2-27-98 Original

ENGINEERING CHANGE NOTICE

Page 1 of ____

1. ECN 646215

Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.	4. USQ Required?	5. Date
Supplemental [ ] Direct Revision [X] Change ECN [ ] Temporary [ ] Standby [ ] Supersedure [ ] Cancel/Void [ ]	TA Carlson/0408/H6-37/372-3473	[ ] Yes [X] No	02/27/98
	6. Project Title/No./Work Order No. Immobolized Low-Activity Waste Interim Storage Project/W-465	7. Bldg./Sys./Fac. No. N/A	8. Approval Designator N/A
	9. Document Numbers Changed by this ECN (includes sheet no. and rev.) HNF-1975, Rev. 0	10. Related ECN No(s). N/A	11. Related PO No. N/A

12a. Modification Work	12b. Work Package No.	12c. Modification Work Complete	12d. Restored to Original Condition (Temp. or Standby ECN only)
[ ] Yes (fill out Blk. 12b) [X] No (NA Blks. 12b, 12c, 12d)	N/A	N/A Design Authority/Cog. Engineer Signature & Date	N/A Design Authority/Cog. Engineer Signature & Date

13a. Description of Change

13b. Design Baseline Document? [X] Yes [ ] No

This revision updates this report with minor technical changes and adds Other Project Cost to Total Estimated Cost for a project Total Project Cost.

14a. Justification (mark one)

Criteria Change	[ ]	Design Improvement	[X]	Environmental	[ ]	Facility Deactivation	[ ]
As-Found	[ ]	Facilitate Const	[ ]	Const. Error/Omission	[ ]	Design Error/Omission	[ ]

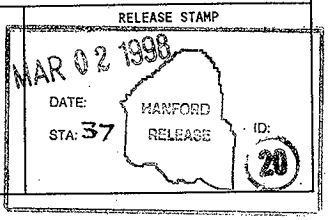
14b. Justification Details

Revision 1 of the Conceptual Design Report did not include Total Project Cost, which is a requirement for validation of this project.

15. Distribution (include name, MSIN, and no. of copies)

See Distribution Sheet

RELEASE STAMP



ENGINEERING CHANGE NOTICE

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1. ECN (use no. from pg. 1): 646215

16. Design Verification Required
[ ] Yes
[X] No

17. Cost Impact

	ENGINEERING		CONSTRUCTION	
Additional	[X]	$	[X]	$
Savings	[ ]	$	[ ]	$

18. Schedule Impact (days)

Improvement	[NA]
Delay	[NA]

19. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 13. Enter the affected document number in Block 20.

SDD/DD	[ ]	Seismic/Stress Analysis	[ ]	Tank Calibration Manual	[ ]
Functional Design Criteria	[ ]	Stress/Design Report	[ ]	Health Physics Procedure	[ ]
Operating Specification	[ ]	Interface Control Drawing	[ ]	Spares Multiple Unit Listing	[ ]
Criticality Specification	[ ]	Calibration Procedure	[ ]	Test Procedures/Specification	[ ]
Conceptual Design Report	[X]	Installation Procedure	[ ]	Component Index	[ ]
Equipment Spec.	[ ]	Maintenance Procedure	[ ]	ASME Coded Item	[ ]
Const. Spec.	[ ]	Engineering Procedure	[ ]	Human Factor Consideration	[ ]
Procurement Spec.	[ ]	Operating Instruction	[ ]	Computer Software	[ ]
Vendor Information	[ ]	Operating Procedure	[ ]	Electric Circuit Schedule	[ ]
OM Manual	[ ]	Operational Safety Requirement	[ ]	ICRS Procedure	[ ]
FSAR/SAR	[ ]	IEFD Drawing	[ ]	Process Control Manual/Plan	[ ]
Safety Equipment List	[ ]	Cell Arrangement Drawing	[ ]	Process Flow Chart	[ ]
Radiation Work Permit	[ ]	Essential Material Specification	[ ]	Purchase Requisition	[ ]
Environmental Impact Statement	[ ]	Fac. Proc. Samp. Schedule	[ ]	Tickler File	[ ]
Environmental Report	[ ]	Inspection Plan	[ ]		[ ]
Environmental Permit	[ ]	Inventory Adjustment Request	[ ]		[ ]

20. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number Revision
N/A		

21. Approvals

	Signature	Date		Signature	Date
Design Authority	C H Peterson	2/27/98	Design Agent		
Cog. Eng.	T. A. Carlson	2/27/98	PE		
Cog. Mgr.	K C Burgard	2/27/98	QA		
QA JF Bores	N/A		Safety		
Safety			Design		
Environ.			Environ.		
Other			Other		

DEPARTMENT OF ENERGY

Signature or a Control Number that tracks the Approval Signature

ADDITIONAL

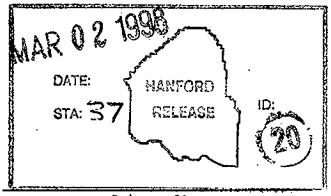
Immobilized Low-Activity Waste Interim Storage Facility, Project W-465 Conceptual Design Report

William W. Pickett
FDNW, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-96RL13200

EDT/ECN: 646215 UC: 721
Org Code: 73000 Charge Code: D4DNB
B&R Code: EW3130010 Total Pages: 207

Key Words: Immobilized Low-Activity Waste
Interim Storage
Grout Vaults

Abstract: This report outlines the design and Total Estimated Cost to modify the four unused grout vaults for the remote handling and interim storage of immobilized low-activity waste (ILAW).



Release Stamp

Release Approval Date

Approved for Public Release

RECORD OF REVISION	(1) Document Number HNF-1975, Rev. 1	Page

(2) Title
Conceptual Design Report For immobolized Low-Activity Waste Interim Storage Facility

CHANGE CONTROL RECORD

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release	
		(5) Cog. Engr.	(6) Cog. Mgr. Date
0	(7) EDT-622833	WW Pickett	KC Burgard
1 RS	Revision to add Other Project Cost. Replace all pages. Per ECN 646215	TA Carlson	KC Burgard 2/27/98

HNF-1975
Revision 1

Conceptual Design Report

Immobilized Low-Activity Waste Interim Storage Facility (Phase I)

Project W-465

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Project Hanford Management Contractor for the
U.S. Department of Energy under Contract DE-AC06-96RL13200

Approved for public release; distribution is unlimited

CONCEPTUAL DESIGN REPORT
for
IMMOBILIZED LOW-ACTIVITY WASTE INTERIM STORAGE FACILITY (PHASE I)

Project W-465

Prepared
by
Fluor Daniel Northwest

for

Numatec Hanford Corporation

APPROVED:

FLUOR DANIEL NORTHWEST

J. R. Zimmerman — Technical Documents — 2-20-98 Date

J. R. Eschenberg — Lead Engineer — 2-25-98 Date

T. G. Anderson — Quality Engineering T Z ANDERSON — 2/25/98 Date

John Rued — Project Manager — 2/25/98 Date

NUMATEC HANFORD CORPORATION

K. C. Burgard — Project Manager, TWRS Operations — 2/25/98 Date

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APPENDICES

ABBREVIATIONS

ALARA	as low as reasonably achievable
A/E	architect-engineer
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
CAM	continuous air monitor
CCTV	closed circuit television
CDR	conceptual design report
CENRTC	capital equipment not related to construction
CFR	Code of Federal Regulations
CICS	computerized inventory control system
CM	construction management
CMAA	Crane Manufacturers Association of America
D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
DRD	Design Requirements Document
FDNW	Fluor Daniel Northwest, Inc.
FHA	fire hazards analysis
FSAR	Final Safety Analysis Report
FY	fiscal year
HASP	health and safety plan
HLAN	Hanford local area network
HVAC	heating, ventilating, and air conditioning
ILAW	immobilized low activity waste
JSA	job safety analysis
MCC	motor control center
NEC	National Electrical Code
NEPA	National Environmental Policy Act of 1969
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration
PSAR	Preliminary Safety Analysis Report
PSE	Preliminary Safety Evaluation
QAPP	quality assurance program plan
RCRA	Resource Conservation and Recovery Act of 1976
RFP	request for proposal
S/RIDS	Standards/Requirements Identification Document
SSC	systems, structures, and components
TWRS-PV	Tank Waste Remediation System-(privatization vendors)
UBC	uniform building code
USQ	unreviewed safety question
WBS	work breakdown structure
WAC	Washington Administrative Code

CONCEPTUAL DESIGN REPORT

IMMOBILIZED LOW-ACTIVITY WASTE INTERIM STORAGE FACILITY (PHASE I)

PROJECT W-465

I. INTRODUCTION

The grout vault facilities in the 200-East Area of the Hanford Site were constructed in the 1980s to support tank waste disposal activities. The facilities were to serve project B-714, which was intended to store grouted low-activity waste.

The existing four unused grout vaults, with modifications for remote handling capability, will provide sufficient capacity for approximately three years of immobilized low-activity waste (ILAW) production from the tank waste remediation system-privatization vendors (TWRS-PV).

These retrofit modifications to the grout vaults will result in an ILAW Interim Storage Facility (project W-465) that will comply with applicable U.S. Department of Energy (DOE) directives, and state and federal regulations. The project will provide capital upgrades to the existing grout vault facilities.

II. SUMMARY

The four existing grout vaults in the 200-East Area have been recommended for use as the initial interim storage facility for immobilized low-activity waste (ILAW) on the

Hanford Site. This will require capital upgrades to the facility to ensure that operations are in compliance with regulatory standards for storage. The upgrade activities planned for the grout vault facilities support the environmental restoration mission, privatization initiatives, and waste management operations for the Hanford Site.

The existing conditions include previously disturbed soils that were compacted for the completion of the civil/structural portion of project B-714. The present conditions of the four grout vaults are as follows:

- The vaults are sealed and undisturbed (below ground requiring some excavation).
- Leachate systems for each vault are fully functional.
- There is an existing fully functional control room for project B-714.
- The change room, with drain field, is fully functional.
- There is an existing fully functional unit substation.

This conceptual design report (CDR) for modification of the grout vaults to support project W-465 is based upon the following strategy:

The project will provide transport containers, equipment, and facilities for accomplishing the transport ILAW function and the interim storage ILAW function. The scope of the project includes the design and construction of a facility to provide for ILAW storage space for ILAW packages, design and procurement of transport vehicle(s) and shielded transport container(s), receiving and shipping of ILAW packages, loading and unloading of ILAW packages from the transport container, package handling for placement and retrieval of ILAW within the storage area, and

monitoring of the stored ILAW packages. The privatization contract specifies a nominal container size of 1.2 m by 1.2 m by 1.8 m, plus or minus 0.2 m in any or all dimensions. Design requirements specify a 10-cm spacing between boxes during emplacement operations.

For the conceptual design, nominal box dimensions were used. For the preliminary safety evaluation (PSE), in order to maximize the waste loading in the vaults, boxes of maximum dimensions were used. Thus, there is a difference in vault package count in the CDR and the PSE. For this CDR, boxes will not be stacked more than six high.

The Design Requirements Document (DRD) and the statement of work for project W-465, as modified during the project kickoff facilitated session and the approved work plan, were the technical baseline for providing the necessary upgrades to the grout vault facilities to accommodate storage activities for up to 50 years. The PSE completed in parallel with this CDR gave the facilities a Hazard Class of 3 and indicated that there were no safety class or safety significant systems, structures, and components (SSCs).

The conceptual design for project W-465 included a pre-engineered metal building with a gantry crane over each existing grout vault, or four buildings and cranes in total. The basis for this was to provide the highest degree of operational flexibility. With a single failure, such as a crane failure or the building ventilation, only one vault would be affected leaving the other three operational with no impact on throughput.

Removal of the entire existing cover over the existing vaults was selected versus partial removal or entry through the end walls. Entry through the end walls was not considered feasible due to the amount of steel reinforcement in the walls and the resulting difficulty of construction and analysis required. Removal of the entire roof provides permanent disposal capability by the addition of back-fill if deemed

desirable at a later date. By removing the entire roof, additional storage space becomes available because the crane can be mounted over the vaults instead of inside on the walls. This creates additional head space for stacking the waste packages more than six high if desired. Removal of the entire roof facilitates constructibility by minimizing the amount of work that is required inside the vaults and provides better accessibility for the work that does have to be performed. Work that is eliminated is the installation of the crane inside the vaults. Also, as an as-low-as-reasonably-achievable (ALARA) consideration, maintenance of the crane during the operating life of the facility is enhanced by not having the crane installed inside the vault where access would be very difficult and radiation dose rates may be excessive. Also with a partial roof removal and installation of a crane inside the vault, an additional crane would be required for unloading the waste packages from the transport vehicle and staging them inside the vault.

There is a potential for cost savings by reducing the number of buildings and systems. One option would be to use one building over all four vaults and use two cranes. One crane could span two vaults. Another option would be to use two buildings and two cranes. To adequately evaluate the various options, a life cycle cost analysis should be performed. This analysis must consider the best option that will not impact the daily throughput requirements.

Fluor Daniel Northwest (FDNW) concludes that the most conservative choice (based on cost and throughput) has been addressed. This allows for opportunity during future phases to determine if a less expensive choice can be used, which will address throughput, regulatory constraints, technical considerations, and ALARA.

The CDR is based upon the following major assumptions:

A. No requirement changes are anticipated from those identified in the DRD/standards requirements identification documents (SRIDs) compliance matrix (Appendix K).

B. There is no Safety Class equipment on the project.

C. The existing grout control room located near the grout vaults will be adequate to support project W-465 without modification.

D. Ventilation system will not be required to provide containment.

E. Design life for existing auxiliary facilities (control room, locker room, maintenance facility) is adequate. If any new auxiliary facilities are required, their design life will be through the year 2006.

F. All privatization vendors will use the same container design.

G. Assume that each vault must store a minimum of 1200 boxes of nominal dimensions specified in the privatization contracts.

H. The shielding ALARA/operator zone analysis will be done during definitive design.

I. Adequate power is available at the grout facilities for any electrical loads created by this project.

J. There will be no restrictions that would affect construction access in anyway.

K. There is no contamination in any areas that this project will utilize. No other site projects or existing conditions will affect road tie-ins, fire/water tie-ins, electrical instrumentation, or any other disciplines.

L. The existing cathodic protection system will not need to be maintained.

M. The cranes will not be required to be single failure, fail safe, or NOG-1.

N. The current radiation source term is bounded by contract (from the request for proposal [RFP] to the private vendors). The upper dose limit at contact is 1000 mrem/h per specification, and it is expected that the dose ratio will actually be less by a factor of 2 to 3. Confirmation of this will be provided by the private vendors in the near future.

The actual operation and maintenance of the upgraded systems will be performed by TWRS operations and is not within the scope of project W-465.

Project W-465 is a fiscal year (FY) 2000 Line Item. Total estimated engineering and construction costs for the project are $36,400,000. The total expense-funded costs are $12,300,000. The total project cost is $51,300,000.

III. JUSTIFICATION

The DOE has planned a course of action to acquire Hanford Site tank waste treatment and immobilization services from private vendors followed by on-site storage and disposal. The DOE will accept the ILAW for disposal and pay the private vendor(s) for the product. New disposal facilities cannot be available to meet the vendor's startup schedule; therefore, project W-465 will provide interim storage capability. An engineering study performed in FY 1996 selected the four unused grout vaults as the best option for interim storage of ILAW. Project W-465 will provide the modifications and transportation systems necessary to make the vaults suitable for this service.

IV. DESCRIPTION OF PROJECT SCOPE

Project W-465 will perform demolition of the roof portions of each grout vault; construct a pre-engineered building over each vault; and will provide waste package remote-handling cranes, shielded waste package transport vehicles, related support utilities, and related interfacing with adjacent infrastructure projects. The project will make minor changes to the existing control and change rooms.

A. IMPROVEMENTS TO LAND (460)

Project W-465 lies east of AP tank farm and Canton Avenue, north of Hanford grid coordinate N40000, west of W45000, and south of N41500 (see sketches ES-W465-C1 and ES-W465-C2.) (All sketches are shown in Appendix M).

The existing grade for the vaults is fairly level with an approximate elevation of 656+ ft above sea level for an approximate area of 250- by 500-ft.

Topographic surveys will be required to determine construction access and to support definitive design. Soil core samples, around the concrete vaults' site, will be obtained in order to design structural footings for the pre-engineered metal building enclosures to cover the vaults.

The site will require clearing and grubbing where grading and excavating are to occur. All areas graded or excavated will be stabilized with crushed gravel. Excavation will be required for the roads, water lines, and electrical, telephone, and instrumentation conduits. All excavation not backfilled to final grade elevations will be sloped 1-½:1. Excavated areas adjacent to buildings will be graded to slope away from the buildings. Excavation trenching and shoring will be performed in accordance with Washington

Administrative Code (WAC), Washington Industrial Safety and Health Act, Title 296, and Labor and Industries, Part N, "Excavation Trenching and Shoring."

All survey data, soil samples, site planning, grading, and excavations will comply with DOE Order 6430.1A.

A concrete truck apron will be curbed to serve as fire water impoundment for 30 minutes of fire protection water discharge as required by DOE Order 6430.1A. The sprinklers and hydrants capacities indicate that the apron can contain up to 134 minutes of flow. This is sufficiently conservative to address design-basis fire, but this will be confirmed (during definitive design) against the fire hazards analysis.

To uncover the existing grout vaults (218-E-16-102 through 218-E-16-105), an approximate area of 350- by 450-ft from the existing grade elevation of 656 ft to a 650 ft elevation will be excavated (ES-465-C2). A slope of 1-½:1 from the 650-ft grade elevation will be maintained around this area. Part of the excavated soil will be used as a shield berm on the south, east, and west sides of the vaults. The remaining excavated soil will be hauled to the Richland Landfill. A concrete truck apron on the east side of the vaults will be built. A 24-ft paved access road, starting south of the concrete truck apron, will go around the vaults until it will turn east at coordinate N40810. The road will turn north at coordinate W45040 and extend to the project W-519 proposed access roadway at coordinate N41430. The existing chain link fence on the south and west sides will be removed. A new 6-ft high chain link fence will be installed around the vaults access areas to establish radiation zone control.

B. BUILDINGS (501)

Four pre-engineered metal buildings will be provided by project W-465. The buildings will be constructed to comply with National Fire Protection Association (NFPA) codes 101 and 220. The types of construction for the buildings are shown in Table 1.

The design and construction of project W-465 buildings will be performed in accordance with the criteria loadings contained in Table 2.

Note: The preliminary safety analysis determined that the facility was Hazard Category 3 and a Performance Category 2. This categorization allows the project to apply a Uniform Building Code (UBC) Seismic Zone 2B criteria in accordance with DOE-STD-1020.

TABLE 1

TYPES OF CONSTRUCTION		
BUILDING	CONSTRUCTION TYPE	OCCUPANCY
ILAW Interim Storage Facility	Type II (000)	Special-Purpose Industrial

TABLE 2

DESIGN CRITERIA LOADINGS				
BUILDING	SAFETY PERFORMANCE AREA	WIND	ROOF SNOW LOAD	EARTHQUAKE
ILAW Interim Storage Facility	General Services	85 mph	20 lb/ft^2	UBC Seismic Zone 2B, Standard Occupancy Structure

1. ILAW Interim Storage Facility

General Arrangement

The typical enclosure building will be a 70-ft wide by 200-ft long permanent pre-engineered metal structure, and will be a

non-occupied facility. The building will include a fire riser room, electrical room, air supply room, air exhaust room, canister delivery/crane maintenance laydown area, personnel access aisles, and existing concrete vault area (ES-W465-A1 and ES-W465-A2).

Truck access to the building(s) will be provided by two 12-ft wide by 16-ft high roll-up doors. Personnel access will be through two 3- by 7-ft high hollow metal doors in pressed metal frames. The access door and frame to the electrical room shall be 1-hr fire rated.

The enclosure building is not required to be accessible for the physically handicapped, therefore, no physically handicapped features have been incorporated into the design. (See Appendix I.)

The exterior 6-in. metal stud walls of the electrical, fire riser, and air supply/exhaust rooms will be covered with metal paneling to match the ILAW Interim Storage Facility. The walls of the electrical and fire riser rooms will have R-19 insulation installed and the metal joist ceiling will have R-30 insulation installed.

The metal stud wall and ceiling framing will be finished with gypsum wallboard (type "X" fire rated at the electrical rooms only), taped, spackled, and painted. The floor will be bare concrete with a 6-in. high perimeter curbing. The floors will slope away from all doors and edges to drain into the concrete apron in front of the buildings.

A functional area breakdown and square footage summary of the building is shown in Table 3.

TABLE 3

ILAW INTERIM STORAGE FACILITY FUNCTIONAL AREA BREAKDOWN	
Area Description	Square Feet (Net)
Existing Concrete Vault	6,235
Waste Package Delivery/Crane Maintenance	3,730
Air Supply Room	100
Air Exhaust Room	100
Fire Riser Room	60
Electrical Room	180
Personnel Access Aisles	3,085
Total Square Footage	13,490

NOTE: All net square footage is approximate

Structure

The ILAW Interim Storage Facility will include the enclosure over the vault, waste package delivery/crane maintenance area, and electrical room. The waste package delivery/crane maintenance area within the building and truck apron area, located on the east side of the building will be paved with 12-in. reinforced concrete slab. The building envelope will be a metal pre-engineered building similar to the GARCO TRF (tapered rigid frame) system. The overall building dimensions will be 70 ft wide by 200 ft long, with an eave height of 20 ft.

The building support structure will consist of rigid frames spaced at 20-ft centers.

The existing walls of each vault, within the ILAW Interim Storage Facility, will be extended 6 ft high to provide shielding. Extended concrete walls will taper in thickness from 2 ft at base to 1-ft 6-in. at the top for north and south sides of vaults (ES-W465-S2) and will be 2-ft 6-in. thick for east and west sides of vaults (ES-W465-S1). The vertical rebar of the existing concrete walls will be exposed to splice them mechanically with the new rebar of the wall extension. A preliminary analysis has been completed to provide a high confidence that the structural integrity of the existing walls are satisfactory. A detailed analysis will be provided in definitive design.

Eighty pound (80-lb) American Society of Civil Engineers (ASCE) rated rails will be provided on top of the north and south walls for each vault for a 15-ton gantry crane (ES-W465-A2). These rails will be extended for approximately 48 ft into the waste package delivery/cane maintenance area (ES-W465-S1). The rails in this area will be supported by W14 steel beams and 18-in. square concrete columns.

Personnel access areas, located 4-ft 6-in. higher than the waste package delivery/cane maintenance area (ES-W465-S1), will have pipe handrails.

Structure bracing or support for the waste packages inside the vault has been assumed to be unnecessary.

Electrical

Electrical power (480 V, 3-phase, 3-wire) to Vaults 218-E-16-102 through 218-E-16-105 will come from the existing unit substation fed by transformer (C6275P). Existing circuit breaker No. 3 will be used to feed a new main 480-V panelboard (No. 102-1) located in the

electrical room at Vault 218-E-16-102 (ES-W465-E1). Panelboard No. 102-1 will provide separate 480-V power to new panelboards located in the electrical room of each vault and new roadway lighting in the vicinity of the vaults. Power cables from the substation to Vault 218-E-16-102 and from Vault 218-E-16-102 to each of the other three vaults will be routed in underground concrete duct banks and manholes as shown on sketch ES-W465-C2.

Each of the four vault 480-V panelboards will provide electrical power for the gantry crane drive units, overhead lighting, intake/exhaust fan motors, and a 480-120/240-V transformer/panelboard unit for miscellaneous convenience power.

Each vault electrical room will house the gantry crane variable speed drive units, the closed circuit television (CCTV) camera control enclosure, the electrical panelboards, and miscellaneous enclosures for monitoring/control cables including the leachate collection pit monitoring cabling.

The existing leachate collection pit monitoring cables will be routed to the electrical room in a conduit installed in the floor slab of the ILAW Interim Storage Facility. The circuits will then be continued to the control room through the duct bank system along with the crane control/monitoring circuits and the closed circuit camera cables.

Lighting inside each Interim Storage Facility building will consist of high-efficiency, high-intensity discharge (metal halide w/quartz standby) high-bay, pendant-mount light fixtures installed over the laydown area. The crane will also have high intensity discharge lighting fixtures to provide for spot lighting while placing or retrieving the ILAW packages. The electrical rooms will have fluorescent

lighting fixtures installed with T-8 lamps. The filter and fire riser rooms will be provided with incandescent light fixtures. All lighting will comply with the Illuminating Engineering Society lighting handbook guidelines.

Convenience receptacles will be provided at each Interim Storage Facility building along each side of the vault, in the unloading area, in the electrical room, in each filter room, in the fire riser room, and at locations on the outside of the building. Ground-fault circuit-interrupting receptacles will be installed in all outdoor locations and in the filter and fire riser rooms.

The need for lightning protection will be evaluated during definitive design. All electrical installations will conform to the requirements of NFPA 70, National Electrical Code.

Heating, Ventilating, and Air Conditioning (HVAC)

A forced air ventilation system is required for the storage vaults. Although airflow is required, temperature and humidity control are not required. It has been determined that a flow rate based on one air change per hour will require 7000 cfm. The maximum air temperature rise expected during waste handling operations is 18 °F above ambient. The air supply and exhaust units will have bag filters to reduce the amount of dust that could collect in the vaults. The supply and exhaust fans and filters will be located in equipment rooms at each end of the Interim Storage Facility. The fans will each require a 5-hp motor. A small amount of ductwork will be required in each exhaust equipment room, but no ductwork is planned for air distribution in the vault enclosures. The exhaust equipment rooms will house a continuous air monitor (CAM) system as specified in the DRD. The CAM system will monitor the exhaust stack flow and will

initiate shutdown of the ventilation fans if contamination is detected. In accordance with the PSE, Section 2.2, there is no need to provide nuclear decay heat removal, active confinement, or mitigation of accident release to the environment.

Each vault will have an electrical room, which will require air conditioning to maintain ambient temperatures below 120 °F. The electrical rooms will have nominal 1.5 ton air conditioners and 1.5 kW electric baseboard heat.

Each vault will have a dry pipe fire protection system with a fire riser room that will require freeze protection. A 1 kW baseboard heater will be adequate.

The ventilation equipment arrangement is shown on the architectural drawings (ES-W465-A1 and ES-W465-A2).

Fire Protection

The facilities will consist of Type II (000) non-combustible, non-fire-rated construction per NFPA 220. Load and unload bays are treated as a special purpose industrial occupancy and the vaults for storage of low-activity waste packages are considered to be a storage occupancy. The occupancy status will be reevaluated during later design stages. Adequate exit access is provided in compliance with NFPA 101. One-hour fire-rated enclosures will be provided for the electrical rooms.

Dry pipe automatic sprinkler systems will be installed throughout the load and unload bays, the motor control center (MCC) rooms, and the air supply and exhaust fan rooms. The systems will be hydraulically designed for an Ordinary Hazard Group 2 occupancy classification.

The automatic sprinkler system shall be in accordance with NFPA 13, and the requirements noted in the Hanford chapter of the DOE Resource Manual. Sprinkler systems will be supplied from the raw water loop. A strainer will be installed on each sprinkler system riser. The sprinkler riser room will be insulated and heated in a manner sufficient to maintain temperatures above freezing when the outdoor temperature drops to a minimum -23 °F. Sprinkler system water supplies will be controlled by post indicator valves located a minimum of 40 ft from the buildings.

Since water discharge into the vaults is not desired, the sprinkler systems will be arranged to protect only a portion of each of the buildings. Separations between the remote sprinkler heads nearest to the vaults and the shield wall/vault will exceed minimum requirements specified by NFPA 13 in order to prevent sprinkler water from entering the vaults.

Existing combustible coatings on the interior walls of the vaults will be removed to mitigate fire exposures.

Floors in the load and unload bays will be sloped to provide drainage away from the vaults and out of the facility. A curb will be provided around the paved exterior "ramp" area and driveways to serve as an impoundment for fire protection water discharge of approximately 134 minutes.

Telecommunications

Telephones will be provided in two separate locations at each interim storage facility. One telephone handset will be located in the

electrical room while the other handset will be located outside in a weatherproof enclosure near one of the rollup doors.

2. **Control Building**

The existing control room panels and equipment shall be removed and new equipment for this project installed. The existing control building size has been assumed to be adequate for this phase of work. During definitive design, the control room equipment and layout will be evaluated for physically handicapped access and usage requirements, as well as Human Factors engineering.

3. **Change Building**

The existing change room and rest room facilities for this project have been assumed to be adequate and no modifications are planned. The change room will be evaluated for handicap access during definitive design (Appendix I).

C. UTILITIES (600)

1. **Telecommunications Systems**

External telephone lines will be provided in the control room and at each vault building. The telephone lines will provide communications from the control room to the vault buildings (both inside and outside) and for emergency response. The Hanford local area network (HLAN) will be provided at the control room.

2. **Electrical Transmission and Distribution System**

The existing 13.8 kV power distribution system will be used to provide electrical power to Vaults 218-E-16-102 through 218-E-16-105. Existing 13.8-kV overhead line C8-L6 currently provides electrical power to a 1000 kVA, 13.8 kV - 480Y/277-V unit substation

transformer (C6275P) located just north of the existing 243-G6 Building. The transformer feeds a 1200-A, 480/277-V, 3-phase, 4-wire switchboard with associated 480-V feeder circuit breakers. One of the existing 480-V feeder circuit breakers will be used to provide power to the vaults.

3. **Exterior Area Lighting**

Low pressure sodium roadway pole lighting will be provided along the entire route of the roadway system. Low pressure sodium wall-mounted lighting fixtures will also be installed on the east and west ends of each Interim Storage Facility building. Lighting fixtures will be provided with photocell control to turn lamps off during daylight hours.

4. **Fire Water Supply**

Currently, there are no water supplies to the site. A 12-in. raw water loop will be installed to supply fire protection water to the ILAW storage facilities (ES-W465-C2). The fire water loop will be connected to a raw water loop supplying the privatized vitrification plants at two locations.

A minimum of four new fire hydrants will be installed on the fire water loop. Fire hydrants will be located so that hose lays from hydrants to all exterior portions of a protected building are no more than 300 ft. Fire hydrants will not be closer to the buildings than 50 ft, and will be installed at a maximum spacing of 400 ft. Maintenance valves will be installed on the underground main leading to each fire hydrant. Each building shall be protected by a minimum of two hydrants.

Multiple sectional isolation valves will be provided at each intersection between a supply source and a fire main loop (one valve

for each leg). Sectional valves will be installed in accordance with a point system, such that no more than six points accumulate between sectional valves. The points for this arrangement are: one point for a fire hydrant and two points for a sprinkler system.

A reduced pressure backflow prevention assembly in a heated enclosure will be provided for each connection to the 12-in. main. These backflow devices will be located prior to the loop for this facility.

D. SPECIAL EQUIPMENT AND PROCESS SYSTEMS (700)

1. ILAW Interim Storage Facility

Mechanical Equipment

Gantry Crane: Project W-465 will procure four cranes to support throughput with consideration for unexpected breakdown events that could result in daily fines exceeding the cost of the crane. An electrically powered 15-ton gantry crane with an approximately 50-ft span, 45-ft lift height, and 12-ft leg height will provide waste package handling in each building (ES-W465-A2). The maximum weight of a waste package is 22,000 lbs as specified in the DRD. A 15-ton crane will provide the required 125% capacity in accordance with the Hoisting and Rigging Manual. The crane will move on rails that run the length of the building. A special handling device designed to engage, handle, and release waste packages will be provided with the crane. There will be motorized rotation of the load block

connection to the lifting device. Maximum speeds and motor sizes are estimated as follows:

Hoist	18 fpm	20 hp
Trolley	50 fpm	1 hp
Bridge (gantry)	75 fpm	(2) 2 hp

Crane design will be in accordance with Crane Manufacturers Association of America (CMAA) Specification No. 70, Class D. Seismic loading will be per UBC Seismic Zone 2B. The crane will have an emergency retrieval system that can pull the crane into the load-in/load-out area for maintenance. The main conductor system for power, control, and instrumentation to the crane will be a festooned flexible cable system. The electrical panels and instrumentation interface panels will be mounted off the crane. The crane will be operated remotely from the control room. The crane will be equipped with CCTV dedicated cameras, remote position reporting, programmable positioning control, automatic container storage/retrieval on operator command, a hoist operational redundancy, and a computerized inventory control system. The inventory system will automatically read waste package identification and create an electronic database with package information. (See Instrumentation and Control.)

Instrumentation and Control

The ILAW facility will be capable of monitoring and controlling the movement, placement, storage, and, retrieval of ILAW packages in the project W-465 vaults. Remote handling of the ILAW packages will be accomplished using a crane that will be controlled and monitored from an existing control room located near the grout vaults.

The control room will be refurbished to accommodate the new crane control, monitoring, and inventory control system.

The crane control system will be capable of the following automatic functions.

- Grasp and pickup, final letdown, and release.
- Travel from present location to another location.
- Lift load to uppermost position, proceed to another specified location, lower load to determined height. Operator to let down and release by manual control.
- Return crane to designated position.
- Avoid fixed obstacles.

The control system shall also be capable of the following:

- Prevent high-speed movement of bridge or trolley unless hoists are in uppermost position.
- Prevent load from being raised unless lifting device is in fully engaged position.
- Prevent release of load from lifting device unless hoist cable is completely slack.
- Prevent bridge and trolley from exceeding their travel limits.

- Prevent the raising of a load during overload.
- Be capable of positioning the load automatically and accurately within specified performance limit.
- Controlled acceleration of bridge and trolley travel speed to high-speed travel and controlled deceleration from high-speed travel to a halt.
- Return the crane to its original starting position.
- Real-time automatic readout and dynamic graphics display on the control panel to indicate hoist location and elevation and load on hoist together with display of neighboring waste packages in both the horizontal and vertical planes.
- Detection of mispositioning of a waste packaging during final letdown.
- Automatic readout and graphic display on the control panel to indicate each vault occupied conditions.
- By means of an override switch at the main control console, allow manual crane operation without perturbation of the computerized inventory control system (CICS) performance.
- Sufficient alarms to alert the operator of any malfunction and diagnostic of crane troubles.
- Feed the CICS with actual waste package position and weight.

The CICS will provide total accountability of all waste packages passing through the facility. The following minimum information for each waste package will be provided:

- Package identification
- Package storage location
- Package surface dose rate (initial/current)
- Package isotopic content
- Date stored
- Date of expected removal or date of removal
- Package gross weight
- Date of solidification
- Package waste source/composition
- Remarks.

The ILAW Interim Storage Facility will be capable of monitoring ILAW waste package placement through visual inspection via CCTV. The degree of inspection required will be determined after the completion of the Resource Conservation and Recovery Act (RCRA) Part B Permit with the Washington State Department of Ecology.

The existing leachate collection pit leak detection system can detect liquids that leak out of the vault and into the leachate collection system. The leachate system will be monitored in the control room.

The exhaust air system of the ILAW Interim Storage Facility will contain a CAM system that will automatically shut down the ventilation fans upon the detection of contamination. The CAM will consist of a vacuum pumping system and a beta-gamma radiation detector assembly.

2. **Transportation System**

A truck/trailer transport vehicle with fixed transport containers will be provided by project W-465 (ES-W465-T1). The transport container will provide shielding during transportation and will have an equivalent minimum wall thickness of 3 in. of steel. To accommodate the maximum gross weight limitation of 45 000 kg for a fully loaded transport vehicle, only one waste package may be transported per vehicle. To achieve the maximum specified throughput of nine waste packages per day (24 hours), three trailers and one tractor will be required (ES-W465-L1).

Note: It will be required to purchase an additional trailer and tractor to allow for maintenance/repairs.

E. DEMOLITION (810)

To uncover the four existing grout vaults (218-E-16-102 through 218-E-16-105), an approximate area of 350- by 450-ft from the existing grade elevation of 656 ft to a 649.5 ft elevation will be excavated. A slope of 1-½:1 from the 656 ft elevation to new grade will be maintained around this area. In addition to removing compacted backfill around the vaults (ES-W465-D2), the excavation consists of removing and hauling the following materials to the Richland Landfill:

1. The 3-ft 4-in. deep asphalt and concrete topping (diffusion break) above the vaults, 2-ft deep by 3-ft 4-in. wide asphalt topping around three sides of the vaults and 4-ft 6-in. deep by 3-ft 4-in. wide on the east side of each vault will be excavated. The existing concrete vault pits and pump pits located on the top of each vault (ES-W465-D1) will be removed. Existing piping and conduits embedded within the asphalt topping and HVAC inlet on each vault will be removed before hauling the asphalt. The HVAC exhauster and ductwork located

between Vaults 102 and 103 and above their roofs will also be removed.

2. The 2-ft deep precast concrete cover blocks (2)- 6-ft 3-in. wide at each end and (29)- 4 ft wide in the middle of each vault roof will be removed. Roof plank lifting connectors, similar to those shown on sketch ES-W465-D3, may have to be installed on these cover blocks for lifting purposes. Partial removal of roof panels instead of the entire roof removal was considered during the initial stage of this CDR. The full roof removal concept was selected because this will require less handling, less moving parts, and less of a time constraint on depositing waste packages in the vaults. This will also allow for approximately 100 additional waste packages per vault.

3. Leachate concrete pump pit, located on the east side of each vault, will be removed. Existing 26 in pipe to leachate collection sump and 8 in. pipe for leak detection will be cut to the new grade level (ES-W465-A2) to maintain the functionality of the leak detection system. Both of these pipes will be provided with new blind flanges.

4. Existing electrical concrete duct banks and manholes with existing cables will be removed.

5. The interior floor and wall surfaces of vaults are coated with 60 mils of an asphaltic coating. The product used was Nokorode by Lion Oil Company, El Dorado, Arkansas. The original purpose for the coating was to provide a chemically resistant watertight membrane to contain the grouted waste during initial set. Because the coating contributes to the fire loading in the vaults, it must be removed.

Commonly available solvents will not dissolve the cured product. The coating is soft and can be elastically deformed with fingernail pressure. Removal of the coating will be done by mechanically scraping it from the concrete surfaces or by sandblasting. The thin layer of residual coating remaining after scraping could be left as is on the walls. Preliminary, evaluation indicates that recoating the floor surfaces with leveling grout will not be required.

The floor surfaces of the vaults were formed with a power screed and finished by hand. The tolerances in the construction specification were plus or minus 1/8 in. in 10 ft. The actual tolerance of the finished floor is unknown at this stage; this will have to be determined by survey during the initial stage of demolition. If the survey determines that floors are not level, the grout leveling layer may be required. Leveling for stacking of the waste packages and maintaining adequate clearances can be accomplished by localized shimming and/or spacers during operations.

F. OTHER PROJECT COSTS (900)

Other project costs are included in the cost estimate.

G. DESIGN COMPLIANCE

The design and construction of project W-465 will comply with the codes, standards, regulations, and laws listed in the project DRD and applicable Standards/Requirements Identification Documents (S/RIDs) at the time of contract award for each phase.

V. METHODS OF PERFORMANCE

The methods of performance comply with the work breakdown structure (WBS) in Appendix A. The WBS indicates the major phases of work to be accomplished (i.e., engineering, construction, project management, and other project activities).

A. ONSITE ARCHITECT-ENGINEER WORK (WBS 1.A, 1.C, 1.D)

The contracted architect-engineer (A/E) will provide definitive design, engineering during construction, construction management, and project management support throughout the life of the project.

Note: A/E acceptance inspection and National Electric Code (NEC) compliance inspection will be acquired by the project integrator.

B. OFFSITE DESIGN-BUILD WORK (WBS 1.B)

Not used.

C. PROCUREMENT (WBS 2.2)

The A/E construction management (CM) will procure and provide the following engineered equipment; cranes, CCTV, shielding box covers, and transporters (truck, trailer, and transport container). These items are planned as long-lead procurements.

D. CONSTRUCTION WORK BY ONSITE CONTRACTOR (WBS 3.2)

The construction contractor will be a CM-firm fixed price contractor who will provide the resources necessary to perform the construction work needed to implement project W-465. This will include the pre-engineered metal buildings.

E. PROJECT INTEGRATION (WBS 4.0)

The project integrator will provide the following:

- Development of the Title II DRD.
- Provide design input and reviews from cognizant facility and infrastructure (onsite utilities) personnel for definitive design and construction.
- Provide construction support, as needed.

F. OTHER PROJECT COSTS (WBS 5.0)

Other project costs are provided by the project integrator.

G. OTHER CAPITAL WORK (CENRTC) (WBS 5.1)

VI. REQUIREMENTS AND ASSESSMENTS

A. SAFEGUARDS AND SECURITY

Project W-465 will take place within the 200-East Controlled Area and will require appropriate clearances and badging for access. Existing safeguards and security measures at the AP tank farm or other adjacent tank farms will not be affected by this project. Badge access is required for transport vehicles past the Wye Barricade and boundaries around this project. No new measures beyond the current site practices will be required as a result of this project.

B. HEALTH AND SAFETY

Project W-465 will support remediation of safety concerns that exist at the grout vaults by providing interim storage of ILAW produced during Phase I of the Hanford Site privatization effort. Project W-465 has addressed safety for this project, initially, through the preparation of a PSE. Further development of accident

scenarios and appropriate mitigation features will be included in the preliminary safety analysis report (PSAR) and during definitive design in FY 2000 and 2001.

The performance contractor will coordinate contamination surveys during excavations to classify waste for disposal.

Accommodations for the physically handicapped will not be provided for the ILAW Interim Storage Facility buildings, but will be evaluated for the control room and change room during definitive design (Appendix I).

There are no known radiation exposure hazards, beyond normal background, associated with the construction of project W-465.

Construction contractors will comply with State of Washington and Fluor Daniel Northwest, Inc., standards in performance of work, and will ensure that all applicable Occupational Safety and Health Administration (OSHA) standards are enforced during the project. See Section 5.0 of the PSE for construction risk discussion. This risk will be documented and controlled by a job safety analysis (JSA) prepared and administered by each applicable contractor. These measures include providing continuous access to construction areas for emergency vehicles and personnel, and ensuring that emergency evacuation routes are unobstructed.

Transporting, handling, and storage of the ILAW packages will involve management of the radiation. The radiation zone categories and criteria used for site and storage facility design are shown on sketch ES-W465-R1. The transport container design for a minimum wall thickness of 3 in. of steel is based on the following criteria: maintain surface dose rates to less than 200 mrem/h at the container surface, 10 mrem/h at 2 meters, and 2 mrem/h at the truck cab. For the shielding design, a definitive source term had not yet been identified so the criteria of a maximum contact surface reading of 1000 mrem/h on the waste package was used to estimate a maximum source term.

The conceptual design has considered skyshine based upon primarily source term data that will require refinement or confirmation during definitive design once privatization vendor information becomes available.

A health and safety plan (HASP) will be prepared as an addendum of the existing TWRS HASP before the start of definitive design to ensure that all health and safety risks will be minimized.

C. DECONTAMINATION AND DECOMMISSIONING

No decontamination and decommissioning (D&D) is expected for the ILAW Interim Storage Facility. It is expected that all portions of the former grout facility being modified for ILAW storage will be uncontaminated. When in operation, all waste packages will be sealed and contamination free. A follow-on project (Project W-520, "Low Activity Waste Disposal Complex"), future studies, and conceptual designs are planned to address D&D and closure. If, however, the decision is made to remove the waste for disposal, D&D will have to be reconsidered.

D. MAINTENANCE AND OPERATION REQUIREMENTS

Project W-465 will be designed to allow access for maintenance. Equipment in the vaults will be designed to operate remotely in the environment in which the equipment is located. Instruments in the control room, outside and adjacent to, will be designed to operated in the environment in which they are located. Maintenance that cannot be done locally in each facility and require removal (e.g., instrument calibrations, camera repair) will be done at an existing facility on the Hanford Site. This project does not provide for any maintenance facilities or equipment. The operating contractor will verify the accuracy of existing facility drawings and supporting calculations with current site conditions, in support of design and construction.

E. QUALITY ASSURANCE/SAFETY CLASSIFICATION

A project-specific Quality Assurance Project Plan (QAPP), will be developed subsequent to the conceptual design stage for providing quality guidance for the on-going project activities through the construction phase. The QAPP will be developed during or before the definitive design phase of the project and will provide quality guidance through the construction phase.

The highest safety classification for the project W-465 modification work is expected to be designated Non-Safety Class/General Services and Hazard Category III. This is confirmed by the PSE (HNF-SD-W465-PSE-001). The work involved will include the cumulative engineering evaluation of the grout vault project B-714 as-built drawings and specifications. The PSE will be further developed by a PSAR, and a final safety analysis report (FSAR). The PSE has looked at accidents and appropriate mitigation features will be included in the definitive design. The project integrator will complete an unreviewed safety question (USQ) prior to facility startup.

F. ENVIRONMENTAL COMPLIANCE

A Notice of Construction (NOC) for the emission of toxic air pollutants and/or criteria pollutants shall be prepared and submitted by the operating contractor to the State of Washington Department of Health prior to construction. A detailed review of the facility design, the storage process, the physical interim storage of the ILAW in these grout vaults does not constitute a source of regulated emissions to the atmosphere. The ILAW products will be sealed in metal containers. The containers will be leak tight as defined by American National Standards Institute (ANSI) Standard N14.5. Each container is to be decontaminated and surveyed before being transferred to the grout vaults for interim storage.

Removable surface contamination will not exceed the limits described in Code of Federal Regulations (CFR) 49 CFR 173.443(a). This conclusion was based on a detailed review of the project design criteria and state and federal regulatory

requirements. Confirmation from the Washington State Departments of Health and Ecology that the hermetically sealed canisters/containers do not constitute a source of regulated emissions will be obtained from each state agency in writing.

All solid waste generated during construction and operation of the facility will be disposed of in accordance with the Waste Minimization/Pollution Prevention Plan.

Whenever possible, nonhazardous materials will be used to keep hazardous waste generation to a minimum.

G. PERMITS

Permits will be obtained in accordance with the *Permitting Plan for the Immobilized Low-Activity Waste Project*, for all operation of the facility (Reference 4). The general contractor (assigned by the performance contractor) and the construction manager will obtain all necessary permits for construction.

H. RELIABILITY, AVAILABILITY, AND MAINTAINABILITY ANALYSIS DOCUMENT

The Reliability, Availability, and Maintainability Document (RAM) addresses each major equipment and will be completed during future design phases (advanced conceptual design or definitive design).

VII. IDENTIFICATION AND ANALYSIS OF UNCERTAINTIES

A. STRUCTURAL

The grout vaults will require qualification for structural integrity due to the removal of their roof cover blocks and the addition of a gantry crane. From a preliminary review of the existing grout vault calculations, it has been determined that the vaults will maintain their structural integrity under their new configuration and loadings.

B. FIRE PROTECTION

A fire hazards analysis (FHA) has not been prepared within the scope of work defined for this CDR. An FHA may identify additional fire protection requirements.

It is uncertain whether a pre-engineered CO_2 or inert gas fire extinguishing system may be required to protect enclosed electrical cabinets containing combustible cables on the gantry crane. This requirement will minimize fire exposures when the crane is in the unsprinklered portion of the structure. This protection is consistent with recommendations contained in Factory Mutual Loss Prevention Data Sheet 1-62/17-16, Cranes. The systems can be supplied by the crane manufacturer as an integral component of the crane.

Separations between the facilities is less than permitted by NFPA 80A for buildings with non-fire-rated walls and no automatic sprinkler protection. Omission of sprinkler systems from portions of the building, excess separation between sprinkler heads and walls, and inadequate exposure separation between buildings will require waivers from requirements in DOE Order 5480.7A, DOE Order 6430.1A, DOE RLID 5480.7, NFPA 13, and NFPA 80A. If waivers are not obtained, additional protection measures will be required. Additional protection may include sprinklers over the vaults, fire rated construction or other measures to mitigate the spread of a fire within and between storage buildings.

C. SHIELDING

The dose rate attributable to skyshine will remain an uncertainty until source term data is received from the vendors. For the CDR, the dose calculations used are as follows:

1. All packages are considered to have the privatization contracts specified average curie content of three curies per cubic meter (3Ci/m3).

2. The package wall thickness on all sides may be assumed to be ½ in. thick.

3. The waste form in the packages may be assumed to be marbles with no filler.

4. The package size may be assumed to be the nominal size of 1.2 m by 1.2 m by 1.8 m as specified in the privatization contracts.

   Note: Skyshine shielding analysis has indicated that "dummy" shielding boxes must be 12-in. thick concrete.

D. ENVIRONMENTAL

1. The requirement to monitor the package may be at a degree that cannot be accomplished at an acceptable cost. The degree of monitoring will be established in the RCRA Part B Permit. This CDR assumes that the project will seek to obtain a waiver to the monitor requirement.

2. A late National Environmental Policy Act (NEPA) and RCRA environmental review, documented in Letter LMHC-9760785, dated November 14, 1997, identified uncertainties that were not addressed in this CDR. These items will be resolved during advanced conceptual design.

VIII. REFERENCES

1. Statement of Work for the Immobilized Low-Activity Waste Interim Storage Facility Project (HNF-SD-W465-SOW-001, Rev. 0).

2. Design Requirements Document for the Immobilized Low-Activity Waste Interim Storage Facility (HNF-SD-W465-DRD-001, Rev. 0).

