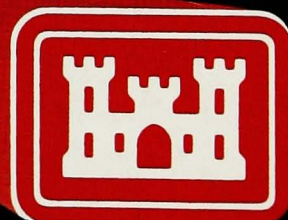
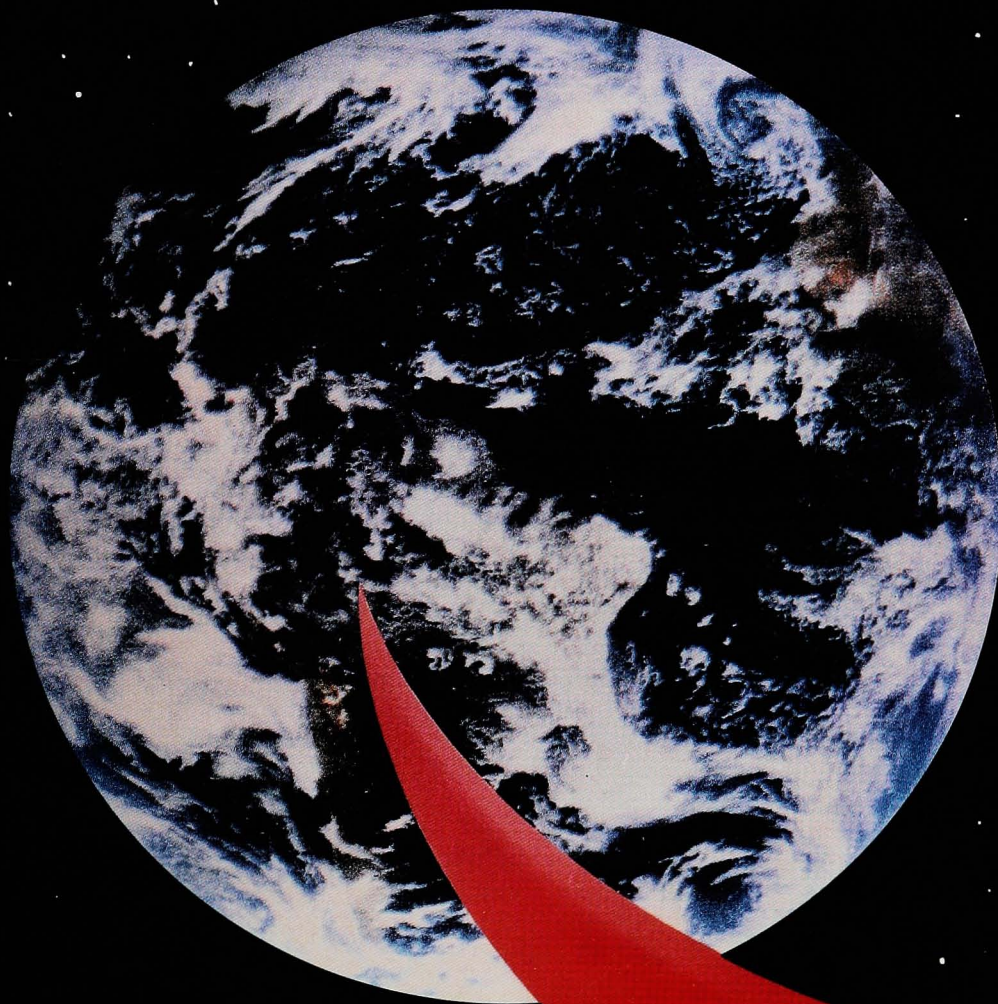


A History of the

Huntsville Division

U.S. Army Corps of Engineers, 1977-1981 Update



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FOREWORD

The Huntsville Division was formed on 15 October 1967, with the exclusive task of designing and constructing facilities needed for the deployment of the Army's Sentinel ballistic missile defense system. As a unique organization within the Corps of Engineers the Huntsville Division had no civil works responsibilities, no geographical boundaries, and no subordinate districts.

This narrative relates the history of the Huntsville Division

for the period 1977 through 1981. It outlines how the Division developed advanced engineering and management capabilities and became a center of expertise for a number of Corps activities.

The capabilities developed during this time frame are a tribute to the men and women, past and present, who met these challenges with dedication and perseverance.

R.E. Abbott
Colonel, Corps of Engineers
Commander

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I.

INTRODUCTION

This volume contains a five-year continuation of the history of the U.S. Army Corps of Engineers, Huntsville Division (HND). The original history described the work of the Division from its inception in 1967 through 1976.¹

The period 1 January 1977 through 31 December 1981 was an important transition period for HND. As shown in figure 1, the Division changed from a design and construction organization, with a few missions dominated by the ballistic missile defense program, to a diversified high-technology engineering and design and procurement organization. The Huntsville Division remained an operating Division without subordinate Districts or geographical areas of responsibility. Indeed, its missions took it worldwide. Although no longer responsible for construction activities, the Division increased in size, number of missions, and complexity of workload.²

At the same time, the following four high-priority strategic programs and quick reaction missions were brought forward:³

Ballistic Missile Defense (BMD)

Munitions Productions Base Support Construction Program (MPBSCP)

Department of Energy (DOE) Support Programs

Saudi Arabia and Jordan Procurement Support⁴

During the years 1977 through 1981, the DOE support mission expanded significantly to include engineering consulting support to the Pantex special weapons plant at Amarillo, Texas; systems planning and engineering support to the Strategic Petroleum Reserve Program; participation

on source evaluation boards for the synthetic fuels program; and continuation of support to the High Btu Pipeline Coal Gasification Program. In August 1980 the Huntsville Division assumed contracting officer responsibility from DOE for the two large coal gasification contracts, which included a wide spectrum of activities such as management, contracting, technical review, and plans and analysis.⁵

In late 1976 the Chief of Engineers initiated a major study on the future role of HND within the Corps of Engineers.⁶ On 4 November 1977 the "Study of the Mission, Functions, and Organization, U.S. Army Engineer Division, Huntsville" was released.⁷ As a result of this study, these six new missions were moved to HND on 6 June 1978:

Corps Training Management

Design and Construction Evaluation Program

Corps of Engineers Guide Specification Maintenance

Computer-Aided Engineering and Architectural Design Systems (CAEADS)

Army Pollution Abatement Program (APAP)

Army Facilities Components System (AFCS)⁸

This Corps reorganization was primarily for the purpose of moving certain operating missions out of the Washington headquarters to a field operating agency, thus allowing the Office of the Chief of Engineers (OCE) to focus on its policy, guidance, and review missions. This move was also in keeping with the policy of moving Army activities out of the National Capital Region.⁹

The addition of the Training Management Division to

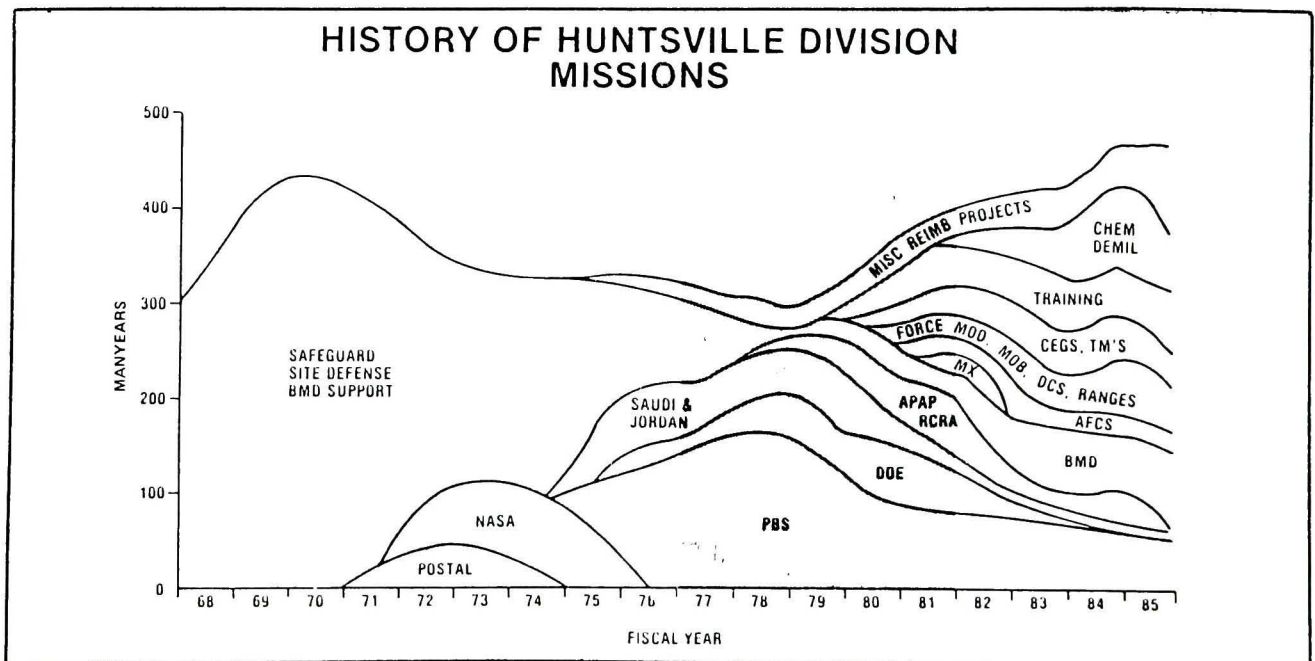


Figure 1

Huntsville's workload significantly expanded the Corps' professional development training effort. This expansion, which continued for a number of years, also centralized the training effort for greater efficiency, economy, and improved quality. In addition, it allowed the guide specification update, design and construction inspection and evaluation, and training to be mutually supportive.¹⁰

Another major reorganization was the change of the Construction Division from a construction execution element to one responsible for construction design, inspection, and evaluation. The Strategic Petroleum Reserve (SPR) Division was also created within HND during this period to respond to DOE requirements for management of the SPR work. With the further diversity of workload, the SPR Division evolved into the Systems Engineering Division. The new division would perform planning functions on new missions, manage large, systems-type programs, and conduct systems and economic analyses as well as the traditional systems engineering work. In addition to continuing a large systems engineering effort, which was unique within the Corps, HND developed a substantial systems safety or safety engineering capability. Finally, the manpower, program development, and traditional controller functions were combined to form the Resource Management Office.

In 1981 the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) added a new mission for HND, the multi faceted Chemical Munitions Demilitarization program. The Huntsville Division took on responsibilities for process engineering, facility design, and equipment procurement and installation for a number of complex, state-of-the-art chemical plants.

In total, HND added the following 21 programs between 1 January 1977 and 31 December 1981:

Terrain Analysis	Contracting Support
Army Pollution Abatement Program	Management and Technical Review
Army Facilities Components System	Management and Design
Design and Construction Evaluation	Management and Execution
Corps of Engineers Documentation Update	Management, Execution, and Review
CE Training Management	Management, Development, Execution, and Evaluation
Army Force Modernization (New Army Systems)	Planning
Defense Communications Systems (Facilities Design)	Planning and Management
Mobilization (Planning and Design)	Planning and Design
U.S. Army Commissary Stores	Planning and Design
Solid Fuel Conversion Railroad Improvement Program	Management and Review Management
Lethal Chemical Munitions and Chemical Demilitarization	Planning, Management, and Design
Defense Nuclear Agency	Planning and Design

Support

Army Range

Modernization

Installation Restoration

Computer Aided

Engineering and

Architectural Design

Systems

Medical Facilities Design

Services

Energy Monitoring and

Control Systems

Energy Engineering

Analysis Program

Resource Conservation and

Recovery Act

Management and Design

Management, Design, and Execution

Management

Procurement and

Contracting Support

Management and Technical Review

Management and Technical Review

Management, Design, and Technical Review

By the end of the period, the programmatic and functional responsibilities of HND were formally recognized to consist of the tasks that:

1. Were national or broad in scope.
2. Required integrated facilities or systems that crossed Division boundaries.
3. Required commonality, standardization, multiple site adaptation, or technology transfer.
4. Required a centralized management structure for effective control of program development, coordination, and execution.
5. Required functions to be performed that are not normally accomplished by a headquarters organizational element.

As a result of the mission and organizational changes that have been summarized, HND was remolded into a Field Operating Agency unique within the Corps because of four vital characteristics:

1. It became an extension of the OCE staff for execution of a number of operational missions formerly performed by OCE.
2. It assumed the role of Corps manager for certain programs that were centrally managed and involved a number of different geographical areas.
3. It evolved into a diversified center of expertise for high-technology engineering, design, and procurement.
4. It developed a quick-reaction capability to support key missions worldwide.¹²

The Division Engineers during this period are listed:

Colonel John V. Parish, Jr.

July 1975 - October 1977

Colonel Dale E. Dobson

October 1977 - October 1979

Brigadier General Max W. Noah

October 1979 - September 1980

Colonel John A. Poteat, Jr.

September 1980 - To Present

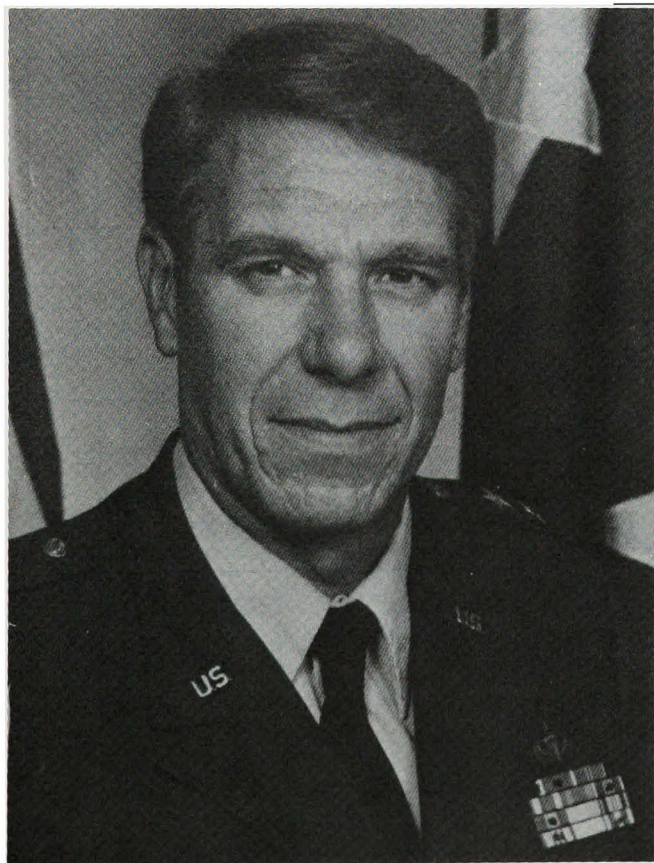
The existing and newly acquired missions necessitated major changes in the organization of the Huntsville Division.



COL. JOHN V. PARISH, Jr., July 1975 - October 1977



COL. DALE E. DOBSON, October 1977 - September 1979



BG. MAX W. NOAH, October 1979 - September 1980



COL. JOHN A. POTEAT, Jr., October 1980 - August 1984

II. ORGANIZATION

The missions of the U.S. Army Corps of Engineers Huntsville Division (HND) grew from 5 to 26 in the years 1977 through 1981,¹ with only a small increase in personnel.² Figure 2³ shows both civilian and military personnel totals. Figure 3 is a 1977 organization chart.

1977 Organization

The HND Executive Office functioned with a staff that included boards, committees, and teams; special assistants; liaison offices; an advisory and administrative staff; a technical staff; and field offices. The Division Engineer, Deputy Division Engineer, Assistant Division Engineer, and executive assistant were within the Executive Office. Special assistants were individuals with dual functions

within the organization. Liaison officers coordinated activities with such agencies as the Department of Energy and, later, the U.S. Army Material Development and Readiness Command (DARCOM) and the U.S. Environmental Protection Agency. In 1977 the advisory and administrative staff consisted of the Office of Comptroller, Office of Counsel, Public Affairs Office, Office of Administrative Services, Automatic Data Processing Center, Planning and Analysis Office, Provost Marshal's Office, the Personnel Office, and the Safety Office.

The Engineering, Construction, and Procurement and Supply divisions comprised the technical staff. The field offices consisted of the Munitions Production Base Support Construction Program (MPBSCP) Project Office, the U.S.

Figure 2
PERSONNEL STRENGTH 1977 - 1981

	Civilian Personnel	Military Personnel	Total
1977	327 Total 305 Permanent 12 Temporary 10 Student Aides	5 Total	332 Total
1978	305 Total 284 Permanent 14 Temporary 7 Student Aides	6 Total	311 Total
1979	353 Total 320 Permanent 22 Temporary 11 Student Aides	6 Total	359 Total
1980	362 Total 324 Permanent 27 Temporary 11 Student Aides	6 Total	368 Total
1981	397 Total 347 Permanent 35 Temporary 15 Student Aides	6 Total	403 Total

Army Armaments Command (ARRCOM) Liaison Office, and the U.S. Army Engineer Resident Office at Marshall Space Flight Center (MSFC).⁴

The Planning and Analysis Office served as the staff element responsible to the Division Engineer for overall HND planning, for cost analysis, and for coordinating the management information system entitled Resource Management System. It was the point of contact with external agencies and ensured proper internal coordination of these activities.⁵

The Automatic Data Processing Center planned, designed, developed, and maintained engineer and management automatic data processing (ADP) applications in support of HND activities. The center conducted studies, made recommendations, and developed standards relating to the use of ADP within the Division.

The Provost Marshal administered the Division security programs pertaining to classified documents; physical, personal, as well as proprietary informational the Privacy Act; and coordination of physical security design in ammunition plant construction.

In administering the Division occupational health and safety program, the Safety Office provided for the timely identification and positive control of hazards affecting the safety of personnel and property within the Division. The office also provided safety information for use in designs prepared by the Division and by other Divisions/Districts involved in the MPBSCP program.

The Office of Administrative Services furnished administrative support to all Division elements and field offices in these areas: records management, library, central mailroom, forms management, printing, reproduction, photography and graphics, and communication services. It also furnished and managed office supplies and equipment, and managed transportation and office space.

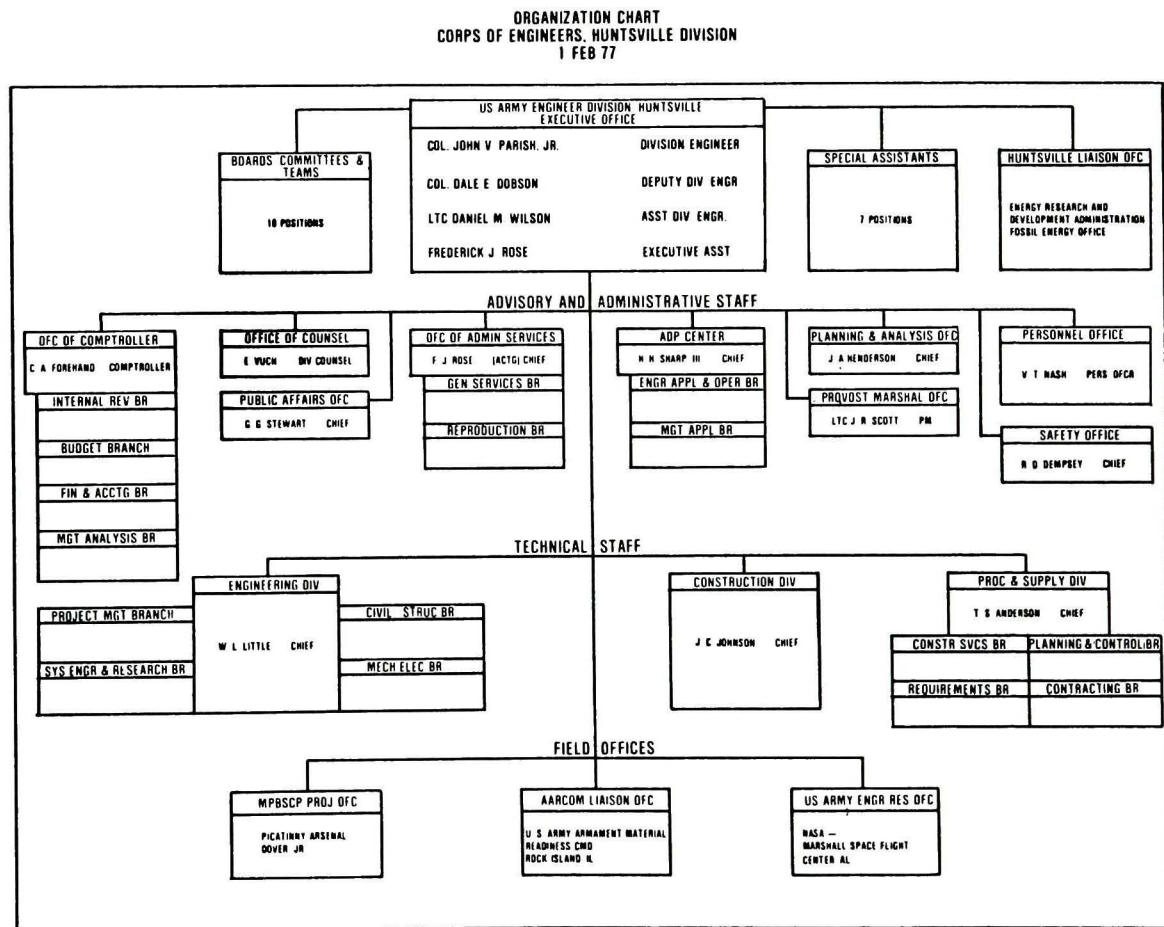
The four branches of the Office of Comptroller assisted the Division Engineer and the staff in maintaining the balance, economy, and efficiency of HND.⁶

The HND Office of Counsel, responsible for providing legal advice and assistance in all HND matters, assisted with contracts and claims, trials, and labor relations. As the number of HND missions increased, the Office of Counsel provided advice during design, negotiation, and award of contracts.⁷

The HND Public Affairs Office (PAO) was responsible for the command information program,⁸ public information activities, news media relations, internal information, community relations, and the historical program. Slide presentations and speech files were maintained by the PAO for the Division Engineer.⁹

During 1977 the elimination of the U.S. Army Engineer Resident Office at MSFC¹⁰ and the U.S. Army Engineer Office at the National Space Technology Laboratory were the only major organizational changes. The closing of these two offices marked the end of HND's role in direct construction activities. Since then, the Division has been

Figure 3



limited to construction program management activities.¹¹

1978 Organizational Changes

The Fossil Energy Office became the Department of Energy (DOE) Division of Coal Conversion, and the HND Liaison Office title was revised to reflect this name change. The Huntsville Division established a liaison office at the site of the ammunition plant under construction at Bay St. Louis, Miss. The CE Training Management Division became new division within the technical staff.¹² This division was established as the result of a transfer of the training mission for Corps of Engineers-sponsored training from headquarters in Washington to HND.¹³

With the end to construction activities and the addition of the new mission of construction evaluation, the Construction Division was renamed the Construction Evaluation and Management Division with two branches to reflect the additional assignments. In the Engineering Division, the Specifications Branch and the Engineering Support Branch were added.¹⁴ Effective 1 December 1978, the Executive Office was reorganized to provide for three Assistant Division Engineers to aid in managing architect-engineer contracts, in-house planning, and design activities relative to their respective programs. The Assistant Division Engineers were assigned to the MPBSCP, the AFCS, and the Army Pollution Abatement Program (APAP). The Provost Marshal's Office was discontinued, and the functions that had been performed by that office were reassigned

to special assistants, the executive assistant, the Personnel Office, Administrative Services Office, and the Engineering Division. A chief of Security and Law Enforcement was added.¹⁵

1979 Organizational Changes

In 1979 a brigadier general became the commander of the Division, and a colonel served as Deputy Division Engineer. The three Assistant Division Engineers held the rank of lieutenant colonel. (See figure 4 for organizational chart.)

