SD-TR-82-79

HAZARDOUS WASTE HANDLING PLAN FOR THE SPACE SHUTTLE PROJECT VANDENBERG AFB

FINAL REPORT

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AUGUST 1982

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TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

LIST OF TABLES

LIST OF TABLES (Continued)

LIST OF FIGURES

1. Waste Handling Activity

1.0 EXECUTIVE SUMMARY

1.1 INTRODUCTION

Beginning in 1985, and continuing for a 10-year period of time, the Space Shuttle is scheduled to be launched from Vandenberg Air Force Base (VAFB) in Santa Barbara County, California. In connection with the Space Transportation System (STS), thousands of gallons of hazardous waste will be generated during the actual launch of the Space Shuttle, as well as during the launch cycle or maintenance and refurbishment period.

Hazardous wastes generated by the Space Shuttle Program will ultimately be treated and discharged (sewer or "dumped to grade") on base or transported off base for treatment/recovery or disposal in a permitted hazardous waste landfill. On-base handling is reserved for a few waste streams that can be readily treated and discharged, including deluge water and Solid Rocket Booster (SRB) wash and rinse waters.

The off-base transport and final recovery or disposal of the STS wastes were shown to be feasible in a May 1982 EMCON Associates draft report entitled Off-Base Disposal Study, STS Program, Vandenberg Air Force Base. The May 1982 report addressed (1) the capability of off-base disposers, treaters and haulers to handle the STS wastes, (2) regulatory requirements and constraints, and (3) costs of hauling, treating and disposing STS wastes. Policy at VAFB is to maximize of off-base treatment and disposal of STS wastes and wastes generated by other tenant and host organizations.

The STS Hazardous Waste Handling Plan (HWHP) developed in this report addresses the following tasks outlined in the scope of work prepared by Air Force Space Division/DEV:

- Logistics
- Recordkeeping
- Containerization
- Labeling
- Facility Requirements
- Program Implementation
- Support Equipment
- Program Operation

EMCON's HWHP STS is based on (1) local, state and federal regulations, (2) best available technical practices, and (3) consultation with experts in both the private and public sector. The intent of the HWHP is to provide "generation-to-storage"[1] management of the hazardous wastes generated as a result of the Space Shuttle maintenance and launch.

As generators of the hazardous wastes associated with the STS program, the Air Force will be subject to the Resource Conservation and Recovery Act (RCRA) of 1976 (PL94-580). Under Subtitle C of RCRA, the U.S. Environmental Protection Agency (EPA) issues hazardous waste permits (Section 3005) and approves state hazardous waste management programs under Section 3006. On the state level, Title 22 of the California Administrative Code regulates the management of hazardous wastes. A summary of relevant RCRA regulations is presented in Appendix F.

The STS HWHP will also be subject to Air Force regulations, including but not limited to, AFR 127-100, SAMTECHM 127.1 and AFM 161-30.[2]

1. Generation refers to the location where the wastes are produced (i.e., work areas with the individual station sets) while storage here refers to the on-base Hazardous Waste Storage Facility.

2. Review of these regulations was not within the project "scope of work." They are listed here as references to be considered prior to actual facility design.

Similarly, all hazardous waste handling, storage, and treatment and/or disposal must be in accordance with the following safety standards:

- American National Safety Institute Standards (ANSI)
- National Institutes of Occupational Safety and Health (NIOSH)

1.2 HAZARDOUS WASTES GENERATED BY STS

The Space Shuttle station sets that produce hazardous wastes are listed in Table 1-1. Six of the station sets shown in Table 1-1 (V19, V21, V23, V31, V32 and V33) produce "routine" wastes -- those expected during every launch cycle of the shuttle. On the other hand, Station Sets V17, V18 and V80 generate only "contingency" wastes -- those resulting from unplanned events, including aborts, spills, special tests, etc. A third classification -- emergency wastes -- are those (1) resulting from an unplanned release of hazardous wastes to air, soil or water, and (2) posing a threat to public health and safety.

1.3 WASTE HANDLING PROCEDURES

The core of the STS HWHP is presented in Chapter 4 of this document, which presents waste handling procedures common to each station set. Following this core chapter are individual chapters for each station set that describe the waste quantities, facility requirements (if any), and where applicable, procedures for management of contingency wastes and handling techniques for large spills other emergency situations.

Figure 1-1 illustrates the relationships between the major elements of this HWHP.

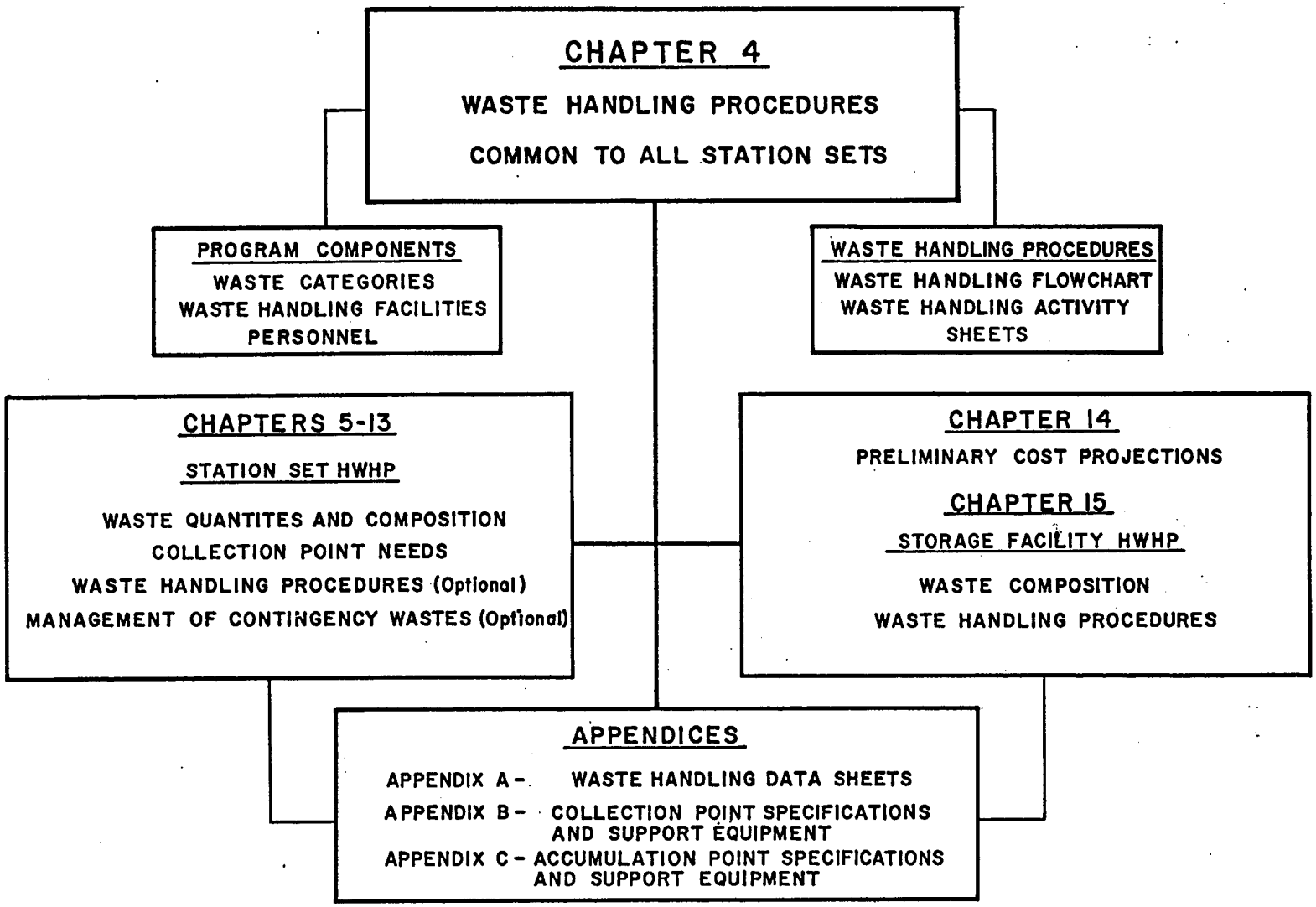
Special handling procedures dictated by the chemical nature of a particular waste category are presented on the Waste Handling Data Sheets (WHDS) in Appendix A. A detailed description of the WHDS is pro-

Table 1-1

SUMMARY OF HAZARDOUS WASTES GENERATED BY STS STATION SETS

Station Set	Function	Primary Hazardous Wastes Generated[1]
V17	Landing (Airfield)	Contingency Wastes Only
V18	Mate/Demate	Contingency Wastes Only
V19	Orbiter Maintenance and Checkout Facility	TPS Maintenance Wastes, Oxidizer Scrubber Liquor, Eyewash and Shower Wastewater, Fuel Scrubber Liquor
V21	Hypergolic Maintenance and Checkout Facility	Eyewash and Shower Wastewater, Fuel Scrubber Liquor, Oxidizer Scrubber Liquor
V23	Launch Pad, Payload Preparation Room, Payload Checkout Room	Foam Wastes, Insulation Wastes, Fuel Scrubber Liquor, Oxidizer Scrubber Liquor, Eyewash and Shower Wastewater
V31	Solid Rocket Booster Refurbishment	Insulation Wastes (Solid and Liquid), Contaminated Filters, Solvents, Eyewash and Shower Wastewater
V32	Solid Rocket Booster Disassembly	Insulation Wastes, Batteries, Miscellaneous Cleanup Wastewaters
V33	External Tank Processing and Storage	Insulation Wastes (Solid and Liquid), Eyewash and Shower Wastewater
V80	Transportation (Tow Route)	Contingency Wastes Only

1. "Primary hazardous wastes" are those given in the SD/DEV July 21, 1982 Space Shuttle Briefing; however, waste streams which will be treated on base have not been included (e.g., sound suppression water, SRB rinse waters). A more complete breakdown is presented in the chapter describing the waste management plan for each station set.



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U.S. AIR FORCE
STS HAZARDOUS WASTE HANDLING PLAN
VANDENBERG AIR FORCE BASE, CALIFORNIA

GUIDE TO STS HWHP PRESENTATION

FIGURE
1-1
PROJECT NO.
534 - 1.1

vided as a preface to Appendix A, which includes all of the WHDS. The WHDS present the following waste management information:

- Waste Identification
- Authorized Containers
- Labeling and Placarding
- Recordkeeping - Manifest Information
- Worker Protection Information
- Spill Response and Procedures

1.4 WASTE HANDLING FACILITIES

Prior to off-base disposal/recovery, STS hazardous wastes will be temporarily stored in several different waste handling centers:

Collection Point: A small waste collection area located within or near a station set work area. The purpose of the collection point is short-term storage for small quantities of low-risk hazardous wastes which will be generated regularly during the launch cycle.

Accumulation Point: Located out of the station set work area, the purpose of this facility is to provide a point at which to initiate labeling, recordkeeping and to provide immediate supply of drums and emergency response equipment. The accumulation point provides a temporary storage/consolidation area where wastes can be readied for transport to the Hazardous Waste Storage Facility or to off-base recovery/disposal, as in the case of the Port Hueneme wastes.

On-Base Hazardous Waste Retention Tank: Located within several of the station set complexes, the purpose of these tanks is to provide short-term storage of bulk liquid wastes contaminated with hypergolic propellents prior to transport to off-base disposal/recycling. Waste retention tanks are presently located at V19, V21, and V23.

Storage Facility: Located at NVAFB, this facility provides storage of drummed STS hazardous wastes and hazardous wastes from all other VAFB host and tenant organizations. Design of the storage facility is being developed by ECOS Management Criteria, Inc. (Program No. F04701-82-C-0064).

Table 1-2 summarizes the waste handling facility needs for the STS program by station set.

Figure 1-2 illustrates the proposed handling pathway from point of generation at each station set through the accumulation point and the storage facility (or, in the case of selected wastes, to waste retention tanks), ultimately to off-base disposal/recovery. As Figure 1-2 indicates, there will be three accumulation points -- one at each of the following locations: North Vandenberg (henceforth designated NVAFB-AP), South Vandenberg (SVAFB-AP), and Port Hueneme (PH-AP).

1.5 WASTE MANAGEMENT PERSONNEL

The following waste management positions are recommended for the STS hazardous waste program.

- Hazardous Waste Manager: Responsible for all aspects of on-base management of STS hazardous wastes.

- Accumulation Point Manager: Directs all waste handling activities associated with an accumulation point, including (1) receiving and storage, (2) container marking and labeling, (3) recordkeeping, and (4) inspection.

- Technician: Performs the activities related to handling routinely generated hazardous wastes.

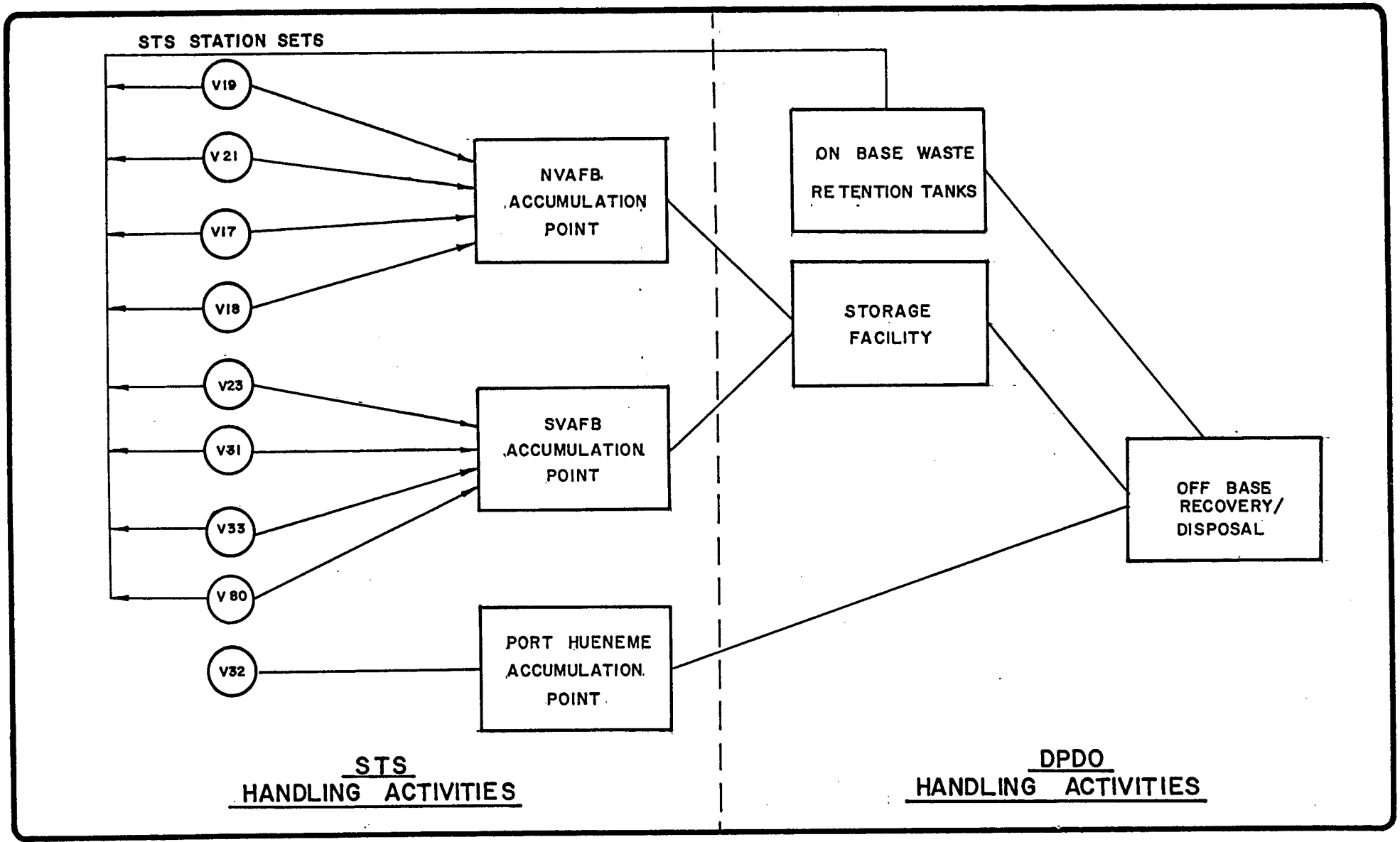
Table 1-2

SUMMARY OF WASTE HANDLING
FACILITY NEEDS

Station Set Number	Station Set Function	Number of Collection Points	Designated Accumulation Points
V17	Airfield and Landing	None	NVAFB-AP[1]
V18	Mate/Demate Facility	None	NVAFB-AP[1]
V19	Orbiter Maintenance and Checkout Facility	1	NVAFB-AP
V21	Hypergolic Maintenance and Checkout Facility	1	NVAFB-AP
V23	Launch Pad	2	SVAFB-AP
V31	SRB Refurbishment and Subassembly Facility	1	SVAFB-AP
V32	SRB Retrieval and Disassembly	None	PH-AP
V33	External Tank Processing and Storage Facility	2[2]	SVAFB-AP
V80	Transportation	None	SVAFB-AP[1]

1. Will receive drummed contingency wastes only.

2. If V33 is not used for closeout activities, no collection point will be needed. In such a case, hazardous wastes would be drummed and transported directly to SVAFB-AP.



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U. S. AIR FORCE
STS HAZARDOUS WASTE HANDLING PLAN
VANDENBERG AIR FORCE BASE, CALIFORNIA

STS WASTE HANDLING SCENARIO

FIGURE
1-2
PROJECT NO.
534 - 1.1

All hazardous waste personnel will be required to complete a comprehensive training program that will focus on standard waste handling procedures and emergency procedures.

1.6 PRELIMINARY COST PROJECTIONS

Preliminary cost projections have been developed for the STS HWHP to serve as a planning tool. While current costs (1982) are the basis for the projections, costs are forecasted to the appropriate STS project year using an annual inflation factor of 10 percent. Not only does the budget provide preliminary cost estimates, but it also serves as an inventory of equipment and supplies needed to implement the STS hazardous waste program.

The capital cost scenario is based on 1984 costs (given the 10 percent per year inflation factor) to concur with the 1984 Military Construction Plan (MCP). The operating cost scenario is provided for each STS project year beginning in 1985 and continuing through 1994.

Table 1-3, Summary of Capital Cost and Annual Operating Budget for STS Hazardous Waste Handling Plan, identifies the costs for the total project outlined in this HWHP. The total capital costs are $196.4 thousand, while the sum of the annual operating budget year is $4.8 million.

1.7 DECISION POINTS

There are a number of issues that have surfaced as a result of developing the STS HWHP. Summarized below are issues that will require resolution by appropriate Air Force organizations in the near future.

- Determine the need for the NVAFB-AP. Depending on the siting of the storage facility, the NVAFB-AP may not be needed.

Table 1-3

SUMMARY OF CAPITAL COST AND
ANNUAL OPERATING BUDGET FOR STS HWHP[1]

Construction and Installation Costs for MCP 84[2]	($1,000)
Accumulation Point SVAFB	89
Accumulation Point NVAFB	75
Collection Point	
One at V19	8.1
One at V21	8.1
One at V23	8.1
One at V31	8.1
Total	196.4

Annual Operating Budget by STS Project Year[3]

Project Year	Fixed[4] ($1,000)	Variable[5] ($1,000)	Total ($1,000)
1985	185	12.9	198
1986	204	42.9	247
1987	224	110	335
1988	252	176	429
1989	272	190	463
1990	297	209	507
1991	327	230	558
1992	360	253	614
1993	397	279	677
1994	437	306	743
Total	2,950	1,810	4,780

1. Values are summation of costs presented in Tables 14-2, 14-6, and 14-9 and are based on the scenario developed from the April 1982 data base. Since that time, waste quantities have been significantly altered; the cost data should therefore be used only as a planning tool.

2. 1982 cost escalated for two years at 10 percent inflation. (No capital costs are budgeted for Port Hueneme Accumulation Point or Storage Facility. Design of these facilities is being handled by other contractors.)

3. Costs are escalated at 10 percent inflation.

4. Fixed costs are independent of number of launch cycles.

5. Variable costs are multiples of the launch cycle.

- Resolve whether to use both collection points and accumulation points for temporary storage of hazardous wastes.

- Determine appropriate location(s) for collection points and accumulation points.

- Identify Air Force organizational responsibilities for all elements of the STS HWHP. In particular, determine who will be the Hazardous Waste Manager.

- Assess the need for an on-base laboratory that is either managed by an Air Force division or is operated by a contractor.

- Determine appropriate hydrazine and oxidizer scrubber liquors: i.e., citric acid or water (hydrazine); potassium hydroxide with potassium sulfite or sodium hydroxide with sodium sulfite (N_2O_4).

- Consider the need and appropriate location for compaction of solid hazardous wastes, for example, as Station Set V31 or at the SVAFB-AP.

- Evaluate the need for an updated waste inventory every six months to reassess the need for modification in the STS HWHP.

- Evaluate the need for a ventilation/air removal system to protect workers during the containerization or consolidation of selected hazardous wastes having high toxic vaporization levels.

- Determine whether V31 packing materials will be treated as nonhazardous wastes (assumed in this HWHP to be acceptable at Class II-1 disposal sites).

- Determine the role of resident contractors in implementing the STS HWHP.

- Assess the need for additional HWHP's that address the waste stream from the MX, Titan, Atlas, and other programs at VAFB.

2.0 REGULATORY REQUIREMENTS

2.1 INTRODUCTION

The HWHP for STS wastes at VAFB has been developed in accordance with local, state and federal regulations pertaining to the management of hazardous wastes. On the federal level, the regulatory basis for control of hazardous wastes is the Resource Conservation and Recovery Act (RCRA) of 1976 (PL94-580). Under Subtitle C of RCRA, the U.S. Environmental Protection Agency (EPA) issues hazardous waste permits (Section 3005) and approves state hazardous waste management programs under Section 3006. On the state level, Title 22 of the California Administrative Code regulates the management of hazardous waste.

Since the STS program at VAFB will generate large amounts of hazardous waste, the base is considered a generator under the definition of RCRA and Title 22 and as such will be subject to all appropriate federal and state hazardous waste regulations. Moreover, all on-base waste management, including identification, containerization, labeling, and storage must conform to these regulations.

Presented below is a summary of existing federal and state regulations that govern the generation and handling of STS wastes at VAFB.

2.2 FEDERAL REGULATIONS

The Air Force is defined as being the primary waste generator at VAFB. This status requires that all on-base hazardous waste handling activities and off-base transport be carried out in compliance with RCRA. Individual contractors and base organizations will also be required to comply with the regulations although they may not be designated as generators.

Specific regulations for carrying out RCRA are described in the Code of Federal Regulations (CFR) (40 CFR, Parts 260 to 266 and Parts 122 to 124). A summary of relevant RCRA regulations is presented in Appendix F.

To comply with federal regulations, generators initially must determine whether the waste they are producing meets the hazardous waste criteria as defined in RCRA (40 CRF, Part 261). This section defines and lists hazardous wastes which are subject to RCRA controls. In addition, the regulation establishes: (1) criteria for identifying characteristics and for listing hazardous waste, (2) procedures for exempting wastes that are listed, and (3) procedures for petitioning EPA to modify the selected hazardous waste characteristics or the list.

2.3 STATE REGULATIONS

The EPA has determined that California's Hazardous Waste Program (HWP) is equivalent to the Phase I federal program described in 40 CFR, Part 123. As a result, in accordance with Section 3006(c) of RCRA, EPA granted California interim authorization in 1981 to operate a HWP in lieu of Phase I of the federal HWP.

Final authorization of California's HWP will be granted by EPA once the State's program is determined to be equivalent to and consistent with the federal program. Currently, California waste generators must meet current California regulations (CAC Title 22) and particular sections within RCRA that are not currently covered under the State regulations. It is expected that California will be fully authorized before the first STS launch in 1985, at which time all applicable RCRA regulations will have been incorporated in Title 22.

Handling/Disposal of Extremely Hazardous Wastes: Article 10, Title 22 of the California Administrative Code (CAC) lists the State-defined "Extremely Hazardous Wastes." A waste containing any of the materials cited is considered an extremely hazardous waste and must be handled and

disposed of in accordance with Articles 6 and 7 of Title 22. Article 7 outlines the management procedures for extremely hazardous wastes. The generator must apply to the Department of Health Services for an Extremely Hazardous Waste Disposal Permit, at least 15 days prior to disposal of the waste.

An authorized Air Force representative must apply for the permit (e.g., DPDO). Copies of the permit will be issued to the transporter, disposer/treater, as well as the generator. The permit is based on a single occurrence, thus requiring reapplication with each activity. Variances are also available; however, these are normally available only in an "emergency" situation. This permit is valid for one year; if continued disposal is planned, reapplication is necessary.

STS materials/wastes defined as extremely hazardous include the following:

- Hydrazine, MMH, UDMH[1]
- Cyanide salt (contained in "Alodine" rinse water)
- Diphenyl Methane Disocyanate (related to methyl isocyanate; material is a component of particular types of both solid and liquid foam insulation)

The above list should be periodically updated to reflect the introduction of materials that generate extremely hazardous wastes.

1. Monomethyl hydrazine (MMH) and unsymmetrical dimethyl hydrazine (MDMH).

2.4 OTHER REGULATIONS

The STS HWHP will also be subject to Air Force regulations, including, but not limited to, AFR 127-100, SAMTECHM 127.1 and AFM 161-30.[1] Similarly, all hazardous waste handling, storage, treatment and/or disposal must be developed in accordance with the following safety standards:

- American National Safety Institute Standards (ANSI)
- National Institutes of Occupational Safety and Health (NIOSH)

1. Review of these regulations was not within the project "scope of work." They are listed here as references to be considered prior to actual facility design.

3.0 HWHP ASSUMPTIONS

In developing this HWHP, several assumptions and qualifications were required:

- This HWHP is designed to serve as a general planning tool for handling STS wastes from the point of generation to delivery to the storage facility; it is not to be treated as the "final word" on managing STS hazardous wastes.

  This document is expected to serve as the basis for the eventual development of an integrated Hazardous Waste Operation Plan for STS wastes that will (1) reflect any modifications that have occurred in the waste quantities reported herein, (2) identify Air Force divisions responsible for specific elements, (3) interface with other waste handling programs at VAFB, (4) modify handling procedures and conceptual designs for collection facilities to reflect Air Force regulations, and (5) incorporate any policy changes or new hazardous waste management decisions (relating to STS wastes) that are implemented after the publication date of this HWHP.

- Waste quantity projections are based on best available information at the time of publication. The major sources of the data are (1) Hazardous Waste Inventory and Disposal Assessment for the Space Shuttle Project, Volumes I and III, SCS Engineers, 1981; and (2) SD/DEV Space Shuttle Hazardous Waste Management Briefing, July 21, 1982.

It is anticipated that Space Shuttle trips between now and the fall of 1985 will provide additional information enabling refinement of the waste quantity data presented in this document.

- The waste management handling procedures in this document have been developed for drummed wastes only. Excluded from the handling procedures described herein are those for selected wastes that will be temporarily stored in on-base waste retention tanks prior to off-base disposal and those wastewaters that will be treated on site. Hypergolic-contaminated wastewaters such as scrubber liquors, emergency eyewash water, and spill cleanup water will be collected and stored in retention tanks located at V19, V21, and V23. Handling procedures for sound suppression and washdown water at V23 will be developed under a separate contract with the U.S. Army Corps of Engineers.

- Optimization was implemented as part of the STS planning process after the development of the HWHP. Therefore, the hazardous waste handling procedures described in this document do not reflect optimization. An exception to this is Station Set V31A, which was not considered since it will be phased out.

- Laboratory services have been assumed to be available on base through a contractor rather than provided by the Air Force.

- Waste anhydrous ammonia generated during routine ammonia boiler servicing will be off-loaded through the "service

panel" (Vent and Drain Panel: S70-1201-1) which acts as an aqueous scrubber; final effluent will be ammonium hydroxide.[1]

- The launch schedule was assumed to be as follows: 1985, 1; 1986, 3; 1987, 7; 1988 through 1995, 10 per year.

- The hazardous waste categories defined in the HWHP were developed from the following sources:

  - SCS Engineers' STS Inventory

  - California Compatibility Codes

  - 49 CFT 172.101; DOT hazard class, containerization and labeling specifications

  - Consultation with industrial chemists

- The HWHP has been developed as a guidance document for routine waste handling procedures only. Emergency and/or contingency response procedures are briefly outlined in Appendix D. The following Air Force Plans should be used during such events:

  - "Oil and Hazardous Substances," 4392 AEROSG, Operation Plan 234-81 (July 1, 1981)

  - "Base Disaster Preparedness," Operation Plan 355-1 (March 15, 1982).

- Final selection of a scrubber for hydrazine had not been determined by the date of publication of this HWHP. For

1. Personal communication with John Thomas, KSC, August 24, 1982.

purposes of selecting storage categories, a citric acid liquor was used for design.[1]

- Packing materials (1,500 cubic feet) at V31 are excluded from consideration in this HWHP since they are assumed to be acceptable at a Class II-1 disposal site.

1. Personal communication with John Edwards, June 6, 1982.

4.0 WASTE HANDLING PROCEDURES COMMON TO ALL STATION SETS

4.1 INTRODUCTION

This chapter (1) provides the vocabulary and the framework to initiate and maintain "generation to disposal/recycle" for the STS hazardous waste stream, and (2) describes general waste handling procedures common to all station sets. In the context of this handling plan, "generation" refers to STS activities that generate hazardous waste, while "disposal/recycle" refers to the ultimate disposition of the waste.

The general waste handling procedures outlined in this chapter constitute the core of the hazardous waste handling program at each station set. Each station set chapter that follows highlights deviations from the general waste handling program presented herein and also provides for elements of the plan which are unique to each station set. Table 4-1 shows the relationship between the general waste handling information presented in this chapter and the specific information presented in each station set chapter.

The hazardous waste handling procedures developed for STS wastes will be centered in the locations where waste handling activities can take place. These centers of waste handling activities and their relationship to the flow of hazardous waste is shown as Figure 4-1. Described below are the functions of each of these waste handling centers as they relate to the handling plan.

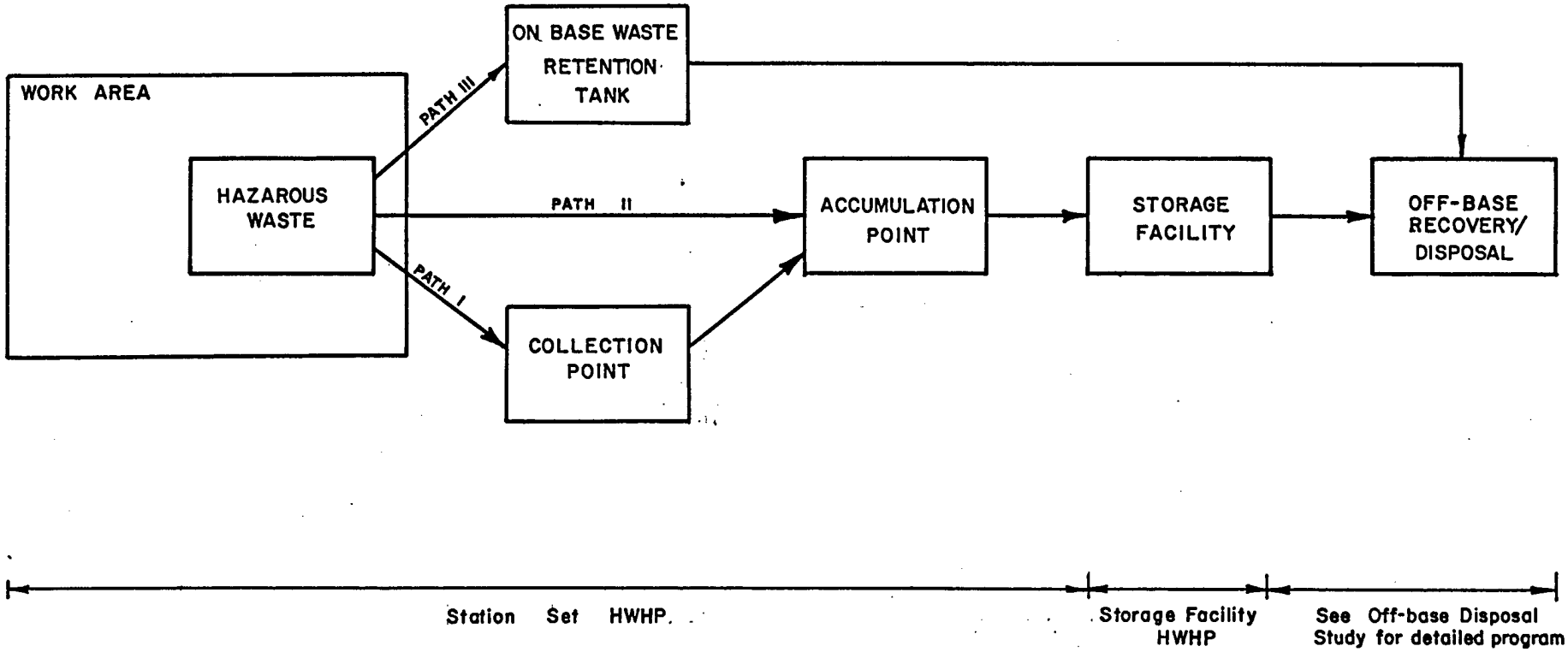
Work Area: An area where hazardous wastes are generated as a bi-product of Space Shuttle servicing or de-servicing activities.

