baltimore
77. Virginia Polytechnic Institute & State University
78. SUNY-Buffalo
79. Brown University
80. University of Medicine & Dentistry of New Jersey
81. University of Texas-Health Science Center San Antonio
82. University of Vermont
83. University of Texas Health Science Center-Houston
84. Florida State University
85. University of Texas-Md Anderson Cancer Center
86. University of Kentucky
87. Wake Forest University
88. Wayne State University
89. Iowa State University of Science & Technology
90. University of New Mexico
91. Georgetown University
92. Dartmouth College
93. University of Kansas
94. Oregon Health Sciences University
95. University of Texas Medical Branch-Galveston
96. University of Missouri-Columbia
97. Temple University
98. George Washington University
99. University of Dayton

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
[Seal] WASHINGTON, D.C. 20503
July 15, 1993

CIRCULAR NO. A-21, Revised Transmittal Memorandum No. 5

TO THE HEADS OF EXECUTIVE DEPARTMENTS AND ESTABLISHMENTS

SUBJECT: Cost Principles for Educational Institutions

This transmittal memorandum revises OMB Circular No. A-21, "Cost Principles for Educational Institutions." This revision further clarifies and standardizes the Circular's principles for determining costs applicable to grants, contracts, and other agreements with educational institutions.

The revisions to the Circular shall be implemented with the establishment of indirect cost rates for all fiscal years beginning on or after January 1, 1994. Earlier implementation is encouraged.

/s/ Leon E. Panetta
Director

The following are revisions to Sections B, C, D, F, G, H, and J of the Attachment to Circular A-21:

1. Section B.1.b.(2) University Research is revised to read as follows:

(2) University research means all research and development activities that are separately budgeted and accounted for by the institution under an internal application of institutional funds. University research, for purposes of this document, shall be combined with sponsored research under the function of organized research.

2. A new subsection d. is added to Section C.4. Allocable costs to read as follows:

d. Allocation and documentation standard.

(1) Cost principles. The recipient institution is responsible for ensuring that costs charged to a sponsored agreement are allowable, allocable, and reasonable under these cost principles.

(2) Internal controls. The institution's financial management system shall ensure that no one person has complete control over all aspects of a financial transaction.

(3) Direct cost allocation principles. If a cost benefits two or more projects or activities in proportions that can be determined without undue effort or cost, the cost should be allocated to the projects based on the proportional benefit. If a cost benefits two or more projects or activities in proportions that cannot be determined because of the interrelationship of the work involved, then, notwithstanding subsection C.4.b., the costs may be allocated or transferred to benefitted projects on any reasonable basis, consistent with d.(1) and (2).

(4) Documentation. Federal requirements for documentation are specified in this Circular, Circular A-110, and specific agency policies on cost transfers. If the institution authorizes the principal investigator or other individual to have primary responsibility, given the requirements of d.(2), for the management of sponsored agreement funds, then the institution's documentation requirements for the actions of

those individuals (e.g., signature or initials of the principal investigator or designee or use of a password) will normally be considered sufficient.

3. Section D.1. Direct costs-General is revised to read as follows:

1. General. Direct costs are those costs that can be identified specifically with a particular sponsored project, an instructional activity, or any other institutional activity, or that can be directly assigned to such activities relatively easily with a high degree of accuracy. Costs incurred for the same purpose in like circumstances must be treated consistently as either direct or indirect costs. Where an institution treats a particular type of cost as a direct cost of sponsored agreements, all costs incurred for the same purpose in like circumstances shall be treated as direct costs of all activities of the institution.

4. A new Section F.1. Definition of Facilities and Administration is added to read as follows:

1. Definition of Facilities and Administration. Indirect costs are classified within two broad categories: "Facilities" and "Administration." "Facilities" is defined as depreciation and use allowances, interest on debt associated with certain buildings, equipment and capital improvements, operations and maintenance expenses, and library expenses. "Administration" is defined as general administration and general expenses; departmental administration; sponsored projects administration; student administration and services; and all other types of expenditures not listed specifically under one of the subcategories of Facilities (including cross allocations from other pools).

5. Previously numbered Section F.1. Depreciation and use allowances is renumbered F.2. and revised to read as follows:

2. Depreciation and use allowances.

a. The expenses under this heading are the portion of the costs of the institution's buildings, capital improvements to land and buildings, and equipment which are computed in accordance with Section J.12.

b. In the absence of the alternatives provided for in Section E.2.d., the expenses included in this category shall be allocated in the following manner:

(1) Depreciation or use allowances on buildings used exclusively in the conduct of a single function, and on capital improvements and equipment used in such buildings, shall be assigned to that function.

(2) Depreciation or use allowances on buildings used for more than one function, and on capital improvements and equipment used in such buildings, shall be allocated to the individual functions performed in each building on the basis of usable square feet of space, excluding common areas such as hallways, stairwells, and rest rooms.

(3) Depreciation or use allowances on buildings, capital improvements and equipment related to space (e.g., individual rooms, laboratories) used jointly by more than one function (as determined by the users of the space) shall be treated as follows. The cost of each jointly used unit of space shall be allocated to the benefiting functions on the basis of:

(a) the employee FTEs or salaries and wages of those individual functions benefiting from the use of that space; or

(b) institution-wide employee FTEs or salaries and wages applicable to the benefiting Major Functions (see B.1) of the institution.

(4) Depreciation or use allowances on certain capital improvements to land, such as paved parking areas, fences, sidewalks, and the like, not included in the cost of buildings, shall be allocated to user categories of students and employees on a full-time equivalent basis. The amount allocated to the student category shall be assigned to the

instruction function of the institution. The amount allocated to the employee category shall be further allocated to the major functions of the institution in proportion to the salaries and wages of all employees applicable to those functions.

6. Previously numbered Section F.2. Operation and maintenance expenses is renumbered F.4. and revised to read as follows:

4. Operation and maintenance expenses.

a. The expenses under this heading are those that have been incurred for the administration, supervision, operation, maintenance, preservation, and protection of the institution's physical plant. They include expenses normally incurred for such items as janitorial and utility services; repairs and ordinary or normal alterations of buildings, furniture and equipment; care of grounds; maintenance and operation of buildings and other plant facilities; security; earthquake and disaster preparedness; environmental safety; hazardous waste disposal; property, liability and all other insurance relating to property; space and capital leasing; facility planning and management; and central receiving. The operation and maintenance expense category should also include its allocable share of fringe benefit costs, depreciation and use allowances, and interest costs.

b. In the absence of the alternatives provided for in Section E.2.d., the expenses included in this category shall be allocated in the same manner as described in Section F.2.b. for depreciation and use allowances.

7. A new Section F.3. Interest is added to read as follows:

3. Interest. Interest on debt associated with certain buildings, equipment and capital improvements, as defined in Section J.22.e., shall be classified as an expenditure under the category Facilities. These costs shall be allocated in the same manner as the depreciation or use allowances on the buildings, equipment and capital improvements to which the interest relates.

8. Previously numbered Section F.3. General administration and general expenses is renumbered F.5. and revised to read as follows:

5. General administration and general expenses

a. The expenses under this heading are those that have been incurred for the general executive and administrative offices of educational institutions and other expense of a general character which do not relate solely to any major function of the institution, i.e., solely to (1) instruction, (2) organized research, (3) other sponsored activities, or (4) other institutional activities. The general administration and general expense category should also include its allocable share of fringe benefit costs, operation and maintenance expense, depreciation and use allowances, and interest costs. Examples of general administration and general expenses include: those expenses incurred by administrative offices that serve the entire university system of which the institution is a part; central offices of the institution such as the President's or Chancellor's office, the offices for institution-wide financial management, business services, budget and planning, personnel management, and safety and risk management; the office of the General Counsel; and, the operations of the central administrative management information systems. General administration and general expenses shall not include expenses incurred within non-university-wide deans' offices, academic departments, organized research units, or similar organizational units. (See Section F.6., Departmental administration expenses.)

b. In the absence of the alternatives provided for in Section E.2.d., the expenses included in this category shall be grouped first according to common major functions of the institution to which they render services or provide benefits. The aggregate expenses of each group shall then be allocated to serviced or benefitted functions on the modified total cost basis. Modified total costs consist of the same cost elements as those in Section G.2. When an activity included in this indirect cost category provides

a service or product to another institution or organization, an appropriate adjustment must be made to either the expenses or the basis of allocation or both, to assure a proper allocation of costs.

9. Previously numbered Section F.4. Departmental administration expenses is renumbered F.6. and previously numbered subsection b. is renumbered c. and a new subsection b. is added to read as follows:

6. Departmental administration expenses.

b. In developing the departmental administration cost pool, special care should be exercised to ensure that costs incurred for the same purpose in like circumstances are treated consistently as either direct or indirect costs. For example, salaries of technical staff, laboratory supplies (e.g., chemicals), telephone toll charges, animals, animal care costs, computer costs, travel costs, and specialized shop costs shall be treated as direct cost wherever identifiable to a particular cost objective. Direct charging of these costs may be accomplished through specific identification of individual costs to benefiting cost objectives, or through recharge centers or specialized service facilities, as appropriate under the circumstances. The salaries of administrative and clerical staff should normally be treated as indirect costs. Direct charging of these costs may be appropriate where a major project or activity explicitly budgets for administrative or clerical services and individuals involved can be specifically identified with the project or activity. Items such as office supplies, postage, local telephone costs, and memberships shall normally be treated as indirect costs.

c. In the absence of the alternatives provided for in Section E.2.d., the expenses included in this category shall be allocated as follows:

(1) The administrative expenses of the dean's office of each college and school shall be allocated to the academic departments within that college or school on the modified total cost basis.

(2) The administrative expenses of each academic department, and the department's share of the expenses allocated in (1) shall be allocated to the appropriate functions of the department on the modified total cost basis.

10. Section G.2. The distribution basis is revised to read as follows:

2. The distribution basis. Indirect costs shall be distributed to applicable sponsored agreements and other benefiting activities within each Major Function (see B.1) on the basis of modified total direct costs, consisting of all salaries and wages, fringe benefits, materials and supplies, services, travel, and subgrants and subcontracts up to the first $25,000 of each subgrant or subcontract (regardless of the period covered by the subgrant or subcontract). Equipment, capital expenditures, charges for patient care and tuition remission, rental costs, scholarships, and fellowships as well as the portion of each subgrant and subcontract in excess of $25,000 shall be excluded from modified total direct costs. Other items may only be excluded where necessary to avoid a serious inequity in the distribution of indirect costs. For this purpose, an indirect cost rate should be determined for each of the separate indirect cost pools developed pursuant to G.1. The rate in each case should be stated as the percentage which the amount of the particular indirect cost pool is of the modified total direct costs identified with such pool.

11. Section number G.4. Predetermined fixed rates for indirect costs is revised to read as follows:

4. Predetermined rates for indirect costs. Public Law 87-638 (76 Stat. 437) authorizes the use of predetermined rates in determining the indirect costs applicable under research agreements with educational institutions. The stated objectives of the law are to simplify the administration of cost-type research and development contracts (including grants) with educational institutions, to facilitate the preparation

of their budgets, and to permit more expeditious closeout of such contracts when the work is completed. In view of the potential advantages offered by this procedure, negotiation of predetermined rates for indirect costs for a period of two to four years should be the norm in those situations where the cost experience and other pertinent facts available are deemed sufficient to enable the parties involved to reach an informed judgment as to the probable level of indirect costs during the ensuing accounting periods.

12. A new Section G.6 Provisional and final rates for indirect costs is added to read as follows:

6. Provisional and final rates for indirect costs. Where the cognizant agency determines that cost experience and other pertinent facts do not justify the use of predetermined rates, or a fixed rate with a carry-forward, or if the parties cannot agree on an equitable rate, a provisional rate shall be established. To prevent substantial overpayment or underpayment, the provisional rate may be adjusted by the cognizant agency during the institution's fiscal year. Predetermined or fixed rates may replace provisional rates at any time prior to the close of the institution's fiscal year. If a provisional rate is not replaced by a predetermined or fixed rate prior to the end of the institution's fiscal year, a final rate will be established and upward or downward adjustments will be made based on the actual allowable costs incurred for the period involved.

13. Previously numbered Section G.6. Limitation on reimbursement of administrative costs is renumbered G.7. and G.7.a. is revised to read as follows:

7. Limitation on reimbursement of administrative costs.

a. Notwithstanding the provisions of G.1.a., the administrative costs charged to sponsored agreements awarded or amended (including continuation and renewal awards) with effective dates beginning on or after the start of the institution's first fiscal year which begins on or after October 1, 1991, shall be limited to 26% of modified total direct costs (as defined in Section G.2.) for the total of General Administration and General Expenses, Departmental Administration, Sponsored Projects Administration, and Student Administration and Services (including their allocable share of depreciation and/or use allowances, interest costs, operation and maintenance expenses, and fringe benefits costs as provided by Sections F.5., F.6., F.7., and F.9.) and all other types of expenditures not listed specifically under one of the subcategories of facilities in Section F.

14. A new Section G.8. is added to read as follows:

8. Alternative method for administrative costs.

a. Notwithstanding the provisions of Section G.1.a., an institution may elect to claim a fixed allowance for the "Administration" portion of indirect costs. The allowance could be either 24% of modified total direct costs or a percentage equal to 95% of the most recently negotiated fixed or predetermined rate for the cost pools included under "Administration" as defined in Section F.1., whichever is less, provided that no accounting or cost allocation changes with the effects described in Section G.7.d have occurred. Under this alternative, no cost proposal need be prepared for the "Administration" portion of the indirect cost rate nor is further identification or documentation of these costs required (but see subsection c.). Where a negotiated indirect cost agreement includes this alternative, an institution shall make no further charges for the expenditure categories described in Sections F.5., F.6., F.7. and F.9.

b. In negotiations of rates for subsequent periods, an institution that has elected the option of Section G.8.a. may continue to exercise it at the same rate without further identification or documentation of costs, provided that no accounting or cost allocation changes with the effects described in Section G.7.d. have occurred.

c. If an institution elects to accept a threshold rate, it is not required to perform a detailed analysis of its administrative costs. However, in order to compute the facilities components of its indirect cost rate, the institution must reconcile its indirect cost proposal to its financial statements and make appropriate adjustments and reclassifications to identify the costs of each major function as defined in B.1., as well as to identify and allocate the facilities components. Administrative costs that are not identified as such by the institution's accounting system (such as those incurred in academic departments) will be classified as instructional costs for purposes of reconciling indirect cost proposals to financial statements and allocating facilities costs.

15. Previously numbered section G.7. Individual Rate Components is renumbered G.9.

16. Section H.1. Simplified method for small institutions is revised as follows:

1. General

a. Where the total direct cost of work covered by this Circular at an institution does not exceed $10 million in a fiscal year, the use of the simplified procedure described in subsection 2., may be used in determining allowable indirect costs. Under this simplified procedure, the institution's most recent annual financial report and immediately available supporting information with salaries and wages segregated from other costs, will be utilized as a basis for determining the indirect cost rate applicable to all sponsored agreements.

17. Section J.8.f.(4) Fringe benefits is revised to read as follows:

f. Fringe benefits.

(4) Fringe benefits may be assigned to cost objectives by identifying specific benefits to specific individual employees or by allocating on the basis of institution-wide salaries and wages of the employees receiving the benefits. When the allocation method is used, separate allocations must be made to selective groupings of employees, unless the institution demonstrates that costs in relationship to salaries and wages do not differ significantly for different groups of employees. Fringe benefits shall be treated in the same manner as the salaries and wages of the employees receiving the benefits. The benefits related to salaries and wages treated as direct costs shall also be treated as direct costs; the benefits related to salaries and wages treated as indirect costs shall be treated as indirect costs.

18. A new subsection g. is added to Section J.21. Insurance and indemnification to read as follows:

g. Medical liability (malpractice) insurance is an allowable cost of research programs only to the extent that the research involves human subjects. Medical liability insurance costs shall be treated as a direct cost and shall be assigned to individual projects based on the manner in which the insurer allocates the risk to the population covered by the insurance.

# CHAPTER 14

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# CHAPTER 14

# 14-000 OTHER CONTRACT AUDIT ASSIGNMENTS

## 14-001 Scope of Chapter

This chapter provides guidance for certain miscellaneous or special audit assignments related to the contract audit mission. It covers only those procedures that are special to accomplishing a particular assignment. Auditing concepts, policies, and procedures having general application, as covered in other chapters of this manual, also apply to assignments discussed in this chapter.

## 14-100 Section 1 — Postaward Audits of Contractor Cost or Pricing Data

### 14-101 Introduction

This section describes postaward audits for defective pricing and provides specific audit guidelines and procedures related to this type of audit. General audit procedures that are equally applicable to these audits are in other chapters of this manual.

### 14-102 The DCAA Defective Pricing Program

a. Defective pricing occurs when a contractor does not submit or disclose to the government cost or pricing data that is accurate, complete, and current prior to reaching a price agreement. Generally, the auditor establishes the existence of defective pricing in a postaward audit by examining and analyzing the records and data available to the contractor as of the date of prime contract price agreement and comparing them with the submitted cost or pricing data.

b. The objective of a postaward audit is to determine if the negotiated contract price was increased by a significant amount because the contractor did not submit or disclose accurate, complete, and current cost or pricing data. To show that defective pricing exists, the audit must establish each of the following five points:

(1) The information in question fits the definition of cost or pricing data.

(2) Accurate, complete, and current data existed and were reasonably available to the contractor before the agreement on price.

(3) Accurate, complete, and current data were not submitted or disclosed to the contracting officer or one of the authorized representatives of the contracting officer and that these individuals did not have actual knowledge of such data or its significance to the proposal.

(4) The government relied on the defective data in negotiating with the contractor.

(5) The government's reliance on the defective data caused an increase in the contract price.

Establishing these five points is a necessary prerequisite to support recommended price adjustments and provide the contracting officer with the information to achieve price reductions to contracts.

c. Based on a 1965 GAO audit, the DoD developed policy designating DCAA to establish and conduct a program for performing regularly scheduled defective pricing (postaward) audits of selected contracts, modifications, subcontracts, and other eligible pricing actions. Based on inter-agency agreements, this program includes contracts awarded by certain non-DoD agencies as well as DoD contracts.

d. Each DCAA branch office, resident office, and suboffice performs postaward audits for defective pricing based on (1) the annual requirements and selection plans issued by Headquarters and (2) specific requests received from contracting officers or other authorized persons or activities. Our audit effort does not stop once the audit is completed and the report is issued. The auditor is also responsible for providing negotiation support to the contracting officer for timely settlement of defective pricing allegations. This audit responsibility con-

tinues until the government achieves final resolution either by negotiation or litigation.

e. Headquarters, OPD (Audit Programs Division), will periodically issue guidance on program objectives.

## 14-103 "Truth in Negotiations Act"

### 14-103.1 Purpose of TINA

a. The purpose of the TINA (Truth in Negotiations Act) is to put the government on equal footing with contractors when negotiating contracts requiring certified cost or pricing data. The TINA requires contractors to submit accurate, complete, and current cost or pricing data when negotiating contracts with the government. It also provides the government with a price reduction remedy if a contractor fails to comply and includes provisions for interest and penalties. The price reduction remedy takes effect when the contractor does not submit accurate, complete, and current data for a contract and the government relied on that defective data in determining the contract price.

b. Section 2306a of Title 10, United States Code, contains the TINA as it applies to DoD, NASA, and the U.S. Coast Guard contracts entered into on or after 15 February 1987. Before 15 February 1987, 10 U.S.C. 2306(f) contained the necessary provisions. Similar provisions for other executive agencies are contained in 41 U.S.C. 254(d) and apply to those solicitations for bids or proposals issued after 31 March 1985. FAR Parts 15 and 52 implement the TINA.

### 14-103.2 TINA Applicability

a. The TINA applies to negotiated prime contracts, modifications, and subcontracts where the government required cost or pricing data. (See FAR 15.804-3 and DFARS 215.804-3 for exemptions to this requirement.) In addition, this includes interdivisional work, final price redeterminations, equitable adjustments, and termination settlements. TINA also applies to modifications of advertised contracts when the modification exceeds the applicable dollar threshold. TINA also applies to change orders when the absolute value of the increase and decrease exceeds the applicable dollar thresholds, even though the net change in price itself is under the threshold.

b. Recent legislation (P.L. 101-510, Section 803; P.L. 102-25, Section 701; and P.L. 102-190, Section 804) has established the dollar thresholds for requiring cost or pricing data as follows:

- $100,000 for prime contracts awarded on or before 5 December 1990 and for any subcontracts or modifications under those prime contracts that are expected to exceed $100,000, unless the prime contract has been modified as provided below.
- $500,000 for contract modifications made after 5 December 1991 to prime contracts entered into on or before 5 December 1990, when the prime contract has been modified to incorporate the $500,000 threshold.
- $500,000 for subcontracts or subcontract modifications entered into after 5 December 1991 under prime contracts entered into on or before 5 December 1990, if the prime contract has been modified to incorporate the $500,000 threshold.
- $500,000 for prime contracts awarded after 5 December 1990 and for any subcontracts or modifications under those prime contracts that are expected to exceed $500,000. (However, see FAR 15.804-3(i) and DFARS 15.804-3(i) for certain exceptions.)

(**Note:** These thresholds apply to DoD, NASA, and U.S. Coast Guard contracts only. The threshold for civilian agencies remains $100,000.)

The operative date is the date of prime contract award. The higher threshold does not apply to modifications or subcontracts (or to modifications or changes to subcontracts) awarded after 5 December 1990 if the prime contract was awarded on or before 5 December 1990 and the prime contract was not subsequently modified to incorporate the higher threshold. Also, the higher threshold does not apply to undefinitized contract actions issued on or before 5 December 1990, even though negotiations were completed after 5 December 1990 unless

the prime contract was subsequently modified to incorporate the higher threshold. However, contracting officers may modify Basic Ordering Agreements to reflect the higher thresholds for orders issued after 5 December 1990. Notwithstanding these prescribed dollar thresholds, contracting officers can request cost or pricing data below these thresholds. For older contract actions note that Public Law 97-86 increased the original $100,000 threshold to $500,000 on 1 December 1981. Public Law 98-369 returned it to $100,000 on 1 April 1985. For older contract actions (including modifications) affected by these public laws, use the 1981 and 1985 dates to determine the appropriate dollar threshold unless the prime contract was subsequently modified to incorporate the higher threshold.

c. Contractors may obtain exemptions from submitting cost or pricing data when the price is based on adequate price competition, established catalog or market price of commercial items sold in substantial quantities to the general public, or prices set by law or regulation (FAR 15.804-3). If the contractor obtains an exemption by the submission of inaccurate data, the action may be subject to TINA. Under an untested legal theory, if the contractor is not entitled to any of the available exemptions, then the incorrectly granted exemption is void. On the other hand, if the contractor submits accurate data and the contracting officer erroneously grants an exemption, case law seems to preclude any possible recovery.

## 14-104 Cost or Pricing Data

### 14-104.1 Legislative and Regulatory Background

The TINA, when enacted in 1962, did not originally define cost or pricing data. The definition was established through legislative intent, regulations, and in decisions by the courts and BCA (Board of Contract Appeals). Congress' initial concern in 1962 was to assure the disclosure of historical cost facts that can be verified objectively to assure that the disclosure of such facts is accurate, complete, and current. The Armed Services Procurement Regulations in 1964 specified that such cost or pricing data are factual only, but also expanded the concept to include more than just historical accounting data. These regulations also emphasized distinctions between facts and judgment. Court and Board cases often attempt to distinguish between cost or pricing data and judgment, and frequently address other concepts such as disclosure, government reliance, and increase in contract price. Court and Board decisions are based on the specific issues of each particular case, but do establish precedent for current audit work. Observing the principles established in those decisions improves the chances for sustaining issues in our current work. Results of appeals are determined on a case-by-case basis, but those results are reached through application of fairly constant principles established through statutes, regulations, and case law. Congress eventually amended the TINA in 1986 and again in 1987 to provide a statutory definition of cost or pricing data.

### 14-104.2 TINA Definition

TINA defines the term "cost or pricing data" to mean all facts that, as of the date of agreement on the price of a contract (or the price of a contract modification), a prudent buyer or seller would reasonably expect to affect price negotiations significantly. Such term does not include information that is judgmental, but does include the factual information from which a judgment was derived.

### 14-104.3 FAR Definition

FAR 15.801 states that "cost or pricing data" mean all facts as of the date of price agreement that prudent buyers and sellers would reasonably expect to affect price negotiations significantly. Cost or pricing data are factual, not judgmental, and are therefore verifiable. While they do not indicate the accuracy of the prospective contractor's judgment about estimated future costs or projections, they do include the data forming the basis for that judgment. Cost or pricing data are more than historical accounting data; they are all facts that can be reasonably expected to contribute to the soundness

of estimates of future costs and to the validity of determinations of costs already incurred.

### 14-104.4 Determining What Data are Cost or Pricing Data

Distinguishing between data that are cost or pricing data and data that are not requires careful analysis in each case. The auditor must separate facts from judgment when analyzing data. Consider the following issues:

a. A purchase order or vendor quote for material is generally considered cost or pricing data. Escalation applied to the purchase order or vendor quote is most likely an estimate. However, the contractor may have based the escalation on prior purchases or usage. Any judgments the contractor applies to such prior purchases or usage to estimate escalation are not cost or pricing data, but the actual purchases or usage are.

b. Are contemplated management actions cost or pricing data and, if so, when do such contemplated actions become facts subject to disclosure? At the time a decision to act was made or when the decision was acted upon? To assess contemplated management actions and business strategies begin with the definitions of cost or pricing data and then assess the facts in each circumstance in relation to the contract price agreement.

What management decisions have been made?

When were the management decisions made?

When were the management decisions carried out or acted upon?

How do such decisions affect the contract price?

For example, management discussions about whether or not to modernize a production line would not be cost or pricing data. It is a fact that discussions have been held, but a decision to act has not yet happened. On the other hand, a decision to modernize, even though the particular method of modernization has not been established, is cost or pricing data which must be disclosed.

### 14-104.5 Judgments Intertwined With Facts

Judgments are not cost or pricing data and do not become cost or pricing data when intertwined with facts. However, when data contains judgments and facts that are so intertwined they cannot practically be segregated, then the entire data is subject to disclosure, but only the facts require certification. For example, a production planning schedule shows both estimated production on potential orders not yet received and actual production on orders received. The schedule is subject to disclosure, but the contractor will only certify to the actual production for orders received.

### 14-104.6 Reasonably Available Cost or Pricing Data

Regulations require the contractor to submit or disclose to the government cost or pricing data that are reasonably available as of date of agreement on price. The concept of reasonably available data depends on the type of cost or pricing data, contractor accounting or estimating systems, and closing or cutoff dates agreed to at negotiations. The auditor must establish whether the cost or pricing data were reasonably available based on the facts and circumstances for each specific contractor and audit. FAR 15.804-4(c) deals with the time at which cost or pricing data become reasonably available to the contractor. Normally, data such as actual indirect costs and production records may not be reasonably available except on normal periodic closing dates. However, the FAR also points out that data within the contractor's or subcontractor's organization on matters significant to management and to the government will be treated as being reasonably available on the date of agreement on price.

## 14-105 Submission or Disclosure of Cost or Pricing Data

### 14-105.1 TINA Requirements

Prime contractors subject to TINA must submit accurate, complete, and current cost or pricing data to the contracting officer or to the "designated representative" of the contracting officer. Subcontractors subject to TINA (at any tier) must make their submissions to the

prime contractors or higher-tier subcontractors.

**14-105.2 FAR Requirements**

The contracting officer must obtain cost or pricing data from the contractor before awarding any contract or modification meeting the cost or pricing data criteria of FAR 15.804-2. The contractor must actually submit the cost or pricing data with its SF 1411, Contract Pricing Proposal, or specifically identify the data in writing. The requirement for submission of cost or pricing data is met when all accurate cost or pricing data reasonably available to the offeror have been submitted, either actually or by specific identification. FAR 15.804-6 (Table 15-2) details the procedural requirements for submitting a proposal and the required supporting cost or pricing data.

**14-105.3 Submission Versus Availability of Data**

The mere availability of books, records, and other documents for review does not constitute submission of cost or pricing data. The regulations make a clear distinction between submitting cost or pricing data and merely making available books, records, and other documents without identification. The adequacy of a given submission or disclosure depends on whether the cost or pricing data is disclosed in a way that places the government on essentially equal footing with the contractor in regard to making the pricing decisions and must be determined on a case-by-case basis.

**14-105.4 Contractor Analysis of Cost or Pricing Data**

The contractor does not have to analyze data solely for the benefit of the government. On the other hand, if the government is unable to analyze the data and the contractor can do so and does, that information must be disclosed. The government is entitled to the best cost or pricing data available to the contractor, not second best. An example of disclosing only second best would be if the contractor has prepared an analysis of cost or pricing data to better understand the raw cost or pricing data, but discloses only the raw data which the government was unable to analyze. However, see 14-108d regarding prime contractor or higher-tier subcontractor analyses of subcontract costs. This concept can also relate to the meaningful disclosure of cost or pricing data to the government (i.e., submission versus availability).

**14-105.5 Updating Cost or Pricing Data**

a. The contractor must update its cost or pricing data, not its proposal. TINA requires cost or pricing data to be submitted prior to contract award, but the data must be accurate, complete, and current as of the date of agreement on price. It is DoD policy to accept cost or pricing data after agreement on price but before contract award, if the data existed before agreement on price. See 14-120.4 on Defective Pricing "Sweeps." The SF 1411 is the vehicle used for submitting cost or pricing data to the government. The attachments to the SF 1411 include the cost or pricing data supporting the cost elements proposed by the contractor. Table 15-2 of FAR 15.804-6 explains that the contractor should promptly submit to the contracting officer later information as it comes into the offeror's possession. The requirement for submission of cost or pricing data continues up to the time of final agreement on price. Future additions or revisions, up to date of agreement on price, must be annotated on a supplemental index.

b. In postaward audits, the auditor and contracting officer must assess whether the updated cost or pricing data was adequately disclosed. The auditor can provide the contracting officer with information about data which we believe was not adequately disclosed by the contractor. However, it is the contracting officer who must ultimately determine whether the contractor's disclosure was adequate and affected the price negotiations. For example, material is proposed at $100 a unit based on a $75 vendor quote plus escalation. The contractor provides updated cost or pricing data for a purchase order of $80 with no escalation applicable. Merely providing updated cost or pricing data without its effect on a bill of material (also cost or pricing data) doesn't appear to provide meaningful disclosure. However, if the contract-

ing officer received the updated information and that information was provided in an adequate way, the fact that the bill of material was not adjusted by the contractor is not a noncompliance with TINA. Moreover, adequate disclosure does not mean contractors have to give a monetary impact of updated cost or pricing data or revise a part of their proposal.

## 14-106 Contracting Officer's Designated Representatives for Receiving Cost or Pricing Data

a. Submission or disclosure of cost or pricing data to the contracting officer is generally easy to establish. Who a contracting officer's designated representative is and when that designation begins or ends requires further analysis. The BCA has held that the contracting officer's representative is someone who is substantially involved in the proposal evaluation or contract negotiation process. Accordingly, such designation may be by specific direction or implied through field pricing support/audit support under FAR 15.805. During the field pricing support process, consider the timing of any government assistance given to the contracting officer. To support price negotiations, a contracting officer can use the buying command administration staff (pricing, contract administration, technical), the contract administration staff responsible for activity at the contractor's location (pricing, contract administration, technical), and DCAA. The organizational staff that provides support to the contracting officer and the timing of that support depends on the nature of the procurement and is not the same in every situation.

b. Auditors must address this issue with the contracting officer to determine if the contractor made an appropriate submission of cost or pricing data. The active involvement of the parties supporting the contracting officer on a specific procurement generally establishes when such designation begins or ends. As a member in the procurement process, DCAA can provide audit support in evaluating a price proposal that enables it to obtain information as the contracting officer's representative. Once that audit is complete, those services may no longer be required. At this point, the auditor would not normally be a representative of the contracting officer for receiving cost or pricing data on that procurement. However, if the auditor subsequently becomes aware of additional cost or pricing data and recognizes its relationship to a specific proposal, the auditor need not perform any analysis of the data but must immediately make the contracting officer aware of the data. Additionally, if the auditor is involved in supporting negotiations after issuing the proposal audit report, he or she is a proper representative for receiving cost or pricing data. The same considerations apply for any of the contracting officer's supporting groups.

c. Case law has held that the entity responsible for establishing indirect cost rates is an appropriate recipient of cost or pricing data relating to indirect costs. Frequently DCAA is such an entity. Even though that entity may not have any active involvement in the negotiations, disclosure of such cost or pricing data to it would be to a proper representative. Because there is a government entity responsible for establishing indirect cost rates, the ASBCA has held that the contracting officer must rely on that entity for evaluation of indirect cost rates, prior to agreeing on price, to ensure all field support data is considered.

## 14-107 Certificate of Current Cost or Pricing Data

a. As soon as practicable after reaching agreement on price, FAR 15.804-4 requires the contractor to submit a Certificate of Current Cost or Pricing Data certifying to the accuracy, completeness, and currentness of the cost or pricing data. The Certificate of Current Cost or Pricing Data covers all cost or pricing data reasonably available to the contractor as of the date of final price agreement. Also, the contractor's responsibility is not limited to the personal knowledge of the contractor's negotiator. It extends to all information reasonably available within

the contractor's organization at the time of price agreement.

b. Absence of a Certificate of Current Cost or Pricing Data does not prevent the auditor from doing a defective pricing audit, since the contractor is statutorily liable if it furnishes defective data. (10 U.S.C. 2306a(d)(3)(D)). However, the auditor must confirm the date of price agreement with the contracting officer in order to determine if defective data exists.

c. When submitting the certificate required by FAR 15.804-4, the contractor certifies that as of the date of the price agreement, the cost or pricing data are accurate, complete, and current. The Certificate addresses the concept of submitting or disclosing required cost or pricing data (facts) to the government as of the date of price agreement. The certification itself usually does not identify the cost or pricing data by specific dollar amounts or cost elements. The auditor is the one who establishes dollars or amounts associated with the certified cost or pricing data in order to perform the audit.

d. Subcontract cost or pricing data must be accurate, complete, and current as of the same date specified in the prime contractor's certificate. Dates other than that of the prime contractor's certification may be relevant to the cost or pricing data provided by the subcontractor depending on the timing of subcontract award and/or the type of prime contract. (See 14-119.3 for significant dates.)

## 14-108 Subcontractor Cost or Pricing Data

a. Any contractor required to submit certified cost or pricing data and a certificate also must obtain certified cost or pricing data from subcontractors and prospective subcontractors. This requirement applies for any subcontract, purchase order, or modification expected to exceed the dollar thresholds for required cost or pricing data (see 14-103.2).

b. Regulations also require the prime contractor to submit subcontractor data to the government if one of the following conditions applies: (1) the subcontract cost estimate is $1 million or more, (2) the estimate is more than the applicable dollar threshold for required cost or pricing data and more than 10 percent of the prime contractor's proposed price, or (3) the contracting officer considers submission necessary for adequately pricing the prime contract.

c. Submitting cost or pricing data from more than one subcontractor, for the same subcontract item, is not usually required when (1) the subcontractor providing the data is the one most likely to receive the subcontract and (2) the prospective prime contractor's subcontract cost estimate for such item is based on the data obtained.

d. A subcontractor or a prospective subcontractor must submit cost or pricing data to the prime contractor or higher-tier subcontractor. The prime contractor or higher-tier subcontractor is responsible for conducting price or cost analysis of the subcontract (see FAR 15.806(a)(2)). The results of this analysis are furnished to the government as part of its cost or pricing data submission up to the date of price agreement. Therefore, defective cost or pricing data of a subcontract cost or item may be attributable to the prime contractor or higher-tier contractor, subcontractor, or both.

## 14-109 Natural and Probable Consequence of Defective Data

DFARS 215.804-7(b)(2) does not require contracting officers to reconstruct negotiations in determining the effect of defective data on the contract price. Unless evidence suggests otherwise, the natural and probable consequence of defective data is presumed to be an increase in the contract price of the defective amount plus related burden and profit or fee. However, a contractor may offer a rebuttal to this presumption and present information showing that the result was not a contract price increase. The contracting officer may require a DCAA analysis of the contractor's support for its rebuttal.

## 14-110 Government's Right of Access to Records

a. The TINA provides the government with the right to examine contractor

records to evaluate the accuracy, completeness, and currency of the cost or pricing data required to be submitted. This right relates to the following:

(1) Proposal for the contract or subcontract,

(2) Discussions conducted on the proposal,

(3) Pricing of the contract or subcontract, or

(4) Performance of the contract or subcontract.

b. The right to examine contractor records expires 3 years after final payment under the contract or subcontract. Therefore, the auditor should plan to complete postaward audits before the right of access expires. If the auditor has not obtained the necessary records before the access rights have expired, the government may have lost its legal entitlement to the records. If the access rights are expiring soon, consult Headquarters, OPD, to determine whether there is a legal recourse available to extend the rights.

## 14-111 Contracting Officer's Record of Price Negotiations

a. FAR 15.808 provides that after concluding each negotiation of an initial or a revised price, the contracting officer shall promptly prepare, or have prepared, a PNM (price negotiation memorandum) giving the principal elements of the price negotiation. If we provided field pricing assistance (i.e., a preaward audit report), the contracting officer shall forward one copy of the memorandum to the cognizant auditor.

b. When the contractor submitted cost or pricing data and a Certificate of Current Cost or Pricing Data was required, the PNM shall reflect the extent to which the contracting officer:

(1) Relied on the cost or pricing data submitted.

(2) Used the cost or pricing data in negotiating the final price.

(3) Recognized as inaccurate, incomplete, or noncurrent any cost or pricing data submitted by the contractor.

(4) Took action as a result of the defective data and the contractor's action on such data.

(5) Determined the effect of such defective data on the price negotiated.

c. In June 1989, the Director for Defense Procurement issued policy guidance to contracting officers for situations where contractors provide cost or pricing data after price agreement. In these situations, the contracting officer must also include in the PNM a list of all data submitted by the contractor after price agreement and the extent to which these data were relied on in order to establish a fair and reasonable price.

d. If the contractor was not required to submit cost or pricing data, the PNM will provide the exemption or waiver used and the basis for claiming or granting it.

e. Subcontract auditors will obtain information on the prime contractor's certification of subcontract cost or pricing data or prime/subcontractor negotiations from the prime contract auditor.

## 14-112 Contract Clauses

### 14-112.1 Price Reduction for Defective Cost or Pricing Data

a. The contract clauses entitled Price Reduction for Defective Cost or Pricing Data are in FAR 52.215-22, 23, 24, and 25. These clauses provide for a reduction in the contract price whenever the contracting officer determines that the contract price increased by a significant amount because the contractor furnished inaccurate, incomplete, or noncurrent cost or pricing data as certified in the contractor's Certificate of Current Cost or Pricing Data. However, the TINA and regulations do not define what is a "significant amount" of increase to a contract price. (See 14-120.1 for further discussions on materiality.)

b. Absence of the price reduction clause in a contract that requires such a clause does not prevent the government from performing a postaward audit for defective pricing. Under a well-established legal principle (the so-called "Christian doctrine") a contractor is bound by a required clause even though the clause is omitted from the contract.

### 14-112.2 Examination of Records

FAR 52.214-26 and 52.215-2 set forth the audit and records clauses to be inserted in prime contracts and subcontracts subject to defective pricing. 10 U.S.C. 2306a grants audit access to contractor or subcontractor records for evaluation of cost or pricing data for three years after final payment under the contract or subcontract. (See 14-110 for the statutory language regarding the government's right of access to contractor records.)

## 14-113 Defective Pricing Requirements and Program Plan

### 14-113.1 Requirements Plan Development

FAOs and regions develop their annual defective pricing requirements plan using the POD (Program Objective Document) and specific instructions issued by Headquarters. FAOs develop and maintain a universe of eligible actions from which they select actions for audit. The specific Headquarters instructions explain how to estimate contractor risk and determine the number of pricing actions for postaward audit. Auditors should be familiar with these Headquarters instructions prior to starting a programmed audit.

### 14-113.2 Program Plan Coordination with Government and Contractor Personnel

a. To foster the exchange of useful information and achieve maximum cooperation, FAOs will provide a list of all programmed postaward audits to affected government personnel (contracting officers and prime contract auditors) at the beginning of the program year. This type of coordination with other government personnel establishes contact points for communications, provides information for planning and prioritizing workload, and offers the chance to obtain pertinent information that may affect the planning and performance of the postaward audits. Coordination and communication with contracting officers and prime contract auditors throughout all phases of the audit will enable the government to achieve timely resolution of defective pricing findings. Send written notification of programmed postaward audits on primecontracts or modifications to the PCO, with a copy to the onsite PLA, if applicable (see 15-303). On subcontract audits, send written notification to the prime auditor. Identify for the PCO or prime auditor, at a minimum, such information as the PCO code, symbol and case number, the prime contract number or modification number, the contractor name, the product name, and subcontract purchase order number. The notification can complement an initial request for the price negotiation memorandum (Attachment 3 to the Postaward Audit Program).

b. At those contractors where you have programmed significant defective pricing activity, discuss the defective pricing program plan with contractor representatives for effective planning and audit coordination. This coordination will include discussions on the contractor risk designation and reasons for such determination, which contracts were selected and how, the timing of our audits, outstanding estimating system deficiencies, and internal control weaknesses.

### 14-113.3 Timing of Audit

a. Promptly audit and report on pricing actions selected for postaward audit. Each audit is part of the FAO's annual program plan for the fiscal year. To effectively accomplish the plan, phase the audits for completion throughout the fiscal year. Furthermore, Headquarters requirements planning instructions require audits on all fixed price and incentive actions over $100 million to start as soon as the office is aware of the award and to be completed no later than one program year after the year of award.

b. The government has the right of access to records for three years from the date of final payment under the contract or subcontract. However, it is better to report on any apparent defective pricing before prime contract completion, or at the latest, before the due date of the final audit report on incurred costs under the contract.

## 14-114 Audit Program for Defective Pricing Audits

a. Use the APPOST standard audit program for doing postaward audits for

defective pricing. The audit program consists of three groups of audit steps: preliminary, detailed, and concluding. Preliminary audit steps allow the auditor to compile basic information needed to conduct the audit. Complete the preliminary audit steps, discuss with the supervisor the planned scope for further effort, and obtain supervisory approval of any additional effort before beginning any detailed audit steps.

b. Detailed audit steps in the program allow the auditor to document audit procedures applied to specific cost elements and support evidence obtained for an audit conclusion. The auditor plans the detailed steps based on the information from the preliminary steps. Successful accomplishment of the detailed steps requires auditors to fully establish the five points detailed in 14-102b to prove defective pricing (see also the APPOST).

c. Concluding audit steps identify the administrative requirements upon completion of field work. These steps include communicating the issues and findings with the contracting officer; reporting estimating system findings, CAS findings, and potential irregularities; conducting exit conferences with the contractor; and preparing the audit report.

d. The audit program also includes sections on contract brief schedules, information request guides, schedule for chronology of events, and audit notification to the contractor.

## 14-115 Obtaining Price Negotiation Memorandums and Requesting Data for the Audit

a. The PNM is the most important government document for the successful completion of any postaward audit. The auditor must review the PNM to determine what cost or pricing data the contractor provided and when, whether the government relied on such data, what considerations the contracting officer made during negotiations, and other factual considerations that may have influenced the negotiations. FAR 15.808(b) details the minimum information included in the PNM and requires contracting officers to provide auditors with a copy of the PNM (see 14-111). Notwithstanding the FAR requirements, the auditor is still responsible for communicating or coordinating issues with the contracting officer. Sole reliance on the PNM without communicating with the contracting officer is not sufficient.

b. Follow the procedures outlined below for requesting data from the contracting officer when doing postaward audits.

(1) Determine what required data is available from the DCAA FAO files, the contractor, or the ACO. Do not request data from the PCO until you determine it is not available locally.

(2) Review available data to determine if additional information is required to perform the audit. Proper planning for any postaward audit begins with the PNM. Specifically, review the PNM to establish the audit scope and determine what data may be needed to do the audit. If we do not have the PNM and cannot obtain it from the ACO, we should initially request only the PNM from the PCO. Also, the PLA can assist in obtaining required PNMs and other data.

(3) Requests for data or clarification on significant issues should be made to the PCO in writing during the audit. Requesting specific data as needed during the audit will enhance communication with the PCO and result in a better audit and a more effective report. Effective communication with the PCOs shows that we are sensitive to their resource constraints and are taking prudent steps to develop sustainable audit recommendations.

(4) Use the standard request letter (Attachment 3 to the APPOST) as a guide when writing to the PCO. Specific explanations or reasons for the data requested should be set forth. The standard request letter was designed to notify the contracting officer of the planned audit and request specific data that was not already available from DCAA FAO files, the contractor, or the ACO.

c. In rare instances the auditor may have to travel to the buying office for a personal review of the contract file before starting the audit. Also consider requesting the contractor's negotiation log and/or record of negotiation. The lack of a PNM should not delay the start of a

scheduled audit. However, it becomes increasingly difficult to support an audit baseline, disclosure of cost or pricing data, and reliance without the PNM.

d. If inadequate negotiation documentation, lack of PNMs, or chronic late receipt is jeopardizing the defective pricing program, notify the PLA at the buying office and the regional office. The regional office should work with the PLA to resolve PNM deficiencies with the buying offices.

e. For subcontracts, determine what cost or pricing data of the subcontractor the government relied on in pricing the prime contract. The auditor at the subcontractor location will contact the auditor at the prime contractor location to obtain the prime contractor's PNM in order to identify the data relied on in pricing the prime contract. Use the PLA to assist in this internal DCAA coordination to obtain the necessary information.

## 14-116 Establishing the Baseline for Audit, Determining the Defective Data, and Calculating the Recommended Price Adjustment

The auditor must (1) establish the appropriate baseline for audit, (2) determine the potential defective data, and (3) calculate the total recommended price adjustment.

### 14-116.1 Communicating with the Contracting Officer and Contractor

During the course of the audit, the auditor should communicate with the PCO as necessary to clarify factual matters regarding the baseline and recommended price adjustment. The auditor should obtain the contractor's responses to audit findings as they are developed or presented at the exit conference and carefully consider the responses when calculating the final recommended price adjustment. If the contractor refuses to provide comments on the draft findings, request the assistance of the PCO. Use the PLA to assist as necessary.

### 14-116.2 Baseline for Audit

a. When contractors certify cost or pricing data (facts) and execute the Certificate of Current Cost or Pricing Data, they do not specifically identify the amounts or elements of costs that are certified. Therefore, to evaluate certified cost or pricing data for compliance with TINA, the auditor must establish an audit baseline as a starting point in order to determine if the certified cost or pricing data were accurate, complete, and current. The audit baseline for determining if defective pricing exists is (1) the contractor's last SF 1411 proposal before price negotiations began and (2) adjustment for any additional cost or pricing data up to the time of price agreement or disclosure of sweeps data (see 14-120.4) for which the contractor addresses its significance on the proposal and submits it to the government. Since the baseline starts with the contractor's proposal, it will include both cost or pricing data and judgments.

DEFECTIVE PRICING AUDIT BASELINE

| | |
|---|---|
| $$$ | Contractor's last SF 1411 proposal by cost element before price negotiations began |
| ± | (Plus or Minus) Additional cost or pricing data up to the time of agreement on price, to include sweeps data, for which the contractor addresses its significance on the proposal and submits it to the government |
| $$$ | (Equals) Baseline for determining if defective pricing exists |

b. Examine the PNM first to determine if the contractor updated its SF 1411 proposal or submitted additional cost or pricing data before negotiations of the contract price began. Sources of data other than the PNM include the buying office's contract file and the contractor's PNM and contract file. Depending on the circumstances, the auditor may need to pursue one or more of these alternative data sources. Follow the procedures in 14-115 to obtain the PNM or other data needed if it is not available locally.

c. The PNM should clearly identify the cost or pricing data the contracting officer relied on to negotiate the prime contract price (FAR 15.808(a)(5)). If not specifically addressed in the PNM, coor-

dinate with the contracting officer and obtain a written statement as to what data were relied on. If the contracting officer will not provide a written statement on reliance and the FAO's review of the contracting officer's file discloses no contrary evidence, assume that the government relied on all data submitted by the contractor in negotiating the contract price.

d. Sometimes the contractor does not submit additional cost or pricing data, but the costs negotiated by the contracting officer are less than the amounts shown in the contractor's proposal. Unless the PNM discusses additional data provided at negotiations, the contractor's SF 1411 proposal is the baseline for audit.

### 14-116.3 Determining the Potential Defective Data

Once the auditor has established the baseline for audit, the next step is to compare the cost or pricing data in the audit baseline to all accurate, complete, and current cost or pricing data reasonably available to the contractor prior to agreement on price. Differences found identify potential defective pricing. For such differences the auditor must establish the five points identified at 14-102. If the auditor cannot establish or support these points, he or she has not developed evidence to support that potential defective pricing exists.

IDENTIFICATION OF POTENTIAL DEFECTIVE PRICING

| | |
|---|---|
| $$$ | Cost or pricing data in audit baseline (14-116.2) |
| – | (Less) Accurate, complete, and current cost or pricing data reasonably available at price agreement pricing data up to the time of agreement on price, to include sweeps data, for which the contractor addresses its significance on the proposal and submits it to the government |
| – | (Less) Adjustment for contracting officer nonreliance, contractor disclosures or government's actual knowledge, and specific adjustment by the contracting officer for the effect of factual information on the negotiated price |
| $$$ | (Equals) Potential defective pricing |

### 14-116.4 Calculating the Recommended Price Adjustment

a. The recommended price adjustment is the total amount the contract price increased because the contractor submitted defective cost or pricing data. It includes not only the defective data, but also the associated costs and profit. Compute all applicable indirect costs and profit using the negotiated rates or rates considered negotiated as set forth in the PNM. If the auditor cannot determine the negotiated rates, use the rates developed in the audit baseline. To accomplish this, compute and include the allocable portion of all applicable indirect costs and profit in the total recommended price adjustment for the contract or subcontract.

b. If the defective pricing involves a subcontract, the prime contract auditor will compute the allocable portion of prime indirect costs and profit applicable to the subcontract defective pricing and include this amount in the total recommended price adjustment for the prime contract. The prime contract auditor's report will include prime add-ons (indirect costs and profit or fee) to the subcontract defect to reflect the total amount of the subcontract defective pricing on the prime contract price.

c. The following paragraphs provide guidelines on how to apply indirect rates and factors using the concept of natural and probable consequences as defined in 14-109.

(1) When the indirect rates and factors are not defective and negotiated rates are known, apply these negotiated rates to all defective base costs in determining the recommended price adjustment.

(2) When the indirect rates and factors are not defective and the negotiated rates

cannot be determined, apply the baseline rates (see 14-116.1a) to all defective base costs in determining the recommended price adjustment.

(3) Regardless of the nature of negotiations, when an audit discloses defective indirect rates, the recommended price adjustment will include both:

(a) the defective costs which result from applying the defective indirect rate to the negotiated base amounts. If the negotiated base amounts cannot be determined from the PNM, use the baseline amounts as developed in accordance with 14-116.1a.

(b) the defective indirect costs which result from applying the recommended indirect rate to the defective base.

d. The same guidelines apply to direct cost elements. For example, assume the defective pricing audit reveals a defect of $2.00 per hour in a proposed labor rate. Also assume that the contractor proposed 11,000 hours but negotiated 10,000 hours despite not providing any additional cost or pricing data. The audit disclosed no defect in hours. The defective amount would be $20,000 (10,000 hours X $2). As with indirect rates, apply the defective element to the negotiated base in computing the recommended price adjustment.

## 14-117 Possible Defective Pricing Indicators

To effectively achieve the basic objectives of the DCAA defective pricing program, audit procedures must be designed to identify and explore conditions suggesting possible defective pricing. The audit procedures should also consider specific information furnished by the contracting officer when applicable. Items normally examined for indications of defective pricing are historical unit cost records, vendor quotes, purchase orders, voluntary refunds or credits from suppliers, cost trend records, sales and manufacturing volume projections, profit and loss statements, and product cost and profit analyses. The following examples are possible defective pricing indicators:

a. Significantly lower actual cost of individual items and cost elements as compared with the amounts included in the audit baseline as explained in 14-116.2. When this condition exists, perform additional tests to determine whether the lower costs reflect defective data.

b. Operations not actually performed or items of cost not incurred, although included in the contractor's proposal. (For example, changes made in the make-or-buy program, a special testing program not performed, or government-owned equipment rental not paid.) Explore the reasons for not incurring the cost.

c. Items of direct cost included in the contract pricing proposal at prices higher than appropriate based on information available to the contractor (and not disclosed to the government) at the time of contract price agreement. Examples are as follows:

(1) After submitting the original proposal but before price agreement, the contractor receives a firm quote from an established source which is significantly below the cost included in the original proposal.

(2) A previously used supplier not solicited this time but who normally submits a low bid. The contractor later purchases the material from this vendor at a price lower than proposed.

When detecting the above or similar situations, evaluate the circumstances involved to reach a conclusion on whether defective pricing exists. A contract price is not defective simply because subsequent market price declines allow the contractor to obtain lower material prices than the quotations obtained before award.

d. Closing or cutoff dates for recording transactions or for computing summary indirect cost rates or production cost data that did not coincide with the date negotiations concluded. For instance, the contractor's proposal included indirect or other cost data as of a prior cutoff period. In this case, the contractor is responsible for the currentness of its cost or pricing data. So even though the contractor may have reached a prior understanding with the contracting officer on closing or cutoff dates, the government would consider significant matters in the books or records on the date of price agreement as reasonably available to the contractor for

TABLE 13-1-1(Ref. 13-102)

EDUCATIONAL INSTITUTIONS ASSIGNED TO DCAA AUDIT COGNIZANCE
by OMB Circular A-88

DCAA CENTRAL REGION
College of Lake County
Colorado School of Mines
New Mexico Institute of Mining and Technology
New Mexico State University
University of Denver
University of Illinois-Chicago
University of Illinois-Urbana
University of New Mexico

DCAA EASTERN REGION
College of William and Mary
Southeastern Ctr. for Electrical Engineering Education
Georgia Institute of Technology
University of Dayton
University of Notre Dame
Virginia Institute of Marine Sciences
Virginia Military Institute
Wright State University

DCAA MID-ATLANTIC REGION
Carnegie-Mellon University
Cornell University-Main
Smithsonian Institution (Astrophysical Observatory)
Smithsonian Institution
Pennsylvania State University
Stevens Institute of Technology

DCAA NORTHEASTERN REGION
Brown University
Columbia University
Cornell University-Medical
Emmanuel College
Massachusetts Institute of Technology
Polytechnic Institute of New York
Regis College
Syracuse University
University of Rhode Island
University of Rochester
Wentworth Institute of Technology

DCAA WESTERN REGION
California Institute of Technology
Stanford University
University of Alaska
University of Hawaii

purposes of defective pricing. This is true even if the data had not yet been summarized (see 14-104.6).

e. Less obvious defective pricing indicators may include the contractor's failure to reflect in the proposal decisions expected to lower costs on prospective contracts. This usually relates to budgets, production, automation, time and motion studies on labor, and management decisions when the decisions were made and the information was available before price agreement. Facts underlying contractor opinions, and projections are cost or pricing data; but judgments based on those facts are not (see 14-104).

## 14-118 Treatment of Offsets

a. The 1987 Defense Authorization Act amended the TINA to give statutory recognition to contractor offsets for defective cost or pricing data that result in understated costs. The amended TINA places the burden of proof for such offsets on the contractor and disallows using any intentional understatements to offset defective cost or pricing data that resulted in a price increase. This amendment applies only to contracts or modifications to contracts entered into on or after 15 February 1987 (10 U.S.C. 2306a). As a result, the following guidelines apply to offsets.

(1) For contracts entered into before 15 February 1987, offsets are usually appropriate against defective cost or pricing data and should be considered during the normal course of audit. This includes inadvertent understatements in the contractor's cost or pricing data and intentional understatements by the contractor that were known to the government and were not misleading or deceptive. Examples of these offsets are mathematical errors and intentional reductions in indirect rates disclosed to the government at the time of negotiations. It does not include unsupported "bottom-line" management adjustments.

(2) For contracts or modifications to contracts entered into on or after 15 February 1987, offsets against defective cost or pricing data are allowable if the contractor:

(a) certifies to the contracting officer that, to the best of the contractor's knowledge and belief, the contractor is entitled to the offset in the amount requested; and

(b) proves that the cost or pricing data were available before the date of agreement on the price of the contract (or price of the modification) and that the data were not submitted before such date.

(3) However, an offset shall not be allowed if:

(a) the understated data was known by the contractor to be understated when the Certificate of Current Cost or Pricing Data was signed; or

(b) the government proves that the facts demonstrate that the contract price would not have increased in the amount to be offset even if the available data had been submitted before the date of agreement on price.

(4) The first exception prohibits an offset if the contractor intentionally withheld from the government information showing a higher cost for an item or service. To deny an offset for this reason, it is not enough that someone in the contractor's organization was aware of the true cost of the item or service. Rather, the government must establish that the contractor made an intentional decision not to revise the proposed price upward based on known cost or pricing data that would justify the increase.

(5) The government permits offsets among and within the various line items of the certified cost or pricing data, but only up to the maximum of defective overstated costs in the same pricing action. For example, the contractor may offset understated material costs against overstated labor, overhead, and G&A. However, offsets apply only within the same pricing action, e.g., for an initial pricing action or for the pricing of a change order.

b. Prior to your evaluation of any contractor offset submission (or potential offsets you have found) for contracts entered into on or after 15 February 1987, the contractor must provide an appropriate certification in support of its claim. Although you should not specifically design audit procedures to seek out understatements, you should notify the contractor and the contracting officer in

writing of potential offsets you have found to obtain the required certification. However, the auditor must exercise good judgment when the audit discloses evidential data that clearly identifies an apparent offset that significantly affects the recommended price adjustment. Until the contractor provides the required certification for its submission, we should neither adjust our findings nor expend additional resources on the alleged offsets. It is important that the contractor certify to the apparent offset to ensure its allowability as stated in 14-118a.(3), (4), and (5). For example, the contractor's review of a potential offset that you have found during your review of a statistical sample of a bill of material may disclose that the cost or pricing data related to the higher price was known and considered by the contractor prior to agreement on price. If the contractor refuses to submit such certification, inform the contracting officer and request assistance in obtaining certified offsets prior to issuing the report to ensure timely consideration of probable offsets. If you are unable to obtain certified offsets, state in your report that the contractor (or auditor) has identified offset amounts, but the contractor refused to provide any certification of offsets and, therefore, we will not express an opinion on the validity of the claimed offsets. However, if the contracting officer requests us to evaluate the uncertified offsets, we should comply with that request and include the supplementary information in a separate appendix to the postaward report.

(1) When the contractor contends that there are understated costs for contracts entered into before 15 February 1987, but does not provide specific information, request in writing that the contractor submit specific information. Also solicit contracting officer assistance so you can confirm data supporting the alleged offsets and give appropriate consideration in the audit report. If the contractor does not submit this offset information within a reasonable time, normally 30 days or as agreed among the FAO, contracting officer, and contractor, issue the audit report. Present available information concerning alleged offsets in the audit report.

(2) When the contractor contends that there are understated costs for contracts entered into on or after 15 February 1987, but does not provide a certified offset submission, request in writing that the contractor submit its certified offsets so you can confirm data supporting the alleged offsets. If the contractor does not submit this offset information within a reasonable time, normally 30 days, proceed as discussed in paragraph b.

(3) When the contractor submits offset data to the auditor after issuing the audit report, tell the contracting officer of this additional submission, furnish a copy should he or she not have one, and request his or her views on the need for auditing the additional data.

## 14-119 Subcontract Audit Procedures

The "Price Reduction for Defective Cost or Pricing Data" clauses in FAR provide that when the government finds defective pricing on a subcontract after the prime contractor and the government have agreed on the contract price, the prime contractor is liable to the government for the amount of the defective pricing. The subcontractor is liable to the prime contractor. Additionally, because the prime contractor is responsible under FAR 15.806-2(d) for obtaining accurate, complete, and current subcontractor cost or pricing data and for updating the data, the prime contractor is liable for subcontract price reductions even when it had no knowledge of the defective data.

### 14-119.1 Prime and Subcontract Auditor Responsibilities for Subcontract Costs

a. Auditors at the prime contractors, higher-tier subcontractors, and subcontractors are responsible for determining whether the certified subcontract cost or pricing data was accurate, complete, and current. Defects in subcontract cost or pricing data may be attributable to the prime contractor or higher-tier contractor, subcontractor, or both. The auditor's job is to uncover defects in subcontract costs regardless of who caused the defect. However, auditors at each level of cost (prime, higher-tier, subcontractor) have

slightly different administrative responsibilities.

b. Prime contract auditors are responsible for reporting on the prime pricing action as a whole, including subcontract costs. The prime auditor evaluates certified cost or pricing data as of the date of price agreement with the government. The prime auditor reports the results of the postaward audit, including any subcontract audit results, to the contracting officer. Even though the DCAA postaward selection process requires each FAO to establish pricing actions for audit, the prime auditor is still responsible for all costs under the prime contract. The prime auditor also serves as the focal point for providing subcontract auditors with the necessary information to do the subcontract audit. To properly manage the prime contract audit and its subcontract costs, the prime auditor must:

(1) Establish the subcontract cost or pricing data certified to by the prime contractor.

(2) Assess the certified cost or pricing data to identify leads or potential defective pricing related to specific subcontractors or subcontract parts.

(3) Request necessary assist audits based on the assessment of the certified cost or pricing data.

(4) Coordinate and provide relevant facts and information to the subcontract auditor doing the subcontract postaward audit.

(5) Ensure that subcontract audit reports support defective pricing and that such defects actually affected prime contract price.

(6) Calculate the full effect of subcontract defects on the prime contract price by including prime add-ons.

(7) Report the audit results to the contracting officer. Contact the contracting officer to establish the most effective approach for issuing completed subcontract findings when the prime report is not completed (see 10-604.1c).

c Subcontract auditors are responsible for evaluating the subcontractor cost or pricing data submitted and/or certified to the prime contractor. The relevant dates for auditing the subcontractor's cost or pricing data vary and should be established at the beginning of the audit (see 14-119.3). The subcontract auditor obtains necessary information through the prime auditor and issues its report directly to the prime auditor, unless otherwise directed. The subcontract auditor must:

(1) Coordinate with the prime auditor to understand why the subcontract pricing action was requested for audit or to explain why the action was selected for audit.

(2) Obtain from the prime auditor, not the contracting officer, the necessary facts and information to do the subcontract postaward audit.

(3) Establish the relevant dates to determine the existence of defective pricing and confirm such with the prime auditor.

(4) Report the audit results to the prime auditor, unless directed otherwise.

### 14-119.2 Release of Subcontractor Data to Higher tier Contractors

FAR 15.804-7(f) governs the release of information necessary to support a reduction in prime contract or higher-tier subcontract prices. FAR provides for contracting officer release of information, on request, to prime contractors or higher-tier subcontractors as necessary to secure a prime contract price reduction. However, if the information includes trade secrets or confidential business information, the contracting officer must protect it from improper disclosure. To assist the contracting officer, the auditor will determine if the subcontractor objects to the release of the information in the audit report to the higher-tier contractor. Present contractor objections in the audit report as shown in 10-603.3. Follow the procedures in 6-801.2 in resolving any objections to unrestricted release of information to the higher-tier contractor.

### 14-119.3 Subcontract Defective Pricing - Significant Dates

Depending on the circumstances, two different dates may be relevant when determining subcontract defective pricing. These dates are: (1) the date of negotiation between the government and the prime contractor and (2) the date of negotiation between the prime contractor and subcontractor. Three factors determine whether one or both dates should

apply: (1) timing of the subcontract award (whether awarded before or after the prime contract), (2) type of prime contract, and (3) type of subcontract.

a. When a subcontract is awarded before the prime contract, subcontractor cost or pricing data must be accurate, complete, and current as of the date of final agreement on subcontract price. As a practical matter, later data would have no impact on final subcontract negotiations. Nevertheless, the prime contractor must still furnish the government with data it becomes aware of which may have an impact on final subcontract cost to the prime contractor, e.g., a subsequent decrease in a flexibly priced subcontractor's labor rates. Such information is cost or pricing data bearing on the negotiation of the prime contract, and the failure to provide the data may lead to defective pricing.

b. If the subcontract is awarded after a firm-fixed-price prime contract, all prime and subcontractor cost or pricing data existing as of the date of the price agreement between the prime and the government must be accurate, complete, and current. Defective subcontractor data occurring after the prime and government price agreement cannot affect the prime contract negotiated price, since there is no right of recovery by the government. Therefore, in this case, only the date of prime contract final price agreement is relevant for subcontractor defective pricing.

c. If a subcontract is awarded after a flexibly priced prime contract, defective subcontractor data occurring between the prime and subcontract price agreement date will affect the prime contract final price (FPI) or total cost (CPFF/CPAF/-CPIF) paid by the government. Accordingly, both dates (prime/government and prime/subcontractor) are relevant to determine defective pricing of the subcontract. In this situation, defective pricing could occur at (1) the prime level if the prime did not provide the government with accurate, complete, and current cost or pricing data as of prime and government price agreement and/or (2) the subcontractor level if the subcontractor did not provide the prime with accurate, complete, and current cost or pricing data as of prime and subcontractor price agreement.

### 14-119.4 Handling Subcontract Price Adjustments

Subcontract cost or pricing data may be defective regarding either the prospective subcontractor, the actual subcontractor, or both.

a. When the prospective and actual subcontractor are the same, and the subcontractor's proposal as a prospective subcontractor is defective, the recommended reduction in the prime contract price is the recommended subcontract price adjustment plus the prime contractor's additives. When a prospective subcontractor's data is defective, and the actual subcontractor for the item was an organization other than the prospective subcontractor, this limits the recommended reduction in the prime contract price to the difference between the prospective subcontractor's cost estimate and the actual subcontract price, plus the prime contractor's additives (FAR 15.804-7(f)(1)).

b. Defective pricing adjustments for subcontracts under flexibly priced prime contracts require different treatment and reporting, depending on the timing of the subcontract award.

(1) Defects in subcontracts negotiated prior to the date of prime contract price agreement and defects in subcontractor cost or pricing data at the time of prime contract price agreement affect the prime contract price. Subcontract defects in these situations, whether caused by the subcontractor or the prime contractor, require recommended prime contract price adjustments that include indirect costs at the rates negotiated in the prime contract plus the application of negotiated profit.

(2) Defects found in subcontracts negotiated after the prime contract price agreement, but which did not exist as of the date of prime contract price agreement, do not affect the prime contract price agreement. Subcontractor defects in these circumstances require disallowance (for cost-type contracts) or nonrecognition (for final pricing of redeterminable and incentive-type contracts) of costs on the prime contract that will include

prime contractor loadings at the rates actually applied by the prime contractor to the incurred costs. No adjustment is required to the profit on the prime contract.

(a) Payments to subcontractors under flexibly priced prime contracts that are higher than they would be had there been no defective subcontractor cost or pricing data shall be the basis for disallowance or nonrecognition of costs. Under flexibly priced prime contracts the government has a continuing interest in such overpayments to subcontractors that is unaffected by the initial agreement on prime contract price. Accordingly, the disallowance or nonrecognition of costs will be accomplished under the contract clauses prescribed in FAR 15.804-8 (also see FAR 15.804-7(f)(2)).

(b) Until the contract closing or final pricing is completed, the disallowance or nonrecognition of costs should be effected through reductions in the prime contractor's billings. If the prime contractor has reduced its own billings for the subcontractor defects, determine if the reduction is comparable to the audit findings.

(3) Separately present findings in the prime audit report "Summary of Audit Results" section and exhibits for (a) recommended price adjustments and (b) recommended disallowance or nonrecognition of incurred costs.

c. A firm-fixed-price contractor may obtain a refund for a defectively priced subcontract even if the subcontract cost or pricing data was not defective at the time the prime was negotiated. In this situation, the government has no contractual right to a price adjustment. However, we should review the facts to determine if an audit report recommendation for voluntary refund is appropriate (see 4-802).

## 14-120 Other Audit Considerations

### 14-120.1 Materiality of the Defective Pricing Findings

a. The TINA and regulations do not define what is a "significant amount" by which a contract price was increased because the contractor furnished defective cost or pricing data. The Courts and the BCA have made differing decisions regarding what is a significant amount. Whether or not the amount of defective pricing findings is presented as a recommended price adjustment in a report should be determined based upon the auditor's judgment for each defective pricing audit.

b. The government expends a substantial amount of resources finding, pursuing, and settling claims of defective pricing. Accordingly, materiality should be one of the underlying factors when doing postaward audits. In determining the significance of defective pricing, consider the magnitude of the defective data including all applicable burdens (see 10-103.3j(2)). Make this judgment considering surrounding circumstances including both the absolute defective amount and its relationship to the total contract amount. Auditors should base their materiality considerations on the dollar amount of the findings, collectively and singularly by element, and the value of the specific contract.

c. DCAA has not established a materiality level for its defective pricing program. The recommended price adjustments must consider the significance of each issue and what caused the defects. Findings may be immaterial to a particular pricing action, but indicative of system deficiencies or suspected irregular conduct, and should be reported as such. On the other hand, system deficiencies may have an impact on all contract actions thereby influencing the decision for reporting the systemic defect.

### 14-120.2 Defective Pricing from CAS Noncompliances

a. Generally, a CAS noncompliance found in a postaward audit does result in the certification of inaccurate cost or pricing data. However, the auditor will report CAS noncompliances revealed in postaward audits to the ACO who has the authority to make determinations of noncompliance. Regulations provide that the ACO, not the PCO, shall perform CAS administration for all contracts. Further, regulations require the DCAA auditor to make CAS-related recommendations to the ACO. Therefore, do not include a

price adjustment for the amount of the noncompliance in the postaward audit report, but do briefly explain in the notes to the exhibit: (1) the noncompliance, (2) its effect on the pricing action, and (3) its status.

b. Issuing a CAS noncompliance report permits the ACO to adjust all affected contracts that are both CAS noncompliant and defectively priced. Whether the violation causes a defect on multiple pricing actions or just one, the responsibility for adjustment belongs to the ACO. Also, systemic noncompliance issues, while significant in the aggregate, may not be significant on individual pricing actions. The responsible ACO has a greater chance to obtain consistent recovery on all affected pricing actions through CAS than the individual PCOs do under defective pricing.

c. For subcontracts, regulations require that the ACO cognizant of the subcontractor shall make the noncompliance determination and advise the ACO cognizant of the prime or next higher-tier subcontractor of such decision. The subcontractor ACO's determination will not be reversed by the ACO at the prime or next higher-tier subcontractor. Accordingly, the government should receive adjustment for the subcontract noncompliance and for the prime contractor's markups applied to the subcontract.

d. If the ACO determines the finding is not a CAS noncompliance, do not report the finding later to the PCO as defective pricing. Once the ACO has made such a determination, the finding would be difficult to support as defective pricing.

### 14-120.3 Systemic Defective Pricing Issues (Non-CAS)

a. Non-CAS-related defects attributable to breakdowns in the contractor's systems may affect multiple pricing actions. The defects may be relatively small on each individual action, but significant in the aggregate. The defects may also affect many contracting officers from the various services. The best way for the government to achieve consistent and maximum recovery of systemic defects is for one designated official to settle the issue on all affected contracts.

b. To promote consistent and maximum recovery for systemic issues the auditor must do the following:

(1) identify systemic defects, affected pricing actions, and applicable contracting officers;

(2) notify the affected contracting officers, explain the systemic defects, and suggest they designate or establish one individual to negotiate with the contractor;

(3) separate systemic findings from other specific defective pricing allegations found in the audits of the individual pricing actions;

(4) report the systemic findings in a single report that identifies all affected pricing actions and contracting officers; and

(5) address the report to each affected contracting officer. If a focal point has been designated to resolve the systemic issue, address the report to that individual with copies furnished to each affected contracting officer.

c. Set up the assignment for the systemic defect as an audit lead and include a description of the systemic defect.

### 14-120.4 Defective Pricing "Sweeps"

a. A defective pricing sweep is a process whereby a contractor reviews its records to determine if more current cost or pricing data exist and need to be disclosed to the government. The sweep usually occurs after price agreement and the contractor submits this additional data to the government with its executed Certificate of Current Cost or Pricing Data. The additional data reflect cost or pricing data that were reasonably available at the time of price agreement but not submitted or disclosed before price agreement.

b. Sweep data appear defective in that the cost or pricing data were not submitted or disclosed to the government before the price agreement. However, if the government receives cost or pricing data with the certificate before the contract award, the contracting officer has the opportunity to adjust the contract price for such data. In addition, procurement policy issued by the DoD in June 1989 (see 14-111c) requires contracting officers to reflect such data in the PNM and

the extent to which they relied on it in establishing the contract price.

c. In situations involving sweeps, contact the contracting officer to fully understand the type of data included with the Certificate, what the contracting officer did with the data, and the effect the data had on the negotiated contract price. The auditor should not recommend a price adjustment simply because the data were provided with the certificate after price agreement because this is not defective pricing.

d. The auditor must assess whether a contractor's sweep practices reflect deficiencies in estimating systems or procedures. For example, a contractor continually delays submitting cost or pricing data until after price agreement or the cost or pricing data were available to the contractor for some time before price agreement (aging of the availability of cost or pricing data). In those cases, the auditor must take appropriate steps to report the deficiencies or irregularities.

**14-120.5 Statistical Sampling Techniques in Postaward Audits**

a. Agency policy supports the use of statistical sampling and professional standards recognize audit sampling as a proper audit practice to provide evidential matter. While statistical sampling provides evidential matter, can it be used to support a projection of a recommended price adjustment for defective pricing? Neither the Courts nor the BCA has ruled on the propriety of sampling evidence to support recommended price adjustments.

b. The government has the burden of proving its case by the preponderance of the evidence. Absolute certainty is not required. The evidence need only show that the validity of the claim is more probable than not. The statistical sampling techniques which are applied within DCAA provide admissible evidence of the amount of the impact of defective data. The issue for the judge is to determine whether the sampling evidence will satisfy the standard of proof for the whole amount claimed. Therefore, the government will be successful in litigation only if judges are persuaded that sampling has sufficient weight to comply with the "preponderance of evidence" test. The test does not require absolute certainty; it does require a weighting of the evidence and a determination of the probability of accuracy. In evaluating whether statistical sampling is a proper audit practice for determining the amount of overpricing, the Courts or the BCA will have to examine this audit technique in the context of professional standards, professional custom, and audit necessity. The weight which a judge will give to sampling evidence will depend upon the facts of the case.

c. The auditor can use sampling techniques for postaward audits to establish that defective pricing exists. However, projecting sample results for the recommended price adjustment requires satisfying the "preponderance of evidence" test. The auditor must properly develop and document the sample plan, assess the reasons for defects found, evaluate the sample, and expand the sample as necessary to reach the desired confidence level and precision. Successfully projecting sample results for defective pricing requires high confidence levels and low precision. To achieve such results, the sample may have to be expanded even more than once after evaluation.

d. Address offsets in accordance with 14-118.

(1) Offsets the auditor finds during the audit of contracts awarded before 15 February 1987 are considered as part of the normal course of audit sampling.

(2) Offsets the auditor finds during the audit of contracts awarded on or after 15 February 1987 must be certified prior to considering them in the sampling process. The auditor will make a reasonable attempt to obtain certification of possible offsets prior to evaluating and projecting sample results (see CAM 14-118 b.).

(3) If the contractor will not certify to offsets identified during our audit of sampled items, take the following steps:

(a) Evaluate the sample, excluding the effect of any offsets the auditor discovers, to assess the confidence level and precision and expand the sample as necessary to achieve the desired confidence level and precision. If certification of offsets is likely, the auditor should also evaluate the sample including the offsets, and

notify the PCO of the effect of the offsets on the sample.

(b) Project the amount excluding any uncertified offsets from the sample findings. Use this projection for the amount of the recommended price adjustment to be presented in the audit report.

(c) Use the guidance in CAM 14-118 b. to report potential offsets that the contractor would not certify.

### 14-120.6 Obtaining Third Party Confirmations

Obtain third party confirmations as appropriate when performing postaward audits. Confirmation of initial contract dates and price quotes to prime or higher-tier subcontractors is a valid audit step in conducting defective pricing reviews. For instance, confirming purchase orders issued within six months after certification at a price significantly lower than that certified to may disclose existence of defective pricing. Vendor confirmations will also help determine if the prime or higher-tier subcontractors were aware of reduced prices before certification. Normally, use positive (rather than negative) confirmations. Begin with informal vendor contact and follow up with a formal confirmation letter.

### 14-120.7 Other Administrative Audit Considerations

a. Significant defective pricing findings, direct or indirect, may affect other contracts of the contractor. The FAO will coordinate the selection of contracts for audit in addition to the current FAO program plan with the regional office if it is likely to involve a major increase in the programmed workload level for postaward audits.

b. Do not issue a DCAA Form 1 instead of an audit report for apparent defective pricing findings on a cost-type contract.

c. During a postaward audit, request any necessary technical advice and assistance from the ACO or PCO as appropriate.

d. Determine whether defective pricing findings suggest estimating system deficiencies. Unless the defective pricing was caused by a breakdown in internal controls, the problem usually relates to an estimating system deficiency. Promptly report those deficiencies using the flash reporting procedures outlined in 9-310.

## 14-121 Findings and Conditions Requiring Further Pursuit as Potential Cases of Fraud

During postaward audits of cost or pricing data, be constantly alert to identify any condition which might suggest wrongdoing against the government. Section 14-121.2 provides examples found during defective pricing reviews. When finding any of these or similar conditions, refer them to the responsible investigative organization following the procedures in 4-702.

### 14-121.1 Statutory Provisions

a. Defective pricing may result in criminal acts under two statutory sections: 18 U.S.C. 1001 False Statements and 18 U.S.C. 287 False Claims. A false statement results when a contractor willfully makes a statement knowing that it contains false information. Certification by use of the Certificate of Current Cost or Pricing Data is an example of a statement subject to 18 U.S.C. 1001. No filing of a claim is required.

b. A violation of 18 U.S.C. 287 occurs when a contractor willfully submits a claim for money or property knowing that the claim is false, fictitious, or fraudulent. Thus, submitting an invoice on a contract that is defectively priced can be a violation.

### 14-121.2 Examples of Conditions Warranting Consideration of a Fraud Referral

The following are examples of conditions found during defective pricing audits which warrant additional review to determine if there is a reasonable basis for suspecting fraud.

a. High incidence of persistent defective pricing.

b. Repeated defective pricing involving similar patterns or conditions.

c. Continued failure to correct known system deficiencies.

d. Consistent failure to update cost or pricing data with knowledge that past

activity showed that prices have decreased.

e. Undisclosed specific knowledge regarding significant cost issues that will reduce proposal cost. Two examples are a revision in the price of a major subcontract and settlement of union negotiations resulting in lower increases in labor rates.

f. Denial by responsible contractor employees of the existence of historical records that are later found.

g. Repeated use of unqualified personnel to develop cost or pricing data used in the estimating process.

h. Indications of falsification or alteration of supporting data.

i. Distortion of the overhead accounts or base information by transferring charges or accounts that have a material impact on government contracts.

j. Continued failure to make complete disclosure to the government of data known to responsible contractor personnel.

k. Continued prolonged delay in release of data to the government to prevent possible price reductions.

l. Employing people known to have previously committed fraud against the government.

## 14-122 Discussing Audit Findings

We must coordinate and communicate with contracting officers and prime contract auditors on a regular basis to enable the government to achieve timely and maximum resolution of defective pricing findings. The accomplishment of the DCAA defective pricing program (in terms of completing planned audits, supporting audit findings, and helping contracting officers achieve price reductions) requires a DCAA commitment to coordination and communication with government personnel.

a. When apparent defective pricing is found, thoroughly discuss these findings with the contracting officer. Do this during the course of the audit to ensure mutual understanding of the facts (e.g., confirm reliance on and disclosure of cost or pricing data), resolve differences in method of computation, and present a unified position to the contractor. Significant factual issues should be confirmed with the PCO as early as possible to avoid wasted effort and incorrect conclusions. Also, auditors should provide the PCO with the draft report exhibit(s) and explanatory notes on the audit position, along with copies of disputed documents and other significant audit evidence, to obtain his or her comments on the factual matters involved. This is especially important if the PNM is the source of the audit opinion regarding reliance on and disclosure of cost or pricing data. Coordination does not require that the auditor provide a complete draft report to the PCO or obtain PCO approval before report issuance. On subcontracts, the subcontract auditor should have the prime auditor contact the PCO to determine whether the PCO wants to review the draft subcontract findings. If the PCO wants to review the draft subcontract findings, the subcontract auditor will forward the draft findings to the PCO. If the PCO doesn't want to review the draft subcontract findings, the subcontract auditor will prepare the report and forward it to the prime auditor.

b. Discuss pertinent factual matters with the contractor throughout and at the conclusion of the audit as suggested by 4-303.1 and 4-304.3. Draft copies of the report exhibits and explanatory notes, along with copies of disputed documents and other significant audit evidence should be provided to the contractor. However, do not give the contractor any government documents, including Price Negotiation Memorandums (PNMs) or portions of PNMs, without permission from the cognizant PCO. Refer to and comply with 4-702.4 if there is suspected fraud or unlawful activity. Generally, the contractor's responses to audit findings and the auditor's comments on those responses should be included in the audit report in order to minimize delays in resolution. If the contractor refuses to provide a response to the audit findings, the auditor should request the assistance of the PCO. Normally, no more than 30 days (after the exit conference) should be allowed for receipt of contractor comments.

c. If the PCO provides information which does not appear in the PNM or

clarifies the PNM content regarding the cost or pricing data relied on, written confirmation should be obtained for purposes of working paper documentation. Copies of data and written confirmation should also be obtained when PCOs confirm receipt of cost or pricing data not otherwise documented in the PNM or the contractor's Certificate of Current Cost or Pricing Data. If PCOs are unwilling to provide written confirmation, the FAO should confirm its understanding of the PCO's orally provided information in writing, noting that the information will be relied on in the final audit position unless notified to the contrary in 10 days. The assistance of the PLA may also be sought if the circumstances (such as materiality, uncertainty of PCO data, and complexity) warrant it.

## 14-123 Reporting Results of Audit

a. An audit report is required for all (positive and negative) postaward audits. Prepare and distribute postaward audit reports using the guidance in 10-600. See 14-118 for a discussion of the proper treatment of offsets.

b. Each audit report with a recommended price adjustment must specifically address the five points for establishing defective pricing in the notes to the report exhibit (14-102b and APPOST).

c. Furnish copies to the responsible Plant Representative/ACO. Distribute additional copies as shown in 10-6S1 and 15-6S1. The working papers file will contain a summary describing audit work performed, the basis for the audit conclusion, and the rationale for any reduction in the audit scope. (For example, if reporting negative findings after reviewing only a bill of materials, the summary would explain why the auditor did not review other cost elements.) The summary will also reflect supervisory review and endorsement of the audit conclusion.

## 14-124 Charging Interest When Defective Pricing is Found

a. Section 952 of the 1987 Defense Authorization Act amended 10 U.S.C. 2306a to allow the government to recover interest on overpayments to contractors resulting from defective cost or pricing data on DoD contracts or modifications dated after 7 November 1985. In addition, these contracts are subject to a penalty payment equal to the overpayment if prior to price agreement the contractor knew the data was defective. FAR extended the interest provision to all government agencies for contracts or modifications entered into on or after 22 January 1991 (FAR 15.804-7(b)(7)). Reimbursements by the contractor for defective pricing must include interest computed from the date of overpayment to the date of repayment. Interest rates are those prescribed by the Secretary of the Treasury under Section 6621 of the 1986 Internal Revenue Code (see d. below).

b. Overpayments occur only from payments made for supplies and services accepted by the government, or in the case of subcontracts, accepted by the prime contractor (see paragraph c.(1) below. They do not result from "contract financing payments" as defined at FAR 32.902. Basically, contract financing payments include advance payments, interim payments on cost-type contracts, and progress payments other than those made on fixed-price, architect-engineering contracts.

c. To assist the contracting officer in carrying out the responsibility for collecting interest on overpayments resulting from defective pricing, applicable reports (see a. above) at the prime level will include the statement given at 10-605.3d as part of the "Summary of Audit Results" portion of the report. Subcontract audit reports will include the statement given at 10-605.3.e. In addition, when the interest amount is expected to be $10,000 or more, an exhibit similar to Figure 14-1-1 will be added to the report. (If interest is expected to be under $10,000, only include the exhibit if requested by the contracting officer.) In developing the information for the exhibit, use the following method for both prime and subcontract defective pricing findings.

(1) Information developed for the exhibit will be based on the premise that interest on defective pricing begins to accrue whenever some part of delivery payment to a contractor under a FFP/FPI

contract includes the defective-related amount (price). For cost type contracts, interest will be computed on any fee payments, made to the contractor, if the fee was overstated based on defective cost or pricing data. A public voucher payment of costs to a prime which includes prices or fees paid on a defectively priced subcontract is the triggering event for subcontract interest computation. Likewise, a progress payment of costs to a prime which includes payments for deliveries on a defectively priced subcontract is the triggering event for subcontract interest computation.

(2) Instead of a detailed calculation based on each overpayment event throughout the year, auditors can obtain reasonably accurate interest calculations using a single computation date for each fiscal year (including partial periods) of prime contract performance. Although this method is reasonably equitable in most cases, make sure it does not result in a significant inequity. Whenever this appears to be the case, the auditor should refine the approach to achieve greater precision.

(3) The computation date in each fiscal period will be the date when 50 percent of the total value of items delivered in that period is reached. Refer to this date as the "period midpoint date."

(4) For each "period midpoint date," the FAO will determine an applicable base predicated on a pro-rata base-allocation factor applied to the total value of items delivered in each period. This factor is the ratio of total value (prime/subcontract) recommended price adjustment (numerator) to total contract price (denominator). The responsible procuring official then may compute simple interest by applying to each cumulative base the corresponding Treasury Department rate.

d. The Treasury rates in effect since 1 July 1985 are as follows:

| Period | Rate |
|---|---|
| 1985 | |
| July - December | 11 |
| 1986 | |
| January - June | 10 |
| July - December | 9 |
| 1987 | |
| January - March | 9 |
| April - June | 9 |
| July - September | 9 |
| October - December | 10 |
| 1988 | |
| January - March | 11 |
| April - June | 10 |
| July - September | 10 |
| October - December | 11 |
| 1989 | |
| January - March | 11 |
| April - June | 12 |
| July - September | 12 |
| October - December | 11 |
| 1990 | |
| January - March | 11 |
| April - June | 11 |
| July - September | 11 |
| October - December | 11 |
| 1991 | |
| January - March | 11 |
| April - June | 10 |
| July - September | 10 |
| October - December | 10 |
| 1992 | |
| January - March | 9 |
| April - June | 8 |
| July - September | 8 |
| October - December | 7 |
| 1993 | |
| January - March | 7 |
| April - June | 7 |
| July - September | 7 |
| October - December | 7 |
| 1994 | |
| January - March | 7 |
| April - June | 7 |
| July - September | 8 |
| October - December | 9 |
| 1995 | |
| January - March | 9 |

## FIGURE 14-1-1 (Ref. 14-124)
## Example of an Exhibit Used to Determine the Base for Interest Computation on a Firm-Fixed-Price Contract Action Required Under Section 952 of the FY 1987 Authorization Act and FAR 15.804-7(b)(7)

Audit Report No. _____

EXHIBIT B
Page 1 of 1

ABC Corporation
Anytown, Virginia
BASE FOR INTEREST COMPUTATION UNDER SECTION 952
OF THE FY 1987 DEFENSE AUTHORIZATION ACT/FAR 15.804-7(b)(7)

| Fiscal Period | Period Midpoint Date | Total Value of Items Delivered | Pro-Rata Base-Allocation Factor | Period Base | Cumulative Base For Interest |
|---|---|---|---|---|---|
| | (Note 1) | | (Note 2) | | (Note 3) |
| 11/10/85 - 03/31/86 | 12/23/85 | $ 50,000 | 5 % | $ 2,500 | $ 2,500 |
| 04/01/86 - 03/31/87 | 09/21/86 | 200,000 | 5 | 10,000 | 12,500 |
| 04/01/87 - 03/31/88 | 12/13/87 | 250,000 | 5 | 12,500 | 25,000 |
| 04/01/88 - 03/31/89 | 05/02/88 | 100,000 | 5 | 5,000 | 30,000 |
| Totals | | $ 600,000 | | $ 30,000 | |
| | | (Note 4) | | | |

Explanatory Notes:

1. Period Midpoint Date

Date on which 50 percent of the total value of items delivered in each period is reached. For a single delivery under a contract, the overpayment date is the delivery date.

2. Pro-Rata Factor

Computation of the Pro-Rata Base-Allocation Factor follows:

| | | |
|---|---|---|
| Total Contract Price | (A) | $600,000 |
| Recommended Price Adjustment | (B) | $ 30,000 |
| Pro-Rata Base-Allocation Factor | (B/A) | 5% |

3. Period Base

Interest shall be applied to the cumulative period bases at the applicable rates prescribed by the Secretary of the Treasury under Section 6621 of the Internal Revenue Code of 1986 from the dates of overpayment (period midpoint) to the date the government

4. Total Value

Total dollar amount will differ from contract price if performance has not been completed. (Note: for cost-type actions, the value of this column will relate to the total amount of defective fee and/or the amount of the subcontract defect.)

## 14-125 Resolution of Audit Findings

a. The auditor must continue to coordinate and communicate with the contracting officer after postaward audit reports are issued in order to enable the government to achieve a timely and favorable resolution either by negotiation or litigation of the defective pricing findings. During periodic discussions with the contracting officer, the auditor should always determine the status of open defective pricing issues. In addition, the auditor should continuously offer assistance such as commenting on data received by the contracting officer after the audit report was issued and offer to attend negotiation conferences. When assistance is requested by the contracting officer, it should be given high priority.

b. If the receipt of additional information or audit effort results in a revised audit position, issue a supplemental audit report (10-216). However, if the additional information or audit effort does not result in a change to the audit position, write a memorandum to the PCO describing the scope of additional audit effort and why there is no change in the audit position.

c. If the contracting officer informally advises the auditor of a disagreement with the audit position, every effort should be made to resolve the differences before a final determination is made. If the difference cannot be resolved, elevate the matter to management for resolution. In some cases it may also be necessary to obtain legal advice.

## 14-200 Section 2 - Review of Progress Payments

### 14-201 Introduction

a. Interim contract financing is available on certain fixed price contracts during the predelivery period as a percentage of allowable costs adjusted as discussed in this section. Financing is interest-free, but the amount is subject to limitations specified in the contract.

b. Interim financing helps stabilize the contractor's cash flow and reduces the need for outside financing. The reduced financial burden increases the number of qualified bidders and can result in a better price to the government.

c. The risk to the government of interim financing is the time value of money if the contractor is provided premature payments or is overpaid. The government is also at risk if the contractor does not deliver or delivers goods and services that do not meet contractual specifications. The DCAA/CAO review process must monitor and limit these risks.

d. This section provides guidance for performing audits of contractor progress payment requests based on cost. The DIIS includes a standard audit program for performing these reviews (entitled APPAYCOS). Since progress payment requests based on percentage of completion, are infrequently encountered, they are not addressed in this section. However, the DIIS includes a standard audit program for reviewing these requests. It is entitled APPAYPCT.

### 14-202 FAR/DFARS Provisions

#### 14-202.1 Customary or Unusual.

a. Progress payments are considered customary (see FAR 32.5/DFARS 232.5) when the contract includes the progress payment clause (FAR 52.232-16) establishing the uniform rate for calculating progress payments.

b. Effective 31 December 1991, DFARS 232.502-1-71 provided criteria for the use of flexible rates to calculate customary progress payments. For those progress payment requests using those rates, our review should include procedures to review the flexible rates. (See CAM 9-1400.) For new contracts or modifications for new work awarded after 11 November 1993, flexible rates are no longer authorized.

c. Any other progress payments are considered unusual, and may be used only in exceptional cases when authorized in accordance with FAR 32.501-2/DFARS 232.501-2.

d. The uniform rates for customary progress payments for foreign military sales, small businesses, or small disadvantaged businesses are shown in DFARS 232.501-1. The rates for all other businesses are based on the contract award date and are listed below. (Table 32-1, DFARS 232.502-1-71).

| Contract Award Date | Uniform Rate |
|---|---|
| Prior to May 1, 1985 | 90% |
| May 1, 1985 through October 17, 1986 | 80% |
| October 18, 1986 through September 30, 1988 | 75% |
| October 1, 1988 through June 30, 1991 | 80% |
| July 1, 1991 through November 10, 1993 | 85% |
| On or after November 11, 1993 | 75% |

e. The contractor can request progress payments as work progresses, but not more frequently than monthly. The amount of each progress payment is computed by (i) applying the rate stipulated in the progress payment clause of the contract (DFARS 252.232-7004) to the cumulative total allowable costs under the contract as shown in the contractor's books and records (see 14-202.4); (ii) plus progress payments to subcontractors or other divisions of the contractor's corporate office (see 14-205h); (iii) less the sum of all previous progress payments. The contracting officer is responsible for approving progress payment requests.

f. The contractor is responsible for maintaining reliable accounting and billing systems with adequate internal controls for the proper administration of progress payments. If the systems or

controls are deemed inadequate, the auditor should recommend that the contracting officer suspend progress payments (or suspend the portion of progress payments associated with the unacceptable portion of the contractor's systems) until the necessary corrections have been made.

g. As contract items are delivered and accepted, progress payment amounts are recovered (liquidated) by reducing payments to the contractor for completed contract items. The liquidated amount is computed by applying the liquidation rate in the progress payment clause to the contract price of items delivered and accepted (FAR 32.503-8 and 32.503-9).

(1) At the beginning of a contract, the liquidation rate is generally the same as the progress payment rate unless the liquidation rate was adjusted for the CAS limitations in FAR 32.503-7 on G&A eligible for progress payments.

(2) As the contract progresses, the contracting officer may adjust the liquidation rate (FAR 32.503-9) to permit the contractor to retain the earned profit element of the contract price for completed items in the liquidation process.

### 14-202.2 Approval of Progress Payment Requests

The ACO will normally approve progress payment requests as a matter of course, if recent audit experience (within the last 12 months) shows that the contractor is:

(i) reliable, competent, and capable of satisfactory performance;

(ii) possesses adequate accounting and billing system controls; and

(iii) in sound financial condition.

As long as these favorable conditions exist, the ACO will sample progress payment requests for audit. If the contractor has poor or inadequate accounting and billing system controls, or there is reason to believe that the contract will involve a loss, the ACO may ask for more frequent audits of the contractor's progress payment requests (FAR 32.503-4).

### 14-202.3 Contract Price and Rate Limitations

a. Contract price is a significant factor for determining the limitations on progress payments (FAR 32.501-3). The contract price for progress payment purposes is as follows:

(1) Firm fixed price contracts — the current contract price including any unpriced modifications with obligated funds.

(2) Redeterminable or Economic Price Adjustment contracts — the initial contract price until modified.

(3) Fixed Price Incentive — target price plus unpriced modifications with obligated funds. However, in certain circumstances, the ACO may provisionally increase the price to the ceiling or maximum price.

b. Contract price is limited to the funds obligated under the contract, as amended. For progress payments, the contract price should exclude any part of the contract where costs are being reimbursed by other means (e.g., cost reimbursable line items).

c. Multiple Order Contracts. Generally, progress payments made under multiple order contracts should be administered under each individual order as if the order constituted a separate contract. However, if the contractor requests it and the contracting officer approves, the administration of progress payments may be based on the overall contract or agreement. Under this method, the contractor shall include a supporting schedule to identify the costs applicable to each order [FAR 32.503-5(c)].

d. Unpriced Contract Actions. The contracting officer may include unpriced contract actions as part of the contract price for purposes of computing progress payments (FAR 32.501-3). The amount for unpriced contract actions must not exceed the funds obligated for the unpriced contract action or the estimated or target prices.

e. Undefinitized Contract Actions. Effective 24 August 1987, the progress payment rate applicable to the work accomplished on undefinitized contract actions is limited to 80 percent. A higher rate is not authorized under unusual or flexible progress payments for undefinitized actions [see FAR 32.501-1(d)].

(1) Additional Limits. In an effort to encourage definitization of contract actions and to protect the government's

interests, DFARS 217.7400 limits DoD expenditures on undefinitized contract actions to 50 percent of the not-to-exceed price without a qualifying proposal and 75 percent of the not-to-exceed price without a definitized contract. This limitation will be applied prior to the 80 percent limitation covered by FAR 32.501-1(d), or any other limitation of payment that may be imposed by the contract. If a progress payment request includes both definitized and undefinitized work, the cost must be broken out separately. Computations of the limitation of payments must be made for each.

(2) Exceptions. For DoD contracts, DFARS 217.7402 exempts undefinitized actions from these limits if they represent purchases of less than $25,000, or purchases involving special access programs, or foreign military sales, or congressionally mandated long-lead procurement contracts. DFARS 217.7404-5 exempts purchases of initial spares.

(3) Price Ceiling Clause. This clause (DFARS 252.217-7027) establishes a not to exceed ceiling amount which the undefinitized contract action (UCA) cannot exceed upon definitization.

(4) Limitation of Government Liability Clause. This clause (FAR 52-216-24) establishes a ceiling over which the contractor is not authorized to expend or incur obligations. Generally the dollar value in this clause is a percentage of the price ceiling which was established in the Price Ceiling Clause. DFARS 216.603-4 requires this clause be included in all UCAs. Together the Limitation of Government Liability Clause and the Price Ceiling Clause establishes the dollar value of the limitation and limits the amount the contractor can bill on progress payments. If the clauses are in conflict with the DFARS, the contract provisions would take precedence, but the contracting officer should be notified.

### 14-202.4 Timing of Eligible Costs in Progress Payment Requests

The following conditions apply to the timing for including eligible costs in progress payment requests:

a. Direct Materials. The costs of supplies and services purchased by the contractor directly for the contract may be included only after actual payment. However, under Alternate I to FAR 52.232-16, this does not apply if the contractor is a small business concern. Title to materials, as defined in the progress payment clause, is vested in the government when the material is properly chargeable to the contract. Accordingly, both large and small business concerns must have clear title before charging materials to the contract.

b. Incurred Costs. The following types of costs may be included when incurred, even before payment, when the contractor is not delinquent in payment of the costs of contract performance in the ordinary course of business:

(1) Materials issued from the contractor's stores inventory and placed in the production process for use on a specific contract. However, the inventory allocated to the contract should not exceed reasonable requirements including a reasonable accumulation of inventory for continuity of operations.

(2) Direct labor, direct travel, and other direct in-house costs associated with the specific contract.

(3) Properly allocable and allowable indirect costs associated with eligible direct costs. Indirect costs are ineligible for progress payment reimbursement until the direct costs with which they are associated are eligible for progress payment reimbursement (e.g., indirect costs applicable to unpaid material costs for large businesses).

c. Accrued costs of contractor contributions under employee pension, profit sharing, stock ownership plans, and other post-retirement benefit (PRB) plans shall be excluded until actually paid, unless:

(1) the contractor's practice is to contribute to the plans quarterly or more frequently and

(2) the contribution does not remain unpaid 30 days after the end of the applicable quarter (any contributions remaining unpaid shall be excluded from the contractor's total costs for progress payments until paid).

d. Cost of money that would be allowable under FAR 31.205-10 shall be deemed an incurred cost for progress payment purposes.

e. Total costs for progress payment purposes shall not include any costs that are not reasonable, allocable, and allowable to the contract, or are inconsistent with generally accepted accounting principles.

## 14-203 Audit Responsibility

a. The purpose of a progress payment audit is to:
(1) verify the amounts included on the progress payment form to the contractor's accounting books and records,
(2) evaluate the propriety of the progress payment request in accordance with the provisions of the contract, and
(3) determine whether undue financial risk to the government will result if the request is granted.

b. Audits will usually be made upon the request of the contracting officer; however, auditors should coordinate with the contracting officer to initiate an audit whenever they have a valid reason to believe that one is necessary to protect the interest of the government. Examples of conditions requiring coordination are:
(1) unsatisfactory financial conditions,
(2) weak or inadequate accounting and/or billing system controls,
(3) evidence of inadequate cost representations, or
(4) indications of contract losses (FAR 32.503-6(g)). To ensure adequate audit coverage, it is important to identify contractors and contracts, early in the audit planning process, where these conditions exist or where there is a high risk they will develop. The assessment of the contractor's accounting and billing system internal controls will determine areas of risk to be pursued during progress payment audits and the frequency of these audits. At major contractors this assessment is documented on the Internal Control Audit Planning Summary sheets. This assessment should be coordinated at least annually with the ACO.

## 14-204 Audit Scope

a. The scope of a progress payment audit depends on our experience with the contractor's operations; the reliance that can be placed on the contractor's accounting and billing systems internal controls, cost representations, estimate to complete the contract, and financial condition; and whether current billing rates have been established.

b. At major contractors, accounting and billing system audits are performed on a cyclical basis and serve as the basis for determining the extent of testing needed on each individual progress payment request. The auditor should review the Internal Control Audit Planning Summary sheets for the accounting and billing systems to determine the risk associated with the systems and adjust the scope of audit accordingly. At nonmajor contractors, the preaward accounting system review and the annual updates provide the basis for determining the scope of audit needed on each request. The auditor should review the internal control questionnaire and other related permanent file data to determine the scope of audit needed. As with any audit, the audit scope should also consider any specific concerns raised by the contracting officer.

c. In those cases where the auditor can rely on the contractor's systems and cost representations, and the contractor is in sound financial condition; then the risk would be considered low. The auditor may limit the audit to verification of billed amounts to amounts recorded on the contractor's accounting books and records, a review of the contractor's compliance with contract provisions, and periodic verification of the contractor's estimated additional costs to complete. Often, a review of the contractor's procedures for reconciling billing system data and records to the cost accounting records and a test of selected reconciliations will satisfy the verification objectives for claimed allowable costs.

d. In those cases where the contractor's accounting and billing system internal controls are inadequate (in total or in part) or the contractors financial condition is unstable, expanded testing of the progress payment request is often needed. However, our emphasis should be on the system rather than on each progress payment request. At those contractors with outstanding deficiencies, the auditor should work with the ACO and the

contractor to correct the deficiencies rather than to perform expanded testing on each progress payment request. When the contractor corrects the deficiency or changes the accounting or billing systems, the auditor should give a high priority to the review of the system change as a basis for placing reliance on the system. The next section (14-205) discusses special areas for consideration when planning an audit of a progress payment request.

## 14-205 Areas for Audit Consideration

During a progress payment audit, the auditor should, at a minimum, verify amounts on the contractor's certified SF 1443 to the contractor's accounting books and records. Often, a review of the contractor's procedures for reconciling billing system data to the accounting records and a test of selected reconciliations will satisfy the verification objectives for claimed allowable costs. Based on assessed audit risk and prior audit experience, the auditor should consider other issues such as indications of financial distress (untimely payments to subcontractors and/or vendor demands for cash-on-delivery), ETC/EAC amounts, the loss ratio, fair value of undelivered work, computation of liquidation amounts, as well as, issues identified by the ACO or other team members. The following paragraphs will address the key amounts on the SF 1443 and related considerations (refer to 14-2S1 as needed):

a. Contract Price (Item 5) should be verified to the most current contract modification (14-202.3). This amount is important because it is used to establish the limitation of payments on future deliveries (Item 21.b) and to compute any applicable loss ratio. The auditor should determine if any part of the contract is being financed by other means (reimbursement on public vouchers or direct payment by the government) and verify that these amounts are excluded. For example, award fees, incentive fees and value engineering change proposals (VECPs) are normally billed on separate invoices or public vouchers. These amounts should not be included in the contract price for progress payment purposes.

b. If the liquidation rate (Item 6.b) is less than the progress payment rate (Item 6.a), the auditor should coordinate with the ACO and determine the estimated profit used to establish the alternate liquidation rate. The auditor should verify that the current profit being realized on the contract (contract price less current EAC) is at least equal to or exceeds estimated profit used to establish the alternate liquidation rate. Otherwise, the contractor may retain excess profit on delivered and accepted contract items. The auditor in this case should recommend to the ACO that the alternate liquidation rate be changed to reflect the current profit estimate.

c. Paid Costs Eligible Under Progress Payment Clause (Item 9) is used only by large businesses. Verify that this amount only includes recorded purchased materials and service cost which have been paid at the date of the SF 1443. The auditor should also verify that any subcontract costs included here are for items delivered, accepted, and paid for, which resulted in the liquidation of subcontractor progress payments at the date of the SF 1443.

d. Incurred Cost Eligible Under Progress Payment Clause (Item 10). For small businesses, this item includes total incurred costs. For large businesses, this item is total incurred costs less costs of materials and services purchased directly for the contract (see Item 9 above).

(1) The auditor should verify all direct costs to the contractor's accounting books and records as appropriate for the reliance that is placed on the contractor's systems and controls. The auditor should use the contractor's reconciliations to the extent possible to accomplish these verifications. Also, direct material costs for small and large businesses should be reviewed to ensure that the government has clear title in accordance with FAR 52.232-16.

(2) Verify that indirect costs are based on approved billing rates or available forward pricing rates, or consider the need to review the billing rates in conjunction with the progress payment audit.

(3) Verify that obligations such as pension, profit sharing, and employee stock ownership plan contributions are paid within 30 days after the close of the quarter to which costs are assignable.

e. Total Costs Incurred to Date (Item 12.a). This item includes all prime contractor incurred costs plus unliquidated subcontractor progress payments (amounts paid and payable) listed on Items 14.c and 14.d. The auditor should verify any additional incurred costs on Line 12.a that were not identified on Items 9 and 10, to the contractor's accounting books and records. Additional costs on this line are usually unpaid costs for items and services.

f. Estimated Additional Cost to Complete (Item 12.b). Instructions on the SF 1443 require the contractor to make technical and financial estimates to complete (ETC) every six months. The auditor should verify contractor compliance with this requirement and determine that the ETC is supported with current, accurate, and complete information. If the ETC is understated, overpayment of progress payments can occur. An accurate ETC can help identify cost overrun areas which may be corrected and prevent possible default on the contract.

(1) Some contractors develop ETCs by preparing an estimate at completion (EAC) and subtracting the total costs incurred to date. EACs are best developed through rigorous methodologies such as those required under management control systems that comply with the Cost/Schedule Control System Criteria (C/SCSC) specified in DoD Instruction 5000.2, Part 11, Section B (see 11-200 and DCAAP 7641.47).

(a) The auditor should contact the government contract administration office and program office officials to determine if they are aware of any cost or schedule problems that affect the EAC.

(b) The EAC should be reconciled with other required reports such as quarterly limitation on payments statements (11-100) and Cost Performance Reports (CPRs) or Cost/Schedule Status Reports (C/SSR) (see 11-304 and 11-305).

(c) Subcontractor costs included in the ETC should be limited to those amounts the prime contractor will be required to pay. This amount is the difference between the amounts that are, or are estimated to be, legal obligations to pay and the amounts already included in Item 12.a. However. assist audits may be necessary to establish the validity of the ETC submitted by the subcontractor to the prime contractor (see 14-205h).

(d) The auditor should compare the ratio of the EAC to the contract price (indicated profit rate) with the ratio of the costs of items delivered to the contract price of those items (experienced profit rate). These ratios should be similar. The auditor should also compare the indicated profit rate with the negotiated profit rate to reveal any variance from initial estimates. Any significant variance should be coordinated with the ACO. See 14-205b.

(2) The contractor's ETC/EAC should be evaluated for reasonableness using the following methodology.

(a) When CPR or C/SSR data are available, the auditor can review this data to identify forecasted or actual overruns and determine if this information is consistently reflected in the EAC. Such relationships are described in the APPAYCOS audit program. Discrepancies between CPR and C/SSR data and the EAC should be discussed with the program office and the contractor.

(b) The auditor should compare the contractor's EAC's for contract billing purposes with those used for financial reporting purposes. Contractors sometimes report different EAC's because of different risk assumptions and profit expectations. The contractor should be able to reconcile any material differences. The auditor should also consider comparing the EAC with other financial and management reports which may be available and show total estimated costs to complete the contract.

(c) The auditor should evaluate the contractor's detailed ETC/EAC using the guidance in CAM 9-300 and ensure that the contractor used appropriate rates and factors and was consistent in its estimating practices.

(d) Government technical evaluations and/or assist audits should be requested if considered necessary (see CAM D-300). When the technical review is based

on an estimate of the physical completion of the contract, there must be close coordination on the timing of the estimate or the auditor will have problems using the technical results to determine an estimate to complete. The estimate of the physical completion of the contract by the technical specialist needs to be for the same period covered by the progress payment request. The auditor should coordinate with the technical specialist and document the methodology used to evaluate the ETC or the EAC in the audit working papers.

g. The Loss Ratio Adjustment discussed in FAR 32.503.6(g) is intended to protect the government's interest when a contract is in a loss condition, that is, when the total costs incurred to date and the ETC (Items 12.a and 12.b) exceed the contract price (Item 5).

(1) Using the Loss Ratio Factor, (Contract Price divided by Total Estimated Contract Costs), the auditor should recommend that the ACO adjust the amount on Item 11 — Total Costs Eligible for Progress Payment to exclude the elements of loss from consideration for the instant and future progress payments.

(2) When appropriate, the auditor should coordinate with the ACO to apply a loss ratio and document the ETC/EAC supporting the decision. If the loss ratio is not applied timely, the government will pay the contractor more than it should before delivery. This does not reduce the amount the government will ultimately pay the contractor, but it will reduce the amount of interim financing at risk.

(3) Since the ACO is required to verify and apply the loss ratio factor, the auditor should advise the contractor to submit future invoices (SF 1443's) without adjusting their figures for the loss. However, the contractor may attach the loss ratio computation as a separate schedule.

(4) Audits of loss contracts should include steps to determine if the contractor is financially capable of completing the contract (FAR 32.503-5(b)(3)). See 14-300 for guidance on financial capability audits.

h. Subcontractor Claims. When subcontractors are entitled to progress payments under FAR 32.504, the higher-tier contractor is responsible for:

(i) verifying subcontractor progress payment claims and liquidations;

(ii) approving billings for current payments; and

(iii) ensuring that progress payments to subcontractors conform to the standards and principles prescribed in paragraph (j) of the progress payments clause (see FAR 52.232-16). The auditor should review the prime (higher-tier) contractor's audit and verification procedures to ensure the government's interest is protected. If the contractor's analyses of subcontract progress payment requests are considered inadequate, and these costs cannot be evaluated by other techniques (other current or historical data), an assist audit should be requested.

(1) Progress Payments Paid to Subcontractors (Item 14a). The auditor should verify that:

(i) a formal written subcontract exists and that it includes progress payment terms similar to FAR 52.232-16 and the customary rate used by the government contracting agency;

(ii) subcontractor(s) have submitted proper progress payment requests in a similar SF 1443 format;

(iii) the claimed amounts have actually been paid if the prime contractor is a large business, or payments are made in the ordinary course of business (verify the cancelled checks),if the prime contractor is a small business;

(iv) the claimed amounts are not advanced payments; and

(v) title to subcontractor property will be vested to the government.

(2) Subcontract liquidations (Item 14b) is the subcontractor liquidation rate applied to the subcontract price of items received, accepted, and invoiced to date.

(a) The auditor should review the higher-tier contractor's records to determine the number of subcontract items actually received, accepted, and invoiced from subcontractor(s). The auditor shouid verify:

(i) the price per unit and liquidation rate to the subcontract terms, and

(ii) that the amount claimed was computed by applying the subcontract unit price and liquidation rate to the units received from the subcontractor.

(b) The amount of liquidated subcontractor progress payments should be included in the paid costs eligible under progress payment clause, Item 9.

(3) Subcontract Progress Billings Approved for Current Payments (Item 14.d) is used only by small business concerns. It represents the progress payment requests from subcontractors which have been approved but not paid. The auditor should verify the amount requested to the subcontractor(s) progress payment request(s) and confirm that the contractor normally pays the subcontractor within a reasonable time after receiving the government progress payment.

(4) The amounts claimed for subcontractor progress payments on Item 14.e are limited to the unliquidated progress payments on Item 14.c that were paid by the date of the SF 1443, plus, for small business (higher-tier) contractors, approved but unpaid subcontractor requests for progress payments on Item 14.d.

(5) Progress payments made to subcontractors in loss positions should have been reduced by application of a loss-ratio factor (FAR 32.503-6(g)).

(6) The prime contract auditor should determine if the subcontract pricing action has had reported defective pricing. If this is the case, the auditor should determine that progress payments do not include liquidation of the defective subcontract costs.

i. Total Amount of Previous Progress Payments Requested (Item 18) should be verified to the contractor's accounts receivable records. Contractors should have adequate billing system internal control policies and procedures for monitoring and reconciling progress payment requests with progress payment receipts and liquidations on government billings (refer to 205.j(3)). The auditor should coordinate Item 18 with the ACO's payment records and reconcile any differences.

j. The computations of limits for outstanding progress payments (Section III) are designed to minimize the government's risk of overpayment by integrating paragraph (a)(4) of the Progress Payment clause in FAR 52.232-16 to restrict the amount of unliquidated progress payments on Item 24. This limitation is determined by comparing the costs of undelivered items to the price of those undelivered items as discussed below.

(1) Items 20.a through 20.e are intended to determine the amount of progress payments made on undelivered items and delivered items not invoiced and accepted, including allowable unliquidated progress payments to subcontractors. The key to this computation is Item 20.a — Cost Included in Item 11 Applicable to Items Delivered, Accepted, and Invoiced. The auditor should verify the items delivered and their cost to the contractor's books and records (see 14-205.c and d).

(2) If the contract is in a loss condition, i.e. Items 12.a plus 12.b exceed the contract price in Item 5, the amount on Item 20.a should be limited to the contract price of delivered items (Item 21.a). The calculation for Item 20.b should use the adjusted costs resulting from the application of the Loss Ratio Factor (see 14-205.f).

(3) Items 21.a through 21.e are intended to determine the contract price of items NOT delivered, accepted, and invoiced. The key to this computation is Item 21.a — Contract Price of Items Delivered, Accepted and Invoiced at the date of this SF 1443. The auditor should verify the number of contract items delivered and related contract unit prices on DD Forms 250 or similar contractor invoices to the contractor's accounting books, records, schedules of contract receivables and the contract terms (for contract unit prices). A reasonableness check between delivered items and incurred costs could highlight possible cost overruns that could impact future deliveries.

(a) Contractors should maintain contra accounts or receivables schedules to reflect the amount of progress payments requested (Item 18) and received (Item 23) as compared to contract price for delivered and invoiced items (Item 21.a). The difference between the contract price and the progress payment amounts would represent the receivable when the invoice is issued on delivered items.

(b) If the contractor does not maintain records containing the needed informa-

tion, the auditor should advise the ACO/PCO of this deficiency and disclose the deficiency in the progress payment request audit report and a separate flash billing system deficiency audit report (see 10-4S2).

k. Total Amount Applied and to be Applied to Reduce Progress Payments (Item 23) is the cumulative amount of previous progress payments applied to reduce the contract price of contract items delivered and invoiced, by the cutoff date of this SF 1443.

(1) The auditor should verify the amount on Item 23 to the contractor's books and records [see 14-205h(3)(a) and (b)] as previously discussed with Item 21a through 21e.

(2) A common error in completing Item 23 is to multiply the contract price of delivered and accepted units (Item 21.a) by the liquidation rate (Item 6.b). This calculation does not consider changes in the liquidation rate or other adjustments over the life of the contract. The amount on Item 23 must be verified to the contractor's books and records, otherwise the amount of unliquidated Progress Payments on Item 24 could be overstated.

l. The Fair Value Test measures the government's investment in the undelivered portion of the contract by comparing unliquidated progress payments to the fair value of the work accomplished on the undelivered portion of the contract.

(1) FAR 32.503-6(f) defines the fair value of undelivered work as the lesser of:

(i) the contract price of undelivered work minus the ETC contract performance,(Item 21.b minus Item 12.b) or

(ii) the incurred costs applicable to the undelivered units (Item 20.b plus Item 14.e).

Unliquidated subcontractor progress payments (Item 14.e) have not been included in Item 20.b. Therefore, this amount should be added to the incurred costs applicable to undelivered work to give a true measure of fair value.

(2) The test compares the fair value of undelivered work to unliquidated progress payments (Item 24). The auditor should add back the amount of the instant progress payment invoice (Item 26) to make sure that the current payment will not cause a failure.

(3) A fair value test failure indicates a loss contract or a liquidation problem. The auditor should coordinate with the contracting officer to adjust the instant and future progress payments to minimize the government's risk.

## 14-206 Reports

a. The audit report should be prepared in accordance with 10-1200 and addressed to the contracting officer who requested the audit. If the review was initiated by the auditor, the report should be addressed to the government representative responsible for review of the contractor's requests for progress payments. In all cases when he or she is not the addressee, the ACO should be furnished a copy of the report. The content of the report will state the amount of progress payment that is recommended for acceptance and provide clear explanations for amounts not recommended for acceptance, including any qualifications required for such items as required technical analysis was not received or access to records problems.

b. When the unpaid balance on a contract is not sufficient to cover the anticipated cost of completion (i.e., loss contract), the report must express an opinion (positive assurance) on whether the contractor has adequate resources to complete the contract (see 14-205g(4) and Figure 10-12-2). If the contract is not in a loss position, and specific audit tests to review the contractor's financial capability were not performed, the report will provide negative assurance relative to the contractor's financial capability. This negative assurance will be contained in a separate scope paragraph (see Figure 10-12-1).

c. When the audit discloses materially adverse findings, such as the contractor's financial deterioration, allocation of inventory to the contract substantially exceeding reasonable requirements, or delinquency in payment of contract costs, these matters will be explained in detail particularly as they relate to the government's financial risk. To ensure that all available facts have been considered in

the conclusions, the auditor should contact the ACO, discuss the findings, and invite the ACO to participate in the exit conference with the contractor (see 4-300). Further guidance on reporting instances of contractor financial jeopardy is in 14-300.

d. The contractor is responsible for maintaining reliable accounting and billing systems with adequate internal controls for the proper recording and segregation of costs. If the audit discloses weaknesses or inadequacies in the systems or controls and the contractor has not taken reasonable corrective action, the auditor should recommend that the contracting officer suspend progress payments for costs, including appropriate burden, associated with the unacceptable portion of the contractor's system until the necessary changes are made and verified. These inadequacies should be described in the audit report on the progress payment request and separate reports on accounting and billing system deficiencies.

e. When a progress payment has most likely already been paid, and we find the contractor has experienced a lower profit rate than the rate anticipated at the time the liquidation rate was established, we should recommend an immediate increase in the liquidation rate with appropriate adjustment being made to billings for delivered items [FAR 32.503-9(b)(1)]. Expediency may call for the reduction to be made on the next progress payment request unless the contractor makes an immediate refund for his prior billings on delivered items. See 14-205b.

## 14-207 Interest

While FAR 32.614-1 provides for interest charges, interest on progress payments overpayments do not begin to run until there is a demand for repayment of the excess progress payments. Further, if the overpayment is repaid within thirty days after the demand is issued, interest is not assessed. However, the auditor should be alert to the significance of interest and, as appropriate, coordinate with the contracting officer to request a voluntary refund from the contractor for interest on overpayments or premature progress payments.

## 14-2S1 Supplement

The SF 1443, Contractor Request for Progress Payment and the related Instructions are included on the following pages for reference.

# 14-2S1 SUPPLEMENT — SF 1443
# CONTRACTOR REQUEST FOR PROGRESS PAYMENT

**CONTRACTOR'S REQUEST FOR PROGRESS PAYMENT**

**IMPORTANT** This form is to be completed in accordance with instructions on reverse

**SECTION I – IDENTIFICATION INFORMATION**

| 1 TO NAME AND ADDRESS OF CONTRACTING OFFICE (Include ZIP Code) | 2 FROM: NAME AND ADDRESS OF CONTRACTOR (Include ZIP Code) |
|---|---|
| PAYING OFFICE | |

| 3 SMALL BUSINESS | 4 CONTRACT NO | 5 CONTRACT PRICE |
|---|---|---|
| ☐ YES ☐ NO | | $ |

| 6 RATES | | 7 DATE OF INITIAL AWARD | | 8A PROGRESS PAYMENT REQUEST NO | 8B DATE OF THIS REQUEST |
|---|---|---|---|---|---|
| A PROG PYMTS | B LIQUIDATION | A YEAR | B MONTH | | |
| % | % | | | | |

**SECTION II – STATEMENT OF COSTS UNDER THIS CONTRACT THROUGH** _____ (Date)

| | | |
|---|---|---|
| 9 PAID COSTS ELIGIBLE UNDER PROGRESS PAYMENT CLAUSE | | $ |
| 10 INCURRED COSTS ELIGIBLE UNDER PROGRESS PAYMENT CLAUSE | | |
| 11 TOTAL COSTS ELIGIBLE FOR PROGRESS PAYMENTS *(Item 9 plus 10)* | | |
| 12 a TOTAL COSTS INCURRED TO DATE | $ | |
| b ESTIMATED ADDITIONAL COST TO COMPLETE | | |
| 13 ITEM 11 MULTIPLIED BY ITEM 6a | | |
| 14 a PROGRESS PAYMENTS PAID TO SUBCONTRACTORS | | |
| b LIQUIDATED PROGRESS PAYMENTS TO SUBCONTRACTORS | | |
| c UNLIQUIDATED PROGRESS PAYMENTS TO SUBCONTRACTORS *(Item 14a less 14b)* | | |
| d SUBCONTRACT PROGRESS BILLINGS APPROVED FOR CURRENT PAYMENT | | |
| e ELIGIBLE SUBCONTRACTOR PROGRESS PAYMENTS *(Item 14c plus 14d)* | | |
| 15 TOTAL DOLLAR AMOUNT *(Item 13 plus 14e)* | | |
| 16 ITEM 5 MULTIPLIED BY ITEM 6b | | |
| 17 LESSER OF ITEM 15 OR ITEM 16 | | |
| 18 TOTAL AMOUNT OF PREVIOUS PROGRESS PAYMENTS REQUESTED | | |
| 19 MAXIMUM BALANCE ELIGIBLE FOR PROGRESS PAYMENTS *(Item 17 less 18)* | | |

**SECTION III – COMPUTATION OF LIMITS FOR OUTSTANDING PROGRESS PAYMENTS**
***SEE SPECIAL INSTRUCTIONS ON BACK FOR USE UNDER THE FEDERAL ACQUISITION REGULATION**

| | | |
|---|---|---|
| 20 COMPUTATION OF PROGRESS PAYMENT CLAUSE *(a(3)(ii) or a(4)(iii))* LIMITATION* | $ | |
| a COSTS INCLUDED IN ITEM 11 APPLICABLE TO ITEMS DELIVERED INVOICED AND ACCEPTED TO THE DATE IN HEADING OF SECTION II | | |
| b COSTS ELIGIBLE FOR PROGRESS PAYMENTS APPLICABLE TO UNDELIVERED ITEMS AND TO DELIVERED ITEMS NOT INVOICED AND ACCEPTED *(Item 11 less 20a)* | | |
| c ITEM 20b MULTIPLIED BY ITEM 6a | | $ |
| d ELIGIBLE SUBCONTRACTOR PROGRESS PAYMENTS *(Item 14e)* | | |
| e LIMITATION a(3)(ii) or a(4)(iii) *(Item 20c plus 20d)* * | | |
| 21 COMPUTATION OF PROGRESS PAYMENT CLAUSE *(a(3)(ii) or a(4)(iii))* LIMITATION * | | |
| a CONTRACT PRICE OF ITEMS DELIVERED, ACCEPTED AND INVOICED TO DATE IN HEADING OF SECTION II | | |
| b CONTRACT PRICE OF ITEMS NOT DELIVERED ACCEPTED AND INVOICED *(Item 5 less 21a)* | | |
| c ITEM 21b MULTIPLIED BY ITEM 6b | | |
| d UNLIQUIDATED ADVANCE PAYMENTS PLUS ACCRUED INTEREST | | |
| e LIMITATION *(a(3)(ii) or a(4)(iii)) (Item 21c less 21d)** | | |
| 22 MAXIMUM UNLIQUIDATED PROGRESS PAYMENTS *(Lesser of Item 20e or 21e)* | | |
| 23 TOTAL AMOUNT APPLIED AND TO BE APPLIED TO REDUCE PROGRESS PAYMENT | | |
| 24 UNLIQUIDATED PROGRESS PAYMENTS *(Item 18 less 23)* | | |
| 25 MAXIMUM PERMISSIBLE PROGRESS PAYMENTS *(Item 22 less 24)* | | |
| 26 AMOUNT OF CURRENT INVOICE FOR PROGRESS PAYMENT *(Lesser of Item 25 or 19)* | | |
| 27 AMOUNT APPROVED BY CONTRACTING OFFICER | | |

**CERTIFICATION**

I certify that the above statement (with attachments) has been prepared from the books and records of the above-named contractor in accordance with the contract and the instructions hereon and to the best of my knowledge and belief that it is correct that all the costs of contract performance (except as herewith reported in writing) have been paid to the extent shown herein or where not shown as paid have been paid or will be paid currently by the contractor when due in the ordinary course of business that the work reflected above has been performed that the quantities and amounts involved are consistent with the requirements of the contract That there are no encumbrances (except as reported in writing herewith or on previous progress payment request No ___ ___ ___ ) against the property acquired or produced for and allocated or properly chargeable to the contract which would affect or impair the Government's title that there has been no materially adverse change in the financial condition of the contractor since the submission of the most recent written information dated ___ ___ ___ ___ by the contractor to the Government in connection with the contract that to the extent of any contract provision limiting progress payments pending first article approval such provision has been complied with and that after the making of the requested progress payment the unliquidated progress payments will not exceed the maximum unliquidated progress payments permitted by the contract

| NAME AND TITLE OF CONTRACTOR REPRESENTATIVE SIGNING THIS FORM | SIGNATURE |
|---|---|
| NAME AND TITLE OF CONTRACTING OFFICER | SIGNATURE |

NSN 7540-01-140-5521 1443-101 STANDARD FORM 1443 (10-82) Prescribed by GSA (FPR ( 16 808) FAR (48 CFR 53 232)

# 14-2S1 SUPPLEMENT — SF 1443 INSTRUCTIONS

INSTRUCTIONS

**GENERAL** - All entries on this form must be typewritten all dollar amounts must be shown in whole dollars rounded up to the next whole dollar All line item numbers not included in the instructions below are self explanatory

**SECTION I – IDENTIFICATION INFORMATION** Complete Items 1 through 8c in accordance with the following instructions

Item 1 TO – Enter the name and address of the cognizant Contract Administration Office PAYING OFFICE – Enter the designation of the paying office as indicated in the contract

Item 2 FROM CONTRACTOR'S NAME AND ADDRESS/ ZIP CODE – Enter the name and mailing address of the contractor If applicable the division of the company performing the contract should be entered immediately following the contractor's name

Item 3 Enter an X in the appropriate block to indicate whether or not the contractor is a small business concern

Item 5 Enter the total contract price as amended If the contract provides for escalation or price redetermination enter the initial price until changed and not the ceiling price If the contract is of the incentive type enter the target or billing price as amended until final pricing For letter contracts enter the maximum expenditure authorized by the contract as amended

Item 6A PROGRESS PAYMENT RATES – Enter the 2 digit progress payment percentage rate shown in paragraph (a)(1) of the progress payment clause

Item 6B LIQUIDATION RATE – Enter the progress payment liquidation rate shown in paragraph (b) of the progress payment clause using three digits Example show 80% as 800 show 72 3% as 723

Item 7 DATE OF INITIAL AWARD – Enter the last two digits of the calendar year Use two digits to indicate the month Example show January 1982 as 82/01

Item 8A PROGRESS PAYMENT REQUEST NO Enter the number assigned to this request All requests under a single contract must be numbered consecutively beginning with 1 Each subsequent request under the same contract must continue in sequence using the same series of numbers without omission

Item 8B Enter the date of the request

**SECTION II – GENERAL INSTRUCTIONS** DATE In the space provided in the heading enter the date through which costs have been accumulated from inception for inclusion in this request This date is applicable to item entries in Sections II and III

Cost Basis For all contracts with Small Business concerns the base for progress payments is total costs incurred For contracts with concerns other than Small Business the progress payment base will be the total recorded paid costs together with the incurred costs per the Computation of Amounts paragraph of the progress payment clause in FPR 1 30 510-1(a) or FAR 52 232 16 as appropriate Total costs include all expenses paid and incurred including applicable manufacturing and production expense general and administrative expense for performance of contract which are reasonable, allocable to the contract consistent with sound and generally accepted accounting principles and practices and which are not otherwise excluded by the contract

Manufacturing and Production Expense General and Administrative Expense In connection with the first progress payment request on a contract attach an explanation of the method bases and period used in determining the amount of each of these two types of expenses If the method bases or periods used for computing these expenses differ in subsequent requests for progress payments under this contract attach an explanation of such changes to the progress payment request involved

Incurred Costs Involving Subcontractors for Contracts with Small Business Concerns If the incurred costs eligible for progress payments under the contract include costs shown in invoices of subcontractors suppliers and others that portion of the costs computed on such invoices can only include costs for (1) completed work to which the prime contractor has acquired title (2) materials delivered to which the prime contractor has acquired title (3) services rendered and (4) costs billed under cost reimbursement or time and material subcontracts for work to which the prime contractor has acquired title

**SECTION II – SPECIFIC INSTRUCTIONS**

Item 9 PAID COSTS ELIGIBLE UNDER PROGRESS PAYMENT CLAUSE Line 9 will not be used for Small Business Contracts

For large business contracts costs to be shown in Item 9 shall include only those recorded costs which have resulted at time of request in payment made by cash check or other form of actual payment for items or services purchased directly for the contract This includes items delivered accepted and paid for resulting in liquidation of subcontractor progress payments

Costs to be shown in Item 9 are not to include advance payments downpayments or deposits all of which are not eligible for reimbursement or progress payments made to subcontractors suppliers or others which are to be included in Item 14 See Cost Basis above

Item 10 INCURRED COSTS ELIGIBLE UNDER PROGRESS PAYMENT CLAUSE – For all Small Business Contracts Item 10 will show total costs incurred for the contract

Costs to be shown in Item 10 are not to include advance payments downpayments deposits or progress payments made to subcontractors suppliers or others

For large business contracts costs to be shown in Item 10 shall include all costs incurred (see Cost Basis above) for materials which have been issued from the stores inventory and placed into production process for use on the contract for direct labor for other direct in house costs and for properly allocated and allowable indirect costs as set forth under Cost Basis above

Item 12a Enter the total contract costs incurred to date If the actual amount is not known enter the best possible estimate If an estimate is used enter (E) after the amount

Item 12b Enter the estimated cost to complete the contract The estimate may be the last estimate made adjusted for costs incurred since the last estimate however estimates shall be made not less frequently than every six months

Items 14a through 14e Include only progress payments on subcontracts which conform to progress payment provisions of the prime contract

Item 14a Enter only progress payments actually paid

Item 14b Enter total progress payments recouped from subcontractors

Item 14d For Small Business prime contracts include the amount of unpaid subcontract progress payment billings which have been approved by the contractor for the current payment in the ordinary course of business For other contracts enter 0' amount

**SECTION III – SPECIFIC INSTRUCTIONS** This Section must be completed only if the contractor has received advance payments against this contract or if items have been delivered invoiced and accepted as of the date indicated in the heading of Section II above EXCEPTION Item 27 must be filled in by the Contracting Officer

Item 20a Of the costs reported in Item 11 compute and enter only costs which are properly allocable to items delivered invoiced and accepted to the applicable date In order of preference these costs are to be computed on the basis of one of the following (a) The actual unit cost of items delivered giving proper consideration to the deferment of the starting load costs or (b) projected unit costs (based on experienced costs plus the estimated cost to complete the contract) where the contractor maintains cost data which will clearly establish the reliability of such estimates

Item 20d Enter amount from 14e

Item 21a Enter the total billing price as adjusted of items delivered accepted and invoiced to the applicable date

Item 23 Enter total progress payments liquidated and those to be liquidated from billings submitted but not yet paid

Item 25 Self explanatory (NOTE If the entry in this item is a negative amount there has been an overpayment which requires adjustment)

Item 26 Self-explanatory but if a lesser amount is requested enter the lesser amount

**SPECIAL INSTRUCTIONS FOR USE UNDER FEDERAL ACQUISITION REGULATION (FAR)**

Items 20 and 20e Delete the references to a(3)(iii) of the progress payment clause

Items 21 and 21e Delete the references to a(3)(iii) of the progress payment clause

**STANDARD FORM 1443 BACK (10-82)**

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## 14-300 Section 3 — Contractor Financial Capability Audits and Reporting

### 14-301 Introduction

a. Financial capability audits are performed to determine if the contractor is financially capable of performing on government contracts. Contractor financial difficulties may disrupt production schedules, cause inefficient use of resources, and result in contract nonperformance. These conditions may also result in monetary loss to the government on guaranteed loans and on progress payments.

b. Many financial capability audits are performed in response to requests by the contracting officer. However, in all audit situations, auditors should be alert to conditions which may indicate potential unfavorable financial conditions or other circumstances which could lead to contract performance jeopardy. Field audit offices will make an annual assessment of a contractor's financial condition to determine whether there is a need to perform a financial capability audit (see 14-303). These assessments may be conducted during the annual planning process; contractor preaward surveys (5-200); audits of advanced payments; or progress payment audits (14-200). Also, financial capability audits may be required because of adverse events or conditions such as plant closings, major contract terminations, program cancellations, slow payment to creditors, and negative financial conditions found in financial statements and other key financial data.

c. The financial capability audit places emphasis on evaluating (1) the contractor's current financial condition, (2) near term cash flows, and (3) the contractor's near and long term capability to obtain funds outside the normal course of operations. While the evaluation of historical financial data can identify unfavorable financial conditions, the audit focus is on future cash flows to sustain contractor performance on government contracts.

d. The auditor should be familiar with DFARS 232.172, "Financial Responsibility of Contractors", and SAS 59 "The Entity's Ability to Continue as a Going Concern." These references include useful information that will greatly assist the auditor in successfully performing the financial capability audit.

e. In considering contractor financial capability, the auditor will encounter several terms (including terms with specific legal meaning) that are commonly used by financial analysts. Some of these terms, which will be used throughout this section, are listed below.

(1) Bankruptcy. A legal recognition of the state of insolvency, initiated for the benefit of creditors with unpaid and unsecured debts. Voluntary bankruptcy involves an assignment of assets by the debtor for the benefit of the creditors, while involuntary bankruptcy is initiated by an unsecured creditor.

(2) Business Failure. An entity's inability to succeed in selling its products or services, meet its obligations, and/or earn a satisfactory rate of return. A business failure may not lead to bankruptcy because the owners may choose to terminate or sell the business.

(3) Default. The failure to do something required by duty or law. The term is normally used in context of the failure to meet the conditions of a contract.

(4) Financial Distress. A condition of being under financial pressure (caused by difficulty in meeting ongoing cash obligations) which may require extraordinary management actions to obtain additional funds outside the course of ordinary operations. This could include actions such as selling assets (including company segments), obtaining loans, and issuing bonds or stock. Financial distress can be brought on by circumstances such as reduced cash flows from operations, customer payment defaults, excessive debt and related interest expense, competition in the marketplace, adverse legal actions, and changing business environment or economics.

(5) Financial Flexibility. The ability of an entity to take effective actions to control amounts and timing of cash flows so it can respond to unexpected needs and opportunities.

(6) Insolvency. Insolvency occurs when an entity cannot pay obligations as they come due. Insolvency may be a temporary condition resulting from a mismatch between cash inflows and cash outflows. Insolvency in the context of bankruptcy is when an entity's financial condition is such that total liabilities exceed the fair market value of assets.

(7) Liquidation. Liquidation is the process of closing a business entity, including selling assets, paying liabilities, and returning the residual to its owners. Partial liquidation would occur when an entity is involved in the piecemeal sale of its assets.

## 14-302 Responsibilities

a. DFARS 232.172, requires the contracting officer to make a determination of financial responsibility and provides suggested policies and procedures for making this evaluation. DCAA has the responsibility to provide all necessary financial advisory services to the contracting officer. An integral part of these services is the review of the contractor's financial condition. A DCAA financial capability audit may be performed in response to a specific contracting officer's request, or as a result of our ongoing monitoring of the contractor's financial condition. If a financial capability audit is requested and the FAO's risk assessment (see 14-304) does not indicate any potential financial capability problems, the FAO will thoroughly review the risk assessment with the contracting officer to verify the need to perform the audit. If agreement is reached that a financial capability audit is not required, a memorandum confirming the discussion should be sent to the contracting officer.

b. All self-initiated financial capability audits will be coordinated in advance with the cognizant contracting officer. This discussion should ensure that pertinent facts and data available to the contracting officer are considered and that no duplication of effort will occur in performing an audit.

c. The FAO cognizant of the corporate office will usually perform the financial capability audit at multidivision/segment corporations. In a CAC network, where the FAO manager cognizant of the corporate office is not the CAC, close coordination with the CAC will be needed prior to and during the audit. Each separate subsidiary or division of a contractor will not be considered as a separate entity unless obligations (including contract performance) of the subsidiary or division are not legally binding on the parent organization. A parent corporation who owns 100% of a subsidiary is usually not legally responsible for the obligations of its subsidiary, unless a guaranty agreement is reached (see d. below.) Subsidiary or division auditors with questions or audit leads should coordinate with the FAO cognizant of the corporate office. Any exception to this policy should be coordinated with Headquarters, OAD, in advance of performing the audit .

d. The cognizant ACO should be contacted to ascertain if any guarantee agreements are in effect between the government and a contractor for the performance of a partially or wholly owned subsidiary. Where guaranty agreements exist concerning performance of government contracts by partially or wholly owned entities, a financial capability audit of the guarantor will also be performed if the segment or subsidiary's financial condition is unfavorable. In some cases these guaranty agreements may be formalized in accordance with instructions in the Defense Logistic Agency Manual (DLAM). As discussed in DLAM 8105.1, guaranty and subordination agreements may be used and are documented using DLA forms 619 — "Guaranty Agreement for Corporate Guarantor" (multiple contracts), 620 — "Subordination Agreement (multiple contracts), 621 — "Guarantee Agreement for Corporate Guarantor" (one contract), and 622 — "Subordination Agreement" (one contract). These forms may be modified for sole proprietorships and partnerships.

e. The auditor should formally advise the ACO of any access to records problems encountered during the financial capability audit and solicit any required assistance pursuant to 1-504. All unresolved access issues should be clearly explained in the audit report including impact on the audit scope and results.

f. Most large corporations have financial departments which perform continuous assessments of financial conditions. Auditors should fully understand the work performed by these departments in their evaluation of financial conditions. The scope of the financial capability audit should consider the degree of reliance which can be placed on the work of others including the work performed by these departments (see 4-1000).

## 14-303 Financial Capability Annual Planning

a. FAOs should monitor and assess major contractors for financial distress at least annually. At many of the major contractors, auditors have established procedures to provide for ongoing, periodic monitoring of key financial data. As previously discussed in Section 14-302c., the FAO responsible for the corporate office will perform the risk assessment at corporations with multiple divisions/segments. This risk assessment will normally be done during the annual planning process. If audit leads of possible financial distress are found, risk assessments should be performed more frequently. To perform the assessments, FAOs will gather appropriate financial data and analyze this data using failure prediction models, ratio analyses, and trend analyses (Section 14-304). Further, the auditor or contracting officer may become aware of contractor financial information or events that indicate contractor' financial distress. From these analyses, audit plans will be developed for conducting financial capability audits.

b. The contracting officer may also be monitoring the contractor's financial condition. The auditor should fully understand the contracting officers work in this area to avoid duplication.

c. At nonmajor contractor locations, especially those with significant government work, financial capability risk is normally assessed during the preaward survey (see 5-202.1). Financial capability risk assessments will also be considered during progress payment reviews (see 14-205g(4). If a preaward survey is not performed, the financial capability risk assessment will be performed at the first field visit during the contractor's fiscal year.

## 14-304 Risk Assessment Procedures

a. The following paragraphs describe risk assessment procedures the auditor should perform to determine the need for a financial capability audit. A decision to perform a self-initiated financial capability audit will be made based on the results of these procedures. The basis for that decision must be fully documented and discussed with the contracting officer. These risk assessment procedures should also be used to establish the scope of requested financial capability audits.

b. Failure Prediction Models

(1) A bankruptcy prediction model is one of several tools that provides insight into a contractor's financial health. The auditor should analyze the contractor's financial data using one of the "Z-Score" bankruptcy prediction models developed by Dr. Edward Altman. Figure 14-3-1 shows the formulas used to develop each Z-score Model, explains the variables used in each formula, and provides examples of the calculations.

(2) The Altman Z-scores are useful in assessing financial capability risk and helping to identify contractors that may have financial problems. Although the Z-score should not be relied on to form a financial capability opinion, it does provide an initial alert of potential financial problems.

(3) The Z-score is interpreted as follows:

| Score | Indication |
|---|---|
| Less than 1.81 | Probable future financial distress |
| 1.81 to 2.99 | Possible future financial distress |
| Greater than 2.99 | No or little chance of financial distress |

(4) When using the Altman Z-score, it is important to perform trend analysis (preferably covering the previous three to five completed fiscal years) of the con-

tractor's financial distress scores and industry averages. A declining trend indicates a deteriorating financial condition.

(5) A score showing probable future financial distress is a high risk indicator and will generally result in a need to perform a financial capability audit. The auditor should also consider Z-score trends, ratio analyses, financial statement evaluations, and other indicators in the decision on whether to perform the audit.

(6) Scores in the middle range may or may not require the need to perform a financial capability audit. Any time the Z-score is in the middle range, careful consideration should be given to the Z-score trends, ratio analyses, financial statement evaluations, and other indicators. Declining Z-score trends combined with a Z-score in the lower half of the middle area will require the FAO to carefully consider performing a financial capability audit. A middle range Z-score combined with any significant adverse conditions in other areas will generally require an audit of the contractor's financial capability.

(7) For many publicly held companies, Altman Z-score information will be provided to regions by the Technical Services Center (TSC), Special Programs Branch. TSC will provide Z-scores for recently completed and prior fiscal years (usually up to five years) using financial data provided by Standard and Poor's Compustat Services, Inc. Altman Z-scores will be provided for both the company under review and the average of companies in the related industry. See Figure 14-3-1, note (a), for more details on TSC services.

c. Selected Key Individual Financial Ratios

(1) Financial statements provide a primary indication of a contractor's financial condition. The analysis of key individual financial ratios is an important consideration when evaluating a contractor's financial condition. However, they must be used with care. General rules of thumb regarding acceptable ratios should be avoided. Instead, the auditor should perform a trend analysis of key financial ratios and a comparative analysis of these ratios with applicable average industry ratios. Ratio analysis should cover three to five years, if available, and use comparable data. [Note: The contractor's financial statements should be used to compute the ratios. Since these ratios are being used as one of many tools to assess risk, and not to express an audit opinion, the auditor can use the information to compute the ratios without testing the reliability of the external auditor's work. This applies to all types of auditor reviews of financial statements (i.e., compilation, review, or audit). If there are compelling reasons to question the reliability of the financial statements, the auditor should consider other information such as the working or closed trial balances to compute the ratios.]

(2) At a minimum, the following key ratios should be calculated and monitored:

| Financial Element Measured | Ratio Used | Description |
|---|---|---|
| Return on Investment | Net Income/ Total Assets | This ratio is a measure of management's efficiency in employing assets profitably by creating a return on owner's investment. |

| Financial Element Measured | Ratio Used | Description |
|---|---|---|
| Capital Turnover | Working Capital/Total Assets | This ratio is a measure of the net liquid assets of the contractor relative to the total capitalization. Working capital is defined as the difference between current assets and current liabilities. Ordinarily a firm experiencing consistent operating losses will have shrinking current assets in relation to total assets. |
| Current Ratio | Current Assets/ Current Liab. | The current ratio is the ratio of current assets to current liabilities. It is a test to determine the ability of a company to liquidate its current obligations and to finance operations in the immediate future. |
| Financial Leverage | Cash Flow/ Total Debt | The ratio of cash flow to total debt has been suggested by some studies as the single best indicator of financial distress. It is an indicator of the adequacy of available funds to satisfy debt obligations. Cash flow is defined as net income plus depreciation, depletion, and amortization. |
| Short Term Liquidity | Quick Assets/ Current Liabilities | This short-term liquidity ratio, (also known as the acid test ratio) is the ratio of the quick assets of cash, accounts receivable, and short-term investments (also called marketable securities) if any, to current liabilities. It is a stringent test of liquidity. It indicates the contractor's ability to liquidate current liabilities without interrupting the normal business cycle. |
| Solvency Ratio | Debt/Equity short | The debt to equity ratio is the ratio of total debt (noninterest as well as interest bearing and short term as well as long term) to stockholders' equity including paid in capital plus retained earnings. This ratio assists in determining the relative size of the claims of creditors compared to the claims of owners. High levels of debt can restrict management and increase risk to owners. |

The auditor should also ask the contractor if there are other financial ratios that should be considered when evaluating the contractor's financial condition.

(3) The ratio analysis concept is that as business deteriorates, so too will key ratios. By monitoring ratios, the auditor should be able to identify if there are conditions suggesting the contractor is experiencing financial distress. Comparing the contractor's ratios to the industry average ratios will provide another basis to assess the risk relating to the contractor's financial condition. Deteriorating ratios that are significantly worse than industry average ratios are a strong indicator of financial problems. Where the majority of these ratios are in a negative trend and significantly worse than industry average, the FAO normally will perform a financial capability audit.

(4) For publicly held companies, specific ratio information will be provided to regions, through the Technical Services Center (TSC), Special Programs Branch. TSC will provide financial ratios for recently completed and prior fiscal years (usually up to five years) using financial data provided by Compustat Services, Inc. Ratios will be provided for both the company and the average of companies in the related industry. See Figure 14-3-1, note (a), for more details on TSC services.

d. Evaluating Financial Statement Statistics for Indicators of Financial Distress

(1) The review of financial statistics can provide additional insight into negative financial trends and other conditions that may result in financial distress. Such conditions may include deteriorating sales, recurring operating losses, working capital deficiencies, and negative cash flow from operations. The financial statements should be obtained for at least the two preceding fiscal years, the current fiscal year (interim), and forecasted fiscal years. The financial data from these statements should be analyzed and trend data developed for the following areas:

(a) Profit/loss
(b) Net income/loss from operations
(c) Cash flow from operating activities
(d) Cash flow from investing activities
(e) Cash flow from financing activities
(f) Sales
(g) Working capital (current assets minus current liabilities)
(h) Noncurrent liabilities
(i) Total assets

(2) The auditor should be alert to any apparent lack of operating success as evidenced by overall net losses or net losses from operations. In these circumstances, particular emphasis should be placed on reviewing the cash flow statement and on evaluating the contractor's ability to pay obligations from the cash inflows obtained in the ordinary course of business. Significant deterioration in sales or increases in liabilities should be monitored, as they have a significant influence on the contractor's ability to meet ongoing operating costs. If any of the above elements demonstrate that the contractor is or will be in financial distress, the FAO will consider scheduling a financial capability audit.

e. Internal Controls

The auditor should also consider the adequacy of the contractor's internal control structure relating to financial planning and monitoring. The contractor's internal control structure should provide controls for the following:

(1) Preparation of cash flow forecasts including reasonable and supported assumptions;

(2) Periodic assessments of accounts payables and receivables, including analysis of accounts payable aging and the collectibility of accounts receivable;

(3) Periodic assessments to ensure compliance with any loan covenants and debt payment schedules; and

(4) Periodic assessments of contract cost performance.

f. Other Indicators that Raise Questions about Financial Distress

(1) Any consideration of or actual filing for bankruptcy by a contractor requires an audit to be performed. The auditor may determine that the contractor is about to file or has filed for bankruptcy under Chapter 7 (Liquidation) or Chapter 11 (Reorganizations) of the bankrupt-

cy laws. Filing under Chapter 11 may provide for the appointment of an independent trustee to assume control of the company for the duration of the bankruptcy proceedings. Chapter 11 proceedings cannot be considered conclusive evidence that the company will be forced to liquidate. However, any filing for bankruptcy gives rise to significant uncertainty as to the future operations of the company and the contractor's ability to perform on government contracts.

(2) Many sources of information can provide insight into events or conditions that can significantly affect a contractor's ability to perform on government contracts. The FAO should review financial statement notes and financial statement audit opinions and analyze this information for any unusual items or comments. The auditor should discuss any adverse financial conditions disclosed in the financial statements with the contractor to obtain a full understanding of the issues. The auditor should then determine the potential impact on the contractor's financial condition. Further, discussions with the Contracting Officer and the contractor and review of audit leads may identify events or conditions that are indicators of financial distress. Adverse events or conditions could include:

(a) Defaults on loan agreements
(b) Denial of usual trade credit from suppliers
(c) Restructuring of debt
(d) Noncompliance with loan covenants
(e) Contracts in a significant loss position
(f) Legal proceedings/pending claims
(g) Loss of principal customer/supplier
(h) Uninsured or underinsured catastrophes
(i) Labor strikes
(j) Unpaid state, local, and Federal tax liabilities
(k) Contingent liabilities
(l) Deteriorating bond ratings
(m) Valuation of account receivable
(n) Significant postaward or suspected irregularity conduct audit findings and other significant unresolved questioned costs
(o) Contract termination for default
(p) Deferral of payments to suppliers
(q) Failure to fund pension plans
(r) Loans from employees or issuing stock to employees in lieu of salary
(s) Environmental clean-up impact
(t) Significant unpaid contractor debts
(u) Approval of unusual progress payments or other billing concerns
(v) Parent company undergoing financial distress/ bankruptcy

(3) Bond ratings for publicly held companies should be reviewed. Low bond ratings or declining trends may signal problems for the company in obtaining cash outside of normal operations. Bond rating information for many publicly held companies will be provided to regions and FAOs through the Technical Services Center (TSC), Special Programs Branch. Data will be provided using Standard and Poor's Compustat Services, Inc. and other sources available to TSC. See Figure 14-3-1, note (a), for more details on TSC services.

(4) The FAO should discuss with the contractor any plans to enter into significant leases, make significant capital expenditures, liquidate assets, borrow significant cash or restructure existing debt, reduce or delay expenditures, and increase ownership equity. The auditor should verify the accuracy of the discussions to appropriate supporting data. The auditor should also identify and analyze any unusual compensation package or outstanding loans to other company operations or company officers that would drain financial resources from an operating unit with government contracts.

g. The auditor should perform all applicable risk assessment procedures to use as a basis for the decision to perform a financial capability audit. Only after full evaluation and consideration of the risk assessment can a decision be made to perform the audit. Conclusions on risk assessment evaluations should be summarized in a memorandum for record and maintained as part of the FAO's permanent file. The results should be discussed with the Contracting Officer. At large multi-division/segment corporations, the results should be communicated in writing to FAOs cognizant of the corporation's divisions/segments.

## 14-305 Audit of Contractor Financial Capability

a. The purpose of the financial capability audit is to provide an opinion on the contractor's financial capability to perform on government contracts. In many cases, contract performance will extend beyond one year and could span several years. Therefore, the audit objectives include the evaluation of existing and future contractor financial capabilities to continue operations.

b. The audit scope will concentrate on analyzing the contractor's financial condit cash-flow projections to determin ne contractor has or will have adequate financial resources to perform on government contracts. The audit coverage will include a review of existing financial conditions, audit of cash flow projections for the near term (one year), and analysis of the contractor's financial flexibility to support operations. From this review, the FAO will determine if the contractor will have sufficient cash flow to continue operations in the short term (one year). If a reasonable doubt exists that the contractor will have sufficient cash flow to sustain operations, the auditor will need to determine whether the contractor can obtain the necessary resources (e.g., loans, sale of assets, or sale of stock) to continue operations in both the short and long term. If the contractor is experiencing financial distress, the contractor may have prepared a projected cash flow statement for the CPA's SAS 59 analysis.

c. When performing an audit of the contractor's financial capability, it is the contractor's responsibility to provide appropriate financial and accounting information. Specific information that the contractor should provide is discussed in DFARS 232.172-2. If the auditor experiences difficulty in obtaining this information, the issue should be elevated to the contracting officer. If these actions are unsuccessful in obtaining the required information, the auditor should follow the guidance on access to records discussed in 1-504. The auditor should adhere to the guidance in 4-400 in preparation of their working papers. Sensitive financial capability audit working papers are likely be used in continuing government analysis.

### 14-305.1 Review of Existing Financial Conditions

a. Assess Current Financial Conditions and Follow-up on Any Prior Adverse Conditions

The auditor will assess the contractor's financial condition at the time of the audit. Risk assessment financial data will be updated with interim current contractor financial data and an evaluation will be made to determine whether the contractor is currently under financial distress. Information and audit leads developed during the annual planning process should be reviewed and updated, if necessary. Any adverse conditions or leads should be discussed with the contractor and evaluated. To analyze future cash flows, the auditor must understand the underlying cause of any current adverse conditions and their potential impact on future operations.

b. Liquidation of Accounts Payable

(1) The auditor will determine if the contractor is liquidating accounts payable on a timely basis in the ordinary course of business. This will normally be performed through a review of the aging of accounts payable. Contractor's may have the capability to manage accounts payable through various computer sort programs. To illustrate, the contractor should provide an aging schedule, similar to the following example, to demonstrate that it is adequately managing accounts payable. In order to assure that the contractor is not recording payments while actually delaying or holding checks, review cancelled checks to determine the accuracy of the number of lag days between recorded payment dates and check cancellation dates. If the contractor is not liquidating its accounts payable in a timely manner, the reasons should be ascertained.