The management responsibilities of the new missions for HND resulted in a number of changes during 1979. A Strategic Petroleum Reserve (SPR) Division was established, along with three supporting branches. The Office of Security and Law Enforcement, the DARCOM Liaison Office, and the ARRCOM Liaison Office were all discontinued.¹⁶

1980 Organizational Changes

As the new role of the Huntsville Division became more clearly defined, several major changes occurred. (Figure 5 show the 1980 organization.) The Department of Energy tasked HND to provide program management support for DOE's Alternative Fuels Program and High Btu Pipeline Gas demonstration plant contracts. These contracts were with the Illinois Coal Gasification Group (ICGG) and CONOCO Coal Development Company. The Huntsville Division established liaison offices (one for ICGG and one

Figure 4

ORGANIZATIONAL CHART
CORPS OF ENGINEERS, HUNTSVILLE DIVISION
17 SEPT 79

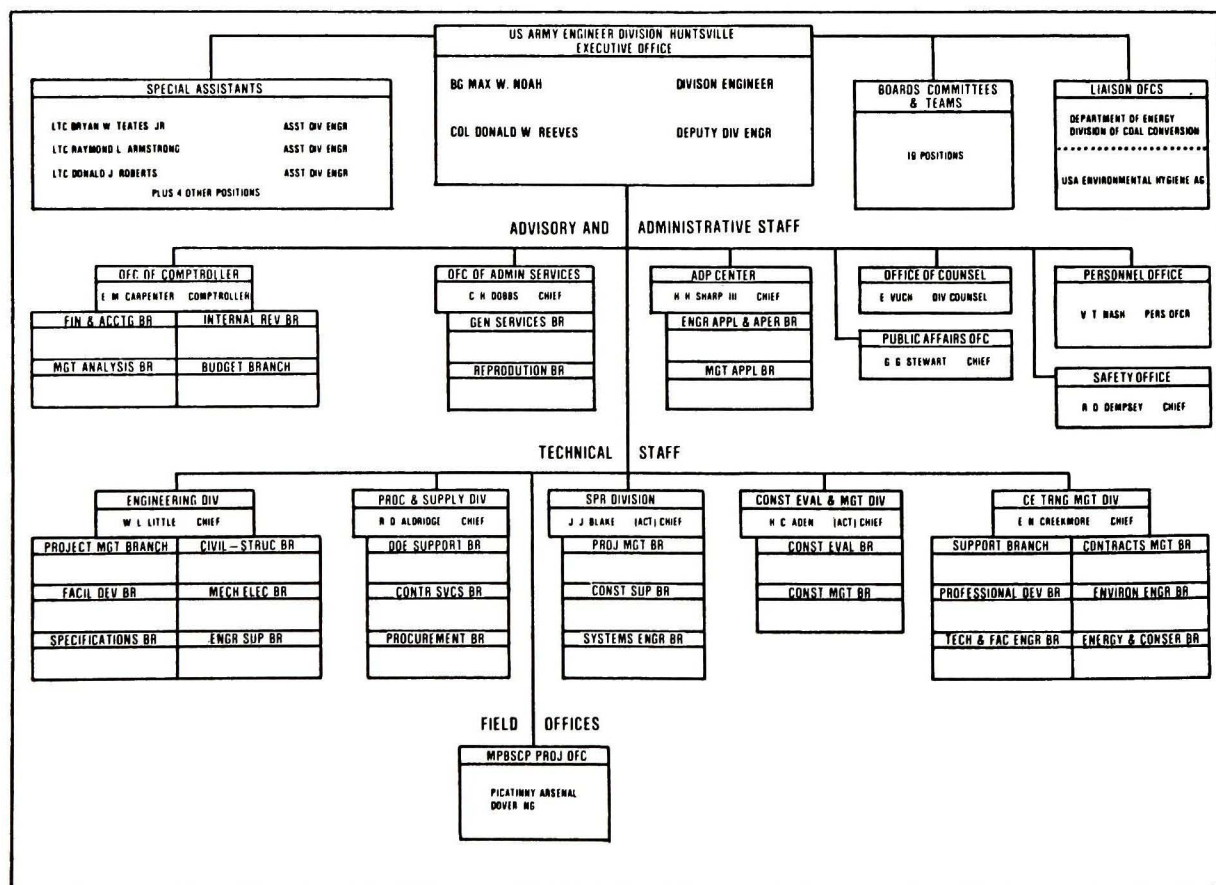
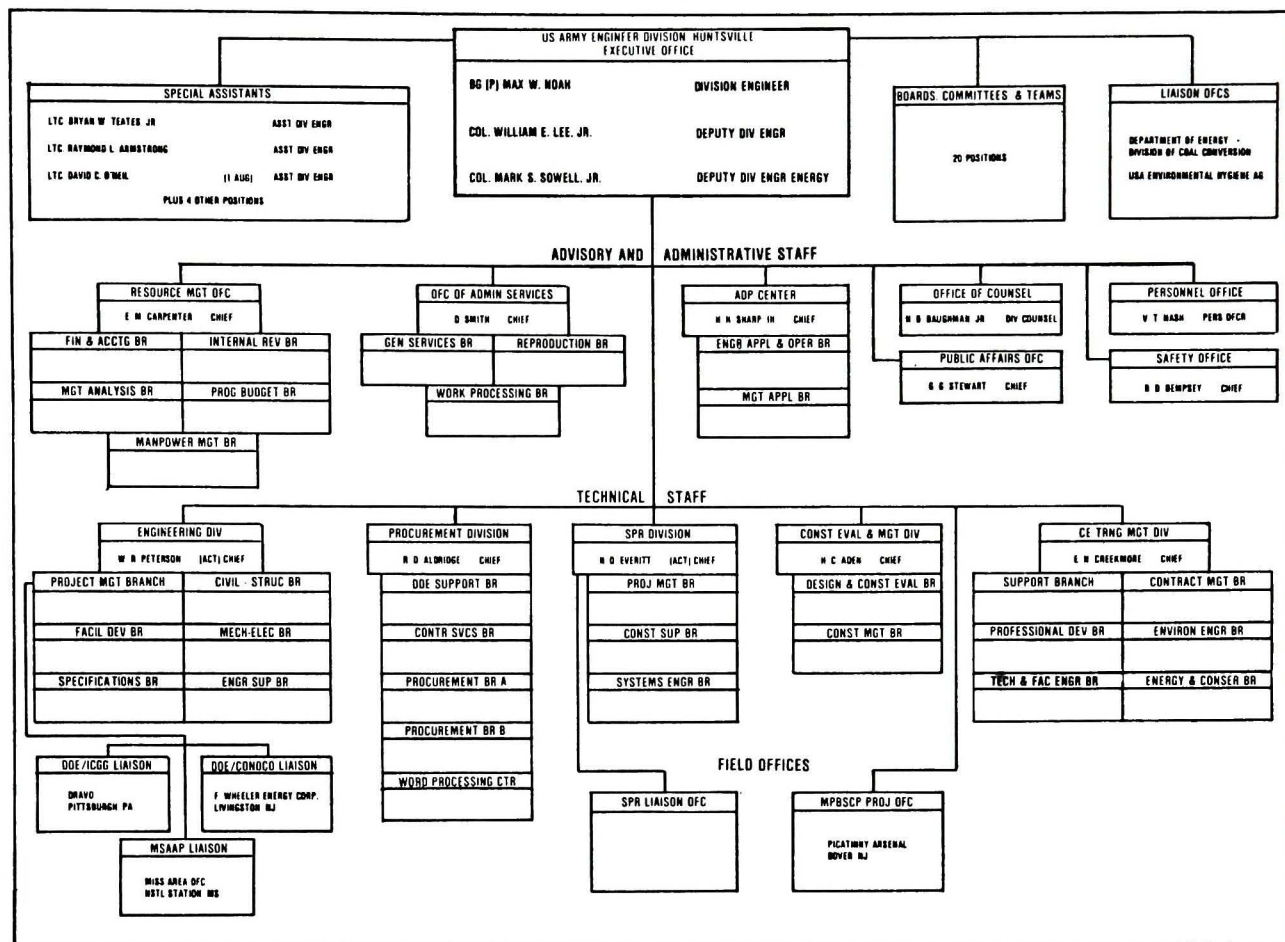


Figure 5

COMPOSITE ORGANIZATION CHART
CORPS OF ENGINEERS, HUNTSVILLE DIVISION
1 JUN 80 AND 1 AUG 80



for CONOCO) to assist the Project Management Branch of the Engineering Division in executing this assignment. The Deputy for Strategic Petroleum Reserve became the Deputy for Energy. The Huntsville Division assumed contracting officer responsibility for these coal gasification projects in August 1980.

The SPR Division added a liaison office in New Orleans.¹⁷ Because of increased activity in the Mississippi Army Ammunition Plant project, a separate liaison office was located at the ammunition plant.

On 6 April 1980 the Office of Comptroller was renamed the Resource Management Office (RMO). The existing Comptroller functions were combined with programming functions that previously had been assigned to the Planning and Analysis Office and Engineering Division.¹⁸ During 1980 OCE gave the respective Division and District commanders the choice of placing the manpower office under the Personnel Office or the Resource Management Office.¹⁹ The Division Engineer approved the recommendation that manpower duties should be under RMO.²⁰

The Division organized the Equal Opportunity Office. The Equal Employment Opportunity Office, Federal Women's Program Coordinator, Equal Employment Op-

portunity Counselor for Class Action Complaints, and three Equal Opportunity counselors handled various duties on a part-time basis.

In 1980 the White House began a goal-setting process for improving contract awards to minority-owned companies. An executive order established women-owned businesses as a set-aside category focused attention on more small businesses. In early FY80 a Defense Acquisition Regulation (DAR) from OCE directed that the person serving as Small Business Specialist be either the Chief of Procurement or in a staff-level position at all major commands and major procurement offices. Due to the DAR changes and the complexity and diversity of the job, on 9 December 1980 HND moved the position from a collateral duty responsibility in the Procurement Division to the staff-level position of special assistant to the Division Engineer.²¹

1981 Organizational Changes

In 1981 shifts in organization added a special assistant for production base support and a missile experimental (MX) liaison officer to the Project Management Branch of the Engineering Division. (See figure 6.) The officer was

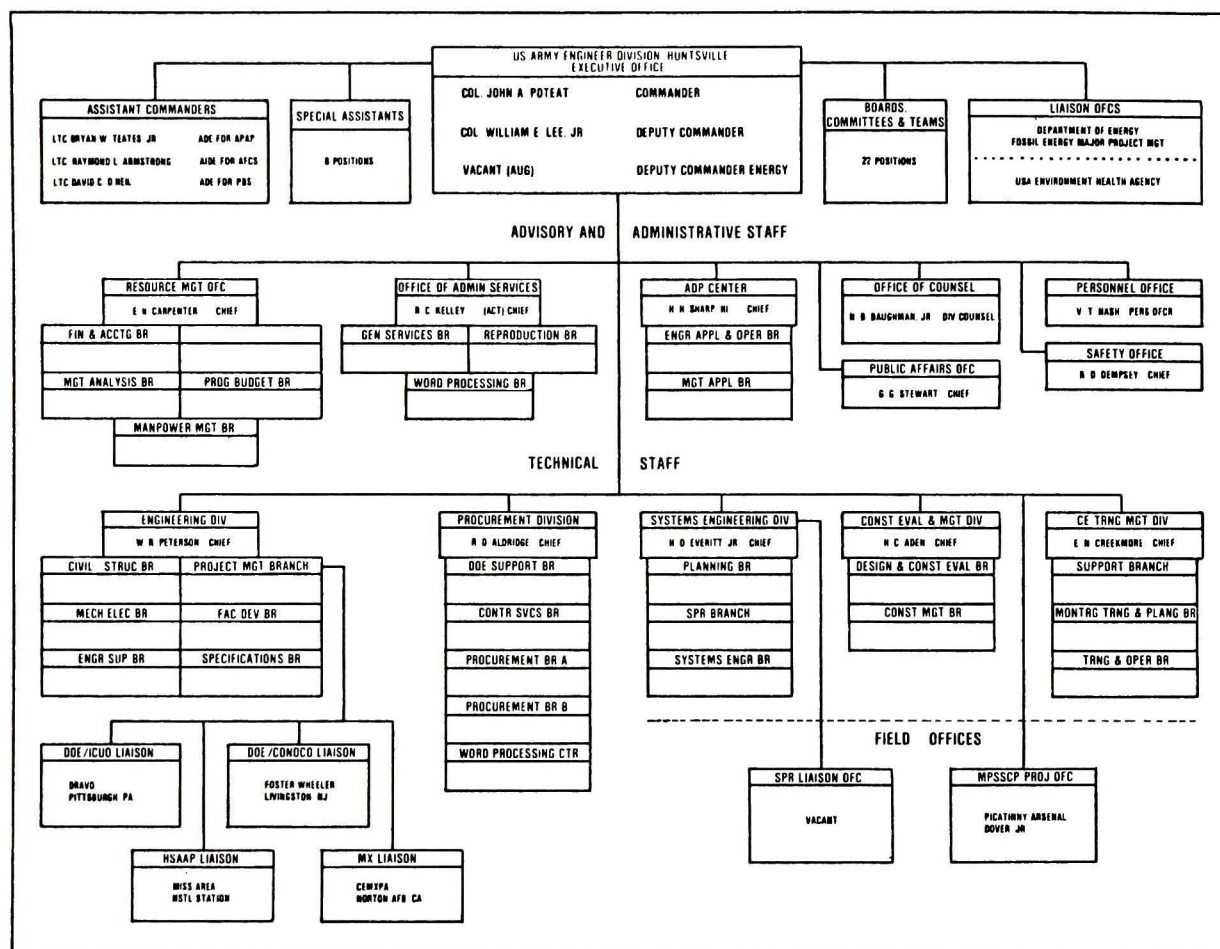
located at the Corps of Engineers MX Program Agency (CEMXPA) at Norton AFB, California. The CE Training Management Division reorganized into three branches—Support, Non-Traditional Training and Planning, and Training and Operation.²² The DOE coal gasification program was phased out except for residual contract closeout requirements. The SPR Division was retitled the Systems Engineering Division. It retained an SPR Branch to do the residual SPR work. The Training Management Division was reorganized from six branches to three to reduce the span of control, maximize the use of available skills and talents, and properly distribute workloads among

the course managers. A new Assistant Division Engineer was designated to assist the Project Management Branch of the Engineering Division in managing the MPBSCP. An MX liaison office was established to assist the Project Management Branch of the Engineering Division with work related to the Ballistic Missile Defense Systems Command (BMDSCOM).²³

During this historical period, especially 1977 and 1978, OCE expanded the HND missions, thus setting the stage for the diverse missions and geographical areas that were to figure in the Huntsville Division's future in the Corps of Engineers.

Figure 6

**COMPOSITE ORGANIZATION CHART
CORPS OF ENGINEERS, HUNTSVILLE DIVISION
1 AUG 81**



III.

PRESIDENTIAL STRATEGIC INITIATIVES

The Corps of Engineers continued to recognize the capabilities of the Huntsville Division during the 1977 through 1981 period by assigning to it a diversity of missions, projects, and programs. Presidential Strategic Initiatives, including the programs of ballistic missile defense, missile, the experimental (MX) communications system, were major areas of responsibility.

Ballistic Missile Defense Systems Command

Funding for the Safeguard system was discontinued by Congress in 1975. This resulted in the closing of one existing site at Grand Forks, North Dakota, and a decision not to proceed with another site in defense of the national capital, as provided under the Strategic Arms Limitation Agreement (SALT). The ballistic missile defense program concentrated on research and development in technologies suitable for future defense deployments. From 1977 through 1981 the Huntsville Division assisted in the conceptual development of promising systems during the research and development phase.¹ Those support efforts included the following:

1. Developing facility concepts and construction cost estimates, and studying advanced BMD systems.
2. Studying concepts relating to detection of missile flights by passive sensors, and developing advanced power systems and new materials for radar domes and antenna elements.
3. Providing support to the Advanced Technical Office (ATO) for the Air Force MX buried-trench construction advanced development program.
4. Continuing the close relationship between BMDSCOM and HND in order to assist in and stay abreast of the latest developments and concepts in the BMD area.

The Division Engineer was responsible for the Corps' direct support to ballistic missile defense. A Deputy Division Engineer and an Assistant Division Engineer aided him during the early part of this reporting period. Within HND, the Engineering Division was responsible for management and support of this program. The Systems Engineering and Research Branch served as the central point of contact for all work related to advanced BMD systems that were funded by the BMD Advanced Technology Center (BMDATC) and the BMD Systems Technology Project Office (BMDSTPO).²

Systems Engineering also produced innovative facility concept designs and studies in response to requests from BMD agencies and their contractors. In addition, this branch developed, maintained, and operated cost prediction and models for BMD. Charles Huang and his personnel in the Advanced Technology Section performed in-depth analyses and investigations of nuclear weapons effects upon

facilities. Cost trade off analyses, advanced materials studies, and hardness investigations were provided to BMDSCOM to assist in their evaluation of various system concepts. The branch examined the nuclear weapons effects of air blast, ground shock, electromagnetic pulse, dust, and debris; and the effects of thermal and nuclear radiation. These investigations and analyses were directed toward providing facilities that would afford survival in a nuclear environment.³ The results of HND's low-profile mission were essential to continuing ballistic missile defense work during this era.

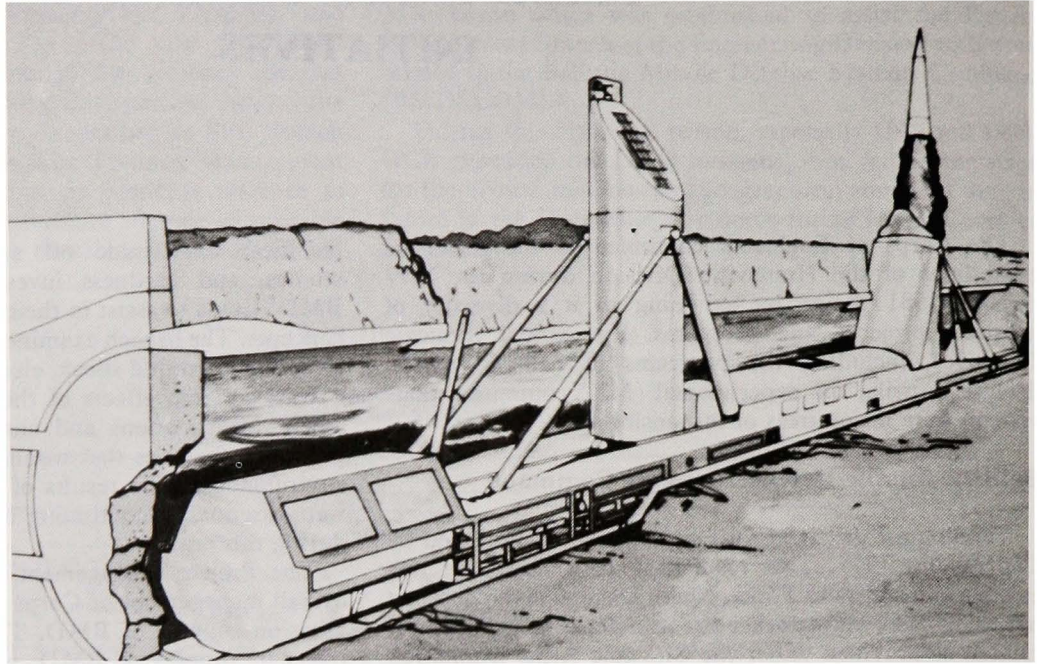
The Project Management Branch was responsible for overall management of Corps of Engineers and Huntsville Division support of BMD. This included managing contracts in support of BMD; evaluating operational, functional, and support requirements for BMD facilities; and doing HND's concept and cost evaluations using contractors or in-house personnel. In addition, this branch retained the responsibility for executing and managing design for test or tactical facilities in the event a decision was made to deploy a BMD system.⁵

Turning the operation of the Perimeter Acquisition Radar over to the U.S. Air Force in October 1977 represented the end of the Corps of Engineers involvement on the Safeguard program. Limited studies and evaluations continued on a reduced scale.⁶ During 1977 and 1978 task assignments included small projects on the sub system analysis and systems technology programs.⁷ During this period (1977-1978) HND was doing little in the area of BMD. In a letter to Major General John W. Morris, Colonel Dale Dobson, Huntsville Division Engineer, observed that the funding level was "not enough to maintain a cadre of personnel who are experts in this specialized area." He also wrote, "Nor does it permit accomplishment of facility studies to the extent necessary to maintain the facility concepts abreast of new weapons concepts under consideration." Colonel Dobson noted that he had expressed his concern to Major General Stewart C. Meyer, BMD commander.²

In 1978 the Huntsville Division provided support to BMD for technical evaluation of proposals for the Homing Overlay Experiment (HOE). The HOE program was based on new technologies to be used in the detection, discrimination, and interception of an incoming intercontinental ballistic missile (ICBM) when directed toward the United States.

In FY79, BMDSCOM increased funding for HND from \$350,000 to \$505,000, to be used primarily for contingency studies. Ballistic missile defense was the focus of increasing interest at all levels of Congress and the Department of Defense (DOD). On 4 January 1979, General Meyer and Randy Clinton, Missile Intelligence Agency (MIA), held briefings for Major General Bates Burnell (OCE) and Major

LOAD DEFENSE UNIT



Ballistic Missile Defense Activities Increased with Pre-Prototype Demonstration Test Program for the LoAD System.

General William Wray, Director of Military Construction for OCE. The briefings pointed out "a projected serious vulnerability" of the Minuteman system in the near term.

The BMD office had been expecting a significant increase in funding for FY80, but at the last minute the budget was cut back to existing levels.⁸ This action caused HND support to remain near its previous funding, with FY80 BMD support at \$510,000 on a reimbursable basis. Colonel Mark Sowell, acting Huntsville Division Engineer, indicated that this amount was considered adequate to maintain HND expertise in hardened facilities, nuclear weapons effects.⁹ White Sands Missile Range and Kwajalein Missile Range would require new test facilities with criteria development first on the schedule.¹⁰ In April 1980, Major General Grayson Tate, BMDSCOM commander, briefed HND personnel on the new low altitude defense (LoAD) system. The pre-prototype demonstration program for LoAD would require facilities to be constructed at White Sands, New Mexico, and Kwajalein missile ranges.¹¹ Facilities at White Sands would support subsystems testing while Kwajalein facilities would support a fully integrated systems test with live interception of a re-entry vehicle over the Pacific Ocean. By FY81, BMD support had increased to \$650,000, primarily in support of LoAD.¹² Approximately one-half of the work was done in-house, with the remainder performed by laboratories or contractors.

The BMD funding levels had risen ten-fold by the end of 1981, as compared to the 1977 funding level of \$300,000. The larger sum was primarily for HND support of the pre-prototype demonstration test program and deployment considerations for the LoAD system, which had been approved by DOD in December 1979.¹³ The LoAD program was funded for \$1 billion over an eight-year period of demonstration of the LoAD missile and associated system components. The system when deployed would be used for the defense of either the MX or the existing Minuteman ICBMs. Colonel John A. Poteat, Jr., Division Engineer at

HND in 1981, said, "We believe our participation in the MX program will be beneficial in providing assistance to BMDSCOM in identifying and resolving potential LoAD/MX interface problems."¹⁴ This involvement was particularly beneficial, because the LoAD system was being seriously considered for ballistic missile defense of MX basing options.

On 26 June 1981, the Huntsville Division produced a management plan for facility support of BMD programs.¹⁵ It was revised 28 September 1981, and referred to as ER 10-10-22, the Basic Organization and Functions for the U.S. Army Engineer Division, Huntsville. After citing the background for HND support for BMD, the management plan had as its stated purpose to provide "a management approach which will be responsive to facility support requirements for BMD programs." The management plan established procedures to provide effective and efficient management of facility-related design and construction for BMD deployment options.¹⁶

During FY82, HND received a total of \$6.5 million from BMDSCOM to support the advanced technology and Deployment Planning programs for LoAD. The Division provided contractual and in-house activities on tasks related to electronic hardness testing, evaluation of propellants in an underground nuclear test, radiation transport calculations, electromagnetic pulse (EMP) evaluations, nuclear weapon effects (NWE) evaluations; and technical support in EMP, hardened structures, NWE, and hardened mechanical and electrical systems design. Initial generic facilities planning for deployment of the LoAD system was accomplished to include siting analysis, environmental analysis and evaluation, program cost estimates, and conceptual evaluations. Colonel Poteat stated that at the close of the 1977 through 1981 period, "availability of highly skilled personnel has led to an organization that is unique and specialized in high technology and design, augmented by expertise in program management, pro-

curement, systems engineers, and training management.”¹⁷

Missile Experimental (MX)

Among the Huntsville Division’s missions in the late 1970s was developing an MX management plan. The Air Force was deploying the MX system to reduce vulnerability of United States, land-based ICBM systems.

In August 1979 Brigadier General N.G. Delbridge, Jr., South Pacific Division (SPD) Engineer, expressed the need for a management plan to the Huntsville Division Engineer, Colonel Dale Dobson. General Delbridge pointed out that OCE has tasked SPD to develop alternative management plans for the Corps of Engineers, participation in deploying the Air Force MX system. The SPD was searching for previous Corps of Engineers organizations established to manage large design and construction programs.

The SPD letter contained an overview of the MX concept, indicating that the recommended configuration for deploying the MX would involve horizontal shelters in the form of earth-covered concrete tubes. The concept would be based on moving a missile, with launch and control equipment, above ground among a large number of shelters. A transporter-erector-launcher (TEL) vehicle covered by a mobile surveillance shield (MSS) would be used for surface movement of missiles above ground. Actual location would remain unknown because the MSS, with or without a TEL, would visit many shelters to go through real or simulated motions of missile emplacement. The concept called for deploying 200 missiles in 4,600 horizontal shelters.¹⁸

On 7 September 1979 the Huntsville Division sent to SPD a Historical Analysis of the Huntsville Division, U.S. Army Corps of Engineers. The analysis described HND work on Sentinel (later Safeguard) programs, the reason for

establishing the Huntsville Division, staffing, responsibilities, and management experience. The report pointed out that:

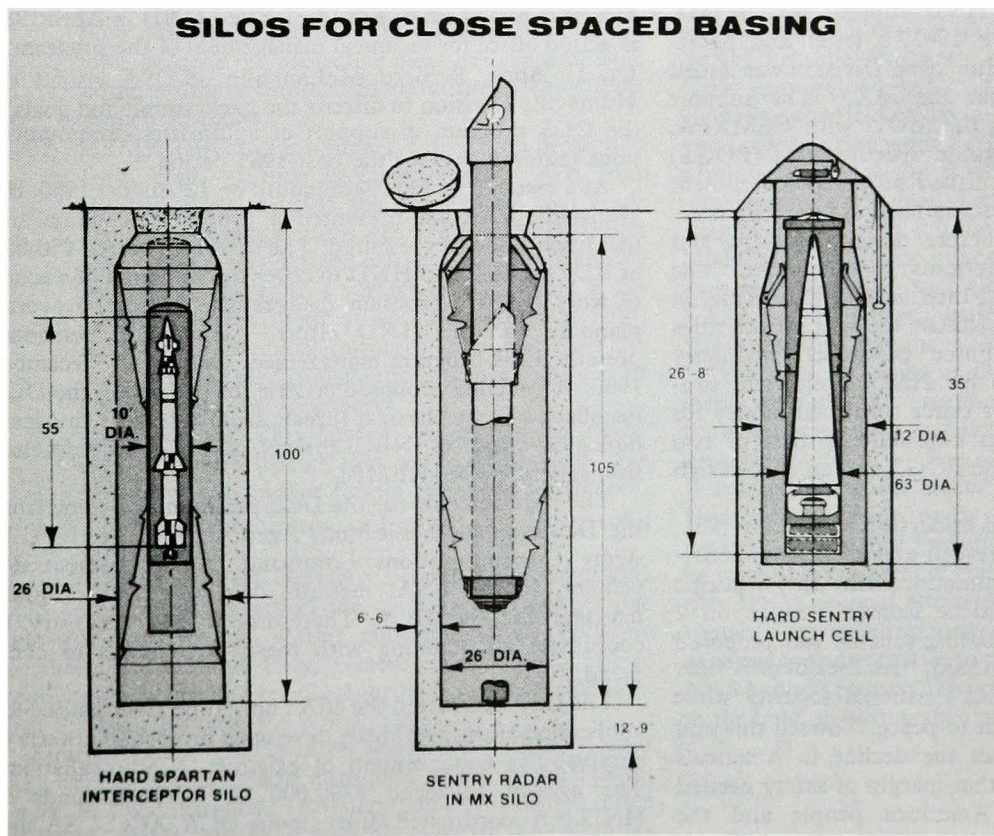
“the SENTINEL/SAFEGUARD program never reached the multi-state deployment that HND was organized to design and construct. The concept of an operating division worked well to the extent that it was tested and all indications are that HND would have been able to successfully fulfill its full intended role if the program had been deployed as planned....” In evaluating the South Pacific Division request, the HND report concluded:

“If the MX program is of the national priority to warrant the huge investment contemplated, then it deserved the ‘first team’ to manage it. Our normal pride in the Corps would lead us to conclude that a strong CE organization can do a better job than a mixed government/private construction management group.”¹⁹ The Office of the Chief of Engineers subsequently reassigned the MX program to a separate Corps management organization, the Corps of Engineers MX Program Agency (CEMXPA) at Norton Air Force Base, California.²⁰

In an address to a professional group on 12 June 1980 in Salt Lake City, Utah, S.L. Zieberg, Ph.D., Deputy Under-Secretary of Defense for Strategic and Space Systems, described the events and decision process that led the government to plan the MX system:

Our strategic nuclear forces consist of three elements—the so-called Strategic Triad. We have about 1,000 land-based inter-continental ballistic missiles, ICBM’s; about 650 submarine-launched ballistic missiles, SLBM’s; and about 350 B-52 bombers carrying a variety of weapons, and with cruise missiles to be deployed starting in late 1982.

