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

William W. Pickett

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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).

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CONCEPTUAL DESIGN REPORT

**IMMOBILIZED LOW-ACTIVITY WASTE INTERIM
STORAGE FACILITY PROJECT
(PHASE 1)**

PROJECT W-465

Prepared for

September 1997

For the U.S. Department of Energy

Prepared by

**Fluor Daniel Northwest, Inc.
Richland, Washington**

W465CDR

W465CDR

CONCEPTUAL DESIGN REPORT

FOR

IMMOBILIZED LOW-ACTIVITY WASTE INTERIM
STORAGE FACILITY PROJECT
(PHASE 1)

PROJECT W-465

Prepared by

Fluor Daniel Northwest, Inc.
Richland, Washington

Principal Lead Engineer

12/2/97
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12/2/97
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12/2/97
Date

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ABBREVIATIONS

ASCE	American Society of Civil Engineers
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
CAM	continuous air monitor
CCTV	closed circuit television
CFR	Code of Federal Regulations
CMAA	Crane Manufacturers Association of America
DOE	U.S. Department of Energy
DRD	Design Requirements Document
FHA	Fire Hazards Analysis
FM	Factory Mutual
FSAR	Final Safety Analysis Report
HLAN	Hanford Local Area Network
HVAC	heating, ventilating, and air conditioning
IES	Illuminating Engineering Society
ILAW	Immobilized Low Activity Waste
MCC	Motor Control Center
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
OSHA	Occupational Safety & Health Association
OAC	Operations Acceptance of Construction
PDCA	Painting and Decorating Contractors of America
PSAR	Preliminary Safety Analysis Report
PSE	Preliminary Safety Evaluation
PVC	Polyvinyl chloride
QAPP	Quality Assurance Program Plan
RFAR	radio fire alarm reporter
SEN	Secretary of Energy Notice
SMACNA	Sheet Metal and Air-Conditioning Contractors National Association
S/RIDS	Standard/Requirements Identification Documents
TWRS	Tank Waste Remediation System
UBC	Uniform Building Code
UL	Underwriters Laboratory
WBS	Work Breakdown Structure
WSDOT	Washington State Department of Transportation
WAC	Washington Administrative Code

**CONCEPTUAL DESIGN REPORT
IMMOBILIZED LOW-ACTIVITY WASTE INTERIM
STORAGE FACILITY PROJECT (PHASE 1)
PROJECT W-465**

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CONCEPTUAL DESIGN REPORT
IMMOBILIZED LOW-ACTIVITY WASTE INTERIM
STORAGE FACILITY PROJECT (PHASE 1)
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 4 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 DOE directives, and state and federal regulations. The project, a fiscal year 2000 Line Item, will provide capital upgrades to the existing Grout Vault Facilities.

II. SUMMARY

The 4 existing grout vaults have been recommended for use as the initial interim storage facility for 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 Initiative, and waste management operations for the Hanford Site.

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

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

This Conceptual Design for modification of the grout vaults to support the ILAW project is based upon the following strategy:

This project will provide transport containers, equipment and facilities for accomplishing the Transport ILAW function and the Interim Storage ILAW Wastes 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), shipping and receiving of ILAW packages, loading and unloading of ILAW packages from the transport container, packaging 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 x 1.2 m x 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 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.

The Design Requirements Document and the Statement of Work for project W-465, as modified during the project kickoff facilitated session and the approved work plan, was the technical baseline for providing the upgrades necessary 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 SSCs (structures, systems and components).

The conceptual design for the project W-465 ILAW Interim Storage Building(s) was 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, etc., 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 wall was not considered feasible due to 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 higher than six high if desired. Removal of the entire roof facilitates constructability by minimizing the amount of work that is required inside the vaults and providing better accessibility for the work that does have to be performed. Work that is eliminated is installation of the crane inside the vaults. Also, as an 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. For the analysis to be meaningful, realistic costs would be required for reduced throughput.

We believe 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 option can be utilized which will address "throughput," regulatory constraints, technical considerations and ALARA.

The CDR is based upon the following major assumptions:

1. No requirement changes are anticipated including any developed from completion of the DRD/SRID's compliance matrix review.
2. There is no safety class equipment on the project.
3. The existing Grout control room located near the grout vaults may be modified and used as the control room if deemed suitable.
4. Ventilation system will not be required to provide containment.
5. 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.
6. All privatization vendors will use the same container design.
7. Assume that each vault must store a minimum of 1200 boxes of nominal dimensions specified in the

privatization contracts.

8. The shielding ALARA/operator zone analysis will be done during definitive design.
9. Adequate power is available at the grout facilities for any electrical loads created by this project.

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 2000 Line Item. Total estimated construction costs for the project are \$31M. The total project cost is TBD.

III. JUSTIFICATION

The United States Department of Energy (US 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 immobilized low-activity waste 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 was performed in FY 1996 which selected the four unused grout vaults as the best option for interim storage of ILAW. This project will provide the modifications and transportation systems necessary to make them suitable for this service.

IV. DESCRIPTION OF PROJECT SCOPE

This project will perform demolition of the roof portions of each grout vault, will construct a pre-engineered building over each vault, 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-465-C1 and ES-465-C2.) (All sketches are located in Appendix K.)

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 ft 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 1-1/2:1. 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 as required by DOE Order 6430.1A for 30 minutes of fire protection water discharge. 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.

In order to uncover the existing grout vaults (218-E-16-102 through 218-E-16-105), an approximate area of 350'x 450' from existing grade elevation 656' to 650' elevation will be excavated (Sketch ES-465-C2). A slope of 1-1/2 to 1 from 650' grade elevation will be maintained around this area. Part of the excavated soil will be used as shield berm on south, east and west sides of the vaults. The remaining excavated soil will be hauled to pit No. 9. A concrete truck apron on the east side of the vaults will be built. A 24'-0" paved access road, starting south of the concrete truck apron will go around the vaults until it will turn east at coordinate N40810, from where it will turn north at coordinate W45040 and extend to project W-519 proposed access roadway at coordinate N41430. The existing chain link fence on south and west sides will be removed. A new chain link fence, 6'-0" high around the vaults access areas will be installed to establish radiation zone control.

B. BUILDINGS (501)

Four pre-engineered metal buildings will be provided by this project. The buildings will be constructed to comply with National Fire Protection Association (NFPA) 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 UBC Zone 2B criteria in accordance with DOE-STD-1020.

TABLE 1

TYPES OF CONSTRUCTION		
Building	Construction Type	Occupancy Type
ILAW Interim Storage Building	Type II (000)	Special-Purpose Industrial

TABLE 2

DESIGN CRITERIA LOADINGS				
Building	Safety Performance Area	Wind	Roof Snow Load	Earthquake
ILAW Interim Storage Building	General Services	85 mph	20 lb/ft ²	Uniform Building Code Seismic Zone 2B, Standard Occupancy Structure

1. ILAW Interim Storage Building

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 (Sketches ES-465-A1 and ES-465-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-ft by 7-ft high hollow metal doors in pressed metal frames. The access door and frame to the Electrical room shall be 1-hour fire rated.

The building is not required to be handicapped accessible (see Appendix I); therefore no handicapped features have been incorporated into the design.

The exterior 6-inch 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 Building. 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 6-inch 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 are shown in Table 3.

TABLE 3

ILAW INTERIM STORAGE BUILDING	
FUNCTIONAL AREA BREAKDOWN	
Area Description	Square Feet (Net)
Existing Concrete Vault	6,235
Waste Package Delivery /Crane Maintenance Area	3,730
Air Supply Room	100
Air Exhaust Room	100
Fire Riser Room	60
Electrical Room	180
Personnel Access Aisles	3,085
Total square feet	13,490
NOTE: All net square foot areas are approximate.	

Structure

The ILAW Interim Storage building 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" reinforced concrete slab. The building envelope will be a metal pre-engineered building similar to GARCO TRF System (Tapered Rigid Frame). 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 Building, will be extended 6'-0" high to provide shielding. Extended concrete walls will taper in thickness from 2'-0" at base to 1'-6" at the top for north and south sides of vaults (Sketch ES-W465-S2) and will be 2'-6" thick for east and west sides of vaults (Sketch 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.

80-lb ASCE rails will be provided on top of the north and south walls for each vault for a 15 ton gantry crane (Sketch ES-W465-A2). These rails will be extended for approximately 48'-0" into the Waste Package Delivery/Crane Maintenance Area (Sketch ES-W465-S1). The rails, in this area, will be supported by W14 steel beams and 18" square concrete columns.

Personnel Access Areas, located 4'-6" higher than the Waste Package Delivery/Crane Maintenance Area (Sketch 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 #3 will be used to feed a new main 480 V panelboard (#102-1) located in the electrical room at vault 218-E-16-102 (Sketch ES-W465-E1). Panelboard #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 vault 480 V panelboard (4) 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 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 interim storage building. 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 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 IES lighting handbook guidelines.

Convenience receptacles will be provided at each interim storage 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 NFPA 70 (National Electrical Code) requirements.

Heating, Ventilating, and Air Conditioning

A forced air ventilation system is required for the storage vaults. Although airflow is required, temperature and humidity control is 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 building. 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 shut down 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°. 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, sketches ES-W465-A1 and ES-W465-A2.

Fire Protection

These facilities will consist of Type II (000) noncombustible 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 for 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 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 and the requirements noted in the Hanford chapter of 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/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 a impoundment for fire protection water discharge of approximately 134 minutes.

Telecommunications

Telephones will be provided in two separate locations at each interim storage building. One telephone handset will be located in the electrical room while the other handset will be located outside in a weather proof enclosure near one of the roll up 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. The control room equipment and layout shall meet handicap access (See Appendix I) 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, see 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 grout 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 existing Building 243-G6. 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 building. Lighting fixtures will be provided with photocell control to turn lamps off during day light hours.

4. Fire Water Supply

At the present time there are no water supplies to the site. A 12-inch raw water loop will be installed to supply fire protection water to the ILAW storage facilities (see sketch 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 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-inch 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 Building

(a) Mechanical Equipment

- Gantry Crane

This project 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 approximately 50 ft. span, 45 ft. lift height and 12 ft. leg height will provide waste package handling in each building (see sketch ES-W465-A2). The maximum weight of a waste package is 22,000 pounds as specified in the Design Requirements Document, Rev. 0. A 15-ton crane will provide the required 125 percent 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 CMAA Spec. No. 70, Class "D". Seismic loading will be per UBC zone 2B. The crane will have an emergency retrieval system which 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 data base with package identification, storage location, etc.

- Transportation System

A truck/trailer transport vehicle with fixed transport containers will be provided by this project, see drawing ES-W465-T1. The transport container will provide shielding during transportation and will have an equivalent minimum wall thickness of 3 inches 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 through put of nine (9) waste packages per day (24 hrs), three trailers and one tractor will be required, see ILAW Logic Flow Diagram ES-W465-L1. Note: It will be required to purchase an additional trailer and tractor to allow for maintenance/repairs.

(b) Instrumentation and Control

The ILAW facility will be capable of monitoring and controlling the movement, placement, storage, and, retrieval of ILAW packages in the W-465 vaults. Remote handling of the ILAW packages will be accomplished using a crane which 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 ILAW facility will be capable of monitoring ILAW canister placement through visual inspection via closed circuit television (CCTV). The degree of inspection required will be determined after the completion of the RCRA Part B Permit with the Washington State Department of Ecology (WDOE).

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 facility will contain a continuous air monitor (CAM) system which 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.

E. DEMOLITION (810)

In order to uncover the 4 existing grout vaults (218-E-16-102 through 218-E-16-105), an approximate area of 350'x 450' from existing grade elevation 656' to 649.5' elevation will be excavated. A slope of 1-1/2 to 1 from 656' elevation to new grade will be maintained around this area. In addition to removing compacted backfill around the vaults, the excavation consists of removing and hauling the following materials (Sketch ES-W465-D2) to pit No. 9.

1. 3'-4" deep asphalt and concrete topping (diffusion break) above the vaults, 2'-0" deep x 3'-4" wide asphalt topping around three sides of the vaults and 4'-6" deep x 3'-4" 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 (Sketch 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. 2'-0" deep precast concrete cover blocks (2)- 6'-3" wide at each end and (29)- 4'-0" 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" pipe to leachate collection sump and 8" pipe for leak detection will be cut to the new grade level (Sketch 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 inch in 10 feet. 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)

This will be provided before the 100 percent CDR completion.

G. DESIGN COMPLIANCE

The design and construction of Project W-465 will comply with the codes, standards, regulations, and laws listed in the Project Design Requirements Document and applicable Standard/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, 1C)

The architect-engineer will provide definitive design, engineering during construction, construction management, and project management support throughout the life of the project. (Note: A/I Acceptance Inspection and NEC compliance inspection will be acquired by the integrating contractor)

B. OFFSITE DESIGN-BUILD WORK (ID)

Not used.

C. PROCUREMENT (WBS 2.2)

The architect-engineer/construction management 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 Design Requirements Document
- Provide design input and reviews from cognizant facility and infrastructure (on-site utilities) personnel for definitive design and construction.
- Provide construction support, as needed.

F. OTHER PROJECT COSTS (WBS 5.0)

Provided Later

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 impacted 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 immobilized low-activity waste (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 Preliminary Safety Evaluation. Further development of accident scenarios and appropriate mitigation features will be included in the Preliminary Safety Analysis Report (PSAR) and definitive design in FY 2000 and 2001.

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

Accommodations for the physically handicapped will not be provided for the ILAW Storage Buildings but will be evaluated for the Control Building and Change Building (see 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 OSHA standards are enforced during the project. See section 5.0 of the PSE for construction risk discussion. This 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 in Appendix K. The transport container design for a minimum wall thickness of 3 inches 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 1,000 mrem/hr on the waste package was used to estimate a maximum source term.

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

A Health and Safety Plan will be prepared as an addendum of the existing TWRS HASP, before the start of definitive design to assure that all health and safety risks will be minimized.

C. DECONTAMINATION AND DECOMMISSIONING

No decontamination and decommissioning (D&D) is expected for the ILAW 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 (Reference 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,

decontamination and decommissioning 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 they are located. Instruments in the control room, outside and adjacent to, will be designed to operate in the environment in which they are located. Maintenance that cannot be done locally in each facility and require removal, such as instrument calibrations, camera repair, etc., 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. AUTOMATED DATA PROCESSING EQUIPMENT

To be provided before 100 percent CDR completion.

F. QUALITY ASSURANCE/SAFETY CLASSIFICATION

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

The highest Safety Classification for the W-465 modification work is expected to be designated Non-Safety Class/General Services and Hazard Category III. This is confirmed by the Preliminary Safety Evaluation (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 Preliminary Safety Analysis Report (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 Integrating Contractor will complete an Unresolved Safety question (USQ) prior to facility startup.

G. ENVIRONMENTAL COMPLIANCE

1. 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 closure system will be leak tight as defined by 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 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.
2. All solid waste generated during construction and operation of the facility will be disposed of in accordance with the Waste Minimization/Pollution Prevention Plan.
3. Whenever possible, nonhazardous materials will be used to keep hazardous waste generation to a minimum.

H. PERMITS

Permits will be obtained in accordance with the "Permitting Plan for the Immobilized Low-Activity Waste Project," HNF-SD-ENV-EE-003, Rev. 0, for all operation of the facility. The general contractor and the Construction manager will obtain all necessary permits for construction.

I. RELIABILITY, AVAILABILITY, AND MAINTAINABILITY ANALYSIS (RAM)

This document will address reliability, availability, and maintainability for each major equipment and will be completed during future design phases (Advanced Conceptual Design or Definitive Design).

VII. IDENTIFICATION AND ANALYSIS OF UNCERTAINTIES

A. SITE PLAN

There are uncertainties associated with existing and adjacent infrastructures for road tie-ins, fire protection water tie-ins, routing of electrical, instrumentation, and condition and availability of existing buildings (such as, the Grout Control Room and Change Room Facility).

There is an uncertainty regarding construction access since the private vendors will be constructing their plants in the same vicinity at the same time as the vaults are being modified.

B. STRUCTURAL

1. 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.

C. ELECTRICAL

1. The existing Cathodic Protection system will not need to be maintained.
2. The status of the existing cathodic protection system is unknown at this time. During demolition some of the existing cathodic protection cabling will have to be removed. The decision to reinstall or redesign the cathodic protection system will be made during the advanced CDR stage.
3. The existing leachate system for each vault is monitored/alarmed. The system will have to be reworked and possibly redesigned to be monitored in the control room.

D. FIRE PROTECTION

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

It is uncertain whether a pre-engineered CO₂ 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.

E. INSTRUMENTATION AND CONTROLS

1. Using the existing control room to accommodate the facility control and monitoring systems will have to be verified for size, fire protection, and other applicable codes and regulations.

F. SHIELDING

1. The private vendors have not provided a definitive source term. Dose rates uncertainty is estimated to be a factor of two or less.
2. The dose rate attributable to skyshine will remain an uncertainty until source term data is received from the vendors. For purposes of the CDR, the dose calculations used are as follows:
 - a. All packages are considered to have the privatization contracts specified average curie content of three curies per cubic meter (3Ci/m³).
 - b. The package wall thickness on all sides may be assumed to be one-half inch thick.
 - c. The waste form in the packages may be assumed to be marbles with no filler.
 - d. The package size may be assumed to be the nominal size of 1.2m x 1.2m x 1.8m as specified in the privatization contracts.

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

G. MECHANICAL EQUIPMENT

1. Additional cost and schedule will be incurred if the cranes are designed to provide additional safety features such as "single failure proof" and structural analysis based on a dynamic analysis and response spectra.

H. VAULT LOADING

1. The conceptual design configuration for vault loading will permit stacking waste packages eight high. It is uncertain whether the vendor package structural design will permit stacking more than six high. If eight-high stacking becomes a requirement, further evaluations will be required for shielding wall height, berming, and fence location.

I. ENVIRONMENTAL

1. The requirement to monitor package leakage may be at a degree which we cannot accomplish at an acceptable cost. The degree of monitoring will be established in the RCRA Part B Permit.
2. A late NEPA and RCRA environmental review, documented in Letter LHMC-9760785, dated November 14, 1997, identified uncertainties that were not addressed in this CDR.

J. GENERAL

1. The potential exists that new requirements (such as the new site HNF procedures) will be imposed on the design. Any new requirements will need to be addressed in the advanced CDR or Title 1 stage.

VIII. REFERENCES

- 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 (HNF-SD-W465-DRD-001, Rev. 0).
- C. Alternative Generation and Analysis Report (HNF-SD-W465-AGA-001).
- D. Subsequent direction from the customer via numerous interface meetings.
- E. 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 (Onsite Architect-Engineer)
 - 1.B Not Used
 - 1.C Title III (Engineering, A/E) A/I Acceptance Inspection (PHMC) and NEC Compliance Inspection (PHMC)
 - 1.D Not used
- 2.2 PROCUREMENT (Engineer/Constructor Contractor)
 - 2.2 Procurement
- 3.2 CONSTRUCTION
 - 3.2 Fixed-Price Construction (Offsite Construction Contractor)
(including Site Preparation)
- 4.0 PROJECT INTEGRATION (Integrating Contractor)
 - 4.0 Project Coordination Activities (Integrating Contractor)
- 5.0 OTHER PROJECT COSTS
 - 5.0 All other costs associated with the Integrating Contractor

APPENDIX B

BA/BO Schedule

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

PHASE	TOTAL COST	FY00				FY01				FY02			
		1	2	3	4	1	2	3	4	1	2	3	4
1.0 ENGINEERING													
1A DEFINITIVE DESIGN	3,700												
		3,600		2,700		100		1,000					
1C TITLE III	3,100												
		600		100		2,200		2,200		300		800	
2A PROCUREMENT	8,400												
		8,400		0		0		8,400					
3.0 CONSTRUCTION													
3A C1 SITE PREP	5,500												
		5,500		0		0		5,500					
3B C2 CONSTRUCTION	8,800												
						8,800		4,400		0		4,400	
4A PROJECT INTEGRATION	3,800												
		1,700		1,400		1,400		1,400		700		1,000	
Budget Authority (BA)	33,300	19,800				12,500				1,000			
Budget Outlay (BO)	33,300	4,200				22,900				6,200			

APPENDIX C

Cost Estimate Summary

FLUOR DANIEL NORTHWEST, INC.
NUMATEC HANFORD CORP.
JOB NO. W-465/P3TP56
FILE NO. W465BAB2

** IEST - INTERACTIVE ESTIMATING **
ILAW INTERIM STORAGE FACILITY (GROUT VAULTS)
CONCEPTUAL ESTIMATE
PHMCR01 - PROJECT COST SUMMARY

PAGE 1 OF 15
DATE 11/24/97 09:19:22
BY CDL/KLR/DEA/RWO/LAA

SORT	DESCRIPTION	ESCALATED TOTAL COST	CONTINGENCY		TOTAL DOLLARS
			%	TOTAL	
FDH	FLUOR DANIEL HANFORD, INC.	560,000	20	110,000	670,000
FDNW	FLUOR DANIEL NORTHWEST	18,560,000	21	3,870,000	22,430,000
NHC	NUMATEC HANFORD CORPORATION	2,730,000	20	550,000	3,280,000

	SUBTOTAL	21,850,000	21	4,530,000	26,380,000

SITE	SITE ALLOCATIONS	5,760,000	21	1,190,000	6,950,000

	PROJECT TOTAL (TECC)	27,610,000	21	5,720,000	33,330,000

TYPE OF ESTIMATE CONCEPTUAL ESTIMATE NOVEMBER 24, 1997

FDNW LEAD ESTIMATOR *[Signature]* ESTIMATING MANAGER *[Signature]*

PROJECT MANAGER

CLIENT

REMARKS:

