WHC-EP--0229-Rev.1

DE90 006352

Double-Shell Tank Waste Disposal Integration Plan

C.A. Augustine

Date Published
January 1989

Prepared for the U.S. Department of Energy
Assistant Secretary for Defense Programs

Westinghouse Hanford Company
P.O. Box 1970
Richland, Washington 99352

Hanford Operations and Engineering Contractor for the
U.S. Department of Energy under Contract DE-AC06-87RL10930

This page intentionally left blank.

Document Title: Double-Shell Tank Waste Disposal Integration Plan

H. F. Daugherty, Manager Defense Waste Management Division	1/17/90 Date
C. M. Cox, Manager Projects Department	12/22/89 Date
B. A. Austin, Manager Defense Waste Planning, Integration and Budgets	12/14/89 Date
R. J. Baumhardt, Manager Tank Farms	12/19/89 Date
G. A. Meyer, Manager Double-Shell Tank Waste Disposal	12/14/89 Date
M. L. Grygiel, Manager Pretreatment	12/19/89 Date
B. R. Dickey, Manager Grout Facility	12/18/89 Date
D. D. Wodrich, Manager Defense Waste Engineering	12/19/89 Date
R. A. Smith, Manager Hanford Waste Vitrification Plant Project	12/20/89 Date

This page intentionally left blank.

DOUBLE-SHELL TANK WASTE DISPOSAL INTEGRATION PLAN

C.A. Augustine

ABSTRACT

In December 1987, the *Final Environmental Impact Statement: Disposal of Hanford Defense High-Level, Transuranic, and Tank Wastes* *was issued by the U.S. Department of Energy. The preferred alternative called for existing and future double-shell tank (DST) wastes to be pretreated, if necessary, in B Plant for separation of the waste into transuranic (TRU) waste, high-level waste (HLW), and low-level waste (LLW) fractions. The TRU waste and HLW fractions will be processed in the Hanford Waste Vitrification Plant (HWVP), which will solidify them into borosilicate waste glass for disposal in a geologic repository. The remaining LLW fraction will be processed into a cementitious grout and disposed of in near-surface concrete vaults.*

Implementation of disposal actions for DST wastes will require waste characterization and technology development for retrieval, pretreatment, and disposal processes, plus operation of the tanks, supporting systems and facilities, and B Plant, HWVP, and the Grout Treatment Facility.

The *Double-Shell Tank Waste Disposal Integration Plan* *defines the baseline processes, scope, schedule, and budget for implementation of DST waste disposal and defines the procedure for changing the baseline.*

This page intentionally left blank.

CONTENTS

CONTENTS (continued)

LIST OF FIGURES

LIST OF FIGURES (continued)

LIST OF TABLES

This page intentionally left blank.

LIST OF TERMS

AMU	aqueous makeup
BA	budget authority
BAT	best available technlogoy
BCP	B Plant condensate process
CC	complexant concentrate
CCB	Change Control Board
CDR	Conceptual Design Report
CEB	Change Evaluation Board
CENTRC	capital equipment not related to construction
CPR	Cost Performance Report
CR	change request
DOE	U.S. Department of Energy
DOE-HQ	U.S. Department of Energy-Headquarters
DOE-RL	U.S. Department of Energy-Richland Operations Office
DSS	double-shell slurry
DST	double-shell tank
DSTWD	double-shell tank waste disposal
DWPIB	Defense Waste Planning Integration and Budgets
DWE	Defense Waste Engineering
DWMD	Defense Waste Management Division (Westinghouse Hanford)
DWP	Defense Waste Programs
EPA	U.S. Environmental Protection Agency
FDC	functional design criteria
FSAR	Final Safety Analysis Report
FY	fiscal year
GPP	General Plant Project
GTF	Grout Treatment Facility
HLW	high-level waste
HVAC	heating, ventilation, and air conditioning
HWVP	Hanford Waste Vitrification Plant
IP	Integration plan
LERF	Liquid Effluent Retention Facility
LI	line item
LLW	low-level waste
MCS	Management Control System
MP	Major Projects
MSA	Major System Acquisition
NCAW	neutralized current acid waste
NCRW	neutralized cladding removal waste
NRC	U.S. Nuclear Regulatory Commission
ORNL	Oak Ridge National Laboratory
OTP	operational test plan
PACE	plant and capital equipment
PACEE	project and capital equipment expense
PFP	Plutonium Finishing Plant
PHP	pneumatic-hydropulse
PMS	Project Master Schedule
PNL	Pacific Northwest Laboratory
PRICE	Productivity Improvement and Cost-Effectiveness [Program]

PUREX	Plutonium-Uranium Extraction [plant or process]
QA	quality assurance
QAPD	Quality Assurance Program Description
QE&C	Quality Engineering and Control
RCRA	Resource Conservation Reovery Act
RR	Readiness Review
SWBS	summary work breakdown structure
TOE	total operating efficiency
TPP	technology program plan
TRU	transuranic
TRUEX	Transuranic Extraction [process]
WBS	work breakdown structure
WESF	Waste Encapsulation and Storage Facility
WFQ	Waste Form Qualification
WMD	Waste Management Division (DOE-RL)

DOUBLE-SHELL TANK WASTE DISPOSAL INTEGRATION PLAN

1.0 INTRODUCTION

1.1 PURPOSE

The *Double-Shell Tank Waste Disposal Integration Plan*, hereafter referred to as the IP, defines the baseline processes, scope, schedule, and budget for implementation of double-shell tank waste disposal (DSTWD) as identified in the *Final Environmental Impact Statement: Disposal of Hanford Defense High-Level, Transuranic and Tank Wastes* (DOE 1987) and the associated Record of Decision (DOE 1988a). The IP also defines the procedure for changing the baseline. Westinghouse Hanford Company (Westinghouse Hanford), as the Hanford Site operations and engineering contractor, is responsible for cost, schedule, and technical program management of DSTWD on behalf of the U.S. Department of Energy-Richland Operations Office (DOE-RL). The IP functions as a summary-level baseline document for DSTWD.

The objective of the DSTWD Program is retrieval, pretreatment, and eventual solidification of all double-shell tank (DST) wastes. The tasks needed to meet this objective reside in the respective programmatic end functions for planning, budget, cost, and schedule reporting:

- Defense High-Level Waste Technology Program (W1H)
- Double-Shell Tank Farm Program (W1B)
- Double-Shell Tank Waste Pretreatment Program (W1D)
- Hanford Waste Vitrification Plant Project (V)
- Grout Disposal Program (W1P).

1.2 OVERVIEW

The IP is divided into the following sections:

- Section 1.0, Introduction--provides a summary of the plan and of the program in terms of mission needs, facilities and processes, and technical requirements.
- Section 2.0, Program Objectives and Assumptions--defines in more detail the objectives established to support the mission needs and process technical requirements. Supporting assumptions and performance criteria are included.
- Section 3.0, Program Description--identifies the elements of the DSTWD Program, including technology development for waste characterization, waste retrieval and waste pretreatment, retrieval and storage operations, pretreatment operations, vitrification, and grout disposal.

- Section 4.0, Program Organization and Responsibilities--depicts the organizational and functional relationships that have been established to achieve the objectives and manage the DSTWD activities.
- Section 5.0, Program Management, Control and Integration--documents the overall approach to be used in establishing and controlling program baseline and integrating the work plan and program performance measurement techniques. This section includes the change-control procedures.
- Section 6.0, Program Baseline--provides the technical, scope, schedule, and budget baseline for DSTWD.
- Section 7.0, Quality Assurance (QA)--describes basic QA requirements and responsibilities applicable to DSTWD.
- Section 8.0, References--provides supporting documentation for the DSTWD Program.

1.3 BACKGROUND

The principal purpose of the DSTWD Program is to recover those radioactive waste solutions and solids presently stored in double-shell tanks (DST) and to immobilize them as solid material for disposal. Solidification will be accomplished by vitrifying the high-level and transuranic (TRU) fraction for disposal in a geologic repository and converting the low-level fraction to grout for disposal in vaults. Grout vaults are Resource Conservation and Recovery Act (RCRA) compliant disposal units for mixed waste as well as low-level waste (LLW). A diagram of DSTWD is shown in Figure 1-1.

Four waste types have been identified for feed to vitrification, with preceding pretreatment: neutralized current acid waste (NCAW), complexant concentrate (CC), Plutonium Finishing Plant (PFP) waste, and neutralized cladding removal waste (NCRW). Each waste has certain chemical properties and constituents that require specialized pretreatment to reduce the disposal cost. This pretreatment is accomplished by separating these wastes into a low-volume, high-level, and TRU waste fraction and a relatively high-volume, low-level waste fraction. Certain other DST waste types, such as double-shell slurry (DSS) and phosphate-sulfate waste*, are anticipated to be directly disposed as grout without pretreatment.

The primary elements of the DSTWD Program are (1) technology development, (2) waste retrieval and interim feed storage, (3) waste pretreatment, (4) Hanford Waste Vitrification Plant (HWVP) Project design, technology development, waste form qualification, construction, and operations, and (5) grout operations. These elements reside in their respective end functions. This plan consolidates these elements as a program for identifying key interfaces and reporting progress.

Technology refers to activities under the Defense High-Level Waste Technology end function (W1H). These activities are waste characterization, waste retrieval development, and pretreatment process development.

*Phosphate-sulfate waste is not considered a DST waste; however, for completeness of cost and schedule reporting, it will be included within the scope of this IP.

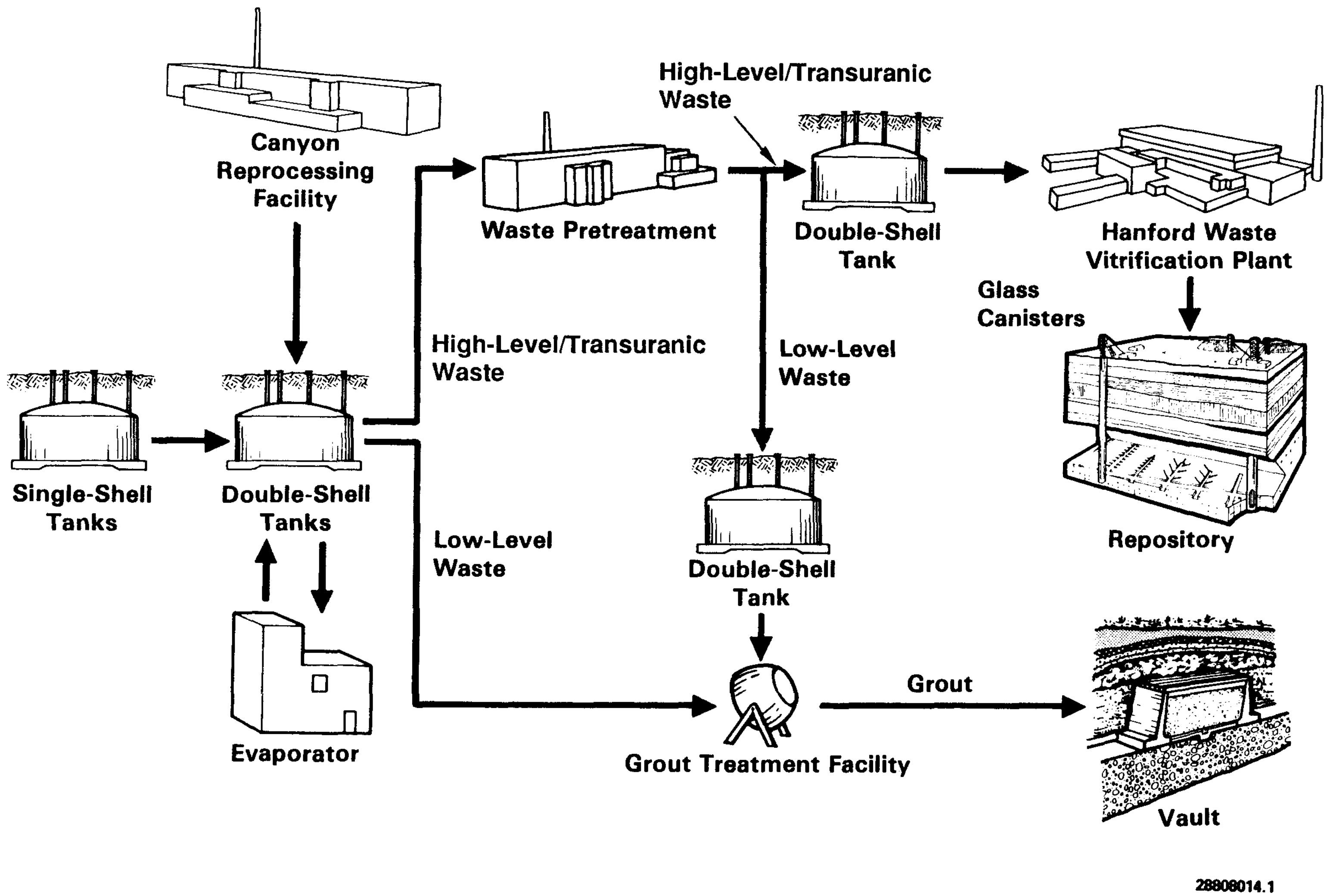


Figure 1-1. Double-Shell Tank Waste Disposal.

Waste storage and retrieval are the activities in the Double-Shell Tank Farm end function (W1B). These activities include the installation of mixer-pumps and related electrical distribution system upgrades. New, direct transfer routes from the DST farms to B Plant will be constructed in the mid-1990's. This activity also includes post-pretreatment storage, retrieval, evaporator operations, transfer operations, and projects that contribute to DSTWD.

The DST Waste Pretreatment end function (W1D) will process the various recovered waste forms at B Plant into streams suitable for feed to the HWVP and Grout Treatment Facility (GTF). These activities include the following:

- Refurbishment and upgrading the 244-AR Vault to perform an NCAW sludge washing demonstration in FY 1994 and subsequent pretreatment operations
- Preparation of B Plant for pretreatment operations, including cesium removal
- Installation of the Transuranic Extraction (TRUEX) process
- Pretreatment of NCRW, PFP waste, and CC
- Installation of complexant destruction processing equipment.

The Grout Disposal Program end function (W1P) is the operation (including vault construction) of the GTF to solidify and dispose of the LLW fraction in near-surface vaults. As the GTF is a new facility, no major upgrades are presently identified; however, support to future capital projects will be provided.

The HWVP Project (V) will vitrify the pretreated high-level and TRU wastes to a form suitable for geologic repository disposal. Vitrification includes the design, construction, startup, and operation of the HWVP. The technology, waste form qualification, design, procurement, construction, startup, and supporting safety, environmental, and quality assurance activities will be managed by the Projects Department for the DSTWD Program. This activity also includes vitrification technology development and waste form qualification activities necessary to support design, operations, and acceptance by the geological repository program of the vitrified waste for geologic disposal.

2.0 PROGRAM OBJECTIVES AND ASSUMPTIONS

The objective of the DSTWD Program is the on-schedule and within-budget retrieval of existing and planned DST wastes, pretreatment, of the retrieved wastes, and solidification of DST wastes for disposal at either the HWVP or the GTF. This objective is the implementation of the Record of Decision (DOE 1988a) for DST wastes from the *Final Environmental Impact Statement: Disposal of Hanford Defense High-Level, Transuranic, and Tank Wastes* (DOE 1987).

2.1 TECHNICAL OBJECTIVES AND ASSUMPTIONS

The overall technical objective of the DSTWD Program is the retrieval, pretreatment (as required), and solidification for disposal of DST wastes. To meet this overall objective, waste characterization and technology development will be required. Sampling, using the existing methods (e.g., core sample truck), and analysis in both the Westinghouse Hanford and Pacific Northwest Laboratory (PNL) facilities will be performed to support technology development and operational activities. Technology development for retrieval, pretreatment, and vitrification processes will be performed to support DSTWD.

Waste retrieval from DSTs is required prior to pretreatment for disposal. The basic technology for retrieval will use Savannah River Plant-type mixer-pump technology for mobilization of waste sludges and Hanford Site transfer pumps for removal of the waste from DSTs. The waste will be transferred from the DSTs to AR Vault, B Plant, the HWVP, and the GTF using existing and planned transfer lines. The 244-AR Vault will be used until completion of NCAW processing. Full-scale NCAW and post-NCAW processing will make use of the Project W-028 transfer lines when available. The 242-A Evaporator-Crystallizer upgrades are completed, and DST space is available to support all DSTWD activities.

Pretreatment of certain DST waste types is necessary to meet HWVP feed requirements. The planned total volume of wastes requiring pretreatment is shown in Table 2-1. The NCAW will be pretreated using solids washing, followed by solid-liquid separation, and ion exchange for removal of cesium from supernatant. The solids washing and solid-liquid separation will be performed in the 244-AR Vault with final filtration and ion exchange at B Plant.

After completion of NCAW pretreatment, NCRW and PFP waste will be pretreated using the TRUEX process, followed by CC waste using the TRUEX process coupled with destruction of organic complexants. Cesium removal from CC will be accomplished by ion exchange if required to meet grout feed requirements. All these waste types will be pretreated in the B Plant Facility at rates that support HWVP operations. The B Plant will undergo facility upgrades to perform the DST waste pretreatment mission. B Plant is in compliance with current codes and standards in most areas. Approximately 1,000 requirements were reviewed resulting in less than 40 areas requiring attention. Facility upgrades will be performed to new facility standards; however, B Plant will not attain new facility compliance standards.

Other DST waste types, such as DSS and phosphate-sulfate waste, will be fed directly to the GTF without pretreatment. Sampling and characterization activities are ongoing to confirm that these waste types will not require any additional treatment to meet criteria for disposal in grout.

Table 2-1. Planned Volume of Double-Shell Tank Waste for Pretreatment.

Waste type	Total volume (Mgal)	Composition
Neutralized current acid waste (NCAW)	1.9	Iron hydroxide sludge, contaminated with actinides and strontium; alkaline supernate, contaminated with cesium
Complexant concentrate (CC)	4.3	Waste from previous strontium and cesium recovery operations; contains actinides, organics, and ^{137}Cs
Plutonium Finishing Plant (PFP) waste	0.4	Iron containing sludge contaminated with actinides
Neutralized cladding removal wastes (NCRW)	0.8	Zirconium containing sludge contaminated with actinides

PST89-3003-2-1

The high-level and TRU fractions of DST waste will be vitrified in the HWVP to meet geologic repository acceptance criteria. A 100 kilogram per hour (kg/h) melter will be used to produce an average of 320 canisters of glass per year. Vitrification operations will produce a liquid waste that will be returned to the DSTs. This liquid waste will be directly disposed at the GTF.

The GTF will dispose of the LLW fraction of DST waste in vaults as a cementitious grout. Feed to the GTF will be pretreated supernate from NCAW, CC, PFP waste, NCRW, and other DST waste types not currently planned to be pretreated. The currently planned GTF mission calls for 44 campaigns, including phosphate-sulfate waste.

A list of technical assumptions used in the development of this IP, including an assessment of potential impacts, is provided in Appendix A.

2.2 SCHEDULE OBJECTIVES AND ASSUMPTIONS

The schedule for DSTWD is developed to support several key milestones. Waste characterization, retrieval and pretreatment development, as well as tank farm, 244-AR Vault and B Plant readiness are scheduled to support the start of the NCAW pretreatment demonstration in October 1993. Other major milestones are the completion of NCAW pretreatment operations in September 1997 and the completion of the TRUEX process installation in B Plant in October 1997.

The pretreatment demonstration and operation schedule is developed to support the startup of the HWVP in December 1999 and HWVP continuous operations, as much as possible, through the completion of the DST waste processing mission in FY 2005.

Operation of the GTF will dispose of the low-level fraction of DST waste and increase the available DST space. The GTF will process 14 campaigns of waste through the end of FY 1994 and will process, as waste is available, up to 4 campaigns per year through the completion of the DST waste processing mission. Processing of 14 grout campaigns through FY 1994 is assumed to require no additional upgrades or equipment to retrieve the waste.

Table 6-2 identifies the milestones established for DSTWD. A detailed list of assumptions used in schedule development is shown in Appendix B.

2.3 COST OBJECTIVES AND ASSUMPTIONS

The basis for funding DSTWD is the FY 1992 Environmental and Defense Waste Five-Year Plan. Additional activities required to achieve the objectives of Option B (NCAW sludge washing demonstration in 244-AR Vault in October 1993 and accelerated TRUEX process installation in B Plant as a 1993 line item) are included. The dollars shown in Table 6-1 reflect budget authority (BA); consequently, reprogramming dollars in FY 1989 carried over into FY 1990 are shown in the FY 1989 column. The funding of $24 million in FY 1990 for the Liquid Effluent Retention Facility (LERF) is also included.

This page intentionally left blank.

3.0 PROGRAM DESCRIPTION

3.1 PROGRAM OVERVIEW

In December 1987, the *Final Environmental Impact Statement: Disposal of Hanford Defense High-Level, Transuranic, and Tank Wastes* (DOE 1987) was issued. The preferred alternative called for existing and future DST wastes to be pretreated, if necessary, in B Plant for separation of the waste into TRU, high-level waste (HLW), and LLW fractions. The TRU and HLW fractions will be processed in the HWVP, which will solidify them into borosilicate waste glass for disposal in a geologic repository. The remaining LLW fraction will be mixed with grout in the GTF and disposed of in near-surface concrete vaults. The Record of Decision (DOE 1988a) selected this preferred alternative for disposal of DST wastes.

Implementation of disposal actions for DST wastes will involve technology development to determine the waste characteristics and develop retrieval and pretreatment processes, as well as operation of the DST tank farms, 242-A evaporator-crystallizer and supporting systems, 244-AR Vault, B Plant, HWVP, and the GTF. The baseline disposal steps for the DST waste types are shown in Figure 3-1.

3.2 TECHNOLOGY DEVELOPMENT

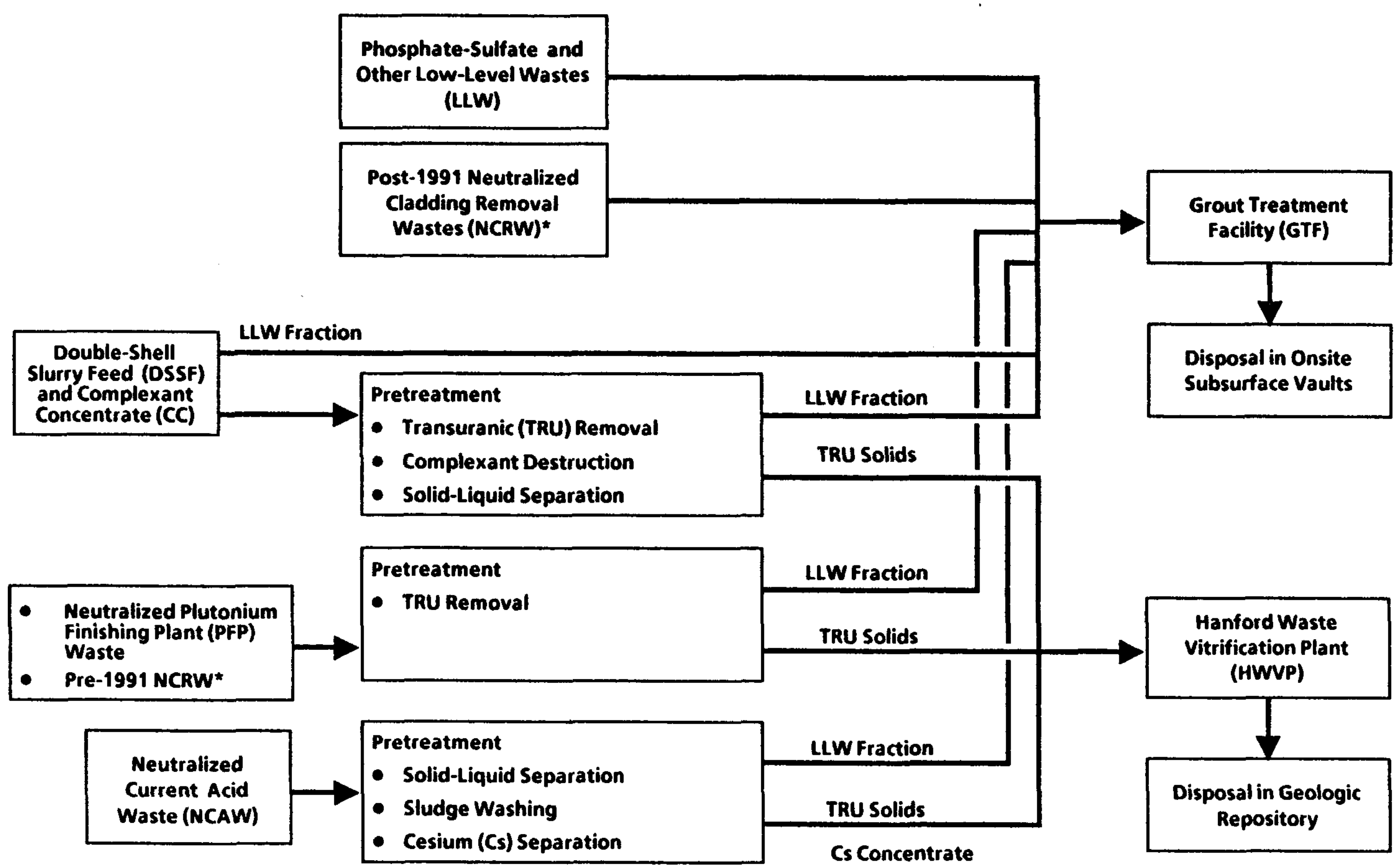
Disposal implementation for DST wastes requires specific technology to be developed and demonstrated. Characterization of existing and future DST wastes, development of waste retrieval and transfer technology, and development of waste pretreatment process technology are included. These technology activities are discussed in this section (3.2). Technology activities associated with continued operation of the waste facilities are included in Sections 3.3 through 3.6.

3.2.1 Waste Characterization

Waste characterization is necessary to determine retrieval requirements, pretreatment requirements to prepare waste for immobilization, and the final disposal waste-form option for the waste (i.e., grout or glass). Characterization is also required to efficiently manage existing space for the storage of future wastes consistent with the safe and cost-effective permanent disposal of all waste.

Samples for characterization of the waste will be obtained from process waste streams before storage in tanks and from waste stored in tanks. Rheological properties of the wastes will be determined from sampling and in situ characterization. Sampling techniques will be developed to provide samples for characterization.

The radionuclide, chemical, and physical composition of the waste will be determined to support technology development, disposal decisions, and operating programs. Analytical methods will be developed as necessary. All sample results are entered into a characterization data base.