He went on to point out that the principal mission for the



One of Several MX Plans; These Included Silo Configuration for Close Spaced Basing.

United States' strategic forces was to deter nuclear war with the Soviet Union. He said, "Our forces not only protect the United States, but are vital to the interests of our allies and friends."

He observed that during the last decade "the Soviets have spent enormous amounts of money to upgrade their military capability, while we reduced spending and depended on benefits from earlier investments made in the 1970s." He stated that the Soviets out spent the United States by approximately \$150 billion in the 1970s and were expected to out spend the United States by \$300 billion during the 1980s.

On 8 June 1979 President Carter announced the decision to proceed with full-scale engineering development of the MX in the multiple protective shelter (MPS) basing plan. The plan was to deploy 10 warheads on each of the 200 missiles, for a total of 2,000 warheads. The President approved a horizontal design, referred to by the press as the "racetrack" concept. The two reasons for the design were as follows:

1. The horizontal design allowed a rapid relocation of the missiles if a breakdown in security of missiles location was perceived.
2. A horizontal shelter made verification easier with the SALT-II considerations in mind.²¹

With President Carter's decision to proceed with full-scale engineering development, Huntsville Division assigned Jerry Mullinix as project manager for support of the MX. Mullinix, who had been with HND for 10 years, part of that time with the Safeguard program, considered the MX the "most valuable strategic land-based ICBM asset" of the military program at that time.²²

On 4 September 1980 the South Pacific Division and the Huntsville Division issued a Memorandum of Understanding (MOU) providing HND support for the MX program. Later, on 9 March 1981, a letter and MOU between CEMXPA and the Huntsville Division was issued to provide Corps support for the MX.²³ The support activities of HND, based on the MOU with CEMXPA, included program oriented guide specifications (POGS) development, government furnished property/government furnished material procurement, training, systems engineering, hardened protective structure design, security, and management information systems development. The Huntsville Division had a full-time liaison, R.E. Riffel at Norton Air Force Base, to coordinate the support activities with the Corps and Air Force personnel.²⁴ Military Construction provided funds for HND design and procurement support and the Air Force furnished money for special studies. The Division awarded the first of two contracts for preparation of the POGS and an MX design manual in November 1980.²⁵

With the change in political leadership in January 1981, the new administration's interest in greater defense activities was anticipated.²⁶ In an announcement on "Strategic Weapons Systems" by President Ronald Reagan on 2 October 1981, an alternative basing scheme was proposed for the MX. President Reagan said, "As President it's my solemn duty to insure America's national security while vigorously pursuing every path to peace. Toward this end I've repeatedly pledged to halt the decline in America's military strength and restore that margin of safety needed for the protection of the American people and the maintenance of peace... A window of vulnerability is

opening, one that would jeopardize not just our hopes for serious productive arms negotiations, but our hopes for peace and freedom."

The President went on to announce a plan "to revitalize our strategic forces and maintain America's ability to keep the peace well into the next century."

President Reagan listed five main features of his comprehensive plan. The third was to change the deployment concepts for the MX. He explained that this plan was not to deploy the MX in the racetrack shelters, but to deploy a more powerful and accurate MX in a limited number in existing silos as soon as possible. "At the same time," he said, "we will pursue three promising long-term options for basing the MX missile and choose among them by 1984 so that we can proceed promptly with full deployment...."²⁷

As a result of President Reagan's announcement, work was discontinued on the MPS concept for deployment of the MX.²⁸ The Huntsville Division submitted a phase-down plan to CEMXPA for orderly phase-out of ongoing support, which was approved by CEMXPA. Colonel John A. Poteat, Jr., HND Division Engineer, reported to the Chief of Engineers that all MX support has ceased except contractual and consultant support for management information system (MIS) development. Huntsville Division manpower resources that had been used to support the MX program were shifted to other programs, primarily the rapidly growing BMD support effort.²⁹

Defense Communications Systems

The U.S. Army Communications Systems Agency (CSA) at Fort Monmouth, New Jersey, in February 1980 requested assistance from OCE in preparing prototype design criteria for new defense communications systems (DCS) facilities construction. Lieutenant General John W. Morris, Chief of Engineers, designated HND in April 1980 as action office for technical management of the program.³⁰ On 17 April, Bernard McLaughlin of CSA visited the Huntsville Division to discuss the background and goals of the DCS program in support of automation-communications requirements for the post-1985 period.³¹

At a meeting in Fort Monmouth on 12 August 1980, the Huntsville Division presented a proposed schedule and identified resources required. The CSA transferred \$50,000 of RDT&E funds to HND to cover development of a scope of work (SOW), program management plan, and overall planning for the HND effort.³² Huntsville personnel presented the program management plan on 19 December 1980. It included proposed criteria for protecting the DCS installation from physical threats from terrorists, nuclear-biological-chemical (NBC) threats, and high-altitude electromagnetic pulse (HEMP).

The requirements for the DCS program had come from the Defense Communications Agency (DCA) to the U.S. Army Communications Command (ACC), combat developer, to the CSA, materiel developer and program manager for the DCS. Therefore, it was necessary to coordinate all planning with these three levels of command.³³

The CSA redirected the effort on 1 June 1980, calling for application of the previously developed protection criteria to survivability enhancement of existing DCS installations. The agency advanced \$200,000 of RDT&E funds to HND.³⁴ A coordinated effort among DCA, ACC, CSA, and HND resulted in selection of 12 Army DCS installations in

Germany to which criteria for survivability enhancement would be applied initially.

The CSA distributed a completed program plan and site survey criteria on 4 September 1981. The basic program intent was to upgrade installations to meet operational requirements in a specified threat environment that had not been foreseen when the installations were built. Another program purpose was to raise the probability of survival to the maximum at the lowest practical cost. The site survey criteria were exercised in a dry run at Fort Detrick on 6 to 8 October 1981, prior to practical applications in the field.

Typical DCS installations included switching centers for AUTOVON, AUTOSEVOCOM, and AUTODIN; system control centers; satellite earth terminals; line-of-sight (LOS) radio stations; high-frequency (HF) transmitter/receiver stations; tropospheric scatter transmitter/receiver stations; and power and fueling facilities.³⁵

An HND technical team conducted surveys in November and December 1981 at the 12 DCS installations in Germany. An advance team of three people from the Huntsville Division visited Germany on 16 to 24 November to establish contacts and to arrange for the technical team survey. From 2 to 17 December, five HND personnel conducted the surveys. The Huntsville Division survey and evaluation team included Gaines Gravlee, William Major, Martin Warvi, Jimmie Stephenson, Ben Small, Ronald Smith, and Tom Bolt.³⁶

In the surveys and evaluations, the following threats were considered:

1. **Physical Threat.** Physical threats were those created by saboteurs, vandals, or terrorists. These included acts of pilferage; and use of cutting tools, grenades, explosives, fire bombs, crash vehicles, and small arms fire. The survey examined fences, gates, and other barriers that could be subjected to attack from a crash vehicle or other devices. Threat considerations did not include attack by an organized military force because the protective measures contemplated would not have diminished significantly the effects of such an attack.
2. **HEMP Threat.** This survey considered protection from high altitude electromagnetic pulse from nuclear bursts outside the atmosphere that could damage communications gear. The HEMP threat environment was defined as radio-frequency energy incident at the earth's surface as a result of a 10-megaton nuclear blast at an altitude of 400 Kilometers. For practical purposes this concerned the portion of the electromagnetic spectrum between 10 kilohertz and 100 megahertz.
3. **CBW Threat.** This survey studied chemical-biological warfare threats that were composed of tear gas, nerve gas, and/or certain biological substances. These could be introduced in gas, liquid, or solid forms.

Installations in West Germany provided long-haul and LOS communication within the country, and connecting links for tropospheric scatter communications between Northern Europe and Italy, Greece, and Turkey. High-frequency radio ground terminals provided communications with the U.S. Navy in the North Sea.

Similarity among DCS installations was limited because they were each designed to meet local needs. Furthermore, equipment was installed in existing structures, such as office buildings, warehouses, and even horse barns. The facilities

were located on military bases and in small enclaves, some of which were in public parks.

The HND team identified parameters that, when used as guidance in design and placement of DCS installations, would result in increased probability of survival. They evaluated conditions found in the installations against those parameters that would identify vulnerable areas and means of protection. The evaluation proposed degrees of protection at three levels, which were presented in ascending orders of criticality, complexity, and costs. Techniques presented could be applied to command, control, and communications installation to enhance survivability.

The Huntsville Division submitted results of these surveys and an evaluation report stating findings and recommendations to CSA on 10 March 1982. The distribution of the final report on 12 May 1982 completed Phase I of the project.³⁷ The DCS plan called for Phase II to serve as the design phase for upgrade of the initial 12 installations. Phase III required evaluation of additional DCS installation.³⁸

The Huntsville Division issued a "Survivability Enhancement for DCS Installations" report in May 1983 in which the Donnersburg, Germany, site was used as an example to demonstrate methods for identification of vulnerabilities, selection of protective measures, and development of estimated costs. The report noted that the ACC had implemented the physical protection recommendations at each of the 12 DCS installations evaluated.³⁹

National Aeronautics and Space Administration and the Marshall Space Flight Center

As a continuation of an earlier completed mission, the Huntsville Division office retained Corps of Engineers responsibility for any industrial engineering activities requested by the National Aeronautics and Space Administration (NASA), mainly its Marshall Space Flight Center (MSFC) shuttle program.

In support of MSFC, two permanent employees remained in the field office in 1977 to complete the details of some construction work.⁴⁰ The Division completed the final administrative closeout of three active contracts in 1977 and transferred constructed facilities to NASA. In the task assignment letter of 6 June 1978, OCE listed support to MSFC/NASA as one of the mission assignments.⁴¹ HND later recommended to OCE that the tasking support to NASA for the space shuttle program be deleted from the HND missions statement.

Although no major additional NASA support requirements were identified for the future, the Corps continued to provide occasional assistance to MSFC for its solar energy program.⁴²

In a report to the Office of the Chief of Engineers, the Huntsville Division noted that for HND to continue to provide support as appropriate to NASA was considered to be in the best interest of the Corps. The report pointed out that HND, located adjacent to the Marshall Space Flight Center was providing some support to NASA, and had the experience and expertise to provide the types of support that NASA might request. The report urged that HND continue as the field operating agency point of contact with NASA.⁴³

IV.

MOBILIZATION AND ARMY READINESS

During the 1977 through 1981 period, 50 percent of the work of the Huntsville Division was devoted to Army mobilization and readiness. Much of the Corps of Engineers work concerned studying methods of conventional warfare. Huntsville, as a nongeographic division, was a suitable organization for a broad range of tasks. The most prominent area of activity was the Munitions Production Base Support Construction Program (MPBSCP).

Munitions Production Base Support Construction Program

The Office of the Chief of Engineers designated the Huntsville Division as the central management agency for the Munitions Production Base Support Construction Program, a multi-billion-dollar project that was to extend into 1999. With HND's background in engineering problem-solving and in research and development programs, this project would use the Division's expertise for the entire final quarter of the century.

The program consisted of two major subprograms:

1. The Modernization and Expansion (M&E) Program. This program was under the direction of the U.S. Army Materiel Development and Readiness Command (DARCOM) project manager for production base support (PBS).
2. The Production Support and Equipment Replacement Program. The U.S. Army Armament Materiel Readiness Command (ARRCOM) directed this program.²

The Division established three liaison offices to handle the coordination requirements. The MPBSCP office at Picatinny Arsenal, New Jersey, provided direct Division contact with the modernization and expansion (M&E) project manager. The ARRCOM office at Rock Island, Illinois, provided liaison with ARRCOM and other agencies involved with MPBSCP. The third was the Mississippi project office located with the Mississippi Army Ammunition Plant (AAP) at Picayune, Mississippi. The Mississippi project was the first completely new AAP built in more than 25 years. The Mississippi project office provided engineering coordination between HND, the plant commander and the operating contractor, and the Mobile District Area Engineer who was responsible for construction.

Originally assigned to HND in September 1973, the purpose of the MPBSCP program was to modernize and expand facilities for conventional explosives and ammunition production.³ Primarily, the facilities were to support industrial chemical processes and heavy metal working operations.⁴ The program involved 23 Army ammunition plants, four Army arsenals, and three naval ammunition depots. Automation was incorporated for increased safety or increased operational efficiency. The long-term goal was a

fully modernized production base capable of meeting both peacetime and mobilization requirements for ammunition.

As program manager, the role of the Huntsville Division included planning, scheduling, and reporting; financial management; tasking for design; reviewing criteria for design adequacy; reviewing and approving cost estimates for budget submissions; and configuration management. For the Districts, HND monitored design and construction status and reviewed District-prepared designs for criteria compliance.⁵ The Huntsville Division was responsible for project design where the process systems were common to two or more sites, for new sites, and for performance of other designs when technical complexity or common design existed. The geographical Districts supervised all PBS construction. The Division also provided engineering and design support during construction for those projects designed by the Huntsville Division.⁶

The MPBSCP program was the largest in dollar volume assigned to the Huntsville Division during this period. It frequently constituted more than 50 percent of the entire HND program.⁷ The total estimated facility cost for the program through 1997 was \$3.75 billion. Overall program management activities were funded by Operation and Maintenance, Army (O&MA) funds allotted specifically for support of MPBSCP. The annual level of that funding was approximately \$950,000. Procurement Ammunition, Army (PAA) omnibus funds provided by the project manager funded in-house and architect engineer design efforts. These were programmed annually as an omnibus line item in the PAA budget based on the anticipated design workload. The PAA appropriation provided funds for construction on a project line item basis. In addition to the latter funds, new construction projects with current working estimates (CWÉs) in excess of \$100,000 had to be included in the Military Construction, Army (MCA) authorization act.⁸

Mississippi Army Ammunition Plant

On 16 December 1977, the Huntsville Division awarded a \$2 million phase 1A site development contract for the Mississippi AAP to Brinson and Bland, Inc., of Jackson, Mississippi. (See figure 7.) The project included clearing and grubbing 315 acres of land, ditching excavation of nearly 300,000 cubic yards, installing 96-inch culverts for road crossings, and seeding 30 acres of embankments. This small business set-aside contract was transferred to the Mobile District for construction supervision.

The new plant was located on the northern portion of the National Aeronautics and Space Administration's National Space Technology Laboratories near Bay St. Louis, Mississippi. The plant consisted of three separate manufacturing complexes: projectile metal parts; cargo metal parts; and load, assemble, and pack (LAP) facilities.

Facilities for support and administration were also incorporated. Thus, the most modern techniques in manufacturing methods and technology were integrated to manufacture a round of ammunition at one location. The Mississippi AAP design provided for production of 120,000 complete rounds of MX83 155 mm projectiles per month, a significant contribution to the nation's mobilization requirements for this new type of artillery shell.⁹ The construction was estimated to take five years.¹⁰ The project manager for Munitions Production Base Modernization and Expansion (MPBME) at Picatinny Arsenal coordinated constructing and equipping the facility. The Corps, through HND, handled design and contracting of plant facilities. The Mobile District provided construction supervision. Mason-Chamberlin, Incorporated, handled construction

and equipment purchases and installation activities. When completed, the plant was to be managed by ARRCOM and operated by a commercial contractor.¹¹

The Mississippi site covered approximately 7,100 acres. The construction authorization was \$181.2 million, with incremental funding planned for fiscal years 1978 through 1981. The projectile metal parts complex construction was awarded to Centex Construction Company of Dallas, Texas. Other construction contracts were awarded for the mechanical plant, cargo metal parts, and metal parts support facilities. The contract award to Centex was delayed because the state of Mississippi conducted a Prevention of Significant Deterioration of Air Quality Review before approving the construction permit. The facility also experienced problems associated with incorporating process equipment changes,

Figure 7

MISSISSIPPI PROGRAM / PROJECT CHART

Programs / Projects	Award Date	CWE's (M)	Contractor
Initial Site	16 Dec 77	\$ 2.0	Brinson and Bland Jackson, MS
Project Metal	26 Sep 78	49.0	Centex Constr. Co. Dallas, TX
Third Site Development	24 Apr 79	3.9	Constr. Mgmt. Eng. Miami, FL
LAP	14 May 80	31.0	Centex Constr. Co. Dallas, TX
Igloo Site Development	25 Aug 80	2.9	RLT Joint Venture, Inc. Mobile, AL
Mechanical Plant	30 Sep 80	31.6	Blount Int. Montgomery, AL
Cargo Metal Parts	18 Nov 80	15.4	Castle Constr. Co. Montgomery, AL
Admin. Building	6 Feb 81	2.4	Roy Anderson, Jr., Inc. Gulfport, MS
Common Support	26 Jun 81	3.7	Hill Bros. Constr. Co. Falkner, MS
LAP Support	31 Aug 81	10.4	Castle Constr. Co. Montgomery, AL
13.8 kVA Power	20 Oct 81	1.5	Line Power, Inc.. Pensacola, FL
Metal Parts	15 Jul 81	4.3	Fortec Constr. Coral Gables, FL

*Current working estimates.

which required special management by HND.

The contract award was made on the third-increment site development in 1979.¹² Work to be performed consisted of clearing, grubbing, excavating 18,000 linear feet of drainage ditches, and installing 13,200 feet of 12.8 kVA power lines. Railroad work involved constructing 16,600 feet of railroad, an inspection pit, and bridge.¹³ Preliminary CWEs for the mechanical plant, however, exceeded the program amount and alternatives were evaluated. Requirements for the industrial waste treatment facility changed significantly, delaying construction award past its planned 1979 date.¹⁴

Centex received the contract in 1980 for another large project for constructing the load, assemble, and pack facilities. Principal work included constructing 14 new buildings with approximately 232,000 square feet of floor space, 2,500 linear feet of covered walkways, nine earth-covered steel and reinforced concrete storage magazines, and site improvements and utilities covering 175 acres. The Mobile District supervised the construction.¹⁵

By the end of 1981, the contracted work on the industrial waste treatment facility had been finished and all other major construction was under way.¹⁶ The waste treatment facility had a 4,000-square-foot control building; steam and air lines; process piping and electrical conduit trays; a two-story sludge dewatering building; and three pre-engineered pumphouses and equipment. The project also involved tanks, clarifiers, filters, carbon columns, and instrumentation to control and monitor the treatment systems; a double-ended electrical substation; and site improvements for six acres.¹⁸

Radford Army Ammunition Plant

The continuous automated multibase line (CAMBL) facility at the Radford (Virginia) AAP was the largest single project in the FY80 military construction program. Centex of Houston, Texas, received the contract award for \$62 million.¹⁹ (See Figure 8.) A contract to perform an independent value engineering analysis of the design was awarded to Metztrain, Olson, and Youngren in 1979. The 100 percent design review meeting for the Radford facility was held 17-21 September 1979. The value engineering analysis resulted in design changes²⁰ that saved more than \$4 million.²¹ The Norfolk District administered and supervised the contracts after award.²²

This modern propellant manufacturing facility was among the larger and more complex PBS projects. The Radford CAMBL project was designed by Catalytic, Incorporated, and contained approximately 99,000 square feet.²³ The principal features of the facility included four propellant manufacturing lines consisting of four separate buildings for each line and a control house. The production rate for the facility was to be 2.4 million units per month of solvent-type multibase multiperforated cannon propellant.²⁴ The Radford installation mixed nitroguanidine, nitrocellulose, and nitroglycerine into a blend of multibase propellant.²⁵ In addition, a secondary anaerobic treatment of industrial waste was to be added to an existing water treatment facility. Existing finishing area buildings were to be rehabilitated and \$30 million of government furnished process and control equipment installed.²⁶

Sunflower Army Ammunition Plant

In 1977 the Huntsville Division negotiated and awarded

a contract for turnkey design, construction, and prove-out of the sulfuric acid concentration (SAC) plant at Sunflower AAP in De Soto, Kansas. After award to Chemetics International, Limited of Tampa, Florida, the Missouri River Division/Kansas City District (MRK) was given successor contracting officer responsibility. (See figure 9.) After a year of negotiations, HND awarded the sulfuric acid regeneration (SAR) plant contract to Monsanto Enviro-Chem Systems, Incorporated. The Huntsville Division continued to provide technical support and liaison services between MRK and the project manager's office.²⁸

Lone Star Army Ammunition Plant

In 1979 the Huntsville Division completed a \$48,000 feasibility study for an Energy Showcase Administration Building at Lone Star AAP at Texarkana, Texas. The project was conceived as a partially underground, earth-covered, solar-powered facility with an aesthetically pleasing architectural design. Colonel Dale Dobson reported, however, that project funding was doubtful.³⁰

Notice for a small business set-aside project for constructing a containerization facility at Lone Star was issued in 1980. The construction included a blocking and bracing building, electrical distribution system, concrete placement, removal of existing railroads, drain pipe placement, and general site improvement and demolition.³¹ Bids were opened in early April of that year.³² Following the award, the contract was to be administered and supervised by the Fort Worth District.³³

Volunteer Army Ammunition Plant

Six new trinitrotoluene (TNT) lines were installed at the Volunteer AAP near Chattanooga, Tennessee. The acid plant complex included ammonia oxidation, direct strong nitric acid, and sulfuric acid regeneration plants. The existing Volunteer AAP was one of the munitions plants with many employees and few pieces of mechanized equipment. Such plants were usually located in remote areas because of their dangerous features. The tasks assigned to HND involved plant modernization using more technical controls, thus increasing efficiency. As with some of the older plants, the area at Volunteer was saturated with TNT. The Huntsville-designed automation provided a clean and safe environment.³⁴



Photograph Shows the New Automated Techniques at the Volunteer Army Ammunition Plant.

Figure 8**Radford Program / Project CHART**

Programs / Projects	Award Date	CWE's (M)	Contractor
TNT Restoration	3 Dec 76	\$ 3.9	RHA*
Boiler Plant Imp.	23 Jun 78	2.9	Algernon Blair Indus. Atlanta, GA
Waste Treatment	20 Sep 78	1.4	Algernon Blair Indus. Atlanta, GA
NG-2 Restoration	20 Dec 78	1.8	RHA*
CAMBL	4 Jun 80	74.0	Centex Constr. Co. Houston, TX
155 RAP Grain	30 Jun 81	1.5	Hicks & Ingle Co. Norfolk, VA
Mod Fire Alarm System	14 Jun 79	1.6	King/Fisher Co. Des Plaines, IL

*Records Holding Area.

Figure 9 ²⁹**SUNFLOWER PROGRAM / PROJECT CHART**

Programs / Projects	Award Date	CWE's (M)	Contractor
NAC - SAC - AOP	Arp 77	\$ 2.8	RHA*
Nitroguanidine	30 Jun 75	51.2	Hensel Phelps Constr. Greeley, CO
Cal. Cyanamide	26 Sep 77	7.1	Hensel Phelps Constr. Greeley, CO
SAC	29 Sep 77	14.7	Chemetics Int'l. (US) Tampa, FL
SAR	10 May 78	18.0	Monsanto Enviro-Chem. St. Louis, MO
Storage Igloos	23 May 79	1.6	RHA*
LWT - SAR	28 Jun 79	2.0	V. S. Dicarlo Gen. Center

*Records Holding Area.

Other Projects

New construction awards in FY77 included an M&E project for a bag-loading facility at the AAP at Charleston, Indiana. (See figure 10.) Among the AAP projects carried over into 1977 were the Holston (Tennessee) AAP administration building and the Scranton (Pennsylvania) bridge crane project.³⁵ The FY78 (Burlington) Iowa Detonator bids opened in December 1979 with total CWEs, including add-ons, of \$14 million. Because this amount

exceeded the funds available, as well as the congressional authorization, steps were taken to obtain additional funding.³⁶ Award for the Center Core Facility at Indiana AAP bid was made in June 1980.³⁷

According to Colonel John A. Poteat, Jr., Division Engineer, the FY81 design program consisted of 26 M&E projects. Of these projects, HND was designing 10 with a construction value of \$126.9 million while the remaining 16, valued at \$46 million, were being designed by the Districts.³⁸

Figure 10³⁹

OTHER AAP PROGRAMS / PROJECTS CHART

Programs / Projects	Award Date	CWE's (M)	Contractor
Indiana Bag Loading Facility	28 Jun 77	\$ 6.5	Struck Constr. Co. Louisville, KY
Milan Melt Pour	12 Jun 78	6.8	RHA*
Louisiana Misc. Buildings	Jul 78	2.9	Fortec Constructors Coral Gables, FL
Milan Modernization	26 Jul 78	1.6	RHA*
Holston Admin. Bldg.	25 Aug 78	3.9	Sharondale Devel. Co. Nashville, TN
Milan E-Line	26 Feb 79	1.0	Barger Constr. Co Huntingdon, TN
Milan Z-Line	12 Mar 79	1.3	Larry Gallagher Ft. Worth, TX
Milan Containerization	14 Mar 79	1.7	Atlas Contractors, Inc. Ft. Worth, TX
Milan Article X-Ray	2 Apr 79	4.1	S & M Builders, Inc. Jackson, TN
Iowa Detonator Facility	29 Jan 80	14.2	Blount Bros. Schaumburg, IL
Indiana Center Core Facility	19 Jun 80	9.9	Geupel Demars, Inc. Indianapolis, IN
Indiana Powder Preparation	2 Sep 81	1.1	Howard W. Pence, Inc. Elizabethtown, KY
Iowa Container Distribution	15 Sep 81	1.8	Swan Electric Co. Sault Ste. Marie, MI
Iowa Hellfire	31 Dec 81	3.8	Carl A. Nelson & Co. Burlington, IA

*Records Holding Area.

Computer Graphics/Master Planning

AR 210-20 established the responsibilities for master planning for Army installations. The Huntsville Division became involved in master planning for Army installations because of its production base support assignments. In assuming Corps of Engineers' responsibility, HND was to assist the U.S. Army Materiel Development and Readiness Command (DARCOM) in preparing master plans for all Army ammunition plants (AAP). As the main point of contact with DARCOM, the Huntsville Division personnel were able to provide central support to the DARCOM project manager for the AAP master plans. Geographical District offices funded and implemented master planning for other DARCOM industrial facilities.⁴⁰ Earlier, the Office of the Chief of Engineers had assigned HND the Corps responsibility for assisting Army industrial installations in the preparation of subject plans.