THIS ESTIMATE DOES NOT INCLUDE - OTHER PROJECT COSTS

(ROUNDED/ADJUSTED TO THE NEAREST " 1,000 / 10,000 " - PERCENTAGES NOT RECALCULATED TO REFLECT ROUNDING)

FLUOR DANIEL NORTHWEST, INC.
NUMATEC HANFORD CORP.
JOB NO. W-456/P3TP56
FILE NO. W465BAB2

** IEST - INTERACTIVE ESTIMATING **
FLAW INTERIM STORAGE FACILITY (GROUT VAULTS)
CONCEPTUAL ESTIMATE
PHMCR02 - WORK BREAKDOWN STRUCTURE (WBS) SUMMARY

PAGE 2 OF 15
DATE 11/24/97 09:19:31
BY CDL/KLR/DBA/RWO/LAA

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ESCALATION % TOTAL	SUB TOTAL	CONTINGENCY % TOTAL	SUB TOTAL	SITE ALLOCAT'N	TOTAL DOLLARS		

1A0100	DRAWINGS	716058	7.11	50912	766970	20	153394	920364	320008	1240372
1A0200	SPECIFICATIONS	89227	7.11	6343	95570	20	19113	114683	39875	154558
1A0300	CHECKING AND REVIEW	285872	7.11	20325	306197	20	61241	367438	127758	495196
1A0400	REPORTS	138113	7.11	9819	147932	20	29587	177519	61722	239241
1A0500	CALCS	100167	7.11	7123	107290	20	21459	128749	44767	173516
1A0600	SUPPORT	711600	7.11	50595	762195	20	152439	914634	318018	1232652
1A0700	ESTIMATING	69210	7.11	4922	74132	20	14826	88958	30930	119888
1A0800	SUBMITTALS	25466	7.11	1811	27277	20	5456	32733	11383	44116
1A0900	QUALITY ASSURANCE	42855	7.11	3047	45902	20	9180	55082	19152	74234
SUBTOTAL 1A DEFINITIVE DESIGN		2178568	7.11	154897	2333465	20	466695	2800160	973613	3773773

1C1000	TITLE III ENGINEERING	1793167	10.29	184518	1977685	20	395537	2373222	702909	3076131
SUBTOTAL 1C TITLE III DESIGN		1793167	10.29	184518	1977685	20	395537	2373222	702909	3076131
SUBTOTAL 1 ENGINEERING		3971735	8.55	339415	4311150	20	862232	5173382	1676522	6849904

220001	GANTRY CRANES	4064040	9.48	385271	4449311	20	889862	5339173	1402067	6741240
220002	TRACTOR & TRANSPORTER	501422	9.48	47535	548957	20	109791	658748	172987	831735
220003	CCTV	74412	9.48	7054	81466	20	16293	97759	25672	123431
220004	CONCRETE SHIELDING COVERS	435940	9.48	41327	477267	20	95453	572720	150397	723117
SUBTOTAL 2 PROCUREMENT		5075814	9.48	481187	5557001	20	1111399	6668400	1751123	8419523

320001	PREP PLANKS FOR REMOVAL	1420682	10.29	146188	1566870	25	391718	1958588	517934	2476522
320002	MISC. DEMOLITION	398054	10.29	40960	439014	25	109753	548767	145117	693884
320003	REMOVE PLANKS	438639	10.29	45136	483775	25	120944	604719	159913	764632
320004	SITWORK & UTILITIES	909919	10.29	93632	1003551	20	200711	1204262	318454	1522716
320005	VAULT CONCRETE	1005333	10.29	103449	1108782	20	221756	1330538	351850	1682388
320006	ENCLOSURE BUILDINGS	3294394	10.29	338993	3633387	20	726677	4360064	1152985	5533049
320007	INSTALL & TEST CRANES	582859	10.29	59976	642835	20	128567	771402	203991	975393
320008	EXISTING FACILITY UPGRADE	341406	10.29	35131	376537	30	112961	489498	129444	618942
SUBTOTAL 3 CONSTRUCTION		8391286	10.29	863465	9254751	22	2013087	11267838	2979688	14247526

400000	PROJECT INTEGRATION	2499980	9.21	230248	2730228	20	546046	3276274	547138	3823412

FLUOR DANIEL NORTHWEST, INC.
 NUMATEC HANFORD CORP.
 JOB NO. W-456/P3TP56
 FILE NO. W465BAB2

** IEST - INTERACTIVE ESTIMATING **
 ILAW INTERIM STORAGE FACILITY (GROUT VAULTS)
 CONCEPTUAL ESTIMATE
 PHMCR02 - WORK BREAKDOWN STRUCTURE (WBS) SUMMARY

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WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ESCALATION % TOTAL	SUB TOTAL	CONTINGENCY % TOTAL	SUB TOTAL	SITE ALLOCAT'N	TOTAL DOLLARS

PROJECT TOTAL		19,938,815	1,914,315	21,853,130	21	4,532,764	26,385,894	33,340,365
			9.60				6,954,471	

FLUOR DANIEL NORTHWEST, INC.
NUMATEC HANFORD CORP.
JOB NO. W-456/P3TP56
FILE NO. W465BAB2

** TEST - INTERACTIVE ESTIMATING **
ILAW INTERIM STORAGE FACILITY (GROUT VAULTS)
CONCEPTUAL ESTIMATE
PHMCR03 - ESTIMATE BASIS SHEET

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1. ESTIMATE PURPOSE

=====

THIS ESTIMATE WILL BE USED TO ESTABLISH THE BUDGETED COST FOR DESIGN, PROCUREMENT, CONSTRUCTION AND PROJECT INTEGRATION FOR THE ILAW FACILITY. IT DOES NOT INCLUDE "OTHER PROJECT COSTS", AND THEREFORE CANNOT ESTABLISH THE PROJECT BUDGET (TPC) UNTIL THOSE COSTS ARE INCLUDED.

2. ESTIMATE TECHNICAL BASIS

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- 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:
ESCALATION ANALYSIS SCHEDULE, DATED NOVEMBER 1997
REQUEST FOR ESTIMATE DATED JULY 22, 1997
CONCEPTUAL DESIGN REPORT, DATED SEPTEMBER 1997
- C. THIS ESTIMATE DOES NOT INCLUDE OTHER PROJECT COSTS.

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 CONSTRUCTION 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.

B. DIRECT COST FACTORS

- (1) SALES TAX HAS BEEN APPLIED TO ALL MATERIALS AND EQUIPMENT PURCHASES AT 8%.
- (2) NO WAREHOUSING COSTS ARE SHOWN SINCE THEY ARE CONSIDERED TO BE INCLUDED IN THE MATERIAL PROCUREMENT RATE (MPR).
- (3) CONTRACT ADMINISTRATION FACTOR OF 18.75% HAS BEEN APPLIED TO THE DIRECT CONTRACT VALUE WHICH INCLUDES COSTS FOR BID PACKAGE PREPARATION, CONTRACT MANAGEMENT & ADMINISTRATION AND PROJECT MANGEMENT & PLANNING SUPPORT

C. INDIRECT COSTS

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

D. RATES

- (1) FLUOR DANIEL NORTHWEST LABOR RATES ARE BASED UPON THE FLUOR DAINEL FEDERAL OPERATIONS (PEDFO) DISCLOSURE STATEMENT AND APPROVED PROVISIONAL BILLING RATES. FOR ESTIMATING PURPOSES, AVERAGE RATES BY OPERATIONS CODE HAVE BEEN DEVELOPED BASED UPON RECENT COST HISTORY.
- (2) FDH & PHMC SUBCONTRACTOR STANDARD LABOR RATES ARE THOSE LISTED IN THE FINANCIAL DATA SYSTEM (FDS) FDST 321R REPORT ORGANIZATION RATES PLUS ADDERS.

FLUOR DANIEL NORTHWEST, INC.
NUMATEC HANFORD CORP.
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** TEST - INTERACTIVE ESTIMATING **
ILAW INTERIM STORAGE FACILITY (GROUT VAULTS)
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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: 14% FOR FDNW, 10% FOR FDNWS (CONSTRUCTION).
- (2) HANFORD SITE G&A RATE OF 18.0% IS APPLIED TO ALL COSTS TO LIQUIDATE THE HANFORD GENERAL & ADMINISTRATIVE COSTS.
- (3) HANFORD SITE MPR RATE OF 7.0% IS APPLIED TO ALL PURCHASED MATERIAL AND SERVICES.

FDNW APPLIES THE ABOVE FACTORS TO ESTIMATED COSTS AS FOLLOWS:

- (1) FDH GFS/G&A CM FACTOR: A COMPOSITE FACTOR OF 34.52% 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 24.93% HAS BEEN APPLIED TO THE FDNW FIXED PRICE CONSTRUCTION CONTRACT VALUE WHICH INCLUDES A SITE G&A OF 16% AND SUBCONTRACT OF 7.7%
- (3) FDH GFS/G&A LABOR FACTOR: A COMPOSITE FACTOR HAS BEEN APPLIED TO TOTAL FDNW LABOR COSTS AS FOLLOWS:
AE/CM COSTS = 34.52%, FDNWS CONSTRUCTION LABOR = 29.00%, FDNWS CONSTRUCTION MANAGEMENT LABOR = 34.52%, FDNW CONTRACT MANAGEMENT AND ADMINISTRATION = 34.52%
- (4) FDH MPR/G&A MATERIAL FACTOR: A COMPOSITE FACTOR OF 26.26% HAS BEEN APPLIED TO TOTAL FDNW MATERIAL COST WHICH INCLUDE A MPR OF 7% AND MATERIAL G&A/FEE OF 16.7%

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 ACQUISITION" FM-50.

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 EXPLANATION 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 UNKNOWNNS AND UNCERTAINTIES THAT ARE GENERALLY ENCOUNTED 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 220001 THROUGH 220004 A CONTINGENCY OF 20% HAS BEEN APPLIED DUE TO UNKNOWNNS AND UNCERTAINTIES CONCERNING THE STATE OF THE ART TECHNOLOGY THAT WILL BE REQUIRED FOR THE CRANES, TRANSPORTERS & CAMERA SYSTEM. ALSO THE UNKNOWNNS CONCERNING HOW MUCH SHIELDING WILL BE REQUIRED.
- WBS 320001 THROUGH 320003 A CONTINGENCY OF 25% HAS BEEN APPLIED DUE TO UNKNOWNNS AND UNCERTAINTIES THAT ARE ALMOST ALWAYS ENCOUNTED 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 OR BE MORE DIFFICULT TO WORK WITH AND DISPOSE.
- WBS 320004 THROUGH 320007 A CONTINGENCY OF 20% HAS BEEN APPLIED DUE TO THE WORK IS MOSTLY NEW CONSTRUCTION AND UNKNOWNNS AND UNCERTAINTIES ARE FEWER BUT IT IS STILL INVOLVED WITH REMODELING AND TIEING INTO AN EXISTING STRUCTURE.
- WBS 320008 A CONTINGENCY OF 30% HAS BEEN APPLIED DUE TO NO DESIGN EFFORT HAS BEEN DONE TO DETERMINE WHAT UPGRADES WILL BE REQUIRED.
- WBS 400000 A CONTINGENCY OF 20% HAS BEEN APPLIED PER CLIENTS REQUEST.

6. ROUNDING

=====

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

7. REMARKS

- =====
- MAJOR ASSUMPTIONS WHICH HAVE BEEN MADE IN THE PREPARATION OF THIS ESITMATE ARE AS FOLLOWS:
- A.) ASSUME ASPHALT AT SIDE WALLS AND END WALLS TO BE 3'6" THICK.
 - B.) ASSUME 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.
 - C.) ASSUME VAULT ENCLOSURE BUILDINGS DO NOT REQUIRE INSULATION AT THE EXTERIOR WALLS AND ROOF.
 - D.) ASSUME BUILDING STRUCTURE & EQUIPMENT WILL BE GROUNDED TO THE NEW WATER SUPPLY AND EXISTING VAULT. NO GROUND GRID IS INCLUDED IN THE ESTIMATE.
 - E.) ELECTRICAL SYSTEMS NOT INCLUDED IN THIS ESTIMATE ARE: LIGHTNING PROTECTION, AND CATHODIC PROTECTION.

FLUOR DANIEL NORTHWEST, INC.
NUMATEC HANFORD CORP.
JOB NO. W-456/P3TP56
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** IEST - INTERACTIVE ESTIMATING **
ILAW INTERIM STORAGE FACILITY (GROUT VAULTS)
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REMARKS (CONT.)

- F.) ASSUME ALL CONSTRUCTION WORK TO BE PERFORMED BY A FIXED PRICE CONTRACTOR DURING NORMAL WORKING HOURS,
NO ALLOWANCE FOR OVERTIME IS INCLUDED IN THIS ESTIMATE.
- G.) ASSUME ALL WORK TO BE CLEAN, NO ALLOWANCE HAS BEEN MADE FOR WORKING WITH CONTAMINATED SOIL OR CONTAMINATED MATERIAL.
- H.) THIS ESTIMATE DOES NOT INCLUDE OTHER PROJECT COSTS.
- I.) WBS 400000 PROJECT INTEGRATION AND WBS 1C1000 DICIPLINE 44 FDH ACCEPTANCE INSPECTION, HAVE A G&A RATE OF 16.7%
APPLIED PER REQUEST OF THE CLIENT.
- J.) ASSUME ALL ASPHALT, CONCRETE AND COVER BLOCKS WILL BE HAULED TO PIT #9 AND DUMPED FOR NO FEE.

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FLUOR DANIEL NORTHWEST, INC.
NUMATEC HANFORD CORP.
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** IEST - INTERACTIVE ESTIMATING **
ILAW INTERIM STORAGE FACILITY (GROUT VAULTS)
CONCEPTUAL ESTIMATE
PHMCR04 - COMPANY/WBS SUMMARY

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SORT CODE/WBS	DESCRIPTION	ESTIMATE		ESCALATION		SUB TOTAL	CONTINGENCY		SUB TOTAL	SITE ALLOCAT'N	TOTAL DOLLARS
		SUBTOTAL	%	TOTAL	TOTAL		%	TOTAL			
PDH	FLUOR DANIEL HANFORD, INC.										
1C1000	TITLE III ENGINEERING	511215	10.29	52604	563819	20	112764	676583	112990	789573	
	SUBTOTAL 1C TITLE III DESIGN	511215	10.29	52604	563819	20	112764	676583	112990	789573	
	TOTAL PDH FLUOR DANIEL HANFORD, INC.	511215	10.29	52604	563819	20	112764	676583	112990	789573	
PDNW	FLUOR DANIEL NORTHWEST										
1A0100	DRAWINGS	716058	7.11	50912	766970	20	153394	920364	320008	1240372	
1A0200	SPECIFICATIONS	89227	7.11	6343	95570	20	19113	114683	39875	154558	
1A0300	CHECKING AND REVIEW	285872	7.11	20325	306197	20	61241	367438	127758	495196	
1A0400	REPORTS	138113	7.11	9819	147932	20	29587	177519	61722	239241	
1A0500	CALCS	100167	7.11	7123	107290	20	21459	128749	44767	173516	
1A0600	SUPPORT	711600	7.11	50595	762195	20	152439	914634	318018	1232652	
1A0700	ESTIMATING	69210	7.11	4922	74132	20	14826	88958	30930	119888	
1A0800	SUBMITTALS	25466	7.11	1811	27277	20	5456	32733	11383	44116	
1A0900	QUALITY ASSURANCE	42855	7.11	3047	45902	20	9180	55082	19152	74234	
	SUBTOTAL 1A DEFINITIVE DESIGN	2178568	7.11	154897	2333465	20	466695	2800160	973613	3773773	
1C1000	TITLE III ENGINEERING	1281952	10.29	131914	1413866	20	282773	1696639	589919	2286558	
	SUBTOTAL 1C TITLE III DESIGN	1281952	10.29	131914	1413866	20	282773	1696639	589919	2286558	
	SUBTOTAL 1 ENGINEERING	3971735	8.55	339415	4311150	20	862232	5173382	1676522	6849904	
220001	GANTRY CRANES	4064040	9.48	385271	4449311	20	889862	5339173	1402067	6741240	
220002	TRACTOR & TRANSPORTER	501422	9.48	47535	548957	20	109791	658748	172987	831735	
220003	CCTV	74412	9.48	7054	81466	20	16293	97759	25672	123431	
220004	CONCRETE SHIELDING COVERS	435940	9.48	41327	477267	20	95453	572720	150397	723117	
	SUBTOTAL 2 PROCUREMENT	5075814	9.48	481187	5557001	20	1111399	6668400	1751123	8419523	
320001	PREP PLANKS FOR REMOVAL	1420682	10.29	146188	1566870	25	391718	1958588	517934	2476522	

FLUOR DANIEL NORTHWEST, INC.
 NUMATEC HANFORD CORP.
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** IEST - INTERACTIVE ESTIMATING **
 ILAW INTERIM STORAGE FACILITY (GROUT VAULTS)
 CONCEPTUAL ESTIMATE
 PHMCR04 - COMPANY/WBS SUMMARY

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SORT CODE/WBS	DESCRIPTION	ESTIMATE	ESCALATION		SUB	CONTINGENCY		SUB	SITE ALLOCAT'N	TOTAL DOLLARS
		SUBTOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL		
320002	MISC. DEMOLITION	398054	10.29	40960	439014	25	109753	548767	145117	693884
320003	REMOVE PLANKS	438639	10.29	45136	483775	25	120944	604719	159913	764632
320004	SITework & UTILITIES	909919	10.29	93632	1003551	20	200711	1204262	318454	1522716
320005	VAULT CONCRETE	1005333	10.29	103449	1108782	20	221756	1330538	351850	1682388
320006	ENCLOSURE BUILDINGS	3294394	10.29	338993	3633387	20	726677	4360064	1152985	5513049
320007	INSTALL & TEST CRANES	582859	10.29	59976	642835	20	128567	771402	203991	975393
320008	EXISTING FACILITY UPGRADE	341406	10.29	35131	376537	30	112961	489498	129444	618942
	SUBTOTAL 3 CONSTRUCTION	8391286	10.29	863465	9254751	22	2013087	11267838	2979688	14247526
	TOTAL FDNW FLUOR DANIEL NORTHWEST	16927620	9.64	1631463	18559083	21	3873954	22433037	6294343	28727380
NHC	NUMATEC HANFORD CORPORATION									
400000	PROJECT INTEGRATION	2499980	9.21	230248	2730228	20	546046	3276274	547138	3823412
	TOTAL NHC NUMATEC HANFORD CORPORATION	2499980	9.21	230248	2730228	20	546046	3276274	547138	3823412
PROJECT TOTAL		19,938,815	9.60	1,914,315	21,853,130	21	4,532,764	26,385,894	6,954,471	33,340,365

FLUOR DANIEL NORTHWEST, INC.
 NUMATEC HANFORD CORP.
 JOB NO. W-456/P3TP56
 FILE NO. W456BAB2

** TEST - INTERACTIVE ESTIMATING **
 ILAW INTERIM STORAGE FACILITY (GROUT VAULTS)
 CONCEPTUAL ESTIMATE
 PHMCRO5 - CONSTRUCTION MANAGEMENT/OTHER COST SUMMARY

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WBS	DESCRIPTION	ESTIMATE SUBTOTAL	CONSTRUCTION & TOTAL	MANAGEMENT TOTAL	OTHER COSTS	SUB TOTAL	TOTAL
-----	-----	-----	-----	-----	-----	-----	-----
1A0100	DRAWINGS	716058	0.00	0	0	0	716058
1A0200	SPECIFICATIONS	89227	0.00	0	0	0	89227
1A0300	CHECKING AND REVIEW	285872	0.00	0	0	0	285872
1A0400	REPORTS	138113	0.00	0	0	0	138113
1A0500	CALCS	100167	0.00	0	0	0	100167
1A0600	SUPPORT	711600	0.00	0	0	0	711600
1A0700	ESTIMATING	69210	0.00	0	0	0	69210
1A0800	SUBMITTALS	25466	0.00	0	0	0	25466
1A0900	QUALITY ASSURANCE	42855	0.00	0	0	0	42855
SUBTOTAL 1A	DEFINITIVE DESIGN	2178568		0	0	0	2178568
1C1000	TITLE III ENGINEERING	1793167	0.00	0	0	0	1793167
SUBTOTAL 1C	TITLE III DESIGN	3971735		0	0	0	3971735
SUBTOTAL 1	ENGINEERING	3971735		0	0	0	3971735
220001	GANTRY CRANES	4064040	0.00	0	0	0	4064040
220002	TRACTOR & TRANSPORTER	501422	0.00	0	0	0	501422
220003	CCTV	74412	0.00	0	0	0	74412
220004	CONCRETE SHIELDING COVERS	435940	0.00	0	0	0	435940
SUBTOTAL 2	PROCUREMENT	5075814		0	0	0	5075814
320001	PREP PLANKS FOR REMOVAL	1196364	18.75	224318	0	224318	1420682
320002	MISC. DEMOLITION	335204	18.75	62850	0	62850	398054
320003	REMOVE PLANKS	369380	18.75	69259	0	69259	438639
320004	SITework & UTILITIES	766247	18.75	143672	0	143672	909919
320005	VAULT CONCRETE	846596	18.75	158737	0	158737	1005333
320006	ENCLOSURE BUILDINGS	2774225	18.75	520169	0	520169	3294394
320007	INSTALL & TEST CRANES	490828	18.75	92031	0	92031	582859
320008	EXISTING FACILITY UPGRADE	287500	18.75	53906	0	53906	341406
SUBTOTAL 3	CONSTRUCTION	7066344		1324942	0	1324942	8391286
400000	PROJECT INTEGRATION	2499980	0.00	0	0	0	2499980