EXAMPLE — SCHEDULE OF ACCOUNTS PAYABLE AGING

| Trade Accts.- No. of Days Outstanding | Amount | Percentage |
|---|---|---|
| 0-30 days | $ 191,300 | 14% |
| 31-60 | 421,992 | 31 |
| 61-90 | 262,334 | 19 |
| 91-120 | 132,570 | 10 |
| Over 120 | 347,062 | 26 |
| Total Trade Accounts | $1,355,258 | 100% |
| Other | 188,972 | |
| Checks Held | 117,174 | |
| Bank Overdraft - Net | $ 187,567 | |
| Total Accounts Payable | $1,848,971 | |

(2) In the circumstances where account balances are significant and the contractor does not perform an aging of accounts payable or similar analysis, the contractor should be asked to perform such analysis. If the contractor refuses, the auditor should report this absence of normal financial management and budgetary controls as a material internal control weakness. The auditor will then consider evaluating liquidation of accounts payable by such audit procedures as statistical sampling and the use of EDP retrieval software (e.g., SAS and FOCUS).

(3) For multidivision corporations with a decentralized accounts payable function, the corporate auditor may need to request assist audits of segments/divisions with significant accounts payable balances.

c. Loan Covenants

The auditor will determine whether the contractor has been unable to meet debt payment schedules or has violated any covenants of its loan agreements. Also, reviews of the explanatory notes to the contractor's financial statements may help determine if any conditions on financial credit requirements exist, such as a bank line of credit that requires maintenance of certain key financial ratios.

d. Chapter 11 Bankruptcy

As discussed previously, the filing of a petition with the Bankruptcy Court for reorganization under Chapter 11 gives rise to significant uncertainty as to the contractor's ability to pay debts or adequately perform on government contracts. This event by itself requires immediate written notification of the ACO, with copies provided to the Regional Special Programs Office and Headquarters, Attention OAD. The ACO is primarily responsible for monitoring the financial condition of a contractor once an unfavorable financial condition has been reported. During Chapter 11 proceedings, a company is generally required to furnish interim financial statements and other information such as status on actions to remain an ongoing concern or plans to reorganize. The auditor should determine what legal provisions exist and obtain the required financial information to ascertain the company's continuing financial condition.

### 14-305.2 Review of Cash Flow Projections

a. Evaluations of cash flow projections will form the framework for the auditor's opinion on the contractor's financial capability. The auditor needs to have a

reasonable basis to assure that the contractor will be able to cover its operating costs and make appropriate payments on its liabilities in the near term (one year). Several cash flow ratios which can help evaluate a contractor's financial performance, in terms of both strength and profitability, are described in Attachment 1 of the DIIS audit program - APFINCAP.

b. Cash flow forecasts are used for many purposes such as strategic planning, managing the contractor's day to day operations, and establishing lines of credit. At larger contractors, cash flow forecasts are generally prepared by a contractor's financial planning or treasurer's department. Since the cash flow forecast will serve as the contractor's demonstration that it has sufficient sources of cash to meet current obligations, it must be obtained and evaluated by the auditor. Similarly, projected sources of cash flow on existing government contracts should reconcile to other internal forecasts that are contractually required to be provided to the government (e.g., C/SCSC estimates-at-completion and the corollary calculations supporting progress payment requests). DFARS 232.172 provides guidance on cash flow requirements and analysis.

c. Auditors should analyze the contractor's cash flow forecasts in order to determine the contractor's ability to meet operating costs in the near term (one year), and any long term liabilities coming due in the near term. There are many uncertainties surrounding a contractor's operations which may make it difficult to reasonably project cash flows beyond one year. As a result, cash flow projections beyond the current fiscal year are not supported by detailed estimates. For this reason, the auditor needs to concentrate the cash flow evaluations on the near term. If there is doubt about the sufficiency of the contractor's cash flow in the short term, evaluation of cash flow projections throughout the life of major contracts should be considered.

d. If the contractor does not prepare a cash flow forecast as part of normal financial management, the auditor must obtain sufficient accounting data to make an independent assessment. This will normally occur only at smaller companies. At larger companies, the auditor should report this absence of normal financial management and budgetary controls as a significant internal control weakness. Actions by a contractor to restrict or deny access should be first elevated to the ACO for assistance in obtaining the relevant information in accordance with DFARS 232.172. If the problem continues, it should be reported as an access to records problem (1-504).

e. Since a cash flow forecast is usually an internal management document, it may be presented in various formats. It may be a statement that identifies all projected sources and uses of cash, or may be presented in the same or similar format as the statement of cash flows in the annual financial statement. Forecasted cash flows in the format of the annual financial statement will normally categorize cash receipts and cash disbursements by operating, investing, and financing activities. The auditor needs to be careful to review the support and reasonableness of these forecasts — estimates may be overly optimistic and favorable to the contractor. The auditor should, as part of the audit, perform the following procedures:

(1) Verify the factual data and determine the reasonableness of the underlying assumptions used to prepare the cash flow forecast;

(2) Compare previous forecasts with actual cash flow statements to determine how reliable forecasts were in the past;

(3) Review forecasts to assure they consider any adverse conditions identified in the auditor's review of existing financial conditions (14-304 and 14-305.1);

(4) Review the logic of the cash flow forecasts — determine if they link into any forecasted balance sheets and income statements;

(5) Determine if sales forecasts or production forecasts and related operating costs are consistent with recent financial statement trends and evaluate assumptions supporting the significant differences;

(6) Determine if the contractor's ability to achieve its cash flow forecast is dependent on the favorable outcome of one or a

few key event(s). If so, the circumstances and chance of occurrence should be thoroughly explored and the impact on the cash flow projection should be considered; and

(7) Determine if there are any significant long-term conditions (such as a recent or potential loss of contracts) that may affect the contractor's operations. If a condition or event is identified, the auditor should determine the impact on the analysis of cash flow projections.

f. Generally, DCAA does not confirm account balances. If the cash flow analysis is dependent on significant amounts in a particular account, the auditor will determine if reliance can be placed on contractor controls or use other analytical procedures. For example, if the cash flow analysis is heavily dependent on collection of accounts receivable, the auditor may note that independent confirmations are conducted annually by external auditors and review the aging schedule of the accounts receivable. If the auditor determines that confirmations are necessary, such confirmations will be coordinated with the ACO. If the ACO does not agree with the necessity for the confirmations, the confirmations will not be performed and the audit report should be qualified for these circumstances.

g. In concluding the review of the cash flow projections, the auditor needs to determine whether the contractor has the financial means to meet ongoing costs of operations in the near term. This determination will be the foundation for the auditor's opinion on the contractor's ability to perform on government contracts. If cash flow forecasts are reasonable and show that the contractor will meet its obligations without initiating actions outside the ordinary course of operations, the contractor's financial condition will be considered adequate. A projected shortfall in meeting short term obligations which requires obtaining cash from outside the normal course of operations (such as liquidation of assets, significant loans, or sale of stock) is considered financial distress. As such, financial distress is considered an unfavorable financial condition. If a short fall is not projected but cash flows are dependent on significant conditions or events for which there is significant doubt (such as optimistic sales of a new product or anticipated contract awards), the contractor's financial condition would be considered unfavorable.

**14-305.3 Analysis of Financial Flexibility**

a. The auditor needs to consider the contractor's financial flexibility to perform on government contracts in the near and long term. Consideration should be given to existing assets (net of liabilities), current bond ratings, bank lines of credit, long-term plans for liquidating assets, restructuring/increasing debt (near term should be considered in the cash flow analysis), and plans for increasing ownership equity. Where short term financial distress is indicated, a determination should be made as to the contractor's capability to obtain the additional resources to continue operations.

b. Future plans to add or sell resources should be discussed with the contractor and verified. These audit procedures are critical if the contractor is in financial distress and needs additional cash to continue operations. The auditor should discuss with the contractor any planned actions to obtain or conserve cash and verify the supporting data, such as the following:

(1) Plans to liquidate assets. Determine possible direct or indirect effects of any planned disposal of assets on government contracts.

(2) Plans to borrow money or restructure debt. Review the availability of debt financing, including existing committed credit arrangements such as lines of credit and arrangements for factoring of receivables or sale-leaseback of assets.

(3) Plans to reduce or delay expenditures. Determine possible direct and indirect effects to reduce or delay capital or maintenance expenditures on government contracts.

(4) Plans to increase ownership equity. Review existing or committed arrangements to raise additional capital, to reduce current dividend requirements, or to accelerate cash distributions from affiliates or other investors.

c. On completion of this part of the audit, the auditor will have better insight on the contractor's capability to obtain

cash resources outside of normal operations. When a contractor is in financial distress, analysis of the contractor's capability to obtain cash resources and repay those resources, will give the auditor a reasonable basis for determining whether or not the contractor will be able to perform on government contracts (near and long term).

## 14-306 Opinion Criteria in Reporting on Contractor Financial Capability

a. In reporting on financial capability, the auditor will express an opinion (in the summary of audit results) on the contractor's financial capability to perform on government contracts. When a contractor is expected to be in financial distress, but has sufficient resources to operate in the near term, the report will specifically address this condition and address the long term implications. An assertion of substantial doubt about the contractor's financial capability to perform on government contracts will be based on near term (one year) expectations that the contractor will (1) be under severe financial distress and (2) have significant difficulty obtaining outside funding to continue performing on government contracts. The determination that a financial jeopardy situation exists should be based on professional judgment supported by a sufficient degree of audit evidence. Based on the conditions identified during the audit, the auditor will select one of the following opinions:

(1) When the audit discloses no financial distress (or relatively insignificant financial distress) and no indications of significant long-term problems, the contractor's financial capability is considered adequate. In this case, the audit opinion would be worded "Our audit of XYZ Corporation's financial capability disclosed no adverse financial conditions which would preclude the contractor from performing on its government contracts."

(2) When the contractor is under financial distress (near term) but management can, through extraordinary action (such as loans, liquidation of assets, or sale of stock), provide adequate funds to continue performing on government contracts, the contractor's financial capability is considered unfavorable for the long term. The opinion would be worded "In our opinion, the contractor is in an unfavorable financial condition. Our audit of XYZ Corporation's financial capability disclosed that it will have difficulty meeting its near term financial obligations and continue performing on government contracts without extraordinary management actions." This condition is reported because the contractor's financial distress in the long term could affect the contractor's ability to continue receiving external funding. The summary of audit results will summarize the adverse conditions and management's plans to mitigate these conditions. Specific details on audit findings and recommendations will be included in the report appendices. The auditor will also include the appropriate paragraphs discussed in ¦4-306b.

(3) When the contractor is under financial distress and there is reasonable doubt that the contractor will be able to obtain necessary funds to continue performance on government contracts, the contractor's financial capability is considered inadequate. The opinion in this case is worded "In our opinion, there is a substantial doubt that the contractor will be financially able to continue performing on government contracts." The summary of audit results paragraph will summarize the adverse conditions and management actions taken to mitigate these conditions. Specific details on audit findings and recommendations will be provided in the report appendices.

b. The following paragraphs provide the auditor with the recommendations considered appropriate, given the seriousness of conditions discussed in 14-306 a. (2) and (3). In addition to these recommendations, the auditor should advise the ACO to selectively scrutinize future progress payments requested by the contractor to ensure that they are computed in accordance with contract terms. The auditor should also report any known weaknesses in the contractor's billing procedures (see 14-200) which would necessitate a restriction of contract financing through progress payments. The existence of financial jeopardy greatly in-

creases the government's risk regarding billings. Consequently, the scheduling of a billing system review should be considered.

(1) If there is substantial doubt that the contractor will meet its ongoing obligation without extraordinary management actions,the auditor should recommend to the ACO that the contractor be required to submit periodic status reports (e.g., monthly, quarterly, or semi-annually) covering the contractor's plans for mitigating the unfavorable financial conditions. The status report should include such relevant information as (a) cash flow projections, (b) efforts to obtain financing, (c) status of compliance with existing loan covenants, (d) efforts to reduce cost, (e) sale of assets, (f) sale of stock, (g) updates of significant contract estimates at completion, and (h) status of sensitive litigation.

(2) If there is substantial doubt that the contractor will be financially capable of performing on government contracts in the near term, the auditor should recommend that the ACO take action to protect the government's interests. The auditor should also recommend to the ACO that the contractor be required to submit a status report monthly (until the adverse conditions are corrected) which covers the contractor's plans for and progress towards mitigating the adverse condition.

## 14-307 Financial Capability Reporting Requirements

a. Audit reports will be issued on all completed financial capability audits whether self-initiated or initiated by request. The financial capability audit report should be prepared in accordance with 10-1200. A proforma financial capability audit report is included on the DIIS under the filename ARFINCAP. If the audit discloses no financial distress, a short form audit may be issued with the opinion discussed in 14-306a(1).

b. If reliance is placed on the work of others to reduce planned audit scope, the guidance in 4-1000 should be followed.

c. Coordination of and responsiveness to requested due dates is always important. However, specific emphasis and attention should be given whenever there is an indication of potential financial distress.

d. To ensure that all available facts have been considered, the auditor will discuss findings with the cognizant ACO and the contractor throughout the audit, especially as issues are identified. Other interested parties should be similarly kept abreast of audit progress and special emphasis should be made to discuss any exception identified during verification of contractor data. The auditor will normally provide the draft report to the contractor at the exit conference and a reasonable time will be provided for the contractor's written response. Top level contractor management should be involved in important interim and exit conferences, especially when sensitive audit issues are presented.

e. The auditor will be responsive and timely to ACO requests to review contractor submissions showing actions taken to improve financial condition. The auditor should communicate the results of these reviews timely, in writing, to the ACO. Depending on the circumstances, the written communication could be a follow-up report or a memorandum.

f. Financial capability audit reports will normally be addressed to the ACO. Audit reports on major contractors that indicate financial distress (14-306 a.(2) and (3)), should be forwarded to the requestor with two copies provided through the regional office to Headquarters, Attn: OAD.

g. Audit reports issued at the corporate office will be provided to FAOs cognizant of the divisions and segments. When the report is distributed to the responsible division or segment FAO, a transmittal letter should advise that the report contains sensitive information and should not be released outside of DCAA to other government agencies unless approval is provided by the corporate auditor.

h. When financial distress conditions are disclosed at a contractor location which is part of a multidivision corporation, this information should be forwarded in writing to the cognizant contract audit coordinator (CAC), Corporate home office auditor (CHOA), or group audit coordinator (GAC), as applicable. Under these circumstances, only the

CAC, CHOA, or GAC is in a position to determine if the conditions adversely affect the contractor's company-wide financial position. If financial jeopardy conditions are disclosed at a subsidiary or affiliate for which the parent company does not have liability for government contracts, separate financial capability reviews will be conducted at the parent and at the applicable subsidiary or affiliate.

i. Identify and mark all financial capability reports "FOR OFFICIAL USE ONLY" in accordance with 10-203.10.

Figure 14-3-1

## THE ALTMAN Z-SCORE FORMULAS

This figure presents the formulas for computing Altman's "Z-Score Prediction Models" and an example of the calculations. The models use multiple discriminant analysis to calculate a single Z-Score for a company. The Z-Score is useful in predicting bankruptcy potential. Although the model should not be relied upon to support a financial condition assessment by itself, it does provide an initial alert to the auditor that further analysis is needed.

Each of the three models use their respective financial ratios, considered simultaneously, to calculate the Z-Score. Pertinent financial data necessary to calculate the Z-Score can normally be derived from the contractor's financial statements. For this analysis, use information from the contractor's most recently completed fiscal years to calculate the Z-Scores. For ease of reference, the Z-Score models are referred to as Model I, II, and III.

MODEL APPLICATION (note a)

MODEL I - Publicly traded (NYSE, AMEX, NASDAQ, etc.) manufacturing (primary SIC codes 2000 through 3999) companies only. This is the original Altman model.

MODEL II - Privately held manufacturing (primary SIC codes 2000 through 3999) companies only. This model is Altman's 1983A bankruptcy prediction model for private companies.

MODEL III - All remaining publicly traded and privately held companies excluded by MODELS I and II. This model is Altman's 1983B bankruptcy prediction model with asset turnover correction.

ALTMAN Z-SCORE MODEL VARIABLE WEIGHTS

| MODEL VARIABLES | MODEL VARIABLE WEIGHTS | | |
|---|---|---|---|
| | MODEL I | MODEL II | MODEL III |
| X1 | 1.2 | .717 | 6.56 |
| X2 | 1.4 | .847 | 3.26 |
| X3 | 3.3 | 3.107 | 6.72 |
| X4 | .6 | .420 | 1.05 |
| X5 (note b) | 1.0 | 1.000 | N/A |

| MODEL VARIABLES | | Notes |
|---|---|---|
| X1 = WORKING CAPITAL | /TOTAL ASSETS | (c) |
| X2 = RETAINED EARNINGS | /TOTAL ASSETS | (d) |
| X3 = EARNINGS BEFORE INTEREST AND TAXES (EBIT) | /TOTAL ASSETS | (e) |
| X4 = STOCKHOLDER'S EQUITY | /TOTAL LIABILITIES | (f) |
| X5 = SALES | /TOTAL ASSETS | (g) |

(a) THE Altman Z Models. Comparable Industry data (including ratios) is available (all models) from TSC (through Region) whether your company is publicly traded or

privately held. However, individual company data (including ratios) is only available (through Region) on publicly traded companies. Therefore, the auditor will be responsible for calculating individual company ratios on other than publicly traded companies.

(b) X5 Application. Based on ease of application and common usage, the weight assigned to the X5 variable has been rounded from .99 to 1.0.

(c) Working Capital/Total Assets. This ratio is a measure of the net liquid assets of the firm relative to the total capitalization. Working capital is defined as the difference between current assets and current liabilities. Ordinarily, a firm experiencing consistent operating losses will experience a reduction in current assets in relation to total assets.

(d) Retained Earnings/Total Assets. The incidence of failure is much higher in a firm's early years. Therefore, the age of a firm is implicitly considered in this ratio. For example, a relatively young firm will probably show a low RE/TA ratio because it has not had time to build up its cumulative profits.

(e) Earnings Before Interest and Taxes/Total Assets. This ratio is a measure of the true productivity of the firm's assets, aside from any tax or leverage factors. Since a firm's ultimate existence is based on the earning power of its assets, this ratio is particularly appropriate for analysis of corporate failure. For the computation of earnings before interest and taxes, the auditor should exclude extraordinary items and gains or losses such as disposal of a segment of a business.

(f) Stockholder's Equity/Book Value of Total Debt. For Model I, stockholder's equity is measured by the combined market value of all shares of stock, preferred and common. Use the book value of stockholder's equity for Models II and III. Total debt includes both current and long-term obligations.

(g) Sales/Total Assets. This is the financial ratio that illustrates the firm's assets' ability to generate sales. It is one measure of management's capability in dealing with competitive conditions. This ratio is applicable to Models I and II only.

CALCULATING THE Z SCORE - STEPS

- Determine which model is appropriate for the company under review.
- Calculate each of the applicable model variables ("X" ratios) via reference to notes (c) through (g).
- Multiply each "X" ratio by the applicable weight for model selected.
- Add the products together to obtain the Z-Score for the company.

EXAMPLE

| COMPANY DATA: | THOUSANDS |
|---|---|
| WORKING CAPITAL | $ 1,534 |
| TOTAL ASSETS | 12,486 |
| TOTAL LIABILITIES | 9,125 |
| SALES | 14,696 |
| EBIT | 923 |
| RETAINED EARNINGS | 2,900 |
| STOCKHOLDER'S EQUITY - MARKET VALUE | 2,235 |
| STOCKHOLDER'S EQUITY - BOOK VALUE | 1,369 |

| VARIABLE | VARIABLE CALCULATION | RESULT |
|---|---|---|
| X1 | $ 1,534 / $ 12,486 | .123 |
| X2 | 2,900 / 12,486 | .232 |
| X3 | 923 / 12,486 | .074 |
| X4 [MARKET VALUE] | 2,235 / 9,125 | .245 |
| X4 [BOOK VALUE] | 1,369 / 9,125 | .150 |
| X5 | 14,696 / 12,486 | 1.177 |

EXAMPLE OF A MODEL III - Z SCORE CALCULATION

| | | | | | |
|---|---|---|---|---|---|
| X1 | 6.56 | × | .123 | = | .81 |
| X2 | 3.26 | × | .232 | = | .76 |
| X3 | 6.72 | × | .074 | = | .50 |
| X4 [BOOK VALUE] | 1.05 | × | .150 | = | .16 |
| X5 | N/A | | | | |
| | Z-Score | | | | 2.23 |

## 14-400 Section 4 — Contract Audits of Government Property

### 14-401 Introduction

This section covers contract audit responsibilities in connection with government-owned property in the possession of contractors and subcontractors. It describes the various types of government-furnished and contractor-acquired government property, key contract regulations on such property, and the responsibilities of the government property administrator. Related contract audit interests are divided into (1) considerations regarding government property that fall within the ongoing audits of incurred costs and reviews of price proposals, and (2) certain reviews of government property matters that are undertaken on specific request.

### 14-402 Types of Government Property

a. Government property in the possession of contractors may consist of (1) property provided or leased to the contractor by the government, and (2) property acquired by the contractor from other sources where upon acquisition title passes to the government under terms of the contract.

b. Government property is further classified by FAR 45.101, 45.301, and DFARS 245.301 into the following categories: (1) plant equipment, (2) real property, (3) special test equipment, (4) special tooling, (5) facilities, (6) government production and research property, (7) material, (8) nonseverable property, (9) agency-peculiar property, (10) industrial plant equipment (IPE), (11) mapping, charting, and geodesy (MC&G) property, and (12) other plant equipment (OPE).

c. Agency-peculiar property, as defined in FAR 45.301 and DFARS 245.301, may be furnished to contractors under a facilities contract, a supply or service contract containing the appropriate Government Property clause, or a special bailment agreement.

### 14-403 Contract Regulations on Government Property

#### 14-403.1 Basic FAR/DFARS References

FAR Part 45/DFARS Part 245 contains the basic regulations regarding government property in the possession of contractors. Both government and contractor responsibilities are set forth in this part. In addition, DoD 4161.2-M, DoD Manual for the Performance of Contract Property Administration, sets forth specific responsibilities of DoD personnel for the administration of government property in the possession of the contractor.

#### 14-403.2 DoD Policy on Furnishing Facilities

It is DoD policy to rely on contractors to furnish, to the maximum extent possible, the facilities necessary to perform a government contract. Facilities includes government property used for production, maintenance, research, development, or testing. It does not include material, special test equipment, special tooling or agency-peculiar property. Facilities having an acquisition cost of less than $10,000 shall not be provided to contractors unless (1) the contractor is operating a government-owned plant on a cost-plus-fee basis, (2) the contractor is performing on-site at government installations, (3) the contractor is a nonprofit institution of higher education or other nonprofit organization whose primary purpose is the conduct of scientific research, (4) the contractor is performing under a contract specifying that it may acquire or fabricate special tooling, special test equipment, and components thereof subsequent to obtaining the approval of the contracting officer, or (5) facilities are unavailable from other-than-government sources. Facilities, as well as IPE and automatic data processing equipment, may be furnished to contractors as prescribed by FAR 45.302 and DFARS 245-302.

### 14-403.3 Use of IPE on Commercial Work

a. IPE is defined and identified by noun name in DFARS 245.301.

b. In conjunction with its use on government contracts, commercial use of IPE may be authorized by the contracting officer or contract provisions for no more than 25 percent of the total time available for both commercial and government use during the contractor's normal work schedule. Commercial use in excess of 25 percent must have the prior approval of an Assistant Secretary of the Military Service or, where applicable, the Defense Logistics Agency Director. In addition, the approval authority may also be delegated to the head of a contracting activity, provided the redelegation is approved by the Office of the Assistant Secretary of Defense, Production and Logistics, Production Resources (OASD (P&L)(PR)).

c. When IPE items are no longer required for government contracts, they will not be made available to the contractor solely for commercial use.

## 14-404 Government Roles in Review of Government Property

### 14-404.1 Functions of the Government Property Administrator

a. A single property administrator is designated for all contracts involving government property at each contractor location. He or she is the government representative primarily responsible for property administration, including the surveillance of the contractor's control of government property. DoD 4161.2-M states procedures and techniques for the guidance of DoD personnel engaged in the administration of government property in the possession of contractors. DoD 4161.2-M also provides guidance as to specific functional areas requiring consideration and surveillance by the property administrator.

b. As stated in DoD 4161.2-M, the property administrator is responsible for approving the contractor's property control system and for examining its actual application. In accomplishing his or her duties, however, the property administrator is to recognize the responsibilities of other government personnel and obtain their assistance when required.

### 14-404.2 Related Contract Audit Functions

a. The contract auditor and the property administrator have certain related responsibilities for government property in the possession of contractors. As a generalization, the contract auditor is primarily concerned with contractors' financial records and controls of government property related to claimed or proposed contract costs and prices. The property administrator, on the other hand, is primarily concerned with contractors' property records and controls related to the physical existence, custody, maintenance, safeguard, usage, rental, and disposition of government property.

b. Since the auditor and the property administrator have a substantial common interest in the contractor's government property records, discussions and close liaison are required to avoid unnecessary duplication and obtain optimum deployment of available government personnel. The contract auditor will accept and make full use of the property administrator's review data and evaluation reports. Consistent with this use, the auditor will develop a program of nonduplicative audit steps designed to accomplish DCAA areas of responsibility.

c. The auditor will be responsive to requests for assistance and advice to responsible government activities on matters involving analyses of the contractor's financial books and records pertaining to government property.

d. Contractor operations are reviewed by the auditor on a comprehensive basis by functions. The auditor will not perform a separate or special audit of property under an individual contract solely to permit the retirement of the contract files and records by procurement or contract administration offices. There is no requirement for an audit of the contractor's government property records by the contract auditor as a prerequisite to the retirement of the property administrator's contract files and records.

### 14-404.3 Internal Audit Functions

The DoD internal audit organizations are responsible for auditing the property administrator's activities and for reviewing the system of government property administration. Policies governing relationships with these organizations, including those concerning requests to assist them in these kinds of reviews, are stated in 1-400.

## 14-405 Contract Audit Objectives and Procedures

The following audit objectives and procedures regarding government property apply at contractor locations where audits of incurred costs are performed on a recurring basis.

### 14-405.1 Preliminary Planning Steps

The DCAA auditor should ascertain whether the contractor's government property accounting and control system has the current approval of the property administrator. Review the property administrator's approval report and obtain copies of (1) the contractor's property accounting procedures manual, (2) reports of the property administrator's surveillance of the property, and (3) the internal audit reports issued by government and contractor personnel. This information should be used by the auditor in making an initial assessment of the extent of reliance to be placed on existing property controls and procedures and the extent of transaction testing to be undertaken.

### 14-405.2 Audit Programs for Material Costs

Contractors normally use the same procurement practices and material control systems for both government-owned and contractor-owned materials. The audit functions for government materials will, therefore, be integrated to the maximum extent with the overall audit of incurred material costs. The audit programs developed in accordance with the guidance contained in Chapter 6 will be used for the review of those aspects of government property activities which are the responsibility of DCAA.

### 14-405.3 Testing of Purchase Costs

The auditor will determine whether recorded purchase costs are properly claimed for reimbursement by the contractor by testing purchases of contractor-acquired government property (facilities, materials, special tooling, and special test equipment) to see if the property was (1) required for contract performance, (2) properly classified and acquired with the proper contractual authority, (3) bought in reasonable quantities at prudent prices, and (4) received, inspected, and entered accurately in the contractor's accounting records. Review the guidance in 14-600 relative to the review of the contractor's capital asset acquisition program and 7-1906 on capital items as contract costs.

### 14-405.4 Review of Material Handling and Usage

The review of the contractor's stockage, issuance, and usage of government material is the primary responsibility of the property administrator. The review of these same functions for contractor-owned material used in performing government contracts is the primary responsibility of the contract auditor. In those cases where the contractor uses the same system, procedures, and personnel for contractor-owned and government-owned material, the auditor may test the effectiveness of each of these functions on a comprehensive basis by selecting transactions without distinction as to material ownership (see 6-300). The results of these tests may be applied to the functions as a whole.

### 14-405.5 Final Audit Reports

Prior to the issuance of a closing statement or final report on each cost-reimbursement type contract or subcontract, the auditor will review the contract to determine if potential credits may result from the disposition of government property. If necessary, coordinate with the property administrator as to whether there are any credits relating to the quantity, condition, use and/or disposition of government property that are to be applied to the total cost of contract performance. The auditor will use the

information in preparing the contract audit closing statement.

### 14-405.6 Review of Residual Materials and Intercontract Transfers

a. Transfers of government materials between contracts and the disposition of residual inventories should be carefully reviewed. The contract auditor should assure that intercontract transfers of inventory and related costs comply with FAR 31.205-26 for inventory and costing purposes.

b. Audit recommendations for adjustments to contract cost, price, or fee should be considered (1) when residual materials from completed cost-reimbursement type contracts are transferred to follow-on incentive type contracts on a no-cost basis and such use was not anticipated, or (2) when amounts of government material authorized for use under the contract are changed significantly without any related contract price or fee adjustment.

### 14-405.7 Review of Physical Controls

The review of physical control of recorded government property, both government-furnished and contractor- acquired, is primarily the responsibility of the property administrator. The auditor will, however, be alert to any unauthorized or improper use of these items or to the existence of idle equipment. Such disclosures may arise from labor floor checks, physical inventory observations, plant perambulations, or other normally performed contract audit procedures. Where extensive repairs or maintenance activities are observed, the auditor will coordinate with technical personnel, as required, to determine whether such practices are necessary and result in reasonable costs to the government.

### 14-405.8 Allocation of Depreciation and Rental Charges

a. Contractor-owned and government-owned facilities and equipment may be used in a single cost center which performs government and commercial work. In these cases, the contract auditor should carefully review the allocation of depreciation costs to government and commercial work to ensure that it is equitable. If, for example, the government-owned equipment is used wholly on government work on a no-charge basis, and other similar items of contractor-owned equipment are used for commercial work, it may be proper to charge all the depreciation costs on such equipment to the commercial work.

b. Rental expense for use of government-owned equipment and facilities on commercial work as authorized in the contract should normally be charged to such commercial work rather than be included as part of overhead allocated to both government and commercial work.

### 14-405.9 Use of Government Property on FMS

Prior to 1 February 1991, when authorized in the contract, rental expense for use of government-owned equipment and facilities on foreign military sales (FMS) contracts were normally charged to such work. On 1 February 1991, DFARS 245.4 was changed to permit rent-free use of U.S. Government property on FMS contracts. In accordance with Public Law 101-165, the change was made retroactive to 21 November 1989. Because of the retroactive application of the policy, FMS contracts issued between 21 November 1989 and 1 February 1991 may have been overcharged. However, reimbursements for such overcharges are limited to the amount of rental use charge contained in the affected "Letter of Agreements" and must be approved by the contracting officer.

## 14-406 Government Property Reviews Upon Specific Request

### 14-406.1 Review of Contractor Reports on Government Property

The contractor is required by FAR 45.505/DFARS 245.505, to prepare and submit financial reports on the amount of government-owned facilities and government material in its possession. The auditor will evaluate these reports if specifically requested to by the contracting officer or property administrator.

### 14-406.2 Review of Rental Charges for Use of Government Property

a. The monthly percentage rental rates for the facilities and equipment (including IPE) furnished a contractor are set forth in the Use and Charges Clause (FAR 52.245-9) in the contract. The rates apply to the acquisition costs of the facilities and equipment, plus the cost of transportation to and installation in the contractor's plant, if such costs are borne by the government. The contractor may, however, be authorized by the contract or by the contracting officer, in writing, to use the facilities and equipment on a no-fee basis for specific contracts, subcontracts, or other work. If any item is used during a rental period without authorization, the contractor is liable for the full period rental for such item without any credit for no-fee use. The Secretary concerned, however, may waive, in writing, the contractor's liability for such unauthorized use if he or she determines that circumstances would justify the waiver.

b. After the close of each rental period, the contractor submits to the contracting officer a written statement of use made of the facilities and equipment and the rental due the government. The rental amount is reduced by a credit for no-fee usage during the rental period. The credit is computed by multiplying the full rental rate by a fraction in which the numerator is the amount of no-charge usage and the denominator is the total amount of usage during the rental period. The unit used in determining usage will be direct labor hours, sales, hours of use or any other equitable basis approved by the contracting officer.

c. The DCAA auditor will be responsive to specific requests from the contracting officer for the review of contractor's rental statements. Generally, such requests will relate to the verification of (1) the basis of the rental computation, and (2) the propriety of the procedures for controlling, recording, and reporting usage in accordance with contract provisions. In accomplishing the requested audit, the results of facilities utilization reviews made by the property administrator will be appropriately used.

(1) A determination of proper rental amounts requires audit consideration of a variety of factors incorporated in facility agreements, including the proper base. The rates applied to base costs are set forth in the contract clause set forth in FAR 52.245-9. The auditor should determine that all facilities acquisition costs are in the base including leasehold improvements for which the government holds title.

(2) The auditor should assure that the unit used to determine facilities utilization is equitable. The unit used should be representative of the actual facilities utilization, regardless of whether the usage is rent-free. Rent-free facilities should not be excluded from the base and included in computing the credit for rent-free usage.

### 14-406.3 Government Property Reviews at Other Locations

At contractor locations where incurred costs are not performed on a recurring basis, the DCAA auditor will review government property only upon the specific request received from the contracting officer or the internal auditor. Such audit assistance would relate to government property areas similar to those outlined in 14-405 above. Where a large number of such requests are received and performance would have an impact upon accomplishing other audit workload, guidance will be requested from Headquarters.

## 14-407 Audit Discussions

Deficiencies or unsatisfactory conditions disclosed by the auditor should be discussed with the contractor to the extent necessary to assure the validity of the findings. Further, any adverse conclusions or recommendations for changes in the contractor's property procedures and controls will be discussed with the property administrator and included in the report to the administrative contracting officer.

## 14-408 Audit Reports on Government Property

a. Findings and recommendations relating to government property will be

reported as appropriate in system survey reports, audit reports on individual contracts, and in reports on significant functional areas. The format for such reporting is in Chapter 10.

b. Deficiencies requiring immediate attention and findings on significant functional areas involving government property should be reported promptly in a separate report to the administrative contracting officer, with a copy to the property administrator.

c. Audit reports in response to specific requests from the administrative contracting officer or internal auditors will be addressed to the requesting office.

d. Where the property administrator requests DCAA assistance on a specific matter or problem, the response will be addressed to the property administrator, with a copy to the administrative contracting officer.

## 14-500 Section 4 — Operations Audits and Other Functional Reviews

### 14-501 Introduction

This section provides guidance on the review of operations of major contractors. DCAAP 7641.73, Guidelines for Operations Audits provides more specific guidance on auditing selected areas of operations. Additional assistance may be obtained from the Special Programs Branch of the Technical Services Center (TSC). TSC maintains a database of positive operations audit findings titled Operations Audit Summary Information System (OASIS). A synopsis of the reported audit findings in a selected area may be obtained from TSC.

### 14-502 Review of Operations of Major Contractors

#### 14-502.1 Audit Plan

When evaluation of the factors influencing the extent and scope of the audit effort (3-104) discloses that the government has a significant interest in a contractor's operation at any major organizational level, the audit plan should provide for continuous auditing of related areas of the contractor's management system. The audit plan should be developed in a manner to permit the timely accumulation and reporting of information in areas of cost that have managerial significance and will contribute to a more economical and efficient operation. It should be sufficiently comprehensive to accord broad coverage of the contractor's complete operations as they affect performance of government contracts.

#### 14-502.2 Audit Approach

a. That portion of a contractor's cost representations which indicate actual experience, generally is taken from the contractor's books of accounts which are the end product of the accounting system element of its internal control structure. The cost so recorded reflects the results of management policies and decisions and the degree of control exercised over operations and expenditures. On the principle that the whole equals the sum of its parts, it follows that data taken from books of account and other records may be accepted based on minimum or reduced verification and testing if costs and financial data are based on (1) prudent management policies and decisions, (2) an efficient organization reflecting effective management control over operations, and (3) a sound and reliable system of accumulating accounting and financial data.

b. Predicated on this principle, the total audit concept places major emphasis on the degree of prudence exercised by management in establishing policies and making management decisions, methods of controlling costs, and the extent of reliance that can be placed on the accounting information and other financial data.

#### 14-502.3 Audit Program

a. A basic requirement in the development of the audit program is a review and evaluation of the contractor's overall organization chart, the management policies, procedures, and controls developed for operations, and the accounting system and other records designed to control, record, and measure the results of operations. Typical areas of coverage are presented in Chapters 6 and 9, e.g. purchasing and subcontracting, bid estimating procedures, employee utilization, and indirect cost audits. From knowledge and understanding obtained from the reviews, auditing procedures should be developed in such manner to provide a basis for repeated evaluations of the functions and operations related to the overall plan and operations of the organization.

b. The audit program should be sectionalized to cover specific functions or areas of the contractor's operations and the various phases of the system as they relate to the accumulation and recording of accounting, financial, and other management data. The auditing procedures to be applied under each of the sectionalized portions of the audit program should be logically arranged to enable an evaluation and reporting of the conditions found for each of the areas programmed.

## 14-503 Major Areas of Interest

a. The audit plan for major contractor operations is primarily designed to seek out and identify those areas where the contractor's practices are wasteful, careless, inefficient and result or may result in unreasonable costs and unsatisfactory conditions in performing government contracts; and to report such matters to those responsible for taking action to correct or improve the condition.

b. FAR 31.201-3 defines "reasonable" as it applies to the cost of performance of government contracts. The responsibility placed upon the auditor to disclose unreasonable costs requires serious consideration and a clear understanding of the internal operations of the business, and the practices of the industry as a whole. The auditor should keep in mind that the interest of the contractor may not be compatible with the interest of the government. For example, from the contractor's viewpoint it may be more prudent for the contractor to rent rather than purchase an item of equipment even if the action results in greater contract cost.

c. The auditing procedures need to be designed and applied in such a way as to provide the auditor with full knowledge of the methods by which the contractor controls its production and research; the bases for the contractor's make-or-buy decisions, including decisions relating to the specific components entering into the end item, and the acquisition of facilities and production equipment; the manner in which employees are recruited and in which materials are acquired; whether or not the employees and materials and facilities are effectively utilized; and what constitutes a reasonable level of expense. In short, the auditor should be in a position to know that expenses are necessary, that business practices are sound, and that actions are prudent and in line with established practices. Therefore, the auditor should be completely familiar with the basis upon which the management decisions are made by the contractor.

d. In terms of an audit technique, this approach must be geared to inquire into those management and operational decisions which affect the nature and level of costs being proposed and incurred under government contracts. The knowledge gained forms the basis for constructive recommendations to improve the contractor's internal control structure and the economy and efficiency of contractor operations.

e. A procurement agency's special interest in certain areas of the contractor's operations should be considered in audit planning (see 3-104).

## 14-504 Conferences and Reports on Functional/Operational Reviews

a. See 4-300 for guidance on entrance, interim, and exit conferences with the contractor.

b. Promptly after completing each operations audit or other functional review, prepare and distribute a report in accordance with 10-400, regardless of findings.

c. Issue a followup report when the contractor agreed to take corrective action on reported deficiencies or cost avoidance but has taken an unusually long time (six months or more) without any effective action. The followup report should recommend that the ACO make further efforts to obtain the needed contractor corrective action(s). If there is a pattern of contractor failure to take corrective action in such cases, emphasize this fact in the report.

d. Also include the impact of cost avoidance recommendations as questioned costs in reports on reviews of price proposals in accordance with the criteria in 9-308.

## 14-600 Section 6 — Review of Contractor Capital Investment Projects

### 14-601 Introduction

This section provides guidance for reviewing the planning, budgeting, implementation and benefits evaluation of contractor capital investment projects.

### 14-602 General

a. Contractors have a responsibility to maintain their competitiveness and increase productivity through the efficient management of capital investment.

b. The capital budgeting process often involves long-term planning decisions for capital investments. The auditor, in conjunction with other members of the procurement team, has an excellent opportunity to assess these management decisions. In performing an operations audit of the contractor's capital investment program, the auditor should identify capital utilization and investment opportunities which may ultimately benefit the government. Recommendations to contractor representatives and administrative contracting officers (ACOs) should emphasize the cost avoidance aspects of capital investments and look for fast-payback opportunities (capital investments which produce cost benefits equal to the original cash outlay over the shortest time frame); however, non-financial benefits such as improved quality, mobilization capability, and enhanced competitiveness should not be overlooked. For purposes of this section, a contractor's capital investment program includes areas such as make-or-buy decisions, ADPE acquisitions/leasing, plant equipment and building acquisitions/leasing, relocations, plant reorganizations and high cost research and test equipment, etc. Recommendations resulting from an operations audit of the contractor's capital investment program may be of particular value in the performance of special procurement studies, such as Should Cost Reviews, since they often require review of the contractor's capital investment program to insure that alternate manufacturing methods, equipment and procedures have been adequately considered for the specific procurement under consideration.

c. Contractor capital expenditures involve resource commitments which, in many instances, are irreversible. Therefore, it is essential that the contractor's capital investment policies and procedures provide management with prompt and comprehensive information on investment decisions. A reliable, logical and documented method of evaluation should be established by the contractor to ensure that broad company objectives are being considered and the proposed capital expenditures are prioritized. Contractor decisions in this regard are affected by a myriad of factors, some of which may not result in the most equitable treatment of government work. For example, due to limitations on funds available for capital investments, the contractor might be required to choose between purchasing a piece of equipment for a commercial division or for a division working primarily on government cost reimbursement type contracts. The contractor will undoubtedly attempt to produce increased profits and cash flow. Since the contractor will continue to recover its incurred costs in the government division, it may be less inclined to increase the efficiency of that division. Thus, priorities should be reviewed carefully to ensure that the government is afforded the benefit of the most economical and efficient capital investment options available to the contractor.

d. The contractor's written procedures for a capital investment program should provide for the following:

(1) A well-defined organization with established decision authority and responsibility for aggressively pursuing capital investment opportunities which will improve the efficiency of operations, affect long term economies, and make timely identification and replacement of deteriorated and obsolete items.

(2) A systematic approach for reviewing processes, organizations and methods, affecting improvements and detecting deteriorated, obsolete, and underutilized items.

(3) A standard procedure for identification of potential capital budgeting projects, estimation of project benefits and costs, evaluation of proposed projects, and development of the capital expenditure budget based on project acceptance criteria.

(4) A documented review and approval process which assures that the assumptions are correct, all relevant factors have been considered, and proposals are consistent with organization objectives.

(5) A systematic follow-up to insure that project implementation is prompt and within estimated costs.

(6) A system for tracking and comparing planned to actual benefits.

## 14-603 Methods for Evaluating Capital Investment Proposals

a. A capital investment evaluation system is necessary to ensure proposals are evaluated in light of organizational goals so that the most desirable investments are undertaken. The financial attractiveness of capital investment proposals must be judged by comparing the cost (investment) required with the benefit (increased revenues) expected.

b. The methods commonly used to evaluate capital investment proposals are presented below. Depending on circumstances, some methods are preferred over others. Auditors should refer to managerial accounting and financial text books for detailed descriptions as to how these methods are applied and ensure that the method selected by the contractor is appropriate to the circumstances.

### 14-603.1 Payback Method

The payback method is the most widely used approach to capital investment. It measures the length of time required for the flow of cash benefits produced by the investment to equal the original cash outlay, and is calculated by dividing the original cost by the annual cash savings. The resultant calculated payback period is usually compared to a predetermined payback period which is preferred by the company. This method is easy to use since it measures the project's desirability in terms of quick cash. However, it does not consider the time value of money or cash flows after the payback period.

### 14-603.2 Accounting Rate of Return Method (ARR)

The ARR method is frequently used. It evaluates a project by computing a rate of return on the investment using accounting measures of net income rather than cash flow, as used in all other evaluation methods. Annual project expenses are subtracted from annual revenues of the project; the resultant amount is divided by the project investment. The project investment (investment base) may be the initial cost or the average investment for the life of the project. Since depreciation is used in determining income, it is considered in this method. The ARR method is criticized because it totally ignores the timing of cash flows, the duration of cash flows and the time value of money.

### 14-603.3 Payback Reciprocal

This method is a simple way of estimating the internal rate of return. It is determined by dividing 1 by the payback period. It should be used only if cash flows are expected to be uniform and the life of the project is at least twice the payback period; otherwise the estimated internal rate of return is very poor.

### 14-603.4 Discounted Cash Flow Methods

a. All discounted cash flow methods are based on the time value of money, meaning that an amount of money received now is worth more than an equal amount of money received in the future. For example, if money can be invested at 6 percent and $100 dollars is invested now, it will accumulate to $106 dollars by the end of one year ($100+4e$100X.06). Thus $100 dollars received today is worth more than $100 dollars received one year from today. The time value of money is a very important concept involving compound interest.

b. To simplify the process of evaluating proposals using discounted cash flows, the assumption is often made that any cash flows or cost savings from a project occur at the end of an accounting period. Although the assumption is sometimes unrealistic, because a project may offer

cash flows or cost savings throughout the year over its lifetime, the assumption simplifies calculations and allows the use of present value tables. The results obtained are usually close enough to those that might be obtained by more realistic estimates of the precise timing of cash flows.

c. Some technique for comparing present values is necessary. Accordingly, one of the discounted cash flow methods described below is preferred. However, the methods described above are acceptable provided substantially the same results are achieved.

(1) Net Present Value Method (NPV). Under the NPV method, all cash inflows and outflows are discounted at a minimum acceptable rate of return, which is usually the firm's cost of capital. The NPV is the difference between the present value of the project cash inflows and outflows discounted at the cost of capital. If the present value of cash inflows is greater than the present value of cash outflows, the project is acceptable. This method is simple to use and especially convenient for non-uniform cash flows since they are all discounted at the firm's cost of capital.

(2) Internal Rate of Return (IRR). The IRR is the interest rate that discounts an investment's future cash flows to the present so that the present value of those cash flows exactly equals the cost of the investment. It is not given; it must be computed. Once found, management can decide whether the rate is high enough to warrant acceptance of the project. Management must have a minimum acceptable rate of return in mind, below which projects are not acceptable. The IRR can be compared to the cost of capital which is typically expressed as an interest rate; an IRR greater than the cost of capital should be considered favorably by the contractor. The IRR method specifically addresses the time value of money and the timing of cash flows. Depreciation plays no role in the evaluation of projects.

(3) Profitability Index (PI). Other things being equal, larger investment proposals yield larger net present values. The PI is the ratio of the present value of the cash inflows to the present value of the cash outflows (present value of cash inflows divided by the present value of cash outflows) thereby providing a basis for comparison between projects of different sizes. The higher the profitability index, the more desirable the project in terms of return per dollar of investment.

## 14-604 Audit Objectives

The primary objectives of the auditor's review are (1) to ascertain that the contractor has a reliable, efficient and cost-effective capital asset acquisition/leasing program; (2) to report any significant deficiencies in the program or practices to responsible contractor and government procurement representatives; and (3) recommend improvements.

## 14-605 Audit Procedures

The audit procedures below are not intended to be all inclusive. They are designed to help identify those contractor capital investment areas where improvements are needed. These procedures include steps to determine whether the contractor has the necessary policies and procedures to identify and implement capital investments on a timely and cost-effective basis.

a. Review Board of Directors or other management level minutes for discussions on proposed and/or considered capital investments and ascertain rationale for acceptance or disapprovals. Be alert to circumstances where management may be so engrossed in improving the economy and efficiency of commercial segments that government segments are not accorded adequate attention.

b. Examine contractor budgets and forecasts for information on capital investment planning.

c. Review budget committee minutes for proposed capital investments; ascertain company rationale for selection, alternatives, or rejection of acquisitions.

d. Scrutinize capital expenditures for equipment to be used primarily on government contracts. Be alert for instances where capital equipment acquired for use on government contracts is later transferred to a commercial division after the

costs have been substantially recovered over a relatively short period of time.

e. Ascertain if the contractor's organization is staffed with personnel who have capital investment decision authority and responsibility.

f. Review the contractor's capital investment program to determine that it provides for a continuing input regarding existing asset utilization and new investment opportunities.

g. Verify that there are established procedures for the preparation and documentation of economic analysis for all proposed capital investment projects.

h. Evaluate the economic analysis of selected investment proposals using the methods described in 14-603.

i. Determine if the contractor has performed studies to ascertain plant capability and whether consideration is given to making rather than buying, at less cost, if the contractor acquired additional equipment.

j. Determine whether the contractor is reviewing selected items of machinery and equipment for excessive down time which may indicate a need for overhaul or replacement.

k. Assure that the contractor is reviewing circumstances leading to production bottle-necks from an obsolete equipment perspective.

l. Ascertain if the contractor is reviewing large backlogs to assure that they do not result from insufficient capital equipment to meet the current level of business activity.

m. Determine whether the contractor is reviewing plant and equipment ledgers to establish the age of existing equipment and the frequency of its replacement.

n. Determine if the contractor is examining maintenance and repair costs for selected items of equipment and ascertain whether decisions are being made regarding the economy of continued repair as opposed to the long run economy of replacement.

o. Determine if the contractor's procedures for identifying deteriorated or obsolete equipment are effective and that recommendations for replacement are appropriately carried out.

p. Ascertain whether the contractor reviews usage records in order to determine if equipment is being fully utilized. Should extensive idleness exist, make certain the condition is noted for follow-up with the ACO/plant representative. A technical review should be requested to determine whether the equipment is excess to the contractor's needs.

q. Review the contractor's system for evaluating scrap and rework accounts to assure that such costs are not a result of improper or inadequate capital equipment.

r. Determine if the contractor is regularly reviewing procedures for controlling the handling of material, tools, and equipment to establish whether excessive losses may be averted by investment in an improved materials control system, e.g., counting devices, measuring devices, and material handling equipment.

s. Consult with contractor cost accountants and industrial engineers to determine if, they have submitted sound investment ideas which were not approved by management. Review and evaluate management's reasons for rejecting these ideas. Ideas with merit should be pursued with contractor management and the ACO.

t. Be alert for capital investment opportunities during perambulation.

## 14-606 Coordination with ACO

In view of the technical aspects involved in most capital investment reviews it is essential that audit plans be coordinated with the ACO (see 14-400 for government property and H-203). Also, recommendations should be coordinated with the/ACO for technical feasibility as well as cost savings and increased productivity. A joint recommendation by the ACO's representative and the auditor will probably receive more favorable consideration by both the contractor and the ACO.

## 14-6S1 Supplement — Industrial Modernization Incentive Program (IMIP)

a. Origins

On 2 November 1982 the Deputy Secretary of Defense announced the test of IMIP, a program to encourage contractor capital investments to enhance productivity. This program supported DoD Acquisition Improvement Program Initiative No. 5, "Encourage Capital Investment to Enhance Productivity."

IMIP emanated from the Tri-Service Committee for Improving Industrial Productivity. The Committee was formed in March 1982 to combine the Military Departments' views on DoD policy for the Service programs known as "Technology Modernization" (TechMod) (Air Force) and "Industrial Productivity Improvement" (Army). TechMod started during 1978 when General Dynamics and the USAF agreed to a program of technology modernization to increase productivity and lower costs of the F-16 fighter aircraft.

b. Program Description

IMIP represents a joint venture between the government and industry to accelerate the implementation of modern equipment and management techniques in the defense industrial base. In simple words, under IMIP, the government can provide incentives to motivate a contractor to invest its own funds for capital expenditures, which will result in reduced acquisition costs. The short term objective is to reduce costs and lead times, and increase the quality of products through efficient production capability. The long term objective is to have a healthy and strong industrial base to meet surge and mobilization requirements should a conflict or war arise.

IMIPs are to be implemented in an environment where competitive market forces are insufficient to foster independent contractor modernization and significant benefits such as cost reduction, elimination of production bottlenecks, improved quality and reliability, and improved production capability can be expected to accrue to the government. This program is applicable only to those capital investment areas that are not required to meet current contractual commitments. IMIP is to motivate the contractor to invest in facilities modernization and to undertake related productivity improvement efforts that the contractor would not have otherwise undertaken or to invest earlier than it otherwise would have done. The program provides for the dissemination to third parties of technology developed as part of IMIP projects.

c. Program Structure

There are two basic IMIP categories, Modernization Investment Projects (MIPs) and Modernization Efficiency Projects (MEPs). In the past the government has placed emphasis on the MIPs. These projects are heavily dependent upon contractor capital investments, i.e., equipment and facilities. MEPs are those projects that enhance contractor productivity without requiring significant capital investment, such as plant rearrangement and integration of management information systems.

IMIP is accomplished in three phases. The first phase is the "top-down factory analysis." This analysis provides an evaluation of the needs for the overall facility and identifies potential opportunities for the application of current manufacturing technologies. A thorough Phase I analysis is critical to the success of an IMIP because of the necessity to identify all critical production constraints or bottlenecks. Phase II is the development of the enabling technologies and design of the factory modernization enhancements. Phase II establishes implementation plans, specifies equipment requirements, and validates specific applications through method demonstration and prototyping. If the demonstration of the technical feasibility of the IMIP project is successful at the conclusion of Phase II, approval is granted to enter Phase III. Phase III represents the implementation of the IMIP which includes the contractor purchase and installation of capital equipment and the implementation of management procedures to support the new manufacturing processes.

The government uses two basic types of incentives to encourage contractor

investment: productivity savings rewards and contractor investment protection. A productivity savings reward (PSR) is the primary IMIP contract incentive and is the portion of the IMIP savings/cost avoidances shared with the contractor. The PSR does not constitute fee. Contractor investment protection consists of guarantees of continued government business to support the investment and may include an agreement by the government to purchase the equipment at stated amounts if government business does not reach agreed-to levels.

d. Applicable Regulations

DoD Directive 5000.44, dated 16 April 1986 establishes DoD policy covering IMIP and assigns implementation responsibilities to the Office of the Secretary of Defense, the Military Departments, and the Defense Agencies. The Directive, and its transmittal memorandum signed by Deputy Secretary Taft directs the Secretaries of the Military Departments and the Directors of DCAA and DLA to foster broader implementation and "follow through" on the program to fully realize the benefits of IMIP and to contribute to a more efficient and modern industrial base. DoD Guide 5000.44-G, "Industrial Modernization Incentives Program (IMIP)," contains the detailed criteria, procedures and guidance for IMIP implementation.

e. Audit Evaluation

Contract auditors are well suited by training and experience to assist in the effective implementation of individual IMIPs. Individual IMIPs are important to contract auditors in their roles. IMIPs may drastically revise the ways in which contractors make their products, which will certainly change the makeup of the costs of those products. Since contract auditors analyze the estimated costs in proposals, they must keep themselves informed of major changes in the ways products are produced.

Although the Directive does not set forth specific responsibilities for DCAA, it does direct DoD Acquisition Components to "Involve the contract administration organizations and the Defense Contract Audit Agency to support the IMIP lead procurement office efforts upon initiating the IMIP process." DCAA IMIP audit support will include but not be limited to:

1. Verifying rates and factors used in rough order-of-magnitude Phase 1 proposals.
2. Providing advice on the reliability of proposed systems for benefits tracking.
3. Advising on contractors' capital budgeting systems and plans.
4. Reviewing proposed capital investment projects.
5. Assisting in post-implementation assessments.
6. Reviewing applications of the Productivity Savings Rewards (PSR) factor.

## 14-700 Section 7 — Review of Production Scheduling and Control

### 14-701 Introduction

This section contains audit guidance for the review of the contractor's production scheduling and control, which comprise the basic system and management procedures for planning, scheduling, and control of the day-to-day operations and for the coordination of the material, labor, and facilities required. The contractor's system of production scheduling and control has a substantial impact on the cost incurred and therefore requires some attention. Audit reviews and evaluations of this kind must be closely coordinated with other government personnel having responsibilities in this phase of the contractor's operations.

### 14-702 General

Production scheduling and control comprise the contractor's basic system and management procedures for planning, scheduling, and the control of the day-to-day operations and for the coordination of the material, labor, and facilities required. The contractor's system of production scheduling and control should provide for the continuous management control and appraisal of the work performed. The objective in the review and evaluation of the system is to determine whether the controls effectively enable the contractor to obtain and use material, labor, and facilities so that production goals and contract delivery schedules are met efficiently and economically. Duplication of the efforts of others should be avoided where possible, and full use should be made of the results of reviews performed by production specialists or other contract administration personnel. Where appropriate, the auditor's review and evaluation should be coordinated with other government personnel having responsibilities in this phase of the contractor's operations.

### 14-703 Review Objective

The objective in the review and evaluation of the system is to determine whether the controls effectively enable the contractor to obtain and use material, labor, and facilities so that production goals and contract delivery schedules are met efficiently and economically.

### 14-704 Review Procedures

a. Review of Organization. The auditor should obtain, where available, or prepare independently, organizational charts reflecting the contractor's operating elements engaged in production control activities. Based on evaluation, personal observations, and discussions with contractor personnel the auditor should determine whether (1) responsibilities for the various aspects of the production control have been assigned to organizational elements and specific individuals, and (2) the various aspects of production control have been organized to promote efficient performance of these functions.

b. Evaluation of Procedures. The auditor should evaluate the production control procedures for overall adequacy of coverage in the areas listed below:

(1) Preparation of master production schedules. These schedules should reflect the production period starting and completion dates for each manufactured component, subassembly, and final assembly so that plant delivery requirements can be established for raw materials and subcontract components. Master production schedules are also used for production control activities related to engineering labor, manufacturing labor, and facility requirements and utilization.

(2) Preparation and distribution of periodic production reports to management during contract performance. These reports should disclose the status of operations and areas of difficulty if established production goals are not being met.

(3) Revision of production and operational plans and schedules for contract changes and modifications processed during the period of contract performance. The prompt processing of revisions to production plans and schedules on the basis of such contract changes is

an important factor in minimizing resulting additional costs.

## 14-705 Testing the Procedures

Guidance with respect to the evaluation of material and labor is in 6-300 and 6-400. The following paragraphs contain additional guidelines for testing procedures relating to production scheduling and control.

### 14-705.1 Material

The auditor should consider the audit steps listed below as the basis for developing an audit program:

a. Evaluate the procedures used for the preparation of detailed bills of material and other media which show the individual raw materials, common items, and purchased parts required for the end item; and evaluate the time schedules which indicate when these items are required at the production line.

b. Evaluate the reliability and timeliness of the procedures for the preparation of work orders, job orders, and other production authorizations. These authorizations are issued to production supervisory personnel as authority for work performance and usually contain a listing of materials to be used in the manufacture and assembly processes; any discrepancies between material requirements and the quantities actually received should be apparent.

c. Review the procedures for the coordination of procurement, engineering, manufacturing, and other functions within the contractor's plant to ascertain whether all problem areas with respect to delinquent deliveries by suppliers and subcontractors, substandard items, production breakdowns, quantity cutbacks, and specification changes are properly coordinated for management's attention and solution. Changes in decisions involving materials from in-house manufacture (make) to subcontract procurement (buy) without proper coordination may result in both the manufacture and procurement of the same item to meet a single requirement.

d. Review the production control reports prepared for management for the status and effectiveness of material operations. Those items which appear to deviate from the established norm should receive further review emphasis.

### 14-705.2 Production Control Activities

The review steps listed below should be considered for inclusion in the audit program:

a. Verify the effectiveness of the contractor's production control procedures for material by selectively testing the application of these procedures to particular contracts and associated component parts.

b. Review the documentation of a number of selected items to ascertain whether requirements were properly determined and scheduled for either receipt or manufacture in accordance with the master production plan for the overall contract.

c. Trace the sequence of the selected items in b. above with the applicable documentation through production control and, for those items purchased, through procurement, receiving and inspection, storage, issue, and the manufacturing process. Ascertain whether the production cycle was accomplished in accordance with the established schedules and whether the schedules were properly developed. When the scheduled sequence of material was not timely, determine whether the delays were reported to management and whether action taken corrected the problem or whether the production schedule was revised.

d. When contract changes have occurred, review the production control procedures to determine whether timely and appropriate action was taken to revise the production control schedules and plans to accommodate the contract changes. Also determine whether the revised plans were furnished to all interested company activities as soon as possible so that the cost of contract changes could be kept to a minimum.

### 14-705.3 Progress Planning

This subparagraph makes reference to such terms as "master release schedules," "master plan," and "engineering parts list." When these terms are used, the auditor should be aware that the specific

terms may not be applicable to a particular contractor, but similar controls should be in effect, and the audit procedures will be equally applicable. The following audit steps should be considered as a minimum during the review of the progress planning activity:

a. Evaluate the method used to transcribe or convert the data from the engineering package to the production planning report. Examine the controls and procedures for developing the data in the engineering package from which make-or-buy decisions are made.

b. Select a number of master release schedules related to the contract end item and compare with the corresponding engineering parts lists. When deviations exist, determine the reasons for the deviations and the effect on production, and ascertain the reasonableness of added costs required to make the changes.

c. Schedule the time phasing between the date the engineering package was received from the engineering section and the date the master release schedule was reproduced and distributed. Inordinate time lags should be reviewed, and further audit effort should be accorded those situations where significant differences exist between the planned time and the actual time experienced.

d. Determine whether all excess parts applicable to canceled assemblies are removed promptly from the engineering parts list.

e. Determine whether the production planning report is maintained on a current basis and contains additions and deletions resulting from engineering changes.

### 14-705.4 Release of Shop Orders

The procedures listed below should be considered for inclusion in the audit program:

a. Evaluate the contractor's procedures for (1) analyzing the data on the master release schedule (are the controls and methods used adequate for the preparation of shop orders), (2) determining quantities to be produced on each shop order to provide lot costs on a timely basis, and (3) coordinating the release of shop orders to ensure contract end items unit costs on a timely basis.

b. Select a number of completed shop orders and:

(1) Determine the propriety of the cost codes by comparing them with the master cost code.

(2) Schedule and compare the actual operation time with the standard time and investigate significant variances for shop overloading, production delays, and the effect of such delays or other failures to meet planned schedules.

(3) Determine causes and reasonableness of variations in actual production from scheduled production, such as (i) failure to receive materials on time, (ii) machine breakdowns, (iii) improper dispatching, (iv) nonavailability of special tools, or (v) employee absenteeism.

(4) Review shop orders reflecting small unit quantity releases, emphasizing those units in which the relationship of setup time to actual production time appears disproportionate, and review the contractor's efforts to determine economical lot size releases and the manner in which small lot sizes are consolidated for more economical runs.

(5) Determine that rework of defective materials received from vendors is properly authorized and approved.

### 14-705.5 Shop Forecasting and Loading

The procedures which follow should be considered for inclusion in the audit program:

a. Review and evaluate the procedures and methods used to determine production capacity, machine output, and shop loading. Determine whether the information made available for forecasting shop production is realistic. Review all reports, charts, and records used to compare the actual production loading with the forecast and determine whether the data used for the contracts under review are current and reliable.

b. Compare the production load forecast charts with actuals for selected departments to determine the extent that peaks and valleys occur for the operation over an extended period of time. When production peaks and valleys persist, determine the action taken, if any, particularly if the situation is the result of loading factors.

c. Review and evaluate the loading factor used for machine utilization and compare with actual utilization records to determine the extent of machine idleness. Emphasis should be accorded idle time resulting from improper loading practices involving the more expensive machines. Further, consideration should be accorded idle machine time caused by factors such as repairs, employee absenteeism, nonavailability of tools or fixtures, or delays occasioned by untimely material deliveries.

## 14-800 Section 11 — Advanced Cost Management Systems (ACMS)

### 14-801 Introduction

a. This section provides guidance concerning the effect of technological advancements in manufacturing on cost accounting systems and contractor's efforts to implement an Advanced Cost Management System (ACMS). As auditors review costs incurred on contracts and evaluate estimates of costs supporting price proposals, they should be aware of the implications of technological modernization and ACMS.

b. ACMS can affect reviews of costs incurred on contracts and estimates of costs supporting price proposals. Specific guidance related to these areas appears in Chapters 5, 6, and 9 with appropriate notations referencing ACMS. It is important to develop a better understanding of the contractor's manufacturing processes and monitor the trends in manufacturing practices and processes. Therefore, auditors should tour contractor manufacturing facilities periodically.

### 14-802 Description of Technological Modernization

Technological modernization involves the introduction or continuing process of implementing a machine orientation on the manufacturing floor. Technological modernization is not just a humanless, robotic, lights-out factory. It can be a gradual process toward a machine orientation of the factory floor. Examples are the use of common numeric control machines and machine cells and the evolution of technical processes that can reduce labor hours and equipment hours in developing a better product.

### 14-803 Indicators of Technological Modernization

Auditors should be aware of the following factors which may indicate the presence of technological modernization:

a. Changing cost patterns (e.g., a shift from direct to indirect costs).

b. Introduction of major new products and program requirements.

c. Increased competition.

d. Increased capital expenditures.

e. Introduction of new high-efficiency machines.

f. Introduction of islands of automation (i.e., computer-controlled sections of the manufacturing process with little or no human involvement).

g. Introduction of new technologies.

h. Introduction of new, more sophisticated information systems.

i. Increased expenditures for manufacturing and production engineering.

### 14-804 Effect of Technological Modernization

a. Some contractors are accomplishing substantial technological advancements on the factory floor. These advancements (in machinery, processes, and practices) can change how products are made and can cause changes to the flow of costs. Technological advancements should reduce the amount of direct labor. In addition, large expenditures are often required to purchase advanced equipment which can increase the amount of depreciation and consequently the overhead pool expense. Thus, if direct labor comprises the allocation base for the manufacturing overhead pool, a declining labor base combined with an increasing overhead pool will cause a significantly higher overhead rate.

b. As technology has evolved, cost accounting systems have not always kept pace. Technological advancements can highlight accounting system weaknesses that result in inconsistent and inequitable cost accounting representations and allocations. Accordingly, the effect of technological modernization on contract costs must be carefully evaluated.

c. If the cost accounting system does not keep pace, the following potential problems may increase costs to the government:

(1) Products are not costed accurately.

(2) Costs are not allocated accurately.

(3) Existing products support the cost associated with developing future product technology.

(4) Improved manufacturing operations and technological advancements are not reflected in the cost estimating systems on a timely basis.

(5) The current accounting system does not support equipment/technological investment justification, i.e., savings beyond time and material, such as reduced cycle time, scrap, rework, and quality.

## 14-805 Definition of an ACMS

a. The main objective of an ACMS is to achieve better information to determine product cost so that management can make business decisions based upon more accurate information.

b. A fully developed ACMS is an integrated system which operates from one database and is capable of supporting cost management functions such as product cost reporting, performance measurement, investment justification, and life-cycle reporting (see below for additional discussion of terms). In most cases, ACMS initiatives are not a revolution; i.e., they are not developed and implemented overnight. ACMS initiatives, for the most part, are an evolution. Contractors will continue to evolve their accounting systems in various stages of progress during the journey to an ACMS. ACMS initiatives also encompass various accounting concepts, such as activity based costing (ABC), which focuses the assignment of costs to the activities of a business. The first stages of ACMS implementation can be as simple as a reexamination of cost pools and allocation bases.

c. Some points which are critical to understanding ACMS are identified as follows:

(1) Activities are those actions needed to achieve the goal and objectives of the function.

(2) Product cost reporting can be viewed as identifying the cost of performing significant activities of the business.

(3) The goal of performance measurement is to determine the efficiency and effectiveness of activities.

(4) The purpose of investment management is to identify, evaluate, and implement new activities, or alternatives for performing existing ones, to improve the future performance of the firm.

(5) Life-cycle costing is the accumulation of costs for activities that occur over the entire life cycle of a product, from inception to abandonment by the manufacturer and consumer.

## 14-806 Role of the Auditor

a. The auditor, in his or her advisory accounting capacity, should evaluate the adequacy and compliance of the proposed accounting change to implement an ACMS in accordance with current regulations using materiality and risk criteria. In fact, auditors should encourage contractor consideration of government needs beyond minimum adequacy. Contractors, making changes for their own needs, are often receptive to considering customer needs that they could readily accommodate and which they might otherwise ignore.

b. The establishment of an early and effective dialogue between the contractor and the government about the planned ACMS is essential to successful implementation. This dialogue should begin after the feasibility study but before the system design. At a minimum, contractors with CAS-covered contracts must notify the government at least 60 days prior to a voluntary change to an accounting practice (or on a mutually agreeable date) as required by FAR 52.230-5(a)(2). In the beginning, the contractor will typically brief the government representatives about reasons for the change, description of the new system, the implementation plan, and the timetable for implementation. If the auditor hears about the proposed transition through alternative sources (for example, the company newspaper), the auditor should raise the question with the contractor as soon as possible.

c. Auditors should monitor the contractor's progress as the change evolves. Monitoring the transition progress entails meeting with the contractor for periodic briefings which focus on the system requirements and capabilities, implementation plans, and proposed timetable; fact-finding potential issues; discussing audit concerns; and recommending improvements on a timely basis. Auditors should be proactive and take the initiative to

make the contractor aware that auditors are available for periodic progress briefings. In addition, if the internal auditors are not acting as members of the implementation team, DCAA auditors should take the initiative to consult with them on system auditability. When auditors discuss audit concerns and issues, they should address the ability of the system to operate in the government contracting realm; for example, audit trails and system controls. Auditors should provide timely input as they foresee possible ramifications that could arise from the change.

d. It is the contractor's responsibility to design and develop the system. Monitoring the transition progress should not include the auditor becoming part of the creation and development process of the system. At no time should the auditor take on any specific responsibility for the system or give up future audit rights when the system starts to function.

## 14-807 ACMS EDP Audit Approach

a. The best and most logical approach to reviewing the sophisticated computer systems which underlie an ACMS is the establishment of a team comprised of cognizant FAO auditors (including the EDP specialist), and, whenever appropriate, the regional EDP auditor (with TSC serving as technical consultants). This team can then interface, under the overall leadership of the FAO manager, with the contractor's own implementation team. If support of the regional EDP auditor is needed, that support should be brought into the process at the earliest possible time; i.e., when the contractor first notifies the government of the approved plan for a new system. In this way, the EDP auditor will be in a position to monitor significant contractor activities in this area throughout the change process. It is important for both the FAO auditors and the regional EDP auditor to understand the fundamental concepts upon which the accounting system is based.

b. When a new cost accounting system is installed, the contractor must validate that the system is operating as designed and developed. The auditor should verify that the system is operating in an auditable and controllable environment. The most effective audit approach is to monitor the contractor's validation process and to coordinate with the contractor's implementation team and internal auditors, thereby avoiding unnecessary duplication of effort and maximizing resource utilization.

c. During periodic contractor briefings, auditors should discuss the design of the audit trail, discuss potential issues, and recommend improvements for the audit trail when appropriate. EDP auditors can assist the FAO auditors in evaluating the reliability of system output by assessing the transaction processing and the controls over it. In addition, FAO auditors should also coordinate efforts with the contractor's auditors who will also be interested in the reliability of the audit trail.

## 14-808 Consistent Charging of Cost

a. The introduction of advanced manufacturing technology may make it possible for the contractor to directly identify machine-related costs normally charged as overhead expense (such as depreciation and machine maintenance costs) to the products using the services of the machinery. Consequently, similar costs may result in both indirect and direct charges to final cost objectives which is a potential CAS 402 noncompliance. 48 CFR 9903.202 requires contractors to disclose/describe their accounting practices, including cost pool composition, associated allocation bases, and the charging of costs direct and indirect. The Disclosure Statement should also describe specific criteria and circumstances when costs are sometimes charged directly and sometimes indirectly. The Disclosure Statement then becomes determinative as to whether or not costs are incurred for the same purpose (see CAS 402-50(b)).

b. One objective of CAS 402 is to preclude overcharging of some cost objectives as may occur when similar costs are charged both directly and indirectly to final cost objectives. This can be accomplished by tracking the flow of parts through the manufacturing floor as a basis for determining what costs are

being charged to those parts. In addition, the contractor can purify the affected cost pools to avoid double counting. Auditors should closely scrutinize the applicable section of the Disclosure Statement that deals with the contractor's criteria for defining the circumstances under which costs may be charged sometimes directly and sometimes indirectly. Auditors should verify that the disclosed practices are in compliance with CAS 402.

## 14-809 ACMS Pilot Tests

a. If the contractor determines to run the new ACMS simultaneously with the existing system as a test, it is important from both the government and contractor perspectives that the contractor disclose the plan for dual systems as soon as top management makes the decision. As part of the disclosure the company can and should explain that the pilot system is a test, subject to change, and that the output is uncertain.

b. Output from the new system being run simultaneously as a pilot test meets the definition of cost or pricing data, even if the contractor does not plan to install the new system as part of its official accounting system but intends to use it only as a management tool. Compliance with the Truth In Negotiations Act (TINA) requires contractors to provide accurate, complete, and current cost or pricing data concerning a covered procurement. FAR 15.801 provides that "cost or pricing data are more than historical accounting data; they are all the facts that can be reasonably expected to contribute to the soundness of estimates of future costs and to the validity of determinations of costs already incurred." It includes all data that have a bearing on price whether or not the data are used to construct the cost estimate or are thought to be important. Official estimating, accumulating, and reporting of costs will continue under the old, existing system while the new system is simultaneously used as a management tool. Timely contractor disclosure of the dual systems to the ACO/PCO will be the key to avoiding problems with the Truth in Negotiations Act.

c. For a contractor planning to install the new system as part of its official accounting system, CAS rules (FAR 52.230-2 and 52.230-5) would govern the change process and ensure that the government is adequately protected during the transition process. Contractors will continue to estimate and report based upon the old system while simultaneously testing the new system. Subsequent to the change, the cost impact proposal will be used to adjust any contracts that were priced using the old system.

d. The auditor should be meeting periodically with the contractor to discuss the pilot system's implementation and progress. During those meetings one of the topics for discussion should be the new system's output. Disclosure by the contractor of the output in the format provided by the system should be sufficient. The auditor should then review the system output (i.e., evaluate system data, reports, and report format) with the contractor. Potential audit issues and recommendations should be discussed, including comments on the form system output should take to be useful for government needs.

e. The contractor should reconcile the dual systems on an overall basis. The auditor should review and evaluate the contractor's reconciliation to determine if both systems are allocating the same total costs to contracts (costs per contract, cost structure, and allocation process may differ, but total costs should not). If the two systems are not reconcilable on an overall basis, auditors should inform the contractor, so that corrective action can be taken.

## 14-900 Section 5 — Other Special Purpose Audits

### 14-901 Introduction

This section provides procedures and audit guidelines for certain special purpose audits which are infrequently encountered by the DCAA auditor. General audit procedures that are equally applicable to these audits are in other chapters of this manual.

### 14-902 Contract Audit Services for CHAMPUS

#### 14-902.1 CHAMPUS Program Background

a. The Dependents' Medical Care Act (PL 84-569) provides in part for the establishment of a uniform program of medical and dental care for eligible dependents of members of the uniformed services. The act was amended by PL 89-614 to authorize an improved health benefits program and to extend health care benefits to retired members of the uniformed services and to eligible dependents of deceased, retired, and active duty personnel. Section 613 of PL 93-82, Veterans Health Expansion Act of 1973, expanded coverage to dependents of totally disabled veterans, living or deceased. All of the medical services authorized for these beneficiaries may be obtained at the medical facilities of the uniformed services subject to the availability of space, facilities, and the capabilities of the medical staff. However, to assure the availability of authorized medical care for eligible beneficiaries, the government may contract for such services through civilian public facilities under insurance, medical service, or health plans as deemed appropriate.

b. Responsibility for the placement and administration of contracts for health and medical care services rendered through civilian public facilities has been delegated to the Office for the Civilian Health and Medical Program of the Uniformed Services (OCHAMPUS), under the jurisdiction of the Assistant Secretary of Defense (Health Affairs). Detailed information concerning the civilian health and medical care available to eligible beneficiaries and the extent to which the cost of this care will be reimbursed by the government is in DoD Instruction 6010.8.

#### 14-902.2 Contract Audit Procedures

a. Contract audit services will be provided, upon contracting officer request, in accordance with applicable RFP or contract clauses, numbered OCHAMPUS letters, and audit procedures in the applicable chapters of this manual.

b. Specific consideration will be given to the following areas when applicable to the contract audit:

(1) Administrative costs claimed by the contractor in its proposal should be evaluated and tested for allowability, reasonableness, and allocability to the program. A large part of the contractor's total administrative costs claimed will consist of allocated salary costs. The bases for allocation of the salary expenses and other elements of administrative costs claimed should be evaluated for propriety. The proposed administrative rate should be reviewed for overall reasonableness (compare it with the provisional amount authorized, the prior years experience, etc.). Significant rate changes should be analyzed and their causes commented on in the audit report.

(2) If auditing a contract with an advance payment provision, the receipts and disbursements of the special bank account maintained for advance payments under the contract should be reviewed to insure that if the contractor is investing this advanced money in interest-bearing accounts, the government is receiving appropriate credits. If the contractor has excess advance payment funds available and these funds are not invested, the auditor should recommend to the contracting officer that the advance payment provisions be adjusted accordingly. Where advance payments have not been completely liquidated, the report is to contain a schedule showing (1) total receipts from the government including those for advance payments, (2) the total of acceptable direct costs and administrative costs at the provisional

rate, and (3) the amount of the unliquidated advance.

### 14-902.3 Audit Reports

a. Audit reports on prime contractors will be addressed to the Program Evaluation Office, OCHAMPUS, Department of Defense, Denver, Colorado 80240.

b. Audit reports on subcontractors will be addressed to the contract auditor responsible for audit of the prime contractor.

c. Prepare audit reports in accordance with the applicable section(s) of Chapter 10, including any supplementary financial information required by the contracting officer.

## 14-903 National Guard Bureau Agreements with the States and Possessions

### 14-903.1 Background

a. The National Guard Bureau enters into training site agreements (TSA) between the Federal government and the States and Possessions (including political subdivisions thereof) of the United States for the maintenance and operation of National Guard training facilities. Such agreements are awarded under the provisions of 10 U.S.C. Chapter 133 which provides for the acquisition, use, and maintenance of facilities needed for reserve component training. The agreements are usually cost-sharing arrangements which provide partial reimbursement of the costs incurred. The agreements are funding devices and are not written as contracts. They lack FAR clauses, including disputes and allowable cost provisions. The United States Property and Fiscal Officer (USP&FO) is the administrator for the Federal government; the Adjutant General or equivalent official generally serves as the representative of the State or Possession.

b. In addition to the usual cost-sharing agreements, there are a limited number of facility construction or operation agreements which provide for direct payment by the Federal government of the allowable costs. Under these agreements, no reimbursements are involved since the State does not disburse its own funds for costs incurred in performance. Certifying officers appointed by the States send approved payroll data and original copies of vendors' invoices through the administrator to the designated Air Force Accounting and Finance Center or Army Finance Center where payment checks are issued directly to the employees and vendors.

c. All State National Guard activities, including the Air National Guard Bureau activities, are under the jurisdiction of the National Guard Bureau, run jointly by the Departments of the Army and the Air Force.

### 14-903.2 Basic Audit Responsibilities

a. The use of DCAA audit services is at the option of the USP&FO. Audits will be made only when requested.

b. In accordance with OMB Circular A-73, the DCAA auditor should coordinate visits to State National Guard units with the State audit office.

c. Audits will be performed in accordance with arrangements mutually agreed upon between DCAA and the USP&FO. Since the agreements are issued on an annual basis and are of relatively small dollar value, audits of the records at completion (end of fiscal year) will ordinarily suffice.

### 14-903.3 Audit Procedures

a. Prior to starting the audit, arrange with the USP&FO and/or the State National Guard representatives for access to the necessary records, vouchers, and supporting documentation.

b. Audit procedures in Chapter 6 will be used as a guide in the audit. The procedures may be modified to fit particular circumstances, however, the objectives of the audit are the same as in cost-reimbursement type contracts. If a concurrent audit of transactions is not made, appropriate emphasis will be placed on the review of the effectiveness of the internal control procedures.

### 14-903.4 Allowability of Costs

The allowability of costs will be determined on the basis of the terms and conditions included in the agreement.

### 14-903.5 Audit Reports

a. Upon request, a contract audit closing statement will be issued to the USP&FO as of the agreement completion date in accordance with 10-900. The Contractor's Release of Claims and Assignment of Refunds, Rebates, Credits, etc. is not required. Therefore, issuance of the contract audit closing statement should not be delayed for this reason. It should be noted, however, that the agreements prescribe the cost sharing of common-use space, and provide for disposition of net income derived from leasing facilities or from other arrangements.

b. Unallowable costs not previously reported will be set forth on DCAA Form 1, letter or audit report, as appropriate, and furnished with the contract audit closing statement.

### 14-903.6 Correspondence

Correspondence pertaining to agreements intended for either the State or the administrator may be mailed to the Adjutant General or equivalent official of the State concerned. When appropriate, the correspondence should be marked for the attention of the administrator (USP&FO). To expedite delivery in those instances where the respective offices are in different parts of the State, such correspondence may be addressed directly to the administrator and a copy forwarded to the Adjutant General or equivalent State official.

## 14-904 Contract Audits of Advance Payments

### 14-904.1 Background

Advance payments may be authorized by the government. Funds authorized must be deposited in a special bank account and withdrawals must be closely supervised by the government. The contractor is usually required by contract terms to furnish a periodic accounting of all funds disbursed from the special bank account.

### 14-904.2 Audit Responsibility

Audits of advance funds will be made only when requested by the contracting officer.

### 14-904.3 Audit Procedures

a. The scope of the audit will be in accordance with generally accepted auditing procedures appropriate under the circumstances. Audit procedures to be considered include:

(1) Direct confirmation of the special bank account fund balance.

(2) Reconciliation of the confirmed bank balance with contractor's records and most recent statement of accountability of funds furnished the government.

(3) Proof of the disbursement and deposit transactions reflected on bank statements with disbursement and deposit transactions shown in the contractor's records.

(4) Review and evaluation of the use of the funds withdrawn from the advance fund bank account to insure propriety thereof. Funds improperly used, including payments of unallowable costs, should be redeposited by the contractor.

(5) Review whether government payments are properly deposited within a reasonable time.

(6) Review whether advances made to subcontractors are in accordance with basic agreements and are properly authorized and approved.

(7) Review whether the amount of the fund is excessive considering the needs of the contractor to finance performance of the contract.

### 14-904.4 Audit Reports

Audit reports on advance funds will be prepared and distributed in the same manner as for progress payments (see 14-200 and 10-200).

## 14-905 Contract Audit Services for Nonappropriated Funds

### 14-905.1 Background and Authority

a. DoD Instruction 7600.6 establishes policies and procedures for audits of nonappropriated funds and related activities. Under this Instruction, DCAA is authorized to furnish appropriate audit services in connection with nonappropriated funds contracts.

b. The matter of reimbursement for such audit services will be based on the

criteria set forth in DoD Instruction 7600.6.

c. The types of audit service that DCAA will render include (1) the evaluation of price proposals where negotiated contracts, estimated to amount to $500,000 or more, are to be awarded on the basis of cost or pricing data submitted by the offerors, (2) the audit of costs incurred under cost reimbursement or incentive type contracts, where the amount to be paid is, except for fee or profit, to be determined by cost incurred by the contractor, and (3) on a limited basis, the review of contracts that include clauses guaranteeing that prices will not exceed those offered other customers.

### 14-905.2 Audit Responsibility

a. Price proposal evaluations and incurred cost audits in connection with nonappropriated fund contracts will be made only upon the specific request of the cognizant DoD component, for example, Office of the Secretary of Defense, Organization of the Joint Chiefs of Staff, a Military Department, or a Defense Agency.

b. Requests for audit service are to be sent directly to the cognizant DCAA regional office, except in overseas areas, where requests may be sent directly to the cognizant DCAA branch office.

### 14-905.3 Audit Procedures

The nature of the audit effort authorized for proposed awards and contracts financed by nonappropriated funds is similar to the service normally provided by DCAA with respect to contracts financed from appropriated funds. Consequently, audits involving nonappropriated fund contracts and proposed awards will be performed in accordance with the appropriate sections of this manual.

### 14-905.4 Audit Reports

Prepare reports for nonappropriated fund activities in accordance with the applicable section of Chapter 10. Generally the requesting official would be the appropriate addressee.

## 14-906 Special Reviews Related to Government Rights in Inventions

### 14-906.1 Background

a. FAR 27.3/DFARS 227.3, Patent Rights Under Government Contracts, emphasize the necessity for the government to be in a position to know and exercise its rights under the Patents Rights-Retention by the Contractor Clause. The contracting officer or designated representative has the primary responsibility for maintaining the proper controls to assure timely reporting by contractors.

b. The patent rights clause entitles the government to certain rights in inventions which are either conceived or first reduced to practice during the performance of a government contract containing the clause. However, the government may find itself in disagreement with a contractor on the question of whether an invention was actually conceived or reduced to practice under a government contract. Resolution of these questions may depend on the ability to demonstrate that contract funds were applied to the development of the invention.

### 14-906.2 Contract Audit Responsibility

a. Field audit offices will be responsive to requests for contract audit services under the patent rights clause.

b. The audit request should provide the contractor's statement as to (1) the specific individuals involved in the conception of the invention, (2) the time period during which the work was performed, and (3) the reason the government was not given license-free use of the invention.

### 14-906.3 Audit Procedures

a. The auditor should determine how the salaries of the individuals responsible for the invention were charged during the period involved.

b. A review should also be made of the contractor technical reports issued in connection with the invention to determine if any individuals, other than those disclosed by the contractor, were instrumental in the invention development. The time charges of the additional indi-

viduals revealed in the review should also be analyzed to determine the accounts or contracts to which their time was charged during this time period.

c. During the normal audit of the contractor's operations, the auditor should be alert to instances where the government may not have received proper rights to contractor inventions. The auditor should advise the administrative contracting officer of the contractor's apparent failure to comply with the patent rights contract clause.

### 14-906.4 Audit Reports

Follow the guidance in 10-1200 in preparing the audit report.

## 14-907 Audit of Contractor's Claim for Exemption From Submission of Certified Cost or Pricing Data Based on Established Catalog or Market Prices.

### 14-907.1 Background

a. Contractors may submit claims for exemption from certified cost or pricing data for items (1) based on established catalog or market prices of commercial items sold in substantial quantities to the general public or (2) exempted by law or regulation. Such exemptions are ordinarily claimed on Standard Form 1412 and may apply to a proposed prime contract, subcontract, or line item within a prime or subcontract. The claim for exemption may be submitted for intracompany transfers (see 6-313) or for direct sales to the government.

b. This section addresses only those exemptions based on established catalog or market prices. Audit assistance is ordinarily not required for the contracting officer to make a determination on a claim for exemption based on prices set by "law or regulation."

c. To qualify for an exemption based on catalog or market prices, the terms of the proposed purchase, such as quantity and delivery requirements, should be sufficiently similar to those of the commercial sales that the price will be fair and reasonable.

### 14-907.2 Audit Objective and Procedures.

a. The objectives of the audit are to evaluate (1) whether the sales data furnished on the SF 1412 are based on the contractor's books and records, are properly classified, and support the contractor's claim and (2) whether the contractor's claim meets the criteria in FAR 15.804-3(c), and provides data necessary to assist the contracting officer in applying the "substantial quantities" criteria guidelines in FAR 15.804-3(f)(2).

b. The auditor should determine whether there is sufficient data in historical audit files to perform a desk audit in accordance with generally accepted government auditing standards. To the extent considered appropriate, the auditor may verify the contractor's submission based on the results of prior audits of recently submitted SF 1412s.

c. Obtain contractor sales information supporting the claimed exemption including quantities sold, dates of sale, prices for the quantities sold, purchaser, relationship of purchaser to the organization, extent of sales for commercial and government end-use, extent of sales to any division, subsidiary, affiliate or other organization under common control, quantity discount schedules, and comparisons between the item being sold and similar items sold previously and used as the basis for the catalog price. Verify this data to the appropriate accounting records.

d. Sales to prime contractors or affiliates for U.S. Government end-use and/or foreign military sales are at times misclassified as sales to the general public. Also note that sales (of any type) to affiliates are not considered sales to the general public per FAR 15.804-3(c)(5) and do not provide a sufficient basis for establishing a competitive, commercial catalog price.

e. The sales period specified in Item 8 of the SF 1412 should be the most recent period for which sales data are available. This period should include the most recent regular monthly, quarterly, or other period for which sales data are reasonably available and should extend back only far enough to provide a total period representative of average sales (not more

than two years preceding). The total units sold, as shown in Item 9 of the SF 1412, should agree with verified sales history. In addition the sales in Item 11 of the SF 1412 (CATEGORIES A, B, and C) should be correctly stated in accordance with the requirements established in the instructions for Item 11, SF 1412, and FAR 15.804-3(f)(2).

f. The contractor's catalog should be regularly maintained and available to all potential customers. In some industries, the custom of the trade is to offer items for sale to the general public at catalog prices less announced discounts. Such discounts are stated in percentages of catalog prices, and the percentages may vary according to type of customer, volume, etc. Where this practice is followed, the catalog price used for intracompany transfers should be reduced by the discount percentage applicable to similar sales to the general public. A listing in a catalog does not, of itself, make the price allowable.

g. In addition to validation of sales data, the auditor is responsible for the determination as to whether the criteria set forth in FAR 15.804-3(c) have been met. The auditor must use judgment in the evaluation of these criteria. The use of judgment is also required to determine if an item has been "sold in substantial quantities." Audit program APEXEMPT provides guidelines for determining whether exemption claims submitted under the catalog price provision of the SF 1412 meet the "substantial quantities" criterion.

h. Another area requiring the use of judgment involves the words "or is based on." The proposed item must be sufficiently similar to the basic item to permit a simple explanation of any significant price difference. Technical assistance should be obtained in those cases where significant amounts are involved. The auditor should determine whether there is a significant disparity between the quantity being acquired and the quantity of prior sales for the item.

i. Determine whether the catalog is recorded in a form regularly maintained by the contractor. The record may be a catalog, price list, computer data base, schedule, or other verifiable and established record and must be published or otherwise made available for customer inspection. It must state the current or last sales price to a significant number of buyers constituting the general public as defined by FAR 15.804-3(c)(5).

j. After verifying that the catalog is appropriate, (c. above), perform the following tests which involve tracing all or selected unit prices to the underlying sale(s) register or comparable sales records:

(1) Test whether the catalog is accurately based on actual sales records.

(2) Test whether the unit prices accurately reflect the prices in the current catalog identified in Item 7 of the SF 1412, less discounts actually available to the contractor's most favored customer as shown in the sales records.

### 14-907.3 Audit Reports

The results of audit should be set forth in a report prepared in accordance with 10-1200. If supporting documentation is considered inadequate, the audit report will express an adverse opinion regarding the contractor's claim and indicate that it may be appropriate to request cost or pricing data. The audit report should also include a statement requesting a copy of the contracting officer's determination regarding the basis for granting the exemption or for waiving the requirement for submission of cost or pricing data.

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# CHAPTER 15

## 15-000 — OTHER DCAA FUNCTIONS

### 15-001 Scope of Chapter

This chapter presents audit policies, procedures, and support requirements relative to other DCAA functions, including contract audit services for non-DoD agencies, the contract audit coordination and procurement liaison auditor programs, support of negotiation conferences, the contract audit follow-up system, and board of contract appeals cases.

## 15-100 Section 1 — Special Procedures for Non-DoD Agencies

### 15-101 Introduction

a. This section presents policies and procedures relating to audit services rendered to non-DoD organizations other than Educational Institutions (Chapter 13), CHAMPUS (14-902) and National Guard Bureau (14-903).

b. General requirements associated with servicing non-DoD organizations are stated in 15-102. Procedures for processing reimbursement vouchers are discussed in 15-103. Supplemental requirements developed by and tailored to the needs of specific non-DoD organizations are presented in 15-104 through 15-117.

### 15-102 General Requirements

The Contract Audit Manual is the determining guide for the conduct and administration of audits for non-DoD as well as DoD contracts. In addition to general guidance provided throughout CAM, specific comments concerning non-DoD audits are contained in various sections of CAM under the audit area being discussed. Presented below is a recapitulation of pertinent CAM guidance as well as a synopsis of procedures unique to non-DoD organizations.

#### 15-102.1 Establishing Audit Cognizance and Processing Non-DoD Audit Requests

a. Cross-servicing arrangements have been made with various non-DoD organizations. Section 1-300 provides guidance for performing audit services for non-DoD organizations, including the rules for establishing audit cognizance and accepting or rejecting non-DoD requests.

b. Requests from non-DoD organizations not listed in the FMIS User Manual, Appendix C, Billing Source Codes, must be coordinated through Headquarters, as described in 1-303f.

c. An increasing number of non-DoD organizations require their activities to submit requests through their Office of Inspector General. In those cases the DCAA field office will honor all reasonable administrative procedures specified by the requesting Office of Inspector General.

d. The cross-servicing arrangements provide for the non-DoD organizations to send the audit requests to the cognizant DCAA field office. Audits performed without a current audit request could result in disagreements regarding reimbursements for the audit services. When an auditor observes non-DoD contracts subject to audit coverage, for which audit requests have not been received, they will be brought to the attention of appropriate non-DoD officials (contracting officer or Office of Inspector General) to facilitate issuance of requests for audit.

#### 15-102.2 Cost Principles and Procedures

The Federal Acquisition Regulation (FAR) is the primary regulation for use by all Federal executive agencies in acquiring supplies and services with appropriated funds. Agencies are authorized to issue supplemental regulations tailored to their organizational needs. Thus, the cost principles and procedures applicable to a specific non-DoD organization consist of the FAR together with that agency's supplemental regulation, if any. The auditor should contact the appropriate non-DoD official (requester, Office of Inspec-

tor General, or acquisition office) to determine whether that organization has issued supplemental regulations.

### 15-102.3 Final Indirect Cost Rates

a. Subpart 42.7 of the Federal Acquisition Regulation provides that final indirect cost rates will be established on the basis of auditor determination where contracting officer determination procedures are not applicable. For non-DoD contractors, contracting officer determination applies to business units under the cognizance of a corporate or resident administrative contracting office or where the predominant contract dollar amount is with an agency whose procedures require contracting officer determination.

b. The non-DoD organization may issue supplemental regulations which modify the designation of auditor versus contracting officer responsibility for final indirect cost rate determination. The DCAA auditor should comply with the designation in the agency's supplemental regulations. Contact the non-DoD contracting officer to clarify the designation of responsibility if there are any questions on this subject.

c. The format and content of audit reports on annual indirect cost rates, prepared in accordance with 10-500, are the same for non-DoD contracts as for DoD contracts, whether the auditor-determined or contracting officer-determined method applies. If the contracting officer is responsible for the rate determination, the subject of the DCAA report will state that it is an advisory report.

### 15-102.4 Cost Accounting Standards

a. "National defense" contracts awarded by non-DoD organizations are subject to the same Cost Accounting Standards Board rules and regulations as DoD contracts. "Nondefense" contracts awarded to business units that are currently performing any CAS-covered national defense contracts shall have the same type of CAS coverage as the most recently awarded national defense contract. This policy extends the applicability of the CASB's rules, regulations, and standards to most negotiated nondefense contracts.

b. Submission or revision of a Disclosure Statement is not required for any nondefense contract. However, if a Disclosure Statement has been submitted in connection with a CAS-covered defense contract, the contractor must also comply with such disclosed practices under nondefense CAS-covered contracts.

### 15-102.5 Technical Reports Associated with Proposal Reviews

Some non-DoD organizations do not routinely furnish technical reports on contractors' price proposals. In those cases, the auditor should inform the requester of the need for a technical report (10-307.9).

### 15-102.6 Audit Reporting

a. As stated in 15-103d and f, DCAA Forms 1 and 1c or their equivalents will not be used to report suspended and/or disapproved costs to certain contracting organizations. Such reporting will be accomplished promptly after disclosure of the suspended or questioned item by means of a letter or audit report.

b. Interim audit status reports will be issued in all cases where required or requested by the contracting organization in its request for audit of the contract. Audit reports will also be issued in all cases where interim audits disclose any adverse conditions or weaknesses in the contractor's management practices which the auditor feels should be brought to the attention of the contracting officer.

c. Audit reports will be addressed in the manner prescribed by 10-208. A number of non-DoD organizations have requested supplemental distribution of audit reports which frequently includes distribution of the original or one or more copies to their Office of Inspector General. The requested supplemental distribution is commented on in various sections of CAM under the audit area being discussed. The table presented in 15-1S7 lists, by organization and by type of report, the additional distribution requirements for these non-DoD organizations.

d. In conjunction with the above, the non-DoD address lists presented in 15-1S1 through 15-1S6 will provide guidance in identifying the cognizant non-

DoD offices which commonly request our services.

e. When a non-DoD organization submits an audit request through its Office of Inspector General, the non-DoD organization assignment number or other identifier will be included in the first one or two sentences of the audit report (10-208.1).

f. Guidance on release to the GAO of audit reports and records pertaining to non-DoD organizations is given in 1-200.

### 15-102.7 Suspected Irregularities

Procedures for referring suspicions of irregularity with respect to non-DoD contracts are included in DCAAR 7640.15.

### 15-102.8 Boards of Contract Appeals

General comments on audit services provided to assist in hearings before boards other than the ASBCA appear in 1-407.2.

### 15-102.9 Defective Pricing Review Program

DCAA's standard memorandum of understanding states that the customer may provide the DCAA Office of Assistant Director, Operations, a list of all contract pricing actions for which the customer wants DCAA to perform a postaward audit in the next fiscal year. This list will constitute specific authority by the customer for DCAA to perform, and bill for, these specific postaward audits.

### 15-102.10 Reimbursable Billings

Field activities will prepare reimbursable billings in accordance with the requirements of the DCAA FMIS User Manual, Volume II, Section III-E2.

## 15-103 Procedures for Processing Cost-Reimbursement Vouchers

a. The processing of reimbursement vouchers under cost-reimbursement type contracts awarded by non-DoD organizations can be accomplished by one of five methods, depending upon which method the organization has selected. These methods are discussed in paragraphs c through g below. Paragraph 15-104 identifies the method designated by each of the non-DoD organizations. Common to all methods and contrary to DoD contract voucher processing procedures, reimbursement vouchers under non-DoD agency contracts must be signed by an authorized certifying officer of the contracting organization prior to payment.

b. Certain particular procedures have been adopted by the National Aeronautics and Space Administration (NASA) for its cost-reimbursement type contracts. Since the volume of auditable NASA contracts is substantial, the procedures are described separately in detail in 15-105.

c. Under the first method, interim vouchers will be prepared by the contractor and forwarded directly to the cognizant auditor. They will be reviewed by the auditor and provisionally approved for payment in the same manner as interim vouchers received on DoD cost-reimbursement type contracts. They will then be forwarded to the finance office of the government organization which awarded the contract for certification and payment. Completion vouchers and necessary supporting documentation will generally be received by auditors and processed in the same manner as DoD completion vouchers. Any suspended or disapproved costs resulting from audit will be reported by use of DCAA Forms 1 and 1c, or equivalent forms as specified by the contracting organization. The procedures for preparation and distribution of the notice of costs suspended and/or disapproved and appeals by the contractor will be as prescribed in 6-902 through 6-908. The auditor will make appropriate deductions on the contractor's submitted vouchers for suspended or disapproved costs.

d. The second method is the same as the first with respect to receipt of vouchers, provisional approval of interim vouchers, and processing of completion vouchers by the auditor. It differs from the first method in that the auditor will report suspended and/or disapproved costs by means of informal interim audit reports with a recommendation that the amount questioned be deducted from the next available voucher. Vouchers approved for provisional payment, together with the informal audit reports, if any, will be forwarded to the contracting orga-

nization's fiscal office. That office should be requested to notify the cognizant audit office of the action taken with respect to any recommended suspension or disapproval. The contracting organization's fiscal office will refer the vouchers and audit reports to the contracting officer, who will certify the vouchers for payment. The contracting officer will also make the determination with respect to the auditor's recommendations for suspended and/or disapproved costs and notify the contractor as appropriate.

e. The third method is the same as the first with respect to receipt of vouchers and provisional approval by the auditor. The vouchers will, however, be forwarded to the contracting organization's contracting officer for final approval, rather than being forwarded to that organization's finance office. Similarly, any notification of suspended and/or disapproved costs will be forwarded to the contracting officer for final approval and notification to the contractor. Such notification will be made by informal audit report with a request that the auditor be advised of the contracting officer's decision. Since the approval of the contracting officer is required before the suspension or disapproval becomes effective, the auditor will not notify the contractor of any such recommendations and should not make any deductions from vouchers for costs suspended and/or disapproved.

f. Under the fourth method, the contracting organization will instruct its contractors to forward interim and completion vouchers directly to the administrative contracting officer or other designated official of the organization. This official will certify the voucher and process it for payment. The cognizant auditor will receive a paid copy of the voucher. In some cases, however, the contractor may forward an information copy of the voucher to the auditor at the time of its initial submission to the contracting organization. Procedures for reporting questioned costs or fee will be the same as in 15-103d.

g. Under the fifth method, the contractor will forward the first and the final vouchers on each cost-reimbursement type contract to the cognizant auditor. All other vouchers will be submitted directly to the contracting officer's representative. The cognizant auditor will review the initial voucher in accordance with paragraphs 6-1007c and 3-2S1. However, costs will be determined by the cost principles and procedures in the Federal Acquisition Regulation together with agency supplemental regulations. If acceptable, the voucher will be provisionally approved and submitted to the contracting officer's representative. If the review discloses deficiencies in the contractor's internal control or billing procedures which the auditor cannot resolve with the contractor, an audit report will be issued to the contracting organization's Office of Audit. The report should state the deficiencies and the recommendations for corrective action. In addition, the initial voucher should be attached to the audit report. The cognizant auditor will receive a paid copy of each voucher processed under the contract. The final voucher, together with the required documentation submitted by the contractor to the cognizant auditor, will be processed in the same manner as DoD completion vouchers (Section 9 of Chapter 10). DCAA Forms 1, or equivalent forms as specified by the contracting organization, will be prepared for any suspended or disapproved costs. The original and four copies of the form will be forwarded to the contracting organization's Office of Audit with a request that the DCAA auditor be advised of the action taken. However, the original and four copies of DCAA Forms 1 pertaining to contracts awarded by the Department of Transportation will be forwarded to the contracting officer.

## 15-104 Organizations to which Various Procedures are Applicable

Listed below are the non-DoD organizations to which various procedures are applicable. NASA procedures and requirements are discussed separately in 15-105 and 15-106. The various procedures described in 15-103 apply to all other non-DoD organizations. The list designates which procedure applies to each organization. This list comprises all the non-Department of Defense organizations with which arrangements have

been made for audits by DCAA of contracts awarded by such organizations.

| Organization | Procedure Prescribed by | Notes |
|---|---|---|
| Agency for International Development | 15-103f | |
| Department of Agriculture | 15-103f | |
| Department of Commerce | 15-103e | |
| Department of Education | 15-103f | |
| Department of Energy | 15-103f | |
| Department of Health and Human Services | 15-103f | |
| Department of Housing and Urban Development | 15-103f | |
| Department of the Interior | 15-103f | |
| Department of Justice | 15-103f | |
| Department of Labor | 15-103f | |
| Department of State | 15-103d | |
| Department of Transportation | 15-103g | (1) |
| Department of the Treasury | 15-103d | |
| Department of Veterans Affairs | 15-103f | |
| Environmental Protection Agency | 15-103f | |
| Executive Office of the President, Office of Administration | 15-103e | |
| Federal Emergency Management Agency | 15-103f | |
| General Accounting Office | 15-103c | |
| General Services Administration | 15-103f | |
| Government Printing Office | 15-103f | |
| Interstate Commerce Commission | 15-103f | |
| National Aeronautics and Space Administration | 15-105, 15-106 | |
| National Science Foundation | 15-103f | (2) |
| Nuclear Regulatory Commission | 15-103a | |
| U.S. Arms Control and Disarmament Agency | 15-103e | (3) |
| U.S. Postal Service | 15-103c | (4) |
| U.S. Railroad Retirement Board | 15-103f | |

Notes:

(1) The DCAA auditor will not make any deductions on public vouchers. For cost-reimbursement type contracts awarded by the Department of Transportation, the vouchers and audit reports will be submitted to the cognizant contracting organizations listed in 15-1S5.

(2) Contractors will furnish information copies of both interim and completion vouchers to the DCAA auditor at the time of their submission to the Foundation. The auditor will also be notified by the Foundation when each contract is completed; thus, in the event the contractor fails to furnish the information copy of the completion voucher, this notification will serve to advise the auditor that a final audit should be accomplished.

(3) Interim and completion vouchers should be sent to the U.S. Arms Control and Disarmament Agency, 320 21st Street, N.W., Washington, DC 20451, ATTN: A/CON.

(4) Interim and completion vouchers should be sent to the cognizant U.S. Postal Inspection Service requesting the audit, with one copy to the contracting officer.

## 15-10. Procedures Applicable to Cost Reimbursement Contracts Awarded by National Aeronautics and Space Administration (NASA)

### 15-105.1 General

a. NASA contracting officers will furnish DCAA branch managers or resident auditors with a separate letter of delegation of authority to perform audits to cover each cost-reimbursement type contract for which an audit is requested. The letter will be accompanied by (1) an attachment setting forth the details of the audit services to be performed and (2) a form designated 'Acceptance of Delegation of Audit Services Function,' which is to be acknowledged and returned to the contracting officer. This form also provides for an estimate of the cost of audit performance by fiscal year for each contract, including related auditable subcontracts. The FAO should complete the form, except for the section on estimated cost of audit performance, and transmit it directly to the contracting officer. The estimated cost of audit performance will not be entered, since DCAA Headquarters will furnish such estimates to NASA on an agency-wide basis rather than by individual contract.

b. Vouchers under cost-reimbursement-type NASA contracts will be processed in accordance with procedures described below. These procedures are applicable only to vouchers for reimbursement of costs. Claims for fees are submitted by contractors on separate vouchers directly to the NASA contracting officer for evaluation and administrative approval. If the audit discloses any information concerning fees which should be brought to the attention of the contracting officer, this information will be promptly furnished by letter or audit report.

(1) Interim reimbursement vouchers for incurred costs will be submitted to the auditor, who will approve them for provisional payment and send them directly to the designated NASA Center for certification and payment. Final vouchers will be submitted by the contractor directly to the auditor for appropriate review and transmittal to the responsible administrative contracting officer. The procedures applicable to DoD contracts will be utilized in processing these vouchers. The auditor therefore will not sign final vouchers. The contractor will submit, as a minimum, enough copies of vouchers to accommodate the distribution requested in the attachment to the letter of delegation received from NASA contracting officers (see 15-105.1a), as well as one copy each for retention by the cognizant auditor and the administrative contracting officer.

(2) NASA Form 456, Notice of Costs Suspended and/or Disapproved, will be used in lieu of DCAA Forms 1 and 1c. When an issue covered by the Form 456 also affects other contracts not included on the Form 456, such as DoD, other civilian agencies, or other NASA contracts, include a schedule of the affected contracts, showing the contract number, suspended/disapproved amount, and contracting officer's name and phone number. This information is very helpful for the NASA contracting officer to facilitate government-wide consistency on dispositioning the issue.

(3) After preparation of the NASA Form 456, the auditor will submit it to the NASA contracting officer for review, approval, and countersignature in the number of copies requested by the attachment to the NASA letter of delegation referred to in 15-105.1a. One copy of this form will also be retained by the auditor. After approval and countersignature, the NASA contracting officer will send two copies of the approved NASA Form 456 to the contractor to advise of the suspension or disapproval and will return three copies to the cognizant auditor. The auditor will attach two copies of the approved Form 456 to the next subsequent voucher provisionally approved. If the contractor has not made a deduction on this voucher for the amount shown thereon, the auditor will make the necessary deduction.

c. If there are NASA cost-reimbursement-type contracts which provide for use of actual indirect cost rates, NASA Forms 456 for each such contract will be submitted with the indirect cost report to NASA (10-507c[1]) to adjust any excess of indirect costs previously claimed on

such contracts over the amount allowable.

### 15-105.2 Contract Audit Closing Statements

Upon completion of the audit of each NASA cost-reimbursement-type contract, issue a contract audit closing statement to the cognizant contracting officer with a copy to the NASA Office of Inspector General cognizant of the geographical area in which the contractor is located. (See Supplement 15-1S1.) The closing statement will conform to the format and content prescribed in 10-900.

## 15-106 Supplemental Requirements for NASA Contracts

To meet the needs of special local situations, departures from procedures described in this section may be arranged by DCAA Headquarters, Attn: OAD, and the NASA Office of Inspector General.

### 15-106.1 NASA Cost Principles and Procedures

a. The cost principles and procedures prescribed by the Federal Acquisition Regulation (FAR) together with the NASA FAR Supplement (NFS) apply to NASA contracts. Each FAO responsible for audits of NASA contracts should maintain a current copy of applicable parts of these regulations.

b. When costs are allocable to a contract, but are unallowable under NASA cost principles, they will not be charged directly or indirectly to any other contract.

### 15-106.2 Audit Services for NASA

a. The policy for establishing cognizance and accepting or rejecting non-DoD audit requests stated in 1-300 does not apply to NASA. DCAA will perform all contract audit work requested by NASA (1-303h).

b. Although not subject to the provisions of DoDD 7640.2, "Policy for Follow-up on Contract Audit Reports," NASA has elected to use the DCAA summary sheets described in 15-605. The NASA address for distributing summary sheets is stated in 15-605b(3).

### 15-106.3 Programming Functional Reviews and Operations Audits

a. NASA has requested that certain specified functional areas which may significantly affect the level of costs incurred be given selective audit emphasis as part of the normal review of contractors' activities. These areas are listed in Supplement 3-S20.

b. The selection of functional/operational areas for audit emphasis will be based on such factors as the dollar value of NASA contracts, type of contract, performance requirements, prior audit experience, and special matters of particular concern to NASA. The DCAA auditor should confer with the NASA Office of Inspector General cognizant of the geographical area in which the contractor is located (see Supplement 15-1S1) preparatory to establishing the annual audit plan. The auditor should also communicate with the NASA Office of Inspector General thereafter when major changes are being made or when other circumstances so warrant, to identify those functions which are of particular interest to NASA and to determine whether the audit service rendered is sufficient for NASA procurement purposes.

c. Promptly after completing each operations audit or other functional review, prepare and distribute a report in accordance with 10-400.

### 15-106.4 Special Information Reports for NASA

a. A special report will be submitted promptly to NASA when underruns or overruns, terminations, unexpected changes, inadequate contractor controls, or any other unusual circumstances will have an immediate and significant impact on the costs of NASA contracts.

b. Prepare such reports in a letter format in accordance with 10-1200. Usually a standard scope of audit statement would not be applicable in providing information of this nature. Rather than using terms such as "report," "audit," or "review," the subject should refer to the information being provided for NASA. For example, a report subject might be-

gin: "Information fo: NASA on Contractor's _____ ."

c. If there is a NASA administrative contracting officer or contracting officer's representative assigned to the contractor facility, the report may be addressed to that official. Otherwise, address the report to the NASA procurement contracting officer having the major NASA interest in the contractor's operations.

### 15-106.5 Indirect Cost Reports for NASA

a. The Federal Acquisition Regulation together with the NASA FAR Supplement provide that final indirect cost rates will be established on the basis of auditor determination when contracting officer determination procedures are not applicable. Contracting officer determination applies at business units under the cognizance of a NASA administrative contracting officer or when NASA has the predominant contract dollar amount (FAR 42.705-1). For contractors subject to indirect cost rates determined by DCAA, NASA treats the DCAA report rates as final. If NASA is responsible for the rate determination, the DCAA report is advisory and will be addressed accordingly.

b. In view of the foregoing, the formats and contents of audit reports on annual indirect cost rates, prepared in accordance with 10-500, are the same for NASA contracts as for DoD contracts, whether the auditor-determined or contracting officer-determined method applies. Provide additional distribution for NASA per 10-507c(1)(a).

### 15-106.6 Audits of Progress Payments for NASA

a. Audits of progress payments under NASA fixed-price contracts will be initiated as requested by NASA procurement offices. The cognizant NASA contracting officer will provide the responsible DCAA branch manager or resident auditor a letter of delegation for each contract selected. Each letter of delegation will be accompanied by a form designated "Acceptance of Delegation of Audit Services Function," which should be completed by the DCAA office and returned to the originating NASA office.

b. Audits of progress payments and preparation, addressing, and distribution of related audit reports will be governed by 14-200.

## 15-107 Supplemental Requirements for Agency for International Development (AID) Contracts

Special AID audit and reporting requirements are stated in 13-704. These requirements, although applicable primarily to contracts awarded to educational institutions, also apply to contracts awarded to other nonprofit and commercial contractors and should be noted in such cases.

## 15-108 Supplemental Requirements for Department of Agriculture Contracts

Audit services will be provided the Department of Agriculture (USDA) only if the request is made by the cognizant regional Department of Agriculture Office of Inspector General - Auditing (OIG-A) (15-1S6). Requests received directly from a USDA agency should be returned, with a reminder that such requests must be channeled through the USDA regional OIG-A.

## 15-109 Supplemental Requirements for Department of Commerce Contracts

All audit requests are administered through the Office of Inspector General. Reports should be sent to the Office of Inspector General, U.S. Department of Commerce, Administration and Development Division, Herbert C. Hoover Building, Room 7099A, 14th St. and Constitution Avenue, N.W., Washington, DC, 20230. The Inspector General will forward the reports to the using activity.

## 15-110 Supplemental Requirements for Department of Energy Contracts

a. The cost principles and procedures prescribed by the Federal Acquisition

Regulation (FAR), supplemented by the Department of Energy Acquisition Regulation (DEAR), apply to Department of Energy contracts. DEAR Part 931 applies to DOE contracts other than DOE prime contracts covered by DEAR Subpart 970.31 which involve operation of government-owned-contractor-operated facilities and National Laboratories. A contract covered by DEAR Subpart 970.31 will contain a special cost principle clause setting forth provisions on allowable and unallowable costs applicable to the contract. In auditing DOE contracts, auditors will comply with all reasonable requirements and instructions of DOE.

b. Costs claimed under DOE contracts should be evaluated in accordance with the applicable provisions cited therein. Costs unallowable under a contract in accordance with its governing cost principles will not be charged directly or indirectly to any other contract.

c. DCAA has agreed to perform contract audit work at all DOE prime contractor locations other than those designated as Management and Operating Contractors (1-303h).

## 15-111 Supplemental Requirements for Department of Health and Human Services Contracts.

a. The Department of Health and Human Services (DHHS) has placed some constraints upon its representatives regarding their authority to issue requests for audit services.

(1) Requests for audits of pricing proposals from contracting officers, program directors, or price analysts shall be honored. A copy of reports sent to contracting officers will be distributed to the DHHS Office of Inspector General (15-1S3).

(2) Other audit requests must come from the regional or headquarters office of the DHHS Inspector General (15-1S3). The Inspector General will forward the audit reports to the using activity.

b. Any long-term requests or informal understandings should be confirmed with the DHHS Office of the Inspector General.

c. When an auditor observes DHHS contracts subject to audit coverage for which audit requests have not been received, the auditor should notify the Headquarters Office of the Inspector General. This includes those DHHS contracts benefiting from operations audits or other across-the-board audits. In the event an appropriate audit request is not forthcoming, DCAA regional offices should notify Headquarters, PLD.

## 15-112 Supplemental Requirements for Department of the Interior Contracts

All audit requests are administered through the Headquarters Office of the Inspector General. The requests will specify the distribution desired by the Inspector General.

## 15-113 Supplemental Requirements for Department of Labor Contracts

Audit services will be provided the Department of Labor (DOL) only if requests are received from the Assistant Inspector General for Audit. DOL's procurement offices may neither request nor authorize audits. Any long-term requests or informal understandings will be reconfirmed with the Inspector General before further auditing occurs.

## 15-114 Supplemental Requirements for Department of Transportation Contracts

a. On Department of Transportation contracts continuing for more than one year, an annual report (original and two copies) will be issued by the auditor to the cognizant contracting officer, with four copies sent to the Office of Inspector General (15-1S5) after the close of the annual period. The report should summarize the status of each contract being audited, including costs by major categories, incurred and billed to date; amounts questioned; and any pertinent comments regarding the contractor's financial practices.

b. The Department of Transportation has authorized the U.S. Coast Guard and

the Federal Aviation Administration to send audit requests directly to DCAA. All other DOT organizations are required to route their requests through the Office of Inspector General (15-1S5).

c. For each audit report sent to a Department of Transportation activity, four copies will be sent to the DOT Office of Inspector General (15-1S5).

## 15-115 Supplemental Requirements for Department of the Treasury Contracts

Copies of each audit report pertaining to a Department of the Treasury contract or procurement action will be sent to Department of the Treasury, Office of the Inspector General, 1500 Pennsylvania Avenue, N.W., Room 2412, Washington. D.C. 20220.

## 15-116 Supplemental Requirements for Environmental Protection Agency Contracts

a. Audit services will be provided to the Environmental Protection Agency (EPA) upon request by EPA procurement officials. Current EPA procedures require that the audit request must include an eleven-digit EPA control number; otherwise the assignment is not to be accepted.

b. If requested, an annual report will be sent to the Inspector General for Audits (15-1S4) on each contractor/grantee where (1) EPA contracts/grants are in excess of $1 million, or (2) two or more contracts/grants are in effect during the contractor's fiscal year. In its request for audit, EPA will indicate the type of information required in the annual report, such as status of contracts/grants, amounts questioned, and other related data.

## 15-117 Supplemental Requirements for National Science Foundation (NSF) Contracts

All audit requests will originate from the National Science Foundation, Office of Inspector General, 4201 Wilson Boulevard, Arlington, Virginia 22230. All questions concerning National Science Foundation audit requests will be directed to this address. The procedures described in 4-300 should be followed when auditable NSF contracts are identified for which audits have not been requested.

## 15-1S1 Supplement - Address List for National Aeronautics and Space Administration Field Audit Offices

| Address of Field Audit Office | Geographic Areas |
|---|---|
| Director, NASA Office of Inspector General<br>Code W<br>NASA Headquarters<br>Washington, DC 20546-0001<br>(202) 358-1220<br>(202) 358-3022 FAX | |
| Director, NASA Office of Inspector General<br>Headquarters Center<br>Code W-1<br>Washington, DC 20546-0001<br>(202) 358-1921<br>(202) 358-3034 FAX | Baltimore-Washington International Airport (Center for Aerospace Information), counties of Arlington and Fairfax in Virginia, the City of Alexandria, Virginia, and Washington, D.C. |
| Director, NASA Office of Inspector General<br>Code 200.1<br>Goddard Space Flight Center<br>Greenbelt, MD 20771<br>(301) 286-5561<br>(301) 286-9120 FAX | Maine, Maryland, Delaware, New Jersey, Connecticut, Rhode Island, Massachusetts, Vermont, New Hampshire, New York, Eastern Pennsylvania (areas east of the western boundaries of counties Potter, Clinton, Center, Huntingdon, and Fulton), and Accomack County, VA |
| Director, NASA Office of Inspector General<br>Mail Stop 60-9<br>Lewis Research Center<br>Cleveland, OH 44135<br>(216) 433-5412<br>(216) 433-5415 FAX | Iowa, Minnesota, North Dakota, South Dakota, Wisconsin, Michigan, Illinois, Indiana, Kentucky, Ohio, and Western Pennsylvania (area west of the western boundaries of counties Potter, Clinton, Center, Huntingdon and Fulton) |
| Director, NASA Office of Inspector General<br>Mail Stop 181,<br>Langley Research Center<br>Hampton, VA 23681-0001ina<br>(804) 864-3262<br>(804) 864-6328 FAX | Virginia (except the counties of Arlington, Fairfax, Accomack, and the city of Alexandria), West Virginia, North Carolina, and South Carolina |
| Director, NASA Office of Inspector General<br>Code M-DI<br>George C. Marshall Space Flight Center<br>Marshall Space Flight Center, AL 35812<br>(205) 544-0069<br>(205) 544 5856 FAX | Alabama, Tennessee, Georgia, Mississippi and Louisiana |
| Director, NASA Office of Inspector General<br>Mail Stop KSC/OIG<br>John F. Kennedy Space Center<br>Kennedy Space Center, FL 32815<br>(407) 867-4664<br>(407) 867-4481 FAX | Florida, Puerto Rico, and the U.S Virgin Islands |
| Director, NASA Office of Inspector General<br>Mail Stop 204-11,<br>Ames Research Center<br>Moffett Field, CA 94035<br>(415) 604-5665<br>(415) 604-3955 FAX | Northern California (north of San Luis Obispo, Kern, and San Bernardino counties), Oregon, Washington, Idaho, Montana, Wyoming, Colorado, Utah, and Nevada |

| | |
|---|---|
| Director, NASA Office of Inspector General<br>Mail Stop 180-301<br>Jet Propulsion Laboratory<br>4800 Oak Grove Drive<br>Pasadena, CA 91109<br>(818) 354-3360<br>(818) 393-4882 FAX | Arizona, Southern California (San Luis Obispo, Kern, and San Bernardino counties, and all points south), and Hawaii |
| Director, NASA Office of Inspector General<br>Code W-JS<br>Lyndon B. Johnson Space Center<br>Houston, TX 77058<br>(713) 483-4773<br>(713) 483-5773 FAX | Texas, Oklahoma, Arkansas, Missouri, Kansas, Nebraska, and New Mexico |

## 15-1S2 Supplement — Address List for National Aeronautics and Space Administration Procurement Centers Supplement - Address List for National Aeronautics and Space Administration Procurement Centers

| Address of Center | Contract Code No. |
|---|---|
| Associate Administrator for Procurement, Code H<br>NASA Headquarters<br>Washington, D.C. 20546<br>(202) 358-2090<br>(202) 358-3082 FAX | |
| Headquarters Contracts and Grants, Code HW<br>NASA Headquarters<br>Washington, DC 20546<br>(202) 358-1852<br>(202) 358-3080 FAX | NAS W |
| Langley Research Center, NASA<br>Code 134<br>Hampton, VA 23681-0001<br>(804) 864-2426<br>(804) 864-8541 FAX | NAS 1 |
| Ames Research Center, NASA<br>Mail Stop 241-1<br>Moffett Field, CA 94035<br>(415) 604-5820<br>(415) 604-4646 FAX | NAS 2 |
| Lewis Research Center<br>Mail Stop 500-313<br>21000 Brookpark Road<br>Cleveland, OH 44135<br>(216) 433-2800<br>(216) 433-5489 FAX | NAS 3 |
| Dryden Flight Research Center, NASA<br>P.O. Box 273<br>Edwards, CA 93523<br>(805) 258-3326<br>(805) 258-2292 FAX | NAS 4 |
| Goddard Space Flight Center, NASA<br>Code 200<br>Greenbelt, MD 20771<br>(301) 286-7522<br>(301) 286-1706 FAX | NAS 5 |

NASA Management Office - JPL — NAS 7
Code 180-802
4800 Oak Grove Drive
Pasadena, CA 91109
(818) 354-5359
(818) 354-6051 FAX

George C. Marshall Space Flight Center, NASA — NAS 8
Code AP01
Marshall Space Flight Center, AL 35812
(205) 544-0253
(205) 544-9344 FAX

Lyndon B. Johnson Space Center, NASA — NAS 9
Code BB
Houston, TX 77058
(713) 483-5473
(713) 483-3106 FAX

John F. Kennedy Space Center, NASA — NAS 10
Code OP
Kennedy Space Center, FL 32899
(407) 867-7212
(407) 867 8599 FAX

John C. Stennis Space Center, NASA — NAS 13
Code DA00
Stennis Space Center, MS 39529-6000
(601) 688-1637
(601) 688-1141 FAX

Space Station Procurement Office, NASA — SSH015
Johnson Space Center
Code OA
2101 NASA Road 1
Building 4S, Room 4810
Houston, TX 77058
(713) 244-7683
(713) 244-8294 FAX

## 15-1S3 Supplement - Address List for Department of Health and Human Services Regional Audit Offices

| Region | Address of Regional Audit Office | Geographic Areas |
|---|---|---|
| I. | Regional Inspector General for Audit, DHHS<br>John F. Kennedy Federal Building, RM 2425<br>Boston, MA 02203<br>(617) 565-2684<br>(617) 565-3750 FAX | Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island & Vermont |
| II. | Regional Inspector General for Audit, DHHS<br>Federal Building, RM 3900A<br>26 Federal Plaza<br>New York, NY 10278<br>(212) 264-4620<br>(212) 264-6307 FAX | New Jersey, New York, Puerto Rico & Virgin Islands |
| III. | Regional Inspector General for Audit, DHHS<br>3535 Market St., RM.4300<br>P.O. Box 13716<br>Philadelphia, PA 19101<br>(215) 596-6743<br>(215) 596-1451 FAX | Delaware, District of Columbia, Maryland, Pennsylvania, Virginia & West Virginia |
| IV. | Regional Inspector General for Audit, DHHS<br>P.O. Box 2047<br>Atlanta, GA 30301<br>(404) 331-2446<br>(404) 334-2308 FAX<br><br>(AIRBORNE USE ONLY)<br>101 Marietta Tower<br>Room 1401<br>Atlanta, GA 30323 | Alabama, Florida, Georgia, North Carolina, and South Carolina |
| V. | Regional Inspector General for Audit, DHHS<br>105 West Adams<br>23rd Floor.<br>Chicago, IL 60606<br>(312) 353-2618<br>(312) 353-1194 FAX | Illinois, Indiana, Michigan, Minnesota, Ohio, & Wisconsin |
| VI. | Regional Inspector General for Audit, DHHS<br>1100 Commerce Street<br>RM 4E1A<br>Dallas, TX 75242<br>(214) 767-8414<br>(214) 767-2039 FAX | Arkansas, Louisiana, New Mexico, Oklahoma, & Texas |
| VII. | Regional Inspector General for Audit, DHHS<br>601 E. 12th St.<br>RM 284A<br>Federal Building<br>Kansas City, MO 64106<br>(816) 426-3591<br>(816) 426-3655 FAX | Colorado, Iowa, Kansas, Missouri Montana, Nebraska, North Dakota, South Dakota, Utah, & Wyoming |

| | | |
|---|---|---|
| IX. | Regional Inspector General for Audit, DHHS<br>Federal Office Building<br>50 United Nationa Plaza<br>RM 171<br>San Francisco, CA 94102<br>(415) 556-5766<br>(415) 556-9513 FAX | Alaska, Arizona, California, Hawaii, Idaho, Nevada, Oregon, Washington, American Samoa, Guam, Trust Ter. of Pacific Islands, & Wake Island |

## 15-1S4 Supplement - Address List for Environmental Protection Agency Audit Offices

| Address of Area Audit Office | Geographic Areas |
|---|---|
| Environmental Protection Agency<br>OIG/Office of Audit (3A100)<br>Mid-Atlantic Audit Division<br>841 Chestnut Street<br>13th Floor<br>Philadelphia, PA 19107<br>(215) 597-0497<br>(215) 597-9802 FAX | Pennsylvania, Delaware, Maryland, Washington, D.C., West Virginia, and Virginia |
| Environmental Protection Agency<br>OIG/Office of Audit - OIG 521<br>Eastern Audit Division<br>JFK Federal Building<br>Boston, MA 02203<br>(617) 565-3160<br>(617) 565-3660 FAX | Maine, Connecticut, New York, Massachusetts, Rhode Island, Vermont, New Hampshire, New Jersey, Puerto Rico and Virgin Islands |
| Environmental Protection Agency<br>OIG/Office of Audit<br>Northern Audit Division (IA-13J)<br>77 West Jackson Boulevard, 13th Floor<br>Chicago, IL 60604<br>(312) 353-2486<br>(312) 353-4225 FAX | Ohio, Michigan, Wisconsin, Minnesota, Indiana, and Illinois |
| Environmental Protection Agency<br>OIG/Office of audit<br>Western Audit Division (I-1)<br>75 Hawthorn Street, 19th Floor<br>San Francisco, CA 94105<br>(415) 744-2445<br>(415) 744-2438 FAX | Alaska, Arizona, California, Hawaii, Idaho, Nevada Oregon, Washington, and Guam |
| Environmental Protection Agency<br>OIG/Office of Audit, Suite 276<br>Southern Audit Division<br>1375 Peachtree Street, N.E.<br>Atlanta, GA 30309<br>(404) 347-3623<br>(404) 347-1578 FAX | Alabama, North Carolina, South Carolina, Florida, Georgia, Mississippi, Texas, Arkansas, Tennessee, Kentucky, Oklahoma, New Mexico, and Louisiana, |
| Environmental Protection Agency<br>OIG/Office of Audit<br>Central Audit Division<br>726 Minnesota Avenue<br>Kansas City, KS 66101<br>(913) 551-7878<br>(913) 551-7837 FAX | Colorado, Utah, Iowa, Kansas, Missouri, Nebraska, Montana, Wyoming, North Dakota, and South Dakota |

## 15-1S5 Supplement – Address List for Department of Transportation Offices

| Address of Office | Supplemental Address for Submission of Public Vouchers and Audit Reports | Audit Report Dist. No. of Copies |
|---|---|---|
| U.S. Coast Guard<br>Headquarters<br>Transpoint Bldg.<br>2100 2nd Street, SW<br>Washington, DC 20593<br>(202) 267-0814<br>(202) 267-4019 FAX | ATTN: Chief, Cost/Price Analysis Section, Procurement Division,GACS-4A | 3 |
| Volpe National<br>Transportation Systems<br>Center, Kendall Square<br>Cambridge, MA 02142<br>(617) 494-2170<br>(617) 494-3656 FAX | ATTN: Chief, Analysis and Information Branch, DTS-854 | 1 |
| Federal Highway<br>Administration<br>Headquarters<br>400 7th Street, SW<br>Washington, DC 20590<br>(202) 366-4205<br>(202) 366-3705 FAX | ATTN: Contracting Officer's Representative, Office of Contracts and Procurement, HCP-20<br>(Contract No. Prefix - DTFH61) | 2 |
| Federal Land Highway<br>Program Office<br>400 7th Street, SW<br>Washington, DC 20590<br>(202) 366-9482<br>(202) 366-7495 FAX | ATTN: Procruement Advisor, HFL-24<br>(Contract No. Prefix DTFH71) | 4 |
| Federal Transit<br>Administration<br>400 7th Street, SW<br>Washington, DC 20590<br>(202) 366-4980<br>(202) 366-3808 FAX | ATTN: Director, Office of Procurement,TAD-40 | 4 |
| Federal Railroad<br>Administration<br>400 7th Street, SW<br>Washington, DC 20590<br>(202) 366-5708<br>(202) 366-3055 FAX | ATTN: Contracting Officer's Representative, Office of Contracts and Procurement, HCP-20 | 3 |
| National Highway Traffic<br>Safety Administration<br>400 7th Street, SW<br>Washington, DC 20590<br>(202) 366-6011<br>(202) 366-9555 FAX | ATTN: Contracting Officer's Representative, NAD-30, Office of Contracts and Procurement | 3 |

| Address of Office | Supplemental Address for Submission of Public Vouchers and Audit Reports | Audit Report Dist. No. of Copies |
|---|---|---|
| Research and Special Programs Administration<br>Headquarters<br>400 7th Street, SW<br>Washington, DC 20590<br>(202) 366-4356<br>(202) 366-7974 FAX | ATTN: Contracting Officer's Representative, Office of Contracts and Procurement, DMA-30 | 3 |
| St. Lawrence Seaway Development Corp.<br>P.O. Box 520<br>Massena, NY 13662 | ATTN: Contracting Officer's Representative, Procurement Division | 2 |
| United States Maritime Administration<br>400 7th Street, SW<br>Washington, DC 20590<br>(202) 366-1365<br>(202) 366-3889 FAX | ATTN: Chief, Office of Acquisition, MAR-380 | 1 |
| Federal Aviation Administration<br>Headquarters<br>800 Independence Ave, SW<br>Washington, DC 20591<br>(202) 267-3686<br>(202) 267-5814 FAX | ATTN: Manager, Pricing Staff, ASU-305, Contracts Division, Contracting and Quality Assurance (for audit reports)<br>(Contract No. Prefix DTFA01) | 1 Indirect cost<br>3 other |
| Federal Aviation Administration<br>Aeronautical Center<br>P.O. Box 25082<br>Oklahoma City, OK 73125<br>(405) 954-7713<br>(405) 954-3111 FAX | ATTN: Pricing Staff, AMQ 120 Office of Acquisition<br>(Contract No. Prefix DTFA02) | 1 Indirect cost<br>3 other |
| Federal Aviation Administration<br>Technical Center<br>Atlantic City International Airport, NJ 08405<br>(609) 485-5360<br>(609) 485-6766 FAX | ATTN: Supervisor, Operations Section, ACM 510D<br>(Contract No. Prefix DTFA03) | 2 |
| Office of the Secretary of Transportation<br>400 7th Street, SW<br>Washington, DC 20590<br>(202) 366-4953<br>(202) 366-9848 FAX | ATTN: Chief, Procurement Operations Division, M-64 | 2 |

For each audit report sent to the above named Department of Transportation activities, one copy will also be sent to the following address:

David F. Kent, Director
Office of Information Technology and
Financial Audits
Department of Transportation
Office of Inspector General
Room 7102, JA-30
400 7th Street, SW
Washington, DC 20590

*Any questions regarding the transmittal of audit reports and acknowledgment letters to the Department of Transportation should be directed to the above office at (202) 366-1996, or fax to (202) 366-3530.*

## 15-1S6 Supplement - Address List for Department of Agriculture Regional Audit Offices

| Address of Regional Audit Office | Geographic Areas |
|---|---|
| Regional Inspector General<br>Northeast Region<br>Room 422<br>6505 Belcrest Road<br>Hyattsville, MD 20782<br>(301) 436-8763<br>(301) 436-7600 FAX | Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Puerto Rico, Rhode Island, Vermont, Virgin Islands, Virginia, and West Virginia |
| Regional Inspector General<br>Southeast Region<br>401 W. Peachtree Street, N.W.<br>Atlanta, GA 30365-3520<br>(404) 881-3675<br>(404) 730-3221 FAX | Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee |
| Regional Inspector General<br>Midwest Region<br>111 N. Canal Street<br>Chicago, IL 60606-7295<br>(312) 353-1352<br>(312) 353-3017 FAX | Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin |
| Regional Inspector General<br>Southwest Region<br>101 S. Main Street<br>Temple, TX 76501<br>(817) 774-1430<br>(817) 774-1373 FAX | Arkansas, Louisiana, New Mexico, Oklahoma, and Texas |
| Regional Inspector General<br>Great Plains Region<br>9435 Holmes Street<br>Kansas City, MO 64131<br>(816) 926-7667<br>(816) 926-3861 FAX | Colorado, Iowa, Kansas, Missouri, Montana, Nebraska, North Dakota, South Dakota, Wyoming, and Utah |
| Regional Inspector General<br>Western Region<br>Suite 225<br>600 Harrison Street<br>San Francisco, CA 94107<br>(415) 556-4244<br>(415) 744-2871 FAX | Alaska, Arizona, California, Hawaii, Idaho, Nevada, Oregon, Territory of Guam, Trust Territories of the Pacific, and Washington |

## 15-1S7 Supplement — Additional Report Distribution Requirements for Non-DoD Organizations

| ORGANIZATION | TYPE OF REPORT | SUPPLEMENTAL DISTRIBUTION (NOTE 1) | NUMBER OF COPIES TO INSPECTOR GENERAL (NOTE 2) | ADDITIONAL INFORMATION REGARDING NUMBER OF COPIES | ADDRESS |
|---|---|---|---|---|---|
| All non-DoD | Incurred Costs | 10-507c | | | |
| | Suspected Irregularity | DCAAI 7640.16 | DCAAI 7640.16 | | |
| AID | Annual Report | 13-704i, 15-107.1 | Orig + 2 | 13-704i | 13-704i |
| DOC | All | 15-109 | 15-109 | | 15-109 |
| DHHS | Incurred Costs | 10-507c(2) | 10-507c(2) | 10-507c(2) | 15-1S3 |
| | Closings | 10-907a(4) | 10-907a(4) | | 15-1S3 |
| | Proposals | 15-111a(1) | 15-111a(1) | | 15-1S3 |
| | All Other Reports | 15-111a(1) | 15-111a(1) | | 15-1S3 |
| DHUD | Incurred Costs | 10-507c(2) | 10-507c(2) | 10-507c(2) | 10-507c(2) |
| DOI | All | 15-112 | 15-112 | | 15-112 |
| DOT | Incurred Costs | 10-507c(1) | 4 | 15-1S5 | 15-1S5 |
| | Annual Report | 15-114 | 4 | 15-1S5 | 15-1S5 |
| | All Other Reports | 15-1S5, 15-114 | 4 | 15-1S5 | 15-1S5 |
| EPA | Incurred Costs | 10-507c(2) | 10-507c(2) | 10-507c(2) | 15-1S4 |
| | Annual Report | 15-116 | 15-116 | | 15-1S4 |
| NASA | Functional/Operational | 10-411.6 | 1 | 1 | 15-1S1, 15-1S2 |
| | Incurred Costs | 10-507c(1) | 10-507c(1) | 10-507c(1) | 15-1S1, 15-1S2 |
| | Special Information | 10-411.6 | 1 | 1 | 15-1S1, 15-1S2 |
| | Closings | 15-105.2 | 1 | | 15-1S1, 15-1S2 |
| | Progress Payments | 15-106.6b | 1 | 14-206 | 15-1S1, 15-1S2 |
| | Postawards | 10-604, 14-123c | 1 | 10-604 | 15-1S1, 15-1S2 |
| | Cost Account Stds. | 10-809 | 1 | 1 | 15-1S1, 15-1S2 |
| | Summary Sheet (7640.2) | 15-605b(3) | | 15-605b(3) | 15-605b(3) |
| | All other Reports | | 1 | | 15-1S1 |

1. The general DCAA policy for addressing audit reports is stated in 10-208.1. Supplemental distribution requirements specified by the non-DoD organizations are referenced in this column. Absence of a listing on this 15-1S7 Supplement or absence of a reference in this column indicates that no supplemental distribution is required.

2. Some non-DoD Offices of Inspector General have requested copies of selected or all audit reports. Absence of a listing on this 15-1S7 Supplement or absence of an entry in this column indicates that distribution to an Office of Inspector General is not required.

## 15-200 Section 2 — Contract Audit Coordinator Program

### 15-201 Introduction

This section sets forth the policies and procedures applicable to the Contract Audit Coordinator (CAC) Program. It also provides guidelines for their implementation by field audit offices.

### 15-202 Policy for Establishment

a. A CAC program may be established and implemented as stated in this section for designated (1) larger multi-segment contractors; (2) government-owned, contractor-operated (GOCO) plants; or (3) other groups of contractors operated as an integrated complex or engaged in a major procurement program or in furnishing the same or similar services or end items to the government, e.g., shipbuilding or aircraft jet engines.

b. When there is a major organizational segment of a contractor's overall corporate structure that consists of a group of subordinate segments under common organizational control, which are relatively independent and have significant auditable government business, a Group Audit Coordinator (GAC) may be established. There should be sufficient contract audit issues, usually unique to the group and normally different from the rest of the corporation, which require coordination among a number of FAOs. Further, there should be a contractor representative available at this group level that can speak for the group and is authorized to resolve issues.

c. Where establishment of a GAC is requested and approved, the DCAA organizational designation of the auditor cognizant of the parent level operations will vary depending on the circumstances. If other segments within the company's organization have sufficient audit requirements, a CAC at the corporate level would be appropriate; if not the position may be a Corporate Home Office Auditor (CHOA).

d. The guidance contained in 15-204 should be followed when establishing a GAC, and all the CAC Case Files required by 15-211 will be maintained at the GAC level, including distribution to Headquarters. All other portions of this guidance should be followed as applicable to the GAC.

e. The program will apply to all locations of each designated contractor or specific group of contractors. It will cover contract audit matters subject to or requiring centralized direction, control, or resolution in such areas as accounting, pricing, audit programming, CAS compliance, and cost estimating policies and practices. In each case, the extent of coordination will be determined by the specific circumstances.

f. Assignment and performance of the coordination duties described herein should be considered an identified part of supervisory and administrative responsibilities at the regional or FAO levels.

### 15-203 Program Objectives

The overall objective is to increase the effectiveness of contract auditing at those contractor locations designated for inclusion in the program by such means as:

a. Establishing a focal point for each contractor or contractor group to coordinate contract audit matters and distribute information regarding activities of common concern and interest within the CAC/CHOA/GAC complex.

b. Facilitating discussion and resolution of major audit problem areas with corporate or group level personnel.

c. Establishing closer working relationships among audit personnel and responsible contract administration officials in the evaluation of price proposals and negotiation, administration, repricing, and settlement of contracts and subcontracts

d. Promoting consistency in the audit treatment of incurred and estimated cost representations and implementation of CAS.

e. Coordinating with procurement offices on contract provisions affecting accounting and finance.

f. Establishing coordinated audits where appropriate.

## 15-204 Designation of Audit Coordination Office

a. Regional directors will submit recommendations to Headquarters, Attn: O, for the establishment of a CAC complex where such action is in consonance with the policy and objectives stated in 15-202.

b. A regional office or FAO will be selected as the audit coordination office for each CAC complex in accordance with the following guidelines:

(1) For multi-segment contractors, the FAO having the predominant audit workload or a major workload will ordinarily be selected. Proximity to the contractor's home office will also be considered.

(2) For other complexes, the CAC function will be assigned to the regional or field audit office which has responsibility for one or more of the larger contractor(s) performing on the major program. Proximity to the key procurement or contract administration office(s) will also be considered.

c. When a CAC complex is authorized by Headquarters, the regional director will notify all interested DCAA regional and field offices, as well as all applicable government procurement and contract administration offices, of the name of the CAC and his/her office location. Also inform the principal representative(s) of a multi-segment contractor of the establishment of the CAC and the objectives of the program. Notification of the establishment of a CAC complex for GOCO plants or other groups of contractors need not be furnished to the contractors involved.

## 15-205 Responsibilities of the Contract Audit Coordinator

The responsibilities of the designated contract audit coordinator will include but are not be limited to:

a. Coordinating the contract audit activities of applicable FAOs as required to accomplish the program objectives and formulating the annual CAC program or plan of operation.

b. Acting as the contact point for discussions with contractor officials in corporate and divisional offices on such matters as:

(1) Management policies and practices, including proposed changes thereto, having cost implications. These may involve relocation of operations, establishment of a new division, change in organizational structure, new types of products or contracts, and similar matters which would be of significant concern to cognizant auditors at the contractor's other plants or divisions (see 1-502 on change of FAOs).

(2) Inconsistencies and weaknesses in cost accounting procedures and practices, estimating methods, or indirect cost allocation procedures particularly those which are common to more than one division.

(3) Compliance with CAS Board rules, regulations, and standards (see Chapter 8).

(4) Treatment of inter- and intra-company transfers or billings.

(5) Access to the contractor's accounting, operating, and statistical records, current and prospective budgets, operating and financial statements, internal audit reports, corporate minutes, and operating committee minutes.

(6) Questions on the contractor's local practices and procedures affecting cognizant auditors at other locations and requiring consultation or resolution at a higher management level.

c. Notifying cognizant auditors at the respective contractor locations of the results of discussions held and actions taken concerning any of the matters covered above; also advising such auditors on proposed or established changes affecting the contractor's accounting, pricing or estimating procedures, and other changes or management decisions having a bearing on contract audit activities.

d. Coordinating with cognizant auditors to promote consistency of audit treatment of normally sensitive and controversial elements of cost such as research and development, advertising, selling expenses, pension and retirement plans, compensation (see 5-803.2) and recruitment expense.

e. Coordinating with cognizant auditors to promote consistency and uniformity of audit approach by (1) providing them with complete details concerning special audit procedures, techniques, and programs which may be usefully applied at their assigned locations, (2) alerting cognizant auditors of problems at other locations which may exist at their assigned locations, (3) informing cognizant auditors of the details of problem resolution achieve at other locations which may also be applicable at their assigned locations, and (4) advising cognizant auditors of action taken on problems referred to the audit coordination office for resolution.

f. Furnishing guidance for the scheduling and performance of the annual (historical) home office audit, and home office or other intracompany reviews required for forward pricing.

g. Ensuring distribution of pertinent home office reports, and the results of the reviews of the corporate minutes and tax returns to each FAO within the CAC complex (3-104.15); and ensuring distribution of the contractor's corporate annual report to FAOs within the network, the CAC's regional office, and Headquarters, Attn: O. When SEC filings contain information pertinent to government contracts at divisions in the CAC complex and are not included in the corporate annual report, the CAC will also provide such data to cognizant DCAA field audit offices.

h. Coordinating with cognizant auditors, contracting officers, and other responsible officials, as appropriate, in the resolution of general questions of reasonableness of costs generated by divisions or affiliates of the contractor.

i. Assisting departmental negotiators by coordinating with cognizant auditors on:

(1) Timely submission of indirect cost audit reports.

(2) Consistency in audit presentations and explanations for questioned costs.

(3) Uniform audit position and rationale on similar items questioned at different locations.

(4) Attendance at company-wide indirect cost negotiations.

j. Cooperating with procurement and contract administration personnel in performing such contractor-wide studies and reports as will assist in increasing the effectiveness of procurement and in achieving consistency in pricing and costing.

k. Developing coordinated objectives or programs for the audit of selected functional areas and indirect cost items which are common to several locations within the CAC complex (see 15-206).

l. Responding to inquiries for information, special studies, etc. on sensitive items or significant and common problem areas in the CAC complex. Such inquiries will ordinarily be made by Headquarters to the regional director with a copy forwarded directly to the CAC. Replies will be made by similar procedures. Inquiries and replies may be made by telephone when required by time limitations.

m. Reviewing reports submitted by participating FAOs and consolidating where appropriate, significant findings for presentation to appropriate government and/or contractor officials on CAC complexes involving major procurement programs for same or similar services or end items, e.g., GOCO plants. Such reports can present pertinent information on common problem areas and indicate recommended action to be taken by procurement and/or contractors to increase financial effectiveness under government contracts.

## 15-206 Coordinated Audit Objectives or Programs

### 15-206.1 Criteria for Multi-Segment Contractor CAC Complexes

As respects multi-segment contractors, common audit objectives and programs are particularly applicable when the same policies and procedures are used throughout the CAC complex in such areas as accounting, estimating, personnel practices, purchasing, and implementation of CAS. In these and other instances the use of common audit programs promotes consistency of audit treatment of selected functional areas at all participating components, as well as assisting in the proper

time phasing and consolidation of audit reports. In those multi-segment CAC complexes where common audit programs cannot be used, the CAC should develop and issue common audit objectives.

### 15-206.2 Criteria for Other CAC Complexes

Where the CAC program is comprised of selected contractors involved in a major item procurement program or the production of similar or like end items, common audit programs cannot usually be adopted because of the differences in accounting, estimating, and other management systems existing among the different contractors. However, common objectives should be developed and must be sufficiently defined to produce audit results which are compatible for consolidated audit reports. Some examples of areas to be given attention in such CAC programs would include review of: (1) purchasing of common items, (2) use of the same subcontractors, (3) labor utilization, (4) make-or-buy programs, and (5) government-furnished materials and equipment.

### 15-206.3 Procedures for Coordinated Audits

Audit objectives and programs should be developed by the CAC with the cognizant auditors, and audits made accordingly. The following guidelines are applicable:

a. Selection of the functions and indirect cost items to be audited will depend upon materiality, sensitivity, and the possibility that such may be questionable or unallowable.

b. The CAC will establish on an overall annual basis the functions and indirect cost items selected for coordinated review and the summary and consolidated reports to be issued.

c. If coordinated audit programs or detailed audit objectives, as appropriate, have been prepared, copies will be distributed to each participating FAO.

d. While the audits are in process, the CAC and participating FAOs should communicate with each other as necessary to clarify questions and problems which may arise.

e. Workshops may be arranged, subject to regional office approval, to discuss and resolve problems and significant questionable areas which cannot otherwise be disposed of.

f. Where indirect cost negotiations are involved, individual reports prepared by the assigned FAOs will be forwarded to the CAC for incorporation in a consolidated audit report covering items audited on a coordinated basis.

## 15-207 Responsibilities of Other Audit Offices

Audit offices having responsibility for CAC complex components shall follow a policy of full disclosure and positive support to the contract audit coordination program. These offices will:

a. Provide to the contract audit coordinator:

(1) Copies of any reports requested or otherwise considered pertinent for CAC complex consideration or action.

(2) Complete data concerning any local problem areas which, in their opinion, may also exist at any other locations of the contractor or within the CAC complex.

(3) Complete data concerning any local problem area which, while not believed to exist at other CAC complex locations, cannot be resolved locally. Problems should not be submitted until local efforts for resolution have been exhausted. When forwarding unresolved problems, it is necessary that the cognizant auditors explain action taken at the local level and make recommendations for solution by the contract audit coordinator.

(4) Description of special audit procedures, techniques, or programs developed locally which resulted in more effective audit performance and which may be applied at other locations.

b. Perform on a coordinated basis audits of selected functional areas, indirect cost items, major item procurement program elements, etc., in accordance with the time schedules and/or audit programs established for the CAC complex under 15-206.

c. Coordinate CAS reviews and report issuance with the CAC, informing

him/her of problem areas pursuant to Chapter 8.

d. On reviews of operations of major contractors, coordinate drafts of functional reports (see 14-504) with the contract audit coordinator. When issued, copies of these reports will be furnished to the contract audit coordinator.

## 15-208 Communication Among Audit Offices

a. Full and free exchange of information and thinking is essential to this program. To that end, the audit coordination office and the FAOs responsible for audit at the other contractor locations are authorized to communicate directly with one another in respect to the types of matters described above. Such communication may be through the media of telephone, correspondence, small workshops or visits, as appropriate. The CAC is encouraged to pursue the availability of contractors' tele/video conferencing facilities as a means of communication if possible.

b. Communications between audit offices on problem areas or interrelated audit matters should not be delayed pending the holding of a contract audit coordination conference. They should be initiated as soon as the need is recognized, and should be continued thereafter, on a day-to-day basis as required, to effect resolutions of problem areas.

## 15-209 Contract Audit Coordinator Conferences

### 15-209.1 Objectives of Conferences

In addition to the normal and regular communication channels provided above, conferences of cognizant auditors of a multi-segment contractor or groups of contractors will be held to review mutual problems. These conferences (1) serve as a means for the dissemination of information and the exchange of experiences, (2) enable conferees to reach common understandings and crystallize unresolved problems, and (3) result in agreement on actions to be taken.

### 15-209.2 Planning and Conduct of Conferences

a. Conferences will be planned and held as required, with the approval of the cognizant regional office. The CAC should notify Headquarters, Attn: O, of all conferences and workshops at least 45 days before the scheduled date. If the scheduled date is later changed, prompt notification should be forwarded to Headquarters. Normally, a CAC conference should be scheduled at least once every two years; if other considerations indicate a longer interval, the regional director and Headquarters should be appropriately advised.

b. Only those cognizant auditors having significant (actual and/or potential) workload should attend the conference.

c. Invitations to participate in conferences will be extended to the corporate ACO (CACO), procurement personnel, and audit representatives from non-defense audit agencies, such as NASA, having a significant audit interest. However, the total number of conferees should be kept to a practical minimum. To facilitate a productive concurrent consideration by different audit and/or procurement representatives, separate workshop sessions may be scheduled at the same time as part of the conference proceedings. A separate session for audit personnel only should be considered in preparing the agenda. Topics to be considered for presentation during auditor-only sessions include procurement support problems, and audit techniques employed at various contractor locations which resulted in improved audit effectiveness or significant audit findings. A summary report of each workshop should be furnished to the conference participants.

d. Contractor representatives may be invited to address the conferees and engage in discussion of matters of mutual interest. Their participation will be limited to specific sessions devoted wholly to this purpose.

e. The CAC should prepare a draft conference agenda on the basis of day-to-day knowledge of CAC activities and information solicited from FAOs on appropriate topics. The draft agenda should

be time-phased, incorporate a concise statement on each topic showing its scope and applicability, and describe any problems for discussion by participants. The draft agenda should, not later than 45 days prior to conference date, be forwarded to Headquarters, Attn: OPD. Headquarters will review and provide comments within 10 days after receipt of the draft agenda. Before release of the agenda, an advance copy will be submitted for regional office approval. A copy of each approved agenda will be sent to Headquarters and each conference participant at least 30 days before the conference. The CAC will generally serve as conference chair.

f. Recommendations for action to resolve problem areas will be developed during the conference. Where applicable, each such recommendation should be assigned a due date for its implementation and, where appropriate, provide for the issuance of any reports required under 14-504. If the conferees cannot agree on a solution to a problem, the matter should be submitted to the appropriate regional directors for resolution (see 15-210).

### 15-209.3 Conference Minutes

Conference minutes will be prepared by the contract audit coordinator within 20 days after the close of the conference. After review and approval by the regional office, they will be distributed as follows:

(1) Three copies to the regional office, one of which will be transmitted (with appropriate comments, if any) by the regional office to Headquarters, Attn: O.

