S

94-73 ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT 619524

2. To: (Receiving Organization)	3. From: (Originating Organization)	4. Related EDT No.:
Distribution	COGEMA Engineering Corp.	N/A
5. Proj./Prog./Dept./Div.: HTI	6. Design Authority/ Design Agent/Cog.Engr.: N/A	7. Purchase Order No.: N/A
8. Originator Remarks: For approval and release.		9. Equip./Component No.: N/A
		10. System/Bldg./Facility: 200Gen
11. Receiver Remarks: 11A. Design Baseline Document? [] Yes [X] No		12. Major Assm. Dwg. No.: N/A
		13. Permit/Permit Application No.: N/A
		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 Desig-nator	(G) Reason for Trans-mittal	(H) Origi-nator Dispo-sition	(I) Receiv-er Dispo-sition
1	HNF-4098	All	0	AX Tank Farm Process Impacts Study	N/A	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 4. Review 2. Release 5. Post-Review 3. Information 6. Dist. (Receipt Acknow. Required)	1. Approved 4. Reviewed no/comment 2. Approved w/comment 5. Reviewed w/comment 3. Disapproved 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		WA Skelly	WA Skelly	3/8/99	
		Design Agent:					~~1~~	~~JA Hunter~~			
		Design Agent Mgr:					1	DL Becker	DL Becker	3/11/99	
		Cog. Eng.:					1	RW Root	RW Root	3/17/99	
		Cog. Mgr.:				1		DC Ramsower	DC Ramsower H3-28	3/9/99	

18. WA Skelly 3/8/99
Signature of EDT Originator Date

19. DL Becker 3/11/99
Authorized Representative for Receiving Organization Date

20. RW Root 3/17/99
Design Authority/ Cognizant Manager Date

21. DOE APPROVAL (if required)
Ctrl. No.
[] Approved
[] Approved w/comments
[] Disapproved w/comments

BD-7400-172-2 (05/96) GEF097

AX Tank Farm Process Impacts Study

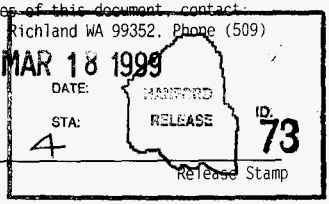
W. A. Skelly
M. D. Crippen
COGEMA Engineering Corp,
Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-96RL13200

EDT/ECN: 619524 UC: 510
Org Code: 73500 CACN: 103226
COA: AA20
B&R Code: EW02J1190 Total Pages: 139

Key Words: AX Tank Farm, Hanford Tanks Initiative, New Processing Facility, heavily contaminated debris, waste process flow sheet, waste treatment, tank and ancillary equipment debris treatment.

Abstract: This study provides facility and process concepts and costs for partial decontamination of the most heavily contaminated debris from the demolition of the four AX tanks and ancillary equipment items. This debris would likely be classified as high-level and/or remote handle TRU waste based on source and radiological inventory. A process flow sheet was developed to treat contaminated metal wastes such as pipes and tank liners as well as contaminated concrete and the residual waste and grout left in the tanks after final waste retrieval. The treated solid waste is prepared for delivery to either the ERDF or the Low-Level waste burial grounds. Liquid waste products are delivered to the private vitrification contractor for further treatment and storage. This is one of several reports prepared for use by the Hanford Tanks Initiative Project to develop retrieval performance criteria for tank farms.

3/18/99
Release Approval Date



Release Stamp

Approved for Public Release

CONTENTS

LIST OF TABLES

LIST OF FIGURES

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:

- Demonstrate alternate retrieval technologies for tank waste.
- Retrieve hard-heel waste from Tank 241-C-106 and assess compliance with retrieval performance evaluation criteria for that activity.
- Characterize residual waste in Tank 241-AX-104 and assess compliance with retrieval performance criteria for that tank.
- 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, HNF-SD-HTI-PLN-022.

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 the 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 (NEPA) of 1969 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 the risk to human health and the environment. Several engineering studies have been conducted by COGEMA Engineering Corporation (COGEMA Engineering) and other contractors to provide essential data for these evaluations. In previous studies, COGEMA Engineering developed concepts for exposing, demolishing, and removing debris from the four AX tanks (AX Tank Farm Tank Removal Study); two alternate methodologies (an ex-situ method and an in-situ method) for remediation of residual vadose zone contamination following removal of the four tanks (AX Tank Farm Soil Remediation Study); and two alternate methodologies (an ex-situ method and an in-situ method) for remediation of related ancillary equipment (AX Tank Farm Ancillary Equipment Study). These reports describe concepts for performing the work, including descriptions of the layouts, equipment, labor, and materials that would be involved, together with characterizations of the concepts with respect to cost, technical practicality, and worker radiological exposures.

1.2 STUDY SCOPE AND OBJECTIVES

Beginning in 1997, HTI has undertaken a number of engineering studies to develop essential information and assessments regarding technologies, health and environmental risks, and costs associated with alternative strategies for closing single- shell tanks (SSTs) at the Hanford Site. Data from these studies are being applied, in turn, to the development of retrieval performance evaluation criteria for Hanford SSTs. The 241-AX Tank Farm has been designated as the "strawman" for these studies and assessments. Although it is the smallest of the 12 SST farms at the Hanford Site, it poses some of the greatest challenges for waste characterization, waste retrieval, and closure due to the tank dimensions, the concentration of in-tank hardware, the residual waste compositions, and the concentration and complex relationships between the tanks and associated ancillary equipment.

This study extends previous work by providing facility and process concepts for partial decontamination of the most heavily contaminated debris from demolition of the four AX tanks and related ancillary equipment items (i.e., debris that would likely be classified as high-level and/or remote-handle TRU waste based on source and radiological inventory). The statement of work for this study directed COGEMA Engineering to:

1. Use the information developed in previous HTI engineering studies regarding waste forms, volumes, generation rates, and contaminant inventories of the highly radioactive wastes generated during demolition of tanks and ancillary equipment to define the waste feed to be processed.

2. Develop a waste processing concept that is compatible with the current Tank Waste Remediation System (TWRS) decision logic.

3. Utilize processing concepts from earlier TWRS systems engineering studies to the maximum practical extent.

4. Develop a concept process flow diagram for treating these highly radioactive wastes.

5. Address packaging, transportation, and storage issues and cost consequences for all waste streams leaving the facility.

Information developed in previous HTI engineering studies of the forms and compositions, volumes, generation rates, and contaminant inventories of the highly radioactive debris generated during demolition of tanks and ancillary equipment is summarized in Section 2 of this report.

The current TWRS decision logic for retrieval, treatment, and disposal of SST and double-shell tank (DST) waste can be generalized as follows:

1. Existing waste in DSTs will be mechanically agitated by mixer pumps to suspend the contained sludges to the maximum practical extent.

2. DST contents will be pumped to the Privatization Contractor's (PC's) designated staging tank.

3. In the PC's staging tank, the waste will go through multiple cycles of washing and mixing (i.e., mechanical agitation). After each wash cycle, the solids will be permitted to settle and the supernate will be decanted off to a low-activity waste (LAW) holding tank.

4. Radionuclides and hazardous constituents in the LAW waste stream will be permanently immobilized in a vitrified waste form. Immobilized LAW will be retained on site in a long-term storage facility.

5. Radionuclides and hazardous constituents in the washed solids (i.e., the high- level portion of the DST waste) will be permanently immobilized in glass logs in the PC's vitrification facility. Glass logs will be transported to the planned high- level waste disposal facility at Yucca Mountain, Nevada.

6. As storage space in DSTs becomes available, waste that is currently stored in SSTs will be retrieved and transferred to DSTs for safe interim storage. In due course, SST waste would go through the same treatment and disposal process described above for DST waste.

Schemes for treating heavily contaminated debris from demolition of SSTs and related ancillary equipment were evaluated by the TWRS Program in engineering studies predating the current TWRS decision logic, project baseline, and environmental impact statement. Appendix J of a draft report entitled *Systems Engineering Study for the Closure of Single-Shell Tanks* (Boomer et al 1991) provides a conceptual description of a solid waste treatment facility (SWTF) that was envisioned to process 495,000 yd^3(376,000 m^3) of material over a 10-year period. The 1991 study does not anticipate the decision to vitrify tank waste for disposal, nor does it anticipate that a large-scale, special-purpose landfill would be constructed at Hanford to receive large volumes of lightly contaminated soil and demolition waste (i.e., the Environmental Restoration Disposal Facility [ERDF]). The 1991 study was terminated before all portions had been completed. However, the 60-percent report draft is available in the Hanford Site records system (Document Control) as a publicly released document. The draft report includes process flow diagrams, material balances, facility layouts, equipment lists, schedule information and costs. The draft report was extensively reviewed for applicability to the current work scope. Portions of the

facility description and process logic from that study have been revised and incorporated into the current facility concept.

This report describes an updated waste processing facility concept supported by a revised process flow diagram and material balance. Initial best estimates (i.e., assumptions) for a number of essential performance parameters (e.g, decontamination factors, mechanical efficiencies) have been used in calculations to develop the supporting rationale for the concept. Notations are provided at appropriate points in figures, tables, and text of this report to identify these assumptions and the context(s) in which they are used. Typically, a chemical processing concept (or at least certain aspects of the process that are regarded as critical to concept viability) would be evaluated in a pilot plant setting. Such testing would provide data that could be used to verify key performance parameters, as well as indications of how the process logic and initial material balance estimates might be revised (optimized) to meet key objectives. Insofar as the process logic and material balance calculations in this report are untested and unproven, it should be understood that this report describes a process concept at the "initial best estimate" stage of maturity.