3. Alternative Generation and Analysis Report (HNF-SD-W465-AGA-001).

4. Permitting Plan for Immobilized Low-Activity Waste Project (HNF-SD-ENV-EE-003, Rev.0).

APPENDIX A

WORK BREAKDOWN STRUCTURE

WORK BREAKDOWN STRUCTURE

1.0 ENGINEERING

- 1.A Definitive Design (Contracted Architect-Engineer)
- 1.B Not Used
- 1.C Title III (Engineering, A/E), A/E Acceptance Inspection (Project Integrator), and NEC Compliance Inspection (Project Integrator)
- 1.D HARP/PSAR/FSAR/Permits/Startup

2.0 PROCUREMENT (Construction Contractor)

- 2.2 Procurement

3.0 CONSTRUCTION

- 3.2.0 Site Preparation
- 3.2.1 Fixed-Price Construction (Offsite Construction Contractor)

4.0 PROJECT INTEGRATION (Performance Contractor)

- 4.0 Project Coordination Activities (Project Integrator)

5.0 OTHER PROJECT COSTS

- 5.0 Other project costs associated with the Project Integrator
- 5.1 Other Capital Work (CENRTC)
  (Spare equipment and parts)

APPENDIX B

BUDGET AUTHORIZED/BUDGET OUTLAY SCHEDULE

W-465 IMMOBILIZED LOW-ACTIVITY WASTE INTERIM STORAGE FACILITY PROJECT
BA/BO SCHEDULE

PHASE	TOTAL COST	PRIOR YEARS	FY00 1	FY00 2	FY00 3	FY00 4	FY01 1	FY01 2	FY01 3	FY01 4	FY02 1	FY02 2	FY02 3	FY02 4
1.0 ENGINEERING														
1A DEFINITIVE DESIGN	4,100													
		0	3,900		3,000		200		1,100					
1C TITLE III	3,300													
		0	700		100		2,300		2,300		300		900	
1D SARP/PSAR/FSAR/PERMITS/STARTUP	1,800													
		0	800		600		700		600		300		600	
2.0 PROCUREMENT	8,000													
		0	8,000		0		0		8,000					
3.0 CONSTRUCTION														
3A C1 SITE PREP	7,300													
		0	7,300		0		0		7,300					
3B C2 CONSTRUCTION	9,400													
		0					9,400		4,700		0		4,700	
4.0 PROJECT INTEGRATION	2,500													
		0	1,100		900		900		900		500		700	
5.0 OTHER PROJECT COSTS (OPCs)	12,300													
		5,100	2,300		2,300		3,200		3,200		1,700		1,700	
5.1 OTHER CAPITAL WORK (CENRTC)	2,600													
		0					2,600		2,600					
Budget Authority (BA)	51,300	5,100	24,100				19,300				2,800			
Budget Outlay (BO)	*51,300*	*5,100*			*6,900*				*30,700*				*8,600*	

APPENDIX C

COST ESTIMATE SUMMARY

SORT	DESCRIPTION	ESCALATED TOTAL COST	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
PHMC/MI	PHMC MANAGEMENT INTEGRATOR	280,000	20	60,000	340,000
A/E-CONST	A/E - CONSTRUCTOR	20,840,000	21	4,480,000	25,320,000
PI	PROJECT INTEGRATOR	17,880,000	1	100,000	17,980,000
PHMC-SUB	PHMC SUBCONTRACTOR	310,000	20	60,000	370,000
	SUBTOTAL	39,310,000	12	4,700,000	44,010,000
SITE	SITE ALLOCATIONS	5,950,000	22	1,290,000	7,240,000
	(ADJUSTED/ROUNDED)	40,000		10,000	50,000
	PROJECT TOTAL	45,300,000	12	6,000,000	51,300,000

C-1

TYPE OF ESTIMATE: CONCEPTUAL ESTIMATE — FEBRUARY 11, 1998

FDNW LEAD ESTIMATOR: Linda

ESTIMATING MANAGER: H Chadwick

PROJECT MANAGER: John Rund

CLIENT: K C Burgard

REMARKS:

(ROUNDED/ADJUSTED TO THE NEAREST " 10,000 / 100,000 " - PERCENTAGES NOT RECALCULATED TO REFLECT ROUNDING)

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	SUB TOTAL	SITE ALLOCAT'N	TOTAL DOLLARS
1A0100	DRAWINGS	665910	6.30	41952	707862	20	141572	849434	271905	1121339
1A0200	SPECIFICATIONS	87820	6.30	5533	93353	20	18672	112025	35861	147886
1A0300	CHECKING AND REVIEW	275869	6.30	17380	293249	20	58649	351898	112641	464539
1A0400	REPORTS	139936	6.30	8816	148752	20	29751	178503	57140	235643
1A0500	CALCS	99671	6.30	6279	105950	20	21190	127140	40700	167840
1A0600	SUPPORT	1038247	6.30	65410	1103657	20	220732	1324389	423900	1748289
1A0700	ESTIMATING	63702	6.30	4013	67715	20	13542	81257	26014	107271
1A0800	SUBMITTALS	36289	6.30	2287	38576	20	7715	46291	14820	61111
1A0900	QUALITY ASSURANCE	38515	6.30	2426	40941	20	8188	49129	15726	64855
SUBTOTAL 1A	DEFINITIVE DESIGN	2445959	6.30	154096	2600055	20	520011	3120066	998707	4118773
1C1000	TITLE III ENGINEERING	1638273	9.86	161534	1799807	20	359963	2159770	691338	2851108
1C2000	ACCEPTANCE INSPECTION	251961	9.86	24843	276804	20	55361	332165	73075	405240
SUBTOTAL 1C	TITLE III DESIGN	1890234	9.86	186377	2076611	20	415324	2491935	764413	3256348
1D0T01	MOBE DESIGN TEAM	168430	0.00	0	168430	20	33686	202116	0	202116
1D0T02	TITLE II PSAR/SARP/PART B PERMIT	470959	0.00	0	470959	20	94192	565151	0	565151
1D0T03	TITLE III PERMITS/STARTUP/FSAR	844298	0.00	0	844298	20	168860	1013158	0	1013158
SUBTOTAL 1D	SUPPORT WORK SCOPE	1483687	0.00	0	1483687	20	296738	1780425	0	1780425
SUBTOTAL 1	ENGINEERING	5819880	5.85	340473	6160353	20	1232073	7392426	1763120	9155546
220001	GANTRY CRANES	4048051	7.78	314938	4362989	20	872598	5235587	1154724	6390311
220002	CCTV	78762	7.78	6128	84890	20	16978	101868	23067	124935
SUBTOTAL 220	P-1 EARLY PROCURMENT	4126813	7.78	321066	4447879	20	889576	5337455	1177791	6515246
221003	TRACTOR & TRANSPORTER	510317	9.33	47612	557929	20	111586	669515	149082	818597
221004	CONCRETE SHIELDING COVERS	434276	9.33	40517	474793	20	94958	569751	125667	695418
SUBTOTAL 221	P-2 LATE PROCURMENT	944593	9.33	88129	1032722	20	206544	1239266	274749	1514015
SUBTOTAL 2	PROCUREMENT	5071406	8.07	409195	5480601	20	1096120	6576721	1452540	8029261
320001	PREP PLANKS FOR REMOVAL	2110504	7.53	158921	2269425	30	680828	2950253	937000	3887253

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	SUB TOTAL	SITE ALLOCAT'N	TOTAL DOLLARS
320002	MISC. DEMOLITION	363161	7.53	27346	390507	30	117152	507659	161234	668893
320003	REMOVE PLANKS	576221	7.53	43389	619610	30	185883	805493	255826	1061319
320004	SITEWORK & UTILITIES	899390	7.53	67724	967114	20	193423	1160537	368583	1529120
SUBTOTAL 320	C-1 EARLY CONSTRUCTION	3949276	7.53	297380	4246656	28	1177286	5423942	1722643	7146585
321005	VAULT CONCRETE	1029845	10.39	107001	1136846	20	227369	1364215	433276	1797491
321006	ENCLOSURE BUILDING	3362346	10.39	349348	3711694	20	742339	4454033	1414601	5868634
321007	INSTALL & TEST CRANES	586290	10.39	60916	647206	20	129441	776647	246664	1023311
321008	EXISTING FACILITY UPGRADES	296875	10.39	30845	327720	15	49158	376878	119698	496576
SUBTOTAL 321	C-2 LATE CONSTRUCTION	5275356	10.39	548110	5823466	20	1148307	6971773	2214239	9186012
327701	C-1 CONST. MGMT. SUPPORT	86574	7.53	6520	93094	20	18620	111714	35763	147477
327702	C-2 CONST. MGMT. SUPPORT	109212	10.39	11348	120560	20	24112	144672	46309	190981
SUBTOTAL 327	CONST. MGMT. SUPPORT	195786	9.13	17868	213654	20	42732	256386	82072	338458
SUBTOTAL 3	CONSTRUCTION	9420418	9.16	863358	10283776	23	2368325	12652101	4018954	16671055
400000	PROJECT INTEGRATION	2499986	0.00	0	2499986	0	0	2499986	0	2499986
SUBTOTAL 4	PROJ. INTEGRATION	2499986	0.00	0	2499986	0	0	2499986	0	2499986
501NA1	PROJECT MGMT/ADMIN	3969599	0.00	0	3969599	0	0	3969599	0	3969599
501NB1	DESIGN	4592125	0.00	0	4592125	0	0	4592125	0	4592125
501NC1	PROCUREMENT	63937	0.00	0	63937	0	0	63937	0	63937
501ND1	ENVIRONMENTAL	1298214	0.00	0	1298214	0	0	1298214	0	1298214
501NE1	SAFETY	1479526	0.00	0	1479526	0	0	1479526	0	1479526
501NF1	QUALITY ASSURANCE	195393	0.00	0	195393	0	0	195393	0	195393
501NG1	ORR & STARTUP	655151	0.00	0	655151	0	0	655151	0	655151
SUBTOTAL 501N	PROJECT SUPPORT (EXPENSE)	12253945	0.00	0	12253945	0	0	12253945	0	12253945
502MA1	SPARES & EQUIPMENT	2624268	0.00	0	2624268	0	0	2624268	0	2624268
SUBTOTAL 502M	OTHER CAPITOL WORK (CENRTC)	2624268	0.00	0	2624268	0	0	2624268	0	2624268

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	SUB TOTAL	SITE ALLOCAT'N	TOTAL DOLLARS
SUBTOTAL 5	OTHER PROJECT COST	14878213	0.00	0	14878213	0	0	14878213	0	14878213
PROJECT TOTAL		37,689,903	4.28	1,613,026	39,302,929	12	4,696,518	43,999,447	7,234,614	51,234,061

1. ESTIMATE PURPOSE

THIS ESTIMATE WILL BE USED TO ESTABLISH THE COST BASELINE FOR THE CAPITOL PROJECT: IMMOBILIZED LOW LEVEL WASTE INTERIM STORAGE FACILITY (GROUT VAULTS) PROJECT W-465.

2. ESTIMATE TECHNICAL BASIS

A. THIS ESTIMATE HAS BEEN PREPARED FOR THE IMMOBILIZED LOW LEVEL WASTE PROJECT AS REQUESTED BY NUMATEC HANFORD CORP.
B. A DESCRIPTION OF THE TECHNICAL SCOPE OF WORK MAY BE FOUND IN THE FOLLOWING REFERENCE DOCUMENTS:
REQUEST FOR ESTIMATE DATED JANUARY 19, 1998
CONCEPTUAL DESIGN REPORT, IMMOBILIZED LOW-ACTIVITY WASTE INTERIM STORAGE FACILITY PROJECT (PHASE 1) #W465-CDR-001 REV. 0, DATED SEPT. 1997
REFERENCE DRAWINGS FROM PROJECT B-714 - GROUT VAULT CONSTRUCTION

3. ESTIMATE METHODOLOGY

A. DIRECT COSTS:
THIS ESTIMATE USES A BOTTOMS-UP METHODOLOGY
(1) CONSTRUCTION LABOR, MATERIAL AND EQUIPMENT UNITS HAVE BEEN ESTIMATED BASED UPON ONE OR MORE OF THE FOLLOWING STANDARD COMMERCIAL ESTIMATING RESOURCES, PUBLISHED ESTIMATING MANUALS/DATABASES: INHOUSE DATABASES, R.S. MEANS, RICHARDSON'S PROCESS PLANT CONTRUCTION ESTIMATING STANDARDS, NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION, INC. (NECA) MANUAL OF LABOR UNITS, ELECTRICAL RESOURCES, INC. ELECTRICAL ESTIMATING PRICE AND LABOR MANUAL.
THE UNITS MAY HAVE BEEN FACTORED/ADJUSTED BY THE ESTIMATOR AS APPROPRIATE TO REFLECT INFLUENCES BY CONTRACT, WORK SITE, OR OTHER IDENTIFIED PROJECT OR SPECIAL CONDITIONS.
(2) FLUOR DANIEL HANFORD DIRECT COSTS HAVE BEEN PROVIDED BY FDNW PROJECT MANAGEMENT FOR INCLUSION INTO THIS ESTIMATE.
(3) PROJECT INTEGRATION AND OTHER PROJECT COST HAVE BEEN PROVIDED BY NHC PROJECT MANAGEMENT.

B. DIRECT COST FACTORS
(1) SALES TAX HAS BEEN APPLIED TO ALL MATERIALS AND EQUIPMENT PURCHASES AT 8%.
(2) CONTRACT ADMINISTRATION FACTOR OF 19.90% FOR C-1 EARLY CONSTUCTION AND 18.75% FOR C-2 LATE CONSTRUCTION HAVE BEEN APPLIED TO THE DIRECT CONTRACT VALUE WHICH INCLUDES COSTS FOR BID PACKAGE PREPARATION, CONTRACT MANAGEMENT & ADMIN. AND PROJECT MANAGEMENT AND PLANNING SUPPORT

C. INDIRECT COSTS
FIXED PRICE CONTRACTOR OVERHEAD, PROFIT, BOND AND INSURANCE COSTS HAVE BEEN APPLIED AT THE FOLLWOING PERCENTAGES:
LABOR =30%, EQUIMENT USE =10%, MATERIAL =30%, AND SUBCONTRACT =15%, AND ARE REFLECTED IN THE "OH&P/B&I" COLUMN OF THE ESTIMATE DETAIL REPORT.

D. RATES
FOR ESTIMATING PURPOSES, AVERAGE FDNW RATES BY OPERATIONS CODE HAVE BEEN DEVELOPED BASED UPON RECENT COST HISTORY & ADJUSTED TO REFLECT INDUSTRY AVERAGE AE/CM RATES.

(2) FDH & PHMC SUBCONTRACTOR STANDARD LABOR RATES ARE THOSE LISTED IN THE FINANCIAL DATA SYSTEM (FDS) FDST 321R REPORT ORGANIZATION RATES PLUS ADDERS.

E. SITE ALLOCATIONS FACTORS

SITE ALLOCATION FACTORS ARE DEVELOPED AND PROVIDED BY FLUOR DANIEL HANFORD (FDH) FOR ESTIMATING USE.

(1) GOVERNMENT FURNISHED SERVICES RATE IS APPLIED TO ALL COSTS TO LIQUIDATE GOVERNMENT FURNISHED SERVICES PROVIDED TO THE ENTERPRISE COMPANIES: 7% FOR FDNW. (8% HAS BEEN APPLIED TO THIS ESTIMATE DUE TO THE RECENT REDUCTION IN SITE RATES THAT HAS NOT PROVIDED TIME TO ADEQUATLEY IDENTIFY COSTS TO THE PROJECT WHICH HAVE BEEN SHIFTED FROM THE GFS POOL).

(2) HANFORD SITE G&A/ESS RATE OF 22.0% IS APPLIED TO ALL COSTS TO LIQUIDATE THE HANFORD GENERAL & ADMINISTRATIVE COSTS, AND ESSENTIAL SITE SERVICES.

FDNW APPLIES THE ABOVE FACTORS TO ESTIMATED COSTS AS FOLLOWS:

(1) FDH GFS/G&A CM FACTOR: A COMPOSITE FACTOR OF 31.76% HAS BEEN APPLIED TO TOTAL FDNW FIXED PRICE CONSTRUCTION MANAGEMENT WHICH INCLUDES GOVERNMENT FURNISHED SERVICES (GFS) AND SITE G&A/FEE.

(2) FDH CM RATE FP CONST FACTOR: A COMPOSITE G&A/FEE RATE OF 31.76% HAS BEEN APPLIED TO THE FDNW FIXED PRICE CONSTRUCTION CONTRACT VALUE WHICH INCLUDES A SITE G&A/ESS OF 22% AND 8% FOR GOVERNMENT FURNISHED SERVICES.

(3) FDH GFS/G&A LABOR FACTOR: A COMPOSITE FACTOR HAS BEEN APPLIED TO TOTAL FDNW LABOR COSTS AS FOLLOWS:
FDNW CONTRACT MANAGEMENT AND ADMINISTRATION = 31.76

4. ESCALATION

ESCALATION PERCENTAGES WERE CALCULATED FROM THE JANUARY 1997 UPDATE OF THE ECONOMIC ESCALATION PRICE CHANGE INDICES FOR DOE CONSTRUCTION PROJECTS AS PUBLISHED BY THE "OFFICE OF INFRASTRUCTURE AQUISITION" FM-50. ESCALATION RATES FOR WBS 1D,40 & 50 WERE BASED ON THE PROJECT HANFORD MANAGEMENT CONTRACT FY 1998 COMPANY PLANNING RATES AS UTILIZED IN THE FY 1998 MULTI-YEAR WORK PLAN. THEY ARE: FY 1999 1.027, FY 2000 1.055, FY 2001 1.083, FY 2002 1.112. THESE RATES ARE INCLUSIVE WITH THE COSTS PROVIDED BY OTHERS. FOR ESCALATION SHOWN IN THIS ESTIMATE SEE ESCALATION ANALYSIS SCHEDULE.

5. CONTINGENCY

A. DEFINITION OF CONTINGENCY AS PROVIDED BY DOE

"CONTINGENCY COVERS COSTS THAT MAY RESULT FROM INCOMPLETE DESIGN, UNFORESEEN AND UNPREDICTABLE CONDITIONS, OR UNCERTAINTIES WITHIN THE DEFINED PROJECT SCOPE. THE AMOUNT OF CONTINGENCY WILL DEPEND ON THE STATUS OF DESIGN, PROCUREMENT, AND CONSTRUCTION; AND THE COMPLEXITY AND UNCERTAINTIES OF THE COMPONENT PARTS OF THE PROJECT. CONTINGENCY IS NOT TO BE USED TO AVOID MAKING AN ACCURATE ASSESSMENT OF EXPECTED COST" (OFFICE OF WASTE MANAGEMENT (EM-30) COST AND SCHEDULE GUIDE.

B. CONTINGENCY ALLOWANCE GUIDELINES

THE DOE GUIDELINE CONTINGENCY ALLOWANCE FOR A
BUDGET/CONCEPTUAL 15% TO 25%

C. METHODOLOGY

CONTINGENCY IS EVALUATED AT THE LOWEST WORK BREAKDOWN STRUCTURE (WBS) LEVEL WITHIN THE COST ESTIMATE DETAILS. IT IS SUMMARIZED AT UPPER WBS LEVELS AND REPORTED ON THE SUMMARY REPORTS.

D. ANALYSIS

AN ASSESSMENT OF DESIGN MATURITY, WORK COMPLEXITY AND PROJECT UNCERTAINTIES HAS BEEN PERFORMED. AN EXPLAINATION OF THIS ASSESSMENT AND CONTINGENCY RATES WHICH HAVE BEEN ADDED TO THE COST OF WORK ARE AS FOLLOWS:

WBS 1A & 1C A CONTINGENCY OF 20% HAS BEEN APPLIED DUE TO UNKNOWNS AND UNCERTAINTIES THAT ARE GENERALLY ENCOUNTERED WHEN DOING REMODEL AND RENOVATION WORK. ALSO THE UNCERTAINTY WITH THE ACTUAL WASTE PACKAGES THAT WILL BE GOING INTO THIS FACILITY. RADIOLOGICAL SOURCE TERMS MAY CREATE ADDITIONAL DESIGN COSTS FOR THE GANTRY CRANES AND THE VAULT SHIELDING DESIGN.

WBS 1D A 20% CONTINGENCY HAS BEEN APPLIED PER CLIENT REQUEST.

WBS 220001 THROUGH 221004 A CONTINGENCY OF 20% HAS BEEN APPLIED DUE TO UNKNOWNS AND UNCERTAINTIES CONCERNING THE STATE OF THE ART TECHNOLOGY THAT WILL BE REQUIRED FOR THE CRANES, TRANSPORTERS & CAMERA SYSTEM. ALSO THE UNKNOWNS CONCERNING HOW MUCH SHIELDING WILL BE REQUIRED.

WBS 320001 THROUGH 320003 A CONTINGENCY OF 30% HAS BEEN APPLIED DUE TO UNKNOWNS AND UNCERTAINTIES THAT ARE ENCOUNTERED WHEN DOING REMODEL AND RENOVATION WORK. ALSO THE UNIQUE TYPES OF MATERIAL AND METHODS OF CONSTRUCTION THAT WERE EMPLOYED DURING THE CONSTRUCTION OF THE EXISTING GROUT VAULTS MAY CREATE ADDITIONAL COSTS.

WBS 320004 THROUGH 321007 & 327701 & 327702 A CONTINGENCY OF 20% HAS BEEN APPLIED DUE TO THE AND UNKNOWNS AND UNCERTAINTIES INVOLVED WITH RETROPITTING TO AN EXISTING STRUCTURE.

WBS 320008 A CONTINGENCY OF 15% HAS BEEN APPLIED PER CLIENT REQUEST

WBS 400000 THROUGH 502MA1 NO CONTINGENCY HAS BEEN APPLIED PER CLIENTS REQUEST.

6. ROUNDING

THE PROJECT COST SUMMERY REPORT IS SUMMARIZED AND ADJUSTED/ROUNDED AS FOLLOWS:
THE ESCALATED TOTAL COST COLUMN, CONTINGENCY TOTAL COLUMN AND TOTAL DOLLARS COLUMN SUB-TOTALS ARE SUMERIZED BY PUNCTION.
THE COLUMN SUBTOTALS ARE ADJUSTED/ROUNDED TO THE NEAREST $1,000/$10,000. THE PROJECT TOTAL SUMMERY LINE TOTALS ARE ADJUSTED/ROUNDED TO THE NEAREST $10,000/$100,000.

7. REMARKS

MAJOR ASSUMPTIONS WHICH HAVE BEEN MADE IN THE PREPARATION OF THIS ESITMATE ARE AS FOLLOWS:
A.) CONTENTS OF VAULT PITS, PUMP PITS, LEACHATE PITS, HVAC EXHAUSTER AND HVAC INTAKE EQUIPMENT WILL BE REMOVED BY A FIXED PRICE CONTRACTOR AND TURNED OVER TO OTHERS AT THE JOB SITE.
B.) VAULT ENCLOSURE BUILDINGS DO NOT REQUIRE INSULATION AT THE EXTERIOR WALLS AND ROOF.
C.) BUILDING STRUCTURE & EQUIPMENT WILL BE GROUNDED TO THE NEW WATER SUPPLY AND EXISTING VAULT. NO GROUND GRID IS INCLUDED IN THE ESTIMATE.
D.) ELECTRICAL SYSTEMS NOT INCLUDED IN THIS ESTIMATE ARE: LIGHTNING PROTECTION, AND CATHODIC PROTECTION.

REMARKS (CONT.)

E.) ALL CONSTRUCTION WORK TO BE PERFORMED BY A FIXED PRICE CONTRACTOR DURING NORMAL WORKING HOURS, NO ALLOWANCE FOR OVERTIME IS INCLUDED IN THIS ESTIMATE.
F.) ALL WORK TO BE CLEAN, NO ALLOWANCE HAS BEEN MADE FOR WORKING WITH CONTAMINATED SOIL OR CONTAMINATED MATERIAL.
G.) WBS 1C2000 FDH ACCEPTANCE INSPECTION, HAS A G&A RATE OF 22% APPLIED TO IT.
H.) ALL ASPHALT, CONCRETE AND COVER PLANKS WILL BE HAULED TO THE RICHLAND LANDFILL AND DUMPED FOR A FEE.
I.) DEMOLITION COSTS HAVE BEEN DETERMINED USING STANDARD RATES FOR DEMOLITION OF STANDARD MATERIALS. HOWEVER BECAUSE SOME MATERIALS AND METHODS OF INSTALLATION USED DURING CONSTRUCTION OF THE EXISTING GROUT VAULTS WERE VERY UNIQUE, THE ESTIMATOR HAS HAD SEVERAL PHONE CONVERSATIONS AND MEETINGS WITH LOCAL CONTRACTORS THAT HAVE WORKED WITH THESE MATERIALS IN AN EFFORT TO GAIN A BETTER UNDERSTANDING OF THE PROPERTIES OF THESE MATERIALS AND THE PROBLEMS THAT MAY BE ENCOUNTERED DURING DEMOLITION. THEREFORE IN THESE UNIQUE SITUATIONS THE RATES APPLIED HAVE BEEN ADJUSTED TO COMPENSATE FOR THE ADDED LABOR.
J.) FDNW WILL PROCURE ALL LONG LEAD ITEMS LISTED IN PROCURMENT WBS 220001 THROUGH 221004.
K.) DIRECT COST FOR FDH ACCEPTANCE INSPECTION AND NEC COMPLIANCE INSPECTION HAS BEEN PROVIDED BY OTHERS.
L.) ALL COSTS SHOWN IN WBS 1D, 40, AND 50 HAVE BEEN PROVIDED BY OTHERS.
M.) DIRECT COSTS SHOWN IN WBS 321008 HAVE BEEN PROVIDED BY OTHERS.
N.) COST PROVIDED BY OTHERS IN WBS 1D, 40, & 50 INCLUDE ALL SITE ALLOCATIONS.
O.) NO SALES TAX HAS BEEN APPLIED TO MATERIAL COST IN WBS 502MA1 PER CLIENT REQUEST. CLIENT HAS STATED THAT SALES TAX IS INCLUDED IN THE LUMP SUM COST

SORT CODE/WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	SUB TOTAL	SITE ALLOCAT'N	TOTAL DOLLARS
FDH	FLUOR DANIEL HANFORD, INC.									
1C2000	ACCEPTANCE INSPECTION	251961	9.86	24843	276804	20	55361	332165	73075	405240
	SUBTOTAL 1C TITLE III DESIGN	251961	9.86	24843	276804	20	55361	332165	73075	405240
	TOTAL FDH FLUOR DANIEL HANFORD, INC.	251961	9.86	24843	276804	20	55361	332165	73075	405240
FDNW	FLUOR DANIEL NORTHWEST									
1A0100	DRAWINGS	665910	6.30	41952	707862	20	141572	849434	271905	1121339
1A0200	SPECIFICATIONS	87820	6.30	5533	93353	20	18672	112025	35861	147886
1A0300	CHECKING AND REVIEW	275869	6.30	17380	293249	20	58649	351898	112641	464539
1A0400	REPORTS	139936	6.30	8816	148752	20	29751	178503	57140	235643
1A0500	CALCS	99671	6.30	6279	105950	20	21190	127140	40700	167840
1A0600	SUPPORT	1038247	6.30	65410	1103657	20	220732	1324389	423900	1748289
1A0700	ESTIMATING	63702	6.30	4013	67715	20	13542	81257	26014	107271
1A0800	SUBMITTALS	36289	6.30	2287	38576	20	7715	46291	14820	61111
1A0900	QUALITY ASSURANCE	38515	6.30	2426	40941	20	8188	49129	15726	64855
	SUBTOTAL 1A DEFINITIVE DESIGN	2445959	6.30	154096	2600055	20	520011	3120066	998707	4118773
1C1000	TITLE III ENGINEERING	1638273	9.86	161534	1799807	20	359963	2159770	691338	2851108
	SUBTOTAL 1C TITLE III DESIGN	1638273	9.86	161534	1799807	20	359963	2159770	691338	2851108
1D0T01	MOBE DESIGN TEAM	74404	0.00	0	74404	20	14881	89285	0	89285
1D0T02	TITLE II PSAR/SARP/PART B PERMIT	470959	0.00	0	470959	20	94192	565151	0	565151
1D0T03	TITLE III PERMITS/STARTUP/FSAR	126948	0.00	0	126948	20	25390	152338	0	152338
	SUBTOTAL 1D SUPPORT WORK SCOPE	672311	0.00	0	672311	20	134463	806774	0	806774
	SUBTOTAL 1 ENGINEERING	5008504	6.80	340473	5348977	20	1069798	6418775	1763120	8181895
220001	GANTRY CRANES	4048051	7.78	314938	4362989	20	872598	5235587	1154724	6390311
220002	CCTV	78762	7.78	6128	84890	20	16978	101868	23067	124935

SORT CODE/WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	SUB TOTAL	SITE ALLOCAT'N	TOTAL DOLLARS
	SUBTOTAL 220 P-1 EARLY PROCURMENT	4126813	7.78	321066	4447879	20	889576	5337455	1177791	6515246
221003	TRACTOR & TRANSPORTER	510317	9.33	47612	557929	20	111586	669515	149082	818597
221004	CONCRETE SHIELDING COVERS	434276	9.33	40517	474793	20	94958	569751	125667	695418
	SUBTOTAL 221 P-2 LATE PROCURMENT	944593	9.33	88129	1032722	20	206544	1239266	274749	1514015
	SUBTOTAL 2 PROCUREMENT	5071406	8.07	409195	5480601	20	1096120	6576721	1452540	8029261
320001	PREP PLANKS FOR REMOVAL	2110504	7.53	158921	2269425	30	680828	2950253	937000	3887253
320002	MISC. DEMOLITION	363161	7.53	27346	390507	30	117152	507659	161234	668893
320003	REMOVE PLANKS	576221	7.53	43389	619610	30	185883	805493	255826	1061319
320004	SITEWORK & UTILITIES	899390	7.53	67724	967114	20	193423	1160537	368583	1529120
	SUBTOTAL 320 C-1 EARLY CONSTRUCTION	3949276	7.53	297380	4246656	28	1177286	5423942	1722643	7146585
321005	VAULT CONCRETE	1029845	10.39	107001	1136846	20	227369	1364215	433276	1797491
321006	ENCLOSURE BUILDING	3362346	10.39	349348	3711694	20	742339	4454033	1414601	5868634
321007	INSTALL & TEST CRANES	586290	10.39	60916	647206	20	129441	776647	246664	1023311
321008	EXISTING FACILITY UPGRADES	296875	10.39	30845	327720	15	49158	376878	119698	496576
	SUBTOTAL 321 C-2 LATE CONSTRUCTION	5275356	10.39	548110	5823466	20	1148307	6971773	2214239	9186012
327701	C-1 CONST. MGMT. SUPPORT	86574	7.53	6520	93094	20	18620	111714	35763	147477
327702	C-2 CONST. MGMT. SUPPORT	109212	10.39	11348	120560	20	24112	144672	46309	190981
	SUBTOTAL 327 CONST. MGMT. SUPPORT	195786	9.13	17868	213654	20	42732	256386	82072	338458
	SUBTOTAL 3 CONSTRUCTION	9420418	9.16	863358	10283776	23	2368325	12652101	4018954	16671055
	TOTAL FDNW FLUOR DANIEL NORTHWEST	19248367	8.25	1588183	20836550	21	4478882	25315432	7161539	32476971
NHC	NUMATEC HANFORD CORPORATION									
1D0T01	MOBE DESIGN TEAM	94026	0.00	0	94026	20	18805	112831	0	112831

SORT CODE/WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	SUB TOTAL	SITE ALLOCAT'N	TOTAL DOLLARS
1D0T03	TITLE III PERMITS/STARTUP/FSAR	411900	0.00	0	411900	20	82380	494280	0	494280
SUBTOTAL 1D	SUPPORT WORK SCOPE	505926	0.00	0	505926	20	101185	607111	0	607111
SUBTOTAL 1	ENGINEERING	505926	0.00	0	505926	20	101185	607111	0	607111
400000	PROJECT INTEGRATION	2499986	0.00	0	2499986	0	0	2499986	0	2499986
SUBTOTAL 4	PROJ. INTEGRATION	2499986	0.00	0	2499986	0	0	2499986	0	2499986
501NA1	PROJECT MGMT/ADMIN	3969599	0.00	0	3969599	0	0	3969599	0	3969599
501NB1	DESIGN	4592125	0.00	0	4592125	0	0	4592125	0	4592125
501NC1	PROCUREMENT	63937	0.00	0	63937	0	0	63937	0	63937
501ND1	ENVIRONMENTAL	1298214	0.00	0	1298214	0	0	1298214	0	1298214
501NE1	SAFETY	1479526	0.00	0	1479526	0	0	1479526	0	1479526
501NF1	QUALITY ASSURANCE	195393	0.00	0	195393	0	0	195393	0	195393
501NG1	ORR & STARTUP	655151	0.00	0	655151	0	0	655151	0	655151
SUBTOTAL 501N	PROJECT SUPPORT (EXPENS	12253945	0.00	0	12253945	0	0	12253945	0	12253945
502MA1	SPARES & EQUIPMENT	2624268	0.00	0	2624268	0	0	2624268	0	2624268
SUBTOTAL 502M	OTHER CAPITOL WORK (CEN	2624268	0.00	0	2624268	0	0	2624268	0	2624268
SUBTOTAL 5	OTHER PROJECT COST	14878213	0.00	0	14878213	0	0	14878213	0	14878213
TOTAL NHC	NUMATEC HANFORD CORPORATION	17884125	0.00	0	17884125	1	101185	17985310	0	17985310
WMH	WASTE MANAGEMENT HANFORD									
1D0T03	TITLE III PERMITS/STARTUP/FSAR	305450	0.00	0	305450	20	61090	366540	0	366540
SUBTOTAL 1D	SUPPORT WORK SCOPE	305450	0.00	0	305450	20	61090	366540	0	366540
SUBTOTAL 1	ENGINEERING	305450	0.00	0	305450	20	61090	366540	0	366540
TOTAL WMH	WASTE MANAGEMENT HANFORD	305450	0.00	0	305450	20	61090	366540	0	366540

FLUOR DANIEL NORTHWEST, INC.
NUMATEC HANFORD CORP.
JOB NO. W-465/B01BP56
FILE NO. W465BAB4

** IEST - INTERACTIVE ESTIMATING **
ILAW INTERIM STORAGE FACILITY (GROUT VAULTS)
CONCEPTUAL ESTIMATE
PHMCR04 - COMPANY/WBS SUMMARY

DATE 02/11/98 14:41:01
BY CDL/KLR/DEA/RWO/LAA

SORT CODE/WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	SUB TOTAL	SITE ALLOCAT'N	TOTAL DOLLARS
PROJECT TOTAL		37,689,903	4.28	1,613,026	39,302,929	12	4,696,518	43,999,447	7,234,614	51,234,061

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	CONSTRUCTION MANAGEMENT %	CONSTRUCTION MANAGEMENT TOTAL	OTHER COSTS	SUB TOTAL	TOTAL
1A0100	DRAWINGS	665910	0.00	0	0	0	665910
1A0200	SPECIFICATIONS	87820	0.00	0	0	0	87820
1A0300	CHECKING AND REVIEW	275869	0.00	0	0	0	275869
1A0400	REPORTS	139936	0.00	0	0	0	139936
1A0500	CALCS	99671	0.00	0	0	0	99671
1A0600	SUPPORT	1038247	0.00	0	0	0	1038247
1A0700	ESTIMATING	63702	0.00	0	0	0	63702
1A0800	SUBMITTALS	36289	0.00	0	0	0	36289
1A0900	QUALITY ASSURANCE	38515	0.00	0	0	0	38515
SUBTOTAL 1A	DEFINITIVE DESIGN	2445959		0	0	0	2445959
1C1000	TITLE III ENGINEERING	1638273	0.00	0	0	0	1638273
1C2000	ACCEPTANCE INSPECTION	251961	0.00	0	0	0	251961
SUBTOTAL 1C	TITLE III DESIGN	1890234		0	0	0	1890234
1D0T01	MOBE DESIGN TEAM	168430	0.00	0	0	0	168430
1D0T02	TITLE II PSAR/SARP/PART B PERMIT	470959	0.00	0	0	0	470959
1D0T03	TITLE III PERMITS/STARTUP/FSAR	844298	0.00	0	0	0	844298
SUBTOTAL 1D	SUPPORT WORK SCOPE	1483687		0	0	0	1483687
SUBTOTAL 1	ENGINEERING	5819880		0	0	0	5819880
220001	GANTRY CRANES	4048051	0.00	0	0	0	4048051
220002	CCTV	78762	0.00	0	0	0	78762
SUBTOTAL 220	P-1 EARLY PROCURMENT	4126813		0	0	0	4126813
221003	TRACTOR & TRANSPORTER	510317	0.00	0	0	0	510317
221004	CONCRETE SHIELDING COVERS	434276	0.00	0	0	0	434276
SUBTOTAL 221	P-2 LATE PROCURMENT	944593		0	0	0	944593
SUBTOTAL 2	PROCUREMENT	5071406		0	0	0	5071406
320001	PREP PLANKS FOR REMOVAL	1760220	19.90	350284	0	350284	2110504

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	CONSTRUCTION MANAGEMENT %	CONSTRUCTION MANAGEMENT TOTAL	OTHER COSTS	SUB TOTAL	TOTAL
320002	MISC. DEMOLITION	302886	19.90	60275	0	60275	363161
320003	REMOVE PLANKS	480585	19.90	95636	0	95636	576221
320004	SITEWORK & UTILITIES	750117	19.90	149273	0	149273	899390
SUBTOTAL 320	C-1 EARLY CONSTRUCTION	3293808		655468	0	655468	3949276
321005	VAULT CONCRETE	867238	18.75	162607	0	162607	1029845
321006	ENCLOSURE BUILDING	2831448	18.75	530898	0	530898	3362346
321007	INSTALL & TEST CRANES	493718	18.75	92572	0	92572	586290
321008	EXISTING FACILITY UPGRADES	250000	18.75	46875	0	46875	296875
SUBTOTAL 321	C-2 LATE CONSTRUCTION	4442404		832952	0	832952	5275356
327701	C-1 CONST. MGMT. SUPPORT	86574	0.00	0	0	0	86574
327702	C-2 CONST. MGMT. SUPPORT	109212	0.00	0	0	0	109212
SUBTOTAL 327	CONST. MGMT. SUPPORT	195786		0	0	0	195786
SUBTOTAL 3	CONSTRUCTION	7931998		1488420	0	1488420	9420418
400000	PROJECT INTEGRATION	2499986	0.00	0	0	0	2499986
SUBTOTAL 4	PROJ. INTEGRATION	2499986		0	0	0	2499986
501NA1	PROJECT MGMT/ADMIN	3969599	0.00	0	0	0	3969599
501NB1	DESIGN	4592125	0.00	0	0	0	4592125
501NC1	PROCUREMENT	63937	0.00	0	0	0	63937
501ND1	ENVIRONMENTAL	1298214	0.00	0	0	0	1298214
501NE1	SAFETY	1479526	0.00	0	0	0	1479526
501NF1	QUALITY ASSURANCE	195393	0.00	0	0	0	195393
501NG1	ORR & STARTUP	655151	0.00	0	0	0	655151
SUBTOTAL 501N	PROJECT SUPPORT (EXPENSE)	12253945		0	0	0	12253945
502MA1	SPARES & EQUIPMENT	2624268	0.00	0	0	0	2624268
SUBTOTAL 502M	OTHER CAPITOL WORK (CENRTC)	14878213		0	0	0	14878213

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	CONSTRUCTION MANAGEMENT %	CONSTRUCTION MANAGEMENT TOTAL	OTHER COSTS	SUB TOTAL	TOTAL
SUBTOTAL 5	OTHER PROJECT COST	14878213		0	0	0	14878213
PROJECT TOTAL		36,201,483		1,488,420	0	1,488,420	37,689,903

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	DYN EQ.USAGE	FDH GFS/G&A CONST.MGMT	FDH MPR F.P./S.C.	FDH GFS/G&A LABOR	FDH MPR/G&A MATERIAL	SITE ALLOC SUBTOTAL
1A0100	DRAWINGS	665910	1664	0	0	211493	0	213157
1A0200	SPECIFICATIONS	87820	219	0	0	27893	0	28112
1A0300	CHECKING AND REVIEW	275869	689	0	0	87615	0	88304
1A0400	REPORTS	139936	350	0	0	44445	0	44795
1A0500	CALCS	99671	249	0	0	31656	0	31905
1A0600	SUPPORT	1038247	2564	0	0	329749	0	332313
1A0700	ESTIMATING	63702	160	0	0	20233	0	20393
1A0800	SUBMITTALS	36289	92	0	0	11525	0	11617
1A0900	QUALITY ASSURANCE	38515	96	0	0	12232	0	12328
SUBTOTAL 1A	DEFINITIVE DESIGN	2445959	6083	0	0	776841	0	782924
1C1000	TITLE III ENGINEERING	1638273	4094	0	0	520315	0	524409
1C2000	ACCEPTANCE INSPECTION	251961	0	0	0	55431	0	55431
SUBTOTAL 1C	TITLE III DESIGN	1890234	4094	0	0	575746	0	579840
1D0T01	MOBE DESIGN TEAM	168430	0	0	0	0	0	0
1D0T02	TITLE II PSAR/SARP/PART B PERMIT	470959	0	0	0	0	0	0
1D0T03	TITLE III PERMITS/STARTUP/FSAR	844298	0	0	0	0	0	0
SUBTOTAL 1D	SUPPORT WORK SCOPE	1483687	0	0	0	0	0	0
SUBTOTAL 1	ENGINEERING	5819880	10177	0	0	1352587	0	1362764
220001	GANTRY CRANES	4048051	56	0	0	7099	885654	892809
220002	CCTV	78762	13	0	0	1605	16216	17834
SUBTOTAL 220	P-1 EARLY PROCURMENT	4126813	69	0	0	8704	901870	910643
221003	TRACTOR & TRANSPORTER	510317	34	0	0	4327	109272	113633
221004	CONCRETE SHIELDING COVERS	434276	6	0	0	778	95002	95786
SUBTOTAL 221	P-2 LATE PROCURMENT	944593	40	0	0	5105	204274	209419
SUBTOTAL 2	PROCUREMENT	5071406	109	0	0	13809	1106144	1120062
320001	PREP PLANKS FOR REMOVAL	1760220	0	111250	559046	0	0	670296

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	DYN EQ.USAGE	FDH GFS/G&A CONST.MGMT	FDH MPR F.P./S.C.	FDH GFS/G&A LABOR	FDH MPR/G&A MATERIAL	SITE ALLOC SUBTOTAL
320002	MISC. DEMOLITION	302886	0	19144	96196	0	0	115340
320003	REMOVE PLANKS	480585	0	30374	152634	0	0	183008
320004	SITEWORK & UTILITIES	750117	0	47408	238237	0	0	285645
SUBTOTAL 320	C-1 EARLY CONSTRUCTION	3293808	0	208176	1046113	0	0	1254289
321005	VAULT CONCRETE	867238	0	51644	275435	0	0	327079
321006	ENCLOSURE BUILDING	2831448	0	168613	899268	0	0	1067881
321007	INSTALL & TEST CRANES	493718	0	29401	156805	0	0	186206
321008	EXISTING FACILITY UPGRADES	250000	0	14888	79400	0	0	94288
SUBTOTAL 321	C-2 LATE CONSTRUCTION	4442404	0	264546	1410908	0	0	1675454
327701	C-1 CONST. MGMT. SUPPORT	86574	216	0	0	27498	0	27714
327702	C-2 CONST. MGMT. SUPPORT	109212	272	0	0	34687	0	34959
SUBTOTAL 327	CONST. MGMT. SUPPORT	195786	488	0	0	62185	0	62673
SUBTOTAL 3	CONSTRUCTION	7931998	488	472722	2457021	62185	0	2992416
400000	PROJECT INTEGRATION	2499986	0	0	0	0	0	0
SUBTOTAL 4	PROJ. INTEGRATION	2499986	0	0	0	0	0	0
501NA1	PROJECT MGMT/ADMIN	3969599	0	0	0	0	0	0
501NB1	DESIGN	4592125	0	0	0	0	0	0
501NC1	PROCUREMENT	63937	0	0	0	0	0	0
501ND1	ENVIRONMENTAL	1298214	0	0	0	0	0	0
501NE1	SAFETY	1479526	0	0	0	0	0	0
501NF1	QUALITY ASSURANCE	195393	0	0	0	0	0	0
501NG1	ORR & STARTUP	655151	0	0	0	0	0	0
SUBTOTAL 501N	PROJECT SUPPORT (EXPENSE)	12253945	0	0	0	0	0	0
502MA1	SPARES & EQUIPMENT	2624268	0	0	0	0	0	0
SUBTOTAL 502M	OTHER CAPITOL WORK (CENRTC)	2624268	0	0	0	0	0	0

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	DYN EQ.USAGE	FDH GFS/G&A CONST.MGMT	FDH MPR F.P./S.C.	FDH GFS/G&A LABOR	FDH MPR/G&A MATERIAL	SITE ALLOC SUBTOTAL
SUBTOTAL 5	OTHER PROJECT COST	14878213	0	0	0	0	0	0
PROJECT TOTAL		36,201,483	10,774	472,722	2,457,021	1,428,581	1,106,144	5,475,242

WBS	DESCRIPTION	SITE ALLOC SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
1A0100	DRAWINGS	213157	6.30	13430	226587	20	45318	271905
1A0200	SPECIFICATIONS	28112	6.30	1772	29884	20	5977	35861
1A0300	CHECKING AND REVIEW	88304	6.30	5564	93868	20	18773	112641
1A0400	REPORTS	44795	6.30	2822	47617	20	9523	57140
1A0500	CALCS	31905	6.30	2011	33916	20	6784	40700
1A0600	SUPPORT	332313	6.30	20938	353251	20	70649	423900
1A0700	ESTIMATING	20393	6.30	1285	21678	20	4336	26014
1A0800	SUBMITTALS	11617	6.30	733	12350	20	2470	14820
1A0900	QUALITY ASSURANCE	12328	6.30	777	13105	20	2621	15726
SUBTOTAL 1A	DEFINITIVE DESIGN	782924	6.30	49332	832256	20	166451	998707
1C1000	TITLE III ENGINEERING	524409	9.86	51705	576114	20	115224	691338
1C2000	ACCEPTANCE INSPECTION	55431	9.86	5465	60896	20	12179	73075
SUBTOTAL 1C	TITLE III DESIGN	579840	9.86	57170	637010	20	127403	764413
1D0T01	MOBE DESIGN TEAM	0	0.00	0	0	0	0	0
1D0T02	TITLE II PSAR/SARP/PART B PERMIT	0	0.00	0	0	0	0	0
1D0T03	TITLE III PERMITS/STARTUP/FSAR	0	0.00	0	0	0	0	0
SUBTOTAL 1D	SUPPORT WORK SCOPE	0	0.00	0	0	0	0	0
SUBTOTAL 1	ENGINEERING	1362764	7.82	106502	1469266	20	293854	1763120
220001	GANTRY CRANES	892809	7.78	69461	962270	20	192454	1154724
220002	CCTV	17834	7.78	1388	19222	20	3845	23067
SUBTOTAL 220	P-1 EARLY PROCURMENT	910643	7.78	70849	981492	20	196299	1177791
221003	TRACTOR & TRANSPORTER	113633	9.33	10602	124235	20	24847	149082
221004	CONCRETE SHIELDING COVERS	95786	9.33	8937	104723	20	20944	125667
SUBTOTAL 221	P-2 LATE PROCURMENT	209419	9.33	19539	228958	20	45791	274749
SUBTOTAL 2	PROCUREMENT	1120062	8.07	90388	1210450	20	242090	1452540
320001	PREP PLANKS FOR REMOVAL	670296	7.53	50473	720769	30	216231	937000

WBS	DESCRIPTION	SITE ALLOC SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
320002	MISC. DEMOLITION	115340	7.53	8686	124026	30	37208	161234
320003	REMOVE PLANKS	183008	7.53	13781	196789	30	59037	255826
320004	SITEWORK & UTILITIES	285645	7.53	21508	307153	20	61430	368583
SUBTOTAL 320	C-1 EARLY CONSTRUCTION	1254289	7.53	94448	1348737	28	373906	1722643
321005	VAULT CONCRETE	327079	10.39	33984	361063	20	72213	433276
321006	ENCLOSURE BUILDING	1067881	10.39	110954	1178835	20	235766	1414601
321007	INSTALL & TEST CRANES	186206	10.39	19347	205553	20	41111	246664
321008	EXISTING FACILITY UPGRADES	94288	10.39	9797	104085	15	15613	119698
SUBTOTAL 321	C-2 LATE CONSTRUCTION	1675454	10.39	174082	1849536	20	364703	2214239
327701	C-1 CONST. MGMT. SUPPORT	27714	7.53	2088	29802	20	5961	35763
327702	C-2 CONST. MGMT. SUPPORT	34959	10.39	3633	38592	20	7717	46309
SUBTOTAL 327	CONST. MGMT. SUPPORT	62673	9.13	5721	68394	20	13678	82072
SUBTOTAL 3	CONSTRUCTION	2992416	9.16	274251	3266667	23	752287	4018954
400000	PROJECT INTEGRATION	0	0.00	0	0	0	0	0
SUBTOTAL 4	PROJ. INTEGRATION	0	0.00	0	0	0	0	0
501NA1	PROJECT MGMT/ADMIN	0	0.00	0	0	0	0	0
501NB1	DESIGN	0	0.00	0	0	0	0	0
501NC1	PROCUREMENT	0	0.00	0	0	0	0	0
501ND1	ENVIRONMENTAL	0	0.00	0	0	0	0	0
501NE1	SAFETY	0	0.00	0	0	0	0	0
501NF1	QUALITY ASSURANCE	0	0.00	0	0	0	0	0
501NG1	ORR & STARTUP	0	0.00	0	0	0	0	0
SUBTOTAL 501N	PROJECT SUPPORT (EXPENSE)	0	0.00	0	0	0	0	0
502MA1	SPARES & EQUIPMENT	0	0.00	0	0	0	0	0
SUBTOTAL 502M	OTHER CAPITOL WORK (CENRTC)	0	0.00	0	0	0	0	0

WBS	DESCRIPTION	SITE ALLOC SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
SUBTOTAL 5	OTHER PROJECT COST	0	0.00	0	0	0	0	0
PROJECT TOTAL		5,475,242	8.60	471,141	5,946,383	22	1,288,231	7,234,614

IMMOBILIZED LOW-ACTIVITY WASTE INTERIM STORAGE FACILITY

PROJECT W-465 - DEFINITIVE DESIGN/ENGINEERING INSPECTION

CLIENT: NHC COMPANY W.O. NO.: E08747

PREPARED BY: FDNW DATE: February 1998

PROJECT SCOPE

This statement of work describes the work scope to be performed by Fluor Daniel Northwest, Inc., as primary contractor (hereafter referred to as the architect-engineer [A/E]) under the direction of Lockheed Martin Hanford Company, hereafter referred to as the buyer. Specifically, the A/E shall prepare definitive design (DD) documents for the Immobilized Low-Activity Waste (ILAW) Interim Storage Facility.

