5T.4 - 73

DEC 18 1998

ENGINEERING DATA TRANSMITTAL

1. EDT 624327

2. To: (Receiving Organization) Distribution	3. From: (Originating Organization) COGEMA Engineering	4. Related EDT No.: NA
5. Proj./Prog./Dept./Div.: HTI	6. Design Authority/ Design Agent/Cog. Engr.: NA	7. Purchase Order No.: NA
8. Originator Remarks: For approval/release		9. Equip./Component No.: NA
		10. System/Bldg./Facility: 200Gen
11. Receiver Remarks: 11A. Design Baseline Document? [] Yes [x] No		12. Major Assm. Dwg. No.: NA
		13. Permit/Permit Application No.: NA
		14. Required Response Date:

15. DATA TRANSMITTED

(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Approval Designator	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1	HNF-3441	All	0	AX Tank Farm Ancillary Equipment Study	NA	2	1	

16. KEY

Approval Designator (F)	Reason for Transmittal (G)	Disposition (H) & (I)
E, S, Q, D or N/A (see WHC-CM-3-5, Sec.12.7)	1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION
(See Approval Designator for required signatures)

(G) Reason	(H) Disp.	(J) Name (K) Signature (L) Date (M) MSIN	(G) Reason	(H) Disp.	(J) Name (K) Signature (L) Date (M) MSIN
		Design Authority		1	~~J. A. Hunter~~
		Design Agent	1	1	D.L. Becker [signature] 10/14/98
1	1	Cog.Eng. [signature] 12/16/98 S5-05	1	1	R. W. Root [signature] 10/13/98
		Cog. Mgr.	1	1	D. C. Ramsower [signature] 9/30/98 B4-JT
		QA	4	4	A.A. Halvorson [signature] 10/22/98
4	4	~~Safety~~ J.S. Hertzel [signature] 10-23-98	4	4	S.A. Krieg [signature] 10/22/98
1	1	WA Skelly See blk. 18	4	4	L.B. McDonald [signature] 10/22/98

18. [signature] W. A. Skelly 9/29/98 Signature of EDT Originator Date	19. [signature] D. L. Becker 10/14/98 Authorized Representative Date for Receiving Organization	20. [signature] R. W. Root 10/13/98 Design Authority/ Cognizant Manager Date	21. DOE APPROVAL (if required) Ctrl. No. [] Approved [] Approved w/comments [] Disapproved w/comments

AX Tank Farm Ancillary Equipment Study

W. A. Skelly
COGEMA Engineering Corporation, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-96RL13200

EDT/ECN: 624327 UC: 510
Org Code: 08E00 Charge Code: D25E3
B&R Code: EW3130010 Total Pages: ~~349~~ 351

Key Words: AX Tank Farm, Hanford Tanks Initiative, excavation and removal, grout filling, closure of tank farms

Abstract: This report examines the feasibility of remediating ancillary equipment associated with the 241-AX Tank Farm at the Hanford Site. Ancillary equipment includes surface structures and equipment, process waste piping, ventilation components, wells, and pits, boxes, sumps, and tanks used to make waste transfers to/from the AX tanks and adjoining tank farms. Two remedial alternatives are considered: (1) excavation and removal of all ancillary equipment items, and (2) in-situ stabilization by grout filling, The 241-AX Tank Farm is being employed as a "strawman" in engineering studies evaluating clean and landfill closure options for Hanford single-shell tanks, This is one of several reports being prepared for use by the Hanford Tanks Initiative Project to explore potential closure options and to develop retrieval performance evaluation criteria for tank farms.

12/17/98

Release Approval Date

Release Stamp

Approved for Public Release

AX TANK FARM ANCILLARY EQUIPMENT STUDY

W. A. Skelly

September 1998

COGEMA Engineering Corporation
P. O. Box 840
Richland, Washington 99352

This page intentionally left blank

CONTENTS

CONTENTS (cont'd)

APPENDICES:

FIGURES:

TABLES:

CONTENTS (cont'd)

TABLES (cont'd):

ACRONYMS

CERCLA	*Comprehensive Environmental Response, Compensation and Liability Act*
DOE	U.S. Department of Energy
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
ERDF	Environmental Restoration Disposal Facility
HEPA	high-efficiency particulate air
HTI	Hanford Tanks Initiative
LLW	low-level waste
MOU	Memorandum of Understanding
NHC	Numatec Hanford Corporation
RCRA	*Resource Conservation and Recovery Act*
RFP	request for proposal
RO/RO	roll-on/roll-off
SOW	statement of work
SST	single-shell tank
STRARCH	stressed arch
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TRU	transuranic
TWRS	Tank Waste Remediation System
WAC	Washington Administrative Code
WBS	work breakdown structure

1.0 INTRODUCTION

1.1 FOREWORD

In May of 1996, the U.S. Department of Energy (DOE) implemented a five-year demonstration project known as the Hanford Tanks Initiative (HTI). The scope of HTI is to (1) demonstrate alternate retrieval technologies for tank waste; (2) retrieve hard-heel waste from tank 241-C-106 and assess compliance with retrieval performance evaluation criteria for that activity; (3) characterize residual waste in Tank 241-AX-104 and assess compliance with retrieval performance criteria for that tank; and (4) develop retrieval performance evaluation criteria supporting readiness to close single-shell tanks (SSTs) in the future. The HTI mission is to minimize technical uncertainties and programmatic risks by conducting demonstrations to characterize and remove tank waste using technologies and methods that will be needed in the future to carry out tank waste remediation and tank farm closure. A detailed description of the entire HTI Project is provided in the Hanford Tanks Initiative Plan (Schaus 1997).

The HTI project team is comprised of representatives from the Project Hanford Management Contract (PHMC), Pacific Northwest National Laboratory (PNNL), and private consultants. The team is working closely with Washington State Department of Ecology (Ecology), various northwest stakeholders, and native American tribes to identify and develop waste retrieval performance criteria for subsequent formulation of acceptable closure criteria and standards for tank farms.

In August of 1996, the DOE and Ecology signed a memorandum of understanding (MOU) in which they agreed to collaborate in addressing the issues of "what degree of waste removal should be used as the basis for waste retrieval systems technology development, retrieval systems engineering, and definition of completion of retrieval operations." In preparing the agreement, the two agencies conceded that "it has not been established that 99 percent waste retrieval as defined in the Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement [TPA]) Milestone M-45-00 will be sufficient to allow closure of tank farms; nor has it been determined that 99 percent retrieval is technically achievable, or represents a performance objective that considers cost, technical practicality, exposure to radiation, and/or Nuclear Regulatory Commission requirements." Conditions of TPA Milestone M-45-00 stipulate that "in evaluating closure options for SSTs, contaminated soil, and ancillary equipment, Ecology and the Environmental Protection Agency (EPA) will consider cost, technical practicality, and potential exposure to radiation" (JEG 1997).

One essential element of the HTI mission is to provide a basis for future National Environmental Policy Act of 1969 (NEPA) safety, and regulatory actions affecting waste retrieval and operable unit closure of the Hanford Site tank farms. This goal is being met by development of retrieval performance criteria, through assessment of risk to human health and environment. Hence, several engineering studies have been conducted to provide the necessary data for evaluation of risk to human health and environment. This study, AX Tank Farm Ancillary Equipment Study, evaluates two alternatives for remediation of ancillary equipment in the AX Farm. One alternative, a clean closure option, consists of excavation and removal of the ancillary equipment. The other alternative, a landfill option, consists of grouting of the equipment in situ. Concepts are developed for performing the work, including descriptions of the layouts, equipment, labor and materials required, and evaluated with respect to cost, technical practicality and worker radiological exposures. Other studies that interact with this study are the AX Tank Farm Tank Removal Study and the Soil Remediation Study.

1.2 STUDY SCOPE AND OBJECTIVES

In January of 1997, Numatec Hanford Corporation (NHC) issued a request for proposals (RFP) with a statement of work (SOW) for engineering services to support HTI in evaluating closure alternatives for development of retrieval performance evaluation criteria. Several tasks described in the RFP were assigned to COGEMA Engineering Corporation (formerly SGN Eurisys Services Corporation) the following month. Engineering study reports for Task 2 - "Tank Removal Study," Task 3 - "Soil Remediation Study", and Task 4 - "Best-Basis Inventory Study" were submitted to NHC during 1997.

In October of 1997, a separate task order with a revised SOW was assigned to COGEMA Engineering to evaluate ancillary equipment in AX Tank Farm. This task was originally identified in the January 1997 RFP as Task 8. The SOW indicated that three distinct remedial options will be evaluated by the HTI project team for AX Tank Farm ancillary equipment:

A. A "no action" alternative
B. Removal and disposal of all waste materials in appropriate disposal facilities on the Hanford Site (Case 1)
C. Stabilization (grouting) of ancillary equipment in place (Case 2).

COGEMA Engineering was directed to develop the following assessments and information:

- An inventory list of ancillary equipment in AX Tank Farm
- A best-basis estimate of residual contamination in the ancillary equipment
- Determinations (based on conceptual engineering analyses) of the technical feasibility of Alternatives B and C.
- Estimates of manpower, equipment, resource requirements and worker exposures for Alternatives B and C.
- Conceptual cost estimates and schedules for Alternatives B and C.
- Supporting information to be used by other project participants to prepare hazard and safety analyses of the work as part of the HTI Path Forward Human Health Impacts Study.

This engineering study report provides narrative descriptions of the remedial actions that would be required to accomplish Alternatives B and C, together with inventory information for all equipment systems present, a best-basis estimate of residual contamination, and data tables summarizing manning, equipment, resources, costs, schedules, estimates of emissions, waste forms and quantities, and potential worker exposures as a consequence of performing the work.

2.0 (CASE 1) DEMOLITION OF SURFACE STRUCTURES AND EXCAVATION AND REMOVAL OF BELOW-GRADE EQUIPMENT

2.1 INTRODUCTION

This section includes descriptions of the work to be performed to reduce all on-site surface structures to grade and remove all underground ancillary equipment. Major study assumptions for this case are summarized in Section 2.2. A summary description of the major equipment and hardware items that would be used to perform the work is provided in Section 2.3. Section 2.4 provides descriptions of the various remedial activities that would be performed. Topics in Section 2.4 are presented in sequential order. Implementability issues and concerns for this case are discussed in Section 2.5. Data tables and schedule information are included at the end of this section. Tank removal tasks also are shown on the schedule (Figure 2.1) to aid in visualizing the interplay between the work scope in this study and work described previously in SESC (1997).

2.2 MAJOR STUDY ASSUMPTIONS

- The intent of the assessment of this alternative is to develop concepts for removal of ancillary equipment that are conformable (to the maximum practical extent) to the previous description of work involved in excavation and removal of the four AX tanks (SESC 1997). The area in which ancillary equipment is to be removed is defined by the limits of the tank removal excavation in the previous study.

- It is assumed that an enclosure structure will be constructed over the site to minimize airborne emissions of contaminants from the site while tanks and ancillary equipment are being removed. A conceptual description of this structure was provided in SESC (1997). Limited additional ancillary equipment items will be demolished/removed to clear the appropriate surface area for construction of this structure over and above the equipment residing within the tank removal excavation area.

- For this study, site access constraints were not imposed on any of the activities that would be carried out to remove or grout-fill ancillary equipment associated with AX Tank Farm. In actuality, other tank farms and support facilities occupy adjacent areas to the north, west, and south of the AX Tank Farm. Consequently, physical access to the site is severely constrained at the present time. Some of the existing constraints may still be in effect when AX Tank Farm enters into closure

- Some ancillary equipment inside AX Tank Farm supports essential systems and functions in adjacent (AY, AZ and AN) tank farms. A number of process waste lines and valve pits in AX Tank Farm are essential components of waste retrieval systems for the A Tank Farm Complex (A, AX, AY, AZ and AN Farms). There are buried instrumentation cables in AX Tank Farm that provide links to operational monitoring/surveillance systems in other tank farms. One of the piping groups (Group 14) identified in this study to be removed or filled with grout includes an 8-in. line which is the primary raw-water supply line to 200-East

Area. This line is the source of water for fire protection systems in 200-East Area (i.e., service generally regarded to be uninterruptible), and therefore, is essential to any/all ongoing operations in East Area. These essential elements would have to remain in place until operations in the adjacent farms are concluded, or they would have to be rerouted outside AX Tank Farm (involving significant additional construction) before a clean closure strategy for the farm could be implemented. These issues are not examined in this study.

- It is assumed that lightly contaminated debris from building demolition will be acceptable for disposal at the Environmental Restoration Disposal Facility (ERDF). This assumption is conformable with the previous study.

- It is assumed that heavily contaminated debris will be packaged in shielded containers and transported to a pre-processing facility co-located with the Tank Waste Remediation System (TWRS) vitrification plant. This assumption is also conformable with the earlier work.

- It is assumed that, prior to initiation of waste retrieval operations, control of AX Tank Farm would pass from the current operations component to a separate retrieval function and, upon completion of retrieval activities, control would pass to a third entity responsible for closure. Current work rules and management practices that apply to tank farms operations would not apply necessarily to the retrieval and closure functions. More specifically, closure would be performed by an entity comparable to one of DOE's environmental restoration contractors, and the work would be done as an identifiably separate project with dedicated crews and equipment. With elimination of matrixed personnel, it is assumed that significantly higher worker productivities (on the order of six hours of productive work per shift) would be achieved, in contrast to productivities that are typical of current operations (on the order of three to four hours of productive work per shift). With these changes, it is assumed that the existing authorization basis for AX Tank Farm operations would be replaced by protocols and procedures that would be applicable to waste retrieval and closure of the farm. The new protocols and procedures would have to be compatible with the authorization basis and applicable procedures that remain in effect for other farms in the A Farm Complex (A, AX, AY, AZ and AN Tank Farms).

- It is assumed that DOE will agree to a 1,500 mrem/yr whole body dose limit criterion for tank remedial actions. This limit has already been applied to 100-K Basin clean-up activities (the most directly comparable activity at the Hanford Site). The same assumption was made for conceptualization of tank removal activities.

- In this study, partial decontamination (scabbling) of unlined pits and boxes is proposed in advance of demolition work. Precedents are not available for predicting the effectiveness of this methodology. It is assumed that 95 percent (or more) of the contaminant inventories in these structures can be removed and segregated in relatively small volumes of decontamination waste.

2.3 EQUIPMENT CONCEPTS

2.3.1 Applications of Hydraulic Excavators with Shielded Cabs and Demolition Implements

The use of hydraulic excavators (Caterpillar 375 or equivalent) with heavily shielded cabs to perform the more hazardous and difficult aspects of tank demolition was proposed in the tank removal study (SESC 1997). In this study, it was determined that this type of equipment is also very well suited for demolition of ancillary equipment. For tank removal, two excavators are required to work in tandem to perform certain tasks (sidewall and base slab demolition). For demolition and removal of ancillary equipment, there are situations (notably removal of piping and demolition of encasements and pier supports) that would require the collaborative efforts of three excavators to do the work efficiently. A grapple implement is also recommended to support the current work scope, that provides a specialized capability for one of the excavators to be able to pick up and load out cut lengths of piping. The cost estimate for this alternative includes procurement costs for this additional equipment (refer to Work Breakdown Structure [WBS] 210000 in Appendix F).

2.3.2 Vacuum/Scabbling Equipment

A new equipment concept developed during the present study is a combination vacuum and scabbling system that would be used for initial decontamination of heavily contaminated pits and boxes prior to demolition. The scabbler will be equipped with three to five hammers mounted on a rotating spindle. The rotating assembly will be surrounded by a shroud with a vacuum pickup. A number of low-volume, high-pressure air nozzles will be mounted inside the shroud. The shroud itself will be constructed of stainless steel with rubber skirting. Air from the nozzles will lift scabbler debris away from the surface and direct it toward the vacuum pickup. Little (if any) dust or debris is expected to be released from the shroud because of the overall negative differential. The scabbler will be powered by an air compressor that delivers 100 to 150 ft^3/min, depending on the number of hammers mounted on the scabbler. The vacuum system will draw 250 ft^3/min, and will be powered by a 5-kW generator. Debris will be removed through a two inch vacuum line and collected in a debris-containment canister with appropriate exhaust air filtration.

This system will be mounted on and operated by a Caterpillar 375 hydraulic excavator with a shielded cab. Video cameras will be mounted in suitable positions on the equipment to enable the operator to view the work surface so that he can control the scabbling operation effectively. The air compressor, generator, and debris containment components of the vacuum/scabbling system will be towed behind the excavator on a small trailer. The system described above utilizes modified L5 or L7 scabblers manufactured by Clean Air Products Technology, Inc. of Alameda, California. It is anticipated that approximately 1/4 in. of surface concrete would have to be removed from the inside surfaces of pits and boxes to achieve a significant level of decontamination. It is assumed that 95 percent or more of residual contamination in pits and boxes can be removed and retained within relatively small volumes of decontamination waste with this concept.

2.3.3 L9000 Dirt Guzzler

This equipment is essentially a truck-mounted vacuum system that is powerful enough to be used to vacuum up coarse soil (sand and gravel). This type of equipment is currently used at Hanford for shallow excavation work in situations that would otherwise require hand excavation because of the danger of rupturing contaminated piping or buried utilities. At an early stage in this study, this equipment was viewed as having a wide variety of potential applications in excavating and removing ancillary equipment. However, since no particular radiological protection is provided for Guzzler operator, its role was limited. Its uses in Section 2.4 are generally limited to exposing small-diameter piping that must be removed during building demolition tasks.

2.4 DESCRIPTIONS OF PROPOSED METHODS FOR BUILDING DEMOLITION AND EXCAVATION/REMOVAL OF ANCILLARY EQUIPMENT

Methods are described in the following subsections for accomplishing each aspect of the scope of work for this remedial alternative. Topics are presented in the same order as they appear on the project schedule in Figure 2.1, which accompanies the data tables in Section 2.6.

2.4.1 Activities to Clear Footing Line for Construction of Enclosure Structure over Tanks

2.4.1.1 Demolition of Surplus Buildings.

2.4.1.1.1 Caissons/Deentrainer Facilities Associated with A-702. The deentrainer units are elements of the aging waste ventilation system, consisting of earth-filled caissons with deentrainer tanks. The original caisson contains two tanks (K1-5-1 and K1-5-2) and a seal pot. The seal pot received condensate drainage from the deentrainer tanks as well as process drainage from the exhaust fans and stack in A-702. The original caisson is a 20-ft diameter corrugated metal culvert section supported on a concrete footing ring at grade. The tanks are supported on separate pad footings below grade. The caisson is filled with soil for shielding. After some period of operation, Tank K1-5-2 was removed from service and replaced by Tank K1-5-2A housed in a separate caisson. The second caisson is similar to the first in construction, but smaller (7 ft high, 10 ft in diameter). There are three valve pits associated with the two caissons (refer to drawings H-2-62880, H-2-62883, H-2-62888, and H-2-90898).

The deentrainer tanks are believed to pose moderate worker exposure hazards. In consideration of the radiological issues involved, as much of the work as possible will be performed using Caterpillar 375 excavators with hydraulic demolition implements. For estimating purposes, It is assumed that the work will be performed by plant forces crews. Soil will be removed from either side of the caissons to expose the connecting vapor header piping. The vapor headers will be cut off and crimped shut. The corrugated steel culvert sections will be cut away and removed. An excavator with a 3-yd^3 bucket will scrape away the shielding soil to expose the deentrainer tanks and seal pot. Connecting piping will be severed so that the components can be handled separately.

Soil will be loaded into 20-ton roll-on/roll-off (RO/RO) containers (approximately 270 tons) and transported to ERDF for disposal. The three deentrainer tanks and seal pot will be loaded into burial boxes of appropriate sizes and sent to low-level burial grounds for disposal as radioactive mixed waste (approximately 150 ft^3). Other demolition waste (corrugated metal culvert, duct work, concrete debris from footings) will be disposed as low-level waste (LLW) (approximately 200 ft^3). Labor and waste disposal costs are summarized under WBS 311006 and 331006.

2.4.1.1.2. A-401 Condenser Building. The A-401 Condenser Building is a principal component of the aging waste ventilation system in East Area tank farms. Hot vapor was drawn off from the head space of tanks containing self-boiling waste. The vapor was routed to three condenser cells in the A-401 Building. Cooling water was circulated through the condenser units to chill the ventilation stream. Condensate from the condenser units was routed to Tank A-417. The condenser building is a 1,750-ft^2 reinforced concrete structure, consisting of (1) an operating gallery along the north side housing the cooling water distribution piping, (2) a central area with three isolated condenser cells, and (3) a hot pipe gallery along the south side containing the vent headers and condensate drains. The operating gallery was constructed with a fixed reinforced concrete roof. Other portions of the building were outfitted with removable cover blocks. Exterior walls are 1-ft thick. Interior walls are thicker to support the cover block loads. The building is earth sheltered on the east, south, and west sides (refer to drawings H-2-56781, H-2-56811, and H-2-57285).

Site-specific information is unavailable regarding activity levels or potential worker exposure rates inside the hot pipe gallery. However, the inventory estimates in Appendix B of this report indicate that dose rates could be as high as 600 mrem/hr based on the projected contents in piping. In consideration of this potential, as much of the demolition work as possible will be performed using hydraulic excavators with heavily shielded cabs carrying hydraulic demolition implements.

Demolition work will be initiated by removing the 42 cover blocks from the condenser cells and 10 cover blocks from the hot pipe gallery. The shielding soil will then be removed from the south side of the building and the south-facing wall will be demolished to gain access to the hot-pipe gallery. Vapor headers and other accessible piping will be cut into manageable lengths with a hydraulic shear implement and loaded into shielded boxes. After removing all accessible hot piping, interior walls of the building will be demolished to expose the three condenser units.

Each condenser unit is supported on a steel-frame structure (i.e., a cradle) as shown on drawing H-2-56811. A hydraulic shear will be used to cut and crimp all connecting piping to the condensers, and to release them from the frame supports if necessary. The drawing does not show the condensers to be equipped with any lifting eyes or lugs. Therefore, the estimate for this activity includes time for riggers to assist with hoisting the condensers out of the cells and into burial boxes. The aggregate volume of condensers and related piping that will be loaded into burial boxes is approximately 3,320 ft^3. For estimating purposes, it is assumed that demolition of the A-401 Building would be done by plant forces crews and that all hot piping components would be disposed as radioactive mixed waste. Cranes will be government-owned equipment.

After all hot piping components have been removed from the building, the remaining "cold" piping will be dismantled and the remainder of the reinforced concrete structure will be demolished, again using demolition implements mounted on a Caterpillar 375 hydraulic excavator. Debris (approximately 700 tons) will be loaded into 20-ton RO/RO containers with a Caterpillar 988 front-end loader. Demolition waste in containers will be transported to ERDF for disposal. Labor and waste disposal costs are summarized under WBS 311007 and 331007.

2.4.1.1.3. A-701 Compressor Building. The A-701 Compressor Building is a pre-engineered metal building erected on a prepared foundation and floor slab. The building measures 20 ft by 33 ft in plan, and 10 ft high at the eaves. Support pads and anchors were cast into the floor slab for four large compressor units. For this study, the following assumptions were made: (1) the compressor units have been salvaged, (2) the building is not contaminated, and (3) the demolition work will be determined by a fixed-price contractor. Essential details of the building are shown on drawing H-2-56343.

The metal building shell can be dismantled by a contractor's crew in a day. The stem walls and the thinner portions of the floor slab can also be rubblized with minimal effort. However, the compressor pads will either have to be sectioned into smaller pieces with wire saws or fragmented with a large hydraulic breaker. Debris will be hauled to a municipal solid waste landfill (approximately 104 yd^3). Labor and waste disposal costs are summarized under WBS 321010 and 331010.

2.4.1.1.4. A-8 Sampler Pits. The sampler pits are temporary holding facilities for excess cooling water. Water was sampled for radionuclides prior to being discharged to one of several liquid disposal sites. The A-8 facility consists of three adjoining cells, two sampler pits, and a control structure. The three cells are all of reinforced concrete construction. The two sampler pits have reinforced concrete roof decks. The control structure is enclosed by three removable concrete cover blocks.

For estimating purposes, it is assumed that the sampler pits are lightly contaminated, and would be demolished by plant forces crews. The total amount of concrete (in place) to be demolished is 1,825 ft^3. Approximately 30 lineal ft of associated ventilation duct work and 20 ft^3 of metal hardware (sluice gates, stems, stands, handwheels, handrails, etc.) also will be removed. Piping connections will be cut and capped (no below-grade piping will be grouted or removed as part of this scope of work).

The facility will be demolished using hydraulic demolition implements mounted on a Caterpillar 375 hydraulic excavator. Debris (approximately 137 tons) will be loaded into 20-ton RO/RO containers with a Caterpillar 988 front-end loader. Demolition waste will be transported to ERDF for disposal. Labor and waste disposal costs are summarized under WBS 311011 and 331011.

2.4.1.2 Cut and Seal Off Piping Bundles Along East and West Sides of Enclosure Structure. The stressed arch (STRARCH) trusses that will form the skeleton of the enclosure structure over the tank removal excavation will be supported on individual column footings. The column footings will be positioned on the east and west perimeter lines of the building. The column footings will be joined by a continuous grade beam. A preliminary evaluation indicates that the column footings will have dimensions of approximately 12.5 ft by 12.5 ft (plan) by 2.5 ft thick, and should be constructed in excavations approximately 3.5 ft below grade. As the STRARCH structure is presently conceptualized, there will be no significant column loads applied to footings along the north and south perimeter lines.

Shallow buried piping bundles on the east and west sides will have to be excavated, cut, crimped, and sealed off at locations where they would physically interfere with footing construction for the tank removal enclosure structure. The following piping groups enter the AX tank removal excavation area along the west perimeter of the enclosure structure:

- Group 4
- Group 5
- Group 6
- Group 7
- Group 16A
- Group 16B
- Group 16C.

One other buried pipe is known to intersect the area along the east perimeter line. This is a cooling water line (not shown on the ancillary equipment drawing) that was cut and capped (i.e., abandoned) at the time the closed-loop cooling system for the A-401 Condenser Building was constructed. This line exits the enclosure structure footprint in the vicinity of the warm water sump (i.e., near the southeast corner of the area). Altogether, eight separate trench excavations will be required to cut and seal off piping around the perimeter of the enclosure structure.

Along the west side, there is a 30-ft margin between the edge of the tank removal excavation and the footing line for the enclosure structure. All contaminated piping within this 30-ft strip and an additional 20 ft outside the footing line will be excavated and removed. For estimating purposes, it is assumed that the one trench on the east side would also be 50 ft long.

Two of the piping bundles on the west side of the AX tank excavation area, Groups 4 and 6, are encased. It will be necessary to excavate to a depth of 20 ft to expose these encasements and remove the designated lengths of piping. Cover soil will be stripped away from the encasement covers and loaded into 20-ton RO/RO containers using a Caterpillar 375 hydraulic excavator. Cover slabs will either be lifted off (if practical) or demolished with a hydraulic impact breaker mounted on a Caterpillar 375 hydraulic excavator. After piping has been exposed, cut, and lifted out, the impact breaker will be used to demolish the remaining concrete sides and floor of the encasements to the extent necessary to facilitate construction of the new footings for the tank removal enclosure structure.

Other trenches with direct-buried piping should not require excavating to depths greater than about 6 ft. Collectively, it is estimated that approximately 4,800 tons of soil will be excavated from the eight trenches, 24 yd^3 of concrete rubble will be generated, and 880 ft^3 of contaminated piping will be loaded into shielded boxes. Soil will be transported to ERDF for disposal. Contaminated pipe in shielded containers will be transferred to a pre-processing facility co-located with the TWRS waste vitrification operation.

A La Bounty hydraulic shear implement mounted on a Caterpillar 375 excavator will be used to cut piping. Pipe ends on either side of the cut generally will be crimped shut by the shearing action of the implement. The initial cut will be made at the east end of the 50-ft long trench. After the initial cut has been made, piping will be cut apart in manageable lengths, (approximately 10 ft). Loose lengths of contaminated pipe will be picked up and placed into shielded boxes with a hydraulic-operated grapple (also mounted on a Caterpillar 375 excavator).

Additional lengths of piping will be exposed, cut off, and removed until the trench has been extended the full 50 ft.

The crimped end of pipe remaining in the ground to the outside the footing line will be encapsulated with concrete. The purposes of the concrete are (1) to shield the pipe end so that it does not contribute to worker exposures during subsequent footing construction for the enclosure structure, and (2) ensure that the pipe is sealed off so that residual free liquids cannot escape into the soil.

Estimates of equipment, labor, and materials for this activity are summarized under WBS 316003. Waste disposal costs are summarized under WBS 336003.

2.4.1.3 Regrade and Compact Surface Along Footing Line and Sanitary Drain Field on East Side. Activities to cut and seal off piping bundles along the east and west edges of the enclosure structure in advance of footing construction for the enclosure have been described in the preceding section (Section 2.4.1.2.). Trenching to expose the various piping bundles will result in the excavation and removal of approximately 4,800 tons of soil. Afterward, a significant portion of this soil volume will have to be replaced with clean fill. The exact volume of material to be replaced is unknown. For estimating purposes, it is assumed that 3/4 of the original quantity of soil removed (i.e., approximately 3,600 tons) will have to be replaced and compacted as load-bearing fill. As part of this activity, the sanitary drain field along the east perimeter of the site will be subjected to machine compacting. This drain field measures approximately 20 ft by 40 ft in plan. Labor and equipment costs for this task are summarized under WBS 316005.

2.4.1.4 Modifications to Enclosure Structure Layout and Dimensions. During the equipment inventory phase of this study, additional detail was accumulated regarding locations, functional histories, details of construction, and potential radiological issues associated with various ancillary equipment items supporting the AX Tank Farm. There is a concentration of surface and subsurface structures and equipment along an east-west alignment straddling the original south footing line for the enclosure structure over the tank excavation area (refer to Section 3.3.1 of SESC [1997]). These structures and equipment items are elements of the aging waste ventilation system, which supported a number of tank farms in the A-Farm complex, including A, AX, AY, and AZ farms.

Locations of the aging waste ventilation components are adverse to the enclosure structure layout as originally proposed for the following reasons:

- It is anticipated that several of the structures involved (i.e., the A-401 Condenser Building and the deentrainer caissons) contain radionuclide inventories that might require demolition work to be done inside an enclosure.

- The south perimeter footing line for the enclosure structure would directly overly two large-diameter, thin-wall (Schedule 10) ventilation ducts. These ducts are buried only a few feet below grade and would not support footing and/or equipment loads during construction of the enclosure structure.

To address these concerns, it was determined that the enclosure should be extended 50 ft to the south of the original footing line by addition of two STRARCH trusses on 25-ft centers. This change would increase the number of STRARCH trusses from 23 to 25. Extending the building would eliminate the need (and costs) to construct separate enclosures for demolition work on the aging waste ventilation facilities in the area and would also eliminate potential footing problems for the tank removal enclosure structure. WBS element 329001 in this study estimate addresses the modification to the enclosure structure cost (refer to Appendix B, WBS 320700, in SESC [1997]).

2.4.2 Demolition of Remaining Buildings Following Construction of Enclosure Structure

2.4.2.1 801-A and 801-B Instrument Buildings. The 801-A and B Instrument Buildings are pre-engineered metal buildings erected on slab-on-grade foundations. The buildings measure 16 ft by 25 ft in plan, and 10 ft high at the eaves. The two buildings contain piping and controls for flush water, instrument air, and process air to the four AX tanks. The process air controls regulated air flow to 22 airlift circulators in each of the four tanks. Piping is routed into each building through four 4-in. tubing conduits below grade. All piping inside the two buildings is small-diameter hard piping.

For estimating purposes, it is assumed that both buildings are lightly to moderately contaminated, and that demolition work will be done by plant forces crews. The amount of concrete (in place) in each building to be demolished is approximately 350 ft^3. Piping will be cut off at grade. Each of the metal building shells will be demolished using hydraulic demolition implements mounted on a Caterpillar 375 hydraulic excavator. Metal will be reduced in size to manageably small sections for disposal. Debris will be loaded into 20-ton RO/RO containers by a Caterpillar 988 front-end loader. Piping will be sectioned into manageable lengths and loaded into containers with other building debris. It is expected that four 20-ton containers of waste will be generated from each building. Demolition waste will be transported to ERDF for disposal. Labor and materials costs are summarized under WBS 311001 and 311002. Waste disposal costs are itemized under WBS 331001 and 331002. Essential details of the buildings are shown on drawing H-2-44740.

2.4.2.2 2707-AX Change House. The 2707-AX Change House is a pre-engineered metal building measuring approximately 12 ft by 30 ft (plan), with an eave height of 8 ft . The building was erected on a prepared foundation slab on grade. Architectural plans and sections are shown on drawing H-2-44603.

The structure is not expected to be contaminated. For estimating purposes, it is assumed that the building will be demolished by a fixed-price contractor's crew. The metal building shell can be dismantled in a day. Debris (approximately 46 yd^3) will be hauled to a municipal solid waste landfill. Labor and waste disposal costs are summarized under WBS 321003 and 331003.

2.4.2.3 Ion Exchange Column. The ion exchange column is situated approximately 25 ft northeast of Tank A-417. The design function of the column was to reduce the radiological inventory in Tank A-417 by stripping out ^{137}Cs. The column itself measures 2 ft in diameter by 12 ft long. It is surrounded by (1) a 5-ft-I.D. reinforced concrete pipe and (2) a 6.5-ft-diameter corrugated steel culvert pipe. The annulus between the two pipes is filled with concrete. The column is supported on a reinforced concrete pedestal measuring approximately 6.5 ft square (plan) by 10.7 ft high. The column was filled with zeolite, which has a high cation exchange capacity. According to general notes on drawings, the column was designed to have a maximum retention capacity of approximately 40 Ci of ^{137}Cs. The 9-in. thickness of concrete surrounding the column was designed to reduce external radiation to 20 mR/hr when the column was fully loaded. A filter unit (F-1) and a pig and sample cell assembly (RE-1) are functionally associated with the column. Details of construction of the column and related components are shown on drawings H-2-64770, H-2-64771, H-2-64772, and H-2-64774.

The current radiological inventory retained on the column is unknown. The understanding from discussions with Tank Farms Operations personnel is that the column is still loaded with zeolite although it was last used many years ago. For this study it will be assumed that the column contains approximately 40 Ci of ^{137}Cs and the column will have to be handled as Category 3 LLW. Similar waste designations will be assumed for the F-1 and RE-1 components.

All connecting piping between the column and Tank A-417 will be removed and disposed. To remove the column, a specially designed and fabricated disposal package will be positioned (hoisted) over the column. Holes will then be drilled through the package into the concrete (i.e., the shielding around the column) and the column will be rigidly secured inside the package with retaining lugs. A wire saw will be used to cut the column free from the support pedestal. After lifting the column away from the pedestal, end caps will be secured onto the package and the internal void volume will be filled with grout. Other components to be handled as Category 3 LLW will be placed in a second container and grouted in a similar manner for disposal.

Soil around connecting piping will be removed with an L9000 Dirt Guzzler. The soil and sections of piping will be loaded into 20-ton roll-off containers for disposal at ERDF. The remainder of the reinforced concrete pedestal will be demolished with hydraulic demolition implements mounted on a Caterpillar 375 excavator. Concrete rubble also will go to ERDF for disposal. In consideration of the radiological issues involved in the work, it is assumed that the work would be performed by plant forces. Labor and waste disposal costs are summarized under WBS 311004 and 331004.

2.4.2.4 A-702 Fan House/Filter Building. The A-702 Fan House (identified on some drawings as the A-702 Filter Building) is a pre-engineered metal building erected on a prepared slab on grade. The building is 24 ft by 36 ft in plan, with an eave height of 12 ft. The fan house received the chilled vapor stream from the A-401 Condenser Building. Inside A-702, the ventilation stream was split into six parallel branches, each of which passed through two high-efficiency particulate air (HEPA) filter elements. After the filtration step, the six branches were recombined and exhausted up the A-702 stack. For details of construction, refer to drawing H-2-62882 and H-2-62895.

For estimating purposes it is assumed that the fan house and contents are moderately contaminated, and would be demolished by plant forces crews. The estimated volume of concrete rubble is 20 yd^3 (or 40 tons). Another 3 tons of debris will be produced from demolition of the metal building shell. The building will be demolished using hydraulic demolition implements mounted on a Caterpillar 375 hydraulic excavator. Debris will be loaded into three 20-ton RO/RO containers by a Caterpillar 988 front-end loader. Demolition waste in roll-off containers will be transported to ERDF for disposal. Labor and waste disposal costs are summarized under WBS 311005 and 331005.

2.4.2.5 Cooling Tower, Cold Water Sump, and Warm Water Sump. These three structures are elements of a cooling water system that supported A-401 Condenser operations. This system provided a closed-loop capability for recycling condenser cooling water to/from A-401. The cooling tower measures 12 ft by 24 ft in plan, by 18 ft high. The two reinforced-concrete sumps are cube-shaped structures, approximately 11.5 ft on a side. The sumps and cooling tower are all assumed to be lightly contaminated. Details of the cooling water system are provided on H-2-57748 and H-2-57749.

The three structures will be demolished by plant forces crews using hydraulic demolition implements mounted on a Caterpillar 375 hydraulic excavator. It is expected that approximately 200 tons of rubble and debris will be generated. Debris will be loaded into ten 20-ton RO/RO containers by a Caterpillar 988 front-end loader . Demolition waste will be transported to ERDF for disposal. Labor and waste disposal costs are summarized under WBS 311008 and 331008.

2.4.3 Abandonment (Perforation and Grouting) of 51 Vadose and Groundwater Monitoring Wells

A comprehensive records search and site survey were undertaken to determine and verify the number and types of wells present within the tank removal excavation area, and their respective designations, locations, and details of construction. Well data for the site are summarized in Appendix C. Based on these assessments, it appears that a total of 51 wells exists on site. Of that number, 48 are vadose zone monitoring wells (i.e., dry wells) and three are *Resource Conservation and Recovery Act* (RCRA) groundwater monitoring wells.

In preparation for excavating and removing below-grade ancillary equipment and the four AX tanks, all vadose and groundwater wells within the footprint of the tank excavation will be perforated and filled with grout. This action will conform to the legal requirements for abandonment of resource protection wells in Washington Administrative Code (WAC) 173-160. Later, as well casings are exposed in the excavation, exposed segments can simply be cut off and removed without incurring any additional regulatory obligations.

Well casings will be perforated full length before being grouted. This procedure is intended to assure that a permanent seal is emplaced around the casing, eliminating the potential for the outside of the casing to act as a preferential pathway for water to move upward or downward in response to some future event. Nearly all of the 51 wells extend to depths below the invert elevation of the planned tank excavation. Depth information is unavailable for two vadose wells. For estimating purposes, depths of 100 ft were assumed for these wells. Wells will be grouted from the bottom up, using a tremie pipe and packer assembly. A 40-ton crane will be used to raise and lower the assembly during the grouting operation. A man-lift will be used to assist in removing sections of pipe from the tremie at 40-ft intervals as the work proceeds.

Grout will be mixed in an on-site batch plant and distributed to individual well locations through a flexible pumpline. The batch plant has been described in an earlier study (WHC 1996; p. 2-7). Costs for grouting wells are summarized under WBS 312001. This report does not include recommendations regarding specific grout formulations for grouting wells or other ancillary equipment items. Grout cost information in WHC (1996) (Appendix E-2) was used to cost materials for this study.

The work will be performed in a subsurface (radiation) contamination area. Therefore, it was assumed that the grouting crew would be required to work in "whites." However, the work should be "clean" work insofar as well casings are not internally contaminated, the equipment used to perform the work should not become contaminated during use, and it is not envisioned that any regulated waste would be generated.

2.4.4 Excavation and Removal of Contaminated Piping, Encasements and Ventilation Components

2.4.4.1 Group 1 Piping. This group includes two large-diameter (18-in. and 24-in.) vapor headers and condensate drains of various sizes. The ventilation piping extends from the tee connection with the Group 2 (24" 0109-M9) vent header, through the large deentrainer caisson to the A-401 Condenser Building, back through the small deentrainer caisson, to the A-702 Fan House. The drains routed condensate that was drawn off from the vapor header stream at various points to Tank A-417.

Because the deentrainer caissons, the condenser building, and the fan house are above-grade structures that straddle the south edge of the tank removal excavation, they will be demolished. However, the piping in Group 1 lies entirely outside the footprint of the tank removal excavation and is all below grade except for small segments that will be removed with the structures. Therefore, consistent with study assumptions, Group 1 piping will not be excavated and removed as part of this scope of work. The intent is that it would be removed at a later date in conjunction with remediation of A Tank Farm.

2.4.4.2 Group 2 Piping. Piping in this group includes process waste lines to AX, AY, and AZ Tank Farms, the vapor header trunk (24" 0109-M9) that connects all the farms north of A Tank Farm to the aging waste ventilation facilities, condensate drains, and other non-contaminated, small-diameter piping. The original four-in. diameter process waste lines are routed through a concrete encasement. Additional process waste lines (three-in. diameter) were routed through a sheet-metal enclosure that was attached to the cover slabs over the encasement. The vent header overlies and is supported by the encasement. Other small-diameter piping in this group is direct buried above and to the side of the original encasement (refer to H-2-44646). North and east of AX-152 Diverter Station, an extension of the Group 2 encasement carries process waste lines and condensate drains from AX Tank Farm to AY-501 Valve Pit.

Extensive portions of the Group 2 encasement that were constructed over fill are supported on piers. From N41680.0 (centerline of AX-152), the encasement is supported in this manner for a distance of 124 ft to the south and another 35 ft to the north (refer to drawings H-2-44587, H-2-44588, H-2-44592, and H-2-44597).

The overall length of Group 2 piping is approximately 240 ft. The invert of the encasement was constructed approximately 20 ft below final grade. To fully expose all piping elements in this group, a trench will have to be excavated measuring some 20 ft deep, 8 ft wide at invert, and 68 ft wide at grade. Subtracting the volume of the encasement (2,562 ft^3), these dimensions indicate that approximately 6,660 bank yd^3 of soil must be moved. Removal of Group 2 piping will be conducted in a south-to-north direction. Since process waste piping in Group 2 drains to the north, working in this direction will minimize releases of any residual free liquids in those lines.

The following generalized procedure will be implemented to expose and remove piping and demolish the concrete encasement:

1. Soil will be stripped away to expose the vent header. Excavation will be performed by a Caterpillar 375 excavator with a 3-yd^3 bucket. Soil will be loaded into 20-ton RO/RO containers.

2. Exposed lengths of vent header will be flattened and then cut off in manageable lengths (approximately 10 ft) by a second Caterpillar 375 excavator with a hydraulic shear implement mounted in place of the bucket.

3. Additional soil will be removed to widen the trench and to expose the cover of the concrete encasement.

4. Direct-buried piping exposed in the excavation will be sheared off in manageable lengths. The sheet-metal enclosure attached to the top of the encasement will be ripped away with the excavator bucket. Sheet metal will be cut into manageable pieces and loaded into 20-ton RO/RO containers with soil. Process waste piping will be cut into lengths and loaded into shielded boxes using the grapple. Non-contaminated piping will be picked up with a grapple implement mounted on a Caterpillar 375 excavator and loaded into 20-ton RO/RO containers with soil.

5. The work outlined in steps 1-4 above will be extended until the cover of the encasement has been exposed over the entire 240-ft length.

6. Resuming work at the south end of the encasement, cover slabs will be broken up with a hydraulic impact breaker mounted on a Caterpillar 375 excavator.

7. Exposed process waste piping will be cut into manageable lengths with a hydraulic shear and loaded into shielded boxes with a grapple implement.

8. The sides and floor of the encasement will be broken up with assorted hydraulic demolition implements (impact breaker, concrete pulverizer, and shear) mounted on Caterpillar 375 excavators.

9. Concrete debris will be loaded into 20-ton RO/RO containers with soil.

The in-place volume of reinforced concrete in the encasement is approximately 1,980 ft^3. Approximately 160 ft^3 of contaminated piping would be removed from Group 2 and loaded into shielded boxes. Shielded boxes will be transported to a pre-processing facility co-located with the TWRS waste vitrification plant.

Costs for removal of Group 2 piping are summarized under WBS 316004. The pier foundations supporting portions of the encasement will not be excavated and demolished as part of this task. Demolition of pier foundations is addressed under WBS 319002.

2.4.4.3 Group 3 Piping. This bundle enters the tank excavation area at the southwest corner and connects to AX-A and AX-B Valve Pits. The two-inch and three-inch process waste lines in this group are pipe-in-pipe, direct buried lines that are currently used to make waste transfers between double-shell tanks in various 200-East Area farms. The steam and steam condensate lines in this group are non-contaminated piping routed to the service pit supporting AX-A and AX-B. One line in this group is a new three-inch process waste line that will be constructed as part of the scope of Project W-314.

From the perimeter of the tank removal excavation to the northwest corner of AX-A valve pit, the length of the Group 3 piping bundle is approximately 240 ft. For estimating purposes, it is assumed that a trench will be excavated measuring 4 ft deep, 5 ft wide at invert, and 17 ft wide at grade. This excavation will require removal of approximately 390 bank yd^3 of soil. Removal of Group 3 piping will be done in a south-to-north direction to minimize releases of residual free liquids.

Because Group 3 piping is direct buried and non-encased, the procedure for excavation and removal is more straightforward than the one described above for Group 2. The generalized procedure in this case is as follows:

1. Soil will be stripped away to expose the piping bundle. Excavation will be performed by a Caterpillar 375 excavator with a 3-yd^3 bucket. Soil will be loaded into 20-ton RO/RO containers.

2. Exposed piping will be cut into manageable lengths with a hydraulic shear. Loose lengths of pipe will be picked up with a grapple implement mounted on a Caterpillar 375 excavator. Non-contaminated piping will be loaded into 20-ton RO/RO containers with soil. Contaminated (i.e., process waste) piping will be loaded into shielded boxes.

Approximately 98 ft^3 of contaminated piping will be removed from Group 3 and loaded into shielded boxes. Shielded boxes will be transported to a pre-processing facility co-located with the TWRS waste vitrification plant. Costs for removal of Group 3 piping are summarized under WBS 316004.

2.4.4.4 Group 4 Piping. Group 4 piping includes two four-inch process waste lines inside a concrete encasement, two three-inch process waste lines in a sheet-metal enclosure anchored to the cover slabs over the encasement, and a three-inch direct-buried sanitary water line on a parallel alignment offset approximately 10 ft to the north. At the east end of Group 4, the encasement makes a 90-degree bend, at which point it is designated as the south end of Group 2.

The overall length of Group 4 piping inside the footprint of the tank removal excavation is approximately 75 ft. The invert of the encasement was constructed approximately 20 ft below final grade. To fully expose all piping elements in this group, a trench will have to be excavated measuring approximately 20 ft deep, 8 ft wide at invert, and 68 ft wide at grade. Excluding the volume of the encasement (478 ft^3), it is estimated that approximately 2,100 bank yd^3 of soil will have to be removed. Removal of Group 4 piping will be done in a west-to-east direction.

The following generalized procedure will be used to remove Group 4 piping:

1. Soil will be stripped away to expose the cover slabs of the encasement. Excavation will be done with a Caterpillar 375 excavator with a 3-yd^3 bucket. Soil will be loaded into 20-ton RO/RO containers.

2. The sheet-metal enclosure attached to the top of the encasement will be ripped away with the excavator bucket. Sheet metal will be cut into manageable pieces and loaded into 20-ton RO/RO containers with soil. Exposed process waste piping will be cut into lengths with a hydraulic shear and loaded into shielded boxes with the grapple.

3. The work outlined in steps 1 and 2 will be extended until the cover of the encasement has been exposed over the entire 75-ft length.

4. The cover slabs of the encasement will be broken up with a hydraulic impact breaker mounted on a Caterpillar 375 excavator.

5. Process waste piping will be cut into manageable lengths as before and loaded into shielded boxes with the grapple.

6. The sides and floor of the encasement will be broken up with assorted hydraulic demolition implements (impact breaker, concrete pulverizer, and shear) mounted on Caterpillar 375 excavators.

7. Concrete debris will be loaded into 20-ton RO/RO containers with soil.

The in-place volume of reinforced concrete in the encasement is approximately 380 ft^3. As it is exposed in the excavation, the sanitary water line will be cut up and loaded out with cover soil. Approximately 27 ft^3 of contaminated Group 4 piping will be removed and loaded into shielded boxes. The shielded boxes will then be transported to a pre-processing facility co-located with the TWRS waste vitrification plant. Costs for removal of Group 4 piping are summarized under WBS 316004.

2.4.4.5 Group 5 Piping. This group includes one existing two-inch line and one new three-inch line that will be constructed as part of the scope of Project W-314. Both are direct-buried, pipe-in-pipe lines that support waste transfers between AY Tank Farm and AX-B Valve Pit.

Within the perimeter of the tank removal excavation, the length of the Group 5 piping bundle is approximately 120 ft. For estimating purposes, it is assumed that a trench will be excavated to expose piping measuring 4 ft deep, 5 ft wide at invert, and 17 ft wide at grade. Approximately 200 bank yd^3 of soil will be removed. Group 5 piping will be removed in a west-to-east direction to minimize releases of residual free liquids. The generalized procedure for Group 5 piping removal is as follows:

1. Soil will be stripped away to expose the piping bundle. Excavation will be performed by a Caterpillar 375 excavator with a 3-yd^3 bucket. Soil will be loaded into 20-ton RO/RO containers.

2. Exposed piping will be cut into manageable lengths with a hydraulic shear. Loose lengths of pipe will be picked up with a grapple mounted on a Caterpillar 375 excavator and loaded into shielded boxes.

Approximately 12 ft^3 of contaminated piping would be removed from Group 5. Shielded boxes will be transported to a pre-processing facility co-located with the TWRS waste vitrification plant. Costs for removal of Group 5 piping are summarized under WBS 316004.

2.4.4.6 Group 6 Piping. This group includes the original encased four-inch process waste lines from AX-152 Diverter Station to AY Tank Farm, the 24-in. 0100-M9 vapor header from AY Farm connecting to the area-wide aging waste ventilation system, one process waste line (variously two-inch and three-inch) that was installed some time after the original construction and is direct buried along the north side of the encasement, and a bundle of non-contaminated small-bore piping (instrument air, process air, and raw water) which is direct buried along the south side of the encasement.

Within the footprint of the tank removal excavation, the length of Group 6 piping is approximately 40 ft. Another 50 ft of this same bundle is to be removed as part of the cut/cap operation to clear the west footing line for construction of the enclosure structure (refer to WBS 316003). The invert of the encasement is approximately 20 ft below grade. For estimating purposes, it is assumed that a trench will be excavated measuring 20 ft deep, 10 ft wide at invert, and 70 ft wide at grade. Approximately 1,140 yd^3 of soil will be removed. Removal of Group 6 piping will be done in an east-to-west direction.

The following generalized procedure will be used in removal of Group 6 piping:

1. Soil will be stripped away to expose the vapor header. Excavation will be performed by a Caterpillar 375 excavator with a 3-yd^3 bucket. Soil will be loaded into 20-ton RO/RO containers.

2. Exposed lengths of vapor header will be flattened, then cut off in manageable lengths (approximately 10 ft) by a second Caterpillar 375 excavator with a hydraulic shear.

3. Additional soil will be removed to widen the trench and to expose the cover of the concrete encasement.

4. Direct-buried piping exposed in the excavation will be sheared off in manageable lengths. Non-contaminated piping will be loaded into 20-ton RO/RO containers with soil. Process waste piping will be loaded into shielded boxes.

5. The work outlined in steps 1-4 will be extended until the cover of the encasement has been exposed over the full 40-ft length.

6. The cover slabs of the encasement will be broken up with a hydraulic impact breaker mounted on a Caterpillar 375 excavator.

7. Process waste piping will be cut into manageable lengths as above and loaded into shielded boxes.

8. The sides and floor of the encasement will be broken up with assorted hydraulic demolition implements (impact breaker, concrete pulverizer, and shear) mounted on Caterpillar 375 excavators.

9. Concrete debris will be loaded into 20-ton RO/RO containers with soil.

The in-place volume of reinforced concrete in the encasement is about 700 ft^3. Approximately 29 ft^3 of contaminated piping will be removed and loaded into shielded boxes. Shielded boxes will be transported to a pre-processing facility co-located with the TWRS waste vitrification plant. Costs for removal of Group 6 piping are summarized under WBS 316004.

2.4.4.7 Group 7 Piping. This group consists of a single direct-buried, pipe-in-pipe process waste line that is involved in waste transfers to/from AX-155 Diversion Box. Within the perimeter of the tank removal excavation, the length of Group 7 piping is approximately 65 ft. For estimating purposes, it is assumed that a trench will be excavated measuring 4 ft deep, 5 ft wide at invert, and 17 ft wide at grade. Approximately 110 bank yd^3 of soil will be excavated. Group 7 piping will be removed in a west-to-east direction to minimize releases of residual free liquids.

The generalized procedure for excavation and removal of Group 7 piping is as follows:

1. Soil will be stripped away to expose the piping. Excavation will be performed by a Caterpillar 375 excavator with a 3-yd^3 bucket. Soil will be loaded into 20-ton RO/RO containers.

2. Exposed piping will be cut into manageable lengths with a hydraulic shear. Loose lengths of pipe will be picked up with a grapple and loaded into shielded boxes.

Approximately 8 ft^3 of contaminated piping will be removed. Shielded boxes will be transported to a pre-processing facility co-located with the TWRS waste vitrification plant. Costs for removal of Group 7 piping are summarized under WBS 316004.

2.4.4.8 Group 8 Piping. The piping in this group is utilized in transfers between AY-152 Sluice Pit and AZ-152 Sluice Transfer Box. Other segments of this piping are included in Group 16. The Group 8 piping alignment is outside the perimeter for the tank removal excavation but inside the perimeter of the tank removal enclosure structure. The planning basis is that Group 8 piping would be removed as part of remediation of AY and AZ Tank Farms. No Group 8 piping will be removed as part of the current scope of work.

2.4.4.9 Group 9 Piping. This group includes both encased and direct-buried piping. The Group 9 encasement turns off to the north from the Group 6 encasement about 35 ft west of the AX-152 Diverter Station. Encased Group 9 piping includes the original six process waste lines to AZ

Tank Farm. Of the six, two lines (4510 and 4511) connect directly to Tank AZ-102 and are encased over their full length. The other four lines exit the encasement at N41786.33, at which point they are direct-buried, pipe-in-pipe lines. Two lines (4509 and 4512) are capped near the point where they leave the encasement. The other two lines (4507 and 4508) connect to Tank AZ-101. The direct-buried lengths of 4507 and 4508 are included in the equipment inventory (Appendix A) under Group 11. Another, smaller (two-inch) process waste line (4551), which is direct buried along the west side of the Group 9 encasement, terminates in a valve pit at N41788. Group 9 also includes V-719 (which extends north from AX-155 Diversion Box to AZ Tank Farm parallel to the encasement but offset to the east approximately 10 ft) and V-713, a three-inch drain line from AX-155 to the AX-152 Diverter Station sump.

Group 9 includes approximately 200 ft of encasement within the perimeter of the tank removal excavation. The invert of the encasement is approximately 20 ft below grade. For estimating purposes, it is assumed that a trench will have to be excavated measuring approximately 20 ft deep, 10 ft wide at invert, and 70 ft wide at grade. Direct-buried piping will be exposed along the east and west sides of the encasement. Taking into account the volume of the encasement, approximately 5,630 bank yd^3 of soil will have to be removed. Excavation and removal of Group 9 piping will be performed in a south-to-north direction. The following generalized procedure will be used:

1. Soil will be stripped away to expose the cover of the concrete encasement. Excavation will be done with a Caterpillar 375 excavator with a 3-yd^3 bucket. Soil will be loaded into 20-ton RO/RO containers.

2. The two-inch and three-inch direct-buried process waste piping exposed in the excavation will be sheared off in manageable lengths and loaded into shielded boxes using a grapple implement mounted on a Caterpillar 375 excavator.

3. The work outlined in steps 1-2 will be extended until the cover of the encasement has been exposed over the full 200-ft length.

4. Resuming work at the south end of the encasement, the cover slabs of the encasement will be broken up with a hydraulic impact breaker mounted on a Caterpillar 375 excavator.

5. Exposed process waste piping will be cut into manageable lengths with a hydraulic shear and loaded into shielded boxes with a grapple.

6. The sides and floor of the encasement will be broken up with assorted hydraulic demolition implements (impact breaker, concrete pulverizer, and shear) mounted on Caterpillar 375 excavators.

7. Concrete debris will be loaded into 20-ton RO/RO containers with soil.

The in-place volume of reinforced concrete making up the encasement is 1,592 ft^3. Approximately 146 ft^3 of contaminated piping will be removed from the encasement trench and loaded into shielded boxes. A separate excavation will be required to remove the three-inch drain line from AX-155 to AX-152. This trench will be approximately 130 ft long, 6 ft deep, and

6 ft wide at the bottom. Approximately 260 bank yd^3 of soil will have to be excavated. An additional 15 ft^3 of contaminated piping will be loaded out of this trench into shielded boxes. The shielded boxes will then be transported to a pre-processing facility co-located with the TWRS waste vitrification plant. Costs for removal of Group 9 piping are summarized under WBS 316004.

2.4.4.10 Group 10 Piping. This group includes piping inside an encasement, which extends from the Group 6 encasement at the west end of AX-152 Diverter Station north to AX-155 Diversion Box, and condensate drains from AY and AZ Tank Farms to AY-501 Condensate Valve Pit. The oldest 35-ft segment of the encasement, which was constructed over fill (see H-2-44697, Section E-E), is supported on piers. Part of the length of the vapor header (24" 0602-M9) between AX-152 and AZ Tank Farm was laid on top of the encasement; the segment north of AX-155 is direct buried.

The encasement was constructed in three separate sections. The overall length is approximately 80 ft. The encasement and the enclosed process waste lines slope toward the south. The invert of the encasement is approximately 20 ft below grade. To expose the encasement, a trench will have to be excavated measuring approximately 20 ft deep, 10 ft wide at invert, and 70 ft wide at grade. Reducing the volume of soil by the volume of the encasement (873 ft^3), it is estimated that approximately 2,340 bank yd^3 of soil will have to be excavated. Removal of encased piping in Group 10 will be done working from north to south.

The following generalized procedure will be implemented to expose and remove piping and demolish the concrete encasement:

1. Soil will be stripped away to expose the vapor header. Excavation will be performed by a Caterpillar 375 excavator with a 3-yd^3 bucket. Soil will be loaded into 20-ton RO/RO containers.

2. Exposed lengths of vapor header will be flattened and then cut off in manageable lengths (approximately 10 ft) by a second Caterpillar 375 excavator with a hydraulic shear. Vent header segments will be loaded into shielded boxes.

3. Additional soil will be removed to widen the trench and to expose the cover slabs of the concrete encasement.

4. The work outlined in steps 1-3 will be extended until the cover of the encasement has been exposed over the entire 80-ft length.

5. The cover slabs of the encasement will be broken up with a hydraulic impact breaker mounted on a Caterpillar 375 excavator.

6. Exposed process waste piping will be cut into manageable lengths with a hydraulic shear and loaded into shielded boxes with a grapple.

7. The sides and floor of the encasement will be broken up with assorted hydraulic demolition implements (impact breaker, concrete pulverizer, and shear) mounted on Caterpillar 375 excavators.

8. Concrete debris will be loaded into 20-ton RO/RO containers with soil.

The in-place volume of reinforced concrete in the encasement is approximately 820 ft^3. Approximately 36 ft^3 of contaminated piping will be removed from the encasement and loaded into shielded boxes. Shielded boxes will be transported to a pre-processing facility co-located with the TWRS waste vitrification plant.

An additional 100 ft of vapor header piping north of AX-155 must be excavated beyond the encasement-supported length. Approximately 16 ft of cover soil must be removed to expose the header. If the trench is 6 ft wide at the bottom and 54 ft wide at grade, then approximately 1,780 bank yd^3 of soil will have to be excavated. Excavation will be done with a Caterpillar 375 excavator with a 3-yd^3 bucket. Exposed lengths of the vapor header will be flattened, then cut into manageable lengths by a second Caterpillar 375 excavator with a hydraulic shear and loaded into shielded boxes.

Group 10 includes two, two-inch condensate drains to AY Tank Farm and another two, two-inch condensate drains to AZ Tank Farm from AY-501 Condensate Valve Pit. The lengths of these lines inside the footprint of the tank removal excavation are approximately 60 ft and 150 ft respectively. Both bundles are direct buried about 10 ft below grade. Assuming a trench width of 6 ft at invert and 36 ft at grade, approximately 1,630 bank yd^3 of soil will have to be excavated to access and remove this piping. About 13 ft^3 of contaminated piping will be cut apart and loaded into shielded boxes. Trenching should be performed from east to west and south to north to minimize losses of any residual free liquid. Costs for removal of Group 10 piping are summarized under WBS 316004. Demolition of the pier foundations supporting portions of the encasement is not addressed as part of this task (refer to WBS 319002).

2.4.4.11 Group 11 Piping. This group consists of two four-inch process waste lines that leave the Group 9 encasement at N41786.33 and extend to Tank AZ-101. These are direct-buried pipe-in-pipe lines. The overall length of this bundle inside the tank excavation area is approximately 430 ft. Over most of this length, the two lines appear to be covered by about 20 ft of soil. For estimating purposes, it is assumed the excavation will measure 6 ft wide at invert and 66 ft wide at grade. Based on these dimensions, approximately 11,470 bank yd^3 of soil will have to be removed. Removal of Group 11 piping will be done in a west-to-east and south-to-north direction to minimize releases of residual free liquids.

The generalized procedure for excavation and removal of Group 11 piping is as follows:

1. Soil will be stripped away to expose the piping bundle. Excavation will be performed by a Caterpillar 375 excavator with a 3-yd^3 bucket. Soil will be loaded into 20-ton RO/RO containers.

2. Exposed piping will be cut into manageable lengths with a hydraulic shear. Loose lengths of pipe will be picked up with a grapple mounted on a Caterpillar 375 excavator and loaded into shielded boxes.

Approximately 99 ft^3 of contaminated piping will be removed from Group 11. Shielded boxes will be transported to a pre-processing facility co-located with the TWRS waste vitrification plant. Costs for removal of Group 11 piping are summarized under WBS 316004.

2.4.4.12 Group 12 Piping. Group 12 includes two, two-inch direct-buried lines that are utilized in waste transfers between AX-A and AX-B Valve Pits and AZ Tank Farm. An additional three-inch line is to be constructed as part of the scope of work of Project W-314. The overall length of this bundle inside the AX tank excavation area is approximately 350 ft. These lines are thought to be covered by about 10 ft of soil. Assuming the trench excavation will be approximately 10 ft wide at invert and 40 ft wide at grade, the amount of soil to be excavated is 3,240 bank yd^3. Approximately 45 ft^3 of contaminated piping will be cut into manageable lengths and loaded into shielded boxes. Shielded boxes will be transported to a pre-processing facility co-located with the TWRS waste vitrification plant. Costs for removal of Group 12 piping are summarized under WBS 316004.

2.4.4.13 Group 13 Piping. Group 13 consists of a single direct-buried process waste line used to make transfers between AX-B Valve Pit and AN Tank Farm. This line is routed around the south and east sides of AX Tank Farm. The length inside the tank excavation area is approximately 620 ft. An average depth of burial of 15 ft is assumed. If the trench excavation to expose and remove the line is 6 ft wide at invert and 51 ft wide at grade, then approximately 9,820 bank yd^3 of soil will have to be moved. Soil will be loaded into 20-ton RO/RO containers. Process waste piping will be cut into manageable lengths with a hydraulic shear and loaded into shielded boxes with a grapple. Shielded boxes will be transported to a pre-processing facility co-located with the TWRS waste vitrification plant. Costs for removal of Group 13 piping are summarized under WBS 316004.

2.4.4.14 Group 14 Piping. The only pipe in Group 14 is a buried eight-inch raw water line that is laid parallel to Canton Avenue, offset to the west of the road about 25 ft. Since this line is not contaminated, it will be excavated, cut up and removed with cover soil. No cost is shown under WBS 316004 for removing this piping.

2.4.4.15 Group 15 Piping. This group consists of two drain lines that have been used at various times to route condensate from steam coils in Tank AX-101 to Tank A-417. After only a few years of use, the original 1.5-inch line was abandoned in place and replaced by a four-inch line as shown on drawing H-2-34266. The two pipes follow the same alignment, and are covered by approximately 3.5 ft of soil. This bundle is laid out along the east and south sides of AX Tank Farm and has an overall length of approximately 450 ft. Assuming a trench 4 ft deep, 5 ft wide at invert, and 17 ft wide at grade will be excavated to expose the two lines, approximately 730 bank yd^3 of soil will have to be removed. Soil will be loaded into 20-ton RO/RO containers. Some 59 ft^3 of contaminated piping will be cut into manageable lengths with a hydraulic shear and loaded into shielded boxes with a grapple implement. The shielded boxes will then be transported to a pre-processing facility co-located with the TWRS waste vitrification plant. Costs are summarized under WBS 316004.

2.4.4.16 Group 16 Piping. All of the piping included in Group 16 ties into AY-152 Sluice Transfer Box. Group 16 includes the sluice lines for AY Tank Farm, segments of the sluice lines to AZ Tank Farm (other segments are listed in Group 8), and the process waste transfer lines to/from 244-AR Vault. The sluice lines for AX Tank Farm also connect to AY-152, but they are listed under Group 17. All of the piping in Group 16 is direct-buried, pipe-in-pipe construction, in contrast to piping in Group 17 (which is all encased). A total of approximately 568 lineal ft of piping (including sections of 14 separate lines) will be removed. The aggregate length of Group 16 piping to be removed is relatively small, because the piping in this group extends toward the west from AY-152 and because AY-152 is situated near the perimeter of the tank removal excavation.

Two separate trench excavations will be required to remove the piping. The first, extending west and north from AY-152 to expose the AY sluice lines, will be approximately 40 ft long. These lines are buried under only about 3 to 4 ft of cover. However, the trench will have to be approximately 12 ft wide at invert to expose the entire bundle. Based on this information, approximately 110 bank yd^3 will have to be removed from the first excavation. The second trench, extending to the southwest from AY-152, will be approximately 60 ft long and about 6 ft deep. Assuming the trench is 5 ft wide at invert and 23 ft wide at grade, the quantity of soil to be excavated is approximately 190 bank yd^3. Approximately 136 ft^3 of contaminated piping will be generated. The pipe will be cut into manageable lengths with a hydraulic shear and loaded into shielded boxes. The shielded boxes will then be transported to a pre-processing facility co-located with the TWRS waste vitrification plant. Costs are summarized under WBS 316004.

2.4.4.17 Group 17 Piping. This group includes the sluice lines from AY-152 Sluice Transfer Pit to AX Tank Farm. The lines in this group are completely encased. The encasement is a complex, branching structure with piping connections to the 16 pump and sluice pits above the four AX tanks. The encasement cover slabs are slightly below grade. Approximately 780 bank yd^3 of soil will have to be removed to fully expose the encasement system. The volume of the encasement itself is about 550 yd^3.

The following generalized procedure will be used to remove encased Group 17 piping:

1. Soil removal will be initiated in the vicinity of AY-152 and proceed in the direction of the four AX tanks. Soil will be stripped away to expose the cover slabs of the concrete encasement. Excavation will be done with a Caterpillar 375 excavator equipped with a 3-yd^3 bucket. Soil will be loaded into 20-ton RO/RO containers.

2. Returning to the vicinity of AY-152, cover slabs of the encasement will be broken up with a hydraulic impact breaker mounted on a Caterpillar 375 excavator.

3. Process waste piping will be cut into manageable lengths with a hydraulic shear and loaded into shielded boxes with a grapple implement.

4. The sides and floor of the encasement will be broken up with assorted hydraulic demolition implements (impact breaker, concrete pulverizer, and shear) mounted on Caterpillar 375 excavators.

5. Concrete debris will be loaded into 20-ton RO/RO containers with soil.

The in-place volume of reinforced concrete making up the encasement is 10,330 ft^3. Inside the encasement, there is an estimated 792 ft^3 of contaminated piping to be cut up, removed, and loaded into shielded boxes. The shielded boxes will then be transported to a pre-processing facility co-located with the TWRS waste vitrification plant. Costs are summarized under WBS 316004.

2.4.4.18 Group 18 Piping. Piping in this group extends from AX-A and AX-B Valve Pits north and east into AX Tank Farm. The group includes a mixture of two-inch and three-inch diameter lines, all of which are direct-buried, pipe-in-pipe. Based on piping elevation data shown on drawings H-2-69241 and H-2-69244, it appears that piping in this group is only covered by about 2 to 3 ft of soil. Approximately 600 ft of shallow trenching will have to be done to expose the piping for removal. Assuming the excavations average about 8 ft in width, the amount of soil removed would be approximately 530 bank yd^3.

The generalized procedure for excavation and removal of Group 18 piping is as follows:

1. Soil will be stripped away to expose the piping bundle. Excavation will be performed by a Caterpillar 375 excavator with a 3-yd^3 bucket. Soil will be loaded into 20-ton RO/RO containers.

2. Exposed piping will be cut into manageable lengths with a hydraulic shear. Loose lengths of pipe will be picked up with a grapple implement mounted on a Caterpillar 375 excavator and loaded into shielded boxes.

Approximately 100 ft^3 of contaminated piping will be removed from Group 18. The shielded boxes will then be transported to a pre-processing facility co-located with the TWRS waste vitrification plant. Costs for removal of Group 18 piping are summarized under WBS 316004.

2.4.4.19 Group 19 Piping. The piping in Group 19 consists entirely of small-diameter (generally 1.5-inch) raw water lines that extend from valve pits situated around the perimeters of the four AX tanks to the various sluice and pump pits above the tanks. These lines distributed flush water to the pits during sluicing operations. Since none of these lines is contaminated, they will be excavated, cut up and removed with cover soil. No costs for removing Group 19 piping are shown in WBS 316004.

2.4.4.20 Group 20 Piping. This group originates at the east end of AX-152 Diverter Station and extends approximately 180 ft due east through the middle of AX Tank Farm with 90-degree elbows and short extensions to each of the four tanks. Group 20 includes the original process waste (fill and pump-out) lines to AX Tank Farm. The full length of Group 20 piping is encased. The encasement is supported on piers (refer to drawing H-2-44595). Group 20 includes the vapor headers that connect AX tanks to the aging waste ventilation system. Group 20 also includes a direct-buried bundle of non-contaminated, small-bore piping along the south side of the encasement. The encasement and the enclosed process waste lines slope toward the east. The invert of the encasement is approximately 20 ft below grade.

To expose the encasement, a trench will have to be excavated measuring some 20 ft deep, 10 ft wide at invert, and 70 ft wide at grade level. Approximately 5,150 bank yd^3 of soil will be excavated in the process (excluding the volume of the encasement which is 4,860 ft^3).

The following generalized procedure will be implemented to expose and remove piping and demolish the concrete encasement:

1. Soil will be stripped away to expose the vapor header. Excavation will be performed by a Caterpillar 375 excavator with a 3-yd^3 bucket. Soil will be loaded into 20-ton RO/RO containers.

2. Exposed lengths of vapor header will be flattened, then cut off in manageable lengths (approximately 10 ft) by a second Caterpillar 375 excavator with a hydraulic shear implement mounted in place of the bucket. Vapor header segments will be loaded into shielded boxes.

3. Additional soil will be removed to widen the trench and to expose the cover slabs of the concrete encasement.

4. The work outlined in steps 1-3 will be extended until the cover of the encasement has been exposed over the entire 180-ft length.

5. The cover slabs will be broken up with a hydraulic impact breaker mounted on a Caterpillar 375 excavator.

6. Process waste piping will be cut into manageable lengths with a hydraulic shear and loaded into shielded boxes with a grapple implement.

7. The sides and floor of the encasement will be broken up with assorted hydraulic demolition implements (impact breaker, concrete pulverizer, and shear) mounted on Caterpillar 375 excavators.

8. Concrete debris will be loaded into 20-ton RO/RO containers with soil.

The in-place volume of reinforced concrete comprising up the encasement is approximately 3,650 ft^3. Encased Group 20 piping will be removed in a west-to-east direction to minimize losses of any residual free liquid. Approximately 195 ft^3 of contaminated piping will be removed from the encasement and loaded into shielded boxes. The shielded boxes will then be transported to a pre-processing facility co-located with the TWRS waste vitrification plant. Non-contaminated, small-bore piping exposed in the sidewall of the excavation will be cut up and loaded into 20-ton RO/RO containers with the concrete debris and soil. Costs for removal of Group 20 piping are summarized under WBS 316004. The pier foundations supporting the encasement are not addressed as part of this task. Demolition of piers is considered separately under WBS 319002.

2.4.5 Demolition of Pits and Boxes

2.4.5.1 Leak Detection Pits. Each of the four AX tanks has a stand-alone leak detection system. Any liquid accumulating at the level of the base slab of the tank will drain to a leak detection sump outside the tank. A riser from the sump opens into a reinforced concrete pit on the surface that provides access for monitoring and/or pumping out of the sump as necessary. The leak detection pits are offset approximately 20 ft to the southwest of Tanks AX-101 and AX-103, and 20 ft to the northwest of Tanks AX-102 and AX-104.

The concrete pit portions of the leak detection systems will be demolished in the same time frame that cover soil is removed to expose the domes of the tanks. This WBS element addresses demolition of the concrete pits only. The lower portions of the leak detection systems (i.e., risers, sumps, and drainage piping) will be removed in conjunction with soil lateral to the tanks. Removal of the lower piping is considered in a separate WBS activity (319002).

The concrete pits, which were constructed with the upper surface at grade, consist of two adjoining compartments with cover blocks. The riser from the sump opens into the floor of the larger compartment, which is a pump pit. The pump pit has overall dimensions of 8 ft by 8 ft (plan) by 7.75 ft deep and has a single 2.5-ft- thick cover block. A monitoring well opens into the floor of the smaller compartment. The monitoring pit has overall dimensions of 2.75 ft by 5.5 ft (plan) by 2.25 ft deep, and has one 3-in.-thick cover slab. There is a floor drain in each compartment. The four-inch drain in the pump pit compartment is plumbed to a riser in the adjacent tank. The pump compartment also contains a positioning flange and an anchor plate for the pump. Any drainage originating within the monitoring compartment goes into a French drain beneath the compartment. The flanged end of the 6-in. monitoring well is positioned about six inches above the floor. Inside surfaces have been sealed with Amercoat #42. The present understanding is that the concrete pits contain no significant levels of radiological contamination. Piping and structural details are as shown on drawings H-2-44576, H-2-44577 and H-2-44578.

Before demolition work is initiated on the four pits, surrounding soil will be removed down to the level of the bottom of the concrete. The pits will be demolished using the concrete pulverizer and/or hydraulic impact breaker implements. The cover blocks will be lifted off and broken up, then the pits will be rubblized.

Based on the assessment that the concrete portions of these structures are not contaminated, concrete and metal waste will be loaded into the same 20-ton RO/RO containers and shipped to ERDF for disposal. A combined total of approximately 160 tons of concrete rubble will be generated from demolition of the four leak detection pits. The volume of metal waste produced is estimated to be about 20 ft^3. Costs for demolishing the four leak detection pits are summarized under WBS 314001.

2.4.5.2 Valve Pits, Jumper Pits, Diversion Boxes, and Associated Structures.

2.4.5.2.1 Removal of AX-A and AX-B Valve Pits. These structures are concrete boxes with overall dimensions of 12 ft by 14 ft (plan) by 7.5 ft deep. Each pit has two eight-inch-thick cover blocks for shielding. A jumper support bracket is bolted to the floor of each pit and each pit has a floor drain. A protective coating has been applied to the inside surfaces of each pit, however, neither pit has a metal liner. Each pit has 19 nozzle penetrations. They range in size from 1.5 to 3 in. in diameter. Each pit has eight spare nozzles capped on the outside wall. Piping and structural details are shown on drawings H-2-69150 and H-2-69244. Based on the inventory estimates provided in Appendix B, approximately 90 Curies of ^{137}Cs are expected to be present in AX-A; another 86 Curies of ^{137}Cs are expected to be present in AX-B.

In view of the unlined configuration and the relatively large potential radiological inventories involved, an initial decontamination procedure will be undertaken that is intended to (1) reduce worker exposures during subsequent demolition work, (2) achieve a reduced waste designation so that concrete demolition waste will be acceptable for disposal at ERDF, and (3) minimize the volumes of demolition waste with the highest treatment/disposal costs (i.e., waste that would have to be sent to the pre-processing facility co-located with the TWRS waste vitrification plant).

The generalized procedure for decontaminating AX-A and AX-B Valve Pits is as follows:

- Cover blocks will be lifted off.
- Loose residual solids will be vacuumed out and collected in containers using a combination HEPA vacuum/scabbler system mounted on a Caterpillar 375 excavator.
- The vacuum/scabbler system will be used to abrade and remove heavily contaminated concrete from the inside surface of the pit. For estimating purposes, it is assumed that a layer of concrete with an average thickness of 1/4-in. will be removed.
- Cover blocks will be replaced.

A combined surface area (walls and floor) of approximately 329 ft^2 must be decontaminated inside each pit. Assuming that a uniform 1/4-inch thickness of surface concrete is removed during decontamination, then approximately 17 ft^3 of debris would be generated. This material will be loaded into shielded boxes and sent to the pre-processing facility co-located with the TWRS waste vitrification plant.

Following the initial decontamination step, demolition work on the pits will be deferred for some time until all interconnecting piping and surrounding soil have been removed. Removal of contaminated piping, risers, and soil external to the pits are addressed under other WBS elements of this study.

Demolition of the AX-A and AX-B Valve Pits will be done with hydraulic demolition implements (hydraulic impact breaker, shear, and pulverizer) mounted on two Caterpillar 375 excavators. For the purpose of estimating worker exposures, it is assumed that decontamination (vacuuming and scabbling) will be at least 95 percent effective (doses will be reduced by a factor of 20). The cabs on the two excavators will be equipped with leaded glass windshields and steel plate shielding.

Concrete and metal waste will be segregated and loaded into separate containers. An estimated 76 tons of concrete rubble will be generated from demolition of the two pits. Based on the expected effectiveness of decontamination, it is assumed the concrete debris can be loaded into 20-ton RO/RO containers and shipped to ERDF for disposal. The estimated volume of metal waste is 118 ft^3. This material will be loaded into shielded boxes and sent to the pre-processing facility. Costs for decontaminating and demolishing the two pits are summarized in WBS 318001.

2.4.5.2.2 Removal of Flush and Service Pits Associated with AX-A and AX-B Valve Pits. The flush pits are constructed of 5-ft-diameter galvanized corrugated steel pipe sections approximately 5.6 ft in length standing vertically on hexagonal-shaped concrete slab foundations. The foundation slab is 5 ft 10 in. wide and 8 in. thick. Each pit has a galvanized steel cover.

Four small-diameter lines enter through penetrations in the sides of each flush pit, all of which have been capped off internally. A drain is located in the floor of each pit which has been plugged. Electrical penetrations have also been capped. All equipment has been removed from the pits and the interior volumes have been filled with sand. One steam line to each pit may be insulated with asbestos.

The service pit consists of a 5-ft-diameter galvanized corrugated steel pipe approximately 4.3 ft in length standing vertically on a hexagonal-shaped concrete slab foundation similar to the flush pits. The service pit also has a galvanized steel cover. The inside surface of the pit is lined with 3 in. of Armstrong ArmaFlex foamed plastic. There are five small-diameter lines and one electrical penetration into the pit. The pit has a floor drain. The pit contains a radiation detector, back-flow preventer, and miscellaneous piping (trap, strainer, etc.). Two steam lines may be insulated with asbestos. None of the three pits is understood to be radiologically contaminated.

Piping to the flush and service pits will be removed with the surrounding soil in advance of demolishing the pits. The culvert sections will be lifted out of place, cut apart and/or crushed flat. The culvert sections, covers, piping, and fittings will be loaded into 20-ton RO/RO containers with soil and other lightly contaminated debris and shipped to ERDF. The materials in each pit will be reduced to approximately 58 ft^3 of concrete rubble, 50 ft^3 of metal scrap, and 4 ft^3 of (presumed asbestos) insulation. Demolition costs are summarized under WBS 318002.

2.4.5.2.3 Removal of AX-152 Diverter Station. The AX-152 Diverter Station is a multi-level concrete box with overall dimensions of 37 ft by 9 ft (plan) by 30 ft deep. There are three compartments within the box: a diverter pit, a pump pit and a catch tank. The catch tank occupies the lower level of the box. This compartment measures 37 ft long by 9 ft wide by 12 ft deep. The tank compartment has a stainless steel liner. On the level above the catch tank there are two compartments built side-by-side. The diverter pit has interior dimensions of 15 ft long by 7 ft wide by 14.5 ft deep. This compartment also has a stainless steel liner. The pump pit has interior dimensions of 6 ft by 6 ft by 14 ft deep. The pump pit walls are coated with Amercoat #42. The 10-inch-thick floor of the upper two compartments forms the top of the catch tank. The upper compartments both have drains into the catch tank. There are five interlocking 5.7-ft -thick cover blocks over the diverter pit and three interlocking 5.7-ft-thick cover blocks over the pump pit providing shielding. A flush (spray ring) system is embedded in the walls of the diverter pit and pump pit. The catch tank also has a floor drain. There is a total of 53 penetrations into the diverter station. Internal equipment includes the pump and motor in the pump pit and the A and B diverter mechanisms in the diverter pit. According to information provided in Appendix B, approximately 146 Curies of ^{137}Cs are believed to be retained in this structure. Piping and structural details are shown on the following drawings: H-2-44580, H-2-44582, H-2-44681 (1 of 3), H-2-44681 (2 of 3), and H-2-44683.

Since two of the three compartments in the diverter station are equipped with metal liners, it should be possible to recover most of the radiological contamination with the liner sheets when the structure is demolished. Therefore, no separate effort is proposed to decontaminate portions of the structure in advance of demolition.

A large number of different waste lines and drains are routed to the diverter station, and many of these are in concrete encasements (i.e., piping Groups 2, 6, 10, and 20). There are a number of other structures in the immediate vicinity that will have to be demolished before work is initiated on AX-152 to alleviate potential access and interference problems. These items include: two manholes, a French drain, the valve box supporting AX-152 to the south, and the AX-153 isolation pit. Lead (i.e., potential lead waste) is present in inspection plugs and clean-out sleeves.

The diverter station will be one of the last ancillary equipment items to be demolished. Before demolition work on the diverter station is initiated, surrounding soil will have been removed down to the level of the foundations and all connecting piping bundles will have been cut off and crimped around the outside of the structure.

Demolition of the diverter station will be performed in the following sequence of steps.

- Remove the shield blocks covering the pump pit.
- Remove jumpers from the pump pit, then cut and crimp any remaining pipe connections to the pump.
- Remove the pump.
- Remove all remaining piping inside the pump pit.
- Replace the shield blocks over the pump pit.
- Cut off the diverter operator assemblies flush with the top of the shield blocks.
- Remove the shield blocks covering the diverter pit.
- Cut and crimp all pipe connections inside the diverter station and remove all connecting piping to the diverter mechanisms.
- Cut and remove the diverter operator assemblies.
- Detach the diverter tank supports.
- Remove the diverter tanks.
- Cut, crimp, and remove all remaining piping in the diverter cell.
- Begin demolition of the diverter pit walls down to the floor of the compartment using the concrete pulverizer and/or hydraulic impact breaker. The stainless steel liner will be bent inward and will become detached from the walls of the pit as concrete is pulverized.
- Remove embedded piping and rebar as they are exposed. Remove liner sheets as they are freed from the concrete.
- Remove the shield blocks from the pump pit and begin demolishing the walls of the pump pit down to the floor of the pump pit compartment using the concrete pulverizer and/or hydraulic impact breaker.

- Remove embedded piping and rebar as they become exposed.
- Demolish the concrete floor of the pump and diverter pits down to a point where piping penetrations into the catch tank near the ceiling level are exposed using the concrete pulverizer and/or hydraulic impact breaker.
- Cut, crimp, and remove all piping inside the catch tank compartment.
- Demolish the remaining portions of the catch tank, again using the concrete pulverizer and/or hydraulic impact breaker, removing and segregating embedded piping, rebar, and liner sheets.

Concrete and metal waste will be segregated and loaded into separate containers. Approximately 392 tons of concrete rubble will be generated from demolition of the diverter station. Based on the expected capability to separate the heavily contaminated metal liner from lightly contaminated concrete, it is assumed that concrete debris can be loaded into 20-ton RO/RO containers and shipped to ERDF for disposal. About 3 ft^3 of waste lead will be generated. The volume of other metal waste is estimated to be 878 ft^3. Metal waste (other than lead) will be loaded into shielded boxes and transferred to the pre-processing facility co-located with the TWRS waste vitrification plant. Costs for demolishing the AX-152 Diverter Station are summarized in WBS 318004.

2.4.5.2.4 Removal of Valve Box and Manholes Associated with AX-152 Diverter Station. The valve box is situated a few feet to the south of AX-152. Overall dimensions of the box are 7 ft by 4 ft (plan) by 6 ft 4 in. deep. The box has a concrete cover and a floor drain. The box has eight piping penetrations. The box contains approximately 4 ft of 1.5-inch pipe, 4 ft of two-inch pipe, and 6 ft of three-inch pipe. The understanding is that the box is not contaminated. Details of construction are shown on drawing H-2-44681.

Before demolition work is initiated on the valve box, surrounding soil will be removed down to the level of the bottom of the box and all external piping connections will be cut off and crimped around the outside of the structure. The pit will be demolished using the concrete pulverizer and/or hydraulic impact breaker implements. The cover will be lifted off and broken up. Piping inside the box will then be cut apart and removed. Finally, the box itself will be rubblized.

There are two manholes associated with the AX-152 Diverter Station. Each manhole consists of five, 4-ft-diameter concrete pipes in a vertical stack with a man-way adapter at the top (i.e., at grade). Both manholes have two piping penetrations and contain one two-inch valve and approximately 3 ft of two-inch pipe. Lolly columns are positioned around both manhole openings. Neither structure is contaminated. Details of construction are shown on drawings H-2-44620 and H-2-44626.

The man-way adapter and lolly columns will be lifted off and removed. Soil will be excavated away to expose sections of concrete pipe. Each concrete pipe section will be lifted away when it is fully exposed. External piping connections will be cut and crimped off. Inside piping will be cut apart and removed. After all sections of concrete pipe have been lifted out of position, they will be demolished with the pulverizer implement.

Based on the assessment that these structures are not contaminated, concrete and metal waste will be loaded into the same 20-ton RO/RO containers and shipped to ERDF for disposal. Approximately 16 tons of concrete rubble will be generated from demolition of the valve box and the two manholes. The volume of metal waste produced is estimated to be 30 ft^3. Costs for demolishing the pit are summarized in WBS 318005.

2.4.5.2.5 Removal of AY-152 Sluice Pit. The AY-152 Sluice Pit is situated roughly 75 ft to the southwest of the AX-152 Diverter Station. The pit is a reinforced concrete box with overall dimensions of 15.5 ft by 17 ft (plan) by 10 ft deep. Shielding is provided by four 2-ft-thick cover blocks. A flush system with eight 1.5-inch spray nozzles embedded in the walls of the box is supplied by a two-inch raw water line. The interior of the box has three coats of Amercoat #33.

The pit has 24 nozzle penetrations in the walls and two other nozzle penetrations in the floor. The 24 nozzles are laid out in a semicircular arrangement on two levels around the north half of the pit. There are 17 upper-level nozzles and seven on the lower level. The nozzles are all six inches in diameter. Two nozzles are spares capped on the outside surface of the pit. A drain is located in the floor. All jumpers have been removed. An estimated 900 Curies of ^{137}Cs remain in the pit according to information in Appendix B. Piping and structural details are shown on drawings H-2-64330 and H-2-64452.

Because of the pit's unlined configuration and the potential radiological inventory involved, an initial decontamination procedure will be undertaken. The procedure for decontamination will be the same as described in Section 2.4.5.2.1. The inside surface of the pit consists of multiple formed levels with surfaces that are variously flat and curved. The aggregate surface area (walls and floor) to be decontaminated is approximately 325 ft^2. Assuming that a uniform 1/4-in. thickness of surface concrete will be removed during decontamination, then approximately 17 ft^3 of debris will be generated. This material will be loaded into shielded boxes and sent to the pre-processing facility co-located with the TWRS waste vitrification plant.

Following the initial decontamination step, demolition work on the pit will be deferred until all interconnecting piping and surrounding soil have been removed. Removal of contaminated piping, risers and soil external to the pits are addressed under separate WBS elements of this study.

Demolition of the AY-152 Sluice Pit will be conducted with hydraulic demolition implements mounted on Caterpillar 375 excavators. Concrete and metal waste will be segregated and loaded into separate containers. An estimated 127 tons of concrete rubble will be generated from demolition of the pit. Based on the expected effectiveness of decontamination, it is assumed that the concrete debris can be loaded into 20-ton RO/RO containers and shipped to ERDF for disposal. The estimated volume of metal waste is 194 ft^3. This material will be loaded into shielded boxes and sent to the pre-processing facility. Costs for decontaminating and demolishing the AY-152 Sluice Pit are summarized in WBS 318003.

2.4.5.2.6 Removal of A-417 Pump Pit and Tank. The A-417 Pump Pit and Tank is a multi-level structure consisting of a concrete box with overall dimensions of 23.3 ft by 11 ft (plan) by 14.5 ft deep, constructed above a concrete tank that is 23.3 ft in diameter and 15 ft deep. The upper concrete box is divided into pump pit and valve pit compartments. The valve pit and tank are lined with stainless steel. The box is shielded with two layers of cover blocks, each 1.25 ft thick. There are four blocks in each layer. The two pits drain to the tank. There is a metal handrail around the perimeter of the cover blocks.

The pump pit was constructed with 20 nozzles and contains four discharge jumpers and a pump. The valve pit has 15 nozzles and six discharge jumpers. Seven of the nozzles split into three lines at the exterior wall. The nozzles range in size from 0.5 to 3 in. in diameter. The pits are equipped with a spray (flush water) system embedded in the walls. A one-inch raw water line feeds two nozzles in the valve pit; a 1.5-inch raw water line feeds six nozzles in the pump pit. The tank on the lower level has seven nozzles ranging in size from two inches to six inches. There are seven risers from the tank to the surface, along with a 5-in. vent. The tank contains 14 ft of two-inch pipe, 14 ft of three-inch pipe, and 13 ft of six-inch pipe. Some amount of lead (i.e., potential lead waste) is present in the form of shield plugs on various risers. According to information provided in Appendix B, it is estimated that approximately 40 Curies of ^{137}Cs activity are retained in this structure. Piping and structural details are shown on the following drawings: H-2-56800, H-2-56801, H-2-56809, and H-2-57302.

There are several other structures (AX-501 valve pit, ion exchange column and 2707-AX change house) in the immediate vicinity that will have to be demolished before work is initiated on A-417 to alleviate potential congestion and interference problems for the work. The A-417 Pump Pit and Tank will be one of the last ancillary equipment items to be demolished. There is a large number of small-diameter piping connecting to the tank from AX-501, the ion exchange column, the A-401 Condenser Building, and other facilities. Before demolition work is initiated on the pump pit and tank, surrounding soil will be removed down to the level of the foundations and all connecting piping bundles will be cut off and crimped around the outside of the structure.

Demolition of the A-417 Pump Pit and Tank will be performed in the following sequence of steps.

