Rockwell Hanford Operations

0010517

SUPPORTING DOCUMENT

PROGRAM:	LANDLORD (F2)
Number	SD- 526-ES-001
Rev. Ltr./ Chg. No.	Rev 0
Page 1 of Total Pages	58
Document Title:	NON-RADIOACTIVE HAZARDOUS CHEMICAL WASTE FACILITY ENGINEERING STUDY
Baseline Document	☐ Yes ☒ No
WBS No. or Work Package No.	F214
Key Words:	DANGEROUS WASTE, HAZARDOUS WASTE, RCRA, TSD FACILITY CHEMICAL STORAGE
Prepared by (Name and Dept. No.)	G. C. Shirey/65620
Date	Nov. 1984

See reverse side for additional approvals

THIS DOCUMENT IS FOR USE IN PERFORMANCE OF WORK UNDER CONTRACTS WITH THE U.S. DEPARTMENT OF ENERGY BY PERSONS OR FOR PURPOSES WITHIN THE SCOPE OF THESE CONTRACTS. DISSEMINATION OF ITS CONTENTS FOR ANY OTHER USE OR PURPOSE IS EXPRESSLY FORBIDDEN.

Abstract

"PROJECT B-526, "NON-RADIOACTIVE HAZARDOUS CHEMICAL WASTE FACILITY."

FY85 GENERAL PLANT PROJECT
LANDLORD PROGRAM

This study gleans facility design requirements for a Hanford dangerous waste facility from the Washington State Dangerous Waste Regulations, WAC 173-303. A 7,700 square foot, precast concrete facility is recommended. A site selection evaluation is made and a site recommended. The estimated cost of the facility project is $950,000.

SEP 1990
RECEIVED
EDMC

*	Distribution Name	Mail Address
	U.S. Department of Energy - Richland Operations Office	
	K. W. Bracken	FED/700
	R. D. Freeberg	FED/700
	P. J. Krupin	FED/700
	Rockwell Hanford Operations	
*	J. F. Albaugh	2750E/200E
*	W. A. Ashmore	2750E/200E
*	D. C. Bartholomew	2750E/200E
*	H. L. Bell	2750E/200E
*	H. C. Boynton	2750E/200E
*	J. L. Butcher	2750E/200E
*	A. C. Crawford	2750E/200E
*	G. R. Cox	222-T/200E
*	G. T. Dukelow	2750E/200E
*	D. M. French	222-B/200E
*	D. R. Groth	2750E/200E
*	H. A. Haerer	2750E/200E
*	C. E. Hodge	2750E/200E
*	M. E. Hunt	MO-021/200E
*	B. E. Knight	2750E/200E
*	P. G. Lorenzini	2750E/200E
*	R. S. Marks	2750E/200E
*	C. B. McVey	2750E/200E
*	G. G. Meade	222-B/200E
*	R. J. Murkowski	2750E/200E
*	J. J. Noble	2750E/200E

(Continued on reverse side)

*COMPLETE DOCUMENT
(No asterisk, title page/summary of revision page only)

Release Stamp

7

OFFICIAL RELEASE
Dec 3 8 53 PM '84

Prepared By: _____

Used By: _____

TABLE OF CONTENTS

Page

SUMMARY 5

1.0 INTRODUCTION 6

1.1 Overview 6
1.2 Background 6

1.2.1 State and Federal Regulations 6
1.2.2 Present Hazardous Waste Management 8

2.0 FACILITY REQUIREMENTS 9

2.1 Security 9

2.1.1 Surveillance and Access Control 10
2.1.2 Warning Signs 10

2.2 Required Equipment and Design Features 10

2.2.1 Required Equipment 11
2.2.2 Access to Communications or Alarms 12
2.2.3 Aisle Space 12
2.2.4 Explosion Venting 13

2.3 Storage Area Requirements 14

2.3.1 Segregation of Materials 14
2.3.2 Container Storage Area Requirements 15

2.4 Siting Requirements 19

2.4.1 General Siting Requirements 19
2.4.2 Specific Siting Requirements 20

2.5 Pesticides Storage Requirements 20

2.6 Administrative Functions 22

3.0 ALTERNATIVES 23

3.1 Facility Alternatives 23

3.1.1 Do Nothing 23
3.1.2 No Construction 23
3.1.3 Surplus Facilities 24
3.1.4 New Construction 25

Page

3.2 Siting Alternatives 25

3.2.1 Specific Site Selection Criteria 25
3.2.2 Candidate Site Evaluation Method 27
3.2.3 Candidate Site Determination and Evaluation 28

4.0 RECOMMENDATION 33

4.1 Facility 33

4.1.1 Building Structure 35
4.1.2 Office Area 35
4.1.3 Change Room and Restroom Area 35
4.1.4 Packaging and Sampling Room 36
4.1.5 Special Equipment Storage Area 37
4.1.6 Packaging Material and Handling Equipment Area 37
4.1.7 Dangerous Waste Storage Area 37
4.1.8 Empty Container Storage Area 38
4.1.9 Front-Loading Dock 39

4.2 Siting Recommendation 39

5.0 COST ESTIMATE 39

6.0 REFERENCES 40

APPENDICES

A. Cross-Reference of Design Requirements A-1
B. Illustrations B-1
C. Cost Estimate C-1

FIGURES

1. Map of Potential Flood Areas in 100-Year Flood B-2
2. Siting Alternatives B-3
3. Proposed Dangerous Waste Facility Layout B-4
4. Typical Storage Cell B-5

SUMMARY

The United States Department of Energy, Richland Operations Office (DOE-RL) has directed all Hanford contractors to implement plans for the management of non-radioactive hazardous chemical waste that comply with state and federal regulations which apply to private industry. The United States Environmental Protection Agency (EPA) has previously enforced requirements of the Resource Conservation and Recovery Act (RCRA), but is in the final stages of delegating its enforcement authority to the Washington State Department of Ecology (WDOE). The WDOE is prepared to assume this role, and has issued its own set of stringent regulations for the management of "dangerous waste" under Washington Administrative Code (WAC) Chapter 173-303, Dangerous Waste Regulations.

A site-wide dangerous waste management program is being formulated under the guidance of DOE-RL. This program will include a centralized storage facility for staging, storing, and packaging dangerous waste for shipment to the Central Landfill or off-site for disposal, and will integrate current pesticides storage and application operations as well. The Dangerous Waste Regulations require specific features for the segregation, protection, and containment of dangerous waste and pesticides to prevent them from becoming a threat to human or public health and the environment, all of which must be incorporated for compliance at Hanford. These requirements cannot be met in current facilities due to lack of space and utility services. Thus, a totally new facility designed to satisfy the Dangerous Waste Regulations facility standards must be constructed.

Project B-526, "Non-Radioactive Hazardous Chemical Waste Facility" is being planned to provide a centralized facility to receive, store, and prepare shipments of locally generated dangerous waste to disposal facilities. This study compiles and defines facility standards, evaluates facility and design alternatives, evaluates siting alternatives, and recommends a facility design concept to be implemented in Project B-526. The study recommends a single floor, precast concrete building providing approximately 7,700 square feet of facility space. This facility should contain an administrative office, a packaging and sampling area, a waste storage area, and a pesticides storage and mixing area, as well as outside storage for empty containers.

The study recommends siting the facility near the 200 Area Central Fire Station, Building 609-A, between 200 East and 200 West Areas. An area on the north side of Route 3 opposite the Fire Station is well suited for this proposed facility, and can easily accommodate growth or expansion of this facility or other facilities for related operations, should the need arise in the future. A site selection evaluation was performed by the study, in accordance with DOE site selection guidelines.

The estimated cost of the facility project is $950,000, which is appropriate for management as a General Plant Project.

1.0 INTRODUCTION

1.1 OVERVIEW

Rockwell Hanford Operations (Rockwell) has overall sitewide responsibility for the management of non-radioactive hazardous waste materials on the Hanford Site. This requires the establishment of a comprehensive program that will address the generation, transportation, storage, treatment, and disposal of hazardous waste. The term "hazardous waste" is defined as any waste which may cause or contribute to an increase in serious illness or mortality, or which may pose a substantial threat to human health or the environment if improperly managed. This includes solids, liquids, semisolids, or contained gases which are of no further use and are intended to be discarded, disposed of, or sent elsewhere for further disposition. At the Hanford Site, this encompasses a long list of materials used in our processing facilities, laboratories, maintenance shops, and in pesticide and herbicide application programs. The Rockwell Hazardous Waste Management Program will deal responsibly with generation, transportation, and facilities for the treatment, storage, or disposal of hazardous waste. Such facilities are referred to as "TSD Facilities" in the governing federal and state regulations. This study addresses the requirements for a Hanford TSD facility for hazardous chemical waste, including herbicides and pesticides. The term "dangerous waste" is used in the state regulations, and is synonymous with "hazardous waste". Both terms will be used throughout this report.

1.2 BACKGROUND

1.2.1 State and Federal Regulations

The Resource Conservation and Recovery Act of 1976 (RCRA), 42 U.S.C. 6901 et seq., was the first comprehensive federal effort to deal with hazardous waste problems. The United States Environmental Protection Agency (EPA) is responsible for the implementation of RCRA, and has enacted a comprehensive set of regulations under Title 40 of the Code of Federal Regulations (40 CFR) for the protection of the environment. A listing of the pertinent parts is provided in Appendix A. Part 264 (40 CFR 264) contains the basic requirements to be incorporated in any hazardous waste facility by design.

The EPA may delegate the responsibility for implementing RCRA requirements to the states, provided the performance and enforcement provisions are consistent with, or at least equivalent to those of the federal government. The State of Washington has applied to the EPA for authorization to assume the responsibility for RCRA, and was granted an interim authorization on August 2, 1983. The state applied for final authorization in early July, 1984, and the EPA has six months to grant or deny final authorization. The state currently applies its interim authorization to regulate hazardous waste generators and transporters, and has applied interim status standards to most treatment, storage, and disposal (TSD) facilities. With the final authorization, the state will fully implement a program for the control of all hazardous waste now controlled by the EPA. It will also require permits for all hazardous waste

facilities, which will in turn require compliance with the state's facility standards.

In recognition of the state's pending authority to regulate non-radioactive hazardous waste activities, DOE-RL has issued RL Order 5480.2, "Hazardous and Radioactive Mixed Waste Management". This order requires all Hanford contractors to follow to the extent practical the Dangerous Waste Regulations of the Washington State Department of Ecology (WDOE). These regulations are contained in Washington Administrative Code (WAC) Chapter, 173-303 "Dangerous Waste Regulations" (Ref. 1) and its subparts. By these regulations, the state legislature has empowered WDOE to implement RCRA as well as the Hazardous Waste Disposal Act of 1976. The Dangerous Waste Regulations is a comprehensive set of regulations which:

- Designates dangerous and extremely hazardous wastes;
- Requires surveillance and monitoring of dangerous wastes until they are detoxified, reclaimed, neutralized, or disposed of safely;
- Provides standard forms and rules for accounting for dangerous and extremely hazardous wastes, including shipping manifesting, tracking, reporting, monitoring, recordkeeping, sampling, and labeling;
- Established siting, design, operation, closure, post-closure, financial, and monitoring requirements for dangerous and extremely hazardous waste transfer, treatment, storage, and disposal facilities;
- Establishes design, operation, and monitoring requirements for managing the state's extremely hazardous waste disposal facility;
- Establishes a program for reviewing, approving, and issuing permits to dangerous and extremely hazardous waste facilities; and
- Encourages recycling, reuse, reclamation, and recovery to the maximum extent possible.

It should be noted that federal and state terminology use the terms "hazardous" and "dangerous or extremely hazardous" in referring to the waste materials in question. The distinction between these two sets of terms lies within their legal definitions in 40 CFR 260 through 265 and WAC 173-303-070 through 173-303-103, which basically indicates that the state makes a finer division of wastes within the broader term used by the EPA. Both sets of terms will be used throughout this report, since federal and state facility design requirements are the same. To certify that a TSD facility complies with all applicable statutory requirements, Rockwell will be required to file for and obtain a permit for the facility. The permit application process involves extensive documentation on each specific facility design, and policy, procedural, and environmental protection criteria called out in the WDOE Dangerous Waste Regulations. As a convenience to allow established facilities to continue operations while going through the permit application process, the

processes have been divided into two steps. The first step allows the operator to obtain an "interim status" permit by submitting a "Part A" application. A facility that is granted an interim status permit is treated as though it had been issued a "final authorization" permit, while it actively pursues the final authorization with a "Part B" application. However, to qualify for an interim status permit, the facility must have been in operation on November 19, 1980, must have a state registered identification number as a dangerous waste facility operator, and must have filed a Part A permit application. The second step requires the operator to submit an extensive, site specific Part B permit application.

Rockwell is preparing to file a Part A permit application for existing hazardous waste facilities and operation. Preparation of the Part B application will commence soon after submittal of Part A, and will be considerably more comprehensive. The interim authorization will be effective until the final authorization is granted. This is expected to cover a 1 1/2 to 2 year time frame, during which WDOE will review design and technical media and documents, plans and procedures, and various environmental evaluations and analyses to determine that the Hanford program meets WDOE requirements.

The proposed Hanford facility will be designed and constructed under the interim authorization, however, its design should intend to meet all requirements that will apply to the final authorization. The WDOE should be kept informed of our progress throughout the duration of this project, to ensure their knowledge and familiarity with the facility design. This will not only reduce the time required by WDOE to review our design, but may also afford opportunities to incorporate features they may feel would improve the design or make design changes that may be necessary for compliance with changes to the Dangerous Waste Regulations. All such communications with WDOE should be made through the appropriate Rockwell and DOE-RL program offices.