(2) One copy each to other interested regional offices.

(3) One copy to each cognizant auditor.

(4) One copy each (or more, as desired) to the CACO, NASA, and other interested offices having representation at the conference.

## 15-210 Resolution of Problem Areas

It is anticipated that most of the contract audit problems that may arise can be resolved through discussions between the contract audit coordinator and the contractor's key management officials, or by agreement among the cognizant auditors involved, subject to appropriate audit and procurement administrative approvals.

### 15-210.1 Resolution with Contractor

In the event resolution cannot be achieved with the contractor, the audit problem will be referred by the contract audit coordinator to his/her regional office for disposition. Where resolution cannot be achieved at that level within a reasonable time, Headquarters, Attn: OPD, will be apprised of all pertinent facts as a basis for appropriate action.

### 15-210.2 Resolution Among Auditors

Disagreements between a contract audit coordinator and a cognizant auditor in common problem areas will be referred by the contract audit coordinator to his/her regional office. If the cognizant auditor is in another region, the regional office will take steps to resolve the disagreement with the regional office in which the cognizant auditor is located. If this cannot be accomplished, the interested regional offices will refer the matter to Headquarters, Attn: OPD. Where appropriate, an Advice of CAC Case (see 15-211) will be used to accomplish this referral.

## 15-211 CAC Case Files

### 15-211.1 Establishing CAC Cases

a. Contract audit coordinators will maintain appropriate records to document activities under the CAC program. A CAC case file will be established, at the contract audit coordinator's discretion, for (1) each separate problem area or action item submitted to the contract audit coordinator under the CAC program if resolution will not be accomplished in a relatively short time frame, and (2) any studies or inquiries undertaken under the monitorship of the contract audit coordinator, the scope of which is CAC complex-wide, or affects more than one location.

b. Examples of CAC case file subjects include (1) difficulties concerning access to records; (2) local problems which cannot be resolved locally; (3) problems affecting more than one contractor divi-

sion or plant; (4) problems requiring coordination or action at the corporate headquarters level; (5) problems requiring uniform action at the contract administration level; (6) CAS compliance issues, and (7) special studies or inquiries on corporate accounting, pricing, and cost estimating policies and procedures.

c. Each CAC case file will contain all pertinent data on the matters and issues involved. Appropriate documentation will also be maintained for CAC activities or actions not made the subject of an individual CAC case file.

### 15-211.2 Advice of CAC Case

a. When a CAC case file is opened, the contract audit coordinator will prepare an Advice of CAC Case. The advice will show the name of the contractor, the date the case was established, and a control number consisting of the fiscal year and a consecutive series of numbers (for each fiscal year) beginning with one. The advice will include a statement of the case, source of the case, action taken to date, and any action planned. It will be signed by the contract audit coordinator. Below the signature, the following statement will appear:

"Recipients of this advice are invited to submit suggestions for solution of the problem." Copies of the advice will be distributed to (1) the cognizant regional office, (2) each of the other cognizant FAOs, (3) the CACO where appropriate, (4) case file, and (5) Headquarters, Attn: OPD.

b. Supplemental Advices of CAC Cases may also be issued as required to present subsequent additional data and status information which the CAC considers should be distributed to the above recipients to keep them currently informed about the case.

### 15-211.3 Case Resolution

When a CAC case is resolved, the contract audit coordinator will prepare an Advice of CAC Case Resolution, which will include the name of the contractor, the case control number, date the case was closed, and a statement of resolution. The advice will be signed by the contract audit coordinator and distributed as in 15-211.2.

## 15-212 CAC Information Files

The CAC will maintain adequate files relating to the CAC complex and activities for his/her own use and the use of participating FAOs, regional directors, DCAA Headquarters, and others as may be authorized. These files should include as a minimum the following information:

a. Contractor Organization

(1) For multi-divisional CACs, location of the corporate office, and each operating division, plant and/or affiliate performing government contracts.

(2) For groups of contractors constituting a CAC complex, a list showing the name and location of each contractor.

(3) Location of each ACO and DCAA regional and field audit office cognizant of the individual offices or plants indicated in (1) and (2) above.

(4) Organizational chart of each division or constituent contractor, including the names of key personnel.

(5) Annual financial reports as available for each contractor or component within the CAC complex.

(6) Number of employees for each of the locations shown in (1) and (2) above.

(7) For multi-segment contractors, major product lines and services by division or plant as applicable.

(8) For multi-segment contractors, annual (calendar or fiscal year) volume of sales by office, division or plant, and if available, amount and percentage of government business for each.

b. Policies and Procedures

Access to corporate or institutional policies and procedures including those applicable to each contractor, GOCO plant, or division in the CAC complex.

c. Plans, Programs, Reports, etc.

(1) Annual CAC program or plan of operation.

(2) Common audit programs, audit objectives, and unusual audit programs of applicable FAOs.

(3) Major audit reports submitted by the CAC and applicable FAOs. (These include reports on functional areas, surveys, indirect costs, significant pricing proposals, and noncompliance with CAS.)

(4) Reports on GAO reviews and procurement surveys, and other non-DCAA reports.

d. Correspondence & Communications

(1) Minutes of all CAC conferences and workshops.

(2) Trip reports covering visits to FAOs.

(3) Written comments of the CAC on the review of reports submitted by FAOs.

(4) All correspondence pertaining to the CAC program.

e. CAC Cases

Files pertaining to CAC cases designated by number and title (See 15-211.)

f. Other. The CAC information files should serve as a central collecting and distributing point for information on:

(1) Access to all types of contractor records about which there is some difficulty or question from time to time.

(2) The status of completion of corporate-wide audits where common programs are in use.

(3) Changes or proposed changes in management policies and practices having cost implications.

(4) Current practices in estimating methods, overhead allocation methods, CAS, IR&D costs, advance agreements, pension plan management, insurance on plants, intracompany cost transfers, and other areas common to more than one office, division, or plant.

(5) Specific areas which may afford special opportunity for achieving contractor-wide or group-wide cost reduction and consistent audit treatment.

## 15-300 Section 3 — Procurement Liaison Auditor Services

### 15-301 Introduction

a. This section provides policies and procedures applicable to the performance of the DCAA procurement liaison function by the procurement liaison auditor (PLA). Procurement liaison covers advisory audit services that are offered to DoD procurement and contract administration offices to assist them in achieving the objectives of sound contracting by providing on-site accounting and financial advice to contracting officers, negotiators, and buyers. Arrangements have also been made with the National Aeronautics and Space Administration (NASA) to furnish similar PLA services to NASA procurement and contract administration offices upon their request.

b. The PLA is primarily concerned with (1) facilitating effective communication and coordination between procurement officers and auditors; (2) providing on-the-spot personal consultation and advice in connection with contractors' cost representations and related matters; (3) providing to DCAA information regarding specific awards, trends in the type and volume of awards and other data impacting on immediate or long-range DCAA responsibilities; and (4) providing DCAA management with information as to the adequacy, responsiveness and timeliness of the advisory audit reports being submitted by field audit offices. See 15-305 for further description and guidance on the services provided by DCAA liaison auditors.

### 15-302 PLA Authorization and Types

a. DoD Directive 5105.36 (see 1-1S1) authorizes the Director, DCAA to establish and maintain liaison auditors as appropriate at procuring and contract administration offices.

b. Liaison auditor services may be provided either on-site (by full-time or part-time PLAs working at the individual procuring and contract administration offices), or off-site (by part-time PLAs using the telephone, facsimile machines, etc., at DCAA field audit offices or contractor plants). Generally speaking, the full-time, on-site PLAs are located at (1) the major procurement commands with the most significant auditable contracting activity, or (2) the procurement policy-making groups for the military services (see 15-303).

### 15-303 Full-time On-Site PLAs

#### 15-303.1 Audit Liaison Division (OAL)

OAL reports to the Assistant Director, Operations, and is responsible for (1) managing the Agency's PLA program, and (2) directly supervising all full-time, on-site PLAs. See 15-3S1 for a listing of the OAL liaison auditors currently on-site at the major procurement commands and contract administration offices.

#### 15-303.2 Memorandums of Understanding (MOUs)

a. To ensure that the PLA services being rendered are genuinely useful and effective and that there is no misunderstanding as to the nature of these services, DCAA is entering into memorandums of understanding (MOUs) with those buying commands that can support/justify a full-time PLA. The MOU represents general agreement on the available services and facilities to be provided the PLA. It also represents a commitment by both parties to cooperate in the exchange information to resolve procurement-related problems.

b. Each MOU is signed by DCAA's Assistant Director, Operations, and by the responsible official at each of the PLA locations. It is a working document without an established effective period, and as such can be amended at any time. Questions regarding the MOU may be directed to the Chief, Audit Liaison Division (see 15-3S1).

#### 15-303.3 Requests for OAL PLAs

Requests for the placement of full-time, on-site PLAs may be forwarded to the Director, DCAA.

## 15-304 Part-time PLA Services

### 15-304.1 Re[illegible]le DCAA Offices

a. The regional office and, when applicable, the designated field audit office (FAO) cognizant of DCAA operations within a given procurement activity's geographical area, are responsible for providing audit liaison services on a part-time basis. This includes those services that are provided on-site, as well as off-site, on a less-than-full-time basis.

b. The full-time, on-site PLAs (see 15-303.1) will assist the Regions and FAOs in performing and coordinating their specific PLA tasks when such assistance is (1) determined appropriate in the circumstances, or (2) specifically requested by either the responsible DCAA activity or procurement command.

### 15-304.2 Arranging for Part-time Services

While part-time PLA services are readily available, they are furnished only upon specific request of, or arrangement with, the respective procurement centers and contract administration offices. Initial requests for part-time services should be first considered by the regional director cognizant of the area in which the procurement center or contract administration office is located.

## 15-305 PLA Services

### 15-305.1 General

The on-site PLA is DCAA's principal point of contact at the procuring or contract administration activity to which assigned, and the duties of the PLA cover a broad spectrum ranging from expediting the submission of advisory audit reports to on-the-spot consultation on complex financial and accounting matters relating to contract costs. Many of the key services which the PLA performs are discussed in 15-305.3 to 15-305.13.

### 15-305.2 Proactive vs. Reactive.

Whenever possible, PLAs are instructed to take a proactive role as opposed to a reactive role. The proactive role stresses the opening of lines of communication with all command activities including contracting officers, pricing directorates, legal staff, and all other acquisition officials requiring DCAA services. It also (1) emphasizes the joint exploration of ways to improve coordination and the establishment of mechanisms to identify, evaluate and resolve issues; (2) recognizes that a strong relationship between DCAA and the acquisition and contract administration commands provides a clearer understanding of customer needs; and (3) facilitates DCAA's ability to provide quality, timely, and responsive audit services.

### 15-305.3 Professional Accounting and Financial Advice

The PLA will advise procurement personnel on accounting and financial matters in areas of DCAA responsibility. This includes:

a. Explaining or elaborating on the accounting and auditing principles, including CAS, underlying advisory audit report comments, findings, and recommendations and, when necessary, obtaining additional data, elaborations, or explanations from the field auditor.

b. Assisting procurement personnel in their efforts to obtain specific cost information when an audit review of a contractor's proposal is not required (see 9-107). PLA assistance in obtaining such information (e.g., indirect cost rates, labor rates, loading factors, etc.) may be necessary and is usually beneficial when a contracting officer is experiencing difficulty (1) contacting the cognizant DCAA field audit office (FAO), (2) obtaining the requested data in a timely manner, or (3) obtaining the requested data because of its connection with some unusual or controversial matter.

c. Providing advice regarding reports on contractors' accounting and estimating systems.

d. Consulting on negotiation targets, and advising on the treatment of controversial items of cost.

e. Arranging for the attendance of field auditors at the negotiation conference, if required, and participating in contract negotiations, when appropriate. (Also see 15-305.6.)

f. Advising on financial sections of business clearances, negotiation memorandums, etc.

g. Discussing with reviewing authorities, on request, the treatment accorded costs in negotiations in which the PLA participated.

h. Advising the contracting officer on matters relating to DCAA's postaward audit reports, and coordinating on requests for followup audit effort on postaward audit findings.

i. Consulting with the contracting officer in determining whether an audit waiver is appropriate, or a DCAA review is necessary to arrive at a decision that a proposed cost or price is fair and reasonable).

j. Providing counsel and any necessary coordination where a contracting officer is planning to issue a request for audit review on only a part of a contractor's price proposal.

**15-305.4 Coordination of Requests for Audit Review of Price Proposals**

a. The PLA is available to provide procurement personnel with information regarding the DCAA field audit office to which a copy of the request for field pricing support should be sent, an estimate of the time required for audit (after consultation with cognizant FAO), and the content of the request when specific information is desired. The PLA may offer an opinion, or concur in an opinion of a contracting officer, that an audit is not essential in specific instances. This is particularly pertinent with respect to cost-type proposals for research and development effort where advice on labor rates, overhead rates, loading factors, etc., may be essentially all that DCAA can provide. In these instances, the PLA may assist the contracting officer by reviewing pertinent audit data previously reported by field audit offices and by obtaining current data verbally from the cognizant field audit office (see 9-107).

b. Direct telephonic communications between procurement personnel in the larger buying offices and the cognizant field auditors may result in multiple requests from various negotiators for the same data or requests for data already available in the files of the PLA; requests for data with unrealistic time deadlines; and requests for data to be furnished by telephone which is of such significance or magnitude that it should be furnished only by means of an advisory audit report. Also, direct telephonic communications may result in misinterpretation because the negotiator may not readily understand what the data means. Consequently, when a field auditor receives a telephonic request for data, questionable or problem areas which cannot be resolved at that time should be promptly referred to the PLA who will obtain any needed clarification or background information from the requester (see 9-107).

c. The PLA should have copies of all correspondence issued concerning audit matters by the procuring activity if he or she is to provide on-the-spot personal consultation and advice to procurement and contract administration personnel in connection with analyses of contractors' cost representations and related matters. Consequently, the PLA should make arrangements with the procurement activity to be furnished a copy of each request for field pricing support as well as any notices of date adjustments for the auditor's submission of audit report to the Plant Representative/ACO.

d. When the buying office changes product requirements, quantities, or specifications while an audit review is in process, the PLA should confer with the contracting officer to assess the impact of the changes on the current proposal. The PLA should then confer with the field auditor on the advisability of continuing the current audit or suspending audit until a revised proposal is submitted. Where appropriate, arrangements may be made for supplemental audit reports.

e. Responsibility for the submittal of a timely audit report rests with the cognizant field auditor; responsibility of the PLA in this matter is to facilitate the use of audit service. The PLA shall look into any inquiry made either orally or in writing by the procuring activity where it is stated that a specific advisory audit report is overdue or was not received on a timely basis. On each such matter the PLA shall discuss the matter with the FAO and the procuring activity in an

effort to assure timely reporting or more practicable due dates for future requests.

### 15-305.5 Counsel on Advisory Audit Reports

a. The PLA will be available to discuss the audit reports with procurement personnel. This can involve providing interpretation and explanation of the accounting and auditing principles underlying the findings, comments, and recommendations set forth in the report or obtaining from the cognizant field auditor additional information or further elaboration and explanation regarding particular cost elements. DCAA offices will provide the on-site PLA one copy of each advisory audit report when it is issued (see 15-308 and 15-3S1).

b. The PLA will pursue all leads and concerns raised by the management at the commands being supported, and those requiring the attention of DCAA field and/or Headquarters management should be elevated accordingly. A file should be maintained on problem areas in order that recurring matters indicating a trend or other condition requiring action at FAO, regional or Headquarters level may be communicated by the PLA to the appropriate office. Arrangements should be made with the procurement office to provide appropriate notification of problems and problem areas to the PLA, preferably by direct written communication or by copy of a PNM in which the matter is set forth.

### 15-305.6 Arranging for DCAA Participation in Negotiation Conferences

a. The PLA should arrange to obtain advance information concerning impending contract negotiation conferences in instances where an audit report has been issued. This could involve the prenegotiation conference attended only by government representatives, the formal negotiation conference with the contractor, or both. When advising the contracting officer as to the need for the field auditors' participation at the conference, the PLA will consider the complexity of the audit findings, the magnitude of the dollar amounts of costs questioned and possible savings to the government, the views of the contracting officer's representative, and any other pertinent factors. When such attendance is required, the PCO's request to the field audit office should be transmitted promptly to provide maximum time for preparation and travel arrangements. Where the PCO consistently fails to solicit necessary field auditor attendance, the PLA should resolve the problem in accordance with 15-402.1.

b. Arrangements for auditors' participation in negotiations should be coordinated through the liaison auditor. Field auditors should inform the PLA of any requests for attendance at negotiations received directly from contracting officers, and discuss any question concerning the necessity or duration of his or her attendance. Field auditors should check in with the liaison auditor upon arrival at the procuring activity to attend a negotiation. The negotiations in which field auditors are invited to participate are usually large-dollar, complex procurements, and it may be advisable for the PLA to attend with the field auditor, especially where (1) continuity is needed because negotiations are expected to extend over a number of days or weeks at both the contractor's location and the procurement office and it will not be possible for the field auditor to be present at all sessions, (2) the contracting officer specifically desires that the PLA attend, or (3) the auditor has limited experience as a participant in negotiation conferences.

c. In those cases where a field audit was not requested or where circumstances do not justify the attendance of the field auditor, the PLA should attend negotiation meetings and conferences when requested by the contracting officer, and should provide whatever accounting and audit advice and assistance is required.

### 15-305.7 Procurement and DCAA Policy and Procedures

The PLA will explain and clarify DCAA policy and procedures to the procuring activity to which assigned, when requested, or if the policy or procedures are not known will request explanation and clarification from Headquarters. In turn, when the PLA becomes aware of new or revised policy or procedures that impact upon DCAA operations, the PLA

will advise Headquarters, through his or her region and/or the Audit Liaison Division.

### 15-305.8 PLA Support of Major Defense Systems Procurement

a. DoD Directive 5000.1 and DoD Instruction 5000.2 set forth the policies and procedures and establish specific requirements and responsibilities for acquiring major defense systems. As stated in the Directive, the policy of DoD is to assure that the acquisition process is timely, efficient, and effective. In support of that policy, the PLA should make a direct offer to assist the program manager for the major defense systems procurement during the initial stages of the program as well as after contract award. Maintaining good communications and close working relationships with the program manager will help facilitate the acquisition process and resolve audit disclosures.

b. Although not intended as a complete listing, the responsibilities of the PLA on major defense system procurements will generally include those summarized below:

(1) To act as the official representative of and focal point for DCAA on all matters requiring contact with the contracting officer, project manager and their staffs. All field office contacts with the indicated representatives should be made through the PLA.

(2) To recommend to the procurement activity, when appropriate, that the request for proposal (RFP) should require the contractor to:

(a) Disclose any deviations from its normal accounting and/or estimating procedures used to prepare the proposal.

(b) Identify the dollar impact of such deviations.

(c) Identify and explain any anticipated differences between the accounting for costs to be incurred under the proposed contract and the accounting methods and procedures reflected in its proposal.

(d) Prepare and furnish for audit review historical unit cost trend studies and analyses of experienced labor and overhead and G&A expense rate data.

(3) To assist the procurement office in the analysis of the accounting and financial aspects of the contractor's proposal.

(4) To monitor the overall audit input, arranging the timing of field audit effort and reporting so that submissions coincide with the overall time schedules and requirements of the procurement office.

(5) To advise FAOs promptly of any unusual cost provisions in the RFP in order that appropriate coverage may be provided in the audit program.

(6) To advise FAOs of any special areas of audit coverage desired by the procuring authority and not detailed in the RFP; this may be especially important in a competitive situation.

(7) To discuss with the proper representatives the extent to which audits will be needed on major subcontract proposals, and expedite the process by making direct and simultaneous requests to the auditors cognizant of the subcontractors. Such arrangements should be coordinated with the resident auditor at the prime contractor location.

(8) To maintain sufficient contact with the FAOs to monitor the timeliness of audit service, and arrange for any necessary extensions of scheduled report dates.

(9) To discuss and, if necessary, explain audit reports to the procuring authority and other interested personnel.

(10) To arrange for any additional audit effort which may become necessary subsequent to the submission of audit reports. In these efforts, it is essential that the field audit offices are timely and completely responsive to the PLA and that actual or expected delays are communicated promptly to the PLA in order that he or she may initiate appropriate action with the procurement office.

### 15-305.9 Distribution of Contractual Documents

The PLA will assist procurement personnel in the identification of DCAA offices to which contract documents should be sent, but will not make the actual distribution.

### 15-305.10 Price Negotiation Memorandum (PNM)

CAM 4-104 states the procedure to be followed by field auditors in the event a

copy of the PNM is not furnished by the contracting officer within a reasonable time after contract negotiation. It also provides that upon receipt of a copy of the FAO's followup request, the PLA has the responsibility to follow up until the PNM is distributed. Preparation and distribution of the PNM is the responsibility of the PCO and unless requested the PLA should not become involved in its preparation. However, when requested by the PCO the PLA may assist in clarification of matters related to audit input and accounting terminology. Although it is not desired that the PLA receive or distribute the DCAA copy of the PNM, he or she should try to arrange that the procedures of the procurement activity provide (1) direct distribution of a copy of the PNM to the cognizant auditor, and (2) notification to the cognizant field audit office in those instances where no PNM will be prepared, e.g., when the procurement was cancelled, the offeror was unsuccessful, etc.

### 15-305.11 Participation in Training Sessions, Seminars and Review Groups

The PLA's participation in informal training sessions and seminars of the procurement or contract administration office is encouraged since it affords an excellent opportunity to elaborate on DCAA services available to procurement. The PLA may participate as a member of various ad hoc review groups when authorized by OAL or the regional director.

### 15-305.12 Assistance in Preparing Replies to General Accounting Office Reports

Procurement and contract administration activities will on occasion request the assistance of the liaison auditor in preparing replies to GAO reports. Although DCAA has no objection to assistance in cost accounting or audit matters involved in such reports, the liaison auditor should make it clear that his advice does not necessarily represent an official DCAA opinion. CAM 1-204 contains the procedures to be followed when a DCAA opinion is desired.

### 15-305.13 General

The PLA should be continuously alert to major items of audit workload originating at the procurement office. When it is learned that a major proposal will require audit evaluation in the near future, the appropriate resident or branch office(s) should be informed. Along these same lines, the PLA should assist field auditors by providing information on developments affecting contracts under their cognizance; discussing audit problems with procurement personnel to minimize audit or negotiation difficulties; and coordinating with procurement personnel in establishing the agendas for negotiation conferences so that the field auditor's time at the conference is not unduly extended.

## 15-306 Liaison Services to Contract Administration Offices

a. Many of the PLA services provided to the procurement centers are also available to Administrative Contracting Officers (ACOs) and other procurement-support personnel at the contract administration offices (CAOs). However, since DCAA field audit office (FAO) managers are often co-located or housed in close proximity, and in daily contact with their CAO counterparts, it is generally unnecessary to assign full-time PLAs to the CAOs.

b. Meetings should be held periodically between the local management of the DCAA FAO and CAO to discuss issues of common concern, and to determine whether DCAA and the CAO could benefit from new or improved liaison services. When this appears to be the case, the FAO responsible for the CAO should not hesitate to provide the services. If there is no known DCAA FAO in close proximity to the CAO, the matter of liaison services should be brought to the attention of the appropriate DCAA regional office.

## 15-307 Liaison Services for Special Access Programs (SAPs)

a. As a result of their special security requirements, SAP procurements require

unique audit liaison services. To provide these services, DCAA has established a PLA position dedicated to the support of SAPs. The PLA for SAPs, or PLA-SAPs, reports to the Chief, Audit Liaison Division.

b. DCAA Instruction 5205.11, "Procedures for Implementing Audit Effort of SAPs," sets forth the specific responsibilities and duties of the PLA-SAP, along with DCAA's operating procedures for supporting SAPs. All questions pertaining to DCAA's support of specific SAPs must be directed to, or through, the PLA-SAP. Questions relating to DCAA's general support of SAPs may be directed to the Chief, Audit Liaison Division, through the Assistant Director, Operations.

## 15-308 Audit Report Distribution to On-site PLAs

a. As provided for in various sections of Chapter 10 (e.g., 10-303.1, 10-411.5, 10-508b.(3), 10-604, 10-704, and 10-1103.2), the on-site PLAs (see 15-3S1) are to be included in the distribution of all DCAA audit reports resulting from forward pricing reviews, functional/ operational audits, annual incurred cost audits, postaward reviews, terminations, and claims.

b. This requirement does not mean that part-time, predominantly off-site PLAs should not receive copies of reports when circumstances warrant such distribution. Nor does it mean that the on-site PLAs should be limited only to the types of reports noted above. Special consideration should always be given to providing the cognizant PLA with a copy of any audit report that may require, or could benefit from, PLA coordination or involvement.

c. Do not send the PLA for Special Access Programs (PLA-SAPs) copies of audit reports unless specifically requested to do so by the PLA-SAPs (see 15-307).

## 15-3S1 Supplement – Audit Liaison Division (OAL) Procurement Liaison Auditors (PLAs) and Other On-site PLA Office Addresses

DEFENSE CONTRACT AUDIT AGENCY
AUDIT LIAISON DIVISION
CAMERON STATION
ALEXANDRIA VA 22304-6178

| NAME & TITLE | ROOM | | |
|---|---|---|---|
| | | (C) | 703-274-0687/0688 |
| | | (A) | 284-0687/8 |
| Henry Simpkins | 4A265 | (X) | 703-617-0014 |
| Chief, Audit Liaison Division | | (H) | 0830 - 1700 EST |

ARMY

U.S. ARMY MATERIEL COMMAND
AMCAQ-DCAA
ATTN: DCAA PLA LIAISON OFFICE
5001 EISENHOWER AVENUE
ALEXANDRIA VA 22333-0001

| NAME & TITLE | ROOM | | |
|---|---|---|---|
| | | (C) | 703-274-3021 |
| | | (A) | 284-3021 |
| Patrick Duffy | 9E10 | (X) | 703-274-3198 |
| Senior PLA | | (H) | 0830 - 1700 EST |

U.S. ARMY AVIATION AND TROOP COMMAND
AMSAT-A-AE
ATTN: DCAA PLA LIAISON OFFICE
4300 GOODFELLOW BLVD
ST LOUIS MO 63120-1798

| NAME, TITLE, & PCO CODE RESPONSIBILITY | BLDG ROOM | | |
|---|---|---|---|
| | | (C) | 314-263-2427 |
| | | (A) | 693-2427 |
| Michael Andert, PLA | 102 | (X) | 314-263-7665 |
| Codes DAAJ09, DAAK50 | G15 | (H) | 0730 - 1600 CST |

U S. ARMY ARMAMENT, MUNITIONS AND CHEMICAL COMMAND
AMSMC-PPF
ATTN: DCAA PLA LIAISON OFFICE
BLDG 350, POST 5F23
ROCK ISLAND IL 61299-6000

| NAME, TITLE, & PCO CODE RESPONSIBILITY | BLDG ROOM | | |
|---|---|---|---|
| | | (C) | 309-782-3705 |
| | | (A) | 793-3705 |
| Michael Andert, PLA | 350 | (X) | 309-782-3799 |
| Codes DAAA08, DAAA09, DAAA20 | 5F23 | (H) | 0730 - 1600 CST |

U.S. ARMY COMMUNICATIONS ELECTRONICS COMMAND
AMSEL-ACSP
ATTN: DCAA PLA LIAISON OFFICE
FORT MONMOUTH NJ 07703-5000

| NAME, TITLE, & PCO CODE RESPONSIBILITY | ROOM | | |
|---|---|---|---|
| | | (C) | 908-532-3351 |
| | | (A) | 992-3351 |
| Tony Cunningham, PLA | 5A21 | (X) | 908-532-3046 |
| Codes DAAB07, DAAB08, DAAK20, DAAK80, DAAL02 | | (H) | 0700 - 1530 EST |

ARMY (Continued)

U.S. ARMY MISSILE COMMAND
AMSMI-AC-CP
ATTN: DCAA PLA LIAISON OFFICE
BUILDING 4488
REDSTONE ARSENAL AL 35898-5280

| NAME, TITLE, & PCO CODE RESPONSIBILITY | BLDG ROOM | | |
|---|---|---|---|
| | | (C) | 205-842-9435 |
| | | (A) | 788-9435 |
| Thomas Weeks, PLA | 4488 | (X) | 205-876-7032 |
| Codes DAAH01, DAAH03 | D348 | (H) | 0730 - 1600 EST |

NAVY

DCAA PLA APIA PP ROOM 500
ASSISTANT SECRETARY OF THE NAVY
RESEARCH DEVELOPMENT ACQUISITION
2211 JEFFERSON DAVIS HIGHWAY
ARLINGTON VA 22244-5106

| NAME, TITLE, & PCO CODE RESPONSIBILITY | BLDG ROOM | | |
|---|---|---|---|
| | | (C) | 703-602-4784 |
| | | (A) | 332-4784 |
| Anne-Marie Chavez, Senior PLA | CP5 | (X) | 703-602-4514 |
| Code N31701, N00014 | 500 | (H) | 0800 - 1630 EST |

COMMANDER
NAVAL AIR SYSTEMS COMMAND
CODE 02PLA
1421 JEFFERSON DAVIS HIGHWAY
ARLINGTON VA 22243-2140

| NAME, TITLE, & PCO CODE RESPONSIBILITY | BLDG ROOM | | |
|---|---|---|---|
| | | (C) | 703-604-6100 ext. 3505 |
| | | (A) | 286-6100 ext 3505 |
| Patricia Letzler, PLA | JP-1 | (X) | 703-604-3062 |
| Code N00019, N00032 | 124 | (H) | 0700 - 1530 EST |

DEPARTMENT OF THE NAVY
STRATEGIC SYSTEMS PROGRAMS
ATTN. DCAA PLA RM 1002 MAIL CODE SPN-D
1931 JEFFERSON DAVIS HWY
ARLINGTON VA 22241-5362

| NAME, TITLE, & PCO CODE RESPONSIBILITY | BLDG ROOM | | |
|---|---|---|---|
| | | (C) | 703-607-0813 |
| | | (A) | 327-0813 |
| Sandra McCall, PLA | CM-3 | (X) | 703-607-2666 |
| Codes N00030 | 1002 | (H) | 0700 - 1530 EST |

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
ATTN: DCAA PLA RM 11-S-70 HOFFMAN COMPLEX 14
200 STOVALL STREET
ALEXANDRIA VA 22332-2300

| NAME, TITLE, & PCO CODE RESPONSIBILITY | BLDG ROOM | | |
|---|---|---|---|
| | | (C) | 703-325-9049 |
| | | (A) | 221-9049 |
| Sandra McCall, PLA | 11-S-70 | (X) | 703-325-0169 |
| Codes N62474, N68711, N62467, N62742, N62470 | | (H) | 0700 - 1530 EST |

NAVY (Continued)

COMMANDER
CODE SEA 0283Y
NAVAL SEA SYSTEMS COMMAND
2531 JEFFERSON DAVIS HWY
ARLINGTON VA 22242-5160

| NAME, TITLE, & PCO CODE RESPONSIBILITY | BLDG ROOM | | |
|---|---|---|---|
| | | (C) | 703-602-8007 |
| | | (A) | 332-8007 |
| David A. Smith, Senior PLA | NC-3 | (X) | 703-602-4770 |
| Code N00024 | 5E52 | (H) | 0730 - 1600 EST |

COMMANDER
SPACE & NAVAL WARFARE SYSTEMS COMMAND
NAVAL SUPPLY SYSTEMS COMMAND
ATTN: DCAA PLA - CODE 02-PLA
2451 CRYSTAL DRIVE
ARLINGTON VA 22245-5200

| NAME, TITLE, & PCO CODE RESPONSIBILITY | BLDG | | |
|---|---|---|---|
| | | (C) | 703-602-8604 |
| | | (A) | 332-8604 |
| Terry Schneider, PLA | 5CPK | (X) | 703-602-1960 |
| Code N00039, N00023 | 225 | (H) | 0745 - 1615 EST |

AIR FORCE

AIR FORCE MATERIEL COMMAND
AERONAUTICAL SYSTEMS CENTER
WRIGHT PATTERSON AFB LIAISON OFFICE
DCAA/WPL BLDG 39
2196 D STREET
WRIGHT PATTERSON AFB OH 45433-7201

| NAME, TITLE, & PCO CODE RESPONSIBILITY | BLDG ROOM | | |
|---|---|---|---|
| | | (C) | 513-255-4369 |
| | | (A) | 785-4369 |
| Rick Robinson, Senior PLA | 39 | (X) | 513-255-1611 |
| | 110 | (H) | 0730 - 1630 EST |
| Thomas E. Mohrhaus, Senior PLA | 39 | | |
| | 110 | | |
| Codes F33600, F33601, F33615, F33657, F33661, F33733 | | | |

AIR FORCE ELECTRONIC SYSTEMS CENTER
ATTN: DCAA/PLA (ESC/PKF)
104 BARKSDALE ST
HANSCOM AFB MA 01731-1806

| NAME, TITLE, & PCO CODE RESPONSIBILITY | BLDG ROOM | | |
|---|---|---|---|
| | | (C) | 617-377-2627 |
| | | (A) | 478-2627 |
| Michael Motulski, PLA | 1521 | (X) | 617-377-4323 |
| Codes F19628, F19630, F19650 | 2nd Floor | (H) | 0730 - 1600 EST |

AIR FORCE SPACE & MISSILE SYSTEMS CENTER
ATTN: DCAA PLA (SCOTT GENTRY)
HQ SMC/PK-DCAA
155 DISCOVERER BLVD SUITE 1516
LOS ANGELES CA 90245-4692

| NAME, TITLE, & PCO CODE RESPONSIBILITY | BLDG ROOM | | |
|---|---|---|---|
| | | (C) | 310-363-6991 |
| | | (A) | 833-6991 |
| S. Scott Gentry, PLA | 110 | (X) | 310-363-6989 |
| Codes F04693, F04701, F04704, F29601, F29650 | 1353 | (H) | 0700 - 1530 PST |

AIR FORCE (Continued)

WARNER ROBINS AIR LOGISTICS CENTER
WR ALC/PKPS ATTN. ARTHUR KLAUSS
235 BYRON STREET
ROBINS AFB GA 31098-1611

| NAME, TITLE, & PCO CODE RESPONSIBILITY | BLDG ROOM | | |
|---|---|---|---|
| | | (C) | 912-926-7510 |
| | | (A) | 468-7510 |
| Arthur Klauss, PLA | 300PKPS | (X) | 912-926-7572 |
| Codes F09603, F09650 | Door | (H) | 0700-1530 EST |
| | 21A | Notification req'd | |

AIR FORCE LOGISTICS CENTER
MAIL CODE DCAA/PLA/PKF
6028 ASPEN AVE
HILL AFB UT 84056-5206

| NAME, TITLE, & PCO CODE RESPONSIBILITY | BLDG | | |
|---|---|---|---|
| | | (C) | 801-777-7561 |
| | | (A) | 458-7561 |
| Dave Geldmacher, PLA | 1298 | (X) | 801-777-7563 |
| Codes F42600, F42610, F42620, F42630, F42650 | | (H) | 0730 - 1600 MST |

SAN ANTONIO AIR LOGISTICS CENTER
DCAA PROCUREMENT LIASON AUDITOR
SA ALC/PKC
143 BILLY MITCHELL RD
KELLY AFB TX 78241-6014

| NAME, TITLE, & PCO CODE RESPONSIBILITY | BLDG POST | | |
|---|---|---|---|
| | | (C) | 210-925-1184 |
| | | (A) | 945-1184 |
| Pete Gonzales, PLA | 43 | (X) | 210-925-3307 |
| Codes F41608, F41621, F41650, F41691, F41636, F41689, F41800 | E-5 | (H) | 0730 - 1600 CST |

AIR FORCE HUMAN SYSTEMS CENTER
DEFENSE CONTRACT AUDIT AGENCY
PROCUREMENT LIASON OFFICE
ATTN: HSC/PKF
8005 9TH STRLET
BROOKS AFB TX 78235-5353

| NAME, TITLE, & PCO CODE RESPONSIBILITY | BLDG POST | | |
|---|---|---|---|
| | | (C) | 210-536-6319 |
| | | (A) | 240-6319 |
| Pete Gonzales, PLA | 626 | (X) | 210-536-9070 |
| Codes F41622, F41624 | | (H) | 0800 - 1630 CST |

AIR FORCE LOGISTICS CENTER
DCAA LIAISON OFFICE
OC-ALC/PKF
3001 STAFF DR STE 2AI78A
TINKER AFB OK 73145-3015

| NAME, TITLE, & PCO CODE RESPONSIBILITY | BLDG | | |
|---|---|---|---|
| | | (C) | 405-739-2946 |
| | | (A) | 339-2946 |
| Vacant, PLA | 3001 | (X) | 405-734-2179 |
| Codes F34601, F34608, F34650 | | (H) | 0730 - 1600 CST |

## 15-400 Section 4 — Audit Support of Negotiation Conferences

### 15-401 Introduction

This section contains procedures and guidance on audit support of negotiation conferences.

### 15-402 Auditor Attendance at a Negotiation Conference

#### 15-402.1 Notification of Availability of Audit Assistance

Each advisory audit report shall contain a concluding statement to the effect that audit counsel and assistance is available to the contracting officer if so desired for the negotiation of contract prices covered by the report. The statement should identify the designated liaison audit office to which requests for assistance should be made, or in the absence of a designated liaison office, the report should state that the request should be submitted directly to the field office which performed the audit. Where, because of either the complexity or the controversial nature of the matters presented in the report, the auditor considers that further assistance will be particularly beneficial, the concluding statement may recommend to the contracting officer that audit assistance be requested. When buying offices continually fail to solicit necessary auditor attendance at negotiation conferences, the PLA, together with the regional directors, should confer with the head of such client activities. Refer significant unresolved problems to Headquarters, "Attention" O, for discussion at higher procurement levels.

#### 15-402.2 Request for Auditor Attendance at the Negotiation Conference

On receiving the request for audit assistance, the liaison auditor will discuss the report with the contracting officer to determine the extent of the assistance required. To the maximum extent practicable, the liaison auditor should render the required assistance through his or her own office, particularly where it involves only an explanation of accounting principles or a limited amount of information which can readily be obtained by contacting the audit office which performed the audit. Copies of selected audit office working papers may be provided to efficiently satisfy an inquiry. The copies will be marked with appropriate protective markings based on the information contained therein and consistent with the audit report (see 10-206). Where, however, the assistance involves extensive referral to audit working papers or presentation of information on conduct of the examination, the liaison auditor will arrange directly with the audit office for auditor attendance at the negotiation conference. The objective should be to provide the assistance necessary to support the audit findings in the minimum amount of time. Although attendance of field auditors at negotiations is promoted, any requests for auditor attendance which will involve more than two weeks shall be coordinated with the regional office.

#### 15-402.3 Subcontract Negotiation Conferences

Arrangements may be made for a DCAA auditor who performed a subcontract audit to attend a subcontract negotiation conference only when all negotiating parties concur. Participation should be limited to explaining the audit procedures performed and the results of examination. The conduct of subcontract negotiations is the responsibility of the uppertier contractor.

### 15-403 Advisory Audit Counsel in the Negotiation Conference

#### 15-403.1 Negotiation Process

The negotiation of a fair and reasonable price is a complex process involving consideration of many factors including (1) actual costs and completion estimates; (2) the amount of profit or fee in relation to total cost, the complexity of the work, quality, efficiency, and ingenuity of the contractor's performance, and the technical and financial risk assumed; and (3) the competitiveness of the end price. Costs constitute an important factor in the contract price negotiation and the

discussions between the contractor and the contracting officer include the objective of arriving at a definitive agreement, to the maximum extent possible, on the amount of costs to be considered in the price. During these discussions, the auditor is responsible for furnishing to the contracting officer, as requested, cost information and explanations of audit findings to facilitate such agreement. Definitive agreement on each element of cost may not always be possible because of honest differences of opinion or other considerations between the negotiating parties. This means, in negotiation terms, a give and take proposition in which the contracting officer usually cannot negotiate a price which includes cost considerations exactly in accordance with the advisory audit report. In this situation, the auditor should clearly establish for the contracting officer the extent and financial significance of any differences or considerations which exist. In connection with profit or fee, many of the other factors enumerated above, which are to be considered in price negotiation, are also not subject to a precise determination. Such factors as the complexity of the work or the contractor's ingenuity are not generally expressed in dollar and cents terms but require judgmental evaluation of a broader basis. Accordingly, in some instances, a total end price may thus be negotiated without specific monetary resolution of all of the individual cost elements or other pricing factors involved.

### 15-403.2 Nature of Audit Counsel

The auditor will act as the accounting advisor to the contracting officer in the negotiation process. In this capacity, provide the contracting officer financial information and audit counsel which will assist in the conclusion of a fair and reasonable price agreement with the contractor. Whether in actual attendance at the conference or through support from the audit office, the auditor will:

a. Upon request of the contracting officer, explain the audit report recommendations on the costs of the particular items in the contractor's proposal. Copies of appropriate supporting working papers may be provided to help answer a request in an efficient, economical, and effective manner, especially when auditor attendance at the negotiation conference is not feasible.

b. Answer questions raised by conference participants relating to the scope of audit or other bases for audit determinations or recommendations. Appropriate references shall be made to the factual information and documentation in the supporting working papers.

c. Review any additional cost information the contractor may submit or any different considerations which it may allege during the negotiation conference. The additional information shall be reviewed and evaluated during the conference. If such information concerns a significant amount of costs which would seriously affect the price negotiation, FAR 15-805-5(h) requires the contracting officer to request the auditor to immediately review this information (also see 9-103.7).

### 15-403.3 Limitations of Audit Counsel

As discussed in FAR 15.805-1, the contracting officer has exclusive responsibility for determining the suitability of the overall negotiated price. It is not appropriate for the auditor to provide in writing or otherwise an overall opinion on a "bottomline" negotiation objective (but see 15-403.4 below).

### 15-403.4 Contracting Officer's Treatment of Reported Recommendations

Circumstances may arise during a negotiation conference when the auditor believes the contracting officer has given inadequate or improper treatment to the audit recommendations in the advisory audit report. In such cases, the auditor has the responsibility to make his/her position clear to the contracting officer prior to the negotiation settlement. This should be accomplished with appropriate tact and objectivity at a time when the contractor is not present. When the contracting officer fails to accept an audit recommendation and the auditor feels that this action has a significant or continuing impact on the reasonableness of pricing or contract administration and there is an opportunity for useful correc-

tive action, the procedures outlined by 1-403.3 and 15-604.2 should be followed.

## 15-404 Documenting Auditor Participation at Negotiations

### 15-404.1 Auditor's Memorandum of Negotiation

The FAO or liaison auditor should prepare a memorandum for the record as soon as possible after attendance at a negotiation conference. The memorandum will include basic identification data with respect to the contractor, the contract, personnel in attendance, etc.; information as to the matters discussed during the negotiation conference; a summary of the action taken on audit recommendations; and the results of the negotiation. Where applicable, the memorandum should also cover the evaluation of new data presented by the contractor, effect of changes in the proposed statement of work, and any other pertinent matters not covered in the audit report. If the contractor's proposal was revised during negotiations, indicate the extent to which the audit report is applicable to the revised proposal, or show a self-explanatory reconciliation. Comment on possible improvements in the audit report presentation, the extent of contracting officer acceptance of audit recommendations, the effectiveness of the contribution made by the auditor at the negotiation conference, audit problem areas disclosed by the negotiation, and other pertinent matters. File the original memorandum with the audit working papers and furnish copies to the liaison audit office. A copy of every memorandum documenting (1) a settlement that is not supported by audit report findings or (2) unusually effective auditor participation will also be furnished to the regional office.

### 15-404.2 Written Concurrence of Settlement

Auditors are sometimes asked to affirm their concurrence in writing with positions negotiated by contracting officers. These negotiated positions frequently differ from audit report positions, as a result of both subjective and objective arguments raised by contractors at negotiations. When asked to provide such concurrence, the auditor should professionally decline. This is because the contracting officer position has the authority to make flexible concessions without audit concurrence, as well as the responsibility to document the negotiations. (See 15-403.2c, however, for guidance on dealing with additional cost information furnished by the contractor.)

# 15-500 Section 5 — Special Procedures for Actual or Potential Contract Appeals Cases

## 15-501 Introduction

This section identifies the responsibilities of field, regional, and Headquarters personnel. It outlines the reporting requirements for actual or potential board of contract appeals (BCA) cases and cases before courts of appeal, such as the United States Claims Court.

## 15-502 Contracting Officer Decisions

Their warrants authorize contracting officers to resolve claims by or against contractors related to contracts subject to the Contract Disputes Act. Contractors may appeal written decisions to agency boards of contract appeals or to the courts (see FAR 33.211). The Armed Services Board of Contract Appeals (DFARS Appendix A) hears most cases affecting DoD contract costs. Many BCA and court cases involve controversial items. Since appeal decisions often influence the treatment of these items in future years, DCAA has special interest in them.

## 15-503 Coordinated Support of Contract Appeals Cases

a. Close communication, through established channels, between the FAOs, regional offices, and Headquarters is needed throughout the course of such appeals. Close communication with the government trial attorney and with the contracting officer is also very important.

b. DCAA Pamphlet 7641.50, The Role of the Auditor in Legal Proceedings, contains procedures for Agency participation in judicial and quasi-judicial proceedings. The purpose of this pamphlet is to assist the auditor in the effective development of audit support for a legal case. The pamphlet provides witnesses with information on the authority and practices of the boards and courts and guidance that should enable witnesses to function more effectively.

c. It is Agency policy to assist the government counsel in accounting matters in all cases, whether initiated through an Agency finding or by other means. Audit support should fully respond to the actual needs of counsel and may consist of comprehensive audit and accounting advisory services, accounting research applicable to the specific case, testimony relative to the audit report, or testimony as an expert on accounting and auditing matters.

## 15-504 Reporting Requirements

### 15-504.1 DCAA Responsibilities

DCAA is responsible for reviewing all appeal decisions that have an impact on the allowability of costs under DoD contracts. Where such decisions appear to adversely affect the desired DoD policy, DCAA will recommend changes to the acquisition procedures through established channels. Furthermore, it is DCAA policy to provide information to contracting officers, contractor representatives, Federal agencies, and the public regarding our activities. Such information includes the status of DCAA actions before courts and boards of contract appeals. The required reporting facilitates accomplishing this responsibility. The policies and procedures for reporting contract disputes cases are outlined in DCAAI 7730.13 dated 2 July 1991. Reporting requirements and report contents are detailed in 15-504.2 and 15-504.3.

### 15-504.2 Immediate Reporting

Actual cases have board or court docket numbers while potential cases have not yet reached that stage. The field auditor identifies potential cases based on experience and judgment and treats them like actual cases for reporting purposes. As soon as they identify an actual or potential BCA or court case involving accounting, financial, or auditing matters, FAOs will submit a report to the regional special programs office. Regional contract disputes coordinators (CDCs) will submit briefs of significant cases to Headquarters, Attn: PAD. Both the FAO and regional CDC will supplement such re-

ports as new data becomes available. Reports on actual and potential cases should include:

a. The contractor's name and address; the name of the board or court and the case number, if applicable; the government procurement office concerned with the dispute; and the name of the government trial attorney.

b. A statement of the issues, the contractor's position, the dollars related to each issue, and the dollar effect on applicable government contracts.

c. Copies of audit reports or other documentation that state the items in contention. Pertinent excerpts will suffice if the total report is very lengthy and extensive portions are not applicable.

d. All known or anticipated significant actions on the dispute.

e. Items such as memorandums for record and trip reports concerning DCAA participation in the dispute proceedings.

f. Recommendation for DCAA counsel (DL) involvement, if warranted (see 15-507.)

### 15-504.3 Semiannual Reporting

Regional directors are responsible for submitting contract appeal case semiannual reports to Headquarters. These reports provide the necessary information for Headquarters reviews and status reports. Regional offices accumulate immediate reports (see 15-504.2), summarize them in a prescribed format, and forward them to Headquarters for the semiannual periods ending 31 March and 30 September. The regional CDC is responsible for the accuracy and timeliness of the database information submitted to Headquarters and for providing FAOs with the regional case data summaries.

## 15-505 Regional Contract Disputes Coordinator (CDC) Participation

### 15-505.1 Review Audit Position

Regional CDCs will review the audit position, working papers, supporting documentation, contractor's response or rebuttal, and other data to ensure that the case is well-founded. Appeals are time-consuming and expensive, so regional offices should make every effort to present the board or court with a clear, well-supported position. DCAA's position should include rebuttals to any known contractor arguments. Regional offices should recommend additional audit work if the existing documentation is inadequate. In such cases, the field auditor should advise the government trial attorney if more time is required to develop the supporting data.

### 15-505.2 Technical Assistance

Regional offices will furnish assistance to the FAO and government counsel when necessary. Regional CDCs will maintain an index of reference materials to help the field in developing cases. They will ensure that the auditor clearly understands the major points in the case, and that the trial attorney understands the accounting significance of these points.

### 15-505.3 Coordinate Government Accounting Witnesses

Government attorneys sometimes request expert witnesses to testify in the areas of cost accounting standards, government procurement regulations, generally accepted accounting principles, and generally accepted governmental auditing standards. These witnesses come from government, academia, public accounting and consulting firms, and industry. Regional offices will provide assistance to the government attorney in locating appropriate witnesses. Most RAMs would qualify as expert witnesses in the various areas covered by contract audit. In some cases, FAO managers and field supervisors may qualify as expert witnesses. In addition, the regional CDC may provide attorneys with the DCAA listing of individuals from the private and academic sectors who are willing to serve as expert witnesses.

### 15-505.4 Develop and Train Field Witnesses

DCAA witnesses of fact (usually the auditor who performed the audit or the supervisory auditor) or expert witnesses (usually the RAM or RSPM) need to prepare for their roles. Trial attorneys prepare witnesses for trial, but, occasion-

ally, this preparation is brief and at the last minute. Whenever appropriate, DCAA should support the witness preparation process. After coordinating with the government trial attorneys, regional CDCs should acquaint the field auditor witness with courtroom procedure, including simulated courtroom testimony. To familiarize themselves with the trial/hearing process, regional CDCs should attend selected board hearings or court trials in their regions.

### 15-505.5 Evaluate Field Support

Regional CDCs should periodically review the FAO compliance with 15-506 responsibilities for the contract disputes program to assure that they are in compliance with Agency policy and to submit suggestions regarding possible improvements. The compliance program should assure active FAO contact with trial attorneys.

### 15-505.6 Control Immediate and Semiannual Reporting

Regional CDC's will maintain effective controls over initial reporting, updating, and semiannual reporting of actual and potential appeals cases to Headquarters as described in 15-504.

## 15-506 FAO Responsibilities

### 15-506.1 Comply with DCAA Regulation 5410.11, Release of Official Information in Litigation and Testimony by DCAA Personnel as Witnesses

This regulation requires a determination by the General Counsel or his/her delegate prior to the release of official DCAA information for use in litigation or the provision of DCAA personnel to be interviewed, contacted, or used as witnesses concerning DoD information. This authority has been delegated to the Chief Trial Attorney or other trial attorneys representing the government in contract appeals proceedings.

### 15-506.2 Support Trial Attorney

Audit support to attorneys should consist of clearly communicating the facts of the case, explaining the significance of the auditing and accounting issues, if required, and providing appropriate requested assistance. This may include suggesting areas for discovery or participating as a technical advisor during depositions. Field auditors should only provide basic accounting information and specific issue (factual) support. They should exercise special care to avoid expressing opinions on subjects outside the accounting field (they should not express legal or engineering opinions, for example.) Auditors should elevate to the regional offices any requests from attorneys that fall outside of accounting areas. For example, auditors should avoid assessing the litigative risk of a case. This responsibility for board or court cases rests with the trial attorney. FAOs should inform the Regional CDC in advance of significant meetings with the trial attorney in order to facilitate regional involvement in important cases.

### 15-506.3 Coordinate with Trial Attorney and Contracting Officer

Offer services to the contracting officer and trial attorney whenever a situation arises where audit services can be effectively used. Notify the trial attorney and the contracting officer promptly of any problems of access to records or contractor delay in furnishing data (see 1-504.4). Request them to obtain any necessary technical reviews, and notify them of any technical reviews that are not received on a timely basis. Delays in receiving required technical reports can impair the government's case and hamper the auditor's work. FAOs should be aware of cases in a prehearing status and periodically contact the trial attorney to offer assistance and discuss case status.

### 15-506.4 Maintain Case Files

Establish a separate case file for each active board or court case. Index the file for easy retrieval of documents. Prepare and maintain a chronology of significant events in the file. Documents belonging in the case file are the decision being appealed, the contract, the audit report, correspondence between parties relating to the appeal, and any other pertinent information. Case files, including the applicable working papers, should be segregated from the general working pa-

per files and maintained in a locked file or cabinet. Board or court cases can last for many years. This procedure secures and protects documents during transition periods (change of cognizant supervisors or FAO, for example).

### 15-506.5 Produce Documents

Clarify and coordinate requests for the production of documents with the trial attorney and the regional office. Review MIS data to identify all pertinent files. Once identified, segregate these files with the case file for the remainder of the litigation. A DCAA representative should physically observe any contractor access to these files during discovery. Arrange to have all pertinent working papers at the hearing. Protect classified documents essential to the case in the appropriate manner. Retain copies of all working papers released from DCAA custody.

### 15-506.6 Testify as a Witness

The auditor who performed the original audit or his supervisor will normally be the DCAA factual witness, unless the regional audit manager in conjunction with the regional CDC and the government trial attorney believe other arrangements are appropriate. If the performing auditor is not available (because of termination, for example), or if the original auditor was a trainee, the supervisory auditor involved in the original audit review will be the recommended DCAA factual witness. Promptly notify the regional office when FAO personnel must testify, so the regional CDC may review the case and assist in the witness preparation when appropriate. Self-study course No. 9310, "Auditor Testimony in BCA Proceedings" should be reviewed by all DCAA witnesses. The CDC should coordinate planned action with the trial attorneys. Refer any requests from the trial attorney for additional or expert witnesses to the regional CDC.

### 15-506.7 Evaluate Audit Support

Following audit participation in an appeal, evaluate the effectiveness of audit support and the need for additional guidance on the issues involved. Include the evaluation in the report submitted to the regional office as outlined in 15-504.2.

## 15-507 Headquarters Support

a. Headquarters, Accounting Policy Division, will monitor all actual and potential cases and update guidance based on an analysis of individual cases or trends. Headquarters will assist regional offices upon receipt of a written request containing the region's position and all supporting documentation (see 4-902.2). The Accounting Policy Division will evaluate regional requests for DL involvement contained in immediate reports (see 15-504.2) and make referrals to DL, if appropriate. Similarly, Headquarters can refer a representative to testify in support of the regional expert witness in significant cases concerning accounting matters, the application of the FAR cost principles, etc. Headquarters will support cases when such support will serve a useful purpose and the elements of the case are likely to have a significant impact on future allowability and allocability of costs at a number of contractor locations.

b. Headquarters, Office of General Counsel, will review and analyze regional requests for DL support referred by PAD. DL will coordinate with P the identification of cases appropriate for DL involvement. Similarly, any direct requests from trial attorneys for DL involvement in contract disputes cases will be coordinated with P. For cases accepted by DL for involvement, DL will contact the trial attorney and offer assistance. DL will communicate to P and the region the significant areas of assistance provided to the trial attorney.

## 15-600 Section 6 — Contract Audit Followup

### 15-601 Introduction

This section presents the responsibilities of acquisition components and contract auditors under DoD Directive 7640.2, "Policy for Followup on Contract Audit Reports."

### 15-602 Background and General Requirements

a. Audit reports often deal with significant problems or controversial situations. Accordingly, each report must provide clear rationale for the audit position. At times, differences of opinion between the auditor and the contracting officer may arise during the settlement of specific audit issues. Whenever a problem of this type occurs, the auditor must provide the contracting officer with all pertinent evidential materials. Moreover, there shall be continuous communication between the contract auditor and the contracting officer, to promote understanding and improve the potential for satisfactory resolution, before a final decision is rendered.

b. DoD Directive 7640.2, "Policy for Followup on Contract Audit Reports," dated 12 February 1988, prescribes DoD policies for contract audit followup and establishes a system for management action on contract audit reports. The system provides for (1) tracking and reporting specified types of contract audit reports, (2) procedures to monitor and ensure the proper, timely resolution and disposition of contract audit reports, and (3) periodic evaluations by internal auditors of the effectiveness of the DoD components' followup systems.

### 15-603 Responsibilities of Acquisition Components

The DoD Directive requires Secretaries of the Military Departments and the Directors of the Defense Agencies to:

a. Designate a Contract Audit Followup Official (CAFO) to manage their component's contract audit followup program.

b. Establish procedures as prescribed by FAR 15.807, whereby contracting officers shall fully consider contract audit advice in the course of determining prenegotiation positions that are subject to DoD component review and clearance processes.

#### 15-603.1 Tracking of Audit Reports

DoD procurement and contract administration components are required, under the directive, to track all contract audit reports. All information is to be maintained on a current basis and is to serve as source documentation for required followup status reports. For preaward contract audit reports, such tracking may be accomplished using records maintained in official contract files.

#### 15-603.2 Reporting Requirements

a. DoD procurement and administrative components are required to submit semiannual status reports on reportable contract audit reports to the DoD Inspector General. These status reports are to be submitted within thirty calendar days after the end of the semiannual periods ending 28 February and 31 August. Reportable reports are:

(1) those reports containing findings and recommendations, including unsupported/qualified findings, covering estimating system surveys, accounting system reviews, defective pricing reviews, and cost accounting standards (CAS) matters. (Reports containing only favorable findings and recommendations, such as CAS reports recommending that a contractor's proposed accounting change be approved, or estimating system surveys that only contain "suggestions for improvements" are not reportable.)

(2) those reports covering internal controls, operations audits, incurred costs, settlement of final indirect cost rates, final pricing submissions, termination settlement proposals, equitable adjustment claims, hardship claims, and escalation claims if reported costs or rates questioned or unsupported/qualified equal $100,000 or more.

(3) reports on audit determined final indirect cost rates and Form(s) 1, to the cognizant Administrative Contracting Officer (ACO) when the auditor cannot reach an agreement with the contractor.

b. Audit reports covering preaward proposals; forward pricing proposals, including change orders/modifications; labor, overhead or other advance rate agreements; progress payments; preaward surveys; assist audits; and closing statements are not subject to the reporting provisions of the directive.

c. Interim reports to be incorporated into a future report are not reportable.

d. The semiannual status reports are to include reportable reports (1) open as of the end of the reporting period, and (2) closed during the reporting period.

e. Under the directive, a contract audit report is considered dispositioned when (1) the contractor implements the audit recommendations or the contracting officer's decision; (2) the contracting officer negotiates a settlement with the contractor and a contractual document has been executed; (3) the contracting officer issues a final decision pursuant to the "Disputes Clause" (see 15-502) and 90 days elapse without contractor appeal to the Armed Services Board of Contract Appeals (ASBCA); (4) a decision has been rendered on an appeal made to the ASBCA or U.S. Claims Court and any corrective actions directed by the Board or Court have been completed and a contractual document has been executed; (5) audit reports have been superseded by, or incorporated into, a subsequent report; or (6) any corrective actions deemed necessary by the contracting officer have been taken so that no further actions can be reasonably anticipated. Should the contractor appeal to the Claims Court within the 12 months after final decision, the audit must be reinstated as an open report in litigation.

### 15-603.3 Resolution of Contract Audit Report Recommendations

a. The contracting officer's prenegotiation position should indicate whether the audit recommendations were accepted or, if not, whether the auditor has revised them. When the contracting officer disagrees with the audit position, the prenegotiation documentation should include the rationale for not accepting the audit advice. The post-negotiation documentation should include a summary of the field pricing report recommendations and the reasons for any pertinent variances from those recommendations.

b. For auditor-determined indirect cost rates, the auditor shall seek agreement with the contractor upon completion of the audit. If agreement is not reached, the auditor shall issue a notice of costs suspended and/or disapproved, and advise the contractor of its right to submit a claim to the ACO for any disapproved costs. If the ACO disagrees with the audit recommendations, the ACO is to comply with the procedures prescribed by his or her DoD component for documentation and review prior to disposition.

## 15-604 DCAA Followup Responsibilities

### 15-604.1 Support Reviewing Officials or Boards

a. DCAA will provide timely and complete responses to any contracting officer or review official who requests factual information or further audit opinions regarding the audit issues under review.

b. Agency policy on review board participation is outlined in 1-403.4.

c. DCAA will assess whether auditor attendance at negotiations would be beneficial to the procuring office in understanding the details related to the audit recommendations. Where it can be determined prior to the issuance of the audit report that the auditor could provide a valuable contribution at negotiations, a statement will be included in the audit report recommending auditor attendance (10-209.4a).

### 15-604.2 Support DoD IG and Internal Audit Reviews

DCAA will provide timely and complete support to the IG and any internal audit organization reviewing a DoD Component's contract audit followup system.

### 15-604.3 Identify Reportable Contract Audit Reports

DCAA will identify for NASA Headquarters and DoD procurement or administrative components, both at the time of issuance and, in summary form, semiannually, all contract audit reports reportable under 15-603.2 above. Procedures are set forth in 15-605 and 15-606.

### 15-604.4 Utilize Feedback

DCAA will use the feedback provided by the contracting and contract audit followup officials, including final disposition and negotiation memorandums, to analyze and improve audit procedures and practices.

## 15-605 DCAA Summary Sheets

a. The DCAA Summary Sheet (Figure 15-6-1) will be used to advise DoD procurement and contract administration components of the issuance of a reportable contract audit report as defined in 15-603.2 above. The National Aeronautics and Space Administration has also elected to receive DCAA Summary Sheets as specified in b(3) below.

b. Procedures. Upon completion of a reportable audit report for DoD or NASA, prepare a summary sheet. Attach the summary sheet to the copy of the audit report marked "Original" and send it to the contracting officer having negotiation or disposition responsibility. Do not attach summary sheets to other report copies.

(1) Additional requirements - Navy

When an Army or Navy contracting officer is the official having negotiation or disposition responsibility, forward a copy of each summary sheet to the cognizant Army or Navy procurement or contract administration office (see 15-6S1). Summary sheets sent to these offices may be batched and transmitted monthly. Do not attach copies of the reports.

(2) Additional requirements - DCMC

When a DCMC contracting officer is the official having negotiation or disposition responsibility, forward a copy of each summary sheet to the cognizant Defense Contract Administration Services Region, Attention Director, Contract Management Division. Summary sheets sent to these offices may be batched and transmitted monthly. Do not attach copies of the reports.

(3) Additional requirements - NASA

Although not subject to the provisions of DoD Directive 7640.2, NASA has elected to use DCAA summary sheets. Attach the original summary sheet to the "original" copy of all audit reports to NASA of the type specified in 15-603.2a. Monthly, summary sheet copies will be batched and forwarded (without copies of the reports) to:

Headquarters, National Aeronautics and Space Administration
Attn: Code HC
Washington, DC 20546

## 15-606 DCAA Control Log

Use the DCAA Control Log (Figure 15-6-2) to advise DoD components and NASA Headquarters, on a semiannual basis, of issued reportable contract audit reports. See 15-6S2 for offices designated to receive control logs. The following procedures apply:

a. Maintain a separate control log, as necessary, for each office designated to receive semiannual notifications. The FAO administrative staff should enter the data on the control logs, using the summary sheets (see 15-605) as the input source. Where a question exists as to which DoD component office should be identified for a particular audit report, request advice from the cognizant contracting officer. Cognizant DoD components are those components having negotiation or resolution responsibility. Thus, if a contract administration component requests and receives a reportable audit report on behalf of a procurement component, consider the procurement component the cognizant DoD component.

b. Except for NASA Headquarters, do not maintain control logs on reports issued to nonDoD agencies.

c. Within three calendar days after the semiannual periods ending 28/29 February and 31 August, each FAO will transmit a copy of the control logs covering the completed semiannual period to the regional office.

d. Regions will sort the FAO input by individual component office and transmit the batched control logs to the appropriate component offices by 21 March and 21 September.

## Figure 15-6-1

**Defense Contract Audit Agency**
Contract Audit Followup
Summary Sheet

**Contractor:** _____

_____

**Contract Number** *(if applicable)*: _____

**Audit Report Number:** _____ **Date:** _____

**Subject to Reporting Because** *(Check one)*

**1. Report contains recommendations covering:**

_____ Estimating System
_____ Accounting System
_____ Defective Pricing
_____ Cost Accounting Standards

**2. Report has findings, recommendations, and costs questioned or qualified of $100,000 or more and covers:**

_____ Incurred costs
_____ Settlement of Indirect Cost Rates
_____ Final Pricing Submission
_____ Termination Settlement Proposal
_____ Equitable Adjustment Claims
_____ Hardship Claims
_____ Escalation Claims
_____ Internal Controls
_____ Operations Audit

**3. Report has unsettled auditor-determined final indirect cost rates** _____

**Amounts involved (if applicable) for item(s) checked in 1, 2, or 3 above:**

Costs questioned: $ _____
Cost avoidances: $ _____
Dollars audited $ _____
Cost unsupported/qualified. $ _____

**Contracting Officer, Address, and DFARS Appendix G Code (if readily available or provided in the audit request) having negotiation/resolution responsibility:**

_____

_____

_____

**Cognizant DoD Component:** _____

**Figure No. 15-6-2**
**Defense Contract Audit Agency**
**Contract Audit Followup**
**Control Log**

Period Ended: _____

Component: _____ DCAA Audit Office: _____

| Report Date | Audit Report Number | Type of Audit | Cost Questioned/ Unsupported/Qualified/ Avoidance | Contractor | Contracting Officer* Activity Address/ DFARS App. G Code |
|---|---|---|---|---|---|
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| | | | | | |

*Activity having negotiation/resolution responsibility

## 15-6S1 Supplement — Army and Navy Office Summary Sheet

### Copy Distribution List

Note: Summary Sheets are to be batched and sent to the appropriate procurement or administrative centers.

ARMY

Commander
U.S. Army Corps of Engineers
ATTN: CEPR
Washington, DC 20314-1000

Commander
U.S. Army Forces Command
ATTN: FCJ4-PR
Ft. McPherson, GA 30330-6000

Commander
U.S. Army Training and Doctrine Command
ATTN: ATCS-A
Fort Monroe, VA 23651-5000

Commander
U.S. Army Medical Research & Development Command
ATTN: SGRD-ACQ
Ft. Detrick, MD 21701-5012

Commander
U.S. Army Strategic Defense Command
ATTN: DASD-H-C
P.O.Box 1500
Huntsville, AL 35807-3801

Commander
U.S. Army Materiel Command
ATTN: AMCAQ-PM
5001 Eisenhower Ave.
Alexandria, VA 22333-0001

Commander
U.S. Army Missile Command
ATTN: AMSMI-AC-MAR
Redstone Arsenal, AL 35898-5000

Commander
U.S. Army Laboratory Command
ATTN: AMSLC-PR
2800 Powder Mill Rd.
Adelphi, MD 20783-1145

Commander
U.S. Army Communications-Electronics Command
ATTN: AMSEL-AC-BED-EN
Ft. Monmouth, NJ 07703-5000

Commander
U.S. Army Tank-Automotive Command
ATTN: AMSTA-IE
Warren, MI 48397-5000

Commander
U.S. Army Aviation and Troop Command
ATTN: AMSAT-A-AE
St. Louis, MO 63120-1798

Commander
U.S. Army Armament, Munitions and Chemical Command
ATTN: AMSMC-PPR
Rock Island, IL 61299-6000

Commander
U.S. Army Depot System Command
ATTN: AMSDS-PP
Chambersburg, PA 17201-4170

Commander
U.S. Army Test and Evaluation Command
ATTN: AMSTE-PR
Aberdeen Proving Ground, MD 21005-5055

NAVY

Cognizant DoD Component
Space and Naval Warfare Systems Command
SPAWAR-02
Washington, DC 20363-5100

Cognizant DoD Component
Office of Naval Research
Code 600
Washington, DC 20375

Cognizant DoD Component
Commandant of the Marine Corps
Contracts Division (MC-LB)
Washington, DC 22209

Cognizant DoD Component
Strategic Systems Programs
Department of the Navy
Office of Contracts, Room 1002
Washington, DC 20376-5002

Cognizant DoD Component
Naval Air Systems Command
Headquarters (AIR-2111)
Washington, DC 20361-2110

Commanding Officer
Naval Air Pacific Rework Facility
(NAVPRA)
APO San Francisco 96405

Naval Aviation Depot Operations
Center
Naval Air Station
Patuxent River, MD 20670-5449

Cognizant DoD Component
Naval Supply Systems Command,
Headquarters
Code 200
Washington, DC 20376-5002

Naval Electronic Systems Command
ELEX-02
Washington, DC 20360

Cognizant Procurement or
Administrative Center(s) for
Component Above
Commanding Officer
Naval Supply Center
Code 200
Oakland, CA 94625

Commanding Officer
Naval Supply Center
Code 200
Charleston, SC 29411-5000

Commanding Officer
Naval Supply Center
Code 200
Norfolk, VA 23512-5000

Commanding Officer
Naval Supply Center, Puget Sound
Code 200
Bremerton, WA 98314-5215

Commanding Officer
Naval Supply Center
Box 300
Code 200
Pearl Harbor, HI 96860-5060

Commanding Officer
Naval Regional Contracting Center
Washington Navy Yard
Code F
Washington, DC 20374-2004

Commanding Officer
Naval Regional Contracting Center
Code O
Philadelphia, PA 19112-5083

Commanding Officer
Naval Regional Contracting Center
Code AOB
Long Beach, CA 98022-5095

Commanding Officer
Naval Regional Contracting Center
Box 50
FPO New York 09521

Commanding Officer
Naval Supply Center
Code 200
San Diego, CA 92132-5106

Commanding Officer
Naval Regional Contracting Center
Philadelphia Newport Det.
Building 1327 Naval Base
Newport, RI 02840-5000

Commanding Officer
London Det.
US Naval Regional Contracting
Center, Naples
Box 45
APO New York 09510

Commanding Officer
US Naval Supply Depot
Box 11
Code 200
FPO Seattle 98762

Commanding Officer
Navy Ships Parts Control Center
Code 02
5450 Carlisle Pike
P.O. Box 2020
Mechanicsburg, PA 17055-0788

Commanding Officer
Navy Aviation Supply Center
Code PG
700 Robbins Avenue
Philadelphia, PA 19111-5098

Commander
Naval Air Development Center
Code 845
Warminster, PA 18974-5000

Commanding Officer
Naval Avionics Center
Code 600
Indianapolis, IN 46218-2189

Commander
Portsmouth Naval Shipyard
Portsmouth, NH 03801

Commander
Navy Resale and Service
Support Office
Fort Wadsworth
Staten Island, NY 10305

Commander
Naval Surface Weapons Center
Code S
Dahlgren, VA 22448-5110

Commanding Officer
Naval Oceanographic Center
Code 4411
NSTL Station
Bay St. Louis, MS 39529-5000

Commander
Naval Weapons Center
Code 252
China Lake, CA 93555-6001

Commanding Officer
US Naval Supply Depot (Guam)
Code 200
FPO San Francisco 96630-2903

Commander
David W. Taylor Naval Ship
Research
and Development Center
Code 53
Bethesda, MD 20084-5000

Commanding Officer
Naval Air Station
Code 77
Patuxent River, MD 20670-5304

Commanding Officer
Naval Coast Systems Center
Code 600
Panama City, FL 32407

Commanding Officer
Naval Air Station
Code 194-200
Jacksonville, FL 32212-0111

Commander
Naval Ocean Systems Center
Code 422
San Diego, CA 92152

Commanding Officer
Naval Weapons Support Center
Code 116
Crane, IN 47522

Commanding Officer
Naval Ordnance Station
Louisville, KY 40214

Commanding Officer
Naval Training Equipment Center
Orlando, FL 32813-5200

Cognizant DoD Component
Naval Facilities Engineering
Command Headquarters
FAC-02
Washington, DC 20375

Cognizant Procurement or
Administrative Center(s) for
Component Above
Commanding Officer
Southern Division
Naval Facilities Engineering
Command
Charleston, SC 28411-0068

Commander
Atlantic Division
Naval Facilities Engineering
Command
Norfolk, VA 23511-5500

Commander
Pacific Division
Naval Facilities Engineering
Command
Pearl Harbor, HI 96860-5470

Commanding Officer
Northern Division
Naval Facilities Engineering
Command
Philadelphia, PA 19112-5066

Commanding Officer
Western Division
Naval Facilities Engineering
Command
San Bruno, CA 94066-3070

Commanding Officer
Chesapeake Division
Washington Navy Yard
Washington, DC 20374-0001

Office in Charge of Construction
Naval Facilities Engineering
Command
Contracts TRIDENT
Naval Submarine Support Base
Kings Bay, GA 31547-6600

Cognizant DoD Component
Military Sealift Command
Headquarters
Director of Procurement
Code M-10
Washington, DC 20016-5100

Cognizant Procurement or
Administrative Center(s) for
Component Above
Military Sealift Command-Atlantic
Military Ocean Terminal
Building 42
Bayonne, NJ 07002

Military Sealift Command-Europe
APO New York 09069-0006

Military Sealift Command-Pacific
Oakland, CA 94624

Military Sealift Command-Far East
FPO Seattle 98760

Cognizant DoD Component
Naval Data Automation Command
Headquarters
NDAC-15
Washington, DC 20374

Cognizant Procurement or
Administrative Center(s) for
Component Above
Naval Automatic Data Processing
Selection Office
Director of Contracts
Washington, DC 20374

Naval Regional Data Automation
Center
Code 072
Washington, DC 20374

Naval Sea Systems Command
Headquarters
SEA-028
Washington, DC 20362-5101

Supervisor of Shipbuilding
Conversion/Repair, USN
ATTN: Code 400
574 Washington Street
Bath, ME 04530-0998

Supervisor of Shipbuilding
Conversion/Repair, USN
ATTN: Code 400
495 Summer Street
Boston, MA 02210-2181

Officer-In-Charge
Supervisor of Shipbuilding
Conversion/Repair, USN
ATTN: Code 400
Flushing and Washington Avenues
Brooklyn, NY 11251-9060

Supervisor of Shipbuilding
Conversion/Repair, USN
ATTN: Code 400
Naval Base
Charleston, SC 29408-6230

Supervisor of Shipbuilding
Conversion/Repair, USN
ATTN: Code 400
Groton, CT 06340-4990

Supervisor of Shipbuilding
Conversion/Repair, USN
ATTN: Code 400
P.O. Box 280158
Mayport Naval Station
Jacksonville, FL 32228-0158

Supervisor of Shipbuilding
Conversion/Repair, USN
ATTN: Code 400
Long Beach Naval Shipyard
Long Beach, CA 90822-5093

Supervisor of Shipbuilding
Conversion/Repair, USN
ATTN: Code 400
New Orleans, LA 70142-5700

Supervisor of Shipbuilding
Conversion/Repair, USN
ATTN: Code 400
Newport News, VA 23607-2785

Supervisor of Shipbuilding
Conversion/Repair, USN
ATTN: Code 400
Pascagoula, MS 39568-2210

Officer-In-Charge
Supervisor of Shipbuilding
Conversion/Repair, USN
San Diego Detachment Pearl Harbor
Box 700
Pearl Harbor, HI 96860-5353

Supervisor of Shipbuilding
Conversion/Repair, USN
ATTN: Code 400
P.O. Box 215
Portsmouth, VA 23705-0215

Supervisor of Shipbuilding
Conversion/Repair, USN
ATTN: Code 400
Box 119, Naval Station
San Diego, CA 92136-5119

Supervisor of Shipbuilding
Conversion/Repair, USN
ATTN: Code 400
San Francisco, CA 94124-5003

Resident Supervisor of Shipbuilding
Conversion/Repair, USN
Supship New Orleans Detachment,
Savannah
P.O. Box 1208
Savannah, GA 31401-1208

Supervisor of Shipbuilding
Conversion/Repair, USN
ATTN: Code 400
Seattle, WA 98115-5003

Supervisor of Shipbuilding
Conversion/Repair, USN
ATTN: Code 400
55 South Third Avenue
Sturgeon Bay, WI 54235-2239

## 15-6S2 Supplement — DCAA Control Log

### Distribution List

AIR FORCE

1. A copy of all control logs applicable to all Air Force components should be sent to:

Headquarters, SAF/AQC
Pentagon, Room 4C314
Washington, DC 20330-1000

2. A separate control log should be prepared for both Headquarters, SAF/AQCF and Air Force Materiel Command and sent to the addresses listed below in **BOLD PRINT.** Each log should identify only reportable audits previously sent to activities listed directly below the respective **BOLD PRINT** address.

3. Any activity not listed below which receives a reportable audit report with a summary sheet attached, should be provided control logs listing all audits provided to that activity within the six month period.

**Headquarters, SAF/AQCF**
**Pentagon**
**Washington, DC 20330**

Director of Contracting
Pacific Air Forces
PACAF/LGC
Hickam AFB, HI 96853-5001

Directorate of Contracting
HQ USAFA/LGC
P.O. Box 189
USAF Academy, CO 80840-0189

Air Force Communications Command
HQ AFCC/PK
203 West Losey St.
Room 1020
Scott AFB, IL 62225-5219

Air Training Command
HQ ATC/LGC
550 D St. East STE 03 Bldg 399
Randolph AFB, TX 78150-4429

Director of Contracts
Air Mobility Command
HQ AMC/LGC
402 Scott Dr., Room 132
Scott AFB, IL 62235-5363

Air Force Intelligence Command
HQ AFIC/LECC
306 Wakkanai, Suite 1
San Antonio, TX 78243-7139

Director of Contracts
Air Force Reserve
HQ AFRES/LGC
155 2nd St.
Robins AFB, GA 31098-1635

Director of Contracting
Air Combat Command
HQ ACC/LGC
130 Douglas St., Suite 210
Langley AFB, VA 23665-2791

Director of Contracting
United States Air Forces
in Europe
USAFE/LGC
APO New York 09012-5001

Director of Contracts
21st Contract Squadron/LGC
700 Suffolk St.
Peterson AFB, CO 80914-1200

**Air Force Materiel Command**
**HQ AFMC/PKF**
**Wright-Patterson AFB, OH 45433**

AGMC/PK
813 Irving-Wick Drive W
Newark AFB, OH 43057-0027

Director of Contracts
Air Force Office of Scientific
Research/PK,
Bldg 410
Bolling AFB
Washington, DC 20332-6448

Director of Contracting
Rome Lab/PKP
26 Electronics Parkway
Griffiss AFB, NY 13441-4514

Director of Contracting
5 South Wolfe Ave
Edwards AFB, CA 93524-1185

Contracting Directorate
Arnold Engineering Development Center/PK
100 Kwidel Dr., Suite A335
Arnold AFB, TN 37389-1335

ARMY

1. A copy of all control logs applicable to all Army components should be sent to:

Deputy Assistant Secretary of the Army (Acquisition)
Office of the Assistant Secretary of the Army (Research, Development and Acquisition)
Department of the Army
Pentagon
Washington, DC 20310

2. In addition, applicable control logs should be sent to the following cognizant Army components. Any activity not listed below which receives a reportable audit report with a summary sheet attached, should be provided control logs listing all audits provided to that activity within the six month period.

Commander
U.S. Army Corps of Engineers
ATTN: CEPR
Washington, DC 20314-1000

Commander
U.S. Army Forces Command
ATTN: FCJ4-PR
Fort McPherson, GA 30330-6000

Commander
U.S. Army Training and Doctrine Command
ATTN: ATCS-A
Fort Monroe, VA 23651-5000

Commander
U.S. Army Medical Research & Development Command
ATTN: SGRD-ACQ
Fort Detrick, MD 21701-5012

Commander
U.S. Army Strategic Defense Command
ATTN: DASD-H-C
PO Box 1500
Huntsville, AL 35807-3801

Commander
U.S. Army Material Command
ATTN: AMCAQ-PM
5001 Eisenhower Ave.
Alexandria, VA 22333-001

Commander
U.S. Army Missile Command
ATTN: AMSMI-AC-MAR
Redstone Arsenal, AL 35898-5000

Commander
U.S. Army Laboratory Command
ATTN: AMSLC-PR
2800 Powder Mill Rd.
Adelphi, MD 20783-1145

Commander
U.S. Army Communications-Electronics Command
ATTN: AMSEL-AC-BED-EN
Fort Monmouth, NJ 07703-5000

Commander
U.S. Army Tank-Automotive Command
ATTN: AMSTA-IE
Warren, MI 48090-5000

Commander
U.S. Army Aviation and Troop Command
ATTN: AMSAT-A-AE
St. Louis, MO 63120-1798

Commander
U.S. Army Armament, Munitions, and Chemical Command
ATTN: AMSMC-PPR
Rock Island, IL 61299-6000

Commander
U.S Army Depot System Command
ATTN: AMSDS-PP
Chambersburg, PA 17201-4170

Commander
U.S. Army Test and Evaluation Command
ATTN: AMSTE-PR
Aberdeen Proving Ground, MD 21005-5055

NAVY

1. A copy of all control logs applicable to all Navy components should be sent to:

Office of the Assistant Secretary of the Navy
(Research, Development and Acquisition)
Navy Acquisition Executive
APIA-PP Room 536
2211 Jefferson Davis Highway
Arlington, VA 22244-5106

2. In addition, applicable control logs should be sent to the following cognizant Navy components:

Commander
Naval Air Systems Command
code air-2111
1421 Jefferson Davis Highway
Arlington VA 22243-2110

Naval Supply Systems Command
SUP-022
1931 Jefferson Davis Highway
Arlington VA 22241-5360

Commander
Space and Naval Warfare Systems Command
SPAWAR-02
2451 Crystal Drive
Arlington VA 22245-5200

Naval Facilities Engineering Command
Code 11
200 Stovall Street
Alexandria VA 22332

Commander
Naval Sea Systems Command
SEA-028
2531 Jefferson Davis Highway
Arlington VA 22242-5160

Office of Naval Research
800 North Quincy Street
Code 14
Arlington, VA 22217-0002

Commandant of the Marine Corps
Contracts Division (MC-LB)
Washington, DC 22209

Military Sealift Command
Division of Procurement (Code M-10)
Washington, DC 20398-5540

Naval Data Automation Command
NDAC-15
Washington, DC 20374

Stategic Systems Programs
Department Of The Navy
ATTN CODE SPN
1931 Jefferson Davis Highway
Arlington VA 22241-5362

DEFENSE LOGISTICS AGENCY

1. A copy of all control logs for contract audit follow-up reports applicable to DLA management offices should be sent to the cognizant office listed below:

Director, Contract Management
DCMD Southern
805 Walker Street
Marietta, GA 30060-2789

Director, Contract Management
DCMD Northeast
495 Summer Street
Boston, MA 02210-2184

Director, Contract Management
DCMD North Central
PO Box 66926
10601 West Higgins
O'Hare International Airport
Chicago, IL 60666-0926

Director, Contract Management
DCMD West
222 N. Sepulveda
El Segundo, CA 90045-4320

Director, Contract Management
DCMD Mid-Atlantic
2800 South 20th Street
Philadelphia, PA 19101-7478

Director, Contract Management
DCMC International
2000 Hamilton Street
Dayton, OH45444-5410

2. A copy of all control logs for contract audit follow-up reports applicable to DLA Supply Centers and other contracting offices (not DCMAOs or DPROs) should be sent to:

a. HQ Defense Logistics Agency
ATTN: DLA-PPR
Cameron Station
Alexandria, VA 22304-6100

b. Distribution addresses for DLA Supply Centers:
Chief, Cost & Price Analysis Branch
Defense Construction Supply Center
ATTN: DCSC-PPC
PO Box 3990
Columbus, OH 43216-5000

Chief, Cost & Price Analysis Branch
Defense Electronics Supply Center
ATTN: DESC-PAP
1507 Wilmington Pike
Dayton, OH45444-5000

Chief, Cost & Price Analysis Division
Defense Fuel Supply Center
ATTN: DFSC-PA
Cameron Station
Alexandria, VA 22304-6160

Chief, Cost & Price Analysis Branch
Defense General Supply Center
ATTN: DGSC-PAP
Richmond, VA 23297-5000

Chief, Cost & Price Analysis Branch
Defense Industrial Supply Center
ATTN: DISC-PTP
700 Robins Avenue
Philadelphia, PA 19111-5096

Chief, Cost & Price Analysis Branch
Defense Personnel Supply Center
ATTN: DPSC-PMC
2800 South 20th Street
Philadelphia, PA 19101-8419

DEFENSE INFORMATION SYSTEMS AGENCY

Defense Information Systems Agency
Chief, Contract Management Division, Code PM
701 South Courthouse Road
Arlington, VA 22204-1845

DEFENSE MAPPING AGENCY

Defense Mapping Agency
8613 Lee Highway
ATTN: AQ (A-3)
Fairfax, VA 22031-2139

DEFENSE NUCLEAR AGENCY

Defense Nuclear Agency
Attn: Director, Acquisition Management
6801 Telegraph Road
Alexandria, VA 22310-3398

NATIONAL SECURITY AGENCY

Maryland Procurement Agency
9800 Savage Road
Fort Meade, MD 20755-6000

DEFENSE SUPPLY SERVICES - WASHINGTON

Defense Supply Services, Washington
Room 1D245, Pentagon
Washington, DC 20310-5200

NASA HEADQUARTERS

Headquarters, National Aeronautics and Space Administration
300 E Street, SW
Attn: Code HP
Washington, DC 20546-0000

# 15-700 Section 9 — Cost Monitoring

## 15-701 Introduction

This section presents audit guidance relating to the Agency's support of DoD components responsible for establishing formal cost monitoring programs to ensure that contractors are effectively managing and controlling their direct and indirect costs. DoD guidelines on the establishment of these programs are in DFARS Subpart 242.70, "Monitoring Contractors' Costs."

## 15-702 Formal Monitoring Program Criteria

DFARS 242.7002-1 states that a formal cost monitoring program should be established at all major contractor locations which satisfy the criteria below, or at any other contractor location where directed by the head of the contracting activity. The criteria are:

a. The contractor's next fiscal year sales to the government are expected to exceed $100 million on other than firm fixed-price and fixed-price with escalation contracts;.

b. The contract administration office determines the cost benefits to be derived from monitoring a contractor with less than $100 million in other than firm fixed-price and fixed-price with escalation contracts would be warranted; or

c. The government's share of indirect costs for these sales is at least 50 percent of the total indirect costs.

## 15-703 Responsibilities

Primary responsibility for controlling and managing DoD contract costs rests with contractor management (DFARS 242.7001). DoD representatives monitor cost management to ensure that contractors are fulfilling their commitments.

### 15-703.1 Cost Monitoring Specialist

For those contractor locations falling under the requirements of DFARS 242.7002-1, the cost monitoring specialist (CMS) is the designated individual in the contract administration office (CAO) responsible for conducting the cost monitoring program. The CMS may be the ACO or another CAO staff member. Specific CMS responsibilities are listed in DFARS 242.7002-2. They include:

a. Planning. A formal monitoring program focuses on the contractor's policies, procedures and practices, and is intended to prevent duplication in the monitoring of contractor costs. The CMS is responsible for preparation of a mutually acceptable consolidated plan and schedule for monitoring the contractor's operations, based on the long-range plans prepared by the various team specialists, including the contract auditor. Prior to the beginning of each government fiscal year the CMS is to coordinate with CAO and DCAA representatives to select areas for review during that period. Examples of the data used in the selection process are identified in DFARS 242.7003-2.

b. Coordination. The CMS is responsible for the various aspects of coordination associated with the program including the execution of cost monitoring efforts; informing contracting officers, auditors and other officials of matters affecting costs on government contracts; and ensuring access to all pertinent contractor policies, procedures, and related data.

c. Monitoring. The CMS is responsible for continuously monitoring the status of the outstanding program review recommendations and for advising the ACO of any necessary corrective action.

### 15-703.2 DCAA

a. Plan execution. A cost monitoring program does not change or add to DCAA's basic responsibilities with regard to providing auditing services and accounting and financial advice to other DoD components. As stated in DFARS 242.7002-3(a), the auditor has primary access to the contractor's financial and accounting records supporting proposed costs or pricing data, and the CAO is required to utilize DCAA's services and audit expertise (see 1-403). The plan described in 15-703.1a generally identifies the organization(s) responsible for

performing planned reviews. DCAA will conduct reviews and sign reports where no technical support is required. Reviews requiring both CAO and DCAA expertise will be conducted jointly, with resulting reports signed by the heads of the respective local organizations. Exit conference and report processing details are in DFARS 242.7004(b) and (c). When preparing reports, the auditor should follow the general reporting guidance in 10-100 and 10-200, and the report format in 10-400.

b. Followup. Although DFARS 242.7002-2 assigns primary responsibility for the monitoring of outstanding reported issues and recommendations to the CMS, the FAO should continue to track the status and resolution of those issues and recommendations which affect the Agency's areas of responsibility. The FAO should also keep the CMS/ACO appropriately informed on any subsequent audit activity or followup actions which affect the outstanding issues and recommendations.

## 15-704 Resolution

The ACO is responsible for resolving CAO/DCAA differences, and for effecting final settlement on issues disputed by the contractor. Guidance on major issues in dispute and DCAA resolution responsibilities is in 1-403.3 and 15-603.3.

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# APPENDIX A

## A-000 CONTRACT COST PRINCIPLES AND PROCEDURES

### A-001 Scope of Appendix

This appendix presents transcripts of the Federal Acquisition Regulation (FAR) Part 31, and Part 231 of the DoD FAR Supplement (DFARS). Also presented is a cross index of FAR to DFARS and to the cost principles included in the Defense Acquisition Regulation (DAR). Effective 1 April 1984, the FAR, together with agency supplemental regulations, replaced the DAR and the NASA Procurement Regulation. The presentation of FAR Part 31 is composed of the initial 1984 edition of the part together with changes which have since been published. The presentation of Part 231 of the DoD FAR Supplement is composed of the April 1984 part and changes since that date. The FAR is effective for new solicitations on or after April 1, 1984. DCAA field office libraries include complete copies of the FAR, DFARS, DAR, and the Cross Index of DAR to FAR.

## A-100 CROSS INDEX - FAR, DAR, DFARS CONTRACT COST PRINCIPLES AND PROCEDURES

### A-101 Scope of Section

This cross index identifies corresponding segments of the cost principles by number and title for the FAR, DoD FAR Supplement, and DAR.

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# A-200 DEFENSE ACQUISITION REGULATION — SECTION XV CONTRACT COST PRINCIPLES AND PROCEDURES

Since DAR Section XV was superceded beginning 1 April 1984, it is no longer printed in CAM; however, it is available in the FAO library.

# A-300 FEDERAL ACQUISITION REGULATION — PART 31 — CONTRACT COST PRINCIPLES AND PROCEDURES

## A-301 Scope of Section.

The Federal Acquisition Regulation Part 31, Contract Cost Principles and Procedures, is transcribed on attached pages A-57 to A-119. The transcript reproduces the initial 1984 edition of FAR Part 31 updated through Federal Acquisition Circular (FAC) Number 90-20.

A chronological history of changes has been listed by FAC number and date after each affected cost principle.

# PART 31 — CONTRACT COST PRINCIPLES AND PROCEDURES

## 31.000 Scope of part.

This part contains cost principles and procedures for (a) the pricing of contracts, subcontracts, and modifications to contracts and subcontracts whenever cost analysis is performed (see 15.805-3) and (b) the determination, negotiation, or allowance of costs when required by a contract clause.

## 31.001 Definitions.

"Accrued benefit cost method" means an actuarial cost method under which units of benefit are assigned to each cost accounting period and are valued as they accrue; i.e., based on the services performed by each employee in the period involved. The measure of normal cost under this method for each cost accounting period is the present value of the units of benefit deemed to be credited to employees for service in that period. The measure of the actuarial liability at a plan's inception date is the present value of the units of benefit credited to employees for service prior to that date. (This method is also known as the unit credit cost method.)

"Accumulating costs" means collecting cost data in an organized manner, such as through a system of accounts.

"Actual cash value" means the cost of replacing damaged property with other property of like kind and quality in the physical condition of the property immediately before the damage.

"Actual costs," as used in this part (other than Subpart 31.6), means amounts determined on the basis of costs incurred, as distinguished from forecasted costs. Actual costs include standard costs properly adjusted for applicable variances.

"Actuarial assumption" means a prediction of future conditions affecting pension costs; e.g., mortality rate, employee turnover, compensation levels, pension fund earnings, and changes in values of pension funds assets.

"Actuarial cost method" means a technique which uses actuarial assumptions to measure the present value of future pension benefits and pension fund administrative expenses, and which assigns the cost of such benefits and expenses to cost accounting periods.

"Actuarial gain and loss" means the effect on pension cost resulting from differences between actuarial assumptions and actual experience.

"Actuarial liability" means pension cost attributable, under the actuarial cost method in use, to years before the date of a particular actuarial valuation. As of such date, the actuarial liability represents the excess of the present value of the future benefits and administrative expenses over the present value of future contributions, for the normal cost for all plan participants and beneficiaries. The excess of the actuarial liability over the value of the assets of a pension plan is the unfunded actuarial liability.

"Actuarial valuation" means the determination, as of a specified date, of the normal cost, actuarial liability, value of the assets of a pension fund, and other relevant values for the pension plan.

"Allocate" means to assign an item of cost, or a group of items of cost, to one or more cost objectives. This term includes both direct assignment of cost and the reassignment of a share from an indirect cost pool.

"Automatic data processing equipment (ADPE)," as used in this part means:

(a) Digital and analog computer components and systems, irrespective of type of use, size, capacity, or price;

(b) All peripheral, auxiliary, and accessorial equipment used in support of digital and/or analog computers, either cable connected, or "self standing," and whether selected or acquired with the computers or separately;

(c) Punched card machines (PCM) and systems used in conjunction with or independently of digital or analog computers; and

(d) Digital and analog terminal and conversion equipment that is acquired solely or primarily for use with a system which employs a computer or punched card machines.

"Business unit" means any segment of an organization, or an entire business organization which is not divided into segments.

"Compensated personal absence" means any absence from work for reasons such as illness, vacation, holidays, jury duty, military training, or personal activities for which an employer pays compensation directly to an employee in accordance with a plan or custom of the employer.

"Cost input" means the cost, except general and administrative (G&A) expenses, which for contract costing purposes is allocable to the production of goods and services during a cost accounting period.

"Cost objective," as used in this part (other than Ssubpart 31.6), means a function, organizational subdivision, contract, or other work unit for which cost data are desired and for which provision is made to accumulate and measure the cost of processes, products, jobs, capitalized projects, etc.

"Cost of capital committed to facilities" means an imputed cost determined by applying a cost of money rate to facilities capital.

"Deferred compensation" means an award made by an employer to compensate an employee in a future cost accounting period or periods for services rendered in one or more cost accounting periods before the date of the receipt of compensation by the employee. This definition shall not include the amount of year end accruals for salaries, wages, or bonuses that are to be paid within a reasonable period of time after the end of a cost accounting period.

"Defined-benefit pension plan" means a pension plan in which the benefits to be paid, or the basis for determining such benefits, are established in advance and the contributions are intended to provide the stated benefits.

"Defined-contribution pension plan" means a pension plan in which the contributions to be made are established in advance and the benefits are determined thereby.

"Directly associated cost" means any cost which is generated solely as a result of the incurrence of another cost, and which would not have been incurred had the other cost not been incurred.

"Estimating costs" means the process of forecasting a future result in terms of cost, based upon information available at the time.

"Expressly unallowable cost" means a particular item or type of cost which, under the express provisions of an applicable law, regulation, or contract, is specifically named and stated to be unallowable.

"Facilities capital" means the net book value of tangible capital assets and of those intangible capital assets that are subject to amortization.

"Final cost objective," as used in this part (other than subparts 31.3 and 31.6), means a cost objective that has allocated to it both direct and indirect costs and, in the contractor's accumulation system, is one of the final accumulation points.

"Fiscal year," as used in this part, means the accounting period for which annual financial statements are regularly prepared, generally a period of 12 months, 52 weeks, or 53 weeks.

"Funded pension cost," as used in this part, means the portion of pension costs for a current or prior cost accounting period that has been paid to a funding agency.

"General and administrative (G&A) expense" means any management, financial, and other expense which is incurred by or allocated to a business unit and which is for the general management and administration of the business unit as a whole. G&A expense does not include those management expenses whose beneficial or causal relationship to cost objectives can be more directly measured by a base other than a cost input base representing the total activity of a business unit during a cost accounting period.

"Home office" means an office responsible for directing or managing two or more, but not necessarily all, segments of an organization. It typically establishes policy for, and provides guidance to, the segments in their operations. It usually performs management, supervisory, or administrative functions, and may also perform service functions in support of the operations of the various segments. An organization which has intermediate

levels, such as groups, may have several home offices which report to a common home office. An intermediate organization may be both a segment and a home office.

"Immediate-gain actuarial cost method" means any of the several actuarial cost methods under which actuarial gains and losses are included as part of the unfunded actuarial liability of the pension plan, rather than as part of the normal cost of the plan.

"Independent research and development (IR&D) cost" means the cost of effort which is neither sponsored by a grant, nor required in performing a contract, and which falls within any of the following four areas: (a) basic research, (b) applied research, (c) development, and (d) systems and other concept formulation studies.

"Indirect cost pools," as used in this part (other than Subparts 31.3 and 31.6), means groupings of incurred costs identified with two or more cost objectives but not identified specifically with any final cost objective.

"Insurance administration expenses" means the contractor's costs of administering an insurance program; e.g., the costs of operating an insurance or risk-management department, processing claims, actuarial fees, and service fees paid to insurance companies, trustees, or technical consultants.

"Intangible capital asset" means an asset that has no physical substance, has more than minimal value, and is expected to be held by an enterprise for continued use or possession beyond the current accounting period for the benefits it yields.

"Labor cost at standard" means a preestablished measure of the labor element of cost, computed by multiplying labor-rate standard by labor-time standard.

"Labor-rate standard" means a preestablished measure, expressed in monetary terms, of the price of labor.

"Labor-time standard" means a preestablished measure, expressed in temporal terms, of the quantity of labor.

"Material cost at standard" means a preestablished measure of the material elements of cost, computed by multiplying material-price standard by material-quantity standard.

"Material-price standard" means a preestablished measure, expressed in monetary terms, of the price of material.

"Material-quantity standard" means a preestablished measure, expressed in physical terms, of the quantity of material.

"Moving average cost" means an inventory costing method under which an average unit cost is computed after each acquisition by adding the cost of the newly acquired units to the cost of the units of inventory on hand and dividing this figure by the new total number of units.

"Normal cost" means the annual cost attributable, under the actuarial cost method in use, to years subsequent to a particular valuation date.

"Original complement of low cost equipment" means a group of items acquired for the initial outfitting of a tangible capital asset or an operational unit, or a new addition to either. The items in the group individually cost less than the minimum amount established by the contractor for capitalization for the classes of assets acquired but in the aggregate they represent a material investment. The group, as a complement, is expected to be held for continued service beyond the current period. Initial outfitting of the unit is completed when the unit is ready and available for normal operations.

"Pay-as-you-go cost method" means a method of recognizing pension cost only when benefits are paid to retired employees or their beneficiaries.

"Pension plan" means a deferred compensation plan established and maintained by one or more employers to provide systematically for the payment of benefits to plan participants after their retirements; provided, that the benefits are paid for life or are payable for life at the option of the employees. Additional benefits such as permanent and total disability and death payments, and survivorship payments to beneficiaries of deceased employees may be an integral part of a pension plan.

"Pension plan participant" means any employee or former employee of an em-

ployer or any member or former member of an employee organization, who is or may become eligible to receive a benefit from a pension plan which covers employees of such employer or members of such organization who have satisfied the plan's participation requirements, or whose beneficiaries are receiving or may be eligible to receive any such benefit. A participant whose employment status with the employer has not been terminated is an active participant of the employer's pension plan.

"Pricing" means the process of establishing a reasonable amount or amounts to be paid for supplies or services.

"Profit center," as used in this part (other than Subparts 31.3 and 31.6), means the smallest organizationally independent segment of a company charged by management with profit and loss responsibilities.

"Projected average loss" means the estimated long-term average loss per period for periods of comparable exposure to risk of loss.

"Projected benefit cost method" means any of the several actuarial cost methods which distribute the estimated total cost of all the employees' prospective benefits over a period of years, usually their working careers.

"Proposal" means any offer or other submission used as a basis for pricing a contract, contract modification, or termination settlement or for securing payments thereunder.

"Residual value" means the proceeds, less removal and disposal costs, if any, realized upon disposition of a tangible capital asset. It usually is measured by the net proceeds from the sale or other disposition of the asset, or its fair value if the asset is traded in on another asset. The estimated residual value is a current forecast of the residual value.

"Segment" means one of two or more divisons, product departments, plants, or other subdivisions of an organization reporting directly to a home office, usually identified with responsibility for profit and/or producing a product or service. The term includes Government-owned contractor-operated (GOCO) facilities, and joint ventures and subsidiaries (domestic and foreign) in which the organization has a majority ownership. The term also includes those joint ventures and subsidiaries (domestic and foreign) in which the organization has less than a majority of ownership, but over which it exercises control.

"Self-insurance" means the assumption or retention of the risk of loss by the contractor, whether voluntarily or involuntarily. Self-insurance includes the deductible portion of purchased insurance.

"Self-insurance charge" means a cost which represents the projected average loss under a self-insurance plan.

"Service life" means the period of usefulness of a tangible capital asset (or group of assets) to its current owner. The period may be expressed in units of time or output. The estimated service life of a tangible capital asset (or group of assets) is a current forecast of its service life and is the period over which depreciation cost is to be assigned.

"Spread-gain actuarial cost method" means any of the several projected benefit actuarial cost methods under which actuarial gains and losses are included as part of the current and future normal costs of the pension plan.

"Standard cost" means any cost computed with the use of preestablished measures.

"Tangible capital asset" means an asset that has physical substance, more than minimal value, and is expected to be held by an enterprise for continued use or possession beyond the current accounting period for the services it yields.

"Termination gain or loss" means an actuarial gain or loss resulting from the difference between the assumed and actual rates at which pension plan participants separate from employment for reasons other than retirement, disability, or death.

"Unallowable cost" means any cost which, under the provisions of any pertinent law, regulation, or contract, cannot be included in prices, cost-reimbursements, or settlements under a Government contract to which it is allocable.

"Unfunded pension plan" as used in this part, means a defined benefit pension plan for which no funding agency is established for the accumulation of contributions.

"Variance" means the difference between a preestablished measure and an actual measure.

"Weighted average cost" means an inventory costing method under which an average unit cost is computed periodically by dividing the sum of the cost of beginning inventory plus the cost of acquisitions by the total number of units included in these two categories.

# SUBPART 31.1 — APPLICABILITY

## 31.100 Scope of subpart.

This subpart describes the applicability of the cost principles and procedures in succeeding subparts of this part to various types of contracts and subcontracts. It also describes the need for advance agreements.

## 31.101 Objectives.

In recognition of differing organizational characteristics, the cost principles and procedures in the succeeding subparts are grouped basically by organizational type; e.g., commercial concerns and educational institutions. The overall objective is to provide that, to the extent practicable, all organizations of similar types doing similar work will follow the same cost principles and procedures. To achieve this uniformity, individual deviations concerning cost principles require advance approval of the agency head or designee in the case of civilian agencies and the National Aeronautics and Space Administration, and by the Director of Defense Procurement, Office of the Under Secretary of Defense for Acquisition (USD(A)DP), in the case of the Department of Defense. Agency supplements and class deviations require advance approval by either the USD(A)DP or Civilian Agency Acquisition Council, as appropriate.

## 31.102 Fixed-price contracts.

The applicable subparts of Part 31 shall be used in the pricing of fixed-price contracts, subcontracts, and modifications to contracts and subcontracts whenever (a) cost analysis is performed, or (b) a fixed-price contract clause requires the determination or negotiation of costs. However, application of cost principles to fixed-price contracts and subcontracts shall not be construed as a requirement to negotiate agreements on individual elements of cost in arriving at agreement on the total price. The final price accepted by the parties reflects agreement only on the total price. Further, notwithstanding the mandatory use of cost principles, the objective will continue to be to negotiate prices that are fair and reasonable, cost and other factors considered.

## 31.103 Contracts with commercial organizations.

This category includes all contracts and contract modifications for supplies, services, or experimental, developmental, or research work negotiated with organizations other than educational institutions (see 31.104), construction and architect-engineer contracts (see 31.105), State and local governments (see 31.107) and nonprofit organizations (see 31.108) on the basis of cost.

(a) The cost principles and procedures in Subpart 31.2 and agency supplements shall be used in pricing negotiated supply, service, experimental, developmental, and research contracts and contract modifications with commercial organizations whenever cost analysis is performed as required by 15.805-3.

(b) In addition, the contracting officer shall incorporate the cost principles and procedures in Subpart 31.2 and agency supplements by reference in contracts with commercial organizations as the basis for—

(1) Determining reimbursable costs under (i) cost-reimbursement contracts and cost-reimbursement subcontracts under these contracts performed by commercial organizations and (ii) the cost-reimbursement portion of time-and-materials contracts except when material is priced on a basis other than at cost (see 16.601(b)(3));

(2) Negotiating indirect cost rates (see Subpart 42.7);

(3) Proposing, negotiating, or determining costs under terminated contracts (see 49.103 and 49.113);

(4) Price revision of fixed-price incentive contracts (see 16.204 and 16.403);

(5) Price redetermination of price redetermination contracts (see 16.205 and 16.206); and

(6) Pricing changes and other contract modifications.

## 31.104 Contracts with educational institutions.

This category includes all contracts and contract modifications for research and development, training, and other work performed by educational institutions.

(a) The contracting officer shall incorporate the cost principles and procedures in Subpart 31.3 by reference in cost-reimbursement contracts with educational institutions as the basis for—

(1) Determining reimbursable costs under the contracts and cost-reimbursement subcontracts thereunder performed by educational institutions;

(2) Negotiating indirect cost rates; and

(3) Settling costs of cost-reimbursement terminated contracts (see Subpart 49.3 and 49.109-7).

(b) The cost principles in this subpart are to be used as a guide in evaluating costs in connection with negotiating fixed-price contracts and termination settlements.

## 31.105 Construction and architect-engineer contracts.

(a) This category includes all contracts and contract modifications negotiated on the basis of cost with organizations other than educational institutions (see 31.104), State and local governments (see 31.107), and nonprofit organizations except those exempted under OMB Circular A-122 (see 31-108) for construction management or construction, alteration or repair of buildings, bridges, roads, or other kinds of real property. It also includes architect-engineer contracts related to construction projects. It does not include contracts for vessels, aircraft, or other kinds of personal property.

(b) Except as otherwise provided in (d) below, the cost principles and procedures in Subpart 31.2 shall be used in the pricing of contracts and contract modifications in this category if cost analysis is performed as required by 15.805-3.

(c) In addition, the contracting officer shall incorporate the cost principles and procedures in Subpart 31.2 (as modified by (d) below) by reference in contracts in this category as the basis for—

(1) Determining reimbursable costs under cost-reimbursement contracts, including cost-reimbursement subcontracts thereunder;

(2) Negotiating indirect cost rates;

(3) Proposing, negotiating, or determining costs under terminated contracts;

(4) Price revision of fixed-price incentive contracts; and

(5) Pricing changes and other contract modifications.

(d) Except as otherwise provided in this paragraph (d), the allowability of costs for construction and architect-engineer contracts shall be determined in accordance with Subpart 31.2.

(1) Because of widely varying factors such as the nature, size, duration, and location of the construction project, advance agreements as set forth in 31.109, for such items as home office overhead, partners' compensation, employment of consultants, and equipment usage costs, are particularly important in construction and architect-engineer contracts. When appropriate they serve to express the parties' understanding and avoid possible subsequent disputes or disallowances.

(2) Construction equipment," as used in this section, means equipment (including marine equipment) in sound workable condition, either owned or controlled by the contractor or the subcontractor at any tier, or obtained from a commercial rental source, and furnished for use under Government contracts.

(i) Allowable ownership and operating costs shall be determined as follows:

(A) Actual cost data shall be used when such data can be determined for both ownership and operating costs for each piece of equipment, or groups of similar serial or series equipment, from the contractor's accounting records. When such costs cannot be so determined, the contracting agency may specify the use of a particular schedule of predetermined rates or any part thereof to determine ownership and operating costs of construction equipment (see subdivisions (d)(2)(i)(B) and (C) of this section). However, costs otherwise unallowable under this part shall not become allowable through the use of any schedule (see 31.109(c)). For example, schedules need

to be adjusted for Government contract costing purposes if they are based on replacement cost, include unallowable interest costs, or use improper cost of money rates or computations. Contracting officers should review the computations and factors included within the specified schedule and ensure that unallowable or unacceptably computed factors are not allowed in cost submissions.

(B) Predetermined schedules of construction equipment use rates (e.g., the Construction Equipment Ownership and Operating Expense Schedule published by the U.S. Army Corps of Engineers, industry sponsored construction equipment cost guides, or commercially published schedules of construction equipment use cost) provide average ownership and operating rates for construction equipment. The allowance for operating costs may include costs for such items as fuel, filters, oil, and grease; servicing, repairs, and maintenance; and tire wear and repair. Costs of labor, mobilization, demobilization, overhead, and profit are generally not reflected in schedules, and separate consideration may be necessary.

(C) When a schedule of predetermined use rates for construction equipment is used to determine direct costs, all costs of equipment that are included in the cost allowances provided by the schedule shall be identified and eliminated from the contractor's other direct and indirect costs charged to the contract. If the contractor's accounting system provides for site or home office overhead allocations, all costs which are included in the equipment allowances may need to be included in any cost input base before computing the contractor's overhead rate. In periods of suspension of work pursuant to a contract clause, the allowance for equipment ownership shall not exceed an amount for standby cost as determined by the schedule or contract provision.

(ii) Reasonable costs of renting construction equipment are allowable (but see paragraph (C) below).

(A) Costs, such as maintenance and minor or running repairs incident to operating such rented equipment, that are not included in the rental rate are allowable.

(B) Costs incident to major repair and overhaul of rental equipment are unallowable.

(C) The allowability of charges for construction equipment rented from any division, subsidiary, or organization under common control, will be determined in accordance with 31.205-36(b)(3).

(3) Costs incurred at the job site incident to performing the work, such as the cost of superintendence, timekeeping and clerical work, engineering, utility costs, supplies, material handling, restoration and cleanup, etc., are allowable as direct or indirect costs, provided the accounting practice used is in accordance with the contractor's established and consistently followed cost accounting practices for all work.

(4) Rental and any other costs, less any applicable credits incurred in acquiring the temporary use of land, structures, and facilities are allowable. Costs, less any applicable credits, incurred in constructing or fabricating structures and facilities of a temporary nature are allowable.

## 31.106 Facilities contracts.

### 31.106-1 Applicable cost principles.

The cost principles and procedures applicable to the evaluation and determination of costs under facilities contracts (as defined in 45.301), and subcontracts thereunder, will be governed by the type of entity to which a facilities contract is awarded. Except as otherwise provided in 31.106-2 below, Subpart 31.2 applies to facilities contracts awarded to commercial organizations; subpart 31.3 applies to facilities contracts awarded to educational institutions; and 31.105 applies to facilities contracts awarded to construction contractors. Whichever cost principles are appropriate will be used in the pricing of facilities contracts and contract modifications if cost analysis is performed as required by 15.805-3. In addition, the contracting officer shall incorporate the cost principles and procedures appropriate in the circumstances (e.g., Subpart 31.2; Subpart 31.3; or 31.105) by reference in facilities contracts as the basis for—

(a) Determining reimbursable costs under facilities contracts, including cost-reimbursement subcontracts thereunder;
(b) Negotiating indirect cost rates; and
(c) Determining costs of terminated contracts when the contractor elects to "voucher out" costs (see Subpart 49.3), and for settlement by determination (see 49.109-7).

**31.106-2 Exceptions to general rules on allowability and allocability.**

(a) A contractor's established accounting system and procedures are normally directed to the equitable allocation of costs to the types of products which the contractor produces or services rendered in the course of normal operating activities. The acquisition of, or work on, facilities for the Government normally does not involve the manufacturing processes, plant departmental operations, cost patterns of work, administrative and managerial control, or clerical effort usual to production of the contractor's normal products or services.

(b) Advance agreements (see 31.109) should be made between the contractor and the contracting officer as to indirect cost items to be applied to the facilities acquisition. A contractor's normal accounting practice for allocating indirect costs to the acquisition of contractor facilities may range from charging all these costs to this acquisition to not charging any. When necessary to produce an equitable result, the contractor's usual method of allocating indirect cost shall be varied, and appropriate adjustment shall be made to the pools of indirect cost and the bases of their distribution.

(c) The purchase of completed facilities (or services in connection with the facilities) from outside sources does not involve the contractor's direct labor or indirect plant maintenance personnel. Accordingly, indirect manufacturing and plant overhead costs, which are primarily incurred or generated by reason of direct labor or maintenance labor operations, are not allocable to the acquisition of such facilities.

(d) Contracts providing for the installation of new facilities or the rehabilitation of existing facilities may involve the use of the contractor's plant maintenance labor, as distinguished from direct labor engaged in the production of the company's normal products. In such instances, only those types of in direct manufacturing and plant operating costs that are related to or incurred by reason of the expenditures of the classes of labor used for the performance of the facilities work may be allocated to the facilities contract. Thus, a facilities contract which involves the use of plant maintenance labor only would not be subject to an allocation of such cost items as direct productive labor supervision, depreciation, and maintenance expense applicable to productive machinery and equipment, or raw material and finished goods storage costs.

(e) Where a facilities contract calls for the construction, production, or rehabilitation of equipment or other items that are involved in the regular course of the contractor's business by the use of the contractor's direct labor and manufacturing processes, the indirect costs normally allocated to all that work may be allocated to the facilities contract.

**31.106-3 Contractor's commercial products.**

If facilities constituting the contractor's usual commercial products (or only minor modifications thereof) are acquired by the Government under the contract, the Government shall not pay any amount in excess of the contractor's most favored customer price or the price of other suppliers for like quantities of the same or substantially the same items, whichever is lower.

## 31.107 Contracts with State, local, and federally recognized Indian tribal governments.

(a) Subpart 31.6 provides principles and standards for determining costs applicable to contracts with State, local, and federally recognized Indian tribal governments. They provide the basis for a uniform approach to the problem of determining costs and to promote efficiency and better relationships between State, local, and federally recognized Indian tribal governments, and Federal Government entities. They apply to all

programs that involve contracts with State, local, and federally recognized Indian tribal governments, except contracts with—

(1) Publicly financed educational institutions subject to subpart 31.3; or

(2) Publicly owned hospitals and other providers of medical care subject to requirements promulgated by the sponsoring Government agencies.

(b) The Office of Management and Budget will approve any other exceptions in particular cases when adequate justification is presented.

### 31.108 Contracts with nonprofit organizations.

Subpart 31.7 provides principles and standards for determining costs applicable to contracts with nonprofit organizations other than educational institutions, State and local governments, and those nonprofit organizations exempted under OMB Circular No. A-122.

### 31.109 Advance agreements.

(a) The extent of allowability of the costs covered in this part applies broadly to many accounting systems in varying contract situations. Thus, the reasonableness and allocability of certain costs may be difficult to determine, particularly for firms or their divisions that may not be under effective competitive restraints. To avoid possible subsequent disallowance or dispute based on unreasonableness or nonallocability, contracting officers and contractors should seek advance agreement on the treatment of special or unusual costs. However, an advance agreement is not an absolute requirement and the absence of an advance agreement on any cost will not, in itself, affect the reasonableness or allocability of that cost.

(b) Advance agreements may be negotiated either before or during a contract but should be negotiated before incurrence of the costs involved. The agreements must be in writing, executed by both contracting parties, and incorporated into applicable current and future contracts. An advance agreement shall contain a statement of its applicability and duration.

(c) The contracting officer is not authorized by this 31.109 to agree to a treatment of costs inconsistent with this part. For example, an advance agreement may not provide that, notwithstanding 31.205-20, interest is allowable.

(d) Advance agreements may be negotiated with a particular contractor for a single contract, a group of contracts, or all the contracts of a contracting office, an agency, or several agencies.

(e) The cognizant administrative contracting officer (ACO), or other contracting officer established in Part 42, shall negotiate advance agreements except that an advance agreement affecting only one contract, or class of contracts from a single contracting office, shall be negotiated by a contracting officer in the contracting office, or an ACO when delegated by the contracting officer. When the negotiation authority is delegated, the ACO shall coordinate the proposed agreement with the contracting officer before executing the advance agreement.

(f) Before negotiating an advance agreement, the Government negotiator shall—

(1) Determine if other contracting offices inside the agency or in other agencies have a significant unliquidated dollar balance in contracts with the same contractor;

(2) Inform any such office or agency of the matters under consideration for negotiation; and

(3) As appropriate, invite the office or agency and the cognizant audit agency to participate in prenegotiation discussions and/or in the subsequent negotiations.

(g) Upon completion of the negotiation, the sponsor shall prepare and distribute to other interested agencies and offices, including the audit agency, copies of the executed agreement and a memorandum providing the information specified in 15.808, Price negotiation memorandum, as applicable.

(h) Examples of costs for which advance agreements may be particularly important are—

(1) Compensation for personal services, including but not limited to allowances for off-site pay, incentive pay, location allowances, hardship pay, cost of

living differential, and termination of defined benefit pension plans;
(2) Use charges for fully depreciated assets;
(3) Deferred maintenance costs;
(4) Precontract costs;
(5) Independent research and development and bid and proposal costs;
(6) Royalties and other costs for use of patents;
(7) Selling and distribution costs;
(8) Travel and relocation costs, as related to special or mass personnel movements, as related to travel via contractor-owned, -leased, or -chartered aircraft, or as related to maximum per diem rates;
(9) Costs of idle facilities and idle capacity;
(10) Costs of automatic data processing equipment;
(11) Severance pay to employees on support service contracts;
(12) Plant reconversion;
(13) Professional services (e.g., legal, accounting, and engineering);
(14) General and administrative costs (e.g., corporate, division, or branch allocations) attributable to the general management, supervision, and conduct of the contractor's business as a whole. These costs are particularly significant in construction, job-site, architect-engineer, facilities, and Government-owned contractor operated (GOCO) plant contracts (see 31.203(f));
(15) Costs of construction plant and equipment (see 31.105(d)).
(16) Costs of public relations and advertising; and
(17) Training and education costs (see 31 205-44(h)).

# SUBPART 31.2 — CONTRACTS WITH COMMERCIAL ORGANIZATIONS

## 31.201 General.

### 31.201-1 Composition of total cost.

The total cost of a contract is the sum of the allowable direct and indirect costs allocable to the contract, incurred or to be incurred, less any allocable credits, plus any allocable cost of money pursuant to 31.205-10. In ascertaining what constitutes a cost, any generally accepted method of determining or estimating costs that is equitable and is consistently applied may be used, including standard costs properly adjusted for applicable variances. See 31.201-2(b) and (c) for Cost Accounting Standards (CAS) requirements.

### 31.201-2 Determining allowability.

(a) The factors to be considered in determining whether a cost is allowable include the following:

(1) Reasonableness.

(2) Allocability.

(3) Standards promulgated by the CAS Board, if applicable; otherwise, generally accepted accounting principles and practices appropriate to the particular circumstances.

(4) Terms of the contract.

(5) Any limitations set forth in this subpart.

(b) Certain cost principles in this subpart incorporate the measurement, assignment, and allocability rules of selected CAS and limit the allowability of costs to the amounts determined using the criteria in those selected standards. Only those CAS or portions of standards specifically made applicable by the cost principles in this subpart are mandatory unless the contract is CAS-covered (see 48 CFR 9903). Business units that are not otherwise subject to these standards under a CAS clause are subject to the selected standards only for the purpose of determining allowability of costs on Government contracts. Including the selected standards in the cost principles does not subject the business unit to any other CAS rules and regulations. The applicability of the CAS rules and regulations is determined by the CAS clause, if any, in the contract and the requirements of the standards themselves.

(c) When contractor accounting practices are inconsistent with this Subpart 31.2, costs resulting from such inconsistent practices shall not be allowed in excess of the amount that would have resulted from using practices consistent with this subpart.

### 31.201-3 Determining reasonableness.

(a) A cost is reasonable if, in its nature and amount, it does not exceed that which would be incurred by a prudent person in the conduct of competitive business. Reasonableness of specific costs must be examined with particular care in connection with firms or their separate divisions that may not be subject to effective competitive restraints. No presumption of reasonableness shall be attached to the incurrence of costs by a contractor. If an initial review of the facts results in a challenge of a specific cost by the contracting officer or the contracting officer's representative, the burden of proof shall be upon the contractor to establish that such cost is reasonable.

(b) What is reasonable depends upon a variety of considerations and circumstances, including—

(1) Whether it is the type of cost generally recognized as ordinary and necessary for the conduct of the contractor's business or the contract performance;

(2) Generally accepted sound business practices, arm's length bargaining, and Federal and State laws and regulations;

(3) The contractor's responsibilities to the Government, other customers, the owners of the business, employees, and the public at large; and

(4) Any significant deviations from the contractor's established practices.

### 31.201-4 Determining allocability.

A cost is allocable if it is assignable or chargeable to one or more cost objectives on the basis of relative benefits received or other equitable relationship. Subject to

the foregoing, a cost is allocable to a Government contract if it—

(a) Is incurred specifically for the contract;

(b) Benefits both the contract and other work, and can be distributed to them in reasonable proportion to the benefits received; or

(c) Is necessary to the overall operation of the business, although a direct relationship to any particular cost objective cannot be shown.

**31.201-5 Credits.**

The applicable portion of any income, rebate, allowance, or other credit relating to any allowable cost and received by or accruing to the contractor shall be credited to the Government either as a cost reduction or by cash refund. See 31.205-6(j)(4) for rules related to refund or credit to the Government upon termination of an overfunded defined benefit pension plan.

**31.201-6 Accounting for unallowable costs.**

(a) Costs that are expressly unallowable or mutually agreed to be unallowable, including mutually agreed to be unallowable directly associated costs, shall be identified and excluded from any billing, claim, or proposal applicable to a Government contract. A directly associated cost is any cost which is generated solely as a result of incurring another cost, and which would not have been incurred had the other cost not been incurred. When an unallowable cost is incurred, its directly associated costs are also unallowable.

(b) Costs which specifically become designated as unallowable or as unallowable directly associated costs of unallowable costs as a result of a written decision furnished by a contracting officer shall be identified if included in or used in computing any billing, claim, or proposal applicable to a Government contract. This identification requirement applies also to any costs incurred for the same purpose under like circumstances as the costs specifically identified as unallowable under either this paragraph or paragraph (a) above.

(c) The detail and depth of records required as backup support for proposals, billings, or claims shall be that which is adequate to establish and maintain visibility of identified unallowable costs, including directly associated costs. Unallowable costs involved in determining rates used for standard costs, or for indirect cost proposals or billing, need be identified only at the time rates are proposed, established, revised, or adjusted. These requirements may be satisfied by any form of cost identification which is adequate for purposes of contract cost determination and verification.

(d) If a directly associated cost is included in a cost pool which is allocated over a base that includes the unallowable cost with which it is associated, the directly associated cost shall remain in the cost pool. Since the unallowable costs will attract their allocable share of costs from the cost pool, no further action is required to assure disallowance of the directly associated costs. In all other cases, the directly associated costs, if material in amount, must be purged from the cost pool as unallowable costs.

(e)(1) In determining the materiality of a directly associated cost, consideration should be given to the significance of (i) the actual dollar amount, (ii ) the cumulative effect of all directly associated costs in a cost pool, or (iii) the ultimate effect on the cost of Government contracts.

(2) Salary expenses of employees who participate in activities that generate unallowable costs shall be treated as directly associated costs to the extent of the time spent on the proscribed activity, provided the costs are material in accordance with subparagraph (e)(1) above (except when such salary expenses are, themselves, unallowable). The time spent in proscribed activities should be compared to total time spent on company activities to determine if the costs are material. Time spent by employees outside the normal working hours should not be considered except when it is evident that an employee engages so frequently in company activities during periods outside normal working hours as to indicate that such activities are a part of the employee's regular duties.

(3) When a selected item of cost under 31.205 provides that directly associated costs be unallowable, it is intended that

such directly associated costs be unallowable only if determined to be material in amount in accordance with the criteria provided in subparagraphs (e)(1) and (e)(2) above, except in those situations where allowance of any of the directly associated costs involved would be considered to be contrary to public policy.

**31.201-7 Construction and architect-engineer contracts.**

Specific principles and procedures for evaluating and determining costs in connection with contracts and subcontracts for construction, and architect-engineer contracts related to construction projects, are in 31.105. The applicability of these principles and procedures is set forth in 31.000 and 31.100.

## 31.202 Direct costs.

(a) A direct cost is any cost that can be identified specifically with a particular final cost objective. No final cost objective shall have allocated to it as a direct cost any cost, if other costs incurred for the same purpose in like circumstances have been included in any indirect cost pool to be allocated to that or any other final cost objective. Costs identified specifically with the contract are direct costs of the contract and are to be charged directly to the contract. All costs specifically identified with other final cost objectives of the contractor are direct costs of those cost objectives and are not to be charged to the contract directly or indirectly.

(b) For reasons of practicality, any direct cost of minor dollar amount may be treated as an indirect cost if the accounting treatment—

(1) Is consistently applied to all final cost objectives, and

(2) Produces substantially the same results as treating the cost as a direct cost.

## 31.203 Indirect costs.

(a) An indirect cost is any cost not directly identified with a single, final cost objective, but identified with two or more final cost objectives or an intermediate cost objective. It is not subject to treatment as a direct cost. After direct costs have been determined and charged directly to the contract or other work, indirect costs are those remaining to be allocated to the several cost objectives. An indirect cost shall not be allocated to a final cost objective if other costs incurred for the same purpose in like circumstances have been included as a direct cost of that or any other final cost objective.

(b) Indirect costs shall be accumulated by logical cost groupings with due consideration of the reasons for incurring such costs. Each grouping should be determined so as to permit distribution of the grouping on the basis of the benefits accruing to the several cost objectives. Commonly, manufacturing overhead, selling expenses, and general and administrative (G&A) expenses are separately grouped. Similarly, the particular case may require subdivision of these groupings, e.g., building occupancy costs might be separable from those of personnel administration within the manufacturing overhead group. This necessitates selecting a distribution base common to all cost objectives to which the grouping is to be allocated. The base should be selected so as to permit allocation of the grouping on the basis of the benefits accruing to the several cost objectives. When substantially the same results can be achieved through less precise methods, the number and composition of cost groupings should be governed by practical considerations and should not unduly complicate the allocation.

(c) Once an appropriate base for distributing indirect costs has been accepted, it shall not be fragmented by removing individual elements. All items properly includable in an indirect cost base should bear a pro rata share of indirect costs irrespective of their acceptance as Government contract costs. For example, when a cost input base is used for the distribution of G&A costs, all items that would properly be part of the cost input base, whether allowable or unallowable, shall be included in the base and bear their pro rata share of G&A costs.

(d) The contractor's method of allocating indirect costs shall be in accordance with standards promulgated by the CAS Board, if applicable to the contract; oth-

erwise, the method shall be in accordance with generally accepted accounting principles which are consistently applied. The method may require examination when—

(1) Substantial differences occur between the cost patterns of work under the contract and the contractor's other work;

(2) Significant changes occur in the nature of the business, the extent of subcontracting, fixed-asset improvement programs, inventories, the volume of sales and production, manufacturing processes, the contractor's products, or other relevant circumstances; or

(3) Indirect cost groupings developed for a contractor's primary location are applied to offsite locations. Separate cost groupings for costs allocable to offsite locations may be necessary to permit equitable distribution of costs on the basis of the benefits accruing to the several cost objectives.

(e) A base period for allocating indirect costs is the cost accounting period during which such costs are incurred and accumulated for distribution to work performed in that period. The criteria and guidance in 48 CFR 9904.406 for selecting the cost accounting periods to be used in allocating indirect costs are incorporated herein for application to contracts subject to full CAS coverage. For contracts subject to modified CAS coverage and for non-CAS-covered contracts, the base period for allocating indirect costs will normally be the contractor's fiscal year. But a shorter period may be appropriate (1) for contracts in which performance involves only a minor portion of the fiscal year, or (2) when it is general practice in the industry to use a shorter period. When a contract is performed over an extended period, as many base periods shall be used as are required to represent the period of contract performance.

(f) Special care should be exercised in applying the principles of paragraphs (b), (c), and (d) above when Government-owned contractor-operated (GOCO) plants are involved. The distribution of corporate, division, or branch office G&A expenses to such plants operating with little or no dependence on corporate administrative activities may require more precise cost groupings, detailed accounts screening, and carefully developed distribution bases.

## 31.204 Application of principles and procedures.

(a) Costs shall be allowed to the extent they are reasonable, allocable, and determined to be allowable under 31.201, 31.202, 31.203, and 31.205. These criteria apply to all of the selected items that follow, even if particular guidance is provided for certain items for emphasis or clarity.

(b) Costs incurred as reimbursements or payments to a subcontractor under a cost-reimbursement, fixed-price incentive, or price redeterminable type subcontract of any tier above the first firm-fixed-price subcontract or fixed-price subcontract with economic price adjustment provisions are allowable to the extent that allowance is consistent with the appropriate subpart of this Part 31 applicable to the subcontract involved. Costs incurred as payments under firm-fixed-price subcontracts or fixed-price subcontracts with economic price adjustment provisions or modifications thereto, when cost analysis was performed under 15.805-3, shall be allowable only to the extent that the price was negotiated in accordance with 31.102.

(c) Section 31.205 does not cover every element of cost. Failure to include any item of cost does not imply that it is either allowable or unallowable. The determination of allowability shall be based on the principles and standards in this subpart and the treatment of similar or related selected items. When more than one subsection in 31.205 is relevant to a contractor cost, the cost shall be apportioned among the applicable subsections, and the determination of allowability of each portion shall be based on the guidance contained in the applicable subsection. When a cost, to which more than one subsection in 31.205 is relevant, cannot be apportioned, the determination of allowability shall be based on the guidance contained in the subsection that most specifically deals with, or best captures the essential nature of, the cost at issue.

## 31.205 Selected costs.

### 31.205-1 Public relations and advertising costs.

(a) "Public relations" means all functions and activities dedicated to—

(1) Maintaining, protecting, and enhancing the image of a concern or its products; or

(2) Maintaining or promoting reciprocal understanding and favorable relations with the public at large, or any segment of the public. The term public relations includes activities associated with areas such as advertising, customer relations, etc.

(b) "Advertising" means the use of media to promote the sale of products or services and to accomplish the activities referred to in paragraph (d) of this subsection, regardless of the medium employed, when the advertiser has control over the form and content of what will appear, the media in which it will appear, and when it will appear. Advertising media include but are not limited to conventions, exhibits, free goods, samples, magazines, newspapers, trade papers, direct mail, dealer cards, window displays, outdoor advertising, radio, and television.

(c) Public relations and advertising costs include the costs of media time and space, purchased services performed by outside organizations, as well as the applicable portion of salaries, travel, and fringe benefits of employees engaged in the functions and activities identified in paragraphs (a) and (b) of this subsection.

(d) The only allowable advertising costs are those that are—

(1) Specifically required by contract, or that arise from requirements of Government contracts and that are exclusively for—

(i) Recruiting personnel required for performing contractual obligations, when considered in conjunction with all other recruitment costs (but see 31.205-34);

(ii) Acquiring scarce items for contract performance or

(iii) Disposing of scrap or surplus materials acquired for contract performance.

(2) Costs of activities to promote sales of products normally sold to the U.S. Government, including trade shows, which contain a significant effort to promote exports from the United States. Such costs are allowable, notwithstanding subparagraphs (f)(1) and (3), subdivision (f)(4)(ii), and subparagraph (f)(5) of this subsection, subject to the limits contained in 31.205-38(c)(2). However, such costs do not include the costs of memorabilia (e.g., models, gifts, and souvenirs), alcoholic beverages, entertainment, and physical facilities which are primarily used for entertainment rather than product promotion.

(e) Allowable public relations costs include the following:

(1) Costs specifically required by contract.

(2) Costs of—

(i) Responding to inquiries on company policies and activities;

(ii) Communicating with the public, press, stockholders, creditors, and customers; and

(iii) Conducting general liaison with news media and Government public relations officers, to the extent that such activities are limited to communication and liaison necessary to keep the public informed on matters of public concern such as notice of contract awards, plant closings or openings, employee layoffs or rehires, financial information, etc.

(3) Costs of participation in community service activities (e.g., blood bank drives, charity drives, savings bond drives, disaster assistance, etc.).

(4) Costs of plant tours and open houses (but see subparagraph (f)(5) of this subsection).

(5) Costs of keel laying, ship launching, commissioning, and roll-out ceremonies, to the extent specifically provided for by contract.

(f) Unallowable public relations and advertising costs include the following:

(1) All public relations and advertising costs, other than those specified in paragraphs (d) and (e) of this subsection, whose primary purpose is to promote the sale of products or services by stimulating interest in a product or product line (except for those costs made allowable under 31.205-38(c)), or by disseminating

messages calling favorable attention to the contractor for purposes of enhancing the company image to sell the company's products or services.

(2) All costs of trade shows and other special events which do not contain a significant effort to promote the export sales of products normally sold to the U.S. Government.

(3) Costs of sponsoring meetings, symposia, seminars, and other special events when the principal purpose of the event is other than dissemination of technical information or stimulation of production.

(4) Costs of ceremonies such as (i) corporate celebrations and (ii) new product announcements.

(5) Costs of promotional material, motion pictures, videotapes, brochures, handouts, magazines, and other media that are designed to call favorable attention to the contractor and its activities (but see 31.205-13(a), Employee morale, health, welfare, food service, and dormitory costs and credits; 31.205-21, Labor relations costs; 31.205-43(c), Trade, business, technical, and professional activity costs; and 31.205-44, Training and education costs).

(6) Costs of souvenirs, models, imprinted clothing, buttons, and other mementos provided to customers or the public.

(7) Costs of memberships in civic and community organizations.

(FACs 84-15, 7 Apr 86; 84-30, 30 Sep 1987; 84-36, 12 Apr 1988; 84-51, 20 Sep 89; 90-4, 15 May 1991)

**31.205-2 Automatic data processing equipment leasing costs.**

(a) This subsection applies to all contractor-leased automatic data processing equipment (ADPE), as defined in 31.001 (except as components of an end item to be delivered to the Government), acquired under operating leases, as defined in Statement of Financial Accounting Standard No. 13 (FAS-13), Accounting for Leases, issued by the Financial Accounting Standards Board. Compliance with 31.205-11(m) requires that ADPE acquired by means of capital leases, as defined in FAS-13, shall be treated as purchased assets; i.e., be capitalized and the capitalized value of such assets be distributed over their useful lives as depreciation charges or over the leased life as amortization charges as appropriate. Allowability of costs related to contractor-owned ADPE is governed by other requirements of this subpart.

(b)(1) If the contractor leases ADPE but cannot demonstrate, on the basis of facts existent at the time of the decision to lease or continue leasing and documented in accordance with paragraph (d) below, that leasing will result in less cost to the Government over the anticipated useful life (see paragraph (c) below), then rental costs are allowable only up to the amount that would be allowed had the contractor purchased the ADPE.

(2) The costs of leasing ADPE are allowable only to the extent that the contractor can annually demonstrate in accordance with paragraph (d) below (whether or not the term of lease is renewed or otherwise extended) that these costs meet the following criteria:

(i) The costs are reasonable and necessary for the conduct of the contractor's business in light of factors such as the contractor's requirements for ADPE, costs of comparable facilities, the various types of leases available, and the terms of the rental agreement.

(ii) The costs do not give rise to a material equity in the facilities (such as an option to renew or purchase at a bargain rental or price other than that normally given to industry at large) but represent charges only for the current use of the equipment, including incidental service costs such as maintenance, insurance, and applicable taxes.

(iii) The contracting officer's approval was obtained for the leasing arrangement (see paragraph (d)(3) below) when the total cost of leasing—

(A) The ADPE is to be allocated to one or more Government contracts which require negotiating or determining costs, or

(B) ADPE in a single plant, division, or cost center exceeds $500,000 a year and 50 percent or more of the total leasing cost is to be allocated to one or more Government contracts which require negotiating or determining costs.

(3) Rental costs under a sale and leaseback arrangement are allowable only up to the amount that would have been allowed had the contractor retained title to the ADPE.

(4) Allowable rental costs of ADPE leased from any division, subsidiary, or organization under a common control are limited to the cost of ownership (excluding interest or other costs unallowable under this Subpart 31.2 and including the cost of money (see 31.205-10)). When there is an established practice of leasing the same or similar equipment to unaffiliated lessees, rental costs shall be allowed in accordance with paragraphs (b)(1) and (2) above, except that the purchase price and costs of ownership shall be determined under 31.205-26(e).

(c)(1) An estimate of the anticipated useful life of the ADPE may represent the application life (utility in a given function), technological life (utility before becoming obsolete in whole or in part), or physical life (utility before wearing out) depending upon the facts and circumstances and the particular facilities involved. Each case must be evaluated individually. In estimating anticipated useful life, the contractor may use the application life if it can be demonstrated that the ADPE has utility only in a given function and the duration of the function can be determined. Technological life may be used if the contractor can demonstrate that existing ADPE must be replaced because of—

(i) Specific program objectives or contract requirements that cannot be accomplished with the existing ADPE;

(ii) Cost reductions that will produce identifiable savings in production or overhead costs;

(iii) Increase in workload volume that cannot be accomplished efficiently by modifying or augmenting existing ADPE; or

(iv) Consistent pattern of capacity operation (2 1/2-3 shifts) on existing ADPE.

(2) Technological advances will not justify replacing existing ADPE before the end of its physical life if it will be able to satisfy future requirements or demands.

(3) In estimating the least cost to the Government for useful life, the cumulative costs that would be allowed if the contractor owned the ADPE should be compared with cumulative costs that would be allowed under any of the various types of leasing arrangements available. For the purpose of this comparison, the costs of ADPE exclude interest or other unallowable costs pursuant to this Subpart 31.2; they include but are not limited to the costs of operation, maintenance, insurance, depreciation, facilities capital cost of money, rental, and the cost of machine services, as applicable.

(d) (1) Except as provided in paragraph (3) below, the contractor's justification, under paragraph (b) above, of the leasing decisions shall consist of the following supporting data, prepared before acquisition:

(i) Analysis of use of existing ADPE.

(ii) Application of the criteria in paragraph (b) above.

(iii) Specific objectives or requirements, generally in the form of a data system study and specification.

(iv) Solicitation of proposals, based on the data system specification, from qualified sources.

(v) Proposals received in response to the solicitation and reasons for selecting the equipment chosen and for the decision to lease.

(2) Except as provided in paragraph (3) below, the contractor's annual justification, under paragraph (b)(2) above, of the decision to retain or change existing ADPE capability and the need to continue leasing shall consist of current data as specified in subdivisions (d)(1)(i) through (iii) above.

(3) If the contractor's prospective ADPE lease cost meets the threshold in 31.205-2(b)(2)(iii) above, the contractor shall furnish data supporting the initial decision to lease (see paragraph (b)(1) above). If the total cost of leasing ADPE in a single plant, division, or cost center exceeds $500,000 per year and 50 percent or more of the total leasing cost is allocated to Government contracts which require negotiating or determining costs, the contractor shall furnish data supporting the annual justification for retaining or changing existing ADPE capability and the need to continue leasing shall

also be furnished (see paragraph (b)(2) above).

**31.205-3 Bad debts.**

Bad debts, including actual or estimated losses arising from uncollectible accounts receivable due from customers and other claims, and any directly associated costs such as collection costs, and legal costs are unallowable.

**31.205-4 Bonding costs.**

(a) Bonding costs arise when the Government requires assurance against financial loss to itself or others by reason of the act or default of the contractor. They arise also in instances where the contractor requires similar assurance. Included are such bonds as bid, performance, payment, advance payment, infringement, and fidelity bonds.

(b) Costs of bonding required pursuant to the terms of the contract are allowable.

(c) Costs of bonding required by the contractor in the general conduct of its business are allowable to the extent that such bonding is in accordance with sound business practice and the rates and premiums are reasonable under the circumstances.

**31.205-5 Civil defense costs.**

(a) Civil defense costs are those incurred in planning for, and protecting life and property against, the possible effects of enemy attack. Costs of civil defense measures (including costs in excess of normal plant protection costs, first-aid training and supplies, fire fighting training and equipment, posting of additional exit notices and directions, and other approved civil defense measures) undertaken on the contractor's premises pursuant to suggestions or requirements of civil defense authorities are allowable when allocated to all work of the contractor.

(b) Costs of capital assets acquired for civil defense purposes are allowable through depreciation (see 31.205-11).

(c) Contributions to local civil defense funds and projects are unallowable.

**31.205-6 Compensation for personal services.**

(a) General. Compensation for personal services includes all remuneration paid currently or accrued, in whatever form and whether paid immediately or deferred, for services rendered by employees to the contractor during the period of contract performance (except as otherwise provided for severance pay costs in paragraph (g) below and for pension costs in paragraph (j) below). It includes, but is not limited to, salaries; wages; directors' and executive committee members' fees; bonuses (including stock bonuses); incentive awards; employee stock options, stock appreciation rights, and stock ownership plans; employee insurance; fringe benefits; contributions to pension, annuity, and management employee incentive compensation plans; and allowances for off-site pay, incentive pay, location allowances, hardship pay, severance pay, and cost of living differential. Compensation for personal services is allowable subject to the following general criteria and additional requirements contained in other parts of this cost principle:

(1) Compensation for personal services must be for work performed by the employee in the current year and must not represent a retroactive adjustment of prior years' salaries or wages (but see 31.205-6(g), (h), (j), (k), and (m) below).

(2) The compensation in total must be reasonable for the work performed; however, specific restrictions on individual compensation elements must be observed where they are prescribed.

(3) The compensation must be based upon and conform to the terms and conditions of the contractor's established compensation plan or practice followed so consistently as to imply, in effect, an agreement to make the payment.

(4) No presumption of allowability will exist where the contractor introduces major revisions of existing compensation plans or new plans and the contractor--

(i) Has not notified the cognizant ACO of the changes either before their implementation or within a reasonable period after their implementation, and

(ii) Has not provided the Government, either before implementation or within a

reasonable period after it, an opportunity to review the allowability of the changes.

(5) Costs that are unallowable under other paragraphs of this Subpart 31.2 shall not be allowable under this subsection 31.205-6 solely on the basis that they constitute compensation for personal services. (See 31.205-34(c).)

(b) Reasonableness. (1) The compensation for personal services paid or accrued to each employee must be reasonable for the work performed. Compensation will be considered reasonable if each of the allowable elements making up the employee's compensation package is reasonable. In determining the reasonableness of individual elements for particular employees or classes of employees, consideration should be given to all potentially relevant facts. Facts which may be relevant include general conformity with the compensation practices of other firms of the same size, the compensation practices of other firms in the same industry, the compensation practices of other firms in the same geographic area, the compensation practices of firms engaged in predominantly non-Government work, and the cost of comparable services obtainable from outside sources. While all of the above factors, as well as any other relevant ones, should be considered, their relative significance will vary according to circumstances. For example, in the case of secretarial salaries, conformity with the compensation paid by other firms in the same geographic area would likely be a more significant criterion than conformity with the compensation paid by other firms in the same industry wherever located. In administering this principle, it is recognized that not every compensation case need be subjected in detail to the above or other tests. The tests need be applied only when a general review reveals amounts or types of compensation that appear unreasonable or unjustified. Based on an initial review of the facts, contracting officers or their representatives may challenge the reasonableness of any individual element or the sum of the individual elements of compensation paid or accrued to particular employees or classes of employees. In such cases, there is no presumption of reasonableness and, upon challenge, the contractor must demonstrate the reasonableness of the compensation item in question. In doing so, the contractor may introduce, and the contracting officer will consider, not only any circumstances surrounding the compensation item challenged, but also the magnitude of other compensation elements which may be lower than would be considered reasonable in themselves. For example, a contractor, if challenged on the amount of base salaries for management, could counter by showing lower than normal end-of-year management bonuses. However, the contractor's right to introduce offsetting compensation elements into consideration is subject to the following limitations:

(i) Offsets will be considered only between the allowable elements of an employee's (or a class of employees') compensation package. For example, excessive management salaries cannot be offset against lower than normal secretarial salaries.

(ii) Offsets will be considered only between the allowable portion of the following compensation elements of employees or classes of employees:

(A) Wages and salaries.
(B) Incentive bonuses.
(C) Deferred compensation.
(D) Pension and savings plan benefits.
(E) Health insurance benefits.
(F) Life insurance benefits.
(G) Compensated personal absence benefits.

However, any of the above elements or portions thereof, whose amount is not measurable, shall not be introduced or considered as an offset item.

(iii) In considering offsets, the magnitude of the compensation elements in question must be taken into account. An executive bonus that is excessive by $100,000 is not fully offset by a base salary that is low by only $25,000. In determining the magnitude of compensation elements, the timing of receipt by the employee must be considered. For example, a bonus of $100,000 in the current period will be considered as of greater value than a deferred compensation arrangement to make the same payment in some future period.

(2) Compensation costs under certain conditions give rise to the need for special consideration. Among such conditions are the following:

(i) Compensation to (A) owners of closely held corporations, partners, sole proprietors, or members of their immediate families, or (B) persons who are contractually committed to acquire a substantial financial interest in the contractor's enterprise. Determination should be made that salaries are reasonable for the personal services rendered rather than being a distribution of profits. Compensation in lieu of salary for services rendered by partners and sole proprietors will be allowed to the extent that it is reasonable and does not constitute a distribution of profits. For closely held corporations, compensation costs covered by this subdivision shall not be recognized in amounts exceeding those costs that are deductible as compensation under the Internal Revenue Code and regulations under it.

(ii) Any change in a contractor's compensation policy that results in a substantial increase in the contractor's level of compensation, particularly when it was concurrent with an increase in the ratio of Government contracts to other business, or any change in the treatment of allowability of specific types of compensation due to changes in Government policy. Contracting officers or their representatives should normally challenge increased costs where major revisions of existing compensation plans or new plans are introduced by the contractor, and the contractor—

(A) Has not notified the cognizant ACO of the changes either before their implementation or within a reasonable period after their implementation; and

(B) Has not provided the Government, either before implementation or within a reasonable period after it, an opportunity to review the reasonableness of the changes.

(iii) The contractor's business is such that its compensation levels are not subject to the restraints that normally occur in the conduct of competitive business.

(iv) The contractor incurs costs for compensation in excess of the amounts which are deductible under the Internal Revenue Code and regulations issued under it.

(c) Labor-management agreements. Nothwithstanding any other requirements of this subsection 31.205-6, costs of compensation are not allowable to the extent that they result from provisions of labor-management agreements that, as applied to work in performing Government contracts, are determined to be unreasonable because they are either unwarranted by the character and circumstances of the work or discriminatory against the Government. The application of the provisions of a labor-management agreement designed to apply to a given set of circumstances and conditions of employment (e.g., work involving extremely hazardous activities or work not requiring recurrent use of overtime) is unwarranted when applied to a Government contract involving significantly different circumstances and conditions of employment (e.g., work involving less hazardous activities or work continually requiring use of overtime). It is discriminatory against the Government if it results in employee compensation (in whatever form or name) in excess of that being paid for similar non-Government work under comparable circumstances. Disallowance of costs will not be made under this paragraph (c) unless—

(1) The contractor has been permitted an opportunity to justify the costs; and

(2) Due consideration has been given to whether unusual conditions pertain to Government contract work, imposing burdens, hardships, or hazards on the contractor's employees, for which compensation that might otherwise appear unreasonable is required to attract and hold necessary personnel.

(d) Salaries and wages. Salaries and wages for current services include gross compensation paid to employees in the form of cash, stock (see paragraph (f)(2) below regarding valuation), products, or services, and are allowable.

(e) Domestic and foreign differential pay. (1) When personal services are performed in a foreign country, compensation may also include a differential that may properly consider all expenses associated with foreign employment such as housing, cost of living adjustments, trans-

portation, bonuses, additional Federal, State, local or foreign income taxes resulting from foreign assignment, and other related expenses.

(2) Although the additional taxes in subparagraph (1) above may be considered in establishing foreign overseas differential, any increased compensation calculated directly on the basis of an employee's specific increase in income taxes is unallowable. Differential allowances for additional Federal, State, or local income taxes resulting from domestic assignments are unallowable.

(f) Bonuses and incentive compensation. (1) Incentive compensation for management employees, cash bonuses, suggestion awards, safety awards, and incentive compensation based on production, cost reduction, or efficient performance are allowable provided the awards are paid or accrued under an agreement entered into in good faith between the contractor and the employees before the services are rendered or pursuant to an established plan or policy followed by the contractor so consistently as to imply, in effect, an agreement to make such payment and the basis for the award is supported.

(2) When the costs of bonuses and incentive compensation are paid in the stock of the contractor or of an affiliate, the following additional restrictions apply:

(i) Valuation placed on the stock shall be the fair market value on the measurement date (i.e., the first date the number of shares awarded is known) determined upon the most objective basis available; and

(ii) Accruals for the cost of stock before issuing the stock to the employees shall be subject to adjustment according to the possibilities that the employees will not receive the stock and that their interest in the accruals will be forfeited.

(3) When the bonus and incentive compensation payments are deferred, the costs are subject to the requirements of subparagraph (f)(1) above and of paragraph (k) below.

(g) Severance pay. (1) Severance pay, also commonly referred to as dismissal wages, is a payment in addition to regular salaries and wages by contractors to workers whose employment is being involuntarily terminated. Payments for early retirement incentive plans are covered in subparagraph (j)(6) below.

(2) Severance pay to be allowable must meet the general allowability criteria in subdivision (g)(2)(i) below, and, depending upon whether the severance is normal or abnormal, criteria in subdivision (g)(2)(ii) for normal severance pay or subdivision (g)(2)(iii) for abnormal severance pay also apply.

(i) Severance pay is allowable only to the extent that, in each case, it is required by (A) law; (B) employer-employee agreement; (C) established policy that constitutes, in effect, an implied agreement on the contractor's part; or (D) circumstances of the particular employment (but see 37.110(f) regarding services performed outside the United States). Payments made in the event of employment with a replacement contractor where continuity of employment with credit for prior length of service is preserved under substantially equal conditions of employment, or continued employment by the contractor at another facility, subsidiary, affiliate, or parent company of the contractor are not severance pay and are unallowable.

(ii) Actual normal turnover severance payments shall be allocated to all work performed in the contractor's plant, or where the contractor provides for accrual of pay for normal severances, that method will be acceptable if the amount of the accrual is reasonable in light of payments actually made for normal severances over a representative past period and if amounts accrued are allocated to all work performed in the contractor's plant.

(iii) Abnormal or mass severance pay is of such a conjectural nature that measurement of costs by means of an accrual will not achieve equity to both parties. Thus, accruals for this purpose are not allowable. However, the Government recognizes its obligation to participate, to the extent of its fair share, in any specific payment. Thus, allowability will be considered on a case-by-case basis.

(h) Backpay. (1) Backpay resulting from violations of Federal labor laws or the Civil Rights Act of 1964. Backpay may result from a negotiated settlement,

order, or court decree that resolves a violation of Federal labor laws or the Civil Rights Act of 1964. Such backpay falls into two categories: one requiring the contractor to pay employees additional compensation for work performed for which they were underpaid, and the other resulting from other violations, such as when the employee was improperly discharged, discriminated against, or other circumstances for which the backpay was not additional compensation for work performed. Backpay resulting from underpaid work is compensation for the work performed and is allowable. All other backpay resulting from violation of Federal labor laws or the Civil Rights Act of 1964 is unallowable.

(2) Other backpay. Backpay may also result from payments to employees (union and non-union) for the difference in their past and current wage rates for working without a contract or labor agreement during labor management negotiations. Such backpay is allowable. Backpay to nonunion employees based upon results of union agreement negotiations is allowable only if (i) a formal agreement or understanding exists between management and the employees concerning these payments, or (ii) an established policy or practice exists and is followed by the contractor so consistently as to imply, in effect, an agreement to make such payment.

(i) Stock options, stock appreciation rights, phantom stock plans, and junior stock conversions.

(1) The cost of stock options awarded to employees to purchase stock of the contractor or of an affiliate will be treated as deferred compensation and must comply with the requirements of paragraph (k) of this subsection. The allowable cost of stock options is limited to the difference between the option price and the market price on the first date on which the option price and the number of shares are known. Accordingly, when the stock option price is equal to or greater than the market price on that date, then no costs are allowable for contract costing purposes.

(2) Stock appreciation rights are rights granted to employees by contractors to receive the increase in value, or appreciation, of company stock even though the employee neither purchases the stock nor receives title to it. Stock appreciation rights will be treated as deferred compensation and must comply with the requirements of paragraph (k) of this subsection. The allowable cost of stock appreciation rights is limited to the difference between the stock-appreciation-right base price from which appreciation will be measured and the market price on the first date on which both the number of shares and the stock-appreciation-right base price are known. Accordingly, when the stock-appreciation-right base price is equal to or greater than the market price on that date, then no costs are allowable for contract costing purposes.