- Remove the shield blocks over the pump pit.
- Remove the jumpers from the pit.
- Remove the pump and all other piping in the pump pit.
- Replace the shield blocks.
- Remove the shield blocks from the valve pit.
- Cut, crimp, and remove all piping inside the pit.
- Remove the shield blocks over the pump pit.
- Begin demolishing the walls of the upper level of the structure down to the level of the pump and valve pit floor using the concrete pulverizer and/or hydraulic impact breaker. The stainless steel liner will be bent inward and become detached from the walls of the pit as concrete is pulverized.

- Remove embedded piping and rebar as they become exposed. Remove liner sheets as they are freed from the concrete.
- Demolish the concrete floor of the pump and valve pits.
- Cut, crimp, and remove all piping inside the tank compartment.
- Demolish all remaining portions of the catch tank, again using the concrete pulverizer and/or hydraulic impact breaker, and remove and segregate embedded piping, rebar, and liner sheets.

Concrete and metal waste will be loaded into separate containers. Approximately 170 tons of concrete rubble will be generated from demolition of the A-417 Pump Pit and Tank. Based on the expected capability to separate the contaminated metal liner sheets from lightly contaminated concrete, it is assumed that concrete debris can be loaded into 20-ton RO/RO containers and shipped to ERDF for disposal. About 4 ft^3 of waste lead will be generated. The volume of other metal waste is estimated to be 304 ft^3. Metal waste (other than lead) will be loaded into shielded boxes and transferred to the pre-processing facility co-located with the TWRS waste vitrification plant. Costs for demolishing the A-417 Pump Pit and Tank are summarized in WBS 318010.

2.4.5.2.7. Removal of AX-155 Diversion Box. This is a reinforced concrete box with overall dimensions of 9.3 ft by 12.25 ft (plan) by 11 ft deep. The pit has a single 3.5-ft-thick cover block. Three coats of Amercoat #33 have been applied to the inside surfaces of the box. The box has 12 nozzle penetrations through the walls. Except for one 1.5-inch drain connection, all nozzles are three inches in diameter. A flush (spray ring) system embedded in the walls is supplied by a one-inch raw water line. The floor drain line (V-713) in this box drains to the catch tank in the AX-152 Diverter Station. There is a hand rail around the cover block. According to information provided in Appendix B, the AX-155 Diversion Box is expected to hold about 16 Curies of residual ^{137}Cs activity. Details of construction are shown on drawing H-2-90359.

Because of the pit's unlined configuration and the potential radiological contamination involved, an initial decontamination procedure will be undertaken. The procedure for decontamination is the same as that described in Section 2.4.5.2.1. The combined surface area (walls and floor) to be decontaminated in this pit is approximately 234 ft^2. Assuming that a uniform 1/4-inch thickness of surface concrete will be removed during decontamination, approximately 6 ft^3 of debris will be generated. This material will be loaded into shielded boxes and sent to the pre-processing facility co-located with the TWRS waste vitrification plant.

Following the initial decontamination step, demolition work on the pit will be deferred until all interconnecting piping and surrounding soil have been removed. Removal of contaminated piping, risers, and soil external to the pits is addressed under other WBS elements of this study.

Demolition of the AX-155 Diversion Box will be done with hydraulic demolition implements mounted on Caterpillar 375 excavators. Concrete and metal waste will be segregated and loaded into separate containers. An estimated 74 tons of concrete rubble will be generated from demolition of the pit. Based on the expected effectiveness of decontamination, it is assumed that the concrete debris can be loaded into 20-ton RO/RO containers and shipped to ERDF for disposal. The estimated volume of metal waste is 113 ft^3. This material will be loaded into shielded boxes and sent to the pre-processing facility. Costs for decontaminating and demolishing the AX-155 Diversion Box are summarized in WBS 318008.

2.4.5.2.8 Removal of AX-153 Isolation (Jumper) Pit. This is a concrete box with overall dimensions of 6 ft by 6.5 ft (plan) by 15.5 ft deep. There is a single 2.5-ft-thick cover block that provides shielding. A protective coating of vinyl Amercoat #55 has been applied to the inside surfaces of the pit. The pit has three, three-inch nozzle penetrations through the walls. A drain is located in the floor. There is no equipment inside the pit. The current understanding is that the pit is not contaminated. Details of construction are as shown on drawings H-2-33294 and H-2-64326.

Before demolition work is initiated on the AX-153 Jumper Pit, surrounding soil will be removed down to the bottom of the pit and all connecting piping will be cut off and crimped around the outside of the structure. Demolition of the pit may be constrained by proximity to the Group 20 piping encasement, which is a few feet away to the south.

The pit will be demolished using the concrete pulverizer and/or hydraulic impact breaker implements. First, the cover block will be lifted off and broken up. Then, the pit will be rubblized using the same implements. Based on the understanding that this structure is not contaminated, concrete and metal waste will be loaded into the same containers. Debris will be loaded into 20-ton RO/RO containers and shipped to ERDF for disposal. Approximately 43 tons of concrete rubble will be generated from demolition of the pit. The volume of metal waste is estimated to be 64 ft^3. Costs for demolishing the pit are summarized in WBS 318006.

2.4.5.2.9 Removal of AX-501 Valve Pit. The AX-501 Valve Pit is situated between the A-702 Fan House and the A-417 Pump Pit and Tank. This pit consists of a concrete box with overall dimensions of 8.3 ft by 5.7 ft (plan) by 7 ft deep. The pit is shielded with one 3-ft-thick cover block. The walls of the pit have two nozzle penetrations and there are two other nozzles penetrating the floor. The nozzles are 2 and 3 in. in diameter. A drain is located in the floor. The pit contains no other equipment. The pit is identified in Appendix B as non-contaminated. Details of construction are shown on drawing H-2-44607.

Before demolition work is initiated on the AX-501 Valve Pit, surrounding soil will be removed down to the bottom of the pit and all connecting piping will have be cut off and crimped around the outside of the structure. The pit will be demolished using the concrete pulverizer and/or hydraulic impact breaker implements. First, the cover block will be lifted off and broken up. Then, the pit will be rubblized using the same implements.

Based on the assessment that this structure is not contaminated, concrete and metal waste will be loaded into the same containers. Debris (except lead) will be loaded into 20-ton RO/RO containers and shipped to ERDF for disposal. Approximately 17 tons of concrete rubble will be generated from demolition of the AX-501 Valve Pit. About 1 ft^3 of waste lead will be generated. The volume of other metal waste is estimated to be 26 ft^3. Costs for demolishing the pit are summarized in WBS 318009.

2.4.5.2.10 Removal of AY-501 Condensate Valve Pit. This pit is a concrete box with overall dimensions of 17.5 ft by 7.25 ft (plan) by 12.5 ft deep. There are three 3-ft-thick cover blocks over the pit which provide shielding. Three coats of Amercoat #33 have been applied to the inside surfaces of the box. The pit has eight nozzle penetrations in the walls and another eight nozzle penetrations in the floor. All 16 nozzles are 2-in. in diameter. A flush system with six nozzles embedded in the walls is supplied by a 1.5-in. raw water line. The pit contains one other 3/4-in. conduit penetration in the wall and a floor drain. The pit contains two jumper nozzles. A bundle of process waste lines (C-101, C-102, C-103, and C-104) are routed to the east side of the pit through an encasement (north end of Group 2 encasement). Piping and structural details are shown on drawings H-2-64322 and H-2-64414.

The AY-501 Condensate Valve Pit is identified in Appendix B as being free of radiological contamination. However, the provision of 3-ft-thick cover blocks to shield the pit would indicate that accumulation of contamination in the pit was anticipated when the pit was constructed. Therefore, the demolition approach will be based on the assumption that some amount of contamination will be encountered.

Because the pit has no metal liner, an initial decontamination procedure will be undertaken. The decontamination procedure will be the same as the one described in Section 2.4.5.2.1. The inside surface area of the pit (walls and floor) is approximately 389 ft^2. Assuming that a uniform 1/4-inch thickness of surface concrete is removed during decontamination, then approximately 10 ft^3 of debris would be generated. This material will be loaded into shielded boxes and sent to the pre-processing facility co-located with the TWRS waste vitrification plant.

Following the initial decontamination step, demolition work on the pit will be deferred until all interconnecting piping and surrounding soil have been removed. Removal of contaminated piping, risers and soil external to the pits are addressed under other WBS elements of this study.

Demolition of the AY-501 Condensate Valve Pit will be performed with hydraulic demolition implements (hydraulic impact breaker, shear, and pulverizer) mounted on Caterpillar 375 excavators. Concrete and metal waste will be segregated and loaded into separate containers. An estimated 74 tons of concrete rubble will be generated from demolition of the pit. Based on the expected effectiveness of decontamination, it is assumed that concrete debris can be loaded into 20-ton RO/RO containers and shipped to ERDF for disposal. The estimated volume of metal waste is 111 ft^3. This material will be loaded into shielded boxes and sent to the pre-processing facility. A minor amount (about 1 ft^3) of waste lead will be generated. Costs for decontaminating and demolishing the AY-501 Condensate Valve Pit are summarized in WBS 318007.

2.4.5.3 Pump Pits and Valve Pits Associated with Individual AX Tanks.

2.4.5.3.1 Removal of Pump and Sluice Pits Associated with Individual AX Tanks. The four concrete pump and sluice pits situated over each of the AX tanks will be among the last ancillary equipment items to be demolished and removed from the site. These are unlined pits and it is expected that they will contain significant inventories of residual radionuclides. The inventory estimates in Appendix B indicate that the 16 pits may contain as much as 692 Curies of ^{137}Cs collectively. Consequently, an initial decontamination procedure will be undertaken that is intended (1) to reduce worker exposures during subsequent demolition work, (2) achieve a reduced waste designation so that concrete demolition waste will be acceptable for disposal at ERDF, and (3) minimize the volumes of demolition waste with the highest treatment/disposal costs (i.e., waste that would have to be sent to the pre-treatment facility co-located with the TWRS waste vitrification plant).

The procedure for decontaminating this group of pits will be the same as the one described in Section 2.4.5.2.1. There are approximately 258 ft^2 of surface area (walls and floor) to be decontaminated within each pit. Assuming that a uniform 1/4-inch thickness of surface concrete will be removed during decontamination, the an estimated 103 ft^3 of decontamination waste will be produced from the 16 pits. This material will be transported in shielded boxes to the pre-processing facility.

Following initial decontamination, demolition work on the pits will be deferred until all interconnecting piping (i.e., piping in Groups 17 and 19), free-standing risers and surrounding soil have been removed. Removal of contaminated piping, risers, and soil external to the pits are addressed under other tasks.

Each pump/distributor pit (01A, 02A, 03A, 04A) has overall dimensions of 11.5 ft by 10 ft (plan) by 11.5 ft deep. The pits are constructed directly on the tank domes. Each pit has two 2-ft-thick cover blocks and contains five jumper nozzles. There are approximately 248 ft^2 of inside surface area (walls and floor) to be decontaminated within each of these pits. Approximately 77 tons of concrete rubble and 116 ft^3 of metal waste will be produced from each pit. For estimating purposes, it is assumed that the original pumps have been removed. For piping and structural details, refer to drawings H-2-44561 and H-2-63826.

The four pump pits (01B, 2B, 03B, 04B) measure 8 ft by 10 ft (plan) by 10 ft deep, and also bear directly on the tank domes. Each pit has two 2-ft-thick cover blocks and five or six jumper nozzles. Approximately 35 tons of concrete rubble and 54 ft^3 of metal waste will be produced from each pit. As before, it is assumed that the original pumps have all been removed. For piping and structural details, refer to drawings H-2-63825.

The eight sluice pits (01C, 01D, 02C, 02D, 03C, 03D, 04C, 04D) are similar to the pump pits in dimensions. Each pit has two 2-ft-thick cover blocks and four or six jumper nozzles. Approximately 35 tons of concrete rubble and 52 ft^3 of metal waste will be produced from each pit. For piping and structural details, refer to drawings H-2-63827 and H-2-63828.

Demolition of the reinforced concrete pits will be performed with hydraulic demolition implements (hydraulic impact breaker, shear, and pulverizer) mounted on Caterpillar 375 excavators. For the purpose of estimating worker exposures, it is assumed that decontamination (vacuuming and scabbling) will be at least 95 percent effective (doses will be reduced by a factor of 20). The cabs on the two excavators will be equipped with leaded glass windshields and steel plate shielding.

A composite total of approximately 725 tons of concrete rubble will be generated from demolition of the 16 pits. Based on the expected effectiveness of decontamination, it is assumed that the concrete debris can be loaded into 20-ton RO/RO containers and shipped to ERDF for disposal. The estimated total volume of metal waste is 1,096 ft^3. Metal waste will be loaded into shielded boxes and sent to the pre-processing facility. Costs for decontaminating and demolishing the 16 pump and sluice pits are summarized in WBS 317001.

2.4.5.3.2 Removal of Valve Pits Associated with Individual AX Tanks. These auxiliary pits, which are constructed of 5-ft long, 42-in.-diameter corrugated metal culvert sections with covers, enclose valves and piping for regulation and distribution of flush water to the four pump and sluice pits above each of the four AX tanks. Piping to/from these valve pits (Group 19 piping) carried raw water only. The available information indicates that the valve pits are free of any significant contamination.

Raw water piping to the valve pits will be removed with the surrounding soil in advance of demolishing the pits. The culvert sections will be lifted out of place, cut apart and/or crushed flat. The culvert sections, covers, valves, and fittings will be loaded into 20-ton RO/RO containers with soil and other lightly contaminated debris and shipped to ERDF. The materials in each pit will be reduced to approximately 15 ft^3 of metal scrap (60 ft^3 total).

2.4.6 Modifications to Manning, Equipment and Productivity Estimates for Soil Removal to Account for Removal of Miscellaneous Non-Contaminated Piping, Concrete and Conduit

2.4.6.1 Productivity Adjustments for Excavating Soil Containing Buried Conduit and Non-Contaminated Piping. The uppermost 5 to 10 ft of soil in the tank excavation area contains significant amounts of small-diameter electrical conduit and non-contaminated piping. These items convey electrical wiring (instrument leads, equipment controls), process air, compressed air, raw water, sanitary water, etc. Because these are not contaminated items, they will not constrain waste disposal options for the soil and/or demolition rubble that will be loaded out with them. However, where conduit and small-diameter piping are present the soil, and especially where they are concentrated in groups or bundles, they will impede soil removal to some degree. To address this productivity impact, the original soil excavation concept has been modified. One hydraulic excavator with a standard 3-yd^3 bucket digging and loading soil will be supported by a second excavator equipped with a hydraulic shear implement mounted in place of the bucket. As necessary, the excavator with the shear will move forward and cut exposed piping and conduit into manageable lengths so they can be loaded into 20-ton RO/RO containers with soil. To reflect the anticipated reduction in excavator productivity, schedule durations for cover soil and lateral soil removal will be increased by 10 percent relative to the original schedules identified for these activities in SESC (1997). These modifications are addressed in WBS 319002 of the estimate.

2.4.6.2 Productivity Adjustments for Cutting Off and Removing Well Casings as they are Exposed. In SESC (1997), removal of cover soil was estimated to be a six-week (30-day) task performed by a crew consisting of one equipment operator an oiler, four teamsters, and two health physics technicians. Soil would be excavated with a hydraulic excavator equipped with a 3 yd^3 bucket and loaded into 20-ton RO/RO containers. In response to the changed condition (i.e., well casings in the soil), a second excavator unit (with an additional operator and oiler) will be shown in the WBS estimate for this activity. The second excavator will be equipped with a hydraulic shear implement mounted in place of the bucket. The second excavator will support the first unit by trimming off sections of well casings as they are exposed in the excavation.

Additionally, productivity impacts on soil removal are anticipated due to (1) the hindering effect that well casing would have on the digging operation, (2) the presence of the second piece of mobile equipment in a relatively confined work area, (3) inclusion of the extra action (i.e., trimming off casing segments) in the unit work cycle. Well casings probably would be cut off in segments of 2 to 3-ft lengths. The depth of the cover soil excavation is 12.5 ft. If each cut adds 5 minutes to the operation, the cumulative effect would be to extend cover soil removal by about 4 days.

In like manner, removal of soil lateral to the tanks was estimated in SESC (1997) to be a 44-week (220-day) task. The crew consisted of one equipment operator, an oiler, four teamsters, and two health physics technicians using the same mobile equipment pieces. To address the changed condition (i.e., well casings in the soil), a second excavator unit (with an additional operator and oiler) would also be required for this activity. The depth of the lateral soil excavation is approximately 40 ft. Making a similar allowance for cutting off casing during lateral soil removal would cause that task to be extended by about 10 days. The cost modifications in WBS 319002 reflect the increases in crew size and task durations discussed above. Capital for the second excavator was identified in SESC (1997). No additional waste volumes will be produced as a result of the scope detail changes. Casing segments will be loaded into 20-ton RO/RO containers with soil and transported to ERDF for disposal.

2.4.6.3 Productivity Adjustment for Cutting Off and Removing Leak Detection Piping. The work involved in demolishing the reinforced concrete portions of the four leak detection pits has been addressed previously (refer to Section 2.4.4.1). After the concrete boxes have been demolished, the remaining portions of the structures will consist of (1) a 48-ft-long, 24-in.-diameter leak detection well extending to the surface from the sump, (2) a 48-ft-long, 6-in. radiation detection well adjacent to the larger pipe but inclined to it at a shallow angle, (3) a 30-ft long, 12-in.-diameter drainage pipe extending horizontally from the base of the tank to the leak detection sump, and (4) a 30-ft-long, 4-in.-diameter drain line running from the pump compartment of the leak detection pit to riser penetration #10 on each tank. These components are shown on drawings H-2-44575 and H-2-44576. Based on this information, it is expected that approximately 156 lineal ft of piping from each of the four pits will have to be clipped into manageably small segments, loaded out with soil, and disposed. This activity is analogous to the work involved in removing well casings and riser piping and would be done in like manner (i.e., by a hydraulic excavator with a hydraulic shear implement). No significant radiological contamination is expected to be encountered in this piping. The projected impact to the original schedule for soil removal is to increase the schedule by about one day. This impact is reflected in adjustments to quantities in WBS 319002.

2.4.6.4 Productivity Adjustment for Demolishing Piers Supporting Encasements. As mentioned at various points in Section 2.4.3, a number of the piping encasements in the tank excavation area are supported on concrete pier foundations. This design treatment was employed where encasements were to be constructed over fill. Pier foundations support portions or entire lengths of Groups 2, 6, 10, and 20. The time and cost impacts for demolishing piping encasements have been characterized in Section 2.4.3 in conjunction with excavation and removal of piping. However, there would be additional impacts to the estimated time and cost for removing soil lateral to the tanks due to demolition of these pier foundations.

The pier supports will impact soil removal in several ways. There is a significant volume (approximately 458 yd^3) of concrete involved in these structures. The volume is attributable to different groups as follows:

- Group 2 - 75 yd^3
- Group 6 - 42 yd^3
- Group 10 - 23 yd^3
- Group 20 - 318 yd^3.

The major portion of the total quantity is associated with Group 20. The pier structure supporting Group 20 extends from the east end of the AX-152 Diverter Station due east through AX Tank Farm between the four AX tanks. The closely spaced configuration between the encasement and the tanks is expected to add significantly to the time and cost for demolishing the Group 20 supports due to the severely constrained equipment access. The piers associated with the other groups will be less difficult to demolish, but their respective contributions to the overall totals are small.

Demolition of piers will be a relatively equipment-intensive activity. During portions of the soil removal tasks when piers are being demolished, three Caterpillar 375 excavators will have to be used simultaneously, one unit with the standard 3-yd^3 bucket for digging and loading soil, a second unit with a hydraulic shear implement for severing imbedded rebar, and a third unit with either a hydraulic impact breaker or a pulverizer implement for breaking up concrete. The three units will have to change places frequently to load out loose soil and debris and expose more unbroken concrete. Anticipated productivity rubblizing and removing concrete is in the range of 3 to 4 yd^3/hr (i.e., about 3 yd^3/hr for Group 20 work and 4 yd^3/hr for other groups). Based on those rates, it is anticipated that demolition of pier supports would require approximately 30 days to complete within the context of soil removal. Specific impacts are as follows:

- The overall schedule duration for lateral soil removal must be extended by 10 days, due to reduced productivity loading out soil while piers are being demolished.

- Soil removal will require 60 additional hydraulic excavator machine days, 60 additional man-days for equipment operators, and 60 additional man-days for oilers.

These impacts are addressed with other productivity adjustments in WBS 319002 of the estimate (refer to Appendix F).

2.5 IMPLEMENTABILITY ISSUES

Implementability issues for ancillary equipment removal are listed and discussed below. Several issues identified here were previously cited as issues for tank removal.

2.5.1 Contamination Levels in Aging Waste Ventilation System Components

The descriptions of demolition work to be performed on the (1) deentrainer caissons, (2) A-401 Condenser Building, and (3) A-702 Fan House/Filter Building in this study have been based on estimates of contamination in the vapor header duct work to/from the various structures. In operation, thermodynamics of the vapor header stream varied considerably from point to point along length. These structures contain a number of unique components (e.g., deentrainer tanks, condensers, filter elements) that may have retained contamination at greater or lesser levels in relation to the duct work. Hence, radiological conditions inside these facilities and waste disposal issues associated with some of the unique internal components may be underestimated in this study.

2.5.2 Disposition of Heavily Contaminated Rubble and Debris

Some types of waste materials (e.g., process waste piping, metal waste and scabbling waste from pits and boxes) produced during demolition activities described for this alternative probably would have radiological inventory values (particularly ^{137}Cs values) that would obligate these materials to be treated like remote-handle transuranic (TRU) waste (even though they may continue to be classified as high level waste). At the present time, there is no on-site facility that is equipped to receive, store, or process remote-handle TRU waste in significant quantities. Nor is there a plan to make such a facility available to support closure of tank farms in the foreseeable future. Therefore, as noted in the tank removal study, disposition of heavily contaminated materials is an open interface issue. It is assumed that these wastes would ultimately be recombined with tank waste and undergo vitrification. No costs are included in the study estimate for this alternative for procurement of shielded transport boxes or for any form of waste treatment.

2.5.3 Environmental Restoration Disposal Facility Interface

It has been assumed for this study that soil and lightly contaminated debris from demolition of ancillary equipment would be transported to ERDF for disposal. At the present time, ERDF is chartered to accept only waste from *Comprehensive Environmental Response, Compensation and Liability Act* (CERCLA) remedial action sites at Hanford. Additionally, ERDF will only take waste with acceptable constituents in concentrations that do not exceed facility-specific waste acceptance criteria. It is unclear how these constraints would be resolved. Tank farms are currently classified and managed as RCRA operable units. Soil and debris from tank farms may contain constituents, such as land-banned constituents, that ERDF would be unable, under State of Washington regulations, to accept. ERDF waste acceptance criteria may have to be broadened to accommodate materials originating in tank farms or a separate-but-functionally equivalent disposal facility may have to be constructed for tank farm waste.

2.6 ENGINEERING DATA TABLES

Data tables have been assembled to summarize the labor, equipment, and resources that would be committed to perform the work outlined in Section 2.4. The tables also provide summary estimates of waste types and forms, emissions, and worker exposures that would be produced or incurred as consequences of prosecuting the work. Additionally, this section includes information on project cost and schedule. More detailed information on project costs is provided in Appendix F of this report.

Table 2.1. Waste Form and Volume Projections

Waste Forms	Characteristic
Building Demolition:	
• Non-contaminated concrete and building rubble	Quantity - 114 yd^3 Number of containers - bulk transport Radionuclide inventory - none Disposal location - local municipal landfill
• Lightly contaminated concrete and building rubble, including minor pipe and soil	Quantity - 1,560 tons Number of containers - 81 Container size - 20'L x 7.5'W x 5.5'H Radionuclide inventory - 6.1E^{-5} (Note 4) Disposal location - Environmental Restoration Disposal Facility (Note 3)
• Heavily contaminated building rubble, piping, filters, equipment, and other metal waste	Quantity - 6,011 ft^3 Number of containers - approximately 50 Container size - varies for LLW Radionuclide inventory - 2.5E^{-3} (Note 4) Disposal location - Low-Level Burial Grounds
Excavation and removal of piping:	
• Soil excavated to remove piping along footing line for enclosure structure	Quantity - 4,767 tons Number of containers - 243 (Note 2) Container size - 20'L x 7.5'W x 5.5'H Radionuclide inventory - Negligible Disposal location - Environmental Restoration Disposal Facility
• Concrete rubble from demolition of piping encasements	Quantity - 1,473 tons Number of containers - 77 (Note 2) Container size - 20'L x 7.5'W x 5.5'H Radionuclide inventory - 3.1E^{-3} (Note 4) Disposal location - Environmental Restoration Disposal Facility
• Process waste piping	Quantity - 5,720 ft^3 Number of containers 120 (Note 1) Container size - 12.1'L x 4.2'W x 3.3'H Radionuclide inventory - 0.31 (Note 4) Disposal location - TWRS Vitrification Facility

Table 2.1. Waste Form and Volume Projections (cont'd)

Waste Forms	Characteristic
Demolition of pits and boxes:	
• Lightly contaminated concrete and building rubble, including minor amounts of metal waste	Quantity - 161 tons (leak detection pits) Quantity - 726 tons (pump and sluice pits) Quantity - 997 tons (all other pits) Number of containers - 95 (Note 2) Radionuclide inventory - 1.8E^{-2} (Note 4) Disposal location - Environmental Restoration Disposal Facility (Note 3)
• Heavily contaminated concrete debris (scabbing waste)	Quantity - 103 ft^3 (pump and sluice pits) Quantity - 50 ft^3 (all other pits) Number of containers - 3 (Note 1) Container size - 12.1'L x 4.2'W x 3.3'H Radionuclide inventory - 0.34 (Note 4) Disposal location - TWRS Vitrification Facility
• Heavily contaminated metal waste	Quantity - 1,096 ft^3 (pump and sluice pits) Quantity - 1,718 ft^3 (all other pits) Number of containers - 60 (Note 1) Container size - 12.1'L x 4.2'W x 3.3'H Radionuclide inventory - 0.31 (Note 4) Disposal location - TWRS Vitrification Facility
Demolition and removal of other lightly contaminated material during excavation of soil to expose AX tanks:	
• Concrete in pier foundations supporting piping encasements	Quantity - 916 T (Note 2)
• Segments of well casings	Quantity - approximately 44 T (Note 2)
• Riser piping	Quantity - approximately 19 T (Note 2)
• Leak detection system piping	Quantity - approximately 33 T (Note 2)
	Number of containers - 52 (Note 2) Radionuclide inventory - 1.4E^{-3} (Note 4) Disposal location - Environmental Restoration Disposal Facility (Note 3)

Note 1: Assuming maximum fill factor for container is 0.5 or less.
Note 2: These quantities were previously counted as soil (i.e., were included in cover soil and lateral soil quantities) in Table 3.2 of SESC (1997).
Note 3: For this study, soil and concrete debris from demolition and removal of ancillary equipment were assumed to exhibit sufficient low levels of radiological and non-radiological contamination to conform to ERDF waste acceptance criteria (i.e., that these materials would be acceptable for disposal at ERDF).
Note 4: Rough estimates of radionuclides in various waste forms can be made by multiplying the listed factor by the quantities in Table 4 of Appendix B.

Table 2.2. Construction Resource Requirements

Construction Resource	Quantity
Land (Temporary Laydown Area for Building Construction Outside AX Tank Farm)	Approximately 3 Acres (The same 3-acre site identified in earlier studies - no new requirement)
Water (Note 1) Waste Container Decontamination Mobile Equipment Decontamination.	 78,100 gal 507,400 gal Total = 585,500 gal
Energy (Note 2) Electrical Propane Diesel Fuel Gasoline	 10.29 GWhr N/A 1,071,900 lbs 450 gal
Concrete used to seal pipes cut off around footing line for enclosure structure (40 yd^3) (Note 3): Water Cement Fly Ash Sand Grout used as void fill in well casings (109 yd^3): API Class H Cement Class F Fly ash Sand Sodium Bentonite Clay Water Water-Reducing Agent	 2,000 gal 1,200 lb 8,000 lb 128,000 lb 32,700 lb 121,200 lb 143,200 lb 4,140 lb 7,400 gal 3.8 gal
Steel	none
Clean fill placed for regrading at A-8 Sampler Pits: Clean fill placed for regrading along east and west footing lines of enclosure structure:	220 yd^3 2,824 yd^3

Table 2.2. Construction Resource Requirements (cont'd)

Note 1: regarding water consumption:

Waste container decontamination: 100 gal/container
Mobile equipment decontamination: 200 gal/day per item

Note 2: regarding electrical energy and fuel consumption: Refer to Figure 3.1 for construction schedule information.

Electrical consumption:

Ventilation: = (1,400 HP)(0.746 kW/HP)(24 hrs/day)(7/5)(560-328 days)
= 8,141,307 kWhr
Lighting: = (275 kW)(24 hrs/day)(7/5)(560-days)
= 2,143,680 kWhr
All Other: = (1.5 kW)(8 hrs/day)(560-days)
= 2,784 kWhr

Total electrical consumption = 10,287,800 kWhr = 10.29 GWhrs

Regarding fuel consumption calculations: Fuel consumption was calculated based on engine specific fuel consumption data provided by Caterpillar Inc. Rated fuel consumption for CAT 3406CATAAC engine is 149.24 lb/hr; for CAT 3408TA engine is 167.44 lb/hr, and CAT 3208/3304NA engines is 70.53 lb/hr.

Total Fuel Consumption:

	Operating Hours	Fuel Consumption
3408 TA engines:	3,240	542,506 lb
3406CATAAC engines:	3,343	498,909 lb
CAT 3208/3304NA engines:	432	30,486 lb
		Total = 1,071,900 lb

Note 3: concrete quantities are based on Control Density Fill (Class A) mix design (WACA 1997, SESC 1997, p. 26). Grout quantities are based on cold-cap grout formulation (WHC 1996, p. 2-9).

Table 2.3. Particulate Emissions Originating Outside of AX Tank Farm from Activities Associated with Ancillary Equipment Removal

Activity	Particulate Emissions (tonne)
Clearing and Grubbing of Laydown Area for Building Constr. Materials	No new land would be cleared for this work scope. Laydown area cleared for tank removal (0.18 tonne emissions reported previously) would be used to support removal of ancillary equipment.
Paved Road Transportation of Waste Containers	3.56

Notes regarding emissions calculations:

Paved Road Transportation Particulate Emissions:

Emissions Factor: $EF = 220\{(\text{silt load})/12\}^{0.3}$
silt load = % silt = 5%
$EF = 220\{5/12\}^{0.3} = 169.2$ g/km

	Trips	Haul Dist.	Emissions
Hauls to Richland City Landfill:	46	29 km	0.45 tonne
Hauls to ERDF:	548	14.4 km	2.69
Hauls to LLBG:	50	19.2 km	0.32
Hauls to Vit Plant:	183	1.6 km	0.10
			3.56 tonne

The emission factor is the amount of PM 10 particles in grams/vehicle kilometer traveled. (Basis: Estimation procedure provided in EPA 451/R-93-004, "Estimation of Air Impacts from Area Sources of Particulate Matter Emissions at Superfund Sites," Report ASF-32.)

Table 2.4. Construction Vehicle Emissions (Note 1)

Emissions Category	Ancillary Equipment Removal Quantity (lb)	Waste Transportation Quantity (lb)
Particulates	310	36
SO_x	3,962	325
CO	4,978	532
Hydrocarbons	285	18
NO_x	36,347	2,816
Aldehydes	N/A	N/A
Organic Acids	N/A	N/A
Thermal Releases Btu (Note 2)	1.366 E10	1.12 E9
NH_3	0	0

Note 1: Quantities were calculated based on engine exhaust chemistry data provided by Caterpillar, Inc., operating hours listed below and the fuel consumption characteristics identified in notes following Table 3.2.

Operating Hours:

	Equipment Removal	Transportation
CAT 3408TA:	2,782	458
CAT 3406CATAAC:	3,343	(none)
CAT 3208/3304NA	366	66

Note 2: Thermal Releases: Thermal releases were calculated assuming that diesel engines lose 75 percent of the energy content of fuel consumed (18,390 Btu/lb; 1055.1 J/Btu) as heat (source: Kline et al. 1995, Table A-10, Note 5).

Table 2.5. Estimates of Particulate Emissions from Enclosure Structure over AX Tank Farm During Ancillary Equipment Removal

Source	Estimated Dust Production	Estimate of Emissions from Enclosure (Note 1)
Concrete dust from pulverizing pits, boxes, encasements and supports	213 kg	10.7 g
Pulverized tank waste produced during demolition of pits, boxes, and tanks.	3.27 kg	0.2 g (Note 2)

Note 1: As conceptualized in SESC (1997), the air filtration system for the enclosure structure will consist of electrostatic precipitators ahead of HEPA filters. The combined decontamination factor for the two components is estimated to be about 20,000. HEPA filter elements alone are about 99.97 percent efficient (corresponding to a DF of 3,333), so the combined DF is expected to be conservative. In general, all particles that pass through HEPA filters are in the minus 0.3 micron size fraction.

Note 2: An estimate of the radiological inventory in the 0.2 g of radiological emissions can be made by multiplying the values listed in Table 4 of Appendix B by a factor of 2.60 E-8.

Additional notes re. calculations of fugitive dust generated during demolition and removal of ancillary equipment:

A. Concrete dust generated from pulverizing pits, boxes, encasements and pier supports:

Pulverization of reinforced concrete produces a significant amount of air-suspended particulates. Case-history based data on particulate emissions is unavailable from vendor sources. It is understood from discussions with vendors that dust generation from such activities varies considerably with the age and composition of the concrete undergoing size reduction. For ancillary equipment removal, the following estimate has been made. The methodology is analogous to the estimate of concrete dust production developed for tank removal in SESC (1997):

In-place volumes of concrete to be pulverized:

737 yd^3 in piping encasements
939 yd^3 in pits and boxes
458 yd^3 in pier foundations

Total Volume = 2,134 yd^3

Table 2.5. Estimates of Particulate Emissions from Enclosure Structure over AX Tank Farm During Ancillary Equipment Removal (cont'd)

Notes on Table 2.5 (continued):

For this estimate, it is assumed that the entire concrete volume will be demolished with the pulverizer jaw implement. Based on visual assessments of dust production in vendor videos, it is estimated that perhaps as much as 100 grams of air-suspended dust will be produced per cubic yard of concrete pulverized.

Dust Production = (100 g/yd^3)(2,134 yd^3)

= 213,400 g = 213.4 kg

B. Radiological Emissions in Air-Suspended Solids:

The estimated distribution of residual contamination among the various categories of AX Tank Farm ancillary equipment is summarized in Tables 4 and 5 of Appendix B. Based on the information in Table 5, the majority (i.e., more than 98% by volume) of the inventory is predicted to reside within piping (i.e., sluice lines, transfer lines and vapor headers), pits and catch tanks. A very small percentage of the total (0.2%) is associated with buildings, and another minor fraction (about 1.6%) is predicted to be retained within risers. Probably 90% or more of the listed contamination in risers will be found in the lengths of risers inside tanks (i.e., below the dome level), which will fall inside tanks when the domes are rubblized, and eventually loaded out with base slab material.

The amount of dust containing residual tank waste produced during removal of piping is expected to be very small. The hydraulic shear implement that will be used will tend to crimp the cut ends of pipe tightly closed. If pipe is sheared off in 10-ft lengths, waste is uniformly distributed within contaminated piping, and 1/8 in. of adhered tank waste is pulverized (i.e., becomes air suspended dust) where each cut is made, then the following volume of dust would be predicted:

1/8 in./(10 ft x 12 in./ft) = 0.1% unit volume

0.1% of 1,365 L of waste in all piping = 1.37 L

If the residual waste in piping has a specific gravity of 1.8, the corresponding mass of tank waste in dust from piping removal would be:

1.37 L x 1.8 kg/L = 2.47 kg.

Applying a similar computational approach to the lengths of riser piping that will be cut off above the domes (which are assumed to contain 10% of the reported inventory for risers as noted above) and assuming that riser pipes will be cut off in 2-ft rather than 10-ft lengths, the mass of radiological waste in dust would be:

Table 2.5. Estimates of Particulate Emissions from Enclosure Structure over AX Tank Farm During Ancillary Equipment Removal (cont'd)

Notes on Table 2.5 (continued):

1/8 in./(2 ft x 12 in/ft) = 0.52% unit volume

0.52% x 10% x 59 L = 0.03 L

0.03 L x 1.8 kg/L = 0.06 kg

Different considerations apply to demolition of (and potential radiological dust production from) pits, boxes and catch tanks. Referring again to the inventory estimate data in Table 5 of Appendix B, approximately 2/3 of the total inventory in ancillary equipment (2,845 L) is expected to be retained in these structures. Some pits and tanks (notably AX-152 Diverter Station and A-417 Pump Pit and Tank) were constructed with stainless steel liners. Inside surfaces of unlined pits generally were coated with sealing materials. In preceding discussions pertaining to demolishing unlined pits and tanks, a vacuum/scabbling method is proposed for segregating and removing 95% or more of the internal surface contamination before the pits are demolished. Because scabbling will be done within the confines of a vacuum hood, releases of dust-sized particles of tank waste should be minimized. An experience basis for estimating dust production from this type of equipment is unavailable, so the following estimate is necessarily speculative. For scoping purposes, it will be assumed that the vacuum hood fails to capture 0.01% of 95% of the total inventory in unlined pits and tanks. On that basis, the amount of radiologically contaminated dust released into the air volume in the enclosure structure would be:

Residual waste volume in unlined pits (from Tables 6.e and 6.f of Appendix B) = 1,485 L

0.01% x 95% x 1,485 L = 0.141 L

Assuming the same specific gravity of 1.8 as above, yields the following estimate:

1.8 kg/L x 0.141 L = 0.25 kg.

For pits and tanks with metal liners, radiological dust production will be estimated using the same approach/rationale that was proposed for predicting dust from cutting apart tank liners (SESC 1997). In that instance, it was assumed that liner plate would be sheared into 1-ft by 3-ft pieces and, surface-adhered waste was 1 in. thick, and a 1/4-in.-wide zone of adhered waste would be completely pulverized along the cut length as the liner plate is sheared. That calculation indicated that approximately 0.28% of the adhered waste volume would be reduced to dust-sized material that could potentially become suspended in air. The combined inventory estimate for AX-152 and A-417 is 1,360 L, or approximately 48 ft^3. The combined horizontal surface area within the two lined pits/tanks is approximately 875 ft^2. Assuming the residual waste inventory is uniformly

Table 2.5. Estimates of Particulate Emissions from Enclosure Structure over AX Tank Farm During Ancillary Equipment Removal (cont'd)

Notes on Table 2.5 (continued):

distributed over this surface area, the average waste thickness is about 0.66 in. Hence, based on the tank liner calculation, the amount of dust production from cutting liners into 1-ft by 3-ft pieces would be:

ratio (0.66/1.0) x 0.28% x 1,360 L = 2.513 L

1.8 kg/L x 2.513 L = 4.52 kg.

Not all of this dust becomes air suspended. If, as was assumed in the tank removal study, 10% of the pulverized waste volume becomes suspended in air during loadout of debris, then:

Air-suspended dust = 10% x 4.52 kg

= 0.45 kg.

Insofar as the demolition methods proposed in this study have not been attempted in a radiological environment, there is no experience basis for evaluating how much of the residual waste inventory adhering to the liner sheets might be pulverized or how much of the pulverized material might become suspended in air as the liner plate is sheared into pieces. This is a speculative estimate provided for scoping purposes, and is not represented as literal fact.

Table 2.6. Personnel Requirements

Category	Construction (FTEs-Note 1)	
	Rad Workers	Non-Rad Workers
Perforate/Grout Wells		
Supervisory	8	1
Direct Labor	4	0
Demolish Buildings		
Supervisory	8	1
Direct Labor	7.4	0.4
Remove Piping		
Supervisory	8	1
Direct Labor	11.8	0
Demolish Pits & Boxes		
Supervisory	8	1
Direct Labor	7.8	0
Support Crew		
Supervisory	0	1
Direct Labor	4	0

Note 1: FTE = full-time equivalent. Most categories involve multiple tasks with short durations and direct labor crews that vary in size and composition. Supervisory manning is constant (eight supervisory and one non-rad worker clerk). Supervisory staffing is costed under Construction Management and Engineering/Inspection in Appendix F, but numbers of personnel are not shown. Only the direct labor crew compositions are detailed in the estimate.

Table 2.7. Worker Exposure Estimates

Perforate/Grout Wells	Crew	Man-Hours	Crew Dose (mrem)	Avg. Exposure Rate (mrem/hr)
	Driller	1080.00	54.00	0.05
	Helper	1080.00	54.00	0.05
	Laborer	1080.00	54.00	0.05
	HPT	1080.00	54.00	0.05
Demolish Buildings	**Crew**	**Man-Hours**	**Crew Dose (mrem)**	**Avg. Exposure Rate (mrem/hr)**
	Operator	512.00	123.35	0.24
	Oiler	384.00	52.80	0.14
	Millwright	80.00	23.20	0.29
	Laborer	472.00	744.00	1.58
	Teamster	500.00	190.02	0.38
	Electrician	48.00	232.00	4.83
	HPT	328.00	520.00	1.59
	PIC	152.00	169.60	1.12
	Rigger/Ironwrkr	64.00	176.00	2.75
	Boilermaker	32.00	160.00	5.00
	Pipefitter	112.00	192.00	1.71
	Pl. Operator	8.00	1600.00	200.00
Remove Piping	**Crew**	**Man-Hours**	**Crew Dose (mrem)**	**Avg. Exposure Rate (mrem/hr)**
	PIC	1872.00	343.93	0.18
	Operator	5496.00	595.08	0.11
	Oiler	5352.00	530.40	0.10
	Helper	64.00	433.92	6.78
	Laborer	264.00	659.28	2.50
	Rigger	32.00	216.96	6.78
	Teamster	7184.00	2451.85	0.34
	HPT	1824.00	182.40	0.10
Demolish Pits, Boxes and Tanks	**Crew**	**Man-Hours**	**Crew Dose (mrem)**	**Avg. Exposure Rate (mrem/hr)**
	PIC	288.00	206.84	0.72
	Operator	872.00	237.97	0.27
	Oiler	576.00	113.09	0.20
	Millwright	16.00	1.60	0.10
	Teamster	480.00	80.45	0.17
	Laborer	32.00	3.20	0.10
	HPT	288.00	38.16	0.13
Support Crew	**Crew**	**Man-Hours**	**Crew Dose (mrem)**	**Avg. Exposure Rate (mrem/hr)**
	Millwright	2208.00	353.28	0.16
	Laborer	4416.00	706.56	0.16
	HPT	2208.00	353.28	0.16

Table 2.8. Cumulative Exposure Estimates by Unit Process

Unit Process	Cumulative Doses (mrem)
Perforate/Grout Wells	216
Demolish Buildings	4,183
Remove Piping	5,414
Demolish Pits & Boxes	612
Support Crew	1,413

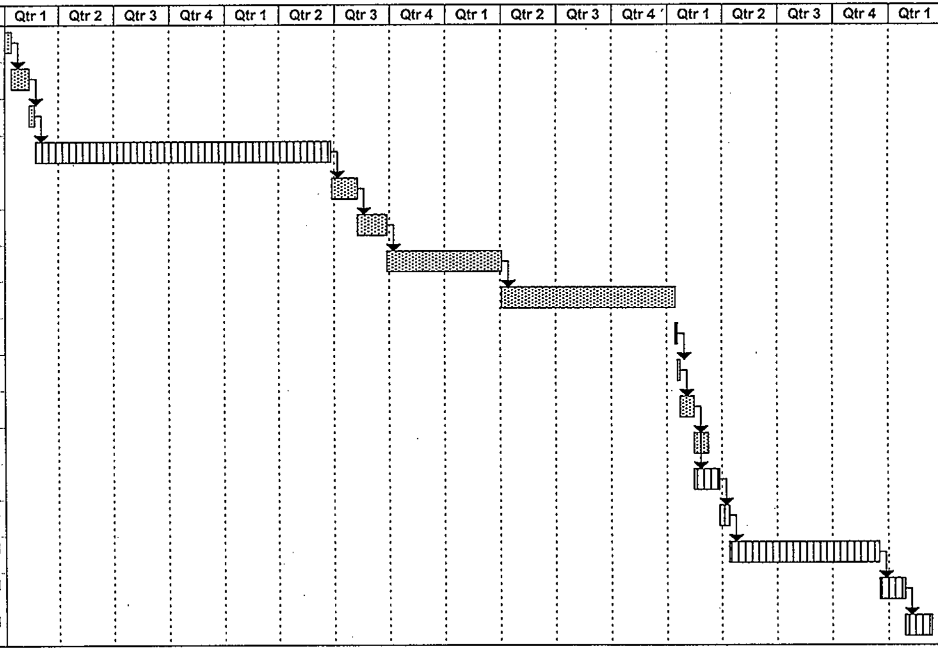
Table 2.9. Cost Breakdown

Cost Component	Cost (Note 1)
Post-Retrieval Monitoring and Maintenance	N/A
Capital Engineering/Construction Management Equipment Procurement Remedial Construction Waste Disposal	 8,340,000 3,520,000 6,200,000 1,280,000 Total = 19,340,000
Research and Development	N/A
Operating	N/A
Decontamination and Decommissioning	N/A

Note 1: Costs are rounded to the nearest $10,000. Costs include contingencies averaging 57 percent (itemized in Appendix F). Costs do not include escalation (all costs are in $1998).

Figure 2.1. AX Tank Farm Ancillary Equipment Study
Removal Case

ID	Task Name	Duration
1	Demolish to clear south footing line	8d
2	Cut and remove/seal piping bundles along E/W footing lines	22d
3	Regrade/compact soil for footings along E/W footing lines	7d
4	Construct enclosure 350 days per TR Study	350d
5	Construct enclosure 30.5 additional days beyond TR study schedule	30.5d
6	Demolish surplus buildings inside enclosure	35d
7	Perforate/grout/abandon wells	135d
8	Excavate/remove piping	205d
9	Place CDF grout in tanks	4d
10	Demolish leak detection pits	2d
11	Demolish pits and boxes away from tanks	16.5d
12	Demolish pits above tanks	17.5d
13	Remove cover soil	30d
14	Remove tank domes	12d
15	Remove lateral soil	176d
16	Remove tank sidewalls	30d
17	Remove base slabs	32d



Tank Removal Activities

Ancillary Equipment Removal Activities

3.0 (CASE 2) DEMOLITION OF SURFACE STRUCTURES, AND FILLING OF BELOW-GRADE EQUIPMENT WITH GROUT

3.1 INTRODUCTION

This section includes descriptions of the work to be performed in reducing all on-site surface structures, and grading and filling (stabilize) all underground ancillary equipment with cementitious fill materials. Major study assumptions for this case are summarized in Section 3.2. A summary description of the major equipment and hardware items that would be used to perform the work is provided in Section 3.3. Section 3.4 provides descriptions of the various remedial activities that would be performed. Topics are presented in Section 3.4 in sequential order. Implementability issues and concerns for this case are discussed in Section 3.5. Data tables and schedule information are included at the end of this section.

3.2 MAJOR STUDY ASSUMPTIONS

- Tanks will be filled (stabilized) with load-bearing fill. Corollary assumptions are (1) that one of the cementitious fill methods/materials proposed in WHC (1996) will be used to fill tanks, and (2) tanks are filled before ancillary equipment. The assumption concerning cementitious fill material impacts costs, as procurement costs for grout mixing equipment are included in cost estimates in WHC (1996) and are not included in this study estimate. The purpose of the assumption regarding the sequencing of activities is to assure that the residual inventories in tanks do not bias the present study by contributing unnecessarily to worker exposures during grouting of equipment items, such as risers and pits directly above the tanks.

- The areal extent of the surface barrier over AX Tank Farm is assumed to be the same as the extent of the pit excavation for tank removal. This area is much larger than the minimum area of surface that would have to be covered to hydraulically isolate the four AX tanks alone. The purpose of this assumption is to create a comparable basis for evaluating the work scope for the two ancillary equipment remediation cases.

- It is assumed that no enclosure would be constructed over the site for grouting of ancillary equipment, filling of tanks or surface barrier construction. An enclosure is not required by DOE Order 6430.1A (Design Criteria) for landfill closures unless significant disturbance and potential releases of contamination are anticipated during the course of remedial activities. In the case of this study, activities relating to demolition of certain structures, notably several of the aging waste ventilation system components along the south perimeter of the tank farm, have the potential to violate this assumption. However, characterization data for these facilities are insufficient to establish specifically what enclosure criteria would apply when the tank farm undergoes closure.

- It is assumed that lightly contaminated debris from building demolition will be acceptable for disposal at ERDF.

- For this case, it is assumed that the most heavily contaminated debris (derived from demolition of aging waste ventilation system components) would be Category 3 LLW, which would be packaged and disposed at on-site low-level burial grounds. The pre-processing facility co-located with the TWRS vitrification plant is presumed not to exist in this case (i.e., DOE would only commit capital funding to construct the pre-processing facility to support clean closure of tank farms).

- It is assumed that, prior to initiation of waste retrieval operations, control of AX Tank Farm would pass from the current operations component to a separate retrieval function and, upon completion of retrieval activities, control would pass to a third entity responsible for closure. Current area practices and management practices that apply to tank farms operations would not necessarily apply to the retrieval and closure functions. More specifically, closure would be performed by an entity comparable to one of DOE's environmental restoration contractors, and the work would be performed as an identifiably separate project with dedicated crews and equipment. With elimination of matrixed personnel, it is assumed that significantly higher worker productivities (on the order of six hours of productive work per shift) would be achieved, in contrast to productivities that are typical of current operations (on the order of three to four hours of productive work per shift).

- It is assumed that DOE would agree to a 1,500 mrem/yr whole body dose limit criterion for tank remedial actions. This limit has already been applied to 100-K Basin clean-up activities (the most directly comparable activity at the Hanford Site).

3.3 EQUIPMENT CONCEPTS

The purpose of the following summary is to call attention to hardware and equipment items identified in remediation concepts for this case that may be regarded as unusual or uncommon. Development issues are highlighted.

- Demolition equipment: Conventional (i.e., unshielded) equipment will be used for most tasks. Caterpillar 375 hydraulic excavators with shielded cabs are included in demolition concepts for several aging waste ventilation facility structures as a means of mitigating dose consequences to operators and reducing the numbers of hands-on laborers and pipefitters who could receive excessive doses.

- Excavation to expose piping bundles for installation of tapping sleeves and risers for grouting piping: The concept description indicates that soil removal work would primarily be done with a L9000 Dirt Guzzler (Guzzler Mfg. Inc., Birmingham, Alabama). Work in Tanks Farm that involves exposing buried piping currently is performed as hand work to avoid the potential that piping (and/or other buried utilities and equipment) might be damaged by earth-moving equipment. Dirt Guzzlers are in current use at Hanford to expedite hand-excavation tasks.

- Tapping sleeves and risers: Tapping sleeves are fully gasketed, two-piece tee fittings that bolt over a pipe where a tap is to be made. After the sleeve is installed, the pipe is breached (drilled out or punctured) inside the fitting. Tapping sleeves are proposed as the most expeditious available method for adding tees to process waste lines at points where supplemental grout injection points are required. Although this hardware enables improvements to be shown in the work cycle, there would still be significant worker exposure issues associated with the work. These issues are addressed in Section 3.5.

- Grout pumps: Conceptualization is based on using progressive-cavity (Moyno-type) pumps for grout injection. Several different sizes of pumps are identified as procurement items in the cost estimate to ensure that equipment is available with appropriate pumping flow rate, velocity, and pressure characteristics for filling pipes, pits, boxes, risers, etc. over the size range of interest.

- Cutting/perforation tools for airlift circulators: A modest development effort will be required to provide an optimal method for opening up the internal void volume within airlift circulators for complete grout filling. Cutting and/or perforation tools like those currently used in the well drilling industry could be applied to this task. However, the existing tools will have to be miniaturized somewhat for the intended application. Such size reduction does not appear to involve any technological constraints.

3.4 DESCRIPTIONS OF PROPOSED METHODS FOR BUILDING DEMOLITION AND GROUTING OF ANCILLARY EQUIPMENT

In the following subsections, methods are described for accomplishing each aspect of the scope of work for this remedial alternative. Topics are presented in the same order as the proposed sequence of activities shown in Figure 3.1 which accompanies the data tables in Section 3.6.

3.4.1 Demolish Buildings to Grade

Most building structures that were identified for demolition in the first remediation case (excavation/removal of ancillary equipment) would also be demolished in this case. Two structures, the A-701 Compressor Building and the A-8 Sampler Pits, are situated far enough to the south of the area of interest for this alternative to be excluded from this scope of work. The list of surface structures to be demolished for this alternative is as follows:

- 801-A Instrument Building
- 801-B Instrument Building
- 2707-AX Change House

- Ion Exchange Column
- A-702 Fan House/Filter Building
- Caissons/Deentrainer Facilities Associated with A-702 Fan House
- A-401 Condenser Building
- Cooling Tower
- Cold Water Sump
- Warm Water Sump

The nature and extent of the work to be performed to demolish these structures would be the same as described under Case 1 (see Sections 2.4.1.1 and 2.4.2). Manning, equipment, waste and emissions generation, worker exposures, costs, and schedule estimates for building demolition would be the same in either case, except for the number of structures involved. Labor, materials, and costs are summarized in WBS elements 311001 through 311008 of the estimate. Waste disposal costs for the rubble and debris from these activities is addressed under WBS elements 331001 through 331008 (refer to Appendix G).

3.4.2 Abandon (Perforate and Grout) 51 Wells On Site; Drill Three Replacement Wells
The scope of work is identical to the work described in Section 2.4.3, except that three new groundwater monitoring wells will have to be constructed to replace the three existing groundwater wells being abandoned. As in the previous case, well casings will be perforated full length and then grouted. This procedure conforms to the requirements for abandonment of resource protection wells in WAC 173-160 and is intended to assure that a permanent seal is emplaced around the casing, eliminating the potential for the outside of the casing to act as a preferential pathway for water to move upward or downward in response to some future event.

Depth information for two vadose wells is unavailable. For estimating purposes, 100-ft depths were assumed for these wells. Wells will be grouted from the bottom up, using a tremie pipe and packer assembly. A crane and a man-lift will be used to raise and lower the assembly during the grouting operation and assist in removing sections of pipe from the tremie as the work proceeds. Grout will be mixed in an on-site batch plant and distributed to individual well locations. The batch plant that will support grouting of wells is the same plant that will be used to mix grout or concrete to fill tanks. The batch plant has been described in an earlier study (WHC 1996; p. 2-7). Capital costs for the batch plant and related equipment were included in cost estimates for tank fill alternatives 2, 3, and 4 of that study. Therefore, capital costs for these equipment items are not included in the estimate for this study. In the event that the gravel fill option for tanks (alternative 1 in the earlier study) is to be evaluated further, capital dollars will have to be added for grout mixing and pumping equipment to support grouting of ancillary equipment. Costs for grouting wells are summarized under WBS 312001.

Replacement costs for three new RCRA monitoring wells are shown under WBS 312002. Groundwater monitoring would have to be continued for at least 30 years into postclosure as a regulatory condition of landfill closure. Costs for postclosure monitoring are not included. Well data are summarized in Appendix C.

3.4.3 Fill Contaminated Piping and Encasements with Grout and Concrete

For purposes of conceptualization, grouting of buried piping was approached using the group designations (1 through 20) developed during the equipment inventory phase of the study. The piping inventory includes a wide range of sizes (diameters), ranging from 24-inch vent headers down to 1.5-inch drain lines. The overall efficacy of grout placement will be dependent on the lengths, diameters, and friction factors of individual pipes, as well as the hydraulic properties (rheology) of the grout materials that will be employed. Pipe lengths and diameters were tabulated during the inventory phase of the study. However, other parameters that would need to be known to do a detailed engineering analysis of the grouting operation are poorly defined. Current conditions of the inside surfaces of various piping elements (e.g., roughness, corrosion, sludge/scale accumulation) are speculative. Candidate grout formulation(s) remain to be proposed and evaluated, therefore specific hydraulic properties data are unavailable.

Some analogous data was developed in unpublished mixing and pumping tests to evaluate grout materials and equipment for void filling of Category 3 LLW disposal containers for the Solid Waste Program at Hanford. In these tests, it was shown that a cement-based grout formulation with a specific gravity of 1.65 could be pumped through a 1.25-inch-diameter pipe at an initial velocity of 0.4 ft/sec and pressure of 35 lb/in^2 for a distance of 60 ft. If differences in friction factors for pipes of different sizes are neglected, this information can be applied to estimate stall distances in pipes of various other lengths and diameters of interest (maintaining velocity and pressure at the previous values). Limit values for injecting grout into pipes of various sizes are listed below, with corresponding initial flow rates.

Pipe Diameter (in.)	Stall Distance (ft)	Flow Rate (gal/min)
0.75	34.6	0.55
1.5	69.2	2.2
2	92.2	3.9
3	138.3	8.8
4	184.4	39
6	276.6	88

The specific formulation of the grout used in these tests is unknown. The stall distance values are regarded as tentative estimates of grouting capabilities for the proposed application. Stall lengths might be increased with higher velocities and pressures (i.e., larger pumps). However, the values listed above were used to conceptualize the grouting operation and to estimate grouting costs in order to maintain traceability to actual measurements. The rheological response of the grout to changes in pumping characteristics is indeterminate.

Most sluice lines and waste transfer lines terminate at jumper nozzles in pits. Because the nozzles are existing and accessible, they will be employed to do as much of the grouting as possible. The estimated costs include fabricating jumpers, removing cover blocks at the appropriate pit(s), pouring approximately 1 ft of grout into the floor of the pit(s) to reduce worker exposures, make jumper connections using the Hanford plant procedure for making remote connections, and then pump grout into the line to the perimeter of the planned tank removal excavation or to the stall distance limit for the pipe size involved. If the stall distance is less than the total length to be grouted, then supplemental pipe penetrations will have to be made along the length of the pipe to fill the pipe completely. Supplemental penetrations will be made by (1) exposing the subject pipe at the appropriate location in a shallow excavation, and (2) installing a tapping sleeve and a short riser extension to make the new pumpline connection.

During the pipe grouting operation, the actual position of the grout front can be tracked by monitoring the movement of a radio transponder in the pipe. The transponder can be placed in the pumpline before pumping is initiated, where it will be picked up and moved along on the leading edge of the grout. The principal use of the transponder will be to verify that grout has been placed over the intended length of pipe. However, if there is a partial blockage somewhere along the line, the transponder can identify the specific location. Use of transponders is proposed as a means of eliminating the labor, worker exposures, and cost to survey each line in advance of grouting.

Costs for grouting the piping and vent headers in Groups 1 through 20 are listed under WBS 316001 of the estimate. The numbers and lengths of piping, the number of jumper connections to be made, and the numbers of excavations for installing supplemental connections (tapping sleeves) are listed by group.

A number of the oldest piping bundles in the AX Tank Farm vicinity are enclosed in reinforced concrete encasements. Some or all of the piping in the following groups is encased:

- Group 2
- Group 4
- Group 6
- Group 9
- Group 10
- Group 17
- Group 20.

Encasements will be filled either with grout or high-flowability concrete. The two types of materials are cementitious mixtures (see Tables 2-1 and 2-2, WHC 1996). The costs of production in an on-site batch plant would be similar. To determine the volumes of grout or concrete to be placed, encasement volumes were determined from drawings and the volumes of enclosed piping were then subtracted. Costs for filling encasements are summarized in WBS 316002. For each major encasement branch, soil will be excavated to expose a specific cover block that will then be removed to facilitate pumping of grout/concrete into the encasement. Labor, materials, and equipment for filling encasements are identified for each group.

3.4.4 Fill Leak Detection Pits with Grout

Each of the tanks in AX Tank Farm was constructed with a dedicated external leak detection system. Grooves were cast into the upper surface of the base slabs of the tanks. Any liquid intercepted by this system of grooves will flow out and away from the tank through a 12-inch drainage pipe to a sump. The sump is directly accessible from the surface through a 24-inch-diameter leak detection well (i.e., a riser pipe), which terminates in the floor of a reinforced concrete pump pit. An adjoining pit opens into a six-inch-diameter radiation detection well, which extends down close to the sump. However, the sump and radiation detection well are not hydraulically connected. A gamma probe can be lowered into the radiation detection well to determine whether radioactive liquid has accumulated in the sump without contacting the liquid and becoming contaminated. If appreciable leakage is detected, a pump could be installed in the pump pit to remove the accumulated liquid. A drain in the floor of the pump pit provided the capability to route liquid back to the tank through a dome penetration. A drain in the floor of the radiation detection pit connects to a French drain. Both pits are equipped with cover blocks that are exposed a few inches above grade. Details of construction are shown on drawings H-2-44575 through H-2-44578.

It is inferred from available information pertaining to the operational history of the AX Tank Farm that none of the AX tanks has ever been involved in a leakage event that would have been detectable with this system. However, it is possible that small quantities of liquid waste might have boiled or splashed up over top of the liner onto the concrete shell and then run down between the liner and the tank shell to the base slab. If so, then low levels of radiation might have been detectable by the system though a leak had not occurred per se. In the best-basis inventory estimate (Appendix B), small volumes of residual waste are predicted within these structures.

Since the radiation detection pit at grade should be free of contamination, it can be grouted by removing the cover block and pumping grout directly into the floor of the compartment. It is expected that grout will flow into and fill the radiation detection well without the need to use a tremie.

If the pump pit compartment and leak detection well are contaminated, they can be grouted without removing the cover block. There is one existing penetration through the cover block. A grouting fixture will be inserted into this penetration, by which grout can be pumped in and displaced air can be collected and routed to a portable exhauster. Unless the associated tank has already been filled when this task is initiated, no special provisions should be necessary to grout the 12-inch drain pipe between the base slab of the tank and the leak detection sump. As long as the tank is open, air can be displaced into the tank between the liner and concrete shell. If the tank has already been filled, then complete replacement of the air volume in the drain line with grout will be difficult to accomplish. Conversely, if the tank is grouted before the leak detection system, then some amount of grout might flow in the opposite direction (i.e., down along the tank liner and into the drain pipe), filling some portion of the void volume of the leak detection system. A similar consideration could apply to grout filling the drain line from the floor of the leak detection pit to the tank. For estimating purposes, it was assumed that grouting of the four leak detection pits would be performed without removing the cover blocks, but would otherwise be free of complications. The void volume to be grouted in each of the four pits is approximately 300 ft^3. The volume of connecting drain lines to/from the tanks is included in this total. Grout will be mixed in an on-site batch plant and distributed to individual leak detection pits through a flexible pumpline. The batch plant that would support grouting of leak detection pits is the same plant that would be used to mix grout or concrete to fill tanks. Estimated costs are summarized under WBS 314001.

3.4.5 Fill Pits and Boxes with Grout

Equipment items included in the work scope for this activity include all of the sluice, pump and valve pits associated with the four individual tanks in AX Tank Farm and all of the other diversion pits and boxes, valve pits, jumper pits, condensate pits and tanks that are situated inside the perimeter of the tank removal excavation. This equipment is itemized below:

Pits associated with individual tanks:

- 241-AX-01A, -01B, -01C, -01D Pump and Distributor Pits
- 241-AX-02A, -02B, -02C, -02D Pump and Sluice Pits
- 241-AX-03A, -03B, -03C, -03D Sluice Pits
- 241-AX-04A, -04B, -04C, -04D Sluice Pits
- 241-AX-01VP, -02VP, -03VP, -04VP Valve Pits.

Other valve pits, jumper pits, diversion boxes, and tanks:

- 241-AX-A Valve Pit
- 241-AX-B Valve Pit
- (2) Flush pits associated with AX-A/AX-B
- (1) Service pit associated with AX-A/AX-B
- 241-AY-152 Sluice Pit
- 241-AX-152 Diverter Station
- (1) Valve box associated with 241-AX-152
- (2) Manholes associated with 241-AX-152
- 241-AX-153 Isolation (Jumper) Pit
- 241-AY-501 Condensate Valve Pit
- 241-AX-155 Diversion Box
- 241-AX-501 Valve Pit
- 241-A-417 Pump Pit and Tank.

Grouting of pits and boxes will not be undertaken until all of the grouting work has been completed on piping that would be accessible via the jumper nozzles inside these structures. For grouting of pits and boxes, it is assumed that all temporary jumpers used to grout piping have been removed and all cover blocks have been replaced.

Compared to grout filling of piping and encasements, the work involved in filling pits and boxes will be relatively simple and straightforward. The upper surfaces of all of these structures are exposed at grade. Weather covers have been installed over some structures, but removing the covers will not impede the work to any significant extent. The cover blocks over most or all of the pits have at least one access port with a removable plug that is available for monitoring purposes. This port will be used for grout injection. In any case where a monitoring port does not exist, one would be created by core drilling. For grout injection, a fixture will be inserted into the port containing an inlet tube and an outlet tube. The grout pumpline will be connected to the inlet side. The outlet side will be connected to a portable exhauster with a HEPA filter element. This fixture will (1) enable the air volume inside the pit to be completely displaced with grout, and (2) facilitate complete filtration of the displaced air volume.

A generalized procedure that will apply for grouting most pits and boxes is as follows:

1. Remove weather cover (if present).

2. Remove the shield plug to expose the monitoring port through cover blocks.

3. Insert grouting fixture into the monitoring port and make up connections to grout the pumpline and portable exhauster.

4. Begin pumping. Continue until grout rises in the exit tube of the fixture.

5. Disconnect grout and vent lines, purge, and relocate equipment to next structure.

According to notes on drawings, many (perhaps all) of the shield plugs are lead (i.e., regulated waste), and as such represent a small-volume secondary waste stream from this activity.

Deviations from the generalized procedure would be necessary for a few of the structures listed above. The AX-152 Diverter Station is a two-level structure with cover blocks that are 5 ft, eight-inches thick. The upper level contains a pump cell and diverter cell. There is a sump on the lower level. The A-417 Tank is another two-level structure consisting of a valve pit above a condensate collection tank. In these cases, an access hole will have to be created by core drilling (1) through the cover blocks and (2) through the floor of the upper level to gain access for pumping grout into the lower level.

Several pits listed above (i.e., AX-501, AY-501, AX-153, AX-01VP, AX-02VP, AX-03VP, AX-04VP) are currently identified as non-contaminated. In the case of the four valve pits, that are corrugated-culvert structures with covers, it might be more expedient and less costly simply to pull the culvert sections out of the ground and fill in the pits with clean soil. However, consistent with study assumptions, costs have been developed to fill these structures with grout. For the three remaining pits, it might be most practical to remove the cover blocks and pump grout directly into the cells. However, for estimating purposes, it was assumed that the procedure outlined above for filling contaminated pits would also be followed to grout non-contaminated pits.

Taken together, filling pits and boxes will require mixing and placing approximately 523 yd^3 of grout. Labor, materials, and equipment for filling pits associated with individual tanks are summarized in WBS 317001. Corresponding costs for filling other valve pits, jumper pits, diversion boxes, and tanks are shown under WBS 318001.

3.4.6 Fill Risers with Grout

The four tank domes in AX Tank Farm were constructed with a large number of specialized riser penetrations to support various operations and maintenance functions. During construction, each AX tank was equipped with 22 airlift circulators for waste agitation. Instrumentation risers were provided for liquid level, sludge level, and temperature measurements. Other riser ports were designated as vents, drains, access points for sluicing nozzles, pump hardware, and steam coils. One riser in each tank is reserved as an observation port. Risers identification numbers and respective lengths, volumes and residual waste volume estimates are tabulated in Appendix A. Details of construction of various dome penetrations on the AX tanks are shown on drawings

H-2-44570 and H-2-44571. Other data concerning riser functions, positions, and recent status (e.g., open, covered, plugged) are tabulated in Alstad (1993).

Most risers will be grouted following a generalized procedure. Exceptions are noted below:

- Small-diameter conduit bundles (identified as risers R11-A, B, C) would not be filled with cementitious grout. Each bundle is made up of seven 3/4-inch-diameter conduit elements. These openings originally contained thermocouple leads which were imbedded in the tank sidewalls to monitor concrete curing during construction. The bundles are not riser penetrations in the usual sense in that they do not access the tank interior. It is unlikely that cement grouting of these openings would be entirely successful, given their length (16 ft) and small diameter. Conduit will be filled with caulking material instead.

- Riser 4 on each tank is the vent header outlet. This opening is addressed with piping.

- Six risers on each tank (various designations) terminate inside sluice pits and pump pits above the tanks. These penetrations will be filled with grout as an aspect of grouting the pits.

- One other riser penetration is the pit drain connection to/from the associated leak detection well. The connecting piping, including the length of piping inside the tank, is treated as part of the scope involved in grouting the leak detection well.

- Several departures from the generalized procedure will be required for airlift circulators, due to internal details of construction.

The generalized procedure applies to the following numbers of riser penetrations per tank:

AX-101	48
AX-102	47
AX-103	46
AX-104	49
Total	190

Nearly all of these risers have either four- or six-inch-diameters. The generalized procedure outlined below assumes that tanks are filled with grout, concrete, or pre-placed aggregate concrete (Options 2, 3, and 4 described in WHC 1996). This procedure would not apply if tanks were filled with gravel (Option 1 in the same study). The current understanding is that in-tank hardware (e.g., dome-suspended riser extensions) would have to be removed to facilitate uniform placement of gravel in the tanks. If Option 1 is implemented, only the penetrations through the tank domes would have to be sealed.

The generalized procedure is as follows. A temporary riser extension (i.e., a cap or fixture) with fixed inlet and outlet pipes will be attached to each riser to be filled with grout. The grout pumpline will be connected to the inlet pipe. Air will be displaced via the outlet pipe. The outlets will be connected to a portable exhauster with a HEPA filter. It is assumed that the displaced air would have to be filtered to remove any air-suspended particulates. This contingency could be eliminated when there is an experience basis for assessing the actual need for filtration. The work will be done in "whites" by plant forces personnel. The grout formulation is to be determined. It is envisioned that the grout would be a cement-based formulation selected primarily for low viscosity and neutral volume change properties. Costs for grouting risers (excluding airlift circulators and others excepted above) are shown under WBS 313001.

Because of their design and construction, airlift circulators will be more difficult to fill with grout than other risers. An airlift circulator consists of a central one-inch Schedule 40 compressed air line enclosed by a six-inch Schedule 40 pipe. The lowermost 17 to 22 ft of the assembly also is surrounded by a large-diameter shroud, constructed of 30-inch-diameter Schedule 10 pipe secured to the 6-in pipe by welded brackets. At the lower end of the assembly, the six-inch pipe is cut in an "orange peel" configuration. The ends (or "peels") are then folded inward and welded (seamed) together and to the outside of the one-inch pipe to form a tapered closure. At the upper end of the assembly, the one-inch and six-inch pipes are joined by a welded centering flange. The assembly is supported on a 2.5-ft high concrete pedestal on the tank dome. The weight of the assembly is transferred to the pedestal at the centering flange and carried in tension by the six-inch pipe. The first 4 to 5 ft of the annular space between the one- and six-inch pipes below the flange was filled with cement grout. A thermocouple well (consisting of 3/4-inch conduit) was tack welded to the outside of each airlift circulator shroud. The conduit extends up through the dome on an alignment parallel to the airlift circulator. The conduit terminates approximately 2.5 ft below grade. Details of construction are shown on drawings H-2-44570 and H-2-44676.

Sufficient soil must be removed to expose and isolate each support pedestal and the associated thermocouple conduit. The one-inch Schedule 40 pipe will be cut off above the pedestal and a small-diameter drill string with a perforation tool will be inserted. The one-inch pipe will be perforated at 8- to 10-ft intervals to allow grout to flow into the annulus of the six-inch pipe. A small-diameter tremie will be inserted about 5 ft into the one-inch pipe. The diameter of the tremie must be small enough to permit air to be displaced up the inside of the one-inch pipe. The displaced air will be collected and routed to a portable exhauster as described above. When the grout surface rises to the bottom of the tremie, the tremie will be gradually withdrawn. A small-diameter tool string with a miniature casing cutter will be inserted into each thermocouple well. The conduit will be cut off below the level of the tank dome. The intact length, (perhaps 5 ft) will be filled with caulking material. There would be some development costs to produce an appropriate perforating tool and casing cutter for this application. Equipment decontamination costs may also be incurred. Allowances for these costs have been included in the estimate for the work (see WBS 313002).

Grout will be mixed in an on-site batch plant and distributed to individual risers through a flexible pumpline. The batch plant that will support grouting of risers is the same plant that would be used to mix grout or concrete to fill tanks.

3.5 IMPLEMENTABILITY ISSUES

3.5.1 Difficult Access for Grout Injection on Some Ancillary Equipment Items

Establishing the necessary physical access for injecting grout into certain ancillary equipment items will be laborious, expensive, and in some instances, hazardous. The principal problem elements are (1) airlift circulator risers and (2) piping in Groups 2, 6, 17, and 20. At the time AX Tank Farm and support infrastructure were designed, piping that was expected to become heavily contaminated with use (i.e., Groups 2, 6, and 20) was routed through encasements buried some 20 ft below grade. These groups of process waste piping were constructed without cleanout risers, and the only access points that might be used to assess current contamination conditions are jumper nozzles inside AX-152 Diverter Station (also is heavily contaminated). Group 17 piping, which is part of the sluicing system that was constructed for waste recovery from AX farm tanks, is less deeply buried, but similar otherwise to the three groups identified above. At every point along these four pipe groups where supplemental penetrations would be installed for grouting, workers will be exposed to dose rates in excess of 1 rem/hr. Group 20 piping poses the greatest exposure hazards with projected dose rates over 3 rem/hr (based on current waste inventory estimates).

Airlift circulators are dome-suspended components. To work on them, it will be necessary to excavate pits down to the surface of the tank domes to expose the support pedestals. Another source of problems is that the annulus between the inner (compressed air) and outer (support) pipes is sealed at both ends. The seals at one or both ends must be destroyed in order to inject grout into the annular volume. The cost and dose estimates for grouting piping and airlift circulators reflect the expectations that these tasks will be relatively difficult to perform because of the access constraints involved.

3.5.2 Contamination Levels in Aging Waste Ventilation System Components

The description of demolition work to be performed on the (1) deentrainer caissons, (2) A-401 Condenser Building, and (3) A-701 Fan House/Filter Building in this study have been based on estimates of contamination in the vapor header duct work to/from the various structures. In operation, thermodynamics of the vapor header stream varied considerably from point to point along the length. These structures contain a number of unique components (e.g., deentrainer tanks, condensers, filter elements) that may have retained contamination at greater or lesser levels in relation to the duct work. Therefore, radiological conditions inside these facilities and waste disposal issues associated with some of the unique internal components may be underestimated in this study.

3.5.3 Low Projected Efficiencies for Grouting Piping

Limited actual data from pumpability tests of grout in small-diameter pipes was applied to estimate performance constraints for grouting process waste piping for this study. Pumpability (i.e., the length of pipe of a given diameter that can be filled with grout) is highly dependent upon specific rheological properties of the grout, the velocity of the grout moving inside the pipe, and the amount of energy (i.e., pressure head) supplied by the pump. Rheological properties data (i.e., characterization of frictional resistance to flow as a function of velocity) of the grout formulation used in the testing was not available. Therefore, the injection velocity in the tests

(0.4 ft/sec) was treated as a constant in calculations. By extrapolating from the available pumpability data, estimates of maximum pumping distances were developed for various pipe sizes of interest. These calculations indicated that a number of supplemental penetrations would have to be made along the lengths of most process waste lines in order to achieve complete filling.

There are significant limitations to this methodology. First of all, the application of the grout being tested was as void fill material for Category 3 LLW packages rather than piping. Optimal properties of grouts for the two applications might be expected to differ considerably. At such time as work is done to develop a grout formulation that is optimized for filling pipes, it may be possible to demonstrate significant improvement in pumpability. Whether the improvement would be great enough to eliminate the need for supplemental injection points altogether is unknown. The overall practicality of grouting process waste piping will be improved considerably if requirements for supplemental penetrations can be eliminated.

3.5.4 Excessive Worker Doses During Grouting of Some Piping Groups

The pipe groups of specific concern are the same groups identified in Section 3.4.1 as being the most difficult to access. The preliminary finding is that all members of the crew that is tasked with installing tapping sleeves for supplemental grout injection points on Group 2, 6, 17 and 20 pipes would receive doses significantly above the 1,500-mrem/yr limit criterion. There are a number of contributing factors. The access problem has been discussed in Section 3.5.1. Another factor is that limited lengths (i.e., 3 to 6 ft) of all piping in a given bundle will be exposed each time a supplemental penetration must be made to any one pipe in the bundle. Therefore, while the work is being performed, all pipes in the bundle are contributing to worker exposures. A third factor is the low projected grouting efficiencies and the underlying basis for these projections, which are summarized in Section 3.4.3. The pumpability assessment leads us to conclude that a large number of supplemental injection points would have be constructed (i.e., increasing the number of worker exposure events) to completely fill all contaminated piping with grout. Finally, installation of tapping sleeves is a "hands-on" process. Laborers and pipefitters would have to work for short periods in close contact with hot piping to make up the tapping sleeve connections. This task does not appear to be readily amenable to robotics or remote operations. Taken together, time, distance, and shielding considerations associated with this task are all adverse.

It is possible that the indicated contamination levels for piping in Appendix B are overestimated. Characterization of large portions of the process waste piping network in AX Tank Farm would have to be done to determine whether or not these estimates are accurate. However, it is considered unlikely that sufficient improvement (inventory reduction) could be demonstrated from characterization data as to minimize worker exposures as an implementability concern.

3.5.5 Recommendations

Based on assessments that were made during this study, there is some basis for doubt as to the overall feasibility of grouting piping. These assessments indicate that exposures for some tasks related to grouting of piping would greatly exceed the 1,500 mrem annual limit criteria. It is unrealistic to expect that DOE would authorize some portions of the work to proceed as presently conceptualized.

Characterization data on key issues (e.g., contamination levels and worker exposures for critical situations, rheological properties vis-a-vis grouting capabilities) will have to be obtained to support essential decisions regarding concept feasibility. There is a need to develop more detailed rationale for grouting of piping. Piping sizes smaller than 18- to 24-inch do not pose credible settlement hazards for surface barriers. It is possible that encased piping might not need to be grouted if the encasements are filled with grout or concrete. Improved rationale might show that certain aspects of the work that currently appear to be least practical are nonessential.

3.6 ENGINEERING DATA TABLES

Data tables have been assembled to summarize the labor, equipment, and resources that would be committed to perform the work outlined in Section 3.4. The tables also provide summary estimates of waste types and forms, emissions, and worker exposures that would be produced or incurred as consequences of prosecuting the work. Additionally, this section includes information on project cost and schedule. More detailed information on project costs is provided in Appendix G of this report.

Table 3.1. Waste Form and Volume Projections

Waste Forms	Characteristic
Building Demolition:	
• Non-contaminated concrete and building rubble	Quantity - 10 yd^3 Number of containers - bulk transport Radionuclide inventory - none Disposal location - local municipal landfill
• Lightly contaminated concrete and building rubble, including minor pipe and soil	Quantity - 1,560 tons Number of containers - 81 Container size - 20'L x 7.5'W x 5.5'H Radionuclide inventory - $6.1E^{-5}$ (Note 1) Disposal location - Environmental Restoration Disposal Facility (Note 2)
• Heavily contaminated building rubble, piping, filters, equipment, and other metal waste	Quantity - 6,011 ft^3 Number of containers - approximately 50 Container size - varies for LLW Radionuclide inventory - $2.5E^{-3}$ (Note 1) Disposal location - Low-Level Burial Grounds

Note 1: Rough estimates of radionuclides in various waste forms can be made by multiplying the listed factor by the quantities in Table 4 of Appendix B.

Note 2: For this study, soil and concrete debris from demolition and removal of ancillary equipment were assumed to exhibit sufficient low levels of radiological and non-radiological contamination to conform to ERDF waste acceptance criteria (i.e., that these materials would be acceptable for disposal at ERDF).

Table 3.2. Construction Resource Requirements

Construction Resource	Quantity
Land (Temporary Laydown Area for Building Construction Outside AX Tank Farm)	Approximately 3 Acres (The same 3-acre site identified in earlier studies - no new requirement)
Water (refer to concrete and grout quantities listed below)	N/A
Energy	
Electrical	1,343 kWhr
Propane	N/A
Diesel Fuel	431,630 lbs
Gasoline	8,950 gal
Grout used to fill risers, pipes, pits, boxes and tanks (1,055 yd^3):	
API Class H Cement	316,500 lb
Class F Fly ash	1,173,160 lb
Sand	1,386,270 lb
Sodium Bentonite Clay	40,090 lb
Water	79,550 gal
Water-Reducing Agent	37.1 gal
High-flowability concrete used to fill encasements (262.5 yd^3):	
Type II Portland cement	146,210 lb
Class F Fly ash	95,290 lb
Sand	313,430 lb
Coarse aggregate (-3/4")	386,400 lb
Water	10,320 gal
Water reducing agent	38.0 gal
Rheological modifier	158 lb
Steel	none
Excavation to expose piping and encasements for grouting:	6,201 yd^3
Backfill:	6,201 yd^3 (all cuts=fills)

Table 3.2. Construction Resource Requirements (cont'd)

The Grout Ancillary Equipment case does not require major amounts of electrical energy, principally because there is no enclosure structure and no ventilation system to operate in this scenario. Power consumption is attributable to electrically powered construction equipment.

Total electrical consumption = 1,343 kWhr

Notes regarding fuel consumption calculations: Fuel consumption was calculated based on engine specific fuel consumption data provided by Caterpillar Inc. Rated fuel consumption for CAT 3406CATAAC engine is 149.24 lb/hr; for CAT 3408TA engine is 167.44 lb/hr, and CAT 3208/3304NA engines is 70.53 lb/hr.

Total Fuel Consumption:

	Operating Hours	Fuel Consumption
CAT 3408 TA engines:	1,025.5	171,170 lb
CAT 3406CATAAC engines:	398.6	59,487 lb
CAT 3208/3304NA engines:	2,841.8	200,432 lb
		Total = 431,630 lb

Note regarding gasoline consumption: Gasoline consumption was calculated for equipment items required to support grouting activities - 160-cfm compressors and pan compactors. Estimated fuel consumption for the compressors is 5 gal/hr; estimated consumption for compactors is 0.5 gal/hr.

Compressors: 8,709 gal
Compactors: 241 gal

Total = 8,950 gal

Table 3.3. Particulate Emissions Originating Outside of AX Tank Farm from Activities Associated with Ancillary Equipment Removal

Activity	Particulate Emissions (tonne)
Clearing and Grubbing of Laydown Area for Building Constr. Materials	No new land would be cleared for this work scope. Laydown area cleared for tank removal (0.18 tonne emissions reported previously) would be used to support removal of ancillary equipment.
Paved Road Transportation of Waste Containers	0.76

Notes regarding emissions calculations:

Paved Road Transportation Particulate Emissions:

Emissions Factor: EF = 220{(silt load)/12}$^{0.3}$
silt load = % silt = 5%
EF = 220{5/12}$^{0.3}$ = 169.2 g/km

	Trips	Haul Dist.	Emissions
Hauls to Richland City Landfill:	4	29 km	0.04 tonne
Hauls to ERDF:	81	14.4 km	0.40
Hauls to LLBG:	50	19.2 km	0.32
			0.76 tonne

The emission factor is the amount of PM 10 particles in grams/vehicle kilometer traveled. (Basis: Estimation procedure provided in EPA 451/R-93-004, "Estimation of Air Impacts from Area Sources of Particulate Matter Emissions at Superfund Sites," Report ASF-32.)

Table 3.4. Construction Vehicle Emissions (Note 1)

Emissions Category	Building Demolition and Ancillary Equipment Grouting Quantity (lb)	Waste Transportation Quantity (lb)
Particulates	814	6
SO_x	1,653	73
CO	5,045	110
Hydrocarbons	314	3
NO_x	15,150	628
Aldehydes	N/A	N/A
Organic Acids	N/A	N/A
Thermal Releases Btu (Note 2)	5.702 E9	2.51 E8
NH_3	0	0

Note 1: Quantities were calculated based on engine exhaust chemistry data provided by Caterpillar Inc., operating hours listed below and the fuel consumption characteristics identified in notes following Table 3.2.

Operating Hours:

	Equipment Grouting	Transportation
CAT 3408TA:	919.2	106.3
CAT 3406CATAAC:	398.6	(none)
CAT 3208/3304NA	2,836.0	5.8

Note 2: Thermal Releases: Thermal releases were calculated assuming that diesel engines lose 75 percent of the energy content of fuel consumed (18,390 Btu/lb; 1055.1 J/Btu) as heat (source: Kline et al 1995, Table A-10, Note 5).

Table 3.5. Personnel Requirements

Category	Construction (FTEs-Note 1)	
	Rad Workers	Non-Rad Workers
Demolish Buildings		
Supervisory	5	1
Direct Labor	7.4	<0.1
Drill/Grout Wells		
Supervisory	5	1
Direct Labor	4	0
Grout Pipes		
Supervisory	5	1
Direct Labor	19.8	0
Grout Encasements		
Supervisory	5	1
Direct Labor	6.1	0
Grout Pits, Boxes, Tanks		
Supervisory	5	1
Direct Labor	8.0	0
Grout Risers		
Supervisory	5	1
Direct Labor	9.2	0

Note 1: FTE = full-time equivalent. Most categories involve multiple tasks with short durations and direct labor crews that vary in size and composition. Supervisory manning is constant (five supervisory and one non-rad worker clerk). Supervisory staffing is costed under Construction Management and Engineering/Inspection in Appendix G, but numbers of personnel are not shown. Only the direct labor crew compositions are detailed in the estimate. Fewer supervisory personnel are required for this scenario relative to "Equipment Removal" because there is no enclosure structure to be administered, no ventilation and decontamination equipment to be operated, and minimal off-site waste disposal activities.

Table 3.6. Worker Exposure Estimates

Demolish Buildings	Crew	Man-Hours	Crew Dose (mrem)	Avg. Exposure Rate (mrem/hr)
	Operator	384.00	122.33	0.32
	Oiler	360.00	50.80	0.14
	Millwright	64.00	21.60	0.34
	Laborer	256.00	358.80	1.40
	Teamster	372.00	188.94	0.51
	Electrician	48.00	232.00	4.83
	HPT	272.00	376.00	1.38
	PIC	152.00	169.60	1.12
	Rigger/Ironwrkr	64.00	176.00	2.75
	Boilermaker	32.00	160.00	5.00
	Pipefitter	80.00	128.00	1.60
	Pl. Operator	8.00	1600.00	200.00
Grout Wells/ Drill Replacement Wells	Crew	Man-Hours	Crew Dose (mrem)	Avg. Exposure Rate (mrem/hr)
	Driller	1180.00	59.00	0.05
	Helper	1180.00	59.00	0.05
	Laborer	1180.00	59.00	0.05
	HPT	1180.00	59.00	0.05
Grout Pipe	Crew	Man-Hours	Crew Dose (mrem)	Avg. Exposure Rate (mrem/hr)
	PIC	4406.50	50701.58	11.51
	Operator	3522.10	318.13	0.09
	Oiler	80.00	8.00	0.10
	Rigger	288.00	252.00	0.88
	Flagger	288.00	60.00	0.21
	Laborer	13286.59	504125.36	37.94
	Pipefitter	6524.19	501565.40	76.88
	Teamster	964.40	96.44	0.10
	Pl. Operator	3537.60	353.76	0.10
	HPT	8320.00	95730.74	11.51
Grout Fill Encasements	Crew	Man-Hours	Crew Dose (mrem)	Avg. Exposure Rate (mrem/hr)
	PIC	1063.80	2903.91	2.73
	Operator	967.80	20.95	0.02
	Rigger	48.00	882.90	18.39
	Laborer	2719.20	57858.25	21.28
	Pl. Operator	288.00	28.80	0.10
	HPT	1112.00	6242.40	5.61
Grout Pits, Boxes and Tanks	Crew	Man-Hours	Crew Dose (mrem)	Avg. Exposure Rate (mrem/hr)
	PIC	312.00	164.40	0.53
	Operator	346.00	191.80	0.55
	Laborer	1138.00	497.80	0.44
	Teamster	264.00	102.00	0.39
	HPT	296.00	67.60	0.23
Grout Risers	Crew	Man-Hours	Crew Dose (mrem)	Avg. Exposure Rate (mrem/hr)
	PIC	594.00	613.40	1.03
	Helper	1656.00	1276.00	0.77
	Laborer	1920.00	2519.60	1.31
	Pipefitter	1044.00	1702.00	1.63
	Operator	594.00	613.40	1.03
	Ironworker	68.00	68.00	1.00
	Driller	760.00	570.00	0.75
	HPT	1856.00	224.00	0.12

Table 3.7. Cumulative Exposure Estimates by Unit Process

Unit Process	Cumulative Doses (mrem)
Demolish Buildings	3,584
Drill and Grout Wells	236
Grout Pipes	1,153,211
Grout Encasements	67,937
Grout Pits, Boxes, Tanks	1,023
Grout Risers	7,586

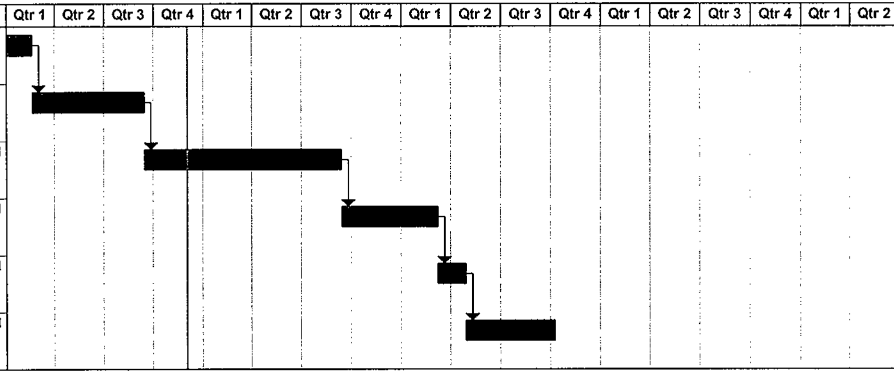
Table 3.8. Cost Breakdown

Cost Component	Cost (Note 1)
Post-Retrieval Monitoring and Maintenance	N/A
Capital	
Engineering/Construction Management	11,690,000
Equipment Procurement	4,040,000
Remedial Construction	13,270,000
Waste Disposal	440,000
	Total = 29,440,000
Research and Development	N/A
Operating	N/A
Decontamination and Decommissioning	N/A

Note 1: Costs are rounded to the nearest $10,000. Costs include contingencies averaging 72 percent (itemized in Appendix G). Costs do not include escalation (all costs are in $1998).

Figure 3.1. AX Tank Farm Ancillary Equipment Grout Case

ID	Task Name	Duration
1	Facility Demolition	35d
2	Perforate/Grout Wells, Drill Three Replacement Wells	147.5d
3	Grout Pipe	260d
4	Concrete Fill Encasements	127d
5	Grout Leak Detection Pits, Grout Other Pits, Diversion Boxes, and Grout Tank Related Pits	37d
6	Grout Risers	116d



4.0 REFERENCES

Alstad, A.T., 1993, *Riser Configuration Document for Single-Shell Waste Tanks*, WHC-SD-RE-TI-053, Rev. 9, Westinghouse Hanford Company, Richland, Washington.

Ecology, EPA, and DOE, 1990, *Hanford Federal Facility Agreement and Consent Order*, 2 vols., as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.

JEG, 1997, *Hanford Tanks Initiative, Retrieval Performance Evaluation Criteria Assessment: Work Plan*, Jacobs Engineering Group, Kennewick, Washington.