1.2.2 Present Hazardous Waste Management

At present, hazardous waste is managed under an interim program, while a full-bodied program and a suitable facility design are being developed. The interim program complies with the requirements of the Dangerous Waste Regulation to the extent possible with present facilities. An existing structure, 2727-S in 200 West, is being used as a storage and staging facility for hazardous waste. Here, 30 and 55 gallon drums of waste are accumulated until they can be either shipped off-site to Arlington, Oregon for disposal in the case of extremely hazardous waste, or transported to the on-site Central Landfill for burial. The present facility is inadequate for providing the engineered features and material segregation required under the Dangerous Waste Regulations. A new facility will be required, and it is the intent of this study to determine the basic facility requirements, specific for Hanford, that should be provided.

A review of 1983 hazardous waste manifests and disposal requests for non-radioactive waste indicates that the 55-gallon drum is the most frequently used container for shipping and disposing of dangerous waste, though some

30-gallon drums and other assorted glass and plastic containers were noted. Most containers contained liquid waste forms, with very few being listed as containing solids and mixtures of solids and liquids. Many drums and containers were only partially filled, and some drums contained numerous other containers of waste. Quantities of drums of any one kind of waste per manifest or disposal request ranged from 1 to 100, with the average appearing to be around 10 to 20 drums per shipment. The heaviest drums were in the 300 to 400 pound range. This sampling of 1983 data suggests that the facility should be designed for handling and storing 55-gallon drums as the principle container, with provisions for smaller containers as well.

2.0 FACILITY REQUIREMENTS

The essential facility features and capabilities required for a TSD facility permit are contained in WAC 173-303-300 through 395. These requirements are basically similar to those contained in 40 CFR 264 in purpose, but provide more precise definition of may requirements and impose additional requirements not found in 40 CFR 264, all of which work toward a more stringent set of regulations. This should not be viewed as unnecessary constraint on the part of the state, since the additional requirements follow simple logic and common sense which any conscientious TSD facility operator would have to consider and implement for himself, regardless of the level of detail in the state regulations. Appendix B is provided as a cross-reference between the state and federal regulations.

The following sections identify the physical requirements that must be considered in the design of a TSD facility. These requirements should be included or at least considered in the Functional Design Criteria (FDC) document for a Hanford non-radioactive hazardous waste facility.

2.1 SECURITY

Security requirements for a hazardous material facility are easily met at the Hanford Site, due to stringent personnel screening and access control requirements already in place for safeguarding nuclear materials and protecting traditional plant operations. Basically the facility operator must be able to control access to the facility and prevent unauthorized or unintended entry which may be dangerous to the intruder. Here the emphasis is not so much on protecting the material, as on managing it so that it is not a hazard to humans or the environment as a result of unauthorized entry or accidental intrusion of persons not aware or prepared to cope with the dangers that could result from contacting or disturbing the material.

2.1.1 Surveillance and Access Control

The security requirements necessary for obtaining a facility permit are covered under WAC 173-303-310 and 40 CFR 264, Subpart B, Section 264.14 "Security",

which call for either an active 24-hour surveillance system which continuously monitors and controls entry to the active areas of the facility, or a combination of passive barriers, fences, gates, door locks and warning signs. Both references state that these requirements can be met if the hazardous material facility is located within an area that itself has a surveillance system or a combination of barriers and an entry-control point that satisfies the above requirements. The passive security requirements can easily be met by locating the facility within the Hanford Controlled Area, where access is controlled by Hanford Patrol on a 24-hour basis at the Wye and Yakima Barricade check-points; and by properly locking the facility to prevent unauthorized entry. Routine tours through the area by duty partolmen adds a surveillance feature in addition to the basic passive security requirements.

There are no specific requirements for siting within the Controlled Area that bare on security, but good judgment that coordinates with future site development plans should be used to avoid or minimize traffic and personnel interferences around the facility. Likewise, the facility should not be placed where it would become an attraction to untrained personnel. The issue of siting is discussed in Section 2.4 of this report, but it should be noted here that security requirements can easily be satisfied by siting the hazardous material facility inside an existing Controlled Area. These requirements can also be met outside a Controlled Area, but at higher cost due to the additional surveillance or passive physical barriers that would be required.

2.1.2 Warning Signs

An additional passive security requirement is the posting of warning signs at each entrance to the facility, stating "Danger - Unauthorized Personnel Keep Out," or equivalent wording that indicates only authorized personnel are permitted to enter. These signs must be posted in sufficient number at each entrance to be seen from any approach, and must be legible from a distance of at least 25 feet.

2.2 REQUIRED EQUIPMENT AND FEATURES

Both 40 CFR 264 and WAC 173-303-340 list essential equipment and design features for a dangerous waste facility. All are dictated by common sense for preventing fires, explosions, or any sudden or non-sudden event that could release dangerous waste or its constituents to the environment, or could threaten human health. This section describes preparedness and preventive measures which would help avoid or mitigate such situations, as required under WAC 173-303-340. Paragraphs (1) through (3) and their sub-paragraphs of this regulation call out specific design requirements and considerations for the subject facility. For clarity, these requirements will be quoted verbatim below, and followed by a comment regarding their implementation in the subject facility. These requirements are essentially identical to those given in 40 CFR 264, Subpart B, Sections 264.32, 264.34, and 264.35.

The WAC goes on to say that these requirements are mandatory unless it can be demonstrated to WDOE that none of the hazards posed by the waste handled at the facility could require the particular kind of equipment specified. The exact determination of an equipment list is beyond the level of detail of this report, but general requirements are easily identified. (Detailed equipment lists will be developed during subsequent project and program activities.)

2.2.1 Required Equipment

The non-radioactive hazardous waste facility must be equipped with the following to provide basic preparedness for plausible emergencies:

- Requirement: "An internal communications or alarm system capable of providing immediate emergency instructions to facility personnel;"

  Comment: This requirement can be met with a voice intercom or building announcing (P.A.) system. The main station should be in the administrative section of the facility, preferably the main office; with speakers in all other areas. Since the office is not likely to be the scene of an emergency, this would permit one person in the office to alert personnel throughout the facility with a voice announcement of the emergency condition, provide immediate procedural instruction for the given condition, and also alert other locations via telephone or radio if necessary.

- Requirement: "A device such as a telephone or a hand-held, two-way, radio, capable of summoning emergency assistance from local police departments, fire departments, or state or local emergency response teams;"

  Comment: This requirement will be met by the standard telephone service installed in the office area of the facility. This basic coverage could be supplemented by a two-way radio set or walkie-talkie. The above reference to "local" agencies would mean Hanford agencies, in our case; although, the telephone would also permit communications with area municipal and state agencies as well.

- Requirement: "Portable fire extinguishers, fire control equipment, spill control equipment, and decontamination equipment;"

  Comment: Portable fire extinguishers will be placed throughout the facility, at strategic locations where facility personnel can locate and use them to control potentially life threatening fires. Rockwell's Fire Protection Engineer will determine the type, number, and locations for fire extinguishers based on the facility design and plans for its operation.

- Requirement: "Water at adequate volume and pressure to supply water hose streams, foam producing equipment, automatic sprinklers or water spray systems":

  Comment: A determination of the water supply requirements will be made during design of the facility and supply water line capacities will be verified to ensure that adequate water flow rates and pressures are available. Flow rate and pressure requirements will depend on the final

facility design, but can be roughly estimated at approximately 600 to 800 gpm and 30 psig as minimums. These figures are based on the recommended basic facility design discussed in Section 4.1 "Facility Design Recommendations."

2.2.2 Access to Communications or Alarms

In addition to requirements for internal and external communications devices as called out in Section 2.2.1 (above), facility personnel must have immediate access to them, as described below:

- Requirement: "Whenever dangerous waste is being poured, mixed, spread, or otherwise handled, all personnel involved must have immediate access to an internal alarm or emergency communication device, either directly or through visual or vocal contact with another employee,"

  Comment: This requirement can be met by locating one or more telephones in the office of the facility where dangerous waste is being handled. There is no specific requirement for the number of phones or the distance between them. A telephone located in the administrative area will be sufficient, since operators at the scene of the incident can alert administrative or supervisory personnel by voice. Locating telephones within handling areas may be beneficial, but should be weight against their cost if they must be "explosion proof" units, as dictated by National Fire Protection Association (NFPA) codes.

- Requirement: "If there is ever just one employee on the premises while the facility is operating, he must have immediate access to a device, such as a telephone or a hand-held, two-way radio, capable of summoning external emergency assistance,"

  Comment: This requirement may also be met by providing telephones in the immediate area of the operation. It may be supplemented by a walkie-talkie, in the event that the lone employee is disabled and unable to get to a telephone.

2.2.3 Aisle Space

The facility design must provide sufficient aisle space to permit response to emergencies; in addition, other requirements for operation and inspection.

- Requirement: "The owner or operator must maintain aisle space to allow the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment to any area of facility operations in an emergency."

  Comment: Aisle space that meets the above requirement is a subjective question with many possible interpretations, since it relates to non-specific emergencies. However, the assumption made in this report is that aisle space is adequate when it permits personnel and portable

emergency and clean-up equipment to be brought close enough to the scene of the incident to perform their functions. It is also assumed that an incident could occur anywhere in the normal working areas and the material handling and storage areas of the facility. Aisle space requirements would then be determined by the response equipment items themselves. Conservative allowances are made in the facility floorplan sketch in Appendix D to permit personnel and equipment access to spills, leaks, and fires, as well as permitting normal operations. Further definition of aisle space requirements will be developed in subsequent project activities, in conjunction with the development of specific fire protection, spill control, decontamination and other emergency equipment lists.

2.2.4 Explosion Venting

An additional safety feature for the waste storage area and the packaging and sampling area is that of explosion venting. These areas must be designed and constructed with a means of relieving explosive force in these areas, as an effort to prevent the total destruction of the building structure if an explosion occurs in these areas. The Uniform Building Code calls for such features in the walls or roofs of these areas, and the National Fire Protection Association provides guidance on sizing and designing such devices in proportion to the size and volume of the area and the amount of flammable liquids that could be stored or handled there. Accepted explosion venting features are:

- Wall or roof "blow-out panels",
- Louvers,
- Skylights and windows, and
- Open or unobstructed vents.

Explosion venting capability can be easily and practically incorporated into the facility design by any one or more of the above method, provided they are adequately sized. Skylights, windows, and louvers can provide additional benefits, such as lighting and the ability to provide supplemental ventilation when desired to remove odors, fumes, vapors, or smoke. The dangerous waste facility at Washington State University (WSU), in Pullman, Washington uses blow-out panels in the walls and a spring loaded, pressure relieving roof vent as the primary method of guarding against explosive overpressures. Smaller wall louvers are also provided to relieve minor overpressures, and save the blow-out panels for larger explosions. The WSU blow-out panels are metal panels set into the concrete block outer walls, and held in place by a thin metal trim along the perimeter of the panel. These panels are designed to be forced out of the wall opening by an overpressure inside the building.

Explosion venting devices should be designed to work in stages, so that the larger, one-time-use devices are not needed except for large explosions. Smaller devices such as gravity closing dampers, which re-close immediately

after the overpressure is relieved, should be the first line of defense, and sized to relieve low pressures. A reusable or easily replaced device such as glass or plastic windows; or large, spring-loaded, roof vents which can be manually re-closed should be the second line of defense, to relieve intermediate pressures above the capacity of the low pressure vents. The final pressure threshold should cause the major devices such as blow-out wall or roof panels or skylights to be blown out to save the permanent building structure. All three pressure thresholds should be considered in the facility design, at the conceptual design phase and suitable devices recommended for each. Final selection of explosion venting devices or features should be done during the definitive design phase. Consideration should be given to winter snow-loading on horizontal, roof-mounted devices; since the snow load (20 psf Hanford design base) can counteract an internal overpressure and reduce the safety factor afforded by roof-mounted devices.

2.3 STORAGE AREA REQUIREMENTS

Storage area requirements are quite extensive and disbursed throughout the WDOE Dangerous Waste Regulations. This section compiles storage area design requirements and considerations, and discusses their practical implementation. Most of the implementation methods discussed here are currently employed at existing hazardous waste management facilities throughout the United States. These methods have proven to be both adequate to satisfy the EPA and WDOE requirements, and practical from a construction and operational point of view.

2.3.1 Segregation of Materials

Since the materials to be handled or stored at the facility will present potent hazards, precautions must be taken to prevent accidental chemical reactions between two or more different kinds of waste. Under WAC 173-303-390 waste may be classified by any one of four chemical characteristics of ignitability, corrosivity, reactivity, or toxicity. Individually, these classifications have to be considered for compatibility with each other, and incompatible combinations identified. Special consideration or protection must then be given to ignitable, reactive, and incompatible wastes to prevent their accidental ignition, reaction, or mixing. These wastes must be separated and protected from ignition sources such as open flames, smoking, metal cutting and welding, and other heat sources. "No Smoking" signs must be posted and obeyed in ignitable or reactive waste areas.

These requirements can be satisfied by excluding potential heat and ignition sources from the storage area by both design and operating policy. From a design aspect, this requires:

- A dedicated hazardous waste storage and management area where non-related operations that could threaten the safety of the waste are not conducted; and
- Electrical and mechanical system designs that do not present unacceptable heat and ignition sources.

The design of the electrical system should follow NFPA 70 with consideration given to areas where potentially explosive vapors may be present. The electrical systems should be designed to preclude the possibility of fires or explosions due to electrical arcing.

The requirement for dedicated areas can be satisfied by partitioning off the waste storage area and other related handling and sampling areas from all other operations and personnel activities.