This study does not consider the issue of treating significant volumes of contaminated soil that might be created as the result of losses of sluicing liquors into the vadose zone during retrieval of waste from the AX tanks. Hypothetical leakage cases have been evaluated in other engineering studies commissioned by HTI. The conclusion has been advanced that contaminated soil excavated from "leakage plumes" could be handled and disposed as Category 1 and Category 3 low-level waste (LLW), for which there are existing disposal options on the Hanford Site. Processing of soil from leakage plumes through the facility described in this study would provide some reduction (possibly a significant reduction) in the volume of Category 3 soil for disposal. There would be a cost incentive (possibly a significant incentive) to use this facility to maximize the volume of soil disposed as Category 1 LLW and to minimize the volume disposed as Category 3 LLW. Because this is an optimization problem as opposed to a technology or feasibility issue, it was determined to be extraneous to this study.

The principal purpose of this study and the new treatment facility (NTF) described in this report is to provide the capability to partially decontaminate highly radioactive debris resulting from demolition of SSTs and tank farm ancillary equipment. The intent of processing debris in this facility would be (1) to reduce the contaminant inventories in the incoming debris to the extent that all washed solids leaving the facility would contain acceptably low levels of residual contamination enabling them to be disposed on site either as Category 1 or Category 3 LLW and (2) to recapture and concentrate the hazardous chemicals and radionuclides separated from the solids in a liquid waste stream that would be forwarded to DSTs for eventual vitrification. In the conceptualization process, consideration was given to the need for the waste going to DSTs to be compatible with current operational requirements (defined in the Tank Farms Authorization Basis) covering transfers to and interim safe storage in DSTs and to avoid concentrating constituents in this waste stream (e.g., iron, aluminum, zirconium) that are understood to be problematic for vitrification.

An objective of the study was to develop a wash concept that is sufficiently aggressive to ensure that contamination levels in all washed solids would be reducible below TRU and Category 3 LLW designation limits. No specific goals were set out for this study with regard to process optimization. However, in developing the process logic, consideration was given to

incorporating the necessary flexibility into the process to ensure that it would be amenable to optimization at a later date. If the concept for the proposed NTF is pursued beyond the feasibility study stage into formal design, it is likely that additional objectives would be applied to process design/development to optimize the process in specific directions, e.g., to maximize production of Category 1 LLW, minimize Category 3 LLW, and minimize the volume of liquid waste going to DSTs. With the expenditure of some additional effort, significant refinement of the process flowsheet and material balance could be achieved before initiation of formal design. However, at an early stage of design, it would be essential to evaluate specific aspects of the process in a pilot plant.

2.0 WASTE INVENTORY DESCRIPTIONS

In this study, facility requirements and process flow logic are to be evaluated for waste feed streams from the following sources:

a) Heavily contaminated soil, metal, and concrete debris from tank removal (demolition)

b) Heavily contaminated metal and concrete debris from removal (demolition) of ancillary equipment.

Removal of tanks and ancillary equipment from the AX Tank Farm have been examined in two previous engineering studies. Waste descriptions, volumes, and inventory data from the previous studies are summarized below. This information will be applied in the current study to conceptualize the essential process flow logic and equipment layout for the proposed NTF.

2.1 HEAVILY CONTAMINATED SOIL, METAL, AND CONCRETE DEBRIS FROM TANK REMOVAL

This material will be derived from demolition, removal, and loadout of debris from the lower-most portions (i.e., base slabs and footing ring sections) of the four AX tanks. A concept for tank demolition was proposed in *AX Tank Farm Tank Removal Study,* HNF-3378. That report provides estimates of quantities of heavily contaminated debris that would be produced from tank removal. Bounding estimates of the associated inventories of chemicals and radionuclides in the debris are provided in HNF-SD-HTI- TI-001 Rev. 0A (AX Tank Farm Waste Inventory Study). Relevant information from the two reports is summarized below:

Base slab debris will consist of a mixture of tank liner scrap, shielding grout, concrete rubble (from tank dome, sidewalls, footing ring and base slab), and some amount of soil from below the slab that will be picked up with the debris. The following itemization of debris (including bulking) originating from each of the four AX tanks was developed for estimating purposes in HNF-3378:

Concrete debris from dome and haunch	383 yd^3
Concrete debris from base slab and footing ring	550 yd^3
Shielding grout rubble	197 yd^3
Residual tank waste (360 ft^3)	13.33 yd^3
Liner plate scrap	69 yd^3
Soil	63 yd^3
Total per tank:	1,275 yd^3
Four-tank total:	5,100 yd^3

The tanks are lined to a height of 32 ft. with 3/8-in. carbon steel plate. The combined liner surface area inside each tank is approximately 11,958 ft^2 (47,832 ft^2 total).

Containers will be specially fabricated steel cargo boxes measuring approximately 12.1 ft. long by 4.2 ft. wide by 3.3 ft. high, with 4-in. thick steel tops and sides. Containers have been sized so that they can be transported by roll-on/roll-off (RO/RO) trucks similar to those hauling to/from ERDF. These trucks have 38,000-lb. payloads. Base slab rubble is expected to exhibit specific activity levels of ^{137}Cs in the range of 0.2 to 0.5 Ci/ft^3. The 4-in. steel thickness is calculated to limit doses to 10 mR/hr at 1 m. This criteria must be met in order to transport containers within the Hanford Site boundaries without barricading the route to other traffic. Due to the amount of steel required for shielding, the tare weight of the containers is estimated to be about 26,000 lbs. Cargo (base slab debris) will be limited to about 3.5 yd^3 per container (assuming a fill factor of about 80 percent and a bulk density of 120 lb/ft^3 for debris). The 5,100 yd^3 of base slab rubble would be delivered to the the NTF in 1,460 shielded containers (see Table 3.2 in HNF- 3378).

For purposes of evaluating exposures, waste segregation, and waste disposition issues in HNF-3378, it was assumed that the entire 1 percent residual inventories in the four AX tanks would be concentrated in a 1-in. thick layer on the floor of each tank and would be firmly adhered to the liner. During base slab demolition, as the liner is wrenched and sheared apart into pieces that are small enough to be loaded into shielded boxes, some amount of tank waste would undoubtedly flake and spall off the liner plate and become comingled with other debris. Therefore, the initial tendency for tank waste to be segregated together with the liner plate scrap fraction of base slab debris may be lost as the debris is broken up and loaded out. Irrespective of how tank waste might become dispersed throughout base slab debris during the demolition and loadout operations, the total inventory is assumed to be essentially the same as the sums of the estimated residual nonradiological and radiological inventories for the four tanks reported in HNF-SD-HTI-TI-001 Rev. 0A. The inventory information is found in the following tables: for Tank AX-101, see Tables B-15 and B-16; for Tank AX-102, see Tables C-7 and C-8; for Tank AX-103, see Tables D-9 and D-10; and for Tank AX-104, see Tables E-6 and E-7. In all of the source tables, The 1 percent residual inventory estimates are listed under the heading of "Case II." The inventory data from the source tables is reproduced in Tables 2.1 and 2.2.

2.2 HEAVILY CONTAMINATED METAL AND CONCRETE DEBRIS FROM REMOVAL OF ANCILLARY EQUIPMENT

Concept methods for demolition and removal of these items are described in *AX Tank Farm Ancillary Equipment Study,* HNF-3441. Most of the proposed methods for demolition of ancillary equipment are extensions and/or modifications of methods proposed previously for demolishing tanks. In the ancillary equipment study, equipment items were grouped together as follows:

- surplus buildings and facilities
- vadose and groundwater monitoring wells
- riser penetrations
- leak detection pits
- cribs and other facilities for liquid disposal to ground
- direct buried piping, encased piping, and ventilation duct work
- pump pits, sluice pits, and valve pits associated with individual tanks
- other valve pits, jumper pits, diversion boxes, and associated structures

AX Tank Farm Ancillary Equipment Study provides estimates of quantities of lightly and heavily contaminated debris that would be produced from demolition, removal, and loadout of all ancillary equipment items from AX Tank Farm. The majority of waste material produced would be Category 1 LLW by classification, which would be sent to ERDF for disposal. Some Category 3 contaminated equipment would be derived from demolition of surplus buildings and facilities. This equipment would be packaged appropriately and sent to the low-level (waste burial) ground (LLBG). Heavily contaminated material that would have to be sent to the NTF (because there is no viable disposal option) will be derived from removal of process waste piping and demolition of various pits and boxes. Bounding estimates of the inventories of chemicals and radionuclides associated with individual equipment components are provided in Appendix B of the *AX Tank Farm Ancillary Equipment Study.*