Kline, P.L., H. Hampt, and W.A. Skelly, 1995, *Closure Technical Data Package for the Tank Waste Remediation System Environmental Impact Statement*, WHC-SD-WM-EV-107, Westinghouse Hanford Company, Richland, Washington.

Schaus, P.S., 1997, *Hanford Tanks Initiative Plan*, HNF-SD-HTI-PLN-002, Lockheed Martin Hanford Corporation, Richland, Washington.

SESC, 1997, *AX Tank Farm Tank Removal Study*, SESC-EN-RPT-003, SGN Eurysis Services Corporation, Richland, Washington.

WACA, 1997, *Suggested Specifications for Controlled Density Fill*, Washington Aggregates and Concrete Association, Seattle, Washington.

WHC, 1996, *Engineering Study of Tank Fill Alternatives for Closure of Single-Shell Tanks*, WHC-SD-WM-ES-399, Westinghouse Hanford Company, Richland, Washington.

APPENDIX A

EQUIPMENT LIST

CONTENTS

A. SURPLUS BUILDINGS AND OTHER SURFACE FACILITIES

- 801-A Instrument Building
- 801-B Instrument Building
- 2707-AX Change House
- Ion Exchange Column
- A-702 Fan House/Filter Building
- Caissons/Deentrainer Facilities Associated with A-702
- A-401 Condenser Building
- Cooling Tower
- Cold Water Sump
- Warm Water Sump
- A-701 Compressor Building
- A-8 Sampler Pits

B. WELLS

- 8 numbered vadose wells associated with AX-101
- 20 numbered vadose wells associated with AX-102
- 1 un-numbered vadose well associated with AX-102
- 6 numbered vadose wells associated with AX-103
- 8 numbered vadose wells associated with AX-104
- 8 numbered perimeter wells (5 vadose and 3 ground water wells)

For additional information, see Well Summary Tables, Appendix C.

C. RISER PENETRATIONS

AX-101

No.	Dia.	Elev.	Description and Comments
1A	34"	681.67	STEAM COIL
1B	12"	675.65	(SLUICER)
3A	16"	681.64	OBSV PORT
4	20"		U. G. VENT LINE - BG
5A	12"	675.92	(SALTWELL SCREEN)
5B	12"	675.92	(PUMP MOUNT)
6	4"		FLANGE, BM
7A	4"	681.71	WC- PROFILE TEMPERATURE
7B	4"	681.71	WC- PROFILE TEMPERATURE
7C	4"	681.75	WC- PROFILE TEMPERATURE
7D	4"	681.71	WC- PROFILE TEMPERATURE
8A	6"	681.64	PLUG
8B	6"	681.65	PLUG
8C	6"	681.66	FIC
8D	6"	681.70	PLUG
8E	6"	681.71	PLUG
8F	6"	681.74	FLANGE, BM
8G	6"	681.71	PLUG
9A	6"	681.60	LOW
9B	6"	681.64	TEMPERATURE PROBE, TO CLASS
9C	6"	681.65	FLANGE
9D	6"	681.70	SMP
9E	6"	681.69	BREATHER FILTER
9F	6"	681.72	FLANGE
9G	6"	681.71	SMP
10	4"		(PIT DRAIN)

AX-101

No.	Dia.	Elev.	Description and Comments
11A	7 - 3/4" conduit bundle		STRUCTURAL TEMPERATURE - CONCRETE PLUG
11B	7 - 3/4" conduit bundle		STRUCTURAL TEMPERATURE - BG
11C	7 - 3/4" conduit bundle		STRUCTURAL TEMPERATURE - BG
12	4"		STRUCTURAL TEMPERATURE - BG
13A	4"	681.51	WC
13B	4"	681.54	WC
13C	4"	681.52	WC
14	42"		STEAM COIL
15	4"		BG
23	12"		(SLUICING NOZZLE)
24	12"		(SLUICING NOZZLE)

This tank also is equipped with 22 airlift circulators (unnumbered).

241-AX-102

No.	Dia.	Elev.	Description and Comments
1A	34"	675.65	(SLUICER) WC
1B	34"	675.65	(PUMP) WC
1C	12"	675.65	
3A	16"	682.65	OBSV PORT, RM
5A	12"	675.92	(SALTWELL SCREEN) WC
5B	12"	675.92	(PUMP ACCESS) WC
6	4"		BG
7A	4"	682.69	FLANGE
7B	4"	682.66	TEMPERATURE
7C	4"	682.68	TEMPERATURE, BM
7D	4"	682.68	TEMPERATURE
8A	6"	682.68	PLUG
8B	6"	682.68	PLUG
8C	6"	682.67	PLUG - FLANGE WITH BALE
8D	6"	682.71	PLUG - FLANGE WITH BALE
8E	6"	682.68	PLUG
8F	6"	682.68	PLUG - FLANGE WITH BALE
8G	6"	682.68	PLUG - FLANGE WITH BALE
9A	6"	682.65	SMP
9B	6"	682.68	FIC
9C	6"	682.68	TEMPERATURE
9D	6"	682.69	LLR
9E	6"	682.66	BREATHER FILTER
9F	6"	682.69	FLANGE
9G	6"	682.66	SMP
10	4"		(PIT DRAIN) WC
11A	7 - 3/4" conduit bundle		STRUCTURAL TEMPERATURE - BG

241-AX-102

No.	Dia.	Elev.	Description and Comments
11B	7 - 3/4" conduit bundle		STRUCTURAL TEMPERATURE - BG
11C	7 - 3/4" conduit bundle		STRUCTURAL TEMPERATURE - BG
12	4"		PIT DRAIN - BG
13A	4"	682.56	WC
13B	4"	682.57	TEMPERATURE
13C	4"	682.56	WC
14	42"		STEAM COIL
15	4"		BG
4	20"		VAPOR OUTLET - BG

This tank also is equipped with 22 airlift circulators (unnumbered).

241-AX-103

No.	Dia.	Elev.	Description and Comments
1A	34"	675.65	(SLUICER)
1B	34"	676.05	(SLUICER)
3A	16"	681.60	FLANGE WITH LEAD/B-222 OBSV PORT
4	20"		U.G. VENT LINE - BG
5A	12"	675.92	(PUMP MOUNT)
5B	12"	675.92	(PUMP MOUNT)
6	4"	681.67	TANK PRESSURE, BM
7A	4"	681.67	TEMPERATURE
7B	4"	681.63	TEMPERATURE
7C	4"	681.66	TEMPERATURE
7D	4"	681.67	TEMPERATURE
8A	6"	681.65	DRYWELL
8B	6"	681.62	PLUG
8C	6"	681.64	DRYWELL
8D	6"	681.67	FLANGE
8E	6"	681.65	FLANGE
8F	6"	681.65	FLANGE, BM
8G	6"	681.70	FLANGE
9A	6"	681.64	TEMPERATURE
9B	6"	681.63	TEMPERATURE
9C	6"	681.64	FIC
9D	6"	681.66	SMP
9E	6"	681.64	BREATHER FILTER
9F	6"	681.65	FLANGE
9G	6"	681.69	FLANGE
10	4"		(PIT DRAIN)
11A	7 - 3/4" conduit bundle		STRUCTURAL TEMPERATURE - BG

241-AX-103

No.	Dia.	Elev.	Description and Comments
11B	7 - 3/4" conduit bundle		STRUCTURAL TEMPERATURE - BG
Z11C	7 - 3/4" conduit bundle		STRUCTURAL TEMPERATURE - BG
12	4"		DRAIN - BG
13A	4"		WC-TEMPERATURE
13B	4"	681.52	WC
13C	4"	681.49	TEMPERATURE - WC
14	42"		(SLUICER)
15	4"		BG

This tank also is equipped with 22 airlift circulators (unnumbered).

241-AX-104

No.	Dia.	Elev.	Description and Comments
1A	34"	675.65	(SLUICER) WC
1B	34"	676.05	(SLUICER) WC
3A	14"	682.63	OBSV PORT, BM
4	20"		U. G. VENTLINE - BG
5A	12"	675.92	(PUMP MOUNT) WC
5B	12"	675.92	(PUMP MOUNT) WC
6	4"		BG
7A	4"	682.79	TEMPERATURE
7B	4"	682.64	TEMPERATURE
7C	4"	682.65	SMP, BM
7D	4"	682.65	SMP
8A	6"	682.62	DRYWELL
8B	6"	682.60	PLUG - FLANGE WITH BALE
8C	6"	682.67	DRYWELL
8D	6"	682.79	BG
8E	6"	682.66	DRYWELL
8F	6"	682.65	PLUG
8G	6"	682.66	PLUG - FLANGE WITH BALE
9A	6"	682.61	LIQUID LEVEL REEL
9B	6"	682.61	FIC
9C	6"	680.66	TEMPERATURE
9D	6"	862.71	BG
9E	6"	682.65	BREATHER FILTER
9F	6"	682.64	BG
9G	6"	682.66	SMP
10	4"		(PIT DRAIN) WC
11A	7 - 3/4" conduit bundle		STRUCTURAL TEMPERATURE - BG

241-AX-104

No.	Dia.	Elev.	Description and Comments
11B	7 - 3/4" conduit bundle		STRUCTURAL TEMPERATURE - BG
11C	7 - 3/4" conduit bundle		STRUCTURAL TEMPERATURE - BG
12	4"		DRAIN - BG
13A	4"	682.49	WC
13B	4"	682.49	WC
13C	4"	682.54	WC
14	42"	675.65	(SLUICER) WC
15	4"		BG
16A	4"	682.20	BG
16B	4"	682.72	FLANGE
16C	4"	682.67	FLANGE

This tank also is equipped with 22 airlift circulators (unnumbered).

D. LEAK DETECTION PITS

- Pit associated with Tank AX-101
- Pit associated with Tank AX-102
- Pit associated with Tank AX-103
- Pit associated with Tank AX-104

E. CRIBS AND OTHER SITES FOR DISPOSAL OF LIQUID WASTE STREAMS TO SOIL COLUMN

- 216-A-39 Crib
- Septic tank associated with 2707-AX Changehouse
- Abandoned leach field associated with septic tank
- Active leach field associated with septic tank
- 24" French drain (dry well) associated with 241-AX-152
- 48" French drain (dry well) associated with vapor header
- 48" French drain (dry well) associated with A-702 Fan House
- French drain (dry well) associated with A-701 Condenser Bldg
- (4) 3" French drains (dry wells) internal to radiation monitoring well compartments of Leak Detection Pits
- (2) French drains (dry wells) at Group 20 vapor header branches

F. DIRECT BURIED PIPING, ENCASED PIPING, AND VENTILATION ELEMENTS

Group 1: From N-S Vent Header to A-401 Condenser Building
- (6) 2" Condensate Trap Drains
- (3) 6" Condensate Drains
- (1) 3" Condensate Drain
- 24" Vapor Header to A-401
- 18" Vapor Header Return to A-702

Group 2: From AX-152 to south edge and AX-152 to AY-501
- 24" 0109-M9 Vapor Header
- 3" 4021-M9 Pump-out line
- 3" 4021-M9 Bypass line
- 3" 4022-M9 Pump-out line
- 4" 4024-M9 Flush line
- 4" 4025-M9 Flush line
- 4" 4017-M9 Waste fill line
- 4" 4018-M9 Waste fill line
- 4" PW-C-101-M9
- 4" PW-C-102-M9
- 4" PW-C-103-M9
- 4" PW-C-104-M9
- 2" F-101-2 Condensate drain to AX-501 valve pit
- 2" F-102-2 Condensate drain to AX-501 valve pit
- 2" 0016-M9 Drain

Group 3: From AX-A/AX-B to south edge
- 1-1/2" S100-M2
- 2" SL-101-M25
- 3" SN-201-M25
- 3" SN-200-M25
- 2" SL-100-M25
- 3" SN-214
- 3" SN-213-M25
- 3" DR-314-M24
- 3/4" CNDS-M2
- New 3" line installed by Proj. W-314 (Replaces SN-200/SN-213)

Group 4: West edge to Group 2; west edge to 2707-AX
- 4" 4017-M9 Waste fill line
- 4" 4018-M9 Waste fill line
- 3" 4021-M9 Pump-out line
- 3" 4022-M9 Pump-out line
- 3" Sanitary water line (to 2707-AX Change House)

Group 5: From AX-B to west edge
2" SL-502-M25
New 3" line installed by Proj. W-314

Group 6: From AX-152 to west edge
24"-V-0100-M9
3"-PW-4526-M35 red. To 2" PW-4027-M35
4" PW-4502-M9 (identified on some drawings as B-108)
4" PW-4501-M9 (identified on some drawings as A-108)
4" PW-4505-M9 (identified on some drawings as B-106)
4" PW-4504-M9 (identified on some drawings as A-106)
4" PW-4503-M9 (identified on some drawings as C-108)
4" PW-4506-M9 (identified on some drawings as C-106)

Group 7: From AX-155 to west edge
4" V-714

Group 8: From AZ-152 to west edge
3" PW-4608
3" PW-4550-M5

Group 9: From Group 6 encasement to north edge
4" PW-4510-M9
4" PW-4511-M9
4" PW-4509-M9
4" PW-4512-M9
4" PW-4507-M9
4" PW-4508-M9
2" PW-4551-M35

Group 10: From Group 6 encasement to AX-155; from AX-155 and AY-501 to north edge; from AX-155 south to AX-152
24" V-0602-M9
2" F-503-M5
2" F-504-M5
2" F-501-M5
2" F-502-M5
3" PW-4506-M9 (identified on some drawings as C-105)
3" PW-4509-M9 (identified on some drawings as C-106)
3" PW-4503-M9 (identified on some drawings as C-107)
3" PW-4512-M9 (identified on some drawings as C-108)
3" V-719
3" DR-V713

Group 11: From Group 9 encasement to north edge
4" PW-4512-M9 (identified on some drawings as C-107) - capped
4" PW-4509-M9 (identified on some drawings as C-105) - capped
4" PW-4507-M9 (identified on some drawings as A-105)
4" PW-4508-M9 (identified on some drawings as B-105)

Group 12: From AX-A and AX-B to north edge
2" SL-500-M25
2" SN-600-M25
New 3" line installed by Proj. W-314

Group 13: From AX-B to north edge
2" SN-247

Group 14: From north edge to south edge
8" raw water line

Group 15: From AX-101 to A-417
1-1/2" M2 Steam Condensate Line (Abandoned)
4" M2 Steam Condensate Line

Group 16: Transfer lines to AY-152 and sluice lines to AY Tank Farm

Group 16A: Feed lines to/from 244-AR Vault
(2) 6" PSW transfer lines

Group 16B: Sluice lines to AY-102
6" PSW-D502-M5
6" PSW-S506-M5
6" PSW-S507-M5
6" PSW-S505-M5
6" PSW-S508-M5

Group 16C: Sluice lines to AY-101
6" PSW-S504-M5
6" PSW-S503-M5
6" PSW-S501-M5
6" PSW-S502-M5
6" PSW-D501-M5

Group 16D: Sluice lines connecting to Group 8 (to AZ Tank Farm)
6" PSW-D505-M5
6" PSW-S517-M5

Group 17: Sluice lines from AY-152 to four AX tanks
6" PSW-8021-M5
6" PSW-8064-M5
6" PSW-8022-M5
6" PSW-8025-M5
6" PSW-8063-M5
6" PSW-8026-M5
6" PSW-8023-M5
6" PSW-8062-M5
6" PSW-8024-M5
6" PSW-8027-M5

6" PSW-8061-M5
6" PSW-8028-M5

Group 18: Waste transfer lines from AX-A and AX-B valve pits to AX tanks

3" SN-211-M25 (to AX-101 and AX-103)
2" SL-111-M25 "
2" SL-108-M25 "
3" DR-326-M24 "
3" SN-208-M25 "
3" DR-327-M24 (to AX-102 and AX-104)
3" DR-314-M24 "
3" SN-212-M25 "
2" SL-112-M25 "
3" SN-209-M25 "
2" SL-109-M25 "
3" DR-325-M24
3" DR-333-M24

(This group also includes flush/drain lines between AX-A and AX-B valve pits and associated flush/service pits)

Group 19: Flush lines between valve pits and sluice/pump pits above four AX tanks

1-1/2" raw water lines (unnumbered)

Group 20: Waste fill lines and associated piping between AX-152 and AX tanks

4" PW-A104
4" PW-A102
4" PW-A101
4" PW-A103
4" PW-C104
4" PW-C102
4" PW-C101
4" PW-C103
4" PW-B104
4" PW-B102
4" PW-B101
4" PW-B103
3" 4026-M35
24" V-0100-M9
3/4" 3312
1" 2000
3" 1000
2" 3000
2" 3001
2" 3003
3/4" 3412

G. PUMP PITS, SLUICE PITS, AND VALVE PITS ASSOCIATED WITH INDIVIDUAL TANKS

Designation	Tank	Description
241-AX-01A	AX-101	Pump/Distributor Pit
241-AX-01B	AX-101	Pump Pit
241-AX-01C	AX-101	Sluice Pit
241-AX-01D	AX-101	Sluice Pit
241-AX-01VP	AX-101	Valve Pit
241-AX-02A	AX-102	Pump/Distributor Pit
241-AX-02B	AX-102	Pump Pit
241-AX-02C	AX-102	Sluice Pit
241-AX-02D	AX-102	Pump/Sluice Pit
241-AX-O2VP	AX-102	Valve Pit
241-AX-03A	AX-103	Pump/Distributor Pit
241-AX-03A	AX-103	Pump Pit
241-AX-03C	AX-103	Sluice Pit
241-AX-03D	AX-103	Pump/Sluice Pit
241-AX-03VP	AX-103	Valve Pit
241-AX-04A	AX-104	Pump/Distributor Pit
241-AX-04B	AX-104	Pump Pit
241-AX-04C	AX-104	Sluice Pit
241-AX-04D	AX-104	Sluice Pit
241-AX-04VP	AX-104	Valve Pit

H. OTHER VALVE PITS, JUMPER PITS, DIVERSION BOXES AND STRUCTURES ASSOCIATED WITH THESE PITS/BOXES

- 241-AX-A Valve Pit
- 241-AX-B Valve Pit
- (2) Flush Pits associated with AX-A/AX-B
- (1) Service pit associated with AX-A/AX-B
- 241-AY-152 Sluice Pit
- 241-AX-152 Diverter Station
- (1) Valve box associated with 241-AX-152
- (2) Manholes associated with 241-AX-152
- 241-AX-153 Isolation (Jumper) Pit
- 241-AY-501 Condensate Valve Pit
- 241-AX-155 Diversion Box
- 241-AX-501 Valve Pit
- 241-A-417 Pump Pit and Tank

APPENDIX B

INVENTORY OF ANCILLARY EQUIPMENT ASSOCIATED WITH 241-AX TANK FARM CLOSURE

INVENTORY OF ANCILLARY EQUIPMENT ASSOCIATED WITH 241-AX TANK FARM CLOSURE

The 241-AX Tank Farm contains four single-shell carbon steel tanks nominally rated for storage capacities of one million gallons each. The tanks are identified as tanks 241-AX-101 through 241-AX-104, and are situated northeast, southeast, northwest, and southwest, in the tank farm. Each tank is supported with a variety of ancillary equipment that has been used in the waste storage tank operations and in the monitoring of tank contents, and the four tanks are surrounded by a concrete support structure.

During 1997, study was conducted on the sludge, supernate, and saltcake contents of the tanks, residual contents of the tanks upon retrieval, retrieval spill loss potentials, and of vadose zone contamination (SESC 1997). Additional HTI study has been tasked to SESC to determine the actions necessary to complete the soil, ancilliary equipment, and tank removal of the 241-AX tank farm. At present no decision has been made to remove these materials; information from these analyses is required to support a decision analysis on the costs and benefits of removing, stabilizing, or abandoning the various materials present in the tank farm.

The objectives of this study is to identify all equipment present in the tank farm to determine the volume and handling requirements of all removed materials as well as to evaluate the most effective options for disposition of the materials.

This analysis is prepared to describe and to anticipate residual waste contamination that may be encountered during the removal of ancillary equipment in the closure of Hanford tank farm 241-AX. Ancillary equipment within the farm does not encompass the tanks nor their current contents but is intended to address all identified equipment beyond the tank dome that has been in contaminated service.

The products of this analysis include a series of tables identifying the equipment studied and the extent of their anticipated contamination, compositions and volumes of waste materials anticipated, and the overall inventory of contaminants anticipated in all ancillary equipment.

It should be recognized that no specific field measurement of equipment fouling or waste material composition exists for the subject equipment. Although sludge material compositions for tank waste materials are supported by process history and limited sampling, and equipment sizing is supported by existing Hanford engineering documentation, the estimated residual contamination volumes of any equipment in the 241-AX tank farm are based on the best engineering judgement of SESC engineering staff. Precision of contaminant residue should be construed to be one significant digit at best. The structure of this analysis allows ready extrema estimates and should be considered when conducting decision analysis with regard to equipment disposition and expectations of personnel exposure.

The following discussion provides an overview of the bases for equipment identification, waste identification and composition estimation, and contamination estimates.

Equipment Identification

Removal of equipment from the 241-AX Tank Farm will require the excavation of large volumes of soil as well as removal of equipment items. In order to effect these removals, it is anticipated that a large building will be constructed over the site in order to provide controlled access and contaminant control. Ancillary equipment for this HTI study is defined as any structure, equipment, or pipeline within the planned excavation building footing area exclusive of the four tanks and the removed soils.

For the purposes of this study, ancilliary equipment has been catagorized, and may be briefly described, as:

- Sluice Lines - Piping used to transfer tank liquor into the tanks through high velocity nozzles, allowing the breakup and suspension of tank waste solids. Once suspended, the liquor and solids were pumped out and through separate sluice lines to sluice pit 241-AY-152. Each pipe is schedule 40 carbon steel with 6" internal diameter. Forty-two sluice lines supporting sluice operations of the 241-AX and 241-AY tank farms are considered in this analysis.

- Transfer Lines - Piping used to transfer tank wastes into and out of tanks to various pits and diversion boxes and piping used to transfer condensates or provide drainage from pits and diversion boxes. Instrument air and raw water lines are generally construed as transfer lines but where present in this analysis have no contamination service. Approximately 100 transfer lines have been considered in this analysis.

- Ventilation Headers - The four tanks in this farm have been actively ventilated. Each tank dome contains a large penetration for the air duct. The various ducts from the tanks join in headers and proceed to join with ducts from other tank farms prior to gas stream treatment and release. Ducting is nominally 24" in diameter and supported on concrete piers. Ten major ventilation header sections are considered in this analysis.

- Risers - Each waste storage tank is penetrated with a number of steel pipes (risers) of various dimension and for various purposes. Some of these risers are for simple entraces to allow uncontaminated thermocouple placement into the tank waste body or into the walls of the tanks. Other risers are used in the extraction of samples, placement of pumps, air lift circulation, and transfer of tank wastes. In all, 234 risers are considered in this analysis.

- Pits and Cribs - Pits are concrete structures used to house material transfer joints. Various lines (especially transfer lines) penetrate such pits through the wall and are terminated with nozzles. such nozzles are 'jumpered' to other nozzles to allow a defined flow path for material being transferred down the line. Cribs are engineered soil receivers which may have received condensates and other liquors. In all, 46 pits and cribs are considered in this analysis.
- Catch Tanks - A catch tank supports material transfers and transfer lines with the ability the receive material spills and mistransferred wastes. One catch tank for

condensates in 241-A-417 is considered in this analysis. An additional catch tank in diversion box 241-AX-152 is also considered.

- Buildings - Buildings required for farm operation include changehouses, instrument buildings, condenser, compressor and other buildings. In all, 14 buildings are considered in this analysis.

- Wells - Wells are steel encased penetrations of the soil intended to monitor soil contamination. In all, 51 wells have been identified within the confines of the excavation and building area.

Each item of ancillary equipment has been identified and considered for the potential of contamination residue (inventory). Consideration of contamination residue within equipment requires a detailed understanding of the design and sizing of the equipment as well as extensive knowledge of the application of the equipment item. An adequate description for an equipment item may be exemplified as: 6-PSW-8062-M5, a six inch schedule 40 carbon steel sluice line serving sluice liquor return from Tank 241-AX-102 to Sluice Pit 241-AY-152, with a length of 80.37 meters.

With such a description, one may determine the approximate volume of the equipment and recognize that this line would have handled heavy solids and liquids sluiced out of Tank 241-AX-102. Such a description will allow for differences in estimate of contamination residue based upon relative activity and equipment history. For this example, sluice lines into the tanks will be significantly less fouled that the sluice lines out of the tanks, and the sluice history of Tank 241-AX-102 (Rodenhizer 1987) indicates that sludge sluicing of Tank 241-AX-102 was substantially unsuccessful due to the low mobility of the sludge. A sluice return line from this tank would be expected to have modestly high settled sludge quantities relative to sluice return lines from other tanks.

Equipment identified for contaminated service and contamination residue inventory are tabulated at the end of this section in association with waste types, equipment volume, contamination load factors and sludge residue volume.

Wells have been discounted from this analysis with the reasoning that soil contamination surrounding any well has already been considered among vadose zone contaminations and that the internal surfaces of well casings have not been in contaminated service. Risers from tanks are considered for contamination over the height from the surface (or maximum elevation) down to the concrete tank dome.

Waste Identification

Wastes assumed to be present in the contaminated equipment are the sludges derived from material transferred into and out of the tanks in this farm and adjacent farms. Prior inventory evaluation of the 241-AX Tank Farm (SESC 1997) detailed sludge composition estimates for each of the four tanks in this tank farm. Sludge estimates for materials processed in the 241-AY Tank Farm are derived from Agnew (1997) as the precipitated sludge composition for materials processed, and remaining, in Tanks 241-AY-101 and 241-AY-102. Equipment in contact with particular wastes are assumed to be contaminated with those wastes.

Many equipment items served combinations of waste types. A significant example of multiple stream contamination is the ventilation header system serving this tank farm. The ventilation duct serving Tank 241-AX-101 joins up with that serving 241-AX-102 in a header between the tanks, the header duct travels west where additional ventilation streams from Tanks 241-AX-103 and 241-AX-104 join the duct. This combined duct continues west to diversion box 241-AX-152 where it is joined by ducting from Farms 241-AY and 241-AZ. The combined stream flowed southward to a joint with the 241-A ventilation ducting and was then ducted eastward through a deentrainer prior to contact with a condenser arrangement in building 241-A-401 and return to fan house 241-A-702 for final filtration and stack release. For cases of multiple contributions to contamination residue, combinatory compositions of the six waste sludges have been composed in proportion to the volume of sludges described by each. No estimate has been prepared explicitly for 241-A or 241-AZ sludge compositions; where encountered, the A and AZ contaminated equipment is assumed to be contaminated with sludges based upon all AY and AX tanks.

Waste sludge compositions for the six tanks and combined wastes are provided in **Table 1** and **Table 2** for chemical and radionuclide concentrations, respectively. These concentrations are expressed in moles (gram-moles) or curies[1] per liter. These concentrations, in association with equipment volume and fractional loading (fraction of equipment filled with waste) are used to estimate chemical and radiochemical inventory in each equipment item.

For purposes of personnel exposure estimation, it must be recognized that primary gamma emitting sources (^{137}Cs-^{137m}Ba) are conservatively estimated in this analysis. The material compositions prepared for the subject wastes are those of tank sludges; these sludges would routinely contain significant quantities (often 60-70 volume percent) of interstitial brine. Operational history, and current practice, indicates significant aqueous flushing of lines and equipment after transfer of tank wastes and their sludges. The high solubility of sodium and cesium in the flush water would serve to dramatically wash out these constituents from any settled sludges. No reduction of inventory estimate of these constituents has been made to reflect this dilution with flushing.

Service and Contamination Estimates

Service and Contamination factors are assigned for each equipment item. Each factor is assigned in accordance with the expectation or history of contamination. A fouling factor is intended to describe the fraction of an equipment item's volume which is occupied with settled sludges. Because of the nature of operation of the various equipment types and their likelihood of sludge contamination, contamination factors must be established for each discrete equipment type. Velocity and shear in pipes and ducts contribute significantly to consideration of contamination factors. Service factors are intended to weight the relative contamination within an equipment type so that items tending to have served waste streams containing lower settelable solids contents will not be grossly overestimated in inventory.

---

[1] The internationally accepted standard of radioactive decay measurement is the Becquerel (Bq). This document uses the term Curie (Ci) to express radioactive decay with a conversion of 1 Ci = 3.7×10^{10} Bq.

The service and contamination factors are categorized, and displayed in **Table 3** as: None, Light, Moderate, Heavy, and Full. These textual descriptors of contamination were deemed most appropriate for equipment inventory estimate reviews. Associated with each category of service or contamination, for each type of equipment, a factor between zero and one is assigned to describe the extent of contamination.

Descriptors 'None' and 'Full' are clearly the limits of zero and one and are provided for application of knowledge about equipment which indicates that it may be either noncontaminated or full of waste sludge. The application of a service or contamination factor of 'None' would be appropriate if the equipment had not been in contaminated service or may have been reported to have been fully decontaminated. The application of a contamination factor of 'Full" may be appropriate if equipment had been reported Failed and Full of Sludge. Intermediate descriptors are *cultured by equipment type.*

Application of both service and contamination factors as full would lead to a combined term $S_{E,k} \cdot F_{E,l}$ of one. This would imply that the equipment item volume is 100% full of tank sludge. Such an estimate may be made for a parametric understanding of an extreme estimate of maximum contamination. All other factors would lead to a decrease in sludge residue estimate of the equipment item.

Service and Contamination are not absolutely linked but are intended to provide a meaningful estimate of contamination in composite. Service factors are generally established as: 0 (None), 0.1 (Light), 0.3 (Moderate), 0.7 (Heavy), and 1(Full). As exemplified above, sluice line 6-PSW-8062-M5 is a sluice return line from tank 241-AX-102. As a sluice return line bringing solids laden liquor out of the tank, its service factor (among sluice lines) is considered heavy while sluice lines feeding sluice liquor to the tank are considered in light service, thus sluice return lines are estimated to have seven times the sludge deposition of sluice feed lines with the same process contamination estimate. The normal flows through the sluicing system were very high yielding expectation of high turbulence in their pipes and light contamination. Due to the nature of relatively unsuccessful sluicing from tank 241-AX-102, the contamination estimate of this tank's sluice return line is considered moderate rather than light.

Again, because each equipment type contacts and allows deposition of waste materials in different ways, different contamination factors are established for each equipment class. Of note, building contamination factors are considered extremely small due to the large dimension of buildings (all assumed three meters high and of plan dimension), and the reality that primary contamination, where existent, will consist of painted surfaces. Contamination factors are developed, and displayed in **Table 3**, based upon equipment application. Heaviest potential contaminations considered are those of transfer, sluice, and ventilation lines. Heavy contamination of waste transfer lines is considered to be 45 percent while moderate contamination is considered 15 percent; again, each contamination term must be selected with recognition of how the equipment has been used and the probability of sludge deposition in the item.

Service and Contamination factors, in concert with waste types, are required to estimate contamination. In some cases no waste type is appropriate and no inventory is estimated. An example of such a case is the change house; the change house will have been in light service and moderate contamination, but routine decontamination will have eradicated waste definition for that building (primarily went out with laundry and contaminated trash) yielding a zero residue estimate. The differences between cases of no waste identification and of either no service or no contamination are academic (all yield zero contamination estimates) but have been carried in this analysis for purposes of review.

Computational Approach

In general approach, the analysis of expectations of contamination is an exercise of sums. For any given piece of equipment (item e) contaminated with waste (j), the waste type (j) volume is the product of the equipment volume, its service factor, contamination factor, and waste type (zero or one for each waste type) [**Eqn.(1)**].

Eqn.(1)

$$\begin{aligned}
&v_{e,j} = v_e \cdot S_{E,k} \cdot F_{E,l} \cdot \delta_{i,j} \\
&where: \\
&v_{e,j} = Waste\ type\ j\ residual\ volume\ in\ equipment\ item\ e \\
&v_e = volume\ of\ equipment\ item\ e \\
&S_{E,k} = Service\ Factor\ k\ for\ Equipment\ Type\ E \\
&F_{E,l} = Fouling\ Factor\ l\ for\ Equipment\ Type\ E \\
&\delta_{i,j} = Kronecker\ delta\ = +1\ if\ waste\ type\ i = j,\ else\ = 0
\end{aligned}$$

For the example sluice line 6-PSW-8062-M5, it is a specification M5 pipe of 6 inch nominal diameter with a length of 80.37 m. The M5 specification dictates schedule 40 carbon steel design when greater than 2" nominal diameter. The volume is thus 1,498 liters. The pipe was assigned in the sluice service of 241-AX-102 with heavy service and moderate contamination. The waste volume of this item is thus:

Eqn.(2)

$$\begin{aligned}
v_{6\text{-}PSW\text{-}8062\text{-}M5,\ AX\text{-}102} &= v_{6\text{-}PSW\text{-}8062\text{-}M5} \cdot S_{Sluice,\ Hvy} \cdot F_{Sluice,\ Mod} \cdot \delta_{i,j} \\
&= 1{,}498\ l \times 0.7 \times 0.1 \times 1_{AX\text{-}102} \\
&= 104.87\ l
\end{aligned}$$

As detailed in **Eqn.(3)**, identification of the contaminant inventory or activity may be determined

from this volume and the waste type concentrations. An example of the estimates of iron and ^{137}Cs for sluice line 6-PSW-8062-M5 may be determined in the method of **Eqn.(3)**.

Eqn.(3)

$$I_{a_{6\text{-}PSW\text{-}8062\text{-}MS}} = C_{a_{AX\text{-}102}} \cdot V_{6\text{-}PSE\text{-}8062\text{-}MS,\ AX\text{-}102}$$

$$\text{where: } C_{a_{AX\text{-}102}} = \textit{concentration of analyte a in Tank 241-AX-102 waste sludge}$$

$$C_{Fe_{AX\text{-}102}} = \frac{2.55\ mol}{l} \qquad C_{137Cs_{AX\text{-}102}} = \frac{0.704\ Ci}{l}$$

$$I_{Fe_{6\text{-}PSW\text{-}8062\text{-}MS}} = \frac{2.55\ mol}{l} \cdot 104.87\ l = 267.4\ mol$$

$$I_{137Cs_{6\text{-}PSW\text{-}8062\text{-}MS}} = \frac{0.704\ Ci}{l} \cdot 104.87\ l = 73.8\ Ci\ 137Cs$$

$$\frac{I_{Fe_{6\text{-}PSW\text{-}8062\text{-}MS}}}{L} = \frac{267.4\ mol}{80.37\ m} = \frac{3.33\ mol\ Fe}{m}$$

$$\frac{I_{137Cs_{6\text{-}PSW\text{-}8062\text{-}MS}}}{L} = \frac{73.8\ Ci}{80.37\ m} = \frac{0.92\ Ci}{m}$$

When all items of an equipment type (e.g. sluice lines) are assessed for contamination residue by waste type, the calculations may be summarized by **Eqn.(4)**. The summary of all equipment type ('m' types) contributions to waste residue volumes of type 'j' is evaluated as **Eqn.(5)**, and the inventory of constituent 'i' (e.g. ^{137}Cs) is evaluated by **Eqn.(6)** as the internal product of the volume of waste type 'j' and concentration of constituent 'i' in each 'j' waste type. Concentrations, by waste sludge type, are provided on Tables 1 and 2.

Eqn.(4)

$$V_{E,j} = \sum_{i=1}^{E} v_{i,j} \cdot S_{E,i} \cdot F_{E,i} \cdot \delta_{i,j}$$

Eqn.(5)

$$V_j = \sum_{E=1}^{m} \sum_{i=1}^{E} v_i \cdot S_{E,i} \cdot F_{E,i} \cdot \delta_{i,j} = \sum_{E=1}^{m} V_{E,j}$$

Eqn.(6)

$$I_i = \sum_{j=1}^{m} V_j \cdot C_{i,j}\ [=]\ \ell \cdot \frac{mol\ or\ Ci}{\ell}\ [=]\ mol\ or\ Ci$$

Results

Table 4 contains the overall inventory estimate of the identified and analyzed tank farm ancillary equipment. **Table 5** contains the summary of calculated results from **Eqn.(4)** and **Eqn.(5)**, thereby yielding a volume of each waste type in each equipment type and a summary of volumes for each waste type. **Table 5** is used in the application of waste type sums and the compositions of **Tables 1** and **2** to yield overall inventory of the identified and analyzed tank farm ancillary equipment.

Tables 6a through **6h**, segregated by equipment type, provide the input data for the above summaries. Piecewise determination (as in **Eqn.(3)**) may be acquired by observing the waste type, and waste volume of an item on **Tables 6a** through **6g** and multiplying that volume by the waste type concentration of a desired constituent from **Table 2**. If, as in pipelines and risers, the object of study is linear contamination (e.g. line source), the contamination per unit length may be found by the product of the waste volume and waste type constituent concentration divided by the length of the item (see **Eqn.(3)**).

These estimates of equipment contamination are intended to approximate residual inventory and provide information on exposure potential and are developed under the engineering judgement of SESC staff with their knowledge of Hanford waste material generation, transfer, and storage, in general, and with the specific operating history of the 241-AX tank farm. These estimates should not be construed to be superior to any field measurements that may be made in the future but may be used to recommend sampling or measurement locations in future field investigation.

References

Agnew, S. F., 1997, *Hanford Tank Chemical and Radionuclide Inventories: HDW Model Rev. 4*, LA-UR-96-3860, Los Alamos National Laboratory, Los Alamos, New Mexico, January 1997.

Rodenhizer, D. G., 1987, *Hanford Waste Tank Sluicing History*, SD-WM-TI-302, Rockwell Hanford Company, Richland, Washington, September 30, 1987.

SESC, 1997, *AX-Tank Farm Inventory Study for the Hanford Tanks Initiative (HTI) Project*, SESC-EN-RPT-002, October 1997, SGN Eurisys Services Corporation, Richland, Washington.

Table 1: Mean Precipitated Chemical Constituents (mol/L) [SESC-EN-RPT-002]{HDW, TLM}

Tank	AX-101	AX-102	AX-103	AX-104	AY-101	AY-102	AX-101/102	AX-101/103	AX-102/104	AX-103/104	All AY	All AX	All AX and AY
Density (kg/m^3)	1.69E+03	1.57E+03	1.80E+03	1.80E+03	1.39E+03	1.56E+03	1.61E+03	1.78E+03	1.68E+03	1.80E+03	1.48E+03	1.74E+03	1.57E+03
Basis Vol. (m^3)	1.14E+01	2.65E+01	6.25E+01	2.65E+01	1.25E+02	1.21E+02	3.79E+01	7.39E+01	5.30E+01	8.90E+01	2.46E+02	1.27E+02	3.73E+02
Components (M)													
Ag	0.00E+00	NR	0.00E+00	NR	NR	NR	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Al	8.26E+00	2.11E+00	2.48E+00	2.49E+00	1.01E+00	2.67E+00	3.96E+00	3.37E+00	2.30E+00	2.48E+00	1.83E+00	2.92E+00	2.20E+00
As	NR	NR	NR	NR	NR	NR	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B	0.00E+00	NR	0.00E+00	NR	NR	NR	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ba	7.00E-02	NR	2.10E-02	2.10E-02	NR	NR	2.10E-02	2.85E-02	1.05E-02	2.10E-02	0.00E+00	2.10E-02	7.15E-03
Bi	0.00E+00	0.00E+00	0.00E+00	NR	1.65E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.40E-06	0.00E+00	5.54E-06
Ca	2.28E+00	1.99E-01	6.42E-01	6.45E-01	4.81E-01	2.35E-01	8.22E-01	8.93E-01	4.22E-01	6.43E-01	3.60E-01	6.96E-01	4.75E-01
Cd	5.00E-02	NR	1.50E-02	1.50E-02	NR	NR	1.50E-02	2.04E-02	7.49E-03	1.50E-02	0.00E+00	1.50E-02	5.11E-03
Cl	5.37E-02	3.52E-02	1.79E-02	1.16E-01	3.50E-02	3.68E-02	4.08E-02	2.34E-02	7.57E-02	4.71E-02	3.58E-02	4.52E-02	3.90E-02
TIC as CO_3	3.41E-01	5.33E-01	0.00E+00	2.43E-01	5.87E-01	3.99E-01	4.75E-01	5.24E-02	3.88E-01	7.23E-02	4.94E-01	1.92E-01	3.92E-01
Cr	2.03E-01	4.90E-03	6.10E-02	6.10E-02	8.27E-03	8.91E-04	6.44E-02	8.29E-02	3.29E-02	6.10E-02	4.64E-03	6.20E-02	2.42E-02
Cu	0.00E+00	NR	0.00E+00	NR	NR	NR	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
F	0.00E+00	0.00E+00	0.00E+00	NR	7.27E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.69E-04	0.00E+00	2.44E-04
Fe	1.90E+01	2.55E+00	5.31E+00	5.34E+00	1.04E+00	2.17E+00	7.48E+00	7.41E+00	3.94E+00	5.32E+00	1.60E+00	5.96E+00	3.08E+00
Hg	NR	0.00E+00	NR	NR	1.72E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.75E-08	0.00E+00	5.77E-08
K	1.17E-02	7.70E-03	0.00E+00	3.40E+00	8.36E-03	8.66E-03	8.89E-03	1.79E-03	1.70E+00	1.01E+00	8.51E-03	7.12E-01	2.48E-01
La	0.00E+00	0.00E+00	0.00E+00	NR	1.98E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E-10	0.00E+00	6.64E-11
Mg	5.70E-01	NR	1.71E-01	1.71E-01	NR	NR	1.71E-01	2.32E-01	8.54E-02	1.71E-01	0.00E+00	1.71E-01	5.82E-02
Mn	2.82E-01	2.17E-01	1.16E-01	8.45E-02	5.25E-04	6.68E-04	2.37E-01	1.42E-01	1.51E-01	1.07E-01	5.95E-04	1.46E-01	4.99E-02
Na	1.76E+01	7.32E+00	3.33E+00	4.03E+00	5.87E+00	6.20E+00	1.04E+01	5.51E+00	5.68E+00	3.54E+00	6.03E+00	5.58E+00	5.88E+00
Ni	8.67E-01	1.08E-01	2.60E-01	2.60E-01	2.65E-01	1.07E+00	3.35E-01	3.53E-01	1.84E-01	2.60E-01	6.61E-01	2.82E-01	5.32E-01
NO_2	8.34E-01	4.14E-01	8.30E-02	8.38E-02	4.68E-01	5.19E-01	5.40E-01	1.98E-01	2.49E-01	8.32E-02	4.93E-01	2.20E-01	4.00E-01
NO_3	4.10E+00	2.07E+00	0.00E+00	1.24E+00	1.95E-01	2.86E-02	2.68E+00	6.30E-01	1.66E+00	3.68E-01	1.13E-01	1.06E+00	4.35E-01
OH	5.60E+01	6.88E+00	1.56E+01	2.58E+01	7.33E+00	1.76E+01	2.16E+01	2.18E+01	1.63E+01	1.86E+01	1.24E+01	1.95E+01	1.48E+01
Pb	0.00E+00	1.63E-05	0.00E+00	1.99E-02	2.32E-05	4.84E-06	1.14E-05	0.00E+00	9.94E-03	5.91E-03	1.42E-05	4.15E-03	1.42E-03
P as PO_4	3.67E-01	2.37E-02	1.10E-01	1.11E-01	2.88E-03	1.36E-02	1.27E-01	1.49E-01	6.71E-02	1.10E-01	8.15E-03	1.15E-01	4.46E-02

Table 1: Mean Precipitated Chemical Constituents (mol/L) [SESC-EN-RPT-002]{HDW, TLM}

Tank	AX-101	AX-102	AX-103	AX-104	AY-101	AY-102	AX-101/102	AX-101/103	AX-102/104	AX-103/104	All AY	All AX	All AX and AY
P	3.67E-01	9.82E-03	1.10E-01	1.10E-01	2.88E-03	1.36E-02	1.17E-01	1.49E-01	5.99E-02	1.10E-01	8.15E-03	1.12E-01	4.35E-02
Se	NR	NR	NR	NR	NR	NR	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Si	1.01E+01	1.26E+00	2.49E+00	2.50E+00	1.98E+00	2.08E+00	3.90E+00	3.65E+00	1.88E+00	2.49E+00	2.03E+00	2.91E+00	2.33E+00
S as SO_4	5.38E-01	3.71E-02	1.35E-01	1.35E-01	1.98E+00	2.08E+00	1.87E-01	1.97E-01	8.60E-02	1.35E-01	2.03E+00	1.51E-01	1.39E+00
S	5.38E-01	1.54E-02	1.35E-01	1.35E-01	1.98E+00	2.08E+00	1.72E-01	1.97E-01	7.51E-02	1.35E-01	2.03E+00	1.46E-01	1.39E+00
Sr	0.00E+00	5.70E-02	0.00E+00	1.25E-02	0.00E+00	0.00E+00	3.99E-02	0.00E+00	3.48E-02	3.72E-03	0.00E+00	1.45E-02	4.94E-03
TOC	4.38E+00	8.76E-02	0.00E+00	NR	1.22E+00	2.84E-01	1.38E+00	6.74E-01	4.38E-02	0.00E+00	7.61E-01	4.11E-01	6.42E-01
Total U	1.36E-05	6.56E-03	1.23E-03	1.79E-05	2.69E-02	7.09E-03	4.59E-03	1.04E-03	3.29E-03	8.67E-04	1.71E-02	1.98E-03	1.20E-02
Zn	0.00E+00	NR	0.00E+00	NR	NR	NR	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zr	0.00E+00	0.00E+00	0.00E+00	NR	2.17E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-06	0.00E+00	7.26E-07
EDTA	1.29E-01	0.00E+00	NR	NR	3.14E-02	0.00E+00	3.87E-02	1.98E-02	0.00E+00	0.00E+00	1.59E-02	1.16E-02	1.44E-02
NH_3	1.34E-01	4.06E-02	2.28E-01	NR	7.33E-02	8.07E-02	6.85E-02	2.14E-01	2.03E-02	1.60E-01	7.69E-02	1.33E-01	9.60E-02
Cr^{+6}	NR	NR	NR	NR	NR	NR	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CN	NR	NR	NR	NR	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
H_2O[1]	4.12E+01	4.04E+01	4.10E+01	4.59E+01	4.80E+01	4.23E+01	4.07E+01	4.11E+01	4.32E+01	4.25E+01	4.52E+01	4.19E+01	4.41E+01

[1] All water concentrations calculated from DSW model estimate

Table 2: Mean Precipitated Radiological Constituents (Ci/L) [SESC-EN-RPT-002]{HDW, TLM}													
Tank	AX-101	AX-102	AX-103	AX-104	AY-101	AY-102	AX-101/102	AX-101/103	AX-102/104	AX-103/104	All AY	All AX	All AX and AY
Components (Ci/L)													
Decay Date	12/31/99	12/31/99	12/31/99	12/31/99	12/31/99	12/31/99	12/31/99	12/31/99	12/31/99	12/31/99	12/31/99	12/31/99	12/31/99
^{3}H	8.30E-05	3.23E-05	1.08E-04	1.28E-04	4.35E-05	1.03E-05	4.75E-05	1.04E-04	8.00E-05	1.14E-04	2.72E-05	9.41E-05	5.00E-05
^{14}C	6.77E-06	9.96E-06	0.00E+00	2.38E-05	1.16E-05	9.73E-07	9.01E-06	1.04E-06	1.69E-05	7.08E-06	6.37E-06	7.65E-06	6.80E-06
^{59}Ni	6.10E-04	4.83E-05	9.99E-05	1.18E-04	2.57E-04	1.65E-04	2.17E-04	1.78E-04	8.31E-05	1.05E-04	2.12E-04	1.39E-04	1.87E-04
^{60}Co	1.37E-05	2.39E-05	5.94E-03	5.94E-03	9.95E-06	9.97E-07	2.09E-05	5.03E-03	2.98E-03	5.94E-03	5.55E-06	4.18E-03	1.43E-03
^{63}Ni	6.00E-02	5.02E-03	1.00E-02	1.18E-02	2.44E-02	1.57E-02	2.15E-02	1.77E-02	8.42E-03	1.06E-02	2.01E-02	1.38E-02	1.80E-02
^{79}Se	3.40E-04	1.82E-04	9.45E-05	1.11E-04	2.22E-04	6.60E-07	2.29E-04	1.32E-04	1.47E-04	9.95E-05	1.13E-04	1.38E-04	1.22E-04
^{90}Sr	9.57E+00	5.09E+00	5.15E+01	5.15E+01	5.84E+00	5.64E+00	6.44E+00	4.51E+01	2.83E+01	5.15E+01	5.74E+00	3.81E+01	1.67E+01
^{90}Y	9.57E+00	5.09E+00	5.15E+01	5.15E+01	5.84E+00	5.64E+00	6.44E+00	4.51E+01	2.83E+01	5.15E+01	5.74E+00	3.81E+01	1.67E+01
^{93}mNb	1.26E-03	5.25E-04	3.26E-04	3.85E-04	5.68E-04	1.84E-06	7.45E-04	4.70E-04	4.55E-04	3.44E-04	2.90E-04	4.64E-04	3.49E-04
^{93}Zr	1.47E-03	7.93E-04	4.33E-04	5.14E-04	9.90E-04	2.97E-06	9.95E-04	5.92E-04	6.53E-04	4.57E-04	5.05E-04	6.18E-04	5.43E-04
^{99}Tc	4.57E-05	6.60E-05	0.00E+00	1.69E-04	7.90E-05	6.51E-06	5.99E-05	7.02E-06	1.17E-04	5.02E-05	4.33E-05	5.31E-05	4.67E-05
^{106}Ru	2.63E-06	2.20E-05	3.23E-07	3.82E-07	2.24E-07	2.39E-08	1.62E-05	6.77E-07	1.12E-05	3.40E-07	1.26E-07	5.08E-06	1.81E-06
^{113}mCd	3.13E-03	3.96E-03	1.85E-03	2.20E-03	2.95E-03	7.55E-06	3.71E-03	2.05E-03	3.08E-03	1.96E-03	1.50E-03	2.48E-03	1.83E-03
^{125}Sb	8.09E-05	1.49E-04	2.37E-03	2.37E-03	2.80E-05	2.98E-06	1.29E-04	2.02E-03	1.26E-03	2.37E-03	1.57E-05	1.70E-03	5.89E-04
^{126}Sn	5.46E-04	2.88E-04	1.47E-04	1.74E-04	3.51E-04	1.04E-06	3.65E-04	2.09E-04	2.31E-04	1.55E-04	1.79E-04	2.18E-04	1.92E-04
^{129}I	8.89E-08	1.29E-07	0.00E+00	3.27E-07	1.53E-07	1.27E-08	1.17E-07	1.37E-08	2.28E-07	9.71E-08	8.41E-08	1.03E-07	9.05E-08
^{134}Cs	9.76E-06	1.15E-06	6.62E-06	7.82E-06	4.09E-07	0.00E+00	3.73E-06	7.10E-06	4.48E-06	6.98E-06	2.08E-07	6.01E-06	2.18E-06
^{135}Cs	NR	NR	NR	NR	NR	NR	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
^{137}Cs	1.77E-01	7.04E-01	1.07E+00	1.07E+00	4.98E-02	0.00E+00	5.46E-01	9.31E-01	8.86E-01	1.07E+00	2.53E-02	9.12E-01	3.27E-01
^{137}mBa	1.67E-01	6.66E-01	1.01E+00	1.01E+00	4.71E-02	0.00E+00	5.16E-01	8.81E-01	8.36E-01	1.01E+00	2.39E-02	8.62E-01	3.09E-01
^{151}Sm	1.27E+00	5.23E-01	3.52E-01	4.16E-01	7.03E-01	2.28E-03	7.47E-01	4.93E-01	4.69E-01	3.71E-01	3.58E-01	4.83E-01	4.01E-01
^{152}Eu	3.18E-04	7.70E-04	1.08E-04	1.27E-04	4.26E-04	9.68E-05	6.34E-04	1.40E-04	4.49E-04	1.13E-04	2.64E-04	2.69E-04	2.66E-04
^{154}Eu	7.47E-03	5.89E-02	4.34E-02	4.34E-02	2.25E-02	4.09E-05	4.35E-02	3.79E-02	5.11E-02	4.34E-02	1.15E-02	4.34E-02	2.23E-02
^{155}Eu	1.95E-02	3.73E-02	2.79E-02	2.79E-02	1.24E-02	3.13E-03	3.20E-02	2.66E-02	3.26E-02	2.79E-02	7.82E-03	2.91E-02	1.51E-02

Table 2: Mean Precipitated Radiological Constituents (Ci/L) [SESC-EN-RPT-002]{HDW, TLM}

Tank	AX-101	AX-102	AX-103	AX-104	AY-101	AY-102	AX-101/102	AX-101/103	AX-102/104	AX-103/104	All AY	All AX	All AX and AY
^{226}Ra	4.10E-08	8.11E-09	6.27E-09	7.41E-09	1.67E-08	5.50E-09	1.80E-08	1.16E-08	7.76E-09	6.61E-09	1.12E-08	1.00E-08	1.08E-08
^{227}Ac	2.12E-07	3.85E-08	3.37E-08	4.01E-08	7.05E-08	1.99E-08	9.05E-08	6.11E-08	3.93E-08	3.56E-08	4.56E-08	5.20E-08	4.78E-08
^{228}Ra	1.86E-13	3.22E-13	5.68E-14	6.69E-14	1.12E-08	3.41E-14	2.81E-13	7.66E-14	1.94E-13	5.98E-14	5.68E-09	1.26E-13	3.75E-09
^{229}Th	3.09E-11	3.02E-11	8.86E-12	1.05E-11	1.06E-09	1.04E-11	3.04E-11	1.22E-11	2.04E-11	9.34E-12	5.45E-10	1.56E-11	3.65E-10
^{231}Pa	3.17E-07	1.20E-09	7.61E-08	8.99E-08	1.21E-07	5.86E-10	9.59E-08	1.13E-07	4.55E-08	8.02E-08	6.18E-08	8.49E-08	6.97E-08
^{232}Th	2.51E-15	4.19E-15	5.12E-15	6.05E-15	6.09E-11	3.90E-16	3.69E-15	4.72E-15	5.12E-15	5.39E-15	3.10E-11	4.88E-15	2.04E-11
^{232}U	8.20E-12	1.57E-11	7.11E-12	8.39E-12	3.96E-07	1.71E-10	1.35E-11	7.28E-12	1.21E-11	7.49E-12	2.01E-07	9.28E-12	1.33E-07
^{233}U	1.15E-13	2.08E-13	1.68E-13	1.98E-13	1.63E-06	1.87E-12	1.80E-13	1.60E-13	2.03E-13	1.77E-13	8.27E-07	1.78E-13	5.45E-07
^{234}U	3.43E-08	5.59E-08	8.76E-08	1.04E-07	2.22E-06	8.16E-07	4.94E-08	7.94E-08	7.97E-08	9.23E-08	1.53E-06	7.95E-08	1.04E-06
^{235}U	1.34E-09	2.14E-09	3.66E-09	4.31E-09	9.16E-08	3.10E-08	1.90E-09	3.30E-09	3.22E-09	3.85E-09	6.18E-08	3.27E-09	4.19E-08
^{236}U	2.26E-09	4.30E-09	2.40E-09	2.82E-09	7.11E-08	6.71E-08	3.69E-09	2.38E-09	3.56E-09	2.52E-09	6.91E-08	2.87E-09	4.66E-08
^{237}Np	1.45E-07	2.13E-07	3.05E-07	3.61E-07	2.59E-07	2.08E-08	1.92E-07	2.81E-07	2.87E-07	3.22E-07	1.42E-07	2.83E-07	1.90E-07
^{238}Pu	4.77E-04	2.28E-03	7.99E-05	9.45E-05	1.35E-03	2.44E-04	1.74E-03	1.41E-04	1.19E-03	8.43E-05	8.07E-04	5.79E-04	7.29E-04
^{238}U	2.75E-08	4.19E-08	8.54E-08	1.01E-07	2.13E-06	5.60E-07	3.76E-08	7.65E-08	7.14E-08	9.00E-08	1.36E-06	7.44E-08	9.20E-07
^{239}Pu	1.28E-02	1.54E-02	2.06E-03	2.45E-03	1.23E-02	4.15E-03	1.46E-02	3.71E-03	8.95E-03	2.18E-03	8.30E-03	5.90E-03	7.48E-03
^{240}Pu	3.38E-02	5.55E-03	3.95E-04	4.65E-04	3.79E-03	9.24E-04	1.40E-02	5.53E-03	3.01E-03	4.16E-04	2.38E-03	4.48E-03	3.09E-03
^{241}Am	1.44E-02	4.98E-02	0.00E+00	3.85E-03	3.21E-02	3.53E-03	3.92E-02	2.21E-03	2.69E-02	1.15E-03	1.80E-02	1.25E-02	1.61E-02
^{241}Pu	3.38E-02	1.58E-01	5.69E-03	6.73E-03	7.37E-02	1.43E-02	1.21E-01	1.00E-02	8.23E-02	6.00E-03	4.45E-02	4.02E-02	4.30E-02
^{242}Cm	1.21E-05	6.64E-05	2.97E-06	3.51E-06	3.83E-09	6.22E-10	5.01E-05	4.38E-06	3.50E-05	3.13E-06	2.25E-09	1.72E-05	5.84E-06
^{242}mAm	NR	NR	NR	NR	NR	NR	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
^{242}Pu	1.99E-07	1.14E-06	3.29E-08	3.89E-08	6.98E-07	1.14E-07	8.60E-07	5.85E-08	5.92E-07	3.47E-08	4.11E-07	2.81E-07	3.67E-07
^{243}Am	7.55E-07	5.59E-06	9.98E-08	1.18E-07	3.34E-06	2.70E-07	4.14E-06	2.00E-07	2.85E-06	1.05E-07	1.83E-06	1.31E-06	1.65E-06
^{243}Cm	1.09E-06	8.15E-06	2.29E-07	2.70E-07	4.43E-06	6.47E-07	6.03E-06	3.61E-07	4.21E-06	2.41E-07	2.57E-06	1.97E-06	2.36E-06
^{244}Cm	4.42E-05	3.37E-04	7.02E-06	8.28E-06	1.60E-04	1.59E-05	2.49E-04	1.27E-05	1.73E-04	7.39E-06	8.91E-05	7.96E-05	8.59E-05

Table 3: Service and Fouling Factors										
Contamination	Service Factor					Fouling Factor				
Equipment	None	Lt	Mod	Hvy	Full	None	Lt	Mod	Hvy	Full
Building	0	0.1	0.3	0.7	1	0	1.00E-05	1.00E-04	1.00E-03	1
Pit	0	0.1	0.3	0.7	1	0	0.02	0.1	0.15	1
Riser	0	0.1	0.3	0.7	1	0	0.005	0.015	0.1	1
Sluice	0	0.1	0.3	0.7	1	0	0.03	0.1	0.25	1
Tank	0	0.1	0.3	0.7	1	0	0.03	0.075	0.15	1
Transfer	0	0.1	0.3	0.7	1	0	0.03	0.15	0.45	1
Ventilation	0	0.1	0.3	0.7	1	0	0.01	0.03	0.1	1
Well	0	0.1	0.3	0.7	1	0	0.01	0.03	0.05	1

Table 4: Overall Waste Inventory Estimate 241-AX Ancilliary Equipment							
Components	kg	Components	kg	Components	(Ci)	Components	(Ci)
Ag	0	NO_2	64.77419	Decay Date	12/31/99	^{226}Ra	4.98E-05
Al	322.5095	NO_3	285.8984	^{3}H	2.95E-01	^{227}Ac	2.45E-04
As	0	OH	1269.622	^{14}C	3.37E-02	^{228}Ra	5.99E-06
B	0	Pb	2.68618	^{59}Ni	7.42E-01	^{229}Th	6.31E-07
Ba	9.628084	P as PO_4	37.59027	^{60}Co	1.03E+01	^{231}Pa	3.60E-04
Bi	0.00185	P	11.89193	^{63}Ni	7.28E+01	^{232}Th	3.26E-08
Ca	110.363	Se	0	^{79}Se	6.08E-01	^{232}U	2.12E-04
Cd	5.62926	Si	347.0492	^{90}Sr	1.04E+05	^{233}U	8.72E-04
Cl	6.652047	S as SO_4	256.3243	^{90}Y	1.04E+05	^{234}U	1.84E-03
TIC as CO3	77.00135	S	84.97465	^{93}mNb	1.95E+00	^{235}U	7.43E-05
Cr	11.05317	Sr	4.828105	^{93}Zr	2.70E+00	^{236}U	8.20E-05
Cu	0	TOC	35.89927	^{99}Tc	2.32E-01	^{237}Np	9.59E-04
F	0.007399	Total U	5.906714	^{106}Ru	2.02E-02	^{238}Pu	3.11E+00
Fe	1236.772	Zn	0	^{113}mCd	9.79E+00	^{238}U	1.64E-03
Hg	1.85E-05	Zr	0.000106	^{125}Sb	4.28E+00	^{239}Pu	3.15E+01
K	87.27667	EDTA	23.1012	^{126}Sn	9.61E-01	^{240}Pu	2.41E+01
La	1.47E-08	NH_3	7.249421	^{129}I	4.50E-04	$^{239/240}$Pu	7.38E+01
Mg	13.87544	Cr^{+6}	0	^{134}Cs	1.81E-02	^{241}Am	6.95E+01
Mn	27.25192	CN	0	^{135}Cs	0.00E+00	^{241}Pu	2.04E+02
Na	622.4564	H_2O	3153.738	^{137}Cs	2.54E+03	^{242}Cm	6.61E-02
Ni	97.122			^{137}mBa	2.40E+03	^{242}mAm	0.00E+00
				^{151}Sm	2.07E+03	^{242}Pu	1.53E-03
				^{152}Eu	1.27E+00	^{243}Am	7.08E-03
				^{154}Eu	1.39E+02	^{243}Cm	1.04E-02
				^{155}Eu	9.67E+01	^{244}Cm	4.06E-01

Table 5: Overall Residual Waste Sludge Contamination Summary by Source and Equipment

Equipment	AX-101	AX-102	AX-103	AX-104	AY-101	AY-102	AX-101/102	AX-101/103	AX-102/104	AX-103/104	All AY	All AX	All AX and AY	Summation
Waste Volume (L)	3.2E+02	4.4E+02	3.2E+02	3.1E+02	1.7E+01	1.7E+01	6.3E+01	9.8E+01	9.7E+01	0.0E+00	6.4E+00	8.5E+02	1.5E+03	4.1E+03
Building	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.0E+00	1.0E-01	0.0E+00	0.0E+00	0.0E+00	7.7E+00	8.8E+00
Pit	2.4E+02	2.4E+02	2.4E+02	2.4E+02	0.0E+00	0.0E+00	0.0E+00	9.7E+01	9.7E+01	0.0E+00	0.0E+00	1.7E+02	4.2E+02	1.7E+03
Riser	9.8E+00	1.7E+01	1.7E+01	1.6E+01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.9E+01
Sluice	5.7E+01	1.7E+02	4.5E+01	3.8E+01	1.7E+01	1.7E+01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.1E+01	3.5E+02
Tank	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.1E+03	1.1E+03
Transfer	7.1E-01	0.0E+00	0.0E+00	2.8E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.2E+02	1.9E-01	6.2E+02
Ventilation	1.8E+01	1.8E+01	1.8E+01	1.8E+01	0.0E+00	0.0E+00	6.3E+01	0.0E+00	0.0E+00	0.0E+00	6.4E+00	5.8E+01	3.8E+01	2.4E+02

Table 6a: Sluice Line Identification and Contamination								Summation
						Volume (l)		354
ID	Equipment	Waste Type	Volume (l)	Length (m)	Service	Fouling	Overall	Waste Volume (L)
6-PSW-8025-M5	Sluice	AX-101	1812.91	97.27	Lt	Lt	0.003	5.4E+00
6-PSW-8040-M5	Sluice	AX-101	318.04	17.06	Hvy	Lt	0.021	6.7E+00
6-PSW-8063-M5	Sluice	AX-101	1731.92	92.92	Hvy	Lt	0.021	3.6E+01
6-PSW-8038-M5	Sluice	AX-101	80.15	4.30	Hvy	Lt	0.021	1.7E+00
6-PSW-8041-M5	Sluice	AX-101	43.59	2.34	Hvy	Lt	0.021	9.2E-01
6-PSW-8026-M5	Sluice	AX-101	1736.17	93.15	Lt	Lt	0.003	5.2E+00
6-PSW-8039-M5	Sluice	AX-101	111.25	5.97	Lt	Lt	0.003	3.3E-01
6-PSW-8035-M5	Sluice	AX-102	111.32	5.97	Hvy	Mod	0.07	7.8E+00
6-PSW-8042-M5	Sluice	AX-102	118.86	6.38	Hvy	Mod	0.07	8.3E+00
6-PSW-8037-M5	Sluice	AX-102	255.15	13.69	Hvy	Mod	0.07	1.8E+01
6-PSW-8036-M5	Sluice	AX-102	111.47	5.98	Hvy	Mod	0.07	7.8E+00
6-PSW-8024-M5	Sluice	AX-102	1498.22	80.38	Lt	Mod	0.01	1.5E+01
6-PSW-8062-M5	Sluice	AX-102	1498.09	80.37	Hvy	Mod	0.07	1.0E+02
6-PSW-8023-M5	Sluice	AX-102	1600.48	85.87	Lt	Mod	0.01	1.6E+01
6-PSW-8029-M5	Sluice	AX-103	108.35	5.81	Hvy	Lt	0.021	2.3E+00
6-PSW-8043-M5	Sluice	AX-103	108.79	5.84	Hvy	Lt	0.021	2.3E+00
6-PSW-8022-M5	Sluice	AX-103	1332.31	71.48	Lt	Lt	0.003	4.0E+00
6-PSW-8031-M5	Sluice	AX-103	161.86	8.68	Lt	Lt	0.003	4.9E-01
6-PSW-8030-M5	Sluice	AX-103	268.84	14.42	Hvy	Lt	0.021	5.6E+00
6-PSW-8064-M5	Sluice	AX-103	1258.00	67.49	Hvy	Lt	0.021	2.6E+01
6-PSW-8021-M5	Sluice	AX-103	1141.84	61.26	Lt	Lt	0.003	3.4E+00
6-PSW-8034-M5	Sluice	AX-104	111.87	6.00	Hvy	Lt	0.021	2.3E+00
6-PSW-8044-M5	Sluice	AX-104	116.41	6.25	Hvy	Lt	0.021	2.4E+00
6-PSW-8027-M5	Sluice	AX-104	1014.37	54.42	Lt	Lt	0.003	3.0E+00
6-PSW-8033-M5	Sluice	AX-104	164.53	8.83	Hvy	Lt	0.021	3.5E+00
6-PSW-8032-M5	Sluice	AX-104	268.90	14.43	Hvy	Lt	0.021	5.6E+00
6-PSW-8028-M5	Sluice	AX-104	791.62	42.47	Lt	Lt	0.003	2.4E+00
6-PSW-8061-M5	Sluice	AX-104	905.15	48.56	Hvy	Lt	0.021	1.9E+01
6" PSW-D502-M5	Sluice	AY-102	522.07	28.01	Hvy	Lt	0.021	1.1E+01
6" PSW-S506-M5	Sluice	AY-102	512.75	27.51	Lt	Lt	0.003	1.5E+00
6" PSW-S507-M5	Sluice	AY-102	510.33	27.38	Lt	Lt	0.003	1.5E+00
6" PSW-S505-M5	Sluice	AY-102	512.75	27.51	Lt	Lt	0.003	1.5E+00
6" PSW-S508-M5	Sluice	AY-102	515.92	27.68	Lt	Lt	0.003	1.5E+00
6" PSW-S504-M5	Sluice	AY-101	512.57	27.50	Lt	Lt	0.003	1.5E+00
6" PSW-S503-M5	Sluice	AY-101	509.40	27.33	Lt	Lt	0.003	1.5E+00
6" PSW-S501-M5	Sluice	AY-101	505.86	27.14	Lt	Lt	0.003	1.5E+00
6" PSW-S502-M5	Sluice	AY-101	487.78	26.17	Lt	Lt	0.003	1.5E+00
6" PSW-D501-M5	Sluice	AY-101	505.11	27.10	Hvy	Lt	0.021	1.1E+01
6" PSW-D505-M5 (shown as capped)	Sluice	All	0.00	0.00	Hvy	Lt	0.021	0.0E+00
6" PSW-S517-M5 (shown as capped)	Sluice	All	0.00	0.00	Lt	Lt	0.003	0.0E+00
6" PSW line to AR Vault	Sluice	All	462.80	24.83	Hvy	Lt	0.021	9.7E+00
6" PSW line from AR Vault	Sluice	All	465.97	25.00	Lt	Lt	0.003	1.4E+00

Table 6b: Transfer Line Identification and Contamination								Summation
							Volume (l)	624
ID	Equipment	Waste Type	Volume (l)	Removed Length (m)	Service	Fouling	Overall	Waste Volume (L)
2" Condensate Trap Drains	transfer	All	0.0	0.0	Mod	Lt	0.009	0.0E+00
2" Condensate Trap Drains	transfer	All	21.6	0.0	Mod	Lt	0.009	1.9E-01
2" Condensate Trap Drains	transfer	All	0.0	0.0	Mod	Lt	0.009	0.0E+00
2" Condensate Trap Drains	transfer	All	0.0	0.0	Mod	Lt	0.009	0.0E+00
2" Condensate Trap Drains	transfer	All	0.0	0.0	Mod	Lt	0.009	0.0E+00
2" Condensate Trap Drains	transfer	All	0.0	0.0	Mod	Lt	0.009	0.0E+00
6" Condensate Drains	transfer	All	0.0	0.0	Mod	Lt	0.009	0.0E+00
6" Condensate Drains	transfer	All	0.0	0.0	Mod	Lt	0.009	0.0E+00
6" Condensate Drains	transfer	All	0.0	0.0	Mod	Lt	0.009	0.0E+00
3" Condensate Drain	transfer	All	0.0	0.0	Mod	Lt	0.009	0.0E+00
3" 4021-M9 Pump-out line (Ref: H-2-44646; H-2-44631; H-2-44632)	transfer	All AX	315.8	74.1	Hvy	Mod	0.105	3.3E+01
3" 4021-M9 Bypass	transfer	All AX	149.1	35.0	Hvy	Mod	0.105	1.6E+01
3" 4022-M9 Pump-out line (Ref: H-2-44646; H-2-44631; H-2-44632)	transfer	All AX	315.8	74.1	Hvy	Mod	0.105	3.3E+01
4" 4024-M9 Flush line (Ref: H-2-44652)	transfer	All AX	525.1	70.8	Lt	Lt	0.003	1.6E+00
4" 4025-M9 Flush line (Ref: H-2-44652)	transfer	All AX	525.1	70.8	Lt	Lt	0.003	1.6E+00
4" 4017-M9 Waste fill line (Ref: H-2-44652)	transfer	All AX	525.1	70.8	Mod	Mod	0.045	2.4E+01
4" 4018-M9 Waste fill line (Ref: H-2-44652)	transfer	All AX	525.1	70.8	Mod	Mod	0.045	2.4E+01
2" F-101-2 Cond. drain to AX-501 valve pit (Ref: H-2-44607; H-2-44625)	transfer	All AX	227.5	105.1	Lt	Lt	0.003	6.8E-01
2" F-102-2 Cond. drain to AX-501 valve pit (Ref: H-2-44607; H-2-44625)	transfer	All AX	196.1	90.6	Lt	Lt	0.003	5.9E-01
2" 0016-M9 Drain	transfer	All AX	0.0	0.0	Lt	Lt	0.003	0.0E+00
1-1/2" S(100#)-M2	transfer	None	38.1	33.4	Lt	Lt	0.003	0.0E+00
2" SL-101-M25	transfer	All AX	119.9	55.4	Lt	Lt	0.003	3.6E-01
3" SN-201-M25	transfer	All AX	303.1	63.6	Lt	Lt	0.003	9.1E-01
3" SN-200-M25	transfer	All AX	237.2	55.7	Lt	Lt	0.003	7.1E-01
2" SL-100-M25	transfer	All AX	118.6	54.8	Lt	Lt	0.003	3.6E-01
3" DR-314-M24	transfer	All AX	295.3	61.9	Lt	Mod	0.015	4.4E+00
3/4" CNDS-M2	transfer	All AX	8.2	29.5	Lt	Lt	0.003	2.5E-02
NEW 3" LINE	transfer	All AX	360.4	84.6	Lt	None	0	0.0E+00
3" S.W. (From 2707-AX Changehouse to west edge) (Ref: H-2-32981)	transfer	None	463.4	97.2	Lt	Lt	0.003	0.0E+00
3" SN-214	transfer	All AX	360.4	84.6	Lt	Lt	0.003	1.1E+00
3" SN-213-M25	transfer	All AX	360.4	84.6	Lt	Lt	0.003	1.1E+00
New 3" line installed by Proj. W-314 (Replaces SN-200/SN-213)	transfer	All AX	180.1	42.3	Lt	Lt	0.003	5.4E-01
4" 4017-M9 (From AX-152 to west edge) (Ref: H-2-44646)	transfer	All AX	282.6	38.1	Mod	Mod	0.045	1.3E+01

Table 6b: Transfer Line Identification and Contamination								Summation
							Volume (l)	624
ID	Equipment	Waste Type	Volume (l)	Removed Length (m)	Service	Fouling	Overall	Waste Volume (L)
4" 4018-M9 (From AX-152 to west edge) (Ref: H-2-44646)	transfer	All AX	282.6	38.1	Mod	Mod	0.045	1.3E+01
2" SL-502-M25	transfer	All AX	112.1	51.8	Lt	Lt	0.003	3.4E-01
New 3" line installed by Proj. W-314	transfer	All AX	220.7	51.8	Lt	Lt	0.003	6.6E-01
3"-PW-4027-M35	transfer	All AX	169.3	35.5	Lt	Lt	0.003	5.1E-01
2"-PW-4526-M35	transfer	All AX	52.4	24.2	Lt	Lt	0.003	1.6E-01
1 IA-2000	transfer	None	26.9	48.3	Lt	Lt	0.003	0.0E+00
3 PA-1000	transfer	None	231.3	48.5	Lt	Lt	0.003	0.0E+00
4 R.W.-3501-M5 (Ref: H-2-66414; 2" 3002 removed and replaced by 3501)	transfer	None	399.2	48.6	Lt	Lt	0.003	0.0E+00
4" PW-4502-M9 (previously shown as B-108-M9 on H-2-44632)	transfer	All AX	203.2	27.4	Mod	Mod	0.045	9.1E+00
4" PW-4503-M9 (Previously shown as C-108-M9 on H-2-44632)	transfer	All AX	203.2	27.4	Mod	Mod	0.045	9.1E+00
4" PW-4506-M9 *(previously shown as C-*106-M9 on H-2-44632)	transfer	All AX	203.2	27.4	Mod	Mod	0.045	9.1E+00
4" PW-4501-M9 (previously shown as A-108-M9 on H-2-44632)	transfer	All AX	203.2	27.4	Mod	Mod	0.045	9.1E+00
4" PW-4505-M9 (previously shown as B-106-M9 on H-2-44632)	transfer	All AX	203.2	27.4	Mod	Mod	0.045	9.1E+00
4" PW-4504-M9 (previously shown as A-106-M9 on H-2-44632)	transfer	All AX	203.2	27.4	Mod	Mod	0.045	9.1E+00
V-714	transfer	All AX	149.6	35.1	Mod	Lt	0.009	1.3E+00
3" 4608 Concr.	transfer	All AX	0.0	0.0	Mod	Lt	0.009	0.0E+00
3" PW-4550-M5	transfer	All AX	0.0	0.0	Mod	Mod	0.045	0.0E+00
4" 4600 Concr./SSTL	transfer	All AX	0.0	0.0	Lt	Lt	0.003	0.0E+00
4" 4601 Concr./SSTL	transfer	All AX	0.0	0.0	Lt	Lt	0.003	0.0E+00
3" V-719 Pipe-in-pipe	transfer	All AX	157.6	33.0	Lt	Lt	0.003	4.7E-01
2" PW-4551-M5	transfer	All AX	72.5	33.5	Lt	Lt	0.003	2.2E-01
2" F-503-M5 (Ref: H-2-64414)	transfer	All AX	26.5	12.2	Lt	Lt	0.003	7.9E-02
2" F-504-M5	transfer	All AX	24.3	11.2	Lt	Lt	0.003	7.3E-02
2" F-606-M5	transfer	All AX	76.7	35.4	Lt	Lt	0.003	2.3E-01
2" F-606-M5	transfer	All AX	76.7	35.4	Lt	Lt	0.003	2.3E-01
2" F-501-M5 From AY-501 to west edge	transfer	All AX	64.8	29.9	Lt	Lt	0.003	1.9E-01
2" F-502-M5 From AY-501 to west edge	transfer	All AX	64.8	30.0	Lt	Lt	0.003	1.9E-01
4 PW-4510-M9 (previously shown as A-107-M9 on H-2-44633)	transfer	All AX	452.5	61.0	Mod	Mod	0.045	2.0E+01
4" PW-4511-M9	transfer	All AX	452.5	61.0	Mod	Mod	0.045	2.0E+01

Table 6b: Transfer Line Identification and Contamination								Summation
						Volume (l)		624
ID (previously shown as B-107-M9 on H-2-44633)	Equipment	Waste Type	Volume (l)	Removed Length (m)	Service	Fouling	Overall	Waste Volume (L)
4" PW-4512-M9 (previously shown as C-107-M9 on H-2-44633)	transfer	All AX	282.6	38.1	Mod	Mod	0.045	1.3E+01
4" PW-4508-M9 (previously shown as B-105-M9 on H-2-44633)	transfer	All AX	1255.0	169.2	Mod	Mod	0.045	5.6E+01
4" PW-4509-M9 (previously shown as C-105-M9 on H-2-44633)	transfer	All AX	282.6	38.1	Mod	Mod	0.045	1.3E+01
4" PW-4507-M9 (previously shown as A-105-M9 on H-2-44633)	transfer	All AX	1255.0	169.2	Mod	Mod	0.045	5.6E+01
2" SL-500-M25 pipe-in-pipe	transfer	All AX	231.0	106.7	Lt	Lt	0.003	6.9E-01
2" SN-600-M25 pipe-in-pipe	transfer	All AX	231.0	106.7	Lt	Lt	0.003	6.9E-01
New 3" line installed by Proj. W-314	transfer	All AX	454.7	106.7	Lt	Lt	0.003	1.4E+00
2" SN-247	transfer	All AX	369.6	170.7	Lt	Lt	0.003	1.1E+00
8" raw water line	transfer	None	0.0	0.0	Lt	Lt	0.003	0.0E+00
1-1/2" M2 Steam Condensate Line (Abandoned) (Ref: H-2-58896)	transfer	None	147.2	129.1	Lt	Lt	0.003	0.0E+00
4" M2 Steam Condensate Line (Ref: H-2-34506)	transfer	None	951.0	115.8	Lt	Lt	0.003	0.0E+00
3" SN-211-M25 (to AX-101 and AX-103)	transfer	AX-101	236.2	49.5	Lt	Lt	0.003	7.1E-01
2" SL-111-M25	transfer	All AX	175.8	81.2	Lt	Lt	0.003	5.3E-01
2 SL-108-M25	transfer	All AX	176.0	81.3	Lt	Lt	0.003	5.3E-01
3 DR-326-M24	transfer	All AX	72.0	15.1	Lt	Lt	0.003	2.2E-01
3 SN-208-M25	transfer	All AX	374.8	78.6	Lt	Lt	0.003	1.1E+00
3 DR-327-M24 (to AX-102 and AX-104)	transfer	AX-104	135.3	28.4	Lt	Lt	0.003	4.1E-01
3" DR-314-M24	transfer	AX-104	127.9	26.8	Lt	Lt	0.003	3.8E-01
3 SN-212-M25	transfer	AX-104	186.5	39.1	Lt	Lt	0.003	5.6E-01
2 SL-112-M25	transfer	AX-104	94.7	43.8	Lt	Lt	0.003	2.8E-01
3 SN-209-M25	transfer	AX-104	261.4	54.8	Lt	Lt	0.003	7.8E-01
2 SL-109-M25	transfer	AX-104	142.7	65.9	Lt	Lt	0.003	4.3E-01
3" DR-325-M24	transfer	All AX	80.1	16.8	Lt	Lt	0.003	2.4E-01
3" DR-333-M24	transfer	All AX	1000.8	209.8	Lt	Lt	0.003	3.0E+00
4" PW-A104	transfer	All AX	228.6	30.8	Mod	Mod	0.045	1.0E+01
4" PW-A102	transfer	All AX	432.4	58.3	Mod	Mod	0.045	1.9E+01
4" PW-A101	transfer	All AX	432.4	58.3	Mod	Mod	0.045	1.9E+01
4" PW-A103	transfer	All AX	228.6	30.8	Mod	Mod	0.045	1.0E+01
4" PW-C104	transfer	All AX	328.6	44.3	Mod	Mod	0.045	1.5E+01
4" PW-C102	transfer	All AX	532.3	71.8	Mod	Mod	0.045	2.4E+01
4" PW-C101	transfer	All AX	532.3	71.8	Mod	Mod	0.045	2.4E+01
4" PW-C103	transfer	All AX	328.6	44.3	Mod	Mod	0.045	1.5E+01

Table 6b: Transfer Line Identification and Contamination								Summation
							Volume (l)	624
ID	Equipment	Waste Type	Volume (l)	Removed Length (m)	Service	Fouling	Overall	Waste Volume (L)
4" PW-B104	transfer	All AX	228.6	30.8	Mod	Mod	0.045	1.0E+01
4" PW-B102	transfer	All AX	432.4	58.3	Mod	Mod	0.045	1.9E+01
4" PW-B101	transfer	All AX	432.4	58.3	Mod	Mod	0.045	1.9E+01
4" PW-B103	transfer	All AX	228.6	30.8	Mod	Mod	0.045	1.0E+01
3" 4026-M35	transfer	All AX	165.4	34.7	Mod	Mod	0.045	7.4E+00
3312-3/4"	transfer	None	13.5	39.2	Lt	Lt	0.003	0.0E+00
2000-1"	transfer	None	58.9	127.0	Lt	Lt	0.003	0.0E+00
1000-3"	transfer	None	523.6	122.9	Lt	Lt	0.003	0.0E+00
3001-2"	transfer	None	242.6	127.4	Lt	Lt	0.003	0.0E+00
3003-2"	transfer	None	242.6	127.4	Lt	Lt	0.003	0.0E+00
3000-2"	transfer	None	242.6	127.4	Lt	Lt	0.003	0.0E+00
3412-3/4"	transfer	None	34.5	100.2	Lt	Lt	0.003	0.0E+00

Table 6c: Ventilation Header Identification and Contamination								Summation
							Volume (l)	236
ID	Equipment	Waste Type	Volume (l)	Removed Length (m)	Service	Fouling	Overall	Waste Volume (L)
24" 0109-M9 Vent Header (Ref: H-2-44646)	Ventilation	All	20,431	76.22	Lt	Lt	0.001	2.0E+01
24"-V-0100-M9 (Ref: H-2-64414)	Ventilation	All AY	6,433	24.00	Lt	Lt	0.001	6.4E+00
24" V-0602-M9	Ventilation	All	14,670	54.73	Lt	Lt	0.001	1.5E+01
0100-24"-M9 (AX-101/102 to AX-103/104)	Ventilation	AX-101/102	7,036	26.25	mod	mod	0.009	6.3E+01
0100-20"-M9 (AX-101)	Ventilation	AX-101	1,951	7.28	mod	mod	0.009	1.8E+01
0100-20"-M9 (AX-102)	Ventilation	AX-102	1,951	7.28	mod	mod	0.009	1.8E+01
0100-24"-M9 (AX-103/104 Header to AX-152)	Ventilation	All AX	6,430	23.99	mod	mod	0.009	5.8E+01
0100-20"-M9 (AX-103)	Ventilation	AX-103	1,951	7.28	mod	mod	0.009	1.8E+01
0100-20"-M9 (AX-104)	Ventilation	AX-104	1,951	7.28	mod	mod	0.009	1.8E+01
0100-24"-M9 (Around AX-152)	Ventilation	All	2,980	11.12	Lt	Lt	0.001	3.0E+00
0112-24"-Vapor Hdr	Ventilation	All	0	0.00	mod	mod	0.009	0.0E+00
0113-18"M9 Cond. Vent	Ventilation	All	0	0.00	Lt	Lt	0.001	0.0E+00

Table 6d: Riser Identification and Contamination								Summation
						Volume (l)		58.91
ID	Equipment	Waste Type	Volume (l)	Length (m)	Service	Fouling	Overall	Waste Volume (L)
241-AX-101 R1A	Riser	AX-101	1,645.6	2.94	Lt	Lt	0.0005	8.2E-01
241-AX-101 R1B	Riser	AX-101	80.4	1.10	Mod	Mod	0.0045	3.6E-01
241-AX-101 R2-1	Riser	AX-101	42.6	2.29	Lt	None	0	0.0E+00
241-AX-101 R2-2	Riser	AX-101	48.7	2.61	Lt	None	0	0.0E+00
241-AX-101 R2-3	Riser	AX-101	48.7	2.61	Lt	None	0	0.0E+00
241-AX-101 R2-4	Riser	AX-101	48.7	2.61	Lt	None	0	0.0E+00
241-AX-101 R2-5	Riser	AX-101	48.7	2.61	Lt	None	0	0.0E+00
241-AX-101 R2-6	Riser	AX-101	48.7	2.61	Lt	None	0	0.0E+00
241-AX-101 R2-7	Riser	AX-101	48.7	2.61	Lt	None	0	0.0E+00
241-AX-101 R2-8	Riser	AX-101	48.7	2.61	Lt	None	0	0.0E+00
241-AX-101 R2-9	Riser	AX-101	65.7	3.53	Lt	None	0	0.0E+00
241-AX-101 R2-10	Riser	AX-101	65.7	3.53	Lt	None	0	0.0E+00
241-AX-101 R2-11	Riser	AX-101	65.7	3.53	Lt	None	0	0.0E+00
241-AX-101 R2-12	Riser	AX-101	65.7	3.53	Lt	None	0	0.0E+00
241-AX-101 R2-13	Riser	AX-101	65.7	3.53	Lt	None	0	0.0E+00
241-AX-101 R2-14	Riser	AX-101	65.7	3.53	Lt	None	0	0.0E+00
241-AX-101 R2-15	Riser	AX-101	65.7	3.53	Lt	None	0	0.0E+00
241-AX-101 R2-16	Riser	AX-101	65.7	3.53	Lt	None	0	0.0E+00
241-AX-101 R2-17	Riser	AX-101	65.7	3.53	Lt	None	0	0.0E+00
241-AX-101 R2-18	Riser	AX-101	65.7	3.53	Lt	None	0	0.0E+00
241-AX-101 R2-19	Riser	AX-101	65.7	3.53	Lt	None	0	0.0E+00
241-AX-101 R2-20	Riser	AX-101	65.7	3.53	Lt	None	0	0.0E+00
241-AX-101 R2-21	Riser	AX-101	65.7	3.53	Lt	None	0	0.0E+00
241-AX-101 R2-22	Riser	AX-101	65.7	3.53	Lt	None	0	0.0E+00
241-AX-101 R3A	Riser	AX-101	333.9	2.93	Lt	Mod	0.0015	5.0E-01
241-AX-101 R4	Riser	AX-101	718.0	3.82	Mod	Mod	0.0045	3.2E+00
241-AX-101 R5A	Riser	AX-101	42.1	0.58	Mod	Mod	0.0045	1.9E-01
241-AX-101 R5B	Riser	AX-101	42.1	0.58	hvy	mod	0.0105	4.4E-01
241-AX-101 R6	Riser	AX-101	33.6	4.08	Lt	Lt	0.0005	1.7E-02
241-AX-101 R7A	Riser	AX-101	38.6	4.70	None	Lt	0	0.0E+00
241-AX-101 R7B	Riser	AX-101	38.6	4.70	None	Lt	0	0.0E+00
241-AX-101 R7C	Riser	AX-101	38.7	4.71	None	Lt	0	0.0E+00
241-AX-101 R7D	Riser	AX-101	38.6	4.70	None	Lt	0	0.0E+00
241-AX-101 R8A	Riser	AX-101	47.1	2.53	Lt	Lt	0.0005	2.4E-02
241-AX-101 R8B	Riser	AX-101	47.1	2.53	Lt	Lt	0.0005	2.4E-02
241-AX-101 R8C	Riser	AX-101	47.2	2.53	Lt	Mod	0.0015	7.1E-02
241-AX-101 R8D	Riser	AX-101	87.5	4.69	Lt	Lt	0.0005	4.4E-02
241-AX-101 R8E	Riser	AX-101	87.5	4.70	Lt	Lt	0.0005	4.4E-02
241-AX-101 R8F	Riser	AX-101	87.7	4.71	Lt	Lt	0.0005	4.4E-02
241-AX-101 R8G	Riser	AX-101	87.5	4.70	Lt	Lt	0.0005	4.4E-02
241-AX-101 R9A	Riser	AX-101	46.8	2.51	mod	mod	0.0045	2.1E-01
241-AX-101 R9B	Riser	AX-101	47.1	2.53	None	Lt	0	0.0E+00
241-AX-101 R9C	Riser	AX-101	47.1	2.53	Lt	Lt	0.0005	2.4E-02
241-AX-101 R9D	Riser	AX-101	87.5	4.69	mod	Lt	0.0015	1.3E-01
241-AX-101 R9E	Riser	AX-101	87.4	4.69	Lt	Lt	0.0005	4.4E-02
241-AX-101 R9F	Riser	AX-101	87.6	4.70	Lt	Lt	0.0005	4.4E-02
241-AX-101 R9G	Riser	AX-101	87.5	4.70	mod	Lt	0.0015	1.3E-01
241-AX-101 R10	Riser	AX-101	19.4	2.37	Lt	Lt	0.0005	9.7E-03
241-AX-101 R11A	Riser	AX-101	1.7	4.88	None	Lt	0	0.0E+00
241-AX-101 R11B	Riser	AX-101	1.7	4.88	None	Lt	0	0.0E+00