Incompatible wastes must not be permitted to mix under any accidental conditions. The Dangerous Waste Regulation requires that any waste that is incompatible with other materials stored nearby in other containers must be separated from them by curbs or other barrier to prevent leakage from reaching the other material. Thus, containment systems for incompatible wastes must be separate.

2.3.2 Container Storage Area Requirements

The facility design requirements for storage areas are given mostly in WAC 173-303-630 "Use and Management of Containers". It should be noted that specific requirements depend on whether free liquids are present in the containers; and, also on the designation of the waste material. Section 1.3 stated that bulk and free liquids will comprise the majority of the waste materials, and that free liquids may be present in many predominately solid wastes. Therefore, it should be assumed that all waste material in the facility could be in liquid form and the facility should be designed accordingly.

All storage areas for containers holding wastes with free liquids must have a containment system capable of collecting and holding spills and leaks. A base must be provided under the containers which is free of cracks or gaps that could allow liquids to escape, and must be sufficiently impervious to retain the liquids until they can be collected. The base (floor) must also be sloped or otherwise designed to allow liquids to drain away from the other containers, unless the containers are elevated or protected by some other means from contact with escaped liquids. The containment system must have the capacity to hold at least 10% of the volume of all containers in the storage area or the total volume of the largest container, whichever capacity is greater. The regulation further specifies that only containers which contain free liquids are considered in the volume determination.

Additional considerations for precipitation must be designed into outdoor storage areas. Uncovered outdoor storage areas must be capable of holding the additional liquid volume of precipitation from a maximum 25-year design base storm over a 24-hour duration. They must also have a drain valve or other device for positive drainage control, to permit the operator to quickly release and discharge uncontaminated water. This restores the full volume of the containment system to service, and alleviates the risk of an overflow occurring, should a container leak occurs while the containment is full of

water. This requirement, however, does not pertain to outside areas where only empty containers are stored, or specific waste designations as discussed below. There are special conditions under which containment would not be required for outdoor storage areas. A containment system for storage areas for containers holding only wastes that both, do not contain free liquids and are not classified as ignitable or reactive wastes, provided the following precautions are taken:

- The storage area is sloped or designed to drain and prevent liquid accumulations from precipitation, or
- The containers are elevated or otherwise protected from contact with standing liquids.

As mentioned in Section 1.3, nearly all waste containers placed in this facility either will or may contain free liquids; therefore, all of the above requirements will apply. Some practical ways of meeting them are discussed below:

- Containment System: An accepted method of containing leakage in a storage area is by means of a raised curb around the stored containers. This approach lends itself well to concrete slabs which serve as the floor of a storage area. A raised curb can be formed around the slab when the floor slab is poured, or the storage area can be recessed into the slab. Concrete is a good medium for hazardous waste storage areas, because it is practically inert and non-reactive to most chemicals, it is extremely durable and long- wearing, and it is relatively inexpensive when compared to other building materials that would have to be used to obtain the same results. Moderate reinforcements can be included in the slab construction to provide the strength and rigidity necessary to prevent cracking under expected loading and design conditions, and thus provide the containment integrity required. A sealer may be sprayed or brushed on to the surface to prevent it from absorbing spilled liquids, to make it easier to recover and clean-up spills.

- Drainage and Collection: The objective of drainage is to remove spilled liquids so that they do not contaminate or cause reactions or degradation of other containers, thus protecting the integrity of other containers.

  Drainage is more desirable for this purpose than elevating containers above the floor because of the inconvenience of additional materials that would be needed to achieve the height necessary. An added benefit of the drainage concept is that it allows the leaked liquid to be routed to a sump or basin where it is out of contact with waste containers and can be easily recovered. A practical approach for implementing drainage and collection is to slope the floor of the storage area to drain to a catch basin which is formed with the concrete floor and totally contained within the perimeter of the curb forming the containment system. In this concept, any leakage is allowed to drain away from the containers and can be collected in the catch basin, all within the boundaries of the containment. Also, subsequent operations to collect the leakage from the catch basin can be performed

inside the storage area and totally within the containment. The advantage of this idea is that any spillage or leakage during the recovery operation would be contained and routed back to the catch basin.

The requirement for retaining at least 10% of allowable waste volume in the containment system can be met quite easily with the curb and catch basin concept. The catch basin alone can be sized for this capacity without reducing storage space in the storage area. Additionally, the volume that can be retained within the curbed area can easily approach 50% of the stored waste volume, without counting the catch basin. The catch basin should have a grating or removable cover over it so that it is not a safety hazard to employees.

All of these containment concepts have been proven satisfactory to the EPA at the Savannah River Plant, where they have been incorporated into their newer hazardous waste facility designs.

- Provisions for Precipitation: Permitting precipitation to enter the material storage area presents several problems that make unsheltered storage undesirable. If it is hypothetically assumed that the storage area is open to the weather so that precipitation can enter, they it stands to reason that freeze protection is not provided for either the precipitation that would collect or the material in storage. In this case, the low winter temperatures commonly experienced at Hanford would freeze any water that is collected in the containment, and may also freeze the aqueous contents of many waste containers. This should be avoided because it not only hinders the drainage and removal of precipitation, but also is likely to cause some containers to leak or fracture when they begin to thaw later. (Such an incident has already been experienced at 2727-S, where a 55 gallon drum of aqueous waste developed a leak after being frozen during early 1984.)

  The benefit of freeze protection alone suggests that hazardous waste should be stored in an enclosed facility to protect it from freezing temperatures, but there are other reasons also. Allowances for precipitation greatly increase the required holding capacity of the containment system. Holding capacity can be kept to a reasonable minimum if the storage area is fully enclosed from the weather, or indoors. Indoor storage also eliminates the need for a drain valve or other device for releasing large quantities of uncontaminated precipitation.

  Overall, the problems associated with precipitation would greatly detract from the desirability of unsheltered storage. Indoor storage eliminates these problems. However, outdoor storage may still be used for storing empty drums which had previously held hazardous or dangerous material other than ignitable or reactive waste. In this case it will be permissible to store these containers outdoors without weather protection. The only strict requirement is that the storage area be constructed to drain and avoid accumulations of standing water. A free draining gravel base will be adequate for disposing of precipitation in this area by direct percolation, since the amount that could reasonably be expected is quite small and well below nominal percolation rates. In the 25-year observation period for

meteorological data presented in the Hanford Final Environmental Impact Statement (Reference 2), the average annual precipitation has been only 6.25 inches. There have been only two occurrences of 0.50 inches or more and only four of 1.00 inches or more in a 24-hour period. The theoretical Hanford 25-year storm is rated at only 1.56 inches in 24 hours, and the 500-year storm is rated at only 2.47 inches in 24 hours.

Precipitation in these amounts can be removed by downward percolation through the gravel base, considering the typical percolation rate around the Hanford site is roughly 2.4 gallons per square foot of ground per day. This percolation rate will accommodate 3.85 inches of precipitation per day, which far exceeds the amount expected in the 25-year and 500-year storms or deposited by past storms. An additional consideration for the outdoor storage area is the effect of a ground freeze on percolation rate. The winter temperatures will usually freeze water on the ground surface and down to a depth of several inches below the ground surface. This has a detrimental effect on percolation, virtually stopping it except where the surface water is sufficiently deep and wide to protect the ground under it from freezing. Since it is predictable that moisture would freeze in the gravel and hinger downward percolation, an additional drainage method should be used, such as sloping the area. A slop of about two to three percent should be adequate to assist in removing precipitation. This drainage should be directed away from the other parts of the facility as much as practical. Additionally, surface run-off from other areas should be diverted away from the outdoor storage area, to further prevent standing water accumulations around the empty containers.

- Safe Separation from Other Facilities:

  Storage area requirements also address safe separation distances from occupied facilities, roads, railroads, and other storage facilities containing ignitable or reactive waste. The Uniform Fire Code's "American Table of Distances for the Storage of Explosives" specifies minimum distances as a function of the quantity of materials in the facility. This will be discussed further in Section 2.4, Siting Requirements, since the issue of separation distances deals with facility siting, not facility design.

2.4 SITING REQUIREMENTS

The general requirements for siting a dangerous waste facility are given in WAC 173-303-500 "Siting Standards", of the Dangerous Waste Regulations. These requirements pertain to the macroscopic issue of selecting a geographic area. Additional siting requirements are implied in WAC 173-303-630 "Use and Management of Containers", which deal with the finer details of topography and drainage considerations for storage areas, and safe separation distances from roads, railroads, and other facilities. Both sets of requirements are discussed below.

2.4.1 General Siting Requirements

The following requirements are regarded as standards under the Dangerous Waste Regulations, and compliance is mandatory:

- Earthquake Faults: The geological stability of a candidate site is an important consideration. The specific requirement is that the facility must not be located within 200 feet of an earthquake fault which has had movement within the last 12,000 years.

  The Hanford Site has been extensively studied to determine its geological characteristics, history, and degree of stability. Within the Columbia Plateau and the Pasco Basin, the significant geological features of the site area west and northwest trending folds (Ref. 3). The bulk of geological evidence concludes that folding is the predominant mode of deformation on the Columbia Plateau and that known faults have occurred parallel to some folds. Such faults have been identified on Saddle Mountain, Gable Mountain, Umtanum Ridge, and Rattlesnake Mountain. Gable Mountain is the closest formation to any candidate sites; however, it is well beyond the 200 foot exclusion distance. Additional assurance that the Hanford Site is geologically suitable for siting a non-radioactive hazardous waste facility is the fact that it has been determined suitable for siting nuclear facilities. Specifically, it is suitable for nuclear power plants in its compliance with Appendix A of 10 CFR Part 100, "Seismic and Geological Siting Criteria for Nuclear Power Plants." In Reference 3, the Washington Public Power Supply System concluded that earthquake ground motion provided a sufficient design basis for power plants, with no need to consider surface faulting. (Earthquake ground motion will also be considered in the design basis for the Hanford hazardous waste facility).

- Floodplains: Dangerous waste facilities are not prohibited from being located in floodplains, but additional requirements are imposed on the design, construction, operation, and maintenance of facilities located within floodplains. The intent of these requirements is to either prevent flood waters from washing out stored material from the facility, or to ensure that the operator can remove the stored material before flood waters can reach the facility.

  The Hanford 100-year flood plain is shown in Figure 1 in Appendix B. This map shown that some other 100 Area facility sites, the 300 Area, and areas along the river in between will be inundated by a 100-year flood. Thus, siting the dangerous waste facility in these areas cannot be recommended. However, the U.S. Army Corps of Engineers has predicted a 1000-year, dam regulated probable maximum flood for the Columbia River (Ref. 2). The 200 Areas are well above this probable maximum flood level, as well as the 100-year flood plain.

- Shoreline Management Act: This act restricts certain areas from consideration as candidate sites for dangerous waste facilities. It specifies that areas designated as "wetlands" cannot be used for the disposal of dangerous waste; and that areas classified as natural, conservancy, rural, or residential cannot be considered for siting a dangerous waste facility. However, the Hanford Site is exempt from this restriction per WAC 173-14-062, in that federal agencies (DOE and its contractors) are not required to obtain state permits for federal development of these areas. Furthermore, these are usually designated within 200 feet of a river, which also lies within the 100-year floodplain.

- Sole Source Aquifers In order to protect the quality of drinking water, the area above an aquifer used as a source of drinking water must not be considered for the disposal of dangerous waste. However, there are no restrictions on locating dangerous waste storage and treatment facilities in these areas. Therefore, this requirement has no bearing on the B-526 facility, since it would be considered as a storage facility only.

  Additionally, hydrology studies have concluded that ultimately all the water in the unconfined aquifer beneath the 200 Area plateau, except that which is lost to the atmosphere through evaporation from surface ponds or evapotranspiration from the ground surface, enters the Columbia on the Hanford Site. This water does not migrate into areas where municipal and private wells are in use (Ref. 2). Unfortunately, this eliminates the 400 Area from further consideration as a landfill disposal facility. It may still be considered a possible site for a storage and treatment facility, unless disqualified for other reasons, since the water table in this area communicates with that under the nearby city of Richland.

2.4.2 Specific Siting Requirements

Additional siting considerations are contained in national codes relating to storage requirements for specific categories of materials. The Uniform Fire Code provides guidance on safe separation distances between the dangerous waste facility and neighboring occupied facilities and regularly used transportation routes.

2.5 PESTICIDES STORAGE REQUIREMENTS

The Dangerous Waste Regulations applies the term "pesticide" to include chemical agents used to control, prevent, destroy, repel, or mitigate both unwanted plant life and animal life. This stems from the Department of Agriculture's use of the term "pest" in reference to unwanted plants species, as well as unwanted animals. Thus, the requirements discussed here pertain to pesticide and herbicide storage. The Dangerous Waste Regulations do not call out separate requirements for pesticides, but include them under the general heading of dangerous materials. Title 40 of the Code of Federal Regulations does, however, address pesticides in Parts 165 and 171. These requirements

have been incorporated by Rockwell's Health, Safety, and Environment (HS&E) Function in the HS&E Criteria for Storage of Pesticides, contained in Reference 4. The essential requirements are discussed below.

The HS&E Criteria for Storage of Pesticides closely parallels those already given in Sections 2.1 through 2.4 for other dangerous materials, but provide additional requirements from 40 CFR 165 and 40 CFR 171. The additional requirements deal chiefly with personnel safety in the storage and operating areas, since most pesticides present a toxic (poison) hazard to humans. These requirements are listed and discussed below. Requirements have also been found in the Uniform Building Code (Ref. 5) and National Fire Protection Association codes NFPA 43D (Ref. 6) and NFPA 231 (Ref. 7).

- Fire Protection: The pesticides storage area should have an automatic water sprinkler system designed in accordance with NFPA 231.