Collection Point: A small waste collection area located within or near a station set work area. The purpose of this small facility is short-term storage for small quantities of low-risk hazardous wastes. At the

Table 4-1

RELATIONSHIP BETWEEN CHAPTER 4 (COMMON WASTE HANDLING PROCEDURES) AND CHAPTERS 5-13 (SPECIFIC STATION SET HANDLING PROCEDURES)

Waste Handling Plan Element	Common Waste Handling Procedures (Chapter 4)	Station Set Chapters (Chapters 5 through 12)
Waste Quantity and Composition	• Defines categories • Defines storage categories	Identifies waste quantities (by category) at station set
Waste Handling Facility-Collection Point	• Siting criteria • General specifications • Conceptual Plan	Special requirements
Waste Handling Facility-Accumulation Point	• Siting Criteria • General specifications • Conceptual Plan	Special requirements
Personnel	• Defines positions • Training program	Special requirements
Waste Handling Procedures	• Waste handling flow path • Waste handling activities	Special requirements



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VANDENBERG AIR FORCE BASE, CALIFORNIA

PROPOSED WASTE HANDLING PATHWAYS

FIGURE
4-1
PROJECT NO.
534-1.1

collection point, small quantities of wastes will be consolidated into 55-gallon drums.

Accumulation Point: Located out of the station set work area, the purpose of this facility is to temporarily store drummed hazardous wastes prior to their delivery to the storage facility (except for Port Hueneme where wastes are subsequently delivered to disposal/recycling).

On-Base Hazardous Waste Retention Tank: Located within several of the station set complexes, the purpose of these tanks is to provide short-term storage of bulk liquid wastes contaminated with hypergolic propellants prior to transport to off-base disposal/recycling. Waste retention tanks are presently located at V19, V21, and V23.

Storage Facility: Located at NVAFB, this facility provides storage of drummed STS hazardous wastes and hazardous wastes from all other VAFB host and tenant organizations.

Figure 4-1 illustrates the proposed waste handling paths. There are three separate handling paths; for a particular waste generation event, only one path will be applicable.

Path I: If a collection point is available in the work area, and the wastes generated are characterized as being "low risk" and "routinely produced," then Path I waste handling would be selected. Under this handling path, hazardous waste would be taken to the collection point in an approved "safety bucket" (capacity less than 5 gallons or 1 cubic foot; definitions and specifications are provided in Appendix B). At the collection point, the like waste types are consolidated into drums, subsequently transported to the accumulation point and then to the storage facility.

Path II: This path is selected in the event that the waste is (1) not a hypergolic-contaminated waste that is handled in bulk, or (2) is such small quantity that handling through a collection point would be ineffi-

cient. Under this handling path, hazardous waste would be drummed in the work area at the station set and transported to the accumulation point. Thereafter, handling would be identical to Path I handling.

Path III: Waste hydrazine fuel, oxidizer, spill cleanup water, or other hypergolic-contaminated waste will be temporarily stored on base in waste retention tanks prior to off-base disposal/recovery. Wastes collected in sumps will be transferred by tanker truck into the tanks. The wastes are held in the waste retention tank until servicing by a tanker truck that will transport the hazardous waste to disposal/recycling.

4.2 STS HAZARDOUS WASTE CATEGORIES

The station sets encompassing the Space Shuttle that produce hazardous wastes are listed in Table 4-2, together with a brief description of the station set function and major wastes produced.

There are three major classifications of the hazardous wastes generated by the station sets listed in Table 4-2: routine, contingency and emergency.

Routine Wastes. These are hazardous wastes that are expected during every launch cycle of the Shuttle. These wastes have been referred to as "baseline" waste streams in the SCS Engineers' study, Hazardous Waste Inventory and Disposal Assessment for the Space Shuttle Program; 1981.[1]

Contingency Wastes. These are hazardous wastes that would result from unplanned events, including aborts, spills, special tests, etc. The contingency waste stream is identified in SD/DEV's "Hazardous Waste Management Briefing" of July 21, 1982.

1. Reference Code: SD-TR-81-32.

Table 4-2

STS STATION SETS PRODUCING HAZARDOUS WASTES

Station Set	Function	Primary Hazardous Wastes Generated[1]
V17	Landing (Airfield)	Contingency Wastes Only
V18	Mate/Demate	Contingency Wastes Only
V19	Orbiter Maintenance and Checkout Facility	TPS Maintenance Wastes, Oxidizer Scrubber Liquor, Eyewash and Shower Wastewater, Fuel Scrubber Liquor
V21	Hypergolic Maintenance and Checkout Facility	Eyewash and Shower Wastewater, Fuel Scrubber Liquor, Oxidizer Scrubber Liquor
V23	Launch Pad, Payload Preparation Room, Payload Checkout Room	Foam Wastes, Insulation Wastes, Fuel Scrubber Liquor, Oxidizer Scrubber Liquor, Eyewash and Shower Wastewater
V31	Solid Rocket Booster Refurbishment	Insulation Wastes (Solid and Liquid), Contaminated Filters, Solvents, Eyewash and Shower Wastewater
V32	Solid Rocket Booster Disassembly	Insulation Wastes, Batteries, Miscellaneous Cleanup Wastewaters
V33	External Tank Processing and Storage	Insulation Wastes (Solid and Liquid), Eyewash and Shower Wastewater
V80	Transportation (Tow Route)	Contingency Wastes Only

1. "Primary hazardous wastes" are those given in the SD/DEV July 21, 1982 Space Shuttle Briefing; however, waste streams which will be treated on base have not been included (e.g., sound suppression water, SRB rinse waters). A more complete breakdown is presented in the chapter describing the waste management plan for each station set.

Emergency Wastes. These wastes are generated during emergency events. An emergency event is similar to a contingency event, (1) resulting in an unplanned release of hazardous wastes to air, soil or surface water; but (2) posing a threat to public health and safety.

Containment, removal and disposal of accidental discharges of hazardous materials will be in accordance with procedures identified in (1) "Oil and Hazardous Substances," 4392 AEROSG, Operation Plan 234-81 (July 1, 1981) and (2) "Base Disaster Preparedness," Operation Plan 355-1; Annex E, Appendix 1: Toxic Propellant Spill Procedures and Appendix 5: Non-Toxic Propellant Chemical Spill Procedures (March 15, 1982).

Procedures for handling emergency wastes are briefly reviewed in Appendix D.

The many varieties of hazardous waste generated by the STS project are grouped into 23 waste categories. These categories are comprised of waste types which receive the same handling within the STS handling plan, and are treated similarly by the various hazardous waste regulations.

A listing of these hazardous waste categories is presented in Table 4-3.

4.3 WASTE HANDLING FACILITY - COLLECTION POINT

As noted in the introduction to this chapter, the collection point is a small area located within the work area of a station set designed to provide short-term storage for small quantities of low-risk hazardous wastes. The collection point should be used to collect one compatibility class of hazardous waste, thus minimizing risk for comingling of incompatible wastes in a work area.[1]

1. "Compatibility class" is defined by the California Department of Health (Law, Regulations, and Guidelines for Handling of Hazardous Wastes, February 1975). Codes are also presented in 45 FR 33257-33258.

Table 4-3

HAZARDOUS WASTE CATEGORIES

1. Adhesive wastes, liquid
2. Adhesive wastes, solid
3. Ammonia (anhydrous and wastewater)
4. Batteries
5. Contaminated rags/cheesecloths
6. Emergency eyewash and shower wastewater (EEW&S wastewater)
7. Fuel, oil and grease wastes
8. Fuel cleanup wastewater
9. Hydraulic fluids
10. Hydrazine scrubber effluent
11. Hydrazine
12. Insulation wastes, liquid
13. Insulation wastes, solid
14. Nitrogen tetroxide (N_2O_4)
15. Oxidizer cleanup wastewater
16. Oxidizer scrubber effluent
17. Paint wastes, liquid
18. Painting wastewater
19. Solid wastes, combustible
20. Solid wastes, noncombustible
21. Solvent wastes (oxygenated)
22. Solvent wastes (chlorinated)
23. Solvent wastewater

4.3.1 Selection Criteria

The development of a collection point is justified if:

1. The wastes generated in the work area:

   - exclude highly reactive or extremely hazardous wastes
   - can be collected in the work area and carried to the collection point in 5- to 10-gallon "safety" buckets, and
   - generated regularly during the launch cycle.

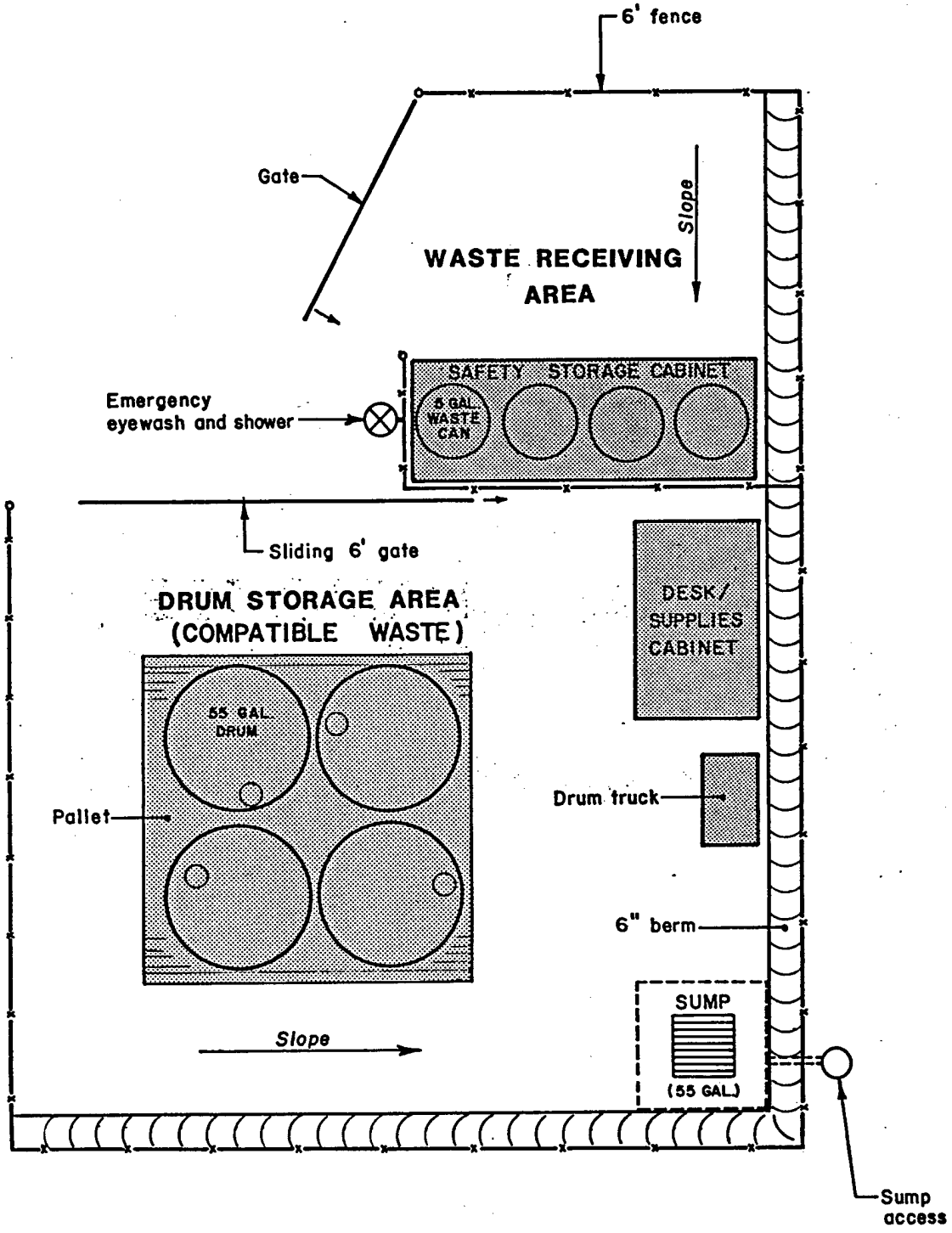
2. The work area is situated such that:

   - a potential site for the collection point is available within or near the work area, and
   - the potential site is accessible by emergency response and waste handling equipment.

Seven collection points are proposed: one at V19; one at V21; two at V23; one at V31 and two at V33.

4.3.2 General Specifications

Critical parameters upon which the design of the collection point would be based include (1) work area activities, (2) the layout of the work area in the station set, and (3) the composition and quantities of waste stream. Figure 4-2 presents a conceptual plan of the collection point; detailed design details are omitted from Figure 4-2 since waste quantity and composition data may be modified prior to the implementation of the STS Waste Handling Plan.



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CONCEPTUAL PLAN - COLLECTION POINT

FIGURE 4-2

PROJECT NO. 534-1.1

The collection point has two areas: (1) a receiving area for the delivery of the waste containing buckets by station set personnel or contractors, and (2) a holding area for consolidation of hazardous wastes of the same waste category into 55-gallon drums. Access to the holding area is restricted to personnel dedicated to hazardous waste handling, while the receiving area is accessible to any generator.

If spills occur in the collection point, capture and containment of the waste is provided by berms on two sides of the collection point and a floor slope that directs the waste to a sump. The sump will be sized to contain the volume of the single largest container or 10 percent of the total volume of stored material, whichever is the larger.

The general specifications for the collection point and recommended support equipment are listed in Appendix B.

4.4 WASTE HANDLING FACILITY - ACCUMULATION POINT

The HWHP provides three accumulation points for STS wastes; these are areas where drummed wastes are temporarily stored prior to their delivery to the VAFB storage facility (however, in the case of Port Hueneme, the wastes are subsequently delivered to disposal/recycling). The waste from each station set will be consolidated at one of the three proposed accumulation points. The station sets in North VAFB, including V17, V18, V19 and V21, will be serviced by an accumulation point in North VAFB (henceforth designated NVAFB-AP). A South VAFB accumulation point (henceforth designated SVAFB-AP) will service Station Sets V23, V31, V33 and V80. The Port Hueneme Station Set, serviced solely by an accumulation point designated PH-AP, is described in Chapter 13, which describes waste handling at V32.

The accumulation point will be receiving large-volume routine and non-routine wastes in 55-gallon drums (directly from the work areas and collection points), whereas the collection point will receive only small quantities of low-risk routinely-produced wastes from the station sets.

Both NVAFB-AP and SVAFB-AP serve as control and supply centers for logistics and emergency response activities, including extra supplies of recovery drums, protective clothing, and drum mobility equipment.

4.4.1 Siting Considerations

The actual siting of the NVAFB-AP and the SVAFB-AP will depend largely upon the needs defined at the station sets they service, the availability of an appropriate area, and the siting of the Hazardous Waste Storage Facility. If the Storage Facility is located such that it is inconvenient for regular delivery of routinely generated wastes and there is no other adequate point to initiate recordkeeping, labeling, etc., an accumulation point will be required. Factors which will define the location of this accumulation point include, but are not limited to, the following:

- Air Force siting regulations, including AFM 161-30, AFR 27-100, 1STRADR 127-200, AFR 88-15.
- Proximity to waste generation points: specifically, convenient to the station sets which will produce large amounts of hazardous wastes.
- Available road access for emergency response and waste handling equipment.
- Open "buffer" zone between facility and surrounding structures (quantity/distance and compatibility regulations).

4.4.2 General Facility Specifications

The two accumulation points will be designed and equipped in accordance with the handling requirements of the waste streams generated at the station sets they service. Appendix C presents design considerations

that should be addressed in developing the accumulation point design. Figure 4-3 illustrates a conceptual layout of an accumulation point. The layout was predicated upon the assumption that all STS hazardous wastes would be drummed, however, this assumption was nullified by an August 5, 1982 decision to store hypergolic-contaminated wastes in on-base waste retention tanks.[1] Further modifications in the accumulation point layout may be required as new data becomes available; therefore, Figure 4-3 should be used only as a planning tool.

The detailed design of the accumulation point will be based on a number of considerations, including: (1) the schedule of transport (incoming and outgoing), (2) available personnel, (3) chemical makeup of wastes, (4) waste quantities per storage category, and (5) Air Force Regulation 127-100, SAMTECM 127.1 and AFM-161-30.[2]

4.4.3 Support Equipment

The accumulation point should be equipped to respond to hazards associated with the storage, movement, and handling of waste chemicals. A list of standard support equipment is presented in Appendix C.

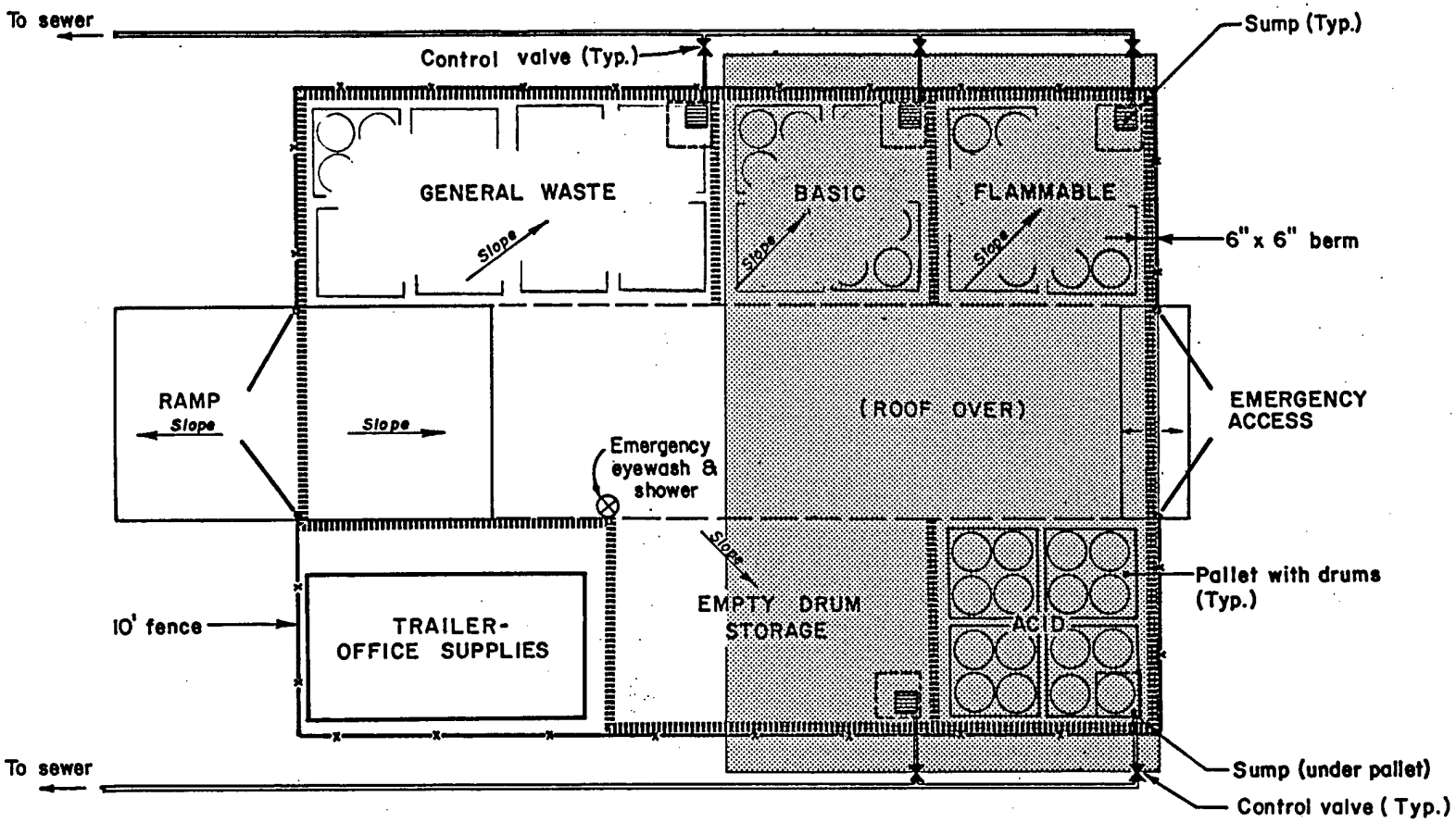
4.4.4 NVAFB-Accumulation Point

Waste Quantities and Composition

Table 4-4 outlines the composition and quantities of the waste stream that will be channeled to NVAFB-AP. Routine wastes generated at Station Sets V17, V18, V19 and V21 are totaled, by category, indicating the

1. This decision was made at a VAFB meeting, August 5, 1981, approximately one month after the development of this HWHP.

2. Review of these regulations was not within the project "Scope of Work." They are listed here as references to be considered prior to actual facility design.



PLAN VIEW

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U. S. AIR FORCE
STS HAZARDOUS WASTE HANDLING PLAN
VANDENBERG AIR FORCE BASE, CALIFORNIA

CONCEPTUAL PLAN- ACCUMULATION POINT

FIGURE
4-3
PROJECT NO.
534-1.1

Table 4-4

INCOMING WASTE STREAM AT
NVAFB ACCUMULATION POINT
(By Storage Category)*

Category	Quantity Per Launch[1] (gallons)	Storage Requirements[2] (drums)
Acid		
Hydrazine Scrubber Effluent	--	Bulk[3]
Oxidizer Cleanup Wastewater	--	Bulk
Painting Wastewater	N/A	0
Total	0	0
Base		
Ammonia (anhydrous and wastewater)	10	1
Batteries/Potassium Hydroxide	N/A	0
Fuel Cleanup Wastewater	N/A	0
Total	10	1
Flammable		
Adhesive Waste, Liquid	N/A	0
Contaminated Rags/Cheesecloth	52.4	1
Hydrazine (MMH, UDMH)	--	Bulk
Paint Waste, Liquid	1.7	1
Solid Waste, Combustible	40.7	1
Solvent Waste, Oxygenated	0.2	1
Total	95.0	4
General Waste		
Adhesive Waste, Solid	2.2	1
EEW&S Wastewater	--	Bulk
Fuel, Oil and Grease Waste	N/A	0
Hydraulic Fluids	1.2	1
Insulation Waste, Liquid	N/A	0
Insulation Waste, Solid	226.0	5
Oxidizer Scrubber Effluent	--	Bulk
Solid Waste, Noncombustible	170.3	4
Solvent Waste, Chlorinated	N/A	0
Solvent Wastewater	24.0	2
Total	423.9	13
FACILITY TOTALS	528.9	18

*Footnotes are presented on the following page

Table 4-4 (Continued)

Notes:

1. Source: Quantities for routine wastes are based on the Hazardous Waste and Disposal Assessment Inventory for the Space Shuttle Project, Volume I, 1981, SCS Engineers and the July 21, 1982 SD/DEV Space Shuttle Hazardous Waste Management Briefing. Values are given on a per launch basis.

2. The drum quantities listed reflect the total number of drums generated at the station sets serviced (see Tables 5-1 and 6-1, Station Sets V19 and V21, respectively).

3. Bulk: Particular waste stream will be collected and stored in bulk tanks rather than drums. Contingency wastes, i.e., hypergolic wastes will also be handled in this manner.

Note: Oxidizer wastes will be stored in bulk retention tanks which eliminates the need for a storage category.

accumulation point drum requirements. Routine quantities are reported on a per launch basis, since the accumulation point is not to accumulate waste for more than 60 days or one launch cyle, whichever is less. Contingency quantities for an unplanned event, such as an abort or spill, are not listed separately because the majority of contingency wastes will be stored in bulk tanks. Acrylic foam (1,000 gallons) may be generated requiring drum capacity.

Table 4-4 also identifies waste streams which will be generated at one of the four station sets, but will be transferred into waste retention tanks. The waste categories listed are for informational purposes; they do not necessarily represent the actual form of the "incoming waste."

Drummed wastes will be labeled according to the relative hazards, compatibility and characteristics and temporarily stored by the appropriate storage category. These storage designations, which are responsive to chemical makeup and compatibility, are as follows:

- Acid
- Base
- Flammable
- General Waste

The size of the accumulation point is a function of the number of drums or containers designated for each storage category. Each storage category will contain compatible solid and liquid wastes (based on similarity of waste type and California compatibility class). The following description briefly characterizes the major sources and components of the waste stream in each particular storage category:[1]

1. No storage category is shown for oxidizer (e.g., nitrogen tetroxide) since these wastes will be collected and stored in retention tanks rather than in drums.

Acid Storage

All wastes in the category will be transferred to bulk storage tanks at V19 and V21.

Base Storage

- Anhydrous ammonia: Concentrated; generated during ammonia boiler servicing.

Flammable Storage

- Combustible solid wastes: Empty containers generated during general maintenance and repair.

- Contaminated rags and cheesecloths: Used during maintenance and repair.

General Waste Storage

- Solid insulation wastes: Thermal Protection System maintenance and repair.

- Noncombustible solid wastes: empty containers and packing materials generated during maintenance and repair activities.

Typically, the "general waste" category will have the largest volume of material; solid insulation wastes, such a polyurethane foam, comprise the largest portion of the category. However, the largest quantities of wastes that will be generated are hypergolic-contaminated wastes which include emergency eyewash and shower water, scrubber effluents and spill cleanup waters. All of these waste streams will be collected in waste retention tanks located at V19 and V21. The emergency eyewash water may be drained to the sewer if a laboratory analysis indicates that the con-

taminant level (hypergols) is insignificant.[1] (A more detailed description of the individual waste streams is presented in the Waste Handling Data Sheets in Appendix A.)

Storage Capacity

The NVAFB-AP should be designed to provide capacity for drum storage based on the following schedule:

Storage Category	Number of Drums[2]
Base	1
Flammable	4
General	11
Total	16

4.4.5 SVAFB Accumulation Point

Waste Quantities and Composition

Table 4-5 outlines the waste stream that will be stored at SVAFB-AP. The wastes will be collected from three separate station sets, the Launch Pad, the SRB Refurbishment and Subassembly Facility, and the External Tank Storage and Checkout Facility, but they will be derived from five major operations: Payload Checkout and Servicing and SRB-TPS Closeout (V23), SRB Subassembly Preparation and Refurbishment (V31),

1. Currently, there are no on-base laboratory facilities. However, the enormous quantity of EEW&S wastewater which will require analysis indicates that installation of on-base laboratory capabilities would be beneficial.

2. These numbers reflect the August 5, 1982 decision on bulk handling of hypergolic-contaminated wastes, emergency eyewash wastewater, and scrubber effluents.

Table 4-5

INCOMING WASTE STREAM AT
SVAFB ACCUMULATION POINT
(By Storage Category)*

Category	Quantity Per Launch[1] (gallons)	Storage Requirements[2] (drums)
Acid		
Hydrazine Scrubber Effluent	--	Bulk[3]
Oxidizer Cleanup Wastewater	N/A	Bulk
Painting Wastewater	40.0	1
Total	40.0	1
Base		
Ammonia (anhydrous and wastewater)	N/A	0
Batteries/Potassium Hydroxide	N/A	0
Fuel Cleanup Wastewater	N/A	0
Total	0	0
Flammable		
Adhesive Waste, Liquid	N/A	0
Contaminated Rags/Cheesecloth	81.6	3
Hydrazine (MMH, UDMH)	--	Bulk
Paint Waste, Liquid	13.0	2
Solid Waste, Combustible	777.0	15
Solvent Waste, Oxygenated	93.8	2
Total	965.4	22
General Waste		
Adhesive Waste, Solid	23.6	2
EEW&S Wastewater	--	Bulk
Fuel, Oil and Grease Waste	10.0	1
Hydraulic Fluids	100.0	2
Insulation Waste, Liquid	80.0	2
Insulation Waste, Solid	4,211.0	79
Oxidizer Scrubber Effluent	--	Bulk
Solid Waste, Noncombustible	2,412.7	46
Solvent Waste, Chlorinated	1,019.5	20
Solvent Wastewater	360.0	7
Total	8,216.8	159
FACILITY TOTALS	9,222.2	182

*Footnotes are presented on the following page

Table 4-5 (Continued)

Notes:

1. Source: Quantities for routine wastes are based on the Hazardous Waste and Disposal Assessment Inventory for the Space Shuttle Project, Volume I, 1981, SCS Engineers and the July 21, 1982 SD/DEV Space Shuttle Hazardous Waste Management Briefing. Values are per launch cycle.

2. The drum quantities listed reflect the total number of drums generated at the station sets serviced (see Tables 9-1, 10-1 and 11-1; Station Sets V23, V31 and V33, respectively).

3. Bulk: Particular waste stream will be collected and stored in retention tanks rather than drums. Contingency wastes, i.e., hypergolic wastes, will also be collected and stored in this manner (acrylic foam contingency wastes will require drum storage).

Note: There will not be a storage category for oxidizer wastes; these wastes will be stored in retention tanks.

External Tank Checkout and Processing (V33), and External Tank Closeout (V23 or V33). The External Tank Closeout Operation has been referred to as V99; however, it does not exist as a separate station set.

External Tank Closeout activities may occur at either V23 or V33. The major operations will generate approximately 2,525 cubic feet (7,292 pounds) of solid wastes during each launch cycle. Installation of a solid waste compaction at the SVAFB-AP could greatly reduce the implied storage area requirements. Empty cans, containers, packing materials, and possibly scrap insulation could be reduced in volume and eliminated from other hazardous waste handling activities. The necessity and feasibility of a compaction unit will need to be assessed at a later point by Air Force personnel.

Incoming drummed wastes will be labeled according to the relative hazards, compatibility and characteristics and temporarily stored by "storage category." These four storage designations, which are responsive to chemical makeup and compatibility, are as follows:

- Acid
- Base
- Flammable
- General Waste

The size of the accumulation point is a function of the number of drums or containers designated for each storage category. Each storage category will contain compatible solid and liquid wastes. The following briefly characterizes the major sources and components of the waste stream in each particular storage category:[1]

1. No storage cateogry is shown for oxidizer wastes, which include nitrogen tetroxide. These wastes will be collected and stored in retention tanks rather than in drums.

Acid Storage

- Alodine rinse water: Chromic-fluoride solution used to chemically treat aluminum surfaces.

Base Storage

- Category may not be needed; current projections do not show any "base" material being generated.

Flammable Storage

- Contaminated rags and cheesecloths; generated during routine maintenance and cleanup. Normally contaminated with solvents.

- Combustible solid wastes; primarily contaminated air filters.

- Solvent wastes; oxygenated solvents used for general cleanup.

General Storage

- Solid adhesive and insulation wastes; generated during SRB and ET Closeout activities.

- Noncombustible solid wastes; empty containers and contaminated rags generated during maintenance and repair activities.

- Solvent wastes: Chlorinated solvents used for surface preparation and general cleanup.

Storage Capacity

The SVAFB-AP should be designed to provide capacity for drum storage based on the following schedule:

Storage Category	Number of Drums[1]
Acid	1
Base	0
Flammable	20
General	146
Total	167

4.5 WASTE MANAGEMENT PERSONNEL

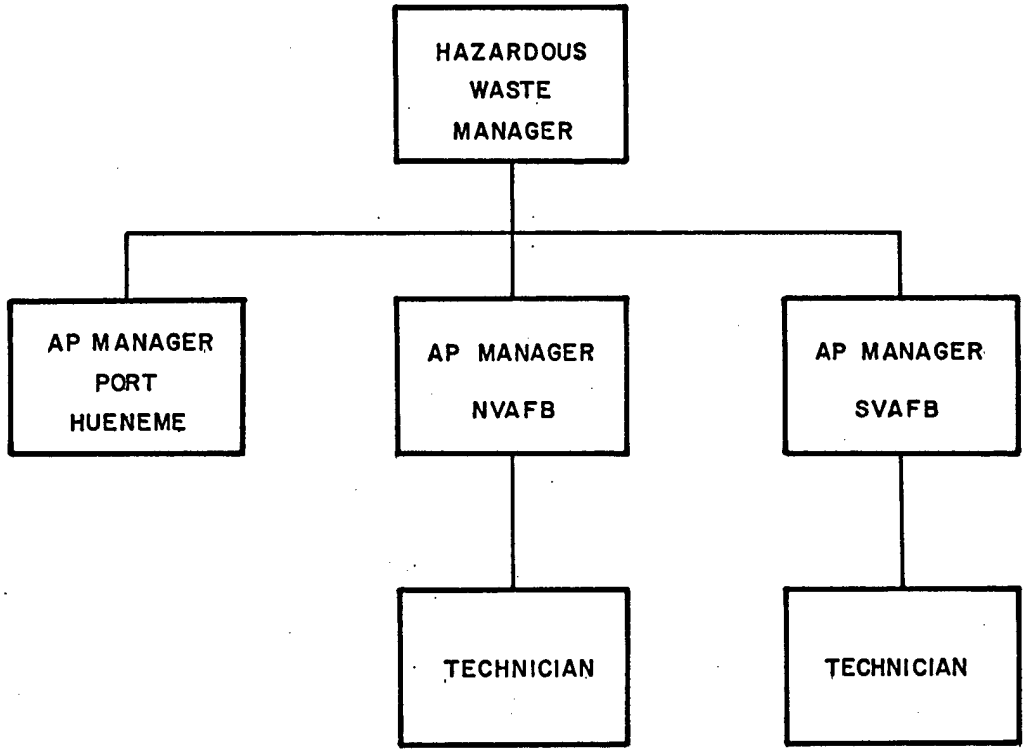
4.5.1 Personnel

The safe and efficient management of STS wastes from point of generation to the storage facility will require the services of several responsible employees. Presented below are recommended job titles together with a brief description of their waste management functions. Figure 4-4 presents an organizational scheme for key personnel in the HWHP.

Hazardous Waste Manager (HWM)

The HWM is ultimately responsible for all aspects of the on-base management of STS hazardous wastes, including (1) waste identification, (2) containerization, (3) operation of the collection and/or accumulation point, (4) container marking and labeling, (5) recordkeeping, and

1. These numbers reflect the August 5, 1982 decision on bulk handing of hypergolic-contaminated wastes, e.g., emergency eyewash wastewaters, and scrubber effluents.