Table 6d: Riser Identification and Contamination								Summation
						Volume (l)		58.91
ID	Equipment	Waste Type	Volume (l)	Length (m)	Service	Fouling	Overall	Waste Volume (L)
241-AX-101 R11C	Riser	AX-101	1.7	4.88	None	Lt	0	0.0E+00
241-AX-101 R12	Riser	AX-101	33.6	4.08	Lt	Lt	0.0005	1.7E-02
241-AX-101 R13A	Riser	AX-101	20.4	2.49	Lt	Lt	0.0005	1.0E-02
241-AX-101 R13B	Riser	AX-101	20.5	2.49	Lt	Lt	0.0005	1.0E-02
241-AX-101 R13C	Riser	AX-101	20.4	2.49	Lt	Lt	0.0005	1.0E-02
241-AX-101 R14	Riser	AX-101	2,625.6	2.94	Lt	Lt	0.0005	1.3E+00
241-AX-101 R15	Riser	AX-101	36.8	4.48	Lt	Lt	0.0005	1.8E-02
241-AX-101 R23	Riser	AX-101	214.3	2.94	Mod	Mod	0.0045	9.6E-01
241-AX-101 R24	Riser	AX-101	214.3	2.94	Mod	Mod	0.0045	9.6E-01
241-AX-102 R1A	Riser	AX-102	617.7	1.10	Mod	Mod	0.0045	2.8E+00
241-AX-102 R1B	Riser	AX-102	617.7	1.10	hvy	mod	0.0105	6.5E+00
241-AX-102 R1C	Riser	AX-102	80.4	1.10	Mod	Mod	0.0045	3.6E-01
241-AX-102 R2-1	Riser	AX-102	42.6	2.29	Lt	None	0	0.0E+00
241-AX-102 R2-2	Riser	AX-102	48.7	2.61	Lt	None	0	0.0E+00
241-AX-102 R2-3	Riser	AX-102	48.7	2.61	Lt	None	0	0.0E+00
241-AX-102 R2-4	Riser	AX-102	48.7	2.61	Lt	None	0	0.0E+00
241-AX-102 R2-5	Riser	AX-102	48.7	2.61	Lt	None	0	0.0E+00
241-AX-102 R2-6	Riser	AX-102	48.7	2.61	Lt	None	0	0.0E+00
241-AX-102 R2-7	Riser	AX-102	48.7	2.61	Lt	None	0	0.0E+00
241-AX-102 R2-8	Riser	AX-102	48.7	2.61	Lt	None	0	0.0E+00
241-AX-102 R2-9	Riser	AX-102	65.7	3.53	Lt	None	0	0.0E+00
241-AX-102 R2-10	Riser	AX-102	65.7	3.53	Lt	None	0	0.0E+00
241-AX-102 R2-11	Riser	AX-102	65.7	3.53	Lt	None	0	0.0E+00
241-AX-102 R2-12	Riser	AX-102	65.7	3.53	Lt	None	0	0.0E+00
241-AX-102 R2-13	Riser	AX-102	65.7	3.53	Lt	None	0	0.0E+00
241-AX-102 R2-14	Riser	AX-102	65.7	3.53	Lt	None	0	0.0E+00
241-AX-102 R2-15	Riser	AX-102	65.7	3.53	Lt	None	0	0.0E+00
241-AX-102 R2-16	Riser	AX-102	65.7	3.53	Lt	None	0	0.0E+00
241-AX-102 R2-17	Riser	AX-102	65.7	3.53	Lt	None	0	0.0E+00
241-AX-102 R2-18	Riser	AX-102	65.7	3.53	Lt	None	0	0.0E+00
241-AX-102 R2-19	Riser	AX-102	65.7	3.53	Lt	None	0	0.0E+00
241-AX-102 R2-20	Riser	AX-102	65.7	3.53	Lt	None	0	0.0E+00
241-AX-102 R2-21	Riser	AX-102	65.7	3.53	Lt	None	0	0.0E+00
241-AX-102 R2-22	Riser	AX-102	65.7	3.53	Lt	None	0	0.0E+00
241-AX-102 R3A	Riser	AX-102	369.0	3.24	Lt	Mod	0.0015	5.5E-01
241-AX-102 R4	Riser	AX-102	718.0	3.82	Mod	Mod	0.0045	3.2E+00
241-AX-102 R5A	Riser	AX-102	42.1	0.58	Mod	Mod	0.0045	1.9E-01
241-AX-102 R5B	Riser	AX-102	42.1	0.58	hvy	mod	0.0105	4.4E-01
241-AX-102 R6	Riser	AX-102	33.6	4.08	Lt	Lt	0.0005	1.7E-02
241-AX-102 R7A	Riser	AX-102	41.0	4.99	Lt	Lt	0.0005	2.1E-02
241-AX-102 R7B	Riser	AX-102	40.9	4.99	None	Lt	0	0.0E+00
241-AX-102 R7C	Riser	AX-102	41.0	4.99	None	Lt	0	0.0E+00
241-AX-102 R7D	Riser	AX-102	41.0	4.99	None	Lt	0	0.0E+00
241-AX-102 R8A	Riser	AX-102	53.0	2.84	Lt	Lt	0.0005	2.6E-02
241-AX-102 R8B	Riser	AX-102	53.0	2.84	Lt	Lt	0.0005	2.6E-02
241-AX-102 R8C	Riser	AX-102	52.9	2.84	Lt	Lt	0.0005	2.6E-02
241-AX-102 R8D	Riser	AX-102	93.2	5.00	Lt	Lt	0.0005	4.7E-02
241-AX-102 R8E	Riser	AX-102	93.0	4.99	Lt	Lt	0.0005	4.7E-02
241-AX-102 R8F	Riser	AX-102	93.0	4.99	Lt	Lt	0.0005	4.7E-02
241-AX-102 R8G	Riser	AX-102	93.0	4.99	Lt	Lt	0.0005	4.7E-02

Table 6d: Riser Identification and Contamination								Summation
						Volume (l)		58.91
ID	Equipment	Waste Type	Volume (l)	Length (m)	Service	Fouling	Overall	Waste Volume (L)
241-AX-102 R9A	Riser	AX-102	52.8	2.83	Mod	Lt	0.0015	7.9E-02
241-AX-102 R9B	Riser	AX-102	53.0	2.84	Lt	Mod	0.0015	7.9E-02
241-AX-102 R9C	Riser	AX-102	53.0	2.84	None	Lt	0	0.0E+00
241-AX-102 R9D	Riser	AX-102	93.1	4.99	Mod	Mod	0.0045	4.2E-01
241-AX-102 R9E	Riser	AX-102	92.9	4.99	Lt	Lt	0.0005	4.6E-02
241-AX-102 R9F	Riser	AX-102	93.1	4.99	Lt	Lt	0.0005	4.7E-02
241-AX-102 R9G	Riser	AX-102	92.9	4.99	Mod	Lt	0.0015	1.4E-01
241-AX-102 R10	Riser	AX-102	19.4	2.37	Lt	Lt	0.0005	9.7E-03
241-AX-102 R11A	Riser	AX-102	1.7	4.88	None	Lt	0	0.0E+00
241-AX-102 R11B	Riser	AX-102	1.7	4.88	None	Lt	0	0.0E+00
241-AX-102 R11C	Riser	AX-102	1.7	4.88	None	Lt	0	0.0E+00
241-AX-102 R12	Riser	AX-102	33.6	4.08	Mod	Lt	0.0015	5.0E-02
241-AX-102 R13A	Riser	AX-102	23.0	2.81	Lt	Lt	0.0005	1.2E-02
241-AX-102 R13B	Riser	AX-102	23.1	2.81	None	Lt	0	0.0E+00
241-AX-102 R13C	Riser	AX-102	23.0	2.81	Lt	Lt	0.0005	1.2E-02
241-AX-102 R14	Riser	AX-102	2,625.6	2.94	Lt	Lt	0.0005	1.3E+00
241-AX-102 R15	Riser	AX-102	36.8	4.48	Lt	Lt	0.0005	1.8E-02
241-AX-103 R1A	Riser	AX-103	617.7	1.10	Mod	Mod	0.0045	2.8E+00
241-AX-103 R1B	Riser	AX-103	686.0	1.22	Mod	Mod	0.0045	3.1E+00
241-AX-103 R2-1	Riser	AX-103	42.6	2.29	Lt	None	0	0.0E+00
241-AX-103 R2-2	Riser	AX-103	48.7	2.61	Lt	None	0	0.0E+00
241-AX-103 R2-3	Riser	AX-103	48.7	2.61	Lt	None	0	0.0E+00
241-AX-103 R2-4	Riser	AX-103	48.7	2.61	Lt	None	0	0.0E+00
241-AX-103 R2-5	Riser	AX-103	48.7	2.61	Lt	None	0	0.0E+00
241-AX-103 R2-6	Riser	AX-103	48.7	2.61	Lt	None	0	0.0E+00
241-AX-103 R2-7	Riser	AX-103	48.7	2.61	Lt	None	0	0.0E+00
241-AX-103 R2-8	Riser	AX-103	48.7	2.61	Lt	None	0	0.0E+00
241-AX-103 R2-9	Riser	AX-103	65.7	3.53	Lt	None	0	0.0E+00
241-AX-103 R2-10	Riser	AX-103	65.7	3.53	Lt	None	0	0.0E+00
241-AX-103 R2-11	Riser	AX-103	65.7	3.53	Lt	None	0	0.0E+00
241-AX-103 R2-12	Riser	AX-103	65.7	3.53	Lt	None	0	0.0E+00
241-AX-103 R2-13	Riser	AX-103	65.7	3.53	Lt	None	0	0.0E+00
241-AX-103 R2-14	Riser	AX-103	65.7	3.53	Lt	None	0	0.0E+00
241-AX-103 R2-15	Riser	AX-103	65.7	3.53	Lt	None	0	0.0E+00
241-AX-103 R2-16	Riser	AX-103	65.7	3.53	Lt	None	0	0.0E+00
241-AX-103 R2-17	Riser	AX-103	65.7	3.53	Lt	None	0	0.0E+00
241-AX-103 R2-18	Riser	AX-103	65.7	3.53	Lt	None	0	0.0E+00
241-AX-103 R2-19	Riser	AX-103	65.7	3.53	Lt	None	0	0.0E+00
241-AX-103 R2-20	Riser	AX-103	65.7	3.53	Lt	None	0	0.0E+00
241-AX-103 R2-21	Riser	AX-103	65.7	3.53	Lt	None	0	0.0E+00
241-AX-103 R2-22	Riser	AX-103	65.7	3.53	Lt	None	0	0.0E+00
241-AX-103 R3A	Riser	AX-103	332.5	2.92	Lt	Mod	0.0015	5.0E-01
241-AX-103 R4	Riser	AX-103	718.0	3.82	Mod	Mod	0.0045	3.2E+00
241-AX-103 R5A	Riser	AX-103	108.4	0.58	hvy	mod	0.0105	1.1E+00
241-AX-103 R5B	Riser	AX-103	108.4	0.58	hvy	mod	0.0105	1.1E+00
241-AX-103 R6	Riser	AX-103	33.6	4.08	lt	Lt	0.0005	1.7E-02
241-AX-103 R7A	Riser	AX-103	38.5	4.68	None	Lt	0	0.0E+00
241-AX-103 R7B	Riser	AX-103	38.4	4.67	None	Lt	0	0.0E+00
241-AX-103 R7C	Riser	AX-103	38.4	4.68	None	Lt	0	0.0E+00
241-AX-103 R7D	Riser	AX-103	38.5	4.68	None	Lt	0	0.0E+00

Table 6d: Riser Identification and Contamination								Summation
						Volume (l)		58.91
ID	Equipment	Waste Type	Volume (l)	Length (m)	Service	Fouling	Overall	Waste Volume (L)
241-AX-103 R8A	Riser	AX-103	47.1	2.53	None	Lt	0	0.0E+00
241-AX-103 R8B	Riser	AX-103	47.0	2.52	Lt	Lt	0.0005	2.3E-02
241-AX-103 R8C	Riser	AX-103	47.1	2.53	None	Lt	0	0.0E+00
241-AX-103 R8D	Riser	AX-103	87.3	4.68	Lt	Lt	0.0005	4.4E-02
241-AX-103 R8E	Riser	AX-103	87.2	4.68	Lt	Lt	0.0005	4.4E-02
241-AX-103 R8F	Riser	AX-103	87.2	4.68	Lt	Lt	0.0005	4.4E-02
241-AX-103 R8G	Riser	AX-103	87.5	4.69	Lt	Lt	0.0005	4.4E-02
241-AX-103 R9A	Riser	AX-103	47.1	2.53	None	Lt	0	0.0E+00
241-AX-103 R9B	Riser	AX-103	47.0	2.52	None	Lt	0	0.0E+00
241-AX-103 R9C	Riser	AX-103	47.1	2.53	Lt	Mod	0.0015	7.1E-02
241-AX-103 R9D	Riser	AX-103	87.2	4.68	mod	Lt	0.0015	1.3E-01
241-AX-103 R9E	Riser	AX-103	87.1	4.67	mod	Lt	0.0015	1.3E-01
241-AX-103 R9F	Riser	AX-103	87.2	4.68	Lt	Lt	0.0005	4.4E-02
241-AX-103 R9G	Riser	AX-103	87.4	4.69	Lt	Lt	0.0005	4.4E-02
241-AX-103 R10	Riser	AX-103	19.4	2.37	mod	Lt	0.0015	2.9E-02
241-AX-103 R11A	Riser	AX-103	1.7	4.88	None	Lt	0	0.0E+00
241-AX-103 R11B	Riser	AX-103	1.7	4.88	None	Lt	0	0.0E+00
241-AX-103 R11C	Riser	AX-103	1.7	4.88	None	Lt	0	0.0E+00
241-AX-103 R12	Riser	AX-103	33.6	4.08	mod	Lt	0.0015	5.0E-02
241-AX-103 R13A	Riser	AX-103	20.8	2.53	None	Lt	0	0.0E+00
241-AX-103 R13B	Riser	AX-103	20.4	2.49	Lt	Lt	0.0005	1.0E-02
241-AX-103 R13C	Riser	AX-103	20.4	2.48	None	Lt	0	0.0E+00
241-AX-103 R14	Riser	AX-103	2,625.6	2.94	lt	Mod	0.0015	3.9E+00
241-AX-103 R15	Riser	AX-103	36.8	4.48	Lt	Lt	0.0005	1.8E-02
241-AX-104 R1A	Riser	AX-104	617.7	1.10	Mod	Mod	0.0045	2.8E+00
241-AX-104 R1B	Riser	AX-104	686.0	1.22	Mod	Mod	0.0045	3.1E+00
241-AX-104 R2-1	Riser	AX-104	42.6	2.29	Lt	None	0	0.0E+00
241-AX-104 R2-2	Riser	AX-104	48.7	2.61	Lt	None	0	0.0E+00
241-AX-104 R2-3	Riser	AX-104	48.7	2.61	Lt	None	0	0.0E+00
241-AX-104 R2-4	Riser	AX-104	48.7	2.61	Lt	None	0	0.0E+00
241-AX-104 R2-5	Riser	AX-104	48.7	2.61	Lt	None	0	0.0E+00
241-AX-104 R2-6	Riser	AX-104	48.7	2.61	Lt	None	0	0.0E+00
241-AX-104 R2-7	Riser	AX-104	48.7	2.61	Lt	None	0	0.0E+00
241-AX-104 R2-8	Riser	AX-104	48.7	2.61	Lt	None	0	0.0E+00
241-AX-104 R2-9	Riser	AX-104	65.7	3.53	Lt	None	0	0.0E+00
241-AX-104 R2-10	Riser	AX-104	65.7	3.53	Lt	None	0	0.0E+00
241-AX-104 R2-11	Riser	AX-104	65.7	3.53	Lt	None	0	0.0E+00
241-AX-104 R2-12	Riser	AX-104	65.7	3.53	Lt	None	0	0.0E+00
241-AX-104 R2-13	Riser	AX-104	65.7	3.53	Lt	None	0	0.0E+00
241-AX-104 R2-14	Riser	AX-104	65.7	3.53	Lt	None	0	0.0E+00
241-AX-104 R2-15	Riser	AX-104	65.7	3.53	Lt	None	0	0.0E+00
241-AX-104 R2-16	Riser	AX-104	65.7	3.53	Lt	None	0	0.0E+00
241-AX-104 R2-17	Riser	AX-104	65.7	3.53	Lt	None	0	0.0E+00
241-AX-104 R2-18	Riser	AX-104	65.7	3.53	Lt	None	0	0.0E+00
241-AX-104 R2-19	Riser	AX-104	65.7	3.53	Lt	None	0	0.0E+00
241-AX-104 R2-20	Riser	AX-104	65.7	3.53	Lt	None	0	0.0E+00
241-AX-104 R2-21	Riser	AX-104	65.7	3.53	Lt	None	0	0.0E+00
241-AX-104 R2-22	Riser	AX-104	65.7	3.53	Lt	None	0	0.0E+00
241-AX-104 R3A	Riser	AX-104	287.3	3.23	Lt	Mod	0.0015	4.3E-01
241-AX-104 R4	Riser	AX-104	718.0	3.82	Mod	Mod	0.0045	3.2E+00

Table 6d: Riser Identification and Contamination								Summation
						Volume (l)		58.91
ID	Equipment	Waste Type	Volume (l)	Length (m)	Service	Fouling	Overall	Waste Volume (L)
241-AX-104 R5A	Riser	AX-104	42.1	0.58	hvy	mod	0.0105	4.4E-01
241-AX-104 R5B	Riser	AX-104	42.1	0.58	hvy	mod	0.0105	4.4E-01
241-AX-104 R6	Riser	AX-104	33.6	4.08	Lt	Lt	0.0005	1.7E-02
241-AX-104 R7A	Riser	AX-104	41.3	5.03	None	Lt	0	0.0E+00
241-AX-104 R7B	Riser	AX-104	40.9	4.98	None	Lt	0	0.0E+00
241-AX-104 R7C	Riser	AX-104	40.9	4.98	mod	Lt	0.0015	6.1E-02
241-AX-104 R7D	Riser	AX-104	40.9	4.98	mod	Lt	0.0015	6.1E-02
241-AX-104 R8A	Riser	AX-104	52.6	2.82	None	Lt	0	0.0E+00
241-AX-104 R8B	Riser	AX-104	52.5	2.82	Lt	Lt	0.0005	2.6E-02
241-AX-104 R8C	Riser	AX-104	52.9	2.84	None	Lt	0	0.0E+00
241-AX-104 R8D	Riser	AX-104	93.7	5.03	Lt	Lt	0.0005	4.7E-02
241-AX-104 R8E	Riser	AX-104	92.9	4.99	None	Lt	0	0.0E+00
241-AX-104 R8F	Riser	AX-104	92.9	4.98	Lt	Lt	0.0005	4.6E-02
241-AX-104 R8G	Riser	AX-104	92.9	4.99	Lt	Lt	0.0005	4.6E-02
241-AX-104 R9A	Riser	AX-104	52.6	2.82	mod	mod	0.0045	2.4E-01
241-AX-104 R9B	Riser	AX-104	52.6	2.82	Lt	Mod	0.0015	7.9E-02
241-AX-104 R9C	Riser	AX-104	41.5	2.23	None	Lt	0	0.0E+00
241-AX-104 R9D	Riser	AX-104	93.2	5.00	Lt	Lt	0.0005	4.7E-02
241-AX-104 R9E	Riser	AX-104	92.9	4.98	mod	Lt	0.0015	1.4E-01
241-AX-104 R9F	Riser	AX-104	92.8	4.98	Lt	Lt	0.0005	4.6E-02
241-AX-104 R9G	Riser	AX-104	92.9	4.99	mod	Lt	0.0015	1.4E-01
241-AX-104 R10	Riser	AX-104	19.4	2.37	mod	Lt	0.0015	2.9E-02
241-AX-104 R11A	Riser	AX-104	1.7	4.88	None	Lt	0	0.0E+00
241-AX-104 R11B	Riser	AX-104	1.7	4.88	None	Lt	0	0.0E+00
241-AX-104 R11C	Riser	AX-104	1.7	4.88	None	Lt	0	0.0E+00
241-AX-104 R12	Riser	AX-104	33.6	4.08	mod	Lt	0.0015	5.0E-02
241-AX-104 R13A	Riser	AX-104	22.9	2.78	Lt	Lt	0.0005	1.1E-02
241-AX-104 R13B	Riser	AX-104	22.9	2.78	Lt	Lt	0.0005	1.1E-02
241-AX-104 R13C	Riser	AX-104	23.0	2.80	Lt	Lt	0.0005	1.1E-02
241-AX-104 R14	Riser	AX-104	985.5	1.10	Mod	Mod	0.0045	4.4E+00
241-AX-104 R15	Riser	AX-104	36.8	4.48	Lt	Lt	0.0005	1.8E-02
241-AX-104 R16A	Riser	AX-104	40.0	4.87	Lt	Lt	0.0005	2.0E-02
241-AX-104 R16B	Riser	AX-104	41.4	5.04	Lt	Lt	0.0005	2.1E-02
241-AX-104 R16C	Riser	AX-104	40.6	4.94	Lt	Lt	0.0005	2.0E-02

Table 6e: Pit and Crib Identification and Contamination							Summation
					Volume (l)		1,744
ID	Equipment	Waste Type	Volume (l)	Service	Fouling	Overall	Waste Volume (L)
241-AX-01A	Pit	AX-101	10,045	Mod	Lt	0.006	6.0E+01
241-AX-01B	Pit	AX-101	9,996	Mod	Lt	0.006	6.0E+01
241-AX-01C	Pit	AX-101	9,996	Mod	Lt	0.006	6.0E+01
241-AX-01D	Pit	AX-101	9,996	Mod	Lt	0.006	6.0E+01
241-AX-02A	Pit	AX-102	10,045	Mod	Lt	0.006	6.0E+01
241-AX-02B	Pit	AX-102	9,996	Mod	Lt	0.006	6.0E+01
241-AX-02C	Pit	AX-102	9,996	Mod	Lt	0.006	6.0E+01
241-AX-02D	Pit	AX-102	9,996	Mod	Lt	0.006	6.0E+01
241-AX-03A	Pit	AX-103	10,045	Mod	Lt	0.006	6.0E+01
241-AX-03A	Pit	AX-103	9,996	Mod	Lt	0.006	6.0E+01
241-AX-03C	Pit	AX-103	9,996	Mod	Lt	0.006	6.0E+01

241-AX-03D	Pit	AX-103	9,996	Mod	Lt	0.006	6.0E+01
241-AX-04A	Pit	AX-104	10,045	Mod	Lt	0.006	6.0E+01
241-AX-04B	Pit	AX-104	9,996	Mod	Lt	0.006	6.0E+01
241-AX-04C	Pit	AX-104	9,996	Mod	Lt	0.006	6.0E+01
241-AX-04D	Pit	AX-104	9,996	Mod	Lt	0.006	6.0E+01
241-AX-A Valve Pit	Pit	AX-101/103	16,141	Mod	Lt	0.006	9.7E+01
241-AX-B Valve Pit	Pit	AX-102/104	16,141	Mod	Lt	0.006	9.7E+01
241-AY-152 Sluice Pit	Pit	All	20,593	Hvy	Lt	0.014	2.9E+02
241-AX-152 Diverter Station	Pit	All AX	78,070	Lt	Lt	0.002	1.6E+02
241-AX-155 Diversion Box	Pit	All AX	9,175	Lt	Lt	0.002	1.8E+01
241-A-417 Pump Pit	Pit	All	63,430	Lt	Lt	0.002	1.3E+02

Table 6f: Catch Tank Identification and Contamination								Summation
							Volume (l)	1,067
ID	Equipment	Waste Type	Volume (l)	Length (m)	Service	Fouling	Overall	Waste Volume (L)
241-A-417 Tank	Tank	All	40,267		Lt	Lt	0.003	1.2E+02
241-AX-152	Tank	All	42,051		mod	mod	0.0225	9.5E+02

Table 6g: Building Identification and Contamination							Summation
						Volume (l)	8.8
ID	Equipment	Waste Type	Volume (l)	Service	Fouling	Overall	Waste Volume (L)
801 A Instrument Building	Building	AX-101/103	1.00E+05	Lt	Mod	1.0E-05	1.0E+00
801 B Instrument Building	Building	AX-102/104	1.00E+05	Lt	Lt	1.0E-06	1.0E-01
2707-AX Change House	Building	None	7.08E+04	Lt	Mod	1.0E-05	0.0E+00
Ion Exchange Column (Ref: H-2-64771)	Building	All	1.22E+04	Lt	Mod	1.0E-05	1.2E-01
A-702 Fan House	Building	All	2.55E+05	Lt	Lt	1.0E-06	2.5E-01
Stack Building associated with A-702	Building	All	3.40E+04	Lt	Lt	1.0E-06	3.4E-02
Unknown Outbuilding #1	Building	None	5.66E+04	Lt	Mod	1.0E-05	0.0E+00
Unknown Outbuilding #2	Building	None	5.66E+04	Lt	Mod	1.0E-05	0.0E+00
Unknown Outbuilding #3	Building	None	5.66E+04	Lt	Mod	1.0E-05	0.0E+00
A-701 Compressor Building	Building	None	4.25E+05	Lt	Mod	1.0E-05	0.0E+00
Cooling Tower	Building	All	1.42E+05	Lt	Lt	1.0E-06	1.4E-01
Cold Water Sump	Building	None	7.08E+04	Lt	None	0.0E+00	0.0E+00
Warm Water Sump	Building	All	5.66E+04	Lt	Lt	1.0E-06	5.7E-02
A-401 Condenser Building	Building	All	7.08E+05	Lt	Mod	1.0E-05	7.1E+00

Table 6h: Well Identification - Assumed Uncontaminated
8 numbered vadose wells associated with AX-101
20 numbered vadose wells associated with AX-102
1 un-numbered vadose well associated with AX-102
6 numbered vadose wells associated with AX-103
8 numbered vadose wells associated with AX-104
8 numbered perimeter wells (5 vadose and 3 ground water wells)
(Ref: WMNW letter report)

APPENDIX C
241-AX TANK FARM WELL DATA COMPILATION

Data provided by Waste Management Northwest
November 1997

1.0 INTRODUCTION

This appendix is a compilation of well data for 51 wells located in and around the 241-AX tank farm. Information used came from numerous sources including geophysical logging activities performed in 1996, US Army Corps of Engineers survey results of 1994, the Hanford Wells Book, the Hanford Wells Database System (HWDS), original "Rutherford" as-built drawings of the 241-AX-Tank Farm with handwritten notes related to drilling activities, existing as-bulit drawings of the AX-Tank Farm (H-2 drawings), well construction as-builts, on-site investigation and personal interviews.

The data has been compiled into three tables. Table 1 identifies general construction information and the status of the wells. Table 2 lists a set of wells that may require further evaluation and study. Horizontal and Vertical survey data has been identified in Table 3. The horizontal surveys have been provided for both the Hanford Plant coordinate system and the Washington State Coordinate system.

2.0 WELL STATUS SUMMARY

Forty-nine wells were originally identified for evaluation. Two additional wells were discovered in the research bringing the total to fifty-one wells evaluated. Thirty-eight of the wells were verified to exist and twelve wells require further evaluation to determine their existence. One additional well was discovered near well 2-E25-109 during field research and will require further investigation since no data could be located on it.

During the course of this research, several other points of interest were uncovered. First was the discovery of a well located approximately 2.36 feet due east of well 2-E25-109 as mentioned above. Although two wells were identified as being drilled east of this well for a Boeing test, these wells were approximately 6 feet away. This well was discovered by Waste Management Northwest personnel while performing a field search for the Boeing test wells. No specific information about this well is available, so it is not listed in Table 1 but included in Table 2

A second discovery was a well that was used for radiological scans up through 1994 based on discussions with Nancy Scott-Proctor (200-E. Tank Farm Engineer). Well information for 2-E25-133 (11-02-03) could not be located and this well was not surveyed by the Army Corps of Engineers project. Drill logs do not exist for this well and the Hanford Wells book does not list it. However, a "Rutherford" as-built drawing was located that shows this well handwritten into a location around the AX-102 tank. Notes on the drawing also provides well coordinates and suggests it may have been drilled in April 1978.

Additional field verification is required in regards to an anomaly in the location of well 2-E25-121. Although H-2 drawing as-builts show this well to be near tank AX-104 at a position suggested by it's tank farm ID 11-04-07 (near 2-E25-147 at the 7:00 position around tank), a photo of the well and Army Corps of Engineers survey coordinates show otherwise. This well is actually positioned southwest of well 2-E25-174.

Table 1--Well Status Summary and General Construction Information

Assoc. Tank	Well Name	Tank Farm ID	Status	Date Drilled	Drill Rig Type	Drill Depth (ft.)	Casing Type	Casing Diam. (in.)	Well Type	Well Capped	Comments
AX-101	2-E25-99	11-01-01	Verified To Exist	11/30/74	Cable tool	100	CS	6	VD	Yes	
AX-101	2-E25-100	11-01-02	Verified To Exist	12/31/74	Cable tool	100	CS	6	VD	Yes	
AX-101	2-E25-101	11-01-04	Verified To Exist	1/31/75	Cable tool	100	CS	6	VD	Yes	
AX-101	2-E25-102	11-01-05	Verified To Exist	1/31/75	Cable tool	100	CS	6	VD	Yes	
AX-101	2-E25-103	11-01-07	Verified To Exist	1/31/75	Cable tool	100	CS	6	VD	Yes	
AX-101	2-E25-104	11-01-09	Verified To Exist	12/31/74	Cable tool	100	CS	6	VD	Yes	
AX-101	2-E25-105	11-01-11	Verified To Exist	12/31/74	Cable tool	100	CS	6	VD	Yes	
AX-101	2-E25-131	11-01-10	Verified To Exist	1978	Cable tool	73	CS	6	VD	Yes	
AX-102	2-E25-106	11-02-02	Verified To Exist	1/31/75	Cable tool	100	CS	6	VD	Yes	
AX-102	2-E25-107	11-02-04	Verified To Exist	2/28/75	Cable tool	100	CS	6	VD	Yes	
AX-102	2-E25-108	11-02-05	Verified To Exist	2/28/75	Cable tool	100	CS	6	VD	Yes	
AX-102	2-E25-109	11-02-07	Verified To Exist	2/28/75	Cable tool	100	CS	6	VD	Yes	
AX-102	2-E25-110	11-02-08	Existence Not Verified	2/14/75	Cable tool	100	?	?	VD	?	Capped off below grade. Drill Logs exist for well. See Table 2.
AX-102	2-E25-111	11-02-10	Verified To Exist	2/28/75	Cable tool	100	CS	6	VD	Yes	
AX-102	2-E25-112	11-02-11	Verified To Exist	1/31/75	Cable tool	100	CS	6	VD	Yes	
AX-102	2-E25-127	11-02-22	Verified To Exist	5/31/75	Cable tool	125	CS	6	VD	Yes	
AX-102	2-E25-128	11-02-23	Verified To Exist	5/31/75	Cable tool	54	CS	6	VD	Yes	
AX-102	2-E25-132	11-02-01	Verified To Exist	4/4/78	Cable tool	125	CS	6	VD	Yes	Plug placed in bottom of well. Top 21' grouted.
AX-102	2-E25-133	11-02-03	Existence Not Verified	4/78?	?	?	?	?	VD	?	See Table 2 for additional information.
AX-102	2-E25-137	None	Existence Not Verified	Mid 70's	?	80	CS	4	VD	Yes	Well cut off below grade and cap welded on. See Table 2
AX-102	2-E25-138	None	Existence Not Verified	Mid 70's	?	80	CS	4	VD	Yes	Well cut off below grade and cap welded on. See Table 2
AX-102	2-E25-139	None	Existence Not Verified	Mid 70's	?	80	CS	4	VD	Yes	Well cut off below grade and cap welded on. See Table 2

Table 1--Well Status Summary and General Construction Information

Assoc. Tank	Well Name	Tank Farm ID	Status	Date Drilled	Drill Rig Type	Drill Depth (ft.)	Casing Type	Casing Diam. (in.)	Well Type	Well Capped	Comments
AX-102	2-E25-140	None	Existence Not Verified	Mid 70's	?	80	CS	4	VD	Yes	Well cut off below grade and cap welded on. See Table 2
AX-102	2-E25-141	None	Existence Not Verified	Mid 70's	?	80	CS	4	VD	Yes	Well cut off below grade and cap welded on. See Table 2
AX-102	2-E25-142	None	Existence Not Verified	Mid 70's	?	80	CS	4	VD	Yes	Well cut off below grade and cap welded on. See Table 2
AX-102	2-E25-143	None	Existence Not Verified	Mid 70's	?	80	CS	4	VD	Yes	Well cut off below grade and cap welded on. See Table 2
AX-102	2-E25-144	None	Existence Not Verified	Mid 70's	?	80	CS	4	VD	Yes	Well cut off below grade and cap welded on. See Table 2
AX-102	2-E25-145	None	Existence Not Verified	Mid 70's	?	80		2	VD	Yes	Well cut off below grade and cap welded on. See Table 2
AX-103	2-E25-114	11-03-05	Verified To Exist	12/31/74	Cable tool	100	CS	6	VD	Yes	
AX-103	2-E25-113	11-03-02	Verified To Exist	1/31/75	Cable tool	100	CS	6	VD	Yes	
AX-103	2-E25-115	11-03-07	Verified To Exist	2/28/75	Cable tool	100	CS	6	VD	Yes	
AX-103	2-E25-116	11-03-09	Verified To Exist	1/31/75	Cable tool	120	CS	6	VD	Yes	
AX-103	2-E25-117	11-03-10	Verified To Exist	1/31/75	Cable tool	100	CS	6	VD	Yes	
AX-103	2-E25-118	11-03-12	Verified To Exist	12/31/74	Cable tool	100	CS	6	VD	Yes	
AX-104	2-E25-119	11-04-01	Verified To Exist	12/31/74	Cable tool	100	CS	6	VD	Yes	
AX-104	2-E25-120	11-04-05	Verified To Exist	2/28/75	Cable tool	100	CS	6	VD	Yes	
AX-104	2-E25-122	11-04-08	Verified To Exist	2/28/75	Cable tool	100	CS	6	VD	Yes	
AX-104	2-E25-123	11-04-10	Verified To Exist	3/31/75	Cable tool	100	CS	6	VD	Yes	
AX-104	2-E25-124	11-04-11	Verified To Exist	1/31/75	Cable tool	125	CS	6	VD	Yes	
AX-104	2-E25-147	11-04-19	Verified To Exist	3/31/78	Cable tool	125	CS	6	VD	Yes	
AX-104	2-E25-173	None	Verified To Exist	6/29/81	Cable tool	19'	CS	6	VD	Yes	Drilled for "Radiological Assessment" Backfilled to 12' on 7/10/81 (per drill records).
AX-104	2-E25-174	None	Verified To Exist	6/29/81	Cable tool	15'	CS	6	VD	Yes	Drilled for "Radiological Assessment"
Perimeter	2-E25-13	None	Verified To Exist	10/15/63	Cable tool	317	CS	4	GW	Yes	See Appendix B for details on construction.
Perimeter	2-E25-40	None	Verified To Exist	9/18/89	Cable tool	274	SS	4	GW	Yes	See Appendix B for details on construction.

Table 1--Well Status Summary and General Construction Information

Assoc. Tank	Well Name	Tank Farm ID	Status	Date Drilled	Drill Rig Type	Drill Depth (ft.)	Casing Type	Casing Diam. (in.)	Well Type	Well Capped	Comments
Perimeter	2-E25-41	None	Verified To Exist	9/22/89	Cable tool	279	SS	4	GW	Yes	See Appendix B for details on construction.
Perimeter	2-E25-121	11-04-07	Verified To Exist	3/31/75	Cable tool	95.9	CS	6	VD	Yes	
Perimeter	2-E25-179	None	Verified To Exist	7/9/81	Cable tool	16'	CS	6	VD	Yes	Drilled for "Radiological Assessment"
Perimeter	2-E25-182	None	Verified To Exist	8/10/81	Cable tool	16'	CS	6	VD	Yes	Drilled for "Radiological Assessment" Backfilled to 12' on 8/18/81 (per drill records)
Perimeter	2-E25-185	None	Verified To Exist	8/11/81	Cable tool	15'	CS	6	VD	Yes	Drilled for "Radiological Assessment"
Unknown	2-E25-183	None	Existence Not Verified	7/10/81	Cable tool	12'	CS	6	VD	?	See Table 2 for additional information.

Also of interest are the nine wells identified as being drilled for a Boeing Leak Detection System test. All indication is that these wells were cut off below grade and a lid welded or cemented over the top of the well head. In addition, well 2-E25-110 has also been identified on as-built drawings as now existing below grade. This information is detailed in Table 2.

3.0 WELLS REQUIRING ADDITIONAL FIELD VERIFICATION

Table 2 identifies a list of wells that require more extensive evaluation to determine their current status. The wells labeled 2-E25-137 thru 2-E25-145 were identified as having been drilled in the mid-1970's for a sensitivity test for a Boeing Leak Detection System (see H-2-36935 drawing). All the wells were 4 inches in diameter except 2-E25-145 which was 2 inches in diameter. They were drilled to 80 feet deep and were identified as having been capped off 1 foot below grade level. A field search for these wells verified that they were not visible at grade level.

Table 2-Wells Requiring Field Verification

Assoc. Tank	Well Name	Tank Farm ID	Date Drilled	Comments
AX-102	Possible Well--not numbered	Not Numbered	Unknown	A well boring was located during a field search approximately .72 m (2.36') due east of well 2-E25-109. A photo of this well was taken. The location of this boring relative to well 2-E25-109 does not coincide with any of the wells drilled for the Boeing sensitivity test.
AX-102	2-E25-110	11-02-08	2/14/75	Identified on 241-AX As-built drawing as having been "Capped off below grade & encasement" (per H-2-36935)
AX-102	2-E25-133	11-02-03		No drill logs found. Survey data was hand written on a Rutherford as-built drawing (N-41624 and W-47427). Well was not identified in the Hanford Wells book (PNL-8800). Dry well radiological scans were performed on well from 10/78 to 6/94. Well is likely to exist but may be covered over with fill material.

Table 2-Wells Requiring Field Verification

Assoc. Tank	Well Name	Tank Farm ID	Date Drilled	Comments
AX-102	2-E25-137		mid-70's	Drawing H-2-71825 indicates well was cut off 1' below grade and a cap welded over casing.
AX-102	2-E25-138		mid-70's	Drawing H-2-71825 indicates well was cut off 1' below grade and a cap welded over casing.
AX-102	2-E25-139		mid-70's	Drawing H-2-71825 indicates well was cut off 1' below grade and a cap welded over casing.
AX-102	2-E25-140		mid-70's	Drawing H-2-71825 indicates well was cut off 1' below grade and a cap welded over casing.
AX-102	2-E25-141		mid-70's	Drawing H-2-71825 indicates well was cut off 1' below grade and a cap welded over casing.
AX-102	2-E25-142		mid-70's	Drawing H-2-71825 indicates well was cut off 1' below grade and a cap welded over casing.
AX-102	2-E25-143		mid-70's	Drawing H-2-71825 indicates well was cut off 1' below grade and a cap welded over casing.
AX-102	2-E25-144		mid-70's	Drawing H-2-71825 indicates well was cut off 1' below grade and a cap welded over casing.
AX-102	2-E25-145		mid-70's	Drawing H-2-71825 indicates well was cut off 1' below grade. This is an insulated well with the bottom 20' being 2" steel and the top 60' plastic 2" pipe. A plastic cap was cemented onto the pipe.
UNKNOWN	2-E25-183	None	7/10/81	Drilled for a "Radiological investigation around dresser couplings"(per Well Completion Report). Note: Wells 2-E25-185, 2-E25-174 and 2-E25-173 were drilled for the same purpose as this well. It is likely that this well exists in the vicinity of these wells.

4.0 WELL SURVEY DATA

Table 3 identifies the survey data available for the 241-AX Tank Farm Wells. Survey values associated with the Hanford Plant datum and the Washington State Coordinate System (WSCS) have been identified. The WSCS survey values are the most current and was the result of a survey project performed by the Army Corps of Engineers in mid-1994. The survey values for the Hanford Plant datum are historic, the survey date for these values is not identified in this table.

Table 3-Well Survey Information

Assoc. Tank	Well Name	Tank Farm ID	N-Han. Plant (ft)	W-Han. Plant (ft)	E-WSCS (m)	N-WSCS (m)	Vertical (m)	WSCS Survey Date	Comment
AX-101	2-E25-99	11-01-01	41776	47453	575428.6	136217.1	207.602	09-Jun-94	
AX-101	2-E25-100	11-01-02	41753	47429	575435.9	136210.5	207.721	09-Jun-94	
AX-101	2-E25-101	11-01-04	41710	47429	575436.2	136197.2	207.877	09-Jun-94	
AX-101	2-E25-102	11-01-05	41682	47458	575427.2	136188.5	207.962	09-Jun-94	
AX-101	2-E25-103	11-01-07	41692	47500	575414.4	136191.5	207.998	09-Jun-94	

Table 3-Well Survey Information

Assoc. Tank	Well Name	Tank Farm ID	N-Han. Plant (ft)	W-Han. Plant (ft)	E-WSCS (m)	N-WSCS (m)	Vertical (m)	WSCS Survey Date	Comment
AX-101	2-E25-104	11-01-09	41726	47520	575408.3	136201.9	208.147	09-Jun-94	
AX-101	2-E25-105	11-01-11	41773	47495	575415.9	136216.3	207.632	09-Jun-94	
AX-101	2-E25-131	11-01-10	41763	47511					
AX-102	2-E25-106	11-02-02	41648	47429	575436.1	136178.3	207.913	08-Jun-94	
AX-102	2-E25-107	11-02-04	41600	47428	575436.6	136163.5	208.123	08-Jun-94	
AX-102	2-E25-108	11-02-05	41585	47455	575428.3	136159	208.115	08-Jun-94	
AX-102	2-E25-109	11-02-07	41585	47495	575415.9	136159.1	208.113	08-Jun-94	
AX-102	2-E25-110	11-02-08	41595	47520	575408.6	136162.3	207.264	28-Feb-75	Han. Coords Converted.
AX-102	2-E25-111	11-02-10	41644	47519	575408.9	136177.1	207.875	08-Jun-94	
AX-102	2-E25-112	11-02-11	41669	47499	575414.7	136184.6	208.022	08-Jun-94	
AX-102	2-E25-127	11-02-22	41670	47508	575411.7	136184.9	208.018	08-Jun-94	
AX-102	2-E25-128	11-02-23	41675	47485	575418.9	136186.6	207.906	08-Jun-94	
AX-102	2-E25-132	11-02-01	41668	47449					
AX-102	2-E25-133	11-02-03							No Survey Data Available
AX-102	2-E25-137								No Survey Data Available
AX-102	2-E25-138								No Survey Data Available
AX-102	2-E25-139								No Survey Data Available
AX-102	2-E25-140								No Survey Data Available
AX-102	2-E25-141								No Survey Data Available
AX-102	2-E25-142								No Survey Data Available
AX-102	2-E25-143								No Survey Data Available
AX-102	2-E25-144								No Survey Data Available
AX-102	2-E25-145								No Survey Data Available
AX-103	2-E25-113	11-03-02	41764	47532	575404.7	136213.6	207.765	09-Jun-94	
AX-103	2-E25-114	11-03-05	41691	47540	575402.3	136191.3	208.172	09-Jun-94	
AX-103	2-E25-115	11-03-07	41691	47589	575387	136190.9	208.973	09-Jun-94	

Table 3-Well Survey Information

Assoc. Tank	Well Name	Tank Farm ID	N-Han. Plant (ft)	W-Han. Plant (ft)	E-WSCS (m)	N-WSCS (m)	Vertical (m)	WSCS Survey Date	Comment
AX-103	2-E25-116	11-03-09	41720	47610	575381.1	136200.2	207.726	09-Jun-94	
AX-103	2-E25-117	11-03-10	41761	47602	575383.7	136212.5	207.843	09-Jun-94	
AX-103	2-E25-118	11-03-12	41776	47569	575393.4	136217	207.734	09-Jun-94	
AX-104	2-E25-119	11-04-01	41672	47547	575400.1	136185.6	208.494	09-Jun-94	
AX-104	2-E25-120	11-04-05	41583	47544	575401	136159	208.028	08-Jun-94	
AX-104	2-E25-122	11-04-08	41605	47604	575381.7	136165.8	208.067	08-Jun-94	
AX-104	2-E25-123	11-04-10	41650	47612	575380.1	136178.9	209.07	08-Jun-94	
AX-104	2-E25-124	11-04-11	41672	47581	575389.5	136185.3	208.488	09-Jun-94	
AX-104	2-E25-147	11-04-19	41591	47588	575387.6	136160.8	208.163	08-Jun-94	
AX-104	2-E25-173				575368.6	136180.2	207.865	03-Aug-94	
AX-104	2-E25-174				575368.7	136164.9	209.244	03-Aug-94	
Not Located	2-E25-183		41696	47687	575357.6	136192.9	0	- -	Han. Coords Converted.
Perimeter	2-E25-13				575362.9	136140.4	208.048	07-Jun-94	
Perimeter	2-E25-40				575464.7	136212.3	202.966	01-Jun-94	
Perimeter	2-E25-41				575466.1	136145.9	204.657	08-Jun-94	
Perimeter	2-E25-121	11-04-07	41588	47686	575357.8	136158.8	208.838	08-Jun-94	
Perimeter	2-E25-179				575368.7	136126.9	208.15	03-Aug-94	
Perimeter	2-E25-182				575352.3	136189.2	207.545	03-Aug-94	
Perimeter	2-E25-185				575368.5	136186.5	207.712	03-Aug-94	

APPENDIX D

SAMPLE CALCULATIONS OF WORKER EXPOSURE FROM PITS AND PIPES

Provided by Harvey Goldberg, Ph.D.
Flour Daniel Northwest
February 1998

and

Bill Skelly
COGEMA Engineering Corporation
April 1998

APPENDIX D

SAMPLE CALCULATIONS OF WORKER EXPOSURE FROM PITS AND PIPES

Provided by Harvey Goldberg, Ph.D.
Fluor Daniel Northwest
February 1998

and

Bill Skelly
COGEMA Engineering Corporation
April 1998

1.0 INTRODUCTION

As part of the effort to demonstrate alternate retrieval technologies for tank waste, the ancillary equipment in tank farm 241-AX will be either grouted in place or removed and disposed of in some way. In order to estimate the scope of this operation, some estimate of the worker radiological exposure calculations were developed for representative pipes and pits. In addition, an analysis of the effect of changes in the various parameters on the dose/exposure rates was performed and reported in this appendix.

2.0 SOURCE TERMS

The estimated source terms were examined and the AX-104 source term was determined to be the worst case in terms of the external dose produced. This source term was then used for all of the analyses in this study. This source term consists of the following concentrations of radioisotopes.

Table 1: Radioisotope Concentrations (Ci/L)

Isotope	Concentration	Isotope	Concentration
^{14}C	$2.3e \times 10^{-5}$	^{155}Eu	2.79×10^{-2}
^{60}Co	5.94×10^{-3}	^{226}Ra	7.41×10^{-9}
^{63}Ni	1.18×10^{-2}	^{227}Ac	4.01×10^{-8}
^{79}Se	1.11×10^{-4}	^{228}Ac	6.69×10^{-14}
^{90}Sr	$5.15 \times 10^{+1}$	^{229}Th	1.05×10^{-11}
^{90}Y	$5.15 \times 10^{+1}$	^{233}U	1.98×10^{-13}
^{93m}Nb	3.85×10^{-4}	^{234}U	1.04×10^{-7}
^{93}Zr	5.14×10^{-4}	^{235}U	4.31×10^{-9}
^{99}Tc	1.69×10^{-4}	^{237}Np	3.61×10^{-7}
^{106}Ru	3.82×10^{-7}	^{238}Pu	9.45×10^{-5}
^{106}Rh	3.82×10^{-7}	^{238}U	1.01×10^{-7}
^{113m}Cd	2.20×10^{-3}	^{239}Pu	2.45×10^{-3}
^{125}Sb	2.37×10^{-3}	^{240}Pu	4.65×10^{-4}
^{126}Sn	1.74×10^{-4}	^{241}Am	3.85×10^{-3}
^{129}I	3.27×10^{-7}	^{241}Pu	6.73×10^{-3}
^{134}Cs	7.82×10^{-6}	^{242}Cm	3.51×10^{-6}
^{137}Cs	1.07×10^{0}	^{242}Pu	3.89×10^{-8}
^{137m}Ba	1.01×10^{0}	^{243}Am	1.18×10^{-7}
^{151}Sm	4.16×10^{-1}	^{243}Cm	2.70×10^{-7}
^{152}Eu	1.27×10^{-4}	^{244}Cm	8.28×10^{-6}
^{154}Eu	4.34×10^{-2}		

3.0 GENERIC PIT ANALYSIS

The 241-AX-152 diverter pit was chosen as the worst case pit. This pit has two levels, the top level where the jumper connectors are, and a lower level for the collection of spills. The levels are separated by slightly less than 6" of concrete in which is a drain hole connecting the two. There is also a pump pit associated with this pit, but it was not analyzed.

The upper pit was modeled as a 6' by 16' 11.25" rectangular hole, 16' 1.125" deep. The radioactive sludge ($\rho = 1.6$ g/cm^3) was assumed to be in a thin layer on the floor of the pit. The source was assumed to have a total volume of one liter. The dose rate/exposure rate was then calculated for a point three feet above the ground in the middle of the edge of the pit along the long side.

The computer code ISOSHLD was run in order to ascertain the photonic spectrum from both the gamma rays and the bremsstrahlung produced by the beta radiation. This spectrum was then used in the computer code Microshield©[1] to calculate the dose and exposure rate. The exposure rate was calculated to be 31 mR/hr. This corresponds to a deep dose equivalent dose (DDE) of 36 mrem/hr or an effective dose equivalent (EDE) Of 29 mrem/hr.

The computer code Microskyshine©[1] was used to calculate the additional dose due to skyshine. The result (DDE = 0.62 mrem/hr) indicated that this contribution would be negligible considering the precision of the calculation. Because of this result, the skyshine was not examined for the other cases.

The upper pit has a drain hole in the floor which leads to a lower pit. The lower pit is 11'5" deep and is separated from the upper pit by 5.87" of concrete. One liter of contamination in this level results in an exposure rate of 2.9 mR/hr, a DDE of 3.2 mrem/hr, and an EDE of 2.8 mrem/hr to a person on the edge.

4.0 SENSITIVITY OF RESULTS ON VARIATIONS OF PIT DIMENSIONS

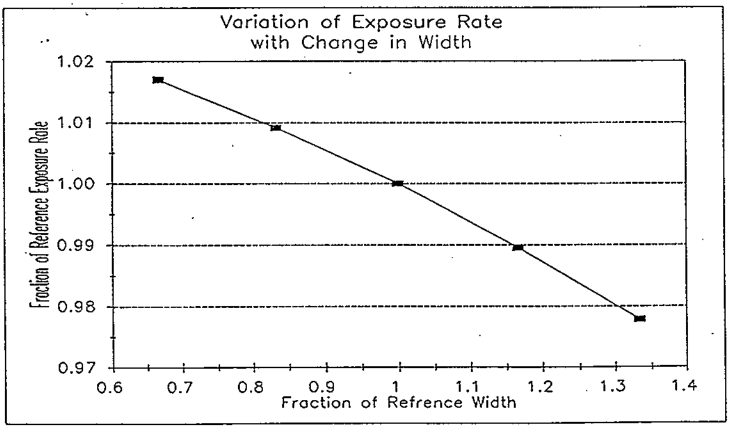
Since this result is to be used as a generic pit, a sensitivity analysis was conducted on the three geometric variables of the upper pit using Microshield. The width of the pit was varied above and below its reference 6' (182.88 cm) value. The results are tabulated in Table 2 and graphed in Figure 1. Note that the variables are unitless, being the ratio of the value (either dimension or exposure rate) divided by the reference value.

---

[1]© Microshield and Microskyshine are copyrighted by Grove Engineering

Table 2: Variation of Exposure Rate with Change in Width			
Width (cm)	% of Reference Width	Exposure Rate (mR/hr)	% of Reference Exposure Rate
121.92	66.67%	31.2	101.7%
152.40	83.33%	30.9	100.9%
182.88	100%	30.7	100.0%
213.36	116.67%	30.3	98.96%
243.84	133.33%	30.0	97.8%

Figure 1: Variation of exposure rate with changes in the width of the pit. Note that a decrease in the width of 30% increases the exposure rate by 1.5% and an increase in width of 30% decreases the exposure rate by 2%.



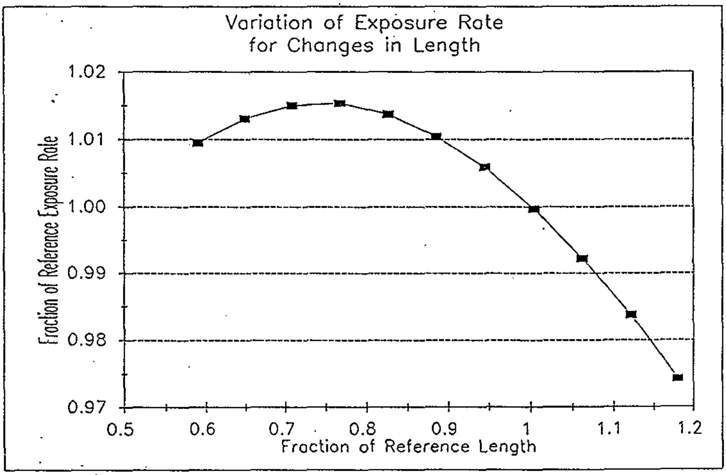
It would seem that a change in the width does not affect the exposure rate strongly. A decrease in the width to 70% of the reference width increases the exposure rate to 101.5% of the reference exposure rate. In increasing the width to 130% of the reference decreases the exposure rate to 98% of the reference. In all these cases, the total amount of contamination in the pit is kept constant. Thus it would seem that using these results on pits that differ from this pit in width is justified.

The length of the pit was then varied around its reference length of 16' 11.25" (516.26 cm). Note that the length is the long side of the pit. The results are tabulated in Table 3 and graphed in Figure 2.

Table 3: Variation of Exposure Rate for Changes in Length

Length (cm)	% of Reference Length	Exposure Rate (mR/hr)	% of Reference Exposure Rate
304.80	59.04%	30.9	100.95%
335.28	64.94%	31.1	101.31%
365.76	70.85%	31.1	101.50%
396.24	76.75%	31.1	101.53%
426.72	82.66%	31.1	101.37%
457.20	88.56%	31.0	101.04%
487.68	94.46%	30.8	100.59%
518.16	100.37%	30.6	99.97%
548.64	106.27%	30.4	99.22%
579.12	112.18%	30.2	98.37%

Figure 2: Variation of exposure rate with changes in the length of the pit. Note that a decrease of the length of 20% increases the exposure rate by approximately 1.5% and an increase in the length by 20% decreases the exposure rate by approximately 3%.

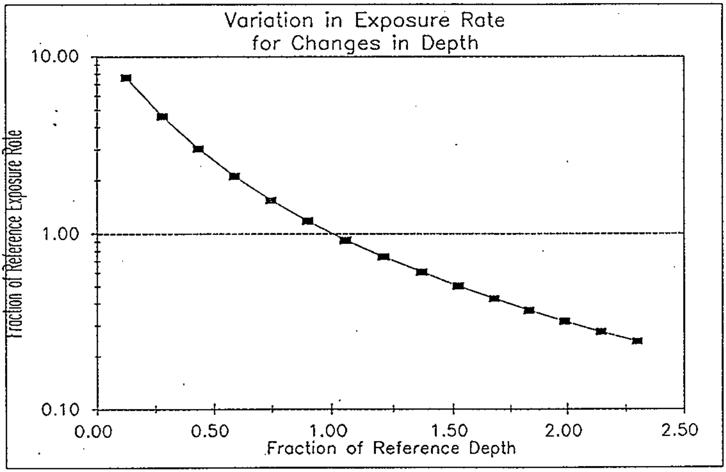


Increasing the length to 120% of the reference length decreases the exposure rate to 97% of the reference exposure rate. Decreasing the length to 80% of the reference increases the exposure to 101.5% of the reference. After that point, further decreases in the length decreases the exposure rate.

Finally, the depth was varied. This dimension is intrinsically different from the other dimensions in that changing the depth changes the distance between the source and the point at which the exposure rate is measured in a more direct manner than changing other dimensions does. The results of this variational analysis are tabulated in Table 4 and graphed in Figure 3.

Table 4: Variation of Exposure Rate for Changes in Depth			
Depth (cm)	% of Reference Depth	Exposure Rate (mR/hr)	% of Reference Exposure Rate
60.96	12.43%	233	760.52%
137.16	27.96%	141	460.03%
213.36	43.49%	92.5	301.83%
289.56	59.03%	64.6	210.64%
365.76	74.56%	47.3	154.19%
441.96	90.10%	35.9	117.19%
518.16	105.63%	28.1	91.81%
594.36	121.16%	22.6	73.74%
670.56	136.70%	18.5	60.42%
746.76	152.23%	15.4	50.38%
822.96	167.77%	13.1	42.61%
899.16	183.30%	11.2	36.48%
975.36	198.83%	9.68	31.58%
1051.56	214.37%	8.46	27.59%
1127.76	229.90%	7.45	24.31%

Figure 3: Variation of exposure rate with changes in the depth of the pit. Note that this is a semi-logarithmic plot.



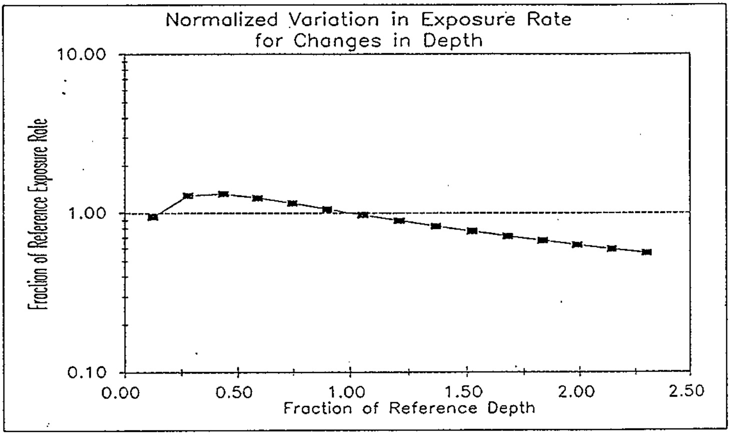
Note that from approximately 50% of the reference depth to 250% of the reference depth, the plot is roughly a straight line. At very shallow depths there is deviation from this form. At this point, the fall-off with distance starts to approximate the fall-off of a point source.

Thus, the exposure rates (and dose rates) scale as an exponential divided by the distance. This is a stronger dependence than that demonstrated for the length or width.

5.0 GENERIC PIPE ANALYSIS

A six inch schedule 40 pipe was chosen as the generic pipe and it was loaded with one liter per foot of tank AX-104 waste in an annular deposit in the inside of the pipe. It was assumed that twenty feet of the pipe was exposed and laid in a trench that is three feet deep. The floor of the trench was assumed to be four feet wide with the walls of the trench sloping outward a foot and a half for every foot of height. On the side of this trench at the center of the exposed pipe at a point three feet above the ground level was the point where the exposure/Dose rate was calculated.

Figure 4: Variation of the exposure rate times the distance with changes in the depth of the pit. This graph indicates that the exposure rate varies as an exponential function of the depth divided by the depth.



The code was rerun for a point four feet from the end of the pipe. This datum is for a pipe that ends at that point and is connected to another pipe that joins at a right angle. A value twice the calculated value would approximate the exposure/dose rate for a person standing at a right angle bend in the piping.

The exposure rate in the middle of a 20' exposed section was calculated to be 2100 mR/hr, the DDE was 2500 mrem/hr and the EDE was 1900 mrem/hr. For a person standing in the crotch of a right angled junction of two pipes, the calculated exposure rate was 3700 mR/hr. The DDE was calculated to be 4500 mrem/hr and the EDE was calculated to be 3400 mrem/hr.

In the course of the project, there will be situations where personnel will be exposed to the cut end of a pipe. In order to model this, a filled pipe was used rather than an annular layer of contamination along the inside wall of the pipe. The size of the pipe and the source was the same as previously with the exception that only five feet of pipe was modeled. With the exposed person off the end of the pipe rather than off the side, the self-shielding would make any further length would be insignificant. These results are tabulated in Table 5 and Figure 5.

Figure 5: Variation of exposure rate as a function of distance for the rate off the end of an open pipe.

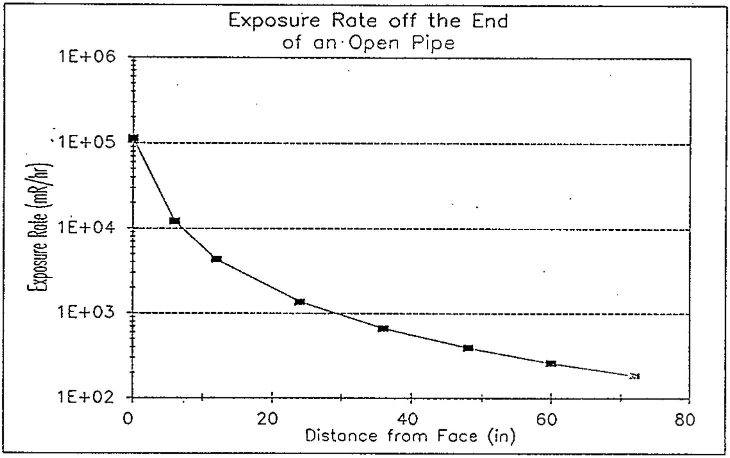
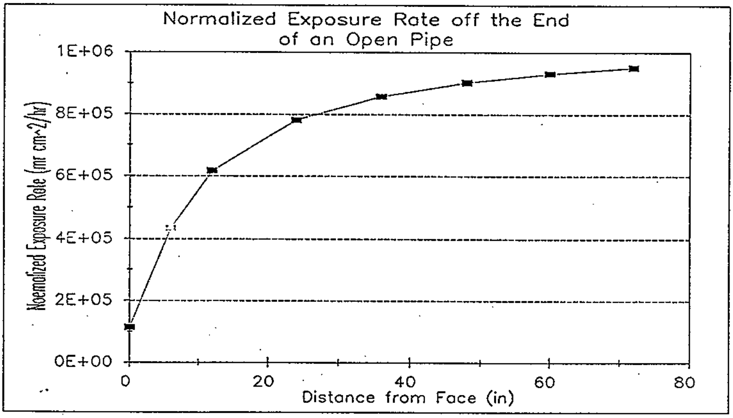


Table 5: Exposure Rate off the End of an Open Pipe			
Distance (in)	Exposure Rate (mR/hr)	DDE (mrem/hr)	EDE (Mrem/hr)
0	1.12×10^5	1.37×10^5	1.01×10^5
6	1.20×10^4	1.45×10^4	1.08×10^4
12	4.28×10^3	5.11×10^3	3.85×10^3
24	1.36×10^3	1.60×10^3	1.22×10^3
36	6.62×10^2	7.78×10^2	5.93×10^2
48	3.92×10^2	4.59×10^2	3.51×10^2
60	2.59×10^2	3.03×10^2	2.32×10^2
72	1.84×10^2	2.15×10^2	1.65×10^2

In Figure 6, the exposure rate times the square of the distance from the face was plotted against the distance from the face. As the distance increases (d ≥ 40") the curve approaches a straight line indicating that the exposure rate now approaches that of a point source.

Figure 6: Variation of exposure rate times the distance to the open face squared as a function of that distance. Note that the curve approaches a straight line on this semi-logarithmic plot indicating that the functional dependence approaches that of a point source.



6.0 FURTHER PIPE INVESTIGATION

As a second iteration, it is conceivable that the results may be utilized for scaling to sources with different compositions. The vast majority of the dose comes from ^{137}Cs-^{137m}Ba and ^{90}Sr-^{90}Y. While the 137 pair result in the largest dose per curie in the waste source terms considered, the 90 pair exceed the 137 pair in curies per liter by an order of magnitude.

The ISOSHLD input decks were run again once with just the first set of radionuclides, and then with the second set in order to ascertain the percentages of the doses due to each of these sets. The percentage of the exposure/dose rates from each of the pairs of radionuclides varies with the shielding encountered. The 137 isotopes are mostly limited to one energy. There are some low level gamma rays and some bremsstrahlung, but the 0.662 MeV gamma ray predominates. The spectrum for the 90 isotopes is almost entirely due to bremsstrahlung from the two beta rays. The ^{90}Sr beta ray with $E_{max.}$=0.546 MeV and E_{av}=0.196 MeV, and the ^{90}Y beta ray with

E_{max}=2.284 MeV and E_{av}=0.935 MeV. Thus the bremsstrahlung spectrum has one low level peak and a higher level peak with contributions up to 2.284 MeV.

The effect of shielding is to preferentially shield out the low level photons, thus hardening the spectrum. Thus, the higher energy photons become more dominant as the shielding increases. Table 6 tabulates the percentage of the results due to each of these contributors for the cases considered.

Table 6: Contributions to results from the Major components

Model	Type of Result	Result	Percentage from ^{90}Sr-^{90}Y	Percentage from ^{137}Cs-^{137m}Ba
Top Pit Thin Source No Shielding	Exposure Rate	31 mR/hr	31.79%	64.57%
	DDE	36 mrem/hr	26.97%	69.99%
	EDE	29 mrem/hr	30.55%	65.93%
End of Pipe Thick Source No Shielding	Exposure Rate	2.9 mrem/hr	36.81%	60.57%
	DDE	3.2 mrem/hr	31.97%	64.94%
	EDE	2.8 mrem/hr	35.69%	61.86%
Side of Pipe This Source Steel Shield	Exposure Rate	2100 mrem/hr	37.30%	59.10%
	DDE	2500 mrem/hr	33.97%	62.89%
	EDE	1900 mrem/hr	35.41%	61.21%
Bottom Pit Thin Source Concrete Shield	Exposure Rate	11000 mrem/hr	47.36%	46.65%
	DDE	14000 mrem/hr	45.06%	49.54%
	EDE	10000 mrem/hr	46.03%	48.26%

6.0 EFFECTIVE DOSE EQUIVALENT CALCULATIONS FOR PIPE GROUPS

This table presents the EDE calculations by group of direct buried piping, encased piping, and ventilation elements as listed in the ancillary equipment inventory. They were completed by using the volume, length, and waste volume information from the best basis waste inventory as listed in Tables 6a, 6b, and 6c of Appendix B for each pipe in each group and multiplying that result by the generic pipe EDE of 1900 mrem/hr in Section 5 Generic Pipe Analysis and by a ratio of the ^{137}Cs in the specific pipe group to the standard volume assumed.

- Group 1 not determined
- Group 2 1,177 mrem/hr
- Group 3 74 mrem/hr
- Group 4 392 mrem/hr
- Group 5 4 mrem/hr

- Group 6 1,316 mrem/hr
- Group 7 22 mrem/hr
- Group 9 688 mrem/hr
- Group 10 65 mrem/hr
- Group 11 328 mrem/hr
- Group 12 8 mrem/hr
- Group 13 4 mrem/hr
- Group 15 0 dose
- Group 16A 268 mrem/hr
- Group 16B 353 mrem/hr
- Group 16C 352 mrem/hr
- Group 16D 256 mrem/hr
- Group 17 1,250 mrem/hr
- Group 18 101 mrem/hr
- Group 19 0 mrem/hr
- Group 20 3,254 mrem/hr

7.0 EFFECTIVE DOSE EQUIVALENT CALCULATION - PITS AND BOXES

These EDE calculations are based on the estimated volume of waste from Table 6e, Appendix B and the generic pit analysis EDE of 29 mrem/hr or 2.8 mrem/hr depending upon the pit level as calculated in Section 3 of this Appendix. The generic EDE was then factored for the pit size and waste volume in the pit.

Pit or Box	Factored EDE (in mrem/hr)
AX-152 (upper)	3797
AX-152 (lower)	2147
Composite AX-152	5945
A-417 Pump Pit	2228
A-417 Tank	616
Composite A-417	2844
AX-A	8395
AX-B	6897
AY-152	4871
AX-153	0
AY-501	0
AX-155	814
LDP-101	31

Pit or Box	Factored EDE (in mrem/hr)
LDP-102	78
LDP-103	181
LDP-014	181
AX-01A	64
AX-01B	64
AX-01C	64
AX-01D	64
AX-02A	160
AX-02B	160
AX-02C	160
AX-02D	160
AX-03A	370
AX-03B	370
AX-03C	370
AX-03D	370
AX-04A	370
AX-04B	370
AX-04C	370
AX-04D	370
01VP	0
02VP	0
03VP	0
04VP	0

APPENDIX E

AX TANK FARM FILE DATA
MEASURED EXPOSURES AT SELECTED LOCATIONS

Data provided by:

Columbia Energy & Environmental Sciences, Inc.

April 1998

INTRODUCTION AND SUMMARY

The following information provided by Columbia Energy and Environmental Services, Inc. is based on research for information regarding field measured AX-Tank Farm radiation exposure data for specific facilities in the AX tank farm area and interviews with TWRS Operations and Vent and Balance personnel. Records were researched through the Radiation Monitoring Information System (RMIS) for the following equipment as listed on the AX-tank farm ancillary equipment list:

- Building 702-A HEPA filters
- Vent header system
- Ion Exchange Column in the south portion of the farm
- A- 401 condenser building
- Process waste piping system
- Pits and boxes associated with the farm

According to the Operations and Vent and Header personnel interviewed, the Building 702-A HEPA filters are still in place and are considered back up for the newly installed tank ventilation upgrades. In addition, all of the sluice pits, pump pits and valve pits have access ports or removable plugs that could be used to obtain additional exposure rate data , however, most of the pits have been stabilized with a foam insulation that would require removal before the data could be obtained.

Little specific information beyond that obtained is available at the Hanford Site. Many records on the waste transfer piping system for the AX-tank farm have been archived in Seattle and are generally not readily accessible. No information was locally available for the vent header system, the ion exchange column, process waste piping and many of the pits and boxes nor is any known to exist in the archived files.

Electronic copies of the Radiological Survey Reports in this appendix are not available.

APPENDIX F

AX TANK FARM ANCILLARY EQUIPMENT STUDY
CASE 1: EQUIPMENT REMOVAL

COGEMA ENGINEERING CORP.
JOB NO. Z466AAF1
FILE NO. Z466AAF1

ANCILLARY EQUIPMENT REMOVAL
241-AX TANK FARM CLOSURE - PLANNING ESTIMATE
PHMCR01 - PROJECT COST SUMMARY

DATE 04/22/98 10:18:28
BY R.OHRT

SORT	DESCRIPTION	ESCALATED TOTAL COST	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
BHI	BECHTEL HANFORD INTERNATIONAL	580,000	35	200,000	780,000
FDNW	FLUOR DANIEL NORTHWEST	5,300,000	58	3,080,000	8,380,000
LMHC	LOCKHEED MARTIN HANFORD CORP.	3,720,000	59	2,190,000	5,910,000
WMHI	WASTE MANAGEMENT HANFORD, INC.	210,000	35	70,000	280,000
WMNW	WASTE MGMT FED SERVICES NORTHWEST	270,000	50	140,000	410,000
	SUBTOTAL	10,080,000	56	5,680,000	15,760,000
SITE	SITE ALLOCATIONS	2,230,000	60	1,350,000	3,580,000
	TOTAL ESTIMATED CONSTRUCTION COST (TECC)	12,310,000	57	7,030,000	19,340,000

TYPE OF ESTIMATE	STUDY ESTIMATE APRIL 22, 1998	REMARKS:
FDNW LEAD ESTIMATOR	Ro ESTIMATING MANAGER	
PROJECT MANAGER		
CLIENT		

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

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	SUB TOTAL	SITE ALLOCAT'N	TOTAL DOLLARS
110000	DEFINITIVE DESIGN	2724505	0.00	0	2724505	55	1498478	4222983	1108955	5331938
120000	ENGINEERING/INSPECTION	749986	0.00	0	749986	70	524990	1274976	334808	1609784
130000	CONSTRUCTION MANAGEMENT	740292	0.00	0	740292	50	370146	1110438	291602	1402040
SUBTOTAL 1	ENGINEERING	4214783	0.00	0	4214783	57	2393614	6608397	1735365	8343762
210000	PROCUREMENT-ONSITE E/C	1639809	0.00	0	1639809	70	1147866	2787675	732044	3519719
SUBTOTAL 2	PROCUREMENT	1639809	0.00	0	1639809	70	1147866	2787675	732044	3519719
311001	801-A INSTRUMENT BUILDING	2900	0.00	0	2900	50	1450	4350	1143	5493
311002	801-B INSTRUMENT BUILDING	2900	0.00	0	2900	50	1450	4350	1143	5493
311004	ION EXCHANGE COLUMN	30700	0.00	0	30700	70	21490	52190	15592	67782
311005	A-702 FAN HOUSE/FILTER BUILDING	3626	0.00	0	3626	55	1994	5620	1372	6992
311006	CAISSONS/DEENTRAINER FACILITIES	9708	0.00	0	9708	55	5339	15047	4560	19607
311007	A-401 CONDENSER BUILDING	39284	0.00	0	39284	70	27499	66783	21123	87906
311008	COOLING TOWER AND SUMPS	12513	0.00	0	12513	50	6257	18770	0	18770
311011	A-8 SAMPLER PITS	22367	0.00	0	22367	50	11184	33551	10608	44159
SUBTOTAL 311	FACILITY DEMO - CPAF	123998	0.00	0	123998	62	76663	200661	55541	256202
312001	GROUTING OF WELLS	323762	0.00	0	323762	50	161881	485643	0	485643
SUBTOTAL 312	WELLS	323762	0.00	0	323762	50	161881	485643	0	485643
314001	REMOVE LEAK DETECTION PITS	7921	0.00	0	7921	50	3961	11882	3863	15745
SUBTOTAL 314	LEAK DETECTION PITS	7921	0.00	0	7921	50	3961	11882	3863	15745
316003	CUT/CAP/REMOVE PIPE BUNDLES	93892	0.00	0	93892	70	65724	159616	51332	210948
316004	REMOVE CONTAMINATED PIPING	1040622	0.00	0	1040622	70	728436	1769058	530597	2299655
316005	REGRADE/COMPACT FOOTINGS	32135	0.00	0	32135	50	16068	48203	12044	60247
SUBTOTAL 316	BURIED PIPE & DUCT	1166649	0.00	0	1166649	69	810228	1976877	593973	2570850
317001	PUMP & SLUICE PITS ASSOC. W/TANKS	45847	0.00	0	45847	70	32093	77940	24298	102238

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING CORP.
JOB NO. Z466AAF1
FILE NO. Z466AAF1

** IEST - INTERACTIVE ESTIMATING **
ANCILLARY EQUIPMENT REMOVAL
241-AX TANK FARM CLOSURE - PLANNING ESTIMATE
PHMCR02 - WORK BREAKDOWN STRUCTURE (WBS) SUMMARY

DATE 04/22/98 10:18:34
BY R.OHRT

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	SUB TOTAL	SITE ALLOCAT'N	TOTAL DOLLARS
317002	VALVE PITS ASSOCIATED WITH TANKS	1348	0.00	0	1348	50	675	2023	624	2647
	SUBTOTAL 317 PITS ASSOCIATED W/TANKS	47195	0.00	0	47195	69	32768	79963	24922	104885
318001	AX-A & AX-B VALVE PITS	5730	0.00	0	5730	70	4011	9741	3036	12777
318002	FLUSH/SERVICE PITS - AX-A & AX-B	1348	0.00	0	1348	50	675	2023	624	2647
318003	AY-152 SLUICE PIT	6093	0.00	0	6093	70	4265	10358	3142	13500
318004	AX-152 DIVERTER STATION	12145	0.00	0	12145	70	8501	20646	6492	27138
318005	MANHOLE & BOXES FOR AX-152 DIV STN	1517	0.00	0	1517	50	759	2276	716	2992
318006	AX-153 ISOLATION PIT	1517	0.00	0	1517	50	759	2276	716	2992
318007	AY-501 CONDENSATE VALVE PIT	5730	0.00	0	5730	70	4011	9741	3036	12777
318008	AX-155 DIVERSION BOX	5730	0.00	0	5730	70	4011	9741	3036	12777
318009	AX-501 VALVE PIT	1517	0.00	0	1517	50	759	2276	716	2992
318010	A-417 PUMP PIT AND TANK	8603	0.00	0	8603	70	6022	14625	4558	19183
	SUBTOTAL 318 REMOVAL OF PITS AND BOXES	49930	0.00	0	49930	68	33773	83703	26072	109775
319002	MODS TO SOIL REMOVAL	147822	0.00	0	147822	50	73911	221733	79766	301499
319003	ADDITIONAL CREW	388904	0.00	0	388904	50	194452	583356	209853	793209
	SUBTOTAL 319 MODS - CPAF	536726	0.00	0	536726	50	268363	805089	289619	1094708
	SUBTOTAL 31 CF CONSTRUCTION	2256181	0.00	0	2256181	62	1387637	3643818	993990	4637808
321003	CHANGE HOUSE DEMOLITION	6095	0.00	0	6095	50	3048	9143	704	9847
321010	COMPRESSOR BUILDING DEMOLITION	6095	0.00	0	6095	50	3048	9143	704	9847
329001	MODS TO ENCLOSURE STRUCTURE	1019196	0.00	0	1019196	40	407678	1426874	109869	1536743
	SUBTOTAL 32 FIXED PRICE CONSTRUCTION	1031386	0.00	0	1031386	40	413774	1445160	111277	1556437
331000	BUILDING DEMOLITION - DISPOSAL	458393	0.00	0	458393	35	160438	618831	0	618831
334001	LEAK DETECTION PITS - DISPOSAL	9615	0.00	0	9615	35	3365	12980	0	12980
336003	PIPE BUNDLE REMOVAL - DISPOSAL	289320	0.00	0	289320	35	101262	390582	0	390582
336004	REMOVE CONTAM. PIPE - DISPOSAL	85080	0.00	0	85080	35	29778	114858	0	114858
337000	DEMOL.PITS ASSOC.W/TKS - DISPOSAL	43560	0.00	0	43560	35	15246	58806	0	58806
338000	DEMOLISH PITS & BOXES - DISPOSAL	59820	0.00	0	59820	35	20937	80757	0	80757
	SUBTOTAL 33 DISPOSAL COSTS	945788	0.00	0	945788	35	331026	1276814	0	1276814

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	SUB TOTAL	SITE ALLOCAT'N	TOTAL DOLLARS
SUBTOTAL 3	CONSTRUCTION	4233355	0.00	0	4233355	50	2132437	6365792	1105267	7471059
PROJECT TOTAL		10,087,947	0.00	0	10,087,947	56	5,673,917	15,761,864	3,572,676	19,334,540

1. ESTIMATE PURPOSE

PLANNING/FEASIBILITY ESTIMATE: THIS ESTIMATE WILL BE USED FOR A SCOPING STUDY.

2. ESTIMATE TECHNICAL BASIS

A. THIS ESTIMATE HAS BEEN PREPARED FOR TASK 8 OF THE "HANFORD TANKS INITIATIVE -- SST CLOSURE ASSESSMENT" WORK PACKAGE AWARDED TO SESC BY NHC.

B. A DESCRIPTION OF THE TECHNICAL SCOPE OF WORK MAY BE FOUND IN THE FOLLOWING REFERENCE DOCUMENTS:
* REQUEST FOR ESTIMATE DATED FEB 11, 1998.
* SESC LETTER # SESC-98-006 DATED JAN 9, 1998 WITH ATTACHMENTS.
* NES REPORT "241-AX TANK FARM ANCILLARY EQUIPMENT REMOVAL STUDY" DATED FEBRUARY 1998.

C. THE FOLLOWING CONSTRAINTS AND/OR SPECIAL CONDITIONS EXIST:
MOST OF THE WORK DONE IN THIS ESTIMATE IS DONE INSIDE A HUGE HEPA FILTERED STRUCTURE. THE WORKERS ARE OPERATING FROM INSIDE THE CABS OF THIS EQUIPMENT THAT HAVE SUPPLIED BREATHING AIR AND AIR CONDITIONING. THERE HAS BEEN NO ALLOWANCE FOR BURN-OUT, HOWEVER, SWP AND MASK WORK WAS FACTORED INTO THE PRODUCTIVITY RATES.

D. THE ESTIMATE DOES NOT INCLUDE COSTS FOR REGULATORY PERMITTING OR FOR IMPLEMENTATION OF AN AUTHORIZATION BASIS FOR THE WORK.

3. ESTIMATE METHODOLOGY

A. DIRECT COSTS:
HISTORICAL DATA HAS BEEN USED WHERE APPLICABLE, EXPERT OPINION WAS UTILIZED WHEN OTHER METHODS WERE NOT AVAILABLE AND A BOTTOMS-UP APPROACH WAS APPLIED.

(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: R.S. MEANS AND RICHARDSON'S PROCESS PLANT CONSTRUCTION ESTIMATING STANDARDS.
THESE SOURCES WERE USED AS A BASIS ONLY. THIS BASIS WAS ADJUSTED TO COMPENSATE FOR THE SLOW DOWN OF PRODUCTIVITY CAUSED BY POOR VISIBILITY, LACK OF MANEUVERABILITY, CONGESTION AND EXTRA CARE NEEDED IN HANDLING CONTAMINATED MATERIALS. ALSO FACTORED IN IS THE FIELD TIME LOST BY DAILY WORK PLAN REVIEW MEETINGS, SUITING UP, ENTERING AND EXITING ZONES AND THE TIME SPENT IN THE EQUIPMENT WHILE TRAVELING IN OR OUT OF THE PIT.

B. DIRECT COST FACTORS:

(1) SALES TAX HAS BEEN APPLIED TO ALL MATERIALS AND EQUIPMENT PURCHASES AT 8%.

(2) A FACTOR OF 15% HAS BEEN APPLIED TO DIRECT CRAFT LABOR FOR GENERAL REQUIREMENTS; THIS INCLUDES HAULING MEN AND MATERIAL, CLEAN-UP AND LABOR SUPPORT AND QC INSPECTION.

3) A FACTOR OF 23.58% HAS BEEN ADDED TO DIRECT LABOR FOR TECHNICAL SERVICES - THIS INCLUDES CONSTRUCTION OVERHEAD OF; MANAGEMENT, SUPERINTENDENT, DOCUMENT CONTROL, TURNOVER, ENGINEERING, SURVEY AND CLERICAL; QUALITY ASSURANCE ENGINEERING, CONSTRUCTION SUPPORT AND PROJECT MANAGEMENT.

(4) CONSUMABLES ARE ESTIMATED AT 3.2% OF DIRECT CRAFT LABOR COSTS.

(5) SPECIAL WORK PROCEDURE (SWP) FACTORS ARE ALREADY INCLUDED IN THE MANHOURS, AS ALL WORK WAS MANLOADED, HAVING TAKEN INTO CONSIDERATION THE PRODUCTIVITY LOSSES DUE TO MASK WORK, SUIT UP, ZONE WORK, ETC.

(6) PREMIUM PAY
OVERTIME REQUIREMENTS AND SHIFT DIFFERENTIAL PAY FOR CRAFT LABOR ARE UNION NEGOTIATED UNDER THE HANFORD SITE STABILIZATION AGREEMENT. NO PREMIUM PAY WAS JUDGED TO BE NECESSARY FOR THIS WORK.

(7) GENERAL FOREMAN FACTOR OF 7% HAS BEEN APPLIED TO DIRECT CRAFT LABOR CREWS.

(8) 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 MANAGEMENT & PLANNING SUPPORT.

(9) A FACTOR OF 10% HAS BEEN APPLIED TO DIRECT CRAFT LABOR TO ALLOW FOR USAGE OF GOVERNMENT OWNED EQUIPMENT CONTROLLED BY DYNCORP.

C. INDIRECT COSTS:
FIXED PRICE CONTRACTOR OVERHEAD, PROFIT, BOND AND INSURANCE COSTS HAVE BEEN APPLIED ARE THE FOLLOWING PERCENTAGES: LABOR =25%, EQUIPMENT USE =25%, MATERIAL =25%, SUBCONTRACT =10%, AND EQUIPMENT =25%, AND ARE REFLECTED IN THE "OH&P/B&I" COLUMN OF THE ESTIMATE DETAIL REPORT.

D. RATES:
(1) FOR ESTIMATING PURPOSES, AVERAGE FDNW RATES BY OPERATIONS CODE HAVE BEEN DEVELOPED BASED UPON RECENT COST HISTORY AND ADJUSTED TO REFLECT INDUSTRY AVERAGE AE/CM RATES.
(2) FLUOR DANIEL NORTHWEST SERVICES (CONSTRUCTION CRAFT LABOR) RATES ARE THOSE LISTED IN APPENDIX A TO THE HANFORD SITE STABILIZATION AGREEMENT (HSSA). THE HSSA RATES INCLUDE BASE WAGE, FRINGE BENEFITS AND OTHER COMPENSATION AS NEGOTIATED BETWEEN FLUOR DANIEL HANFORD, INC. AND THE NATIONAL BUILDING AND CONSTRUCTION TRADES DEPARTMENT AFL-CIO. FLUOR DANIEL NORTHWEST COST ESTIMATING INCORPORATES FACTORS TO COVER ADDITIONAL COSTS FOR WORKMANS COMPENSATION, FICA, STATE AND FEDERAL EMPLOYMENT INSURANCE AND G&A/FEE TI DEVELOPE A FULLY BURDENED RATE BY CRAFT.
(3) FDH & PHMC SUBCONTRACTOR STANDARD LABOR RATES ARE THOSE LISTED IN THE FINANCIAL DATA SYSTEM (FDS) FDST 321R REPORT ORGANIZATION RATES PLUS ADDERS.

E. SITE ALLOCATIONS FACTORS:
SITE ALLOCATION FACTORS ARE DEVELOPED AND PROVIDED BY FLUOR DANIEL HANFORD (FDH) FOR ESTIMATING USE.
(1) DYNCORP EQUIPMENT USAGE: APPLIED TO HOME OFFICE ENGINEERING FOR GOVERNMENT OWNED EQUIPMENT CONTROLLED BY DYNCORP 0.25%
(2) GOVERNMENT FURNISHED SERVICES (GFS): APPLIED TO ALL COSTS TO LIQUIDATE GOVERNMENT FURNISHED SERVICES PROVIDED TO THE ENTERPRISE COMPANIES, 7% FOR FDNW.
(3) HANFORD SITE GENERAL ADMINISTRATIVE (G&A): APPLIED TO ALL COSTS TO LIQUIDATE THE COST OF HANFORD GENERAL AND ADMINISTRATIVE SERVICES, 18.0%.

THE ABOVE FACTORS ARE APPLIED TO ESTIMATED COSTS AS SHOWN IN THE PHMCR06 REPORT.

(1) DYNCORP EQUIPMENT USAGE: 0.25% APPLIED TO HOME OFFICE ENGINEERING AND CONSTRUCTION MANAGEMENT LABOR; 10% APPLIED TO CONSTRUCTION LABOR.
(2) FDH GFS/G&A CONST. MGMT: GFS (7%) AND G&A (18.0%) COMPOUNDED AND APPLIED TO FIXED PRICE CONSTRUCTION MANAGEMENT, 26.26%
(3) FDH SUBCONTRACT - G&A/FEE RATE (7.7%) APPLIED TO FIXED PRICE SUBCONTRACTS.
(4) FDH GFS/G&A - LABOR: GFS (7%) AND G&A (18.0%) COMPOUNDED AND APPLIED TO HOME OFFICE ENGINEERING, CONSTRUCTION MANAGEMENT LABOR AND TO FDNWS CONSTRUCTION LABOR AT 26.26%.

4. ESCALATION

ESCALATION PERCENTAGES WERE NOT PROVIDED, ALL COSTS REFLECT CURRENT APRIL 1998 PRICES.