*Modifications Implemented in Plutonium-Uranium Extraction (PUREX) Facility in 1991 to Generate Low-Level NCRW.

PS89-3003-3-1

Figure 3-1. Double-Shell Tank Waste Disposal Steps.

3.2.2 Waste Retrieval and Transfer

Development and demonstration of the technology for retrieval of certain DST wastes are required. Existing pumping techniques and facilities are considered to be adequate for retrieval and transport of dilute phosphate-sulfate waste and dilute supernatant liquids. These techniques and facilities will not be adequate for retrieval of NCRW, CC, NCAW, PFP waste, DSSF, and pretreated sludges being stored as feed to the HWVP. Retrieval techniques, including pump mixing, airlift circulation, high-shear pumping, and hydraulic sluicing, must be tested in pilot-scale equipment, and full-scale retrieval systems will be developed and implemented.

3.2.3 Waste Pretreatment

Existing and future waste stored in DSTs will become feeds to the grout and vitrification facilities. Certain pretreatment steps will be necessary to ensure that the waste feeds exhibit appropriate physical and chemical properties to avoid upsetting the immobilization process and to produce acceptable products. Feed preparation technology will be demonstrated in the Waste Encapsulation and Storage Facility (WESF). The feed pretreatment process for NCAW differs considerably from the pretreatment process for the other DST waste types. The pretreatment processes for NCRW, PFP waste, and CC waste will require the development of dissolution methods and suitable offgas treatment systems. Pretreatment of CC waste may require destruction of organic constituents.

The NCAW consists of sludges and supernatant resulting from neutralization of current acid wastes generated by the Plutonium-Uranium Extraction (PUREX) process. The NCAW sludge is a feed to the vitrification facility. A process for separating sludge and supernatant liquid in NCAW has been tested in B Plant. The sludge must be washed to remove sulfate, aluminum, and sodium salts.

The supernatant liquid from NCAW, following removal of ^{137}Cs, together with salts removed from the sludge constitutes feed to the grout immobilization facility. An ion exchange system, based on a nitric acid eluant, for the removal and concentration of cesium is undergoing laboratory testing to determine resin life expectancy and eluant concentrations. The crude concentrate of cesium from the ion exchange process will be combined with the NCAW sludge for transfer to a HWVP feed tank for vitrification.

A process for removing TRU elements from complexed waste liquors has been laboratory tested and will be further developed in pilot plant testing. Candidate methods for destroying organic complexants in CC waste have been identified and also will be developed in pilot plant tests. The TRU sludges resulting from the TRUEX process and the destruction of organic complexants in CC are candidate feeds to the vitrification facility. Negotiations between the U.S. Department of Energy (DOE) and the U.S. Nuclear Regulatory Commission (NRC) may result in additional cesium removal being required to allow CC supernatant to be disposed of as LLW. The LLW portion of CC will be immobilized in grout.

The NCRW consists of sludges and supernatant resulting from neutralization of PUREX process cladding removal waste. The NCRW sludge produced to date contains concentrations of TRU elements that preclude disposal as grout. The baseline plan involves retrieval of the sludge and dissolution in nitric acid to prepare it as a TRUEX process feed. The TRUEX process will be used to produce a concentrated TRU fraction suitable for vitrification and the remaining LLW volume will be suitable for disposal in grout.

Currently, acidic PFP wastes are neutralized and stored in a DST. The sludge portion of the neutralized waste contains concentrations of TRU elements that preclude grout disposal; the supernatant liquid is a LLW that can be immobilized in grout. As with NCRW, the baseline plan involves sludge retrieval and dissolution in nitric acid followed by the TRUEX process to produce a concentrated TRU fraction suitable for vitrification and a LLW fraction suitable for disposal in grout.

As a result of past B Plant operations, waste liquors in DSTs (CC and potentially some DSS waste) contain significant concentrations of organic materials that form chemical complexes with TRU elements. The mobility of complexed radionuclides in Hanford Site soils and sediments is largely unknown. Control of organic levels in the vitrification plant feed is required for process control and waste form qualification. Regardless of radionuclide concentrations, destruction of organic materials may be mandated by regulatory criteria to achieve permissible concentrations of organic materials in radionuclide wastes disposed of in grout form. Destruction of organic complexants is therefore included as part of the baseline pretreatment process.

3.3 WASTE STORAGE AND RETRIEVAL OPERATIONS

The 28 DSTs presently store approximately 17 million gallons of radioactive liquid, solids, and slurry. A total of about 32 million gallons of waste is expected to accumulate from processing by the year 2000. Retrieval, pretreatment, and disposal is required to manage the anticipated waste within the volume of the DSTs.

Preparation of the waste tanks and supporting systems to support DST waste disposal will include the following:

- Preparation of DSTs for receipt of waste
- Installation and operation of mixer jet pumps and retrieval systems
- Installation or refurbishment and operation of transfer pumps, lines, and related electrical and ventilation systems
- Operation of the 242-A Evaporator for reduction of DST waste volume, as part of disposal plans
- Safety and environmental compliance upgrades to the 244-AR Vault
- Facility modifications to of the 244-AR Vault for sludge washing of NCAW.

The NCAW is the initial DST waste identified for pretreatment and disposal. The NCAW from the PUREX Plant is stored in double-shell, aging waste tanks in the 241-AY or 241-AZ Tank Farms. The first NCAW to be processed will be taken from Tank 241-AZ-101 and consists of a blend of NCAW from processing of various N Reactor fuels. The NCAW will be recovered from the aging waste tanks for sludge washing in the 244-AR Vault, also providing a retrieval demonstration. A process demonstration, with a duration of six months, will pretreat up to 100,000 gal of NCAW.

The remaining waste retrieval system components will then be procured and installed to support processing of NCAW.

The NCAW will be transferred from the 241-AZ and 241-AY tanks to the 244-AR Vault. The solids will be washed and allowed to settle. The NCAW supernatant will then be decanted and transferred from the 244-AR Vault to B Plant for final filtration and cesium removal.

After pretreatment processing, a HLW fraction and a LLW fraction will be received in separate DSTs for interim storage before disposal. The selected DSTs will be prepared for receipt of these wastes. Retrieval systems will be installed to mobilize these waste fractions for transfer to the HWVP and GTF.

Continued DST waste pretreatment and disposal operations will require transfer line upgrades and continued maintenance.

3.4 WASTE PRETREATMENT OPERATIONS

Some types of DST waste will require pretreatment before processing at the HWVP and GTF for disposal. The use of B Plant for pretreatment of DST wastes is planned (DOE-RL 1988). Sludge washing at the 244-AR Vault will supplement the use of B Plant for pretreatment.

Operation of B Plant for DST waste pretreatment will include the following:

- Installation, operation, and maintenance of process equipment to separate DST waste into the HWVP and GTF feed streams
- Transfer of pretreated waste to interim storage in DSTs.

The NCAW is the initial DST waste identified for pretreatment and disposal. At the 244-AR Vault, the NCAW solids will be allowed to settle, and the supernate will be decanted as the first step of the solid-liquid separation. The objective is to separate the TRU- and strontium-bearing solids from the supernate. After the initial decant, the remaining supernate will be displaced by water washes. The slurried solids will be washed and recycled for solid-liquid separation until the sulfate and other critical soluble component levels meet the requirements for HWVP glass feed. The supernatant stream from the settle-decant process will be transferred to B Plant for further clarification by a pneumatic hydropulse filtration system.

The cesium contained in the filtered supernate will be removed by ion exchange at B Plant. Cesium-depleted supernate will be transferred to the DSTs for storage and/or concentration and eventual feed to the GTF. The recovered cesium will be transferred to the TRU- and strontium-bearing solids DST for HWVP feed.

B Plant will be further upgraded for pretreatment of NCRW, PFP waste, and CC. The TRUEX solvent extraction process will be used for pretreatment of NCRW and PFP waste. The TRUEX process coupled with organic complexant destruction will be used to pretreat CC. Cesium removal may also be required for CC.

3.5 WASTE VITRIFICATION OPERATIONS

The HWVP will process pretreated DST wastes into a borosilicate glass waste form suitable for disposal in a geologic repository.

The vitrification process includes five major process systems:

- Feed receipt and storage
- Melter
- Canister closure, decontamination, and storage
- Melter offgas and vessel vent system
- Radioactive waste treatment.

These remotely operated systems are located within cells in the vitrification building. Supporting cold chemical storage, makeup, control, and utility systems are in buildings adjacent to the vitrification building. Byproduct radioactive wastes, generated from the vitrification process, are either recycled or sent to the DSTs for eventual disposal as grout. Non-radioactive wastes will be treated for disposal according to site standards and systems.

Feed preparation includes addition of glass frit and chemicals, and concentration by evaporation. Concentrated slurry from feed preparation is fed into the melter where the remaining water is driven off and the solids are melted. The molten glass is poured into stainless steel canisters where it cools and solidifies. Filled canisters are sealed, decontaminated, and placed in storage to await shipment to a repository.

The HWVP project technology activities include vitrification process development and waste form qualification for the pretreated wasted identified for immobilization in glass. Other HWVP project tasks include preparation of required safety analyses and documentation, and obtaining of environmental permits for construction and operation of the facility.

3.6 GROUT IMMOBILIZATION OPERATIONS

The GTF consists of:

- A Dry Materials Facility (for receiving, storing and blending cementitious materials such as blast furnace slag, fly ash, cement and diluent materials)
- The Transportable Grout Equipment (for mixing liquid wastes with blended cementitious materials)
- Disposal vaults (for disposal of the solidified grout).

Initial grouting began in August 1988 using low-level phosphate-sulfate waste, which results from N Reactor operations. Grout feed streams include the low-level fraction of DST wastes from past, current, and future Hanford Site operations and the low-level fraction of liquid wastes from future pretreatment of waste feed streams destined for the HWVP. Several wastes will require pretreatment at B Plant before they are acceptable as feed to the grout process.

The GTF consists of a materials facility for preparing blended material, transportable grout equipment for mixing waste feed and dry-blended material, and grout disposal vaults. Tank 241-AP-102 (and, during certain processing scenarios, Tank 241-AP-104) in the AP Tank Farm will be used as the liquid-waste feed tanks. Radioactive waste materials will be transferred from the waste feed tank to the GTF by pumping solutions through underground and shielded aboveground pipes. The waste will be mixed with the dry-solid components, and the resultant grout slurry will be pumped to grout disposal vaults for curing.

Major activities requiring completion before initiation of the grouting of DST waste in FY 1991 include:

- Issuance of an approved Final Safety Analysis Report (FSAR)
- Issuance of required environmental compliance documentation including the performance assessment
- Completion of remaining technology items such as formal qualification of the grout formulation, development of decontamination solutions and procedures, and satisfactory demonstration of methods to measure grout quality (remote in vault/on-line from grout pump)
- Completion of vault construction including support equipment
- Completion of a formal readiness review process including the Dry Materials Facility, Transportable Grout Equipment, modified feed tanks (AP-103/104) and the disposal vaults.

This page intentionally left blank.

4.0 PROGRAM ORGANIZATION AND RESPONSIBILITIES

4.1 U.S. DEPARTMENT OF ENERGY-RICHLAND OPERATIONS OFFICE

As shown in Figure 4-1 field responsibility lies with the Waste Management Division (WMD) within the Assistant Manager for Operations, DOE-RL. The Director, WMD, is responsible for managing the resources of the end function programs that have DSTWD elements, including the approval of overall project control baselines, monitoring, and reviewing project activities, assuring compliance with DOE and DOE-RL Orders, and providing management guidance and direction to Westinghouse Hanford. Other matrix support is provided to the WMD as required from the DOE-RL organization, including the Defense Production Operations Division, Budget, Finance, Quality Assurance, Counsel, Environment and Safety, Safeguards and Security, Procurement, and Personnel.

In performing management activities, the WMD Director will oversee technology development operations activities and will exercise baseline control through the change-control process.

A major portion of the DSTWD is the design, construction, and startup of the HWVP. Managing the resources of the HWVP Project is the responsibility of the HWVP Project Division within the Assistant Manager for Research and Projects. The WMD will review and approve changes to the functional design criteria for HWVP. A detailed description of the organizational interrelationships for the HWVP Project is contained in the HWVP Project Plan, HWVP-89-001 U.S. Department of Energy-Headquarters (DOE-HQ).

4.2 WESTINGHOUSE HANFORD COMPANY

Westinghouse Hanford, as the Hanford Site operations and engineering contractor, has the responsibility for implementing DSTWD. Within Westinghouse Hanford, the Defense Waste Management Division (DWMD) has overall responsibility for DSTWD, and the Projects Department has the responsibility for the completion of supporting construction projects.

The DWMD and Projects Department are responsible for obtaining the necessary support from other Westinghouse Hanford organizations to complete the DSTWD mission. The DWMD organization and HWVP Project interfaces are shown in Figure 4-2.

4.2.1 Defense Waste Management Division

The Westinghouse Hanford DWMD has overall responsibility for development, implementation, and operation of DSTWD. The DWMD will support the DOE-RL WMD with management, coordination, control, and reporting of program activities.

Within the DWMD, a matrix organization has been established to execute the DSTWD Mission. The organization includes the mission manager working in concert with fully committed organizational elements matrixed from the various DWMD end functions and support departments. The DSTWD Mission organization is shown on Figure 4-3. Matrix relationships within DWMD and with other Westinghouse Hanford operating units are also shown.

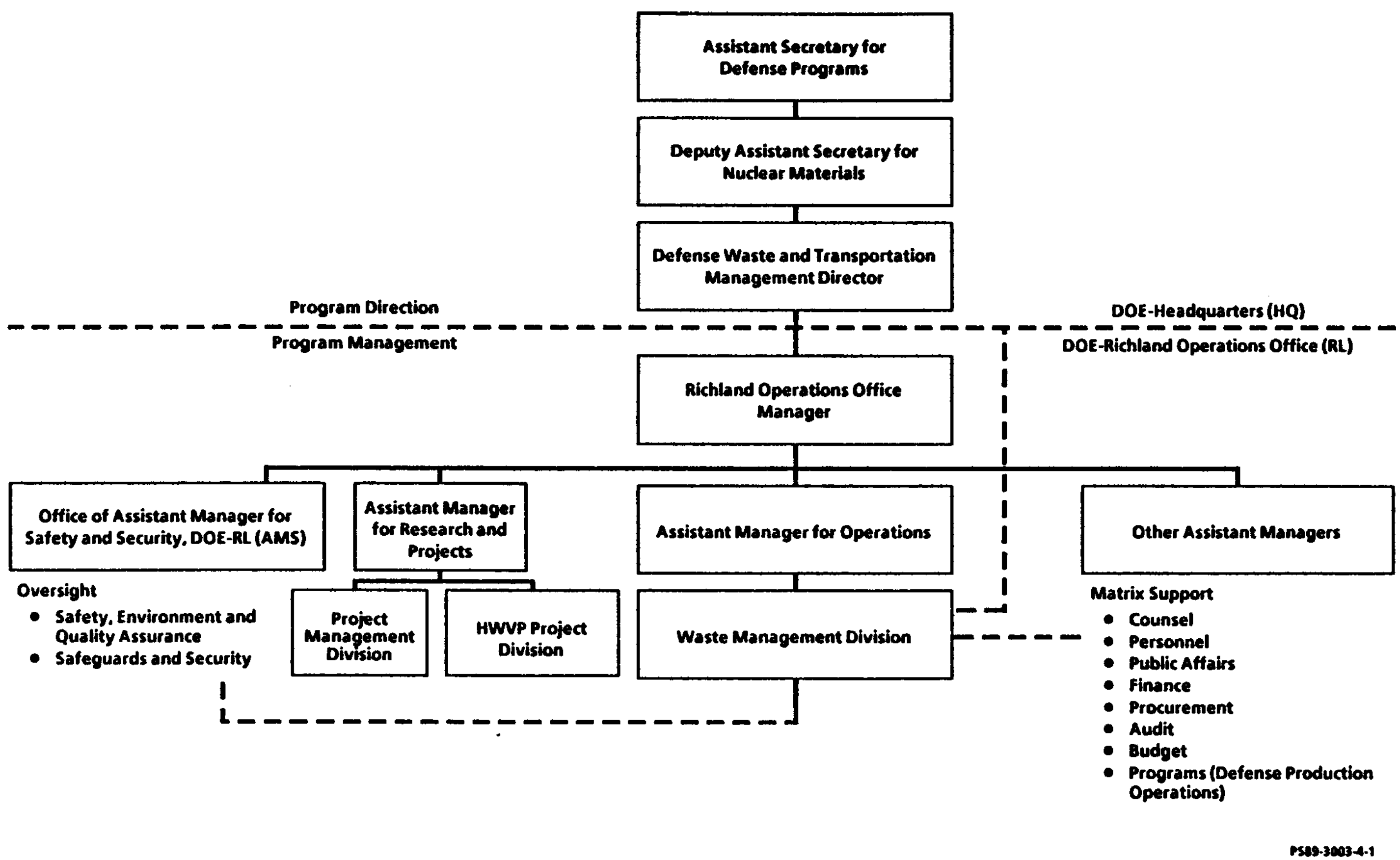
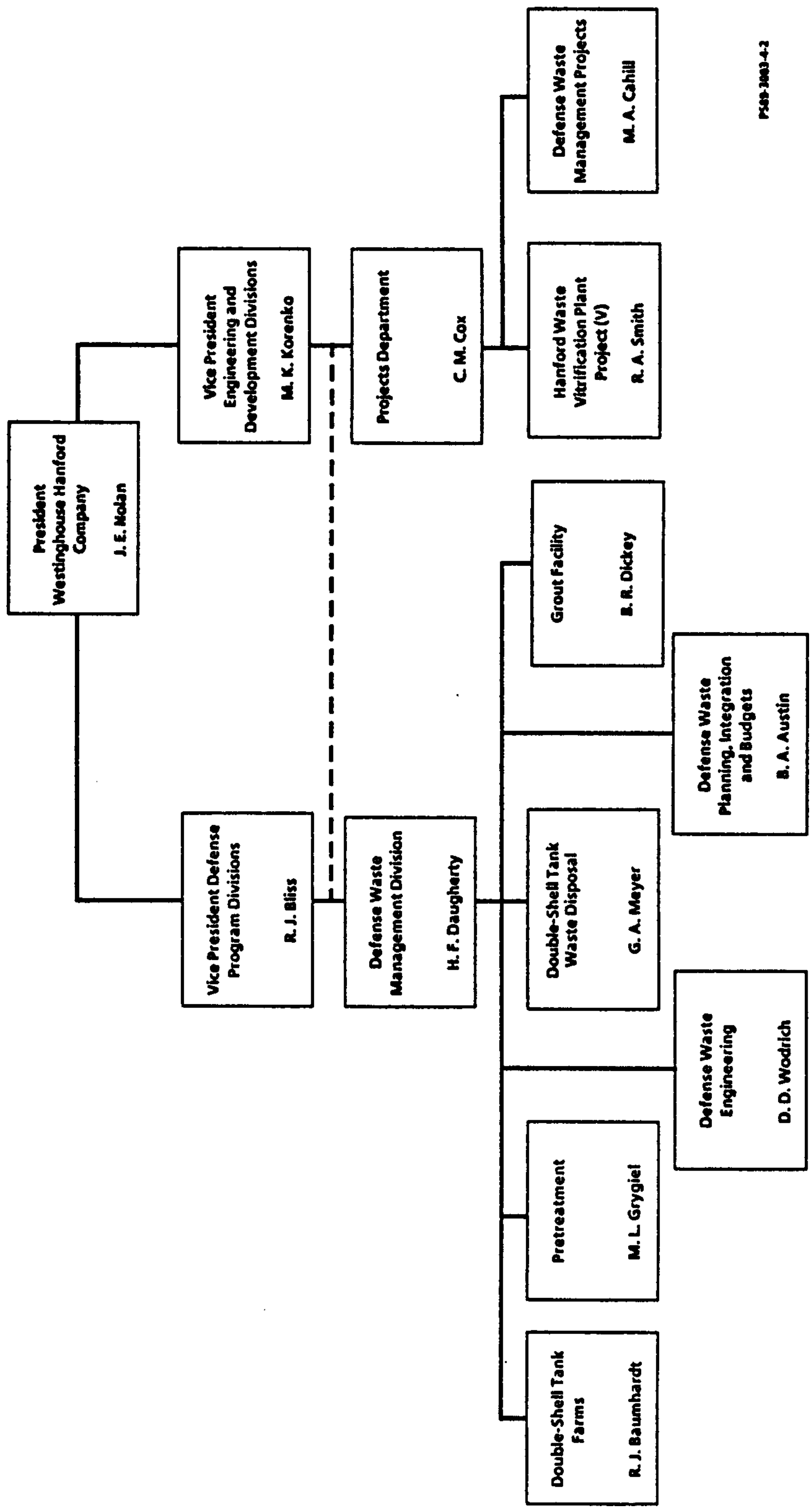


Figure 4-1. U.S. Department of Energy Program Management Relations.

Figure 4-2. Westinghouse Hanford Double-Shell Tank Waste Disposal Program Organization.



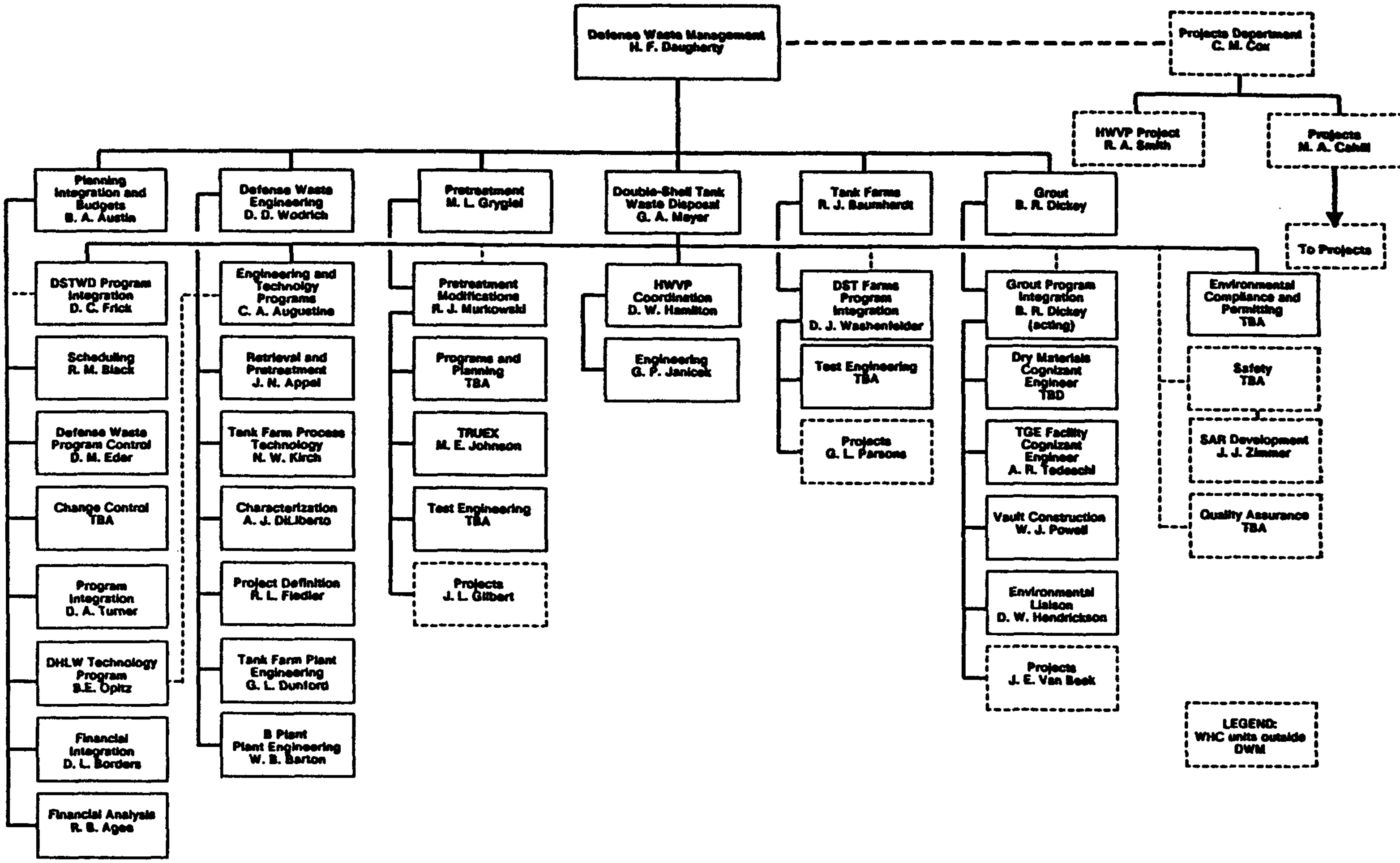


Figure 4-3. Double-Shell Tank Waste Disposal Mission Organization

4.2.1.1 Double-Shell Tank Waste Disposal Mission Staff. The DSTWD Mission staff is responsible for planning and managing all activities associated with DSTWD that are not specifically assigned to the HWVP Project. The DSTWD manager will serve as the principal point of contact between Westinghouse Hanford and DOE-RL. The DSTWD manager will negotiate budget, schedule, work scope, and milestones with the DOE-RL and will report to the DOE-RL on the DWMD end functions associated with DSTWD. The DSTWD manager will be responsible for initiating, reviewing, and approving Class I and Class II changes.

The DSTWD mission staff have been assigned the following functions:

- Integration of activities and maintenance of the formal interface between DWMD and the HWVP Project
- Integration of engineering activities performed by DWMD
- Integration of schedules, budgets, and milestones between participating DWMD end functions
- Integration of environmental compliance and permitting activities
- Coordination with Westinghouse Hanford units outside DWMD to ensure that the full resources of Westinghouse Hanford and particularly those of the Safety and Quality Assurance organizations are effectively applied to the DSTWD Mission.

4.2.1.2 Defense Waste Planning Integration and Budgets. Defense Waste Planning Integration and Budgets (DWPIB) will provide the DSTWD Program with program control support. The DWPIB will prepare and maintain budget and schedule reporting documents and will prepare the annual budget submittals for the end functions associated with DSTWD Mission. The DWPIB will report on earned value performance, administer the change control log, and prepare monthly reports.

4.2.1.3 Defense Waste Engineering. Defense Waste Engineering (DWE) is responsible for technical support to the DSTWD Program. The DWE is responsible for performing technology development, maintaining design criteria documentation, performing engineering studies, preparing technical requirements documents, preparing FSARs and preparing operating procedures and specifications for DSTWD. The DWE will approve all technical documentation associated with the DSTWD Program including the HWVP Project.