The DD work scope covers the design phase of the ILAW Interim Storage Facility (Project W-465, Immobilized Low-Activity Waste Storage Facility), hereafter referred to as the project. This design phase entails services for producing construction drawings, and construction and procurement specifications for the ILAW Interim Storage Facility. A large fraction of the DD effort will encompass retrofit modifications to the four existing grout vaults designed and constructed in accordance with project B-714 requirements.

The engineering inspection (EI) work scope covers the construction phase of the project. The construction phase entails engineering services in support of construction with resolution of field problems, review, and disposition of construction submittals, preparing, and issuing engineering change notices (ECNs), resolution, and disposition of nonconformance reports (NCRs), construction management, records management, and as-building.

The overall function of the project is to transport containers loaded with ILAW packages (provided by the immobilization vendors) from the low-level waste (LLW) Immobilization facility, place the waste packages in their storage locations, monitor the packages for storage containment integrity, and if necessary, retrieve the packages from storage for permanent disposal. The project furnishes transport containers to the LLW Immobilization Facility. The LLW Immobilization Facility loads the transport containers with packages of ILAW. The storage ILAW function will be to collect the loaded transport containers and transport them to the interim storage area.

The project shall provide transport containers, equipment, and facilities for accomplishing the transport ILAW function and the interim storage ILAW function. The scope of the project includes the design and construction of a facility to provide for ILAW storage space for ILAW packages, design and procurement of transport vehicle(s) and shielded transport containers(s), shipping and receiving of ILAW packages, loading and unloading of ILAW packages from the transport container, package handling for placement and retrieval of ILAW within the storage area, and monitoring of the stored ILAW packages.

REFERENCES

The following references, as modified by the buyer interface meetings, establish the current baseline:

A. Statement of Work for the Immobilized Low-Activity Waste Interim Storage Facility Project (HNF-SD-W465-SOW-001, Rev. 0).

B. Design Requirements Document for the Immobilized Low-Activity Waste Interim Storage Facility (HNF-SD-W465-DRD-001, Rev. 0).

C. Alternative Generation and Analysis Report (Burbank 1996a).

D. Subsequent direction from the customer via numerous interface meetings.

E. Immobilized Low-Activity Waste Interim Storage Facility, Project W-465 Work Plan (FDNW correspondence FDNW-97-TWRS-059).

DEFINITIVE DESIGN

The work to be provided by the A/E firm on project W-465 during DD is to consist of the following discipline efforts. All of the engineering discipline hours include 15% for engineering support which includes mobilization and planning, interdiscipline interfacing, project meetings, field trips, periodic schedule progressing, estimating support, and 30% and 90% design reviews with incorporation of comments. The numbers used to identify the individual disciplines (shown in parentheses) correlate with the numbering system used in the estimate and on the schedule.

Quality Engineering (41)

The quality engineering (QE) group will provide quality reviews of the design concepts, specifications, and design media. The QE group will provide the Quality Assurance Program Plan (QAPP) for the project.

Project Manager (101)

Project manager and staff will provide overall project coordination, oversee design groups and support groups, and interface with the operations contractor and DOE. The project manager will coordinate all management and self assessments with the FDNW-TWRS Engineering Manager.

Project Management Clerical (103)

The project clerical scope includes word processing of project correspondence, specifications, calculations, reports, meeting minutes, and other documents as required.

Project Engineering/Design Administration (201)

Project engineering/design administration will provide overall design coordination between the various design disciplines and cost account managers (CAMs) to track the cost and progress of each cost account. Project engineering will coordinate/interface with the inspection group(s) and participate in final acceptance activities associated with official acceptance of construction (OAC).

Project Engineering Support (205)

Project engineering support will include:

- Engineering, construction, and submittal document control functions
- Specifications (Procurement and Construction).

Survey (210)

Provide any field conditions required during the design effort.

Civil/Structural (215)

The civil/structural group will provide:

- Civil Drawings (9)
- Structural Drawings (9)
- Demolition/Modification Drawings (4)
- Calculations (9)
- Construction Specification Input
- Independent Seismic Review
- Transportation Plan Input
- Systems Engineering Management Plan Compliance Input
- Human Factors Program Plan Input
- Maintainability Analysis Input
- Alignment and Value Engineering Session
- As-build Existing Project B-714 Drawings
- Critical Design Review
- Early Procurement Submittal Review.

Architecture (220)

The architectural group will provide:

- Drawings (21)
- Construction Specification Input
- Material Handling Study with report
- Transportation Plan Input
- Systems Engineering Management Plan Compliance Input
- Human Factors Program Plan Input
- Maintainability Analysis Input
- Alignment and Value Engineering Session
- As-build Existing Project B-714 Drawings
- Critical Design Review.

Environmental Engineering (230)

The environmental group will provide:

- Design and Specification input
- Pollution Prevention/Waste Minimization Plan.

Heating, Ventilating, and Air Conditioning (235)

The HVAC group will provide:

- Drawings (3)
- Construction Specification Input
- Calculations (2)
- Systems Engineering Management Plan Compliance Input
- Human Factors Program Plan Input
- Maintainability Analysis Input
- Alignment and Value Engineering Session
- As-build Existing Project B-714 Drawings
- Critical Design Review.

Fire Protection And Safety Review (245)

The fire protection group will provide:

- Input to Civil Drawings
- Construction Specification Input
- Fire Hazards Analysis
- Systems Engineering Management Plan Compliance Input
- Human Factors Program Plan Input
- Maintainability Analysis Input
- Alignment and Value Engineering Session
- As-build Existing Project B-714 Drawings
- Critical Design Review.

Mechanical (255)

The mechanical systems groups will provide:

- Procurement Specifications (2)
- Early Procurement Submittal Reviews
- Systems Engineering Management Plan Compliance Input
- Human Factors Program Plan Input
- Maintainability Analysis Input
- Alignment and Value Engineering Session
- As-build Existing Project B-714 Drawings
- Critical Design Review.

Electrical (265)

The electrical group will provide:

- Drawings (55)
- Calculations (2)
- Construction Specification Input
- Input to Procurement Specifications (2)
- Systems Engineering Management Plan Compliance Input
- Human Factors Program Plan Input
- Maintainability Analysis Input
- Alignment and Value Engineering Session
- As-build Existing Project B-714 Drawings
- Critical Design Review
- Early Procurement Submittal Review

Instrumentation and Control (I&C) (270)

The I&C group will provide:

- Drawings (7)
- Construction Specification Input
- Procurement Specification Input (2)
- Systems Engineering Management Plan Compliance Input
- Human Factors Program Plan Input
- Maintainability Analysis Input
- Alignment and Value Engineering Session
- As-build Existing Project B-714 Drawings
- Critical Design Review
- Early Procurement Submittal Review

Nuclear Engineering/Shielding (290)

The nuclear engineering/shielding group will provide:

- Calculations (6)
- ALARA Report (1)
- Systems Engineering Management Plan Compliance Input
- Human Factors Program Plan Input
- Maintainability Analysis Input

- Alignment and Value Engineering Session
- As-build Existing Project B-714 Drawings
- Critical Design Review
- Early Procurement Submittal Review

Project Control (300)

The project control engineer will develop and maintain the project schedule and cost baseline, and will provide monthly cost, progress, and schedule reports.

Estimating (310)

The estimating scope includes production of the 30% and final definitive design estimate, plus other estimates as required.

Subcontract/Procurement (430)

The subcontract/procurement specialist will manage the development and placement of early procurement packages, and will provide support during the bid/award cycles for both procurement and fixed-price construction.

Construction Management (501)

Construction management includes both construction forces (CF) and construction management (CM) administration. This support includes performance of the constructibility review, plus input to the construction and procurement specifications, as well as input to the final design estimate and construction schedule.

Construction Engineering (505)

The construction engineering function provides support to the constructibility review and the final design estimate.

ENGINEERING/INSPECTION (EI)

Work provided by the A/E firm on project W-465 during construction will consist of the following discipline efforts.

Civil/Structural (215)

A full-time, qualified civil/structural engineer will be assigned to support the construction efforts during the early civil/structural stage of construction. This support function will include: 1) review and disposition of fixed-price contractor submittals; 2) prepare and issue ECNs; 3) disposition NCRs; 4) attend construction meetings; 5) be available to assist construction personnel in resolving technical issues; and 6) final as-documenting of drawings and specifications.

Architecture (220)

A full-time, qualified architect will be assigned to support the construction effort for the buildings. This support function will include : 1) review and disposition of building contractor submittals; 2) prepare and issue ECNs; 3) disposition NCRs; 4) attend construction meetings; and 5) final as-documenting of drawings and specifications.

Environmental Engineering (230)

Perform overview and approval of all project ECNs and NCRs and submittals to ensure compliance with governing environmental requirements. Attend meetings and field trips as required to support construction activities.

HVAC Engineering (235)

A full-time HVAC engineer will be assigned to support construction for installation of the HVAC equipment. This support function will include: 1) review and disposition of building contractor submittals; 2) prepare and issue ECNs; 3) disposition NCRs; 4) attend construction meetings; and 5) final as-documenting of drawings and specifications.

Safety/Fire Protection Engineering (245)

The safety and fire protection engineer will perform overview safety review and approval of all project ECNs and NCRs, and support construction during installation of the fire protection systems.

Mechanical Engineering (255)

A full-time, qualified mechanical engineer will be assigned to support the construction effort during the installation phase of mechanical equipment on the project. This

support function will include: 1) review and disposition of fixed-price contractor submittals; 2) prepare and issue ECNs, 3) disposition NCRs; 4) attend construction meetings; 5) be available to assist construction personnel in resolving technical issues; 6) provide acceptance test plan (ATP) input, and 7) final as-documenting of drawings and specifications.

Instrumentation Engineering (270)

A full-time, qualified instrumentation engineer will be assigned to support the construction effort during the latter phases of construction while instrumentation installation and check-out activities are in progress. This support function will include: 1) review and disposition of fixed-price contractor submittals; 2) prepare and issue ECNs, 3) disposition NCRs; 4) attend construction meetings; 5) be available to assist construction personnel in resolving technical issues; 6) provide ATP input, and 7) final as-documenting of drawings and specifications.

Electrical Engineering (265)

A full-time electrical engineer will be assigned to support construction during installation and testing of the electrical system. This support function will include: 1) review and disposition of building contractor submittals; 2) prepare and issue ECNs; 3) disposition NCRs; 4) attend construction meetings; and 5) final as-documenting of drawings and specifications.

Project Engineer/Design Administration (201)

Coordinate interdiscipline activities and provide performance/progress information to support schedule and cost statusing.

Project Management (101)

Provide overall coordination of all EI activities. Responsible for cost and schedule performance and reporting.

Quality Engineering (41)

Provide review of ECNs and NCRs for compliance with appropriate criteria and procedures. Provide auditing services to verify that project work is performed in accordance with appropriate procedures.

Project Controls (300)

Set up and maintain costs and schedule baselines. Provide schedule analysis and cost trending.

Estimating (310)

Provide estimating support during construction as required to support disposition of contractor change requests.

Construction Submittals (206)

Provide contractor submittal control and distribution system to ensure timely disposition of submittals.

Construction Forces Administration (505)

Responsible for managing and coordinating CF activities.

Construction Management (501)

The fixed-price contractor will be managed by FDNW CM.

Surveying (210 - Field)

Provide horizontal and vertical control points at site for fixed price contractor use. Spot-check fixed price contractor's layout on critical structures and equipment.

Records Management and Turnover (205)

Maintain project engineering/management files. Transmit project documents internally and externally. Responsible for project records turnover at project completion.

ASSUMPTIONS

The assumptions used to prepare this estimate include:

1. Environmental engineering effort is mainly in the area of regulatory compliance. NEPA documentation will be required for the start of detailed design.

2. The ILAW Interim Storage Facility is a pre-engineered metal building classified as General Services and seismically qualified to UBC, Seismic Zone 2B, for standard occupancy structures.

3. The gantry crane located in the ILAW Interim Storage Facility is General Services and seismically qualified for UBC, Zone 2B, standard occupancy structure.

4. The electrical design is General Services.

5. The existing grout control room will be used by project W-465 with no major structural modifications.

6. The project will not provide any change room facilities, restroom facilities, or drain field. It has been assumed that the existing grout facilities are adequate and do not require any modifications.

7. Ventilation systems are non-safety.

8. The ILAW Interim Storage Facility will not require cooling.

9. Procurement and submittal reviews are performed during definitive design for the crane and transportation system.

10. All privatization vendors will use the same container design.

11. As-building of the existing grout vault drawings has not been included within the scope of the project.

12. The demolishing contractor will design and supply the lifting brackets for removal of roof blanks from the grout vaults.

ESCALATION ANALYSIS SCHEDULE

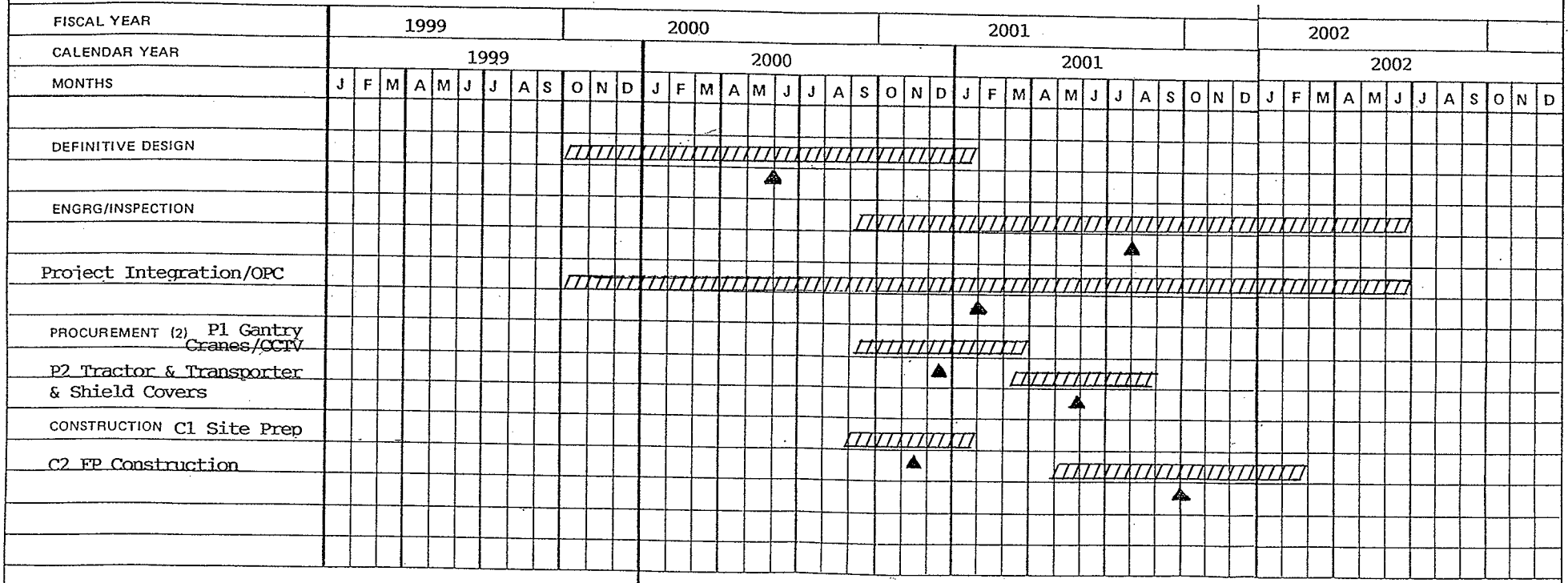
PROJECT NO./WORK ORDER NO. W-465

TITLE ILAW Interim Storage Facility

PREPARED BY Norm Nelson DATE 1/22/98

REQUESTED BY _____ APPROVED BY _____ DATE _____

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



ENGINEERING ESCALATION

1.A - 6.3%
1.C - 9.86%

(1) CONSTRUCTION AND PROCUREMENT ESCALATION

2.2.0 - 7.78%	3.2.0 - 7.53%	3.2.7.7.0.1 - 7.53%
2.2.1 - 9.33%	3.2.1 - 10.39%	3.2.7.7.0.2 - 10.39%

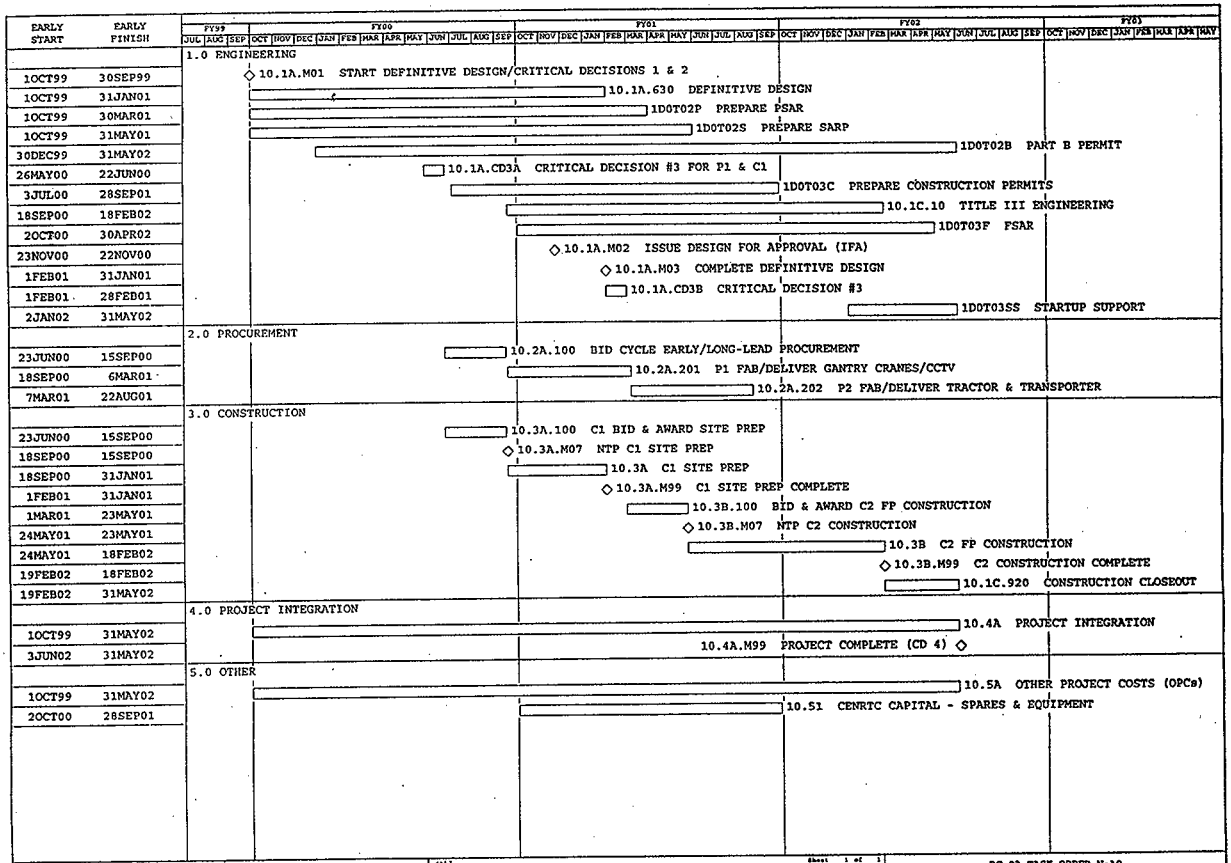
(1) To be provided by Estimating Department.

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

KEH 0291.00 (03/94)

APPENDIX D

CONCEPTUAL PROJECT SCHEDULE



Plot Date 6FEB98
Data Date 1OCT97
Project Start 1JAN97
Project Finish 31MAY02

Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Plug Activity

Sheet 1 of 1

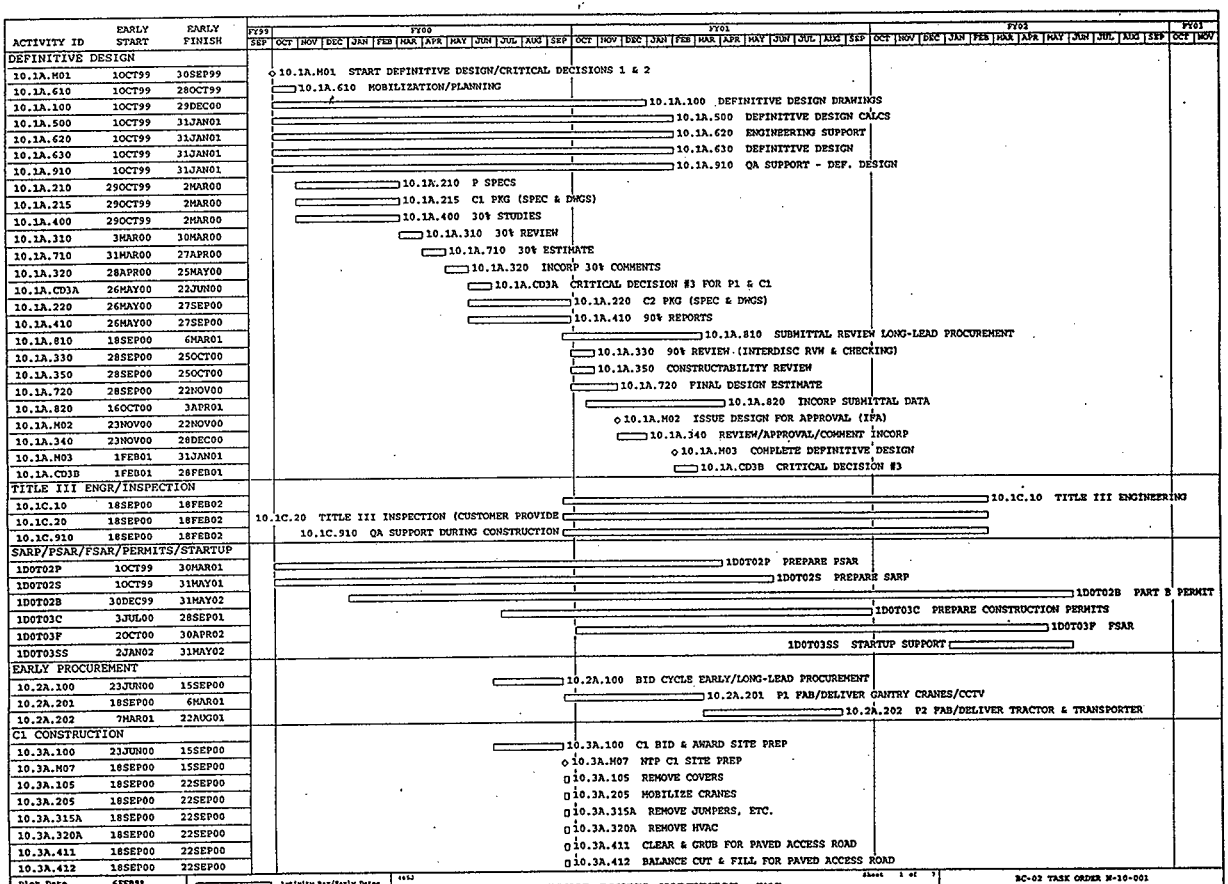
FLUOR DANIEL NORTHWEST, INC.
W-465 ILAW INTERIM STORAGE FACILITY
CONCEPTUAL SCHEDULE (SUMMARY)

BC-03 TASK ORDER N-10

Date	Revision	Checked	Approved
2/26/98			

D-1

HNF-1975, Rev. 1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EARLY FINISH
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FY00
FY01
FY02
FY03
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DEFINITIVE DESIGN
10.1A.M01 1OCT99 30SEP99 10.1A.M01 START DEFINITIVE DESIGN/CRITICAL DECISIONS 1 & 2
10.1A.610 1OCT99 28OCT99 10.1A.610 MOBILIZATION/PLANNING
10.1A.100 1OCT99 29DEC00 10.1A.100 DEFINITIVE DESIGN DRAWINGS
10.1A.500 1OCT99 31JAN01 10.1A.500 DEFINITIVE DESIGN CALCS
10.1A.620 1OCT99 31JAN01 10.1A.620 ENGINEERING SUPPORT
10.1A.630 1OCT99 31JAN01 10.1A.630 DEFINITIVE DESIGN
10.1A.910 1OCT99 31JAN01 10.1A.910 QA SUPPORT - DEF. DESIGN
10.1A.210 29OCT99 2MAR00 10.1A.210 P SPECS
10.1A.215 29OCT99 2MAR00 10.1A.215 C1 PKG (SPEC & DWGS)
10.1A.400 29OCT99 2MAR00 10.1A.400 30% STUDIES
10.1A.310 3MAR00 30MAR00 10.1A.310 30% REVIEW
10.1A.710 31MAR00 27APR00 10.1A.710 30% ESTIMATE
10.1A.320 28APR00 25MAY00 10.1A.320 INCORP 30% COMMENTS
10.1A.CD3A 26MAY00 22JUN00 10.1A.CD3A CRITICAL DECISION #3 FOR P1 & C1
10.1A.220 26MAY00 27SEP00 10.1A.220 C2 PKG (SPEC & DWGS)
10.1A.410 26MAY00 27SEP00 10.1A.410 90% REPORTS
10.1A.810 18SEP00 6MAR01 10.1A.810 SUBMITTAL REVIEW LONG-LEAD PROCUREMENT
10.1A.330 28SEP00 25OCT00 10.1A.330 90% REVIEW (INTERDISC RVW & CHECKING)
10.1A.350 28SEP00 25OCT00 10.1A.350 CONSTRUCTABILITY REVIEW
10.1A.720 28SEP00 22NOV00 10.1A.720 FINAL DESIGN ESTIMATE
10.1A.820 16OCT00 3APR01 10.1A.820 INCORP SUBMITTAL DATA
10.1A.M02 23NOV00 22NOV00 10.1A.M02 ISSUE DESIGN FOR APPROVAL (IFA)
10.1A.340 23NOV00 28DEC00 10.1A.340 REVIEW/APPROVAL/COMMENT INCORP
10.1A.M03 1FEB01 31JAN01 10.1A.M03 COMPLETE DEFINITIVE DESIGN
10.1A.CD3B 1FEB01 28FEB01 10.1A.CD3B CRITICAL DECISION #3
TITLE III ENGR/INSPECTION
10.1C.10 18SEP00 18FEB02 10.1C.10 TITLE III ENGINEERING
10.1C.20 18SEP00 18FEB02 10.1C.20 TITLE III INSPECTION (CUSTOMER PROVIDE
10.1C.910 18SEP00 18FEB02 10.1C.910 QA SUPPORT DURING CONSTRUCTION
SARP/PSAR/FSAR/PERMITS/STARTUP
1D0T02P 1OCT99 30MAR01 1D0T02P PREPARE PSAR
1D0T02S 1OCT99 31MAY01 1D0T02S PREPARE SARP
1D0T02B 30DEC99 31MAY02 1D0T02B PART B PERMIT
1D0T03C 3JUL00 28SEP01 1D0T03C PREPARE CONSTRUCTION PERMITS
1D0T03F 2OCT00 30APR02 1D0T03P FSAR
1D0T03SS 2JAN02 31MAY02 1D0T03SS STARTUP SUPPORT
EARLY PROCUREMENT
10.2A.100 23JUN00 15SEP00 10.2A.100 BID CYCLE EARLY/LONG-LEAD PROCUREMENT
10.2A.201 18SEP00 6MAR01 10.2A.201 P1 FAB/DELIVER GANTRY CRANES/CCTV
10.2A.202 7MAR01 22AUG01 10.2A.202 P2 FAB/DELIVER TRACTOR & TRANSPORTER
C1 CONSTRUCTION
10.3A.100 23JUN00 15SEP00 10.3A.100 C1 BID & AWARD SITE PREP
10.3A.M07 18SEP00 15SEP00 10.3A.M07 NTP C1 SITE PREP
10.3A.105 18SEP00 22SEP00 10.3A.105 REMOVE COVERS
10.3A.205 18SEP00 22SEP00 10.3A.205 MOBILIZE CRANES
10.3A.315A 18SEP00 22SEP00 10.3A.315A REMOVE JUMPERS, ETC.
10.3A.320A 18SEP00 22SEP00 10.3A.320A REMOVE HVAC
10.3A.411 18SEP00 22SEP00 10.3A.411 CLEAR & GRUB FOR PAVED ACCESS ROAD
10.3A.412 18SEP00 22SEP00 10.3A.412 BALANCE CUT & FILL FOR PAVED ACCESS ROAD
Plot Date 6FEB98
Data Date 1OCT97
Project Start 1JAN97
Project Finish 31MAY02
(c) Primavera Systems, Inc.
Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Plug Activity
FLUOR DANIEL NORTHWEST, INC.
W-465 ILAW INTERIM STORAGE FACILITY
CONCEPTUAL SCHEDULE (DETAILED)
Sheet 1 of 1
BC-02 TASK ORDER M-10-001
Date
Revision
Checked
Approved

ACTIVITY ID	EARLY START	EARLY FINISH
C1 CONSTRUCTION		
10.3A.420	18SEP00	29SEP00
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10.3A.310A	25SEP00	29SEP00
10.3A.315B	25SEP00	29SEP00
10.3A.320B	25SEP00	29SEP00
10.3A.413	25SEP00	29SEP00
10.3A.451	25SEP00	29SEP00
10.3A.110	25SEP00	20OCT00
10.3A.120	25SEP00	6OCT00
10.3A.405	25SEP00	3NOV00
10.3A.105C	20CT00	6OCT00
10.3A.205C	20CT00	6OCT00
10.3A.210B	20CT00	6OCT00
10.3A.310B	20CT00	6OCT00
10.3A.315C	20CT00	6OCT00
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10.3A.330A	20CT00	6OCT00
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10.3A.340A	20CT00	6OCT00
10.3A.414	20CT00	6OCT00
10.3A.430	20CT00	6OCT00
10.3A.110B	20CT00	9OCT00
10.3A.452	20CT00	200CT00
10.3A.105D	9OCT00	13OCT00
10.3A.115	9OCT00	13OCT00
10.3A.205D	9OCT00	13OCT00
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10.3A.325A	9OCT00	13OCT00
10.3A.330B	9OCT00	13OCT00
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10.3A.461	16OCT00	20OCT00
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10.3A.110D	16OCT00	23OCT00
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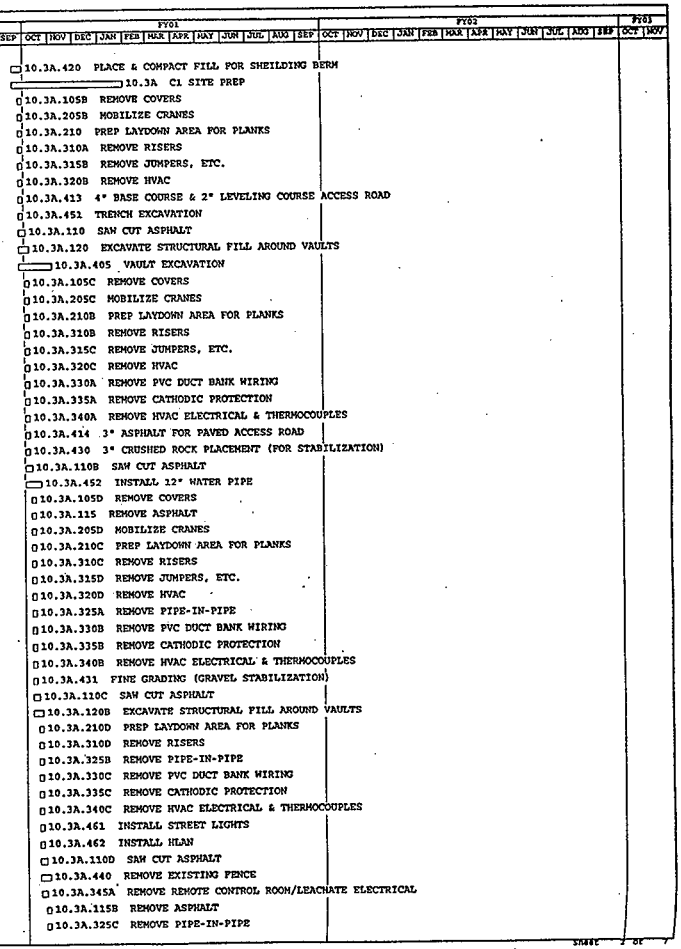

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10.3A.130B	12DEC00	18DEC00
10.3A.305B	12DEC00	18DEC00
10.3A.215C	27DEC00	3JAN01
10.3A.125D	27DEC00	17JAN01
10.3A.130C	4JAN01	10JAN01
10.3A.305C	4JAN01	10JAN01
10.3A.215D	18JAN01	24JAN01
10.3A.130D	25JAN01	31JAN01
10.3A.305D	25JAN01	31JAN01
10.3A.M99	1FEB01	31JAN01
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10.3B.M07	24MAY01	23MAY01
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10.3B.521A	24MAY01	30MAY01
10.3B.130A	24MAY01	19JUL01
10.3B	24MAY01	18FEB02
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10.3B.512A	31MAY01	6JUN01
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10.3B.512B	7JUN01	13JUN01
10.3B.513A	7JUN01	13JUN01
10.3B.521C	7JUN01	13JUN01
10.3B.522B	7JUN01	20JUN01
10.3B.511D	14JUN01	20JUN01
10.3B.512C	14JUN01	20JUN01
10.3B.513B	14JUN01	20JUN01
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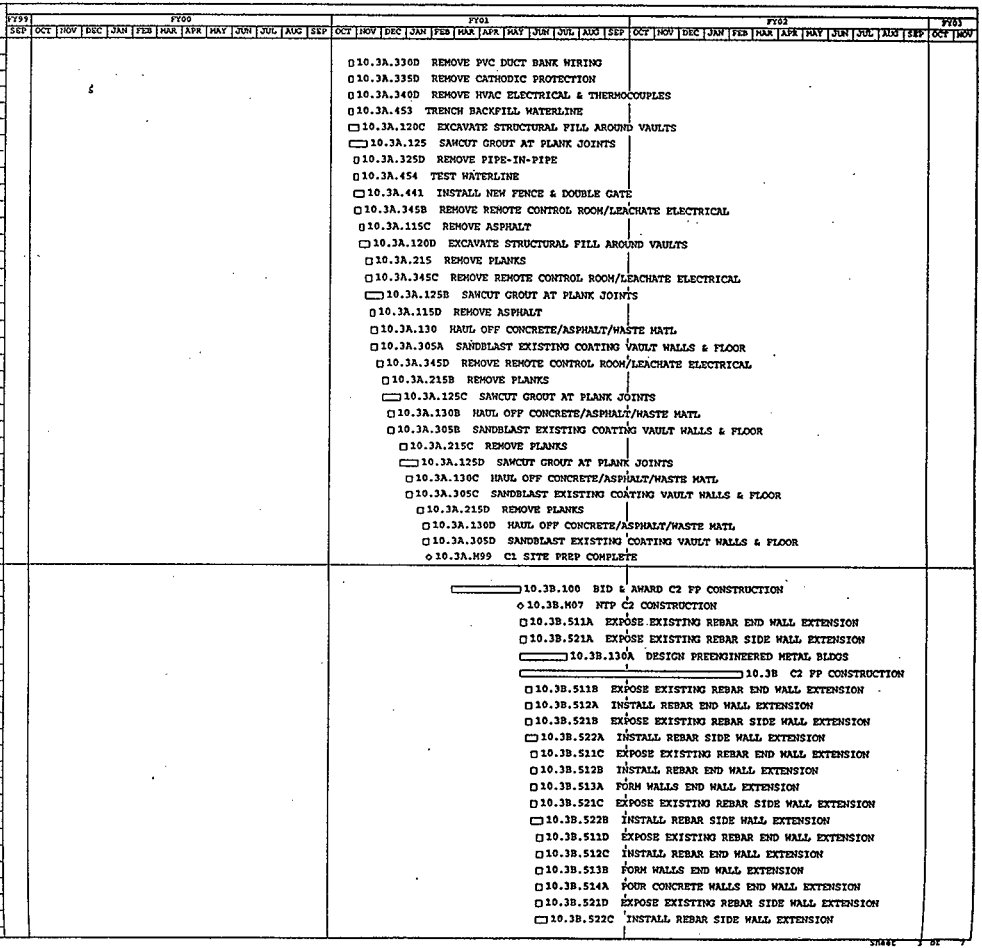

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10.3B.522D	21JUN01	5JUL01
10.3B.523B	21JUN01	5JUL01
10.3B.524A	28JUN01	29JUN01
10.3B.513D	28JUN01	5JUL01
10.3B.514C	28JUN01	5JUL01
10.3B.523C	28JUN01	12JUL01
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10.3B.514D	6JUL01	12JUL01
10.3B.523D	6JUL01	19JUL01
10.3B.631B	10JUL01	16JUL01
10.3B.632A	10JUL01	19JUL01
10.3B.524C	13JUL01	16JUL01
10.3B.631C	17JUL01	23JUL01
10.3B.632B	17JUL01	26JUL01
10.3B.524D	20JUL01	23JUL01
10.3B.633A	20JUL01	26JUL01
10.3B.131A	20JUL01	13SEP01
10.3B.631D	24JUL01	30JUL01
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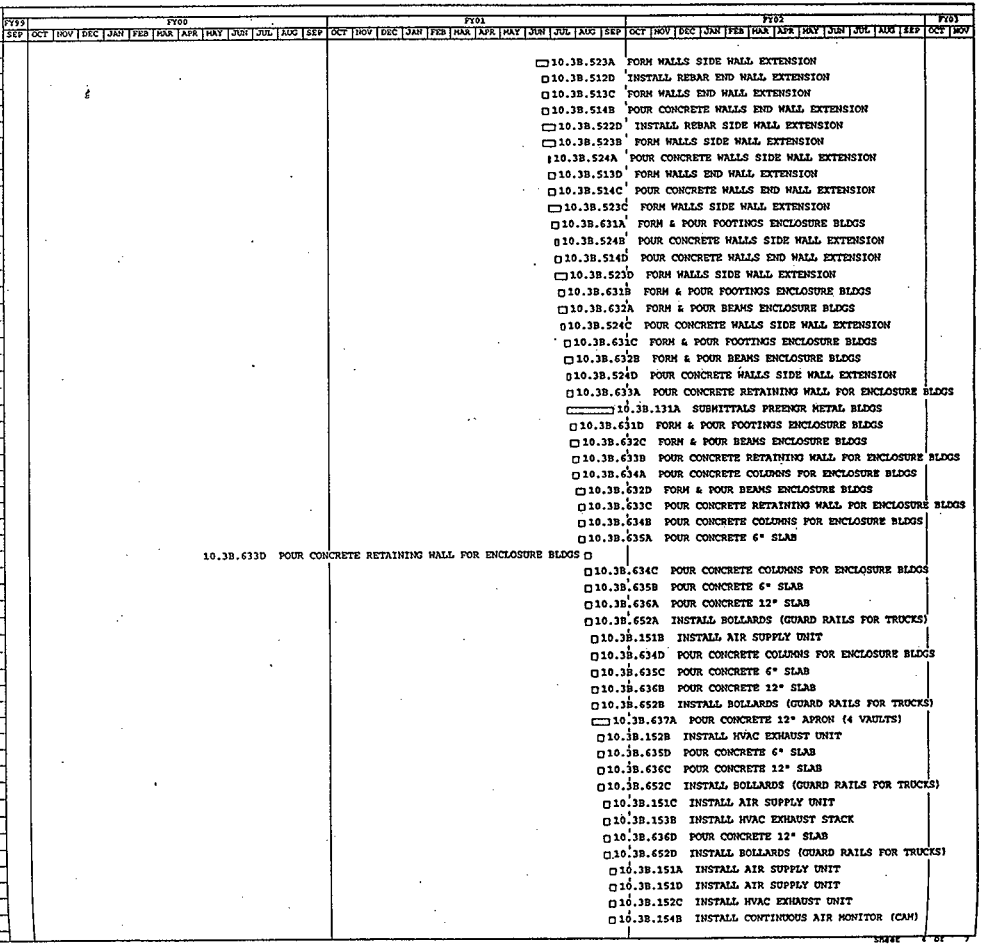

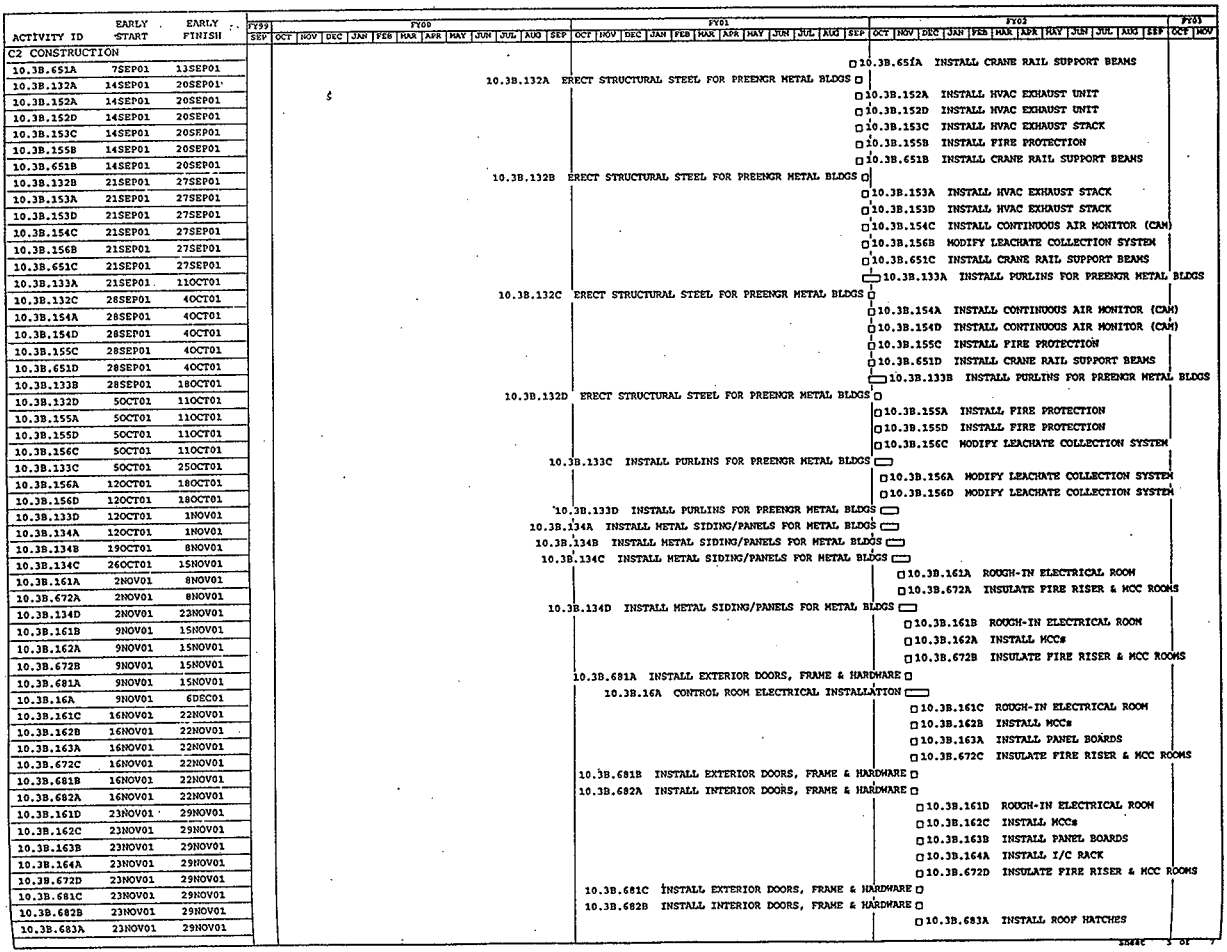
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EARLY FINISH
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FY00
FY01
FY02
FY03
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10.3B.132A 14SEP01 20SEP01
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10.3B.162A 9NOV01 15NOV01
10.3B.672B 9NOV01 15NOV01
10.3B.681A 9NOV01 15NOV01
10.3B.16A 9NOV01 6DEC01
10.3B.161C 16NOV01 22NOV01
10.3B.162B 16NOV01 22NOV01
10.3B.163A 16NOV01 22NOV01
10.3B.672C 16NOV01 22NOV01
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10.3B.162C 23NOV01 29NOV01
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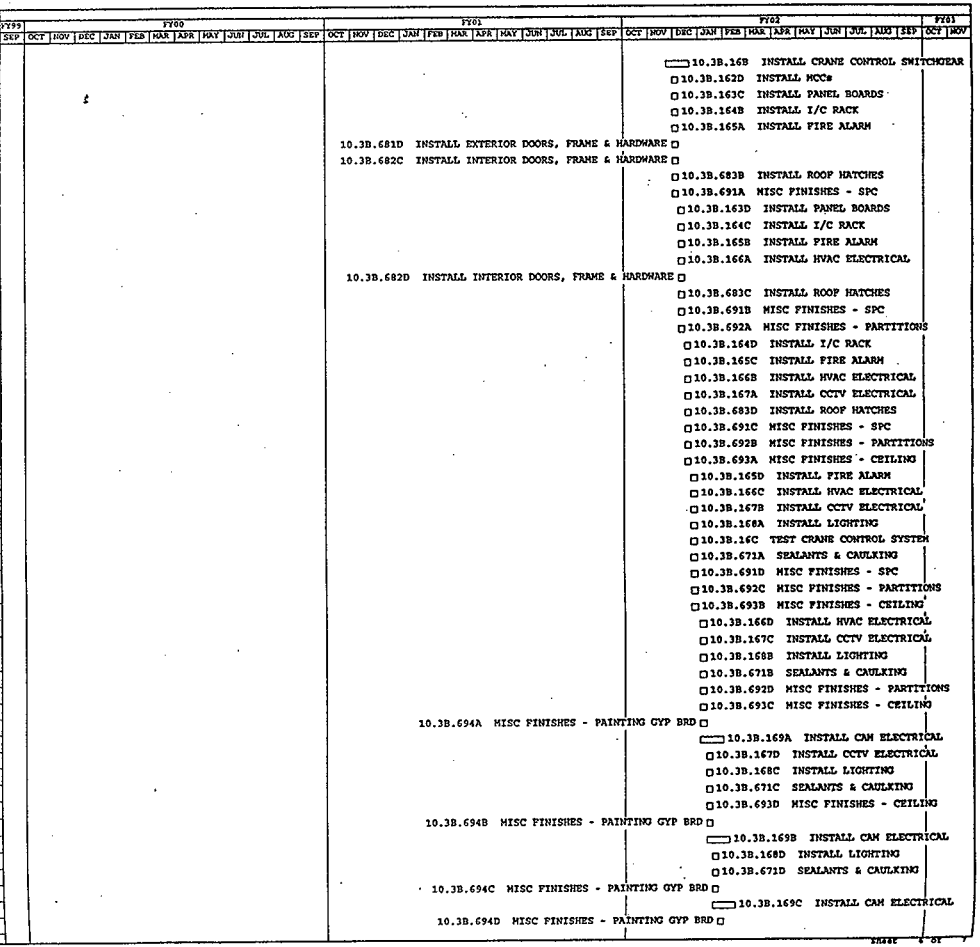
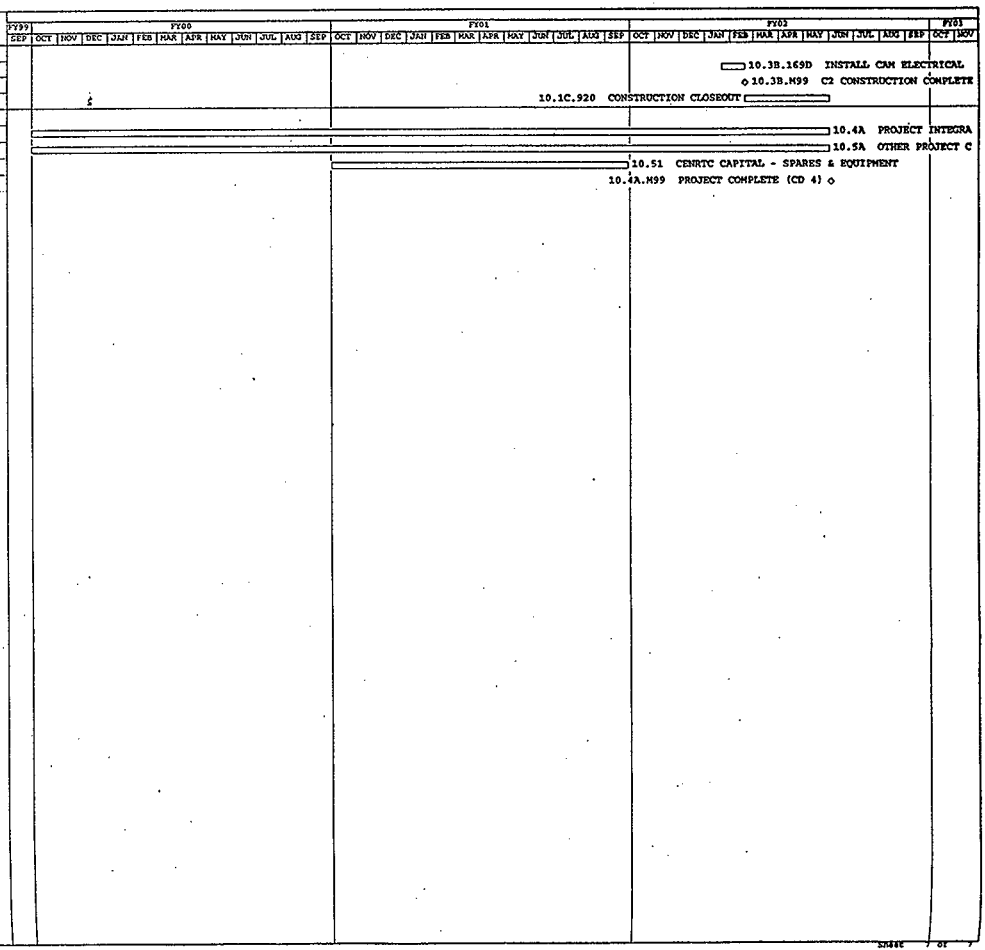
10.3B.681C 23NOV01 29NOV01
10.3B.682B 23NOV01 29NOV01
10.3B.683A 23NOV01 29NOV01
10.3B.651A INSTALL CRANE RAIL SUPPORT BEAMS
10.3B.132A ERECT STRUCTURAL STEEL FOR PREENGR METAL BLDGS
10.3B.152A INSTALL HVAC EXHAUST UNIT
10.3B.152D INSTALL HVAC EXHAUST UNIT
10.3B.153C INSTALL HVAC EXHAUST STACK
10.3B.155B INSTALL FIRE PROTECTION
10.3B.651B INSTALL CRANE RAIL SUPPORT BEAMS
10.3B.132B ERECT STRUCTURAL STEEL FOR PREENGR METAL BLDGS
10.3B.153A INSTALL HVAC EXHAUST STACK
10.3B.153D INSTALL HVAC EXHAUST STACK
10.3B.154C INSTALL CONTINUOUS AIR MONITOR (CAM)
10.3B.156B MODIFY LEACHATE COLLECTION SYSTEM
10.3B.651C INSTALL CRANE RAIL SUPPORT BEAMS
10.3B.133A INSTALL PURLINS FOR PREENGR METAL BLDGS
10.3B.132C ERECT STRUCTURAL STEEL FOR PREENGR METAL BLDGS
10.3B.154A INSTALL CONTINUOUS AIR MONITOR (CAM)
10.3B.154D INSTALL CONTINUOUS AIR MONITOR (CAM)
10.3B.155C INSTALL FIRE PROTECTION
10.3B.651D INSTALL CRANE RAIL SUPPORT BEAMS
10.3B.133B INSTALL PURLINS FOR PREENGR METAL BLDGS
10.3B.132D ERECT STRUCTURAL STEEL FOR PREENGR METAL BLDGS
10.3B.155A INSTALL FIRE PROTECTION
10.3B.155D INSTALL FIRE PROTECTION
10.3B.156C MODIFY LEACHATE COLLECTION SYSTEM
10.3B.133C INSTALL PURLINS FOR PREENGR METAL BLDGS
10.3B.156A MODIFY LEACHATE COLLECTION SYSTEM
10.3B.156D MODIFY LEACHATE COLLECTION SYSTEM
10.3B.133D INSTALL PURLINS FOR PREENGR METAL BLDGS
10.3B.134A INSTALL METAL SIDING/PANELS FOR METAL BLDGS
10.3B.134B INSTALL METAL SIDING/PANELS FOR METAL BLDGS
10.3B.134C INSTALL METAL SIDING/PANELS FOR METAL BLDGS
10.3B.161A ROUGH-IN ELECTRICAL ROOM
10.3B.672A INSULATE FIRE RISER & MCC ROOMS
10.3B.134D INSTALL METAL SIDING/PANELS FOR METAL BLDGS
10.3B.161B ROUGH-IN ELECTRICAL ROOM
10.3B.162A INSTALL MCCs
10.3B.672B INSULATE FIRE RISER & MCC ROOMS
10.3B.681A INSTALL EXTERIOR DOORS, FRAME & HARDWARE
10.3B.16A CONTROL ROOM ELECTRICAL INSTALLATION
10.3B.161C ROUGH-IN ELECTRICAL ROOM
10.3B.162B INSTALL MCCs
10.3B.163A INSTALL PANEL BOARDS
10.3B.672C INSULATE FIRE RISER & MCC ROOMS
10.3B.681B INSTALL EXTERIOR DOORS, FRAME & HARDWARE
10.3B.682A INSTALL INTERIOR DOORS, FRAME & HARDWARE
10.3B.161D ROUGH-IN ELECTRICAL ROOM
10.3B.162C INSTALL MCCs
10.3B.163B INSTALL PANEL BOARDS
10.3B.164A INSTALL I/C RACK
10.3B.672D INSULATE FIRE RISER & MCC ROOMS
10.3B.681C INSTALL EXTERIOR DOORS, FRAME & HARDWARE
10.3B.682B INSTALL INTERIOR DOORS, FRAME & HARDWARE
10.3B.683A INSTALL ROOF HATCHES