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 AN ENVIRONMENTAL RESTORATION PLANNING ESTIMATE WITH EXPERIMENTAL/SPECIAL CONDITIONS = UP TO 100%

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 110000 DEFINITIVE DESIGN - A 35% CONTINGENCY WAS APPLIED HERE BECAUSE IT IS THE AVERAGE OF ALL THE CONTINGENCIES APPLIED FOR THE CONSTRUCTION ACTIVITIES. IT WAS FELT THAT THE DESIGN PORTION OF THE REMOVAL WAS SUBJECT TO THE SAME RISKS AS THE ASSOCIATED FIELD ACTIVITY. *TOTAL CONTINGENCY = 55%

WBS 120000 ENGINEERING INSPECTION - A 50% CONTINGENCY WAS APPLIED HERE BECAUSE OF THE DIFFICULTY IN PREDICTING TO ANY DEGREE OF ACCURACY THE COSTS TO BE INCURRED DOING THE WASTE SAMPLING PORTION OF THIS ACTIVITY. A 50% GROWTH IN THIS AREA IS ENTIRELY POSSIBLE. *TOTAL CONTINGENCY = 70%

WBS 130000 CONSTRUCTION MANAGEMENT - THE DOLLAR AMOUNT USED FOR THIS ACTIVITY IS NORMALLY AUTOMATICALLY ADDED TO ALL FDNW WORK AS AN ALLOCATION, IT WAS ASSIGNED ITS OWN WBS HERE TO MAKE THIS COST MORE VISIBLE TO THE CUSTOMER. A 30% CONTINGENCY WAS FELT ACCEPTABLE TO COVER COST GROWTH DUE TO A SCHEDULE INCREASE CAUSED BY POTENTIAL UNKNOWN RADIOLOGICAL CONTAMINATION. *TOTAL CONTINGENCY = 50%

WBS 210000 PROCUREMENT - A CONTINGENCY OF 50% HAS BEEN APPLIED DUE TO ADDITIONAL REQUIREMENTS NOT QUOTED BY VENDORS SUCH AS SPECIAL SHIELDED CAB NEEDS (FRESH AIR, COOLING, REMOTE VIEWING, COMMUNICATION, HATCH DOORS) CHASSIS DESIGNED FOR 54,000 LB OF ADDED CAB WEIGHT DUE TO 6" OF STEEL SHIELDING. *TOTAL CONTINGENCY = 70%

WBS 311001 & 311002 INSTRUMENT BUILDINGS - EQUIPMENT SHOULD BE ABLE TO QUICKLY DEMOLISH A PRE-ENGINEERED STEEL BUILDING, HOWEVER, THE CONTENTS THAT MAY REQUIRE HANDS ON REMOVAL ARE UNKNOWN, SO A 30% CONTINGENCY HAS BEEN APPLIED. *TOTAL CONTINGENCY = 50%

WBS 311004 ION EXCHANGE COLUMN - A 50% CONTINGENCY HAS BEEN APPLIED WHICH ALLOWS APPROXIMATELY 3 EXTRA CREW DAYS IN THE EVENT PROPOSED METHODS PROVE UNFEASIBLE AND MORE LABOR INTENSIVE METHODS ARE NEEDED. *TOTAL CONTINGENCY = 70%

WBS 311005 FAN HOUSE - EQUIPMENT SHOULD BE ABLE TO QUICKLY DEMOLISH A PRE-ENGINEERED STEEL BUILDING, HOWEVER, THE FILTER HOUSING/EXHAUST TRAIN MAY PRESENT CONDITIONS NOT ANTICIPATED AND POSSIBLY REQUIRE DECONTAMINATION. A 35% CONTINGENCY WAS APPLIED TO THIS ACTIVITY. *TOTAL CONTINGENCY = 55%

WBS 311006 DEENTRAINER FACILITIES - THE 375 EXCAVATORS AND ATTACHMENTS SHOULD HAVE NO PROBLEMS EXCAVATING THE SOIL OR DEMOLISHING THE CONCRETE, THE ONLY CONCERN HERE IS THE TANKS AND SEAL POT REMOVAL AND SUBSEQUENT LOADING INTO SUITABLE CONTAINERS. A 35% CONTINGENCY WAS FELT ADEQUATE. *TOTAL CONTINGENCY = 55%

WBS 311007 CONDENSER BUILDING - A 50% CONTINGENCY HAS BEEN APPLIED TO THIS ACTIVITY TO COVER THE POSSIBILITY OF DIFFICULTIES IN REMOTELY CUTTING/CRIMPING THIS HIGH RAD PIPING AND EQUIPMENT AND FITTING IT IN SMALL SHIELDED BOXES. THE REMAINING LOWER DOSE PIPE, CONCRETE AND SOIL TO BE LOADED INTO 20 TON ROLL-OFF CONTAINERS SHOULD BE EASILY ATTAINABLE.
*TOTAL CONTINGENCY = 70%

WBS 311008 COOLING TOWER AND SUMPS - A 30% CONTINGENCY HAS BEEN APPLIED HERE AS USING THE EQUIPMENT DESCRIBED, THIS SHOULD BE AN EASY TASK TO ACCOMPLISH IN 2 DAYS. *TOTAL CONTINGENCY = 50%

WBS 311011 A-8 SAMPLER PIT - HALF THE MANHOURS FOR THIS WBS ARE FOR BACKFILLING AND COMPACTING CLEAN SOIL. THE REMAINING WORK IS REMOTELY HANDLED USING HEAVY DUTY EQUIPMENT THAT IS MORE THAN ADEQUATE FOR THE TASK OF DEMOLITION. A 30% CONTINGENCY HAS BEEN APPLIED. *TOTAL CONTINGENCY = 50%

WBS 312001 GROUTING OF WELLS - 30% CONTINGENCY, THIS COST WAS QUOTED BY D.MOAK OF WASTE MANAGEMENT FEDERAL SERVICES WHICH HAS PERFORMED SIMILAR WORK IN THE PAST. THE SIZES, QUANTITIES AND DEPTS CONSIDERED FOR THE COST SHOULD BE ACCURATE. OVERRUN RISK SHOULD BE LOW. *TOTAL CONTINGENCY = 50%

WBS 314001 LEAK DETECTION PITS - A 30% CONTINGENCY WAS APPLIED HERE TO REFLECT SOME CONFIDENCE THAT THE MASSIVE EQUIPMENT IS VERY CAPABLE OF DEMOLISHING AND LOADING THIS DEBRIS INTO 20 TON ROLL-OFF CONTAINERS.
*TOTAL CONTINGENCY = 50%

WBS 316003 CUT/CAP/REMOVE PIPE BUNDLES - A 50% CONTINGENCY WAS ALLOWED FOR THIS ACTIVITY AS IT IS AT A HIGHER RISK FOR COST GROWTH. REMOTELY DIGGING UP, CUTTING, CRIMPING AND LOADING PIPE AND ENCASEMENTS INTO ROLL-OFF CONTAINERS AND THE SMALLER SHIELDED BOXES WILL REQUIRE A GREAT DEAL OF FINESSE NOT NORMALLY ASSOCIATED WITH CATERPILLAR 375 EXCAVATORS.
*TOTAL CONTINGENCY = 70%

WBS 316004 REMOVE CONTAMINATED PIPING - A 50% CONTINGENCY WAS ALLOWED FOR THIS ACTIVITY AS IT IS AT A HIGHER RISK FOR COST GROWTH. REMOTELY DIGGING UP, CUTTING, CRIMPING AND LOADING PIPE AND ENCASEMENTS INTO ROLL-OFF CONTAINERS AND THE SMALLER SHIELDED BOXES WILL REQUIRE A GREAT DEAL OF FINESSE NOT NORMALLY ASSOCIATED WITH CATERPILLAR 375 EXCAVATORS.
*TOTAL CONTINGENCY = 70%

WBS 316005 REGRADE AND COMPACT AT FOOTINGS - THIS WORK IS TO BE DONE IN AN OPEN AIR ENVIRONMENT USING CONVENTIONAL EQUIPMENT. THE MAIN RISK BEING THE QUANTITY OF SOIL THAT IS TO BE BACKFILLED. A 30% CONTINGENCY SHOULD COVER THIS.
*TOTAL CONTINGENCY = 50%

WBS 317001 REMOVE PUMP AND SLUICE PITS ASSOCIATED WITH TANKS - VACUUM SCABBLING OPERATION ASSUMES REMOTE OPERATION OF A SPECIALLY FITTED CATERPILLAR 375 EXCAVATOR, CAMERAS, ECT. AND IS AN UNPROVEN METHOD WITH MANY POSSIBLE PROBLEMS. THE DEMOLITION PORTION INVOLVING TWO 375 EXCAVATORS WITH ATTACHMENTS SHARE SIMILAR PROBLEMS WITH WBS 316003. ALLOW FOR A CONTINGENCY OF 50%. *TOTAL CONTINGENCY = 70%

WBS 317002 REMOVE VALVE PITS ASSOCIATED WITH TANKS - A 30% CONTINGENCY WAS APPLIED HERE TO REFLECT SOME CONFIDENCE THAT THE MASSIVE EQUIPMENT IS VERY CAPABLE OF DEMOLISHING AND LOADING THIS DEBRIS INTO 20 TON ROLL-OFF CONTAINERS.
*TOTAL CONTINGENCY = 50%

WBS 318001 REMOVE AX-A & AX-B VALVE PITS - VACUUM SCABBLING OPERATION ASSUMES REMOTE OPERATION OF A SPECIALLY FITTED CATERPILLAR 375 EXCAVATOR, CAMERAS, ECT. AND IS AN UNPROVEN METHOD WITH MANY POSSIBLE PROBLEMS. THE DEMOLITION PORTION INVOLVING TWO 375 EXCAVATORS WITH ATTACHMENTS SHARE SIMILAR PROBLEMS WITH WBS 316003. ALLOW FOR A CONTINGENCY OF 50%. *TOTAL CONTINGENCY = 70%

WBS 318002 REMOVE FLUSH/SERVICE PITS AX-A & AX-B - A 30% CONTINGENCY WAS APPLIED HERE TO REFLECT SOME CONFIDENCE THAT THE MASSIVE EQUIPMENT IS VERY CAPABLE OF DEMOLISHING AND LOADING THIS DEBRIS INTO 20 TON ROLL-OFF CONTAINERS. *TOTAL CONTINGENCY = 50%

WBS 318003 REMOVE AY-152 SLUICE PIT - VACUUM SCABBLING OPERATION ASSUMES REMOTE OPERATION OF A SPECIALLY FITTED CATERPILLAR 375 EXCAVATOR, CAMERAS, ECT. AND IS AN UNPROVEN METHOD WITH MANY POSSIBLE PROBLEMS. THE DEMOLITION PORTION INVOLVING TWO 375 EXCAVATORS WITH ATTACHMENTS SHARE SIMILAR PROBLEMS WITH WBS 316003. ALLOW FOR A CONTINGENCY OF 50%. *TOTAL CONTINGENCY = 70%

WBS 318004 REMOVAL OF AX-152 DIVERTER STATION - A 50% CONTINGENCY WAS ALLOWED FOR THIS ACTIVITY AS IT IS AT A HIGHER RISK FOR COST GROWTH. REMOTELY DIGGING UP, CUTTING, CRIMPING AND LOADING PIPE AND ENCASEMENTS INTO ROLL-OFF CONTAINERS AND THE SMALLER SHIELDED BOXES WILL REQUIRE A GREAT DEAL OF FINESSE NOT NORMALLY ASSOCIATED WITH CATERPILLAR 375 EXCAVATORS. *TOTAL CONTINGENCY = 70%

WBS 318005 REMOVAL OF VALVE BOX AND MANHOLES - A 30% CONTINGENCY WAS APPLIED HERE TO REFLECT SOME CONFIDENCE THAT THE MASSIVE EQUIPMENT IS VERY CAPABLE OF DEMOLISHING AND LOADING THIS DEBRIS INTO 20 TON ROLL-OFF CONTAINERS. *TOTAL CONTINGENCY = 50%

WBS 318006 REMOVE AX-153 ISOLATION PIT - A 30% CONTINGENCY WAS APPLIED HERE TO REFLECT SOME CONFIDENCE THAT THE MASSIVE EQUIPMENT IS VERY CAPABLE OF DEMOLISHING AND LOADING THIS DEBRIS INTO 20 TON ROLL-OFF CONTAINERS. *TOTAL CONTINGENCY = 50%

WBS 318007 REMOVE AY-501 CONDENSATE VALVE PIT - VACUUM SCABBLING OPERATION ASSUMES REMOTE OPERATION OF A SPECIALLY FITTED CATERPILLAR 375 EXCAVATOR, CAMERAS, ECT. AND IS AN UNPROVEN METHOD WITH MANY POSSIBLE PROBLEMS. THE DEMOLITION PORTION INVOLVING TWO 375 EXCAVATORS WITH ATTACHMENTS SHARE SIMILAR PROBLEMS WITH WBS 316003. ALLOW FOR A CONTINGENCY OF 50%. *TOTAL CONTINGENCY = 70%

WBS 318008 REMOVE AX-155 DIVERSION BOX - VACUUM SCABBLING OPERATION ASSUMES REMOTE OPERATION OF A SPECIALLY FITTED CATERPILLAR 375 EXCAVATOR, CAMERAS, ECT. AND IS AN UNPROVEN METHOD WITH MANY POSSIBLE PROBLEMS. THE DEMOLITION PORTION INVOLVING TWO 375 EXCAVATORS WITH ATTACHMENTS SHARE SIMILAR PROBLEMS WITH WBS 316003. ALLOW FOR A CONTINGENCY OF 50%. *TOTAL CONTINGENCY = 70%

WBS 318009 REMOVE AX-501 VALVE PIT - A 30% CONTINGENCY WAS APPLIED HERE TO REFLECT SOME CONFIDENCE THAT THE MASSIVE EQUIPMENT IS VERY CAPABLE OF DEMOLISHING AND LOADING THIS DEBRIS INTO 20 TON ROLL-OFF CONTAINERS. *TOTAL CONTINGENCY = 50%

WBS 318010 REMOVE A-417 PUMP PIT & TANK - A 50% CONTINGENCY WAS ALLOWED FOR THIS ACTIVITY AS IT IS AT A HIGHER RISK FOR COST GROWTH. REMOTELY DIGGING UP, CUTTING, CRIMPING AND LOADING PIPE AND ENCASEMENTS INTO ROLL-OFF CONTAINERS AND THE SMALLER SHIELDED BOXES WILL REQUIRE A GREAT DEAL OF FINESSE NOT NORMALLY ASSOCIATED WITH CATERPILLAR 375 EXCAVATORS. *TOTAL CONTINGENCY = 70%

WBS 319002 MODS TO SOIL REMOVAL QUANTITIES - THIS ACTIVITY IS A CREDIT/DEBIT TO A PREVIOUS ESTIMATE, THEREFORE THE CONTINGENCY WAS LEFT THE SAME AS FOUND IN THE ORIGINAL ESTIMATE FOR CONSISTENCY AT 30%. *TOTAL CONTINGENCY = 50%

WBS 319003 ADDITIONAL CREW - A 30% CONTINGENCY WAS APPLIED HERE. THIS ACTIVITY MODIFIES THE ORIGINAL CREW FROM A PREVIOUS ESTIMATE IN ORDER TO ADEQUATELY PERFORM THE JOB ACCORDING TO THE CONDITIONS WE NOW KNOW TO EXIST BUT DIDN'T KNOW EXISTED AT THE TIME OF THE ORIGINAL ESTIMATE. THE CONTINGENCY WAS LEFT UNCHANGED FROM EARLIER FOR CONSISTENCY.
*TOTAL CONTINGENCY = 50%

WBS 321003 CHANGE HOUSE REMOVAL & WBW 321010 COMPRESSOR BUILDING REMOVAL - THESE ACTIVITIES ARE IN A CLEAN AREA AND WORK IS TO BE DONE BYA FIXED PRICE CONTRACTOR BY A COMPETETIVE BID, THEREFORE A 30% CONTINGENCY SHOULD SUFFICE TO COVER ANY UNKNOWNS DUE TO LACK OF DETAIL IN THE DRAWINGS. *TOTAL CONTINGENCY = 50%

WBS 329001 MODS TO ENCLOSURE STRUCTURE - THIS ACTIVITY INCREASES THE SIZE OF THE ENCLOSURE FROM A PREVIOUS ESTIMATE BY TWO COLUMN LENGHTS. SINCE A PRORATED FIGURE WAS USED, THE PREVIOUS USED CONTINGENCY OF 20% WAS ALSO APPLIED.
*TOTAL CONTINGENCY = 40%

WBS 33XXXX DISPOSAL COSTS - THIS ACTIVITY MOSTLY CONSISTS OF DIRT AND RUBBLE DISPOSAL COSTS AT ERDF. COSTS FOR DISPOSAL AT ERDF IS EXPECTED TO DECREASE. THE VOLUME OF MATERIAL SHOULD BE ACCURATE, THEREFORE ONLY 15% CONTINGENCY WAS APPLIED.
*TOTAL CONTINGENCY = 35%

*E. PROGRAMATIC RISK (CONTINGENCY)

THE ABOVE LISTED CONTINGENCIES INCLUDE AN ADDITIONAL 20% CONTINGENCY. THIS IS TO PROVIDE ADDITIONAL CONTINGENCY AGAINST THE PROGRAMATIC RISK SOURCES CAUSED BY THE MINIMAL AMOUNT OF CHARACTERIZATION DATA. WOTKER EXPOSURE CHARACTERIZATION, ALSO, MAY BE INADEQUATE WHICH COULD IMPACT THE PROPOSED CONCEPTS.

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. THE PROJECT TOTAL SUMMARY LINE TOTALS ARE ADJUSTED/ROUNDED TO THE NEAREST $10,000/$100,000.

7. REMARKS

MAJOR ASSUMPTIONS WHICH HAVE BEEN MADE IN THE PREPARATION OF THIS ESTIMATE ARE AS FOLLOWS:

A.) ALL WASTE MATERIALS ADDRESSED AS GOING TO PPF (PRE-PROCESSING FACILITY) HAVE NO DISPOSAL COSTS SHOWN IN THIS ESTIMATE, THE BURIAL OR TREATMENT COSTS ARE TO BE INCLUDED IN SOME OTHER STUDY.

B.) COSTS FOR ROLL-OFF CONTAINERS AND SHIELDED BURIAL CONTAINERS ARE NOT INCLUDED IN THIS STUDY.

C.) THE BUILDING MODIFICATIONS ARE PRORATED FROM AN EARLIER STUDY.

D.) ALL SWP AND MASK WORK HAS BEEN MANLOADED AND ALL INEFFICIENCIES HAVE BEEN TAKEN INTO ACCOUNT, THEREFORE, NO FURTHER FACTORING PERCENTAGES WERE ADDED.

E.) BACKFILL MATERIALS ARE ASSUMED TO BE AVAILABLE WITHIN 5 MILES.

F.) PURCHASE OF THE CATERPILLAR 988 LOADER, TWO CATERPILLAR 375 EXCAVATORS AND A CONCRETE BATCH PLANT WERE COVERED BY AN EARLIER ESTIMATE AND ARE CONSIDERED "FREE" FOR USE IN THIS ESTIMATE.

G.) COSTS FOR WASTE ACCEPTANCE PROFILE AND WASTE SAMPLING WAS FIGUREDTO ADD 5 TO 6 MANYEARS AND THESE COSTS ARE REFLECTED IN WBS 120000 ENGINEERING INSPECTION.

I.) TITLE II AND TITLE III ENGINEERING ARE ASSUMED TO BE PERFORMED BY A LOCAL A/E FIRM. CONSTRUCTION MANAGEMENT IS ASSUMED TO BE PERFORMED BY FLUOR DANIEL NORTHWEST.

J.) IT IS ASSUMED THAT LIGHTLY CONTAMINATED SOIL, CONCRETE, PIPE AND BUILDING DEBRIS WILL BE ACCEPTABLE FOR DISPOSAL AT ERDF.

K.) THE ESTIMATE ASSUMES THAT, PRIOR TO INITIATION OF WASTE RETRIEVAL OPERATIONS, CONTROL OF AX TANK FARM WOULD PASS FROM THE CURRENT OPERATIONS ACTIVITY TO A SEPARATE RETRIEVAL FUNCTION. AT COMPLETION OF RETRIEVAL, THE CONTROL WOULD BE GIVEN TO A THIRD ENTITY FOR CLOSURE. CURRENT TANK FARM PRACTICES WOULD CHANGE ALLOWING FOR A MORE PRODUCTIVE WORK SHIFT AND ALLOWING FOR MORE CONVENTIONAL CONSTRUCTION PRACTICES SIMILAR TO DOE'S ENVIRONMENTAL RESTORATION CONTRACTORS.
FOR FURTHER DESCRIPTIONS OF MAJOR ASSUMPTIONS AND CONCEPTS SEE THE COGEMA REPORT "COGEMA RPT25".

SORT CODE/WBS DESCRIPTION	ESTIMATE SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	SUB TOTAL	SITE ALLOCAT'N	TOTAL DOLLARS
BHI BECHTEL HANFORD INTERNATIONAL									
331000 BUILDING DEMOLITION - DISPOSAL	90600	0.00	0	90600	35	31710	122310	0	122310
334001 LEAK DETECTION PITS - DISPOSAL	9615	0.00	0	9615	35	3365	12980	0	12980
336003 PIPE BUNDLE REMOVAL - DISPOSAL	289320	0.00	0	289320	35	101262	390582	0	390582
336004 REMOVE CONTAM. PIPE - DISPOSAL	85080	0.00	0	85080	35	29778	114858	0	114858
337000 DEMOL.PITS ASSOC.W/TKS - DISPOSA	43560	0.00	0	43560	35	15246	58806	0	58806
338000 DEMOLISH PITS & BOXES - DISPOSAL	59820	0.00	0	59820	35	20937	80757	0	80757
SUBTOTAL 33 DISPOSAL COSTS	577995	0.00	0	577995	35	202298	780293	0	780293
SUBTOTAL 3 CONSTRUCTION	577995	0.00	0	577995	35	202298	780293	0	780293
TOTAL BHI BECHTEL HANFORD INTERNATIONA	577995	0.00	0	577995	35	202298	780293	0	780293
FDNW FLUOR DANIEL NORTHWEST									
130000 CONSTRUCTION MANAGEMENT	740292	0.00	0	740292	50	370146	1110438	291602	1402040
SUBTOTAL 1 ENGINEERING	740292	0.00	0	740292	50	370146	1110438	291602	1402040
210000 PROCUREMENT-ONSITE E/C	1639809	0.00	0	1639809	70	1147866	2787675	732044	3519719
SUBTOTAL 2 PROCUREMENT	1639809	0.00	0	1639809	70	1147866	2787675	732044	3519719
311001 801-A INSTRUMENT BUILDING	2136	0.00	0	2136	50	1068	3204	1143	4347
311002 801-B INSTRUMENT BUILDING	2136	0.00	0	2136	50	1068	3204	1143	4347
311004 ION EXCHANGE COLUMN	26878	0.00	0	26878	70	18815	45693	15592	61285
311005 A-702 FAN HOUSE/FILTER BUILDING	2480	0.00	0	2480	55	1364	3844	1372	5216
311006 CAISSONS/DEENTRAINER FACILITIES	8179	0.00	0	8179	55	4498	12677	4560	17237
311007 A-401 CONDENSER BUILDING	34697	0.00	0	34697	70	24288	58985	21123	80108
311008 COOLING TOWER AND SUMPS	11749	0.00	0	11749	50	5875	17624	0	17624
311011 A-8 SAMPLER PITS	19691	0.00	0	19691	50	9846	29537	10608	40145
SUBTOTAL 311 FACILITY DEMO - CPAF	107946	0.00	0	107946	62	66822	174768	55541	230309
314001 REMOVE LEAK DETECTION PITS	7157	0.00	0	7157	50	3579	10736	3863	1459[illegible]

SORT CODE/WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	SUB TOTAL	SITE ALLOCAT'N	TOTAL DOLLARS
SUBTOTAL 314	LEAK DETECTION PITS	7157	0.00	0	7157	50	3579	10736	3863	14599
316003	CUT/CAP/REMOVE PIPE BUNDLES	85483	0.00	0	85483	70	59838	145321	51332	196653
316004	REMOVE CONTAMINATED PIPING	883904	0.00	0	883904	70	618733	1502637	530597	2033234
316005	REGRADE/COMPACT FOOTINGS	29459	0.00	0	29459	50	14730	44189	12044	56233
SUBTOTAL 316	BURIED PIPE & DUCT	998846	0.00	0	998846	69	693301	1692147	593973	2286120
317001	PUMP & SLUICE PITS ASSOC. W/TANK	39731	0.00	0	39731	70	27812	67543	24298	91841
317002	VALVE PITS ASSOCIATED WITH TANKS	1157	0.00	0	1157	50	579	1736	624	2360
SUBTOTAL 317	PITS ASSOCIATED W/TANKS	40888	0.00	0	40888	69	28391	69279	24922	94201
318001	AX-A & AX-B VALVE PITS	4966	0.00	0	4966	70	3476	8442	3036	11478
318002	FLUSH/SERVICE PITS - AX-A & AX-B	1157	0.00	0	1157	50	579	1736	624	2360
318003	AY-152 SLUICE PIT	5137	0.00	0	5137	70	3596	8733	3142	11875
318004	AX-152 DIVERTER STATION	10616	0.00	0	10616	70	7431	18047	6492	24539
318005	MANHOLE & BOXES FOR AX-152 DIV S	1326	0.00	0	1326	50	663	1989	716	2705
318006	AX-153 ISOLATION PIT	1326	0.00	0	1326	50	663	1989	716	2705
318007	AY-501 CONDENSATE VALVE PIT	4966	0.00	0	4966	70	3476	8442	3036	11478
318008	AX-155 DIVERSION BOX	4966	0.00	0	4966	70	3476	8442	3036	11478
318009	AX-501 VALVE PIT	1326	0.00	0	1326	50	663	1989	716	2705
318010	A-417 PUMP PIT AND TANK	7456	0.00	0	7456	70	5219	12675	4558	17233
SUBTOTAL 318	REMOVAL OF PITS AND BOX	43242	0.00	0	43242	68	29242	72484	26072	98556
319002	MODS TO SOIL REMOVAL	147822	0.00	0	147822	50	73911	221733	79766	301499
319003	ADDITIONAL CREW	388904	0.00	0	388904	50	194452	583356	209853	793209
SUBTOTAL 319	MODS - CPAF	536726	0.00	0	536726	50	268363	805089	289619	1094708
SUBTOTAL 31	CF CONSTRUCTION	1734805	0.00	0	1734805	63	1089698	2824503	993990	3818493
321003	CHANGE HOUSE DEMOLITION	6095	0.00	0	6095	50	3048	9143	704	9847
321010	COMPRESSOR BUILDING DEMOLITION	6095	0.00	0	6095	50	3048	9143	704	984[illegible]

SORT CODE/WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	SUB TOTAL	SITE ALLOCAT'N	TOTAL DOLLARS
329001	MODS TO ENCLOSURE STRUCTURE	1019196	0.00	0	1019196	40	407678	1426874	109869	1536743
	SUBTOTAL 32 FIXED PRICE CONSTRUCTIO	1031386	0.00	0	1031386	40	413774	1445160	111277	1556437
331000	BUILDING DEMOLITION - DISPOSAL	153874	0.00	0	153874	35	53856	207730	0	207730
	SUBTOTAL 33 DISPOSAL COSTS	153874	0.00	0	153874	35	53856	207730	0	207730
	SUBTOTAL 3 CONSTRUCTION	2920065	0.00	0	2920065	53	1557328	4477393	1105267	5582660
	TOTAL FDNW FLUOR DANIEL NORTHWEST	5300166	0.00	0	5300166	58	3075340	8375506	2128913	10504419
LMHC	LOCKHEED MARTIN HANFORD CORP.									
110000	DEFINITIVE DESIGN	2724505	0.00	0	2724505	55	1498478	4222983	1108955	5331938
120000	ENGINEERING/INSPECTION	749986	0.00	0	749986	70	524990	1274976	334808	1609784
	SUBTOTAL 1 ENGINEERING	3474491	0.00	0	3474491	58	2023468	5497959	1443763	6941722
311001	801-A INSTRUMENT BUILDING	764	0.00	0	764	50	382	1146	0	1146
311002	801-B INSTRUMENT BUILDING	764	0.00	0	764	50	382	1146	0	1146
311004	ION EXCHANGE COLUMN	3822	0.00	0	3822	70	2675	6497	0	6497
311005	A-702 FAN HOUSE/FILTER BUILDING	1146	0.00	0	1146	55	630	1776	0	1776
311006	CAISSONS/DEENTRAINER FACILITIES	1529	0.00	0	1529	55	841	2370	0	2370
311007	A-401 CONDENSER BUILDING	4587	0.00	0	4587	70	3211	7798	0	7798
311008	COOLING TOWER AND SUMPS	764	0.00	0	764	50	382	1146	0	1146
311011	A-8 SAMPLER PITS	2676	0.00	0	2676	50	1338	4014	0	4014
	SUBTOTAL 311 FACILITY DEMO - CPAF	16052	0.00	0	16052	61	9841	25893	0	25893
312001	GROUTING OF WELLS	51602	0.00	0	51602	50	25801	77403	0	77403
	SUBTOTAL 312 WELLS	51602	0.00	0	51602	50	25801	77403	0	77403
314001	REMOVE LEAK DETECTION PITS	764	0.00	0	764	50	382	1146	0	1146

SORT CODE/WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	SUB TOTAL	SITE ALLOCAT'N	TOTAL DOLLARS
	SUBTOTAL 314 LEAK DETECTION PITS	764	0.00	0	764	50	382	1146	0	1146
316003	CUT/CAP/REMOVE PIPE BUNDLES	8409	0.00	0	8409	70	5886	14295	0	14295
316004	REMOVE CONTAMINATED PIPING	156718	0.00	0	156718	70	109703	266421	0	266421
316005	REGRADE/COMPACT FOOTINGS	2676	0.00	0	2676	50	1338	4014	0	4014
	SUBTOTAL 316 BURIED PIPE & DUCT	167803	0.00	0	167803	70	116927	284730	0	284730
317001	PUMP & SLUICE PITS ASSOC. W/TANK	6116	0.00	0	6116	70	4281	10397	0	10397
317002	VALVE PITS ASSOCIATED WITH TANKS	191	0.00	0	191	50	96	287	0	287
	SUBTOTAL 317 PITS ASSOCIATED W/TANKS	6307	0.00	0	6307	69	4377	10684	0	10684
318001	AX-A & AX-B VALVE PITS	764	0.00	0	764	70	535	1299	0	1299
318002	FLUSH/SERVICE PITS - AX-A & AX-B	191	0.00	0	191	50	96	287	0	287
318003	AY-152 SLUICE PIT	956	0.00	0	956	70	669	1625	0	1625
318004	AX-152 DIVERTER STATION	1529	0.00	0	1529	70	1070	2599	0	2599
318005	MANHOLE & BOXES FOR AX-152 DIV S	191	0.00	0	191	50	96	287	0	287
318006	AX-153 ISOLATION PIT	191	0.00	0	191	50	96	287	0	287
318007	AY-501 CONDENSATE VALVE PIT	764	0.00	0	764	70	535	1299	0	1299
318008	AX-155 DIVERSION BOX	764	0.00	0	764	70	535	1299	0	1299
318009	AX-501 VALVE PIT	191	0.00	0	191	50	96	287	0	287
318010	A-417 PUMP PIT AND TANK	1147	0.00	0	1147	70	803	1950	0	1950
	SUBTOTAL 318 REMOVAL OF PITS AND BOX	6688	0.00	0	6688	68	4531	11219	0	11219
	SUBTOTAL 31 CF CONSTRUCTION	249216	0.00	0	249216	65	161859	411075	0	411075
	TOTAL LMHC LOCKHEED MARTIN HANFORD COR	3723707	0.00	0	3723707	59	2185327	5909034	1443763	7352797
WMHI	WASTE MANAGEMENT HANFORD, INC.									
331000	BUILDING DEMOLITION - DISPOSAL	213919	0.00	0	213919	35	74872	288791	0	288791
	SUBTOTAL 33 DISPOSAL COSTS	213919	0.00	0	213919	35	74872	288791	0	28879[illegible]

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING CORP.
JOB NO. Z466AAF1
FILE NO. Z466AAF1

** IEST - INTERACTIVE ESTIMATING **
ANCILLARY EQUIPMENT REMOVAL
241-AX TANK FARM CLOSURE - PLANNING ESTIMATE
PHMCR04 - COMPANY/WBS SUMMARY

DATE 04/22/98 10:18:38
BY R.OHRT

SORT CODE/WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	SUB TOTAL	SITE ALLOCAT'N	TOTAL DOLLARS
	TOTAL WMHI WASTE MANAGEMENT HANFORD, I	213919	0.00	0	213919	35	74872	288791	0	288791
WMNW	WASTE MGMT FED SERVICES NORTHWEST									
312001	GROUTING OF WELLS	272160	0.00	0	272160	50	136080	408240	0	408240
	SUBTOTAL 312 WELLS	272160	0.00	0	272160	50	136080	408240	0	408240
	SUBTOTAL 31 CF CONSTRUCTION	272160	0.00	0	272160	50	136080	408240	0	408240
	SUBTOTAL 3 CONSTRUCTION	735295	0.00	0	735295	51	372811	1108106	0	1108106
	TOTAL WMNW WASTE MGMT FED SERVICES NOR	272160	0.00	0	272160	50	136080	408240	0	408240
PROJECT TOTAL		10,087,947	0.00	0	10,087,947	56	5,673,917	15,761,864	3,572,676	19,334,540

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING CORP.
JOB NO. Z466AAF1
FILE NO. Z466AAF1

** IEST - INTERACTIVE ESTIMATING **
ANCILLARY EQUIPMENT REMOVAL
241-AX TANK FARM CLOSURE - PLANNING ESTIMATE
PHMCR05 - CONSTRUCTION MANAGEMENT/OTHER COST SUMMARY

DATE 04/22/98 10:18:42
BY R.OHRT

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	CONSTRUCTION MANAGEMENT %	CONSTRUCTION MANAGEMENT TOTAL	OTHER COSTS	SUB TOTAL	TOTAL
110000	DEFINITIVE DESIGN	2724505	0.00	0	0	0	2724505
120000	ENGINEERING/INSPECTION	749986	0.00	0	0	0	749986
130000	CONSTRUCTION MANAGEMENT	740292	0.00	0	0	0	740292
SUBTOTAL 1	ENGINEERING	4214783		0	0	0	4214783
210000	PROCUREMENT-ONSITE E/C	1639809	0.00	0	0	0	1639809
SUBTOTAL 2	PROCUREMENT	1639809		0	0	0	1639809
311001	801-A INSTRUMENT BUILDING	2900	0.00	0	0	0	2900
311002	801-B INSTRUMENT BUILDING	2900	0.00	0	0	0	2900
311004	ION EXCHANGE COLUMN	30700	0.00	0	0	0	30700
311005	A-702 FAN HOUSE/FILTER BUILDING	3626	0.00	0	0	0	3626
311006	CAISSONS/DEENTRAINER FACILITIES	9708	0.00	0	0	0	9708
311007	A-401 CONDENSER BUILDING	39284	0.00	0	0	0	39284
311008	COOLING TOWER AND SUMPS	12513	0.00	0	0	0	12513
311011	A-8 SAMPLER PITS	22367	0.00	0	0	0	22367
SUBTOTAL 311	FACILITY DEMO - CPAF	123998		0	0	0	123998
312001	GROUTING OF WELLS	323762	0.00	0	0	0	323762
SUBTOTAL 312	WELLS	447760		0	0	0	447760
314001	REMOVE LEAK DETECTION PITS	7921	0.00	0	0	0	7921
SUBTOTAL 314	LEAK DETECTION PITS	455681		0	0	0	455681
316003	CUT/CAP/REMOVE PIPE BUNDLES	93892	0.00	0	0	0	93892
316004	REMOVE CONTAMINATED PIPING	1040622	0.00	0	0	0	1040622
316005	REGRADE/COMPACT FOOTINGS	32135	0.00	0	0	0	32135
SUBTOTAL 316	BURIED PIPE & DUCT	1622330		0	0	0	1622330
317001	PUMP & SLUICE PITS ASSOC. W/TANKS	45847	0.00	0	0	0	45847

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	CONSTRUCTION MANAGEMENT %	CONSTRUCTION MANAGEMENT TOTAL	OTHER COSTS	SUB TOTAL	TOTAL
317002	VALVE PITS ASSOCIATED WITH TANKS	1348	0.00	0	0	0	1348
SUBTOTAL 317	PITS ASSOCIATED W/TANKS	1669525		0	0	0	1669525
318001	AX-A & AX-B VALVE PITS	5730	0.00	0	0	0	5730
318002	FLUSH/SERVICE PITS - AX-A & AX-B	1348	0.00	0	0	0	1348
318003	AY-152 SLUICE PIT	6093	0.00	0	0	0	6093
318004	AX-152 DIVERTER STATION	12145	0.00	0	0	0	12145
318005	MANHOLE & BOXES FOR AX-152 DIV STN	1517	0.00	0	0	0	1517
318006	AX-153 ISOLATION PIT	1517	0.00	0	0	0	1517
318007	AY-501 CONDENSATE VALVE PIT	5730	0.00	0	0	0	5730
318008	AX-155 DIVERSION BOX	5730	0.00	0	0	0	5730
318009	AX-501 VALVE PIT	1517	0.00	0	0	0	1517
318010	A-417 PUMP PIT AND TANK	8603	0.00	0	0	0	8603
SUBTOTAL 318	REMOVAL OF PITS AND BOXES	1719455		0	0	0	1719455
319002	MODS TO SOIL REMOVAL	147822	0.00	0	0	0	147822
319003	ADDITIONAL CREW	388904	0.00	0	0	0	388904
SUBTOTAL 319	MODS - CPAF	2256181		0	0	0	2256181
SUBTOTAL 31	CF CONSTRUCTION	2256181		0	0	0	2256181
321003	CHANGE HOUSE DEMOLITION	6095	0.00	0	0	0	6095
321010	COMPRESSOR BUILDING DEMOLITION	6095	0.00	0	0	0	6095
329001	MODS TO ENCLOSURE STRUCTURE	1019196	0.00	0	0	0	1019196
SUBTOTAL 32	FIXED PRICE CONSTRUCTION	3287567		0	0	0	3287567
331000	BUILDING DEMOLITION - DISPOSAL	458393	0.00	0	0	0	458393
334001	LEAK DETECTION PITS - DISPOSAL	9615	0.00	0	0	0	9615
336003	PIPE BUNDLE REMOVAL - DISPOSAL	289320	0.00	0	0	0	289320
336004	REMOVE CONTAM. PIPE - DISPOSAL	85080	0.00	0	0	0	85080
337000	DEMOL.PITS ASSOC.W/TKS - DISPOSAL	43560	0.00	0	0	0	43560
338000	DEMOLISH PITS & BOXES - DISPOSAL	59820	0.00	0	0	0	59820
SUBTOTAL 33	DISPOSAL COSTS	4233355		0	0	0	4233355

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	CONSTRUCTION MANAGEMENT %	CONSTRUCTION MANAGEMENT TOTAL	OTHER COSTS	SUB TOTAL	TOTAL
SUBTOTAL 3	CONSTRUCTION	4233355		0	0	0	4233355
PROJECT TOTAL		10,087,947		0	0	0	10,087,947

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
110000	DEFINITIVE DESIGN	2724505	0	0	0	715455	0	715455
120000	ENGINEERING/INSPECTION	749986	0	0	0	196946	0	196946
130000	CONSTRUCTION MANAGEMENT	740292	0	0	0	194401	0	194401
SUBTOTAL 1	ENGINEERING	4214783	0	0	0	1106802	0	1106802
210000	PROCUREMENT-ONSITE E/C	1639809	0	0	0	0	430614	430614
SUBTOTAL 2	PROCUREMENT	1639809	0	0	0	0	430614	430614
311001	801-A INSTRUMENT BUILDING	2900	201	0	0	528	33	762
311002	801-B INSTRUMENT BUILDING	2900	201	0	0	528	33	762
311004	ION EXCHANGE COLUMN	30700	2477	0	0	6503	192	9172
311005	A-702 FAN HOUSE/FILTER BUILDING	3626	234	0	0	615	36	885
311006	CAISSONS/DEENTRAINER FACILITIES	9708	795	0	0	2086	61	2942
311007	A-401 CONDENSER BUILDING	39284	3313	0	0	8699	413	12425
311008	COOLING TOWER AND SUMPS	12513	0	0	0	0	0	0
311011	A-8 SAMPLER PITS	22367	1901	0	0	4993	178	7072
SUBTOTAL 311	FACILITY DEMO - CPAF	123998	9122	0	0	23952	946	34020
312001	GROUTING OF WELLS	323762	0	0	0	0	0	0
SUBTOTAL 312	WELLS	323762	0	0	0	0	0	0
314001	REMOVE LEAK DETECTION PITS	7921	695	0	0	1826	54	2575
SUBTOTAL 314	LEAK DETECTION PITS	7921	695	0	0	1826	54	2575
316003	CUT/CAP/REMOVE PIPE BUNDLES	93892	7747	0	0	20343	2105	30195
316004	REMOVE CONTAMINATED PIPING	1040622	80003	0	0	210087	22026	312116
316005	REGRADE/COMPACT FOOTINGS	32135	2168	0	0	5693	168	8029
SUBTOTAL 316	BURIED PIPE & DUCT	1166649	89918	0	0	236123	24299	350340
317001	PUMP & SLUICE PITS ASSOC. W/TANKS	45847	3859	0	0	10135	299	14293

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
317002	VALVE PITS ASSOCIATED WITH TANKS	1348	112	0	0	295	9	416
SUBTOTAL 317	PITS ASSOCIATED W/TANKS	47195	3971	0	0	10430	308	14709
318001	AX-A & AX-B VALVE PITS	5730	482	0	0	1267	37	1786
318002	FLUSH/SERVICE PITS - AX-A & AX-B	1348	112	0	0	295	9	416
318003	AY-152 SLUICE PIT	6093	499	0	0	1310	39	1848
318004	AX-152 DIVERTER STATION	12145	1031	0	0	2708	80	3819
318005	MANHOLE & BOXES FOR AX-152 DIV STN	1517	129	0	0	338	10	477
318006	AX-153 ISOLATION PIT	1517	129	0	0	338	10	477
318007	AY-501 CONDENSATE VALVE PIT	5730	482	0	0	1267	37	1786
318008	AX-155 DIVERSION BOX	5730	482	0	0	1267	37	1786
318009	AX-501 VALVE PIT	1517	129	0	0	338	10	477
318010	A-417 PUMP PIT AND TANK	8603	723	0	0	1898	60	2681
SUBTOTAL 318	REMOVAL OF PITS AND BOXES	49930	4198	0	0	11026	329	15553
319002	MODS TO SOIL REMOVAL	147822	14359	0	0	37706	1112	53177
319003	ADDITIONAL CREW	388904	37776	0	0	99201	2925	139902
SUBTOTAL 319	MODS - CPAF	536726	52135	0	0	136907	4037	193079
SUBTOTAL 31	CF CONSTRUCTION	2256181	160039	0	0	420264	29973	610276
321003	CHANGE HOUSE DEMOLITION	6095	0	0	469	0	0	469
321010	COMPRESSOR BUILDING DEMOLITION	6095	0	0	469	0	0	469
329001	MODS TO ENCLOSURE STRUCTURE	1019196	0	0	78478	0	0	78478
SUBTOTAL 32	FIXED PRICE CONSTRUCTION	1031386	0	0	79416	0	0	79416
331000	BUILDING DEMOLITION - DISPOSAL	458393	0	0	0	0	0	0
334001	LEAK DETECTION PITS - DISPOSAL	9615	0	0	0	0	0	0
336003	PIPE BUNDLE REMOVAL - DISPOSAL	289320	0	0	0	0	0	0
336004	REMOVE CONTAM. PIPE - DISPOSAL	85080	0	0	0	0	0	0
337000	DEMOL.PITS ASSOC.W/TKS - DISPOSAL	43560	0	0	0	0	0	0
338000	DEMOLISH PITS & BOXES - DISPOSAL	59820	0	0	0	0	0	0
SUBTOTAL 33	DISPOSAL COSTS	945788	0	0	0	0	0	0

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	DYN EQ.USAGE	FDH GFS/G&A CONST.MGMT	FDH MPR F.P./S.C.	FDH GFS/G&A LABOR	FDH MPR/G&A MATERIAL	SITE ALLOC SUBTOTAL
SUBTOTAL 3	CONSTRUCTION	4233355	160039	0	79416	420264	29973	689692
PROJECT TOTAL		10,087,947	160,039	0	79,416	1,527,066	460,587	2,227,108

WBS	DESCRIPTION	SITE ALLOC SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
110000	DEFINITIVE DESIGN	715455	0.00	0	715455	55	393500	1108955
120000	ENGINEERING/INSPECTION	196946	0.00	0	196946	70	137862	334808
130000	CONSTRUCTION MANAGEMENT	194401	0.00	0	194401	50	97201	291602
	SUBTOTAL 1 ENGINEERING	1106802	0.00	0	1106802	57	628563	1735365
210000	PROCUREMENT-ONSITE E/C	430614	0.00	0	430614	70	301430	732044
	SUBTOTAL 2 PROCUREMENT	430614	0.00	0	430614	70	301430	732044
311001	801-A INSTRUMENT BUILDING	762	0.00	0	762	50	381	1143
311002	801-B INSTRUMENT BUILDING	762	0.00	0	762	50	381	1143
311004	ION EXCHANGE COLUMN	9172	0.00	0	9172	70	6420	15592
311005	A-702 FAN HOUSE/FILTER BUILDING	885	0.00	0	885	55	487	1372
311006	CAISSONS/DEENTRAINER FACILITIES	2942	0.00	0	2942	55	1618	4560
311007	A-401 CONDENSER BUILDING	12425	0.00	0	12425	70	8698	21123
311008	COOLING TOWER AND SUMPS	0	0.00	0	0	0	0	0
311011	A-8 SAMPLER PITS	7072	0.00	0	7072	50	3536	10608
	SUBTOTAL 311 FACILITY DEMO - CPAF	34020	0.00	0	34020	63	21521	55541
312001	GROUTING OF WELLS	0	0.00	0	0	0	0	0
	SUBTOTAL 312 WELLS	0	0.00	0	0	0	0	0
314001	REMOVE LEAK DETECTION PITS	2575	0.00	0	2575	50	1288	3863
	SUBTOTAL 314 LEAK DETECTION PITS	2575	0.00	0	2575	50	1288	3863
316003	CUT/CAP/REMOVE PIPE BUNDLES	30195	0.00	0	30195	70	21137	51332
316004	REMOVE CONTAMINATED PIPING	312116	0.00	0	312116	70	218481	530597
316005	REGRADE/COMPACT FOOTINGS	8029	0.00	0	8029	50	4015	12044
	SUBTOTAL 316 BURIED PIPE & DUCT	350340	0.00	0	350340	70	243633	593973
317001	PUMP & SLUICE PITS ASSOC. W/TANKS	14293	0.00	0	14293	70	10005	24298

WBS	DESCRIPTION	SITE ALLOC SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
317002	VALVE PITS ASSOCIATED WITH TANKS	416	0.00	0	416	50	208	624
	SUBTOTAL 317 PITS ASSOCIATED W/TANKS	14709	0.00	0	14709	69	10213	24922
318001	AX-A & AX-B VALVE PITS	1786	0.00	0	1786	70	1250	3036
318002	FLUSH/SERVICE PITS - AX-A & AX-B	416	0.00	0	416	50	208	624
318003	AY-152 SLUICE PIT	1848	0.00	0	1848	70	1294	3142
318004	AX-152 DIVERTER STATION	3819	0.00	0	3819	70	2673	6492
318005	MANHOLE & BOXES FOR AX-152 DIV STN	477	0.00	0	477	50	239	716
318006	AX-153 ISOLATION PIT	477	0.00	0	477	50	239	716
318007	AY-501 CONDENSATE VALVE PIT	1786	0.00	0	1786	70	1250	3036
318008	AX-155 DIVERSION BOX	1786	0.00	0	1786	70	1250	3036
318009	AX-501 VALVE PIT	477	0.00	0	477	50	239	716
318010	A-417 PUMP PIT AND TANK	2681	0.00	0	2681	70	1877	4558
	SUBTOTAL 318 REMOVAL OF PITS AND BOXES	15553	0.00	0	15553	68	10519	26072
319002	MODS TO SOIL REMOVAL	53177	0.00	0	53177	50	26589	79766
319003	ADDITIONAL CREW	139902	0.00	0	139902	50	69951	209853
	SUBTOTAL 319 MODS - CPAF	193079	0.00	0	193079	50	96540	289619
	SUBTOTAL 31 CF CONSTRUCTION	610276	0.00	0	610276	63	383714	993990
321003	CHANGE HOUSE DEMOLITION	469	0.00	0	469	50	235	704
321010	COMPRESSOR BUILDING DEMOLITION	469	0.00	0	469	50	235	704
329001	MODS TO ENCLOSURE STRUCTURE	78478	0.00	0	78478	40	31391	109869
	SUBTOTAL 32 FIXED PRICE CONSTRUCTION	79416	0.00	0	79416	40	31861	111277
331000	BUILDING DEMOLITION - DISPOSAL	0	0.00	0	0	0	0	0
334001	LEAK DETECTION PITS - DISPOSAL	0	0.00	0	0	0	0	0
336003	PIPE BUNDLE REMOVAL - DISPOSAL	0	0.00	0	0	0	0	0
336004	REMOVE CONTAM. PIPE - DISPOSAL	0	0.00	0	0	0	0	0
337000	DEMOL.PITS ASSOC.W/TKS - DISPOSAL	0	0.00	0	0	0	0	0
338000	DEMOLISH PITS & BOXES - DISPOSAL	0	0.00	0	0	0	0	0
	SUBTOTAL 33 DISPOSAL COSTS	0	0.00	0	0	0	0	0

WBS	DESCRIPTION	SITE ALLOC SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
SUBTOTAL 3	CONSTRUCTION	689692	0.00	0	689692	60	415575	1105267
PROJECT TOTAL		2,227,108	0.00	0	2,227,108	60	1,345,568	3,572,676

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING CORP.
JOB NO. Z466AAF1
FILE NO. Z466AAF1

** IEST - INTERACTIVE ESTIMATING **
ANCILLARY EQUIPMENT REMOVAL
241-AX TANK FARM CLOSURE - PLANNING ESTIMATE
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 1
DATE 04/22/98 10:18:53
BY R.OHRT

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
110000	DEFINITIVE DESIGN										
110000.90	HOME OFFICE LABOR										
110000.9020002	****************************** DEFINITIVE DESIGN ******************************	000	0	0	0	0	0	0	0	0	0
110000.9020004	SAFETY ANALYSIS/DOCUMENT-ATION, ALLOWANCE.	000	1 LS	32092	1999973	0	0	0	0	0	1999973
110000.9020008	PROCEDURES, AIR PERMITTING, SPECIFICATIONS AND DRAWINGS AT 15% OF CONSTRUCTION, WBS 21, 31 AND 32.	000	1 LS	11626	724532	0	0	0	0	0	724532
SUBTOTAL	HOME OFFICE LABOR			43,718	2,724,505	0	0	0	0	0	2,724,505
TOTAL	COST CODE 00090 WBS 110000 (ESCALATION 0.00% - CONTINGENCY 55.00 %)			43,718	2,724,505	0	0	0	0	0	2,724,505
TOTAL WBS 110000 DEFINITIVE DESIGN				43,718	2,724,505	0	0	0	0	0	2,724,505

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING CORP.
JOB NO. Z466AAF1
FILE NO. Z466AAF1

** IEST - INTERACTIVE ESTIMATING **
ANCILLARY EQUIPMENT REMOVAL
241-AX TANK FARM CLOSURE - PLANNING ESTIMATE
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 2
DATE 04/22/98 10:18:53
BY R.OHRT

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
120000	ENGINEERING/INSPECTION										
120000.90	HOME OFFICE LABOR										
120000.9020002	****************************** ENGINEERING INSPECTION ******************************	000	0	0	0	0	0	0	0	0	0
120000.9020003	WASTE ACCEPTANCE PROFILE, AND WASTE SAMPLING, ALLOWANCE.	000	1 LS	11914	749986	0	0	0	0	0	749986
SUBTOTAL	HOME OFFICE LABOR			11,914	749,986	0	0	0	0	0	749,986
TOTAL	COST CODE 00090 WBS 120000 (ESCALATION 0.00% - CONTINGENCY 70.00 %)			11,914	749,986	0	0	0	0	0	749,986
TOTAL WBS 120000 ENGINEERING/INSPECTION				11,914	749,986	0	0	0	0	0	749,986

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
130000	CONSTRUCTION MANAGEMENT										
130000.90	HOME OFFICE LABOR										
130000.9050002	****************************** CONSTRUCTION MANAGEMENT ******************************	000	0	0	0	0	0	0	0	0	0
130000.9050003	AT 23.58% OF WBS 31, THIS COVERS ALL CPAF WORK.	000	1 LS	8500	535075	0	0	0	0	0	535075
130000.9050005	AT 19.9% OF WBS 32, THIS COVERS ALL FIXED PRICE WORK.	000	1 LS	3260	205217	0	0	0	0	0	205217
SUBTOTAL	HOME OFFICE LABOR			11,760	740,292	0	0	0	0	0	740,292
TOTAL	COST CODE 00090 WBS 130000 (ESCALATION 0.00% - CONTINGENCY 50.00 %)			11,760	740,292	0	0	0	0	0	740,292
TOTAL WBS 130000 CONSTRUCTION MANAGEMENT				11,760	740,292	0	0	0	0	0	740,292

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING CORP.
JOB NO. Z466AAF1
FILE NO. Z466AAF1

** IEST - INTERACTIVE ESTIMATING **
ANCILLARY EQUIPMENT REMOVAL
241-AX TANK FARM CLOSURE - PLANNING ESTIMATE
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

DATE 04/22/98 10:18:53
BY R.OHRT

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
210000	PROCUREMENT-ONSITE E/C										
210000.01	DEMOLITION										
210000.0101000	****************************** EQUIPMENT PROCUREMENT ******************************	460	0	0	0	0	0	0	0	0	0
210000.0101002	CATERPILLAR 375 EXCAVATOR	460	1 EA	0	0	0	814000	0	0	40700	854700
210000.0101004	HYDRAULIC CIRCUIT OPTION	460	1 EA	0	0	0	15340	0	0	767	16107
210000.0101006	ELEVATED CAB	460	1 EA	0	0	0	23400	0	0	1170	24570
210000.0101008	SHIELDED CAB ALLOWANCE	460	1 EA	0	0	0	400000	0	0	20000	420000
210000.0101010	UP-70 BASE UNIT	460	1 EA	0	0	0	77000	0	0	3850	80850
210000.0101012	193 RGS GRAPPLE	460	1 EA	0	0	0	35000	0	0	1750	36750
210000.0101014	QUICK COUPLER	460	1 EA	0	0	0	5700	0	0	285	5985
210000.0101016	COUPLER	460	1 EA	0	0	0	600	0	0	30	630
210000.0101020	GUZZLER	460	1 EA	0	0	0	25000	0	0	1250	26250
210000.0101030	VACUUM/SCABBLER	460	1 EA	0	0	0	50000	0	0	2500	52500
SUBTOTAL	DEMOLITION			0		0		0		72,302	
					0		1,446,040		0		1,518,342
	SALES TAX 8.00 %						115683		0		115683
	OH&P (ON MARKUPS ONLY)									5784	5784
TOTAL	COST CODE 46001			0		0		0		78,086	
	WBS 210000				0		1,561,723		0		1,639,809
	(ESCALATION 0.00% - CONTINGENCY 70.00 %)										
TOTAL WBS 210000	PROCUREMENT-ONSITE E/C			0		0		0		78,086	
					0		1,561,723		0		1,639,809

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
311001	801-A INSTRUMENT BUILDING										
311001.07	SITE IMPROVEMENTS										
311001.0710002	**************************** 801-A INSTRUMENT BUILDING ****************************	460	0	0	0	0	0	0	0	0	0
311001.0780060	UTILIZING CATERPILLAR 375 EXCAVATOR WITH HYDRAULIC BREAKER, PULVERIZER, SHEAR & BUCKET ATTACHMENTS,	460	0	0	0	0	0	0	0	0	0
311001.0780061	DEMOLISH PREENGINEERED STEEL BUILDING, 25' X 16' X 10' EAVE HEIGHT WITH SLAB ON GRADE FOUNDATION (13 CY),	460	0	0	0	0	0	0	0	0	0
311001.0780062	EQUIPMENT AND PIPING. USING A 988 CATERPILLAR LOADER, LOAD INTO 20 TON CONTAINERS AND HAUL TO ERDF.	460	0	0	0	0	0	0	0	0	0
311001.0780070	1 EQ OPERATOR	460	1 DAY	8	269	0	0	0	0	0	269
311001.0780072	1 EQ OILER	460	1 DAY	8	269	0	0	0	0	0	269
311001.0780074	1 MILLWRIGHT	460	1 DAY	8	270	0	0	0	0	0	270
311001.0780076	1 LABORER	460	1 DAY	8	230	0	0	0	0	0	230
311001.0780078	1 TEAMSTER	460	1 DAY	8	270	0	0	0	0	0	270
311001.0780080	2 ELECTRICIANS	460	1 DAY	8	325	0	0	0	0	0	325
311001.0780090	ALLOWANCE FOR LINERS, ONE FOR EACH ROLL-OFF CONTAINER LOAD @ $15. EACH.	460	4 EA	0	0	0	60	0	0	3	63
SUBTOTAL	SITE IMPROVEMENTS			48		0		0		3	
					1,633		60		0		1,696
	CONSUMABLES 3.20 %						52				52
	GENERAL FOREMAN 7.00 %			3	114						114
	GENERAL REQUIREMENTS 15.00 %			7	262						262
	SALES TAX 8.00 %						8		0		8
	OH&P (ON MARKUPS ONLY)									3	3
TOTAL	COST CODE 46007			59		0		0		6	
	WBS 311001				2,009		121		0		2,136
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
311001.92	CONST. SERVICES, SUPPLIES & EXPENSE										
311001.9214002	**************************** HPT'S	460	0	0	0	0	0	0	0	0	

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
	****************************										
311001.9214004	1 MAN FOR 2 DAYS	460	1 LS	16	764	0	0	0	0	0	764
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			16	764	0	0	0	0	0	764
TOTAL	COST CODE 46092 WBS 311001 (ESCALATION 0.00% - CONTINGENCY 50.00 %)			16	764	0	0	0	0	0	764
TOTAL WBS 311001 801-A INSTRUMENT BUILDING				75	2,773	0	121	0	0	6	2,900

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
311002	801-B INSTRUMENT BUILDING										
311002.07	SITE IMPROVEMENTS										
311002.0710002	*************************** 801-B INSTRUMENT BUILDING ***************************	460	0	0	0	0	0	0	0	0	0
311002.0780060	UTILIZING CATERPILLAR 375 EXCAVATOR WITH HYDRAULIC BREAKER, PULVERIZER, SHEAR & BUCKET ATTACHMENTS,	460	0	0	0	0	0	0	0	0	0
311002.0780061	DEMOLISH PREENGINEERED STEEL BUILDING, 25' X 16' X 10' EAVE HEIGHT WITH SLAB ON GRADE FOUNDATION (13 CY),	460	0	0	0	0	0	0	0	0	0
311002.0780062	EQUIPMENT AND PIPING. USING A 988 CATERPILLAR LOADER, LOAD INTO 20 TON CONTAINERS AND HAUL TO ERDF.	460	0	0	0	0	0	0	0	0	0
311002.0780070	1 EQ OPERATOR	460	1 DAY	8	269	0	0	0	0	0	269
311002.0780072	1 EQ OILER	460	1 DAY	8	269	0	0	0	0	0	269
311002.0780074	1 MILLWRIGHT	460	1 DAY	8	270	0	0	0	0	0	270
311002.0780076	1 LABORER	460	1 DAY	8	230	0	0	0	0	0	230
311002.0780078	1 TEAMSTER	460	1 DAY	8	270	0	0	0	0	0	270
311002.0780080	2 ELECTRICIANS	460	1 DAY	8	325	0	0	0	0	0	325
311002.0780090	ALLOWANCE FOR LINERS, ONE FOR EACH ROLL-OFF CONTAINER LOAD @ @15. EACH.	460	4 EA	0	0	0	60	0	0	3	63
SUBTOTAL	SITE IMPROVEMENTS			48		0		0		3	
					1,633		60		0		1,696
	CONSUMABLES 3.20 %						52				52
	GENERAL FOREMAN 7.00 %			3	114						114
	GENERAL REQUIREMENTS 15.00 %			7	262						262
	SALES TAX 8.00 %						8		0		8
	OH&P (ON MARKUPS ONLY)									3	3
TOTAL	COST CODE 46007			59		0		0		6	
	WBS 311002				2,009		121		0		2,136
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
311002.92	CONST. SERVICES, SUPPLIES & EXPENSE										
311002.9214002	*************************** HPT'S	460	0	0	0	0	0	0	0	0	

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
	****************************										
311002.9214004	1 MAN FOR 2 DAYS	460	1 LS	16	764	0	0	0	0	0	764
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			16	764	0	0	0	0	0	764
TOTAL	COST CODE 46092 WBS 311002 (ESCALATION 0.00% - CONTINGENCY 50.00 %)			16	764	0	0	0	0	0	764
TOTAL WBS 311002 801-B INSTRUMENT BUILDING				75	2,773	0	121	0	0	6	2,900

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
311004	ION EXCHANGE COLUMN										
311004.07	SITE IMPROVEMENTS										
311004.0740000	*************************** ION EXCHANGE COLUMN ***************************	460	0	0	0	0	0	0	0	0	0
311004.0740002	THE ION EXCHANGE COLUMN WILL BE REMOVED INTACT WITH THE SURROUNDING TOWER AFTER SEV- ERING THE TOWER AT JUST	460	0	0	0	0	0	0	0	0	0
311004.0740004	BELOW THE 692'-6" ELEVATION. USING A 40 TON CRANE, LOWER THE BURIAL CONTAINER (MADE OF 1" TH. STEEL) OVER THE	460	0	0	0	0	0	0	0	0	0
311004.0740006	6'-6" DIA TOWER. ANCHOR THE CONTAINER TO TOWER, UNBOLT 1" FLANGES (4 EA) AT BOTTOM OF VESSEL, SEVER 9" THICK	460	0	0	0	0	0	0	0	0	0
311004.0740008	TOWER USING A WIRE SAW. SET CONTAINER ON LOWBOY AND SEAL WELD LID AND PENETRATIONS. DISPOSE OF AS CAT 3 LLW.	460	0	0	0	0	0	0	0	0	0
311004.0740020	1 PIC	460	2 DAY	16	962	0	0	0	0	0	962
311004.0740022	1 OPERATOR	460	2 DAY	16	537	0	0	0	0	0	537
311004.0740024	1 OILER	460	2 DAY	16	537	0	0	0	0	0	537
311004.0740026	1 RIGGER	460	2 DAY	16	593	0	0	0	0	0	593
311004.0740028	2 IRONWORKERS	460	2 DAY	32	1187	0	0	0	0	0	1187
311004.0740030	2 BOILERMAKERS	460	2 DAY	32	1187	0	0	0	0	0	1187
311004.0740032	1 TEAMSTER	460	2 DAY	16	539	0	0	0	0	0	539
311004.0740034	4 LABORERS	460	2 DAY	64	1839	0	0	0	0	0	1839
311004.0740050	REMOVE PIG, SAMPLE CELL RE-1 AND FILTER F-1, DISCONNECT ALL SMALL BORE PIPING. LOAD INTO BURIAL CONTAINER AND	460	0	0	0	0	0	0	0	0	0
311004.0740052	HAUL TO BURIAL AS CATEGORY 3 LLW.	460	0	0	0	0	0	0	0	0	0
311004.0740060	1 PIC	460	2 DAY	16	962	0	0	0	0	0	962
311004.0740062	1 OPERATOR	460	2 DAY	16	537	0	0	0	0	0	537
311004.0740064	1 OILER	460	2 DAY	16	537	0	0	0	0	0	537
311004.0740066	1 RIGGER	460	2 DAY	16	593	0	0	0	0	0	593
311004.0740068	2 PIPEFITTERS	460	2 DAY	32	1320	0	0	0	0	0	1320
311004.0740070	1 TEAMSTER	460	2 DAY	16	539	0	0	0	0	0	5[illegible]

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
311004.0740074	2 LABORERS	460	2 DAY	32	920	0	0	0	0	0	920
311004.0740100	USING CATERPILLAR 375 EXCAV- ATOR AND ATTACHMENTS FOR DEMOLITION ALONG WITH A CATERPILLAR 988 LOADER,	460	0	0	0	0	0	0	0	0	0
311004.0740102	REMOVE REMAINING CONCRETE STRUCTURE, ABOVE GRADE PIPE AND EQUIPMENT.	460	0	0	0	0	0	0	0	0	0
311004.0740110	1 PIC	460	2 DAY	16	962	0	0	0	0	0	962
311004.0740112	2 OPERATORS	460	1 DAY	16	537	0	0	0	0	0	537
311004.0740114	1 OILER	460	1 DAY	8	269	0	0	0	0	0	269
311004.0740116	1 MILLWRIGHT	460	1 DAY	8	270	0	0	0	0	0	270
311004.0740118	2 PIPEFITTERS	460	2 DAY	32	1320	0	0	0	0	0	1320
311004.0740120	4 LABORERS	460	2 DAY	64	1839	0	0	0	0	0	1839
311004.0740130	UTILIZING A L9000 DIRT GUZZLER TO AID HAND DIGGING, EXCAVATE AND REMOVE UNDER- GROUND PIPE AND LOAD INTO	460	0	0	0	0	0	0	0	0	0
311004.0740132	20 TON ROLL-OFF CONTAINERS AND HAUL TO ERDF, APPROX 25 CY OR 50 TONS.	460	0	0	0	0	0	0	0	0	0
311004.0740140	1 PIC	460	1 DAY	8	481	0	0	0	0	0	481
311004.0740142	1 OPERATORS	460	1 DAY	8	269	0	0	0	0	0	269
311004.0740144	1 TEAMSTER	460	1 DAY	8	270	0	0	0	0	0	270
311004.0740146	2 LABORERS	460	1 DAY	16	460	0	0	0	0	0	460
311004.0740148	2 PIPEFITTERS	460	1 DAY	16	660	0	0	0	0	0	660
311004.0740150	1 GUZZLER W/TRUCK	460	1 DAY	8	0	0	0	0	320	0	320
311004.0740155	COST FOR ROLL-OFF CONTAINER LINERS @ $15. EACH.	460	3 EA	0	0	0	0	0	960	0	960
SUBTOTAL	SITE IMPROVEMENTS			560		0		0		0	
					20,126		0		1,280		21,406
	CONSUMABLES 3.20 %						644				644
	GENERAL FOREMAN 7.00 %			39	1408						1408
	GENERAL REQUIREMENTS 15.00 %			89	3230						3230
	SALES TAX 8.00 %						51		102		153
	OH&P (ON MARKUPS ONLY)									34	34
TOTAL	COST CODE 46007			689		0		0		34	
	WBS 311004				24,765		695		1,382		26,877
	(ESCALATION 0.00% - CONTINGENCY 70.00 %)										

311004.92 CONST. SERVICES, SUPPLIES & EXPENSE

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
311004.9214002	****************************** HPT'S ******************************	460	0	0	0	0	0	0	0	0	0
311004.9214004	ONE MAN FOR JOB DURATION OF 10 DAYS	460	1 LS	80	3822	0	0	0	0	0	3822
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			80	3,822	0	0	0	0	0	3,822
TOTAL	COST CODE 46092 WBS 311004 (ESCALATION 0.00% - CONTINGENCY 70.00 %)			80	3,822	0	0	0	0	0	3,822
TOTAL WBS 311004 ION EXCHANGE COLUMN				769	28,587	0	695	0	1,382	34	30,699

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
311005	A-702 FAN HOUSE/FILTER BUILDING										
311005.07	SITE IMPROVEMENTS										
311005.0750002	**************************** FAN HOUSE ****************************	460	0	0	0	0	0	0	0	0	0
311005.0750004	REMOVE, BAG AND DISPOSE OF 12 HEPA FILTERS, HAUL TO LLBG.	460	0	0	0	0	0	0	0	0	0
311005.0750006	PLANT OPERATORS (2)	460	4 HRS	8	382	0	0	0	0	0	382
311005.0750009	TEAMSTER (1)	460	4 HRS	8	270	0	0	0	0	0	270
311005.0750014	UTILIZING CATERPILLAR 375 EXCAVATOR WITH HYDRAULIC BREAKER, PULVERIZER, SHEAR & BUCKET ATTACHMENTS,	460	0	0	0	0	0	0	0	0	0
311005.0750016	DEMOLISH PREFABRICATED STEEL BUILDING, 24' X 36' X 12' EAVE HEIGHT WITH SLAB ON GRADE FOUNDATION (20 CY),	460	0	0	0	0	0	0	0	0	0
311005.0750018	EQUIPMENT AND PIPING. USING A 988 CATERPILLAR LOADER, LOAD INTO 20 TON CONTAINERS AND HAUL TO ERDF.	460	0	0	0	0	0	0	0	0	0
311005.0750030	1 EQ OPERATOR	460	1 DAY	8	269	0	0	0	0	0	269
311005.0750032	1 EQ OILER	460	1 DAY	8	269	0	0	0	0	0	269
311005.0750036	1 MILLWRIGHT	460	1 DAY	8	270	0	0	0	0	0	270
311005.0750038	1 LABORER	460	1 DAY	8	230	0	0	0	0	0	230
311005.0750040	1 TEAMSTER	460	1 DAY	8	270	0	0	0	0	0	270
311005.0750042	2 ELECTRICIANS	460	1 DAY	8	325	0	0	0	0	0	325
311005.0750050	ALLOWANCE FOR LINERS, ONE FOR EACH 20 TON LOAD @ $15. EACH.	460	4 EA	0	0	0	60	0	0	3	63
SUBTOTAL	SITE IMPROVEMENTS			64	2,285	0	60	0	0	3	2,348
	CONSUMABLES 3.20 %						73				73
	GENERAL FOREMAN 7.00 %			4	159						159
	GENERAL REQUIREMENTS 15.00 %			10	366						366
	SALES TAX 8.00 %						10		0		10
	OH&P (ON MARKUPS ONLY)									4	4
TOTAL	COST CODE 46007 WBS 311005			78	2,811	0	143	0	0	7	2,962

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
	(ESCALATION 0.00% - CONTINGENCY 55.00 %)										
11005.92	CONST. SERVICES, SUPPLIES & EXPENSE										
11005.9214002	**************************** HPT'S ****************************	460	0	0	0	0	0	0	0	0	0
11005.9214004	1 MAN FOR 2 DAYS	460	1 LS	16	764	0	0	0	0	0	764
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			16	764	0	0	0	0	0	764
TOTAL	COST CODE 46092 WBS 311005 (ESCALATION 0.00% - CONTINGENCY 55.00 %)			16	764	0	0	0	0	0	764
TOTAL WBS 311005 A-702 FAN HOUSE/FILTER BUILDING				94	3,575	0	143	0	0	7	3,726

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
311006	CAISSONS/DEENTRAINER FACILITIES										
311006.07	SITE IMPROVEMENTS										
311006.0760002	**************************** DEENTRAINER FACILITIES ****************************	460	0	0	0	0	0	0	0	0	0
311006.0760100	UTILIZING CATERPILLAR 375 EXCAVATORS WITH HYDRAULIC BREAKER, PULVERIZER, SHEAR & BUCKET ATTACHMENTS, EXCAVATE	460	0	0	0	0	0	0	0	0	0
311006.0760102	AT SIDES OF CAISSONS TO VAPOR HEADER PIPING, CUT AND CRIMP THIS OFF. REMOVE CAIS-SON CULVERT SECTIONS THEN	460	0	0	0	0	0	0	0	0	0
311006.0760104	DIG OUT TANKS K1-5-1, K1-5-2 K1-5-2A, SEAL POT, ASSOCIA-TED DUCT AND CONCRETE. DISPOSE OF THE 3 TANKS AND	460	0	0	0	0	0	0	0	0	0
311006.0760106	SEAL POT AS RMW WITH THE REMAINDER TO GO TO LOW LEVEL BURIAL GROUNDS.	460	0	0	0	0	0	0	0	0	0
311006.0760110	2 OPERATORS	460	4 DAY	64	2150	0	0	0	0	0	2150
311006.0760112	2 OILERS	460	4 DAY	64	2150	0	0	0	0	0	2150
311006.0760118	2 TEAMSTERS	460	4 DAY	64	2157	0	0	0	0	0	2157
311006.0760200	WASTE GENERATED: SOIL VOL (ERDF) = 270 TONS METAL AND CONCRETE (LLW) = 200 CF	460	0	0	0	0	0	0	0	0	0
311006.0760201	3 DEENTRAINER TANKS AND SEAL POT (RMW) = 150 CF	460	0	0	0	0	0	0	0	0	0
SUBTOTAL	SITE IMPROVEMENTS			192		0		0		0	
					6,457		0		0		6,457
	CONSUMABLES 3.20 %						206				206
	GENERAL FOREMAN 7.00 %			13	451						451
	GENERAL REQUIREMENTS 15.00 %			30	1036						1036
	SALES TAX 8.00 %						16		0		16
	OH&P (ON MARKUPS ONLY)									11	11
TOTAL	COST CODE 46007			236		0		0		11	
	WBS 311006				7,945		223		0		8,179
	(ESCALATION 0.00% - CONTINGENCY 55.00 %)										
311006.92	CONST. SERVICES, SUPPLIES & EXPENSE										

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
311006.9214002	****************************** HPT'S ******************************	460	0	0	0	0	0	0	0	0	0
311006.9214004	ALLOWANCE FOR ONE MAN FOR 4 DAYS.	460	1 LS	32	1529	0	0	0	0	0	1529
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			32	1,529	0	0	0	0	0	1,529
TOTAL	COST CODE 46092 WBS 311006 (ESCALATION 0.00% - CONTINGENCY 55.00 %)			32	1,529	0	0	0	0	0	1,529
TOTAL WBS 311006 CAISSONS/DEENTRAINER FACILITIES				268	9,474	0	223	0	0	11	9,708

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
311007	A-401 CONDENSER BUILDING										
311007.07	SITE IMPROVEMENTS										
311007.0780002	**************************** CONDENSER BUILDING ****************************	460	0	0	0	0	0	0	0	0	0
311007.0780003	THIS BUILDING IS MADE OF RE- INFORCED CONCRETE WITH COVER BLOCKS OVER THE 3 CELLS AND OVER THE HOT PIPE GALLERY.	460	0	0	0	0	0	0	0	0	0
311007.0780004	TOP OF BUILDING IS SLIGHTLY ABOVE FINISH GRADE.	460	0	0	0	0	0	0	0	0	0
311007.0780006	REMOVE COVER BLOCKS (42 EA) OVER THE 3 CONDENSERS AND FROM THE HOT PIPE GALLERY (10 EA). EXCAVATE TO EXPOSE	460	0	0	0	0	0	0	0	0	0
311007.0780008	SOUTH SIDE OF BUILDING. DEM- OLISH THIS WALL TO ACCESS HOT-PIPE GALLERY. SHEAR OFF PIPE AND HEADERS AND LOAD	460	0	0	0	0	0	0	0	0	0
311007.0780010	INTO SHIELDED BOXES. DEMOL- ISH INSIDE WALLS TO EXPOSE THE 3 CONDENSERS. CUT/CRIMP PIPE AND SUPPORTS. TWO IRON-	460	0	0	0	0	0	0	0	0	0
311007.0780012	WORKERS WILL NEED TO QUICKLY RIG THESE TO AVOID UNNECES- SARY DOSES. LOAD THESE THREE CONDENSERS INTO BURIAL CONT-	460	0	0	0	0	0	0	0	0	0
311007.0780014	AINERS TO BE DISPOSED OF AS RMW.	460	0	0	0	0	0	0	0	0	0
311007.0780020	UTILIZING A 988 LOADER AND A 375 EXCAVATOR WITH HYDRAULIC BREAKER, PULVERIZER, SHEAR & BUCKET ATTACHMENTS, CUT AND	460	0	0	0	0	0	0	0	0	0
311007.0780022	REMOVE REMAINING PIPING, PULVERIZE, LOAD AND REMOVE WALLS AND FOUNDATION.	460	0	0	0	0	0	0	0	0	0
311007.0780065	INVENTORY INCLUDES APPROX. 343 CY REINFORCED CONCRETE, 25' OF 20" PIPE, 50' OF 16" PIPE, 80' OF 8" PIPE & 50'	460	0	0	0	0	0	0	0	0	0
311007.0780066	OF SMALL BORE, PLUS ASSOCIA- TED EQUIPMENT. LOAD INTO 20	460	0	0	0	0	0	0	0	0	0

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
	TON ROLL-OFF CONTAINERS AND HAUL TO ERDF.										
311007.0780068	1 PIC	460	12 DAY	96	5772	0	0	0	0	0	5772
311007.0780070	2 OPERATORS	460	12 DAY	192	6449	0	0	0	0	0	6449
311007.0780072	2 OILERS	460	12 DAY	192	6449	0	0	0	0	0	6449
311007.0780078	2 TEAMSTERS	460	12 DAY	192	6470	0	0	0	0	0	6470
311007.0780080	2 IRONWORKERS	460	3 DAY	48	1780	0	0	0	0	0	1780
311007.0780090	ALLOWANCE FOR LINERS, ONE FOR EACH 20 TON LOAD @ $15. EACH FOR MATERIAL GOING TO ERDF.	460	35 EA	0	0	0	525	0	0	26	551
311007.0780200	WASTE GENERATED: CONDENSERS AND RELATED PIPE (RMW) = 3320 CF PIPE/CONC (ERDF) = 700 TONS	460	0	0	0	0	0	0	0	0	0
SUBTOTAL	SITE IMPROVEMENTS			720		0		0		26	
					26,920		525		0		27,471
	CONSUMABLES 3.20 %						861				861
	GENERAL FOREMAN 7.00 %			50	1884						1884
	GENERAL REQUIREMENTS 15.00 %			115	4320						4320
	SALES TAX 8.00 %						110		0		110
	OH&P (ON MARKUPS ONLY)									48	48
TOTAL	COST CODE 46007			885		0		0		74	
	WBS 311007				33,125		1,497		0		34,697
	(ESCALATION 0.00% - CONTINGENCY 70.00 %)										
311007.92	CONST. SERVICES, SUPPLIES & EXPENSE										
311007.9214002	**************************** HPT'S ****************************	460	0	0	0	0	0	0	0	0	0
311007.9214004	MAN STEP-OFF PAD, 1 MAN FOR 12 DAYS.	460	1 L/S	96	4587	0	0	0	0	0	4587
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			96		0		0		0	
					4,587		0		0		4,587
TOTAL	COST CODE 46092			96		0		0		0	
	WBS 311007				4,587		0		0		4,587
	(ESCALATION 0.00% - CONTINGENCY 70.00 %)										

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
	TOTAL WBS 311007 A-401 CONDENSER BUILDING			981	37,712	0	1,497	0	0	74	39,284

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
311008	COOLING TOWER AND SUMPS										
311008.06	ENVIRONMENTAL WORK										
311008.0680002	***************************** COOLING TOWER & SUMPS *****************************	460	0	0	0	0	0	0	0	0	0
311008.0680003	UTILIZING CATERPILLAR 375 EXCAVATORS AND ATTACHMENTS, UNCOVER TWO 11'-6" X 11'-6" X 11'-6" HIGH CONCRETE SUMPS	460	0	0	0	0	0	0	0	0	0
311008.0680004	AND ASSOCIATED EQUIPMENT AND PIPE, ONE 12' X 24' X 18' H COOLING TOWER (METAL) AND CONCRETE FOUNDATION, STEM	460	0	0	0	0	0	0	0	0	0
311008.0680005	WALL AND ASSOCIATED EQUIP-MENT AND PIPING. LOAD INTO 20-TON ROLL-OFF CONTAINERS AND HAUL TO ERDF.	460	0	0	0	0	0	0	0	0	0
311008.0680010	OPERATORS (2)	460	2 DAY	32	1075	0	0	0	0	0	1075
311008.0680012	OILERS (2)	460	2 DAY	32	1075	0	0	0	0	0	1075
311008.0680014	MILLWRIGHTS (2)	460	2 DAY	32	1081	0	0	0	0	0	1081
311008.0680016	LABORERS (2)	460	2 DAY	32	920	0	0	0	0	0	920
311008.0680018	TEAMSTERS (2)	460	2 DAY	32	1078	0	0	0	0	0	1078
311008.0680030	ALLOWANCE FOR LINERS, ONE FOR EACH 20 TON LOAD @ $15. EACH.	460	10 EA	160	5392	0	0	0	0	0	5392
SUBTOTAL	ENVIRONMENTAL WORK			320		0		0		0	
					10,621		0		0		10,621
	CONSUMABLES 3.20 %						339				339
	GENERAL FOREMAN 7.00 %			22	743						743
	SALES TAX 8.00 %						27		0		27
	OH&P (ON MARKUPS ONLY)									18	18
TOTAL	COST CODE 46006			342		0		0		18	
	WBS 311008				11,364		367		0		11,749
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
11008.92	CONST. SERVICES, SUPPLIES & EXPENSE										
11008.9214002	***************************** HPT'S *****************************	460	0	0	0	0	0	0	0	0	0

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING CORP.
JOB NO. Z466AAF1
FILE NO. Z466AAF1

** IEST - INTERACTIVE ESTIMATING **
ANCILLARY EQUIPMENT REMOVAL
241-AX TANK FARM CLOSURE - PLANNING ESTIMATE
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

DATE 04/22/98 10:18:56
BY R.OHRT

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
311008.9214004	1 MAN FOR 2 DAYS	460	1 LS	16	764	0	0	0	0	0	764
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			16	764	0	0	0	0	0	764
TOTAL	COST CODE 46092 WBS 311008 (ESCALATION 0.00% - CONTINGENCY 50.00 %)			16	764	0	0	0	0	0	764
TOTAL WBS 311008 COOLING TOWER AND SUMPS				358	12,128	0	367	0	0	18	12,513

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
311011	A-8 SAMPLER PITS										
311011.07	SITE IMPROVEMENTS										
311011.0711002	****************************	460	0	0	0	0	0	0	0	0	0
	A-8 SAMPLER PITS										
	****************************										
311011.0711004	UTILIZING A CATERPILLAR 375	460	0	0	0	0	0	0	0	0	0
	EXCAVATOR WITH HYDRAULIC										
	BREAKER, PULVERIZER, SHEAR &										
	BUCKET ATTACHMENTS AND A										
311011.0711005	CATERPILLAR 988 LOADER,	460	0	0	0	0	0	0	0	0	0
	REMOVE AND CRUSH COVER										
	BLOCKS, 30 FT OF DUCT AND										
	MISC HARDWARE, LOAD INTO										
311011.0711006	20 TON ROLL-OFF CONTAINERS	460	0	0	0	0	0	0	0	0	0
	AND HAUL TO ERDF. EXCAVATE										
	TO EXPOSE WALLS (13 FT DEEP)										
	PILE DIRT TO SIDE (300 CY)										
311011.0711007	FOR REPLACEMENT LATER. BREAK	460	0	0	0	0	0	0	0	0	0
	UP CONCRETE WALLS AND FLOOR,										
	LOAD INTO 20 TON ROLL-OFF										
	CONTAINERS AND HAUL TO ERDF.										
311011.0711008	(APPROX 68 CY OR 135 TONS)	460	0	0	0	0	0	0	0	0	0
	CAP OFF PIPE.										
311011.0711010	2 OPERATORS	460	2 DAY	32	1075	0	0	0	0	0	1075
311011.0711012	1 OILER	460	2 DAY	16	537	0	0	0	0	0	537
311011.0711014	2 TEAMSTERS	460	2 DAY	32	1078	0	0	0	0	0	1078
311011.0711016	1 MILLWRIGHT	460	2 DAY	16	540	0	0	0	0	0	540
311011.0711018	2 PIPEFITTERS	460	2 DAY	32	1320	0	0	0	0	0	1320
311011.0711020	2 LABORERS	460	2 DAY	32	920	0	0	0	0	0	920
311011.0711024	ALLOWANCE FOR LINERS, ONE	460	7 EA	0	0	0	105	0	0	5	110
	FOR EACH 20 TON LOAD @ $15										
	EACH.										
311011.0711030	BRING IN 220 CY OF NEW FILL,	460	0	0	0	0	0	0	0	0	0
	BACKFILL AND COMPACT 520 CY										
	TOTAL.										
311011.0711032	2 OPERATORS	460	5 DAY	80	2687	0	0	0	0	0	2687
311011.0711034	2 TEAMSTERS	460	5 DAY	80	2696	0	0	0	0	0	2696
311011.0711036	4 LABORERS	460	5 DAY	160	4598	0	0	0	0	0	4598
SUBTOTAL	SITE IMPROVEMENTS			480	15,451	0	105	0	0	5	15,561

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
	CONSUMABLES 3.20 %						494				494
	GENERAL FOREMAN 7.00 %			33	1081						1081
	GENERAL REQUIREMENTS 15.00 %			77	2479						2479
	SALES TAX 8.00 %						47		0		47
	OH&P (ON MARKUPS ONLY)									27	27
TOTAL	COST CODE 46007			590		0		0		32	
	WBS 311011				19,012		647		0		19,691
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
311011.92	CONST. SERVICES, SUPPLIES & EXPENSE										
311011.9214002	****************************** HPT'S ******************************	460	0	0	0	0	0	0	0	0	0
311011.9214004	ONE MAN FOR 7 DAYS	460	1 LS	56	2676	0	0	0	0	0	2676
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			56		0		0		0	
					2,676		0		0		2,676
TOTAL	COST CODE 46092			56		0		0		0	
	WBS 311011				2,676		0		0		2,676
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
TOTAL WBS 311011 A-8 SAMPLER PITS				646		0		0		32	
					21,688		647		0		22,367

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
312001	GROUTING OF WELLS										
312001.07	SITE IMPROVEMENTS										
312001.0750002	***************************** CASING PERFORATION *****************************	460	0	0	0	0	0	0	0	0	0
312001.0750004	THE CASINGS WILL BE PERFORA- TED PRIOR TO GROUTING. THIS OPERATION WILL BE PERFORMED BY WASTE MANAGEMENT FEDERAL	460	0	0	0	0	0	0	0	0	0
312001.0750005	SERVICES NORTHWEST OPERA- TIONS. THESE COSTS ARE BASED ON A LETTER DATED 01/15/98 FROM DONALD J. MOAK "AX TANK	460	0	0	0	0	0	0	0	0	0
312001.0750008	FARM WELL DECOMMISSIONING".	460	0	0	0	0	0	0	0	0	0
312001.0750010	135 DAYS @ $1800/DAY, PLUS $200 OTHER DIRECT COSTS.	460	135 DAY	0	0	0	27000	243000	0	0	270000
SUBTOTAL	SITE IMPROVEMENTS			0		0		243,000		0	
					0		27,000		0		270,000
	SALES TAX 8.00 %						2160		0		2160
TOTAL	COST CODE 46007			0		0		243,000		0	
	WBS 312001				0		29,160		0		272,160
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
312001.92	CONST. SERVICES, SUPPLIES & EXPENSE										
312001.9214002	***************************** HPT'S *****************************	460	0	0	0	0	0	0	0	0	0
312001.9214004	HPT TO MAN STEP OFF PAD	460	135 DAY	1080	51602	0	0	0	0	0	51602
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			1,080		0		0		0	
					51,602		0		0		51,602
TOTAL	COST CODE 46092			1,080		0		0		0	
	WBS 312001				51,602		0		0		51,602
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
TOTAL WBS 312001 GROUTING OF WELLS				1,080		0		243,000		0	
					51,602		29,160		0		323,762

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
314001	REMOVE LEAK DETECTION PITS										
314001.07	SITE IMPROVEMENTS										
314001.0760000	**************************** REMOVE LEAK DETECTION PITS ****************************	460	0	0	0	0	0	0	0	0	0
314001.0760032	THIS CREW WILL CONSIST OF: 1 PIC 2 OPERATORS 2 OILERS	460	0	0	0	0	0	0	0	0	0
314001.0760034	1 MILLWRIGHT 2 TEAMSTERS 2 LABORERS USING 2 CATERPILLAR 375	460	0	0	0	0	0	0	0	0	0
314001.0760036	EXCAVATORS WITH ATTACHMENTS THE PITS WILL BE BROKEN UP AND LOADED INTO 20 TON ROLL-OFF CONTAINERS FOR DISPOSAL	460	0	0	0	0	0	0	0	0	0
314001.0760038	AT ERDF.	460	0	0	0	0	0	0	0	0	0
314001.0760072	ALLOW 2 CREW DAYS FOR THE FOUR PITS. *	460	2 DAY	160	5650	0	0	0	0	0	5650
314001.0760100	WASTE GENERATED: CONC VOL (ERDF) = 160 TONS METAL VOL (ERDF) = 20 CF	460	0	0	0	0	0	0	0	0	0
SUBTOTAL	SITE IMPROVEMENTS			160		0		0		0	
					5,650		0		0		5,650
	CONSUMABLES 3.20 %						180				180
	GENERAL FOREMAN 7.00 %			11	395						395
	GENERAL REQUIREMENTS 15.00 %			25	906						906
	SALES TAX 8.00 %						14		0		14
	OH&P (ON MARKUPS ONLY)									9	9
TOTAL	COST CODE 46007			196		0		0		9	
	WBS 314001				6,952		195		0		7,157
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
314001.92	CONST. SERVICES, SUPPLIES & EXPENSE										
314001.9214002	**************************** HPT'S ****************************	460	0	0	0	0	0	0	0	0	0

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
314001.9214004	1 MAN FOR 2 DAYS	460	1 LS	16	764	0	0	0	0	0	764
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			16		0		0		0	
					764		0		0		764
TOTAL	COST CODE 46092			16		0		0		0	
	WBS 314001				764		0		0		764
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
TOTAL WBS 314001 REMOVE LEAK DETECTION PITS				212		0		0		9	
					7,716		195		0		7,921

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
316003	CUT/CAP/REMOVE PIPE BUNDLES										
316003.07	SITE IMPROVEMENTS										
316003.0760000	**************************** CUT/CAP/REMOVE PIPE BUNDLES ****************************	460	0	0	0	0	0	0	0	0	0
316003.0760002	THIS ACTIVITY WILL INVOLVE EXCAVATING TO UNCOVER PORT- IONS OF PIPE & ENCASEMENTS, SHEARING/CRIMPING PIPE IN	460	0	0	0	0	0	0	0	0	0
316003.0760004	10 FT SECTIONS, LOADING INTO APPROPRIATE CONTAINERS AND HAULING TO BURIAL. APPROXI- MATELY 50 FT OF EACH PIPE	460	0	0	0	0	0	0	0	0	0
316003.0760006	LINE WILL BE REMOVED TO CLEAR ROOM FOR THE STRARCH STRUCTURE'S COLUMN FOOTINGS. THE PIPE END ON THE OUTSIDE	460	0	0	0	0	0	0	0	0	0
316003.0760008	OF THE PROPOSED STRUCTURE WILL BE SEALED AND SHIELDED WITH AN ENCAPSULATION OF CONCRETE. THE EXCAVATION	460	0	0	0	0	0	0	0	0	0
316003.0760009	PROFILE IS ASSUMED TO BE 6 FT DEEP BY 7-1/2 FT WIDE BY 50 FT LONG UNLESS STATED OTHERWISE.	460	0	0	0	0	0	0	0	0	0
316003.0760010	THE CREW WILL CONSIST OF: 1 PIC 3 OPERATORS	460	0	0	0	0	0	0	0	0	0
316003.0760012	3 OILERS 2 TEAMSTERS THE EQUIPMENT BEING USED WILL INCLUDE CATERPILLAR 375	460	0	0	0	0	0	0	0	0	0
316003.0760014	EXCAVATORS USING VARIOUS ATTACHMENTS INCLUDING HYDR- AULIC SHEARS, GRAPPLE, PULV- ERIZER AND A BUCKET. TWO	460	0	0	0	0	0	0	0	0	0
316003.0760016	TRUCKS WILL BE HAULING EITHER SHIELDED BURIAL CONT- AINERS TO A PRE-PROCESSING FACILITY OR 20 TON ROLL-OFF	460	0	0	0	0	0	0	0	0	0

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING CORP.
JOB NO. Z466AAF1
FILE NO. Z466AAF1

** IEST - INTERACTIVE ESTIMATING **
ANCILLARY EQUIPMENT REMOVAL
241-AX TANK FARM CLOSURE - PLANNING ESTIMATE
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 27
DATE 04/22/98 10:18:56
BY R.OHRT

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
316003.0760018	CONTAINERS TO ERDF.	460	0	0	0	0	0	0	0	0	0
	DURING THE CONCRETE ENCAP-										
	SULATION ACTIVITY THE CREW										
316003.0760020	WILL CONSIST OF:	460	0	0	0	0	0	0	0	0	0
	1 PIC										
	2 HELPERS										
	3 LABORERS										
316003.0760022	1 OPERATOR	460	0	0	0	0	0	0	0	0	0
	1 RIGGER										
316003.0760050		460	0	0	0	0	0	0	0	0	0
	*****************************										
	GROUP 4										
	*****************************										
316003.0760052	THIS GROUP IS INSIDE A	460	0	0	0	0	0	0	0	0	0
	CONCRETE ENCASEMENT. INSIDE										
	THE ENCASEMENT ARE TWO 3"										
	LINES AND TWO 4" LINES. THE										
316003.0760054	PIPE WILL BE LOADED INTO	460	0	0	0	0	0	0	0	0	0
	SHIELDED BOXES FOR TRANSPOR-										
	TATION TO A PRE-PROCESSING										
	FACILITY (PPF). THE CONCRETE										
316003.0760056	RUBBLE AND SOIL WILL BE	460	0	0	0	0	0	0	0	0	0
	LOADED INTO 20 TON ROLL-OFF										
	CONTAINERS AND HAULED TO										
	ERDF FOR DISPOSAL. THE										
316003.0760057	EXCAVATION PROFILE IS ASSUM-	460	0	0	0	0	0	0	0	0	0
	ED TO BE 20 FT DEEP AND 8 FT										
	WIDE AT THE BOTTOM WITH										
	1:1.5 SLOPED SIDES.										
316003.0760058		460	0	0	0	0	0	0	0	0	0
	EXCAVATE, LOAD & HAUL DIRT,										
	CUT, LOAD & HAUL PIPE, AND										
	BREAK, LOAD & HAUL CONCRETE.										
316003.0760059	ALLOW 7 CREW DAYS, CREW HAS	460	0	0	0	0	0	0	0	0	0
	TWO MORE TEAMSTERS TO HANDLE										
	THE EXTRA SOIL HAULING.										
316003.0760060	ALLOW 7 CREW DAYS	460	7 DAY	616	22521	0	0	0	0	0	22521
316003.0760062	LINERS	460	134 EA	0	0	0	2010	0	0	101	2111
316003.0760070		460	0	0	0	0	0	0	0	0	0
	PIPE VOL.(PPF) +100%= 25 CF										
	SOIL VOL.(ERDF)= 2678 TONS										
	CONC VOL.(ERDF)= 10CY= 20 T										

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
316003.0760080		460	0	0	0	0	0	0	0	0	0
	POUR PIPE PLUG										
316003.0760082	ALLOW 1/2 CREW DAY	460	4 HRS	32	1098	0	0	0	0	0	1098
316003.0760084	CONCRETE	460	5 CY	0	0	0	240	0	0	12	252
316003.0760100	******************************	460	0	0	0	0	0	0	0	0	0
	GROUP 5										
	******************************										
316003.0760102	THIS GROUP CONSISTS OF ONE EACH 2", 3" & 4" DIRECT BURIED PIPE LINES. THEY ARE HIGH-RAD, SO WILL BE LOADED	460	0	0	0	0	0	0	0	0	0
316003.0760104	INTO SHIELDED BOXES & TAKEN TO PPF. THE SOIL & CONCRETE RUBBLE WILL BE LOADED AND TAKEN TO ERDF.	460	0	0	0	0	0	0	0	0	0
316003.0760106		460	0	0	0	0	0	0	0	0	0
	EXCAVATE, LOAD & HAUL DIRT, CUT, LOAD & HAUL PIPE										
316003.0760108	ALLOW 1 CREW DAY	460	1 DAY	72	2632	0	0	0	0	0	2632
316003.0760110		460	0	0	0	0	0	0	0	0	0
	PIPE VOL.(PPF) +100%= 14 CF SOIL VOL.(ERDF)= 83CY= 106 T										
316003.0760120		460	0	0	0	0	0	0	0	0	0
	POUR PIPE PLUG										
316003.0760122	ALLOW 1/2 CREW DAY	460	4 HRS	32	1098	0	0	0	0	0	1098
316003.0760124	CONCRETE	460	5 CY	0	0	0	240	0	0	12	252
316003.0760200	******************************	460	0	0	0	0	0	0	0	0	0
	GROUP 6										
	******************************										
316003.0760202	THIS GROUP CONSISTS OF SIX 4" PIPE INSIDE A CONCRETE ENCASEMENT; A 24" VENT LINE, DIRECT BURIED; A 2" PW LINE;	460	0	0	0	0	0	0	0	0	0
316003.0760204	A 1" IA LINE, 3" PA LINE AND A 4" RW LINE ALL DIRECT BURIED. THE EXCAVATION PROFILE IS ASSUMED TO BE	460	0	0	0	0	0	0	0	0	0
316003.0760205	20 FT DEEP AND 10 FT WIDE AT THE BOTTOM WITH 1:1.5 SLOPED SIDES.	460	0	0	0	0	0	0	0	0	0