4.2.1.4 Defense Waste Pretreatment. Defense Waste Pretreatment (DWP) is responsible for operating the DST waste pretreatment processes at B Plant and 244-AR Vault. The DWP is responsible for the readiness of B Plant and 244-AR Vault to initiate operations, maintain the facility for pretreatment operations, and operate the facility to pretreat DST waste to meet HWVP and grout feed specifications. The DWP is responsible for performing operability reviews of the HWVP.

4.2.1.5 Tank Farms. Tank Farms is responsible for operating the DSTs, the 242-A Evaporator, mixer-pumps, transfer pumps, and the supporting facilities to support DSTWD. Tank Farms is responsible for the readiness of the tank farm facilities to initiate DSTWD operations, maintaining the facilities to support DSTWD, and operating the facilities to support the DSTWD mission.

4.2.1.6 Grout Facility. Grout Facility is responsible for developing and verifying the technology for grouting of waste, characterizing the waste feed and qualifying the waste form before actual waste feed grouting, providing required modification at both the dry material facility and transportable grout equipment to assure successful grout operations, constructing grout disposal vaults, preparing supporting safety and environmental documentation and operating the facilities in a safe and efficient manner.

4.2.2 Projects Department

The Westinghouse Hanford Projects Department has the overall responsibility for completion of construction projects. Within the Projects Department, the HWVP Project has overall responsibility for technology development, waste form qualification, design, construction, and startup of the HWVP. The HWVP Project is responsible for providing the HWVP to meet the DSTWD mission. The HWVP Project also has overall responsibility for preparation of safety documentation, environmental permits, startup and operations documentation, operator training, operational readiness reviews, and all project management activities. Responsibility for completion of projects for the Defense Waste Management Division lies within Defense Waste Management Projects.

5.0 PROGRAM MANAGEMENT, CONTROL, AND INTEGRATION

5.1 PROGRAM MANAGEMENT CONTROL SYSTEM

The DSTWD Program will be in accordance with the Westinghouse Hanford management control system (MCS) as required by DOE Order 2250.1C, *Cost and Schedule Control Systems Criteria for Contract Performance Measurement* (DOE 1988c). The primary purpose of the management control system is to provide a method for planning, authorizing, and controlling work so that it can be completed as defined, on schedule, and within budget. The MCS is focused on the establishment and control of a baseline for DSTWD, comprised of well defined portions of the Defense Waste Management Program.

5.2 CHANGE CONTROL

The control of changes within the DSTWD Program will be through the MCS change-control procedures. Changes will be documented by preparing a change request (CR) form (Figure 5-1).

5.2.1 Change Approval

The CR documentation will be dispositioned by either an approval, approval as amended, disapproval, or deferral. The change originator, change-control administrator, and change board will identify the appropriate review and approval authority. The approval authority is summarized in Table 5-1.

Changes that are originated by or affect the HWVP Project will have review and approval by the Change Evaluation Board before submittal to DOE-RL for Change Control Board review and approval.

5.3 PROGRAM INTEGRATION

Responsibility for overall integration of the five end-function, DSTWD elements resides with the DSTWD Manager. The DSTWD Program Integration will assure that the technical, budget, scope, and schedule baseline (representing completion of the work) is controlled, according to the procedures identified in this DSTWD IP.

5.4 PROGRAM REPORTING

The DSTWD Program Integration is responsible for the preparation and issuance of reports based on MCS DATA and schedule status provided by DWPIB. The MCS is designed to have an upward flow of integrated, summarized information from the program to the DOE-RL WMD, PMD, and HWVP Division, and then to DOE-HQ, ensuring timely reporting and decision making on DSTWD issues.

Figure 5-1. Change Request Form.

CHANGE REQUEST
(PROGRAMS AND SITE) PAGE 1 OF ________

CIN (3)
Date
Rev.

Program/Project Title (1) ☐ Program Plan Affected

Originator (4)
Organization

Change Title (2)

Phone
Date

(5) **BASELINE IMPACT**
☐ Work Scope ☐ Funds
☐ Budget ☐ Contingency
☐ Schedule ☐ Staffing
☐ Technical

(6) **PRIORITY**
☐ Emergency
☐ Urgent
☐ Routine

(7) **CLASS**
☐ I
☐ II
☐ III
☐ CRP

Cost Impact * (8)
B&R Code
Schedule Impact (9)
Manhours Impact (10)
Staffing Plan Affected ☐ Yes ☐ No

DESCRIPTION (Attach pages as necessary)
(11)

COST ACCOUNTS AFFECTED

JUSTIFICATION (Include impact if not implemented. Attach pages as necessary.)
(12) (Reasons for revision)

(13) **DISPOSITION**
☐ Approved
☐ Approved as Amended
☐ Disapproved
☐ Deferred

ORGANIZATIONAL IMPACT (15)

Org.	Manhours	Dollars	Org.	Manhours	Dollars
☐ Def. Reactor			☐ Projects		
☐ Chem. Process.			☐ Civ. W. M.		
☐ Def. W. M.			☐ Ops. Support		
☐ Def. Prog. Planning			☐ E.S.&S.		
☐ Adv. Reactor Dev.			☐ Resource Alloc.		
☐ Surplus Fac. Mgmt			☐ Other		
☐ Engineering			________		

(14) **FUNDING SOURCE**

	Capital	Expense
Contingency		
Mgmt. Reserve		
Baseline Funds		

Cost Account Mgr./Perf. Org. Mgr.	Date	Program Administration		☐ DOE Directed Change Implement Change Prior to DOE Approval Program/Project Director Date
Activity Manager	Date		Date	DOE-RL APPROVAL Name Date
End Function Manager	Date	Program Manager	Date	Name Date

Page 1 of ______

54-6100-633 (08/87)

Table 5-1. Double-Shell Tank Waste Disposal Change-Control Approval Authority.

Change class	Change Control Board[a]	DOE-RL Branch Chief	Change Evaluation Board[a]	Double-Shell Tank Waste Disposal Manager	Defense Waste Planning Integration and Budgets	End Function or Level III Manager	Cost Account Manager
I Programs		A		A	A	A	
I MSAs/MPs[a]	A		A	R[b]		A	
II Programs				A	A		A
II MSAs/MPs			A	R[b]			

[a]For major system acquisitions (MSA) and major projects (MP) Change Control Board/Change Evaluation Board (CCB/CEB) is the approval authority, except as noted in (b).
[b]MSA/MP CCB/CEB action affecting Double-Shell Tank Waste Disposal Program Class I, II baselines requires program change Class I, II authority approvals.
A = Approve.
R = Review.

PST88-3373-5-1

This timely reporting is accomplished by the following:

- Defining DSTWD in a disciplined manner from the total program level to detailed, manageable packages of work in each end function for which a technical scope of effort and associated schedule and budget are established and responsibility for performance of the work is assigned
- Ensuring that the contributing end function program teams are interfaced and are capable of organizing, planning, scheduling, budgeting, accounting, and reporting work in a timely, consistent manner
- Obtaining technical, schedule, cost, and funding information in the format and level of detail necessary to meet DSTWD management and reporting needs
- Integrating and submitting data to derive DSTWD progress against planned accomplishments
- Evaluating and analyzing the information to identify potential problems, developing alternative corrective actions to be taken, and permitting management to make informed decisions
- Correlating the project funding profile with planned commitments, expenditures, and work accomplished to date
- Processing the information for exception reporting.

Program reporting provides timely, accurate exception data to apprise the program team and DOE management of current and projected program conditions. Information contained in these reports is obtained from the same data base that supports day-to-day management by the program team.

The cost and schedule status for DSTWD will be prepared by extracting the requisite elements of the contributing end function's cost performance reports (CPR), consolidating the elements to provide meaningful evaluation of progress, and reporting that progress on the consolidated basis.

The DSTWD status will be submitted on a monthly basis and will be in the same format used for the contributing end-function reports to the maximum practical extent. This report includes the following:

- Progress During Reporting Period
- Major Problem Areas and Corrective Action
- Performance Status (Schedule and Cost Variances)
- Major Milestone Status
- Change Control Log Status
- Planned Activities.

6.0 PROGRAM BASELINE

6.1 TECHNICAL BASELINE

Disposal of DST wastes involves retrieval and transfer of the wastes from DSTs; pretreatment, if required, at B Plant; and solidification, at either HWVP or GTF, for final disposal. The summary technical baseline for DSTWD is depicted graphically in Figure 6-1.

The DST wastes are categorized into one of six categories depending on source and waste composition. Two of these waste types (DSSF and phosphate-sulfate waste) will be disposed by retrieval and direct grouting at the GTF. The other four DST waste types (NCAW, CC, PFP waste, and NCRW) will require pretreatment for separation into a HWVP feed and a GTF feed portion. Figures 6-2 through 6-5 show a more detailed depiction of the baseline pretreatment for these waste types. A more detailed technical description is contained in Section 3.0, Program Description.

6.2 SCOPE BASELINE

The scope baseline for the DSTWD Program is identified in the summary work breakdown structure (SWBS). The SWBS is made up of well-defined portions of the Defense Waste Management Program, as described in the program plan (WHC 1988), as modified by the *Hanford Federal Facility Agreement and Consent Order*, (EPA 1989), study work performed in assessing double-shell tank waste pretreatment options, and direction from DOE-RL . The scope baseline is further defined by the HWVP work breakdown structure (WBS), which is maintained separately.

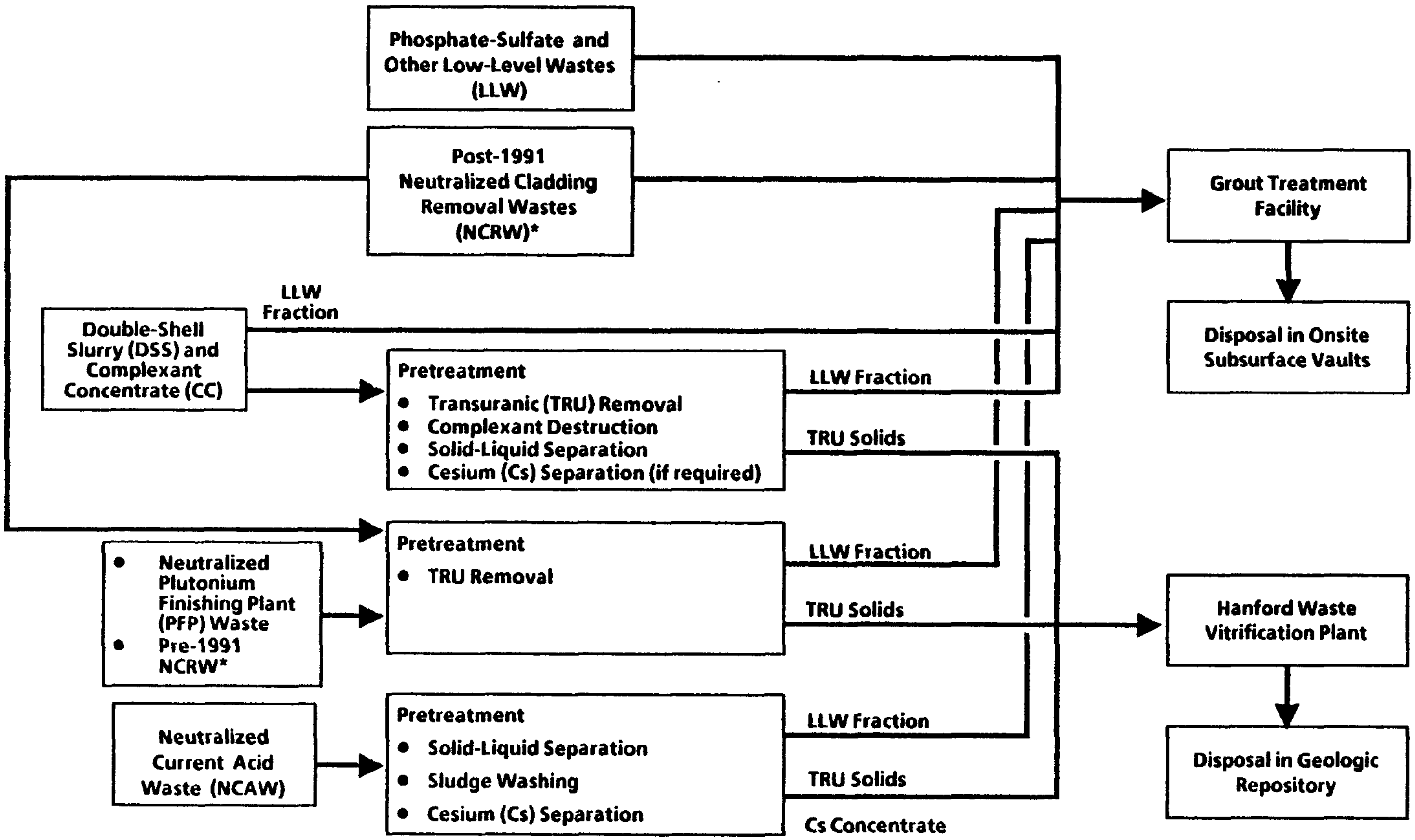
The SWBS for the DSTWD Program is shown in Figure 6-6 and depicts a single, common structure for definition and control of all DSTWD work. Level 2 WBSs for each end function supporting the SWBS are defined to the Cost Account level and are shown in Figures 6-7 through 6-11. The assumptions used to select the WBS elements for DSTWD cost and schedule reporting are provided in Appendixes B (Schedule Assumptions) and C (Budget Assumptions).

6.3 BUDGET BASELINE

This subsection presents the funding needs for implementation of DSTWD at the Hanford Site (Table 6-1). The values are expressed in the respective year dollars for FY 1988 through FY 1991 and in FY 1992 dollars for FY 1992 through FY 2008. The spreadsheet (Table 6-1) is accompanied by brief explanatory notes. The budget identified in the spreadsheet contains only the values required to accomplish the DSTWD Program. An explanation of the underlying assumptions is given in Section 2.3.

6.3.1 Technology Development

The technology development budget includes the work scope identified in the FY 1989 program plan (WHC 1988) that supports implementation of disposal for DST wastes.



*Modifications Implemented in Plutonium-Uranium Extraction (PUREX) Facility in 1991 to Generate Low-Level NCRW.

PS89-3003-6-1

Figure 6-1. Technical Baseline for Disposal of Double-Shell Tank Wastes.

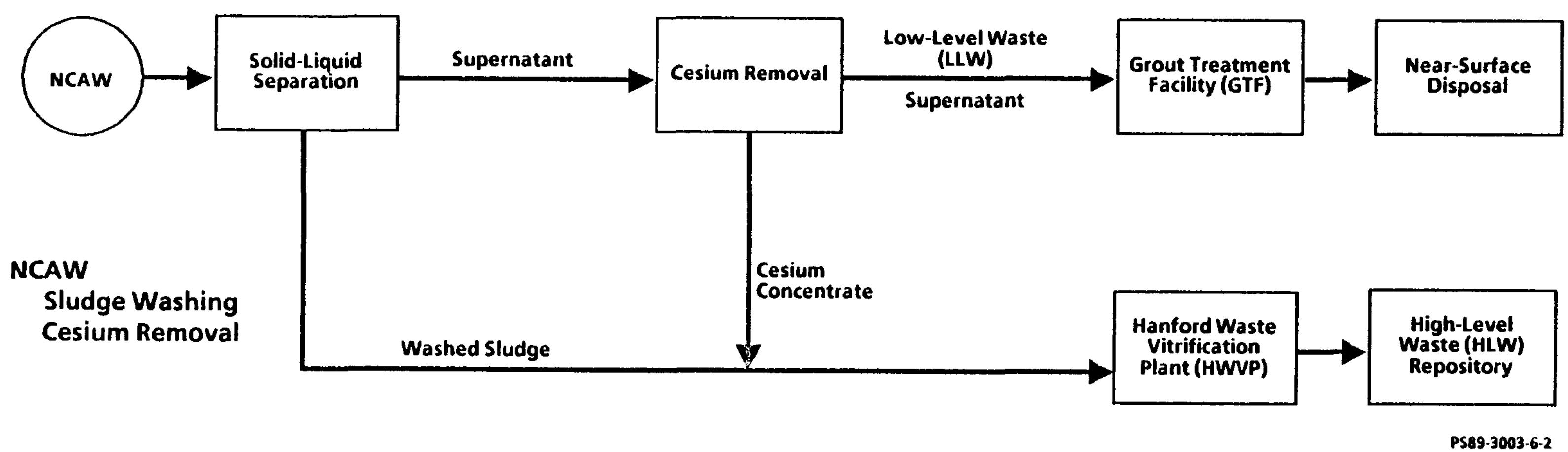
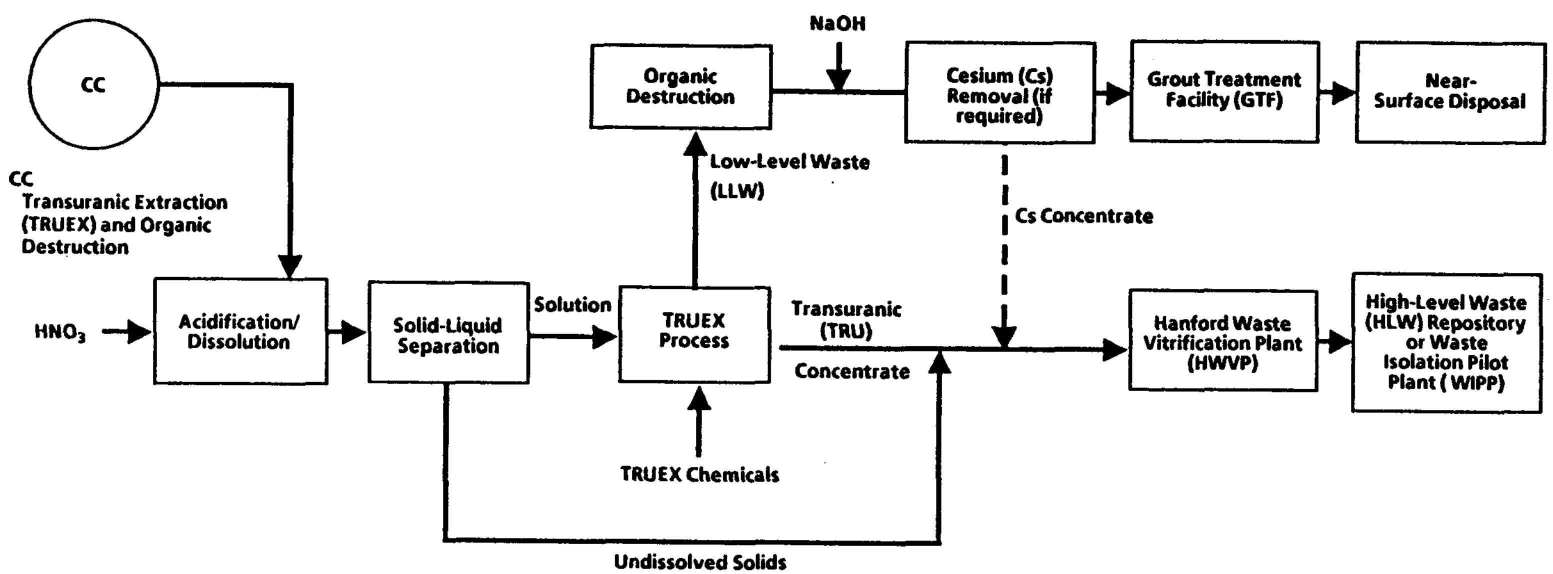


Figure 6-2. Neutralized Current Acid Waste (NCAW) Pretreatment and Disposal.



PS89-3003-6-3

Figure 6-3. Complexant Concentrate (CC) Pretreatment and Disposal.

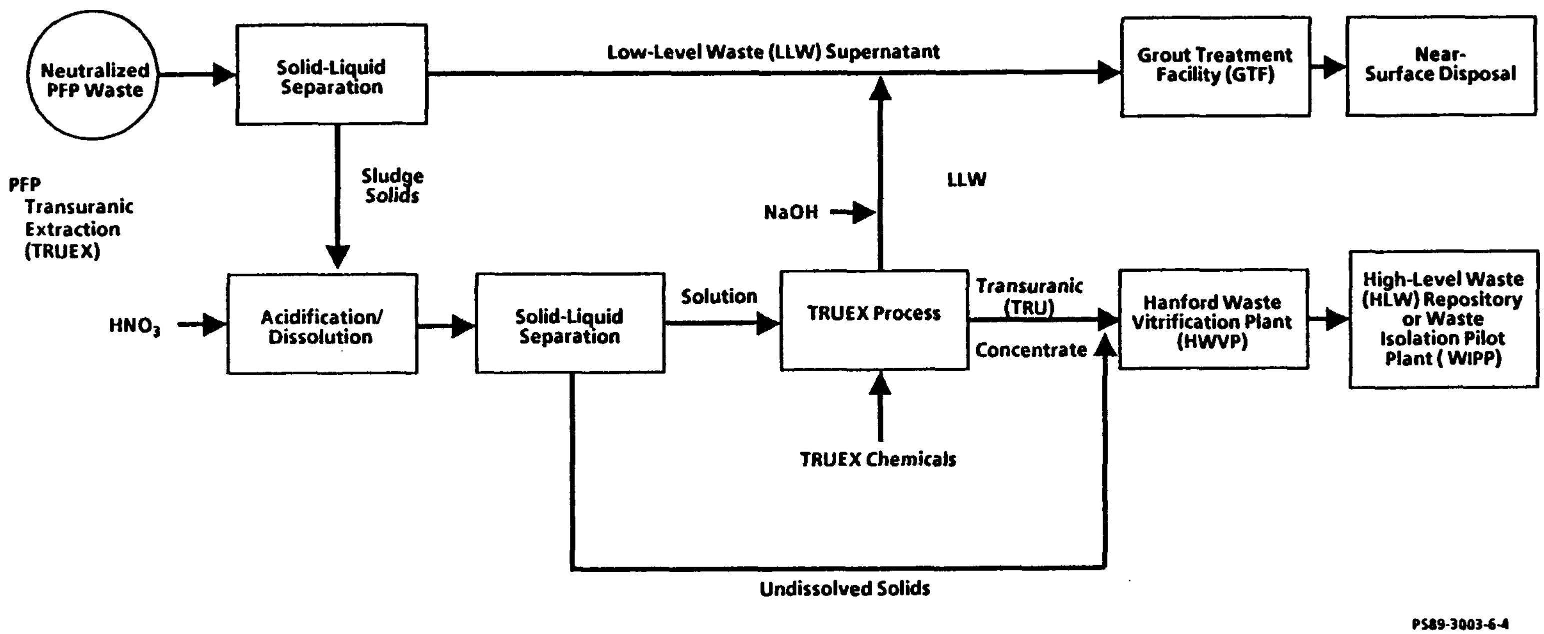


Figure 6-4. Plutonium Finishing Plant (PFP) Pretreatment and Disposal.

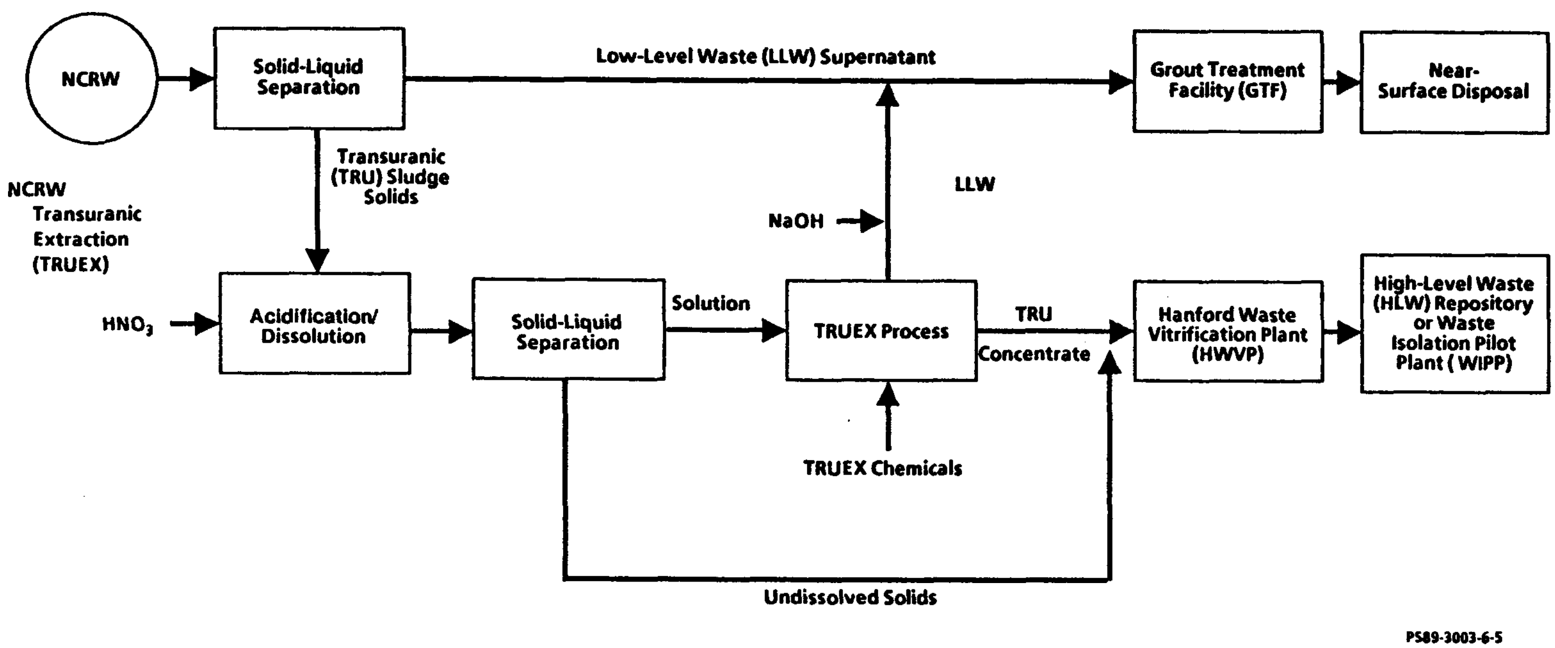


Figure 6-5. Neutralized Cladding Removal Waste (NCRW) Pretreatment and Disposal.