In July 1978 Huntsville personnel investigated the feasibility of adapting computer-aided drafting technology to prepare civil engineering drawings and master plans. The investigation indicated considerable savings could be realized by using computer graphics rather than scribe-coating to prepare maps for the Sunflower AAP master plan. The investigation also revealed that the technology and necessary equipment were available in the Huntsville area at the U.S. Army Missile Command at Redstone Arsenal. The Huntsville Division personnel used that system on a very limited basis during the first shift and extensively during the second and third shifts.⁴¹

The Huntsville Division also branched out into computerized production of civil engineering contract drawings. Personnel noted that the system produced exceptionally high-quality drawings in considerably less time. Computer capabilities offered advantages in detail modification, periodic updating, physical changes, retrieval and selective information production, and scale changing. In a report to the Chief of

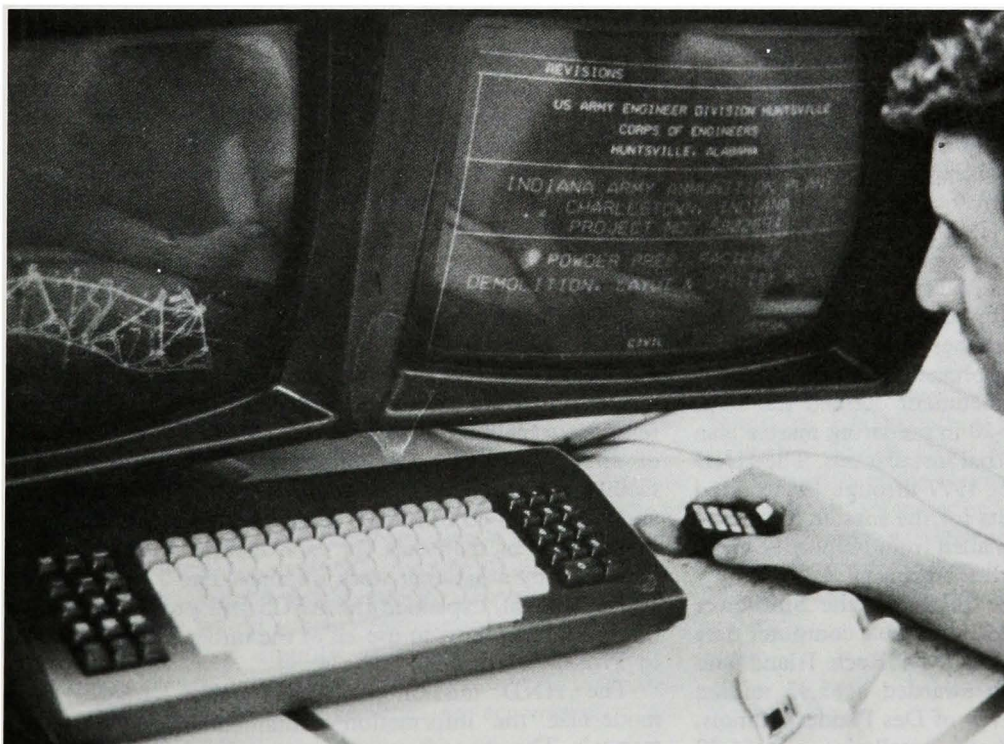
Engineers, Colonel Dale Dobson, Huntsville Division Engineer, said, "This appears to be tomorrow's method of producing drawings and if our development continues to show promise, we'll forward a proposal on offering demonstrations and perhaps training to other Districts, Divisions, and Army commands."⁴²

As HND continued to increase its use of the Redstone system, savings in manpower, time, and costs were apparent. The system heightened production with improved performance, reduced effort, better drawing quality, and shorter completion time.

As a result, HND submitted a request to OCE to purchase a computer graphics system. The Washington office approved the leasing of a system for one year. The Division issued a request for proposal for a computer graphics system in July 1980 and the contract was awarded to M&S Computing Company in September 1980. The system provided computer graphics capability consisting of a central processing unit, system console, plotter, and two remote graphics work stations. The central processing unit included a minicomputer, data concentrator, scanner processor, magnetic tape unit, and disk drive. The Division personnel were to operate the central processing unit and plotter. Graphics work stations, wired directly to the central processor, were located in the engineers' and drafting technicians' work areas.

The master planning tasks provided the opportunity to delve into state-of-the-art computer graphics techniques while simultaneously developing practical capabilities. This facilitated instantaneous updating and/or modification of stored graphics files. The system was installed in February 1981 and was used in producing the Sunflower AAP master plans program. Additional equipment enabled the computer graphics system to be used for the storage and maintenance of the Mobilization ("M") drawings data files.⁴³

The master plan for Sunflower AAP was innovative in three ways:



Computer Graphics Assisted the Master Planning Efforts at the Army Ammunition Plants.

1. It was the first Army instructional installation master plan.
2. Computer graphics were used for mapping a large, complex site.
3. The final product maps were printed in multicolor.

The purpose of the program was to provide an integrated series of documents that presented in graphic, narrative, and tabular form the present makeup of the installation. The plan also provided for orderly and comprehensive development. The computer graphics automated drafting system implemented by HND's Site Investigation and Development Section was "both practical and beneficial," according to Neal G. Davis, Project Engineer with the Data Processing Office.

Both the input and output of the system were under constraint control by the user and observed on a viewscreen similar to that of a television set. Engineering drawings were produced by entering data in three different ways:

1. Words and numbers were located on drawings by a keyboard.
2. Line and special features including automatic dimensioning and precision placement of standardized symbols could be added.
3. A drawing or sketch was rapidly reproduced with an electric impulse tool.

Completed drawings were produced on a high-speed plotter and/or microfilm. As an example, a complete full-sized ink drawing could be produced in 20 to 30 minutes. The new system provided better drawing quality and flexibility when compared to conventional methods. It was also reviewed for expansion to include production of facility design drawings combined with a programming capability for word processing and associated data. With the additional capability, engineering change proposals, modifications, and other changes and drawings could be readily updated, controlled, and processed.

Davis was detailed to install the system, train engineers and technicians in its use, and initiate production. Huntsville Division personnel were introduced to methods and use of computer graphics in a four-day session on "Structural Design and Analysis Using Interactive Graphics." The ADP Center also demonstrated other computer graphics programs and techniques including AUTONET, a network and scheduling program.⁴⁴

The overall responsibility of HND for Army ammunition plants (AAPs) was to provide new plant surveys, Phase I mapping (current condition), and Phase II plans (future plans). While assisting the plant in document development, HND created a new building number system. The Division also prepared a master planning procedural guide for Army industrial installations. That document defined the steps required to implement AR 210-20 in preparing master plan documents for the Army industrial installations. The HND tasks were completed within the 1977 through 1981 period except for the final overlay plots for the master plan basic information maps, which were mailed from Huntsville on 18 January 1982 to Sunflower AAP for printing.⁴⁵

After completing the master plans for the Sunflower AAP, HND began producing an interactive computer data base for master plans at DARCOM's Rock Island and Restone arsenals. The Division awarded a \$3.43 million contract to Chicago Aerial Survey of Des Plaines, Illinois, on 25 September 1981 for those installations. A \$1.89 million supplemental agreement was later awarded to

incorporate a computerized data base for a building management system at Rock Island Arsenal.⁴⁶ The Division also used the computer graphics system to complete the design of six containerization projects at various Army ammunition plants.

Army Facilities Components System (AFCS)

In mid 1978 the U.S. Army Facilities Engineering Support Agency (FESA) at Fort Belvoir, Virginia, transferred the Army Facilities Components System (AFCS) to HND. The system was an engineering construction support program to provide planning guidance, construction drawings, and bills of materials required for Army contingency construction. This system could be used either in a theater of operations (war zone) or in a mobilization situation in the United States. The system used a building block concept to permit maximum flexibility in construction. The building blocks were items, subfacilities, facilities, and installations. The AFCS branch of the Engineering Division provided management within HND.⁴⁷

Initiated during World War II and expanded during the Korean conflict, AFCS was a program to provide improved emergency construction planning and supply. It grew to involve planning guidance, detailed construction drawings, and computer-updated bills of materials for approximately 4,100 pre-engineered facilities and installations. The designs were for troop camps, hospitals, bridges, marine terminals, facilities for ports, petroleum storage and distribution, and ammunition storage. The system had been used by Major Army Commands (MACOMs), and Army agencies and planning schools. It was used for estimating, training, stockpiling, and construction activities.

The system was the subject of a 6 June 1978 task assignment letter to the Huntsville Division, resulting in a Memorandum of Understanding (MOU) between HND and the Army Communications Command dated 20 November 1978. The following year the Army Facilities Components and Logistics Data Base systems support requirements were the subject of an MOU on 31 August 1979. Providing simple structures, the AFCS program planned designs and related construction information for the Army troop-built facilities. These facilities were to be built by Army Engineer Troop units in field situations.⁴⁸

The AFCS data base consisted of four Army technical manuals, TMs 5-301, 302, 303; and an AFCS users manual, TM 5-304. The TM 5-301 offered summaries published in four volumes for facilities in temperate, frigid, tropical, and desert climatic zones. It included costs, shipping weight, volume, and staff hours required for construction of each facility, as well as three standards of construction that were initial (0 to 6 months), intermediate (6 to 24 months), and temporary (24 months to 5 years). The TM 5-302 consisted of three volumes containing site plans, utility plans, and facility construction drawings for the various installations and facilities. The TM 5-303 listed all of the items contained in the bills of materials for each facility with each item identified by a national stock number. The TM 5-304, the Users Manual, explained the AFCS and provided detailed instructions on how to use all of the information contained in TMs 5-301 through 303.

The HND mission was to maintain, update, and modernize the information contained in the technical manuals. The changes came from recommendations of user agencies received at the annual review, and changes in table

of organization and equipment (TOE) unit organization and mission. Huntsville personnel also addressed material and procedure obsolescence, drawing and material list errors cited following in-house review and/or by users, and the need to simplify the overall system.

In September 1979, Colonel Dale Dobson, Huntsville Division Engineer, reported that HND had begun initiatives that would result in a marked improvement in the AFCS. The Division published Change 2 to the AFCS TMs and a new AFCS users manual. It also completed a new AFCS design manual providing uniform design standards and correlated AFCS directly to the facility requirements of each TOE unit. Division personnel also initiated necessary new designs such as across-the-shore petroleum, oils, and lubricants (POL) system, container handling port (using existing LeLong piers), signal intelligence facilities, munition storage facilities, revetments, and dispersal plans.⁴⁹

By the fall of 1980, change 3 to TMs 5-301 through 5-303 was ready for printing and distribution. This change involved inserting ten new designs, altering the entire numbering system to agree with AR 415-28, updating all logistics data, and inserting data to simplify use. The change included approximately 960 drawings and a 3,350-page data base. Colonel William Lee, Acting Huntsville Division Engineer, reported in September 1980 that the totally updated data base "should restore user confidence in the currency, usability, and accuracy of the AFCS throughout the world."⁵⁰

Highlights of Change 3 included the following:

1. Panelized wood building design package in various sizes
2. Pre-engineered steel building design package
3. Petroleum systems (size of pipe and pump) standards for one mile, 30 miles, etc., giving groups of hardware, estimate of roads crossed, rivers, etc.
4. Electrical materials update, including lighting kits for office and warehouses
5. Completed table of organization and equipment study for field Army facility requirement
6. Sewage system design update for systems and septic tanks
7. War damage repair kits

In assisting military planners, supply agencies, and construction personnel, AFCS helped facilitate unified command planning, theater transportation feasibility analysis, and force construction. The level of detail and the format for planning required by the joint operations planning system could not be accomplished without AFCS, the basis of all civil engineering support planning.

The program was funded by using both Operation and Maintenance, Army (O&MA) and Military Construction, Army (MCA) funds. The O&MA funds were used primarily for architect-engineer contracts and in-house costs. The MCA funds were used primarily for projects accomplished by Corps laboratories so that projects would carry beyond the end of the fiscal year without refunding. An average of six to eight designs were started annually.⁵¹ In 1981 Colonel John A. Poteat, Jr., reported that the new designs were directed toward light-weight, quickly erectable structures. These designs would support the initial period operations, and update and simplify the existing data base. A commonality study based on approximately 600 TOE units provided optimum sized facilities to accommodate the greatest number of units.⁵²

Although the Division continued to update the informa-

tion, HND met with several difficulties. Line item costs required constant monitoring. The Division developed budgets for AFCS. It prepare and presented a quarterly program review and analysis briefing. In other tasks, HND monitored related instructional technology advancements, planned projects and programs, and arranged and supervised periodic exercise of the system. Personnel also developed and coordinated detailed scopes of work for additions and revisions, negotiated and awarded design contracts, and reviewed designs for technical and functional adequacy. Coordinating work with Corps laboratories, HND interact with other Army and Department of Defense agencies on designs and logistic data, and provided users with technical advice and assistance.⁵³ Projects in 1981 included evaluation of the AFCS test plan by the U.S. Army Troop Support and Aviation Materiel Readiness Command. A paper exercise was planned followed by a test involving delivery of materials and field construction. In agreements with Air Force representatives at Bolling Air Force Base, AFCS was allowed to provide designs to support Corps AR 415-30 theater construction obligations to the Air Force. A Mobile Army Surgical Hospital (MASH) unit warehouse in Korea was selected for testing the AFCS documentation, supply system, and transportation system response and constructibility in the field. Designs awarded during FY81 were for Air Force airfields, theater construction materials, alternative container ports, desert facilities study and update, operational facilities, and troop camp installations and facilities.⁵⁴

Railroad Improvement Program

In August 1981, the Directorate of Military Programs, Construction Division, Army branch, tasked the Huntsville Division to support OCE in performing work for the U.S. Army Forces Command (FORSCOM). That command had requested assistance in improving railroad facilities on Army installations for the rapid deployment force and mobilization missions. The purpose of these missions was to ensure rail transportation readiness in time of a national emergency.

Because of not having been used for a number of years, the railroads on military installations needed to be readied for equipment shipping and troop deployment.⁵⁵ The program included work on railroads and rail loading facilities at approximately 31 military installations. The Huntsville Division functioned as a center of management and competence, using the usual geographical Corps Division and District relationships for upgrading the rail lines.

The Huntsville Division initiated design work on eight installations in five geographical areas. In the course of these projects, HND worked with the Savannah, Kansas City, Omaha, Seattle, and Fort Worth Districts.⁵⁶ Railroad personnel from the Department of Transportation provided preliminary information after walking the tracks assessing needs for repair.⁵⁷ Due to requirements changes, however, all projects except one at Fort Riley, Kansas, were deferred to the following year.⁵⁸

V.

PROCUREMENT/OVERSEAS MISSIONS

Within the Huntsville Division of the U.S. Army Corps of Engineers, the Procurement and Supply Division, later renamed the Procurement Division, worked on various domestic and worldwide projects in the period 1977 through 1981. Because the Huntsville Division operated as a nongeographical unit, it dealt with a number of Divisions and Districts both overseas and within the Continental United States. Procurement activities involved government-furnished property (GFP) and government-furnished materials (GFM). Saudi Arabia, Jordan, and Israel were the sites for special foreign projects. Projects inside the Continental United States included work for Army ammunition plants (AAPs) and for the Department of Energy (DOE).¹

Procurement

The Procurement and Supply (P&S) Division purchased items ranging from simple pre-packaged wares to highly sophisticated machinery. The professionals in that division amassed a wide range of specialized knowledge and experience gained through award and administration of large-scale centralized procurement of complex-cost-type and fixed-price contracts.²

The P&S Division directed solicitation, award, and administration of supply services, construction, and architect-engineer (AE contracts). They also performed contract services for these contracts and maintained all official contract files. The division also provided services for small and disadvantaged businesses, and for labor surplus and defense materials system programs.³ The chief of Procurement and Supply planned, directed and supervised procurement programs, including inspection, warehousing, utilization, redistribution, disposal of equipment, and transportation of personal property.⁴

Army Range Program

In 1981 the Huntsville Division began its activities with the Army range modernization program. On 5 June 1981 the Division presented the program management plan for FY84. The Huntsville Division forwarded a proposal to OCE on 12 June 1981 outlining HND activities along with required resources. On 1 September 1981 OCE sent a task assignment letter to Huntsville regarding the range modernization program. The OCE named HND as the Corps center of competence in range modernization. The purpose of HND's work was to support Training and Doctrine



Modern Marksmanship Ranges were Developed to Reduce Real Estate Requirements.

Command (TRADOC) and U.S. Army Forces Command (FORSCOM). Such support included standardization of range buildings, creating more flexibility in range utilization, and design guidance to Corps Districts.

The Directorate for Army Ammunition, Ranges, and Targets (DAART) and HND signed a Memorandum of Understanding on 29 October 1981. The letter called for HND to provide Engineer support to the U.S. Army Training Support Center, DAART.

Within the general scope of the program, HND was expected to:

1. Assist with preparation and review of DD Forms 1391 and PDBs.
2. Provide technical services support in range facility design standardization.
3. Coordinate multipurpose range requirements.
4. Provide Corps Districts with generic designs, guide specifications, and design guidance.
5. Review the Corps Districts concept designs.
6. Provide special studies and assistance in range equipment development⁵⁹.

To accomplish this mission, HND was involved with three types of training ranges, which required facility standardization. One was the rifle marksmanship range with the Infantry Remote Targets System (IRTS). The second type was the multipurpose range. This was a new concept that reduced real estate requirements. It also provided more realistic training by allowing simultaneous use of different weapons systems. Representative armor stationary and moving targets as well as ranges. The third was the military operations on urban terrain (MOUT) facility. A MOUT range was under construction at Fort Bragg, North Carolina, and was used as a prototype in the range standardization program.

In working with representatives from DAART, TRADOC, FORSCOM, and various installations, HND developed a generic multipurpose range complex design. The requirement included layout drawings, target engagement sequences, and cost estimates. Seventeen multipurpose range complexes and 28 modified field fire and defense test ranges were to be built.⁶⁰

In supporting OCE, the Huntsville Division developed design guide manuals for each of the three range types. The manuals provided Corps Districts with standard feature design information and interface design guidance between the civil works and the target systems. The initial versions of these design manuals were completed in early 1982 for infantry ranges and a multipurpose range complex.⁶¹

Army Force Modernization

The Army force modernization program at HND began in 1979 when the COE offered Corps of Engineers' support, specifically Huntsville Divisions, to assist the Army in new system facility development.

In a task assignment letter to HND dated 19 March 1980, OCE staffing requirements to support fielding of new Army systems (force modernization) were discussed. Another letter, dated 18 July 1980, tasked HND to prepare facility status reports for four missile projects: Pershing II, Patriot, Roland, and MLRS. The Huntsville Division sent a draft management plan to OCE in August 1980 describing proposed participation. The Corps defined ten additional systems as requiring facility support plans and expected HND to participate in their development.

The Huntsville Division was to assist Major Army Commands in several areas of new Army systems development. Topics of concern were facility requirement definition, programming, criteria development, and any related activities providing facilities on time to support the development, training, and fielding of new Army systems. As a result, OCE provided \$150,000 in FY81 funds, with an additional \$60,000 requested by HND. The Army established a long-range force modernization program to keep pace with fast-moving changes in conventional land warfare over the next two decades. It was anticipated that new weapons systems, force structures, and logistical concepts would be needed to provide the high degree of mobility, concentrated fire power, and sophisticated electronic capability. Of the 400 new weapons systems and force structure changes identified for deployment in the next eight to ten years, 70 were selected as critical and were to receive the major amount of program effort.

The Corps mission was to define and document generic support facilities requirements of each new system and force structure through facilities support plans (FSPs). It was also to act as the center of expertise on support facilities matters for other members of the development community. The primary objective was to ensure that the support facilities for a given system or force structure were identified early so they could be programmed, designed, and constructed prior to fielding of the new systems. This planning would not only enhance combat readiness, but would also ensure the cost-effective acquisition of support facilities.⁶² The Huntsville Division studied potential problem areas, particularly in support facilities for weapon system maintenance and personnel training activities. The Office of the Chief of Engineers was responsible for distributing the FSPs and special studies to the appropriate agencies outside the Corps.

In February 1981, HND was requested to prepare FSPs for AAH, Hellfire, DIVAD, RPV, and AHIP, with Stinger added in April 1981. These plans were sent to OCE by the summer of 1981. The Division was also directed to prepare an FSP for the field artillery ammunition support vehicle.⁶³ The Division prepared a maintenance report on the M-1 tank and an initial FSP for the Army's 86 armored and mechanized battalions. Updating of the 12 combat electronic warfare intelligence FSPs completed the assignment.⁶⁴

1977

One recipient of procurement support in the planning and development stages in 1977 was the Energy Research and Development Administration (ERDA). On 4 August 1977 HND representatives visited the ERDA office in Washington, D.C., to provide contracting assistance to the pipeline gas demonstration plant program. Prior to that time HND had provided minimal and infrequent contracting support. During the meetings ERDA requested support for contract administration in which HND would oversee the review and approval of contractor procedures and sub-contracts. The Huntsville Division assisted on the CONOCO; Illinois Coal Gasification Group (ICGG); and Memphis Light, Gas, and Water contracts. These contracts involved demonstration plant programs to convert coal to pipeline quality gas.

The Middle East Division (MED) tasked HND to negotiate a logistical management and support services

contract to move construction equipment, materials, and supplies from the U.S. to Saudi Arabia. The Planning and Control Branch provided automatic data processing (ADP) support. In November 1977 the branch issued directives for procurement of 68 line items of GFP for the Airborne School at Tabuk, Saudi Arabia. Planning for the Saudi Arabian GFP program involved the following:

1. Overall program planning for more than \$100 million in procurements of highly technical equipment items of office and household furniture over a period of several years.
2. Developing a sophisticated ADP tracking and associated systems, consisting of seven modules.
3. Planning for the transition from funding through MED-issued Intra-Army Orders to funding by major grouping.
4. Developing requirements for data acquisition, preservation, packaging specifications, use of contractor's technical representatives, and other contractual requirements.
5. Developing in-house budgets and manpower requirements⁵.

The P&S Division's GFP support to that project resulted in the award and administration of 869 major contracts and 4,240 delivery/purchase orders valued at approximately \$190 million.⁶

In 1977 the Postal Construction Program, the largest GFP project up to that time, was essentially complete, with only a few contract claims left to be settled.⁷ A total of 97 contracts had been awarded for the basic systems at a cost of \$181 million.⁸ The program supported the U.S. Postal Service Bulk Mechanization Program. Identical automatic bulk mail processing equipment was required at 21 separate Bulk Mail Centers through out the Continental United States. The Procurement and Supply Division performed all contracting obligations on time and at a cost savings of \$26 million below the original Postal Service estimates.⁹

In FY77, the Contract Services Branch administered nine new AE contracts, the basic awards totaling \$2.6 million. Contract modifications increased the total to \$6 million. The largest, at \$814,600, was to Catalytic, Incorporated, designers of continuous automated multibase line (CAMBL) facilities at Radford and Sunflower AAPs. The branch also awarded three service contracts, 75 purchase orders, and 62 modifications against AE and service contracts.

The Branch awarded two construction contracts. Struck Construction Company and Struck, Incorporated, of Louisville, Kentucky, received a contract for \$5.5 million for modernizing the bag loading and assembly operations at the Indiana AAP at Charleston, Indiana. Chemetics International, Incorporated, of Tampa, Florida, received a contract for \$12.6 million for design, construction, and performance verification of a sulfuric acid concentration (SAC) plant at Sunflower AAP at De Soto, Kansas. The branch transferred the Indiana contract supervision to the Omaha District Engineer on 11 July 1977 and the Sunflower contract to the Kansas City District Engineer on 6 October 1977.

The Requirements Branch assisted with the requirements activities in the areas of work assignments, schedules, development of special contract provisions, and coordination of contractual actions. During FY77 these activities centered on Saudi Arabian projects amounting to \$88.5 million.¹⁰

1978

Although the Procurement and Supply Division continued its support of the Saudi GFP program during FY78, requirements were more limited than had been anticipated. The division continued its program planning and ADP support of the Saudi Arabian program in coordination with MED.

The two procurement branches concentrated on GFP purchases to meet critical construction dates for ongoing Corps of Engineers projects. The Requirements Branch negotiated with various furniture manufacturers and suppliers for large furniture and accessories purchases. The procurement actions totaled \$57.7 million for FY78.

In FY78, the division issued 171 modifications to the contracts. Of 370 contracts issued, 102 were shipped, completed, and closed out during the fiscal year. In addition, 1,017 delivery orders and purchase orders were issued. Of these, 455 were in support of the Saudi Arabian procurement effort and 562 were division support.

The Contract Services Branch handled 16 AE contracts totaling nearly \$2 million during FY78. The largest was \$499,000 to Hayes, Seay, Mattern, and Mattern for an AAP loading, assembly, and packaging facility. The five construction contracts awarded that year involved the Mississippi, Sunflower, and Volunteer AAPs. The branch also issued 600 airbills for the Saudi Arabian program and added 447 contracts to the official contract files.

The Planning and Control Branch continued planning and coordination for the Saudi Arabian GFP program. That branch also provided procurement support to ERDA, which had delegated administrative contracting officer (ACO) authority to HND.

The extremely high volume output and high priority associated with the GFP tracking system necessitated adding three data conversion clerks for ADP technical support.

1979

In February 1979 the Middle East Division held a meeting at Huntsville to work out details for reducing HND support to the Saudi GFP effort. By the fall of 1979, HND had lost a total of 10 persons. With the staff reduction, HND merged the two procurement branches into one. The Division abolished the Planning and Control Branch, and created a new Department of Energy Support Branch. The Saudi Arabian program and ADP were placed under the remaining procurement Branch. In the Contract Services Branch responsibilities for the Training Division increased substantially.

Three construction contracts were awarded in 1979. One for \$1.4 million was awarded to Atlas Contractors, Incorporated, of Fort Worth, Texas, for construction of a container distribution system at the Milan (Tennessee) AAP. Another contract for Milan was awarded to S & M Builders, Incorporated, of Jackson, Tennessee, to construct a central X-ray facility for \$3.5 million. The last contract was awarded to Construction Management Engineers of Miami, Florida, for the silo development at the Mississippi AAP in the amount of \$2.9 million.

The Contract Services Branch awarded 46 new AE contracts during the year. The largest was \$490,000 to Roy F. Weston for characterization of explosive-contaminated waste for Army storage depots. There were two contracts for

design manuals and specifications. Syska and Hennessy, Incorporated, received \$451,000 for development and Keller and Bannon received \$373,000 for updates. The largest of 15 services contracts was for \$169,000, awarded to Data Design Labs to develop a training course in grounding, bonding, and shielding quality assurance.