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
316003.0760206		460	0	0	0	0	0	0	0	0	0
	EXCAVATE, LOAD & HAUL DIRT, CUT, LOAD & HAUL PIPE, AND BREAK, LOAD & HAUL CONCRETE.										
316003.0760208	ALLOW FIVE CREW DAYS, CREW HAS 2 MORE TEAMSTERS TO HANDLE THE EXTRA SOIL REMOVAL.	460	5 DAY	440	15858	0	0	0	0	0	15858
316003.0760210	LINERS	460	75 EA	0	0	0	1125	0	0	56	1181
316003.0760220		460	0	0	0	0	0	0	0	0	0
	PIPE VOL.(PPF) +100%= 307 CF CONC VOL.(ERDF)=470CF= 35T SOIL VOL.(ERDF)= 1453 T										
316003.0760224	POUR PIPE PLUG ALLOW 1/2 CREW DAY	460	4 HRS	32	1098	0	0	0	0	0	1098
316003.0760230	CONCRETE	460	5 CY	0	0	0	240	0	0	12	252
316003.0760300		460	0	0	0	0	0	0	0	0	0
	*************************** GROUP 7 ***************************										
316003.0760302	THIS GROUP CONSISTS OF ONE 4" PIPE-IN-PIPE, DIRECT BURIED.	460	0	0	0	0	0	0	0	0	0
316003.0760306		460	0	0	0	0	0	0	0	0	0
	EXCAVATE, LOAD & HAUL DIRT, CUT, LOAD & HAUL PIPE										
316003.0760308	ALLOW 1 CREW DAY	460	1 DAY	72	2632	0	0	0	0	0	2632
316003.0760310		460	0	0	0	0	0	0	0	0	0
	PIPE VOL.(PPF) +100%= 14 CF SOIL VOL.(ERDF)= 83CY= 106 T										
316003.0760320		460	0	0	0	0	0	0	0	0	0
	POUR PIPE PLUG										
316003.0760322	ALLOW 1/2 CREW DAY	460	4 HRS	32	1098	0	0	0	0	0	1098
316003.0760324	CONCRETE	460	5 CY	0	0	0	240	0	0	12	252
316003.0760400		460	0	0	0	0	0	0	0	0	0
	*************************** GROUP 16A ***************************										
316003.0760402	THIS GROUP CONSISTS OF TWO 6" PIPE-IN-PIPE, DIRECT BURIED.	460	0	0	0	0	0	0	0	0	0
316003.0760406		460	0	0	0	0	0	0	0	0	0
	EXCAVATE, LOAD & HAUL DIRT,										

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
	CUT, LOAD & HAUL PIPE										
316003.0760408	ALLOW 1 CREW DAY	460	1 DAY	72	2632	0	0	0	0	0	2632
316003.0760410		460	0	0	0	0	0	0	0	0	0
	PIPE VOL.(PPF) +100%= 61 CF										
	SOIL VOL.(ERDF)= 83CY= 106 T										
316003.0760420		460	0	0	0	0	0	0	0	0	0
	POUR PIPE PLUG										
316003.0760422	ALLOW 1/2 CREW DAY	460	4 HRS	32	1098	0	0	0	0	0	1098
316003.0760424	CONCRETE	460	5 CY	0	0	0	240	0	0	12	252
316003.0760500		460	0	0	0	0	0	0	0	0	0
	*****************************										
	GROUP 16B										
	*****************************										
316003.0760502	THIS GROUP CONSISTS OF FIVE 6" PIPE-IN-PIPE, DIRECT BURIED.	460	0	0	0	0	0	0	0	0	0
316003.0760506		460	0	0	0	0	0	0	0	0	0
	EXCAVATE, LOAD & HAUL DIRT,										
	CUT, LOAD & HAUL PIPE										
316003.0760508	ALLOW 1 CREW DAY	460	1 DAY	72	2632	0	0	0	0	0	2632
316003.0760510		460	0	0	0	0	0	0	0	0	0
	PIPE VOL.(PPF) +100%= 153 CF										
	SOIL VOL.(ERDF)= 83CY= 106 T										
316003.0760520		460	0	0	0	0	0	0	0	0	0
	POUR PIPE PLUG										
316003.0760522	ALLOW 1/2 CREW DAY	460	4 HRS	32	1098	0	0	0	0	0	1098
316003.0760524	CONCRETE	460	5 CY	0	0	0	240	0	0	12	252
316003.0760600		460	0	0	0	0	0	0	0	0	0
	*****************************										
	GROUP 16C										
	*****************************										
316003.0760602	THIS GROUP CONSISTS OF FIVE 6" PIPE-IN-PIPE, DIRECT BURIED.	460	0	0	0	0	0	0	0	0	0
316003.0760606		460	0	0	0	0	0	0	0	0	0
	EXCAVATE, LOAD & HAUL DIRT,										
	CUT, LOAD & HAUL PIPE										
316003.0760608	ALLOW 1 CREW DAY	460	1 DAY	72	2632	0	0	0	0	0	2632
316003.0760610		460	0	0	0	0	0	0	0	0	0
	PIPE VOL.(PPF) +100%= 153 CF										
	SOIL VOL.(ERDF)= 83CY= 106 T										
316003.0760620		460	0	0	0	0	0	0	0	0	0
	POUR PIPE PLUG										

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING CORP.
JOB NO. Z466AAF1
FILE NO. Z466AAF1

** IEST - INTERACTIVE ESTIMATING **
ANCILLARY EQUIPMENT REMOVAL
241-AX TANK FARM CLOSURE - PLANNING ESTIMATE
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 31
DATE 04/22/98 10:18:57
BY R.OHRT

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
16003.0760622	ALLOW 1/2 CREW DAY	460	4 HRS	32	1098	0	0	0	0	0	1098
16003.0760624	CONCRETE	460	5 CY	0	0	0	240	0	0	12	252
16003.0760700		460	0	0	0	0	0	0	0	0	0
	****************************** EAST SIDE GROUP ******************************										
16003.0760702	THIS GROUP CONSISTS OF FIVE 6" PIPE-IN-PIPE, DIRECT BURIED.	460	0	0	0	0	0	0	0	0	0
16003.0760706		460	0	0	0	0	0	0	0	0	0
	EXCAVATE, LOAD & HAUL DIRT, CUT, LOAD & HAUL PIPE										
316003.0760708	ALLOW 1 CREW DAY	460	1 DAY	72	2632	0	0	0	0	0	2632
316003.0760710		460	0	0	0	0	0	0	0	0	0
	PIPE VOL.(PPF) +100%= 153 CF SOIL VOL.(ERDF)= 83CY= 106 T										
316003.0760720		460	0	0	0	0	0	0	0	0	0
	POUR PIPE PLUG										
316003.0760722	ALLOW 1/2 CREW DAY	460	4 HRS	32	1098	0	0	0	0	0	1098
316003.0760724	CONCRETE	460	5 CY	0	0	0	240	0	0	12	252
SUBTOTAL	SITE IMPROVEMENTS			1,744	62,955	0	5,055	0	0	253	68,263
	CONSUMABLES 3.20 %						2014				2014
	GENERAL FOREMAN 7.00 %			122	4406						4406
	GENERAL REQUIREMENTS 15.00 %			279	10104						10104
	SALES TAX 8.00 %						565		0		565
	OH&P (ON MARKUPS ONLY)									129	129
TOTAL	COST CODE 46007 WBS 316003 (ESCALATION 0.00% - CONTINGENCY 70.00 %)			2,145	77,466	0	7,635	0	0	382	85,483
316003.92	CONST. SERVICES, SUPPLIES & EXPENSE										
316003.9214002	****************************** HPT'S ******************************	460	0	0	0	0	0	0	0	0	0
316003.9214004	1 MAN FOR 22 DAYS	460	1 LS	176	8409	0	0	0	0	0	8409
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			176	8,409	0	0	0	0	0	8,409
TOTAL	COST CODE 46092 WBS 316003			176	8,409	0	0	0	0	0	8,409

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
	(ESCALATION 0.00% - CONTINGENCY 70.00 %)										
	TOTAL WBS 316003 CUT/CAP/REMOVE PIPE BUNDLES			2,321	85,875	0	7,635	0	0	382	93,892

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
316004	REMOVE CONTAMINATED PIPING										
316004.07	SITE IMPROVEMENTS										
316004.0760000	**************************** REMOVE CONTAMINATED PIPING ****************************	460	0	0	0	0	0	0	0	0	0
316004.0760002	THIS ACTIVITY WILL INVOLVE EXCAVATING TO UNCOVER PORT- IONS OF PIPE & ENCASEMENTS, SHEARING/CRIMPING PIPE IN	460	0	0	0	0	0	0	0	0	0
316004.0760004	10 FT SECTIONS, LOADING INTO APPROPRIATE CONTAINERS AND HAULING TO BURIAL.	460	0	0	0	0	0	0	0	0	0
316004.0760010	THE CREW WILL CONSIST OF: 1 PIC 3 OPERATORS	460	0	0	0	0	0	0	0	0	0
316004.0760012	3 OILERS 4 TEAMSTERS THE EQUIPMENT BEING USED WILL INCLUDE CATERPILLAR 375	460	0	0	0	0	0	0	0	0	0
316004.0760014	EXCAVATORS USING VARIOUS ATTACHMENTS INCLUDING HYDR- AULIC SHEARS, GRAPPLE, PULV- ERIZER AND A BUCKET. FOUR	460	0	0	0	0	0	0	0	0	0
316004.0760016	TRUCKS WILL BE HAULING EITHER SHIELDED BURIAL CONT- AINERS TO A PRE-PROCESSING FACILITY OR 20 TON ROLL-OFF	460	0	0	0	0	0	0	0	0	0
316004.0760018	CONTAINERS TO ERDF.	460	0	0	0	0	0	0	0	0	0
316004.0760200	**************************** GROUP 2 **************************** THIS GROUP CONSISTS OF:	460	0	0	0	0	0	0	0	0	0
316004.0760202	2" F-101-2 2" F-102-2 2" 0016-M9 3" 4021-M9 PUMP OUT LINE	460	0	0	0	0	0	0	0	0	0
316004.0760204	3" 4021-M9 BYPASS LINE 3" 4022-M9 PUMP OUT LINE 4" 4024 4" 4025	460	0	0	0	0	0	0	0	0	0

CCOUNT UMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
116004.0760206	4" 4017 4" 4018 24" 0109-M9 VENT HEADER	460	0	0	0	0	0	0	0	0	0
116004.0760220	EXCAVATE 240 FT LONG TRENCH 20'D X 8'W SLOPED 1.5:1, LOAD SOIL INTO 20 TON ROLL-OFF CONTAINERS AND HAUL TO	460	0	0	0	0	0	0	0	0	0
116004.0760221	ERDF. BREAK UP CONCRETE ENCASEMENT & LOAD INTO 20 TON ROLL-OFF CONTAINERS AND HAUL TO ERDF.	460	0	0	0	0	0	0	0	0	0
16004.0760222	LOAD PIPE INTO SHIELDED BURIAL CONTAINERS TO BE TAKEN TO PPF.	460	0	0	0	0	0	0	0	0	0
16004.0760230	ALLOW 22 CREW DAYS	460	22 DAY	1936	69773	0	0	0	0	0	69773
16004.0760232	LINERS	460	432 EA	0	0	0	6480	0	0	324	6804
16004.0760240	 PIPE VOL.(PPF) +100%= 320 CF SOIL VOL.(ERDF)= 8492 TONS CONC VOL. (ERDF)=1980CF=147T	460	0	0	0	0	0	0	0	0	0
16004.0760300	**************************** GROUP 3 **************************** THIS GROUP CONSISTS OF:	460	0	0	0	0	0	0	0	0	0
16004.0760302	1-1/2" S(100#) - M2 2" SL-101-M25 2" SL-100-M25 3" SN-2010M25	460	0	0	0	0	0	0	0	0	0
16004.0760304	3" SN-200-M25 2" SN-214 2" SN-213-M25 3" DR-314-M24	460	0	0	0	0	0	0	0	0	0
116004.0760306	3" NEW W-314 LINE 3/4" CNDS-M2 ALL DIRECT BURIED	460	0	0	0	0	0	0	0	0	0
116004.0760320	EXCAVATE 240 FT LONG TRENCH 4'D X 5'W SLOPED 1.5:1, LOAD SOIL INTO 20 TON ROLL-OFF CONTAINERS AND HAUL TO ERDF.	460	0	0	0	0	0	0	0	0	0
116004.0760322	LOAD PIPE INTO SHIELDED BURIAL CONLVINERS TO BE TAKEN TO PPF.	460	0	0	0	0	0	0	0	0	0

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
316004.0760330	ALLOW 2 CREW DAYS	460	2 DAY	176	6343	0	0	0	0	0	6343
316004.0760332	LINERS	460	25 EA	0	0	0	375	0	0	19	394
316004.0760340		460	0	0	0	0	0	0	0	0	0
	PIPE VOL.(PPF) +100%= 231 CF										
	SOIL VOL.(ERDF)= 391CY=499T										
316004.0760400	*****************************	460	0	0	0	0	0	0	0	0	0
	GROUP 4										
	*****************************										
	THIS GROUP CONSISTS OF:										
316004.0760402	4" 4017-M9	460	0	0	0	0	0	0	0	0	0
	4" 4018-M9										
316004.0760420	EXCAVATE 75 FT LONG TRENCH	460	0	0	0	0	0	0	0	0	0
	20'D X 8'W SLOPED 1.5:1,										
	LOAD SOIL INTO 20 TON ROLL-										
	OFF CONTAINERS AND HAUL TO										
316004.0760421	ERDF.	460	0	0	0	0	0	0	0	0	0
	BREAK UP CONCRETE ENCASEMENT										
	& LOAD INTO 20 TON ROLL-OFF										
	CONTAINERS AND HAUL TO ERDF.										
316004.0760422	LOAD PIPE INTO SHIELDED	460	0	0	0	0	0	0	0	0	0
	BURIAL CONTAINERS TO BE										
	TAKEN TO PPF.										
316004.0760430	ALLOW 7 CREW DAYS	460	7 DAY	616	22201	0	0	0	0	0	22201
316004.0760432	LINERS	460	136 EA	0	0	0	2040	0	0	102	2142
316004.0760440		460	0	0	0	0	0	0	0	0	0
	PIPE VOL.(PPF) +100%= 27 CF										
	SOIL VOL.(ERDF)= 2678 TONS										
	CONC VOL. (ERDF)=380CF= 28 T										
316004.0760500	*****************************	460	0	0	0	0	0	0	0	0	0
	GROUP 5										
	*****************************										
	THIS GROUP CONSISTS OF:										
316004.0760502	2" SL-502-M25	460	0	0	0	0	0	0	0	0	0
	3" NEW W-314 LINE										
	4" DR-0074-M5										
	ALL PIPE-IN-PIPE										
316004.0760520	EXCAVATE 120 FT LONG TRENCH	460	0	0	0	0	0	0	0	0	0
	4'D X 5'W SLOPED 1.5:1, LOAD										
	SOIL INTO 20 TON ROLL-OFF										
	CONTAINERS AND HAUL TO ERDF.										
316004.0760522	LOAD PIPE INTO SHIELDED	460	0	0	0	0	0	0	0	0	0
	BURIAL CONTAINERS TO BE										

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
	TAKEN TO PPF.										
316004.0760530	ALLOW 1 CREW DAY	460	1 DAY	88	3172	0	0	0	0	0	3172
316004.0760532	LINERS	460	13 EA	0	0	0	195	0	0	10	205
316004.0760540		460	0	0	0	0	0	0	0	0	0
	PIPE VOL.(PPF) +100%= 76 CF										
	SOIL VOL.(ERDF)= 196CY=249T										
316004.0760600	****************************	460	0	0	0	0	0	0	0	0	0
	GROUP 6										
	****************************										
	THIS GROUP CONSISTS OF:										
316004.0760602	2" PW-4526-M35	460	0	0	0	0	0	0	0	0	0
	4" PW-4502-M9										
	4" PW-4501-M9										
	4" PW-4505-M9										
316004.0760604	4" PW-4504-M9	460	0	0	0	0	0	0	0	0	0
	4" PW-4503-M9										
	4" PW-4506-M9										
	24"-V-0100-M9										
316004.0760605	ALL BUT 24" VENT HEADER IS	460	0	0	0	0	0	0	0	0	0
	CONCRETE ENCASED.										
316004.0760620	EXCAVATE 40 FT LONG TRENCH	460	0	0	0	0	0	0	0	0	0
	20'D X 10'W SLOPED 1.5:1,PUT										
	SOIL INTO 20 TON ROLL-OFF										
	CONTAINERS AND HAUL TO ERDF.										
316004.0760621	BREAK UP CONCRETE ENCASEMENT	460	0	0	0	0	0	0	0	0	0
	& LOAD INTO 20 TON ROLL-OFF										
	CONTAINERS AND HAUL TO ERDF.										
316004.0760622	CUT AND LOAD PIPE INTO	460	0	0	0	0	0	0	0	0	0
	SHIELDED BURIAL CONTAINERS										
	TO BE TAKEN TO PPF.										
316004.0760630	ALLOW 4 CREW DAYS	460	4 DAY	352	12686	0	0	0	0	0	12686
316004.0760632	LINERS	460	74 EA	0	0	0	1110	0	0	56	1166
316004.0760640		460	0	0	0	0	0	0	0	0	0
	PIPE VOL.(PPF) +100%= 230 CF										
	SOIL VOL.(ERDF)= 1434 TONS										
	CONC VOL. (ERDF)= 376CF= 28T										
316004.0760700	****************************	460	0	0	0	0	0	0	0	0	0
	GROUP 7										
	****************************										
	THIS GROUP CONSISTS OF:										
316004.0760702	4" V-714	460	0	0	0	0	0	0	0	0	0
	DIRECT BURIED PIPE-IN-PIPE.										

CCOUNT UMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
116004.0760720	EXCAVATE 65 FT LONG TRENCH 4'D X 5'W SLOPED 1.5:1, LOAD SOIL INTO 20 TON ROLL-OFF CONTAINERS. AND HAUL TO ERDF.	460	0	0	0	0	0	0	0	0	0
116004.0760722	CUT AND LOAD PIPE INTO SHIELDED BURIAL CONTAINERS TO BE TAKEN TO PPF.	460	0	0	0	0	0	0	0	0	0
116004.0760730	ALLOW 1 CREW DAY	460	1 DAY	88	3172	0	0	0	0	0	3172
116004.0760732	LINERS	460	8 EA	0	0	0	120	0	0	6	126
116004.0760740		460	0	0	0	0	0	0	0	0	0
	PIPE VOL.(PPF) +100%= 18 CF SOIL VOL.(ERDF)= 106CY= 135T										
116004.0760900	**************************** GROUP 9 **************************** THIS GROUP CONSISTS OF:	460	0	0	0	0	0	0	0	0	0
116004.0760902	2" PW-4551-M35 3" V-719 (PIPE-IN-PIPE) 4" PW-4510-M9 4" PW-4511-M9	460	0	0	0	0	0	0	0	0	0
116004.0760904	4" 4600 CONCR/SST 4" 4601 CONCR/SST	460	0	0	0	0	0	0	0	0	0
116004.0760920	EXCAVATE 200 FOOT OF TRENCH 20'D X 10'W SLOPED 1.5:1, AND 130 FOOT OF TRENCH 6'D X 6'W SLOPED 1.5:1, PUT	460	0	0	0	0	0	0	0	0	0
116004.0760922	SOIL INTO 20 TON ROLL-OFF CONTAINERS AND HAUL TO ERDF.	460	0	0	0	0	0	0	0	0	0
116004.0760924	BREAK UP CONCRETE ENCASEMENT & LOAD INTO 20 TON ROLL-OFF CONTAINERS AND HAUL TO ERDF.	460	0	0	0	0	0	0	0	0	0
116004.0760926	CUT AND LOAD PIPE INTO SHIELDED BURIAL CONTAINERS TO BE TAKEN TO PPF.	460	0	0	0	0	0	0	0	0	0
116004.0760930	ALLOW 19 CREW DAYS	460	19 DAY	1672	60259	0	0	0	0	0	60259
116004.0760932	LINERS	460	382 EA	0	0	0	5730	0	0	287	6017
116004.0760940		460	0	0	0	0	0	0	0	0	0
	PIPE VOL.(PPF) +100%= 322 CF SOIL VOL.(ERDF)= 7510 TONS CONC VOL. (ERDF)= 59CY= 118T										
116004.0761000	**************************** GROUP 10	460	0	0	0	0	0	0	0	0	0

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
	****************************										
	THIS GROUP CONSISTS OF:										
316004.0761002	2" F-503-M5	460	0	0	0	0	0	0	0	0	0
	2" F-504-M5										
	2" F-606-M5										
	2" F-607-M5										
316004.0761004	2" F-501-M5	460	0	0	0	0	0	0	0	0	0
	2" F-502-M5										
	24" V-0602-M9										
316004.0761020	EXCAVATE 80 FOOT OF TRENCH	460	0	0	0	0	0	0	0	0	0
	20'D X 10'W SLOPED 1.5:1,										
	100 FOOT OF TRENCH 16'D										
	X 6'W SLOPED 1.5:1, AND										
316004.0761021	210 FOOT OF TRENCH 10'D X	460	0	0	0	0	0	0	0	0	0
	6'W SLOPED 1.5:1, PUT										
316004.0761022	SOIL INTO 20 TON ROLL-OFF	460	0	0	0	0	0	0	0	0	0
	CONTAINERS AND HAUL TO ERDF.										
316004.0761024	BREAK UP CONCRETE ENCASEMENT	460	0	0	0	0	0	0	0	0	0
	& LOAD INTO 20 TON ROLL-OFF										
	CONTAINERS AND HOUL TO ERDF.										
316004.0761026	CUT AND LOAD PIPE INTO	460	0	0	0	0	0	0	0	0	0
	SHIELDED BURIAL CONTAINERS										
	TO BE TAKEN TO PPF.										
316004.0761030	ALLOW 18 CREW DAYS	460	18 DAY	1584	57087	0	0	0	0	0	57087
316004.0761032	LINERS	460	370 EA	0	0	0	5550	0	0	278	5828
316004.0761040		460	0	0	0	0	0	0	0	0	0
	PIPE VOL.(PPF) +100%= 726 CF										
	SOIL VOL.(ERDF)= 7330 TONS										
	CONC VOL. (ERDF)= 820CF=61T										
316004.0761100	****************************	460	0	0	0	0	0	0	0	0	0
	GROUP 11										
	****************************										
	THIS GROUP CONSISTS OF:										
316004.0761102	4" PW-4512-M9	460	0	0	0	0	0	0	0	0	0
	4" PW-4508-M9										
	4" PW-4509-M9										
	4" PW-4507-M9										
316004.0761104	DIRECT BURIED PIPE-IN-PIPE	460	0	0	0	0	0	0	0	0	0
316004.0761120	EXCAVATE 430 FOOT OF TRENCH	460	0	0	0	0	0	0	0	0	0
	20'D X 6'W SLOPED 1.5:1. PUT										
316004.0761122	SOIL INTO 20 TON ROLL-OFF	460	0	0	0	0	0	0	0	0	
	CONTAINERS AND HAUL TO ERDF.										

CCOUNT UMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
16004.0761126	CUT AND LOAD PIPE INTO	460	0	0	0	0	0	0	0	0	0
	SHIELDED BURIAL CONTAINERS										
	TO BE TAKEN TO PPF.										
16004.0761130	ALLOW 46 CREW DAYS	460	46 DAY	4048	145890	0	0	0	0	0	145890
16004.0761132	LINERS	460	731 EA	0	0	0	10965	0	0	548	11513
16004.0761140		460	0	0	0	0	0	0	0	0	0
	PIPE VOL.(PPF) +100%= 198 CF										
	SOIL VOL.(ERDF)= 14,620 TONS										
16004.0761200	****************************	460	0	0	0	0	0	0	0	0	0
	GROUP 12										
	****************************										
	THIS GROUP CONSISTS OF:										
16004.0761202	2" SL-500-M25	460	0	0	0	0	0	0	0	0	0
	2" SN-600-M25										
	3" NEW W-314 LINE										
	ALL DIRECT BURIED.										
16004.0761220	EXCAVATE 350 FOOT OF TRENCH	460	0	0	0	0	0	0	0	0	0
	10'D X 10'W SLOPED 1.5:1.										
16004.0761222	PUT SOIL IN 20 TON ROLL-OFF	460	0	0	0	0	0	0	0	0	0
	CONTAINERS AND HAUL TO ERDF.										
16004.0761226	CUT AND LOAD PIPE INTO	460	0	0	0	0	0	0	0	0	0
	SHIELDED BURIAL CONTAINERS										
	TO BE TAKEN TO PPF.										
16004.0761230	ALLOW 11 CREW DAYS	460	11 DAY	968	34887	0	0	0	0	0	34887
16004.0761232	LINERS	460	207 EA	0	0	0	3105	0	0	155	3260
16004.0761240		460	0	0	0	0	0	0	0	0	0
	PIPE VOL.(PPF) +100%= 90 CF										
	SOIL VOL.(ERDF)= 4,131 TONS										
16004.0761300	****************************	460	0	0	0	0	0	0	0	0	0
	GROUP 13										
	****************************										
	THIS GROUP CONSISTS OF:										
16004.0761302	2" SN-247	460	0	0	0	0	0	0	0	0	0
	DIRECT BURIED.										
16004.0761320	EXCAVATE 620 FOOT OF TRENCH	460	0	0	0	0	0	0	0	0	0
	15'D X 6'W SLOPED 1.5:1. PUT										
16004.0761322	SOIL INTO 20 TON ROLL-OFF	460	0	0	0	0	0	0	0	0	0
	CONTAINERS AND HAUL TO ERDF.										
16004.0761326	CUT AND LOAD PIPE INTO	460	0	0	0	0	0	0	0	0	0
	SHIELDED BURIAL CONTAINERS										
	TO BE TAKEN TO PPF.										
16004.0761330	ALLOW 40 CREW DAYS	460	40 DAY	3520	126861	0	0	0	0	0	126861

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
316004.0761332	LINERS	460	626 EA	0	0	0	9390	0	0	470	9860
316004.0761340		460	0	0	0	0	0	0	0	0	0
	PIPE VOL.(PPF) +100%= 38 CF										
	SOIL VOL.(ERDF)= 12,516 TONS										
316004.0761500	****************************	460	0	0	0	0	0	0	0	0	0
	GROUP 15										
	****************************										
	THIS GROUP CONSISTS OF:										
316004.0761502	1-1/2" M2 STEAM CONDENSATE	460	0	0	0	0	0	0	0	0	0
	4" M2 STEAM CONDENSATE										
	DIRECT BURIED.										
316004.0761520	EXCAVATE 450 FOOT OF TRENCH	460	0	0	0	0	0	0	0	0	0
	4'D X 5'W SLOPED 1.5:1. PUT										
316004.0761522	SOIL INTO 20 TON ROLL-OFF	460	0	0	0	0	0	0	0	0	0
	CONTAINERS AND HAUL TO ERDF.										
316004.0761526	CUT AND LOAD PIPE INTO	460	0	0	0	0	0	0	0	0	0
	SHIELDED BURIAL CONTAINERS										
	TO BE TAKEN TO PPF.										
316004.0761530	ALLOW 3 CREW DAYS	460	3 DAY	264	9515	0	0	0	0	0	9515
316004.0761532	LINERS	460	47 EA	0	0	0	705	0	0	35	740
316004.0761540		460	0	0	0	0	0	0	0	0	0
	PIPE VOL.(PPF) +100%= 118 CF										
	SOIL VOL.(ERDF)= 935 TONS										
316004.0761600	****************************	460	0	0	0	0	0	0	0	0	0
	GROUP 16										
	****************************										
	THIS GROUP CONSISTS OF:										
316004.0761602	6" PSW (2) FROM AR VAULT	460	0	0	0	0	0	0	0	0	0
	6" PSW-D502-M5										
	6" PSW-S506-M5										
	6" PSW-S507-M5										
316004.0761604	6" PSW-S505-M5	460	0	0	0	0	0	0	0	0	0
	6" PSW-S508-M5										
	6" PSW-S504-M5										
	6" PSW-S503-M5										
316004.0761606	6" PSW-S501-M5	460	0	0	0	0	0	0	0	0	0
	6" PSW-S502-M5										
	6" PSW-D501-M5										
	6" PSW-D505-M5										
316004.0761608	6" PSW-S517-M5	460	0	0	0	0	0	0	0	0	0
	ALL DIRECT BURIED PIPE-IN-										
	PIPE.										

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
316004.0761620	EXCAVATE 40 FOOT OF TRENCH	460	0	0	0	0	0	0	0	0	0
	4'D X 12'W SLOPED 1.5:1, AND										
	60 FOOT OF TRENCH 6'D X 5'W										
	SLOPED 1.5:1. LOAD SOIL										
316004.0761622	INTO 20 TON ROLL-OFF	460	0	0	0	0	0	0	0	0	0
	CONTAINERS AND HAUL TO ERDF.										
316004.0761626	CUT AND LOAD PIPE INTO	460	0	0	0	0	0	0	0	0	0
	SHIELDED BURIAL CONTAINERS										
	TO BE TAKEN TO PPF.										
316004.0761630	ALLOW 2 CREW DAYS	460	2 DAY	176	6343	0	0	0	0	0	6343
316004.0761632	LINERS	460	19 EA	0	0	0	285	0	0	14	299
316004.0761640		460	0	0	0	0	0	0	0	0	0
	PIPE VOL.(PPF) +100%= 272 CF										
	SOIL VOL.(ERDF)= 375 TONS										
316004.0761700	***************************	460	0	0	0	0	0	0	0	0	0
	GROUP 17										
	***************************										
	THIS GROUP CONSISTS OF:										
316004.0761702	6" PSW-8021-M5	460	0	0	0	0	0	0	0	0	0
	6" PSW-8064-M5										
	6" PSW-8022-M5										
	6" PSW-8025-M5										
316004.0761704	6" PSW-8063-M5	460	0	0	0	0	0	0	0	0	0
	6" PSW-8026-M5										
	6" PSW-8023-M5										
	6" PSW-8062-M5										
316004.0761706	6" PSW-8024-M5	460	0	0	0	0	0	0	0	0	0
	6" PSW-8027-M5										
	6" PSW-8028-M5										
	6" PSW-8061-M5										
316004.0761708	ALL CONCRETE ENCASED	460	0	0	0	0	0	0	0	0	0
316004.0761722	LOAD SOIL INTO 20 TON ROLL-	460	0	0	0	0	0	0	0	0	0
	OFF CONTAINERS AND HAUL TO										
	ERDF.										
316004.0761724	BREAK UP CONCRETE ENCASEMENT	460	0	0	0	0	0	0	0	0	0
	& LOAD INTO 20 TON ROLL-OFF										
	CONTAINERS AND HAUL TO ERDF.										
316004.0761726	CUT AND LOAD PIPE INTO	460	0	0	0	0	0	0	0	0	0
	SHIELDED BURIAL CONTAINERS										
	TO BE TAKEN TO PPF.										
316004.0761730	ALLOW 4 CREW DAYS	460	4 DAY	352	12686	0	0	0	0	0	12686
316004.0761732	LINERS	460	89 EA	0	0	0	1335	0	0	67	1402

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
316004.0761740		460	0	0	0	0	0	0	0	0	0
	PIPE VOL.(PPF) +100%=1584 CF										
	SOIL VOL.(ERDF)= 995 TONS										
	CONC VOL. (ERDF)= 383CY=766T										
316004.0761800	****************************	460	0	0	0	0	0	0	0	0	0
	GROUP 18										
	****************************										
	THIS GROUP CONSISTS OF:										
316004.0761802	2" SL-111-M25	460	0	0	0	0	0	0	0	0	0
	2" SL-108-M25										
	2" SL-112-M25										
	2" SL-109-M24										
316004.0761804	3" SN-211-M25	460	0	0	0	0	0	0	0	0	0
	3" DR-326-M25										
	3" SN-208-M25										
	3" DR-327-M24										
316004.0761806	3" DR-314-M25	460	0	0	0	0	0	0	0	0	0
	3" SN-212-M25										
	3" SN-209-M25										
	3" DR-325-M24										
316004.0761808	3" DR-333-M25	460	0	0	0	0	0	0	0	0	0
	ALL DIRECT BURIED PIPE-IN-										
	PIPE.										
316004.0761820	EXCAVATE 600 FOOT OF TRENCH	460	0	0	0	0	0	0	0	0	0
	2-3'D X 4-8'W, SLOPED 1.5:1,										
316004.0761822	LOAD SOIL INTO 20 TON ROLL-	460	0	0	0	0	0	0	0	0	0
	OFF CONTAINERS AND HAUL TO										
	ERDF.										
316004.0761826	CUT AND LOAD PIPE INTO	460	0	0	0	0	0	0	0	0	0
	SHIELDED BURIAL CONTAINERS										
	TO BE TAKEN TO PPF.										
316004.0761830	ALLOW 3 CREW DAYS	460	3 DAY	264	9515	0	0	0	0	0	9515
316004.0761832	LINERS	460	43 EA	0	0	0	645	0	0	32	677
316004.0761840		460	0	0	0	0	0	0	0	0	0
	PIPE VOL.(PPF) +100%=200 CF										
	SOIL VOL.(ERDF)= 676 TONS										
316004.0762000	****************************	460	0	0	0	0	0	0	0	0	0
	GROUP 20										
	****************************										
	THIS GROUP CONSISTS OF:										
316004.0762002	4" PW-A104	460	0	0	0	0	0	0	0	0	0
	4" PW-A102										

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
	4" PW-A101										
	4" PW-A103										
316004.0762004	4" PW-C104	460	0	0	0	0	0	0	0	0	0
	4" PW-C102										
	4" PW-C101										
	4" PW-C103										
316004.0762006	4" PW-B104	460	0	0	0	0	0	0	0	0	0
	4" PW-B102										
	4" PW-B101										
	4" PW-B103										
316004.0762008	3" 4026-M35	460	0	0	0	0	0	0	0	0	0
	2" 3000										
	2" 3001										
	4" 3003										
316004.0762010	3/4" 3312	460	0	0	0	0	0	0	0	0	0
	24" V-0100-M9										
	20" 0100-M9 (4 LINES)										
316004.0762020	EXCAVATE 180 FOOT OF TRENCH 20'D X 10'W SLOPED 1.5:1 TO EXPOSE CONCRETE ENCASEMENT,	460	0	0	0	0	0	0	0	0	0
316004.0762022	LOAD SOIL INTO 20 TON ROLL-OFF CONTAINERS AND HAUL TO ERDF.	460	0	0	0	0	0	0	0	0	0
316004.0762024	BREAK UP CONCRETE ENCASEMENT & LOAD INTO 20 TON ROLL-OFF CONTAINERS AND HAUL TO ERDF.	460	0	0	0	0	0	0	0	0	0
316004.0762026	CUT AND LOAD PIPE INTO SHIELDED BURIAL CONTAINERS TO BE TAKEN TO PPF.	460	0	0	0	0	0	0	0	0	0
316004.0762030	ALLOW 22 CREW DAYS	460	22 DAY	1936	69773	0	0	0	0	0	69773
316004.0762032	LINERS	460	342 EA	0	0	0	5130	0	0	257	5387
316004.0762040		460	0	0	0	0	0	0	0	0	0
	PIPE VOL.(PPF) +100%= 390 CF										
	SOIL VOL.(ERDF)= 6566 TONS										
	CONC VOL. (ERDF)= 135CY=270T										
SUBTOTAL	SITE IMPROVEMENTS			18,040		0		0		2,660	
					650,163		53,160		0		705,983
	CONSUMABLES 3.20 %						20805				20805
	GENERAL FOREMAN 7.00 %			1262	45511						45511
	GENERAL REQUIREMENTS 15.00 %			2895	104351						104351
	SALES TAX 8.00 %						5917		0		5917

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
	OH&P (ON MARKUPS ONLY)									1336	1336
TOTAL	COST CODE 46007 WBS 316004 (ESCALATION 0.00% - CONTINGENCY 70.00 %)			22,198	800,025	0	79,882	0	0	3,996	883,904
316004.92	CONST. SERVICES, SUPPLIES & EXPENSE										
316004.9214002	**************************** HPT'S ****************************	460	0	0	0	0	0	0	0	0	0
316004.9214004	2 MEN FOR 205 DAYS	460	1 LS	3280	156718	0	0	0	0	0	156718
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			3,280	156,718	0	0	0	0	0	156,718
TOTAL	COST CODE 46092 WBS 316004 (ESCALATION 0.00% - CONTINGENCY 70.00 %)			3,280	156,718	0	0	0	0	0	156,718
TOTAL WBS 316004 REMOVE CONTAMINATED PIPING				25,478	956,743	0	79,882	0	0	3,996	1,040,622

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
316005	REGRADE/COMPACT FOOTINGS										
316005.07	SITE IMPROVEMENTS										
316005.0760000	****************************	460	0	0	0	0	0	0	0	0	0
	REGRADE & COMPACT AT FOOTING										
	FOR MAIN BUILDING										
	****************************										
316005.0760002	THIS ACTIVITY REPLACES SOIL	460	0	0	0	0	0	0	0	0	0
	PREVIOUSLY REMOVED WHILE										
	UNCOVERING PIPE BUNDLES WITH										
	CLEAN SOIL, BACKFILLING AND										
316005.0760004	COMPACTING. ALSO INCLUDED IS	460	0	0	0	0	0	0	0	0	0
	MACHINE COMPACTING OF THE										
	SANITARY DRAIN FIELD. THIS										
	WILL BE REQUIRED BEFORE ANY										
316005.0760006	WORK CAN PROCEED ON THE	460	0	0	0	0	0	0	0	0	0
	FOOTINGS FOR THE MAIN										
	BUILDING.										
	BRING IN CLEAN FILL, APPROX.										
316005.0760008	3600 TONS OR 2824 CY, SPREAD	460	0	0	0	0	0	0	0	0	0
	ABD COMPACT IN 6" LIPTS.										
	CREW WILL CONSIST OF:										
316005.0760010	1 - PIC	460	7 DAY	56	3367	0	0	0	0	0	3367
316005.0760012	2 - OPERATORS	460	7 DAY	112	3762	0	0	0	0	0	3762
316005.0760014	3 - TEAMSTERS	460	7 DAY	168	5662	0	0	0	0	0	5662
316005.0760016	3 - LABORERS	460	7 DAY	168	4828	0	0	0	0	0	4828
316005.0760018	1 - DOZER	460	7 DAY	0	0	1960	0	0	0	0	1960
316005.0760020	1 - LOADER	460	7 DAY	0	0	2464	0	0	0	0	2464
316005.0760022	1 - ROLLER-TOWED VIBRATORY SHEEPSFOOT	460	7 DAY	0	0	1148	0	0	0	0	1148
316005.0760024	1 - PAN TYPE COMPACTOR, 21" X 24"	460	7 DAY	0	0	168	0	0	0	0	168
316005.0760026	1 - WATER TRUCK, 2500 GAL	460	7 DAY	0	0	1400	0	0	0	0	1400
SUBTOTAL	SITE IMPROVEMENTS			504		7,140		0		0	
					17,619		0		0		24,759
	CONSUMABLES 3.20 %						563				563
	GENERAL FOREMAN 7.00 %			35	1233						1233
	GENERAL REQUIREMENTS 15.00 %			80	2827						2827
	SALES TAX 8.00 %						45		0		45
	OH&P (ON MARKUPS ONLY)									30	30
TOTAL	COST CODE 46007			620		7,140		0		30	
	WBS 316005				21,680		608		0		29,45[illegible]

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING CORP.
JOB NO. Z466AAF1
FILE NO. Z466AAF1

** IEST - INTERACTIVE ESTIMATING **
ANCILLARY EQUIPMENT REMOVAL
241-AX TANK FARM CLOSURE - PLANNING ESTIMATE
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

DATE 04/22/98 10:18:59
BY R.OHRT

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
316005.92	CONST. SERVICES, SUPPLIES & EXPENSE										
316005.9214002	***************************** HPT'S *****************************	460	0	0	0	0	0	0	0	0	0
316005.9214004	1 MAN FOR 7 DAYS	460	1 LS	56	2676	0	0	0	0	0	2676
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			56	2,676	0	0	0	0	0	2,676
TOTAL	COST CODE 46092 WBS 316005 (ESCALATION 0.00% - CONTINGENCY 50.00 %)			56	2,676	0	0	0	0	0	2,676
TOTAL WBS 316005 REGRADE/COMPACT FOOTINGS				676	24,356	7,140	608	0	0	30	32,135

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
317001	PUMP & SLUICE PITS ASSOC. W/TANKS										
317001.07	SITE IMPROVEMENTS										
317001.0760000	**************************** REMOVE PUMP & SLUICE PITS ASSOC. W/INDIVIDUAL TANKS ****************************	460	0	0	0	0	0	0	0	0	0
317001.0760002	THIS WBS IS COMPOSED OF THE FOLLOWING ACTIVITIES AND ANTICIPATED CREWS:	460	0	0	0	0	0	0	0	0	0
317001.0760010	**************************** VACUUM/SCABBLER OPERATION ****************************	460	0	0	0	0	0	0	0	0	0
317001.0760012	USING A CREW CONSISTING OF: 1 PIC 2 OPERATORS 2 OILERS	460	0	0	0	0	0	0	0	0	0
317001.0760014	1 TEAMSTER 1 40 TON CRANE	460	0	0	0	0	0	0	0	0	0
317001.0760016	1 CATERPILLAR 375 EXCAVATOR WITH A HEPA VACUUM/SCABBLER SYSTEM.	460	0	0	0	0	0	0	0	0	0
317001.0760018	REMOVE COVER BLOCKS. VACUUM AND SCABBLE INSIDE SURFACES, REPLACE COVER BLOCKS.	460	0	0	0	0	0	0	0	0	0
317001.0760020	ALLOW 1/2 CREW DAY PER PIT.	460	16 EA	384	14604	0	0	0	0	0	14604
317001.0760030	**************************** DEMOLITION ****************************	460	0	0	0	0	0	0	0	0	0
317001.0760032	THIS CREW WILL CONSIST OF: 1 PIC 2 OPERATORS 2 OILERS	460	0	0	0	0	0	0	0	0	0
317001.0760034	2 TEAMSTERS USING 2 CATERPILLAR 375	460	0	0	0	0	0	0	0	0	0
317001.0760036	EXCAVATORS WITH ATTACHMENTS THE PITS WILL BE BROKEN UP AND LOADED INTO 20 TON ROLL-OFF CONTAINERS FOR DISPOSAL	460	0	0	0	0	0	0	0	0	0
317001.0760038	AT ERDF.	460	0	0	0	0	0	0	0	0	0
317001.0760040	METALS WILL BE LOADED INTO SHIELDED CONTAINERS FOR	460	0	0	0	0	0	0	0	0	0

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
	DISPOSAL AT PPF.										
317001.0760042	ALLOW 1/2 CREW DAY PER PIT.	460	16 EA	448	16760	0	0	0	0	0	16760
	*										
317001.0760100	WASTE GENERATED:	460	0	0	0	0	0	0	0	0	0
	CONC VOL (PPF) = 103 CF										
	CONC VOL (ERDF) = 725 TONS										
	METAL VOL (PPF) = 1096 CF										
SUBTOTAL	SITE IMPROVEMENTS			832		0		0		0	
					31,364		0		0		31,364
	CONSUMABLES 3.20 %						1003				1003
	GENERAL FOREMAN 7.00 %			58	2195						2195
	GENERAL REQUIREMENTS 15.00 %			133	5033						5033
	SALES TAX 8.00 %						80		0		80
	OH&P (ON MARKUPS ONLY)									54	54
TOTAL	COST CODE 46007			1,023		0		0		54	
	WBS 317001				38,593		1,083		0		39,731
	(ESCALATION 0.00% - CONTINGENCY 70.00 %)										
317001.92	CONST. SERVICES, SUPPLIES & EXPENSE										
317001.9214002	****************************	460	0	0	0	0	0	0	0	0	0
	HPT'S										
	****************************										
317001.9214004	1 MAN FOR 16 DAYS	460	1 LS	128	6116	0	0	0	0	0	6116
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			128		0		0		0	
					6,116		0		0		6,116
TOTAL	COST CODE 46092			128		0		0		0	
	WBS 317001				6,116		0		0		6,116
	(ESCALATION 0.00% - CONTINGENCY 70.00 %)										
TOTAL WBS 317001	PUMP & SLUICE PITS ASSOC. W/TANKS			1,151		0		0		54	
					44,709		1,083		0		45,847

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
317002	VALVE PITS ASSOCIATED WITH TANKS										
317002.07	SITE IMPROVEMENTS										
317002.0760000	***************************** REMOVE VALVE PITS ASSOCIATED WITH INDIVIDUAL AX TANKS *****************************	460	0	0	0	0	0	0	0	0	0
317002.0760032	THIS CREW WILL CONSIST OF: 1 PIC 2 OPERATORS 2 OILERS	460	0	0	0	0	0	0	0	0	0
317002.0760034	2 TEAMSTERS USING 2 CATERPILLAR 375	460	0	0	0	0	0	0	0	0	0
317002.0760036	EXCAVATORS WITH ATTACHMENTS THE CMP PITS WILL BE CRUSHED AND LOADED INTO 20 TON ROLL-OFF CONTAINERS FOR DISPOSAL	460	0	0	0	0	0	0	0	0	0
317002.0760038	AT ERDF.	460	0	0	0	0	0	0	0	0	0
317002.0760072	ALLOW 1/2 CREW DAY FOR THE 4 PITS.	460	1 LS	28	913	0	0	0	0	0	913
317002.0760100	WASTE GENERATED: METAL VOL (ERDF) = 60 CF (1500#)	460	0	0	0	0	0	0	0	0	0
SUBTOTAL	SITE IMPROVEMENTS			28		0		0		0	
					913		0		0		913
	CONSUMABLES 3.20 %						29				29
	GENERAL FOREMAN 7.00 %			1	63						63
	GENERAL REQUIREMENTS 15.00 %			4	146						146
	SALES TAX 8.00 %						2		0		2
	OH&P (ON MARKUPS ONLY)									1	1
TOTAL	COST CODE 46007			34		0		0		1	
	WBS 317002				1,123		31		0		1,156
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
317002.92	CONST. SERVICES, SUPPLIES & EXPENSE										
317002.9214002	***************************** HPT'S *****************************	460	0	0	0	0	0	0	0	0	0
317002.9214004	1 MAN FOR 4 HOURS	460	1 LS	4	191	0	0	0	0	0	191

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			4	191	0	0	0	0	0	191
TOTAL	COST CODE 46092 WBS 317002 (ESCALATION 0.00% - CONTINGENCY 50.00 %)			4	191	0	0	0	0	0	191
TOTAL WBS 317002 VALVE PITS ASSOCIATED WITH TANKS				38	1,314	0	31	0	0	1	1,347

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
18001	AX-A & AX-B VALVE PITS										
18001.07	SITE IMPROVEMENTS										
18001.0760000	***************************** REMOVE AX-A, AX-B VALVE PITS *****************************	460	0	0	0	0	0	0	0	0	0
18001.0760002	THIS WBS IS COMPOSED OF THE FOLLOWING ACTIVITIES AND ANTICIPATED CREWS:	460	0	0	0	0	0	0	0	0	0
18001.0760010	***************************** VACUUM/SCABBLER OPERATION *****************************	460	0	0	0	0	0	0	0	0	0
18001.0760012	USING A CREW CONSISTING OF: 1 PIC 2 OPERATORS 2 OILERS	460	0	0	0	0	0	0	0	0	0
18001.0760014	1 TEAMSTER 1 40 TON CRANE	460	0	0	0	0	0	0	0	0	0
18001.0760016	1 CATERPILLAR 375 EXCAVATOR WITH A HEPA VACUUM/SCABBLER SYSTEM.	460	0	0	0	0	0	0	0	0	0
18001.0760018	REMOVE COVER BLOCKS. VACUUM AND SCABBLE INSIDE SURFACES, REPLACE COVER BLOCKS.	460	0	0	0	0	0	0	0	0	0
18001.0760020	ALLOW 1/2 CREW DAY PER PIT.	460	2 EA	48	1825	0	0	0	0	0	1825
18001.0760030	***************************** DEMOLITION *****************************	460	0	0	0	0	0	0	0	0	0
18001.0760032	THIS CREW WILL CONSIST OF: 1 PIC 2 OPERATORS 2 OILERS	460	0	0	0	0	0	0	0	0	0
18001.0760034	2 TEAMSTERS USING 2 CATERPILLAR 375	460	0	0	0	0	0	0	0	0	0
18001.0760036	EXCAVATORS WITH ATTACHMENTS THE PITS WILL BE BROKEN UP AND LOADED INTO 20 TON ROLL-OFF CONTAINERS FOR DISPOSAL	460	0	0	0	0	0	0	0	0	0
18001.0760038	AT ERDF.	460	0	0	0	0	0	0	0	0	0
18001.0760040	METALS WILL BE LOADED INTO SHIELDED CONTAINERS FOR DISPOSAL AT PPF.	460	0	0	0	0	0	0	0	0	0

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING CORP.
JOB NO. Z466AAF1
FILE NO. Z466AAF1

** IEST - INTERACTIVE ESTIMATING **
ANCILLARY EQUIPMENT REMOVAL
241-AX TANK FARM CLOSURE - PLANNING ESTIMATE
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 52
DATE 04/22/98 10:19:00
BY R.OHRT

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
318001.0760042	ALLOW 1/2 CREW DAY PER PIT. *	460	2 EA	56	2095	0	0	0	0	0	2095
318001.0760100	WASTE GENERATED: CONC VOL (PPF) = 17 CF CONC VOL (ERDF) = 76 TONS METAL VOL (PPF) = 118 CF	460	0	0	0	0	0	0	0	0	0
SUBTOTAL	SITE IMPROVEMENTS			104	3,920	0	0	0	0	0	3,920
	CONSUMABLES 3.20 %						125				125
	GENERAL FOREMAN 7.00 %			7	274						274
	GENERAL REQUIREMENTS 15.00 %			16	629						629
	SALES TAX 8.00 %						10		0		10
	OH&P (ON MARKUPS ONLY)									6	6
TOTAL	COST CODE 46007 WBS 318001 (ESCALATION 0.00% - CONTINGENCY 70.00 %)			127	4,823	0	135	0	0	6	4,965
318001.92	CONST. SERVICES, SUPPLIES & EXPENSE										
318001.9214002	**************************** HPT'S ****************************	460	0	0	0	0	0	0	0	0	0
318001.9214004	1 MAN FOR 2 DAYS	460	1 LS	16	764	0	0	0	0	0	764
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			16	764	0	0	0	0	0	764
TOTAL	COST CODE 46092 WBS 318001 (ESCALATION 0.00% - CONTINGENCY 70.00 %)			16	764	0	0	0	0	0	764
TOTAL WBS 318001 AX-A & AX-B VALVE PITS				143	5,587	0	135	0	0	6	5,729

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
318002	FLUSH/SERVICE PITS - AX-A & AX-B										
318002.07	SITE IMPROVEMENTS										
318002.0760000	**************************** REMOVE FLUSH & SERVICE PITS FOR AX-A & AX-B VALVE PITS ****************************	460	0	0	0	0	0	0	0	0	0
318002.0760002	THIS WBS IS COMPOSED OF THE FOLLOWING ACTIVITIES AND ANTICIPATED CREWS:	460	0	0	0	0	0	0	0	0	0
318002.0760030	**************************** DEMOLITION ****************************	460	0	0	0	0	0	0	0	0	0
318002.0760032	THIS CREW WILL CONSIST OF: 1 PIC 2 OPERATORS 2 OILERS	460	0	0	0	0	0	0	0	0	0
318002.0760034	2 TEAMSTERS USING 2 CATERPILLAR 375	460	0	0	0	0	0	0	0	0	0
318002.0760036	EXCAVATORS WITH ATTACHMENTS THE PITS WILL BE BROKEN UP AND LOADED INTO 20 TON ROLL-OFF CONTAINERS FOR DISPOSAL	460	0	0	0	0	0	0	0	0	0
318002.0760038	AT ERDF.	460	0	0	0	0	0	0	0	0	0
318002.0760072	ALLOW 1/2 CREW DAY FOR THE 4 PITS. *	460	1 LS	28	913	0	0	0	0	0	913
318002.0760100	WASTE GENERATED: CONC VOL (ERDF) =58CF= 4 TON METAL VOL (ERDF)=50CF= 1270# ASBESTOS VOL = 4 CF	460	0	0	0	0	0	0	0	0	0
SUBTOTAL	SITE IMPROVEMENTS			28		0		0		0	
					913		0		0		913
	CONSUMABLES 3.20 %						29				29
	GENERAL FOREMAN 7.00 %			1	63						63
	GENERAL REQUIREMENTS 15.00 %			4	146						146
	SALES TAX 8.00 %						2		0		2
	OH&P (ON MARKUPS ONLY)									1	1
TOTAL	COST CODE 46007			34		0		0		1	
	WBS 318002				1,123		31		0		1,15[illegible]

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
318002.92	CONST. SERVICES, SUPPLIES & EXPENSE										
318002.9214002	****************************** HPT'S ******************************	460	0	0	0	0	0	0	0	0	0
318002.9214004	1 MAN FOR 4 HOURS	460	1 LS	4	191	0	0	0	0	0	191
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			4		0		0		0	
					191		0		0		191
TOTAL	COST CODE 46092			4		0		0		0	
	WBS 318002				191		0		0		191
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
TOTAL WBS 318002 FLUSH/SERVICE PITS - AX-A & AX-B				38		0		0		1	
					1,314		31		0		1,347

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
318003	AY-152 SLUICE PIT										
318003.07	SITE IMPROVEMENTS										
318003.0760000	****************************	460	0	0	0	0	0	0	0	0	0
	AY-152 SLUICE PIT										
	****************************										
318003.0760002	THIS WBS IS COMPOSED OF THE	460	0	0	0	0	0	0	0	0	0
	FOLLOWING ACTIVITIES AND										
	ANTICIPATED CREWS:										
318003.0760010	****************************	460	0	0	0	0	0	0	0	0	0
	VACUUM/SCABBLER OPERATION										
	****************************										
318003.0760012	USING A CREW CONSISTING OF:	460	0	0	0	0	0	0	0	0	0
	1 PIC										
	2 OPERATORS										
	2 OILERS										
318003.0760014	1 TEAMSTER	460	0	0	0	0	0	0	0	0	0
	1 40 TON CRANE										
318003.0760016	1 CATERPILLAR 375 EXCAVATOR	460	0	0	0	0	0	0	0	0	0
	WITH A HEPA VACUUM/SCABBLER										
	SYSTEM.										
318003.0760018	REMOVE COVER BLOCKS. VACUUM	460	0	0	0	0	0	0	0	0	0
	AND SCABBLE INSIDE SURFACES,										
	REPLACE COVER BLOCKS.										
318003.0760020	ALLOW 1/2 CREW DAY PER PIT.	460	1 EA	24	913	0	0	0	0	0	913
318003.0760030	****************************	460	0	0	0	0	0	0	0	0	0
	DEMOLITION										
	****************************										
318003.0760032	THIS CREW WILL CONSIST OF:	460	0	0	0	0	0	0	0	0	0
	1 PIC										
	2 OPERATORS										
	2 OILERS										
318003.0760034	2 TEAMSTERS	460	0	0	0	0	0	0	0	0	0
	USING 2 CATERPILLAR 375										
318003.0760036	EXCAVATORS WITH ATTACHMENTS	460	0	0	0	0	0	0	0	0	0
	THE PIT WILL BE BROKEN UP										
	AND LOADED INTO 20 TON ROLL-										
	OFF CONTAINERS FOR DISPOSAL										
318003.0760038	AT ERDF.	460	0	0	0	0	0	0	0	0	0
318003.0760040	METALS WILL BE LOADED INTO	460	0	0	0	0	0	0	0	0	0
	SHIELDED CONTAINERS FOR										
	DISPOSAL AT PPF.										

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING CORP.
JOB NO. Z466AAF1
FILE NO. Z466AAF1

** IEST - INTERACTIVE ESTIMATING **
ANCILLARY EQUIPMENT REMOVAL
241-AX TANK FARM CLOSURE - PLANNING ESTIMATE
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 56
DATE 04/22/98 10:19:00
BY R.OHRT

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
318003.0760072	ALLOW 1-1/2 CREW DAYS. *	460	1 EA	84	3142	0	0	0	0	0	3142
318003.0760100	WASTE GENERATED: CONC VOL (PPF) = 17 CF CONC VOL (ERDF) = 127 TONS METAL VOL (PPF) = 194 CF	460	0	0	0	0	0	0	0	0	0
SUBTOTAL	SITE IMPROVEMENTS			108	4,055	0	0	0	0	0	4,055
	CONSUMABLES 3.20 %						129				129
	GENERAL FOREMAN 7.00 %			7	283						283
	GENERAL REQUIREMENTS 15.00 %			17	650						650
	SALES TAX 8.00 %						10		0		10
	OH&P (ON MARKUPS ONLY)									7	7
TOTAL	COST CODE 46007 WBS 318003 (ESCALATION 0.00% - CONTINGENCY 70.00 %)			132	4,989	0	140	0	0	7	5,136
318003.92	CONST. SERVICES, SUPPLIES & EXPENSE										
318003.9214002	**************************** HPT'S ****************************	460	0	0	0	0	0	0	0	0	0
318003.9214004	1 MAN FOR 2-1/2 DAYS	460	1 LS	20	956	0	0	0	0	0	956
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			20	956	0	0	0	0	0	956
TOTAL	COST CODE 46092 WBS 318003 (ESCALATION 0.00% - CONTINGENCY 70.00 %)			20	956	0	0	0	0	0	956
TOTAL WBS 318003 AY-152 SLUICE PIT				152	5,945	0	140	0	0	7	6,092

CCOUNT UMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
18004	AX-152 DIVERTER STATION										
18004.07	SITE IMPROVEMENTS										
18004.0760000	****************************	460	0	0	0	0	0	0	0	0	0
	REMOVAL OF AX-152 DIVERTER STATION										
	****************************										
18004.0760032	THIS CREW WILL CONSIST OF:	460	0	0	0	0	0	0	0	0	0
	1 PIC										
	2 OPERATORS										
	2 OILERS										
18004.0760034	2 TEAMSTERS	460	0	0	0	0	0	0	0	0	0
	USING 2 CATERPILLAR 375										
18004.0760036	EXCAVATORS WITH ATTACHMENTS	460	0	0	0	0	0	0	0	0	0
	THE ABOVE WILL BE BROKEN UP										
	AND LOADED INTO 20 TON ROLL-										
	OFF CONTAINERS FOR DISPOSAL										
18004.0760038	AT ERDF.	460	0	0	0	0	0	0	0	0	0
18004.0760040	METALS WILL BE LOADED INTO	460	0	0	0	0	0	0	0	0	0
	SHIELDED CONTAINERS FOR										
	DISPOSAL AT PPF.										
18004.0760050	REMOVE COVER BLOCKS ON PUMP	460	0	0	0	0	0	0	0	0	0
	PIT, REMOVE JUMPERS, PIPE &										
	PUMP, REPLACE COVER BLOCKS.										
	CUT OFF DIVERTER OPERATOR										
18004.0760052	ASSY'S, REMOVE COVER BLOCKS	460	0	0	0	0	0	0	0	0	0
	ON DIVERTER PIT, REMOVE ALL										
	PIPING INSIDE DIVERTER STN.										
	REMOVE TANKS & SUPPORTS.										
18004.0760054	DEMOLISH DIVERTER PIT WALLS	460	0	0	0	0	0	0	0	0	0
	REMOVING LINER, EMBEDDED										
	PIPING AND REBAR.										
18004.0760056		460	0	0	0	0	0	0	0	0	0
	REMOVE THE COVER BLOCKS FROM										
	THE PUMP PIT, DEMOLISH THE										
	WALLS REMOVING LINER, EMBED-										
18004.0760058	ED PIPING AND REBAR.	460	0	0	0	0	0	0	0	0	0
	DEMOLISH CONCRETE FLOOR OF										
	PUMP & DIVERTER PITS. REMOVE										
18004.0760060	ALL PIPE INSIDE THE CATCH	460	0	0	0	0	0	0	0	0	0
	TANK. DEMOLISH AND SEGREGATE										
	REMAINING PORTIONS FOR LOAD-										

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
	ING INTO APPROPRIATE BURIAL										
318004.0760062	CONTAINERS.	460	0	0	0	0	0	0	0	0	0
318004.0760072	ALLOW 4 CREW DAYS FOR	460	4 DAY	224	8380	0	0	0	0	0	8380
	DEMOLITION CREW.										
	*										
318004.0760100	WASTE GENERATED:	460	0	0	0	0	0	0	0	0	0
	CONC VOL (ERDF) = 392 TONS										
	LEAD VOL = 3 CF										
	METAL VOL (PPF) = 878 CF										
SUBTOTAL	SITE IMPROVEMENTS			224		0		0		0	
					8,380		0		0		8,380
	CONSUMABLES 3.20 %						268				268
	GENERAL FOREMAN 7.00 %			15	586						586
	GENERAL REQUIREMENTS 15.00 %			35	1344						1344
	SALES TAX 8.00 %						21		0		21
	OH&P (ON MARKUPS ONLY)									14	14
TOTAL	COST CODE 46007			275		0		0		14	
	WBS 318004				10,311		289		0		10,615
	(ESCALATION 0.00% - CONTINGENCY 70.00 %)										
318004.92	CONST. SERVICES, SUPPLIES & EXPENSE										
318004.9214002	****************************	460	0	0	0	0	0	0	0	0	0
	HPT'S										
	****************************										
318004.9214004	1 MAN FOR 4 DAYS	460	1 LS	32	1529	0	0	0	0	0	1529
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			32		0		0		0	
					1,529		0		0		1,529
TOTAL	COST CODE 46092			32		0		0		0	
	WBS 318004				1,529		0		0		1,529
	(ESCALATION 0.00% - CONTINGENCY 70.00 %)										
TOTAL WBS 318004 AX-152 DIVERTER STATION				307		0		0		14	
					11,840		289		0		12,144

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
318005	MANHOLE & BOXES FOR AX-152 DIV STN										
318005.07	SITE IMPROVEMENTS										
318005.0760000	****************************	460	0	0	0	0	0	0	0	0	0
	REMOVAL OF VALVE BOX & MAN-										
	HOLES - AX-152 DIVERTER STN										
	****************************										
318005.0760032	THIS CREW WILL CONSIST OF:	460	0	0	0	0	0	0	0	0	0
	1 PIC										
	2 OPERATORS										
	2 OILERS										
318005.0760034	2 TEAMSTERS	460	0	0	0	0	0	0	0	0	0
	USING 2 CATEPILLAR 375										
318005.0760036	EXCAVATORS WITH ATTACHMENTS	460	0	0	0	0	0	0	0	0	0
	THE ABOVE WILL BE BROKEN UP										
	AND LOADED INTO 20 TON ROLL-										
	OFF CONTAINERS FOR DISPOSAL										
318005.0760038	AT ERDF.	460	0	0	0	0	0	0	0	0	0
318005.0760072	ALLOW 1/2 CREW DAY.	460	1 LS	28	1047	0	0	0	0	0	1047
	*										
318005.0760100	WASTE GENERATED:	460	0	0	0	0	0	0	0	0	0
	CONC VOL (ERDF) = 16 TONS										
	METAL VOL (ERDF) = 30 CF										
SUBTOTAL	SITE IMPROVEMENTS			28		0		0		0	
					1,047		0		0		1,047
	CONSUMABLES 3.20 %						33				33
	GENERAL FOREMAN 7.00 %			1	73						73
	GENERAL REQUIREMENTS 15.00 %			4	168						168
	SALES TAX 8.00 %						2		0		2
	OH&P (ON MARKUPS ONLY)									1	1
TOTAL	COST CODE 46007			34		0		0		1	
	WBS 318005				1,288		36		0		1,326
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
318005.92	CONST. SERVICES, SUPPLIES & EXPENSE										
318005.9214002	****************************	460	0	0	0	0	0	0	0	0	0
	HPT'S										
	****************************										
318005.9214004	1 MAN FOR 4 HOURS	460	1 LS	4	191	0	0	0	0	0	191
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			4		0		0		0	
					191		0		0		191

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
TOTAL	COST CODE 46092			4		0		0		0	
	WBS 318005				191		0		0		191
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
TOTAL WBS 318005 MANHOLE & BOXES FOR AX-152 DIV STN				38		0		0		1	
					1,479		36		0		1,517

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
318006	AX-153 ISOLATION PIT										
318006.07	SITE IMPROVEMENTS										
318006.0760000	***************************** AX-153 ISOLATION PIT *****************************	460	0	0	0	0	0	0	0	0	0
318006.0760032	THIS CREW WILL CONSIST OF: 1 PIC 2 OPERATORS 2 OILERS	460	0	0	0	0	0	0	0	0	0
318006.0760034	2 TEAMSTERS USING 2 CATERPILLAR 375	460	0	0	0	0	0	0	0	0	0
318006.0760036	EXCAVATORS WITH ATTACHMENTS THE PIT WILL BE BROKEN UP AND LOADED INTO 20 TON ROLL-OFF CONTAINERS FOR DISPOSAL	460	0	0	0	0	0	0	0	0	0
318006.0760038	AT ERDF.	460	0	0	0	0	0	0	0	0	0
318006.0760072	ALLOW 1/2 CREW DAY. *	460	1 LS	28	1047	0	0	0	0	0	1047
318006.0760100	WASTE GENERATED: CONC VOL (ERDF) = 43 TONS METAL VOL (ERDF) = 64 CF	460	0	0	0	0	0	0	0	0	0
SUBTOTAL	SITE IMPROVEMENTS			28		0		0		0	
					1,047		0		0		1,047
	CONSUMABLES 3.20 %						33				33
	GENERAL FOREMAN 7.00 %			1	73						73
	GENERAL REQUIREMENTS 15.00 %			4	168						168
	SALES TAX 8.00 %						2		0		2
	OH&P (ON MARKUPS ONLY)									1	1
TOTAL	COST CODE 46007			34		0		0		1	
	WBS 318006				1,288		36		0		1,326
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
318006.92	CONST. SERVICES, SUPPLIES & EXPENSE										
318006.9214002	***************************** HPT'S *****************************	460	0	0	0	0	0	0	0	0	0
318006.9214004	1 MAN FOR 4 HOURS	460	1 LS	4	191	0	0	0	0	0	191
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			4		0		0		0	
					191		0		0		191

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
TOTAL	COST CODE 46092 WBS 318006 (ESCALATION 0.00% - CONTINGENCY 50.00 %)			4	191	0	0	0	0	0	191
TOTAL WBS 318006 AX-153 ISOLATION PIT				38	1,479	0	36	0	0	1	1,517

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
318007	AY-501 CONDENSATE VALVE PIT										
318007.07	SITE IMPROVEMENTS										
318007.0760000	**************************** AY-501 CONDENSATE VALVE PIT ****************************	460	0	0	0	0	0	0	0	0	0
318007.0760002	THIS WBS IS COMPOSED OF THE FOLLOWING ACTIVITIES AND ANTICIPATED CREWS:	460	0	0	0	0	0	0	0	0	0
318007.0760010	**************************** VACUUM/SCABBLER OPERATION ****************************	460	0	0	0	0	0	0	0	0	0
318007.0760012	USING A CREW CONSISTING OF: 1 PIC 2 OPERATORS 2 OILERS	460	0	0	0	0	0	0	0	0	0
3318007.0760014	1 TEAMSTER 1 40 TON CRANE	460	0	0	0	0	0	0	0	0	0
3318007.0760016	1 CATERPILLAR 375 EXCAVATOR WITH A HEPA VACUUM/SCABBLER SYSTEM. REMOVE COVER BLOCKS AND	460	0	0	0	0	0	0	0	0	0
3318007.0760018	REMOTELY VACUUM AND SCABBLE INSIDE CONCRETE SURFACE, REMOVING APPROXIMATELY 1/4". THE DEBRIS WILL BE LOADED	460	0	0	0	0	0	0	0	0	0
3318007.0760020	INTO SHIELDED BOXES TO GO TO PPF. REPLACE COVER BLOCKS.	460	0	0	0	0	0	0	0	0	0
3318007.0760022	ALLOW 1 CREW DAY.	460	1 LS	48	1825	0	0	0	0	0	1825
3318007.0760030	**************************** DEMOLITION ****************************	460	0	0	0	0	0	0	0	0	0
3318007.0760032	THIS CREW WILL CONSIST OF: 1 PIC 2 OPERATORS 2 OILERS	460	0	0	0	0	0	0	0	0	0
3318007.0760034	2 TEAMSTERS USING 2 CATERPILLAR 375	460	0	0	0	0	0	0	0	0	0
3318007.0760036	EXCAVATORS WITH ATTACHMENTS THE PIT WILL BE BROKEN UP AND LOADED INTO 20 TON ROLL-OFF CONTAINERS FOR DISPOSAL	460	0	0	0	0	0	0	0	0	0

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
318007.0760038	AT ERDF.	460	0	0	0	0	0	0	0	0	0
318007.0760040	METALS WILL BE LOADED INTO SHIELDED CONTAINERS FOR DISPOSAL AT PPF.	460	0	0	0	0	0	0	0	0	0
318007.0760072	ALLOW 1 CREW DAY.	460	1 LS	56	2095	0	0	0	0	0	2095
318007.0760100	WASTE GENERATED: CONC VOL (PPF) = 10 CF CONC VOL (ERDF) = 74 TONS METAL VOL (PPF) = 111 CF	460	0	0	0	0	0	0	0	0	0
318007.0760101	LEAD VOL = 1 CF	460	0	0	0	0	0	0	0	0	0
SUBTOTAL	SITE IMPROVEMENTS			104		0		0		0	
					3,920		0		0		3,920
	CONSUMABLES 3.20 %						125				125
	GENERAL FOREMAN 7.00 %			7	274						274
	GENERAL REQUIREMENTS 15.00 %			16	629						629
	SALES TAX 8.00 %						10		0		10
	OH&P (ON MARKUPS ONLY)									6	6
TOTAL	COST CODE 46007			127		0		0		6	
	WBS 318007				4,823		135		0		4,965
	(ESCALATION 0.00% - CONTINGENCY 70.00 %)										
318007.92	CONST. SERVICES, SUPPLIES & EXPENSE										
318007.9214002	**************************** HPT'S ****************************	460	0	0	0	0	0	0	0	0	0
318007.9214004	1 MAN FOR 2 DAYS	460	1 LS	16	764	0	0	0	0	0	764
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			16		0		0		0	
					764		0		0		764
TOTAL	COST CODE 46092			16		0		0		0	
	WBS 318007				764		0		0		764
	(ESCALATION 0.00% - CONTINGENCY 70.00 %)										
TOTAL WBS 318007	AY-501 CONDENSATE VALVE PIT			143		0		0		6	
					5,587		135		0		5,729

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
318008	AX-155 DIVERSION BOX										
318008.07	SITE IMPROVEMENTS										
318008.0760000	***************************** AX-155 DIVERSION BOX *****************************	460	0	0	0	0	0	0	0	0	0
318008.0760002	THIS WBS IS COMPOSED OF THE FOLLOWING ACTIVITIES AND ANTICIPATED CREWS:	460	0	0	0	0	0	0	0	0	0
318008.0760010	***************************** VACUUM/SCABBLER OPERATION *****************************	460	0	0	0	0	0	0	0	0	0
318008.0760012	USING A CREW CONSISTING OF: 1 PIC 2 OPERATORS 2 OILERS	460	0	0	0	0	0	0	0	0	0
318008.0760014	1 TEAMSTER 1 40 TON CRANE	460	0	0	0	0	0	0	0	0	0
318008.0760016	1 CATERPILLAR 375 EXCAVATOR WITH A HEPA VACUUM/SCABBLER SYSTEM. REMOVE COVER BLOCKS AND	460	0	0	0	0	0	0	0	0	0
318008.0760018	REMOTELY VACUUM AND SCABBLE INSIDE CONCRETE SURFACE, REMOVING APPROXIMATELY 1/4". THE DEBRIS WILL BE LOADED	460	0	0	0	0	0	0	0	0	0
318008.0760020	INTO SHIELDED BOXES TO GO TO PPF. REPLACE COVER BLOCKS.	460	0	0	0	0	0	0	0	0	0
318008.0760022	ALLOW 1 CREW DAY.	460	1 EA	48	1825	0	0	0	0	0	1825
318008.0760030	***************************** DEMOLITION *****************************	460	0	0	0	0	0	0	0	0	0
318008.0760032	THIS CREW WILL CONSIST OF: 1 PIC 2 OPERATORS 2 OILERS	460	0	0	0	0	0	0	0	0	0
318008.0760034	2 TEAMSTERS USING 2 CATERPILLAR 375	460	0	0	0	0	0	0	0	0	0
318008.0760036	EXCAVATORS WITH ATTACHMENTS THE BOX WILL BE BROKEN UP AND LOADED INTO 20 TON ROLL-OFF CONTAINERS FOR DISPOSAL	460	0	0	0	0	0	0	0	0	0

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING CORP.
JOB NO. Z466AAF1
FILE NO. Z466AAF1

** IEST - INTERACTIVE ESTIMATING **
ANCILLARY EQUIPMENT REMOVAL
241-AX TANK FARM CLOSURE - PLANNING ESTIMATE
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

DATE 04/22/98 10:19:02
BY R.OHRT

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
318008.0760038	AT ERDF.	460	0	0	0	0	0	0	0	0	0
318008.0760040	METALS WILL BE LOADED INTO SHIELDED CONTAINERS FOR DISPOSAL AT PPF.	460	0	0	0	0	0	0	0	0	0
318008.0760072	ALLOW 1 CREW DAY.	460	1 LS	56	2095	0	0	0	0	0	2095
318008.0760100	WASTE GENERATED: CONC VOL (PPF) = 6 CF CONC VOL (ERDF) = 74 TONS METAL VOL (PPF) = 113 CF	460	0	0	0	0	0	0	0	0	0
SUBTOTAL	SITE IMPROVEMENTS			104	3,920	0	0	0	0	0	3,920
	CONSUMABLES 3.20 %						125				125
	GENERAL FOREMAN 7.00 %			7	274						274
	GENERAL REQUIREMENTS 15.00 %			16	629						629
	SALES TAX 8.00 %						10		0		10
	OH&P (ON MARKUPS ONLY)									6	6
TOTAL	COST CODE 46007 WBS 318008 (ESCALATION 0.00% - CONTINGENCY 70.00 %)			127	4,823	0	135	0	0	6	4,965
318008.92	CONST. SERVICES, SUPPLIES & EXPENSE										
318008.9214002	**************************** HPT'S ****************************	460	0	0	0	0	0	0	0	0	0
318008.9214004	1 MAN FOR 2 DAYS	460	1 LS	16	764	0	0	0	0	0	764
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			16	764	0	0	0	0	0	764
TOTAL	COST CODE 46092 WBS 318008 (ESCALATION 0.00% - CONTINGENCY 70.00 %)			16	764	0	0	0	0	0	764
TOTAL WBS 318008 AX-155 DIVERSION BOX				143	5,587	0	135	0	0	6	5,729

CCOUNT UMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
18009	AX-501 VALVE PIT										
18009.07	SITE IMPROVEMENTS										
18009.0760000	***************************	460	0	0	0	0	0	0	0	0	0
	AX-501 VALVE PIT										
	***************************										
18009.0760002	THIS WBS IS COMPOSED OF THE	460	0	0	0	0	0	0	0	0	0
	FOLLOWING ACTIVITIES AND										
	ANTICIPATED CREWS:										
18009.0760030	***************************	460	0	0	0	0	0	0	0	0	0
	DEMOLITION										
	***************************										
18009.0760032	THIS CREW WILL CONSIST OF:	460	0	0	0	0	0	0	0	0	0
	1 PIC										
	2 OPERATORS										
	2 OILERS										
18009.0760034	2 TEAMSTERS	460	0	0	0	0	0	0	0	0	0
	USING 2 CATERPILLAR 375										
18009.0760036	EXCAVATORS WITH ATTACHMENTS	460	0	0	0	0	0	0	0	0	0
	THE PIT WILL BE BROKEN UP										
	AND LOADED INTO 20 TON ROLL-										
	OFF CONTAINERS FOR DISPOSAL										
18009.0760038	AT ERDF.	460	0	0	0	0	0	0	0	0	0
18009.0760072	ALLOW 1/2 CREW DAY.	460	1 EA	28	1047	0	0	0	0	0	1047
18009.0760100	WASTE GENERATED:	460	0	0	0	0	0	0	0	0	0
	CONC VOL (ERDF) = 17 TONS										
	METAL VOL (ERDF) = 26 CF										
	LEAD VOL = 1 CF										
SUBTOTAL	SITE IMPROVEMENTS			28		0		0		0	
					1,047		0		0		1,047
	CONSUMABLES 3.20 %						33				33
	GENERAL FOREMAN 7.00 %			1	73						73
	GENERAL REQUIREMENTS 15.00 %			4	168						168
	SALES TAX 8.00 %						2		0		2
	OH&P (ON MARKUPS ONLY)									1	1
TOTAL	COST CODE 46007			34		0		0		1	
	WBS 318009				1,288		36		0		1,326
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
18009.92	CONST. SERVICES, SUPPLIES & EXPENSE										

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
318009.9214002	****************************** HPT'S ******************************	460	0	0	0	0	0	0	0	0	0
318009.9214004	1 MAN FOR 4 HOURS	460	1 LS	4	191	0	0	0	0	0	191
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			4	191	0	0	0	0	0	191
TOTAL	COST CODE 46092 WBS 318009 (ESCALATION 0.00% - CONTINGENCY 50.00 %)			4	191	0	0	0	0	0	191
TOTAL WBS 318009 AX-501 VALVE PIT				38	1,479	0	36	0	0	1	1,517

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
318010	A-417 PUMP PIT AND TANK										
318010.07	SITE IMPROVEMENTS										
318010.0760000	*****************************	460	0	0	0	0	0	0	0	0	0
	A-417 PUMP PIT AND TANK										
	*****************************										
318010.0760002	THIS WBS IS COMPOSED OF THE	460	0	0	0	0	0	0	0	0	0
	FOLLOWING ACTIVITIES AND										
	ANTICIPATED CREWS:										
318010.0760030	*****************************	460	0	0	0	0	0	0	0	0	0
	DEMOLITION										
	*****************************										
318010.0760032	THIS CREW WILL CONSIST OF:	460	0	0	0	0	0	0	0	0	0
	1 PIC										
	2 OPERATORS										
	2 OILERS										
318010.0760034	2 TEAMSTERS	460	0	0	0	0	0	0	0	0	0
	USING 2 CATERPILLAR 375										
318010.0760036	EXCAVATORS WITH ATTACHMENTS	460	0	0	0	0	0	0	0	0	0
	THE ABOVE WILL BE BROKEN UP										
	AND LOADED INTO 20 TON ROLL-										
	OFF CONTAINERS FOR DISPOSAL										
318010.0760038	AT ERDF.	460	0	0	0	0	0	0	0	0	0
318010.0760040	METALS WILL BE LOADED INTO	460	0	0	0	0	0	0	0	0	0
	SHIELDED CONTAINERS FOR										
	DISPOSAL AT PPF.										
318010.0760050	REMOVE COVER BLOCKS ON PUMP	460	0	0	0	0	0	0	0	0	0
	PIT, REMOVE JUMPERS, PIPE &										
	PUMP, REPLACE COVER BLOCKS.										
318010.0760052	REMOVE COVER BLOCKS ON VALVE	460	0	0	0	0	0	0	0	0	0
	PIT, REMOVE ALL PIPING										
	INSIDE. DEMOLISH WALLS										
	REMOVING LINER, EMBEDDED										
318010.0760054	PIPING AND REBAR.	460	0	0	0	0	0	0	0	0	0
318010.0760056		460	0	0	0	0	0	0	0	0	0
	REMOVE THE COVER BLOCKS FROM										
	THE PUMP PIT, DEMOLISH THE										
	FLOORS OF PUMP AND VALVE PIT										
318010.0760058	REMOVE PIPE IN TANK COMPART-	460	0	0	0	0	0	0	0	0	0
	MENT. DEMOLISH REMAINING										
	TANK.										
318010.0760072	ALLOW 3 CREW DAYS FOR	460	3 DAY	168	6285	0	0	0	0	0	628
	DEMOLITION CREW.										