(3) In phantom-stock-type plans, contractors assign or attribute contingent shares of stock to employees as if the employees own the stock, even though the employees neither purchase the stock nor receive title to it. Under these plans, an employee's account may be increased by the equivalent of dividends paid and any appreciation in the market price of the stock over the price of the stock on the first date on which the number of shares awarded is known. Such increases in employee accounts for dividend equivalents and market price appreciation are unallowable.

(4) Junior stock is a class of equity stock that (i) is sold to employees at a price below that of the contractor's common stock, (ii) carries reduced dividend and voting rights, and (iii) is convertible to common stock upon the attainment of specified corporate goals. Costs associated with the conversion of junior stock into common stock are not allowable, whether or not they are accounted for as compensation costs.

(j) Pension costs. (1) A pension plan is a deferred compensation plan that is established and maintained by one or more employers to provide systematically for paying benefits to plan participants after their retirement, provided that the benefits are paid for life or are payable for life at the option of the employee. Additional benefits such as permanent and total disability and death payments and survivorship payments to beneficiaries of deceased employees may be treated

as pension costs, provided the benefits are an integral part of the pension plan and meet all the criteria pertaining to pension costs.

(2) Pension plans are normally segregated into two types of plans: defined benefit or defined contribution pension plans. The cost of all defined benefit pension plans shall be measured, allocated, and accounted for in compliance with the provisions of 48 CFR 9904.412, Composition and Measurement of Pension Costs, and 48 CFR 9904.413, Adjustment and Allocation of Pension Cost. The costs of all defined contribution pension plans shall be measured, allocated, and accounted for in accordance with the provisions of 48 CFR 9904.412. Pension costs are allowable subject to the referenced standards and the cost limitations and exclusions set forth in subdivision (j)(2)(i) and in subparagraphs (j)(3) through (8) of this subsection.

(i) Except for unfunded pension plans as defined in 31.001, to be allowable in the current year, pension costs must be funded by the time set for filing the Federal income tax return or any extension thereof. Pension costs assigned to the current year, but not funded by the tax return time, shall not be allowable in any subsequent year.

(ii) Pension payments must be reasonable in amount and be paid pursuant to (A) an agreement entered into in good faith between the contractor and employees before the work or services are performed and (B) the terms and conditions of the established plan. The cost of changes in pension plans which are discriminatory to the Government or are not intended to be applied consistently for all employees under similar circumstances in the future are not allowable.

(iii) Except as provided for early retirement benefits in subparagraph (j)(7) of this subsection, one-time-only pension supplements not available to all participants of the basic plan are not allowable as pension costs unless the supplemental benefits represent a separate pension plan and the benefits are payable for life at the option of the employee.

(iv) Increases in payments to previously retired plan participants covering cost-of-living adjustments are allowable if paid in accordance with a policy or practice consistently followed.

(3) Defined benefit pension plans. This subparagraph covers pension plans in which the benefits to be paid or the basis for determining such benefits are established in advance and the contributions are intended to provide the stated benefits. The cost limitations and exclusions pertaining to defined benefit plans are as follows:

(i)(A) Except for unfunded pension plans as defined in 31.001, normal costs of pension plans not funded in the year incurred, and all other components of pension costs (see 48 CFR 9904.412-40(a)(1)) assignable to the current accounting period but not funded during it, shall not be allowable in subsequent years (except that a payment made to a fund by the time set for filing the Federal income tax return or any extension thereof is considered to have been made during such taxable year). However, any part of a pension cost that is computed for a cost accounting period that is deferred pursuant to a waiver granted under the provisions of the Employee's Retirement Income Security Act of 1974 (ERISA) (see 48 CFR 9904.412-50(c)(3)), will be allowable in those future accounting periods in which the funding does occur. The allowability of these deferred contributions will be limited to the amounts that would have been allowed had the funding occurred in the year the costs would have been assigned except for the waiver.

(B) Allowable costs for unfunded pension plans, as defined in 31.001, are limited to the amount computed in accordance with 48 CFR 9904.412 and 48 CFR 9904.413.

(ii) Any amount paid or funded before the time it becomes assignable and allowable shall be applied to future years, in order of time, as if actually paid and deductible in those years. The interest earned on such premature funding, based on the valuation rate of return, may be excluded from future years' computations of pension costs in accordance with 48 CFR 9904.412-50(a)(7).

(iii) Increased pension costs caused by delay in funding beyond 30 days after each quarter of the year to which they are assignable are unallowable. If a compos-

ite rate is used for allocating pension costs between the segments of a company and if, because of differences in the timing of the funding by the segments, an inequity exists, allowable pension costs for each segment will be limited to that particular segment's calculation of pension costs as provided for in 48 CFR 9904.413-50(c)(5). Determination of unallowable costs shall be made in accordance with the actuarial method used in calculating pension costs.

(iv) Allowability of the cost of indemnifying the Pension Benefit Guaranty Corporation (PBGC) under ERISA Section 4062 or 4064 arising from terminating an employee deferred compensation plan will be considered on a case-by-case basis; provided that if insurance was required by the PBGC under ERISA Section 4023, it was so obtained and the indemnification payment is not recoverable under the insurance. Consideration under the foregoing circumstances will be primarily for the purpose of appraising the extent to which the indemnification payment is allocable to Government work. If a beneficial or other equitable relationship exists, the Government will participate, despite the requirements of 31.205-19(a)(3) and (b), in the indemnification payment to the extent of its fair share.

(v) Increased pension costs resulting from the withdrawal of assets from a pension fund and transfer to another employee benefit fund are unallowable except to the extent authorized by an advance agreement. The advance agreement shall:

(A) State the amount of the Government's equitable share in the gross amount withdrawn; and

(B) Provide that the Government receive a credit equal to the amount of the Government's equitable share of the gross withdrawal. If a transfer is made without such an agreement, paragraph (j)(4) of this subsection will apply to the transfer as a constructive withdrawal and receipt of the funds by the contractor.

(4) Termination of defined benefit pension plans. When excess or surplus assets revert to the contractor as a result of termination of a defined benefit pension plan, or such assets are constructively received by it for any reason, the contractor shall make a refund or give a credit to the Government for its equitable share of the gross amount withdrawn. The Government's equitable share shall reflect the Government's participation in pension costs through those contracts for which certified (see 15.804) cost or pricing data were submitted or which are subject to Subpart 31.2.

(5) Defined contribution pension plans. This subparagraph covers those pension plans in which the contributions to be made are established in advance and the level of benefits is determined by the contributions made. It also covers profit sharing, savings plans, and other such plans provided the plans fall within the definition of a pension plan in paragraph (j)(1) above.

(i) The pension cost assignable to a cost accounting period is the net contribution required to be made for that period after taking into account dividends and other credits, where applicable. However, any portion of pension cost computed for a cost accounting period that is deferred pursuant to a waiver granted under the provisions of ERISA (see 48 CFR 9904.412-50(c)(3)) will be allowable in those future accounting periods when the funding does occur. The allowability of these deferred contributions will be limited to the amounts that would have been allowed had the funding been made in the year the costs would have been assigned except for the waiver.

(ii) Any amount paid or funded to the trust before the time it becomes assignable and allowable shall be applied to future years, in order of time, as if actually paid and deductible in such years.

(iii) The provisions of subdivision (j)(3)(iv) above concerning payments to PBGC apply to defined contribution plans.

(6) Pension plans using pay-as-you-go methods. Reserved.

(7) Early retirement incentive plans. An early retirement incentive plan is a plan under which employees receive a bonus or incentive, over and above the requirement of the basic pension plan, to retire early. These plans normally are not applicable to all participants of the basic

plan and do not represent life income settlements, and as such would not qualify as pension costs. However, for contract costing purposes, early retirement incentive payments are allowable subject to the pension cost criteria contained in subdivisions (j)(3)(i) through (iv) provided—

(i) The costs are accounted for and allocated in accordance with the contractor's system of accounting for pension costs.

(ii) The payments are made in accordance with the terms and conditions of the contractor's plan;

(iii) The plan is applied only to active employees. The cost of extending the plan to employees who retired or were terminated before the adoption of the plan is unallowable; and

(iv) The total of the incentive payments to any employee may not exceed the amount of the employee's annual salary for the previous fiscal year before the employee's retirement.

(8) Employee stock ownership plans (ESOP) (i) An ESOP is an individual stock bonus plan designed specifically to invest in the stock of the employer corporation. The contractor's contributions to an Employee Stock Ownership Trust (ESOT) may be in the form of cash, stock, or property. Costs of ESOP's are allowable subject to the following conditions:

(A) Contributions by the contractor in any one year may not exceed 15 percent (25 percent when a money purchase plan is included) of salaries and wages of employees participating in the plan in any particular year.

(B) The contribution rate (ratio of contribution to salaries and wages of participating employees) may not exceed the last approved contribution rate except when approved by the contracting officer based upon justification provided by the contractor. When no contribution was made in the previous year for an existing ESOP, or when a new ESOP is first established, and the contractor proposes to make a contribution in the current year, the contribution rate shall be subject to the contracting officer's approval.

(C) When a plan or agreement exists wherein the liability for the contribution can be compelled for a specific year, the expense associated with that liability is assignable only to that period. Any portion of the contribution not funded by the time set for filing of the Federal income tax return for that year or any extension thereof shall not be allowable in subsequent years.

(D) When a plan or agreement exists wherein the liability for the contribution cannot be compelled, the amount contributed for any year is assignable to that year provided the amount is funded by the time set for filing of the Federal income tax return for that year.

(E) When the contribution is in the form of stock, the value of the stock contribution shall be limited to the fair market value of the stock on the date that title is effectively transferred to the trust. Cash contributions shall be allowable only when the contractor furnishes evidence satisfactory to the contracting officer demonstrating that stock purchases by the ESOT are or will be at a fair market price; e.g., makes arrangements with the trust permitting the contracting officer to examine purchases of stock by the trust to determine that prices paid are at fair market value. When excessive prices are paid, the amount of the excess will be credited to the same indirect cost pools that were charged for the ESOP contributions in the year in which the stock purchase occurs. However, when the trust purchases the stock with borrowed funds which will be repaid over a period of years by cash contributions from the contractor to the trust, the excess price over fair market value shall be credited to the indirect cost pools pro rata over the period of years during which the contractor contributes the cash used by the trust to repay the loan. When the fair market value of unissued stock or stock of a closely held corporation is not readily determinable, the valuation will be made on a case-by-case basis taking into consideration the guidelines for valuation used by the IRS.

(ii) Amounts contributed to an ESOP arising from either (A) an additional investment tax credit (see 1975 Tax Reduction Act - TRASOP's); or (B) a payroll-based tax credit (see Economic Recovery Tax Act of 1981) are unallowable.

(iii) The requirements of subdivision (j)(3)(ii) above are applicable to Employee Stock Ownership Plans.

(k) Deferred compensation. (1) Deferred compensation is an award given by an employer to compensate an employee in a future cost accounting period or periods for services rendered in one or more cost accounting periods before the date of receipt of compensation by the employee. Deferred compensation does not include the amount of year-end accruals for salaries, wages, or bonuses that are paid within a reasonable period of time after the end of a cost accounting period. Subject to 31.205-6(a), deferred awards are allowable when they are based on current or future services. Awards made in periods subsequent to the period when the work being remunerated was performed are not allowable.

(2) The costs of deferred awards shall be measured, allocated, and accounted for in compliance with the provisions of 48 CFR 9904.415, Accounting for the Cost of Deferred Compensation.

(3) Deferred compensation payments to employees under awards made before the effective date of 48 CFR 9904.415 are allowable to the extent they would have been allowable under prior acquisition regulations.

(l) Compensation incidental to business acquisitions. The following costs are unallowable:

(1) Payments to employees under agreements in which they receive special compensation, in excess of the contractor's normal severance pay practice, if their employment terminates following a change in the management control over, or ownership of, the contractor or a substantial portion of its assets.

(2) Payments to employees under plans introduced in connection with a change (whether actual or prospective) in the management control over, or ownership of, the contractor or a substantial portion of its assets in which those employees receive special compensation, which is contingent upon the employee remaining with the contractor for a specified period of time.

(m) Fringe benefits. (1) Fringe benefits are allowances and services provided by the contractor to its employees as compensation in addition to regular wages and salaries. Fringe benefits include, but are not limited to, the cost of vacations, sick leave, holidays, military leave, employee insurance, and supplemental unemployment benefit plans. Except as provided otherwise in Subpart 31.2, the costs of fringe benefits are allowable to the extent that they are reasonable and are required by law, employer-employee agreement, or an established policy of the contractor.

(2) That portion of the cost of company-furnished automobiles that relates to personal use by employees (including transportation to and from work) is unallowable regardless of whether the cost is reported as taxable income to the employees (see 31.205-46(f)).

(n) Employee rebate and purchase discount plans. Rebates and purchase discounts, in whatever form, granted to employees on products or services produced by the contractor or affiliates are unallowable.

(o) Post-retirement benefits other than pensions (PRB).

(1) PRB covers all benefits, other than cash benefits and life insurance benefits paid by pension plans, provided to employees, their beneficiaries, and covered dependents during the period following the employees' retirement. Benefits encompassed include, but are not limited to, post-retirement health care; life insurance provided outside a pension plan; and other welfare benefits such as tuition assistance, day care, legal services, and housing subsidies provided after retirement.

(2) To be allowable, PRB costs must be reasonable and incurred pursuant to law, employer-employee agreement, or an established policy of the contractor. In addition, to be allowable in the current year, PRB costs must be paid either to (i) an insurer, provider, or other recipient as current year benefits or premiums, or (ii) an insurer or trustee to establish and maintain a fund or reserve for the sole purpose of providing PRB to retirees. The costs in paragraph (o)(2)(ii) of this subsection must also be calculated in accordance with generally accepted actuarial principles and practices as promulgated by the Actuarial Standards Board,

and be funded by the time set for filing the Federal income tax return or any extension thereof. PRB costs assigned to the current year, but not funded or otherwise liquidated by the tax return time, shall not be allowable in any subsequent year.

(3) Increased PRB costs caused by delay in funding beyond 30 days after each quarter of the year to which they are assignable are unallowable.

(4) Costs of postretirement benefits attributable to past service ("transition obligation") as defined in Financial Accounting Standards Board Statement 106, paragraph 110, are allowable subject to the following limitation: The allowable amount of such costs assignable to a contractor fiscal year cannot exceed the amount of such costs which would be assigned to that contractor fiscal year under the delayed recognition methodology described in paragraphs 112 and 113 of Statement 106.

(5) The Government shall receive an equitable share of any amount of previously funded PRB costs which revert or inure to the contractor. Such equitable share shall reflect the Government's previous participation in PRB costs through those contracts for which certified cost or pricing data were required or which were subject to Subpart 31.2.

(FACs 84-15, 7 Apr 86; 84-21, 29 Aug 86; 84-26, 30 Jul 87; 84-3, 30 Sep 87; 84-35, 4 Apr 88; 84-39, 3 Oct 88; 84-44, 28 Apr 89; 84-51, 20 Sep 89; 90-5, 25 Jul 1991; 90-7, 23 Sep 1991; 90-12, 31 Aug 1992)

**31.205-7 Contingencies.**

(a) "Contingency," as used in this subpart, means a possible future event or condition arising from presently known or unknown causes, the outcome of which is indeterminable at the present time.

(b) Costs for contingencies are generally unallowable for historical costing purposes because such costing deals with costs incurred and recorded on the contractor's books. However, in some cases, as for example, terminations, a contingency factor may be recognized when it is applicable to a past period to give recognition to minor unsettled factors in the interest of expediting settlement.

(c) In connection with estimates of future costs, contingencies fall into two categories:

(1) Those that may arise from presently known and existing conditions, the effects of which are foreseeable within reasonable limits of accuracy; e.g., anticipated costs of rejects and defective work. Contingencies of this category are to be included in the estimates of future costs so as to provide the best estimate of performance cost.

(2) Those that may arise from presently known or unknown conditions, the effect of which cannot be measured so precisely as to provide equitable results to the contractor and to the Government; e.g., results of pending litigation. Contingencies of this category are to be excluded from cost estimates under the several items of cost, but should be disclosed separately (including the basis upon which the contingency is computed) to facilitate the negotiation of appropriate contractual coverage. (See, for example, 31.205-6(g), 31.205-19, and 31.205-24.)

**31.205-8 Contributions or donations.**

Contributions or donations, including cash, property and services, regardless of recipient, are unallowable, except as provided in 31.205-1(e)(3).

(FAC 84-15, 7 Apr 86)

**31.205-9 Reserved.**

**31.205-10 Cost of money.**

(a) Facilities capital cost of money - (1) General. (i) Facilities capital cost of money (cost of capital committed to facilities) is an imputed cost determined by applying a cost-of-money rate to facilities capital employed in contract performance. A cost-of-money rate is uniformly imputed to all contractors (see subdivision (ii) below). Capital employed is determined without regard to whether its source is equity or borrowed capital. The resulting cost of money is not a form of interest on borrowings (see 31.205-20).

(ii) CAS 414, Cost of Money as an Element of the Cost of Facilities Capital, establishes criteria for measuring and allocating, as an element of contract cost,

the cost of capital committed to facilities. Cost-of-money factors are developed on Form CASB-CMF, broken down by overhead pool at the business unit, using (A) business-unit facilities capital data, (B) overhead allocation base data, and (C) the cost-of-money rate, which is based on interest rates specified by the Secretary of the Treasury under Public Law 92-41.

(2) Allowability. Whether or not the contract is otherwise subject to CAS, facilities capital cost of money is allowable if—

(i) The contractor's capital investment is measured, allocated to contracts, and costed in accordance with CAS 414;

(ii) The contractor maintains adequate records to demonstrate compliance with this standard;

(iii) The estimated facilities capital cost of money is specifically identified or proposed in cost proposals relating to the contract under which this cost is to be claimed; and

(iv) The requirements of 31.205-52, which limit the allowability of facilities capital cost of money, are observed.

(3) Accounting. The facilities capital cost of money need not be entered on the contractor's books of account. However, the contractor shall (i) make a memorandum entry of the cost, and (ii) maintain, in a manner that permits audit and verification, all relevant schedules, cost data, and other data necessary to support the entry fully.

(4) Payment. Facilities capital cost of money that is (i) allowable under subparagraph (2) above, and (ii) calculated, allocated, and documented in accordance with this cost principle shall be an "incurred cost" for reimbursement purposes under applicable cost-reimbursement contracts and for progress payment purposes under fixed-price contracts.

(5) The cost of money resulting from including asset valuations resulting from business combinations in the facilities capital employed base is unallowable (see 31.205-52).

(b) Cost of money as an element of the cost of capital assets under construction - (1) General. (i) Cost of money as an element of the cost of capital assets under construction is an imputed cost determined by applying a cost-of-money rate to the investment in tangible and intangible capital assets while they are being constructed, fabricated, or developed for a contractor's own use. Capital employed is determined without regard to whether its source is equity or borrowed capital. The resulting cost of money is not a form of interest on borrowing (see 31.205-20).

(ii) CAS 417, Cost of Money as an Element of the Cost of Capital Assets Under Construction, establishes criteria for measuring and allocating, as an element of contract cost, the cost of capital committed to capital assets under construction, fabrication, or development.

(2) Allowability. (i) Whether or not the contract is otherwise subject to CAS, and except as specified in subdivision (ii) below, the cost of money for capital assets under construction, fabrication, or development is allowable if—

(A) The cost of money is calculated, allocated to contracts, and costed in accordance with CAS 417;

(B) The contractor maintains adequate records to demonstrate compliance with this standard;

(C) The cost of money for tangible capital assets is included in the capitalized cost that provides the basis for allowable depreciation costs, or, in the case of intangible capital assets, the cost of money is included in the cost of those assets for which amortization costs are allowable; and

(D) The requirements of 31.205-52, which limit the allowability of cost of money for capital assets under construction, fabrication, or development, are observed.

(ii) Actual interest cost in lieu of the calculated imputed cost of money for capital assets under construction, fabrication, or development is unallowable.

(3) Accounting. The cost of money for capital assets under construction need not be entered on the contractor's books of account. However, the contractor shall (i) make a memorandum entry of the cost and (ii) maintain, in a manner that permits audit and verification, all relevant schedules, cost data, and other data necessary to support the entry fully.

(4) Payment. The cost of money for capital assets under construction that is allowable under subparagraph (2) above

of this cost principle shall be an incurred cost for reimbursement purposes under applicable cost-reimbursement contracts and for progress payment purposes under fixed-price contracts.

(FACs 84-3, 27 Jun 84; 84-30, 30 Sep 87; 84-58, 23 Jul 90; 90-5, 25 Jul 1991; 90-12, 31 Aug 1992)

**31.205-11 Depreciation.**

(a) Depreciation is a charge to current operations which distributes the cost of a tangible capital asset, less estimated residual value, over the estimated useful life of the asset in a systematic and logical manner. It does not involve a process of valuation. Useful life refers to the prospective period of economic usefulness in a particular contractor's operations as distinguished from physical life; it is evidenced by the actual or estimated retirement and replacement practice of the contractor.

(b) Contractors having contracts subject to 48 CFR 9904.409, Depreciation of Tangible Capital Assets, must adhere to the requirement of that standard for all fully CAS-covered contracts and may elect to adopt the standard for all other contracts. All requirements of 48 CFR 9904.409 are applicable if the election is made, and its requirements supersede any conflicting requirements of this cost principle. Once electing to adopt 48 CFR 9904.409 for all contracts, contractors must continue to follow it until notification of final acceptance of all deliverable items on all open negotiated Government contracts. Paragraphs (c) through (e) below apply to contracts to which 48 CFR 9904.409 is not applied.

(c) Normal depreciation on a contractor's plant, equipment, and other capital facilities is an allowable contract cost, if the contractor is able to demonstrate that it is reasonable and allocable (but see paragraph (i) below).

(d) Depreciation shall be considered reasonable if the contractor follows policies and procedures that are—

(1) Consistent with those followed in the same cost center for business other than Government;

(2) Reflected in the contractor's books of accounts and financial statements; and

(3) Both used and acceptable for Federal income tax purposes.

(e) When the depreciation reflected on a contractor's books of accounts and financial statements differs from that used and acceptable for Federal income tax purposes, reimbursement shall be based on the asset cost amortized over the estimated useful life of the property using depreciation methods (straight line, sum of the years' digits, etc.) acceptable for income tax purposes. Allowable depreciation shall not exceed the amounts used for book and statement purposes and shall be determined in a manner consistent with the depreciation policies and procedures followed in the same cost center on non-Government business.

(f) Depreciation for reimbursement purposes in the case of tax-exempt organizations shall be determined on the basis described in paragraph (e) immediately above.

(g) Special considerations are required for assets acquired before the effective date of this cost principle if, on that date, the undepreciated balance of these assets resulting from depreciation policies and procedures used previously for Government contracts and subcontracts is different from the undepreciated balance on the books and financial statements. The undepreciated balance for contract cost purposes shall be depreciated over the remaining life using the methods and lives followed for book purposes. The aggregate depreciation of any asset allowable after the effective date of this 31.205-11 shall not exceed the cost basis of the asset less any depreciation allowed or allowable under prior acquisition regulations.

(h) Depreciation should usually be allocated to the contract and other work as an indirect cost. The amount of depreciation allowed in any accounting period may, consistent with the basic objectives in paragraph (a) above, vary with volume of production or use of multishift operations.

(i) In the case of emergency facilities covered by certificates of necessity, a contractor may elect to use normal depreciation without requesting a determination of "true depreciation," or may elect to use either normal or "true depreciation

tion" after a determination of "true depreciation" has been made by an Emergency Facilities Depreciation Board (EFDB). The method elected must be followed consistently thoughout the life of the emergency facility. When an election is made to use normal depreciation, the criteria in paragraphs (c), (d), (e), and (f) above shall apply for both the emergency period and the post-emergency period. When an election is made to use "true depreciation," the amount allowable as depreciation—

(1) With respect to the emergency period (five years), shall be computed in accordance with the determination of the EFDB and allocated rateably over the full five year emergency period; provided no other allowance is made which would duplicate the factors, such as extraordinary obsolescence, covered by the Board's determination; and

(2) After the end of the emergency period, shall be computed by distributing the remaining undepreciated portion of the cost of the emergency facility over the balance of its useful life provided the remaining undepreciated portion of such cost shall not include any amount of unrecovered "true depreciation."

(j) No depreciation, rental, or use charge shall be allowed on property acquired at no cost from the Government by the contractor or by any division, subsidiary, or affiliate of the contractor under common control.

(k) The depreciation on any item which meets the criteria for allowance at a price under 31.205-26(e) may be based on that price, provided the same policies and procedures are used for costing all business of the using division, subsidiary, or organization under common control.

(l) No depreciation or rental shall be allowed on property fully depreciated by the contractor or by any division, subsidiary, or affiliate of the contractor under common control. However, a reasonable charge for using fully depreciated property may be agreed upon and allowed (but see 31.109(h)(2)). In determining the charge, consideration shall be given to cost, total estimated useful life at the time of negotiations, effect of any increased maintenance charges or decreased efficiency due to age, and the amount of depreciation previously charged to Government contracts or subcontracts.

(m) CAS 404, Capitalization of Tangible Assets, applies to assets acquired by a capital lease as defined in Statement of Financial Accounting Standard No. 13 (FAS-13), Accounting for Leases, issued by the Financial Accounting Standards Board (FASB). Compliance with CAS 404 and FAS-13 requires that such leased assets (capital leases) be treated as purchased assets; i.e., be capitalized and the capitalized value of such assets be distributed over their useful lives as depreciation charges, or over the leased life as amortization charges as appropriate. Assets whose leases are classified as capital leases under FAS-13 are subject to the requirements of 31.205-11 while assets acquired under leases classified as operating leases are subject to the requirements on rental costs in 31.205-36. The standards of financial accounting and reporting prescribed by FAS-13 are incorporated into this principle and shall govern its application, except as provided in subparagraphs (1), (2), and (3) below.

(1) Rental costs under a sale and leaseback arrangement shall be allowable up to the amount that would have been allowed had the contractor retained title to the property.

(2) Capital leases, as defined in FAS-13, for all real and personal property, between any related parties are subject to the requirements of this subparagraph 31.205-11(m). If it is determined that the terms of the lease have been significantly affected by the fact that the lessee and lessor are related, depreciation charges shall not be allowed in excess of those which would have occurred if the lease contained terms consistent with those found in a lease between unrelated parties.

(3) Assets acquired under leases that the contractor must capitalize under FAS-13 shall not be treated as purchased assets for contract purposes if the leases are covered by 31.205-36(b)(4).

(n) Whether or not the contract is otherwise subject to CAS, the requirements of 31.205-52, which limit the allowability of depreciation, shall be observed.

(FACs 84-30, 30 Sep 87; 84-58, 23 Jul 90; 90-12, 31 Aug 1992)

**31.205-12 Economic planning costs.**

(a) This category includes costs of generalized long-range management planning that is concerned with the future overall development of the contractor's business and that may take into account the eventual possibility of economic dislocations or fundamental alterations in those markets in which the contractor currently does business. Economic planning costs do not include organization or reorganization costs covered by 31.205-27.

(b) Economic planning costs are allowable as indirect costs to be properly allocated.

(c) Research and development and engineering costs designed to lead to new products for sale to the general public are not allowable under this principle.

**31.205-13 Employee morale, health, welfare, food service, and dormitory costs and credits.**

(a) Aggregate costs incurred on activities designed to improve working conditions, employer-employee relations, employee morale, and employee performance (less income generated by these activities) are allowable, except as limited by paragraph (b) immediately below, and to the extent that the net amount is reasonable. Some examples are house publications, health clinics, recreation, employee counseling services, and food and dormitory services, which include operating or furnishing facilities for cafeterias, dining rooms, canteens, lunch wagons, vending machines, living accommodations, or similar types of services for the contractor's employees at or near the contractor's facilities.

(b) Losses from operating food and dormitory services may be included as costs only if the contractor's objective is to operate such services on a break-even basis. Losses sustained because food services or lodging accommodations are furnished without charge or at prices or rates which obviously would not be conducive to the accomplishment of the above objective are not allowable. A loss may be allowed, however, to the extent that the contractor can demonstrate that unusual circumstances exist (e.g., (1) where the contractor must provide food or dormitory services at remote locations where adequate commercial facilities are not reasonably available, or (2) where charged but unproductive labor costs would be excessive but for the services provided or where cessati on or reduction of food or dormitory operations will not otherwise yield net cost savings) such that even with efficient management, operating the services on a break-even basis would require charging inordinately high prices, or prices or rates higher than those charged by commercial establishments offering the same services in the same geographical areas. Costs of food and dormitory services shall include an allocable share of indirect expenses pertaining to these activities.

(c) When the contractor has an arrangement authorizing an employee association to provide or operate a service, such as vending machines in the contractor's plant, and retain the profits, such profits shall be treated in the same manner as if the contractor were providing the service (but see paragraph (d) immediately below).

(d) Contributions by the contractor to an employee organization, including funds from vending machine receipts or similar sources, may be included as costs incurred under paragraph (a) above only to the extent that the contractor demonstrates that an equivalent amount of the costs incurred by the employee organization would be allowable if directly incurred by the contractor.

(FACs 84-15, 7 Apr 86)

**31.205-14 Entertainment costs.**

Costs of amusement, diversion, social activities, and any directly associated costs such as tickets to shows or sports events, meals, lodging, rentals, transportation, and gratuities are unallowable (but see 31.205-1 and 31.205-13). Costs of membership in social, dining, or country clubs or other organizations having the same purposes are also unallowable, regardless of whether the cost is reported as taxable income to the employees.

(FAC 84-15, 7 Apr 86)

**31.205-15 Fines, penalties, and mischarging costs.**

(a) Costs of fines and penalties resulting from violations of, or failure of the contractor to comply with, Federal, State, local, or foreign laws and regulations, are unallowable except when incurred as a result of compliance with specific terms and conditions of the contract or written instructions from the contracting officer.

(b) Costs incurred in connection with, or related to, the mischarging of costs on Government contracts are unallowable when the costs are caused by, or result from, alteration or destruction of records, or other false or improper charging or recording of costs. Such costs include those incurred to measure or otherwise determine the magnitude of the improper charging, and costs incurred to remedy or correct the mischarging, such as costs to rescreen and reconstruct records.

(FACs 84-15, 7 Apr 86; 84-44, 28 Apr 89; 90-3, 22 Jan 91)

**31.205-16 Gains and losses on disposition of depreciable property or other capital assets.**

(a) Gains and losses from the sale, retirement, or other disposition (but see 31.205-19) of depreciable property shall be included in the year in which they occur as credits or charges to the cost grouping(s) in which the depreciation or amortization applicable to those assets was included (but see paragraph (d) of this subsection). However, no gain or loss shall be recognized as a result of the transfer of assets in a business combination (see 31.205-52).

(b) Gains and losses on disposition of tangible capital assets, including those acquired under capital leases (see 31.205-11(m), shall be considered as adjustments of depreciation costs previously recognized. The gain or loss for each asset disposed of is the difference between the net amount realized, including insurance proceeds from involuntary conversions, and its undepreciated balance. The gain recognized for contract costing purposes shall be limited to the difference between the acquisition cost (or for assets acquired under a capital lease, the value at which the leased asset is capitalized) of the asset and its undepreciated balance (except see subdivisions (c)(2)(i) or (ii) below).

(c) Special considerations apply to an involuntary conversion which occurs when a contractor's property is destroyed by events over which the owner has no control, such as fire, windstorm, flood, accident, theft, etc., and an insurance award is recovered. The following govern involuntary conversions:

(1) When there is a cash award and the converted asset is not replaced, gain or loss shall be recognized in the period of disposition. The gain recognized for contract costing purposes shall be limited to the difference between the acquisition cost of the asset and its undepreciated balance.

(2) When the converted asset is replaced, the contractor shall either—

(i) Adjust the depreciable basis of the new asset by the amount of the total realized gain or loss; or

(ii) Recognize the gain or loss in the period of disposition, in which case the Government shall participate to the same extent as outlined in subparagraph (c)(1) above.

(d) Gains and losses on the disposition of depreciable property shall not be recognized as a separate charge or credit when—

(1) Gains and losses are processed through the depreciation reserve account and reflected in the depreciation allowable under 31.205-11; or

(2) The property is exchanged as part of the purchase price of a similar item, and the gain or loss is taken into consideration in the depreciation cost basis of the new item.

(e) Gains and losses arising from mass or extraordinary sales, retirements, or other disposition other than through business combinations shall be considered on a case-by-case basis.

(f) Gains and losses of any nature arising from the sale or exchange of capital assets other than depreciable property shall be excluded in computing contract costs.

(FAC 84-58, 23 Jul 90)

**31.205-17 Idle facilities and idle capacity costs.**

(a) "Costs of idle facilities or idle capacity," as used in this subsection, means costs such as maintenance, repair, housing, rent, and other related costs; e.g., property taxes, insurance, and depreciation.

"Facilities," as used in this subsection, means plant or any portion thereof (including land integral to the operation), equipment, individually or collectively, or any other tangible capital asset, wherever located, and whether owned or leased by the contractor.

"Idle capacity," as used in this subsection, means the unused capacity of partially used facilities. It is the difference between that which a facility could achieve under 100 percent operating time on a one-shift basis, less operating interruptions resulting from time lost for repairs, setups, unsatisfactory materials, and other normal delays, and the extent to which the facility was actually used to meet demands during the accounting period. A multiple-shift basis may be used in the calculation instead of a one-shift basis if it can be shown that this amount of usage could normally be expected for the type of facility involved.

"Idle facilities," as used in this subsection, means completely unused facilities that are excess to the contractor's current needs.

(b) The costs of idle facilities are unallowable unless the facilities—

(1) Are necessary to meet fluctuations in workload; or

(2) Were necessary when acquired and are now idle because of changes in requirements, production economies, reorganization, termination, or other causes which could not have been reasonably foreseen. (Costs of idle facilities are allowable for a reasonable period, ordinarily not to exceed 1 year, depending upon the initiative taken to use, lease, or dispose of the idle facilities (but see 31.205-42)).

(c) Costs of idle capacity are costs of doing business and are a factor in the normal fluctuations of usage or overhead rates from period to period. Such costs are allowable provided the capacity is necessary or was originally reasonable and is not subject to reduction or elimination by subletting, renting, or sale, in accordance with sound business, economics, or security practices. Widespread idle capacity throughout an entire plant or among a group of assets having substantially the same function may be idle facilities.

(d) Any costs to be paid directly by the Government for idle facilities or idle capacity reserved for defense mobilization production shall be the subject of a separate agreement.

**31.205-18 Independent research and development and bid and proposal costs.**

(a) Definitions.

"Applied research," as used in this subsection, means that effort which (1) normally follows basic research, but may not be severable from the related basic research, (2) attempts to determine and exploit the potential of scientific discoveries or improvements in technology, materials, processes, methods, devices, or techniques, and (3) attempts to advance the state of the art. Applied research does not include efforts whose principal aim is design, development, or test of specific items or services to be considered for sale; these efforts are within the definition of the term "development," defined in this subsection.

"Basic research," as used in this subsection, means that research which is directed toward increase of knowledge in science. The primary aim of basic research is a fuller knowledge or understanding of the subject under study, rather than any practical application thereof.

"Bid and proposal (B&P) costs," as used in this subsection, means the costs incurred in preparing, submitting, and supporting bids and proposals (whether or not solicited) on potential Government or non-Government contracts. The term does not include the costs of effort sponsored by a grant or cooperative agreement or required in contract performance of a contract.

"Company," as used in this subsection, means all divisions, subsidiaries, and affiliates of the contractor under common control.

"Contractor," as used in paragraph (c)(2) of this subsection, includes all divisions, subsidiaries, and affiliates under common control.

"Covered contract," as used in paragraph (c)(2) of this subsection, means a prime contract entered into by a Government agency for an amount more than $100,000 except for a fixed-price contract without cost incentives. It also includes a subcontract for an amount more than $100,000, except for a fixed-price subcontract without cost incentives under such a prime contract.

"Covered segment," as used in paragraph (c)(2) of this subsection, means a product division of the contractor that allocated more than $1,000,000 in IR&D/B&P costs to covered contracts during the preceding fiscal year. In the case of a contractor that has no product divisions, such term means that contractor as a whole. A product division of the contractor that allocated less than $1,000,000 in IR&D/B&P costs to covered contracts during the preceding fiscal year shall not be subject to the limitations for major contractors set forth in 31.205-18(c)(2)(i) and (c)(2)(ii).

"Development," as used in this subsection, means the systematic use, under whatever name, of scientific and technical knowledge in the design, development, test, or evaluation of a potential new product or service (or of an improvement in an existing product or service) for the purpose of meeting specific performance requirements or objectives. Development includes the functions of design engineering, prototyping, and engineering testing. Development excludes: (1) subcontracted technical effort which is for the sole purpose of developing an additional source for an existing product, or (2) development effort for manufacturing or production materials, systems, processes, methods, equipment, tools, and techniques not intended for sale.

"Independent research and development (IR&D)," as used in this subsection, means a contractor's IR&D cost that consists of projects falling within the four following areas: (1) basic research, (2) applied research, (3) development, and (4) systems and other concept formulation studies. The term does not include the costs of effort sponsored by a grant or required in the performance of a contract. IR&D effort shall not include technical effort expended in developing and preparing technical data specifically to support submitting a bid or proposal.

"Major contractor," as used in paragraph (c)(2) of this subsection, means any contractor whose covered segments allocated to covered contracts a total of more than $10,000,000 in IR&D/B&P costs in the preceding fiscal year. For purposes of calculating the dollar threshold amounts to determine whether a contractor meets the definition of "major contractor, contractor segments allocating less than $1,000,000 of IR&D/B&P costs to covered contracts in the preceding year shall not be included.

"Systems and other concept formulation studies," as used in this subsection, means analyses and study efforts either related to specific IR&D efforts or directed toward identifying desirable new systems, equipment or components, or modifications and improvements to existing systems, equipment, or components.

(b) Composition and allocation of costs. The requirements of 48 CFR 9904.420, Accounting for independent research and development costs and bid and proposal costs, are incorporated in their entirety and shall apply as follows—

(1) Fully-CAS-covered contracts. Contracts that are fully-CAS-covered shall be subject to all requirements of 48 CFR 9904.420.

(2) Modified CAS-covered and non-CAS-covered contracts. Contracts that are not CAS-covered or that contain terms or conditions requiring modified CAS coverage shall be subject to all requirements of 48 CFR 9904.420 except 48 CFR 9904.420-50(e)(2) and 48 CFR 9904.420-50(f)(2), which are not then applicable. However, non-CAS-covered or modified CAS-covered contracts awarded at a time the contractor has CAS-covered contracts requiring compliance with 48 CFR 9904.420, shall be subject to all the requirements of 48 CFR 9904.420. When the requirements of 48 CFR 9904.420-50(e)(2) and 48 CFR 9904.420-50(f)(2) are not applicable, the following apply:

(i) IR&D and B&P costs shall be allocated to final cost objectives on the same basis of allocation used for the G&A expense grouping of the profit center (see 31.001) in which the costs are incurred. However, when IR&D and B&P costs clearly benefit other profit centers or benefit the entire company, those costs shall be allocated through the G&A of the other profit centers or through the corporate G&A, as appropriate.

(ii) If allocations of IR&D or B&P through the G&A base do not provide equitable cost allocation, the contracting officer may approve use of a different base.

(c) Allowability. (1) This subparagraph (c)(1) implements section 824 of the National Defense Authorization Act for Fiscal Year 1991 (Pub. L. 101-510). Except as provided in paragraphs (c)(2), (d), and (e) of this subsection, or as provided in agency regulations, costs for IR&D and B&P are allowable only in accordance with the following:

(i) Companies required to negotiate advance agreements.

(A) Any company that received payments for IR&D and B&P costs in a fiscal year, either as a prime contractor or subcontractor, exceeding $7,000,000 from Government agencies, is required to negotiate with the Government an advance agreement which establishes a ceiling for allowability of IR&D and B&P costs for the following fiscal year. This agreement is binding on all Government agencies, unless prohibited by statute. The requirements of section 203 of Public Law 91-441 necessitate that the Department of Defense (DOD) be the lead negotiating agency when the contractor has received more than $7,000,000 in payments for IR&D and B&P from DOD. Computation of IR&D and B&P costs to determine whether the threshold criterion was reached shall include only recoverable IR&D and B&P costs allocated during the company's previous fiscal year to prime contracts and subcontracts for which the submission and certification of cost or pricing data were required. (See also paragraph (b) of this subsection and 15.804.) The computation shall include full burdening pursuant to 48 CFR 9904.420.

(B) When a company meets the criterion in (c)(1)(i)(A) of this subsection, required advance agreements may be negotiated at the corporate level and/or with those profit centers that contract directly with the Government and that in the preceding year allocated recoverable IR&D and B&P costs exceeding $700,000, including burdening, to contracts and subcontracts for which the submission and certification of cost or pricing data were required (see also paragraph (b) of this subsection and 15.804). When ceilings are negotiated for separate profit centers of the company, the allowability of IR&D and B&P costs for any center that in its previous fiscal year did not reach the $700,000 threshold may be determined in accordance with paragraph (c)(1)(ii) of this subsection.

(C) Ceilings are the maximum dollar amounts of total IR&D and B&P costs that will be allowable for allocation over the appropriate base for that part of the company's operation covered by an advance Agreement.

(D) No IR&D and B&P cost shall be allowable if a company fails to initiate negotiation of a required advance agreement before the end of the fiscal year for which the agreement is required.

(E) When negotiations are held with a company meeting the $7,000,000 criterion or with separate profit centers (when negotiations are held at that level under (c)(1)(i)(B) of this subsection), and if no advance agreement is reached, payment for IR&D and B&P costs shall be reduced below that which the company or profit center would have otherwise received. The amount of such reduced payment shall not exceed 75 percent of the amount of which, in the opinion of the contracting officer, the company or profit center would be entitled to receive under an advance agreement. Written notification of the contracting officer's determination of a reduced amount shall be provided the contractor. In the event that an advance agreement is not reached before the end of the contractor's fiscal year for which the agreement is to apply, negotiations shall immediately be terminated, and the contracting officer shall furnish a determination of the reduced amount.

(F) Contractors may appeal decisions of the contracting officer to reduce payment. The appeal shall be filed with the contracting officer within 30 days of receipt of the contracting officer's determination. (See also Subpart 42.10.)

(ii) Companies not required to negotiate advance agreements. Costs for IR&D and B&P are allowable as indirect expenses on contracts to the extent that those costs are allocable and reasonable.

(2) This subparagraph (c)(2) implements section 802 of the National Defense Authorization Act for Fiscal Years 1992 and 1993 (Pub. L. 102-190) and is effective for IR&D and B&P costs incurred by a contractor during fiscal years of that contractor that begin on or after October 1, 1992. Except as provided in paragraph (d) of this subsection, or as provided in agency regulations, costs for IR&D and B&P are allowable as indirect expenses on contracts to the extent that those costs are allocable and reasonable. The following limitations apply to major contractors—

(i) For the first three contractor fiscal years beginning on or after October 1, 1992, the total maximum allowable amount of IR&D/B&P costs shall not exceed the sum of:

(A) The total amount of allowable IR&D/B&P costs in the preceding fiscal year (i.e., the lower of the previous year's ceiling or actual costs incurred); plus

(B) Five percent of the amount in (c)(2)(i)(A) of this subsection; plus

(C) If the total amount of IR&D/B&P costs for a fiscal year is greater than the total amount of IR&D/B&P costs for the preceding fiscal year, the amount that is determined by multiplying the amount in (c)(2)(i)(A) of this subsection by the lesser of—

(1) The percentage by which the total amount of IR&D/B&P costs for a fiscal year exceeds the total amount of such costs for the preceding fiscal year; or

(2) The percentage rate of inflation from the end of the preceding fiscal year to the end of the fiscal year for which the amount of the limitation is being computed. The rate of inflation shall be the price escalation index for the Research, Development, Test & Evaluation (RDT&E) account, Total Obligation Authority (TOA) which is published annually (normally in January) by the Department of Defense Comptroller and used in preparation of the annual submission of the Defense budget. This rate will be published in the Federal Register on an annual basis.

(ii) Major contractors shall submit, in accordance with agency guidance, financial and technical information to support their IR&D/B&P costs.

(iii) A waiver may be granted, in accordance with agency procedures, to increase the amount prescribed in (c)(2)(i) of this subsection for the following special circumstances:

(A) To ensure that the contractor's allowable IR&D/B&P costs are at least the same amount that would have been allowed under this subpart which was in effect on December 4, 1991; or

(B) When it is in the best interest of the Government.

(d) Deferred IR&D and B&P costs.

(1) IR&D costs that were incurred in previous accounting periods are unallowable, except when a contractor has developed a specific product at its own risk in anticipation of recovering the development costs in the sale price of the product provided that-

(i) The total amount of IR&D costs applicable to the product can be identified;

(ii) The proration of such costs to sales of the product is reasonable;

(iii) The contractor had no Government business during the time that the costs were incurred or did not allocate IR&D costs to Government contracts except to prorate the cost of developing a specific product to the sales of that product; and

(iv) No costs of current IR&D programs are allocated to Government work except to prorate the costs of developing a specific product to the sales of that product.

(2) When deferred costs are recognized, the contract (except firm-fixed price and fixed-price with economic price adjustment) will include a specific provision setting forth the amount of deferred IR&D costs that are allocable to the contract. The negotiation memorandum will state the circumstances pertaining to

the case and the reason for accepting the deferred costs.

(e) Cooperative arrangements. IR&D effort may be performed by contractors working jointly with one or more non-Federal entities pursuant to a cooperative arrangement (for example, joint ventures, limited partnerships, teaming arrangements, and collaboration and consortium arrangements). IR&D effort may also be performed by contractors pursuant to cooperative research and development agreements, or similar arrangements, entered into under (1) section 12 of the Stevenson-Wydler Technology Transfer Act of 1980 (15 U.S.C. 3710(a); (2) section 203(c)(5) and (6) of the National Aeronautics and Space Act of 1958, as amended (42 U.S.C. 2473(c)(5) and (6)), when there is no transfer of Federal appropriated funds; (3) 10 U.S.C. 2371 for the Defense Advanced Research Projects Agency; or (4) other equivalent authority. IR&D costs incurred by a contractor pursuant to these types of cooperative arraignments should be considered as allowable IR&D costs it the work performed would have been allowed as contractor IR&D had there been no cooperative arrangement.

(FAC 84-1, 26 Mar 84; 84-30, 30 Sep 87; 84-58, 23 Jul 90; 90-13, 24 Sep 92; 90-20, 10 Mar 1994)

**31.205-19 Insurance and indemnification.**

(a) Insurance by purchase or by self-insuring includes coverage the contractor is required to carry, or to have approved, under the terms of the contract and any other coverage the contractor maintains in connection with the general conduct of its business. Any contractor desiring to establish a program of self-insurance applicable to contracts that are not subject to 48 CFR 9904.416, Accounting for Insurance Costs, shall comply with the self-insurance requirements of that standard as well as with Part 28 of this Regulation. However, approval of a contractor's insurance program in accordance with Part 28 does not constitute a determination as to the allowability of the program's cost. The amount of insurance costs which may be allowed is subject to the cost limitations and exclusions in the following subparagraphs.

(1) Costs of insurance required or approved, and maintained by the contractor pursuant to the contract, are allowable.

(2) Costs of insurance maintained by the contractor in connection with the general conduct of its business are allowable, subject to the following limitations:

(i) Types and extent of coverage shall follow sound business practice, and the rates and premiums must be reasonable.

(ii) Costs allowed for business interruption or other similar insurance must be limited to exclude coverage of profit.

(iii) The cost of property insurance premiums for insurance coverage in excess of the acquisition cost of the insured assets is allowable only when the contractor has a formal written policy assuring that in the event the insured property is involuntarily converted, the new asset shall be valued at the book value of the replaced asset plus or minus adjustments for differences between insurance proceeds and actual replacement cost. If the contractor does not have such a formal written policy, the cost of premiums for insurance coverage in excess of the acquisition cost of the insured asset is unallowable.

(iv) Costs of insurance for the risk of loss of or damage to Government property are allowable only to the extent that the contractor is liable for such loss or damage and such insurance does not cover loss or damage that results from willful misconduct or lack of good faith on the part of any of the contractor's directors or officers or other equivalent representatives.

(v) Contractors operating under a program of self-insurance must obtain approval of the program when required by 28.308(a).

(vi) Costs of insurance on the lives of officers, partners, or proprietors are allowable only to the extent that the insurance represents additional compensation (see 31.205-6).

(3) Actual losses are unallowable unless expressly provided for in the contract, except—

(i) Losses incurred under the nominal deductible provisions of purchased insurance, in keeping with sound business practice, are allowable for contracts not

subject to 48 CFR 9904.416 and when the contractor did not establish a self-insurance program. Such contracts are not subject to the self-insurance requirements of 48 CFR 9904.416. For contracts subject to 48 CFR 9904.416, and for those made subject to the self-insurance requirements of that Standard as a result of the contractor's having established a self-insurance program (see paragraph (a) above), actual losses may be used as a basis for charges under a self-insurance program when the actual amount of losses will not differ significantly from the projected average losses for the accounting period (see 48 CFR 9904.416-50(a)(2)(ii)). In those instances where an actual loss has occurred and the present value of the liability is determined under the provisions of 48 CFR 9904.416-50(a)(3)(ii), the allowable cost shall be limited to an amount computed using as a discount rate the interest rate determined by the Secretary of the Treasury pursuant to 50 U.S.C. App. 1215(b)(2) in effect at the time the loss is recognized. However, the full amount of a lump-sum settlement to be paid within a year of the date of settlement is allowable.

(ii) Minor losses, such as spoilage, breakage, and disappearance of small hand tools that occur in the ordinary course of doing business and that are not covered by insurance are allowable.

(4) The cost of insurance to protect the contractor against the costs of correcting its own defects in materials or workmanship is unallowable. However, insurance costs to cover fortuitous or casualty losses resulting from defects in materials or workmanship are allowable as a normal business expense.

(5) Premiums for retroactive or backdated insurance written to cover occurred and known losses are unallowable.

(b) If purchased insurance is available, the charge for any self-insurance coverage plus insurance administration expenses shall not exceed the cost of comparable purchased insurance plus associated insurance administration expenses.

(c) Insurance provided by captive insurers (insurers owned by or under the control of the contractor) is considered self-insurance, and charges for it must comply with the self-insurance provisions of 30.416. However, if the captive insurer also sells insurance to the general public in substantial quantities and it can be demonstrated that the charge to the contractor is based on competitive market forces, the insurance will be considered purchased insurance.

(d) The allowability of premiums for insurance purchased from fronting insurance companies (insurance companies not related to the contractor but who reinsure with a captive insurer of the contractor) shall not exceed the amount (plus reasonable fronting company charges for services rendered) which the contractor would have been allowed had it insured directly with the captive insurer.

(e) Self-insurance charges for risks of catastrophic losses are not allowable (see 28.308(e)).

(f) The Government is obligated to indemnify the contractor only to the extent authorized by law, as expressly provided for in the contract, except as provided in paragraph (a)(3) above.

(g) Late premium payment charges related to employee deferred compensation plan insurance incurred pursuant to Section 4007 (29 U.S.C. 1307) or Section 4023 (29 U.S.C. 1323) of the Employee Retirement Income Security Act of 1974 are unallowable.

(FACs 84-7, 30 Apr 85; 84-21, 29 Aug 86; 84-30, 30 Sep 87; 90-12, 31 Aug 1992)

**31.205-20 Interest and other financial costs.**

Interest on borrowings (however represented), bond discounts, costs of financing and refinancing capital (net worth plus long-term liabilities), legal and professional fees paid in connection with preparing prospectuses, costs of preparing and issuing stock rights, and directly associated costs are unallowable except for interest assessed by State or local taxing authorities under the conditions specified in 31.205-41 (but see 31.205-28).

**31.205-21 Labor relations costs.**

Costs incurred in maintaining satisfactory relations between the contractor and its employees, including costs of shop

stewards, labor management committees, employee publications, and other related activities, are allowable.

**31.205-22 Legislative lobbying costs.**

(a) C sts associated with the following activities are unallowable:

(1) Attempts to influence the outcomes of any Federal, State, or local election, referendum, initiative, or similar procedure, through in kind or cash contributions, endorsements, publicity, or similar activities;

(2) Establishing, administering, contributing to, or paying the expenses of a political party, campaign, political action committee, or other organization established for the purpose of influencing the outcomes of elections;

(3) Any attempt to influence (i) the introduction of Federal or state legislation, or (ii) the enactment or modification of any pending Federal or state legislation through communication with any member or employee of the Congress or state legislature (including efforts to influence state or local officials to engage in similar lobbying activity), or with any government official or employee in connection with a decision to sign or veto enrolled legislation;

(4) Any attempt to influence (i) the introduction of Federal or state legislation, or (ii) the enactment or modification of any pending Federal or state legislation by preparing, distributing or using publicity or propaganda, or by urging members of the general public or any segment thereof to contribute to or participate in any mass demonstration, march, rally, fund raising drive, lobbying campaign or letter writing or telephone campaign; or

(5) Legislative liaison activities, including attendance at legislative sessions or committee hearings, gathering information regarding legislation, and analyzing the effect of legislation, when such activities are carried on in support of or in knowing preparation for an effort to engage in unallowable activities.

(b) The following activities are excepted from the coverage of (a) above:

(1) Providing a technical and factual presentation of information on a topic directly related to the performance of a contract through hearing testimony, statements or letters to the Congress or a state legislature, or subdivision, member, or cognizant staff member thereof, in response to a documented request (including a Congressional Record notice requesting testimony or statements for the record at a regularly scheduled hearing) made by the recipient member, legislative body or subdivision, or a cognizant staff member thereof; provided such information is readily obtainable and can be readily put in deliverable form; and further provided that costs under this section for transportation, lodging or meals are unallowable unless incurred for the purpose of offering testimony at a regularly scheduled Congressional hearing pursuant to a written request for such presentation made by the Chairman or Ranking Minority Member of the Committee or Subcommittee conducting such hearing.

(2) Any lobbying made unallowable by (a)(3) above to influence state legislation in order to directly reduce contract cost, or to avoid material impairment of the contractor's authority to perform the contract.

(3) Any activity specifically authorized by statute to be undertaken with funds from the contract.

(c) When a contractor seeks reimbursement for indirect costs, total lobbying costs shall be separately identified in the indirect cost rate proposal, and thereafter treated as other unallowable activity costs.

(d) Contractors shall submit as part of their annual indirect cost rate proposals a certification that the requirements and standards of this subsection have been complied with.

(e) Contractors shall maintain adequate records to demonstrate that the certification of costs as being allowable or unallowable pursuant to this subsection complies with the requirements of this subsection.

(f) Time logs, calendars, or similar records shall not be required to be created for purposes of complying with this subsection during any particular calendar month when—

(1) The employee engages in lobbying (as defined in paragraphs (a) and (b) of

this subsection) 25 percent or less of the employee's compensated hours of employment during that calendar month; and

(2) Within the preceding 5-year period, the organization has not materially misstated allowable or unallowable costs of any nature, including legislative lobbying costs. When the conditions of subparagraphs (f)(1) and (2) of this subsection are met, contractors are not required to establish records to support the allowability of claimed costs in addition to records already required or maintained. Also, when conditions of subparagraphs (f)(1) and (2) of this subsection are met, the absence of time logs, calendars, or similar records will not serve as a basis for disallowing costs by contesting estimates of lobbying time spent by employees during a calendar month.

(g) Existing procedures should be utilized to resolve in advance any significant questions or disagreements concerning the interpretation or application of this subsection.

(FACs 84-2, 27 Apr 84; 84-15, 7 Apr 86; 84-26, 30 Jul 87)

**31.205-23 Losses on other contracts.**

An excess of costs over income under any other contract (including the contractor's contributed portion under cost-sharing contracts) is unallowable.

**31.205-24 Maintenance and repair costs.**

(a) Costs necessary for the upkeep of property (including Government property, unless otherwise provided for) that neither add to the permanent value of the property nor appreciably prolong its intended life, but keep it in an efficient operating condition, are to be treated as follows (but see 31.205-11):

(1) Normal maintenance and repair costs are allowable.

(2) Extraordinary maintenance and repair costs are allowable, provided those costs are allocated to the applicable periods for purposes of determining contract costs (but see 31.109).

(b) Expenditures for plant and equipment, including rehabilitation which should be capitalized and subject to depreciation, according to generally accepted accounting principles as applied under the contractor's established policy or, when applicable, according to 48 CFR 9904.404, Capitalization of Tangible Assets, are allowable only on a depreciation basis.

(FAC 84-30, 30 Sep 87; 90-12, 31 Aug 1992)

**31.205-25 Manufacturing and production engineering costs.**

(a) The costs of manufacturing and production engineering effort as described in (1) through (4) below are all allowable:

(1) Developing and deploying new or improved materials, systems, processes, methods, equipment, tools and techniques that are or are expected to be used in producing products or services;

(2) Developing and deploying pilot production lines;

(3) Improving current production functions, such as plant layout, production scheduling and control, methods and job analysis, equipment capabilities and capacities, inspection techniques, and tooling analysis (including tooling design and application improvements); and

(4) Material and manufacturing producibility analysis for production suitability and to optimize manufacturing processes, methods, and techniques.

(b) This cost principle does not cover:

(1) Basic and applied research effort (as defined in 31.205-18(a)) related to new technology, materials, systems, processes, methods, equipment, tools and techniques. Such technical effort is governed by 31.205-18, Independent research and development and bid and proposal costs; and

(2) Development effort for manufacturing or production materials, systems, processes, methods, equipment, tools and techniques that are intended for sale is also governed by 31.205-18.

(c) Where manufacturing or production development costs are capitalized or required to be capitalized under the contractor's capitalization policies, allowable cost will be determined in accordance with the requirements of 31.205-11, Depreciation.

**31.205-26 Material costs.**

(a) Material costs include the costs of such items as raw materials, parts, subassemblies, components, and manufacturing supplies, whether purchased or manufactured by the contractor, and may include such collateral items as inbound transportation and intransit insurance. In computing material costs, consideration shall be given to reasonable overruns, spoilage, or defective work (unless otherwise provided in any contract provision relating to inspecting and correcting defective work). These costs are allowable, subject to the requirements of paragraphs (b) through (e) below.

(b) Costs of material shall be adjusted for income and other credits, including available trade discounts, refunds, rebates, allowances, and cash discounts, and credits for scrap, salvage, and material returned to vendors. Such income and other credits shall either be credited directly to the cost of the material or be allocated as a credit to indirect costs. When the contractor can demonstrate that failure to take cash discounts was reasonable, lost discounts need not be credited.

(c) Reasonable adjustments arising from differences between periodic physical inventories and book inventories may be included in arriving at costs; provided, such adjustments relate to the period of contract performance.

(d) When materials are purchased specifically for and are identifiable solely with performance under a contract, the actual purchase cost of those materials should be charged to the contract. If material is issued from stores, any generally recognized method of pricing such material is acceptable if that method is consistently applied and the results are equitable. When estimates of future material costs are required, current market price or anticipated acquisition cost may be used, but the basis of pricing must be disclosed.

(e) Allowance for all materials, supplies, and services that are sold or transferred between any divisions, subsidiaries, or affiliates of the contractor under a common control shall be on the basis of cost incurred in accordance with this subpart. However, allowance may be at a price when it is the established practice of the transferring organization to price interorganizational transfers at other than cost for commercial work of the contractor or any division, subsidiary, or affiliate of the contractor under a common control, and when the price—

(1) Is or is based on an "established catalog or market price of commercial items sold in substantial quantities to the general public" in accordance with 15.804; or

(2) Is the result of "adequate price competition" in accordance with 15.804 and is the price at which an award was made to the affiliated organization after obtaining quotations on an equal basis from such organization and one or more outside sources that produce the item or its equivalent in significant quantity.

(3) Provided, that in either subparagraph (1) or (2) above-

(i) The price is not in excess of the transferor's current sales price to its most favored customer (including any division, subsidiary or affiliate of the contractor under a common control) for a like quantity under comparable conditions; and

(ii) The contracting officer has not determined the price to be unreasonable.

(f) The price determined in accordance with subparagraph (e)(1) above should be adjusted to reflect the quantities being acquired and may be adjusted to reflect actual cost of any modifications necessary because of contract requirements.

**31.205-27 Organization costs.**

(a) Except as provided in paragraph (b) of this section, expenditures in connection with (1) planning or executing the organization or reorganization of the corporate structure of a business, including mergers and acquisitions, (2) resisting or planning to resist the reorganization of the corporate structure of a business or a change in the controlling interest in the ownership of a business, and (3) raising capital (net worth plus long-term liabilities), are unallowable. Such expenditures include but are not limited to incorporation fees and costs of attorneys, accountants, brokers, promoters and organizers, management consultants and investment

counselors, whether or not employees of the contractor. Unallowable "reorganization" costs include the cost of any change in the contractor's financial structure, excluding administrative costs of short-term borrowings for working capital, resulting in alterations in the rights and interests of security holders, whether or not additional capital is raised.

(b) The cost of activities primarily intended to provide compensation will not be considered organizational costs subject to this subsection, but will be governed by 31.205-6. These activities include acquiring stock for (1) executive bonuses, (2) employee savings plans, and (3) employee stock ownership plans.

(FAC 84-35, 4 Apr 88)

**31.205-28 Other business expenses.**

The following types of recurring costs are allowable when allocated on an equitable basis:

(a) Registry and transfer charges resulting from changes in ownership of securities issued by the contractor.

(b) Cost of shareholders' meetings.

(c) Normal proxy solicitations.

(d) Preparing and publishing reports to shareholders.

(e) Preparing and submitting required reports and forms to taxing and other regulatory bodies.

(f) Incidental costs of directors' and committee meetings.

(g) Other similar costs.

**31.205-29 Plant protection costs.**

Costs of items such as (a) wages, uniforms, and equipment of personnel engaged in plant protection, (b) depreciation on plant protection capital assets, and (c) necessary expenses to comply with military requirements, are allowable.

**31.205-30 Patent costs.**

(a) The following patent costs are allowable to the extent that they are incurred as requirements of a Government contract (but see 31.205-33):

(1) Costs of preparing invention disclosures, reports, and other documents.

(2) Costs for searching the art to the extent necessary to make the invention disclosures.

(3) Other costs in connection with the filing and prosecution of a United States patent application where title or royalty-free license is to be conveyed to the Government.

(b) General counseling services relating to patent matters, such as advice on patent laws, regulations, clauses, and employee agreements, are allowable (but see 31.205-33).

(c) Other than those for general counseling services, patent costs not required by the contract are unallowable. (See also 31.205-37.)

**31.205-31 Plant reconversion costs.**

Plant reconversion costs are those incurred in restoring or rehabilitating the contractor's facilities to approximately the same condition existing immediately before the start of the Government contract, fair wear and tear excepted. Reconversion costs are unallowable except for the cost of removing Government property and the restoration or rehabilitation costs caused by such removal. However, in special circumstances where equity so dictates, additional costs may be allowed to the extent agreed upon before costs are incurred. Care should be exercised to avoid duplication through allowance as contingencies, additional profit or fee, or in other contracts.

**31.205-32 Precontract costs.**

Precontract costs are those incurred before the effective date of the contract directly pursuant to the negotiation and in anticipation of the contract award when such incurrence is necessary to comply with the proposed contract delivery schedule. Such costs are allowable to the extent that they would have been allowable if incurred after the date of the contract (see 31.109).

**31.205-33 Professional and consultant service costs.**

(a) Definition. Professional and consultant services, as used in this subpart, are those services rendered by persons who are members of a particular profession or possess a special skill and who are not officers or employees of the contractor. Examples include those services acquired by contractors or subcontractors in order

to enhance their legal, economic, financial, or technical positions. Professional and consultant services are generally acquired to obtain information, advice, opinions, alternatives, conclusions, recommendations, training, or direct assistance, such as studies, analyses, evaluations, liaison with Government officials, or other forms of representation.

(b) Costs of professional and consultant services are allowable subject to this paragraph and paragraphs (c) through (f) of this subsection when reasonable in relation to the services rendered and when not contingent upon recovery of the costs from the Government (but see 31.205-30 and 31.205-47).

(c) Costs of professional and consultant services performed under any of the following circumstances are unallowable:

(1) Services to improperly obtain, distribute, or use information or data protected by law or regulation (e.g., 52.215-12, Restriction on Disclosure and Use of Data).

(2) Services that are intended to improperly influence the contents of solicitations, the evaluation of proposals or quotations, or the selection of sources for contract award, whether award is by the Government, or by a prime contractor or subcontractor.

(3) Any other services obtained, performed, or otherwise resulting in violation of any statute or regulation prohibiting improper business practices or conflicts of interest.

(4) Services performed which are not consistent with the purpose and scope of the services contracted for or otherwise agreed to.

(d) In determining the allowability of costs (including retainer fees) in a particular case, no single factor or any special combination of factors is necessarily determinative. However, the contracting officer shall consider the following factors, among others:

(1) The nature and scope of the service rendered in relation to the service required.

(2) The necessity of contracting for the service, considering the contractor's capability in the particular area.

(3) The past pattern of acquiring such services and their costs, particularly in the years prior to the award of Government contracts.

(4) The impact of Government contracts on the contractor's business.

(5) Whether the proportion of Government work to the contractor's total business is such as to influence the contractor in favor of incurring the cost, particularly when the services rendered are not of a continuing nature and have little relationship to work under Government contracts.

(6) Whether the service can be performed more economically by employment rather than by contracting.

(7) The qualifications of the individual or concern rendering the service and the customary fee charged, especially on non-Government contracts.

(8) Adequacy of the contractual agreement for the service (e.g., description of the service, estimate of time required, rate of compensation, termination provisions).

(e) Retainer fees, to be allowable, must be supported by evidence that—

(1) The services covered by the retainer agreement are necessary and customary;

(2) The level of past services justifies the amount of the retainer fees (if no services were rendered, fees are not automatically unallowable);

(3) The retainer fee is reasonable in comparison with maintaining an in-house capability to perform the covered services, when factors such as cost and level of expertise are considered; and

(4) The actual services performed are documented in accordance with paragraph (f) of this subsection.

(f) Fees for services rendered shall be allowable only when supported by evidence of the nature and scope of the service furnished. (See also 31.205-38(f).) However, retainer agreements generally are not based on specific statements of work. Evidence necessary to determine that work performed is proper and does not violate law or regulation shall include—

(1) Details of all agreements (e.g., work requirements, rate of compensation, and nature and amount of other expenses, if any) with the individuals or organizations providing the services and details of actual services performed;

(2) Invoices or billings submitted by consultants, including sufficient detail as to the time expended and nature of the actual services provided; and

(3) Consultants' work products and related documents, such as trip reports indicating persons visited and subjects discussed, minutes of meetings, and collateral memoranda and reports.

(FACs 84-15, 7 Apr 86; 84-44, 28 Apr 89; 84-56, 7 Mar 90; 90-3, 22 Jan 91; 90-16, 21 Dec 92)

**31.205-34 Recruitment costs.**

(a) Subject to paragraphs (b) and (c) below, and provided that the size of the staff recruited and maintained is in keeping with workload requirements, the following costs are allowable:

(1) Costs of help-wanted advertising.

(2) Costs of operating an employment office needed to secure and maintain an adequate labor force.

(3) Costs of operating an aptitude and educational testing program.

(4) Travel costs of employees engaged in recuiting personnel.

(5) Travel costs of applicants for interviews.

(6) Costs for employment agencies, not in excess of standard commercial rates.

(b) Help-wanted advertising costs are unallowable if the advertising—

(1) Is for personnel other than those required to perform obligations under a Government contract;

(2) Does not describe specific positions or classes of positions;

(3) Is excessive relative to the number and importance of the positions or to the industry practices;

(4) Includes material that is not relevant for recruitment purposes, such as extensive illustrations or descriptions of the company's products or capabilities;

(5) Is designed to "pirate" personnel from another Government contractor; or

(6) Includes color (in publications).

(c) Excessive compensation costs offered to prospective employees to "pirate" them from another Government contractor are unallowable. Such excessive costs may include salaries, fringe benefits, or special emoluments which are in excess of standard industry practices or the contractor's customary compensation practices.

**31.205-35 Relocation costs.**

(a) Relocation costs are costs incident to the permanent change of duty of assignment (for an indefinite or for a stated period, but in either event for not less than 12 months) of an existing employee or upon recruitment of a new employee. The following types of relocation costs are allowable as noted, subject to paragraphs (b) through (f) below:

(1) Cost of travel of the employee and members of the immediate family (see 31.205-46) and transportation of the household and personal effects to the new location.

(2) Cost of finding a new home, such as advance trips by employees and spouses to locate living quarters, and temporary lodging during the transition periods not exceeding separate cumulative totals of 60 days for employees and 45 days for spouses and dependents, including advance trip time.

(3) Closing costs (i.e., brokerage fees, legal fees, appraisal fees, points, finance charges, etc.) incident to the disposition of actual residence owned by the employee when notified of transfer, except that these costs when added to the costs described in subparagraph (a)(4) below shall not exceed 14 percent of the sales price of the property sold.

(4) Continuing costs of ownership of the vacant former actual residence being sold, such as maintenance of building and grounds (exclusive of fixing up expenses), utilities, taxes, property insurance, mortgage interest, after settlement date or lease date of new permanent residence, except that these costs when added to the costs described in subparagraph (a)(3) above, shall not exceed 14 percent of the sales price of the property sold.

(5) Other necessary and reasonable expenses normally incident to relocation, such as disconnecting and connecting household appliances; automobile registration; driver's license and use taxes; cutting and fitting rugs, draperies, and curtains; forfeited utility fees and deposits; and purchase of insurance against

damage to or loss of personal property while in transit.

(6) Costs incident to acquiring a home in a new location, except that (i) these costs will not be allowable for existing employees or newly recruited employees who, before the relocation, were not homeowners and (ii) the total costs shall not exceed 5 percent of the purchase price of the new home.

(7) Mortgage interest differential payments, except that these costs are not allowable for existing or newly recruited employees who, before the relocation, were not homeowners and the total payments are limited to an amount determined as follows:

(i) The difference between the mortgage interest rates of the old and new residences times the current balance of the old mortgage times 3 years.

(ii) When mortgage differential payments are made on a lump sum basis and the employee leaves or is transferred again in less than 3 years, the amount initially recognized shall be proportionately adjusted to reflect payments only for the actual time of the relocation.

(8) Rental differential payments covering situations where relocated employees retain ownership of a vacated home in the old location and rent at the new location. The rented quarters at the new location must be comparable to those vacated, and the allowable differential payments may not exceed the actual rental costs for the new home, less the fair market rent for the vacated home times 3 years.

(9) Cost of canceling an unexpired lease.

(b) The costs described in paragraph (a) above must also meet the following criteria to be considered allowable:

(1) The move must be for the benefit of the employer.

(2) Reimbursement must be in accordance with an established policy or practice that is consistently followed by the employer and is designed to motivate employees to relocate promptly and economically.

(3) The costs must not otherwise be unallowable under Subpart 31.2.

(4) Amounts to be reimbursed shall not exceed the employee's actual expenses, except that for miscellaneous costs of the type discussed in subparagraph (a)(5) above, a flat amount, not to exceed $1,000, may be allowed in lieu of actual costs.

(c) The following types of costs are not allowable:

(1) Loss on sale of a home.

(2) Costs incident to acquiring a home in a new location as follows:

(i) Real estate brokers fees and commissions.

(ii) Cost of litigation.

(iii) Real and personal property insurance against damage or loss of property.

(iv) Mortgage life insurance.

(v) Owner's title policy insurance when such insurance was not previously carried by the employee on the old residence (however, cost of a mortgage title policy is allowable).

(vi) Property taxes and operating or maintenance costs.

(3) Continuing mortgage principal payments on residence being sold.

(4) Payments for employee income or FICA (social security) taxes incident to reimbursed relocation costs.

(5) Payments for job counseling and placement assistance to employee spouses and dependents who were not employees of the contractor at the old location.

(6) Costs incident to furnishing equity or nonequity loans to employees or making arrangements with lenders for employees to obtain lower-than-market rate mortgage loans.

(d) If relocation costs for an employee have been allowed either as an allocable indirect or direct cost, and the employee resigns within 12 months for reasons within the employee's control, the contractor shall refund or credit the relocation costs to the Government.

(e) Subject to the requirements of paragraphs (a) through (d) above, the costs of family movements and of personnel movements of a special or mass nature are allowable. The cost, however, should be assigned on the basis of work (contracts) or time period benefited.

(f) Relocation costs (both outgoing and return) of employees who are hired for performance on specific contracts or long-term field projects are allowable if—

(1) The term of employment is not less than 12 months;

(2) The employment agreement specifically limits the duration of employment to the time spent on the contract or field project for which the employee is hired;

(3) The employment agreement provides for return relocation to the employee's permanent and principal home immediately prior to the outgoing relocation, or other location of equal or lesser cost; and

(4) The relocation costs are determined under the rules of paragraphs (a) through (d) above. However, the costs to return employees, who are released from employment upon completion of field assignments pursuant to their employment agreements, are not subject to the refund or credit requirement of paragraph (d).

(FAC 84-25, 1 Jul 87)

**31.205-36 Rental costs.**

(a) This subsection is applicable to the cost of renting or leasing real or personal property, except ADPE (see 31.205-2), acquired under "operating leases" as defined in Statement of Financial Accounting Standards No. 13 (FAS-13), Accounting for Leases. Compliance with 31.205-11(m) requires that assets acquired by means of capital leases, as defined in FAS-13, shall be treated as purchased assets; i.e., be capitalized and the capitalized value of such assets be distributed over their useful lives as depreciation charges, or over the lease term as amortization charges, as appropriate (but see subparagraph (b)(4) below).

(b) The following costs are allowable:

(1) Rental costs under operating leases, to the extent that the rates are reasonable at the time of the lease decision, after consideration of (i) rental costs of comparable property, if any; (ii) market conditions in the area; (iii) the type, life expectancy, condition, and value of the property leased; (iv) alternatives available; and (v) other provisions of the agreement.

(2) Rental costs under a sale and leaseback arrangement only up to the amount the contractor would be allowed if the contractor retained title.

(3) Charges in the nature of rent for property between any divisions, subsidiaries, or organization under common control, to the extent that they do not exceed the normal costs of ownership, such as depreciation, taxes, insurance, facilities capital cost of money, and maintenance (excluding interest or other unallowable costs pursuant to Part 31), provided that no part of such costs shall duplicate any other allowed cost. Rental cost of personal property leased from any division, subsidiary, or affiliate of the contractor under common control, that has an established practice of leasing the same or similar property to unaffiliated lessees shall be allowed in accordance with subparagraph (b)(1) above.

(4) Rental costs under leases entered into before March 1, 1970 for the remaining term of the lease (excluding options not exercised before March 1, 1970) to the extent they would have been allowable under Defense Acquisition Regulation (Formerly ASPR) 15-205.34 or Federal Procurement Regulations section 1-15 .205-34 in effect January 1, 1969.

(c) The allowability of rental costs under unexpired leases in connection with terminations is treated in 31.205-42(e).

(FACs 84-12, 20 Jan 86)

**31.205-37 Royalties and other costs for use of patents.**

(a) Royalties on a patent or amortization of the cost of purchasing a patent or patent rights necessary for the proper performance of the contract and applicable to contract products or processes are allowable unless—

(1) The Government has a license or the right to a free use of the patent;

(2) The patent has been adjudicated to be invalid, or has been administratively determined to be invalid;

(3) The patent is considered to be unenforceable; or

(4) The patent is expired.

(b) Care should be exercised in determining reasonableness when the royalties may have been arrived at as a result of less-than-arm's-length bargaining; e. g., royalties—

(1) Paid to persons, including corporations, affiliated with the contractor;

(2) Paid to unaffiliated parties, including corporations, under an agreement

entered into in contemplation that a Government contract would be awarded; or

(3) Paid under an agreement entered into after the contract award.

(c) In any case involving a patent formerly owned by the contractor, the royalty amount allowed should not exceed the cost which would have been allowed had the contractor retained title.

(d) See 31.109 regarding advance agreements.

**31.205-38 Selling costs.**

(a) "Selling" is a generic term encompassing all efforts to market the contractor's products or services, some of which are covered specifically in other subsections of 31.205. Selling activity includes the following broad categories:

(1) Advertising.

(2) Corporate image enhancement including broadly-targeted sales efforts, other than advertising.

(3) Bid and proposal costs.

(4) Market planning.

(5) Direct selling.

(b) Advertising costs are defined at 31.205-1(b) and are subject to the allowability provisions of 31.205-1(d) and (f). Corporate image enhancement activities are included within the definitions of public relations at 31.205-1(a) and entertainment at 31.205-14 and are subject to the allowability provisions at 31.205-1(e) and (f) and 31.205-14, respectively. Bid and proposal costs are defined at 31.205-18 and have their allowability controlled by that subsection. Market planning involves market research and analysis and generalized management planning concerned with development of the contractor's business. The allowability of long-range market planning costs is controlled by the provisions of 31.205-12. Other market planning costs are allowable to the extent that they are reasonable and not in excess of the limitations of subparagraph (c)(2) of this subsection. Costs of activities which are correctly classified and disallowed under cost principles referenced in this paragraph (b) are not to be reconsidered for reimbursement under any other provision of this subsection.

(c)(1) Direct selling efforts are those acts or actions to induce particular customers to purchase particular products or services of the contractor. Direct selling is characterized by person-to-person contact and includes such activities as familiarizing a potential customer with the contractor's products or services, conditions of sale, service capabilities, etc. It also includes negotiation, liaison between customer and contractor personnel, technical and consulting activities, individual demonstrations, and any other activities having as their purpose the application or adaptation of the contractor's products or services for a particular customer's use. The cost of direct selling efforts is allowable if reasonable in amount.

(2) The costs of broadly targeted and direct selling efforts and market planning other than long-range, which are incurred in connection with a significant effort to promote export sales of products normally sold to the U.S. Government, including the costs of exhibiting and demonstrating such products, are allowable on contracts with the U.S. Government provided—

(i) The costs are allocable, reasonable, and otherwise allowable under this subpart 31.2;

(ii) That, with respect to a business segment which allocates to U.S. Government contracts $2,500,000 or more of such costs in a given fiscal year of such business segment, a ceiling on allowable costs shall apply. The ceiling on the amount of allowable costs to be allocated over the appropriate base shall be 110 percent of foreign selling costs incurred by the business segment in the previous year; and

(iii) That, in order to comply with Public Law 100-456, the substance of this subparagraph (c)(2) shall also apply to all contracts and subcontracts of the contractor with the Department of Defense being performed by the contractor on the first day of the contractor's first full fiscal year that begins on or after December 15, 1988, whether or not a contract or subcontract contains this subparagraph (c)(2).

(d) The costs of any selling efforts other than those addressed in paragraphs (b) or (c) of this subsection are unallowable.

(e) Costs of the type identified in paragraphs (b), (c), and (d) of this subsec-

tion are often commingled on the contractor's books in the selling expense account because these activities are performed by the sales departments. However, identification and segregation of unallowable costs is required under the provisions of 31.201-6 and 48 CFR 9904.405, and such costs are not allowable merely because they are incurred in connection with allowable selling activities.

(f) Notwithstanding any other provision of this subsection, sellers' or agents' compensation, fees, commissions, percentages, retainer or brokerage fees, whether or not contingent upon the award of contracts, are allowable only when paid to bona fide employees or established commercial or selling agencies maintained by the contractor for the purpose of securing business (see 3.408-2).

(FACs 84-12, 20 Jan 86; 84-15, 7 Apr 86; 84-26, 30 Jul 87; 84-30, 30 Sep 87; 90-4, 15 May 1991; 90-7, 23 Sep 1991; 90-12, 31 Aug 1992; 90-20, 10 Mar 1994)

**31.205-39 Service and warranty costs.**

Service and warranty costs include those arising from fulfillment of any contractual obligation of a contractor to provide services such as installation, training, correcting defects in the products, replacing defective parts, and making refunds in the case of inadequate performance. When not inconsistent with the terms of the contract, such service and warranty costs are allowable. However, care should be exercised to avoid duplication of the allowance as an element of both estimated product cost and risk.

**31.205-40 Special tooling and special test equipment costs.**

(a) The terms "special tooling" and "special test equipment" are defined in 45.101.

(b) The cost of special tooling and special test equipment used in performing one or more Government contracts is allowable and shall be allocated to the specific Government contract or contracts for which acquired, except that the cost of (1) items acquired by the contractor before the effective date of the contract (or replacement of such items), whether or not altered or adapted for use in performing the contract, and (2) items which the contract schedule specifically excludes, shall be allowable only as depreciation or amortization.

(c) When items are disqualified as special tooling or special test equipment because with relatively minor expense they can be made suitable for general purpose use and have a value as such commensurate with their value as special tooling or special test equipment, the cost of adapting the items for use under the contract and the cost of returning them to their prior configuration are allowable.

**31.205-41 Taxes.**

(a) The following types of costs are allowable:

(1) Federal, State, and local taxes (see Part 29), except as otherwise provided in paragraph (b) below that are required to be and are paid or accrued in accordance with generally accepted accounting principles. Fines and penalties are not considered taxes.

(2) Taxes otherwise allowable under subparagraph (a)(1) above, but upon which a claim of illegality or erroneous assessment exists; provided the contractor, before paying such taxes—

(i) Promptly requests instructions from the contracting officer concerning such taxes; and

(ii) Takes all action directed by the contracting officer arising out of subparagraph (2)(i) above or an independent decision of the Government as to the existence of a claim of illegality or erroneous assessment, to (A) determine the legality of the assessment or (B) secure a refund of such taxes.

(3) Pursuant to subparagraph (a) (2) above, the reasonable costs of any action taken by the contractor at the direction or with the concurrence of the contracting officer. Interest or penalties incurred by the contractor for non-payment of any tax at the direction of the contracting officer or by reason of the failure of the contracting officer to ensure timely direction after a prompt request.

(4) The Environmental Tax found at section 59A of the Internal Revenue Code, also called the "Super Fund Tax."

(b) The following types of costs are not allowable:

(1) Federal income and excess profits taxes.

(2) Taxes in connection with financing, refinancing, refunding operations, or reorganizations (see 31.205-20 and 31.205-27).

(3) Taxes from which exemptions are available to the contractor directly, or available to the contractor based on an exemption afforded the Government, except when the contracting officer determines that the administrative burden incident to obtaining the exemption outweighs the corresponding benefits accruing to the Government. When partial exemption from a tax is attributable to Government contract activity, taxes charged to such work in excess of that amount resulting from application of the preferential treatment are unallowable. These provisions intend that tax preference attributable to Government contract activity be realized by the Government. The term "exemption" means freedom from taxation in whole or in part and includes a tax abatement or reduction resulting from mode of assessment, method of calculation, or otherwise.

(4) Special assessments on land that represent capital improvements.

(5) Taxes (including excises) on real or personal property, or on the value, use, possession or sale thereof, which is used solely in connection with work other than on Government contracts (see paragraph (c) below).

(6) Taxes on accumulated funding deficiencies of, or prohibited transactions involving, employee deferred compensation plans pursuant to Section 4971 or Section 4975 of the Internal Revenue Code of 1954, as amended.

(7) Income tax accruals designed to account for the tax effects of differences between taxable income and pretax income as reflected by the books of account and financial statements.

(c) Taxes on property (see subparagraph (b)(5) above) used solely in connection with either non-Government or Government work should be considered directly applicable to the respective category of work unless the amounts involved are insignificant or comparable results would otherwise be obtained; e.g., taxes on contractor-owned work-in-process which is used solely in connection with non-Government work should be allocated to such work; taxes on contractor-owned work-in-process inventory (and Government-owned work-in-process inventory when taxed) used solely in connection with Government work should be charged to such work. The cost of taxes incurred on property used in both Government and non-Government work shall be apportioned to all such work based upon the use of such property on the respective final cost objectives.

d) Any taxes, interest, or penalties that were allowed as contract costs and are refunded to the contractor shall be credited or paid to the Government in the manner it directs. If a contractor or subcontractor obtains a foreign tax credit that reduces its U.S. Federal income tax return because of the payment of any tax or duty allowed as contract costs, and if those costs were reimbursed by a foreign government, the amount of the reduction shall be paid to the Treasurer of the United States at the time the Federal income tax return is filed. However, any interest actually paid or credited to a contractor incident to a refund of tax, interest, or penalty shall be paid or credited to the Government only to the extent that such interest accrued over the period during which the contractor had been reimbursed by the Government for the taxes, interest, or penalties.

(FACs 84-56, 7 Mar 90; 90-3, 22 Jan 91)

**31.205-42 Termination costs.**

Contract terminations generally give rise to the incurrence of costs or the need for special treatment of costs that would not have arisen had the contract not been terminated. The following cost principles peculiar to termination situations are to be used in conjunction with the other cost principles in Subpart 31.2:

(a) Common items. The costs of items reasonably usable on the contractor's other work shall not be allowable unless the contractor submits evidence that the items could not be retained at cost without sustaining a loss. The contracting officer should consider the contractor's

plans and orders for current and planned production when determining if items can reasonably be used on other work of the contractor. Contemporaneous purchases of common items by the contractor shall be regarded as evidence that such items are reasonably usable on the contractor's other work. Any acceptance of common items as allocable to the terminated portion of the contract should be limited to the extent that the quantities of such items on hand, in transit, and on order are in excess of the reasonable quantitative requirements of other work.

(b) Costs continuing after termination. Despite all reasonable efforts by the contractor, costs which cannot be discontinued immediately after the effective date of termination are generally allowable. However, any costs continuing after the effective date of the termination due to the negligent or willful failure of the contractor to discontinue the costs shall be unallowable.

(c) Initial costs. Initial costs (see 15.804-6(f)), including starting load and preparatory costs, are allowable as follows:

(1) Starting load costs not fully absorbed because of termination are nonrecurring labor, material, and related overhead costs incurred in the early part of production and result from factors such as—

(i) Excessive spoilage due to inexperienced labor;

(ii) Idle time and subnormal production due to testing and changing production methods;

(iii) Training; and (iv) Lack of familiarity or experience with the product, materials, or manufacturing processes.

(2) Preparatory costs incurred in preparing to perform the terminated contract include such costs as those incurred for initial plant rearrangement and alterations, management and personnel organization, and production planning. They do not include special machinery and equipment and starting load costs.

(3) When initial costs are included in the settlement proposal as a direct charge, such costs shall not also be included in overhead. Initial costs attributable to only one contract shall not be allocated to other contracts.

(4) If initial costs are claimed and have not been segregated on the contractor's books, they shall be segregated for settlement purposes from cost reports and schedules reflecting that high unit cost incurred during the early stages of the contract.

(5) If the settlement proposal is on the inventory basis, initial costs should normally be allocated on the basis of total end items called for by the contract immediately before termination; however, if the contract includes end items of a diverse nature, some other equitable basis may be used, such as machine or labor hours.

(d) Loss of useful value. Loss of useful value of special tooling, and special machinery and equipment is generally allowable, provided—

(1) The special tooling, or special machinery and equipment is not reasonably capable of use in the other work of the contractor;

(2) The Government's interest is protected by transfer of title or by other means deemed appropriate by the contracting officer; and

(3) The loss of useful value for any one terminated contract is limited to that portion of the acquisition cost which bears the same ratio to the total acquisition cost as the terminated portion of the contract bears to the entire terminated contract and other Government contracts for which the special tooling, or special machinery and equipment was acquired.

(e) Rental under unexpired leases. Rental costs under unexpired leases, less the residual value of such leases, are generally allowable when shown to have been reasonably necessary for the performance of the terminated contract, if—

(1) The amount of rental claimed does not exceed the reasonable use value of the property leased for the period of the contract and such further period as may be reasonable; and

(2) The contractor makes all reasonable efforts to terminate, assign, settle, or otherwise reduce the cost of such lease.

(f) Alterations of leased property. The cost of alterations and reasonable restorations required by the lease may be allowed when the alterations were necessary for performing the contract.

(g) Settlement expenses. (1) Settlement expenses, including the following, are generally allowable:

(i) Accounting, legal, clerical, and similar costs reasonably necessary for—

(A) The preparation and presentation, including supporting data, of settlement claims to the contracting officer; and

(B) The termination and settlement of subcontracts.

(ii) Reasonable costs for the storage, transportation, protection, and disposition of property acquired or produced for the contract.

(iii) Indirect costs related to salary and wages incurred as settlement expenses in (i) and (ii); normally, such indirect costs shall be limited to payroll taxes, fringe benefits, occupancy costs, and immediate supervision costs.

(2) If settlement expenses are significant, a cost account or work order shall be established to separately identify and accumulate them.

(h) Subcontractor claims. Subcontractor claims, including the allocable portion of the claims common to the contract and to other work of the contractor, are generally allowable. An appropriate share of the contractor's indirect expense may be allocated to the amount of settlements with subcontractors; provided, that the amount allocated is reasonably proportionate to the relative benefits received and is otherwise consistent with 31.201-4 and 31.203(c). The indirect expense so allocated shall exclude the same and similar costs claimed directly or indirectly as settlement expenses.

**31.205-43 Trade, business, technical and professional activity costs.**

The following types of costs are allowable:

(a) Memberships in trade, business, technical, and professional organizations.

(b) Subscriptions to trade, business, professional, or other technical periodicals.

(c) When the principal purpose of a meeting, conference, symposium, or seminar is the dissemination of trade, business, technical or professional information or the stimulation of production or improved productivity—

(1) Costs of organizing, setting up, and sponsoring the meetings, symposia, etc., including rental of meeting facilities, transportation, subsistence, and incidental costs;

(2) Costs of attendance by contractor employees, including travel costs (see 31.205-46); and

(3) Costs of attendance by individuals who are not employees of the contractor, provided; (i) such costs are not also reimbursed to the individual by the employing company or organization, and (ii) the individual's attendance is essential to achieve the purpose of the conference, meeting, symposium, etc.

(FAC 84-38, 19 Aug 88)

**31.205-44 Training and education costs.**

(a) Allowable costs. Training and education costs are allowable to the extent indicated below.

(b) Vocational training. Costs of preparing and maintaining a noncollege level program of instruction, including but not limited to on-the-job, classroom, and apprenticeship training, designed to increase the vocational effectiveness of employees, are allowable. These costs include (1) salaries or wages of trainees (excluding overtime compensation), (2) salaries of the director of training and staff when the training program is conducted by the contractor, (3 ) tuition and fees when the training is in an institution not operated by the contractor, and/or (4) training materials and textbooks.

(c) Part-time college level education. Allowable costs of part-time college education at an undergraduate or postgraduate level, including that provided at the contractor's own facilities, are limited to—

(1) Fees and tuition charged by the educational institution, or, instead of tuition, instructors' salaries and the related share of indirect cost of the educational institution, to the extent that the sum thereof is not in excess of the tuition that would have been paid to the participating educational institution;

(2) Salaries and related costs of instructors who are employees of the contractor;

(3) Training materials and textbooks; and

(4) Straight-time compensation of each employee for time spent attending classes during working hours not in excess of 156 hours per year where circumstances do not permit the operation of classes or attendance at classes after regular working hours. In unusual cases, the period may be extended (see paragraph (h) of this section).

(d) Full-time education. Costs of tuition, fees, training materials and textbooks (but not subsistence, salary, or any other emoluments) in connection with full-time education, including that provided at the contractor's own facilities, at a postgraduate but not undergraduate college level, are allowable only when the course or degree pursued is related to the field in which the employee is working or may reasonably be expected to work and are limited to a total period not to exceed 2 school years or the length of the degree program, whichever is less, for each employee so trained.

(e) Specialized programs. Costs of attendance of up to 16 weeks per employee per year at specialized programs specifically designed to enhance the effectiveness of managers or to prepare employees for such positions are allowable. Such costs include enrollment fees and related charges and employees' salaries, subsistence, training materials, textbooks, and travel. Costs allowable under this paragraph do not include costs for courses that are part of a degree-oriented curriculum, which are only allowable pursuant to paragraphs (c) and (d) of this subsection.

(f) Other expenses. Maintenance expense and normal depreciation or fair rental on facilities owned or leased by the contractor for training purposes are allowable in accordance with 31-205-11, 31.205-17, 31.205-24, and 31.205-36.

(g) Grants. Grants to educational or training institutions, including the donation of facilities or other properties, scholarships, and fellowships are considered contributions and are unallowable.

(h) Advance agreements. (1) Training and education costs in excess of those otherwise allowable under (c) and (d) of this subsection, including subsistence, salaries, or any other emoluments, may be allowed to the extent set forth in an advance agreement negotiated under 31.109. To be considered for an advance agreement, the contractor must demonstrate that the costs are consistently incurred under an established managerial, engineering, or scientific training and education program, and that the course or degree pursued is related to the field in which the employees are now working or may reasonably be expected to work. Before entering into the advance agreement, the contracting officer shall give consideration to such factors as—

(i) The length of employees' service with the contractor;

(ii) Employees' past performance and potential;

(iii) Whether employees are in formal development programs; and

(iv) The total number of participating employees.

(2) Any advance agreement must include a provision requiring the contractor to refund to the Government training and education costs for employees who resign within 12 months of completion of such training or education for reasons within an employee's control.

(i) Training or education costs for other than bona-fide employees. Costs of tuition, fees, textbooks, and similar or related benefits provided for other than bona-fide employees are unallowable, except that the costs incurred for educating employee dependents (primary and secondary level studies) when the employee is working in a foreign country where public education is not available and where suitable private education is inordinately expensive may be included in overseas differential.

(j) Employee dependent education plans. Costs of college plans for employee dependents are unallowable.

(FACs 84-12, 20 Jan 86; 84-25, 1 Jul 87; 84-29, 24 Aug 87)

**31.205-45 Transportation costs.**

Allowable transportation costs include freight, express, cartage, and postage charges relating to goods purchased, in process, or delivered. When these costs can be identified with the items involved, they may be directly costed as transportation costs or added to the cost of such items. When identification with the ma-

terials received cannot be made, inbound transportation costs may be charged to the appropriate indirect cost accounts if the contractor follows a consistent and equitable procedure. Outbound freight, if reimbursable under the terms of the contract, shall be treated as a direct cost.

**31.205-46 Travel costs.**

(a)(1) Costs for transportation, lodging, meals, and incidental expenses incurred by contractor personnel on official company business are allowable subject to the limitations contained in this subsection. Costs for transportation may be based on mileage rates, actual costs incurred, or on a combination thereof, provided the method used results in a reasonable charge. Costs for lodging, meals, and incidental expenses may be based on per diem, actual expenses, or a combination thereof, provided the method used results in a reasonable charge.

(2) Except as provided in paragraph (a)(3) of this section, costs incurred for lodging, meals, and incidental expenses (as defined in the regulations cited in (a)(2)(i) through (iii) of this paragraph) shall be considered to be reasonable and allowable only to the extent that they do not exceed on a daily basis the maximum per diem rates in effect at the time of travel as set forth in the—

(i) Federal Travel Regulation, prescribed by the General Services Administration, for travel in the conterminous 48 United States, available on a subscription basis from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402, Stock No. 022-001-81003-7;

(ii) Joint Travel Regulations, Volume 2, DoD Civilian Personnel, Appendix A, prescribed by the Department of Defense, for travel in Alaska, Hawaii, The Commonwealth of Puerto Rico, and territories and possessions of the United States, available on a subscription basis from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402, Stock No. 908-010-00000-1; or

(iii) Standarized Regulations (Government Civilians, Foreign Areas), Section 925, "Maximum Travel Per Diem Allowances for Foreign Areas," prescribed by the Department of State, for travel in areas not covered in (a)(2)(i) and (ii) of this subparagraph, available on a subscription basis from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402, Stock No. 744-088-00000-0.

(3) In special or unusual situations, actual costs in excess of the above-referenced maximum per diem rates are allowable provided that such amounts do not exceed the higher amounts authorized for Federal civilian employees as permitted in the regulations referenced in (a)(2)(i), (ii), or (iii) of this section. For such higher amounts to be allowable, all of the following conditions must be met:

(i) One of the conditions warranting approval of the actual expense method, as set forth in the regulations referred in (a)(2)(i), (ii), or (iii) of this section, must exist.

(ii) A written justification for use of the higher amounts must be approved by an officer of the contractor's organization or designee to ensure that the authority is properly administered and controlled to prevent abuse.

(iii) If it becomes necessary to exercise the authority to use the higher actual expense method repetitively or on a continuing basis in a particular area, the contractor must obtain advance approval from the contracting officer.

(iv) Documentation to support actual costs incurred shall be in accordance with the contractor's established practices provided that a receipt is required for each expenditure in excess of $25.00. The approved justification required by (a)(3)(ii) and, if applicable, (a)(3)(iii) of this paragraph must be retained.

(4) Subparagraphs (a)(2) and (a)(3) of this subsection do not incorporate the regulations cited in subdivisions (a)(2)(i), (ii), and (iii) of this subsection in their entirety. Only the maximum per diem rates, and definitions of lodging, meals and incidental expenses, and the regulatory coverage dealing with special or unusual situations are incorporated herein.

(5) An advance agreement (see 31.109) with respect to compliance with subparagraphs (a)(2) and (a)(3) of this section may be useful and desirable.

(6) The maximum per diem rates referenced in subparagraph (a)(2) of this subsection generally would not constitute a reasonable daily charge—

(i) When no lodging costs are incurred; and/or

(ii) On partial travel days (e.g., day of departure and return).

Appropriate downward adjustments from the maximum per diem rates would normally be required under these circumstances. While these adjustments need not be calculated in accordance with the Federal Travel Regulation or Joint Travel Regulations, they must result in a reasonable charge.

(b) Travel costs incurred in the normal course of overall administration of the business are allowable and shall be treated as indirect costs.

(c) Travel costs directly attributable to specific contract performance are allowable and may be charged to the contract under 31.202.

(d) Airfare costs in excess of the lowest customary standard, coach, or equivalent airfare offered during normal business hours are unallowable except when such accommodations require circuitous routing, require travel during unreasonable hours, excessively prolong travel, result in increased cost that would offset transportation savings, are not reasonably adequate for the physical or medical needs of the traveler, or are not reasonably available to meet mission requirements. However, in order for airfare costs in excess of the above standard airfare to be allowable, the applicable condition(s) set forth above must be documented and justified.

(e)(1) Cost of travel by contractor-owned, -leased, or -chartered aircraft, as used in this subparagraph, includes the cost of lease, charter, operation (including personnel), maintenance, depreciation, insurance, and other related costs.

(2) The costs of travel by contractor-owned, -leased, or -chartered aircraft are limited to the standard airfare described in paragraph (d) of this subsection for the flight destination unless travel by such aircraft is specifically required by contract specification, term, or condition, or a higher amount is approved by the contracting officer. A higher amount may be agreed to when one or more of the circumstances for justifying higher than standard airfare listed in paragraph (d) of this subsection are applicable, or when an advance agreement under subparagraph (e)(3) of this subsection has been executed. In all cases, travel by contractor-owned, -leased, or -chartered aircraft must be fully documented and justified. For each contractor-owned, -leased, or -chartered aircraft used for any business purpose which is charged or allocated, directly or indirectly, to a Government contract, the contractor must maintain and make available manifest/logs for all flights on such company aircraft. As a minimum, the manifest/log shall indicate—

(i) Date, time, and points of departure;

(ii) Destination, date, and time of arrival;

(iii) Name of each passenger and relationship to the contractor;

(iv) Authorization for trip; and

(v) Purpose of trip.

(3) Where an advance agreement is proposed (see 31.109), consideration may be given to the following:

(i) Whether scheduled commercial airlines or other suitable, less costly, travel facilities are available at reasonable times, with reasonable frequency, and serve the required destinations conveniently.

(ii) Whether increased flexibility in scheduling results in time savings and more effective use of personnel that would outweigh additional travel costs.

(f) Costs of contractor-owned or leased automobiles, as used in this paragraph, include the costs of lease, operation (including personnel), maintenance, depreciation, insurance, etc. These costs are allowable, if reasonable, to the extent that the automobiles are used for company business. That portion of the cost of company-furnished automobiles that relates to personal use by employees (including transportation to and from work) is compensation for personal services and is unallowable as stated in 31.205-6(m)(2).

(FACs 84-12, 20 Jan 86; 84-15, 7 Apr 86; 84-19, 31 Jul 86; 84-23, 30 Sep 86; 90-7, 23 Sep 1991; 90-11, 12 May 1992)

**31.205-47 Costs related to legal and other proceedings.**

(a) Definitions. "Conviction," as used in this subsection, is defined in 9.403.

"Costs" include, but are not limited to, administrative and clerical expenses; the costs of legal services, whether performed by in-house or private counsel; the costs of the services of accountants, consultants, or others retained by the contractor to assist it; costs of employees, officers, and directors; and any similar costs incurred before, during, and after commencement of a judicial or administrative proceeding which bears a direct relationship to the proceeding.

"Fraud," as used in this subsection, means (1) acts of fraud or corruption or attempts to defraud the Government or to corrupt its agents, (2) acts which constitute a cause for debarment or suspension under 9.406-2(a) and 9.407-2(a) and (3) acts which violate the False Claims Act, 31 U.S.C., sections 3729-3731, or the Anti-Kickback Act, 41 U.S.C., sections 51 and 54.

"Penalty," does not include restitution, reimbursement, or compensatory damages.

"Proceeding," includes an investigation.

(b) Costs incurred in connection with any proceeding brought by a Federal, State, local or foreign government for violation of, or a failure to comply with, law or regulation by the contractor (including its agents or employees) are unallowable if the result is—

(1) In a criminal proceeding, a conviction;

(2) In a civil or administrative proceeding, either a finding of contractor liability where the proceeding involves an allegation of fraud or similar misconduct or imposition of a monetary penalty where the proceeding does not involve an allegation of fraud or similar misconduct.

(3) A final decision by an appropriate official of an executive agency to—

(i) Debar or suspend the contractor;

(ii) Rescind or void a contract; or

(iii) Terminate a contract for default by reason of a violation or failure to comply with a law or regulation.

(4) Disposition of the matter by consent or compromise if the proceeding could have led to any of the outcomes listed in subparagraphs (b)(1) through (3) of this subsection (but see paragraphs (c) and (d) of this subsection); or

(5) Not covered by subparagraphs (b)(1) through (4) of this subsection, but where the underlying alleged contractor misconduct was the same as that which led to a different proceeding whose costs are unallowable by reason of subparagraphs (b)(1) through (4) of this subsection.

(c) To the extent they are not otherwise unallowable, costs incurred in connection with any proceeding under paragraph (b) of this subsection commenced by the United States that is resolved by consent or compromise pursuant to an agreement entered into between the contractor and the United States, and which are unallowable solely because of paragraph (b) of this subsection, may be allowed to the extent specifically provided in such agreement.

(d) To the extent that they are not otherwise unallowable, costs incurred in connection with any proceeding under paragraph (b) of this subsection commenced by a State, local, or foreign government may be allowable when the contracting officer (or other official specified in agency procedures) determines, that the costs were incurred either:

(1) As a direct result of a specific term or condition of a Federal contract; or

(2) As a result of compliance with specific written direction of the cognizant contracting officer.

(e) Costs incurred in connection with proceedings described in paragraph (b) of this subsection, but which are not made unallowable by that paragraph, may be allowable to the extent that:

(1) The costs are reasonable in relation to the activities required to deal with the proceeding and the underlying cause of action;

(2) The costs are not otherwise recovered from the Federal Government or a third party, either directly as a result of the proceeding or otherwise; and

(3) The percentage of costs allowed does not exceed the percentage determined to be appropriate considering the

complexity of procurement litigation, generally accepted principles governing the award of legal fees in civil actions involving the United States as a party, and such other factors as may be appropriate. Such percentage shall not exceed 80 percent. However, if an agreement reached under paragraph (c) of this subsection has explicitly considered this 80 percent rule, then the full amount of costs resulting from that agreement shall be allowable.

(f) Costs not covered elsewhere in this subsection are unallowable if incurred in connection with—

(1) Defense against Federal Government claims or appeals or the prosecution of claims or appeals against the Federal Government (see 33.201).

(2) Organization, reorganization, (including mergers and acquisitions) or resisting mergers and acquisitions (see also 31.205-27).

(3) Defense of antitrust suits.

(4) Defense of suits brought by employees or ex-employees of the contractor under section 2 of the Major Fraud Act of 1988 where the contractor was found liable or settled.

(5) Costs of legal, accounting, and consultant services and directly associated costs incurred in connection with the defense or prosecution of lawsuits or appeals between contractors arising from either (1) an agreement or contract concerning a teaming arrangement, a joint venture, or similar arrangement of shared interest; or (2) dual sourcing, coproduction, or similar programs, are unallowable, except when (i) incurred as a result of compliance with specific terms and conditions of the contract or written instructions from the contracting officer, or (ii) when agreed to in writing by the contracting officer.

(6) Patent infringement litigation, unless otherwise provided for in the contract.

(7) Representation of, or assistance to, individuals, groups, or legal entities which the contractor is not legally bound to provide, arising from an action where the participant was convicted of violation of a law or regulation or was found liable in a civil or administrative proceeding.

(g) Costs which may be unallowable under 31.205-47, including directly associated costs, shall be segregated and accounted for by the contractor separately. During the pendency of any proceeding covered by paragraph (b) and subparagraphs (f)(4) and (f)(7) of this subsection, the contracting officer shall generally withhold payment of such costs. However, if in the best interests of the Government, the contracting officer may provide for conditional payment upon provision of adequate security, or other adequate assurance, and agreement by the contractor to repay all unallowable costs, plus interest, if the costs are subsequently determined to be unallowable.

(FACs 84-12, 20 Jan 86; 84-15, 7 Apr 86; 84-44, 28 Apr 89; 90-3, 22 Jan 91)

**31.205-48 Deferred research and development costs.**

Research and development, as used in this subsection, means the type of technical effort which is described in 31.205-18 out which is sponsored by, or required in performance of, a contract or grant. Research and development costs (including amounts capitalized) that were incurred before the award of a particular contract are unallowable except when allowable as precontract costs. In addition, when costs are incurred in excess of either the price of a contract or amount of a grant for research and development effort, such excess may not be allocated as a cost to any other Government contract.

**31.205-49 Goodwill.**

Goodwill, an unidentifiable intangible asset, originates under the purchase method of accounting for a business combination when the price paid by the acquiring company exceeds the sum of the identifiable individual assets acquired less liabilities assumed, based upon their fair values. The excess is commonly referred to as goodwill. Goodwill may arise from the acquisition of a company as a whole or a portion thereof. Any costs for amortization, expensing, write-off, or write-down of goodwill (however represented) are unallowable.

(FAC 84-3, 27 Jun 84)

**31.205-50 Executive lobbying costs.**

Costs incurred in attempting to improperly influence (see FAR 3.401), either directly or indirectly, an employee or officer of the executive branch of the Federal Government to give consideration or to act regarding a regulatory or contract matter are unallowable.
(FAC 84-15, 7 Apr 86)

**31.205-51 Costs of alcoholic beverages.**

Costs of alcoholic beverages are unallowable.
(FAC 84-15, 7 Apr 86)

**31.205-52 Asset valuations resulting from business combinations.**

When the purchase method of accounting for a business combination is used, allowable amortization, cost of money, and depreciation shall be limited to the total of the amounts that would have been allowed had the combination not taken place.
(FAC 84-58, 23 Jul 90)

# SUBPART 31.3 — CONTRACTS WITH EDUCATIONAL INSTITUTIONS

## 31.301 Purpose.

This subpart provides the principles for determining the cost of research and development, training, and other work performed by educational institutions under contracts with the Government.

## 31.302 General.

Office of Management and Budget (OMB) Circular No. A-21, Cost Principles for Educational Institutions, revised, provides principles for determining the costs applicable to research and development, training, and other work performed by educational institutions under contracts with the Government.

## 31.303 Requirements.

(a) Contracts that refer to this Subpart 31.3 for determining allowable costs under contracts with educational institutions shall be deemed to refer to, and shall have the allowability of costs determined by the contracting officer in accordance with, the revision of OMB Circular A-21 in effect on the date of the contract.

(b) Agencies are not expected to place additional restrictions on individual items of cost.

# SUBPART 31.4 — RESERVED

# SUBPART 31.5 — RESERVED

# SUBPART 31.6 — CONTRACTS WITH STATE, LOCAL, AND FEDERALLY RECOGNIZED INDIAN TRIBAL GOVERNMENTS

## 31.601 Purpose.

This subpart provides the principles for determining allowable cost of contracts and subcontracts with State, local, and federally recognized Indian tribal governments.

## 31.602 General.

Office of Management and Budget (OMB) Circular No. A-87, Cost Principles for State and Local Governments, Revised, sets forth the principles for determining the allowable costs of contracts and subcontracts with State, local, and federally recognized Indian tribal governments. These principles are for cost determination and are not intended to identify the circumstances or dictate the extent of Federal and State or local participation in financing a particular contract.

## 31.603 Requirements.

(a) Contracts that refer to this Subpart 31.6 for determining allowable costs under contracts with State, local and Indian tribal governments shall be deemed to refer to, and shall have the allowability of costs determined by the contracting officer in accordance with, the revision of OMB Circular A-87 which is in effect on the date of the contract.

(b) Agencies are not expected to place additional restrictions on individual items of cost.

# SUBPART 31.7 — CONTRACTS WITH NONPROFIT ORGANIZATIONS

## 31.701 Purpose.

This subpart provides the principles for determining the cost applicable to work performed by nonprofit organizations under contracts with the Government. A nonprofit organization, for purpose of identification, is defined as a business entity organized and operated exclusively for charitable, scientific, or educational purposes, of which no part of the net earnings inure to the benefit of any private shareholder or individual, of which no substantial part of the activities is carrying on propaganda or otherwise attempting to influence legislation or participating in any political campaign on behalf of any candidate for public office, and which are exempt from Federal income taxation under section 501 of the Internal Revenue Code.

## 31.702 General.

Office of Management and Budget (OMB) Circular No. A-122, Cost Principles for Nonprofit Organizations, sets forth principles for determining the costs applicable to work performed by nonprofit organizations under contracts (also applies to grants and other agreements) with the Government.

## 31.703 Requirements.

(a) Contracts which refer to this Subpart 31.7 for determining allowable costs shall be deemed to refer to, and shall have the allowability of costs determined by the contracting officer in accordance with, the revision of OMB Circular A-122 in effect on the date of the contract.

(b) Agencies are not expected to place additional restrictions on individual items of cost.

# A-400 DEFENSE FEDERAL ACQUISITION REGULATION SUPPLEMENT PART 231 — CONTRACT COST PRINCIPLES AND PROCEDURES

## A-401 Scope of Section.

The Defense Federal Acquisition Regulation Supplement Part 231, Contract Cost Principles and Procedures, is transcribed on attached pages A-121 to A-128. The transcript reproduces the December 1991 edition of DFARS Part 231 updated through Defense Acquisition Circular (DAC) Number 91-6.

# SUBPART 231.1 — APPLICABILITY

## 231.100 Scope of Subpart.

### 231.100-70 Contract clause.

Use the clause at 252.231-7000, Supplemental Cost Principles, in all solicitations and contracts, except those which use the small purchase procedures of FAR part 13.

# SUBPART 231.2 — CONTRACTS WITH COMMERCIAL ORGANIZATIONS

## 231.205 Selected costs.

### 231.205-6 Compensation for Personal Services.

(g)(2)(i) Notwithstanding the reference to geographical area in FAR 31.205-6(b)(1), under 10 U.S.C. 2324(e)(1)(M), the costs of severance payments to foreign nationals employed under a service contract or subcontract performed outside the United States are unallowable to the extent that such payments exceed amounts typically paid to employees providing similar services in the same industry in the United States. Further, under 10 U.S.C. 2324(e)(1)(N), all such costs of severance payments which are otherwise allowable are unallowable if the termination of employment of the foreign national is the result of the closing of, or the curtailment of activities at, a United States military facility in that country at the request of the government of that country; this does not apply if the closing of a facility or curtailment of activities is made pursuant to a status-of-forces or other country-to-country agreement entered into with the government of that country before November 29, 1989. 10 U.S.C. 2324(e)(3) permits the head of the agency to waive these cost allowability limitations under certain circumstances (see 237.171 and the clause at 252.237-7020).

(DAC 91-4, 30 Oct 92)

### 231.205-10 Cost of Money.

The contractor also must comply with subpart 230.70 and maintain records to demonstrate compliance.

### 231.205-18 Independent Research and Development and Bid and Proposal Costs.

(c)(1)(i)(C)(1) Total incurred IR&D/B&P costs, including total IR&D/B&P ceiling amounts which are negotiated pursuant to FAR 31.205-18(c)(1), are fully allocable to all final cost objectives of the contractor. The amount of IR&D/B&P costs allowable under contracts which are subject to advance agreements negotiated by DoD shall not exceed the lesser of —

(i) Such contracts' allocable share of incurred IR&D/B&P costs;

(ii) Such contracts' allocable share of the total IR&D/B&P ceiling; or

(iii) The amount of incurred IR&D/B&P costs for projects having potential interest to DoD.

(2) Allowable IR&D/B&P costs are limited to those for projects which are of potential interest to DoD, including activities that —

(i) Stregthen the defense industrial and technology base of the United States;

(ii) Enhance the industrial competitiveness of the United States;

(iii) Promote the development of technologies identified as critical in the plan required under 10 U.S.C. 2508;

(iv) Increase the development of technologies useful for both the private commercial sector and the public sector; or

(v) Develop efficient and effective technologies for achieving such environmental benefits as improved environmental benefits as improved environmental data gathering, environmental cleanup and restoration, pollution-reduction in manufacturing, environmental conservation, and environmentally safe management of facilities.

(3) The contracting officer will:

(i) Determine whether IR&D/B&P projects are of potential interest to DoD; and

(ii) Provide the results of the determination to the contractor.

(4) See 225.7303 for additional allowability requirements affecting Foreign Military Sales contracts.

(2) Departments/agencies shall not supplement this regulation in any way that limits IR&D/B&P cost allowability. See 225.7303-2 for allowability exceptions for foreign military sales contracts.

(i) In addition to the limitations in FAR 31.205-18(c)(2)(i), for major contractors —

(1) The amount of IR&D/B&P costs allowability under DoD contracts shall not exceed the lesser of —

(i) Such contracts' allocable share of incurred IR&D/B&P costs;
(ii) Such contracts' allocable share of the contractor's total maximum allowable amount; or
(iii) The amount of incurred IR&D/B&P costs for projects having potential interest to DoD.
(2) Allowable IR&D/B&P costs are limited to those for projects which are of potential interest to the DoD, including activities intended to accomplish any of the following —
(i) Enable superior performance of future U.S. weapon systems and components;
(ii) Reduce acquisition costs and lifecycle costs of military systems;
(iii) Strengthen the defense industrial and technology base of the United States;
(iv) Enhance the industrial competitiveness of the United States;
(v) Promote the development of technologies identified as critical under 10 U.S.C. 2522;
(vi) Increase the development and promotion of efficient and effective applications of dual-use technologies;
(vii) Provide efficient and effective technologies for achieving such environmental benefits as: improved environmental data gathering, environmental cleanup and restoration, pollution reduction in manufacturing, environmental conservation, and environmentally safe management of facilities.
(ii) The cognizant contract administration office shall furnish contractors with guidance on financial information needed to support IR&D/B&P costs and on technical information needed from major contractors to support the potential interest to DoD determination (see also 242.771-3(a)).
(iii) The total maximum allowable amount limitation may be waived at a level above the contracting officer. A waiver may be appropriate for contractors whose significant growth in sales or IR&D/B&P spending justify higher levels of reimbursement.
(DAC 91-4, 30 Oct 92)

**231.205-22 Legislative Lobbying Costs.**

(a) Preparing any material, report, list, or analysis on the actual or projected economic or employment impact in a particular State or congressional district of an acquisition program for which all research, development, testing and evaluation has not been completed (Section 9048 of Pub. L. 102-396).

# SUBPART 231.3 — CONTRACTS WITH EDUCATIONAL INSTITUTIONS

## 231.303 Requirements.

Under 10 U.S.C. 2324(e), the following costs are unallowable —

(1) Costs of entertainment, including amusement, diversion, and social activities and any costs directly associated with such costs (such as tickets to shows or sports events, meals, lodging, rentals, transportation, and gratuities).

(2) Costs incurred to influence (directly or indirectly) legislative action on any matter pending before Congress or a State Legislature.

(3) Cost incurred in defense of any civil or criminal fraud proceeding or similar proceeding (including filing of any false certification) brought by the United States where the contractor is found liable or has pleaded nolo contendere to a charge of fraud or similar proceeding (including filing of a false certification).

(4) Payments of fines and penalties resulting from violations of, or failure to comply with, Federal, State, local, or foreign laws and regulations, except when incurred as a result of compliance with specific terms and conditions of the contract or specific written instructions from the contracting officer authorizing in advance such payments in accordance with applicable regulations of the Secretary of Defense.

(5) Costs of any membership in any social, dining, or country club or organization.

(6) Costs of alcoholic beverages.

(7) Contributions or donations, regardless of the recipient.

(8) Costs of advertising designed to promote the contractor or its products.

(9) Costs of promotional items and memorabilia, including models, gifts, and souvenirs.

(10) Costs for travel by commercial aircraft which exceed the amount of the standard commercial fare.

(11) Costs incurred in making any payment (commonly known as a "golden parachute payment") which is—

(i) In an amount in excess of the normal severance pay paid by the contractor to an employee upon termination of employment; and

(ii) Is paid to the employee contingent upon, and following, a change in management control over, or ownership of, the contractor or a substantial portion of the contractor's assets.

(12) Costs of commercial insurance that protects against the costs of the contractor for correction of the contractor's own defects in materials or workmanship.

(13) Costs of severance pay paid by the contractor to foreign nationals employed by the contractor under a service contract performed outside the United States, to the extent that the amount of the severance pay paid in any case exceeds the amount paid in the industry involved under the customary or prevailing practice for firms in that industry providing similar services in the United States, as determined by regulations prescribed by the Secretary of Defense.

(14) Costs of severance pay paid by the contractor to a foreign national employed by the contractor under a service contract performed in a foreign country if the termination of the employment of the foreign national is the result of the closing of, or curtailment of activities at a United States military facility in that country at the request of the government of that country.

(15) Costs incurred by a contractor in connection with any criminal, civil, or administrative proceedings commenced by the United States or a State, to the extent provided in 10 U.S.C. 2324(k).

(DAC 91-3, 31 Aug 92)

# SUBPART 231.6 — CONTRACTS WITH STATE, LOCAL, AND FEDERALLY RECOGNIZED INDIAN TRIBAL GOVERNMENTS

## 231.603 Requirements.

Under 10 U.S.C. 2324(e), the following costs are unallowable.

(1) Costs of entertainment, including amusement, diversion, and social activities and any costs directly associated with such costs (such as tickets to shows or sports events, meals, lodging, rentals, transportations, and gratuities).

(2) Costs incurred to influence (directly or indirectly) legislative action on any matter pending before Congress or a State legislature.

(3) Costs incurred in defense of any civil or criminal fraud proceeding or similar proceeding (including filing of any false certification) brought by the United States where the contractor is found liable or has pleaded nolo contendere to a charge of fraud or similar proceeding (including filing of a false certification).

(4) Payments of fines and penalties resulting from violation of, or failure to comply with, Federal, State, local, or foreign laws and regulations, except when incurred as a result of compliance with specific terms and conditions of the contract or specific written instructions from the contracting officer authorizing in advance such such payments in accordance with applicable regulations of the Secretary of Defense.

(5) Costs of any membership in any social, dining, or country club or organization.

(6) Costs of alcoholic beverages.

(7) Contributions or donations, regardless of the recipient.

(8) Costs of advertising designed to promote the contractor or its products.

(9) Costs of promotional items and memorabilia, including models, gifts, and souvenirs.

(10) Costs for travel by commercial aircraft which exceed the amount of the standard commercial fare.

(11) Costs incurred in making any payment (commonly known as a "golden parachute payment") which is —

(i) In an amount in excess of the normal severance pay paid by the contractor to an employee upon termination of employment; and

(ii) Is paid to the employee contingent upon, and following, a change in management control over, or ownership of, the contractor or a substantial portion of the contractor's assets.

(12) Costs of commercial insurance that protects against the costs of the contractor for correction of the contractor's own defects in materials or workmanship.

(13) Costs of severance pay paid by the contractor to foreign nationals employed by the contractor under a service contract performed outside the United States, to the extent that the amount of the severance pay paid in any case exceeds the amount paid in the industry involved under the customary or prevailing practice for firms in the industry providing similar services in the United States, as determined by regulations prescribed by the Secretary of Defense.

(14) Costs of severance pay paid by the contractor to a foreign national employed by the contractor under a service contract performed in a foreign country if the termination of the employment of the foreign national is the result of the closing of, or curtailment of activities at a United States military facility in that country at the request of the government of that country.

(15) Costs incurred by a contractor in connection with any criminal, civil, or administrative proceedings commenced by the United States or a State, to the extent provided in 10 U.S.C. 2324(k). (DAC 91-3, 31 Aug 92)

# SUBPART 231.7 — CONTRACTS WITH NONPROFIT ORGANIZATIONS

## 231.703 Requirements.

Under 10 U.S.C. 2324(e), the costs cited in 231.603 are unallowable.

## SUBPART 231.70 — PENALTIES FOR UNALLOWABLE COSTS

### 231.7000 Scope of Subpart.

(a) This subpart implements 10 U.S.C. 2324(a) through (d). It covers the assessment of penalties against contractors which include unallowable indirect costs in—(1) Final indirect cost rate proposals, or (2) The final statement of costs incurred or estimated to be incurred under a fixed-price incentive contract.

(b) This subpart applies to all DoD contracts awarded after February 26, 1987, in excess of $100,000, except fixed-price contracts without cost incentives.

(c) The status of the Government's audit of the final indirect cost proposal will determine whether penalties should be assessed under 231.7001 or 231.7002. An audit will be deemed to be formally initiated when the Government provides the contractor with written notice that audit work on a specific final indirect cost proposal has begun or the Government holds an audit entrance conference with the contractor.

### 231.7001 Audits Initiated before October 23, 1992.

If the Government formally initiates an audit before October 23, 1992, penalties shall be assessed under 10 U.S.C. 2324(a) through (d), as added by section 911(a) of the National Defense Authorization Act for Fiscal Year 1986 (Pub. L. 99-145). Under Section 911(a) of Pub. L. 99-145, these penalties may total up to three times the amount of unallowable costs and include an additional penalty of $10,000.

### 231.7002 Audits Initiated on or after October 23, 1993.

If the Government initiates an audit on or after October 23, 1992, penalties shall be assessed under 10 U.S.C. 2324(a) through (d), as amended by section 818 of the National Defense Authorization Act for Fiscal Year 1993 (Pub. L. 102-484).

### 231.7002-1. General.

(a) Under 10 U.S.C. 2324(a) through (d), as amended by section 818 of Pub. L. 102-484, the following penalties apply:

(1) If the cost is expressly unallowable under a FAR or DFARS cost principle that defines the allowability of specific selected costs, the penalty is equal to —

(i) The amount of the disallowed costs allocated to contracts that are subject to this Subpart for which an indirect cost proposal has been submitted, plus

(ii) Interest on the paid portion, if any, of the disallowance.

(2) If the cost was determined to be unallowable for that contractor before proposal submission, the penalty is two times the amount in paragraph (a)(1)(i) of this section.

(b) These penalties are in addition to other administrative, civil, and criminal penalties provided by law.

(c) It is not necessary for unallowable costs to have been paid to the contractor in order to assess a penalty.

### 231.7002-2 Responsibilities.

(a) The cognizant ACO is responsible for —

(1) Determining whether the penalties in 231.7002-1(a) should be assessed.

(2) Determining whether such penalties should be waived pursuant to 231.7002-5.

(3) If there is evidence that the contractor knowingly submitted unallowable costs —

(i) Referring the matter to the appropriate defense criminal investigative organization for review; and

(ii) Taking the actions indicated in DoDD 7050.5, Coordination of Remedies for Fraud and Corruption Relating to Procurement Activities.

(b) The contract auditor, in the review and/or the determination of final indirect cost rate proposals for contracts subject to this Subpart, is responsible for —

(1) Recommending to the ACO which costs may be unallowable and subject to

the penalties in paragraphs 231.7002-1(a).

(2) Providing rationale and supporting documentation for any recommendation.

### 231.7002-3 Assessing the Penalty.

Unless a waiver is granted pursuant to 231.7002-5, the cognizant ACO shall —

(a) Assess the penalty in 231.7002(a)(1), when the submitted cost is expressly unallowable under a FAR or DFARS cost principle that defines the allowability of specific selected costs; or

(b) Assess the penalty in 231.7002-1(a)(2) when the submitted cost was determined to be unallowable for that contractor prior to submission of the proposal. Prior determinations of unallowability may be evidenced by —

(1) A DCAA Form 1, Notice of Contract Costs Suspended and/or Disapproved, (see 242.705-2) which the contractor elected not to appeal and was not withdrawn by DCAA.

(2) A contracting officer final decision which was not appealed.

(3) Prior ASBCA or court decision involving the contractor, which upheld the cost disallowance.

(4) Any determination of unallowability under FAR 31.201-6.

(c) Issue a final decision (see FAR 33.211) which includes a demand for payment of any penalty assessed under paragraphs (a) or (b) of this section. The letter shall state that the determination is a final decision under the Disputes clause of the contract. (Demanding payment of the penalty is separate from demanding repayment of any paid portion of the disallowed cost.)

### 231.7002-4 Computing Interest.

For 231.7002-1(a)(1)(ii), compute interest on any paid portion of the disallowed cost as follows:

(a) Consider the overpayment to have occurred, and interest to have begun accumulating, from the midpoint of the contractor's fiscal year. Use an alternate equitable method if the cost was not paid evenly over the fiscal year.

(b) Use the interest rate specified by the Secretary of the Treasury pursuant to Pub. L. 92-41 (85 Stat. 97).

(c) Compute interest from the date of overpayment to the date of the demand letter for payment of the penalty.

(d) Determine the paid portion of the disallowed cost in consultation with the contract auditor.

### 231.7002-5 Waiver of the Penalty.

Pursuant to 10 U.S.C. 2324(c), the cognizant ACO shall waive the penalties as 231.7002-1(a) when —

(a) The contractor withdraws the proposal before the Government formally initiates an audit of the proposal and the contractor submits a revised proposal;

(b) The amount of the unallowable costs under the proposal which are subject to the penalty is $10,000 or less; or

(c) The contractor demonstrates, to the cognizant ACO's satisfaction, that —

(1) It has established appropriate policies and personnel training and an internal control and review system that provides assurances that unallowable costs subject to penalties are precluded from being included in the contractor's final indirect cost rate proposals (This should include the types of controls required for satisfactory participation in a DoD sponsored self-governance program, specific accounting controls over indirect costs, compliance tests which show the controls are effective, and Government audits which do not disclose recurring instances of expressly unallowable costs.); and

(2) The unallowable costs subject to the penalty were inadvertently incorporated into the proposal; i.e., their inclusion resulted from an unintentional error, notwithstanding the exercise of due care.

### 231.7002-6 Contract Clause.

Use the clause at 252.231-7001, Penalties for Unallowable Costs, in all solicitations and contracts over $100,000, which contain the clauses at FAR 52.216-7, 52.216-13, 52-216-16 or 52.216-17.

# APPENDIX B

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# APPENDIX B

## B-000 STATISTICAL SAMPLING TECHNIQUES

### B-001 Scope of Appendix

This appendix presents essential principles and methods of statistical (probability) sampling applicable to contract auditing. In statistical sampling, each sample item in the universe has a determinable probability of being selected thus providing a basis for estimating the reliability of results. This appendix provides guidance for auditors in the design of a sampling plan and the selection and use of appropriate sampling methods for achieving their audit objectives. The guidance applies to both estimation and acceptance sampling. It is not, however, a detailed course in statistical sampling. General audit sampling guidance, including the Agency's sampling policy, is discussed in 4-600, Audit Sampling.

### B-100 – Impact of Other Sources of Reliance on Amount of Sampling

### B-101 Introduction

This section discusses the interrelationship and interdependence of statistical sampling and the other contract audit techniques that serve as sources of reliance for audit conclusions and recommendations. In the examination of contract costs, the auditor's objective is to report an informed opinion on the propriety of the contractor's cost representations. In expressing an opinion, the auditor does not require certainty (which may not be practical to obtain) regarding the contractor's representations. The auditor only needs reasonable assurance that the audit conclusions are substantially correct. An understanding of these relationships is essential to the effective application of statistical sampling to contract auditing.

### B-102 The Contract Auditor's Sources of Reliance

a. The fact that the audit report expresses an opinion and not a statement of absolute fact is of primary importance to the selection and application of appropriate audit procedures and techniques. The contract auditor may use any analytical or summary methods which will yield a sufficiently accurate determination or opinion. In forming this opinion the auditor is often able to rely on a number of sources of information. It is important to understand these sources in order to properly weigh their influence on the sampling plan. The contract auditor's principal sources of reliance include the following:

(1) Review and Analysis of Procedures and Controls. Procedures which are well designed, effectively operating, and combined with strong controls produce consistent results on which the auditor can rely with a minimum of testing. Conversely, weak or poor operating procedures or controls frequently produce inconsistent results or consistently wrong results. The latter conditions will require a more thorough examination. The auditor can gain knowledge of the contractor's system from formal or informal survey procedures.

(2) Comparison with Historical Cost Patterns. In many cases, the results of prior reviews in a given audit area will have disclosed no significant discrepancies. If costs currently under review follow a similar pattern, the amount of testing required will be reduced. Techniques for evaluating the consistency of current costs with previous experience include the traditional auditing tools of comparative, ratio, and trend analysis, as well as graphic and regression analysis.

(3) The Test Audit or Test-Check Procedure. This audit procedure may be used to highlight undesirable practices or conditions; or it may be used to secure a cross-section of an audit area so that the

auditor may draw conclusions about the entire area by examining the sample. It is in the application of the test audit or test-check procedure that statistical sampling is most useful to the contract auditor.

b. By considering all of the sources of reliance available, the auditor is able to make an informed decision as to the level of transaction testing that is required to be completed for a given audit circumstance. If all sources of reliance indicate favorable conditions, the auditor should limit tests of transactions to the minimum number which will support an informed opinion assuming a reasonable degree of risk. For example, when a survey indicates that the controls are strong and operating effectively and an adequate sampling of the records discloses no exceptions, the auditor has greater confidence in the reliability of the records than he/she would have from the sample alone. Correspondingly, the amount of sampling required to confirm other system or data analyses is less than when dependence is placed solely on the results of the sample.

c. Although the extent of the auditor's examination of records can be minimized by other sources of reliance, it seldom can be eliminated when substantial dollar values or sensitive issues are involved. In all audits, a certain amount of record examination is required to ascertain that controls are actually effective and that procedures and practices, which were satisfactory in the past, have not changed. Furthermore, the auditor must consider the objectives as well as the effectiveness of internal controls. For example, controls designed to assure that costs are properly recorded from purchase orders and vouchers to appropriate accounts would influence a sample selection that is designed to determine if those costs were assigned to appropriate contracts.

d. One of the principal advantages of statistical sampling is the measurement of the reliability of the results that it provides. Published tables indicate the sample size required to achieve given reliability objectives. However, sample size tables do not recognize the impact of stratification nor the auditor's consideration of other sources of reliance. Procedures for considering other sources of reliance in determining optimum sample sizes are discussed in B-400 and B-500. Stratification is discussed in B-600.

# B-200 - Design of the Sampling Plan

## B-201 Introduction

This section discusses the design of the sampling plan and the elements that should be documented in the plan. Detailed sampling plans are developed for the sampling categories of (1) sampling for attributes and (2) sampling for variables. Sampling plan elements, common to both attribute and variable sampling, are discussed in B-300. Elements specific to sampling for attributes or variables are discussed in B-400 or B-500, respectively.

## B-202 Audit Sampling Methods

a. Auditors do not usually perform a 100 percent review of universe data. Therefore, auditors will normally use either statistical or judgmental (nonstatistical) sampling in their audits. The method selected depends on which is the most cost effective means of satisfying the audit objective and supporting favorable resolution of any reported conditions.

b. Statistical sampling is preferred because of its advantages including objectivity, overall defensibility, and the risk of sampling error can be measured. Also, it is usually the preferred approach where the risk of material errors is probable and the universe consists of a large number of transactions of similar dollar value or consequence. If statistical sampling is not used, an explanation should be included in the working papers (4-605a).

c. The use of statistical sampling methods should be discussed in advance with appropriate contractor personnel. These discussions should establish mutual acceptance of sampling procedures; however, no prior commitment should be made regarding sample reliability (4-605f).

## B-203 Sampling Plan Design and Documentation

a. The successful audit application of statistical sampling begins with the design of the sampling plan. Sampling plans are required for audit applications of both attribute sampling or variable sampling.

b. The general sampling plan elements are listed below. Detailed sampling plans for attributes and variables are discussed in B-204 and B-205, respectively.

(1) Briefly state the objective of the sample evaluation, that is, what the auditor is looking for in the universe.

(2) Describe the universe. Essential elements to adequately describe the universe include identifying the sampling unit (i.e.,basic item to be examined), specifying the criteria to include all sampling units pertinent to the sampling objective, and stating the universe size (B-303).

(3) Describe the sampling frame, that is, the physical or electronic representation of the universe.

(4) Determine if the universe reconciles with the sampling frame. The sampling frame may include items not intended to be in the universe and/or may exclude part of the universe. The auditor must develop remedies as required by the type of mismatch and as permitted by available information.

(5) Select a suitable sampling approach. For a variable sampling application, the auditor can choose physical unit sampling or dollar unit sampling (DUS). In sampling for attributes, the alternatives are acceptance or estimation sampling. When using E-Z-Quant software, attribute sampling only uses physical unit sampling.

(6) Develop the reliability goals. The reliability goals, to be specified for either attribute sampling or variable sampling, are listed in B-204f or B-205f, respectively.

(7) When sampling for variables, establish a sample size using auditor judgement. In sampling for attributes, determine a sample size for each attribute using E-Z-Quant.

(8) Describe the sample selection method.

(9) Identify, by name, the specific software to be used for the sample evaluation.

c. To maintain audit consistency, auditors should use the sampling plan formats described in B-204 and B-205 for all audit applications of statistical sampling. Audit working papers must include a complete sampling plan clearly cross-referenced to where the sample selection, review, and evaluation are located.

## B-204 Detailed Sampling Plan for Attributes

Detailed elements (with examples) for an attribute sampling plan are:

a. State the objective for the sample.

(1) Briefly state the general objective. For acceptance sampling, examples of objectives are to test compliance with timekeeping procedures or test the accuracy of an inventory accounting system. For estimation sampling, an example is to test an expected error rate of 20 percent based on the results of tests performed in a prior audit.

(2) Identify the critical (significant) system features (attributes) to be tested. Some attribute examples are "Did the employee endorse the time sheet (or card)?" or "Does the actual part count agree with the inventory system count?"

(3) Define the error condition for each attribute. For example, the inventory system is in error if the actual count differs from the inventory count by more than 5 percent.

b. Describe the universe.

(1) Identify the sampling unit. Some examples are an employee (for the timekeeping test) or a part number (for the inventory system test).

(2) Specify the criteria to include all sampling units pertinent to the sampling objective. For example, all first-shift, hourly employees for Departments A, B, and C (for a timekeeping test).

(3) State the universe size – the number of all sampling units. An example is the 2,000 first-shift, hourly employees for Departments A, B, and C.

c. Describe the sampling frame – the physical or electronic representation of the universe. An example is a computer listing of social security numbers for all hourly employees for all departments.

d. Determine if the universe reconciles with the sampling frame.

(1) Determine if the sampling frame includes units not intended to be in the universe. For example, a listing of social security numbers includes those for employees outside Departments A, B, and C.

(2) Determine if the sampling frame excludes part of the universe. For example, a listing of part numbers may exclude items stored in remote locations.

(3) Develop remedies as required by the type of mismatch and as permitted by available information.

e. Select a suitable sampling approach. An example for the inventory accounting system test is to use acceptance sampling if incorrect rejection (of an acceptable system) would call for a costly remedy; otherwise, use discovery acceptance sampling.

f. Develop reliability goals.

(1) For acceptance sampling, the reliability goals (B-404.1) are:

Critical Error Rate – the maximum error rate in the universe that is considered acceptable,

Desired Government's Risk – the tolerable level of risk of accepting a faulty universe (i.e., universe error rate is greater than the specified critical error rate),

False Alarm Error Rate – an acceptable universe error rate (less than critical error rate) used to control the risk of incorrect rejection (false alarm) of an acceptable universe, and

False Alarm Risk – the tolerable level of risk of rejecting an acceptable universe (i.e., universe error rate is less than the false alarm error rate).

(2) For estimation sampling, the reliability goals (B-404.2) are:

Anticipated Error Rate – an expected error rate for the universe,

Precision Range – the width of the desired confidence interval for the universe error rate, and

Confidence Level – the likelihood (or probability) that the universe error rate, being estimated by the sample, will fall within a specified range about the (point) estimate itself.

g. Determine a sample size for each attribute. Give the name of the specific software and inputs used to determine the sample size. For example: "E-Z-Quant ATTDISC will be used to deter-

mine the sample size for a discovery sample."

h. Describe the sample selection method. That is, briefly describe the way sample items are randomly selected.

i. Identify, by name, the specific software to be used for sample evaluation. For example: "E-Z-Quant ATTEVAL1 will be used to evaluate the attribute discovery (acceptance) sample."

## B-205 Detailed Sampling Plan for Variables

Detailed elements (with examples) for a variable sampling plan are:

a. State the objective for the sample.

(1) Briefly state the general objective. For example, the objective is to estimate the misstatement of proposed material costs.

(2) State the specific characteristics (potential sources of error) to be tested. Examples of potential sources of error are the differences between proposed prices and vendor quotes or between proposed prices and purchase history.

b. Describe the universe.

(1) Identify the sampling unit. Some examples of sampling units are a line item on a bill of materials or a transaction in an overhead account.

(2) Specify the criteria to include all sampling units pertinent to the sampling objective. For example, all travel accounts 100 and 101 for FY 93 for Departments A, B, and C.

(3) State the universe size – the number and value (if applicable) of all sampling units. An example is the universe of 250 transactions, totaling $1,000,000, charged to the travel account during FY 93.

c. Describe the sampling frame – the physical or electronic representation of the universe. Some examples of sampling frames are a computer listing of a consolidated bill of material, a data file (specifically named) of journal voucher entries, or a file drawer of vouchers.

d. Determine if the universe reconciles with the sampling frame.

(1) Determine if the sampling frame includes units not intended to be in the universe. An example would be a listing of travel vouchers that includes certain departments outside the scope of the audit.

(2) Determine if the sampling frame excludes part of the universe. For example, the same listing of travel vouchers excludes those units intended to be in the universe, such as travel vouchers recently incurred by off-site personnel.

(3) Develop remedies as required by the type of mismatch and as permitted by available information.

e. Select a suitable sampling approach. Examples of a suitable sampling approach is the use of physical unit sampling when the sampling frame is a file drawer of vouchers or the use of dollar unit sampling when the sampling frame includes clusters of sampling units (e.g., voucher cost consisting of multiple invoices or a BOM assembly cost consisting of several part numbers).

f. Develop reliability goals. For variable sampling, establish the following reliability goals (B-504):

Confidence Level – the likelihood (or probability) that the universe amount, being estimated by the sample, will fall within a specified range about the point estimate itself,

Desired Precision Ratio – the amount of sampling error, stated as a percentage of the point estimate, that is considered acceptable by the auditor.

g. Establish the sample size consistent with the audit objective (B-505).

h. Describe the sample selection method.

(1) If automated, give the name of the sampling software procedure. For example: "E-Z-Quant STRAT will be used to select a physical unit sample" or, "E-Z-Quant DUSSEL will be used to select a dollar unit sample."

(2) If manual, briefly describe the universe stratification process (if done) and the way sample items are randomly selected.

i. Identify, by name, the specific software to be used for sample evaluation. For example: "E-Z-Quant SAMPL will be used to evaluate the physical unit sample" or, "E-Z-Quant DUSAM will be used to evaluate the dollar unit sample."

# B-300 - Sampling Plan Elements Common To Attribute and Variable Sampling

## B-300 Introduction

This section provides guidance on sampling plan elements that are common to both attribute and variable sampling.

## B-301 Identifying the Sampling Objective

a. A prerequisite to the application of any sampling process is the need to identify the specific audit objectives to be attained by examination of the area under evaluation. Prior to initiation of the sampling process, the auditor should definitively set forth in the sampling plan the characteristics and values to be examined during the audit. The auditor's sampling objective should satisfy the audit objectives of the area under review.

b. The purpose of sampling is to infer something about a "characteristic" of the universe items under consideration. One typical universe characteristic is the total audited dollar amount. To permit inferences about this universe characteristic, it must be possible to determine an audited amount for each sample item examined by the auditor.

c. In the examination of sample items, the auditor is usually concerned with determining the existence of "errors." These errors are not limited to oversights on the part of contractor personnel. They may reflect differences of opinion between the auditor and the contractor as to the proper distribution of a cost or the appropriate documentation of transactions. A generalized objective statement (e.g., "to see if any errors exist" or "to determine if anything is wrong") should be avoided. The precise type of errors, occurrences, or values under review must be defined in order to design an economical or efficient sampling plan.

d. Frequently, the objectives of the audit may require the examination of all items for several characteristics. The sampling plan should take into consideration that findings from the sample of each characteristic should be kept separate for individual analysis and not combined, since each characteristic may be of different audit significance. For example, suppose a floor check of a random sample of employees disclosed that (1) some employees who were late or absent were being checked in by other employees and (2) some job tickets, which were otherwise correct, were not being countersigned by the supervisor. An analysis based on the combined number of errors would be less informative than separate analyses of the errors in each category.

e. When different categories of errors disclosed by a sample can be evaluated monetarily, the findings can be combined if they are recurring in nature and not peculiar to only certain characteristics or accounts. For example, suppose a sample of travel vouchers disclosed unallowable costs for (1) entertainment of customers and (2) the excess cost of first-class over other available air accommodations. Separate estimates of the amount of unallowable expenses in each category would not be necessary since the auditor's objective is to obtain a reliable estimate of the total amount of unallowable expenses.

f. If monetary errors are evidently peculiar to certain characteristics or subareas, or are apparently nonrecurring, they should not be combined. A judgment is required as to whether or not a particular type of unallowable cost should be projected across-the-board. There is occasionally an advantage to separate treatment, such as a reduction in an unreasonable confidence interval (or precision, as discussed in B-504). Suppose, for example, relocation costs were included in travel expense and no costs were questioned in this category, the confidence interval could be narrowed by stratifying out relocation costs.

g. When the auditor has reason to believe that a cost category includes a significant amount of unallowable expenses, the purpose in taking a sample will generally be to estimate the total amount of unallowable expenses. On the other hand, if the auditor has no reason to believe the costs under review include unallowable amounts, the purpose will

generally be to obtain additional assurance that the costs do not, in fact, include a significant amount of unallowable expenses. In either case, the auditor should seek to develop a sampling plan that will provide maximum support for conclusions in return for the time spent in the selection, examination, and evaluation of the sample. In addition, the sample size should provide a reasonable balance between (1) the amount of support the sample will provide for audit conclusions and (2) the expenditure of auditor resources the sample will require.

## B-302 Sampling for Attributes or Variables

a. The sampling of characteristics may be divided into two broad categories of sampling for attributes and sampling for variables. When sampling to determine the rate or proportion of errors in the records or to obtain assurance that an error rate is not excessive, the auditor is sampling for attributes. On the other hand, sampling for variables is when a sample is selected in order to estimate a dollar amount such as the amount of unallowable costs contained in the total amount of material invoices charged to a government contract. The distinction is important because the methods eventually used to determine optimum sample sizes and evaluate sample results differ.

b. The same sample may be used for attributes and variables. For example, in reviewing direct material costs, the auditor may want to estimate both the percentage of purchases made without competition and the dollar amounts improperly charged to a government contract. The auditor may also switch emphasis from one type of sampling to the other based on examination of a preliminary sample. For instance, the auditor may initially determine the sample size necessary to support acceptance of an account if no errors are disclosed. If the examination of the sample discloses errors with dollar impact on government contract costs, the auditor may (1) use the results of the initial sample to support a recommendation for questioned costs, (2) expand audit stratification if errors are limited to one or two sources, or (3) determine the additional number of items to be examined to support such a recommendation.

## B-303 Describing the Universe

a. A universe is a group of items or transactions from which information is desired. Some statistical texts refer to the universe as the group of items before segregation and audit stratification of items for detailed examination. However, in this appendix, the term "universe" will refer to the group which remains after the large dollar or sensitive transactions have been stratified for audit examination.

b. The sampling unit is the basic unit that will be examined. A sampling unit may be a document or record, such as a purchase order or travel voucher, or may be an item reflected on the document or record. As an example, an objective may be to determine how many, if any, purchase orders lack adequate supporting documentation, or the objective may be to verify certain characteristics of the items on the purchase orders, such as whether each item's cost is correct. If the examinations were to be made on a sampling basis, the sampling unit in the first instance would be a purchase order. In the second instance, the sampling unit would be a line item on a purchase order. If there were several line items on each of the purchase orders, it can be readily seen that the sizes of the two groups would differ substantially.

c. When using dollar unit sampling (DUS), the universe is expressed in terms of dollars rather than physical units such as purchase orders or invoices. However, in order to evaluate the dollars selected, documents containing those dollars must be reviewed. In the event of multiple levels of documentation, the sampling plan should identify the level of detail of the sampling unit.

d. The universe is the aggregate of all sampling units. Therefore, the auditor must specify criteria to ensure that all sampling units, pertinent to the sampling objective, will be included in the universe. Examples of specific criteria, which could describe a universe, include accounts, time period, dollar range, bill of material, and/or organizational units.

## B-304 Describing the Sampling Frame

a. The sampling frame is the physical (or electronic) representation of the sampling units from which the sample is actually selected. In sampling for attributes, an example of a sampling frame could be a computer listing of social security numbers for all hourly employees for all departments. In this sampling frame, a possible sampling unit is the social security number which can be related to an individual employee (for a future interview). In sampling for variables, some examples of sampling frames could be a computer listing of a consolidated bill of material, a data file of journal voucher entries, or a file drawer of vouchers. For these sampling frames, possible sampling units are a part number, item number, or physical voucher, respectively.

b. One sampling frame requirement is that it be a complete representation of all sampling units constituting the universe. Since an auditor's conclusions pertain to those sampling units actually in the sampling frame, he/she must determine if the sampling frame excludes part of the previously defined universe items. In this case, the auditor should attempt to reconcile the universe with the sampling frame and document the results in the audit working papers.

c. Although a sampling frame should be complete, it may include items not intended to be in the universe. For this situation, the auditor should attempt to reconcile the universe with the sampling frame and document the results in the audit working papers. Even if complete reconciliation is not achieved, the auditor can select a sample from a sampling frame with extra non-universe units. For example, a listing of travel vouchers that includes certain departments outside the scope of the audit, can be used to select a sample. Any non-universe item selected should be simply ignored for statistical purposes.

# B-400 - Sampling for Attributes

## B-401 Introduction

This section provides detailed guidance for developing sampling plans that are specifically related to sampling for attributes.

## B-402 Use of Sampling for Attributes

Attribute sampling can be classified into two approaches of acceptance and estimation sampling. Their use depends on audit objectives. With acceptance sampling, the goal is to either accept or reject the universe. With estimation sampling, the goal is to estimate the actual error rate in the universe.

### B-402.1 Attribute Acceptance Sampling

a. In auditing, the typical application of attribute sampling is a test for compliance of the controls built into a system. Since perfection is seldom expected, there is some level of noncompliance that can be tolerated. Attribute acceptance sampling is designed to discern whether noncompliance is within a tolerable level. In acceptance sampling, the minimum sample size can be determined to distinguish between tolerable and intolerable conditions. The tolerable level of noncompliance or critical error rate (defined in B-404.1b) is specified in advance.

b. The feature of compliance testing that calls for attribute sampling is that there are only two possible outcomes from the review of a sample item. Either the sampled item is in compliance with the control being tested or it is not. Audit review considerations can be satisfied by attribute questions which are answered by either "yes" or "no." This condition distinguishes sampling for attributes from sampling for variables.

c. Attribute acceptance sampling is typically used for reviewing a contractor's internal controls. This includes the review of policies, procedures, and practices to determine the adequacy of internal controls or operational efficiency. Acceptance sampling is not designed to estimate questioned costs. Instead, poor compliance revealed by an acceptance sample will normally prompt recommendations for system changes.

### B-402.2 Attribute Estimation Sampling

a. In contrast to acceptance sampling, estimation sampling is designed to estimate the noncompliance rate within some range of sampling error specified by the auditor. Of course, the results of an estimation sampling plan could be used to reach an accept-or-reject decision. However, the sample results would have to be compared with the same tolerable level of noncompliance that would be used in developing an acceptance sampling plan.

b. Attribute estimation sampling is generally applicable to reviews where compliance is being estimated as opposed to being subject to a pass/fail test. Estimation sampling is appropriate when the audit objective is to estimate an adjustment (impact) to a statement of error conditions. In other cases, such as the sampling of individuals in work sampling, it can be used to estimate the error (or idleness) rate.

## B-403 Selecting the Sampling Approach

### B-403.1 Acceptance Sampling Approach

For acceptance sampling, three sampling procedures are available for compliance testing: (1) discovery sampling, (2) one-step acceptance sampling, and (3) two-step acceptance sampling. Acceptance sampling procedures are designed to test whether the rate of a particular type of error exceeds a specified acceptable level (i.e., acceptance number of errors). The procedures are pass/fail tests which place limits on the risks that the results will be misleading. The goal of acceptance sampling is to simply show whether the universe is acceptable or unacceptable.

a. Discovery sampling is a special case of attribute acceptance sampling which may be used for preliminary sampling purposes. In attribute discovery sampling, the acceptance number of errors is set to zero. This feature provides a mini-

mum sample size which is achieved by considering only the risk of accepting a faulty universe (i.e., universe error rate greater than an upper specified error rate – critical error rate as defined in B-404.1b).

b. A one-step acceptance sampling procedure determines both the sample size and an acceptance number of errors using a single sampling step.

(1) In addition to considering the risk of accepting a faulty universe, one-step acceptance sampling considers the risk of rejecting an acceptable universe (i.e., universe error rate less than a lower specified error rate - false alarm error rate as defined in B-404.1c). If the risk of wrongful rejection of an acceptable universe is not an audit concern, discovery sampling (with its minimum sample size) is the preferred sampling option.

(2) This sampling procedure should be used when there is reason to believe that the actual error rate falls in the interval between two specified error rates (i.e., critical error rate and false alarm error rate). The auditor's specified error rates are used to test for wrongful rejection of acceptable universe and wrongful acceptance of faulty universe, respectively. In this case (with actual error rate less than upper specified rate), the auditor should accept the universe because the sample results would not exceed the acceptance number of errors.

c. The two-step acceptance procedure is similar to the one-step procedure except that it breaks the sample into two individual steps and gives the universe a second chance for a favorable finding. The first step is essentially an attribute discovery step since its acceptance number of errors is set to zero.

(1) This sampling procedure should be used when there is reason to believe that the actual error rate is minimal (e.g., no errors are likely in the sample). In this case, the auditor would accept the universe if no errors are found in the first step.

(2) Also, two-step acceptance sampling should be used when there is reason to believe that the actual error rate is poor (e.g., numerous errors likely in the sample). In the second case, the auditor would reject the universe for noncompliance if the total acceptable number of errors (for both steps) was exceeded in the first step.

### B-403.2 Estimation Sampling Approach

An attribute estimation sample is designed to estimate the frequency of a specific type of error in a universe. The goal of estimation sampling is to show how unacceptable (or acceptable) the universe is. The sample size is determined in order to provide a desired level of assurance (or confidence) that the error rate is estimated with a desired degree of precision (i.e., distance between the confidence limits).

## B-404 Developing Reliability Goals

### B-404.1 Acceptance Sampling Reliability Goals

a. In acceptance sampling, attributes should be evaluated individually so that an auditor can make a pass/fail decision relative to the system being audited. The auditor should rank the attributes because some attributes are normally more critical than others. Ordinarily, separate sample size queries would be performed for each attribute. Therefore, the auditor should establish a set of reliability goals for each attribute under consideration.

b. All three acceptance sampling procedures, described in B-403.1, consider the risk of accepting a faulty universe. A universe is faulty when the universe error rate is greater than a maximum error rate goal specified by the auditor, which is commonly known as the "critical error rate." Also, a goal for assurance (or a corresponding risk goal discussed below) must be specified in acceptance/discovery sampling.

(1) The critical error rate (CER) is the maximum error rate in the universe that is considered "acceptable" by the auditor. For example, there may be only one error in 5,000 transactions, indicating an error rate of only 0.02 percent, but that error may be for a million dollars. On the other hand, a higher rate could reflect errors of less significance which are of a random nature, and show no trend or pattern. Accordingly, the significance of an error rate must be evaluated in terms

of its potential effect on government contract costs. For example, a one percent error rate in direct labor or material costs charged to government contracts by a large contractor could result in overcharges totalling hundreds of thousands of dollars over the course of a year. A five percent error rate in a $100,000 overhead account which is allocated in large part to commercial work would be less significant. As with all reliability goals, the value assigned to the critical error rate will affect the required sample size. By itself, increasing the CER decreases the required sample size.