Procurement Branch Contracts resulted in more than \$67 million worth of items of industrial plant equipment, vehicles, furniture and furnishings, and miscellaneous items for the Saudi Arabian government. Before its abolishment, the Planning and Support Branch added work on the Strategic Petroleum Reserve support Program.

1980

In the spring of 1980 the Procurement and Supply Division was renamed the Procurement Division and an assistant chief was authorized. Although the Procurement Division continued its GFP support to the Middle East Division for the Saudi Arabian construction program, HND was advised that no additional procurement directives would be sent. With the signing of the Foreign Military Sales (FMS) case on the Jordan Armor Rebuild Facility, procurement actions were initiated for an estimated 10 man-years' effort over 18 months.

The Huntsville Division was to handle contract administration with full contracting officer authority for two coal gasification contracts, CONOCO and ICGG. The Contracting Services Branch work was primarily in construction, AE, and Training Division service contracts. Procurement established a word processing unit to improve productivity in document preparation. This was done in conjunction with the HND plan to establish a Huntsville Division word processing center.

The Contracts Services Branch awarded eight construction contracts for work on Iowa, Mississippi, Radford, and Charleston AAPs. The largest was a continuous automated multibase line facility at Radford awarded to Centex Construction Company, Incorporated, of Dallas, Texas, in the amount of \$61.9 million. The Procurement Division awarded 332 contracts in FY80.¹¹

The Contract Services Branch designated a position of Small and Disadvantaged Business Utilization (SADBU) specialist during FY80. Due to interest in and need for more time to meet OCE goals, a full-time position was established on 20 January 1981 and then moved to the executive office. Huntsville was the first Division to develop this position full time at staff level; the large volume of procurement and complexity of the job had led to that decision. The SADBU specialist established a data base of 14,000 firms, had access to the national small business computer listings, and worked toward designating set-asides and identifying eligible companies. Between 1980 and 1981 HND increased awards to small businesses from \$800,000 to \$1.5 million.¹²

1981

The Contract Services Branch awarded six AAP contracts in 1981, four of these on the Mississippi project. The largest as to Castle Construction Company Incorporated of Montgomery, Alabama, for \$9.4 million to construct the load, assembly, and pack support facilities at Mississippi.

The DOE Support Branch was staffed conservatively during the year because of uncertainties over the DOE program. However, the branch personnel became actively

involved in the preliminary planning for the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) munition/agent disposal program. Although the Strategic Petroleum Reserve and Alternative Fuels projects had essentially ended and Termination for Convenience actions remained, the USATHAMA project was expected to increase the branch workload substantially.

The Word Processing Branch changed as permanent personnel spaces were assigned, masters of repetitive documents prepared and recorded, and policies and procedures made final. The branch also planned for updating the word processing equipment.

In November 1981 the Office of the Surgeon General contacted the Procurement Division regarding a central procurement activity for furniture and furnishings for renovation and new construction of all Army health care facilities worldwide. The division was tasked to revise the furniture and furnishings specifications for the Fort Stewart Army Hospital to permit competitive bidding. This hospital was the first major facility provided for and was to serve as a model for future work assignments.¹³

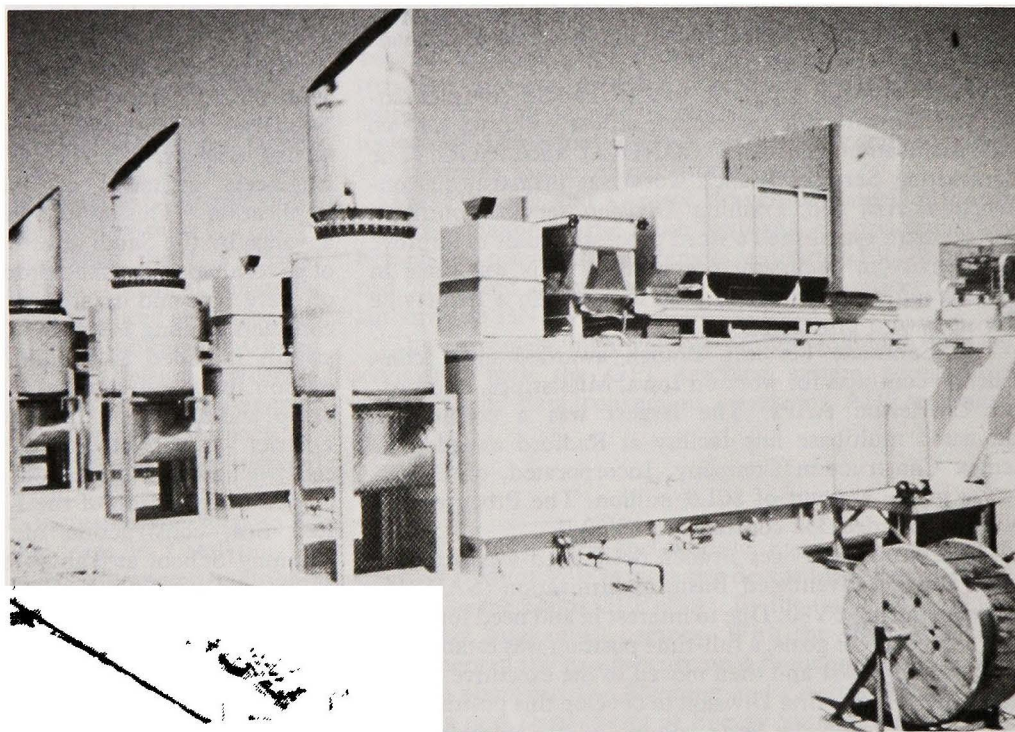
Saudi Arabian Procurement Program

Among the three new missions that came to the Huntsville Division just prior to 1977 through 1981, the Saudi Arabian procurement appeared to hold the promise of setting new records for the Division and the Corps of Engineers in terms of dollar value and international implication.¹⁴ This multi-billion-dollar program, paid for in advance by the Saudi government, involved large amounts of government furnished property, equipment, and supplies of every type and description. In 1977 HND executed 108 contracts totaling \$49 million for the Saudi program. Major awards included \$4.5 million for turbine generators, \$9 million for a self-contained 1,200 person pre mobilization camp, and \$7 million for relocatable buildings.¹⁵ The Jidda District was activated on 1 April 1977 for supervision of construction and expansion activities. These projects included construction of the King Faisal Naval Base on the Red Sea, construction of the Airborne and Physical Training School at Tabuk, expansion at the King Faisal Military Cantonment, and other activities. Total work placement during the three-year history of the District, which was phased out 1 April 1980, exceeded \$1 billion. At its peak more than 300 personnel were employed in the District headquarters and in four area offices. The Red Sea area office was assigned to the Riyadh District but remained in Jidda to complete the naval facility construction.¹⁶

In 1978 funding for all Saudi Arabian procurement support was provided initially by bulk allotments through OCE furnished by major grouping such as Engineer Assistance Agreement, Saudi Arabian National Guard, and Saudi Naval Expansion programs. The total Saudi program obligations for FY78 totaled \$64.8 million.

Because of the technical questions raised by prospective suppliers on procurement packages, an Engineer was detailed to HND from Berryville. He was to serve as technical advisor in an effort to facilitate timely responses to questions and to reduce coordination time. Also, a contract specialist was detailed from HND to Berryville to aid in developing and processing procurement packages and data. The Huntsville Division's support to Saudi procurement included 886 deliveries, 3,354 purchase orders, and 869 contracts.

Overseas Involvement Included Supervision of Construction and Procurement Activities in Saudi Arabia.



Solar Turbine Generators Part of Procurement for Saudi Arabia.

The final procurement data packages went to HND during the last quarter of FY79, and minimal HND effort for ongoing contract administration continued into the second quarter of FY80. The announcement of the impending reduction in GFP work had "caused several key, highly skilled employees to seek and obtain employment elsewhere."¹⁷

A report from Colonel Dale Dobson to Lieutenant General John W. Morris in January 1979 warned that the decision to move the Saudi GFP mission to Berryville "could cause HND to lose its procurement force and to have to reconstitute a GFP capability should the need arise." However, the number of incoming items on the Saudi mission was higher than estimated in the spring of 1979. Colonel Dobson anticipated that the continuing manpower effort for the Saudi program would fall off sharply toward

the end of the phaseout.¹⁸

By September 1980, Colonel William Lee, Acting Huntsville Division Engineer, reported that procurement support to Saudi construction would continue through the first half of FY81.¹⁹ Colonel John A. Poteat, Jr., Division Engineer, reported an expected closeout by 30 September 1981.²⁰ Termed a "real nation-building project" for Saudi Arabia, the mission was closed out by the Huntsville Division at the end of 1981.²¹

Jordan Armor Rebuild Project

Prior to this historical period, Huntsville Division, by agreement with the Mediterranean (Later called Middle East) Division, accepted responsibility for the design of a tracked vehicle rebuild center for the Jordanian govern-

ment. A team of U.S. Department of Defense personnel had visited several Middle East countries to perform an overall defense survey.²²

The team report recommended that a workshop for rebuilding armored vehicles be built in Jordan.²³ The Jordanian Army hired the Corps of Engineers' Middle East Division (MED), Rear, office in Berryville, Virginia, which in turn assigned the design work to HND.²⁴

In a report to Lieutenant General John W. Morris on 6 October 1977, Colonel John V. Parish, Jr., Huntsville Division Engineer, wrote that the Jordanian armed forces had given HND authorization and funds to proceed with the final design.²⁵ In the summer of 1978, HND began designing an armor rebuild facility in Amman, Jordan, on a tract of desert land owned by the Jordanian Army.²⁶ Giffels Associates of Detroit, Michigan, received the design contract with completion scheduled for summer 1978. The Huntsville Division, working closely with the MED, sent personnel to Jordan for a site visit to discuss construction supervision, Jordanian armed forces/contractor negotiations, and general and specific provisions.²⁷ By June 1978 the project was under way. Major General Abdul-Haddie al-Majali, Assistant Chief of Staff for Planning and Operations for the Jordanian armed forces, met with Giffels and HND personnel in Detroit for a 90 percent review of the design. The agenda also included processing the Foreign Military Sales case for equipment procurement.²⁸ Ron Larkin and Buford Sims of HND formalized the FMS No. JO-B-HAE.²⁹

The industrial complex consisted of 11 major buildings. Building 1, the largest, housed most of the actual rebuild operations. It included facilities for complete engine and transmission refurbishment as well as a large versatile general-purpose machine shop, which allowed for remanufacture of individual piece parts as required. A number of separately housed functions supported the major rebuild operations in Building 1. These comprised a hydraulic and fire control workshop, a dynamometer building for testing engines and transmissions under simulated load conditions, and a pre-delivery preparation building for miscellaneous touchup and provisioning steps. Depot support operation facilities such as water and waste treatment, fire station, boiler plant, and depot support shop for repair of depot equipment completed the site. A well about six miles away provided water for the facility.³⁰ However, potable, process, and fire water came through a recycling distribution.³¹

The main production goal was to rebuild approximately 80 tanks annually, some of which were British and American. Other vehicles also passed through the facility, and goals were set for their repair. Anniston Army Depot, Anniston, Alabama; Tooele Army Depot, Utah; Letterkenny Army Depot, Pennsylvania; Red River Army Depot, Texas; and the U.S. Marine Corps Rebuild Facility, California, provided specialized support on a number of occasions.³² When Giffels completed the facility design, a construction contract of \$65 million was awarded in March 1980.

During the construction phase, the Procurement Division of HND obtained as government-furnished property more than 1,700 selected items of industrial plant equipment. Formalized in the FMS, the mission called for expenditures of approximately \$10 million.³³ In addition to the large industrial plant equipment, the nearly 300 contracts involved fixture, production equipment, hand tools, tool crib items, and spare parts. The division managed

the procurement and delivery of the items to a Jordanian freight forwarder.³⁴ The FMS case was signed in December 1979, and procurement began in February 1980.³⁵ With an estimated 10 man-years' effort over 18 months, the procurement moved through FY80 on time and within budget. This procurement activity called for all items to be delivered to the Port of New York by the end of 1981. The Huntsville Division awarded a contract of \$81,760 to William H. Muller Shipping Corporation, the Jordanian-designated freight forwarder, for receiving, inspecting, and crating the GFP. The division had procured approximately 1,711 major line items and 2,400 line items of spare parts, furnishing them to the construction contractor for installation.³⁶

The Jordanian government tasked HND for a second FMS case, this time for a management plan to provide for initial startup and operation of the facility.³⁷ The FMS case (HAF) dated 21 April 1980 authorized the Jordan Armor Rebuild Facility Management Plan. The Division awarded the management contract to Dynetics, Incorporated, of Huntsville, Alabama, for \$308,250. The contract required documentation and detailed instructions for organization of the rebuild facility; rebuild flow description, diagrams, and production schedules; production functions; quality control inventory; planning for materials and spare; facility support, maintenance, and safety; and manpower and configurations management.³⁸

The coordination of the management plan was discussed at an in-process review with the Jordanian armed forces 17 and 18 March 1981 in Anniston, Alabama. In addition to Jordan Army and Dynetics personnel, HND personnel who attended were Colonel John A. Poteat, Jr., Henry Everitt, Vernon Oden, Ray Aldridge, and Ron Larkin.³⁹

A team representing Dynetics and the Huntsville Division presented the completed management plan to the Jordanian government in June 1981. The Jordanians accepted the plan as presented, and demonstrated a very detailed and comprehensive series of documents that would be used, without modification, to operate the rebuild facility.

In August 1981 Colonel Poteat presented a plaque of appreciation to the Dynetics management team represented by Herschel A. Matheny, president; Robert O. Wilson, operation manager; and William O. Cress, project manager. Colonel Poteat complimented the Dynetics team "for their professionalism, their cooperation with the Division, the Anniston Army Depot Management; and the Jordanian officials" and "for the outstanding end product delivered."⁴⁰

The first tanks were scheduled to pass through the plant in 1982, with gull production being reached in 1985.⁴¹

Israeli Airbases

In 1979 the President designated the Corps of Engineers as the construction agent for a \$1 billion project to design and construct two strategic airbases in Israel. As part of the Corps-wide support to the project, the Huntsville Division detailed Brigadier General Max Noah, Division Engineer, and others to the effort.⁴²

Under the terms of the Israeli-Egyptian peace treaty, Israel agreed to withdraw from the Sinai Peninsula and relinquish two military airbases at Etam and Etzion in the Sinai desert to Egypt. Israel had built the original airfields after the 1967 Arab-Israeli war. In return, the United

States, as mediator, had agreed to partially finance and supervise construction of two airbases within the borders of Israel. The new bases were located at Ramon near Be'erSheva and at Ovdah, north of Eilat in the Negev Desert. Construction began during the summer of 1979 and had to be completed within three years.

Lieutenant General John W. Morris, Chief of Engineers, made the North Atlantic Division (NAD) under Major General Bennett L. Lewis responsible for the actual execution. The Corps part of the mission was organized with two area Offices supervising management of the airfield construction. Both offices reported to the Near East Project Office (NEPO) in Tel Aviv. General Morris declared the Israeli project one of the top priority projects of the Corps.

As part of the project, General Noah left 7 January 1980 for temporary duty in Israel with the specific mission of assisting NEPO to establish management systems and procedures for the overall construction and procurement program. In accomplishing his mission, General Noah had authority to call upon members of the Huntsville Division to assist with expertise and advice. Leonard Getty chief of the Facilities Development Branch, and Raymond D. Aldridge, chief of Procurement, accompanied General Noah to Israel to work on configuration management and the procurement process, respectively.⁴³ General Noah remained for 4.5 months on the airbase construction program.⁴⁴ In his absence from HND, Lieutenant Colonel Mark S. Sowell was Acting Division Engineer.⁴⁵

Originally the Israelis, represented at international talks by Prime Minister Menachem Begin, were reluctant to give up their jetports, which together housed five squadrons of war planes. The Israelis claimed that replicating the airfields on their side of the border would take at least five years. However, the preliminary treaty called for Egypt to regain all of the Sinai within three years. President Carter pledged that the United States would build the new bases for Israel within 30 months, giving the Israelis six months to make them operational. The United States also offered a grant of \$800 million toward the project.

Major General James A. Johnson, Deputy Chief of Engineers, was in charge of seeing that the airbases were completed on time. Several factors complicated his assignments. No Israeli construction labor was to be used due to its possible adverse effect on the high inflation rate in that country. All contractors were to be imported and paid in U.S. dollars. In order to expedite the project, General Johnson asked for a rare wartime priority known as "DX brickbat," which would give the Corps first priority scheduling at any U.S. factory to requisition needed materials. The Corps issued a cost-plus fixed-fee contract, possibly the largest ever in peacetime, rather than waiting for the competitive-bid process.⁴⁶ A three-firm consortium of engineers was formed to expedite procurement and shipping, check design, monitor construction, arrange housing, and keep a close watch on expenditures. This team was known as Management Support Associates, a joint venture of Lester B. Knight Associates, Incorporated, and A. Epstein and Sons International, Incorporated, both of Chicago, Illinois; and Pope, Evans and Robbins, Incorporated, of New York.

The call for contractors was announced on 13 April. On 1 May, eleven private companies and joint ventures submitted design and construction proposals, and on 16 May separate awards were made for the two airbases. The Negev Airbase

Constructors was a joint venture of Perini Corporation, sponsor, of Framingham, Massachusetts; Harbert of Greensboro, North Carolina; and Louis Berger International, Incorporated, of East Orange, New Jersey. The other airbase was to be built by Air Base Constructors, a joint venture of Guy F. Atkinson Company, sponsor, of San Francisco, California; Dillingham Corporation of Honolulu, Hawaii; and Nello L. Teer Company of Durham, North Carolina, in association with Tippetts-Abbett-McCarthy-Stratton of New York, New York.⁴⁷

The construction requirements included runways and parking aprons, aircraft shelters, and other operational and support facilities such as utilities, roads, and housing.⁴⁸

The project was completed near budget and nine months ahead of schedule.⁴⁹

Sinai Project

The Corps of Engineers mission to "fast-track" design and construct peacekeeping facilities in the Sinai Peninsula's of Israel and Egypt⁵⁰ involved the Huntsville Division in an extremely important international project. It was originally designated the "Z-Prime Project."⁵¹

The Corps was authorized to use extraordinary contracting procedures such as concurrent design and construction, and compressed notification schedules. R.D. Aldridge, chief of the HND Procurement Division, and R.L. Phillips of the Engineering Division, met with the chief of the Engineering Division, Military Program Directorate, OCE, to discuss HND's role in the Sinai peacekeeping construction mission. At this time HND representatives developed a preliminary schedule of events necessary to award a letter contract for the required design-construct-life support effort. This scheduling presumed consummation of an inter-country agreement and necessary funding. To meet the project time constraints, certain approvals and waivers from normal procurements were necessary. In a 23 June 1981 letter to the Huntsville Division OCE granted all requests.

Under the Camp David accords, one point of agreement was that the Sinai Peninsula would be returned to Egypt. The agreement called for three zones, with Zones A and B under the multinational observers and Zone C occupied by a multinational force. The Huntsville Division was to do the preliminary engineering and site investigation, produce a program development brochure, and set design criteria in order to establish housing, road, and facilities for Zone C. Negotiations between Egypt, Israel, and the United States resulted in initial agreements on 25 June 1981. By letter of 8 July 1981, OCE officially tasked HND with the mission and directed the following specific areas of support:

1. Conduct a source evaluation, selection, and award of a letter contract to a contractor who would design and construct facilities to accommodate the peacekeeping forces.
2. Support the Director General and OCE in finalizing agreements covering Corps construction.
3. Finalize criteria and designs to the maximum extent possible prior to the letter contract award.
4. Provide temporary personnel for technical, administrative, and contractual support as agreed upon in a Memorandum of Understanding (MOU) with the Sinai Project Office (SPO).
5. Negotiate the initial letter contract.
6. Develop an outline organization and indicate initial positions to be filled for the Sinai Construction

Management Office (SCMO).

7. Develop a draft MOU between the SCMO and HND .
8. Provide such other support as needed and agreed upon by the SPO and HND⁵².

Interested Israeli contractors were briefed in Tel Aviv on 13 August 1981, and HND held an industry briefing on 17 August. A selection process concluding on 20 August recommended a contractor to the Chief of Engineers. The expedited letter contract and technical package were completed 21 August 1981 in anticipation of contract award

on the same day. However, no funds were made available at that time.⁵³ On 22 August, Colonel William E. Lee, Jr., Deputy Division Engineer at HND, was selected to command the SCMO as a field operating agency of the Corps. Award of the letter contract was made on 2 September 1981 and transferred to the SCMO. Once the FOA status was established SCMO was no longer under the control of HND.⁵⁴ Numerous Procurement Division personnel were sent to Israel to support the SCMO during the first three months of operation.

VI.

HIGH TECHNOLOGY/ FACILITY SUPPORT

Nationally, the historical period 1977 through 1981 was one of accelerated technical growth and diversity. The Corps of Engineers used this new knowledge for a broad spectrum of applications. As a result of expanded programs for the Office of the Chief of Engineers, numerous new and extended missions came to the Huntsville Division. Among the major efforts were the Army Pollution Abatement Program, the Computer-Aided Engineering and Architectural Design System, and Department of Energy Projects.

Army Pollution Abatement Program

The Clean Air Act Amendment (Public Law 95-95) of 8 August 1977 stated that federal agencies must comply with procedural as well as substantive requirements of federal, state, and local pollution abatement laws. Thus, the Army had to obtain state permits for air pollution sources on its installations. This amendment allowed federal and state agencies and courts to take legal and/or administrative action at Army locations that failed to comply with applicable standards after 1 July 1975. It also required mandated fines after July 1979.

The Clean Water Act of 17 December 1977 was basically the same regarding compliance and action, however, the compliance date was extended from 1 July to 1 April 1979 in certain instances. That act also required a national contingency plan for minimizing damage from oil and other hazardous spills. The Department of Defense implemented the act through spill prevention control and countermeasures plans at all installations.¹

On 19 October 1977 the deputy administrator of EPA listed 25 installations as major noncompliers regarding air regulations and 32 as noncompliers of water regulations in the Department of the Army. Eight installations not complying with the water act were cited for priority action, including the Army ammunition plants at Kingsport and Milan in Tennessee, and Anniston Army Depot and Redstone Arsenal in Alabama. The Anniston Army Depot was also cited as a major federal noncomplier of the Clean Air Act.²

In reply, the Army Secretary cited the fact that the Office of Management and Budget had eliminated the Army's \$70 million request for pollution abatement projects in the FY78 budget, although the Congress restored \$18 million. He pointed out that six of the eleven "priority" actions that were identified remained in an unfunded status.³

A TWX dated 15 March 1978 from the Chief of Engineers to all Divisions and Districts covered a number of topics. In discussing the Army Pollution Abatement Program, the following points were addressed:

1. A growing concern was expressed that all pollution sources had not been identified and that pollution problems would not be resolved by the stipulated

dates.

2. The Chief of Engineers directed immediate action be taken to solve the Army's pollution problems, with provisions for full engineering services by the Corps of a nonreimbursable basis.
3. Support would be offered to complete pre-design documentation for all known pollution sources. With a target date of 1 May 1978, OCE would offer to conduct installation source surveys.
4. The Huntsville Division was tasked as the Corps coordinator for each survey. It would develop a standardized scope of work and be responsible for a project documentation review plan. Funds for nonreimbursable support would be provided through HND.
5. The Divisions/Districts were to provide to OCE by 17 March 1978 assessments of their capabilities to perform these surveys.⁴

The TWX also indicated that OCE was investigating access to Operations and Maintenance, Army (O&MA) funds to accomplish the work. Laboratories and other agencies were notified by DAEN-MCZ that the surveys would receive supplemental support from the U.S. Army Environmental Hygiene Agency (AEHA). The Huntsville Division was to coordinate the efforts of the Corps Districts with AEHA, Corps Laboratories, and other Army support personnel. Covered in the missions assignment letter of 6 June 1978, the APAP management plan was tasked specifically to HND.

The APAP required the following:

1. That all known sources of air and water pollution be included immediately in FY80 programming.
2. That surveys of Army installations be conducted immediately to identify unreported sources of pollution.
3. That project definitions and criteria be completed by 1 September 1978 for valid projects established by these surveys⁵.

Of the 144 Army installations, 129 were surveyed by 1 May 1978 for previously unreported pollution sources. Surveys of 15 lower priority installations were completed during September 1978. Of these 144 installations surveyed, 116 were found to be not in compliance.

At a program conference at the Huntsville Division on 9 May 1978, topics involved new projects for FY80 such as oil separators and wash racks at various MACOMs and Districts. A report on installations surveyed was presented, and packaging and priorities were discussed. The conference established milestones for Phase II of the program, which included survey results, funding plans, and pre-design information for review. The final milestones for pre-concept control data were to be delivered to MACOMs and OCE.⁶

On 24 May 1978 an APAP conference was held.

Representatives of nine Divisions, nine Districts, and four agencies attended, along with OCE. Colonel Dale Dobson, Division Engineer; Colonel Donald Reeves, Deputy Division Engineer; and nine other members represented the Huntsville Division staff.⁷ A number of pollution problems were addressed through the various conferences and interagency correspondence. Air pollution problems discussed were particulates, explosive and contaminated waste incineration, NOX and SOX monitoring, hydrocarbons, and photochemical oxidants. Water problems discussed were TNT, detonator, motor pool, acid, nitroglycerine, nitrocellulose, and nitroguanidine waste treatment; monitoring, metal processing, and finishing waste; nutrient removal; vehicle wash rack waste; and domestic waste.⁸

In the spring of 1978 Colonel Dobson reported that HND had identified, packaged, and ranked the following new projects: 23 FY80 MCA projects at \$50.0 million, 22 FY81 MCA projects at \$94.0 million, 19 MMCA projects at \$4.0 million, and 19 OMA projects at \$0.4 million. There were also 60 new projects added to ongoing MCA projects for \$5.0 million, and 155 new requirements for sampling and/or studies at approximately \$2.3 million of OMA funds.

Between May and September 1978, Colonel Dobson reported that major accomplishments "due in large part to excellent cooperation from all the Divisions and Districts" included the following:

1. A FY80 program that addressed the Army's most urgent problems.
2. Negotiation for more than \$2 million in pollution abatement studies.
3. Assignment of \$150,000 in studies to AEHA.
4. Completion of a U.S. Army Reserve Centers survey.
5. Appointment of the Mobile District as design center of competence for explosive waste incinerators standard design.
6. Appointment of the Fort Worth District as the design center of competence for conventional ammunition demilitarization facilities standard design.
7. Selection procedure for technology development centers of competence.
8. Establishment of a program technical support center at HND.
9. Preparation of contracts for support to AEHA.