FLUOR DANIEL NORTHWEST, INC.
NUMATEC HANFORD CORP.
JOB NO. W-456/P3TP56
FILE NO. W465BAB2

** IEST - INTERACTIVE ESTIMATING **
ILAW INTERIM STORAGE FACILITY (GROUT VAULTS)
CONCEPTUAL ESTIMATE
PHMCR05 - CONSTRUCTION MANAGEMENT/OTHER COST SUMMARY

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WBS	DESCRIPTION	ESTIMATE SUBTOTAL	CONSTRUCTION MANAGEMENT % TOTAL	OTHER COSTS	SUB TOTAL	TOTAL
*****	*****	*****	*****	*****	*****	*****

PROJECT TOTAL		18,613,873	1,324,942	0	1,324,942	19,938,815

FLUOR DANIEL NORTHWEST, INC.
 NUMATEC HANFORD CORP.
 JOB NO. W-456/P3TP56
 FILE NO. W465BAB2

** IEST - INTERACTIVE ESTIMATING **
 ILAW INTERIM STORAGE FACILITY (GROUT VAULTS)
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 PHMCR06 - SITE ALLOCATIONS BY WBS

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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	716058	1790	0	0	247182	0	248972
1A0200	SPECIFICATIONS	89227	223	0	0	30801	0	31024
1A0300	CHECKING AND REVIEW	285872	715	0	0	98683	0	99398
1A0400	REPORTS	138113	345	0	0	47676	0	48021
1A0500	CALCS	100167	251	0	0	34578	0	34829
1A0600	SUPPORT	711600	1777	0	0	245644	0	247421
1A0700	ESTIMATING	69210	174	0	0	23891	0	24065
1A0800	SUBMITTALS	25466	64	0	0	8791	0	8855
1A0900	QUALITY ASSURANCE	42855	107	0	0	14794	0	14901
SUBTOTAL 1A DEFINITIVE DESIGN		2178568	5446	0	0	752040	0	757486
1C1000	TITLE III ENGINEERING	1793167	3206	0	0	527901	0	531107
SUBTOTAL 1C TITLE III DESIGN		1793167	3206	0	0	527901	0	531107
SUBTOTAL 1 ENGINEERING		3971735	8652	0	0	1279941	0	1288593
220001	GANTRY CRANES	4064040	0	0	0	0	1067217	1067217
220002	TRACTOR & TRANSPORTER	501422	0	0	0	0	131673	131673
220003	CCTV	74412	0	0	0	0	19541	19541
220004	CONCRETE SHIELDING COVERS	435940	0	0	0	0	114478	114478
SUBTOTAL 2 PROCUREMENT		5075814	0	0	0	0	1332909	1332909
320001	PREP PLANKS FOR REMOVAL	1196364	0	77435	298254	0	0	375689
320002	MISC. DEMOLITION	335204	0	21696	83566	0	0	105262
320003	REMOVE PLANKS	369380	0	23908	92086	0	0	115994
320004	SITEWORK & UTILITIES	766247	0	49595	191025	0	0	240620
320005	VAULT CONCRETE	846596	0	54796	211056	0	0	265852
320006	ENCLOSURE BUILDINGS	2774225	0	179561	691615	0	0	871176
320007	INSTALL & TEST CRANES	490828	0	31769	122363	0	0	154132
320008	EXISTING FACILITY UPGRADE	287500	0	18608	71674	0	0	90282
SUBTOTAL 3 CONSTRUCTION		7066344	0	457368	1761639	0	0	2219007
400000	PROJECT INTEGRATION	2499980	0	0	0	417497	0	417497

FLOOR DANIEL NORTHWEST, INC.
NUMATEC HANFORD CORP.
JOB NO. W-456/P3TP56
FILE NO. W465BAB2

** IEST - INTERACTIVE ESTIMATING **
ILAW INTERIM STORAGE FACILITY (GROUT VAULTS)
CONCEPTUAL ESTIMATE
PHMCR06 - SITE ALLOCATIONS BY WBS

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BY CDL/KLR/DEA/RWO/LAA

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

PROJECT TOTAL		18,613,873	8,652	457,368	1,761,639	1,697,438	1,332,909	5,258,006

FLUOR DANIEL NORTHWEST, INC.
NUMATEC HANFORD CORP.
JOB NO. W-456/P3TP56
FILE NO. W465BAB2

** IEST - INTERACTIVE ESTIMATING **
ILAW INTERIM STORAGE FACILITY (GROUT VAULTS)
CONCEPTUAL ESTIMATE
PHMCR07 - SITE ALLOCATION ESCALATION/CONTINGENCY REPORT

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DATE 11/24/97 09:20:01
BY CDL/KLR/DEA/RHO/LAA

WBS	DESCRIPTION	SITE ALLOC	ESCALATION		SUB	CONTINGENCY		TOTAL
		SUBTOTAL	%	TOTAL	TOTAL	%	TOTAL	DOLLARS

1A0100	DRAWINGS	248972	0.00	17702	266674	20	53334	320008
1A0200	SPECIFICATIONS	31024	0.00	2205	33229	20	6646	39875
1A0300	CHECKING AND REVIEW	99398	0.00	7067	106465	20	21293	127758
1A0400	REPORTS	48021	0.00	3413	51434	20	10288	61722
1A0500	CALCS	34829	0.00	2476	37305	20	7462	44767
1A0600	SUPPORT	247421	0.00	17594	265015	20	53003	318018
1A0700	ESTIMATING	24065	0.00	1711	25776	20	5154	30930
1A0800	SUBMITTALS	8855	0.00	630	9485	20	1898	11383
1A0900	QUALITY ASSURANCE	14901	0.00	1059	15960	20	3192	19152
SUBTOTAL 1A DEFINITIVE DESIGN		757486	7.11	53857	811343	20	162270	973613
1C1000	TITLE III ENGINEERING	531107	0.00	54650	585757	20	117152	702909
SUBTOTAL 1C TITLE III DESIGN		531107	10.29	54650	585757	20	117152	702909
SUBTOTAL 1 ENGINEERING		1288593	8.42	108507	1397100	20	279422	1676522
220001	GANTRY CRANES	1067217	0.00	101172	1168389	20	233678	1402067
220002	TRACTOR & TRANSPORTER	131673	0.00	12483	144156	20	28831	172987
220003	CCTV	19541	0.00	1852	21393	20	4279	25672
220004	CONCRETE SHIELDING COVERS	114478	0.00	10853	125331	20	25066	150397
SUBTOTAL 2 PROCUREMENT		1332909	9.48	126360	1459269	20	291854	1751123
320001	PREP PLANKS FOR REMOVAL	375689	0.00	38658	414347	25	103587	517934
320002	MISC. DEMOLITION	105262	0.00	10831	116093	25	29024	145117
320003	REMOVE PLANKS	115994	0.00	11936	127930	25	31983	159913
320004	SITEWORK & UTILITIES	240620	0.00	24759	265379	20	53075	318454
320005	VAULT CONCRETE	265852	0.00	27356	293208	20	58642	351850
320006	ENCLOSURE BUILDINGS	871176	0.00	89644	960820	20	192165	1152985
320007	INSTALL & TEST CRANES	154132	0.00	15860	169992	20	33999	203991
320008	EXISTING FACILITY UPGRADE	90282	0.00	9290	99572	30	29872	129444
SUBTOTAL 3 CONSTRUCTION		2219007	10.29	228334	2447341	22	532347	2979688
400000	PROJECT INTEGRATION	417497	0.00	38451	455948	20	91190	547138

FLUOR DANIEL NORTHWEST, INC.
NUMATEC HANFORD CORP.
JOB NO. W-456/P3TP56
FILE NO. W465BAB2

** IEST - INTERACTIVE ESTIMATING **
ILAW INTERIM STORAGE FACILITY (GROUT VAULTS)
CONCEPTUAL ESTIMATE
PHMCR07 - SITE ALLOCATION ESCALATION/CONTINGENCY REPORT

PAGE 15 OF 15
DATE 11/24/97 09:20:01
BY CDL/KLR/DEA/RWO/LAA

WBS	DESCRIPTION	SITE ALLOC SUBTOTAL	ESCALATION % TOTAL	SUB TOTAL	CONTINGENCY % TOTAL	TOTAL DOLLARS
=====	=====	=====	=====	=====	=====	=====

PROJECT TOTAL		5,258,006	9.54	5,759,658	21	6,954,471
				1,194,813		

FLUOR DANIEL NORTHWEST, INC.
NUMATEC HANFORD CORP.
JOB NO. W-456/P3TP56
FILE NO. W465BAB2

** TEST - INTERACTIVE ESTIMATING **
ILAW INTERIM STORAGE FACILITY (GROUT VAULTS)
CONCEPTUAL ESTIMATE
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 1
DATE 11/24/97 09:20:15
BY CDL/KLR/DEA/RWO/LAA

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
1A0100	DRAWINGS										
1A0100.21	CIVIL										
1A0100.2121002	CIVIL ENGR	020	160 HR	160	11094	0	0	0	0	0	11094
1A0100.2121102	CIVIL DESIGNER	020	780 HR	780	33774	0	0	0	0	0	33774
SUBTOTAL	CIVIL			940		0		0		0	
					44,868		0		0		44,868
TOTAL	COST CODE 02021 WBS 1A0100 (ESCALATION 7.11% - CONTINGENCY 20.00 %)			940		0		0		0	
					44,868		0		0		44,868
1A0100.23	ARCHITECTURAL										
1A0100.2322002	ARCHITECT	020	1302 HR	1302	87716	0	0	0	0	0	87716
SUBTOTAL	ARCHITECTURAL			1,302		0		0		0	
					87,716		0		0		87,716
TOTAL	COST CODE 02023 WBS 1A0100 (ESCALATION 7.11% - CONTINGENCY 20.00 %)			1,302		0		0		0	
					87,716		0		0		87,716
1A0100.24	STRUCTURAL										
1A0100.2421502	STRUCTURAL ENGR	020	2036 HR	2036	148628	0	0	0	0	0	148628
1A0100.2421602	STRUCTURAL DESIGNER	020	1060 HR	1060	65179	0	0	0	0	0	65179
SUBTOTAL	STRUCTURAL			3,096		0		0		0	
					213,807		0		0		213,807
TOTAL	COST CODE 02024 WBS 1A0100 (ESCALATION 7.11% - CONTINGENCY 20.00 %)			3,096		0		0		0	
					213,807		0		0		213,807
1A0100.26	FIRE PROT/SAFETY										
1A0100.2624502	FP/SAFETY ENGR	020	464 HR	464	30522	0	0	0	0	0	30522
SUBTOTAL	FIRE PROT/SAFETY			464		0		0		0	
					30,522		0		0		30,522
TOTAL	COST CODE 02026 WBS 1A0100			464		0		0		0	
					30,522		0		0		30,522

FLUOR DANIEL NORTHWEST, INC.
 NUMATEC HANFORD CORP.
 JOB NO. W-456/P3TP56
 FILE NO. W465BAB2

** IEST - INTERACTIVE ESTIMATING **
 ILAW INTERIM STORAGE FACILITY (GROUT VAULTS)
 CONCEPTUAL ESTIMATE
 PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 2
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 BY CDL/KLR/DEA/RWO/LAA

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
(ESCALATION 7.11% - CONTINGENCY 20.00 %)											
1A0100.28	HVAC										
1A0100.2823502	HVAC DESIGNER	020	220 HR	220	14520	0	0	0	0	0	14520
1A0100.2823504	HVAC ENGR	020	360 HR	360	23760	0	0	0	0	0	23760
SUBTOTAL	HVAC			580		0		0		0	
					38,280		0		0		38,280
TOTAL	COST CODE 02028 WBS 1A0100 (ESCALATION 7.11% - CONTINGENCY 20.00 %)			580		0		0		0	38,280
					38,280		0		0		38,280
1A0100.29	INSTRUMENT										
1A0100.2927002	I/C DESIGNER	020	220 HR	220	14194	0	0	0	0	0	14194
1A0100.2927004	INSTRUMENTATION ENGR	020	580 HR	580	37422	0	0	0	0	0	37422
SUBTOTAL	INSTRUMENT			800		0		0		0	
					51,616		0		0		51,616
TOTAL	COST CODE 02029 WBS 1A0100 (ESCALATION 7.11% - CONTINGENCY 20.00 %)			800		0		0		0	51,616
					51,616		-0		0		51,616
1A0100.31	ELECTRICAL										
1A0100.3126502	ELECTRICAL ENGR	020	1314 HR	1314	85922	0	0	0	0	0	85922
1A0100.3126602	ELECTRICAL DESIGNER	020	1858 HR	1858	121495	0	0	0	0	0	121495
SUBTOTAL	ELECTRICAL			3,172		0		0		0	
					207,417		0		0		207,417
TOTAL	COST CODE 02031 WBS 1A0100 (ESCALATION 7.11% - CONTINGENCY 20.00 %)			3,172		0		0		0	207,417
					207,417		0		0		207,417
1A0100.35	DESIGN ADMIN										
1A0100.3520102	DESIGN ADMIN/PLE	020	280 HR	280	22870	0	0	0	0	0	22870
SUBTOTAL	DESIGN ADMIN			280		0		0		0	
					22,870		0		0		22,870
TOTAL	COST CODE 02035 WBS 1A0100			280		0		0		0	22,870
					22,870		0		0		22,870

HNF-1975
 Rev.

FLUOR DANIEL NORTHWEST, INC.
NUMATEC HANFORD CORP.
JOB NO. W-456/P3TP56
FILE NO. W465BAB2

** IEST - INTERACTIVE ESTIMATING **
ILAW INTERIM STORAGE FACILITY (GROUT VAULTS)
CONCEPTUAL ESTIMATE
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 3
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BY CDL/KLR/DEA/RMO/LAA

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
	(ESCALATION 7.11% - CONTINGENCY 20.00 %)										
1A0100.39	ENVIROMENTAL COMPLIANCE										
1A0100.3923002	ENVIRONMENTAL ENG.	020	13 HR	13	856	0	0	0	0	0	856
	SUBTOTAL			13		0		0		0	
					856		0		0		856
TOTAL	COST CODE 02039			13		0		0		0	
	WBS 1A0100				856		0				856
	(ESCALATION 7.11% - CONTINGENCY 20.00 %)										
1A0100.62	SURVEY										
1A0100.6221002	SURVEY	020	276 HR	276	18106	0	0	0	0	0	18106
	SUBTOTAL			276		0		0		0	
					18,106		0		0		18,106
TOTAL	COST CODE 02062			276		0		0		0	
	WBS 1A0100				18,106		0				18,106
	(ESCALATION 7.11% - CONTINGENCY 20.00 %)										
TOTAL WBS 1A0100 DRAWINGS				10,923	716,058	0	0	0		0	716,058

FLUOR DANIEL NORTHWEST, INC.
 NUMATEC HANFORD CORP.
 JOB NO. W-456/P3TP56
 FILE NO. W465BAB2

** IEST - INTERACTIVE ESTIMATING **
 ILAW INTERIM STORAGE FACILITY (GROUT VAULTS)
 CONCEPTUAL ESTIMATE
 PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 4
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 BY CDL/KLR/DEA/RWO/LAA

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
1A0200	SPECIFICATIONS										
1A0200.21	CIVIL										
1A0200.2121002	CIVIL ENGR	020	65 HR	65	4507	0	0	0	0	0	4507
	SUBTOTAL			65		0		0		0	
					4,507		0		0		4,507
TOTAL	COST CODE 02021 WBS 1A0200 (ESCALATION 7.11% - CONTINGENCY 20.00 %)			65	4,507	0	0	0	0	0	4,507
1A0200.27	PIPING/VESSEL										
1A0200.2725502	LEAD MECHANICAL ENGR	020	344 HR	344	20320	0	0	0	0	0	20320
	SUBTOTAL			344		0		0		0	
					20,320		0		0		20,320
TOTAL	COST CODE 02027 WBS 1A0200 (ESCALATION 7.11% - CONTINGENCY 20.00 %)			344	20,320	0	0	0	0	0	20,320
1A0200.28	HVAC										
1A0200.2823502	HVAC DESIGNER	020	20 HR	20	1320	0	0	0	0	0	1320
1A0200.2823504	HVAC ENGR	020	210 HR	210	13860	0	0	0	0	0	13860
	SUBTOTAL			230		0		0		0	
					15,180		0		0		15,180
TOTAL	COST CODE 02028 WBS 1A0200 (ESCALATION 7.11% - CONTINGENCY 20.00 %)			230	15,180	0	0	0	0	0	15,180
1A0200.29	INSTRUMENT										
1A0200.2927002	INSTRUMENTATION ENGR	020	240 HR	240	15485	0	0	0	0	0	15485
	SUBTOTAL			240		0		0		0	
					15,485		0		0		15,485
TOTAL	COST CODE 02029 WBS 1A0200 (ESCALATION 7.11% - CONTINGENCY 20.00 %)			240	15,485	0	0	0	0	0	15,485
1A0200.32	SPECIF										

FLUOR DANIEL NORTHWEST, INC.
 NUMATEC HANFORD CORP.
 JOB NO. W-456/P3TP56
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** IEST - INTERACTIVE ESTIMATING **
 ILAW INTERIM STORAGE FACILITY (GROUT VAULTS)
 CONCEPTUAL ESTIMATE
 PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
1A0200.3220402	SPECS	020	173	HR	173	8603	0	0	0	0	8603
1A0200.3220404	SPECS	020	173	HR	173	12975	0	0	0	0	12975
	(SPECIAL RATE)										
SUBTOTAL SPECIF				346		0		0		0	
					21,578		0		0		21,578
TOTAL				346		0		0		0	
					21,578		0		0		21,578
				(ESCALATION 7.11% - CONTINGENCY 20.00 %)							
1A0200.49	SUB/PROC										
1A0200.4943002	SUBCONTRACTS/PROC	020	173	HR	173	12157	0	0	0	0	12157
SUBTOTAL SUB/PROC				173		0		0		0	
					12,157		0		0		12,157
TOTAL				173		0		0		0	
					12,157		0		0		12,157
				(ESCALATION 7.11% - CONTINGENCY 20.00 %)							
TOTAL WBS 1A0200 SPECIFICATIONS				1,398		0		0		0	
					89,227		0		0		89,227

FLUOR DANIEL NORTHWEST, INC.
NUMATEC HANFORD CORP.
JOB NO. W-456/P3TP56
FILE NO. W465BAB2

** IEST - INTERACTIVE ESTIMATING **
ILAW INTERIM STORAGE FACILITY (GROUT VAULTS)
CONCEPTUAL ESTIMATE
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

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BY CDL/KLR/DEA/RNO/LAA

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
1A0300	CHECKING AND REVIEW										
1A0300.22	ENVIRON ENGRG										
1A0300.2223002	ENVIRONMENTAL ENGR	020	16 HR	16	1053	0	0	0	0	0	1053
SUBTOTAL	ENVIRON ENGRG			16		0	0	0	0	0	
					1,053		0				1,053
TOTAL	COST CODE 02022 WBS 1A0300 (ESCALATION 7.11% - CONTINGENCY 20.00 %)			16	1,053	0	0	0	0	0	1,053
1A0300.23	ARCHITECTUAL										
1A0300.2322002	ARCHITECT	020	416 HR	416	28026	0	0	0	0	0	28026
SUBTOTAL	ARCHITECTUAL			416		0	0	0	0	0	
					28,026		0				28,026
TOTAL	COST CODE 02023 WBS 1A0300 (ESCALATION 7.11% - CONTINGENCY 20.00 %)			416	28,026	0	0	0	0	0	28,026
1A0300.24	STRUCTURAL										
1A0300.2421502	STRUCTURAL ENGR	020	705 HR	705	51465	0	0	0	0	0	51465
SUBTOTAL	STRUCTURAL			705		0	0	0	0	0	
					51,465		0				51,465
TOTAL	COST CODE 02024 WBS 1A0300 (ESCALATION 7.11% - CONTINGENCY 20.00 %)			705	51,465	0	0	0	0	0	51,465
1A0300.26	FIRE PROT/SAFETY										
1A0300.2624502	FP/SAFETY ENGR	020	108 HR	108	7104	0	0	0	0	0	7104
SUBTOTAL	FIRE PROT/SAFETY			108		0	0	0	0	0	
					7,104		0				7,104
TOTAL	COST CODE 02026 WBS 1A0300 (ESCALATION 7.11% - CONTINGENCY 20.00 %)			108	7,104	0	0	0	0	0	7,104
1A0300.27	PIPING/VESSEL										

FLUOR DANIEL NORTHWEST, INC.
NUMATEC HANFORD CORP.
JOB NO. M-456/P37F56
FILE NO. W465BAB2

.. 1ST - INTERACTIVE ESTIMATING ..
ILAM INTERIM STORAGE FACILITY (GROUT VAULTS)
CONCEPTUAL ESTIMATE
PHMC808 - ESTIMATE DETAIL BY WBS / COST CODE

ACCOUNT	DESCRIPTION	COST	QUANTITY	MANHOURS	LABOR	EQUIP	SUB-	EQUIP-	OH&P	TOTAL
NUMBER		CODE			USAGE	MATERIAL	CONTRACT	MENT	/ B & I	DOLLARS

1A0300.2725502	LEAD MECH ENGR	020	39	HR	39	2304	0	0	0	2304
	SUBTOTAL				39	2,304	0	0	0	2,304
	TOTAL				39	2,304	0	0	0	2,304
	WBS 1A0300									
	COST CODE 02027									
	(ESCALATION									
	7.11% - CONTINGENCY									2,304
1A0300.28	HVAC	020	306	HR	306	20196	0	0	0	20196
	SUBTOTAL				306	20,196	0	0	0	20,196
	TOTAL				306	20,196	0	0	0	20,196
	WBS 1A0300									
	COST CODE 02028									
	(ESCALATION									
	7.11% - CONTINGENCY									20,196