(2) The desired assurance or confidence level (CL) is the reliability that an auditor places on the sample results. Since it is often easier to think in terms of risk, the complement of the confidence level (100 - CL, when both are stated as a percentage) can also be used in acceptance sampling. This risk term is defined as the "Government's Risk" (GR) in the E-Z-Quant documentation (DCAAP 7641.91). By itself, increasing the acceptable level of the GR decreases the required sample size.

(3) The reliance an auditor obtains from past experience in auditing such areas as the same cost element or internal controls disclosed by surveys has no effect on what constitutes an "unacceptable" error rate, but it does affect the additional confidence the auditor needs from the sample. For example, if the auditor is performing an audit of historical costs at a location where DCAA has not previously performed an audit, considerable reliance must be placed on the results of a sample. As an example, a 90 percent confidence level (i.e., 10 percent risk) could be used to estimate the initial sample size. On the other hand, if the auditor is at a contractor where experience has indicated good internal controls and prior years' tests have disclosed no significant errors, a confidence level of 70 percent or less (i.e., risk of 30 percent or more) could suffice.

c. Both, one-step and two-step acceptance sampling procedures, consider the risk of rejecting an acceptable universe. Discovery sampling simply ignores this risk. The possibility of rejecting an acceptable universe is sometimes defined as a "false alarm," which is a possibility with a partial review. An acceptable universe has an actual universe error rate that is less than a minimum rate goal specified by the auditor and is commonly known as the "false alarm error rate." Additionally, a specified "false alarm risk" goal (or corresponding assurance goal) must be specified in one-step or two-step acceptance sampling.

(1) The false alarm error rate (FAER) is an acceptable universe error rate (less than the CER) used to control the risk of false alarm. Note the contrast between the CER and FAER, which are both specified by the auditor. An actual error rate that is greater than the CER is unacceptable. In contrast, an actual error rate that is lower than the FAER is acceptable. By itself, increasing the FAER increases the required sample size.

(2) The desired risk goal, commonly known as false alarm risk (FAR), is the tolerable level of risk of rejecting an acceptable universe. The contractor bears this risk of false indication of flawed conditions. By itself, increasing the FAR decreases the required sample size.

### B-404.2 Estimation Sampling Reliability Goals

For estimation sampling, a specified error rate is used only to anticipate the precision goal (at a specified assurance goal) that is associated with different possible sample sizes. The following reliability goals are established by the auditor for the attribute estimation sampling procedure described in B-403.2

a. The anticipated error rate is an expected error rate for the universe. Normally, the auditor will refer to past experiences with the same or similar systems (or universes) to estimate the anticipated error rate. A contractor's stated error rate could be used if the auditor judges it to be an adequate rough estimate.

b. The precision range is the desired confidence interval for the universe error rate. This parameter, specified as a percentage, refers to the distance between the confidence limits.

c. The confidence level is the desired assurance that the actual error rate will be within the upper and lower confidence

limits that will be determined from the sample results.

## B-405 Determining Sample Sizes

a. Although sample sizes can be determined manually from published sampling tables, auditors should use the E-Z-Quant software to compute sample sizes for acceptance and estimation sampling procedures.

b. The auditor should rank the attributes according to their relative importance. Normally, the most critical attribute will require the largest sample size and so forth. For each attribute, the required sample size should be determined using the appropriate E-Z-Quant acceptance or estimation sampling option. The maximum number of items to be selected for review will be the largest sample size of all the sample sizes determined for individual attributes.

## B-406 Describing the Sample Selection Method

Proper implementation of the auditor's sampling plan requires (1) that the required number of items be drawn randomly from the universe and (2) that each item be reviewed for compliance on the aspects of audit concern. In a randomly selected sample, each item has a known chance (or probability) of being selected. The results of a randomly selected sample can be objectively applied to the universe (or system) to assist the auditor in deciding whether the universe is in compliance with the system control being tested. Section B-700 discusses the various random selection methods.

## B-407 Identifying the Sample Evaluation Method/Software

In sampling for attributes, the results of the examination are expressed as an estimate of the actual error rate. The estimated error rate is the ratio of the error occurrences to the sample size. For each attribute, sample findings should be tabulated separately as if each constituted an independent and separate sample. This is necessary to isolate critical problem areas for further audit effort and to possibly terminate testing in other areas.

### B-407.1 Acceptance Sample Evaluation Method/Software

a. In acceptance sampling, the pass/fail purpose of the sample is accomplished when the acceptance number of errors is exceeded or when the sample is completed, whichever comes first Ordinarily, the auditor will want to proceed beyond a pass/fail conclusion in the event of a failure. That is, the auditor will normally use the sample results to estimate the universe error rate in order to gauge the potential severity of error conditions. In this manner, the sample assumes the role of an attribute estimation sample.

b. For proper evaluation of the confidence interval, the auditor must complete the sample even if the acceptable number of errors is exceeded. When using E-Z-Quant, the auditor's selection of the appropriate sample evaluation procedure depends on which attribute sampling procedure was previously selected (i.e., discovery, one-step or two-step acceptance).

c. The one-step acceptance sample evaluation option (ATTEVAL1) of E-Z-Quant should be used to evaluate sample results from either discovery or one-step acceptance sampling procedures. The one-step sample evaluation procedure permits the auditor to focus on a pass/fail decision derived from an acceptance sample. It duplicates what is apparent from comparing the number of errors in the sample to the acceptance number of errors specified in the sampling plan. Failure of the universe presents a more compelling reason to focus on the pass/fail decision. An analysis of the sampling error is possible by using sample evaluation options to (1) specify a confidence level and obtain an upper precision limit (to compare with CER specified in sampling plan) or (2) specify an upper precision limit and obtain a confidence level (to compare with the sampling plan specification).

d. The two-step acceptance sample evaluation option (ATTEVAL2) of E-Z-Quant should be used to evaluate the results of a fully implemented two-step acceptance sample. This analysis is simi-

lar to the one-step sample evaluation described above.

**B-407.2 Estimation Sample Evaluation Method/Software**

In estimation sampling, the sample results are evaluated to determine whether the desired assurance and precision goals, as specified in the sampling plan, were obtained. The one-step acceptance sample evaluation option (ATTEVAL1) of E-Z-Quant should be used to evaluate the results of an attribute estimation sample.

# B-500 - Sampling for Variables

## B-501 Introduction

This section provides detailed guidance for developing sampling plans that are specifically related to sampling for variables.

## B-502 Use of Sampling for Variables

a. Variable sampling is generally used to verify account balances or cost elements and note any differences. This type of sampling is substantive testing (as opposed to compliance testing) whereby sample items are evaluated for error amounts or variables (as opposed to attributes). The audit universe (e.g., accounts, vouchers, or bill of material) is the entire grouping of items which will be sampled. Variable sampling can be applied to proposals, incurred costs, progress payments, forward pricing rates, and defective pricing.

b. An important objective of variable sampling is to estimate a particular universe characteristic such as total unallowable costs (or questioned cost). The estimated questioned cost is commonly known as the "point estimate." A point estimate strikes a balance between potential understatement (considering both likelihood and amount) and potential overstatement of the true universe amount. In statistical sampling, "confidence level" and "precision" are used to measure the reliability of the point estimate. The confidence level deals with "sureness" (or assurance) while precision deals with "closeness" (or accuracy). Auditors must establish desired levels of reliability goals (discussed in B-504) in order to properly evaluate the sample results.

## B-503 Selecting the Sampling Approach

In the application of variable sampling, the auditor can choose either physical unit sampling or dollar unit sampling (DUS). The important difference between these sampling approaches is the basic sampling unit that will be examined by the auditor. For a physical unit sample, the unit being examined may be a document or record (such as a purchase order, travel voucher, or bill of material) or an item reflected on the document or record. When using dollar unit sampling, the universe is expressed in terms of dollars instead of physical units. However, in order to evaluate the dollars selected, the documents or records containing those dollars must be reviewed.

### B-503.1 Physical Unit Sampling

a. Most audit universes are widely dispersed. Usually, there is a wide variation between the smallest and largest individual dollar amounts, with most of the amounts being relatively small and only a few amounts being very large. Since a random sample from the entire universe would probably include only a few large (high dollar) items, the reliability of the results would be correspondingly low. This is possible because wide variations are likely between questionable amounts for individual large items and the average of questionable amounts from the universe.

b. Stratification of the universe into several dollar ranges or strata can be used to improve audit reliability and reduce the overall number of items for review. Normally, the universe is stratified into a high-dollar stratum (for 100 percent review) and several other strata from which samples are selected for review. Audit effort is concentrated on the high-dollar items where the risk is greater. Samples are statistically selected from each of the other strata, which are used as the basis for projecting individual stratum sample results to the corresponding universe.

c. In physical unit sampling, sample items can be randomly selected either manually or by using an appropriate software package. The auditor then reviews the sample items and determines any cost that should be questioned. Sample results can be manually projected to the universe by the auditor; however, use of the sample evaluation option (SAMPL) of E-Z-Quant is preferred. Sample evaluation software will deter-

mine both the point estimate (projection of sample results to universe) and the associated confidence interval.

**B-503.2 Dollar Unit Sampling (DUS)**

a. Many audit universes can have extreme variability such as clustered items dispersed throughout the universe. In this situation, an appropriate sampling method is dollar unit sampling, which is also known as "probability proportionate to size" (PPS). PPS sampling means that the larger the value of an item, the greater its chance of being selected. This sampling procedure concentrates the sampling review toward larger items much the same as stratification for physical unit sampling.

b. With the DUS approach, the cumulative dollar value is computed for each item in the universe. Sample items are systematically selected from the sampling stratum, beginning with the first randomly selected "dollar hit." All other dollar hits (and sample items) are identified by adding the value of the sampling interval to the prior dollar hit until the process has stepped through the entire sampling stratum.

c. In dollar unit sampling, sample items can be randomly selected either manually or by using appropriate DUS software such as the Electronic Selection Program (ESP) or E-Z-Quant DUSSEL. After reviewing the sample items associated with their dollar hits, the auditor determines any cost that should be questioned. As with physical unit sampling, the auditor can manually project DUS results to the universe. However, it is preferable to use DUS evaluation software (i.e., ESP or E-Z-Quant DUSAM) to determine the point estimate (projection of sample results to universe) and the associated confidence interval.

## B-504 Developing Reliability Goals

a. The probable degree of reliability of the findings is measured by two interrelated terms, precision and confidence level. The auditor must establish these reliability goals for either approach to variable sampling (i.e. physical or dollar unit sampling).

b. Precision relates to the amount or degree of probable error associated with an estimate. That is, the extent to which the sample findings may differ from the actual universe values or conditions. Precision is a measure of the potential sampling error after the sample has been reviewed. It measures the accuracy of a point estimate by showing, for a specified confidence level, how much the point estimate may vary from the true universe amount.

c. In sampling for variables, precision can be expressed as either (1) an interval about the point estimate obtained from the sample or (2) a maximum or upper limit such as "less than $50" or "less than 6 percent error." In most cases, the primary consideration influencing the auditor's selection of a desired level of precision will be the potential effect of the error on government contract costs.

d. In establishing a goal for the precision amount in terms of dollars, the auditor could have difficulty in estimating what amount will be considered as tolerable or immaterial. As an alternative, the precision goal can also be expressed in terms of a "precision ratio"; that is, the ratio of precision to point estimate. The precision ratio is the amount of sampling error, expressed as a percentage of the point estimate (that is unknown prior to review of sample), considered by the auditor to be tolerable or immaterial.

e. Confidence level is the assurance (or probability) that the amount being estimated by the sample will fall within a specified range (or interval). A confidence interval is commonly defined as the point estimate plus or minus the precision amount. The confidence level indicates the degree of expectation associated with a specific precision amount. For instance, a 95 percent confidence level indicates that 95 times out of 100 the actual universe amount will be expected to fall within the precision computed from the sample results. Correspondingly, five percent of the time it may be expected to fall outside the interval.

f. Without additional sampling, the more confident an auditor wants to be that the confidence interval contains the true amount, the wider that interval must

be. When establishing the confidence level, the auditor should consider the impact of other sources of reliance as discussed in B-100. In most cases this is accomplished subjectively by the auditor in deciding that a lower confidence level is adequate for a particular audit situation where there are other sources of reliance.

g. Desired levels of precision and confidence level are judgmentally set by the auditor considering risk, materiality, and audit objective.

## B-505 Establishing the Sample Size

a. In sampling for variables, there is no single "best sample size." Sample size is a compromise between precision and audit time considerations which are inversely related. Reliability goals and audit time constraints vary from one audit to the next.

b. Reviewing too many sample items can result in achieving greater precision than necessary. That is, more resources will have been devoted to sample review than necessary. As the sample size is increased, the confidence interval can be expected to become smaller; however, the improvement in the expected reliability will be less for each additional item added to the sample. Thus, the determination of an optimum sample size involves recognition of the point of diminishing returns. This point occurs when the improvement in the reliability from increasing the sample size is not worth the audit time required to examine the additional items.

c. It is also important to consider the absolute size of the sample itself. A larger sample increases the likelihood of nonsampling errors (e.g., transposing numbers). In summary, the precision should be reasonable: (1) as an absolute amount, (2) in relation to the total amounts questioned and accepted, and (3) in relation to the cost in audit time of improving the precision through examination of additional items.

## B-506 Describing the Sample Selection Method

Proper implementation of the auditor's sampling plan requires (1) that the required number of items be drawn randomly from the universe and (2) that each item be reviewed for acceptability of the recorded cost. In a randomly selected sample, each item has a known chance (or probability) of being selected. A random sample can be selected manually by the auditor or automatically using statistical sampling software. The results of a randomly selected sample can be objectively applied to the universe to assist the auditor in determining the projected cost questioned.

### B-506.1 Physical Unit Sample Selection

a. When manually selecting a physical unit sample, the auditor should briefly describe the stratification process (if used) and the sample selection method. A detailed discussion of various random selection methods is included in B-700.

b. The physical unit stratified sample selection option (STRAT) of E-Z-Quant can be used to stratify a universe and select a sample. This E-Z-Quant option will divide the universe into strata, determine the number of sample items for each stratum, and randomly select the sample items for each stratum. The auditor must specify both the number of strata and the total number of review items. After reviewing the sample items, the auditor will enter the questioned amounts into a data file so that the point estimate (for projection to the universe) and sampling precision can be determined by the sample evaluation option (SAMPL) of E-Z-Quant.

c. Data retrieval software packages are available for installation and use on contractor computer systems for data retrieval and statistical sampling. For example, Datatrak, described in DCAAP 7641.89, can be used to retrieve data, stratify the data, and select a sample. B-706 contains a complete discussion of the auditor's use of electronic data processing (EDP) in sample selection.

### B-506.2 Dollar Unit Sample Selection

a. When manually selecting a sample, the auditor should document the details of the sample selection method. A detailed discussion of the systematic selection method, normally used in DUS applications, is included in B-705.

b. The dollar unit sample selection option (DUSSEL) of E-Z-Quant can be used to divide the universe into two strata (i.e. high dollar and sampling), determine the number of items to be reviewed from each stratum, and randomly select the strata samples. For dollar unit sampling, the auditor must specify a dollar amount for the sampling interval. The high-dollar stratum consists of items with absolute amounts that are equal to or greater than the interval amount. All other items make up the sampling stratum. For the sampling stratum, the cumulative dollar value is computed for each item in the stratum. The computer program systematically selects the sample from the sampling stratum, beginning with the first "dollar hit" which has a dollar value less than the sampling interval and is randomly selected by the procedure. The first sample item is the one that includes the first dollar hit. All other dollar hits (and sample items) are identified by adding the value of the sampling interval to the prior dollar hit until the process has stepped through the entire sampling stratum. After reviewing the sample items, the auditor will enter the questioned amounts into a data file so that the point estimate (for projection to the universe) and sampling precision can be determined by the sample evaluation option (DUSAM) of E-Z-Quant.

c. The Electronic Selection Program (ESP) is a microcomputer software package that has multiple capabilities including dollar unit sampling. ESP provides the opportunity to significantly increase auditor productivity because of its combined features. It combines the concepts of high-dollar judgmental review and DUS with the ability to (1) read contractor data files or use auditor extracted data files, (2) manage the scope of items to review within the time available, (3) export and import data files for interfacing with supporting mainframes, and (4) produce audit workpapers and report schedules.

d. Data retrieval software packages are available for installation and use on contractor mainframe computer systems for data retrieval and statistical sampling. For example, Datatrak, described in DCAAP 7641.89, can be used for data retrieval, data stratification, and DUS sample selection. At certain contractor locations involved in the EDP expansion program, the Integrated Audit Workstation (IAW) is available to expand mainframe-to-microcomputer data retrieval and analysis capabilities. When used in conjunction with the IAW data retrieval functions, ESP software can export and import data files so supporting mainframe-based data can be retrieved for dollar unit sampling and audit report schedule preparation. B-706 discusses the use of electronic data processing (EDP) in sample selection.

## B-507 Identifying the Sample Evaluation Method/Software

In sampling for variables, the sample evaluation results are usually expressed in terms of a point estimate of unacceptable (or questioned) costs in the sampled universe. In order to determine whether the sample size is adequate to provide a reliable point estimate, the auditor should evaluate sample reliability (in terms of the precision at a given confidence level). If the sample evaluation results exceed the sampling plan reliability goals, the auditor can expand the sample to obtain greater reliability without expending significant audit effort.

### B-507.1 Physical Unit Sample Evaluation Method/Software

a. The point estimate may be manually computed by the auditor using the "ratio" and "difference" methods.

(1) The ratio method computes the ratio of unallowable costs in the sample to total costs examined in the sample and applies this ratio to the total costs in the universe. For example, an examination of a sample of 125 items with a recorded value of $160,000 from a universe of 1200 items with a recorded value of $1,500,000 disclosed unallowable costs totalling $16,000. The calculated ratio would be 0.10 (i.e., $16,000 divided by $160,000). Also, the point estimate of total unallowable costs would be $150,000 (i.e., 0.10 times $1,500,000). In the case of a stratified sample, two different methods of ratio estimation are avail-

able. In the "separate ratio" method, the estimates of unallowable costs obtained by applying the ratio method to each stratum individually are simply added together. In the "combined ratio" method a single weighted average ratio is calculated and multiplied by the total recorded value of all items in the universe to obtain the sample estimate.

(2) The difference method is also known as the "mean" or "average" method. This method computes the average dollar amount of the errors in the sample and multiplies this average by the number of items in the universe. For example, if a random sample of 80 items from a universe of 700 disclosed unallowable costs totalling $16,000, the average would be $200 (i.e., $16,000 divided by 80 items). The point estimate of total unallowable costs would be $140,000 (i.e., $200 times 700 items). In the case of a stratified sample, the point estimates obtained for each stratum are simply added together to obtain the point estimate for the total unallowable costs.

(3) If the number of items in the universe is unknown, the ratio method should be used. (It will still be necessary to estimate this number in order to obtain a confidence interval, but the estimate will not affect the calculation of unallowable costs.) If the total dollar value of the items is unknown, the difference method should be used. (The total dollar value will not affect either the point estimate or related confidence interval under the difference method.) When both the total number and dollar value of the items in each stratum are known, it is not necessary for the auditor to choose between the two methods in advance. When the sample results are evaluated, the method that produces the smaller confidence interval at a given confidence level should be used.

(4) When the unallowable costs for individual items tend to be in proportion to the recorded costs, the ratio method will usually produce the smaller confidence interval. When this relationship does not hold, the difference or mean method will usually produce the smaller confidence interval. In the case of a stratified sample, the separate ratio method will generally provide more precise estimates than the combined ratio method. However, when questioned costs are found in some strata but not in others, the combined ratio method is preferred because neither the separate ratio nor the difference method can be used to obtain a confidence interval around the total estimate of unallowable costs in the universe.

b. The physical unit sample evaluation option (SAMPL) of E-Z-Quant projects sample results to the unreviewed portion of each stratum for the ratio and difference methods. Projections are performed for each method because one method is normally more precise than the other. After the auditor specifies a confidence level, the point estimate, precision, and confidence interval (for each stratum and overall) are determined. The auditor will use the overall point estimate which has the lowest precision amount and produces the smallest confidence interval. If the sample evaluation results exceed the sampling plan reliability goals, the auditor can expand the sample using the sample expansion procedure discussed in the E-Z-Quant SAMPL section of DCAAP 7641.91. For example, the auditor established a sampling plan goal with the target precision to be no larger than 25% of the point estimate (i.e. precision divided by the point estimate is equal to 25%) at the 85% confidence level. After the sample evaluation, the achieved precision was 31% of the point estimate at the 85% confidence level. Therefore, the auditor should consider expanding the sample in order to meet the sampling plan reliability goal.

### B-507.2 Dollar Unit Sample Evaluation Method/Software

a. When manually projecting questioned costs in DUS, the ratio of cost questioned to cost examined is determined for each item reviewed. These ratios are added together and divided by the number of sample units reviewed. The resulting average ratio is then multiplied by the universe dollar to yield the point estimate. Assume a sample of 30 items from a universe of $500,000 resulted in three items questioned, as shown below. Computation of the point estimate would be as follows:

| Examined | Questioned | Ratio |
|---|---|---|
| $100 | $30 | .3 |
| 50 | 50 | 1.0 |
| 5 | 1 | .2 |
| Total | | 1.5 |
| Average ratio questioned (1.5 / 30) | | 0.05 |
| Total cost questioned *($500,000 X .05)* | | $25,000 |

In this example, we reviewed 30 (one dollar) units and questioned on the average $.05. Since the dollars were randomly sampled, we can apply this average ratio to the universe.

b. The DUS sample evaluation option (DUSAM) of E-Z-Quant computes a point estimate, precision, and upper/lower confidence limits from the results of the dollar unit sample. The point estimate is computed by multiplying the total dollars in the sampling stratum by the simple average of the ratio of questioned amount to reviewed amount for each item. This computation procedure is also used in the Electronic Selection Program (ESP). If the sample evaluation results exceed the sampling plan reliability goals, the auditor can expand the sample using the sample expansion procedure discussed in the E-Z-Quant DUSAM section of DCAAP 7641.91.

# B-600 - Data Stratification for Audit Purposes

## B-601 Introduction

This section discusses the general stratification of contractor data for audit purposes.

## B-602 Auditing Large Data Bases

Contract auditing often requires the auditor to analyze masses of data to obtain the required evidential matter on which to base an opinion. The examination of properly selected samples is usually the most practical method of auditing a large number of transactions from the contractor's data base. The examination of only high-value items in an audit area will not give a true picture of the conditions in the total area, even though the high-value items are examined in detail. This review provides information only on the items examined. On the other hand, use of an unrestricted random sampling procedure will frequently require very large samples. Therefore, effective auditing and the efficient use of statistical sampling usually require that the auditor divide the audit area into groups of similar items to provide for the varying degrees of examination that are needed in each group.

## B-603 Purpose of Stratification

a. The usual purpose of stratification in contract audit applications is to decrease the amount of auditor time required to obtain support for the auditor's conclusions. Stratification for this purpose is based on an assumed relationship between the variable or characteristic the auditor wishes to measure, usually unallowable costs, and one or more other variables or characteristics. The amount of unallowable cost applicable to any item in the universe generally cannot be determined without examining the item. However, the variables and characteristics used for stratification purposes must already be known for each item. Also, it must be possible to classify (stratify) the items into groupings based on these variables and characteristics before samples are selected and examined.

b. Further stratification may be necessary during the course of the examination or based on interim findings. The most common basis for stratification in contract audit applications is the recorded dollar value of the items in the universe. The items are divided into two or more groupings based on dollar ranges of the recorded values, and separate samples are taken from each group. In most instances, this procedure will offset the possible effect of extreme values on sample sizes. In addition, sufficient coverage of high-dollar transactions is provided which reduces the risk of missing significant monetary errors. In many areas, the auditor may believe that other characteristics of the universe items affect the probability or amounts of errors. In such cases, the universe may be stratified on a basis other than dollar values. For example, unallowable costs may be more frequently encountered in vouchers that relate to certain types of transactions, departments, or payees.

c. In most audit areas, there is wide variation between the smallest and largest individual dollar amounts, with the bulk of the amounts being relatively small and only a few very large. In these areas, there are likely to be large differences between unallowable amounts for individual large items and the average of the unallowable amounts. Since a random sample drawn from the entire universe would probably include only few of the large items, the reliability of the sampling results would be correspondingly low. Even after segregating such items for 100 percent examination, the reliability of results obtained from a given sample size will generally be increased if the remaining items are stratified into two or more dollar ranges (e.g., items under $1,000 and $1,000 to $5,000) so that more extensive coverage can be given to the larger items. If the cost classification, department, or other characteristic of the items in the universe affect the likelihood of errors or their impact on government contract costs, increased reliability can also be obtained

by stratifying the items based on this characteristic.

## B-604 Types of Stratification

Stratification by dollar amounts and stratification by characteristics are sometimes referred to as horizontal and vertical stratification, respectively. These two types of stratification can be employed either separately or combined. Preliminary stratification of the audit area is essential to the efficient use of statistical sampling in contract auditing. Its purpose is to group together items with similar dollar impact and sensitivity so that these characteristics can be considered in determining the extent of audit review. By increasing the proportion of items examined in areas where amounts of unallowable costs are likely to vary widely, the auditor increases the reliability of audit conclusions.

## B-605 Stratification by Dollars

a. The number of dollar strata appropriate in an audit application will depend on (1) the dispersion of dollar values and (2) the audit time required to accomplish the stratification. If all items are of approximately the same amount, stratification by dollar value will serve no useful purpose. On the other hand, if items vary widely in amount, examination of all large amounts and stratification of the remaining items into several dollar ranges can substantially increase the effectiveness of audit time devoted to examining the sample items. However, consideration must be given to audit time required to accomplish the stratification. If automated (computerized) stratification is not available, further manual stratification (after the identification of high-dollar items) may require more audit effort than is justified by the increased efficiency obtained from stratification.

b. To provide sufficient coverage of both high and low dollar transactions and also reduce the risk of missing significant monetary errors, dollar stratification may be necessary. The auditor may obtain satisfactory stratification by dividing the universe into approximately equal dollar strata. For example, assume the following:

| Dollar Amount | No. of Items | Total Amount |
|---|---|---|
| 0-9,999.99 | 1,400 | $ 2,800,000 |
| 10,000-19,999.99 | 150 | 2,000,000 |
| 20,000-29,999.99 | 65 | 1,500,000 |
| 30,000-39,999.99 | 35 | 1,200,000 |
| 40,000-79,999.99 | 45 | 2,500,000 |
| 80,000 and over | 60 | 20,800,000 |
| | 1,755 | $30,800,000 |

If we decide to examine all 60 items over $80,000 and sample from three dollar strata, the following stratification plan would be reasonable:

| Stratum | Dollar Range | Total Amount |
|---|---|---|
| 1 | $0-$9,999.99 | $ 2,800,000 |
| 2 | 10,000-29,999.99 | 3,500,000 |
| 3 | 30,000-79,999.99 | 3,700,000 |
| | 80,000 and over | 20,800,000 |

The initial sample may be distributed equally among the strata or approximately in proportion to the dollar value of items in each stratum. For example, an initial sample of 100 items could be distributed 28 to stratum 1, 35 to stratum 2, and 37 to stratum 3.

c. The stratified sample selection option (STRAT) of E-Z-Quant can be used to stratify a universe and select a sample as described in B-506.1b. Details on the operation of E-Z-Quant are given in DCAAP 7641.91. Contractor EDP systems can be used to stratify the universe and select sample items as discussed in B-706.

d. Sample results may indicate a need for additional stratification. For example, the sample may identify additional accounts or types of transactions which contain unallowable costs or for some other reason are sensitive. Stratification of these accounts or transactions for more intensive sampling can be accomplished at this time.

e. Dollar unit sampling (DUS) eliminates problems associated with determining stratum boundaries, allocating sample size among the strata, and evaluating results when costs are questioned in some strata and not in others. Since the universe is defined in terms of dollars, no variation exists among sampling unit values. DUS capabilities are available in

(1) microcomputer software packages such as the Electronic Selection Program (ESP) (B-506.2c) or E-Z-Quant and (2) mainframe installed EDP software packages (such as Datatrak) as discussed in B-706.

## B-606 Use of Electronic Data Processing Equipment for Stratification

a. The contractor's EDP equipment should be used to stratify the universe and obtain sample selections whenever possible because this procedure (1) facilitates the use of effective sampling techniques, (2) saves auditor time, and (3) improves control over the sample. Dollar unit sampling and multistrata samples are often impractical without computer selection. These techniques generally reduce required sample sizes and, consequently, time required to examine the selected items. Other savings result because (1) the selection process is less time consuming, (2) use of computer listings as working papers saves the time required to transcribe data from contractor records, and (3) most computer selection programs provide the sum-of-squares information required to use the abbreviated input format of the physical unit sample evaluation option (SAMPL) of E-Z-Quant. Computer selection increases control because the total dollar amount of the universe from which the sample was selected is printed. If the sample universe is large, this may be the only practical way of verifying that the sample universe agrees with the contractor's submission.

b. The contractor's EDP equipment can be used to obtain listings which facilitate manual sample selection. This can be best accomplished by using fourth-generation data retrieval software (e.g., SAS, Focus, and Decision Analyzer) to extract the desired types of data from one or more data files into a unique mainframe-based data file for downloading to a microcomputer. Alternatively, the items can be listed in ascending or descending order, dollar value, or have all items within specified dollar limits listed on separate runs. However, manual manipulation of computer listings is generally more time consuming than using data in an electronic format.

(1) It may be easier for the contractor to provide listings of all items in each stratum than to provide random selections. The auditor can then use one of the methods described in B-704 or B-705 to select sample items from the listings. If the contractor has a listing of all transactions in a format suitable for sample selection, this listing can be used to select items in the bottom dollar stratum as described in B-704.3 or B-705.1b. However, removal of higher dollar value items to a separate stratum will simplify sample selection from the sampling stratum (or multiple strata).

(2) An example of using a computer listing of items in descending order of dollar value is described in DCAAP 7641.91 in the discussion of the random number option (RANUM) of E-Z-Quant. Such listings are particularly useful in audits of proposed material costs.

c. The auditor's examination of proposed bills of materials (BOMs) can present special problems if (1) items are listed by part number within assemblies and subassemblies and (2) the same items are used in a number of different assemblies and subassemblies. The audit will be greatly facilitated if the contractor's equipment is used to (1) sort BOM items by part number, (2) compute total proposed costs for each part, and (3) print information on each part (description, quantity required, unit price, and total price) in descending order of proposed cost. In addition to facilitating the selection of a statistical stratified sample, such listings may disclose inconsistencies in pricing the same item in different locations in the bill of materials. Information on the total quantity requirement for a part is also needed to evaluate the price where quantity discounts are available. When BOM data has been downloaded to a microcomputer, the Electronic Selection Program (ESP) is particularly helpful in evaluating the proposed BOM. ESP will perform all the functions listed above and, in addition, produce a consolidated BOM by part number, stratify the universe, evaluate sample results, and prepare audit report schedules.

d. Some contractors have programmed sample selections for DCAA auditors or use commercial data retrieval programs to obtain sample selections requested by DCAA.

(1) When using a sample selected by the contractor's software, additional information (e.g., possible risks, input/output files, program used, method of sample selection, etc.) should be documented, including any additional information or audit procedures required when using contractor supplied samples. The auditor should be present when the sample is generated or have access to all input/output relating to sample selection.

(2) While properly documented contractor selections are generally acceptable, the use of data retrieval programs developed or supported by DCAA is preferred because they provide greater control and versatility. B-706 discusses the use of available Agency software tools, such as Datatrak, Electronic Selection Program (ESP), and E-Z-Quant, to assist the auditor in data retrieval and statistical sampling.

# B-700 - Random Selection Methods

## B-701 Introduction

This section discusses and illustrates the unrestricted and systematic random methods of selecting samples for physical and dollar unit sampling. Also, the use of electronic data processing (EDP) to assist n sample selection is discussed in B-706.

## B-702 Random Selection

a. Statistical sampling is dependent upon the principle of random selection. In sampling, the terms random and haphazard selection have completely different meanings. Haphazard selection is accidental selection. Random selection is governed by the laws of probability. For example, in selecting one voucher at random from a group of 10, the likelihood or probability that any specific voucher is selected is one chance in 10. This probability is known and can be specified because the only factor involved in random selection is the element of chance.

b. To select randomly is to eliminate personal bias or subjective considerations (which cannot be expressed numerically) from the choice of a sample. Random sampling is a selection process in which each item in a stratum has a known probability (chance) of being selected. Although the results of repeated random samples from a given universe will not all be the same, the differences will be the result of chance and not personal bias. Subjective considerations (conscious or otherwise), such as selecting new-looking vouchers, choosing vouchers with few entries, or not taking the first voucher or the last voucher, must be avoided.

c. With DUS, each dollar individually has an equal chance of selection. Collectively, the dollars making up an item give that item a chance of selection proportionate to its size in the universe. Dollar unit sampling is sometimes referred to as "probability proportionate to size" (PPS) sampling. In order to evaluate the dollars selected, the items, documents, or records containing those dollars must be reviewed (See B-503.2).

## B-703 How Randomness May Be Obtained

a. How can an audit sample be selected in a random manner? In the case of 10 items, this could be accomplished as follows: record the serial number (or other identification symbol) of each of the 10 items on a separate tag or slip of paper. Place the tags or papers in a container and mix them thoroughly. Then withdraw the required number for the sample. This procedure is feasible when the universe is very small, but difficulties become quite apparent when the universe contains thousands of items (such as vouchers, records, or units of equipment). Random numbers and computer selection routines provide the means for overcoming such difficulties.

b. The selection of random numbers is simplified by the use of quantitative software. Random numbers, which fall in auditor-specified range(s), are produced in sequences of either single numbers or sets of numbers, depending on the option used. The random number option (RANUM) of E-Z-Quant generates a sequence of single random numbers which contains no repeats of individual numbers (for sampling without replacement) or allows duplicate numbers (for sampling with replacement). The sequences are available in both the order generated and ascending order. The random number sets option (RASEQ) of E-Z-Quant generates a sequence of sets of random numbers, available in random and sorted order. This E-Z-Quant option supports both sampling with and without replacement.

c. The random number generator options of E-Z-Quant are discussed in DCAAP 7641.91, Quantitative Methods for Auditors. This documentation includes an explanation of the terms "sets" and "numbers" as used in the context of these procedures. For example, auditors frequently encounter the problem of obtaining samples of unnumbered vouchers, materials, employees, or other items from listings. Combinations (sets) of two numbers, the first corresponding to a

page number and the second to the position of an item on the page, usually provide a convenient method for selecting samples of unnumbered items. Other cases of sample selection might involve other characteristics of the sample items, such as the month, week, and day the item was first recorded.

## B-704 Unrestricted Random Selection Procedures

The two basic random selection procedures are unrestricted random selection and systematic random selection. In unrestricted random selection, each item is drawn completely at random from the universe. The systematic random selection method, after a random start, selects items in such a way that a uniform interval results between sample items. There are various statistical sampling plans, but each involves the use of one of these two basic procedures or a modification or a combination of them. Methods of using random numbers to obtain unrestricted random selections under various circumstances are described in the following subparagraphs. Systematic random selection is described in B-705.

### B-704.1 Items Identified by a Single Series of Consecutive Numbers

The simplest use of random numbers to select a sample occurs when the selection is made from a file of consecutively numbered documents or from a listing of consecutively numbered items. For example, suppose that (1) the universe contains 5,000 documents which are to be sampled, (2) these documents are numbered in sequence from 1 through 5,000, (3) stratification of the sample is unnecessary since it is known that no high dollar or sensitive items are included in the documents, and (4) the desired sample size is 125. Selection can be accomplished by the random number option (RANUM) of E-Z-Quant, as described in DCAAP 7641.91.

### B-704.2 Items Identified by Sets of Numbers

a. In many accounting situations, a document or transaction is more readily identified by a combination or set of numbers. A combination may consist of a page number plus a line number on that page. It could also consist of a time period plus a document number as illustrated in the following example.

b. Some accounting methods call for documents to be numbered in sequence, by month or other period, commencing with "1" at the beginning of each period. If the documents to be sampled cover several such periods, selection of an unrestricted random sample presents the problem of either sampling each period separately or sampling all periods collectively with random numbers which identify both a period and document number in the period. When it is decided to sample each period separately, the random number option (RANUM) of E-Z-Quant can be used for selecting the sample from consecutively numbered documents. Suppose, however, that the audit objective is to determine by test-checking certain characteristics of 125 documents covering a period of 12 months. Assume that each month's documents are numbered in sequence commencing with 1 and the quantity issued in a month varies from 500 to 800. This selection can be accomplished by the random number sets option (RASEQ) of E-Z-Quant.

### B-704.3 Numbers Which Represent Items Not Included in the Universe

a. Often, numbers which fall within the range of document numbers cannot be used. For example, some numbers may (1) correspond to spoiled and voided documents, (2) identify documents previously selected for examination because of their high dollar value or sensitivity, and (3) relate to types of transactions which are not included in the universe. It is possible to determine the usability of each random number as it is selected and discard those which cannot be used before proceeding to the next number. In many cases, however, it is easier to initially obtain more numbers than needed and later discard those which are not usable.

b. Suppose, for example, that a file of 7,000 vouchers contains approximately 5,000 vouchers of Type A and about 2,000 of Type B which are intermingled

and numbered in sequence from 1,427 to 8,426. Each voucher must be examined by the auditor to determine whether it is Type A or Type B. A sample size of 125 Type B vouchers is desired. Since the two types are intermingled and the Type B vouchers comprise about 2/7ths of the total, our random numbers will probably identify only 2 of the Type B vouchers for every 7 selected. Therefore, to have a reasonable chance of identifying 125 Type B vouchers, at least 438 random numbers should be selected (i.e., multiply the desired sample size of 125 times the ratio of total vouchers to Type B vouchers (7 divided by 2 or 3.5) which equals 437.5 or 438 random numbers required).

c. In the above example, the first step is to select 438 random numbers in the range 1,427 to 8,426 using the random number option (RANUM) of E-Z-Quant. As each voucher is drawn, determine if it is Type A or Type B. Return the Type A vouchers to the file and retain the Type B vouchers. Continue until 125 Type B vouchers are selected. If less than 125 Type B vouchers had been selected after reviewing all 438 vouchers, continue the selection process until 125 Type B vouchers are selected.

## B-705 Systematic Random Selection

a. The systematic random selection procedure selects sample items on a fixed or uniform interval after a random start. The uniform interval between selected sample items is obtained by dividing the estimated number of universe items by the number of sample items to be selected. The random start is the first number, selected from a random digit table or generated by random number software, which falls within the uniform interval.

b. Systematic random selection is frequently used in manual selections and automated (computerized) selections because it is often easier to program and control than unrestricted random selection. Some conditions and circumstances under which the systematic method may be used for document selection are as follows:

(1) When items to be sampled are documents which are neither listed nor serially numbered or, if numbered, are not filed in numerical sequence.

(2) When items to be sampled are not suitably listed or numbered and are intermingled with other items which are not to be sampled.

(3) When items in the universe are numbered in blocks of numbers with some blocks not being used.

(4) When using DUS.

c. If there is a pattern or arrangement in the universe where items with special or significant characteristics occur at regular intervals, the auditor should ensure that items to be selected include, but not be limited to, these special or significant items. For instance, if every 24th payroll record is that of a supervisor and the auditor's sampling procedure calls for selection of every 24th item, the interval should be revised to ensure that the sample does not consist only of records covering supervisors. On the other hand, there should be a chance of including supervisors' records unless they comprise a separate stratum. The existence of a specified order of the sampling units does not mean that systematic random sampling cannot be used.

d. The usual method of obtaining a dollar unit sample is by systematic random selection. With this selection method, the universe does not have to be arranged in any particular order. If an auditor wants to preclude a potential universe arrangement problem, some DUS software will randomize (or have an option to randomize) the universe prior to sample selection (e.g., Electronic Selection Program (ESP) and E-Z-Quant DUSSEL). Normally, all item values greater than the interval are selected for 100 percent review; the remainder are sampled randomly.

### B-705.1 Examples of Use of Systematic Random Selection Method

a. Example 1. - Audit application where universe items (1) are not listed or numbered sequentially or (2) are numbered but not filed in numerical order:

(1) Assume that a sample size of 125 is desired from a universe of approximately 11,100 items. (When the universe size is not known, it should be estimated as closely as practicable.) The sampling in-

terval of 88.8 is obtained by dividing 11,100 by 125.

(2) Select a random number contained in the interval. Assume this number to be 23.

(3) Starting with the 23rd item in the universe, select every 88th item until the universe has been covered. Note that the interval number 88.8 was reduced to 88 by dropping the fraction. When an interval number is not an integer, the fraction is dropped. In this case, dropping the fraction results in a sample size slightly larger than 125.

b. Example 2. - Audit application where the universe items (1) are intermingled with other items and (2) are not suitably numbered:

(1) Assume approximately 11,100 items to be examined are intermingled with about 15,000 which are not to be examined. Assume a sample size of 125.

(2) Proceed by dividing 11,100 by 125, obtaining the interval number of 88.8, which is reduced to 88. Select a random start number from 1 to 88. Assume this to be 23.

(3) Starting with the 23rd item in the universe, select every 88th item. This procedure will result in the selection of approximately 297 items, of which about 126 should be of the type to be examined (i.e., multiply the sample size of 297 items times the ratio of desired type of items to total items (11,100 divided by 26,100) which equals 126 items).

c. Example 3. - Audit application where the universe items are numbered in broken sequences:

(1) Assume approximately 3,400 vouchers in the universe are numbered serially as follows:

First 342: Vol. Nos. 8,102 through 8,443, next 1,819: Vol. Nos. 11,651 through 13,469, next 1,154: Vol. Nos. 21,891 through 23,044, next 85: Vol. Nos. 25,000 through 25,084.

(2) Assume the sample size is 125. Divide 3,400 by 125, obtaining an interval number of 27.2. Reduce this to 27.

(3) Select at random a number from 1 to 27. Assume this number is 15.

(4) Determine and list the serial numbers of vouchers to be selected in the following manner:

(a) The first voucher number to be selected is No. 8,116 (No. 8,101 plus 15). Note that although voucher number 8,101 is not in the universe, it must be used as a base for adding the random number since adding the random number to the first voucher would prevent its selection. The next number is 8,143 (8,116 plus 27). The third is 8,170 (8,143 plus 27). Continue to list each 27th number. The last voucher to be listed in the first 342 is number 8,440.

(b) The next voucher number to be listed is 11,674, which is in the second group of 1,819, determined as follows: Since the last voucher in the first group of 342 to be listed was No. 8,440, there were three vouchers left in this group. Therefore, the first voucher to be listed in the next group of 1,819 is the 24th voucher which is No. 11,674 (11,650 plus 24). The second voucher number to be selected in this group is 11,701 (11,674 plus 27).

(c) In this manner continue to determine and list each remaining 27th voucher, until the universe has been covered. In this case there will be a few more than 125 items since the interval was reduced to 27.

(5) A variation of the method described above is to use four random starts, one for each block of numbers, instead of 1 random start. Assume these to be 8, 11, 17, and 20. Starting with the 8th voucher in the first 342, (No. 8109) list each succeeding 27th voucher in this group, making a total of 13. The numbers of these 13 vouchers are: 8109, 8136, 8163, 8190, 8217, 8244, 8271, 8298, 8325, 8352, 8379, 8406, and 8433. In a like manner, select each 27th voucher in the remaining three groups, commencing with the appropriate random start.

d. Example 4. - DUS audit application:

(1) Divide the population dollars by the sample size to determine the interval. Assume this to be 105,697 divided by 50 to obtain 21,139.

(2) Select a random start number contained in the interval. Assume 9,872.

(3) Beginning with dollar 9,872, every 21,139th dollar is selected for review. Cumulative subtotals of the population values, excluding those greater than the interval, are necessary to identify the

documents containing the dollars of interest. Both the Electronic Selection Program (ESP) and the DUS option (DUSSEL) of E-Z-Quant perform all calculations required to select a sample and obtain control totals for later input to the appropriate DUS sample evaluation procedure (e.g., ESP or E-Z-Quant DUSAM).

(4) Since the total population used to determine the interval may contain items which are later removed for 100 percent review, the combined number of items selected probably will be less than that used to determine the interval. Normally, this will not degrade the results of the random sample. However, as with other methods of sampling, a sample size as large as could reasonably be foreseen should be obtained to provide for expansion. The preliminary sample will be a random selection from the total.

## B-706 Use of Electronic Data Processing to Assist in Sample Selection

a. DCAA has available a number of automated tools to assist auditors in statistical sampling. These tools include Datatrak, the Electronic Selection Program (ESP), and E-Z-Quant. As discussed in 4-605e, computer systems should be used to the maximum extent to improve auditor productivity, the stratification of contractor data, the accuracy of sample selection and evaluation, and the documentation of sampling plans and results of sampling. The reasons for not applying this technology should be documented in FAO working papers.

b. Use of these tools can be further enhanced through integration with various data retrieval techniques. Examples include (1) the use of fourth-generation data retrieval software (e.g., SAS, Focus, and Decision Analyzer) to extract mainframe-based data for downloading to microcomputers and (2) the application of Integrated Audit Workstation technology to automate recurring retrieval/sampling applications.

c. As is the case with any computer application, DCAA auditors should be sensitive to the need for strong internal controls as they relate to the integrity of data and its processing. Auditors applying this technology should review FAO risk assessments and internal control evaluations to establish a degree of confidence that data retrieval and sampling will not be compromised. Typically the aforementioned automated sampling tools will provide summary data on universe size as well as other statistics. The data can be compared to various contractor submissions to further improve auditor confidence in the contractor's system.

d. Documentation of the use of automated sampling tools and related techniques in audit working papers is extremely important. For Datatrak and ESP software applications, documentation should include: (1) a narrative description and flowchart of the process in sufficient detail to enable an understanding of computer files used; (2) record layouts and definitions of data fields used; (3) merging, sorting, extraction operations; (4) software employed; and (5) computer files/outputs produced.

e. Operating instructions for the automated sampling tools and technical assistance in implementing data retrieval and sampling applications can be obtained through Regional Office AM/EDP Divisions or the Technical Services Center (TSC).

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# APPENDIX C

## C-000 ELECTRONIC DATA PROCESSING SYSTEMS

### C-001 Scope of Appendix

a. This appendix provides basic information on electronic data processing (EDP) systems and general guidance on surveying and auditing the accounting and business data produced. Understanding the material in this appendix will provide a fundamental knowledge of the principles of EDP auditing and a compilation of applicable guidance principles. This material is not all inclusive, however, and the skills and technical background needed for effective and efficient EDP audits will require continuing study and research as technology changes.

b. The first standard of field work requires the auditor to consider the methods the entity uses to process accounting information in developing the nature, timing, and extent of audit procedures. The auditor should consider the extent to which the computer is used, the complexity of the installation, the organizational structure, and the availability and retention of data. The auditor should have sufficient computer-related knowledge to communicate the audit objectives and evaluate audit procedures and results.

c. Audit objectives do not change whether accounting data is processed manually or electronically. In some systems it may be difficult or impossible to obtain certain data for inspection, inquiry, or confirmation without computer assistance.

## C-100 Section 1 — Description of Electronic Data Processing Systems

### C-101 Introduction

This section describes characteristics of computer processing, differences between manual and computer processing, computer system components, including hardware components, software components, and classifications and responsibilities of computer system personnel, and common modes of electronic processing. This establishes a starting point of basic knowledge and training for the auditor to become familiar with the functions and capabilities of EDP systems. The variety and complexity of equipment and software now available or being developed require a continuing survey and review of new technology.

### C-102 Characteristics of Computer Processing

The impact of a computer on an organization varies depending on how the computer is utilized within the organization. Some businesses experience minimal impact when the computer system fails, while others virtually cease to function. It is the responsibility of the organization to identify, minimize and control the business risks introduced by the computer. The control objective of processing accurate data is as valid in an automated system as it is in a manual one, however, the audit methods used to ensure that accuracy will vary. Auditors must learn new skills and be able to employ special software packages designed for their use when participating in audits of computerized applications.

### C-103 Difference Between Manual and Automated Systems

a. The obvious difference between manual and automated systems is in the utilization of data processing equipment plus magnetic and electronic media to gather, display, process, transmit and store information. But, from an auditor's point of view, there are several additional significant differences to be considered.

(1) First and foremost is the fact that information generated from manual systems is visible and usually available. It is in a form that can be read and understood without additional outside aids. Files and records stored within an automated system are usually maintained on magnetic media and storage devices

which can only be accessed by the use of a computer. Not only does this restrict the auditor's access to this information, but also requires the dedication of sometimes limited computer resources to make the information available.

(2) Transaction trails which consist of hardcopy documents, journals, ledgers and worksheets within a manual system may, in an automated system, exist only as formatted CRT screen displays or may be processed and stored solely within the automated system with no physical or visual evidence being created. This makes it very difficult, if not impossible, to perform an audit by conventional means. Alternate tests for compliance may be required, and special programs written to access and retrieve the necessary audit information. EDP auditors must become familiar with the capabilities of the many data extraction utilities and generalized fourth generation languages (4GL) available today. This is not to say that auditors must become technically expert in these products, but rather that they become aware of the abilities, usefulness and limitations of these automated tools.

(3) Another area of concern is the lack of segregation of duties which can exist in an automated system. There should be a separation between the computer operations section and the applications programming staff. If the applications programming departments are not independent of the computer operations areas, the probability of unauthorized system modifications is increased. Independent scheduling and control groups should be implemented to not only schedule the actual computer runs within the system, but also to provide control management for application program changes and modifications.

(4) The ability of computers to perform repetitious tasks quickly, coupled with the decrease of manual involvement can result in an obscure error being repeated many times over before its effect becomes evident. On the other hand, automated systems can provide better reliability by subjecting all information and processing to the same controls without the risk of random human error.

(5) Management has the responsibility to establish and maintain EDP control procedures. Up-to-date documentation plus knowledgeable and skilled personnel must be made available to assist the auditor in developing an understanding of the system and in accessing and extracting the information required by the auditor. Management must also ensure that computer resources for audit processing are provided.

(6) Automated systems have an additional capability which is not inherent in manual systems. Based on a given parameter such as time of day, inventory level or execution of a particular function, a transaction can be automatically initiated and executed without manual intervention. This automatic transaction initiation (ATI) can be very useful in producing regularly scheduled management and operational reports, controlling stock levels, generating billing notices, etc., and as EDP systems grow in size and complexity, the use of ATI is sure to increase. This will require additional checks and balances not present in manual systems to verify and control these transactions. Without the implementation of adequate control procedures, risk is increased for unauthorized inventory manipulation, fraud, waste, theft and repetitive errors.

b. Auditors must develop the skills and abilities required to audit computerized systems because these systems are having a major impact on the ways in which organizations function. In most cases, automated systems are not just a computerization of the old manual system, but instead reflect new methods of not only recording, but also conducting business.

c. Some of the many business areas benefitted by automation are production scheduling, material requirements planning (MRP), inventory control, sales analysis, automated billing and accounts receivable, personnel administration and payroll. But along with the benefits of automation come the increased risk of computer crime. Theft, extortion, embezzlement, vandalism, and records falsification and destruction are areas of risk which the auditor must be aware of and develop controls to safeguard against.

## C-104 Computer Components

A computer system or an information system is comprised of hardware, software and personnel. The software is required to tell the hardware what to do and in what manner to do it. The people are needed to write and maintain the software, operate and control the hardware, and manage both of these critical resources. Without all three of these components the computer system is incomplete.

### C-104.1 Hardware

a. Central Processing Unit (CPU) Components.

(1) The CONTROL component of a computer monitors and directs all of the other components, including those within the CPU and the INPUT and OUTPUT units. This internal CONTROL component receives and interprets the operating instructions given to the computer by the programmers and then causes each of the other components to perform the necessary operations to comply with these instructions. It is important to realize that the CONTROL component only causes the computer system to follow the instructions of the programmer; neither computers nor their CONTROL components can think for themselves.

(2) In addition to the portion contained within the CPU, the term CONTROL component includes the external console or manual control station with which most computers are equipped. A console, consisting of a panel of signal lights or other display devices, permits a computer operator to observe and monitor the computer operations. These consoles may also contain switches and a typewriter-like keyboard which allow the operator to manually instruct the computer, introduce limited amounts of data, and otherwise communicate with the internal portion of the CONTROL component. All instructions and data introduced through the console are automatically written out.

(3) The ARITHMETIC AND PROCESSING component, in compliance with instructions received from the CONTROL component, performs all of the necessary mathematical operations. This component receives all of the necessary factors to perform the desired computations from the MEMORY component, and returns the results to the MEMORY component. Also, most ARITHMETIC AND PROCESSING components are capable of comparing factors and sending the results of these comparisons to the CONTROL component. Based upon these results, the CONTROL component can be programmed to select the subsequent operations to be performed.

(4) Data entering a computer through the INPUT components are initially received and stored in some type of computer storage area called MEMORY as directed by the CONTROL component. Most commonly, this MEMORY consists of a network of electronic circuitry capable of retaining quantities of data ranging from a few thousand to many millions of characters. The time required to transfer data between MEMORY and the ARITHMETIC AND PROCESSING component is commonly referred to as "access time." The access time for MEMORY is usually commensurate with computer operating speeds and, consequently, does not delay processing. Internal memory is said to provide "random access" because the access time for every storage location is independent of the location of the information most recently obtained or placed in storage. Other memory components include drums and disks with magnetized surfaces which rotate at a constant speed past read-write heads. Since these devices require longer access time than the newer internal memory, they are used for internal computer MEMORY only on older, slower computers. Drums and disks are, however, frequently used as secondary storage devices to supplement the MEMORY component. These devices are not an integral part of the computer, but they are directly connected with it and controlled by it. Data from these secondary storage devices must be read into MEMORY before they can be processed by the computer.

(5) In certain computer systems a DATA CHANNEL controls the transfer of data between main storage and INPUT/OUTPUT devices. It includes a "buffer" which holds a limited amount of

data which is in transit. After activating the channel, the CPU is free to execute other programmed instructions while the channel controls the movement of data between MEMORY and INPUT/OUTPUT components. When the data transfer is complete, the data channel interrupts the CPU to obtain instructions for the transfer of additional data. A data channel may also interrupt the CPU when it detects an error in the data being transferred. Each channel is an independent unit. Selector channels service only one INPUT or OUTPUT device. A shared or multiplexor channel has a number of subchannels, each of which can sustain an INPUT/OUTPUT operation.

b. Telecommunications Controller. These devices are multifunctional, program controlled, digital computers dedicated to communications and able to serve as control points in a data communications network. In general, a communications controller performs one or more of three major functions: (i) front-end processing, (ii) intelligent switching, and (iii) concentration. A front-end processor serves as a locally attached peripheral device to one or more large computers, relieving them of the overhead involved in message handling and network control that is required in a communications environment. An intelligent switch routes messages among the network's various end points and participates in the network's control and management either under the control of a master (usually front-end) processor, or as a peer of other intelligent switches. A concentrator controls a community of terminals, clusters of terminals, or distributed applications processors. It controls their transmissions, and participates in the network's control and management, again either under the direction of a master processor or as a peer of other concentrators and switches. Most high-end communications processors perform all three of these tasks.

c. Tape Drives.

(1) Even with costs for storing data on magnetic disk declining, tape drives and tape subsystems will continue to play a significant role in the media storage marketplace. Magnetic tape is a low cost and easily maintained storage medium, well suited to a wide variety of computer applications and easily transported to secure offsite storage areas.

(2) There are two basic styles of magnetic tape subsystems in use today: (i) reel-to-reel, and (ii) magnetic tape cartridge. These are capable of storing up to 300 million characters (bytes) of data on each reel or cartridge, making them ideal for backup and archival storage of data.

d. Disk Drives. The cost of storing data on magnetic disk has been greatly reduced in recent years due partly to technology advances in recording density and data transfer rates. Capacities of disk drives in use today range from the older removable-type drive with a capacity of 100 million bytes to the newest nonremovable-type dual density drive with a capacity of 2.52 billion bytes.

e. Data Entry Devices. Data entry devices in use today range from keypunch machines where data is punched into cards to intelligent terminals where data may be keyed directly to disk or diskettes for later use.

(1) Data entry devices are grouped into two categories, either a general-purpose device or a special-purpose device. If information can be entered directly into the EDP system and verified as correct, the device is a general-purpose device. General purpose devices include card punches and verifiers, key-to-tape or key-to-disk/diskette stand-alone keystations, shared-processor key to disk/diskette systems, interactive remote terminals, intelligent terminals, and distributed processing systems.

(2) If information cannot be entered directly, it is a special-purpose device. Special-purpose devices include industrial data collection devices such as a system used to monitor employee attendance or record labor distribution, and optical character recognition (OCR) devices which read typewritten or computer-printed data. This also includes magnetic ink character readers (MICR) such as those used by banks to process checks.

f. Central Console/Card Readers/Terminals. These devices are considered input devices to the computer system and can be used to control or monitor the system or used just to feed in data

to be processed by a particular application.

(1) The central console is the primary control point of any computer system and normally requires constant monitoring. This is both an input and output device as all system requests are displayed on this console and the system operator's responses are entered here.

(2) Card readers receive standard punched cards and send the data contained in these cards to the MEMORY component when instructed to do so by the CONTROL component. Card readers and paper tape readers are extremely slow in relation to the operating speeds of computers and therefore are seldom used for introducing large quantities of data into computer systems.

(3) Terminals range from locally connected to remote site terminals and from basic "dumb terminals" to "intelligent terminals." Basic display terminals or "dumb terminals" are usually directly connected to a CPU either locally or as a remote device and require the resources of that CPU to actually process data. Intelligent terminals are commonly "user-programmable" and although they may be physically connected to a CPU, the processing done by these terminals is usually handled by an internal processor. This eliminates the need to tie up mainframe resources to handle the processing.

g. Printers/Terminals/Micrographic Equipment. These output components are the only means by which computers communicate with the outside world. It is through these components that the results of processing operations are revealed. Forms of computer output include microfilm, listings, reports, documents, graphs, visual displays, magnetic tape and magnetic disk files. Printers, graph plotters, and micrographic equipment are used only for output. The previously mentioned magnetic tape and magnetic disk units can be used for input, output, and secondary storage. As with the INPUT components, the OUTPUT components which print data are much slower than the magnetic tape read-write units. Consequently, the results of computer operations are often written on magnetic tape for later "off line" conversion to other forms of output.

(1) Printers in use today are either impact or non-impact type devices. Impact printers are generally slower (400-2500 lines per minute) while the non-impact type printers are capable of up to 20,000 lines per minute.

(2) Terminals are seldom used for normal machine output, although they are generally connected permanently to the CPU. The reason for this is their extremely slow speed relative to the computer's operating speed. Therefore, this unit is usually reserved for exceptional types of low volume output such as error messages, record counts, and messages to the computer operator containing instructions for handling special situations which might arise.

(3) Although micrographic equipment has made considerable progress in the computer industry, it has not revolutionized computer output. Micrographics, the process of producing microfilm from other computer output, is less expensive and offers better archival life than either magnetic tape or disk. It also greatly reduces physical space requirements and retrieval problems when compared to the large volumes of paper necessary to store the same data. Companies can take advantage of micrographics without having to lease or purchase the equipment by using one of the micrographic service bureaus that will take magnetic tapes and deliver completely processed microfilm or microfiche.

h. Trends in Computer Hardware. The technology of computer hardware is changing so rapidly it is virtually impossible to keep up with. Today's desk top computers are comparable in speed and processing power to computers of just a few years ago that required an entire floor of an office building. The trend in hardware is toward smaller, more powerful CPUs, disk drives capable of storing more data in less space, faster data transfer rates, networking or connecting systems to each other, and the portability of data between these systems.

### C-104.2 Software

a. O/S and System Software. The operating system (O/S) and system software components of a computer system provide various high-level generalized func-

tions and services to the other hardware and software components.

(1) The operating system is the primary controlling and scheduling supervisor within the computer system. It establishes the necessary links between application, data base management system (DBMS) and communications software and the hardware components with which they interface. The operating system controls, but does not perform, all events which occur within the computer.

(2) System software executes under the control of the operating system and drives the system related events within a computer system. These events include, but are not limited to, accessing storage devices, maintaining and managing memory, sorting and manipulating data, file and table management, performing arithmetic operations, task initialization and termination processing, error control and recovery at the system and program level, and signaling the operating system after event completion.

b. Application Software. The majority of computer programs may be normally classified as application software. This software can be either supplied with the computer system, user written, or provided by a third-party vendor. Application software typically performs unique and individual tasks such as reading a particular master file and producing a particular output product; i.e. an updated master file or a printed report. It can also provide the logic which creates formatted CRT screens for terminals and processes the responses and data entered at these terminals.

c. Data Base Management System (DBMS) Software. Data base management systems are software packages which provide data storage, control, and data retrieval services to the user. They maintain relationships between separate elements of data based on user supplied parameters, perform validity checking and error recovery at the data element level, and provide the programmer or functional user with standardized methods and procedures for creating, accessing, revising, deleting, summarizing, and rearranging the data managed by the DBMS.

d. Communications Software. Communications software performs network and terminal management functions within the computer system. Communications software can include (i) teleprocessing (TP) monitors and telecommunication access methods running on a mainframe, (ii) data communication and network control programs (NCP) which execute within a network front-end processor (FEP), and (iii) terminal control software on local and remote terminal control units (TCU).

e. Performance Monitoring Software. Performance monitoring software packages can be used to measure the utilization level of the different components of a computer system. These software packages can be used in capacity planning, system optimization, and transaction and work measurement. Performance monitors are primarily tools for systems programmers, senior systems analysts, and data center and computer resource managers. By using these tools, potential computer resource shortfalls and performance bottlenecks can be identified and corrected before they become major problem. Corrective action does not always lead to the purchase of bigger, faster hardware or more expensive software. Sometimes techniques such as rearranging job mix, running batch and nonpriority jobs on other than prime shifts, operating system tuning, and optimization of application software can result in improved utilization of computer resources. The point to remember about performance monitors is that they identify potential problem areas, they don't solve them. Solutions must be developed and implemented based on the results and information acquired from these software tools.

### C-104.3 Personnel

The basic categories of data processing personnel can be broken into the following groups. Management personnel are responsible for planning, organizing, directing and controlling data processing functions. Software personnel are responsible for developing and maintaining computer software and procedures. Hardware personnel are responsible for operating and maintaining data process-

ing equipment, and controlling the processing and storage of data. Although position descriptions, titles, and responsibilities may vary depending on the organization, they will usually fall into one of the above categories.

a. Management Personnel

(1) Director of MIS. This individual possesses both managerial and technical expertise. The position is the highest level within the data processing organization and reports normally to the Executive Vice President or Chief Executive Officer (CEO). Other titles that define the same responsibilities are Chief Information Systems Officer (CISO) or Vice President for Information Systems.

(2) Manager of Systems and Programming. The manager is responsible for all application systems, directs project managers/leaders, and sets future needs by working with functional and corporate management to prioritize projects. The manager ensures there are sufficient subordinate personnel with the requisite training and experience to meet organizational needs and ensures utilization of the latest methodologies in systems development. This function may be divided into two separate areas, new development and maintenance. The manager in each area coordinates and controls the activities of subordinate personnel. Additionally, these managers control and allocate data processing personnel resources to achieve optimum utilization.

(3) Project Managers/Leaders. This is normally the lowest management position within systems and programming. This level is the first line of supervision and must be technically proficient. The project manager/leader normally supervises a combination of system analysts, programmer/analysts, and programmers. They are responsible for developing major applications and may delegate responsibility of small projects.

(4) Manager of Computer Operations. This position has management responsibility and control of all hardware and equipment functions. This includes such areas as data entry, production control including process scheduling and input/output control, computer performance management, and quality control of data processing services.

(5) Manager of Technical Support. The manager of the technical support function is responsible for many diverse operations in support of systems and programming, operations, and users. These functions include developing, publishing, and enforcing standard methods and procedures for all functions of the data processing activity. This individual also provides technical assistance and resources to both data processing and functional users within the organization and provides systems programming support for the operating system and all generalized software. Other functions may include, management of the communications facilities including configuration and acquisition of data communications equipment, configuration management and performance measurement, capacity planning, and system optimization.

b. Software Personnel

(1) Applications Systems Analyst. The systems analyst is responsible for analyzing the requirements for information. The analyst evaluates the existing application systems and designs new or improved automated procedures. He/she is well versed in data processing and functional areas and works with the user in defining solutions for system deficiencies. The analyst evaluates the various solutions presented for a given opportunity and makes recommendations. Upon selection of an alternative, the systems analyst prepares a general system design for use by the programmers in performing the detailed design. The systems analyst can continue in the ongoing development either as a team leader or even as a programmer.

(2) Programmer/Programmer Analyst. The programmer/programmer analyst determines the logic of the computer programs required by the overall system as designed by the systems analyst. The programmer codes the logic in the appropriate computer language to meet the system specifications. He/she writes documentation for users, operations, and program maintenance. In many organizations, the programming function may be divided into two areas, maintenance and development. The maintenance programmer is responsible for maintaining and updating already existing programs, and

the development programmer is responsible for new development.

(3) Systems Programmer. Systems programmers supply technical guidance and maintain the operating system and all other system utility programs such as the sort/merge programs, compilers, and file conversion utilities. The systems programmers interface with and provide support to the applications programmers. Other functions normally accomplished by the systems programmer include system capacity planning, software/hardware evaluations, computer performance measurement, and system optimization.

(4) Data Base Administrator (Technical and User). Most organizations have taken a data base approach to systems development. Recognition of data as an organizational resource has led to the establishment of data management responsibilities. The data base administrator manages this resource. The data base administrator is also responsible for the data dictionary. This allows for standardization of all available data elements. Other responsibilities include design reviews to ensure data base integrity and data base security.

c. Hardware Personnel

(1) Computer Operations Supervisor. The computer operations supervisor does the short range planning of resources within the physical confines of the computer room. He/she ensures that the equipment is operating correctly and that the computer room environment is within specifications and is usually assisted by shift supervisors who are responsible for around the clock operation and a communications supervisor responsible for the data communications equipment.

(2) Computer Operator. Computer operators ensure the machine is operating with the most efficient use of resources. They ensure that all required resources are available at the predetermined time so that the systems run as scheduled. They respond to messages from the system and ensure proper equipment configuration to meet production and testing needs. Computer operators must ensure an optimum environment through proper mix scheduling. Their additional functions may include end-of-day systems processing, systems log processing, equipment utilization statistics, and scheduling of recurring processing.

(3) Data Communications Operator. A subset to the computer operator is the data communications operator who is responsible for the communications systems and the equipment, including the terminals in use throughout the organization.

(4) Production Control Supervisor. The production control supervisor is responsible for the data entry function and production scheduling. He/she determines data entry controls and edits to ensure data accuracy and that all data for a system process is available prior to job commencement. The production control supervisor resolves scheduling conflicts and makes modifications to the schedules as required. This position can also be called the data control (entry) supervisor.

(5) Production Control Scheduler. The scheduler controls the processing of the data through the systems. The tasks involved include receiving data to be processed, and monitoring the processing and distribution of output. The scheduler also checks for abnormal system or program terminations and takes appropriate action to correct and reschedule. He/she provides for demand processing to be included in daily, weekly, and monthly schedules to minimize impact on scheduled production. This position can also be called the data control clerk.

(6) Data Entry Operator. The data entry operator converts the source data to machine readable format through the use of various data entry equipment. This equipment includes keypunch/verify machines, key-to-tape and key-to-disk devices, optical/magnetic character recognition units, and various terminals, both CRT and teletype.

(7) Librarian. The librarian maintains all data and program files and ensures the security of sensitive and proprietary resources. He/she releases files for processing or maintenance and ensures their return. If a data base has been implemented in the organization, the librarian may also maintain the data dictionary. Since programs are an integral part of the system documentation, the librarian nor-

mally maintains the system documentation files.

## C-105 EDP Processing Modes

a. The two most generally used modes for processing of data on a computer are called batch and interactive. Batch processing means that data is accumulated and processed at one time. Interactive processing means that as data is entered into the computer it is processed immediately and output is produced in the form of a file update or as a reply to a query.

b. Many systems are comprised of both interactive and batch programs. An example would be a point of sales (POS) system which immediately provides the individual sales information and updates the inventory, and collects the sales transactions for batch processing to provide total sales statistics, create purchase orders, and reports.

### C-105.1 Batch

a. Batch is the mode for processing data on a computer whereby data records are accumulated and are processed as a group when all of the required records have been gathered.

b. Batch systems use a preassembled queue of jobs to be processed so that a good mix can be running on the computer at any one time. With the correct choice of hardware, extremely efficient operation can be achieved. For applications which require the accumulation of large amounts of data before processing, printing of information on special forms, or a large volume of printing, it is more efficient to use the batch processing mode. An example of a batch application is the credit card company that processes thousands of charges and payments each month.

### C-105.2 Interactive (Online/Data Base)

a. Interactive or online is the mode for processing data on a computer whereby data is entered into the computer as a single field or group of fields directly from the point of origin, is processed immediately, and output data is transmitted directly to where it is used.

b. Online systems usually require a data base since each record or field is acted upon immediately and individually. The use of a data base provides for immediate access to all organizational information instead of the batch processing of several sequential files to extract all the pertinent data needed. The technology allows data to be processed as a whole rather than as bits and pieces. It reduces redundancy imposed by separate files for each application and permits a more natural interaction between the user and the computer system.

### C-105.3 EDP Implementation Modes

a. Centralized. Centralization permits economies of scale, promotes specialization, and facilitates integration. All processing is done on a single centrally located system. Where applications are batch oriented, input arrives at, and outputs depart from, the computer center on physical media. Where applications are of an online nature, the input arrives in the form of a transaction and output if any, would be formatted and sent back to the appropriate terminal. A given application need not be either all batch or all online, many times a combination of these two modes of processing will be used. An example of this would be where transactions are collected online for a nightly batch update run.

b. Decentralized. The components of the system are geographically separated and processing is done on more than one system. Application processing can be accomplished closer to the user location and normally in an interactive environment. Decentralized and centralized modes of implementation are not mutually exclusive. A combination of the two methods of hardware distribution may be used within a single data system implementation.

c. Network.

(1) A system network is a system composed of two or more large computers, personal computers, or terminals. Most networks are composed of multiple terminals and personal computers, and possibly multiple large host computers to enable the network to function more efficiently and more productively.

(2) Since neither the centralized nor decentralized system was the ideal by itself, the combination of the two con-

cepts through networking created the distributed processing system. This system allows for each organizational entity to process its own unique information and provide any common information to other decentralized sites for processing. Distributed computer systems can be totally autonomous and independent, or they can be interconnected and very dependent.

# C-200 Section 2 — Control Procedures in EDP Systems

## C-201 Introduction

This section defines the auditor's responsibility in the review of control procedures and describes general and application controls associated with EDP systems.

## C-202 Standards on Study of Internal Control Structure in EDP Systems

a. The second standard of field work issued by the AICPA states that a sufficient understanding of the internal control structure is to be obtained to plan the audit and to determine the nature, timing, and extent of tests to be performed. The purpose of the auditor's study and evaluation is to establish a basis for reliance thereon in determining the nature, extent, and timing of audit tests to be applied in the examination of financial statements or cost representations.

b. The definition and related basic concepts of control procedures are expressed in terms of objectives, and are independent of the method of data processing used. They apply equally to manual, mechanical, and electronic data processing systems. However, the methods an entity uses to process accounting data may influence the procedures designed to test the adequacy and compliance of the accounting system and control procedures.

c. Where electronic data processing is used in significant accounting applications, control procedures are sometimes defined by classifying them into two types: general and application controls. Whether the control procedures are classified by the auditor as general and application controls, the objectives of control procedures remain the same: to provide reasonable, but not necessarily absolute, assurance that assets are safeguarded from unauthorized use or disposition and that financial and cost records are reliable to permit the preparation of financial statements and cost representations.

d. The auditor should review the general and application controls in data processing systems to determine if they have been designed according to management direction, GAAP, and applicable government regulations and that control procedures are operating effectively to provide reliability of and security of the data processed.

### C-202.1 Control Procedure Objectives

a. Control procedures should be designed to meet or satisfy the following objectives.

(1) Access to assets is permitted only in accordance with management's policies and objectives. The number of persons having access should be limited and functions within the system should be segregated between the data processing department and the system's users.

(2) Transactions are initiated in accordance with management's authorizations. Transactions may include accounting transactions, system and program changes, authorization table changes, etc. This objective should also include automatically initiated transactions such as those which the application system starts based on a time of day or a system event. An example of a system event that would utilize automatic transaction initiation (ATI) would be on-hand inventory falling below a reorder point.

(3) All transactions are promptly recorded to permit preparation of financial statements and to maintain accountability for assets.

(4) Accountability records are compared periodically with the actual assets or with other resources and appropriate action is taken to resolve any differences.

b. To achieve the above control procedure objectives, the EDP system should be able to identify each authorized user, determine if the processing request is within that user's authorization, process all valid user requests in an appropriate time frame, and record all authorized user activity plus unauthorized login attempts and attempts to perform unauthorized functions by otherwise authorized users.

## C-203 EDP General Controls

a. General controls are composed of (i) organization and operation controls, (ii) systems development and documentation controls, (iii) hardware and systems software controls, (iv) access controls, and (v) data and procedural controls.

b. Weaknesses often have pervasive effects. When general controls are weak or absent, consider the effect of such weaknesses or absence in the evaluation of application controls.

### C-203.1 Organization and Operation Controls

a. The effectiveness of many control procedures depends on the activities of responsible personnel. A properly functioning organization is an important control factor. In an EDP system, the plan of organization should include these basic general controls.

(1) Segregation of functions between the EDP department and users. The EDP department should be independent of the user community and should have control over the data processed, but should not correct errors unless they are generated within EDP.

(2) Provision for general authorization over the execution of transactions, e.g., prohibiting the EDP department from initiating or authorizing transactions. The EDP department should not prepare the data for input, have custody of or control non-EDP assets, or have the authority to originate master file changes.

(3) Segregation of functions within the EDP department, including separation between operations and programming, an independent control group, a librarian, rotation of operators, and required vacations.

b. An effective plan of organization should provide for the segregation of functions and responsibilities so that no one person has incompatible duties that would permit the perpetration and concealment of material errors or irregularities. Weaknesses in EDP organization usually affect all applications.

### C-203.2 Systems Development and Documentation Controls

a. These controls relate to the review, testing, and approval of new systems, control over program changes, and documentation procedures. When properly designed, these controls can help prevent (i) implementation of systems that do not have adequate application controls, (ii) development of systems that do not meet management objectives or operate in accordance with original specifications, (iii) implementation of systems that have not been adequately tested, and (iv) implementation of systems that are susceptible to unauthorized modification.

b. The systems development and documentation controls are as follows:

(1) System design and acquisition of software packages should require participation of EDP personnel, system users, the accounting department and internal auditors.

(2) Each system should have written specifications which are reviewed and approved by management and user departments. These specifications will serve as a benchmark to measure the resulting system's performance.

(3) System testing should be a combined effort of the users and EDP personnel to determine that a system operates in conformity with its design specifications and that it satisfies user requirements. The testing should be designed to ensure that correct input will produce the desired or expected output and that incorrect or erroneous input, processing, or output will be detected.

(4) Final approval should be obtained from management, users and EDP personnel prior to implementing a new system. The final test results and documentation, changes in the original design, and operation procedures should be examined.

(5) All master file, data base and transaction file conversions should be controlled to prevent unauthorized changes and to provide accurate and complete results. Responsible personnel should establish controls such as record counts, hash totals, and amount totals to reconcile converted file data to original input.

(6) All system and application software changes should be reviewed and approved prior to implementation to determine that they have been authorized, tested and documented.

(7) Management should require appropriate levels of documentation and procedures to define the system at various levels of detail. Good documentation policies and procedures greatly facilitate program modifications, staff training, and establish a starting point for a review of control procedures.

### C-203.3 Hardware and Systems Software Controls

a. Most computer hardware can detect and record hardware failures, although some systems are not designed to take advantage of available controls. Failure to utilize available hardware controls can result in processing errors. General inquiries should ascertain that (i) the hardware is equipped with automatic error detection features, (ii) periodic preventive maintenance is performed on all hardware, (iii) procedures have been established to recover from hardware failures, and (iv) there is adequate authorization and control over implementation of, and changes to, operating systems software.

b. Hardware and systems software controls are as follows:

(1) Control features of computer hardware, operating systems, and other supporting software should be utilized to the extent possible. One such example is access control software. This software works as an extention of the operating system to protect file and program access. The use of access control software has become an industry standard. Vendor-supplied software may contain operational control features, such as, provisions for creating and checking header and trailer records, file names, record counts, block counts, volume identification, date, and file/data retention periods.

(2) Systems software should be subjected to the same controls as those applied to application software. By its very nature, systems software is extremely complex and is sensitive to even minor program changes. Systems documentation should indicate a chronological history of all changes made to operating system software.

### C-203.4 Access Controls

a. Access controls provide safeguards to insure that EDP resources are properly utilized. Proper access controls will assist in the prevention or detection of deliberate or accidental errors caused by improper use or manipulation of data files, unauthorized or incorrect use of a computer program, and/or improper use of computer resources.

b. Access to EDP systems should be controlled and limited to only those individuals who require access. Information is a valuable asset and should be protected as such. Information management functions should be divided between EDP systems personnel and information users/owners. Functions which relate to the actual physical EDP system or to the information data base as a whole are the responsibility of the EDP systems office, while functions which act upon the information stored within the system or data base are the responsibility of that information element's owner or authorized user.

c. Access to EDP systems is often controlled via system and application software. Controls in the operating system, e.g., passwords and access control software, help control system access. Application program software often contains access controls which limit the capabilities of different users to perform various options of the application program. For example, in menu driven applications, access to data and files is determined by user responses.

d. Transactions which reference or update organizational master files and data bases, transactions which change system software or application software, or transactions which update control tables should be initiated only by individuals with proper management approval and authorization. The EDP system should have the ability to identify and record each specific attempt to gain access and to recognize and allow authorized use, while blocking invalid access. The system should be capable of validating each authorized user's level of access so that casual users and individuals with

reference-only authority are not allowed to update data files, control tables, or system and application software.

e. Control procedures should ensure that.

(1) Access to program documentation is limited to those persons who require it in the performance of their duties.

(2) Access to data files and programs is limited to those individuals authorized to process and maintain that system. Access to data files should be limited to computer operators processing the application only during the scheduled time period for the application process. Access to programs should be limited only to authorized persons making modifications. Usually this control is implemented through a librarian function. The librarian can be a person or group of individuals, or can be a software package designed for this purpose. There are several commercial librarian software packages available.

(3) Access to computer hardware and operating system software is limited to authorized individuals.

### C-203.5 Data and Procedural Controls

a. Data and procedural controls provide a framework for controlling daily operations and establishing safeguards against processing errors.

b. The following controls should be established within the processing department.

(1) A control unit should be responsible for receiving all data to be processed, recording all data, followup on errors detected during processing to include error correction and resubmission, and for verifying the proper distribution of output. This control function is most effectively performed by the user community or by an independent group within EDP. The control function should maintain control totals on input, master files, output files, and verify totals when files are processed.

(2) A written manual of systems and procedures should be prepared for all computer processing and should provide for management's authorization to process transactions. Operator manuals should describe operational procedures, identify all input files, and outline actions to respond to error messages or halts. Restart procedures should be set forth.

(3) Internal auditors or some other independent group within an organization should review and evaluate proposed systems at critical stages of development. In accordance with management's general or specific authorization, user departments and system analysts have the primary responsibility for designing, implementing, and testing a system in a manner that is efficient, provides an audit trail, and includes adequate control procedures.

(4) Internal auditors or some other independent group within an organization should periodically review and test computer processing procedures and activities.

c. The auditor should consider control procedures over the physical security of the EDP system and data produced. Physical security can improve the separation of custody over assets, prevent the accidental or intentional destruction of data, and provide for both the replacement of records that may be destroyed and the continuity of operations following a major hardware or software failure. Some controls that might be reviewed include:

(1) Off-premises storage of important files, programs, and documentation, as well as a formal plan for record retention.

(2) Environmental controls to protect against excess humidity, temperature variations, or other atmospheric conditions.

(3) Protection of computer hardware, programs, and files against fire and other hazards.

## C-204 EDP Application Controls

a. Application control procedures are applied to the input, processing and output phases of a single EDP application, e.g., labor distribution, inventory control, purchasing; in contrast, general controls affect all applications and elements of an EDP system. Separate control procedures are developed for each unique application system. Although some application control procedures affect only one or just a few control objectives, most of the control procedures are

designed to prevent or detect several types of errors in most or all phases of the application.

b. During the review of application controls, consider any weaknesses that exist within the general controls. Consider the importance of the presence or absence of each application control as one element of the internal control structure. The absence of one control may not be a weakness if other controls compensate for it. Place emphasis on understanding the entire internal control structure and review only those application controls that will serve as a basis for audit reliance.

c. Application controls are normally divided into three categories; input controls, processing controls, and output controls.

### C-204.1 Input Controls

a. Input controls are designed to provide reasonable assurance that data received for processing by EDP have been properly authorized, converted into machine sensible form and identified, and that data have not been lost, suppressed, added, duplicated, or otherwise improperly changed. Input controls include controls that relate to rejection, correction, and resubmission of data that were initially incorrect.

b. There are four basic categories of input to be controlled:

(1) Transaction entry. Transaction entry is usually the largest volume of activity and can account for the greatest number of errors. The entry of transactions can cause the system to generate additional transactions.

(2) File maintenance transactions. File maintenance involves a limited volume of data, originates from restricted sources and has a relatively long-term impact on the file or files that are updated, for example, a change of address on a customer master file. Errors in the maintenance of master files can have a continuing impact on accounting transactions.

(3) Inquiry transactions. Although these transactions do not change the file that is referenced, they can serve to trigger other decisions on the part of the user.

(4) Error correction transactions. Error correction is usually more complex than the original transaction entry, and offers a greater opportunity for errors.

c. Input controls should be designed to ensure that:

(1) Only properly authorized and approved input, prepared in accordance with management's general or specific authorization, is accepted by EDP for processing. Each application should include a procedure for authorizing input transactions. In systems where input is not supported by documents, e.g., an automated labor input system, authorization can be controlled by programs that check control tables to be sure that the individual is both authorized to operate the input device (terminal) and to enter the particular transaction.

(2) The EDP system verifies all significant codes used to record data. In many systems, efficiency is obtained by using codes to represent data, e.g., codes to represent geographic locations, state names, cities, etc. Self-checking digits are often added to code numbers to detect transpositions or other clerical errors. Input might include both account number and the first three or four letters of the account name and if either of these does not match the master file, the transaction would be rejected for processing.

(3) The conversion of data into machine-sensible form is controlled. The most common errors involve keying errors and the losing or dropping of errors. Errors can be minimized by using record counts, batch totals and controls, computer editing and verification, hash totals, and reasonableness checks.

(4) The movement of data between one processing step and another, or between departments is controlled. This control should be designed to prevent lost, added, or altered data. This control can involve input control totals which are then compared to run-to-run totals. Batch totals (in a batch processing system) can be used to control the physical flow and movement of data.

(5) The correction of all errors detected by the system and the resubmission of corrected transactions is reviewed and controlled. Effective control can be achieved by assigning the responsibility

to a specific individual or group. A correction or revision that is entered into the system should be subjected to the same edits and controls that were applied to the original transaction.

**C-204.2 Processing Controls**

a. Processing controls are designed to provide reasonable assurance that electronic data processing has been performed as intended for a particular application.

b. These controls are designed to prevent or detect failures to process all input, duplicate processing of the same input, processing and updating of the wrong data files, processing of unreasonable or illogical input, and loss or distortion of input.

c. Processing controls should help insure that:

(1) The EDPS facilitates balancing input controls with processing controls. For example, if the general ledger system provides for total debits and credits to be posted as an input control, the system should produce corresponding totals. In other words, the system should facilitate reconciling input totals with run-to-run totals.

(2) Processing the wrong file, file manipulation errors, and operational-caused errors are highlighted and controlled. Programs should be designed to check the identification of files. External file labels should be established and controlled. The system should employ internal labels. Parameter cards, processing dates, job control or execution commands, and other commands entered by the operators should be controlled. The system may be able to print the input received prior to any further processing so that it can be reviewed for accuracy. All operator commands may be recorded and may be reviewed by management at a subsequent time.

(3) Limit and reasonableness checks are incorporated within programs. Properly designed programs may contain logic checks that prevent processing errors such as reducing inventory quantities to a minus value, charging depreciation in excess of original asset value, or charging excess hours, e.g., 60, by one employee in a work week. Some of these logic tests and checks include comparison to a limit or range of values, tests for mathematical sign, test for zero value, test for nonnumeric data in numeric fields, and test for logical relationships between data fields.

(4) Run-to-run controls are verified at appropriate points in the processing cycle. Selected record counts/field totals should be verified at appropriate processing points. Run-to-run errors are usually caused by operator mistakes, or a program, file, or hardware failure. An example of run-to-run controls would be if 1000 transactions totaling $100,000 were currently processed and the prior open file contains 4000 transactions totaling $700,000, the updated file should contain 5000 transactions totaling $800,000. This control feature can be performed manually or by the computer program.

**C-204.3 Output Controls**

a. Output controls are designed to assure the accuracy of the processing results and that only authorized personnel receive the output results. The results of processing can be listings, displays, reports, magnetic files, invoices, checks, etc.

b. Output controls usually include balancing, visually scanning, verifying, and distributing the output.

c. Output controls should be designed to ensure that:

(1) Output control totals are reconciled with input and processing controls. Ideally, these reconciliations, such as balancing to general ledger figures, should be performed by the user, an independent control group, or computer program.

(2) Output is scanned and tested against the original source input documents. Some types of processing cannot be controlled by balancing of totals. For example, master file updated of non-numeric data. In such cases, before and after contents of the file should be prepared and subjected to an item-by-item reconciliation with the source input.

(3) Systems output is distributed to only authorized users. An independent control group should be responsible for the distribution of all output.

**C-204.4 Audit Effect of a Weakness in Application Controls**

a. The effectiveness of controls in each category should be considered in relation to their impact on the application being reviewed.

b. Evaluating the application controls should consider the following:

(1) The absence of input controls may permit transactions to be lost, duplicated, or entered incorrectly. This could seriously affect financial results or cost representations.

(2) Processing control weaknesses could result in lost or duplicate records or out-of-balance financial records or cost representations.

(3) Output control weaknesses can have serious audit implications. Be aware of increased potential for errors when distribution of output is not adequately controlled, especially when the output consists of checks, invoices, or other sensitive information.

# C-300 Section 3 — EDP General and Application System Reviews

## C-301 Introduction

This section describes the audit procedures and risks associated with EDP general and application system reviews. The preliminary review, system survey, and internal control survey are discussed. The audit risks associated with EDP systems and the techniques of transaction auditing are presented.

## C-302 Audit Scope

a. The EDP general and application system control review usually involves a preliminary review and survey of the contractor's EDP system, a review and survey of the EDP general controls and application controls for the accounting application being reviewed (e.g., labor, material, etc.), an evaluation of EDP audit risk and vulnerability, and sufficient transaction testing to determine the integrity and reliability of the data resulting from the application.

b. All auditors require a high level of insight into individual automated systems and control procedures, and the relationship of the system and control procedures to the contractor's internal control structure. Auditors need to develop the ability to view automation and EDP activities as tools which may be used incorrectly or even used to attempt fraud. Increased use of data communications, especially from outside, should heighten auditor concern about unauthorized access and will further define the direction of future audits. The auditor should not automatically accept the fact that information is as it appears to be and that records are inherently accurate just because they are processed or stored on a computer. The auditor should maintain a professional skepticism concerning EDP.

## C-303 Preliminary Review and System Survey

a. The auditor's concerns should be identifying and understanding the basic EDP organization, function, and control procedures as they relate to the contractor's internal control structure.

b. The purpose of the preliminary review and system survey is to obtain an understanding of how the contractor's general EDP systems and/or particular application being reviewed is designed to operate by reviewing EDP organization charts, discussing the functions of the EDP internal audit group, and discussing the operational and control procedures with representatives from the EDP and accounting departments.

c. Design the preliminary phase to also provide an understanding of (1) the flow of transactions through the accounting systems, (2) the extent to which EDP is used in each significant accounting application, and (3) control procedures.

d. After completing the preliminary phase of the review, the auditor should have a good understanding of the internal control structure. With this understanding, the auditor should be able to assess the significance of control procedures and determine the nature and extent of any additional review.

### C-303.1 Flow of Transactions

To understand the flow of transactions, focus attention on:

a. Applications documentation, including system and program flowcharts.

b. Source documents and other activities that start the transaction flow process.

c. Any non-EDP processing involving the source documents.

d. Data conversion to machine-sensible form.

e. The creation of all input files, the subsequent processing of these files, and the resulting output files of each processing step within the application.

f. Any use of master files to supply additional information or to aid in processing source documents.

g. Flow of converted data through accounting applications.

h. Error correction and resubmission procedures.

i. Any other data files created or updated as a result of data processing.

### C-303.2 Extent of EDP Utilization

Consider the following factors when determining the extent of EDP utilization in an accounting function.

a. The flow of transactions between EDP and non-EDP activities.

b. The processing nature within EDP (computer processing).

c. The number and nature of transactions processed in a given application cycle.

d. The collective dollar amount of transactions processed, as well as, the average amount of each individual transaction.

### C-303.3 Basic Control Procedures

Evaluate the following factors when reviewing the basic control procedures in EDP systems.

a. Divisions of responsibility between EDP and non-EDP portions of the system.

b. Manual and EDP-based controls relationships.

c. The nature, extent, and availability of information to create an audit trail.

## C-304 EDP Internal Control Survey

### C-304.1 Scope of Review

The scope of any internal control survey must include the complete system; both automated and manual portions thereof. It must encompass the system from the creation of the source data to the final reporting of the information creation activity. Usually the review of control procedures is concurrent with the preliminary review and survey of the EDP system.

### C-304.2 Audit Objectives

a. In surveying EDP control procedures consider the types of errors and irregularities that could occur, identify the control procedures that would prevent or detect such events, determine whether these procedures exist and are being followed, and evaluate any weaknesses and their effect on the nature, timing, and extent of auditing procedures to be applied.

The auditor should review the accounting system and assess control procedures to provide evidence that the following conditions exist:

(1) Audit trails, where possible, should identify all of the detail transactions that are included in any summarized results.

(2) Accounting and audit information should be controlled and protected from loss, alteration, or destruction. The application processing should not destroy the audit trail.

(3) The above control procedures should exist so that the auditor can be reasonably certain that processing integrity within the EDP system is maintained.

(4) Audit tools should be available to permit the auditor to access the audit evidence in an independent and cost-effective manner. In addition to operating system utility programs and 4th generation language (4GL) query capabilities which may be available through the contractors own facilities, the DCAA data retrieval package, DATATRAK can be installed and utilized. Operational guidance is provided in DCAAP 7641.89.

c. Notify the contractor of serious weaknesses in EDP general and application controls at the earliest possible time. Do not wait until the completion of the review or the exit conference. The notification should be written whenever possible. Document any oral discussions with appropriate memorandums or notations in the working papers.

## C-305 Audit Risk in EDP Systems

a. Risk is the probability that an adverse event may occur. Understanding the risk allows the auditor to determine the probability that an adverse event will or will not occur. One such adverse event is the risk of fraud. With the development of advanced data processing systems, potential fraud is enhanced by two factors: manually prepared records being replaced by computer output and audit trails being eliminated or made more difficult to follow.

b. Risks associated with the elimination of the audit trail are as follows:

(1) Source documents may not be easily accessible at the audit site due to high-speed communications and distributed processing systems.

(2) Traditional source documents may no longer be available due to more widespread use of direct input equipment and data entry terminals. For example, an automated timekeeping/labor entry system may have eliminated the use of timecards.

(3) Master files may not contain all details previously seen in manual ledger systems. Computerized master files may contain only the summarization and totals for all of the detail transactions.

(4) Source data may only exist for a limited time. Input data may be destroyed after successful processing. For example, once the labor processing is complete and labor has been distributed to proper cost objectives, the raw input labor transactions file may be written over the following pay period. In this case, the raw labor input for a given pay period will only exist until the next pay cycle.

(5) The application system processing cycle may not provide detailed output for each individual transaction. This may be especially true in processing corrections of erroneous input transactions.

(6) Since historical records can be maintained by computer systems on automated storage devices such as direct assess storage devices (DASD) disk and magnetic tape media, it is no longer necessary to produce printed output of the historical records on a frequent basis.

(7) Computers are necessary to retrieve, maintain and print historical and current accounting data stored on DASD or magnetic tape media.

(8) Visual verification of processing activities and records is difficult because much of the data and many of the processing activities reside within and take place within the EDP system. For example, it is possible to program the computer to overstate cumulative costs charged to government cost-type contracts with a balancing understatement of costs charged to commercial projects or government fixed-price contracts. Such falsifications may not be detectable on detailed printouts. As an alternative, falsified cost distribution printout could be substituted for a valid one.

c. The first step in setting up an internal controls system review is to evaluate each possibility of adverse conditions which may occur in an applications system and then determine an acceptable level of risk.

d. An acceptable level of risk can be determined using one of two common methods: (1) Measure risk in quantitative terms, such as the dollar amount of loss per transaction that would be accepted, and (2) Estimate the probability of the occurrence of a loss. Setting a quantitative acceptable level of risk is preferred for individual transactions, whereas the second method is preferred if the risk is not attributable to specific transactions.

## C-306 Transaction Auditing

a. The objective of transaction testing is to verify the contractor's compliance with disclosed policies and procedures by tracing selected transactions through the application system. Transaction testing should help the auditor determine if the computer application is operating as designed. Sometimes referred to as "auditing through the computer," transaction testing should help the auditor test the visibility of accounting transactions and verify the existence of audit trails.

b. Once the auditor has obtained and analyzed the documentation for the specific application being reviewed and has interviewed both data processing and accounting personnel, he/she should possess a reasonably good understanding of how the specific application is designed to work and the types of controls included. The next step is to trace several different types of transactions through the system to establish the existence of system procedures and to confirm the auditor's understanding of the system. The auditor may be able to test some aspects of the system without the computer, while other situations and tests require the use of the computer. If the application being evaluated is well documented and a reliable audit trail exists, the auditor may test the controls and processing procedures by checking source data, control reports, error listings, transaction registers, and management reports. The auditor should be aware that most automated applications do not have accurate, up-to-date and complete system

documentation and will, therefore, require the use of the computer to obtain the audit information.

c. Use transaction testing to determine if the contractor's EDPS and control procedures operate as designed and provide reliable and accurate financial and cost information by evaluating the system in sufficient detail to provide reasonable assurance that:

(1) Input data are correctly recorded and transcribed

(2) All authorized transactions are processed without additions or omissions.

(3) Processing steps performed, such as arithmetic computations, accumulations, and comparisons, are correct.

(4) Output is distributed to proper individuals on a timely basis.

d. A problem often arises in evaluating an EDP system because processing transactions within an automated system usually involves more steps than in a manual system. This increased processing activity increases the opportunity for error. There is, therefore, a need for a greater number of control procedures in conjunction with an EDP system audit. Many of these controls will deal with the invisible portions of the transaction trail and may often be technical in nature. For this reason, auditors should consider performing the evaluation of EDP control procedures with the assistance of an EDP specialist when there is significant EDP involvement.

e. There are three basic steps in transaction testing; identifying the selected transactions and data files on which they reside, retrieving the data, and verifying and reconciling the information.

### C-306.1 Identification

a. Select transactions to be tested. Specific individual transactions may be selected or the auditor may wish to test certain types or groups of transactions. For example, if performing a review of the labor application system, the auditor may want to test how the system processes normal labor transactions, i.e., labor charges entered from the employee timecards, by selecting random labor entries and tracing them through the application system. However, the auditor may also want to test how erroneous labor entries are corrected and resubmitted for processing. In this case, the auditor may want to design a retrieval to capture all labor corrections to test if the control procedures for labor corrections are operating as designed.

b. In most reviews of computer application systems, sensitive transactions such as error corrections and cost transfers represent high risk and vulnerability and should be selected for transaction testing. The audit visibility and audit trail of such transactions should not diminish in an EDP System.

c. Identify the magnetic file(s) where the transactions to be tested reside. For example, if reviewing labor input and distribution, identify the file(s) which record raw labor input, i.e., the information keyed directly from the timecard, files which record any labor corrections and/or transfers, any master file(s) which supply additional information, and the resulting file(s) which record the distribution of labor. Depending on the particular contractor's application system, the availability of the necessary audit data may only exist for a short period of time. Be sure to ascertain the retention periods for all data files and arrange to perform any necessary retrievals during the period when this data exists.

d. Obtain record layouts from the contractor for each file previously identified. These layouts identify the various data fields, the type of data stored in each field, and possibly the retention period of the file and are essential when retrieving data from the data files. Files which have been identified may be copied and the copies used to perform the audit if the files are regularly and routinely updated by the activity within the system being audited. This effectively "freezes the system" as of a particular date and time and prevents changes to data as the audit progresses or as a result of the audit process. This also saves the data and helps reduce the risk and problems associated with the file retention periods.

### C-306.2 Retrieval and Testing

a. Retrieve the selected transactions from the files previously identified using data retrieval software. Transactions should be reviewed during each process-

ing stage to ensure integrity and accuracy. One important objective in retrieving transactions is to verify the audit trail of the transactions as they flow through the system.

b. The purpose of retrieving data from various points in the application processing is to verify the system is operating as designed. Input and output from each processing step should be retrieved and the output should be compared to the input to verify expected results.

c. Design the data retrievals to simulate the application processing. For example, the auditor may design a retrieval to capture all labor entries for a particular cost objective for a pay period and use the mathematical options of the retrieval software to sum the total hours for all employees. The auditor could then reconcile this sum with the total hours as shown on the labor distribution output from the application system. In addition, the auditor may use the retrieval to create a labor distribution from the same data file that creates the contractor's labor distribution. The retrieval output could then be reconciled to the contractor's labor distribution report.

d. The contractor may have developed data retrieval software or may be using one of the many commercially available data retrieval packages. In addition, the DCAA Technical Services Center (TSC) has developed the data retrieval package, DATATRAK, which can be installed on the contractor's EDP system. Operational guidance is contained in DCAAP 7641.89. Information and assistance in installing and utilizing this package can be obtained by contacting the TSC EDP Branch.

e. If the contractor refuses to allow the use of either the contractor's data retrieval software or DCAA's DATATRAK software to extract the necessary data for audit, consider this a denial of access to records and follow the procedures in 1-504.3.

f. To reconcile the audit retrieval data and the contractor's application system output, it may be necessary to identify and retrieve certain other transactions. For example, it may be necessary to retrieve labor corrections in order to reconcile raw labor input and labor distribution output.

g. If the retrieval yields results which differ from the system's actual results or from expected results, discuss the differences with the contractor to ascertain the following:

(1) All input, processing, and output files have been identified for the particular application being reviewed.

(2) No modifications have been made to the application systems which are not reflected in the application flowcharts and documentation.

(3) Correct file and record layouts have been used.

(4) Correct files have been used for the retrievals.

(5) The retrieval software is operating as designed and no unauthorized changes have been made to either the contractor's retrieval package or DCAA's DATATRAK software.

h. The contractor must reconcile any differences between expected results and actual results from the retrievals. The contractor must be able to demonstrate the existence of sufficient audit trails and visibility of transactions. Any significant unexplained differences should be reported and may result in the contractor's system being considered unacceptable for the accumulation of costs under government contracts.

## C-307 Reporting Audit Results

a. Any problems or concerns, especially those relating to weaknesses in EDP general and application controls should be discussed with the contractor during the audit as outlined in 4-303.3.

b. Summarize the results of audit and conduct an exit conference in accordance with procedures in 4-304.5.

c. Prepare the audit report in accordance with 10-400.

# C-400 Section 4 — Other EDP Reviews

## C-401 Introduction

In contrast to EDP general and application control reviews which provide reasonable assurance that assets are safeguarded and financial and cost records are reliable, other EDP reviews are designed to evaluate the acceptability of EDP costs estimated or incurred by the contractor.

## C-402 Scope of Section

a. This section provides an introduction and overview of other EDP reviews that the auditor may perform. Economy and efficiency and DFARS 239.73 reviews are discussed.

b. Government auditing standards require adequate planning and supervision in all audits performed. Normally, these requirements are satisfied by the typical auditor. However, in these types of EDP reviews. the auditor may have to request assistance from regional EDP auditors and the TSC EDP Branch. If the use of these specialists is planned, the auditor should have sufficient computer-related knowledge to communicate the audit objectives and evaluate the results.

## C-403 Economy and Efficiency Reviews

### C-403.1 Audit Concerns and Procedures

a. Uneconomical or inefficient contractor EDP operations can have a significant impact on government contract costs. EDP operations have costs associated with equipment, input/output data recording media, software and personnel.

b. With the declining cost and improved reliability of hardware and the rising cost and low reliability of software, it has become even more important to intelligently manage the development and maintenance of application software. It is not unusual for 50 percent or more of software expenditures to be used for the maintenance of poorly designed and documented systems. In recognition of this problem, many commercial products and methodologies have been developed in recent years such as automated project control, structured analysis, fourth generation computer languages, prototyping and code optimizers. Most of these tools have merit and software managers should be aware of their time and cost saving capabilities and employ at least some of them.

c. The elimination of unneeded EDP processes and reports can reduce costs of equipment and data recording media, usually magnetic tape and paper. The cost of support personnel and other operating expenses will generally also be reduced.

d. A plan, usually referred to as the System Development Life Cycle (SDLC) plan, should be published and used. This plan provides the mechanism to monitor and control tasks, completion dates, end product quality and company resource expenditures in the development and maintenance of application software. The plan should address items such as: a centralized review of the need and priority of software products; cost/benefit analysis; requirements documents; participation of internal auditors with provisions made for control procedures and audit trails; formal project milestones; formal standards for systems analysis, design, documentation and coding; customer participation in design and testing; a training plan, a conversion plan; and a customer certification document. A review should be made of the plan itself and the execution of the plan on actual systems both old and new, and under development. Particular concerns are projects that exceed cost and time milestones and completed projects that failed to meet the customer's needs.

e. EDP services purchased from outside vendors may be more economically performed by the contractor's computer center. In making comparisons only incremental costs should be considered. If a contractor's EDP equipment is not fully utilized, no additional equipment costs will generally be incurred to use the equipment in additional applications. However, computer center cost allocations normally include a share of equip-

ment costs based on usage. Consequently, comparison of total estimated computer center billings for new applications with cost estimates from outside vendors can lead to purchase services which can actually be accomplished for less cost internally.

f. The contractor should formally monitor EDP equipment utilization and perform strategic planning to predict the optimal times to upgrade or downgrade capacity. When excess functionality or capacity is identified, equipment should be disposed of or replaced with less costly equipment of more limited functionality or capacity.

**C-403.2 Capacity Planning, Computer Performance Evaluation (CPE), and System Tuning**

Certain critical planning, evaluation and utilization improvement functions relate specifically to computer mainframe system components. These functions are often collectively referred to as capacity planning, computer performance evaluation (CPE), and system tuning.

a. Capacity planning consists of determining user requirements and response time goals by type of service. A methodology is then developed to forecast future computer workloads by soliciting user projections for computer terminals, batch records, online transactions, etc. which are in turn translated into projected computer resource requirements. CPE must then be done to establish a baseline, or system profile with which to measure current and projected resource requirements against, and to plan for increases or decreases of computer resource capacities. CPE is also done to uncover the need for system tuning and measure the results of system tuning efforts.

b. Although CPE, system tuning and capacity planning may encompass many computer system components, the greatest cost risk is the CPU, memory, disks and disk channels. Management is a complex task because the availability, cost and capability of the various models of these components are always changing. Typically, there is also constant pressure on management by computer users to increase their quantity and performance. The following utilization thresholds should be used as an aid in evaluating the extent that these key computer components are being utilized. They can provide a reasonable basis for deciding whether a system is truly saturated and ready for an upgrade or simply poorly managed and out of tune. They are also indicative of how much capacity remains in a system when evaluating the contractor's capacity planning.

(1) CPU. Because the CPU must serve and be served by other system components, the maximum average utilization of the CPU during the computer's busiest period (the prime shift) is about 90 percent busy. In a multiprocessing environment where the CPU must share resources such as disks, maximum utilization would be 85 percent busy. When utilized to capacity, a CPU will therefore average 10 to 15 percent idle time in a wait state. The potential for the CPU to accommodate additional work before saturation can be derived by comparing actual CPU busy to its theoretical capacity. The estimated life of a CPU can in turn be derived by comparing forecasted growth to this potential to accommodate growth:

$$\text{Growth Potential (GP)} = \frac{\text{Capacity Limit}}{\text{Base Use}} - 1$$

Where Base Use = Average Prime Shift CPU Utilization

$$\text{Est Life (Mos.)} = \frac{\text{GP}}{\text{Growth Rate Forecast}} \times 12$$

High CPU utilization does not necessarily mean the CPU is operating at a high level of productivity. When the CPU is busy it is either in the problem program state executing programs that are producing a customer's product, or in the supervisory state executing systems tasks. System tuning, chiefly by modifying the system configuration and the computer's job mix and schedule, can maximize the amount of time the CPU is in the problem program state.

(2) Memory. Computer memory provides for direct access to information by the CPU. The access time to information stored in memory is therefore faster than

the access time to information stored on peripheral storage devices. Program code provides instructions for the CPU and therefore directs the computer's operation. Most system program code, such as the operating system itself, resides in memory. Application program code, that is, the code which directs the CPU to perform work that directly produces a customer product, is packaged into jobs and is stored on peripherals. These are moved to memory as needed for execution by the CPU. Because jobs are serial in nature, a complete job need not be moved into memory, only the program currently needed by the CPU in the processing of the job. Programs from several jobs are typically resident in memory at the same time to reduce the CPU's idle time. For example, instead of waiting on a program of a particular job to receive data from the disk storage subsystem, the CPU could start executing a program in another job which already has data in memory to be processed.

CPU idle is further reduced in some computers by the use of virtual memory, which allows the apparent moving of more programs to memory than the memory has the capacity to hold. This is done by keeping programs apparently moved to memory in very high speed storage, typically high speed DASD or cache storage devices employing solid state components. Only those segments of each program that are actually being executed at a given moment are actually in memory. These segments are called pages, and the rate per second in which pages are moved between high speed storage and memory is referred to as the paging rate. Virtual memory increases the CPU busy rate by presenting a greater number of jobs in real memory for the CPU to process and therefore reducing the chances of the CPU being idle.

However, if the paging rate is too high, the CPU starts to expend more effort performing the paging than is saved through virtual memory. This is referred to as thrashing. The net effect of thrashing is to reduce productivity by increasing the ratio of the supervisory state to the problem program state in the CPU. The contractor should demonstrate by sampling his system the average page rate during different processing periods, and the optimal page rate for yielding the greatest amount of CPU operation in the problem program state. System tuning should also be performed, typically by increasing/decreasing the number of jobs executing concurrently or increasing/decreasing real memory.

(3) Disks and Disk Channels. Passing information between the CPU and disk drives involves a very complex interaction between the functions of hardware capability and its configuration, and controlling software. Performance problems can best be analyzed by examining the percentage of time the various disk volumes and channels are busy. Disk channel busy in the 10 to 15 percent range is good utilization while channel busy greater than 30 percent will degrade computer performance. Disk drives will degrade computer performance if disk busy is greater than 20 percent, while their utilization is reasonable if its within the 6 to 10 percent busy range. Utilization in the mid-range between reasonable and overuse is excellent for both of these devices.

The amount of total disk space capacity actually used to store data should also be analyzed. The goal of allocating 80 percent of the total disk capacity for use with 60 percent of the allocation actually used is desirable. This leaves a 20 percent capacity for growth. Less stringent goals should be questioned. Actual utilization percentages less than these represent excess capacity unless capacity planning indicates convincingly that a large increase in disk space usage is anticipated.

A computer center should have reports available which provide the information needed to evaluate disk and disk channel utilization. Commercial or in-house developed software packages should also be employed to aid in system tuning and disk space utilization. Tuning the disk subsystem typically consists of reconfiguring the data path between the CPU and the various disk volumes, and in placing files or data sets on specific disk volumes based on their size or how often they are accessed. Disk space utilization can be improved by software that does such functions as compacting data to allow more efficient use of available space, or identifies data that is seldom accessed so

it can be removed from the disk and placed on a cheaper storage medium such as magnetic tape.

The majority of computer performance problems are attributable to the disk subsystem. Unreasonable delays in its performance has a direct impact upon the efficient use of the CPU and memory, and ultimately degrades the performance of the computer system as a whole. Serious deficiencies found in measurement, management or utilization should be corrected before recommending that the Administrative Contract Office approve any costs associated with upgrading computer system components.

(4) Although the costs associated with computer systems are substantial, their technical complexity inhibits an effective analysis of their economy and efficiency. The DCAA Technical Services Center (TSC) has computer specialists and software which can aid in this effort. DCAA's System Evaluation Software (SES) package is a series of computer programs developed by TSC which can process actual performance information which is usually already being captured by system software on the contractor's computer. SES processing eliminates most of the manual effort in measuring the utilization of a computer system's CPU, memory and disk subsystems.

## C-404 DFARS 239.73 Reviews

### C-404.1 General Requirements

a. DFARS 239.73 prescribes specific guidelines under which contractors must obtain government approval for the acquisition of EDP equipment. This regulation is applicable to contractor acquired EDP equipment as defined in FAR 31.001, except as components of end items delivered to the government. If a contractor acquires EDP equipment for the account of the government or if title to the equipment will pass to the government, the acquisition must be approved as provided in DFARS 239.73 and FAR Part 45. The contractor is required to submit documentation justifying the need for, and the method employed to obtain the equipment.

b. If a contractor leases EDP equipment, and the lease will not be for the account of the government or title will not pass to the government, and the total cost is to be allocated to one or more government contracts requiring the determination or negotiation of costs, the acquisition must be approved in accordance with the procedures of DFARS 239.73 and FAR Part 45.

c. If a contractor leases EDP equipment with an annual cost in excess of $500,000 and more than 50 percent of the cost is allocated to government contracts requiring the negotiation or determination of costs, the acquisition must be approved in accordance with the procedures of DFARS 239.73.

### C-404.2 Audit Procedures

a. The requirements of DFARS 239.73 designates the ACO responsible for the initiation and completion of reviews performed under this regulation.

b. DCAA should participate with the ACO, as well as other DoD agencies, in any review conducted under the auspices of DFARS 239.73. These reviews are used to determine compliance with DFARS 239.73 and other governing directives. These reviews usually cover the following areas:

(1) Leasing Arrangements
(2) Mainframe Utilization
(3) Peripheral Utilization
(4) Auxiliary Storage Management
(5) Lease Versus Purchase Analysis
(6) Work Load Leveling

c. Review the requirements and procedures in DFARS 239.73 before participating in any review under this regulation.

d. Any review in support of the DFARS 239.73 and FAR Part 45 must evaluate the configuration and capacity of currently installed/onhand EDP equipment as well as any proposed change.

e. Due to the technical complexity of these reviews, assistance from the regional EDP staff and/or the TSC EDP Branch may be necessary.

## C-500 Section 5 — Auditor's Role During System Design and Development

### C-501 Introduction and Applicability

a. As EDP systems become more complex, another important responsibility has been added to both the internal and external auditor's role. Auditors must now be able to perform a wide variety of tasks which, until recently, did not exist or were not considered part of their role. The auditor's role in the design and development of electronic systems has become crucial if management is to have reasonable assurance that auditable and controllable systems are being developed. The contract auditor should review the design and development of new EDP systems and significant modifications to existing systems that have a significant impact in controlling or accounting for costs incurred or estimated under government contracts, preferably before implementation.

b. The nature of the contract audit responsibility may make it impractical to fully comply with this audit objective. Partial compliance may be reached by determining the extent and effectiveness of the review done by the contractor's internal auditors or outside accountants. However, compliance with this objective should be an auditing goal.

### C-502 Audit Objective

a. The purpose of reviewing the design and development of new data processing systems, applications, and significant modifications is to provide assurance that the system economically, efficiently, and accurately executes management policies in an auditable and controllable environment. Without effective review, these systems may not possess the built-in controls necessary to provide reasonable assurance of proper operation. The lack of auditor review may result in systems that do not provide the capability to track events (transactions) through the system and that prohibit a classification of transactions for the preparation of financial and cost representations in accordance with generally accepted accounting principles and/or Cost Accounting Standards. Such situations may result in qualifications of audit opinions.

b. Both the auditor and management have an interest in ensuring that system design, development, and overall operations achieve the objectives of adequate internal controls and effective auditability. For existing systems, the auditor should ensure that the system is operating according to the design objectives.

### C-503 Design Objectives

The auditor should review the design and development of new systems and significant modifications to existing systems to ensure that the following objectives have been successfully incorporated.

a. Management Policies. Determine if policies on what is required of the automated systems are established, are consistent with government regulations, and are adhered to in the design. Evaluate the proposed system products (e.g. reports, journal vouchers, public vouchers) to ensure conformity with corporate policy. Design documents will describe these products and the processes employed to create them. Actual products and data should be tested during system production testing. Also, review the security provisions required by management to protect data and programs against unauthorized access and modification.

b. Legal Requirements. Legal requirements applicable to systems/applications may originate from various sources. Examine system adherence to legal requirements in the same manner as management policy compliance. System processes should not only conform to regulatory and other legal requirements, but also to generally accepted accounting principles.

c. Economy and Efficiency. Determine whether the system has been developed in such a way that operations will produce desired results at minimum cost. There are potential cost savings in beginning the audit review well before a system is placed in operation. Begin with a review of the cost/benefit analysis and

other rationale that led to the decision that the system should be developed. Review the adequacy of the statement of mission needs and system objectives, the adequacy of the feasibility study and evaluation of alternative designs to meet the needs and objectives, and the adequacy of the cost/benefit analysis. The auditor should review all proposed system development activities, including those charged to indirect accounts, and ensure that the contractor has considered the impact of the new system on existing EDP hardware facilities.

d. Controls. Application control procedures to ensure the proper recording of transactions and to prevent or detect errors or irregularities should be integrated into the basic system design process. An essential part of these procedures are audit trails which establish accounts to which all transactions are posted, enable the tracing of summarized amounts back to individual transactions, and provide a means to answer queries about specific accounts and transactions. The reliability of the output can only be properly assessed when the transaction processing flow can be traced and the controls over it can be evaluated. Ensure that controls are part of the system design function, and check for their adequacy in a specific system design well before system testing begins. Any delays in examining these controls can lead to costly redesign and test effort. The auditor should ensure that none of the control mechanisms are bypassed or overridden by management, design, or development personnel to expedite placing a system in operation. The system should not become operational unless all designed controls have been activated.

e. Documentation. System design documents which define the system for management approval and software development should provide sufficient documentation to allow effective auditing and maintenance of a new system. Determine if the design, development, and modification procedures produce sufficient documentation to define (1) the processing that must be done by programs in the system, (2) the data files to be processed, (3) the reports to be prepared, (4) the instructions to be used by computer operators, and (5) the instructions to user groups for preparation and control of data. Evaluate the effectiveness of management policy for evaluation of the documentation and adequate testing of the system before it is made operational.

## C-504 Audit Procedures

a. The procedures used to ensure that the design objectives are achieved are determined by the level and complexity of the system development or modification. As a minimum, the auditor should review the adequacy of management policies; examine approvals, documentation, test results, cost studies, and other data to see if management policies are followed and legal requirements are met; and determine if the systems/applications have the necessary controls and audit trails. When reviewing a system modification, the auditor should ensure that in addition to testing the change, the impact on the entire system is also tested.

b. As in all areas of contract auditing, proper reliance on the work of others, including the contractor's external and internal auditors, may influence the nature and extent of auditing procedures to be applied. See 4-1000 for related documentation requirements.

c. The auditor should not be a part of the system design team, but rather should review the team's work as it occurs to ensure that the objectives described in C-503 are being achieved.

d. If, during any audit, the auditor determines that the system design objectives are not being met or deficiencies exist in any of the areas defined in C-503, then the following should be accomplished:

(1) Document each deficient area or situation.

(2) Assess the audit impact.

(3) Recommend appropriate corrective actions.

(4) Issue appropriate audit report(s) in accordance with 10-400.

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# APPENDIX D

## D-000 TECHNICAL SPECIALIST ASSISTANCE

### D-001 Scope

This appendix presents guidance to assist in (1) deciding if technical specialist assistance is needed, (2) identifying the specific type of assistance needed, (3) requesting the assistance, (4) achieving good communications with technical specialists, (5) assessing the impact of technical specialist findings upon the audit opinion, and (6) reporting on the use of technical specialists or the impact of their non-availability.

## D-100 Section 1 — Deciding Whether Technical Specialist Assistance is Needed

### D-101 General

a. Assistance from technical specialists may be required in a wide range of audit activities. This guidance focuses on one of the main areas, the evaluation of price proposals. Typically, contractor proposals are comprised of estimates for direct material, direct labor, other direct costs, and indirect costs. The auditor is responsible for evaluating all aspects of these cost estimates and advising the contracting officer on whether they are reasonable and in compliance with applicable cost principles and standards.

b. An important aspect of a proposal evaluation is determining the reasonableness of the quantities for material and labor. Audit tests of this aspect often require the assistance of technical specialists.

c. While the acquisition command or the contract administration office may initiate technical specialist reviews independent of the audit request, auditors cannot presume this review will anticipate and provide all the technical assistance needed to support the auditor's analysis. Statement on Auditing Standards (SAS) No. 11, "Using the Work of Specialists," requires auditors to exercise professional judgment when the work of a specialist is required, including a determination of the type of technical expertise needed, and provides guidance on using the specialist's findings. It notes that while the appropriateness and reasonableness of methods or assumptions used and their application are the responsibility of the specialist, the auditor should obtain an understanding of these matters to determine whether the findings are suitable for corroborating the cost representations.

d. The auditor is also required to make appropriate tests of accounting data provided to and used by the specialist. Documentation requirements are in 4-1000. Ordinarily, the auditor would use the work of the specialist unless the procedures lead him/her to believe that the findings are unreasonable in the circumstances.

e. Successful implementation of this guidance requires establishing a close working relationship with the cognizant ACO and technical specialist. The FAO manager should discuss the basis for this guidance with these individuals to promote proper understanding of its objective of improving audit quality and to dispel concerns regarding duplication of efforts, roles, and missions.

### D-102 Audit Steps

a. This section provides audit steps to help the auditor decide if technical specialist assistance is needed. Before applying these audit steps, consider materiality, for both the total amount involved and for the individual cost items, and the contemplated contract type.

b. The following audit steps are intended to provide sufficient information for making an informed decision, and to help formulate the questions to be addressed by the technical specialist. They may best

be performed as part of an estimating system survey or other separate assignment (such as, validation of labor standards, or review of material requirement systems). Also, familiarity with the information contained in D-407 and D-408 may be necessary to properly understand some of these audit steps.

### D-102.1 Labor Estimating Systems — General

Section D-407 describes seven labor estimating methods that might be used by a contractor. The methods vary significantly in terms of the accuracy of the cost estimates they produce. Specific audit steps to help decide if assistance should be requested follow:

a. Gain some familiarity with the product or service. The best way to do this is by observing manufacturing processes or services for the product or a like product.

b. Identify the specific labor estimating method(s) used in preparing the proposal. This information should be contained in the proposal, but may have to be obtained from the contractor.

c. If the labor estimating technique used is based on historical data, determine if its use is appropriate or whether another technique (e.g., one based on industry production standards) should be used for greater estimating accuracy/reliability (see D-407 and 9-503). This is done by:

(1) Identifying the historical data used to develop the labor cost estimate.

(2) Ascertaining the reliability and accuracy of the data. Audits of timekeeping and labor charging practices performed previously may provide the needed level of understanding and confidence.

(3) Evaluating the content of the data to ensure that it is representative and contains all costs that are purported to be there. Compare supporting data to other sources of historical information such as operational staffing. Inconsistencies may indicate exclusions of pertinent historical data. Determine whether there are valid reasons for excluding data.

(4) Testing for the consistency of data accumulation over a given period. Look for accounting system changes and reclassification of costs from direct to indirect and vice versa, and consider the results of previous cost accounting standard (CAS) audits. If the data is inconsistent (either historically or prospectively), request the contractor make appropriate adjustments.

(5) Ensuring that nonrecurring costs are removed from historical data. Pay special attention to manufacturing set up costs which are lot quantity sensitive. Other nonrecurring costs may be in the historical period, but not expected to occur in the forecast period. These costs should not be used to estimate future costs.

(6) Ensuring that other non-representative data is excluded. For example, some historical inefficiencies may not be expected to recur. Likewise, some historical events are unique and should not be used as a basis for predicting future costs.

(7) Making sure the data is current. Data which is too old may not reflect expected conditions (e.g., facilities, equipment, management, organization, and staffing). Several years of historical data may be useful in identifying important trends.

(8) Ensuring that historical data is obtained from the same facility in which the proposed end item or product will be manufactured. If the data was obtained from a different facility, determine its acceptability for estimating purposes.

(9) Drawing a conclusion regarding the suitability of historical data for making estimates.

### D-102.2 Labor Estimating Systems — Standard Time Method

The standard time method is the most accurate of the seven labor estimating methods described in D-407.2. Labor estimates computed using this method consist of labor standards adjusted by productivity factors. The following audit steps address labor standards and productivity factors separately. Before performing any of the recommended audit steps, contact the ACO/PCO to determine if any work in this area is being performed by other government representatives. Technical specialist assistance, if needed, should be obtained from the ACO/PCO (see D-203).

a. Labor Standards

(1) Determine if MILSTD 1567A (D-407.4) is applicable to the contractor's proposal. When applicable, determine if the government has accepted, disapproved, or partially accepted the contractor's work measurement system.

(2) If MILSTD 1567A applies and the system has been accepted, the auditor can normally have confidence that engineered labor standards (ELSs) can be produced. If the system has been disapproved or partially accepted, determine the reasons for this condition. Depending upon the severity of the condition, the auditor may have to qualify the audit opinion.

(3) If MILSTD 1567A does not apply, determine the method used by the contractor to develop labor standards. If the contractor advises that ELSs were used, verify that one of the work measurement techniques described in D-407.3 (stopwatch time studies, predetermined time systems, work sampling, standard data systems) was employed The recommended procedure is to obtain a sample of parts and verify the computation of labor standards. If the contractor indicates nonuse of ELSs, consider the results unreliable until tested. Evaluate the identified technique, determine its reasonableness, and establish the impact on proposed costs to the extent possible.

(4) When evaluating the use of labor standards, verify that standards developed for specific operations or manufacturing steps are appropriately applied. This can be accomplished by selecting a sample of part number routing sheets and verifying labor standards contained on the routing sheets to supplemental sources of information on labor standards maintained by the contractor. If routing sheets are not available, look for similar descriptions of manufacturing processes containing labor standards.

(5) Other possible problem areas are duplication of estimated labor, use of adjustment factors, and computational errors. The recommended method to test for the occurrence of these errors is to request routing sheets (see D-407.2h) and/or other documentation supporting the labor cost buildup for a high level component part. Verify that alternate routings were not inadvertently included in computations, adjustment factors were not used, and calculations are correct.

b. Productivity Factors

(1) Verify that productivity factors applied to labor standards were derived from historical data for the actual or like product. Productivity factors are most accurate when applied at a low organizational level (e.g., welding, numerical control machine operation, etc.). Inappropriately applied productivity factors will produce inaccurate labor cost estimates.

(2) Productivity factors are derived by dividing labor standards by actual labor. When a contractor changes its method of computing labor standards, the accuracy of productivity factors may be affected. Ascertain whether any changes in method have occurred. If so, work through several productivity factor calculations to determine the impact of the change.

### D-102.3 Labor Estimating Methods — Cost and Time Relationships (Parametric)

As explained in D-405, parametric cost estimating is a technique that estimates future costs by statistically analyzing and manipulating historical cost relationships (D-407.2g). The primary justification for using parametrics is reduced estimating and negotiation costs. When a contractor uses parametric cost estimating relationships, the contractor is expected to demonstrate that the relationships are logical, verifiable, statistically valid, and fairly accurate in predicting results. The relationships used should also be periodically monitored by the contractor to ensure appropriateness. Audit steps designed to review parametric cost estimates will ensure that the contractor can indeed demonstrate its estimates meet the above criteria. In addition, the audit steps listed in D-102.4 apply to parametric cost estimates.

### D-102.4 Labor Estimating Systems — Other Methods

The following audit steps should be performed for labor estimating methods other than the standard time method.

These methods are (1) judgment and conference, (2) comparison, (3) unit method, (4) factor method, (5) probability approaches, and (6) cost and time estimating relationships. Judgment and conference is the least accurate of these methods. The others yield progressively more accurate labor cost estimates, but not as good as those produced by the standard time method. (See D-407.2 for further explanation of these labor estimating methods.) Contractors may combine two or more of these methods to produce labor cost estimates.

a. Review the information in D-407 relevant to the specific method employed by the contractor.

b. Scrutinize historical data used to develop the labor cost estimates. Pay special attention to the factors identified in D-102.1c.

c. Identify the method, including rationale supporting use of the technique, historical evidence of the accuracy of the method, assumptions, adjustments made, etc.

d. Validate some of the calculations by working through the estimate.

e. Note discrepancies. Try to establish the cost impact of these discrepancies.

### D-102.5 Material Estimating Systems

Section D-408 describes material estimating methods, of which the use of the "bill of material" or BOM to establish material cost estimates is the most common. Routing sheets and engineering drawings are also important to the auditor in verifying material quantities. Specific audit steps related to material estimates follow:

a. Become thoroughly familiar with the requirements of the RFP and the contents of the contractor's proposal.

b. Obtain the engineering BOM that supports the contractor's proposal. For audit purposes, engineering BOMs are normally preferable to "manufacturing" BOMs because of their correspondence to engineering drawings. BOMs are sorted different ways to accommodate different users and purposes. The two most common sorts are ascending part number and assembly/subassembly. Next assembly or "where used" information is usually also available and in most cases quite useful to the auditor.

c. If the auditor intends to select a manual sample of parts, obtain a priced ascending/descending order BOM as it is usually a necessity. To allow proper review, next assembly information should be part of this BOM, or available in a supplemental document.

d. If BOM detail part records are computer-based, the BOM obtained may be either ascending/descending part number or assembly/subassembly as long as it is priced. For mechanized sample selection, the preferred method is to use an available software tool. DCAA sample selection software includes DATATRAK III and the Electronic Selection Programs (ESP).

e. Prepare a sampling plan. Select either a random stratified or dollar unit sample of parts for review. Guidance on sampling methods is contained in Appendix B. Although the sample is intended for use in validating BOM quantities to engineering drawings, the sample should also be used to validate pricing. Validation of parts pricing should usually be accomplished as a separate phase of the audit.

f. Obtain detailed engineering drawings for selected sample BOM parts. Separate engineering drawings may not be available for purchased parts, but may be available as part of the next higher assembly drawing. Also, initial BOMs may be incomplete and contain pseudo-parts which do not have engineering drawings. A large number of pseudo-parts is usually sufficient reason to obtain the assistance of a technical specialist.

g. Compare sample part quantities on engineering drawings to the BOM.

h. Identify how the contractor calculated part quantities and the number of parts to be produced from raw material. Pay special attention to the use of rounded factors for raw material. Verify the accuracy of the contractor's calculations by working through several part estimates.

i. Typically, engineering drawings are frequently changed. Depending upon the date of revision and other factors, there is danger that changes may not have been incorporated into the BOM. Audit tests

should include a review of engineering change notices (ECNs) to determine if any in-process ECNs have not been included in the BOM. The date of the last revision on the engineering drawing may be beneficial in identifying potential omissions.

j. Quantity and computational discrepancies identified during the material requirements review of sample BOM parts should be projected to the entire BOM population to assess impact.

## D-200 Section 2 — Procedures for Requesting Technical Specialist Assistance

### D-201 General

In this section, the procedures for requesting technical specialist assistance in price proposal evaluations are described. Requests for technical assistance should be very specific to avoid miscommunication and improve the probability of obtaining meaningful evaluations. Examples of questions that might be directed to a technical specialist are also contained in this section.

### D-202 Timeliness

Auditors must concentrate on analyzing contractor support for labor hours and material quantities in the initial stages of the audit evaluation. This analysis should include an early identification of cost estimating techniques used by the contractor, and evaluation of supporting data.

### D-203 Sources of Technical Specialist Assistance

Government engineers working directly for the acquisition command or administrative contracting officer have primary responsibility for performing technical analyses of contractor pricing submissions. Accordingly, this group of people should be contacted when the auditor requires technical assistance in a proposal evaluation.

### D-204 Method of Requesting Assistance

a. If possible, requests for technical specialist assistance should initially be handled verbally (with appropriate written followup documentation). The auditor should attempt to make requests in person at FAOs having on-site engineers. For offices without on-site engineering support, telephone requests for assistance are usually appropriate. These procedures will promote a closer working relationship between the auditor and others responsible for proposal evaluation, and improve chances for a timely response. A written request should be transmitted to the acquisition command or contract administration office (DFARS 215.805-5(a)(2)(A)(3) can be cited as a reference authorizing the request). A request must be made even when the auditor is satisfied with the scope of planned technical evaluation and also when the auditor is told that the results of a planned technical evaluation will not be furnished. If a pattern of untimely or nonavailability of government technical support is encountered, the matter should be elevated to the regional office for discussion with the appropriate acquisition management officials. Headquarters (Attn: O) should be notified of unsatisfactory conditions which cannot be resolved by the regional director.

b. Figures D-2-1 and D-2-2 present examples of audit requests for government technical specialist assistance. These examples should be used as guidelines and modified as necessary to reflect specific conditions identified by the auditor. Coordination and followup of requests are essential. Nonreceipt of a requested technical evaluation requires a qualification in the resulting audit report.

### D-205 Formulating Questions

a. Once a decision has been made to request assistance from a technical specialist, focus on identifying exactly what information is needed. The third statement of Standards of Field Work requires that the auditor obtain sufficient, competent, and relevant evidence to afford a reasonable basis for an opinion. This evidence may appropriately include the work of a technical specialist; however, the responsibility for meeting this requirement cannot be transferred.

b. SAS No. 11 provides guidance regarding the use of specialists in performing an examination of accounting records in accordance with GAGAS. It requires that the auditor be specific in identifying the nature of work to be performed by the technical specialist. Preferably, this state-

ment of work should include (1) the scope and objectives of the work, (2) the methods and assumptions to be used by the specialist, (3) a description of how the auditor will use the specialist's work to support assertions made in the cost statements, and (4) the form and content the specialist's report should take.

c. Specific questions for technical specialists should correspond to individual audit steps expected to be performed, and address each element for which the auditor could not make an independent assessment. In formulating questions, describe in detail tests performed and/or reasons for questioning an aspect of the cost estimate. The remainder of this section contains examples of questions that might be directed to a technical specialist.

**D-205.1 Example Questions — Labor**

a. Judgment and Conference

"Because of a lack of historical information, the contractor estimated direct labor hours for its automated assembly line using judgment only. Review of the judgmental estimate revealed no auditable supporting data in which the auditor could place confidence. Accordingly, the assumptions used to develop the contractor's position need to be evaluated by an engineer knowledgeable in the area. Results of this technical analysis should be provided to the auditor for review and determination of the impact upon audit scope and conclusions."

b. Comparison

"The contractor multiplied all historical data supporting proposed direct engineering labor hours by a factor of 2.0 because of the belief that the program being estimated will have twice as many configuration changes as previously experienced. Supporting data for this factor could not be obtained by the auditor. Both the magnitude of anticipated configuration changes and the manner in which the contractor estimated their influence on cost need to be assessed by an engineer. Results of this technical analysis should be provided to the auditor for review and determination of the impact upon audit scope and conclusions."

c. Unit Method

"The contractor estimated maintenance/cleaning labor using a unit measure of 'hours per square foot of floor area to be cleaned.' This unit measure was developed from the contractor's experience at five small office facilities. The building to be cleaned (under this contract) is a multistory office building seven times larger than any of the office facilities used to develop this rate. The auditor has verified the accuracy of composite rate development. However, we believe that the contractor should realize some gain in efficiency due to the large facility size. Accordingly, we request that an engineer develop an adjustment factor to compensate for efficiency gains. Results of this technical analysis should be provided to the auditor for review and determination of the impact upon audit scope and conclusions."

d. Factor Method

"The contractor estimated electrical assembly final test labor as a percentage of basic factory labor using data from five previous contracts. The contractor requested and received considerable funds to procure special test equipment to automate these operations for the contract being estimated. No similar automation effort was undertaken on the previous contracts. By using unadjusted history, the contractor has not given consideration to the impact of automation in estimating future assembly final test labor. The auditor was unable to locate information to develop an adjustment for this change in production methods. We request that an engineer estimate an appropriate adjustment for this labor category. Results of this technical analysis should be provided to the auditor for review and determination of the impact upon audit scope and conclusions."

e. Probability Approaches

"The contractor used a computer program to derive its probability estimate that it is 75 percent certain that it will take 365 staff days to construct a test stand. Activity interrelationships and time estimates were computer program inputs. Audit substantiated the time estimates. We request that an engineer (1) determine if the contractor has properly represented interrelationships and (2) evaluate the computer algorithm used to produce the estimate. Results of this technical analysis should be provided to the auditor for review and determination of its impact on audit scope and conclusion."

f. Cost and Time Estimating Relationships

"The contractor's cost estimating relationships (parameters) for wire harness assemblies were based on a regression analysis of past program experience to quantity of connectors per assembly. Audit of this regression application indicated a poor coefficient of determination (.51). However, the auditor could not identify possible alternative variables for consideration in refining the regression model. We request that an engineer assess the reasonableness of the cost estimating relationships for estimating future costs. Results of this technical analysis should be provided to the auditor for review and determination of the impact upon audit scope and conclusions."

g. Standard Time Method

(1) Labor Standards

"Audit disclosed that the contractor's estimate of recurring manufacturing labor hours was based on "industry average" labor standards, not engineered labor standards (ELSs). Although the contractor has not been accumulating data to develop its own labor standards, we believe that it has the capability, and should be encouraged to develop ELSs for use in future proposal submissions. Regarding the current proposal, we request that an engineer review the reasonableness of the individual labor standards identified below. Results of this technical analysis should be provided to the auditor for review and determination of the impact upon audit scope and conclusions."

(2) Productivity Factors

"The contractor's proposed productivity factor of .25 is based on composite experience from six programs whose individual productivity factors range from .85 to .08. Audit substantiated the development of the individual factors (see the enclosed schedule). Since the six programs are similar, we believe that only current experience should be used in estimating future productivity. We request that an engineer determine the appropriateness of using a composite factor derived from multiple programs covering several years in lieu of current productivity experience. Results of this technical analysis should be provided to the auditor for review and determination of the impact upon audit scope and conclusions."

**D-205.2 Example Questions—Material**

a. Bill of Material

"Proposed material quantities for raw material, hardware, and purchased parts were derived from a mechanized bill of material (BOM). We statistically sampled this BOM and traced proposed quantities back to engineering drawings. Since this proposal is for a new product, formal drawings were not available on several parts. Therefore, we were unable to validate the need for certain parts or the required quantities. The items in question, along with related engineering drawing references, are enclosed. We request that they be reviewed by an engineer, and the results provided to the auditor for incorporation into the audit report."

b. Material Scrap Factor

"The contractor's method for estimating material scrap does not provide for improvement resulting from learning. The scrap factor was derived from production history for similar products. We have verified the data used to compute the scrap factor. However, it

is our opinion that scrap should decrease over time as manufacturing personnel become more familiar with the product and operations required to produce it. We request that an engineer review this factor to determine its reasonableness. Results of this technical analysis should be provided to the auditor for review and determination of the impact upon audit scope and conclusions."

**FIGURE D-2-1**

PRO FORMA REQUEST FOR TECHNICAL ASSISTANCE
LABOR EXAMPLE

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TO: Administrative Contracting Officer [or Other Audit Requester]

SUBJECT: Request for Technical Specialist Assistance, Proposal __-__

As part of our audit of the subject price proposal, we have examined the estimating rationale used in calculating proposed direct manufacturing labor hours. In estimating this cost element, the contractor used plant-wide labor standards adjusted by a productivity factor resulting from experience on the XYZ contract. The contractor then judgmentally applied a 20 percent complexity factor to reflect the impact of this newly proposed product. We request that an engineer review the reasonableness of the following items:

1. The proposed 20 percent complexity adjustment factor.

2. The benefit of past learning on the proposed labor estimates. The auditor plans to apply a learning curve technique.

3. The proposed in-house labor standards for recurring manufacturing labor for:

a. Item 1 — Set up 1.097; Run 453.301
b. Item 2 -- Set up 212.5; Run 63.511
c. Item 3 — Set up 312.4; Run 75.551

We further request that the technical specialist's review results be furnished to us as soon as possible for incorporation into our audit. Our audit report is due by ____ . If the technical specialist's review results cannot be provided by ____ , we request that the audit report due date be revised to permit consideration of the technical findings.

FIGURE D-2-2

PRO FORMA REQUEST FOR TECHNICAL ASSISTANCE
MATERIAL EXAMPLE

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TO: Administrative Contracting Officer [or Other Audit Requester]

SUBJECT: Request for Technical Specialist Assistance, Proposal ____

As part of our audit of the subject price proposal, we have sampled certain material costs for detailed analysis. During our evaluation of the sampled items, we attempted to validate proposed quantities and prices. As part of this validation process, we traced sample part quantities back to originating engineering drawings and related supporting documents. However, we were unable to validate whether the drawings reviewed accurately reflect the item(s) to be furnished, or that the parts are required. The items in question are summarized as Enclosure 1 to this memorandum. We request that an engineer review each of these items to determine (1) item necessity, (2) required quantity, and (3) the propriety of the contractor's proposed quality level. We request that the results of this technical review be furnished to us as soon as possible.

In addition, the contractor proposed use of a historical scrap factor. Since this proposal is for production of a product similar to those produced in the past, it is our opinion that the factor should be adjusted for the impact of learning. We further request that an engineer review this matter and provide an opinion on whether reductions from learning may be reasonably expected in the circumstances. If so, we will ask the contractor to revise the estimates.

Our audit report is due by ____ . If the results of the technical specialist review cannot be provided by ____ , we request that the audit report due date be revised to permit consideration of the findings.

# D-300 Section 3 — Evaluation, Use, and Impact of the Results of Technical Specialist Assistance

## D-301 Introduction

The procedures discussed in this section regarding the evaluation, use, and impact of the results of government technical specialist assistance applies to those reports received as a result of a DCAA request for assistance. Procedures associated with the evaluation of work of others, excluding government technical specialists are discussed in 4-1000.

## D-302 General

a. It is the auditor's responsibility to examine the report on any requested technical evaluation to ensure a reasonable understanding of the work performed, the accounting data relied on, and the impact of the results on proposed costs. The work of a specialist should be used unless findings are obviously unrealistic, or procedures used appear inadequate. In these situations, attempt to reconcile differences with the specialist or, if necessary, the responsible supervisory official. Obtain the assistance of the ACO in facilitating a resolution. Discussion of procedures and technical aspects of the evaluation is usually sufficient to eliminate concerns. If the auditor is unable to resolve differences, the technical evaluation should not be relied on in the audit opinion or the development of questioned costs. In such cases, the technical report should be attached to the audit report. Additionally, the audit report should include an explanation of the reasons the auditor did not utilize the technical recommendations.

b. GAGAS requires that audit opinions be qualified when evaluations of labor hours and material quantities have not been performed by either the auditor or a technical specialist, and sufficient evidential matter has not been obtained to formulate an audit opinion. Such absences and/or the inability to obtain essential information, constitute scope restrictions and necessitate opinion qualifications.

c. All audit report qualifications should be identified and expressed in general terms in the paragraph entitled "Circumstances Affecting the Audit', as shown in the examples included in D-303. This paragraph should briefly state why the audit report is being qualified and direct the reader to an appendix for further detail. Section D-304 contains examples of detailed descriptions of the reasons for technical qualification that would be included in the appendix. Instances where audit scope has been substantially restricted may require an adverse audit opinion statement (9-209.3) under the audit report paragraph "Summary of Audit Results." This determination will have to be made based on the auditor's best judgment. Questioned costs should not be segregated between audit and technical findings in the exhibits and schedules of the audit report. However, this information should be given in the supporting notes.

## D-303 Circumstances and Summary of Audit Results Qualifiers

a. Example No. 1 - Labor. Where a recommendation is made to not conclude negotiations until results of technical evaluation of a 20 percent complexity factor have been considered. (Refer to 10-209.2 and 10-304.2 for further guidance on what to include in the following report sections.)

(1) Circumstances Affecting the Audit

"Our audit of the contractor's proposal included an examination of the rationale used in estimating proposed manufacturing direct labor hours. In estimating this cost element, the contractor used plant-wide labor standards adjusted by a productivity factor based on experience on the XYZ contract. The contractor then applied a 20 percent complexity factor to represent the impact of this newly proposed product. We verified to the accounting records the actual XYZ contract hours used in computing the productivity factors."

"We traced the proposed recurring manufacturing labor standards to engineering records. However, we were not able to determine the reasonableness of the proposed 20 percent complexity factor the contractor judgementally applied. In our opinion, the contractor's estimating method failed to consider benefits from past learning which could significantly impact proposed costs. Technical specialist assistance was requested from [enter organization and title of technical specialist] but was not received in time for incorporation into this report. We anticipate receipt of the technical report on or about 15 December 1992. An extension of our audit report due date was requested from you on 1 December 1992, but was not granted. We were unable to reach a definitive conclusion regarding the acceptability of the proposed 20 percent factor by other available audit procedures. The results are considered essential to the conclusion of this audit. Therefore, the results of audit are qualified to the extent that additional costs may be questioned based on technical evaluation results. See Appendix [insert number] for further discussion of this item. Upon receipt of the technical report, we will issue a supplement to this report incorporating the results of the technical evaluation, if contract negotiations have not been concluded and the supplemental report would serve a useful purpose."

(2) Summary of Audit Results

"In our opinion, the cost or pricing data submitted by the offeror are inadequate in some respects. (See comments in paragraph 2 concerning the proposed 20 percent complexity factor.) The proposal was not prepared in all respects in accordance with applicable Cost Accounting Standards and appropriate provisions of FAR and the DoD FAR Supplement (DFARS) [for non-DoD agencies, identify the specific agency supplement, if any (see 15-102.2)].* (See comments on , Exhibit , Note .) However, the impact of the inadequacies and noncompliances is considered to be relatively insignificant. Nevertheless, in our opinion the technical considerations discussed above are significant enough to materially impact the results of the audit. Therefore, as discussed with [enter name and title of contracting officer or representative] by [enter name of auditor] on [enter date of telephone call], we recommend that contract price negotiations not be concluded until the results of the technical evaluation of the 20 percent factor are considered."

*[All four examples given in this portion of the appendix assume no other cost or pricing data or CAS problems were noted during the audit.]

b. Example No. 2 - Labor. (This is the same as Example No. 1, except no recommendation is made to delay negotiations until technical information has been considered.)

(1) Circumstances Affecting the Audit

"Our audit of the contractor's proposal included an examination of the rationale used in estimating proposed manufacturing direct labor hours. In estimating this cost element, the contractor used plant-wide labor standards adjusted by a productivity factor based on experience on the XYZ contract. The contractor then applied a 20 percent complexity factor to represent the impact of this newly proposed product. We verified to the accounting records the actual XYZ contract hours used in computing the productivity factors.

"We traced the proposed recurring manufacturing labor standards to engineering records. However, we were not able to determine the reasonableness of the proposed 20 percent complexity factor the contractor judgementally applied. In our opinion, the contractor's estimating method failed to consider benefits from past learning which could significantly impact proposed costs. Technical specialist assistance was requested from [enter organization and title of technical specialist] but was not received in time for incorporation into this report. We anticipate receipt of the technical report on or about 15

December 1992. An extension of our audit report due date was requested from you on 1 December 1992, but was not granted. We were unable to reach a definitive conclusion regarding the acceptability of the proposed 20 percent factor by other available audit procedures. Therefore, the results of audit are qualified to the extent that additional costs may be questioned based on technical evaluation results. See Appendix [insert number] for further discussion of this item. Upon receipt of the technical report, we will issue a supplement to this report incorporating the results of the technical evaluation, if contract negotiations have not been concluded and the supplemental report would serve a useful purpose."

(2) Summary of Audit Results

"In our opinion, the cost or pricing data submitted by the offeror are inadequate in some respects. (See comments in paragraph 2 concerning the proposed 20 percent complexity factor.) The proposal was not prepared in all respects in accordance with applicable Cost Accounting Standards and appropriate provisions of FAR and the DoD FAR Supplement (DFARS) [for non-DoD agencies, identify the specific agency supplement, if any (see 15-102.2)]. (See comments on , Exhibit , Note .) However, the impact of the inadequacies and noncompliances is considered to be relatively insignificant. Therefore, we consider the proposal to be acceptable as a basis for negotiation of a fair and reasonable price. This statement should not be interpreted to mean that the remaining data are necessarily accurate, complete, and current in accordance with [insert "10 U.S.C. 2306a" if DoD, NASA, or Coast Guard proposal or "41 U.S.C. 254(d)" for all others], since a postaward audit may disclose evidence not now discernible. Nor should the statement be interpreted to mean that the offeror is necessarily in compliance in all respects with applicable Cost Accounting Standards, since a final recommendation cannot be made in a preaward evaluation. Instances of noncompliance with the Cost Accounting Standards may be reported during contract performance."

c. Example No. 3 - Material. Where a recommendation is made to not conclude negotiations until results of technical evaluation of material quantities and scrap factor have been considered. (Refer to 10-209.2 and 10-304.2 for further guidance on what to include in the following report sections.)

(1) Circumstances Affecting the Audit

"During our audit of the contractor's proposal, we evaluated direct material costs through statistical sampling. We traced proposed quantities to the originating engineering drawings and supporting documentation. However, we were not able to determine whether the drawings reviewed are an accurate rendering of the item(s) to be furnished or that the parts are required. Also, the contractor proposed a historical scrap factor that does not recognize the benefit of past learning. Technical specialist assistance was requested from [enter organization and title of technical specialist] but was not received in time for incorporation into this report. We anticipate receipt of the technical report on or about 15 December 1992. An extension of our audit report due date was requested from you on 1 December 1992, but was not granted. We were unable to reach a definitive conclusion regarding the acceptability of the proposed quantities and scrap factor by other available audit procedures. The results are considered essential to the conclusion of this audit. Therefore, the results of audit are qualified to the extent that additional costs may be questioned based on technical evaluation results. See Appendix [insert number] for further discussion of this area. Upon receipt of the technical report, we will issue a supplement to this report incorporating the results of the technical evaluation, if contract negotiations have not been concluded and the supplemental report would serve a useful purpose."

(2) Summary of Audit Results

"In our opinion, the cost or pricing data submitted by the offeror are inadequate in some r- -cts. (See comments in paragrap oncerning the proposed material qu ntities and scrap factor.) The proposal was not prepared in all respects in accordance with applicable Cost Accounting Standards and appropriate provisions of FAR and the DoD FAR Supplement (DFARS) [for non-DoD agencies, identify the specific agency supplement, if any (see 15-102.2)]. (See comments on , Exhibit , Note .) However, the impact of the inadequacies and noncompliances is considered to be relatively insignificant. Nevertheless, in our opinion the technical considerations discussed above are significant enough to materially impact the results of the audit. Therefore, as discussed with [enter name and title of contracting officer or representative] by [enter name of auditor] on [enter date of telephone call], we recommend that contract price negotiations not be concluded until the results of the technical evaluation of the material quantities and scrap factor are considered."

d. Example No. 4 - Material. (This is the same as Example No. 3, except no recommendation is made to delay negotiations until technical information has been considered.)

(1) Circumstances Affecting the Audit

"During our audit of the contractor's proposal, we evaluated direct material costs through statistical sampling. We traced proposed quantities to the originating engineering drawings and supporting documentation. However, we were not able to determine whether the drawings reviewed are an accurate rendering of the item(s) to be furnished or that the parts are required. Also, the contractor proposed a historical scrap factor that does not recognize the benefit of past learning. Technical specialist assistance was requested from [enter organization and title of technical specialist] but was not received in time for incorporation into this report. We anticipate receipt of the report of technical evaluation on or about 15 December 1992. An extension of our audit report due date was requested from you on 1 December 1992, but was not granted. We were unable to reach a definitive conclusion regarding the acceptability of the proposed quantities and scrap factor by other available audit procedures. Therefore, the results of audit are qualified to the extent that additional costs may be questioned based on technical evaluation results. See Appendix [insert number] for further discussion of this area. Upon receipt of the technical report, we will issue a supplement to this report incorporating the results of the technical evaluation, if contract negotiations have not been concluded and the supplemental report would serve a useful purpose."

(2) Summary of Audit Results

"In our opinion, the cost or pricing data submitted by the offeror were inadequate in some respects. (See comments in paragraph 2 concerning the proposed material quantities and scrap factor.) The proposal was not prepared in all respects in accordance with applicable Cost Accounting Standards and appropriate provisions of FAR and the DoD FAR Supplement (DFARS) [for non-DoD agencies, identify the specific agency supplement, if any (see 15-102.2)]. (See comments on , Exhibit , Note .) However, the impact of the inadequacies and noncompliances is considered to be relatively insignificant. Therefore, we consider the proposal to be acceptable as a basis for negotiation of a fair and reasonable price. This statement should not be interpreted to mean that the remaining data are necessarily accurate, complete, and current in accordance with [insert "10 U.S.C. 2306a" if DoD, NASA, or Coast Guard proposal or "41 U.S.C. 254(d)" for all others], since a postaward audit may disclose evidence not now discernible. Nor should the statement be interpreted to mean that the offeror is necessarily in compliance in all respects with applicable Cost Accounting Standards, since a final recommendation cannot be made

in a preaward evaluation. Instances of noncompliance with the Cost Accounting Standards may be reported during contract performance."

## D-304 Examples of Report Appendix Statements on Technical Qualifications

a. Labor Examples

"The following technical cost estimating techniques were identified during our audit but could not be evaluated without technical assistance from an engineer. An overall audit opinion on labor costs cannot be drawn until the assistance requested has been received and its impact reviewed.

"(1) Direct Labor Complexity Factor Adjustment. The contractor applied a 20 percent upward complexity factor adjustment to the proposed recurring manufacturing direct labor productivity factor of 47 percent. This adjustment was judgmentally made to reflect increased complexity of the proposed product over that considered in accounting records for prior products. The appropriateness of this 20 percent judgment factor should be evaluated by an engineer.

"(2) Direct Labor Standards. Proposed recurring direct manufacturing labor was developed using standard hours for set-up and run time as detailed below:

| | Standard Hours | |
|---|---|---|
| | Set-up | Run |
| Item 1 | 1.097 | 453.301 |
| Item 2 | 212.500 | 63.511 |
| Item 3 | 312.400 | 5.551 |

"(3) Benefits From Learning. The contractor failed to consider the benefits to be derived from past learning in producing similar products. Our audit recommendations incorporate the use of learning curve theory to recognize the impact of learning from prior experience. An engineer should address this point, particularly in view of the proposed adjustment to productivity."

b. Material Examples

"The following cost estimating techniques were identified during our audit but could not be evaluated without technical specialist assistance. An overall opinion of material costs cannot be drawn until the assistance requested has been received and its impact reviewed.

"(1) Bill of Material (BOM) Requirements. Our evaluation of proposed direct material cost included a review of material requirements. Proposed material requirements for raw material, hardware and purchased parts were based on a mechanized BOM. We statistically sampled this BOM and traced proposed quantities back to originating engineering drawings. The results of this review are incorporated into our results of audit shown on Exhibit A. However, we were unable to validate whether the drawings reviewed accurately reflect the items to be furnished, or that the parts are required. The items in question, along with related engineering drawing references, are shown at the end of this appendix. They should be reviewed by an engineer.

"(2) Material Scrap Factor. The contractor estimating method fails to consider the benefit from learning. The proposed scrap factor is based on history for prior production contracts of similar products. We have verified development of this scrap factor to accounting records. It is our opinion that scrap should decrease over time when dealing with similar production effort. An engineer should review this factor to determine the reasonableness of not reducing it for learning."

# D-400 Section 4 — Cost Estimating Methods

## D-401 Introduction

a. Cost estimating encompasses planning, coordinating, compiling, and pricing of proposed material, labor, and other items. Depending upon the contractor's size and type of work, this function may be performed by a single department or several departments acting together.

b. The objective of this section is to provide a cost estimating overview of the labor and material areas, with the understanding that the estimating methods discussed may also be used on other cost elements. A basic understanding of these areas is essential when attempting to evaluate a proposal. While the following guidance does not address a specific contractor estimating system nor a particular estimating method, the described principles and techniques will be applicable to most estimating environments.