Early in 1979, Colonel Dobson reported that FY79 funds would support only a very low level of activity. "Lack of sufficient funds," he noted, "has resulted in substantial loss of momentum, delayed execution of ongoing studies, and delayed programming action for FY81 projects." He especially cited the inability of HND to provide the necessary nonreimbursable support requested for many of the FY80 and FY81 MCA projects, and for FY79 exigent minor projects. Receipt of FY79 funds totaling \$4.6 million, mainly from the environmental funds, enabled HND to reestablish the APAP as a viable program. Specific APAP funding was sought by the Military Programs Directorate to avoid future use of the environmental fund. With installation compliance necessary at the earliest possible date, personnel continued to work toward that goal.⁹

In May 1980, a total of 136 MCA 1980 air and water projects were reported under construction at a cost of \$348 million. An additional 51 projects totaling \$141 million were programmed for FY81 through FY83.¹⁶ By the fall of 1980, 59 installations were reported as not meeting current air or water quality standards and requiring corrective action.

Following the FY80 program, noncompliers were reduced to 26, and then reduced to nine following the FY81 program. Two of the remaining 16 DARCOM projects contained in the EPA/DA compliance agreement were delayed or canceled. The Lake City AAP project was canceled because the state of Missouri forced regional treatment plant participation. The Tobyhanna Depot baghouse project was delayed while new technology was evaluated with state participation.

In FY81 APAP consisted of 21 projects programmed at \$67.87 million. The APAP portion of the FY82 program, the smallest program since FY74, included 10 projects totaling \$12.11 million.¹¹

Centralized management of the APAP was discontinued in January 1981 because Congress failed to fund APAP activities for FY81. The Office of the Chief of Engineers encouraged a phasedown of HND activities in favor of a decentralized management concept. The Huntsville Division was retained as a center of competence for APAP technology. It performed programming documentation, design review, and other pollution abatement tasks as required by OCE.¹²

Later, DARCOM requested HND support for its pollution abatement studies program. A Memorandum of Understanding between DARCOM and OCE was prepared to cover this relationship. It tasked HND to perform contracting management and technical support for studies DARCOM would assign. Most were to be groundwater assessments at installations where confirmed contamination existed according to results of the AEHA groundwater sampling program. The Huntsville Division expected that other studies would also be conducted and that work would continue for several years.¹³

Resource Conservation and Recovery Act

The Environmental Protection Agency (EPA) published implementing regulations for the 1976 Resource Conservation and Recovery Act (RCRA) in 1980. To begin early support of MACOM'S, proposed regulations were used to develop the scope of work for the FY79 architect-engineering (AE) study contracts. The May 1980 regulation imposed milestone dates on installations that treated, stored, or disposed of hazardous wastes. Monitoring wells were to be installed and a monitoring program was developed for each affected facility. The most pertinent milestone date for the Army Pollution Abatement Program was 19 November 1981, when underground monitoring was to begin around hazardous waste disposal facilities. As a result, MACOM's requested assistance from HND through the APAP to meet the deadline at remaining installations.¹⁴

The Huntsville Division had a substantial number of environmental, chemical, and mechanical engineers experienced in pollution abatement technology. This staff proficiency, along with other Corps capabilities and HND's contracting capability, provided a team well qualified to assist MACOMs in meeting regulatory compliance deadlines.¹⁵ The RCRA-related solid waste management activities provided for engineering data required for disposal site operating permits and investigation of potential contaminating conditions. During FY79, the MACOMs and HND identified 170 sites at 53 installations that required investigations for determining compliance. Funding shortfalls were expected to delay identification and corrective action past the deadline of 31 December 1980.¹⁶ By the fall

of 1980 action had begun on 38 installations and four had been completed.

Colonel William Lee, Acting Huntsville Division Engineer, reported to the Chief of Engineers that lack of funding for RCRA-related work would jeopardize the Division's capability to support the MACOM requests. The Division anticipated continued use of nonreimbursable support from the Army Environmental Health Agency. However, support from the Agency was hampered by personnel and equipment limitations. Colonel Lee reported that drilling and engineering support would be required from the field operating agencies and the AE firms.

To accomplish these projects, USATHAMA, AEHA, and HND worked together. These organizations held quarterly meetings to foster their relationship, and to coordinate study and corrective action for RCRA compliance. The meetings also helped prevent study duplication and wasteful Government expenditure.¹⁷

The Huntsville Division Engineer, reported to OCE in May 1981 that studies at 22 installations had been suspended pending the results of the new EPA groundwater requirements. By September 10 studies had been completed, and AEHA had installed the groundwater monitoring systems tasked to them by HND.

In the fall of 1981, HND awarded a contract to a private laboratory for analysis of groundwater samples. The laboratory was to perform groundwater studies near hazardous waste and some sanitary waste disposal sites. The work involved 44 installations that were identified by the applicable MACOMs. Of these, 29 were located at U.S. Army Material Development and Readiness Command installations.

Chemical Demilitarization Program

In August 1981 the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) and the Huntsville Division signed a Memorandum of Understanding to establish a program for demilitarization of obsolete chemical munitions.¹⁹ A short-term effort was for facility design and construction at Johnston Atoll. The Johnston Atoll project utilized technology developed from existing facilities at Tooele Army Depot, Utah, and the Rocky Mountain Arsenal, Colorado.²⁰ A long-term effort was technical support and studies to be developed for the facilities in the Continental United States.

The MOU established general relationships and procedures for support by HND to USATHAMA in the planning, programming, contracting, design, and construction of the facilities.²¹ Under the MOU the Huntsville Division would be the single Corps point of contact and as such would assure consistency and continuity between the various CONUS facilities.

The Department of the Army, in the late 1960s and early 1970s, had directed the ecologically safe disposal of certain chemical munitions that were obsolete and in excess of the national stockpile. One disposal facility was at the Rocky Mountain Arsenal. Technology gained on that project was used in developing the Chemical Agent Munition Disposal System (CAMDS) pilot facility at Tooele Army Depot. The CAMDS pilot facility was designed to dispose of all types of chemical munitions in the national stockpile. However, the actual demilitarization of obsolete chemical munitions would be accomplished by fixed disposal systems at selected CONUS sites and Johnston Atoll. Ultimately, the current

stockpile would be eliminated.

The Johnston Atoll stockpile had originated on Okinawa, which was the chemical depot for the Far East. Johnston Atoll became the repository for the stockpile because Public Law 91-672 prohibited its return to the Continental United States.³⁶ These stocks were removed from Okinawa in 1972, prior to that island's return to Japanese sovereignty. Design of the Johnston Atoll facility was expected to lead to the development of new methods that would be used at several sites in CONUS. Standardized and/or modular designs were expected to involve absolute containment to prevent accidental release of lethal agents. Hazardous and toxic materials would be handled both in the unloading and disposal of the chemical munitions.²² Incineration in lieu of chemical neutralization as the primary method of disposal for nerve agents was a significant advance incorporated into the Johnston Atoll facility.²³ The program was to encompass acquisition of facilities and specialized equipment requiring systems engineering and broad-based program management.

According to the MOU, the Huntsville Division was to prepare scopes of work for approval by USATHAMA, to prepare studies, and to distribute final reports per USATHAMA directions. The Division would develop criteria and designs for facility construction, and would assist USATHAMA in equipment design and procurement. Facilities construction coordination and monitoring would be handled by HND with appropriate geographical field operating agencies responsible for facility construction. The Division was to provide a supporting role to USATHAMA for all facility operation and maintenance.

As the result of a decision by the Navy not to participate in the Johnston Atoll project, Pacific Ocean Division (POD) assumed responsibility for support facility design and all facility construction. A Memorandum of Understanding between HND, POD, and USATHAMA established the role and responsibilities of each agency in the Johnston Atoll Project.

As a historical period 1977 through 1981 ended, the Huntsville Division had awarded a criteria development contract for the Johnston Atoll facility as well as contracts for study of a barge concept and development of design guidelines for containment facilities.²⁴

Computer-Aided Engineering and Architectural Design Systems

The Huntsville Division was the Assigned Responsible Agent (ARA) for one phase of the Computer-Aided Engineering and Architectural Design Systems (CAEADS). Army Regulation 18-1 divided the life cycle of the Army Management Information System into three phases: system planning and definition; system development; and system installation, operation and maintenance. The Chief of Engineers assigned Huntsville Division ARA responsibility for the third phase.

Systems developed in the 1977 through 1981 period were EDITSPEC, a program to aid the user in preparing and editing contract specifications; the DD Form 1391 Processor program; Selected Evaluation and Review of Criteria for Habitability (SEARCH); and Building Load Analysis Systems Thermodynamics (BLAST). As initially developed, the modules were "stand-alone" programs operating independently of the other modules. They could not

exchange information with each other. In addition to handling the system installation, operation, and maintenance, HND assisted the program through user training sessions.²⁵

EDITSPEC

The first of the five operating modules of CAEADS to be used in Huntsville was the EDITSPEC system. That system enabled all Divisions and Districts to produce project specifications by text editing or by complete automatic generation. It was more sophisticated than a text editing system and more advanced than other automated specification systems. As the automated specification module of the CAEADS system, EDITSPEC was originally developed by the Corps of Engineers Construction Engineering Research Laboratory (CERL). Huntsville Division assisted CERL by providing a field office environment, checking and testing commands, and setting up demonstrations of system use. The Division also entered text in a data base, updated the data base, and recommended changes necessary to the system from a user point of view.

Huntsville Division coded and entered all of the military construction guide specifications into the data base.²⁶ The Office of the Chief of Engineers also tasked HND to do a prototype test and to operate and maintain the data base for the system.

By 1979 contracts for computer terminals, printers, and computer services were being negotiated in Huntsville. The Division continued to update the guide specifications in CERL's research computer. The portion of the prototype test using Magnetic Tape Selectric Typewriter (MTST) machines began 16 April 1980 and the portion using EDITSPEC began 12 May 1980. The specifications for the cargo metal parts facility at the Mississippi Army Ammunition Plant were selected for the testing.²⁷

Whenever automatic generation was used, the specification engineer identified the design conditions required for the particular project on a checklist that was stored with each guide specification in the data base. By following a checklist, the terminal operator generated a project specification. Coding and defining guide specifications for complete automatic generation would require a 10-man-year effort. The Huntsville Division made EDITSPEC available to other Districts and Divisions. A central data base ensured that all Divisions and Districts would have access to current data and promoted uniformity through the Corps. The use of the computer facilitated exchange of information between Divisions and Districts and minimized human error.²⁸

Following completion of the production portion of the prototype test, a performance evaluation test review was held 8 and 9 December 1980. The review's major result was the recommendation that the system be implemented Corps-wide. The Huntsville Division and CERL worked to complete documentation for the Management Information System Economic Analysis and the Project Master Plan in early 1981.⁵¹ The Department of Army headquarters extended the system Corps-wide 8 October 1981. Training required three courses for a minimum of two operators from each District. Initial training was held in December 1981.²⁹

DD Form 1391 Processor Program

In a letter to the Divisions and Districts, the Director of Military Programs in OCE pointed out that one Corps goal

was to improve the process by which the Corps designed and constructed the facilities required by the Army missions. Basic to this process was the preparation of the military construction project data sheet, DD Form 1391. The form was used to justify the request for each program item before Congress.

From the primary inception by the installation to the final submittal to Congress, each project data sheet went through many revisions. Most of these revisions resulted from criteria or cost changes. To improve the form's quality and timeliness, CERL developed a computer-assisted process for technical review of the form. During development of the technical review phase, it became apparent that the system would be useful to the facility engineers for the initial preparation of the form. For this reason, the Corps expanded the study to make the entire process available to the commands.³⁰

As an integral part of CAEADS, the DD Form 1391 Processor program assisted in preparing, editing, and reviewing DD Forms 1391.³¹ The program also helped users in preparing, submitting, reviewing, correcting, printing, and storing the form and its associated data in accordance with AR 415-15, "Military Construction, Army (MCA) program development."

The functions of the system were to prepare documents, provide system-generated data, and manage a data base scope. The documentation included the front page DD Form 1391 and continuation page DD Form 1391c, project supplemental data, detailed project justification, quantitative data, special requirements paragraphs, review comments, and history changes. The system-generated data included three system modules. They were as follows:

1. Space allowance criteria for various AR 415-28 Facility Classes and Construction category codes.
2. Empirical cost estimates based on AR 415-17 category codes for computing facility cost per square foot in terms of size, location, construction time midpoint, technological complexity, construction type, modernization, and cost data reliability.
3. Project requirement and deficiency based on various factors, including the projected military strength from the AR 210-20 defined Tabulation of Existing and Required Facilities.

The data base scope required management of Military Construction, Army; nonappropriated funds, production base support; Army family housing; and operations and maintenance projects. With a projection of more than 10,000 forms to change, each project was automatically assigned a unique form number. The originator of the project could then "track" a form as it proceeded up the review channels, observing any modifications, alterations, and review comments.³²

Initiating the DD Form 1391 Processor program provided a challenge. Although the Automation Management Office had computers, the facility engineers also needed computers. The federal government AUTOVON telephone lines did not transmit data well due to old switching units. Because many persons needed to access the system, meeting the functional needs of all users presented problems. However, the Huntsville Division made changes in the program for different functional requirements.

Systematic Evaluation and Review of Criteria for Habitability

The Huntsville Division accepted the ARA designation for the Systematic Evaluation and Review of Criteria for Habitability (SEARCH) program in 1978.³⁴ A program to assist engineers in checking facility designs for criteria compliance, SEARCH was part of the CAEADS assignment from OCE.³⁵ As a means of becoming familiar with the program, OCE conducted the initial field test of the program with HND assisting CERL. Initially, HND leased the system for the first testing period of January through October 1981.³⁶ The Huntsville Division monitored the test to gain first-hand knowledge before assuming the ARA role for the system. The initial field test was later extended for four months.³⁷

During the field test some deficiencies were uncovered. The program had difficulties in handling multi-story buildings with many rooms per floor. The SEARCH software dated from the early 1970s with a technology which had been overtaken by the recently developed program. The CERL personnel modified SEARCH to incorporate a program called SKETCH-INPUT, developed by the University of Michigan. A supplemental scope of work issued to HND on 25 March 1981, stated that the Division would assume full responsibility for maintaining SEARCH and SKETCH-INPUT. The Division was also assigned DRAFT, the interface program between SEARCH and SKETCH-INPUT for training various Army personnel in its use.

During discussions among CERL, OCE, and HND personnel, Huntsville representatives indicated that the Division would assume full responsibility for SEARCH as Phase II ARA when the program was fully developed and documented. The Division would not be training other Army installations until its personnel had been fully trained in the use of the program. However, HND would render program development assistance whenever possible.

Computer Evaluation of Utility Plans

Among the CAEADS programs assigned to Huntsville Division was the Computer Evaluation of Utility Plans (CEUP). The purpose of this program was to analyze electrical distribution, storm water, sanitary sewer, and waste distribution systems.³⁸ The Division reviewed programming documentation for the water distribution and sanitary sewer program. This task included a system overview. User and operation and maintenance manuals were reviewed for each program.³⁹ Testing revealed that the system was not ready for fielding.

Building Loan Analysis and Systems Thermodynamics

Another CAEADS module was the Building Loan Analysis Systems Thermodynamics (BLAST) program set. The set, comprising BLAST, forecasted energy consumption and energy system performance. Representatives of OCE, HND, and CERL developed a plan to transfer that system responsibility to HND by 1 October 1981,⁴¹ a date that was later moved into the 1982 calendar year.⁴²

Guide Specifications

The Office of the Chief of Engineers transferred the

functional responsibility for development and maintenance of guide specifications and technical manuals to HND in July 1978.⁴³ The task involved developing and/or revising the guide specification series documents to promote Army construction uniformity and to provide requirements compatible with industry.⁴⁴

The technical manuals provided guidance for the design of Army facilities. They included criteria, procedures, and technical information pertaining to specific facilities and features of work.⁴⁵ Other important tasks were work on various standard drawings, preparation of design guide (DG-series) documents, and Mobilization ("M") design. The "M" design effort included both drawings and a new series of guide specifications.⁴⁶

As its first project, HND assumed the task of developing and maintaining the Real Property Maintenance Activities (RPMAs) guide specifications, which consisted of 282 handbooks. These were to be completed and distributed during 1979. A separate series of guide specifications existed for categories of emergency, Army Reserve Centers, family housing, and regular new construction. The family housing specifications were tri-service documents published by the Department of Defense, for which HND had limited updating responsibilities. The Guide specifications were developed and maintained through a combination of architect-engineer contracts, in-house effort, and work by Corps laboratories.

Whenever evidence existed that the specification requirements did not reflect current Army needs, HND updated a guide specification. Some specifications were used more frequently, represented a higher dollar value, were critical to safety, or were in a rapid state of technology change. Because the guide specifications were used repetitively throughout the country and in some cases overseas, their effect was greatly magnified. It was essential that the specifications be as up-to-date as possible. Therefore, the Division applied the latest information to evaluate research results and to use feedback from users and industry. Each specification had a comprehensive review at least once every three years.⁴⁷ The FY81 criteria update program included 16 contracts plus documents that were developed in-house.⁴⁸

Strategic Petroleum Reserve

The Strategic Petroleum Reserve (SPR) was organized to minimize the effect of oil-supply reductions, although overall responsibility for the program rested with the Department of Energy. Anticipated to be one of Huntsville Division's largest projects ever, the mission called for HND to provide systems engineering for all phases of the program. The Division was also responsible for managing construction for the Phase II portion. The Huntsville Division reported to the SPR Management Office at New Orleans, where HND received its technical management. Although the multi-billion-dollar three-phase program would provide storage for as many as a billion barrels of crude petroleum,⁴⁹ this potential was not reached because DOE did not follow through in its agreement with the Corps of Engineers. Phase I involved constructing facilities capable of storing 248 million barrels of crude oil. Phase II called for construction of an expanded capacity for an additional 280 million barrels of crude oil. The Corps involvement in Phase III was to support DOE in turnkey facility development of the remaining storage facilities,

which could reach 472 million barrels of capacity.

The Phases I and II storage was in underground salt caverns along the Texas and Louisiana Gulf coasts. Phase III sites were projected for other sections of the country and were to be a combination of underground salt caverns, underground mines, and above-ground steel tanks.⁵⁰

The Huntsville Division managed the SPR program under an SPR Division consisting of a Project Management Branch, a Construction Support Branch, and a Systems Engineering Branch. A Division SPR Project Office was co-located with DOE in New Orleans. In addition to the design and engineering capability in the SPR division, additional assistance and support was obtained from the Engineering Division and from the advisory and administrative staff of HND. Individual SPR resident offices were expected to be established at each construction site.⁵¹ The Resource Management Office instituted a revolving fund and civil works accounting system to handle the transfer of the SPR mission to HND. With civil money in the system, it was necessary to segregate accounting to provide cash to finance temporary needs.⁵²

Under the DOE program, the Corps was to become the design and construction agency for SPR, to provide a ready avenue for assuming additional DOE missions, and to safeguard Corps interests. The primary objectives for DOE were to obtain selected dedicated Corps services, to maintain control of programs, and to deal with a minimum number of field operating agencies.

From January through August 1979, the HND Procurement and Supply Division provided the chairman of the business committee and three other members to the Source Evaluation Board for the turnkey major solicitation for the SPR program. Two of these members also supported the three separate solicitations known as T-3 for three small turnkey projects where the Environmental Impact Statement had already been approved. Existing caverns at those locations could facilitate early storage of crude oil for this program. Subsequently, DOE made a programmatic decision to cancel the solicitation for the turnkey major projects. The small turnkey projects at Napoleonville and Cote Blanche involved many meetings, but 1979 ended without any clear direction as to the future of the projects. Efforts were made to negotiate a contract to develop the Ironton Mine site into an SPR site. Negotiations failed principally because of the inability to arrive at an agreement regarding the acquisition of real estate and the movement of oil through privately owned pipelines. These problems and the many other drawbacks in using this particular site prompted a DOE's decision to abandon the site.

By the end of 1979, HND's procurement and supply role with the SPR program had been reduced to providing support consistent with the developing nature of the HND involvement. Because the mission had not been positively defined, no active negotiations were in progress.⁵³

Although it was not as large as the T-3 program potential, HND anticipated a substantive mission with the DOE Regional and Noncontiguous Storage Program. That program was a new initiative under SPR aimed at alleviating refined product shortages in the Northeast, Hawaii, and Puerto Rico. The role of HND was discussed with the Acting Deputy Assistant Secretary for SPR. A statement of work for HND support during the planning phase was developed and agreed upon in principle.

During 1980 HND worked on two systems engineering

tasks for the SPR in New Orleans and delivered the final system performance criteria and system design criteria documentation in August 1980.⁵⁴ The Huntsville Division prepared a complete study on the Puerto Rico region, covering a wide range of subjects including oil transportation and drawdown.

Although 25 spaces had been allocated for the SPR program, only 16 were filled in 1979, which dropped to 14 by spring of 1980 because of the uncertain future of the program.⁵⁵ On 9 May 1980 the DOE Secretary decided not to include the Regional and Noncontiguous Storage Program in the DOE FY82 budget. This decision ended the program for the immediate future and HND wrapped up its work in that area. Within Systems Engineering, HND had completed the Levels I, II, and III criteria development. Some work was done in preparing solicitations for the Loan Guarantee Program and a handbook for the Source Evaluation Board proceedings. In that area, HND worked closely with the Deputy Assistant Secretary of DOE for Synthetic Fuels and his staff. To handle the assigned functions, the Huntsville Division called Wilmington, Fort Worth, Savannah, and Baltimore Districts as well as the Southwest Division and OCE personnel.⁵⁶

With the closing out of these DOE projects, the HND staff was now available to participate in new programs as assigned by the Office of the Chief of Engineers.

Pantex

One of the Department of Energy (DOE) support projects assigned to Huntsville Division was the Corps of Engineers support for design and construction management at the DOE Pantex munitions facility in Amarillo, Texas. The Pantex plant, owned by DOE and operated by Mason & Hanger-Silas Mason Company, Incorporated, was involved in the production, assembly, storage, distribution, and disassembly of nuclear weapons and associated hardware. Representatives of the Albuquerque Operations office and the Washington, D.C.-based Division of Construction Planning and Support of DOE visited HND in 1977 to discuss modernization of DOE's munition production facilities. As a result of the meeting, two representatives of HND's structural section visited the Pantex plant to present an overview on the methodology and state of the art in blast pressure prediction. The design and construction of protective structures was also discussed. The presentation and subsequent discussions with DOE and their contractor plant personnel let to HND's role as consultant to the Pantex plant, primarily in the areas of structural blast design and munition-type facility safety. The Division also worked on design and construction using the latest research, and on development- and production-type facilities. In conjunction with this effort, Charlie Huang of HND developed a design manual specifically for plant use in the design of protective structures.⁵⁷

In 1980 HND completed technical engineering support for the High Explosive Machining Development Facility. The Division also was engaged in review and consultation support for a Universal Pilot Plant and for a Production and Assembly Facility in the concept design.⁵⁸

Funded by DOE through its operating contractor on a cost-reimbursable basis, HND supplemented operating contractor services. The Division also independently checked the adequacy of designs performed both in house and by contract architect-engineers. Completed projects

during 1981 included design and design package review of the high-explosive development machine facility, review of data from the model test program for high-explosive production and assembly facilities, and final design and review of the universal pilot plant.⁵⁹

On 13 March 1981, a representative of the Albuquerque Operations Office of DOE and the OCE Military Programs staff met to discuss possible Corps assistance to DOE for their modernization and expansion program at the Pantex plant. Correspondence between Lieutenant General J. W. Bratton, Chief of Engineers, and the manager of the DOE Albuquerque office led to a meeting at the Pantex plant on 8 April 1981. The group discussed in detail the scope and magnitude of the DOE Pantex program and its requirements. The Southwest Division and HND furnished management plans to OCE. The Washington version of a consolidated management plan was sent to the DOE Albuquerque Operations Office. In May personnel from HND, the Southwest Division, DOE, the Fort Worth District, and OCE met at Fort Worth to discuss the Corps support to DOE in more detail. The Huntsville Division received informal copies of Interagency Agreements between the Corps and DOE, and a project management plan.

In meetings held between HND and the Fort Worth District in September and October 1981, it was agreed that HND would provide technical support to the Fort Worth District Amarillo Area Office during the construction of identified DOE Pantex facilities.

High Btu Pipeline Coal Gasification Program

The High Btu Pipeline Coal Gasification Program demonstrated the commercial readiness of selected processes for coal conversion to an environmentally acceptable substitute natural gas. The Energy Research and Development Administration (ERDA) and the Corps of Engineers entered into a Memorandum of Understanding in 1975. The MOU provided for furnishing certain support functions to the Fossil Energy Division of ERDA. The memorandum continued in its original form when ERDA became part of the Department of Energy in 1977. The Chief of Engineers designated HND as the responsible agency for the support mission.

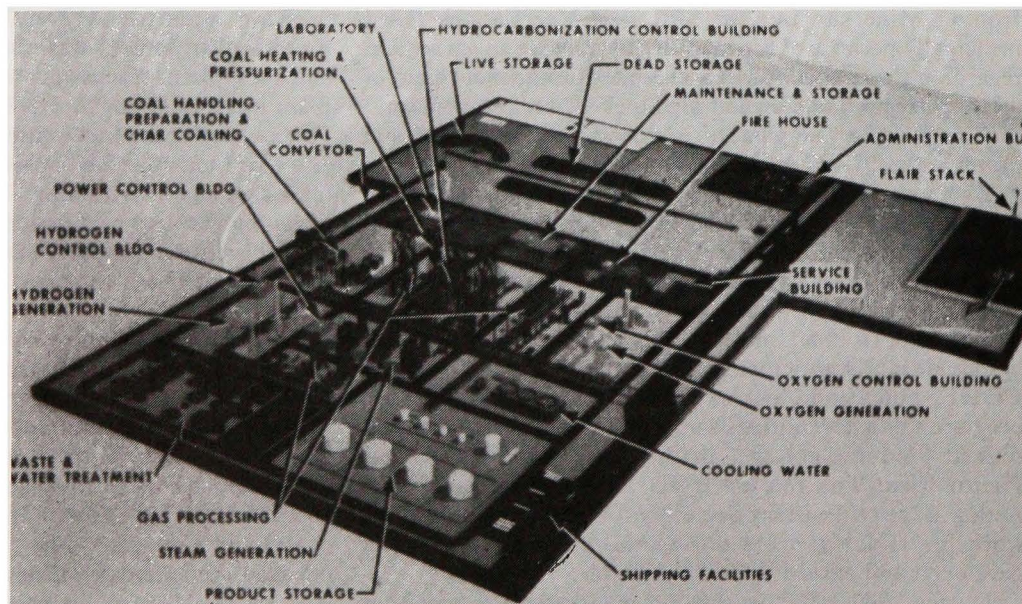
The Division provided technical and administrative support in the clean boiler fuel, fuel gas, and pipeline gas demonstration plant programs. These programs were intended to convert high-sulfur coal to clean burning liquid, gas, or solid fuels.