1A0300.2927002	INSTRUMENT	020	326	HR	326	21034	0	0	0	21034
	SUBTOTAL				326	21,034	0	0	0	21,034
	TOTAL				326	21,034	0	0	0	21,034
	WBS 1A0300									
	COST CODE 02029									
	(ESCALATION									
	7.11% - CONTINGENCY									21,034
1A0300.3126502	ELECTRICAL ENGR	020	338	HR	338	22102	0	0	0	22102
	SUBTOTAL				338	22,102	0	0	0	22,102
	TOTAL				338	22,102	0	0	0	22,102
	WBS 1A0300									
	COST CODE 02031									
	(ESCALATION									
	7.11% - CONTINGENCY									22,102

1A0300.3520102	DESIGN ADMIN/ENGR MGMT	020	334	HR	334	27281	0	0	0	27281
	SUBTOTAL				334	27,281	0	0	0	27,281
	TOTAL				334	27,281	0	0	0	27,281
	WBS 1A0300									
	COST CODE 02032									
	(ESCALATION									
	7.11% - CONTINGENCY									27,281

1A0300.35	DESIGN ADMIN	020	334	HR	334	27281	0	0	0	27281
	SUBTOTAL				334	27,281	0	0	0	27,281
	TOTAL				334	27,281	0	0	0	27,281
	WBS 1A0300									
	COST CODE 02033									
	(ESCALATION									
	7.11% - CONTINGENCY									27,281

1A0300.3520102	DESIGN ADMIN/ENGR MGMT	020	334	HR	334	27281	0	0	0	27281
	SUBTOTAL				334	27,281	0	0	0	27,281
	TOTAL				334	27,281	0	0	0	27,281
	WBS 1A0300									
	COST CODE 02034									
	(ESCALATION									
	7.11% - CONTINGENCY									27,281

FLUOR DANIEL NORTHWEST, INC.
NUMATEC HANFORD CORP.
JOB NO. W-456/P3TP56
FILE NO. W465BAB2

** TEST - INTERACTIVE ESTIMATING **
ILAW INTERIM STORAGE FACILITY (GROUT VAULTS)
CONCEPTUAL ESTIMATE
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

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BY CDL/KLR/DEA/RWO/LAA

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS

TOTAL	COST CODE 02035			334		0		0		0	
	WBS 1A0300				27,281		0		0		27,281
	(ESCALATION 7.11% - CONTINGENCY 20.00 %)										
1A0300.39	ENVIRONMENTAL COMPLIANCE										
1A0300.3923002	ENVIRONMENTAL ENGR	020	80 HR	80	5266	0	0	0	0	0	5266
SUBTOTAL	ENVIRONMENTAL COMPLIANCE			80		0		0		0	
					5,266		0		0		5,266
TOTAL	COST CODE 02039			80		0		0		0	
	WBS 1A0300				5,266		0		0		5,266
	(ESCALATION 7.11% - CONTINGENCY 20.00 %)										
1A0300.40	PROJECT MANAGER										
1A0300.4010102	PROJECT MANAGER	020	111 HR	111	8529	0	0	0	0	0	8529
SUBTOTAL	PROJECT MANAGER			111		0		0		0	
					8,529		0		0		8,529
TOTAL	COST CODE 02040			111		0		0		0	
	WBS 1A0300				8,529		0		0		8,529
	(ESCALATION 7.11% - CONTINGENCY 20.00 %)										
1A0300.41	WORD PROCESSING										
1A0300.4110302	PM CLERICAL/SEC'Y	020	40 HR	40	1201	0	0	0	0	0	1201
SUBTOTAL	WORD PROCESSING			40		0		0		0	
					1,201		0		0		1,201
TOTAL	COST CODE 02041			40		0		0		0	
	WBS 1A0300				1,201		0		0		1,201
	(ESCALATION 7.11% - CONTINGENCY 20.00 %)										
1A0300.42	QUALITY ENGINEERING										
1A0300.4204202	QUALITY ASSURANCE	020	353 HR	353	26355	0	0	0	0	0	26355
SUBTOTAL	QUALITY ENGINEERING			353		0		0		0	
					26,355		0		0		26,355
TOTAL	COST CODE 02042			353		0		0		0	
	WBS 1A0300				26,355		0		0		26,355

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
	(ESCALATION 7.11% - CONTINGENCY 20.00 %)										
1A0300.45	PROJECT PLANNING										
1A0300.4530002	PROJECT CONTROLS	020	40 HR	40	2281	0	0	0	0	0	2281
	SUBTOTAL PROJECT PLANNING			40		0		0		0	
					2,281		0		0		2,281
	TOTAL COST CODE 02045			40		0		0		0	
	WBS 1A0300				2,281		0		0		2,281
	(ESCALATION 7.11% - CONTINGENCY 20.00 %)										
1A0300.60	CF ADMINISTRATION										
1A0300.6050102	CONSTRUCTION MGMT	020	692 HR	692	43354	0	0	0	0	0	43354
1A0300.6050502	CONSTRUCTION ENGR	020	346 HR	346	18321	0	0	0	0	0	18321
	SUBTOTAL CF ADMINISTRATION			1,038		0		0		0	
					61,675		0		0		61,675
	TOTAL COST CODE 02060			1,038		0		0		0	
	WBS 1A0300				61,675		0		0		61,675
	(ESCALATION 7.11% - CONTINGENCY 20.00 %)										
	TOTAL WBS 1A0300 CHECKING AND REVIEW			4,250		0		0		0	
					285,872		0		0		285,872

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
1A0400	REPORTS										
1A0400.23	ARCHITECTUAL										
1A0400.2322002	ARCHITECT	020	474 HR	474	31933	0	0	0	0	0	31933
	SUBTOTAL			474		0		0		0	
					31,933		0		0		31,933
TOTAL	COST CODE 02023			474		0		0		0	
	WBS 1A0400				31,933		0		0		31,933
	(ESCALATION 7.11% - CONTINGENCY 20.00 %)										
1A0400.24	STRUCTURAL										
1A0400.2421502	STRUCTURAL ENGR	020	219 HR	219	15987	0	0	0	0	0	15987
	SUBTOTAL			219		0		0		0	
					15,987		0		0		15,987
TOTAL	COST CODE 02024			219		0		0		0	
	WBS 1A0400				15,987		0		0		15,987
	(ESCALATION 7.11% - CONTINGENCY 20.00 %)										
1A0400.26	FIRE PROT/SAFETY										
1A0400.2624502	FP/SAFETY ENGR	020	48 HR	48	3157	0	0	0	0	0	3157
	SUBTOTAL			48		0		0		0	
					3,157		0		0		3,157
TOTAL	COST CODE 02026			48		0		0		0	
	WBS 1A0400				3,157		0		0		3,157
	(ESCALATION 7.11% - CONTINGENCY 20.00 %)										
1A0400.27	PIPING/VESSEL										
1A0400.2725502	LEAD MECH ENGR	020	30 HR	30	1772	0	0	0	0	0	1772
	SUBTOTAL			30		0		0		0	
					1,772		0		0		1,772
TOTAL	COST CODE 02027			30		0		0		0	
	WBS 1A0400				1,772		0		0		1,772
	(ESCALATION 7.11% - CONTINGENCY 20.00 %)										
1A0400.28	HVAC										

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
1A0400.2823502	HVAC ENGR	020	45 HR	45	2970	0	0	0	0	0	2970
SUBTOTAL	HVAC			45	2,970	0	0	0	0	0	2,970
TOTAL	COST CODE 02028 WBS 1A0400 (ESCALATION 7.11% - CONTINGENCY 20.00 %)			45	2,970	0	0	0	0	0	2,970
1A0400.29	INSTRUMENT										
1A0400.2927002	I/C ENGINEER	020	68 HR	68	4387	0	0	0	0	0	4387
SUBTOTAL	INSTRUMENT			68	4,387	0	0	0	0	0	4,387
TOTAL	COST CODE 02029 WBS 1A0400 (ESCALATION 7.11% - CONTINGENCY 20.00 %)			68	4,387	0	0	0	0	0	4,387
1A0400.31	ELECTRICAL										
1A0400.3126502	ELECTRICAL ENGR	020	219 HR	219	14320	0	0	0	0	0	14320
SUBTOTAL	ELECTRICAL			219	14,320	0	0	0	0	0	14,320
TOTAL	COST CODE 02031 WBS 1A0400 (ESCALATION 7.11% - CONTINGENCY 20.00 %)			219	14,320	0	0	0	0	0	14,320
1A0400.35	DESIGN ADMIN										
1A0400.3520102	DESIGN ADMIN/PLE	020	91 HR	91	7433	0	0	0	0	0	7433
SUBTOTAL	DESIGN ADMIN			91	7,433	0	0	0	0	0	7,433
TOTAL	COST CODE 02035 WBS 1A0400 (ESCALATION 7.11% - CONTINGENCY 20.00 %)			91	7,433	0	0	0	0	0	7,433
1A0400.39	ENVIROMENTAL COMPLIANCE										
1A0400.3923002	ENVIROMENTAL ENGR	020	731 HR	731	48114	0	0	0	0	0	48114
SUBTOTAL	ENVIROMENTAL COMPLIANCE			731	48,114	0	0	0	0	0	48,114

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS

TOTAL	COST CODE 02039			731		0		0		0	
	WBS 1A0400				48,114		0		0		48,114
	(ESCALATION 7.11% - CONTINGENCY 20.00 %)										
1A0400.45	PROJECT PLANNING										
1A0400.4530002	PROJECT CONTROLS	020	141 HR	141	8040	0	0	0	0	0	8040

SUBTOTAL	PROJECT PLANNING			141		0		0		0	
					8,040		0		0		8,040

TOTAL	COST CODE 02045			141		0		0		0	
	WBS 1A0400				8,040		0		0		8,040
	(ESCALATION 7.11% - CONTINGENCY 20.00 %)										

TOTAL WBS 1A0400 REPORTS				2,066		0		0		0	
					138,113		0		0		138,113

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
1A0500	CALCS										
1A0500.21	CIVIL										
1A0500.2129002	NUCLEAR/SHIELDING ENGR	020	990 HR	990	62667	0	0	0	0	0	62667
	SUBTOTAL CIVIL			990	62,667	0	0	0	0	0	62,667
	TOTAL COST CODE 02021			990	62,667	0	0	0	0	0	62,667
	WBS 1A0500				62,667		0				62,667
	(ESCALATION 7.11% - CONTINGENCY 20.00 %)										
1A0500.24	STRUCTURAL										
1A0500.2421502	STRUCTURAL ENGR	020	360 HR	360	26280	0	0	0	0	0	26280
	SUBTOTAL STRUCTURAL			360	26,280	0	0	0	0	0	26,280
	TOTAL COST CODE 02024			360	26,280	0	0	0	0	0	26,280
	WBS 1A0500				26,280		0				26,280
	(ESCALATION 7.11% - CONTINGENCY 20.00 %)										
1A0500.28	HVAC										
1A0500.2823502	HVAC DESIGNER	020	30 HR	30	1980	0	0	0	0	0	1980
1A0500.2823504	HVAC ENGR	020	140 HR	140	9240	0	0	0	0	0	9240
	SUBTOTAL HVAC			170	11,220	0	0	0	0	0	11,220
	TOTAL COST CODE 02028			170	11,220	0	0	0	0	0	11,220
	WBS 1A0500				11,220		0				11,220
	(ESCALATION 7.11% - CONTINGENCY 20.00 %)										
	TOTAL WBS 1A0500 CALCS			1,520	100,167	0	0	0	0	0	100,167

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
1A0600	SUPPORT										
1A0600.21	CIVIL										
1A0600.2121002	CIVIL ENGR	020	60 HR	60	4160	0	0	0	0	0	4160
1A0600.2129002	NUCLEAR/SHIELDING ENGR	020	148 HR	148	9368	0	0	0	0	0	9368
SUBTOTAL	CIVIL			208		0		0		0	
					13,528		0		0		13,528
TOTAL	COST CODE 02021			208		0		0		0	
	WBS 1A0600				13,528		0		0		13,528
	(ESCALATION 7.11% - CONTINGENCY 20.00 %)										
1A0600.22	ENVIRON ENGRG										
1A0600.2223002	ENVIRONMENTAL ENGR	020	6 HR	6	395	0	0	0	0	0	395
SUBTOTAL	ENVIRON ENGRG			6		0		0		0	
					395		0		0		395
TOTAL	COST CODE 02022			6		0		0		0	
	WBS 1A0600				395		0		0		395
	(ESCALATION 7.11% - CONTINGENCY 20.00 %)										
1A0600.23	ARCHITECTUAL										
1A0600.2322002	ARCHITECT	020	506 HR	506	34089	0	0	0	0	0	34089
SUBTOTAL	ARCHITECTUAL			506		0		0		0	
					34,089		0		0		34,089
TOTAL	COST CODE 02023			506		0		0		0	
	WBS 1A0600				34,089		0		0		34,089
	(ESCALATION 7.11% - CONTINGENCY 20.00 %)										
1A0600.24	STRUCTURAL										
1A0600.2421502	STRUCTURAL ENGR	020	641 HR	641	46793	0	0	0	0	0	46793
1A0600.2421602	STRUCTURAL DESIGNER	020	261 HR	261	16049	0	0	0	0	0	16049
SUBTOTAL	STRUCTURAL			902		0		0		0	
					62,842		0		0		62,842
TOTAL	COST CODE 02024			902		0		0		0	
	WBS 1A0600				62,842		0		0		62,842

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
	(ESCALATION 7.11% - CONTINGENCY 20.00 %)										
1A0600.26	FIRE PROT/SAFETY										
1A0600.2624502	FP/SAFETY ENGR	020	276 HR	276	18155	0	0	0	0	0	18155
SUBTOTAL	FIRE PROT/SAFETY			276		0	0	0	0	0	
					18,155		0		0		18,155
TOTAL	COST CODE 02026			276		0	0	0	0	0	
	WBS 1A0600				18,155		0		0		18,155
	(ESCALATION 7.11% - CONTINGENCY 20.00 %)										
1A0600.27	PIPING/VESSEL										
1A0600.2725504	LEAD-MECH ENGR	020	453 HR	453	26759	0	0	0	0	0	26759
SUBTOTAL	PIPING/VESSEL			453		0	0	0	0	0	
					26,759		0		0		26,759
TOTAL	COST CODE 02027			453		0	0	0	0	0	
	WBS 1A0600				26,759		0		0		26,759
	(ESCALATION 7.11% - CONTINGENCY 20.00 %)										
1A0600.28	HVAC										
1A0600.2823502	HVAC ENGR	020	226 HR	226	14916	0	0	0	0	0	14916
1A0600.2823504	HVAC DESIGNER	020	40 HR	40	2640	0	0	0	0	0	2640
SUBTOTAL	HVAC			266		0	0	0	0	0	
					17,556		0		0		17,556
TOTAL	COST CODE 02028			266		0	0	0	0	0	
	WBS 1A0600				17,556		0		0		17,556
	(ESCALATION 7.11% - CONTINGENCY 20.00 %)										
1A0600.29	INSTRUMENT										
1A0600.2927002	INSTRUMENTATION ENGR	020	291 HR	291	18775	0	0	0	0	0	18775
1A0600.2927004	I/C DESIGNER	020	33 HR	33	2129	0	0	0	0	0	2129
SUBTOTAL	INSTRUMENT			324		0	0	0	0	0	
					20,904		0		0		20,904
TOTAL	COST CODE 02029			324		0	0	0	0	0	
	WBS 1A0600				20,904		0		0		20,904

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
	(ESCALATION 7.11% - CONTINGENCY 20.00 %)										
1A0600.31	ELECTRICAL										
1A0600.3126502	ELECTRICAL ENGR	020	726 HR	726	47473	0	0	0	0	0	47473
1A0600.3126602	ELECTRICAL DESIGNER	020	279 HR	279	18244	0	0	0	0	0	18244
SUBTOTAL	ELECTRICAL			1,005		0	0	0	0	0	65,717
TOTAL	COST CODE 02031 WBS 1A0600 (ESCALATION 7.11% - CONTINGENCY 20.00 %)			1,005	65,717	0	0	0	0	0	65,717
1A0600.35	DESIGN ADMIN										
1A0600.3520102	DESIGN ADMIN/ENGR MGMT	020	1695 HR	1695	138448	0	0	0	0	0	138448
SUBTOTAL	DESIGN ADMIN			1,695		0	0	0	0	0	138,448
TOTAL	COST CODE 02035 WBS 1A0600 (ESCALATION 7.11% - CONTINGENCY 20.00 %)			1,695	138,448	0	0	0	0	0	138,448
1A0600.40	PROJECT MANAGER										
1A0600.4010102	PROJECT MANAGER	020	2019 HR	2019	155140	0	0	0	0	0	155140
1A0600.4010302	PM CLERICAL	020	1630 HR	1630	48933	0	0	0	0	0	48933
SUBTOTAL	PROJECT MANAGER			3,649		0	0	0	0	0	204,073
TOTAL	COST CODE 02040 WBS 1A0600 (ESCALATION 7.11% - CONTINGENCY 20.00 %)			3,649	204,073	0	0	0	0	0	204,073
1A0600.45	PROJECT PLANNING										
1A0600.4530002	PROJECT CONTROLS	020	1630 HR	1630	92943	0	0	0	0	0	92943
SUBTOTAL	PROJECT PLANNING			1,630		0	0	0	0	0	92,943
TOTAL	COST CODE 02045 WBS 1A0600			1,630	92,943	0	0	0	0	0	92,943

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
(ESCALATION 7.11% - CONTINGENCY 20.00 %)											
1A0600.49	SUB/PROC										
1A0600.4943002	SUBC/PROC ADMIN	020	40 HR	40	2811	0	0	0	0	0	2811
SUBTOTAL	SUB/PROC			40		0	0	0	0	0	
					2,811		0		0		2,811
TOTAL	COST CODE 02049			40		0	0	0	0	0	
	WBS 1A0600				2,811		0		0		2,811
(ESCALATION 7.11% - CONTINGENCY 20.00 %)											
1A0600.65	RECORDS MGMT/TURNOVER										
1A0600.6520502	PROJECT ENGR SUPPORT	020	400 HR	400	13380	0	0	0	0	0	13380
SUBTOTAL	RECORDS MGMT/TURNOVER			400		0	0	0	0	0	
					13,380		0		0		13,380
TOTAL	COST CODE 02065			400		0	0	0	0	0	
	WBS 1A0600				13,380		0		0		13,380
(ESCALATION 7.11% - CONTINGENCY 20.00 %)											
TOTAL WBS 1A0600 SUPPORT				11,360		0	0	0	0	0	
					711,600		0		0		711,600

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
1A0700	ESTIMATING										
1A0700.21	CIVIL										
1A0700.2121002	CIVIL ENGR	020	16 HR	16	1109	0	0	0	0	0	1109
SUBTOTAL	CIVIL			16		0		0		0	
					1,109		0		0		1,109
TOTAL	COST CODE 02021 WBS 1A0700 (ESCALATION 7.11% - CONTINGENCY 20.00 %)			16	1,109	0	0	0	0	0	1,109
1A0700.23	ARCHITECTURAL										
1A0700.2322002	ARCHITECT	020	16 HR	16	1078	0	0	0	0	0	1078
SUBTOTAL	ARCHITECTUAL			16		0		0		0	
					1,078		0		0		1,078
TOTAL	COST CODE 02023 WBS 1A0700 (ESCALATION 7.11% - CONTINGENCY 20.00 %)			16	1,078	0	0	0	0	0	1,078
1A0700.24	STRUCTURAL										
1A0700.2421502	STRUCTURAL ENGR	020	16 HR	16	1168	0	0	0	0	0	1168
SUBTOTAL	STRUCTURAL			16		0		0		0	
					1,168		0		0		1,168
TOTAL	COST CODE 02024 WBS 1A0700 (ESCALATION 7.11% - CONTINGENCY 20.00 %)			16	1,168	0	0	0	0	0	1,168
1A0700.26	FIRE PROT/SAFETY										
1A0700.2624502	FP/SAFETY ENGR	020	16 HR	16	1052	0	0	0	0	0	1052
SUBTOTAL	FIRE PROT/SAFETY			16		0		0		0	
					1,052		0		0		1,052
TOTAL	COST CODE 02026 WBS 1A0700 (ESCALATION 7.11% - CONTINGENCY 20.00 %)			16	1,052	0	0	0	0	0	1,052
1A0700.28	HVAC										

FLUOR DANIEL NORTHWEST, INC.
 NUMATEC HANFORD CORP.
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 ILAW INTERIM STORAGE FACILITY (GROUT VAULTS)
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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
1A0700.2823502	HVAC ENGR	020	8 HR	8	528	0	0	0	0	0	528
	SUBTOTAL			8	528	0	0	0	0	0	528
	TOTAL			8	528	0	0	0	0	0	528
	COST CODE 02028 WBS 1A0700 (ESCALATION 7.11% - CONTINGENCY 20.00 %)										
1A0700.29	INSTRUMENT										
1A0700.2927002	INSTRUMENTATION ENGR	020	8 HR	8	516	0	0	0	0	0	516
	SUBTOTAL			8	516	0	0	0	0	0	516
	TOTAL			8	516	0	0	0	0	0	516
	COST CODE 02029 WBS 1A0700 (ESCALATION 7.11% - CONTINGENCY 20.00 %)										
1A0700.31	ELECTRICAL										
1A0700.3126502	ELECTRICAL ENGR	020	16 HR	16	1046	0	0	0	0	0	1046
	SUBTOTAL			16	1,046	0	0	0	0	0	1,046
	TOTAL			16	1,046	0	0	0	0	0	1,046
	COST CODE 02031 WBS 1A0700 (ESCALATION 7.11% - CONTINGENCY 20.00 %)										
1A0700.46	ESTIMATES										
1A0700.4631002	ESTIMATING	020	320 HR	320	20861	0	0	0	0	0	20861
1A0700.4631004	ESTIMATING	020	642 HR	642	41852	0	0	0	0	0	41852
	SUBTOTAL			962	62,713	0	0	0	0	0	62,713
	TOTAL			962	62,713	0	0	0	0	0	62,713
	COST CODE 02046 WBS 1A0700 (ESCALATION 7.11% - CONTINGENCY 20.00 %)										
TOTAL WBS 1A0700 ESTIMATING				1,058	69,210	0	0	0	0	0	69,210