ACTIVITY ID	EARLY START	EARLY FINISH
C2 CONSTRUCTION		
10.3B.16B	23NOV01	20DEC01
10.3B.162D	30NOV01	6DEC01
10.3B.163C	30NOV01	6DEC01
10.3B.164B	30NOV01	6DEC01
10.3B.165A	30NOV01	6DEC01
10.3B.681D	30NOV01	6DEC01
10.3B.682C	30NOV01	6DEC01
10.3B.683B	30NOV01	6DEC01
10.3B.691A	30NOV01	6DEC01
10.3B.163D	7DEC01	13DEC01
10.3B.164C	7DEC01	13DEC01
10.3B.165B	7DEC01	13DEC01
10.3B.166A	7DEC01	13DEC01
10.3B.682D	7DEC01	13DEC01
10.3B.683C	7DEC01	13DEC01
10.3B.691B	7DEC01	13DEC01
10.3B.692A	7DEC01	13DEC01
10.3B.164D	14DEC01	20DEC01
10.3B.165C	14DEC01	20DEC01
10.3B.166B	14DEC01	20DEC01
10.3B.167A	14DEC01	20DEC01
10.3B.683D	14DEC01	20DEC01
10.3B.691C	14DEC01	20DEC01
10.3B.692B	14DEC01	20DEC01
10.3B.693A	14DEC01	20DEC01
10.3B.165D	21DEC01	28DEC01
10.3B.166C	21DEC01	28DEC01
10.3B.167B	21DEC01	28DEC01
10.3B.168A	21DEC01	28DEC01
10.3B.16C	21DEC01	28DEC01
10.3B.671A	21DEC01	28DEC01
10.3B.691D	21DEC01	28DEC01
10.3B.692C	21DEC01	28DEC01
10.3B.693B	21DEC01	28DEC01
10.3B.166D	31DEC01	7JAN02
10.3B.167C	31DEC01	7JAN02
10.3B.168B	31DEC01	7JAN02
10.3B.671B	31DEC01	7JAN02
10.3B.692D	31DEC01	7JAN02
10.3B.693C	31DEC01	7JAN02
10.3B.694A	31DEC01	7JAN02
10.3B.169A	31DEC01	28JAN02
10.3B.167D	8JAN02	14JAN02
10.3B.168C	8JAN02	14JAN02
10.3B.671C	8JAN02	14JAN02
10.3B.693D	8JAN02	14JAN02
10.3B.694B	8JAN02	14JAN02
10.3B.169B	8JAN02	4FEB02
10.3B.168D	15JAN02	21JAN02
10.3B.671D	15JAN02	21JAN02
10.3B.694C	15JAN02	21JAN02
10.3B.169C	15JAN02	11FEB02
10.3B.694D	22JAN02	28JAN02



ACTIVITY ID	EARLY START	EARLY FINISH
C2 CONSTRUCTION		
10.3B.169D	22JAN02	18FEB02
10.3B.M99	19FEB02	18FEB02
10.1C.920	19FEB02	31MAY02
PROJECT INTEGRATION/OPCs		
10.4A	1OCT99	31MAY02
10.5A	1OCT99	31MAY02
10.51	2OCT00	28SEP01
10.4A.M99	3JUN02	31MAY02



APPENDIX E

OUTLINE SPECIFICATION

OUTLINE SPECIFICATION

DIVISION 2 - SITEWORK

Section 02050 Demolition

1. Removal of existing electrical power line.
2. Removal of existing boundary fence.
3. Removal of HVAC exhauster and ductwork above roof vaults.
4. Removal of concrete pits, pump pits above the roof vaults and leachate concrete pits on the side of each vault.
5. Removal of asphalt topping (diffusion break).
6. Removal of concrete roof planks, including concrete topping above the planks.

Section 02200 Earthwork

1. Excavation around the vault buildings.
2. Excavation for underground pipe and duct banks.
3. Excavation for new access road and parking areas.
4. Excavation of onsite soil for road subgrade.
5. Structural backfill, compacted: WSDOT M41-10, Section 2-03.3(14)C.
6. Sand bedding for underground pipe and duct banks: ASTM D 653.
7. Plastic sheet marker for buried pipe and duct bank.
8. Stabilization of disturbed areas.

Section 02235 Road Subgrade and Granular Base

1. Granular base: WSDOT M41-10, Section 9-03.9(3).
2. Leveling course: WSDOT M41-10, Section 9-03.9(3).

Section 02512 Hot-Laid Asphaltic Concrete Pavement

1. Paving asphalt: WSDOT M41-10, Section 9-02.1(4), Grade AR-4000-W.
2. Prime coat: WSDOT M41-10, Section 9-02.1(2) MC-250.
3. Aggregate: Class B. WSDOT M41-10, Section 9-03.8.

Section 02668 Fire Water Systems

1. Buried fire water piping: Polyvinyl chloride (PVC) plastic pipe, NFPA 24.
2. Fittings: Cement lined ductile iron per AWWA C104, AWWA C110, and NFPA 24.
3. Valves: Provided with adjustable cast iron valve boxes.
4. Post indicator valves with tamper proof valve position supervisory switches.
5. Barricade posts: 6 inch, Schedule 40 carbon steel, grout filled, to protect PIVs.
6. System components listed or FM approved for the use intended.
7. Thrust restraints in accordance with NFPA 24.
8. Flush and hydrostatic test in accordance with NFPA 24.
9. Disinfect fire main in accordance with AWWA C651.
10. Reduce pressure backflow prevention assembly in heated enclosure.

Section 02831 Chain Link Fences and Gates

1. Fence fabric: FS RR-F-191/1, Type I.

2. Posts, top rails, and braces: FS RR-F-191/3, Class 1, Grade A or B.

3. Accessories: FS RR-F-191/4.

4. Gates: Steel pipe meeting requirements for FS RR-F-191/3.

5. Hinges, latches, stops, and keepers: Zinc-coated steel meeting requirements of FS-RR-F-191/2.

6. Concrete: 2000 psi at 28 days.

DIVISION 3 - CONCRETE

Section 03300 Cast-in-Place Concrete

1. Concrete minimum strength: 3000 and 4000 psi at 28 days.
2. Reinforcing steel: ASTM A 615, deformed, Grade 60.
3. Nonshrink grout: Nonmetallic type.
4. Welded wire fabric: ASTM A 185.
5. Concrete forms: Wood, steel, or plywood.
6. Anchor bolts.
7. Floor topping: Self-leveling grout.

DIVISION 5 - METALS

Section 05120 Structural Steel

1. Rolled steel shapes and plates: ASTM A 36, A 572, Grade 50.
2. Miscellaneous steel: ASTM A 36.
3. Crane rails: ASTM A 759, Structural Grade.
4. Bolts: ASTM A 325, A 490.
5. Welding: AWS D1.1.

Section 05400 Cold-Formed Metal Framing

1. Structural studs and runners: ASTM C 955.
2. Joists and stringers: ASTM A 446.

Section 05500 Metal Fabrications

1. Rolled steel shapes, plates, and bars: ASTM A 36, A 572, Grade 50.
2. Steel pipe: ASTM A 53, Schedule 40.
3. Fasteners: Kwik-Bolt II by Hilti.
4. Metal grating: FS RR-G-661, Type 1, Class 1, Material S, hot-dip galvanized.
5. Pipe railing.

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

Section 07150 Dampproofing

1. Trowel-type mastic asphaltic compound, below grade surfaces.

Section 07190 Vapor Retarders

1. Continuous plastic sheets, 6 mils.

Section 07200 Insulation

1. Exterior wall and ceilings: Glass fiber, blanket type, R-19 and R-30. Fire Hazard Classification (FHC) 25/50.

Section 07600 Flashing and Sheet Metal

1. Galvanized metal flashings and trim, 24 gage (min).
2. Gutters/Downspouts.

Section 07700 Roof Specialties and Accessories

1. Prefabricated curbs for equipment hatches on roof.
2. Equipment Hatch, 10ft x 10ft (2 per building).

Section 07920 Sealants and Caulking

1. Urethane self-leveling sealant, one part.
2. Polysulfide sealant, one part, with nonstaining primer.
3. Closed-cell polyethylene foam backer rod.

DIVISION 8 - DOORS AND WINDOWS

Section 08100 Metal Doors and Frames

1. Doors: Hollow metal, flush-type with 18 gage face sheets, insulated door at the Fire Riser Room. Insulated and fire rated door at the Electrical Room.

2. Frames: Pressed metal, 16 gage, fire rated at the Electrical Room.

Section 08331 Overhead Coiling Doors

1. Insulated-type, face mounted, electric power operated with motor drive.

Section 08710 Door Hardware

1. Panic hardware for exterior doors.
2. Lockset for miscellaneous doors.
3. Door closers, stops, holders, latch sets, thresholds, kick plates, and weatherstripping.
4. Fire rated hardware at the electrical room door.

DIVISION 9 - FINISHES

Section 09250 Gypsum Board

1. Gypsum board

    a. 5/8 inch, all interior walls where scheduled.
    b. 5/8 inch, Type X where required for fire resistance rating.

2. Metal ceiling joists and wall studs: 6 inch wide, loadbearing, galvanized at interior and exterior walls.

Section 09900 Painting

1. Gypsum board walls: PDCA Architectural Specification Manual.
2. Metals: PDCA Architectural Specification Manual.
3. Concrete: PDCA Architectural Specification Manual.

DIVISION 10 - SPECIALTIES

Section 10400 Identifying Devices

1. Door signage, nonilluminating.

Section 10522 Fire Extinguishers, Cabinets, and Accessories

1. Portable fire extinguisher with metal cabinet.

Section 10670 Storage Shelving

1. Metal storage shelving.

DIVISION 13 - SPECIAL CONSTRUCTION

Section 13120 Pre-Engineered Structures

1. Metal buildings: Clear-span structures, tapered rigid-frame beam and column type.

2. Wall and roof systems: Preformed metal panels of vertical profile, and accessory components.

3. Wall and roof framing: Rough opening framing for doors, overhead coiling doors, and other penetrations.

Section 13440 Instrumentation

1. Closed Circuit Television (CCTV)

   a. Remote positioning device: Pan and tilt drive, weatherproof, 24 V 50/60 Hz, with scanner.

b. Camera: ½-inch high-resolution monochrome type with 120 VAC power supply.
c. Monitor: 15-inch monochrome type.
d. Switcher: Automatic (sequential), non-alarming type.

2. Beta/Gamma Radiation Monitoring System

   a. In-line entry sampling head with cable: Eberline Model AMS40PT7.
   b. Beta particulate monitor with alarm relays: Eberline Model AMS-4.
   c. Regulated air pump - 2.0 cfm, 0.2 hp, 3 amps @ 115 VAC: Eberline Model RAP-1.

DIVISION 15 - MECHANICAL

Section 15300 Fire Protection

1. Dry pipe sprinkler system with standard trim per NFPA 13 for ordinary hazard group 2 occupancy (4 systems).

2. Installation and testing per NFPA 13.

3. High and low air pressure switches.

4. FM approved or UL listed equipment for fire protection services.

5. Supervised control valve 40 ft or more from building.

6. Supervised reduce pressure backflow prevention assembly in heated enclosure.

Section 15500 Heating, Ventilating, and Air Conditioning

1. Unit air conditioner: Unit air conditioner shall be wall mounted, nominal 18,000 Btu/h capacity, 230/208 volt, single phase, 60 hz, 20 amp circuit. Carrier "Sierra II" model no. 51.

2. Exhaust fan/supply fan: Exhaust fans and supply fans shall be centrifugal, upblast, double inlet, with structural base and vibration isolators. Capacity shall be 7000 cfm at 2.0 in.wc. static pressure. Cook 165-CA-DWDI 86 or equal. Motor shall be 5 hp, 480 volt, 3 phase, 60 hz with integral starter.

3. Air filters: Air filters shall be extended surface, bag style, nominal size 24"x24"x20" deep. Efficiency shall be 50% in accordance with ASHRAE 62-76. Initial resistance shall not exceed 0.30 in.wc. at 500 fpm face velocity. Each filter bank shall contain eight filters. Farr Hi-Flo III model 6-50A20 or equal.

4. Electric baseboard heaters: Electric baseboard heaters shall have bottom air inlet and top outlet. Heaters shall be 208 volt, and capacity shall be 1 kW for Fire Riser room, and 1.5 kW for Electrical room. Brasch model CCR or equal.

5. Ductwork: Galvanized steel, in accordance with SMACNA duct construction standards for rectangular industrial ducts.

DIVISION 16 - ELECTRICAL

Section 16400 Service and Distribution

1.	Panelboards	(1 ea) 480 V, 3 phase, 600A, NEMA 12 enclosure (4 ea) 480 V, 3 phase, 250A, NEMA 12 enclosure
2.	Manholes	(8 ea) 7' Square x 8' Deep
3.	Enclosures	(8 ea) 72" x 36" x 18" NEMA 12 free standing enclosure with full back and side mounted panels
4.	Mini Power Center	(4 ea) 10 KVA, 480-120/240V
5.	Lighting Fixtures	(17 ea) Roadway light, 480 V, 400 W, LPS with 35' metal poles, support arm and photo cell (36 ea) High Bay Pendant Mount, 480 V, 400 W, metal halide with quartz standby (16 ea) Outdoor, wall mount, LPS, 120 V, 35 W with photo cell (8 ea) Fluorescent, 4', Industrial, 120 V, 2 T-8 lamps (20 ea) Incandescent, vapor tight, 120 V, 150 W

Section 16721 Alarm and Detection System

1. Master fire alarm control panel with annunciator in three valve houses.

2. Valve tamper switches for the 4 PIV and two back flow prevention assembly valves

3. Five low temperature switches (four in the riser room and one in the backflow prevention assembly enclosure).

4. Designed, installed, and tested in accordance with NFPA 72.

5. RFAR box, furnished by the government but project needs to buy replacement.

APPENDIX F

ENERGY CONSERVATION REPORT AND ANALYSIS

The vaults will not be heated or cooled and, therefore, do not require building energy conservation per 10 CFR 435 or DOE Order 6430.1A. Process energy per DOE Order 6430.1A will be evaluated during definitive design, 10 CFR 436, for the crane operations.

APPENDIX G

PRELIMINARY SAFETY EVALUATION
HNF-SD-W465-PSE-001 (DRAFT)

(Provided by the Performance Contractor under a separate cover)

APPENDIX H

LIFE CYCLE COST ANALYSIS

February 10, 1998

NHC-C-97-0005
CO-98-TWRS-132

Mr. Kenneth C. Burgard
Numatec Hanford Corporation
P. O. Box 1300
Richland, Washington 99352-1300

Dear Mr. Burgard:

LIFE CYCLE COST ANALYSIS FOR PROJECT W-465, IMMOBILIZED LOW ACTIVITY WASTE INTERIM STORAGE FACILITY

Response Requested By: N/A

Responds To: N/A

This letter transmits the Life Cycle Cost analysis (LCCA) report which has been informally approved by Terry Carlson of your staff. We will include this report in the LCCA Appendix of the W-465 Conceptual Design Report.

If you have any questions, please call me at 376-3207.

Sincerely,

J. L. Ruud
Project Manager

JLR:sst

Attachment

This life cycle cost analysis evaluates the most cost effective method of providing ILAW interim storage facilities. Two alternatives were selected for evaluation:

- Alternative 1, Modify the Grout Vaults
- Alternative 2, Remote-Handled Mixed Waste Disposal Vault

Each alternative has been applied evaluation criteria and a 3.5-year operation period.

The comparative present-value life cycle costs of the alternatives from the LCCA are shown in the attached information.

The LCCA indicated that the Grout Vault alternative would be the most cost effective.

The Cost Data information sheets explain how the input to each alternative was obtained.

The National Institute of Standards and Technology (NIST) "Building Life Cycle Cost" (BLCC ver. 4.5-97) program was used to determine life cycle costs for the alternatives.

BLCC 4.5-97 complies with NIST Handbook 135, *Life-Cycle Costing Manual for the Federal Energy Management Program.* For projects not related to energy or water, BLCC 4.5-97 complies with OMB Circular A-94 (revised), "Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs", October 29, 1992.

The input to each alternative is shown on the attached output sheets from the BLCC program titled, "NIST BLCC: Input Data Listing".

The attached output sheet from the BLCC program titled, "Comparative Present-Value Costs of Alternative Projects" show the lowest life cycle cost among the alternatives considered.

Definitions:

Discount Rate - the interest rate used in calculating the present value of expected yearly costs and benefits.

Present-Value Cost - each year's expected yearly cost multiplied by it's discount factor then summed over all years of the planning period.

Base Date - the month and calendar year at which the study period begins.

Service Date - the month and calendar year when the building or systems/component is expected to be put into service.

Study Period Length - the number of years over which the project-related costs are to be evaluated.

Initial Cost - the total installed cost of the component, unadjusted for price escalation during the planning/construction period (if any).

Expected Life - the useful life of the component anticipated by the investor

Initial Cost	$30,420,000
Operation and Maintenance Costs	See Table 1
Fuel Costs	
Electricity	$0.046/kW

Fuel Use

Each Grout Vaults is ventilated with two 5 HP fans. Assume these fans operate 8760 hours per year = 65700 kW/yr. Assume fans on all vaults are running at start of operations.

Replacements

No equipment is assumed to need replacement during the 3.5 year operating time of the facilities.

Resale

No resale value was given to the vaults or equipment associated with the vaults.

Notes:

The basis for the initial costs used in this alternative and how this cost varies from the cost estimate from the Conceptual Design Report (CDR) for Immobilized Low-Activity Waste Interim Storage Facility Project (Phase 1) Project W-465 is shown in Table 2. The initial cost shown above is rounded up to the nearest ten thousand dollar figure.

The information on the number of crew members for operation shown in Table 1 was taken from sketch ES-W465-L1 of Appendix K of the CDR.

The information for the number of support staff and their costs shown in Table 1 was taken from Appendix A Table A-7 and Table A-8 of the Analysis of Alternatives for Immobilized Low-Activity Waste Disposal, HNF-SD-TWR-AGA-004, Rev. 0.

Initial Cost

Module 1	$46,500,000

Operation and Maintenance Costs — See Table 1

Fuel Costs

Electricity	$0.046/kW

Fuel Use

No operating ventilation system was installed in this concept.

Replacements

No equipment is assumed to need replacement during the 3.5 year operating time of the facilities.

Resale

No resale value was given to vaults or equipment associated with the vaults.

Notes:

The basis for the initial costs used in this alternative and how these costs vary from the cost estimates from the Analysis of Alternatives for Immobilized Low-Activity Waste Disposal, HNF-SD-TWR-AGA-004, Rev. 0 is shown in Table 2. The initial cost shown above includes infrastructure cost and is rounded up to the nearest ten thousand dollar figure.

The information for the number of support staff and their costs shown in Table 1 was taken from Appendix A Table A-7 and Table A-8 of the AGA.

The information on the number of crew members for operation shown in Table 1 was taken from sketch ES-W465-L1 of Appendix K of the Conceptual Design Report (CDR) for Immobilized Low-Activity Waste Interim Storage Facility Project (Phase 1) Project W-465.

Operations Crews							
Description	No. of Members	Hrs/Day	$/Hr	Days/ Week	Project Cost - $/Year	Project Duration- Months	Cost to Project
Crew # 1	7	7.5	$55.89	5	$762,312	42	$2,668,091
Crew # 2	7	7.5	$55.89	5	$762,312	42	$2,668,091
Crew # 3	7	7.5	$55.89	5	$762,312	42	$2,668,091
Crew # 4	7	7.5	$55.89	5	$762,312	42	$2,668,091
				Total	$3,049,247	Total	$10,672,363
Support Staff							
Description	FTE	$/Hr	Months	Man Hours	Project Cost - $/Year	Project Duration- Months	Cost to Project
Manager	4	$71.35	12	7400	$2,111,960.00	42	$7,391,860.00
Engineer	4.5	$71.35	12	8325	$2,672,949.38	42	$9,355,322.81
Professional	4	$71.35	12	7400	$2,111,960.00	42	$7,391,860.00
Technicians	3.5	$55.81	12	6475	$1,264,794.13	42	$4,426,779.44
Clerks	1.5	$33.51	12	2775	$139,485.38	42	$488,198.81
Crafts	2	$55.89	12	3700	$413,586.00	42	$1,447,551.00
				Total	$8,714,734.88	Total	$30,501,572.06

Table 2 Basis For Initial Costs

ILAW Interim Storage Facility Alternatives							
Alternative	Estimate Sub Total	Escalation % (Total)	Sub Total	Contingency % (Total)	Sub Total	Site Allocation	Total Dollars
Grout Vaults [1]	$19,938,815	9.60 ($1,914,315)	$21,853,130	21 ($4,532,764)	$26,385,894	$6,954,471	$33,340,365
Grout Vaults [2]	$19,938,815	0	$19,938,815	21 ($4,134,770)	$24,073,585	$6,348,485	$30,422,070
Mixed Waste Vault [3]	$17,057,636	14.86 $2,534,764	$19,592,400	30 ($5,806,716)	$25,399,116		$25,399,116
Mixed Waste Vault [4]	$20,101,000	0	$20,101,000	30 ($5,968,482)	$26,069,402	$4,814,163	$30,883,645
Infrastructure [5]	$8,926,059	14.86 ($1,326,412)	$10,252,471	28 ($2,905,670)	$13,158,142	$1,539,990	$14,698,132
Infrastructure [6]	$10,532,679	0	$10,532,679	29 ($3,011,735)	$13,544,415	$2,061,740	$15,606,156

Notes:

1. Cost estimate was taken from the Conceptual Design Report (CDR) for Immobilized Low-Activity Waste Interim Storage Facility Project (Phase 1) Project W-465.
2. Cost estimate from CDR was modified by deleting escalation. Costs are in 1997 dollars.
3. Cost estimate was taken from Analysis of Alternatives for Immobilized Low-Activity Waste Disposal, HNF-SD-TWR-AGA-004, Rev. 0.
4. Cost estimate from AGA was modified as follows: a) escalation deleted, b) costs are in 1997 dollars, c) additional costs of Definitive Design (10% of construction costs), Title III (5% of construction costs), and Project Management (3% of construction costs) were included.
5. Cost estimate was taken from Analysis of Alternatives for Immobilized Low-Activity Waste Disposal, HNF-SD-TWR-AGA-004, Rev. 0.
6. Cost estimate from AGA was modified as follows: a) escalation deleted, b) costs are in 1997 dollars, c) additional costs of Definitive Design (10% of construction costs), Title III (5% of construction costs), and Project Management (3% of construction costs) were included.

Comparative Present-Value Costs of Alternative Projects
(Shown in Ascending Order of Initial Cost, * = Lowest LCC)

Project Alternative	LCC Filename	Initial Cost (PV)	Life Cycle Cost (PV)
Grout Vaults	GROUT	$30,420,000	$65,971,960*
RHMW Fac	RHMW	$46,500,000	$82,014,144

```
*******************************************************************************
*     N I S T  B L C C:  I N P U T  D A T A  L I S T I N G (ver. 4.5-97 )   *
*******************************************************************************

FILE NAME: GROUT
FILE LAST MODIFIED ON 12-01-1997/15:50:15
PROJECT NAME: ILAW Interim Storage Facility W-465
PROJECT ALTERNATIVE: Grout Vaults
COMMENT: Modify Grout Vaults - Phase 1

GENERAL DATA:
-------------
ANALYSIS TYPE: Federal Analysis--Projects Subject to OMB A-94
BASE DATE FOR LCC ANALYSIS: APR 1997
STUDY PERIOD:  3 YEARS, 6 MONTHS
SERVICE DATE:   APR 1997
DISCOUNT AND INTEREST RATES ARE Real (exclusive of general inflation)
DISCOUNT RATE:  7.0%
Mid-year discounting convention
Escalation rates do not include general inflation

CAPITAL ASSET COST DATA:
------------------------
INITIAL COST (BASE YEAR $)          30420000
EXPECTED ASSET LIFE (YRS/MTHS)          50/0
RESALE VALUE FACTOR                    0.00%
AVG PRICE ESC RATE(SERVICE PD.)        0.00%
NUMBER OF REPLACEMENTS                     0

NO REPLACEMENTS


OPERATING, MAINTENANCE, AND REPAIR COST DATA:
---------------------------------------------
ANNUAL RECUR OM&R COST ($):        0
ESCALATION RATE FOR OM&R:      0.00%

NON-AN RECURRING OM&R COSTS (YRS/MTHS FROM SERVICE DATE; COST IN BASE YEAR $)
 Y/M    COST
 1/0   %3049247
 1/0   %8714734
 2/0   %3049247
 2/0   %8714734
 3/0   %3049247
 3/0   %8714734
 3/6   %1524624
 3/6   %4357367

ENERGY-RELATED DATA:
--------------------
NUMBER OF ENERGY TYPES = 1
DOE energy price escalation rates filename: ENCOST7A
DOE region (state code): 4 (WA)
DOE rate schedule type: Industrial
Underlying gen. inflation rate used with DOE rates:  0.00%

                                    (A)
ENERGY TYPE:                    Electricity
BASE ANNUAL CONSUMPTION:          262800
```

```
*****************************************************************************
*     N I S T  B L C C:  I N P U T  D A T A  L I S T I N G (ver. 4.5-97 )   *
*****************************************************************************

FILE NAME: RHMW
FILE LAST MODIFIED ON 01-27-1998/08:12:19
PROJECT NAME: ILAW Interim Storage Facility W-465
PROJECT ALTERNATIVE: RHMW Fac
COMMENT: Remote Handled Mixed Waste Disposal Facility Ph 1

GENERAL DATA:
-------------
ANALYSIS TYPE: Federal Analysis--Projects Subject to OMB A-94
BASE DATE FOR LCC ANALYSIS: APR 1997
STUDY PERIOD:  3 YEARS, 6 MONTHS
SERVICE DATE:   APR 1997
DISCOUNT AND INTEREST RATES ARE Real (exclusive of general inflation)
DISCOUNT RATE:  7.0%
Mid-year discounting convention
Escalation rates do not include general inflation

CAPITAL ASSET COST DATA:
------------------------
INITIAL COST (BASE YEAR $)          46500000
EXPECTED ASSET LIFE (YRS/MTHS)          50/0
RESALE VALUE FACTOR                    0.00%
AVG PRICE ESC RATE(SERVICE PD.)        0.00%
NUMBER OF REPLACEMENTS                     0

NO REPLACEMENTS


OPERATING, MAINTENANCE, AND REPAIR COST DATA:
---------------------------------------------
ANNUAL RECUR OM&R COST ($):        0
ESCALATION RATE FOR OM&R:      0.00%

NON-AN RECURRING OM&R COSTS (YRS/MTHS FROM SERVICE DATE; COST IN BASE YEAR $):
 Y/M   COST
 1/0  %3049247
 1/0  %8714734
 2/0  %3049247
 2/0  %8714734
 3/0  %3049247
 3/0  %8714734
 3/6  %1524624
 3/6  %4357367

ENERGY-RELATED DATA:
--------------------
NUMBER OF ENERGY TYPES = 1
DOE energy price escalation rates filename: ENCOST7A
DOE region (state code): 4 (WA)
DOE rate schedule type: Industrial
Underlying gen. inflation rate used with DOE rates:  0.00%

                                  (A)
ENERGY TYPE:                 Electricity
BASE ANNUAL CONSUMPTION:           0
UNITS:                           kWh
```

UNITS:	kWh
PRICE PER UNIT ($):	0.046
ANNUAL DEMAND CHARGE ($):	0.00
ESCALATION RATE METHOD:	DOE rates

1997	0.53
1998	0.99
1999	-1.11
2000	-1.19
2001	-0.87

APPENDIX I

PHYSICALLY HANDICAPPED ASSESSMENT

The vaults will be operated by remote handling equipment and will have no personnel entry, with the exception of the entry/maintenance bay, where the transport truck/trailers enter with the shipping casks, under a metal building enclosure in the front of each vault. Therefore, physically handicapped considerations do not apply.

During definitive design, the control room and change/locker room shall be evaluated for physically handicapped access.

APPENDIX J

PLANT FORCES WORK REVIEW

(Provided by the Performance Contractor)

F D H	Fluor Daniel Hanford, Inc. P.O. Box 1000, Richland, WA 99352-1000 **PLANT FORCES WORK REVIEW**	Plant Forces Work Review No. FDH-263-97	Date 11/21/97	Page 1 of 5

Title	JCS Work Pkg or Project No.	Area	Bldg. No.
ILAW INTERIM STORAGE FACILITY	W-465	200E	218-E-16

REQUESTER

Estimated Cost of Work:

*1.	Procured Material/Equipment	$ 7.M
*2.	Materials/Equipment Purchased for Shop Fabrication	$ 0
*3.	Job-Site Material	$ 1.M
4.	Shop Labor	$ 0
5.	Job-Site Labor	$ 13.2M
6.	Other Costs (design, field inspection, and contingency allowance)	$ 7.0M
7.	General Overhead (Labor Only)	$ 2.8M
	*Include estimated fair value of material or equipment acquired on site — Total Job	$ 31.0M

Requester's Name and Phone No. William W. Pickett, 372-1151 Date 11/11/97

FDH

Reviewed By:

Area Work Review Agent: John E. Allison Date 11/20/97

Company Work Review Agent: *Gary Maxwell* Date *12/9/97*

DOE

The following determination has been made regarding applicability of the Davis-Bacon Act, as amended, to the work described above:

Applicable	Not Applicable		
[XX]	[ ]	Chairman RL-Labor Standards Board: *Original signed by Dominic Sansotta*	Date *12/11/97*
Construction	Plant Forces		

"Description of Work"

Briefly state the reason for this work activity:

This project will provide the transporters and modify a facility for the interim storage of the Immobilized Low-Activity Waste (ILAW) produced by DOE's private vendor.

Job summary:

Project W-465 will require the procurement/fabrication/certification of a transporter and the modification of four existing grout vaults for ILAW storage/disposal. Modifications include removal of existing vault roofs, placement of four new enclosure buildings, and installation of four gantry cranes.

Discuss all programmatic or physically associated work planned, underway, or recently completed in the work area:

No programmatic or physically associated work is planned, underway, or recently completed in the work area.

Describe entire work scope. Fully describe complete job scope using a stepped work flow format. Describe and estimate the cost of labor and material on foundations, structures, utility systems, or other construction type activity. Provide sketches or measurements for all work:

See sketches in attachment A.

1) Capital Procurements:
   - Four 15 ton gantry cranes with a 50' span, 45' lift height, and Closed Circuit TV dedicated cameras.
   - Two 400hp tractors and transport vehicles with a gross weight limitation of 45,000 kg.

F D H	Fluor Daniel Hanford, Inc. P.O. Box 1000, Richland, WA 99352-1000 PLANT FORCES WORK REVIEW Continued	Plant Forces Work Review No. FDH-263-97	Page 2 of 5

2) Excavate approximately 14,600 CY of fill from around each existing vault.

3) Remove 5,364 CY of asphalt from the top and ends of each vault to expose thirty two vault cover blocks for removal.

4) Lay approximately 1,800 LF of new asphalt paved roadway, build new shielding berm from 11,000 CY of fill material, and install 2,250LF of new fence.

5) Install 2,720 LF of new concrete footings.

6) Install 2,010 LF of 12" PVC pipe for a water line to support the fire system.

7) Extend existing vault end and side walls 6' with 767 CY of additional concrete.

8) Pour 1,620 CY of new concrete for a new slab and truck apron in front of vaults.

9) Erect four 200'lg x 70'w metal pre-engineered vault enclosure buildings with a 20' eave height. The structure consists of rigid frames spaced on 20' centers.

10) Excavate 2,100 LF of trenching and install PVC conduit with #8 & #10 THHN wire.

11) Install seventeen manholes (hot boxes) and seventeen steel street lights.

12) Install four 1½ ton wall mounted Air Conditioning units.

13) Install four 1 KW heaters and four 1½ KW heaters.

14) Install four 7,000 cfm, 5 HP exhaust units.

15) Install 5,100' x ½" EMT w/ #10 THHN conductors.

16) Install thirty six 400 watt metal halide light fixtures.

17) Stabilize disturbed construction areas with hydro seed and crushed gravel.

SKETCHES ON FILE IN THE DAVIS-BACON OFFICE

F D H	Fluor Daniel Hanford, Inc. P.O. Box 1000, Richland, WA 99352-1000 **PLANT FORCES WORK REVIEW Continued**	Plant Forces Work Review No. FDH-263-97	Page 4 of 5

SKETCHES ON FILE IN THE DAVIS-BACON OFFICE

F D H	Fluor Daniel Hanford, Inc. P.O. Box 1000, Richland, WA 99352-1000 PLANT FORCES WORK REVIEW Continued	Plant Forces Work Review No. FDH-263-97	Page 5 of 5

SKETCHES ON FILE IN THE DAVIS-BACON OFFICE

APPENDIX K

COMPLIANCE MATRIX

FLUOR DANIEL NORTHWEST, INC.

P. O. Box 1050
1100 Jadwin
Richland, Washington 99352-1050

December 2, 1997

NHC-C-97-0005
CO-98-TWRS-066

Mr. K. C. Burgard
Numatec Hanford Corporation
P.O. Box 1300
Richland, Washington 99352-1300

Dear Mr. Burgard:

COMPLETION OF W-465 CONCEPTUAL DESIGN REVIEW LEVEL, COMPLIANCE MATRIX

Response Requested By: N/A

Responds To: N/A

This letter transmits the completion of the Design Review Documentation compliance matrix (see attached). The attachment includes a preamble which identified exclusions, recommendations, and explanations which focus on the need to revisit this matrix during definitive design.

If you have any questions, please contact me at 376-9871 or J. L. Ruud at 376-3207.

Sincerely,

J. L. Henderson
Project Manager

JHL:JLR:dfm

Attachments (2)

CORRESPONDENCE DISTRIBUTION COVERSHEET

Author	Addressee	Correspondence
J. L. Ruud	K. C. Burgard	CO-98-TWRS-066

Subject: COMPLETION OF W-465 CONCEPTUAL DESIGN REVIEW LEVEL COMPLIANCE MATRIX

INTERNAL DISTRIBUTION

Name	Location	w/att
K. J. Dempsey	G3-12	
J. L. Henderson	G3-14	X
J. L. Ruud	G3-14	X
J. W. Viita	B4-57	X
NHC Project Files	B4-57	X

Compliance Matrix - Project W-465

Discipline Check Review

(Note: Reviewed for consistency, accuracy, and identification of necessary waivers.)

M. A. Haq, Civil/Structural

P. D. Rice, HVAC

C. D. Eggen, Fire Protection

M. L. Alexander, Electrical

J. R. Collins, Mechanical

W. D. Lindholm, Architecture

T. C. Oten, TWRS Division Eng. Mgr.

(For consistency with TWRS compliance matrix)

R. L. Newell, Environmental

J. L. Ruud, Project Manager

(For overall consistency)

Preamble to Project W-465 Engineer/Constructor Requirements Matrix

The attached Project W-465 Engineer/Constructor Requirements Matrix lists the various requirements imposed on Project W-465 through written direction from Numatec Hanford Company (NHC). These requirements include specific citations from the Code of Federal Regulations (CFR); United States Code (USC); Washington Administrative Code (WAC); U.S. Department of Energy (DOE) orders, directives, and standards; national codes and standards; and site-specific documents. The matrix identifies those requirements that directly apply to the FDNW work scope (i.e., engineer-constructor [E-C] work), as opposed to those requirements that are primarily the responsibility of the operating contractor (OC).

The following documents were reviewed for applicable requirements: 1) the Project W-465 Design Requirements Document (DRD)/Functional Design Criteria (FDC); 2) the site-wide Standards/Requirements Identification Document (SRID); 3) the tank farm-specific SRID; and 4) the Fluor Daniel Hanford (FDH) contract. The contract does not directly apply because the SRID requirements take precedence. The contract was included for overlay purposes only and for the identification of potential requirements/opportunities not covered elsewhere. Where appropriate, the matrix identifies existing FDNW implementing practices and waivers to specific requirements that either already exist or need to be obtained (to account for discrepancies in requirements from two or more sources).

As complete as the attached matrix is, it is important to note sources of potential requirements that are not listed because they were not identified as applicable in the controlling documents. The following represent further opportunities for the customer to pinpoint the design, construction, and operating requirements for Project W-465:

- Safety Analysis Review (SAR) document.
- Basis of Interim Operations (BIO) document.
- Lockhead Martin Hanford (LMH) and Numatec Hanford Company (NHC) procedures.
- Lessons learned, commitments to audits, assessments, etc.
- Washington State Department of Ecology (WDOE) permits and other regulatory agreements (e.g., Hanford Site Air Operating Permit (AOP), Resource Conservation and Recovery Act [RCRA] Part B Permit for dangerous waste management, Tri-Party Agreement [TPA]).

In addition, DOE Order 6430.1A contains approximately 2,500 "shall" statements and 10 to 14 thousand reference documents. FDNW was not budgeted to do a detailed matrix on the full applicability of this order to Project W-465. The degree of compliance to DOE Order 6430.1A for E-C scope will be determined based upon a FDNW 6430.1A checklist that will be filled out during definitive design and approved by the customer. However without a detailed review of 6430.1A requirements, the project may be faced with conflicting requirements. For example, the DRD/FDC invokes all of DOE Order 6430.1A, while the SRIDs reduce its applicability.

Several other issues need to be addressed as they related to the attached Project W-465 requirements matrix. Many of the documents reviewed are outdated and, as such, still mandate outdated requirements and canceled or superseded DOE orders. FDNW is aware that there is an agreement between FDH and the other prime contractors that apparently allows for the automatic usage of the most recent version/revision of DOE orders. However, no such agreement exists with FDNW, and LMH and NHC need to provide the appropriate direction down the contractor chain if the intent is for FDNW to automatically adopt the most recent requirements. Otherwise, FDNW cannot on its own initiative delete superseded or canceled orders from the DRD/FDC and SRIDS and automatically replace these with the most recent editions. If the intent is for FDNW to comply with all orders and requirements referenced in the DRD/FDC and SRIDs (even those that have been canceled or superseded), then FDNW needs to be funded to maintain a project library to ensure the availability of requirements that may otherwise not be available. Currently, FDNW does not have access to all of the obsolete standards that are being imposed. The customer will have to provide copies to FDNW for use in the project library.

There is also an additional consideration related to the apparent mandated use of Project B-714 criteria on this job. This may impose certain criteria and requirements on Project W-465 that otherwise would not apply. As design progresses, other criteria may be imposed on the job through mandatory reliance on Project B-714 criteria. As yet, FDNW has not been assigned the responsibility of evaluating the existing documents of Project B-714 to determine which ones to use on Project W-465.

FDNW has identified requirements based upon written direction from its customer. However, in past discussion with various lawyers, there is some confusion associated with the use of code of federal regulations (CFRs), public laws, Washington Administrative Code (WAC) requirements, and executive orders (EOs). These requirements are almost always applicable to DOE, are "self-deleting", and to an unknown degree, require some form of passage to the contractor ("self-deleting" means that they are either applicable or not applicable). An E-C contractor like FDNW can only deal with those requirements specifically spelled out in its contract, DRD/FDC, SRIDS, etc.

In developing this requirements matrix, FDNW complied with a statement contained in the contract (NHC-C-97-0005) which says that "upon approval of an SRID, that set of requirements (i.e., from the SRIDs) is the applicable directive/requirements set applicable to a facility, work activity, or project and supersedes this list (i.e., those in the contract) of applicable directives." This leaves many CFRs, WAC standards, public laws, EOs, and DOE orders that potentially apply to the project W-465 scope of work, but since they were not included on the SRIDS, are not listed as applicable requirements on this requirements matrix. For example, WAC 51.30 mandates full compliance with the Uniform Building Code (UBC); 48 CFR 10X and 48 CFR 970 contain requirements to be used in contracts providing for contractor management of a DOE-owned or DOE controlled facilities; EO 12902 provides requirements for energy efficiency and water conservation at Federal facilities; and DOE Order 420.1 imposes new seismic criteria. In addition, the new HNF series of Hanford site procedures are not listed as applicable requirements even though they potentially impose many new requirements affecting design. For example,

HNF-PRO-097 replaces Standard GC-LOAD-01 and DOE-RL-HPS-SDC-4.1 in providing standard design load criteria. However, before this new standard can be applied it needs to be evaluated for design criteria variations because it is significantly different from the standards it replaces. Also, SDC-1.3, the site's drawing standard, has been replaced by HNF-PRO-709 through 713.

Finally, although many of the requirements on the matrix have been identified as being part of the E-C scope of work, this presupposes that appropriate funding will be provided by the OC, as appropriate.

Project W-465 Engineer/Constructor Requirements Matrix

Requirement	Title	BIO	DRD/ FDC	T-Farm SRID	Site SRID	CON	Resp.	Waivers	PROC (E-C only)	Comments
KEY:										
BIO	Basis of Interim Operations Document									
DRD	Design Requirements Document									
FDC	Functional Design Criteria									
SRID	Standards/Requirements Identification Document									
CON	FDH Contract									
Resp.	Responsibility -- OC (Operating Contractor or Integrating Contractor), E-C (Engineer-Constructor Contractor)									
PROC	FDNW Implementing Practice									
*	see comments column									
10 CFR 1021	National Environmental Policy Implementation Procedures						na			
10 CFR 1021.200	NEPA						na			
10 CFR 1021.211	Limitations on the NEPA Process					Yes	OC			
10 CFR 1021.300	EIS, EA Process					Yes	OC			NEPA is primarily a DOE/OC responsibility. FDNW involvement is limited and is per OC assignment
10 CFR 1021.321	Environmental Assessments					Yes	OC			DOE/OC responsibility
10 CFR 1021.400	NEPA Review Process					Yes	OC/E-C*		134.230.1105	on assignment basis only
10 CFR 1021.410	Categorical Exclusions					Yes	OC/E-C*		134.230.1105	on assignment basis only
10 CFR 1046	Protective Force Personnel				Yes		OC			
10 CFR 1047	Use of Physical Force when Making an Arrest				Yes		OC			
10 CFR 1926	Safety and Health Regulations for Construction		Yes				OC/E-C			
10 CFR 20	Standards for Protection Against Radiation						na			
10 CFR 40.13							na			
10 CFR 435	Energy Conservation Voluntary Performance Standards for New Buildings; Mandatory for Federal Buildings						na			ELR by E-C in DD, not CDR
10 CFR 436	Federal Energy Management and Planning Programs - Subpart A - Methodology and Procedures for Life Cycle Cost Analysis						na			LCCA by E-C
10 CFR 50	Domestic Licensing of Production and Utilization Facilities						na			
10 CFR 60							na			
10 CFR 61	Licensing Requirements for Land Disposal of Radioactive Waste		Yes				OC			OC responsibility -- FDNW does not directly dispose of any waste
10 CFR 708	DOE Contractor Employee Protection Program				Yes		OC/E-C			
10 CFR 71	Packaging and Transportaton of Radioactive Materials				Yes	Yes	OC			transportation is OC responsibility

Note: Many of the Orders on this matrix have been cancelled by DOE.
Numerous requirements are not standard. Compliance costs will need to be evaluated.

Project W-465 Engineer/Constructor Requirements Matrix

Requirement	Title	BIO	DRD/ FDC	T-Farm SRID	Site SRID	CON	Resp.	Waivers	PROC (E-C only)	Comments
10 CFR 72	Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste						na			
10 CFR 75.1							na			
10 CFR 830	Nuclear Safety Management, Subpart A, General Provisions, Section 830.120, "Quality Assurance Requirement"		Yes	Yes	Yes	Yes	OC/E-C*		134.000.301	part 120 only, per FDNW QAP
10 CFR 835	Occupational Radiation Protection		Yes	Yes	Yes	Yes	OC/E-C*		134.653.3100 134.653.3103 HSRCM-1 CESH 32	as directed by OC - see backup for applicable sections
10 CFR 961							na			
29 CFR 1904	Recording and Reporting of Occupational Injury and Illness				Yes	Yes	OC/E-C		134.563.1201	
29 CFR 1910	Occupational Safety and Health Standards		Yes	Yes	Yes	Yes	OC/E-C*		FDNW IS&H Manual	as reflected in FDNW IS&H manual
29 CFR 1915	Safety and Health						na			
29 CFR 1918	Safety and Health						na			
29 CFR 1919.119	Process Safety Management of Highly Hazardous Chemicals			Yes			OC/E-C			
29 CFR 1926	Safety and Health Regulations for Construction					Yes	OC/E-C*	required	FDNW IS&H Manual	conflict in requirement for design of stairs between 29 CFR 1926 and DOE 6430.1A - FDNW will follow more restrictive requirements of DOE 6430.1A - see backup for applicable sections
29 CFR 1928	Safety and Health						na			
29 USC 651, et. seq.							na			
29 USC 655, et. seq.	Occupational Safety and Health Act of 1970						na			
36 CFR 1220	Federal Records Management				Yes		OC			
36 CFR 1222	Federal Records Management				Yes		OC			
36 CFR 1228	Federal Records Management				Yes		OC			
36 CFR 1230	Federal Records Management				Yes		OC			
36 CFR 1232	Federal Records Management				Yes		OC			
36 CFR 1234	Federal Records Management				Yes		OC			
36 CFR 1236	Federal Records Management				Yes		OC			

Note: Many of the Orders on this matrix have been cancelled by DOE.
Numerous requirements are not standard. Compliance costs will need to be evaluated.