The Clean Boiler Fuel Program was to verify, through a demonstration plant, the economics, potential, and feasibility of a process for producing clean-liquid boiler fuel, pipeline gas, and other useful products. Initiated in the mid-1970s, this program was terminated in June 1977 when it was determined that the process technology was not sufficiently advanced.

The fuel gas program had as its objective the demonstration of the economic feasibility of low- and medium-Btu fuel gas use in large- and small-scale industrial applications and utilities. Contracts for the industrial plants were awarded to both Memphis Light, Gas and Water and to EBASCO Services, Inc. The Huntsville Division was tasked to assist Memphis Light, Gas and Water in developing required procedures to obtain DOE approval for proposed subcontracts. The Division's participation ended with completion of source selection.

The pipeline gas demonstration plant program objective was to demonstrate the economic feasibility of producing high Btu pipeline quality gas (900 to 1,000 Btu cubic foot) from high-sulfur, agglomerating-type coal.⁶⁰ The program resulted in the award of two contracts, one to the Continental Oil Company (Conoco, Inc.) on 27 May 1977 and the other to the Illinois Coal Gasification Group (ICGG) on 7 June 1977. The latter was a consortium of five public utilities in northern Illinois.⁶¹ These were multiphase contracts that were to lead to the construction of one demonstration plant. The support role of HND increased in the technical management and procurement management areas. The Division established one-man field offices at the architect-engineers' design facilities at Pittsburgh, Pennsylvania, and Livingston, New Jersey. Phase I, engineering and design, was fully funded by the government. Phase II, construction, and Phase III, operation, were 50-50 cost shared.

In a separate action, Procon, Inc., of Des Plaines, Illinois, received the third contract in high-Btu gas technology on 29 July 1977. This AE-type contract was to



The Clean Boiler Fuel Program was Aimed At Establishing a Demonstration Plant.

develop conceptual design of a commercial plant and scale down to a demonstration plant using the HYGAS process developed by the Institute of Gas Technology. The Huntsville Division supported the effort by providing project management, technical, and subcontracting support. Work on the Procon contract was completed in April 1979.⁶²

In November 1977 the Huntsville Division Engineer was named administrative contracting officer for all three pipeline gas contracts, with authority to approve subcontracts up to \$1 million and all contractor payment vouchers. The Division performed a number of technical, administrative, and contract administration tasks in its multiple roles as a member of the project management team for each contract and as administrative contracting officer.⁶³

The demonstration plants were basically chemical plants similar in many respects to explosive manufacturing and acid production facilities. The Huntsville Division support provided to DOE was similar to that used for the production base support program and other HND missions.⁶⁴

Some problems arose with the British Gas/Lurgi Slagging Gasifier in Noble County, Ohio. Legal difficulties with British Gas and Lurgi over proprietary data disposition on the Conoco contract were resolved by modifying the contract.⁶⁵

Upon award of three synthetic pipeline gas contracts, Conoco, ICGG, and the HYGAS demonstration plant projects, HND provided full-time personnel on site for the primary subcontractors. This involved project management support at Foster Wheeler Energy Corporation for ICGG and at Dravo Corporation for Conoco. A full-time project management team in Huntsville provided support in design reviews, progress assessment, cost and voucher review and approval, quality assurance planning, and site requirements. The team also handled configuration management, overall contract administration, scheduling, procurement, real estate, and environmental requirements. In providing contractor assistance, HND offered instruction and preparation of draft responses to contractors' letters.⁶⁶ The Department of Energy, Fossil Fuel Processing Division, maintained a liaison office within the Huntsville Division.⁶⁷

Following considerable design work and plans for developing a demonstration plant, HND was forced to terminate the contracts due to a congressional decision not to construct either plant.⁶⁸ The DOE budget proposed to Congress in 1981 eliminated further funding. The contracts were terminated at the end of Phase I. Conoco completed Phase I on 30 June 1981, and ICGG completed a reduced-scope Phase I in mid-July of that year.⁶⁹

In other DOE areas, HND provided a construction management function at two centers: a \$1.6 million project at the Carbondale Mining Research Center, Carbondale, Illinois, and a \$1.5 million project at Pittsburgh Energy Technology Center, Brucetown, Pennsylvania. Both projects provided full contracting officer authority to HND to advertise, award, and manage construction. Actual construction management was performed by the Omaha and Pittsburgh Districts.⁷⁰

Solid Fuel Conversion Program

The Army was embarking on a program to provide new central boiler plants using solid fuel rather than oil or gas at selected installations. In mid-1981 the Huntsville Division was designated the center of engineering expertise in the area of central coal-fired boiler and electric power gen-

eration plants. The Huntsville Division proposed to OCE that the Division be tasked to assist with the Solid Fuel Conversion Program (SFCP) to assure proper application of technology, to verify costs, and to provide technical guidance to field operating agencies.

Responding with a tasking letter on 8 June 1981, OCE outlined major responsibilities and requested a management plan. The management plan was forwarded to OCE 16 July 1981. That office formally concurred with the management plan on 4 September 1981, but stated that design tasks would not be assigned to HND.

It was estimated that one project per year would be funded using Military Construction, Army money. The feasibility studies were prepared as part of the Energy Engineering Analysis Program (EEAP).

The program included providing technical assistance to each design District for the following:

1. Development of DD Form 1391 and Project Development Brochure.
2. Architect-engineer selection.
3. Development of a design package with cost estimates, design analysis, and outline specifications.
4. Detailed design reviews.
5. Development of operations and maintenance guidance.
6. Evaluation of acceptance testing, followed by compliance testing of the complete plant.

Additionally, HND was to develop a design manual and specifications for standard components and subsystems leading to standardization in the plant engineering and design. Huntsville's support to the SFCP was a technical mission handled primarily by the Mechanical-Electrical Branch of the Engineering Division. A total of 16 installations were considered for central solid fuel boiler plants through FY95. The first 3 in design were Red River Army Depot, Texas; Redstone Arsenal, Alabama; and Fort Bragg, North Carolina.⁷¹ The Division was also to assist the Mobile District with revalidation of economic analyses to determine feasibility of cogeneration at Redstone Arsenal's central boiler plant.⁷²

The Division Engineer reported that HND was to develop a cell of engineering expertise in the design of central coal-fired boiler and/or selective-power generation plants. The objective of the cell was to maintain familiarity with appropriate advanced technology and current regulations governing air quality, energy conservation, and alternative fuels. The cell would improve cost estimates, achieve commonality in programming documentation for like requirements using the latest proven technology, and achieve maximum standardization of designs for functional systems.⁷³

Energy Monitoring and Control Systems

On 7 June 1979, HND received a task assignment letter designating and clarifying Corps of Engineers responsibility for the Energy Monitoring and Control System (EMCS).⁷⁴ This system provides energy savings by controlling and monitoring mechanical and electrical systems in building. Huntsville Division had the responsibility for technical coordination during design and construction of all EMCS projects managed by the Corps Districts and Divisions. The Division prepared an EMCS design manual and accompanying instruction course aimed toward standardization of designs. Funding for technical manuals and guide specifica-

tions came from the guide specifications program. The Corps of Engineers Training Management Division program funded the design course.

Huntsville Division developed, presented, and conducted four 40-hour courses for Army, Navy, and Air Force personnel. It held separate courses for architect-engineer firms that were interested in designing EMCS. The Division also developed a special EMCS orientation trainer-simulator to use with both the course of instruction and the educational presentation. The educational presentation furnished to the Districts was for base or depot commanders, facility engineers, and civil works project engineers. The Division also was responsible for preparing four different Corps of Engineers guide specifications for EMCS.⁷⁵

Colonel Dale Dobson, Division Engineer, reported that the Division's initial responsibility was to provide the design manual, the Army's share of the tri-service effort. At that time the Navy was producing the specifications. Huntsville Division personnel attended several review and management conferences in 1978, and HND was later tasked to act as the Corps agency to coordinate all Army comments relative to the specifications and manuals. The rationale for designating HND for overall management and as the center of competence for EMCS technology was submitted to OCE. The Huntsville Division tasked Kling-Lindquist to prepare a presentation explaining the importance of and methods for initiating EMCS installation procurement for post commanders and facility engineers. This design manual contractor developed a distribution program for the Major Army Commands (MACOMs) and other services.

The Division began work on a tri-service design manual and issued an intermediate draft of a technical manual for consolidated tri-services design requirements by fall of 1979. The Office of the Chief of Engineers designated HND as the center of competence for EMCS technical coordination in the design and construction phases. The Division reviewed several EMCS designs during 1979.⁷⁶ Division personnel attending a Corps-wide EMCS workshop in October 1979 recommended an annual workshop to promote exchange of technical information in EMCS.⁷⁷

Huntsville personnel prepared the technical manual, guide specifications, and design course of instruction. They also reviewed EMCS design packages and prepared a presentation for facility engineers. The Huntsville Division co-chaired a workshop with OCE in October 1979 and March 1981. The Training Division course featured a trainer-simulator, which was demonstrated at a conference in December 1980.⁷⁸

During 1980, HND reviewed four EMCS projects and resolved technical questions and problems in response to FOA requests. Several EMCS courses were conducted that year.⁷⁹ In the fall of 1980 and in the spring of 1981 HND managed four industry forums to discuss proposed changes and updates for the EMCS guide specifications.⁸⁰ During 1981, HND initiated a new guide specification for EMCS data transmission media, including both radio frequency and line carrier techniques. That same year OCE assigned new responsibilities to HND for overall coordination of EMCS technical activities. These included design review for all phases and participation in factory and site testing. The Division also established an overall management information system. The Office of the Chief of Engineers approved and printed the technical manual and guide specifications. The Huntsville Division formulated and

distributed the management information system, which required additional information from the Divisions and Districts.

On 22 December 1981, HND and OCE jointly formulated a concept of overall EMCS program supervision. The concept was to establish technical and contractual criteria for new systems, assure operation and maintenance of EMCS, and resolve problems of systems under construction or completed. Ad hoc committees, consisting of Division and/or District Engineers or construction technical coordinators, were to be formed as required to supervise programs. Most of the Divisions and Districts had already assigned technical coordinators for EMCS. The Huntsville Division was also to review all contract modifications that would significantly alter the description, performance, or test and acceptance requirements of the hardware or software.⁸¹

Energy Engineering Analysis Program

An Energy Engineering Analysis Program (EEAP) was established in July 1977 to reduce energy consumption at all Army installations. The program resulted from Executive Order 12003 of 1977 regarding energy savings. Working directly with the geographical Divisions and Districts, the Office of the Chief of Engineers managed the program. On 13 September 1979, HND received a task assignment.⁸²

The short-term goals established in 1977 were to reduce energy by 20 percent by 1985 for existing facilities and by 45 percent on new facilities. These figures were based on the gross square footage for like facilities in 1975. The long-term goal established was a 50 percent energy reduction by the year 2000. The program was OMA-funded by direct allotment from OCE. The role of HND was to provide centralized management and technical assistance to achieve these goals. The geographic Districts were to perform installation energy consumption surveys and develop methods for reducing these demands.

The Army Facilities Energy Plan was issued by OCE on 1 October 1978. Outlining the background orders, the report discussed the goals, energy studies and surveys, energy management, funding, objectives, and guidance of the program.⁸³ The Division submitted a draft management plan on 6 December 1979 to establish HND as the central manager of EEAP.⁸⁴ A month later, on 10 January 1980, OCE assigned central management of EEAP to the Huntsville Division. Additional tasks were to publish and distribute a management plan delineating the functions and responsibilities of the various offices participating in the program.⁸⁵

The field operating agencies and Major Army Commands received a program management plan in early spring implementing the HND central management function. In May and June 1980, HND met with the MACOMs and Divisions and Districts to discuss the program, problems, and improvements.⁸⁶ Division personnel worked closely with OCE to ensure that all actions were accomplished on time while management shifted to HND. The Division closely monitored the program, particularly as to contract costs, uniformity of product, and user satisfaction with the results of the program, all of which OCE had identified as problem areas.⁸⁷

For 1980 the project scope was to provide central management for a multiyear program to analyze the energy use of all major Army installations and to develop plans and

projects for energy conservation. The work would require eight man-years in house for FY80, with HND funding at \$384,000. On 5 September 1980 HND briefed the Assistant Secretary of the Army.⁸⁸ In 1980, when Congress funded the program through 1986, Bobby Ganus was the program manager at the Huntsville Division.

The energy management plan called for storm windows, insulation, heating and cooling air flow, heat recovery incinerators, heat recovery, and solar heat. The solar heating, while not hot enough for showers or dishwashing, was used for such areas as indoor swimming pools. The program also included shower flow restrictors, caulking for older buildings, new lighting systems, and setting back thermostats back at night. If the project was under \$200,000, the funding was handled by the FOAs, MACOMs, FORSCOM, Districts, and/or Divisions and completed within a year. Larger projects had to be federally funded and generally took a longer period of time.⁸⁹

A revised edition of the management plan was distributed 5 December 1980 and 11 pages of that plan were revised 9 June 1981.⁹⁰ The FY81 program was realigned to add maintenance and repair, and minor MCA construction projects that did not meet Energy Conservation Investment Program criteria. This realignment resulted in some FY81 installations being moved to FY82 and some installations being included as options subject to availability of funds. Although HND received \$14.5 million for the FY81 program, \$1.4 million was temporarily withdrawn for the rapid deployment force. The remaining funds went to the Divisions and/or Districts that were working on AE selection procedures and modifying existing contracts. The Huntsville Division completed a comparative review of nine studies and revised the standard scope of work to incorporate lessons learned for the review. Huntsville Division personnel met with representatives of OCE, FORSCOM, TRADOC, and DARCOM on 9, 16, and 23 April 1981 to establish items of work for the FY82 program. The revised SOW was issued in May 1981.

In a report to Lieutenant General J.K. Bratton, Chief of Engineers, in the fall of 1981, Colonel John Poteat, Huntsville Division Engineer, reported that the FY81 program had been expanded. An additional \$1.8 million had been received, increasing the funds from \$12.75 million to \$14.44 million. A meeting was held with Division and District personnel on 14-15 July 1981 to discuss the SOW and EEAP. With the increase in FY81 funding, the FY82 program was revised and issued to the Divisions and Districts in July 1981.⁹¹

Terrain Analysis

Early in 1977 the Engineer Topographic Laboratory (ETL) at Fort Belvoir, Virginia, requested the assistance of HND in fulfilling its mission of providing planning documents to base commanders. The Office of the Chief of Engineers coordinated this Request. The purpose of the task was to award and manage architect-engineer contracts to perform terrain analyses in selected areas of the world. The analyses presented essential information for evaluating the effects of terrain and man-made facilities on Army field operations.

The scope of work prepared by ETL generally included cartographic and engineering services for the preparation of stable base film overlays for the following topics: surface configuration, vegetation, cover, concealment from aerial

detection (summer), concealment of aerial detection (winter), surface drainage, cross-country movement, key terrain, and climate. Railroads, Lines of Communication-highways, airfields, built-up areas, transmission lines, and facilities were also included.⁹²

On 22 July 1977, HND awarded the first AE contract for the preparation of a military terrain analysis at Fort Carson, Colorado. Two months later HND awarded the second contract at Fort Bliss. In the two similar 1977 contracts, HND passed contracting officer representative (COR) authority back to ETL to provide the property technical review. While HND continued to provide contract support to ETL during the life of the contracts, it provided technical support only as requested.⁹³

In 1978, HND continued to work on this mission. Analysis for the AE selection for Fort Knox, Kentucky, and Fort Jackson, South Carolina, was completed. During that year, 10 additional terrain analysis contracts remained in the Continental United States program. Following discussions with ETL, HND selected and negotiated classified contracts for selected areas of the world. In 1979 HND worked on six to eight contracts.⁹⁴ The laboratory provided the funds to administer the AE contracting procedures.

Design and Construction Evaluation Program

On 6 June 1978 the Office of the Chief of Engineers transferred the Design and Construction Evaluation (D&CE) function to the Huntsville Division, while Training Management and the guide specifications program were also in progress.⁹⁵ Traditionally, field review and inspection of military construction for design or material deficiencies had been a function of the D&CE Branch of OCE.⁹⁶

Colonel Dale Dobson discussed the Design and Construction Evaluation Branch, a section of the Construction Evaluation and Management Division, in a September 1978 report. He indicated that the Division, headed by Harvey Aden, analyzed the quality of design and construction through field visits and recommended ways to meet required quality standards.⁹⁷

Three kinds of visits were used for on-site evaluation of design and construction. The three, each of which used a team approach, were the technical evaluation team, post-completion inspections, and design criteria feedback. Huntsville Division personnel, assisted by team members from the appropriate Division and District, made design-construction technical evaluation team visits to installations with construction in progress.⁹⁸ Three major engineering disciplines—civil, mechanical, and electrical—were usually represented. The on-site visits included technical evaluation of design application, adequacy, and thoroughness; materials and equipment suitability; workmanship quality; and criteria application. Contract compliance and conformance to OCE guides, technical manuals, and Engineer technical letters comprised other aspects of the review. The Division also encouraged use of uniform interpretations and application of national building codes, federal specifications, guide specifications, and other technical criteria affecting Corps-wide construction operations.

Post-completion inspections were held six months after occupancy to detect deficiencies that were not discernible until the facility had been used. These inspections covered problems in the areas of construction, materials, equipment, design maintainability, and functional adequacy.

Inspections in the Design Criteria Feedback Program also used the team concept. They were performed on

facilities that either had been in use for approximately three years or for which design criteria problems had surfaced. Information on deficiencies in design, construction, and functional requirements observed on these visits was sent to responsible offices. This information was then used in updating training manuals, guide specifications, and standard drawings. Design and construction deficiencies that occurred repeatedly were given attention by the personnel who were instructors and proponents of the Corps-sponsored training courses.⁹⁹

The three programs that had been transferred from OCE were interrelated in several ways. The Military Construction Directorate D&CE activity promoted proper interpretation of guide specifications and other technical guidelines in the Corps-wide construction operations. It also developed data for input to new or revised criteria, regulations, and guidelines. The Corps training mission was directed primarily at improving the skills of Corps personnel in performing their assignments. In particular the program emphasized applying appropriate guidelines in the design and construction process. The Huntsville Division participated in the RPMA guide specification program to provide specific requirements for maintenance and repair of facilities. It had been tasked with developing specifications for 45 topics.

The Division pointed out several advantages of moving the project to Huntsville:

1. Co-location of these functions with guide specification management provided the opportunity for direct feedback from the design/construction evaluation activity into the guide specifications and training programs. These functions were judged to be mutually supportive and more effectively accomplished under single management.
2. The Huntsville Division provided organizational and administrative support for automatic data processing, reproduction, and legal and contracting areas.¹⁰⁰

Establishing the three functions at Huntsville was

consistent with HND's nongeographical role. Other benefits were to provide an interface of functions, to facilitate feedback, and to establish a base in the field for development of a stronger Corps-wide training/evaluation organization. That organization could be expanded to include evaluation of and assistance to facilities engineers in their operation and maintenance work.

By performing on-site review and inspections of constructed facilities, HND evaluated the design methods and provided information affecting future projects as well as identifying areas for immediate corrective actions. This service provided an excellent exchange of ideas with the military construction guide specifications program as well as with the professional training program.¹⁰¹

Nuclear Weapons Storage Test and Evaluation Site

The Defense Nuclear Agency (DNA) requested that HND furnish engineering support for a simulated security nuclear weapons storage test evaluation and training site. This support included preparing conceptual studies and site investigations.¹⁰² In a task assignment letter dated 27 August 1981, DNA requested that HND design project.¹⁰³ The project was to be built on an actual U.S. site, but was planned for use at tactical sites outside the Continental United States. In order to accommodate all possibilities, HND selected a "middle of the road" type of design. Russ Hilyar and Al Bertini of the Huntsville Division served as program managers for the design study and site evaluations.¹⁰⁴ The goal of the test facility was to evaluate site defense, security techniques, and state-of-the art intrusion detection systems. The program studied designs that were, or might be, used at new or existing fixed storage sites.¹⁰⁵ The facility was to provide a testing site in a "real world" training atmosphere.¹⁰⁶

The Defense Nuclear Agency approved the site selection in December 1981. The Huntsville Division determined that the least expensive site to meet the functional needs¹⁰⁷ based on terrain and environmental similarities was located on Pelham range at Fort McClellan, Alabama.¹⁰⁸

VII.

CORPS OF ENGINEERS

TRAINING MANAGEMENT

During 1977 Lieutenant General John W. Morris, Chief, U.S. Army Corps of Engineers, directed that a study be conducted to determine if the skills and capabilities of the Huntsville Division could be better utilized. The study was completed and approved, and by letter dated 6 June 1978 HND received several additional mission assignments. One of these was to manage and administer the CE training management program for the Corps of Engineers.¹ In its original mission statement, the Office of the Chief of Engineers directed the CE Training Management Division to perform the following functions:

1. Plan, develop, direct, and coordinate the short-course training program sponsored by the Corps of Engineers. The program would be attended by personnel from other agencies and services.
2. Advise Corps participants and other users concerning the Corps-sponsored training program objectives. Provide technical assistance and advice to management regarding determination of training needs and evaluation of results.
3. Develop intermediate and long-range plans and program guidance. Estimate future training requirements for courses based on information provided by the OCE Resource Management Office.
4. Develop special courses to assist District and Division Engineers and other Corps personnel in implementing new or revised policies, regulations, and procedures.
5. Evaluate and review courses of instruction. Review and approve new course proposals and determine the location for each course.
6. Manage funds for the Corps-sponsored training program.
7. Prepare procedural directives for Corps-sponsored courses.
8. Designate field operating agencies to furnish personnel for course instructors, then train and monitor instructors.
9. Publish and maintain the Managers and Supervisors Training Handbook.
10. Administer training for the Alcohol and Drug Abuse Program.²

The move to the Huntsville Division also provided centralized management for short-course training.³

Personnel

Charles (Wes) Dahlgren of OCE was selected to serve as chief of the CE Training Management Division. In July 1978 Richard Sanborn and Arthur Deckelman transferred from OCE to HND to assist in developing the program.⁴ The HND building at Cummings Research Park served as the temporary quarters for the office.⁵

On 1 March 1979 Dahlgren left the CE Training Management Division to return to OCE. In April 1979 Emmett Creekmore became chief of the CE Training Management Division.⁶ Creekmore had been assistant director of the Directorate of Training at the Missile and Munitions School, Redstone Arsenal, Alabama. At that time Sanborn was chief of the Professional Development Branch, and Deckelman was chief of the Technical and Facilities Engineering Branch.⁷

In late 1979 Mike Rand, Ph.D., was added as an academic advisor, and in 1980 Frank Neilson, Ph.D., became a research and development advisor. Rand, Professor of Environmental Science at the University of Alabama in Huntsville (UAH), worked with the Corps through an Intergovernmental Personnel Agreement to review the environmental content of the training program. Rand's job was to consider the curriculum being offered and to recommend adding environmental topics for other courses, especially construction. He also researched the possibilities of using courses from universities or private organizations. As a result of Rand's research, the course contents were determined to be above average in the environmental area.⁸ The Corps detailed Neilson, a permanent employee and hydraulic engineer with the Waterways Experiment Station (WES) at Vicksburg, Mississippi, to the CE Training Management Division. He was to ensure that the Corps-sponsored training incorporated the latest technical advances as soon as they were ready for transfer from the laboratory to practical application in the field.

Later Gerald R. Guinn, Ph.D., director of the Alabama Solar Energy Center at UAH, joined the CE Training Management Division for a six-month period as an academic advisor. In this capacity he assisted in defining and planning the energy-related training activities and in identifying projects and current requirements imposed by Corps programs, policies, technology transfer, and development needs.⁹

Organization

As originally formed the CE Training Management Division (see figure 11) was the center for the Corps-sponsored training program and became an operating division of HND.¹⁰ In early FY79 the division had a total of 18 spaces, and it reorganized into six branches: Professional Development, Technical and Facilities engineering, Contracts Management, Environmental Engineering, Energy and Conservation, and Support.¹¹ The expansion of the program required 10 additional spaces.

The Support Branch coordinated hotel arrangements, assisted with on-site preparations, furnished logistical support, and prepared student packets and correspondence. The branch remained intact throughout the 1979-1981 period. The other content-oriented branches were reor-

ORGANIZATION CHART OF HND TRAINING DIVISION

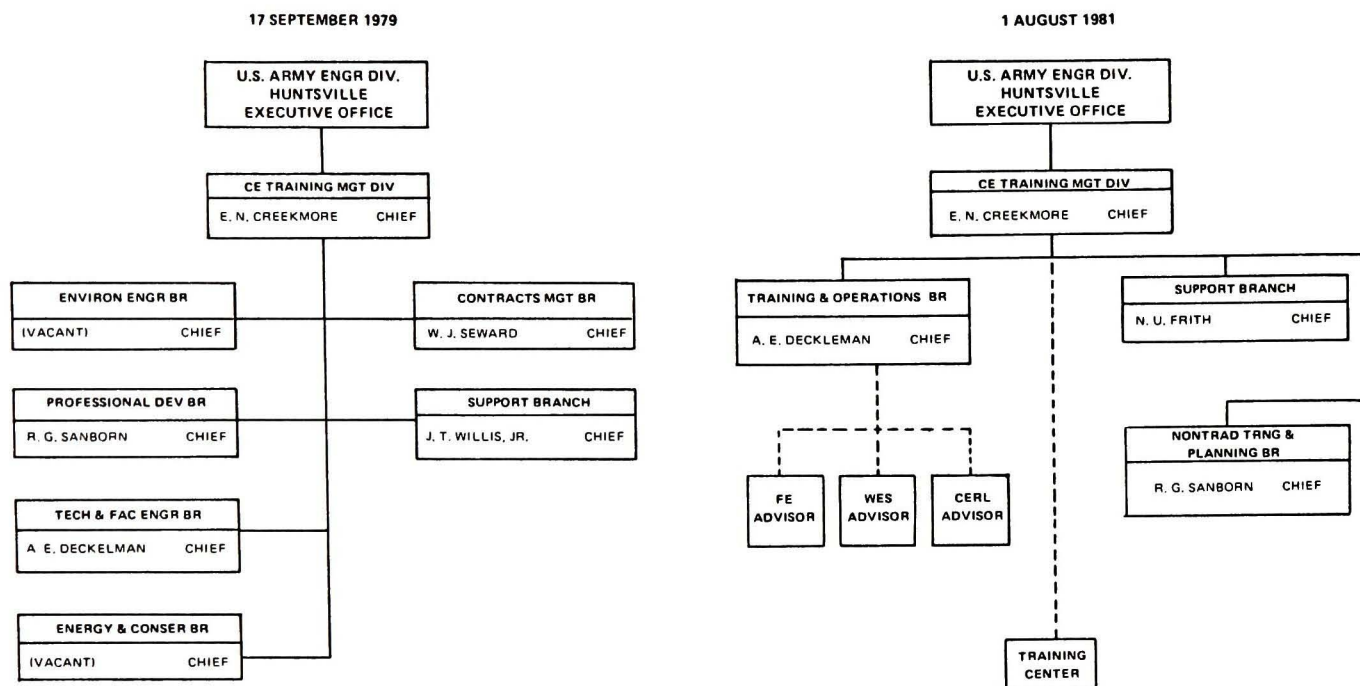


Figure 11

ganized in 1981 as the Training and Operations Branch and Nontraditional Training and Planning Branch,¹² the latter to accommodate the new CONTRAST program that was organized to develop videotape-based exportable training.