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STS HAZARDOUS WASTE HANDLING PLAN
VANDENBERG AIR FORCE BASE, CALIFORNIA

STS HAZARDOUS WASTE MANAGEMENT

FIGURE
4-4
PROJECT NO.
534-1.1

(6) inspection. With respect to waste identification, the HWM will arrange for a chemical analysis (on base if available, outside lab if not) for any wastes which require clarification and a category definition. Once the analysis has been completed, the HWM will inform the Accumulation Point Manager (see below) of the appropriate category and any specific handling procedure for the waste.

Recommended Qualifications: An academic degree in chemistry and/or environmental engineering, several years experience in waste management or a related field, and excellent managerial capabilities.

Accumulation Point Manager (APM)

As the title indicates, the APM directs all waste handling activities associated with an accumulation point. The individual who holds this position will report to the HWM. The APM will supervise (1) receiving and storage, (2) container marking and labeling, (3) recordkeeping, and (4) inspection. With respect to inspection, the APM will examine (1) temporarily stored containers for evidence of deterioration, (2) tank construction and discharge confinement equipment, (3) monitoring, safety, emergency response, security devices, and operating equipment.

Recommended Qualifications: At least two years of technical course work, demonstrated managerial skills, and a working knowledge of hazardous waste regulations.

Technician

At both the collection point and accumulation point, a technician will perform the activities related to handling routinely generated hazardous wastes. These functions include:

- Collecting empty waste receptacle. Labeling on this can must correspond to the waste type to be placed in the container. (Duty performed daily.)

- Transferring waste delivered to receiving area (in the collection point) to drums in storage area by means of a drum pump. (Duty performed daily.)

- Delivering drum to the accumulation point when it is full or on a regular schedule (e.g., bimonthly). (The State implied time limit of 60 days storage without a TSDF permit may be initiated after the material arrives at the accumulation point.)

- Inspecting container for damage upon receipt at the accumulation point.

- Logging waste into the record book upon arrival at the accumulation point.

- Placing container in storage area specified on the Hazardous Waste Manifest. Drums are placed on a pallet.

- Loading palletized drums on flatbed for transport to storage facility.

Recommended Qualifications: Familiarity with accepted waste handling practices and a general understanding of regulations related to hazardous waste management. The individual filling this position shall have completed a comprehensive training program focusing on the safe management of hazardous wastes. The technician will report to the APM.

4.5.2 Personnel Training

The hazardous nature of many of the STS waste streams requires a comprehensive training program to ensure safe management of the waste chemicals. Additionally, to satisfy requirements set out by RCRA, OSHA and DOT, all personnel who are responsible for some aspect of the waste management program need to be familiar and comfortable with both standard and emergency operating procedures. The anticipated rate of employee turnover is another factor to be considered in developing an appropriate training program. In light of this situation, the program will need to be repeated and updated on a regular basis (every 6 to 12 months, preferably).

The training program will need to be tailored to the level of personnel attending. The following outline is a guideline for a classroom training program for non-management personnel. Management level personnel would benefit from attending an off-base comprehensive seminar on hazardous waste management; several private firms provide extensive courses in all aspects of waste handling/management.

Outline: Waste Management Training

Introduction

- Introduce program: Necessity of regular update and continuous training
- Present Waste Management Program for STS wastes, EMCON document, Air Force Guidelines, Base Plan 355-1, 4392 AEROSG, Plan 234-81
- Describe means or pathway for attaining emergency assistance

Standard Operating Procedures

- Introduce and explain use of WHDS and WHA sheets[1]
- Waste Identification: Define responsibilities and methodologies
- Labeling: Refer to WHDS, DOT regulations (49 CFR 100-199) and compatibility codes
- Containerization: Refer to DOT regulations (49 CFR Parts 173, 178 and 179), AFM-161-30, DoD Regulations, AFR-127-100 and SAMTECM 127-1
- Manifesting: Describe on-base system and off-base shipment requirements (Department of Health Services)
- Use of routine safety equipment
  - Respirators, goggles
  - Protective clothing
  - Basic first aid; exposure, burns (acid, alkalines)
  - Fire extinguishers; use of proper type
  - Evacuation procedures

1. WHDS are waste handling data sheets that describe special handling procedures required by the chemical nature of each waste category (see Appendix A) for the WHDS's. WHA's are waste handling activities that describe common handling procedures. The WHA's are presented in Section 4.6 below.

- Routine waste/drum handling
  - Forklift operation
- Monitoring and spill detection
- Procedures for adding a new waste stream
- Inspection procedures

Emergency Operating Procedures

- Introduction of current Base SPCC Plan
  - Application of alarm system and communication network
  - Available equipment at each facility
- Hazard identification
- Varying response methods for spills, leaks and other releases
- Facility shut-down procedures, how to secure operations during an emergency

4.6 WASTE HANDLING PROCEDURES

4.6.1 Introduction

This section describes all the waste handling procedures to be followed from the point of generation to preparation for off-base recovery or disposal. Figure 4-1, presented in the introduction to this chapter, illustrates the waste flow through three main pathways.

Figure 4-1 depicts waste handling procedures as being equivalent for all wastes; in reality, however, regulations call for specific handling criteria for different waste categories. To respond to this regulatory constraint, Waste Handling Activities (WHA), which are listed below, describe common handling procedures.[1]

The WHA's and their numerical designations are as follows:

WHA 1 - Waste Identification
WHA 2 - Containerization
WHA 3 - Receiving and Storage - Collection Point
WHA 4 - Receiving and Storage - Accumulation Point
WHA 5 - Container Marking and Labeling
WHA 6 - Recordkeeping
WHA 7 - Logistics
WHA 8 - Inspection

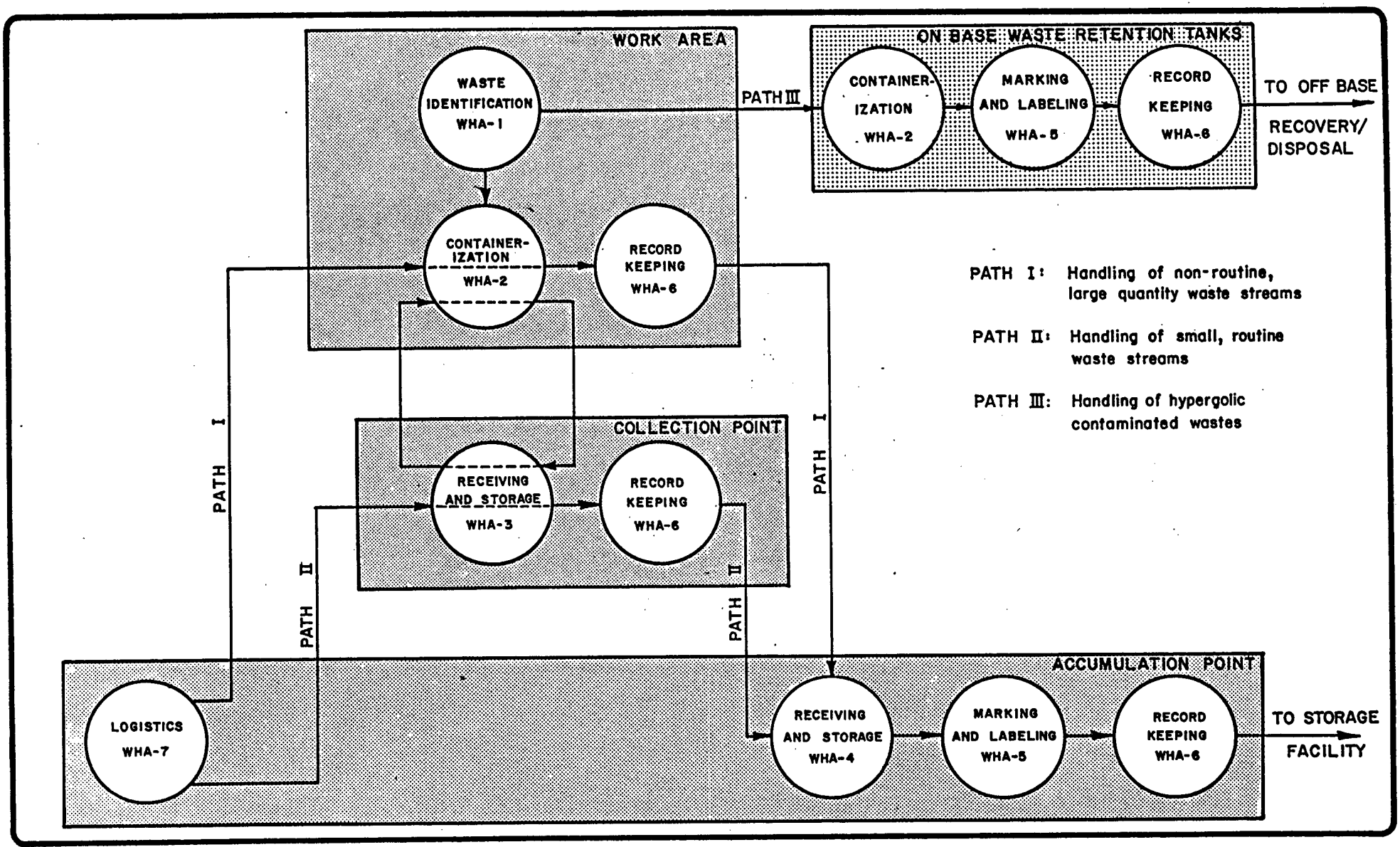
4.6.2 Waste Handling Flowchart

The Waste Handling Flowchart (Figure 4-5) provides a rapid reference to the sequencing and relationships among the WHA's. The major features of the flowchart are as follows:

- Waste Handling Activities: Each circle in the flowchart encloses a WHA. Within each circle, a number is placed which refers to the numbering for the WHA in the text.

- Paths: Three paths are shown corresponding to Path I, Path II and Path III.

1. Provisions for special handling procedures required by the chemical nature of the waste category are described in Section 4.6.3 below.



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WASTE HANDLING FLOW CHART

FIGURE 4-5
PROJECT NO. 534-1.1

- Flow Lines: The flow lines show sequencing of WHA; in addition, they symbolize the transport of the waste and/or the waste stream.

- Waste Handling Locations: Waste handling activities will occur at four areas: the work area, the collection point, the accumulation point, and waste retention tanks. All activities taking place in one generation area are aligned in rows on the flow chart. Waste transfer activities are shown occurring between the rows.

4.6.3 Waste Handling Activities and Procedures

Figures 4-6 through 4-17 present the WHA's that comprise the core of the STS waste handling procedures. For each waste handling activity, the steps performed, and the responsible staff are identified on each WHA. When needed, the steps are subdivided to account for handling differences between the different waste pathways.

Special handling procedures dictated by the chemical nature of a particular waste category are presented on the Waste Handling Data Sheets (WHDS) in Appendix A. A detailed description of the WHDS is provided as a preface to Appendix A, which includes all of the WHDS. The WHDS present the following waste management information:

- Waste Identification
- Authorized Containers
- Labeling and Placarding
- Recordkeeping - Manifest Information
- Worker Protection Information
- Spill Response and Procedures

The Waste Identification Section of each WHDS lists trade and common names that are encompassed by each waste category.

Figure 4-6

STS HAZARDOUS WASTE MANAGEMENT PROGRAM

WASTE HANDLING ACTIVITY

ACTIVITY No.	ACTIVITY	LOCATION
WHA-1	Waste Identification	Work Area

DESCRIPTION:

This activity identifies which of the following management strategies is chosen: (1) Path I (use of collection point), (2) Path II (direct transport to accumulation point), or (3) Path III (handling the hazardous waste in bulk). Upon completion of the activity, the waste-handling sequence is initiated.

DUTIES:

1.1 Identify waste category (Table 5-1, 6-1, etc.).

1.2a When the waste category is handled at the collection point, inform the Accumulation Point Manager that a waste receptacle (labeled for the waste category) is needed at the work area. After initial contact, a waste can is permanently issued to the operator. Waste handling will follow Path II on the "Waste Handling Flowchart."

1.2b When handling is not available at the collection point, inform the Accumulation Point Manager of the waste category, quantity and generation schedule. Waste handling will follow Path I on the "Waste Handling Flowchart."

1.2c Any waste stream containing hypergolic fuel wastes will be handled in bulk quantities. Identification may require a laboratory analysis. Arrange with the Hazardous Waste Manager for analysis and specific storage requirements.

RESPONSIBLE STAFF:	DUTIES:
Technician	1.1, 1.2

APPROVED BY _____ REVISION DATE _____

Figure 4-7

STS HAZARDOUS WASTE MANAGEMENT PROGRAM

WASTE HANDLING ACTIVITY

ACTIVITY No.	ACTIVITY	LOCATION
WHA-2	Containerization	Work Area

DESCRIPTION:

Containerization provides for the transfer of the unpackaged waste to an authorized container (drum, tank, etc.).

DUTIES:

2.1 Refer to Section 5 of the appropriate WHDS in order to obtain handling procedures. Request safety personnel as needed.

2.2 Verify that authorized container (DOT approved) is delivered as listed in Section 2 of WHDS.

2.3 Fill drum to capacity as specified on the WHDS (Section 2 designated "Authorized Containers").

2.4 Initiate recordkeeping, i.e., fill out appropriate section of Drum Waste Log (WHA-6).

2.5 Materials requiring bulk containerization, i.e., hypergolic contaminated wastes, will necessitate specific handling/storage procedures. These procedures will be determined by the degree of hazard, quantity, and the location of material involved.

RESPONSIBLE STAFF:	DUTIES:
Station Set Employee	2.1; 2.2; 2.3; 2.4
Hazardous Waste Manager	2.5

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Figure 4-8

STS HAZARDOUS WASTE MANAGEMENT PROGRAM

WASTE HANDLING ACTIVITY

ACTIVITY No.	ACTIVITY	LOCATION
WHA-3	Receiving and Storage - Collection Point	Collection Point

DESCRIPTION:

Collection point operations provide initial waste handling for small quantities of routinely generated, not highly reactive waste materials.

DUTIES:

3.1 Deliver waste receptacle at end of every day to the hazardous waste collection point receiving area. Place in safety cabinent.

3.2 Collect empty waste receptacle. Labeling on this receptacle must correspond to the waste category to be placed in the container. (Duty performed daily.)

3.3 Transfer waste delivered to receiving area to drums in storage area. Use of a drum pump may be necessary to complete the transfer. (Duty performed daily).

3.4 Deliver drum to the accumulation point when it is full or on a regular schedule (e.g., bimonthly). The State implied time limit for storage without a TSDF permit is 60 days; this limit may be initiated after the drum arrives at the accumulation point.

RESPONSIBLE STAFF:	DUTIES:
Station Set Employee	3.1
Technician	3.2; 3.3; 3.4

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Figure 4-9

STS HAZARDOUS WASTE MANAGEMENT PROGRAM

WASTE HANDLING ACTIVITY

ACTIVITY No.	ACTIVITY	LOCATION
WHA-4	Receiving and Storage - Accumulation Point	Accumulation Point

DESCRIPTION:

These activities provide drum transport to the accumulation point and handling activities at the accumulation point.

DUTIES:

4.1 Collect full container from generation point or collection point with forklift. Waste drums will be transported on a pallet. Deliver to accumulation point. Accept only with DoD manifest attached.

4.2 Inspect container for damage upon receipt and upon deliver to accumulation point.

4.3 Log waste into accumulation point records upon arriving at accumulation point.

4.4 Place container in storage area specified on DoD manifest. Drums are placed on pallet.

4.5 In loading area of accumulation point, load palletized drums on flatbed for transport to storage facility with forklift.

RESPONSIBLE STAFF:	DUTIES:
Technician	4.1; 4.3; 4.4; 4.5
Accumulation Point Manager	4.3

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Figure 4-10

STS HAZARDOUS WASTE MANAGEMENT PROGRAM

WASTE HANDLING ACTIVITY

ACTIVITY No.	ACTIVITY	LOCATION
WHA-5	Container Marking and Labeling	Accumulation Point

DESCRIPTION:

Labeling provides symbolic hazard recognition while the markings provide more detailed information. Figure 4-11 provides guidance on placement of labels and markings. (Marking and labeling requirements for bulk storage tanks must be consistent with NFPA, DoD, and applicable VAFB regulations.)

DUTIES:

5.1 Upon receipt of the waste at the accumulation point, place the following information on the RCRA/DOT marking (sample marking attached as Figure 4-11).

- o Proper DOT shipping name (see Section 1, WHDS)
- o UN/NA number (see Section 1, WHDS)
- o Accumulation date (from DoD manifest or Drum Waste Log)

5.2 Place warning labels as specified by Section 3 of the WHDS.

5.3 Complete the following markings prior to off-base transport.

- o California hazardous waste manifest number (on RCRA/DOT marking)
- o Co-signee address

5.4 Placard stationary storage tanks; complete manifest information for off-base transport.

RESPONSIBLE STAFF:	DUTIES:
Accumulation Point Manager	5.1; 5.2
Storage Facility Manager	5.3
DPDO personnel	5.4

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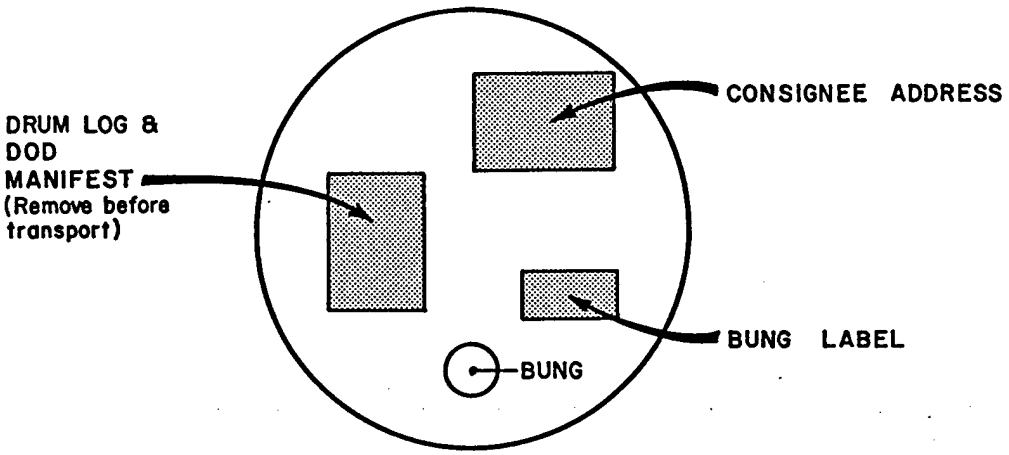
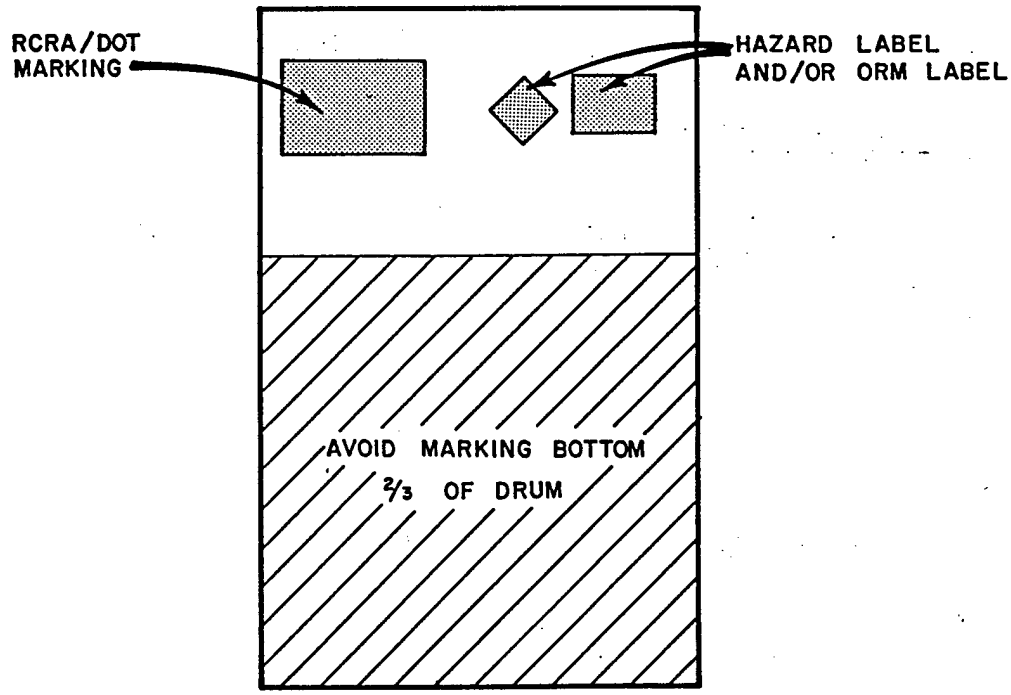


TOP VIEW



SIDE VIEW

EMCON Associates
San Jose, California

U.S. AIR FORCE
STS HAZARDOUS WASTE HANDLING PLAN
VANDENBERG AIR FORCE BASE, CALIFORNIA

LABEL AND MARKING PLACEMENT

FIGURE
4-11
PROJECT NO.
534-1.1

Figure 4-12

STS HAZARDOUS WASTE MANAGEMENT PROGRAM

WASTE HANDLING ACTIVITY

ACTIVITY No.	ACTIVITY	LOCATION
WHA-6	Recordkeeping - On-Base Hazardous Waste Manifest and Drum Waste Log	All

DESCRIPTION:

Maintaining the two records provides the data base used for completion of the California Hazardous Waste Manifest (CHWM). Also, information contained in these records is used in Labeling and Marking (WHA-5) and Waste Receiving and Storage Activities (WHA-3 and WHA-4). The DoD manifest, DD Form 1348-1 (Figure 4-13), will accompany the containerized waste to the storage facility. The Drum Waste Log (Figure 4-14) is used at the collection point for completion of the DoD manifest. All accumulated information will be used in the preparation of an annual report (WHA-12).

DUTIES:

6.1 At the collection point, enter waste information on the Drum Waste Log (see Figure 4-14 for a sample Drum Waste Log). Part I is completed at the initial use of an existing drum. An entry is made in Part II for each waste receptacle transferred to the drum.

6.2 Upon closure of a drum at the work area or at the collection point, complete the section labeled "shipper's use" on DD Form 1348-1 (see Figure 4-13).

An optional "On-Base Hazardous Waste Manifest" is recommended as an internal document to supplement the DoD manifest if additional detail is needed (see Figure 4-15). Section 1, "Work Area Information" of the optional OBHWM includes the following:

- o Accumulation Date: Date waste first enters drum
- o Waste Storage Area: From Section 3
- o Physical State and Waste Composition: Visual inspection, WHDS and Drum Waste Log

6.3 When containerized waste arrives at the accumulation point, complete the section labeled "receiver's use" on DD Form 1348-1 (see Figure 4-13).

RESPONSIBLE STAFF:	DUTIES:
Technician	6.1; 6.2
Accumulation Point Manager	6.3

APPROVED BY _____ REVISION DATE _____

Figure 4-13

DEPARTMENT OF DEFENSE WASTE MANIFEST
(DD Form 1348-1)

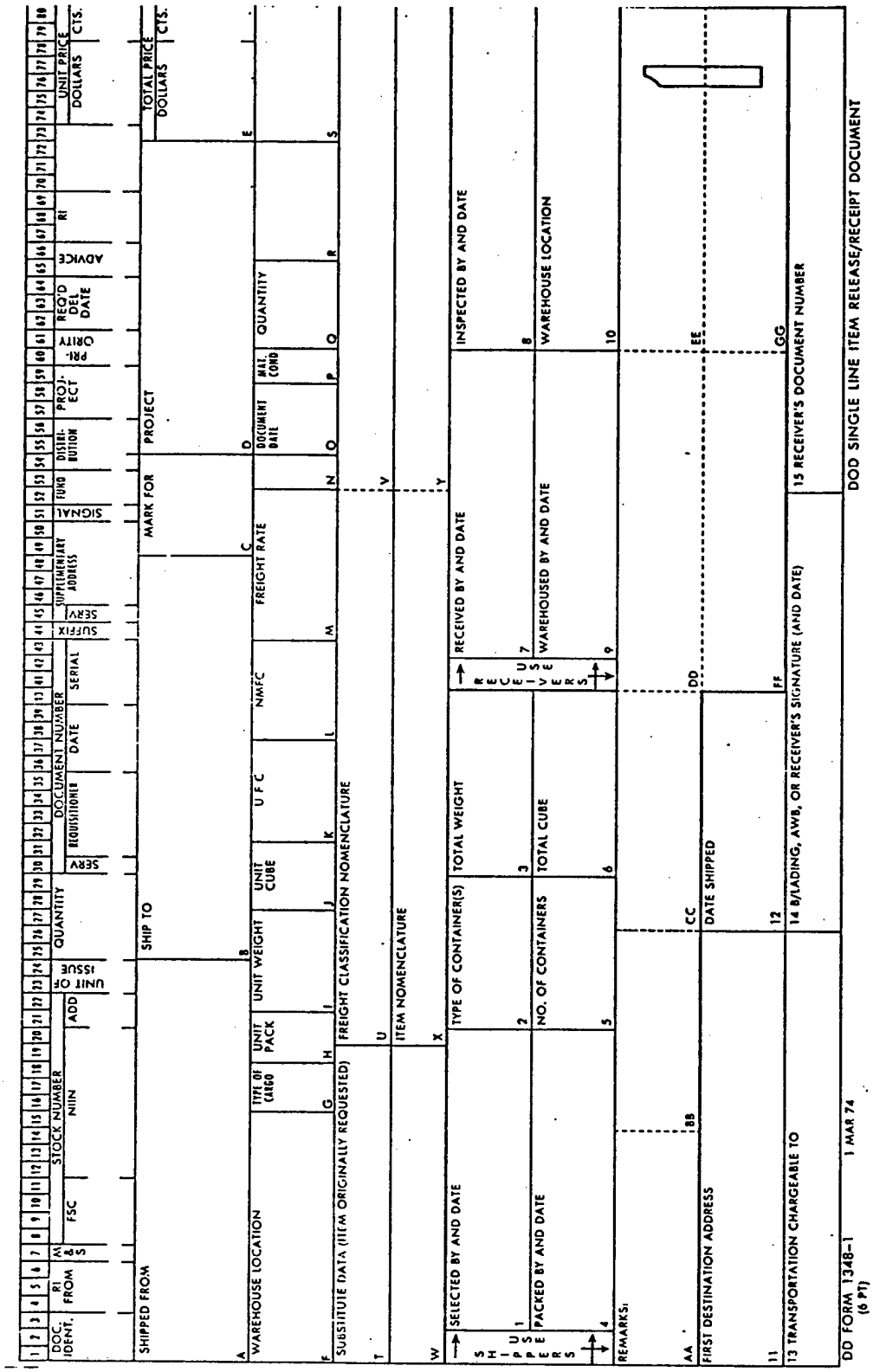


FIGURE 4-14

STS HAZARDOUS WASTE MANAGEMENT PROGRAM

DRUM WASTE LOG

Part I:

IDENTIFICATION:

DRUM No. _____ ①

WASTE STORAGE CATEGORY _____ ②

ACCUMULATION DATE _____ ③

Part II:

WASTE COMPOSITION / COMPONENTS

TRADE / COMMON NAME	SOLID / LIQUID	WASTE CATEGORY ④	GALLONS OR % TOTAL VOLUME	DATE

TOTAL GALLONAGE: _____

OPERATOR'S SIGNATURE _____ REMOVAL DATE _____ OHWM No. _____ ⑤

① Each drum will be given an identification number

② Corresponds to Storage Category Codes: Acid, Base, Flammable, General Waste

③ Start date; initial drum use

④ Corresponds to Waste Category Codes

⑤ On-base Hazardous Waste Manifest No., to be attached to drum before removal.

FIGURE 4-15

STS HAZARDOUS WASTE MANAGEMENT PROGRAM

ON-BASE HAZARDOUS WASTE MANIFEST

MANIFEST No. _____

DRUM No. _____

1. WORK AREA INFORMATION

ACCUMULATION DATE _____ GENERATOR NAME _____ LOCATION _____

WASTE STORAGE AREA:

☐ Acid ☐ Base ☐ Flammable ☐ General Waste

PHYSICAL STATE:

☐ Solid ☐ Liquid ☐ Sludge ☐ Slurry ☐ Gas

WASTE COMPOSITION:

COMPONENTS	CONCENTRATION RANGE		UNITS		
	Upper	Lower	%	(or)	ppm

2. ACCUMULATION POINT INFORMATION

RECEIVED BY _____ DATE _____

3. STORAGE FACILITY INFORMATION

RECEIVED BY _____ DATE _____ CA. HAZARDOUS WASTE MANIFEST No. _____

Figure 4-16

STS HAZARDOUS WASTE MANAGEMENT PROGRAM

WASTE HANDLING ACTIVITY

ACTIVITY No.	ACTIVITY	LOCATION
WHA-7	Logistics	Accumulation Point

DESCRIPTION:

Logistics incorporates all duties required to provide supplies at the accumulation point and collection point storage.

DUTIES:

7.1 Maintain inventory of containers, labels, and manifests. Order containers and labels through 43-97 LGS-C (Base Supply).

7.2 Maintain supply of empty drums at collection point storage.

7.3 Upon receiving Container Request from collection point, refer to appropriate WHDS to obtain proper waste container.

7.4 Inspect and maintain all safety and emergency response equipment in working order.

RESPONSIBLE STAFF:	DUTIES:
Accumulation Point Manager	7.1 through 7.4

APPROVED BY _____ REVISION DATE _____

Figure 4-17

STS HAZARDOUS WASTE MANAGEMENT PROGRAM

WASTE HANDLING ACTIVITY

ACTIVITY No.	ACTIVITY	LOCATION
WHA-8	Inspection	Accumulation Point and Stationary Retention Tanks

DESCRIPTION:

Inspect and maintain inspection records of facilities, equipment and supplies for handling hazardous waste.

DUTIES:

8.1 On a weekly basis, inspect filled (and partially filled) containers for any evidence of deterioration.

8.2 For all waste-containing facilities, inspect the following equipment (frequency of inspection based on probability of deterioration or malfunction).

a. Monitoring equipment
b. Safety equipment
c. Emergency response equipment
d. Security devices
e. Structural equipment
f. Operating equipment

8.3 Inspect loading and unloading areas daily when in use.

RESPONSIBLE STAFF:	DUTIES:
Accumulation Point Manager	8.1 through 8.6

APPROVED BY _____ REVISION DATE _____

STS HAZARDOUS WASTE MANAGEMENT PROGRAM

WASTE HANDLING ACTIVITY

ACTIVITY No.	ACTIVITY	LOCATION
WHA-8 (Continued)		

DESCRIPTION:

DUTIES:

8.4 For all waste retention tanks, inspect the following equipment daily:

a. Discharge (inflow and outflow) control equipment.
b. Data from monitoring equipment.
c. Level of waste in tank.

Inspect the following equipment weekly:

a. Tank construction material (above ground) to detect corrosion or other signs of deterioration.
b. Discharge confinement equipment.
c. Response procedures for tank spills or leakage.

8.5 Initiate procedures to correct deterioration or malfunction discovered during inspection.

8.6 Maintain records of inspection and corrections. Records must be maintained at the facility for a minimum of three years.

RESPONSIBLE STAFF: **DUTIES:**

APPROVED BY _____ **REVISION DATE** _____

The Hazardous Waste Storage Categories on each WHDS are groupings of compatible hazardous waste categories for storage purposes. This compatibility information responds to the storage guidance dictates of the Environmental Protection Agency. Four major storage categories provide compatible storage of the STS hazardous waste stream. An oxidizer storage category may be necessary at Port Hueneme; hypergolic wastes will be stored in drums rathern than bulk retention tanks.

- Acid
- Base
- Flammables
- General waste

Section 3 of each WHDS lists the storage category for each hazardous waste category.

NORTH VANDENBERG STATION SETS

Presented in Chapters 5.0 through 8.0 is hazardous waste information unique to the station sets in North Vandenberg: V17, V18, V19 and V21. Two of these four station sets -- V19 and V21 -- produce routine quantities of hazardous wastes in addition to contingency wastes.[1] Since the major generators of hazardous wastes in North Vandenberg are V19 and V21, waste handling procedures for these two station sets are presented in the first two chapters of this section. Neither V17 nor V18 produces routine hazardous wastes; therefore, waste handling procedures for these station sets follow the discussion of Station Sets V19 and V21. Chapters 5.0 through 8.0 describe (1) sources, quantities, and composition of hazardous wastes generated at that location, (2) collection point usage, and (3) accumulation point usage for the station sets in North Vandenberg.

General waste handling required by all station sets -- including facility requirements and such waste handling activities as containerization, recordkeeping and labeling -- were described in detail in Chapter 4.

1. As defined in Chapter 3, routine wastes are those generated during each launch cycle of the shuttle. Contingency wastes are those generated from unplanned events such as aborts, spills, special tests, etc.

5.0 STATION SET V19

5.1 WASTE QUANTITIES AND COMPOSITION

The majority of the hazardous combustible and noncombustible solid wastes generated at V19 will be produced as a result of maintenance and refurbishment of the Orbiter's Thermal Protection System. Operations such as surface cleaning and preparation, and repair and replacement of heat tiles generate more than 95 percent of the hazardous solid waste at V19. Typically, these wastes will include contaminated cloths, empty containers, spent paint brushes, and excess adhesives and epoxies.