Project W-465 Engineer/Constructor Requirements Matrix

Requirement	Title	BIO	DRD/ FDC	T-Farm SRID	Site SRID	CON	Resp.	Waivers	PROC (E-C only)	Comments
40 CFR 122	National Pollution Discharge Elimination System				Yes	Yes	OC/E-C*		134.230.1155	as directed by OC - OC is permit holder - applies to facilities with discharge permits
40 CFR 129.4,5	Pollutants					Yes	OC/E-C		134.230.1150	addresses time for compliance and enforcement actions
40 CFR 129.8	Compliance Date						na			
40 CFR 1500-1508	Regulations for Implementing the Procedural Provisions of NEPA						na			
40 CFR 1500.2	Council on Environmental Quality Policy			Yes			OC			NEPA is DOE/OC responsibility
40 CFR 1501.2,4,5,6	Application NEPA			Yes		Yes	OC			
40 CFR 1505.2	NEPA and Agency Decision Making: Record of Decision and Cases Requiring Environmental Statements			Yes			OC			
40 CFR 1506.1,2,9,10	Actions During NEPA Process			Yes		Yes	OC			
40 CFR 1508.4	NEPA Actions					Yes	OC			
40 CFR 1508.9	Environmental Assessments					Yes	OC			
40 CFR 172.600	Applicability and General Requirements: Emergency Response Information			Yes	Yes		OC/E-C*		134.230.1135	as directed by OC
40 CFR 191	Radiation Dose Regulations					Yes	OC			
40 CFR 261						Yes	OC			
40 CFR 262	Standards Applicable to Generators		Yes	Yes		Yes	OC/E-C*		134.230.111	Part II (a) through (d) only - FDNW responsibility as generator needs to be negotiated with OC
40 CFR 264	Standards for Owners and Operators of Hazardous Waste TSD Facilities		Yes	Yes	Yes		OC			part 264 applies to owners/operators of TSDs - not generators
40 CFR 265	Interim Status TSD Facility Standards			Yes			OC			
40 CFR 265.65	Emergency Procedures			Yes			OC/E-C*			as directed by OC
40 CFR 268.40	Waste (Restricted)			Yes		Yes	OC/E-C*		134.230.1110 134.230.1111 134.230.1130 124.230.1145	as directed by OC
40 CFR 268.7	Land Disposal Restrictions: Waste Analysis and Recordkeeping			Yes		Yes	OC			
40 CFR 268.9	Land Disposal Restrictions: Special Rules Regarding Wastes that Exhibit a Characteristic			Yes			OC/E-C*		134.230.1110	part 9 (a) only

Note: Many of the Orders on this matrix have been cancelled by DOE.
Numerous requirements are not standard. Compliance costs will need to be evaluated.

Project W-465 Engineer/Constructor Requirements Matrix

Requirement	Title	BIO	DRD/ FDC	T-Farm SRID	Site SRID	CON	Resp.	Waivers	PROC (E-C only)	Comments
40 CFR 279.10	Used Oil			Yes		Yes	OC/E-C*		134.230.1113 134.230.1170	as directed by OC
40 CFR 279.21	Hazardous Waste Mixing			Yes		Yes	OC/E-C*		134.230.1113 134.230.1170	as directed by OC
40 CFR 279.22	Used Oil Storage			Yes		Yes	OC/E-C*		134.230.1113 134.230.1170	as directed by OC
40 CFR 279.81	Disposal			Yes		Yes	OC/E-C*		134.230.1113	as directed by OC
40 CFR 302	Designation, Reportable Quantities, and Notification Requirements for Hazardous Substances under CERCLA				Yes		OC			OC makes all notifications
40 CFR 355.30	Emergency Planning and Notification			Yes	Yes		OC			OC makes all notifications
40 CFR 355.40	Emergency Release Notification			Yes		Yes	OC			FDNW provides input to OC notification process - as directed by OC
40 CFR 370	Hazardous Chemical Reporting: Community Right-To-Know				Yes		OC/E-C*		134.230.1175	as directed by OC
40 CFR 372	Toxic Chemical Release: Community Right-To-Know				Yes		OC/E-C*		134.230.1175	as directed by OC
40 CFR 50	EPA Regulations on National Primary and Secondary Air Quality Standards		Yes				OC/E-C		134.230.1145	
40 CFR 50.4-50.9			Yes				OC			
40 CFR 52	Approval and Promulgation of Implementation Plans		Yes				OC			
40 CFR 52.21			Yes				OC			
40 CFR 61	National Emission Standards for Hazardous Air Pollutants		Yes	Yes			OC/E-C*		134.230.1145	see specific sections addressed below - more restrictive than WAC 246-247 (dose driver)
40 CFR 61.14	Records Management: Owner		Yes	Yes		Yes	OC			owner/operator recordkeeping requirements
40 CFR 61.145	National Emission Standard for Asbestos			Yes			na			job scope will not involve any removal of asbestos - process outlined in FDH procedure HNF-PRO-450
40 CFR 61.150	Discharging Regulations (Asbestos)		Yes	Yes		Yes	na			job scope will not involve any rmoval of asbestos
40 CFR 61.9	Construction Startup		Yes	Yes		Yes	OC/E-C*		134.230.1145	primarily OC responsibility – FDNW needs to be directed by OC through appropriate channels
40 CFR 61.92	National Emission Standard for Emissions of Radionuclides other than Radon from DOE Facilities			Yes			OC			

Note: Many of the Orders on this matrix have been cancelled by DOE.
Numerous requirements are not standard. Compliance costs will need to be evaluated.

Project W-465 Engineer/Constructor Requirements Matrix

Requirement	Title	BIO	DRD/ FDC	T-Farm SRID	Site SRID	CON	Resp.	Waivers	PROC (E-C only)	Comments
40 CFR 61.93	National Emission Standard for Emissions of Radionuclides other than Radon from DOE Facilities: Emission Monitoring and Test Procedures			Yes			OC			OC responsible for monitoring and test procedures
40 CFR 61.94	Compliance Reporting		Yes		Yes	Yes	OC			addresses owner/operator reporting requirements
40 CFR 61.94	National Emission Standard for Emissions of Radionuclides other than Radon from DOE Facilities: Compliance and Reporting			Yes		Yes	OC			
40 CFR 61.95	Recordkeeping Requirements		Yes	Yes		Yes	OC			facility recordkeeping requirements
40 CFR 61.96	Construction/Modification Applications		Yes			Yes	OC/E-C*		134.230.1145	primarily OC responsibility - FDNW involvement by assignment
40 CFR 761.180	PCBs Manufacturing, Processing, Distribution in Commerce: General Records and Reports			Yes			OC			
40 CFR 761.40	Waste Labeling (PCBs)			Yes		Yes	OC/E-C*		134.230.1135	as directed by OC
40 CFR 761.45	Marking Requirements			Yes		Yes	OC/E-C*		134.230.1135	as directed by OC
40 CFR 761.60	Disposal (PCBs)			Yes			OC			OC responsbible for disposal
40 CFR 761.65	Storage (Marking)			Yes		Yes	OC/E-C*		124.230.1130	as directed by OC
40 CFR 761.79	PCB Waste			Yes		Yes	OC/E-C*		134.230.1125 134.230.1135	as directed by OC
41 CFR 201	Rules of Practice and Procedure				Yes		OC			
42 USC 13106.6607	Source Reduction and Recycling Data Collection			Yes	Yes	Yes	OC/E-C*		134.230.1170	section 6602 (b) only
42 USC 2210	Price-Anderson Amendments Act of 1988						na			
42 USC 4321, et. seq.	National Environmental Policy Act of 1969						na			
42 USC 6901, et. seq.	Resource Conservation and Recovery Act of 1976						na			
42 USC 7671	Air Quality					Yes	OC			
44 USC 3101	Public Printing and Documents				Yes		OC			
44 USC 3105	Public Printing and Documents				Yes		OC			
44 USC 3309	Public Printing and Procedures				Yes		OC			
44 USC 3312	Public Printing and Documents				Yes		OC			
44 USC 3506	Public Printing and Documents				Yes		OC			
49 CFR 107.502	General Registration Requirements (Cargo Tanks)				Yes		OC/E-C		134.230.1135	FDNW does not operate cargo tanks
49 CFR 107.608	General Registration Requirements				Yes		OC/E-C		134.230.1135	registration required only for transporters

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Numerous requirements are not standard. Compliance costs will need to be evaluated.

Project W-465 Engineer/Constructor Requirements Matrix

Requirement	Title	BIO	DRD/ FDC	T-Farm SRID	Site SRID	CON	Resp.	Waivers	PROC (E-C only)	Comments
49 CFR 107.620	Recordkeeping Requirements			Yes			OC			FDNW responsibility limited
49 CFR 171.11	Use of ICAO Technical Instructions				Yes		OC			
49 CFR 171.12	Import and Export Shipments				Yes		OC/E-C*		134.230.1135	paragraph (a) only
49 CFR 171.2	General Requirements				Yes		OC/E-C*		134.230.1135	as directed by OC
49 CFR 171.3	Hazardous Waste				Yes	Yes	OC/E-C*		134.230.1111 134.230.1135	as directed by OC
49 CFR 171.97	Advanced Notification of Shipment of Nuclear Wastes					Yes	OC			FDNW does not ship nuclear waste
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Material Communications, Emergency Response Information, and Training Requirements			Yes	Yes		OC/E-C*		134.230.1135	see specific sections listed below
49 CFR 172.101	Proper Shipping Name			Yes		Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 172.200	Applicability			Yes		Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 172.201	General Entries (Packaging)			Yes		Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 172.202	Description of Hazardous Materials on Shipping Papers			Yes		Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 172.203	Additional Description Requirements			Yes		Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 172.203 (f)	Transportation by Air						na			
49 CFR 172.203 (j)	Dangerous When Wet Material Transportation						na			
49 CFR 172.203 (m)	Poisonous by Inhalation Transportation					Yes	OC			FDNW does not transport
49 CFR 172.204	Shipper's Certification			Yes			OC/E-C*		134.230.1135	as directed by OC
49 CFR 172.205	Hazardous Waste Manifest			Yes			OC			prepared by OC
49 CFR 172.300	Applicability			Yes	Yes		OC/E-C*		134.230.1135	as directed by OC
49 CFR 172.301	Marking Nonbulk Packaging		Yes	Yes	Yes	Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 172.302	Marking Bulk Packaging		Yes				OC/E-C*		134.230.1135	as directed by OC
49 CFR 172.303	Prohibited Marking			Yes	Yes		OC/E-C*		134.230.1135	as directed by OC
49 CFR 172.304	Marking Requirements		Yes	Yes	Yes	Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 172.310	Radioactive Material Marking		Yes	Yes	Yes	Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 172.312	Liquid Hazardous Material Marking			Yes		Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 172.313	Poisonous Hazardous Material Marking			Yes		Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 172.324	Hazardous Substances in Nonbulk Packages (Marking)					Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 172.326	Portable Tanks (Marking)					Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 172.328	Cargo Tanks (Marking)					Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 172.332	Identification Number Marking			Yes			OC/E-C*		134.230.1135	as directed by OC
49 CFR 172.334	Identification Numbers: Prohibited Display			Yes			OC/E-C*		134.230.1135	as directed by OC
49 CFR 172.336	Identification Numbers: Special Provisions			Yes			OC/E-C*		134.230.1135	as directed by OC
49 CFR 172.338	Placement of Identification Numbers			Yes			OC/E-C*		134.230.1135	as directed by OC
49 CFR 172.400	General Labeling Requirements			Yes			OC/E-C*		134.230.1135	as directed by OC

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Project W-465 Engineer/Constructor Requirements Matrix

Requirement	Title	BIO	DRD/ FDC	T-Farm SRID	Site SRID	CON	Resp.	Waivers	PROC (E-C only)	Comments
49 CFR 172.401	Prohibited Labeling			Yes			OC/E-C*		134.230.1135	as directed by OC
49 CFR 172.402	Additional Labeling Requirements			Yes		Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 172.403	Radioactive Material Markings			Yes		Yes	OC/E-C*		134.230.1135 134.500.8500	as directed by OC
49 CFR 172.404	Labels for Mixed and Consolidated Packaging			Yes		Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 172.405	Authorized Label Modifications			Yes			OC/E-C*			as directed by OC
49 CFR 172.406	Placement of Labels			Yes		Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 172.407	Label Specifications			Yes			OC/E-C*		134.500.8500	as directed by OC
49 CFR 172.500	Applicability of Placarding Requirements			Yes			OC/E-C*		134.230.1135	as directed by OC
49 CFR 172.502	Prohibited and Permissive Placarding			Yes			OC/E-C*		134.500.8500	as directed by OC
49 CFR 172.504	General Placarding Requirements			Yes		Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 172.505	Placarding for Subsidiary Material			Yes		Yes	OC/E-C*		134.230.1135	as directed by OC - FDNW does not transport
49 CFR 172.506	Highway Placarding			Yes		Yes	OC/E-C*		134.230.1135	as directed by OC - FDNW does not transport
49 CFR 172.508	Placarding and Affixing Placards: Rail			Yes			OC			
49 CFR 172.516	Visibility and Display of Placards			Yes			OC			
49 CFR 172.602	Emergency Response			Yes		Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 172.604	Emergency Response Telephone Number			Yes		Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 172.702	Hazmat Training and Qualification					Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 172.704	Hazmat Training Requirements				Yes	Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 173.12	Exceptions for Shipment of Waste Materials			Yes			OC/E-C*		134.230.1135	as directed by OC
49 CFR 173.121	Class 3 Material Packaging					Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 173.125	Class 4 Material Packaging					Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 173.127	Assignment of Packing Groups					Yes	OC			
49 CFR 173.133	Packaging Hazard Zones Division 6.1 Materials					Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 173.137	Assignment of Packing Group					Yes	OC			
49 CFR 173.164	Mercury Transportation					Yes	na			not within project scope
49 CFR 173.173	Packaging Paint, Adhesives & Inc					Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 173.20	Nonbulk Packaging Liquid Hazardous Materials					Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 173.202	Nonbulk Packaging of Liquid Hazardous Materials					Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 173.203	Nonbulk Packaging of Class III Liquids					Yes	OC/E-C*		134.230.1135 134.500.8500	as directed by OC
49 CFR 173.211	Nonbulk Packaging of Solid Hazardous Materials (PG I)					Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 173.212	Nonbulk Packaging of Solid Hazardous Materials (PG II)					Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 173.216	Packaging Asbestos					Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 173.22	Shipper's Responsibility			Yes		Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 173.226	Packaging Materials Poisonous by Inhalation (Hazard Zone A)					Yes	OC/E-C*		134.230.1135	as directed by OC

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Project W-465 Engineer/Constructor Requirements Matrix

Requirement	Title	BIO	DRD/ FDC	T-Farm SRID	Site SRID	CON	Resp.	Waivers	PROC (E-C only)	Comments
49 CFR 173.227	Packaging Materials Poisonous by Inhalation (Hazard Zone B)					Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 173.23	Previously Authorized Packaging					Yes	OC			
49 CFR 173.24	General Requirements for Packaging and Packages				Yes	Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 173.27	General Requirements for Transportation by Aircraft				Yes		OC			FDNW does not transport by air
49 CFR 173.28	Reuse, Recordkeeping and Remanufacture of Packagings			Yes			OC			
49 CFR 173.3	Packaging and Exceptions				Yes	Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 173.32	Damaged Tanks				Yes	Yes	OC			
49 CFR 173.413	Requirements for Type B Packaging		Yes		Yes	Yes	OC			applies to rad only
49 CFR 173.415	Authorized Type A Packages		Yes		Yes		OC			applies to rad only
49 CFR 173.417	Packaging of Fissile Materials				Yes	Yes	na			FDNW does not handle fissile materials
49 CFR 173.419	Packaging Oxidizing Radioactive Materials					Yes				
49 CFR 173.421	Limited Quantity Packaging		Yes	Yes	Yes		OC/E-C*		134.230.1135	as directed by OC
49 CFR 173.422	Exceptions for Instruments and Articles				Yes		OC/E-C*		134.230.1135	as directed by OC
49 CFR 173.424	Excepted Articles Containing Natural Uranium or Thorium				Yes		OC/E-C*		134.230.1135	as directed by OC
49 CFR 173.425	Low Specific Activity Packaging		Yes	Yes	Yes		OC			
49 CFR 173.427	Empty Radioactive Packaging				Yes		OC			na -- applies to rad
49 CFR 173.431	Activity Limits for Type A & B					Yes	OC			na -- applies to rad
49 CFR 173.435	Table of A1 and A2 Values for Radionuclides		Yes			Yes	OC			na -- applies to rad
49 CFR 173.441	Radiation Level Limitations			Yes	Yes	Yes	OC			na -- applies to rad
49 CFR 173.442	Thermal Limitations for Packaging			Yes	Yes	Yes	OC			na -- applies to rad
49 CFR 173.443	Contamination Control			Yes	Yes	Yes	OC			na -- applies to rad
49 CFR 173.448	General Transportation Requirements (radioactive materials)			Yes			OC			na -- applies to rad -- FDNW does not transport
49 CFR 173.455	Classification of Fissile Material Packages				Yes	Yes	OC			na - applies to rad
49 CFR 173.457	Transportation of Fissile Class III				Yes	Yes	OC			na - applies to rad -- FDNW does not transport
49 CFR 173.459	Mixing of Fissile Material Packages				Yes		OC			na -- applies to rad
49 CFR 173.463	Packaging and Shielding - Testing for Integrity				Yes		OC			na -- applies to rad
49 CFR 173.471	Requirements for U.S. NRC Approved Packages		Yes		Yes		OC			na -- applies to rad
49 CFR 173.472	Requirements for Exporting DOT Specification Type B and Fissile Packages				Yes		OC			na -- applies to rad
49 CFR 173.474	Quality Control for Construction of Packaging			Yes			OC			na -- applies to rad
49 CFR 173.475	Quality Control Prior to Each Shipment of Radioactive Materials			Yes		Yes	OC			na -- applies to rad
49 CFR 173.476	Approval of Special Form of Radioactive Material				Yes		OC			na -- applies to rad
49 CFR 173.477	Approval of Export Shipments				Yes		OC			na -- applies to rad

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Project W-465 Engineer/Constructor Requirements Matrix

Requirement	Title	BIO	DRD/ FDC	T-Farm SRID	Site SRID	CON	Resp.	Waivers	PROC (E-C only)	Comments
49 CFR 174	Carriage by Rail				Yes		OC			FDNW does not transport by rail
49 CFR 174.715	Cleanliness of Cars After Use				Yes		OC			FDNW does not transport by rail
49 CFR 177	Carriage by Public Highway				Yes		OC			FDNW does not transport in commerce
49 CFR 177.817	Shipping Papers				Yes		OC			FDNW does not transport in commerce
49 CFR 177.834	Loading and Unloading				Yes		OC/E-C*		134.230.1135	as directed by OC
49 CFR 177.842	Class 7 (radioactive) Materials			Yes			OC			na - applies to rad
49 CFR 177.843	Contamination of Vehicles				Yes		OC			na - applies to rad
49 CFR 177.848	Segregation of Hazardous Materials			Yes	Yes		OC.E-C*		134.230.1135	as directed by OC
49 CFR 262.31	Labeling		Yes			Yes	OC/E-C*		134.230.1135	as directed by OC
49 CFR 262.32	Marking						na			
49 CFR 383.23	Commercial Driver's License				Yes		OC			FDNW does not transport in commerce
49 CFR 385.21	Safety Fitness Procedures: Failure to Report				Yes		OC			FDNW does not transport in commerce
49 CFR 392.2	Driving of Commercial Motor Vehicles: Applicable Operating Rules				Yes		OC			FDNW does not transport in commerce
49 CFR 392.9	Driving of Commercial Motor Vehicles: Safe Loading				Yes		OC			FDNW does not transport in commerce
49 CFR 393.1	Parts and Accessories Necessary for Safe Operation				Yes		OC			FDNW does not transport in commerce
49 CFR 396	Inspection, Repair, and Maintenance				yes		OC			FDNW does not transport in commerce
49 CFR 397.101	Physical Protection for Security						na			
49 CFR 397.101	Transportation of Hazardous Materials; Driving and Parking Rules: Routing of Class 7 (radioactive) Materials				Yes		OC			FDNW does not transport in commerce
49 CFR 71.3	Requirements for License				Yes		OC			FDNW does not transport in commerce
49 CFR 71.97					Yes		OC			reference does not exist
5 USC 552	Public Information				Yes		OC			
54 FR 3904	OSHA: Issuance of Voluntary Guidance			Yes	Yes		OC/E-C			
94 FDB-015, Section A/B	Asbestos Waste			Yes		Yes	na			no asbestos expected to be removed by project
ACGIH 70C	Chemical/Physical Substances			Yes			OC/E-C			
ANSI B30.17	Overhead and Gantry Cranes		Yes				OC/E-C*			design only
ANSI N300-1975 (ANSI 1975)	Design Criteria for Decommissioning of Nuclear Fuel Reprocessing Plants						na			

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Project W-465 Engineer/Constructor Requirements Matrix

Requirement	Title	BIO	DRD/ FDC	T-Farm SRID	Site SRID	CON	Resp.	Waivers	PROC (E-C only)	Comments
ANSI Z88.2	American National Standard for Respiratory Protection				Yes		OC/E-C*			Sections 10.2, 10.4, and 10.5.1 only
ANSI-N300-1975	Design Criteria for Decommissioning of Nuclear Final Reprocessing Plants		Yes				na			
ANSI-Y-14.15	Labeling of Electrical Raceway		Yes				OC/E-C			
ANSI/ACI, 1985 ANSI/ACI 349-85	Code Requirements for Nuclear Safety-Related Concrete Structures						na			
ANSI/ACI, 1994ANSI/AISC N690-94	Specification for the Design. Fabrication, and Erection of Steel Safety-Related Structures for Nuclear Facilities						na			
ANSI/ANS 8.1	Responsibility Requirements for Criticality Safety					Yes	OC			
ANSI/ANS 8.19-84	Nuclear Criticality Safety					Yes	OC			
ANSI/ANS 8.7	Fissile Materials					Yes	OC			
ANSI/ANS-3.2 (1988)	Records		Yes				OC/E-C*			design and construction only
ANSI/ANS-3.2-88 (ANSI/ANS 1988)	Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants						na			
ANSI/ANS-57.1-1992	Design Requirements for Light Water Reactor Fuel Handling System						na			
ANSI/ANS-57.9-1992	Design Criteria for an Independent Spent Fuel Storage Installation (Dry Type)						na			
ANSI/ASHRAE/ IES-90A1980 (ANSI/ASHRAE/IES 1980)	Energy Conservation in New Building Design						na			not applicable to scope
ANSI/ASME B30.2	Overhead and Gantry Cranes		Yes				OC/E-C*			design only
ANSI/ISA (1985)	Graphic Symbols for Process Display		Yes				OC/E-C*			design only
ANSI/ISA (1991)	Instrument Loop Diagrams		Yes				OC/E-C*			design only
ANSI/ISA (1992-r)	Binary Logic Diagrams for Process Operations		Yes				OC/E-C*			design only
ANSI/ISA (1994)	Instrumentation Symbols and Identification		Yes				OC/E-C*			design only
API Standard 650 (API 1993)	Welded Steel Tanks for Oil Storage						na			
ASCE, 1986 ASCE-4-86	Seismic Analysis fo Safety-Related Nuclear Structures and Commentary on Standard Analysis of Safety-Related Nuclear Structures						na			
ASHRAE 52.1-1992 (ASHRAE 1992)	Gravimetric and Dust-Spot Procedures for Testing Air Cleaning Devices Used in General Ventilation for Removing Particulate Matter						na			

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Project W-465 Engineer/Constructor Requirements Matrix

Requirement	Title	BIO	DRD/ FDC	T-Farm SRID	Site SRID	CON	Resp.	Waivers	PROC (E-C only)	Comments
ASHRAE Handbook (ASHRAE 1993)	ASHRAE Handbook - Fundamentals						na			
ASME B30 Series (ASME 1994a)	Miscellaneous Specifications for Cranes, Hoists, and Tools						na			
ASME B30.20-1993	Below-the-Hook Lifting Devices						na			
ASME B31.1-1992 (ASME 1992)	Power Piping						na			
ASME B31.3-1990 (ASME 1990)	Chemical Plant and Petroleum Refinery Piping						na			
ASME N509-1989 (ASME 1989a)	Nuclear Power Plant Air-Cleaning Units and Components						na			confinement not required per OC (DRD)
ASME N510-1989 (ASME 1989b)	Testing of Nuclear Air Treatment Systems						na			
ASME NOG-1-1994-IA (ASME 1989c)	Rules for Construction of Overhead and Gantry Cranes						na			
ASME NQA-1-1994-IA (ASME 1989c)	Quality Assurance Program Requirements for Nuclear Facility Applications		Yes				OC/E-C			
ASME Section III (ASME 1995a)	Boiler and Pressure Vessel Codes, Section VIII, Rules for Construction of Nuclear Power Plant Components						na			
ASME, Section VIII, Div. 1	Boiler and Pressure Vessel Code		Yes				OC/E-C			
ASME-NOG-1-1995	Rules for Construction of Overhead and Gantry Cranes						na			
ASME/ANSI B31.9-1988 (ASME/ANSI 1988)	Building Services Piping Code						na			
AWWA	American Water Works Association						na			
BCCAA Reg 1, Article, Section 8.03	Asbestos						na			
Bernero Letter	NRC Letter dated March 2, 1993		Yes				OC			
CGA P-1-1991 9CGA 1991)	Safe Handling of Compressed Gas in Containers						na			
CMMA Specification #70 (CMMA 1994)	Specification for Top Running Bridge and Gantry Type Multiple Girder Electric Overhead Traveling Cranes		Yes				na			

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Project W-465 Engineer/Constructor Requirements Matrix

Requirement	Title	BIO	DRD/ FDC	T-Farm SRID	Site SRID	CON	Resp.	Waivers	PROC (E-C only)	Comments
DANGEROUS-GOOD-REGU	International Air Transport Association				Yes		OC			FDNW does not transport by air
DEAR 952.204-2	Security					Yes	OC/E-C			
DEAR 952.204-71	Sensitive Foreign Nations Controls					Yes	OC/E-C			
DEAR 952.204-74	Foreign Ownership, Control, or Influence Over Contractor					Yes	OC/E-C			
DEAR 952.208-70	Printing					Yes	OC/E-C			
DEAR 952.209-72	Organizational Conflicts of Interest					Yes	OC/E-C			
DEAR 952.212-72	Uniform Reporting System					Yes	OC/E-C			
DEAR 952.212-73	Cost and Schedule Control Systems Criteria					Yes	OC/E-C			
DEAR 952.217-70	Acquisition of Real Property					Yes	OC/E-C			
DEAR 952.227-13	Patent Rights-Acquisition by the Government					Yes	OC/E-C			
DEAR 952.227-9	Refund of Royalties					Yes	OC/E-C			
DEAR 952.235-70	Key Personnel					Yes	OC/E-C			
DEAR 952.250-70	Nuclear Hazards Indemnity Agreement					Yes	OC/E-C			
DEAR 970.5204-38	Government Facility Subcontract Approval					Yes	OC/E-C			
DEAR 970.5204-43	Other Government Contractors					Yes	OC/E-C			
DEAR 970.5204-59	Whistleblower Protection for Contractor Employees					Yes	OC/E-C			
DEAR 970.5204-60	Facilities Management					Yes	OC/E-C			
DEAR 970.5204-63	Collective Bargaining Agreements-Management and Operating Contracts					Yes	OC/E-C			
DEAR 970.5204-72	Patent Rights-Profit-Making Management and Operating Contractors					Yes	OC/E-C			
DEAR 970.5204-9	Accounts, Records, and Inspection (modified)					Yes	OC/E-C			
DOE 1220.1A	Congressional & Intergovernmental Affairs					Yes	na			applies to DOE only
DOE 1230.2	American Indian Tribal Government Policy						na			
DOE 1240.2B	Unclassified Visits & Assignments by Foreign Nationals				Yes	Yes	OC			
DOE 1270.2B	Safeguards Agreement with the International Atomic Energy Agency					Yes	OC			
DOE 1300.2A	Department of Energy Technical Standards Program						na			
DOE 1300.3	Policy on the Protection of Human Subjects					Yes	OC			
DOE 1324.2	Records Disposition						na			cancelled by DOE 1324.2A
DOE 1324.2A	Records Disposition				Yes		OC			cancelled by DOE 1324.5B
DOE 1324.3	Files Management			Yes		Yes	OC			cancelled order
DOE 1324.5A	Records Management		Yes				OC			cancelled by 1324.5B
DOE 1324.5B	Records Management Program		Yes	Yes	Yes	Yes	OC			

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Project W-465 Engineer/Constructor Requirements Matrix

Requirement	Title	BIO	DRD/ FDC	T-Farm SRID	Site SRID	CON	Resp.	Waivers	PROC (E-C only)	Comments
DOE 1324.6	Automated Electronic Recordkeeping			Yes			OC			cancelled by 1324.5B
DOE 1330.1D	Computer Software Management		Yes	Yes		Yes	OC/E-C			for contract computer misuse
DOE 1340.1B	Management of Public Communications Publications & Scientific, Technical and Engineering Publications					Yes	OC			
DOE 1350.1	Audiovisual and Exhibits Management					Yes	na			not within scope
DOE 1360.2B	Unclassified Computer Security Program		Yes	Yes	Yes		OC/E-C*		WHC-CM-4-7	Section 11c only
DOE 1410.2	Mail Management					Yes	na			not within scope
DOE 1430.1D	Scientific & Technical Information Management					Yes	na			not within scope
DOE 1450.3A	Call Control/Verification Programs & Authorized Use of Government Telephone System					Yes	OC/E-C*			requirements needs to be selectively imposed on FDNW
DOE 1450.4	Consensual Listening-In to Recording Telephone/Radio Conversations					Yes	OC/E-C			
DOE 1500.3	Foreign Travel Authorizations					Yes	OC			not within scope
DOE 1540.1A	Loading Operations Portions			Yes			OC			cancelled by DOE 1540.2
DOE 1540.2	Hazardous Material Packaging for Transport: Administrative Procedures		Yes		Yes	Yes	OC			
DOE 1700.1	Freedom of Information Act					Yes	OC/E-C*		use DOE 1700.1	as directed by OC
DOE 1800.1A	Privacy Act					Yes	OC/E-C*		use DOE 1800.1	as directed by OC
DOE 2030.4B	Reporting Fraud, Waste, and Abuse to the Office of Inspector General					Yes	OC/E-C*			applies primarily to OC -- specific FDNW expectations need to be assigned
DOE 210.1	Performance Indicators and Analysis of Operations Information						na			
DOE 2100.8A	Cost Accounting, Cost Recovery & Interagency Sharing of Information Technology Facilities					Yes	OC			applies to major computer network servers
DOE 2110.1A	Pricing of Departmental Materials & Services						na			
DOE 2300.1B	Audit Resolution & Follow-Up					Yes	na			applies to DOE only
DOE 2320.1C	Cooperation with the Office of the Inspector General					Yes	OC/E-C		134.230.1101 134.230.1102	
DOE 2320.2B	Establishment of Departmental Position on Inspector General Reports					Yes	na			applies to DOE only
DOE 3220.1A	Management of Contractor Personnel Policies and Programs					Yes	na			not part of scope
DOE 3220.4A	Contractor Personnel and Industrial Relations Reports					Yes	OC			pending HR review
DOE 3220.6A	Federal Labor Standards					Yes	OC			
DOE 3309.1A	Reductions in Contractor Employment					Yes	OC			pending HR review

Note: Many of the Orders on this matrix have been cancelled by DOE.
Numerous requirements are not standard. Compliance costs will need to be evaluated.

Project W-465 Engineer/Constructor Requirements Matrix

Requirement	Title	BIO	DRD/ FDC	T-Farm SRID	Site SRID	CON	Resp.	Waivers	PROC (E-C only)	Comments
DOE 3790.1A	Federal Employee OSH Program						na			cancelled by DOE 3790.1B
DOE 3790.1B	Federal Employee OSH Program						na			
DOE 3830.1	Policies & Procedures for Pension Programs Under Operating and Onsite Service Contracts					Yes	OC			pending review by HR
DOE 3890.1A	Contractor Insurance and Other Health Benefit Programs					Yes	OC			
DOE 3900.1B	Parking						na			
DOE 4210.9A	Unsolicited Proposals						na			
DOE 4300.2C	Non-DOE Funded Work (Work-For-Others)					Yes	OC			
DOE 4330.2D	In-House Energy Management					Yes	OC			input from FNDW to be solicited on as-needed basis
DOE 4330.4B	Management MGT. Program			Yes	Yes	Yes	OC/E-C*			as addressed in FDNW QAP
DOE 4700.1	Project Design System		Yes	Yes			OC/E-C			cancelled order
DOE 5000.3B	Occurrence Reporting and Processing			Yes			na			deleted by DOE ECN# 626696 - superceded by DOE O 231.1
DOE 5300.1C	Telecommunications						na			
DOE 5300.2D	Telecommunications: Emission					Yes	OC			
DOE 5300.3D	Telecommunications: Communications				Yes	Yes	OC			
DOE 5300.4D	Telecommunications: Protected					Yes	OC			
DOE 5400.1	General Environmental Compliance Issue Coordination		Yes	Yes	Yes	Yes	OC/E-C*		134.230.1101 134.230.1102	Chapter III, Sec. 4.b and c Chapter IV, Sec. 5.b (2)
DOE 5400.2A	Environmental Compliance Issue Coordination					Yes	OC			
DOE 5400.5	Radiation Protection of the Public and the Environment		Yes	Yes		Yes	OC			no offsite consequences -- buyin from state -- see pg. 14 of CDR
DOE 5440.1E	National Environmental Policy Act Compliance Program					Yes	OC/E-C		134.230.1105	DOE/OC have prime responsibility
DOE 5480.10	Contractor Industrial Hygience Program		Yes	Yes	Yes	Yes	OC/E-C		FDNW IS&H Manual	cancelled order - but remains in contract
DOE 5480.11	Radiation Protection for Occupational Workers		Yes	Yes	Yes	Yes	OC/E-C*		HSRCM-1 HNF-SD-1145 134.653.3100 134.653.3101 CESH 32	exclude Sec. 9.p (3) (b) 1 and Sec. 9.q (1)
DOE 5480.13A	Aviation Safety						na			
DOE 5480.16A	Firearms Safety					Yes	OC			not within scope
DOE 5480.17	Site Safety Representatives					Yes	OC			

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Project W-465 Engineer/Constructor Requirements Matrix

Requirement	Title	BIO	DRD/ FDC	T-Farm SRID	Site SRID	CON	Resp.	Waivers	PROC (E-C only)	Comments
DOE 5480.18B	Nuclear Facility Training Accreditation Program			Yes		Yes	OC			OC needs to mandate requirements to follow
DOE 5480.19	Conduct of Operations Requirements for DOE Facilities (Selected Sections Only)		Yes	Yes		Yes	OC			applies to DOE and OC only - specific requirements need to be passed down
DOE 5480.20A	Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities		Yes	Yes	Yes	Yes	OC/E-C*		134.000.0205	non non-reactor facilities only - only attachment 1 applies directly to FDNW
DOE 5480.21	Unreviewed Safety Questions		Yes	Yes		Yes	OC/E-C*		134.290.1100 134.290.1111 134.290.1112 134.290.1113 134.290.1114	only to degree passed down by OC in DRD/FDC - this is for SARs
DOE 5480.22	Technical Safety Requirements		Yes	Yes		Yes	OC			FDNW involvement needs to be specifically directed through task order from OC
DOE 5480.23	Nuclear Safety Analysis Reports		Yes	Yes		Yes	OC/E-C*		134.290.1100 134.290.1111 134.290.1112 134.290.1113 134.290.1114 134.290.1133 134.290.1134 134.290.1155 134.290.1159 134.290.1160	Sec. 9.a (1), Sentence 1
DOE 5480.24	Nuclear Criticality Safety			Yes		Yes	OC/E-C*		134.290.1100 134.290.1111 134.290.1112 134.290.1113 134.290.1114	only as related to design - design requirements need to be passed down from OC - see backup for applicable sections
DOE 5480.26	Trending and Analysis of Operations Information Using Performance Indicators			Yes	Yes	Yes	OC			reportable performance indicators
DOE 5480.28	Natural Phenomena Hazards Mitigation		Yes			Yes	OC/E-C*		use DOE 5480.28	performance indicators and equipment list
DOE 5480.29	Emoloyee Concerns Management System			Yes	Yes	Yes	OC/E-C			
DOE 5480.3	Safety Requirements for the Packaging and Transportation of Hazardous Materials, Hazardous Substances, and Hazardous Wastes		Yes		Yes	Yes	OC/E-C		134.500.8500	cancelled order

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Project W-465 Engineer/Constructor Requirements Matrix

Requirement	Title	BIO	DRD/ FDC	T-Farm SRID	Site SRID	CON	Resp.	Waivers	PROC (E-C only)	Comments
DOE 5480.30	Nuclear Reactor Safety Design Criteria					Yes	na			
DOE 5480.31	Startup and Restart of Nuclear Facilities			Yes	Yes	Yes	OC			
DOE 5480.4	Environmental Protection, Safety, and Health Protection Standards		Yes			Yes	OC/E-C*	required	134.230.1101 134.230.1102 FDNW IS&H Manual	only as passed down from OC waiver exists to use this order in favor of NFPA 72 for installation of fire alarm bypass switches
DOE 5480.6	Safety of DOE-Owned Nuclear Reactors					Yes	na			
DOE 5480.7	Fire Protection					Yes	OC/E-C		134.653.2101	cancelled by DOE 5480.7A
DOE 5480.7A	Fire Protection		Yes	Yes	Yes	Yes	OC/E-C*	required		only as passed down from OC see backup for applicable sections waiver exists to use this order in favor of NFPA 72 for installation of fire alarm bypass switches
DOE 5480.8A	Contractor Occupational Medical Program			Yes	Yes	Yes	OC/E-C		134.653.3006	
DOE 5480.9A	Construction Project Safety and Health Management					Yes	OC/E-C		134.653.1004 134.653.1004 134.653.1008 134.653.3200	
DOE 5481.1B	Safety Analysis and Review System					Yes	OC			
DOE 5482.1B	Environment,Safety, Health,and Quality Assurance Appraisal and Surveillance Program			Yes		Yes	OC			facility managers
DOE 5483.1A	Occupational Safety and Health Program for DOE Contractor Employees at GOCO Facilities		Yes	Yes	Yes	Yes	OC/E-C		134.653.1000	Chapter II cancelled by DOE 5480.29
DOE 5484.1	Environment, Safety, and Health Protection Information Reporting Requirements			Yes	Yes	Yes	OC			need to check reporting responsibilities
DOE 5500.10	Emergency Readiness Assurance Program				Yes	Yes	OC			FDNW responsibilities need to be assigned by OC
DOE 5500.1B	Emergency Management System			Yes	Yes	Yes	OC/E-C*			as directed by OC
DOE 5500.2B	Emergency Categories, Classes, and Notification and Reporting Requirements			Yes	Yes	Yes	OC			FDNW responsibilities need to be assigned by OC
DOE 5500.3A	Planning and Preparedness for Operational Emergencies			Yes	Yes	Yes	OC			Sec. 11.c (10) (d)

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Project W-465 Engineer/Constructor Requirements Matrix

Requirement	Title	BIO	DRD/ FDC	T-Farm SRID	Site SRID	CON	Resp.	Waivers	PROC (E-C only)	Comments
DOE 5500.4A	Public Affairs Policy and Planning Requirements for Emergencies					Yes	OC			based on facility requirements
DOE 5500.7B	Emergency Operating Records Protection Program		Yes	Yes		Yes	OC			FDNW responsibilities need to be assigned by OC
DOE 5530.1A	Accident Response Group					Yes	OC			as directed by DOE
DOE 5530.2	Nuclear Emergency Search Team					Yes	OC			FDNW would need specific direction from OC on level of involvement
DOE 5530.3	Radiological Assistance Program					Yes	OC			
DOE 5530.4	Aerial Measuring System					Yes	OC			done by other contractors
DOE 5530.5	Federal Radiological Monitoring and Assessment Center					Yes	na			staffing the center is DOE responsibility
DOE 5560.1A	Priorities and Allocation Program					Yes	OC			
DOE 5610.13	Joint Department of Energy/Department of Defense Nuclear Weapon Safety, Security, and Control Program					Yes	na			control of nuclear weapons is OC responsibility
DOE 5610.14	Transportation Safeguards System Program Operations					Yes	na			applies to Albuquerque office only
DOE 5610.2	Control of Weapon Data					Yes	na			not within project scope
DOE 5630.11	Safeguards and Security Inspection and Assessment Program						na			cancelled by DOE 5630.12A
DOE 5630.11B	Safeguards and Security Program				Yes		OC			
DOE 5630.12A	Safeguards and Security Inspection and Assessment Program					Yes	na			not within project scope
DOE 5630.13A	Master Safeguards and Security Agreement				Yes		OC			
DOE 5630.16A	Safeguards and Security Acceptance and Validation Testing Program				Yes		OC			
DOE 5631.4A	Control of Classified Visits				Yes		OC			cancelled order
DOE 5632.1B	Safeguards and Security						na			cancelled by DOE 5632.1C
DOE 5632.1C	Protection and Control of Safeguards and Security Interests			Yes	Yes	Yes	OC/E-C*		RLID 473.1 WHC-CM-4-33	as directed by OC
DOE 5632.2C	Personnel Security Program (Chapters I-IX only)				Yes		OC/E-C*			as directed by OC
DOE 5632.5	Control of Classified Documents and Information			Yes		Yes	OC			
DOE 5632.7A	Protection Force Program				Yes	Yes	OC			
DOE 5633.3B	Control and Accountability of Nuclear Materials				Yes		OC			
DOE 5634.1B	Facility Approvals, Security Surveys, and Nuclear Materials Surveys			Yes			OC			
DOE 5635.4	Protection of Unclassfied Information			Yes			OC			

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Project W-465 Engineer/Constructor Requirements Matrix

Requirement	Title	BIO	DRD/ FDC	T-Farm SRID	Site SRID	CON	Resp.	Waivers	PROC (E-C only)	Comments
DOE 5639.1	Information Security Program				Yes		OC/E-C*			Preamble, Sections: 8.b (13 (k) 13.a 14.b
DOE 5639.3	Violation of Laws, Losses and Incidents of Security Concerns				Yes		OC			
DOE 5639.5	Reporting (Safeguards and Security) Violations						na			cancelled order
DOE 5639.7	Operations Security Program				Yes		OC			
DOE 5650.1B	Management of Nuclear Materials						OC			
DOE 5650.2B	Identification of Classified Information				Yes		OC/E-C*			function of OC to identify data to be classified - Chapter VII, Sec. 2.a, Sentence 1 only
DOE 5660.1B	Management of Nuclear Materials					Yes	OC			
DOE 5670.1A	Management and Control of Foreign Intelligences					Yes	OC			
DOE 5670.3	Counterintelligence Program				Yes	Yes	na			not applicable to project
DOE 5700.2D	Cost Estimating, Analysis, and Standardization			Yes			OC/E-C			
DOE 5700.6C	Quality Assurance		Yes		Yes	Yes	OC/E-C		QMP, PEP, PPM	
DOE 5700.7C	Work Authorization System					Yes	OC			applies to M&O contractors only
DOE 5800.1A	Research and Development Laboratory Technology Transfer Program					Yes	na			not applicable to project
DOE 5820.2A	Radioactive Waste Management		Yes	Yes		Yes	OC/E-C*		HSRCM-1 134.230.1112	see backup for applicable sections
DOE 6430.1A	General Design Criteria		Yes	Yes			OC/E-C	required	use DOE 6430.1A	see backup for specific sections where waivers have been granted
DOE M 471.2-1	Manual for Classified Matter Protection & Control						na			
DOE M 5632.1C-1	Manual for Protection and Control of Safeguards and Security Interests			Yes	Yes		OC/E-C*		RLID 473.1 WHC-CM-4-33	Chapter III, Sec. 2, sent. 1 Chapter III, Sec. 3a
DOE M 5632.7-1	Firearms Qualification Courses Manual					Yes				
DOE M 5639.6A-1	Manual of Security Requirements for the Classfied Automated Information System Security Program				Yes	Yes	OC			
DOE M-5632.1C	Safeguards and Security				Yes	Yes	OC			
DOE M-5632.1C-1	Manual for Protection and Control of Safeguards and Security Interests				Yes		OC/E-C*			see backup
DOE N 4700.5	Project Control System Guidelines			Yes			OC/E-C			
DOE N 5400.9	Sealed Radioactive Source				Yes	Yes	OC			FDNW involvement needs to be further defined

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Project W-465 Engineer/Constructor Requirements Matrix

Requirement	Title	BIO	DRD/ FDC	T-Farm SRID	Site SRID	CON	Resp.	Waivers	PROC (E-C only)	Comments
DOE N 5480.11	Extension of Radiological Control Manual, Rev. 1					Yes	OC/E-C		134.653.3100 134.500.8505 134.500.8500 134.653.3103	
DOE O 130.1	Budget Formulation Process					Yes	OC			applies to DOE -- FDNW expections need to be handed down through task order
DOE O 232.1	Occurrence Reporting & Processing of Operations Information			Yes	Yes	Yes	OC			
DOE O 430.1	Life-Cycle Asset Management		Yes			Yes	na			applies to DOE only
DOE O 440.1	Occupational Safety and Health						OC/E-C			
DOE O 460.1	Packaging and Transportation Safety		Yes		Yes		OC/E-C*		134.230.1135	as directed by OC
DOE O 460.2	Departmental Materials Transportation and Packaging Management		Yes				OC			
DOE O 470.1	Safeguards and Security Program					Yes	OC			
DOE O 471.1	Identification & Protection of Unclassified Controlled Nuclear Information					Yes	OC			
DOE O 471.2	Information Security Program					Yes	OC			
DOE O 472.1	Personnel Security Activities				Yes	Yes	OC			
DOE O 534.1	Accounting						OC			
DOE-0223	RL Emergency Implementing Procedures					Yes	OC			only to degree applicable to job
DOE-0225	Hanford Emergency Assessments Resource Manual					Yes	na			not within job scope
DOE-95-SWT-186 (1995c)	Hazardous Material Packaging and Shipping						OC/E-C		134.230.1135	receiving and shipping requirements
DOE-GUIDE-10 CFR 830				Yes			OC/E-C			
DOE-RL-HPS-SDC-4.1	A/E Civil Design Criteria, Design Loads for Facilities						na			cancelled by DOE 5480.28 -- replaced by HNF-PRO-097 which needs to be evaluated for design criteria variations -- significant changes in new standard
DOE-RW0328P						Yes	OC			priority ranking list for DOE to accept SNF
DOE-STD-1020-94	Natural Phenomena Hazard Design and Evaluation Criteria for Department of Energy Facilities						OC\E-C*			this standard has been imposed by RCR comment from Pascal Moutte

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Project W-465 Engineer/Constructor Requirements Matrix

Requirement	Title	BIO	DRD/ FDC	T-Farm SRID	Site SRID	CON	Resp.	Waivers	PROC (E-C only)	Comments
DOE-STD-1021-93	Performance Categorization Criteria for Structures, Systems, and Components at DOE Facilities Subject to Natural Phenomena Hazards						na			
DOE-STD-1022-94	Natural Phenomena Hazards Site Characterization Criteria						na			
DOE-STD-1023-95 (1995b)	Natural Phenomena Hazards Assessment Criteria						na			
DOE-STD-1044-93	Guide to Good Practice for Equipment and Pipe Labeling		Yes				OC/E-C			
DOE-STD-1070-94	Tracking Evaluation Results, Section 8, Para. 3			Yes			OC/E-C			
DOE-STD-1073-93	Configuration Management			Yes			OC/E-C*			only those paragraphs listed under Sec. 3.2 and 3.3 of T-Farm SRID
DOE-STD-3009-94 (1994f)	Preparedness Guide for U.S DOE Nonreactor Nuclear Facilities Safety Analysis Report						na			
DOE/EH 0135	Training Standards						na			
DOE/EH 0135.OA.6							na			
DOE/EH 0135.TC.1.15	Training Schedules			Yes			OC/E-C			
DOE/EH 01737	Environmental Monitoring, Surveillance, and Inspection					Yes	OC/E-C*		134.230.1145	as directed by OC
DOE/EH 256T	DOE Radiological Control Manual			Yes	Yes	Yes	OC/E-C*			as directed by OC - see backup for applicable sections
DOE/EM-0093 (DOE/EM 1995)	Wase Acceptance Product Specifications for Vitrified High-Level Waste Forms						OC			
DOE/EP-0108	Standard for Fire Protection of AEC Electric Computer					Yes	na			applicable to computer facilities
DOE/EV-0043,8-79, 101	Standards for Fire Protection for Portable Structures			Yes			OC/E-C		IS 10F	
DOE/EV-016194	DOE Explosives Safety Manual					Yes	OC			FDNW does not handle explosive materials
DOE/RL 94-02	Emergency Program Management						na			
DOE/RL-91-28	Hanford Facility Dangerous Waste Permit Application				Yes		OC			
DOE/RL-92-36 (RL 1993a)	Hanford Site Hoisting and Rigging Manual		Yes			Yes	OC/E-C		HSRCM-1	enveloped by GOG-1
DOE/RL-92-49	Radiological Assistance Program Plan - Region 8					Yes	OC			not applicable to project
DOE/RL-93-75	Hanford Facility Contingency Plan					Yes	OC			
DOE/RL-94-02	Hanford Emergency Response Plan					Yes	OC			
DOE/RL-94-125	Federal Building Self Protection Plan					Yes	na			not within project scope