- Ventilation: The Uniform Building Code classifies indoor pesticide and other hazardous, explosive, or highly flammable liquids under Group H, Division 1 occupancy requirements, and as such requires a minimum of four air changes per hour. It also specifies that the exhaust air should be drawn from a point at or near the floor. This should be considered in the HVAC design for the facility. The HVAC system must also be able to maintain a temperature between 40°F and 110°F, per the HS&E Criteria.

- Separation from Other Facilities: It is recommended that the pesticides storage area be separate from other facilities, covered, and well-ventillated. The intent of separation is to remove the toxic hazard posed by pesticides away from routing human activities, and thus minimize human exposure. This does not require that the facility where they are stored be exclusively dedicated to pesticides. Pesticides may be stored and handled at the same facility as other dangerous waste and materials, since both categories requires the same level of isolation and protection from intrusion and other hazards that could threaten its safety and the integrity of its containments. If a common facility is used, the pesticides are should be separated from the other dangerous waste and material within the facility, if it is being stored for a later use. This permits convenient access to it when needed, without requiring personnel to enter other storage areas were they may come in contact with other chemical hazards.

- Security: Basic security requirements are the same as those that apply to dangerous waste facilities, as called out in Section 2.1. No additional requirements are called out. A requirement for a climb-proof fence is listed by HS&E, but is already covered by a Limited Area fence.

- Signs and Labels: The pesticides area should be posted with signs to alert personnel to the dangers present. Recommended wording for signs is "Danger, Poison, Pesticide Storage." All portable or movable equipment used for handling pesticides should be labeled "Contaminated with Pesticides" and should not be reused elsewhere unless thoroughly decontaminated.

- Safety Equipment: Since pesticides can pose an immediate threat to personnel health and safety, appropriate equipment should be provided to enable personnel to immediately wash away pesticides from their hands, faces, eyes, and whole bodies if necessary. A wash basin, a safety shower, and an emergency eye-wash station should be provided in the pesticides handling area, with an unobstructed access to each. Any contaminated wash water should be routed to a collection system and disposed of as waste pesticides, if practical. It is also permissible to release such wash water to the environment in designated areas where they will have not detrimental effects.

- Containment System: Pesticides storage areas should have liquid containment systems identical to those of other dangerous wastes, as described in Section 2.3.2. This will require a concrete floor sloped to a drain which leads to a holding sump or tank, a septic tank and tile field system, or similar drainage system. A four inch curb should be provided around the entire pesticides are, to contain any liquids and ensure they are drained to the collection sump. The sump should have the capacity to hold at least 10% of the liquids stored in the pesticides area.

- Temperature Control: Temperature is allowed to range from 40°F to 110°F by the HS&E Criteria. This temperature range is quite wide, and requires very little energy input other than a small amount of heat for freeze protection.

2.6 ADMINISTRATIVE FUNCTIONS

Though the principle mission of the facility will be the interim storage of dangerous waste and pesticides, support and administrative functions must also be conducted. The Hanford dangerous waste management program is being formulated at this time, but certain elements of it are already being established and others can be foreseen. One such element will be the shipping manifest system to provide identification, accountability, and traceability of dangerous waste shipments from their points of origin to their final disposal. The program under development will call for manifests for on-site shipments from local generators to the TSD facility, as well as for shipments from the facility. Manifests must be kept on file for three years. Additionally, numerous other reports, chemical analysis records, and pertinent notices and communications must be kept on hand at the facility. A computerized inventory and accounting system is also planned, to aid in maintaining accurate accounts of dangerous waste. These administrative functions will require an office, preferably at the TSD facility for immediate data input when shipments are made or received. It is anticipated that dangerous waste operations will require dedicated attention and support. A tentative staffing plan for the TSD facility calls for a facility manager, a records clerk, and two operating personnel. The manager and clerk will centralize their work in the office, while the operators may work throughout the facility.

The office will also be the on-scene command post for directing and reporting any dangerous waste accidents or incidents. It will be equipped with procedural documents, report forms, emergency plans, additional reference

information on dangerous waste and chemical hazards, and communications equipment. The communication equipment will include telephones, an intercom or building P.A. system, and a two-way radio set. A viewing window is highly recommended, to afford visual supervision and observation of the surrounding areas inside the building. Ample space is also recommended, to accommodate filing and recordkeeping requirements, which will probably increase as the program develops.

3.0 ALTERNATIVES

This section presents the basic issues that must be decided in complying with the Dangerous Waste Regulations. The issue of compliance itself is not negotiable, since DOE 5480.2 directs compliance, however choices regarding the method of compliance must be decided within the guidelines of practicality. The essential alternatives can be divided into two basic categories: those dealing with a functional facility as a physical structure, and those dealing with its location. Each is treated separately below.

3.1 FACILITY ALTERNATIVES

The intent of the Dangerous Waste Regulations is to require a facility, where the specific functional requirements discussed in Section 2.0 "Facility Requirements" can be provided to ensure proper management of hazardous waste and pesticides in storage.

3.1.1 Do Nothing

The "Do Nothing" alternative equates to continuing storage operations at 2727-S in its present condition. This would in no way comply with the intent of the regulation and cannot be considered as a viable alternative. This facility fails to satisfy the WAC facility requirements as follows:

- No containment and collection system.
- Inadequate segregation of materials according to the characteristics of ignitability, corrosivity, reactivity, or toxicity.
- No water supply to the facility.
- No sprinkler.
- No freeze protection.
- Inadequate storage capacity.

3.1.2 No Construction

Since 2727-S is totally inadequate for satisfying WAC requirements, it would have no conceivable role in an accepted and responsible hazardous waste management program. Its use would have to be discontinued and fundamental changes made in the method of site operations to compensate for not having a centralized TSD facility. The advantage of a central TSD facility is that it relieves the individual generating facilities of having to come into compliance with the Dangerous Waste Regulations for storing waste chemicals. In this scenario (No Construction), each generating plant or facility would have to seek a permit as a TSD, or stop all operations that require the use or that produce materials that fall within the domain of the Dangerous Waste Regulations.

This decision would require an extensive program for reducing waste and for managing that which would still be produced unless many processing plant operations and site services are curtailed. Since hazardous chemicals are essential in the operation of plutonium production facilities, this would be contrary to the mission of the Hanford Site, and would essentially call for a stoppage of PUREX, B-Plant, and PF-Plant operations. In spite of the most conscientious in-plant hazardous chemical waste management programs, there will still be some amount of excess, out-of-date, off-spec, and unintentional waste. Other outlets for disposing of this waste to facilities such as double shell tanks may have to become viable destinations for chemical waste. This method, however, would not physically be available to most chemical wastes, and thus would not be a complete alternative.

In conclusion, the No Construction alternative will not satisfy the intent of the Dangerous Waste Regulations, and would only perpetuate and frustrate the problems of managing and disposing of hazardous chemical waste. The No Construction alternative is not recommended.

3.1.3 Surplus Facilities

The possible use of a surplus facility was considered, since it may afford considerable capital savings provided one capable of satisfying the WDOE facility standards and our own capacity requirements could be obtained. Three facilities; 212-N, 212-P, and 212-R, were identified as potential candidates for conversion to a dangerous waste management role. These three facilities are located approximately one mile north of the area between 200 East and 200 West. However, all three were eliminated from consideration upon further investigation.

The three buildings in question are all dedicated to other purposes and cannot be easily made available for project use. Additionally, these building would require considerable modification and upgrading to convert them to a workable dangerous waste facility. Building 212-N is currently being used to store excess laboratory hoods and gloveboxes contaminated with very low level amounts of radioactive materials. A metal bulkhead has been installed to isolate the storage area within the building. Removal of the bulkhead, the hoods and gloveboxes, and decontamination of this area pose an obstacle to making this facility available. Likewise, 212-P is being used to store electrical

transformers cooled with an oil that contains PCB. This facility is presently designated for PCB storage and is also not available. Building 212-R held in reserve for reactivation on short notice as an alternate storage facility for N-Reactor fuel. It is currently used as a temporary refurbishment shop for railcars, but this operation can be easily curtailed if the facility is needed for fuel storage.

Since no suitable surplus facilities were found, this alternative cannot be recommended.

3.1.4 New Construction

After thoroughly analyzing the rigorous facility standards demanded by WDOE and logically eliminating all other alternatives, it is recommended that a new facility be constructed for storing and properly managing dangerous waste. Only in a specifically designed facility can the material segregation, containment, ventilation, safety, supervision and administration functions and features be combined in a cost-effective manner. A description of the recommended facility is provided in Section 4.1, which satisfies all immediately known facility needs for the Hanford Site.

3.2 SITING ALTERNATIVES

The site selected for the proposed facility must satisfy program requirements within the boundaries of economic, engineering, and site development planning factors. Consideration must be given to the functional requirements discussed in Section 2.0, the availability of utilities, proximity to facility users, transportation routes, and integration into the future planning of the Hanford Site. This section addressed and evaluates these and other siting issues.

The general siting standards presented in WAC 173-303-500 essentially excludes certain areas from consideration as candidate sites. These are earthquake fault areas, floodplain areas, wetlands and other areas covered by the Shoreline Management Act, and areas above sole source aquifiers. These areas include all those along the shores of the Columbia including the 100 and 300 Areas, and the area around Gable Mountain. The 400 Area must also be excluded as candidate site for future landfill disposal facilities, because of the sole source aquifer restriction. All other areas on the Hanford Site are outside of these restrictions, and additional criteria must be applied to identify an optimum site.

3.2.1 Specific Site Selection Criteria

The following criteria have been developed along DOE guidelines presented in RL 4320.2 "Site Selection," to isolate and define the individual requirements that must be met in the site chosen for the project. These criteria will apply in varying degrees to each candidate site. The site that best satisfies this set of criteria as a whole will be the one recommended for the project.

- Compatibility with Site Development Plans: The facility should be sited where its presence will not disrupt or restrict the future growth and development of the adjacent areas. For areas where long-range site development plans have been prepared, candidate sites should be chosen from those already identified for development in a manner similar to that planned by this project. Areas intended for development that would not be compatible with a dangerous waste facility should be avoided. This criterion also considers general compatibility with surrounding areas and facilities, and the impacts that may result from normal operations, accident conditions, and traffic increases. Consideration is given to wind and drainage patterns, to avoid jeapordizing the safety or normal operations of nearby facilities.

- Proximity and Accessibility to Facility Users: This is an important criterion which will determine the practicality of operating the facility. To satisfy this criterion, the facility should be sited where good roads or streets, and traffic patterns will permit convenient access to the facility during normal working hours. The location should be somewhat central to all Hanford contractor areas to generally minimize the average distances materials will have to be transported to get them to the facility. This will also minimize most communication and travel distances. On-site transportation of dangerous waste to the facility will be a normal daily occurrence, once a new facility becomes operational.

  Locating the facility to minimize average travel distances and use well-maintained roads will also minimize the probability of in-transit accidents. Off-site transport from the facility will occur less frequently and will utilize 55-gallon drums for consolidating and packaging smaller containers and quantities to enhance safety.

  The functional relationship of the dangerous waste facility to other facilities will be enhanced by locating it reasonably close to most of its users. This will make it convenient for waste generators to send material to the facility and permit a higher level of service to the generators by being able to provide flexibility and continuity of services that may not be practical in a remote location. Consideration should also be given locating the facility reasonably close to its aoperator's base and support services areas. In this case, Rockwell Hanford Operations will operate, maintain, and provide supporing services to the facility. This would suggest a location in or near the 200 Areas.

- Proximity to Emergency Response Units: The facility should be located where response times for emergency response units and assistance teams will be minimized, and not cause undue risk situations due to abnormally late responses from fire stations, security forces, medical aid stations and other trained response and assistance teams at other facilities; or from municipal, county, or state agencies.

- Proximity to Utilities: The availability of adequate utilities at the facility site will be mandatory. The cost of providing them or of extending them from nearby existing utility systems should be considered in site

selection. The maximum distance they can be extended will be governed by project funding limits, and a site should be selected where utilities can be provided within the given funding limits.

- Topography: The natural topography and surface condition of the facility site should prevent surface water run-on from unusually high precipitation from inundating the facility site. Also, the run-off from the facility area should not drain to other occupied or frequently traveled area. Both of these considerations will prevent the possible transport of dangerous waste material by water to areas where it may present a hazard to people.

Other factors were noted but not considered as significant siting criteria. Aesthetics for example, was not considered because it has traditionally been a low priority in siting facilities on federal reservations, and is normally overruled by purely functional or budgetary constraints. However, the visual impression presented by the facility should suggest a conscientiously managed operation. This can be achieved by orienting the facility to present its most uncluttered side to the neighboring roads, streets, and facilities; and placing the general operating, storage, and handling areas on the less frequently observed side.

Special functional requirements of the facility do not dictate any particular siting criteria other than those listed above. The facility itself will be essentially indifferent to its location. The more important factors will be those that relate the facility to its users, transportation routes, emergency services, and utilities.

3.2.2 Candidate Site Evaluation Method

The siting criteria discussed above can now be used to evaluate the field of candidate sites. The next step in the site selection process is to identify available sites that may reasonably satisfy the siting standards and criteria an appreciable degree. The initial field of potential sites includes the entire Hanford Site; then the standards and criteria will be applied to eliminate inadequate sites and reduce the field to a small number of candidates that could satisfy all requirements. A simple statistical approach will be used to rank the candidate sites, using a scoring system to compile each site's overall suitability and arrive at a ranking. Each criterion will be assigned a numerical weighting factor proportional to its relative importance, then each candidate will be scored in accordance with its satisfaction of each criterion. The arithmetic product of the performance score and the weighting factor will be used as each candidates evaluation on each criterion. The site scoring the highest net evaluation will be recommended for development by the project.