The largest volume of liquid wastes generated at V19 is contaminated wastewater. Draining and purging the Aft Propulsion Systems and Forward Reaction Control System contributes a large portion of the fuel-contaminated wastewaters (e.g., spill cleanup and scrubber effluent) and nonaqueous fuel and oxidizer wastes. However, the largest portion of contaminated wastewaters is generated from the emergency eyewashes and showers; this waste stream comprises 43 percent of the total. Any liquid waste stream which is determined to contain a significant amount of hypergolic fuel[1] will be collected and stored in a waste retention tank located at V19 rather than being in drums.

The EEW&S wastewater will be treated as other hypergolic-contaminated wastes unless a lab analysis followed by DOHS approval "reclassifies" the waste stream as "nonhazardous," thereby allowing Class II-1 disposal or drainage to the sewer.

Table 5-1 further details the wastes produced, the estimated quantities per launch, and the storage requirements. The quantities are listed on

1. Significant amount is that which would define the waste stream as a hazardous waste or an extremely hazardous waste (defined by the California Assessment Manual for Hazardous Wastes, DOHS, June 1981).

Table 5-1

V19 WASTE CATEGORIES AND STORAGE QUANTITIES

WHDS Number	Category	Storage Category	Quantity Per Launch[1] (gallons)	Storage Requirements (drums)
1	Adhesive Wastes, Liquid	Flammable	TBD[2]	(1)
2	Adhesive Wastes, Solid	General Waste	2.2	1
3	Ammonia (Anhydrous and Wastewater)	Base	10.0	1
4	Batteries	Base	N/A[3]	0
5	Contaminated Rags/Cheesecloths	Flammable	52.4	1
6	EEW&S Wastewater	General Waste	800.0	*
7	Fuel, Oil and Grease Waste	General Waste	N/A[2]	*
8	Fuel Spill Cleanup/Wastewater	Base	160.0	*
9	Hydraulic Fluids	General Waste	1.2	1
10	Hydrazine Scrubber Effluent	Acid[4]	700.0	*
11	Hydrazine[5]	Flammable	59.4	*
12	Insulation Wastes, Liquid	General Waste	TBD	(1)
13	Insulation Wastes, Solid	General Waste	117.4	3
14	Nitrogen Tetroxide	Oxidizer (Poison)	34.6	*
15	Oxidizer Scrubber Effluent	General Waste	824.0	*
16	Oxidizer Cleanup Wastewater	Acid	90.0	*
17	Paint Wastes, Liquid	Flammable	1.7	1
18	Painting Wastewater	Acid	N/A	0
19	Solid Wastes (Combustible)	Flammable	40.7	1
20	Solid Wastes (Noncombustible)	General Waste	95.56	2
21	Solvent Wastes (Oxygenated)	Flammable	0.2	1
22	Solvent Wastes (Chlorinated)	General Waste	N/A	0
23	Solvent Wastewater	General Waste	12.0	1

1. Quantities shown are for routinely generated wastes. Solids and liquids are given in gallons (based on 7.4 x cubic footage). Baseline numbers were derived from the "STS Inventory," Volume I, Table 8, SCS Engineers and from the SD/DEV July 21, 1982 Space Shuttle Briefing.

2. To be determined: Quantities were not given; however, the waste should be taken into design considerations.

3. Not applicable: Waste will not be generated at this particular station set.

4. Based on the use of citric acid as the scrubber (worst case assumption); scrubber designs have not been finalized.

5. Includes hydrazine, monomethylhydrazine, and unsymmetrical dimethylhydrazine.

*All hypergolic contaminated wastes will be stored in retention tanks. V19 has both oxidizer and fuel waste retention tanks.

Table 5-1 for informational purposes, i.e., to give a more complete view of the wastes which will be generated.

5.2 COLLECTION POINT

Given the general collection point criteria presented in Chapter 4.0, Section 4.3, it is envisioned that one collection point storage area would be located within or adjacent to V19. The majority of the solid wastes generated at V19 are associated with the maintenance and refurbishment of the Orbiter's Thermal Protection System, whereas the majority of liquid wastes are generated during servicing of the Payload Bay Kit and Aft Propulsion System. Therefore, to best respond to the needs at V19, the collection point should be located outside of the OMCF but near either the Orbiter hanger (TPS maintenance), the Payload Servicing area or other work area routinely handling solvent and paint waste. Precise siting will need to be determined once areas of heavy waste generation and available locations are defined. If more than 30 gallons of paint waste are generated in one servicing operation, then collection point handling should not be used. Instead, this paint waste should be collected in a 55-gallon drum and delivered directly to the North Vandenberg Accumulation Point.

Figure 4-2 presents a conceptual layout of the collection point; wastes that are shown as being stored together are assumed to be compatible (such as paint and solvent wastes). It is further assumed that drums will be removed regularly from this short-term storage area.

6.0 STATION SET V21

6.1 WASTE QUANTITIES AND COMPOSITION

The Hypergolic Maintenance and Checkout Facility, Station Set V21, consists of the Orbiter Processing and Support Building and two Hypergolic Maintenance and Checkout Cells. A large portion of the wastes, both solid and liquid, are generated during the drain, purge and maintenance of the Aft Propulsion Systems pods, the Forward Reaction Control System, and the Payload Bay Kit -- all of which occur in the two test cells. However, the majority of the liquid wastes (73 percent) are generated by the emergency eyewashes and showers. The chemical makeup of this waste stream is unclear at the present time; it is possible that the waste stream could be classified as a "non-hazardous" waste, thereby eliminating the need to dispose of it in a Class I landfill. A lab analysis will be required followed by DOHS approval to "reclassify" the waste stream. Current designs would require off-base lab analysis for all waste streams. The large quantity of EEW&S wastewater requiring analysis may necessitate on-base lab analysis for economic reasons.

The remainder of the liquid waste stream at V21 is comprised of fuel and oxidizer scrubber wastes and cleanup wastewaters (contaminated with both hydrazine and nitrogen tetroxide). These waste streams (i.e., all hypergolic contaminated wastes) will be collected and stored in waste retention tanks rather than being drummed. This will avoid unnecessary handling and potentially dangerous situations.

The solid wastes generated at V21 will normally consist of small quantities of polyurethane foam, air filters, seals and sockets. All of these materials can be easily transported to and managed by a collection point. Table 6-1 summarizes the wastes which will be generated on a routine basis at V21. Potential contingency wastes generated at V21 consist of small amounts of oxidizer or fuel and contaminated cleanup waters. These wastes will be washed into a trench system; vapors will

Table 6-1

V21 WASTE CATEGORIES AND STORAGE QUANTITIES

WHDS Number	Category	Storage Category	Quantity Per Launch[1] (gallons)	Storage Requirements (drums)
1	Adhesive Wastes, Liquid	Flammable	N/A[2]	0
2	Adhesive Wastes, Solid	General Waste	N/A	0
3	Ammonia (Anhydrous and Wastewater)	Base	N/A	0
4	Batteries	Base	N/A	0
5	Contaminated Rags/Cheesecloths	Flammable	N/A	0
6	EEW&S Wastewater	General Waste	720.0	*
7	Fuel, Oil and Grease Waste	General Waste	N/A	0
8	Fuel Spill Cleanup/Wastewater	Base	N/A	0
9	Hydraulic Fluids	General Waste	N/A	0
10	Hydrazine Scrubber Effluent	Acid[3]	130.0	*
11	Hydrazine[4]	Flammable	N/A	0
12	Insulation Wastes, Liquid	General Waste	N/A	0
13	Insulation Wastes, Solid	General Waste	108.8	2
14	Nitrogen Tetroxide	Oxidizer (Poison)	12.2	*
15	Oxidizer Scrubber Effluent	General Waste	120.0	*
16	Oxidizer Cleanup Wastewater	Acid	20.0	*
17	Paint Wastes, Liquid	Flammable	N/A	0
18	Painting Wastewater	Acid	N/A	0
19	Solid Wastes (Combustible)	Flammable	N/A	0
20	Solid Wastes (Noncombustible)	General Waste	74.8	2
21	Solvent Wastes (Oxygenated)	Flammable	N/A	0
22	Solvent Wastes (Chlorinated)	General Waste	N/A	0
23	Solvent Wastewater	General Waste	12.0	1

1. Quantities shown are for routinely generated waste. Solids and liquids are given in gallons (based on 7.4 x cubic footage). Baseline numbers were derived from the "STS Inventory," Volume I, Table 8, SCS Engineers and from the SD/DEV July 21, 1982 Space Shuttle Briefing.

2. Not applicable: Waste will not be generated at this particular station set.

3. Based on the use of citric acid as the scrubber (worst case assumption); scrubber designs have not been finalized.

4. Includes hydrazine, monomethylhydrazine, and unsymmetrical dimethylhydrazine.

*All hypergolic contaminated wastes will be stored in retention tanks. V21 has both oxidizer and fuel waste retention tanks.

be vented to the appropriate scrubber, and liquids aspirated and transferred to a waste retention tank.

6.2 COLLECTION POINT

It is anticipated that a collection point or temporary storage area will be located within or adjacent to V21. The waste stream typically generated at V21 will consist of small amounts of "routinely" produced solid and liquid wastes. This characterization falls under the Path II scenario illustrated in the Waste Handling Flowchart in Figure 4-4; as a result, the user would benefit from being able to transfer the small amounts of waste into 55-gallon drums at a nearby storage area. The wastes would be removed on a regular (i.e., bimonthly) basis or before that time if the waste drums are filled.

The most appropriate location for the collection point at V21 appears to be directly adjacent to Checkout Cell A. Details concerning facility specifications and necessary support equipment are outlined in Appendix B.

7.0 STATION SET V17

7.1 WASTE QUANTITIES AND COMPOSITION

The Airfield or Landing (V17) will not generate any routine hazardous waste; however, contingency wastes should be considered in the waste management plan. The contingency wastes which could be generated include emergency eyewash and shower water, acrylic foam, hydrazine (MMH, UDMH) oxidizer, and large quantities of hypergolic-contaminated water. The quantities listed below are based on "abort residual capacity."[1]

Waste	Contingency Quantity (gallons)
EEW&S water	720
Acrylic foam	500
Oxidizer	126 + 400 gallons water
Fuel	832 + 2,500 gallons water

7.2 COLLECTION POINT

Because of the small amounts of routinely generated wastes, no collection point is planned for V17.

7.3 WASTE HANDLING PROCEDURES

The method by which the wastes generated at V17 will be collected and disposed of will vary depending upon the type of material and the quantity. Any hypergolic-contaminated waste (e.g., hydrazine-contaminated

1. Figures derived from the SD/DEV Space Shuttle Hazardous Waste Management Briefing, July 21, 1982.

cleanup water) will be aspirated (if spilled) from containment trenches or sumps into a mobile tank truck and transferred to an off-base waste retention tank; gases will be routed to the appropriate scrubber. The scrubber liquors will also be transferred to a waste retention tank. Ultimately, the waste hypergols will be pumped into a mobile tanker (DOHS-approved) and moved off base for disposal.

Station Sets V19 and V21 have oxidizer and fuel waste tanks which could accept wastes generated by V17 activities. Contingency wastes which do not fall into the category of "hypergolic-contaminated waste," such as acrylic foam, will require drumming and transport to the NVAFB Accumulation Point. If drums are utilized, the Waste Handling Activities (WHA) detailed in Figures 4-5 through 4-16 in Chapter 4.0 should be followed. Specific chemical data and safety considerations are described on the Waste Handling Data Sheets (Appendix A).

7.4 MANAGEMENT OF CONTINGENCY WASTES

Since Station Set V17 generates only contingency wastes, members of the Disaster Response Force (in accordance with the Base 355-1 Plan), as well as the necessary chemical response unit described in Appendix D, will be called upon during a contingency event. The designated hazardous waste manager will be contacted and communications with VAFB and DOHS authorities will be initiated. During a contingency event, trained hazardous waste technicians will need to be on hand to assist the response teams with final cleanup and removal of containerized waste. It is assumed that all hypergolic wastes will be aspirated into mobile tank trucks. However, V17 personnel should be prepared to handle certain wastes (acrylic foam) in drum quantities.

8.0 STATION SET V18

8.1 WASTE QUANTITIES AND COMPOSITION

Station Set V18, the Mate/Demate facility is similar to V17 in that negligible amounts of hazardous waste are generated on a routine basis. Typically, small amounts of hydraulic fluids will be produced from the routine maintenance of the hydraulic system associated with the Orbiter Mating Device. In addition, contingency wastes may be generated at V18, including dilution water from fuel and oxidizer spill cleanup, emergency eyewash and shower wastewater, and acrylic foam. The contingency quantities listed below are based on "flight residual."[1]

Waste	Contingency Quantity (gallons)
Fuel	63 + 200 gallons water
Oxidizer	72 + 200 gallons water
Diesel fuel, oil, hydraulic fluid	TBD
Emergency eyewash and shower water	720
Acrylic foam	500

8.2 COLLECTION POINT

Because of the small amounts of routinely generated wastes, no collection point is planned for V18.

1. Source: SD/DEV Space Shuttle Hazardous Waste Management Briefing, July 21, 1982.

8.3 WASTE HANDLING PROCEDURES

The method by which the wastes generated at V18 will be collected and disposed of will vary depending upon the type of material and the quantity. Any hypergolic-contaminated waste (e.g., hydrazine-contaminated cleanup water) will be aspirated (if spilled) from containment trenches or sumps into a mobile tank truck and transferred to an on-base waste retention tank; gases will be routed to the appropriate scrubber. The scrubber liquors will also be transferred to a waste retention tank. The waste hypergols will ultimately be pumped into a mobile tanker (DOHS approved) and moved off base for disposal.

Station Sets V19 and V21 have oxidizer and fuel waste tanks which could accept wastes generated by V18 activities. Contingency wastes which do not fall into the category of "hypergolic-contaminated waste," such as acrylic foam, may require drumming and transport to the NVAFB Accumulation Point. If drums are utilized, the Waste Handling Activities (WHA) detailed in Figures 4-5 through 4-16 in Chapter 4.0 should be followed. Specific chemical data and safety considerations are described on the Waste Handling Data Sheets (Appendix A).

8.4 MANAGEMENT OF CONTINGENCY WASTES

Since Station Set V18 generates only contingency wastes, members of the Disaster Response Force (in accordance with the Base 355-1 Plan), as well as the necessary chemical response unit described in Appendix D, will be called upon during a contingency event. The designated hazardous waste manager will be contacted and communications with VAFB and DOHS authorities will be initiated. During a contingency event, trained hazardous waste technicians will need to be on hand to assist the response teams with final cleanup and removal of containerized wates. It is assumed that all hypergolic wastes will be aspirated into mobile tank trucks. However, V18 personnel should be prepared to handle certain wastes (acrylic foam) in drum quantities.

SOUTH VANDENBERG STATION SETS

Presented in Chapters 9.0 through 12.0 is hazardous waste information unique to the station sets in South Vandenberg: V23, V31, V33 and V80. Three of the four station sets -- V23, V31 and V33 -- produce routine quantities of hazardous wastes in addition to contingency wastes.[1] These station sets are presented in numerical order in Chapters 9.0, 10.0 and 11.0. V80, which generates only contingency wastes, is described in Chapter 12.0. Chapters 9.0 through 12.0 describe, in general terms, (1) sources, quantities, and composition of hazardous wastes generated at that location, (2) collection point usage, and (3) accumulation point usage for the station sets in South Vandenberg.

Waste handling procedures required by all station sets -- including facility requirements and such waste handling activities as containerization, recordkeeping and labeling -- are described in detail in Chapter 4.

1. As defined in Chapter 3, routine wastes are those generated during each launch cycle of the shuttle. Contingency wastes are those generated from unplanned events such as aborts, spills, special tests, etc.

9.0 STATION SET V23

9.1 WASTE QUANTITIES AND COMPOSITION

At V23, the Launch Pad, large amounts of solid and liquid hazardous wastes will be generated, including approximately 3,700 gallons of liquid waste during each launch cycle. An additional 1,000,000 gallons of sound supression water generated at V23 will not be included as part of the data base for this study because it will be treated on base. Similarily, all hypergolic-contaminated wastes will be collected and temporarily held in waste retention tanks prior to off-base disposal.

Hypergolic-contaminated wastes, which are comprised mainly of emergency eyewash and shower water, account for approximately 88 percent of the total liquid wastes generated at V23. It may be possible to treat the EEW&S water as "nonhazardous" and drain it directly to the sewer rather than haul it to a Class I landfill and secure an "Extremely Hazardous Waste Disposal Permit" for that disposal. Such a procedure should be preceded by a laboratory analysis to determine whether or not the wastewater falls under the "hazardous properties" defining criteria. These criteria are outlined in the California Assessment Manual, which states that "if you are the producer of a waste, it is your responsibility to determine if the waste is hazardous and, if it is, to assess its hazardous properties."[1] On-base laboratory analyses, although not currently planned, may be helpful in defining the waste.

Solvent wastes and solvent-contaminated wastewater also contribute to the liquid waste stream. The waste solvents are generated during routine cleanup operations such as those associated with the cleaning of both the Payload Changeout Room and the Payload Preparation Room. Generally, the solvents used will be either chlorinated or fluorinated.

1. California Assessment Manual for Hazardous Wastes, DOHS, June 1981.

Table 9-1 lists the wastes produced, the estimated quantities per launch, and the storage requirements at V23.

During each launch cycle, approximately 50 cubic feet (200 pounds)[1] of solid insulation waste will be generated at V23. This does not take into account the large amounts of foam wastes generated during External Tank Closeout activities. Approximately 323 cubic feet (645 pounds)[2] will be produced. These wastes are presented in Table 11-1 in Chapter 11, Station Set V33.

9.2 COLLECTION POINT

It is anticipated that two collection points or temporary storage areas will be located within or adjacent to V23 (in accordance with Air Force quantity/distance standards and waste compatibility standards). The Payload Changeout Room and/or the Payload Preparation Room may serve as appropriate collection point sites due to the types and quantities of wastes generated within each. Additional details concerning collection point specifications support equipment are included in Appendix B.

1. Based on a solid insulation density of 4 pounds per cubic foot; SCS Engineers, "Hazardous Waste Inventory," Volume III, July 1981.

2. Based on a BX-250 foam density of 2 pounds per cubic foot; SCS Engineers, Hazardous Waste Inventory, Volume III, July 1981.

Table 9-1

V23 WASTE CATEGORIES AND STORAGE QUANTITIES

WHDS Number	Category	Storage Category	Quantity Per Launch[1] (gallons)	Storage Requirements (drums)
1	Adhesive Wastes, Liquid	Flammable	N/A[2]	0
2	Adhesive Wastes, Solid	General Waste	N/A	0
3	Ammonia (Anhydrous and Wastewater)	Base	N/A	0
4	Batteries	Base	N/A	0
5	Contaminated Rags/Cheesecloths	Flammable	N/A	0
6	EEW&S Wastewater	General Waste	800.0	*
7	Fuel, Oil and Grease Waste	General Waste	N/A	0
8	Fuel Spill Cleanup/Wastewater	Base	N/A	0
9	Hydraulic Fluids	General Waste	100.0	2
10	Hydrazine Scrubber Effluents	Acid[3]	1,250.0	*
11	Hydrazine[4]	Flammable	150.0	*
12	Insulation Wastes, Liquid	General Waste	N/A	0
13	Insulation Wastes, Solid	General Waste	370.0[5]	7
14	Nitrogen Tetroxide	Oxidizer (Poison)	N/A	0
15	Oxidizer Scrubber Effluent	General Waste	863.0	*
16	Oxidizer Cleanup Wastewater	Acid	N/A	0
17	Paint Wastes, Liquid	Flammable	N/A	0
18	Painting Wastewater	Acid	N/A	0
19	Solid Wastes (Combustible)	Flammable	N/A	0
20	Solid Wastes (Noncombustible)	General Waste	N/A	0
21	Solvent Wastes (Oxygenated)	Flammable	N/A	0
22	Solvent Wastes (Chlorinated)	General Waste	105.0	2
23	Solvent Wastewater	General Waste	360.0	7

1. Quantities shown are for routinely generated wastes. Solids and liquids are given in gallons (based on 7.4 x cubic footage). Baseline numbers were derived from the "STS Inventory," Volume I, Table 8, SCS Engineers and from the SD/DEV July 21, 1982 Space Shuttle Briefing.

2. Not applicable: Waste will not be generated at this particular station set.

3. Based on the use of citric acid as the scrubber (worst case assumption); scrubber designs have not been finalized.

4. Includes hydrazine, monomethylhydrazine, and unsymmetrical dimethylhydrazine.

5. Based on 200 pounds and a density of 4 pounds per cubic foot x 7.4, SCS Engineers, STS Inventory, Volume 3.

*All hypergolic contaminated wastes will be stored in retention tanks. V23 has two oxidizer tanks and three fuel tanks.

10.0 STATION SET V31

10.1 WASTE QUANTITIES AND COMPOSITION

The SRB Refurbishment and Subassembly Facility, located near the launch complex, generates approximately 2,100 cubic feet (6,600 pounds) of solid waste, and 1,400 gallons of liquid waste during each launch cycle. The majority of material is generated during the preparation and refurbishment of the SRB subassemblies: forward skirt assembly; aft skirt assembly; and frustum. Activities such as surface preparation, followed by the application of ablative materials, paint and topcoat, and finally general cleanup, represent 95 percent of the total solid wastes and 75 percent of the liquid wastes produced.

Table 10-1 lists the wastes produced, the estimated quantities per launch, and the storage requirements at V31.

Solid wastes which are typically generated include empty paint and primer containers, excess ablative (uncured) material, contaminated cloths and rags, contaminated solvents, and small amounts of excess epoxy adhesive. Although these wastes comprise a large portion of the V31 solid wastes, ablative and insulation packing materials (cans, cartons, cardboard and wood) contribute over 1,800 cubic feet of waste per launch. Expensive Class I disposal fees and excessive on-base storage could be reduced if these materials were hauled to a Class II-1 landfill. This would be feasible if a lab analysis showed that the concentrations, mobility and hazardous characteristics of the contaminants did not define the material as a hazardous waste. To fully reclassify the material, the waste generator (Air Force) must apply to the Department of Health Services for a non-hazardous classification pursuant to Section 66305 of Title 22.[1] Because of the high probability that the

1. California Department of Health Services, California Assessment Manual for Hazardous Wastes, June 1981

Table 10-1

V31 WASTE CATEGORIES AND STORAGE QUANTITIES

WHDS Number	Category	Storage Category	Quantity Per Launch[1] (gallons)	Storage Requirements (drums)
1	Adhesive Wastes, Liquid	Flammable	N/A[2]	0
2	Adhesive Wastes, Solid	General Waste	22.4	1
3	Ammonia (Anhydrous and Wastewater)	Base	N/A	1
4	Batteries	Base	N/A	0
5	Contaminated Rags/Cheesecloths	Flammable	59.2	2
6	EEW&S Wastewater	General Waste	320.0	*
7	Fuel, Oil and Grease Waste	General Waste	10.0	1
8	Fuel Spill Cleanup/Wastewater	Base	TBD[3]	*
9	Hydraulic Fluids	General Waste	N/A	0
10	Hydrazine Scrubber Effluents	Acid[4]	10.0	*
11	Hydrazine[5]	Flammable	28.8	*
12	Insulation Wastes, Liquid	General Waste	40.0	1
13	Insulation Wastes, Solid	General Waste	1,451.0	27
14	Nitrogen Tetroxide	Oxidizer (Poison)	N/A	0
15	Oxidizer Scrubber Effluent	General Waste	N/A	0
16	Oxidizer Cleanup Wastewater	Acid	N/A	0
17	Paint Wastes, Liquid	Flammable	12.0	1
18	Painting Wastewater	Acid	40.0	1
19	Solid Wastes (Combustible)	Flammable	740.0	14
20	Solid Wastes (Noncombustible)	General Waste	2,298.4	43
21	Solvent Wastes (Oxygenated)	Flammable	N/A	0
22	Solvent Wastes (Chlorinated)	General Waste	912.3	17
23	Solvent Wastewater	General Waste	N/A	0

1. Quantities shown are for routinely generated wastes. Solids and liquids are given in gallons (based on 7.4 x cubic footage). Baseline numbers were derived from the "STS Inventory," Volume I, Table 8, SCS Engineers and from the SD/DEV July 21, 1982 Space Shuttle Hazardous Waste Management Briefing.

2. Not applicable: Waste will not be generated at this particular station set.

3. To be determined: Quantities were not given; however, the waste should be taken into design considerations.

4. Based on the use of citric acid as the scrubber (worst case assumption); designs have not been finalized.

5. Includes hydrazine, monomethylhydrazine, and unsymmetrical dimethylhydrazine.

*All hypergolic contaminated wastes will be stored in retention tanks. V31 does not have available retention tanks; hypergolic wastes will require transfer to V23.

Note: The data in this table do not include 1,500 cubic feet of packing materials which will probably be treated as nonhazardous wastes (decision to be made).

materials will be handled in this manner, they are not included in the storage quantities shown in Table 10-1.

The liquid wastes generated at V31 are primarily chlorinated and fluorinated solvents contaminated with various insulation and paint residues. Emergency eyewash water contributes 300+ gallons per launch; this waste stream may also be handled (classified) as a non-hazardous waste pending lab analysis. The remainder of the liquid waste stream is comprised of small amounts of diesel oil and fuel, scrubber effluent and "Alodine" contaminated wastewater. Any hypergolic wastes generated at V31 would require transport to a retention tank, e.g., those located at V23.

10.2 COLLECTION POINT

It is anticipated that one collection point or temporary storage area will be located within or adjacent to V31 (in accordance with Air Force quantity/distance standards and compatibility standards). The most appropriate location for the collection point would be outside the east wall of the "clean room" (Reference Drawing 82431840017, paragraph 2.1.2). For details concerning facility specifications and necessary support equipment, see Appendix B.

11.0 STATION SET V33

11.1 WASTE QUANTITIES AND COMPOSITION

The routine hazardous wastes generated at V33, the External Tank Processing and Storage Facility, are presented in Table 11-1. The wastes generated during External Tank (ET) Closeout activities account for the majority of V33 solid wastes. External Tank Closeout activities may occur at either V23 or V33; however, the quantities are presented with other V33 waste quantities in Table 11-1. If ET Closeout activities occur at V33, large amounts of solid insulation wastes will be generated. The wastes will primarily be excess ablative and adhesive materials, as well as excess "pour foam" and "BX-250 foam." The foam insulation may contain significant amounts of diphenyl methane diisocyanate which is an "extremely hazardous waste" (see Appendix A for specific handling instructions).

Operations occurring at V33 (excluding ET Closeout activities) will typically generate small amounts of contaminated Rymple cloths and BX-250 cured tile repair foam. Approximately 30 gallons of flammable liquid will also be generated: 15 gallons each of both Part A (BX-250) and Part B (CPR 488) unmixed tile repair foam and small amounts of epoxy primer.

11.2 COLLECTION POINT

If ET Closeout activities occur at V33, it would be beneficial to locate at least two collection points within or adjacent to the facility. It is possible, however, that V33 will not be utilized for closeout activities, thereby completely eliminating the need for a collection point.

Table 11-1

V33 WASTE CATEGORIES AND STORAGE QUANTITIES[1]

WHDS Number	Category	Storage Category	Quantity Per Launch[2] (gallons)	Storage Requirements (drums)
1	Adhesive Wastes, Liquid	Flammable	N/A[3]	0
2	Adhesive Wastes, Solid	General Waste	1.2	1
3	Ammonia (Anhydrous and Wastewater)	Base	N/A	0
4	Batteries	Base	N/A	0
5	Contaminated Rags/Cheesecloths	Flammable	22.4	1
6	EEW&S Wastewater	General Waste	50.0	*
7	Fuel, Oil and Grease Waste	General Waste	N/A	0
8	Fuel Spill Cleanup/Wastewater	Base	N/A	0
9	Hydraulic Fluids	General Waste	N/A	0
10	Hydrazine Scrubber Effluents	Acid[4]	N/A	0
11	Hydrazine[5]	Flammable	N/A	0
12	Insulation Wastes, Liquid	General Waste	40.0	1
13	Insulation Wastes, Solid	General Waste	2,390.0	45
14	Nitrogen Tetroxide	Oxidizer (Poison)	N/A	0
15	Oxidizer Scrubber Effluent	General Waste	N/A	0
16	Oxidizer Cleanup Wastewater	Acid	N/A	0
17	Paint Wastes, Liquid	Flammable	<1.0	1
18	Painting Wastewater	Acid	N/A	0
19	Solid Wastes (Combustible)	Flammable	37.0	1
20	Solid Wastes (Noncombustible)	General Waste	114.7	3
21	Solvent Wastes (Oxygenated)	Flammable	93.8	2
22	Solvent Wastes (Chlorinated)	General Waste	2.2	1
23	Solvent Wastewater	General Waste	N/A	0

1. V33 waste quantities include all wastes associated with External Tank Closeout Activities; these wastes may be generated at V33 or V23 (previously V99).

2. Quantities shown are for routinely generated wastes. Solids and liquids are given in gallons (based on 7.4 x cubic footage). Baseline numbers were derived from the "STS Inventory," Volume I, Table 8, SCS Engineers and from the SD/DEV July 21, 1982 Space Shuttle Briefing.

3. Not applicable: Waste will not be generated at this particular station set.

4. Based on the use of citric acid as the scrubber (worst case assumption); designs have not been finalized.

5. Includes hydrazine, monomethylhydrazine, and unsymmetrical dimethylhydrazine.

*All hypergolic contaminated wastes will be stored in retention tanks. V33 does not have available retention tanks; hypergolic wastes would require transfer to V23.

If a collection point is not built into the V33 design, hazardous wastes generated at the facility could be collected in drums and transported directly to the South Vandenberg Accumulation Point.

12.0 STATION SET V80

12.1 WASTE QUANTITIES AND COMPOSITION

V80, Transportation, consists of the tow route for transporting the Orbiter from the airfield processing area to the launch complex and the tow road for transporting the External Tanks from the shallow draft barge docking facility to the launch complex. The Orbiter tow route is approximately 16 miles in length; the tow road is approximately 2 miles in length.

No routine hazardous wastes will be generated by the transportation system; however, contingency wastes should be considered in the waste management plan. The contingency wastes that could be generated at V80 include accidental releases of fuels or oxidizer diluted with water and/or vapor suppressant. The quantities listed below are based on "abort residual capacity."[1]

Waste	Contingency Quantity (gallons)
Fuel	832 + 2,500 gallons water
Oxidizer	126 + 400 gallons water

12.2 COLLECTION POINT

A collection point would not be necessary at V80 due to the lack of routinely generated wastes and the nature of the tow route itself, i.e., it would be impossible to site a facility along the tow route which could adequately service the entire route.

1. Figures derived from the July 21, 1982 Space Shuttle Hazardous Waste Management Briefing.

12.3 WASTE HANDLING PROCEDURES

The method by which the wastes generated at V80 will be collected and disposed of will vary depending upon the size and type of release. Under normal circumstances, any hypergolic-contaminated waste (e.g., concentrated hydrazine or diluted hydrazine cleanup water) will be aspirated (if spilled) from containment trenches or sumps into a mobile tank truck and transferred to an on-base waste retention tank; gases will be routed to the appropriate scrubber. The scrubber liquors will also be transferred to a waste retention tank. The retention tanks located at V23 would be the most appropriate storage location. Ultimately, the waste hypergols will be pumped into a mobile tanker (DOHS approved) and moved off base for disposal.

Due to the fact that only contingency (hypergolic) wastes will be generated by V80, it is not likely that any of the wastes will be routed to the SVAFB accumulation point. However, if drums are used and the wastes require transport to the SVAFB-AP, the Waste Handling Activities (WHA) detailed in Figures 4-5 through 4-16 in Chapter 4.0 should be followed. Specific chemical data and safety considerations are described on the Waste Handling Data Sheets (Appendix A).

12.4 MANAGEMENT OF CONTINGENCY WASTES

During a contingency event, members of the Disaster Response Force (in accordance with the Base 355-1 Plan), as well as the necessary chemical response unit described in Appendix D, will be called upon. The designated hazardous waste manager will be contacted, and communications with VAFB and DOHS authorities will be initiated. During a contingency event, trained hazardous waste technicians will need to be on hand to assist the response teams with final cleanup and removal of containerized waste. It is assumed that all hypergolic wastes will be aspirated into mobile tank trucks. However, V80 personnel should be prepared to handle certain wastes (acrylic foam) in drum quantities.

13.0 STATION SET V32

13.1 WASTE QUANTITIES AND COMPOSITION

The solid hazardous wastes generated at V32 consist of insulation, insulation-contaminated filters, and batteries. Insulation removal from the exterior of each SRB generates 99 percent of the solid wastes at V32.

The largest volume of liquid wastes generated at V32 is composed of wash waters contaminated by insulation and detergents. The removal of the SRB exterior insulation with high-pressure water streams followed by detergent and water rinses generates 100,000 gallons. These waters will be piped to sanitary sewers after filtration and clarification. The remainder of the liquid hazardous waste is contaminated by hydrazine as emergency wash water, scrubber liquor, and spill cleanup water.

Table 13-1 further details the wastes produced and the estimated quantities per launch.

13.2 COLLECTION POINT

No collection point is necessary at V32 since the Port Hueneme Accumulation Point will be located such that hazardous wastes generated at separate work areas can easily be transported to the accumulation point.