In the report, it is proposed that as process waste piping is exposed in trench excavations, it would be sheared into manageable lengths (i.e., lengths of approximately 10 ft.) and loaded into shielded boxes using hydraulic shears and grapple implements. Contaminated piping is expected to make up the majority of the material in the ancillary equipment waste stream going to the NTF. The heavily contaminated debris derived from demolition of pits and boxes would be of two principal types: (1) scabbling waste and (2) metal waste. Scabbling waste would be generated from an initial decontamination step that would be applied to the inside surfaces of most unlined pits and boxes in the farm. It is anticipated that scabbling would eliminate the majority of contamination from pits and boxes in advance of demolition. Scabbling waste would be in the form of pulverized concrete with a top size of 3/8 in. to 1/4 in. Metal waste would consist of embedded pipe stubs, jumpers, nozzles, drains, liner sheet scrap (a few pits have metal liners), pumps, pump and jumper supports, and casings, etc. recovered during pit demolition. Summary descriptions of the materials in the ancillary equipment waste stream are given below:

The expected composition of materials in the ancillary equipment waste stream going to the NTF is as follows:

Process waste piping and ventilation duct work:	5,720 ft^3	120 containers
Scabbling waste (pulverized concrete):	153 ft^3	3 containers
Metal waste from pits:	2,814 ft^3	60 containers

Best estimates of hazardous and radiological constituents in process waste piping and below-ground ventilation elements are identified in Tables 6a, 6b, and 6c of Appendix B, HNF-3441. Information from the source tables is reproduced in Tables 2.3 and 2.4. The source tables include some lengths of piping that would be left in place around the perimeter of the AX Tank Farm, pending closures of adjacent tank farms. The entries in Tables 2.3 and 2.4 reflect only those lengths of piping that would be removed as part of closure of the AX Tank Farm. For purposes of estimating contaminant inventories in scabbling waste and metal waste from pits and boxes, it is assumed that the combined inventory retained in the two waste forms will equal 95

percent of the original best estimate inventories for contaminated pits, boxes, and tanks listed in Tables 6e and 6f in Appendix B of HNF-3441. Chemical and radiological constituents from pits and boxes are summarized in Tables 2.3 and 2.4.

The same specially designed containers used to loadout base slab debris during tank removal would be used to transport ancillary equipment debris. Specific activity levels of ^{137}Cs in this debris have not been evaluated but could vary over wide limits. However, activity levels would likely be of the same order of magnitude as those predicted for base slab debris.

Table 2-1. Best Estimates of Nonradiological Inventories in Base Slab Debris from Tank Removal (in kg)

Analyte	AX-101	AX-102	AX-103	AX-104	Total (kg)
Ag	0.0000	NR	0.0000	NR	0.0000
Al	2,271.9262	580.9498	681.5779	685.7827	4,220.2365
As	NR	NR	NR	NR	0.0000
B	NR	NR	0.0000	NR	0.0000
Ba	97.9966	NR	29.3990	29.3990	156.7945
Bi	0.0000	0.0000	0.0000	NR	0.0000
Ca	929.5551	81.1448	262.1029	263.5255	1,536.3282
Cd	57.2957	NR	17.1887	17.1887	91.6732
Cl	19.3922	12.7320	6.4538	41.9946	80.5726
TIC as CO3	208.7726	325.7662	125.9794	148.7147	809.2330
Cr	107.7770	2.5953	32.3331	32.3331	175.0384
Cu	NR	NR	0.0000	NR	0.0000
F	NR	0.0000	0.0000	NR	0.0000
Fe	10,803.8713	1,450.0039	3,023.0255	3,039.7896	18,316.6903
Hg	0.0000	0.0000	0.0000	NR	0.0000
K	4.6493	3.0676	0.0000	1,354.6135	1,362.3304
La	NR	0.0000	0.0000	NR	0.0000
Mg	141.2271	NR	42.3681	42.3681	225.9633
Mn	157.7451	121.6662	65.0878	47.3235	391.8225
Na	4,113.9745	1,715.7021	779.7132	943.9144	7,553.3042
Ni	518.6061	64.3388	155.5818	155.5818	894.1086
NO2	391.3358	194.1024	38.9256	39.2977	663.6614
NO3	2,591.5366	1,311.2090	0.0000	782.1005	4,684.8461
OH	9,702.0420	1,192.3677	2,704.6272	4,469.1456	18,068.1826
Pb	0.0000	0.0345	0.0000	41.9946	42.0290
P as PO4	354.9862	22.9665	106.4959	107.1054	591.5540
P	115.7745	3.0992	34.7323	34.7323	188.3383
Se	NR	NR	NR	NR	0.0000
Si	2,887.5267	359.6466	711.4690	716.6044	4,675.2468
S as SO4	526.5928	36.3772	132.1944	132.1944	827.3588
S	175.7546	5.0206	44.1209	44.1209	269.0171
Sr	0.0000	50.9010	0.0000	11.1729	62.0739
TOC	536.8712	10.7231	0.0000	NR	547.5943
Total U	0.0330	15.9135	2.9769	0.0433	18.9667
Zn	NR	NR	0.0000	NR	0.0000
Zr	0.0000	0.0000	0.0000	NR	0.0000
EDTA	384.5268	0.0000	0.0000	NR	384.5268
NH3	23.2367	7.0404	39.6028	NR	69.8799
Cr+6	NR	NR	NR	NR	0.0000
CN	NR	NR	NR	NR	0.0000
H2O	33,230.2758	7,425.7745	7,523.2207	7,523.2207	55,702.4917

Table 2-2. Best Estimates of Radiological Inventories in Base Slab Debris from Tank Removal (in curies)

Analyte	AX-101	AX-102	AX-103	AX-104	Totals (Ci)
3H	0.8461	0.3293	1.1017	1.3022	3.5794
14C	0.0690	0.1016	0.0000	0.2427	0.4133
59Ni	6.2184	0.4924	1.0186	1.2020	8.9315
60Co	0.1397	0.2439	60.5740	60.5740	121.5316
63Ni	611.7357	51.1679	102.1851	120.5899	885.6786
79Se	3.4660	1.8505	0.9632	1.1366	7.4162
90Sr	97,593.3700	51,891.3141	524,979.8032	524,979.8032	1,199,444.2900
90Y	97,593.3700	51,891.3141	524,979.8032	524,899.8689	1,199,364.3560
93mNb	12.8445	5.3476	3.3247	3.9298	25.4466
93Zr	14.9751	8.0791	4.4166	5.2397	32.7105
99Tc	0.4659	0.6733	0.0000	1.7222	2.8613
106Ru	0.0268	0.2247	0.0033	0.0039	0.2587
113mCd	31.9074	40.3957	18.9051	22.4228	113.6310
125Sb	0.8247	1.5235	24.1222	24.1222	50.5926
126Sn	5.5660	2.9316	1.5026	1.7761	11.7763
129I	0.0009	0.0013	0.0000	0.0033	0.0055
134Cs	0.0995	0.0117	0.0675	0.0798	0.2585
135Cs	NR	NR	NR	NR	0.0000
137Cs	1,800.9754	7,174.8814	10,890.0823	10,890.0823	30,756.0214
137mBa	1,703.7228	6,787.4378	10,302.0178	10,302.0178	29,095.1962
151Sm	12,961.3981	5,329.6907	3,585.4430	4,237.9829	26,114.5148
152Eu	3.2417	7.8483	1.0968	1.2945	13.4813
154Eu	76.1803	600.1644	442.1659	442.1659	1,560.6766
155Eu	198.6722	380.4889	284.1697	284.1697	1,147.5004
226Ra	0.0004	0.0001	0.0001	0.0001	0.0006
227Ac	0.0022	0.0004	0.0003	0.0004	0.0033
228Ra	0.0000	0.0000	0.0000	0.0000	0.0000
229Th	0.0000	0.0000	0.0000	0.0000	0.0000
231Pa	0.0032	0.0000	0.0008	0.0009	0.0049
232Th	0.0000	0.0000	0.0000	0.0000	0.0000
232U	0.0000	0.0000	0.0000	0.0000	0.0000
233U	0.0000	0.0000	0.0000	0.0000	0.0000
234U	0.0004	0.0006	0.0009	0.0011	0.0029
235U	0.0000	0.0000	0.0000	0.0000	0.0001
236U	0.0000	0.0000	0.0000	0.0000	0.0001
237Np	0.0015	0.0022	0.0031	0.0037	0.0104
238Pu	4.8626	23.2756	0.8149	0.9632	29.9162
238U	0.0003	0.0004	0.0009	0.0010	0.0026
239Pu	130.4433	157.3508	21.0237	24.9270	333.7449
240Pu	24.2415	56.5540	4.0255	4.7388	89.5598
239/240Pu	154.6848	213.9048	134.2687	134.2687	637.1269
241Am	146.8863	507.8314	0.0000	39.2977	694.0154
241Pu	344.4779	1,608.1329	58.0190	68.5783	2,079.2080
242Cm	0.1233	0.6771	0.0303	0.0358	0.8666
242mAm	NR	NR	NR	NR	0.0000
242Pu	0.0020	0.0117	0.0003	0.0004	0.0144
243Am	0.0077	0.0569	0.0010	0.0012	0.0669

Analyte	AX-101	AX-102	AX-103	AX-104	Totals (Ci)
243Cm	0.0111	0.0831	0.0023	0.0028	0.0993
244Cm	0.4506	3.4394	0.0715	0.0844	4.0459

Decay Date: 12/31/99

Table 2-3. Best Estimates of Nonradiological Inventories in Heavily Contaminated Debris from Ancillary Equipment Removal (in kg)