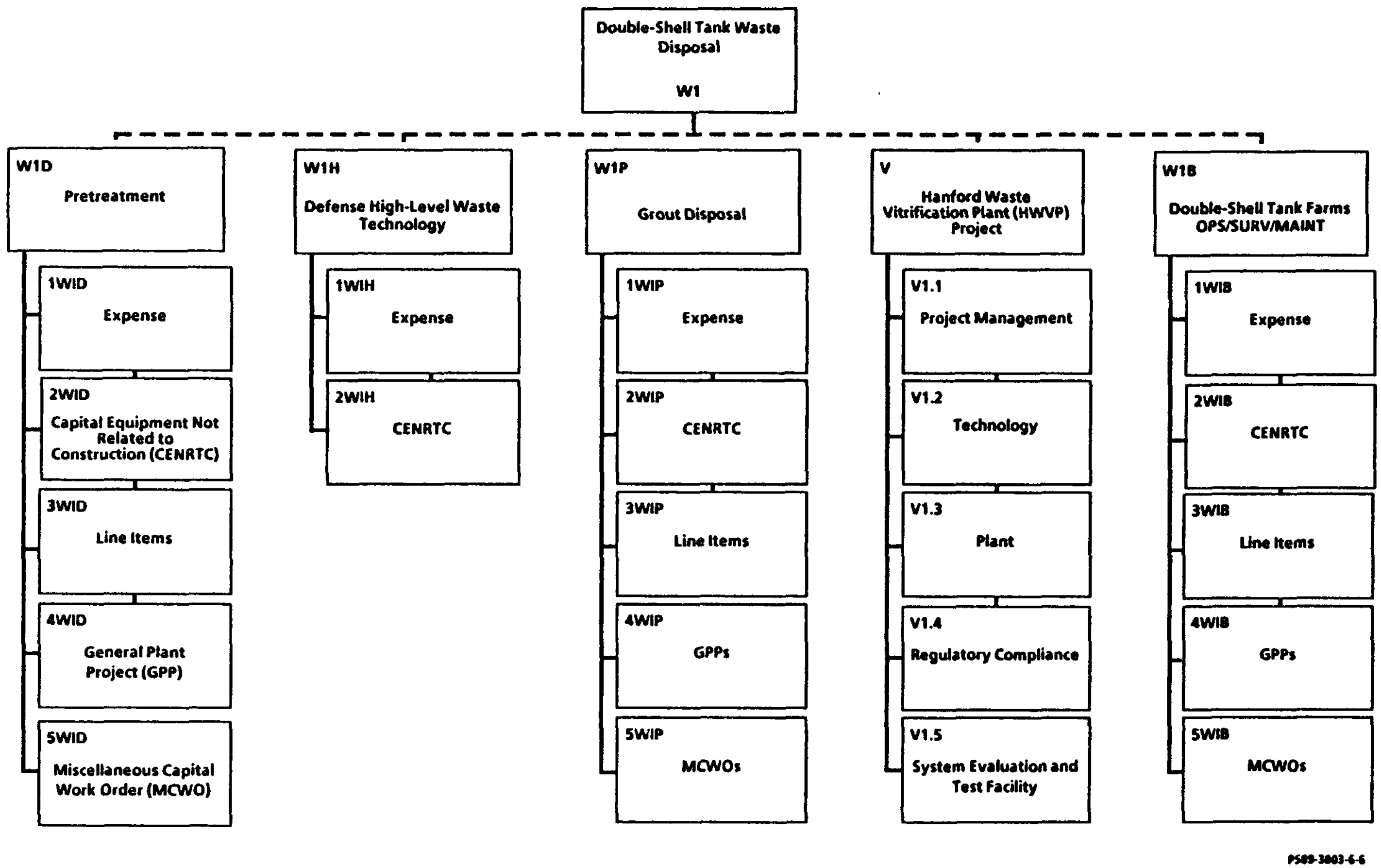


Figure 6-6. Double-Shell Tank Waste Disposal (DSTWD) Summary Work Breakdown Structure.

Figure 6-7. Double-Shell Tank Waste Disposal (DSTWD) Contributing Cost Elements Pretreatment.

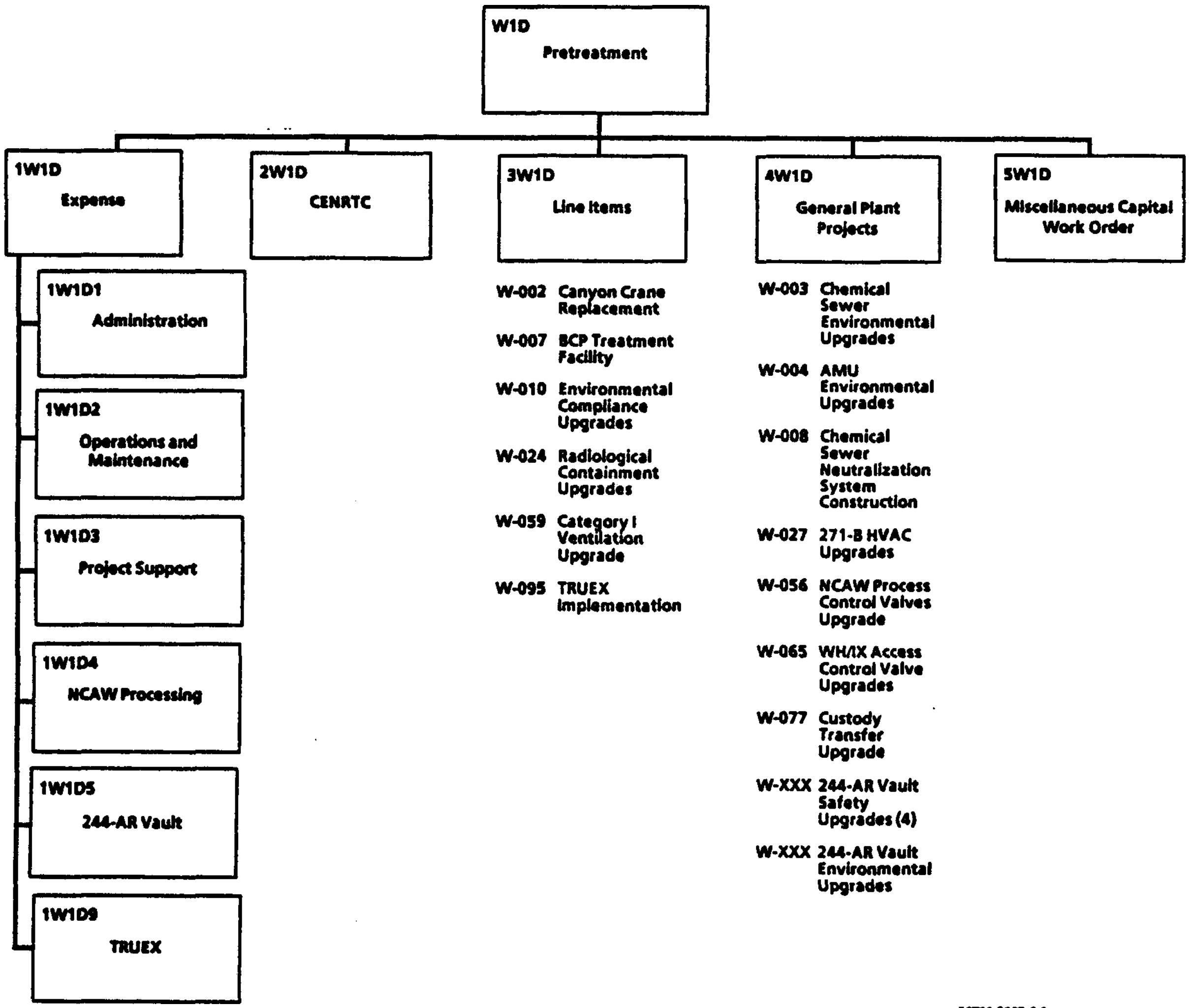
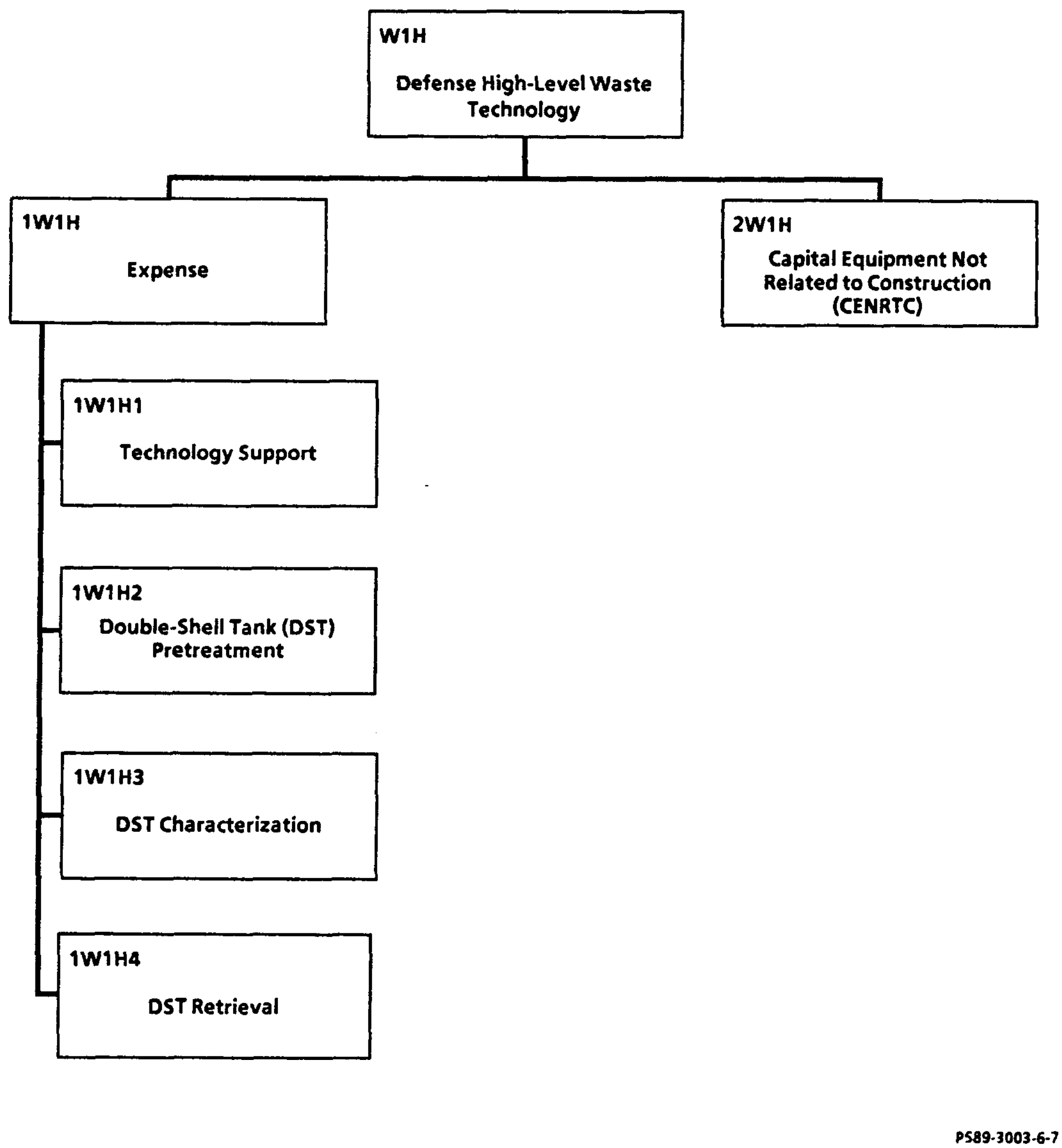
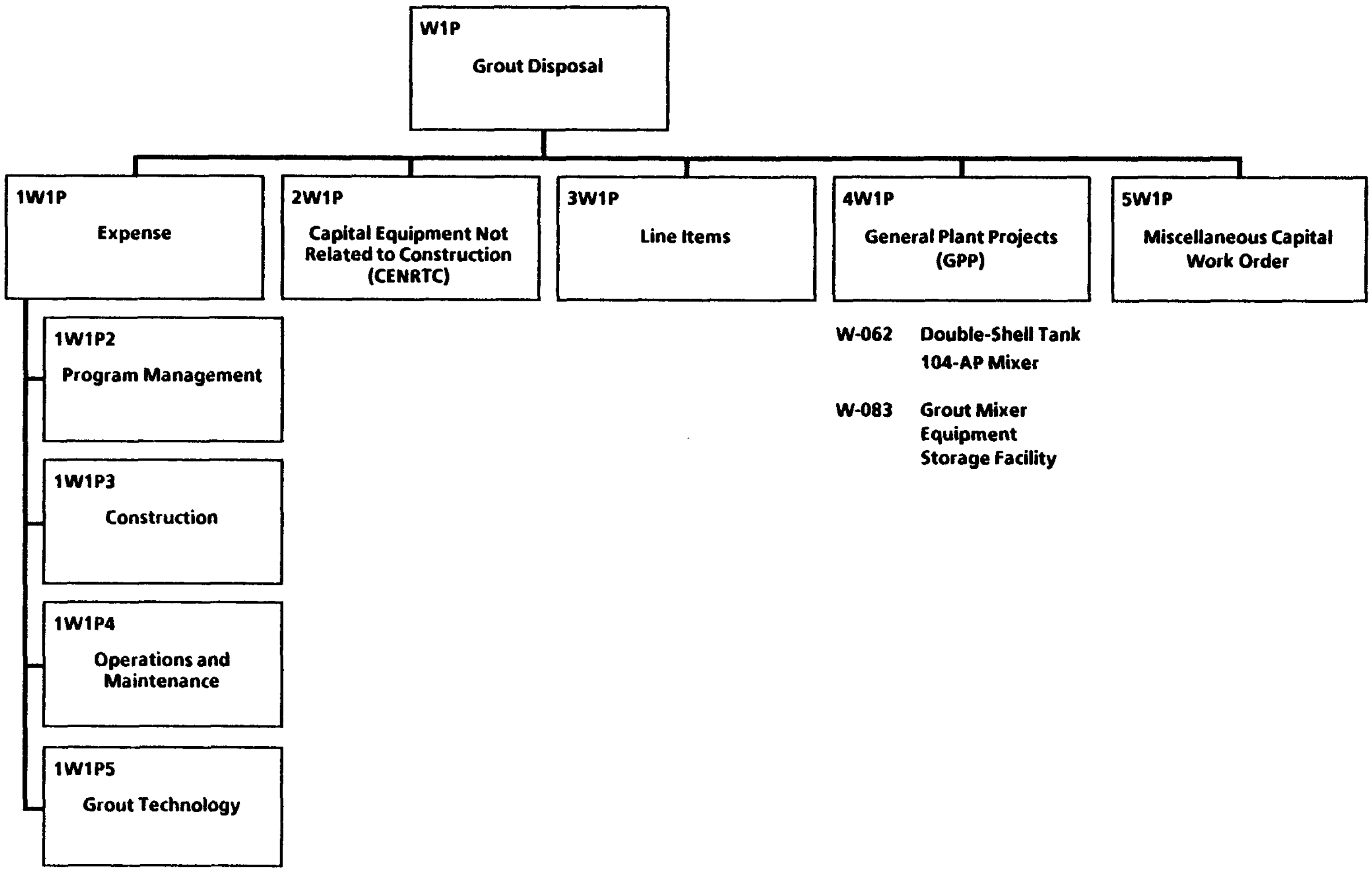


Figure 6-8. Double-Shell Tank Waste Disposal (DSTWD) Contributing Cost Elements Defense High-Level Waste Technology.





PS89-3003-6-11

Figure 6-9. Double-Shell Tank Waste Disposal (DSTWD) Contributing Cost Elements Grout.

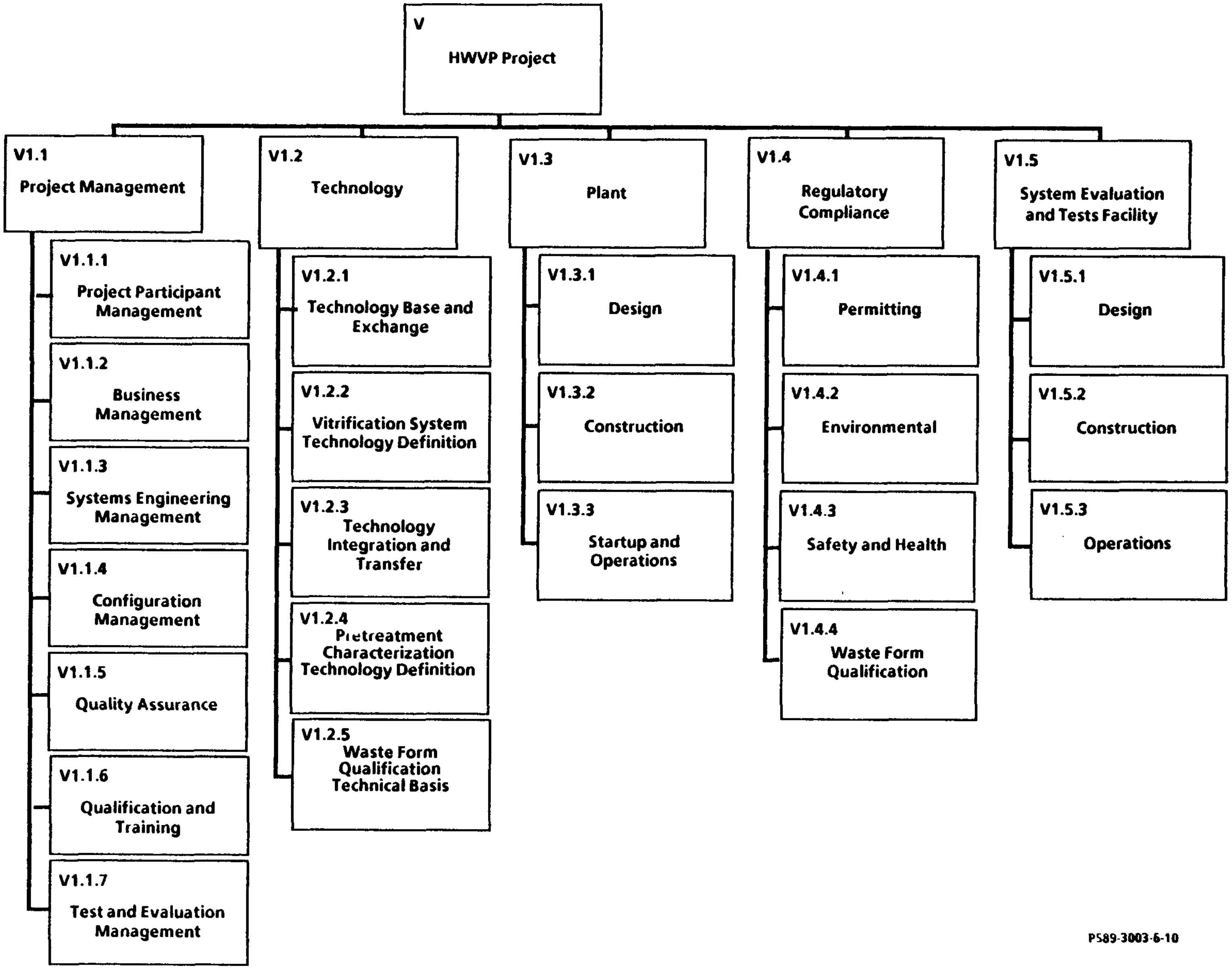


Figure 6-10. Double-Shell Tank Waste Disposal (DSTWD) Contributing Cost Elements Hanford Waste Vitrification Plant (HWVP) Project.

Figure 6-11. Double-Shell Tank Waste Disposal (DSTWD) Contributing Cost Elements Double-Shell Tank Farms.

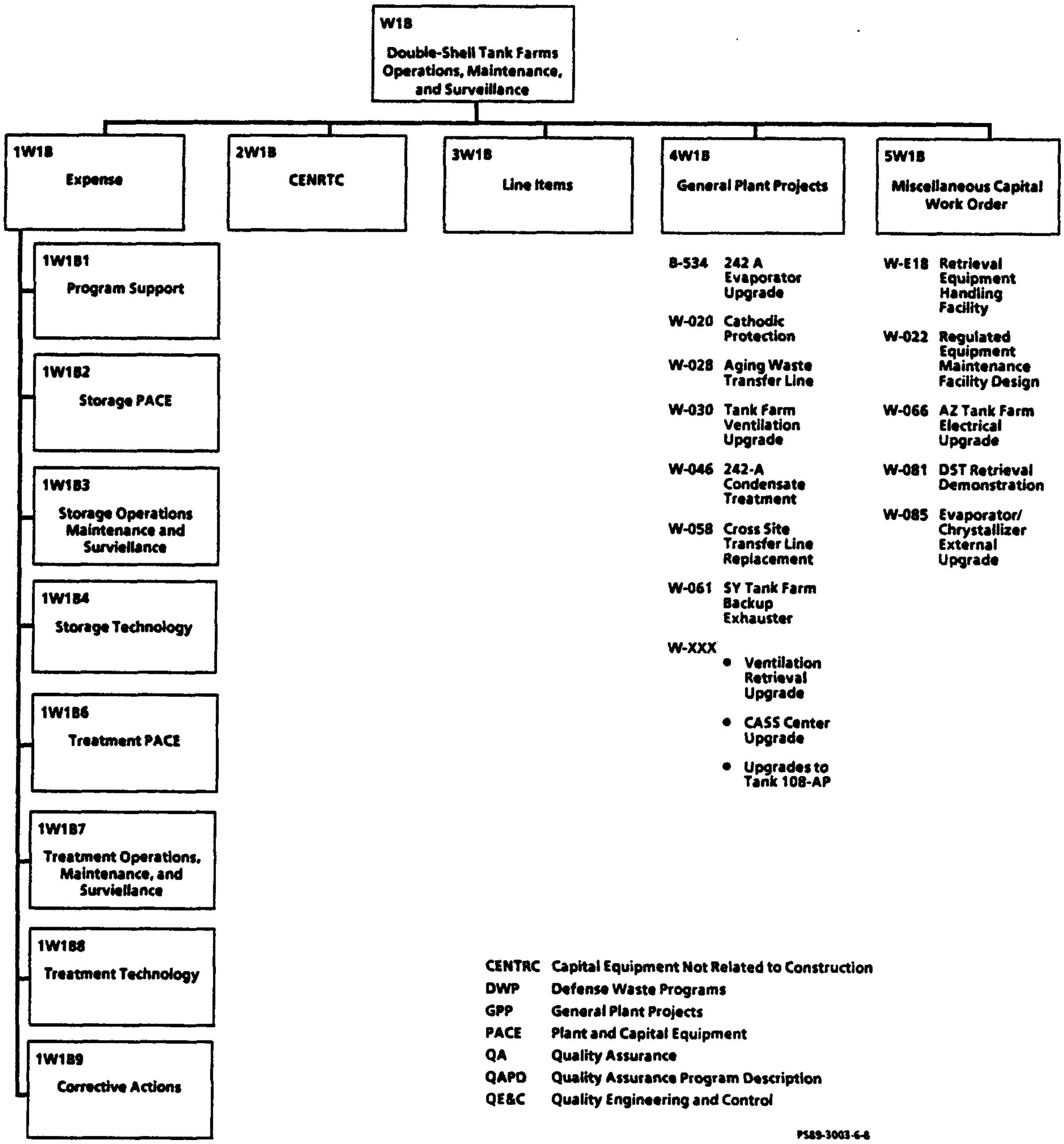


Table 6-1. Option B Baseline Budget for Double-Shell Tank Waste Disposal Program (in millions of dollars).

Program/ project	Funding	Fiscal year																					Total
		1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	
Grout	Expense	14.7	19.5	31.2	37.7	41.5	44.7	42.8	43.1	43.1	42.0	40.0	42.0	38.0	15.0	10.0	10.0	6.0	6.0				527.3
	Capital	1.8	1.3	2.8	2.5	2.2	2.3	1.1	2.3	2.2	1.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5				24.5
	Subtotal	16.5	20.8	34.0	40.2	43.7	47.0	43.9	45.4	45.3	43.0	41.0	43.0	38.5	15.5	10.5	10.5	6.5	6.5				551.8
HWVP Project	Expense	6.9	8.8	16.3	25.0	34.5	39.7	47.6	39.6	47.9	36.2	43.8	56.2	8.1	0.0	0.0	0.0	0.0	0.0				410.6
	Capital	7.5	22.5	29.1	78.8	111.9	125.0	207.9	180.6	129.7	63.7	18.5	9.6	2.0	0.0	0.0	0.0	0.0	0.0				986.8
	Subtotal	14.4	31.3	45.4	103.8	146.4	164.7	255.5	220.2	177.6	99.9	62.3	65.8	10.1	0.0	0.0	0.0	0.0	0.0				1,397.4
HWVP Startup/ Operations	Expense	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.1	27.1	36.2	69.2	69.2	69.2	69.2	69.2	69.2				498.6
	Capital	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	14.3	14.3	14.3	14.3	14.3	14.3				86.7
	Subtotal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.4	27.4	36.5	83.5	83.5	83.5	83.5	83.5	83.5				585.3
B Plant	Expense	22.3	26.0	37.2	48.3	49.6	48.4	48.1	49.2	45.5	36.6	36.6	35.8	29.9	40.3	39.3	39.3	30.0	20.0				682.4
	Capital	3.8	4.9	14.4	20.7	16.1	21.1	31.7	43.0	40.0	4.3	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0				204.3
	Subtotal	26.1	30.9	51.6	69.0	65.7	69.5	79.8	92.2	85.5	40.9	40.9	35.8	29.9	40.3	39.3	39.3	30.0	20.0				886.7
Tank farms	Expense	25.9	36.3	70.9	106.1	101.9	73.2	65.1	61.7	60.2	30.0	30.0	30.0	30.0	28.0	28.0	28.0	28.0	28.0				861.3
	Capital	13.0	5.9	23.9	11.7	15.9	10.9	15.9	70.7	97.8	20.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				317.7
	Subtotal	38.9	42.2	94.8	117.8	117.8	84.1	81.0	132.4	158.0	50.0	34.0	34.0	34.0	32.0	32.0	32.0	32.0	32.0				1,179.0
Technology	Expense	4.9	6.6	13.0	31.4	18.3	14.8	13.3	8.1	4.7	4.0	4.0	4.0	1.0	0.2	0.2	0.2	0.2	0.2				129.1
	Capital	0.4	0.4	0.5	10.1	1.7	1.8	3.7	4.6	2.8	1.0	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0				27.8
	Subtotal	5.3	7.0	13.5	41.5	20.0	16.6	17.0	12.7	7.5	5.0	4.4	4.4	1.0	0.2	0.2	0.2	0.2	0.2				156.9
	Total expense	74.7	97.2	168.6	248.5	245.8	220.8	216.9	201.7	201.4	168.9	181.5	204.2	176.2	152.7	146.7	146.7	133.4	123.4	0.0	0.0	0.0	3,109.3
	Total capital	26.5	35.0	70.7	123.8	147.8	161.1	260.3	301.2	272.5	90.3	28.5	15.3	20.8	18.8	18.8	18.8	18.8	18.8	0.0	0.0	0.0	1,647.8
	Total	101.2	132.2	239.3	372.3	393.6	381.9	477.2	502.9	473.9	259.2	210.0	219.5	197.0	171.5	165.5	165.5	152.2	142.2	0.0	0.0	0.0	4,757.1

NOTE: Total funding not included in HWVP baseline. FY 1989 is Authorized Budget plus Reserve and Reprogramming (FY 1991 Budget Submittal Rev. 1, FY 1989 Program Plan Rev.2, reprogramming shown in FY 1989). FY 1990-2005 includes increased costs to support NCAW pretreatment sludge washing at AR Vault (i.e., NCAW Demo) in October 1993. FY 1990-1996 consistent with the FY 1992 Five Year Plan Activity Data Sheets (Note: Tank Farms includes current expense and capital estimates for the Liquid Effluent Retention Facility). FY 1990 consistent with the $197.8M funding level except for the following adjustments: Grout 34.1 - 2.9 (carryover) = 31.2M, Tank Farms 52.0 - 1.5 (carryover) + 20.4 (LERF) = 70.9M. The LERF estimate for FY 1990 is 24.0, however, 3.6 is included in the $197.8M funding level.