The weighting factors assigned to siting criteria are as follows.

Criteria	Weighting Factor
1. Compatibility with Site Development Plan	5
2. Proximity and Accessibility to Facility Users	5
3. Proximity to Emergency Response Units	4
4. Proximity to Utilities	3
5. Topography	1

Each candidate site will be evaluated independently and a net score determined. The net scores for all candidates will then be compared and ranked.

3.2.3 Candidate Site Determination and Evaluation

The original field of candidate sites includes the entire Hanford Site, as stated earlier. The first reduction in this field is made by eliminating all areas that do not satisfy the WDOE siting standards discussed in Section 2.4. Thus, the 100 Area, the 300 Area, the 400 Area, all areas along the banks of the Columbia River and the immediate area around Gable Mountain can be eliminated for their inability to satisfy earthquake fault, floodplain, wetlands, and sole source aquifer avoidance requirements. Next the remaining areas that could potentially satisfy the criteria Section 3.2.1 are identified. This reduces the field of candidates to those contained on the 200 Area Plateau.

The 200 Area siting candidates are:

Site 1 Adjacent to 2727-S, in 200 West.

Site 2 Immediately north of the 200 Area Central Fire Station (Building 609-A), between 200 East and 200 West.

Site 3 Immediately east of the 200 Area Central Fire Station (Building 609-A), between 200 East and 200 West.

Site 4 Outside the west gate (Gate 814) to 200 East, south side of the road (Route 3).

Site 5 Outside the west gate (Gate 814) to 200 West, north side of the road (Route 3).

Site 6 North of 4th Street and approximately 800 feet east of the Patrol Helicopter Facility (Building 2721-EA), in 200 East.

Site 7 West side of Baltimore Avenue, approximately 1,000 feet north of the Medical Aid Station (Building 2719-EA), in 200 East.

Site 8 Abandoned Nike missile launcher site, one mile southeast of 200 East.

These candidate sites are shown in Figure 2 in Appendix B, and are individually evaluated against the siting criteria as follows.

Site 1: Adjacent to 2727-S, 200 West

CRITERIA	WT. FACTOR	PERFORMANCE	EVALUATION
Compatibility with Site Development Plan	5	9	45
Proximity and Accessibility to Facility Users	5	5	25
Proximity to Emergency Response Units	4	8	32
Proximity to Utilities	3	7	21
Topography	1	8	8
		Net:	131

Site 2: Immediately North of 200 Area Central Fire Station

CRITERIA	WT. FACTOR	PERFORMANCE	EVALUATION
Compatibility with Site Development Plan	5	9	45
Proximity and Accessibility to Facility Users	5	7	35
Proximity to Emergency Response Units	4	10	40
Proximity to Utilities	3	8	24
Topography	1	9	9
		Net:	153

Comment: This site scores the highest net evaluation since it satisfies all criteria points quite well. This site is centrally located, relative to all dangerous waste generators on the Hanford site; and generally convenient to them and Rockwell Hanford Operations, who will be responsible for its operation. This site, as well as all other candidate sites outside the 200 East or 200 West Limited Areas will be accessible without requiring re-badging of customer personnel for 200 Area Limited Area access. Transportation of materials to and from this location will not add to Limited Area traffic; and transportation routes can be chosen to avoid more heavily traveled routes, thus minimizing the risk of traffic accidents for dangerous waste vehicles.

Site 3: Immediately East of 200 Area Central Fire Station

CRITERIA	WT. FACTOR	PERFORMANCE	EVALUATION
Compatibility with Site Development Plan	5	8	40
Proximity and Accessibility to Facility Users	5	7	35
Proximity to Emergency Response Units	4	10	40
Proximity to Utilities	3	8	24
Topography	1	8	8
		Net:	147

Comment: This site is similar to Site 2 in general suitability, but would require additional site preparation and a further setback from Route 3, in order to clear existing power lines. This site would have the disadvantage of being downwind of the new fire training tower which will be constructed immediately southeast of the Fire Station. Live fires staged for training purposes would generate smoke which could be a nuisance to a facility sited here.

Site 4: Outside West Gate to 200 East Area, South Side of Route 3

CRITERIA	WT. FACTOR	PERFORMANCE	EVALUATION
Compatibility with Site Development Plan	5	4	20
Proximity and Accessibility to Facility Users	5	7	35
Proximity to Emergency Response Units	4	10	40
Proximity to Utilities	3	8	24
Topography	1	4	4
		Net:	123

Comment: This site would require extensive site preparation work, due to the rough topography of this area. It is also crossed by a high-level radioactive liquid waste transfer line, which restricts the amount of usable space at this site. No construction would be permitted within 100 feet of this line. Another problem with this site is its proximity to the Patrol Helicopter Facility, approximately 200 yards to the east, inside 200 East. Any structure at this site could restrict helicopter normal approach and take-off corridors, since it could present a safety hazard to low-flying helicopters.

Site 5: Outside West Gate to 200 East Area, North Side of Route 3

CRITERIA	WT. FACTOR	PERFORMANCE	EVALUATION
Compatibility with Site Development Plan	5	5	25
Proximity and Accessibility to Facility Users	5	7	35
Proximity to Emergency Response Units	4	10	40
Proximity to Utilities	3	8	24
Topography	1	5	5
		Net:	129

Comment: This site is similar to Site 4, and would impose a lesser hazard to low-flying helicopters. This site is also crossed by the high-level radioactive liquid waste transfer line, which restricts possible construction. Though this site would require less site preparation than Site 4, but its usable space is reduced by the presence of two rows of overhead power lines.

Site 6: North of 4th Street, Near Helicopter Facility, 200 East

CRITERIA	WT. FACTOR	PERFORMANCE	EVALUATION
Compatibility with Site Development Plan	5	2	10
Proximity and Accessibility to Facility Users	5	8	40
Proximity to Emergency Response Units	4	9	36
Proximity to Utilities	3	8	24
Topography	1	7	7
		Net:	117

Comment: The problems with this site are its proximity to the Patrol Helicopter Facility (similar to Site 4) and the fact that a large number of employees and other facilities may be directly downwind of this site. This latter point has raised objections and questions about the possible airborne transport of dangerous chemicals in the direction of those employees and facilities, which are not in keeping with our objective of minimizing employee risks and exposure to dangerous materials. Though calculations and dispersion models can predict that releases and exposures would be quite small, no evidence has yet been produced that shows their effects are inconsequential. These uncertainties are unacceptable, though this site satisfies all other criteria.

Site 7: North of 200 East Medical Aid Station

CRITERIA	WT. FACTOR	PERFORMANCE	EVALUATION
Compatibility with Site Development Plan	5	5	25
Proximity and Accessibility to Facility Users	5	8	40
Proximity to Emergency Response Units	4	9	36
Proximity to Utilities	3	7	21
Topography	1	7	7
		Net:	129

Comment: Access to this site from Baltimore Avenue is presently hindered by an existing 12 inch, 225 psig, above-ground steam line which runs along the west side of Baltimore Avenue to B-Plant. Use of this site will require elevation of a portion of the steam line, in order to provide a roadway to the facility. The cost of this steam line modification would have to be borne by the project.

Another obstacle to the use of this site is the presence of a neighboring tile field which has been used in the past for disposal of various chemical waste water solutions. This tile field is currently in use, serving the Engineering Development Facility (Building 2703-E). Continuing water additions may drive existing chemical agents beyond the tile field area, where their presence might suggest that they could have come from the dangerous waste facility. This possibility will be nuisance to the facility, unless the tile field area is decommissioned, which would be a cost impact not presently budgeted or planned.

Site 8: Abandoned Nike Missile Site, Southwest of 200 East

CRITERIA	WT. FACTOR	PERFORMANCE	EVALUATION
Compatibility with Site Development Plan	5	7	35
Proximity and Accessibility to Facility Users	5	4	20
Proximity to Emergency Response Units	4	8	32
Proximity to Utilities	3	2	6
Topography	1	5	5
		Net:	98

Comment: All new utilities would have to be extended from 200 East to make this site usable.

RANKING	SITE DESIGNATION	NET EVALUATION
1	Site 2: Immediately North of 200 Area Central Fire Station	153
2	Site 3: Immediately East of 200 Area Central Fire Station	147
3	Site 1: Adjacent to 2727-S, 200 West	131
4	Site 5: Outside West Gate to 200 East on North Side of Route 3,	129
	and	
	Site 7: North of 200 East Medical Aid Station, 200 East	129
5	Site 4: Outside West Gate to 200 East, on South Side of Route 3	123
6	Site 6: North of 4th Street, Near Facility, 200 East	117
7	Site 8: Abandoned Nike Missile Site	98

In summary, the recommended site for the facility is Site 2, immediately across Route 3 from the 200 Area Central Fire Station (Building 609-A). This recommendation has been reviewed and approved by Rockwell's Site Selection Review Team.

4.0 RECOMMENDATIONS

This section presents the recommendations derived and discussed in Section 3.0 "Alternatives" and provides specific recommendations for the facility design, tailored to the programmatic needs that exist at Hanford. The design recommendations that follow have been developed to satisfy the facility criteria discussed in Section 2.0 "Facility Requirements" as well as national codes and standards, and established operating policies.

4.1 FACILITY DESIGN RECOMMENDATIONS

This section describes the recommended facility design, which has been developed to fit within the funding and project management guidelines of a General Plant Project (GPP) as discussed in Reference 9. The facility design features discussed in Section 2.0 "Facility Requirements" should be integrated into a single facility designed to meet Hanford's specific needs. A single facility structure is recommended because:

- It maximizes the size and functional capabilities that can be provided within the GPP funding limit, and

- It permits effective administration and control of dangerous waste operations by centralizing them at one location.

The recommended facility layout is shown on Figure 3 in Appendix B. This layout has been developed to maximize the floor space that can be provided for each required functional area. Common areas have been used as much as possible to accommodate the movement of materials and personnel without detracting from the total operating and storage space that can be provided. The layout shown can be extended in the future to provide additional space, if it is ever needed.

Concrete is highly recommended as the primary construction medium, because of its inertness to attack from corrosive liquids and vapors that will be present in the facility. Steel and wooden structures were ruled out because of their susceptibility to corrosion, structural deterioration, and fire in this application. Concrete also offers a favorable construction cost and excellent structural properties, that cannot be matched by steel or wood without incurring additional construction costs.

4.1.1 Building Structure

The recommended building structure is a single floor structure, on a concrete slab, assembled with precast concrete wall panels and a truss supported built-up roof. The building should be approximately 66 feet wide and 120 feet long, with a 12 to 14 foot eave height. The roof should be cambered to ensure precipitation run-off.

4.1.2 Office Area

The office area should provide about 400 square feet of floor space, and should be totally enclosed from other facility areas. It should provide a quiet working environment for the facility manager and a records clerk with sufficient space for normal administrative functions, file cabinets for manifests and records, bookshelves for procedural and policy documents and other reference data. The office must be planned to accommodate a computer for recordkeeping functions, with a dedicated communication line for networking with other data systems. The computer, however, is not required for basic compliance with the recordkeeping requirements of the Dangerous Waste Regulations and should only be provided by the project if sufficient funding is available.

4.1.3 Change Room and Restroom Area

It is envisioned that this facility will be staffed by a manager, a records clerk, and two operating personnel. An area will have to be provided where operating personnel can change into and out of coveralls and other protective and work clothing needed at the facility. Lockers will be needed for personal clothing storage during working hours, plus a privacy area where employees may

change clothes. A shower area will also be needed to permit employees to clean up at the end of the day, and general restroom facilities will be needed for all employees. The layout shown in Figure 4 attempts to consolidate these requirements into as small an area as practical in order to avoid construction costs. A combined men's and women's change room and restroom area is shown, which will permit mutual privacy without excluding either from the facilities.

4.1.4 Packaging and Sampling Room

A separately enclosed area is required where dangerous waste containers will be opened when necessary for drawing samples for analysis or for consolidating the compatible contents of partially filled containers into a single container for transport off-site or to the landfill. This area will require good ventilation to carry off dangerous fumes and vapors. A fume hood is recommended, in which containers as large as 55-gallon drums can be handled and filled. An auxiliary exhaust fan is also recommended, to rapidly expel concentrated vapors when needed.

This room will contain the most potentially hazardous operations that will be conducted at the facility. Care must be taken in its design to minimize the probability and mitigate the consequences of accidents or mishaps that could occur when dangerous waste containers are handled and opened, when samples are being drawn, and when material is being transferred from one container to another. This room will require good lighting so that operators can adequately see what they are doing. The emphasis on safety in this room should override energy conservation, both in lighting and in ventilation. The lighting intensity at approximately 3 to 4 feet above the floor, where most hands-on work will take place, should be at least 50 footcandles. At least 4 air changes per hour should be provided by the normal, facility ventilation system, without operating the fume hood or auxiliary exhaust fan. An emergency exit to the outside should also be provided.

The design for the Packaging and Sampling Room must include explosion venting provisions as discussed in Section 2.2.4 "Explosion Venting," and liquid containment provisions as discussed in Section 2.3.2 "Container Storage Area Requirements," since either accidents are possible in this area. The study recommendation is to provide a 4 inch high curb around the perimeter of this room, and slope the floor to a collection sump located inside the room. The recommended capacity of the sump is 100 gallons plus 110% of the volume of samples that could be stored in the room. This will be more accurately developed during design, but is expected to result in a sump of about 120 to 150 gallons. This would require a sump with measurement similar to 24 inches wide by 48 inches long by about 30 inches deep. This capacity recommendation is based on engineering judgment, assuming the spillage of one or more partially filled 55-gallon drums as the worst case.