13.3 ACCUMULATION POINT

13.3.1 Description

The Port Hueneme Accumulation Point (PH-AP) serves as the collection area for containerized hazardous wastes prior to off-base shipment. Whereas the STS wastes generated at VAFB are moved through collection

Table 13-1

V32 WASTE CATEGORIES AND STORAGE QUANTITIES

WHDS Number	Category	Storage Category	Quantity Per Launch[1] (gallons)	Storage Requirements[2] (drums)
1	Adhesive Wastes, Liquid	Flammable	N/A[3]	0
2	Adhesive Wastes, Solid	General Waste	N/A	0
3	Ammonia (Anhydrous and Wastewater)	Base	N/A	0
4	Batteries	Base	30.0	1
5	Contaminated Rags/Cheesecloths	Flammable	N/A	0
6	EEW&S Wastewater	General Waste	N/A	0
7	Fuel, Oil and Grease Waste	General Waste	N/A	0
8	Fuel Spill Cleanup/Wastewater	Base	190.0	4
9	Hydraulic Fluids	General Waste	N/A	0
10	Hydrazine Scrubber Effluents	Acid[4]	50.0	1
11	Hydrazine[5]	Flammable	N/A	0
12	Insulation Wastes, Liquid	General Waste	3,000	55
13	Insulation Wastes, Solid	General Waste	N/A	0
14	Nitrogen Tetroxide	Oxidizer (Poison)	N/A	0
15	Oxidizer Scrubber Effluent	General Waste	N/A	0
16	Oxidizer Cleanup Wastewater	Acid	N/A	0
17	Paint Wastes, Liquid	Flammable	N/A	0
18	Painting Wastewater	Acid	N/A	0
19	Solid Wastes (Combustible)	Flammable	N/A	0
20	Solid Wastes (Noncombustible)	General Waste	N/A	0
21	Solvent Wastes (Oxygenated)	Flammable	N/A	0
22	Solvent Wastes (Chlorinated)	General Waste	2.0	1
23	Solvent Wastewater	General Waste	N/A	0

1. Quantities shown are for routinely generated wastes. Solids and liquids are given in gallons (based on 7.4 x cubic footage). Baseline numbers were derived from the "STS Inventory," Volume I, Table 8, SCS Engineers and from the SD/DEV July 21, 1982 Space Shuttle Briefing.

2. At V32, hypergolic-contaminated wastes will not be stored in retention tanks; drums will be utilized (personal communication: J. Shah SD/DEC, August 5, 1982).

3. Not applicable: Waste will not be generated at this particular station set.

4. Based on the use of citric acid as the scrubber (worst scrubber assumption); scrubber designs have not been finalized.

5. Includes hydrazine, monomethylhydrazine, and unsymmetrical dimethylhydrazine.

points to accumulation points to an on-base storage facility, the PH-AP will serve as the final storage point before hazardous wastes are transported directly to off-base disposal or recovery. Ralph M. Parsons Company prepared a general specification for V32, including a plan view for the PH-AP.[1] Wastes from other tenant organizations in addition to STS project hazardous waste, will be handled and stored at this facility.

PH-AP will serve as a control and supply center for logistics and emergency response activities at V32, housing, for example, supplies of drums, protection clothing, overpack drums and drum mobility equipment.

13.3.2 Waste Quantities and Composition

Table 13-2 identifies the incoming waste stream to be delivered to the PH-AP. Incoming drummed wastes will be labeled according to the relative hazards, compatibility and characteristics and will be temporarily stored by "storage category." These storage designations, which reflect chemical makeup and compatibility, are as follows:

- Acid
- Base
- Flammable
- General Waste

The size of the accumulation point is a function of the number of drums or containers designated for each storage category. Each storage category will contain compatible solid and liquid wastes. The following briefly characterizes the major waste streams which will be delivered to the PH-AP.

1. Project Book for STS Hazardous Waste Facilities at Station Set V32, Port Hueneme, California, May 21, 1982.

Table 13-2

INCOMING WASTE STREAM AT
PORT HUENEME ACCUMULATION POINT*
(By Storage Category)

Category	Quantity Per Launch[1] (gallons)	Storage Requirements[2] (drums)
Acid		
Hydrazine Scrubber Effluent	50.0	1
Oxidizer Cleanup Wastewater	N/A	0
Painting Wastewater	N/A	0
Total	50.0	1
Base		
Ammonia (anhydrous and wastewater)	N/A	0
Batteries/Potassium Hydroxide	30.0	1
Fuel Cleanup Wastewater[3]	190.0	4
Total	220.0	5
Flammable		
Adhesive Waste, Liquid	N/A	0
Contaminated Rags/Cheesecloth	N/A	0
Hydrazine (MMH, UDMH)	11.0	1
Paint Waste, Liquid	N/A	0
Solid Waste, Combustible	N/A	0
Solvent Waste, Oxygenated	N/A	0
Total	11.0	1
General Waste		
Adhesive Waste, Solid	N/A	0
EEW&S Wastewater	N/A	0
Fuel, Oil and Grease Waste	N/A	0
Hydraulic Fluids	N/A	0
Insulation Waste, Liquid	N/A	0
Insulation Waste, Solid	3,000.0	55
Oxidizer Scrubber Effluent	N/A	0
Solid Waste, Noncombustible	N/A	0
Solvent Waste, Chlorinated	2.0	1
Solvent Wastewater	N/A	0
Total	3,002.0	56
FACILITY TOTALS	3,283.0	63

*Footnotes are presented on the following page

Table 13-2 (Continued)

1. Source: Quantities for routine wastes are based on the Hazardous Waste Inventory for the Space Shuttle Project, Volume I, 1981. SCS Engineers and the July 21, 1982 SD/DEV Space Shuttle Hazardous Waste Management Briefing. Values are given on a per launch basis.

2. There will be no bulk storage of wastes generated at Port Hueneme aside from large quantities of SRB wash/rinse waters which will be treated on site.

3. During a contingency event, approximately 10 gallons of fuel plus 90 gallons of water could be generated (SD/DEV July 21, 1982 Briefing). Additional drum capacity should be available.

- Lithium and silver-zinc batteries; will be stored with acid wastes. Source of waste batteries is the safing of the destruct ordnance.

- Hydrazine; small amounts (3 gallons per SRB per launch) are generated during SRB guidance system off base.

- Solid insulation wastes; removed from SRB exterior.

- Solvent wastes; chlorinated and fluorinated solvents used for general cleanup.

- Hydrazine scrubber effluents; contaminated with less than 2 percent hydrazine.

The majority of liquid wastes generated at V32, SRB wash/rinse waters, will not be handled at the AP. However, hypergolic-contaminated wastes, e.g., scrubber liquors and EEW&S water will be drummed and stored at the AP. Currently, there are no waste retention tanks planned for V32; this is the only station within the STS program which will require hypergolic waste handling by STS personnel.

13.3.3 Accumulation Point Design Sizing and Siting

The V32 accumulation facility has already been designed and the site selected. See STS Project Book, Station Set V32, dated May 21, 1982 for details.

Additional details concerning accumulation point specifications and support equipment are included in Appendix C.

14.0 PRELIMINARY COST PROJECTIONS

14.1 INTRODUCTION

This chapter projects capital costs and an annual operating budget for the STS hazardous waste handling program. The costs are preliminary and are provided for planning purposes only. The capital cost scenario is projected to 1984 to concur with the 1984 Military Construction Plan, while the operating cost scenario is provided for STS project years 1985 through 1994. While current costs (1982) are the basis for the projections, costs are forecasted to the appropriate STS project year using an annual inflation factor of 10 percent. Not only does the budget provide preliminary cost estimates, but it also serves as an inventory of equipment and supplies needed to implement the STS hazardous waste program.

It is important to note that the waste quantities per unit launch used for the cost projections are based on waste quantity data available in April 1982 when the draft of this HWHP was prepared. These data have been subsequently revised and are expected to be further refined between now and the first launch date in 1985. In addition, preliminary cost projections are based on a scenario that assumes that all wastes (except those treated on site) will be drummed. These and other assumptions upon which the cost projections are based are outlined below.

14.2 ASSUMPTIONS

- All STS wastes, including oxidizer and hypergolic-contaminated wastes, will be drummed. The only exception are wastes that will be treated on base, such as 1,000,000 gallons of sound suppression water generated at V23.

- Collection Point Specifications[1]

  Concrete Pad (192 square feet)
  Fence (44 feet)
  Gates (6-foot sliding and 6-foot swinging)

- Accumulation Point Specifications[1]

  Roof (960 square feet)
  Concrete Pad (1,730 square feet)
  Fence and Gates (144 feet) and four 6-foot gates
  Sewer (120 feet)

- Number of Collection Points

  A total of four: one each at V19, V21, V23, and V31.

- Number of Accumulation Points at VAFB[2]

  A total of two: one in NVAFB and one in SVAFB

Cost projections presented in this chapter can be readily updated to reflect more recent waste quantity data as well as modifications in the STS planning program. For example, the capital costs for accumulation points as well as the annual operating budget should be modified to ensure that drum quantities and storage capacities match the updated hazardous waste quantities.

Table 14-1, Summary of Capital Cost and Annual Operating Budget for STS Hazardous Waste Handling Plan, identifies the costs for the total project. The total capital costs are $196.4 thousand, while the sum of the annual operating budgets is $4.8 million. The capital cost projections exclude construction cost at Port Hueneme. Construction of treatment/handling facilities at Port Hueneme is being developed in a

1. The specifications for "typical" collection and accumulation points are based on drum requirements developed from the April 1982 waste quantity data.

2. No capital costs are budgeted for the Port Hueneme Accumulation Point or Storage Facility. Costs for this facility will be addressed under a separate contract.

Table 14-1

SUMMARY OF CAPITAL COST AND
ANNUAL OPERATING BUDGET FOR STS HWHP[1]

Construction and Installation Costs for MCP 84[2]	($1,000)
Accumulation Point SVAFB	89
Accumulation Point NVAFB	75
Collection Point	
One at V19	8.1
One at V21	8.1
One at V23	8.1
One at V31	8.1
Total	196.4

Annual Operating Budget by STS Project Year[3]

Project Year	Fixed[4] ($1,000)	Variable[5] ($1,000)	Total ($1,000)
1985	185	12.9	198
1986	204	42.9	247
1987	224	110	335
1988	252	176	429
1989	272	190	463
1990	297	209	507
1991	327	230	558
1992	360	253	614
1993	397	279	677
1994	437	306	743
Total	2,950	1,810	4,780

1. Values are summation of costs presented in Tables 14-2, 14-6, and 14-9 and are based on the scenario developed from the April 1982 data base. Since that time, waste quantities have been significantly altered; the cost data should therefore be used only as a planning tool.

2. 1982 cost escalated for two years at 10 percent inflation. (No capital costs are budgeted for Port Hueneme Accumulation Point or Storage Facility. Design of these facilities is being handled by other contractors.)

3. Costs are escalated at 10 percent inflation.

4. Fixed costs are independent of number of launch cycles.

5. Variable costs are multiples of the launch cycle.

separate study; hence no projected capital costs are included here. General specifications for the Port Hueneme facility (V32), including a plan view, are presented in the May 21, 1982 "Project Book for STS Hazardous Waste Facilities at Station Set V32, Port Hueneme, California."

The basis for the cost summary projections is the individual handling programs and needs outlined for the in NVAFB and SVAFB accumulation points and station sets. Presented below are cost projections for these facilities.

14.3 COST PROJECTIONS FOR NVAFB

Table 14-2, Summary of Capital Cost and Annual Operating Budget, summarizes the cost analysis for the NVAPB-AP. The capital costs are based on the analysis shown in Table 14-3, Capital Cost for NVAFB-AP, and Table 14-4, Capital Cost for a Typical Collection Point. Table 14-5, Baseline Budget for NVAFB-AP, is the basis for the Annual Operating Budget by STS project year. Cost assumptions and data sources are presented in Table 14-11.

14.3.1 Capital Cost

Total capital cost for the MCP 1984 is $91.2 thousand. For this analysis, NVAFB-AP is assumed to be located nearby or adjacent to the V19/V21 Orbiter Support Facilities. Capital costs are based on a scenario developed from April 1982 data, which assumes two collection points for NVAFB Station Sets: one at V19 and one at V21.[1]

Based on the relative routine waste quantities generated by the two station sets, 50 percent of the capital cost, $45.6 thousand, would be

1. Significant alterations in waste generation quantities have occurred since April 1982; however, the cost projections can be readily modified to reflect any STS planning changes or updates on waste production.

Table 14-2

SUMMARY OF CAPITAL COST AND ANNUAL OPERATING BUDGET FOR NVAFB ACCUMULATION POINT[1]

Construction and Installation Costs for MCP 84[2]	($1,000)
Accumulation Point NVAFB[3]	75.0
Collection Point	
One at V19[4]	8.1
One at V21	8.1
Total	91.2

Anticipated Budget by Project Year[5]

Project Year	Fixed ($1,000)	Variable[6] ($1,000)	Total ($1,000)
1985	74.2	3.8	78.0
1986	81.6	12.6	94.0
1987	89.8	32.3	122.0
1988	101.0	51.7	153.0
1989	109.0	55.7	165.0
1990	119.0	61.3	180.0
1991	131.0	67.4	198.0
1992	144.0	74.2	218.0
1993	159.0	81.6	241.0
1994	175.0	89.8	265.0
Total	1,180.0	530.0	1,710.0

1. Based on the scenario developed from the April 1982 data base. Since that time, waste quantities have been significantly altered; the cost data should therefore be used only as a general planning tool.
2. 1982 cost escalated for two years at 10 percent inflation.
3. See Table 14-3.
4. See Table 14-4.
5. See Table 14-5; inflation of 10 percent.
6. Variable costs are multiples of the launch cycle.

Table 14-3

CAPITAL COST FOR NVAFB ACCUMULATION POINT[1]

Facility	
Roof (960 square feet at $7.70/square foot)[a]	$ 7,400
Concrete Pad (1,730 square feet at $6.25/square foot)[b]	11,000
Fence and Gates (144 feet at $20/foot and four 6-foot gates at $300/gate)[c]	3,600
Sewer (120 feet at $11/foot and valves at $100/valve)[d]	1,320
Trailer (Includes officer equipment)[e]	5,000
Lighting (Two luminair lamps at $200/lamp)[f]	400
Total	28,720
Waste Handling Equipment	
Forklift[g] (Hyster E40B - 2 ton)	26,000
Drum dolly[h]	200
Miscellaneous tools	200
Total	26,400

1. The letters following each cost item (a, b, c, etc.) refer to assumptions and data sources presented in Table 14-11.

Table 14-3 (Continued)[1]

Safety and Spill Response Equipment[d]	
Emergency Eyewash and Shower	600
First Aid Equipment	300
ABC Fire Extinguisher	150
D Fire Extinguisher	150
Reserve Protective Clothing and Respirator Equipment (Two sets at $200/set)	400
Protective Clothing (Two sets at $150/set)	300
Full Protective Suit (Two sets at $1,000/set)	2,000
Self-Contained Breathing Apparatus (Two sets at $1,000/set)	2,000
Spill Containment Equipment	1,000
Total	6,900
Total	$62,020

1. The letters following each cost item (a, b, c, etc.) refer to assumptions and data sources presented in Table 14-11.

Table 14-4

CAPITAL COST FOR A TYPICAL COLLECTION POINT[1]

Facility	
Concrete Pad (192 square feet at $6.25/square foot)[b]	$1,200
Fence (44 feet at $20/foot)[c]	900
Gates (6-foot sliding at $600 and 6-foot swinging at $400)[c]	1,000
Total	3,100
Waste Handling Equipment[h]	
Waste Receptical (10 at $25 each)	250
Drum Truck	200
Cabinet, Desk and Chair	400
Safety Storage Cabinent	500
Drum Pumps (four)	600
Total	1,950
Safety Equipment[e]	
Eyewash/Shower	600
First Aid Equipment	300
ABC Fire Extinguisher	150
D Fire Extinguisher	150
Reserve Protective Clothing and Respiratory Equipment	400
	1,600
Total	$6,650

1. The letters following each cost item (a, b, c, etc.) refer to assumptions and data sources presented in Table 14-11. Costs are based on a collection point having the assumed dimensions that are described in this chapter.

Table 14-5

BASELINE BUDGET FOR NVAFB ACCUMULATION POINT[1]

FIXED COST[2]	
Labor	
Accumulation Point Manager (1 at $20,000/year)[i]	$20,000
Technician (1 at $15,000/year)	15,000
Overhead (33% of salary)[j]	11,600
Total	46,600
Utilities	
Forklift Operation (1,000 hours/year at $0.25/hour)[g]	250
Facility Lighting (1,200 kwhr/year at $0.10/kwhr)[f]	120
Total	370
Maintenance	
Forklift Maintenance (1,000 hours/year at $0.60/hour)[g]	600
Facility Maintenance (at 1% of facility capital cost)[d]	1,000
Safety Equipment (at 1/3 replacement/year)[d]	2,000
Total	3,600
Total Fixed Cost	$50,570

1. Cost in 1982 dollars. Note that the letters refer to assumptions and data sources presented in Table 14-11.

Table 14-5 (Continued)[1]

VARIABLE COST (ON PER LAUNCH BASIS)[3]	
Drums	
DOT Specification 17E (19 drums at $25/drum)[k]	$ 475
DOT Specification 17H (9 drums at $20/drum)[k]	180
DOT Specification 17E-304 SS (5 drums at $250/drum)[l]	1,250
DOT Specification 34B (19 drums at $25/drum)[m]	475
Total	2,380
Supplies	
Markings and Labels (75 drum sets at $1/drum)[d]	75
Transportation	
Flatbed Transport (1 trip) (80 drum flatbed at 3 hours/trip and $50/hour)[n]	150
Total Variable Cost	$2,600

1. Cost in 1982 dollars. Note that the letters refer to assumptions and data sources presented in Table 14-11.
2. Independent of launch cycles.
3. Costs are for one launch cycle.

paid by each of the two station sets. No cost is allocated to station sets generating only contingency waste streams (V17 and V18).

14.3.2 Operating Budget

The total budget (NVAFB, SVAFB and Port Heuneme) for all STS project years is estimated at $4.8 million (see Table 14-1). The budget is equally split between variable costs and fixed costs. The major source of variable costs, those costs which depend upon the launch frequency, is the expenditure for drums. These costs will vary considerably if (1) all hypergolic wastes are handled in bulk, and (2) activation/optimization goes into effect. On the other hand, the major source of fixed costs, those costs that are independent of the launch cycle, is the cost of personnel.

14.4 COST PROJECTIONS FOR SVAFB

Table 14-6, Summary of Capital Cost and Annual Operating Budget, summarizes the cost analysis for the SVAFB-AP. The capital costs are based on the analysis shown in Table 14-7, Capital Cost for the SVAFB Accumulation Point, and Table 14-4, Capital Cost for a Typical Collection Point. Table 14-8, Baseline Budget for the SVAFB Accumulation Point, is the basis for Annual Operating Budget by STS project year. Cost assumptions and data sources are presented in Table 14-11.

14.4.1 Capital Cost

Total capital cost for the MCP 1984 is $105.2 thousand. For this analysis, SVAFB-AP is assumed to be located nearby or adjacent to the V23/V33 launch complex. Two collection points are the basis for the cost scenario: one at V23 near either the Payload Preparation Room or the Payload Changeout Room, and the second near or adjacent to V31.[1]

1. As stated earlier, the cost scenario was developed from the April 1982 data base. Significant alterations in the waste quantities have occurred since that time and are anticipated between now and 1985; however, the cost projections can be readily modified to reflect these changes.

Table 14-6

SUMMARY OF PRELIMINARY CAPITAL COST AND
ANNUAL OPERATING BUDGET FOR
SVAFB ACCUMULATION POINT[1]

Construction and Installation Costs for MCP 84[2]	($1,000)
Accumulation Point SVAFB[3]	89
Collection Point	
One at V23[4]	8.1
One at V31	8.1
Total	105.2

Annual Operating Budget by STS Project Year[5]

Project Year	Fixed ($1,000)	Variable[6] ($1,000)	Total ($1,000)
1985	74.3	6.8	81.0
1986	81.7	22.6	104.0
1987	89.9	57.9	148.0
1988	101.0	92.9	194.0
1989	109.0	100.0	209.0
1990	120.0	110.0	230.0
1991	132.0	121.0	253.0
1992	145.0	133.0	278.0
1993	159.0	147.0	306.0
1994	175.0	161.0	336.0
Total	1,190.0	952.0	2,140.0

1. Based on the scenario developed from the April 1982 data base. At that time, it was determined that Station Sets V23 and V31 would require one collection point each and that V33 would not require a collection point at all. These determinations have been altered since April 1982 as noted in the text. Therefore, these cost data should be used as a general planning tool.
2. 1982 cost escalated for two years at 10 percent inflation.
3. See Table 14-7
4. See Table 14-4.
5. See Table 14-8; inflation of 10 percent.
6. Variable costs are multiples of the launch cycle.

Table 14-7

CAPITAL COST FOR SVAFB ACCUMULATION POINT[1]

Facility	
Roof (1,440 square feet at $7.70/square foot)[a]	$11,000
Concrete Pad (2,600 square feet at $6.25/square foot)[b]	16,200
Fence and Gates (192 feet at $20/foot and four 6-foot gates at $300/gate)[c]	5,000
Sewer (170 feet at $11/foot and valves at $100/valve)[d]	2,500
Trailer (Includes office equipment)[e]	5,000
Lighting (Three Luminair lamps at $200/lamp)[f]	600
Total	40,300
Waste Handling Equipment	
Forklift[g] (Hyster E40B - 2 ton)	26,000
Drum dolly[h]	200
Miscellaneous tools	200
Total	26,400

1. The letters following each cost item (a, b, c, etc.) refer to assumptions and data sources presented in Table 14-11.

Table 14-7 (Continued)[1]

Safety and Spill Response Equipment[d]	
Emergency Eyewash and Shower	600
First Aid Equipment	300
ABC Fire Extinguisher	150
D Fire Extinguisher	150
Reserve Protective Clothing and Respirator Equipment (Two sets at $200/set)	400
Protective Clothing (Two sets at $150/set)	300
Full Protective Suit (Two sets at $1,000/set)	2,000
Self-Contained Breathing Apparatus (Two sets at $1,000/set)	2,000
Spill Containment Equipment	1,000
Total	6,900
Total	$73,600

1. The letters following each cost item (a, b, c, etc.) refer to assumptions and data sources presented in Table 14-11.

Table 14-8

BASELINE BUDGET FOR SVAFB ACCUMULATION POINT[1]

FIXED COST[2]	
Labor	
Accumulation Point Manager (1 at $20,000/year)	$20,000
Technician (1 at $15,000/year)	15,000
Overhead (33% of salary)	11,600
Total	46,600
Utilities	
Forklift Operation (1,000 hours/year at $0.25/hour)	250
Facility Lighting (1,800 kwhr/year at $0.10/kwhr)[f]	180
Total	430
Maintenance	
Forklift Maintenance (1,000 hours/year at $0.60/hour)	600
Facility Maintenance (at 1% of facility capital cost)	1,000
Safety Equipment (at 1/3 replacement/year)	2,000
Total	3,600
Total Fixed Cost	$50,630

1. Cost in 1982 dollars. Note that the letters refer to assumptions and data sources presented in Table 14-11.

2. Independent of launch cycles.

3. Costs are for one launch cycle.

Table 14-8 (Continued)[1]

VARIABLE COST (ON PER LAUNCH BASIS)[3]	
Drums	
DOT Specification 17E (9 drums at $25/drum)[k]	$ 225
DOT Specification 17H (61 drums at $20/drum)[k]	1,220
DOT Specification 17E-304 SS (9 drums at $250/drum)[l]	2,250
DOT Specification 34B (21 drums at $25/drum)[m]	525
Total	4,220
Supplies	
Markings and Labels (75 drum sets at $1/drum)[d]	150
Transportation	
Flatbed Transport (2 trips) (80 drum flatbed at 3 hours/trip and $50/hour)[n]	300
Total Variable Cost	$4,670

1. Cost in 1982 dollars. Note that the letters refer to assumptions and data sources presented in Table 14-11.

2. Independent of launch cycles.

3. Costs are for one launch cycle.

14.4.2 Operating Budget

The total budget for all STS project years is estimated at $4.8 million (see Table 14-1). The budget is equally split between variable costs and fixed costs. The major source of variable costs, those costs which depend upon the launch frequency, is the expenditure for drums. On the other hand, the major source of fixed costs, those costs that are independent of the launch cycle, is the cost of personnel.

14.5 COST PROJECTIONS FOR PORT HUENEME

Table 14-9, Summary of Annual Operating Budget, summarizes the cost analysis for Port Hueneme. Table 14-10, Baseline Budget for the Port Hueneme Accumulation Point is the basis for the Annual Operating Budget by STS project year. Cost assumptions for Tables 14-9 and 14-10 are presented in Table 14-11.

14.5.1 Capital Cost

Since the hazardous waste storage facility at V32 is already in the final design stage, no projected capital costs for future MCP's are necessary.

14.5.2 Operating Budget

For V32, the total budget is estimated at $917,000 (for all STS project years). The budget is equally split between variable costs and fixed costs. The major source of variable costs, those costs which depend upon the launch frequency, is the expenditure for drums. On the other hand, the major source of fixed costs, those costs that are independent of the launch cycle, is the cost of personnel.

Table 14-9

SUMMARY OF ANNUAL OPERATING BUDGET FOR
PORT HUENEME ACCUMULATION POINT

Anticipated Budget by Project Year[1]

Project Year	Fixed ($1,000)	Variable[2] ($1,000)	Total ($1,000)
1985	37,100	2,300	39,400
1986	40,800	7,700	48,500
1987	44,800	19,900	64,700
1988	50,300	31,800	82,100
1989	54,200	34,300	88,500
1990	59,700	37,700	97,400
1991	65,600	41,500	107,100
1992	72,200	45,600	117,800
1993	79,400	50,200	129,600
1994	87,300	55,000	142,300
Total	591,400	326,000	917,400

1. See Table 14-10, inflation of 10 percent.
2. Variable costs are multiples of the launch cycle.

Table 14-10

BASELINE BUDGET FOR PORT HUENEME ACCUMULATION POINT[1]

FIXED COST[2]	
Labor	
Accumulation Point Manager (1/2 at $20,000/year)[i]	$10,000
Technician (1/2 at $15,000/year)	7,500
Overhead (33% of salary)[j]	5,800
Total	23,300
Utilities	
Forklift Operation (1,000 hours/year at $0.25/hour)[g]	125
Facility Lighting (1,200 kwhr/year at $0.10/kwhr)[f]	60
Total	185
Maintenance	
Forklift Maintenance (1,000 hours/year at $0.60/hour)[g]	300
Facility Maintenance (at 1% of facility capital cost)[d]	500
Safety Equipment (at 1/3 replacement/year)[d]	1,000
Total	1,800
Total Fixed Cost	$25,300

1. See footnotes on the following page.

Table 14-10 (Continued)[1]

VARIABLE COST (ON PER LAUNCH BASIS)[3]	
Drums	
DOT Specification 17E (2 drums at $25/drum)[k]	50
DOT Specification 17H (56 drums at $20/drum)[k]	1,120
DOT Specification 17E-304 SS (1 drum at $250/drum)[l]	250
DOT Specification 34B (5 drums at $25/drum)[m]	125
Total	1,545
Supplies	
Markings and Labels (64 drum sets at $1/drum)	64
Total Variable Cost	$ 1,600

1. Cost in 1982 dollars
2. Independent of launch cycles
3. Costs are for one launch cycle

Table 14-11

COST ASSUMPTIONS AND DATA SOURCES

a. Contact: Russ Simpson, Dudley Steel, Fremont, California.

b. McGraw-Hills 1982 Dodge Guide to Public Works and Heavy Construction Costs.

c. Contact: San Jose Steel, San Jose, California.

d. Contact: EMCON Associates, San Jose, California.

e. Contact: Elenor Euald, Space Company, Newark, California.

f. Contact: Larry Martin, Lighting Maintenance Company, Dublin, California.

g. Contact: Frank Misrus, Hyster Company, Fremont, California.

h. Catalog of Industrial Safety and Security Company, Lima, Ohio.

i. Contact: John Edwards, SD/DEV.

j. Typical for waste management handling employees.

k. Contact: Ernie Lorentz, Lorentz Drum, San Jose, California.

l. Contact: Nelson Newman, Abbey Drum, Baltimore, Maryland.

m. Contact: Howard Hambelton, ACT Corporation, City of Industry, California.

n. Average Value for Contract Hauler, Off-Base Planning Study, EMCON Associates.

15.0 STORAGE FACILITY HWHP

15.1 INTRODUCTION

The extent of the hazardous waste management information provided within the storage facility HWHP is limited compared to that provided in the station set HWHP. The storage facility HWHP is comprised of two major elements:

- Waste Quantities and Composition Data
- Waste Handling Procedures

Within a separate document, "Design Criteria for the Hazardous Waste Storage Facility," the balance of the storage facility HWHP will be provided. This document, now being completed by ECOS Management Criteria, Inc. (Program No. F04701-82-C-0064), is comprised of the following major elements.

- General Facility Design Criteria (Size, Traffic, Utilities, Grading and Surfacing)

- Special Facility Design Criteria (Security, Waste Storage, Inspection, Aisle Space Requiarements, Waste Handling Equipment, Safety/Emergency Features)

- Conceptual Plan

- General Operations Plan

The storage facility will be operated by DPDO personnel. A Memo for Record from a Joint Defense Property Disposal Region and Vandenberg Air Force Base Hazardous Waste Management Meeting (June 17, 1982) provides design constraints for the storage facility:

- A warehousing-type operation is envisioned without recontainerization or compaction capability.

- No laboratory analysis will be provided at the facility.

15.2 WASTE COMPOSITION AND QUANTITIES

Most all of the wastes generated in association with the STS program will be channeled to the Hazardous Waste Storage Facility, which will be located in North Vandenberg near Station Set V21.[1]

Wastes which will be treated on base (e.g., deluge water) are not included. The routine waste streams that will be channeled to the storage facility are outlined and characterized in Table 15-1. As with the individual station sets, no hypergolic contaminated wastes will be handled at the storage facility; these wastes will be stored in on-base bulk retention tanks. The quantities shown in Table 15-1 are derived from the accumulation point summary tables presented in Chapter 4.0.

The wastes derived from Port Hueneme (Station V32) will not be transferred to the storage facility. Materials generated there will be accumulated and directly transported off base.

15.3 WASTE HANDLING PROCEDURES

15.3.1 Introduction

This section describes all the waste handling procedures to be followed in the process of accepting wastes from work areas and the accumulation points.

1. SD/DEV Minutes of Meeting on Hazardous Waste Storage Facility Siting of VAFB, June 11, 1982.

Table 15-1

INCOMING WASTE STREAM AT
STORAGE FACILITY
(By Storage Category)*

Category	Quantity Per Launch[1] (gallons)	Storage Requirements[2] (drums)
Acid		
Hydrazine Scrubber Effluents	--	Bulk[3]
Oxidizer Cleanup Wastewater	--	Bulk
Painting Wastewater	40.0	1
Total	40.0	1
Base		
Anhydrous Ammonia	10.0	1
Batteries/Potassium Hydroxide	N/A	0
Fuel Cleanup Wastewater	N/A	0
Total	10.0	1
Flammable		
Adhesive Waste, Liquid	N/A	0
Contaminated Rags/Cheesecloth	34.0	4
Hydrazine (MMH, UDMH)	--	Bulk
Paint Waste, Liquid	14.7	3
Solid Waste, Combustible	817.7	16
Solvent Waste, Oxygenated	94.0	3
Total	1,037.0	24
General Waste		
Adhesive Waste, Solid	25.8	3
EEW&S Wastewater	--	Bulk
Fuel, Oil and Grease Waste	10.0	1
Hydraulic Fluids	101.2	3
Insulation Waste, Liquid	80.0	2
Insulation Waste, Solid	4,437.0	84
Oxidizer Scrubber Effluent	--	Bulk
Solid Waste, Noncombustible	2,583.0	50
Solvent Waste, Chlorinated	1,019.5	20
Solvent Wastewater	384.0	9
Total	8,178.5	157
FACILITY TOTALS	9,265.5	183

*Footnotes are presented on the following page

Table 15-1 (Continued)

1. Source: Quantities for routine wastes are based on the Hazardous Waste Inventory for the Space Shuttle Project, Volume I, 1981. SCS Engineers and the July 21, 1982 Space Shuttle Hazardous Waste Management Briefing. Values are per launch cycle.

2. The drum quantities listed reflect the total number of station sets. However, the quantities are derived from the accumulation point figures: NVAFB-AP (Table 4-4); SVAFB-AP (Table 4-5). These figures assume that no consolidation has occurred.

3. Bulk: Particular waste stream will be collected and stored in bulk tanks rather than drums. Contingency wastes, i.e., hypergolic wastes, will also be collected and stored in this manner.

Note: There will not be a storage category for oxidizer wastes; these wastes will be stored in the retention tanks located at V19, V21 or V23.