Analyte	Process Waste and Vent Piping	Pits, Boxes and Tanks	Totals (kg)
Ag	0.0000	0.0000	0.0000
Al	100.6455	205.2056	305.8510
As	0.0000	0.0000	0.0000
B	0.0000	0.0000	0.0000
Ba	3.2565	5.8636	9.1201
Bi	0.0001	0.0016	0.0018
Ca	33.9592	70.6403	104.5995
Cd	1.9040	3.4283	5.3322
Cl	1.9555	4.3406	6.2961
TIC as CO3	20.3532	52.7238	73.0770
Cr	3.6947	6.7769	10.4716
Cu	0.0000	0.0000	0.0000
F	0.0005	0.0065	0.0070
Fe	406.3872	765.9242	1,172.3114
Hg	0.0000	0.0000	0.0000
K	27.2847	54.8822	82.1669
La	0.0000	0.0000	0.0000
Mg	4.6930	8.4503	13.1433
Mn	10.4427	15.4381	25.8808
Na	186.3005	404.2244	590.5249
Ni	22.4572	69.6393	92.0964
NO2	17.1455	44.3287	61.4742
NO3	104.2518	166.7700	271.0218
OH	380.8297	822.0258	1,202.8555
Pb	0.8409	1.6879	2.5288
P as PO4	12.7134	22.9053	35.6188
P	3.9802	7.2862	11.2664
Se	0.0000	0.0000	0.0000
Si as SiO3	104.2501	224.7285	328.9786
S as SO4	31.5168	211.6355	243.1523
S	10.2560	70.3494	80.6504
Sr	2.1029	2.4902	4.5931
TOC	9.2787	24.7207	33.9994
Total U	1.0016	4.6094	5.6111
Zn	0.0000	0.0000	0.0000
Zr	0.0000	0.0001	0.0001
EDTA	6.2249	15.6464	21.8713
NH3	2.2845	4.6082	6.8926
Cr+6	0.0000	0.0000	0.0000
CN	0.0000	0.0000	0.0000
H2O	917.0230	2,075.7411	2,992.7640

Table 2-4. Best Estimates of Radiological Inventories in Heavily Contaminated Debris from Ancillary Equipment Removal (in curies)

Analyte	Process Waste and Vent Piping	Pits, Boxes and Tanks	Totals (Ci)
3H	0.0969	0.1830	0.2800
14C	0.0101	0.0217	0.0319
59Ni	0.1933	0.5099	0.7032
60Co	3.6285	6.1568	9.7853
63Ni	19.1899	49.8489	69.0388
79Se	0.1905	0.3860	0.5765
90Sr	35,175.9620	63,479.4315	98,655.3936
90Y	35,174.3643	63,476.2266	98,650.5909
93mNb	0.6256	1.2228	1.8484
93Zr	0.8441	1.7140	2.5581
99Tc	0.0695	0.1500	0.2195
106Ru	0.0089	0.0103	0.0192
113mCd	3.2873	6.0097	9.2970
125Sb	1.5104	2.5442	4.0546
126Sn	0.3015	0.6107	0.9122
129I	0.0001	0.0003	0.0004
134Cs	0.0062	0.0109	0.0172
135Cs	0.0000	0.0000	0.0000
137Cs	944.6089	1,467.8086	2,412.4175
137mBa	892.6076	1,386.5564	2,279.1640
151Sm	648.1854	1,317.4025	1,965.5879
152Eu	0.4280	0.7745	1.2025
154Eu	50.5547	81.7730	132.3277
155Eu	34.6263	57.1722	91.7985
226Ra	0.0000	0.0000	0.0000
227Ac	0.0001	0.0002	0.0002
228Ra	0.0000	0.0000	0.0000
229Th	0.0000	0.0000	0.0000
231Pa	0.0001	0.0002	0.0003
232Th	0.0000	0.0000	0.0000
232U	0.0000	0.0002	0.0002
233U	0.0001	0.0008	0.0008
234U	0.0002	0.0016	0.0017
235U	0.0000	0.0001	0.0001
236U	0.0000	0.0001	0.0001
237Np	0.0003	0.0006	0.0009
238Pu	1.0438	1.9147	2.9585
238U	0.0002	0.0014	0.0016
239Pu	9.7416	20.1434	29.8849
240Pu	7.7912	15.0567	22.8479
239/240Pu	23.9621	46.0818	70.0439
241Am	23.0854	43.0099	66.0953
241Pu	71.5411	122.2445	193.7856
242Cm	0.0288	0.0341	0.0629
242mAm	0.0000	0.0000	0.0000
242Pu	0.0005	0.0009	0.0015

Analyte	Process Waste and Vent Piping	Pits, Boxes and Tanks	Totals (Ci)
243Am	0.0024	0.0043	0.0067
243Cm	0.0036	0.0063	0.0099
244Cm	0.1448	0.2418	0.3866

Decay Date: 12/31/99

3.0 PROCESS DESCRIPTION

3.1 INTRODUCTION AND APPROACH

This section provides a summary of background information, general process knowledge, and rationale that were applied in conceptualizing the process logic for the new treatment facility.

Carbon and stainless steels do not interact chemically with tank waste to any appreciable extent. Process waste piping and tank liner plate in the waste feed may be heavily contaminated, though it is expected that contamination will be a surface-adhesion problem almost exclusively. Experience has shown that a dilute acid solution will dissolve the scale and oxide compounds making up the matrix in which the radiological and non-radiological contaminants reside. Hypothetically, after the steel is removed from the acid solution, it should be free of all contamination. As a practical matter, deposition of contamination in small pits and crevices (where reagent access is constrained) and issues that affect rinsing efficiency will tend to prevent perfect decontamination. Based on these considerations, an acid-etch and water-rinse process is envisioned that is expected to provide a large decontamination factor for the free metal in the waste feed.

As indicated in Section 2, the waste feed will include coarse concrete debris from the four AX tanks, fine concrete debris (scabbling waste) from pits and boxes, and grout rubble from the 1-ft. thick layer of shielding material poured into the tanks prior to demolition. Concrete and grout are capable of interacting with tank waste constituents. Cementitious materials act as porous media in which strontium, cesium, and other radioisotopes can be taken up and retained in the cement matrix. The depth to which contaminants can penetrate exposed concrete is ordinarily limited to a small fraction of an inch, provided that the concrete is free of surface defects, such as cracks, microchannels, or large pores. Mineral aggregates (sand and gravel) in concrete generally do not exhibit significant reactivity with tank waste. Contaminants can sorb onto the surfaces of mineral grains, either in concrete or in loose soil. Sheet silicate minerals (e.g., micas and clay minerals) can take up and retain some contaminants as inter-layer cations.

The proposed treatment process will include an autogenous grinding step to physically abrade away contaminated surfaces from coarse soil and cementitious rubble material. Grinding will be followed by a radiological survey step for coarse solids. Material with acceptably low levels of radiological contamination will be released for disposal as Category 1 LLW. Material with unacceptably high levels of contamination (i.e., solids that fail the release survey step) will be returned for additional grinding. The fines from autogenous grinding (consisting of a mixture of sand-size particles of cement and silicate mineral matter) will be diverted to an acid digestion step to break down the cement. The insoluble residues (i.e., the fine mineral matter) will be turned into a concreted waste form and disposed as Category 3 LLW. Contaminants in solution will be forwarded to DSTs.

Index factors were carried through the material balance calculations (see Appendix A) to aid in visualizing the results of various decontamination factors and unit operations within the overall process. Cat-1 and Cat-3 indices are defined in terms of the ratio of Curies per unit volume in a given stream to Category 1 and 3 limits identified in the Hanford Site Solid Waste Acceptance Criteria (FDH 1998). An index value of 0.999 or less indicates that a given stream is within the

designated category limit. In a similar manner, the TRU index is defined as the ratio of TRU per gram to the limit of 100 nCi/gram prescribed in DOE Order 5820.2A.

3.2 FEED STREAMS

The incoming waste feed for the process was subdivided into a number of streams of distinct material types to facilitate calculations and process description. They are identified as Streams 101 through 107 on the Process Flowsheet (Figure 3.1) and in the material balance (Appendix A). The given information for this study regarding compositions, masses and volumes, and chemical and radiological inventories of the waste feed is summarized in Section 2.