A laboratory counter with one or more sinks should also be provided to facilitate sampling. Fire rated, chemical storage cabinets will be required for sample storage. These cabinets must have exhaust ventilation to prevent dangerous fume accumulations inside. The cabinet exhaust can be tied in to the room exhaust and expelled to the outside. At least 4 cabinets, or 3 cabinets

and a refrigerator will be needed to provide proper sample segregation as discussed in Section 2.3.1 "Segregation of Materials." A refrigerator is recommended for storing reactive waste at a low temperature to reduce volatility.

4.1.5 Special Equipment Storage Area

The facility should have a designated area for the storage of special and emergency response equipment and materials. This should be one or two adjacent small rooms providing a total of about 20 to 50 square feet of floor space, with shelves or lockers for stocking equipment and materials. This equipment and materials would consists of spill control, clean-up, and neutralization materials; portable air sampling equipment, special protective clothing required for dealing with specific chemical spills, and various containers and pumps for reclaiming spilled liquids from collection sumps. A mercury rated vacuum cleaner is also recommended, for its effectiveness in cleaning up many kinds of spills.

4.1.6 Packaging Material and Handling Equipment Area

An open area of about 300 square feet will be required, where packaging materials and new drums can be stored prior to use, and where an electric forklift can be parked and recharged when not in use.

4.1.7 Dangerous Waste Storage Area

The area designated for the storage of dangerous waste will be designed to incorporate the features called out in Section 2.3 "Storage Area Requirements." A series of storage cells will be provided, for the segregation of waste types and designed to contain leakage and spillage. The recommended approach is a storage cell measuring roughly 28 by 30 feet with a four inch high curb around its perimeter. The floor should be sloped to a collection sump located inside the cell. The sump must have a capacity of at least 10% of the storage capacity of the cell. A ramp leading into the cell will provide a smooth transition over the curb. The cell floor, the curb, ramp, and sump should all be of concrete construction.

A typical storage cell is shown on Figure 4 in Appendix B. Such cells can be constructed using standard concrete construction and finishing techniques. A similar cell design is now in use at the Savannah River Plant's Hazardous Waste Facility, and has proven to be satisfactory. The curbs used at Savannah River are four inches high and eight inches wide. This width was selected because it permits fire walls or cell dividers to be erected using eight inch concrete blocks, if it ever becomes necessary for fire zoning or additional material protection as storage usage changes to match the needs. It is recommended that eight inch wide curbs be used in the Hanford dangerous waste facility to allow similar flexibility. At the time of this study, however, additional walls between cells do not appear necessary, but may be called out in subsequent safety evaluations of the facility design.

In the interest of preparedness, the storage cell area should also have electrical outlets and hose bibbs at frequent intervals, to allow decontamination and clean-up of spills and leaks. These items should be located where they will not normally be damaged or become obstructions to normal material handling operations.

The basic facility recommendation identifies a total of six cells, one of which is designated as the pesticides cell. The remaining fire should provide for material segregation into groups according to waste characteristics (ignitability, corrosivity, reactivity, toxicity, and incompatibility) as discussed in Section 2.3.1 "Segregation of Materials." The cell measurements are expected to accommodate the anticipated quantities of materials that will be accumulated prior to disposal, with good space management. About 700 to 1,000 square feet per cell will be needed. This will require arranging 55-gallon drums in orderly rows and stacks (two high stacking), leaving adequate space for weekly inspections, emergency access, and normal handling operations. If additional space is required in the future, the storage area can be extended by a building addition to provide additional storage cells.

The pesticides cell should be constructed identically to the other cells, but need not be as large. A minimum of 460 square feet of space will be needed within the cell. An external dock area adjoining the cell and accessible through a wide door must also be provided. This dock will be used for pouring pesticides into spraying equipment and trucks which will be parked at the dock. The dock must have a curb around its edge to catch spillage. This curb need only be about one inch high, and the floor of the dock should be sloped to drain to a small sump with a pluggable drain. The drain should lead to a nearby french drain, and should not be allowed to enter the facility's septic tank or tile field. Care should be taken in designing the drain piping to ensure no liquids are trapped where they could freeze in winter. The dock area should also have an awning with a three foot or greater overhang, to minimize the amount of precipitation that may enter the dock area.

Mixing operations on the dock will require water for diluting pesticides in the spray rig tanks, and also for general clean-up. A hose bibb should be provided by the facility design, as well as a wash basin for personnel use. As a safety precaution, a safety shower with an eyewash should also be provided. The shower will drain to the french drain via the dock floor drain. The wash basin should have a separate drain leading to the same destination. Since pesticides operations will not be conducted during the winter and winter temperatures could damage water unprotected water piping, all outdoor water piping should be isolated by a shutoff valve located indoors and drained of all residual water in the winter.

4.1.8 Empty Container Storage Area

Empty containers will be generated as a result of pesticide applications and the consolidation of residual waste from partially filled containers into others. In most cases, these empty containers will be triple rinsed and returned to certain generating facilities for reuse, or may be discarded. In either case, an area will be required where these containers can be stored with

a similar concern for containment and protection to that given to full containers. Due to the high cost of indoor storage, it is recommended that an outdoor storage yard be provided for empty containers. A fenced and gravel paved area is recommended, with a mild surface slope to permit surface runoff in the winter, as discussed in Section 2.3.2, "Container Storage Area Requirements." No additional weather protection is required.

This area should be conveniently accessible from the material storage and pesticides areas, so that personnel can transport empty drums and other containers to it without disrupting other routine operations. A handtruck will be used to carry most drums. A gate at least 10 feet wide will be needed to permit trucks to enter and pick up empty containers. A chain-link fence is needed to maintain positive administrative control and custody of these containers.

4.1.9 Front Loading Dock

The front-loading dock recommendation features a low dock about one to two feet above grade and a recessed (below grade) concrete truck ramp with side retaining walls. This dock will also require containment features to prevent uncontrolled releases of dangerous waste to the environment in the event of a spill or leak on the dock. This is accomplished by sloping the dock to drain into the recessed truck ramp and providing one inch high curbs on the sides to direct spillage or leakage into the ramp areas. The ramp area will have a small sump for catching liquids, and a removable drain plug to permit releasing uncontained precipitation water to a french drain. The sump will also permit collection of dangerous waste and washdown water, for storage within the facility.

4.2 SITING RECOMMENDATION

It is recommended that the Hanford dangerous waste facility be sited between 200 East and 200 West Areas, on the north side of Route 3 opposite the 200 Area Central Fire Station. This site selection is consistent with the development pattern proposed for the 200 Area Plateau in Reference 8.

5.0 COST ESTIMATE

Appendix C provides the cost estimate for the proposed facility, which indicates a Total Estimated Cost (TEC) of $950,000, expressed in 1985 dollars. This estimate is based on the recommended facility description given in Section 4.1, "Facility Design Recommendations", and Figure 3 in Appendix B. It should be noted that this is a "Rough Order of Magnitude" (ROM) estimate based on preliminary investigations and conservative estimates of construction project requirements, for use in general project planning.

This estimate is based on the assumptions that design will be performed by the on-site A/E contractor and that consturction will be performed under a Fixed Price contract. A conservative project schedule is assumed which, allows five months for design, three months for bid package preparation and awarding of the construction contract, and six months for construction. Cost elements for each activity are calculated and escalated from their calendar midpoints. Allowing an additional month for final acceptance of the facility and close-out of the project results in a tentative beneficial use date of May 1, 1986.

The information provided here should be regarded as upper boundaries for cost and schedule data, due to the rather conservative nature of its input data and assumptions. A more precise cost estimate and project schedule will be developed in the Conceptual Design Report (CDR), which will go into greater detail and deeper analysis of design options and features. It is anticipated that the CDR's cost estimate will be significantly lower, due to a reduction in conservatism as the facility design and project planning become better defined.

6.0 REFERENCES

1. Chapter 173-303 Washington Administrative Code (WAC), "Dangerous Waste Regulations", Washing State Department of Ecology.

2. Final Environmental Statement, Hanford Waste Management Operations, ERDA 1538, December 1975.

3. Final Safety Analysis Report (FSAR) for WPPSS Nuclear Project No. 2, September 1981.

4. Letter, T. J. McLaughlin, "Criteria for Storage of Pesticides," Rockwell Hanford Operations, Richland, Washington; December 29, 1980.

5. Uniform Building Code (UBC), International Congress of Building Officials, 1982 edition.

6. NFPA-43D, "Storage of Pesticides in Portable Containers", National Fire Protection Association, 1980 edition.

7. NFPA-231, "Indoor General Storage", National Fire Protection Association, 1980 edition.

8. RHO-LD-178, "200 Area Plateau Plan", R. K. Brazeal and D. L. Salem, Rockwell Hanford Operations, Richland, Washington, October 1981.

9. RL Order 5700.2, "Project Management System", United States Department of Energy, Richland Operations Office; Richland, Washington, March 15, 1982.

APPENDIX A

CROSS-REFERENCE OF DESIGN REQUIREMENTS

CROSS-REFERENCE OF DESIGN REQUIREMENTS
FOR A DANGEROUS WASTE STORAGE FACILITY

TOPIC	REFERENCE		
	WAC 173-303	40 CFR	OTHER
1. Security	340	264.14	
2. General requirements for ignitible, reactive, and incompatible wastes	395	264.17	
3. Siting requirements	500	264.18	Uniform Fire Code
4. Design features to enhance safety and operability			
• Required equipment	340	264.32	
• Internal communications	340	264.32	
• Fire extinguishers and fire control equipment	340	264.32	
• Spill control equipment	340	264.32	
• Water supply	340	264.32	
• Access to communications and alarms	340	264.34	NFPA
• Aisle space	340	264.35	
5. Container storage areas	630		
• Containment system	630		
• Provisions for precipitation	630		
• 10% holding capacity	630		
• Special requirements for ignitibles and reactives	630		Uniform Fire Code
• Loading and unloading areas	Amendment to WAC 173-303-395		
6. Manifests	180	262.20	

TOPIC	REFERENCE WAC 173-303	40 CFR	OTHER
7. Recordkeeping	210	265.73	
8. Waste analysis	300	264.13	
9. Dangerous waste characteristics			
• Ignitibility	090	261.21	
• Corrosivity	090	261.22	
• Reactivity	090	261.23	
• Toxicity	090	261.24	
10. Explosion Venting			UBC NFPA
11. Number of Air Changes			UBC
12. Electrical Systems			NFPA-70
13. Designation of Hazards Ratings for Areas			UBC NFPA-43D NFPA-231

Chapter 173-303 WAC

DANGEROUS WASTE REGULATIONS

WAC

173-303-010 Purpose.
173-303-020 Applicability.
173-303-030 Abbreviations.
173-303-040 Definitions.
173-303-045 References to EPA's hazardous waste and permit regulations.
173-303-050 Department of ecology cleanup authority.
173-303-060 Notification and identification numbers.
173-303-070 Designation of dangerous waste.
173-303-071 Excluded categories of waste.
173-303-075 Certification of designation.
173-303-080 Dangerous waste lists.
173-303-081 Discarded chemical products.
173-303-082 Dangerous waste sources.
173-303-083 Infectious dangerous wastes.
173-303-084 Dangerous waste mixtures.
173-303-090 Dangerous waste characteristics.
173-303-100 Dangerous waste criteria.
173-303-101 Toxic dangerous wastes.
173-303-102 Persistent dangerous wastes.
173-303-103 Carcinogenic dangerous wastes.
173-303-104 Generic dangerous waste numbers.
173-303-110 Sampling and testing methods.
173-303-120 Recycled, reclaimed, and recovered wastes.
173-303-121 Accumulation without sufficient use, reuse or recycling.
173-303-130 Containment and control of infectious wastes.
173-303-140 Disposal of extremely hazardous waste.
173-303-141 Treatment, storage, or disposal of dangerous waste.
173-303-145 Spills and discharges into the environment.
173-303-150 Division, dilution, and accumulation.
173-303-160 Containers.
173-303-161 Overpacked containers (labpacks).
173-303-170 Requirements for generators of dangerous waste.
173-303-180 Manifest.
173-303-190 Preparing dangerous waste for transport.
173-303-200 Accumulating dangerous waste on-site.
173-303-210 Generator recordkeeping.
173-303-220 Generator reporting.
173-303-230 Special conditions.
173-303-240 Requirements for transporters of dangerous waste.
173-303-250 Dangerous waste acceptance, transport, and delivery.
173-303-260 Transporter recordkeeping.
173-303-270 Discharges during transport.
173-303-275 Transfer facilities (or collection facilities).
173-303-280 General requirements for dangerous waste management facilities.
173-303-290 Required notices.
173-303-300 General waste analysis.

173-303-310 Security.
173-303-320 General inspection.
173-303-330 Personnel training.
173-303-340 Preparedness and prevention.
173-303-350 Contingency plan and emergency procedures.
173-303-360 Emergencies.
173-303-370 Manifest system.
173-303-380 Facility recordkeeping.
173-303-390 Facility reporting.
173-303-395 Other general requirements.
173-303-400 Interim status facility standards.
173-303-420 Siting standards.
173-303-430 Performance standards.
173-303-440 Buffer monitoring zones.
173-303-500 Siting standards.
173-303-505 Special requirements for recycled moderate risk waste.
173-303-510 Performance standards.
173-303-520 Buffer monitoring zones.
173-303-550 Special requirements for facilities managing moderate risk waste.
173-303-560 Minimum standards for facilities managing moderate risk waste.
173-303-575 (Reserved.)
173-303-600 Final facility standards.
173-303-610 Closure and post-closure.
173-303-620 Financial requirements.
173-303-630 Use and management of containers.
173-303-640 Tanks.
173-303-645 Ground water protection.
173-303-650 Surface impoundments.
173-303-655 Land treatment.
173-303-660 Waste piles.
173-303-665 Landfills.
173-303-670 Incinerators.
173-303-700 Requirements for the Washington state extremely hazardous waste management facility at Hanford.
173-303-800 Permit requirements for dangerous waste management facilities.
173-303-801 Types of dangerous waste management facility permits.
173-303-802 Permits by rule.
173-303-804 Emergency permits.
173-303-805 Interim status permits.
173-303-806 Final facility permits.
173-303-807 Trial burns for dangerous waste incinerator final facility permits.
173-303-808 Demonstrations for dangerous waste land treatment final facility permits.
173-303-810 General permit conditions.
173-303-815 (Reserved.)
173-303-820 (Reserved.)
173-303-825 (Reserved.)
173-303-830 Permit changes.
173-303-840 Procedures for decision making.
173-303-845 Appeal of decision.
173-303-900 Public involvement and participation.