FLUOR DANIEL NORTHWEST, INC.
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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
1A0800	SUBMITTALS										
1A0800.27	PIPING/VESSEL										
1A0800.2725502	LEAD MECH ENGR	020	160 HR	160	9451	0	0	0	0	0	9451
	SUBTOTAL			160		0		0		0	
					9,451		0		0		9,451
TOTAL	COST CODE 02027 WBS 1A0800 (ESCALATION 7.11% - CONTINGENCY 20.00 %)			160		0		0		0	
					9,451		0		0		9,451
1A0800.29	INSTRUMENT										
1A0800.2927002	INSTRUMENTATION ENGR	020	80 HR	80	5162	0	0	0	0	0	5162
	SUBTOTAL			80		0		0		0	
					5,162		0		0		5,162
TOTAL	COST CODE 02029 WBS 1A0800 (ESCALATION 7.11% - CONTINGENCY 20.00 %)			80		0		0		0	
					5,162		0		0		5,162
1A0800.31	ELECTRICAL										
1A0800.3126502	ELECTRICAL ENGR	020	80 HR	80	5231	0	0	0	0	0	5231
	SUBTOTAL			80		0		0		0	
					5,231		0		0		5,231
TOTAL	COST CODE 02031 WBS 1A0800 (ESCALATION 7.11% - CONTINGENCY 20.00 %)			80		0		0		0	
					5,231		0		0		5,231
1A0800.49	SUB/PROC										
1A0800.4943002	SUBCONTRACTS/PROC	020	80 HR	80	5622	0	0	0	0	0	5622
	SUBTOTAL			80		0		0		0	
					5,622		0		0		5,622
TOTAL	COST CODE 02049 WBS 1A0800 (ESCALATION 7.11% - CONTINGENCY 20.00 %)			80		0		0		0	
					5,622		0		0		5,622

FLUOR DANIEL NORTHWEST, INC.
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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS

TOTAL WBS 1A0800 SUBMITTALS				400	25,466	0	0	0	0	0	25,466

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
1A0900	QUALITY ASSURANCE										
1A0900.42	QUALITY ENGINEERING										
1A0900.4204202	QA SUPPORT - DEF DESIGN	020	574 HR	574	42855	0	0	0	0	0	42855
SUBTOTAL	QUALITY ENGINEERING			574		0		0		0	
					42,855		0		0		42,855
TOTAL	COST CODE 02042			574		0		0		0	
	WBS 1A0900				42,855		0		0		42,855
	(ESCALATION 7.11% - CONTINGENCY 20.00 %)										
TOTAL WBS 1A0900	QUALITY ASSURANCE			574		0		0		0	
					42,855		0		0		42,855

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
1C1000	TITLE III ENGINEERING										
1C1000.00	TECHNICAL SERVICES										
1C1000.0000002	A/E, CONSTRUCTION & CONSTRUCTION MGR.ACCEPTANCE SIGN OFF ON OAC	030	1060 HR	1060	75016	0	0	0	0	0	75016
	SUBTOTAL			1,060		0	0	0	0	0	75,016
	TOTAL			1,060	75,016	0	0	0	0	0	75,016
	COST CODE 03000 WBS 1C1000 (ESCALATION 10.29% - CONTINGENCY 20.00 %)				75,016	0	0	0	0	0	75,016
1C1000.21	CIVIL										
1C1000.2121002	CIVIL ENGR	030	1459 HR	1459	101167	0	0	0	0	0	101167
1C1000.2129002	NUCLEAR/SHIELDING ENGR	030	202 HR	202	12787	0	0	0	0	0	12787
	SUBTOTAL			1,661		0	0	0	0	0	113,954
	TOTAL			1,661	113,954	0	0	0	0	0	113,954
	COST CODE 03021 WBS 1C1000 (ESCALATION 10.29% - CONTINGENCY 20.00 %)				113,954	0	0	0	0	0	113,954
1C1000.23	ARCHITECTURAL										
1C1000.2322002	ARCHITECT	030	291 HR	291	19605	0	0	0	0	0	19605
	SUBTOTAL			291		0	0	0	0	0	19,605
	TOTAL			291	19,605	0	0	0	0	0	19,605
	COST CODE 03023 WBS 1C1000 (ESCALATION 10.29% - CONTINGENCY 20.00 %)				19,605	0	0	0	0	0	19,605
1C1000.24	STRUCTURAL										
1C1000.2421502	STRUCTURAL ENGR	030	1592 HR	1592	116216	0	0	0	0	0	116216
	SUBTOTAL			1,592		0	0	0	0	0	116,216
	TOTAL			1,592	116,216	0	0	0	0	0	116,216
	COST CODE 03024 WBS 1C1000				116,216	0	0	0	0	0	116,216

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
	(ESCALATION 10.29% - CONTINGENCY 20.00 %)										
1C1000.26	FIRE PROT/SAFETY										
1C1000.2624502	FP/SAFETY ENGR	030	160 HR	160	10525	0	0	0	0	0	10525
	SUBTOTAL FIRE PROT/SAFETY			160		0	0	0	0	0	
					10,525		0		0		10,525
TOTAL	COST CODE 03026 WBS 1C1000 (ESCALATION 10.29% - CONTINGENCY 20.00 %)			160	10,525	0	0	0	0	0	10,525
1C1000.27	PIPING/VESSEL										
1C1000.2725502	LEAD MECH ENGR	030	4490 HR	4490	265224	0	0	0	0	0	265224
	SUBTOTAL PIPING/VESSEL			4,490		0	0	0	0	0	
					265,224		0		0		265,224
TOTAL	COST CODE 03027 WBS 1C1000 (ESCALATION 10.29% - CONTINGENCY 20.00 %)			4,490	265,224	0	0	0	0	0	265,224
1C1000.28	HVAC										
1C1000.2823502	HVAC ENGR	030	213 HR	213	14058	0	0	0	0	0	14058
	SUBTOTAL HVAC			213		0	0	0	0	0	
					14,058		0		0		14,058
TOTAL	COST CODE 03028 WBS 1C1000 (ESCALATION 10.29% - CONTINGENCY 20.00 %)			213	14,058	0	0	0	0	0	14,058
1C1000.29	INSTRUMENT										
1C1000.2927002	INSTRUMENTATION ENGR	030	2553 HR	2553	164720	0	0	0	0	0	164720
	SUBTOTAL INSTRUMENT			2,553		0	0	0	0	0	
					164,720		0		0		164,720
TOTAL	COST CODE 03029 WBS 1C1000 (ESCALATION 10.29% - CONTINGENCY 20.00 %)			2,553	164,720	0	0	0	0	0	164,720
1C1000.31	ELECTRICAL										

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
1C1000.3126502	ELECTRICAL ENGR	030	2758 HR	2758	180346	0	0	0	0	0	180346
SUBTOTAL	ELECTRICAL			2,758		0	0	0	0	0	180,346
TOTAL	COST CODE 03031 WBS 1C1000 (ESCALATION 10.29% - CONTINGENCY 20.00 %)			2,758	180,346	0	0	0	0	0	180,346
1C1000.32	SPECIF										
1C1000.3220402	SPECS	030	346 HR	346	17207	0	0	0	0	0	17207
SUBTOTAL	SPECIF			346		0	0	0	0	0	17,207
TOTAL	COST CODE 03032 WBS 1C1000 (ESCALATION 10.29% - CONTINGENCY 20.00 %)			346	17,207	0	0	0	0	0	17,207
1C1000.35	DESIGN ADMIN										
1C1000.3520102	DESIGN ADMIN/ENGR MGMT	030	1268 HR	1268	103570	0	0	0	0	0	103570
SUBTOTAL	DESIGN ADMIN			1,268		0	0	0	0	0	103,570
TOTAL	COST CODE 03035 WBS 1C1000 (ESCALATION 10.29% - CONTINGENCY 20.00 %)			1,268	103,570	0	0	0	0	0	103,570
1C1000.40	PROJECT MANAGER										
1C1000.4010102	PROJECT MANAGER	030	540 HR	540	41494	0	0	0	0	0	41494
1C1000.4010302	PM CLERICAL	030	440 HR	440	13209	0	0	0	0	0	13209
SUBTOTAL	PROJECT MANAGER			980		0	0	0	0	0	54,703
TOTAL	COST CODE 03040 WBS 1C1000 (ESCALATION 10.29% - CONTINGENCY 20.00 %)			980	54,703	0	0	0	0	0	54,703
1C1000.42	QUALITY ENGINEERING										
1C1000.4204202	QA SUPPORT DURING CONSTR	030	522 HR	522	38973	0	0	0	0	0	38973

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
SUBTOTAL	QUALITY ENGINEERING			522		0		0		0	
					38,973		0		0		38,973
TOTAL	COST CODE 03042 WBS 1C1000 (ESCALATION 10.29% - CONTINGENCY 20.00 %)			522	38,973	0	0	0	0		38,973
1C1000.44	ACCEPTNCE INSPECTION										
1C1000.4445002	ACCEPTANCE INSPECTION AND NEC COMPLIANCE INSPECTION	030	8404 HR	8404	511215	0	0	0	0	0	511215
SUBTOTAL	ACCEPTNCE INSPECTION			8,404		0		0		0	
					511,215		0		0		511,215
TOTAL	COST CODE 03044 WBS 1C1000 (ESCALATION 10.29% - CONTINGENCY 20.00 %)			8,404	511,215	0	0	0	0		511,215
1C1000.45	PROJECT PLANNING										
1C1000.4530002	PROJECT CONTROLS	030	570 HR	570	32501	0	0	0	0	0	32501
SUBTOTAL	PROJECT PLANNING			570		0		0		0	
					32,501		0		0		32,501
TOTAL	COST CODE 03045 WBS 1C1000 (ESCALATION 10.29% - CONTINGENCY 20.00 %)			570	32,501	0	0	0	0		32,501
1C1000.46	ESTIMATES										
1C1000.4631002	ESTIMATING	030	232 HR	232	15124	0	0	0	0	0	15124
SUBTOTAL	ESTIMATES			232		0		0		0	
					15,124		0		0		15,124
TOTAL	COST CODE 03046 WBS 1C1000 (ESCALATION 10.29% - CONTINGENCY 20.00 %)			232	15,124	0	0	0	0		15,124
1C1000.65	RECORDS MGMT/TURNOVER										
1C1000.6520502	PROJECT ENGR SUPPORT	030	1800 HR	1800	60210	0	0	0	0	0	60210
SUBTOTAL	RECORDS MGMT/TURNOVER			1,800		0		0		0	
					60,210		0		0		60,210

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
TOTAL	COST CODE 03065			1,800		0		0		0	
	WBS 1C1000				60,210		0		0		60,210
	(ESCALATION 10.29% - CONTINGENCY 20.00 %)		20.00 %								
TOTAL WBS 1C1000 TITLE III ENGINEERING				28,900		0	0	0	0	0	1,793,167

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
220001	GANTRY CRANES										
220001.14	CONVEYING SYSTEMS										
220001.1400002	***** REMOTE CRANES *****	700	0	0-	0	0	0	0	0	0	0
220001.1400004	REMOTE RADWASTE GANTRY CRANE	700	4 EA	0	0	0	3080000	0	0	184800	3264800
220001.1400006	PROGRAMMABLE POSITIONING, AUTOMATIC CONTAINER STORAGE, RETRIEVAL ON OPERATOR COM- MAND	700	4 EA	0	0	0	120000	0	0	7200	127200
220001.1400008	COMPUTERIZED INVENTORY CON- TROL SYSTEM FOR 4 VAULTS	700	1 LOT	0	0	0	350000	0	0	21000	371000

SUBTOTAL	CONVEYING SYSTEMS			0		0		0		213,000	
	SALES TAX 8.00 %				0		3,550,000		0		3,763,000
	OH&P (ON MARKUPS ONLY)						284000		0		284000
										17040	17040

TOTAL	COST CODE 70014			0		0		0		230,040	
	WBS 220001				0		3,834,000		0		4,064,040
	(ESCALATION 9.48% - CONTINGENCY 20.00 %)										

TOTAL WBS 220001	GANTRY CRANES			0		0		0		230,040	
					0		3,834,000		0		4,064,040

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
220002	TRACTOR & TRANSPORTER										
220002.11	EQUIPMENT										
220002.1100012	FREIGHTLINER TRACTOR, 400HP, 10 SPEED, DAY CAB	700	2 EA	0	0	0	150000	0	0	9000	159000
220002.1100014	TRANSPORTER HD TRAILER W/ SHIELDED WASTE PACKAGE COMPARTMENT	700	4 EA	0	0	0	288000	0	0	17280	305280
SUBTOTAL	EQUIPMENT			0		0		0		26,280	
	SALES TAX 8.00 %				0		438,000		0		464,280
	OH&P (ON MARKUPS ONLY)						35040		0		35040
										2102	2102
TOTAL	COST CODE 70011			0		0		0		28,382	
	WBS 220002				0		473,040		0		501,422
	(ESCALATION 9.48% - CONTINGENCY 20.00 %)										
TOTAL WBS 220002 TRACTOR & TRANSPORTER				0		0	473,040	0	0	28,382	501,422

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
220003	CCTV										
220003.16	ELECTRICAL										
220003.1654000	CCTV EQUIPMENT PACKAGE	700	1 LS	0	0	0	65000	0	0	3900	68900
220003.1654010	CAMERA, B/W, 24VAC	700	16 EA	0	0	0	0	0	0	0	0
220003.1654020	CAMERA LENS, 6X, ZOOM	700	16 EA	0	0	0	0	0	0	0	0
220003.1654030	CAMERA HOUSING, OUTDOOR	700	16 EA	0	0	0	0	0	0	0	0
220003.1654040	CAMERA PAN/TILT	700	16 EA	0	0	0	0	0	0	0	0
220003.1654050	CAMERA MOUNT, FIXED	700	16 EA	0	0	0	0	0	0	0	0
220003.1654060	MONITOR, B/W, 15-INCH	700	4 EA	0	0	0	0	0	0	0	0
220003.1654070	MONITOR RACK MTG KIT	700	4 EA	0	0	0	0	0	0	0	0
220003.1654080	VIDEO SWITCHER, 32-CAMERA INPUTS & 8-MONITOR OUTPUTS	700	1 EA	0	0	0	0	0	0	0	0
220003.1654090	DISTRIBUTION LINE CONTROL UNIT	700	2 EA	0	0	0	0	0	0	0	0
220003.1654100	UNIVERSAL RECEIVER	700	16 EA	0	0	0	0	0	0	0	0
220003.1654110	VPS INTERFACE CARD	700	16 EA	0	0	0	0	0	0	0	0
220003.1654120	16-CHANNEL DUPLEX, B/W	700	1 EA	0	0	0	0	0	0	0	0
220003.1654130	VIDEO RECORDER, 2-168 HOUR MODES	700	1 EA	0	0	0	0	0	0	0	0
220003.1654140	VCR RACK MOUNT KIT	700	1 EA	0	0	0	0	0	0	0	0
SUBTOTAL	ELECTRICAL			0		0		0		3,900	
	SALES TAX 8.00 %						65,000		0		68,900
	OH&P (ON MARKUPS ONLY)						5200		0		5200
										312	312
TOTAL	COST CODE 70016			0		0		0		4,212	
	WBS 220003				0		70,200		0		74,412
	(ESCALATION 9.48% - CONTINGENCY 20.00 %)										
TOTAL WBS 220003 CCTV				0		0		0		4,212	
					0		70,200		0		74,412

FLUOR DANIEL NORTHWEST, INC.
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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
220004	CONCRETE SHIELDING COVERS										
220004.03	CONCRETE										
220004.0300002	WASTE PACKAGE SHIELDING COVERS 4' X 6' X 12" CONCRETE W/EMBEDED LIFTING DEVICES (MATERIAL ONLY)	550	896 EA	0	0	0	380800	0	0	22848	403648
SUBTOTAL	CONCRETE			0	0	0	380,800 30464	0	0	22,848	403,648 30464
	SALES TAX 8.00 % OH&P (ON MARKUPS ONLY)									1827	1827
TOTAL	COST CODE 55003 WBS 220004 (ESCALATION 9.48% - CONTINGENCY 20.00 %)			0	0	0	411,264	0	0	24,675	435,939
TOTAL WBS 220004	CONCRETE SHIELDING COVERS			0	0	0	411,264	0	0	24,675	435,939

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
320001	PREP PLANKS FOR REMOVAL										
320001.02	SITWORK										
320001.0200002	REMOVE COVER BLOCKS AT ALL PITS	810	32 EA	256	8484	4000	0	0	0	2945	15429
320001.0200003	REMOVE GUARD RAIL ENCLOSURES AT PITS	810	24 EA	24	795	3000	0	0	0	539	4334
320001.0200004	REMOVE HVAC INTAKE & EXHAUST SHIELDING HOUSING	810	4 EA	24	795	500	0	0	0	289	1584
320001.0200006	REMOVE SOIL BERM OVER SUPPLY PIPING	810	1 LS	64	1940	1800	0	0	0	762	4502
320001.0200008	REMOVE VALVE PIT CONTENTS	810	4 EA	256	9423	0	0	0	0	2827	12250
320001.0200010	REMOVE PUMP PIT CONTENTS	810	16 EA	512	18847	0	0	0	0	5654	24501
320001.0200012	REMOVE LEACHATE PIT CONTENTS	810	4 EA	128	4712	0	0	0	0	1414	6126
320001.0200014	REMOVE VAULT PITS	810	4 EA	0	0	0	0	14000	0	2100	16100
320001.0200016	REMOVE PUMP PITS	810	16 EA	0	0	0	0	36800	0	5520	42320
320001.0200018	REMOVE LEACHATE PITS	810	4 EA	0	0	0	0	13600	0	2040	15640
320001.0200082	EXCAVATE STRUCTURAL FILL AROUND VAULTS	810	14600 CY	0	0	0	0	73000	0	10950	83950
320001.0200083	SAW CUT ASPHALT	810	6960 LF	0	0	0	0	41760	0	6264	48024
320001.0200085	REMOVE ASPHALT TOPPING	810	4192 CY	0	0	0	0	100608	0	15091	115699
320001.0200086	REMOVE ASPHALT AT SIDE WALLS & END WALLS	810	1172 CY	0	0	0	0	28128	0	4219	32347
320001.0200112	DEMO DRAINAGE PATH AT PLANK AND VAULT JOINT	810	1 LS	0	0	0	0	14000	0	2100	16100
320001.0200118	SAWCUT CONCRETE TOPPING AT PICK POINTS	810	2480 LF	0	0	0	0	19840	0	2976	22816
320001.0200120	DEMO CONCRETE TOPPING AT PICK POINTS	810	248 EA	0	0	0	0	37200	0	5580	42780
320001.0200122	PREP SURFACE AT PLANK JOINTS	810	6480 LF	0	0	0	0	51840	0	7776	59616
320001.0200124	SAWCUT GROUT AT PLANK JOINTS	810	6480 LF	0	0	0	0	291600	0	43740	335340
320001.0200126	FAB LIFTING CONNECTORS	810	20 EA	0	0	0	0	30000	0	4500	34500
320001.0200128	INSTALL LIFTING CONNECTORS	810	248 EA	2976	98625	0	19840	0	0	35540	154005
320001.0200228	HAUL OFF CONCRETE (ASSUME PIT #9)	810	450 CY	0	0	0	0	8100	0	1215	9315
320001.0200230	HAUL OFF ASPHALT (ASSUME PIT #9)	810	5364 CY	0	0	0	0	64368	0	9655	74023
320001.0200232	HAUL OFF WASTE MATERIAL TO LANDFILL (ALLOWANCE QUANTITIES UNKNOWN)	810	1000 CY	0	0	0	0	20000	0	3000	23000

SUBTOTAL SITWORK

4,240

143,621

9,300

19,840

844,844

176,696

1,194,301

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
	SALES TAX 8.00 %						1587		0		1587
	OH&P (ON MARKUPS ONLY)									476	476
TOTAL	COST CODE 81002			4,240		9,300		844,844		177,172	
	WBS 320001				143,621		21,427		0		1,196,364
	(ESCALATION 10.29% - CONTINGENCY 25.00 %)										
TOTAL WBS 320001	PREP PLANKS FOR REMOVAL			4,240		9,300		844,844		177,172	
					143,621		21,427		0		1,196,364