PS89-3083-6-12

6.3.2 Tank Farms

The waste storage and retrieval budget includes funding for operation of the DSTs and for upgrade and operation of the 242-A Evaporator and the waste transfer system to support the DSTWD mission. The initiation of NCAW pretreatment will occur with sludge washing in 244-AR Vault in FY 1994.

6.3.3 Pretreatment

The waste pretreatment budget includes funding for the 244 AR-Vault, the B Plant minimum case, plus the increment to support initiation of the NCAW processing demonstration at 244-AR Vault and B Plant in FY 1994, installation and operation of the TRUEX process by FY 1998, and continued pretreatment operations.

6.3.4 Hanford Waste Vitrification Plant Project

The funding requirements for waste vitrification operations include the PACE-, CENRTC- and expense-funded activities to develop technology and construct, start up, and operate the HWVP, as identified in HWVP Project documentation. The startup and operating support is identified as a separate entry to identify funding not included in the HWVP project baseline but required to support HWVP startup and operations.

6.3.5 Grout Disposal

The grout disposal budget includes the operation of the GTF and construction of the 44 vaults required for disposal of the DST waste (including phosphate-sulfate waste), as identified in the FY 1989 program plan (WHC 1988) for the WP Program. The baseline budget supports the construction and filling of 14 vaults through FY 1994 and the construction of 4 vaults per year after FY 1994, until a total of 44 vaults are constructed. Vaults will be filled as waste is available for grout feed. Construction of the Dry Materials Handling Facility and the Transportable Grout Equipment is not included in the budget baseline.

6.4 SCHEDULE BASELINE

As part of DSTWD planning activities, schedules incorporating existing and proposed DOE-HQ/DOE-RL-controlled milestones were developed for the scope identified in the SWBS. This schedule information constitutes the schedule baseline and is documented in the following:

- Level 1 - Integrated Double-Shell Tank Waste Disposal Schedule (Appendix D)
- Level 2 - Double-Shell Tank Waste Disposal Contributing End Function Schedule (Appendix E)
- Milestone Summary (Table 6-2).

Table 6-2. Fiscal Year 1988 and Outyear Milestone Summary.

End function	Scheduled completion date	Milestone type	Title
W1H	1989/09/30	DOE-HQ	Complete and Report Characterization of First Hanford NCAW Sample from Tank 101-AZ (1)
	1989/09/30	DOE-HQ	Complete and Submit Draft Report on Conceptual Design for NCAW Retrieval System Demonstration
	1995/09/30	New	Complete Complexant Concentrate (CC) Pilot Plant Demonstration
	1994/12/31	New	Complete Plutonium Finishing Plant (PFP) Waste Pilot Plant Demonstration
	1993/03/31	New	Complete Neutralized Cladding Removal Waste (NCRW) Pilot Plant Demonstration
W1B	1993/06/30	New	Complete First Neutralized Current Acid Waste (NCAW) Retrieval System
	1993/09/30	New	Complete 244-AR Vault Preparations
W1D	1993/10/01	DOE-HQ	Complete Preparation for Neutralized Current Acid Waste (NCAW) Processing Demonstration
	1994/10/01	DOE-HQ	Complete Neutralized Current Acid Waste (NCAW) Processing Demonstration
	1997/10/01	New	Complete Neutralized Current Acid Waste (NCAW) Pretreatment Processing
	1997/10/01	New	Complete TRUEX Processing Modifications
W1P	1994/09/30	New	Complete 14 grout campaigns
V	1999/12/31	DOE-HQ	Issue Final Waste Qualification Report Issued to Repository
	1990/06/30	DOE-RL	Complete Title I Design
	1993/06/30	DOE-RL	Complete PACE-Funded Design
	1991/07/17	DOE-HQ	Initiate HWVP construction
	1998/06/30	DOE-RL	Complete HWVP construction
	1999/12/31	DOE-HQ	Initiate Hanford Waste Vitrification Plant operations
	2001/08/31	New	Complete Neutralized Current Acid Waste (NCAW) Vitrification Processing
	2002/09/30	New	Complete Neutralized Cladding Removal Waste (NCRW) Vitrification Processing
	2003/07/31	New	Complete Plutonium Finishing Plant (PFP) Waste Vitrification Processing
	2005/02/31	New	Complete Complexant Concentrate (CC) Vitrification Processing

NOTES: (1) Change request submitted (CRHLE002-89)

PST89-3003-6-2

Westinghouse Hanford is responsible for the preparation and management of these schedules and the Milestone Summary in accordance with the MCS and change-control procedures. The Level 1 schedule is supported by Level 2 schedules developed by the contributing end function programs. These schedules are oriented toward the work scope assigned to each program team for particular phases of the program, such as Technology and Facility Operation.

The DSTWD schedule and schedule-control process include the following:

- Schedules have been constructed using the SWBS and levels; they reflect tasks required to complete a single WBS element. Also, in accordance with the WBS, lower level schedules are directly integrated and traceable to higher level schedules.

- An integrated network capable of providing the logic for the entire project has been implemented for analysis and reporting.

- Schedule objectives identified in Section 2.0 of this plan have been incorporated into DSTWD-specified major milestones. These milestones provide points for control and reporting within the schedules. Changes in schedule dates for these major milestones must be approved, as previously described; designated DOE-HQ and DOE-RL milestones require DOE-HQ and DOE-RL approval.

In addition, as part of the Westinghouse Hanford MCS, a listing of FY 1988, FY 1989, and outyear major milestones is provided (Table 6-2) and will be maintained to provide definition, control, and tracking on each DOE-HQ- and DOE-RL-controlled milestone.

- At the agreed upon frequency (quarterly), Westinghouse Hanford reports progress against the Level 1 and Level 2 schedules. Schedule status is incorporated in the DSTWD CPR, which is reviewed by DOE-RL and Westinghouse Hanford management. Appropriate corrective actions are initiated to rectify schedule variances as they are identified.

- The DOE-RL Program Office conducts periodic analysis of program schedules to ensure the accuracy of the monthly data.

7.0 QUALITY ASSURANCE

7.1 QUALITY ASSURANCE REQUIREMENTS

Basic QA policy for DOE-RL and requirements for cost-effective QA programs and plans to be used by DOE-RL contractors are contained in DOE Order 5700.6B, *Quality Assurance* (DOE 1986). This Order requires each contractor to develop a generic QA program and implement procedures for DOE-sponsored programs and projects. In addition, each contractor is required to prepare and implement a QA plan for assigned programs that identify the requirements from the overall QA program that are applicable to a particular program or project. The QA programs and plans are required to be developed using appropriate requirements from ANSI/ASME NQA-1 (ANSI 1986).

Certain DSTWD activities will fall under the requirements of quality assurance requirements for HLW form production (DOE 1988b). These are the requirements for waste forms being sent to a geologic repository. The DSTWD activities under these requirements will be identified by the HWVP QA program description.

This page intentionally left blank.

8.0 REFERENCES

ANSI, 1986, *Quality Assurance Program Requirements for Nuclear Facilities*, ANSI/ASME NQA-1, American National Standards Institute/American Society of Mechanical Engineers.

DOE, 1983, *Project Management Systems*, DOE Order 5700.4A, U.S. Department of Energy, Washington, D.C.

DOE, 1986, *Quality Assurance*, DOE Order 5700.6B, U.S. Department of Energy, Washington, D.C.

DOE, 1987, *Final Environmental Impact Statement: Disposal of Hanford Defense High-Level, Transuranic, and Tank Wastes*, DOE-EIS-0113, U.S. Department of Energy, Washington, D.C.

DOE, 1988a, "Record of Decision for Disposal of Hanford Defense High-Level, Transuranic and Tank Wastes," *U.S. Federal Register*, Volume 53, U.S. Department of Energy (Government Printing Office), Washington, D.C., p. 12449.

DOE, 1988b, *Office of Geologic Repositories Quality Assurance Requirements for High-Level Waste Form Production*, OGR/B-14, U.S. Department of Energy, Washington, D.C.

DOE, 1988c, *Cost and Schedule Control Systems Criteria for Contract Performance Measurement*, DOE Order 2250.1C, U.S. Department of Energy, Washington, D.C.

DOE-RL, 1988, *Hanford Site Waste Management Plan*, DOE-RL 88-33, U.S. Department of Energy-Richland Operations Office, Richland, Washington.

EPA, Ecology, and DOE, 1989, *Hanford Federal Facility Agreement and Consent Order*, U.S. Environmental Protection Agency, Region X, and Washington State Department of Ecology, U.S. Department of Energy, Richland, Washington.

WHC, 1988, *Fiscal Year 1989 Defense Waste Management and Environmental Program Plan*, WHC-SP-0428, Westinghouse Hanford Company, Richland, Washington.

WHC, 1989, *Fiscal Year 1991 Budget Submittal Defense Waste and Environmental Restoration--Waste Operations--Budget and Reporting Code: GF-01*, Revision 1, Westinghouse Hanford Company, Richland, Washington.

This page intentionally left blank.

APPENDIX A

TECHNICAL ASSUMPTIONS AND IMPACTS

This page intentionally left blank.

APPENDIX A

TECHNICAL ASSUMPTIONS AND IMPACTS

The baseline scope, budget and schedules provided in Section 6.0 are predicated on the assumptions listed below. Following each stated assumption is an order-of magnitude assessment of the potential impact to budget and scope in the event the assumption is not viable.

A.1 The TRUEX is an acceptable technology for the removal of TRU elements from NCRW, PFP waste and CC waste. A corollary assumption is that pilot plant work in TRUEX process development will confirm laboratory data used to develop the Functional Design Criteria (FDC), and Conceptual Design Report (CDR).

Potential Impact: Complete failure of the TRUEX process would be a major setback in the planned disposal of NCRW, CC and PFP. A total failure of the TRUEX process is unlikely in view of the laboratory tests to date. The more likely problem is that during pilot plant testing, problems might be identified such as solvent contamination or lack of phase separation. The identification of such problems would extend the pilot plant test duration and require additional refinements to define a reliable process and could result in process changes to effectively solve the problems. Cost and schedule impacts resulting from yet-to-be identified problems cannot be reasonably assessed. However, a slippage of only a few months in finalizing the CDR could delay validation of this line item by a full year.

A.2 A pilot plant can be constructed and operated in the Waste Encapsulation and Storage facility (WESF).

Potential Impact: Although another pilot facility could probably be located (such as the 324 Building), there would likely be a schedule slip because of the current lack of capability to transport slurries to the 300 Area. (Significantly larger transport volumes are required than those required for Waste Farm Qualification tests.) Furthermore, actual full-scale operations at B Plant are likely to be slowed without a close-coupled pilot plant to aid in troubleshooting full-scale operations.

A.3 Waste volumes shown in Table 2-1 are based on the following assumptions: The NCRW & NCAW Volume is based on processing the remaining weapons and fuels grade spent fuel in PUREX. The PFP Volume is based on PFP operations through 1995. The CC is based on existing volumes of CC waste in DSTs and does not include any waste that might be generated from saltwell liquor pumping.

Potential Impact: The quantity of waste to be vitrified does not impact the NCAW demonstration wash or HWVP startup schedules. It does affect the duration required for HWVP to process these wastes and the amount of glass produced from the waste. That is, if the projections increase the processing time, the number of glass canisters produced will also increase.

A.4 The HWVP will be able to accept the four waste forms, including NCRW, without blending. (The present scope of the HWVP Project Plan, HWVP-89-001, does not include processing of NCRW.)

Potential Impact: The addition of NCRW as a separate waste form to be vitrified impacts the HWVP budget in that additional process equipment to improve operational flexibility may be required and additional process development and waste form qualification testing would be needed. Engineering and construction costs may increase, but this item alone will not impact HWVP startup in December 1999. Blending pretreated wastes for feed to the HWVP may be necessary to maximize the quantity of waste vitrified in each canister. For example, PFP waste contains a high level chromium oxide which limits the amount of PFP waste per canister. Similarly, NCRW has a high percentage of zirconium oxide which limits the weight percent waste per canister. By blending pretreated PFP waste with NCRW, the total weight percent wastes per canister can be increased. The blending of wastes could result in HWVP standby awaiting pretreatment and qualification of another waste. Standby costs would be offset by higher weight percent loading of blend waste and a reduction in the number of canisters for disposal in the repository.

A.5 Organics in complexant concentrates can be destroyed by a high temperature pressure process, an ozonization process, or a hydrogen peroxide process.

Potential Impact: If this technology development is not successful in producing an acceptable grout feed, then another process, which has not yet been identified, will be developed. If this other process is not successful, the entire complex concentrate waste may have to be disposed in a glass form.

A.6 A system consisting of two mixer-pumps will satisfactorily mobilize DST sludges.

Potential Impact: A four mixer-pump system is being designed in parallel to the two-pump system to minimize schedule impact. The cost impacts would be significant in that mixer-pump costs would be increased by a factor of two. The power requirement to operate the pumps would double. Project W-066, upgrading the DS Tank Farms electrical system, would have to be approved and implemented as a FY 1990 General Plant Project (GPP).

A.7 Abrasion tests on mixer-pumps and structural tank elements will conclude that corrosion/erosion rates are within acceptable limits.

Potential Impact: If the corrosion/erosion rates are too high due to erosive jets from the mixer pumps, the pump flow rates will be reduced by means of a variable speed drive. If the rates are reduced too low and do not provide adequate sludge mobilization, additional mixer pumps, pump pits and, perhaps, risers will need to be installed. Other technology may need to be evaluated if the costs are excessive.

A.8 Small-scale retrieval systems can be developed to support pilot plant testing of NCRW, CC and PFP waste in sufficient quantities to provide the 4 kg and 400 kg samples for Waste Form Qualification (WFQ) testing.

Potential Impact: Because the small-scale retrieval systems have not yet been identified, the cost and schedule for this activity is an order-of-magnitude estimate. Therefore, as these systems become known, more definitive costs and schedules will be available that may differ from current assumptions.

A.9 Washed NCAW sludges presently stored in B Plant will provide an acceptable 4 kg sample for WFQ testing.

Potential Impact: If the sludge presently stored in B Plant is not acceptable for the 4 kg WFQ sample, another sample will need to be obtained from the 244 AR Vault/B Plant demonstration. If the WFQ activities schedule cannot be compressed, then HWVP start-up will be delayed.

A.10 Double-shell slurry and phosphate-sulphate waste will not require pretreatment.

Potential Impact: A requirement to pretreat double-shell slurry and phosphate-sulphate waste would cause a significant delay in the grout program and create a severe tank shortage problem until technology to pretreat the waste could be implemented and the waste processed.

A.11 Concrete-encased transfer line NHW-817 will be used for processing NCAW and, if necessary, NCRW, CC, and PFP waste.

Potential Impact: The replacement of the concrete-encased section of NHW-817 would be required if the variance is not accepted. A viable alternative would be to install the line around the congested area in the vicinity of 244-AR Vault and tie into cell 1. The length of new line would be approximately 175 ft at an estimated cost of $520,000. It is estimated that, if initiated in FY 1991, the line could be ready to support pretreatment startup in October 1993.

A.12 A variance will be obtained to allow continued use of the single-contained ventilation seal-pot in 244-AR Vault, or sampling will show the seal pot contents to be nonhazardous and eliminate the need for a variance.

Potential Impact: Replacement of the single-containment sealpot would add $170,000 to the FY 1991 GPP budget and could be completed to support the NCAW demonstration wash in October 1993.

A.13 Testing will confirm the integrity of tankage in 244-AR Vault.

Potential Impact: Another option is to wash NCAW sludges in a DST. Should both options (AR-Vault and DST) be unacceptable, then NCAW sludge washing reverts to B Plant with a 4-yr delay in TRUEX installation.

A.14 Single-pass cooling water effluent from B Plant with continuous monitoring and the capability to direct effluent to a retention pond will be accepted as best available technology (BAT) by the EPA and Ecology.

Potential Impact: The alternative is to install a closed-loop cooling system and cooling tower. The order-of-magnitude cost identified in the Treatment Effluent Disposal Study is $29 million. Funding as a FY 1993 line item would have an adverse impact on the NCAW demonstration wash in October 1993 (TPA milestone) as well as on the NCAW processing schedule if a variance allowing interim operation is not granted.

A.15 The B Plant cell drain header can be relined and downcomers sealed to new liner.

Potential Impact: If inspection and testing concludes that the drain header cannot be relined, an alternative would be to plug the drains to the cell drain header and pump or jet the collected material to a common collection point. Sealing of the drains is conceptually feasible but most likely could not be completed in time for the October 1993 demonstration. Plant modifications could be completed for the full scale processing in October 1995.

A.16 B Plant process cells will not require lining.

Potential Impact: The current position is that the cells are classified as vaults with massive walls (7 ft thick) of concrete, and that the intent of lining was to prevent migration of radionuclides into the concrete as an aid to decontamination. If this position is not accepted, the cells could be lined or coated. This effort is technically straightforward but would be costly and time consuming. Another alternative would be to line only the cells that will be cleaned out for installation of the TRUEX process which will be used to pretreat the follow-on campaigns after the 2-yr NCAW campaign.

A.17 Third-party review will confirm the seismic analysis that indicates that B Plant, B Stack, AR Vault, and AR Stack will survive the Design Basis Earthquake (with specified reinforcing, if needed).

Potential Impact: The third-party review will be completed by January 1990. If the review does not support the current conclusions of the report, additional seismic upgrades will be required.

A.18 Double-shell tank space will be available to support all DST waste disposal activities.

Potential Impact: If DST space is not available, the disposal activities will have to be delayed until space is available through volume reduction of the DST inventory or construction of new DSTs.

A.19 The HWVP will provide process equipment to remove TRU elements from the waste stream, and waste from the HWVP operation can be disposed of in the Grout Treatment Facility without additional treatment.

Potential Impact: A requirement to collect and pretreat HWVP wastes prior to disposal in grout will extend B-Plant operations until the HWVP completes the DSTWD mission (an additional 3 yr), and pretreatment processing will result in additional wastes for grout disposal. Collection of HWVP wastes prior to pretreatment will require additional DST space. The cost impact will be between $20 million and $100 million depending on the concentration of TRU elements and the waste handling scenario.

This page intentionally left blank.

APPENDIX B

SCHEDULE ASSUMPTIONS

This page intentionally left blank.

APPENDIX B

SCHEDULE ASSUMPTIONS

1. The *Hanford Federal Facility Agreement and Consent Order* milestones will be met.

2. NCAW sludge washing will be done in the 244-AR Vault with filtration of supernate and ion exchange in B-Plant to allow the installation of the TRUEX process in B-Plant to be completed in FY 1997. This accelerated installation of the TRUEX process will minimize HWVP downtime awaiting pretreated waste feed.

3. Procurement and installation of prototype retrieval systems, one system for each waste type, will be expense funded rather than line items.

4. If planned general plant projects escalate above the $1.2 million limit, alternatives to line item funding will be available.

This page intentionally left blank.

APPENDIX C

PREVIOUS BUDGET BASELINE AND INCREMENTAL CHANGES

This page intentionally left blank.

Table C-1. Original Budget Baseline February 1989.

Program/ project	Funding	Fiscal year																					Total
		1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	
Grout	Expense	14.7	19.8	33.0	33.0	31.7	37.5	35.1	31.9	31.4	34.1	32.2	34.0	29.9	11.9	7.8	3.2	2.7	3.5	2.2	3.1	2.2	434.9
	Capital	1.8	1.5	3.9	3.3	2.3	1.7	2.0	2.3	1.3	1.3	1.3	1.3	1.0	1.5	1.5	2.0	2.0	2.0	1.0	1.0	1.0	37.0
	Subtotal	16.5	21.3	36.9	36.3	34.0	39.2	37.1	34.2	32.7	35.4	33.5	35.3	30.9	13.4	9.3	5.2	4.7	5.5	3.2	4.1	3.2	471.9
HWVP Project	Expense	6.9	8.8	16.3	25.0	34.5	39.7	47.6	39.6	47.9	36.2	43.8	56.2	8.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	410.6
	Capital	7.5	22.5	29.1	78.8	111.9	125.0	207.9	180.6	129.7	63.7	18.5	9.6	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	986.8
	Subtotal	14.4	31.3	45.4	103.8	146.4	164.7	255.5	220.2	177.6	99.9	62.3	65.8	10.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1,397.4
HWVP Startup/ Operations	Expense	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.1	27.1	36.2	69.2	69.2	69.2	69.2	69.2	69.2	69.2	69.2	706.2
	Capital	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	129.6
	Subtotal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.4	27.4	36.5	83.5	83.5	83.5	83.5	83.5	83.5	83.5	83.5	835.8
B Plant	Expense	22.3	22.9	31.5	34.5	35.1	35.5	36.0	35.1	36.0	36.0	36.0	39.0	39.0	37.0	38.0	39.0	39.0	38.0	38.0	31.0	20.0	718.9
	Capital	3.8	4.0	9.0	13.7	12.7	4.8	3.9	1.5	44.0	55.0	54.5	31.5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	283.4
	Subtotal	26.1	26.9	40.5	48.2	47.8	40.3	39.9	36.6	80.0	91.0	90.5	70.5	44.0	42.0	43.0	44.0	44.0	43.0	43.0	36.0	25.0	1,002.3
Tank farms	Expense	25.9	34.6	48.7	47.1	41.6	40.8	40.5	40.5	33.0	30.0	30.0	30.0	30.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	696.7
	Capital	13.0	4.0	22.5	14.1	14.2	10.5	29.5	27.4	20.0	20.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	219.2
	Subtotal	38.9	38.6	71.2	61.2	55.8	51.3	70.0	67.9	53.0	50.0	34.0	34.0	34.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	915.9
Technology	Expense	4.9	6.6	13.0	31.4	18.3	14.8	13.3	8.1	4.7	4.0	4.0	4.0	1.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	129.7
	Capital	0.4	0.4	0.5	10.1	1.7	1.8	3.7	4.6	2.8	1.0	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.8
	Subtotal	5.3	7.0	13.5	41.5	20.0	16.6	17.0	12.7	7.5	5.0	4.4	4.4	1.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	157.5
	Subtotal expense	74.7	92.7	142.5	171.0	161.2	168.3	172.5	155.2	153.0	160.4	173.1	199.4	177.2	146.3	143.2	139.6	139.1	138.9	137.6	131.5	119.6	3,097.0
	Subtotal capital	26.5	32.4	65.0	120.0	142.8	143.8	247.0	216.4	197.8	141.3	79.0	47.1	26.3	24.8	24.8	25.3	25.3	25.3	24.3	24.3	24.3	1,683.8
	Subtotal	101.2	125.1	207.5	291.0	304.0	312.1	419.5	371.6	350.8	301.7	252.1	246.5	203.5	171.1	168.0	164.9	164.4	164.2	161.9	155.8	143.9	4780.8

Additions to Baseline from FY 1992 Five Year Plan Activity Data Sheets:

Grout: upgrade vault design requirements, program management and escalation.	79.9
B Plant: delete WESF from double-shell tank waste disposal mission.	-62.6
Tank Farms: LERF, retrieval process technology and projects, operational restoration, concrete encasement, operations assurance, program management and escalation.	291.4
Total	5089.5

PS89-3003-C-1

Table C-2. Difference Between Option B and Original Baseline Budget for Double-Shell Tank Waste Disposal Program (in millions of dollars).

Program/ project	Funding	Fiscal year 1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Grout	Expense	0.0	-0.3	-1.8	4.7	9.8	7.2	7.7	11.2	11.7	7.9	7.8	8.0	8.1	3.1	2.2	6.8	3.3	2.5	-2.2	-3.1	-2.2	92.4
	Capital	0.0	-0.2	-1.1	-0.8	-0.1	0.6	-0.9	0.0	0.9	-0.3	-0.3	-0.3	-0.5	-1.0	-1.0	-1.5	-1.5	-1.5	-1.0	-1.0	-1.0	-12.5
	Subtotal	0.0	-0.5	-2.9	3.9	9.7	7.8	6.8	11.2	12.6	7.6	7.5	7.7	7.6	2.1	1.2	5.3	1.8	1.0	-3.2	-4.1	-3.2	79.9
HWVP Project	Expense	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Capital	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Subtotal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HWVP Startup/ Operations	Expense	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	69.2	69.2	69.2	69.2	-207.6
	Capital	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	14.3	14.3	14.3	-42.9
	Subtotal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	83.5	83.5	83.5	83.5	-250.5
B Plant	Expense	0.0	3.1	5.7	13.8	14.5	12.9	12.1	14.1	9.5	0.6	0.6	-3.2	-9.1	3.3	1.3	0.3	-9.0	-18.0	-38.0	-31.0	-20.0	-36.5
	Capital	0.0	0.9	5.4	7.0	3.4	16.3	27.8	41.5	-4.0	-50.7	-50.2	-31.5	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-5.0	-79.1
	Subtotal	0.0	4.0	11.1	20.8	17.9	29.2	39.9	55.6	5.5	-50.1	49.6	-34.7	-14.1	-1.7	-3.7	-4.7	-14.0	-23.0	-43.0	-36.0	-25.0	-115.6
Tank farms	Expense	0.0	1.7	22.2	59.0	60.3	32.4	24.6	21.2	27.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-28.0	-28.0	-28.0	164.6
	Capital	0.0	1.9	1.4	-2.4	1.7	0.4	-13.6	43.3	77.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-4.0	-4.0	-4.0	98.5
	Subtotal	0.0	3.6	23.6	56.6	62.0	32.8	11.0	64.5	105.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-32.0	32.0	32.0	263.1
Technology	Expense	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.2	-0.2	-0.6
	Capital	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Subtotal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.2	-0.2	-0.6
	Subtotal expense	0.0	4.5	26.1	77.5	84.6	52.5	44.4	46.5	48.4	8.5	8.4	4.8	-1.0	6.4	3.5	7.1	-5.7	-15.5	-137.6	-131.5	-119.6	12.3
	Subtotal capital	0.0	2.6	5.7	3.8	5.0	17.3	13.3	84.8	74.7	-51.0	-50.5	-31.8	-5.5	-6.0	-6.0	-6.5	-6.5	-6.5	-24.3	-24.3	-24.3	-36.0
	Subtotal	0.0	7.1	31.8	81.3	89.6	69.8	57.7	131.3	123.1	-42.5	-42.1	-27.0	-6.5	0.4	-2.5	0.6	-12.2	-22.0	-161.9	-155.8	-143.9	-23.7

Adjustments:

Grout: upgrade vault design requirements, program management and escalation.	-79.9
B Plant: delete WESF from double-shell tank waste disposal mission.	62.6
Tank Farms: LERF, retrieval process technology and projects, operational restoration, concrete encasement, operations assurance, program management and escalation.	-291.4
Total	-332.4

[a]See Table C-1 for baseline budget.