173-303-910 Petitions.
173-303-950 Violations and enforcement.
173-303-9901 Flow chart for designating dangerous wastes.
173-303-9902 Narrative for designating dangerous wastes.
173-303-9903 Discarded chemical products list.
173-303-9904 Dangerous waste sources list.
173-303-9905 Dangerous waste constituents list.
173-303-9906 Toxic dangerous waste mixtures graph.
173-303-9907 Persistent dangerous waste mixtures graph.

40 CFR	Corresponding RCRA Section and Descriptive Title
Part 260	Definitions generally used in other parts, and provisions generally applicable to other parts
Part 261	Section 3001: Identification and Listing of Hazardous Waste
Part 262	Section 3002: Standards Applicable to Generators of Hazardous Waste
Part 263	Section 3003: Standards Applicable to Transporters of Hazardous Waste See also Department of Transportation regulations at 49 CFR Parts 171-179.
Part 264	Section 3004: Standards Applicable to Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
Part 265	Section 3004: Interim Status Standards Applicable to Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities
Part 266	Permits by Rule (proposed as of this writing)
Part 267	Temporary Standards for Land Disposal Facilities
Parts 270, 271 & 124	Section 3005: Permits for Treatment, Storage, and Disposal of Hazardous Waste Section 3010: Preliminary Notification of Hazardous Waste Activity

APPENDIX B

ILLUSTRATIONS

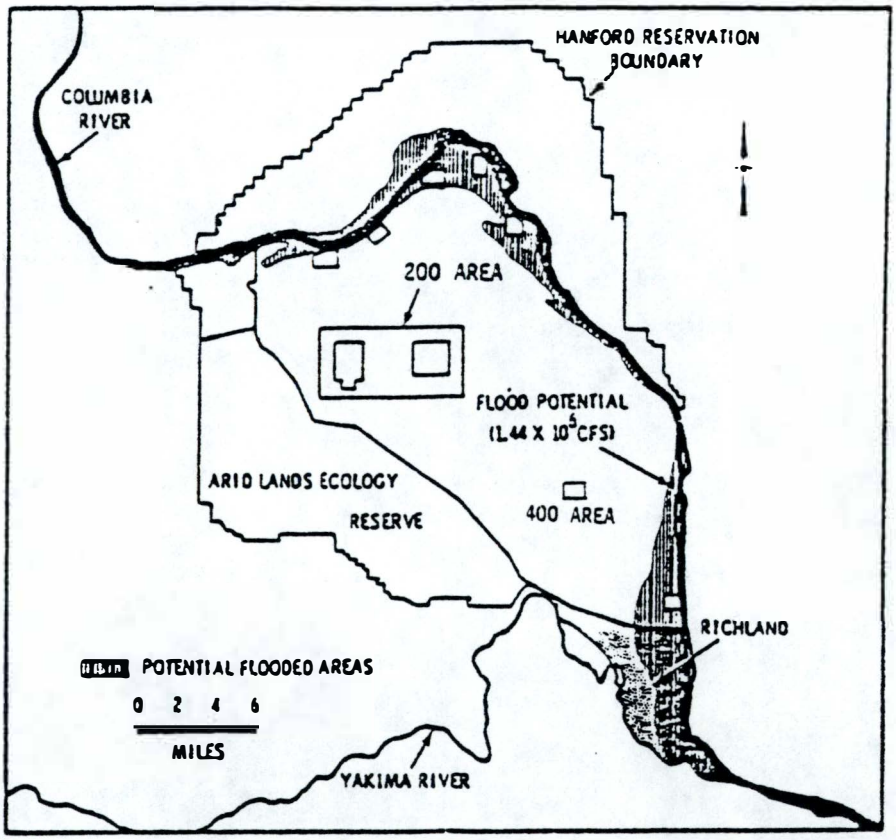


FIGURE 1. MAP OF POTENTIAL FLOOD AREAS IN 100-YEAR FLOOD

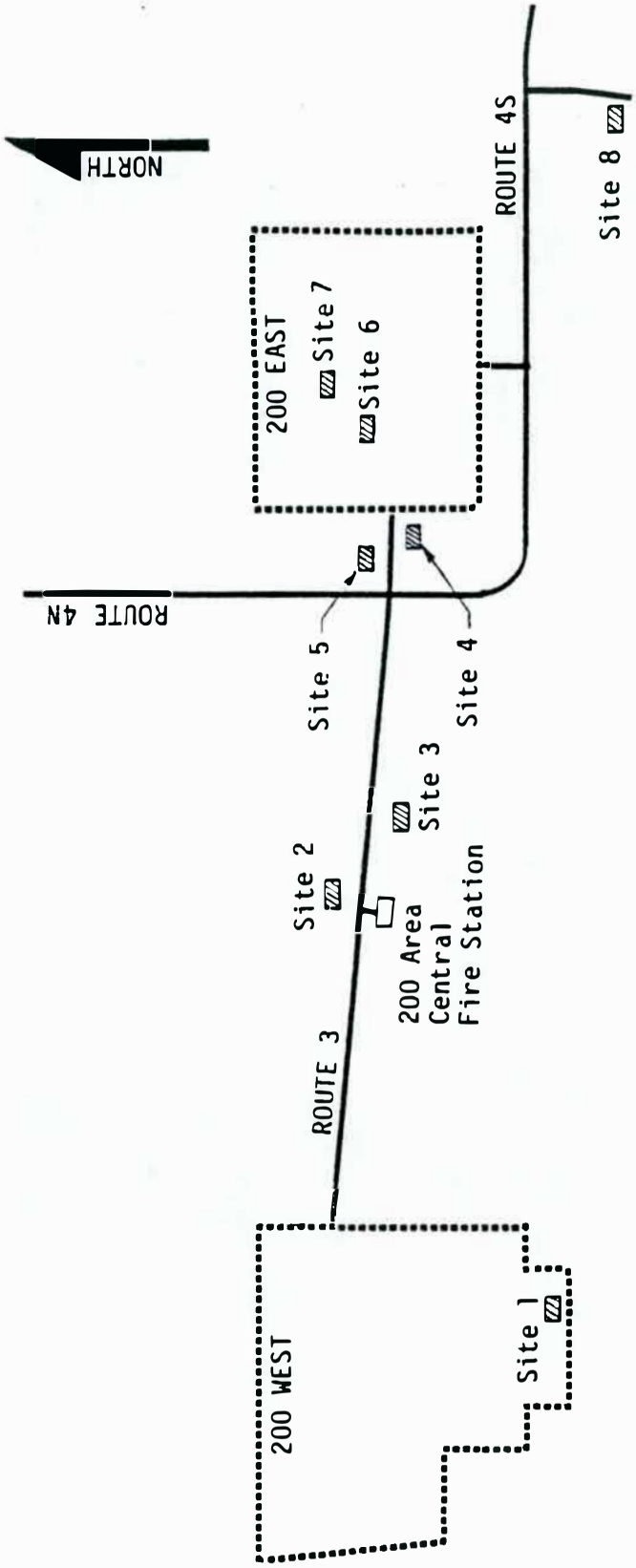


FIGURE 2. SITING ALTERNATIVES

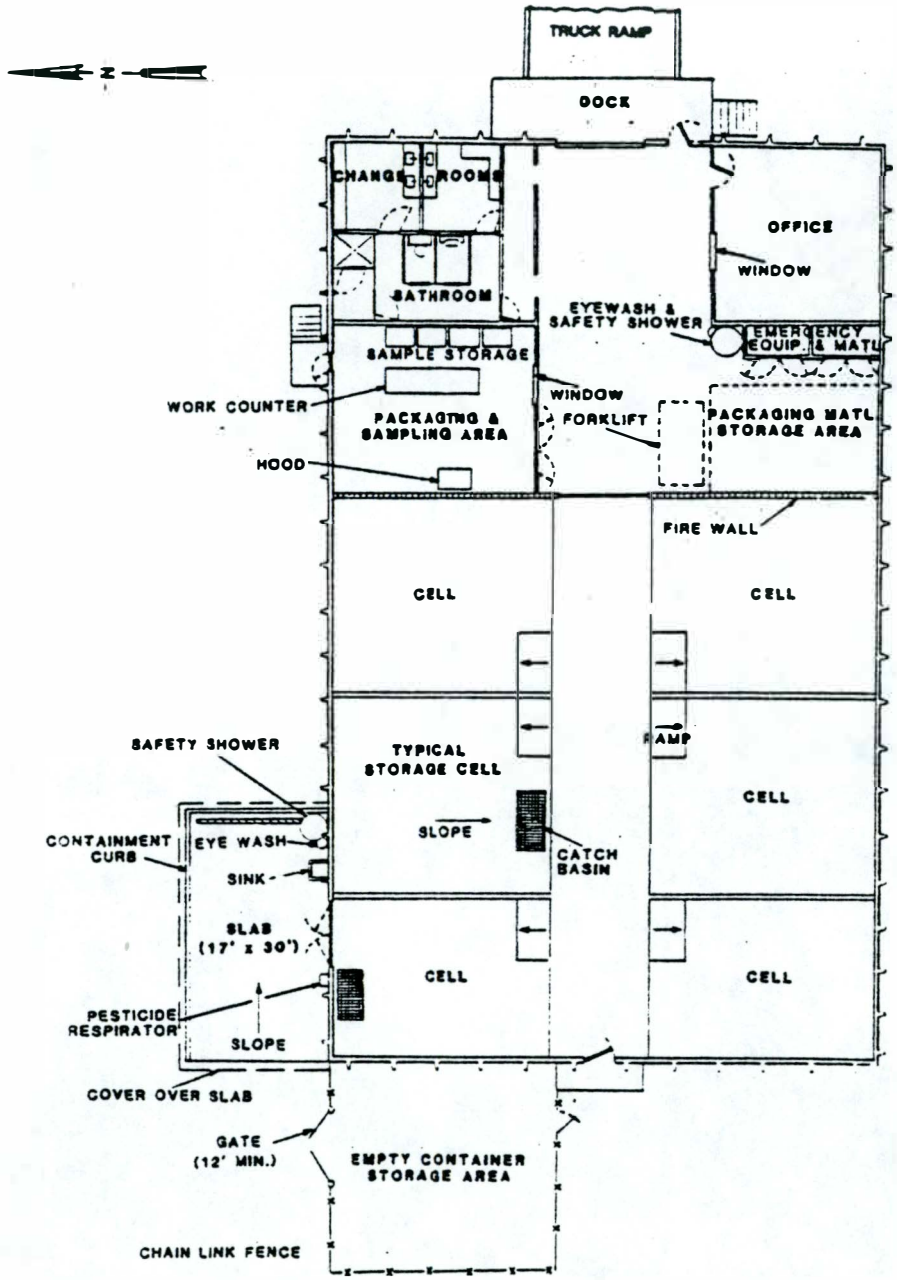


FIGURE 3. PROPOSED DANGEROUS WASTE FACILITY LAYOUT

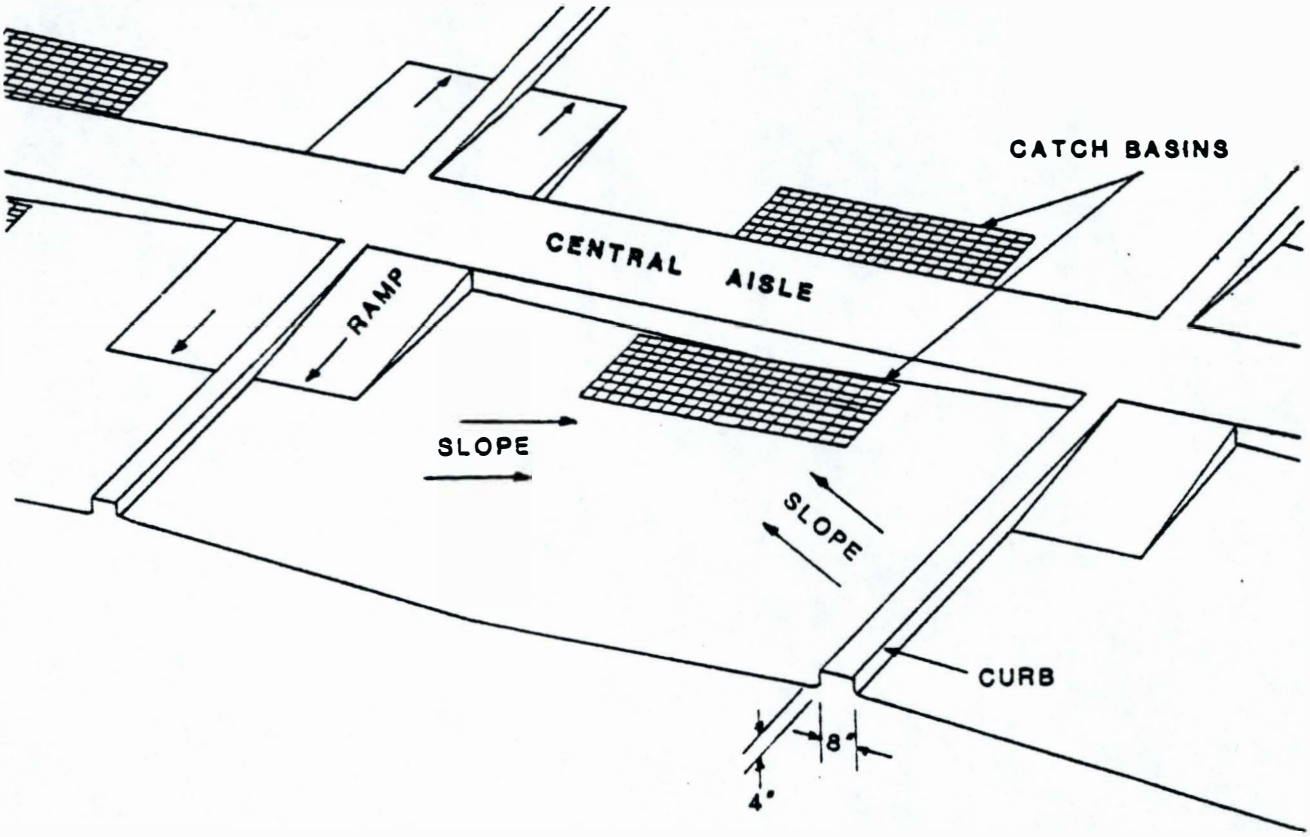


FIGURE 4. TYPICAL STORAGE CELL

APPENDIX C

COST ESTIMATE

KAISER ENGINEERS
HANFORD

PROJECT COST ESTIMATE SUMMARY

R688B0

Title	Prepared For	Prepared By	Checked By	Project No.	Date
Non-Radioactive Hazardous Waste Facility	Rockwell	R. Jonson	A. Dove	B-526	10/23/84