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
320002	MISC. DEMOLITION										
320002.02	SITEWORK										
320002.0200002	SANDELAST EXISTING 60 MIL COATING ON VAULT WALLS & FLOOR	810	69800 SF	0	0	0	0	157050	0	23558	180608
	SUBTOTAL SITEWORK			0	0	0	0	157,050	0	23,558	180,608
	TOTAL	COST CODE 81002 WBS 320002 (ESCALATION 10.29% - CONTINGENCY 25.00 %)		0	0	0	0	157,050	0	23,558	180,608
320002.02	SITEWORK										
320002.0205000	***** REMOVE RISERS *****	810	0	0	0	0	0	0	0	0	0
320002.0205001	1-1/2" SCH 40	810	16 EA	1	33	0	0	0	0	10	43
320002.0205002	2" SCH 40	810	4 EA	1	33	0	0	0	0	10	43
320002.0205003	3" SCH 40	810	24 EA	3	99	0	0	0	0	30	129
320002.0205004	4" SCH 40	810	144 EA	24	795	0	0	0	0	239	1034
320002.0205005	8" SCH 40	810	4 EA	2	66	0	0	0	0	20	86
320002.0205006	12" SCH 40	810	8 EA	4	133	0	0	0	0	40	173
320002.0205007	24" SCH 40	810	24 EA	24	795	0	0	0	0	239	1034
320002.0205008	26" SCH 40	810	4 EA	4	133	0	0	0	0	40	173
320002.0205009	TS 14 X 10 X 3/8"	810	8 EA	4	133	0	0	0	0	40	173
320002.0205020	***** REMOVE JUMPERS, ETC. *****	810	0	0	0	0	0	0	0	0	0
320002.0205022	REMOVE CONTENTS OF VAULT PITS	810	4 EA	256	8484	0	0	0	0	2545	11029
320002.0205024	REMOVE CONTENTS OF PUMP PITS	810	16 EA	512	16968	0	0	0	0	5090	22058
320002.0205026	REMOVE CONTENTS OF LEACHATE PUMP PITS	810	4 EA	128	4242	0	0	0	0	1273	5515
320002.0205030	***** REMOVE HVAC *****	810	0	0	0	0	0	0	0	0	0
320002.0205032	REMOVE INLET FILTER UNITS	810	2 EA	80	2081	200	0	0	0	644	2925
320002.0205034	REMOVE EXHAUSTER SYSTEM	810	0	0	0	0	0	0	0	0	0
320002.0205035	24" DUCT	810	170 LF	102	2653	0	0	0	0	796	3449

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
320002.0205036	EXHAUSTER	810	1 EA	48	1248	500	200	0	0	484	2432
320002.0205037	4" RISER PIPE	810	100 LF	50	1301	0	0	0	0	390	1691
320002.0205050	***** REMOVE PIPE-IN-PIPE *****	810	0	0	0	0	0	0	0	0	0
320002.0205051	REMOVE 2" IN 4" PIPING EMBEDDED IN ASPHALTIC CONC. (ASPHALT DEMOL. ELSEWHERE)	810	2100 LF	210	6959	0	0	0	0	2088	9047
320002.0205052	REMOVE 2" IN 4" PIPING, BURIED AND ENCASED FROM VAULT TO W45765.	810	0	0	0	0	0	0	0	0	0
320002.0205053	EXCAVATE/BACKFILL, 4 FT DEEP X 8'W X 560 LF.	810	664 CY	0	0	0	0	5312	0	797	6109
320002.0205055	BREAK UP 18" X 24" CONC. ENCASEMENT.	810	560 LF	0	0	0	0	8400	0	1260	9660
320002.0205056	REMOVE 2" IN 4" PIPE	810	1120 LF	112	3712	0	0	0	0	1114	4826
SUBTOTAL SITEWORK				1,565		700		13,712		17,149	
	SALES TAX 8.00 %				49,868		200		0		81,629
	OH&P (ON MARKUPS ONLY)						16		0		16
										4	4
TOTAL	COST CODE 81002			1,565		700		13,712		17,153	
	WBS 320002				49,868		216		0		81,649
	(ESCALATION 10.29% - CONTINGENCY 25.00 %)										
320002.16	ELECTRICAL										
320002.1600000	LOCKOUT & TAGGING ELECTRICAL SYSTEMS FOR DEMOLITION	810	1 JOB	80	2903	0	0	0	0	871	3774
320002.1600010	REMOVE PVC DUCT BANK WIRING	810	1400 LF	210	7621	1400	0	0	0	2426	11447
320002.1600020	REMOVE PVC DUCT BANK, INCLUDES: MACH EXC, MACH BREAKUP CONCRETE/CONDUIT, & HAND LABOR SUPPORT	810	1500 LF	450	16331	6000	0	0	0	5499	27830
320002.1600030	REMOVE CATHODIC PROTECTION INCLUDES: MACH EXC, MACH TEAROUT DB CABLE/ANODES/ J-BOXES/TEST STATIONS/PADS	810	1550 LF	233	8456	3100	0	0	0	2847	14403
320002.1600040	REMOVE HVAC INLET/EXHAUSTER ELECTRICAL, INCLUDES: EXCAVATION/CONDUIT AND WIRE	810	2 JOB	24	871	4	0	0	0	262	1137
320002.1600050	REMOVE THERMOCOUPLES INCLUDES: EXCAVATION/CONDUIT	810	4 JOB	64	2323	8	0	0	0	698	3029

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
320002.1600060	WIRING/TERMINAL BOX REMOVE REMOTE CONSTROL ROOM ELECTRICAL AS NEEDED TO SUPPORT NEW INSTALLATION	810	1 JOB	160	5806	2	0	0	0	1742	7550
320002.1600070	DISCONNECT AND REMOVE LEACHATE WIRING AS NEEDED AND MAINTAIN FOR THE LATER REINSTALLATION EFFORT	810	1 JOB	80	2903	2	0	0	0	871	3776
SUBTOTAL	ELECTRICAL			1,301	47,214	10,516	0	0	0	15,216	72,946
TOTAL	COST CODE 81016 WBS 320002 (ESCALATION 10.29% - CONTINGENCY 25.00 %)			1,301	47,214	10,516	0	0	0	15,216	72,946
TOTAL WBS 320002 MISC. DEMOLITION				2,866	97,082	11,216	216	170,762	0	55,927	335,203

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
320003	REMOVE PLANKS										
320003.02	SITWORK										
320003.0200038	MOBE & DEMOBE CRANES	810	4 EA	0	0	0	0	12000	0	1800	13800
320003.0200040	CRANE RENTAL	810	4 EA	0	0	0	0	60000	0	9000	69000
320003.0200041	2 EA TRACTOR W/LOWBOY TO HAUL COVER BLOCKS, 6 WEEK DURATION (OPERATED, HAUL TO PIT #9)	810	480 HRS	0	0	0	0	86400	0	12960	99360
320003.0200042	PREP LAYDOWN AREA FOR PLANKS (ALLOWANCE)	810	1 LS	0	0	0	0	10000	0	1500	11500
320003.0200044	REMOVE PLANKS (ASSUME 4 EA. OPERATOR, OILER, IRONWORKER & 2 EA LABORER FOR A DURATION OF 6 WEEKS)	810	1 LS	3360	100632	0	2000	0	0	30790	133422
320003.0200045	(ASSUME REMOVAL OF 4 PLANKS PER DAY)	810	0	0	0	0	0	0	0	0	0
320003.0200046	ALLOWANCE FOR LABOR & MATER- IAL TO PROVIDE BARRICADES & OR SAFETY RAIL AT OPENING	810	1464 LF	0	0	0	0	36600	0	5490	42090
SUBTOTAL	SITWORK			3,360		0		205,000		61,540	
	SALES TAX 8.00 %				100,632		2,000		0		369,172
	OH&P (ON MARKUPS ONLY)						160		0		160
										48	48
TOTAL	COST CODE 81002 WBS 320003 (ESCALATION 10.29% - CONTINGENCY 25.00 %)			3,360	100,632	0	2,160	205,000	0	61,588	369,380
TOTAL WBS 320003 REMOVE PLANKS				3,360	100,632	0	2,160	205,000	0	61,588	369,380

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
320004	SITEWORK & UTILITIES										
320004.02	SITEWORK										
320004.0200001	***** VAULT EXCAVATION *****	460	0	0	0	0	0	0	0	0	0
320004.0200002	TOTAL EXCAVATION	460	32165 CY	0	0	0	0	56289	0	8443	64732
320004.0200101	***** PAVED ACCESS ROAD *****	460	0 CY	0	0	0	0	0	0	0	0
320004.0200102	CLEAR & GRUB	460	1000 CY	0	0	0	0	3000	0	450	3450
320004.0200104	HAUL OFF WASTE	460	500 CY	0	0	0	0	2500	0	375	2875
320004.0200108	BALANCE CUT & FILL	460	4800 CY	0	0	0	0	9600	0	1440	11040
320004.0200110	FINE GRADING	460	9600 SY	0	0	0	0	4800	0	720	5520
320004.0200112	4" BASE COURSE	460	1820 SY	0	0	0	0	30940	0	4641	35581
320004.0200114	2" LEVELING COURSE	460	800 TON	0	0	0	0	13600	0	2040	15640
320004.0200116	3" ASPHALT	460	1090 TON	0	0	0	0	41420	0	6213	47633
320004.0200118	SURVEY	460	1 LS	0	0	0	0	2500	0	375	2875
320004.0200120	GRAVEL STABILIZATION	460	5000 SF	0	0	0	0	3000	0	450	3450
320004.0200122	HYDROSEEDING	460	1 AC	0	0	0	0	1200	0	180	1380
320004.0200124	WATER FOR CONSTRUCTION	460	480 MG	0	0	0	0	3360	0	504	3864
320004.0200302	***** SHEILDING BERM *****	460	0	0	0	0	0	0	0	0	0
320004.0200304	PLACE & COMPACT FILL	460	11000 CY	0	0	0	0	33000	0	4950	37950
320004.0200306	FINE GRADING	460	3900 SY	0	0	0	0	1950	0	293	2243
320004.0200308	WATER FOR CONSTRUCTION	460	200 MG	0	0	0	0	1400	0	210	1610
320004.0200310	***** GRAVEL STABILIZATION *****	460	0	0	0	0	0	0	0	0	0
320004.0200312	FINE GRADING	460	22250 SY	0	0	0	0	11125	0	1669	12794
320004.0200314	3" CRUSHED ROCK	460	4000 TON	0	0	0	0	60000	0	9000	69000
320004.0200316	WATER FOR CONSTRUCTION	460	120 MG	0	0	0	0	840	0	126	966
320004.0200416	***** FENCE *****	460	0	0	0	0	0	0	0	0	0
320004.0200418	REMOVE EXISTING FENCE	460	1250 LF	0	0	0	0	5000	0	750	5750
320004.0200420	NEW FENCE	460	2250 LF	0	0	0	0	33750	0	5063	38813
320004.0200422	NEW DOUBLE GATE	460	1 EA	0	0	0	0	1000	0	150	1150
SUBTOTAL SITEWORK				0	0	0	0	320,274	0	48,042	368,316

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
TOTAL	COST CODE 46002 WBS 320004 (ESCALATION 10.29% - CONTINGENCY 20.00 %)				0	0		320,274		48,042	368,316
320004.02	SITWORK										
320004.0200006	***** BUILDING FOOTING EXCAVATION *****	501	0	0	0	0	0	0	0	0	0
320004.0200008	FOOTING EXCAVATION	501	2720 LF	0	0	0	0	10880	0	1632	12512
320004.0200010	BACKFILL & COMPACT	501	2720 LF	0	0	0	0	8160	0	1224	9384
SUBTOTAL	SITWORK				0	0		19,040		2,856	
TOTAL	COST CODE 50102 WBS 320004 (ESCALATION 10.29% - CONTINGENCY 20.00 %)				0	0		19,040		2,856	21,896
320004.02	SITWORK										
320004.0200201	***** WATERLINE *****	600	0	0	0	0	0	0	0	0	0
320004.0200202	12" C-900 PVC PIPE	600	3570 LF	0	0	0	0	64260	0	9639	73899
320004.0200204	12" PIV	600	6 EA	0	0	0	0	13200	0	1980	15180
320004.0200206	12" MJ 90	600	6 EA	0	0	0	0	1800	0	270	2070
320004.0200208	12" TEE	600	3 EA	0	0	0	0	1050	0	158	1208
320004.0200210	12" X 8" TEE	600	4 EA	0	0	0	0	1400	0	210	1610
320004.0200212	8" PIV	600	4 EA	0	0	0	0	7000	0	1050	8050
320004.0200214	GUARD POST	600	48 EA	0	0	0	0	8400	0	1260	9660
320004.0200216	12 X 6 TEE	600	4 EA	0	0	0	0	1400	0	210	1610
320004.0200218	6" GATE VALVE	600	4 EA	0	0	0	0	1300	0	195	1495
320004.0200220	VALVE BOX	600	4 EA	0	0	0	0	400	0	60	460
320004.0200222	8" PIPING	600	360 LF	0	0	0	0	5040	0	756	5796
320004.0200224	8" 90	600	4 EA	0	0	0	0	800	0	120	920
320004.0200226	8" CAPS	600	4 EA	0	0	0	0	400	0	60	460
320004.0200228	TRENCH EXCAVATION	600	3930 LF	0	0	0	0	19650	0	2948	22598
320004.0200230	BEDDING/TAPE	600	3930 LF	0	0	0	0	5895	0	884	6779
320004.0200232	TRENCH BACKFILL	600	3930 LF	0	0	0	0	15720	0	2358	18078
320004.0200234	TESTING	600	1 LS	0	0	0	0	1200	0	180	1380
320004.0200236	FIRE HYDRANTS	600	5 EA	0	0	0	0	5500	0	825	6325
320004.0200238	THRUST BLOCKS	600	30 EA	0	0	0	0	2700	0	405	3105

FLUOR DANIEL NORTHWEST, INC.
NUMATEC HANFORD CORP.
JOB NO. W-456/P3TP56
FILE NO. W465BAB2

** IEST - INTERACTIVE ESTIMATING **
ILAW INTERIM STORAGE FACILITY (GROUT VAULTS)
CONCEPTUAL ESTIMATE
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

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BY CDL/KLR/DEA/RNO/LAA

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
320004.0200240	HOT BOX W/PRESSURE REDUCER VALVE & BACKFLOW PREVENTER	600	2 EA	0	0	0	0	40000	0	6000	46000
320004.0200244	FIRE DEPT. PUMPER CONNECTION	600	1 EA	0	0	0	0	500	0	75	575
SUBTOTAL	SITework			0		0		197,615		29,643	
TOTAL	COST CODE 60002 WBS 320004 (ESCALATION 10.29% - CONTINGENCY 20.00 %)			0		0		197,615		29,643	227,258
320004.16	ELECTRICAL										
320004.1615003	1" PVC Ctd GRC (STREET LIGHTING)	600	2100 LF	126	4573	0	5775	0	0	3104	13452
320004.1615004	1" PVC Ctd GRC (HOT BOX)	600	1550 LF	93	3375	0	4263	0	0	2291	9929
320004.1615103	HANDHOLE (STREET LIGHTING)	600	17 EA	34	1234	0	595	0	0	549	2378
320004.1615104	HANDHOLE (HOT BOX)	600	4 EA	8	290	0	140	0	0	129	559
320004.1621210	#10 THHN 1/C Copper 600V (STREET LIGHTING)	600	5000 LF	50	1815	0	750	0	0	770	3335
320004.1621211	#8 THHN 1/C Copper 600V (STREET LIGHTING)	600	8000 LF	96	3484	0	1600	0	0	1525	6609
320004.1621220	#10 THHN 1/C Copper 600V (HOT BOX)	600	6500 LF	65	2359	0	975	0	0	1000	4334
320004.1634007	400W HPS LUMINARE & LAMP	600	17 EA	85	3085	0	8925	0	0	3603	15613
320004.1634141	TRENCHING & BACKFILL 6" x 24"	600	2200 LF	44	1597	3300	0	0	0	809	5706
320004.1634651	1 LIGHT STEEL POLE FIXTURE BRACKET	600	17 EA	34	1234	0	1700	0	0	880	3814
320004.1634804	CONCRETE POLE BASE 24"x 60"	600	17 EA	272	9871	0	7225	0	0	5129	22225
320004.1641010	TELEPHONE INSTALLATION - CONTROL BUILDING (1EA) - VAULT (2 X 4 = 8 EA) (ELECT RM/OUTDOORS)	600	9 EA	0	0	0	0	45000	0	6750	51750
320004.1641020	HLAN INSTALLATION - CONTROL BUILDING (1EA)	600	1 EA	0	0	0	0	5000	0	750	5750
SUBTOTAL	ELECTRICAL			907		3,300		50,000		27,289	
	SALES TAX 8.00 %				32,917		31,948		0		145,454
	OH&P (ON MARKUPS ONLY)						2555		0		2555
TOTAL	COST CODE 60016 WBS 320004			907		3,300	34,503	50,000	0	28,055	148,776

FLUOR DANIEL NORTHWEST, INC.
NUMATEC HANFORD CORP.
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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS

	(ESCALATION 10.29% - CONTINGENCY 20.00 %)										

TOTAL WBS 320004	SITWORK & UTILITIES		907		32,917	3,300	34,503	586,929	0	108,596	766,246

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FLUOR DANIEL NORTHWEST, INC.
NUMATEC HANFORD CORP.
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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
320005	VAULT CONCRETE										
320005.03	CONCRETE										
320005.0300002	***** END WALL EXTENTION *****	550	0	0	0	0	0	0	0	0	0
320005.0300004	BUSH HAMMER EXIST. CONCRETE	550	1080 SF	86	2561	0	216	0	0	833	3610
320005.0300006	EXPOSE EXISTING REBAR	550	864 EA	864	22473	0	216	0	0	6807	29496
320005.0300008	REBAR COUPLERS	550	864 EA	734	24325	0	25920	0	0	15074	65319
320005.0300010	FORM WALLS	550	6048 SF	726	21599	0	9072	0	0	9201	39872
320005.0300012	STRIP & OIL	550	6048 SF	121	3600	0	1512	0	0	1534	6646
320005.0300014	CONCRETE WALLS	550	250 CY	250	7445	0	16250	0	0	7109	30804
320005.0300016	CURING	550	7128 SF	107	2783	0	143	0	0	878	3804
320005.0300018	REBAR	550	21830 LBS	218	7225	0	5458	0	0	3805	16488
320005.0300020	TROWEL FINISH	550	1080 SF	32	953	0	0	0	0	286	1239
320005.0300022	SCAFFOLDING ALLOWANCE	550	1 LOT	1056	31416	0	6283	0	0	11310	49009
320005.0300040	***** SIDE WALL EXTENTION *****	550	0	0	0	0	0	0	0	0	0
320005.0300042	BUSH HAMMER EXIST. CONCRETE	550	2064 SF	165	4914	0	413	0	0	1598	6925
320005.0300044	EXPOSE EXIST REBAR	550	2064 EA	2064	53685	0	516	0	0	16260	70461
320005.0300046	REBAR COUPLERS	550	2064 EA	1754	58128	0	61920	0	0	36014	156062
320005.0300048	FORM WALLS	550	14448 SF	1734	51587	0	21672	0	0	21978	95237
320005.0300050	STRIP & OIL	550	14448 SF	289	8598	0	3612	0	0	3663	15873
320005.0300052	CONCRETE WALL	550	417 CY	417	12418	0	27105	0	0	11857	51380
320005.0300054	CURING	550	15996 SF	240	6242	0	320	0	0	1969	8531
320005.0300056	REBAR	550	52067 LBS	521	17266	0	13017	0	0	9085	39368
320005.0300058	TROWEL FINISH	550	1548 SF	46	1370	0	0	0	0	411	1781
320005.0300060	ANCHOR BOLTS	550	704 EA	141	4195	0	3520	0	0	2315	10030
320005.0300062	SCAFFOLDING ALLOWANCE	550	1 LOT	2640	78540	0	15708	0	0	28274	122522
<hr/>											
SUBTOTAL	CONCRETE			14,205		0		0		190,261	
	SALES TAX 8.00 %				421,323		212,873		0		824,457
	OH&P (ON MARKUPS ONLY)						17029		0		17029
<hr/>											
TOTAL	COST CODE 55003			14,205		0		0		195,369	
	WBS 320005				421,323		229,902		0		846,595
	(ESCALATION 10.29% - CONTINGENCY 20.00 %)										
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TOTAL WBS 320005 VAULT CONCRETE				14,205		0		0		195,369	
					421,323		229,902		0		846,595

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FLUOR DANIEL NORTHWEST, INC.
NUMATEC HANFORD CORP.
JOB NO. W-456/P3TP56
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** TEST - INTERACTIVE ESTIMATING **
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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
320006	ENCLOSURE BUILDINGS										
320006.03	CONCRETE										
320006.0300002	*****	501	0	0	0	0	0	0	0	0	0
	ENCLOSURE BLDGS CONCRETE										

320006.0300004	FINE GRADE FOOTINGS	501	1664 SF	17	442	0	0	0	0	133	575
320006.0300006	GRADE & SCREED SLABS	501	48536 SF	291	8666	0	7280	0	0	4784	20730
320006.0300008	FORM COLUMN FOOTINGS	501	1664 SF	133	3957	0	2496	0	0	1936	8389
320006.0300010	FORM GRADE BEAMS	501	12960 SF	1296	38556	0	19440	0	0	17399	75395
320006.0300012	FORM RETAINING WALL	501	4320 SF	432	12852	0	6480	0	0	5800	25132
320006.0300014	FORM CONCRETE COLUMNS	501	1440 SF	259	7705	0	2880	0	0	3176	13761
320006.0300016	FORM 6" SLAB	501	1760 LF	141	4195	0	2200	0	0	1919	8314
320006.0300018	FORM 12" SLAB	501	616 LF	62	1845	0	1078	0	0	877	3800
320006.0300020	FORM 12" APRON	501	872 LF	87	2588	0	1526	0	0	1234	5348
320006.0300022	KEY JOINTS	501	432 LF	22	655	0	432	0	0	326	1413
320006.0300024	STRIP & OIL	501	22760 SF	455	13536	0	5690	2760	0	5768	24994
320006.0300026	CONCRETE FOOTINGS	501	64 CY	51	1519	0	4160	0	0	1704	7383
320006.0300028	CONCRETE GRADE BEAMS	501	167 CY	167	4973	0	10855	0	0	4748	20576
320006.0300030	CONCRETE RETAINING WALL	501	56 CY	56	1668	0	3640	0	0	1592	6900
320006.0300032	CONCRETE COLUMNS	501	21 CY	25	745	0	1365	0	0	633	2743
320006.0300034	CONCRETE 6" SLAB	501	249 CY	199	5926	0	16185	0	0	6633	28744
320006.0300036	CONCRETE 12" SLAB	501	586 CY	469	13967	0	38090	0	0	15617	67674
320006.0300038	CONCRETE 12" APRON	501	785 CY	628	18702	0	51025	0	0	20918	90645
320006.0300040	CURING	501	71296 SF	1069	27805	0	1426	0	0	8769	38000
320006.0300042	REBAR @ 140#	501	269920 LBS	2699	89445	0	67480	0	0	47078	204003
320006.0300044	CONCRETE FINISH	501	48536 SF	291	8666	0	0	0	0	2600	11266
320006.0300046	ANCHOR BOLTS (ALLOW)	501	800 EA	160	4760	0	4000	0	0	2628	11388
320006.0300048	12" CURB STRAIGHT RUN	501	475 LF	0	0	0	0	4988	0	748	5736
320006.0300050	12" CURB RADIUS	501	60 LF	0	0	0	0	1200	0	180	1380