PST89-3083-6-12

APPENDIX D

LEVEL I Integrated Double-Shell Tank Waste Disposal Schedule

Figure D-1. Double-Shell Tank Waste Disposal - Level 1 - Integrated Double-Shell Tank Waste Disposal Schedule

APPENDIX E

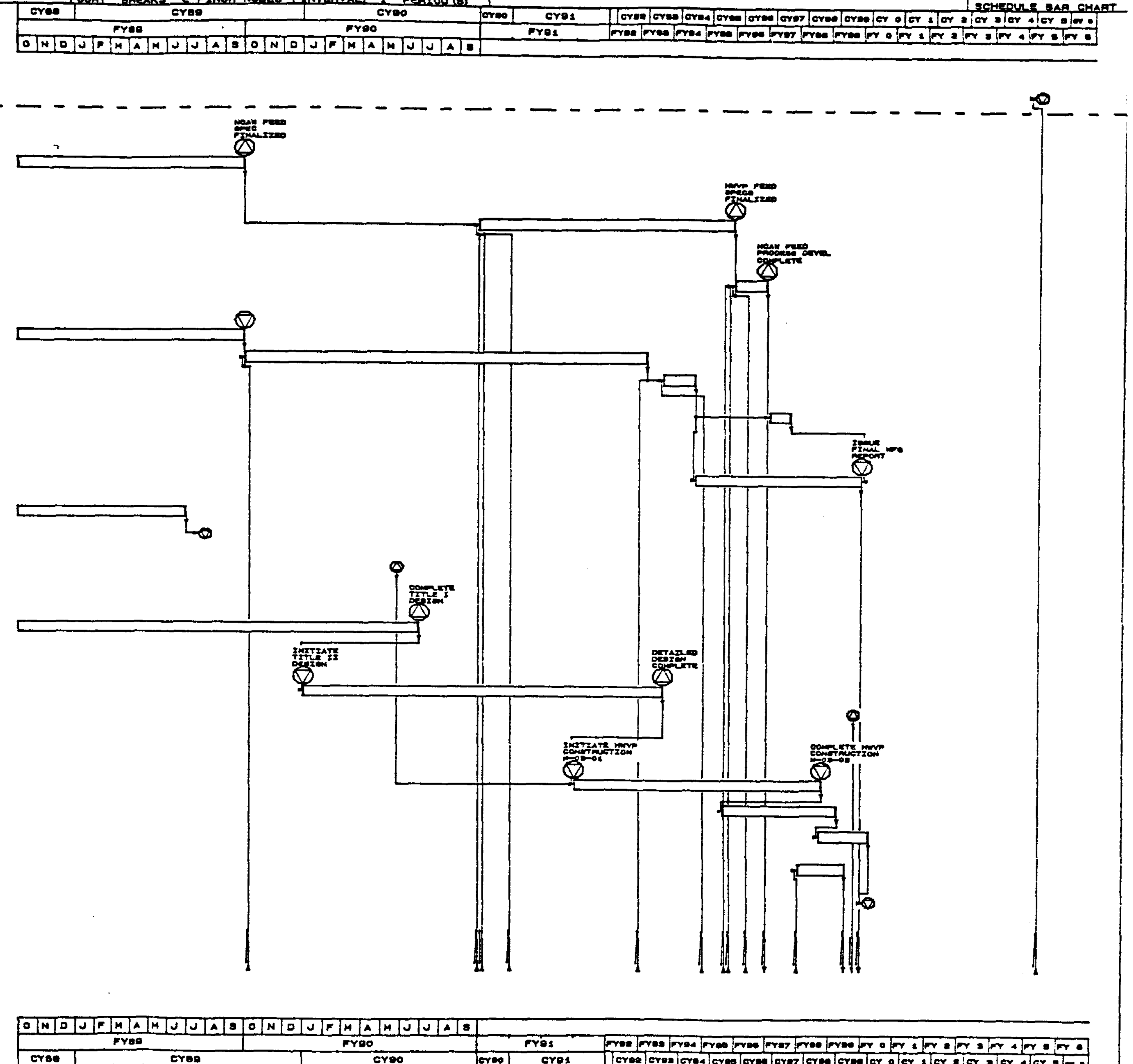
LEVEL II Double-Shell Tank Waste Disposal Contributing End Function Schedule

Figure E-1. Double-Shell Tank Waste Disposal Hanford Waste Vitrification Plant (Sheet 1 of 3)

PROJECT L2 PLOT WDL2R2 PAGE 1 SHEET 1	START 1OCT87 FINISH 31OCT13 DATA DATE 1OCT87	DOUBLE SHELL TANK WASTE DISPOSAL DEFENSE WASTE MANAGEMENT WESTINGHOUSE HANFORD COMPANY	WORKING SCHEDULE PAGE BREAK VALUE: V - HWVP LINE BREAK ON WASTE TYPE
LINE BREAK ON WASTE TYPE SPACE BREAK ON SORT BREAKS E FINSH NODES	MODE O/FE INTERVAL: 1 PERIOD (S)	RUN 18DEC89 12:06 PROJECT/2 86A2 SCHEDULE BAR CHART	

HWVP

		SD.	FD.
410008000	COMPLETE DST WASTE VITRIFICATION		28FEB05
NCAW			
410003011	DEVELOP NCAW FEED SPEC - HWVP	1OCT88	29SEP89
410003012	DEVELOP FINAL WASTE FEED SPECS - HWVP	1OCT90	27SEP96
410003013	FINAL HWVP FEED PROCESS DEVELOPMENT	1OCT95	30SEP98
417500101	UPDATED WFQ PLAN - HWVP	1OCT88	30SEP89
410003710	NCAW LAB SCALE TEST - HWVP	1OCT89	31DEC92
417503711	NCAW BENCH SCALE TEST	1JUL93	30JUN94
417500102	PREPARE FINAL WASTE COMPLIANCE PLAN	1NOV96	30JUN97
417500103	NCAW WFQ - HWVP	1JUL94	22SEP99
417300001	PREPARE HWVP RCRA PART B PERMIT APPLICATION	1OCT88	30JUN89
417300002	SUBMIT HWVP PART B (M-20-01)		30JUL89
417201001	PSAR APPROVED BY DOE-RL		25MAY90
410001102	HWVP TITLE I DESIGN	1OCT88	29JUN90
410001104	DETAILED DESIGN (TITLE II) - HWVP	1JAN90	30JUN93
417201002	FSAR APPROVED BY DOE-RL		30JUN99
410001301	HWVP CONSTRUCTION	1JUL91	30JUN98
410001401	PREOPERATIONAL TESTING - HWVP	31MAY95	31DEC98
410001402	COLD TESTING - HWVP	1JUN98	31DEC99
410008711	NCAW FRIT - HWVP	1OCT97	31MAR99
410003000	INITIATE HWVP OPERATIONS (M-03-00)		31DEC99



SIGNATURE APPROVAL		DATE
G.A. MEYERS	[signature]	1/15/90
R.A. SMITH	[signature]	12/20/89

LEGEND
- DOE-HQ MAJOR MILESTONE
- DOE-RL MAJOR MILESTONE
- KEY MILESTONE
- INTER-PROGRAM INTERFACE

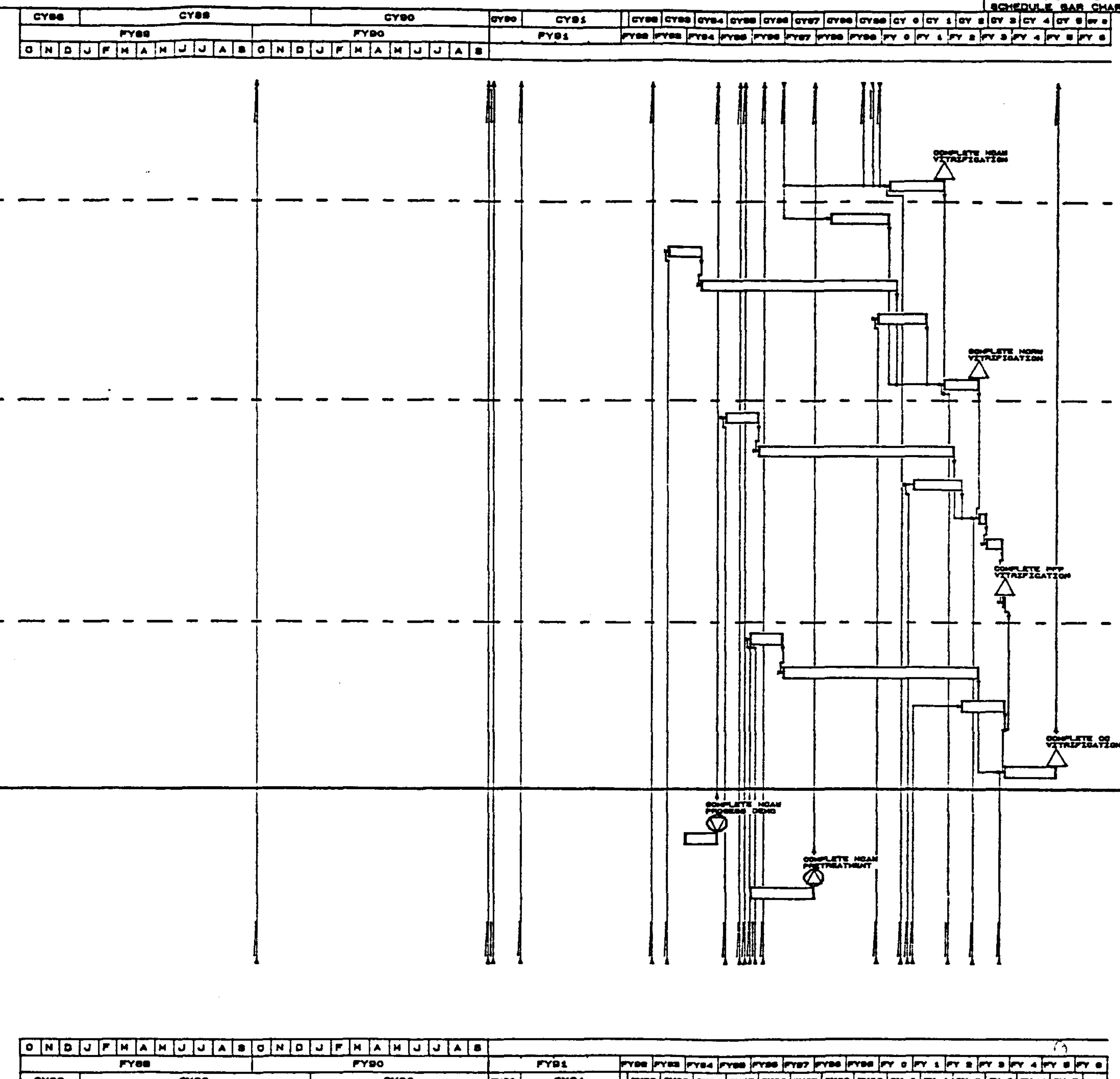
Program Title DST WASTE DISPOSAL	Data Shown Through
Schedule Title HWVP	Work Breakdown Structure V
Schedule Number 4	Data Base DSTWD Network HWVP
Revision 4 Revision Date 12/18/89	Plot File HWVPR4.PLO
Prepared For	
Scheduler SJ STREET	Page 1 of 3

Figure E-1. Double-Shell Tank Waste Disposal Hanford Waste Vitrification Plant (Sheet 2 of 3)

PROJECT L2
PLOT WDL2R2
PAGE 1 SHEET 2

PROJECT/2 SSA2
SCHEDULE BAR CHART

		Activity	SD	FD
HWVP	NCAW	410008811 NCAW OPERATIONS - HWVP	31DEC99	31AUG01
	NCRW	410003014 COMPLETE POST NCAW PROCESS DEVELOPMENT	1APR98	31DEC99
		417503721 NCRW BENCH SCALE TEST - HWVP	1APR93	31MAR94
		417500121 NCRW WFQ - HWVP	1APR94	31MAR00
		410008722 NCRW FRIT - HWVP	1SEP98	28FEB01
		410008821 NCRW OPERATIONS - HWVP	1SEP01	30SEP02
	PFP	410003731 PFP BENCH SCALE TEST - HWVP	1JAN95	31DEC95
		417500131 PFP WFQ - HWVP	1JAN96	31DEC01
		410008733 PFP FRIT - HWVP	1OCT00	31MAR02
		410008831 PFP OPERATIONS - HWVP	1OCT02	31DEC02
		410002301 REPLACE MELTER - HWVP	1JAN03	30JUN03
		410008832 PFP OPERATIONS - HWVP	1JUL03	31JUL03
	CC	410003741 CC BENCH SCALE TEST - HWVP	1OCT95	30SEP96
		417500141 CC WFQ - HWVP	1OCT96	30SEP02
		410008744 CC FRIT - HWVP	1APR02	31JUL03
		410008841 CC OPERATIONS - HWVP	1AUG03	28FEB05
OFF-PAGE ACTIVITIES		130008800 NCAW DEMONSTRATION PROCESSING	1OCT93	30SEP94
		130008802 NCAW FULL SCALE PRETREATMENT PROCESSING	1OCT95	30SEP97



SIGNATURE APPROVAL		DATE
G.A. MEYERS	[signature]	1/15/90
R.A. SMITH	[signature]	12/21/89

LEGEND
- DOE-HQ MAJOR MILESTONE
- DOE-RL MAJOR MILESTONE
- △ KEY MILESTONE
- ◇ INTER-PROGRAM INTERFACE

Program Title DST WASTE DISPOSAL
Schedule Title HWVP
Schedule Number 4
Revision 4 Revision Date 12/18/89
Prepared For
Scheduler SJ STREET

Data Shown Through
Work Breakdown Structure V
Data Base DSTWD Network HWVP
Plot File HWVPR4.PLO
Page 2 of 3

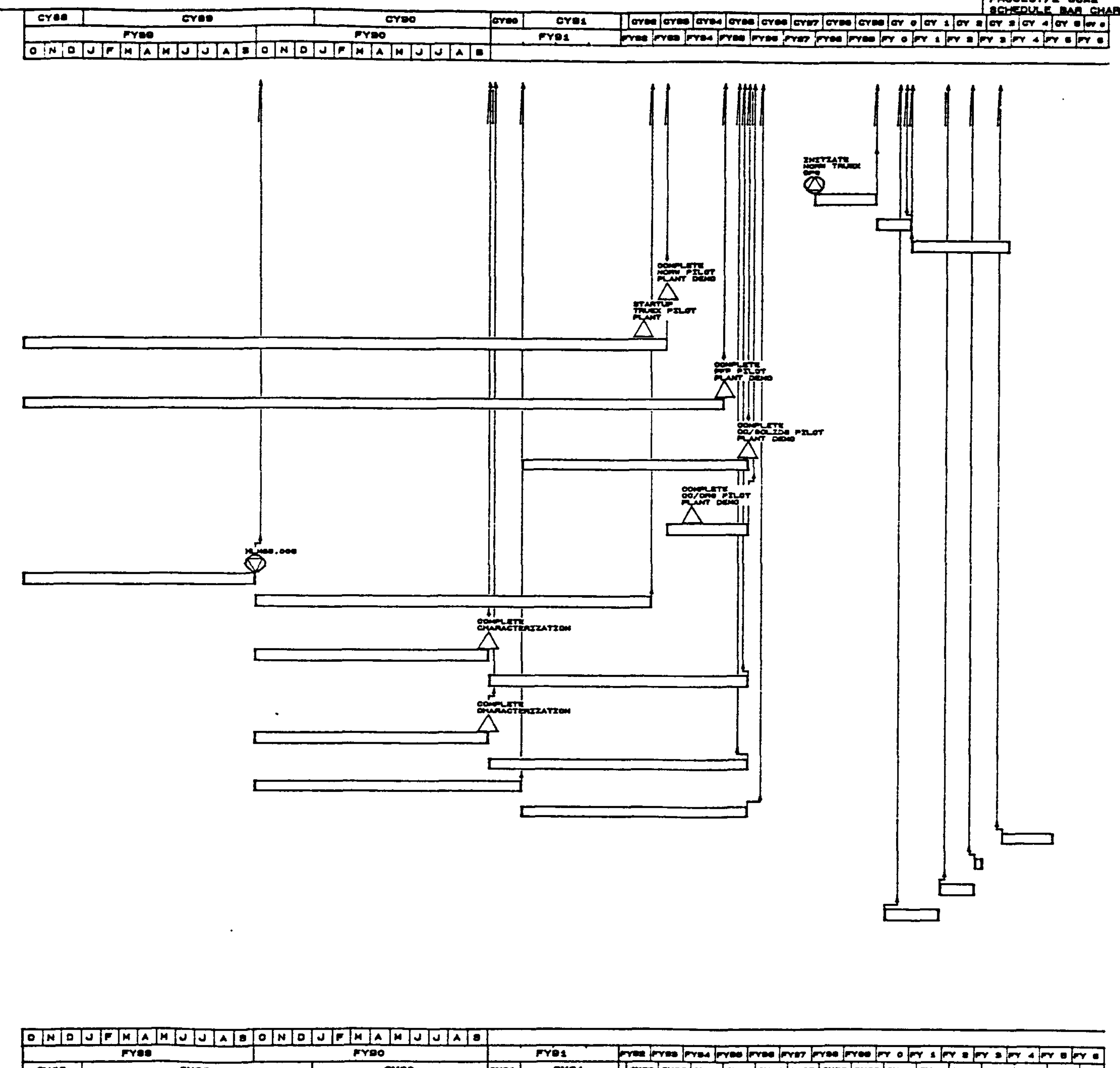
Figure E-1. Double-Shell Tank Waste Disposal Hanford Waste Vitrification Plant (Sheet 3 of 3)

PROJECT LS
PLOT WDL3R3
PAGE 1 SHEET 3

RUN 18DEC89 12:06
PROJECT/2 86A2
SCHEDULE BAR CHART

OFF-PAGE ACTIVITIES

Activity	SD.	ED.
136008002 NCRW TRUEX OPERATIONS - B PLANT	1OCT87	31AUG99
136008003 PFP TRUEX	1SEP96	30SEP00
136008004 CC TRUEX OPERATIONS - B PLANT	1OCT00	30SEP03
210003022 TECHNOLOGY/PILOT PLANT TEST (NCRW)	1OCT88	31MAR93
210003032 TECHNOLOGY/PILOT PLANT TEST (PFP)	1OCT88	31DEC94
210003042 TECHNOLOGY/PILOT PLANT TRUEX (CC)	1JAN91	30SEP95
210003044 FINAL PILOT PLANT ORGANIC DESTRUCTION (CC)	1APR93	30SEP95
210004111 CHARACTERIZE 1 SAMPLE (NCAW)	1OCT88	30SEP89
210004112 CORE SAMPLE AND CHARACTERIZE 12 CORES (NCAW)	1OCT89	30SEP92
210004122 SECOND CORE AND CHARACTERIZATION (NCRW)	1OCT89	30SEP90
210004123 CHARACTERIZATION OF REMAINING CORES (NCRW)	1OCT90	30SEP95
210004132 SECOND CORE SAMPLE & CHAR COMPLETE (PFP)	1OCT89	30SEP90
210004133 CHARACTERIZATION OF REMAINING CORES (PFP)	1OCT90	30SEP95
210004141 CORE & CHARACTERIZATION (CC)	1OCT89	31DEC90
210004142 CHARACTERIZATION OF REMAINING CORES (CC)	1JAN91	30SEP95
711035002 PCC TRANSFER TO HWVP	1AUG03	28FEB05
711045002 PPFP TRANSFER TO HWVP	1OCT02	31DEC02
731015001 PNCRW TRANSFER TO HWVP	1SEP01	30SEP02
741025003 PNCAW TRANSFER TO HWVP	31DEC99	31AUG01



SIGNATURE APPROVAL		DATE
G.A. MEYERS	[signature]	1/15/90
R.A. SMITH	[signature]	12/20/89

LEGEND
- DOE-HQ MAJOR MILESTONE
- DOE-RL MAJOR MILESTONE
- KEY MILESTONE
- INTER-PROGRAM INTERFACE

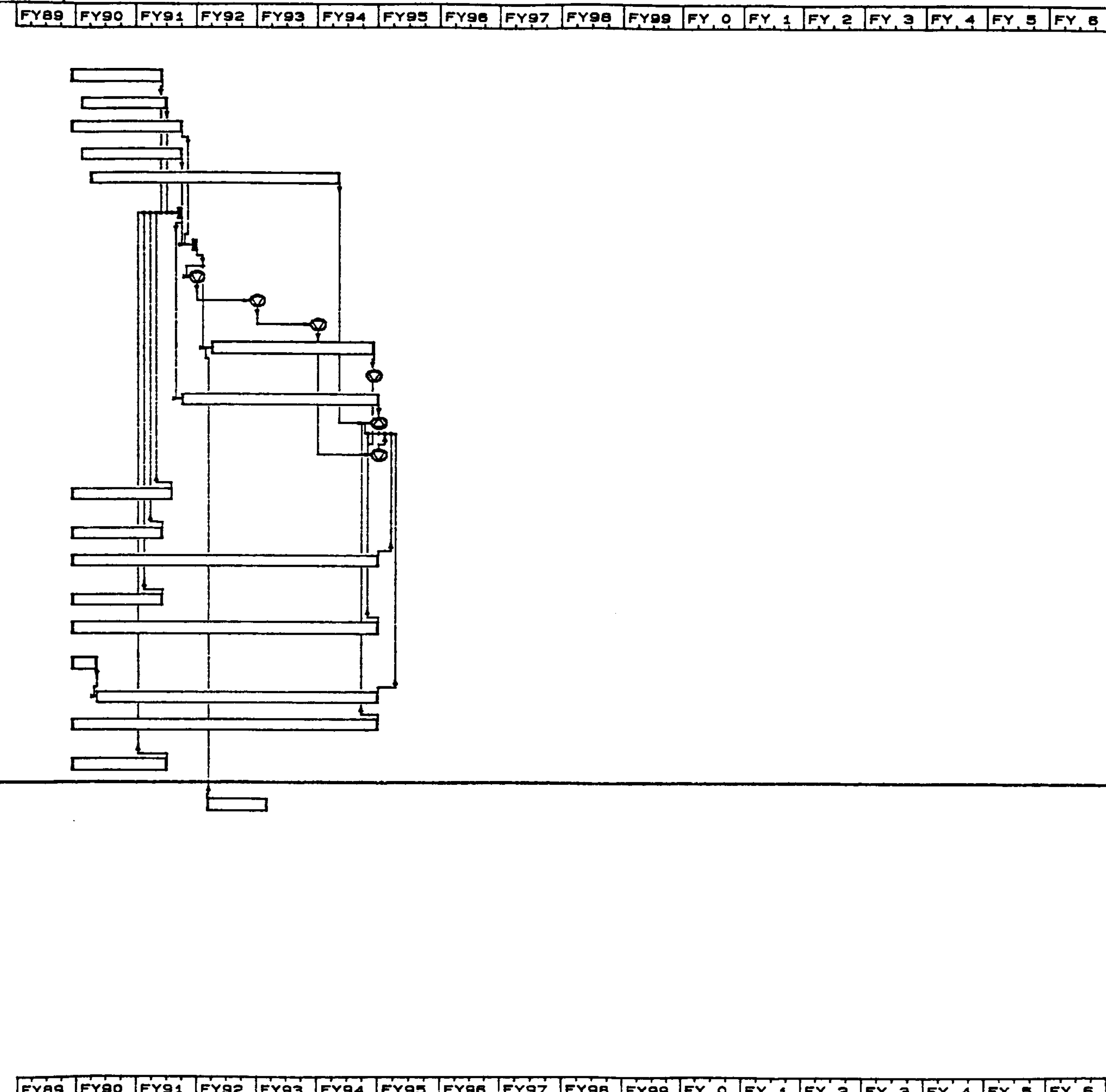
Program Title DST WASTE DISPOSAL
Schedule Title HWVP
Schedule Number 4
Revision 4 Revision Date 12/18/89
Prepared For
Scheduler SJ STREET

Data Shown Through
Work Breakdown Structure V
Data Base DSTWD Network HWVP
Plot File HWVPR4.PLO
Page 3 of 3

Figure E-2. Double-Shell Tank Waste Disposal - Grout

PROJECT LEVEL2 PLOT SJS2 PAGE 1 SHEET 1	DOUBLE SHELL TANK WASTE DISPOSAL DEFENSE WASTE MANAGEMENT WESTINGHOUSE HANFORD COMPANY	MODE O/FE INTERVAL: 1 PERIOD (S)	RUN 29SEP89 07:40 PROJECT/2 66A2 SCHEDULE BAR CHART
START 1OCT87 FINISH 31OCT13	W O R K I N G S C H E D U L E PAGE BREAK VALUE: P - GROUT LINE BREAK ON WASTE TYPE	LINE BREAK ON WASTE TYPE SPACE BREAK ON SORT BREAKS E FINSH NODES	