## D-402 Overview of Cost Estimating

a. Cost estimating requires the application of skillful analysis and experienced judgment in projecting labor and material contract requirements. Timing constraints and the availability of historical data have an impact on the estimating process. Selections of appropriate estimating techniques require extensive analysis by contractors. Appropriateness of selected estimating techniques should be reviewed periodically. The same technique used when the program is at the engineering-concept stage, or when no bill of materials exists, is usually not appropriate for ongoing production. Because cost estimating integrates technical as well as financial information, the process requires input from many diverse organizational elements.

b. Although contractor estimating systems differ in approach and philosophy, their basic objectives are the same. Cost estimates are a series of informed projections and assumptions based on available information existing at the time of proposal preparation.

c. Cost estimating is comprised of logical steps. The level of detail required in these steps is often affected by the anticipated contract requirements expressed in the RFP. Typical steps in cost estimating follow:

(1) Ensuring that all relevant background documents such as historical costs, drawings, and specifications are available to assist in understanding job requirements.

(2) Determining which estimating techniques will be used, the level of detail required, and the amount of time available to generate and document a completed estimate.

(3) Determining if quotes and other information will be required from outside sources.

(4) Deciding if any elements require further clarification, redesign, or have potential manufacturing difficulties.

(5) Determining if the capability and capacity to manufacture required components exist in-house.

(6) Determining if further information is required to develop and complete estimates.

(7) Coordinating the activities of departments participating in the estimating exercise.

(8) Obtaining quotes, history, and other bases for material and subcontract items.

(9) Assembling direct costs by cost element, and computing indirect expenses using appropriate factors and rates.

(10) Consolidating proposal elements and documenting preparation rationale.

## D-403 Estimating Process at a Typical Contractor

a. At large contractors, the estimating (or pricing) department usually has overall responsibility for coordinating and assembling estimates to be incorporated into proposals authorized by top management. Preparation of detailed estimates is accomplished by the departments which will actually perform or supervise the work if the contract is received.

b. The cost estimating project is usually initiated in response to an RFP. The RFP

provides a statement of work, outlines government requirements, and invites contractors to prepare a proposal. It is also a source of information in establishing a baseline for labor and material requirements. Contractor proposals should include tasks and materials consistent with the RFP. When top management authorizes a response to an RFP, the estimating department reviews the RFP and top-management guidance and issues a "cost estimate request" to other departments within the company that will be involved in putting the proposal together. The estimating department generally has primary responsibility for coordinating the overall effort and authorizing the finalized proposal.

c. Contractors may also submit unsolicited proposals for requirements not yet reflected in any outstanding RFPs. When such proposals are pursued by a government acquisition organization, the PCO will normally request a more detailed cost proposal before requesting an audit. The estimating process should be the same as when there is an RFP.

d. When production is contemplated on items not previously produced, the estimating department (or the related project management department) solicits a preliminary conceptual design from the engineering department. The preliminary design should be detailed to the point that individual parts can be identified and numbered. After the preliminary design has been completed and reviewed, a work breakdown structure (WBS) is prepared. The WBS is a matrix that organizes and describes proposed tasks and identifies the performing departments. This is best done before the details of the "cost estimate request" are finalized. (If conceptual design and detailed estimating must proceed concurrently, the contractor will have much greater difficulty producing a sound cost estimate.)

e. The planning process entails the preparation of delivery schedules, staffing projections, span-time requirements, and funding estimates. Planning is a cooperative effort that involves the estimating, engineering administration, and production planning and control departments.

f. "Grass-roots estimates" are basic estimates of labor, material, and other direct costs developed by the departments that will actually perform the work. In some cases, departments are asked to generate price estimates. When this occurs, special care must be exercised to ensure that sound purchasing considerations such as competition and quantity discounts are applied to the estimates.

g. The engineering department usually develops staff-hour estimates for all potential make items. These estimates are normally prepared at a very low level, such as by individual part. The manufacturing department uses this information with historical data to project labor requirements. These projections may be broken down by functional area and/or cost center (e.g., system analysis, design, fabrication, assembly, test, inspection, packaging, and shipping). A variety of techniques including manloading, statistical relationships, past experience, and judgment are used to produce staff-hour estimates. Additional information such as program schedules and configuration/performance characteristics from preliminary and final engineering design drawings may be worked into the estimates. In all cases, the method used to produce direct-labor estimates should be discernible, and supporting documentation should be available for verification.

h. A make-or-buy committee, normally chaired by the program manager, reviews required materials and associated labor, and determines which items should be produced internally. In some instances, decisions will be deferred until a contract award is made and further design effort completed.

i. The estimating department requests the purchasing department to provide estimates for all potential buy items. The purchasing department is provided with the best available specification data from the engineering and quality assurance departments. Delivery requirements are provided by the manufacturing planning department. Material unit prices (including purchased parts, raw material, buy-to-drawing items, and subcontract items) are obtained by the purchasing department from vendor quotations, current purchase orders, catalogs, and in some

cases statistical methods. Material costs are usually developed by applying these prices to unit quantities in a bill or list of material provided by the engineering or manufacturing department. The purchasing and estimating departments are usually responsible for determining appropriate material escalation factors. Escalation is either quoted by major vendors or projected using specific price indices.

j. Each estimate is reviewed and approved at the functional level. These estimates are then submitted to the estimating department which assembles the total proposal estimate. Estimating personnel integrate, adjust, and analyze estimates for accuracy and completeness. The cost estimate is summarized further by functional organization, major tasks, and other breakdowns required by the RFP. When all direct-cost elements have been received and properly classified, applicable direct-labor rates and indirect-expense rates and factors (e.g., labor overhead, material burden, and G&A expense) are applied to complete the basic cost estimate. These rates and factors may be developed by the estimating or accounting departments. Fee calculations are usually applied in accordance with RFP guidance and company pricing policy. The completed cost package is then reviewed for accuracy and reasonableness by program management.

k. Subsequent to initial pricing and the determination of profit factors, the proposal is reviewed by a management committee usually consisting of representatives from marketing, accounting, plant management, estimating, and the program office. The committee scrutinizes the reasonableness of estimates, overall acceptability, and compatibility with the company's business strategy. This process culminates in the formal release of the pricing proposal, including the Standard Form (SF) 1411 and supporting rationale.

## D-404 Government Regulations

Several government regulations provide guidance relevant to cost estimating:

a. FAR 15.804-6(b) requires contractors to use the SF 1411. It provides a vehicle for the contractor to submit to the government a proposal of estimated and/or incurred costs by contract line item with supporting information, adequately cross referenced, and suitable for detailed analysis. It requires a breakdown of cost by line item so that pricing data is easily understood and tracked.

b. FAR 15.80 4-2 requires contractors to issue a certificate of current cost or pricing data attesting that the information furnished was accurate, current, and complete as of the date of final agreement on price.

c. FAR 3.501 deals with investment pricing and addresses contractor attempts at "marginal buying" or "buying in." The regulation instructs contracting officers to ensure that contract shortfalls are not recovered in subsequent pricing actions when it is believed the contractor is using artificially low prices to "buy in."

d. Military Standard 1567A specifies work measurement requirements for applicable contractors. The standard requires contractors to develop accurate and current labor standards for use in estimating proposed labor costs.

e. Cost/Schedule Control System Criteria (C/SCSC), as described in DoD Instruction 5000.2, define contractor management system requirements on significant flexibly-priced contracts for selected items identified as major defense systems.

f. The Cost/Schedule Status Report (C/SSR), DoD Manual 5000.2M, may be required for non-major contracts that exceed $5 million and a 12-month duration. C/SSRs are not usually required on firm-fixed-price contracts.

## D-405 Types of Cost Estimating

a. The basic elements of cost are direct material, direct engineering and manufacturing labor, other direct costs, indirect expenses, and cost of facilities capital. The cost estimating technique selected will be dictated by the availability of historical evidence and government requirements, and rarely is one estimating technique used to the exclusion of all others. For example, contractors typically use synthetic estimating in conjunction with parametric and comparative techniques.

b. Cost estimating methods may be categorized into six main groups: subjective, parametric, comparative, synthetic, global, and research and development. Further comments related to each of these follow.

(1) Subjective. This estimating method develops costs using experience, judgment, memory, informal notes, and other readily available data. Typically, these kinds of estimates are used in proposals when drawings have not yet been developed or the contractor is faced with limited proposal preparation time.

(2) Parametric. This method creates labor and material estimates by statistically analyzing and manipulating historical data to reflect current quantity requirements (see 9-1000). For example, previous raw material requirements on a price-per-pound basis could be used to project current proposal amounts. Parametrics uses one or more cost estimating relationships (CERs) to estimate costs associated with the development, manufacture, or modification of an end item. Special cost comparisons are required to validate parametric estimating systems. Variables used in CERs must be logically related and statistically valid. The rationale for selecting the variables should be well documented. Parametrics are often used to cross-check estimates developed using other estimating techniques.

(3) Comparative. This method develops proposed costs using like items produced in the past as a surrogate. Allowances are made for product dissimilarities and changes in complexity, scale, design, and materials. The comparative method can be used in conjunction with parametric estimating and can be used to develop adjusted unit costs while parametrics are applied to project the newly proposed quantities. Improvement curve applications are an example of comparative estimating.

(4) Synthetic. This method divides proposals into their smallest component tasks. Estimates are developed for component tasks which make up the whole. Synthetic estimates are normally supported by detailed bills of material.

(5) Global. This is a quick and subjective technique used to determine the advisability of continuing with a project.

(6) Research and Development (R&D). There are two basic approaches available for this difficult type of estimating. The first is a simple form of targeting R&D objectives in the context of a fixed budget. As in the preparation of routine budgets, the breakdown should be compatible with the cost-accounting system and procedures established to monitor and control expenditures. A second method of estimating R&D is a trial-and-error procedure involving an interchange of ideas and information including all available records of past R&D effort and experience. Because there are so many unknown factors involved in R&D effort, the potential for error in this type of estimating is especially great.

## D-406 Validation of the Cost Estimating Method

a. Normally, contractors settle on a cost estimating procedure and use it repetitively. Validation of estimating procedures entails a comparison of cost estimates to actual costs for completed projects. If the actual costs accurately reflect the work content and historically approximate the estimates, then the estimating procedure should be considered reliable. Parametric-technique documentation should show that work being estimated is comparable to the prior work from which the costs are developed. Data is verifiable if it is generated from an adequate estimating system as described in 5-1204.1. Attention to validation of a contractor's estimating procedure is critical, and will save audit effort in the long run.

b. Deviations between estimated and actual cost are usually a consequence of human error or changed circumstances. Some common causes of deviations in estimates follow:

(1) Careless accumulation of supporting data.

(2) Incorrect design information.

(3) Unexpected delays causing premiums to be paid for overtime or material.

(4) Unexpected processing problems requiring deviation from the manufacturing plan.

(5) Failure to identify unrealistic bids from subcontractors.

(6) Failure to rework preliminary estimates to produce an accurate finished estimate.

(7) Reliance upon estimators who are not familiar with job processes.

(8) Making a "guesstimate" and then "padding" it to protect against unanticipated costs.

(9) Failure to consider price breaks on quantity purchases.

(10) Inappropriate use of learning curves or other techniques.

c. Controlling Estimate Deviations

(1) Project Simplification. A successful approach has been to divide a project into component parts of roughly equal size and generate estimates for the component parts. The summation of the component estimates typically produces fewer errors than the high-level approach.

(2) Random Errors. Some cost estimating errors occur at random and their causes may be difficult to identify. A determination of the magnitude of these errors needs to be made so that allowances in cost estimates can be provided for. Statistical analysis may be used (by the contractor and the auditor) in making this determination.

(3) Biased Errors. Other cost estimating errors can be identified to causes. Trends can usually be developed for these type of errors. Examples of biased errors and their causes follow:

(a) Fluctuation in labor and material costs caused by economic conditions.

(b) Variation in the cost of a machine, tool, or piece of equipment attributable to its size or capacity.

(c) Decrease in the cost of performing an operation as the number of units produced increases.

d. Contractor estimators should periodically monitor the accuracy of their estimates. Cost-to-noncost CERs should be monitored in the same manner as cost-to-cost CERs. For change-order pricing or for repetitive use, CER monitoring is critical. Significant deviation from actuals should alert the estimators to the influence of random and biased errors.

e. Contractors may use estimating methods that will cut proposal preparation costs. Cost benefit analysis must be performed to assure that the costs of implementing and monitoring new methods do not outweigh the benefits of reduced estimating costs. If analysis suggests that they do, then the matter should be pursued for potential cost-avoidance recommendations as discussed in 9-308.

f. The Truth in Negotiations Act, 10 U.S.C. 2306a, requires the contractor provide the government with all facts available at the time it certifies the cost or pricing data as current, complete, and accurate (see 14-100). All estimating techniques employed must meet the same basic disclosure requirements under the act as discrete estimates. If a contractor uses a cost-to-noncost CER in developing an estimate, the data for the CER should be current, accurate, and complete (see 9-1000). The certification is not to the judgments employed in preparing the estimates, but to the factual data underlying the contractor's judgment.

## D-407 Labor Estimating

### D-407.1 Overview

a. Labor is a major element of direct cost and overhead allocation. Total labor cost is described by the equation:

Total Labor Cost = Rates X Labor Hours

Evaluation of the accuracy of labor-hour quantities requires a thorough understanding of a contractor's estimating methods. Commonly used labor estimating methods will be described in following sections.

b. Different terminology is frequently used to classify labor. The accounting and non-accounting classifications are as follows:

(1) Accounting. Auditors use the terms "direct" and "indirect" to describe the manner in which labor costs are charged to end-items or products. Direct labor such as factory workers and design engineers is closely linked and identifiable to end items. Indirect labor such as general engineers and supervisors is accounted for in overhead pools and distributed to a base. In this guidance, attention is focused on verification of direct labor requirements.

See 9-300, 9-500, and Chapter 8 for guidance dealing with the potential that contractors may under or over recover

costs as a result of inconsistency in the classification and treatment of labor costs, and deviation from applicable Cost Accounting Standards.

(2) Non-Accounting. Engineers and manufacturing personnel use the terms "touch labor" and "non-touch labor" to distinguish between individuals who have direct hands-on involvement in manufacturing and testing processes and those who do not. Examples of touch labor personnel are production workers, test technicians, numeric control operators, and electronic assemblers. Non-touch-labor employees include some engineers, production control personnel, administrators, and logistic personnel. Usually touch labor is direct; however, not all direct labor is touch labor.

c. There is little uniformity among contractors in the way they categorize labor when estimating costs. However, direct labor can generally be grouped into the following three major categories.

(1) Manufacturing Labor. This is touch labor on a product or a service which advances the product toward completion. Most weapon systems contain metal components. Organizations engaged in metal manufacturing normally employ numerical control (NC) machinists, sheet metal fabricators, and welders.

Another common component of weapon systems is electronics. Electronic manufacturing typically encompasses printed circuit board (PCB) manufacturing, PCB assembly, cable and harness assembly, and final box or cabinet assembly.

Some contractors use processes which necessitate specialized labor. For example, non-metalic manufacturing deals with plastics, injection molding, composite technology, and transfer molding. Other specialties include foundry, forging, and chemical processing.

Many of the above operations produce components that feed a final assembly. Frequently, final assembly areas will be dedicated to just one product such as a missile or aircraft. If the effort is large, labor may be categorized by major aircraft structure or worker trades.

In the shipbuilding industry, manufacturing labor is generally organized by trade such as electricians, pipefitters, welders, machinists, riggers, loftsmen, painters, grinders, burners, and carpenters. Other trades may be present depending on the particular shipyard.

(2) Support Labor. Support workers are responsible for the smooth operation and coordination of production activities. Production planning and control, quality inspection, material transportation, and warehousing personnel are examples. Other support labor activities ensure that manufacturing labor personnel have all the proper capabilities to manufacture products efficiently. Examples are toolmakers and equipment maintenance personnel.

A distinction is usually made between recurring (sustaining) and non-recurring onetime support labor. Recurring effort is a function of the number of units produced. Recurring labor assists manufacturing personnel by incorporating design changes, productivity improvements, and process control monitoring. Non-recurring labor does not depend upon quantity of units produced. Examples include tool design, instruction writing, and factory rearrangement. These activities are onetime occurrences. The separation of non-recurring and recurring labor is important and must be performed to obtain accurate estimates.

(3) Engineering Labor. Engineers are primarily involved with product research, design, and production support. Engineering labor comprises a significant portion of labor costs for high-technology weapon systems. The major disciplines of engineering are industrial, mechanical, electrical, chemical, and civil. Some subspecialties are hydraulic, tooling, manufacturing, test, quality, reliability, and facilities. Engineers working in these specialties usually have degrees in one of the major disciplines. Technical cost estimates are frequently prepared by engineers.

d. Cost estimating is not an exact science. Quality cost estimates are possible, however, if pertinent historical information is available and expert judgment and experience are applied. Information used in preparing cost estimates includes (1) actuals for the same item or activity, (2) actuals for a similar item or activity, (3) labor standards with adjusted historical efficiency factors, (4) standard cost

with forecast adjustment factors, and (5) tentative, judgmental, rough estimated hours, or hours based on a similar item/activity.

One of the initial steps in evaluating a contractor's estimating procedure is to ensure that accurate and reliable information was used to make estimates. Examples of information that may produce unreliable estimates are:

(1) Factoring support labor based on judgment rather than using earlier production contract history.

(2) Using Lot 1 experience in lieu of improvement curve projections from Lot 1 experience for estimates of subsequent production lots.

(3) Using a cost estimating method based on experience at one facility although the item proposed will be manufactured at a different facility.

(4) Employing an estimating method based on a supposed "industry-wide-accepted-and-used" method rather than in-house experience.

**D-407.2 Labor Estimating Methods**

a. Available labor estimating methods have application across a wide range of business functions and product designs. Seven general estimating approaches are normally used. Selection of the most appropriate estimating technique and use of high-quality estimating data are necessary to produce reasonable and accurate labor estimates. These seven methods, listed in relative increasing degree of accuracy, are: (1) judgment and conference; (2) comparison; (3) unit method; (4) factor method; (5) probability approaches; (6) cost-and-time estimating relationships; and (7) standard time method.

b. Judgment and Conference. Good judgment is essential when using any of the seven labor estimating methods. In the absence of historical data, estimators may have to rely solely on judgment. When the judgment method is used, labor cost estimators are selected for their experience, common sense, and knowledge. An estimator must be objective in attempting to measure all future factors that affect actual cost.

Various techniques are used to enhance judgment. Sometimes judgmental estimating is done collectively. The conference method is a group consensus-method of establishing a collective estimate. This method usually involves representatives from various organizations conferring with the estimators to jointly estimate cost. Major drawbacks to the conference technique are the lack of analysis and a verifiable trail of facts from the estimate back to the governing assumptions. In spite of these drawbacks, the conference technique is widely used.

The major problem with both the judgmental and conference techniques is the influence of personal bias. Forecasts can be influenced by a person's assigned role, position, and special interests. Depending upon the degree and direction of personal bias, estimates may be high or low.

Judgment must be applied in deciding which estimating relationships will be used. Secondly, judgment is important in determining the impact of technology and the type of adjustments that must be made. Judgment is also required to decide whether the results obtained from estimating relationships are reasonable in comparison to the past cost of similar items.

c. Comparison Method. This method compares items being estimated to items of similar configuration (and known cost) to produce labor estimates. The comparison method is similar to the judgment method, except that it attaches a formal logic. The comparison method is represented by the following algebraic equation:

Estimated Cost (New Design) = Historical Cost (Similar Design) + Adjustments

An estimator confronted with the task of projecting labor costs for a new product design should investigate similar product designs for which historical cost data exists. To be of use, similar designs must closely approximate the technical characteristics of the new design. Allowances are made for product dissimilarities in complexity, scale, materials, function, and other parameters. A comparison estimator makes judgmental additions and subtractions to costs of a similar design to obtain new cost estimates.

To produce accurate cost estimates, the estimator must understand the factors and relationships that have an impact on product costs. For example, when using the comparison method to estimate the cost of a new electronic assembly board design, it is important to understand that number and type of electronic components are the critical factors, not overall board size.

d. Unit Method. This method of labor estimating relies on an accumulation of past experience which is divided by a cost driver to produce a cost per unit. Other terms used to describe this method include order-of-magnitude, lump sum, module estimating, and flat rates. One typical example of unit estimating is "labor cost of fabricated components per pound of casting." Another example is "support labor hour per manufacturing labor hour."

e. Factor Method. A logical extension of the unit method of estimating is to improve accuracy by using more than one factor. Use of separate factors for different cost items should improve results. For example, building construction can be estimated by using a unit factor such as dollars per square feet. However, an improved method might be to use separate unit factors for heating, lighting, electrical, and other elements. The individual costs are summed to obtain total labor costs.

Comparison, unit, and factor methods typically use only selected historical data. The auditor should make sure that historical data is representative and complete. The contractor should be able to provide rationale for including or excluding historical data.

f. Probability Approaches. This estimating method makes provision for uncertainty in the estimating process. Other approaches typically produce discrete estimates. For example, a contractor may estimate that 365 staff-days are required to complete a test-stand. Using a probability technique, the same estimate would be expressed as follows:

"The contractor is 75 percent certain that it requires 365 staff-days to complete the test-stand."

Probability approaches attempt to compensate for random occurrences and dependency between events. A good example of dependency is wall construction. A normal sequence of events in wall construction is studding, plumbing, electrical, sheet rock, and painting. Each stage is dependent upon a prior stage being completed. Probability approaches make recognition of the fact that specific labor costs can be affected by other activities which must first occur.

Computer simulation, Monte Carlo techniques, and PERT are examples of probability approaches. Input estimates for these approaches are derived from the other estimating methods. Auditors must carefully review the base for the input estimates. Final estimates result from the probability approach's treatment of the input estimates. The mathematical and statistical characteristics of probability approaches can be complex and, consequently, subject to high risk of error.

g. Cost-and-Time Estimating Relationships. Statistical estimating methods can produce mathematically fitted functions called cost estimating relationships (CERs) and time estimating relationships (TERs). CERs and TERs are developed by mathematically relating cost or time estimates to a cost driving feature of the product or manufacturing environment. Examples of cost drivers include number of transformer wire leads, quantity of components mounted on a printed circuit board assembly, number of wires making up a cable assembly, end item weight, or cumulative production quantity of any product.

The estimating relationship is an equation with two kinds of variables. The equation provides the ability to predict a dependent variable on the basis of knowledge of one or more independent variables. The relationship between the variables must be a logical one. Whether the relationship is cost-to-cost or cost-to-non-cost, the contractor should be expected to demonstrate that it is logical. A variable whose value is to be predicted is called the dependent variable. The cost or time driver is the independent variable. The estimator using experience and judgment identifies potential cost drivers and mathematical relationships. If they exist, mathematical relationships between the

two kinds of variables can take on many forms including linear and exponential.

To develop CERs and TERs, historical data on both dependent (labor) and independent (cost drivers) variables must exist. Regression analysis is then performed to determine if a mathematical relationship exists between the variables. Mathematical relationships are evaluated by including and excluding various cost drivers until "best fit" relationships are identified. DCAA has issued extensive instructions in the use of regression analysis. Refer to Appendix E for more information.

Common CERs and TERs are described by improvement curves, linear relationships, and power law and sizing models.

(1) Improvement Curve. Improvement curve theory is based on the principle that the time required (labor) to produce successive quantities of a product decreases with (i) additional experience and (ii) introduction of improved methods and tools. The theory supporting improvement curve modeling is well established. Workers accrue manipulative skills and familiarity with the details of the job. Improved plant layout and tooling impact productivity. Process planning refines the work into orderly and producible stages. Raw materials, parts, and subassemblies are purchased in more suitable designs, sizes, and shapes. Shop organization and control practices are revised to address production problems. The improvement curve theory holds that improvement will be a constant percentage over doubled quantities.

Mathematically, the improvement curve (unit theory) is expressed as:

$y = ax^b$

where

x = the unit (or lot) mid-point

y = the direct cost (or hours) for unit x or the average direct cost (or hours) for the lot whose mid-point is x.

a = a coefficient depicting the direct cost (or hours) for the first unit

b = the improvement coefficient

An improvement curve normally displays a negative slope which reflects a decrease in required time for successive product quantities. Since the reduction is primarily due to increased knowledge and skill, the curve is also referred to as the learning curve, experience curve, or progress curve. DCAA has issued extensive guidance on the use of improvement curves. Refer to Appendix F for more information.

(2) Linear Relationships. The relationship between labor and the cost driver (dependent and independent variables) is frequently linear. A linear relationship can be described graphically by a straight line. The representation of a single independent linear equation is:

Labor Cost (or Time) = Coefficient × Cost Driver + Constant

where:

Coefficient = the ratio of the change in Y associated with a given change in X (referred to as the slope of the line)

Constant = the value of Y when X is zero (the Y intercept)

Cost or Time = the dependent variable (the variable to be predicted)

Cost Driver = the independent variable

As the quantity of the cost-driving variable changes, cost or time also changes proportionally.

Linear CERs and TERs are not just limited to a single independent variable. When developing the equation, the cost estimator may choose an infinite variety of variables until the best correlation is found.

(3) Power Law and Sizing Model (Cost Capacity Relationship). This theory models the relationship between similar products of different sizes, weights, and volumes, and takes into account "economy of scale." The following equation provides the mathematical relationship for comparison on this basis:

$Cb = Ca(Qb/Qa)^x$

where:

Ca = actual cost for reference size Qa
Cb = estimated cost for new design size Qb
Qa = size of reference design a
Qb = size of new design b
x = correlating exponent $O < X < 1$

For example, a contractor has determined from historical records that machine-component manufacturing-labor costs increase by half as the machine-component weight doubles. The correlating exponent (x) in the above equation is determined as follows:

Rearrange the equation to:

$Cb/Ca = (Qb/Qa)^x$

Based on data given, the following is obtained from the equation:

Cb/Ca = 1.5 and
Qb/Qa = 2

Substituting these values into the rearranged equation in (2) above, the equation is:

$1.5 = 2^x$

Using logarithms, the exponent (x) is found as follows:

x = log 1.5 / log 2
x = 0.585

The contractor's records indicate that a 1,000-pound component was completed in 1,000 hours. The new component to be estimated weighs 1,250 pounds. Substituting into the equation gives the following results:

$Cb = 1{,}000 \text{ hrs } (1{,}250 \text{ lbs}/1{,}000 \text{ lbs})^{.585}$
Cb = 1,139 hrs

Note that a 25 percent increase in weight results in only a 14 percent increase in manufacturing hours.

h. Standard Time Method. The standard time method is the most precise technique for estimating manufacturing labor. The basis for the manufacturing labor estimate is a "labor standard." Contractors do not bid standards but bid labor cost based on standards which are adjusted to reflect production inefficiencies. Adjustments take the form of a productivity factor. The following algebraic equation represents this concept:

Estimate of
Actual Labor = Standard / Expected Productivity Factor

(1) Standard. As discussed above, a standard is a measure used for making judgments or as a basis for comparison. A labor standard is a unit of time required to accomplish a work task. Industrial engineering work measurement techniques (see D-407.3) are used to develop engineered labor standards (ELSs).

Engineered labor standards provide an unbiased assessment of a "fair day's work." The term "engineered standards" is frequently misapplied. True engineered standards are not based on history, judgment, guesses, comparison, or opinions.

Cost estimators will determine a product's total ELS content by summing all the ELS for assemblies, subassemblies, manufactured components, and other efforts required to build a product. The ELS content summation process is roughly analogous to adding up material costs in an exploded assembly/subassembly BOM. Total ELS content will not remain stable for a product over an extended period of time. ELS apply to specific methods, machinery, tools, and automation available at the time when the standards were established. If contractor management does not estimate any reduction in ELS, it is implied that no attempt will be made to improve operations.

Engineered standard time does not relate to any particular unit of production. An unhindered average skilled worker can achieve an ELS almost from the first try. Most cases of inefficiency in the factory are attributed to management deficiencies. Work measurement techniques do not recognize the concept of achieving standard at a specific cumulative production point (e.g., 1000th unit). The standard attainment method, discussed in D-407.3b, adjusts an efficiency factor to a production unit. The efficiency factor is applied to a standard to obtain estimated labor cost.

(2) Routings. Routing sheets provide a detailed breakdown of operations required to process raw material and/or produce parts and the time required to perform each of these operations. Each



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product part number manufactured internally by a contractor will have a routing sheet. If the contractor uses a work measurement system, each step will have a description and standard time. Contractor management can use this information to plan, schedule, and control the shop.

Proposed labor costs based on standards can be verified against information contained on routing sheets. Use of a statistical sample will expedite the verification process. Verification frequently reveals numerous problems, including addition errors, erroneous adjustment factors, and missing labor standards. Without verification, contractors may substitute poorly derived estimates in lieu of estimates based on valid labor standards.

(3) Audit. Duplication and inclusion of unnecessary standards are difficult to detect. Make/buy parts should be carefully scrutinized to verify that double counting has not occurred. Alternate routings which include extra operations may be listed on routing sheets. Their existence provides flexibility to handle unusual circumstances such as machine breakdown, critical machine overload, or product quantity variations which affect machine selection. Inclusion of labor standards for alternate routings can produce duplication and inflation of labor estimates.

**D-407.3 Work Measurement Techniques**

Work measurement is a generic term used to refer to the setting of a time standard by a recognized industrial engineering technique, such as time study, standard data, work sampling, or predetermined motion time systems.

a. Standard Time Method Work Measurement Techniques. Work measurement techniques determine the time required to do a task. To account for differences in factory conditions and employees, a universal labor standard was defined as follows: the time for an average skilled worker to complete a task under average conditions, working at an average pace, and using a prescribed method. Average is not defined in a mathematical sense but has the meaning of typical or expected. There is a misconception that a standard reflects what a "perfecty" worker can achieve uner "ideal" conditions. By definition, ELSs relate to an "average" worker and "average" conditions.

Techniques for establishing labor standards are stopwatch time study, predetermined motion-time data, work sampling, and standard data.

(1) Stopwatch Time Study. The use of stopwatch time study to establish ELSs requires (1) observing the task and subdividing it into motion elements; (2) timing and statistically establishing an arithmetic average for the elements; (3) normalizing, rating, or leveling the elemental times; and (4) applying an allowance for PF&D. Normalizing, rating, or leveling are used to adjust the observed time to a comparative standard. Operators will perform a task at a pace above normal if they have superior skills or are intentionally rushing. Conversely, operators will perform at a pace below normal if they are not totally familiar with the job or are purposely slow. To compensate for the difference in pace, the Industrial Engineer must rate the performance of his subject by established criteria.

(2) Predetermined Motion-Time Study. There are a number of predetermined motion-time systems available including Methods Time Measurement (MTM), Work Factor Systems (WO-FAC), and Basic Motion-Time (BMT) Study which break manual tasks into basic motions. Predetermined time systems were established to avoid the difficulties of timing and normalizing. Observing the task and subdividing into elements are required to classify all motions into elemental components. Unit times have been tabulated for elemental components according to factors such as distance, degree of muscle control required, precision, and strength. The ELSs are completed by application of a PF&D factor to the elemental component unit time.

(3) Work Sampling. Work sampling is used to establish standards for (1) large work crews or (2) long-duration job cycles with irregular patterns. Continuous observation of the worker is not required with work sampling. A statistically significant quantity of worker observations is


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made so that proportions of time devoted to various activities can be determined at given confidence levels. This technique produces the least accurate ELSs.

(4) Standard Data Systems (also referred to as Standard Time Data System or STD). These systems provide labor standards prior to the actual performance of work. (Other methods of establishing standards require direct observation.) Because of this characteristic, standard data systems are important in the cost-estimating process.

There are two kinds of STDs: (1) synthetic and (2) analytical. Synthetic STDs use a catalog of individual operation ELSs which are added to create a total labor standard for a manufactured part. An analytical STD uses a mathematical formula to establish the total labor standard for a manufactured part. Both require using ELSs previously developed via time study, predetermined motion time systems, and work sampling.

Synthetic STD combine separate ELS. Many tasks are repeated frequently, and are identical regardless of the product being manufactured. The time standards for these tasks, once established by a work measurement specialist, can be cataloged and referred to each time they are required. Examples are loading/unloading of a machine, driving a rivet, or removing a part from a fixture.

Establishing a synthetic data system ELS requires an industrial engineer to determine all the required manufacturing steps. In addition to establishing labor standards, this procedure is necessary to determine process routing. The engineer refers to the STD catalog for the appropriate manufacturing step's standard time. The ELS for a manufactured part is a summary of all the standards for the separate manufacturing steps.

Analytical standard data systems are similar to CERs (D-407.2g). The difference is that labor standards are substituted for historical actual hours during the development process. Sets of previously established labor standards for a product and related possible cost driving characteristics (parameters) are gathered. Regression analysis is then performed to determine the mathematical relationship between the developed labor standard and the cost drivers. Numerous relationships (determined by including and excluding various cost drivers) may be tested until a best fit is established.

STDs are derived from ELSs previously developed by direct observation of manufacturing operations. A significant problem is that contractors frequently lose or misplace this data. STD systems require periodic maintenance and auditing to ensure accuracy. Retention of original data is extremely important to both the maintenance and audit functions.

Unmaintained, STD system accuracy will deteriorate because of changes in the work environment. An effective STD requires that adjustments be made for changes in machinery, tooling automation, and procedures. Since ELSs are specific to machines and tools, it is extremely important that all changes be reflected in the standards. Periodic audits are required to ensure that system accuracy and reliability are maintained.

STDs not based on engineered standards are suspect. Guesstimates, standards derived from technical literature, will likely produce unreliable results.

b. Standard Time Method Productivity Factor. The expected productivity factor is part of the Estimated Labor Time equation for the Standard Time Method. Standards assume a degree of efficiency for work accomplished by an average worker under average conditions. Products may be manufactured under conditions that make standards unachievable. Productivity factors adjust product standard times for varying work conditions and other influences.

Productivity factors are derived from contractor historical timekeeping data. Productivity factors are estimated by adjusting historical efficiency for various influences and special circumstances. Adjustment factors are developed using the unit method, and improvement curves. Expected productivity is described by the following equation:

$$\text{Expected Productivity Factor} = \text{Historical Efficiency} \times \text{Adjustment}$$

(1) Historical efficiency is normally developed for a specific period. The efficiency factor is the ratio of standard hours earned to actual hours spent on an increment of work. Earned hours is the time in standard hours credited to a worker (or group of workers) who completes a given task (or group of tasks). When earned hours equal actual hours, efficiency equals 100 percent. Efficiency is described by the following equation:

$$\text{Efficiency Factor} = \frac{\text{Earned hours (Standard/}}{\text{Actual hours (elapsed time)}}$$

Efficiency factors can be developed for any level in a contractor's organization. Auditors should verify that an appropriate efficiency is used for the organizational level most closely identified with the actual work. For example, using a plant-wide efficiency for estimating labor for an individual department or vice versa will distort the labor estimate.

(2) Adjustments to historical efficiency are required to project expected from historical costs. Normally, contractors lower productivity factors based on the belief that the estimated product is unique and differs from the products which generated the historical basis for its estimate. These adjustments require special audit attention.

The impact of different production quantities on productivity is generally estimated by (1) the standard attainment and (2) first unit estimating methods. To develop an estimate using these methods, historical realization factors and their related cumulative production quantities are collected. An improvement curve is developed by means of regression analysis. The x-intercept is the standard attainment point (or the cumulative production quantity) when realization equals 1.0. The first unit estimate of realization is the y-intercept (or the point where the cumulative production quantity equals 1.0). Both approaches treat the curve slope similarly, but they differ in how they express efficiency in relation to the cumulative production unit.

(3) Standard Attainment Method. This method assumes that a cumulative production quantity exists where the standard will be achieved. Achieving standard means achieving an efficiency factor of 1.0. Contractors will speak of 100th, 250th, or 1,000th unit standard, which means they expect to eventually achieve efficient production after producing that quantity of a product. The productivity factor is developed from an estimate of the expected realization. The realization factor is developed by projecting backwards from the point where realization equals 1.0 (at the standard attainment point) to the lot mid-point of the product being estimated.

Auditors are cautioned to evaluate how the standard attainment technique is applied. Contractors may fail to substantiate method parameters such as slope and realizations with historical data. Frequently, contractors assert that there is a traditional standard attainment point, e.g. 1,000 units. There is usually no validity to this assertion since each company has a unique rate of improvement.

Another caveat has to do with the slope of the curve. In typical improvement curve applications, steep rates of improvement (100 percent being flat, 80 percent steep, and 60 percent very steep) are projected forward from actuals which reduces estimated cost. In the standard attainment estimating technique, because the estimator projects backward up the curve, steeper curves produce significantly greater estimated costs. Contractors may state they are being aggressive by projecting steeper curves than are historically supported. Such a statement is usually false.

(4) First Unit Estimating Method. This method is essentially the opposite of the standard attainment approach. As previously discussed, historical information is used to derive the typical realization factor for the initial production unit. The realization factor is developed by projecting forward from the first unit realization factor at the expected improvement curve slope to the product lot mid-point. Labor cost is estimated by multiplying the standard labor content by the lot mid-point realization factor.

**D-407.4 Military Standard (MILSTD) 1567A**

When made a contractual requirement, MILSTD 1567A requires contractors to implement a proper work measurement system. Contractors are required to meet predetermined minimum work measurement system requirements of accuracy, coverage, consistency, documentation, and audit. Any weaknesses inherent in the work measurement system which have an impact on the accuracy of labor estimates must be fully documented and provided to the government. Additional information pertinent to MILSTD 1567A is as follows:

a. Applicability. MILSTD 1567A establishes a contractual requirement for an integrated and disciplined work measurement system on manufacturing operations. When applied with a positive management commitment, experience shows that MILSTD 1567A has achieved improved productivity and cost control. MILSTD 1567A became effective 11 March 1983.

It applies to prime production contracts exceeding $20 million annually or $100 million cumulatively. When the standard applies to a prime contract, subcontracts exceeding $5 million annually or $20 million cumulatively are also covered. Ship construction, R&D, and service-type contracts are exempt.

b. Requirements. Under the standard, contractors are required to:

(1) Establish and maintain a documented measurement system using recognized techniques such as time study or standard data to derive at least 90 percent confidence that the hours are accurate within 10 percent.

(2) Prepare a schedule to achieve the stated precision limits for at least 80 percent of all touch-labor categories.

(3) Include allowances in production standards for PF&D.

(4) Measure touch-labor efficiency as a ratio of production standards to actual hours.

(5) Establish periodic labor efficiency and variance reporting requirements for each work center to include causes of significant variances and corrective action taken.

(6) Identify major elements which comprise realization factors used to modify labor standards.

(7) Use engineered labor standards as an input for budgeting, estimating, planning, and performance evaluation.

(8) Conduct an internal audit of the work measurement system at least annually to ensure compliance with the requirements of the standard.

(9) Retain a copy of any audit findings for at least two years and make audit findings available to the designated government representative for review upon request.

(10) Conduct operations analyses and methods improvement programs.

(11) Have a formal written policy covering the use of the work measurement system.

c. Definitions

(1) Engineered Labor Standards (ELSs). The time it should take, derived from an engineering method, for a trained worker or group of trained workers working at a normal pace to produce a described unit of work of an acceptable quality according to a specified method under specific working conditions. It is derived from a complete, objective analysis and measurement of the task. The generic methods which are used to develop ELSs are direct time study, predetermined time systems, work sampling, and standard time data. Note also that ELSs are not only attainable but also maintainable over a long period of time. ELSs include PF&D allowances which vary according to the task. (For example, a welder would have a different and higher fatigue allowance than one who monitors the operation of a machine.)

(2) Realization. The actual touch labor hours divided by the standard labor hours for the effort completed.

(3) Variance. Includes not only worker inactivity but also delays caused by material shortages, machine downtime, and improper scheduling.

(4) Type I Standard. A standard which is statistically valid. It may consist of actual time studies within the contractor's organization or buildup of published times for given operations.

(5) Type II Standard. Engineering estimates of the time required to perform a

given task. The distinction between a Type I and Type II standard relates to the question of accuracy and verifiability. That is, a Type I standard for a given task is not necessarily lower than a Type II, even though the purpose of MILSTD 1567A is cost reduction, and the general direction is from Type II standards to Type I standards.

(6) Touch Labor. "Hands-on" effort actually involved in the manufacturing (e.g., fabrication and testing) process.

d. Significance to the Auditor. MILSTD 1567A should benefit the auditor in his/her review of proposed labor costs and operations audits. Relative to improvement-curve applications, manufacturing improvement consists of two components. First, productivity increases as the contractor overcomes production difficulties in parts availability, scheduling, quality, and workmanship. Concurrently, product and methods improvement in tooling, partibility, design, and factory layout further reduce labor hours.

MILSTD 1567A earned-hour standards must reflect what labor is required to build the current product design with the existing production methods, assuming no production difficulties. Detailed variance analyses must identify causes of existing inefficiencies and corrective action plans to overcome them must be prepared.

When the contractor uses actual history to project labor hours, proper use of the variance analyses could eliminate existing inefficiencies in forward pricing. For example, a contractor may attribute the difference between actual and standard hours to parts shortages. The plan to improve the warehouse integrity by incorporating a bar-code material tracking system or by improving other operating practices would relate to a specific time frame. Thereafter, the curve should project only standard hours to reflect additional learning caused by design and methods improvements.

If the contractor uses a theoretical unit standard to project labor hours, these same analyses will provide insight regarding the horizontal positioning of the theoretical unit. It is not logical that many contractors should be using the same unit standard. Each has different problems, methods of resolution, timetables, and rates of production. Whether new manufacturing processes or design changes are involved, the contractor is obliged to reconcile current conditions with those proposed. Differences, as explained in the contractor's rationale, should be reviewed for reasonableness.

## D-408 Material Estimating

### D-408.1 Overview

As noted in D-101b, two major components of contractor proposals are labor and material estimates. Material is the cost element that is usually the easiest to estimate and check. It can normally be seen and touched in the end product. The material component may vary anywhere from 30 to 70 percent of the total cost depending on the type of contract (e.g., production, development, or research).

a. Material costs are normally divided into three major categories: direct, indirect, and burden.

(1) Direct material consists primarily of raw material, purchased parts, subcontracted items, and interdivisional transfers. The term "direct" is applied to this material since it can be readily identified in the end product.

(2) Indirect materials are those items necessary to produce the product but do not become a physical part of the end item. Materials such as lubricants, welding rods, and shop supplies are good examples. Because their direct usage levels are difficult to determine, indirect materials are usually allocated through indirect expense pools.

(3) Material burden is a term used to describe the indirect activity associated with converting purchased material into an end product. Costs related to material procurement and handling are collected in material burden centers. At smaller contractors, material burden may be included in general overhead expense pools rather than in a separate material overhead account. At larger contractors, material burden centers may be organized along functional lines that will separate rates for procurement, handling, etc.

b. The major categories of direct material are:

(1) Raw Material. Bulk or unfinished materials that require processing or are involved in manufacturing processes. Examples include sheet stock, castings, forgings, bar stock, wire, printed circuit board materials, epoxies, resins, paints, and solvents.

(2) Purchased Parts. A component, or subassembly, purchased as an off-the-shelf item which becomes an integral part of the product.

(3) Subcontracted Material. Material manufactured to specifications, drawings, or standards outlined in a subcontract. Subcontracted material may be low or high cost. Subcontracted low-cost material typically results from a contractor's inability to produce the part due to capacity constraints, quality problems, special processes, unique assembly techniques, or other manufacturing limitations.

High-dollar subcontracted material is, by government contract law, require special treatment. When purchases of specific items exceed certain dollar thresholds, contractors are required to perform price analyses or audits. In some circumstances, they may arrange for an assist audit by DCAA at a subcontractor location.

(4) Interdivisional or Interplant Transfers. Materials that are purchased from another business unit of the contractor.

(5) Vendor Charges/Tooling. Costs incurred by a supplier to set up or prepare for production. These charges usually consist of production line set up and the fabrication of unique tools needed in manufacturing processes. Examples include drill fixtures, cable jigs, cable potting molds, and printed circuit artwork.

(6) Packing Material. Material required to package the product for safe delivery. Special packaging requirements are normally dictated by contractual provision and classified as direct material.

(7) Minor Material. Low-value items such as nuts, bolts, fasteners, and wire that are not cost effective to estimate in discrete quantities. Also known as line stock items, they are usually proposed as a percentage of direct material, or as a rate per manufacturing hour. They may, however, appear in detailed bills of material as individual line items.

(8) Freight. Estimated contractor delivery costs that are proposed either as a direct item or as a percentage of direct material.

(9) Other Direct Costs. These items are not readily identifiable as part of the product and are not subject to labor or material indirect expense loadings. Examples include computer timesharing, technical publications, photographs, and blueprints.

c. Recurring and Nonrecurring Costs. Major material cost categories may also be described as recurring and nonrecurring costs:

(1) Recurring Costs. Those costs which are variable and are dependent upon the quantity produced Examples of recurring costs are direct materials used in production, contractor set-up charges, and charges associated with tooling that must be accomplished with each production run. While not repeated on each unit manufactured, set-up charges are repetitive for each release and, as such, must be amortized into unit cost. Most vendors will amortize set-up charges before quoting unit prices; others itemize them separately.

(2) Nonrecurring Costs. Those costs which represent the fixed effort expended to produce an item regardless of quantity. Nonrecurring costs consist primarily of vendor tooling and engineering/testing charges.

(a) Vendor Tooling. Vendor or subcontractor costs to make tools needed to produce materials or fabricate parts. Vendor tooling can be categorized as either proprietary or accountable tooling. Proprietary tooling is the property of the vendor. Examples are forging dies, extrusion dies, patterns, and molds. Accountable tooling will eventually become the property of the purchaser or government. Tooling possession is obtained after the vendor no longer requires its use. Tooling costs are normally applicable to subcontracted parts, but may be encountered with purchased parts.

(b) Engineering/Testing Costs. These costs are associated with vendor design effort, development activities, qualification testing, or first article qualification Testing charges frequently include the

cost of components used in tests that either destroy or impair article function.

Except for the eventual replacement of tooling because of wear, nonrecurring costs are onetime in nature and may suffice for several follow-on pricing actions. To avoid duplication, these costs should be shown separately and not included in the unit cost.

**D-408.2 Estimating Methods**

The methods employed to estimate material quantities and costs are largely dependent upon material type and information available at the time of proposal preparation. Material requirement data may range from detailed part lists to rough estimates based upon the available history on like items. Regardless of the method employed, estimates will be difficult to make and will be subject to significant error when a major portion of the materials represents unique items that have not been previously produced.

Direct material constitutes the major portion of material cost and requires expert technical knowledge to estimate. EDP data bases are used in developing models which may be used in parametric cost estimating systems, and for development of comparative--similar to—bills of material when discrete bills of material are not available. Indirect material and material burden are largely accounting issues.

The general procedures associated with estimating direct materials are as follows:

a. Estimate quantity requirements.

b. Determine raw material requirements; convert measurements as necessary; and estimate actual yields.

c. Estimate current prices.

d. Adjust estimated prices for cost trends and quantities and project total cost.

e. Document procedures and methods utilized in the estimating process.

**D-408.3 Bills of Materials (BOM)**

Perhaps the most frequently used method of direct material estimating is the priced BOM. Most auditors are familiar with this mechanism and often use the BOM as a basis for sampling material costs. The auditor should review both the unit prices reflected in a priced BOM and the material requirements aspect. At some contractor locations, there may be more than one type of BOM. The original bill of material, known as an engineering BOM, will list all of the parts required to produce the end products. In some cases, engineering may be unable to estimate certain actual-quantity requirements such as the length of a wire. To address detailed material requirements, manufacturing may develop a manufacturing BOM which is used as a manufacturing aid.

The BOM is a comprehensive list of all parts required to produce an end item. At large contractors, BOMs are loaded into computer data bases which provide the capability to request information in many formats. Additional information such as description, when used, as well as item number and dollar value may also be contained in the data base. A BOM can be requested for an end product or any subassembly. The two most common BOM sorts are as follows:

a. Part Number Ascending Order. This BOM is "exploded" and sorted by ascending part number showing total quantity required for each part of an end item. A detailed report may give further information including where the part is used. Figure D-4-1 illustrates a part number ascending order BOM.

b. Assembly/Subassembly "Christmas Tree". This BOM is hierarchical and lists major assemblies followed by all levels of subassemblies. The assembly/subassembly BOM is often referred to as a "Christmas Tree" BOM because of its pyramidal or Christmas-tree shape. Figure D-4-2 illustrates the assembly/subassembly BOM. Figure D-4-3 is another representation of the assembly/subassembly BOM. This representation is often referred to as an "indented" BOM.

Each format has advantages and disadvantages. Hierarchical BOMs permit tracing material assemblies to drawings, and accounting for the use of each part. Hierarchical BOMs do not communicate total part requirements; therefore, sampling is difficult because other formats may not be available. Part number ascending order BOMs disclose total requirements and pricing, but do not de-

scribe product organization and composition; therefore, auditors will normally have difficulty in determining actual part requirements.

Regardless of the format employed, the BOM is an essential tool in validating material requirements and serves as an intermediate vehicle in tracing requirements to original drawings. The drawings disclose part listings and show how the parts are integrated to form completed stages or finished products. Frequently, an estimating department will price a BOM to be used as supporting data. With the exception of tooling and other minor additives, a priced BOM should be comprehensive. Costs not shown in the bill of material can be verified through vendor tooling quotes or historical analyses.

**D-408.4 Routing Sheets**

A routing sheet is usually a process description showing discrete manufacturing operations and associated times. Some routing sheets will also disclose material quantity, tools, fixtures, and labor standards. They may be referred to as operations sheets.

Routing sheets are a main source of labor information and are also discussed in the labor section (D-407.2h). Routings may be used as a substitute for BOMs for cost-estimating purposes. Care should be exercised when routing sheets are used in conjunction with BOMs to ensure that costs are not duplicated.

Figure D-4-4 presents an example of the routing for the part number 8876902. In this example, there is only one line item, RS3000197, which is listed under product structure.

**D-408.5 Engineering Drawings**

Material requirements are normally determined from engineering drawings. To properly evaluate proposed material quantities, it is important that the auditor understand engineering drawings.

An engineering drawing graphically shows the configuration of a part or assembly. It can be a sketch drawn by a draftsman or generated by a Computer-Aided Design (CAD) system. The trend at most contractors is toward CAD. With CAD, operators can develop complete drawings using a light pen. A good feature of CAD is that drawings can be recalled from computer memory and changed with minimal effort. Regardless of method, drawings are essential in all phases of design and manufacturing.

Typically, engineering drawings are classified as either level 1, 2, or 3. These levels represent a natural progression from conceptual design to production. Level 1 drawings address conceptual and development designs; level 2 drawings are concerned with production prototypes and limited production quantities; and level 3 drawings are production oriented. A drawing level or various combinations of levels may be established by a contractor, or specified in a contract.

The drawing level and quantities required to satisfactorily depict product function and material requirements are determined by design complexity, product sophistication, and engineering judgment. Drawings illustrate and provide essential information needed to design and manufacture a product including (1) physical characteristics, (2) dimensional and tolerance data, (3) critical assembly sequences, (4) performance ratings, (5) material identification details, (6) inspection tests, (7) evaluation criteria, (8) calibration information, and (9) quality control data.

All product components should be supported by engineering drawings. All drawings should be tied to the end item drawing with major subassemblies and components identified. Drawings should be available to the lowest level unit part.

Normally, engineering drawings use the hierarchy or level concept. Each assembly or subassembly will have drawings identifying all components and additional levels of subassemblies that constitute the upper-tier product. For complex projects, as many as 10 levels of drawings may be used, beginning at the component or manufactured part level and culminating in an assembly or subassembly. Manufactured components may have material reference drawings which further define forging, casting, and similar requirements. In short, all parts required to manufacture an end-item will be shown in drawings along with their relationship to the next higher-level drawing.

Each drawing should contain certain basic information which can be used by the auditor to assess material requirements. Figure D-4-5 is an example of an engineering drawing.

**D-408.6 Material Allowances**

Material allowances, also known as material adjustment factors, are the difference between the product material requirement and the actual material consumed during manufacturing. The material-allowance factor represents allowances for scrap, attrition, rework, and other factors that influence material cost and cannot be accurately estimated because of incomplete BOMs and future design changes in subcontractor delivery requirements.

Contractors have used various approaches to estimate material allowances. Some of these approaches are acceptable, while others are questionable. Material allowances can be applied to an individual part and be included in the BOM quantity. In other cases, it may be applied as a lump sum to the total material requirement. The basis of these adjustment factors should be closely scrutinized to ensure they are reasonably valid and that there are no duplications. Historical evidence should be available to support the factors. However, the existence of history should not be considered as automatic evidence of validity because the previous losses may have occurred under different circumstances. Factors frequently used in pricing actions should be periodically reviewed under separate assignments. Section 9-407 further addresses material-allowance factors.

a. Scrap is defective material that cannot be used in its present condition. Scrap may result from operator error, unacceptable vendor material, handling damage, or out-of-control processes (such as poor heat treatment). Scrap allowances should normally be based on historical data. Reduction in scrap should be expected as learning occurs.

b. Process loss is the difference between the amount of material required at the beginning of a process and the final amount used for the finished part. In comparison, scrap loss is defective material while process loss is the material lost during the manufacturing process. Process loss may be estimated using an overall factor or separate factors for major sub-elements such as trim loss, chip loss, and excess casting material. BOM quantities for items manufactured from raw material such as sheet metal, bar stock, and composite frequently are adjusted to include process loss factors. Also note that raw-material items like sheet metal and bar stock are generally only available in certain industrial standard sizes and lengths. As a result, estimating factors are frequently applied to the finished material requirement to convert from industry standards to proposed sizes and lengths in order to determine the amount of material to be purchased.

(1) Process Trim Loss. This occurs when a rough cut is made from the standard-size purchased material. Because the dimensions of the rough cut are not perfectly compatible with that of the standard size, the leftover material is commonly known as process trim loss or residual loss. In some instances, it can amount to a large portion of the material required for the end product.

(2) Process Machining Loss. This is the difference between the rough-cut size and final size. The rough cut part may be bored, milled, ground, threaded, or processed in some other way to create a final part.

Process machining and trim losses are often figured together and added to the required raw material quantity. Scrap loss is added as a separate factor.

c. Inventory Adjustments. Physical inventory normally varies from the inventory of record. This is a result of theft, carelessness, or miscounting. Although the variance can be either positive or negative, it is usually negative and known as inventory shrinkage.

d. Inventory Obsolescence. Parts become obsolete in storage because of changes in their physical characteristics. Normally, it is not economically feasible to restore these parts to the required condition. Some parts have a specified shelf life and cannot be used even though they may look visually acceptable. Other parts go through physical deterioration because of excessive heat, humidity, and mishandling. Parts with excessive rust

may be more expensive to clean and restore than to replace. Certain cables, electronic components, and chemicals have shelf lives and are governed by military standards. These parts are disposed of because of expected deterioration.

e. Engineering Obsolescence. Material and parts may be become obsolete because of design changes. These design changes are a consequence of parts testing, failure in field use, and unanticipated user requirements. Engincering changes will result in material not being used on the product. This factor estimates the cost of material that can no longer be used.

f. Engineering Design Growth. Designers often fail to fully comprehend the technical requirements of a proposed product. As a complex program matures and develops, material content will often increase. The costs estimated by this factor should diminish as the program matures.

g. Attrition. This is the allowance established to compensate for loss, breakage, floor shortages, and other damage such as solder burns. The allowance is often used to finance the original overbuying or rebuying of material.

h. Other Allowances. Contractors use other allowance factors besides the attrition factor, and each factor needs to be carefully evaluated on its own merit. Material allowance factors may be offset by salvage income resulting from the sale of scrap or obsolete items. Salvage credits can be substantial, particularly for items categorized as obsolete according to DoD standards. The cost of material can be summarized as:

Total Cost = Material Cost/Item + (Material Allowances - Salvage)

### D-408.7 Estimating Raw Material

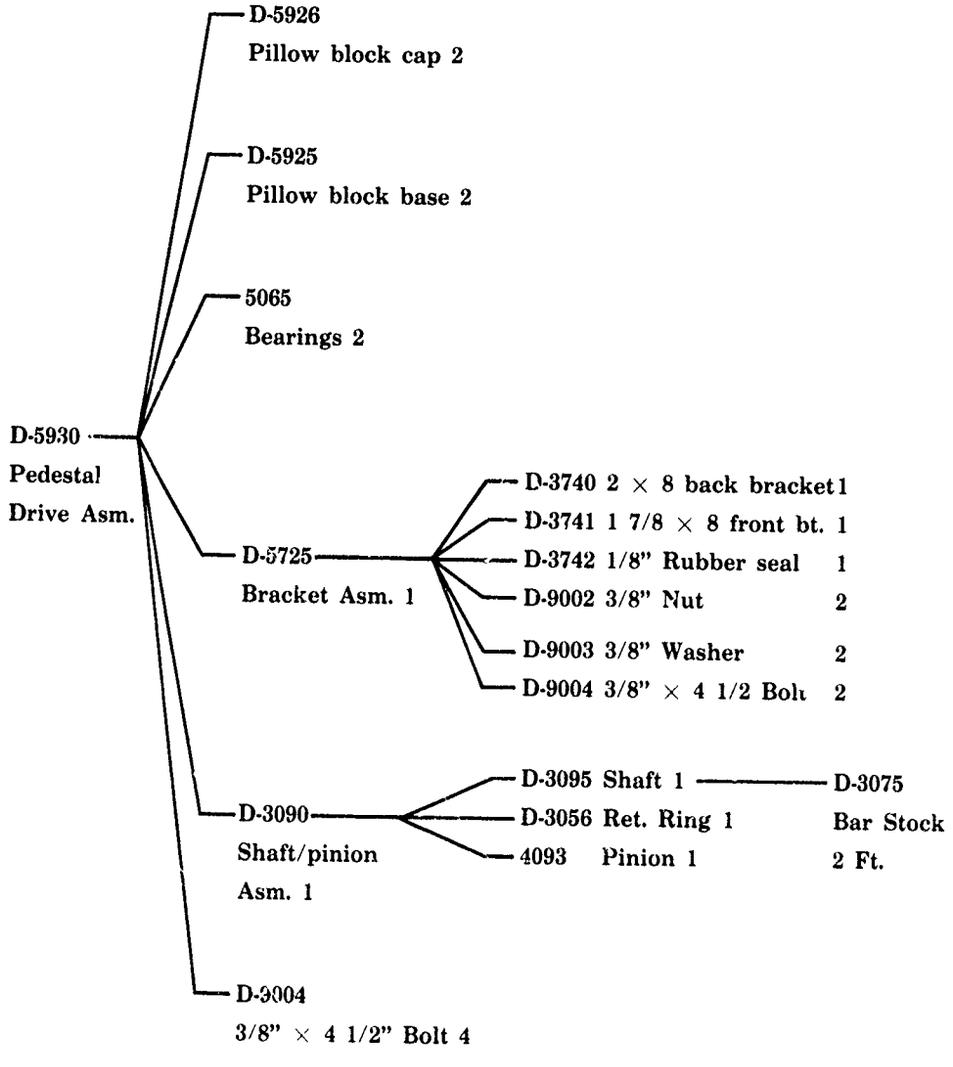
The process of estimating raw material can be complex. To explain the process, a sheet metal part is illustrated in Figure D-4-6.

Figure D-4-1

## Ascending Order — Bill of Material "Exploded" for D-5930 Pedestal Drive Assembly

| Part | Part Description | Where Used | Seq. | Quant | Code | Policy |
|---|---|---|---|---|---|---|
| 4093 | Pinion | D-3090 | 2 | 1 | P | 2 |
| 5065 | Bearing | D-5930 | 4 | 2 | P | 3 |
| D-3056 | Retaining Ring | D-3090 | 3 | 1 | P | 4 |
| D-3075 | 2," Bar Stock | D-3095 | 1 | 2 | P | 4 |
| D-3095 | Shaft | D-3090 | 1 | 1 | A | 1 |
| D-3090 | Shaft/Pinion Asm | D-5930 | 6 | 1 | A | 1 |
| D-3740 | 2 × 8 Back Bracket | D-5725 | 1 | 1 | P | 2 |
| D-3741 | 1 7/8 × 8 ft. Brkt. | D-5725 | 2 | 1 | P | 2 |
| D-3742 | 1/8" Rubber Seal | D-5725 | 3 | 1 | P | 2 |
| D-5725 | Bracket Assembly | D-5930 | 5 | 1 | A | 1 |
| D-5925 | Pillow Blk. Base | D-5930 | 2 | 1 | P | 2 |
| D-5926 | Pillow Blk. Cap | D-5930 | 1 | 1 | P | 2 |
| D-9002 | 3/8" Nut | D-5725 | 4 | 2 | P | 4 |
| D-9003 | 3/8" Washer | D-5725 | 5 | 2 | P | 4 |
| D-9004 | 3/8 × 4 1/2 Bolt | D-5725/5930 | 3/6 | 6 | P | 4 |

**Figure D-4-2**
**Assembly/Subassembly — Bill of Material**



## Figure D-4-3

### Assembly/Subassembly —"Indented" Bill of Material

| Level | Part | Description | Where Used | Seq. | Quant. | Comm. Code | Policy |
|---|---|---|---|---|---|---|---|
| 0 | D-5930 | Pedestal Dr. Asm. | | | 1 | A | 1 |
| 1 | 5065 | Bearings | D-5930 | 4 | 2 | P | 3 |
| 1 | D-3090 | Shaft/Pinion Asm. | D-5930 | 6 | 1 | A | 1 |
| 2 | 4093 | Pinion | D-3090 | 2 | 1 | P | 2 |
| 2 | D-3056 | Retaining Ring | D-3090 | 2 | 1 | P | 4 |
| 2 | D-3095 | Shaft | D-3090 | 1 | 1 | M | 2 |
| 3 | D-3075 | 2 1/4″ Bar Stock | D-3095 | 1 | 2 ft | P | 4 |
| 1 | D-5725 | Bracket Asm. | D-5930 | 5 | 1 | A | 1 |
| 2 | D-3740 | 2 × 8 Bk. Bracket | D-5725 | 1 | 1 | P | 2 |
| 2 | D-3741 | 1 7/8 × 8 ft. Brkt. | D-5725 | 2 | 1 | P | 2 |
| 2 | D-3742 | 1/8″ Rubber Seal | D-5725 | 3 | 1 | P | 2 |
| 2 | D-9002 | 3/8″ Nut | D-5725 | 4 | 2 | P | 4 |
| 2 | D-9003 | 3/8″ Washer | D-5725 | 5 | 2 | P | 4 |
| 2 | D-9004 | 3/8 × 4 1/2 Bolt | D-5725 | 6 | 2 | P | 4 |
| 1 | D-5925 | Pillow Bl. Base | D-5930 | 2 | 2 | P | 3 |
| 1 | D-5926 | Pillow Bl. Cap | D-5930 | 1 | 2 | P | 2 |
| 1 | D-9004 | 3/8 × 4 1/2 Bolt | D-5930 | 3 | 4 | P | 4 |

## FIGURE D-4-4 EXAMPLE OF A ROUTING SHEET

| PART NUMBER | RT CODE | ROUTING SHEET | PAGE NO 1 OF 1 |
|---|---|---|---|
| 8876 902 | A1 | | PRINT DATE 9/25/86 |

| CHANGE NO | BY | ISSUE DATE | PART DESCRIPTION | PROGRAM DESCRIPTION | MIN-MAX |
|---|---|---|---|---|---|
| 8876 902A | KP | 09/24/86 | ARMOUR PLATE | TARGET STATION | 1 - 25 |

| QUANTITY | R MAT CODE | PRODUCT STRUCTURE | PRODUCT DESCRIPTION | DIMENSIONS |
|---|---|---|---|---|
| 19 450 | RSSA | R83000197 | 4340 SHEET STEEL | 12 ¼ × 19 ½ × 197 |

| OPER NO | BEQ NO | DEPT NO | WCN NO | PROCESS DESCRIPTION | T/F/G NUMBER | QT | T/F/G DESCRIPTION | FEED | SPEED | T | S U STD | T | PROD STD | M/MC RAT | M |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0010A1 | 010<br>020<br>030 | 471 | 4012 | MARK AND SHEAR PER LAYOUT SHEET<br>14 PIECES PER SHEET | 8876902 8 01 | 1 | LAYOUT SHEET | | | E | 050 | S | 050 | 1 0 | 1 |
| 0020A1 | 010<br>020<br>030 | 472 | 4013 | DRAW AND CUT TO SHAPE<br>DEBURR EDGES & SHARP CORNERS | 8876902 T 01 | 1 | TEMPLATE | | | E | 050 | S | 250 | 1.0 | |
| 0030A1 | 010<br>020 | 472 | 4020 | USING JIG DRILL 7 HOLES AND DEBURR | 8876902 J 01 | 1 | DRILL JIG | 2 00 | 250 | S | 250 | S | 200 | 1 0 | 1 |
| 0035A1 | 010 | 455 | 4001 | INSPECT | | | | | | N | | N | | | |
| 0040A1 | 010 | 473 | 2095 | HEAT TREAT PER SPEC | MIL-H-6875 M235 | 1 | MIL SPEC SHEET | | | E | 050 | E | 500 | 0 5 | 2 |
| 0045A1 | 010 | 455 | 2020 | INSPECT FOR HARDNESS TO ROCKWELL C 54 | | | | | | N | | N | | | |
| 0050A1 | 010<br>020 | 475 | 3864 | TEMPER FOR 2 HOURS BY HEATING TO 325 F + 20 | | | | | | E | 050 | E | 2250 | 1.0 | 1 |
| 0060A1 | 010<br>020<br>030 | 475 | 3870 | MANGANESE PHOSPHATE COAT PER MIL SPEC<br>TYPE M CLASS 2 | MIL-P-16232 M280 | 1 | MIL SPEC SHEET | | | E | 050 | E | 300 | 1 0 | 1 |
| 0070 | 010 | 475 | 3910 | VAPOR DEGREASE | | | | | | E | 050 | S | 100 | 0 5 | 1 |
| 0080 | 010 | 475 | 3930 | PRIME | | | | | | E | 050 | S | 100 | 1 0 | 1 |
| 0090 | 010 | 475 | 3931 | PAINT GREEN PER SPEC | MIL- M390 | 1 | MIL SPEC SHEET | | | E | 050 | S | 230 | 1 0 | 1 |
| 0100 | 010 | 455 | 3940 | INSPECT | | | | | | N | | N | | | |

**Figure D-4-4**

Explanatory notes to Figure D-4-4

(a) Part Number – Identifies the processes described on the routing sheet to a specific part or assembly. There may be alternate routings for a part number if different types of processing are potentially required. The cost estimator should fashion estimates based on prime routing, or the routing which is most likely to be used.

(b) RT Code – Code used to indicate whether the routing is primary (e.g. A1) or alternate (e.g. B1, C1).

(c) Change Number – This number normally refers to an engineering change notice (ECN) number. It relates directly to a change on a drawing.

(d) By – Initials of the person who made the last change to the routing sheet.

(e) Issue Date – The day the last change was made. This date may be different from the ECN date. Changes in methods, standard, tooling, etc. may be responsible for changes in the issue date.

(f) Part Description – A brief description, usually the name of the part.

(g) Program Description – Indicates the main program or the assembly where this part will be used.

(h) Min-Max – Describes an optimal quantity range for the processes described on the routing sheet. If the shop order quantity outside the indicated range, there may be a more efficient method of producing the part.

(i) Quantity – Represents an amount of material that will be required to fabricate one unit. Quantity may be expressed in pounds, cubic inches or other units of measure. Sometimes, the units will not make sense by themselves. Familiarity with raw material codes and product structures will be required to interpret the quantity.

(j) R. Mat. Code – Contains an abbreviation for the specific type of raw material used. In this example, the code is RSSA. "R" represents raw material, "SS" is for sheet steel, and "A" could mean a special kind of sheet steel, indicate a buyer code, or even a vendor.

(k) Product structure – Indicates the next level part number required to manufacture the part. In this example, there is only one part number, RS3000197, which is a particular type and gauge of raw sheet steel.

(l) Product Description – A name for the part number identified in product structure.

(m) Dimension – Indicates the size of raw material required at the start of the manufacturing process. Normally, this space is used for raw material only. In some cases, it can be used to give more information about the components.

(n) Operation Number – Identifies the work breakdown or operations required to produce the part. The numbers are ascending, and indicate the order in which the work must be performed. In this example, all operations are identified by a six character code. The first four characters specify the sequence, while the last two characters differentiate between primary and alternate operations. In the example, primary operations are identified by the code A1. Secondary operations could be identified by other codes such as B1 and C1. Primary and alternate processes may appear on the same routing sheet.

(o) Sequence Number – Used in updating routing sheets.

(p) Department Number – Identifies the principal department where work is to be performed.

(q) Work Center Number (WCN) – A number identifying the work station where the operation is to be performed. It can refer to a machine, bank of machines, or an assembly bench. Sometimes, department and machine numbers are combined to form a WCN.

(r) Process Description – Describes the process and gives instructions for operators and supervisors.

(s) T/F/G/ Number – This number identifies a tool (T), fixture (F) or gauge (G) required to perform an operation. A tool number could be a physcial tool, numerical control tape number, or an instruction sheet.

(t) QT – Quantity of tools required to perform an operation.

(u) T/F/G Description – Description of tools, fixtures, and gauges.

(v) Feed – Indicates how fast the material should be advanced. Normally, feed is expressed in inches per minute, or inches per revolution.

(w) Speed – RPM (revolutions per minute) at which a machine must operate to produce the part.

(x) T, E, S, and N – T indicates type of labor standard used for set up and production; E shows standard was estimated; S indicates standard was studied or engineered; and N stands for nonstandard operation, or no labor standard (i.e., labor may be indirect or a factor).

(y) S.U. Std (Set-up Standard) – Staff-hours required to setup an operation for production. The alpha character in the preceding column indicates whether the standard was estimated or engineered.

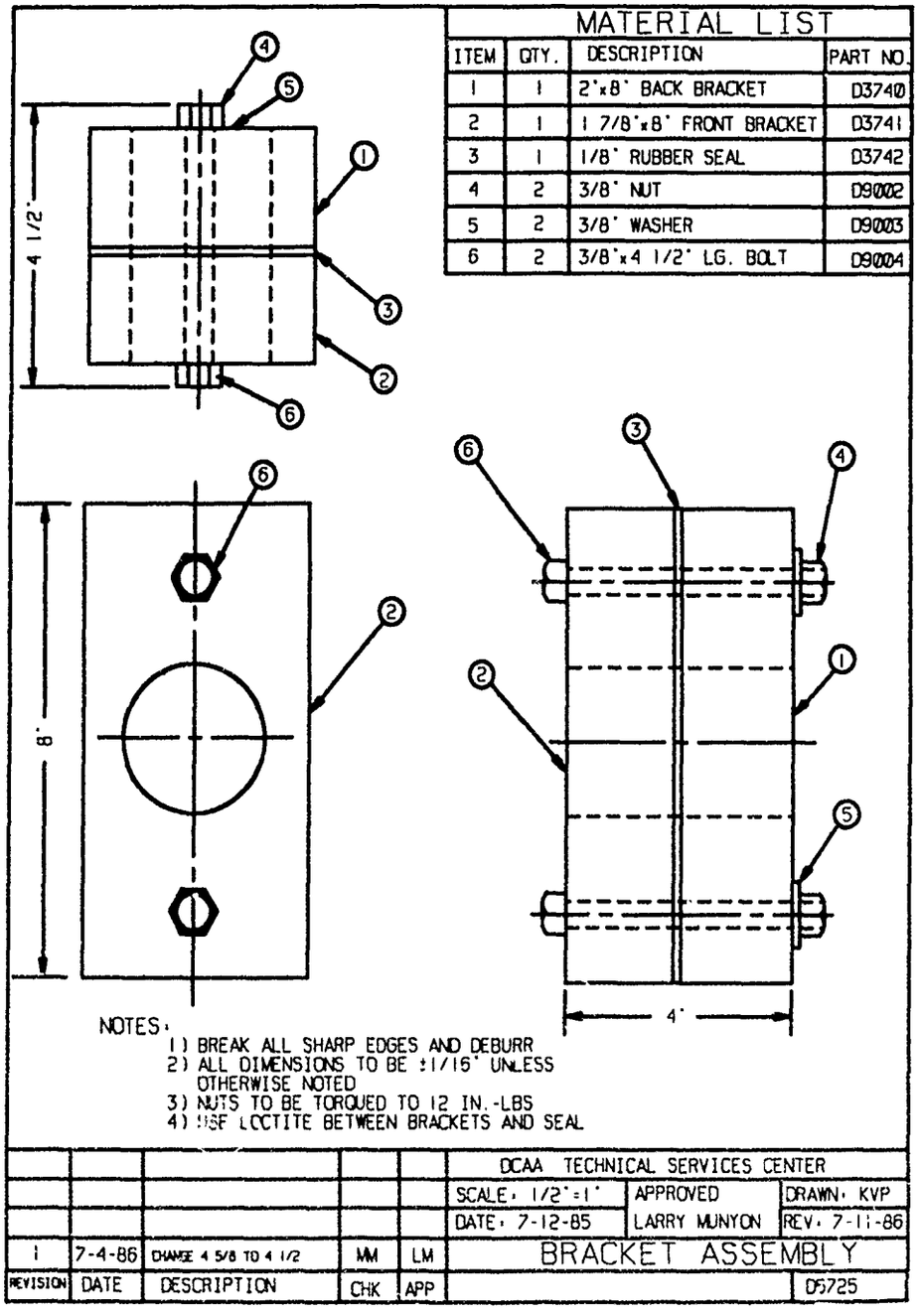
(z) Prod. Std. (Production Standard) – Staff-hours required to perform the operation. The preceding column indicates if the standard is estimated or engineered. Standards are normally in hours per piece. They can also represent time required to produce a lot (e.g. 100 pieces). In this example, the operation is performed on a per piece basis. Hours are rounded to three decimal places. Care should be taken to ensure that estimators do not further round the numbers which may produce overstated estimates.

(aa) M/MC Rat. (Man/Machine Ratio) – Indicates number of people required to perform a task. A operator/machine ratio of .500 means that an operator is required to operate two machines at the same time. A ratio of 2.00 means that the task requires two operators.

(ab) M – Indicates number of machines available, and is used primarily as a scheduling tool.

FIGURE D-4-5

EXAMPLE OF AN ENGINEERING DRAWING

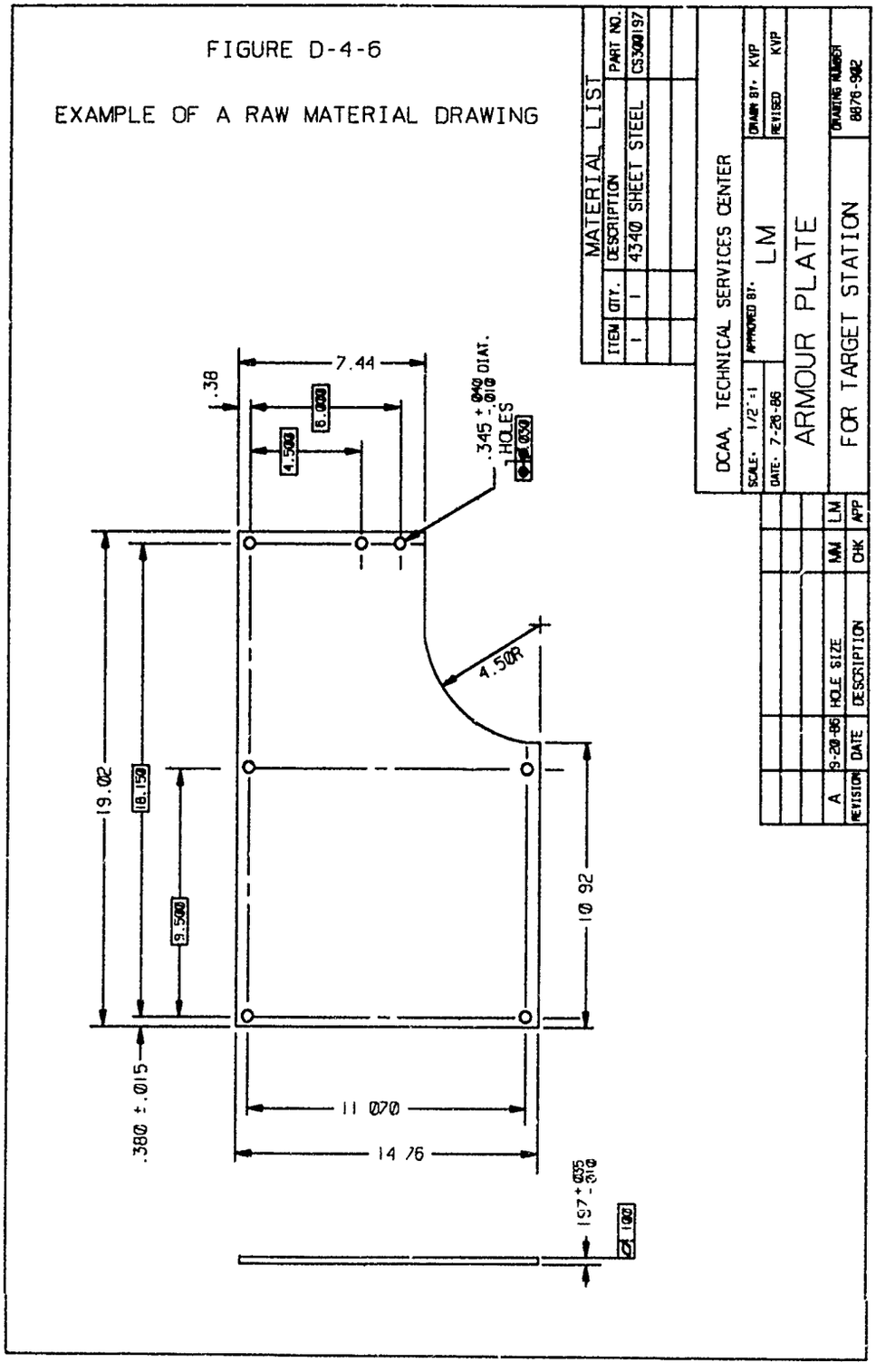


Explanatory notes to Figure D-4-5:

(a) Drawing Number/Part Number – All drawings are numbered by part or assembly number. In some cases, a part drawing may have more than one page. A drawing may depict more than one variation of a basic part.
(b) Sheet Number/Continuation Sheet – Depending upon complexity, any number of sheets may be necessary to show the drawing for a particular item.
(c) Drawing Description – A brief description of the part.
(d) Dimensions – Indicates whether the metric or English system was used to prepare the drawing. A conversion table may be included on the drawing.
(e) Scale – Shows scale used for preparing the drawing. All drawings are drawn to scale to give correct relationships to other components on the drawing.
(f) Tolerances – Design engineers establish ranges for dimensions and other factors so that a manufactured part will function as intended. Tight tolerances result in more costly manufacturing processes.
(g) Size – All drawings are standardized into five sizes for economical storage and reproduction purposes. Sizes range from A to E, with E being the largest. Most contractors store drawings on microfilm attached to punched cards which show part number, description, and drawing size.
(h) Revisions – The revision log lists all changes from initial release and onward. It identifies Engineering Change Notice (ECN) numbers, description, dates, and personnel making the change. There may be ECNs in process which may affect the drawings. Such drawings changes will be incorporated by the drafting department after completion of the approval process. All parts must meet the latest change specifications unless a waiver is obtained from the customer.
(i) Material List – Also known as a bill of material. The parts list identifies all components required to produce the part shown on the drawing by item number. Item numbers cross referenced to a parts list can be shown on the drawing or on a separate sheet. The parts list further provides additional information such as drawing numbers, quantity, part description, required materials, and references to the next higher level of assembly.

Inexperienced users will have to carefully examine drawings to determine material requirements. Occasionally, parts lists may not be included on the drawings or associated documentation. Additionally, some parts may be duplicated on the next drawing level.

(j) Type of Material – Specifies materials to be used and/or alternatives. This reference is very important in verifying the "quality" of proposed parts. The majority of materials used by contractors will be military standard materials.
(k) Notes – Used by the design engineer to communicate special nonstandard requirements or precautions.
(l) Type of Finish – A symbol and/or number indicating the degree of smoothness (finish) required for different surfaces.
(m) Security Classification – Drawings may have security classifications.


FIGURE D-4-6
EXAMPLE OF A RAW MATERIAL DRAWING
MATERIAL LIST
ITEM
QTY.
DESCRIPTION
PART NO.
1
1
4340 SHEET STEEL
CS3001197
DCAA, TECHNICAL SERVICES CENTER
SCALE: 1/2"=1"
APPROVED BY: LM
DRAWN BY: KVP
DATE: 7-26-86
REVISED KVP
ARMOUR PLATE
FOR TARGET STATION
DRAWING NUMBER
8876-982
REVISION
DATE
DESCRIPTION
CHK
APP
A
9-29-86
HOLE SIZE
MM
LM
7.44
.38
6.000
4.500
.345 +.010 -.040 DIAT.
1 HOLES
4.50R
19.02
18.150
9.500
10.92
.380 ±.015
11.070
14.76
1.87 +.010 -.035
Ø1.000

Explanatory notes to Figure D-4-6:

(a) Process machining allowances are added to the designer's finished dimensions on the drawing. In this example, the largest part dimensions are 11.96″ × 19.02″ × .197″ which equals 44.81 cubic inches. The manufacturing engineer knows that he will need to add at least 1/4″ to two sides of the part. This allowance is based on the individual estimator's judgment and experience. Therefore, the amount of material specified is 12.25″ × 19.5″ × .197″ = 47.06 cubic inches. The process machining allowance for this case amounts to 5.0 percent.

(b) Process Trim Allowances are calculated using a method similar to the one described below.

Example Assumptions:

Raw material is available only in 4′ × 8′ (48″ × 96″) sheets.

The dimensions of each piece are 12.25″ × 19.5″ (determined by adding 5 percent process machining allowance).

The contractor has calculated that 14 pieces can be obtained from each sheet.

Calculations:

Amount of material per piece = 64.84 cubic inches ((48″ × 96″ × .197″) / 14)
Trim Allowance = 17.78 cubic inches (64.84 − 47.06)
Trim Allowance as a percentage = 37.8 percent (17.78 / 47.06)

Potential Savings:

If 17 pieces per sheet could be obtained with minimal add-on labor cost, the amount of material per piece could be reduced to 53.4 cubic inches.

This equates to a savings of 17.6 percent per piece when compared to the proposed amount ((64.84 − 53.4) / 64.84).

(c) Unit of Measure Conversion. Sometimes, raw material is expressed in different units of measure. For example, steel is normally purchased and sold by weight (pounds). In the manufacturing environment, it is measured in cubic inches. Conversion is fairly simple and can be accomplished by applying factors. To convert 64.84 cubic inches of steel to pounds, multiply by the factor .281 to obtain the amount (18.22 pounds). Some estimates may use rounded factors which may produce overstated amounts. For example, if .281 were rounded to .3, an overstatement of 6.8 percent would result.

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# APPENDIX E

## E-000 GRAPHIC AND COMPUTATIONAL ANALYSIS TECHNIQUES

### E-001 Scope of Appendix

a. This appendix and Appendix F provide guidance for the auditor in the use of computational methods, charts, and graphs for analyzing contract costs and associated production data. The presentation is directed toward special problems of cost evaluation in the field of contract auditing and is not intended as a general discussion of graphic and computational analysis techniques. Each of the procedures presented should be considered from this limited viewpoint.

b. The techniques discussed in this appendix are not by themselves means of evaluating costs and cost estimates. They are, under appropriate conditions and combined with proper auditing procedures, valuable aids or tools which the auditor may use in establishing a basis of facts from which sound conclusions on the reasonableness and acceptability of the contractor's cost statements may be formed.

c. The discussion of improvement (or learning) curves, which also involves consideration of graphic and computational analysis techniques, has been placed for convenience in a separate appendix, Appendix F.

## E-100 Section 1 — Correlation and Use of Scatter Diagrams

### E-101 Introduction

This section presents information on the objectives of correlation techniques and the preparation of scatter diagrams.

### E-102 Audit Objective

a. The auditor's objective when using the techniques described in this section and in E-200 is to evaluate the relationships and interdependencies that may exist between cost factors. The auditor is concerned with determining, measuring, and describing the manner in which the level of a particular cost or group of costs is influenced by changes in other factors.

b. One of the principal audit uses of these techniques is for identifying current departures from historical cost patterns. The graphic presentations and computations described in the following paragraphs provide a ready means of focusing attention on those costs which are deviating from experienced trends and which, therefore, may be assumed to require some degree of special examination. By thus isolating cost factors needing special examination, the auditor is also provided with a means for improving the control and planning of the audit.

c. Another important use is for predicting costs. Such applications entail establishing a mathematical relationship between a cost the auditor wants to predict and one or more additional factors he is able to predict. For example, if the auditor determines that a contractor's overhead costs are related to direct labor hours, he can use this information to predict overhead rates. Such predictions assume that relationships observed in the past will continue in the future. They are most likely to be reliable when they are within the general range of the historical data. If changed conditions or circumstances, such as operating efficiencies, changes in plant location, etc., which will affect overhead costs are anticipated, projections based on historical data should be adjusted to reflect the related change in costs anticipated.

d. Other applications of these techniques include the evaluation of how closely costs in an overhead pool have been related to various possible bases of allocation.

## E-103 Terminology

a. A variable is a quantity that assumes different values at different times or for different units. A contractor's direct man-hours, average labor rates, and expense levels are examples of variables that assume different values for different periods or points in time. The wage rate and period of service for individual employees are examples of variables that assume different values for different members of a population.

b. Two variables are said to be correlated when there is a measurable tendency for a change in one to be accompanied by a change in the other. If a variable (for example, direct labor hours) is considered to cause changes in the other, it is called the independent (or x) variable. The other variable (for example, indirect labor hours) is called the dependent (or y) variable. The nature of this relationship may vary from one of a high degree of dependence, where a change in the independent variable directly causes a change in the other, to one of merely a casual association. For example, some indirect labor is required to supervise and support direct labor. However, changes in other categories of indirect labor are not directly caused by changes in direct labor requirements. Rather, both are the result of changes in production requirements.

c. Unless otherwise stated, "average" signifies the "arithmetic mean," usually referred to simply as the "mean." In order to avoid any confusion with other types of averages, the word "mean" has been used throughout this appendix wherever possible. The word "average" is used either because it is an adjective or verb or because statistical usage requires it, as in the discussion of "semi-average" and "moving averages." The words "formula" and "equation" are generally used interchangeably. The latter term is preferred when the text pertains to the mathematics involved or where it is necessary to conform to statistical usage as in "simultaneous equations."

## E-104 The Scatter Diagram

### E-104.1 Purpose

The scatter diagram, sometimes called the scattergram, is the basic device for displaying the relationship between two variables. Ordinarily the initial step in simple correlation analysis should be the drawing of such a diagram. If only a rough notion of the degree of relationship is required, the scatter diagram alone may yield adequate results. In other cases, further analysis may be advisable. Nevertheless, the scatter diagram is useful for exploratory purposes in any analysis of quantitative or trend relationships and can serve as a guide to further review and audit work.

### E-104.2 Construction

The scatter diagram is plotted on graph paper using a horizontal x scale to measure values of the independent x values and a vertical y scale to measure values of the dependent y values. The method of plotting should be clear from observation of Figure E-1-1, and it is evident that a scatter of points is obtained. Other illustrations of scatter diagrams are given in Figures E-1-2 to E-1-9. The size of the plot points in these graphs has been exaggerated for the purpose of illustration. In practice, accuracy requires more precise plotting.

### E-104.3 Interpretation

a. Direction, Position, and Linearity of Pattern.

(1) The points of a scatter diagram normally form a pattern having a definite direction with relation to the scales. It is inherent in the construction of diagrams of this type, as illustrated in Figure E-1-1, that when the general path of the pattern is from the lower left to the upper right of the graph. the dependent y values increase with increases in the independent x factor. The correlation in these cases is said to be direct or positive. When the path is from the upper left to the lower right (Figure E-1-2), the dependent y values decrease as the independent x values increase, and the correlation is said to be inverse or negative.

(2) The general path of the scatter of points also indicates whether the correlation is linear or curvilinear. If the central path through the pattern of points from the lowest to the highest x value is approximately a straight line as shown in Figures E-1-1 and E-1-2, the correlation

is linear and there is said to be a constant or straight-line relationship between the variables. If the central path through the pattern is curved, as illustrated in Figure E-1-3, the correlation is curvilinear and a curved-line relationship is said to exist between the variables. It is important to distinguish between linear and curvilinear relationships because different computational techniques are required for analysis of the data. Serious errors may result from assuming a straight-line relationship when the true relationship is curvilinear. An important reason for constructing a scatter diagram prior to computational analysis is to determine from the path of the points the type of analysis that should be used. However, the determination of a functional relationship should not be made exclusively from a scatter diagram; the auditor should also consider the degree of logic in relating the variables concerned.

b. Degree of correlation.

(1) In the ideal case, all the points would fall precisely on a slanted straight line or smooth curve, as in Figures E-1-4 and E-1-5. In such a situation, seldom found in practical work, there is perfect correlation, and the value of one variable may be accounted for and computed from the value of the other variable. When this line is straight and lies at a 45 degree angle to the axis, assuming x and y scales of equal magnitude, a change in one variable would be associated with an equal change in the other variable. However, as the pattern approaches either the horizontal or vertical position, changes in one of the variables are associated with either much smaller or much larger changes in the other variable. When the plotted points fall in a line that is either horizontal or vertical, as in Figures E-1-6 and E-1-7, there is no correlation between the two sets of data, since one and only one value of one of the variables is associated with all values of the other variable. A scatter diagram of fixed expenses and direct labor hours, for example, would show this relationship.

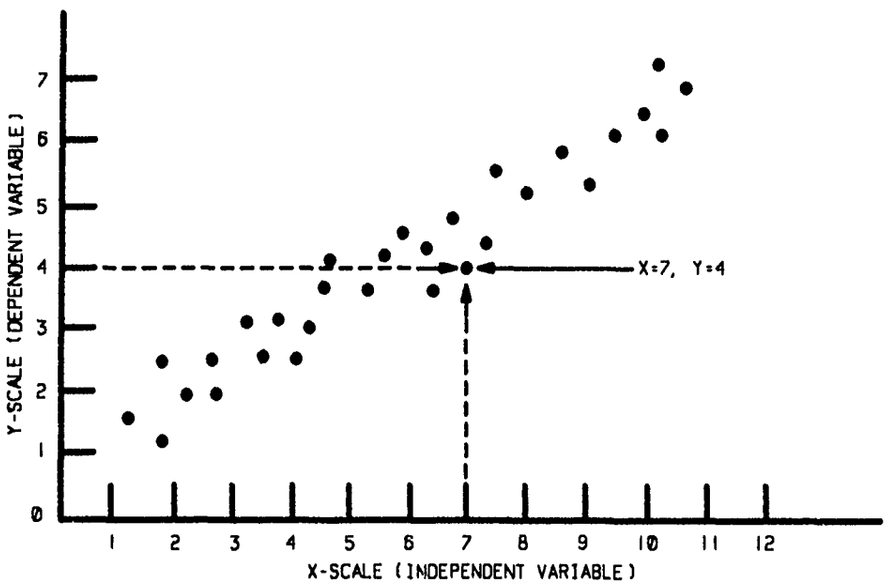
(2) Ordinarily the points do not fall in a line but tend to form a band-like pattern as in Figure E-1-1. The width of this pattern (the scatter of the points), together with its slope as indicated by its line of central tendency, is a direct indication of the degree of correlation or the closeness of the relationship between the two series of data. The degree of correlation indicates the confidence that can be placed on the relationship not on its continuance, but on its historical validity. A very narrow sloping pattern, approximating a line, indicates a high degree of correlation. The wider the pattern and the more that a pattern of a given width approaches the horizontal or vertical, the lower the degree of correlation. If the pattern formed by the points is very wide, as shown in Figure E-1-8, little correlation is present as there is little tendency for one variable to change in consonance with the other.

(3) A distribution or scatter of points that is frequently encountered is illustrated in Figure E-1-9. While most of the plotted points are located within an area that forms a cohesive generalized pattern, some of them lie outside this area, as at (A) in Figure E-1-9. Other points, (B) in Figure E-1-9, while adjacent to or a part of the general pattern area, may be so located as to produce a significant distortion of an otherwise smooth pattern. The values represented by these out-of-pattern points have the effect of reducing the degree of correlation between the two variables; and the more these values deviate from the general pattern for the rest of the data, the greater their adverse effect on the correlation. A material variation in a few values from an otherwise uniform pattern suggests that unusual circumstances might have caused the extreme variation. The presence and nature of these circumstances, however, cannot be assumed. If examination indicates that such variations are characteristic of the data being analyzed and, therefore, pertinent to the analysis, they must be considered in any evaluation and in any estimate or computation. However, if the examination indicates that they are not pertinent to the analysis (for example, they might result from nonrecurring expenditures that have no bearing on the analysis), proper adjustment of the data and the diagram must be made before any further analysis of the data is undertaken or the data evaluated.

(4) Techniques for mathematically evaluating the extent of correlation are described in E-205.

FIGURES E-1-1 THRU E-1-3
SCATTER DIAGRAMS
CLOSE, POSITIVE (DIRECT), LINEAR CORRELATION

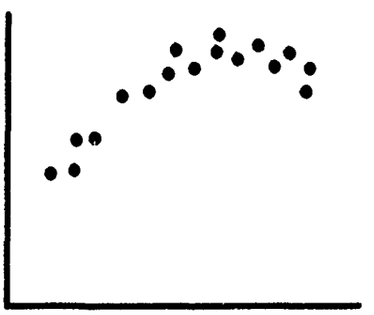
FIGURE E-1-1




CLOSE, NEGATIVE (INVERSE),
LINEAR CORRELATION
FIGURE E-1-2



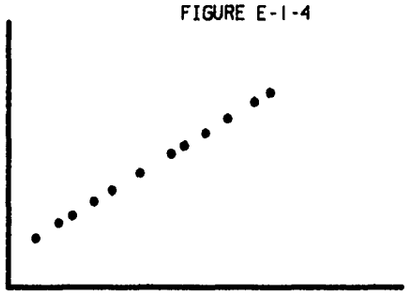
CLOSE, CURVILINEAR
CORRELATION
FIGURE E-1 3



FIGURES E-1-4 THRU E-1-9
SCATTER DIAGRAMS
CLOSE, POSITIVE (DIRECT), LINEAR CORRELATION

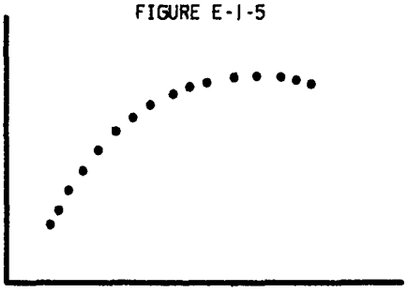
PERFECT, POSITIVE, LINEAR CORRELATION

FIGURE E-1-4



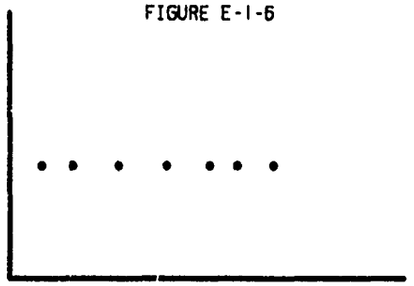
PERFECT, CURVILINEAR CORRELATION

FIGURE E-1-5



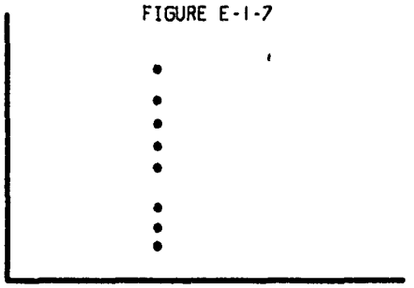
NO CORRELATION. (ONE VALUE OF Y IS ASSOCIATED WITH ALL VALUES OF X)

FIGURE E-1-6



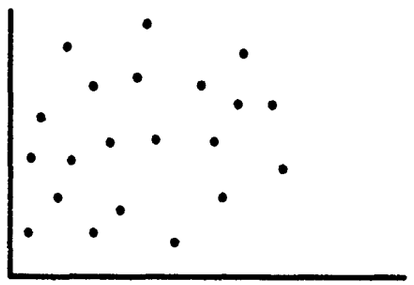
NO CORRELATION. (ONE VALUE OF X IS ASSOCIATED WITH ALL VALUES OF Y)

FIGURE E-1-7



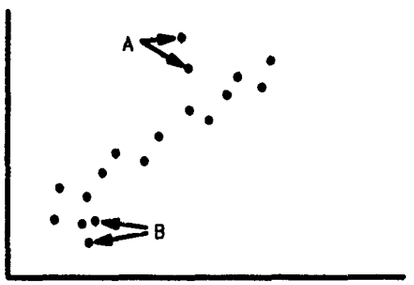
LITTLE OR NO CORRELATION. (NO UNIQUE ASSOCIATION BETWEEN VALUES OF X AND Y)

FIGURE E-1-8



DEGREE OF CORRELATION MATERIALLY REDUCED BY A FEW EXTREME VARIATIONS (A) AND (B)

FIGURE E-1-9



**E-104.4 Selection of Appropriate Graph Paper and Scales**

a. Failure to prepare and to use scatter diagrams in an appropriate manner can lead to formulation of unsound conclusions as to the pattern of the plot points and the degree of correlation between the variables. Some of the relevant factors are discussed below.

b. Ordinary graph paper, with two arithmetic scales, should be used by the auditor in most cases in the construction of scatter diagrams. Graph paper with one or two logarithmic scales is sometimes used in the preparation of scatter diagrams. For a discussion of logarithmic scales see E-312a.

c. The scales selected must have a wide enough range to accommodate the lowest and highest values of the data to be plotted. It is good practice to organize the graph so that the plot points cover a fairly wide area. This will facilitate a visual evaluation of whether the points follow a systematic path. Compression of the dots into a small space may not convey a correct interpretation of the relationship between the variables. An example of a poor choice of scales is illustrated in Figure E-1-10. The restriction of the plot points to a narrow rectangular area at the bottom of the paper results in a diagram that is difficult to interpret. Figure E-1-11, where the same data have been plotted using an expanded scale for the y axis, provides a much better picture of the degree of scatter.

**FIGURE E-1-10**
**SCATTER DIAGRAMS**
**ILLUSTRATION OF POOR CHOICE OF SCALES**

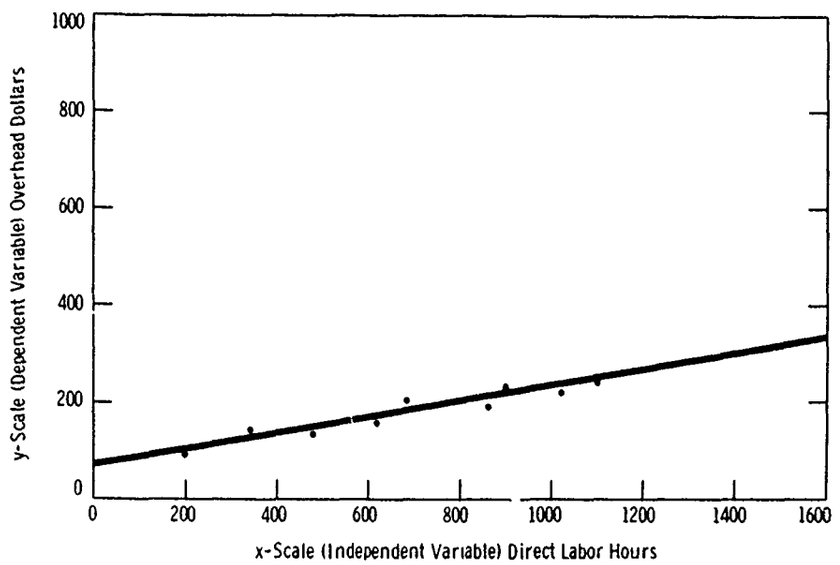
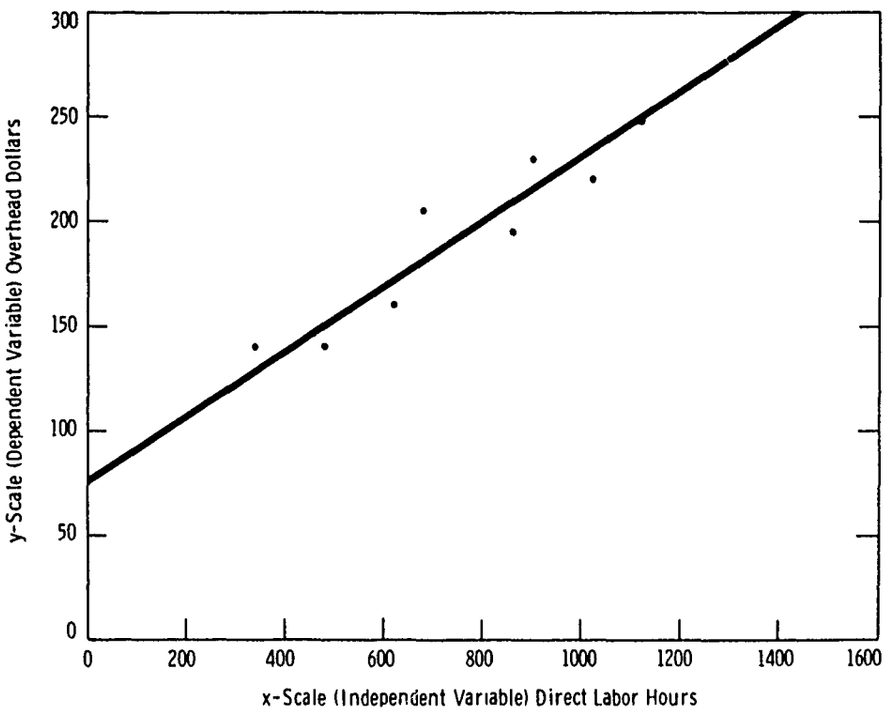


FIGURE E-1-11
ILLUSTRATION OF CORRECT CHOICE OF SCALES




d. In some cases, a better picture of the pattern and spread of the plot points can be obtained if the smaller values on one or both scales are suppressed. This will, however, result in a distortion of the range data relative to the total possible range. In addition, where the unit of measure (e.g. dollars) is the same for both the x and y values, the use of different scales will distort the relative magnitude of the variable. These distortions are not important when the sole purpose of the diagram is to evaluate the pattern of the plot points and degree of correlation of the two variables, but they detract from the use of the diagram for other purposes. Further comments on this subject are presented in E-312b.

**E-104.5 Time Relationships**

a. Although no time scale is shown on a scatter diagram, the time element may be introduced by joining, numbering, coding, or otherwise identifying the successive points.

b. Figure E-1-12 is a chart correlating general and administrative expenses to the base, cost input, for a period of 13

quarters. The points have been joined according to time sequence. This line shows that the period was one of generally rising production except for two quarters between B and C. During this period of declining business, G&A expenses remained at a higher level relative to cost input than the auditor might expect from observation of the trend established during the first four quarters, A to B. When production again resumed an upward direction, the trend of G&A expenses was parallel to but at some distance above the previous trend. The auditor would want to know why G&A expenses did not decline during the period B to C and why the correlation of these expenses to cost input established a new trend at a significantly higher level than in the earlier months.

c. When used with discretion, indicating time on the diagram can be useful for detecting changes in relationships due to inflation or some other factor that occurs over a period of time and for identifying portions of the data that may require special examination. Because a least-squares line fitted to the same data may not reveal this type of information, it is advisable to use both techniques.

**FIGURE E-1-12**
**SCATTER DIAGRAMS**
**ILLUSTRATION OF JOINING POINTS BY TIME SEQUENCE**

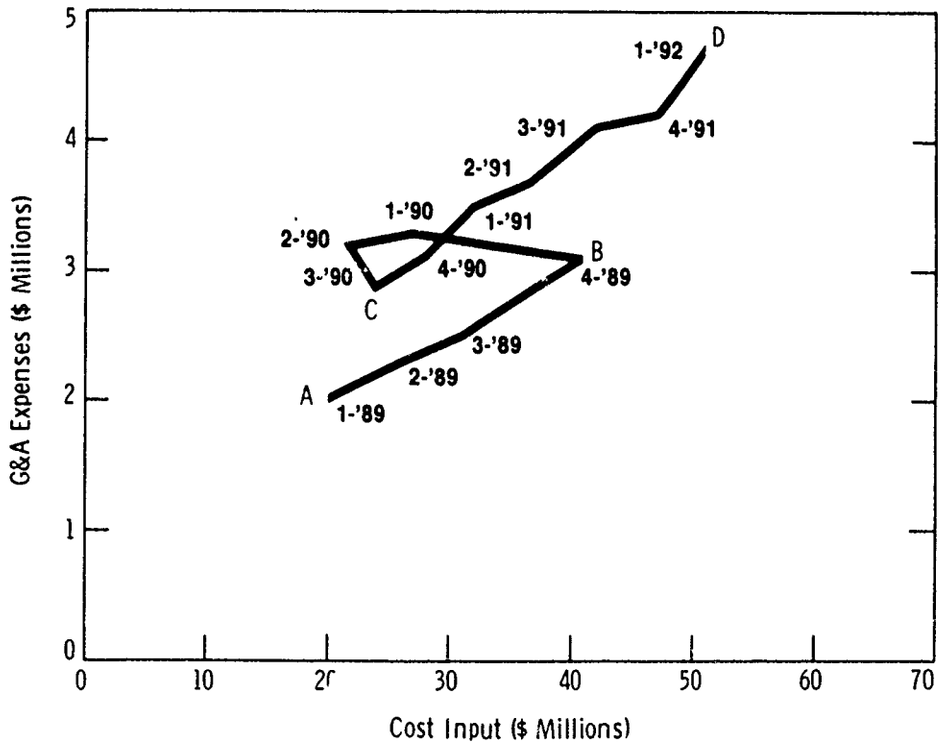
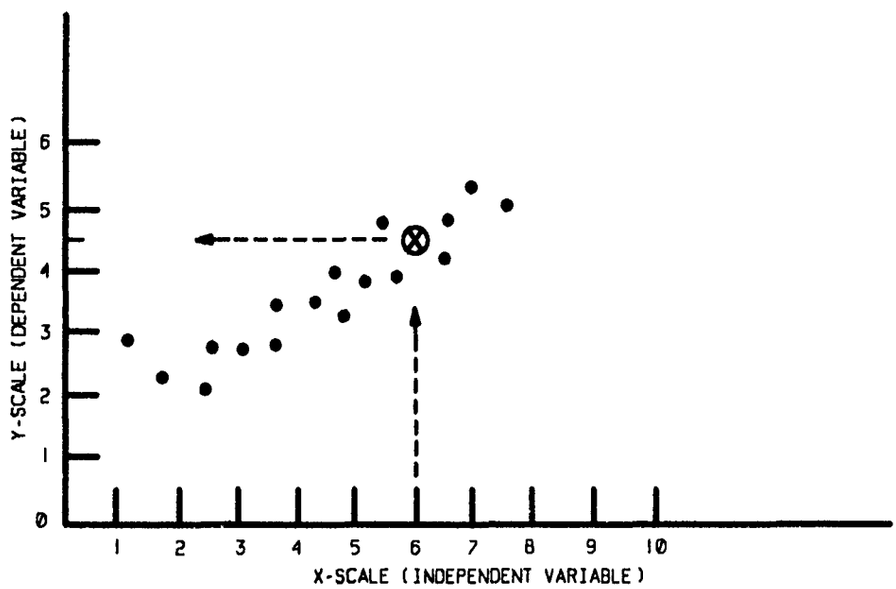


FIGURE E-1-13
ESTIMATING OR EVALUATING AN ESTIMATE OF THE DEPENDENT (Y) VALUE
FROM A KNOWN INDEPENDENT (X) VALUE




GIVEN: AN INDEPENDENT VARIABLE (X) EQUAL TO 6, MOVE VERTICALLY TO THE CENTER OF PATTERN OF POINTS REPRESENTED BY ⊗. FROM ⊗ MOVE HORIZONTALLY TO Y-SCALE AND READ THE SCALE VALUE OF $4\frac{1}{2}$

THUS FOR X=6, Y=$4\frac{1}{2}$

**E-104.6 Use and Limitations**

a. The scatter diagram, without the refinements of computational analysis discussed in subsequent paragraphs, may be adequate when the auditor's purpose is to identify current departures from historical patterns, as discussed in E-402. It also can provide a quick appraisal of the degree of relationship between two variables and the general pattern of this relationship.

b. A rough estimate of the amount of a dependent y variable from a given value of the independent x variable, or the evaluation of an estimation, may be made directly from the scatter diagram. To accomplish this, first locate, as in Figure E-1-13, the point on the horizontal x scale which represents a given value of the independent x variable. From this point move vertically and parallel to the y-scale until the approximate center line of the pattern is reached. From this point move horizontally to the y-scale and read the indicated value as an estimated value of the dependent y variable. Alternatively, a line that follows the central path through the plotted points can be drawn judgmentally through the scatter diagram and used to estimate the amount of the dependent variable corresponding to any given value of the independent variable. The line should be drawn in such a manner that the sum of the vertical distances between the line and the points above the line is approximately equal to the sum of the vertical distances between the line and the points below the line. If a straight line best fits the pattern, this may be accomplished by drawing the line through the plotted mean values of the two variables. The first step is to average separately the x values and the y values and plot the point corresponding to these averages. The line may then be drawn based on visual observation by placing a ruler through the scatter of points and rotating it on the plot point of the mean values until it falls along a path that appears to provide the best fit.

c. While in many instances the scatter diagram and the approximated line of best fit described in b. above furnish sufficient information for preliminary determinations, their usefulness is limited by the auditor's inability, using only the diagram, to define precisely the location of the path of central tendency or to determine objectively the closeness of the association between the variables. Furthermore, a straight line fitted judgmentally to a scattergram will differ according to the opinion and experience of each individual and can be subject to disagreement as to whether it is properly drawn. E-200 discusses how a unique line of best fit can be fitted to historical data based on a mathematical equation which has been judgmentally determined to express a logical cause and effect relationship.

# E-200 Section 2 — Regression and Correlation Analysis

## E-201 Introduction

This section presents a brief discussion of the mathematical procedures used to express relationships between two or more variables, the use of E-Z-Quant to perform the necessary calculations, and other aspects of regression and correlation analysis applicable to the evaluation of contract costs.

## E-202 Simple Linear Regression Analysis

### E-202.1 Definition and Concept

a. Paragraph E-104.3a.(2) explained that it is possible to fit either a straight or curved line to a set of data; different computations are required for each type of line and the type should be so selected that it expresses a logical relationship between the variables and follows the central path or trend pattern of the data. Many of the relationships which are of interest to the contract auditor tend to follow a straight line. This paragraph is limited to the fitting of a straight line. To apply the described techniques to curvilinear relationships or situations involving more than two variables see E-203 and E-204.

b. If two variables x and y are associated by a straight-line relationship, the equation expressing that relationship is commonly designated as:

$y=a + bx$

where a is the value or point at which the line if it were extended would intersect the vertical y axis and b is the slope of the line, that is, the ratio of the change in the dependent y variable that is associated with a given change in the independent x variable. In other words, b tells how much y changes for a change of unity in the value of x. When the sign of b is positive, the line slopes upward; when negative, the line has a downward trend.

The values in a regression equation which are calculated from the observed data are referred to as "coefficients" (also termed "parameters"). Thus, a and b are the coefficients of this regression equation because they are calculated based on the observed values of x and y, as discussed in E-202.1e.

c. As indicated in E-104.6c, a freehand straight line which is judgmentally fitted to a scatter diagram will vary from individual to individual; different auditors using the same data would draw slightly different lines. To be unique, the line should satisfy the mathematical requirements for a straight line of best fit. Such a line then represents a mathematical determination and is, therefore, not influenced by the auditor's judgment. A line so determined is commonly referred to as the simple linear regression line, the straight line of least-squares, the least-squares straight line, the straight line of average relationships, and the straight line of best fit. All of these names are descriptive of the characteristics of the unique line which satisfies the following requirement: the sum of the squares of the vertical distances from each point to the line is less than any other straight line. In order to obtain the equation of the line which meets this requirement, it is necessary to calculate values for the coefficients a and b so that the sum of the squares of the differences between the actual observed values of the independent variable y and the corresponding values calculated from the equation shown in paragraph b. is minimized.

d. The use of the least-squares principle is based on complex statistical concepts. However, it may be observed that the sum of the squares of the differences between a series of numbers and their mean is less than for any value other than the mean, and the use of the least-squares criterion in evaluating more complex relationships may be regarded as an extension of the concept of a mean. Figures E-2-1 and E-2-3 show simple linear regression lines fitted to data points. Figure E-2-3 and the related table of data in E-205.1b. are particularly helpful in visualizing the following characteristics of such a line:

(1) The sum of the squares of the vertical distances between the regression line and the points is less than for any other straight line.

(2) The sum of the distances above the line equals the sum of the distances below the line.

(3) The line passes through the point corresponding to the mean of the observed values of the x variable and the mean of the observed values of the y variable.

e. The values of a and b which will minimize the sum of the squares of the differences between the actual and calculated values of the dependent variable are provided by the following equation:

$$b = \frac{\Sigma xy - \Sigma x \, \Sigma y/n}{\Sigma x^2 - (\Sigma x)^2/n}$$

$$a = \frac{\Sigma y - b\Sigma x}{n}$$

where n = the number of observations
$\Sigma y$ = the sum of the observed values of y
$\Sigma x$ = the sum of the observed values of x
$\Sigma xy$ = the sum of the products of the observed values of x and y
$\Sigma x^2$ = the sum of the squares of the observed values of x

In using these equations, b is calculated first and then used in the calculation of a. An example of such calculations is shown in E-202.2a.

f. In addition to the values of a and b, it is necessary to calculate other statistics which measure the degree of closeness of the linear relationship between the two variables. The statistics generally used for this purpose are the coefficient (or index) of correlation, denoted r, and the coefficient (or index) of determination, denoted $r^2$. The coefficient of correlation may be computed by means of the following equation:

$$r = \frac{\Sigma xy - \Sigma x \, \Sigma y/n}{\sqrt{[\Sigma x^2 - (\Sigma x)^2/n] \, [\Sigma y^2 - (\Sigma y)^2/n]}}$$

An example of the computation of the coefficient of correlation using the equation is illustrated in E-202.2b. The coefficient of determination may be calculated by simply squaring the coefficient of correlation as shown in E-202.2b., or by using the more general equation described in E-205.1a. The possible values of r range from -1 (perfect negative correlation) to 1 (perfect positive correlation) and the values of $r^2$ range from 0 (no correlation) to 1 (perfect correlation). Further information on the interpretation of these statistics is contained in E-205.

g. A considerable savings in auditor time, together with greater assurance of accuracy, can be realized by the use of E-Z-Quant to perform the calculations described in the preceding subparagraphs. Further information on this program is contained in E-202.3.

**E-202.2 Example of Manual Computations**

a. The given and computed values required in the equations for determining the least-squares regression line and the coefficients of correlation and determination for two variables are shown in the following table. The given data are in the first four columns; the last three columns are computed.

¶E-202.2a.

| Year | Quarter | Direct Labor $x$ | Overhead Expense $y$ | $x^2$ | $y^2$ | $xy$ |
|---|---|---|---|---|---|---|
| | | (in thousands) | | | | |
| 1990 | 1 | $1,203 | $3,212 | 1,447,209 | 10,316,944 | 3,864,036 |
| | 2 | 1,304 | 3,367 | 1,700,416 | 11,336,689 | 4,390,568 |
| | 3 | 872 | 2,573 | 760,384 | 6,620,329 | 2,243,656 |
| | 4 | 1,104 | 2,804 | 1,218,816 | 7,862,416 | 3,095,616 |
| 1991 | 1 | 1,176 | 2,873 | 1,382,976 | 8,254,129 | 3,378,648 |
| | 2 | 1,258 | 3,376 | 1,582,564 | 11,397,376 | 4,247,008 |
| | 3 | 983 | 2,701 | 966,289 | 7,295,401 | 2,655,083 |
| | 4 | 1,283 | 3,572 | 1,646,089 | 12,759,184 | 4,582,876 |
| 1992 | 1 | 1,576 | 3,862 | 2,483,776 | 14,915,044 | 6,086,512 |
| | 2 | 1,372 | 3,303 | 1,882,384 | 10,909,809 | 4,531,716 |
| | 3 | 956 | 2,678 | 913,936 | 7,171,684 | 2,560,168 |
| | 4 | 957 | 2,684 | 915,849 | 7,203,856 | 2,568,588 |
| Σ or | Total | $14,044 | $37,005 | $16,900,688 | $116,042,861 | $44,204,475 |

To find the value of b, substitute the appropriate values from the above table in the equation for b given in E-202.1e as follows:

$$b = \frac{44,204,475 - (14,044)\ (37,005)/12}{16,900,688 - (14,044)^2/12}$$

$$= 1.92947$$

Now that the value of b is known, the appropriate values can be substituted in the equation for a giving

$$a = \frac{37,005 - (1.92947)\ (14,044)}{12}$$

$$= 825.628$$

b. To draw the regression line, the value of a (825.628) and any other calculated point on the line are sufficient to determine the position of the line. Using, for example, a value of x = 1000, substitution in the equation y = a + bx yields y = 825.628 + (1.92947)(1000)

= 2755.1

Figure E-2-1 shows the plot points of the actual data and the regression line drawn through the a value of 825.628 on the y axis and the plot point x = 1000, y = 2755.1. As a check of the work, it is good practice to plot a third point in drawing the line. These three points should lie on a straight line.

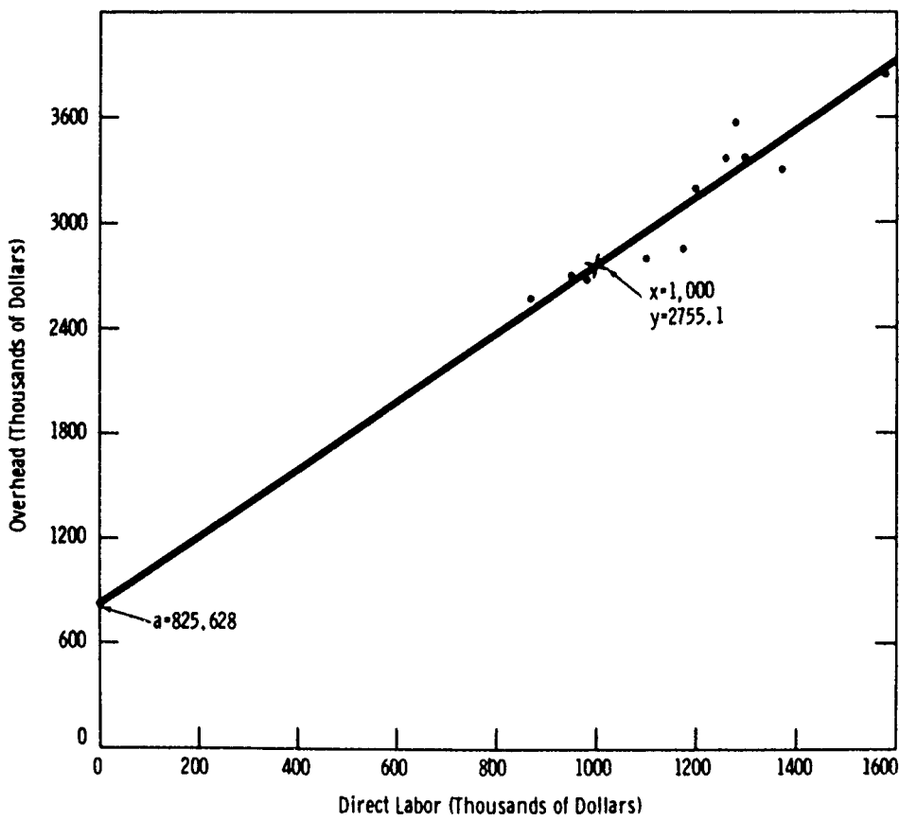
c. In the same way, the coefficient of correlation may be computed by substituting the appropriate values in the equation given in E-202.1f for r.

$$r = \frac{44,204,475 - (14,044)(37,005/12)}{\sqrt{[16,900,688-(14044)\ /12]\ [116,042,861-(37,005)\ /12]}}$$

= .946917

The coefficient of determination is equal to .946917 squared or $r^2$ = .896651

FIGURE E-2-1
GRAPH OF SIMPLE LINEAR REGRESSION LINE




**E-202.3 Example of Computerized Regression**

a. The E-Z-Quant package is available to perform the regression analysis computations. E-Z-Quant is described, operationally and with some theoretical treatment, in DCAAP 7641.91, Quantitative Methods for Auditors.

b. The two pages of Figure E-2-2 illustrate the use of regression software to fit a line to the data described in E-202.2a and plotted in Figure E-2-1. The option shown is multiple regression (discussed in E-204), though in this case a single explanatory (independent) variable is used. Also, the auditor can use the simple (two variables) regression option of E-Z-Quant (described in DCAAP 7641.91) to perform the same regression. Figure E-2-2 shows only the most prominent features of the E-Z-Quant multiple regression option. The user will encounter other queries and instructions in an E-Z-Quant session, but they are of no concern here.

c. The first part of Figure E-2-2 shows how the data file looks when it is ready for regression processing. The rest of the figure shows the regression output from the multiple regression option. The first table, the correlation coefficients, depicts the linear correlation between pairs of variables.

d. The second table lists the coefficients that were estimated by the regression analysis, the associated "t" value for the b coefficient, the "inclusion assurance" for the b coefficient, and the "comparison assurance" for the regression

equation. The t values are computed for each independent variable coefficient to answer the question, "Is the appearance of a relationship (the value of the coefficient) simply a random event, or is there reason to believe that a relationship does exist between the dependent variable and this independent variable?'. In this example, the computed "t" value corresponds to an inclusion assurance of 99.9 percent for the b coefficient. For each independent variable coefficient, the inclusion assurance is the assurance (or confidence) that the regression equation is a better predictor with (rather than without) that particular variable. Section 4, DCAAP 7641.91 provides additional guidance on acceptable levels for inclusion assurance values reported by E-Z-Quant. The other calculated statistic, comparison assurance, is discussed in E-205.2c.

e. The third table compares the calculated and actual values for the dependent variable for each case (or observation). This table can assist the auditor in identifying out-of-pattern plot points which should be reviewed with greater scrutiny. It also assists in identifying significant "runs" of points above and below the regression line, as described in E-208f.

f. The last table shows how projections can be made using the regression equation. A projected value of the dependent variable (DVAR) will be calculated for each independent variable (IVAR) value entered by the auditor.

g. To plot the regression line, the value of a (i.e., 825.628 which corresponds to x = 0) and any pair of x and calculated y values (for example, x = 1203 and y = 3146.45) are sufficient to determine the position of the regression line. Alternatively, for ease in plotting, the auditor may prefer to use a rounded value for the x variable, such as 1000. In Figure E-2-2 the auditor followed this procedure and found that when x is 1000, the projected y value is 2755.10. This pair of values is then used for plotting the regression line. It is good practice to check the accuracy of the line by verifying that a third pair of x and calculated y values falls on the line.

## Figure E-2-2
## LINEAR REGRESSION OF E-Z-QUANT

PAGE: 1 EDITING DATA FILE

| ROW NO. | (DEP VRBL) COLUMN 1 | (IND VRBL) COLUMN 2 |
|---|---|---|
| 1 | 3212 | 1203 |
| 2 | 3367 | 1304 |
| 3 | 2573 | 872 |
| 4 | 2804 | 1106 |
| 5 | 2873 | 1176 |
| 6 | 3376 | 1258 |
| 7 | 2701 | 983 |
| 8 | 3572 | 1283 |
| 9 | 3862 | 1576 |
| 10 | 3303 | 1372 |

PAGE: 2 EDITING DATA FILE

| ROW NO. | (DEP VRBL) COLUMN 1 | (IND VRBL) COLUMN 2 |
|---|---|---|
| 11 | 2678 | 956 |
| 12 | 2684 | 957 |

CORRELATION COEFFICIENTS
for all pairs of variables

| | VARIABLES | |
|---|---|---|
| VARIABLE | DVAR | IVAR1 |
| DVAR | 1.000000 | |
| IVAR1 | 0.946917 | 1.000000 |

REGRESSION COEFFICIENTS
and statistics for the fitted equation

DVAR = a + b*IVAR1

| Variable | ID | Coefficient Value | Computed T Value | Inclusion* Assurance |
|---|---|---|---|---|
| (constant) | a | 825.627617360 | | |
| IVAR1 | b | 1.92946942407 | 9.3145 | 99.9 + % |

*Assurance that inclusion of the variable improved the equation as a predictor of the dependent variable (DVAR)

Number of data points: 12 Avg. value of DVAR: 3083.75

Coefficient of determination (r-squared): .8966512
Comparison assurance that the equation is a better predictor of DVAR than the average DVAR: 99.9%

**Figure E-2-2**

COMPARISON OF OBSERVED AND CALCULATED VALUES
of the dependent variable (DVAR)

| Item No. | Actual DVAR | Calculated DVAR | Difference (act.-Calc.) | Percent Diff. (Diff./Act.) |
|---|---|---|---|---|
| 1 | 3212 | 3146.77933 | 65.2206655 | 2.1 |
| 2 | 3367 | 3341.65575 | 25.3442536 | .8 |
| 3 | 2573 | 2508.12496 | 64.8750448 | 2.6 |
| 4 | 2804 | 2955.76186 | −151.761862 | −5.1 |
| 5 | 2873 | 3094.68366 | −221.683660 | −7.2 |
| 6 | 3376 | 3252.90015 | 123.099847 | 3.8 |
| 7 | 2701 | 2722.29606 | −21.2960612 | −.8 |
| 8 | 3572 | 3301.13689 | 270.863112 | 8.2 |
| 9 | 3862 | 3866.47143 | −4.47142970 | −.1 |
| 10 | 3303 | 3472.85967 | −169.859667 | −4.9 |
| 11 | 2678 | 2670.20039 | 7.79961323 | .3 |
| 12 | 2684 | 2672.12986 | 11.8701438 | .4 |

PROJECTIONS
Using The Fitted Equation
DVAR = a + b* IVAR1

| DVAR | IVAR1 |
|---|---|
| 2755.0970414 | 1000 |
| 3526.8848111 | 1400 |
| 3623.3582823 | 1450 |
| 3816.3052247 | 1550 |

## E-203 Curvilinear Regression Analysis

a. The same least-squares criterion which is used to obtain a straight line of best fit, as described in E-202, can be applied to more complicated equations. The equation used should be the one which has been judgmentally determined to reflect a logical relationship between the variables. Since these equations can be represented by a curved line on a scattergram, the process of mathematically fitting this line to data is referred to as curvilinear regression analysis. There are an infinite number of non-linear equations; however, only a few of them have been found to have application to contract cost audits.

b. The curvilinear models with greatest applicability to contract audit are improvement curves. Comprehensive guidance on the use of improvement curves is provided in Appendix F.

c. Another curve with applicability to certain business data is expressed by the simple exponential or compound interest equation

$$y = a\ (1 + r)^x$$

Several types of business data tend to follow such a curve. For example:

(1) where y is the principal plus interest of an amount a, compounded x times at a fixed rate r, or

(2) where y is the remaining book value of an asset purchased for an amount a, and depreciated x years by the declining balance method with rate r, or

(3) where y is a price level or wage level which has increased (or is expected to increase) from a level a, at a constant rate r for x periods of time, or

(4) where y is the price of a new product which has decreased (or is expected to decrease) from a level a, at a constant rate r for x periods.

It should be noted that in fitting a least-squares line to a time series, as suggested by (3) and (4), a thorough understanding of the caveats discussed in E-310 is essential.

d. An exponential curve appears as a straight line on semi-logarithmic graph paper. Curve type 2 in the simple regression option of E-Z-Quant can be used to fit this type of curve to historical data. An application of this software for curvilinear analysis is discussed in E-311. Figure E-3-3 shows the important output features of the simple regression option of E-Z-Quant. In this figure, the equation y = a*b^x at first glance appears to be unlike the expression given above in E-203.c. That expression, when written in the form shown on the output, would be y = a * (1 + r)^x. Since B is equal to 1 + r, the expressions are functionally the same.

## E-204 Multiple Regression Analysis

a. Multiple regression analysis is concerned with evaluating the relationship between a dependent variable and two or more independent variables, and is used in those applications where the regression of y on a single independent variable is found to be inadequate. It employs the least-squares method to determine the combined effect of the independent variables on the dependent variable. Since more than two variables are involved, this relationship cannot be plotted graphically; however, the same principles and techniques are involved as in simple regression analysis.

b. The equation used in most calculations of multiple regression analyses takes the form of

$$y = a + bx_1 + cx_2 \ldots$$

where y is the dependent variable,

$x_1$ is the first independent variable,

$x_2$ is the second, and so on.

The letters a, b, c . . . stand for constants (coefficients) which minimize the sum of the squares of differences between the actual values of y and values calculated from the equation. In addition to calculating the values of these coefficients, it is necessary to calculate a statistic which measures the closeness of the relationship between the dependent variable and the independent variables. This statistic, called the coefficient (or index) of determination, is discussed in E-205.

c. The computations required in multiple regression analysis are so laborious that manually fitting just one least-squares equation can be prohibitively time-consuming. However, the computer performs the computations so rapidly that the auditor can experiment with various combinations of independent variables until he or she finds the combination which seems to provide the best prediction of the dependent variable in which he is interested.

d. An example of the use of the multiple regression option of E-Z-Quant is given above in E-202.3, though in that case, a single independent variable was used. Additional discussion of the E-Z-Quant option is available in DCAAP 7641.91.

## E-205 Correlation Analysis

As explained in the preceding paragraphs of this section, regression analysis is concerned with obtaining equations which express functional relationships among variables. Correlation analysis is concerned with evaluating how closely the variables are related.

### E-205.1 Interpretation of Coefficient of Determination

a. The statistic most widely available and commonly used to evaluate how well an equation fits available data is the coefficient of determination, denoted $r^2$. In its simplest form, the equation for this statistic is as follows:

$$r^2 = 1 - \frac{\Sigma(y - y_{..})^2}{\Sigma(y - y_{.})^2} = 1 - \frac{SSE}{SST}$$

or

$$r^2 = \frac{\Sigma(y_{..} - y_{.})^2}{(y - y_{.})^2} = \frac{SSR}{SST}$$

Where $y$ = observed values of $y$
$y_{.}$ = average observed value of $y$
$y_{..}$ = value of $y$ computed from the regression equation

$\Sigma(y-y.)^2$ = SST = "total sum of squares": sum of squares of differences between the observed values of *y* and the average value of *y*.

$\Sigma(y-y..)^2$ = SSE = "error sum of squares": sum of squares of differences between the observed values of *y* and the corresponding values computed from the regression equation, and

$\Sigma(y..-y.)^2$ = SSR = "regression sum of squares": sum of squares of differences between the values of y on the regression line and the average value of *y*.

b. In simple linear regression, the coefficient of determination measures how much closer the plot points are to the regression line than they are to a line drawn horizontally through the average of the y values. This is illustrated graphically in Figure E-2-3, using the following data:

| Observed Values | | | Calculated Values | | |
|---|---|---|---|---|---|
| | | | SSE | SST | SSR |
| *x* | *y* | *y..* | $(y-y..)^2$ | $(y-y.)^2$ | $(y..-y.)^2$ |
| 44 | 46 | 44 | 4 | 441 | 529 |
| 60 | 47 | 52 | 25 | 400 | 225 |
| 76 | 62 | 60 | 4 | 25 | 49 |
| 110 | 79 | 77 | 4 | 144 | 100 |
| 160 | 101 | 102 | 1 | 1156 | 1225 |
| 450 | 335 | 335 | 38 | 2166 | 2128 |

Fitting a least-squares regression line to the observed values shown above yields values of 22 for a and .5 for b. Therefore, the values of y are equal to 22 +. 5x. The value of y is 335 ÷ 5 = 67. Based on the above totals the value of $r^2$ is as follows:

$$r^2 = 1 - \frac{38}{2166} = \frac{2128}{2166} = .9825$$

c. As shown in the equation above, the coefficient of determination measures how well the regression fits the data. The value of $r^2$ compares how much closer the historical values of y are to the regression line than they are to the average value of y. The coefficient of determination is used to evaluate the relative efficiency of predicting future values of y based on the regression equation, as opposed to predicting that future values of y will equal the average value of y in the historical data. The value of $r^2$ is not indicative of how much better (or worse) predictions based on the regression line will be compared with predictions based on, for example, a judgmental evaluation or the contractor's most recent experience.

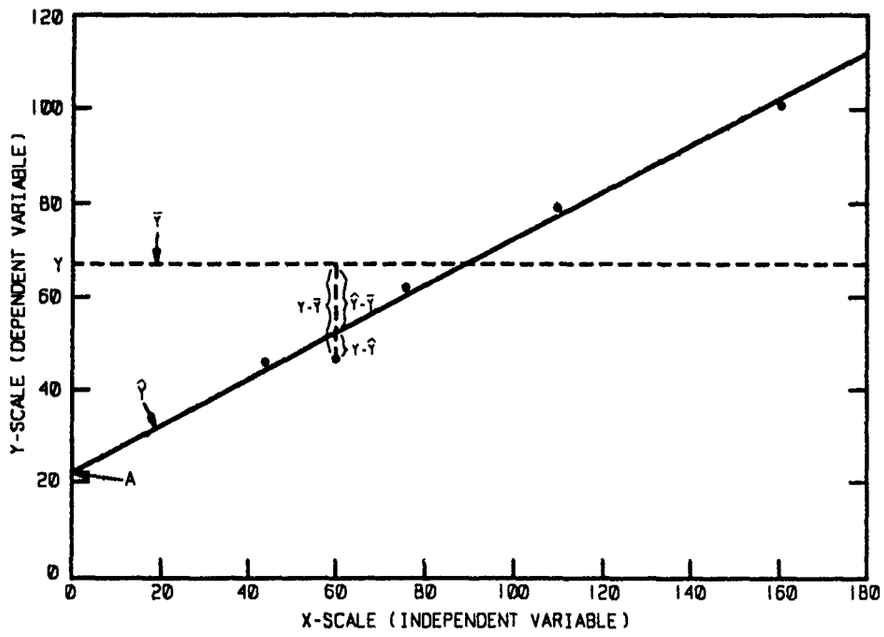
d. Even if the historical observations vary significantly about the regression line, a high coefficient of determination will be obtained if the variations about the mean are much wider. On the other hand, if the independent variable has remained fairly constant during the period covered by the observations, a low coefficient of determination can be obtained even though all observations are close to the regression line.

e. It may be seen from the equation for the coefficient of determination that if all of the observed values of y fall on the regression line, SSE will equal zero, SSR will equal SST and $r^2$ will equal one, indicating perfect correlation. This result will always be obtained if the number of observations equals the number of coefficients in the regression equation (two in the case of simple linear regression); however, it will rarely occur otherwise. On the other hand, if the regression equation provides no better fit to the historical data than the mean of the y values, then SSE will equal SST, and SSR and $r^2$ will equal zero. This result, which would produce a perfectly horizontal regression line in simple linear regression, is also very unlikely, regardless of

whether or not the variables are correlated.

f. The principal problem encountered in the use of $r^2$ derives from the fact that if the number of observations is small, regression analysis may produce a high coefficient of determination even if the variables are unrelated. Instances have been noted where auditors have cited a high coefficient of determination as evidence of a good fit when, in fact, the coefficient of determination provides no evidence of correlation and could easily have occurred by chance. When there are only a few plot points on a scatter diagram, it will usually be possible to draw a straight line at an angle which fits the points much better than a horizontal line. Consequently, a high coefficient of determination is nearly always obtained and the only use that can be made of the coefficient of determination is to test whether it is high enough to provide statistical support for an assumption that the variables are actually correlated (E-205.2). On the other hand, the larger the number of observations used, the more remote is the possibility of a high coefficient of determination occurring by chance; the coefficient of determination can then be regarded as a measure of the extent to which changes in the y values can be explained by changes in the x values (E-205.3).

FIGURE E-2-3
GRAPH ILLUSTRATING COMPUTATION
OF INDEX OF DETERMINATION ($R^2$)




**E-205.2 Determining the Existence of Correlation**

a. Table E-2-1 gives significant values of $r^2$ at the 75 percent and 95 percent confidence levels. To test the significance of the value of $r^2$ obtained from a regression analysis, the auditor selects the column corresponding to the number of coefficients in the regression equation and the row corresponding to the number of observations in the historical data. In simple linear regression, there are two coefficients (a and b). Consequently, in order to test the significance of the .9825 value of $r^2$ obtained in the example cited in E-205.1b. at the 95 percent confidence level, the auditor would compare it with .772 obtained from Table E-2-1. The table indicates that if the x and y variables were unrelated, there would be a 95 percent probability that the coefficient of determination would in turn be less than .772 and a 5 percent probability that it would, by chance, be greater than .772. Since .9825 is much larger than .772, the auditor could conclude that the probability of the x and y values being correlated is much greater than 95 percent.

b. Multiple regression analysis usually employs equations with three or more coefficients. For example, the model $y = a + bx_1 + cx_2 + dx_3$ has four coefficients (a, b, c, and d). If there were 16 observations, the appropriate value from Table E-2-1 for testing the coefficient of determination would be .466. If the coefficient of determination exceeds .466, the auditor could conclude that there is more than 95 percent probability that the three independent variables ($x_1$, $x_2$, and $x_3$), as a

group, could influence the values obtained for y.

c. As discussed in DCAAP 7641.91, E-Z-Quant reports a statistic, the comparison assurance, for the following E-Z-Quant options: simple (two variables) regression, multiple regression, and improvement curve regression (Appendix F). The comparison assurance is the level of confidence (assurance) associated with the value of the coefficient of determination ($r^2$). Its function is similar to that of Table E-2-1 which helps the auditor decide how much reliance to place on the estimated regression equation. The difference between the two reference values is that Table E-2-1 shows the $r^2$ value needed to achieve a specific level of confidence while the comparison assurance indicates the level of confidence achieved by the $r^2$ value produced by the regression.

d. It should be clearly understood that simply because a regression analysis passes the test described in this section, it does not follow that the regression equation will provide the best possible estimates of future y values, or even that the estimates will be reasonably close. It merely means that a statistical analysis of the historical data provides a given percentage assurance that the equation will provide better estimates than could be obtained by merely averaging the historical values of y.

e. The auditor should also bear in mind that the test considers only the mathematical relationship between the variables. It does not take into account the audit significance of the relationship expressed in the regression equation. In this connection, the logic of the relationship is most important. If the regression equation expresses a relationship which can be strongly defended by logical arguments, and only a few observations are available, some significance can be attached to the analysis even if the test does not provide conclusive statistical evidence that the values are correlated. However, a special effort should be made in such cases to determine why the correlation is not close and whether the factors causing the observed variation or any other unusual conditions are likely to be present and materially affect the costs during the forecast period.

### E-205.3 Evaluating the Extent of Correlation

a. The larger the number of observations that are included in a regression analysis, the smaller the significant values shown in Table E-2-1 become and the more remote the chance of a high coefficient of determination occurring by accident becomes. Consequently, the coefficient of determination can be regarded as a measure of the proportion or percentage of the total variance in the dependent variable(s). The larger the coefficient of determination, the smaller the proportion of the variance that is attributed to other influences. For instance, if the coefficient of determination obtained from fitting a regression equation is .92, it may be concluded that approximately 92 percent of the variance in the dependent variable is associated with changes in the independent variable(s) and 8 percent of the variance is associated with chance or other influences.

b. Even though the coefficient of determination may be large enough to provide ample assurance that the variables are related, it may be too small for the auditor's purposes. Assume, for example, that a simple linear regression analysis based on 20 observations produced a coefficient of determination of .3. Reference to Table E-2-1 indicates that this coefficient of determination provides substantially greater than 95 percent assurance that the variables are related. However, since such a small proportion of the variation in the y variable is explained by variation in the x variable, the auditor would generally seek a more reliable basis for predicting y. He or she may be able to identify the reasons for substantial deviations from the regression line and improve the fit by appropriate adjustments to the data. Alternatively, he may be able to identify and add to the regression equation another independent variable which is influencing the dependent variable, or he may consider methods of prediction other than regression analysis.

**E-205.4 Comparing Correlation in Two Analyses**

a. The index or coefficient of determination can also be used to determine which of two different equations or independent variables provides the better fit to historical data. A direct comparison between the values of $r^2$ obtained in two different regression analyses is valid only if both analyses employ the same observations and the same number of coefficients. Such a comparison provides an objective means of choosing between two equally logical equations or independent variables. The greater the number of observations used and the more substantial the differences between the values of $r^2$, the more reliance it is possible to place on such comparisons.

b. In assessing the relative efficiency of two regression equations or independent variables in explaining changes in the value of a dependent variable, the ratio of the values for $1 - r^2$ is more important than the difference between the values obtained for $r^2$. The value of $1 - r^2$, called the "coefficient of nondetermination," measures the extent to which variations in the historical values of the dependent variables are not explained by a regression equation. The greater the ratio of the larger value of $1 - r^2$ to the smaller value of $1 - r^2$, the greater is the confidence that can be placed on the superiority of the analysis which produced the larger value of $r^2$ (and hence the smaller value of $1 - r^2$). However, when the number of observations is small, the value of $1 - r^2$obtained from one analysis can be several times larger than the value obtained from another analysis, without providing conclusive evidence of the superiority of the second analysis.

**Table E-2-1**
**TABLE OF SIGNIFICANT VALUES OF THE COEFFICIENT OF DETERMINATION ($R^2$)**

| NUMBER OF OBSERVATIONS | AT THE 95% CONFIDENCE LEVEL — NUMBER OF COEFFICIENTS | | | | | NUMBER OF OBSERVATIONS | AT THE 75% CONFIDENCE LEVEL — NUMBER OF COEFFICIENTS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2 | 3 | 4 | 5 | 6 | | 2 | 3 | 4 | 5 | 6 |
| 3 | .994 | | | | | 3 | .854 | | | | |
| 4 | .903 | .998 | | | | 4 | .562 | .882 | | | |
| 5 | .772 | .951 | .999 | | | 5 | .403 | .667 | .891 | | |
| 6 | .659 | .865 | .967 | .999 | | 6 | .311 | .533 | .703 | .896 | |
| 7 | .57 | .777 | .903 | .975 | 1 | 7 | .253 | .444 | .586 | .721 | .898 |
| 8 | .5 | .699 | .832 | .925 | .98 | 8 | .213 | .382 | .506 | .614 | .732 |
| 9 | .445 | .632 | .765 | .865 | .938 | 9 | .184 | .335 | .447 | .541 | .632 |
| 10 | .4 | .576 | .705 | .806 | .887 | 10 | .161 | .298 | .401 | .486 | .564 |
| 11 | .363 | .528 | .651 | .752 | .835 | 11 | .144 | .269 | .364 | .443 | .513 |
| 12 | .332 | .487 | .605 | .702 | .786 | 12 | .13 | .245 | .334 | .407 | .472 |
| 13 | .306 | .451 | .563 | .658 | .74 | 13 | .118 | .225 | .308 | .377 | .437 |
| 14 | .284 | .42 | .527 | .618 | .698 | 14 | .109 | .208 | .286 | .351 | .409 |
| 15 | .265 | .394 | .495 | .582 | .66 | 15 | .1 | .193 | .267 | .329 | .383 |
| 16 | .248 | .37 | .466 | .55 | .625 | 16 | .093 | .181 | .251 | .31 | .362 |
| 17 | .233 | .349 | .441 | .521 | .593 | 17 | .087 | .17 | .236 | .292 | .342 |
| 18 | .22 | .33 | .418 | .495 | .565 | 18 | .082 | .16 | .223 | .277 | .325 |
| 19 | .208 | .313 | .397 | .471 | .539 | 19 | .077 | .151 | .212 | .263 | .309 |
| 20 | .197 | .297 | .378 | .45 | .514 | 20 | .073 | .143 | .201 | .251 | .295 |
| 21 | .188 | .283 | .361 | .43 | .492 | 21 | .069 | .136 | .192 | .24 | .282 |
| 22 | .179 | .271 | .345 | .411 | .472 | 22 | .066 | .13 | .183 | .229 | .27 |
| 23 | .171 | .259 | .331 | .395 | .453 | 23 | .062 | .124 | .175 | .22 | .26 |
| 24 | .164 | .249 | .318 | .38 | .435 | 24 | .06 | .119 | .168 | .211 | .25 |
| 25 | .157 | .239 | .305 | .365 | .419 | 25 | .057 | .114 | .161 | .203 | .241 |
| 26 | .151 | .23 | .294 | .352 | .404 | 26 | .055 | .109 | .155 | .196 | .232 |
| 27 | .146 | .221 | .284 | .339 | .39 | 27 | .053 | .105 | .15 | .189 | .224 |
| 28 | .14 | .213 | .274 | .328 | .377 | 28 | .051 | .101 | .144 | .182 | .217 |
| 29 | .135 | .206 | .265 | .317 | .365 | 29 | .049 | .098 | .139 | .176 | .21 |
| 30 | .131 | .199 | .256 | .307 | .354 | 30 | .047 | .094 | .135 | .171 | .203 |
| 31 | .127 | .193 | .248 | .297 | .343 | 31 | .045 | .091 | .131 | .165 | .197 |
| 32 | .123 | .187 | .241 | .288 | .333 | 32 | .044 | .088 | .126 | .16 | .191 |

## E-206 Prediction Intervals

a. In addition to the coefficient of determination, several other statistics are sometimes used to measure the extent of the historical correlation between the variables and the reliability which can be placed on projected values computed from the regression estimate. One such statistic is the "prediction interval." A confidence interval at any specified confidence level can be calculated for a prediction of the independent variable obtained from a regression equation. This interval is included in the output of many standard regression software packages. The mathematical equation used to calculate the interval assumes that (1) the relationships between the variables which existed in the period covered by the historical data will continue into the future and (2) the predicted values of the independent variable are accurate. For the reasons discussed below, prediction

intervals have limited application to contract audit work.

b. Prediction intervals and confidence intervals (discussed in B-204 and B-205) are similar, but there are two important differences between them. First, the confidence intervals computed in sampling applications relate to the precision of the single estimate of the mean or, when the mean is projected, the corresponding single estimate of the total value of all items in the universe. A prediction interval in regression analysis relates to the precision of the regression estimate of the value of the dependent variable that is associated with given values for each of the independent variables. Since the independent variable values can vary without limit, there is an unlimited number of values that the dependent variable might take, hence the number of prediction intervals is unlimited. Each prediction interval is unique. Second, the auditor can reduce the range of a confidence interval by increasing the sample size, but cannot reduce a prediction interval if all pertinent historical data has been properly used. As a result, while a confidence interval can help the auditor determine the adequacy of the sample size, a prediction interval in regression analysis does not serve a similar purpose.

## E-207 Adjustments for Economic Factors

Many contract audit applications of regression analysis include variables which are affected by changes in wage and price levels. When economic changes have significantly affected any of the variables during the period covered by the historical data, the regression analysis applied to the raw data will not produce reliable results. In such cases it is necessary to (1) include a measure of economic change as a separate explanatory variable in multiple regression or (2) adjust the data to eliminate the effects of the economic changes.

a. One method is to use multiple regression with an economic index as one of the independent variables. For example, to measure the effect of direct labor volume on labor costs, changes in costs resulting from economic factors (such as cost-of-living allowances) can be considered by applying the following multiple regression equation:

$$y = a + bx_1 + cx_2$$

where y is the average labor rate; $x_1$ is the number of employees; $x_2$ is an economic wage index; and a, b, and c are coefficients (constants) which minimize the sum of the squares of the differences between the actual values of y and values calculated from the equation.

(1) Economic indexes that can be used as an independent variable in the multiple regression are discussed in Volume 1, Part III, DCAAP 7641.74, Use of Economic Indexes in Contract Audits. Salary and wage changes generally include both inflation (cost-of-living) as well as the effects of other economic changes. The most precise cost-of-living adjustments can be made using wage-related economic changes specific to a particular contractor — union agreements or other labor records. However, if such agreements or records do not exist or it is too time consuming to construct the data, economic indexes should be used to make the adjustments. If wages are to be adjusted to account for inflation alone, the Consumer Price Index, Urban Wage Earners and Clerical Workers (CPIW), should be used. However, if labor rates are are adjusted for all wage-related economic changes (including inflation), wage indexes should be used. Volume 1, Part III, DCAAP 7641.74, provides a discussion of the types of indexes available to make such adjustments.

(2) The multiple regression option of E-Z-Quant (described in DCAAP 7641.91) reports several statistics that are used to judge the adequacy of the regression equation that was fitted to unadjusted data. When accepted by the auditor, the multiple regression equation can be used to predict future costs.

b. A second method to perform a valid regression analysis is to adjust the cost data to eliminate the effects of economic changes. For example, to measure the effect of direct labor volume on labor costs, changes in costs resulting from economic factors (such as cost-of-living allowances) must be removed from the data. This is accomplished by removing

the effects of the changes from all data during the historical period, thus placing all amounts on an economic level comparable to the earliest observation in the historical data. Alternatively, all of the data may be updated to the current economic level or adjusted to some other base period. Because this example has one independent variable (i.e., number of employees), the simple (two-variable) regression option or the multiple (with a single independent variable) regression option of E-Z-Quant can be used to fit a regression equation to the adjusted cost data.

(1) When adjusting an individual cost element or a homogenous grouping of similar costs, an economic index (commodity, industry, or category) that is the most appropriate disaggregate index available should be used. When adjusting a group of costs, either a composite index should be developed for the group, or the most representative disaggregate index of the group of costs should be used. The method for placing costs on a common base is discussed in Volume 1, Chapter 4, DCAAP 7641.74.

(2) When the regression equation is used to predict future costs, the anticipated effects of economic changes between the base period and the prediction period must be considered. Economic data are used to adjust the results of the regression so that realistic future costs can be estimated. Predictions of future economic conditions, particularly long-range, can best be made by qualified economists. Volume 2, DCAAP 7641.74, provides information on the forecasting services purchased by DCAA, including the list of the indexes readily available to all auditors through the DCAA's Electronic Bulletin Board System.

## E-208 Other Considerations in Using Regression Analysis

a. Changes in facilities, production methods, and accounting procedures generally limit the period of time over which consistent cost data can be obtained without extensive adjustments. Accordingly, the historical data included in a regression analysis should normally cover this entire period. In addition, the use of quarterly or monthly data in performing regression analyses is usually favored over the use of annual data, in order to provide more plot points. The auditor's selection of an appropriate period for the development of historical cost data will, however, be governed to some extent by the contractor's operations and accounting methods. It may be necessary to use annual data if extensive adjustments to quarterly or monthly data would be required to compensate for accruals and seasonal fluctuations in activity or costs. When periods of a month or less are used, it may be necessary to adjust the data for the number of working days or hours, as discussed in E-309.

b. It is usually necessary to purify historical costs and bases to some extent. Adjustments for economic factors are described in E-207. Other adjustments may be required to eliminate unusual or nonrecurring costs (e.g., costs incurred during interruptions in normal activity because of strikes, floods, or fires), to compensate for accounting system changes, and to effect transfers of costs recorded in a period to which they do not apply.

c. It is essential that the equation used in a regression analysis represent the relationship between the variables. When, for example, the auditor uses the equation $y = a + bx$, he or she must first establish that a straight line best describes the relationship between the two variables. This step will require a scrutiny of the scatter diagram, consideration of how changes in the x variable can logically be expected to influence the value of the y variable, and determination if a logical meaning can be ascribed to each of the a and b coefficients.

d. Sometimes the sign of a coefficient obtained from regression analysis is the opposite from that which could logically be expected. For example, in using the equation $y = a + bx$ to evaluate the relationship between direct labor x and overhead y, it would normally be expected that both the a and b coefficients would be positive. A negative value for b would indicate that increases in direct labor are accompanied by decreases in overhead. More commonly, a negative value of a would indicate a negative

amount of fixed overhead. Under these conditions the auditor should reexamine the logic of the association between the variables and determine that the equation used expresses a valid relationship between the x and y values. He should also satisfy himself as to the acceptability of the basic data used in the correlation. In some instances it may be found that the data require further purification as described in paragraph b. When the data appear to be correct but result in an illogical negative a value, consideration should be given to forecasting the value of y by some other method, such as the average or most recent ratio of the y values to the x values.

e. In the application of statistical methods to regression analysis, there is a fundamental assumption that the distance of each y value from the underlying regression line is independent of the other y values. If the y plot points are, for example, moving averages or cumulative averages, this assumption is not met. Consequently, a value of $r^2$ obtained in fitting a least-squares line to such data has little or no meaning and cannot be tested for significance as described in E-205.2.

f. The auditor should be aware of the significance of a "run of points" in the data. A run consisting of a long series of points which are all above or below the regression line may occur when the historical data are arranged chronologically or in order of increasing values of the independent variable. The existence of such runs may indicate that (1) some factor not considered in the regression equation is influencing the dependent variable, (2) the equation being used in the analysis does not truly represent the underlying relationship between the variables, and/or (3) the data do not satisfy the assumption of independence cited in paragraph e. Suppose, for example, that all of the earlier values of the dependent variable are below the regression line and all of the later values are above the line. This condition indicates that a general rise in price levels, or some other factor not considered in the regression equation, may have caused the dependent variable to increase over the period of time covered by the analysis. As an example of the second condition, suppose that all of the small and large values of the independent variable are below the straight line of best fit, while those for intermediate values are above the line. This condition could indicate the existence of a curvilinear relationship between the two variables.

g. Predictions made from a regression equation will be most reliable (precise) when the independent variable values are close to their average values in the data. In the case of simple linear regression, for example, the regression line passes through the point corresponding to the average observed values of the x and y variables. Small errors in the slope of the line, caused by random fluctuations in the data, can result in large errors in predicted values far away from this point. When the predicted values of the independent variable(s) are outside the range of the historical data, particular care must be exercised. A regression equation which does not represent the true underlying relationship between the variables can provide a reasonably good fit to historical data within a limited range, but grossly erroneous predictions outside that range. This caveat is appropriate when an a factor outside the range is being analyzed in terms of representing fixed expenses.