To facilitate the safe handling and management of the incoming wastes at the storage facility, common handling procedures are presented in the following Waste Handling Activities (WHA):

WHA 9 - Waste Receiving and Handling
WHA 10 - Recordkeeping
WHA 11 - Administer Off-Base Transport and Disposal
WHA 12 - Inspection

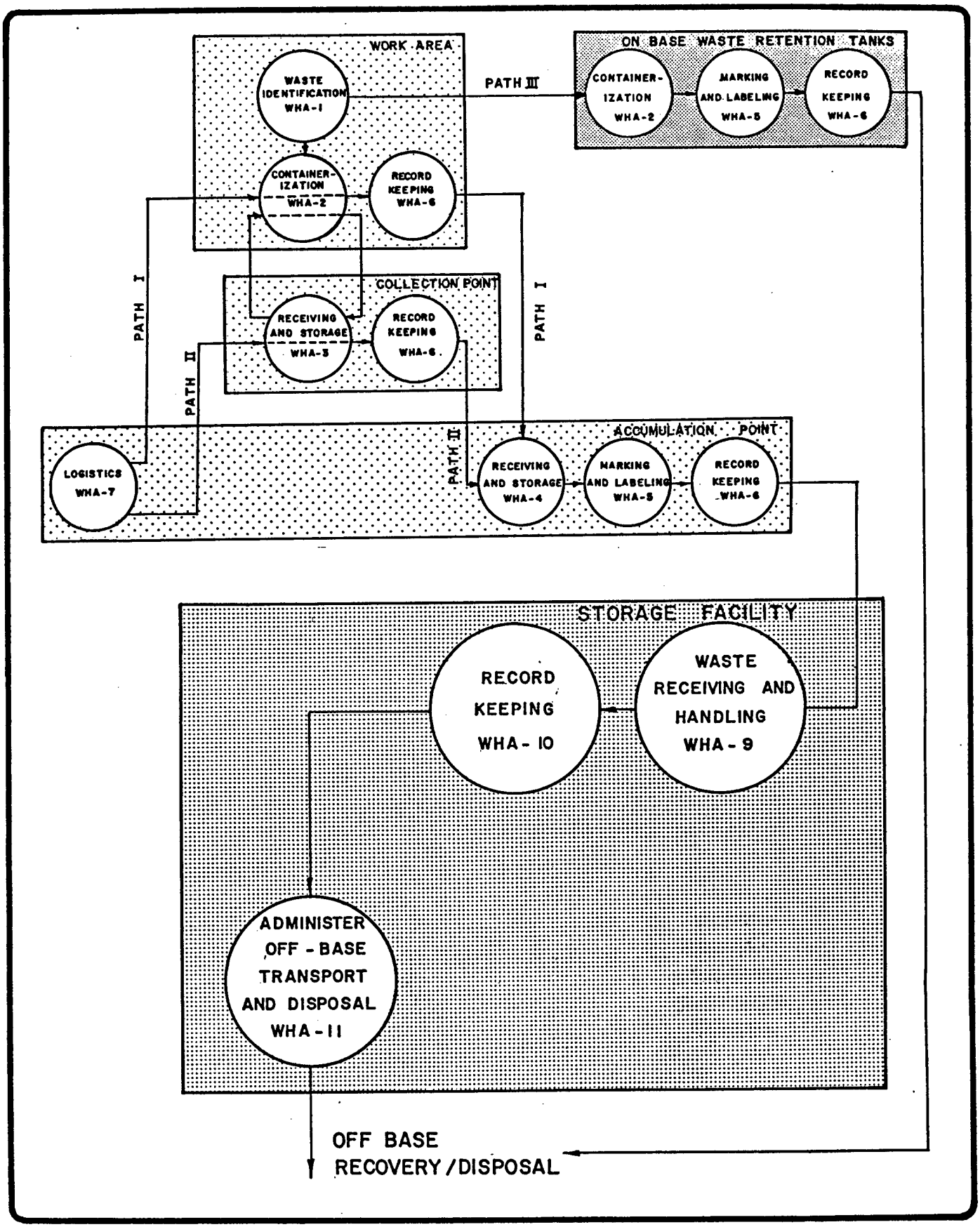
Specific handling criteria for individual waste categories are described in the Waste Handling Data Sheets (WHDS) in Appendix A.

15.3.2 Waste Handling Flowchart

The Waste Handling Flowchart (Figure 15-1) provides a rapid reference to the sequencing and relationships among the WHA's. The flow of waste materials is depicted from the point of generation to the final site of handling or management. The central pathway represents the movement of routine and contingency wastes. Path III illustrates the collection and temporary storage (prior to off-base disposal/recovery) of waste hydrazine fuel, oxidizer, spill cleanup water, or other hypergolic-contaminated wastes. Wastes will be collected in sumps, then transferred by tanker truck into the tanks. These include cleanup wastewaters, scrubber effluents, and emergency eyewash waters. The major features of the flowchart are as follows:

- Waste Handling Activities: Each circle in the flowchart encloses a WHA. Within each circle, a number is placed which refers to the numbering for the WHA in the text.

- Pathways: Because the generation rate quantity and composition vary between wastes, various waste handling sequences, or pathways, are provided (see Chapter 5.0 for discussion of Pathways I, II and III).



EMCON Associates
San Jose, California

U.S. AIR FORCE
STS HAZARDOUS WASTE HANDLING PLAN
VANDENBERG AIR FORCE BASE, CALIFORNIA

STORAGE FACILITY
WASTE HANDLING FLOWCHART

FIGURE
15-1
PROJECT NO.
534-1.1

- Flow Lines: The flow lines show sequencing of WHA; in addition, they symbolize the transport of the waste and/or the waste stream.

- Waste Handling Locations: Waste handling activities will occur at several locations: the work area, the collection point, the accumulation point, waste retention tanks, and the storage facility. All activities taking place in one generation area are represented in the shaded areas. Waste transfer activities are shown occurring between the shaded areas.

15.3.3 Waste Handling Activities and Procedures

Figures 15-2 through 15-5 present the WHA's that comprise the core of the STS waste handling procedures. For each waste handling activity, the steps performed, and the responsible staff are identified on each WHA. When needed, the steps are subdivided to account for handling differences between various waste pathways. As noted above, any special handling procedrues dictated by the chemical nature of a particular waste category are described in the WHDS in Appendix A.

Figure 15-2

STS HAZARDOUS WASTE MANAGEMENT PROGRAM

WASTE HANDLING ACTIVITY

ACTIVITY No.	ACTIVITY	LOCATION
WHA-9	Receiving and Storage - Storage Facility	Storage Facility

DESCRIPTION:

These activities provide for receiving and handling activities at the storage facility.

DUTIES:

9.1 DPDO will inspect container for damage upon delivery to storage facility.

9.2 Verify accuracy of marking and labeling for drums received using appropriate WHDS.

9.3 Log waste into records upon arriving at storage facility.

9.4 Place pallet with drums in storage area specified on Section 1 of OBHWM.

9.5 In loading area of storage facility, load palletized drums on flatbed for transport to off-base disposal with forklift.

RESPONSIBLE STAFF:	DUTIES:
DPDO (Technician)	9.1 through 9.5

APPROVED BY _____ REVISION DATE _____

Figure 15-3

STS HAZARDOUS WASTE MANAGEMENT PROGRAM

WASTE HANDLING ACTIVITY

ACTIVITY No.	ACTIVITY	LOCATION
WHA-10	Recordkeeping	Storage Facility

DESCRIPTION:

Recordkeeping provides for (1) completion of on-base hazardous waste manifest (OBHWM), (2) completion of California Hazardous Waste Manifest (CHWM), (3) occasional application for Extremely Hazardous Waste Disposal Permit, and (4) retention of documentation.

DUTIES:

10.1 Upon receipt of drummed hazardous waste, complete Part 3 of OBHWM.

10.2 Record receipt of the drum(s) in a storage facility record book and place drums in appropriate area of the storage facility.

10.3 Fill out CHWM by truck load at time of removal for disposal and log material out of storage facility record book. If material is classed as extremely hazardous by California DOHS, note Extremely Hazardous Waste Disposal Permit number on CHWM.

10.4 Signed manifests (those received from the designated facility which received the wastes) must be retained by the generator (VAFB) for at least three years from the date the waste was accepted by the initial transporter (40 CFR 262.40).

10.5 Annual reports must be submitted to DOHS March 1 for the preceding calendar year. Copies of annual reports must be maintained by the generator for three years after the due date of the report.

RESPONSIBLE STAFF:	DUTIES:
DPDO Personnel	10.1 through 10.5

APPROVED BY _____ REVISION DATE _____

Figure 15-4

STS HAZARDOUS WASTE MANAGEMENT PROGRAM

WASTE HANDLING ACTIVITY

ACTIVITY No.	ACTIVITY	LOCATION
WHA-11	Administer Off-Base Transport and Disposal	Storage Facility

DESCRIPTION:

Activity will encompass administrative activities to provide off-base transport and disposal services. These services will be provided by a contractor.

DUTIES:

11.1 Contact transporter to schedule transport of wastes.

11.2 Contact disposal site to schedule receipt of hazardous waste.

RESPONSIBLE STAFF:	DUTIES:
DPDO Personnel	11.1, 11.2

APPROVED BY _____ REVISION DATE _____

Figure 15-5

STS HAZARDOUS WASTE MANAGEMENT PROGRAM

WASTE HANDLING ACTIVITY

ACTIVITY No.	ACTIVITY	LOCATION
WHA-12	Inspection	Storage Facility

DESCRIPTION:

Inspect and maintain inspection records of storage facility equipment and supplies for handling hazardous waste.

DUTIES:

12.1 On a weekly basis, inspect filled (and partially filled) containers for any evidence of deterioration.

12.2 For all waste-containing facilities, inspect the following equipment (frequency of inspection based on probability of deterioration or malfunction):

a. Monitoring equipment
b. Safety equipment
c. Emergency response equipment
d. Security devices
e. Structural equipment
f. Operating equipment

12.3 Inspect loading and unloading areas daily when in use.

12.4 Initiate procedures to correct deterioration or malfunction discovered during inspection.

12.5 Maintain records of inspection and corrections. Records must be maintained at the facility for a minimum of three years.

RESPONSIBLE STAFF:	DUTIES:
DPDO Personnel	12.1 through 12.5

APPROVED BY _____ REVISION DATE _____

16.0 PROGRAM IMPLEMENTATION

16.1 ORGANIZATIONAL FUNCTIONS

The HWHP will be integrated into the existing VAFB planning structure that includes, but is not limited to, the following organizations: (1) VAFB Environmental Protection Committee (EPC), (2) Defense Property Disposal Office (DPDO), (3) Defense Logistics Agency (DLA), and (4) Space Division Environmental Protection Committee.

The VAFB EPC, established by AF Regulation 19-8, incorporates environmental concerns into the decision-making process according to the National Environmental Policy Act (NEPA) of 1969 (as amended); it applies to all Air Force installations and facilities. In effect, the VAFB EPC serves as a steering group to monitor the environmental protection program at VAFB. The Western Space Missile Command (WSMC) EPC will serve as the key organizational vehicle for coordinating the activities of host and tenant organizations that are involved with the STS Program. Within the EPC, the Toxic and Hazardous Waste Subcommittee establishes policy concerning the management of hazardous wastes.

To facilitate the integration of the STS HWHP into the existing planning structure, the STS Hazardous Waste Manager (HWM) should be a permanent member of the Toxic and Hazardous Waste Subcommittee of the EPC.[1] The inclusion of the HWM on this committee will ensure that a clear line of communication is established among the Air Force and contractor organizations concerned with environmental protection. The HWM will work closely with DPDO, the organization charged with operating the VAFB storage facility. In addition, the HWM will interface with appropriate VAFB organizations in developing plans in the event of an emergency. Procedures for handling such an event are enumerated in the "Oil and

1. See Chapter 4.0 for a description of the HWM's duties.

Hazardous Substances Pollution Contingency Plan," (OPLAN 234-81) July 1981 and Base Plan 355-1. A summary of emergency procedures is presented in Appendix D.

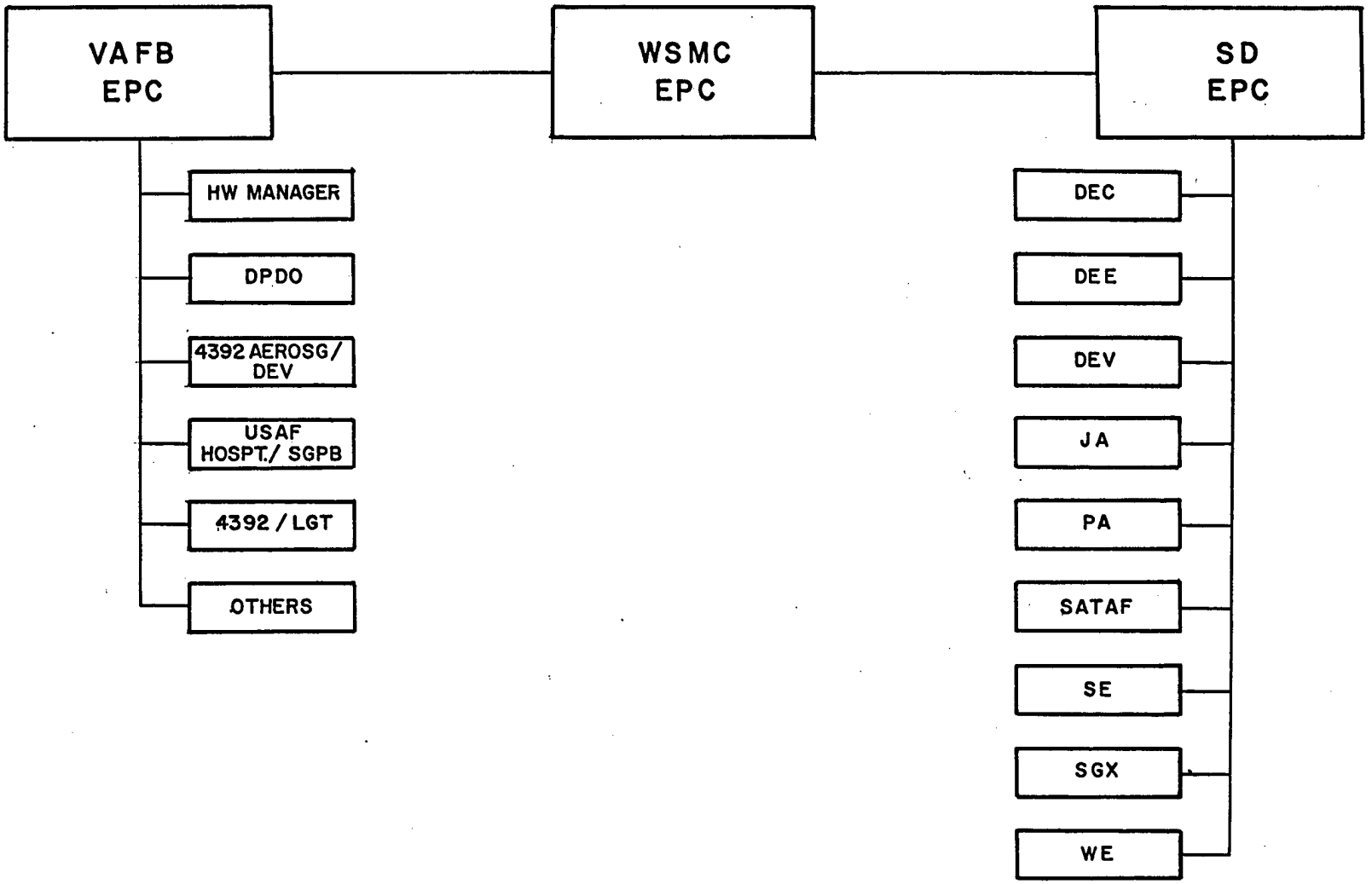
Figure 16-1 illustrates the anticipated interrelationships of the key participants in the STS HWHP.

16.2 COMMUNICATIONS PLAN FOR HWHP

A communications program will be implemented to acquaint key decision makers, interested public and regulatory agencies with the major features of the HWHP. The HWHP communications program will be coordinated with STRAD/PA. A variety of public information tools can be used, including (1) press releases, (2) radio spots, (3) public information brochures, and (4) briefings to political and industrial groups.

Regulatory agencies that should be targeted for briefings on the HWHP include:

- Department of Health Services (DOHS), Sacramento, California
- EPA Region IX, San Francisco, California
- Regional Water Quality Control Board, San Luis Obispo, California



EMCON Associates
San Jose, California

U.S. AIR FORCE
STS HAZARDOUS WASTE HANDLING PLAN
VANDENBERG AIR FORCE BASE, CALIFORNIA

RELATIONSHIP OF EPC AND PARTICIPANTS IN HWHP

FIGURE
16-1
PROJECT NO.
534-1.1

Appendix A

WASTE HANDLING DATA SHEETS

The Waste Handling Data Sheets (WHDS) presented in this appendix are to be used as guidelines or examples in the development of actual on-base waste management practices. The waste handling information presented is developed from local, state and federal regulations and based on the best available technical practices and consultation with industrial professionals. However, the success and workability of the WHDS depends upon continuous update and supplemental detail. The application of the WHDS is under the direction of the Hazardous Waste Manager.

The information presented on each data sheet applies to a broad "waste categorization" rather than to the specific chemical components for the following reasons:

- Flexibility of application; some of the materials and/or chemicals currently used for the STS program may be replaced by substitute materials by 1985. However, even if this occurs, most of the information on the WHDS will be applicable since the waste categories are broad enough to encompass materials of a related chemical composition.

- Limited chemical data; it would be inappropriate to present specific handling practices for compounds or mixes which have not been clearly defined.

- The WHDS should be used as a guideline rather than an irrevocable management requirement.

The WHDS presented in Figure A-1 defines the particular sections and the information that will be presented on each handling sheet. A complete list of references used as sources of information for the WHDS is given at the end of this appendix.

An asterisk (*) indicates the waste may (1) require special handling procedures, (2) contain a poison or other highly toxic material, or (3) be an "extremely" hazardous waste, as defined in Title 22, CAC Title 10. Precautions are given in WHDS Sections 5 and 6.

1. Waste Category - Refers to the Waste Category codes (see Table A-1) which were developed from SCS Engineers' data base to facilitate identifying similar waste characteristics and storage compatibilities.

2. Trade/Common Names - Further defines the waste category; presents manufacturer's trade names, common acronyms and military key words.

3. Proper U.S. Dot Shipping Name - The Department of Transportation requires proper identification of all materials before transport; 49 CFR Section 172.101, Hazardous Materials Table (HMT) defines the appropriate shipping names. Additionally, the word "waste" must be included as the first word of the shipping name when the material is shipped as a waste and it must be given on the hazardous waste drum label.

4. UN or NA Number - Numbers preceded by a "UN" are associated with descriptions considered appropriate for international shipments as well as domestic shipments. Those preceded by an "NA" are associated with descriptions that are not recognized for international shipments, except to and from Canada. The purpose of the numbering system is to improve the capability of emergency personnel to quickly identify hazardous materials/waste in emergency situations. These are referenced in DOT's Emergency Response Guidebook.

Table A-1

HAZARDOUS WASTE CATEGORIES

1. Adhesive wastes, liquid
2. Adhesive wastes, solid
3. Ammonia (anhydrous and wastewater)
4. Batteries
5. Contaminated rags/cheesecloths
6. Emergency eyewash and shower wastewater (EEW&S wastewater)
7. Fuel, oil and grease wastes
8. Fuel cleanup wastewater
9. Hydraulic fluids
10. Hydrazine scrubber effluent
11. Hydrazine
12. Insulation wastes, liquid
13. Insulation wastes, solid
14. Nitrogen tetroxide (N_2O_4)
15. Oxidizer cleanup wastewater
16. Oxidizer scrubber effluent
17. Paint wastes, liquid
18. Painting wastewater
19. Solid wastes, combustible
20. Solid wastes, noncombustible
21. Solvent wastes (oxygenated)
22. Solvent wastes (chlorinated)
23. Solvent wastewater

5. ORM Designation - Other Regulated Material (ORM) is a material that (1) may pose an unreasonable risk...when transported, and (2) does not meet any of the definitions of the other hazard classes specified (49 CFR Section 172.500).

6. Authorized Containers - Each waste/material requires varying containerization; specific requirements are given in the section(s) presented. The packaging given on each WHDS represents one method; others may also be appropriate. DOT Specification 17E and 17H drums are typical hazardous waste containers.

7. Required Warning Labels - Required by DOT and the USEPA (RCRA) for drum identification. Column 4 of the HMT lists the necessary labels determined by the "hazard class" (see No. 11-b).

8. Off-Base Transport Placards - DOT color-coded signs with both written and illustrated warnings which are required on all motor vehicles, rail cars and freight containers carrying a hazardous material/waste identified in Table 1 of Section 172-504 (49 CFR) or over 1,000 pounds of those identified in Table 2 of that Section. Required placards are determined by the "hazard class" (see No. 11-b).

9. Storage Area Classification - Determines which on-base storage area will be appropriate for the particular waste. Categories used at the collection and accumulation points may include:

- Acid
- Base
- Flammable
- General Waste
- Oxidizer (as appropriate: e.g., retention tanks or very dilute or neutralized waste stream)

10. NFPA Identification - "Recommended system for the identification of the fire hazards of materials" which provides basic warning information to firefighters in industrial plants and storage facilities (Table A-2) gives code descriptions. This system is not necessarily designed for wastes; consequently many of the materials are not listed with NFPA. Estimates (~) have been made for particular materials to help determine storage compatibility characteristics.

11. Recordkeeping - Items A through G give information required on the California Hazardous Waste Manifest (RCRA, see Appendix B).

    a. Proper Shipping Name: See No. 3 above.

    b. U.S. DOT Hazard Class: Refers to Column 3 of the HMT; corresponds to the proper shipping name and relative hazard of the chemical or waste material.

    c. UN or NA Number: See No. 4 above.

    d. Generating Process(es): Brief description defining the means by which the waste is produced.

    e. Waste Properties: Taken from Title 22, CAC, Sections 66680 and 66685: toxic, flammable, corrosive, irritant, reactive, sensitizer, carcinogen/nitrogen. Required on California Hazardous Waste Manifest.

    f. Physical State: Descriptive item, required on California Hazardous Waste Manifest.

    g. Special Handling Instructions: "Item 12" on the California Hazardous Waste Manifest refers to protective gear necessary for material handling. A limited response is required, e.g., gloves, goggles, respirator,

or "other." Specific handling information can be attained from the two following sections.

12. Worker Protection Information - Precautions to be taken when handling the particular material in both normal and emergency situations.

13. Spill Response and Procedures - Outlines protective action for a spill or other emergency situation.

14. Reviewed By - The reviewer, preferably trained in chemistry and/or environmental engineering, will be a responsible Air Force officer who is familiar with hazardous waste regulations. A logical candidate for this very important function is the Hazardous Waste Manager.

15. Last Date Revised - These WHDS will be reviewed and updated periodically (at least once every six months) to reflect (1) changes in the regulations, (2) most recent findings in hazardous waste technology, and (3) modifications in the STS waste stream.

EXAMPLE

STS HAZARDOUS WASTE MANAGEMENT PROGRAM

WASTE HANDLING DATA SHEET

WHDS_____

SECTION 1: WASTE IDENTIFICATION

WASTE CATAGORY

* (1)

TRADE / COMMON NAME(S)

(2)

MARKING:

PROPER U.S. DOT SHIPPING NAME

(3)

UN OR NA NUMBER

(4)

ORM DESIGNATION

(5)

SECTION 2: AUTHORIZED CONTAINERS

APPROPRIATE CONTAINERS / SPECIFIC REQUIREMENTS

(6)

SECTION 3: LABELING AND PLACARDING

REQUIRED WARNING LABELS

(7)

OFF-BASE TRANSPORT PLACARDS

(8)

STORAGE AREA:

CLASSIFICATION

(9)

NFPA IDENTIFICATION

(10)

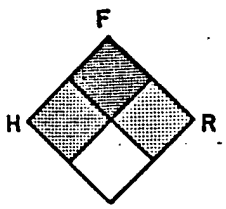


Figure A - 1

WASTE HANDLING DATA SHEET (cont.) WHDS_____

SECTION 4: RECORD KEEPING - MANIFEST INFORMATION

PROPER U.S. DOT SHIPPING NAME

(11) A

U.S. DOT HAZARD CLASS

B

UN OR NA NUMBER

C

GENERATING PROCESS(ES)

D

WASTE PROPERTIES

E

PHYSICAL STATE

F

SPECIAL HANDLING INSTRUCTIONS

G

SECTION 5: WORKER PROTECTION INFORMATION

(12)

SECTION 6: SPILL RESPONSE AND PROCEDURES

(13)

FORM REVIEWED BY _____ DATE LAST REVISED_____

Table A-2[1]

EXPLANATION OF NFPA HAZARD CLASSIFICATIONS

Classification	Definition
Health Hazard (blue)	
4	Materials which on very short exposure could cause death or major residual injury even though prompt medical treatment were given.
3	Materials which on short exposure could cause serious temporary or residual injury even though prompt medical treatment were given.
2	Materials which on intense or continued exposure could cause temporary incapacitation or possible residual injury unless prompt medical treatment is given.
1	Materials which on exposure would cause irritation but only minor residual injury even if no treatment is given.
0	Materials which on exposure under fire conditions would offer no hazard beyond that of ordinary combustible material.
Flammability (red)	
4	Materials which will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature, or which are readily dispersed in air and which will burn readily.
3	Liquids and solids that can be ignited under almost all ambient temperature conditions.
2	Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur.

1. Department of Transportation, Coast Guard; CHRIS - Hazardous Chemical Data, Volume I, Washington, D.C., October 1978.

Table A-2 (Continued)

Classification	Definition
Flammability (red) cont'd	
1	Materials that must be preheated before ignition can occur.
0	Materials that will not burn.
Reactivity (yellow)	
4	Materials which in themselves are readily capable of detonation or of explosive decomposition or reaction at normal temperatures and pressures.
3	Materials which in themselves are capable of detonation or explosive reaction but require a strong initiating source or which must be heated under confinement before initiation or which react explosively with water.
2	Materials which in themselves are normally unstable and readily undergo violent chemical change but do not detonate. Also materials which may react violently with water or which may form potentially explosive mixtures with water.
1	Materials which in themselves are normally stable, but which can become unstable at elevated temperatures and pressures or which may react with water with some release of energy but not violently.
0	Materials which in themselves are normally stable, even under fire exposure conditions, and which are not reactive with water.
Other (white)	
~~W~~	Materials which react so violently with water that a possible hazard results when they come in contact with water, as in a fire situation. Similar to Reactivity Classification 2.
Oxy	Oxidizing material; any solid or liquid that readily yields oxygen or other oxidizing gas, or that readily reacts to oxidize combustible materials.

WASTE HANDLING DATA SHEET

WHDS 1

SECTION 1: WASTE IDENTIFICATION

WASTE CATEGORY

* Adhesive Wastes, Liquid

MARKING:

PROPER U.S. DOT SHIPPING NAME

Waste Resin Solution

UN OR NA NUMBER

UN 2868

ORM DESIGNATION

TRADE / COMMON NAME(S)

EA 911 Epoxy
EA 934 Epoxy
EA 9209 Epoxy

SECTION 2: AUTHORIZED CONTAINERS

APPROPRIATE CONTAINERS / SPECIFIC REQUIREMENTS

Section(s) 173.119:
Spec. 17E or 17H; single trip, metal drum
Section 178.116:
Outage: 1-3 gallons of head room must be allowed for in "full" drums

SECTION 3: LABELING AND PLACARDING

REQUIRED WARNING LABELS

Flammable liquid
Bung Label
(Section 173.119)

OFF-BASE TRANSPORT PLACARDS

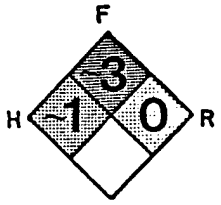
Flammable

STORAGE AREA:

CLASSIFICATION

Flammable

NFPA IDENTIFICATION



WASTE HANDLING DATA SHEET (cont.) WHDS 1

SECTION 4: RECORD KEEPING - MANIFEST INFORMATION

PROPER U.S. DOT SHIPPING NAME

Waste Resin Solution

U.S. DOT HAZARD CLASS

Flammable liquid

UN OR NA NUMBER

UN 2868

GENERATING PROCESS(ES)

TPS maintenance and repair

WASTE PROPERTIES

Toxic, flammable

PHYSICAL STATE

Liquid

SPECIAL HANDLING INSTRUCTIONS

Gloves

SECTION 5: WORKER PROTECTION INFORMATION

Wear gloves, resistant coveralls, avoid vapors, respiratory apparatus may be necessary

Some of these materials contain acrylonitrile, an extremely hazardous waste; precautions should be taken to avoid exposure.

SECTION 6: SPILL RESPONSE AND PROCEDURES

Protect from ignition, absorb with inert material (vermiculite), treat all residues as hazardous wastes

FORM REVIEWED BY _____ DATE LAST REVISED _____

WASTE HANDLING DATA SHEET

WHDS 2

SECTION 1: WASTE IDENTIFICATION

WASTE CATEGORY

Adhesive Wastes, Solid

MARKING:

PROPER U.S. DOT SHIPPING NAME

Hazardous Wastes, Solid, NOS

UN OR NA NUMBER
NA 9189

ORM DESIGNATION
ORM-E

TRADE / COMMON NAME(S)

TPS Adhesive, RTV 566/577
GX-6300 Ablator Adhesive
Isochem polyester resin adhesive
EA 934 epoxy adhesive

SECTION 2: AUTHORIZED CONTAINERS

APPROPRIATE CONTAINERS / SPECIFIC REQUIREMENTS

Section 173.1300 (173.510):
Spec. 17H; Single trip, metal drum with removable head

SECTION 3: LABELING AND PLACARDING

REQUIRED WARNING LABELS

Hazardous Waste
ORM-E

OFF-BASE TRANSPORT PLACARDS

None required

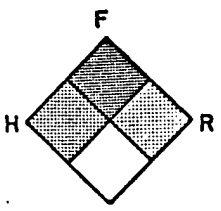
STORAGE AREA:

CLASSIFICATION

General Waste

NFPA IDENTIFICATION

Not Listed



WASTE HANDLING DATA SHEET (cont.) WHDS 2

SECTION 4: RECORD KEEPING - MANIFEST INFORMATION

PROPER U.S. DOT SHIPPING NAME
Hazardous Waste, Solid, NOS

U.S. DOT HAZARD CLASS
ORM-E

UN OR NA NUMBER
NA 9189

GENERATING PROCESS(ES)
TPS and external tank surface preparation

WASTE PROPERTIES
Toxic

PHYSICAL STATE
Solid

SPECIAL HANDLING INSTRUCTIONS
Gloves

SECTION 5: WORKER PROTECTION INFORMATION

Wear gloves and standard protective clothing; respiratory protective equipment should be worn if air monitoring indicates need.

SECTION 6: SPILL RESPONSE AND PROCEDURES

Promptly place solid materials in approved shipping container. Absorb or contain any liquids which may be present. Decontaminate cleanup tools and treat residues as hazardous wastes

FORM REVIEWED BY _____ DATE LAST REVISED _____

WASTE HANDLING DATA SHEET

WHDS 3

SECTION 1: WASTE IDENTIFICATION

WASTE CATEGORY

Ammonia (Anhydrous and Wastewater)

MARKING:

PROPER U.S. DOT SHIPPING NAME
Waste Ammonium Hydroxide (Solution)

UN OR NA NUMBER
NA 2672

ORM DESIGNATION
ORM-A

TRADE / COMMON NAME(S)

Ammonia Wastewater
(From ammonia boiler servicing)

Note: This WHDS assumes the usage of a "Vent and Drain Panel" which will neutralize the anhydrous ammonia forming ammonium hydroxide.

SECTION 2: AUTHORIZED CONTAINERS

APPROPRIATE CONTAINERS / SPECIFIC REQUIREMENTS

Section(s) 173.510
Spec. 17E or 17H; Single trip metal drum with openings not to exceed 2.3 inches in diameter

SECTION 3: LABELING AND PLACARDING

REQUIRED WARNING LABELS

Hazardous Waste
ORM-A

OFF-BASE TRANSPORT PLACARDS

None Required

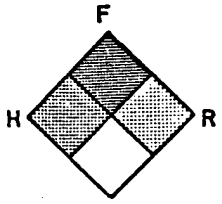
STORAGE AREA:

CLASSIFICATION

Base

NFPA IDENTIFICATION

Not Listed



WASTE HANDLING DATA SHEET (cont.) WHDS 3

SECTION 4: RECORD KEEPING - MANIFEST INFORMATION

PROPER U.S. DOT SHIPPING NAME

Waste Ammonium Hydroxide

U.S. DOT HAZARD CLASS

ORM-A

UN OR NA NUMBER

NA 2672

GENERATING PROCESS(ES)

Ammonia boiler servicing

WASTE PROPERTIES

Toxic, Corrosive

PHYSICAL STATE

Liquid

SPECIAL HANDLING INSTRUCTIONS

Gloves, goggles

SECTION 5: WORKER PROTECTION INFORMATION

Avoid breathing vapors and bodily contact; wear boots, goggles, gloves, and flush contacted areas with copious amounts of water

SECTION 6: SPILL RESPONSE AND PROCEDURES

Stay upwind, stop discharge if possible; use water to "knock down" vapors; isolate and remove discharged material.

FORM REVIEWED BY _____ DATE LAST REVISED _____

WASTE HANDLING DATA SHEET

WHDS 4

SECTION 1: WASTE IDENTIFICATION

WASTE CATEGORY

Batteries

MARKING:

PROPER U.S. DOT SHIPPING NAME

Waste Batteries, Electric Storage, Wet with Alkaline Battery Fluid

UN OR NA NUMBER

NA 2794

ORM DESIGNATION

TRADE / COMMON NAME(S)

Lithium Storage Batteries
Silver-Zinc Storage Batteries

SECTION 2: AUTHORIZED CONTAINERS

APPROPRIATE CONTAINERS / SPECIFIC REQUIREMENTS

Section(s) 173.206(f) and 173.260:
Batteries must be completely protected so that short circuits will be prevented; packaging varies depending upon size, weight and casing composition.