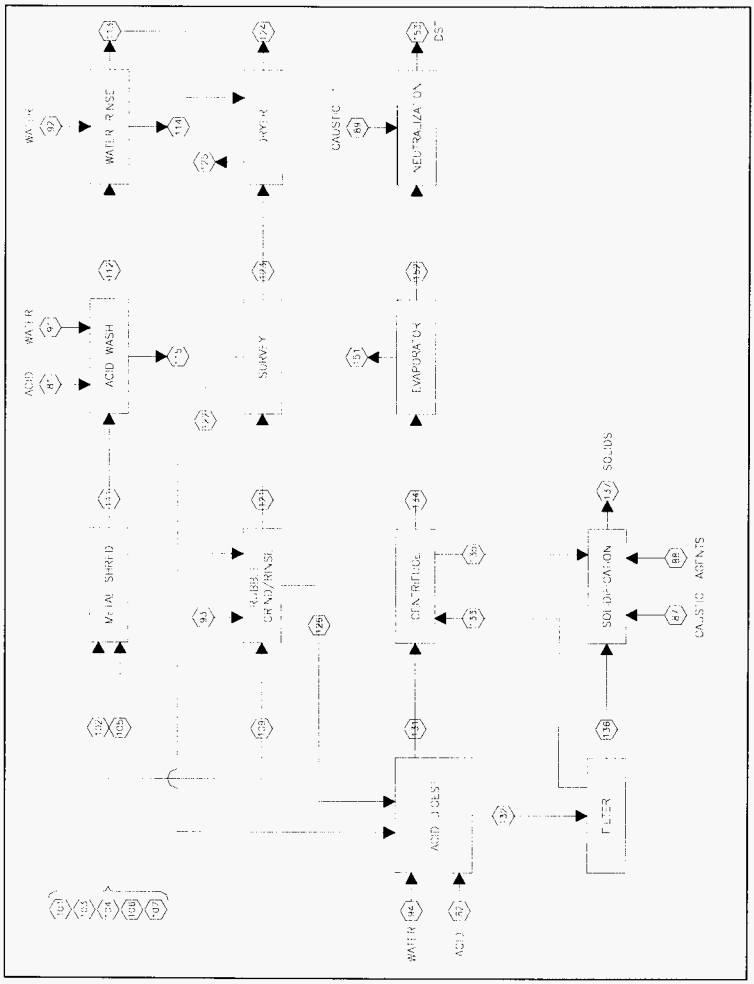
At the head end of the process, the seven material streams are segregated into two groups for processing. The first group is made up of metal, including Ancillary Metal (Stream 102), which consists of process waste piping and metal scrap from demolition of pits, auxiliary tanks and diversion boxes, and Tank Metal (Stream 105), consisting of liner plate scrap from the four AX tanks. The segregated metal moves through a set of processing steps that is distinct from the second group. The second group is made up of "rubble", consisting of Ancillary Scabbling Waste (Stream 101), Tank Soil (Stream 103), Tank Concrete (Stream 104), Tank Grout (Stream 106), and Residual Tank Waste (Stream 107), as described in Section 2.

A set of enabling assumptions was made regarding the distribution of residual tank waste constituents (listed in Tables 2.1 and 2.2) among Streams 103 - 107. Collectively, these five streams make up the base slab debris from demolition of tanks. The mass of residual tank waste in base slab debris is assigned to Stream 107. It is expected that, up until the time that tanks are demolished, most residual waste will remain as an intact layer of hard heel material on the floor of the tanks. When the tanks are demolished, it is expected that the hard heel material will arrive at the waste treatment facility as a thick coating adhering to tank liner scrap and as detached lumps of various sizes mixed in with concrete, grout, and soil. The chemical and radiological inventory in residual tank waste was allocated to the five base slab debris streams as follows:

Stream	Percent of Inventory
Tank Soil (Stream 103)	0.5%
Tank Concrete (Stream 104)	0.5%
Tank Metal (Stream 105)	1.5%
Tank Grout (106)	2.5%
Residual Tank Waste (107)	95%

As indicated in Section 2, demolition waste from ancillary equipment includes metal (process waste pipe and metal waste from pits, boxes and tanks) and non-metal (pulverized concrete scabbling waste from pits, boxes and tanks). Based on the manner in which the chemical and radiological inventory estimates for ancillary equipment is presented in Tables 2.3 and 2.4, it is unclear how the inventories should be distributed between Ancillary Scabbling Waste (Stream 101) and Ancillary Metal (Stream 102). For material balance calculations, another enabling assumption was made that the inventory in ancillary equipment debris would be distributed equally between Streams 101 and 102.

Figure 3-1. New Treatment Facility Flowsheet



3.3 METAL WASTE PROCESSING

The initial processing step for metal streams is shredding. Shredding will make the inside surfaces of pipe more accessible to etching and rinse solutions. A uniform fragment size also will facilitate material handling in subsequent process steps. The next step is immersion (washing) in dilute nitric acid. The time and temperature are controlled to allow full dissolution of all scale and dissolution of some metal (1% loss of the metal is assumed for material balance purposes). Virtually all of the residual tank waste contamination associated with Stream 111 is assumed to be in the liquid phase (Stream 115) following this processing step. Contamination carried forward in Steam 112 is a function of solution drag-out from the wash process (residual droplets of the acid wash solution adhering to the metal). Although not specifically shown, the dilution water (Stream 91) for the acid wash operation is identified in the material balance as a combination of rinse return water (Stream 114) and evaporator condensate (Stream 151).

After acid washing, metal will be rinsed with fresh (not recycled) water (Stream 92). As it is conveyed from the rinse area to the dryer, the material in Stream 113 will be surveyed with radiation detectors to verify that it is acceptable for disposal as Category 1 LLW. A small fraction of material in Stream 113 is expected to fail the survey. Reject metal in Stream 113 will be recycled back to the acid wash step (no assigned stream number). At the dryer, Stream 113 is combined with Stream 123, dried, and loaded into 20-ton RO/RO containers for shipment to ERDF for disposal (Stream 124).

3.4 RUBBLE

The initial processing step for the combined rubble stream (Steam 109) is autogenous milling (wet grinding). The fines (sand-size material and smaller) and soluble waste in Stream 109 will immediately go into the underflow, rubble fines (Stream 126), from the mill. After it is discharged from the mill, the coarse fraction (Stream 121- consisting of coarse soil and concrete aggregate) will move to a radiation survey step. Some fraction of the material in Stream 121 will fail the survey step the first time through and will be cycled back to the grinding mill for further attrition. For material balance calculation purposes, it was assumed that a relatively small percentage of material in Stream 121 would need to be recycled. Examination of the composition of the wet rubble (Stream 123) shows that the only way it is likely to meet the Category 1 limits for LLW disposal is for essentially all of the contaminated cement to be stripped away. The released rubble (Stream 123) is combined with the washed metal stream, dried, and loaded into containers for shipment to ERDF.

3.5 ACID DIGESTION

The slurry (Stream 126) containing the cement and sand fines from wet grinding is fed to the acid digester. The digester also receives the underflow, metal wash return (Stream 115), from the metal acid washing step. Sufficient additional acid is supplied to maintain concentration and dissolve essentially all (99%) of the cement. The resulting sand slurry, digester underflow (Stream 132), is sent to a filter to remove most of the carrier solution. The filter cake (Steam 136) is surveyed to confirm its radiological status and is then routed to solidification.

The digester overflow (Stream 131) and the filter liquor (Stream 133) go to a centrifuge for clarification. The small amount of centrifuge cake (Stream 135) is surveyed to confirm status and is then routed to solidification. The centrifuge overflow (Stream 134) is essentially pure solution, free of any entrained solids, and is suitable for evaporation.

Streams 135 and 136 are combined for solidification as Category 3 low-level mixed waste (LLMW). Caustic is added to neutralize the acid values of the entrained liquids. The neutralized solids are mixed with Portland cement powder to give a solid product that will meet Category 3 waste stabilization criteria. Since most of the contamination is expected to be associated with the residual moisture in the solids, it might be argued that the solids could be rinsed further with the objective of meeting Category 1 limits. Certainly, standard methods of operation for both filters and centrifuges can involve single or multiple rinse cycles. However, to meet Category 1 limits, rinsing would have to provide an additional decontamination factor of at least 10,000. That could be difficult to achieve if the solids are difficult to filter efficiently. It is unclear whether the reduction in disposal costs would be sufficient to offset the costs of incorporating the additional counter-current rinse/filter equipment into the process.

3.6 EVAPORATION

The evaporator receives the centrifuge overflow and removes about 60 percent of the incoming liquid volume as evaporator condensate (Stream 151). The evaporator bottoms (Stream 152) is a concentrated solution that may contain a small amount of precipitated solids. Sufficient caustic is added to meet DST specifications, yielding DST returns (Stream 153). In the proposed sequence, the feed is neutralized after evaporation rather than before. The opposite sequence may be used and there are arguments concerning overhead composition and precipitated solids in the evaporator that would affect this scheme. The amounts and compositions of the condensate and returns would not be affected at this level of detail by the pre/post neutralization decision.

A percentage of the evaporator condensate can be reused without treatment as dilution water (Stream 91) to the acid washing step. Even with some amount of reuse, a significant quantity (perhaps as much as 4.8 million liters or 1.2 million gallons) of lightly contaminated water in Stream 151 would require on-site or off-site treatment. With refinements to the flowsheet (e.g., addition of an ion exchange process step), it may be possible to show "zero" output of contaminated waste water from the process. However, that issue is beyond the scope of the present study.

3.7 PROCESS OUTPUTS

As a result of processing heavily contaminated tank farm debris through the proposed NTF, all solid and liquid waste generated by the process would be in forms that are compatible with existing on-site treatment/disposal options. The principal outputs are Category 1 LLW, Category 3 LLW, and concentrated liquid waste returns to DSTs. Secondary outputs from the process are evaporator condensate and trace air emissions. From the material balance calculations in Appendix A, it is estimated that the waste inventory in the incoming waste feed would be distributed among the output streams as follows:

Stream	Percentage of Original Inventory
DST Returns	84.73%
Category 3 LLW	15.10%
Evaporator Condensate	5.7 x 10-2 of 1%
Category 1 LLW	1.7 x 10-3 of 1%
Fugitive Air Emissions	4.6 x 10-6 of 1%

Additional information regarding waste forms and volumes is provided in the data tables following Section 4.