SUBTOTAL	CONCRETE			9,009		0		6,188		157,200	
	SALES TAX 8.00 %								0		684,289
	OH&P (ON MARKUPS ONLY)				273,173		247,728		0		19818
										5945	5945

TOTAL	COST CODE 50103			9,009		0		6,188		163,145	
	WBS 320006				273,173		267,546		0		710,052
	(ESCALATION 10.29% - CONTINGENCY 20.00 %)										
320006.05	METALS										
320006.0500002	*****	501	0	0	0	0	0	0	0	0	0
	MISC. METALS										

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 NUMATEC HANFORD CORP.
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** IEST - INTERACTIVE ESTIMATING **
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 CONCEPTUAL ESTIMATE
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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
320006.0500004	METAL STAIRS	501	8 EA	0	0	0	0	9600	0	1440	11040
320006.0500006	HAND RAIL	501	432 LF	0	0	0	0	14256	0	2138	16394
320006.0500008	BOLLARDS	501	72 EA	0	0	0	0	10800	0	1620	12420
320006.0500010	CRANE RAIL SUPPORT BEAMS W14 X 51	501	22032 LBS	0	0	0	0	24235	0	3635	27870
SUBTOTAL METALS				0	0	0	0	58,891	0	8,833	67,724
TOTAL COST CODE 50105 WBS 320006 (ESCALATION 10.29% - CONTINGENCY 20.00 %)				0	0	0	0	58,891	0	8,833	67,724
320006.07	MOISTURE AND THERMAL										
320006.0700002	***** MOISTURE & THERMAL *****	501	0	0	0	0	0	0	0	0	0
320006.0700004	INSULATE FIRE RISER ROOMS	501	1776 SF	0	0	0	0	2220	0	333	2553
320006.0700006	INSULATE MCC ROOMS	501	2880 SF	0	0	0	0	3600	0	540	4140
320006.0700008	DAMPPOOF RETAINING WALLS	501	2160 SF	0	0	0	0	2376	0	356	2732
320006.0700010	MISC. SEALANTS & CAULKING (ALLOW)	501	1 LS	0	0	0	0	6000	0	900	6900
SUBTOTAL MOISTURE AND THERMAL				0	0	0	0	14,196	0	2,129	16,325
TOTAL COST CODE 50107 WBS 320006 (ESCALATION 10.29% - CONTINGENCY 20.00 %)				0	0	0	0	14,196	0	2,129	16,325
320006.08	DOORS, WINDOWS AND G										
320006.0800002	***** DOORS & HATCHES *****	501	0	0	0	0	0	0	0	0	0
320006.0800004	12 X 16 ROLLUP DOOR W/OPER	501	8 EA	0	0	0	0	52000	0	7800	59800
320006.0800006	3/0 X 7/0 EXTERIOR DOOR, FRAME & HDW.	501	32 EA	320	9520	0	35200	0	0	13416	58136
320006.0800008	3/0 X 7/0 INTERIOR DOOR, FRAME & HDW.	501	4 EA	36	1071	0	3600	0	0	1401	6072
320006.0800010	10 X 10 ROOF HATCH	501	8 EA	0	0	0	0	36000	0	5400	41400
SUBTOTAL DOORS, WINDOWS AND G				356	10,591	0	38,800	88,000	0	28,017	165,408

FLUOR DANIEL NORTHWEST, INC.
NUMATEC HANFORD CORP.
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** IEST - INTERACTIVE ESTIMATING **
ILAW INTERIM STORAGE FACILITY (GROUT VAULTS)
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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
	SALES TAX 8.00 %						3104		0		3104
	OH&P (ON MARKUPS ONLY)									931	931
TOTAL	COST CODE 50108			356		0		88,000		28,948	
	WBS 320006				10,591		41,904		0		169,443
	(ESCALATION 10.29% - CONTINGENCY 20.00 %)										
320006.09	FINISHES										
320006.0900002	*****	501	0	0	0	0	0	0	0	0	0
	MISC. FINISHES										

320006.0900004	SPC LOADING AREA	501	18064 SF	0	0	0	0	54192	0	8129	62321
320006.0900006	METAL STUD & GYP. BRD.	501	2160 SF	0	0	0	0	11880	0	1782	13662
	PARTITION - 1 HR. RATED										
320006.0900008	METAL STUD & GYP. BRD.	501	720 SF	0	0	0	0	4680	0	702	5382
	CEILING 1 HR. RATED										
320006.0900010	PAINT FERROUS METALS	501	1 LS	0	0	0	0	8000	0	1200	9200
	(ALLOW)										
320006.0900012	PAINT GYP. BRD.	501	5040 SF	0	0	0	0	2520	0	378	2898
320006.0900110	MISC. PAINT & TOUCHUP	501	1 LS	0	0	0	0	4000	0	600	4600
	(ALLOW)										
C-60 SUBTOTAL	FINISHES			0		0		85,272		12,791	
					0		0		0		98,063
TOTAL	COST CODE 50109			0		0		85,272		12,791	
	WBS 320006				0		0		0		98,063
	(ESCALATION 10.29% - CONTINGENCY 20.00 %)										
320006.13	SPECIAL CONSTRUCTION										
320006.1300002	PRE-ENGINEERED METAL BLDG.	501	4 EA	0	0	0	0	588000	0	88200	676200
	ERECTED										
SUBTOTAL	SPECIAL CONSTRUCTION			0		0		588,000		88,200	
					0		0		0		676,200
TOTAL	COST CODE 50113			0		0		588,000		88,200	
	WBS 320006				0		0		0		676,200
	(ESCALATION 10.29% - CONTINGENCY 20.00 %)										
320006.15	MECHANICAL										
320006.1500000	*****	501	0	0	0	0	0	0	0	0	0
	H V A C										

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** TEST - INTERACTIVE ESTIMATING **
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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
320006.1500002	***** 1.5 TON A/C, WALL MOUNTED, 18,000 BTU/HR, 230/208 VOLT, 15A.	501	4 EA	16	552	0	2800	0	0	1006	4358
320006.1500004	1.5 KW BASEBOARD HEATERS	501	4 EA	8	276	0	600	0	0	263	1139
320006.1500006	1 KW BASEBOARD HEATERS	501	4 EA	8	276	0	440	0	0	215	931
320006.1500012	AIR SUPPLY UNIT, 7000 CFM, 5 HP.	501	4 EA	96	3309	0	20000	0	0	6993	30302
320006.1500014	EXHAUST UNIT, 7000 CFM, 5 HP.	501	4 EA	96	3309	0	20000	0	0	6993	30302
320006.1500016	FILTER BANKS, INCLUDING HOLDING FRAMES, CLIP AND BAG FILTERS.	501	8 EA	128	4412	0	5600	0	0	3004	13016
320006.1500017	ALLOWANCE FOR ADDITIONAL SHEETMETAL WORK FOR MOUNTING FILTER FRAMES.	501	8 EA	256	8824	0	1600	0	0	3127	13551
320006.1500020	AIR SUPPLY GRILL, SAY 48 SF	501	4 EA	32	1103	0	3840	0	0	1483	6426
320006.1500022	TRANSITION PIECE, FAN TO GRILLE, ALLOWANCE	501	4 EA	64	2206	0	800	0	0	902	3908
320006.1500024	MODIFY WALL	501	4 EA	64	2206	0	400	0	0	782	3388
320006.1500030	AIR EXHAUST GRILL, SAY 40 SF	501	4 EA	32	1103	0	3200	0	0	1291	5594
320006.1500032	MODIFY WALL	501	4 EA	64	2206	0	400	0	0	782	3388
320006.1500050	STACK, 30" DIA BY 40' HIGH, STEEL, SINGLE WALL.	501	4 EA	128	4863	1440	54000	0	0	17803	78106
320006.1500052	DUCTWORK FOR STACK, ALLOWANCE.	501	4 PL	96	3309	0	800	0	0	1233	5342
320006.1500054	ROOF REPAIR, FLASHING, ETC.	501	4 PL	96	3309	0	800	0	0	1233	5342
320006.1500060	CAM, ALLOWANCE	501	4 EA	16	552	0	0	24000	0	3766	28318
320006.1500062	STACK PROBE ALLOWANCE	501	4 EA	32	1103	0	0	4000	0	931	6034
320006.1530000	***** FIRE PROTECTION *****	501	0	0	0	0	0	0	0	0	0
320006.1530002	***** INSTALL FIRE PROTECTION, 4,550 SF IN EACH OF THE 4 AREAS, 102, 103, 104 & 105. *****	501	18200 SF	0	0	0	0	45500	0	6825	52325
320006.1540002	***** MODIFY LEACHATE COLLECTION SYSTEM *****	501	0	0	0	0	0	0	0	0	0
320006.1540004	CUT 26" & 8" RISER PIPES AND INSTALL NEW COVERS & FRAMES	501	4 EA	192	7068	0	12000	0	0	5720	24788

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FLUOR DANIEL NORTHWEST, INC.
NUMATEC HANFORD CORP.
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** IEST - INTERACTIVE ESTIMATING **
ILAW INTERIM STORAGE FACILITY (GROUT VAULTS)
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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
<hr/>											
	(ALLOWANCE)										
SUBTOTAL	MECHANICAL			1,424		1,440		73,500		64,352	
	SALES TAX 8.00 %				49,986		127,280		0		316,558
	OH&P (ON MARKUPS ONLY)						10182		0		10182
										3054	3054
TOTAL	COST CODE 50115			1,424		1,440		73,500		67,406	
	WBS 320006				49,986				0		329,795
	(ESCALATION 10.29% - CONTINGENCY 20.00 %)						137,462				
320006.16	ELECTRICAL										
320006.1610302	20A 3W CIRCUIT - 1/2" EMT w/3 #10 THHN Conductors (LIGHTING/RECEPTACLES/HEAT ELECTRICAL/FIRE RISER RM)	501	1600 LF	160	5806	0	2400	0	0	2462	10668
320006.1610303	20A 3W CIRCUIT - 1/2" EMT w/3 #12 THHN Conductors (RECEPTACLES/GFI RECEPT IN VAULT/LOADING AREAS)	501	2000 LF	200	7258	0	3000	0	0	3077	13335
320006.1610323	CIRCUIT - 3/4" EMT w/4 #10 THHN Conductors (HIGH BAY LIGHTING - VAULT 102/103/104/105)	501	1500 LF	225	8165	0	3000	0	0	3350	14515
320006.1611906	2"GRS Cnd - w/Fittings & Supports	501	400 LF	68	2468	0	1658	0	0	1238	5364
320006.1611910	4"GRS Cnd - w/Fittings & Supports	501	800 LF	300	10887	0	14599	0	0	7646	33132
320006.1614874	8 - 4" PVC Duct Bank - FP Includes: Mach Exc, Conc, Form, Cnd, Backfill, Stbln	501	1200 LF	1800	65322	0	26400	0	0	27517	119239
320006.1614884	UTILITY VAULT 7FTSQ X 8FTDP W/COVER/HARDWARE	501	8 EA	192	6968	0	16800	0	0	7130	30898
320006.1617525	72x36x18 NEMA 12 ENCLOSURE, FREESTANDING, W/FULL BACK AND SIDE PANELS	501	8 EA	384	13935	0	25600	0	0	11861	51396
320006.1621212	#6 THHN 1/C Copper 600V	501	1500 LF	14	537	0	335	0	0	262	1134
320006.1621214	#3 THHN 1/C Copper 600V	501	1000 LF	10	363	0	428	0	0	237	1028
320006.1621220	#4/0 THHN 1/C Copper 600V	501	6000 LF	156	5661	0	9828	0	0	4647	20136
320006.1621225	#500 THHN 1/C Copper 600V	501	6000 LF	252	9145	0	22968	0	0	9634	41747
320006.1631802	150W VAPOR PROOF, SURF MTD, INCANDESCENT, W/MTG BOX	501	20 EA	40	1452	0	4774	0	0	1868	8094

FLUOR DANIEL NORTHWEST, INC.
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** TEST - INTERACTIVE ESTIMATING **
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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
320006.1632311	4' 2Lamp Indust Fluor Fxtr	501	4 EA	5	181	0	340	0	0	156	677
320006.1632321	4' 2Lamp Indust Fluor Fxtr w/EM Battery	501	4 EA	8	290	0	726	0	0	305	1321
320006.1633828	FIXTURE, 400W METAL HALIDE, t W/QUARTZ STANDBY	501	36 EA	108	3919	0	35050	0	0	11691	50660
320006.1633902	FIXTURE, 35W LPS, WALL MTD, W/LAMP AND PHOTOCCELL	501	12 EA	24	871	0	2820	0	0	1107	4798
320006.1636003	SWITCH W/Box & Plate	501	20 EA	20	726	0	199	0	0	278	1203
320006.1637001	DupIvy SpecRecp20A W/Box&Plt (ELECTRICAL ROOMS)	501	20 EA	20	726	0	300	0	0	308	1334
320006.1637002	DupIvy SpecRecp20A W/Box&Plt (VAULT/UNLOADING AREAS)	501	80 EA	80	2903	0	1200	0	0	1231	5334
320006.1637013	WP SpecRecp20A W/Box&Plt GFI (FILTER/FIRE RISER ROOMS/ OUTDOOR LOCATIONS)	501	20 EA	20	726	0	700	0	0	428	1854
320006.1642010	MASTER FA CONTROL PANEL W/PWR SUPPLY AND BATTERY BACKUP, 20-ZONE	501	1 EA	18	653	0	3740	0	0	1318	5711
320006.1642020	Radio Transmitter/Antenna & Interface 8 Zone F.A. Master Box	501	1 EA	12	435	0	4000	0	0	1331	5766
320006.1642030	AUX CONTROL PANEL, 4-ZONE	501	3 EA	18	653	0	2625	0	0	983	4261
320006.1642033	F.A. LOCATOR LIGHT W/CONDUIT & WIRE	501	4 EA	7	254	0	333	0	0	176	763
320006.1642044	LOW TEMP SWITCH (INSTALL/CONNECT)	501	5 EA	20	726	0	3750	0	0	1343	5819
320006.1642091	FIRE ALARM CONDUIT & WIRE ALLOW 1/2" GRS/PVC W/2#14 (PIV'S/HOT BOX)	501	850 LF	54	1960	0	587	0	0	764	3311
320006.1642092	FIRE ALARM CONDUIT & WIRE ALLOW 1/2" EMT W/4#14 (ELECT ROOM/LAYDOWN AREA)	501	1400 LF	98	3556	0	1084	0	0	1392	6032
320006.1642121	Pyrotronics #MS-501 Manual Station w/SB-5	501	8 EA	8	290	0	696	0	0	296	1282
320006.1642131	Pyrotronics #BDC-6 6" F.A. Bell	501	1 EA	1	36	0	32	0	0	20	88
320006.1642133	Pyrotronics #CES-24 Strobe/Chime	501	1 EA	1	36	0	74	0	0	33	143
320006.1644000	GROUNDING SYSTEM FOR BUILDING AND EQUIPMENT	501	4 JOB	160	5806	0	800	0	0	1982	8588
320006.1647001	BASEBOARD HEATER, 1,000WATT, 120V, W/STAT (FIRE RISER RM)	501	4 EA	6	218	0	700	0	0	275	1193

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
320006.1647005	BASEBOARD HEATER, 1,500WATT, 120V, W/STAT (ELECT ROOM)	501	4 EA	8	290	0	860	0	0	345	1495
320006.1654005	1-1/2"GRS Cnd - w/Fittings' & Supports (CCTV/TV)	501	2500 LP	500	18145	0	8750	0	0	8069	34964
320006.1654010	CAMERA, B/W, 24VAC	501	16 EA	32	1161	0	0	0	0	348	1509
320006.1654020	CAMERA LENS, 6X, ZOOM	501	16 EA	16	581	0	0	0	0	174	755
320006.1654030	CAMERA HOUSING, OUTDOOR	501	16 EA	16	581	0	0	0	0	174	755
320006.1654040	CAMERA PAN/TILT	501	16 EA	32	1161	0	0	0	0	348	1509
320006.1654050	CAMERA MOUNT, FIXED	501	16 EA	64	2323	0	80	0	0	721	3124
320006.1654060	MONITOR, B/W, 15-INCH	501	4 EA	8	290	0	0	0	0	87	377
320006.1654070	MONITOR RACK MTG KIT	501	4 EA	16	581	0	80	0	0	198	859
320006.1654080	VIDEO SWITCHER, 32-CAMERA INPUTS & 8-MONITOR OUTPUTS	501	1 EA	4	145	0	0	0	0	44	189
320006.1654090	DISTRIBUTION LINE CONTROL UNIT	501	2 EA	4	145	0	0	0	0	44	189
320006.1654100	UNIVERSAL RECEIVER	501	16 EA	16	581	0	0	0	0	174	755
320006.1654110	VPS INTERFACE CARD	501	16 EA	8	290	0	0	0	0	87	377
320006.1654120	16-CHANNEL DUPLEX, B/W	501	1 EA	4	145	0	0	0	0	44	189
320006.1654130	VIDEO RECORDER, 2-168 HOUR MODES	501	1 EA	2	73	0	0	0	0	22	95
320006.1654140	VCR RACK MOUNT KIT	501	1 EA	4	145	0	25	0	0	51	221
320006.1654503	RG-59/U MATV CABLE	501	32000 lf	320	11613	0	4800	0	0	4924	21337
320006.1654528	8TWHSPR TV/CCTV CAMERA CABLE	501	3000 LF	30	1089	0	4371	0	0	1638	7098
320006.1654530	14/C TV & CCTV CAMERA CABLE	501	5000 LF	150	5444	0	8750	0	0	4258	18452
320006.1654540	Wire Termination	501	600 EA	150	5444	0	210	0	0	1696	7350
320006.1662025	Distribution Pnlbld 600A MCB	501	1 EA	32	1161	0	3846	0	0	1502	6509
320006.1662661	Factory Assembled Distributi Panelboard 3 Phase 600V MCB 225A	501	4 EA	96	3484	0	6140	0	0	2887	12511
320006.1663978	CKT BKR 800AF/400AT, 3P, 600V	501	1 EA	24	871	0	2001	0	0	862	3734
320006.1664302	10 KVA MiniPwr Zone Pnl 1Ph	501	4 EA	64	2323	0	4792	0	0	2135	9250
320006.1668700	120V FRACTIONAL HP MOTOR CONNECTION (OVERHEAD DOORS)	501	8 EA	8	290	0	104	0	0	118	512
320006.1668701	480V 0-10 HP MOTOR CONNECTION (SUPPLY/EXHAUST FANS - VAULTS 102/103/104/105)	501	8 EA	16	581	0	120	0	0	210	911
320006.1668800	120V FRACTIONAL HP MOTOR FEEDER, (0.50"GRS W/#12)	501	400 LP	31	1125	0	472	0	0	479	2076

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
320006.1668801	(OVERHEAD DOORS) 480V 0-10 HP MOTOR FEEDER, (0.75"GRS W/#12) (SUPPLY/EXHAUST FANS - VAULTS 102/103/104/105)	501	1200 LF	144	5226	0	2100	0	0	2198	9524
320006.1685010	INSTRUMENT CONTROL RACK - LEACHATE WIRING - CAM ALARM	501	1 EA	160	5806	0	5000	15000	0	5492	31298
320006.1685020	CAM ALARM UNIT (VAULT EXHAUST STACK)	501	4 EA	96	3484	0	20000	0	0	7045	30529
320006.1685030	CAM ALARM - 3/4" EMT w/WIRING (EXHAUST STACK MONITORING VAULT 102/103/104/105)	501	1000 LF	150	5444	0	2000	0	0	2233	9677
SUBTOTAL ELECTRICAL				6,694	242,954	0	266,047	15,000	0	154,953	678,954
SALES TAX 8.00 %							21283		0		21283
OH&P (ON MARKUPS ONLY)									0	6385	6385
TOTAL				6,694	242,954	0	287,330	15,000	0	161,338	706,622
WBS 320006 (ESCALATION 10.29% - CONTINGENCY 20.00 %)											
TOTAL WBS 320006 ENCLOSURE BUILDINGS				17,483	576,704	1,440	734,243	929,047	0	532,791	2,774,225

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
320007	INSTALL & TEST CRANES										
320007.14	CONVEYING SYSTEMS										
320007.1400010	INSTALL CRANES	700	4 EA	0	0	0	0	300000	0	45000	345000
320007.1400012	INSTALL 80# CRANE RUNNING RAIL	700	1464 LF	366	11218	0	21960	0	0	9953	43131
320007.1400014	ALLOWANCE FOR FACTORY REP DURING CRANE INSTALLATION & TESTING	700	1 LS	0	0	0	0	30000	0	4500	34500
SUBTOTAL	CONVEYING SYSTEMS			366	11,218	0	21,960	330,000		59,453	422,631
	SALES TAX 8.00 %						1756		0		1756
	OH&P (ON MARKUPS ONLY)									527	527
TOTAL	COST CODE 70014			366	11,218	0	23,716	330,000		59,980	424,914
	WBS 320007 (ESCALATION 10.29% - CONTINGENCY 20.00 %)								0		
320007.16	ELECTRICAL										
320007.1690010	CONTROL ROOM INSTALLATION	700	1 JOB	240	8710	0	4000	0	0	3813	16523
	- CONTROL CONSOLE/MONITORS/ ASSOCIATED CONDUIT/WIRING AND CONNECTIONS	700	4 JOB	640	23226	0	8000	0	0	9368	40594
320007.1690020	CRANE CONTROL SWITCHGEAR	700	4 JOB	640	23226	0	8000	0	0	9368	40594
	- POWER/CONTROL/INSTRUMENT EQUIPMENT/ASSOCIATED/ CONDUIT/WIRING/CONNECTIONS	700	1 JOB	160	5806	0	0	0	0	1742	7548
320007.1690030	CRANE CONTROL SYSTEM TESTING AND ATP SUPPORT	700	1 JOB	160	5806	0	0	0	0	1742	7548
SUBTOTAL	ELECTRICAL			1,040	37,742	0	12,000	0	0	14,923	64,665
	SALES TAX 8.00 %						960		0		960
	OH&P (ON MARKUPS ONLY)									288	288
TOTAL	COST CODE 70016			1,040	37,742	0	12,960	0		15,211	65,913
	WBS 320007 (ESCALATION 10.29% - CONTINGENCY 20.00 %)								0		
TOTAL WBS 320007 INSTALL & TEST CRANES				1,406	48,960	0	36,676	330,000	0	75,191	490,827

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
320008	EXISTING FACILITY UPGRADE										
320008.09	FINISHES										
320008.0900002	MISC. CHANGES & UPGRADES TO EXISTING FACILITIES TO SUP- PORT NEW MISSION (ALLOWANCE, NO DESIGN AVAILABLE)	501	1 LS	0	0	0	0	250000	0	37500	287500
SUBTOTAL	FINISHES			0		0		250,000	0	37,500	287,500
					0						
TOTAL	COST CODE 50109			0		0		250,000		37,500	287,500
	WBS 320008				0		0		0		287,500
	(ESCALATION 10.29% - CONTINGENCY 30.00 %)										
TOTAL WBS 320008	EXISTING FACILITY UPGRADE			0		0		250,000	0	37,500	287,500
					0		0				

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
400000	PROJECT INTEGRATION										
400000.19	PROJECT MANAGEMENT										
400000.1950102	PROJECT INTEGRATION	060	39739 HR	39739	2499980	0	0	0	0	0	2499980
SUBTOTAL PROJECT MANAGEMENT				39,739		0	0	0	0	0	
					2,499,980		0		0		2,499,980
TOTAL				39,739		0	0	0	0	0	
COST CODE 06019					2,499,980		0		0		2,499,980
WBS 400000							0		0		
(ESCALATION 9.21% - CONTINGENCY 20.00 %)											
TOTAL WBS 400000 PROJECT INTEGRATION				39,739		0	0	0	0	0	2,499,980
					2,499,980		0		0		2,499,980

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ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS

REPORT TOTAL				146,655		25,256		3,316,582		1,531,447	
					7,892,954		5,847,634		0		18,613,873

APPENDIX D

Conceptual Project Schedule

Need input from Burgard for long-range planning.