Spec. 15D or 16B; wooden boxes
Spec. 12B; fiberboard boxes

SECTION 3: LABELING AND PLACARDING

REQUIRED WARNING LABELS

Corrosive

OFF-BASE TRANSPORT PLACARDS

Corrosive

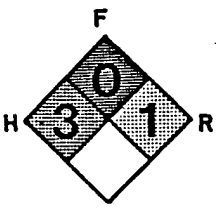
STORAGE AREA:

CLASSIFICATION

Base

NFPA IDENTIFICATION

(sodium hydroxide)



WASTE HANDLING DATA SHEET (cont.) WHDS 4

SECTION 4: RECORD KEEPING - MANIFEST INFORMATION

PROPER U.S. DOT SHIPPING NAME
Waste Batteries, Electric Storage, Wet with Alkaline Battery Fluid

U.S. DOT HAZARD CLASS
Corrosive Material

UN OR NA NUMBER
NA 2794

GENERATING PROCESS(ES)
Replacement/maintenance

WASTE PROPERTIES
Corrosive, irritant

PHYSICAL STATE
Solid with some liquid residues

SPECIAL HANDLING INSTRUCTIONS
Gloves

SECTION 5: WORKER PROTECTION INFORMATION

Avoid bodily contact with material, liquid destroys tissue; wear boots, protective gloves and goggles as necessary. Wear self-contained breathing apparatus when fighting fires involving this material.

SECTION 6: SPILL RESPONSE AND PROCEDURES

Keep material out of water sources and sewers; build dikes to contain flow; isolate and remove material, treat residues as hazardous waste.

FORM REVIEWED BY _____ DATE LAST REVISED _____

WASTE HANDLING DATA SHEET

WHDS 5

SECTION 1: WASTE IDENTIFICATION

WASTE CATEGORY

Contaminated Rags and Cheesecloths

TRADE / COMMON NAME(S)

Used cheesecloths, rags, Rymple cloths, and clothes contaminated with solvents, etc.

MARKING:

PROPER U.S. DOT SHIPPING NAME

Waste Flammable Solid, NOS

UN OR NA NUMBER

UN 1325

ORM DESIGNATION

SECTION 2: AUTHORIZED CONTAINERS

APPROPRIATE CONTAINERS / SPECIFIC REQUIREMENTS

Section(s) 173.154:
Spec. 17H; Single trip, metal drum with removable head

SECTION 3: LABELING AND PLACARDING

REQUIRED WARNING LABELS

Flammable Solid

OFF-BASE TRANSPORT PLACARDS

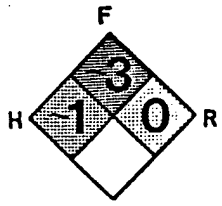
Flammable Solid

STORAGE AREA:

CLASSIFICATION

Flammable

NFPA IDENTIFICATION



WASTE HANDLING DATA SHEET (cont.) WHDS 5

SECTION 4: RECORD KEEPING - MANIFEST INFORMATION

PROPER U.S. DOT SHIPPING NAME

Waste Flammable Solid, NOS

U.S. DOT HAZARD CLASS

Flammable Solid

UN OR NA NUMBER

UN 1325

GENERATING PROCESS(ES)

TPS surface preparation and cleanup

WASTE PROPERTIES

Flammable, toxic

PHYSICAL STATE

Solid

SPECIAL HANDLING INSTRUCTIONS

Gloves

SECTION 5: WORKER PROTECTION INFORMATION

Wear appropriate gloves and protective clothing, avoid breathing fumes (especially from burning material); respiratory protection may be necessary

SECTION 6: SPILL RESPONSE AND PROCEDURES

Protect from ignition, contain in an approved flame-resistant shipping container, treat all residues as hazardous waste.

FORM REVIEWED BY _____ DATE LAST REVISED _____

WASTE HANDLING DATA SHEET

WHDS 6

SECTION 1: WASTE IDENTIFICATION

WASTE CATEGORY

*EEW&S Wastewater

TRADE / COMMON NAME(S)

Scapesuit rinsewaters;
(Water will contain varying concentrations of hydrazine.)

MARKING:

PROPER U.S. DOT SHIPPING NAME

Waste Hydrazine, Aqueous Solution

UN OR NA NUMBER

UN2030

ORM DESIGNATION

SECTION 2: AUTHORIZED CONTAINERS

APPROPRIATE CONTAINERS / SPECIFIC REQUIREMENTS

Section 173.276:
Spec. 34; Reuseable molded polyethylene container, DOT exemption (DOT E-6637). See documentation at the end of this appendix.

NOTE: Lab analysis may determine waste to be "non-hazardous" allowing sewer disposal or "dump to grade." If the waste stream is reclassified, adjustments will be required for labeling, storage and handling practices.

SECTION 3: LABELING AND PLACARDING

REQUIRED WARNING LABELS

Corrosive

OFF-BASE TRANSPORT PLACARDS

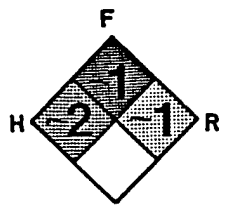
Corrosive

STORAGE AREA:

CLASSIFICATION

Base

NFPA IDENTIFICATION



WASTE HANDLING DATA SHEET (cont.) WHDS 6

SECTION 4: RECORD KEEPING - MANIFEST INFORMATION

PROPER U.S. DOT SHIPPING NAME

Waste Hydrazine, Aqueous Solution

U.S. DOT HAZARD CLASS

Corrosive Material

UN OR NA NUMBER

UN 2030

GENERATING PROCESS(ES)

Routine rinsing of scapesuits

WASTE PROPERTIES

Corrosive, toxic

PHYSICAL STATE

Liquid

SPECIAL HANDLING INSTRUCTIONS

Gloves, goggles

SECTION 5: WORKER PROTECTION INFORMATION

Wear protective gloves, goggles and clothing; avoid breathing fumes and bodily contact; respiratory protection may be necessary.

SECTION 6: SPILL RESPONSE AND PROCEDURES

Keep upwind; build dikes to contain flow; keep material out of water sources and sewers; attempt to stop leak if without hazard; use water spray to disperse vapors and dilute standing pools of liquid; absorb spill with inert material; treat residues as hazardous waste.

FORM REVIEWED BY _____ DATE LAST REVISED _____

WASTE HANDLING DATA SHEET

WHDS 7

SECTION 1: WASTE IDENTIFICATION

WASTE CATEGORY

Fuel, Oil and Grease Wastes

TRADE / COMMON NAME(S)

Diesel fuels
Oil and grease

MARKING:

PROPER U.S. DOT SHIPPING NAME

Waste Fuel Oil

UN OR NA NUMBER

NA 1993

ORM DESIGNATION

SECTION 2: AUTHORIZED CONTAINERS

APPROPRIATE CONTAINERS / SPECIFIC REQUIREMENTS

Section(s) (None listed):
Spec. 17E; Single trip, metal drum, openings not in excess of 2.3 inches in diameter

SECTION 3: LABELING AND PLACARDING

REQUIRED WARNING LABELS

Hazardous Waste

OFF-BASE TRANSPORT PLACARDS

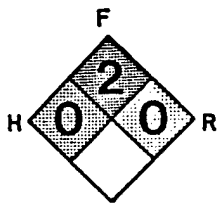
Combustible Liquid

STORAGE AREA:

CLASSIFICATION

Flammable

NFPA IDENTIFICATION



WASTE HANDLING DATA SHEET (cont.) WHDS 7

SECTION 4: RECORD KEEPING - MANIFEST INFORMATION

PROPER U.S. DOT SHIPPING NAME
Waste Fuel Oil

U.S. DOT HAZARD CLASS
Combustible Liquid

UN OR NA NUMBER
NA 1993

GENERATING PROCESS(ES)
Routine spill cleanup and maintenance

WASTE PROPERTIES
Flammable, toxic

PHYSICAL STATE
Liquid

SPECIAL HANDLING INSTRUCTIONS
Goggles, gloves

SECTION 5: WORKER PROTECTION INFORMATION

Avoid breathing vapors; wear protective boots, goggles and gloves; flush contacted areas with copious amounts of water.

SECTION 6: SPILL RESPONSE AND PROCEDURES

Stop discharge if possible; avoid contact with liquid; isolate and remove discharged material.

FORM REVIEWED BY _____ DATE LAST REVISED _____

WASTE HANDLING DATA SHEET

WHDS 8

SECTION 1: WASTE IDENTIFICATION

WASTE CATEGORY

* Fuel Spill Cleanup

TRADE / COMMON NAME(S)

Dilute hydrazine (MMH, UDMH) in water (<2-5% by weight)

MARKING:

PROPER U.S. DOT SHIPPING NAME

Waste Hydrazine, Aqueous Solution

UN OR NA NUMBER

UN 2030

ORM DESIGNATION

SECTION 2: AUTHORIZED CONTAINERS

APPROPRIATE CONTAINERS / SPECIFIC REQUIREMENTS

Section(s) 173.276:
Spec. 34; Reuseable polyethylene drum for use without overpack.
(See discussion on DOT exemptions at the end of this appendix.)

SECTION 3: LABELING AND PLACARDING

REQUIRED WARNING LABELS

Corrosive

OFF-BASE TRANSPORT PLACARDS

Corrosive

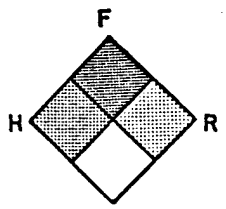
STORAGE AREA:

CLASSIFICATION

Base

NFPA IDENTIFICATION

Not Listed



WASTE HANDLING DATA SHEET (cont.) WHDS 8

SECTION 4: RECORD KEEPING - MANIFEST INFORMATION

PROPER U.S. DOT SHIPPING NAME

Waste Hydrazine, Aqueous Solution

U.S. DOT HAZARD CLASS

Corrosive Material

UN OR NA NUMBER

UN 2030

GENERATING PROCESS(ES)

Routine spill cleanup and washdown

WASTE PROPERTIES

Corrosive, toxic

PHYSICAL STATE

Liquid

SPECIAL HANDLING INSTRUCTIONS

Gloves, goggles

SECTION 5: WORKER PROTECTION INFORMATION

Wear protective gloves, goggles and clothing; avoid breathing fumes and bodily contact; respiratory protection may be necessary.

SECTION 6: SPILL RESPONSE AND PROCEDURES

Keep upwind; build dikes to contain flow; keep material out of water sources and sewers; attempt to stop leak if without hazard; use water spray to disperse vapors and dilute standing pools of liquid; absorb spill with inert material; treat residues as hazardous waste.

FORM REVIEWED BY _____ DATE LAST REVISED _____

WASTE HANDLING DATA SHEET

WHDS 9

SECTION 1: WASTE IDENTIFICATION

WASTE CATEGORY

Hydraulic Fluids

MARKING:

PROPER U.S. DOT SHIPPING NAME

Waste Petroleum Oil, NOS

UN OR NA NUMBER

NA 1270

ORM DESIGNATION

TRADE / COMMON NAME(S)

Texaco Regal Oil 068
(Vacuum pump oil)
Tetraorthocresol Phosphate
Skydrol
5606 Hydraulic Fluid

SECTION 2: AUTHORIZED CONTAINERS

APPROPRIATE CONTAINERS / SPECIFIC REQUIREMENTS

Section(s) (None listed):
Spec. 17E; Single trip, metal drum with openings not to exceed 2.3 inches in diameter

SECTION 3: LABELING AND PLACARDING

REQUIRED WARNING LABELS

Hazardous Waste

OFF-BASE TRANSPORT PLACARDS

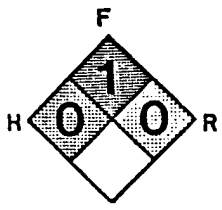
Combustible Liquid

STORAGE AREA:

CLASSIFICATION

General Waste

NFPA IDENTIFICATION



WASTE HANDLING DATA SHEET (cont.) WHDS 9

SECTION 4: RECORD KEEPING - MANIFEST INFORMATION

PROPER U.S. DOT SHIPPING NAME

Waste Petroleum Oil, NOS

U.S. DOT HAZARD CLASS

Combustible Liquid

UN OR NA NUMBER

NA 1270

GENERATING PROCESS(ES)

Densification of Orbiter tiles, maintenance of hydraulic systems

WASTE PROPERTIES

Toxic

PHYSICAL STATE

Liquid

SPECIAL HANDLING INSTRUCTIONS

Gloves

SECTION 5: WORKER PROTECTION INFORMATION

Wear gloves and appropriate protective clothing; avoid breathing vapors; avoid bodily contact and rinse contacted areas with copious amounts of water.

SECTION 6: SPILL RESPONSE AND PROCEDURES

Stop discharge if possible; use dike to contain flow; absorb residues with inert material; collect and dispose of wastes (treat as hazardous).

FORM REVIEWED BY _____ DATE LAST REVISED _____

WASTE HANDLING DATA SHEET

WHDS 10

SECTION 1: WASTE IDENTIFICATION

WASTE CATEGORY

* Hydrazine Scrubber Effluent

TRADE / COMMON NAME(S)

Scrubber Liquor
(Hydrazine Citrate)*

MARKING:

PROPER U.S. DOT SHIPPING NAME
Waste Corrosive Liquid, NOS

UN OR NA NUMBER

UN 1760

ORM DESIGNATION

*This data sheet assumes the use of citric acid scrubbers; if another type is selected, waste handling data will differ

SECTION 2: AUTHORIZED CONTAINERS

APPROPRIATE CONTAINERS / SPECIFIC REQUIREMENTS

Section(s) 173.245, 173.245(a):
Spec. 34; Reuseable polyethylene drum for use without overpack.
(See discussion on DOT exemptions at the end of this appendix.)

SECTION 3: LABELING AND PLACARDING

REQUIRED WARNING LABELS

Corrosive

OFF-BASE TRANSPORT PLACARDS

Corrosive

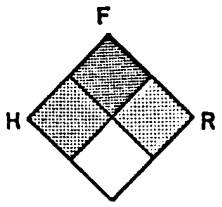
STORAGE AREA:

CLASSIFICATION

Acid* (See above)

NFPA IDENTIFICATION

Not Listed



WASTE HANDLING DATA SHEET (cont.) WHDS 10

SECTION 4: RECORD KEEPING - MANIFEST INFORMATION

PROPER U.S. DOT SHIPPING NAME

Waste Corrosive Liquid, NOS

U.S. DOT HAZARD CLASS

Corrosive Material

UN OR NA NUMBER

UN 1760

GENERATING PROCESS(ES)

Effluents from fuel scrubbers

WASTE PROPERTIES

Corrosive, toxic

PHYSICAL STATE

Liquid

SPECIAL HANDLING INSTRUCTIONS

Gloves, goggles

SECTION 5: WORKER PROTECTION INFORMATION

Wear protective gloves, goggles and clothing; avoid breathing fumes and bodily contact; respiratory protection may be necessary.

SECTION 6: SPILL RESPONSE AND PROCEDURES

Keep upwind; contain or dike spilled material; keep material out of water sources and sewers, absorb spill with inert material; treat residues as hazardous waste.

FORM REVIEWED BY _____ DATE LAST REVISED _____

PREFACE

This report was prepared by EMCON Associates, San Jose, California 95112. This Hazardous Waste Handling Plan for the Space Shuttle Project, Vandenberg AFB was initiated by the Air Force to meet the requirements of the Resource Conservation and Recovery Act of 1976 as ammended in 40 CFR 261 and 264 May 19, 1980, and the California Administrative Code, Title 22 Division 4. The report will be used for hazardous waste management planning e.g. identification of responsible organizations for specific elements, and for engineering design concepts for the STS.

The report provides handling proceedures for the on-base management of drummed hazardous wastes during the operation of STS at Vandenberg AFB. It addresses handling at each station set and includes requirements for collection/accumulation points.

This work was accomplished between February 1982 and August 1982. Mr. John R. Edwards, Headquarters Space Division was the Project Officer.

This report has been reviewed by the office of Public Affairs (PA) and is releasable to the National Technical Information Service (NTIS). At the NTIS it will be available to the general public, including foreign nations.

This report has been reviewed and is approved for publication.

JOHN R. EDWARDS
Environmental Engineer

R.C. WOOTEN JR, Lt Col, USAF, BSC
STS Environmental Program Manager

RAPHAEL O. ROIG
Chief, Environmental Planning Division

JOHN D. PEARMAN, Colonel, USAF
Directorate of Civil Engineering

WASTE HANDLING DATA SHEET

WHDS 11

SECTION 1: WASTE IDENTIFICATION

WASTE CATEGORY

* Hydrazine

MARKING:

PROPER U.S. DOT SHIPPING NAME

Waste Hydrazine, Anhydrous

UN OR NA NUMBER

UN 2029

ORM DESIGNATION

TRADE / COMMON NAME(S)

Hydrazine
Monomethylhydrazine (MMH)
Unsymmetrical Dimethylhydrazine (UDMH)

SECTION 2: AUTHORIZED CONTAINERS

APPROPRIATE CONTAINERS / SPECIFIC REQUIREMENTS

Section(s) 173.276:
Spec. 5C or 17E (single trip); metal drums which shall be of the type 304 or 347 stainless steel with openings not to exceed 2.3 inches in diameter.

SECTION 3: LABELING AND PLACARDING

REQUIRED WARNING LABELS

Flammable Liquid and Poison
Bung Label
(Section 173.119)

OFF-BASE TRANSPORT PLACARDS

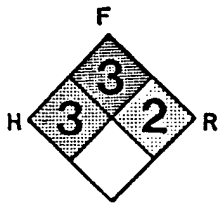
Flammable

STORAGE AREA:

CLASSIFICATION

Flammable

NFPA IDENTIFICATION



WASTE HANDLING DATA SHEET (cont.) WHDS 11

SECTION 4: RECORD KEEPING - MANIFEST INFORMATION

PROPER U.S. DOT SHIPPING NAME

Waste Hydrazine, Anhydrous

U.S. DOT HAZARD CLASS

Flammable Liquid

UN OR NA NUMBER

UN 2029

GENERATING PROCESS(ES)

Drain and purge of fuel lines

WASTE PROPERTIES

Toxic, flammable

PHYSICAL STATE

Liquid

SPECIAL HANDLING INSTRUCTIONS

Gloves, goggles and respirator

SECTION 5: WORKER PROTECTION INFORMATION

Full chemical protection suit (scape) necessary and self-contained or supplied air breathing apparatus. Personnel must be trained specifically for hydrazine handling. Vapors are very toxic and attack eyes and respiratory system. Liquid is corrosive to skin. Wash contacted areas immediately with water.

SECTION 6: SPILL RESPONSE AND PROCEDURES

Issue warning, secure ignition sources; initiate washdown using water fog and vapor suppression. Dry chemical and carbon dioxide may be used to extinguish fire but flooding with water will be necessary to prevent reignition. Isolate and contain all wastes; treat all cleanup residue as hazardous waste.

FORM REVIEWED BY _____ DATE LAST REVISED _____

WASTE HANDLING DATA SHEET (cont.) WHDS 12

SECTION 4: RECORD KEEPING - MANIFEST INFORMATION

PROPER U.S. DOT SHIPPING NAME

Hazardous Waste, Solid, NOS

U.S. DOT HAZARD CLASS

ORM-E

UN OR NA NUMBER

NA 9189

GENERATING PROCESS(ES)

Excess ablative material from forward skirt and frustrum

WASTE PROPERTIES

Toxic

PHYSICAL STATE

Liquid (sludge)

SPECIAL HANDLING INSTRUCTIONS

Gloves

SECTION 5: WORKER PROTECTION INFORMATION

Wear appropriate gloves and protective clothing; avoid bodily contact with material; respiratory protection may be required.

Some of these materials contain diphenyl methane diisocyanate, an extremely hazardous waste (see introductory discussion) and epichlorohydrin, a Class B poison. Precautions should be taken to avoid exposure; materials could be considered highly toxic.

SECTION 6: SPILL RESPONSE AND PROCEDURES

Absorb small spills with an inert material (vermiculite); contain large spills by diking. Depending upon flammability and vapor release, vapor suppression foam deployment may also be appropriate.

FORM REVIEWED BY _____ DATE LAST REVISED _____

WASTE HANDLING DATA SHEET

WHDS 12

SECTION 1: WASTE IDENTIFICATION

WASTE CATEGORY

* Insulation Wastes (Liquid)

MARKING:

PROPER U.S. DOT SHIPPING NAME

Hazardous Waste, Solid, NOS

UN OR NA NUMBER

NA 9189

ORM DESIGNATION

ORM-E

TRADE / COMMON NAME(S)

MSA-1
Marshall Sprayable Ablative

MTA-2
Marshall Trowelable Ablative

Alumacast A/B Mixture
Pour Foam Part A
Pour Foam Part B

SECTION 2: AUTHORIZED CONTAINERS

APPROPRIATE CONTAINERS / SPECIFIC REQUIREMENTS *

Section(s) 173.1300 (173.510):
Spec. 17E; Single trip metal drum. (Spec. 17H may also be acceptable)
Section 173.116:
Outage; 1-3 gallons of head room must be allowed for in "full" drums.

*Chemical analysis of representative samples need to be performed prior to determining specific containerization and labeling practices.

SECTION 3: LABELING AND PLACARDING

REQUIRED WARNING LABELS

Poison
(Epichlorohydrin)

OFF-BASE TRANSPORT PLACARDS

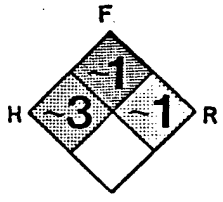
Poison

STORAGE AREA:

CLASSIFICATION

General Waste

NFPA IDENTIFICATION



WASTE HANDLING DATA SHEET

WHDS 13

SECTION 1: WASTE IDENTIFICATION

WASTE CATEGORY

* Insulation Wastes, Solid

MARKING:

PROPER U.S. DOT SHIPPING NAME

Waste Flammable Solid, NOS

UN OR NA NUMBER

UN 1325

ORM DESIGNATION

TRADE / COMMON NAME(S)

Alumacast A/B Mixture
Instant Set Polymer Scraps
Silane/Acetic Acid Residues
Tile repair foam
(BX-250, CPR 488)

SECTION 2: AUTHORIZED CONTAINERS

APPROPRIATE CONTAINERS / SPECIFIC REQUIREMENTS

Section 173.154:
Spec. 17H; Single trip, metal drum with removable head.

SECTION 3: LABELING AND PLACARDING

REQUIRED WARNING LABELS

Flammable Solid and Poison

OFF-BASE TRANSPORT PLACARDS

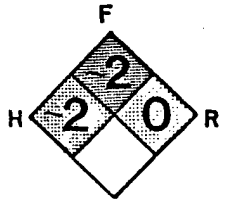
Flammable Solid

STORAGE AREA:

CLASSIFICATION

Flammable

NFPA IDENTIFICATION



WASTE HANDLING DATA SHEET (cont.) WHDS 13

SECTION 4: RECORD KEEPING - MANIFEST INFORMATION

PROPER U.S. DOT SHIPPING NAME
Waste Flammable Solid, NOS

U.S. DOT HAZARD CLASS
Flammable Solid

UN OR NA NUMBER
UN 1325

GENERATING PROCESS(ES)
TPS maintenance and repair

WASTE PROPERTIES
Flammable

PHYSICAL STATE
Solid

SPECIAL HANDLING INSTRUCTIONS
Gloves, goggles

SECTION 5: WORKER PROTECTION INFORMATION

Wear appropriate gloves and coveralls; avoid breathing fumes (especially if burning); respiratory protection may be necessary

Some of these materials contain diphenyl methane diisocyanate, an extremely hazardous waste (see introductory discussion) and epichlorohydrin, a Class B poison. Precautions should be taken to avoid exposure; materials could be considered highly toxic.

SECTION 6: SPILL RESPONSE AND PROCEDURES

Protect from ignition sources; contain in an approved flame resistant shipping container; treat residues as hazardous waste.

FORM REVIEWED BY _____ DATE LAST REVISED _____

WASTE HANDLING DATA SHEET

WHDS 14

SECTION 1: WASTE IDENTIFICATION

WASTE CATEGORY

* Nitrogen Tetroxide

TRADE / COMMON NAME(S)

Oxidizer

MARKING:

PROPER U.S. DOT SHIPPING NAME

Waste Nitrogen Tetroxide, Liquid

UN OR NA NUMBER

NA 1067

ORM DESIGNATION

SECTION 2: AUTHORIZED CONTAINERS

APPROPRIATE CONTAINERS / SPECIFIC REQUIREMENTS

Highly Regulated

Section 173.336:
Spec. 110A500W (Section 179.300,301);
One-ton cylinders, 316 L stainless steel (possibly 304 stainless steel). Outage must be sufficient to prevent tanks from becoming liquid full at 130°F (also see Sections 174.600 and 177.834(m)).

SECTION 3: LABELING AND PLACARDING

REQUIRED WARNING LABELS

Poison Gas and Oxidizer

OFF-BASE TRANSPORT PLACARDS

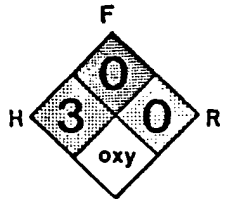
Poison Gas

STORAGE AREA:

CLASSIFICATION

Oxidizer

NFPA IDENTIFICATION



WASTE HANDLING DATA SHEET (cont.) WHDS 14

SECTION 4: RECORD KEEPING - MANIFEST INFORMATION

PROPER U.S. DOT SHIPPING NAME

Waste Nitrogen Tetroxide, Liquid

U.S. DOT HAZARD CLASS

Poison A

UN OR NA NUMBER

NA 1067

GENERATING PROCESS(ES)

Drain and purge propulsion and control systems, manifolds, and payload baykits

WASTE PROPERTIES

Toxic, Flammable

PHYSICAL STATE

Liquid (under pressure)

SPECIAL HANDLING INSTRUCTIONS

Gloves, goggles, respirator

SECTION 5: WORKER PROTECTION INFORMATION

Vapors are extremely toxic and may cause fatal lung damage even in very dilute concentrations. Both the liquid and vapor may cause severe eye and skin burns. Full protective gear (SCAPE) must be worn. Personnel should be fully trained in all aspects of N_2O_4 handling prior to any association.

SECTION 6: SPILL RESPONSE AND PROCEDURES

Issue warning, evacuate for a radius of 2,500 feet; secure ignition sources; use water to "knock down" vapors -- DO NOT SPRAY WATER DIRECTLY ON LEAK AREAS; stop discharge, if possible; contain and isolate residues; treat as hazardous waste.

FORM REVIEWED BY _____ DATE LAST REVISED _____

WASTE HANDLING DATA SHEET

WHDS 15

SECTION 1: WASTE IDENTIFICATION

WASTE CATEGORY

* Oxidizer, Cleanup Wastewater

MARKING:

PROPER U.S. DOT SHIPPING NAME

Waste Nitric Acid, 40% or less

UN OR NA NUMBER

NA 1760

ORM DESIGNATION

TRADE / COMMON NAME(S)

Nitrogen Tetroxide in Water Solution*
(Dissociates into Nitric Acid)

*Handling practices will vary depending upon the concentration of nitrogen tetroxide: lab analysis will be required.

SECTION 2: AUTHORIZED CONTAINERS

APPROPRIATE CONTAINERS / SPECIFIC REQUIREMENTS

Section(s) 173.268:
Spec. 5C; Closed top, metal drum of type 304 or 347 stainless steel (according to Section 178.83-3(c) specifications).

SECTION 3: LABELING AND PLACARDING

REQUIRED WARNING LABELS

Corrosive

OFF-BASE TRANSPORT PLACARDS

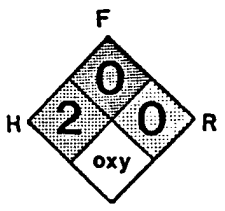
Corrosive

STORAGE AREA:

CLASSIFICATION

Acid

NFPA IDENTIFICATION



WASTE HANDLING DATA SHEET (cont.) WHDS 15

SECTION 4: RECORD KEEPING - MANIFEST INFORMATION

PROPER U.S. DOT SHIPPING NAME

Waste Nitric Acid, 40% or less

U.S. DOT HAZARD CLASS

Corrosive Material

UN OR NA NUMBER

NA 1760

GENERATING PROCESS(ES)

Oxidizer spill cleanup, final wash water

WASTE PROPERTIES

Corrosive, toxic

PHYSICAL STATE

Liquid -- may be gaseous

SPECIAL HANDLING INSTRUCTIONS

Gloves, goggles, respirator

SECTION 5: WORKER PROTECTION INFORMATION

Wear boots, protective gloves and goggles; wear self-contained breathing apparatus during fire fighting; full protective clothing required if contact with material anticipated.

SECTION 6: SPILL RESPONSE AND PROCEDURES

Avoid breathing vapors; keep upwind; apply water to knock down vapors; DO NOT SPRAY WATER DIRECTLY ON LEAK AREAS; stop discharge if possible; absorb bulk liquid with fly ash or cement powder; neutralize with agricultural lime (or soda ash); remove wastes; treat residues as hazardous waste.

FORM REVIEWED BY _____ DATE LAST REVISED _____

WASTE HANDLING DATA SHEET

WHDS 16

SECTION 1: WASTE IDENTIFICATION

WASTE CATEGORY

Oxidizer Scrubber Effluent

TRADE / COMMON NAME(S)

Potassium nitrate solution: oxidizer scrubber liquor

MARKING:

PROPER U.S. DOT SHIPPING NAME

Waste Potassium Nitrate Solution

UN OR NA NUMBER

UN 1486

ORM DESIGNATION

SECTION 2: AUTHORIZED CONTAINERS

APPROPRIATE CONTAINERS / SPECIFIC REQUIREMENTS

Section 173.182;
Spec. 34; Reuseable, molded polyethylene container; DOT exempt (DOT E-6637). See documentation at the end of this appendix.

SECTION 3: LABELING AND PLACARDING

REQUIRED WARNING LABELS

Oxidizer

OFF-BASE TRANSPORT PLACARDS

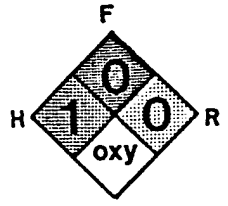
Oxidizer

STORAGE AREA:

CLASSIFICATION

Waste retention tank (oxidizer)

NFPA IDENTIFICATION



WASTE HANDLING DATA SHEET (cont.) WHDS 16

SECTION 4: RECORD KEEPING - MANIFEST INFORMATION

PROPER U.S. DOT SHIPPING NAME

Waste Potassium Nitrate Solution

U.S. DOT HAZARD CLASS

Oxidizer

UN OR NA NUMBER

UN 1486

GENERATING PROCESS(ES)

Scrubber liquor used for N_2O_4 vapors

WASTE PROPERTIES

Pressure generating (applicable to solid material)

PHYSICAL STATE

Liquid

SPECIAL HANDLING INSTRUCTIONS

Gloves

SECTION 5: WORKER PROTECTION INFORMATION

Avoid bodily contact, wear protective gloves, boots and safety glasses. If involved in fire, wear self-contained breathing apparatus; fumes may contain toxic oxides and nitrogen.

SECTION 6: SPILL RESPONSE AND PROCEDURES

Secure emission sources, contain liquid by diking. Cover with soda ash and transfer into a drum containing water. Neutralize wit predetermined amount of HCI.

FORM REVIEWED BY _____ DATE LAST REVISED _____

WASTE HANDLING DATA SHEET

WHDS 17

SECTION 1: WASTE IDENTIFICATION

WASTE CATEGORY

Paint Wastes (Liquid)

MARKING:

PROPER U.S. DOT SHIPPING NAME
Waste Paint, Primer or Lacquer, Liquid

UN OR NA NUMBER
UN 1263

ORM DESIGNATION

TRADE / COMMON NAME(S)

Lacquer #626486
Organic Zinc Primer
Koropon Primer
Zinc Chromate Primer
Bostik Epoxy Primer
*Bostik Epoxy Topcoat
Rustoleum Primer
Rustoleum Topcoat
Gacoflex

SECTION 2: AUTHORIZED CONTAINERS

APPROPRIATE CONTAINERS / SPECIFIC REQUIREMENTS

Section 173.128:
Spec. 17E; single trip, metal drum with openings not over 2.3 inches in diameter
Section 178.116:
Outage; 1-3 gallons of headroom must be allowed for in "full" drums

SECTION 3: LABELING AND PLACARDING

REQUIRED WARNING LABELS

Flammable Liquid
Bung Label
(Section 173.119)

OFF-BASE TRANSPORT PLACARDS

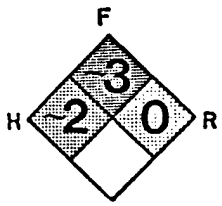
Flammable

STORAGE AREA:

CLASSIFICATION

Flammable

NFPA IDENTIFICATION



WASTE HANDLING DATA SHEET (cont.) WHDS 17

SECTION 4: RECORD KEEPING - MANIFEST INFORMATION

PROPER U.S. DOT SHIPPING NAME

Waste Paint, Primer or Lacquer, Liquid

U.S. DOT HAZARD CLASS

Flammable Liquid

UN OR NA NUMBER

UN 1263

GENERATING PROCESS(ES)

Orbiter Surface and TPS Maintenance/Repair

WASTE PROPERTIES

Toxic, Flammable

PHYSICAL STATE

Liquid (Sludge)

SPECIAL HANDLING INSTRUCTIONS

Gloves, Goggles

SECTION 5: WORKER PROTECTION INFORMATION

Wear protective gloves and goggles; avoid breathing fumes; appropriate organic vapor canister or air-supplied mask should be available. Some of these materials contain epichlorohydrin, a Class B poison. The material is extremely toxic; ingestion may be fatal. Full protective clothing should be worn during fire fighting.

SECTION 6: SPILL RESPONSE AND PROCEDURES

Issue warning (fire alarm for greater than 20 gallons), secure ignition sources, control vapors with absorbent and AFFF foam (water fog on large spills), contain runoff, full SCBA and fire protective clothing for inside spills, treat residue as hazardous flammable liquid, notify authorities.