	DEFINITIVE DESIGN	CONSTRUCTION ENGR/INSP	DEFINITIVE DESIGN	CONSTRUCTION ENGR/INSP	$ TOTAL	
A. ENGINEERING						
Architect - Engineer						
Escalation	%	%				
Contingency	%	%				
Subtotal						
Other (specify) J. A. Jones Constructibility Review					100,000*	
Escalation	%	%			-0-	
Contingency	%	%			-0-	
Subtotal					6,000*	
Operating Contractor						
Total A					106,000*	
B. CONSTRUCTION						
(1) Improvements To Land						(1)
(2) Buildings						(2)
Building No. ____ 7,700 sq. ft.			Lump Sum Contractor		500,000	
Building No. ____ ____ sq. ft.						
(3) Other (Detached Structures)						(3)
(4) Special Construction (Facilities & Installation)						(4)
(5) Utilities						(5)
(6) Procurement						(6)
(7) Operating Expense Charges						(7)
(8) Other (Specify)						(8)
(9) Contract Administration					55,900	(9)
(10) Bid Package					5,500	(10)
(11) Reconciliation Adjustment						(11)
Subtotal					561,400	
Escalation	8.6 %				48,200	
Contingency	22 %				134,400	
Total B					744,000	
C. STANDARD EQUIPMENT See Estimate Basis #6A					100,000	

TOTAL PROJECT ESTIMATE $ 950,000

PROPOSED FUNDS ALLOCATION

FUNDS PURPOSE	OPER. CONTR.	DOE-RL
Engineering	106,000	
Procurement		
Construction	661,400	
Escalation	48,200	
Contingency	134,400	
Total	950,000	

Type of Estimate: Study

Approvals — Date

Architect-Engineer: 10-23-84

Operating Contractor: 10-25-84

REMARKS:
*Allowance

Estimate Sheet 1 of 6

526-ES-001 Rev. 0 C-2

KEH-18 (6 82)

KAISER ENGINEERS HANFORD

PROJECT COST ESTIMATE

Project No.	Title	Type Estimate	Date Prepared
B-526	Non-Radioactive Hazardous Waste Facility	Study	10/23/84

WORK BREAKDOWN STRUCTURE

Item number from Project Cost Estimate Summary:				
B-2	Lump Sum Construction	485,700		
	Washington State Sales Tax	14,300		
	Subtotal			500,000
B-9	Contract Administration	55,900		55,900
B-10	Bid Package	5,500		5,500
C	Allowance	100,000		100,000
	Total Construction			661,400

KAISER ENGINEERS
HANFORD

ESTIMATE BASIS

TITLE Non-Radioactive Hazardous Waste Facility DATE 10/23/84

KEH JOB # R688B0

CLIENT PROJECT/WORK ORDER # B-526

1 DOCUMENTS AND DRAWINGS

DOCUMENTS General Notes

DRAWINGS 8-1/2" x 11" sketches from the client

2 MATERIAL PRICES

UNIT COSTS REPRESENT CURRENT PRICES FOR SPECIFIED MATERIAL. VENDOR QUOTES WERE OBTAINED FOR from current in-house cost data.

3 LABOR RATES

CURRENT BASE RATES AS ISSUED BY KEH (ISSUE # 8,Rev.3 , DATED 5/15/84)INCLUDE FRINGE BENEFITS, LABOR INSURANCES AND TAXES, AND TRAVEL WHERE APPLICABLE.

4 ESCALATION

ESCALATION IS CALCULATED AT 8.6 % ON THE ACCRUAL BASED PROJECTED FROM THE ATTACHED SCHEDULE NOTING THE MID-POINT OF CONSTRUCTION. PROCUREMENT IS CALCULATED AT N/A % PER THE ATTACHED SCHEDULE.

5 CONTINGENCY

CALCULATED AT 22 % OF THE ESTIMATED CONSTRUCTION PER THE ATTACHED CONTINGENCY ANALYSIS.

6 REMARKS

A. A later engineering evaluation has been made and an additional $100,000 has been added to the TEC under Line "C" to cover costs of installed equipment, drainage system with holding tanks, area separation walls and loading dock.

B. Engineering is an allowance of $100,000 for KEH and $6,000 for constructibility.

RGJ:ad

KEH-318 (4-82)

KAISER ENGINEERS
HANFORD

Date: 10/23/84

Work By: X L.S.

Type Est.: X Study

Project No.: B-526

Project Title: Non-Radioactive Hazardous Waste Facility

CONTINGENCY ANALYSIS

Prepared By: R. Jonson

Checked By: A. Dove

Sheet 4 of 6

Estimate No.	Description	Direct Cost	Contingency Percent	Contingency Dollars	Subtotal	Contingency Percent	Contingency Dollars	Total
02	Sitework	20,300	8.6	1,700	22,000	20	4,400	26,400
03	Concrete	131,000		11,300	142,300	20	28,500	170,800
04	Masonry	7,700		700	8,400	25	2,100	10,500
05	Metals	22,000		1,900	23,900	20	4,800	28,700
06	Wood and Plastics	9,100		800	9,900	20	2,000	11,900
07	Thermal and moisture protection	28,100		2,400	30,500	25	7,600	38,100
08	Doors and Windows	15,100		1,300	16,400	15	2,500	18,900
09	Finishes	15,900		1,400	17,300	20	3,500	20,800
10	Specialties							
11	Equipment	13,900		1,200	15,100	20	3,000	18,100
12	Furnishings							
13	Special Construction							
14	Conveying Systems							
15	Mechanical	93,700		8,000	101,700	25	25,400	127,100
16	Electrical	49,400		4,200	53,600	25	13,400	67,000
	Direct Cost Totals	406,200		34,900	441,100	22	97,200	538,300
01	General Requirements	35,600		3,100	38,700	20	7,700	46,400
01	Technical Services							
	Overhead and Profit	43,900		3,800	47,700	20	9,500	57,200
	Construction Cost Totals	485,700		41,800	527,500	22	114,400	641,900
	Contract Administration / Construction Management	55,900		4,800	60,700	25	15,300	76,000
	Bid Package	5,500		400	5,900	22	1,300	7,200
	~~XXXXXXXX~~ Washington State Sales Tax	14,300		1,200	15,500	22	3,400	18,900
	Procured Equipment							
	TOTALS	561,400	8.6	48,200	609,600	22	134,400	744,000

526-CS-001

Rev. 0

G-5

KEH 242 (6-81)

KAISER ENGINEERS
HANFORD

ESCALATION ANALYSIS SCHEDULE

PROJECT NO./WORK ORDER NO. B-526/CK5521/R688B0

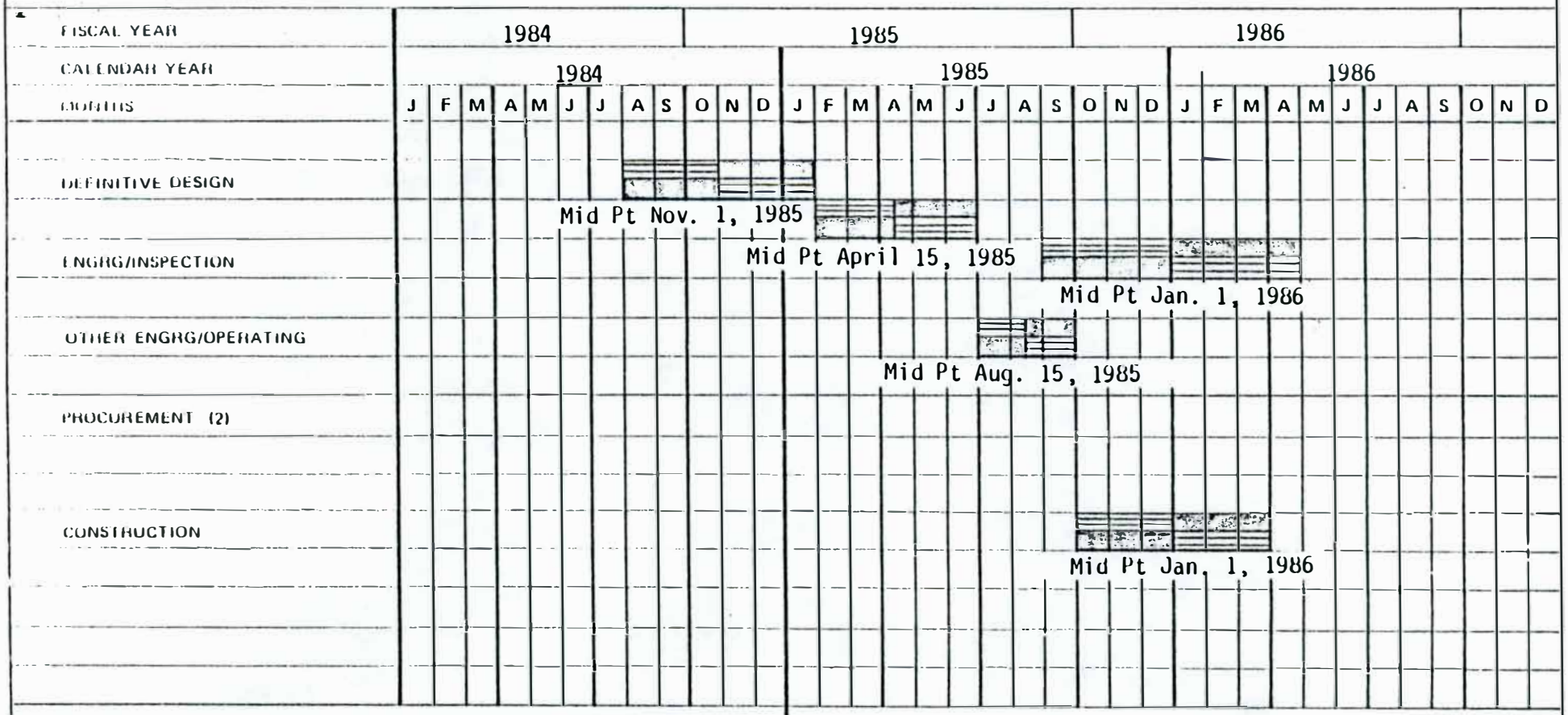
TITLE Non-Radioactive Hazardous Chemical Waste Facility

REQUESTED BY Rockwell Hanford Operations

PREPARED BY S. R. Zdravkovich DATE 10-15-84

APPROVED BY _____ DATE _____

Tasks are shown as forecasted work and do not represent approved schedules nor manpower assignments.



ENGINEERING ESCALATION

(1) **CONSTRUCTION AND PROCUREMENT ESCALATION**

Construction = 8.6% per Escalation Rate Table, dated 1-23-84.

(1) To be provided by Estimating Department.

(2) May/May Not be required to be broken out separately

NOTE: Above dates pertain to Fiscal Year

KEH-291 (6-82)

KAISER ENGINEERS HANFORD

TYPE ESTIMATE: ☐ BUDGET ☐ PLANNING ☐ TITLE II ☐ TITLE I ☒ OTHER Study

ESTIMATE WORK SHEET

PROJ/WO. NO.	CSI DIV	DESCRIPTION	DATE	WORK BY	TAKE-OFF/PRICED	CHECKED	SHEET
B-526		Washington State Sales Tax	10/23/84	L/S	R. Jonson	A. Dove	6 of 6

DESCRIPTION	QUANTITY	UNIT	MANHOURS UNIT MH	MANHOURS TOTAL	MANHOURS $/MH	UNIT COST MTL/SC	TOTAL COST LABOR	TOTAL COST MATERIAL	TOTAL COST EQUIPMENT USAGE	TOTAL COST SUB-CONTR	TOTAL COST TOTAL
Basis:											
Lump Sum:											
Materials 30,700											
Equipment 7,200											
Subs 153,400											
191,300 x 7.5%							14,300				14,300

526-ES-001 Rev. 0 C-7