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Project W-465 Engineer/Constructor Requirements Matrix

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DOE/RL-94-55	Hanford Analytical Services QA Plan					Yes	na			not within project scope
DOE/RL-94-97	Selection of Analytical Methods for Mixed Waste Analysis at Hanford						na			
DOE/RW-0333P (DOE/RW 1995)	Quality Assurance Requirements and Description for Civilian Radioactive Waste Management						na			
DOE/RW-0351P (DOE/RW 1996)	Waste Acceptance System Requirements Documents						na			
DOE1324.2A	Records Disposition			Yes			OC/E-C			
EO 12856	Federal Compliance with Right-To-Know Laws and Pollution Prevention Requirements				Yes		OC/E-C*			as directed by OC
EO 12873	Federal Acquisition, Recycling, and Waste Prevention				Yes		OC/E-C*			as directed by OC
EO 516	Final Guidance on Administrative Records				Yes		OC			
FAR 52.203-12	Limitations on Payments to Influence Certain Federal Transactions					Yes	OC/E-C			
FAR 52.203-6	Restrictions on Subcontractors Sales to the Government					Yes	OC/E-C			
FAR 52.203-7	Anti-Kickback Procedures					Yes	OC/E-C			
FAR 52.208-1	Required Sources for Jewell Bearings and Related Items					Yes	OC/E-C			
FAR 52.215-22	Price Reduction for Defective Cost or Pricing Data					Yes	OC/E-C			
FAR 52.215-23	Price Reduction for Defective Cost or Pricing Data--Modifications					Yes	OC/E-C			
FAR 52.215-24	Subcontractor Cost or Pricing Data					Yes	OC/E-C			
FAR 52.215-25	Subcontractor Cost or Pricing Data--Modifications					Yes	OC/E-C			
FAR 52.215-26	Integrity of Unit Prices					Yes	OC/E-C			
FAR 52.215-27	Termination of Defined Benefit Pension Plans					Yes	OC/E-C			
FAR 52.215-39	Reversion or Adjustment of Plans for Postretirement Benefits Other than Pensions					Yes	OC/E-C			
FAR 52.215-40	Notification of Ownership Changes					Yes	OC/E-C			
FAR 52.215-43	Audit-Commercial Items					Yes	OC/E-C			
FAR 52.216-16	Incentive Price Revision-Firm Target					Yes	OC/E-C			
FAR 52.216-17	Incentive Price Revision-Successive Targets					Yes	OC/E-C			
FAR 52.216-5	Price Redetermination-Prospective					Yes	OC/E-C			
FAR 52.216-6	Price Redetermination-Retroactive					Yes	OC/E-C			
FAR 52.219-8	Utilization of Small, Small Disadvantaged and Women-Owned Business Concerns					Yes	OC/E-C			
FAR 52.219-9	Small, Small Disadvantaged and Women-Owned Business Subcontracting Plan					Yes	OC/E-C			
FAR 52.221-1	Notice to the Government of Labor Disputes					Yes	OC/E-C			
FAR 52.221-11	Subcontractors (Labor Standards)					Yes	OC/E-C			
FAR 52.221-12	Contract Termination-Debarment					Yes	OC/E-C			

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Project W-465 Engineer/Constructor Requirements Matrix

Requirement	Title	BIO	DRD/ FDC	T-Farm SRID	Site SRID	CON	Resp.	Waivers	PROC (E-C only)	Comments
FAR 52.221-13	Compliance with Davis-Bacon and Related Act Regulations					Yes	OC/E-C			
FAR 52.221-14	Disputes Concerning Labor Standards					Yes	OC/E-C			
FAR 52.221-15	Certification of Eligibility					Yes	OC/E-C			
FAR 52.221-17	Labor Standards for Construction Work-Facilities Contracts					Yes	OC/E-C			
FAR 52.222-26	Equal Opportunity					Yes	OC/E-C			
FAR 52.222-27	Affirmative Action Compliance Requirements for Construction					Yes	OC/E-C			
FAR 52.222-35	Affirmative Action for Special Disabled adn Vietnam Era Veterans					Yes	OC/E-C			
FAR 52.222-37	Employment Reports on Special Disabled Veterans of the Vietnam Era					Yes	OC/E-C			
FAR 52.222-4	Contract Work Hours and Safety Standards Act-Overtime Compensation					Yes	OC/E-C			
FAR 52.222-41	Service Contract Act of 1995, as amended					Yes	OC/E-C			
FAR 52.222-6	Davis-Bacon Act					Yes	OC/E-C			
FAR 52.222-7	Withholding of Funds					Yes	OC/E-C			
FAR 52.222-8	Payrolls and Basic Records					Yes	OC/E-C			
FAR 52.222-9	Apprentices and Trainees					Yes	OC/E-C			
FAR 52.223-2	Clean Air and Water					Yes	OC/E-C			
FAR 52.224-2	Privacy Act					Yes	OC/E-C			
FAR 52.225-11	Restrictions on Certain Foreign Purchases					Yes	OC/E-C			
FAR 52.227-1	Authorization and Consent					Yes	OC/E-C			
FAR 52.227-2	Notice and Assistance Regarding Patent Copyright Infringement					Yes	OC/E-C			
FAR 52.230-2	Cost Accounting Standards					Yes	OC/E-C			
FAR 52.230-6	Administration of Cost Accounting					Yes	OC/E-C			
FAR 52.236-13	Accident Prevention					Yes	OC/E-C			
FAR 52.236-21	Specifications and Drawings for Construction					Yes	OC/E-C			
FAR 52.244-2	Subcontracts (Cost Reimbursement and Letter Contracts)					Yes	OC/E-C			
FAR 52.244-6	Subcontracts for Commercial Items and Commercial Components					Yes	OC/E-C			
FAR 52.245-18	Special Test Equipment					Yes	OC/E-C			
FAR 52.247-64	Preference for Privately Owned U.S.-Flag Commercial Vessels					Yes	OC/E-C			
FF-01	Radionuclide Emissions			Yes			OC			
Generic Letter 88-14	Instrument Air Supply/ Safety- Related Equipment						na			
HSL&T-1	Hanford Site Lock and Tag Standard						na			

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Project W-465 Engineer/Constructor Requirements Matrix

Requirement	Title	BIO	DRD/ FDC	T-Farm SRID	Site SRID	CON	Resp.	Waivers	PROC (E-C only)	Comments
HSRCM-1 (RL 1993b)	Hanford Site Radiological Control Manual		Yes				OC/E-C			
ICBO 1991	Uniform Plumbing Code						na			out of date, replaced by ICBO (1997) Uniform Mechanical Code
ICBO 1997	Uniform Building Code		na				na			see UBC, pg. 23
IEEE C2-1993	National Electric Safety Code						na			
IES 1993	Illumination Engineering Society of America						na			
ISO 9000 Series (ISO 1994)	Quality Management and Quality Assurance Standards						na			
LAPCA-REG 1, Article 5	Burning Requirements					Yes	OC/E-C		134.230.1145	
LAPCA-REG 1, Article 8	Asbestos Removal					Yes	na			no asbestos expected to be removed by this project
MIL-STD-1472D (DOD 1993)	Human Engineering Design Criteria for Military System Equipment and Facilities		Yes				OC/E-C			
NEMA	National Electric Manufacturers Association						na			
NFPA (all codes and standards)							na			
NFPA 101 (NFPA 1997)	Life Safety Code		Yes				OC/E-C*	required	134.653.2101	sections 5-2.4.5 (f) and 5-2.2.4.6 (c) do not apply to Hanford need decision between UBC and NFPA 101 for exits
NFPA 13 (NFPA 1996)	Installation of Sprinkler Systems						na			
NFPA 220 (NFPA 1997)	Fire Walls and Fire Barrier Walls						na			NFPA 220 for building and construction types; UBC for definitions
NFPA 70 NFPA 1996)	National Electric Code		Yes				OC/E-C	required	134.653.2101	
NFPA 72 (NFPA 1996)	National Fire Alarm Code						na			use DOE 6430.1A
NFPA 780	Lightning Protection Code						na			
NRC Reg. Guide 1.26	Quality Group Classification & Standards						na			
NRC Reg. Guide 1.3	Loss of Coolant Accidents						na			
NRC Reg. Guide 1.78	Habitability of Nuclear Power Plant Control Rooms during Postulated Hazardous Chemical Release						na			

Note: Many of the Orders on this matrix have been cancelled by DOE.
Numerous requirements are not standard. Compliance costs will need to be evaluated.

Project W-465 Engineer/Constructor Requirements Matrix

Requirement	Title	BIO	DRD/ FDC	T-Farm SRID	Site SRID	CON	Resp.	Waivers	PROC (E-C only)	Comments
NRC Reg. Guide 3.48	Format for the Safety Analysis Report						na			
NRC Reg. Guide 3.60	Design of an Independent Spent Fuel Storage Installation						na			
NUREG-0554 (NRC 1979)	Single Failure-Proof Cranes for Nuclear Power Plants						na			
NUREG-0700 (NRC 1981)	Guidelines for Control Room Design Reviews		na				na			
NUREG-0800	Standard Review Plan						na			
NUREG/BR-0204	Package of Dangerous Waste		Yes				OC			
NUREG/CR-0098	Development of Criteria for Seismic Review of Selected Nuclear Power Plants						na			
OSHA-IS-1-12-14	Guards for Rotating Equipment						na			
PNL-6577	Health Physics Manual of Good Practices for Reducing Exposure to Levels that are ALARA						na			
Public Law-100-605	Interim Protection		Yes			Yes	OC/E-C		134.230.1150	
Public Law-91-596.5 (a) (1)				Yes			OC/E-C			
RCRA-B (DW) 940829	Dangerous Waste Regulations					Yes	OC/E-C		134.230.1110 134.230.1111 134.230.1125 134.230.1130 134.230.1180 134.230.1181 134.230.1182	
RLID 1300.1C	Richland Operations Office Facility Representative Program					Yes	na			not within project scope
RLID 1360.2B	Unclassified Computer Security Program					Yes	OC/E-C*		WHC-CM-4-7	only if deemed applicable to project
RLID 232.1	Occurrence Reporting and Processing of Operations Information					Yes	OC/E-C*		HNF-MD-006 134.000.0301	only to extent of providing information to OC for necessary reporting
RLID 430.1	Systems Engineering Criteria Document and Implementing Directive					Yes	OC			AECs role must be addressed per project scope
RLID 473.1	Protection of Safeguards and Security Interests					Yes	OC/E-C		WHC-CM-4-33	
RLID 5000.1	Baseline Execution and Management Process					Yes	OC			
RLID 5000.2	Long Range Planning Process					Yes	na			not within project scope
RLID 5480.13A	Aviation Safety					Yes	na			not within project scope
RLID 5480.19	Conduct of Operations Requirements for RL		Yes			Yes	OC			

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Project W-465 Engineer/Constructor Requirements Matrix

Requirement	Title	BIO	DRD/ FDC	T-Farm SRID	Site SRID	CON	Resp.	Waivers	PROC (E-C only)	Comments
RLID 5480.29	RL Employee Concerns Program				Yes	Yes	OC/E-C*			only as directed by OC
RLID 5480.31	Startup and Restart of Nuclear Facilities			Yes		Yes	na			not within project scope
RLID 5480.7	Fire Protection		Yes	Yes	Yes		OC/E-C	required	134.653.2101	
RLID 5630.3A	Protection of Hanford Facilities Against Radiological and Toxicological Sabotage			Yes			OC/E-C			
RLID 5632.1B	Asset Protection Requirements			Yes			OC			
RLID 5633.3	Control and Accountability of Nuclear Materials at RL			Yes	Yes	Yes	na			not within project scope
RLID 5634.3	Control and Accountability of Nuclear Materials				Yes		OC			
RLID 5635.1A	Special Access and Top Secret Access Authorization			Yes		Yes	na			not within project scope
RLID 5670.3	Counterintelligence Program						na			not within project scope
RLIP 1322.1B	RL Forms Management					Yes	na			not within project scope
RLIP 5484.1A	Environmental Protection, Safety, and Health Protection Information Reporting Requirements			Yes		Yes	OC			check responsibilities for injuries reporting
RLPD 430.1	Hanford Site Systems Engineering Policy						na			
RLPD 5000.1	Site Management System					Yes	OC			DOE and OC function
SDC-1.3	Drawing Standard		Yes				OC/E-C			obsolete criteria
SEN-15-90	National Environmental Policy Act					Yes	OC			FDNW responsibility limited -- NEPA is primarily DOE.OC responsibility
SEN-22-90	DOE Policy on Signature of RCRA Permit Application						na			
SEN-30A-92	Staying the Course for Technology Transfer atthe Department of Energy					Yes	OC			not a FDNW function
SEN-35-91	Nuclear Safety Policy					Yes	OC			OC function -- this job would be governed by lower tier DOE orders
SEN-39-92	Department of Energy Occupational Safety and Health (OSH) Incentives Program					Yes	OC/E-C			VPP programs, etc.
SNT-TC-1A, 5.1	Personnel Qualification and Certification in Nondestructive Testing			Yes			OC/E-C			
Standard GC-LOAD-01 (Kaiser 1996a)	Standard Architectural-Civil Design Criteria, Design Loads for Facilities		Yes				na			negated by DOE 5480.28
Standard GH-CLIM-01 (Kaiser 1996b)	Design Climate Data for Hanford Site						OC/E-C			
TPA	Hanford Federal Facility and Consent Order		Yes	Yes	Yes		OC/E-C*			as directed by OC

Note: Many of the Orders on this matrix have been cancelled by DOE.
Numerous requirements are not standard. Compliance costs will need to be evaluated.

Project W-465 Engineer/Constructor Requirements Matrix

Requirement	Title	BIO	DRD/ FDC	T-Farm SRID	Site SRID	CON	Resp.	Waivers	PROC (E-C only)	Comments
UBC (1997)	Uniform Building Code		Yes				OC/E-C*	required		structural technical requirements only UBC not used for emergency exits -- see DOE 6430.1A
WA 7890008967-DW part III.2.B.h	Containers Utilized for Offsite Shipment					Yes	OC			FDNW does not transport offsite
WA000374-3.I.A/2	Effluent Limits					Yes	OC/E-C		134.230.1150	applies to surface discharges
WAC 170-12.050	Marking (Tank Vehicles)						na			
WAC 173-201	Water Quality Standards for Surface Water of the State of Washington			Yes			OC/C-E		134.230.1150	
WAC 173-216.110	Entrance by State			Yes		Yes	OC/C-E*			addresses permit holder responsibilities -- only paragraph (4) applicable to FDNW
WAC 173-216.125	State of Washington Discharge Program: Monitoring			Yes			OC			
WAC 173-218	Underground Injection Control			Yes		Yes	OC/E-C*		134.230.1150	sections 040 and 100 only
WAC 173-220	Radiation Protection - General Provision		Yes				OC			
WAC 173-240.110	Submission of Plans and Reports for Construction of Wastewater Facilities: Submission of Plans and Reports			Yes			OC/E-C*		134.230.1150	responsible for preparation stage only
WAC 173-240.130	Submission of Plans and Reports for Construction of Wastewater Facilities: Engineering Reports			Yes			OC/E-C*		134.230.1150	responsible for preparation stage only
WAC 173-240.150	Submission of Plans and Reports for Construction of Wastewater Facilities: Operation and Maintenance Manual			Yes			OC			
WAC 173-240.160	Submission of Plans and Reports for Construction of Wastewater Facilities: Requirements for Professional Engineers			Yes			OC/E-C*		134.230.1150	responsible for preparation stage only
WAC 173-240.170	Submission of Plans and Reports for Construction of Wastewater Facilities: Right of Inspection			Yes			OC			
WAC 173-303	Dangerous Waste Regulations		Yes	Yes	Yes	Yes	OC/E-C*		134.230.1110 134.230.1111	see backup for applicable sections if facility is classified as a facility covered under WAC 173-303, then UBC-UFC is used in favor of NFPA standards
WAC 173-303-370	Dangerous Waste Labeling		Yes				OC			

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Numerous requirements are not standard. Compliance costs will need to be evaluated.

Project W-465 Engineer/Constructor Requirements Matrix

Requirement	Title	BIO	DRD/ FDC	T-Farm SRID	Site SRID	CON	Resp.	Waivers	PROC (E-C only)	Comments
WAC 173-303.190	Marking		Yes				OC			
WAC 173-304	Solid Waste Management			Yes	Yes		OC/E-C*		134.230.1113	excluding Sec. 490
WAC 173-307.030	Pollution Prevention Plans			Yes	Yes	Yes	OC			Hanford Site exempted from plan submission requirements due to TSD status
WAC 173-340	UST: Emergency Release Reporting			Yes			OC			
WAC 173-360	UST Systems			Yes	Yes	Yes	OC/E-C*			only as related to design/installation -- see backup for applicable sections
WAC 173-400	Construction Application (General Air Regulations)		Yes	Yes	Yes	Yes	OC/E-C*		134.230.1145	only as related to design and construction -- OC does permitting -- FDNW involvement by specific OC assignment
WAC 173-401	Duty to Apply (Operating Permit Regulations)		Yes		Yes	Yes	OC			applies to air operating permit - FDNW involvement by OC assignment
WAC 173-460	Toxic Air Pollutants		Yes	Yes			OC/E-C*		134.230.1145	only as related to design/construction -- OC makes notifications -- see pg. 14 of CDR
WAC 173-470	Particle Fallout					Yes	OC			
WAC 173-480	Ambient Air Quality Standards and Emission Limits for Radionuclides		Yes				OC/E-C		134.230.1145	confinement verification not required by OC
WAC 173-802.080	Mitigated DNS					Yes	OC			
WAC 197-11.100	SEPA: Information Required of Applicants			Yes			OC			FDNW responsibility limited -- primarily DOE/OC requirement -- FDNW involvement only on assignment
WAC 197-11.305	Categorical Exemptions					Yes	OC			FDNW responsibility limited -- primarily DOE/OC requirement -- FDNW involvement only on assignment

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Numerous requirements are not standard. Compliance costs will need to be evaluated.

Project W-465 Engineer/Constructor Requirements Matrix

Requirement	Title	BIO	DRD/ FDC	T-Farm SRID	Site SRID	CON	Resp.	Waivers	PROC (E-C only)	Comments
WAC 197-11.335							na			
WAC 197-11.960	SEPA					Yes	OC			FDNW responsibility limited -- primarily DOE/OC requirement -- FDNW involvement only on assignment
WAC 197-640	SEPA						na			
WAC 246-247	Radiation Protection - Air Emissions		Yes	Yes	Yes	Yes	OC/E-C*		134.230.1145	requirements related to design/construction only - FDNW provides input to notifications - but does not prepare/submit to State
WAC 246-272	Domestic Sewage		Yes				OC/E-C*		134.230.1155	design only
WAC 246-272	Onsite Sewage System		Yes	Yes		Yes	OC/E-C*		134.230.1155	MCLs apply to drinking water run by water systems -- responsible for design/installation only
WAC 246-290	Public Water Supplies		Yes			Yes	OC			
WAC 246-292	Water Works Operator					Yes	OC			FDNW has no certified water works operators
WAC 273-200.100	Water Quality Standards for Groundwater of the State of Washington			Yes			OC/C-E*		134.230.1150	design only
WAC 296-62.3140	Emergency Response Program			Yes			OC/C-E*			as directed by OC
WAC 296-65.005/007	Asbestos Training					Yes	na			no asbestos anticipated to be removed by this project
WAC 296-65.010 & 012	Asbestos Worker Certification					Yes	na			no asbestos anticipated to be removed by this project
WAC 296-65.015	Asbestos Training Course Approval					Yes	na			no asbestos anticipated to be removed by this project
WAC 296-65.020	Notification Requirements (Asbestos)			Yes		Yes	na			no asbestos anticipated to be removed by this project
WAC 296-65.030	Methods of Compliance (Asbestos)			Yes		Yes	na			no asbestos anticipated to be removed by this project
WAC 470-12	Transportation of Dangerous Cargos				Yes		OC			only as directed by OC
WAR-10-000F, Part IV	Storm Water Pollution Prevention						na			
WGC-SD-ETF-WAC-001	Acceptance of Feed Streams for Storage and Treatment at the LERF/ETF Complex		Yes				OC			
WHC-CM-1-10	Safety Manual		Yes				OC/E-C			manual updated in HNF-PRO series

Note: Many of the Orders on this matrix have been cancelled by DOE.
Numerous requirements are not standard. Compliance costs will need to be evaluated.

Project W-465 Engineer/Constructor Requirements Matrix

Requirement	Title	BIO	DRD/ FDC	T-Farm SRID	Site SRID	CON	Resp.	Waivers	PROC (E-C only)	Comments
WHC-CM-1-11	Industrial Hygiene		Yes				OC/E-C			manual updated in HNF-PRO series
WHC-CM-1-3	Management Requirements and Procedures		Yes				OC			manual updated in HNF-PRO series
WHC-CM-1-5, section 7.3	Identifying and Resolving Unreviewed Safety Questions						na			manual updated in HNF-PRO series
WHC-CM-2-14	Hazardous Materials Packaging and Transportation		Yes				OC/E-C		134.230.1135	only as directed by OC manual updated in HNF-PRO series
WHC-CM-2-6	Data Standards Administration		Yes				OC			manual updated in HNF-PRO series
WHC-CM-4-2	Quality Assurance		Yes				OC			manual updated in HNF-PRO series
WHC-CM-4-27	Radiological Control Practices and Procedures		Yes				OC			manual updated in HNF-PRO series
WHC-CM-4-29	Nuclear Criticality Safety Manual						na			manual updated in HNF-PRO series
WHC-CM-4-3	Industrial Safety Manual						na			manual updated in HNF-PRO series
WHC-CM-4-4 (1995)	Fire Protection Program Manual		Yes				OC			manual updated in HNF-PRO series requires use of DOE resources manual and Hanford chapters
WHC-CM-4-40	Industrial Hygiene Manual		Yes				na	required		manual updated in HNF-PRO series use DOE 5480.10
WHC-CM-4-46	Safety Analysis Manual		Yes				OC			manual updated in HNF-PRO series
WHC-CM-6-1	Standard Engineering Practices		Yes				OC			manual updated in HNF-PRO series
WHC-CM-6-12	Project Department Procedures						OC			manual updated in HNF-PRO series
WHC-CM-7-5	Environmental Compliance		Yes				OC/E-C		all 134.230 series practices	manual updated in HNF-PRO series no source of regulated emissions from this project
WHC-EP-0063-04	Hanford Site Solid Waste Acceptance Criteria		Yes				OC			
WHC-IP-1043	WHC Occupational ALARA Program		Yes				OC/E-C*			design and constructibility only
WHC-S-0425	Performance Specification for the SNF-CSB						na			

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Project W-465 Engineer/Constructor Requirements Matrix

Requirement	Title	BIO	DRD/ FDC	T-Farm SRID	Site SRID	CON	Resp.	Waivers	PROC (E-C only)	Comments
WHC-S-0468	Specification for Multi-Canister Overpack Storage Building						na			
WHC-SD-6-2	Project Management		Yes				OC			
WHC-SD-GN-DGS-30011	Radiological Design Guide		Yes				OC/E-C			
WHC-SD-GN-DGS-30012	HPS-ARCH/Civil Manual		Yes				OC/E-C			outdated requirement
WHC-SD-GN-DGS-30013	HPS-Electrical Manual		Yes				OC/E-C			outdated requirement
WHC-SD-GN-DGS-30014	HPS-Instrumentation Manual		Yes				OC/E-C			outdated requirement
WHC-SD-GN-DGS-30015	Mechanical Manual		Yes				OC/E-C			outdated requirement
WHC-SD-SNF-DB-004	SNF Seismic DC, NRC Equivalency Report						na			
WHC-SD-SNF-DB-009	CSB Natural Phenomena/Hazards						na			
WHC-SD-SNF-FHA 002	Fire Hazard Analysis for the CSB Vaults			Yes	Yes		OC			FHA update not planned by AEC -- an updated to the FHA is required by DOE 5480.7A and RLID 5480.7 -- DOE 6430.1A also has a required fire protection review -- this review can be included in the FHA
WHC-SD-SNF-HC-007	Hazard Category Analysis for the Canister Storage Building						na			
WHC-SD-SNF-MP-001-1995	SNF- Project Document Management Plan						na			
WHC-SD-SNF-PLN-012	SNF- Project Integrated Safety Management Plan						na			
WHC-SD-SNF-QAPP-004	SNF - Quality Assurance Plan						na			
WHC-SD-SNF-TI-029	Multi-Canister Overpack						na			
WHC-SD-W236-T1-002	Probabalistic Seismic Hazard Analysis, DOE Hanford Site						na			
WHC-SP-113	Site Implementation Plan						na			
WHC-SP-1131	WHC QA Program Plan						na			

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Numerous requirements are not standard. Compliance costs will need to be evaluated.

Requirements Matrix Backup
Project W-465

1.0 Waivers

6430.1A

a. Waiver exists for use of butterfly valves in fire protection systems.

b. SAR exemption exists for fire protection sytems.

c. Waiver exists for DBE water sytstems.

d. Additionally, waivers exist for the following sections of 6430.1A:

1300-3.4.1	Equipment Environmental Considerations: General
1300-3.4.2	Environmental Qualification of Equipment (first paragraph)
1660-1	Special Systems: General (last sentence, first paragraph)
1600-2	Emergency Power Systems (first, second, fourth, and sixth paragraphs)
1660-95.05	Test and Calibration
1660-99.0.1	Safety Class (Emergency) Electrical Systems (first, second, third, fourth, sixth, seventh, and eighth paragraphs)
1660-99.02	Protection System and Instrumentation and Controls (first, sixth, seventh, eighth, and tenth)
1660-99.03	Qualification
1660-99.04	Separation and Physical Protection (first and second paragraphs)

2.0 Applicable Requirements

a. 10 CFR 835

Part 101 (a)
Part 202 (a)
Part 204 (a) (b)
Part 205 (a)
Part 206 (a) (b) (c)
Part 207
Part 208
Part 402 (a) (c)
Part 501 (a) (b) (c) (d)
Part 701 (a)
Part 702 (f)
Part 704 (a) (b)
Part 801 (b) (d)
Part 901 (a) (b)
Part 902
Part 1001 (a) (b)
Part 1003 (a)
Part 1301 (d) (e)
Part 1302 (d) (e)

b. 29 CFR 1926

Parts 20-35
Parts 50-65
Part 150 (A) (2), (3), (4)
Parts 200-201
Parts 250-252
Parts 300-307
Parts 350-354
Parts 403-441
Parts 451-453
Part 500
Parts 550-556
Parts 600-604
Parts 651-652
Parts 701-706
Parts 750-752
Parts 950-959
Parts 1000-1003
Parts 1051-1060

Parts 1102-1148

c. DOE 5480.7A

Section 5.a, b, c, d, e, f, g, h
Section 9.a.(3)
Section 9.b (1), (3), (4), (6), (10), (11), (12), (15), (17)
Section 9.c.(1)
Section 630 (2), (3), (4), (5) (8), (9)
Section 640 (2) (c), (3) (a), (c), (d), (e), (f), (g), (4) (a), (b), (c), (d), (e), (f), (5) (e)

d. DOE 5480.24

Section 040 (3)
Section 060 (1)
Section 075 (11)
Section 080 (1), (8), (10)

e. DOE 5820.2A

Chapter I, Section 3.b (3) (b), (d)
Chapter II, Section 3.a (1), (2)
Chapter III, Section 3.d.(1)
Chapter III, Section 3.a.(5) (c), (d)
Chapter III, Section 3.b (3) (b) (d)

f. DOE/EH 0256T

Chapter 1, Part 2, Article 125.5, 125.10
Chapter 2, Part 1, Article 213.5, 215.1
Chapter 2, Part 2, Article 222.2, 222.6, 222.7,
Chapter 3, Part 1, Article 311, 312.2, 312.4, 312.5, 314.1, 314.2, 314.3, 314.4, 314.6, 315.1
Chapter 3, Part 2, Article 322.7, 324.1, 324.2, 324.3, 324.4, 324.5, 325.1, 325.2, 325.3, 325.4, 325.5,, 325.6, 325.7, 325.8
Chapter 3, Part 3, Article 334.3, 334.4, 337.1, 337.2, 337.3, 337.4338.1, 338.2, 338.3, 338.4, 338.5, 338.7,
Chapter 3, Part 4, Article 341.1, 342.2, 342.3, 342.4, 342.5, 342.6, 342.7, 342.8, 342.10, 342.11, 343.3, 343.4, 345.1, 345.3, 345.4, 348.2, 348.7
Chapter 3, Part 7, Article 372.1, 372.2
Chapter 4, Part 1, Article 414.1, 412.2, 414.8, 419.9, 414.10, 414.11

Chapter 4, Part 2, Article 422.4
Chapter 4, Part 3, Article 431.1, 431.2, 431.4
Chapter 4, Part 6, Article 462.6
Chapter 5, Part 4, Article 541.2, 542.1, 542.2, 542.3
Chapter 6, Part 5, Article 654.3
Chapter 6, Part 6, Article 521.6
Chapter 7, Part 2, Article 725.3, 725.5

g. WAC 173-303

Section 070 (2) (a), (b), (3), (5), (6)
Section 081 (3), (4)
Section 082 (1), (3), (4)
Section 090 (5), (6), (7), (8)
Section 100 (3), (5), (6)
Section 104 (2)
Section 120 (1), (2), (3), (4)
Section 140 (b)
Section 145 (1), (2), (3) (FDNW notifies OC -- OC notifies regulators)
Section 150 (1), (3)
Section 160 (1), (2)
Section 161
Section 170 (1), (3)
Section 200 (1)
Section 210 (4), (5), (6)
Section 283 (3)
Section 330 (1), (2)
Section 340 (1), (2)
Section 380 (1), (2), (3) (a)
Section 395 (1) (a), (b), (3), (6)
Section 515 (1) (b), (c), (d)

h. WAC 173-360

Section 110 (9)
Section 120, Appendix B
Section 130 (2) (a)
Section 200 (1), (3), (5), (7)
Section 300
Section 305 (1) (b), (2) (b), (3) (a) (b)
Section 323
Section 335
Section 340 (1)

Section 345 (1), (6) (f) (v), (6) (g) (iii), (6) (h), (6) (j)
Section 350 (1), (2) (a)

APPENDIX L

PACKAGING REPORTS FOR IMMOBILIZED LOW ACTIVITY WASTE TRANSPORT

Waste Management Federal Services, Inc.

Northwest Operations
P. O. Box 650
Richland, WA 99352

Phone 509.376.7055
Fax 509.372.1435

July 21, 1997

WMNW-9756121

Mr. C. A. Petersen
Numatec Hanford Corporation H5-27
Post Office Box 1300
Richland, Washington 99352-1300

Dear Mr. Petersen:

TRANSMITTAL OF PACKAGING REPORTS FOR IMMOBILIZED LOW-ACTIVITY WASTE TRANSPORT

In accordance with the agreed scope of work, dated June 3, 1997 (P97-216), the following reports are attached:

1. "Onsite Transportation Safety Requirements for ILAW"

2. "Preliminary Shielding Requirements for the ILAW Transportation Package."

Please contact me or A. V. Savino if we can provide further assistance.

Very truly yours,

J. G. Field, Manager
Packaging Engineering

acp

Attachments 2

ONSITE TRANSPORTATION SAFETY REQUIREMENTS FOR ILAW

JULY 21, 1997

WASTE MANAGEMENT FEDERAL SERVICES, INC.,
NORTHWEST OPERATIONS

Preparer: J. E. Mercado J. E. Mercado

Section Chief: P. C. Ferrell P. C. Ferrell

ONSITE TRANSPORTATION SAFETY REQUIREMENTS FOR ILAW

J. E. Mercado July 21, 1997

1.0 INTRODUCTION

This report describes the Hanford Site transportation safety requirements applicable to the transfer of Immobilized Low-Activity Waste (ILAW) and provides guidance on how these requirements can be met. ILAW will be produced by the privatized Tank Waste Remediation System treatment contractors in the form of glass monoliths, glass marbles, or glass cullet. The ILAW will be loaded into a waste package and then into a shipping container. The shipping container is intended for reuse while the waste package is disposable and will contain the ILAW during storage.

2.0 SUMMARY OF ONSITE TRANSPORTATION SAFETY PROGRAM REQUIREMENTS

Packaging systems for radioactive material are intended to provide three critical functions: containment, shielding, and assurance of subcriticality. Onsite packaging systems are designed and operated in accordance with criteria established to support these functions. The authorizing document for use of onsite packaging systems containing significant quantities of radioactive material is the onsite Safety Analysis Report for Packaging (SARP). This document describes the packaging system, the approved payload, and the operating procedures as well as documenting the analyses that are performed to demonstrate the safety and performance of the packaging system.

Radiation levels on the exterior of onsite packaging systems should meet the same criteria that apply to offsite packaging systems. However, as specifically approved in the applicable packaging safety documentation (SARP), higher authorized radiation levels may be specified based on the Hanford Site Radiological Control Manual in accordance with ALARA and operational considerations.

Contamination levels on the exterior of the packaging should meet the same acceptance criteria that apply to offsite packaging including levels based on ALARA, operational considerations and those approved in the applicable SARP.

Criticality control acceptance criteria are generally the same as those applicable to offsite packaging systems, except that modifications can be made to account for normal onsite

transportation and credible onsite transportation accidents.

The criteria for containment are based on the principle that the radioactive contents shall be retained during normal onsite transportation as specified, evaluated, and approved in the applicable SARP. Evaluation criteria shall be in accordance with *"Report on Equivalent Safety for Transportation of Radioactive Materials", WHC-SD-TP-RPT-001.* Radioactive material contents shall be retained during accidents, as evaluated in dose consequence analyses in the SARP as follows:

1. For onsite transportation accidents which have predicted annual release frequencies of greater than one in a thousand, predicted doses due to loss of contents shall not exceed 200 mrem to any onsite individual or 10 mrem to any offsite individual.

2. For onsite transportation accidents which have predicted annual frequencies of between one in a million and one in a thousand, predicted doses due to loss of contents shall not exceed 5000 mrem to any onsite individual or 500 mrem to any offsite individual.

3. For onsite transportation accidents which have indeterminate annual release frequencies, predicted doses due to loss of contents shall not exceed 200 mrem to any onsite individual or 10 mrem to any offsite individual.

4. For accidents which have predicted annual release frequencies between one in a million and one in ten million, predicted doses due to loss of contents shall not exceed 25 rem to any offsite individual.

As the safety class system and related requirements (originally implemented via the *Safety Analysis Manual*, (WHC-CM-4-46)) apply solely to the design, specification, construction, and operation of facilities, the onsite transportation safety program was developed and documented in *Hazardous Material Packaging and Shipping* (WHC-CM-2-14). A graded system based on the hazard of the payload being shipped has been developed for onsite packaging systems that establishes an approach analogous to and compatible with the facility safety classification system and offsite transportation regulations. The graded approach is intended to provide flexibility and economy in developing a packaging system for radioactive materials.

Two designators determine the packaging system requirements for a proposed payload: the Transportation Hazard Indicator (THI) and the Quality Level (QL).

The THI is assigned to designate the relative safety significance of the onsite packaging system. This indicator is assigned based on the hazard of the authorized contents of the packaging system.

The definitions of requirements for each THI are documented in WHC-CM-2-14. In

summary, THI-1 represents the highest level of hazard from the contents. A packaging system assigned this level transports material that has the potential of causing a dose consequence to an individual in excess of 25 rem at the Hanford Site boundary if fully released. THI-4 is the lowest hazard level. A THI-4 packaging system transports material that has the potential of causing a dose consequence to an individual of less than 0.01 rem at the Hanford site boundary or less than 0.2 rem within the site, if fully released.

Four quality levels (QL) correspond to each THI. These quality levels determine the Quality Assurance (QA) requirements based on the importance to safety of the component or activity. Within each quality level are subsets for different levels of packaging components.

In general, the higher the potential hazard of the packaging contents, the stricter the requirements for the packaging system design, testing, and fabrication.

3.0 GUIDANCE ON MEETING THE APPLICABLE ONSITE PACKAGING REQUIREMENTS FOR THE ILAW PACKAGING SYSTEM

The primary requirements that apply to the ILAW packaging system are the shielding and the containment criteria. Due to the restrictions on the waste stream, it is assumed that the ILAW will be fissile-excepted, containing minimal quantities of fissile isotopes.

For the purposes of transportation, the packaging system consists of the waste package used in combination with the shipping container. If the waste package is designed as a sealed system, providing containment under shipping conditions, then it is possible that the shipping container will not be required to provide containment. This option depends on containment performance of the waste package and the contents under accident conditions and normal transport conditions. If the waste package provides the containment boundary, then the design of the final closure is critical to ensure that the system performs its function adequately. As discussed in Section 2.0, the containment boundary must prevent the release of material to the extent which will preclude the potential dose consequence from exceeding the applicable limit with respect to the corresponding annual accident rate. The release fractions applied to the ILAW payload in transportation accident scenarios are derived in a manner consistent with that used for the Preliminary Safety Evaluation.

In order to maintain dose rates at the required levels with respect to transportation requirements and ALARA, the packaging system may be required to provide shielding (see shielding report). Any supplementary shielding must be provided as part of the shipping container in order to maintain the waste packages at a reasonable weight and cost. It may be possible to design and operate a shipping container that has no lid, provided that the lack of shielding above the waste packages does not result in excessive doses to the operators and the waste package provides containment, as discussed above. Provisions to tie down the package over and above the requirements of the DOT regulations (49 CFR 173) to prevent the waste package from being ejected from an open top shipping container under normal conditions will

probably be required.

Another option to consider is to design a trailer integrated with the shipping container. If there is no operational need to remove the shipping containers from the transport trailer, then this approach may be recommended because it could be less expensive to build one or two specialized trailers than several shipping containers with high strength tiedown systems. Also, the structural integrity of the trailer can be used in the safety analyses.

In principle, the requirements discussed in this report apply strictly to transportation operations (i.e., transportation of radioactive materials between onsite facilities). Facility safety requirements apply to facility operations, including the transfer of radioactive materials from one location to another within the facility. For the initial phases of the operation during which the grout vaults are the destination for the ILAW waste packages, it is possible that the movement of the packages could be considered a facility operation. However, the requirements that apply to onsite packagings for transportation are fundamental safety requirements that would be applicable in a facility Safety Analysis Report (SAR). Site facility SARs rely heavily on the SARPs to demonstrate the safety of transportation operations. Furthermore, once the capacity of the grout vaults is exceeded, then the transportation of the ILAW to another facility will be required.

4.0 RECOMMENDATIONS

In order to initiate shipping container design, the following steps should be taken to establish the design criteria.

1. Define a bounding payload.

2. Perform a Transportation Hazard Indicator (THI) evaluation to determine the relative hazard of the package.

3. Perform a preliminary radiological risk evaluation.

4. Identify operational requirements and facility interfaces to determine handling requirements for the packaging system.

5. Prepare a Packaging Design Criteria document to identify the applicable criteria for the design and performance of the packaging systems.

PRELIMINARY SHIELDING REQUIREMENTS FOR THE ILAW TRANSPORTATION PACKAGE

JULY 21, 1997

WASTE MANAGEMENT FEDERAL SERVICES, INC.,
NORTHWEST OPERATIONS

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PRELIMINARY SHIELDING REQUIREMENTS FOR THE ILAW TRANSPORTATION PACKAGE

A. V. Savino
July 21, 1997

1.0 INTRODUCTION

This report documents a preliminary shielding evaluation performed for the Immobilized Low-Activity Waste (ILAW) transportation package. The evaluation identifies the shielding required for safe transport of the ILAW. The ILAW will contain radioactive contamination which has been immobilized, or solidified, in the form of a glass monolith, glass marbles, or glass cullets. The waste will first be placed in a waste package, which will then be loaded into a shipping container. A maximum of two shipping containers will be loaded on the transportation vehicle. The shipping container will be transported from the Tank Waste Remediation System treatment contractor's facility on the Hanford Site to the Grout facility. At the Grout facility, the waste package will be removed from the shipping container and placed into the vaults. The waste package is disposable and the shipping container is intended to be reused.

2.0 SOURCE TERM

This study assumes that the ILAW contains primarily cesium contamination, although analyses indicate that ^{154}Eu and very small amounts of ^{60}Co may also be present. The cesium is in the form of ^{137}Cs ($T_{1/2}$= 30.17 yr) and is assumed to be homogeneously mixed throughout the volume of the ILAW. The primary shielding hazard from ^{137}Cs is the 0.662 MeV gamma ray emitted by ^{137m}Ba, which is a daughter product of ^{137}Cs. The impact of the presence of ^{154}Eu and ^{60}Co is discussed in Section 5.0.

3.0 SHIELDING EVALUATION CRITERIA

Onsite transportation safety specifies a dose rate of less than 1000 mrem/h at the package (shipping container) surface, 10 mrem/h at 2 m from the package(s) after they are loaded on the transportation vehicle, and 2 mrem/h at the nearest normally occupied space, i.e., the driver location. Note, however, that if the driver is a qualified Hanford Site radiological worker, the dose rate limit is 5 mrem/h.

Two additional dose rate limits exist which are associated with handling of the package and are not transportation-related. If the waste package surface dose rate is 1000 mrem/h, the package is considered remote-handled, and if the surface dose rate is 200 mrem/h, the package is considered contact-handled. These dose rates will be factored into the shielding evaluation as discussed in Section 4.

4.0 SHIELDING EVALUATION

For purpose of this study, the waste package is defined as the waste inside of a 1.2 m x 1.2 m x 1.8 m steel box (outer dimensions) box with a 1.59 cm (5/8 in) steel wall. The ILAW transportation package is defined as the waste package inside of the shipping container.

The required thickness of the shipping container will be determined for two cases. The first assumes that the waste package is remote-handled and has a dose rate limit of 1000 mrem/h at the waste package surface (see Section 4.1). For the remote-handled case, the ^{137}Cs activity concentration that results in a surface dose rate of 1000 mrem/h will first be calculated. Then, using this activity concentration, the required thickness of the shipping container will be determined so that the transportation dose rate limits are met.

The second case (see Section 4.2) assumes that the waste package is loaded with 3 Ci/m^3 of ^{137}Cs. First, the waste package will be evaluated to determine if it qualifies as contact-handled, i.e., does not exceed a surface dose rate of 200 mrem/h. If the surface dose rate exceeds 200 mrem/h, the required amount of shielding in the waste package will be determined to meet the 200 mrem/h dose rate limit. Then, various dose rates will be calculated for the waste package (with the additional shielding to meet the 200 mrem/h dose rate limit), to see if the transportation dose rate limits are met without the shipping container. Finally, if the transportation dose rate limits are not met with the additional shielding, the required thickness of the shipping container will be determined so that the transportation dose rate limits are satisfied.

The ISO-PC computer program (Rittmann 1994) was used for the gamma-ray dose rate calculations. ISO-PC uses the point-kernel integration method to compute the dose rate at a detector location. Fluence-to-dose conversion factors were based on an anterior-to-posterior irradiation pattern (ANSI/ANS 1991).

The ILAW will potentially be in three different forms, that of a glass monolith, glass marbles, or glass cullets. The glass marbles occupy approximately 2/3 of the package volume, with air occupying the remaining 1/3 of the volume. This form of waste results in the most conservative shielding results, i.e., the highest dose rates for a given activity concentration, since it has the least amount of self-shielding. Therefore, it will be assumed for this study that the waste is in the form of glass marbles.

The glass waste composition was taken from Appendix 1 and is shown in Table 1. The average density of the glass waste material is 2.5 g/cc. The spreadsheet in Appendix 2 shows the calculations used to determine the density of each of the individual elements in the waste as listed in Table 2 below.

Table 1: Chemical Composition of Glass Waste	
Compound	Weight %
Na_2O	20.00
K_2O	1.52
Al_2O_3	10.00
B_2O_3	5.00
CaO	5.00
SiO_2	56.78
Other	1.70
Total	100.00

Table 2: Elemental Composition of Glass Waste Material			
Element	Weight Fraction	Density in Glass Marbles g/cc	Density in Waste Package* g/cc
Na	0.141	0.371	0.247
Al	0.082	0.132	0.088
Si	0.251	0.683	0.456
K	0.018	0.032	0.021
B	0.017	0.039	0.026
Ca	0.031	0.089	0.060
O	0.461	1.154	0.769
Total	1.000	2.500	1.667

* Density in waste package = 2/3 density in glass marbles

4.1 Remote-Handled Waste Package

The waste was modeled in ISO-PC as 1/3 air and 2/3 glass waste. The density of the air was taken to be 1/3 of the normal air density (4.07×10^{-4} g/cc = 0.00122/3) since the air only fills 1/3 of the package volume. The density of each element in the waste package was taken to be 2/3 of the density of the element in the glass marbles, as shown in the last column of Table 2. An activity concentration of 10.9 Ci/m^3 of ^{137}Cs is required to obtain a 1000 mrem/h dose rate at the waste package surface (detector at 1 cm from the surface). Note that the element carbon was used in place of boron in the ISO-PC model because boron is not contained in the ISO-PC material library. Because of the low

density of boron in the mixture, this will have a negligible impact on the dose rates. The ISO-PC input file for the waste package is included in Appendix 3.

As mentioned in Section 1.0, a maximum of two shipping containers will be transported together. The shielding evaluation must account for the dose contribution from both containers since there is a 10 mrem/h dose rate limit at 2 m from the packages after they are loaded on the transportation vehicle.

The arrangement of the shipping containers on the transport vehicle and the dimensions of the transport vehicle are not known at this time. Therefore, it was conservatively assumed that the shipping containers were arranged with very little spacing between the two, and with the short (1.2 m) side facing the driver, as shown in Figure 1. This arrangement results in the highest dose rates at the side of the vehicle. For simplicity, the two containers were conservatively modeled with no space between them in ISO-PC since the computer code cannot easily handle the two distinct radioactive sources in this case.

The shipping container must have a wall thickness of approximately 6.4 cm of steel for the remote-handled case. The dose rate is limited at 2 m from the packages, as shown in Table 3 below. With 6.4 cm of steel, all of the dose rate limits are met except for the driver if the distance between the driver and the shipping container is less than 3.5 m and there is no additional shielding in place. If the driver is a qualified Hanford radiological worker, no additional shielding is required if the driver is located 3 m from the shipping containers since the dose rate is less than 5 mrem/h. Note that due to the uncertainty in the driver location and the relative ease of adding shielding for the driver, the dose rate at the driver location was not used as a limiting criteria for this shielding evaluation.

If the packages are loaded such that the long (1.8 m) side is facing the driver (see Figure 2), the dose rate at 3 m is 3.7 mrem/h (versus 2.6 mrem/h for the other arrangement). This arrangement results in the highest driver dose rate. A distance of 4.3 m (versus 3.5 m) is required to bring the driver dose below 2 mrem/h. For this arrangement of the shipping containers, slightly less shielding (6.1 cm vs 6.4 cm) is required in the shipping container to meet the 2 m dose rate limit of 10 mrem/h. These results are summarized in Table 3. The ISO-PC input files are included in Appendix 3.

Table 3: Dose Rates for Remote-Handled Waste Package Containing 10.9 Ci/m^3 of ^{137}Cs, mrem/h			
Detector Location	Transportation Dose Rate Limit	Dose Rate with 6.4 cm[a] Steel (short side to driver)	Dose Rate with 6.1 cm[a] Steel (long side to driver)
shipping container surface	1000	24	24
2 m from shipping containers	10	10	10
Driver Location at 3 m	2	2.6[b]	3.7[b]
Driver Location at 3.5 m	2	2.0	NA
Driver Location at 4.3 m	2	NA	2.0

[a] The dose rate also accounts for 1.59 cm of steel in the wall of the waste package.

[b] Additional shielding will be required to bring the dose rate below the 2 mrem/h limit for a driver located 3 m from the shipping containers. If the driver is a qualified Hanford radiological worker, the dose rates meets the 5 mrem/h limit and no additional shielding is required.

4.2 Contact-Handled Waste Package

A ^{137}Cs activity concentration of 3 Ci/m^3 in the waste package was used for this case. The dose rate at the waste package surface is 275 mrem/h for this activity concentration, which exceeds the contact-handled dose rate limit of 200 mrem/h. Approximately 0.5 cm of additional steel shielding is required for the waste package to meet a surface dose rate of 200 mrem/h. The calculated dose rates for each location are listed in Table 4 for the waste package with an additional 0.5 cm of steel. Note that the transportation dose rate limits at 2 m and the driver location are exceeded if the shipping container wall is only 0.5 cm and the activity concentration is 3 Ci/m^3 in the waste package.

If it is assumed that the activity concentration of 3 Ci/m^3 applies only to the glass marbles, the actual activity concentration of ^{137}Cs in the waste package is only 2 Ci/m^3, since the marbles occupy only 2/3 of the waste package volume. For this situation, the dose rate at the waste package surface is 185 mrem/h, which is below the 200 mrem/h contact-handled dose rate limit. Therefore, the waste package meets the contact-handled dose rate limit with only the 1.59 cm (5/8 in) steel wall. Note, however, that additional shielding is required to meet the transportation dose rate limits at 2 m and at the driver location whether the ^{137}Cs activity concentration is 2 or 3 Ci/m^3.