4.0 DESCRIPTION OF PROCESS FACILITY AND EQUIPMENT

4.1 FACILITY DESCRIPTION

The principal intent of conceptualizing the NTF is to show that a processing capability could be devised for treating the most extremely contaminated debris that would be generated during the removal (i.e., excavation and demolition) of SSTs and related ancillary components to residual levels that would permit the solids to be disposed as LLMW.

The Solid Waste Treatment Facility (SWTF) described in *TWRS Systems Engineering Study for the Closure of Single-Shell Tanks, Appendix J* (Boomer et al 1991) was the basis for conceptualizing the building structure to house the processing equipment described in Section 4.2. The SWTF concept was for a facility that would operate continuously for a 10-year period supporting a single mission (closure of SST farms). Over that time, the SWTF would receive and process some 495,000 yd^3 of mixed solid waste, consisting of debris from demolition of SSTs, related ancillary equipment, and miscellaneous tanks, as well as large volumes of contaminated soil from tank farms. Processing objectives were to:

- Remove 90 percent of the radionuclides and hazardous constituents from the solids.
- Facilitate disposal of 90 percent of the incoming solids volume in a landfill.
- Dispose of 10 percent (or less) of the solids and 10 percent (or less) of the radionuclides and hazardous constituents as mixed waste.

The processing criteria for the current study are that (1) contamination levels in solids going to a landfill (i.e, ERDF) are to be within Category 1 LLW limits, (2) contamination levels in solids going to LLBG are to be within Category 3 LLW limits, and (3) the separated radionuclides and hazardous constituents are to be segregated as a concentrated solution that can be returned to DSTs for eventual treatment (vitrification) by the TWRS PC.

Significant differences in waste processing requirements between the NTF and SWTF are as follows:

- For the SWTF concept, it was assumed that the waste feed would include large volumes of contaminated soil. The present study does not apply this assumption. It is anticipated that little (possibly none) of the soil excavated at tank farms would exhibit levels of contamination exceeding the Category 3 LLW disposal limits. Therefore, hypothetically at least, disposal options exist for soil that would not obligate DOE to process (treat) it first.
- For this study, the quantity of heavily contaminated debris that is envisioned to be generated in the course of clean closure of the AX Tank Farm (see Section 2.0) is significantly less (by approximately 50 percent) than the pro rata fraction of the quantity identified in conceptualizing the SWTF. To a large extent, this difference is traceable to the divergent assumptions regarding the amount of contaminated soil in the waste feed.

- With a longer operating period and lower waste feed volume and delivery rate compared to previous assumptions, the scale of the operation required to process the waste is reduceable to some degree. For purposes of this study, the structure concept has been retained from the previous study, though some aspects have been modified to reflect the current waste feed input information, criteria, interfaces, and mission.

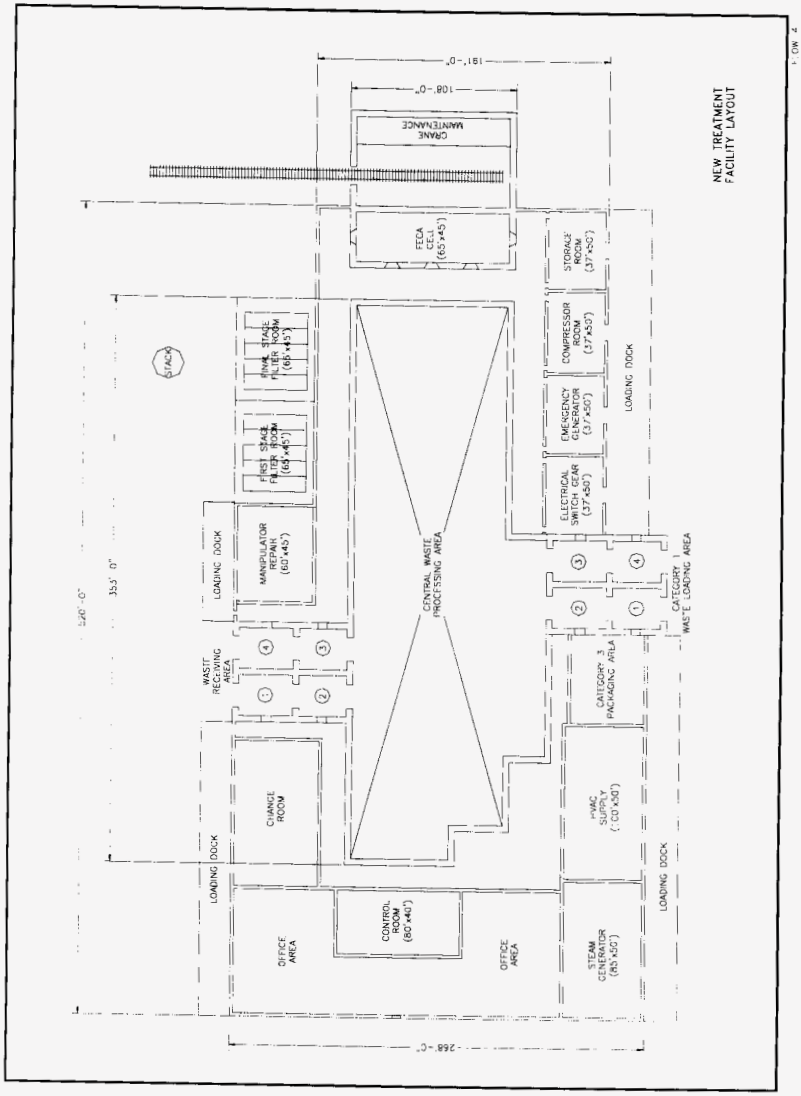
It is envisioned that the NTF, operating over a longer time frame, would support a variety of projects (including SST farm closure projects and other unrelated Hanford cleanup projects) in a series of separate operations (campaigns). Between campaigns, the processing area within the facility would undergo decontamination, equipment that is nonessential to the next campaign would be decontaminated and removed, new components would be brought in, and the process train for the next campaign would be assembled. The processing area would be physically isolated from manned access areas by continuous shielding walls, seals, and separate ventilation, and would have no permanent internal walls or partitions. This arrangement provides flexibility and would make the maximum amount of space available to arrange equipment over a succession of campaigns.

As illustrated in Figure 4.1, the NTF would be housed in a single-story reinforced concrete building, with plan (outline) dimensions of approximately 268 ft. by 520 ft, and a height of 108 ft. The building would occupy a site of approximately 10 acres, with allowances for parking, setback, and vehicle access. The NTF structure has the same plan outline and dimensions as the SWTF. Below-grade utility chases and galleries in the earlier concept were eliminated. All fixed utilities and systems identifed in the earlier facility concept were retained. These systems include:

- Raw water and firewater supply
- Fire protection and detection
- Heating, ventilation, and air conditioning systems
- Normal electrical distribution
- Standby electrical distribution
- Uninterruptible power source
- Process equipment decontamination and repair
- Compressed air and gas distribution
- Process air
- Distributed control system
- Communications
- Analytical facilities
- Health physics (radiological) monitoring equipment

The labor and materials involved to construct the building and equip these systems were revised from the original estimate to consider the reduced extent and complexity of the structure. The capital cost estimate for the NTF is included as Appendix B of this report.

Figure 4-1. New Treatment Facility



4.2 PROCESS EQUIPMENT

An overview of the proposed process logic is presented in Section 3.0. This section provides supplemental information regarding the numbers, types, and size ratings of the essential equipment components that would be used to process debris from the AX Tank Farm remediation project. It is envisioned that most process equipment will be constructed in a modular arrangement with piping and electrical jumper connections. Solids will be moved from point to point within the processing area by conveyor segments. Modules will be brought in and set up with the aid of the process area bridge crane. Modules will be designed with lifting points (eyes, bales) incorporated into the frames for this purpose. The lifting capacity of the crane (currently identified in the estimate as 30 tons) will limit the combined weight of components that can be arranged together as a "module." At the end of a campaign or mission, modules that are no longer needed will be removed from service. The process area crane will be used to disconnect jumpers between adjoining modules. Individual modules will then be picked up and moved to a separate work area, where they can be decontaminated, renovated, and/or disassembled.

For purposes of schedule estimation, it has been assumed that NTF construction would be coordinated with the AX Tank Farm remediation project, and that the project would be the initial user. The expected average processing rate is 25 container loads per day, equivalent to 67 m3 or 2,360 ft^3 of material per day. However, process equipment has been sized with capacity ratings that would support receiving and processing material at twice the average rate (i.e., at a maximum rate of 50 shielded boxes per 24-hr operating day, the same rate at which containers will be loaded at the AX tank demolition site).

Shielded transport boxes - The rubble produced from demolition of the base slabs of the four AX tanks is expected to exhibit specific activity levels of ^{137}Cs in the range of 0.2 to 0.5 Ci/ft^3 (COGEMA 1998). Based on the shielding analysis in Appendix A of that report, it was concluded that no existing waste package design would be suitable for transporting debris with these levels of gamma emissions (WHC 1995), (i.e., existing designs would not be capable of limiting exposures to 10 mR/hr at 1 m as required). A new container design would be needed for on-site transportation of base slab debris. The shielding calculations indicated that a package with an aspect ratio of 1.0 : 1.2 : 4.0 and a length of 11.5 ft. would have a tare weight of approximately 26,000 lbs., a cargo capacity of approximately 3.5 yd^3, and would require 4 in. of steel on the top and sides to provide appropriate shielding. This container was sized to be transportable by 20-ton container trucks similar to those currently used in the Hanford Environmental Restoration Program to haul RORO containers to/from ERDF.