Courses

The first course offered by the CE Training Management Division at Huntsville was the Contracting Officers Course, presented on 11-20 September 1978.¹³ All officers appointed as District Engineers and Deputy District or Deputy Division Engineers were required to take this course to be certified as contracting officers.¹⁴ Thirty-two officers attended the course which was a 59 hour session held at the Huntsville Hilton Hotel. Major General Bates C. Burnell, Deputy Chief of Engineers and former Huntsville Division Engineer, made the opening remarks. Principal blocks of instruction included procurement, contract law, and contract administration.¹⁵

In the overall CE training management program, the largest number of students was trained in the in-house sessions taught by Corps employees. By 1 April 1979 the Corps was offering 106 different courses, many with multiple sessions. The program expanded in FY79 and again in FY80 as a result of Presidential attention to the environment and energy. Corps research and development laboratories and organizations acted as training agencies and provided both instructors and facilities for a number of specialized courses. As an example, one Corps Agency, WES, at Vicksburg, Mississippi, presented nearly 40 courses annually to 1,200 students.¹⁶ The U.S. Army Institute for Water Resources at Fort Belvoir, Virginia, offered seven courses, and the Hydrologic Engineering Center at Davis, California, offered more than a dozen courses.¹⁷ See figure 13 for a map showing site locations. A typical short course offering did one or more of the

following: increased or maintained technical knowledge, provided technology transfer, taught new technology and skills, oriented new employees, and/or provided cross training.¹⁸

The Purple Book

On 15 February 1977 OCE published a curriculum catalog entitled the Managers and Supervisors Training Handbook.¹⁹ Its purple binder was selected especially to make this manual stand out visually on any shelf for quick access and use in counseling personnel.²¹ The staff, assisted by Deckelman and Sanborn, completed this compilation in 120 days and made the catalog available to all supervisors and training officers.²² The manual's foreword by Lieutenant General John W. Morris, Chief of Engineers, reaffirmed training as a top priority for all employees.²³ On 11 December 1980 the CE Training Management Division published a new issue of the "Purple Book," updated by Al Stokes, and revised to keep pace with new Corps missions, technology transfer needs, changing personnel, and workload.²⁴ This revised catalog demonstrated how the loose-leaf binder could facilitate the orderly updating of course offerings. Redesign of the "Purple Book" allowed for more space for specific course titles and descriptions. By late 1981 Janice Perry was in charge of the yearly updating of the "Purple Book."²⁵

Marketing and Facilities

In order to promote courses available to the various Corps personnel, Jeff Seward prepared a training briefing early in 1979. During the summer of that year Emmett Creekmore and Colonel Donald Reeves, Deputy Division Engineer, traveled to CONUS Divisions and OCE and gave 1.5 hours of formal presentations, followed by one to two

hours of questions and answers. The purpose of this "road show" approach was to explain the entire proponent-sponsored short-course training program to all the field users. The Corps also made available a one-hour videotape of the program for Corps personnel in Europe and the Middle East Division.²⁶

In August 1979 the CE Training Management Division moved from the Cummings Research Park building to a leased facility at 1309 North Memorial Parkway in Huntsville. Known as the Training Center for Professional Development, the center was a two-story building totaling 10,470 square feet. It had three classrooms, a student lounge, and office and administrative space, providing much-needed space for the expanding programs.²⁷ The Division later added 3,000 square feet of warehouse space at a separate location.²⁸

Instructors

Instructors from the 14 Divisions and 40 Districts of the Corps presented the in-house courses, accounting for approximately two-thirds of the total course offerings. In-house instructors were chosen from personnel, who for the most part were experts in their specific fields of endeavor and who taught in addition to their normal duties.²⁹ The instructors' in-depth knowledge was tested and sometimes enhanced by their interaction with working engineers attending the courses from the various Division/Districts. Retired Corps employees or employees of other government agencies were also under contract to teach. Contractors,

such as vendors or universities, and training agents taught the remaining sessions. By 1981 the CE Training Management Division used more than 400 instructors from its field operating agencies.³⁰

As part of the HND instructor recognition program, begun on 1 October 1981, an annual recognition letter was sent to each in-house and training agent instructor. A letter was also sent to their respective commanders.³¹

Affiliation with the University of Alabama in Huntsville

In 1979 the Division and UAH established an academic liaison. The Corps consideration included the following:

1. The concerns of Lieutenant General John W. Morris (COE) that the Corps be a leader in environmental and energy training programs.
2. The need for an academic advisor in these areas to provide guidance in program development.
3. A program including a blend of academic and operational information.
4. The need for a proper training environment in the form of a facility to serve as a learning center.

The University involvement provided the ability to design and implement short courses through UAH's Division of Continuing Education and its Johnson Environmental and Energy Center staff.

John Wright, Ph.D., president of UAH, and Brigadier General Max Noah, Division Engineer, met on 31 October

SITE LOCATIONS OF CLASSES HELD BY CE TRAINING MANAGEMENT DIVISION

REGIONAL SITES WHERE THE BULK OF TRAINING COURSES ARE PRESENTED -

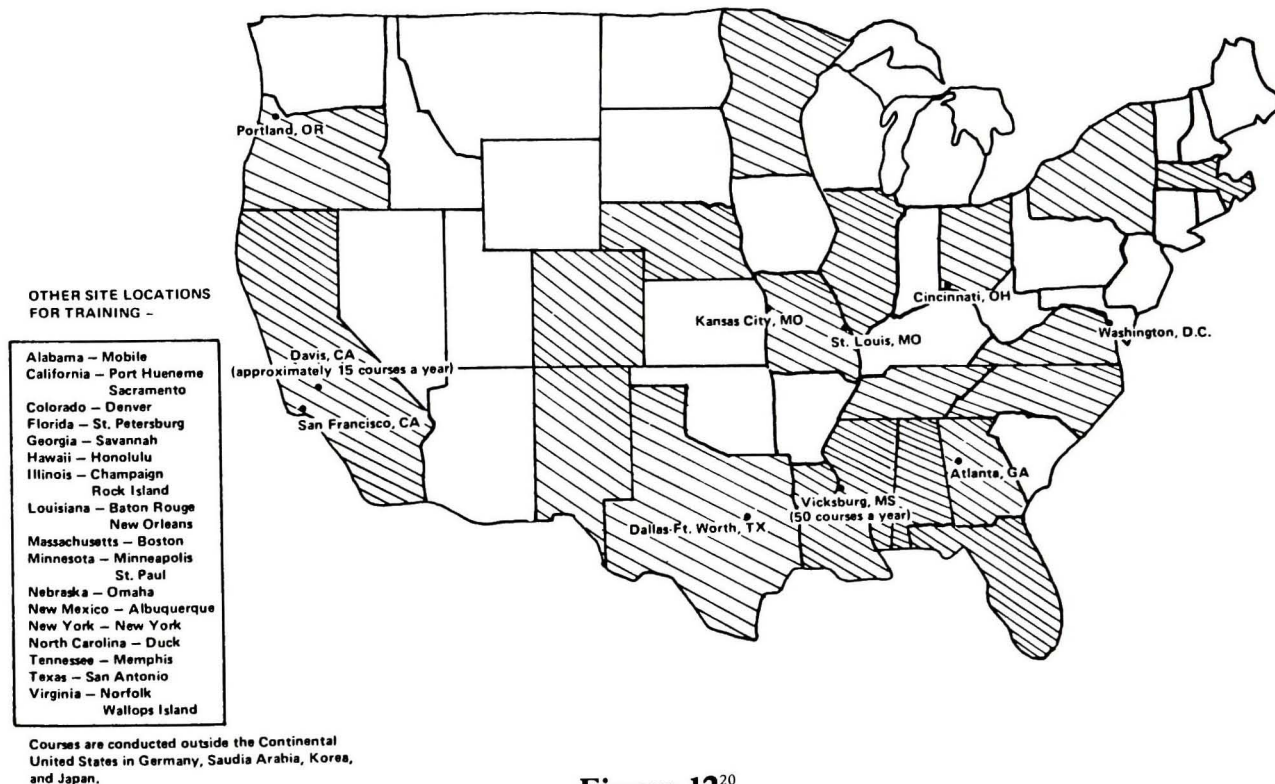


Figure 12²⁰

1979 to discuss an open partnership. On 29 November 1979 Major General E.R. (Vald) Heiberg III, Deputy Chief of Engineers; Brigadier General John F. Wall, Jr., Division Engineer of the South Atlantic; and General Noah and his staff met with UAH personnel. This group established an ad hoc committee for further planning.³² As discussions proceeded regarding the joint venture, it was noted that such a partnership would provide a traditional learning environment, the capability to extend facilities, potential for college credit for the programs, opportunity for enhanced training, availability of recreational facilities, access to the campus library, and backup and support facilities.³³

TRACE

The Corps Training Review Committee (TRACE), which was established by OCE and located in Washington, D.C., was another significant adjunct to the training program plans. Organized to assist in the Corps training program requirements cycle, the committee met twice yearly. The spring meeting addressed the upcoming fiscal year program. The fall meeting was to validate existing

courses, suggest new courses for the spring survey, and recommend courses to be dropped.³⁴ Throughout the 1979-1981 period, Creekmore, as chief of the CE Training Management Division, attended each TRACE meeting and gave the formal division presentations, which increased the credibility of the program as it developed.³⁵

Membership in TRACE consisted of senior OCE representatives from the Resource Management Office; Directorate of Civil Works, Engineering Division; Directorate of Military Programs, Construction Division; Directorate of Real Estate; Office of Personnel; Office of Administrative Services; Research and Development Office; a designated Engineer Division (Planning); and a designated Engineer District (Construction). Other areas represented were the U.S. Army Facilities Engineering Support Agency (FESA) and the Research and Development Office (RDO).³⁶

Training Cycle

Within the training cycle, students enrolled during one fiscal year for the next fiscal year. A list of TRACE-

PROSPECT PROGRAM

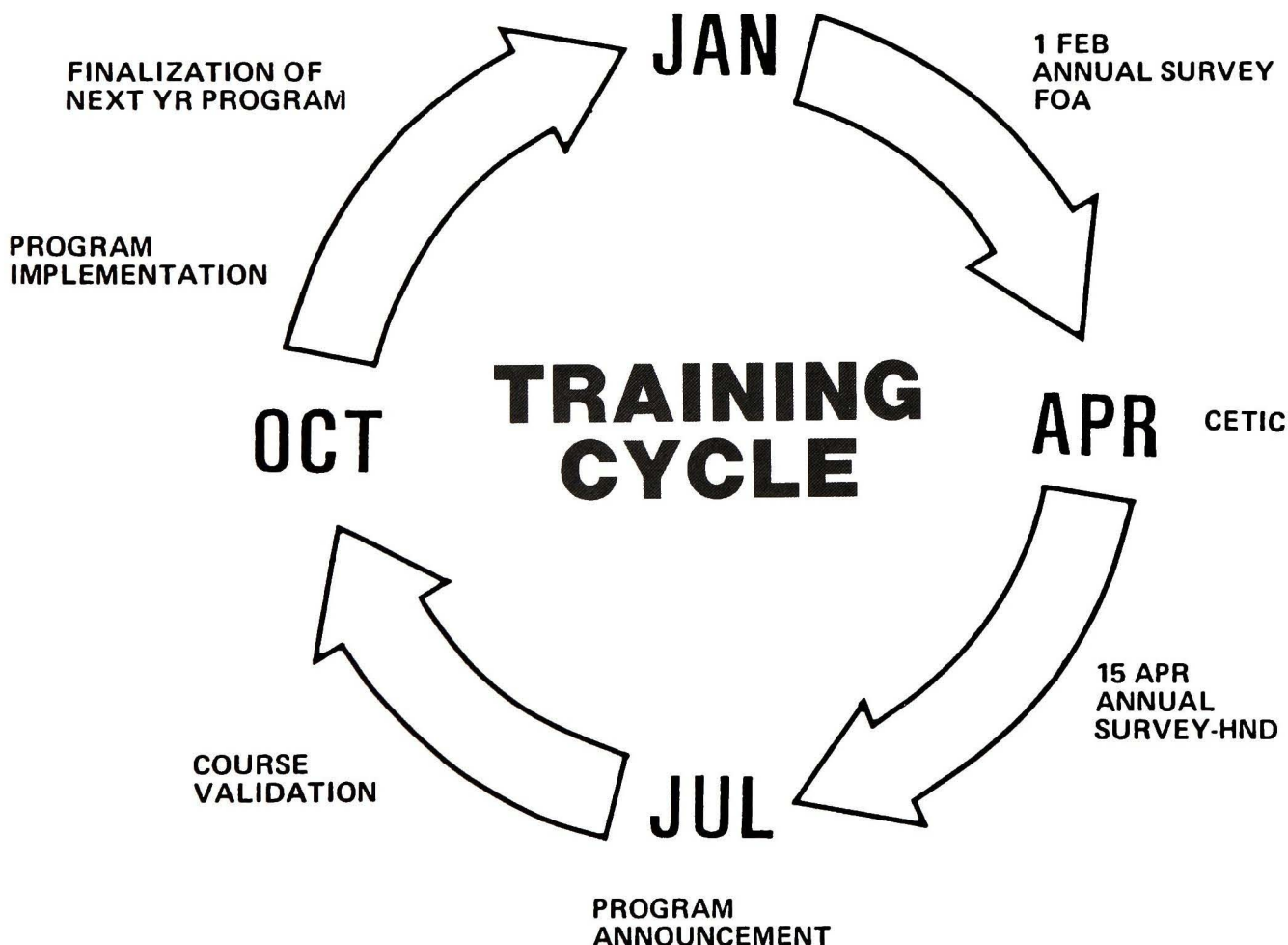


Figure 13

approved courses for the next fiscal year was mailed to all Corps field offices each 1 February. Course enrollment was to be returned to Huntsville prior to 15 April. The CE Training Management Division approved which courses were to be conducted, and Huntsville allocated spaces and notified the field training offices. Instruction for the fiscal year began on 1 October.³⁷ (See Figure 14, Prospect Program Training Cycle.)

Tuition

In order for the training mission to become self-sufficient, additional HND personnel became involved in the fiscal planning for training management.³⁸ Originally the various users, such as Corps Divisions, Districts, and laboratories, and other agencies and organizations, paid in advance for the courses, making their own adjustment. Later, HND billed in three installments, making adjustments at mid-year and at the end of the year. The Resource Management Office of HND assisted in setting tuition rates based on cost information. Audit groups allocated spaces and worked on automated systems for rosters, thus enabling the Training Management Division to stay within budget.

Many factors were considered in determining tuition costs. Direct costs included instructors' salaries, developing or updating the courses, meeting rooms, reproduction of materials, special equipment, travel and per diem, and HND support labor. Indirect costs included the building lease, office expenses and salaries, automatic data processing services, and the course catalog and announcements. Course development costs varied greatly, with the major difference being between managerial and technical training. Management firms and instructors with already-developed materials could teach for relatively little cost. Managerial training changed little over the years, while technical training changes tended to be frequent. Due to rapid developments, technical courses that were originally revised annually began to be revised between class sessions. Tuition costs varied because development costs needed to be absorbed.³⁹ The Corps of Engineers short-course training program was designed to be fiscally self-sufficient from tuition payments.

In 1981 HND completed an audit review of tuitions to assess direct and indirect costs more precisely. The audit resulted in adjustments in tuition for the FY82 courses to make tuition funding more accurately match the course actual cost. A comparison was made between the average Corps training tuition and other federal, state, university, and private short-course tuitions. The comparison affirmed the cost-effectiveness of the central management concept by determining that Corps tuitions were, on the average, less costly than other courses.

A new tuition billing system was established for the training program for FY81 and future years that eliminated the advance payment and semi-annual adjustment procedures. Billings reflected FOA use of the courses. FOAs had to pay tuition for the number of spaces reserved whether or not the spaces were actually used. Monthly billings were made the fifth of each month for classes held the previous month. Adjustments were incorporated into the monthly bill and were made on the same basis as in the past.⁴⁰

PROSPECT

The Corps short-course training program received a new name, Proponent Sponsored Engineer Corps Training (PROSPECT), upon issuance of Engineering Regulation (ER) 350-1-414 on 14 November 1980.⁴¹ The ER defined the roles of the OCE proponent, Office of Personnel, Directorate of Resource Management, TRACE, CE Training Management Division, and FOAs. The Corps developed the acronym to emphasize that the proponents (sponsors) in OCE (and selected FOAs) had a significant role in determining work force training needs. The proponent identified course needs, reviewed and validated requirements, assisted in course development and in-course content evaluation, and gave final approval of course content. The HND role was in program management, execution, operations, and evaluation.

When the CE Training Management Division was reorganized into three branches in FY81, the Training and Operations Branch Chief was designated the manager for the PROSPECT program. The reorganization helped coordinate the five major programs of professional development, contract management, technical and facility engineering, environmental engineering, and energy and conservation.⁴²

CONTRAST

In March of 1981 the Corps formulated plans for a series of exportable training packages, known as the Corps of Engineers Nontraditional Systems Training (CONTRAST). The mission of CONTRAST was to:

1. Develop and adapt mandatory training programs.
2. Analyze PROSPECT courses, adapting current courses and developing new ones in conjunction with PROSPECT.
3. Develop and adapt special training programs.
4. Evaluate and acquire new government or commercial materials.

The exportable training packages condensed approximately 40 hours of course material into a tightly compressed 24-hour unit that was facilitator-led.⁴³

Adult education/training had been experimenting with a departure from the traditional instructor/lecturer role during the 1970s and 1980s. Rather than relying on the instructor to impart the total course content, this new method employed a variety of media. Exportable training packages included a facilitator's guide, a student study guide, and television videotaped training segments, four to ten minutes long. The facilitator enhanced the structured format by motivational support to encourage individual learning. Furthermore, videotaped segments provided realistic examples from field work and common level of expertise for all students.⁴⁴

Two vital missions surfaced that required the resources of the CONTRAST program. The Occupational Safety and Health Agency (OSHA) called for training 35,000 to 40,000 persons, and four spaces were added to CONTRAST to work on this program. The other program was for civilians requiring mobilization training. Later the curriculum added training courses for inspection and quality assurance/quality control.⁴⁵

Summary

HND again accepted its role as central manager for an OCE project and, using the combined Division resources, saw considerable growth in training management. With the continuing missions of CONTRAST, PROSPECT, and the plans for a new Corps building on Huntsville's University of Alabama training management was established as a continuing program for the Huntsville Division.

EPILOGUE

This continuation of the history of the U.S. Army Corps of Engineers, Huntsville Division, recaps the important transition period 1977 through 1981. Because of its capabilities, the Division received a diversity of missions, projects, and programs.

At the same time, missions in support of requirements for conventional warfare involved 50 percent of the

Division's work effort through the Munitions Production Base Support Construction Program. Procurement experience enabled HND to receive several overseas special assignments that required quick reaction time and a variety of central management roles.

Simultaneously, the Corps of Engineers incorporated a variety of new high-technology knowledge into a broad spectrum of projects. Thus, extended missions became part of the day-to-day work of the Huntsville Division. The management and administration of the CE Training Management Division program for the Corps of Engineers began in 1978 and grew to require an expanded permanent facility in the Huntsville location.

The versatility and flexibility of personnel, the quick reaction capabilities, and central management skills enabled the Huntsville Division to emerge from this transition period as the center of expertise for high technology, engineering, design, and procurement.

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ABBREVIATIONS AND ACRONYMS

AAP	- Army Ammunition Plant	EEAP	- Energy Engineering Analysis Program
ACC	- Army Communications Command	EMCS	- Energy Monitoring and Control System
ACO	- Administrative Contracting Officer	EMP	- Electromagnetic Pulse
ADP	- Automatic Data Processing	EPA	- U.S. Environmental Protection Agency
AE	- Architect/Engineer	ER	- Engineering Regulation
AEHA	- U.S. Army Environmental Hygiene Agency	ERDA	- Energy Research and Development Administration
AFCS	- Army Facilities Components System		- Engineer Topographic Laboratory
APAP	- Army Pollution Abatement Program	ETL	
AR	- Army Regulation	FESA	- U.S. Army Facilities Engineering Support Agency
ARA	- Assigned Responsible Agency	FMS	- Foreign Military Sales
ARRCOM	- U.S. Army Armaments Command	FOA	- Field Operating Agency
ATO	- Advanced Technical Office	FORSCOM	- U.S. Army Forces Command
		FS	- Fact Sheet
BLAST	- Building Load Analysis Systems Thermodynamics	FSPs	- Facilities Support Plans
BMD	- Ballistic Missile Defense	FY	- Fiscal Year
BMDATC	- Ballistic Missile Defense Advances Technology Center	GFM	- Government-Furnished Materials
BMDSCOM	- Ballistic Missile Defense Systems Command	GFP	- Government-Furnished Property
BMDSTPO	- Ballistic Missile Defense Systems Technology Project Office	HEMP	- High-Altitude Electromagnetic Pulse
BTU	- British Thermal Units	HF	- High Frequency
		HND	- Huntsville Division, U.S. Army Corps of Engineers
CACES	- Computer Aided Cost Estimating System	HOE	- Homing Overlay Experiment
CAEADS	- Computer-Aided Engineering and Architectural Design Systems	HYGAS	- Process for High BTU Gas
CAMBL	- Continuous Automated Multibase Line	ICBM	- Intercontinental Ballistic Missile
CAMDS	- Chemical Agent Munition Disposal System	ICGG	- Illinois Coal Gasification Group
CBW	- Chemical/Biological Warfare	IRTS	- Infantry Remote Targets System
COE	- Corps of Engineers	LAP	- Load, Assemble, and Pack
CEMXPA	- Corps of Engineers MX Program Agency	LoAD	- Low Altitude Defense
CERL	- Construction Engineering Research Laboratory	LOC	- Launch Operation Center or Lines of Communication
CEUP	- Computer Evaluation of Utility Plans	LOS	- Line of Sight
COE	- Chief of Engineers	"M" Drawings	- Mobilization Drawings
CONTRAST	- Corps of Engineers Nontraditional Systems Training	MACOMs	- Major Army Commands
CONUS	- Continental United States	MASH	- Mobile Army Surgical Hospital
COR	- Contracting Officer's Representative	MCA	- Military Construction, Army
CSA	- U.S. Army Communications Systems Agency	M&E	- Modernization and Expansion
CWE	- Current Working Estimate	MED	- Middle East Division
		MIA	- Missile Intelligence Agency
DA	- Department of the Army	MIS	- Management Information System
DAART	- Department of Army Ammunition, Ranges, and Targets	MLRS	- Multiple Launch Rocket System
DAR	- Defense Acquisition Regulation	MOU	- Memorandum of Understanding
DARCOM	- U.S. Army Materiel Development and Readiness Command	MOUT	- Military Operations of Urban
DCA	- Defense Communications Agency	MPCME	- Munitions Production Base Modernization and Expansion
DCE (D&CE)	- Design and Construction Evaluation	MPBSCP	- Munitions Production Base Support Construction Program
DCS	- Defense Communications Systems	MPS	- Multiple Protective Shelter
D&F	- Determination and Finding	MRK	- Missouri River Division/Kansas City District
DIVAD	- Division Air Defense	MSFC	- Marshall Space Flight Center
DNA	- Defense Nuclear Agency	MSS	- Mobile Surveillance Shield
DOD	- Department of Defense	MTST	- Magnetic Tape Selectric Typewriter
DOE	- Department of Energy	MX	- Missile Experimental

NAC	- Nitric Acid Concentrator	RMO	- Resource Management Office
NAD	- North Atlantic Division	RPMA's	- Real Property Maintenance Activities
NASA	- National Aeronautics and Space Administrative	SADBU	- Small and Disadvantaged Business Utilization
NBC	- Nuclear-Biological-Chemical	SAC	- Sulfuric Acid Concentration
NCR	- National Capitol Region	SAR	- Sulfuric Acid Regeneration
NEPO	- Near East Project Office	SCMO	- Sinai Construction Management Office
NOX	- Nitrous Oxide	SEARCH	- Selected Evaluation and Review of Criteria for Habitability
NWE	- Nuclear Weapon Effects	SFCP	- Solid Fuel Conversion Program
OCE	- Office of the Chief of Engineers	SLBM	- Submarine-Launched Ballistic Missile
O&MA	- Operation and Maintenance, Army	SOW	- Statement of Work
OSHA	- Occupational Safety and Health Agency	SPD	- South Pacific Division
PAA	- Procurement Ammunition, Agency	SPO	- Sinai Project Office
PAO	- Public Affairs Office	SPR	- Strategic Petroleum Reserve
PBS	- Production Base Support	TEL	- Transporter-Erector-Launcher
PDB	- Project Development Brochure	TM	- Technical Manual
POD	- Pacific Ocean Division	TNT	- Trinitrotoluene
POGS	- Program Oriented Guide Specifications	TOE	- Table of Organization and Equipment
POL	- Petroleum, Oils, and Lubricants	TRACE	- Training Review Committee
PROSPECT	- Proponent Sponsored Engineer Corps Training	TRADOC	- Training and Doctrine Command
RCRA	- Resource Conservation and Recovery Act	UAH	- University of Alabama in Huntsville
RDO	- Research and Development Office	USATHAMA	- U.S. Army Toxic and Hazardous Materials Agency
RDT&E	- Research, Development, Test, and Evaluation	WES	- Waterways Experiment Station



**US Army Corps
of Engineers**
Huntsville Division