			SD	FD
GROUT	DSS/DSSF	173202010 VAULT #102 EQUIP	1SEP89	28FEB91
		173202020 VAULT #102 CONSTRUCTION	1NOV89	31MAR91
		173202030 VAULT #103 EQUIP	1SEP89	30JUN91
		173202040 VAULT #103 CONSTRUCTION	1NOV89	30JUN91
		173202050 VAULT #104-#114 CONSTRUCTION	1JAN90	31JAN94
		174102010 FILL VAULT #102	1JUN91	30JUN91
		174102020 FILL VAULT #103	1SEP91	30SEP91
		170000101 COMPLETE 3 GROUT CAMPAIGNS (M-01-01)		30SEP91
		170000102 COMPLETE 6 GROUT CAMPAINGS (M-01-02)		30SEP92
		170000103 COMPLETE 10 GROUT CAMPAINGS (M-01-03)		30SEP93
		174102030 FILL VAULT #104-#114	1JAN92	31AUG94
		170000105 COMMIT ADDITIONAL GROUT CAMPAIGNS (M-01-05)		1SEP94
		174102040 CLOSE VAULTS #102-#114	1JUL91	30SEP94
		170000100 COMPLETE 14 GROUT CAMPAIGNS (M-01-00)		30SEP94
		170000104 COMPLETE 14 GROUT CAMPAINGS (M-01-04)		30SEP94
		174302000 OPER DOC/SPARES/MODS/DRY MATL	1SEP89	30APR91
		175102000 GROUT PERFORMANCE ASSESSMENT	1SEP89	28FEB91
		175102010 PNL NON-PA SUPPORT	1SEP89	30SEP94
		175202010 VOID FILL VAULT #101	1SEP89	28FEB91
		175202020 MISC ORNL SUPPORT	1SEP89	30SEP94
		175302010 GROUT PART B RESUBMITTAL	1SEP89	31JAN90
		175302020 GROUT DRAFT/ISSUE/MAINTAIN PART B PERMIT	1FEB90	30SEP94
		175302030 FORMULATION/MISC TECH TASKS	1SEP89	30SEP94
		175402010 GROUT SAFETY ANALYSIS REPORT	1SEP89	31MAR91
OFF-PAGE ACTIVITIES		420005100 DSS FEED FOR GROUT	1DEC91	30NOV92



SIGNATURE APPROVAL	DATE
[signature]	10/2/89
[signature]	10/2/89

LEGEND
- DOE-HQ MAJOR MILESTONE
- DOE-RL MAJOR MILESTONE
- KEY MILESTONE
- INTER-PROGRAM INTERFACE

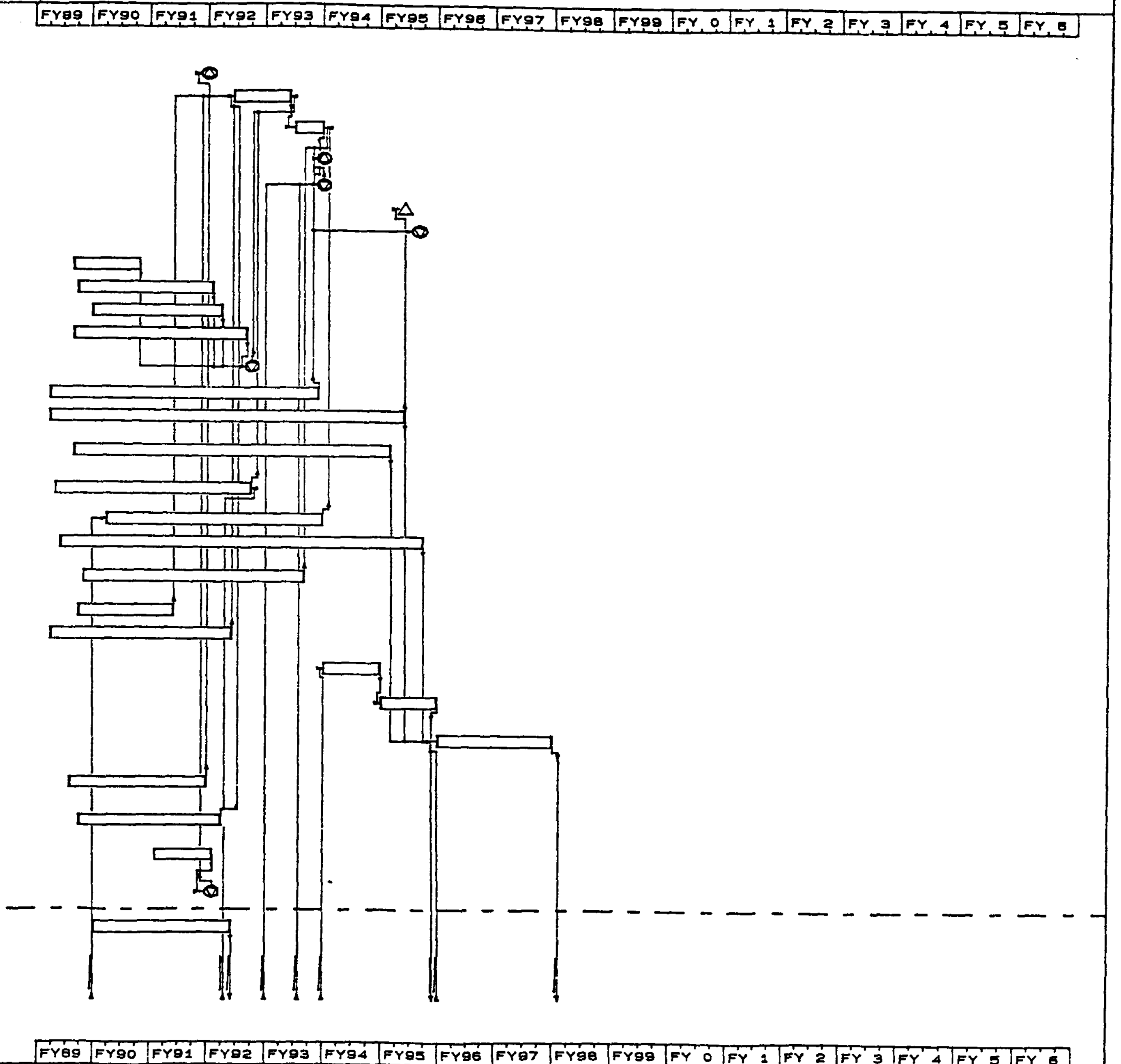
Program Title DST WASTE DISPOSAL
Schedule Title GROUT
Schedule Number 1
Revision 1 Revision Date 9/29/89
Prepared For RM BLACK
Scheduler

Data Shown Through
Work Breakdown Structure
Data Base Network
Plot File
Page 1 of 1

Figure E-3. Double-Shell Tank Waste Disposal - Pretreatment (Sheet 1 of 2)

PROJECT BPL2 PLOT SJS2 PAGE 1 SHEET 1	DOUBLE SHELL TANK WASTE DISPOSAL DEFENSE WASTE MANAGEMENT WESTINGHOUSE HANFORD COMPANY	MODE O/FE INTERVAL: 1 PERIOD (S)	RUN 1OCT89 13: 13 PROJECT/2 85A2 SCHEDULE BAR CHART
START 1OCT87 FINISH 31OCT13	W O R K I N G S C H E D U L E PAGE BREAK VALUE: D - B PLANT LINE BREAK ON WASTE TYPE	LINE BREAK ON WASTE TYPE SPACE BREAK ON SORT BREAKS E FINSH NODES	

			BD.	ED.
B PLANT	NCAW	130008405 ACHIEVE COMPLIANCE INTERIM STATUS ACTION M-23-00		30SEP91
		130008402 NCAW WHC READINESS REVIEW - B PLANT	1MAR92	28FEB93
		130008403 NCAW DOE READINESS REVIEW - B PLANT	1APR93	30SEP93
		130008400 INITIATE B PLANT OPS FOR PRETREATMENT (M-02-00)		1OCT93
		130008401 INITIATE PRETREATMENT OF NCAW (M-02-01)		1OCT93
		130008406 COMPLETE B PLANT RAD/CONTAINMENT UPGRADE		3MAR95
		130008404 COMPLETE LIQUID EFFLUENT TRTMNT FAC (M-17-00)		1JUN95
		130081000 W-008 CHEMICAL SEWER NEUTRALIZATION	1JUN89	31JUL90
		130031000 W-003 CHEMICAL SEWER ENVIRON COMPLIANCE-B PLANT	1JUL89	31OCT91
		130041000 W-004 CHEMICAL PREP AREA MOD - B PLANT	1OCT89	31DEC91
		130101000 W-010H ENVIRONMENTAL COMPLIANCE - B PLANT	1JUN89	31MAY92
		130081170 B PLANT CHEM SEWER UPGRADE (M-17-04)		1JUL92
		130071000 W-007H PROCESS CONDENSATE TREATMENT - B PLANT	1JAN89	31AUG93
		130241000 W-024H RAD EFFLULENT & CONTAINMENT - B PLANT	1JAN89	28FEB95
		130021000 W-002 221-B CANYON CRANE REPLACEMENT	1JUN89	30NOV94
		130401000 W-040 CESIUM ION EX COLUMN - B PLANT	1FEB89	30JUN92
		130551000 B PLT PRCSS CNTRL EFF UPG-W-056 W-065 W-077 MISC	1JAN90	30SEP93
		130591000 W-059 CANYON VENT SAFETY UPGRADE - B PLANT	1MAR89	30JUN95
		136001001 RADIATION AREA REDUCTION - B PLANT	1AUG89	31MAY93
		136001002 221-B CANYON EXPANSION JOINT RESEALING	1JUL89	28FEB91
		136001003 B PLANT CANYON GALLERY DECONTAMINATION/PAINTING	1JAN89	29FEB92
		130008800 NCAW DEMONSTRATION PROCESSING	1OCT93	30SEP94
		130008801 NCAW PREPARATION FOR FULL SCALE	1OCT94	30SEP95
		130008802 NCAW FULL SCALE PROCESSING	1OCT95	30SEP97
		137400000 B PLANT INTERIM STATUS ACTIONS	1MAY89	30SEP91
		137200510 B PLANT FACILITY SAR REVISION	1JUL89	31DEC91
		137300501 B PLANT PART B APPLICATION PREPARATION	1NOV90	31OCT91
		137300500 SUBMIT B PLANT PART B APPLICATION (M-20-21)		31OCT91
	NCRW	136001004 221-B CANYON EQUIPMENT REMOVAL/BURIAL	1OCT89	29FEB99



SIGNATURE APPROVAL	DATE	LEGEND	
M.L. GRYGIEL	10/2/89	DOE-HQ MAJOR MILESTONE	Program Title DST WASTE DISPOSAL
R.J. MURKOWSKI	10/2/89	DOE-RL MAJOR MILESTONE	Schedule Title PRETREATMENT
N.L. SIMON	10/2/89	KEY MILESTONE	Schedule Number 1
10/2/89		INTER-PROGRAM INTERFACE	Revision 1 Revision Date 10/1/89
			Prepared For RM BLACK
			Scheduler NL SIMON

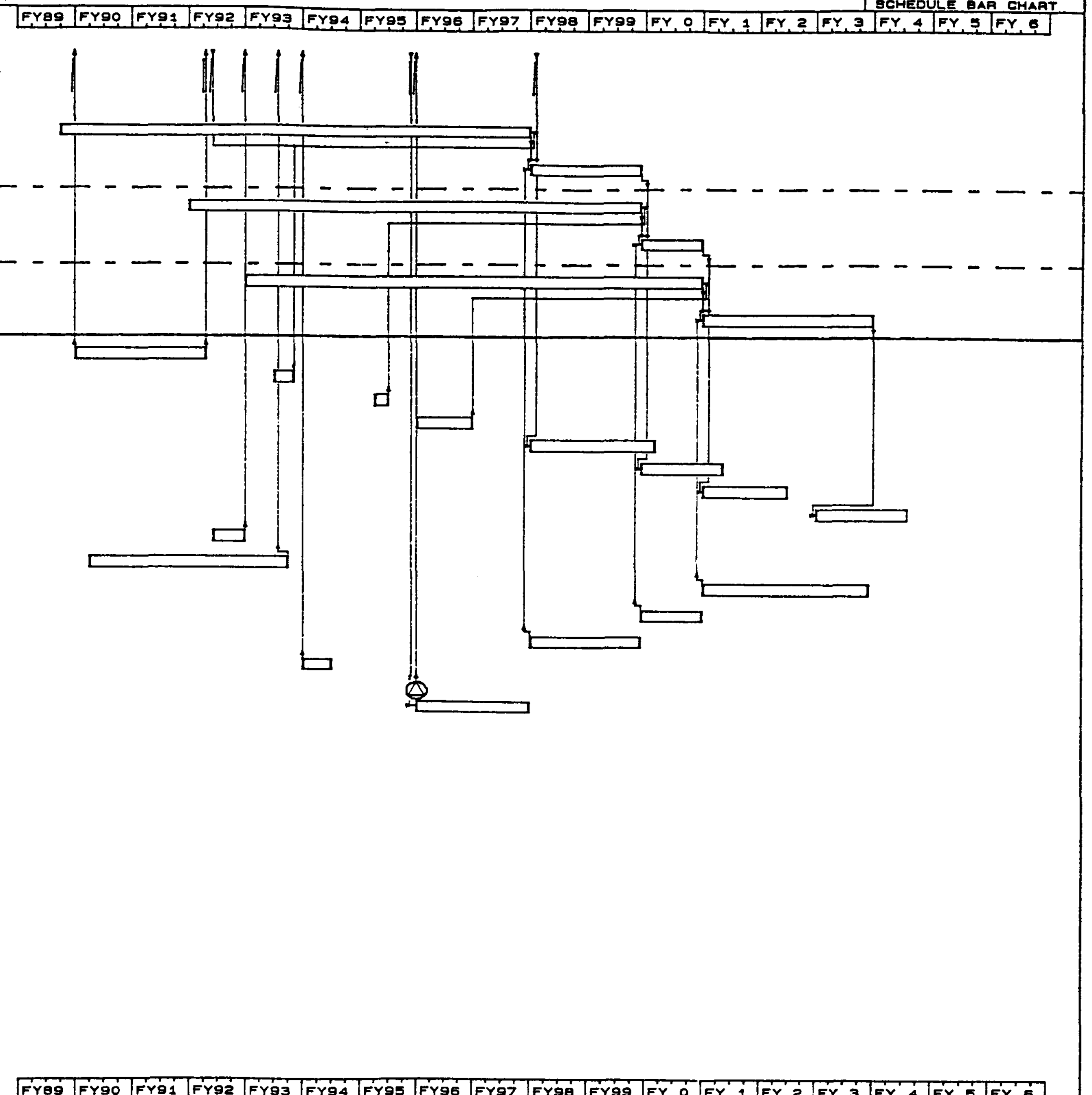
Data Shown Through ______
Work Breakdown Structure ______
Data Base ______ Network ______
Plot File ______
Page 1 of 2

Figure E-3. Double-Shell Tank Waste Disposal - Pretreatment (Sheet 2 of 2)

PROJECT BPL2
PLOT SJS2
PAGE 1 SHEET 2

RUN 1OCT89 13:13
PROJECT/2 86A2
SCHEDULE BAR CHART

			SD	FD
B PLANT	NCRW	130951000 W-095 NCRW PROCESS MODIFICATIONS - B PLANT	1JUL89	30SEP97
		136008002 NCRW TRUEX OPERATIONS - B PLANT	1OCT97	31AUG99
	PFP	136001005 PFP PROCESS MODIFICATIONS - B PLANT	1OCT91	31AUG99
		136008003 PFP TRUEX	1SEP99	30SEP00
	CC	130961000 W-096 CC/OXIDATION - B PLANT	1OCT92	30SEP00
		136008004 CC TRUEX OPERATIONS - B PLANT	1OCT00	30SEP03
OFF-PAGE ACTIVITIES		210003001 FINAL TECHNOLOGY DEVELOPMENT (NCAW)	1OCT89	13JAN92
		210003024 FLOWSHEET (NCRW)	1APR93	31JUL93
		210003034 FLOWSHEET (PFP)	1JAN95	31MAR95
		210003046 FLOWSHEET (CC/ORGANIC DESTRUCTION)	1OCT95	30SEP96
		410008711 NCAW FRIT - HWVP	1OCT97	30NOV99
		410008722 NCRW FRIT TESTS - HWVP	1SEP99	31JAN01
		410008733 PFP FRIT TESTS - HWVP	1OCT00	31MAR02
		410008744 CC FRIT TESTS - HWVP	1OCT02	30APR04
		440009991 AR VAULT READINESS REVIEW (WHC & DOE)	1MAR92	30SEP92
		500280000 W-028 AGING WASTE TRANSFER LINES	1JAN90	30JUN93
		711025000 CC TRANSFER TO B PLANT	1OCT00	31AUG03
		711045001 PFP TRANSFER TO B PLANT	1SEP99	30SEP00
		731035001 NCRW TRANSFER TO B PLANT	1OCT97	31AUG99
		751015001 101-AZ NCAW TRANSFER TO AR VAULT/B PLANT	1OCT93	31MAR94
		751015002 NCAW TRANSFERS TO AR VAULT/B PLANT	1OCT95	30SEP97



SIGNATURE APPROVAL	DATE

LEGEND
- DOE-HQ MAJOR MILESTONE
- DOE-RL MAJOR MILESTONE
- KEY MILESTONE
- INTER-PROGRAM INTERFACE

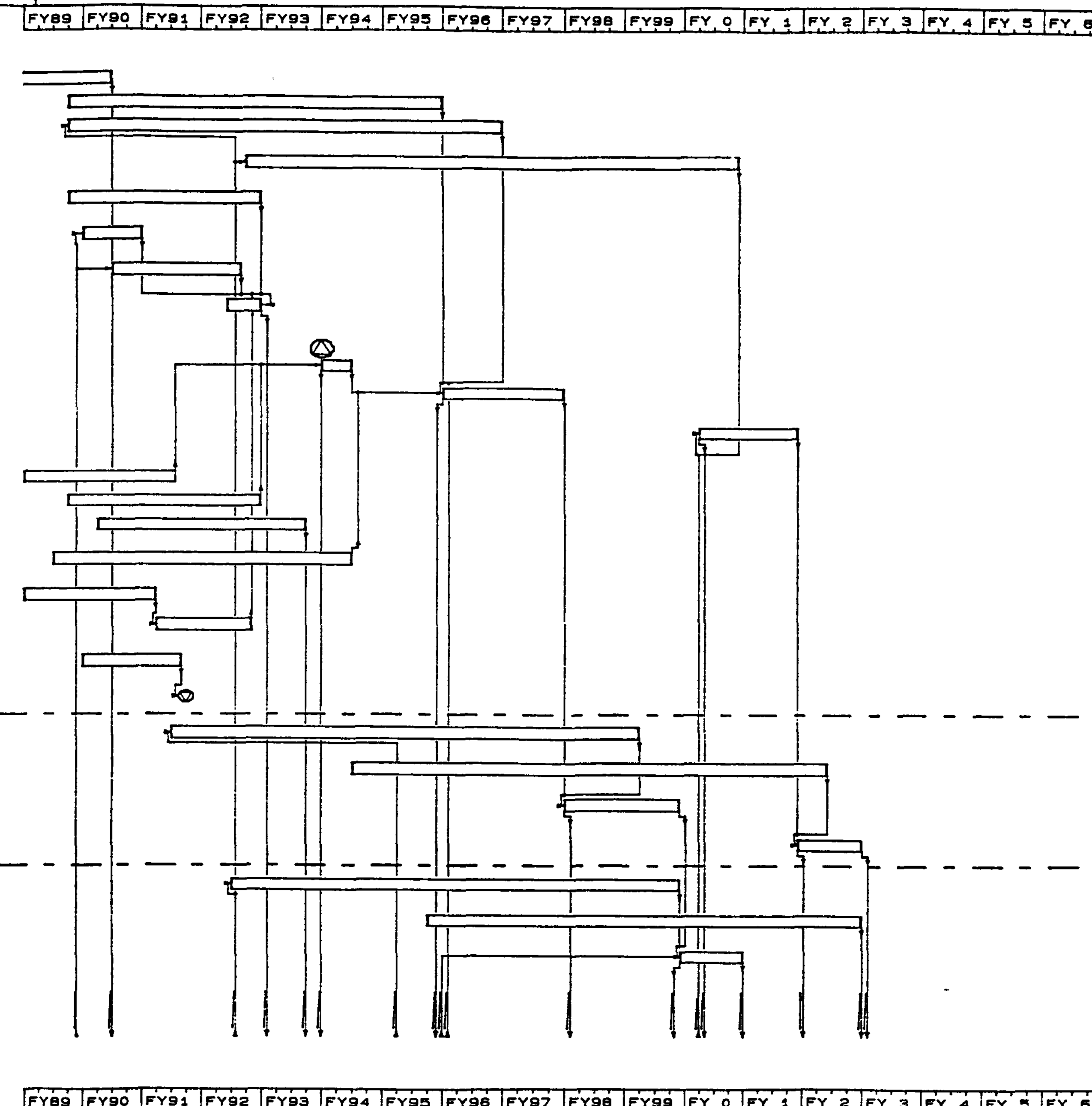
Program Title DST WASTE DISPOSAL
Schedule Title PRETREATMENT
Schedule Number 1
Revision 1 Revision Date 10/1/89
Prepared For RM BLACK
Scheduler NL SIMON

Data Shown Through ______
Work Breakdown Structure ______
Data Base ______ Network ______
Plot File ______
Page 2 of 2

Figure E-4. Double-Shell Tank Waste Disposal Tank Farms (Sheet 1 of 3)

PROJECT LEVEL2 PLOT SJS2 PAGE 1 SHEET 1	DOUBLE SHELL TANK WASTE DISPOSAL DEFENSE WASTE MANAGEMENT WESTINGHOUSE HANFORD COMPANY	MODE O/FE INTERVAL: 1 PERIOD (S)	RUN 29SEP89 07:39 PROJECT/2 86A2 SCHEDULE BAR CHART
START 1OCT87 FINISH 31OCT13	W O R K I N G S C H E D U L E PAGE BREAK VALUE: B - TANK FARMS LINE BREAK ON WASTE TYPE	LINE BREAK ON WASTE TYPE SPACE BREAK ON SORT BREAKS E FINSH NODES	

		Activity	SD.	ED.
TANK FARMS	NCAW	751019098 PROCURE & INSTALL NCAW TRANSFER PUMP	1OCT87	31MAR90
		750011010 W-XXX TF VENT/RETRIEVAL UPGRADE (NON-AGING)	1JUL89	30SEP95
		751011010 W-XXX NCAW RETRIEVAL SYSTEMS-FULL SCALE PROCESS	1JUL89	30SEP96
		741021000 W-XXX PROCESSED NCAW RETRIEVAL SYSTEM - HWVP	1JUL92	31AUG00
		440011100 W-XXX AR VAULT SAFETY UPGRADES	1JUL89	30SEP92
		440031300 AR VAULT COMPRESSOR UPGRADE	1OCT89	30SEP90
		440021101 W-XXX AR VAULT SLUDGE WASHING UPGRADE	1APR90	31MAY92
		440009991 AR VAULT READINESS REVIEW (WHC & DOE)	1MAR92	30SEP92
		751015001 101-AZ NCAW TRANSFER TO AR VAULT/B PLANT	1OCT93	31MAR94
		751015002 NCAW TRANSFERS TO AR VAULT/B PLANT	1OCT95	30SEP97
		741025003 PNCAW TRANSFER TO HWVP	1JAN00	31AUG01
		750661100 W-066 AZ TANK FARM ELECTRICAL UPGRADE	1OCT88	30APR91
		750811010 W-081 OPERATING HANDLING FACILITY	1JUL89	30SEP92
		600280000 W-028 AGING WASTE TRANSFER LINES	1JAN90	30JUN93
		700300000 W-030 TANK FARM VENTILATION UPGRADE	1APR89	31MAR94
		127201100 AGING WASTE SAR	1OCT88	31DEC90
		447200100 AR VAULT/DST RETRIEVAL SAR	1JAN91	31JUL92
		127300500 DBL SHELL TANK PART B PERMIT APPLICATION	1OCT89	31MAY91
		127300501 SUBMIT DST PART B APPLICATION (M-20-16)		30JUN91
	NCRW	731031101 W-XXX NCRW RETRIEVAL SYSTEMS	1APR91	31DEC98
		731011000 W-XXX PROCESSED NCRW RETRIEVAL SYSTEM - HWVP	1APR94	28FEB02
		731035001 NCRW TRANSFER TO B PLANT	1OCT97	31AUG99
		731015001 PNCRW TRANSFER TO HWVP	1SEP01	30SEP02
	PFP	711041101 W-XXX PFP RETRIEVAL SYSTEMS	1APR92	31AUG99
		711041000 W-XXX PROCESSED PFP RETRIEVAL SYSTEM - HWVP	1JUL95	30SEP02
		711045001 PFP TRANSFER TO B PLANT	1SEP98	30SEP00



SIGNATURE APPROVAL | DATE 10/2/89 | 10/2/89

LEGEND
- DOE-HQ MAJOR MILESTONE
- DOE-RL MAJOR MILESTONE
- KEY MILESTONE
- INTER-PROGRAM INTERFACE

Program Title DST WASTE DISPOSAL
Schedule Title TANK FARMS
Schedule Number 1
Revision 1 Revision Date 9/29/89
Prepared For RM BLACK
Scheduler