FORM REVIEWED BY _____ DATE LAST REVISED _____

WASTE HANDLING DATA SHEET

WHDS 18

SECTION 1: WASTE IDENTIFICATION

WASTE CATEGORY

* Painting Wastewater

TRADE / COMMON NAME(S)

"Alodine" contaminated water

MARKING:

PROPER U.S. DOT SHIPPING NAME

Waste Chromic Fluoride Solution

UN OR NA NUMBER

UN 1757

ORM DESIGNATION

N/A

SECTION 2: AUTHORIZED CONTAINERS

APPROPRIATE CONTAINERS / SPECIFIC REQUIREMENTS

Section 173.245:
Spec. 17E, single trip; metal drum with openings not to exceed 2.3 inches in diameter

SECTION 3: LABELING AND PLACARDING

REQUIRED WARNING LABELS

Corrosive

OFF-BASE TRANSPORT PLACARDS

Corrosive

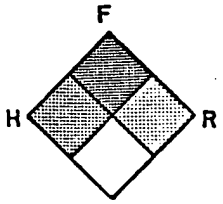
STORAGE AREA:

CLASSIFICATION

Acid

NFPA IDENTIFICATION

Not Listed



WASTE HANDLING DATA SHEET (cont.) WHDS 18

SECTION 4: RECORD KEEPING - MANIFEST INFORMATION

PROPER U.S. DOT SHIPPING NAME

Waste Chromic Fluoride Solution

U.S. DOT HAZARD CLASS

Corrosive Material, Acidic

UN OR NA NUMBER

UN 1757

GENERATING PROCESS(ES)

Chemical surface preparation for aluminum

WASTE PROPERTIES

Toxic, Irritant (Possible Sensitizer)

PHYSICAL STATE

Liquid

SPECIAL HANDLING INSTRUCTIONS

Gloves, Goggles

SECTION 5: WORKER PROTECTION INFORMATION

Wear boots, goggles and protective gloves, avoid breathing fumes, wash bodily areas that may have contacted material with copious amounts of water.

This material contains cyanide salt which is an extremely hazardous waste. Precautions should be taken to avoid exposure; material could be considered highly toxic.

SECTION 6: SPILL RESPONSE AND PROCEDURES

Stop discharge if possible, contain (dike) flow, neutralize spilled material with lime or soda ash, remove discharged material, treat all residues as hazardous waste.

FORM REVIEWED BY _____ DATE LAST REVISED _____

WASTE HANDLING DATA SHEET

WHDS 19

SECTION 1: WASTE IDENTIFICATION

WASTE CATEGORY

Solid Waste, Combustible

MARKING:

PROPER U.S. DOT SHIPPING NAME

Hazardous Waste, Solid, NOS

UN OR NA NUMBER

NA 9189

ORM DESIGNATION

ORM-E

TRADE / COMMON NAME(S)

Koropon Primer Cans
Contaminated Paint Brushes
Contaminated Air Filters and
Charcoal Filter Wastes

SECTION 2: AUTHORIZED CONTAINERS

APPROPRIATE CONTAINERS / SPECIFIC REQUIREMENTS

Section(s) 173.1300 (173.510):
Spec. 17H; Single trip, metal drum with removable head

SECTION 3: LABELING AND PLACARDING

REQUIRED WARNING LABELS

Hazardous Waste
ORM-E

OFF-BASE TRANSPORT PLACARDS

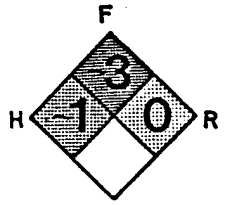
Combustible

STORAGE AREA:

CLASSIFICATION

Flammable

NFPA IDENTIFICATION



WASTE HANDLING DATA SHEET (cont.) WHDS 19

SECTION 4: RECORD KEEPING - MANIFEST INFORMATION

PROPER U.S. DOT SHIPPING NAME

Hazardous Waste, Solid, NOS

U.S. DOT HAZARD CLASS

ORM-E

UN OR NA NUMBER

NA 9189

GENERATING PROCESS(ES)

TPS maintenance and repair, general maintenance

WASTE PROPERTIES

Flammable, toxic

PHYSICAL STATE

Solid

SPECIAL HANDLING INSTRUCTIONS

Gloves, goggles

SECTION 5: WORKER PROTECTION INFORMATION

Wear gloves and appropriate protective clothing; avoid breathing fumes (especially from burning material); respiratory protection may be necessary.

SECTION 6: SPILL RESPONSE AND PROCEDURES

Protect from ignition; contain promptly in an approved flame resistant shipping container; treat all residues as hazardous waste.

FORM REVIEWED BY _____ DATE LAST REVISED _____

WASTE HANDLING DATA SHEET

WHDS 20

SECTION 1: WASTE IDENTIFICATION

WASTE CATEGORY

Solid Wastes, Non-Combustible

MARKING:

PROPER U.S. DOT SHIPPING NAME

Hazardous Waste, Solid, NOS

UN OR NA NUMBER

NA 9189

ORM DESIGNATION

ORM-E

TRADE / COMMON NAME(S)

Empty cans: TPS Sealer, lacquer, Marshall Stencil Ink, enamel, Zinc Chromate Primer, Bostik Primer and Topcoat, Rustoleum Primer and Topcoat
ISP contaminated cups and sticks
Tare cups
Contaminated clothes
Waste seals, filters
Pour foam containers

SECTION 2: AUTHORIZED CONTAINERS

APPROPRIATE CONTAINERS / SPECIFIC REQUIREMENTS

Section(s) 173.1300 (173.510):
Spec. 17H; Single trip, metal drum with removeable head.

SECTION 3: LABELING AND PLACARDING

REQUIRED WARNING LABELS

Hazardous Waste
ORM-E

OFF-BASE TRANSPORT PLACARDS

None required

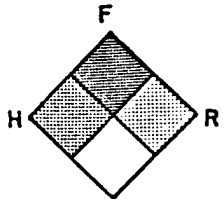
STORAGE AREA:

CLASSIFICATION

General Waste

NFPA IDENTIFICATION

Not Listed



WASTE HANDLING DATA SHEET (cont.) WHDS 20

SECTION 4: RECORD KEEPING - MANIFEST INFORMATION

PROPER U.S. DOT SHIPPING NAME

Hazardous Waste, Solid, NOS

U.S. DOT HAZARD CLASS

ORM-E

UN OR NA NUMBER

NA 9189

GENERATING PROCESS(ES)

General maintenance, part replacement and repair

WASTE PROPERTIES

Toxic (depending upon contaminants)

PHYSICAL STATE

Solid

SPECIAL HANDLING INSTRUCTIONS

Gloves

SECTION 5: WORKER PROTECTION INFORMATION

Wear gloves and appropriate protective clothing; respiratory protective equipment should be worn if air monitoring indicates need.

SECTION 6: SPILL RESPONSE AND PROCEDURES

Promptly place solid materials in approved shipping container. Absorb or contain any liquids which may be present. Decontaminate cleanup tools and treat all residue as hazardous waste.

FORM REVIEWED BY _____ DATE LAST REVISED _____

WASTE HANDLING DATA SHEET

WHDS 21

SECTION 1: WASTE IDENTIFICATION

WASTE CATEGORY

Solvent Wastes (Oxygenated)

TRADE / COMMON NAME(S)

Dope and Lacquer Thinner
Solvent Reducer

MARKING:

PROPER U.S. DOT SHIPPING NAME

Waste Solvent, NOS

UN OR NA NUMBER

NA 1993

ORM DESIGNATION

SECTION 2: AUTHORIZED CONTAINERS

APPROPRIATE CONTAINERS / SPECIFIC REQUIREMENTS

Section 173.119:
Spec. 17E; single trip, metal drum with openings not over 2.3 inches in diameter
Section 178.116:
Outage: 1-3 gallons of headroom must be allowed for a "full" drum

SECTION 3: LABELING AND PLACARDING

REQUIRED WARNING LABELS

Flammable Liquid
Bung Label
(Section 173.119)

OFF-BASE TRANSPORT PLACARDS

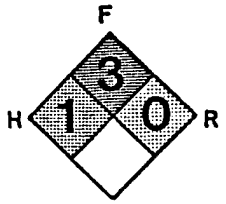
Flammable

STORAGE AREA:

CLASSIFICATION

Flammable

NFPA IDENTIFICATION



WASTE HANDLING DATA SHEET (cont.) WHDS 21

SECTION 4: RECORD KEEPING - MANIFEST INFORMATION

PROPER U.S. DOT SHIPPING NAME
Waste Solvent, NOS

U.S. DOT HAZARD CLASS
Flammable Liquid

UN OR NA NUMBER
NA 1993

GENERATING PROCESS(ES)

General cleanup, paint and lacquer thinning

WASTE PROPERTIES

Toxic, Flammable

PHYSICAL STATE

Liquid

SPECIAL HANDLING INSTRUCTIONS

Gloves, Goggles

SECTION 5: WORKER PROTECTION INFORMATION

Wear protective gloves and goggles; avoid breathing fumes; appropriate organic vapor canister or air-supplied mask should be available.

SECTION 6: SPILL RESPONSE AND PROCEDURES

Issue warning (fire alarm for greater than 20 gallons), secure ignition sources, control vapors with absorbent and AFFF foam (water fog on large spills), contain runoff, full SCBA and fire protective clothing for inside spills, treat residue as hazardous, flammable liquid, notify authorities.

FORM REVIEWED BY _____ DATE LAST REVISED _____

WASTE HANDLING DATA SHEET

WHDS 22

SECTION 1: WASTE IDENTIFICATION

WASTE CATEGORY

Solvent Wastes (Chlorinated)

MARKING:

PROPER U.S. DOT SHIPPING NAME

Consult 49 CFR 172.101

UN OR NA NUMBER

Consult 49 CFR 172.101

ORM DESIGNATION

ORM-A

TRADE / COMMON NAME(S)

1. Perchloroethylene
2. 1,1,1-Trichloroethane
3. Dichloromethane (Methylene Chloride)

SECTION 2: AUTHORIZED CONTAINERS

APPROPRIATE CONTAINERS / SPECIFIC REQUIREMENTS

Section(s) 173.605 (Numbers 2 and 3)
173.119 (Number 1):
Spec. 17E; Single trip, metal drum with openings not to exceed 2.3 inches in diameter

SECTION 3: LABELING AND PLACARDING

REQUIRED WARNING LABELS

Hazardous Waste
ORM-A

OFF-BASE TRANSPORT PLACARDS

None Required

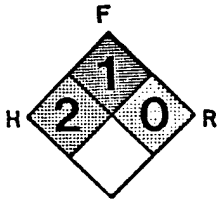
STORAGE AREA:

CLASSIFICATION

General Waste

NFPA IDENTIFICATION

(Dichloromethane)



WASTE HANDLING DATA SHEET (cont.) WHDS 22

SECTION 4: RECORD KEEPING - MANIFEST INFORMATION

PROPER U.S. DOT SHIPPING NAME

Consult 49 CFR 172.101

U.S. DOT HAZARD CLASS

ORM-A

UN OR NA NUMBER

Consult 49 CFR 172.101

GENERATING PROCESS(ES)

General cleaning and Orbiter TPS surface preparation

WASTE PROPERTIES

Toxic, irritant

PHYSICAL STATE

Liquid

SPECIAL HANDLING INSTRUCTIONS

Gloves, goggles

SECTION 5: WORKER PROTECTION INFORMATION

Wear neoprene gloves, boots and apron; self-contained breathing apparatus may be necessary.

SECTION 6: SPILL RESPONSE AND PROCEDURES

Keep upwind, avoid breathing vapors; stop discharge if possible; absorb spill with inert material; isolate and remove; treat residues as hazardous waste.

FORM REVIEWED BY _____ DATE LAST REVISED _____

WASTE HANDLING DATA SHEET

WHDS 23

SECTION 1: WASTE IDENTIFICATION

WASTE CATEGORY

Solvent Wastewater

TRADE / COMMON NAME(S)

MEK-Contaminated Washwater

MARKING:

PROPER U.S. DOT SHIPPING NAME

Waste Combustible Liquid, NOS

UN OR NA NUMBER

NA 1993

ORM DESIGNATION

SECTION 2: AUTHORIZED CONTAINERS

APPROPRIATE CONTAINERS / SPECIFIC REQUIREMENTS

Section (none listed):
Spec. 17E; Single trip, metal drum with openings not to exceed 2.3 inches in diameter

Section 178.116:
Outage; 1-3 gallons of head room must be allowed for in "full" drums

SECTION 3: LABELING AND PLACARDING

REQUIRED WARNING LABELS

Hazardous Waste

OFF-BASE TRANSPORT PLACARDS

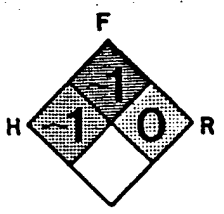
Combustible Liquid

STORAGE AREA:

CLASSIFICATION

General Waste

NFPA IDENTIFICATION



WASTE HANDLING DATA SHEET (cont.) WHDS 23

SECTION 4: RECORD KEEPING - MANIFEST INFORMATION

PROPER U.S. DOT SHIPPING NAME

Waste Combustible Liquid, NOS

U.S. DOT HAZARD CLASS

Combustible

UN OR NA NUMBER

NA 1993

GENERATING PROCESS(ES)

General cleanup and Orbiter surface preparation for TPS

WASTE PROPERTIES

Toxic

PHYSICAL STATE

Liquid

SPECIAL HANDLING INSTRUCTIONS

Gloves

SECTION 5: WORKER PROTECTION INFORMATION

Avoid breathing fumes, wear available protective clothing

SECTION 6: SPILL RESPONSE AND PROCEDURES

Standard spill response procedures apply. Adsorb with paper towels or vermiculite sorbant. Dike with sandbags to contain large spills. Prevent release to surface, storm or sanitary drains

FORM REVIEWED BY _____ DATE LAST REVISED _____

DEPARTMENT OF TRANSPORTATION

CONTAINER EXEMPTIONS

1. Shipper's Responsibilities
2. DOT-E6637 (Fifth Revision)
3. DOT-E6637 Extension

Para. 173.22 SHIPPERS RESPONSIBILITY

(a) Where containers are supplied by the shipper, the shipper shall be responsible to determine that shipments of hazardous materials are made in containers which, unless otherwise provided in this part (see para. 173.9(c), have been made assembled with all parts or fittings in their proper place, and marked in compliance with applicable specifications prescribed in Parts 178 and 179 of this chapter or with specifications of the Department in effect at date of manufacture of container. The shipper may accept the manufacturer's certification or specification marking to determine that the containers were manufactured in accordance with applicable specifications. Where containers are supplied by the carrier, the shipper shall determine that the containers in which commodities are to be loaded are proper containers for the transportation of such commodities by examining the manufacturer's identification plate, specification marking, or certification by the carrier.

DEPARTMENT OF TRANSPORTATION
RESEARCH AND SPECIAL PROGRAMS ADMINISTRATION
WASHINGTON, D.C. 20590

DOT-E 6637
(FIFTH REVISION)

1. Advanced Chemical Technology, City of Industry, California, is hereby granted an exemption from those provisions of this Department's Hazardous Materials Regulations specified in paragraph 5 below to manufacture, mark, and sell the packaging described in paragraph 7 below for use in the transportation of the corrosive liquids, Class B poisonous liquids, flammable liquids, organic peroxides, and oxidizer described in paragraph 3 below in commerce subject to the requirements specified herein. This exemption authorizes the use of a non-DOT specification polyethylene drum, and provides no relief from any regulation other than as specifically stated.

2. BASIS. This exemption is based on Advanced Chemical Technology's letters of December 13, 1979 and November 4, 1980, and application dated February 15, 1980, submitted in accordance with 49 CFR 107.105 and the public proceeding thereon.

3. HAZARDOUS MATERIALS (Descriptor and class).

a. Corrosive liquids for which DOT-34 reuseable polyethylene container is prescribed in 49 CFR 173; Corrosive liquids specifically identified to, and acknowledged in writing by, the Office of Hazardous Materials Regulation (OHMR) prior to the first shipment.

b. Poisonous liquids, Class B which are specifically identified to, and acknowledged in writing by, the OHMR prior to the first shipment.

c. Flammable liquids for which 49 CFR 173.119(a) and (b) packaging requirements are applicable and which have been specifically identified to, and acknowledged in writing by, the OHMR; other flammable liquids, including liquid organic peroxides classed as flammable liquids, specifically identified to, and acknowledged in writing by, the OHMR prior to the first shipment.

d. Liquid organic peroxides classed as organic peroxides which are specifically identified to, and acknowledged in writing by, the OHMR prior to the first shipment.

e. Hydrogen peroxide solution in water containing 52 percent or less hydrogen peroxide by weight classed as an oxidizer.

4. PROPER SHIPPING NAME (49 CFR 172.101). The generic commodity description or specific chemical name, as appropriate.

5. REGULATION AFFECTED. 49 CFR 173.119(a),(b), (m); 173.221; 173.245(a)(26); 173.249(a)(1); 173.250a(a)(1); 173.257(a)(1); 173.263(a)(28); 173.265(d)(6); 173.266(b)(8); 173.272(i)(9); 173.277(a)(6); 173.287(c)(1); 173.289(a)(i); 173.292(a)(1); 173.346(a); 173.357(b); 173.358(a); 173.359(a),(b); 178.19.

6. MODES OF TRANSPORTATION AUTHORIZED. Motor vehicle, rail freight and cargo vessel.

7. SAFETY CONTROL MEASURES.

a. The packaging authorized is a non-DOT specification reusable molded polyethylene container of 55 gallon capacity for use without overpack (removable head not authorized), made in compliance with Specification 34 (49 CFR 178.19) except as follows:

49 CFR 178.19-2	-	Melt index value is 0.10 maximum.
49 CFR 178.19-3	-	(Add) For marked (rated) capacity of 55 gallons, the minimum thickness measured on any point of the container is 0.140 inch except for no less than 0.100 inch measured only in small arms around under cuts and corners.
49 CFR 178.19-6(a)(1)	-	Does not apply. Instead, each drum must be marked "DOT-E 6637" followed by the rated capacity of the container. These marks shall be understood to certify that the container complies with all specification requirements.
49 CFR 178.19-7(c)(2)	-	Static compression value is 2,400 pounds.

b. The containers must possess the chemical and physical properties as reported to the OHMR by petitioner's letters of application. Futhermore, drums manufactured after November 4, 1980, may have rolling hoops and dimensions as shown in petitioner's letter and drawing dated November 4, 1980.

c. Any change of design, materials or process method must be approved by the OHMR.

d. Opening in the container must not exceed 2.7 inches in diameter.

e. Containers for hydrogen peroxide must have a vented closure to prevent accumulation of internal pressure and the head with the closure must be marked "Keep This End Up."

f. Reuse of container must be in accordance with the applicable requirements of 49 CFR 173.28.

g. For shipment of those organic peroxides by motor vehicle and cargo vessel which require refrigeration, an alarm system must be provided which by means of a light, sound or other signal will indicate that the cargo has reached the maximum allowable transportation control temperature. The driver of the vehicle or the master of the vessel must be informed concerning the hazards of the cargo and steps to take if the alarm indicator functions.

h. Commodities must be compatible with the polyethylene container (PE), and must not permeate the PE to an extent that a hazardous condition could be caused during transportation and handling.

8. SPECIAL PROVISIONS.

a. Shippers may use the packaging covered by this exemption pursuant to 49 CFR 173.22a.

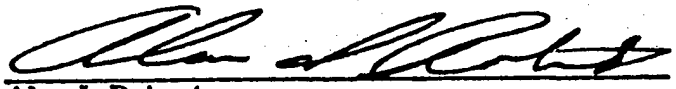
b. A copy of this exemption must be carried aboard each vessel used to transport packages covered by this exemption.

c. Packages specified herein that were marked "DOT SP 6637" prior to February 25, 1976, may be transported under the terms of this exemption.

9. REPORTING REQUIREMENTS. Any incident involving loss of contents of the package must be reported to the OHMR as soon as practicable.

10. EXPIRATION DATE. April 30, 1982.

Issued at Washington, D.C.:



DEC 23 1980
(DATE)

Alan I. Roberts
Associate Director for
Hazardous Materials Regulation
Materials Transportation Bureau

Address all inquiries to: Associate Director for Hazardous Materials Regulation, Materials Transportation Bureau, Research and Special Programs Administration, U.S. Department of Transportation, Washington, D.C., 20590. Attention: Exemptions Branch.

Dist: USCG, FHWA, FRA

DEPARTMENT OF TRANSPORTATION
RESEARCH AND SPECIAL PROGRAMS ADMINISTRATION
WASHINGTON, D.C. 20590

DOT-E 6637
(EXTENSION)

In accordance with 49 CFR 107.105 of the Department of Transportation (DOT) Hazardous Materials Regulations DOT-E 6637 is hereby extended by changing the expiration date in paragraph 10 from April 30, 1982 to March 31, 1984.

This extension applies only to party(s) listed below based on the application(s) received in accordance with 49 CFR 107.105. All other terms of the exemption remain unchanged. This extension forms part of the exemption and must be attached to it.

J. R. Grothe for

Alan I. Roberts
Associate Director for
Hazardous Materials Regulation
Materials Transportation Bureau

MAY 17 1982
(DATE)

Dist: FHWA, FRA, USCG

EXEMPTION HOLDER	APPLICATION DATE
Advanced Chemical Technology City of Industry, CA	February 22, 1982

Appendix B

COLLECTION POINT SPECIFICATIONS AND SUPPORT EQUIPMENT

The collection point will be designed in accordance with the needs of each station set and, in particular, in consideration of the requirements of the known incoming waste streams. However, each collection point will have similar general specifications. The following list identifies common facility design specifications:

- Proximity to waste generation point: centrally located
- Access control measures
  - Safety fencing
  - Locked gates when facility is unattended
- Readily accessible
- Nearby water source for fire protection and/or area washdown
- Impervious base for leak and spill containment
- Efficient internal drainage to facilitate collection of spill/leak washdown and rainwater

The collection point will be designed for each station set in accordance with specific waste needs. However, the area should have, but not be limited to, the following "support equipment" to facilitate safe and efficient waste handling:

- Drum mobility equipment

  - Drum dollies
  - Accessible fork-lift with drum attachment

- Method of communication

- Accessible eyewash and shower

- Warning or alarm system (air horn)

- Fire extinguishers: Consistent with NFPA codes

- Spare safety equipment: Refer to American National Safety Institute Standards (ANSI):

  - Goggles
  - Respirators
  - Gloves
  - Coveralls
  - First-aid supplies

- Warning signs

  - Posted on all sides of perimeter fence

  - Visible from 25 feet

  - Wording (must be in English, "Caution--Hazardous Waste Area--Unauthorized Persons Keep Out;" and Spanish, "Cuidado! Zona De Residuos Paligrosos. Prohibida La Entrada A Personas No Authorizadas").

- Security

  - Monitoring system: guard watch
  - Lighting
  - Fencing and locking gate

Appendix C

SPECIFICATIONS AND SUPPORT EQUIPMENT

Accumulation Point Design Specifications

The following considerations should be addressed in developing an appropriate accumulation point design:

- Designed and sized in accordance with:
  - Incoming waste stream characterization
  - Schedule of transport; incoming and outgoing
  - Available personnel
- Appropriate security measures
  - Monitoring system[1]
  - Gates locked when facility is unattended
  - Attendant
  - Safety fencing
  - Exclusion of highly reactive (explosive) materials
- Warning signs
  - Posted on all sides of the perimeter fence indicating that the facility contains hazardous waste
  - Posted on access roads

1. Workers will be responsible for following strict security procedures. Monitoring shifts will be shared by responsible staff.

Accumulation Point Support Equipment

- Waste Handling Equipment
  - Forklift with drum attachment
  - Drum dollies
  - Accessible lift-gate truck (for on-base transport)
  - Wooden pallets for drum and small parcel storage
- Method of communication, i.e., telephone or two-way radio
- Warning or alarm system
- Routine and emergency safety equipment[1]
  - Spark arrestors and flashback prevention screens
  - Bond and ground drums
  - Drip pans and catch basins
  - Absorbent material and sandbags to control and contain leaks and spills
  - Neutralization materials (for acids and alkalis)
  - Safety shower and eyewash
  - Plugging, sealing and clamping devices for punctured drums, piping, valves, etc.

1. Specific, per chemical, emergency response equipment is detailed on the Waste Data Handling Sheets, Appendix A.

- Fire extinguishers

  Standard Multiclass (ABC)
  Vapor Suppression Agent (AFFF)
  Pyrophoric (Class D)

- First aid and personal decontamination equipment and supplies

- Personal safety equipment: Consult standards from ANSI and the National Institutes of Occupational Safety and Health (NIOSH):

  - Prescription safety glasses or goggles
  - Lab coats or coveralls
  - Chemical resistant safety shoes
  - Additional supplies to replace contaminated gear

  Based on the chemical hazards at the particular facility, the following may be necessary:

  - Face shields

  - Respirators: half- and full-face cartridge respirators and self-contained breathing apparatus and backup air tanks (work in pairs)

  - Chemical-resistant aprons, coveralls with hoods, shoe covers, boots, and outer gloves

- Legible from a distance of 25 feet

- Wording must be in both English and Spanish. Sample warnings include: "Caution--Hazardous Waste Area--Unauthorized Persons Keep Out"; "Cuidado! Zona De Residuos Paligrosos. Prohibida La Entrada A Personas No Autorizadas."

- Sufficient water supply for fire fighting and spill wash down

- Electrical hookups

- A base underlying the containers that is free of cracks or gaps and sufficiently impervious to contain leaks, spills, and accumulated rainfall.

- Proper drainage provisions. These should ensure that standing liquid does not remain on the base longer than one hour after a leak or precipitation. The only exception would be if the containers are elevated or in some other manner protected from contact with accumulated liquids.

- Containment berm(s) capable of holding at least 10 percent of the total volume of the containers stored within.

- Materials/drums should be checked and removed on a regular basis; all waste chemicals to be transfered to main storage facility within 60 days.

- Trailer Office

Appendix D

EMERGENCY PROCEDURES

WASTE HANDLING PROCEDURES

In the event of an emergency event, procedures will be implemented in accordance with the "Oil and Hazardous Substances," 4392 AEROSG Operation Plan 234-81" (referred to hereinafter as the July 1981 Contingency Plan). As stated in this document, the objective of this plan is to "provide coordinated, effective and efficient procedures to minimize damage from accidental discharge of oil or hazardous materials, including containment, removal and disposal of such discharges." Elements of this plan include:

- Names, addresses and phone numbers (office and home) of all persons qualified to act as an emergency coordinator.

- List of all emergency equipment at the facility where hazardous wastes are stored, including fire control equipment, spill control equipment, communication and alarm systems, and decontamination equipment.

- Evacuation plan for facility personnel (if necessary).

Station set staff who are associated with the management of routine and contingency hazardous wastes generated by the STS program are expected to be familiar with the July 1981 VAFB Contingency Plan, particularly Section 2, page 8, ("Tasks for Subordinate Units") and Section 3, page 11, ("General Instructions").

EMERGENCY SPILL RESPONSE

The "Base Disaster Preparedness Operation Plan" 355-1 outlines procedures for responding to emergencies involving hazardous chemical spills, leaks, fires, etc. Specific elements of OPLAN 355-1 that relate to STS hazardous wastes are (1) Annex E, Appendix 1: "Toxic Propellant Spill Procedures," and (2) Annex E, Appendix 5: "Non-Toxic Propellant Chemical Spill Procedures."

The STS Emergency Response Program should involve both dedicated emergency response equipment and personnel specifically trained for the possible indidents. The program will be coordinated with the VAFB fire department and other existing emergency response organizations to maximize response efforts.

Key requirements for the emergency response program are:

- Disaster Response Team - Selected personnel whose duties involving safe handling of hazardous chemicals and wastes should be given specific training for handling emergencies. An alerting system for activating the team should be developed. The purpose of this team will be to provide quick response to hazardous chemical emergencies and provide mitigation containment prior to arrival of the chemical emergency unit. Appropriate personnel for the initial response team include chemical handlers, safety technicians, waste accumulation point managers, etc.

- Chemical Emergency Unit - One or more emergency vehicles should be equipped with protective clothing, breathing apparatus including long-term bottled/air line air, leak plugging, diking, and cleanup equipment. Additional AFFF foam and specialized fire fighting capabilities may

also be appropriate depending on existing VAFB fire department capabilities.

- Chemical Emergency Team - Selected fire fighter or other emergency personnel should be given specific chemical response training and should be assigned on a 24-hour basis to respond with the Chemical Emergency Unit to all emergencies involving hazardous chemicals.

INSTRUCTIONS: TYPE OR PRINT CLEARLY.
PRESS HARD

☐ ON-SITE ☐ OFF-SITE
☐ HAZARDOUS ☐ NON-HAZARDOUS

STATE DEPARTMENT OF HEALTH SERVICES
HAZARDOUS MATERIALS MANAGEMENT SECTION
744 P STREET, SACRAMENTO, CA 95814

MANIFEST DOCUMENT NUMBER

GENERATOR (GENERATOR MUST COMPLETE)

② NAME
EPA NO.
ADDRESS
CITY, STATE, ZIP CODE
PHONE NO.
ORDER PLACED BY ORDER DATE
P.O./ CONTRACT NO.

③ DESIGNATED TSD FACILITY
(AUTHORIZED TO OPERATE UNDER AN APPROVED STATE OR FEDERAL PROGRAM)
NAME
EPA NO.
ADDRESS
CITY, STATE, ZIP CODE
PHONE NO.

④ ALTERNATE TSD FACILITY
NAME
EPA NO.
ADDRESS
CITY, STATE, ZIP CODE
PHONE NO.

⑤ U.S. DOT PROPER SHIPPING NAME	U.S. DOT HAZARD CLASS	UN/NA ID NO.	WEIGHT OR VOLUME	UNITS	CONTAINERS: NUMBER
WASTE					☐ DRUMS ☐ BAGS ☐ CARTONS ☐ DUMP TRUCK
WASTE					☐ TANK TRUCK ☐ OTHER

⑥ WASTE CATEGORY
⑦ EX. HAZ. WASTE PERMIT NO.
⑧ GENERATING PROCESS

⑨ LIST COMPONENTS:

	CONC. RANGE UPPER	CONC. RANGE LOWER	UNITS			CONC. RANGE UPPER	CONC. RANGE LOWER	UNITS	
A			☐ %	☐ PPM	E			☐ %	☐ PPM
B			☐ %	☐ PPM	F			☐ %	☐ PPM
C			☐ %	☐ PPM	G			☐ %	☐ PPM
D			☐ %	☐ PPM					

NONHAZARDOUS MATERIAL ____ %

⑩ WASTE PROPERTIES: PH ____ ☐ TOXIC ☐ FLAMMABLE ☐ CORROSIVE IRRITANT ☐ REACTIVE ☐ SENSITIZER ☐ CARCINOGEN/MUTAGEN

⑪ PHYSICAL STATE ☐ SOLID ☐ LIQUID ☐ SLUDGE ☐ SLURRY ☐ GAS ☐ OTHER

⑫ SPECIAL HANDLING INSTRUCTIONS: ☐ GLOVES ☐ GOGGLES ☐ RESPIRATOR ☐ OTHER

E-1

GENERATOR CERTIFICATION: THIS IS TO CERTIFY THAT THE ABOVE NAMED MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED & LABELED, AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE APPLICABLE REGULATIONS OF THE DEPARTMENT OF TRANSPORTATION AND THE EPA.

IN THE EVENT OF A SPILL CONTACT THE NATIONAL RESPONSE CENTER, U.S. COAST GUARD 1-800-424-8802.

⑬ SIGNATURE OF AUTHORIZED AGENT & TITLE — DATE SHIPPED

TRANSPORTER (HAULER MUST COMPLETE)

⑭ NAME
EPA NO.
ADDRESS
CITY, STATE, ZIP CODE
PHONE NO.

JOB NO.
UNIT NO.

⑮ PICK UP DATE
TIME ☐ AM ☐ PM

⑯ SIGNATURE OF AUTHORIZED AGENT & TITLE

TSD FACILITY (OPERATOR MUST COMPLETE)

⑰ NAME
EPA NO.

⑱ QUANTITY (IF MEASURED)
⑲ STATE FEE (IF ANY) $

⑳ INDICATE ANY SIGNIFICANT DISCREPANCIES BETWEEN MANIFEST AND SHIPMENT

㉑ HANDLING OR DISPOSAL METHOD
☐ SURFACE IMPOUNDMENT ☐ LANDFILL
☐ INJECTION WELL ☐ LAND TREATMENT
☐ TREATMENT (SPECIFY)
☐ RECOVERY OR REUSE ☐ STORAGE TRANSFER

㉒ IF WASTE IS HELD FOR DELIVERY ELSEWHERE, SPECIFY THE DESIGNATED TSD FACILITY
NAME
EPA NO.

EPA WASTE CODE

㉓ SIGNATURE OF AUTHORIZED AGENT & TITLE

DATE ACCEPTED

REVISED 11/80

TSDF COPY - SEND PHOTOCOPY TO DOHS

SUMMARY OF RCRA HAZARDOUS WASTE
REGULATIONS GOVERNING STS PROGRAM

Target of Regulation	RCRA Reference Number	Title	Elements of the Regulation Relevant to STS Program
Transporters	40 CFR Part 263: Section 3003	Standards Applicable to Transporters of Hazardous Wastes	• EPA Requirement Notification • EPA Identification System • Manifest System • Hazardous Waste Discharge
States	40 CFR Part 123: Section 3006	Guidelines for Authorized State Hazardous Waste Programs	• Requirements for Permitting • Requirements for Enforcement Authority • Interim Authorization for Hazardous Waste Program • EPA Review of State Permits