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
	*										
318010.0760100	WASTE GENERATED:	460	0	0	0	0	0	0	0	0	0
	CONC VOL (ERDF) = 170 TONS										
	METAL VOL (PPF) = 304 CF										
	LEAD VOL = 4 CF										
SUBTOTAL	SITE IMPROVEMENTS			168		0		0		0	
					6,285		0		0		6,285
	CONSUMABLES 3.20 %						201				201
	GENERAL REQUIREMENTS 15.00 %			25	942						942
	SALES TAX 8.00 %						16		0		16
	OH&P (ON MARKUPS ONLY)									10	10
TOTAL	COST CODE 46007			193		0		0		10	
	WBS 318010				7,227		217		0		7,455
	(ESCALATION 0.00% - CONTINGENCY 70.00 %)										
318010.92	CONST. SERVICES, SUPPLIES & EXPENSE										
318010.9214002	****************************	460	0	0	0	0	0	0	0	0	0
	HPT'S										
	****************************										
318010.9214004	1 MAN FOR 3 DAYS	460	1 LS	24	1147	0	0	0	0	0	1147
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			24		0		0		0	
					1,147		0		0		1,147
TOTAL	COST CODE 46092			24		0		0		0	
	WBS 318010				1,147		0		0		1,147
	(ESCALATION 0.00% - CONTINGENCY 70.00 %)										
TOTAL WBS 318010 A-417 PUMP PIT AND TANK				217		0		0		10	
					8,374		217		0		8,602

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
319002	MODS TO SOIL REMOVAL										
319002.07	SITE IMPROVEMENTS										
319002.0760000	****************************** MODS TO SOIL REMOVAL QTYS ******************************	460	0	0	0	0	0	0	0	0	0
319002.0760002	THIS WBS SERVES AS AN ADJUS-TMENT TO AN EARLIER ESTIMATE #Z466AAA2 DATED 9/18/97 "241 -AX-TANK REMOVAL", TAKING	460	0	0	0	0	0	0	0	0	0
319002.0760004	INTO ACCOUNT THE ADDED REQ-UIREMENTS OF REMAINING ANCI-LLARY EQUIPMENT ITEMS IMBED-DED IN THE SOIL. THE OVERALL	460	0	0	0	0	0	0	0	0	0
319002.0760006	EFFECT BEING AN INCREASED CREW SIZE TO HANDLE THE VAR-IOUS ITEMS ENCOUNTERED DUR-ING SOIL REMOVAL, BUT SPREAD	460	0	0	0	0	0	0	0	0	0
319002.0760008	OVER A SHORTER TIME PERIOD.	460	0	0	0	0	0	0	0	0	0
319002.0760020	****************************** COVER SOIL REMOVAL ******************************	460	0	0	0	0	0	0	0	0	0
319002.0760022	PREVIOUS ESTIMATED CREW WILL NEED 2 ADDITIONAL OPERATORS, 2 ADDITIONAL OILERS AND 2 CATERPILLAR 375 EXCAVATORS	460	0	0	0	0	0	0	0	0	0
319002.0760024	WITH ATTACHMENTS FOR SHEAR-ING OR GRAPPLING. THE JOB DURATION WILL REMAIN 30 DAYS	460	0	0	0	0	0	0	0	0	0
319002.0760026	2 OPERATORS	460	30 DAY	480	16123	0	0	0	0	0	16123
319002.0760028	2 OILERS	460	30 DAY	480	16123	0	0	0	0	0	16123
319002.0760040	****************************** LATERAL SOIL REMOVAL ******************************	460	0	0	0	0	0	0	0	0	0
319002.0760042	PREVIOUS ESTIMATED CREW WILL NEED 2 ADDITIONAL OPERATORS, 2 ADDITIONAL OILERS AND 2 CATERPILLAR 375 EXCAVATORS	460	0	0	0	0	0	0	0	0	0
319002.0760044	WITH ATTACHMENTS FOR SHEAR-ING OR GRAPPLING. THE JOB DURATION WILL BE REDUCED FROM 220 TO 176 DAYS.	460	0	0	0	0	0	0	0	0	0

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
319002.0760046		460	0	0	0	0	0	0	0	0	0
	ORIGINAL CREW										
319002.0760048	1 OPERATOR	460	220 DAY	-1760	-59118	0	0	0	0	0	-59118
319002.0760050	1 OILER	460	220 DAY	-1760	-59118	0	0	0	0	0	-59118
319002.0760052	2 HPT'S	460	220 DAY	-3520	-168186	0	0	0	0	0	-168186
319002.0760054	4 TEAMSTERS	460	220 DAY	-7040	-237248	0	0	0	0	0	-237248
319002.0760066		460	0	0	0	0	0	0	0	0	0
	REVISED CREW										
319002.0760068	3 OPERATORS	460	176 DAY	4224	141884	0	0	0	0	0	141884
319002.0760070	3 OILERS	460	176 DAY	4224	141884	0	0	0	0	0	141884
319002.0760072	2 HPT'S	460	176 DAY	2816	134548	0	0	0	0	0	134548
319002.0760074	4 TEAMSTERS	460	176 DAY	5632	189798	0	0	0	0	0	189798
SUBTOTAL	SITE IMPROVEMENTS			3,776		0		0		0	
					116,690		0		0		116,690
	CONSUMABLES 3.20 %						3734				3734
	GENERAL FOREMAN 7.00 %			264	8168						8168
	GENERAL REQUIREMENTS 15.00 %			606	18728						18728
	SALES TAX 8.00 %						298		0		298
	OH&P (ON MARKUPS ONLY)									201	201
TOTAL	COST CODE 46007			4,646		0		0		201	
	WBS 319002				143,587		4,032		0		147,821
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
TOTAL WBS 319002 MODS TO SOIL REMOVAL				4,646		0		0		201	
					143,587		4,032		0		147,821

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
319003	ADDITIONAL CREW										
319003.07	SITE IMPROVEMENTS										
319003.0760000	****************************** ADDITIONAL CREW ******************************	460	0	0	0	0	0	0	0	0	0
319003.0760002	IN ADDITION TO THE CREW ENGAGED IN THE ACTUAL DEMOL- ITION WORK WITHIN THE MAIN STRUCTURE, AN ADDITIONAL	460	0	0	0	0	0	0	0	0	0
319003.0760004	CREW WILL BE REQUIRED IN THE DECONTAMINATION AREA FOR EQUIPMENT DECONTAMINATION, PART CHANGING AND CONTAINER	460	0	0	0	0	0	0	0	0	0
319003.0760006	DECONTAMINATION. THIS CREW WILL BE AVAILABLE FROM THE BEGINNING OF BUILD- ING DEMOLITION WITHIN THE	460	0	0	0	0	0	0	0	0	0
319003.0760008	NEW STRUCTURE THRU THE FINAL DEMOLITION OF THE PITS, A SPAN OF 276 DAYS.	460	0	0	0	0	0	0	0	0	0
319003.0760010	THIS CREW WILL CONSIST OF:	460	0	0	0	0	0	0	0	0	0
319003.0760012	1 HPT	460	276 DAY	2208	105498	0	0	0	0	0	105498
319003.0760014	2 LABORERS	460	276 DAY	4416	126916	0	0	0	0	0	126916
319003.0760016	1 MILLWRIGHT	460	276 DAY	2208	74586	0	0	0	0	0	74586
SUBTOTAL	SITE IMPROVEMENTS			8,832		0		0		0	
					307,000		0		0		307,000
	CONSUMABLES 3.20 %						9824				9824
	GENERAL FOREMAN 7.00 %			618	21490						21490
	GENERAL REQUIREMENTS 15.00 %			1417	49273						49273
	SALES TAX 8.00 %						785		0		785
	OH&P (ON MARKUPS ONLY)									530	530
TOTAL	COST CODE 46007			10,867		0		0		530	
	WBS 319003				377,763		10,609		0		388,903
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
TOTAL WBS 319003 ADDITIONAL CREW				10,867		0		0		530	
					377,763		10,609		0		388,9[illegible]

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING **
COGEMA ENGINEERING CORP. ANCILLARY EQUIPMENT REMOVAL DATE 04/22/98 10:19:03
JOB NO. Z466AAF1 241-AX TANK FARM CLOSURE - PLANNING ESTIMATE BY R.OHRT
FILE NO. Z466AAF1 PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
321003	CHANGE HOUSE DEMOLITION										
321003.07	SITE IMPROVEMENTS										
321003.0750002	**************************** CHANGE HOUSE ****************************	460	0	0	0	0	0	0	0	0	0
321003.0750003	12 X 30 X 8' EAVE HT PRE-ENGINEERED METAL BUILDING.	460	0	0	0	0	0	0	0	0	0
321003.0750004	TEAR DOWN, LOAD, HAUL AND DUMP DEBRIS AT LOCAL LANDFILL.	460	0	0	0	0	0	0	0	0	0
321003.0750010	3 LABORERS	460	1 DAY	24	690	0	0	0	0	173	863
321003.0750012	2 EQ OPERATORS	460	1 DAY	16	537	0	0	0	0	134	671
321003.0750014	1 EQ OILER	460	1 DAY	8	269	0	0	0	0	67	336
321003.0750016	2 TEAMSTERS	460	1 DAY	16	539	0	0	0	0	135	674
321003.0750018	25 TON HYDRAULIC CRANE	460	1 DAY	0	0	510	0	0	0	128	638
321003.0750020	FRONT END LOADER, 2.5 CY	460	1 DAY	0	0	770	0	0	0	193	963
321003.0750022	DUMP TRUCKS (2) - 16 TON	460	1 DAY	0	0	1560	0	0	0	390	1950
SUBTOTAL	SITE IMPROVEMENTS			64	2,035	2,840	0	0	0	1,220	6,095
TOTAL	COST CODE 46007 WBS 321003 (ESCALATION 0.00% - CONTINGENCY 50.00 %)			64	2,035	2,840	0	0	0	1,220	6,095
TOTAL WBS 321003 CHANGE HOUSE DEMOLITION				64	2,035	2,840	0	0	0	1,220	6,095

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
321010	COMPRESSOR BUILDING DEMOLITION										
321010.07	SITE IMPROVEMENTS										
321010.0750002	****************************** COMPRESSOR BUILDING ******************************	460	0	0	0	0	0	0	0	0	0
321010.0750003	33 X 20 X 10' EAVE HT PRE-ENGINEERED METAL BUILDING.	460	0	0	0	0	0	0	0	0	0
321010.0750004	TEAR DOWN, LOAD, HAUL AND DUMP DEBRIS AT LOCAL LANDFILL.	460	0	0	0	0	0	0	0	0	0
321010.0750010	3 LABORERS	460	1 DAY	24	690	0	0	0	0	173	863
321010.0750012	2 EQ OPERATORS	460	1 DAY	16	537	0	0	0	0	134	671
321010.0750014	1 EQ OILER	460	1 DAY	8	269	0	0	0	0	67	336
321010.0750016	2 TEAMSTERS	460	1 DAY	16	539	0	0	0	0	135	674
321010.0750018	25 TON HYDRAULIC CRANE	460	1 DAY	0	0	510	0	0	0	128	638
321010.0750020	FRONT END LOADER, 2.5 CY	460	1 DAY	0	0	770	0	0	0	193	963
321010.0750022	DUMP TRUCKS (2) - 16 TON	460	1 DAY	0	0	1560	0	0	0	390	1950
SUBTOTAL	SITE IMPROVEMENTS			64	2,035	2,840	0	0	0	1,220	6,095
TOTAL	COST CODE 46007 WBS 321010 (ESCALATION 0.00% - CONTINGENCY 50.00 %)			64	2,035	2,840	0	0	0	1,220	6,095
TOTAL WBS 321010 COMPRESSOR BUILDING DEMOLITION				64	2,035	2,840	0	0	0	1,220	6,095

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
329001	MODS TO ENCLOSURE STRUCTURE										
329001.32	PRE-FAB BUILDINGS										
329001.3290000	****************************** MODS TO ENCLOSURE STRUCTURE ******************************	501	0	0	0	0	0	0	0	0	0
329001.3290002	THIS SECTION HAS BEEN PRO-RATED FROM AN EARLIER ESTI-MATE FOR THE ORIGINAL MAIN BUILDING. SEE ESTIMATE	501	0	0	0	0	0	0	0	0	0
329001.3290004	Z466AAA2 WBS 320700 DATED 9/18/97. LABOR:	501	0	0	0	0	0	0	0	0	0
329001.3290010	CARPENTERS, 4 MEN FOR 3 DAYS	501	1 LS	96	2953	0	0	0	0	738	3691
329001.3290012	LABORERS, 4 MEN FOR 21 DAYS	501	1 LS	672	18090	0	0	0	0	4523	22613
329001.3290014	OPERATORS, 4 MEN FOR 16 DAYS	501	1 LS	512	16108	0	0	0	0	4027	20135
329001.3290016	OILERS, 2 MEN FOR 16 DAYS	501	1 LS	256	8054	0	0	0	0	2014	10068
329001.3290018	IRONWORKERS,10 MEN FOR 5 DAY	501	1 LS	400	13892	0	0	0	0	3473	17365
329001.3290020	SHEETMETAL WORKERS, 10 MEN FOR 25 DAYS	502	1 LS	2000	71080	0	0	0	0	17770	88850
329001.3290022	SPRINKLER FITTERS, 12 MEN FOR 11 DAYS	501	1 LS	1056	34795	0	0	0	0	8699	43494
329001.3290024	ELECTRICIANS, 10 MEN FOR 10 DAYS	501	1 LS	800	30464	0	0	0	0	7616	38080
329001.3290030	MATERIAL	501	1 LS	0	0	0	574000	0	0	143500	717500
329001.3290040	EQUIPMENT USEAGE: 2 - 200T CRANES, 16 DAYS 2 - 40T CRANES, 16 DAYS 2 - SERV. TRUCKS, 16 DAYS	501	0	0	0	0	0	0	0	0	0
SUBTOTAL	PRE-FAB BUILDINGS			5,792		0		0		192,360	
					195,436		574,000		0		961,796
	SALES TAX 8.00 %						45920		0		45920
	OH&P (ON MARKUPS ONLY)									11480	11480
TOTAL	COST CODE 50132			5,792		0		0		203,840	
	WBS 329001				195,436		619,920		0		1,019,196
	(ESCALATION 0.00% - CONTINGENCY 40.00 %)										
TOTAL WBS 329001 MODS TO ENCLOSURE STRUCTURE				5,792		0		0		203,840	
					195,436		619,920		0		1,019,1[illegible]

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
331000	BUILDING DEMOLITION - DISPOSAL										
331000.07	SITE IMPROVEMENTS										
331000.0701000	***************************** INSTRUMENT BUILDING 801-A *****************************	460	0	0	0	0	0	0	0	0	0
331000.0701002	BUILDING RUBBLE, ERDF, @ $60/TON.	460	80 TON	0	0	0	0	4800	0	0	4800
331000.0702000	***************************** INSTRUMENT BUILDING 801-B *****************************	460	0	0	0	0	0	0	0	0	0
331000.0702002	BUILDING RUBBLE, ERDF @ $60/TON.	460	80 TON	0	0	0	0	4800	0	0	4800
331000.0703000	***************************** CHANGE HOUSE *****************************	460	0	0	0	0	0	0	0	0	0
331000.0703002	DUMP CHARGES, CONCRETE, LOCAL LANDFILL @ $15/CY.	460	10 CY	0	0	0	0	150	0	0	150
331000.0704000	***************************** ION EXCHANGE COLUMN *****************************	460	0	0	0	0	0	0	0	0	0
331000.0704002	ION EXCHANGE COLUMN, DUMP CHARGES, BLDG RUBBLE, CATEGORY I LLW, CONTACT HANDLED $58.82/CF.	460	36 CY	0	0	0	0	57173	0	0	57173
331000.0704004	BURIAL COST FOR CATEGORY 3 LLW, REMOTE HANDLED, BASE RATE $13.76 PLUS HIC CHARGE OF $65.10 PER CF OR $78.86.	460	845 CF	0	0	0	0	66637	0	0	66637
331000.0704006	BURIAL COST FOR CATEGORY 3 LLW, CONTACT HANDLED, BASE RATE $13.76 PLUS HIC CHARGE OF $39.06 PER CF OR $52.82.	460	80 CF	0	0	0	0	4226	0	0	4226
331000.0704008	BURIAL COST FOR CATEGORY 1 LLW, CONTACT HANDLED, BASE RATE $13.76 PLUS HIC CHARGE OF $39.06 PER CF OR $52.82.	460	400 CF	0	0	0	0	21128	0	0	21128
331000.0704010	BURIAL COST FOR U/G PIPE AND DIRT GOING TO ERDF @ $60/TON	460	50 TON	0	0	0	0	3000	0	0	3000
331000.0705000	***************************** FAN HOUSE *****************************	460	0	0	0	0	0	0	0	0	0

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
331000.0705002	DUMP CHARGES, CONCRETE, ERDF, 40 TON (20 CY) AT $60/TON.	460	40 TON	0	0	0	0	2400	0	0	2400
331000.0705004	DUMP CHARGES, BLDG RUBBLE @ 7 LB/SF, ERDF, @ $60/TON.	460	3 TON	0	0	0	0	180	0	0	180
331000.0705006	BURIAL CHARGE FOR 12 HEPA FILTERS @ $78.86/CF.	460	48 CF	0	0	0	0	3785	0	0	3785
331000.0706000	**************************** DEENTRAINER ****************************	460	0	0	0	0	0	0	0	0	0
331000.0706002	EARTH FILL FROM DEENTRAINER CAISSONS TO GO TO ERDF AT $60/TON.	460	270 TON	0	0	0	0	16200	0	0	16200
331000.0706004	DISPOSAL COST FOR DEENTRAI-NER DUCT, CAISSONS AND CONCRETE AT LOW LEVEL BURIAL GROUND @ $78.86/CF.	460	200 CF	0	0	0	0	15772	0	0	15772
331000.0706006	DISPOSAL COST FOR THREE DEENTRAINER TANKS AND SEAL POT (RMW) AT $120/CF. CONTAINER COST IS INCLUDED.	460	150 CF	0	0	0	0	18000	0	0	18000
331000.0707000	**************************** CONDENSER BUILDING ****************************	460	0	0	0	0	0	0	0	0	0
331000.0707002	DISPOSAL COST FOR 52 COVER BLOCKS CAT 1 LLW @ $13.76 PER CUBIC FOOT.	460	2916 CF	0	0	0	0	128362	0	0	128362
331000.0707004	DISPOSAL COST FOR PIPE IN CELLS & 3 CONDENSERS (RMW), AT $120/CF, CONTAINER COST IS INCLUDED.	460	400 CF	0	0	0	0	48000	0	0	48000
331000.0707006	CONCRETE RUBBLE DISPOSAL COST FOR 686 TONS (343 CY) TO ERDF @ $60/TON.	460	686 TON	0	0	0	0	41160	0	0	41160
331000.0707008	DISPOSAL COSTS FOR MISC. PIPING AND EQUIPMENT (14 TONS) TO ERDF AT $60/TON.	460	14 TON	0	0	0	0	840	0	0	840
331000.0708000	**************************** COOLING TOWER AND SUMPS ****************************	460	0	0	0	0	0	0	0	0	0
331000.0708002	DUMP CHARGES, BLDG RUBBLE FROM COOLING TOWER & SUMPS,	460	200 TON	0	0	0	0	12000	0	0	12000

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
	ERDF AT $60/TON.										
331000.0709000	**************************** COMPRESSOR BUILDING ****************************	460	0	0	0	0	0	0	0	0	0
331000.0709002	DUMP CHARGES, CONCRETE, LOCAL LANDFILL	460	22 CY	0	0	0	0	330	0	0	330
331000.0709004	DUMP CHARGES, BLDG RUBBLE, LOCAL LANDFILL.	460	82 CY	0	0	0	0	1230	0	0	1230
331000.0710000	**************************** SAMPLER PITS ****************************	460	0	0	0	0	0	0	0	0	0
331000.0710002	DUMP CHARGES, ERDF @ $60/TON	460	137 TON	0	0	0	0	8220	0	0	8220
331000.0730000	**************************** CHANGE HOUSE ****************************	460	0	0	0	0	0	0	0	0	0
SUBTOTAL	SITE IMPROVEMENTS			0	0	0	0	458,393	0	0	458,393
TOTAL	COST CODE 46007 WBS 331000 (ESCALATION 0.00% - CONTINGENCY 35.00 %)			0	0	0	0	458,393	0	0	458,393
TOTAL WBS 331000 BUILDING DEMOLITION - DISPOSAL				0	0	0	0	458,393	0	0	458,393

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
334001	LEAK DETECTION PITS - DISPOSAL										
334001.07	SITE IMPROVEMENTS										
334001.0701000	**************************** DISPOSAL COSTS LEAK DETECTION PITS ****************************	460	0	0	0	0	0	0	0	0	0
334001.0701004	DUMP CHARGES, CONCRETE, AT ERDF, $60/TON.	460	160 TON	0	0	0	0	9600	0	0	9600
334001.0701006	DUMP CHARGES, METAL, AT ERDF, $60/TON.	460	500 LB	0	0	0	0	15	0	0	15
SUBTOTAL	SITE IMPROVEMENTS			0	0	0	0	9,615	0	0	9,615
TOTAL	COST CODE 46007 WBS 334001 (ESCALATION 0.00% - CONTINGENCY 35.00 %)			0	0	0	0	9,615	0	0	9,615
TOTAL WBS 334001 LEAK DETECTION PITS - DISPOSAL				0	0	0	0	9,615	0	0	9,615

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
336003	PIPE BUNDLE REMOVAL - DISPOSAL										
336003.07	SITE IMPROVEMENTS										
336003.0770110	****************************** DISPOSAL COSTS PIPE BUNDLE REMOVAL ******************************	460	0	0	0	0	0	0	0	0	0
336003.0770112	DISPOSAL COSTS FOR MISC. PIPING, CONCRETE AND SOIL TO ERDF AT $60/TON.	460	4822 TON	0	0	0	0	289320	0	0	289320
SUBTOTAL	SITE IMPROVEMENTS			0	0	0	0	289,320	0	0	289,320
TOTAL	COST CODE 46007 WBS 336003 (ESCALATION 0.00% - CONTINGENCY 35.00 %)			0	0	0	0	289,320	0	0	289,320
TOTAL WBS 336003 PIPE BUNDLE REMOVAL - DISPOSAL				0	0	0	0	289,320	0	0	289,320

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
336004	REMOVE CONTAM. PIPE - DISPOSAL										
336004.07	*SITE IMPROVEMENTS*										
336004.0750000	**************************** DISPOSAL COSTS CONTAMINATED PIPE REMOVAL ****************************	460	0	0	0	0	0	0	0	0	0
336004.0750002	DUMP CHARGES, CONCRETE, AT ERDF, $60/TON.	460	1418 TON	0	0	0	0	85080	0	0	85080
SUBTOTAL	SITE IMPROVEMENTS			0	0	0	0	85,080	0	0	85,080
TOTAL	COST CODE 46007 WBS 336004 (ESCALATION 0.00% - CONTINGENCY 35.00 %)			0	0	0	0	85,080	0	0	85,080
TOTAL WBS 336004 *REMOVE CONTAM. PIPE - DISPOSAL*				0	0	0	0	85,080	0	0	85,080

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
337000	DEMOL.PITS ASSOC.W/TKS - DISPOSAL										
337000.07	SITE IMPROVEMENTS										
337000.0701000	****************************** DISPOSAL COSTS - PITS ASSOC-IATED W/INDIVIDUAL AX TANKS ******************************	460	0	0	0	0	0	0	0	0	0
337000.0750002	DUMP CHARGES, CONCRETE, AT ERDF, $60/TON.	460	725 TON	0	0	0	0	43500	0	0	43500
337000.0750004	DUMP CHARGES, METAL, AT ERDF, $60/TON.	460	1 TON	0	0	0	0	60	0	0	60
SUBTOTAL	SITE IMPROVEMENTS			0	0	0	0	43,560	0	0	43,560
TOTAL	COST CODE 46007 WBS 337000 (ESCALATION 0.00% - CONTINGENCY 35.00 %)			0	0	0	0	43,560	0	0	43,560
TOTAL WBS 337000 DEMOL.PITS ASSOC.W/TKS - DISPOSAL				0	0	0	0	43,560	0	0	43,560

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
338000	DEMOLISH PITS & BOXES - DISPOSAL										
338000.07	SITE IMPROVEMENTS										
338000.0701000	****************************** DISPOSAL COSTS - PITS/BOXES ******************************	460	0	0	0	0	0	0	0	0	0
338000.0701004	DUMP CHARGES, CONCRETE, AT ERDF, $60/TON.	460	993 TON	0	0	0	0	59580	0	0	59580
338000.0701008	DUMP CHARGES, METAL, AT ERDF, $60/TON.	460	4 TON	0	0	0	0	240	0	0	240
SUBTOTAL	SITE IMPROVEMENTS			0	0	0	0	59,820	0	0	59,820
TOTAL	COST CODE 46007 WBS 338000 (ESCALATION 0.00% - CONTINGENCY 35.00 %)			0	0	0	0	59,820	0	0	59,820
TOTAL WBS 338000 DEMOLISH PITS & BOXES - DISPOSAL				0	0	0	0	59,820	0	0	59,820

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
REPORT TOTAL				124,318	6,275,345	12,820	2,319,893	1,188,788	1,382	289,822	10,088,051

APPENDIX G

AX TANK FARM ANCILLARY EQUIPMENT STUDY
CASE 2: FILL EQUIPMENT WITH GROUT

** IEST - INTERACTIVE ESTIMATING **
ANCILLARY EQUIPMENT GROUT IN PLACE
241-AX TANK FARM CLOSURE - PLANNING ESTIMATE
PHMCR01 - PROJECT COST SUMMARY

SORT	DESCRIPTION	ESCALATED TOTAL COST	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
BHI	BECHTEL HANFORD INTERNATIONAL	260,000	55	150,000	410,000
FDNW	FLUOR DANIEL NORTHWEST	8,480,000	74	6,320,000	14,800,000
LMHC	LOCKHEED MARTIN HANFORD CORP.	4,520,000	69	3,110,000	7,630,000
WMHI	WASTE MANAGEMENT HANFORD, INC.	130,000	45	60,000	190,000
WMNW	WASTE MGMT FED SERVICES NORTHWEST	270,000	50	140,000	410,000
	SUBTOTAL	13,660,000	71	9,780,000	23,440,000
SITE	SITE ALLOCATIONS	3,470,000	73	2,540,000	6,010,000
	TOTAL ESTIMATED CONSTRUCTION COST (TECC)	17,130,000	72	12,320,000	29,450,000

TYPE OF ESTIMATE	STUDY ESTIMATE	APRIL 22, 1998	REMARKS:
FDNW LEAD ESTIMATOR		ESTIMATING MANAGER	
PROJECT MANAGER			
CLIENT			

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

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	SUB TOTAL	SITE ALLOCAT'N	TOTAL DOLLARS
110000	DEFINITIVE DESIGN	3150626	0.00	0	3150626	65	2047907	5198533	1365134	6563667
120000	ENGINEERING/INSPECTION	749986	0.00	0	749986	80	599989	1349975	354503	1704478
130000	CONSTRUCTION MANAGEMENT	1693292	0.00	0	1693292	60	1015975	2709267	711453	3420720
SUBTOTAL 1	ENGINEERING	5593904	0.00	0	5593904	65	3663871	9257775	2431090	11688865
210000	EQUIPMENT PROCUREMENT	1778157	0.00	0	1778157	80	1422526	3200683	840499	4041182
SUBTOTAL 2	PROCUREMENT	1778157	0.00	0	1778157	80	1422526	3200683	840499	4041182
311001	801-A INSTRUMENT BUILDING	3604	0.00	0	3604	50	1802	5406	1524	6930
311002	801-B INSTRUMENT BUILDING	3604	0.00	0	3604	50	1802	5406	1524	6930
311004	ION EXCHANGE COLUMN	39368	0.00	0	39368	70	27557	66925	20936	87861
311005	A-702 FAN HOUSE/FILTER BUILDING	3626	0.00	0	3626	55	1994	5620	1372	6992
311006	CAISSONS/DEENTRAINER FACILITIES	9708	0.00	0	9708	55	5339	15047	4560	19607
311007	A-401 CONDENSER BUILDING	39284	0.00	0	39284	70	27499	66783	21123	87906
311008	COOLING TOWER AND SUMPS	14218	0.00	0	14218	50	7109	21327	7260	28587
SUBTOTAL 311	FACILITY DEMO - ONSITE C.F.	113412	0.00	0	113412	64	73102	186514	58299	244813
312001	GROUTING OF WELLS	323762	0.00	0	323762	50	161881	485643	0	485643
312002	DRILLING REPLACEMENT WELLS	184778	0.00	0	184778	60	110867	295645	0	295645
SUBTOTAL 312	WELLS	508540	0.00	0	508540	54	272748	781288	0	781288
313001	GROUT MISC. RISERS	80253	0.00	0	80253	65	52165	132418	40192	172610
313002	GROUT AIRLIFT CIRCULATOR RISERS	586538	0.00	0	586538	70	410577	997115	142504	1139619
SUBTOTAL 313	RISERS	666791	0.00	0	666791	69	462742	1129533	182696	1312229
314001	GROUT LEAK DETECTION PITS	26452	0.00	0	26452	60	15871	42323	12398	54721
SUBTOTAL 314	LEAK DETECTION PITS	26452	0.00	0	26452	60	15871	42323	12398	54721
316001	GROUT BURIED PIPE AND DUCT	4196548	0.00	0	4196548	80	3357238	7553786	2254603	9808389

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	SUB TOTAL	SITE ALLOCAT'N	TOTAL DOLLARS
316002	CONCRETE FILL ENCASEMENTS	348663	0.00	0	348663	80	278931	627594	165874	793468
SUBTOTAL 316	GROUT BURIED PIPE & DUCT	4545211	0.00	0	4545211	80	3636169	8181380	2420477	10601857
317001	GROUT TANK RELATED PITS	62606	0.00	0	62606	65	40694	103300	32868	136168
SUBTOTAL 317	TANK RELATED PITS	62606	0.00	0	62606	65	40694	103300	32868	136168
318001	GROUT OTHER PITS/BOXES/STRUCTURES	58340	0.00	0	58340	70	40838	99178	29539	128717
SUBTOTAL 318	OTHER PITS/BOXES/STRUCTURES	58340	0.00	0	58340	70	40838	99178	29539	128717
SUBTOTAL 31	CF CONSTRUCTION	5981352	0.00	0	5981352	76	4542164	10523516	2736277	13259793
321003	CHANGE HOUSE	6095	0.00	0	6095	60	3657	9752	750	10502
SUBTOTAL 321	FACILITY DEMO - F/P	6095	0.00	0	6095	60	3657	9752	750	10502
SUBTOTAL 32	FIXED PRICE CONSTRUCTION	6095	0.00	0	6095	60	3657	9752	750	10502
331001	INSTRUMENT BLDG 801-A - DISPOSAL	4800	0.00	0	4800	45	2160	6960	0	6960
331002	INSTRUMENT BLDG 801-B - DISPOSAL	4800	0.00	0	4800	45	2160	6960	0	6960
331003	CHANGE HOUSE - DISPOSAL	690	0.00	0	690	45	311	1001	0	1001
331004	ION EXCHANGE COLUMN - DISPOSAL	94991	0.00	0	94991	45	42746	137737	0	137737
331005	FAN HOUSE - DISPOSAL	6365	0.00	0	6365	45	2864	9229	0	9229
331006	DEENTRAINER - DISPOSAL	49972	0.00	0	49972	45	22487	72459	0	72459
331007	CONDENSER BUILDING - DISPOSAL	130124	0.00	0	130124	45	58556	188680	0	188680
331008	COOLING TOWER AND SUMPS - DISPOSAL	12000	0.00	0	12000	45	5400	17400	0	17400
SUBTOTAL 331	BURIAL / DISPOSAL COSTS	303742	0.00	0	303742	45	136684	440426	0	440426
SUBTOTAL 3	CONSTRUCTION	6291189	0.00	0	6291189	74	4682505	10973694	2737027	13710721
PROJECT TOTAL		13,663,250	0.00	0	13,663,250	71	9,768,902	23,432,152	6,008,616	29,440,768

1. ESTIMATE PURPOSE

PLANNING/FEASIBILITY ESTIMATE: THIS ESTIMATE WILL BE USED FOR A SCOPING STUDY.

2. ESTIMATE TECHNICAL BASIS

A. THIS ESTIMATE HAS BEEN PREPARED FOR TASK 8 OF THE "HANFORD TANKS INITIATIVE -- SST CLOSURE ASSESSMENT" WORK PACKAGE AWARDED TO SESC BY NHC.

B. A DESCRIPTION OF THE TECHNICAL SCOPE OF WORK MAY BE FOUND IN THE FOLLOWING REFERENCE DOCUMENTS:
* REQUEST FOR ESTIMATE DATED FEB 11, 1998.
* SESC LETTER # SESC-98-006 DATED JAN 9, 1998 WITH ATTACHMENTS.
* NES REPORT "241-AX TANK FARM ANCILLARY EQUIPMENT REMOVAL STUDY" DATED FEBRUARY 1998.

C. THE FOLLOWING CONSTRAINTS AND/OR SPECIAL CONDITIONS EXIST:
MOST OF THE WORK DONE IN THIS ESTIMATE IS DONE INSIDE A HUGE HEPA FILTERED STRUCTURE. THE WORKERS ARE OPERATING FROM INSIDE THE CABS OF THIS EQUIPMENT THAT HAVE SUPPLIED BREATHING AIR AND AIR CONDITIONING. THERE HAS BEEN NO ALLOWANCE FOR BURN-OUT, HOWEVER, SWP AND MASK WORK WAS FACTORED INTO THE PRODUCTIVITY RATES.

3. ESTIMATE METHODOLOGY

A. DIRECT COSTS:
HISTORICAL DATA HAS BEEN USED WHERE APPLICABLE, EXPERT OPINION WAS UTILIZED WHEN OTHER METHODS WERE NOT AVAILABLE AND A BOTTOMS-UP APPROACH WAS APPLIED.

(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: R.S. MEANS AND RICHARDSON'S PROCESS PLANT CONSTRUCTION ESTIMATING STANDARDS.
THESE SOURCES WERE USED AS A BASIS ONLY. THIS BASIS WAS ADJUSTED TO COMPENSATE FOR THE SLOW DOWN OF PRODUCTIVITY CAUSED BY POOR VISIBILITY, LACK OF MANEUVERABILITY, CONGESTION AND EXTRA CARE NEEDED IN HANDLING CONTAMINATED MATERIALS. ALSO FACTORED IN IS THE FIELD TIME LOST BY DAILY WORK PLAN REVIEW MEETINGS, SUITING UP, ENTERING AND EXITING ZONES AND THE TIME SPENT IN THE EQUIPMENT WHILE TRAVELING IN OR OUT OF THE PIT.

B. DIRECT COST FACTORS:

(1) SALES TAX HAS BEEN APPLIED TO ALL MATERIALS AND EQUIPMENT PURCHASES AT 8%.

(2) A FACTOR OF 15% HAS BEEN APPLIED TO DIRECT CRAFT LABOR FOR GENERAL REQUIREMENTS; THIS INCLUDES HAULING MEN AND MATERIAL, CLEAN-UP AND LABOR SUPPORT AND QC INSPECTION.

(3) A FACTOR OF 23.58% HAS BEEN ADDED TO DIRECT LABOR FOR TECHNICAL SERVICES - THIS INCLUDES CONSTRUCTION OVERHEAD OF; MANAGEMENT, SUPERINTENDENT, DOCUMENT CONTROL, TURNOVER, ENGINEERING, SURVEY AND CLERICAL; QUALITY ASSURANCE ENGINEERING, CONSTRUCTION SUPPORT AND PROJECT MANAGEMENT.

(4) CONSUMABLES ARE ESTIMATED AT 3.2% OF DIRECT CRAFT LABOR COSTS.

(5) SPECIAL WORK PROCEDURE (SWP) FACTORS ARE ALREADY INCLUDED IN THE MANHOURS, AS ALL WORK WAS MANLOADED, HAVING TAKEN INTO CONSIDERATION THE PRODUCTIVITY LOSSES DUE TO MASK WORK, SUIT UP, ZONE WORK, ETC.

(6) OVERTIME REQUIREMENTS AND SHIFT DIFFERENTIAL PAY FOR CRAFT LABOR ARE UNION NEGOTIATED UNDER THE HANFORD SITE STABILIZATION AGREEMENT. NO PREMIUM PAY WAS JUDGED TO BE NECESSARY FOR THIS WORK.

(7) GENERAL FOREMAN FACTOR OF 7% HAS BEEN APPLIED TO DIRECT CRAFT LABOR CREWS.

(8) 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 MANAGEMENT & PLANNING SUPPORT.

(9) A FACTOR OF 10% HAS BEEN APPLIED TO DIRECT CRAFT LABOR TO ALLOW FOR USAGE OF GOVERNMENT OWNED EQUIPMENT CONTROLLED BY DYNCORP.

C. INDIRECT COSTS:
FIXED PRICE CONTRACTOR OVERHEAD, PROFIT, BOND AND INSURANCE COSTS HAVE BEEN APPLIED ARE THE FOLLOWING PERCENTAGES: LABOR =25%, EQUIPMENT USE =25%, MATERIAL =25%, SUBCONTRACT =10%, AND EQUIPMENT =25%, AND ARE REFLECTED IN THE "OH&P/B&I" COLUMN OF THE ESTIMATE DETAIL REPORT.

D. RATES:
(1) FOR ESTIMATING PURPOSES, AVERAGE FDNW RATES BY OPERATIONS CODE HAVE BEEN DEVELOPED BASED UPON RECENT COST HISTORY AND ADJUSTED TO REFLECT INDUSTRY AVERAGE AE/CM RATES.
(2) FLUOR DANIEL NORTHWEST SERVICES (CONSTRUCTION CRAFT LABOR) RATES ARE THOSE LISTED IN APPENDIX A OF THE HANFORD SITE STABILIZATION AGREEMENT (HSSA). THE HSSA RATES INCLUDE BASE WAGE, FRINGE BENEFITS AND OTHER COMPENSATION AS NEGOTIATED BETWEEN FLUOR DANIEL HANFORD, INC. AND THE NATIONAL BUILDING AND CONSTRUCTION TRADES DEPARTMENT AFL-CIO. FLUOR DANIEL NORTHWEST COST ESTIMATING INCORPORATES FACTORS TO COVER ADDITIONAL COSTS FOR WORKMANS COMPENSATION, FICA, STATE AND FEDERAL EMPLOYMENT INSURANCE AND G&A/FEE TO DEVELOPE A FULLY BURDENED RATE BY CRAFT.
(3) FDH & PHMC SUBCONTRACTOR STANDARD LABOR RATES ARE THOSE LISTED IN THE FINANCIAL DATA SYSTEM (FDS) FDST 321R REPORT ORGANIZATION RATES PLUS ADDERS.

E. SITE ALLOCATIONS FACTORS:
SITE ALLOCATION FACTORS ARE DEVELOPED AND PROVIDED BY FLUOR DANIEL HANFORD (FDH) FOR ESTIMATING USE.
(1) DYNCORP EQUIPMENT USAGE: APPLIED TO HOME OFFICE ENGINEERING FOR GOVERNMENT OWNED EQUIPMENT CONTROLLED BY DYNCORP 0.25%
(2) GOVERNMENT FURNISHED SERVICES (GFS): APPLIED TO ALL COSTS TO LIQUIDATE GOVERNMENT FURNISHED SERVICES PROVIDED TO THE ENTERPRISE COMPANIES, 7% FOR FDNW.
(3) HANFORD SITE GENERAL ADMINISTRATIVE (G&A): APPLIED TO ALL COSTS TO LIQUIDATE THE COST OF HANFORD GENERAL AND ADMINISTRATIVE SERVICES, 18.0%.

THE ABOVE FACTORS ARE APPLIED TO ESTIMATED COSTS AS SHOWN IN THE PHMCR06 REPORT.

(1) DYNCORP EQUIPMENT USAGE: 0.25% APPLIED TO HOME OFFICE ENGINEERING AND CONSTRUCTION MANAGEMENT LABOR; 10% APPLIED TO CONSTRUCTION LABOR.
(2) FDH GFS/G&A CONST. MGMT: GFS (7%) AND G&A (18.0%) COMPOUNDED AND APPLIED TO FIXED PRICE CONSTRUCTION MANAGEMENT, 26.26%
(3) FDH SUBCONTRACT - G&A/FEE RATE (7.7%) APPLIED TO FIXED PRICE SUBCONTRACTS.
(4) FDH GFS/G&A - LABOR: GFS (7%) AND G&A (18.0%) COMPOUNDED AND APPLIED TO HOME OFFICE ENGINEERING, CONSTRUCTION MANAGEMENT LABOR AND TO FDNWS CONSTRUCTION LABOR AT 26.26%.

4. ESCALATION
==========
ESCALATION PERCENTAGES WERE NOT PROVIDED, ALL COSTS REFLECT CURRENT APRIL 1998 PRICES.

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 AN ENVIRONMENTAL RESTORATION PLANNING ESTIMATE WITH EXPERIMENTAL/SPECIAL CONDITIONS = UP TO 100%

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 110000 DEFINITIVE DESIGN - A 35% CONTINGENCY WAS APPLIED HERE BECAUSE IT IS THE AVERAGE OF ALL THE CONTINGENCIES APPLIED FOR THE CONSTRUCTION ACTIVITIES. IT WAS FELT THAT THE DESIGN PORTION OF THE REMOVAL WAS SUBJECT TO THE SAME RISKS AS THE ASSOCIATED FIELD ACTIVITY. *TOTAL CONTINGENCY = 65%

WBS 120000 ENGINEERING INSPECTION - A 50% CONTINGENCY WAS APPLIED HERE BECAUSE OF THE DIFFICULTY IN PREDICTING TO ANY DEGREE OF ACCURACY THE COSTS TO BE INCURRED DOING THE WASTE SAMPLING PORTION OF THIS ACTIVITY. A 50% GROWTH IN THIS AREA IS ENTIRELY POSSIBLE. *TOTAL CONTINGENCY = 80%

WBS 130000 CONSTRUCTION MANAGEMENT - THE DOLLAR AMOUNT USED FOR THIS ACTIVITY IS NORMALLY AUTOMATICALLY ADDED TO ALL FDNW WORK AS AN ALLOCATION, IT WAS ASSIGNED ITS OWN WBS HERE TO MAKE THIS COST MORE VISIBLE TO THE CUSTOMER. A 30% CONTINGENCY WAS FELT ACCEPTABLE TO COVER COST GROWTH DUE TO A SCHEDULE INCREASE CAUSED BY POTENTIAL UNKNOWN RADIOLOGICAL CONTAMINATION. *TOTAL CONTINGENCY = 60%

WBS 210000 PROCUREMENT - A CONTINGENCY OF 50% HAS BEEN APPLIED DUE TO ADDITIONAL REQUIREMENTS NOT QUOTED BY VENDORS SUCH AS SPECIAL SHIELDED CAB NEEDS (FRESH AIR, COOLING, REMOTE VIEWING, COMMUNICATION, HATCH DOORS) CHASSIS DESIGNED FOR 54,000 LB OF ADDED CAB WEIGHT DUE TO 6" OF STEEL SHIELDING. *TOTAL CONTINGENCY = 80%

WBS 311001 & 311002 INSTRUMENT BUILDINGS - EQUIPMENT SHOULD BE ABLE TO QUICKLY DEMOLISH A PRE-ENGINEERED STEEL BUILDING, HOWEVER, THE CONTENTS THAT MAY REQUIRE HANDS ON REMOVAL ARE UNKNOWN, SO A 30% CONTINGENCY HAS BEEN APPLIED. *TOTAL CONTINGENCY = 50%

WBS 311004 ION EXCHANGE COLUMN - A 50% CONTINGENCY HAS BEEN APPLIED WHICH ALLOWS APPROXIMATELY 3 EXTRA CREW DAYS IN THE EVENT PROPOSED METHODS PROVE UNFEASIBLE AND MORE LABOR INTENSIVE METHODS ARE NEEDED. *TOTAL CONTINGENCY = 70%

WBS 311005 FAN HOUSE - EQUIPMENT SHOULD BE ABLE TO QUICKLY DEMOLISH A PRE-ENGINEERED STEEL BUILDING, HOWEVER, THE FILTER HOUSING/EXHAUST TRAIN MAY PRESENT CONDITIONS NOT ANTICIPATED AND POSSIBLY REQUIRE DECONTAMINATION. A 35% CONTINGENCY WAS APPLIED TO THIS ACTIVITY. *TOTAL CONTINGENCY = 55%

WBS 311006 DEENTRAINER FACILITIES - THE 375 EXCAVATORS AND ATTACHMENTS SHOULD HAVE NO PROBLEMS EXCAVATING THE SOIL OR DEMOLISHING THE CONCRETE, THE ONLY CONCERN HERE IS THE TANKS AND SEAL POT REMOVAL AND SUBSEQUENT LOADING INTO SUITABLE CONTAINERS. A 35% CONTINGENCY WAS FELT ADEQUATE. *TOTAL CONTINGENCY = 55%

WBS 311007 CONDENSER BUILDING - A 50% CONTINGENCY HAS BEEN APPLIED TO THIS ACTIVITY TO COVER THE POSSIBILITY OF DIFFICULTIES IN REMOTELY CUTTING/CRIMPING THIS HIGH RAD PIPING AND EQUIPMENT AND FITTING IT IN SMALL SHIELDED BOXES. THE REMAINING LOWER DOSE PIPE, CONCRETE AND SOIL TO BE LOADED INTO 20 TON ROLL-OFF CONTAINERS SHOULD BE EASILY ATTAINABLE. *TOTAL CONTINGENCY = 70%

WBS 311008 COOLING TOWER AND SUMPS - A 30% CONTINGENCY HAS BEEN APPLIED HERE AS USING THE EQUIPMENT DESCRIBED, THIS SHOULD BE AN EASY TASK TO ACCOMPLISH IN 2 DAYS. *TOTAL CONTINGENCY = 50%

WBS 312001 GROUTING OF WELLS - 30% CONTINGENCY, THIS COST WAS QUOTED BY D.MOAK OF WASTE MANAGEMENT FEDERAL SERVICES WHICH HAS PERFORMED SIMILAR WORK IN THE PAST. THE SIZES, QUANTITIES AND DEPTS CONSIDERED FOR THE COST SHOULD BE ACCURATE. OVERRUN RISK SHOULD BE LOW. *TOTAL CONTINGENCY = 50%

WBS 312002 DRILLING REPLACEMENT WELLS - A 30% CONTINGENCY HAS BEEN APPLIED HERE AS THIS IS A RELATIVELY LOW RISK JOB THAT HAS BEEN PERFORMED MANY TIMES BEFORE AT HANFORD UNDER SIMILAR CONDITIONS. *TOTAL CONTINGENCY = 60%

WBS 313001 GROUT FILL MISCELLANEOUS RISERS - A 35% CONTINGENCY SHOULD SUFFICE HERE DUE TO THE INCREASED RISK OF HAVING TO ALTER THE METHOD OF GROUTING DUE TO EXPOSURE RISKS. *TOTAL CONTINGENCY = 65%

WBS 313002 GROUT AIRLIFT CIRCULATOR RISERS - A 40% CONTINGENCY WAS APPLIED HERE DUE TO THE UNIQUE PROBLEMS POSED BY THIS GROUTING ACTIVITY IN TERMS OF BEING MECHANICALLY CHALLENGING AND HAVING POTENTIAL RADIOLOGICAL RISKS.
*TOTAL CONTINGENCY = 70%

WBS 314001 GROUT LEAK DETECTION PITS - A 30% CONTINGENCY WAS APPLIED HERE AS THIS WAS A RELATIVELY LOW RISK JOB IN THAT THE LEAK DETECTION PITS ARE REPORTED TO HAVE SEEN NO USEAGE SO WOULD NOT CREATE RADIOLOGICAL PROBLEMS.
*TOTAL CONTINGENCY = 60%

WBS 316001 GROUT BURIED PIPE AND DUCT - A 50% CONTINGENCY WAS ALLOWED FOR THIS ACTIVITY AS IT IS AT A HIGH RISK FOR COST GROWTH. EXCAVATING AND TAPPING UNDERGROUND PIPE AND DUCT MAY BE VERY DIFFICULT TO DO AS PROPOSED SHOULD RADIATION DOSES REQUIRE ALTERNATE APPROACHES. THE STALL DISTANCES OF GROUT INJECTION OR OBSTRUCTIONS NOT ANTICIPATED MAY ALSO HAVE A SIZEABLE AFFECT IF MORE EXCAVATING AND TAPPING IS REQUIRED. *TOTAL CONTINGENCY = 80%

WBS 316002 CONCRETE FILL ENCASEMENTS - A 50% CONTINGENCY WAS ALLOWED FOR THIS ACTIVITY AS IT IS AMONG THE MOST LABOR INTENSIVE OPERATIONS PLUS HAS A PROBABILITY OF BEING HIGHLY RADIOACTIVE. IF CONDITIONS ARE FOUND TO BE TOO HOT TO ACCOMPLISH THE WORK AS PROPOSED, OTHER MORE COSTLY METHODS MUST BE CONSIDERED. *TOTAL CONTINGENCY = 80%

WBS 317001 GROUT TANK RELATED PITS - A 35% CONTINGENCY HAS BEEN APPLIED TO THIS ACTIVITY BECAUSE WHILE IT POSES SOME OF THE SAME RISKS AS THE ONE ABOVE, MUCH OF THE TIME CAN BE SPENT AT A SAFER DISTANCE FROM THE RADIATION SOURCE.
*TOTAL CONTINGENCY = 65%

WBS 318001 GROUT OTHER PITS, BOXES & STRUCTURES - A 40% CONTINGENCY WAS USED FOR THIS WORK AS THE EXPOSURE RISK IS SIMILAR TO THE TANK RELATED PITS WITH A SLIGHTLY HIGHER RISK DUE TO CONTAMINATION.
*TOTAL CONTINGENCY = 70%

WBS 321003 CHANGE HOUSE REMOVAL & WBS 321010 COMPRESSOR BUILDING REMOVAL - THESE ACTIVITIES ARE IN A CLEAN AREA AND WORK IS TO BE DONE BY A FIXED PRICE CONTRACTOR BY A COMPETITIVE BID, THEREFORE A 30% CONTINGENCY SHOULD SUFFICE TO COVER ANY UNKNOWNS DUE TO LACK OF DETAIL SHOWN IN DRAWINGS. *TOTAL CONTINGENCY = 60%

WBS 33XXXX DISPOSAL COSTS - THIS ACTIVITY MOSTLY CONSISTS OF DIRT AND RUBBLE DISPOSAL COSTS AT ERDF. COSTS FOR DISPOSAL AT ERDF IS EXPECTED TO DECREASE. THE VOLUME OF MATERIAL SHOULD BE ACCURATE, THEREFORE ONLY 15% CONTINGENCY WAS APPLIED.
*TOTAL CONTINGENCY = 45%

* E. PROGRAMATIC RISK (CONTINGENCY)

*THE ABOVE LISTED CONTINGENCIES INCLUDE AN ADDITIONAL 20% TO 30% CONTINGENCY. THIS IS TO PROVIDE ADDITIONAL CONTINGENCY AGAINST THE PROGRAMATIC RISK SOURCES CAUSED BY THE MINIMAL AMOUNT OF CHARACTERIZATION DATA. WORKER EXPOSURE CHARACTERIZATION ALSO, MAY BE INADEQUATE WHICH COULD IMPACT THE PROPOSED CONCEPTS.

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. THE PROJECT TOTAL SUMMARY LINE TOTALS ARE ADJUSTED/ROUNDED TO THE NEAREST $10,000/$100,000.

7. REMARKS

MAJOR ASSUMPTIONS WHICH HAVE BEEN MADE IN THE PREPARATION OF THIS ESTIMATE ARE AS FOLLOWS:

A.) ALL WASTE MATERIALS ADDRESSED AS GOING TO PPF (PRE-PROCESSING FACILITY) HAVE NO DISPOSAL COSTS SHOWN IN THIS ESTIMATE, THE BURIAL OR TREATMENT COSTS ARE TO BE INCLUDED IN SOME OTHER STUDY.

B.) COSTS FOR ROLL-OFF CONTAINERS AND SHIELDED BURIAL CONTAINERS ARE NOT INCLUDED IN THIS STUDY.

C.) SOME SWP AND MASK WORK HAS BEEN MANLOADED AND INEFFICIENCIES TAKEN INTO ACCOUNT, THEREFORE, NO FURTHER FACTORING PERCENTAGES WERE ADDED, SOME ACTIVITIES WERE BASE ON A UNIT RATE THAT HAVE SWP FACTORS INCLUDED.

D.) BACKFILL MATERIALS ARE ASSUMED TO BE AVAILABLE WITHIN 5 MILES.

F.) COST OF THE CONCRETE BATCH PLANT WAS PART OF AN EARLIER ESTIMATE AND CONSIDERED "FREE" FOR USE IN THIS ESTIMATE.

G.) COSTS FOR BURN-OUT HAVE NOT BEEN FIGURED IN THIS ESTIMATE AS RADIATION LEVELS WERE NOT KNOWN.

H.) COSTS FOR WASTE ACCEPTANCE PROFILE AND WASTE SAMPLING WAS FIGURED TO ADD 5 TO 6 MANYEARS AND THESE COSTS ARE REFLECTED IN WBS 120000 ENGINEERING INSPECTION.

I.) TITLE II AND TITLE III ENGINEERING ARE ASSUMED TO BE PERFORMED BY A LOCAL A/E FIRM. CONSTRUCTION MANAGEMENT IS ASSUMED TO BE PERFORMED BY FLUOR DANIEL NORTHWEST.

J.) IT IS ASSUMED THAT LIGHTLY CONTAMINATED DEBRIS FROM BUILDING DEMOLITION WILL BE ACCEPTABLE FOR DISPOSAL AT ERDF.

K.) THE ESTIMATE ASSUMES THAT, PRIOR TO INITIATION OF WASTE RETRIEVAL OPERATIONS, CONTROL OF AX TANK FARM WOULD PASS FROM THE CURRENT OPERATIONS ACTIVITY TO A SEPARATE RETRIEVAL FUNCTION. AT COMPLETION OF RETRIEVAL, THE CONTROL WOULD BE GIVEN TO A THIRD ENTITY FOR CLOSURE. CURRENT TANK FARM PRACTICES WOULD CHANGE ALLOWING FOR A MORE PRODUCTIVE WORK SHIFT AND ALLOWING FOR MORE CONVENTIONAL CONSTRUCTION PRACTICES SIMILAR TO DOE'S ENVIRONMENTAL RESTORATION CONTRACTORS. FOR FURTHER DESCRIPTIONS OF MAJOR ASSUMPTIONS AND CONCEPTS SEE THE COGEMA REPORT "COGEMA RPT25".

SORT CODE/WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	SUB TOTAL	SITE ALLOCAT'N	TOTAL DOLLARS
BHI	BECHTEL HANFORD INTERNATIONAL									
312002	DRILLING REPLACEMENT WELLS	180000	0.00	0	180000	60	108000	288000	0	288000
	SUBTOTAL 312 WELLS	180000	0.00	0	180000	60	108000	288000	0	288000
	SUBTOTAL 31 CF CONSTRUCTION	180000	0.00	0	180000	60	108000	288000	0	288000
331001	INSTRUMENT BLDG 801-A - DISPOSAL	4800	0.00	0	4800	45	2160	6960	0	6960
331002	INSTRUMENT BLDG 801-B - DISPOSAL	4800	0.00	0	4800	45	2160	6960	0	6960
331005	FAN HOUSE - DISPOSAL	2580	0.00	0	2580	45	1161	3741	0	3741
331006	DEENTRAINER - DISPOSAL	16200	0.00	0	16200	45	7290	23490	0	23490
331007	CONDENSER BUILDING - DISPOSAL	42000	0.00	0	42000	45	18900	60900	0	60900
331008	COOLING TOWER AND SUMPS - DISPOS	12000	0.00	0	12000	45	5400	17400	0	17400
	SUBTOTAL 331 BURIAL / DISPOSAL COSTS	82380	0.00	0	82380	45	37071	119451	0	119451
	SUBTOTAL 3 CONSTRUCTION	262380	0.00	0	262380	55	145071	407451	0	407451
	TOTAL BHI BECHTEL HANFORD INTERNATIONA	262380	0.00	0	262380	55	145071	407451	0	407451
FDNW	FLUOR DANIEL NORTHWEST									
130000	CONSTRUCTION MANAGEMENT	1693292	0.00	0	1693292	60	1015975	2709267	711453	3420720
	SUBTOTAL 1 ENGINEERING	1693292	0.00	0	1693292	60	1015975	2709267	711453	3420720
210000	EQUIPMENT PROCUREMENT	1778157	0.00	0	1778157	80	1422526	3200683	840499	4041182
	SUBTOTAL 2 PROCUREMENT	1778157	0.00	0	1778157	80	1422526	3200683	840499	4041182
311001	801-A INSTRUMENT BUILDING	2840	0.00	0	2840	50	1420	4260	1524	5784
311002	801-B INSTRUMENT BUILDING	2840	0.00	0	2840	50	1420	4260	1524	5784
311004	ION EXCHANGE COLUMN	35546	0.00	0	35546	70	24882	60428	20936	81364
311005	A-702 FAN HOUSE/FILTER BUILDING	2480	0.00	0	2480	55	1364	3844	1372	5216
311006	CAISSONS/DEENTRAINER FACILITIES	8179	0.00	0	8179	55	4498	12677	4560	17237

SORT CODE/WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	SUB TOTAL	SITE ALLOCAT'N	TOTAL DOLLARS
311007	A-401 CONDENSER BUILDING	34697	0.00	0	34697	70	24288	58985	21123	80108
311008	COOLING TOWER AND SUMPS	13454	0.00	0	13454	50	6727	20181	7260	27441
SUBTOTAL 311	FACILITY DEMO - ONSITE	100036	0.00	0	100036	65	64599	164635	58299	222934
313001	GROUT MISC. RISERS	68021	0.00	0	68021	65	44214	112235	40192	152427
313002	GROUT AIRLIFT CIRCULATOR RISERS	510090	0.00	0	510090	70	357063	867153	142504	1009657
SUBTOTAL 313	RISERS	578111	0.00	0	578111	69	401277	979388	182696	1162084
314001	GROUT LEAK DETECTION PITS	23394	0.00	0	23394	60	14036	37430	12398	49828
SUBTOTAL 314	LEAK DETECTION PITS	23394	0.00	0	23394	60	14036	37430	12398	49828
316001	GROUT BURIED PIPE AND DUCT	3799018	0.00	0	3799018	80	3039214	6838232	2254603	9092835
316002	CONCRETE FILL ENCASEMENTS	295531	0.00	0	295531	80	236425	531956	165874	697830
SUBTOTAL 316	GROUT BURIED PIPE & DUC	4094549	0.00	0	4094549	80	3275639	7370188	2420477	9790665
317001	GROUT TANK RELATED PITS	59548	0.00	0	59548	65	38706	98254	32868	131122
SUBTOTAL 317	TANK RELATED PITS	59548	0.00	0	59548	65	38706	98254	32868	131122
318001	GROUT OTHER PITS/BOXES/STRUCTURE	54900	0.00	0	54900	70	38430	93330	29539	122869
SUBTOTAL 318	OTHER PITS/BOXES/STRUCT	54900	0.00	0	54900	70	38430	93330	29539	122869
SUBTOTAL 31	CF CONSTRUCTION	4910538	0.00	0	4910538	78	3832687	8743225	2736277	11479502
321003	CHANGE HOUSE	6095	0.00	0	6095	60	3657	9752	750	10502
SUBTOTAL 321	FACILITY DEMO - F/P	6095	0.00	0	6095	60	3657	9752	750	10502
SUBTOTAL 32	FIXED PRICE CONSTRUCTIO	6095	0.00	0	6095	60	3657	9752	750	105[illegible]
331003	CHANGE HOUSE - DISPOSAL	690	0.00	0	690	45	311	1001	0	100[illegible]

SORT CODE/WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	SUB TOTAL	SITE ALLOCAT'N	TOTAL DOLLARS
331004	ION EXCHANGE COLUMN - DISPOSAL	94991	0.00	0	94991	45	42746	137737	0	137737
SUBTOTAL 331	BURIAL / DISPOSAL COSTS	95681	0.00	0	95681	45	43057	138738	0	138738
SUBTOTAL 3	CONSTRUCTION	5012314	0.00	0	5012314	77	3879401	8891715	2737027	11628742
TOTAL FDNW	FLUOR DANIEL NORTHWEST	8483763	0.00	0	8483763	74	6317902	14801665	4288979	19090644
LMHC	LOCKHEED MARTIN HANFORD CORP.									
110000	DEFINITIVE DESIGN	3150626	0.00	0	3150626	65	2047907	5198533	1365134	6563667
120000	ENGINEERING/INSPECTION	749986	0.00	0	749986	80	599989	1349975	354503	1704478
SUBTOTAL 1	ENGINEERING	3900612	0.00	0	3900612	68	2647896	6548508	1719637	8268145
311001	801-A INSTRUMENT BUILDING	764	0.00	0	764	50	382	1146	0	1146
311002	801-B INSTRUMENT BUILDING	764	0.00	0	764	50	382	1146	0	1146
311004	ION EXCHANGE COLUMN	3822	0.00	0	3822	70	2675	6497	0	6497
311005	A-702 FAN HOUSE/FILTER BUILDING	1146	0.00	0	1146	55	630	1776	0	1776
311006	CAISSONS/DEENTRAINER FACILITIES	1529	0.00	0	1529	55	841	2370	0	2370
311007	A-401 CONDENSER BUILDING	4587	0.00	0	4587	70	3211	7798	0	7798
311008	COOLING TOWER AND SUMPS	764	0.00	0	764	50	382	1146	0	1146
SUBTOTAL 311	FACILITY DEMO - ONSITE	13376	0.00	0	13376	64	8503	21879	0	21879
312001	GROUTING OF WELLS	51602	0.00	0	51602	50	25801	77403	0	77403
312002	DRILLING REPLACEMENT WELLS	4778	0.00	0	4778	60	2867	7645	0	7645
SUBTOTAL 312	WELLS	56380	0.00	0	56380	51	28668	85048	0	85048
313001	GROUT MISC. RISERS	12232	0.00	0	12232	65	7951	20183	0	20183
313002	GROUT AIRLIFT CIRCULATOR RISERS	76448	0.00	0	76448	70	53514	129962	0	129962
SUBTOTAL 313	RISERS	88680	0.00	0	88680	69	61465	150145	0	150145
314001	GROUT LEAK DETECTION PITS	3058	0.00	0	3058	60	1835	4893	0	4893

SORT CODE/WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	SUB TOTAL	SITE ALLOCAT'N	TOTAL DOLLARS
	SUBTOTAL 314 LEAK DETECTION PITS	3058	0.00	0	3058	60	1835	4893	0	4893
316001	GROUT BURIED PIPE AND DUCT	397530	0.00	0	397530	80	318024	715554	0	715554
316002	CONCRETE FILL ENCASEMENTS	53132	0.00	0	53132	80	42506	95638	0	95638
	SUBTOTAL 316 GROUT BURIED PIPE & DUC	450662	0.00	0	450662	80	360530	811192	0	811192
317001	GROUT TANK RELATED PITS	3058	0.00	0	3058	65	1988	5046	0	5046
	SUBTOTAL 317 TANK RELATED PITS	3058	0.00	0	3058	65	1988	5046	0	5046
318001	GROUT OTHER PITS/BOXES/STRUCTURE	3440	0.00	0	3440	70	2408	5848	0	5848
	SUBTOTAL 318 OTHER PITS/BOXES/STRUCT	3440	0.00	0	3440	70	2408	5848	0	5848
	SUBTOTAL 31 CF CONSTRUCTION	618654	0.00	0	618654	75	465397	1084051	0	1084051
	TOTAL LMHC LOCKHEED MARTIN HANFORD COR	4519266	0.00	0	4519266	69	3113293	7632559	1719637	9352196
WMHI	WASTE MANAGEMENT HANFORD, INC.									
331005	FAN HOUSE - DISPOSAL	3785	0.00	0	3785	45	1703	5488	0	5488
331006	DEENTRAINER - DISPOSAL	33772	0.00	0	33772	45	15197	48969	0	48969
331007	CONDENSER BUILDING - DISPOSAL	88124	0.00	0	88124	45	39656	127780	0	127780
	SUBTOTAL 331 BURIAL / DISPOSAL COSTS	125681	0.00	0	125681	45	56556	182237	0	182237
	TOTAL WMHI WASTE MANAGEMENT HANFORD, I	125681	0.00	0	125681	45	56556	182237	0	182237
WMNW	WASTE MGMT FED SERVICES NORTHWEST									
312001	GROUTING OF WELLS	272160	0.00	0	272160	50	136080	408240	0	408240
	SUBTOTAL 312 WELLS	272160	0.00	0	272160	50	136080	408240	0	40824[illegible]

SORT CODE/WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	SUB TOTAL	SITE ALLOCAT'N	TOTAL DOLLARS
SUBTOTAL 31	CF CONSTRUCTION	272160	0.00	0	272160	50	136080	408240	0	408240
SUBTOTAL 3	CONSTRUCTION	1016495	0.00	0	1016495	65	658033	1674528	0	1674528
TOTAL WMNW	WASTE MGMT FED SERVICES NOR	272160	0.00	0	272160	50	136080	408240	0	408240
PROJECT TOTAL		13,663,250	0.00	0	13,663,250	71	9,768,902	23,432,152	6,008,616	29,440,768

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	CONSTRUCTION MANAGEMENT %	CONSTRUCTION MANAGEMENT TOTAL	OTHER COSTS	SUB TOTAL	TOTAL
110000	DEFINITIVE DESIGN	3150626	0.00	0	0	0	3150626
120000	ENGINEERING/INSPECTION	749986	0.00	0	0	0	749986
130000	CONSTRUCTION MANAGEMENT	1693292	0.00	0	0	0	1693292
SUBTOTAL 1	ENGINEERING	5593904		0	0	0	5593904
210000	EQUIPMENT PROCUREMENT	1778157	0.00	0	0	0	1778157
SUBTOTAL 2	PROCUREMENT	1778157		0	0	0	1778157
311001	801-A INSTRUMENT BUILDING	3604	0.00	0	0	0	3604
311002	801-B INSTRUMENT BUILDING	3604	0.00	0	0	0	3604
311004	ION EXCHANGE COLUMN	39368	0.00	0	0	0	39368
311005	A-702 FAN HOUSE/FILTER BUILDING	3626	0.00	0	0	0	3626
311006	CAISSONS/DEENTRAINER FACILITIES	9708	0.00	0	0	0	9708
311007	A-401 CONDENSER BUILDING	39284	0.00	0	0	0	39284
311008	COOLING TOWER AND SUMPS	14218	0.00	0	0	0	14218
SUBTOTAL 311	FACILITY DEMO - ONSITE C.F.	113412		0	0	0	113412
312001	GROUTING OF WELLS	323762	0.00	0	0	0	323762
312002	DRILLING REPLACEMENT WELLS	184778	0.00	0	0	0	184778
SUBTOTAL 312	WELLS	621952		0	0	0	621952
313001	GROUT MISC. RISERS	80253	0.00	0	0	0	80253
313002	GROUT AIRLIFT CIRCULATOR RISERS	586538	0.00	0	0	0	586538
SUBTOTAL 313	RISERS	1288743		0	0	0	1288743
314001	GROUT LEAK DETECTION PITS	26452	0.00	0	0	0	26452
SUBTOTAL 314	LEAK DETECTION PITS	1315195		0	0	0	1315195
316001	GROUT BURIED PIPE AND DUCT	4196548	0.00	0	0	0	4196548

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	CONSTRUCTION MANAGEMENT %	CONSTRUCTION MANAGEMENT TOTAL	OTHER COSTS	SUB TOTAL	TOTAL
316002	CONCRETE FILL ENCASEMENTS	348663	0.00	0	0	0	348663
SUBTOTAL 316	GROUT BURIED PIPE & DUCT	5860406		0	0	0	5860406
317001	GROUT TANK RELATED PITS	62606	0.00	0	0	0	62606
SUBTOTAL 317	TANK RELATED PITS	5923012		0	0	0	5923012
318001	GROUT OTHER PITS/BOXES/STRUCTURES	58340	0.00	0	0	0	58340
SUBTOTAL 318	OTHER PITS/BOXES/STRUCTURES	5981352		0	0	0	5981352
SUBTOTAL 31	CF CONSTRUCTION	5981352		0	0	0	5981352
321003	CHANGE HOUSE	6095	0.00	0	0	0	6095
SUBTOTAL 321	FACILITY DEMO - F/P	5987447		0	0	0	5987447
SUBTOTAL 32	FIXED PRICE CONSTRUCTION	5987447		0	0	0	5987447
331001	INSTRUMENT BLDG 801-A - DISPOSAL	4800	0.00	0	0	0	4800
331002	INSTRUMENT BLDG 801-B - DISPOSAL	4800	0.00	0	0	0	4800
331003	CHANGE HOUSE - DISPOSAL	690	0.00	0	0	0	690
331004	ION EXCHANGE COLUMN - DISPOSAL	94991	0.00	0	0	0	94991
331005	FAN HOUSE - DISPOSAL	6365	0.00	0	0	0	6365
331006	DEENTRAINER - DISPOSAL	49972	0.00	0	0	0	49972
331007	CONDENSER BUILDING - DISPOSAL	130124	0.00	0	0	0	130124
331008	COOLING TOWER AND SUMPS - DISPOSAL	12000	0.00	0	0	0	12000
SUBTOTAL 331	BURIAL / DISPOSAL COSTS	6291189		0	0	0	6291189
SUBTOTAL 3	CONSTRUCTION	6291189		0	0	0	6291189
PROJECT TOTAL		13,663,250		0	0	0	13,663,250

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
110000	DEFINITIVE DESIGN	3150626	0	0	0	827354	0	827354
120000	ENGINEERING/INSPECTION	749986	0	0	0	196946	0	196946
130000	CONSTRUCTION MANAGEMENT	1693292	0	0	0	444658	0	444658
SUBTOTAL 1	ENGINEERING	5593904	0	0	0	1468958	0	1468958
210000	EQUIPMENT PROCUREMENT	1778157	0	0	0	0	466944	466944
SUBTOTAL 2	PROCUREMENT	1778157	0	0	0	0	466944	466944
311001	801-A INSTRUMENT BUILDING	3604	271	0	0	712	33	1016
311002	801-B INSTRUMENT BUILDING	3604	271	0	0	712	33	1016
311004	ION EXCHANGE COLUMN	39368	3343	0	0	8780	192	12315
311005	A-702 FAN HOUSE/FILTER BUILDING	3626	234	0	0	615	36	885
311006	CAISSONS/DEENTRAINER FACILITIES	9708	795	0	0	2086	61	2942
311007	A-401 CONDENSER BUILDING	39284	3313	0	0	8699	413	12425
311008	COOLING TOWER AND SUMPS	14218	1307	0	0	3432	101	4840
SUBTOTAL 311	FACILITY DEMO - ONSITE C.F.	113412	9534	0	0	25036	869	35439
312001	GROUTING OF WELLS	323762	0	0	0	0	0	0
312002	DRILLING REPLACEMENT WELLS	184778	0	0	0	0	0	0
SUBTOTAL 312	WELLS	508540	0	0	0	0	0	0
313001	GROUT MISC. RISERS	80253	6497	0	0	17061	801	24359
313002	GROUT AIRLIFT CIRCULATOR RISERS	586538	14986	0	0	39354	29486	83826
SUBTOTAL 313	RISERS	666791	21483	0	0	56415	30287	108185
314001	GROUT LEAK DETECTION PITS	26452	1932	0	0	5074	743	7749
SUBTOTAL 314	LEAK DETECTION PITS	26452	1932	0	0	5074	743	7749
316001	GROUT BURIED PIPE AND DUCT	4196548	269154	0	0	706799	276604	1252557

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
316002	CONCRETE FILL ENCASEMENTS	348663	24005	0	0	63037	5110	92152
SUBTOTAL 316	GROUT BURIED PIPE & DUCT	4545211	293159	0	0	769836	281714	1344709
317001	GROUT TANK RELATED PITS	62606	4545	0	0	11934	3441	19920
SUBTOTAL 317	TANK RELATED PITS	62606	4545	0	0	11934	3441	19920
318001	GROUT OTHER PITS/BOXES/STRUCTURES	58340	3485	0	0	9152	4739	17376
SUBTOTAL 318	OTHER PITS/BOXES/STRUCTURES	58340	3485	0	0	9152	4739	17376
SUBTOTAL 31	CF CONSTRUCTION	5981352	334138	0	0	877447	321793	1533378
321003	CHANGE HOUSE	6095	0	0	469	0	0	469
SUBTOTAL 321	FACILITY DEMO - F/P	6095	0	0	469	0	0	469
SUBTOTAL 32	FIXED PRICE CONSTRUCTION	6095	0	0	469	0	0	469
331001	INSTRUMENT BLDG 801-A - DISPOSAL	4800	0	0	0	0	0	0
331002	INSTRUMENT BLDG 801-B - DISPOSAL	4800	0	0	0	0	0	0
331003	CHANGE HOUSE - DISPOSAL	690	0	0	0	0	0	0
331004	ION EXCHANGE COLUMN - DISPOSAL	94991	0	0	0	0	0	0
331005	FAN HOUSE - DISPOSAL	6365	0	0	0	0	0	0
331006	DEENTRAINER - DISPOSAL	49972	0	0	0	0	0	0
331007	CONDENSER BUILDING - DISPOSAL	130124	0	0	0	0	0	0
331008	COOLING TOWER AND SUMPS - DISPOSAL	12000	0	0	0	0	0	0
SUBTOTAL 331	BURIAL / DISPOSAL COSTS	303742	0	0	0	0	0	0
SUBTOTAL 3	CONSTRUCTION	6291189	334138	0	469	877447	321793	1533847
PROJECT TOTAL		13,663,250	334,138	0	469	2,346,405	788,737	3,469,749

WBS	DESCRIPTION	SITE ALLOC SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
110000	DEFINITIVE DESIGN	827354	0.00	0	827354	65	537780	1365134
120000	ENGINEERING/INSPECTION	196946	0.00	0	196946	80	157557	354503
130000	CONSTRUCTION MANAGEMENT	444658	0.00	0	444658	60	266795	711453
SUBTOTAL 1	ENGINEERING	1468958	0.00	0	1468958	65	962132	2431090
210000	EQUIPMENT PROCUREMENT	466944	0.00	0	466944	80	373555	840499
SUBTOTAL 2	PROCUREMENT	466944	0.00	0	466944	80	373555	840499
311001	801-A INSTRUMENT BUILDING	1016	0.00	0	1016	50	508	1524
311002	801-B INSTRUMENT BUILDING	1016	0.00	0	1016	50	508	1524
311004	ION EXCHANGE COLUMN	12315	0.00	0	12315	70	8621	20936
311005	A-702 FAN HOUSE/FILTER BUILDING	885	0.00	0	885	55	487	1372
311006	CAISSONS/DEENTRAINER FACILITIES	2942	0.00	0	2942	55	1618	4560
311007	A-401 CONDENSER BUILDING	12425	0.00	0	12425	70	8698	21123
311008	COOLING TOWER AND SUMPS	4840	0.00	0	4840	50	2420	7260
SUBTOTAL 311	FACILITY DEMO - ONSITE C.F.	35439	0.00	0	35439	65	22860	58299
312001	GROUTING OF WELLS	0	0.00	0	0	0	0	0
312002	DRILLING REPLACEMENT WELLS	0	0.00	0	0	0	0	0
SUBTOTAL 312	WELLS	0	0.00	0	0	0	0	0
313001	GROUT MISC. RISERS	24359	0.00	0	24359	65	15833	40192
313002	GROUT AIRLIFT CIRCULATOR RISERS	83826	0.00	0	83826	70	58678	142504
SUBTOTAL 313	RISERS	108185	0.00	0	108185	69	74511	182696
314001	GROUT LEAK DETECTION PITS	7749	0.00	0	7749	60	4649	12398
SUBTOTAL 314	LEAK DETECTION PITS	7749	0.00	0	7749	60	4649	12398
316001	GROUT BURIED PIPE AND DUCT	1252557	0.00	0	1252557	80	1002046	2254603

WBS	DESCRIPTION	SITE ALLOC SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
316002	CONCRETE FILL ENCASEMENTS	92152	0.00	0	92152	80	73722	165874
SUBTOTAL 316	GROUT BURIED PIPE & DUCT	1344709	0.00	0	1344709	80	1075768	2420477
317001	GROUT TANK RELATED PITS	19920	0.00	0	19920	65	12948	32868
SUBTOTAL 317	TANK RELATED PITS	19920	0.00	0	19920	65	12948	32868
318001	GROUT OTHER PITS/BOXES/STRUCTURES	17376	0.00	0	17376	70	12163	29539
SUBTOTAL 318	OTHER PITS/BOXES/STRUCTURES	17376	0.00	0	17376	70	12163	29539
SUBTOTAL 31	CF CONSTRUCTION	1533378	0.00	0	1533378	78	1202899	2736277
321003	CHANGE HOUSE	469	0.00	0	469	60	281	750
SUBTOTAL 321	FACILITY DEMO - F/P	469	0.00	0	469	60	281	750
SUBTOTAL 32	FIXED PRICE CONSTRUCTION	469	0.00	0	469	60	281	750
331001	INSTRUMENT BLDG 801-A - DISPOSAL	0	0.00	0	0	0	0	0
331002	INSTRUMENT BLDG 801-B - DISPOSAL	0	0.00	0	0	0	0	0
331003	CHANGE HOUSE - DISPOSAL	0	0.00	0	0	0	0	0
331004	ION EXCHANGE COLUMN - DISPOSAL	0	0.00	0	0	0	0	0
331005	FAN HOUSE - DISPOSAL	0	0.00	0	0	0	0	0
331006	DEENTRAINER - DISPOSAL	0	0.00	0	0	0	0	0
331007	CONDENSER BUILDING - DISPOSAL	0	0.00	0	0	0	0	0
331008	COOLING TOWER AND SUMPS - DISPOSAL	0	0.00	0	0	0	0	0
SUBTOTAL 331	BURIAL / DISPOSAL COSTS	0	0.00	0	0	0	0	0
SUBTOTAL 3	CONSTRUCTION	1533847	0.00	0	1533847	78	1203180	2737027
PROJECT TOTAL		3,469,749	0.00	0	3,469,749	73	2,538,867	6,008,616

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING CORP.
JOB NO. Z466AAE1
FILE NO. Z466AAE1

** IEST - INTERACTIVE ESTIMATING **
ANCILLARY EQUIPMENT GROUT IN PLACE
241-AX TANK FARM CLOSURE - PLANNING ESTIMATE
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

DATE 04/22/98 10:09:24
BY R.OHRT

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
110000	DEFINITIVE DESIGN										
110000.90	HOME OFFICE LABOR										
110000.9020002	***************************** DEFINITIVE DESIGN *****************************	000	0	0	0	0	0	0	0	0	0
110000.9020003	*SAFETY ANALYSIS/DOCUMENT-* ATION ALLOWANCE.	000	1 LS	26785	2000036	0	0	0	0	0	2000036
110000.9020005	PROCEDURES, AIR PERMITTING, SPECIFICATIONS AND DRAWINGS AT 15% OF CONSTRUCTION, WBS' 21, 31 AND 32.	000	1 LS	15409	1150590	0	0	0	0	0	1150590
SUBTOTAL	HOME OFFICE LABOR			42,194	3,150,626	0	0	0	0	0	3,150,626
TOTAL	COST CODE 00090 WBS 110000 (ESCALATION 0.00% - CONTINGENCY 65.00 %)			42,194	3,150,626	0	0	0	0	0	3,150,626
TOTAL WBS 110000 DEFINITIVE DESIGN				42,194	3,150,626	0	0	0	0	0	3,150,626

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
120000	ENGINEERING/INSPECTION										
120000.90	HOME OFFICE LABOR										
120000.9020002	****************************** ENGINEERING INSPECTION ******************************	000	0	0	0	0	0	0	0	0	0
120000.9020003	WASTE ACCEPTANCE PROFILE AND WASTE SAMPLING, ALLOWANCE	000	1 LS	11914	749986	0	0	0	0	0	749986
SUBTOTAL	HOME OFFICE LABOR			11,914	749,986	0	0	0	0	0	749,986
TOTAL	COST CODE 00090 WBS 120000 (ESCALATION 0.00% - CONTINGENCY 80.00 %)			11,914	749,986	0	0	0	0	0	749,986
TOTAL WBS 120000 ENGINEERING/INSPECTION				11,914	749,986	0	0	0	0	0	749,986

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
130000	CONSTRUCTION MANAGEMENT										
130000.90	HOME OFFICE LABOR										
130000.9050003	****************************** CONSTRUCTION MANAGEMENT ******************************	000	0	0	0	0	0	0	0	0	0
130000.9050005	AT 23.58% OF WBS 31. THIS COVERS ALL CPAF WORK.	000	1 LS	26859	1690774	0	0	0	0	0	1690774
130000.9050007	AT 35.3% OF WBS 32. THIS COVERS ALL FIXED PRICE WORK.	000	1 LS	40	2518	0	0	0	0	0	2518
SUBTOTAL	HOME OFFICE LABOR			26,899	1,693,292	0	0	0	0	0	1,693,292
TOTAL	COST CODE 00090 WBS 130000 (ESCALATION 0.00% - CONTINGENCY 60.00 %)			26,899	1,693,292	0	0	0	0	0	1,693,292
TOTAL WBS 130000 CONSTRUCTION MANAGEMENT				26,899	1,693,292	0	0	0	0	0	1,693,292

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
210000	EQUIPMENT PROCUREMENT										
210000.01	DEMOLITION										
210000.0101000	**************************** EQUIPMENT PROCUREMENT ****************************	460	0	0	0	0	0	0	0	0	0
210000.0101002	CATERPILLAR 375 EXCAVATOR	460	1 EA	0	0	0	814000	0	0	40700	854700
210000.0101004	HYDRAULIC CIRCUIT OPTION	460	1 EA	0	0	0	15340	0	0	767	16107
210000.0101006	ELEVATED CAB	460	1 EA	0	0	0	23400	0	0	1170	24570
210000.0101008	SHIELDED CAB ALLOWANCE	460	1 EA	0	0	0	400000	0	0	20000	420000
210000.0101010	UP-70 BASE UNIT	460	1 EA	0	0	0	77000	0	0	3850	80850
210000.0101012	SHEAR JAW	460	1 EA	0	0	0	45000	0	0	2250	47250
210000.0101014	PULVERIZER	460	1 EA	0	0	0	33000	0	0	1650	34650
210000.0101016	HYDRAULIC BREAKER, MB5950	460	1 EA	0	0	0	99000	0	0	4950	103950
210000.0101018	QUICK COUPLER	460	1 EA	0	0	0	5700	0	0	285	5985
210000.0101020	COUPLER	460	1 EA	0	0	0	600	0	0	30	630
210000.0101022	GUZZLER	460	1 EA	0	0	0	25000	0	0	1250	26250
210000.0101024	MOYNO PUMPS	460	3 EA	0	0	0	30000	0	0	1500	31500
SUBTOTAL	DEMOLITION			0		0		0		78,402	
					0		1,568,040		0		1,646,442
	SALES TAX 8.00 %						125443		0		125443
	OH&P (ON MARKUPS ONLY)									6272	6272
TOTAL	COST CODE 46001			0		0		0		84,674	
	WBS 210000				0		1,693,483		0		1,778,157
	(ESCALATION 0.00% - CONTINGENCY 80.00 %)										
TOTAL WBS 210000	EQUIPMENT PROCUREMENT			0		0		0		84,674	
					0		1,693,483		0		1,778,157

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
311001	801-A INSTRUMENT BUILDING										
311001.07	SITE IMPROVEMENTS										
311001.0710002	*************************** 801-A INSTRUMENT BUILDING ***************************	460 W	0	0	0	0	0	0	0	0	0
311001.0780060	UTILIZING CATERPILLAR 375 EXCAVATOR WITH HYDRAULIC BREAKER, PULVERIZER, SHEAR & BUCKET ATTACHMENTS,	460 W	0	0	0	0	0	0	0	0	0
311001.0780061	DEMOLISH PREENGINEERED STEEL BUILDING, 25' X 16' X 10' EAVE HEIGHT WITH SLAB ON GRADE FOUNDATION (13 CY),	460 W	0	0	0	0	0	0	0	0	0
311001.0780062	EQUIPMENT AND PIPING. USING A 988 CATERPILLAR LOADER, LOAD INTO 20 TON CONTAINERS AND HAUL TO ERDF.	460 W	0	0	0	0	0	0	0	0	0
311001.0780070	1 EQ OPERATOR	460 W	1 DAY	8	269	0	0	0	0	0	269
311001.0780072	1 EQ OILER	460 W	1 DAY	8	269	0	0	0	0	0	269
311001.0780074	1 MILLWRIGHT	460 W	1 DAY	8	270	0	0	0	0	0	270
311001.0780076	1 LABORER	460 W	1 DAY	8	230	0	0	0	0	0	230
311001.0780078	1 TEAMSTER	460 W	1 DAY	8	270	0	0	0	0	0	270
311001.0780080	2 ELECTRICIANS	460 W	1 DAY	8	325	0	0	0	0	0	325
311001.0780090	ALLOWANCE FOR LINERS, ONE FOR EACH ROLL-OFF CONTAINER LOAD @ $15. EACH.	460 W	4 EA	0	0	0	60	0	0	3	63
SUBTOTAL	SITE IMPROVEMENTS	(SWP)		48		0		0		3	
					1,633		60		0		1,696
	CONSUMABLES 3.20 %						52				52
	SWP 35.00%			16	571						571
	GENERAL FOREMAN 7.00 %			4	154						154
	GENERAL REQUIREMENTS 15.00 %			10	353						353
	SALES TAX 8.00 %						8		0		8
	OH&P (ON MARKUPS ONLY)									3	3
TOTAL	COST CODE 46007			79		0		0		6	
	WBS 311001				2,712		121		0		2,839
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										

311001.92 CONST. SERVICES, SUPPLIES & EXPENCE

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
311001.9214002	***************************** HPT'S *****************************	460	0	0	0	0	0	0	0	0	0
311001.9214004	1 MAN FOR 2 DAYS	460	1 LS	16	764	0	0	0	0	0	764
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			16		0		0		0	
					764		0		0		764
TOTAL	COST CODE 46092			16		0		0		0	
	WBS 311001				764		0		0		764
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
TOTAL WBS 311001 801-A INSTRUMENT BUILDING				95		0		0		6	
					3,476		121		0		3,603

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
311002	801-B INSTRUMENT BUILDING										
311002.07	SITE IMPROVEMENTS										
311002.0710002	**************************** 801-B INSTRUMENT BUILDING ****************************	460 W	0	0	0	0	0	0	0	0	0
311002.0780060	UTILIZING CATERPILLAR 375 EXCAVATOR WITH HYDRAULIC BREAKER, PULVERIZER, SHEAR & BUCKET ATTACHMENTS,	460 W	0	0	0	0	0	0	0	0	0
311002.0780061	DEMOLISH PREENGINEERED STEEL BUILDING, 25' X 16' X 10' EAVE HEIGHT WITH SLAB ON GRADE FOUNDATION (13 CY),	460 W	0	0	0	0	0	0	0	0	0
311002.0780062	EQUIPMENT AND PIPING. USING A 988 CATERPILLAR LOADER, LOAD INTO 20 TON CONTAINERS AND HAUL TO ERDF.	460 W	0	0	0	0	0	0	0	0	0
311002.0780070	1 EQ OPERATOR	460 W	1 DAY	8	269	0	0	0	0	0	269
311002.0780072	1 EQ OILER	460 W	1 DAY	8	269	0	0	0	0	0	269
311002.0780074	1 MILLWRIGHT	460 W	1 DAY	8	270	0	0	0	0	0	270
311002.0780076	1 LABORER	460 W	1 DAY	8	230	0	0	0	0	0	230
311002.0780078	1 TEAMSTER	460 W	1 DAY	8	270	0	0	0	0	0	270
311002.0780080	2 ELECTRICIANS	460 W	1 DAY	8	325	0	0	0	0	0	325
311002.0780090	ALLOWANCE FOR LINERS, ONE FOR EACH ROLL-OFF CONTAINER LOAD @ @15. EACH.	460 W	4 EA	0	0	0	60	0	0	3	63
SUBTOTAL	SITE IMPROVEMENTS	(SWP)		48		0		0		3	
					1,633		60		0		1,696
	CONSUMABLES 3.20 %						52				52
	SWP 35.00%			16	571						571
	GENERAL FOREMAN 7.00 %			4	154						154
	GENERAL REQUIREMENTS 15.00 %			10	353						353
	SALES TAX 8.00 %						8		0		8
	OH&P (ON MARKUPS ONLY)									3	3
TOTAL	COST CODE 46007			79		0		0		6	
	WBS 311002				2,712		121		0		2,839
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
311002.92	CONST. SERVICES, SUPPLIES & EXPENCE										

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
311002.9214002	***************************** HPT'S *****************************	460	0	0	0	0	0	0	0	0	0
311002.9214004	1 MAN FOR 2 DAYS	460	1 LS	16	764	0	0	0	0	0	764
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			16	764	0	0	0	0	0	764
TOTAL	COST CODE 46092 WBS 311002 (ESCALATION 0.00% - CONTINGENCY 50.00 %)			16	764	0	0	0	0	0	764
TOTAL WBS 311002 801-B INSTRUMENT BUILDING				95	3,476	0	121	0	0	6	3,603

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
311004	*ION EXCHANGE COLUMN*										
311004.07	SITE IMPROVEMENTS										
311004.0740000	**************************** ION EXCHANGE COLUMN ****************************	460 W	0	0	0	0	0	0	0	0	0
311004.0740002	THE ION EXCHANGE COLUMN WILL BE REMOVED INTACT WITH THE SURROUNDING TOWER AFTER SEV- ERING THE TOWER AT JUST	460 W	0	0	0	0	0	0	0	0	0
311004.0740004	BELOW THE 692'-6" ELEVATION. USING A 40 TON CRANE, LOWER THE BURIAL CONTAINER (MADE OF 1" TH. STEEL) OVER THE	460 W	0	0	0	0	0	0	0	0	0
311004.0740006	6'-6" DIA TOWER. ANCHOR THE CONTAINER TO TOWER, UNBOLT 1" FLANGES (4 EA) AT BOTTOM OF VESSEL, SEVER 9" THICK	460 W	0	0	0	0	0	0	0	0	0
311004.0740008	TOWER USING A WIRE SAW. SET CONTAINER ON LOWBOY AND SEAL WELD LID AND PENETRATIONS. DISPOSE OF AS CAT 3 LLW.	460 W	0	0	0	0	0	0	0	0	0
311004.0740020	1 PIC	460 W	2 DAY	16	962	0	0	0	0	0	962
311004.0740022	1 OPERATOR	460 W	2 DAY	16	537	0	0	0	0	0	537
311004.0740024	1 OILER	460 W	2 DAY	16	537	0	0	0	0	0	537
311004.0740026	1 RIGGER	460 W	2 DAY	16	593	0	0	0	0	0	593
311004.0740028	2 IRONWORKERS	460 W	2 DAY	32	1187	0	0	0	0	0	1187
311004.0740030	2 BOILERMAKERS	460 W	2 DAY	32	1187	0	0	0	0	0	1187
311004.0740032	1 TEAMSTER	460 W	2 DAY	16	539	0	0	0	0	0	539
311004.0740034	4 LABORERS	460 W	2 DAY	64	1839	0	0	0	0	0	1839
311004.0740050	REMOVE PIG, SAMPLE CELL RE-1 AND FILTER F-1, DISCONNECT ALL SMALL BORE PIPING. LOAD INTO BURIAL CONTAINER AND	460 W	0	0	0	0	0	0	0	0	0
311004.0740052	HAUL TO BURIAL AS CATEGORY 3 LLW.	460 W	0	0	0	0	0	0	0	0	0
311004.0740060	1 PIC	460 W	2 DAY	16	962	0	0	0	0	0	962
311004.0740062	1 OPERATOR	460 W	2 DAY	16	537	0	0	0	0	0	537
311004.0740064	1 OILER	460 W	2 DAY	16	537	0	0	0	0	0	537
311004.0740066	1 RIGGER	460 W	2 DAY	16	593	0	0	0	0	0	593
311004.0740068	2 PIPEFITTERS	460 W	2 DAY	32	1320	0	0	0	0	0	1320
311004.0740070	1 TEAMSTER	460 W	2 DAY	16	539	0	0	0	0	0	539

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
311004.0740074	2 LABORERS	460 W	2 DAY	32	920	0	0	0	0	0	920
311004.0740100	USING CATERPILLAR 375 EXCAV-ATOR AND ATTACHMENTS FOR DEMOLITION ALONG WITH A CATERPILLAR 988 LOADER,	460 W	0	0	0	0	0	0	0	0	0
311004.0740102	REMOVE REMAINING CONCRETE STRUCTURE, ABOVE GRADE PIPE AND EQUIPMENT.	460 W	0	0	0	0	0	0	0	0	0
311004.0740110	1 PIC	460 W	2 DAY	16	962	0	0	0	0	0	962
311004.0740112	2 OPERATORS	460 W	1 DAY	16	537	0	0	0	0	0	537
311004.0740114	1 OILER	460 W	1 DAY	8	269	0	0	0	0	0	269
311004.0740116	1 MILLWRIGHT	460 W	1 DAY	8	270	0	0	0	0	0	270
311004.0740118	2 PIPEFITTERS	460 W	2 DAY	32	1320	0	0	0	0	0	1320
311004.0740120	4 LABORERS	460 W	2 DAY	64	1839	0	0	0	0	0	1839
311004.0740130	UTILIZING A L9000 DIRT GUZZLER TO AID HAND DIGGING, EXCAVATE AND REMOVE UNDER-GROUND PIPE AND LOAD INTO	460 W	0	0	0	0	0	0	0	0	0
311004.0740132	20 TON ROLL-OFF CONTAINERS AND HAUL TO ERDF, APPROX 25 CY OR 50 TONS.	460 W	0	0	0	0	0	0	0	0	0
311004.0740140	1 PIC	460 W	1 DAY	8	481	0	0	0	0	0	481
311004.0740142	1 OPERATORS	460 W	1 DAY	8	269	0	0	0	0	0	269
311004.0740144	1 TEAMSTER	460 W	1 DAY	8	270	0	0	0	0	0	270
311004.0740146	2 LABORERS	460 W	1 DAY	16	460	0	0	0	0	0	460
311004.0740148	2 PIPEFITTERS	460 W	1 DAY	16	660	0	0	0	0	0	660
311004.0740150	1 GUZZLER W/TRUCK	460 W	1 DAY	8	0	0	0	0	320	0	320
311004.0740155	COST FOR ROLL-OFF CONTAINER LINERS @ $15. EACH.	460 W	3 EA	0	0	0	0	0	960	0	960
SUBTOTAL	SITE IMPROVEMENTS	(SWP)		560	20,126	0	0	0	1,280	0	21,406
	CONSUMABLES 3.20 %						644				644
	SWP 35.00%			196	7044						7044
	GENERAL FOREMAN 7.00 %			52	1901						1901
	GENERAL REQUIREMENTS 15.00 %			121	4360						4360
	SALES TAX 8.00 %						51		102		153
	OH&P (ON MARKUPS ONLY)									34	34
TOTAL	COST CODE 46007 WBS 311004 (ESCALATION 0.00% - CONTINGENCY 70.00 %)			930	33,432	0	695	0	1,382	34	35,545

311004.92 CONST. SERVICES, SUPPLIES & EXPENCE

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
311004.9214002	**************************** HPT'S ****************************	460	0	0	0	0	0.	0	0	0	0
311004.9214004	ONE MAN FOR JOB DURATION OF 10 DAYS	460	1 LS	80	3822	0	0	0	0	0	3822
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			80	3,822	0	0	0	0	0	3,822
TOTAL	COST CODE 46092 WBS 311004 (ESCALATION 0.00% - CONTINGENCY 70.00 %)			80	3,822	0	0	0	0	0	3,822
TOTAL WBS 311004 ION EXCHANGE COLUMN				1,010	37,254	0	695	0	1,382	34	39,367

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
311005	A-702 FAN HOUSE/FILTER BUILDING										
311005.07	SITE IMPROVEMENTS										
311005.0750002	***************************** FAN HOUSE *****************************	460	0	0	0	0	0	0	0	0	0
311005.0750004	REMOVE, BAG AND DISPOSE OF 6 HEPA FILTERS, HAUL TO LLBG	460	0	0	0	0	0	0	0	0	0
311005.0750006	PLANT OPERATORS (2)	460	4 HRS	8	382	0	0	0	0	0	382
311005.0750009	TEAMSTER (1)	460	4 HRS	8	270	0	0	0	0	0	270
311005.0750014	UTILIZING CATERPILLAR 375 EXCAVATOR WITH HYDRAULIC BREAKER, PULVERIZER, SHEAR & BUCKET ATTACHMENTS,	460	0	0	0	0	0	0	0	0	0
311005.0750016	DEMOLISH PREFABRICATED STEEL BUILDING, 24' X 36' X 12' EAVE HEIGHT WITH SLAB ON GRADE FOUNDATION (20 CY),	460	0	0	0	0	0	0	0	0	0
311005.0750018	EQUIPMENT AND PIPING. USING A 988 CATERPILLAR LOADER, LOAD INTO 20 TON CONTAINERS AND HAUL TO ERDF.	460	0	0	0	0	0	0	0	0	0
311005.0750030	1 EQ OPERATOR	460	1 DAY	8	269	0	0	0	0	0	269
311005.0750032	1 EQ OILER	460	1 DAY	8	269	0	0	0	0	0	269
311005.0750036	1 MILLWRIGHT	460	1 DAY	8	270	0	0	0	0	0	270
311005.0750038	1 LABORER	460	1 DAY	8	230	0	0	0	0	0	230
311005.0750040	1 TEAMSTER	460	1 DAY	8	270	0	0	0	0	0	270
311005.0750042	2 ELECTRICIANS	460	1 DAY	8	325	0	0	0	0	0	325
311005.0750050	ALLOWANCE FOR LINERS, ONE FOR EACH 20 TON LOAD @ $15. EACH.	460	4 EA	0	0	0	60	0	0	3	63
SUBTOTAL	SITE IMPROVEMENTS			64	2,285	0	60	0	0	3	2,348
	CONSUMABLES 3.20 %						73				73
	GENERAL FOREMAN 7.00 %			4	159						159
	GENERAL REQUIREMENTS 15.00 %			10	366						366
	SALES TAX 8.00 %						10		0		10
	OH&P (ON MARKUPS ONLY)									4	4
TOTAL	COST CODE 46007 WBS 311005			78	2,811	0	143	0	0	7	2,96[illegible]

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
	(ESCALATION 0.00% - CONTINGENCY 55.00 %)										
311005.92	CONST. SERVICES, SUPPLIES & EXPENCE										
311005.9214002	*************************** HPT'S ***************************	460	0	0	0	0	0	0	0	0	0
311005.9214004	1 MAN FOR 2 DAYS	460	1 LS	16	764	0	0	0	0	0	764
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			16		0		0		0	
					764		0		0		764
TOTAL	COST CODE 46092			16		0		0		0	
	WBS 311005				764		0		0		764
	(ESCALATION 0.00% - CONTINGENCY 55.00 %)										
TOTAL WBS 311005	A-702 FAN HOUSE/FILTER BUILDING			94		0		0		7	
					3,575		143		0		3,726

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
311006	CAISSONS/DEENTRAINER FACILITIES										
311006.07	SITE IMPROVEMENTS										
311006.0760002	****************************** DEENTRAINER FACILITIES ******************************	460	0	0	0	0	0	0	0	0	0
311006.0760100	UTILIZING CATERPILLAR 375 EXCAVATOR WITH HYDRAULIC BREAKER, PULVERIZER, SHEAR & BUCKET ATTACHMENTS, EXCAVATE	460	0	0	0	0	0	0	0	0	0
311006.0760102	AT SIDES OF CAISSONS TO VAPOR HEADER PIPING, CUT AND CRIMP THIS OFF. REMOVE CAIS-SON CULVERT SECTIONS, THEN	460	0	0	0	0	0	0	0	0	0
311006.0760104	DIG OUT TANKS K1-5-1, K1-5-2 K1-5-2A, SEAL POT, ASSOCIAT-ED DUCT AND CONCRETE. DISPOSE OF THE 3 TANKS AND	460	0	0	0	0	0	0	0	0	0
311006.0760106	SEAL POT AS RMW WITH THE REMAINDER TO GO TO LOW LEVEL BURIAL GROUNDS.	460	0	0	0	0	0	0	0	0	0
311006.0760110	2 OPERATORS	460	4 DAY	64	2150	0	0	0	0	0	2150
311006.0760112	2 OILERS	460	4 DAY	64	2150	0	0	0	0	0	2150
311006.0760118	2 TEAMSTERS	460	4 DAY	64	2157	0	0	0	0	0	2157
311006.0760200	WASTE GENERATED: SOIL VOL (ERDF) = 270 TONS METAL AND CONCRETE VOL (LLW) = 200 CF	460	0	0	0	0	0	0	0	0	0
311006.0760202	3 DEENTRAINER TANKS AND SEAL POT (RMW) = 150 CF	460	0	0	0	0	0	0	0	0	0
SUBTOTAL	SITE IMPROVEMENTS			192		0		0		0	
					6,457		0		0		6,457
	CONSUMABLES 3.20 %						206				206
	GENERAL FOREMAN 7.00 %			13	451						451
	GENERAL REQUIREMENTS 15.00 %			30	1036						1036
	SALES TAX 8.00 %						16		0		16
	OH&P (ON MARKUPS ONLY)									11	11
TOTAL	COST CODE 46007			236		0		0		11	
	WBS 311006				7,945		223		0		8,179
	(ESCALATION 0.00% - CONTINGENCY 55.00 %)										
311006.92	CONST. SERVICES, SUPPLIES & EXPENCE										