For costing purposes, it was assumed that the boxes will be "owned" by the NTF (i.e., the capital cost to provide an appropriate number of boxes to support the AX Tank Farm remediation project is included in the NTF capital cost estimate). It has been estimated(COGEMA 1998) that the tank demolition operation will load approximately 50 shielded boxes per day (250 per week). The NTF will be capable of unloading and processing debris at an average rate of approximately 25 boxes per day (175 per week). Considering processing rates, schedule durations, day-use quantities and in-plant storage, it is anticipated that a minimum of 250 shielded boxes will be needed to support the AX Tank Farm remediation project.

Waste delivery area - The waste delivery area will be arranged in a four-compartment configuration. The concept for the waste receiving operation is as follows. A container truck will back into the first compartment, off-load the shielded box onto a chain conveyor, and drive out. The outside access door will be closed off and sealed. Another door, between the first compartment and the second, will be unsealed and opened. The shielded box will be transferred by chain conveyor into the second compartment. The second door will be secured and sealed. A third door, between the second compartment and the dump area where the receiving hopper is located, will be opened. The shielded box will be opened and lifted by a hydraulic dumping mechanism, emptying the contents into the receiving hopper. The dumping mechanism will then lower and close the empty box. The access door to the dump area will be closed and sealed. Another door, between the second compartment and the third, will be unsealed and opened, and the empty box will be transferred by chain conveyor into the third compartment. The door opening into the third compartment will then be resecured. Inside the third compartment, the box will move through an external decontamination- and-release process consisting of (a) a wash station (similar to a car wash) and (b) a radiation survey station (similar to a whole-body counter). A fifth door, between the third and fourth compartments will be opened, and the decontaminated box will be repositioned. The door between the third and fourth compartments will be resecured. An external access door to the fourth compartment will be opened, enabling a container truck to back in, pick up the empty container, and drive away.

Dump mechanism for shielded boxes in second compartment - This mechanism will be situated in the second compartment of the waste receiving area and will be designed to perform the following functions. After the chain conveyor delivers and positions the box inside the compartment, the dump mechanism will:

- Remove (or open) the lid of the box (depending on specifics of the design of the box)
- Engage claspers to the box
- Raise the box for dumping. The mechanism rotates in the vertical plane about a forward pivot point. Prime movers are two long-throw hydraulic cylinders similar to cylinders used on end-dump semi-trailers. The box must be rotated through an angle somewhat greater than 90 degrees.
- Lower the box after dumping. The box is returned to its original position, the claspers are disengaged, and it is reclosed before it goes to "decon."

Decontamination and radiation survey equipment in third compartment - This equipment will be identical to the decontamination and survey equipment described for performing equivalent functions at the AX Tank Farm Enclosure Structure (COGEMA 1998).

Receiving hopper - The receiving hopper will be approximately 100 ft. long, 15 ft. wide at the top, and 15 ft. deep, with inward tapered sides (trapezoidal section). The hopper will be elevated on supports to provide the head room required to feed the autogenous grinding mill. The hopper will be fitted with a wear-resistant liner and a spray ring around the top to control dust, wash out residual fines, and facilitate decontamination of the hopper at the end of each facility operating campaign. The floor of the hopper will be sloped toward the mill. The hopper will be equipped with a scraper mechanism (e.g., a slusher) that will be used to reposition material toward the feed

(discharge) end. A vibratory pan feeder will be provided at the discharge end of the hopper to control the rate of transfer of waste feed from the hopper to the autogenous mill. The hopper will provide an in-plant storage capacity equivalent to approximately 190 shielded boxes.

Metal shredder - The shredder will receive metal waste (Ancillary Metal - Stream 102; Tank Metal - Stream 105) and reduce it to 1/2-in. shards. The shredder will have a throughput capacity of 4 tons/hr and capability to shear 1-in. plate.

Small bridge crane - The portion of the process area, including the receiving hopper, the autogenous mill and the shredder, will be supported by a dedicated bridge crane. The bridge span will be 30 ft.; the crane rails will be approximately 180 ft. long. The crane will be a nuclear service-rated crane with dual trolleys. One trolley will support a five-ton electromagnet that will be used to separate magnetic ferrous metal scrap from other waste feed and divert this material around the autogenous mill to the shredder. The second trolley will be equipped with a 10-ton grapple that will be used to separate non- magnetic metal scrap (e.g, stainless steel pipe) from the feed and transfer it to the shredder.

Large bridge crane - Activities within the entire central section of the building can be supported by the large bridge crane. This also will be a nuclear service-rated crane, with dual trolleys (30-ton and 5-ton hooks), a 100-ft. bridge and 500-ft. long rails. It is envisioned that the large crane would be used principally to set up the process train for a new campaign and to remove and replace components after a campaign has been concluded. The large and small bridge cranes will be installed as part of the NTF building construction. However, In the capital cost estimate (Appendix B), they are listed with process equipment items.

Acid washing and rinsing station - This equipment will consist of two stainless steel tanks, each approximately 1 m deep, 1.5 m wide, and 5 m long, with a 200-gal/min recirculation pump and an 85-gal/min transfer pump.

Autogenous mill - The mill will be a fully autogenous grinding mill, approximately 12 ft. in diameter by 10 ft. long, rated at 10 tons/hr, with a 375-HP drive motor. The mill will be supplied with motor and couplings, rubber liner, and feed and discharge chutes. This equipment is heavy enough (approximately 440,000 lb) to require a fixed foundation pad, unlike most other components, which can be skid-mounted. A rubber liner and slow rotation speed (as opposed to a steel liner and fast rotation) will maximize abrasion (grinding) of the coarse solids and minimize fracturing. Because of the potential for generating contaminated airborne particulates during the operation, the air space inside the mill will be ventilated separately. Exhaust air from the mill will be ducted away to a HEPA filter unit.

Dryer - The dryer will receive washed metal (Stream 113) and coarse solids from the autogenous grinding step (Stream 123). The dryer will be an insulated sheet-metal enclosure, measuring 56 ft. long, 12 ft. high, and 6 ft. wide. Radiant heating elements inside the dryer will be rated at 2 million Btu/hr. Washed solids will move through the enclosure on a conveyor belt. Belt speed and air flow through the dryer will be regulated to optimize the elimination of water vapor, heat retention, and drying time.

Acid digester - The underflow from the grinding mill (Stream 126) will be directed to the acid digester. The digester also receives acid wash solution (Stream 115) from the metal washing

operation. Additional acid will be fed to the digester at a rate of 15 gal/min. The digester will be a stainless steel leach tower with an interior auger lift. The tower will be approximately 5 ft. in diameter by 12 ft. high. Throughput capacity will be rated at 6 tons/hr of solids.

Rotary drum filter - Two rotary drum filter units will separate undissolved solids (principally sand-size and finer mineral matter) from the acid digester (Stream 132). All parts of the filter unit contacting liquid feed would be constructed of stainless steel. The two units will have the capacity to produce a combined 6 tons/hr of solids cake and pass 20 gal/min of filtered liquid.

Centrifuge - The centrifuge will receive the overflow from the acid digester (Stream 131) and the filtered liquid from the rotary drum filters (Stream 133) and will separate out residual solids. The centrifuge will have a feed rating of 50 gal/min. Filtered liquid from the centrifuge (Stream 134) will be routed to the evaporator for concentration.

Evaporator - Two evaporator units will remove a combined 3,500 gal/hr of water from an incoming solution (Stream 134) containing an estimated 20 wt percent dissolved solids. A portion of the evaporator condensates will be reused in the process. The balance will be routed to the 200-Area ETF.

Category 1 waste loading station - This portion of the facility is conceptualized as a four-compartment area (similar to the waste receiving area) for delivering and picking up 20-ton RO/RO containers. In the first compartment, the container truck backs in and off- loads an empty RO/RO container onto a chain conveyor. The conveyor then repositions the RO/RO trailer from the first compartment to the second. Access doors to the second compartment are then closed and sealed off. The container is opened. Washed and dried solid waste debris (i.e, material in Stream 124) is transferred into the container from a bulk storage hopper by a vibratory pan feeder. The door between compartments two and three is opened, and the loaded container is transferred into the third compartment. Within this compartment, the container is subjected to the same type of external decontamination-and-release process described above for empty shielded boxes. The released RO/RO container is then transferred to the fourth compartment, where a container truck backs in and picks it up.

Category 1 waste storage hopper - The storage hopper will be approximately 50 ft. long, 20 ft. wide at the top, and 20 ft. deep, with tapered sides (trapezoidal section). The hopper will be elevated on supports to gain the head room required to load 20-ton RO/RO containers. The hopper will be fitted with a wear-resistant liner and a spray ring around the top to control dust, wash out residual fines, and aid in decontamination after each facility operating campaign. The floor of the hopper will be sloped toward a discharge chute to the vibratory pan feeder. The pan feeder will be employed to control the transfer of material from the hopper into the trailers. During the loading process, the chain conveyor segment within the second compartment will reposition the RO/RO container so that it is evenly loaded along its length.