# E-300 Section 3 — Time Series Charts

## E-301 Introduction

This section presents a discussion of the use of time series analysis in the evaluation of contract costs.

## E-302 Definition and Concept

a. Data which are collected and classified by successive time intervals so as to reflect changes occurring with the passage of time form what is generally called a "time series." The graph of a time series is in effect a scatter diagram in which the independent variable has been replaced by a time element, such as years, months, or weeks. An illustration of indirect labor plotted as a time series is given in Figure E-3-1. As shown on the chart, successive plotted points are usually connected by a series of straight lines to show more clearly the variations in the data. This usually is not done in a scatter diagram because the plotted points are seldom in chronological order. A type of situation in which it would be informative to join the points is discussed in E-104.5.

b. The graphs of few time series approximate straight lines, a few others look like rough curves, but the majority give the impression of a series of hills and valleys. For this reason, time series analysis is used to bring some order into the irregular pattern and seemingly erratic appearance of a time series. A variety of circumstances and conditions acting simultaneously and with their effects superimposed give the time series its irregular appearance. It is customary to divide the fluctuations of a time series into the following four general classifications: (1) chance and unusual variations, (2) secular or long-term industry and company trends, (3) seasonal variations, and (4) business or economic cycles.

## E-303 Chance and Unusual Variations

Chance and unusual variations of time series are those changes which, being caused by unusual events such as strikes, floods, and fires, do not follow the normal pattern of business operations. To the extent that variations are caused by chance, there is little that can be done to predict the behavior of the time series. However, changes in time series which are due to unusual events may be correlated with the events, simply by inspecting the data. The primary reason for the discovery and isolation of fluctuations due to rare events is that adjustment can subsequently be made for these variations in the investigation of secular trends and seasonal patterns.

## E-304 Secular Trends

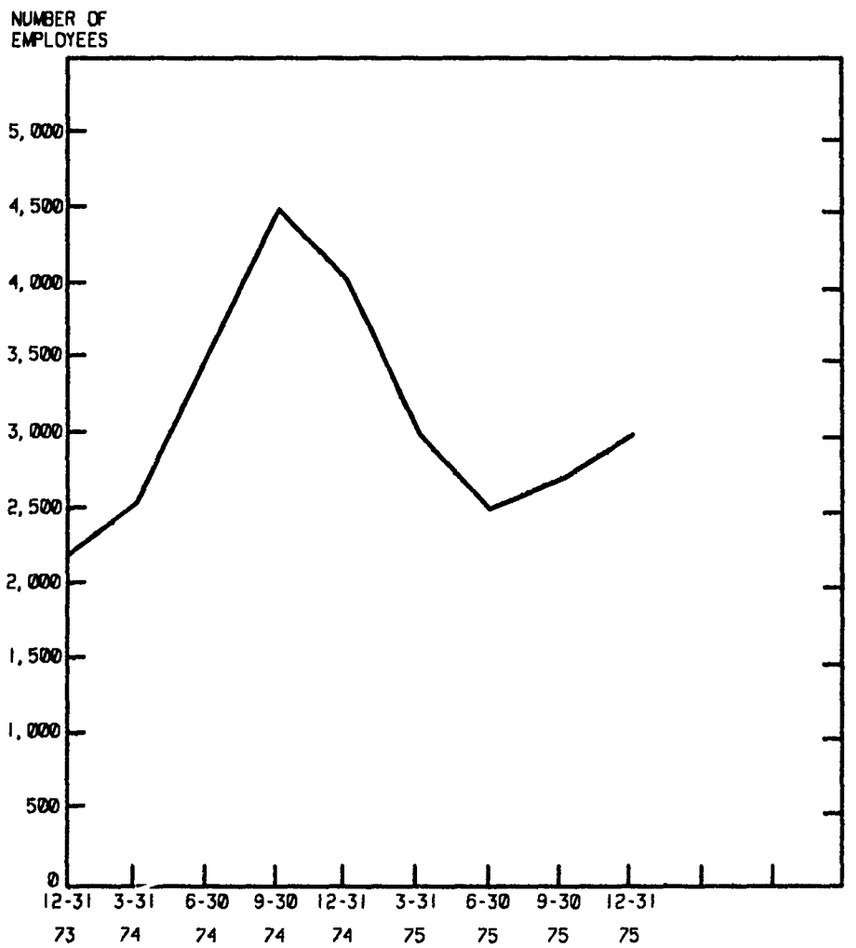
The term "secular trend" is used in this appendix for any long term industry or company trend as distinguished from long term variations in the business data caused by the business or economic cycle.

a. Secular trends depict the gradual and consistent pattern of long term changes in the business operations. Whether a long term trend is secular or a phase of a longer term economic cycle is often difficult to determine; generally, however, it will represent a combination of both. It is for this reason that, as long as the data are comparable, it is advisable to have data covering as long a period of time as practicable.

b. In simple analyses and evaluations of time series, secular trends are usually thought of as straight lines fitted to the series indicating the gradual growth or decline of the variable. For example, if wage rates increase from year to year, we say there is an upward trend. Time series trends are usually shown as straight lines on regular or semi-logarithmic graph paper. As explained in E-203 and illustrated in Figure E-3-4, a straight line on semi-logarithmic graph paper represents an exponential curve. This type of curve is applicable to a variable which tends to increase or decrease by a fixed percentage from one period to the next. Few time series are actually of such a simple nature that they closely follow a straight line when plotted on either regular or semi-logarithmic graph paper. For example, national indexes of wage and price levels

generally have not closely followed either a simple linear or exponential curve. For reasons of simplicity, straight line trends are the most commonly used and this discussion, also for simplicity, will be limited to their use. Nevertheless, straight lines should be used only if they reasonably represent the trend for the desired period. When a straight line does not reasonably approximate the trend, the analysis requirements for cost auditing purposes can usually be met by drawing a moving average line as described in E-307.

FIGURE E-3-1
NUMBER OF INDIRECT EMPLOYEES BY QUARTERS




c. As in the case of a scatter diagram, a convenient means for obtaining an objectively fitted trend line to time series data is by the method of least-squares described in E-202. An illustration of the computation of such a trend line using

the microcomputer quantitative methods software package, E-Z-Quant, is given in E-311. This approach is useful in studying the behavior of historical data when there is a reasonable degree of correlation between the passage of time and the growth of or decline of a variable. Such correlation is only likely to prevail if there are few changes in the general direction of the slope and if the approximate trend, when plotted on arithmetic paper, is a straight line. However, business data tend to result from the synthesis of many variable factors whose effects cannot be isolated or measured, so that there is a high degree of variability in the resultant data. This variability may make the use of the mathematical precision of the least-squares line rather pointless for the analysis of time series; hence, when only a rough idea of the trend is needed, a freehand line based solely on judgment and sight is sufficiently accurate. Extreme caution should be exercised in using trend lines fitted to time series data as a forecasting technique. Use and limitations of such trend lines for forecasting purposes are discussed in E-310.

d. A method, the precision of which lies between the method of least-squares and the freehand drawing of a line, is that of semi-averages. This method, which also may be applied to several partial averages, requires the following steps: (1) divide the data into two or more parts; normally, two equal parts are used; but, if it would be more appropriate, especially if a very long time period is used, the data can be divided into three of more parts, (2) calculate the individual average (mean) for each part of the data, (3) plot these averages at the midpoints of each part of the data, and (4) extend a smooth line through the points. If only two points are plotted, the line will be straight.

(1) To illustrate the method of semi-averages, consider the following data:

| *Year* | *Mo.* | *Mo. Value* | *6-Mo. Total* | *Mo. Avg.* |
|---|---|---|---|---|
| 1975 | Jan | 3,800 | | |
| | Feb | 3,900 | | |
| | Mar | 4,400 | | |
| | Apr | 3,600 | < Plot Point 22,800 | 3,800 |
| | May | 3,100 | | |
| | Jun | 4,000 | | |
| | Jul | 5,500 | | |
| | Aug | 4,400 | | |
| | Sep | 3,900 | | |
| | Oct | 4,300 | < Plot Point 29,400 | 4,900 |
| | Nov | 6,600 | | |
| | Dec | 4,700 | | |

(2) In the above table the six-month totals and the corresponding monthly averages are listed at the midpoint of each averaging period; that is between March and April and between September and October. The monthly values from this table are then plotted at the midpoint of each month; and the two averages (3,800 and 4,900) are plotted at the midpoints of each six-month period. The line drawn through these two points is the semi-average trend line.

## E-305 Seasonal Variations

a. The type of variation in a time series easiest to understand is the seasonal variation, which consists of regularly repeating patterns of moderate or short duration in the contractor's operation. Although the name of this type of variation implies a connection with the seasons of the year, it is used to indicate any kind of variation which is periodic in nature, provided it is also of short duration.

b. While as a rule, it is easy to determine the length or period of seasonal cycles, the description of their characteristics is more involved. There are a number of techniques for describing them, including some which involve rather tedious calculation. A relatively simple method of measuring seasonal patterns, which may be called the simple average method, consists of constructing a seasonal index. This is a descriptive measure that compares, by a series of ratios, the value of each month with the overall monthly average for the entire period.

**SEASONAL INDEX OF DIRECT LABOR HOURS**

| *Year* | *Month* | *Direct Labor Hours* | *Seasonal Index* |
|---|---|---|---|
| 1974 | Jul | 38,414 | 88 |
| | Aug | 38,610 | 89 |
| | Sep | 45,203 | 104 |
| | Oct | 36,734 | 84 |
| | Nov | 31,368 | 72 |
| | Dec | 41,415 | 95 |
| 1975 | Jan | 55,556 | 127 |
| | Feb | 44,158 | 101 |
| | Mar | 34,545 | 79 |
| | Apr | 41,214 | 95 |
| | May | 68,252 | 157 |
| | Jun | 47,460 | 109 |
| Total | | 522,929 | |
| Monthly Average (522,929 ÷ 12) | | 43,577 | |

The seasonal index is computed by dividing the labor hours for the month by the monthly average labor hours and multiplying by 100. For example, the seasonal index for the month of July is computed as follows:

$$\frac{38,414}{43,577} \times 100 = 88.15$$

rounded to 88 in the table.

c. The principal use of the seasonal index in contract auditing is in the evaluation of the relative level of an estimate for an interim period. To illustrate this use, assume that the seasonal labor hour index for the month of May is 157, as shown in the above table, and that this value is considered typical. This would mean that based on the seasonal pattern the number of labor hours for May could be expected to be approximately 157% of the monthly average. If the total for the year were estimated at 600,000, the average monthly estimated hours would be 50,000 (600,000 ÷ 12) and the estimated hours for May would be 78,500 (50,000 × 157%).

## E-306 Business Economic Cycle

a. Generally speaking, the economic cycle consists of those up and down movements of a time series which extend over long periods of time and originate from and are associated with general economic conditions such as prosperity, inflation, and depression. That is, the economic cycle for a particular business would be those variations in a time series for that business which would remain if the trend, the seasonal variation, and the chance or unusual fluctuations were eliminated.

b. The general business economic cycle may be analyzed into a number of different types of cycles associated with various theories which endeavor to explain their occurrence. However, since most cost evaluations for contract auditing purposes cover relatively short periods of time, it is not usually feasible to apply the refined techniques necessary to isolate the business economic cycle.

## E-307 The Moving Average

### E-307.1 Description

When the time series trend is not a straight line and when in evaluating costs the only interest is in the general movement of the series, it is customary to study the behavior of the series by means of a so-called "moving average." A moving average time series is an artificially constructed series composed of overlapping averages in which the value for each period is replaced by the average (mean) value for two or more adjacent periods. In computing the second and subsequent averages, the earliest value of the preceding computation is dropped and the next new value in point of time is picked up to yield the new overlapping average. In constructing a graph of a moving average time series each average value is plotted at the midpoint of its respective averaging period. The moving average has the effect of smoothing the minor fluctuations in a time series. In fact, a perfectly regular, periodic pattern can be eliminated from the series by the use of the appropriate moving average. The moving average method, however, will yield a smooth trend only if the variations to be eliminated are essentially stable in both duration and amplitude and if the trend is basically linear. By averaging the effects of the seasonal and other short term variations, the resultant average line will primarily express the approximate general trend of the longer term variations.

### E-307.2 Construction

a. The first step in the construction of a moving average time series is the selection of the proper averaging period. As a general rule, it should correspond to the average length of the cycle of the variations to be eliminated. If a shorter period is selected, then influences pertinent to the average but occurring before or after the averaging period will be disregarded and, as a result, part of the cycle will remain in the moving average. On the other hand, if the period is too long, occurrences which in point of time are not pertinent to the average will be included in its computation.

b. The computation of the moving average is illustrated in the following table; a graph showing both the monthly and moving average data is given in Figure E-3-2. For ease and clarity of presentation, an averaging period of three months was selected and data for only one year has been shown. The moving total, column 4, was computed by first adding the values for the first three months and entering the amount opposite the midpoint of the period, the second month. Next a similar total is computed by adding the values for the second, third, and fourth months, and entering the total after the third month. At each subsequent shift of the moving total a new total is computed dropping the earliest of the months previously used and substituting the value for the next succeeding month. The final total (for February, March, and April 1975) is entered opposite March 1975. The moving average values, column 5, are computed by dividing the moving total by the number of terms in the average period; in this case, three.

**COMPUTATION OF A THREE-MONTH MOVING AVERAGE FOR FIGURE E-3-2**

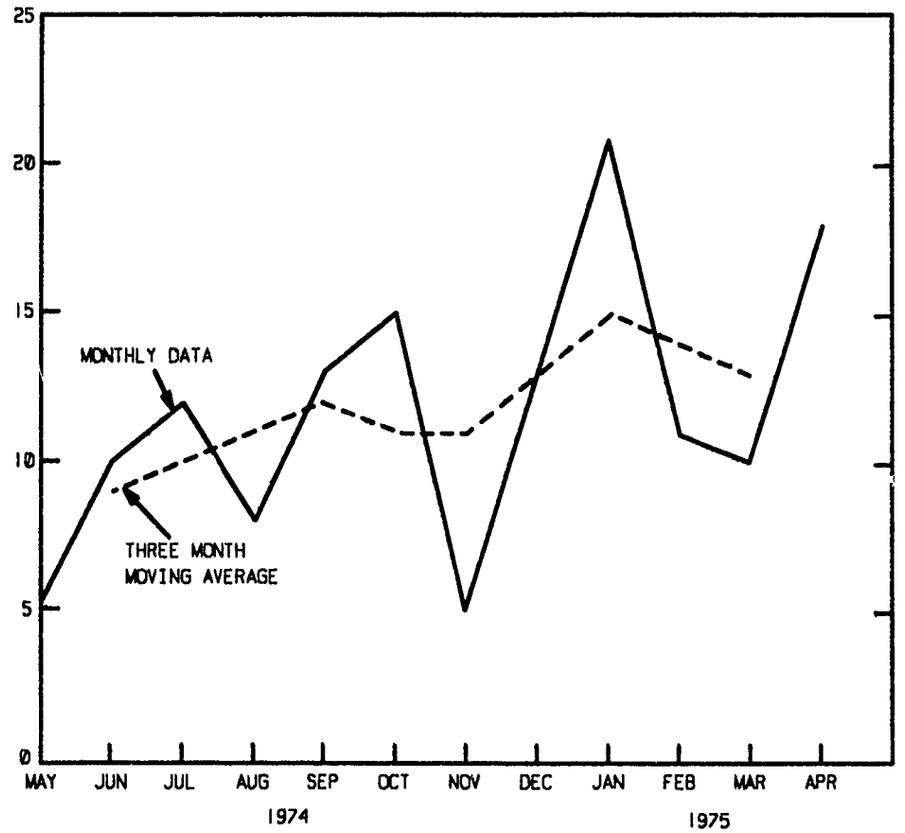
| *Year* | *Month* | *Monthly Values* | *Three-Month Moving Total* | *Three-Month Moving Average* |
|---|---|---|---|---|
| 1974 | May | 5 | | |
| | Jun | 10 | 27 | 9 |
| | Jul | 12 | 30 | 10 |
| | Aug | 8 | 33 | 11 |
| | Sep | 13 | 36 | 12 |
| | Oct | 15 | 33 | 11 |
| | Nov | 5 | 33 | 11 |
| | Dec | 13 | 39 | 13 |
| 1975 | Jan | 21 | 45 | 15 |
| | Feb | 11 | 42 | 14 |
| | Mar | 10 | 39 | 13 |
| | Apr | 18 | | |

**E-307.3 General**

a. As shown above and in Figure E-3-2, both the moving total and moving average are entered at the midpoint of the averaging period. The reason for this is that an actual figure or a calculated figure, referring to a given period of time, refers equally to all portions of that period; and it is usually best to show the figure as applicable to the middle of the period. A yearly figure is referenced to the middle of the year, July first, a monthly figure to the fifteenth of the month, and a figure applying to an odd number of terms (weeks, months, or years) is referenced to the midpoint of the middle period. From this reasoning an average for an even number of terms would be located between the data for the two middle periods, and it may be so shown. However, it is usually desirable to show the average in its customary position, as applying to the middle rather than the end of a period; this requires one more computation to shift the average one half term. It may be accomplished by adding in turn each two successive moving averages and dividing by two. This latter average is then centered at the midpoint of the combined periods. This process, known as "centering the moving average," is applicable to any situation where the moving average period includes an even number of terms.

b. While the moving average will indicate the general direction and extent of a trend, it will closely portray only a linear trend. When the basic trend is curvilinear, the moving average line will follow a path which is inside the curve of data points. In effect, in a curvilinear situation the moving average values do not reflect the full swing of the trend variation, but tend to somewhat reduce it. Another limitation on the use of moving averages is that they cannot be computed for time periods nearer to the end of the series than approximately one-half of the averaging period.

FIGURE E-3-2
THREE-MONTH MOVING AVERAGE




## E-308 Adjustment of Data

It is essential that the data be comparable item by item throughout the analysis period. Because this is not always true of the raw data, it is frequently necessary to adjust the figures before an analysis is undertaken. Two common types of adjustments are discussed below:

a. Adjusting for Changes in Classification Methods.

Since the methods of classifying and apportioning costs may be changed from time to time, the contents of the accounts to be analyzed may also change during the analysis period. Occasionally, these changes are not significant to the analysis and may be disregarded. This, however, is not usually true; and, to the extent that the changes are significant, the data accumulated before the change are not comparable to the data accumulated after the change. For evaluation of estimates, the contract auditor is interested in the analysis of only that data which were developed under current procedures. If a significant change in procedures is made,

the auditor would have a choice of using a shorter analysis period, or adjusting the data to place it on a comparable basis, preferably adjusting the first part of the data. Adjustment of the data is the better method if the analysis period is relatively short. In this case, any further shortening of the period to avoid adjustment of the data could result in a period so short that the full pattern of the variations might not be reflected.

b. Adjusting for Periods of Various Length.

(1) Most of the data which the contract auditor will use are available in monthly, weekly, or daily forms; and the auditor must recognize that the work month, work week, and even the work day are variable units of time. The shortest month is about 10% less than the longest; and the variation may be even greater if holidays are taken into consideration. The work week may vary from one to seven days; and the work day may vary from a few hours to one containing considerable overtime or to one composed of three eight-hour shifts. The solution to the problem, usually, is to put the data on a "per standard working day" basis by dividing the total for each period by the approximate number of standard working days or hours. When there is considerable overtime, more than one shift, or an abnormally low work load, the reduced efficiency of these abnormal operations could also affect the comparability of the data, depending on the purpose of the analysis. For example, if the object of the analysis is to determine the normal costs for the operation of a production center at normal levels of production, reduction of the data to a standard working day basis without recognition of the extra costs due to the lowered efficiency of extended operations could distort the results of the analysis.

(2) The adjustment for the number of working days is necessary for any series, like that of monthly production and cost totals, where each individual working day means a more or less proportionate increase in the data values. There are, however, two kinds of data which do not require adjustment to a working day or similar basis: those involving values as of certain dates and those stated as averages. For example, figures showing the number of workers in departments are usually based on the number on the payroll on a certain day of the month; and inventory quantities and values are also stated as of a specific day. On the other hand, monthly average labor rates, and percentages, and index numbers are obviously values which do not depend in any systematic way on the length of the period to which they are applied.

## E-309 Length of the Analysis Period

a. The length of the selected analysis period can greatly affect the outcome of a trend analysis. Although no simple rules can be given for determining the proper length, the period normally should be sufficiently long to reflect the full pattern of changes that may be pertinent to the purpose of the review. When this is not possible and a trend analysis is prepared on the basis of a few observations, the auditor should bear in mind the resulting limitations.

b. In selecting the period for fitting a trend line to cyclical data, the series should normally start and end in about the same phase of the cycle. For example, if it is to end during a period of high costs, then it normally should also start during a period of high costs. If it starts and ends at different points in the cycle, then the slope of the trend line is apt to be steeper or more shallow than conditions warrant. On the other hand, changes that suddenly reverse a trend are not uncommon; and, if there is a distinct or abrupt change in the series, it is usually best to break the series into two parts and fit separate trend lines.

## E-310 Interpretation and Use

The time series chart and trend lines have been used for a number of years in analyzing costs and in preparing cost estimates. While in most instances these devices and techniques have been properly and successfully used, a number of cases reflect a lack of understanding of the purpose, nature, and limitations of time series analysis in the evaluation and estimation of costs. Much of the misuse appears to stem from a confusion of the

devices and methods of time series analysis with those of correlation analysis. Because of the similarity between these two techniques, the problems involved in the interpretation and use of a time series from the contract auditing standpoint can probably be best visualized in contrast with those of correlation analysis.

**E-310.1 Comparison of Concepts**

a. In the evaluation of contract costs and cost estimates, it is frequently important to know and to measure the interrelationships between the various costs and cost factors; to know whether, with what probability, and under what conditions a change in one cost factor will be accompanied by a change in another cost factor. These facts about the cost factors can only be determined by studying their interrelationships independently of all other factors, including that of time. The discovery and measurement of these interrelationships, without reference to the sequence of the events in which these relationships occur, is the objective of correlation analysis.

b. Although few occurrences in business are functions of time, the amount of cost that will be incurred in any operation is directly dependent on the nature and extent of the contractor's facilities and the skill and experience of its workers. These capabilities are dynamic; they are constantly changing and expanding with time as new facilities are acquired and experience is gained. Any evaluation of incurred or forecast costs must take into consideration this changing pattern of capability; therefore, any analysis of changes in costs or cost factors must also take their sequential relationship into account. This is the function of time series analysis; to discover, analyze by type, and depict in sequence the changing values of a variable during a selected period of time.

c. Correlation analysis and time series analysis are supplemental, not alternative procedures. For example, the growth and decline of indirect expense may be related to the changes in the direct labor by correlation analysis, but their relationship can be fully understood only if the changes in these variables are also considered in relationship to time. A time series chart displaying the costs of both direct labor and indirect expense might be used for this latter purpose; and these in turn could be correlated to the changes in plant capacity, such as the use of extra shifts and extra production lines.

d. A time series is a succession of periodically measured values from a sequence of individual events. The time series line which joins the otherwise disconnected points serves only to make fluctuations in the measured values and their sequential relationship more readily apparent. As a result, the segments of the line between the data points have no meaning in regard to intermediate values. Changes in the measured values during a period of time are associated, except in a few instances, with the changing events and not with the passage of time per se. Consequently, the trend line of a time series does not portray a mathematical relationship whereby the value of one variable may be computed from the known or assumed value of another variable. Instead, it indicates the general direction of the variable values during the total time period being analyzed.

**E-310.2 Application**

a. The fact that the trend line generally cannot be used as a regression line does not mean that it cannot be used in making or evaluating cost forecasts. The trend line and the moving average line may be projected into the immediate future to the extent that the future values will develop in a predictable manner out of the current operating position. Their usefulness, however, diminishes rapidly the farther they are extended; and, if this extension is carried beyond the point where influences may be evaluated, unknown factors intervene so that the connection from the current to the future operating status becomes tenuous and unclear. The extended lines then lose their value, and their use in making or evaluating an estimate is hazardous. The validity of using the extended trend line or moving average line in connection with cost forecasts is closely associated with the lead time of production and production planning, with industrial and economic conditions, and on the forecaster's or evaluator's knowledge and

understanding of the cost factors which will determine the trend of the costs from the present through the forecast period.

b. The time series readily reveals limits within the historical operations, such as the highest, lowest, and normal values. If similar factors can be expected to operate in the future these limits may be used as a guide to the audit evaluation of forecasted values. This use of time series must be based entirely upon judgment. The coefficients of correlation and determination cannot be statistically evaluated as described in E-205.2. The reason for this is that a time series has only one variable whose values are sequentially related and not two (or more) variables whose values tend to be related to one another, as in a correlation.

c. Arranging data in the form of a time series facilitates comparisons between data occurring at different points in time and thereby gives meaning to observations that otherwise would signify virtually nothing. For example, it is possible to ascertain whether the data reveals a trend in the movement of the values or whether their occurrences are erratic. If there is a trend, and it disappears and reoccurs over a period of time, it is usually indicative of a cyclic operation, and it would be desirable to determine its nature and causes. A study of the interrelationships implied by coincident troughs or peaks for several cost factors should lead to a better understanding of the effects of changes in production methods and policies. On the other hand, lead time is frequently indicated by changes in one cost factor regularly preceding those of another factor. This fact will often enable the auditor to anticipate changes before they appear as historical data.

## E-311 Illustration of Computation of the Least-Squares Line for a Time Series

a. The values required for computation of the least-squares line for a time series study of material prices are given in the following table. In this example, a manufacturer of electronic components publishes quarterly price lists. A newly-developed component first appears in the list at $10 and nine quarters later has declined in price to $4.

| *Year* | *Quarter* | *Unit Price* |
|---|---|---|
| 1974 | 1st | $10.00 |
| 1974 | 2nd | 9.00 |
| 1974 | 3rd | 8.00 |
| 1974 | 4th | 7.00 |
| 1975 | 1st | 7.00 |
| 1975 | 2nd | 5.50 |
| 1975 | 3rd | 5.50 |
| 1975 | 4th | 4.50 |
| 1976 | 1st | 4.50 |
| 1976 | 2nd | 4.00 |

b. The manual method described in E-202.2 could be used to fit a least-squares line to the linear equation $y = a + bx$. However, price levels often tend to follow an exponential equation more closely than a linear equation. The use of the simple regression analysis option of E-Z-Quant has the advantage of enabling the auditor to fit both equations to the data in the same session or computer run. An objective determination as to which equation provides the better fit can be made by comparing the indexes obtained for curve types 1 and 2. Curve type 1 fits the linear equation $y = a + bx$ to the data, while curve type 2 fits an exponential curve to the data. Further information on the characteristics of this exponential equation and the use of the simple regression analysis option of E-Z-Quant is presented in E-203c. and d.

c. In preparing input to the program the periods may simply be numbered in sequence beginning with one. Figure E-3-3 shows how the data scheduled in paragraph a. could be run against the program. Since curve type 2 produced a higher index than curve type 1, it was used to obtain an estimate of the price of the component in the 2nd quarter of 1977. A $2.60 estimate was accomplished by typing "14" in response to the computer inquiry for "x". The number 14 was used because the price list for the 2nd quarter of 1977 will be the 14th in the series.

## E-312 Selection of Appropriate Graph Paper and Scales

a. Ordinary arithmetic graph paper can be used by the auditor for the construc-

tion of most time series charts. On an arithmetic scale, equal distances represent equal values or an equal number of units. Changes in the values or numbers of units, therefore, are portrayed proportionately. The units of value, which are represented on an arithmetic scale by equal distances, constitute an arithmetic progression, such as 2, 4, 6, 8, 10, where each succeeding value is obtained by adding the same quantity to the preceding amount. Arithmetic scales usually start with zero, though for convenience the lower portion of the y scale is sometimes not shown. This technique is discussed further in E-312b. In many instances, however, it is desirable to emphasize the rate of change rather than the amount of change. This can be accomplished by using semi-logarithmic graph paper. On this type of graph paper, equal distances on the vertical scale represent equal ratios and an exponential equation appears as a straight line. Figure E-3-4 shows how the data and exponential equation obtained in Figure E-3-3 would appear on semi-logarithmic graph paper.

b. A proper interpretation of the relationships between series of data, as displayed in most charts, depends on the scales selected and on the manner in which the data are shown on the chart. A poor choice of scales or a poor method of displaying the data can distort the perspective of the diagram and unfavorably influence its interpretation. Figures E-3-5 and E-3-6 illustrate the use of arithmetic graph paper for the presentation of identical data on two time series charts with different vertical scales. Although the data are correctly plotted in each case, the figures create an entirely different impression as to the severity of the fluctuations and the overall rate of increase. The selection of proper scales is dependent on the auditor's objective and on the things he or she wishes to emphasize on the chart. Figure E-3-5 depicts the fluctuations in the data in relationship to the total volume. In Figure E-3-6, these same factors are displayed without regard to the total volume, thus focusing attention on the changes themselves. The expansion of the vertical scale in Figure E-3-6 as compared to Figure E-3-5, without a corresponding change in the horizontal scale, emphasizes the severity of the changes and the apparent overall rate of increase. Figure E-3-6 also illustrates the use of a partial scale; in this case a portion of the scale between 0 and 300 has been suppressed. In another form of the partial scale the zero also could be suppressed; for instance, the vertical scale in Figure E-3-6 could have been shown with either 200 or 300 on the base line. The presentation in Figure E-3-6 is preferable because the use of a partial scale is clearly brought to the reader's attention by the wavy lines. Partial scales are useful when the values to be displayed are restricted to a limited range that is well removed from the lower portion of the scale and when the relationship of the changes to the total volume is not important and, therefore, does not need to be graphically displayed.

**Figure E-3-3**
COMPUTATION OF THE LEAST-SQUARES LINE
FOR A TIME SERIES

LEAST-SQUARES CURVE FIT
Two-Variables Regression Results

| Curve | Value of a | Value of b | Comparison* r-sq | Assurance |
|---|---|---|---|---|
| 1. Y=a+(b*X) (linear) | 10.1333333 | −.66060606 | .960 | 99.9+ % |
| 2. Y=a+(b^X) (exponential) | 10.9372261 | .90242709 | .979 | 99.9+ % |
| 3. Y=a*(X^b) (power) | 11.5057716 | −.40739559 | .904 | 99.9+ % |
| 4. Y=a+(b/X) (hyperbolic) | 4.61902238 | 6.4219802 | .761 | 99.9 % |

* Assurance that the curve is a better predictor of dependent variable (Y) values than is the average value of Y.

| | |
|---|---|
| Number of data points: | 10 |
| Average value of the dependent variable (Y): | 6.5 |

COMPARISON OF ACTUAL AND CALCULATED VALUES
Curve 2. Y=a*(b^X) (exponential)

| Item No. | X (Indep) | Calculated Y at X | Actual Y | Pct. Difference (Act.-Calc.)/Act. |
|---|---|---|---|---|
| 1 | 1 | 9.87005 | 10 | 1.2 |
| 2 | 2 | 8.907 | 9 | 1 |
| 3 | 3 | 8.037918 | 8 | −.4 |
| 4 | 4 | 7.253635 | 7 | −3.6 |
| 5 | 5 | 6.545877 | 7 | 6.4 |
| 6 | 6 | 5.907177 | 5.5 | −7.4 |
| 7 | 7 | 5.330796 | 5.5 | 3 |
| 8 | 8 | 4.810655 | 4.5 | −6.9 |
| 9 | 9 | 4.341266 | 4.5 | 3.5 |
| 10 | 10 | 3.917676 | | 2 |

PROJECTIONS
Curve 2. Y=a*(b^X) (exponential)

| Calculated Y | Percent Y to X | X |
|---|---|---|
| 2.59822638510 | 18.559 | 14 |

FIGURE E-3-4
TIME SERIES CURVE
PLOTTING OF CURVILINEAR DATA
ON SEMI-LOGARITHMIC GRAPH PAPER

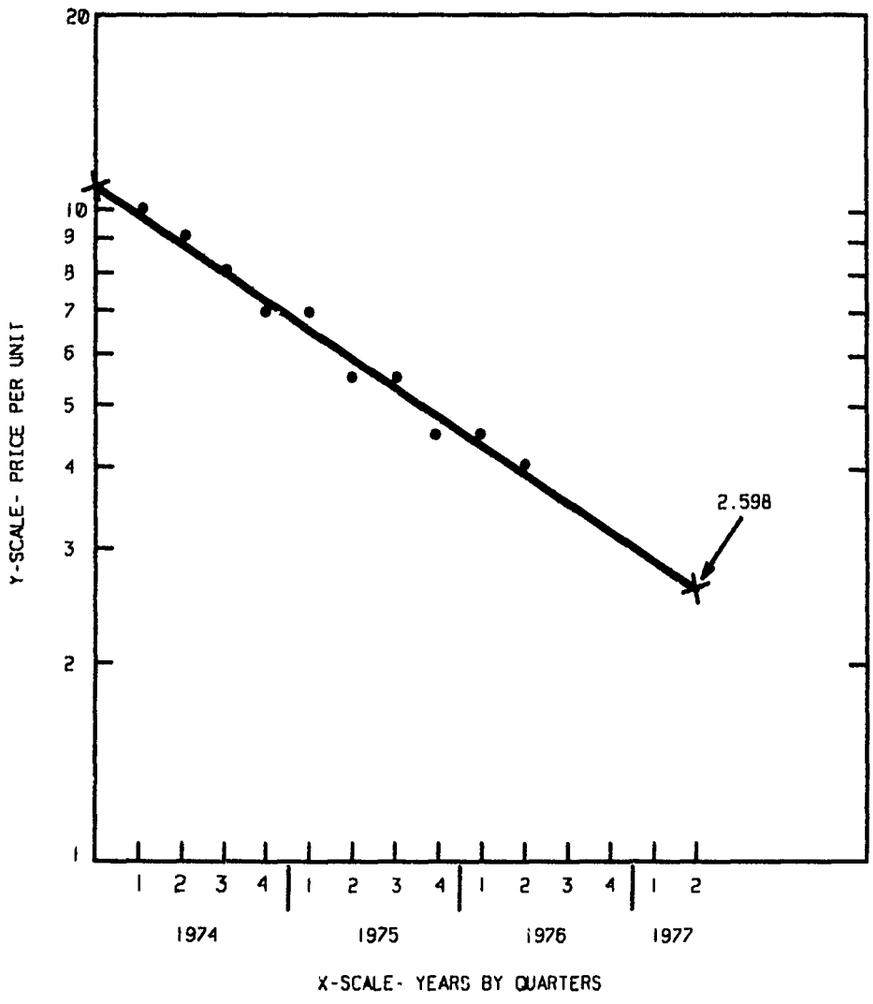


FIGURE E-3-5
TIME SERIES CHART-COMPLETE VERTICAL SCALE
VARIATIONS IN VALUES ARE THEREBY SHOWN IN
GRAPHICAL RELATIONSHIP TO TOTAL VOLUME

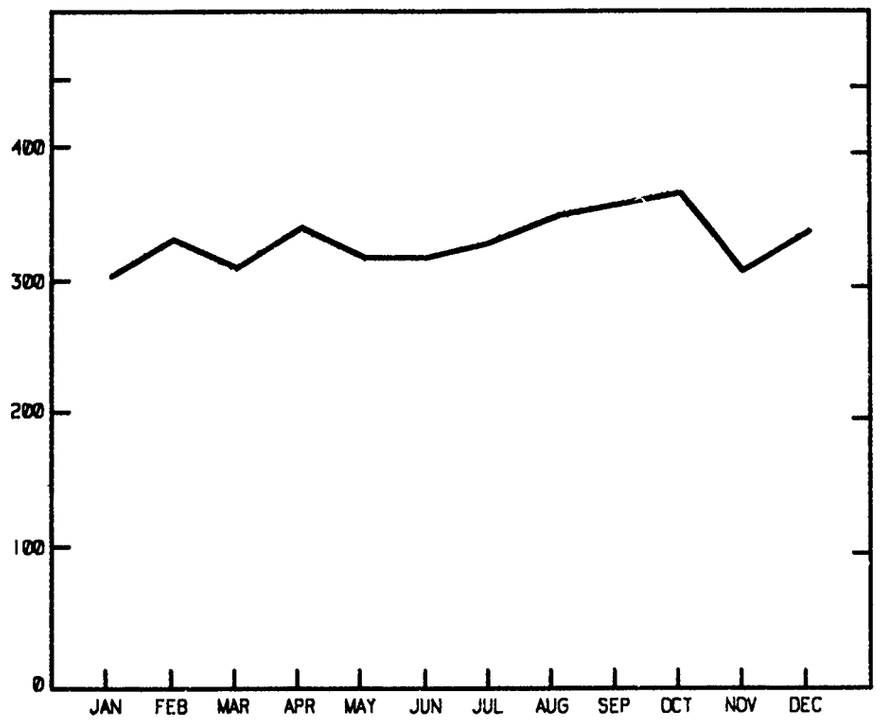
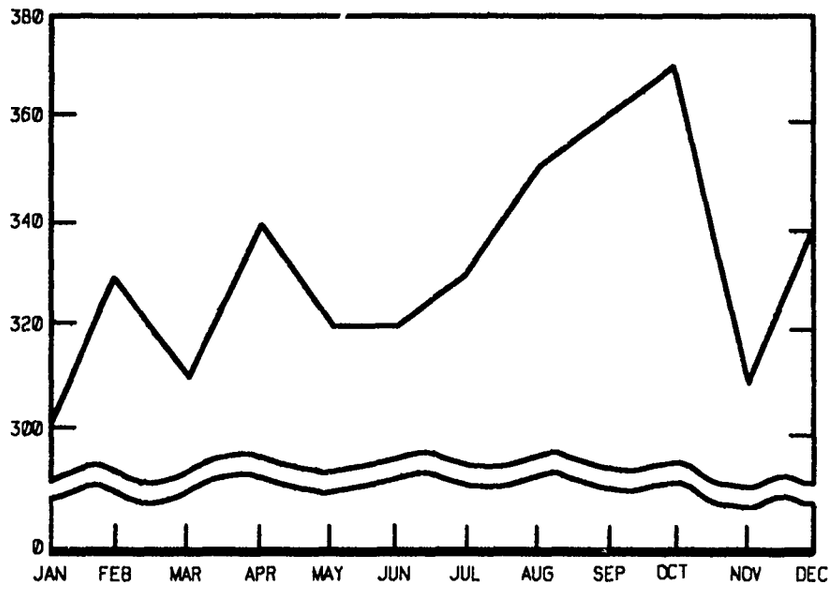


FIGURE E-3-6
TIME SERIES CHART-BROKEN VERTICAL SCALE
FLUCTUATIONS ARE EMPHASIZED AND THEIR RELATIONSHIP
TO TOTAL VOLUME IS NOT GRAPHICALLY PORTRAYED




c. While it is preferable to use only one scale on an arithmetic line chart, time series presentations frequently pose the problem of comparing the growth or decline of values in two series of data that differ in magnitude or that are measured in different units. When close comparison is desired, the two series of data may be displayed on one chart if a separate vertical scale is used for each series. Preferably, one scale should be shown on the left-hand and the other on the right-hand side of the chart (Figure E-4-1 is an example). Since, however, it is difficult to obtain a proper visual impression from two series of data plotted against different scales on the same graph, considerable caution must be exercised in the use and choice of multiple scales. The two scales should be so related that the change in magnitude on one scale is proportionate to the change in magnitude on the other scale. In addition, from a logical point of view, each series of data should be shown in its relative position of magnitude; that is, with the one of greater magnitude shown above the one of lower magnitude. The most common correct usage of multiple scales is to depict changes that occur in two or more related variables over a period of time.

# E-400 Section 4 — Audit Applications of Graphic and Computational Techniques

## E-401 Introduction

This section presents illustrations of the application of graphic and computational analysis to specific problems of cost evaluation in the field of contract cost auditing.

## E-402 Identification of Departures from Historical Cost Patterns

### E-402.1 General

a. Both time series analysis and scatter diagrams are easily used and especially helpful devices in focusing attention on costs which deviate from historical patterns. Regression analysis can also be used for this purpose. Whether or not a specific historical trend may be applicable to a current situation can be determined by a direct comparison of past and current data. The auditor should be aware of the cost patterns which are normal to the contractor's operation. He should look for, recognize and investigate significant departures from normal patterns. Special attention should be given to the impact of any significant changes in products or production methods.

b. The analyses can and should be subjective since the auditor's goal is to identify those accounts which have deviated significantly from experienced trends and thus deserve a more detailed review. If, for example, there are significant changes in overhead expenses or rates or in direct labor costs which cannot be explained by a corresponding change in the level of production, the auditor will want to know the reason. Such changes may signal lack of management control over cost levels or a change in accounting procedures. This does not mean that costs falling within the normal pattern are automatically acceptable and need not be examined. The auditor should review individual expenditures which are so large that they have a material impact on government contract costs. In addition, samples of items in cost categories which account for large proportions of the costs under review should be examined. Appendix B provides guidance on the determination of appropriate sample sizes for this purpose.

c. By pinpointing costs that need special examination, by establishing a pattern within which costs may be considered generally acceptable and subject to only a minimum examination, and by indicating the trend of these costs in relation to some base of recognized acceptability, graphic and computational analysis techniques provide the auditor with an additional and quickly usable tool for determining both the direction and extent of required audit effort.

### E-402.2 Compilation of Data

The data to be collected can be updated on a monthly or quarterly basis from the contractor's accounts and operating statements. Contractors frequently prepare graphs and analyses to identify cost trends and departures from historical patterns for attention by management. The auditor should attempt to identify and gain access to these documents in order to avoid duplication of effort. The following is a listing of basic variables, accounts and groups of accounts that may be useful for analysis purposes. In addition to collecting and analyzing current data for such variables, valuable information can be gained from tracking budgeted or forecasted amounts.

a. Overhead expenses, by pool, in total and segregated by account or homogeneous groups of accounts, such as:

(1) Indirect labor
(2) Employee benefits and payroll taxes
(3) Repairs and maintenance
(4) Marketing
(5) Bid and proposal expense
(6) Allocations
(7) Other variable overhead expenses
(8) Fixed expenses (depreciation, rent, etc.)

b. Overhead base for each pool.

c. Direct costs and other variables related to volume, such as:

(1) Direct material dollars
(2) Direct labor dollars and/or hours
(3) Other direct charges (tooling, travel, etc.)
(4) Sales
(5) Cost of sales or cost input
(6) Employees hired
(7) Number of employees, direct and indirect
(8) Square feet of plant space

**E-402.3 Analyzing the Data**

Some examples of the types of graphs that the auditor may wish to consider in identifying departures from normal cost patterns follow. The more points of data included in an analysis, the more useful the analysis will be for identifying deviations from historical patterns.

a. Time-Series Analysis.

(1) Overhead rates by month. Both the actual monthly and year-to-date rates should be plotted on a time-series graph. The current estimating rate should also be plotted for comparison. These graphs will enable the auditor to become aware of within-the-year trends and evaluate whether the current estimating rate is acceptable for the remainder of the year. If rates from prior years are also plotted this will enable the auditor to identify months which deviate from experienced trends.

(2) Relationship of estimated amounts of key variables to actual amounts. The objective of these analyses is to determine if there is any pattern of under- or overestimation by the contractor. For example, does the contractor consistently underestimate sales, the number of employees, or the amount of the overhead base? Does the contractor overestimate certain expenses which are not particularly susceptible to audit review? Over a period of time, such patterns, if they exist, will show up and the auditor can consider them in his review of future estimating rates. The analyses can be accomplished by plotting the estimates on graphs used to track the actual data.

b. Scatter Diagrams.

(1) Relationship of overhead dollars to the base of allocation. The total overhead dollars are plotted, preferably monthly or quarterly, on a scatter diagram on which overhead dollars are scaled on the y (vertical) axis and the base is scaled on the x (horizontal) axis. This type of graph can also be used to compare individual accounts or groups of accounts with the base. Such graphs will assist the auditor in determining when overhead costs for a period are out of pattern. In addition, it will give the auditor some insight into whether the overhead costs are dependent on the base of allocation or whether they are controlled by other factors.

(2) Relationship of overhead expenses to other variables. For example, scatter diagrams relating total overhead expenses to sales, cost of sales, or direct labor will enable the auditor to evaluate whether overhead costs are increasing or decreasing consistently with changes in business volume. A scatter diagram relating indirect labor dollars, hours or employees to direct labor dollars, hours or employees will indicate whether indirect labor is increasing or decreasing disproportionately. A graph relating rent, depreciation and/or maintenance expense to floor space may be helpful in determining the reasonableness of these expenses. A graph relating the expenses of the payroll and/or personnel operations to the number of employees is helpful in evaluating the reasonableness of the expenses of these operations. Other potentially useful graphs are the relationship of bid and proposal expenses to sales, cost of sales, or the value of new contracts; the relationship of employee benefit costs to the total labor dollars; the relationship of recruitment and personnel costs to the number of employees hired; the relationship of material handling costs to material costs; and the relationship of allocated expenses to the appropriate allocation bases.

c. Regression Analysis.

(1) Scatter diagrams are adequate to detect significant departures from historical relationships between two variables. Consequently, regression analysis should be used for this purpose only in applications which are sufficiently mechanized to avoid the expenditure of excessive auditor time. Either the contractor's computer or a E-Z-Quant can be used for this purpose. Where it is important to

evaluate the reasonableness of a cost in terms of more than one independent variable, multiple regression will be required.

(2) Regression equations developed from historical data can be stored in a computer file. The computer can then be programmed to accept current monthly or quarterly data on the actual amounts of the dependent and printout comparisons of the actual amounts of the dependent variables with amounts calculated from the equations. The following variations on this basic procedure can be incorporated in more advanced applications:

(a) Instead of merely storing the regression equations, the historical data can be stored and the regression equations automatically recomputed by the program as new data becomes available.

(b) Instead of inputting current data on punched cards or paper tape, the data can be automatically read in from the contractor's computer files.

(c) Instead of, or in addition to, printing out all actual and calculated amounts of each dependent variable, the computer can be programmed to identify those which deviate significantly from historical patterns.

## E-403 Evaluation of Proposed Overhead Costs

a. One of the most important applications of regression analysis is an analytical means of testing the reasonableness of estimated overhead costs. Overhead rates vary in response to many causes but because many overhead costs are fixed or semi-fixed, the level of operations is one of the most important factors. Overhead rates generally are lowest when a plant is operating at capacity and increase substantially when production levels are reduced. This relationship becomes increasingly significant in evaluating bid proposals for large contracts which will involve production over extended periods of time. In these cases it is necessary to predict overhead rates many years in advance on the basis of operating levels projected for these years.

b. The simplest way of using regression analysis to evaluate proposed overhead costs is to fit a least-squares line to the historical amounts of an overhead pool (the dependent variable) and the base of allocation or some other predictable measure of the level of operations (the independent variable). An example is presented in E-202.2 and E-202.3. This procedure assumes that the overhead pool consists of (1) fixed expenses which remain approximately the same at all operating levels, (2) variable expenses which tend to be directly proportionate to the base and (3) semi-fixed expenses which cannot be reduced below a certain level while the plant is in operation, and which increase above this level in proportion to the base. The value obtained for the a parameter will then represent the average value of the fixed expense plus the fixed portion of semi-fixed expenses during the period covered by the historical data. The value obtained for b will represent the average ratio of the variable expenses plus the variable portion of the semi-fixed expenses to the base. Estimates of the a and b parameters can also be obtained by judgmentally segregating fixed and variable expenses based on a review of each account in the overhead pool. However, many overhead accounts consist of semi-fixed expenses and it is difficult to judgmentally determine the amount of fixed and variable expense in each such account. Consequently, regression analysis may be an easier means of estimating the total amount of fixed and variable expenses in an overhead pool. For reasons discussed in E-208g, caution should be exercised in the use of the a value obtained from a regression analysis as the total amount of fixed expense. However, in many contract audit applications, the use of simple linear regression as described in this paragraph has been found to provide sufficiently accurate and reliable predictions of overhead costs. The following paragraphs describe refinements to this basic procedure which may be needed to improve predictions of overhead. The extent to which these refinements are appropriate in any given audit situation depends on the extent to which departures from the assumptions cited earlier in this paragraph can be expected to affect government contract prices.

c. If the variables included in the regression analysis have been significantly affected by changes in major economic factors (such as inflation or wage levels), adjustments of the type described in E-207 will be required. As discussed in E-208a. and b., adjustments may also be required to eliminate unusual or nonrecurring costs and to compensate for accounting system changes.

d. Some overhead expenses can often be predicted more accurately by methods other than regression analysis. For example, future depreciation expense may be obtained from depreciation schedules for existing facilities and planned acquisitions. Likewise, future rental expenses may be predicted based on existing leases. Acceptable research and development and bid and proposal expenses may be predictable based on advance agreements. Changes in union agreements, management policies and payroll tax laws can cause significant deviations from past patterns of employee benefit costs. Consequently, it may be necessary to predict employee benefits based on a judgmental consideration of these factors in conjunction with anticipated employment levels.

e. In some situations management may be planning to institute changes which will result in greater operating efficiencies and lower costs. The auditor should adjust projections based on historical data accordingly.

f. Some overhead expenses may vary in response to a factor other than the base of allocation. If the factor is predictable, better forecasts of the related costs may be obtained by applying regression analysis to the historical amounts of these costs and the factor. In some cases more than one factor can be identified as influencing certain expenses. For example, maintenance costs may vary in response to both floor space and direct labor. Multiple regression analysis should be considered as a means of forecasting such expenses.

g. The use of regression analysis assumes that overhead costs will be the same in the future as the past except for predictable changes in the independent variable(s). If a change in the basic pattern of an expense is anticipated, regression analysis applied to historical data will obviously not provide useful results and some other method of prediction should be employed. When significant changes in production capacity are planned, it generally will not be reasonable to assume that past patterns will continue. However, if no drastic changes in operating methods are planned, it may be possible to compensate for the changes by adjusting the amount of the a factor obtained from the application of regression analysis to historical data.

h. In some cases, it may not be practical to adjust prior data to compensate for the creation of new overhead pools and transfers of functions among pools. In such cases, the application of regression analysis to the combined expenses in two or more pools should be considered. Of course, when this is done, some means of breaking out predictions of overhead costs among pools must be devised.

## E-404 Evaluation of Allocation Bases

a. While there will never be a perfect correlation between any overhead pool and any available base of allocation, some bases of allocation will provide a greater degree of correlation than others. The higher the correlation, the more likely it is that a base will provide an equitable distribution of overhead. One of the principal arguments that can be presented to support an audit recommendation for a change in a contractor's base of allocation is an analysis which shows that variations in the overhead pool have historically been more closely related to variations in the base recommended by the auditor than that being used by the contractor. An objective evaluation of the relative efficiency of alternative bases of allocation can be obtained by comparing the coefficients (indexes) of determination obtained as a result of fitting a least-squares line to the pool and each base. A discussion of such comparisons is presented in E-205.4. In order to maintain comparability between the coefficients, data for the same periods must be included in each analysis. The relationship between each base and the overhead pool should be tested over a sufficient period of time to establish its historic

stability. Both conditions tending to produce stability and the causes of any material deviation should be evaluated.

b. As noted in E-403f., better predictions of some expenses in an overhead pool may be obtained by correlating them with some factor other than the base of allocation. When this situation is encountered, consideration should be given to recommending that these expenses be included in a separate pool for allocation based on this factor.

## E-405 Evaluation of Proposed Labor Rates

### E-405.1 General

a. In recent years labor rates have generally increased from one period to the next. However, it must be remembered that this pattern of increase applies only to individuals with the same qualifications doing the same job. In analyzing labor rates projected for a government contract, the auditor must be sure that the types of employees whose wages are being projected are the same as those to be assigned to the contract. It would not be proper, for example, to project engineering department labor costs based on average departmental rates, if a proposed contract will require a disproportionate amount of time by lower paid draftsmen. In addition to the category of work required, the auditor must consider changes in the projected level of production, e.g., if new workers are to be hired, they will probably start at wage rates lower than the current average.

b. In the usual application of regression analysis to the prediction of labor rates, average historical rates are first adjusted to eliminate the effect of changes in wage-related economic factors, as discussed in E-207b. The adjusted wage rates are then correlated with the plant population or the number of labor hours. The logic underlying this procedure is that as the number of employees increases, new employees will be hired at rates below the plant average, thereby reducing the average labor rate. Conversely, when the plant population is reduced, the employees with the least seniority and experience will be released first, thereby increasing the average labor rate. This procedure has produced excellent results in many contract audit applications. However, it does have limitations. It is most appropriate when the historical data included in the regression analysis is relatively recent, so that the auditor can be reasonably sure that manufacturing techniques and conditions have not changed substantially during the period of time covered by the data. It is also best when the projected plant population falls within or close to the range of population levels included in the data. A possible complication is that although a plant's population may vary at times, average seniority and hence labor rates may tend to rise during extended periods (say several years) of stable plant population. Under such circumstances, an evaluation based on estimates of the number of employees to be hired and separated and the average wage rates of the employees in each category may be required. In any projection of labor rates, the impact of expected changes in economic factors and employee mix must be considered along with the impact of expected changes in the number of employees.

c. Cautions set forth in E-310.1 in regard to limitations of time series analysis are pertinent to the forecast of labor rates using multiple regression analysis. In other words, wherever time is not appropriate as an independent variable in a simple regression analysis, it is equally not appropriate when combined with another independent variable in a multiple regression analysis.

### E-405.2 Illustration of the Use of Graphic and Computational Analysis in the Evaluation of Labor Rates

a. The time series chart in Figure E-4-1 graphically portrays hypothetical data on the number and average hourly rate of a contractor's direct manufacturing employees for an 18-month period starting July 1, 1991 and ending December 31, 1992. The data are shown in Table E-4-1.

**Table E-4-1**
**TABLE FOR CURVES A, B, AND C**
**Average Monthly Direct Labor Hourly Rates and Number of Direct Workers**

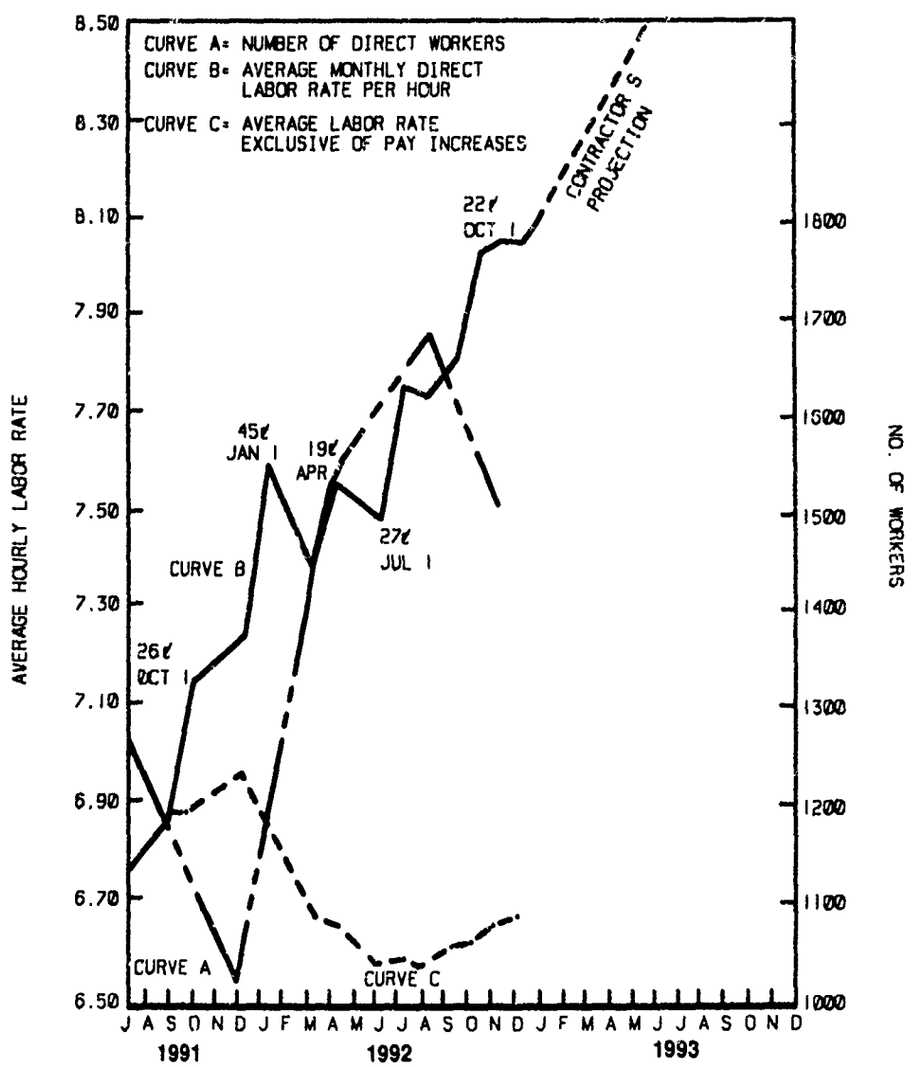
**July 1991 to December 1992**

| Month | | *Average Hourly Labor Rate* | *Cumulative Rate Increases* | *Adjusted Hourly Labor Rate* | *Number of Employees* |
|---|---|---|---|---|---|
| | | | $ | $ | (y) |
| 1991 | Jul | 6.76 | - | 6.76 | 1,289 |
| | Aug | 6.80 | - | 6.80 | 1,227 |
| | Sep | 6.88 | - | 6.88 | 1,143 |
| | Oct | 7.15 | .26 | 6.89 | 1,128 |
| | Nov | 7.20 | .26 | 6.94 | 1,053 |
| | Dec | 7.22 | .26 | 6.96 | 1,022 |
| 1992 | Jan | 7.60 | .71 | 6.89 | 1,117 |
| | Feb | 7.52 | .71 | 6.81 | 1,244 |
| | Mar | 7.39 | .71 | 6.68 | 1,419 |
| | Apr | 7.56 | .90 | 6.66 | 1,532 |
| | May | 7.50 | .90 | 6.60 | 1,564 |
| | Jun | 7.48 | .90 | 6.58 | 1,617 |
| | Jul | 7.76 | 1.17 | 6.59 | 1,652 |
| | Aug | 7.74 | 1.17 | 6.57 | 1,682 |
| | Sep | 7.78 | 1.17 | 6.61 | 1,613 |
| | Oct | 8.01 | 1.39 | 6.62 | 1,568 |
| | Nov | 8.05 | 1.39 | 6.66 | 1,513 |
| | Dec | 8.06 | 1.39 | 6.67 | 1,452 |

b. Three lines and two scales are shown on the chart. The right-hand scale applies to Curve A, which indicates the number of workers employed each month, while the left-hand scale is used with Curve B, which shows the average direct labor rate per hour exclusive of premium pay. The dotted line, Curve C, represents a replotting of Curve B to eliminate the effect of general pay increases granted during the period. The example assumes that the union contract provides for quarterly cost-of-living adjustments to wage rates and that a general wage increase was negotiated as part of a 2-year contract effective in January 1992. These pay increases, the effective dates of which are indicated on the graph by arrows, total $1.39. The peak month of employment occurred in August 1992 when there were 1,682 workers. The cumulative pay increases up to that time totaled $1.17. Adding this increase to the July 1991 starting rate of $6.76 would make a prospective average rate of $7.93 ($6.76 + $1.17) as of August, 1992. The average rate excluding overtime at that time was however, only $7.74. The decline of 19 cents ($7.93 = $7.74) resulted from other causes, primarily the increase in the number of direct workers from 1,289 in July 1991 to 1,682 in August 1992. During the following four months when the number of workers declined to 1,452, the trend was reversed and the wage rate increased 32 cents, of which only 22 cents was accounted for by wage increases. A projection line has been constructed indicating an expected increase in the average hourly labor cost over the next year of 8 cents per month. This represents a projection made by the contractor and corresponds to the average experience for the last 18 months. Two defects in this projection are apparent: (1) the projected rate of increase reflects the general wage

increase granted in January, 1992 although only cost-of-living increases are provided under the union contract during the period covered by the projection and (2) it gives no consideration to any anticipated changes in the number of direct employees.

FIGURE E-4-1
AVERAGE MONTHLY DIRECT LABOR
RATES AND NUMBER OF
DIRECT WORKERS



c. It is apparent from a comparison of curves A and C that changes in the number of employees have had an impact on hourly rates. However, the precise relationship between these two variables cannot be determined from the graph. Figure E-4-2 illustrates the use of the weighted two-variable regression option of E-Z-Quant to estimate the relationship between the number of employees and the average labor rate. The weighted regression option was selected over the unweighted option because each observation is to be weighted proportionally to the number of workers. Based on the analysis in Figure E-4-2 it is concluded that the adjusted labor rate tends to follow the following equation:

Rate = $5.95763 + (1039.71/No. of workers)

d. The following computation illustrates how the foregoing analysis might be used in the evaluation of proposed direct labor costs. It is assumed that the contract will be performed in the second, third and fourth quarters of 1993 with employment reaching peak in the third quarter.

| | Year 1993 | | |
|---|---|---|---|
| | 2nd Qtr | 3rd Qtr | 4th Qtr |
| Estimated No. of employees | 1,500 | 1,650 | 1,450 |
| Estimated average rates based on regression analysis in Figure E-4-2 (base Jul 1991) | $6.65 | $6.59 | $6.67 |
| Estimated cumulative increases since Jul 1991 ($1.39 in 4th Qtr 1992, plus $.27, $.30 and $.31 for each respective Qtr thereafter) | $1.66 | $1.96 | $2.27 |
| Estimated hourly labor rate | $8.31 | $8.55 | $8.94 |
| Estimated direct labor hours for proposed contract | 62,000 | 119,000 | 31,500 |
| Estimated total direct labor cost for proposed contract | $515,220 | $1,017,450 | $281,610 |

### E-405.3 Alternative Methods

a. In the preceding example, the adjustment of historical data for pay increases was simplified by the fact that the union contract provided for uniform increases for all workers. If the increases had not been uniform, a more detailed computation based on the amount of the raise granted to each class of worker and the number of workers in each class would have been necessary. When the number of workers in each class is not readily available, estimates may be based on samples of the workers.

b. At some contractor locations, union pay increases are granted to non-union workers. In such cases, the union agreement can be used to adjust the rates paid to non-union personnel. Even at some plants which are not unionized, management grants across-the-board increases to employees to compensate for changes in economic levels. Adjustment of historical data for such increases can be accomplished in the same manner as for union increases.

## E-406 Other Applications

a. An application of graphic and computational analysis techniques to the evaluation of proposed material prices is illustrated in E-312.

b. Correlation techniques may also be used in evaluating standards, such as (1) material handling costs, (2) scrap, re-

work, and spoilage, (3) export packaging costs, and (4) field service warranty or guarantee expense. As indicated in Chapter 9, contractors frequently use loading factors based on such standards in developing cost estimates. Before accepting such a standard, the auditor should know (1) the relationship between the costs included in the standard and the costs to which the standard is applied and (2) the causes of any material deviations from this relationship.

**Figure E-4-2**
**CORRELATION OF HOURLY LABOR RATES AND NUMBER OF EMPLOYEES**

WEIGHTED LEAST-SQUARES CURVEFIT
Rate Regression Results

| Curve | Value of a | Value of b | r-sq | Comparison* Assurance |
|---|---|---|---|---|
| 1. Y=a+(b*X) (linear) | 7.54123702 | −.00058692 | .982 | 99.9+ % |
| 2. Y=a*(b^X) (exponential) | 7.58839167 | .99991301 | .983 | 99.9+ % |
| 3. Y=a*(X^b) (power) | 15.6946846 | −.11732849 | .990 | 99.9+ % |
| 4. Y=a+(b/X) (hyperbolic) | 5.95220256 | 1046.8882 | .990 | 99.9+ % |

* Assurance that the curve is a better predictor of dependent variable (Y) values than is the average value of Y.

Number of data points: 18
Average value of the dependent variable (Y): 6.71097

COMPARISON OF ACTUAL AND CALCUALTED VALUES
Curve 4. Y=a+(b/X) (hyperbolic)

| Item No. | X (Indep.) | Calculated Y at X | Actual Y | Pct. Difference (Act.-Calc.)/Act. |
|---|---|---|---|---|
| 6 | 1022 | 6.976555 | 6.96 | −.2 |
| 5 | 1053 | 6.946398 | 6.94 | 0.0 |
| 7 | 1117 | 6.889435 | 6.89 | 0.0 |
| 4 | 1128 | 6.880295 | 6.89 | .1 |
| 3 | 1143 | 6.868115 | 6.88 | .1 |
| 2 | 1227 | 6.805412 | 6.8 | 0.0 |
| 8 | 1244 | 6.793753 | 6.81 | .2 |
| 1 | 1289 | 6.764373 | 6.76 | 0.0 |
| 9 | 1419 | 6.689968 | 6.68 | −.1 |
| 18 | 1452 | 6.6732 | 6.67 | 0.0 |
| 17 | 1513 | 6.644131 | 6.66 | .2 |
| 10 | 1532 | 6.63555 | 6.66 | .3 |
| 11 | 1564 | 6.621569 | 6.6 | −.3 |
| 16 | 1568 | 6.619861 | 6.62 | 0.0 |
| 15 | 1613 | 6.601234 | 6.61 | .1 |
| 12 | 1617 | 6.599629 | 6.58 | −.3 |
| 13 | 1652 | 6.585912 | 6.59 | 0.0 |
| 14 | 1682 | 6.574609 | 6.57 | 0.0 |

PROJECTIONS
Curve 4. Y=a+(b/X) (hyperbolic)

| Calculated Rate (Y) | Calculated Total (X*Y) | Base (X) |
|---|---|---|
| 6.65012809467 | 9975.19214200 | 1500 |
| 6.58668031937 | 10868.0225270 | 1650 |
| 6.67419449220 | 9677.58201369 | 1450 |

# APPENDIX F

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# APPENDIX F

## F-000 IMPROVEMENT CURVE ANALYSIS TECHNIQUES

### F-001 Scope of Appendix

As explained later in this appendix, the improvement (or learning) curve is a generalization of the concept that, within certain reasonable limits, the knowledge, skills, and techniques employed in the production of a product will improve as production of the product continues without material change and that this improvement will result in corresponding reduction in the time and material required to produce the product and, therefore, in the cost of the product. The generalization also postulates that the rate of improvement will be relatively regular and constant for any given product. By stating these concepts as generalizations, a valuable technique of graphical and computational analysis and a tool for evaluating production requirements and costs has been made available to production planners, analysts, and contract auditors. This appendix discusses the methods of using these techniques in the evaluation of contract production costs. The principles underlying these techniques and their use in analyzing costs are extensions of the principles discussed in Appendix E.

## F-100 Section 1 — The Improvement Curve Theory

### F-101 Introduction

This section discusses the improvement curve theory including its concept, description, and characteristics.

### F-102 Concept

a. The improvement curve is a statistical device used in predicting production costs and as an aid in planning and controlling production. The theory of the curve assumes a predictable correlation between the number of manhours (or the labor, material, or other cost) necessary to produce a particular unit or a particular production lot of units and the number of such units or lots successively produced. The term is also applied to the line graph which depicts this correlation and to the computational procedures for estimating the cost or man-hour requirements under the improvement curve theory. The line graph and improvement curve theory are both based on the principle that the time required to produce (and, therefore, other things being equal, the cost of producing) successive quantities of a product decreases with additional experience and the introduction of improved methods and tools. The term "improvement curve" is derived from the fact that the curve reflects this decrease. Because the reduction is largely a result of increased knowledge and skill, the curve and its theory are sometimes referred to as the learning curve, the experience curve, or the progress curve.

b. The principles of a gradual reduction in the unit cost of a product as production continues has long been accepted but the use of the improvement curve as a management and auditing tool for evaluating and forecasting costs, and for planning and controlling production, is an outgrowth of research in the fields of defense procurement and production conducted primarily by the airframe industry and the government. The correlation of production quantities and direct labor requirements for the production of airplanes disclosed for the firms studied that as production of a particular product continued there was a relatively constant percentage reduction in the labor requirements for doubled quantities of production. For example, a study of production costs incurred by various airframe contractors during World War II revealed that the average rate of improvement (that is, the average rate of reduction in labor requirements) for all companies

studied was 20% between successive doubled quantities. In other words, the labor required to build the second plane was approximately 80% of that required to build the first; the labor required for the fourth plane was approximately 80% of that to build the second; the labor for the eighth, approximately 80% of that for the fourth; and so on for each successive doubling of production. During this same period, the calculated rate of improvement for individual companies in the airframe industry varied from 2% to approximately 35%. Expressed in another manner, the cost of successive doubled quantities of production varied from 98% to 65% of the cost of the preceding quantities. The improvement curve theory as presently used by the industry and the government assumes this basic relationship: that there will be a relatively constant percentage reduction in the cost for doubled quantities of production. "Cost" as used in this paragraph and in all subsequent references to the cost-quantity relationship refers to a cost that may be expressed in terms of dollars or where appropriate, in terms of a quantity such as labor-hours. This latter method of expressing the cost of a product, especially of direct labor, is frequently preferred because it eliminates the effect of extraneous factors such as changes in labor rates.

c. The original studies and applications of the improvement curve were confined to the direct labor requirements for building airplanes, but subsequent experience indicates that there are similar patterns of improvement for other production costs (such as material costs) and in other industries, especially where hand or line operations are involved. Thus, today the improvement curve theory may be applied in the audit evaluation of costs and cost estimates in any industry, provided that the basic assumption of a relatively constant rate of improvement can be shown to be true for the particular cost-quantity relationships being studied. When this relationship is valid for any element of the cost of producing an item, the improvement curve pattern experienced in the production of the item in the past can be extended to obtain predictions of the costs which will be required to produce additional units in the future. A further assumption relative to these elements may sometimes be made; namely, that the rate of improvement experienced by a particular contractor on a prior product may be indicative of the rate of improvement which can be expected on a new product of similar size, complexity, and construction. When both of these assumptions are valid, the use of the improvement curve simplifies the problem of evaluating an estimated cost for a new product and permits a more sound evaluation than is possible without the use of the curve. Without the improvement curve technique, the auditor must attempt to evaluate directly either the total cost or the overall average cost for the entire future production. This direct evaluation of an estimate is difficult if the estimate covers an extended period of time even though past cost experience is available. It is more difficult for a new product. Where the improvement curve assumptions are valid, however, the auditor can first evaluate the actual or estimated initial cost of manufacture and from this information he or she can evaluate both the expected total and the average costs for the production period by using the improvement curve theory.

d. A number of factors, such as those listed below, contribute toward a progressive increase in efficiency as production of a given product continues and thus account for a corresponding and progressive decline in unit costs. Their effect on the improvement curve is discussed more fully in F-106b.

(1) Job familiarization by both production workers and supervisory personnel.

(2) Changes in product design which do not materially affect the product, but result in increased ease and speed of production.

(3) Changes in tooling, machinery, and equipment which simplify or speed up the production process.

(4) Improved production planning and scheduling, and improvements in production techniques and operational methods.

(5) Improvements in shop organization, and in engineering coordination and liaison.

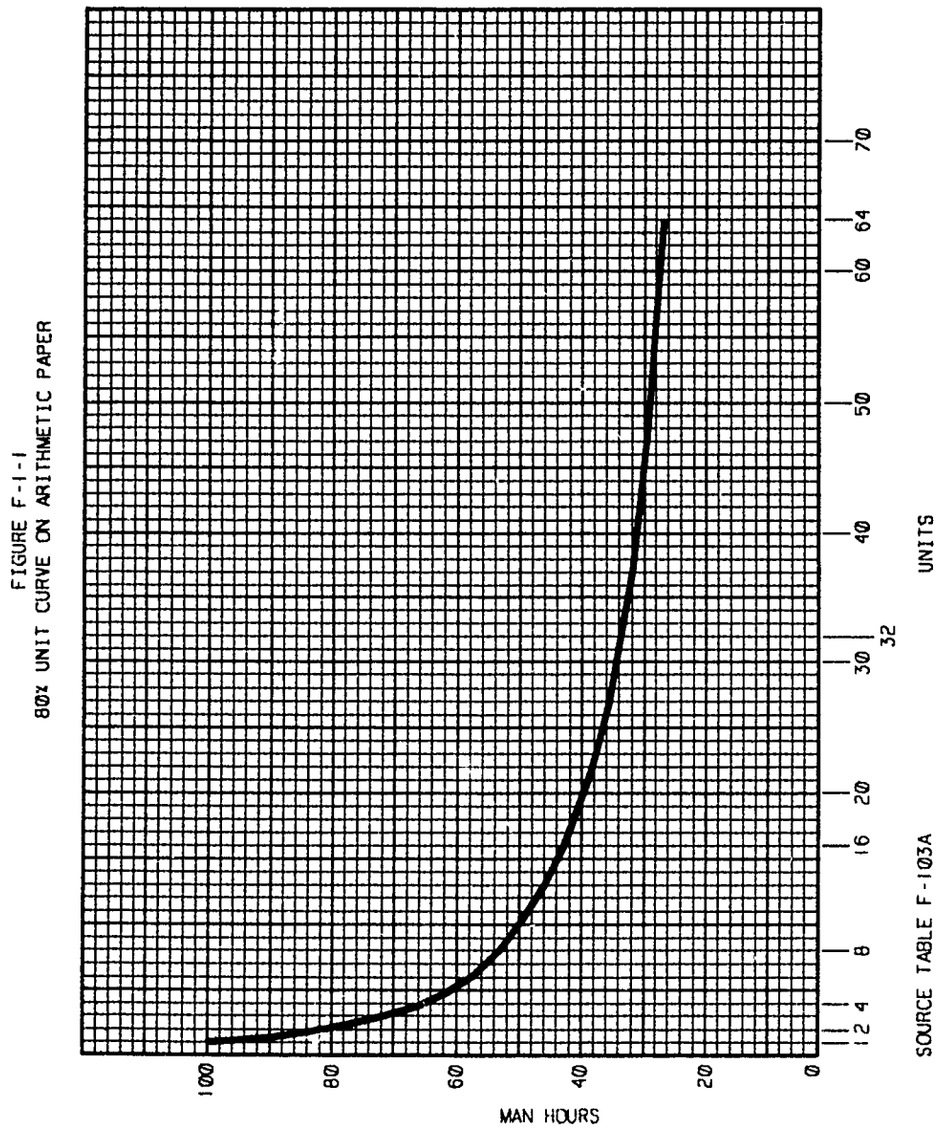
(6) Improvements in the handling and flow of materials, and in the materials and parts supply systems, with an attendant reduction in lost time.

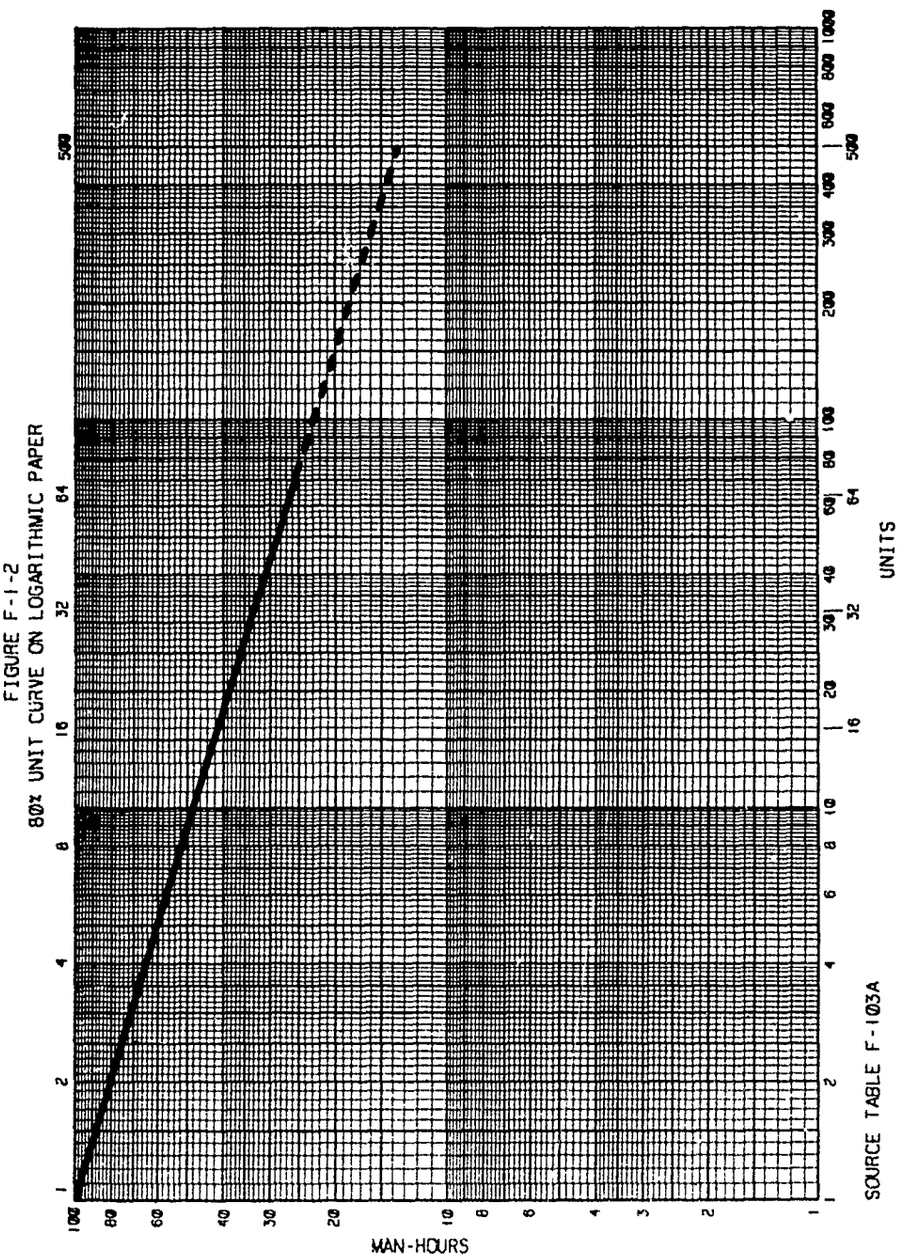
## F-103 Description of the Improvement Curve

a. Figure F-1-1 is an illustration of an idealized 80% improvement curve (a 20% rate of improvement) plotted on arithmetic graph paper and based on the man-hour data contained in the following table. For simplicity, the table is based on the assumption that the first unit required 100 person-hours to produce. It will be observed that the table indicates a constant rate of reduction of 20% for each doubling of the unit number; the value of the second and each succeeding item in the table is 80% of the value of the preceding item. The curve drawn through the plotted points in Figure F-1-1 dramatically reveals this reduction in person-hours as succeeding units are produced. At first it dips sharply because the amount of reduction per unit is large. As production continues the reduction per unit becomes smaller, and the line begins to slope downward more gently as the distance between doubled quantities becomes progressively larger. Thus, as production continues, the curve, when plotted on arithmetic paper, tends to approach the horizontal but theoretically does not actually become horizontal.

**TABLE FOR FIGURES F-1-1 and F-1-2**

| *Unit No.* | *Unit Person-hours* |
|---|---|
| *1* | *100.00* |
| *2* | *80.00* |
| *4* | *64.00* |
| *8* | *51.20* |
| *16* | *40.96* |
| *32* | *32.77* |
| *64* | *26.21* |


FIGURE F-1-1
80% UNIT CURVE ON ARITHMETIC PAPER
100
80
60
40
20
0
MAN HOURS
1
2
4
8
16
20
30
32
40
50
60
64
70
UNITS
SOURCE TABLE F-103A


FIGURE F-1-2
80% UNIT CURVE ON LOGARITHMIC PAPER
MAN-HOURS
UNITS
SOURCE TABLE F-103A

b. An improvement curve plotted on arithmetic paper has the advantage of displaying the pattern of costs incurred in normal perspective. This is particularly useful in assessing the effects of engineering changes and other descriptions. However, it is difficult to determine from a graph drawn on arithmetic paper if there is a constant reduction for doubled quantities; and it is difficult to measure the rate of reduction. Further, as each unit is represented by an equal distance, a graph showing a series of several hundred or several thousand units would be excessively long and impractical. Construction, interpretation, and projection of a curve on arithmetic paper are also difficult, especially for the portion of the curve pertaining to early production quantities where the slope of the curve changes rapidly. For these reasons the improvement curve should be plotted on full logarithmic scale (log-log) paper where, as will be shown later, the curve becomes a straight line.

c. On an arithmetic scale equal amounts are represented by equal distances (Figure F-1-1). In contrast, on a logarithmic scale the distances between doubled amounts are equal (Figure F-1-2). An improvement curve, therefore, which very closely follows the improvement curve theory will be approximately a straight line when plotted on log-log paper; a fact which facilitates interpretation and projection of the curve. Figure F-1-2 illustrates an improvement curve drawn on log-log paper. The solid portion of the curve was plotted from the data previously used in constructing Figure F-1-1. A projection of the curve through unit 500 is shown by a broken line. Improvement curves of 60%, 70%, 80%, and 90% drawn on log-log paper; are illustrated in Figure F-1-3. These curves show that the more rapid the rate of improvement, the steeper the curve; and, conversely, the more gradual the improvement, the flatter the curve. A 100% curve, indicating no improvement, would be horizontal. Portions of a curve which slope upward indicate a loss of production efficiency. It should be noted that the improvement curve is referred to by the complement of the rate of improvement and not by the rate itself. A 60% improvement curve, therefore, reflects a 40% rate of improvement.

d. An improvement curve can be expressed mathematically as well as graphically. The basic model is expressed by the equation:

$$y = ax^b$$

where y is the man-hours or cost to produce the xth unit. The parameter a represents the cost of the first unit and the parameter b indicates the rate of improvement. The relationship between b and the improvement curve percentage (P) is expressed by the following equations:

$$P = 100(2^b)$$

and

$$b = \frac{\log(P) - \log(100)}{\log(2)}$$

The curve shown in Figure F-1-1 was plotted from the equation

$$y = 100 \text{ x } -.321928$$

The value of −.321928 for b, was calculated as follows:

$$b = \frac{\log(80) - \log(100)}{\log(2)} = -.321928$$

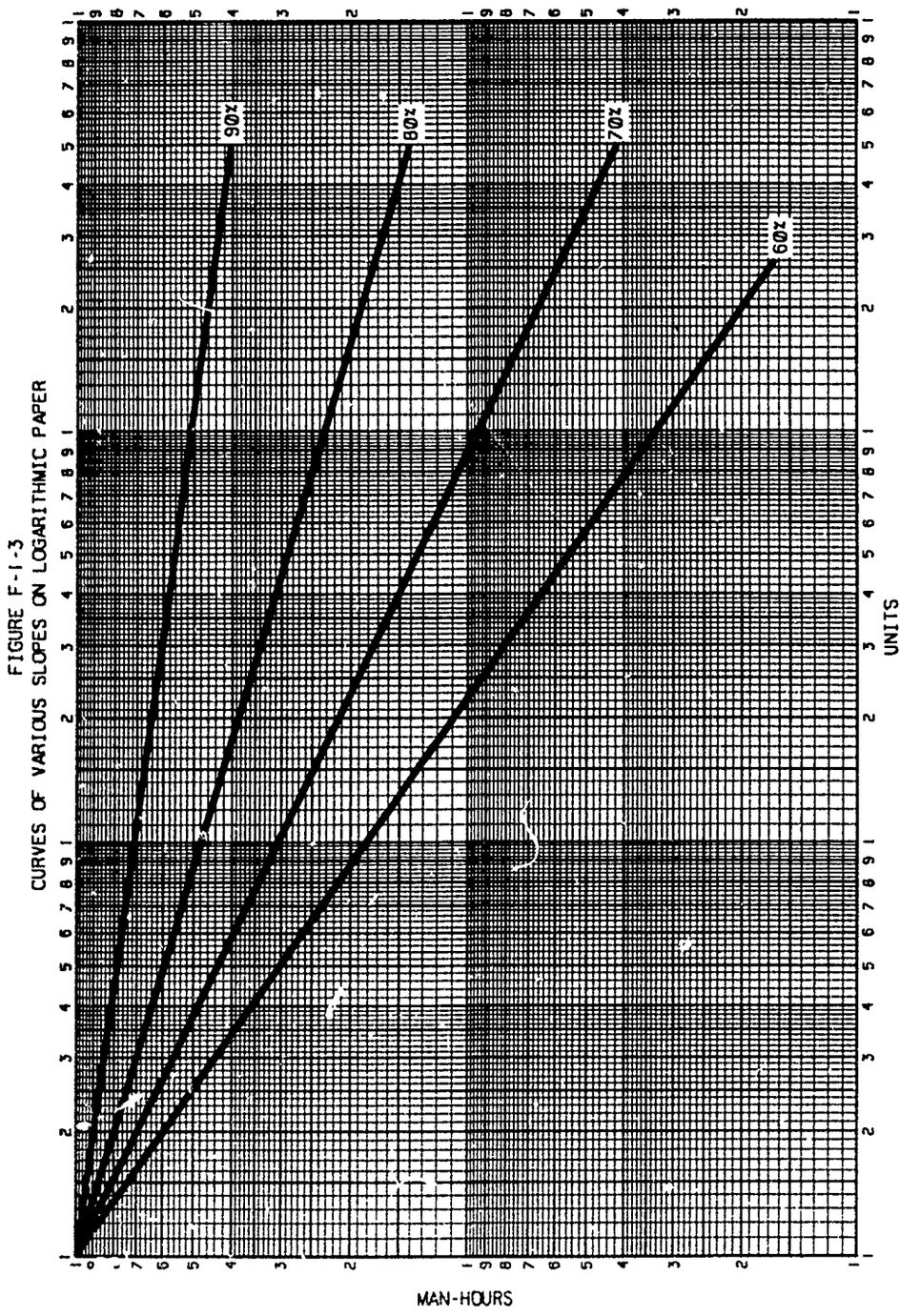
The basic improvement curve model can also be expressed by the following equation, which is obtained by taking the logarithms of both sides of the first equation,

$$y = ax^b\text{: } \log(y) = \log(a) + b \log(x)$$

It may be seen that this equation is in the same basic form as the simple linear regression equation which, as discussed in E-202.1, may be represented by a straight line on arithmetic graph paper. The only difference is that the logarithms of y, x, and a replace the values of y, x, and a in the simple linear model. The effect of using log-log paper is to convert the values of x and y to the logarithms of x and y, and it is for this reason that the improvement curve model becomes a straight line when plotted on log-log paper.

e. As illustrated in the above discussion and throughout this appendix, the im-

provement curve can be depicted both graphically and mathematically. Hence, projections of anticipated performance can be attained graphically by extending the line or by computation. While graphics facilitate analysis and presentation in audit reports, and are encouraged for these purposes, the mathematical approach provides more precise estimates and should be used to obtain estimates presented in audit opinions.


FIGURE F-1-3
CURVES OF VARIOUS SLOPES ON LOGARITHMIC PAPER
90%
80%
70%
60%
UNITS
MAN-HOURS

## F-104 Fitting an Improvement Curve to Data

a. The data for the hypothetical improvement curve shown in Figure F-1-2 were selected to follow the improvement curve theory; that is, the values were calculated so that the cost-quantity relationship was perfectly linear for successive doubled quantities. As a result, the graph of that relationship on log-log paper is a straight line. In actual practice, a strictly linear relationship is seldom present; instead, the pattern is usually somewhat irregular. As a result, it is generally necessary to fit a line to the data as shown in Figure F-1-4.

b. Before fitting a line to the data, the auditor must determine whether or not a clear trend exists. This can be determined by plotting the data on appropriate graph paper and reviewing the resultant diagrams. If the improvement curve theory is to be applied, the data pattern plotted on log-log paper should be approximately linear.

c. Frequently, the auditor may find that improvement curve assumptions are not valid in particular circumstances. For example the rate of cost reduction may not be constant, or it may be constant only for relatively short periods. In certain operations, unit production costs may reach a plateau where they may remain unchanged for a significant period of time or tend to vary in an erratic manner. Because the basic assumptions of the curve are not always valid, the auditor cannot assume their validity in any particular situation; to do so may lead to invalid conclusions.

d. When the preliminary study shows that the cost-quantity relationships are not sufficiently linear, no attempt should be made to apply the improvement curve techniques to the forecasting of costs. Instead, the auditor should use other analytical procedures such as those discussed in Appendix E. There are exceptions to this general prohibition. Data patterns that are otherwise approximately linear may contain significant variations. For example, engineering changes often result in such variations, or the data may be affected by breaks-in-production or the retention of learning from the manufacture of similar items. Methods of treating these types of cost fluctuations as part of the improvement curve theory are discussed in F-600.

e. When the cost-quantity relationships are sufficiently linear on a logarithmic graph to permit the application of the learning curve theory, an improvement curve can be fitted to the plotted data. The preferred and widely accepted method of fitting an improvement curve to data is the least-squares method discussed in Section 2, Appendix E. Computer software prepared for the purpose of providing least-squares fits of improvement curves to data are described in F-405.

## F-105 Characteristics of the Improvement Curve

In comparing rates of improvement experienced by various contractors in the production of a common item, it may appear that a contractor operating on a 70% or 75% curve is doing a better job than one operating on a 90% or 95% curve. On the other hand, it may be contended that a high slope rate (a low improvement rate) is indicative of effective planning and efficient operation while a low percentage curve (a high rate of improvement) is indicative of poor planning and inefficient operation. The total contract cost, in any event, is the deciding factor in judging the economy of a particular operation. Effective planning and efficient operation from the start of a production cycle tends to keep costs at a relatively low level; but it does not follow, as will be shown later, that either low initial cost or operation on a low percentage curve will assure the lowest cost. From the standpoint of the improvement curve theory, three factors affect the total production run cost: (1) the slope of the improvement curve, (2) the level of costs at the start of operations, and (3) the length of the production run. These factors will be considered in the paragraphs which follow.

FIGURE F-1-4
TYPICAL IMPROVEMENT CURVE

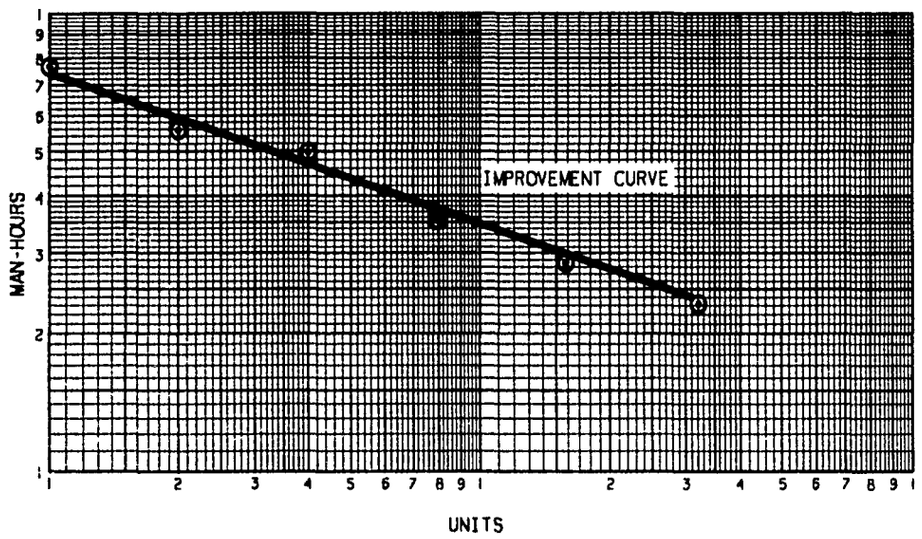


FIGURE F-1-5
DETERMINING SLOPE OF A TREND LINE
FOR AN IMPROVEMENT CURVE ON LOGARITHMIC PAPER

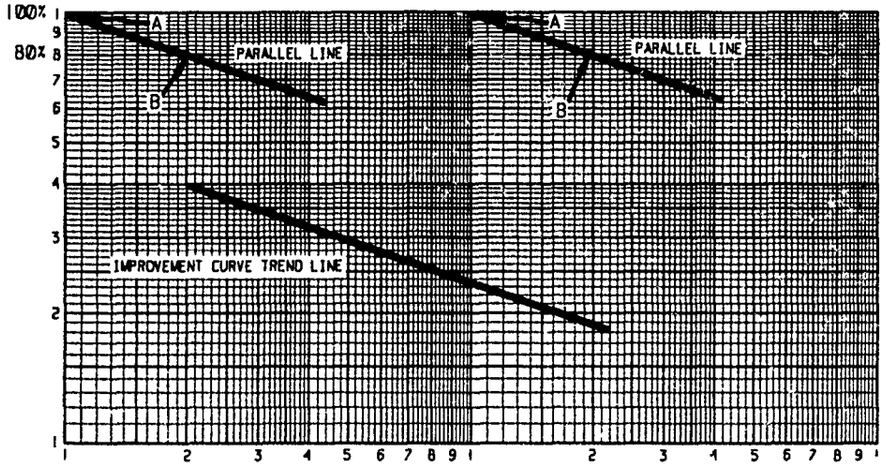



FIGURE F-1-6
CONSTRUCTING A PARRELLEL LINE
BY MEASUREMENT

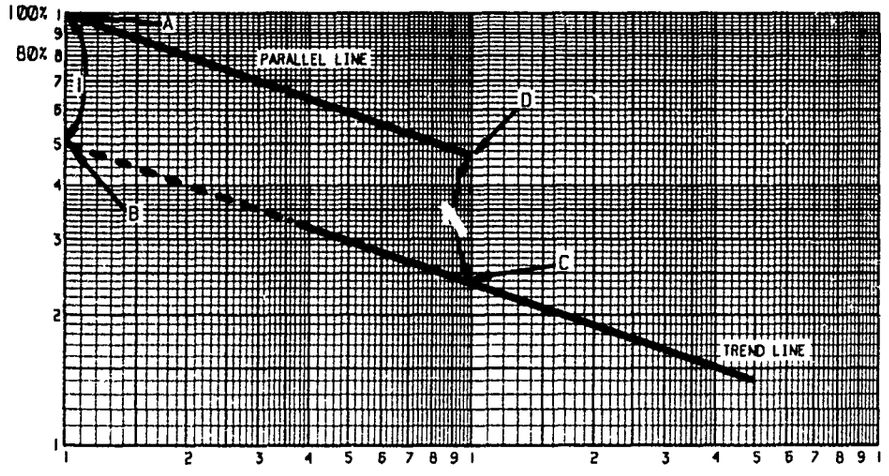
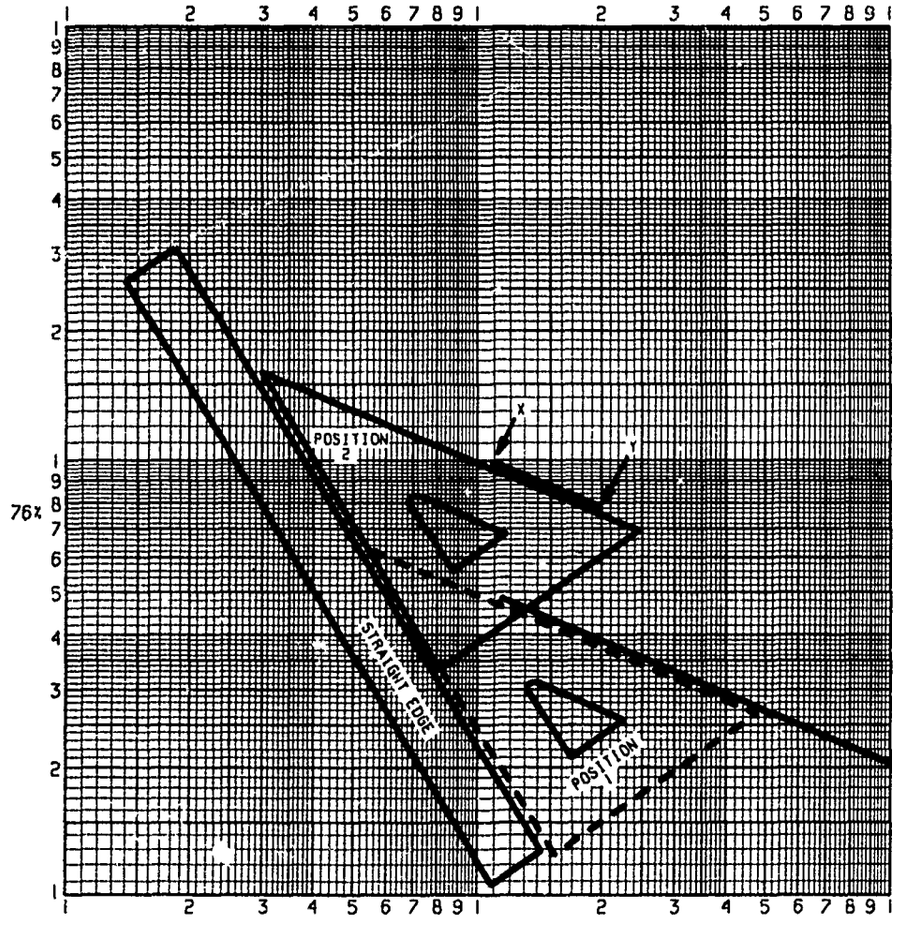


FIGURE F-1-7
CONSTRUCTION OF PARALLEL LINES
USING STRAIGHT EDGE AND TRIANGLE



**F-105.1 Slope**

a. The improvement curve slope, expressed in percentage terms, is the primary characteristic by which a curve is identified. As previously discussed, it is actually the complement of the rate of cost reduction that occurs as production progresses. It is also the ratio (in percentage terms) of the unit cost of any given quantity to the unit cost of half of that same quantity. For example, the slope of the curve shown in Figure F-1-2 can be computed from the curve data given in F-103a. Using the hours for units 32 and 16 (32.77 and 40.97), the slope would be

32.77/40.97 or 80%

b. The slope of an improvement curve also can be determined by graphical methods. The simplest of these methods involves the use of a protractor. The protractor is placed with its straight edge on a vertical line and the center of the straight edge on the intersection of the vertical line with the trend line. The angle between the two lines is measured in a counterclockwise direction from the vertical line to the trend line. The reading in degrees is divided by .9 to obtain the slope percentage. If a protractor is not available, another graphic method can be used. A line is first drawn parallel to the trend line and in such a position, either above or below the trend line, that it intersects the left-hand vertical (y) axis (the unit number one line) at the start of a vertical cycle (point A in Figure F-1-5). The units of the vertical scale may be read as percentages with 100% at the end of the cycle where the parallel line intersects the scale (point A). The percentage value of the point at which the parallel line intersects the vertical axis for unit two (point B) will be the slope of the curve (80% in the example). There are two methods by which the parallel line may be constructed: (1) by measurement, or (2) by use of a triangle and straight edge.

(1) To construct the parallel line by measurement, the trend line first should be extended, if necessary, to intersect the left-hand axis (point B in Figure F-1-6). The distance from this point to the start of the next vertical cycle (point A) is measured, and this distance (1 inch in the illustration) is laid out vertically from any second point on the trend line; in Figure F-1-6 this was arbitrarily done at unit 10 (point C). A straight line is then drawn from the point thus determined (point D) to the start of the vertical cycle (point A); this line is parallel to the improvement curve trend line, and the percentage value of the point where it crosses the unit two line indicates the slope of the curve.

(2) To draw the parallel line using a triangle and a straight edge, the triangle is placed on the graph with one edge (called the leading edge) lying along the trend line (position 1, Figure F-1-7). The straight edge is placed against the left-hand edge of the triangle; and the triangle is then moved to the left along the straight edge until its leading edge intersects the vertical axis at the start of a cycle (position 2). The parallel line is then drawn through this point along the leading edge of the triangle (points x and y). The curve is thus determined to be a 76% curve (point y).

c. The degree of precision attainable by these methods is directly dependent on the skill and care exercised by the estimator, especially in constructing the curves and in reading values from the curves. For example, a small variation in placing a point or a line, or in reading a value from a trend line may have little significance, numerically, at the lower end of the logarithmic scale. At the upper end of the scale, however, the same physical amount of variation can have a significant effect even though the relative degree of error would be the same. This is evident from the fact that the distances between the values 2 and 4, 200 and 400, and 2,000 and 4,000 are equal on a logarithmic scale. Thus, a deviation that may appear small may represent a sizable variation in the upper end of the scale; even the width of a pencil line may make a material difference.

d. By using the above techniques in a reverse manner, the estimated cost of any subsequent unit or group of units may be computed (1) from the slope of the improvement curve and the known or estimated cost of any unit or lot of production, or (2) from the costs of any two units from the same production run.

(1) The validity of this procedure will be directly dependent on the validity of the underlying assumptions and the skill of the estimator. The cost-quantity relationships, both and in the future, must warrant the use of the improvement curve technique; and the assumed improvement curve rate must be valid for both the known cost and for the production throughout the forecast period. The auditor should assess the validity of these assumptions before applying this technique or before accepting any estimates based on its use.

(2) The technique of using the cost of a single unit or lot and the slope of the improvement curve as a base for estimating future costs is frequently used in pricing new or modified products. In these cases, the cost used may be the estimated cost of the first unit or lot and the improvement curve rate may be the average for the plant or for comparable previous production. In addition to computation by graphical means, the cost for doubled quantities could be computed by multiplication in the same manner that the table for Figure F-1-1 (F-103a.) was computed. The costs, however, usually will be computed by use of improvement curve tables or improvement curve software, as discussed in section 4.

**F-105.2 The Vertical Position of the Improvement Curve and Length of the Production Run**

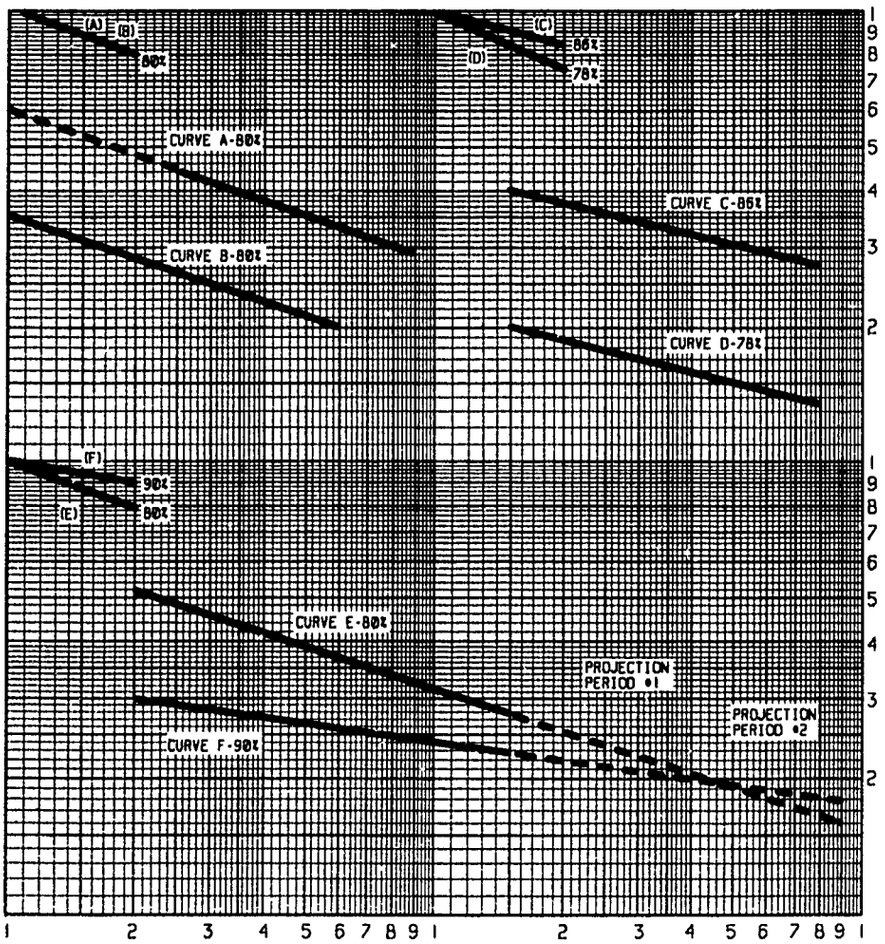
For convenience, these two factors are discussed under one heading.

a. The commonly used index of the cost level or vertical position of the curve is the value assigned to the point where the improvement curve crosses the vertical (y) axis, the actual or calculated theoretical cost of the number one unit. In Figure F-1-8, the first or irregular portion of the solid line connects the first three plotted points of a typical set of improvement curve data. The straight portion of the line portrays the trend for units 4 through 80. The broken line extends this trend line backward to intersect the vertical axis at the 190 man-hour point. This number, the index of the vertical position of the curve, is referred to as the computed or theoretical value of the number one unit because it is the amount that the number one unit would have cost had the subsequent cost-quantity relationship existed from the start of production. In practice, the computed or theoretical cost of the number one unit often differs materially from the actual cost of the unit when a constant rate of improvement does not develop immediately. In the example in Figure F-1-8, this constant rate of improvement begins only with the fourth unit. Many factors can cause this difference and at times, as when the early production is performed in the pilot shop, two distinct curves may be apparent; for example, a steep one for the pilot shop production and a more shallow one for production in the regular shop.

b. The length of the production run (that is, the number of units or production lots of a particular product to be successively produced) frequently must be considered as a fixed factor in the evaluation of cost estimates for a particular contract, if production is to be confined to the requirements of that contract. However when there will be production for several contracts, government or commercial, for the same or relatively the same product, evaluation must be made on the basis of the total production requirements.

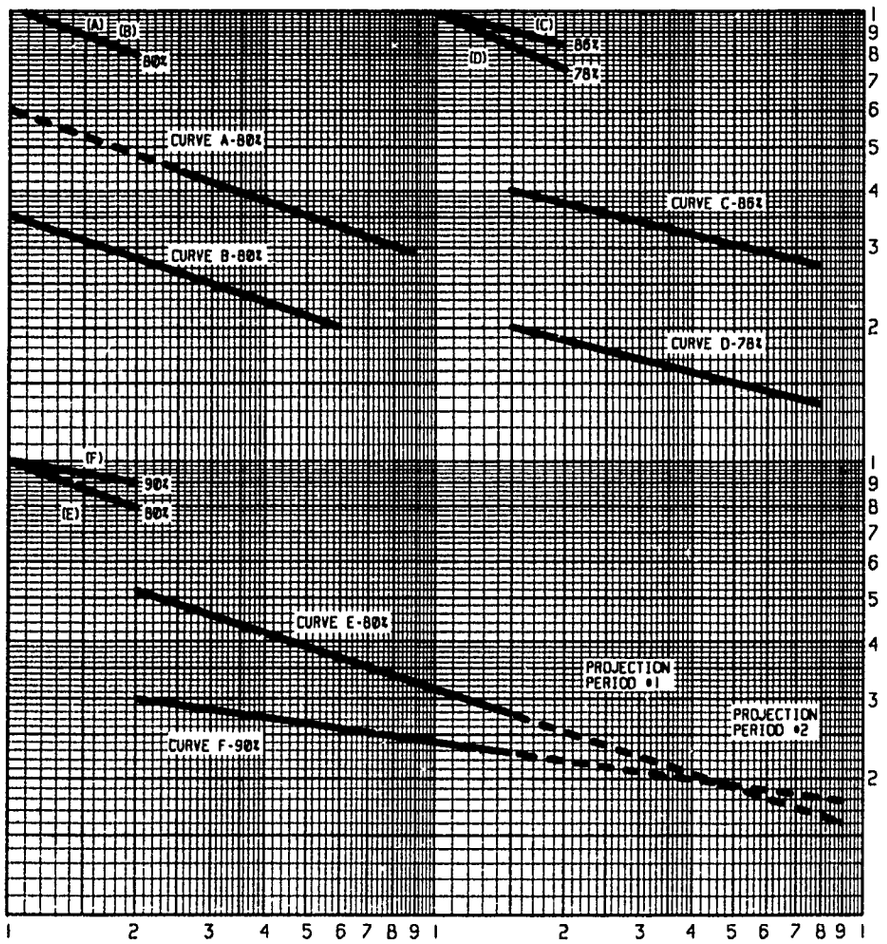
c. As illustrated by curves A and B in Figure F-1-9, all curves which have the same slope are parallel. It follows, that for curves of the same slope, the one occupying the lowest position with reference to the vertical axis will yield the lowest total cost for any given quantity of production. The same general prediction may be made if the curves, though not parallel, are so positioned that they cannot cross (curves C and D) or will not cross within the production period for a particular quantity of product (curves E and F, projection period No. 1). However, if production were continued for curves E and F, they would eventually cross, and the cost of units produced thereafter and in time the total cost of all units produced would be lower for the curve with the higher starting cost and the lower slope rate (curve E, projection period No. 2). The three factors of slope, initial cost, and the number of units to be successively produced are interdependent

FIGURE F-1-9
COMPARISON OF CURVES DIFFERING IN SLOPE AND POSITION




(A)(B)(C)(D)(E)(F) = MEASURING LINES FOR DETERMINING SLOPES OF PARALLEL CURVE LINES A, B, C, D, E AND F RESPECTIVELY

FIGURE F-1-9
COMPARISON OF CURVES DIFFERING IN SLOPE AND POSITION




(A), (B), (C), (D), (E), (F) = MEASURING LINES FOR DETERMINING SLOPES OF PARALLEL CURVE LINES A, B, C, D, E AND F RESPECTIVELY

and must be considered together in determining the overall economy of production operations. For any given number of units, however, the level of the curve with reference to the vertical axis and the slope of the curve determine the total cost.

## F-106 Significance of Vertical Position and Slope

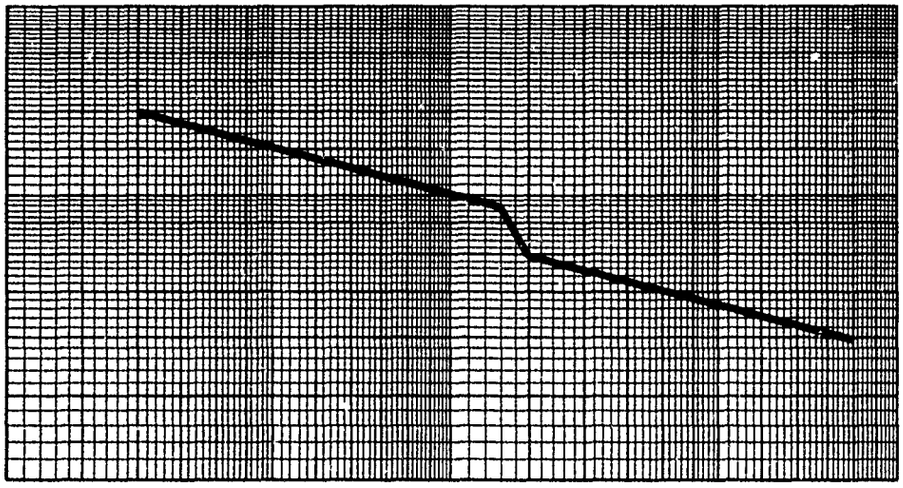
a. A number of factors determine the overall level of costs and the rate of improvement and, thereby, the vertical position and slope of the curve. Whether a given change will affect the level or the slope, or both, is dependent not only on the type and extent of the change, but also and primarily on the timing and manner of its implementation. For example, improvements made in tooling, if introduced gradually during production, will tend to affect the slope of the curve, whereas a major change made at any one time could shift the subsequent cost level. A change in product design resulting in a major simplification of production can have a similar effect, reducing the subsequent cost level. Major changes are commonly made at the start of the production cycle, and their effect is reflected in the cost level of the number one unit. However, when major changes are introduced during production, the overall level of subsequent costs may change materially, as illustrated in Figure F-1-10. When this situation is encountered in the historical period, predictions of future costs should be based on the straight portion of the curve after the change. An attempt to fit an over-all trend line that would integrate the two sections of the curve would lead in most cases to incorrect cost estimates.

b. Factors which affect the slope of the curve were listed in paragraph F-102d. Some of these and others which also affect the vertical position of the curve are discussed below. Neither the listing of items nor the discussion of those listed is exhaustive, rather, the purpose of the discussion is to suggest avenues of investigation for determining the importance of any abnormalities in the cost trends. Possibly because the curve integrates the effects of so many operational factors, it frequently exhibits a considerable degree of stability.

(1) The relative amount of manual labor to machine time. In general, the higher the ratio of manual labor to machine time, the greater may be the rate of improvement and the smaller the slope value of the improvement curve, conversely, the higher the degree of automation, the less the opportunity for improvement by the individual operator. With the increased complexity and cost of automation, changes may tend to become less frequent and of relatively major significance. Thus, highly automated processes, after the shakedown period when improvement is rapid, may exhibit relatively little improvement for an extended period.

(2) The complexity of the product. Generally, as complexity increases, more man-hours are required and the vertical position of the curve becomes higher. Complexity also affords more opportunities for improvement and steeper slopes are typically encountered.

FIGURE F-1-10
REDUCTION IN COST LEVEL
RESULTING FROM MAJOR SIMPLIFICATION



(3) The experience and skill of management and the work force. Inexperience usually results in higher first unit costs than would be expected with more experienced personnel, but it can also result in higher observed rates of improvement since the opportunities for improvement are greater. The fact that more experienced personnel might start at a lower first unit cost and proceed at a lower observed rate of improvement can be attributed to prior applicable experience gained elsewhere.

(4) Number of shifts and amount of overtime. Multi-shift operations and excessive overtime tend to reduce efficiency, with a resulting adverse effect on the vertical position of the curve.

(5) Plant capacity. Operation at other than optimum plant capacity may adversely affect the vertical position of the curve and, frequently, the slope.

(6) The costs of experimental models, prototypes, and pilot shop production. The cost of production in model and pilot shops tends to be higher than the cost of subsequent production in the regular shop. Whether or not the costs of these operations can be used, even with adjustment, as a basis for forecasting subsequent production costs in the regular production shop, can be determined only by careful analysis of the contractor's experience. Further, when these costs are used as a basis for developing a forecast, the auditor's report should include comments on this fact and all pertinent findings as to the historical reliability of this procedure. These problems arise primarily from a contemplated transfer of production from the model or pilot shop to the regular production facilities. They will not exist, as a rule, if production is to be completed in the model or pilot shop.

(7) The stability of the work force. When labor turnover is high, production efficiency and hence labor costs will be adversely affected. The vertical position of the curve usually will be higher than it otherwise would have been. The effect on the slope of the curve will depend on the rate of turnover and on the stability of that rate; for example, a consistent but excessive rate of turnover may substantially reduce overall improvement.

(8) Period between production units. When an extensive period elapses between the production of successive units, the rate of improvement will tend to be

low because of the lapse of time between when a worker performs the identical operation on successive units. For example, the rates of improvement in the construction of large ships are generally less than in the manufacture of other end items which employ extensive manual labor but over much shorter periods of time.

(9) Documentation. Records should be maintained of problems encountered in past production and work methods, schedules, and layouts devised to alleviate these problems and improve future efficiency. In this manner, the lessons of the past will not be forgotten. If substantial periods elapse between the production of successive units, the extent of such documentation will affect the rate of improvement. When there is a break in production, the extent of such documentation will affect the amount of improvement retained when production is resumed.

(10) Engineering changes. Major engineering changes usually tend to disrupt normal improvement curve patterns. Because of the importance of these changes, they are separately discussed in F-502.

(11) Make-or-buy practices. Because a company's make-or-buy practices can have a significant effect on the work being performed, on the capacity level at which the company operates, and on unit labor requirements, they can also materially affect the vertical position and slope of the improvement curve. A major change during the production cycle can have an effect somewhat similar to an engineering change. A major change from make to buy may cause a rapid drop in cost, possibly followed by a change in slope. A major change from buy to make may cause a rapid increase in cost and can also be followed by a change in slope.

(12) Prior experience in producing similar items. If a contractor produces an item similar to items previously produced in the same facility with the same work force, it can be expected that some of the improvement gained on prior production will be carried over to the new item. The same effect is generally obtained when a contractor makes an item which has previously been produced by another contractor, and documentation on the lessons learned by the first contractor is made available to the second. In either case, it will appear that initial improvement is less than that experienced later in production, when the data are plotted normally. The appropriate adjustment is to reposition the data several units to the right in order to compensate for the number of units of retained improvement. This adjustment is discussed in F-503.

(13) Breaks-in-production. Resumption of production after an inordinate interval between units or lots will adversely affect the pattern of improvement and the vertical position of the curve can be expected to be higher than it was prior to the disruption. Breaks-in-production are discussed in some detail in F-504.

(14) Fluctuations in volume. When manloading requirements are not proportional to the number of units being produced, there will be instances when the volume of production impacts the production efficiency. A complete discussion of this factor is presented in F-505.

## F-200 Section 2 — Types of Improvement Curves

### F-201 Introduction

This section discusses and compares the two basic theories underlying improvement curves.

### F-202 General

As has been previously stated, the basic concept of the improvement curve assumes that there will be a relatively constant rate of reduction in the unit cost for each successive doubling of the total production. This general concept has been expressed in two slightly different ways: (1) as the unit curve theory and (2) as the cumulative average curve theory. For each of these theories, two types of improvement curves may be constructed: a unit cost curve and a cumulative average cost curve. Thus, there are four improvement curves: a unit cost curve and a cumulative average cost curve for the unit curve theory, and a unit cost curve and a cumulative average cost curve for the cumulative average theory. The methods of constructing these four curves, their similarities and differences, and the difference between the two improvement curve theories, are discussed in the following paragraphs.

### F-203 The Unit Curve Theory

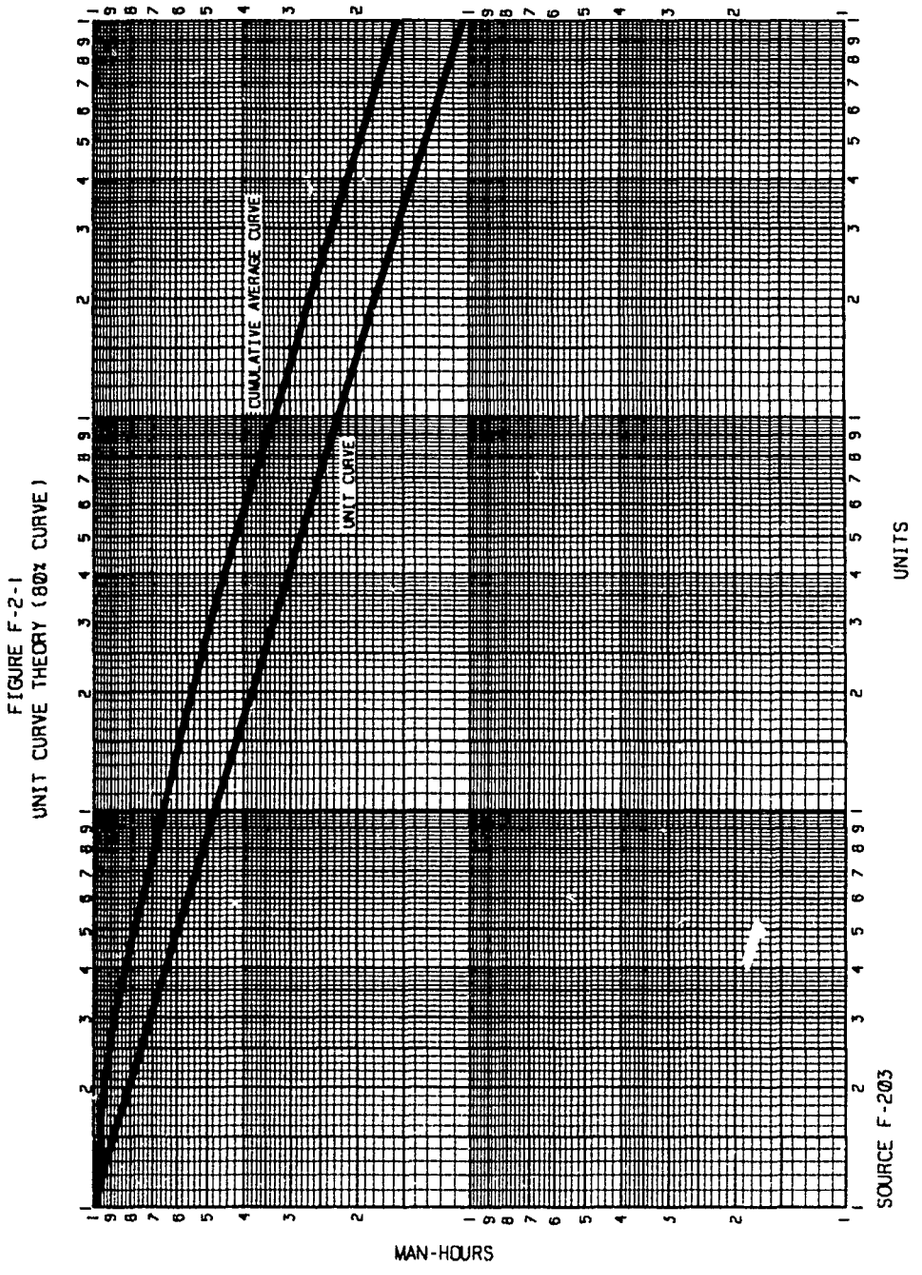
The unit curve theory is based on the assumption that as production quantity is doubled from any level, the cost of the last unit of the doubled quantity is a constant percentage of the cost of the last unit before doubling. That is, the cost of the fourth unit is assumed to be the same percentage of cost of the second unit as is the cost of the eighth unit is to the cost of the fourth. This is the improvement curve theory discussed in section 1. It was illustrated with an 80% curve in Figure F-1-2. Based on the data given in the following table, an 80% unit cost curve and an 80% cumulative average cost curve computed under the unit curve theory are illustrated in Figure F-2-1.

**Table for Figure F-2-1**
**80% Unit Curve Theory**

| *Unit No.* | *Unit Man-hours* | *Cumulative No. of Units* | *Cumulative Total Man-hours** | *Cumulative Average Man-hours* |
|---|---|---|---|---|
| 1 | 100.00 | 1 | 100.00 | 100.00 |
| 2 | 80.00 | 2 | 180.00 | 90.00 |
| 4 | 64.00 | 4 | 314.21 | 78.55 |
| 8 | 51.20 | 8 | 534.59 | 66.82 |
| 16 | 40.96 | 16 | 892.01 | 55.75 |
| 32 | 32.77 | 32 | 1,467.86 | 45.87 |
| 64 | 26.21 | 64 | 2,392.45 | 37.38 |
| 100 | 22.71 | 100 | 3,265.08 | 32.65 |
| 1000 | 10.82 | 1000 | 15,867.09 | 15.87 |

*The totals include the values of omitted units.

The data in columns 1 and 2 of this table are the same through unit 64 as the data given in the table for Figures F-1-1 and F-1-2 (F-103a.). As a result, the unit curve in Figure F-2-1 and the curve in Figure F-1-2 are identical. Because the assumed uniform rate of reduction applies to the cost of specific units, the unit cost line is linear. On the other hand, the cumulative average data, which are derived from the unit cost data, do not reflect a constant rate of improvementt linear. However, the curvature in this line decreases rapidly, so that it becomes approximately linear and parallel to the unit cost line after the first 20 to 30 units.


FIGURE F-2-1
UNIT CURVE THEORY (80% CURVE)
CUMULATIVE AVERAGE CURVE
UNIT CURVE
UNITS
MAN-HOURS
SOURCE F-203

## F-204 The Cumulative Average Curve Theory

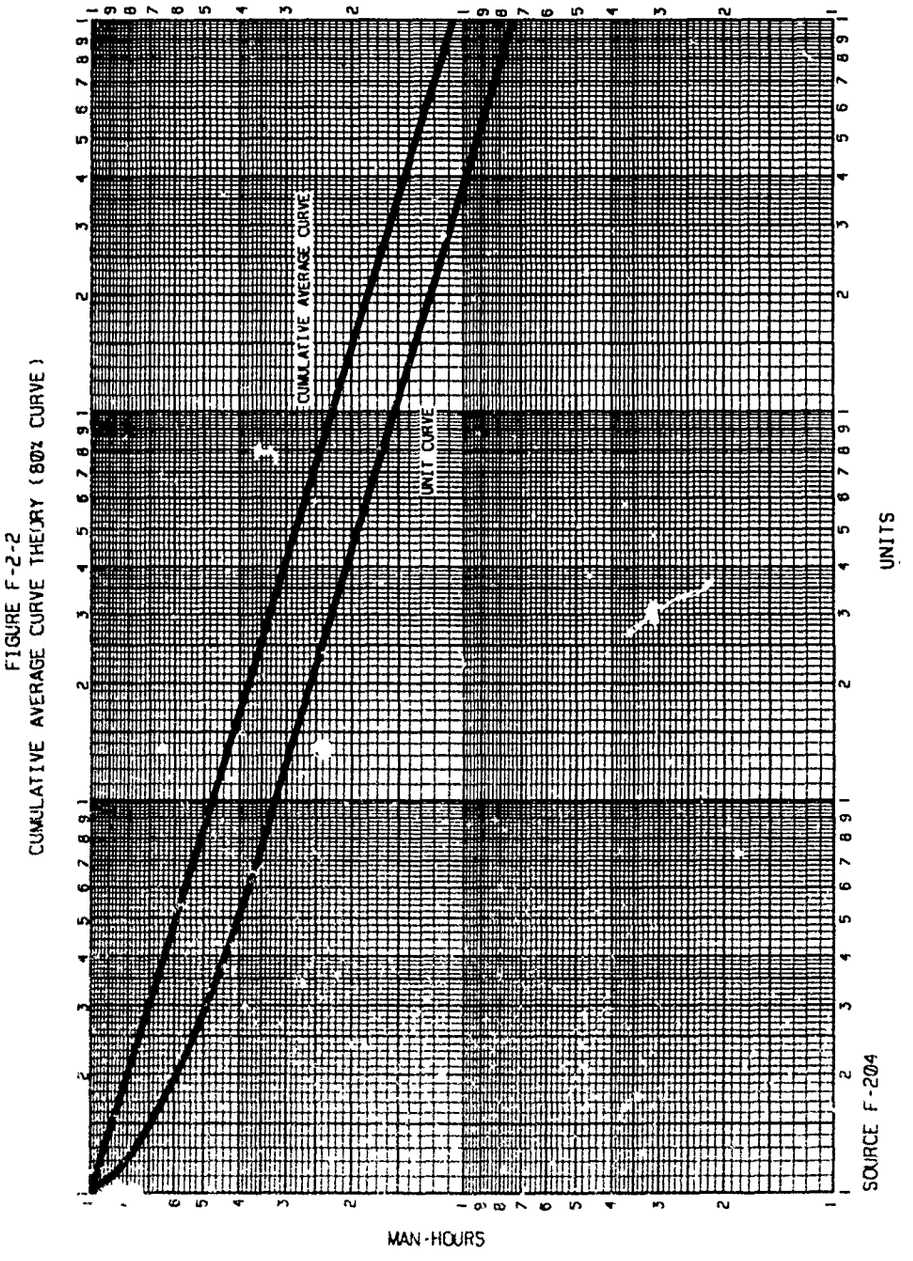
The hypothesis for the cumulative average curve theory assumes that as the total number of units successively produced is doubled, the cumulative average cost of each doubled quantity of production (that is, the average cost of units 1 and 2, of units 1 through 4, 1 through 8, 1 through 16, etc.) will decline by some constant percentage. The operation of this theory is illustrated in the following table and in Figure F-2-2.

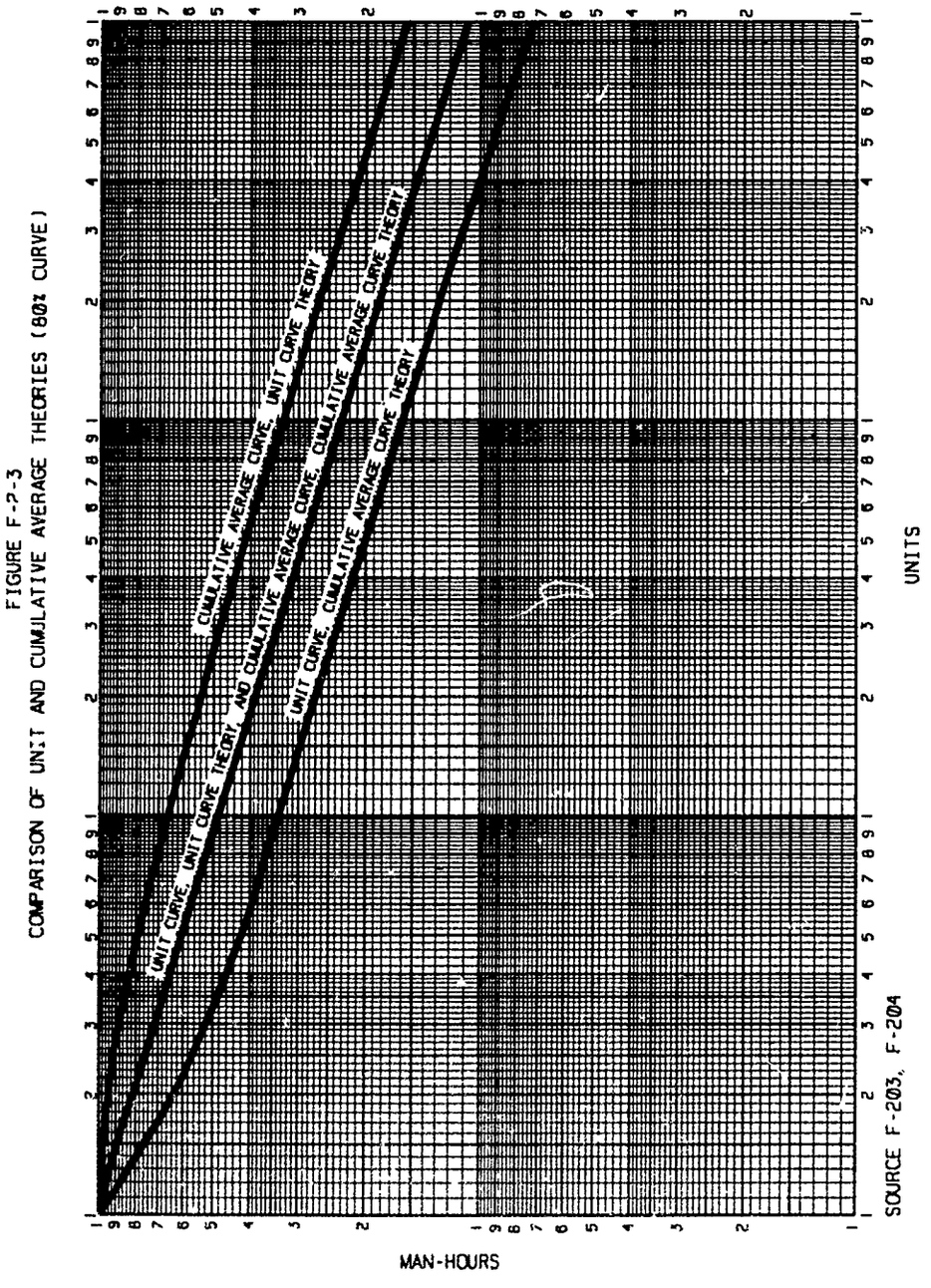
**Table for Figure F-2-2**
**80% (Cumulative Average Curve Theory)**

| *Unit No.* | *Unit Man-hours* | *Cumulative No. of Units* | *Cumulative Total Man-hours** | *Cumulative Average Man-hours* |
|---|---|---|---|---|
| 1 | 100.00 | 1 | 100.00 | 100.00 |
| 2 | 60.00 | 2 | 160.00 | 80.00 |
| 3 | 50.63 | 3 | 210.63 | 70.21 |
| 4 | 45.37 | 4 | 256.00 | 64.00 |
| 5 | 41.82 | 5 | 297.82 | 59.56 |
| 6 | 39.19 | 6 | 337.01 | 56.17 |
| 7 | 37.13 | 7 | 374.14 | 53.45 |
| 8 | 35.46 | 8 | 409.60 | 51.20 |
| 16 | 28.06 | 16 | 655.36 | 40.96 |
| 32 | 22.33 | 32 | 1,048.58 | 32.77 |
| 64 | 17.82 | 64 | 1,677.70 | 26.21 |
| 100 | 15.42 | 100 | 2,270.62 | 22.71 |
| 1000 | 7.34 | 1000 | 10,819.71 | 10.82 |

*Totals include values of omitted units.

The data in the last column of this table, the cumulative average man-hours, is identical with that in the unit man-hours columns in the table for Figure F-2-1 (F-203). Both tables reflect a 20% improvement for doubled quantities (80% curves). In Figure F-2-2 it is the cumulative average cost line which is linear, and the unit line which is curved. Again, the rate of curvature becomes negligible after the first few units and the unit cost line becomes approximately linear and parallel to the cumulative average cost line.


FIGURE F-2-2
CUMULATIVE AVERAGE CURVE THEORY (80% CURVE)
CUMULATIVE AVERAGE CURVE
UNIT CURVE
UNITS
MAN-HOURS
SOURCE F-204


FIGURE F-2-3
COMPARISON OF UNIT AND CUMULATIVE AVERAGE THEORIES (80% CURVE)
UNIT CURVE, UNIT CURVE THEORY
CUMULATIVE AVERAGE CURVE, UNIT CURVE THEORY
UNIT CURVE, CUMULATIVE AVERAGE CURVE THEORY
CUMULATIVE AVERAGE CURVE, CUMULATIVE AVERAGE CURVE THEORY
UNITS
MAN-HOURS
SOURCE F-203, F-204

## F-205 Comparison of the Unit Curve and the Cumulative Average Curve Theories

a. The auditor should understand from the discussion in the first part of this appendix that the improvement curve theory is not an expression of an exact or absolute principle. It is a generalization based on observed relationships between the production cost and the quantity produced which has been found to be sufficiently true to permit broad usage in the analysis and forecasting of product costs. The concept expresses an approximation, and many variations in the method of application have been developed to meet the needs and ideas of users. These differences represent varying methods of interpreting the general concept and the two theories of the improvement curve. The auditor must determine the appropriateness of the methods used by the contractor. He or she will not find it a difficult task if he or she understands the basic principles and interrelationships underlying and integrating the two slightly different expressions of the basic concept.

b. A comparison of the curves in Figure F-2-1 and F-2-2 will disclose a number of similarities and differences that are significant to their construction and interpretation. To facilitate this comparison the four curves have been combined in Figure F-2-3.

(1) It should be evident that the unit cost line for the unit curve theory and the cumulative average cost line for the cumulative average curve theory are identical for any given slope; an identity that is postulated in the two curve theories. As a result, these curves are represented by a single line in Figure F-2-3. Although the two lines are identical for any given slope, the basic data resulting in identical slopes is different. For example, if unit one requires 100 man-hours and unit two requires 80 man-hours, under the unit curve theory this would be represented by an 80 percent unit curve, but under the cumulative average curve theory this would be represented by a 90 percent cumulative average curve, i.e., in order for the cumulative average curve under the cumulative average curve theory to be 80 percent, unit number two must require 60 man-hours.

(2) Except for the curvature in the first portion of the cumulative average line for the unit curve theory and in the first portion of the unit line for the cumulative average curve theory, which result primarily from the construction methods used, the only difference between curves of the same slope lies in the level or relative vertical positions of the unit and cumulative average lines. Regardless of the curve theory being followed, the cumulative average cost curve lies above the unit cost curve (occupies a higher position in relation to the vertical axis). This difference in position arises from the fact that each cumulative average cost is an average of all costs from the first unit through a given point of production and thus includes a portion of the high cost of the early, less efficient production; while the unit cost curve presents only the costs of individual units. However, because of the lack of linearity in the first part of the curves, the use of the cumulative average curve for the unit curve theory and of the unit curve for the cumulative average curve theory is not practical for forecasting the early cost of production. Beyond the first few units, however, the relationship between the unit and the cumulative average curves for either theory becomes relatively constant and either curve could be used.

(3) In practice, it is customary to plot the unit curve of the unit curve theory and the cumulative average curve of the cumulative average curve theory. This representation of the cumulative average curve can be misleading since the averaging process tends to smooth out the data pattern, concealing and suppressing significant deviations in unit costs. For this reason, the auditor should plot a unit curve as part of the analysis, regardless of whether the unit curve theory or the cumulative average curve theory is used.

c. Although the cumulative average theory was developed first, the unit curve theory is most commonly used. Furthermore, studies of Defense production data

have generally provided more support for the unit curve theory. Accordingly, auditors should use the unit curve theory unless there is evidence that the contractor's experience has consistently followed the pattern predicated by the cumulative average curve theory.

## F-300 Section 3 — Fitting Improvement Curves to Lot Data

### F-301 Introduction

This section discusses the application of the improvement curve theory to data accumulated in lots rather than by individual units.

### F-302 General

a. The accounting systems maintained by the majority of manufacturers accumulate costs by production lots rather than by production units. Both the unit curve and the cumulative average curve theories can be applied to lot data.

b. Plotting a cumulative average curve presents no problem because the cumulative averages are simply plotted at the last unit number for each lot. However, in plotting a unit curve under either theory, it will be necessary to locate the unit number at which the average unit cost of each lot is plotted. This lot midpoint represents the unit number to which the average lot cost could be expected to apply if cost data were available on each unit in the lot. In consonance with the improvement curve theory, it may be assumed that the first unit a production lot would normally cost more to produce than the average for the lot and the last unit less. Some unit within the lot, however, would cost approximately the same as the lot average. The true lot midpoint will not usually be a whole number, although rule-of-thumb methods may result in whole numbers being used. For example, if a lot consists of units 1 and 2 on an 80% unit theory curve, the midpoint will obviously be between 1 and 2. Even if the lot consists of units 1 and 3, the midpoint will not be exactly 2 because the average unit cost of the first three units under an 80% unit theory curve is about 83.4% of the first unit cost, whereas the cost of the second unit is 80% (Table F-4-1). In general, a lot midpoint will be less than the mean of the first and last unit numbers in the lot. However, it will be quite close to the mean if (1) many units were produced in prior lots and/or (2) the slope of the curve is shallow.

c. Another consideration when an improvement curve is fitted to lot data is the weight to be given to each lot. Both theory and logic dictate that more weight be given to larger lots. Computer programs are available which provide the correct weighting of lots, as well as precise calculations of lot midpoints.

### F-303 Locating Lot Midpoint by Rule-of-Thumb

Many short-cut methods of obtaining lot midpoints have been developed. The following rule-of-thumb is simple and fairly accurate in most applications: (1) for the first lot multiply the number of units by .3 and add one, (2) for all subsequent lots, divide the lot size by two and add the number of units in the preceding lots. An example of a unit curve theory graph constructed by this rule-of-thumb is presented in Figure F-3-1.

### F-304 Computation of Lot Midpoints from Tables

Improvement curve tables (excerpts are shown in Tables F-4-1 and F-4-2) may be used to compute lot midpoints. This method is more precise than rule-of-thumb methods (F-303). The lot midpoint is determined in this method by finding the number of that unit within the lot whose factor is equal to the cumulative average factor for the lot. The method is illustrated below.

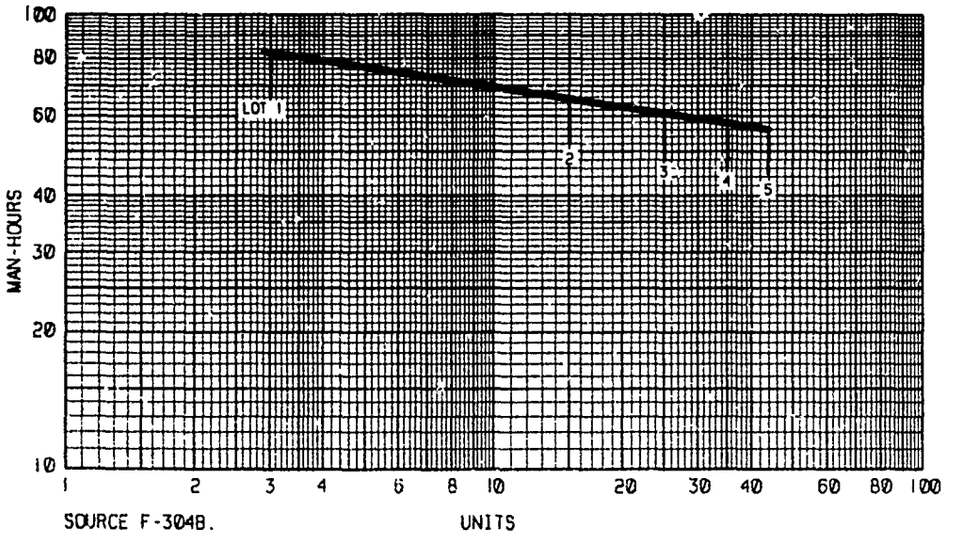
a. In this illustration it is assumed that the tables for an 80% curve under the unit curve theory (F-203) will be used and that the midpoint of a first lot of 10 units will be computed. From the cumulative total column of Table F-4-1 the cumulative average factor is found to be .631537 (6.315373 divided by 10). In the unit factor column, this falls between units 4 and 5. By interpolation, it is found that a unit factor of .631537 corresponds to unit no. 4.19. Therefore, 4.19 is considered the lot midpoint for a first lot of 10 units.

b. Table F-3-1 shows exact first lot midpoints for selected lot sizes and slopes. The table should not be used for second and subsequent lots.

**Table for Figure F-3-1**
**Lot Average Cost Curve (Unit Curve Theory)**

| *Lot No.* | *No. of Units in Lot* | *Cumulative No. of Units* | *Plotting Point* | *Lot Hours* | *Average Hours Per Unit* |
|---|---|---|---|---|---|
| 1 | 6 | 6 | 2.8 | 480 | 80 |
| 2 | 16 | 22 | 14 | 1,024 | 64 |
| 3 | 6 | 28 | 25 | 354 | 59 |
| 4 | 14 | 42 | 35 | 784 | 56 |
| 5 | 4 | 46 | 44 | 216 | 54 |

FIGURE F-3-1
LOT AVERAGE COST CURVE
(UNIT CURVE THEORY)




SOURCE F-304B.

**Table F-3-1**
**FIRST LOT MIDPOINTS**
**FOR SELECTED QUANTITIES AND CURVES**
**(Unit Curve Theory)**

| *Units in 1st Lot* | *70% Curve* | *80% Curve* | *90% Curve* |
|---|---|---|---|
| 2 | 1.37 | 1.39 | 1.40 |
| 3 | 1.72 | 1.75 | 1.79 |
| 4 | 2.06 | 2.12 | 2.17 |
| 5 | 2.39 | 2.47 | 2.54 |
| 6 | 2.71 | 2.82 | 2.91 |
| 7 | 3.03 | 3.16 | 3.28 |
| 8 | 3.34 | 3.50 | 3.64 |
| 9 | 3.65 | 3.83 | 4.00 |
| 10 | 3.95 | 4.17 | 4.36 |
| 15 | 5.44 | 5.82 | 6.14 |
| 25 | 8.32 | 9.03 | 9.65 |
| 50 | 15.25 | 16.90 | 18.30 |
| 100 | 28.65 | 32.36 | 35.43 |
| 500 | 131.71 | 153.76 | 171.31 |
| 1000 | 258.15 | 304.43 | 340.67 |
| 10000 | 2495.48 | 3002.85 | 3384.18 |

## F-305 Computer Programs and Lot Data

The preceding discussion is presented to provide a basic understanding of lot midpoints and to aid the auditor when computer facilities are not readily available. However, the preferred method of fitting improvement curves and projecting future costs is with the Agency's computer software designed specifically for this purpose. Unit and cumulative average improvement curve options are available on E-Z-Quant (discussed in DCAAP 7641.91) for curve estimation and cost projection.

## F-306 Use of Equivalent Units

a. In some situations contractors may not segregate costs by units or lots. If, however, data are available on the actual labor hours charged to the production of an item during each month (or other period) and labor standards are used, it is often possible to determine the equivalent number of units produced during the period. The following tabulation illustrates computations for an item for which the standard hours per unit is 150.

Computation of Equivalent Units and Related Hours

| *Month Col. 1* | *Standard Hours Col. 2* | *Equivalent Units* Col. 3* | *Actual Hours Col. 4* | *Actual Hrs. Per Unit** Col. 5* |
|---|---|---|---|---|
| Jan | 6,037 | 40.24 | 8,624 | 214.31 |
| Feb | 17,058 | 113.72 | 15,972 | 140.45 |
| Mar | 36,307 | 242.05 | 26,728 | 110.42 |
| Apr | 48,973 | 326.49 | 27,851 | 85.30 |
| May | 51,207 | 341.38 | 26,528 | 77.71 |
| Jun | 51,853 | 345.69 | 25,630 | 74.14 |

* Col. 2 ÷ 150
**Col. 4 ÷ Col. 3

b. Even if labor standards are not used, this same general procedure can be followed if (1) records are maintained of the number of units in process at various stages of production at the end of each payroll period, and (2) there are estimates of the number of labor hours required for the work performed between stages. Such estimates could, for example, be obtained from the bill of labor submitted by the contractor in support of the bid proposal. To illustrate the procedure, suppose the contractor's records show the following status of production at the end of a payroll period:

| | *Number* | *Cumulative Total* |
|---|---|---|
| Completed | 100 | 100 |
| In process through | | |
| Operation 3 | 10 | 110 |
| Operation 2 | 30 | 140 |
| Operation 1 | 20 | 160 |

The equivalent number of units produced through the end of the period could be calculated as follows:

| *Operation* | *Total Units Processed* | *Estimated Unit Labor Hours* | *Extended Amount* |
|---|---|---|---|
| 1 | 160 | 10 | 1,600 |
| 2 | 140 | 30 | 4,200 |
| 3 | 110 | 40 | 4,400 |
| 4 | 100 | 20 | 2,000 |
| Total | | 100 | 12,200 |

This would mean the equivalent of 122 units (12,200 − 100) had been produced through the end of the period. By applying this analysis to the status of operations at the end of each period, the equivalent number of units produced in each period can be obtained.

## F-400 Section 4 — Improvement Curve Techniques

### F-401 Introduction

This section sets forth the methods of applying improvement curve theories.

### F-402 General

As mentioned earlier, the methods or techniques of applying improvement curves are as follows:

a. The graphical method, in which the forecast values are derived from a graph upon which historical data have been plotted or one point is plotted and an improvement curve slope is drawn through the plot point. This method is satisfactory for exploratory purposes or where a high degree of accuracy is not required. Although this method is not desirable for expressing an audit opinion, inclusion of a graph in an audit report to depict the visual representation of the audit recommendation is desirable, and graphic analysis should always be utilized in conjunction with mathematical analysis.

b. The computational method, in which the forecast values are computed directly from the curve derived from the data. To eliminate the cumbersome procedure of manually computing projected costs, two methods of streamlined calculation are available: (1) tables of improvement curve factors and (2) specially developed computer software in E-Z-Quant (DCAAP 7641.91). The second option is the best method for both improvement curve estimation and cost projection. In addition to the significant savings in time and the superior accuracy of computer-based analysis, the computerized approach permits more complete and in-depth analysis than is possible by any other means.

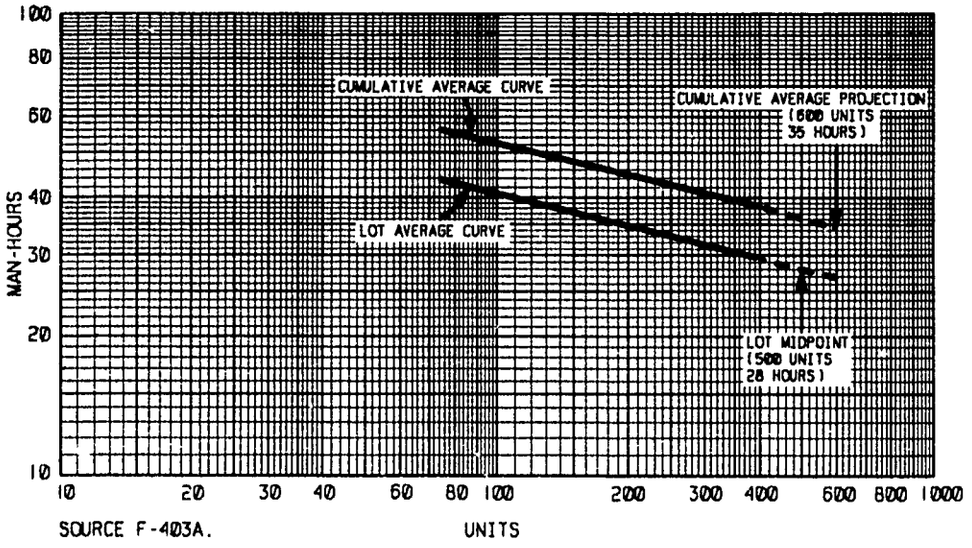
### F-403 Graphical Projection

a. Figure F-4-1 illustrates the graphical method of estimating the hours required to produce units 401 through 600 of a given product. The production data upon which the projection is to be based is given in the table which follows:

**Table for Figure F-4-1**

| *Unit No.* | *Lot Average Unit Hours* | *Cumulative Total Hours From Unit 1* | *Cumulative Average Hours from Unit 1* |
|---|---|---|---|
| 75 | 43.6 | 4,199 | 56.0 |
| 80 | 42.9 | 4,415 | 55.2 |
| 90 | 41.8 | 4,838 | 53.8 |
| 100 | 40.8 | 5,250 | 52.5 |
| 150 | 37.0 | 7,187 | 47.9 |
| 200 | 34.6 | 8,975 | 44.9 |
| 250 | 32.9 | 10,660 | 42.9 |
| 400 | 29.4 | 15,308 | 38.3 |

FIGURE F-4-1
COST REDUCTION




SOURCE F-403A.

b. After plotting the lot average unit hour and cumulative average hour data, two trend lines were fitted to the plotted points. These lines were then extended to unit 600. The values necessary for estimating the labor-hour cost of units 401 through 600 may be read from either line. To use the lot average unit line, the 200 units (from 401 through 600) are treated as a single lot and the desired value is read from the midpoint of this lot. Using the rule-of-thumb, which assumes for second and subsequent lots that the midpoint is midway in a lot (F-303), the desired value is read at unit 500. This value, 28 hours, is the unit hour average for the lot; and the total hours required to produce the lot of 200 units is 200 × 28 or 5600 hours. To use the cumulative average curve, the auditor would proceed as follows:

(1) The cumulative average value of all units is read from the cumulative average curve at unit 600, the last unit in the lot; and this reading, 35 hours is multiplied by 600 to obtain the total cumulative hours, 21,000.

(2) The desired answer is the difference between the cumulative hours for the 600 and the 400 units, as shown in F-403a., (21,000 - 15,308) or 5,692 hours.

c. This graphical method has several disadvantages. Construction of the graphs with any degree of precision requires care and is time consuming, and the precision attained may be relatively low. More important, is the fact that the degree of precision is not known or predictable because it is largely dependent on the care and skill of the estimator.

## F-404 Use of Improvement Curve Factors

a. Many contractors have developed tables of improvement curve factors which permit the computation of forecasted values to several more significant places than is possible by graphic means. Portions of two tables for both the unit curve theory and for the cumulative average curve theory are shown as Table F-4-1 and Table F-4-2.

b. Comparison of the tables developed by various companies will disclose a number of differences resulting, primarily, from the adaptation of the tables to

the needs and specific methods of the developer. A principal difference is to be found in the unit number to which a value of unity is assigned. Several manufacturers, for example, assign the value of one to the number one unit. At least one assigned this value to unit 350 and another assigned it to unit 1,000. In each of these latter cases, the developers worked forward and backward from this point. Because of such differences, the values given for any particular unit in the different tables are not necessarily the same. Nevertheless, except for the very first units, the differences in the construction of the tables should not materially affect the answers to any given problem, provided that the instructions for using the tables are followed.

c. The tables are constructed on either the "unit curve theory" (F-203) or the "cumulative average theory" (F-204), depending on which concept the contractor believes will best meet his or her needs. The tables usually contain a series of factors for both the unit and cumulative average curves under the selected curve theory and for each percent of slope from 51% to 99%. The tables are bulky and to keep their size to a minimum, cumulative total factors, rather than cumulative average factors, are usually given. Cumulative average factors may be readily obtained by dividing the cumulative total factor by the corresponding cumulative number of units.