EARLY START	EARLY FINISH	FY00												FY01												FY02												FY03											
		SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN							
		◇ 10.1A.M01 START DEFINITIVE DESIGN/CRITICAL DECISIONS 1 & 2																																															
10OCT99	30SEP99																									10.1A.630 DEFINITIVE DESIGN																							
10OCT99	31JAN01																																																
10OCT99	17JUN02																																																
26MAY00	23JUN00																									10.1A.CD3A CRITICAL DECISION #3 FOR P1 & C1																							
23JUN00	15SEP00																									10.2A.100 BID CYCLE EARLY/LONG-LEAD PROCUREMENT																							
23JUN00	15SEP00																									10.3A.100 C1 BID & AWARD SITE PREP																							
18SEP00	15SEP00																									◇ 10.3A.M07 NTP C1 SITE PREP																							
18SEP00	31JAN01																									10.3A C1 SITE PREP																							
18SEP00	6MAR01																									10.2A.201 P1 FAB/DELIVER GANTRY CRANES/CCTV																							
18SEP00	18FEB02																																					10.1C.10 TITLE III ENGINEERING											
23NOV00	22NOV00																									◇ 10.1A.M02 ISSUE DESIGN FOR APPROVAL (IFA)																							
1FEB01	31JAN01																									◇ 10.1A.M03 COMPLETE DEFINITIVE DESIGN																							
1FEB01	31JAN01																									◇ 10.3A.M99 C1 SITE PREP COMPLETE																							
1FEB01	28FEB01																									10.1A.CD3B CRITICAL DECISION #3																							
1MAR01	23MAY01																									10.3B.100 BID & AWARD C2 FP CONSTRUCTION																							
7MAR01	22AUG01																									10.2A.202 P2 FAB/DELIVER TRACTOR & TRANSPORTER																							
24MAY01	23MAY01																									◇ 10.3B.M07 NTP C2 CONSTRUCTION																							
24MAY01	18FEB02																																					10.3B C2 FP CONSTRUCTION											
19FEB02	18FEB02																																					◇ 10.3B.M99 C2 CONSTRUCTION COMPLETE											
19FEB02	17JUN02																									10.1C.920 CONSTRUCTION CLOSEOUT																							
18JUN02	17JUN02																																					10.4A.M99 PROJECT COMPLETE ◇											

Plot Date	21NOV97
Data Date	1OCT97
Project Start	1JAN97
Project Finish	17JUN02

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

(c) Primavera Systems, Inc.

BC-03 TASK ORDER N-10

Date	Revision	Checked	Approved

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ACTIVITY ID	EARLY START	EARLY FINISH	FY99												FY00												FY01												FY02												FY03											
			SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC																				
C2 CONSTRUCTION																																																														
10.3B.130A	24MAY01	19JUL01																																					10.3B.130A DESIGN PREENGINEERED METAL BLDGS																							
10.3B	24MAY01	18FEB02																																					10.3B C2 PF CONSTRUCTION																							
10.3B.511B	31MAY01	6JUN01																																					10.3B.511B EXPOSE EXISTING REBAR END WALL EXTENSION																							
10.3B.512A	31MAY01	6JUN01																																					10.3B.512A INSTALL REBAR END WALL EXTENSION																							
10.3B.521B	31MAY01	6JUN01																																					10.3B.521B EXPOSE EXISTING REBAR SIDE WALL EXTENSION																							
10.3B.522A	31MAY01	13JUN01																																					10.3B.522A INSTALL REBAR SIDE WALL EXTENSION																							
10.3B.511C	7JUN01	13JUN01																																					10.3B.511C EXPOSE EXISTING REBAR END WALL EXTENSION																							
10.3B.512B	7JUN01	13JUN01																																					10.3B.512B INSTALL REBAR END WALL EXTENSION																							
10.3B.513A	7JUN01	13JUN01																																					10.3B.513A FORM WALLS END WALL EXTENSION																							
10.3B.521C	7JUN01	13JUN01																																					10.3B.521C EXPOSE EXISTING REBAR SIDE WALL EXTENSION																							
10.3B.522B	7JUN01	20JUN01																																					10.3B.522B INSTALL REBAR SIDE WALL EXTENSION																							
10.3B.511D	14JUN01	20JUN01																																					10.3B.511D EXPOSE EXISTING REBAR END WALL EXTENSION																							
10.3B.512C	14JUN01	20JUN01																																					10.3B.512C INSTALL REBAR END WALL EXTENSION																							
10.3B.513B	14JUN01	20JUN01																																					10.3B.513B FORM WALLS END WALL EXTENSION																							
10.3B.514A	14JUN01	20JUN01																																					10.3B.514A POUR CONCRETE WALLS END WALL EXTENSION																							
10.3B.521D	14JUN01	20JUN01																																					10.3B.521D EXPOSE EXISTING REBAR SIDE WALL EXTENSION																							
10.3B.522C	14JUN01	27JUN01																																					10.3B.522C INSTALL REBAR SIDE WALL EXTENSION																							
10.3B.523A	14JUN01	27JUN01																																					10.3B.523A FORM WALLS SIDE WALL EXTENSION																							
10.3B.512D	21JUN01	27JUN01																																					10.3B.512D INSTALL REBAR END WALL EXTENSION																							
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10.3B.523B	21JUN01	5JUL01																																					10.3B.523B FORM WALLS SIDE WALL EXTENSION																							
10.3B.524A	28JUN01	29JUN01																																					10.3B.524A POUR CONCRETE WALLS SIDE WALL EXTENSION																							
10.3B.513D	28JUN01	5JUL01																																					10.3B.513D FORM WALLS END WALL EXTENSION																							
10.3B.514C	28JUN01	5JUL01																																					10.3B.514C POUR CONCRETE WALLS END WALL EXTENSION																							
10.3B.523C	28JUN01	12JUL01																																					10.3B.523C FORM WALLS SIDE WALL EXTENSION																							
10.3B.631A	2JUL01	9JUL01																																					10.3B.631A FORM & POUR FOOTINGS ENCLOSURE BLDGS																							
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10.3B.514D	6JUL01	12JUL01																																					10.3B.514D POUR CONCRETE WALLS END WALL EXTENSION																							
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10.3B.631B	10JUL01	16JUL01																																					10.3B.631B FORM & POUR FOOTINGS ENCLOSURE BLDGS																							
10.3B.632A	10JUL01	19JUL01																																					10.3B.632A FORM & POUR BEAMS ENCLOSURE BLDGS																							
10.3B.524C	13JUL01	16JUL01																																					10.3B.524C POUR CONCRETE WALLS SIDE WALL EXTENSION																							
10.3B.631C	17JUL01	23JUL01																																					10.3B.631C FORM & POUR FOOTINGS ENCLOSURE BLDGS																							
10.3B.632B	17JUL01	26JUL01																																					10.3B.632B FORM & POUR BEAMS ENCLOSURE BLDGS																							
10.3B.524D	20JUL01	23JUL01																																					10.3B.524D POUR CONCRETE WALLS SIDE WALL EXTENSION																							
10.3B.633A	24JUL01	26JUL01	10.3B.633A POUR CONCRETE RETAINING WALL FOR ENCLOSURE BLDGS																																																											
10.3B.131A	20JUL01	13SEP01																																					10.3B.131A SUBMITTALS PREENGR METAL BLDGS																							
10.3B.631D	24JUL01	30JUL01																																					10.3B.631D FORM & POUR FOOTINGS ENCLOSURE BLDGS																							
10.3B.632C	24JUL01	2AUG01																																					10.3B.632C FORM & POUR BEAMS ENCLOSURE BLDGS																							
10.3B.633B	27JUL01	2AUG01	10.3B.633B POUR CONCRETE RETAINING WALL FOR ENCLOSURE BLDGS																																																											
10.3B.634A	27JUL01	2AUG01																																					10.3B.634A POUR CONCRETE COLUMNS FOR ENCLOSURE BLDGS																							
10.3B.632D	31JUL01	9AUG01																																					10.3B.632D FORM & POUR BEAMS ENCLOSURE BLDGS																							
10.3B.633C	3AUG01	9AUG01	10.3B.633C POUR CONCRETE RETAINING WALL FOR ENCLOSURE BLDGS																																																											

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Sheet 3 of 5

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10.3A.405 30.61

SEW

VAULT EXCAVATION

10.3A.461 5.71

INSTALL

STREET LIGHTS

10.3A.462 5.71

INSTALL

HLAN

Plot Date 2100V97
Data Date 120797
Project Start 120897
Project Finish 170802

Activity hierarchy diagram showing the relationship between activities: Activity hierarchy diagram showing the relationship between activities: Activity hierarchy diagram showing the relationship between activities.

FLUOR DANIEL NORTHWEST, INC.
W-465 ILAW INTERIM STORAGE FACILITY
TL-3B C2 FP CONSTRUCTION

Sheet 1 of 3

CHART TL-02

Date	Revision	Checked	Approved

D-16

Sheet 3 of 7

HNF-1975

[illegible]

[illegible]

1127

POWER & TEST CRANES (WBS 320007)

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. This includes hauling debris to pit 9.
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 and fire hydrants.
6. System components will be 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. Reduce pressure backflow prevention assembly in heated enclosure (two 10-inch backflow preventers).

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 & 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 for 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: Per PDCA Architectural Specification Manual.
2. Metals: Per PDCA Architectural Specification Manual.
3. Concrete: Per 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: 1/2-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 std 52-76. 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
(24 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. The alarm will have one Fire Control Panel and three auxiliary panels in order to sound alarms in each building separately.
2. Valve tamper switches for the 4 PIV and two back flow prevention assembly valves
3. Six low temperature switches (four in the riser room and one of each 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

ENERGY CONSERVATION REPORT AND ANALYSIS

These vaults will not be heated or cooled and, therefore, do not require building Energy Conservation per 10 CFR435/436 or DOE 6430.1A. Process Energy per DOE 6430.1A will be evaluated during Definitive Design for the crane operations.

APPENDIX G

**Preliminary Safety Evaluation
#HNF-SD-W465-PSE-001**

(Provided by the Performance Contractor
under a separate cover.)

APPENDIX H

NOT USED

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, physical handicapped considerations do not apply.

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

PRELIMINARY

APPENDIX J

Plant Forces Work Review

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 ILAW INTERIM STORAGE FACILITY		JCS Work Pkg or Project No. W-465	Area 200E	Bldg. No. 218-E-16
R E Q U E S T E R	<u>Estimated Cost of Work:</u>				
	*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
F D H	<u>Reviewed By:</u>				
	Area Work Review Agent John E. Allison			Date	11/20/97
Company Work Review Agent Gary Maxwell			Date	12/9/97	
D O E	The following determination has been made regarding applicability of the Davis-Bacon Act, as amended, to the work described above:				
	Applicable ☒ [XX]	Not Applicable ☐ []	Chairman <i>Original signed by Dominic Sansotta</i>		12/11/97
Construction		Plant Forces	RL-Labor Standards Board	Date	

"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
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- 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.

F D H	Fluor Daniel Hanford, Inc. P.O. Box 1000, Richland, WA 99352-1000	Plant Forces Work Review No.	Page
	PLANT FORCES WORK REVIEW Continued	FDH-263-97	3 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 No.	Page
	PLANT FORCES WORK REVIEW Continued	FDH-263-97	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 No.	Page
	PLANT FORCES WORK REVIEW Continued	FDH-263-97	5 of 5

SKETCHES ON FILE IN THE DAVIS-BACON OFFICE

APPENDIX K

Sketches

Title: PROJECT SITE PLAN DRAWING LIST	ENGINEERING SKETCH IMMOBILIZED LOW ACTIVITY WASTE			
	Prepared by: P LAING	Sh of 1 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

FLUOR DANIEL NORTHWEST

ENGINEERING SKETCH
IMMOBILIZED LOW ACTIVITY WASTE

Title:

PROJECT
SITE PLAN

Prepared by
P. LAING
Checked by
R. Hollenbeck

Sheet
1 of 1
Sketch no.
ES-W465-C2
Rev
0

REF: H-2-7573 DWG LIST VAULTS 102 & 103
REF: H-2-7843 DWG LIST VAULTS 104 & 105

SCALE IN FEET

EXTEND ROADWAY TO PROJECT W-519
PROPOSED ACCESS ROAD ES-505-C1
PROPOSED 12" RW

LEGEND

PROPOSED RW
12" RW
8" FW
PTV
PROBANT W/ MANIT VALVE
FW "HOT BOX" SEE NOTE BELOW
EXIST FENCE
NEW FENCE
ELEC DUCT BANK
ELEC MH
EXIST GRADE 672
FINISH GRADE
PROPOSED ROAD
NEW PAVED ROAD
NEW BERM
EXIST VAULT NEW BLDG

"HOT BOX" NOTE:
FOR REDUCED PRESSURE
ASSEMBLY AND FIRE DPT.
PUMPER CONNECTION

FLUOR DANIEL NORTHWEST

ENGINEERING SKETCH IMMOBILIZED LOW ACTIVITY WASTE

Title:
OVERALL BUILDING
FLOOR PLAN

Prepared by:
R. REDMAN
Checked by:
1465A1

Sh. of 1
Drawing
ES-W465-A1

Rev
0

TYPICAL EXHAUST AIR ROOM
ENLARGED PLAN 2
OVERALL AIR EXHAUST ROOM SIZE 10' x 10'

TYPICAL AIR SUPPLY ROOM
ENLARGED PLAN 1

FLUOR DANIEL NORTHWEST		ENGINEERING SKETCH	
ELECTRICAL		IMMOBILIZED LOW ACTIVITY WASTE	
ONE-LINE DIAGRAM		Prepared by: CL CLOUD	Sh of 1 1
		Checked by: ML Allen	1465E1
		Sketch no.	Rev
		ES-W465-E1	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 WASTETitle: TRACTOR/TRAILER
ILAW TRANSPORT VEHICLEPrepared by:
P LAINGSh of
1 1Sketch no.
ES-W465-T1Rev
0

Checked by:

R. Hallenbeck I465T1

HS20-44

8,000 LBS

32,000 LBS

32,000 LBS

0.2 W

14'-0"

0.8 W

28'-0"

0.8 W

0.1W

0.4W

0.4W

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 WASTETitle:
ILAW
LOGIC FLOW DIAGRAMPrepared by:
P LAINGSh of
1 1

Sketch no.

ES-W465-L1

Rev

0

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:

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

GANTRY RAIL CONNECTION

(B) SIDE WALL EXTENSION
NO SCALE

VAULT SECTION LOOKING WEST

FLUOR DANIEL NORTHWEST

ENGINEERING SKETCH
IMMOBILIZED LOW ACTIVITY WASTE

Title:

ILAW VAULT
SHIELD ZONES

Prepared by:

P LAING

Sh

of

1 1

Sketch no.

ES-W465-R1

Rev

0

Checked by:

R Hollombeck

Cadfile

I465R1

TABLE 3-2 ILAW Vault Shield Design Criteria

Zone category	Access time allowed	Maximum ($\mu\text{Sv/h}$)	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.

① CONTROLLED AREA BETWEEN FENCE
AND ENCLOSURE BUILDINGS

② EIGHT PLACES

NEW SHIELD BERM

SCALE IN FEET

FLUOR DANIEL NORTHWEST

ENGINEERING SKETCH
IMMOBILIZED LOW ACTIVITY WASTE

Title:
ILAW VAULT
STORAGE ARRAY

Prepared by:
P LAING

Sh of
1 1

Sketch no.

ES-W465-P1

Rev

0

Checked by:
R Hollenbeck

Cadfile
I465P1

123'-6" VAULT INTERIOR DIMENSION

50'-6" VAULT INTERIOR DIMENSION

OPTIONAL STAGING
SPACE (2 x 3 x 6)

2'-2" CLEAR EACH END OF VAULT

4" CLEAR AT SIDES AND WALLS

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. Hollenbeck

Cadfile
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 DIFFUSION BREAK TO 4'-6" BELOW TOP OF WALL (WEST WALL ONLY TYP EACH VAULT)
9. REMOVE 1" PVC CONDUITS - THERMOCOUPLE (FOUR PER VALUT)

SEE NOTES: 1, 2, & 3

FLUOR DANIEL NORTHWEST

ENGINEERING SKETCH
IMMOBILIZED LOW ACTIVITY WASTETitle:
GROUT VAULT
DEMOLITION SECTIONPrepared by:
PA LAINGSh of
1 1Sketch no.
ES-W465-D2Rev
0Checked by:
*R. Hollenbeck*Cadfile
I465D2

REMOVE 3'-4" DEEP ASPHALTIC TOPPING
EXISTING PIPING EMBEDDED IN TOPPING
TO BE REMOVED WITH PLANKS

EXISTING ELECTRICAL DUCT BANKS
& CATHODIC PROTECTION CABLES

REMOVE EXISTING ROOF PLANKS WITH
CONCRETE TOPPING IN PLACE

REMOVE EXISTING ASPHALTIC COATING
ALL WALLS AND FLOORS; ALL VAULTS

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	Sh of 1 1	Sketch no. ES-W465-D3	Rev 0
	Checked by: RG Hollenbeck	Cadfile I465D3

ROOF PLANK LIFTING CONNECTOR

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

APPENDIX L

Packing 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,

A handwritten signature in dark ink, appearing to read 'J. G. Field'.

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**

Preparer: A. V. Savino *AV Savino*

Checker: J. G. McFadden *J G McFadden*

Section Chief: J. G. McFadden *J G McFadden*

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 culllets. 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 $^{137\text{m}}\text{Ba}$, 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 ₂ O	20.00
K ₂ O	1.52
Al ₂ O ₃	10.00
B ₂ O 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 ($4.07 \times 10^{-4} \text{ g/cc} = 0.00122/3$) 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/m³ of ¹³⁷Cs, mrem/h

Detector Location	Transportation Dose Rate Limit	Dose Rate with 6.4 cm ² Steel (short side to driver)	Dose Rate with 6.1 cm ² 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 ¹³⁷Cs activity concentration of 3 Ci/m³ 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/m³ in the waste package.

If it is assumed that the activity concentration of 3 Ci/m³ applies only to the glass marbles, the actual activity concentration of ¹³⁷Cs in the waste package is only 2 Ci/m³, 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 ¹³⁷Cs activity concentration is 2 or 3 Ci/m³.

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=659.08 &
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, NShld= 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, NShld= 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, NShld= 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, NShld= 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
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, NShld= 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
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, NShld= 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

Reviewer (Printed Name and Signature)

7/21/97

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.

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Immobilized Low-Activity Waste Interim Storage Facility Project W-465 Conceptual Design Report		ECN No.

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