A shipping container wall thickness of 3.85 cm is required to meet the transportation dose rate limit of 10 mrem/h at 2 m if the waste package has a 1.59 cm (5/8 in) steel wall. Table 4 shows the resulting dose rates for this case. Once again, the driver dose rate slightly exceeds the 2 mrem/h limit at 3 m. A distance of 3.3 m between the

driver and the shipping containers is required to meet the 2 mrem/h limit without additional shielding. If the driver is a qualified Hanford radiological worker, no additional shielding is required for a driver at 3 m since the dose rate is less than 5 mrem/h. Note that these results apply for the shipping containers arranged as shown in Figure 1.

For the sake of completeness, calculations were also made for the case where the shipping containers are arranged to maximize the driver dose (see Figure 2). If the packages are loaded with the long (1.8 m) side facing the driver, the dose rate at 3 m is 3.4 mrem/h versus 2.3 mrem/h for the other arrangement (see Figure 1). A distance of 4 m (versus 3.3 m) is required to bring the driver dose below 2 mrem/h. For this arrangement, slightly less shielding (3.4 cm vs 3.85 cm) is required in the shipping container to meet the 2 m dose rate limit of 10 mrem/h. The ISO-PC input files are included in Appendix 3.

Table 4: Dose Rates for Remote-Handled Waste Package Containing 3 Ci/m^3 of ^{137}Cs, mrem/h

Detector Location	Transportation Dose Rate Limit	Dose Rate w/ 0.5 cm[a] (short side to driver)	Dose Rate w/ 3.85 cm[a] (short side to driver)	Dose Rate w/ 3.4 cm[a] (long side to driver)
shipping container surface	1000	200	28	36
2 m from shipping containers	10	29[b]	9.9	10
Driver Location at 3 m	2	14[b]	2.3[c]	3.4[c]
Driver Location at 3.3 m	2	NA	2.0	NA
Driver Location at 4.0 m	2	NA	NA	2.0

[a] The dose rate also accounts for 1.59 cm of steel in the wall of the waste package.

[b] These results exceed the transportation dose rate limits and are presented for information only.

[c] Additional shielding will be required to bring the dose rate below the 2 mrem/h limit for a driver located 3 m from the shipping containers. If the driver is a qualified Hanford radiological worker, the dose rates meets the 5 mrem/h limit and no additional shielding is required.

5.0 SUMMARY AND CONCLUSIONS

A ^{137}Cs concentration of 10.9 Ci/m^3 results in a 1000 mrem/h dose rate at the waste package surface. The wall of the shipping container needs to be 6.4 cm for the remote-handled case, i.e., if the waste package surface dose rate is 1000 mrem/h. A shipping container wall thickness of 3.85 cm is required to meet the transportation dose rate limits if the activity concentration inside the waste package is 3 Ci/m^3. These thicknesses apply for the arrangement of the shipping containers shown in Figure 1, which maximizes the dose rate at 2 m. If the shipping containers are arranged to maximize the driver dose rate (see Figure 2), slightly less shielding is required to meet the 10 mrem/h dose rate limit at 2 m. However, either additional shielding will be required, or greater distances between the driver and the shipping container is required to meet the driver dose rate limits.

Only 0.5 cm of additional steel shielding is required in the waste package to reduce the surface dose rate to 200 mrem/h for a ^{137}Cs activity concentration of 3 Ci/m^3 in the waste package. If the activity concentration of 3 Ci/m^3 applies only to the glass marbles, the actual activity concentration of ^{137}Cs in the waste package is only 2 Ci/m^3, and the waste package surface dose rate is 185 mrem/h, which meets the contact-handled dose rate limit of 200 mrem/h with no additional shielding. Note, however, that additional shielding is required to meet the transportation dose rate limits at 2 m and at the driver location whether the ^{137}Cs activity concentration is 2 or 3 Ci/m^3.

In all cases examined, additional shielding or distance is required to bring the dose below the 2 mrem/h limit for the driver if the driver is not trained as a radiological worker. This assumes that the distance between the driver and the shipping container is 3 m.

This analysis conservatively assumes that the waste is in the form of glass marbles with an overall glass density of approximately 1.67 g/cc in the waste package. If the waste is in the form of a solid glass monolith with a density of 2.5 g/cc, approximately 16.3 Ci/m^3 of ^{137}Cs is required to obtain a dose rate of 1000 mrem/h at the surface of the waste package. The shipping container thicknesses in Tables 3 and 4 would not change appreciably if the waste was in the form of a glass monolith with an activity concentration of 16.3 Ci/m^3, since the dose rate at the surface of the waste package is the same (1000 mrem/h) for the glass marble case and the glass monolith case.

A few additional runs were made to assess the impact of the presence of ^{154}Eu and ^{60}Co on the surface dose rates. An activity concentration of 1 Ci/m^3 was assumed for all cases. For the sake of comparison, the dose rates are also included for 1 Ci/m^3 of ^{137}Cs. The dose rates in Table 5 are directly proportional to the ^{154}Eu or ^{60}Co activity concentration, and may be added to the shipping container surface dose rates presented above for ^{137}Cs after scaling them to an appropriate ^{154}Eu or ^{60}Co activity concentration (from sample results or other process information). Note that as the shield thickness increases, the impact of the presence of ^{154}Eu and ^{60}Co on the dose rates relative to ^{137}Cs becomes greater.

Table 5: Dose Rates for 1 Ci/m^3 of ^{137}Cs, ^{154}Eu and ^{60}Co				
Detector Location	Thickness of Steel cm	Dose Rate for ^{137}Cs mrem/h	Dose Rate for ^{154}Eu mrem/h	Dose Rate for ^{60}Co mrem/h
waste package surface	1.59	92	250	585
shipping container surface*	3.85	9.4	39	100
shipping container surface*	6.4	2.2	12	35

* Also accounts for the 1.59 cm waste package steel wall thickness.

The total glass waste, waste package, and shipping container weight is estimated in Table 6 for each of the shipping container thicknesses. These weights assume that the waste is in the form of glass marbles. If the waste is in the form of a glass monolith, approximately 4000 lb must be added to the total weight listed in the table. Weights are presented for the case where the shipping container has a lid and bottom with a thickness equal to the wall thickness, and also for a shipping container without a lid and bottom. Note that if the shipping container does not contain a lid, some type of hold-down device will be required to ensure that the waste package remains inside the shipping container during transport.

Table 6: Approximate Weight of a Single ILAW Transport Package		
Thickness of Steel cm	With Lid/Bottom pounds	W/out Lid/Bottom pounds
0*	11,200	11,200
3.85	20,100	16,900
6.4	26,000	20,300

* Glass waste and waste package only.

6.0 REFERENCES

ANS, 1991, *Neutron and Gamma-Ray Fluence-to-Dose Factors,* ANSI/ANS-6.1.1-1991, American Nuclear Society, La Grange Park, Illinois.

Rittmann, P. D., 1995, *ISO-PC Version 1.98 - User's Guide,* WHC-SD-WM-UM-030, Westinghouse Hanford Company, Richland, Washington.

FIGURE 1

Worst Case Shipping Container Orientation for Dose Rate at Side of Vehicle

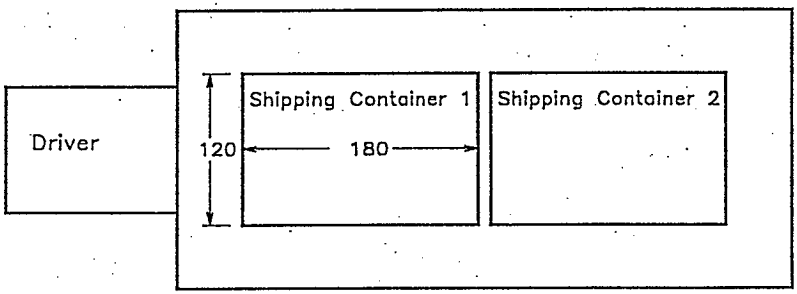
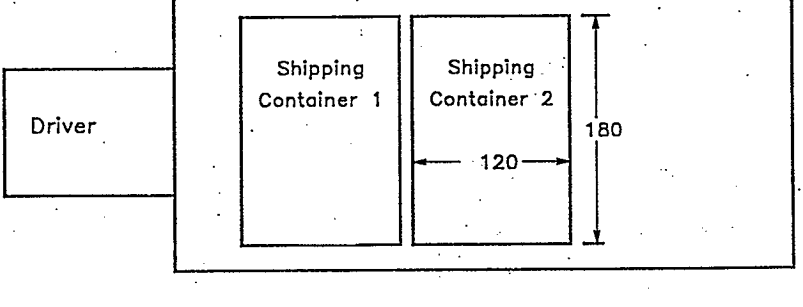


FIGURE 2

Worst Case Shipping Container Orientation for Driver Dose Rate



Appendix 1

CCMAIL Message for the Glass Composition

Author: Dewey A Jr Burbank at ~WHC156
Date: 6/30/97 3:37 PM
Priority: Normal
TO: Anthony V Savino at ~HANFORD08A
Subject: Re: ILLW Glass compositions
---------- Message Contents ----------
Jay,

The composition of LD6-5510 glass assumed for the composition of the private vendors product is as follows:

Component	Wt%
Na2O	20.00
K2O	1.52
Al2O3	10.00
B2O3	5.00
CaO	5.00
SiO2	56.78
'Other'	1.70
Total	100.00

For our original Microshield runs, the Material file for the glass was as follows:

Component	Atoms
B	144
O	2830
Na	645
Al	196
Si	947
K	31
Ca	89

Density = 2.50

Call if you have any more questions.

Dewey Burbank
372-0855

Appendix 2

Spreadsheet for Glass Composition Calculations

Glass Composition - Vendor Glass

Compound	Wgt %	Element	Atom Wgt	Atoms	Wgt frac of Comp	Wgt frac of Total
Na2O	20	Na	22.99	2	0.742	0.148
Mix Dens	0.5	O	15.999	1	0.258	0.052
Total for Compound			61.979		1.000	
Al2O3	10	Al	26.982	2	0.529	0.053
Mix Dens	0.25	O	15.999	3	0.471	0.047
Total for Compound			101.961		1.000	
SiO2*	58.48	Si	28.086	1	0.467	0.273
Mix Dens	1.462	O	15.999	2	0.533	0.311
Total for Compound			60.084		1.000	
K2O	1.52	K	39.102	2	0.830	0.013
Mix Dens	0.038	O	15.999	1	0.170	0.003
Total for Compound			94.203		1.000	
B2O3	5	B	10.811	2	0.311	0.016
Mix Dens	0.125	O	15.999	3	0.689	0.034
Total for Compound			69.619		1.000	
CaO	5	Ca	40.08	1	0.715	0.036
Mix Dens	0.125	O	15.999	1	0.285	0.014
Total for Compound			56.079		1.000	
Total for Glass Mixture			65.446			1.000

* SiO2 includes 1.7 wt% "Other"

Density of Glass Mixture 2.5 g/cc
Air makes up 1/3 of volume

Element	Wgt frac of Total	Density in Mix g/cc	Density in container g/cc
Na	0.148	0.371	0.247
Al	0.053	0.132	0.088
Si	0.273	0.683	0.456
K	0.013	0.032	0.021
B	0.016	0.039	0.026
Ca	0.036	0.089	0.060
O	0.461	1.154	0.769
Total	1.000	2.500	1.667

APPENDIX 3

ISO-PC Input Files

```
0        2   ILAW - 10.9 Ci/m3 Cs-137 in Waste Package
Rectangular Source Geom - Dose Rate at Surface
&Input Next= 1 , ISpec= 3 , IGeom= 10 , ICONC=1, SFACT=10.9, DUNIT=1,
 NTheta= 30, NPsi= 30, NShld= 2 , JBuf= 2, OPTION=0,
 SLTH= 176.82,
 y =  116.82,
 T(1)= 116.82,
 T(2)= 1.59 ,
 X= 119.41,
 WEIGHT(335) =    1,
 WEIGHT(336) =  0.946, &
 Na      25  0.247
 Al       7  0.088
 Si      27  0.456
 K       32  0.021
 B        6  0.026
 Ca      33  0.060
 O       23  0.769
 Air      3  4.06e-4
1Fe       9          7.86
End of Input
&Input Next= 6 &
```

```
 0         2   ILAW - 10.9 Ci/m3 Cs-137 w/ 1 Container
Rect Source Geom - Surface dose rate for 6.4 cm Steel
&Input Next= 1 , ISpec= 3 , IGeom= 10 , ICONC=1, SFACT=10.9, DUNIT=1,
 NTheta= 30, NPsi= 30, NShld= 3 , JBuf= 3, OPTION=0,
 SLTH= 176.82 ,
 y =   116.82 ,
 T(1)= 116.82 ,
 T(2)= 1.59 ,
 T(3)= 6.40 ,
 X= 125.81,
 WEIGHT(335) =    1,
 WEIGHT(336) =  0.946, &
 Na      25  0.247
 Al       7  0.088
 Si      27  0.456
 K       32  0.021
 B        6  0.026
 Ca      33  0.060
 O       23  0.769
 Air      3  4.06e-4
 Fe       9          7.86
1Fe       9                     7.86
End of Input
&Input Next= 4 &
0         2   ILAW - 10.9 Ci/m3 Cs-137 w/ 2 Containers -
Rect Source Geom - 10 mrem/h at 2 m
&Input Next= 1 , ISpec= 3 , IGeom= 10 , ICONC=1, SFACT=10.9, DUNIT=1,
 NTheta= 30, NPsi= 30, NShld= 3 , JBuf= 3, OPTION=0,
 SLTH= 353.64 ,
 y =   116.82 ,
 T(1)= 116.82 ,
 T(2)= 1.59 ,
 T(3)= 6.40 ,
 X= 324.81,
 WEIGHT(335) =    1,
 WEIGHT(336) =  0.946, &
 Na      25  0.247
 Al       7  0.088
 Si      27  0.456
 K       32  0.021
 B        6  0.026
 Ca      33  0.060
 O       23  0.769
 Air      3  4.06e-4
 Fe       9          7.86
1Fe       9                     7.86
End of Input
&Input Next= 4 &
0         2   ILAW - 10.9 Ci/m3 Cs-137 w/ 2 Containers -Short Facing Driver
Rect Source Geom - Driver Dose Rate at 3 m
&Input Next= 1 , ISpec= 3 , IGeom= 10 , ICONC=1, SFACT=10.9, DUNIT=1,
 NTheta= 30, NPsi= 30, NShld= 3 , JBuf= 3, OPTION=0,
 SLTH= 116.82 ,
 y =   116.82 ,
 T(1)= 353.64 ,
 T(2)= 1.59 ,
 T(3)= 6.40 ,
 X= 661.63,
 WEIGHT(335) =    1,
 WEIGHT(336) =  0.946, &
 Na      25  0.247
 Al       7  0.088
 Si      27  0.456
 K       32  0.021
 B        6  0.026
 Ca      33  0.060
 O       23  0.769
 Air      3  4.06e-4
 Fe       9          7.86
1Fe       9                     7.86
Dose Rate at 3.5 m - To get to 2 mrem/h
&Input Next= 4, X =711.63  &
End of Input
&Input Next= 6 &
```

```
0         2   ILAW - 10.9 Ci/m3 Cs-137 w/ 2 Containers - Long Facing Driver
Rect Source Geom - 10 mrem/h at 2 m from side
&Input Next= 1 , ISpec= 3 , IGeom= 10 , ICONC=1, SFACT=10.9, DUNIT=1,
 NTheta= 30, NPsi= 30, NShld= 3 , JBuf= 3, OPTION=0,
 SLTH= 233.64 ,
 y =  116.82 ,
 T(1)= 176.82 ,
 T(2)= 1.59 ,
 T(3)= 6.1 ,
 X= 384.51,
 WEIGHT(335) =    1,
 WEIGHT(336) =  0.946, &
 Na      25  0.247
 Al       7  0.088
 Si      27  0.456
 K       32  0.021
 B        6  0.026
 Ca      33  0.060
 O       23  0.769
 Air      3  4.06e-4
 Fe       9          7.86
1Fe       9                     7.86
End of Input
&Input Next= 4 &
0         2   ILAW - 10.9 Ci/m3 Cs-137 w/ 2 Containers - Long Facing Driver
Rect Source Geom - Dose Rate at 3 m - Worst 2 Cont Config -  Driver
&Input Next= 1 , ISpec= 3 , IGeom= 10 , ICONC=1, SFACT=10.9, DUNIT=1,
 NTheta= 30, NPsi= 30, NShld= 3 , JBuf= 3, OPTION=0,
 SLTH= 176.82 ,
 y =   116.82 ,
 T(1)= 233.64 ,
 T(2)= 1.59 ,
 T(3)= 6.4 ,
 X= 541.63,
 WEIGHT(335) =    1,
 WEIGHT(336) =  0.946, &
 Na      25  0.247
 Al       7  0.088
 Si      27  0.456
 K       32  0.021
 B        6  0.026
 Ca      33  0.060
 O       23  0.769
 Air      3  4.06e-4
 Fe       9          7.86
1Fe       9                     7.86
Dose Rate at 4.3 m - Driver
&Input Next= 4, X =671.63  &
End of Input
&Input Next= 6 &
```

```
0         2   ILAW - 3 Ci/m3 Cs-137 in Waste Package
Rectangular Source Geom - Dose Rate at Surface
&Input Next= 1 , ISpec= 3 , IGeom= 10 , ICONC=1, SFACT=3, DUNIT=1,
 NTheta= 30, NPsi= 30, NShld= 2 , JBuf= 2, OPTION=0,
 SLTH= 176.82,
 y =   116.82 ,
 T(1)= 116.82 ,
 T(2)= 1.59 ,
 X= 119.41,
 WEIGHT(335) =    1,
 WEIGHT(336) =  0.946, &
 Na     25  0.247
 Al      7  0.088
 Si     27  0.456
 K      32  0.021
 B       6  0.026
 Ca     33  0.060
 O      23  0.769
 Air     3  4.06e-4
1Fe      9          7.86
End of first run
&Input Next= 4 &
0         2   ILAW - 2 Ci/m3 Cs-137 in Waste Package (3 Ci/m3 in Glass Marbles)
Rectangular Source Geom - Dose Rate at Surface
&Input Next= 1 , ISpec= 3 , IGeom= 10 , ICONC=1, SFACT=2, DUNIT=1,
 NTheta= 30, NPsi= 30, NShld= 2 , JBuf= 2, OPTION=0,
 SLTH= 176.82,
 y =   116.82 ,
 T(1)= 116.82 ,
 T(2)= 1.59 ,
 X= 119.41,
 WEIGHT(335) =    1,
 WEIGHT(336) =  0.946, &
 Na     25  0.247
 Al      7  0.088
 Si     27  0.456
 K      32  0.021
 B       6  0.026
 Ca     33  0.060
 O      23  0.769
 Air     3  4.06e-4
1Fe      9          7.86
End of first run
&Input Next= 4 &
0         2   ILAW - 3 Ci/m3 Cs-137 in Waste Package- Contact-Handled
Rectangular Source Geom - Dose Rate at Surface - 200 mrem/h - 0.5 cm Fe
&Input Next= 1 , ISpec= 3 , IGeom= 10 , ICONC=1, SFACT=3, DUNIT=1,
 NTheta= 30, NPsi= 30, NShld= 3 , JBuf= 3, OPTION=0,
 SLTH= 176.82,
 y =   116.82 ,
 T(1)= 116.82 ,
 T(2)= 1.59 ,
 T(3)= 0.5 ,
 X= 119.91,
 WEIGHT(335) =    1,
 WEIGHT(336) =  0.946, &
 Na     25  0.247
 Al      7  0.088
 Si     27  0.456
 K      32  0.021
 B       6  0.026
 Ca     33  0.060
 O      23  0.769
 Air     3  4.06e-4
 Fe      9          7.86
1Fe      9                    7.86
Dose Rate at 2 m
&Input Next= 4, X =318.91  &
Dose Rate at 3 m - Driver Location
&Input Next= 4, X =418.91  &
End of Input
&Input Next= 6 &
```

```
 0        2   ILAW - 3 Ci/m3 Cs-137 in 1 Container - Contact Handled
Rectangular Source Geom - Dose Rate at Surface for 3.85 cm Steel
&Input Next= 1 , ISpec= 3 , IGeom= 10 , ICONC=1, SFACT=3, DUNIT=1,
 NTheta= 30, NPsi= 30, NShld= 3 , JBuf= 3, OPTION=0,
 SLTH= 176.82,
 y =   116.82 ,
 T(1)= 116.82 ,
 T(2)= 1.59 ,
 T(3)= 3.85 ,
 X= 123.26,
 WEIGHT(335) =    1,
 WEIGHT(336) =  0.946, &
 Na      25  0.247
 Al       7  0.088
 Si      27  0.456
 K       32  0.021
 B        6  0.026
 Ca      33  0.060
 O       23  0.769
 Air      3  4.06e-4
 Fe       9          7.86
1Fe       9                     7.86
End of first run
&Input Next= 4 &
0        2   ILAW - 3 Ci/m3 Cs-137 in 2 Containers- Contact-Handled
Rectangular Source Geom - Dose Rate at 2 m for 3.85 cm Steel
&Input Next= 1 , ISpec= 3 , IGeom= 10 , ICONC=1, SFACT=3, DUNIT=1,
 NTheta= 30, NPsi= 30, NShld= 3 , JBuf= 3, OPTION=0,
 SLTH= 353.64,
 y =   116.82 ,
 T(1)= 116.82 ,
 T(2)= 1.59 ,
 T(3)= 3.85 ,
 X= 322.26,
 WEIGHT(335) =    1,
 WEIGHT(336) =  0.946, &
 Na      25  0.247
 Al       7  0.088
 Si      27  0.456
 K       32  0.021
 B        6  0.026
 Ca      33  0.060
 O       23  0.769
 Air      3  4.06e-4
 Fe       9          7.86
1Fe       9                     7.86
End of Input
&Input Next= 4 &
0        2   ILAW - 3 Ci/m3 Cs-137 w/ 2 Containers -Short Facing Driver
Rect Source Geom - Driver Dose Rate at 3 m
&Input Next= 1 , ISpec= 3 , IGeom= 10 , ICONC=1, SFACT=3, DUNIT=1,
 NTheta= 30, NPsi= 30, NShld= 3 , JBuf= 3, OPTION=0,
 SLTH= 116.82 ,
 y =   116.82 ,
 T(1)= 353.64 ,
 T(2)= 1.59 ,
 T(3)= 3.85 ,
 X= 659.08,
 WEIGHT(335) =    1,
 WEIGHT(336) =  0.946, &
 Na      25  0.247
 Al       7  0.088
 Si      27  0.456
 K       32  0.021
 B        6  0.026
 Ca      33  0.060
 O       23  0.769
 Air      3  4.06e-4
 Fe       9          7.86
1Fe       9                     7.86
Dose Rate at 3.3 m - To get to 2 mrem/h
&Input Next= 4, X =689.08  &
End of Input
&Input Next= 6 &
```

```
 0         2   ILAW - 3 Ci/m3 Cs-137 w/ 1 Container - Long Facing Driver
Rect Source Geom - Surface Dose Rate for - 3.4 cm Steel
&Input Next= 1 , ISpec= 3 , IGeom= 10 , ICONC=1, SFACT=3, DUNIT=1,
 NTheta= 30, NPsi= 30, NShid= 3 , JBuf= 3, OPTION=0,
 SLTH= 176.82 ,
 y =   116.82 ,
 T(1)= 116.82 ,
 T(2)= 1.59 ,
 T(3)= 3.4 ,
 X= 122.81,
 WEIGHT(335) =    1,
 WEIGHT(336) =  0.946, &
 Na      25  0.247
 Al       7  0.088
 Si      27  0.456
 K       32  0.021
 B        6  0.026
 Ca      33  0.060
 O       23  0.769
 Air      3  4.06e-4
 Fe       9          7.86
1Fe       9                     7.86
End of Input
&Input Next= 4 &
0         2   ILAW - 3 Ci/m3 Cs-137 w/ 2 Containers - Long Facing Driver
Rect Source Geom - 10 mrem/h at 2 m from side - 3.4 cm Steel
&Input Next= 1 , ISpec= 3 , IGeom= 10 , ICONC=1, SFACT=3, DUNIT=1,
 NTheta= 30, NPsi= 30, NShid= 3 , JBuf= 3, OPTION=0,
 SLTH= 233.64 ,
 y =   116.82 ,
 T(1)= 176.82 ,
 T(2)= 1.59 ,
 T(3)= 3.4 ,
 X= 381.81,
 WEIGHT(335) =    1,
 WEIGHT(336) =  0.946, &
 Na      25  0.247
 Al       7  0.088
 Si      27  0.456
 K       32  0.021
 B        6  0.026
 Ca      33  0.060
 O       23  0.769
 Air      3  4.06e-4
 Fe       9          7.86
1Fe       9                     7.86
End of Input
&Input Next= 4 &
0         2   ILAW - 3 Ci/m3 Cs-137 w/ 2 Containers - Long Facing Driver
Rect Source Geom - Dose Rate at 3 m - Driver With 3.85 cm Steel
&Input Next= 1 , ISpec= 3 , IGeom= 10 , ICONC=1, SFACT=3, DUNIT=1,
 NTheta= 30, NPsi= 30, NShid= 3 , JBuf= 3, OPTION=0,
 SLTH= 176.82 ,
 y =   116.82 ,
 T(1)= 233.64 ,
 T(2)= 1.59 ,
 T(3)= 3.85 ,
 X= 539.08,
 WEIGHT(335) =    1,
 WEIGHT(336) =  0.946, &
 Na      25  0.247
 Al       7  0.088
 Si      27  0.456
 K       32  0.021
 B        6  0.026
 Ca      33  0.060
 O       23  0.769
 Air      3  4.06e-4
 Fe       9          7.86
1Fe       9                     7.86
Dose Rate at 4.0 m - Driver
&Input Next= 4, X =639.08  &
End of Input
&Input Next= 6 &
```

```
 0         2   ILAW - 16.3 Ci/m3 Cs-137 in Waste Package - Glass Monolith
Rectangular Source Geom - Dose Rate at Surface
&Input Next= 1 , ISpec= 3 , IGeom= 10 , ICONC=1, SFACT=16.3, DUNIT=1,
 NTheta= 30, NPsi= 30, NShld= 2 , JBuf= 2, OPTION=0,
 SLTH= 176.82,
 y =   116.82,
 T(1)= 116.82,
 T(2)= 1.59 ,
 X= 119.41,
 WEIGHT(335) =    1,
 WEIGHT(336) =  0.946, &
 Na      25  0.371
 Al       7  0.132
 Si      27  0.683
 K       32  0.032
 B        6  0.039
 Ca      33  0.089
 O       23  1.154
1Fe       9          7.86
End of Input
&Input Next= 6 &
```

```
 0         2   ILAW - 1 Ci/m3 Cs-137 in Waste Package
Rectangular Source Geom - Dose Rate at Surface
&Input Next= 1 , ISpec= 3 , IGeom= 10 , ICONC=1, SFACT=1, DUNIT=1,
 NTheta= 30, NPsi= 30, NShld= 2 , JBuf= 2, OPTION=0,
 SLTH= 176.82,
 y =   116.82,
 T(1)= 116.82,
 T(2)= 1.59 ,
 X= 119.41,
 WEIGHT(335) =    1,
 WEIGHT(336) =  0.946, &
 Na      25  0.247
 Al       7  0.088
 Si      27  0.456
 K       32  0.021
 B        6  0.026
 Ca      33  0.060
 O       23  0.769
 Air      3  4.06e-4
1Fe       9          7.86
0          2   ILAW - 1 Ci/m3 Cs-137 in 1 Container with 6.4 cm Steel
Rectangular Source Geom - Dose Rate at Surface
&Input Next= 1 , ISpec= 3 , IGeom= 10 , ICONC=1, SFACT=1, DUNIT=1,
 NTheta= 30, NPsi= 30, NShld= 2 , JBuf= 2, OPTION=0,
 SLTH= 176.82,
 y =   116.82,
 T(1)= 116.82,
 T(2)= 7.99 ,
 X= 125.81,
 WEIGHT(335) =    1,
 WEIGHT(336) =  0.946, &
 Na      25  0.247
 Al       7  0.088
 Si      27  0.456
 K       32  0.021
 B        6  0.026
 Ca      33  0.060
 O       23  0.769
 Air      3  4.06e-4
1Fe       9          7.86
0          2   ILAW - 1 Ci/m3 Cs-137 in 1 Container with 3.85 cm Steel
Rectangular Source Geom - Dose Rate at Surface
&Input Next= 1 , ISpec= 3 , IGeom= 10 , ICONC=1, SFACT=1, DUNIT=1,
 NTheta= 30, NPsi= 30, NShld= 2 , JBuf= 2, OPTION=0,
 SLTH= 176.82,
 y =   116.82,
 T(1)= 116.82,
 T(2)= 5.44 ,
 X= 123.26,
 WEIGHT(335) =    1,
 WEIGHT(336) =  0.946, &
 Na      25  0.247
 Al       7  0.088
 Si      27  0.456
 K       32  0.021
 B        6  0.026
 Ca      33  0.060
 O       23  0.769
 Air      3  4.06e-4
1Fe       9          7.86
End of Input
&Input Next= 6 &
```

```
0         2   ILAW - 1 Ci/m3 Eu-154 in Waste Package
Rectangular Source Geom - Dose Rate at Surface
&Input Next= 1 , ISpec= 3 , IGeom= 10 , ICONC=1, SFACT=1, DUNIT=1,
 NTheta= 30, NPsi= 30, NShld= 2 , JBuf= 2, OPTION=0,
 SLTH= 176.82,
 y =   116.82,
 T(1)= 116.82,
 T(2)= 1.59 ,
 X= 119.41,
 WEIGHT(415) =    1, &
 Na      25  0.247
 Al       7  0.088
 Si      27  0.456
 K       32  0.021
 B        6  0.026
 Ca      33  0.060
 O       23  0.769
 Air      3  4.06e-4
1Fe       9          7.86
0         2   ILAW - 1 Ci/m3 Eu-154 in 1 Container with 6.4 cm Steel
Rectangular Source Geom - Dose Rate at Surface
&Input Next= 1 , ISpec= 3 , IGeom= 10 , ICONC=1, SFACT=1, DUNIT=1,
 NTheta= 30, NPsi= 30, NShld= 2 , JBuf= 2, OPTION=0,
 SLTH= 176.82,
 y =   116.82,
 T(1)= 116.82,
 T(2)= 7.99 ,
 X= 125.81,
 WEIGHT(415) =    1, &
 Na      25  0.247
 Al       7  0.088
 Si      27  0.456
 K       32  0.021
 B        6  0.026
 Ca      33  0.060
 O       23  0.769
 Air      3  4.06e-4
1Fe       9          7.86
0         2   ILAW - 1 Ci/m3 Eu-154 in 1 Container with 3.85 cm Steel
Rectangular Source Geom - Dose Rate at Surface
&Input Next= 1 , ISpec= 3 , IGeom= 10 , ICONC=1, SFACT=1, DUNIT=1,
 NTheta= 30, NPsi= 30, NShld= 2 , JBuf= 2, OPTION=0,
 SLTH= 176.82,
 y =   116.82,
 T(1)= 116.82,
 T(2)= 5.44 ,
 X= 123.26,
 WEIGHT(415) =    1, &
 Na      25  0.247
 Al       7  0.088
 Si      27  0.456
 K       32  0.021
 B        6  0.026
 Ca      33  0.060
 O       23  0.769
 Air      3  4.06e-4
1Fe       9          7.86
End of Input
&Input Next= 6 &
```

```
 0         2   ILAW - 1 Ci/m3 Co-60 in Waste Package
Rectangular Source Geom - Dose Rate at Surface
&Input Next= 1 , ISpec= 3 , IGeom= 10 , ICONC=1, SFACT=1, DUNIT=1,
 NTheta= 30, NPsi= 30, NShid= 2 , JBuf= 2, OPTION=0,
 SLTH= 176.82,
 y =   116.82,
 T(1)= 116.82,
 T(2)= 1.59 ,
 X= 119.41,
 WEIGHT(472) =    1, &
 Na      25  0.247
 Al       7  0.088
 Si      27  0.456
 K       32  0.021
 B        6  0.026
 Ca      33  0.060
 O       23  0.769
 Air      3  4.06e-4
1Fe       9          7.86
0          2   ILAW - 1 Ci/m3 Co-60 in 1 Container with 6.4 cm Steel
Rectangular Source Geom - Dose Rate at Surface
&Input Next= 1 , ISpec= 3 , IGeom= 10 , ICONC=1, SFACT=1, DUNIT=1,
 NTheta= 30, NPsi= 30, NShid= 2 , JBuf= 2, OPTION=0,
 SLTH= 176.82,
 y =   116.82,
 T(1)= 116.82,
 T(2)= 7.99 ,
 X= 125.81,
 WEIGHT(472) =    1, &
 Na      25  0.247
 Al       7  0.088
 Si      27  0.456
 K       32  0.021
 B        6  0.026
 Ca      33  0.060
 O       23  0.769
 Air      3  4.06e-4
1Fe       9          7.86
0          2   ILAW - 1 Ci/m3 Co-60 in 1 Container with 3.85 cm Steel
Rectangular Source Geom - Dose Rate at Surface
&Input Next= 1 , ISpec= 3 , IGeom= 10 , ICONC=1, SFACT=1, DUNIT=1,
 NTheta= 30, NPsi= 30, NShid= 2 , JBuf= 2, OPTION=0,
 SLTH= 176.82,
 y =   116.82,
 T(1)= 116.82,
 T(2)= 5.44 ,
 X= 123.26,
 WEIGHT(472) =    1, &
 Na      25  0.247
 Al       7  0.088
 Si      27  0.456
 K       32  0.021
 B        6  0.026
 Ca      33  0.060
 O       23  0.769
 Air      3  4.06e-4
1Fe       9          7.86
End of Input
&Input Next= 6 &
```

CHECKLIST FOR REVIEW

Document Reviewed: Preliminary Shielding Requirements for the ILAW Transportation Package

Scope of Review: entire document

Yes	No	NA	
[ ]	[ ]	[✓] *	Previous reviews complete and cover analysis, up to scope of this review, with no gaps.
[✓]	[ ]	[ ]	Problem completely defined.
[✓]	[ ]	[ ]	Accident scenarios developed in a clear and logical manner.
[✓]	[ ]	[ ]	Necessary assumptions explicitly stated and supported.
[✓]	[ ]	[ ]	Computer codes and data files documented.
[✓]	[ ]	[ ]	Data used in calculations explicitly stated in document.
[✓]	[ ]	[ ]	Data checked for consistency with original source information as applicable.
[✓]	[ ]	[ ]	Mathematical derivations checked including dimensional consistency of results.
[✓]	[ ]	[ ]	Models appropriate and used within range of validity or use outside range of established validity justified.
[✓]	[ ]	[ ]	Hand calculations checked for errors. Spreadsheet results should be treated exactly the same as hand calculations.
[✓]	[ ]	[ ]	Software input correct and consistent with document reviewed.
[✓]	[ ]	[ ]	Software output consistent with input and with results reported in document reviewed.
[✓]	[ ]	[ ]	Limits/criteria/guidelines applied to analysis results are appropriate and referenced. Limits/criteria/guidelines checked against references.
[✓]	[ ]	[ ]	Safety margins consistent with good engineering practices.
[✓]	[ ]	[ ]	Conclusions consistent with analytical results and applicable limits.
[✓]	[ ]	[ ]	Results and conclusions address all points required in the problem statement.
[✓]	[ ]	[ ]	Format consistent with appropriate NRC Regulatory Guide or other standards
[ ]		[✓] *	Review calculations, comments, and/or notes are attached.
[✓]	[ ]	[ ]	Document approved.

J. G. McFadden J G McFadden 7/21/97
Reviewer (Printed Name and Signature) Date

* Any calculations, comments, or notes generated as part of this review should be signed, dated and attached to this checklist. Such material should be labeled and recorded in such a manner as to be intelligible to a technically qualified third party.

APPENDIX M

SKETCHES

ES-W465-C1	PROJECT COVER PAGE DRAWING LIST
ES-W465-C2	PROJECT SITE PLAN
ES-W465-A1	OVERALL BUILDING FLOOR PLAN
ES-W465-A2	OVERALL BUILDING SECTIONS
ES-W465-E1	ELECTRICAL ONE LINE DIAGRAM
ES-W465-T1	TRACTOR/TRAILER ILAW TRANSPORT VEHICLE
ES-W465-L1	ILAW LOGIC FLOW DIAGRAM
ES-W465-S1	ILAW VAULT END WALL EXTENSION
ES-W465-S2	ILAW VAULT SIDE WALL EXTENSION
ES-W465-R1	ILAW VAULT SHIELD ZONES
ES-W465-P1	ILAW VAULT STORAGE ARRAY
ES-W465-D1	GROUT VAULT DEMOLITION PLAN
ES-W465-D2	GROUT VAULT DEMOLITION SECTION
ES-W465-D3	GROUT VAULT ROOF PLANK LIFTING CONNECTOR

FLUOR DANIEL NORTHWEST	ENGINEERING SKETCH IMMOBILIZED LOW ACTIVITY WASTE			
Title: PROJECT SITE PLAN DRAWING LIST	Prepared by: P LAING	Sh 1 of 1	Sketch no. ES-W465-C1	Rev 0
	Checked by: R Hollenbeck	Cadfile I465C1		

PROJECT TITLE:

W-465
IMMOBILIZED LOW ACTIVITY WASTE

FOR:

U S DEPARTMENT OF ENERGY
RICHLAND OPERATIONS OFFICE

BY:

FLUOR DANIEL NORTHWEST

ENGINEERING SKETCH LIST

ILAW SKETCHES

ES-W465-C1 PROJECT COVER PAGE DRAWING LIST
ES-W465-C2 PROJECT SITE PLAN

ES-W465-A1 OVERALL BUILDING FLOOR PLAN
ES-W465-A2 OVERALL BUILDING SECTIONS

ES-W465-E1 ELECTRICAL ONE LINE DIAGRAM

ES-W465-T1 TRACTOR/TRAILER ILAW TRANSPORT VEHICLE

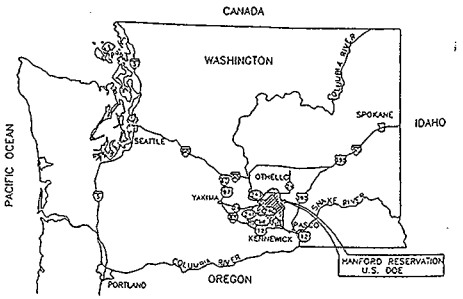
ES-W465-L1 ILAW LOGIC FLOW DIAGRAM

ES-W465-S1 ILAW VAULT END WALL EXTENSION
ES-W465-S2 ILAW VAULT SIDE WALL EXTENSION

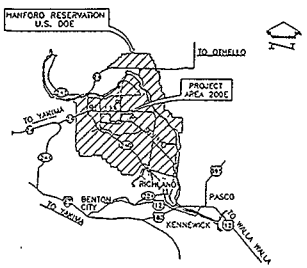
ES-W465-R1 ILAW VAULT SHIELD ZONES

ES-W465-P1 ILAW VAULT STORAGE ARRAY

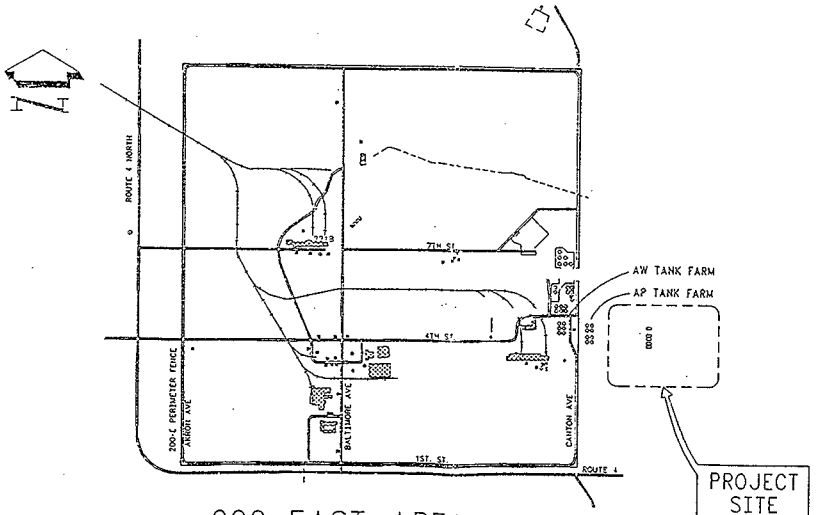
ES-W465-D1 GROUT VAULT DEMOLITION PLAN
ES-W465-D2 GROUT VAULT DEMOLITION SECTION
ES-W465-D3 GROUT VAULT ROOF PLANK LIFTING CONNECTOR



REGIONAL MAP



VICINITY MAP



200 EAST AREA

PROJECT SITE PLAN

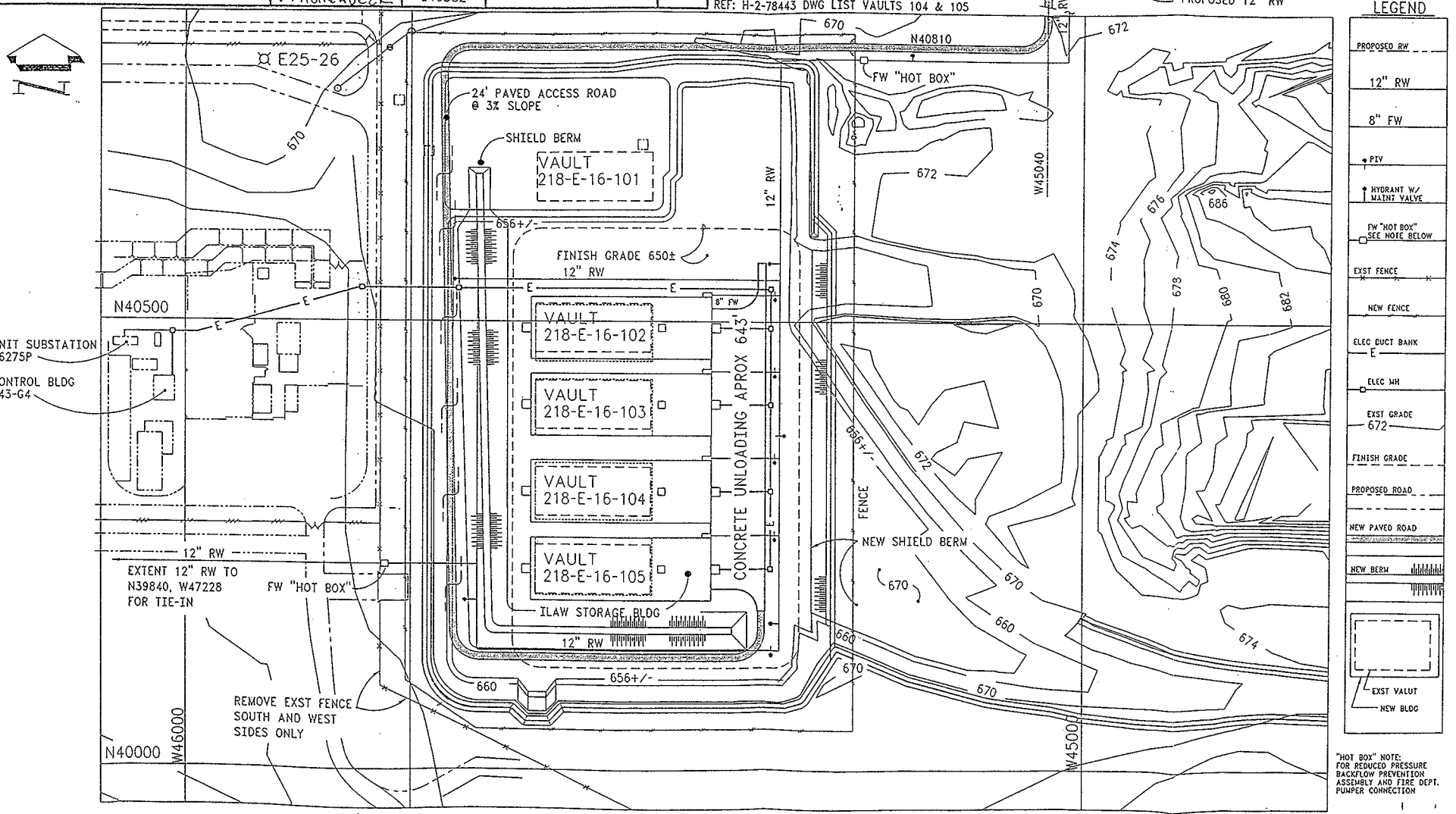
FLUOR DANIEL NORTHWEST

ENGINEERING SKETCH
IMMOBILIZED LOW ACTIVITY WASTE

Title:	Prepared by:	Sh of	Sketch no.	Rev
PROJECT SITE PLAN	P LAING	1 1	ES-W465-C2	0
	Checked by: R Hollenbeck	Cadfile I465C2		

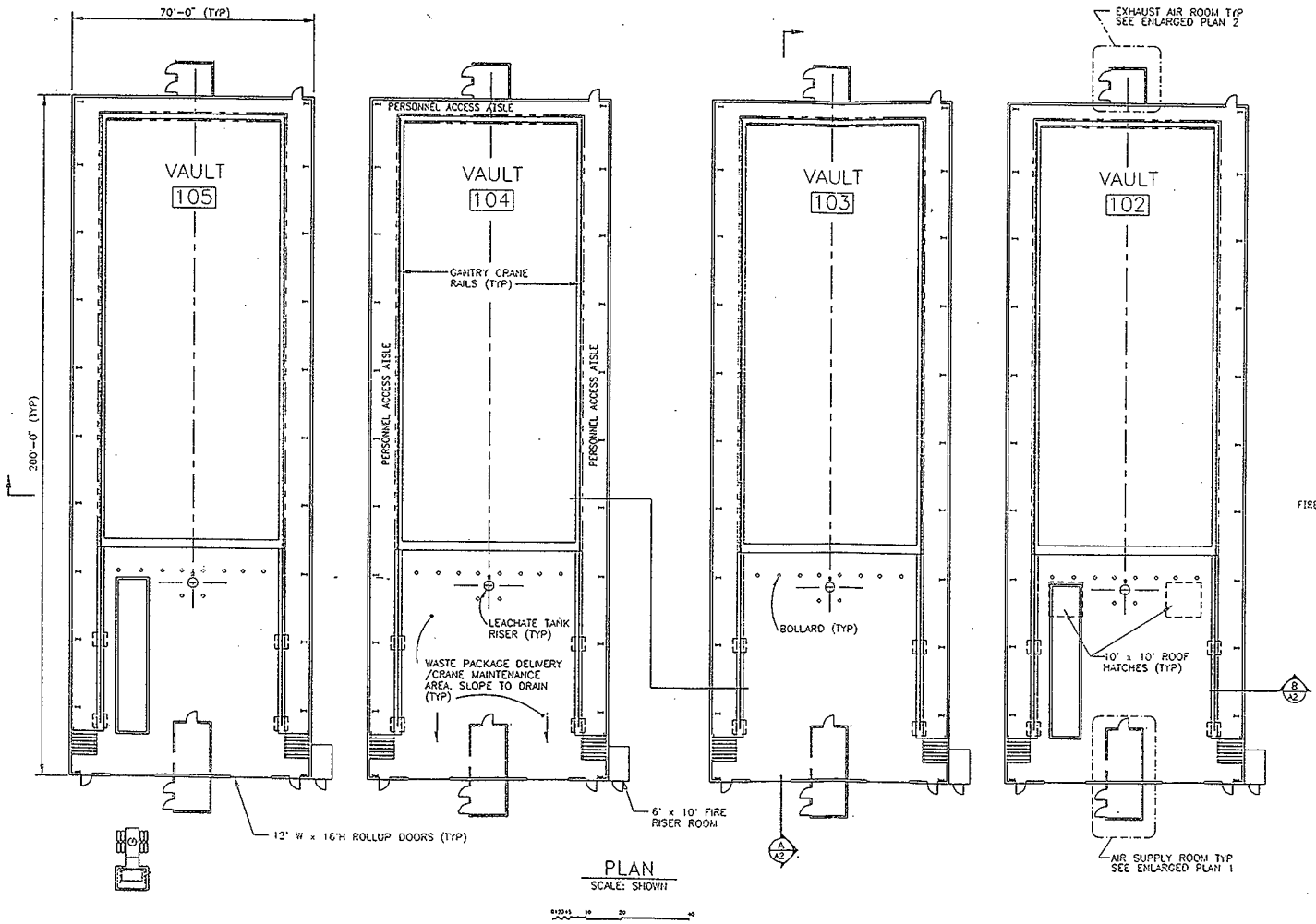
100 0 100 200
SCALE IN FEET

REF: H-2-77573 DWG LIST VAULTS 102 & 103
REF: H-2-78443 DWG LIST VAULTS 104 & 105

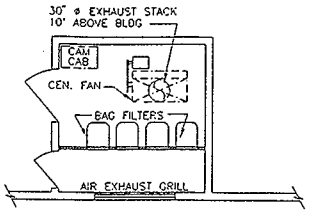


"HOT BOX" NOTE:
FOR REDUCED PRESSURE BACKFLOW PREVENTION ASSEMBLY AND FIRE DEPT. PUMPER CONNECTION

FLUOR DANIEL NORTHWEST	ENGINEERING SKETCH IMMOBLIIZED LOW ACTIVITY WASTE			
Title: OVERALL BUILDING FLOOR PLAN	Prepared by: R REDMAN Checked by:	Sh of 1 1 Cognite I465A1	Sketch no. ES-W465-A1	Rev 0