**Table F-4-1**
**Improvement Curve Table**
**(Unit Curve Theory)**

| Unit Number | 70% Curve | | 80% Curve | | 81% Curve | |
|---|---|---|---|---|---|---|
| | Unit | Cumulative Total | Unit | Cumulative Total | Unit | Cumulative Total |
| 1 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 |
| 2 | .700000 | 1.700000 | .800000 | 1.800000 | .810000 | 1.810000 |
| 3 | .568180 | 2.268180 | .702104 | 2.502104 | .716065 | 2.526065 |
| 4 | .490000 | 2.758180 | .640000 | 3.142104 | .656100 | 3.182165 |
| 5 | .436846 | 3.195027 | .595637 | 3.737741 | .613068 | 3.795233 |
| 6 | .397726 | 3.592753 | .561683 | 4.299424 | .580012 | 4.375245 |
| 7 | .367397 | 3.960150 | .534490 | 4.833914 | .553458 | 4.928703 |
| 8 | .343000 | 4.303150 | .512000 | 5.345914 | .531441 | 5.460144 |
| 9 | .322829 | 4.625979 | .492950 | 5.838863 | .512748 | 5.972893 |
| 10 | .305792 | 4.931771 | .476510 | 6.315373 | .496585 | 6.469478 |
| 15 | .248208 | 6.273896 | .418199 | 8.510537 | .438996 | 8.767505 |
| 16 | .240100 | 6.513996 | .409600 | 8.920137 | .430467 | 9.197970 |
| 20 | .214055 | 7.406536 | .381208 | 10.484043 | .402234 | 10.846694 |
| 25 | .190835 | 8.404015 | .354784 | 12.308596 | .375853 | 12.775653 |
| 32 | .168070 | 9.643943 | .327680 | 14.678620 | .348678 | 15.292932 |
| 50 | .133584 | 12.306881 | .283827 | 20.121714 | .304441 | 21.110529 |
| 64 | .117649 | 14.050641 | .262144 | 23.924477 | .282430 | 25.199400 |
| 75 | .108429 | 15.287445 | .249095 | 26.727271 | .269135 | 28.223858 |
| 100 | .093509 | 17.790708 | .227062 | 32.650811 | .246597 | 34.641675 |
| 150 | .075900 | 21.972246 | .199276 | 43.233519 | .217999 | 46.179489 |
| 200 | .065456 | 25.482013 | .181649 | 52.719963 | .199743 | 56.585447 |
| 400 | .045819 | 36.259632 | .145319 | 84.848727 | .161792 | 92.153287 |
| 800 | .032074 | 51.355161 | .116256 | 136.269264 | .131052 | 149.788541 |

Table F-4-1

| Unit Number | 82% Curve | | 85% Curve | | 90% Curve | |
|---|---|---|---|---|---|---|
| | Unit | Cumulative Total | Unit | Cumulative Total | Unit | Cumulative Total |
| 1 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 |
| 2 | .820000 | 1.820000 | .850000 | 1.850000 | .900000 | 1.900000 |
| 3 | .730127 | 2.550127 | .772915 | 2.622915 | .846206 | 2.746206 |
| 4 | .672400 | 3.222527 | .722500 | 3.345415 | .810000 | 3.556206 |
| 5 | .630786 | 3.853313 | .685671 | 4.031086 | .782987 | 4.339193 |
| 6 | .598704 | 4.452016 | .656978 | 4.688064 | .761585 | 5.100778 |
| 7 | .572855 | 5.024872 | .633656 | 5.321720 | .743948 | 5.844726 |
| 8 | .551368 | 5.576240 | .614125 | 5.935845 | .729000 | 6.573726 |
| 9 | .533085 | 6.109324 | .597397 | 6.533242 | .716065 | 7.289790 |
| 10 | .517244 | 6.626569 | .582820 | 7.116063 | .704688 | 7.994479 |
| 15 | .460554 | 9.030936 | .529965 | 9.861056 | .662568 | 11.383717 |
| 16 | .452122 | 9.483058 | .522006 | 10.383062 | .656100 | 12.039187 |
| 20 | .424140 | 11.219085 | .495397 | 12.402277 | .634219 | 14.607759 |
| 25 | .397891 | 13.258028 | .470145 | 14.800727 | .613068 | 17.713230 |
| 32 | .370740 | 15.929740 | .443705 | 17.981384 | .590490 | 21.910730 |
| 50 | .326270 | 22.142563 | .399623 | 25.513111 | .551761 | 32.141956 |
| 64 | .304007 | 26.535175 | .377150 | 30.931342 | .531441 | 39.707512 |
| 75 | .290511 | 29.795770 | .363382 | 34.994932 | .518782 | 45.475307 |
| 100 | .267542 | 36.742290 | .339680 | 43.753867 | .496585 | 58.141020 |
| 150 | .238219 | 49.308133 | .308875 | 59.888286 | .466904 | 82.155823 |
| 200 | .219384 | 60.709807 | .288728 | 74.788513 | .446927 | 104.964061 |
| 400 | .179895 | 100.036233 | .245419 | 127.569018 | .402234 | 189.267825 |
| 800 | .147514 | 164.547743 | .208606 | 217.314261 | .362011 | 341.034718 |

Computation of Equivalent Units and Related Hours

| *Month* *Col. 1* | *Standard Hours* *Col. 2* | *Equivalent Units** *Col. 3* | *Actual Hours* *Col. 4* | *Actual Hrs. Per Unit*** *Col. 5* |
|---|---|---|---|---|
| Jan | 6,037 | 40.24 | 8,624 | 214.31 |
| Feb | 17,058 | 113.72 | 15,972 | 140.45 |
| Mar | 36,307 | 242.05 | 26,728 | 110.42 |
| Apr | 48,973 | 326.49 | 27,851 | 85.30 |
| May | 51,207 | 341.38 | 26,528 | 77.71 |
| Jun | 51,853 | 345.69 | 25,630 | 74.14 |

* Col. 2 ÷ 150
**Col. 4 ÷ Col. 3

b. Even if labor standards are not used, this same general procedure can be followed if (1) records are maintained of the number of units in process at various stages of production at the end of each payroll period, and (2) there are estimates of the number of labor hours required for the work performed between stages. Such estimates could, for example, be obtained from the bill of labor submitted by the contractor in support of the bid proposal. To illustrate the procedure, suppose the contractor's records show the following status of production at the end of a payroll period:

| | *Number* | *Cumulative Total* |
|---|---|---|
| Completed | 100 | 100 |
| In process through | | |
| Operation 3 | 10 | 110 |
| Operation 2 | 30 | 140 |
| Operation 1 | 20 | 160 |

The equivalent number of units produced through the end of the period could be calculated as follows:

| *Operation* | *Total Units Processed* | *Estimated Unit Labor Hours* | *Extended Amount* |
|---|---|---|---|
| 1 | 160 | 10 | 1,600 |
| 2 | 140 | 30 | 4,200 |
| 3 | 110 | 40 | 4,400 |
| 4 | 100 | 20 | 2,000 |
| Total | | 100 | 12,200 |

This would mean the equivalent of 122 units (12,200 − 100) had been produced through the end of the period. By applying this analysis to the status of operations at the end of each period, the equivalent number of units produced in each period can be obtained.

**Table F-4-2**
**Improvement Curve Theory**
**(Cumulative Average Curve Theory)**

| Unit Number | 70% Curve | | 80% Curve | | 81% Curve | |
|---|---|---|---|---|---|---|
| | Unit | Cumulative Total | Unit | Cumulative Total | Unit | Cumulative Total |
| 1 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 |
| 2 | .400000 | 1.400000 | .600000 | 1.600000 | .620000 | 1.620000 |
| 3 | .304541 | 1.704541 | .506311 | 2.106311 | .528194 | 2.148194 |
| 4 | .255459 | 1.960000 | .453689 | 2.560000 | .476206 | 2.624400 |
| 5 | .224232 | 2.184232 | .418187 | 2.978187 | .440941 | 3.065341 |
| 6 | .202125 | 2.386357 | .391911 | 3.370098 | .414733 | 3.480074 |
| 7 | .185419 | 2.571777 | .371329 | 3.741427 | .394135 | 3.874209 |
| 8 | .172223 | 2.744000 | .354573 | 4.096000 | .377319 | 4.251528 |
| 9 | .161460 | 2.905460 | .340546 | 4.436546 | .363208 | 4.614736 |
| 10 | .152465 | 3.057925 | .328552 | 4.765099 | .351116 | 4.965852 |
| 15 | .122626 | 3.723113 | .286705 | 6.272988 | .308728 | 6.584946 |
| 16 | .118487 | 3.841600 | .280612 | 6.553600 | .302529 | 6.887475 |
| 20 | .105279 | 4.281095 | .260614 | 7.624158 | .282128 | 8.044681 |
| 25 | .093609 | 4.770870 | .242146 | 8.869596 | .263210 | 9.396316 |
| 32 | .082252 | 5.378240 | .223324 | 10.485760 | .243847 | 11.157710 |
| 50 | .065183 | 6.679218 | .193080 | 14.191354 | .212539 | 15.222031 |
| 64 | .057341 | 7.529536 | .178203 | 16.777216 | .197039 | 18.075490 |
| 75 | .052816 | 8.132144 | .169269 | 18.682129 | .187698 | 20.185106 |
| 100 | .045509 | 9.350905 | .154213 | 22.706166 | .171892 | 24.659691 |
| 150 | .036907 | 11.385001 | .135269 | 29.891406 | .151880 | 32.699872 |
| 200 | .031815 | 13.091267 | .123271 | 36.329866 | .139126 | 39.948699 |
| 400 | .022256 | 18.327774 | .098577 | 58.127785 | .112649 | 64.716892 |
| 800 | .015574 | 25.658884 | .078846 | 93.004456 | .091229 | 104.841366 |

| Unit Number | 82% Curve | | 85% Curve | | 90% Curve | |
|---|---|---|---|---|---|---|
| | Unit | Cumulative Total | Unit | Cumulative Total | Unit | Cumulative Total |
| 1 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 | 1.000000 |
| 2 | .640000 | 1.640000 | .700000 | 1.700000 | .800000 | 1.800000 |
| 3 | .550380 | 2.190380 | .618745 | 2.318745 | .738618 | 2.538618 |
| 4 | .499220 | 2.689600 | .571255 | 2.890000 | .701382 | 3.240000 |
| 5 | .464329 | 3.153929 | .538355 | 3.428355 | .674934 | 3.914934 |
| 6 | .438294 | 3.592223 | .513510 | 3.941866 | .654579 | 4.569512 |
| 7 | .417764 | 4.009987 | .493730 | 4.435595 | .638123 | 5.207635 |
| 8 | .400957 | 4.410944 | .477405 | 4.913000 | .624365 | 5.832000 |
| 9 | .386820 | 4.797764 | .463576 | 5.376576 | .612581 | 6.444581 |
| 10 | .374680 | 5.172444 | .451628 | 5.828204 | .602299 | 7.046880 |
| 15 | .331925 | 6.908304 | .408968 | 7.949480 | .564778 | 9.938521 |
| 16 | .325645 | 7.233948 | .402620 | 8.352100 | .559079 | 10.497600 |
| 20 | .304922 | 8.482809 | .381514 | 9.907947 | .539900 | 12.684385 |
| 25 | .285628 | 9.947271 | .361628 | 11.753620 | .521485 | 15.326705 |
| 32 | .265795 | 11.863675 | .340933 | 14.198570 | .501937 | 18.895680 |
| 50 | .233530 | 16.313524 | .306649 | 19.981154 | .468609 | 27.588069 |
| 64 | .217457 | 19.456427 | .289253 | 24.137569 | .451199 | 34.012224 |
| 75 | .207734 | 21.788301 | .278619 | 27.253642 | .440374 | 38.908649 |
| 100 | .191218 | 26.754179 | .260343 | 33.967962 | .421424 | 49.658525 |
| 150 | .170178 | 35.732810 | .236640 | 46.331192 | .396134 | 70.035568 |
| 200 | .156686 | 43.876854 | .221161 | 57.745536 | .379137 | 89.385344 |
| 400 | .128436 | 71.958040 | .187932 | 98.167411 | .341158 | 160.893620 |
| 800 | .105299 | 118.011186 | .159718 | 166.884598 | .307013 | 289.608516 |

## F-405 E-Z-Quant Computer Programs

Comprehensive guidance on the use of E-Z-Quant is given in DCAAP 7641.91. E-Z-Quant includes the following improvement curve models:

a. Estimated least squares curve fits to data using the unit curve theory and the cumulative average theory models.

b. Models to project values on an improvement curve defined by a percentage slope and the cost of any unit or lot.

c. Special application improvement curve models which account for engineering design changes, production breaks, retained prior improvement, or variations in production rates. These additional procedures are discussed in section 5.

## F-406 Coefficient of Determination

a. The least squares improvement curves fitted to the data by the E-Z-Quant options discussed in DCAAP 7641.91 generally satisfy the requirements of regression analysis. Accordingly, the coefficient of determination (r-squared) is included in the output. This statistic measures the extent to which variations in unit costs can be explained by difference in unit numbers. Paragraph E-205 discussed correlation analysis and provides guidance on interpreting the index of determination and determining the existence of correlation. In using Table E-2-1, it should be noted that mathematical models for the standard unit curve theory and cumulative average have two parameters. However, each of the more advanced models discussed in F-503, F-504, and F-505 has three.

b. Certain improvement curve options of E-Z-Quant determine the comparison assurance (or confidence) that is associated with the coefficient of determination for the regression equation. This correlation analysis statistic is discussed in paragraph E-205.2.

## F-407 Selection of a Curve

The best possible source of improvement curve data is the records of the contractor who is to produce an item. If the contractor has produced the same item in the past, its records can usually be used to obtain both the percentage slope and the theoretical first unit. Even if the contractor has not produced the item before, its experience in producing other items at the facilities planned for the new item will generally provide a more reliable percentage than the experience from another contractor. It should also be noted that while improvement curves can best be fitted to direct labor hours or costs which have been segregated by unit or lot, it is often possible to develop satisfactory improvement curves from monthly or weekly costs and equivalent units of production (F-306), or even from cost recorded against successive contracts.

## F-500 Section 5 — Other Factors Which Affect Improvement

### F-501 Introduction

This section describes factors which may cause departures from normal improvement curve patterns. It also discusses methods of measuring and compensating for the effects of these factors.

### F-502 Engineering and Other Major Changes

a. Changes in a product and in the method of its manufacture will affect the unit cost of the product and, therefore, the slope and vertical position of the improvement curve. Most of these changes are relatively minor; and, because they are constantly taking place, they form a continuing and repetitive pattern of change. Their combined and continuing impact on product unit cost is one of the principal improvement factors that the curve is designed to measure. The use of the improvement curve to measure a rate of change is a dynamic method of analyzing costs. Where other methods assume a constancy in composition of a product and in the technology of its production, the theory of the improvement curve assumes the constancy of change. It assumes that the rate of change is the factor that will be constant. To the extent that this assumption is true, the curve, appropriately plotted, will be linear; and the slope of the curve will be constant.

b. It must be recognized that these improvement curve assumptions encompass only those changes which compose the normal, continuing, repetitive pattern of change. There are, however, other changes, occasional in frequency, that have an abrupt and major impact on unit costs. These changes tend to produce a sharp and material deviation in the slope and vertical position of the improvement curve, as shown between lots 5 and 6 in Figure F-5-1. Major changes in the design of a product, commonly known as engineering changes, are one of the most common causes of these sharp deviations in the level and trend of the curve. There are, however, a number of other causes which can have the same or a similar effect, such as a major change in tooling and equipment, a major shift towards automation, or the production of a major component previously purchased.

c. The difficulty of forecasting from a curve that reflects an engineering or other major change may be seen from the example given in Figure F-5-1. In this example, a major change was made in a component in lot 6. As a result, a sharp rise in the vertical position of the curve occurred between lots 5 and 6. Though the curve slopes back sharply thereafter, it does not begin to reflect a stabilized trend until lot 10, when it becomes asymptotic to the trend before the change. Projection of the basic trend at lot 6 to forecast lots 7 to 10 would be meaningless, as would a projection of any segment of the line connecting any of these points.

d. The first step in appraising the full impact of engineering changes should be the segregation of costs between components affected by the change and those not affected. When unit cost or lot costs by components are available, there is usually no problem in securing this segregation. When appropriate data is not readily available, the auditor may segregate costs on some other basis provided it measures the relative effort in the changed portion to that in the whole product.

Asymptote: A curve always approaching but never meeting a straight line; tangent at infinity.

**Table for Figure F-5-1**

| *Lot No.* | *Units Per Lot* | *Total Units* | *Lot Mid-Point* | *Lot Plotting Point* | *Total Hours Per Lot* | *Average Hours Per Lot* |
|---|---|---|---|---|---|---|
| 1 | 10 | 10 | 4.0 | 4.0 | 2000 | 200 |
| 2 | 10 | 20 | 5.0 | 15.0 | 1100 | 110 |
| 3 | 20 | 40 | 10.0 | 30.0 | 1600 | 80 |
| 4 | 20 | 60 | 10.0 | 50.0 | 1240 | 62 |
| 5 | 20 | 80 | 10.0 | 70.0 | 1080 | 54 |
| 6 | 8 | 88 | 4.0 | 84.0 | 720 | 90 |
| 7 | 12 | 100 | 6.0 | 94.0 | 840 | 70 |
| 8 | 30 | 130 | 15.0 | 115.0 | 1680 | 56 |
| 9 | 40 | 170 | 20.0 | 150.0 | 1840 | 46 |
| 10 | 40 | 210 | 20.0 | 190.0 | 1600 | 40 |
| 11 | 80 | 290 | 40.0 | 250.0 | 2800 | 35 |
| 12 | 80 | 370 | 40.0 | 330.0 | 2400 | 30 |
| 13 | 80 | 450 | 40.0 | 410.0 | 2160 | 27 |
| 14 | 120 | 570 | 60.0 | 510.0 | 2880 | 24 |
| 15 | 120 | 690 | 60.0 | 630.0 | 2640 | 22 |
| 16 | 120 | 810 | 60.0 | 750.0 | 2400 | 20 |

e. The data for a simplified example showing the plotting of separate curves for the changes and unchanged components are shown in the following table and graphically displayed in Figures F-5-2 and F-5-3. Curve A in Figure F-5-2 reflects the impact of an engineering change in Component A. Figure F-5-3 reflects an uninterrupted and uniform rate of improvement for all other components. Figure F-5-3 therefore presents no special evaluation problem, but the changed segment of Curve A should be replotted as though it were a new unit, as shown in Curve B of Figure F-5-2. It may be seen in Figure F-5-2 that Curve B curves downward slightly. This indicates there is some retention of learning in the production of Component A. Use of the retained prior improvement curve option of E-Z-Quant as described in F-503, indicates that this retained improvement (or learning) is equivalent to the production of 5 units. Accordingly, the data should be replotted at unit nos. 9, 19, 40, etc. By computing and then combining separate evaluations for Component A, and for all other components, an evaluation for the entire product may be obtained.

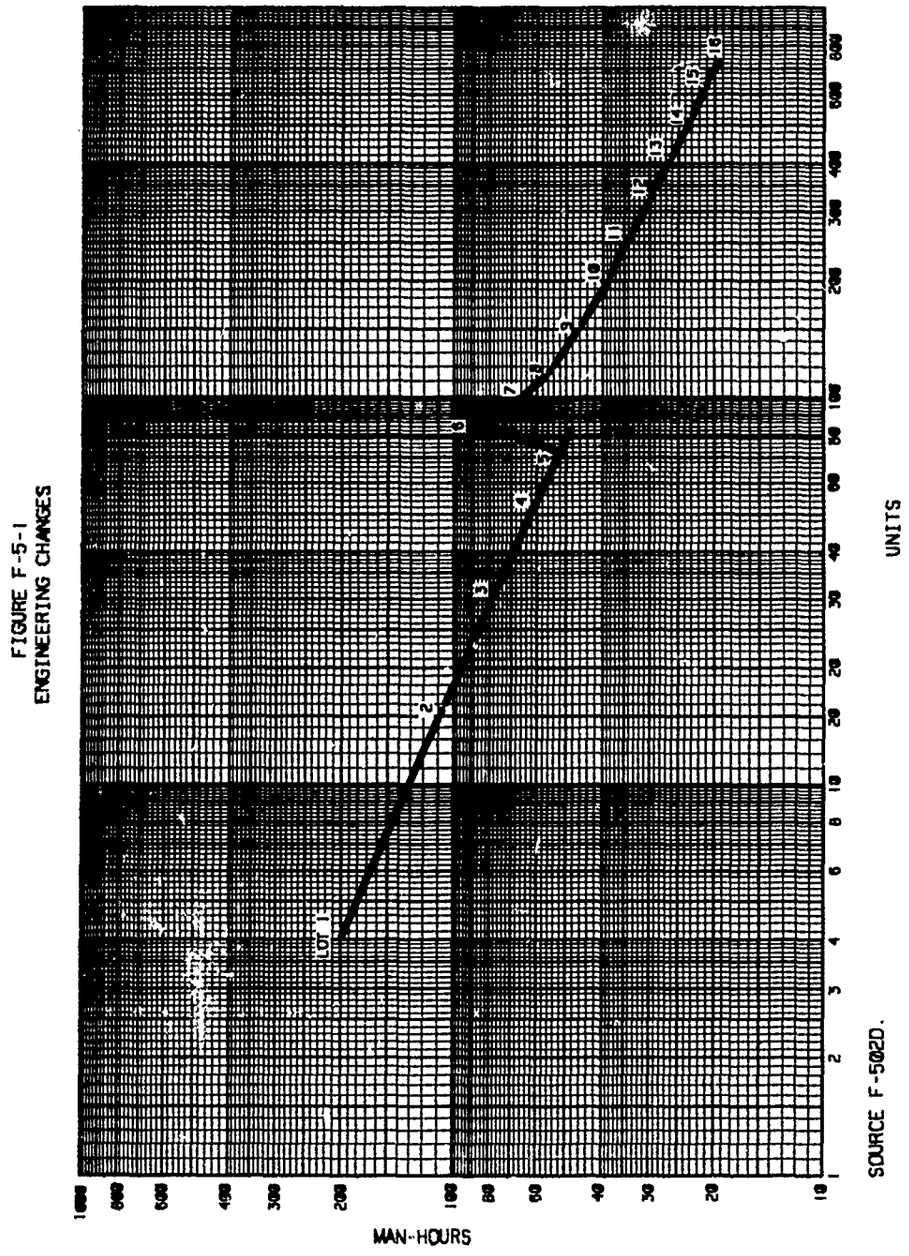
f. When unit or lot costs for the changed work are not available, it may be possible to obtain a reliable engineering estimate of the proportion of direct labor for the lots prior to the change which is accounted for by the unchanged work. This proportion is applied to the hours for each lot prior to the change. The improvement curve is fitted to the resultant data to estimate the proportion of labor hours in subsequent lots which are related to the unchanged work. This portion is deducted from the total hours per unit for these subsequent lots to obtain estimates of the hours applicable to the changed work. If, in the foregoing example, an estimated 70% of the work prior to the change related to unchanged operations, the following analysis would be made:

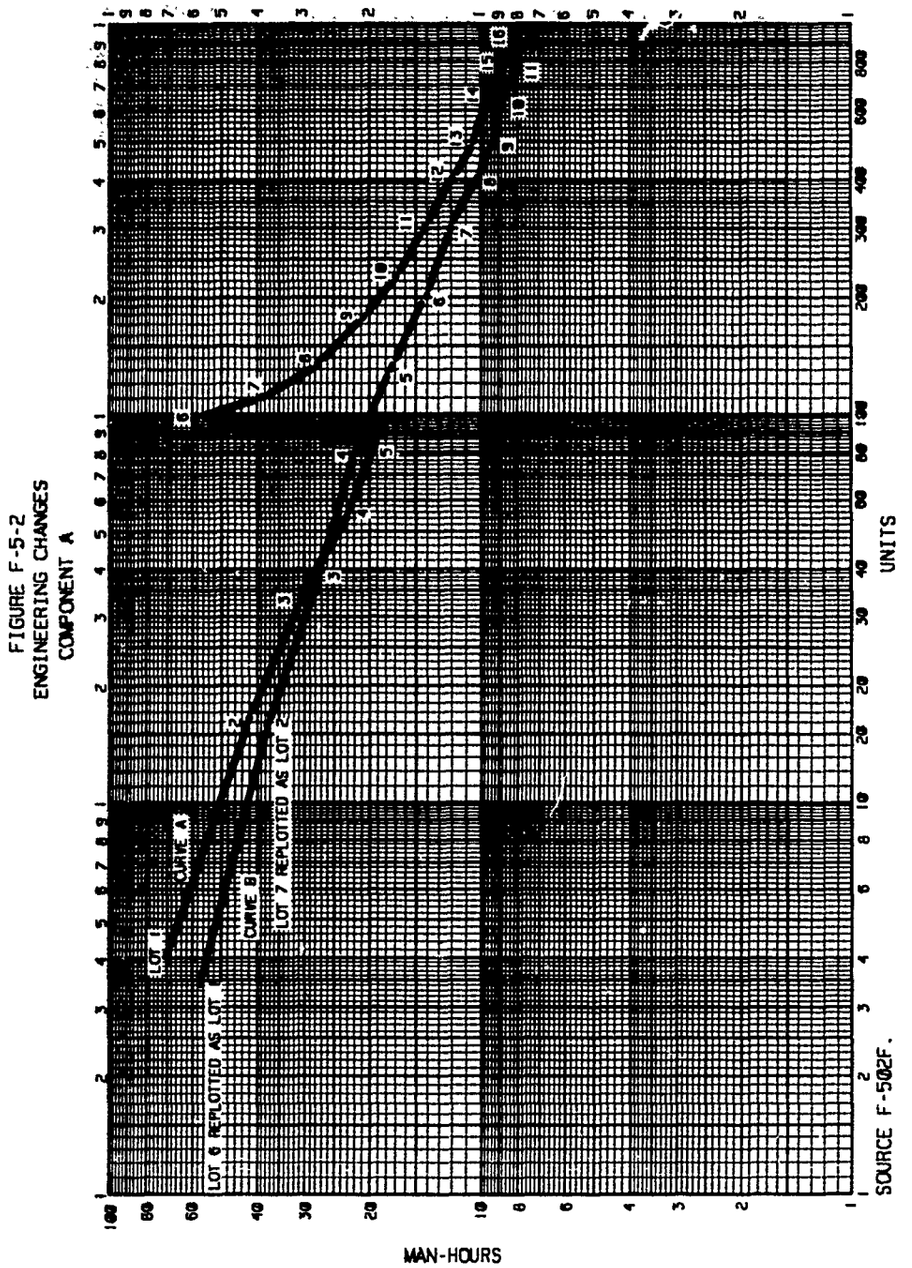
**Average Hours per Lot**
**Unchanged Operations**

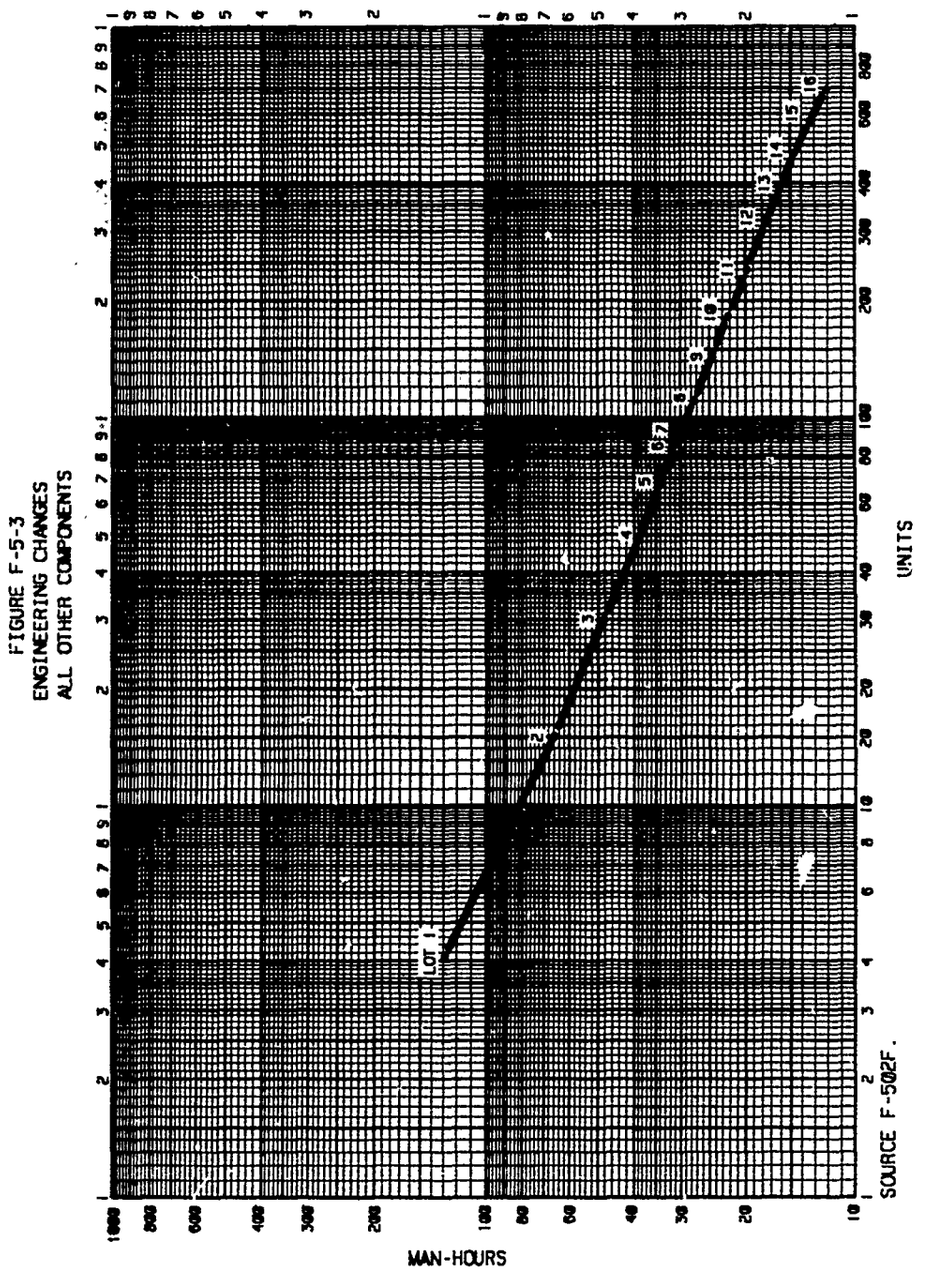
| Lot No. Col. 1 | Total Col. 2 | Historic Col. 3 | Projected Col. 4 | Changed Col. 5 |
|---|---|---|---|---|
| 1 | 200 | 140 | | |
| 2 | 110 | 77 | | |
| 3 | 80 | 56 | | |
| 4 | 62 | 43.4 | | |
| 5 | 54 | 37.8 | | |
| 6 | 90 | | 34.49 | 55.51 |
| 7 | 70 | | 32.76 | 37.24 |
| 8 | 56 | | 29.91 | 26.09 |
| 9 | 46 | | 26.47 | 19.53 |
| 10 | 40 | | 23.73 | 16.27 |
| 11 | 35 | | 20.95 | 14.05 |
| 12 | 30 | | 18.41 | 11.59 |
| 13 | 27 | | 16.65 | 10.35 |
| 14 | 24 | | 15.07 | 8.93 |
| 15 | 22 | | 13.66 | 8.34 |
| 16 | 20 | | 12.60 | 7.40 |

**Table for Figures F-5-2 and F-5-3**
**ENGINEERING CHANGES**
**Component A and All Other Components**

| | | | | *Component A Replotted As* | | *Average Hours Per Lot* | | |
|---|---|---|---|---|---|---|---|---|
| *Lot No.* | *Units Per Lot* | *Lot Mid-Point* | *Lot Plotting Point* | *Lot No.* | *At Unit No.* | *Component A* | *All Other Components* | *Total* |
| 1 | 10 | 4.0 | 4.0 | | | 70.0 | 130.0 | 200.0 |
| 2 | 10 | 5.0 | 15.0 | | | 44.0 | 66.0 | 110.0 |
| 3 | 20 | 10.0 | 30.0 | | | 32.0 | 48.0 | 80.0 |
| 4 | 20 | 10.0 | 50.0 | | | 24.0 | 38.0 | 62.0 |
| 5 | 20 | 10.0 | 70.0 | | | 20.0 | 34.0 | 54.0 |
| 6 | 8 | 4.0 | 84.0 | 1 | 3.4 | 59.0 | 31.0 | 90.0 |
| 7 | 12 | 6.0 | 94.0 | 2 | 14 | 40.0 | 30.0 | 70.0 |
| 8 | 30 | 15.0 | 115.0 | 3 | 35 | 29.0 | 27.0 | 56.0 |
| 9 | 40 | 20.0 | 150.0 | 4 | 70 | 22.0 | 24.0 | 46.0 |
| 10 | 40 | 20.0 | 190.0 | 5 | 110 | 18.0 | 22.0 | 40.0 |
| 11 | 80 | 40.0 | 250.0 | 6 | 170 | 15.4 | 19.6 | 35.0 |
| 12 | 80 | 40.0 | 330.0 | 7 | 250 | 12.8 | 17.2 | 30.0 |
| 13 | 80 | 40.0 | 410.0 | 8 | 330 | 11.2 | 15.8 | 27.0 |
| 14 | 120 | 60.0 | 510.0 | 9 | 430 | 10.0 | 14.0 | 24.0 |
| 15 | 120 | 60.0 | 630.0 | 10 | 550 | 9.0 | 13.0 | 22.0 |
| 16 | 120 | 60.0 | 750.0 | 11 | 670 | 8.0 | 12.0 | 20.0 |


FIGURE F-5-1
ENGINEERING CHANGES
UNITS
MAN-HOURS
SOURCE F-502D.
LOT 1


FIGURE F-5-2
ENGINEERING CHANGES
COMPONENT A
LOT 1
CURVE A
CURVE B
LOT 7 REPLOTTED AS LOT 2
LOT 6 REPLOTTED AS LOT
UNITS
MAN-HOURS
SOURCE F-502F.


FIGURE F-5-3
ENGINEERING CHANGES
ALL OTHER COMPONENTS
UNITS
MAN-HOURS
SOURCE F-502F.
LOT 1

In this example, column 3 equals 70% of column 2. A weighted least squares fit to the data in column 3 resulted in an improvement curve with a slope of 72.644% and a theoretical first unit cost of 266.68. Projections along the curve produced the estimate of 34.49 for units 81 to 88, 32.76 for units 89 to 100, etc., shown in column 4. Column 5 is the difference between columns 2 and 4. It corresponds to the column headed "Component A" in the table referred to in the preceding subparagraph e and could be used in the same manner to project future costs of the changed work.

g. The design change improvement curve model of E-Z-Quant (described in DCAAP 7641.91) estimates curve segments for (1) the pre-change production history, (2) the unchanged portion (remaining original work), and (3) the changed portion (or new work). The procedure also computes projected cost or hours for user-specified lots.

## F-503 Measuring Retained Prior Improvement

a. Where a contractor produces a new item that is similar to items produced in the past, it is likely that the first unit of the new item will require less cost than if the similar item had not been produced. In other words, prior improvement (or learning) achieved on the earlier item may be retained, thereby benefiting the new item. For example, if the retained prior improvement was equivalent to the production of 10 units, the labor-hour requirement for the first unit of the new model would correspond to unit 11 on a normal improvement curve, the hours required for the second unit would correspond to unit 12.

b. Typically, where retained prior improvement is a factor in determining costs required to produce an item, the trend line of actual costs will be "humped" as illustrated by the points connected by the solid line in Figure F-5-4. Moving the points five units to the right produces the approximately linear pattern shown by the x's. This pattern is readily discernible through a review of the "percent difference" statistics. If the first two or three data points are below the computed improvement curve, this may indicate retained prior improvement.

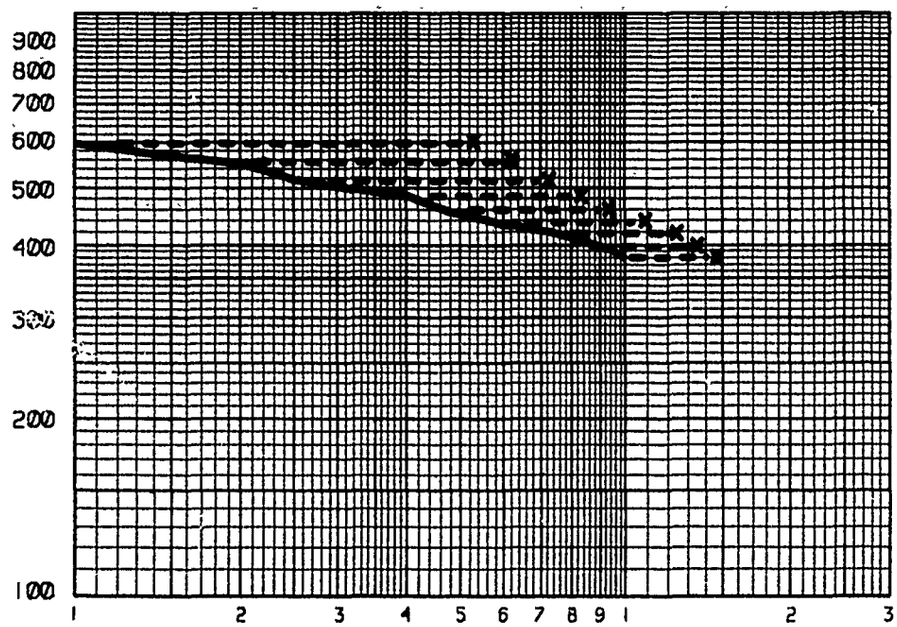
c. The retained prior improvement curve option of E-Z-Quant (described in DCAAP 7641.91) will compute a least squares estimate of the retained improvement in terms of the equivalent number of units. The procedure repositions the curve to reflect the retained improvement and to project cost or hours for user-specified lots.

## F-504 Interruptions in Production

a. A significant break in the production of an item may cause a "loss of experience (or learning)." The slope and vertical position of the improvement curve will not change, but the first unit produced after the disruption will regress to an earlier position on the improvement curve and the pattern established in the past will be repeated. A similar pattern may result when normal production is disrupted over an extended period because of a shortage of materials, unacceptable reject rate, or other factors.

b. The effect of a disruption is illustrated graphically in Figure F-5-5. In this case, an interruption between the production of units 7 and 8 caused a loss of experience of about 3.5 units. Moving the points for units 8 through 15 by 3.5 units to the left brings them into alignment with the points for units 1 through 7.

FIGURE F-5-4
EFFECT OF RETAINED LEARNING

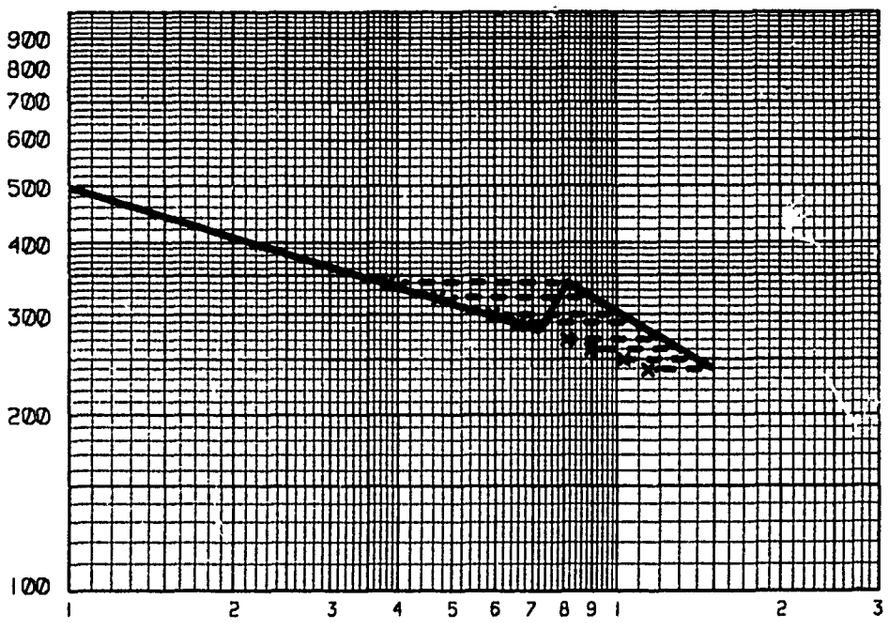



c. The break in production improvement curve option of E-Z-Quant (described in DCAAP 7641.91) provides a least squares estimate of the improvement lost (expressed in terms of units) due to a break in production. In the process, E-Z-Quant fits an improvement curve to the data, some of which is repositioned to account for the lost improvement. Data must be available for units before and after the break. The procedure also computes projected cost or hours for user-specified lots.

d. Where historical data are available only before the disruption occurred and projections of costs for units to be produced subsequent to the disruption are required, the following procedures should be considered individually or in combination to form the basis of an audit opinion.

(1) Review the contractor's methodology for an understanding of the logic employed and evaluate the computation in light of that logic. Answer such questions as: Is the contractor's reasoning consistent with the situation? Do the mathematical computations follow logically from the contractor's reasoning? Is the computed loss of learning a realistic value?

FIGURE F-5-5
EFFECT OF PRODUCTION BREAK




(2) Determine whether the contractor had breaks with production of similar items for which historical data are available both before and after the disruption. If such data are available, perform an analysis of that data with the E-Z-Quant break in production improvement curve option and compare the results with the contractor's proposal considering the respective time intervals for each disruption.

(3) Request a technical evaluation of the extent of lost improvement.

e. Much of the improvement in unit costs is generally the result of better product design, tooling, work methods, and work layout. If these are properly documented, learning will not be totally lost, regardless of the length of the interruption or the turnover in personnel. Accordingly, a 100% loss of improvement (or learning) can rarely, if ever, be anticipated.

## F-505 Variations in the Rate of Production

a. The rate of production can have a significant effect on unit direct labor-hour requirements if labor hours for part of the production process are fixed or semi-fixed. For example, it may be necessary for some direct workers to tend certain machines or production line stations or to perform duties related to production scheduling control, or supervision regardless of production levels.

b. Unlike engineering changes, retained learning or interruptions in production, the existence of fixed and semi-fixed

labor produces no typical pattern to an improvement curve graph. Familiarity with the production process is necessary to identify situations of this sort.

c. When it is suspected that the production process may include fixed or semi-fixed labor while production rates have varied significantly, an analysis should be performed with the fixed level of effort (per time period) improvement curve option of E-Z-Quant (described in DCAAP 7641.91) This procedure provides a least squares estimate of the fixed portion of the observed hours and the improvement curve applicable to the variable hours. It also provides projections of future costs or hours for user-specified lots and production periods.

## F-506 Other Variations in the Rate of Improvement and Cost Level

a. The improvement rate may not always appear uniform during a production run, particularly if the run occurs over a long period of time. Long-term production runs sometimes display a series of plateaus where the improvement curve is flatter than the long-term trend. These are the result of "bunching" of the implementation of improvement-inducing measures such as tool changes and production reorganization as opposed to a more gradual and continuous implementation of such measures. The long-term improvement rate is still a good reflection of the general trend of cost reduction that can be expected for future lots.

b. Contractors sometimes experience a rise in unit costs during the last few lots of a production run; the improvement curve reflects this by an upward or positive swing. There may be many reasons for a potential loss in efficiency including reduced rate of production, loss of more experienced workers, continued use of worn tools and equipment, part shortages, and worker concern for job security. Although costs might tend to go up for those reasons, there are other reasons why unit costs could actually go down (e.g., excess purchased parts and production inventory accumulated throughout the life of the program).

c. Cost and productivity improvements don't just happen—they are managed. Continuous management attention is required to ensure that costs are properly controlled. A constant rate of improvement may generally be assumed, unless the contractor can specifically document support for any proposed deviation.

## F-600 Section 6 — Application of Improvement Curve Techniques

### F-601 Introduction

This section contains guidance in the use of improvement curve techniques in contract auditing.

### F-602 Use with Other Analysis Methods

The improvement curve, like other statistical analysis methods, should not be considered as a complete or absolute procedure; rather, it is only an additional analytical tool useful for analyzing and forecasting cost trends when the reasonableness of the historical costs has been established by other means. While historical trends can be determined and measured with fair certainty, no future trend can be predicted with certainty. A number of variables, some of which have been discussed, can affect the forecast.

### F-603 Preliminary Evaluations

In evaluating cost estimates based on an improvement curve, review is necessary to understand the reasoning behind the cost proposal and the methods of using the curve. If the contractor has constructed a curve following certain assumptions and the auditor interprets the curve from another viewpoint, his conclusions may be entirely erroneous. This does not mean that one theory or method of construction is better than another, or that the auditor should insist on only one method of construction. The basic question is this: Which approach best fits the data, especially during the early states of production? The data used to construct an improvement curve must be homogeneous; and the auditor should determine whether or not this is true. For example, if the relationship of manufacturing to subcontract work varies significantly between different production lots, an improvement curve constructed by plotting data from these lots may be inaccurate. Further, the projection of a curve assumes that the same conditions that existed in the past will be perpetuated in the future; and it is the auditor's responsibility, in evaluating a forecast, to determine whether this assumption is valid.

### F-604 Use of Improvement Curves for Production Planning and Control Purposes

a. When the improvement curve is used as a guide for planning and controlling production, it is possible that the production operations may be so planned and controlled as to assure that the decline in costs as production continues will follow a preselected improvement curve pattern. This can occur when the improvement curve technique is used to establish the man-hour, space, and similar production requirements and to control their utilization for each successive production lot. Under proper conditions this method of production planning and control can result in a highly efficient operation but it also lends itself to the development and perpetuation of an inefficient operation. While the determination of the efficiency of a particular operation requires the services of a specialist who is expert in that particular field of production, there is much that the auditor can do by observing and reporting specific areas of inefficiency. These observable inefficiencies may be reflected in many ways: poor space and equipment utilization, a rate of work which is abnormally slow or clearly geared to low work requirements, production lots that are not of optimum size for efficient production, stretched out production schedules, the use of rates or norms established for discontinued production methods, workers having to wait for each other or getting in each other's way, a material flow system or shop organization that does not permit workers to work effectively, and use of old initial cost and curve slope data for control of new production situations without giving adequate consideration to past and expected changes in the product and the manufacturing methods.

b. Whether or not improvement curves are used by a contractor in controlling

production, they can be used by the auditor in evaluating the efficiency of a production process. If the contractor's data shows a very low rate of improvement or other similar programs have shown higher rates of improvement, these conditions may indicate inadequate attention to improving the work methods, production line layout, and equipment and tooling used in the production process. On the other hand, an abnormally high rate of improvement for the initial units of production may be indicative of inadequate planning.

c. In making these evaluations, the auditor must be careful not to act as an expert in a field in which he does not have technical proficiency. However, he or she should be, and is expected to be an expert observer. He or she can and should be cognizant of any readily apparent material inefficiencies and weaknesses in the planning and control systems. The auditor should report facts as observed and the extent to which the improvement curve is used in production control. To the extent that a cost determination is possible, the auditor should evaluate the effect of inefficient practices on the costs. As a minimum, he or she should report his or her observations to cognizant procurement officials for further investigation and corrective action.

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# APPENDIX G

## G-000 MANAGEMENT OF MOBILE AUDITS

### G-001 Scope of Appendix

This appendix provides guidance on the management and administration of the mobile audit workload of DCAA branch offices. It covers the organization, planning, performance, and management of branch office activities and auditor relationships with contractors and contracting officers on a mobile audit basis. This guidance also applies to suboffices established at other geographic locations to perform mobile audit work under management of a branch office. Appendix H applies to resident suboffices located at contractor plants.

### G-100 Section 1 — Reserved

## G-200 Section 2 — Branch Office Staffing

### G-201 Introduction

This section sets forth methods and guidelines for organizing the branch office staff and assigning audit workload.

### G-202 Organization of Staff

a. The head of a branch office will be designated the branch manager. Dependent upon the workload of the branch office, the number of assigned audit personnel varies over a considerable range.

b. The basic unit of staff organization within the branch office is the audit team. As used in this appendix, audit team means an integral component of the branch office to which auditors are assigned organizationally to perform audits and receive supervision and on-the-job training. A team generally conducts a number of audits at the same time with members acting individually or in small groups. The latter groups are assembled temporarily for particular assignments. Although these groups may be commonly described as audit teams, this is not the use intended in this appendix.

c. Each team, as set forth in the "Field Audit Office GM-13 Supervisory Staffing Model" baseline definition, should generally consist of no more than nine auditors, including a supervisory auditor, of various grade levels. The baseline team is composed of one supervisor, six senior auditors (GS-12s), and two less experienced lower grade auditors. In determining actual team size, consideration should be given to the audit experience of the auditors to be supervised plus other factors such as audit risk, supervisory workload complexity, and workload dispersion. (DCAA plans to include in DCAAM 1400.1, Personnel Management Manual, the model to determine the actual number of supervisors and auditors to be supervised.) A suboffice of the same size range may itself constitute an audit team. In other situations, an audit team may include a small suboffice as well as some auditors stationed at the main branch office.

### G-203 Division of Workload by Audit Teams

The basis of dividing the branch workload among audit teams depends upon the workload characteristics of the particular branch office. Various arrangements are discussed below.

a. The most prevalent and preferred arrangement is to distribute all contractors under the branch's cognizance to the various audit teams by assigning specific contractors to a specific team for the performance of all work associated with those contractors. As an objective, except as described in d. below, reasonable balance should be maintained among teams by considering such factors as type of contractor and the volume and complexity of workload. When the physical situation in the branch territory is such that this balance can best be achieved by assigning each audit team a geographical area of responsibility, this is permissible, and it may save travel funds and would also help in routing audit requests, inquiries, etc., to the responsible team. However, the branch manager should periodically review the workload balance and, if a significant imbalance occurs, adjust team boundaries or make other appropriate adjustments.

b. Conditions at some branches may make it desirable to set up specialized or functional teams. As an example, if the workload of auditable contracts and grants awarded by DoD and other government agencies to various educational institutions under the branch cognizance is large enough, a team approach may be warranted. This team could specialize in the unique characteristics of university accounting practices and audit requirements under Federal grants. Some other examples might be the establishment of teams assigned to the audit of not-for-profit research institutions or to audit of corporate home offices. The formation of specialized teams to conduct defective pricing reviews, estimating system surveys or reviews of pricing proposals, however, is not desirable unless the branch is responsible for a large number

of contractors who perform under firm fixed-price contracts which do not require the audit of incurred costs.

c. When functional teams are used, the branch manager and team supervisors must give special attention to such matters as on-the-job training, and rotation of auditors among teams to preclude the adverse impact that continuous highly specialized experience can have on an auditor's professional development.

d. An exception to the objective of balancing workload among audit teams noted in a. above may be desirable in some cases; for example, a suboffice may be responsible for a workload some distance from the branch office location. If the suboffice audit staffing is within the range of normal team size and the complexity of the audit warrants the full attention of a team supervisor, this suboffice may be designated as an audit team without assigning it additional mobile responsibility solely for the purpose of equating team size.

# G-300 Section 3 — Planning and Scheduling Audit Work

## G-301 Introduction

This section sets forth guidance for the overall and detailed planning of branch office audit work.

## G-302 Audit Planning and Permanent Files

### G-302.1 Establishing the Basic Audit Plan

a. The format to be used by each branch office in submitting overall summary data on its annual program plan is included in the annual program guidance issued by Headquarters. This overall submission must be supported and supplemented by further detailed planning and scheduling.

b. A branch office's mobile workload usually includes a number of contractors in which the depth of audit interest varies considerably. A major difficulty in advance planning is that a large segment of audit service is performed in response to specific requests for audit to which individual contractors cannot be identified before the requests are received. The total of such requests is also difficult to estimate accurately. Audit work in this category includes forward pricing proposals, terminations, and work in connection with new cost reimbursable contracts, new contractors, etc. A combination of methods must be employed to plan the best use of the audit staff. These methods include specific detailed planning for known audit requirements on a company by company basis, and realistic estimates for unknown but anticipated requirements.

c. Establishing the basic audit plan for any period involves (i) forecasting and identifying the dollar volume of workload and the number of reviews (audit workpackages) to be performed, and (ii) determining the staffing required to perform it. Although these two aspects are discussed separately in the following paragraphs (G-303 and 304), in many instances planning can best be done by considering both concurrently.

d. For contractors subject to the Cost Accounting Standards (CAS), reviews for compliance with the CAS must be integrated into regularly scheduled audits of proposals and incurred costs. CAS compliance review control schedules and noncompliance summary schedules (8-305) should be maintained in the permanent file. These schedules identify outstanding noncompliance issues, provide documentation of audit coverage of contractor compliance with the provisions of CAS, and highlight areas requiring additional audit coverage.

### G-302.2 Preparing and Maintaining Permanent Files on Contractors' Operations

a. Permanent file content should be related to audit scope. For nonmajor contractors, it may vary greatly depending on the magnitude, risk assessment, and nature of current and future audits. This concept of including only relevant information which would have a bearing on the performance of current and future audits is most important when working with nonmajor contractors audited from a branch office.

b. The auditor is to exercise judgment as to what should be included using the guidance in 4-405.1. Data gathered that may be of continuing value should be considered for placement in the permanent file. If a contractor has completed all government contracts and contemplates no others in the near future, a permanent file would not be appropriate since the purpose of the permanent file is to assist the auditor in performing future audits.

c. For most nonmajor contractors the indirect cost audit files applicable to contracts that have not been closed out should be considered part of the permanent file. The most recent audits are frequently referred to by the auditor as much as the permanent file because they contain the latest information available on the contractor. For very small contractors audited on an infrequent basis, or where continuing work is not a certainty, the most current audit file should be considered the permanent file. To pre-

pare another file in anticipation of audit work that may never materialize would not be an efficient use of auditor resources.

d. Permanent files should be updated at the time of audit performance; this includes contractors with no cost reimbursable work. If the auditor has not been to the contractor for over a year, a separate trip should not be scheduled just to update the permanent file. It may be necessary to contact the contractor during requirements/program planning time, but effort to set up a permanent file in anticipation of future audit work would not be prudent.

e. For many nonmajor contractors that have cost reimbursable work, there are certain mandatory requirements. These are the completion of the internal control questionnaire, the preparation of a vulnerability assessment, and the performance of the applicable MAARs. These requirements should be linked to the content of the permanent files. If these activities are required to be accomplished, relevant information should become part of the permanent file. In some cases this is all that will be in the permanent file. The key is sound judgment by the auditor as to what may be needed for current and future audits.

## G-303 Forecasting Dollars of Workload

Since branch offices are responsible for many contractors, the forecasting of total dollars of workload is usually more difficult than for a resident office. Although the administrative staff can assist as in providing historical statistics which serve as a starting point, each audit team should generally be responsible for developing at least the preliminary workload planning estimates for its assigned contractors. The audit staff and team supervisor's knowledge of its contractors' systems, operations, pending programs, etc., must be applied if planning is to be realistic. Working papers used to develop or support the annual program plan should show sources of information, assumptions and other relevant data; they should be retained for later review or for use in any revision of the plan. The working papers should show summary data for individual audit teams as well as overall branch office data needed for reporting purposes. Two primary workload categories are subject to measurement and reporting in dollar terms: (1) auditable incurred costs, including backlog and costs which will be incurred during the year covered by the plan; and (2) the volume of price proposals anticipated to be received for review. These categories are discussed below.

### G-303.1 Incurred Costs

a. Most incurred cost workload can be determined in advance, since it generally relates to existing contracts which were awarded to contractors previously audited by the branch office. Appropriate estimates should also be included, however, for workload representing new contracts and contractors.

b. Realistic projections should be made of the dollar volume of incurred costs to be audited during the planned period at each existing contractor location where audit workload may be expected to continue or recur. The dollar volume of audit workload at each of these contractor locations should be projected on the basis of information obtained from such sources as the contract (see 3-202), the audit working papers, contract document files, recent audit visits to the contractor and normal contacts with government procurement and contract administration activities.

c. Prior experience of a branch office may show that a significant volume of incurred cost workload is consistently generated each year at new or intermittent contractors. In these cases a realistic lump sum estimate for this increment should be added to the workload more specifically identified under (b.) above. Where circumstances permit, this estimate should be made separately for each audit team.

### G-303.2 Price Proposals

Workload forecasts of proposals are more difficult to make than forecasts of auditable incurred costs. A separate estimate must, however, be made for each major contractor as defined in the Program Objective Document prepared an-

nually by Headquarters. The projection should be made from sources of information outlined in G-303.1 above. Wherever feasible, this procedure should also be used for smaller dollar volume contractors since it will help in planning the audit work at each contractor. The degree to which estimates are prepared individually for smaller contractors depends on the circumstances of each case. Considerations include:

a. Some contractors perform continuous or long range projects under a limited number of successive contracts. In such a situation, an individual workload forecast for proposals can readily be made.

b. How familiar the branch office personnel are with a contractor's programs and/or product lines.

c. Occasionally, one or more contractors which have a significant effect on the branch office workload may be involved in a single major procurement program. In the few cases where this occurs, the appropriate procurement liaison auditor may be contacted for informal assistance in estimating relative procurement trends for the program so that they can be used in planning for the audit of these individual contractors.

d. For many existing contractors, it will not be feasible to forecast individually the anticipated volume of proposals. Also, proposals by some new contractors cannot be identified in advance of being received for review. Overall estimates must be made for this share of workload, preferably broken down by each team. Such estimates should be based on the experience of previous years for the same group or category of contractors.

### G-303.3 Other Audit Workload

Certain categories of audit service such as defective pricing reviews, estimating system surveys, progress payment reviews, etc., cannot be expressed in terms of workload dollars. In the course of identifying workload as provided above, it will be helpful to note in the working papers any known significant requirements for these other categories of audit services as they pertain to individual contractors. If these requirements are noted as specifically as possible, it will assist in planning overall programs, scheduling visits to individual contractors, and in measuring needed staffing.

### G-303.4 Trend Data and Other Available Information

In all aspects of workload planning, the branch office should consider workload trends, pending changes in workload levels, and other information in audit files bearing on future workload. Any reliable information obtained informally from contractors, contracting officers or other sources should be used; however, a formal or widespread solicitation of information should not be made for this purpose.

## G-304 Determining Audit Staffing Requirements

a. The planning process also involves estimating the staffing required for each workload element. This can best be done as an expression of professional audit judgment rather than through the use of arbitrary formulas or ratios. Whenever feasible, staffing requirements should be estimated for individual contractors. Realistic overall estimates must then be made for the remaining contractors whose dollars of workload were not forecast individually and for those elements based on level of effort required. The basis for such estimates is the auditor's knowledge and prior experience and yearly Headquarters guidance issued in the Program Objective Document.

b. For suboffices located at major contractor locations (see 1-502.2 and H-001), the full implementation of Appendix H will provide the basis for determining staffing requirements, as well as for detailed programming and scheduling of auditable areas. A limited application of Appendix H to the larger contractors audited on a mobile basis would also serve to determine and document staffing requirements for such contractors.

c. For the remaining contractors audited on a mobile basis, it is recognized that scheduling and programming of auditable incurred costs will be somewhat less detailed. Nevertheless, whenever feasible, a projection of the hours required in each planning period to accomplish the planned workload of incurred costs

should be made for each contractor. Normally these estimates should be based on actual experience of prior years, findings of audit risk identified through completion/update of the internal control questionnaire, the detailed audit program, the dollars of workload projected for the contractor, etc. Suitable adjustments should be made for any significant changes warranted in audit scope. For example, if prior experience with a particular contractor established the reliability of its internal controls and the accuracy of its incurred cost submissions, planning for the ensuing year should reflect a reduced scope of audit. Conversely, it may be appropriate to plan additional audit time when the previous audit has pointed up unsatisfactory conditions or inadequate controls.

d. Wherever dollar amounts of price proposals are projected for individual contractors, audit hour requirements should be similarly projected. If a factor is used to project the dollar amount of price proposals for a small group of contractors, an appropriate factor which considers Program Objective Document instructions should also be developed and used to project staffing requirements.

e. In addition, staffing requirements must be determined for audit service elements which are not expressed in terms of workload dollars (G-303.3) and for any anticipated workload which cannot be specifically identified or programmed in advance. Requirements for this workload will be based on overall estimates considering trend data, prior experience, the latest Agency audit policy guidance, and Program Objective Document instructions.

f. As a final step in determining staffing requirements, the branch manager should carefully review the workload projections made by each audit team, and should ensure that workload and staffing projections made by each audit team were developed realistically.

## G-305 Developing and Maintaining the Program Plan

a. After staffing allocations have been made by the regional office, the branch office must develop a realistic plan for accomplishing all or an optimum share of the workload with the resources which will be available. Guidance for establishing priorities and programming workload areas is issued by Headquarters in connection with the staffing allocation process.

(1) If the total staffing requirements projected for the programming period differ greatly from the auditor resources expected to be available, major imbalances should be adjusted in terms of the workload and/or personnel assignments to the audit teams. If workload peaks are created by two or more teams planning special assignments, such as estimating system surveys or defective pricing reviews at the same time of the year, adjustments in the time scheduling should be considered.

(2) If the audit resources which will be available to the branch office during the programming period are not sufficient to complete all the workload initially projected, the program plan should be adjusted, in accordance with DCAA Manual 7730.1 instructions, to reflect (a) reductions in the number and/or duration of visits to be made to particular contractors and (b) the workload to be deferred to the subsequent period. In determining the adjustments to be made for individual contractors, the branch manager should weigh many factors such as the following: the accomplishment of real time mandatory annual audit requirements (MAARs); the date that the contractor's incurred cost submission was received; the elapsed time since the previous visit; the volume of unaudited costs; prior experience as to the reliability of the contractor's records and cost representations; the need for the review of recent historical costs as a basis for evaluating future forward pricing proposals; the extent and aging of physically completed contracts requiring audit action so they can be finalized; and so forth.

(3) The forecasted workload will include unaudited Prior Contractor Fiscal Years (PCFYs) and some costs which will be incurred concurrently with the execution of the plan. Therefore, some carryover, to the subsequent period of unau-

dited costs incurred late in the current period, may be unavoidable.

b. An abbreviated example of an annual plan for an audit team is shown as Figure G-3-2. The example indicates the minimum degree of planning at the team level. The format of a plan may be expanded if desired; for example, it may show hours programmed monthly, quarterly or semiannual. When all team plans are summarized, (Figure G-3-1), overall totals for workload dollar amounts and staff hours should be in agreement with the relevant DCAA Form 7730-40. Summary entries for the larger incurred costs audits should be supported by detailed plans for auditable areas, such as Figure H-3-1. Separate computations or worksheets, not illustrated here, should be used for the indirect time categories (code 50000 and 60000 series) entered on Form 7730-40. Planning by quarters is desirable to show trends and workload peaks contemplated during the fiscal year and to coordinate the separate scheduling of the various branch teams. It also serves as a better basis for evaluating the validity of the annual plan and for reviewing actual progress as compared with planned performance for interim periods during the year.

## G-306 Scheduling of Individual Audit Performance

a. The branch office audit plan (Figure G-3-2) establishes the work planned for each audit team for the fiscal year without identifying specific team members. Additional shorter range planning to match individual assignments with team members is important for orderly scheduling and performance of the workload. Such planning can assist the branch in recognizing audit scheduling problems at an early point and in correlating the branch financial and training plans with its scheduling of audit assignments. It permits more realistic appraisals of travel fund requirements, overtime authorizations, etc. It also is a means for considering, in advance, the capabilities of individual staff members, as contrasted with the practice of making audit assignments on the expediency of the moment. At a suboffice which is responsible for a single large contractor, the preparation of an Audit Manpower Utilization Plan (Figure H-3-2) in accordance with Appendix H, serves this purpose. For each audit team performing primarily mobile audits, an Audit Staff Utilization Schedule such as Figure G-3-3 should be used.

(1) This schedule is essentially a planning worksheet. It is prepared from and used in conjunction with other branch planning and control records, such as assignment control forms, machine tabulations, worksheet inventories of assignments, etc. It is prepared at the beginning of each month and shows all information known at the time, but it does not represent a rigid scheduling of audit assignments. Since it must be updated frequently as new requests materialize or unexpected developments occur, it should be maintained in an informal format of medium and recasted as necessary. Blank forms such as Figure G-3-3 (prepared locally), accounting worksheets, or plastic sheet displays may be used.

(2) The schedule prepared at the beginning of each month should include the following:

(a) All requested audit assignments with due dates which fall within the month, such as audits of forward pricing and termination settlement proposals.

(b) Other specific assignments with starting or estimated completion dates within the month which have been coordinated or confirmed outside the branch. Examples are formal estimating system surveys (5-1200) and defective pricing reviews pursuant to a specific timetable coordinated with the regional office.

(c) Time which must be reserved for request audits, e.g., forward pricing proposals, expected to be received during the period. The unspecific nature of these workload projections do not permit scheduling by individual companies, but it may be possible to determine the auditors most likely to be assigned considering auditors skills, training needs, other work, etc. The time reserved for unidentified demand requests can be shown as blank spaces so that specific assignments can be inserted as they are received. If any unscheduled, or idle time period can be anticipated for any mem-

ber of the team's staff, the plan should indicate this auditor's tentative deployment to other work of the branch or region, but a blank space or reserved category should not be used in this circumstance.

(d) An appropriate share of other known contractor audit requirements programmed for accomplishment during the year, but for which the precise time scheduling is discretionary with the branch office. Examples are comprehensive audits of costs incurred under auditable contracts and estimating system surveys not conducted on a formal team basis.

(e) Anticipated leave and training.

(3) The completed schedule should be as specific as known facts permit, including individual contractors, auditors to be assigned, audit assignment types, and the duration of the assignment in hours. Time of team supervisors should not be included in these schedules.

(4) If it appears during the initial drafting of the schedule that the work on hand plus assignments anticipated to be received cannot be matched to the available time or capabilities of the audit team audit staff, the team supervisor and branch manager should attempt to resolve the potential problem within their respective authorities. A solution might require a temporary readjustment of priorities or deferment of work. The more persistent problems in this area will probably be revealed through the monthly reviews discussed in paragraph G-307b. Since the schedule includes provision for anticipated requests and the experience within any specific period may differ in timing or volume, the reassignment of personnel or responsibilities should be considered as a contingency plan but should not actually be put into effect until the appropriate time.

(5) When the tentative schedule is developed each month by the team supervisor it should be reviewed with the branch manager. This review should consider whether (1) estimates in the schedule are realistic, (2) the number of auditors and the auditor hours shown for each planned assignment evidence an appropriate scope of audit and (3) the schedule represents satisfactory progress in meeting annual and overall goals, such as reduction of backlog. The effectiveness of the planned use of individual team personnel and their on-the-job training needs should also be reviewed.

(6) After the branch manager's review, the schedule represents an approved, although tentative plan. Thereafter, changes should be made by the team supervisor as required by day-to-day events such as receipt of new audit requests, extension of planned completion dates, postponement of starting dates, changes in auditor assignments, unanticipated sick or emergency leave, etc. Changes made to the plan should be brought to the branch manager's attention promptly whenever it appears that an audit report due date may be missed, audit requests received are significantly above or below the level anticipated, annual or quarterly goals may need to be revised, and when financial plans affecting travel funds, overtime premium pay, interagency reimbursement, etc., require review.

b. In addition to the workload schedules discussed above, the branch may often find it desirable to develop special schedules for controlling phases of audit activity which are considered particularly critical or sensitive. These schedules would also be appropriate to monitor the performance of newly initiated types of audits. Such schedules could be used for controlling: (1) estimating system surveys (see 5-1201.1); (2) defective pricing reviews; (3) overdue or postponed assignments; or (4) a series of initial visits to new contractors. The format and detailed content of the schedules may vary but they should show the status of the matters involved and include realistic plans for alleviating audit problems.

c. After the completion of each recurring audit assignment or each visit in the case of contractors audited on a periodic basis, the basic audit plan for the contractor and the program for future visits should be reviewed and adjusted as necessary. Any significant difference between planned and actual time of the work completed should be explained in the working papers, and those areas where audit coverage needs to be expanded or reduced should be noted. The

annual audit plan should be adjusted for any changes which significantly affect time programmed for future visits.

## G-307 Analysis of Audit Progress

a. The detailed plans and schedules outlined above are also intended to give the branch manager a means of evaluating the progress and performance of each team and of assessing the effect of any unexpected developments which may occur. The monthly updating of the workload schedules (Figure G-3-3) can be used by team supervisors and branch managers as a tool, in conjunction with other branch documents, to appraise the progress and status of audits. Although the schedules are not a formal reporting medium they may serve as the basis for narrative comments in quarterly performance reports on progress or incipient problem areas. They are also available for onsite review by regional or Headquarters, DCAA personnel.

b. Each month at the time the schedule of assignments for the following month is submitted for approval, the branch manager should review the status and progress of each team's performance with its supervisor. Actual or potential slippages should be reviewed for indication of overauditing or other undesirable conditions. Scheduling problems should be solved expeditiously. For example, a problem caused by temporary concentration of peak workload may be resolved by measures such as realignment of auditors or workload assignment among audit teams, deferment of lower priority audits, authorization for use of overtime, or requests for temporary assignment of auditors from other FAOs within the region. A more permanent increase in workload levels would necessitate a revised program plan and might require regional action to adjust the branch office's assigned geographical area of audit cognizance or its authorized staffing.

Figure G-3-1 (Ref. G-305b)
ABC BRANCH
SUMMARY OF ANNUAL AUDIT PLAN — FY 19XX

| | Time Code | Team 1 (Suboffice) | Team 2 | Team 3 | Branch Total |
|---|---|---|---|---|---|
| Incurred Costs: | | | | | |
| All Inclusive Reviews | 16990 | | | | |
| Dollars | | $ 85,200 | $ 80,000 | $ 89,500 | $254,700 |
| Staff Hours | | 4,100 | 3,800 | 4,330 | 12,230 |
| Compensation Reviews | 16993 | | | | |
| Dollars | | $ 3,300 | $ 6,000 | $ 700 | $ 10,000 |
| Staff Hours | | 300 | 510 | 50 | 860 |
| Comprehensive Labor Audits | 16994 | | | | |
| Dollars | | | $ 4,700 | $ 800 | $ 5,500 |
| Staff Hours | | | 450 | 60 | 510 |
| Contract Audit Closings | 16991 | 620 | 760 | 810 | 2,190 |
| Total Incurred Costs | | | | | |
| Dollars | | $ 88,500 | $ 90,700 | $ 91,000 | $270,200 |
| Staff Hours | | 5,020 | 5,520 | 5,250 | 15,790 |
| Forward Pricing: | | | | | |
| Price Proposals | 21000 | | | | |
| Dollars | | $315,000 | $295,000 | $345,000 | $955,000 |
| Staff Hours | | 1,430 | 1,550 | 1,560 | 4,540 |
| Forward Pricing Rate Agreement | 23000 | 160 | 120 | | 280 |
| Estimating System Surveys | 24010 | 300 | | 330 | 630 |
| Other Direct Audit Effort: | | | | | |
| Supervision and Management | 40000 | 1,500 | 1,500 | 1,500 | 4,500 |
| Permanent File Maintenance | 41800 | 60 | | | 60 |
| Defective Pricing | 42000 | 370 | 210 | 200 | 780 |
| Special Projects/Headquarters | 48010 | 80 | 80 | | 160 |
| Attendance At Negotiations | 49200 | 80 | 20 | 160 | 260 |
| Total Direct Audit Effort (Note a) | | 9,000 | 9,000 | 9,000 | 27,000 |

Note a. Indirect time must be shown for the branch as a whole in this or a supplemental worksheet and must be documented in the planning workpapers.

Note b. While not shown, the number of reviews (audit workpackages) to be performed should be shown, where appropriate, for each audit review area in accordance with Headquarters guidance. Such audit areas include incurred cost, price proposals, forward pricing rate agreements, estimating system surveys, and defective pricing, etc.

Figure G-3-2
ABC BRANCH
ANNUAL AUDIT PLAN — FY 19XX
AUDIT TEAM 3

| | Time Code | Costs Programmed For Audit (100's) | Staff Hours Programmed | |
|---|---|---|---|---|
| Incurred Costs: | | | | |
| Company A | 16990 | $41,000 | 1,700 | (Note 1) |
| Company B | 16990 | 1,500 | 230 | |
| Company B | 16993 | 700 | 50 | |
| Company C | 16994 | 800 | 60 | |
| Other contractors not itemized | 16990 | 47,000 | 2,400 | |
| Contract Audit Closing Statements (Summary): | 16991 | | 810 | |
| Total Incurred Costs | | $91,000 | 5,250 | |
| Forward Pricing: | | | | |
| Price Proposals: | | | | |
| Company A | 21000 | $195,000 | 360 | (Note 1) |
| Other Contractors (Summary) | 21000 | 150,000 | 1,200 | |
| Total Price Proposals | | 345,000 | 1,560 | |
| Estimating System Surveys | | | | |
| Company A | 24010 | | 120 | |
| Company C | 24010 | | 30 | |
| Total Estimating System Surveys | | | 150 | |
| Total Forward Pricing | | $345,000 | 1,890 | |
| Other Direct Audit Effort: | | | | |
| Supervision and Management | 40000 | | 1,500 | |
| Defective Pricing: | | | | |
| Company A | 42030 | | 120 | (Note 1) |
| Company E | 42030 | | 80 | |
| Total Defective Pricing | | | 200 | |
| Attendance At Negotiations | 49200 | | 160 | |
| Total Direct Audit Effort | | | 9,000 | |

Note 1 - A major contractor ($40 million of auditable annual costs or 5,000 audit hours) must be supplemented by a detail audit plan such as figure H-3-1.

Note 2 - While not shown, the number of reviews (audit workpackages) to be performed should be shown, where appropriate, for each audit review area in accordance with headquarters guidance. Such audit areas include incurred cost price proposals, forward pricing rate agreements, estimating system surveys, and defective pricing, etc.

Figure G-3-3
ABC BRANCH
AUDIT STAFF UTILIZATION SCHEDULE
MONTH OF _____, 19XX

| Assignments | Assignment Number | Staff Hours | | | | | |
|---|---|---|---|---|---|---|---|
| | | Auditor A | Auditor B | Auditor C | Auditor D | Auditor E | Total |
| Price Proposal - Co. A | 8A21000001 | | | | | 76 | 76 |
| Price Proposal - Co. S | 8A21000009 | 36 | | | | 4 | 40 |
| Price Proposal - Co. E | 8A21000012 | | 56 | | | | 56 |
| Unidentified PriceProposals | 8A21000xxx | | 16 | | 28 | | 44 |
| 19X3 Incurred Cost - Co. F | 8A16990001 | | | 40 | 40 | | 80 |
| 19X5 Incurred Cost - Co. Z | 8A16990003 | | | 4 | 16 | 20 | 40 |
| 19X3-19X5 Incurred Cost - Co. L | 8A16990004 | 80 | | | | | 80 |
| 19X2 Incurred Cost - Co. W | 8A16990005 | | 64 | | | | 64 |
| 19X5 Incurred Cost - Co. X | 8A16990006 | | | | 36 | | 36 |
| 19X4 Incurred Cost - Co. C | 8A16990008 | | | | | 56 | 56 |
| Compensation Review - Co. U | 8A16990009 | | | | 36 | | 36 |
| Contract Audit Closings | 8A16991001 | | | 72 | | | 72 |
| Total Direct Audit Effort | | 116 | 136 | 116 | 156 | 156 | 680 |
| Indirect Auditor Time: | | | | | | | |
| Annual Leave | | 40 | 16 | | | | 56 |
| Holiday | | 8 | 8 | 8 | 8 | 8 | 40 |
| Sick Leave | | | 4 | | | | 4 |
| Training | | | | 40 | | | 40 |
| Staff Meetings | | 4 | 4 | 4 | 4 | 4 | 20 |
| Total Direct Audit Effort | | 168 | 168 | 168 | 168 | 168 | 840 |

APPROVED
BRANCH MANAGER

## G-400 Section 4 — Supervision of Field Audit Work

### G-401 Introduction

CAM 2-303 sets forth standards for supervising field work. This section discusses additional aspects of within-the-branch supervision of mobile audits and branch office activities. External supervision (technical direction and guidance by representatives of DCAA regional offices and Headquarters) is also an important element of guiding the implementation of government auditing standards and agency policies by branch offices but it is not included within the scope of this appendix.

### G-402 General

a. Supervision of individual audit assignments applies before, during, and after completion of the field visit. Oral and written instructions, preparation or approval of detailed audit programs, on-site guidance and review of working papers and report drafts are all aspects of supervision. The depth and extent of supervision in individual cases will vary in relation to the materiality and complexity of the audit assignment and the competence and experience of the auditors assigned. It should not be inordinately reduced because of problems presented by the geographic location of the audit site. For example, supervision of a complex audit assignment which must be conducted on a TDY travel basis is usually not adequate if it first begins with the review of working papers in the branch office after the field work is completed.

b. The various levels of supervisory responsibility discussed in the following paragraphs do not relieve each individual auditor of the responsibility for the professional adequacy of his/her own work. Similarly, the necessity for a detailed audit program prepared or approved at a higher supervisory level should not preclude any auditor from applying ingenuity during the course of the assignment to achieve the audit objectives and to recommend improvements of the program.

### G-403 Team Leader

The team leader is primarily responsible for preparing and executing the audit program and for drafting the audit report. The designation of team leader is made separately for each assignment; the team leader on one assignment may next act in an assisting capacity in another, more complex assignment. Thus, the grade level may differ depending on the complexity or sensitivity of the particular assignment, but must be adequate for satisfactory performance. He or she may act alone, or may be assisted by one or more auditors of the same or lower grade levels for part, or all, of the duration of the assignment. In addition to his or her participation, the team leader must supervise the day-to-day activities of all auditors assigned to assist and must review their working papers for both format and content.

### G-404 Supervisory Auditor

a. The supervisory auditor plays a large role in the success of branch office operations. He or she has the fundamental responsibility of assuring that each team assignment is conducted in accordance with government auditing standards as well as the responsibility of participating in the overall planning and management of branch activities. The effectiveness of audit guidance and supervision depends mainly on his or her personal familiarity with the contractors assigned to the team. To carry out the responsibilities properly, the supervisory auditor must spend a considerable share of his or her time at field audit sites-usually more than 40% of the total direct time.

b. Many factors must be weighed in planning and scheduling supervisory visits. The supervisory auditor should visit each contractor having a continuing work-load at least once a year but the timing and frequency of visits depend upon the materiality of the various audits in progress, the experience and proficiency of the auditors performing the assign-

ment, and the type and significance of any audit problems encountered.

c. The supervisory auditor must ensure before each field audit assignment is started that the team leader understands clearly the purpose and scope of the audit, the time limitations and any special matters which may be involved. He or she should ascertain that the auditors assigned have familiarized themselves with all relevant information available in the branch office files (4-405). On recurring type audit assignments at active contractors, he or she should ascertain that an adequate audit program has been developed with steps tailored specifically for the assignment and with a time budget in corresponding detail (3-103). In cases where the branch does not have enough information about either the contractor or the assignment to develop an audit program in advance, the supervisory auditor should be sure that a general agenda has been prepared, sufficient to indicate the broad scope and approach planned, and that it will be supplemented with an audit program as soon as adequate background information has been obtained during the visit. On all assignments the supervisory auditor should also ensure that adequate arrangements have been made for any necessary external support, such as assist audits or technical assistance, although this should preferably have already been done shortly after the request for audit was received.

d. While the audit is in process the supervisory auditor should keep in contact with the auditor at the site, either through visits or by telephone, frequently enough (1) to give timely technical guidance on audit or accounting problems, (2) to coordinate on any major changes the team leader proposes to make to the audit program or time budget, and (3) to maintain familiarity with the status of the audit. These supervisory activities can generally be conducted more effectively by visits than by telephone contact.

e. After the conclusion of an assignment, the supervisory auditor will review the working papers and the report draft for professional quality, accuracy and responsiveness to the audit requirement. The review should be in sufficient depth to evaluate the adequacy of significant technical judgments, findings, and recommendations made by the auditor. After making or suggesting any necessary changes to the report draft, the supervisory auditor should prepare a written summary of the review and include it in the working paper file. For contractors at which there is a recurring workload, the supervisory auditor should also include written observations on any modifications to the program required for subsequent audits.

f. Reviews of complex or sensitive audits should be conducted on site if at all possible. In this way, any additional audit work or necessary discussions with contractor personnel can be accomplished readily. He or she should particularly try to complete the review on site in those instances where monitoring of audit progress or past experience indicates the existence of complex problems which require resolution.

g. On the more significant or sensitive assignments, the supervisory auditor should participate in entrance, exit and problem solving conferences held with the contractor.

## G-405 Branch Manager

a. The branch manager is responsible for all aspects of the branch operations. He or she establishes branch office procedures and management controls over the programming, scheduling and timely completion of audits and reports. In some cases as discussed in c. below, he or she may participate directly in audit assignments in process. In addition to day-to-day supervision of overall audit activities, he or she should review monthly the status and progress of each team's performance with its supervisor as provided in G-307b.

b. The branch manager should review all significant audit reports; other audit reports should be reviewed selectively. The reviews should be in sufficient depth to provide continuing visibility into the technical proficiency of the branch audit efforts and the compliance with applicable agency policies. He or she should also make selective examinations of working papers files with sufficient frequency to

ensure that government auditing standards of field work and reporting are being observed. He or she should assure that technical problems which are expected to require referral to higher levels are brought to his or her attention as soon as practicable rather than at the time of final report review.

c. The branch manager may be more directly involved in audits of unusual materiality or sensitivity. He or she will also participate in supervising individual audit assignments which involve significant administrative problems such as denial of access to records or timeliness or reporting. He or she should attend any especially significant conferences with contractors.

## G-406 Personnel Management

The branch manager and the supervisory auditor also have important personnel management responsibilities. They must prepare or approve performance evaluations and career appraisals. They must make decisions or recommendations on the promotion, reassignment and training requirements of subordinate audit personnel. The branch manager is also responsible for resolving employee complaints and grievances and keeping the regional director informed of any major personnel problems having a significant effect on branch office accomplishments.

## G-500 Section 5 — Relations with Contractors and Contracting Officers

### G-501 Introduction

General guidance on relationships with contractors and contracting officers is contained in 1-403. Additional guidance pertaining primarily to resident and suboffices is given in Section 2, Appendix H. This section discusses some further aspects related particularly to branch offices.

### G-502 Relations with Contractors

Because of the nature of its workload, a branch office must frequently deal with small contractors, some of whom may not be well versed in the administration of government contracts. Others may have accounting systems which are only marginally adequate. Occasionally, personnel of such contractors ask extensive advice and assistance from the branch office on accounting and financial matters pertaining to their government contracts. It is consistent with the auditor's role and purpose to recommend improvements to the contractor's accounting or administrative procedures that will increase the reliability of its cost records and representations. It is also appropriate to advise the contractor on the proper preparation of public vouchers, on the implementation of contractual provisions for reserves, on funding limitations, and on many other areas of mutual concern. The time and effort expended in these areas should, however, be consistent with the branch office's overall responsibilities and priorities for audit performance. Where the requested assistance relates to government finance or contract administration activities, the contractor should be referred to these organizations.

### G-503 Relations with Contracting Officers

a. The physical environment of a branch office usually does not offer the same convenient opportunities for informal communications and coordination with contracting officer representatives as a resident audit office. The branch office should, however, exert special efforts to maintain a close relationship with contract administrative offices, particularly in resolving problem areas of mutual interest. Some important elements in maintaining good relations with contracting officers are (1) prompt acknowledgment of audit requests (9-103.2), (2) timely compliance with audit requests, and (3) appropriate action if report due dates need adjustment (9-103.7). The branch manager should assure that the internal office procedures adequately control these items. It is especially important that the contracting officer be advised as soon as possible after it is determined that an original report due date cannot be met. On the more significant audit assignments any requested reschedule of due dates should be discussed with the contracting officer by telephone and, if approved, confirmed by the auditor in writing. When advantageous, these verbal communications should be made through the assigned PLA (15-300).

b. Coordination between the auditor and ACO technical personnel also warrants special attention to maintain effective relations and avoid duplication. Whenever possible, the time scheduling of field audit visits should be coordinated in advance with technical personnel if technical input is required. Informal discussions of significant audit findings with technical personnel and the exchange of pertinent information during the course of a proposal review may do much to minimize any differences or delays. See 4-1000 for documentation requirements when relying upon the work of others.

c. Some branches located near procurement or contract administration activities perform a procurement liaison function on a full-time or part-time basis. Guidance in performing these services is contained in 15-300. Normally, a specific senior auditor is assigned to carry out required day-to-day liaison activities. The branch manager should supervise this activity personally and participate in resolving any major problems. He or she should also visit the procurement activi-

ties in the area so that he or she is informed on significant developments of broad interest to DCAA, such as general timeliness of audit reports, trends in procurement workload, emerging audit/procurement problems, quality of audit services and so forth. He or she will in turn advise the regional director on these matters.

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# APPENDIX H

## H-000 MANAGEMENT OF RESIDENT AUDITS

### H-001 Scope of Appendix

This appendix provides guidance on the management and administration of DCAA resident audit offices at contractors' locations. It covers organization, audit programming, scheduling, review of accomplishments, and audit relationships with contractor personnel and cognizant procurement and contract administration representatives on a resident audit basis. This guidance applies to both resident offices and suboffices located at major contractor plants; hence, the term "resident audit office" as used in this appendix includes both types of offices. Portions of Appendix G may apply more directly to isolated audits performed by resident audit office personnel on a mobile basis; that is, at contractor locations other than the one at which the office was established.

### H-002 Statement of Objectives

a. The complexity and volume of government activities at contractor locations where resident audit offices are maintained require that audit service at these locations be directed toward (1) a continuing comprehensive review and evaluation of the contractor's financial management policies and procedures in each auditable area, and (2) the performance of adequate tests of selected transactions in each area to assure that operations are being conducted effectively in accordance with prescribed sound management policies and procedures and that the financial transactions are accurately and reliably recorded and reported. It is essential that any significant deficiencies found in a contractor's policies, procedures, or internal controls affecting the costing of its government contracts be discussed with the contractor to obtain agreement on the corrective action required. We should also discuss how the contractor's actions will influence our audit planning in the future (see H-202d).

b. Use of techniques discussed in paragraph H-002 a. above, coupled with the need for obtaining maximum use of available audit staffing have led to the need for more effective discipline in planning, programming, and administration of resident audit offices. The following sections set forth procedures for accomplishing these activities.

### H-100 Section 1 — Reserved

## H-200 Section 2 — Relationships With Contractors and Contracting Officers

### H-201 Introduction

a. This section presents supplementary guidelines for establishing and maintaining effective relationships with the contractor and with contracting officers and their representatives in the resident audit environment.

b. See 1-403, 1-500, 4-102, and 15-700 for basic guidance on relationships with contractors and contracting officers and their representatives. See 4-300 for basic guidance on audit conferences with contractors. See 4-1000 for documentation requirements when relying upon the work of others.

### H-202 Relationships with Contractors

a. Upon the decision to establish a new resident audit office, the resident auditor should hold preliminary discussions with the contractor to explain the method and the advantages of resident audit operations. Advantages include familiarity of assigned audit personnel with the contractor's operations and records, their day-to-day availability for consultation on audit recommendations, the more expeditious performance of initial pricing reviews, and other similar aspects of resident audit operations. No agreement should be made with the contractor to limit the scope of resident audit office operations or access to contractor books and records. The following matters should also be covered during these preliminary discussions.

(1) Briefing the contractor on the mission and responsibilities of DCAA.

(2) A date for establishment of the resident office or suboffice.

(3) Designation of representative(s) of the contractor for liaison purposes.

(4) Arrangements for support required, including office space and facilities.

(5) Arrangements for indoctrination of audit personnel with respect to the contractor's operations and accounting records, etc.

b. A letter from the regional director confirming the results of the discussions will be sent to the contractor and will, in effect, constitute the basic agreement for the maintenance of the resident office or suboffice.

c. The resident auditor or AIC will assure that mutually satisfactory relationships with contractor personnel are maintained on a continuing basis. The contractor's designated representative should be generally informed of the audit standards and techniques used by DCAA.

d. In the interest of fostering contractor self-governance and improving communications, the auditor should discuss the annual program plan with the contractor. Upon finalization and approval of the annual program plan applicable to a major contractor, the cognizant auditor should make arrangements to go over the plan with the contractor. The areas selected for review should be discussed in relation to the reliance being placed upon the adequacy of established internal controls as well as other actions taken by the contractor to effect improvements in its operations.

### H-203 Relationships with Contracting Officers

The auditor should maintain a close working relationship with contracting officers and their representatives (see 1-403 and 15-700). FAR 15.805-5 provides that the contracting officer shall avail her/himself of the advice of specialists in various fields, including contract audit. Although organizationally independent, the contract auditor is the principal adviser to the contracting officer on accounting and contract audit matters. The following factors will contribute to the development and maintenance of effective working relationship with procurement representatives:

a. The criteria for establishment of resident offices will normally result in location at contractor plants where the contracting officer has resident contract administration representatives. The auditor should become familiar with the assigned responsibilities of these repre-

sentatives and cooperate with them in areas of mutual interest.

b. The resident audit office should render all reasonable contract audit service and advice within the framework of DCAA responsibility.

c. When formulating its annual audit plans, each audit office should coordinate and exchange planning information with Administrative Contracting Officers and Plant Representatives at residencies, suboffices and other major contractor locations (see 15-700). The exchange should be mutual, applying not only to the proposed functional areas to be examined by the auditor during the next fiscal year, but also to the plans of the ACO and Plant Representative for activities which may impact on, or coincide with, DCAA operations. Close coordination is important and necessary to (1) conserve audit resources, and the resources of other government representatives involved, by avoiding overlapping or duplication of effort, (2) maximize effectiveness by exchanging leads and recommendations concerning known or suspected weaknesses, deficiencies and problems, (3) correlate respective plans and schedules so that timely, mutual assistance can be provided in areas such as production scheduling and control and labor utilization, as well as in the evaluation of price proposals and contractor claims, and (4) obtain mutual support in getting the cooperation of the contractor in resolving problems and implementing recommendations for corrective action. If reliance is placed on the work of others, it must be documented and reported in accordance with the requirements of 4-1005 and 4-1006 respectively.

d. Before commencing the examination of major segments of the contractor's operations, the auditor should contact the contracting officer(s) or designated representative who has a major procurement interest in the contractor's activities. At that time the auditor should inquire as to whether there are any matters of particular interest to procurement personnel so that special attention may be given any such matters in the examination. This procedure need not be followed for all auditable areas, but should generally be used for those broad functional areas with which procurement personnel are primarily concerned, such as purchasing and subcontracting, bid estimating systems, contract financial management reporting, etc. Usually, this procedure can be accomplished through coordination of information with the contracting officer's representative stationed at the contractor's plant.

e. Requests for audit from procurement officials will be accepted and completed as expeditiously as possible. Mutually acceptable due dates should be worked out with the requesting activities. The auditor should request clarification of any obscure facets of a request received for audit services. Close liaison should also be established in connection with forthcoming requests for bid proposal evaluations, so that preliminary audit work may be commenced as soon as possible. In some instances, preaward and other information in the files of purchasing and contract administration offices may have considerable value in connection with audits of specific contracts. DCAA liaison audit personnel can be utilized to obtain such information.

f. The auditor should make arrangements with major contracting officers to be kept currently advised of financial matters which may affect the contractor. In this connection, meetings or briefings may be periodically held by contracting officers' representatives and contractor management personnel on such matters as status of delivery of end items, technical progress in relation to contract expenditures, possible problem areas and results of tests. If possible, the auditor should attend such meetings to increase awareness of the contractor's current operations.

g. Imposition of limitations on the auditor, such as denial by the contractor of access to records, should be brought promptly to the attention of contracting officers.

# H-300 Section 3 — Workload Planning, Audit Staffing, and Progress Analysis

## H-301 Introduction

This section sets forth methods and guidelines for organizing the resident staff, programming the audit, scheduling performance of audit segments, and assessing progress toward accomplishing the audit plan.

## H-302 Audit Planning and Permanent File

### H-302.1 Establishing the Basic Audit Plan

a. Chapter 3 sets forth objectives and guidelines to be used in planning audit assignments. In implementing these objectives, an audit plan should be developed for newly established resident audit offices and updated annually for existing resident audit offices. The audit plan should identify (1) the workpackages scheduled for review during the fiscal year, (2) the audit hours required and programmed for each workpackage, and (3) the number of audits required and programmed (see Figure H-3-1).

b. The audits required and programmed should provide for the accomplishment of those mandatory annual audit requirements (MAARs) that are applicable to the contractor. Guidance for establishing an audit plan is contained in H-302.3.

c. At each major contractor location, FAO managers and RAMs should meet with senior contractor management executives (e.g., corporate or division president) to provide a briefing on the annual program plan. At their discretion, the regional director or deputy regional director will attend this meeting, particularly when significant or sensitive issues will be addressed. The meeting should include discussions on the FAO's understanding of the contractor's internal control systems, our assessment of risk, and any significant outstanding regulatory or CAS issues. FAO representatives should discuss the planning process and explain how the assessed level of risk translates into the planned audit coverage. The goal of these communications is to ensure the contractor has an appreciation of the DCAA planning process and an understanding of areas where they can work to strengthen internal controls. Therefore, it is critical that feedback is received from contractor executives at the meeting. A Memorandum for Record documenting these discussions will be prepared.

d. Effective resident audit office management necessitates (1) the periodic appraisal of actual performance in the light of the plan, (2) an analysis of the causes of deviations, and (3) appropriate action either to obtain adherence to the audit plan or document a management decision to deviate from the planned application of available resources to those segments assigned the highest priorities.

### H-302.2 Maintaining Permanent Files on the Contractor's Operations

a. To perform effective audits, the resident auditor and staff must maintain a continuing and current familiarity with the contractor's organization, activities, operational concepts, policies, procedures, financial management controls, and accounting system. This should be accomplished by maintaining the permanent file on a current basis.

b. Maintaining permanent files for a major contractor audited by a resident office is a more involved process than for a nonmajor contractor audited by a branch office. The guidance in 4-405.1 states that the permanent file is the repository of information gathered during the course of an audit which has continuing value and use to subsequent audits expected to be performed at the same contractor; therefore, only information that the auditor anticipates will be needed for the performance of future audits should be placed in the permanent file. Furthermore, the format and content of permanent files is determined by anticipated audit involvement. Because audit involvement at a residency has already been determined to be significant, these permanent files will be more exten-

sive and contain certain minimum information.

c. It is DCAA policy to use the total audit concept technique (TACT) philosophy in planning and managing audit activities at all major contractor locations. Resident auditors are expected to implement this policy by ensuring that all audit activities are managed on the basis of an integrated totality. To plan and guide the entire audit activity in such a manner, all areas of the contractor's organization and operations requiring audit must be identified. This is accomplished through a comprehensive review of the contractor's organization and operations, completion of an internal control audit planning summary and postaward risk assessment (CAM 9-310f.(4)). The internal control audit planning summary represents an essential part of a contractor's permanent file. The internal control audit planning summary organizes the contractor's cost accounting system into audit areas which are defined as sets of critical internal controls or elements of risk within a major expense grouping. Additional guidance is included in CAM 3-300 and DCAAP 7641.64, "Audit Management at Major Contractors."

**H-302.3 Establishment of Workpackages and Staffing Requirements**

a. The Agency's planning system provides the structure for systematically identifying total audit workload, establishing work priorities, and estimating resource requirements. Audit workload is usually expressed in terms of (1) dollars to be examined, (2) hours required to perform the identified audit work, and (3) number of audits/workpackages. The planning system is basically an annual zero-based approach to planning, comprised of three major activities. These are (1) requirements planning, (2) program planning, and (3) performance monitoring and reporting. The resident office audit plan, as a minimum, should include these three major activities.

(1) Requirements planning is the most critical, for this is the means by which FAOs (1) identify specifically the total audit work that must be accomplished at a contractor location, (2) perform risk assessment and establish priorities related to performance of identified audit work, and (3) develop estimates of hours required to perform the identified audit workload. The requirements plan is used by the Agency to justify budget requests for staff resources. Staff resources provided to the Agency are allocated during the program planning cycle.

(2) Program planning and performance monitoring and reporting are also important since it is through these activities that priorities are determined to match workload with available staff resources.

(3) Audit workload is categorized as two types, demand and other. Demand audits are generally performed as a result of specific written audit requests from procurement or contract administration activities. These requests usually specify an audit report due date. Examples of major types of demand audits are (1) forward pricing proposals, (2) contract termination proposals, (3) contractor's claims, (4) progress payments, and (5) other special requests. Other workload is that audit effort considered necessary to obtain sufficient competent evidential matter to express an opinion on incurred costs claimed by the contractor, such as reviews of internal controls and cost allocation methods, or to evaluate cost projections, such as reviews of estimating systems. Other workload is classified as mandatory if such effort is required to be performed in the current year to preclude issuance of qualified audit reports.

b. Headquarters annually issues the Program Objective Document (POD). The POD sets forth criteria to be used in developing personnel requirements for the coming fiscal year. The POD communicates to regions and individual field audit offices information on overall Agency objectives to assure the development of total staff requirements on a uniform and consistent basis. The resulting requirements plan is (1) a source for the Agency's budget request, (2) the basis for determining workload priorities, and (3) the basis for allocating authorized staff.

(1) The auditor's assesment of control risk from the internal control audit planning summary sheets mentioned in H-302.2 and guidance included in the annual POD, in conjunction with the prior

audit experience at the location, will permit the auditor to identify audit areas requiring review, divide the workload into specific workpackages, and provide a sound basis for projecting staffing requirements.

(2) Determination of requirements and establishment of priorities should appropriately consider materiality and audit risk assessments, which are an inherent part of DCAA's planning process, as well as adherence to Government Auditing Standards and generally accepted auditing standards of the American Institute of Certified Public Accountants (AICPA).

(3) Audit or staffing requirements will be estimated in terms of required hours and numbers of audits or workpackages. The estimate should include total hours required for both audit activity and operation of the resident office. The FAO GM-13 Supervisory Staffing Model (DCAAM 1400.1, Chapter 5) should be used to determine the requirements for supervisory personnel. The model should also be used at the regional level to determine the subsequent allocation of authorized supervisory spaces to the FAOs.

c. After establishing the estimated hour requirements for each segment of the audit, an audit plan for the FAO should be developed, using the Headquarters and regional staff allocation models and program plan guidance. Figure H-3-1 is an illustration of such a plan. The total time shown as programmed on the plan should agree with authorized staffing and the distribution of hours should be consistent with the priorities established by DCAA Headquarters in the fiscal year program planning guidance. To ensure the audit plan is accomplished in an orderly manner, the FAO should time-phase the programmed audit workload consistent with estimated staff availability. Time-phasing may be documented by notations on the audit plan or maintained in separate analytical and narrative format.

d. Appropriate supporting data should be maintained showing the details of the requirements and program plan. In this connection, care should be exercised to ensure that all the time-sensitive MAARs associated with the audit areas requiring review have been identified so they can be programmed for review during the current fiscal year.

e. Audit assignment numbers should be given to each workpackage programmed whether or not it is expected that an audit report will be issued. These numbers will be used to manage accomplishment of the audit plan and should be noted on each page of the audit working paper file. Assignment numbers for demand assignments, such as for review of price proposals, will be established as requests for audit are received. Assignment registers (see FMIS User Manual section III.C.4. list of available reports) should be maintained to monitor the progress of each audit and facilitate management of the audit staff. The register should provide such information as the due date, auditor assigned, hours budgeted, hours incurred, and dollars examined. An example of such a register is shown in Figure H-3-2.

f. In preparing the annual audit plan, the individual workpackages should be assigned priority ratings based on their importance and relationship to the total audit effort (materiality and audit risk) during the requirements plan cycle. This will facilitate adjustments from the requirements plan to the program plan, or adjustment of workload in cases of significant slippage in accomplishment of the program plan. For instance, urgent needs for audit service in certain sensitive areas, occurring subsequent to preparing the requirements plan, may require deferment of work in less sensitive areas.

g. The tools available to resident offices in determining materiality and audit risk include the control audit planning summary and the workpackage risk analysis procedure (WRAP).

(1) The internal control audit planning summary summarizes the auditor's assesment of the contractor's organization, accounting system, and system of internal controls.

(2) WRAP (3-400) is a tool which may be used to prioritize workpackages among the alternatives based on the range of expected savings. However, establishing requirements for only those workpackages which exceed some minimum dollar level in terms of savings rate

per hour is not appropriate. WRAP may be used to validate selection of nonmandatory workpackages and to rank workpackages within an audit area considered mandatory. Any workpackage otherwise considered mandatory should be included in the requirements plan. WRAP should not be used to justify deferral of workpackages which are considered mandatory. However, WRAP can be used to support the expansion or limitation of scope in mandatory areas if potential savings is the major consideration.

h. A control should be maintained for all audit workpackage deferments, showing the nature of the work deferred and the estimated dates that such work will be initiated. This control can be maintained by appropriate notations on the annual audit plan, or by any other suitable method. Appropriate supporting documentation should be maintained on the reasons for such deferment.

**H-302.4 Organization of Audit Staff and Assignment of Personnel**

a. The organization of the audit staff and the assignment and control of auditor personnel will necessarily vary, depending on the nature and size of the contractor's activities, its operation, organizational and divisional alignment, types of products, and similar considerations. Where the resident audit office staff consists of about twelve or more auditors, organization of the staff into "teams" capable of accomplishing audit assignments without extensive supervision is usually the most effective approach to audit performance. The identification of auditable areas and their assignment to audit teams can usually be best accomplished by the method discussed below.

b. The total audit workload should be divided into auditable areas which generally coincide with functional activities relating to cost incurrence, e.g. purchasing and contracting, payroll preparation and payment, indirect cost allocation, and overtime policies. These functional areas are then assigned to individual teams for performance in accordance with the concepts set forth in this appendix. Performance should be accomplished on a time-phased basis in accordance with the established annual audit plan. As an objective, each team should be assigned those functional areas which bear direct relationship to each other so that the members of the team will acquire a comprehensive understanding of the various interrelated functions. The efforts of the various teams must be coordinated to assure that there are no omissions and no duplication in audit coverage, and that equitable costing is accomplished with respect to those related functions which are assigned to different teams. This approach is particularly effective where the contractor itself is organized along functional lines. As a practical matter, experience indicates that this approach should be given primary consideration and should be used generally at most resident audit offices.

c. The method described in b. may be modified in those circumstances where the contractor is producing two or more major military weapons systems on a continuing basis. In these circumstances, it may be advantageous for the resident auditor to assign workload coordination responsibility for these weapons systems to one or more designated staff auditors. These auditors will maintain a continuing interest in the procurement-audit relationships affecting the weapon system as well as a historic current knowledge of its peculiar audit problems. Requests to evaluate follow-on pricing proposals or significant change orders can be initially referred to these auditors for (1) development of an overall audit approach to be followed by the functional audit area teams and (2) coordination with them on problem areas. These auditors may also be assigned responsibility for preparing the audit report and participating in contract negotiation conferences. Their assigned responsibilities should complement the work of the audit teams responsible for the review of the established functional areas.

d. When the resident audit staff is organized into audit teams, a plan should be adopted to rotate personnel to the various teams on a systematic basis. This will preclude personnel from becoming unduly restricted to one area and enable them to gain broader experience.

e. The annual audit plan and assignment register are illustrated in figures H-3-1 and H-3-2. The annual audit plan is one of four standard reports that can be printed from the dBase III Plus requirements/program software. The assignment register can be printed from the FAO Management Information System (FMIS). Additionally, the FMIS provides other real-time management reports which may be used in lieu of the illustrated assignment register, at the discretion of the regional audit manager and resident auditor.

## H-303 Evaluation of Audit Performance

a. Effective management of resident audit offices requires the resident auditor and supervisory auditors to continually evaluate the audit effort and the interim results achieved in order to (1) curtail effort in areas where audit experience to date has been favorable and (2) intensify effort in areas where interim results indicate the existence of significant deficiencies.

b. Periodically, the actual time expended in each auditable area should be compared with the programmed time to evaluate actual performance. Causes of substantial time overruns or underruns should be analyzed. The impact of any delays in performing individual audit segments should also be reviewed. Action should be taken to eliminate slippage.

**Figure H-3-1 (Ref. H-302.3)**
**XYZ CORPORATON RESIDENT OFFICE**
**ANNUAL AUDIT PLAN - FISCAL YEAR _____**
**PAGE 1 OF 3**

| Workpackage Title (1) | Activity Code | Assignment number | Dollars ($000) Requirements | Dollars ($000) Programmed | Number of Audit/Work pkg Required | Number of Audit/Work pkg Program | Hours Required | Hours Program | Hours Programmed Quarter Ended 31 Dec | 31 Mar | 30 Jun | 30 Sep | Start Date | Completion Date | Date Report Issued (2) | Notations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Operations Audits (10501/10599) | | | | | | | | | | | | | | | | |
| Facilities Management | 10506 | | | | 1 | | 760 | | | | | | | | | |
| Production Scheduling and Control | 10515 | 9A105001 | | | 1 | 1 | 500 | 500 | 250 | 250 | | | 10/01/88 | 02/28/89 | | Deferred - Anticipated to be preformed 1st quarter next fiscal year |
| Transportation and Traffic | 10523 | | | | 1 | | 400 | | | | | | | | | |
| Insurance Administration | 10529 | | | | 1 | | 400 | | | | | | | | | |
| Productivity Improvement Program | 10546 | 9A105002 | | | 1 | 1 | 500 | 500 | | 250 | 250 | | 03/01/89 | 06/15/89 | | Deferred - Anticipated to be preformed 4th quarter next fiscal year |
| Ops Audit Follow up | 10599 | 9A105100 | | | 1 | 1 | 100 | 100 | 50 | | | 50 | 10/01/88 | 09/30/89 | | Deferred - Anticipated to be preformed 2nd quarter next fiscal year |
| Total Operations Audits | | | | | 6 | 3 | 2,660 | 1,100 | 300 | 500 | 250 | 50 | | | | |
| Auditable Dollars (10100) | | | $365,000 | | | | | | | | | | | | | |
| CCFY | | | | | | | | | | | | | | | | |
| PCFY | | | | | | | | | | | | | | | | |
| CFY 1986 | | | $116,800 | $116,800 | | | | | | | | | | | | |
| CFY 1987 | | | 162,000 | 162,000 | | | | | | | | | | | | |
| CFY 1988 | | | 345,000 | | | | | | | | | | | | | |
| Total PCFY | | | $623,800 | 278,800 | | | | | | | | | | | | |
| Incurred Cost - Financial & EDP Controls (11010/11990) | | | | | | | | | | | | | | | | |
| Budget System and Financial Control | 11020 | 9B110002 | | | 1 | 1 | 600 | 600 | 200 | 300 | 100 | | 11/15/88 | 04/30/89 | | |
| Internal Controls System | 11050 | 9B110003 | | | 1 | 1 | 500 | 500 | 100 | 100 | 300 | | 12/01/88 | 06/30/89 | | |
| EDP - General Controls | 11510 | 9B110004 | | | 2 | 2 | 700 | 100 | 100 | | | | 10/01/88 | 10/31/89 | | |
| EDP - Lease Vs Buy | 11540 | | | | 1 | | 600 | | | | | | | | | Deferred - Anticipated to be preformed 1st quarter next fiscal year |
| Total Financial & EDP Control | | | | | 5 | 4 | 2,400 | 1,200 | 400 | 400 | 400 | 0 | | | | |

(1) Audit areas are shown for illustrative purposes only and should not be considered an all inclusive audit plan Audit areas may be further broken down by identifiable work packages within each area (See H-302f)

(2) This column is for use in inserting the dates of issuance of reports upon completion of each functional area

**Figure H-3-1 (Ref. H-302.3)**
**XYZ CORPORATION RESIDENT OFFICE**
**ANNUAL AUDIT PLAN - FISCAL YEAR _____**
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| Workpackage Title (1) | Activity Code | Assignment number | Dollars ($000) Requirements | Dollars ($000) Programmed | Number of Audit/Work pkg Required | Number of Audit/Work pkg Program | Hours Required | Hours Program | Hours Programmed Quarter Ended 31 Dec | 31 Mar | 30 Jun | 30 Sep | Start Date | Completion Date | Date Report Issued (2) | Notations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Incurred Cost - Materials & Services (12010/12990) | | | | | | | | | | | | | | | | |
| Catalog Item Purchases | 12020 | | | | | | 600 | | | | | | | | | Deferred - Anticipated to be performed 3rd quarter next fiscal year. |
| Scrap and Rework | 12090 | 9C120001 | | | 1 | 1 | 450 | 450 | | | 150 | 300 | 06/01/89 | 09/30/89 | | |
| Subcontract Costs | 12100 | 9C120002 | | | 1 | 1 | 750 | 750 | | 200 | 300 | 250 | 03/01/89 | 08/31/89 | | |
| Purchased Labor | 12120 | 9C120003 | | | 1 | 1 | 300 | | | | | | | | | Completed in 4th quarter of prior fiscal year |
| Total Materials & Services | | | | | 4 | 3 | 2 100 | 1,200 | 0 | 200 | 450 | 550 | | | | |
| Incurred Cost - Labor (13010/13990) | | | | | | | | | | | | | | | | |
| Compensation Review | 13020 | | | | 1 | | 500 | | | | | | | | | Completed in 4th quarter of prior fiscal year. |
| Floorchecks | 13030 | 9C130001 | | | 1 | 1 | 2,100 | 2 100 | 500 | 500 | 500 | 600 | 10/01/88 | 09/30/89 | | |
| Labor Distribution | 13050 | 9C130002 | | | 1 | 1 | 500 | 500 | 100 | 100 | 150 | 150 | 10/01/88 | 09/30/89 | | |
| Comprehensive Labor Audit | 13500 | 9C135001 | | | 1 | 1 | 900 | 900 | | 200 | 300 | 400 | 03/01/89 | 09/30/89 | | |
| Total Labor | | | | | 4 | 3 | 4 000 | 3,500 | 600 | 800 | 950 | 1,150 | | | | |
| Incurred Cost - Indirect Expenses (14010/14990) | | | | | | | | | | | | | | | | |
| Overhead Claim Analysis & Report | 14010 | 9D140001 | | | 9 | 5 | 4 500 | 2 500 | 800 | 800 | 700 | 200 | 11/01/88 | 08/31/89 | | |
| Allocation Bases, Methods, & Cost | 14020 | 9D140002 | | | 1 | 1 | 400 | 400 | 400 | | | | 11/01/88 | 11/30/88 | | |
| Depreciation and Amortization | 14120 | 9D140003 | | | 1 | 1 | 375 | 375 | | 375 | | | 01/01/89 | 01/31/89 | | |
| Lobbying Cost | 14200 | | | | 1 | | 150 | | | | | | | | | Deferred - Anticipated to be performed 3rd quarter next fiscal year |
| Pensions | 14270 | | | | 1 | | 200 | | | | | | | | | Deferred - Anticipated to be performed 4th quarter next fiscal year |
| Total Indirect Expenses | | | | | 13 | 7 | 5 625 | 3,275 | 1,200 | 1,175 | 700 | 200 | | | | |

## Figure H-3-1 (Ref. H-302.3)
## XYZ CORPORATION RESIDENT OFFICE
## ANNUAL AUDIT PLAN - FISCAL YEAR _____
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| Workpackage Title (1) | Activity Code | Assignment number | Dollars ($000) Requirements | Dollars ($000) Programmed | Number of Audit/Work pkg Required | Number of Audit/Work pkg Program | Hours Required | Hours Program | Hours Programmed Quarter Ended 31 Dec | 31 Mar | 30 Jun | 30 Sep | Start Date | Completion Date | Date Report Issued (2) | Notations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Incurred Cost - Other Scheduled Reviews (15300/15900) | | | | | | | | | | | | | | | | |
| Contract Audit Closing Statements | 15400 | VARIOUS | | | 50 | 50 | 200 | 200 | | | 100 | 100 | | | | |
| Provisional Billing Rates Reviews | 15500 | 9D155001 | | | 15 | 15 | 400 | 400 | | | 400 | | | VARIOUS | | |
| Total Other Scheduled Reviews | | | | | 65 | 65 | 600 | 600 | 0 | 0 | 500 | 100 | | | | |
| Incurred Cost - Other Direct/Indirect (16100/16980) | | | | | | | | | | | | | | | | |
| Changes In Direct/Indirect Charging | 16100 | 9D110004 | | | 1 | 1 | 250 | 250 | 100 | 150 | | | 12/15/88 | 01/31/89 | | |
| Service Centers | 16400 | | | | 1 | | 650 | | | | | | | | | |
| Travel | 16600 | 9D120005 | | | 2 | 2 | 450 | 450 | 250 | 200 | | | 12/01/88 | 01/31/89 | | Deferred - Anticipated to be preformed 4th quarter next fiscal year |
| Total Other Direct/Indirect | | | | | 4 | 3 | 1,350 | 700 | 350 | 350 | 0 | 0 | | | | |
| Total Incurred Cost | | | $988,800 | $278,800 | 95 | 85 | 16,075 | 10,475 | 2,550 | 2,925 | 3,000 | 2,000 | | | | |
| Special Audits (17100/17900) | | | | | | | | | | | | | | | | |
| Progress Payments | 17500 | VARIOUS | | | 7 | 7 | 1,240 | 1,200 | 300 | 300 | 300 | 300 | | | | |
| Other Special Audits | 17900 | VARIOUS | $6,000 | $6,000 | 12 | 12 | 500 | 500 | 100 | 200 | 100 | 100 | | | | |
| Total Special Audits | | | $6,000 | $6,000 | 19 | 19 | 1,740 | 1,700 | 400 | 500 | 400 | 400 | | | | |
| Forward Pricing Activity (21000/26000) | | | | | | | | | | | | | | | | |
| Individual Price Proposals | 21000 | VARIOUS | $2,100,000 | $2,100,000 | 128 | 128 | 11,500 | 11,500 | 3,500 | 2,000 | 2,000 | 4,000 | | | | |
| Should Cost Studies | 22000 | 9C220001 | | | 2 | 2 | 900 | 900 | 500 | 400 | | | 10/01/88 | 11/30/88 | | |
| Forward Pricing Rate Agreements | 23000 | VARIOUS | | | 68 | 68 | 4,000 | 4,000 | | 2,000 | | 2,000 | | | | |
| Estimating System Survey | 24000 | VARIOUS | | | 18 | 18 | 600 | 600 | 200 | 300 | 50 | 50 | | | | |
| Telephone Rate Requests | 2500 | 9C250001 | | | | | 250 | 250 | 75 | 50 | 50 | 75 | | | | |
| Total Forward Pricing Activity | | | $2,100,000 | $2,100,000 | 216 | 216 | 17,250 | 17,250 | 4,275 | 4,750 | 2,100 | 6,125 | | | | |

Figure H-3-2 (Ref H-302.4e)
XYZ CORPORATION RESIDENT OFFICE
AUDIT MANPOWER UTILIZATION PLAN
QUARTER ENDED DECEMBER 31, 1988
PAGE 1 OF 2

| Assignment Number | Audit Area | Program Hours | Resident Auditor | (1) Team A Supervisor | Auditor 1 | Auditor 2 | Auditor 3 | Auditor 4 | Auditor 5 | Auditor 6 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Operations Audit | | | | | | | | | |
| 9A105001 | Production Scheduling & Control | 250 | | | | | | | | |
| 9A105100 | Ops Audit Followup | 50 | | | | | | | | |
| | Financial & EDP Control | | | | | | | | | |
| 9B110002 | Budget Sys & Fin Control | 200 | | | | | | | | |
| 9B110003 | Internal Control System | 100 | | | | | | | | |
| 9B110004 | EDP - General Control | 100 | | | | | | | | |
| | Labor | | | | | | | | | |
| 9C130001 | Floorchecks | 500 | | | | | | | | |
| 9C130002 | Labor Distribution | 100 | | | | | | | | |
| | Indirect Expenses | | | | | | | | | |
| 9D140001 | Overhead Claim Analysis & Report | 800 | | | | | | | | |
| 9D140002 | Allocation Bases, Methods & Cost | 400 | | | | | | | | |
| | Other Direct/Indirect Expenses | | | | | | | | | |
| 9D110004 | Changes in Direct/Ind Charging | 100 | | | | | | | | |
| 9D120005 | Travel | 250 | | | | | | | | |
| | Special Audits | | | | | | | | | |
| | Progress Payments | 300 | | | | | | | | |
| | Other Special Audits | 100 | | | | | | | | |

**Figure H-3-2 (Ref. H-302.4e)**
**XYZ CORPORATION RESIDENT OFFICE**
**AUDIT MANPOWER UTILIZATION PLAN**
**QUARTER ENDED DECEMBER 31, 1988**
**PAGE 2 OF 2**

| Assignment Number | Workpackage Title (1) | Program Hours | Resident Auditor | (1) Team A Supervisor | Auditor 1 | Auditor 2 | Auditor 3 | Auditor 4 | Auditor 5 | Auditor 6 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Forward Pricing Activity | | | | | | | | | |
| 9C220001 | Individual Price Proposals | 3,500 | | | | | | | | |
| | Should Cost Study | 500 | | | | | | | | |
| | Estimating System Survey | 200 | | | | | | | | |
| 9C250001 | Telephone Rate Request | 75 | | | | | | | | |
| | Other Areas (2) | 2,270 | | | | | | | | |
| | Supervision & Management | 1,875 | | | | | | | | |
| | Total | 11,670 | | | | | | | | |

(1) In the preparation of the actual audit manpower utilization plan, this column will be divided into columns for each team and auditor.

(2) To be shown by workpackage in the preparation of the actual audit manpower utilization plan.

# APPENDIX I

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# APPENDIX I

# I-000 WORK SAMPLING

## I-001 Scope of Appendix

This appendix presents work sampling principles and techniques as related to contract auditing. It concentrates on the application of work sampling to the use of labor (staffing). General guidance is provided for the selection and use of appropriate work sampling methods for accomplishing audit objectives.

## I-100 Section 1 — Work Sampling Overview

### I-101 Introduction

The section presents an overview of work sampling with focus on background, definition, advantages, terminology, and software. In addition, the connection between work sampling and statistical sampling in general is demonstrated.

### I-102 Background

a. Work sampling is a commonly used industrial engineering technique designed to measure how resources such as people, machines, facilities, or equipment are used. The work sampling objective is to assess selected aspects of an organization's operations. If an operation is to be reviewed, work sampling is a low cost alternative to continuous monitoring, just as sampling in the audit context is a low cost alternative to 100 percent review of an account. The cost of continuous monitoring of an entire operation is generally prohibitive, and work sampling can yield adequately precise results at a fraction of that cost.

b. Work sampling studies are used by auditors to review contractors' labor usage. To conduct a work sample, the auditor makes a specified number of observations of contractor personnel involved in the operation under review. Each observation is classified according to type of activity, the activity types being specified prior to sampling. Using information gathered during the study, the auditor can estimate the percentage of time that the workers actually spend in each activity.

c. With minimal specialized training, an auditor can assess workers' activity and determine whether contractors' management practices yield reasonable and acceptable levels of working activity. Work sampling may disclose underutilized workers, poor worker discipline, overstaffing, inadequate training, inefficient plant layout, excessive delays (caused by poor planning, material scheduling, or tooling), or other deficiencies.

### I-103 Definition

a. Work sampling is broadly defined as the application of statistical sampling techniques to the study of work activities. In the audit context work sampling is typically used to estimate the proportion of workers' time that is devoted to different elements of work activity.

b. For DCAA applications, observed activities are grouped into either of two main classifications: working or nonworking.

(1) The working classification can be subdivided into desirable or undesirable. Hands-on activities like assembling, machining, drawing, designing, etc., are desirable productive efforts. Minor delays, i.e., waiting for material, cleaning work areas, or walking to get tools, though necessary, are undesirable productive activities.

(2) Nonworking activities include unnecessary delays, needless walking, nonbusiness conversations, personal time, etc. These activities may be broken down further to help identify contributing factors. The degree of detail will depend on the overall objectives of sampling, the

type of work environment, and the work sampling method.

## I-104 Work Sampling — Assessing the Reasonableness of Labor Costs

a. Contractors develop labor estimates and budgets based on incurred labor cost history. If these costs reflect inappropriate activities, they are not a reasonable basis for estimating future costs. Typically, auditors perform two significant audits to determine whether incurred labor costs are allocable and reasonable. These audits are:

(1) Labor allocation reviews which determine whether the contractor's workers are charging the activities to which they are actually assigned.

(2) Work sampling which determines whether, while assigned and charging to a specific task, the workers are actively performing the task.

b. The typical DCAA work sampling audit does not formally assess worker effectiveness or efficiency. Its primary concern is whether the work force is working.

## I-105 Work Sampling — An Application of Statistical Sampling

a. The statistical basis for work sampling is the same as that for the statistical sampling methods discussed in Appendix B. The observations to be made must be selected randomly and the observations themselves must be free of bias (measurement or observation errors that tend to run in the same direction). If these conditions are met, the sample results will differ from the actual conditions only in a random manner and will thus be unbiased. Furthermore, the greater the number of observations, the more closely will sample results approximate actual conditions.

b. Work sampling can enhance auditor productivity. Worker activities, like records or items in an account or bill of materials, can be sampled instead of being totally or continuously reviewed.

## I-106 Advantages, Terminology, and Software

a. Some of the primary advantages of work sampling are as follows:

(1) Sampling is less expensive than continuous observation techniques.

(2) Observers with minimal specialized training can conduct the sampling.

(3) The number of observations can be adjusted to meet desired levels of precision.

(4) Sampling is an effective means of collecting facts that would not normally be collected by other means.

(5) Sampling results in less anxiety and agitation among workers than continuous observation.

(6) There is minimal interference with the worker's normal routine.

b. An understanding of the principal work sampling terms is necessary to use this guidance and work sampling software. Key terms and their definitions are as follows:

(1) SURVEY AREA (Universe): the total of all workers or machines to be covered in the survey.

(2) PRELIMINARY SURVEY (Probe): the preliminary "work/no-work" observations are conducted to determine the general amount of nonworking in the survey area. This survey helps to estimate the approximate number of observations that will be required for the work sampling audit. Additionally, the preliminary survey aids in identifying the categories of nonworking activity.

(3) PRELIMINARY POINT ESTIMATE: the preliminary estimate of nonworking activity determined either by the preliminary survey (probe) or past experience.

(4) KNOWLEDGE WORKERS: those workers whose output is mostly intangible (e.g., accountants, engineers, clerks, etc.). Often referred to as nontouch workers.

(5) PHYSICAL WORKERS: those workers whose output is mostly tangible (e.g., welders, machinists, assemblers, etc.). Often referred to as touch workers.

(6) GROUP SAMPLING: a method in which groups of workers are collectively

observed at randomly selected areas and times.

(7) INDIVIDUAL SAMPLING: a method in which the workers are randomly selected and individually observed at randomly selected times.

(8) OBSERVATION TOUR (Round): a tour performed at a specific time to determine the work classification of an individual worker or a group of workers.

(9) OBSERVATION: the recorded results of an individual or group sampling observation tour. An example of a group observation is: 5 working, 3 nonworking (2 nonbusiness talking, 1 reading newspaper).

(10) OBSERVATION TIME: a randomly selected start time for initiating an observation tour.

(11) NONWORKING ACTIVITY: that effort which does not contribute to the output of the operation. Eating and nonbusiness talking are examples of nonworking activity.

(12) WORKING ACTIVITY: that effort which directly or indirectly contributes to the output of the operation. Assembling and designing are examples of working activity.

(13) UNDESIRABLE WORKING ACTIVITY: an activity that is classified as working but can be eliminated or reduced by improved procedures. Examples include walking, waiting, cleaning, etc.

(14) CONFIDENCE LEVEL: the chance (or probability) that the true universe value that is being estimated by the sample is included in a specified range (see item (15) below). In evaluation of sample results, the desired confidence level is specified by the sampler and the precision range is computed accordingly. In sample size determination, both the desired confidence level and the desired precision range are specified, and the sample size is computed accordingly. For example, if the desired confidence level is 95 percent and the precision range computed from the sample results is from 12 to 18 percent nonworking, there is a 95 percent chance that the true nonworking is between 12 and 18 percent. Normal desired confidence levels are 90 or 95 percent.

(15) PRECISION RANGE: a range of possible universe values that is determined according to the confidence level (see item (14) above). When computed from sample results to meet a specified confidence level, the precision range consists of an upper and lower limit. In sample size determination, the desired precision range (sometimes referred to as desired precision) is specified along with the desired confidence level. It does not depict an upper and lower limit, but instead it consists of a desired limit on the amount by which the sample point estimate might differ from the true universe value. In work sampling desired precision ranges are typically 6 percent ( 3 percent).

c. Microcomputer software (WSAMP2) to appraise work sampling results is available on floppy diskette. Information necessary to use the software is contained within the program, and is available as a menu option. The program computes the average percentage of nonworking activity, related precision ranges, and estimates of the number of observations required to achieve desired precision at various confidence levels. In addition, the program can be used to analyze causes, areas, and timeframes of nonworking activity. The program has two options. Option 1 analyzes group sampling results, and option 2 analyses individual sampling results. Operational guidance is available from the Technical Services Center (TSC).

## I-200 Section 2 — Planning the Work Sample

### I-201 Introduction

The section presents the step-by-step procedures of planning and preparing for a work sample.

### I-202 Decision to Sample

The decision to work sample may be based on general perceptions or specific findings. Examples include routine floor checks that reveal unnecessary staffing, or volume adjustments that suggest the need for staffing reductions where none have occurred. Whatever the source, if there is concern, conduct a probe to substantiate the need to audit.

### I-203 Planning the Work Sample

a. At the outset, prepare an audit program with audit steps for the preparation of a sampling plan. Be sure to dedicate adequate time and resources to the sampling plan. General steps are as follows:

(1) Develop audit objective and define universe.

(2) Establish familiarity with contractor's operation.

(3) Choose group or individual sampling method.

(4) Obtain necessary data from contractor (such as organization charts, plant layouts, and shift schedules).

(5) Determine activity classifications for workers being reviewed.

(6) Design observation forms to accumulate and summarize data.

(7) Conduct a probe to evaluate classifications, estimate nonworking activity, review observation areas, as well as any other required area or activity.

(8) Establish audit dates and duration.

(9) Estimate sample size and select audit staff.

(10) Prepare team folders containing such items as schedules, observation forms, and plant layouts.

(11) Train audit team observers.

(12) Estimate allowance factor.

b. The sequence and steps may be altered to fit specific situations as particular audits evolve or may be tailored to suit uniquely different audits.

#### I-203.1 Defining Audit Objective, Universe, and Work Sampling Method

a. The auditor should begin by defining the audit objective. List various reasons for considering work sampling, such as excessive walking, idleness, and poor use of resources. Define the universe (area and population) to be studied. These two steps will help clarify and focus the audit. As a part of the audit objective, develop a precise statement of purpose. Data accumulation and savings computations hinge on a precisely defined objective.

b. The auditor should become familiar with the target universe. Information sources include facility layouts, organization charts, department charters, product lines, process sheets, and occupation codes. Gather information about support service functions and areas including test labs, CAD/CAM rooms, technical libraries, tool cribs, stock rooms, production/quality control points, and setup and maintenance areas.

c. Choose either the individual or group sampling method.

(1) In individual sampling, for each observation, workers are randomly selected from the defined population. The activities of the entire defined population are determined based on an analysis of the activities of the randomly selected workers. The advantages of the individual method are as follows:

(a) Individual sampling allows detailed scrutiny of employee work activities. The observation consists of only one individual worker at a time. Any missing worker in the sample must be accounted for.

(b) Individual sampling adapts readily to detailed classification of activities. This aids in the analysis of nonworking activities.

(2) In group sampling, for each observation, groups of workers from the defined population are studied at randomly selected locations. The advantages of the group method are as follows:

(a) Group sampling requires, at maximum, less than half the time to conduct

each observation round. Seeking specific individuals is time consuming.

(b) Group sampling is less disruptive to the work force because individuals are not singled out for sampling and, unlike individual sampling, no follow-up action to account for missing workers is required. Therefore, discussions with supervisors or coworkers to trace whereabouts of individuals are avoided.

(c) With group sampling, the potential for worker-induced bias is reduced. Workers are not forewarned, as is likely when specific individuals are sought.

d. Select the appropriate sampling plan and selection procedure. The sampling plan can be either simple or stratified, and random sample selection procedure can be either unrestricted or restricted.

(1) Restricted sample selection generally takes the form of systematic sampling. For a general discussion of random sample selection procedures geared to audit sampling, see Appendix B-700. The concepts are fully applicable to work sampling. Systematic sample selection in work sampling generally is most useful in setting the time when rounds will be made. A fixed time interval between one observation and the next is established. The time interval must be large enough to give the sampler adequate time to make a round at one location and move to the next. The starting time, the time of the first observation, is selected randomly and can be anywhere between a specified minimum and maximum starting time. The difference between the minimum and maximum starting times must equal the fixed time interval. Subsequent rounds must be made at fixed intervals from the randomly selected starting time.

(2) A stratified sampling plan consists of subdividing the universe into strata, which are essentially separate smaller universes. Either simple or systematic selection can be used on the individual strata. There are various reasons for stratification. As discussed in I-400, it enables the sampler to control the number of sample observations that are drawn from specified subsets (strata) of the universe. In group sampling, stratification can yield sample results that are more precise than those of simple random samples of the same sample size. This would be the case when certain areas of activity can be expected to have exceptionally high variation (or wide fluctuation) in nonproductive activity from one observation to the next. If stratification is done, the strata should be well defined and the conclusions based on the sample from each stratum should be limited to that stratum.

### I-203.2 Obtaining Contractor Data

a. Notify the contractor of the pending work sample. In a brief formal letter, explain the sampling technique, purpose, and tentative schedule. Request that the contractor assign a liaison contact. Also, if appropriate, propose a date for an entrance conference.

b. At some early point, ask the contractor for data needed to support the audit. Typical pre-sampling information includes:

(1) Detailed maps or layouts of work areas and facilities.

(2) Department charters, job classifications, and position descriptions.

(3) Policies and schedules for work hours and break and lunch times.

(4) Procedures for labor utilization and work measurement.

(5) Organization charts and employee rosters.

(6) Other relevant information or EDP file access that will facilitate the audit.

c. In addition, arrange to interview supervisors responsible for the areas to be sampled. Ascertain their understanding of policies and practices relative to their responsibilities.

### I-203.3 Classifying, Formatting, and Probing

a. In work sampling, subcategorization of activities under "working" and "nonworking" is desirable. Define subcategories that are clear, concise, and mutually exclusive. Subcategories should permit "snapshot" observation and recording without time-consuming decisions. Create enough classifications to sustain audit objectives without being too exhaustive. If the number of classifications is excessive, sampling may become too cumbersome to accomplish effectively. Below is an example of subcategorization. P1 and P2 are subcategories of work

activity, whereas N1, N2, N3, N4 are subcategories of nonworking activity. This example may be used as a model to develop a sampling plan. Modify or expand the subcategories as appropriate to reflect the sampling population and type of work being evaluated. Subcategories not described below may be required to perform a good work sample that meets the specific audit objectives.

(1) Productive subcategories:

P1: Operative or "hands-on" (such as machining, welding, setting up, cleaning, inspecting, adjusting, and monitoring)

P2: Business conversations (including conversing with supervisor, engineer, maintenance, material handler, and timekeeper)

(2) Nonworking subcategories:

N1: Idle (such as waiting on assignment, material, tools, maintenance, and inspection)

N2: Personal (including eating, drinking beverage, smoking, and tending to personal hygiene)

N3: Non-business talking (such as joking and chitchatting)

N4: Miscellaneous (such as horseplay, reading newspaper, gambling, and sleeping)

b. Design the observation form in a simple chart format. Leave adequate space to record brief comments that make each observation unique. For every round, one form is used to collect, summarize, and input observed activity. These forms become part of the working papers to support the audit position.

c. Conduct a probe to test the adequacy of the observation forms and the adequacy of overall preparation. The probe will also provide a preliminary point estimate. The point estimate is used to determine sample size from which an audit timeframe and staffing needs can be calculated. The probe also provides data that can be used to familiarize auditors with the Agency's work sampling software.

**I-203.4 Scheduling, Sizing, and Staffing**

a. Schedule the dates and duration of work sampling to cover a period of operation that is typical of the contractor's normal business activity. Key factors to consider are required sample size, audit team availability, contractor production and work schedules (including shutdowns, holidays, and vacations), and the cyclical nature of worker activities. Sampling periods of 10 cumulative days duration are preferred. Sampling periods should never be less than five days. If the number of work days in the sampling period is greater than the number of observation days, observation days should be selected randomly in the sampling period.

b. Sample size is estimated by using the Agency work sampling software (WSAMP2).

(1) The sample size for individual sampling is derived by selecting an option for sample size and specifying the point estimate, confidence level, and precision range.

(2) To estimate a sample size for group sampling, conduct the probe and input the requested data. The software will analyze the data and provide a table of sample size for five different confidence levels with precision ranges.

(3) The sample size will vary with the amount of nonworking activity, desired confidence level, and desired precision. However, precision has the largest effect on a sample size. The effect of each of these three factors on the sample size are as follows:

i) For a given desired confidence and precision level, the required sample size will increase with the amount of nonworking activities until the nonworking activities reach 50 percent. After nonworking activities exceed 50 percent, the sample size will then begin to decrease with further increases in nonworking activities.

ii) For a given level of nonworking activity (the point estimate) and a given desired precision, the required sample size will increase with an increase in the desired confidence level.

iii) For a given level of nonworking activity and a given desired confidence level, the required sample size will increase with a decrease in precision range (more precise) and decrease with an increase in precision range (less precise).

c. Audit team staffing is based on sample size divided by potential number of observations per team per day (visits

in the case of group sampling). Allow a sufficient margin of extra observations to compensate for possible problems. If possible, schedule about twenty percent additional observations. These extra observations will strengthen the audit.

(1) Determine the number of people required, select the individuals, and advise them of scheduled dates for training and auditing.

(2) Do not understaff. Work sampling is a physically demanding activity that will require occasional substitutes.

### I-203.5 Training Audit Teams

a. Prepare one folder for each team including predated and sequenced observation forms with specific times and locations (and people, if using individual sampling), daily summary sheets for tabulating observations, a copy of the defined activity classifications, facility maps, and any other relevant information.

b. Schedule a training day for all team members as close as possible to the first audit day Key points to emphasize include:

(1) scope and objective of the work sampling study.

(2) classifications of activity.

(3) work sampling forms administration.

(4) use of maps and layouts.

(5) role of team members.

(6) observation techniques.

c. Provide the work sampling teams with an opportunity to practice under audit conditions. This practice may help air many remaining questions before the actual sampling begins.

## I-204 Establishing Allowances

a. Since some nonworking-related activity can be expected at any work place, an allowance is made to adjust for the nonworking-related activities. This allowance is known as the work sampling allowance.

b. In DCAA work sampling audits, the amount of the work sampling allowance will vary depending on variables such as the type of industry, work environment, sampling plan (classification of working and nonworking categories), sampling universe (time and area under observance), company policies and procedures, and union contracts. Because of the various complexities involved, there are no set standards in industry for developing work sampling allowance factors. Therefore, the judgment of the auditor in determining reasonableness of the observed levels of nonworking activities is extremely important. The following guidance is provided to help the auditor develop or review contractor-developed work sampling allowance factors.

### I-204.1 General Discussion

The normal industry or contractor PF&D (personal, fatigue, and minor delays) allowance factors used for setting labor standards should not be applied to work sampling studies, since these factors are used in situations where a job is scrutinized in great detail. However, these factors can be modified for use in developing work sampling allowances. The auditor should analyze the contractor's PF&D factors and make any needed adjustments based on the following factors.

### I-204.2 Personal Component

a. Personal needs are normally met by visiting restrooms, water fountains, the cafeteria, and/or taking breaks in a work area. Companies normally allow one break in the morning and one in the afternoon, of 10 to 15 minutes duration, to meet these needs. This is equivalent to 4.2 to 6.3 percent of daily work time. The length of these breaks is normally specified in a union contract or in the company's policies and procedures.

b. In work sampling, DCAA does not normally make observations during break times or in break areas. Additionally, personal needs during work periods are commonly met outside work areas. These areas are seldom included in the work sampling universe. Therefore, very little consideration, if any, is required to compensate for personal needs.

c. In instances where employees do not have scheduled breaks and traditional break areas are excluded from the sampling universe, some allowance is necessary. This allowance is necessary because

some employees may prefer to take breaks in their work areas.

d. Generally a 4 to 5 percent allowance could be considered appropriate providing the following two conditions are met: (1) all areas except restrooms and lunchrooms are included in the sampling universe, and (2) all work hours, including break times, are included in the sampling universe.

**I-204.3 Fatigue Component**

a. Fatigue normally results in a slowdown of work pace and, in some instances, a minor stoppage of work. However, it is believed that breaks help to reduce the effects of fatigue. Some experts in the field of work measurement suggest that no additional fatigue allowance is necessary in companies with scheduled work breaks, except in unusual situations.

b. DCAA work sampling does not measure the efficiency of employees or the speed at which they work. DCAA work sampling simply records whether an individual is working or not working. Therefore, under normal circumstances, an allowance for fatigue is not necessary.

c. However, certain work environments (e.g., hot and humid foundry working conditions, or the continuous observance of monitors) may necessitate workers taking short "breathers." These breathers may be accomplished in work areas and include eating, smoking, and talking to other workers; or they may take place outside work areas and include visiting a water fountain, using the restroom, or getting coffee. If unscheduled relief from monotonous work is achieved outside the workplace, DCAA work sampling will not normally observe it. Consequently, no allowance is necessary. However, if the relief from monotonous work is achieved at the workplace, some allowance may be necessary. Since each work environment is different, the allowance has to be left to the auditor's judgment. Normally a range of 1 to 3 percent may be more than adequate.

**I-204.4 Minor Delay Component**

a. Minor delays (such as talking to a supervisor, waiting for someone to get out of the way, or changing tools) are delays over which an employee does not have direct control. Since these delays occur randomly, an individual performing a time-study to establish labor standards will exclude this time from total observed time. Then, based on the type of work observed, he or she adds a reasonable amount of time to compensate for the delays. In the absence of in-house-developed allowances for delays, the manufacturing industry normally uses 5 percent.

b. Most traditional minor delays, which are considered undesirable when setting standards, are normally identified as work-related activities in DCAA work sampling audits. Therefore, very little delay allowance for work sampling is necessary. However, unusual situations (such as frequent waiting for inspectors to approve work) may result in employees performing activities other than those which are considered work activity by the DCAA study. As addressed in I-204.4c., if it is determined that other work-related activities cannot be performed during these interruptions, a reasonable allowance may be necessary.

c. The work sampling study itself may identify various types of interruptions that commonly occur in the work area. Accordingly, the auditor may want to wait until the work sampling study is complete before making an evaluation for determining the reasonableness or the need of a delay factor.

## I-300 Section 3 — Conducting and Analyzing the Work Sample

### I-301 Introduction

This section presents guidelines for conducting the actual work sample and analyzing the results.

### I-302 Conducting the Work Sample

One auditor should be designated as the overall coordinator for the work sampling application. The coordinator has the following responsibilities.

a. Arrange for adequate office space for teams to meet, communicate, and prepare daily reports. Team leaders are responsible for generating narrative summaries of each day's observation experience. Summaries should include potential causes for nonworking activity, contractor supervisor/employee attitudes, impact of environmental factors, etc. These summaries will be used in conjunction with the work sampling results to produce the final audit report.

b. Establish sampling schedules that are realistic and will not contribute to errors. Emphasize the need to avoid personal absence and tardiness. Have substitutes readily available for unavoidable absences. Initial, as well as subsequent, observations must be taken at the randomly selected times.

c. Meet with observers at the start and close of each day to make pairings and assignments and distribute folders. Use these sessions to verify completeness, organization, and accuracy of folder information and communicate collective concerns and resolve each day's problems.

d. Review each team's daily summaries and, as necessary, spot-check observation forms for accuracy and completeness. Arrange for input of data to WSAMP2 or applicable software, request desired output, and analyze cumulative performance against objectives. From the software output:

(1) Compare and contrast team performances to isolate unusual trends. Rotate auditor pairings frequently to minimize the possibility of bias. Encourage team members to switch, at least once per day, the job of recording observations. Observations should be made independently, but discussed and agreed upon before recording.

(2) Track daily point estimates to verify adequacy of projected sample size. That is, recompute the required sample size using the updated point estimate and the original values for the desired precision range and confidence level.

### I-303 Evaluating the Work Sample Data

The primary objective of work sampling is to determine how well the contractor uses its resources. Evaluation of sample data is the last step in that process.

a. The WSAMP2 software provides different sort options for sample data. Subareas of the contractor's operation may be brought into focus by sorting the data with respect to such characteristics as date, time, shift, area, department, supervision, process, product, teams, etc.

b. Examine the data using various sorts to identify subareas of unusual nonworking activity. Concentrate analysis on subareas impacting audit objectives. Only subareas which make up a stratum (as defined in the original sampling plan) can be validly assessed statistically, but other examinations can still yield useful information.

c. Focus attention on the "nonworking" and "undesirable working" classifications in the sampling.

(1) For activities classified as nonworking, expect to find histogram spikes occurring around start-up, break, lunch, and quit times. Late starts, extended breaks, and early quits are indicative of relaxed work rules. Another nonworking classification, "talking," occurs frequently at remote and isolated work stations where direct supervision is infrequent or unstructured work is performed.

(2) Activities classified as undesirable working activity such as excessive walking, frequent business discussions, repetitive equipment and tool problems may indicate poorly trained employees or

poorly engineered products, processes, or production environments.

d. Work sampling data is the "effect" portion of the "cause/effect" sequence. The contractor is ultimately responsible for determining cause and implementing corrective action. There may be data in the supporting summaries that suggests "cause". Sharing such useful information with the contractor is appropriate.

e. Undesirable activities should be documented for follow-up in future work sampling studies.

## I-304 Summarizing the Audit

a. Draft the audit report using the format in 10-400 and discuss findings with the supervisory auditor.

b. Consult with the Agency technical specialists (Technical Services Center) as necessary.

c. Organize supporting documentation and arrange for exit conference.

d. Conduct an exit conference in accordance with 4-304.

e. Prepare final audit report.

## I-400 Section 4 — Work Sampling Concerns

### I-401 Introduction

The section discusses major concerns specific to the sample as a valid representation of the universe, stratification, and bias. An understanding of statistical sampling (Appendix B) is recommended when using this section.

### I-402 The Sample as a Valid Representation of the Universe

The universe in a work sample is the contractor activity being reviewed. Operationally, it is defined in terms of the entire work environment connected with the activity, including the work force, the work period, the workplace, and the work itself. For purposes of statistical sampling, the universe consists of all possible observations of the activity that could be made. Any sample that gives every possible observation an equal chance of selection is a valid representation of the universe.

### I-403 Stratification

a. Stratification divides the universe into separate smaller universes, or strata. Stratification in the typical audit context is discussed in B-600, the primary reason cited being the potential for improvement in sampling precision. The same principles can be applied directly to work sampling but there are also other reasons for stratification. Among these reasons is control of the relative proportions of different types of observations that appear in the sample.

b. In work sampling, the observed event is the activity of the observed individual(s) at the moment of observation. However, the sampler is often interested in the nonworking status of specific subsets of the universe, categorized according to such characteristics as day of the week, type of work, or shift. There is an intuitive (but unwarranted) impulse to require that such characteristics be represented in the sample in the same proportions as they exist in the universe. However, a valid sampling procedure provides no guarantee that these characteristics will be proportionally represented.

c. The occurrence of specific characteristics in the sample can be controlled through stratification according to the characteristics. If it is considered important, for instance, that specific proportions of the sample items be drawn from each work shift, the universe could be stratified according to shift. This in effect would create a separate universe (stratum) for each shift. Each stratum could be further stratified by type of work if so desired.

d. In work sampling, stratification by day of the week is the most frequent stratification scheme, yet there is little mention of stratification in work sampling handbooks or similar literature. The sampler may not even be aware of the stratification, but it is implicit anytime the work sampling plan calls for a specific number of observations per day. Error results not during the sampling itself but when evaluation of the sample results ignores the stratification.

e. For administrative and practical convenience, work sampling plans often require the same number of observations per day of the study. Handbook literature that deals with this practice ignores the implicit stratification. The reason for this omission is that with sufficiently large sample sizes, the effect of the practice is minimal. Work sampling studies typically involve at least several hundred observations, and often involve more than a thousand. With such large sample sizes, it is overwhelmingly likely that very close to the same number of observations per day would be drawn anyway, even if the daily constraint were not placed on sample selection. In such cases, the error incurred by evaluating the sample as though no stratification were done is minimal.

f. Workers within a population differ in numerous ways. There can be touch/nontouch, technical/ administrative, hourly/ salaried, union/ nonunion, and supervisor/ subordinate personnel within a given population. Because of these differences, the auditor should first

define the population in which the study will be conducted. Depending on the audit objective, the contractor's population may be subdivided or stratified. The contractor's organizational structure may provide a logical population grouping. Exercise care when defining the strata.

g. Selection of the work sampling study period must be done carefully so that contractor operations during the period typify operations throughout the year. Periods include days of the year and times of the day.

(1) Most work sampling studies are conducted over a 1-2 week period. Special attention should be directed at period selection. It may be appropriate to consult with the contractor to arrive at a mutually acceptable time to conduct the study. Advance agreement should eliminate subsequent problems on this point.

(2) Consider the impact of shift work on worker behavior. As a general rule, working activity deteriorates from first to second to third shift. Reasons for the decline in work activity include inadequate offshift supervision and support.

(3) Exclude from consideration certain time periods in the contractor's universe that will bias the study. Examples include time segments surrounding major staffing or production schedule changes, holidays or pending plant shutdowns, or significant weather extremes which affect the work. Inclusion of these periods would distort the nonworking content in the study.

(4) The time period over which the sampling will be conducted should emulate a typical day's operations. To illustrate, consider cyclical variations which occur normally within a workweek. Monday morning and Friday afternoon are typically transition times. However, to avoid bias, each work day must be given an equal opportunity to contribute to the sample.

(5) Periodicity is the tendency of subjects to adapt to normal routine or fixed patterns. Examples of periodicity include start, break, lunch, and quit times. Typically, high nonworking activity clusters around these periods. Randomly selected observation times will ensure inclusion of these periods.

## I-404 Avoiding Observation Bias

a. Observation bias, sometimes referred to as measurement bias, is the tendency to either overestimate or underestimate the true value of the observed event. Intentional or otherwise, observation bias can be caused by both the observer and the observed.

b. Bias caused by observers can be eliminated through proper training and formation of observation teams.

(1) A team should normally consist of two people. It may consist of two auditors, an auditor and a procurement employee, or an auditor and a contractor's representative. Using other than two auditors increases acceptance. Avoid teams of more than two. They become conspicuous, distract the work force, and thereby induce observation bias through their influence on the observed.

(2) Conduct training first in a classroom environment, then in the workplace. Establish clear, concise procedures and mutually exclusive classifications. Anticipate, discuss, and resolve "gray areas" (telephone or face-to-face conversation classifications) and issues of potential disagreement.

(3) Advocate techniques that prevent classification problems. Nonworking workers often alter their activity once aware of observers' presence. Avoid arriving too early for an observation. Loitering in the area will likely bias the observation.

(a) Classify based on the first impression; the "snapshot" observation. Use worker's subsequent behavior modification to confirm initial suspicion of nonworking activity.

(b) In some instances the snapshot is inadequate. A closer observation supplemented with listening may be required.

(4) Before the regular study, observers should tour the workplace. "Walk throughs" condition observers to the workers' environment, and reduce the likelihood of bias in actual observations.

(5) Work sampling does not require in-depth knowledge of the work being performed. The observer need know only whether the worker is working. Most of the time that will be obvious. If questionable, classify them as "working." The

study will not suffer from these infrequent cases of indecision.

c. In addition to the observers, those being observed are sources of potential observation bias.

(1) Measurement can influence the measured activity. Workers might change their activity once they are aware of being observed. Such influence can be minimized or eliminated by varying routes, blending with appropriate attire, expediting observations, and being as nondisruptive as possible. Avoid discussions with the workers unless essential.

(2) If the first day or two of the audit reflects abnormal working activity, i.e., results substantially different from the preliminary probe, bias is to be expected. Routine will return as workers become accustomed to the observation teams. If strong bias exists, early data may be discounted.

(3) Delay or terminate the audit if deliberate biasing occurs. Overt attempts by contractor management to bias the sample may include: restricting access, staging work, limiting the universe, signaling workers, etc.

# TI-000 AUDIT GUIDANCE KEYWORD INDEX SYSTEM (AGKIS)

## TI-001 Introduction

This section contains the keyword index of contract audit guidance. The index is designed to help auditors locate current sources of guidance on a particular contract audit subject. The index includes:

(1) Audit standards, policies, procedures and other guidance issued pursuant to DCAA Regulation No. 7640.1, Contract Audit Manual.

(2) Other technical field guidance included in pamphlets and memorandums issued pursuant to DCAA Instruction 5025.1 and 5025.4.

(3) Selected other directive, decisions and instructional material published by DCAA and others that will directly help to understand and apply the audit guidance.

## TI-002 The DCAA Keyword Index System

### TI-002.1 Background and Responsibilities

The AGKIS was developed by the System Design and Development Branch and the Policy Formulation Division. The system uses electronic data processing to provide a keyword index of current guidance documents needed by contract auditors in the field and by Headquarters in the formulation of audit policy. The AGKIS database is maintained by the Policy Formulation Division under the Assistant Director, Policy and Plans. Software maintenance and development is provided by the Systems Design and Development Branch, under the Assistant Director, Operations.

### TI-002.2 User Input to the Keyword Index

Auditors are encouraged to inform the Policy Formulation Division of specific entries they believe should be added or changed to make the AGKIS more useful in field audit work.

### TI-002.3 System Design Objectives

The index is designed primarily to reference readily available, broadly applicable audit guidance documents necessary for day-to-day contract audit assignments in the field. However, no index will eliminate the need for field auditors to consult through management channels and Agency specialist networks for guidance in unusual audit situations.

## TI-003 The Keyword Index Technique

### TI-003.1 Caption Input for the KWIC Analysis

The keyword-in-context (KWIC) analysis technique is used to produce the AGKIS. Rather than comprehensive indexing of entire source texts, the system indexes "captioned" text manually extracted from source documents contents. Although manually captioned text reduces visibility of the actual source context of keywords, it gives better control over irrelevant variations in terminology that occur in the source text. The result is a much shorter index, which is more useful to the user. Complete text search of the entire CAM is currently available on the Compusearch time-shared computer program.

### TI-003.2 The KWIC Analysis Module

The KWIC indexing program is the core of the keyword index system. The system software parses each input caption to produce a separate output line for each word found in the "caption". The words identified are sorted alphabetically and the associated caption is printed in that order.

### TI-003.3 Glossary Control File

a. The indexing program is controlled by both the program logic discussed above and a glossary file maintained by the Policy Formulation Division. The glossary file controls the words to be indexed. Specifically, it allows words to be excluded and phrases to be added to the index file. Glossary file manipulation controls the size of the keyword index while attempting to provide the most useful references. The glossary file will

require continuing refinement based on field experience.

b. An example of glossary file manipulation can be demonstrated with the caption "Cost Accounting". Without the glossary file the caption would list under both "Cost" and "Accounting". If the phrase "Cost Accounting" were included in the glossary file as a phrase to be indexed, the caption would list under "Cost", "Accounting", and "Cost Accounting". Proper utilization would be to include "Cost Accounting" as a phrase and exclude "Cost" and "Accounting" in the glossary file. Under this method, the caption would only list under "Cost Accounting" and voluminous entries of the words "Cost" and "Accounting" would not be included in the index.

### TI-003.4 Abbreviations and Cross-Reference Entries

Cross-references and explanations of unusual abbreviations used in the "caption" are included as separate alphabetized line entries immediately preceding the indexed keyword and are annotated by a preceding ".". Also, the cross-reference "Cost Accounting Standards (see CAS)" is indexed immediately before the entries containing the phrase "Cost Accounting". For example, "CAS" is defined as "Cost Accounting Standards" immediately before the first indexed caption containing "CAS".

## TI-004 Source Document References

The documents referenced in the AGKIS are coded by three character abbreviations representing the sources of the indexed guidance. The following abbreviations are used in the AGKIS:

a. CAM - The DCAA Contract Audit Manual. References are generally to the CAM paragraph.

b. MRD - Memorandum For Regional Directors. References are to the date, issuing organization office symbol and sequential issuance number. MRDs are indexed by caption and affected CAM reference. For example, an MRD regarding CAS 408 will show up under "CAS" and "CAM 8-408". Under this method, auditors may determine if specific CAM guidance is changed or supplemented by MRDs.

c. DAP - DCAA Audit Program. References are to the DIIS and the file name of the audit program. DAPs are indexed by "Audit Program" as well as the specific type; i.e., Incurred Costs, Pensions, etc., and may be found by subject.

d. OAG - Operations Audit Guidelines Pamphlet, DCAAP 7641.73. References are to paragraphs as numbered in the pamphlet.

e. PAM - Other DCAA Pamphlets. If the number begins with a four-digit number followed by a period, it contains the complete pamphlet number. For audit pamphlets, the first part of the number ("7641.") is omitted and the first part of the references is the decimal part of the pamphlet number.

f. REG - DCAA Regulation (DCAAR)

g. INS - DCAA Instruction (DCAAI)

h. DHI - DCAA Headquarters Instruction (DCAAHI)

i. FAR - Federal Acquisition Regulation

j. DFR - DoD FAR Supplement

k. OMB - Office of Management and Budget (OMB) Circular. References are to the circular number.

l. OFP - Office of Federal Procurement Policy (OFPP) Policy Letter. References are to policy letter number.

m. WGI - Working Group Item. The WGIs have been incorporated in the CAM. Reference to the CCH for the full text has also been included. The WGIs are indexed by CAS, WGI, and by subject.

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