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
311006.9214002	**************************** HPT'S ****************************	460	0	0	0	0	0	0	0	0	0
311006.9214004	ALLOWANCE FOR ONE MAN FOR 4 DAYS.	460	1 LS	32	1529	0	0	0	0	0	1529
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			32	1,529	0	0	0	0	0	1,529
TOTAL	COST CODE 46092 WBS 311006 (ESCALATION 0.00% - CONTINGENCY 55.00 %)			32	1,529	0	0	0	0	0	1,529
TOTAL WBS 311006 CAISSONS/DEENTRAINER FACILITIES				268	9,474	0	223	0	0	11	9,708

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
311007	A-401 CONDENSER BUILDING										
311007.07	SITE IMPROVEMENTS										
311007.0780002	**************************** CONDENSER BUILDING ****************************	460	0	0	0	0	0	0	0	0	0
311007.0780003	THIS BUILDING IS MADE OF RE- INFORCED CONCRETE WITH COVER BLOCKS OVER THE 3 CELLS AND OVER THE HOT PIPE GALLERY.	460	0	0	0	0	0	0	0	0	0
311007.0780004	TOP OF BUILDING IS SLIGHTLY ABOVE FINISH GRADE.	460	0	0	0	0	0	0	0	0	0
311007.0780006	REMOVE COVER BLOCKS (42 EA) OVER THE 3 CONDENSERS AND FROM THE HOT PIPE GALLERY (10 EA). EXCAVATE TO EXPOSE	460	0	0	0	0	0	0	0	0	0
311007.0780008	SOUTH SIDE OF BUILDING. DEM- OLISH THIS WALL TO ACCESS HOT-PIPE GALLERY. SHEAR OFF PIPE AND HEADERS AND LOAD	460	0	0	0	0	0	0	0	0	0
311007.0780010	INTO SHIELDED BOXES. DEMOL- ISH INSIDE WALLS TO EXPOSE THE 3 CONDENSERS. CUT/CRIMP PIPE AND SUPPORTS. TWO IRON-	460	0	0	0	0	0	0	0	0	0
311007.0780012	WORKERS WILL NEED TO QUICKLY RIG THESE TO AVOID UNNECES- SARY DOSES. LOAD THESE THREE CONDENSERS INTO BURIAL CONT-	460	0	0	0	0	0	0	0	0	0
311007.0780014	AINERS TO BE DISPOSED OF AS RMW.	460	0	0	0	0	0	0	0	0	0
311007.0780020	UTILIZING A 988 LOADER AND A 375 EXCAVATOR WITH HYDRAULIC BREAKER, PULVERIZER, SHEAR & BUCKET ATTACHMENTS, CUT AND	460	0	0	0	0	0	0	0	0	0
311007.0780022	REMOVE REMAINING PIPING, PULVERIZE, LOAD AND REMOVE WALLS AND FOUNDATION.	460	0	0	0	0	0	0	0	0	0
311007.0780024	INVENTORY INCLUDES APPROX. 343 CY REINFORCED CONCRETE, 25' OF 20" PIPE, 50' OF 16" PIPE, 80' OF 8" PIPE & 50'	460	0	0	0	0	0	0	0	0	0
311007.0780026	OF SMALL BORE, PLUS ASSOCIA- TED EQUIPMENT. LOAD INTO 20	460	0	0	0	0	0	0	0	0	0

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
	TON ROLL-OFF CONTAINERS AND HAUL TO ERDF.										
311007.0780068	1 PIC	460	12 DAY	96	5772	0	0	0	0	0	5772
311007.0780070	2 OPERATORS	460	12 DAY	192	6449	0	0	0	0	0	6449
311007.0780072	2 OILERS	460	12 DAY	192	6449	0	0	0	0	0	6449
311007.0780078	2 TEAMSTERS	460	12 DAY	192	6470	0	0	0	0	0	6470
311007.0780080	2 IRONWORKERS	460	3 DAY	48	1780	0	0	0	0	0	1780
311007.0780090	ALLOWANCE FOR LINERS, ONE FOR EACH 20 TON LOAD @ $15. EACH FOR MATERIAL GOING TO ERDF.	460	35 EA	0	0	0	525	0	0	26	551
311007.0780200	WASTE GENERATED: CONDENSERS AND RELATED PIPE (RMW) = 3320 CF PIPE/CONC (ERDF) = 700 TONS	460	0	0	0	0	0	0	0	0	0
SUBTOTAL	SITE IMPROVEMENTS			720		0		0		26	
					26,920		525		0		27,471
	CONSUMABLES 3.20 %						861				861
	GENERAL FOREMAN 7.00 %			50	1884						1884
	GENERAL REQUIREMENTS 15.00 %			115	4320						4320
	SALES TAX 8.00 %						110		0		110
	OH&P (ON MARKUPS ONLY)									48	48
TOTAL	COST CODE 46007			885		0		0		74	
	WBS 311007				33,125		1,497		0		34,697
	(ESCALATION 0.00% - CONTINGENCY 70.00 %)										
311007.92	CONST. SERVICES, SUPPLIES & EXPENCE										
311007.9214002	**************************** HPT'S ****************************	460	0	0	0	0	0	0	0	0	0
311007.9214004	MAN STEP-OFF PAD, 1 MAN FOR 12 DAYS.	460	1 L/S	96	4587	0	0	0	0	0	4587
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			96		0		0		0	
					4,587		0		0		4,587
TOTAL	COST CODE 46092			96		0		0		0	
	WBS 311007				4,587		0		0		4,587
	(ESCALATION 0.00% - CONTINGENCY 70.00 %)										

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
TOTAL WBS 311007 A-401 CONDENSER BUILDING				981	37,712	0	1,497	0	0	74	39,284

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
311008	COOLING TOWER AND SUMPS										
311008.06	*ENVIRONMENTAL WORK*										
311008.0680002	***************************** COOLING TOWER & SUMPS *****************************	460	0	0	0	0	0	0	0	0	0
311008.0680003	UTILIZING CATERPILLAR 375 EXCAVATORS AND ATTACHMENTS, UNCOVER TWO 11'-6" X 11'-6" X 11'-6" HIGH CONCRETE SUMPS	460	0	0	0	0	0	0	0	0	0
311008.0680004	AND ASSOCIATED EQUIPMENT AND PIPE, ONE 12' X 24' X 18' H COOLING TOWER (METAL) AND CONCRETE FOUNDATION, STEM	460	0	0	0	0	0	0	0	0	0
311008.0680005	WALL AND ASSOCIATED EQUIP-MENT AND PIPING. LOAD INTO 20-TON ROLL-OFF CONTAINERS AND HAUL TO ERDF.	460	0	0	0	0	0	0	0	0	0
311008.0680010	OPERATORS (2)	460	2 DAY	32	1075	0	0	0	0	0	1075
311008.0680012	OILERS (2)	460	2 DAY	32	1075	0	0	0	0	0	1075
311008.0680014	MILLWRIGHTS (2)	460	2 DAY	32	1081	0	0	0	0	0	1081
311008.0680016	LABORERS (2)	460	2 DAY	32	920	0	0	0	0	0	920
311008.0680018	TEAMSTERS (2)	460	2 DAY	32	1078	0	0	0	0	0	1078
311008.0680030	ALLOWANCE FOR LINERS, ONE FOR EACH 20 TON LOAD @ $15. EACH.	460	10 EA	160	5392	0	0	0	0	0	5392
SUBTOTAL	ENVIRONMENTAL WORK			320		0		0		0	
					10,621		0		0		10,621
	CONSUMABLES 3.20 %						339				339
	GENERAL FOREMAN 7.00 %			22	743						743
	GENERAL REQUIREMENTS 15.00 %			51	1704						1704
	SALES TAX 8.00 %						27		0		27
	OH&P (ON MARKUPS ONLY)									18	18
TOTAL	COST CODE 46006			393		0		0		18	
	WBS 311008				13,069		367		0		13,454
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
311008.92	CONST. SERVICES, SUPPLIES & EXPENCE										
311008.9214002	***************************** HPT'S	460	0	0	0	0	0	0	0	0	0

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
	*****************************										
311008.9214004	1 MAN FOR 2 DAYS	460	1 LS	16	764	0	0	0	0	0	764
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			16	764	0	0	0	0	0	764
TOTAL	COST CODE 46092 WBS 311008 (ESCALATION 0.00% - CONTINGENCY 50.00 %)			16	764	0	0	0	0	0	764
TOTAL WBS 311008 COOLING TOWER AND SUMPS				409	13,833	0	367	0	0	18	14,218

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
312001	GROUTING OF WELLS										
312001.07	SITE IMPROVEMENTS										
312001.0750002	***************************** CASING PERFORATION *****************************	460	0	0	0	0	0	0	0	0	0
312001.0750004	THE CASINGS WILL BE PERFORA- TED PRIOR TO GROUTING. THIS OPERATION WILL BE PERFORMED BY WASTE MANAGEMENT FEDERAL	460	0	0	0	0	0	0	0	0	0
312001.0750005	SERVICES NORTHWEST OPERA- TIONS. THESE COSTS ARE BASED ON A LETTER DATED 01/15/98 FROM DONALD J. MOAK "AX TANK	460	0	0	0	0	0	0	0	0	0
312001.0750008	FARM WELL DECOMMISSIONING".	460	0	0	0	0	0	0	0	0	0
312001.0750010	135 DAYS @ $1800/DAY, PLUS $200 OTHER DIRECT COSTS.	460	135 DAY	0	0	0	27000	243000	0	0	270000
SUBTOTAL	SITE IMPROVEMENTS			0	0	0	27,000	243,000	0	0	270,000
	SALES TAX 8.00 %						2160		0		2160
TOTAL	COST CODE 46007 WBS 312001 (ESCALATION 0.00% - CONTINGENCY 50.00 %)			0	0	0	29,160	243,000	0	0	272,160
312001.92	CONST. SERVICES, SUPPLIES & EXPENCE										
312001.9214002	***************************** HPT'S *****************************	460	0	0	0	0	0	0	0	0	0
312001.9214004	HPT TO MAN STEP OFF PAD	460	135 DAY	1080	51602	0	0	0	0	0	51602
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			1,080	51,602	0	0	0	0	0	51,602
TOTAL	COST CODE 46092 WBS 312001 (ESCALATION 0.00% - CONTINGENCY 50.00 %)			1,080	51,602	0	0	0	0	0	51,602
TOTAL WBS 312001 GROUTING OF WELLS				1,080	51,602	0	29,160	243,000	0	0	323,76[illegible]

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
312002	DRILLING REPLACEMENT WELLS										
312002.07	SITE IMPROVEMENTS										
312002.0750002	**************************** WELL DRILLING ****************************	460	0	0	0	0	0	0	0	0	0
312002.0750004	DRILL 3 REPLACEMENT GROUND-WATER WELLS, 4" STAINLESS STEEL, 300 FT DEEP.	460	900 LF	0	0	0	0	180000	0	0	180000
SUBTOTAL	SITE IMPROVEMENTS			0	0	0	0	180,000	0	0	180,000
TOTAL	COST CODE 46007 WBS 312002 (ESCALATION 0.00% - CONTINGENCY 60.00 %)			0	0	0	0	180,000	0	0	180,000
312002.92	CONST. SERVICES, SUPPLIES & EXPENCE										
312002.9214002	**************************** HPT'S ****************************	460	0	0	0	0	0	0	0	0	0
312002.9214004	HPT TO MAN STEP OFF PAD DURING WELL DRILLING.	460	1 LS	100	4778	0	0	0	0	0	4778
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			100	4,778	0	0	0	0	0	4,778
TOTAL	COST CODE 46092 WBS 312002 (ESCALATION 0.00% - CONTINGENCY 60.00 %)			100	4,778	0	0	0	0	0	4,778
TOTAL WBS 312002 DRILLING REPLACEMENT WELLS				100	4,778	0	0	180,000	0	0	184,778

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
313001	GROUT MISC. RISERS										
313001.06	ENVIRONMENTAL WORK										
313001.0600100	*****************************	460 W	0	0	0	0	0	0	0	0	0
	GROUT FILL MISC. RISERS										
	*****************************										
313001.0600102	PRELIMINARY WORK FOR THIS	460 W	0	0	0	0	0	0	0	0	0
	ACTIVITY WILL CONSIST OF										
	REMOVING THE PROTECTIVE										
	COVERS FROM THE RISERS AND										
313001.0600104	EXCAVATING AS NECESSARY TO	460 W	0	0	0	0	0	0	0	0	0
	CLEAN AND CLEAR THE AREA FOR										
	THE PUMPING.										
	ALLOW AN AVERAGE OF 4 MAN-										
313001.0600106	HOURS PER RISER FOR THIS	460 W	0	0	0	0	0	0	0	0	0
	ACTIVITY, ASSUME AN EQUAL										
	AMOUNT OF TIME FOR BOTH										
	LABORERS AND PIPEFITTERS.										
313001.0600108	LABORERS	460 W	102 EA	204	5863	0	0	0	0	0	5863
313001.0600110	PIPEFITTERS	460 W	102 EA	204	8413	0	0	0	0	0	8413
313001.0600120	PUMP WITH GROUT. THE CREW	460 W	0	0	0	0	0	0	0	0	0
	WILL CONSIST OF 1 PIC, 2										
	HELPERS, 3 LABORERS, 2 PIPE-										
	FITTERS, 1 OPERATOR AND 1										
313001.0600122	IRONWORKER.	460 W	0	0	0	0	0	0	0	0	0
	ASSUME THREE RISERS WILL BE										
	FILLED SIMULTANEOUSLY, 30										
	MINUTES WILL BE REQUIRED TO										
313001.0600124	SET UP FOR EACH SUCCESSIVE	460 W	0	0	0	0	0	0	0	0	0
	GROUP OF 3 RISERS AND 2-1/2										
	HOURS PER DAY WILL BE REQ-										
	UIRED FOR MORNING START-UP,										
313001.0600126	CLEAN UP/RESTART AT NOON AND	460 W	0	0	0	0	0	0	0	0	0
	END OF DAY CLEAN UP. THIS										
	PRODUCTION RATE WILL ALLOW										
	FOR AN AVERAGE OF FOUR SETS										
313001.0600128	OF THREE RISERS OR 12 RISERS	460 W	0	0	0	0	0	0	0	0	0
	TO BE DONE PER DAY. AT THIS										
	RATE, THE JOB WILL REQUIRE										
	8.5 DAYS PLUS THE 35% SWP										
313001.0600130	ADDER.	460 W	0	0	0	0	0	0	0	0	0
313001.0600140	GROUT RISERS	460 W	102 EA	680	24834	0	0	0	0	0	24834

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING CORP.
JOB NO. Z466AAE1
FILE NO. Z466AAE1

** IEST - INTERACTIVE ESTIMATING **
ANCILLARY EQUIPMENT GROUT IN PLACE
241-AX TANK FARM CLOSURE - PLANNING ESTIMATE
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

DATE 04/22/98 10:09:27
BY R.OHRT

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
313001.0600150	GROUT COST, 30 CY	460 W	30 CY	0	0	0	1440	0	0	72	1512
SUBTOTAL	ENVIRONMENTAL WORK		(SWP)	1,088		0		0		72	
					39,110		1,440		0		40,622
	CONSUMABLES 3.20 %						1251				1251
	SWP 35.00%			380	13688						13688
	GENERAL FOREMAN 7.00 %			102	3695						3695
	GENERAL REQUIREMENTS 15.00 %			235	8474						8474
	SALES TAX 8.00 %						215		0		215
	OH&P (ON MARKUPS ONLY)									73	73
TOTAL	COST CODE 46006			1,807		0		0		145	
	WBS 313001				64,968		2,906		0		68,020
	(ESCALATION 0.00% - CONTINGENCY 65.00 %)										
313001.92	CONST. SERVICES, SUPPLIES & EXPENCE										
313001.9214002	*****************************	460	0	0	0	0	0	0	0	0	0
	HPT'S										
	*****************************										
313001.9214004	ASSUME 2 HPT'S FOR 16 DAYS	460	1 LS	256	12232	0	0	0	0	0	12232
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			256		0		0		0	
					12,232		0		0		12,232
TOTAL	COST CODE 46092			256		0		0		0	
	WBS 313001				12,232		0		0		12,232
	(ESCALATION 0.00% - CONTINGENCY 65.00 %)										
TOTAL WBS 313001	GROUT MISC. RISERS			2,063		0		0		145	
					77,200		2,906		0		80,252

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
313002	GROUT AIRLIFT CIRCULATOR RISERS										
313002.06	ENVIRONMENTAL WORK										
313002.0600100	****************************	460	0	0	0	0	0	0	0	0	0
	EXCAVATE ACCESS PITS										
	****************************										
313002.0600104	REMOVE SOIL DOWN TO TANK	460	0	0	0	0	0	0	0	0	0
	DOME TO EXPOSE RISER AND										
	SUPPORT PEDESTAL.										
313002.0600106	EXCAVATE 6 FT DIAMETER BY	460	0	0	0	0	0	0	0	0	0
	9'-9" DEEP PIT USING SLIP										
	SHORING. QUANTITY OF PITS IS										
	88 FOR A TOTAL OF 900 CY OR										
313002.0600107	1150 TONS.	460	0	0	0	0	0	0	0	0	0
	CREW CONSISTS OF:										
313002.0600108	1 PIC	460	0	0	0	0	0	0	0	0	0
	2 PIPEFITTERS										
	1 OPERATOR										
	2 LABORERS										
313002.0600110	1 L9000 DIRT GUZZLER	460	0	0	0	0	0	0	0	0	0
	ASSUME 4 CREW HOURS PER PIT.										
313002.0600114	EXCAVATE PITS	460	88 EA	2112	82262	14080	74800	0	0	3740	174882
313002.0600130	AT JOB COMPLETION, BACKFILL	460	0	0	0	0	0	0	0	0	0
	AND COMPACT USING CATERPIL-										
	LAR D-4E DOZER AND PAN TYPE										
	COMPACTORS.										
313002.0600132	CREW WILL CONSIST OF:	460	0	0	0	0	0	0	0	0	0
	1 PIC										
	1 OPERATORS										
	4 LABORERS										
313002.0600138	BACKFILL & COMPACT	460	1080 CY	324	11269	1760	0	0	0	0	13029
313002.0600200	****************************	460	0	0	0	0	0	0	0	0	0
	AIRLIFT CIRCULATOR										
	PERFORATION AND GROUTING										
	****************************										
313002.0600202	TO GROUT ISOLATED VOID	460	0	0	0	0	0	0	0	0	0
	INSIDE 6" DIA RISER ON THE										
	OUTSIDE OF 1" DIA PIPE, A										
	SPECIAL PERFORATION TOOL										
313002.0600204	MUST BE UTILIZED WHICH WILL	460	0	0	0	0	0	0	0	0	0
	BE A SMALLER VERSION OF										
	PRESENTLY AVAILABLE PERFOR-										

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
313002.0600206	ATION TOOLS. ASSUME FABRICA- TION OR PURCHASE COST TO BE $20,000 FOR THE FIRST ONE AND $1200 EACH THEREAFTER.	460	0	0	0	0	0	0	0	0	0
313002.0600208	ASSUME A USEFUL LIFE OF 6 RISERS FOR A TOTAL REQUIRE- MENT OF 15 TOOLS AT AN AVER- AGE PRICE OF $2500 EACH.	460	0	0	0	0	0	0	0	0	0
313002.0600210	PERFORATION TOOL	460	15 EA	0	0	0	0	37500	0	0	37500
313002.0600250	PERFORATE 1" PIPE UTILIZING PERFORATION TOOL AND FILL VOID WITH GROUT. CREW WILL	460	0	0	0	0	0	0	0	0	0
313002.0600251	CONSIST OF 3 MEN FROM WASTE MANAGEMENT. ALLOW FOR 36 LF PER DAY INCLUDING PRE-PLAN-	460	0	0	0	0	0	0	0	0	0
313002.0600252	NING, WORK PLANS, SET-UP TIME AND SUITING UP AT $1800 PER DAY PLUS $200 PER DAY OTHER DIRECT COSTS. THERE	460	0	0	0	0	0	0	0	0	0
313002.0600254	ARE 3410 TOTAL FEET AT 36 FT PER DAY = 95 DAYS. GROUT VOLUME WILL BE 672 CF.	460	0	0	0	0	0	0	0	0	0
313002.0600260	PERFORATE PIPE	460	95 DAY	0	0	0	19000	171000	0	950	190950
313002.0600262	DECON PERFORATION TOOL, ASSUME 2 LABORERS 2 HOURS EA	460	88 EA	352	10116	0	1320	0	0	66	11502
313002.0600300	**************************** THERMOCOUPLE WELL GROUTING ****************************	460	0	0	0	0	0	0	0	0	0
313002.0600302	THE 3/4" CONDUIT, DUE TO ITS SMALL DIAMETER WILL BE CAULKED INSTEAD OF GROUTED.	460	0	0	0	0	0	0	0	0	0
313002.0600304	A SPECIAL CUT-OFF TOOL WILL BE REQUIRED TO SEVER THE CONDUIT JUST BENEATH THE LOWER SIDE OF TANK DOME.	460	0	0	0	0	0	0	0	0	0
313002.0600306	FOR THIS TOOL, ASSUME FABRI- CATION OR PURCHASE COST TO BE $20,000 FOR THE FIRST ONE AND $1200 EACH THEREAFTER.	460	0	0	0	0	0	0	0	0	0
313002.0600308	ASSUME A USEFUL LIFE OF 25 CUTS FOR A TOTAL REQUIRE- MENT OF 4 TOOLS FOR A TOTAL	460	0	0	0	0	0	0	0	0	0

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING CORP.
JOB NO. Z466AAE1
FILE NO. Z466AAE1

** IEST - INTERACTIVE ESTIMATING **
ANCILLARY EQUIPMENT GROUT IN PLACE
241-AX TANK FARM CLOSURE - PLANNING ESTIMATE
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 27
DATE 04/22/98 10:09:27
BY R.OHRT

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
	COST OF $23,600.										
313002.0600310	CUT-OFF TOOL	460	4 EA	0	0	0	0	23600	0	0	23600
313002.0600350	SEVER 3/4" THERMOCOUPLE WELL AND FILL VOID WITH CAULK. THE CREW WILL CONSIST OF: 1 PIC	460	0	0	0	0	0	0	0	0	0
313002.0600352	1 OPERATOR 2 LABORERS ASSUME THE CREW CAN CUT AND CAULK 6 THERMOWELLS A DAY,	460	0	0	0	0	0	0	0	0	0
313002.0600354	INCLUDING INEFFICIENCIES DUE TO SWP'S, ZONE WORK, ETC.	460	0	0	0	0	0	0	0	0	0
313002.0600360	CUT AND CAULK THERMOWELLS	460	88 EA	480	18144	0	0	0	0	0	18144
SUBTOTAL	ENVIRONMENTAL WORK			3,268		15,840		232,100		4,756	
					121,791		95,120		0		469,607
	CONSUMABLES 3.20 %						3897				3897
	GENERAL FOREMAN 7.00 %			228	8525						8525
	GENERAL REQUIREMENTS 15.00 %			524	19547						19547
	SALES TAX 8.00 %						7921		0		7921
	OH&P (ON MARKUPS ONLY)									590	590
TOTAL	COST CODE 46006			4,021		15,840		232,100		5,346	
	WBS 313002				149,863		106,938		0		510,089
	(ESCALATION 0.00% - CONTINGENCY 70.00 %)										
313002.92	CONST. SERVICES, SUPPLIES & EXPENCE										
313002.9214002	**************************** HPT'S ****************************	460	0	0	0	0	0	0	0	0	0
313002.9214004	ASSUME 2 HPT'S FOR 100 DAYS	460	1 LS	1600	76448	0	0	0	0	0	76448
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			1,600		0		0		0	
					76,448		0		0		76,448
TOTAL	COST CODE 46092			1,600		0		0		0	
	WBS 313002				76,448		0		0		76,448
	(ESCALATION 0.00% - CONTINGENCY 70.00 %)										
TOTAL WBS 313002	GROUT AIRLIFT CIRCULATOR RISERS			5,621		15,840		232,100		5,346	
					226,311		106,938		0		586,53

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
314001	GROUT LEAK DETECTION PITS										
314001.06	ENVIRONMENTAL WORK										
314001.0600100	***************************** GROUT LEAK DETECTION PITS *****************************	460 W	0	0	0	0	0	0	0	0	0
314001.0600102	COREDRILL 3" DIAMETER HOLES THROUGH THE FOUR 2'-6" THICK COVER BLOCKS OVER PUMP PITS. CREW CONSISTS OF:	460 W	0	0	0	0	0	0	0	0	0
314001.0600104	1 PIC	460 W	4 EA	24	1443	0	0	0	0	0	1443
314001.0600106	1 OPERATOR	460 W	4 EA	48	1510	240	0	0	0	0	1750
314001.0600108	1 LABORER	460 W	4 EA	48	1292	0	0	0	0	0	1292
314001.0600110	PULL MONITORING PLUG FROM COVER BLOCK, INSTALL HEPA EXHAUSTER. PUMP GROUT INTO PITS (4 EA). PULL COVER	460 W	0	0	0	0	0	0	0	0	0
314001.0600112	BLOCKS AND REMOVE 6" BLIND FLANGE FROM RADIATION DETECTION WELL AND FILL WITH GROUT (4 EA).	460 W	0	0	0	0	0	0	0	0	0
314001.0600120	1 PIC	460 W	4 DAY	32	1924	0	0	0	0	0	1924
314001.0600122	1 OPERATOR	460 W	4 DAY	32	1007	0	0	0	0	0	1007
314001.0600124	1 TEAMSTER	460 W	4 DAY	32	1010	0	0	0	0	0	1010
314001.0600126	4 LABORERS	460 W	4 DAY	128	3446	0	0	0	0	0	3446
314001.0600130	GROUT	460 W	1200 CF	0	0	0	2124	0	0	106	2230
314001.0600132	HEPA SYSTEM	460 W	1 LS	0	0	1000	0	0	0	0	1000
SUBTOTAL	ENVIRONMENTAL WORK		(SWP)	344		1,240		0		106	
					11,632		2,124		0		15,102
	CONSUMABLES 3.20 %						372				372
	SWP 35.00%			120	4071						4071
	GENERAL FOREMAN 7.00 %			32	1099						1099
	GENERAL REQUIREMENTS 15.00 %			74	2520						2520
	SALES TAX 8.00 %						199		0		199
	OH&P (ON MARKUPS ONLY)									28	28
TOTAL	COST CODE 46006			571		1,240		0		134	
	WBS 314001				19,322		2,695		0		23,393
	(ESCALATION 0.00% - CONTINGENCY 60.00 %)										
314001.92	CONST. SERVICES, SUPPLIES & EXPENCE										

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
314001.9214002	***************************** HPT'S *****************************	460	0	0	0	0	0	0	0	0	0
314001.9214004	ASSUME 1 HPT FOR 8 DAYS	460	1 LS	64	3058	0	0	0	0	0	3058
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			64	3,058	0	0	0	0	0	3,058
TOTAL	COST CODE 46092 WBS 314001 (ESCALATION 0.00% - CONTINGENCY 60.00 %)			64	3,058	0	0	0	0	0	3,058
TOTAL WBS 314001 GROUT LEAK DETECTION PITS				635	22,380	1,240	2,695	0	0	134	26,451

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
316001	GROUT BURIED PIPE AND DUCT										
316001.06	ENVIRONMENTAL WORK										
316001.0600100	***************************** COVER BLOCK REMOVAL *****************************	460 W	0	0	0	0	0	0	0	0	0
316001.0600102	1 OPERATOR	460 W	10 DAY	80	2687	0	0	0	0	0	2687
316001.0600104	1 OILER	460 W	10 DAY	80	2687	0	0	0	0	0	2687
316001.0600106	1 FLAGGER	460 W	10 DAY	80	2966	0	0	0	0	0	2966
316001.0600108	1 RIGGER	460 W	10 DAY	80	2966	0	0	0	0	0	2966
316001.0600110	4 LABORERS	460 W	10 DAY	320	9197	0	0	0	0	0	9197
316001.0600112	1 PIC	460 W	10 DAY	320	19238	0	0	0	0	0	19238
316001.0600200	***************************** GROUT FILL PITS *****************************	460 W	0	0	0	0	0	0	0	0	0
316001.0600202	FILL BOTTOM 12 INCHES OF PITS WITH GROUT.	460 W	0	0	0	0	0	0	0	0	0
316001.0600204	1 OPERATOR	460 W	10 DAY	80	2687	0	0	0	0	0	2687
316001.0600206	1 TEAMSTER	460 W	10 DAY	80	2696	0	0	0	0	0	2696
316001.0600208	4 LABORERS	460 W	10 DAY	320	9197	0	0	0	0	0	9197
316001.0600210	1 PIC	460 W	10 DAY	320	19238	0	0	0	0	0	19238
316001.0600212	MATERIAL, 60 CY.	460 W	1 LS	0	0	0	2880	0	0	144	3024
316001.0600300	***************************** ACCESS PITS *****************************	460 W	0	0	0	0	0	0	0	0	0
316001.0600302	EXCAVATE 6 FT DIAMETER BY 6 FT DEEP PIT USING SLIP SHORING. CREW CONSISTS OF: 1 PIC	460 W	0	0	0	0	0	0	0	0	0
316001.0600303	2 LABORERS 2 PIPEFITTERS 1 OPERATOR	460 W	0	0	0	0	0	0	0	0	0
316001.0600304	1 L9000 DIRT GUZZLER ASSUME 4 CREW HOURS PER PIT. 6.3 CY OF SOIL WILL BE EXCAVATED FOR EACH PIT.	460 W	0	0	0	0	0	0	0	0	0
316001.0600306	SEE INDIVIDUAL PIPE GROUPS FOR ACCESS PIT COSTS.	460 W	0	0	0	0	0	0	0	0	0
316001.0600350	***************************** BACKFILLING *****************************	460 W	0	0	0	0	0	0	0	0	0
316001.0600352	BACKFILLING WILL BE DONE AT COMPLETION OF GROUTING. THE	460 W	0	0	0	0	0	0	0	0	0

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
	CREW WILL CONSIST OF:										
316001.0600354	1 PIC 1 OPERATOR 4 LABORERS	460 W	0	0	0	0	0	0	0	0	0
316001.0600356	BACKFILL AND COMPACT 318 PITS.	460 W	2003 CY	601	20903	3265	0	0	0	0	24168
316001.0600400	**************************** INSTALL TAPPING SLEEVES ****************************	460 W	0	0	0	0	0	0	0	0	0
316001.0600402	THE CREW FOR THIS ACTIVITY WILL CONSIST OF; 1 PIC 2 PIPEFITTERS	460 W	0	0	0	0	0	0	0	0	0
316001.0600404	1 OPERATOR 2 LABORERS THE TAPPING SLEEVES WILL INCLUDE A TAPPING VALVE AND	460 W	0	0	0	0	0	0	0	0	0
316001.0600406	ADEQUATE PIPE TO EXTEND OUT-SIDE OF PIT TO A CONNECTOR.	460 W	0	0	0	0	0	0	0	0	0
316001.0600408	SEE INDIVIDUAL PIPE GROUPS FOR ACCESS PIT COSTS.	460 W	0	0	0	0	0	0	0	0	0
316001.0600500	**************************** JUMPER FABRICATION ****************************	460 W	0	0	0	0	0	0	0	0	0
316001.0600502	3/4" JUMPER FABRICATION	460 W	1 EA	42	1732	0	755	0	0	38	2525
316001.0600504	1-1/2" JUMPER FABRICATION	460 W	1 EA	45	1856	0	1225	0	0	61	3142
316001.0600506	2" JUMPER FABRICATION	460 W	23 EA	1104	45529	0	34730	0	0	1737	81996
316001.0600508	3" JUMPER FABRICATION	460 W	23 EA	1380	56911	0	55200	0	0	2760	114871
316001.0600510	4" JUMPER FABRICATION	460 W	19 EA	1406	57983	0	76570	0	0	3829	138382
316001.0600512	6" JUMPER FABRICATION	460 W	42 EA	4704	193993	0	256200	0	0	12810	463003
316001.0600600	**************************** INSTALL JUMPERS ****************************	460 W	0	0	0	0	0	0	0	0	0
316001.0600602	JUMPER INSTALLATION CREW WILL CONSIST OF; 1 OPERATOR 1 FLAGGER	460 W	0	0	0	0	0	0	0	0	0
316001.0600604	1 IRONWORKER RIGGER 2 PIPEFITTERS 4 LABORERS 1 PIC	460 W	0	0	0	0	0	0	0	0	0
316001.0600606	ASSUME THE CREW WILL AVERAGE 1 HOOK-UP IN 2 HOURS.	460 W	0	0	0	0	0	0	0	0	

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
316001.0600608	SEE INDIVIDUAL PIPE GROUPS FOR ACCESS PIT COSTS.	460 W	0	0	0	0	0	0	0	0	0
316001.0600700	*************************** GROUT FILL BURIED PIPING ***************************	460 W	0	0	0	0	0	0	0	0	0
316001.0600702	INJECT GROUT INTO CONTAMIN- UNDERGROUND PIPE LINES FROM VARIOUS PITS UTILIZING ABOVE JUMPERS OR TAPPING SLEEVES.	460 W	0	0	0	0	0	0	0	0	0
316001.0600704	GROUTING CREW WILL CONSIST OF; 1 OPERATOR (MIXER) 1 OPERATOR (PUMP)	460 W	0	0	0	0	0	0	0	0	0
316001.0600706	1 OPERATOR (LOADER) 1 OPERATOR (TRANSPONDER RECEIVER) 6 LABORERS	460 W	0	0	0	0	0	0	0	0	0
316001.0600708	1 TEAMSTER 1 PIC SET UP TIME WILL AVERAGE 2 HOURS. PUMPING WILL BE AT A	460 W	0	0	0	0	0	0	0	0	0
316001.0600710	RATE OF 24 LF/MIN FOR PIPE UP TO 6 " DIA. AND 6 CY/HR FOR PIPE 18" AND LARGER.	460 W	0	0	0	0	0	0	0	0	0
316001.0601000	**************************** GROUP 1 **************************** THIS GROUP CONSISTS OF:	460 W	0	0	0	0	0	0	0	0	0
316001.0601002	2" CONDENSATE TRAP DRAINS(6) 3" CONDENSATE DRAIN 6" CONDENSATE DRAINS (3) 18" VENT RETURN TO A-702	460 W	0	0	0	0	0	0	0	0	0
316001.0601004	24" VENT HEADER TO A-401	460 W	0	0	0	0	0	0	0	0	0
316001.0601200	INSTALL PITS	460 W	24 EA	672	25670	3840	12000	0	0	600	42110
316001.0601202	ROLL-OFF CONTAINER LINERS	460 W	8 EA	0	0	0	120	0	0	6	126
316001.0601300	INSTALL 2" TAPPING SLEEVE	460 W	12 EA	288	11218	0	4200	0	0	210	15628
316001.0601304	INSTALL 3" TAPPING SLEEVE	460 W	2 EA	60	2337	0	1000	0	0	50	3387
316001.0601306	INSTALL 6" TAPPING SLEEVE	460 W	6 EA	216	8413	0	6000	0	0	300	14713
316001.0601308	INSTALL 18" TAPPING SLEEVE	460 W	2 EA	96	3739	0	6000	0	0	300	10039
316001.0601310	INSTALL 24" TAPPING SLEEVE	460 W	2 EA	96	3739	0	10000	0	0	500	14239
316001.0601400	GROUT 2" LINES	460 W	198 LF	290	9744	0	8	0	0	0	9752
316001.0601402	GROUT 3" LINES	460 W	33 LF	48	1613	0	4	0	0	0	161[illegible]

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
316001.0601404	GROUT 6" LINES	460 W	99 LF	145	4872	0	44	0	0	2	4918
316001.0601406	GROUT 18" LINES	460 W	129 LF	66	2218	0	507	0	0	25	2750
316001.0601408	GROUT 24" LINES	460 W	119 LF	72	2419	0	822	0	0	41	3282
316001.0602000	**************************** GROUP 2 **************************** THIS GROUP CONSISTS OF:	460 W	0	0	0	0	0	0	0	0	0
316001.0602001	2" F-101-2 2" F-102-2 2" 0016-M9	460 W	0	0	0	0	0	0	0	0	0
316001.0602002	3" 4021-M9 PUMP OUT LINE 3" 4021-M9 BYPASS LINE 3" 4022-M9 PUMP OUT LINE	460 W	0	0	0	0	0	0	0	0	0
316001.0602004	4" 4024 4" 4025 4" 4017 4" 4018	460 W	0	0	0	0	0	0	0	0	0
316001.0602006	24" 0109-M9 VENT HEADER	460 W	0	0	0	0	0	0	0	0	0
316001.0602100	INSTALL JUMPERS, 4@ 4", 3@ 3" & 6@ 2".	460 W	13 EA	260	9568	0	0	0	0	0	9568
316001.0602200	INSTALL PITS	460 W	16 EA	448	17114	2560	8000	0	0	400	28074
316001.0602202	ROLL-OFF CONTAINER LINERS	460 W	6 EA	0	0	0	90	0	0	5	95
316001.0602302	INSTALL 2" TAPPING SLEEVE	460 W	8 EA	192	7478	0	2800	0	0	140	10418
316001.0602304	INSTALL 3" TAPPING SLEEVE	460 W	2 EA	60	2337	0	1000	0	0	50	3387
316001.0602306	INSTALL 4" TAPPING SLEEVE	460 W	4 EA	120	4674	0	3000	0	0	150	7824
316001.0602308	INSTALL 24" TAPPING SLEEVE	460 W	2 EA	96	3739	0	10000	0	0	500	14239
316001.0602401	GROUT 2" LINES	460 W	992 LF	344	11558	0	40	0	0	2	11600
316001.0602402	GROUT 3" LINES	460 W	501 LF	124	4166	0	55	0	0	3	4224
316001.0602404	GROUT 4" LINES	460 W	928 LF	199	6686	0	186	0	0	9	6881
316001.0602410	GROUT 24" LINES	460 W	311 LF	120	4032	0	2149	0	0	107	6288
316001.0603000	**************************** GROUP 3 **************************** THIS GROUP CONSISTS OF:	460 W	0	0	0	0	0	0	0	0	0
316001.0603002	1-1/2" S(100#) - M2 2" SL-101-M25 2" SL-100-M25 3" SN-2010M25	460 W	0	0	0	0	0	0	0	0	0
316001.0603003	3" SN-200-M25 3" SN-214 3" SN-213-M25 3" DR-314-M24	460 W	0	0	0	0	0	0	0	0	0

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
316001.0603004	3" NEW W-314 LINE 3/4" CNDS-M2	460 W	0	0	0	0	0	0	0	0	0
316001.0603100	INSTALL JUMPERS, 1@ 1-1/2", 1@ 2", 6@ 3" & 1@ 3/4".	460 W	9 EA	180	6624	0	0	0	0	0	6624
316001.0603200	INSTALL PITS	460 W	10 EA	280	10696	1600	5000	0	0	250	17546
316001.0603202	ROLL-OFF CONTAINER LINERS	460 W	4 EA	0	0	0	60	0	0	3	63
316001.0603301	INSTALL 3/4" TAPPING SLEEVE	460 W	2 EA	48	1870	0	500	0	0	25	2395
316001.0603302	INSTALL 1-1/2" TAP SLEEVE	460 W	1 EA	24	935	0	300	0	0	15	1250
316001.0603304	INSTALL 2" TAPPING SLEEVE	460 W	2 EA	48	1870	0	700	0	0	35	2605
316001.0603306	INSTALL 3" TAPPING SLEEVE	460 W	5 EA	150	5843	0	2500	0	0	125	8468
316001.0603402	GROUT 3/4" LINE	460 W	97 LF	73	2453	0	1	0	0	0	2454
316001.0603404	GROUT 1-1/2" LINE	460 W	110 LF	25	840	0	3	0	0	0	843
316001.0603406	GROUT 2" LINES	460 W	362 LF	51	1714	0	14	0	0	1	1729
316001.0603410	GROUT 3" LINES	460 W	1288 LF	275	9240	0	142	0	0	7	9389
316001.0604000	**************************** GROUP 4 **************************** THIS GROUP CONSISTS OF:	460 W	0	0	0	0	0	0	0	0	0
316001.0604002	4" 4017-M9 4" 4018-M9	460 W	0	0	0	0	0	0	0	0	0
316001.0604200	INSTALL PITS	460 W	6 EA	168	6418	960	3000	0	0	150	10528
316001.0604202	ROLL-OFF CONTAINER LINERS	460 W	2 EA	0	0	0	30	0	0	2	32
316001.0604306	INSTALL 4" TAPPING SLEEVE	460 W	6 EA	180	7011	0	4500	0	0	225	11736
316001.0604410	GROUT 4" LINES	460 W	616 LF	149	5006	0	123	0	0	6	5135
316001.0605000	**************************** GROUP 5 **************************** THIS GROUP CONSISTS OF:	460 W	0	0	0	0	0	0	0	0	0
316001.0605002	2" SL-502-M25 3" NEW W-314 LINE 4" DR-0074-M5	460 W	0	0	0	0	0	0	0	0	0
316001.0605100	INSTALL JUMPERS, 1@ 2", 1@ 3" & 1@ 4".	460 W	3 EA	60	2208	0	0	0	0	0	2208
316001.0605200	INSTALL PITS	460 W	2 EA	56	2139	320	1000	0	0	50	3509
316001.0605202	ROLL-OFF CONTAINER LINERS	460 W	1 EA	0	0	0	15	0	0	1	16
316001.0605304	INSTALL 2" TAPPING SLEEVE	460 W	1 EA	24	935	0	350	0	0	18	1303
316001.0605306	INSTALL 3" TAPPING SLEEVE	460 W	1 EA	30	1169	0	500	0	0	25	1694
316001.0605410	GROUT 2" LINE	460 W	147 LF	49	1646	0	6	0	0	0	1652
316001.0605412	GROUT 3" LINE	460 W	145 LF	49	1646	0	16	0	0	1	1663
316001.0605414	GROUT 4" LINE	460 W	145 LF	25	840	0	29	0	0	1	870
316001.0606000	**************************** GROUP 6	460 W	0	0	0	0	0	0	0	0	0

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
	*****************************										
	THIS GROUP CONSISTS OF:										
316001.0606002	2" PW-4526-M35	460 W	0	0	0	0	0	0	0	0	0
	4" PW-4502-M9										
	4" PW-4501-M9										
	4" PW-4505-M9										
316001.0606004	4" PW-4504-M9	460 W	0	0	0	0	0	0	0	0	0
	4" PW-4503-M9										
	4" PW-4506-M9										
	24"-V-0100-M9										
316001.0606100	INSTALL JUMPERS, 1@ 2" &	460 W	7 EA	140	5152	0	0	0	0	0	5152
	6@ 4".										
316001.0606200	INSTALL PITS	460 W	2 EA	56	2139	320	1000	0	0	50	3509
316001.0606202	ROLL-OFF CONTAINER LINERS	460 W	1 EA	0	0	0	15	0	0	1	16
316001.0606308	INSTALL 24" TAPPING SLEEVE	460 W	2 EA	96	3739	0	10000	0	0	500	14239
316001.0606410	GROUT 2" LINE	460 W	30 LF	24	806	0	1	0	0	0	807
316001.0606414	GROUT 4" LINES	460 W	450 LF	148	4973	0	90	0	0	5	5068
316001.0606424	GROUT 24" LINE	460 W	79 LF	66	2218	0	546	0	0	27	2791
316001.0607000	*****************************	460 W	0	0	0	0	0	0	0	0	0
	GROUP 7										
	*****************************										
	THIS GROUP CONSISTS OF:										
316001.0607004	4" V714 ?	460 W	0	0	0	0	0	0	0	0	0
316001.0607100	INSTALL JUMPER	460 W	1 EA	20	736	0	0	0	0	0	736
316001.0607414	GROUT 4" LINES	460 W	93 LF	25	840	0	19	0	0	1	860
316001.0608000	*****************************	460 W	0	0	0	0	0	0	0	0	0
	GROUP 8										
	*****************************										
	THIS GROUP CONSISTS OF:										
316001.0608002	3" 4608 CONCR	460 W	0	0	0	0	0	0	0	0	0
	3" PW-4550-M5										
316001.0608100	INSTALL JUMPERS, 2@ 3".	460 W	2 EA	40	1472	0	0	0	0	0	1472
316001.0608414	GROUT 3" LINES	460 W	62 LF	49	1646	0	7	0	0	0	1653
316001.0609000	*****************************	460 W	0	0	0	0	0	0	0	0	0
	GROUP 9										
	*****************************										
	THIS GROUP CONSISTS OF:										
316001.0609002	2" PW-4551-M35	460 W	0	0	0	0	0	0	0	0	0
	3" V-719 (PIPE-IN-PIPE)										
	4" PW-4510-M9										
	4" PW-4511-M9										
316001.0609004	4" 4600 CONCR/SST	460 W	0	0	0	0	0	0	0	0	
	4" 4601 CONCR/SST										

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
316001.0609100	INSTALL JUMPERS, 1@ 2", 1@ 3" & 4@ 4".	460 W	6 EA	120	4416	0	0	0	0	0	4416
316001.0609200	INSTALL PITS	460 W	6 EA	168	6418	960	3000	0	0	150	10528
316001.0609202	ROLL-OFF CONTAINER LINERS	460 W	2 EA	0	0	0	30	0	0	2	32
316001.0609304	INSTALL 2" TAPPING SLEEVE	460 W	2 EA	48	1870	0	700	0	0	35	2605
316001.0609310	INSTALL 4" TAPPING SLEEVE	460 W	4 EA	120	4674	0	3000	0	0	150	7824
316001.0609414	GROUT 2" LINES	460 W	198 LF	74	2486	0	8	0	0	0	2494
316001.0609416	GROUT 3" LINES	460 W	108 LF	25	840	0	12	0	0	1	853
316001.0609418	GROUT 4" LINES	460 W	1012 LF	200	6720	0	202	0	0	10	6932
316001.0610000	**************************** GROUP 10 **************************** THIS GROUP CONSISTS OF:	460 W	0	0	0	0	0	0	0	0	0
316001.0610002	2" F-503-M5 2" F-504-M5 2" F-606-M5 2" F-607-M5	460 W	0	0	0	0	0	0	0	0	0
316001.0610004	2" F-501-M5 2" F-502-M5 24" V-0602-M9	460 W	0	0	0	0	0	0	0	0	0
316001.0610100	INSTALL JUMPERS, 6@ 2".	460 W	6 EA	120	4416	0	0	0	0	0	4416
316001.0610200	INSTALL PITS	460 W	7 EA	196	7487	1120	3500	0	0	175	12282
316001.0610202	ROLL-OFF CONTAINER LINERS	460 W	3 EA	0	0	0	45	0	0	2	47
316001.0610304	INSTALL 2" TAPPING SLEEVE	460 W	5 EA	120	4674	0	1750	0	0	88	6512
316001.0610306	INSTALL 24" TAPPING SLEEVE	460 W	2 EA	96	3739	0	10000	0	0	500	14239
316001.0610414	GROUT 2" LINES	460 W	505 LF	268	9005	0	20	0	0	1	9026
316001.0610424	GROUT 24" LINES	460 W	180 LF	52	1747	0	1244	0	0	62	3053
316001.0611000	**************************** GROUP 11 **************************** THIS GROUP CONSISTS OF:	460 W	0	0	0	0	0	0	0	0	0
316001.0611002	4" PW-4512-M9 4" PW-4508-M9 4" PW-4509-M9 4" PW-4507-M9	460 W	0	0	0	0	0	0	0	0	0
316001.0611100	INSTALL JUMPERS, 4@ 4".	460 W	4 EA	80	2944	0	0	0	0	0	2944
316001.0611200	INSTALL PITS	460 W	4 EA	112	4278	640	2000	0	0	100	7018
316001.0611202	ROLL-OFF CONTAINER LINERS	460 W	2 EA	0	0	0	30	0	0	2	32
316001.0611304	INSTALL 4" TAPPING SLEEVE	460 W	4 EA	120	4674	0	2000	0	0	100	6774
316001.0611414	GROUT 4" LINES	460 W	1190 LF	202	6787	0	238	0	0	12	7037
316001.0612000	**************************** GROUP 12	460 W	0	0	0	0	0	0	0	0	0

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
	****************************										
	THIS GROUP CONSISTS OF:										
316001.0612002	2" SL-500-M25 (PIPE-IN-PIPE)	460 W	0	0	0	0	0	0	0	0	0
	2" SN-600-M25 (PIPE-IN-PIPE)										
	3" NEW W-314 LINE										
316001.0612100	INSTALL JUMPERS, 2@ 2" AND 1@ 3".	460 W	3 EA	60	2208	0	0	0	0	0	2208
316001.0612200	INSTALL PITS	460 W	8 EA	224	8557	1280	4000	0	0	200	14037
316001.0612202	ROLL-OFF CONTAINER LINERS	460 W	3 EA	0	0	0	45	0	0	2	47
316001.0612302	INSTALL 2" TAPPING SLEEVE	460 W	6 EA	144	5609	0	2100	0	0	105	7814
316001.0612304	INSTALL 3" TAPPING SLEEVE	460 W	2 EA	60	2337	0	1000	0	0	50	3387
316001.0612414	GROUT 2" LINES	460 W	631 LF	213	7157	0	25	0	0	1	7183
316001.0612416	GROUT 3" LINE	460 W	338 LF	75	2520	0	37	0	0	2	2559
316001.0613000	****************************	460 W	0	0	0	0	0	0	0	0	0
	GROUP 13										
	****************************										
	THIS GROUP CONSISTS OF:										
316001.0613002	2" SN-247	460 W	0	0	0	0	0	0	0	0	0
316001.0613100	INSTALL JUMPER, 2".	460 W	1 EA	20	736	0	0	0	0	0	736
316001.0613200	INSTALL PITS	460 W	6 EA	168	6418	960	3000	0	0	150	10528
316001.0613202	ROLL-OFF CONTAINER LINERS	460 W	2 EA	0	0	0	30	0	0	2	32
316001.0613302	INSTALL 2" TAPPING SLEEVE	460 W	6 EA	144	5609	0	2100	0	0	105	7814
316001.0613414	GROUT 2" LINE	460 W	560 LF	172	5779	0	22	0	0	1	5802
316001.0615000	****************************	460 W	0	0	0	0	0	0	0	0	0
	GROUP 15										
	****************************										
	THIS GROUP CONSISTS OF:										
316001.0615002	1-1/2" M2 STEAM CONDENSATE	460 W	0	0	0	0	0	0	0	0	0
	4" M2 STEAM CONDENSATE										
316001.0615200	INSTALL PITS	460 W	14 EA	392	14974	2240	7000	0	0	350	24564
316001.0615202	ROLL-OFF CONTAINER LINERS	460 W	5 EA	0	0	0	75	0	0	4	79
316001.0615302	INSTALL 1-1/2" TAP SLEEVE	460 W	9 EA	216	8413	0	2700	0	0	135	11248
316001.0615304	INSTALL 4" TAPPING SLEEVE	460 W	5 EA	150	5843	0	3750	0	0	188	9781
316001.0615414	GROUT 1-1/2" LINE	460 W	423 LF	219	7358	0	13	0	0	1	7372
316001.0615418	GROUT 4" LINE	460 W	380 LF	123	4133	0	76	0	0	4	4213
316001.0616000	****************************	460 W	0	0	0	0	0	0	0	0	0
	GROUP 16										
	****************************										
	THIS GROUP CONSISTS OF:										
316001.0616002	6" PSW (2) FROM AR VAULT	460 W	0	0	0	0	0	0	0	0	0
	6" PSW-D502-M5										
	6" PSW-S506-M5										

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
	6" PSW-S507-M5										
316001.0616004	6" PSW-S505-M5	460 W	0	0	0	0	0	0	0	0	0
	6" PSW-S508-M5										
	6" PSW-S504-M5										
	6" PSW-S503-M5										
316001.0616006	6" PSW-S501-M5	460 W	0	0	0	0	0	0	0	0	0
	6" PSW-S502-M5										
	6" PSW-D501-M5										
	6" PSW-D505-M5										
316001.0616008	6" PSW-S517-M5	460 W	0	0	0	0	0	0	0	0	0
316001.0616100	INSTALL JUMPERS, 14@ 6".	460 W	14 EA	280	10304	0	0	0	0	0	10304
316001.0616418	GROUT 6" LINES	460 W	2163 LF	353	11861	0	952	0	0	48	12861
316001.0617000	****************************	460 W	0	0	0	0	0	0	0	0	0
	GROUP 17										
	****************************										
	THIS GROUP CONSISTS OF:										
316001.0617002	6" PSW-8021-M5	460 W	0	0	0	0	0	0	0	0	0
	6" PSW-8064-M5										
	6" PSW-8022-M5										
	6" PSW-8025-M5										
316001.0617004	6" PSW-8063-M5	460 W	0	0	0	0	0	0	0	0	0
	6" PSW-8026-M5										
	6" PSW-8023-M5										
	6" PSW-8062-M5										
316001.0617006	6" PSW-8024-M5	460 W	0	0	0	0	0	0	0	0	0
	6" PSW-8027-M5										
	6" PSW-8028-M5										
	6" PSW-8061-M5										
316001.0617100	INSTALL JUMPERS, 28@ 6".	460 W	28 EA	560	20608	0	0	0	0	0	20608
316001.0617200	INSTALL PITS	460 W	4 EA	112	4278	640	2000	0	0	100	7018
316001.0617202	ROLL-OFF CONTAINER LINERS	460 W	2 EA	0	0	0	30	0	0	2	32
316001.0617306	INSTALL 6" TAPPING SLEEVE	460 W	4 EA	144	5609	0	4000	0	0	200	9809
316001.0617418	GROUT 6" LINES	460 W	3308 LF	792	26611	0	1456	0	0	73	28140
316001.0618000	****************************	460 W	0	0	0	0	0	0	0	0	0
	GROUP 18										
	****************************										
	THIS GROUP CONSISTS OF:										
316001.0618002	2" SL-111-M25	460 W	0	0	0	0	0	0	0	0	0
	2" SL-108-M25										
	2" SL-112-M25										
	2" SL-109-M24										
316001.0618004	3" SN-211-M25	460 W	0	0	0	0	0	0	0	0	
	3" DR-326-M25										

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
	3" SN-208-M25										
	3" DR-327-M24										
316001.0618006	3" DR-314-M25	460 W	0	0	0	0	0	0	0	0	0
	3" SN-212-M25										
	3" SN-209-M25										
	3" DR-325-M24										
316001.0618008	3" DR-333-M25	460 W	0	0	0	0	0	0	0	0	0
316001.0618100	INSTALL JUMPERS, 4@ 2" AND 9@ 3".	460 W	13 EA	260	9568	0	0	0	0	0	9568
316001.0618200	INSTALL PITS	460 W	74 EA	2072	79150	11840	37000	0	0	1850	129840
316001.0618202	ROLL-OFF CONTAINER LINERS	460 W	24 EA	0	0	0	360	0	0	18	378
316001.0618302	INSTALL 2" TAPPING SLEEVE	460 W	20 EA	480	18696	0	7000	0	0	350	26046
316001.0618304	INSTALL 3" TAPPING SLEEVE	460 W	54 EA	1620	63099	0	27000	0	0	1350	91449
316001.0618404	GROUT 2" LINES	460 W	1932 LF	591	19858	0	77	0	0	4	19939
316001.0618406	GROUT 3" LINES	460 W	8119 LF	1577	52987	0	893	0	0	45	53925
316001.0620000	**************************** GROUP 20 **************************** THIS GROUP CONSISTS OF:	460 W	0	0	0	0	0	0	0	0	0
316001.0620002	4" PW-A104	460 W	0	0	0	0	0	0	0	0	0
	4" PW-A102										
	4" PW-A101										
	4" PW-A103										
316001.0620004	4" PW-C104	460 W	0	0	0	0	0	0	0	0	0
	4" PW-C102										
	4" PW-C101										
	4" PW-C103										
316001.0620006	4" PW-B104	460 W	0	0	0	0	0	0	0	0	0
	4" PW-B102										
	4" PW-B101										
	4" PW-B103										
316001.0620008	3" 4026-M35	460 W	0	0	0	0	0	0	0	0	0
	2" 3000										
	2" 3001										
	2" 3003										
316001.0620010	3/4" 3312	460 W	0	0	0	0	0	0	0	0	0
	24" V-0100-M9 (3 LINES)										
	20" 0100-M9 (4 LINES)										
316001.0620200	INSTALL PITS	460 W	135 EA	3780	144396	21600	67500	0	0	3375	236871
316001.0620202	ROLL-OFF CONTAINER LINERS	460 W	43 EA	0	0	0	645	0	0	32	677
316001.0620304	INSTALL 4" TAPPING SLEEVE	460 W	96 EA	2880	112176	0	72000	0	0	3600	187776
316001.0620306	INSTALL 3" TAPPING SLEEVE	460 W	5 EA	150	5843	0	2500	0	0	125	8468

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING CORP.
JOB NO. Z466AAE1
FILE NO. Z466AAE1

** IEST - INTERACTIVE ESTIMATING **
ANCILLARY EQUIPMENT GROUT IN PLACE
241-AX TANK FARM CLOSURE - PLANNING ESTIMATE
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

DATE 04/22/98 10:09:29
BY R.OHRT

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
316001.0620308	INSTALL 2" TAPPING SLEEVE	460 W	30 EA	720	28044	0	10500	0	0	525	39069
316001.0620310	INSTALL 3/4" TAP SLEEVE	460 W	2 EA	48	1870	0	500	0	0	25	2395
316001.0620312	INSTALL 20" TAPPING SLEEVE	460 W	8 EA	384	14957	0	28000	0	0	1400	44357
316001.0620314	INSTALL 24" TAPPING SLEEVE	460 W	6 EA	288	11218	0	30000	0	0	1500	42718
316001.0620402	GROUT 4" LINES	460 W	14320 LF	2419	81278	0	2864	0	0	143	84285
316001.0620404	GROUT 3" LINES	460 W	543 LF	124	4166	0	60	0	0	3	4229
316001.0620406	GROUT 2" LINES	460 W	2388 LF	739	24830	0	96	0	0	5	24931
316001.0620408	GROUT 3/4" LINES	460 W	44 LF	48	1613	0	0	0	0	0	1613
316001.0620410	GROUT 20" LINES	460 W	96 LF	113	3797	0	384	0	0	19	4200
316001.0620412	GROUT 24" LINES	460 W	201 LF	119	3998	0	1389	0	0	69	5456
SUBTOTAL	ENVIRONMENTAL WORK	(SWP)		42,816		54,145		0		43,854	
					1,620,265		877,010		0		2,595,274
	CONSUMABLES 3.20 %						51848				51848
	SWP 35.00%			14985	567092						567092
	GENERAL FOREMAN 7.00 %			4046	153115						153115
	GENERAL REQUIREMENTS 15.00 %			9277	351070						351070
	SALES TAX 8.00 %						74308		0		74308
	OH&P (ON MARKUPS ONLY)									6307	6307
TOTAL	COST CODE 46006			71,124		54,145		0		50,161	
	WBS 316001				2,691,543		1,003,167		0		3,799,017
	(ESCALATION 0.00% - CONTINGENCY 80.00 %)										
316001.92	CONST. SERVICES, SUPPLIES & EXPENCE										
316001.9214002	**************************** HPT'S ****************************	460	0	0	0	0	0	0	0	0	0
316001.9214004	ASSUME 4 HPT'S FOR ONE YEAR	460	1 LS	8320	397530	0	0	0	0	0	397530
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			8,320		0		0		0	
					397,530		0		0		397,530
TOTAL	COST CODE 46092			8,320		0		0		0	
	WBS 316001				397,530		0		0		397,530
	(ESCALATION 0.00% - CONTINGENCY 80.00 %)										
TOTAL WBS 316001 GROUT BURIED PIPE AND DUCT				79,444		54,145		0		50,161	
					3,089,073		1,003,167		0		4,196,547

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
316002	CONCRETE FILL ENCASEMENTS										
316002.06	ENVIRONMENTAL WORK										
316002.0600050	**************************** EXCAVATE COVER BLOCKS ****************************	460	0	0	0	0	0	0	0	0	0
316002.0600051	EXCAVATE 9' X 14' X 4' DEEP WITH 1:1 SLOPED SIDES FOR A TOTAL OF 61 CY PER COVER BLOCK. THE CREW WILL CONSIST	460	0	0	0	0	0	0	0	0	0
316002.0600052	OF 1 PIC, 1 OPERATOR, 2 LABORERS AND 1 L9000 DIRT GUZZLER. ASSUME 3 DAYS PER EXCAVATION WHICH INCLUDES	460	0	0	0	0	0	0	0	0	0
316002.0600053	FACTORING IN SWP'S. ALL SOIL WILL BE SET TO SIDE FOR LATER BACKFILLING.	460	0	0	0	0	0	0	0	0	0
316002.0600070	**************************** BACKFILL ****************************	460	0	0	0	0	0	0	0	0	0
316002.0600072	BACKFILLING CREW WILL CONSIST OF: 1 PIC 1 OPERATOR	460	0	0	0	0	0	0	0	0	0
316002.0600074	4 LABORERS CATERPILLAR D-4E DOZER PAN TYPE COMPACTORS	460	0	0	0	0	0	0	0	0	0
316002.0600100	**************************** REMOVE COVER BLOCKS ****************************	460	0	0	0	0	0	0	0	0	0
316002.0600102	USING A 20 TON CRANE AND A CREW CONSISTING OF AN OPERA-TOR, RIGGER, PIC, 2 LABORERS LIFT COVER FROM ENCASEMENTS	460	0	0	0	0	0	0	0	0	0
316002.0600104	AND SET TO SIDE. ASSUME ONE DAY MINIMUM FOR CREW.	460	0	0	0	0	0	0	0	0	0
316002.0600105	**************************** CONCRETE FILL ENCASEMENTS ****************************	460	0	0	0	0	0	0	0	0	0
316002.0600106	FILL ENCASEMENTS WITH CONCRETE. USING A 10 MAN CREW CONSISTING OF 1 PIC, 1	460	0	0	0	0	0	0	0	0	0

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
	OPERATOR (MIXER), 1 OPERATOR										
316002.0600108	(BATCH PLANT), 1 OPERATOR (PUMP) AND 6 LABORERS. ALLOW 1 HR SET-UP TIME FOR EACH POUR AND 1 HR CLEAN UP AT	460	0	0	0	0	0	0	0	0	0
316002.0600110	END OF POUR, AND A POUR RATE OF 10 CY/HR MAX. WORK IS TO BE DONE IN SWP'S, THIS HAS BEEN FACTORED INTO	460	0	0	0	0	0	0	0	0	0
316002.0600112	THE RATES.	460	0	0	0	0	0	0	0	0	0
316002.0600200	*************************** GROUP 2 FROM AX-152 TO SOUTH ***************************	460	0	0	0	0	0	0	0	0	0
316002.0600202	EXCAVATE COVER BLOCKS	460	4 EA	384	14511	3840	0	0	0	0	18351
316002.0600204	LIFT COVER BLOCKS	460	1 LS	40	1506	0	0	0	0	0	1506
316002.0600206	FILL ENCASEMENTS WITH CONCRETE.	460	1 LS	80	2666	0	0	0	0	0	2666
316002.0600208	CONCRETE COST @ $1.54/CF.	460	424 CF	0	0	0	653	0	0	33	686
316002.0600210	BACKFILL	460	244 CY	73	2539	398	0	0	0	0	2937
316002.0600400	*************************** GROUP 4 - FROM SOUTH END OF GROUP 2, WEST TO PIT EDGE ***************************	460	0	0	0	0	0	0	0	0	0
316002.0600402	ASSUME THIS GROUP WILL BE DONE SIMULTANEOUSLY WITH GROUP 2, AT NO ADDITIONAL COST FOR THE COVER BLOCK	460	0	0	0	0	0	0	0	0	0
316002.0600404	REMOVAL CREW OR THE CONCRETE PUMPING CREW. A COVER BLOCK EXCAVATION AND ADDITIONAL CONCRETE COST WILL BE REQ'D.	460	0	0	0	0	0	0	0	0	0
316002.0600410	EXCAVATE COVER BLOCK	460	1 EA	96	3628	960	0	0	0	0	4588
316002.0600412	CONCRETE COST @ $1.54/CF.	460	77 CF	0	0	0	119	0	0	6	125
316002.0600420	BACKFILL	460	61 CY	18	626	99	0	0	0	0	725
316002.0600600	*************************** GROUP 6 - AX-152 TO WEST EDGE OF EXCAVATION ***************************	460	0	0	0	0	0	0	0	0	0
316002.0600602	ASSUME THIS GROUP WILL BE DONE SIMULTANEOUSLY WITH GROUP 9, AT NO ADDITIONAL	460	0	0	0	0	0	0	0	0	0

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
316002.0600604	COST FOR THE COVER BLOCK REMOVAL CREW OR THE CONCRETE PUMPING CREW. 2 COVER BLOCK EXCAVATIONS AND ADDITIONAL CONCRETE COST WILL BE REQ'D.	460	0	0	0	0	0	0	0	0	0
316002.0600610	EXCAVATE COVER BLOCKS	460	2 EA	192	7256	1920	0	0	0	0	9176
316002.0600611	CONCRETE COST @ $1.54/CF.	460	203 CF	0	0	0	313	0	0	16	329
316002.0600620	BACKFILL	460	122 CY	37	1287	199	0	0	0	0	1486
316002.0600900	*************************** GROUP 9 GROUP 6 ENCASEMENT TO NORTH ***************************	460	0	0	0	0	0	0	0	0	0
316002.0600902	THIS GROUP, DUE TO ITS VOLUME WILL REQUIRE 2 DAYS WORK FOR COVER BLOCK REMOVAL AND PUMPING CREWS.	460	0	0	0	0	0	0	0	0	0
316002.0600908	EXCAVATE COVER BLOCKS	460	3 EA	288	10884	2880	0	0	0	0	13764
316002.0600910	LIFT COVER BLOCKS	460	2 DAY	80	3012	0	0	0	0	0	3012
316002.0600912	FILL ENCASEMENTS WITH CONCRETE.	460	2 DAY	160	5333	0	0	0	0	0	5333
316002.0600914	CONCRETE COST @ $1.54/CF.	460	1500 CF	0	0	0	2310	0	0	116	2426
316002.0600920	BACKFILL	460	183 CY	55	1913	298	0	0	0	0	2211
316002.0601000	*************************** GROUP 10 WEST END AX-152 TO AX-155 ***************************	460	0	0	0	0	0	0	0	0	0
316002.0601008	EXCAVATE COVER BLOCKS	460	2 EA	192	7256	1920	0	0	0	0	9176
316002.0601010	LIFT COVER BLOCKS	460	1 LS	40	1506	0	0	0	0	0	1506
316002.0601012	FILL ENCASEMENTS WITH CONCRETE.	460	1 LS	80	2666	0	0	0	0	0	2666
316002.0601014	CONCRETE COST @ $1.54/CF.	460	360 CF	0	0	0	554	0	0	28	582
316002.0601020	BACKFILL	460	122 CY	37	1287	199	0	0	0	0	1486
316002.0601700	*************************** GROUP 17 SLUICE LINES FROM AY-152 TO 4 AX TANKS ***************************	460	0	0	0	0	0	0	0	0	0
316002.0601708	EXCAVATE COVER BLOCKS	460	16 EA	1536	58045	15360	0	0	0	0	73405
316002.0601710	LIFT COVER BLOCKS	460	7 DAY	280	10542	0	0	0	0	0	10542
316002.0601712	FILL ENCASEMENTS WITH CONCRETE.	460	7 DAY	560	18665	0	0	0	0	0	18665
316002.0601714	CONCRETE COST @ $1.54/CF.	460	3712 CF	0	0	0	5716	0	0	286	6002
316002.0601720	BACKFILL	460	976 CY	293	10191	1591	0	0	0	0	11782

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
316002.0602000	****************************** GROUP 20 AX-152 EAST THRU AX FARM ******************************	460	0	0	0	0	0	0	0	0	0
316002.0602008	EXCAVATE COVER BLOCKS	460	6 EA	576	21767	5760	0	0	0	0	27527
316002.0602010	LIFT COVER BLOCKS	460	1 LS	40	1506	0	0	0	0	0	1506
316002.0602012	FILL ENCASEMENTS WITH CONCRETE.	460	1 LS	80	2666	0	0	0	0	0	2666
316002.0602014	CONCRETE COST @ $1.54/CF.	460	812 CF	0	0	0	1250	0	0	63	1313
316002.0602020	BACKFILL	460	366 CY	110	3826	597	0	0	0	0	4423
SUBTOTAL	ENVIRONMENTAL WORK			5,327	195,084	36,021	10,915	0	0	548	242,568
	CONSUMABLES 3.20 %						6242				6242
	GENERAL FOREMAN 7.00 %			372	13655						13655
	GENERAL REQUIREMENTS 15.00 %			854	31310						31310
	SALES TAX 8.00 %						1372		0		1372
	OH&P (ON MARKUPS ONLY)									380	380
TOTAL	COST CODE 46006 WBS 316002 (ESCALATION 0.00% - CONTINGENCY 80.00 %)			6,554	240,050	36,021	18,530	0	0	928	295,530
316002.92	CONST. SERVICES, SUPPLIES & EXPENCE										
316002.9214002	****************************** HPT'S ******************************	460	0	0	0	0	0	0	0	0	0
316002.9214004	ASSUME 2 HPT'S FOR 12 DAYS DURING GROUTING.	460	1 LS	192	9174	0	0	0	0	0	9174
316002.9214006	ASSUME 1 HPT FOR 103 DAYS DURING EXCAVATION.	460	1 LS	824	39371	0	0	0	0	0	39371
316002.9214008	ASSUME 1 HPT FOR 12 DAYS DURING BACKFILLING.	460	1 LS	96	4587	0	0	0	0	0	4587
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			1,112	53,132	0	0	0	0	0	53,132
TOTAL	COST CODE 46092 WBS 316002 (ESCALATION 0.00% - CONTINGENCY 80.00 %)			1,112	53,132	0	0	0	0	0	53,132
TOTAL WBS 316002 CONCRETE FILL ENCASEMENTS				7,666	293,182	36,021	18,530	0	0	928	348,66[illegible]

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
317001	GROUT TANK RELATED PITS										
317001.06	ENVIRONMENTAL WORK										
317001.0600300	**************************** GROUT PUMP PITS & VALVE PITS ASSOCIATED WITH TANKS ****************************	460	0	0	0	0	0	0	0	0	0
317001.0600302	GROUT FILL THE FOLLOWING: 241-AX-01A PUMP/DISTRIBUTOR PIT, 241-AX-01B PUMP PIT, 241-AX-01C SLUICE PIT,	460	0	0	0	0	0	0	0	0	0
317001.0600304	241-AX-01D SLUICE PIT, ALL ASSOCIATED WITH TANK AX-101.	460	0	0	0	0	0	0	0	0	0
317001.0600312	GROUT FILL THE FOLLOWING: 241-AX-02A PUMP/DISTRIBUTOR PIT, 241-AX-02B PUMP PIT, 241-AX-02C SLUICE PIT,	460	0	0	0	0	0	0	0	0	0
317001.0600314	241-AX-02D SLUICE PIT, ALL ASSOCIATED WITH TANK AX-102.	460	0	0	0	0	0	0	0	0	0
317001.0600322	GROUT FILL THE FOLLOWING: 241-AX-03A PUMP/DISTRIBUTOR PIT, 241-AX-03B PUMP PIT, 241-AX-03C SLUICE PIT,	460	0	0	0	0	0	0	0	0	0
317001.0600324	241-AX-03D SLUICE PIT, ALL ASSOCIATED WITH TANK AX-103.	460	0	0	0	0	0	0	0	0	0
317001.0600332	GROUT FILL THE FOLLOWING: 241-AX-04A PUMP/DISTRIBUTOR PIT, 241-AX-04B PUMP PIT, 241-AX-04C SLUICE PIT,	460	0	0	0	0	0	0	0	0	0
317001.0600334	241-AX-04D SLUICE PIT, ALL ASSOCIATED WITH TANK AX-104. ALSO GROUT FILL VALVE PITS 01VP, 02VP, 03VP AND 04VP.	460	0	0	0	0	0	0	0	0	0
317001.0600406		460	0	0	0	0	0	0	0	0	0
317001.0600408	PULL MONITORING PLUG FROM COVER BLOCK, INSTALL HEPA EXHAUSTER. PUMP GROUT INTO PITS (20 TOTAL) CREW CONSISTS OF:	460	0	0	0	0	0	0	0	0	0
317001.0600410	1 PIC	460	20 DAY	160	9619	0	0	0	0	0	9619
317001.0600412	1 OPERATOR	460	20 DAY	160	5034	0	0	0	0	0	5034
317001.0600414	1 TEAMSTER	460	20 DAY	160	5050	0	0	0	0	0	5050

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
317001.0600416	4 LABORERS	460	20 DAY	640	17229	0	0	0	0	0	17229
317001.0600430	GROUT	460	217 CY	0	0	0	10373	0	0	519	10892
317001.0600432	HEPA SYSTEM	460	1 LS	0	0	1000	0	0	0	0	1000
SUBTOTAL	ENVIRONMENTAL WORK			1,120		1,000		0		519	
					36,932		10,373		0		48,824
	CONSUMABLES 3.20 %						1181				1181
	GENERAL FOREMAN 7.00 %			78	2585						2585
	GENERAL REQUIREMENTS 15.00 %			179	5927						5927
	SALES TAX 8.00 %						924		0		924
	OH&P (ON MARKUPS ONLY)									105	105
TOTAL	COST CODE 46006			1,378		1,000		0		624	
	WBS 317001				45,444		12,479		0		59,548
	(ESCALATION 0.00% - CONTINGENCY 65.00 %)										
317001.92	CONST. SERVICES, SUPPLIES & EXPENCE										
317001.9214002	***************************** HPT'S *****************************	460	0	0	0	0	0	0	0	0	0
317001.9214004	ASSUME 1 HPT FOR 20 DAYS	460	1 LS	64	3058	0	0	0	0	0	3058
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			64		0		0		0	
					3,058		0		0		3,058
TOTAL	COST CODE 46092			64		0		0		0	
	WBS 317001				3,058		0		0		3,058
	(ESCALATION 0.00% - CONTINGENCY 65.00 %)										
TOTAL WBS 317001 GROUT TANK RELATED PITS				1,442		1,000		0		624	
					48,502		12,479		0		62,606

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
318001	GROUT OTHER PITS/BOXES/STRUCTURES										
318001.06	ENVIRONMENTAL WORK										
318001.0600100	**************************** GROUT AX-152 DIVERTER STN. AND A-417 PUMP PIT / TANK ****************************	460 W	0	0	0	0	0	0	0	0	0
318001.0600102	THE 241-AX-152 DIVERTER STATION AND 241-A-417 PUMP PIT AND TANK, DUE TO THEIR MULT-LEVEL CONFIGURATION,	460 W	0	0	0	0	0	0	0	0	0
318001.0600104	WILL NEED TO BE BREACHED TO ALLOW CONCRETE FLOW THOUGH-OUT THE ENTIRE VOLUME. THIS WILL BE ACCOMPLISHED BY CORE	460 W	0	0	0	0	0	0	0	0	0
318001.0600106	DRILLING THROUGH COVERBLOCK AND ON DOWN THROUGH THE SECOND LEVEL. THE COVER BLOCK IS 5'-8" THICK AND THE	460 W	0	0	0	0	0	0	0	0	0
318001.0600108	SECOND LEVEL IS 9" THICK. CORE DRILL CREW WILL CONSIST OF:	460 W	0	0	0	0	0	0	0	0	0
318001.0600110	1 PIC	460 W	2 EA	24	1443	0	616	0	0	31	2090
318001.0600112	1 OPERATOR	460 W	2 EA	50	1573	0	0	0	0	0	1573
318001.0600114	1 LABORER	460 W	2 EA	50	1346	0	0	0	0	0	1346
318001.0600202	PUMP GROUT INTO 241-AX-152 AND 241-A-417, ALLOW 1 HOUR TWICE A DAY FOR SET-UP AND 1/2 HOUR TWICE A DAY FOR	460 W	0	0	0	0	0	0	0	0	0
318001.0600204	CLEAN-UP. PUMP RATE WILL BE 10 CY/HOUR.	460 W	0	0	0	0	0	0	0	0	0
318001.0600220	1 PIC	460 W	4 DAY	32	1924	0	0	0	0	0	1924
318001.0600222	1 OPERATOR	460 W	4 DAY	32	1007	0	0	0	0	0	1007
318001.0600224	1 TEAMSTER	460 W	4 DAY	32	1010	0	0	0	0	0	1010
318001.0600226	4 LABORERS	460 W	4 DAY	128	3446	0	0	0	0	0	3446
318001.0600230	GROUT	460 W	185 CY	0	0	0	8843	0	0	442	9285
318001.0600232	HEPA SYSTEM	460 W	1 LS	0	0	1000	0	0	0	0	1000
318001.0600300	**************************** GROUT REMAINING PITS AND DIVERSION BOX ****************************	460 W	0	0	0	0	0	0	0	0	0
318001.0600302	GROUT FILL THE FOLLOWING: 241-AX-A VALVE PIT/FLUSH PIT	460 W	0	0	0	0	0	0	0	0	

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
	/SLUICE PIT										
	241-AX-B VALVE PIT/FLUSH PIT										
318001.0600304	/SLUICE PIT	460 W	0	0	0	0	0	0	0	0	0
	241-AY-152 SLUICE PIT										
	241-AX-153 ISOLATION PIT										
	241-AY-501 CONDENSATE VALVE										
318001.0600306	241-AX-152 SLUICE PIT	460 W	0	0	0	0	0	0	0	0	0
	A-417 PIT										
	241-AX-501 CONDENSATE VALVE										
	PIT										
318001.0600307	PIT	460 W	0	0	0	0	0	0	0	0	0
	241-AX-155 DIVERSION BOX										
	PULL MONITORING PLUG FROM										
318001.0600308	COVER BLOCK, INSTALL HEPA	460 W	0	0	0	0	0	0	0	0	0
	EXHAUSTER. PUMP GROUT INTO										
	PITS (13 TOTAL)										
	CREW CONSISTS OF:										
318001.0600310	1 PIC	460 W	5 DAY	40	2405	0	0	0	0	0	2405
318001.0600312	1 OPERATOR	460 W	5 DAY	40	1258	0	0	0	0	0	1258
318001.0600314	1 TEAMSTER	460 W	5 DAY	40	1262	0	0	0	0	0	1262
318001.0600316	4 LABORERS	460 W	5 DAY	160	4307	0	0	0	0	0	4307
318001.0600330	GROUT	460 W	121 CY	0	0	0	5784	0	0	289	6073
318001.0600332	HEPA SYSTEM	460 W	1 LS	0	0	1000	0	0	0	0	1000
SUBTOTAL	ENVIRONMENTAL WORK		(SWP)	628		2,000		0		762	
					20,981		15,243		0		38,986
	CONSUMABLES 3.20 %						671				671
	SWP 35.00%			219	7343						7343
	GENERAL FOREMAN 7.00 %			59	1982						1982
	GENERAL REQUIREMENTS 15.00 %			136	4546						4546
	SALES TAX 8.00 %						1273		0		1273
	OH&P (ON MARKUPS ONLY)									97	97
TOTAL	COST CODE 46006			1,043		2,000		0		859	
	WBS 318001				34,853		17,187		0		54,899
	(ESCALATION 0.00% - CONTINGENCY 70.00 %)										
318001.92	CONST. SERVICES, SUPPLIES & EXPENCE										
318001.9214002	****************************	460	0	0	0	0	0	0	0	0	0
	HPT'S										
	****************************										
318001.9214004	ASSUME 1 HPT FOR 9 DAYS	460	1 LS	72	3440	0	0	0	0	0	3440

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
SUBTOTAL	CONST. SERVICES, SUPPLIES & EXPEN			72	3,440	0	0	0	0	0	3,440
TOTAL	COST CODE 46092 WBS 318001 (ESCALATION 0.00% - CONTINGENCY 70.00 %)			72	3,440	0	0	0	0	0	3,440
TOTAL WBS 318001	GROUT OTHER PITS/BOXES/STRUCTURES			1,115	38,293	2,000	17,187	0	0	859	58,339

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
321003	CHANGE HOUSE										
321003.07	SITE IMPROVEMENTS										
321003.0750002	**************************** CHANGE HOUSE ****************************	460	0	0	0	0	0	0	0	0	0
321003.0750003	12 X 30 X 8' EAVE HT PRE-ENGINEERED METAL BUILDING.	460	0	0	0	0	0	0	0	0	0
321003.0750004	TEAR DOWN, LOAD, HAUL AND DUMP DEBRIS AT LOCAL LANDFILL.	460	0	0	0	0	0	0	0	0	0
321003.0750010	3 LABORERS	460	1 DAY	24	690	0	0	0	0	173	863
321003.0750012	2 EQ OPERATORS	460	1 DAY	16	537	0	0	0	0	134	671
321003.0750014	1 EQ OILER	460	1 DAY	8	269	0	0	0	0	67	336
321003.0750016	2 TEAMSTERS	460	1 DAY	16	539	0	0	0	0	135	674
321003.0750018	25 TON HYDRAULIC CRANE	460	1 DAY	0	0	510	0	0	0	128	638
321003.0750020	FRONT END LOADER, 2.5 CY	460	1 DAY	0	0	770	0	0	0	193	963
321003.0750022	DUMP TRUCKS (2) - 16 TON	460	1 DAY	0	0	1560	0	0	0	390	1950
SUBTOTAL	SITE IMPROVEMENTS			64	2,035	2,840	0	0	0	1,220	6,095
TOTAL	COST CODE 46007 WBS 321003 (ESCALATION 0.00% - CONTINGENCY 60.00 %)			64	2,035	2,840	0	0	0	1,220	6,095
TOTAL WBS 321003 CHANGE HOUSE				64	2,035	2,840	0	0	0	1,220	6,095

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
331001	INSTRUMENT BLDG 801-A - DISPOSAL										
331001.07	SITE IMPROVEMENTS										
331001.0710002	DUMP CHARGES, ERDF @ $60/TON	460	80 TON	0	0	0	0	4800	0	0	4800
SUBTOTAL	SITE IMPROVEMENTS			0	0	0	0	4,800	0	0	4,800
TOTAL	COST CODE 46007 WBS 331001 (ESCALATION 0.00% - CONTINGENCY 45.00 %)			0	0	0	0	4,800	0	0	4,800
TOTAL WBS 331001 INSTRUMENT BLDG 801-A - DISPOSAL				0	0	0	0	4,800	0	0	4,800

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
331002	INSTRUMENT BLDG 801-B - DISPOSAL										
331002.07	SITE IMPROVEMENTS										
331002.0710002	DUMP CHARGES, ERDF @ $60/TON	460	80 TON	0	0	0	0	4800	0	0	4800
SUBTOTAL	SITE IMPROVEMENTS			0	0	0	0	4,800	0	0	4,800
TOTAL	COST CODE 46007 WBS 331002 (ESCALATION 0.00% - CONTINGENCY 45.00 %)			0	0	0	0	4,800	0	0	4,800
TOTAL WBS 331002 INSTRUMENT BLDG 801-B - DISPOSAL				0	0	0	0	4,800	0	0	4,800

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
331003	CHANGE HOUSE - DISPOSAL										
331003.07	SITE IMPROVEMENTS										
331003.0750002	DUMP CHARGES, CONCRETE, LOCAL LANDFILL AT $15/TON.	460	10 CY	0	0	0	0	150	0	0	150
331003.0750004	DUMP CHARGES, BLDG RUBBLE, LOCAL LANDFILL 2 $15/TON	460	36 CY	0	0	0	0	540	0	0	540
SUBTOTAL	SITE IMPROVEMENTS			0	0	0	0	690	0	0	690
TOTAL	COST CODE 46007 WBS 331003 (ESCALATION 0.00% - CONTINGENCY 45.00 %)			0	0	0	0	690	0	0	690
TOTAL WBS 331003 CHANGE HOUSE - DISPOSAL				0	0	0	0	690	0	0	690

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
331004	ION EXCHANGE COLUMN - DISPOSAL										
331004.07	SITE IMPROVEMENTS										
331004.0740004	BURIAL COST FOR CATEGORY 3 LLW, REMOTE HANDLED, BASE RATE $13.76 PLUS HIC CHARGE OF $65.10 PER CF OR $78.86.	460	845 CF	0	0	0	0	66637	0	0	66637
331004.0740006	BURIAL COST FOR CATEGORY 3 LLW, CONTACT HANDLED, BASE RATE $13.76 PLUS HIC CHARGE OF $39.06 PER CF OR $52.82.	460	80 CF	0	0	0	0	4226	0	0	4226
331004.0740008	BURIAL COST FOR CATEGORY 1 LLW, CONTACT HANDLED, BASE RATE $13.76 PLUS HIC CHARGE OF $39.06 PER CF OR $52.82.	460	400 CF	0	0	0	0	21128	0	0	21128
331004.0740010	BURIAL COST FOR U/G PIPE AND DIRT GOING TO ERDF @ $60/TON	460	50 TON	0	0	0	0	3000	0	0	3000
SUBTOTAL	SITE IMPROVEMENTS			0	0	0	0	94,991	0	0	94,991
TOTAL	COST CODE 46007 WBS 331004 (ESCALATION 0.00% - CONTINGENCY 45.00 %)			0	0	0	0	94,991	0	0	94,991
TOTAL WBS 331004 ION EXCHANGE COLUMN - DISPOSAL				0	0	0	0	94,991	0	0	94,991

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
331005	FAN HOUSE - DISPOSAL										
331005.07	SITE IMPROVEMENTS										
331005.0750002	DUMP CHARGES, CONCRETE, ERDF, 40 TON (20 CY) AT $60/TON.	460	40 TON	0	0	0	0	2400	0	0	2400
331005.0750004	DUMP CHARGES, BLDG RUBBLE @ 7 LB/SF, ERDF, @ $60/TON.	460	3 TON	0	0	0	0	180	0	0	180
331005.0750006	BURIAL CHARGE FOR 12 HEPA FILTERS @ $78.86/CF.	460	48 CF	0	0	0	0	3785	0	0	3785
SUBTOTAL	SITE IMPROVEMENTS			0	0	0	0	6,365	0	0	6,365
TOTAL	COST CODE 46007 WBS 331005 (ESCALATION 0.00% - CONTINGENCY 45.00 %)			0	0	0	0	6,365	0	0	6,365
TOTAL WBS 331005 FAN HOUSE - DISPOSAL				0	0	0	0	6,365	0	0	6,365

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
331006	DEENTRAINER - DISPOSAL										
331006.07	SITE IMPROVEMENTS										
331006.0730005	EARTH FILL FROM DEENTRAINER CAISSONS TO GO TO ERDF AT $60/TON.	460	270 TON	0	0	0	0	16200	0	0	16200
331006.0760103	DISPOSAL COST FOR DEENTRAI-NER DUCT, CAISSONS AND CONCRETE AT LOW LEVEL BURIAL GROUND @ $78.86/CF.	460	200 CF	0	0	0	0	15772	0	0	15772
331006.0760105	DISPOSAL COST FOR THREE DEENTRAINER TANKS AND SEAL POT (RMW) AT $120/CF. CONTAINER COST IS INCLUDED.	460	150 CF	0	0	0	0	18000	0	0	18000
SUBTOTAL	SITE IMPROVEMENTS			0		0		49,972		0	
					0		0		0		49,972
TOTAL	COST CODE 46007 WBS 331006			0		0		49,972		0	
	(ESCALATION 0.00% - CONTINGENCY 45.00 %)				0		0		0		49,972
TOTAL WBS 331006 DEENTRAINER - DISPOSAL				0		0		49,972		0	
					0		0		0		49,972

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
331007	CONDENSER BUILDING - DISPOSAL										
331007.07	SITE IMPROVEMENTS										
331007.0770105	DISPOSAL COST FOR 52 COVER BLOCKS CAT I LLW @ $13.76 PER CUBIC FOOT.	460	2916 CF	0	0	0	0	40124	0	0	40124
331007.0770107	DISPOSAL COST FOR PIPE IN CELLS & 3 CONDENSERS (RMW), AT $120/CF, CONTAINER COST IS INCLUDED.	460	400 CF	0	0	0	0	48000	0	0	48000
331007.0770110	CONCRETE RUBBLE DISPOSAL COST FOR 686 TONS (343 CY) TO ERDF @ $60/TON.	460	686 TON	0	0	0	0	41160	0	0	41160
331007.0770112	DISPOSAL COSTS FOR MISC. PIPING AND EQUIPMENT (14 TONS) TO ERDF AT $60/TON.	460	14 TON	0	0	0	0	840	0	0	840
SUBTOTAL	SITE IMPROVEMENTS			0	0	0	0	130,124	0	0	130,124
TOTAL	COST CODE 46007 WBS 331007 (ESCALATION 0.00% - CONTINGENCY 45.00 %)			0	0	0	0	130,124	0	0	130,124
TOTAL WBS 331007 CONDENSER BUILDING - DISPOSAL				0	0	0	0	130,124	0	0	130,124

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
331008	COOLING TOWER AND SUMPS - DISPOSAL										
331008.07	SITE IMPROVEMENTS										
331008.0780004	DUMP CHARGES, BLDG RUBBLE FROM COOLING TOWER & SUMPS, ERDF AT $60/TON.	460	200 TON	0	0	0	0	12000	0	0	12000
SUBTOTAL	SITE IMPROVEMENTS			0	0	0	0	12,000	0	0	12,000
TOTAL	COST CODE 46007 WBS 331008 (ESCALATION 0.00% - CONTINGENCY 45.00 %)			0	0	0	0	12,000	0	0	12,000
TOTAL WBS 331008 COOLING TOWER AND SUMPS - DISPOSAL				0	0	0	0	12,000	0	0	12,000

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
REPORT TOTAL				183,196	9,556,068	113,086	2,889,718	958,842	1,382	144,253	13,663,350

DISTRIBUTION SHEET

To	From	Page 1 of 1
DISTRIBUTION	W. A. Skelly	Date 12-17-98
Project Title/Work Order		EDT No. 624327
AX Tank Farm Ancillary Equipment Study, HNF-3441, Rev. 0		ECN No.

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
CENTRAL FILES	B1-07	X			
PROJECT FILES - HTI	R1-41	X			
DOE READING ROOM	H2-53	X			
D.L. BECKER (2)	R2-89	X			
L.E. BORNEMAN	S7-40	X			
T.J. CONRADS	H5-25	X			
E.A. FREDENBURG	R1-04	X			
J.C. HENDERSON	B1-40	X			
J.A. HUNTER	H3-28	X			
T. LANEY	S5-05	X			
D.L. NICHOLS	B1-40	X			
A.F. NOONAN	R3-89	X			
R.W. POWELL	R3-75	X			
D.C. RAMSOWER	H3-28	X			
W.R. ROOT	R2-53	X			
P.A. SCOTT	K9-46	X			
W.A. SKELLY	H3-26	X			
(COGEMA DOCUMENT CONTROL)	H3-26	X			
J.C. SONNICHSEN	H6-26	X			
W.J. STOKES	R3-75	X			
T.L. STEWART	K9-69	X			
C.D. WEST	A0-21	X			