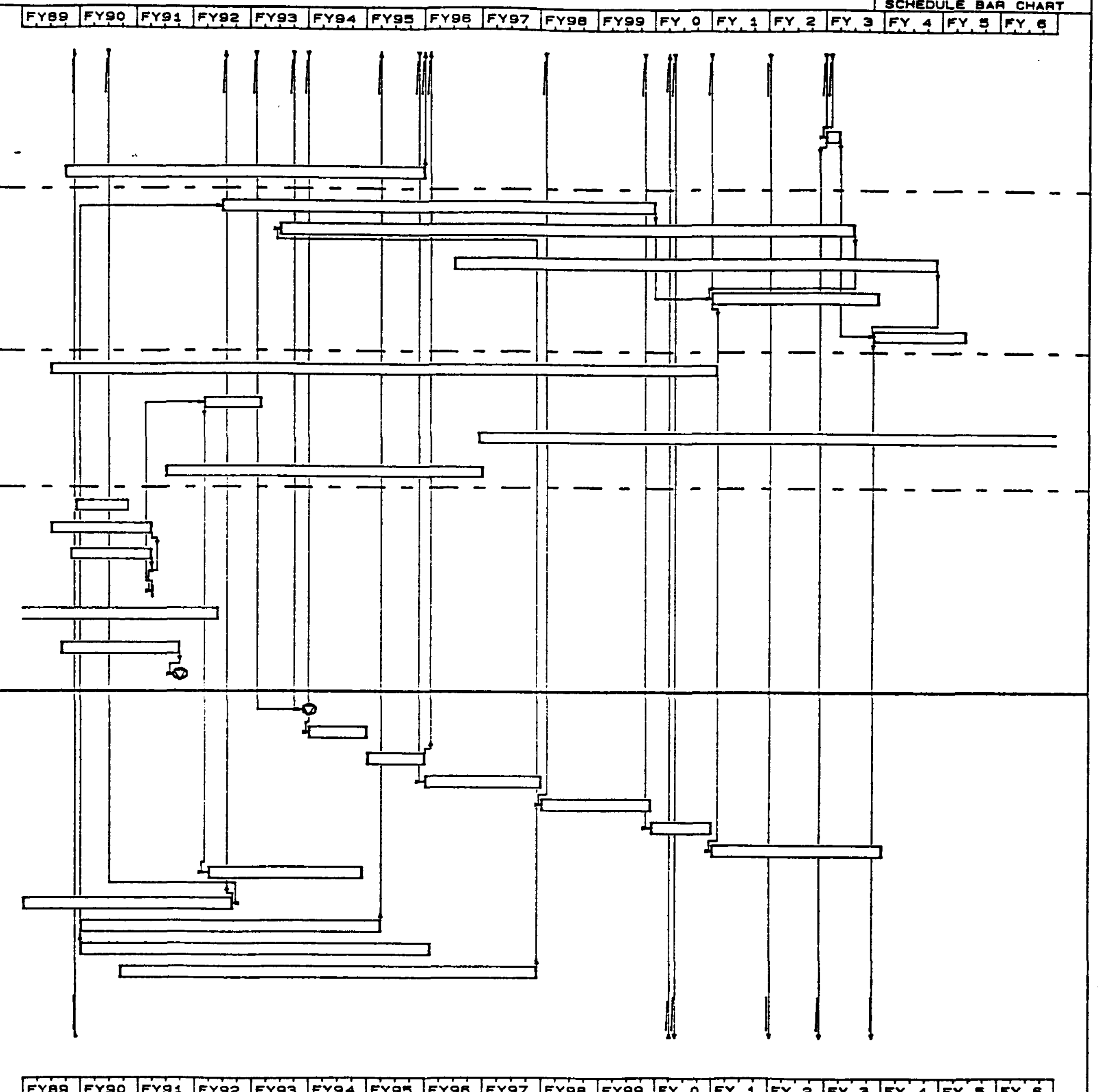
Data Shown Through
Work Breakdown Structure
Data Base Network
Plot File
Page 1 of 3

Figure E-4. Double-Shell Tank Waste Disposal Tank Farms (Sheet 2 of 3)

PROJECT LEVEL2
PLOT SJS2
PAGE 1 SHEET 2

RUN 29SEP89 07:39
PROJECT/2 86A2
SCHEDULE BAR CHART

		Activity	SD.	ED.
TANK FARMS	PFP	711045002 PPFP TRANSFER TO HWVP	1OCT02	31DEC02
		500581100 W-058 CROSS-SITE TRANSFER LINES	1JUL89	30SEP95
	CC	761011101 W-XXX CC WASTE RETRIEVAL SYSTEM (WEST)	1APR92	30SEP99
		711021300 W-XXX CC WASTE RETRIEVAL SYSTEM (EAST)	1APR93	31MAR03
		711031000 W-XXX PROCESSED CC RETRIEVAL SYSTEM - HWVP	1APR96	31AUG04
		711025000 CC TRANSFER TO B PLANT	1OCT00	31AUG03
		711035002 PCC TRANSFER TO HWVP	1AUG03	28FEB05
	DSS/DSSF	711031110 W-XXX DSSF SOLIDS RETRIEVAL SYSTEMS	1APR89	31OCT00
		420005100 DSS FEED FOR GROUT	1DEC91	30NOV92
		711035110 DSSF SOLIDS TRANSFERS	1SEP96	31OCT13
		721081100 W-XXX TANK 108-AP UPGRADES	1APR91	30SEP96
		470230000 W-023 207-A RETENTION BASIN UPGRADE	1SEP89	31JUL90
		420001302 242-A EVAPORATOR OUTAGE	1APR89	31DEC90
		420011300 242-A LERF DESIGN/CONSTRUCTION	1AUG89	31DEC90
		420001309 242-A RESTART	1JAN91	1JAN91
		425341311 B-534 242-A EVAPORATOR UPGRADE	1OCT87	29FEB92
		427300500 242-A EVAPORATOR PART B APPLICATION	1JUN89	30JUN91
		427300501 SUBMIT 242-A EVAP PART B APPLICATION (M-20-17)		30JUN91
OFF-PAGE ACTIVITIES		130008401 INITIATE PRETREATMENT OF NCAW (M-02-01)		1OCT93
		130008800 NCAW DEMONSTRATION PROCESSING	1OCT93	30SEP94
		130008801 NCAW PREPARATION FOR FULL SCALE	1OCT94	30SEP95
		130008802 NCAW FULL SCALE PROCESSING	1OCT95	30SEP97
		136008002 NCRW TRUEX OPERATIONS - B PLANT	1OCT97	31AUG99
		136008003 PFP TRUEX	1SEP99	30SEP00
		136008004 CC TRUEX OPERATIONS - B PLANT	1OCT00	30SEP03
		174102030 FILL VAULT #104-#114	1JAN92	31AUG94
		210141100 DEF DES/INSTALL/2 MIXER PUMP NCAW PROCESS TEST	1OCT88	31MAY92
		210151120 NCRW PROCESS TEST WASTE RETRIEVAL SYSTEM	1OCT89	31DEC94
		210161141 CC PROCESS TEST (WEST) WASTE RETRIEVAL SYSTEM	1OCT89	31OCT95
		210171141 CC PROCESS TEST (EAST) WASTE RETRIEVAL SYSTEM	1JUN90	31AUG97



SIGNATURE APPROVAL	DATE

LEGEND
- DOE-HQ MAJOR MILESTONE
- DOE-RL MAJOR MILESTONE
- KEY MILESTONE
- INTER-PROGRAM INTERFACE

Program Title DST WASTE DISPOSAL
Schedule Title TANK FARMS
Schedule Number 1
Revision 1 Revision Date 9/29/89
Prepared For RM BLACK
Scheduler

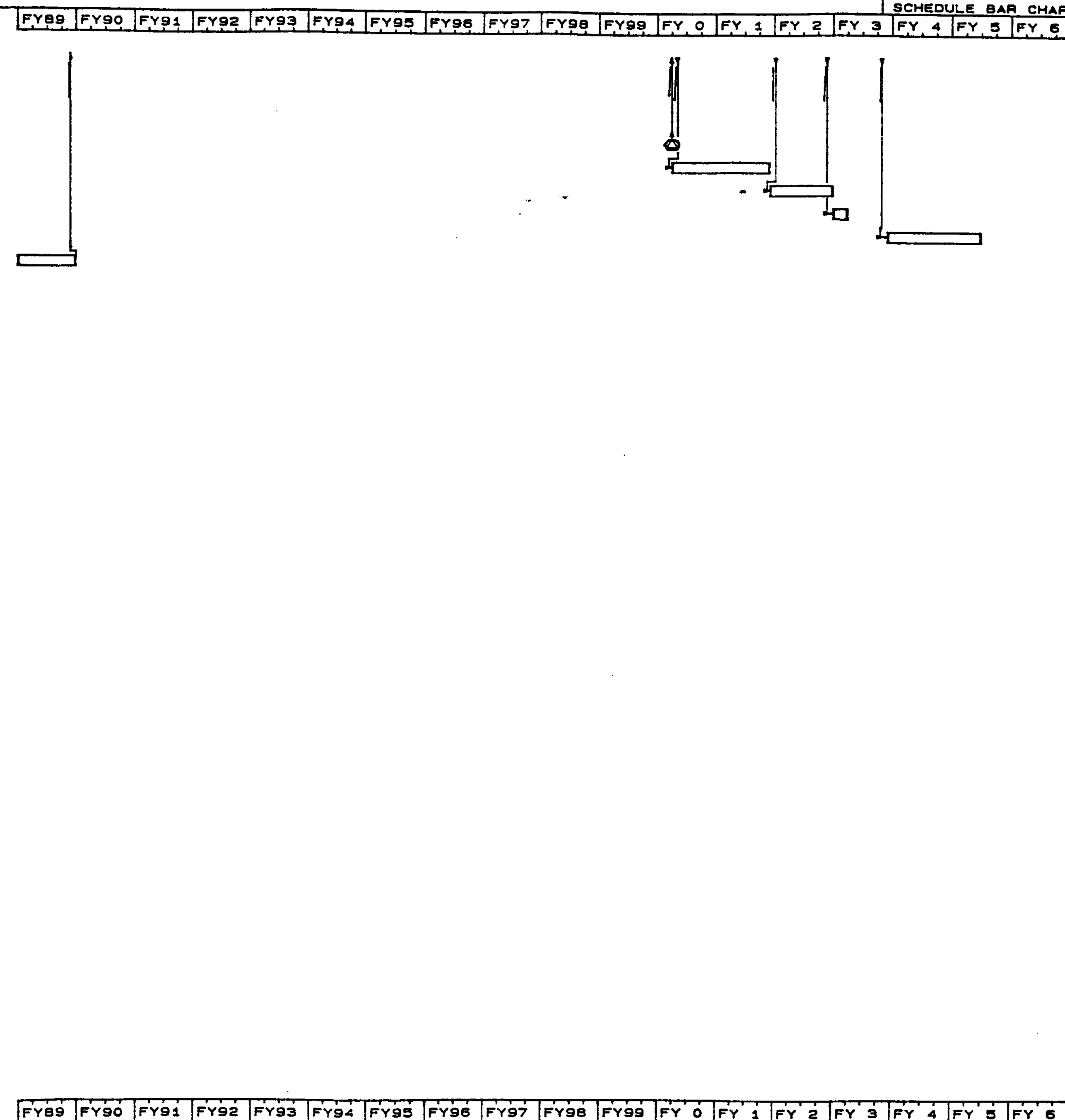
Data Shown Through
Work Breakdown Structure
Data Base Network
Plot File
Page 2 of 3

Figure E-4. Double-Shell Tank Waste Disposal Tank Farms (Sheet 3 of 3)

PROJECT LEVEL2
PLOT SJS2
PAGE 1 SHEET 3

RUN 29SEP89 07:39
PROJECT/2 86A2
SCHEDULE BAR CHART

		SD.	ED.
OFF-PAGE ACTIVITIES	410003000 INITIATE HWVP OPERATIONS (M-03-00)		31DEC99
	410008811 NCAW OPERATIONS - HWVP	1JAN00	31AUG01
	410008821 NCRW OPERATIONS - HWVP	1SEP01	30SEP02
	410008831 PFP OPERATIONS - HWVP	1OCT02	31DEC02
	410008841 CC OPERATIONS - HWVP	1SEP03	31MAR05
	446808001 CONCEPTUAL AR VAULT FLOWSHEET (NCAW)	1OCT88	30SEP89



SIGNATURE APPROVAL	DATE

LEGEND
- DOE-HQ MAJOR MILESTONE
- DOE-RL MAJOR MILESTONE
- KEY MILESTONE
- INTER-PROGRAM INTERFACE

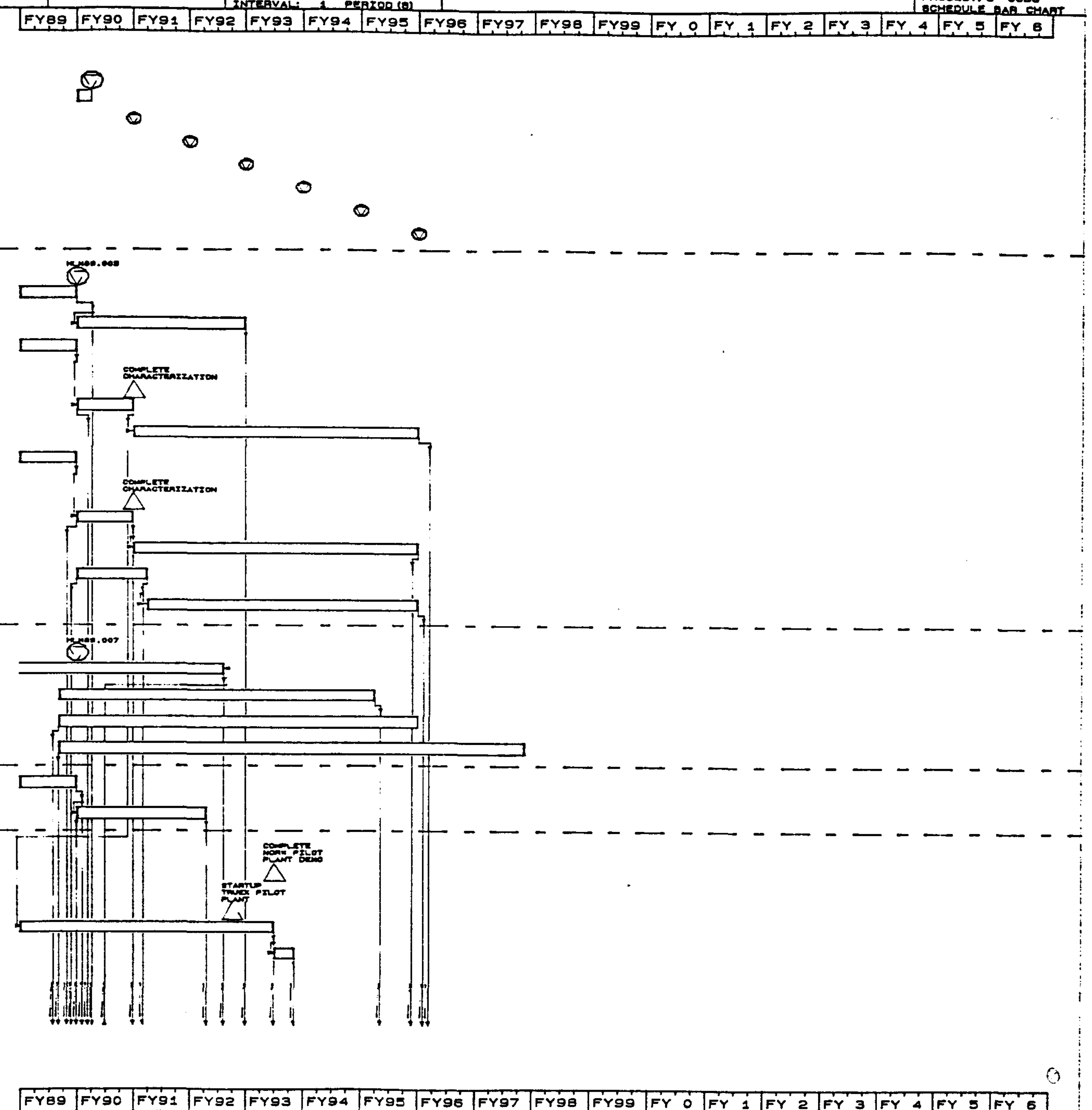
Program Title DST WASTE DISPOSAL
Schedule Title TANK FARMS
Schedule Number 1
Revision 1 Revision Date 9/29/89
Prepared For RH BLACK
Scheduler

Data Shown Through
Work Breakdown Structure
Data Base Network
Plot File
Page 3 of 3

Figure E-5. Double-Shell Tank Waste Disposal Defense High-Level Waste Technology (Sheet 1 of 3)

PROJECT L2 PLOT TECHL2 PAGE 1 SHEET 1	START 1OCT87 FINISH 31OCT13 DATA DATE 1OCT87	DOUBLE SHELL TANK WASTE DISPOSAL DEFENSE WASTE MANAGEMENT WESTINGHOUSE HANFORD COMPANY	WORKING SCHEDULE PAGE BREAK VALUE: H - TECHNOLOGY LINE BREAK ON	LINE BREAK ON SORT BREAKS NODES
MODE O/FE INTERVAL: 1 PERIOD (S)	RUN 17OCT89 14:03 PROJECT/2 6685 SCHEDULE BAR CHART			

			SD	ED
TECHNOLOGY	MILESTONES	210004001 PROVIDE LTR TO ECOLOGY (M-04-01) -WST TRTMNT SCOPE	1OCT89	31DEC89
		210004010 PROVIDE TANK WASTE TREATABILITY REPORT (M-04-00)		30SEP90
		210004011 PROVIDE TANK WASTE TREATABILITY REPORT (M-04-00)		30SEP91
		210004012 PROVIDE TANK WASTE TREATABILITY REPORT (M-04-00)		30SEP92
		210004013 PROVIDE TANK WASTE TREATABILITY REPORT (M-04-00)		30SEP93
		210004014 PROVIDE TANK WASTE TREATABILITY REPORT (M-04-00)		30SEP94
		210004015 PROVIDE TANK WASTE TREATABILITY REPORT (M-04-00)		30SEP95
	CHARACTERIZATION	210004111 CHARACTERIZE 1 SAMPLE (NCAW)	1OCT88	30SEP89
		210004112 CORE SAMPLE AND CHARACTERIZE 12 CORES (NCAW)	1OCT89	30SEP92
		210004121 CORE AND CHARACTERIZATION (NCRW)	1OCT88	30SEP89
		210004122 SECOND CORE AND CHARACTERIZATION (NCRW)	1OCT89	30SEP90
		210004123 CHARACTERIZATION OF REMAINING CORES (NCRW)	1OCT90	30SEP95
		210004131 CORE SAMPLE & CHARACTER COMPLETE (PFP)	1OCT88	30SEP89
		210004132 SECOND CORE SAMPLE & CHAR COMPLETE (PFP)	1OCT89	30SEP90
		210004133 CHARACTERIZATION OF REMAINING CORES (PFP)	1OCT90	30SEP95
		210004141 CORE & CHARACTERIZATION (CC)	1OCT89	31DEC90
		210004142 CHARACTERIZATION OF REMAINING CORES (CC)	1JAN91	30SEP95
	RETRIEVAL	210141100 DEF DES/INSTALL/2 MIXER PUMP NCAW PROCESS TEST	1SEP88	6MAY92
		210151120 NCRW PROCESS TEST WASTE RETRIEVAL SYSTEM	1JUN89	31DEC94
		210161141 CC PROCESS TEST (WEST) WASTE RETRIEVAL SYSTEM	1JUN89	3OCT95
		210171141 CC PROCESS TEST (EAST) WASTE RETRIEVAL SYSTEM	1JUN89	13AUG97
	NCAW PRETREATMENT	210003000 CONCEPTUAL AR VAULT FLOWSHEET (NCAW)	1OCT88	30SEP89
		210003001 FINAL TECHNOLOGY DEVELOPMENT (NCAW)	1OCT89	13JAN92
	POST NCAW PRETREATMENT	210003022 TECHNOLOGY/PILOT PLANT TEST (NCRW)	1OCT88	31MAR93
		210003024 FLOWSHEET (NCRW)	1APR93	31JUL93



SIGNATURE APPROVAL	DATE
G.A. MEYER	10/13/89
D.D. WODRICH	10/18/89

LEGEND
- DOE-HQ MAJOR MILESTONE
- DOE-RL MAJOR MILESTONE
- △ KEY MILESTONE
- ◇ INTER-PROGRAM INTERFACE

Program Title DST WASTE DISPOSAL
Schedule Title DHL WASTE TECHNOLOGY
Schedule Number 2
Revision 2 Revision Date 10/17/89
Prepared For RM BLACK
Scheduler RM BRACKETT

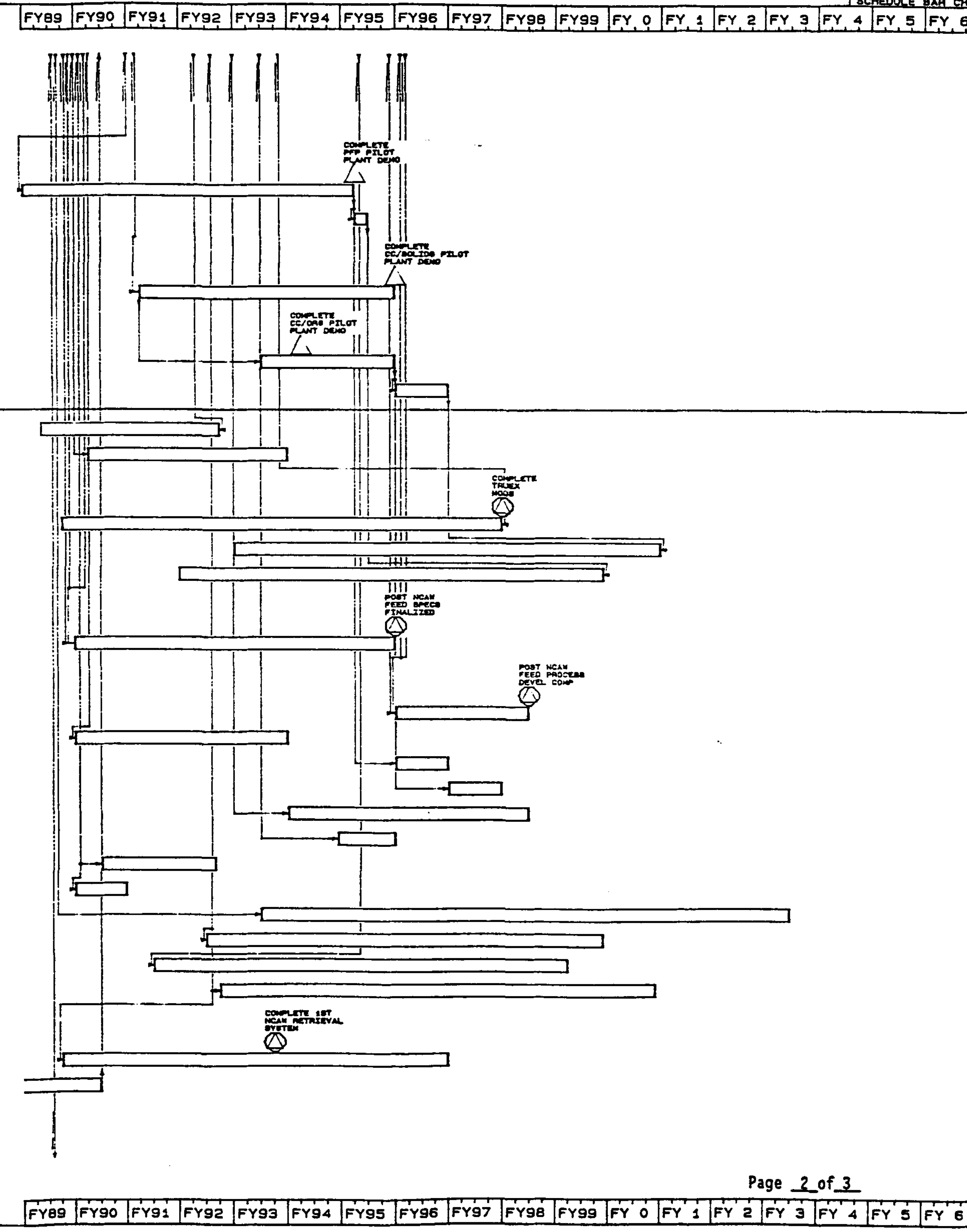
Data Shown Through ______
Work Breakdown Structure 1W1H
Data Base DSTWD Network 1H
Plot File TECHL2.PLO
Page 1 of 3

Figure E-5. Double-Shell Tank Waste Disposal Defense High-Level Waste Technology (Sheet 2 of 3)

PROJECT L2
PLOT TECHL2
PAGE 1 SHEET 2

RUN 17OCT89 14:03
PROJECT/2 66B5
SCHEDULE BAR CHART

			SD	ED
TECHNOLOGY	POST NCAW PRETREATMENT	210003032 TECHNOLOGY/PILOT PLANT TEST (PFP)	1OCT88	31DEC94
		210003034 FLOWSHEET (PFP)	1JAN95	31MAR95
		210003042 TECHNOLOGY/PILOT PLANT TRUEX (CC)	1JAN91	30SEP95
		210003044 FINAL PILOT PLANT ORGANIC DESTRUCTION (CC)	1APR93	30SEP95
		210003046 FLOWSHEET (CC/ORGANIC DESTRUCTION)	1OCT95	30SEP96
OFF-PAGE ACTIVITIES		130401000 W-040 CESIUM ION EX COLUMN - B PLANT	1FEB89	30JUN92
		130561000 B PLT PRCSS CNTRL EFF UPG-W-056 W-065 W-077 MISC	1JAN90	30SEP93
		130951000 W-095 NCRW PROCESS MODIFICATIONS - B PLANT	1JUL89	30SEP97
		130961000 W-096 CC/OXIDATION - B PLANT	1OCT92	30SEP00
		136001005 PFP PROCESS MODIFICATIONS - B PLANT	1OCT91	31AUG99
		410003012 POST NCAW WASTE FEED SPECS FOR HWVP	1OCT89	30SEP95
		410003013 FINAL HWVP FEED PROCESS DEVEL-POST NCAW	1OCT95	31MAR98
		410003710 NCAW LAB SCALE TEST - HWVP	1OCT89	30SEP93
		410003731 PFP BENCH SCALE TEST - HWVP	1OCT95	30SEP96
		410003741 CC BENCH SCALE TEST - HWVP	1OCT96	30SEP97
		417503711 NCAW BENCH SCALE TEST/FINAL WST COMPLIANCE PLAN	1OCT93	31MAR98
		417503721 NCRW BENCH SCALE TEST - HWVP	1SEP94	30SEP95
		440021101 W-XXX AR VAULT SLUDGE WASHING UPGRADE	1APR90	31MAY92
		440031300 AR VAULT COMPRESSOR UPGRADE	1OCT89	30SEP90
		711021300 W-XXX CC WASTE RETRIEVAL SYSTEM (EAST)	1APR93	31MAR03
		711041101 W-XXX PFP RETRIEVAL SYSTEMS	1APR92	31AUG99
		731031101 W-XXX NCRW RETRIEVAL SYSTEMS	1APR91	31DEC98
		741021000 W-XXX PROCESSED NCAW RETRIEVAL SYSTEM - HWVP	1JUL92	31AUG00
		751011010 W-XXX NCAW RETRIEVAL SYSTEMS-FULL SCALE PROCESS	1JUL89	30SEP98
		751019095 PROCURE & INSTALL NCAW TRANSFER PUMP	1OCT87	31MAR90



Page 2 of 3

Figure E-5. Double-Shell Tank Waste Disposal Defense High-Level Waste Technology (Sheet 3 of 3)