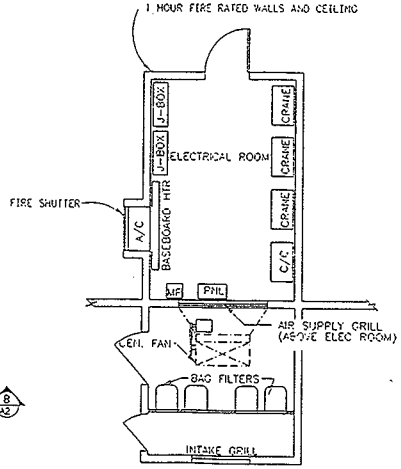


PLAN
SCALE: SHOWN



TYPICAL EXHAUST AIR ROOM
ENLARGED PLAN 2

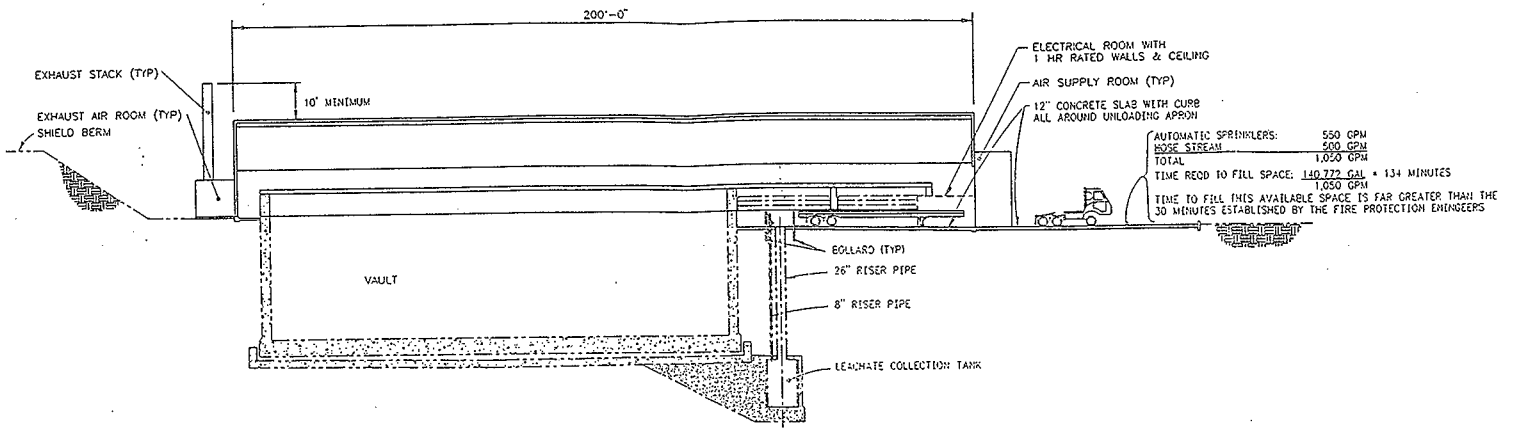
OVERALL AIR EXHAUST ROOM SIZE 10' x 10'



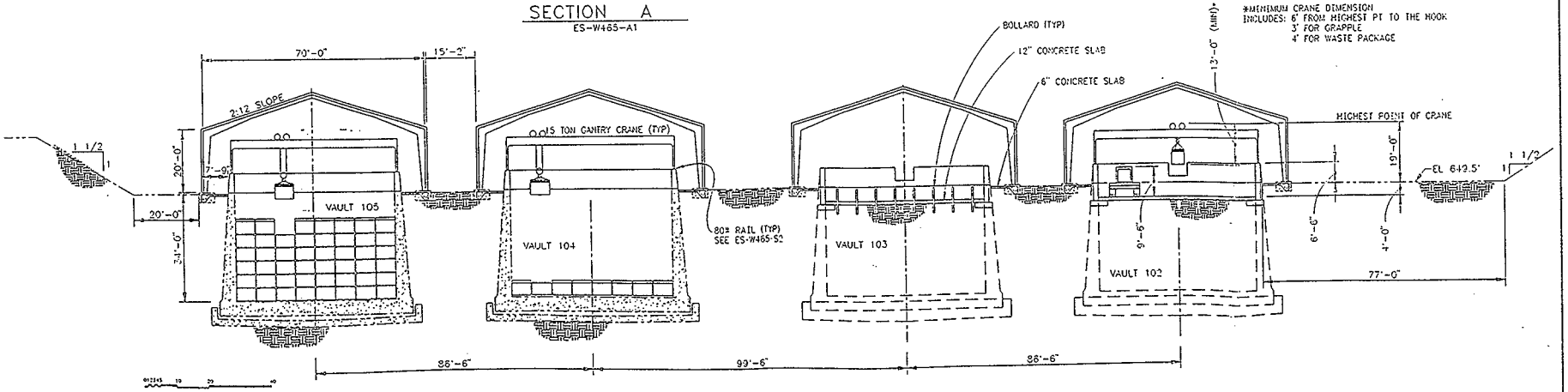
TYPICAL AIR SUPPLY ROOM
ENLARGED PLAN 1

OVERALL AIR SUPPLY ROOM SIZE 10' x 10'
OVERALL ELECTRICAL ROOM SIZE 12' x 25'
ELECTRICAL ROOM CEILING HT 10'

FLUOR DANIEL NORTHWEST	ENGINEERING SKETCH IMMOBILIZED LOW ACTIVITY WASTE			
Title: OVERALL BUILDING SECTIONS	Prepared by: R REDMAN Checked by: [signature]	Sh of 1 1 Cadfile I465A2	Sketch no. ES-W465-A2	Rev 0



SECTION A
ES-W465-A1

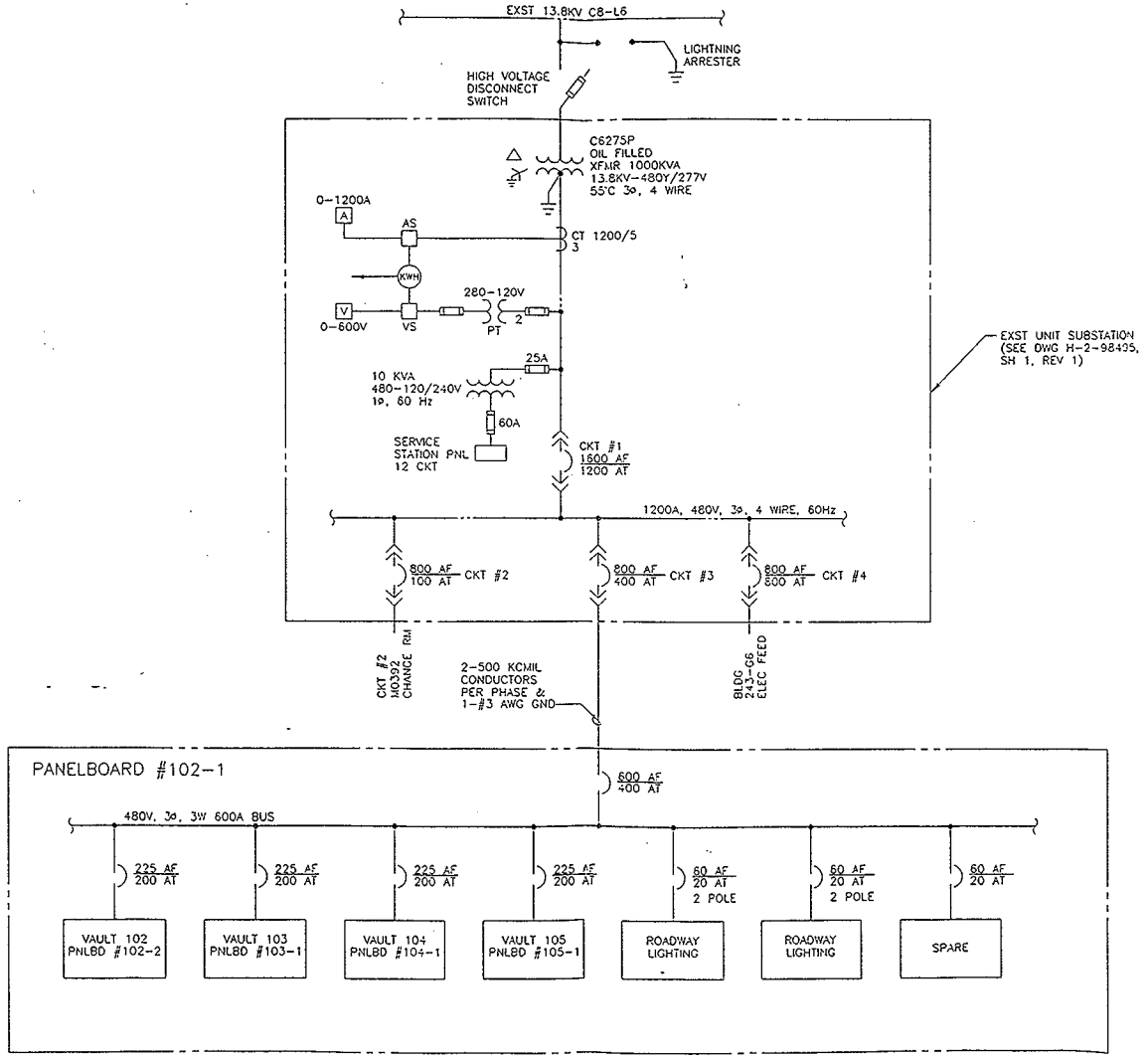


SECTION B
ES-W465-A1

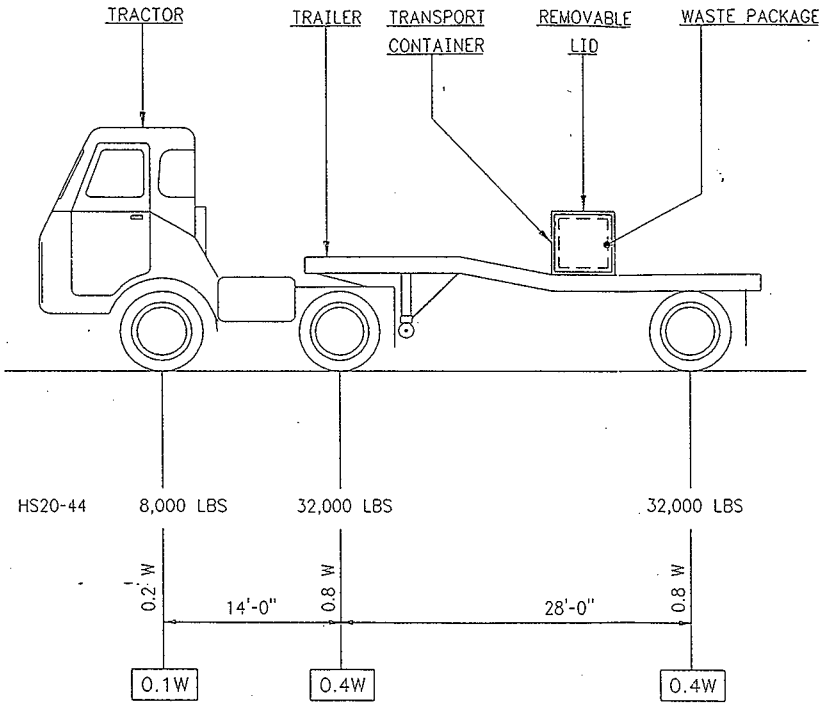
FLUOR DANIEL NORTHWEST	ENGINEERING SKETCH IMMOBILIZED LOW ACTIVITY WASTE			
Title: ELECTRICAL ONE-LINE DIAGRAM	Prepared by: CL CLOUD Checked by: M L Alexander	Sh of 1 1 Cadfile I465E1	Sketch no. ES-W465-E1	Rev 0

LEGEND

CT – CURRENT TRANSFORMER
PT – POTENTIAL TRANSFORMER
VS – VOLTAGE SWITCH
AS – AMMETER SWITCH
AF – AMPERE FRAME
AT – AMPERE TRIP



FLUOR DANIEL NORTHWEST	ENGINEERING SKETCH IMMOBILIZED LOW ACTIVITY WASTE			
Title: TRACTOR/TRAILER ILAW TRANSPORT VEHICLE	Prepared by: P LAING Checked by: R Hollenbeck	Sh 1 of 1 Cadfile I465T1	Sketch no. ES-W465-T1	Rev 0



W = COMBINED WEIGHT OF FIRST TWO AXLES

MAXIMUM ALLOWABLE GROSS WEIGHT AS DIRECTED BY DRD: 45,000 kg (99,000 LBS)

TRACTOR/TRAILER ILAW TRANSPORT VEHICLE

* 3" THICK CARBON STEEL SHIELDING CASK

GROSS VEHICLE WEIGHT:

TRACTOR	19,000 LBS
TRAILER	7,500 LBS
TRANSPORT CONTAINER	21,000 LBS *
WASTE PACKAGE	22,000 LBS
TOTAL ±	69,500 LBS

FLUOR DANIEL NORTHWEST

ENGINEERING SKETCH
IMMOBILIZED LOW ACTIVITY WASTE

Title:	Prepared by:	Sh of	Sketch no.	Rev
ILAW LOGIC FLOW DIAGRAM	P LAING	1 1	ES-W465-L1	0
	Checked by:	Cadfile I465L1		

INITIAL TRANSPORT TRAILER LOCATIONS
VITRIFICATION BUILDING
1 LOADED TRAILER 1 EMPTY TRAILER
ILAW VAULTS
1 EMPTY TRAILER

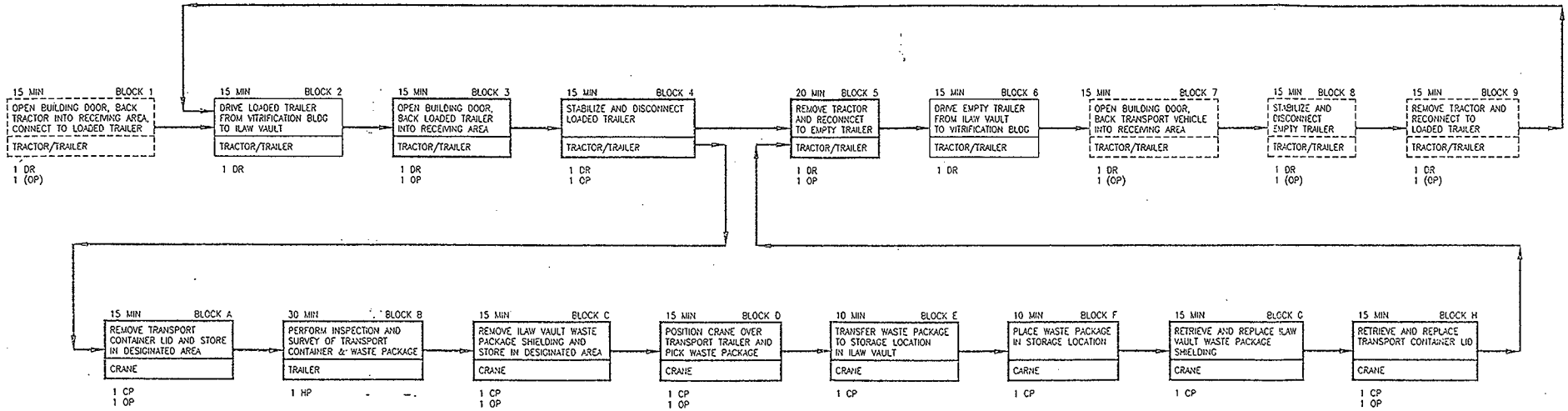
CRANE TRAVEL TIMES	
TOTAL TIME	7 MIN
HOIST & LOWER	3 MIN
TROLLEY MAX	2 MIN
GANTRY MAX	2 MIN
CASK LID	3 MIN

MANPOWER LEGEND

DR = DRIVER ----------> 1
MW = MILL WRIGHT --------> 2
OP = OPERATOR ----------> 1
CP = CRANE OPERATOR -----> 1
HP = HEALTH PHYSICIST -----> 1
SUPERVISOR ----------> 1

TOTAL MANPOWER REQUIRED --> 7

(OP) = VITRIFICATION PLANT OPERATOR



CYCLE TIMES:

INITIAL WASTE PACKAGE:
BLOCKS 1 – 4 AND BLOCKS A – H; = 3 HRS 5 MIN

SUBSEQUENT WASTE PACKAGES: (PARALLEL CYCLES)
BLOCKS 2 – 9; = 2 HRS 5 MIN
BLOCKS A – H; = 2 HRS 5 MIN

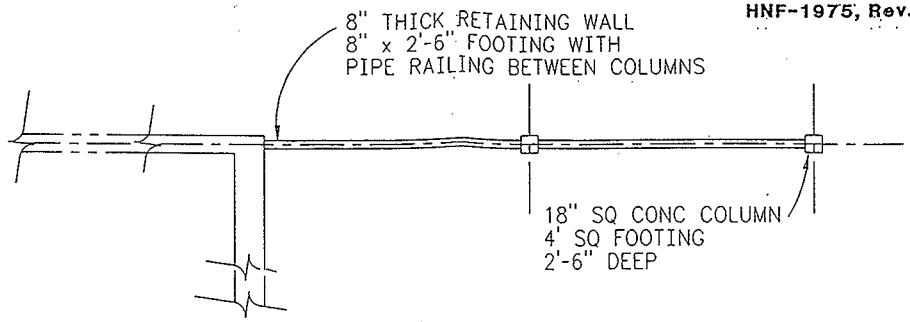
BLOCK LEGEND:

AT VITRIFICATION BUILDING

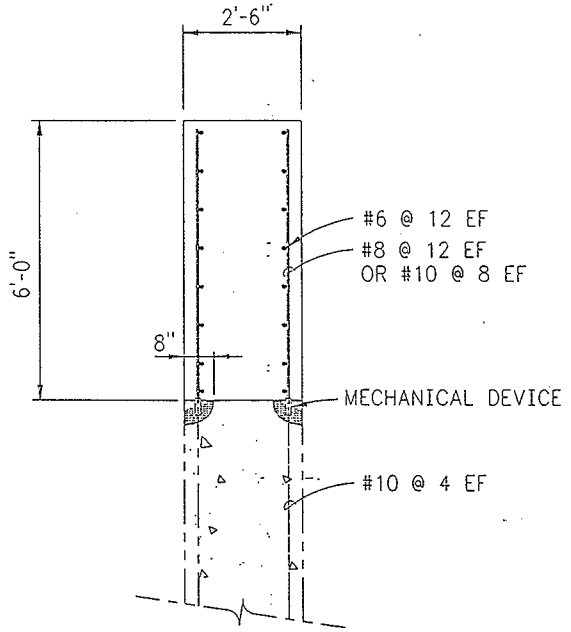
DURING TRAILER TRANSPORT

AT ILAW VAULT

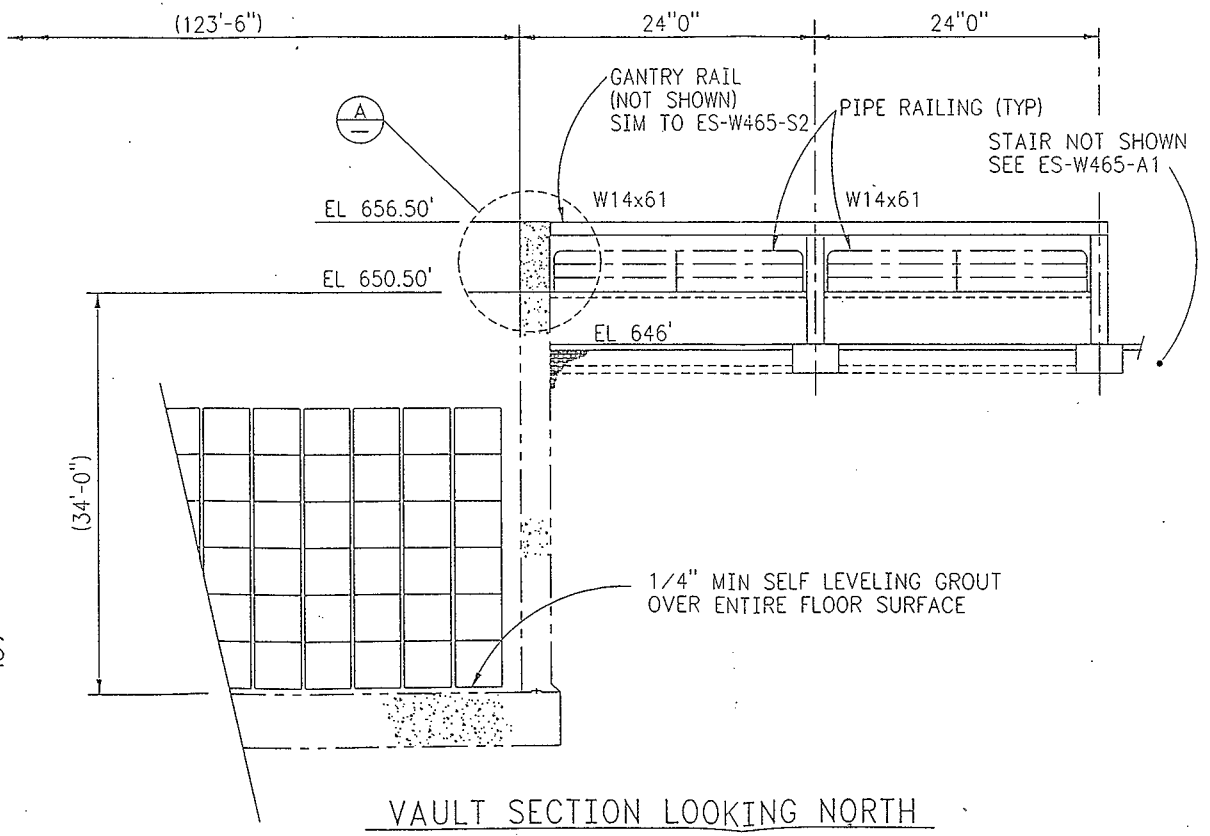
FLUOR DANIEL NORTHWEST	ENGINEERING SKETCH IMMOBILIZED LOW ACTIVITY WASTE			
Title: ILAW VAULT END WALL EXTENSION	Prepared by: P LAING	Sh of 1 1	Sketch no. ES-W465-S1	Rev 0
	Checked by: R Hollenbeck	Cadfile I465S1		



PARTIAL PLAN GANTRY RAIL EXTENSION

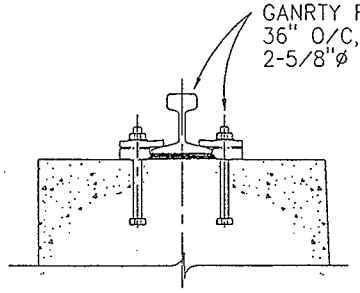


TYPICAL WEST AND EAST ENDS
(A) END WALL EXTENSION
NO SCALE

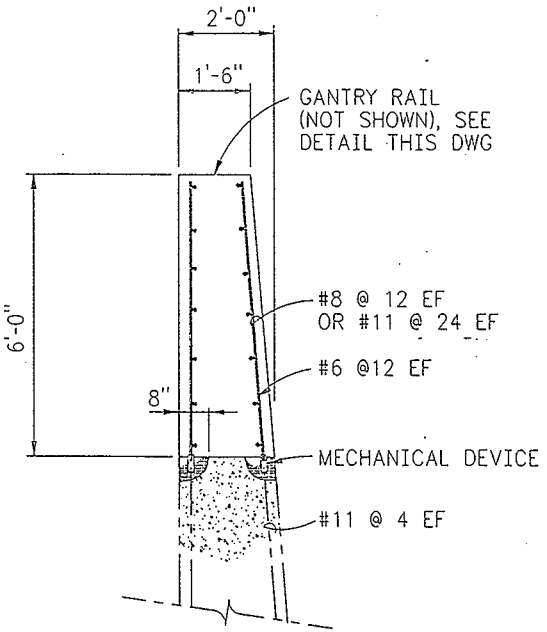


VAULT SECTION LOOKING NORTH

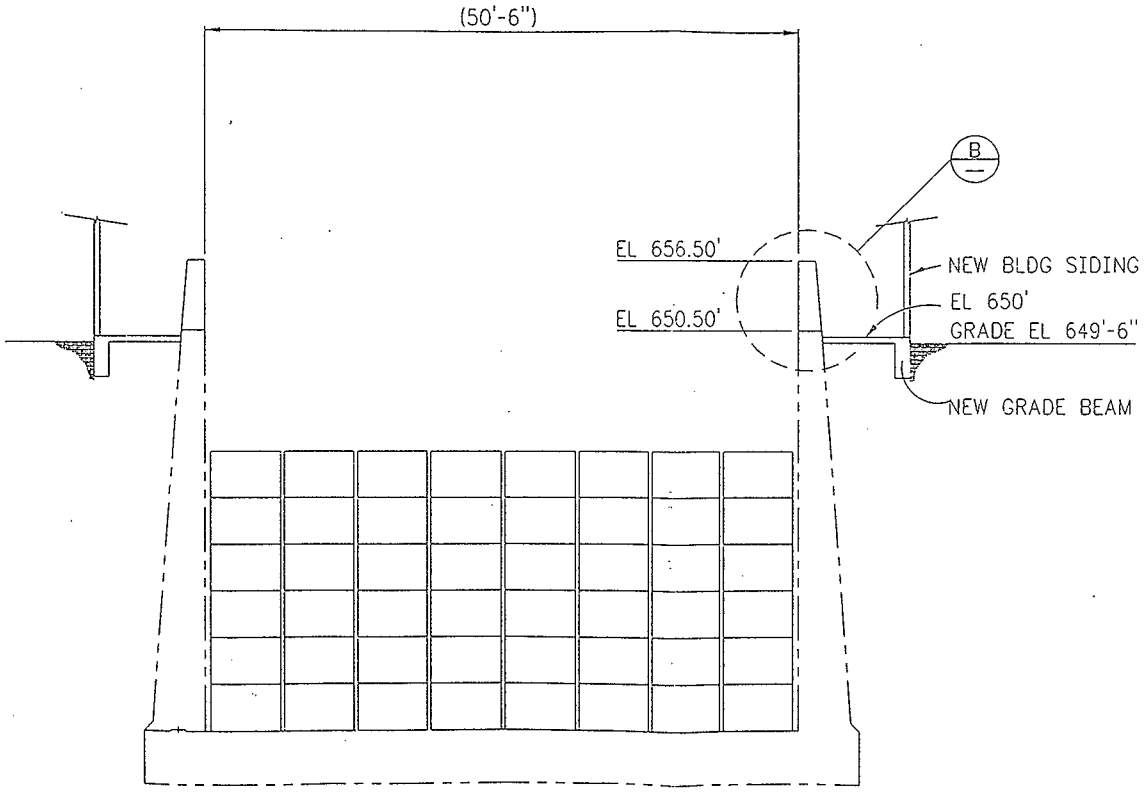
FLUOR DANIEL NORTHWEST	ENGINEERING SKETCH IMMOBILIZED LOW ACTIVITY WASTE			
Title: ILAW VAULT SIDE WALL EXTENSION	Prepared by: P LAING	Sh of 1 1	Sketch no. ES-W465-S2	Rev 0
	Checked by: RC Hollenbeck	Cadfile I465S2		



GANTRY RAIL CONNECTION



B — SIDE WALL EXTENSION
NO SCALE

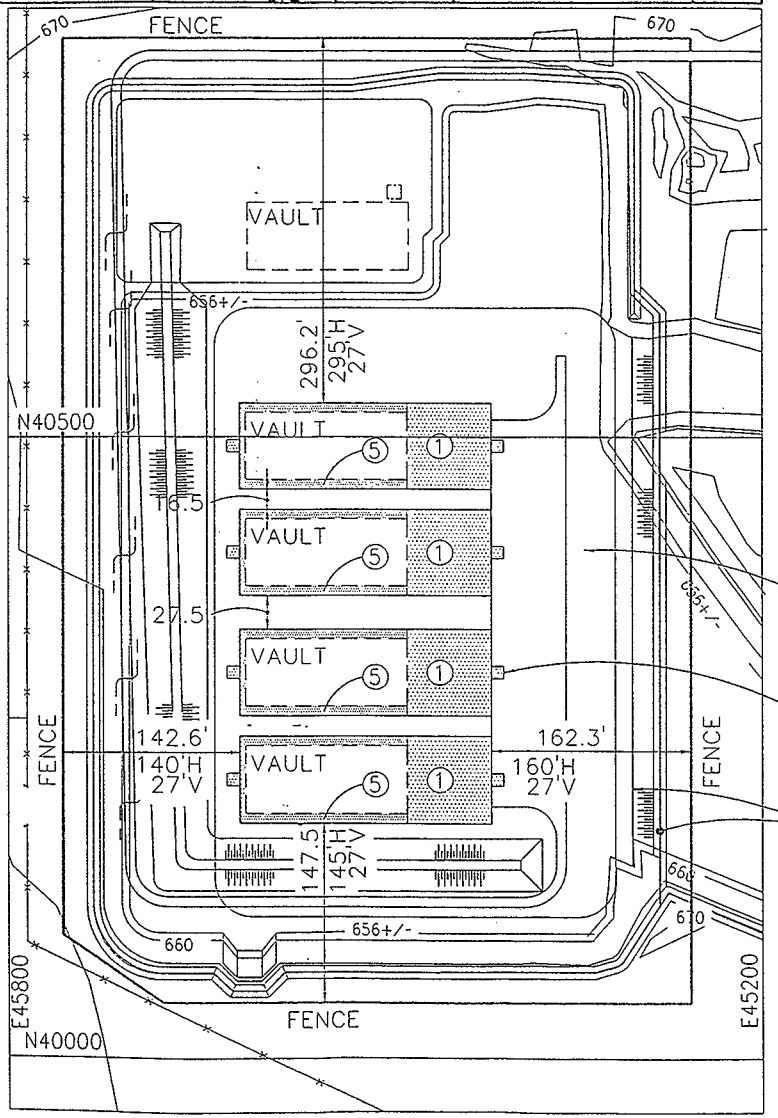


VAULT SECTION LOOKING WEST

FLUOR DANIEL NORTHWEST

ENGINEERING SKETCH
IMMOBILIZED LOW ACTIVITY WASTE

Title:	Prepared by:	Sh of	Sketch no.	Rev
ILAW VAULT SHIELD ZONES	P LAING	1 1	ES-W465-R1	0
	Checked by: R Hollenbeck	Cadfile I465R1		



① CONTROLLED AREA BETWEEN FENCE AND ENCLOSURE BUILDINGS

② EIGHT PLACES

NEW SHIELD BERM

100 0 100 200

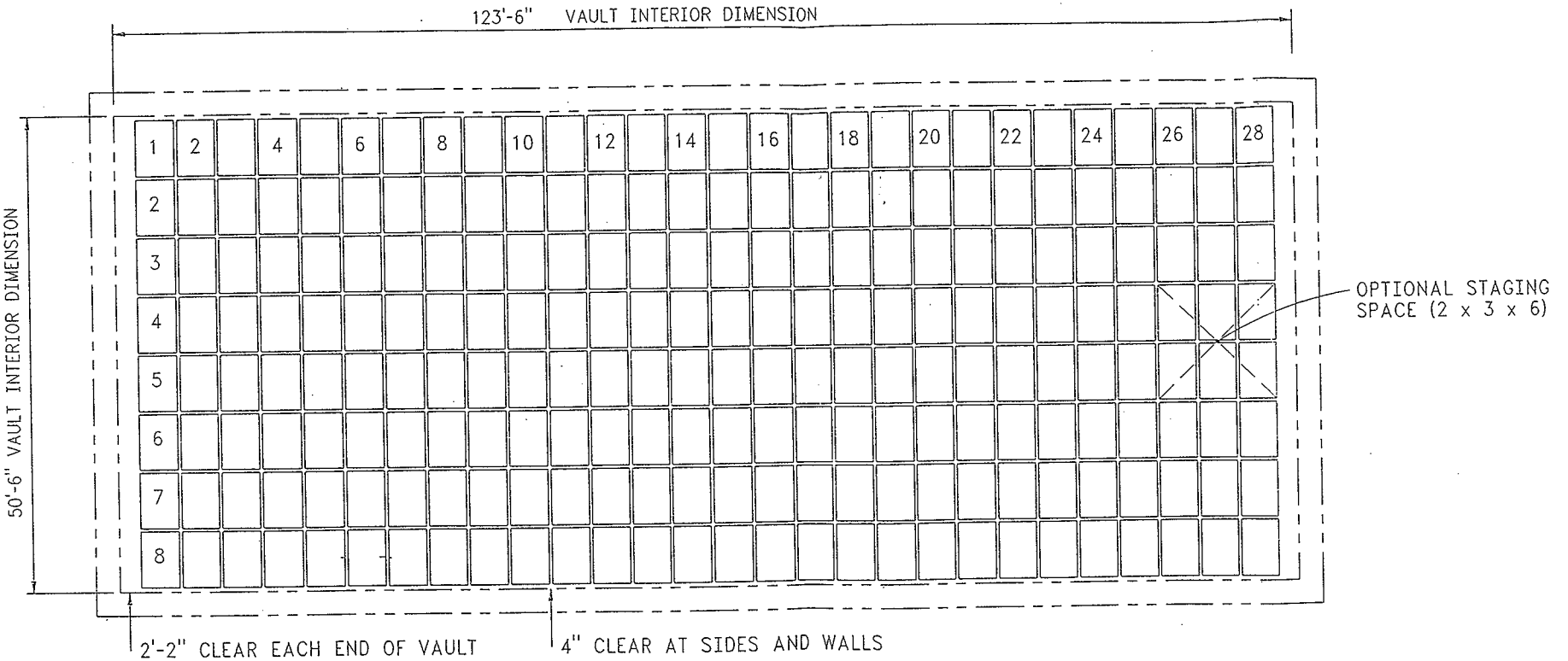
SCALE IN FEET

TABLE 3-2 ILAW Vault Shield Design Criteria

Zone category	Access time allowed	Maximum (μSv/h)	Maximum (mrem/h)
Uncontrolled Area	Fulltime	0.5	0.05
Controlled Area			
①	Fulltime	2.5	0.25
②	Less than 1 h/day	20	2.0
③ *	Less than 1 h/week	100	10.0
④ *	Less than 10 h/year	500	50.0
⑤	No normal access permitted	>500	>50

* There are no controlled areas 3 & 4 for this site.

FLUOR DANIEL NORTHWEST	ENGINEERING SKETCH IMMOBILIZED LOW ACTIVITY WASTE			
Title: ILAW VAULT STORAGE ARRAY	Prepared by: P LAING Checked by: R Hollenbeck	Sh of 1 1 Cadfile I465P1	Sketch no. ES-W465-P1	Rev 0



VAULT FLOOR PLAN

MAX STORAGE	
6 LAYERS (28 x 8 x 6)	1344
STAGING SPACE	<36>
TOTAL	1308
TOP SHIELD LAYER ⁂	
1 LAYER (28 x 8 x 1)	224
STAGING SPACE	<36>
TOTAL	188

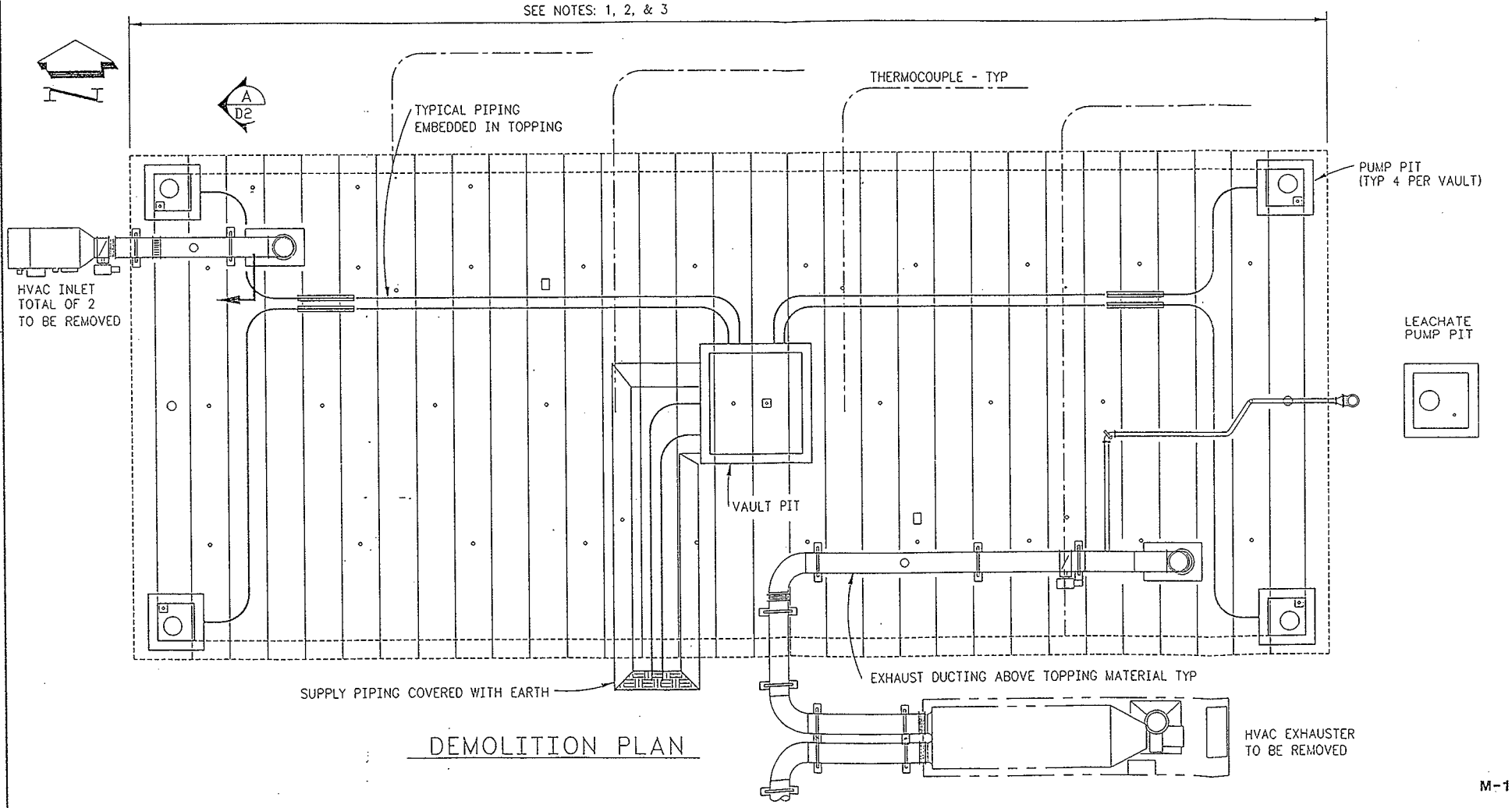
MIN REQUIRED STORAGE	
5 LAYERS (28 x 8 x 5)	1120
TOP LAYER	80
TOTAL	1200
TOP SHIELD LAYER ⁂	
1 LAYER (28 x 8 x 1)	224
STAGING SPACE	0
TOTAL	224

⁂ SHIELDING MATERIAL TO BE ESTABLISHED DURING DEFINITIVE DESIGN

FLUOR DANIEL NORTHWEST	ENGINEERING SKETCH IMMOBILIZED LOW ACTIVITY WASTE			
Title: GROUT VAULT DEMOLITION PLAN	Prepared by: PA LAING	Sh of 1 1	Sketch no. ES-W465-D1	Rev 0
	Checked by: R Hallenbeck	Cadrile I465D1		

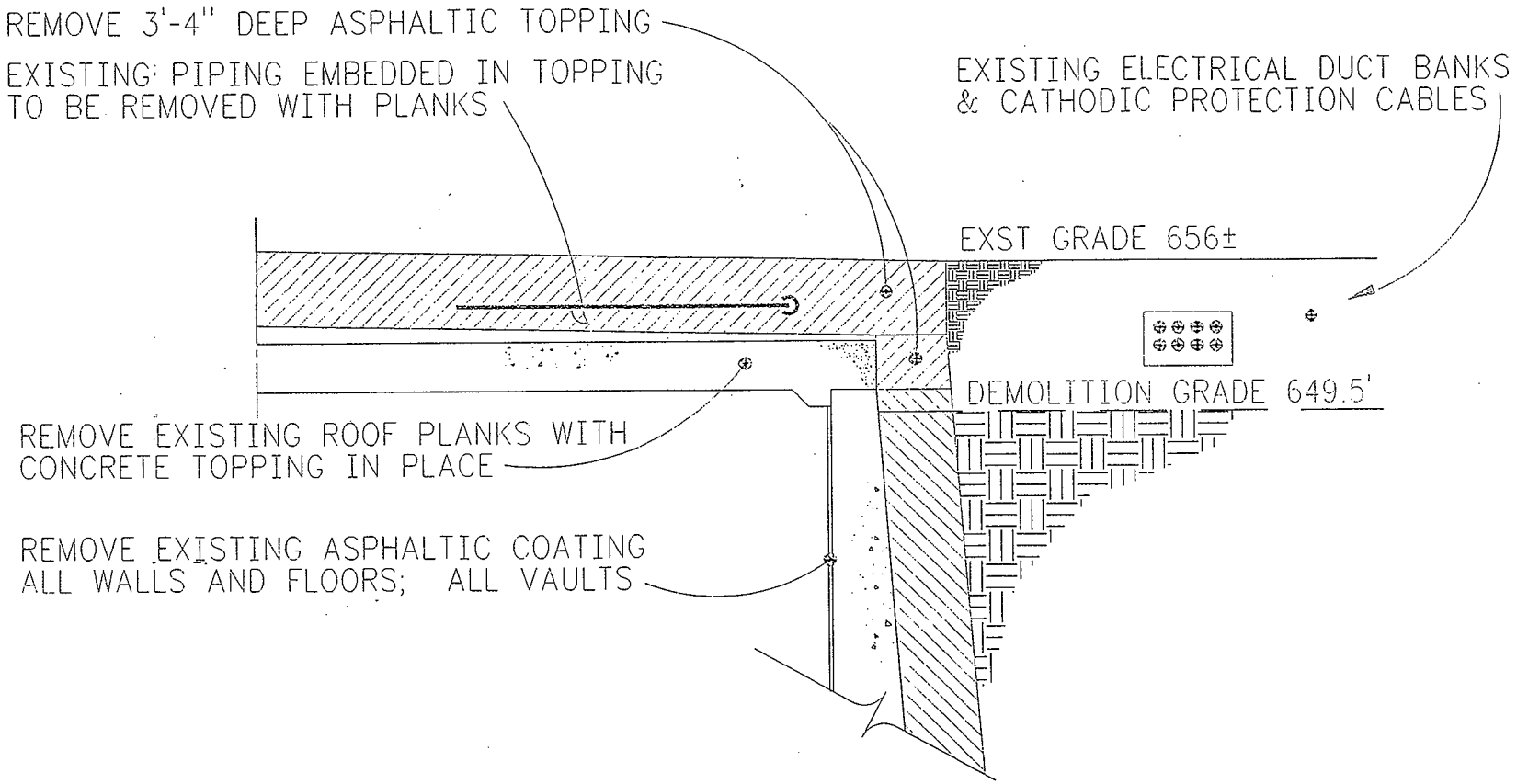
NOTES:

1. ALLOWABLE ROOF LIVE LOAD; 300 PSF
2. REMOVE HVAC INLET FILTERS (2 PER PROJECT) AND HVAC EXHAUSTER (1 PER PROJECT)
3. REMOVE ASPHALTIC CONCRETE 3'-4" DEEP TOPPING
4. REMOVE EXISTING PIPING EMBEDDED IN ASPHALTIC TOPPING
5. REMOVE EXISTING ROOF PLANKS WITH CONCRETE TOPPING IN PLACE
6. REMOVE EXISTING LEACHATE PUMP PIT, RESTORE PIPE RISER TO SERVICE (ONE PER VAULT)
7. REMOVE EXISTING CONCRETE VALVE PITS (ONE PER VALUT) AND PUMP PITS (FOUR PER VALUT)
8. REMOVE DIFFUSTION BREAK TO 4'-6" BELOW TOP OF WALL (WEST WALL ONLY TYP EACH VAULT)
9. REMOVE 1" PVC CONDUITS - THERMOCOUPLE (FOUR PER VALUT)



DEMOLITION PLAN

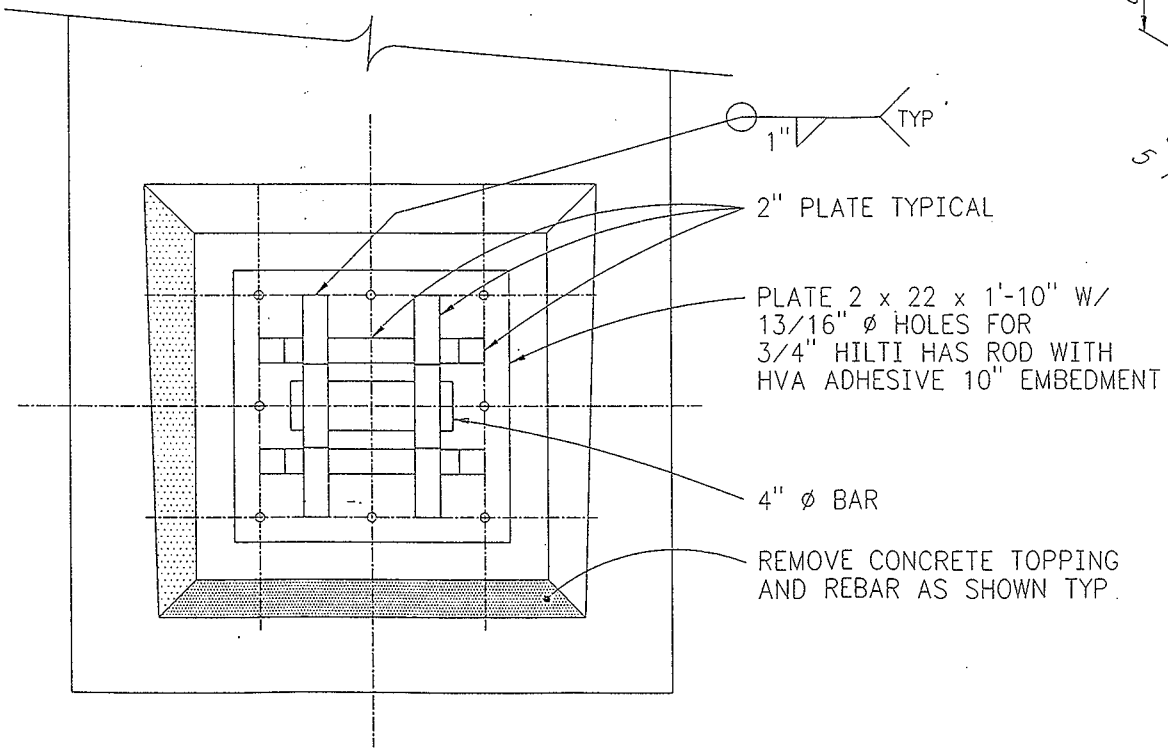
FLUOR DANIEL NORTHWEST	ENGINEERING SKETCH IMMOBILIZED LOW ACTIVITY WASTE			
Title: GROUT VAULT DEMOLITION SECTION	Prepared by: PA LAING	Sh of 1 1	Sketch no. ES-W465-D2	Rev 0
	Checked by: R Hollenbeck	Cadfile I465D2		

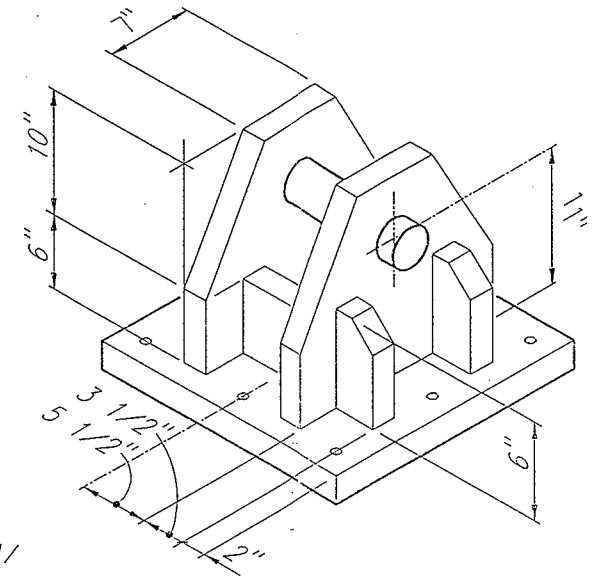


SECTION A

ES-W465-D1

FLUOR DANIEL NORTHWEST	ENGINEERING SKETCH IMMOBILIZED LOW ACTIVITY WASTE			
Title: GROUT VAULT ROOF PLANK LIFTING CONN	Prepared by: PA LAING Checked by: RG Hollenbeck	Sh of 1 1 Cadfile I465D3	Sketch no. ES-W465-D3	Rev 0





ROOF PLANK LIFTING CONNECTOR

LIFTING ASSEMBLIES (2 REQD), ONE EACH END OF PLANK
USE TWO MOBILE CRANES (45mTON CAPACITY EACH)

DISTRIBUTION SHEET

To	From	Page 1 of 1
Distribution	W. W. Pickett	Date 02/27/97
Project Title/Work Order		EDT No.
Immobilized Low-Activity Waste Interim Storage Facility Project W-465 Conceptual Design Report		ECN No. 646215

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
J. Alibert	S2-48	X			
K. C. Burgard	H6-37	X			
T. A. Carlson	H6-37	X (12)			
M. L. Deffenbaugh	H6-37	X			
P. Mouette	R1-49	X			
C. A. Petersen	H6-37	X			
W. W. Pickett	H6-37	X			
J. A. Voogd	H6-37	X			
W. T. Thompson	G3-21	X			
Project Files (2)	H6-08	X			
Central Files	B1-07	X			