Category 3 waste solidification/loading station - The solidification station will receive filter cake (solids with residual moisture content) from Streams 135 and 136. The solids will first be neutralized by caustic addition and then entrained as fine aggregate in Portland cement paste. The mixture will be poured into 55-gal drums for disposal. The mixing and metering equipment will be sized to produce approximately 4 yd^3 of material per hour. Drummed Category 3 waste will be transported by truck to LLBG for disposal.

Aqueous make-up (reagent storage) tanks - These tanks include two 50,000-gal tanks for bulk acid and caustic storage, two 10,000-gal mixing tanks, and related pumps and controls.

Staging tanks for DST returns - Two 100,000-gal stainless steel tanks will receive and temporarily store the concentrated liquid waste solution from the process (Stream 152) for transfer to DSTs. The tanks will be 15 ft. in diameter and 72 ft. long. They will be placed in a concrete vault adjacent to the NTF structure, measuring 40 ft. by 80 ft. (plan) by 20 ft. deep. The vault will be constructed below grade with 2-ft. thick walls and cover blocks. While the liquid waste is held in these tanks, caustic additions will be made to meet specifications for transfer to the DSTs. The tanks will be equipped with separate mixing and transfer pumps.

4.3 DATA TABLES

Data tables have been assembled to summarize the resources, staffing, equipment, waste quantities, and emissions that would be needed to construct and operate the proposed NTF in support of clean closure of the AX Tank Farm. Additionally, this section includes summary information on project costs and schedule.

Table 4-1. Waste Form and Volume Projections

Waste Form	Characteristic
Category 1 LLW:	
Quantity	6,360 tons
Number of containers	318 RO/RO container loads
Container size	20'L x 7.5'W x 5.5'H
Radionuclide Inventory	Approx. 22.3 Ci ^{90}Sr, 1.08 Ci ^{137}Cs, 0.025 Ci TRU
Disposal location	Environmental Restoration Disposal Facility
Category 3 LLW:	
Quantity	70,000 ft^3
Number of containers	9,520 (perfect filling); 10,578 (90% fill factor)
Container size	55-gal drums
Radionuclide Inventory	Approx. 196,000 Ci ^{90}Sr, 9,750 Ci ^{137}Cs, 192 Ci TRU
Disposal location	Low-Level Burial Grounds
Concentrated Liquid Waste (DST Returns):	
Quantity	Approx. 1,053,000 gal
Number of containers	none (bulk transfers)
Container size	N/A
Radionuclide Inventory	Approx. 1.10×10^6 Ci ^{90}Sr, 5.47×10^4 Ci ^{137}Cs, 1,075 Ci TRU
Disposal location	Transfer to DSTs for eventual vitrification with other tank waste
Evaporator Condensate	
Quantity	Approx. 1,200,000 gal
Number of containers	none (bulk transfers)
Container size	N/A
Radionuclide Inventory	Approx. 734 Ci ^{90}Sr, 35 Ci ^{137}Cs, 0.72 Ci TRU
Disposal location	200-East Effluent Treatment Facility

Table 4-2. Construction Resource Requirements

Construction Resource	Quantity
Land Area	Site will be approx. 10 acres with parking and setback. Building footprint will cover approx. 3.2 acres.
Temporary Laydown Area for Building Construction	None (adequate area for laydown on site)
Concrete	83,150 yd^3
Water (6.6 wt %)	2,475,000 gal
Cement (14.6 wt %)	45,884,000 lb.
Sand (34.1 wt %)	107,063,000 lb.
Gravel (44.8 wt %)	140,712,000 lb.
Rebar (10 lb/ft^3)	22,451,000 lb.
Steel	None (see rebar above)
Excavation	
Site Grading (cut and fill)	Approx. 24,200 yd^3
For Foundations	Approx. 20,000 yd^3
Backfill	N/A

Table 4-3. Radiological Air Emissions (in curies)

Analyte (Ci)	Grinding Particulates (1) (Ci)	Dryer Offgas (2) (Ci)	Totals (Ci)
3H	1.100e-07	6.529e-08	1.753e-07
14C	1.269e-08	7.492e-09	2.018e-08
59Ni	2.745e-07	1.634e-07	4.379e-07
60Co	3.738e-06	2.245e-06	5.984e-06
63Ni	2.721e-05	1.613e-05	4.334e-05
79Se	2.278e-07	1.349e-07	3.627e-07
90Sr	3.693e-02	2.237e-02	5.930e-02
90Y	3.693e-02	2.237e-02	5.930e-02
93mNb	7.798e-07	4.497e-07	1.229e-06
93Zr	1.005e-06	5.966e-07	1.602e-06
99Tc	8.785e-08	5.176e-08	1.396e-07
106Ru	7.933e-09	4.497e-07	1.229e-06
113mCd	3.498e-06	2.114e-06	5.612e-06
125Sb	1.556e-06	9.327e-07	2.489e-06
126Sn	3.617e-07	2.139e-07	5.756e-07
129I	1.703e-10	1.003e-10	2.707e-10
134Cs	7.896e-09	4.403e-09	1.230e-08
135Cs	0.000e+00	0.000e+00	0.000e+00
137Cs	9.451e-04	5.617e-04	1.507e-03
137mBa	8.940e-04	5.311e-04	1.425e-03
151Sm	8.012e-04	4.685e-04	1.270e-03
152Eu	4.165e-07	2.610e-07	6.775e-07
154Eu	4.811e-05	2.951e-05	7.762e-05
155Eu	3.529e-05	2.114e-05	5.643e-05
226Ra	1.962e-11	1.139e-11	3.101e-11
227Ac	1.012e-10	5.757e-11	1.587e-10
228Ra	8.542e-14	5.799e-13	6.654e-13
229Th	3.321e-14	6.948e-14	1.027e-13
231Pa	1.510e-10	8.542e-11	2.364e-10
232Th	4.701e-16	3.164e-15	3.634e-15
232U	3.031e-12	2.055e-11	2.357e-11
233U	1.241e-11	8.440e-11	9.681e-11
234U	1.109e-10	2.075e-10	3.183e-10
235U	4.507e-12	8.396e-12	1.290e-11
236U	4.717e-12	9.174e-12	1.389e-11
237Np	3.221e-10	2.000e-10	5.220e-10
238Pu	9.285e-07	6.088e-07	1.537e-06
238U	1.003e-10	1.852e-10	2.856e-10
239Pu	1.031e-05	6.474e-06	1.679e-05
240Pu	2.990e-06	3.251e-06	6.240e-06
239/240Pu	1.988e-05	1.368e-05	3.356e-05
241Am	2.150e-05	1.386e-05	3.537e-05
241Pu	6.435e-05	4.111e-05	1.055e-04

Analyte (Ci)	Grinding Particulates (1) (Ci)	Dryer Offgas (2) (Ci)	Totals (Ci)
242Cm	2.655e-08	1.531e-08	4.186e-08
242mAm	0.000e+00	0.000e+00	0.000e+00
242Pu	4.480e-10	2.967e-10	7.446e-10
243Am	2.077e-09	1.373e-09	3.450e-09
243Cm	3.082e-09	2.026e-09	5.108e-09
244Cm	1.224e-07	8.023e-08	2.026e-07

Decay Date: 12/31/99

Note 1: To estimate grinding particulate emissions, it was assumed that a decontamination factor of 10,000 for the grinding step would be present, and that exhaust air would be routed through a HEPA filter with an efficiency of 3,333.

Note 2: To estimate dryer offgas emissions, it was assumed that 0.001 of the combined radiological inventory in Streams 113 and 123 going through the dryer would become carryover, and that the offgas stream is unfiltered.

Table 4-4. Manning List for the Proposed New Treatment Facility

During normal operations (i.e., when the facility is receiving and processing demolition waste from AX Tank Farm), it will operate three shifts per day, seven days per week. The facility will have four separate operations crews, each composed of: 1 traffic master for incoming trucks 2 health physics technicians (HPTs) for incoming trucks 2 decon operators for incoming trucks 8 plant operators 3 control room operators 1 traffic master for outgoing trucks 2 HPTs for outgoing trucks 2 decon operators for outgoing trucks 1 shift supervisor 1 control room supervisor 1 packaging supervisor 2 electrical/instrument craftsmen 1 mechanical craftsman 1 fitter craftsman 1 craft supervisor 29 per shift (116 total)
The following are required for one back shift (graveyard) maintenance crew during normal operations: 1 craft supervisor 1 expediter 1 millwright 1 fitter 2 electrical/instrumentation 6 per shift
The following are required for a single office crew during normal operations: 1 manager 1 secretary 1 janitor 1 expediter 4 total
The following are required to maintain the building HVAC system three shifts per day, seven days per week during all periods (operating campaigns, maintenance periods, and standby periods): 2 power operators (total of 8).

It is anticipated that building maintenance can be conducted by the operations maintenance personnel between operating campaigns. The grand total is 29+29+29+29+6+4+8 = 134 people
The following are required on a single day shift during maintenance and D/D operations (scheduled two days for every day of operation): 4 HPTs for general maintenance support 4 decon operators for general maintenance support 4 control room and equipment operators 1 shift supervisor 1 control room supervisor 1 packaging supervisor 4 electrical/instrument craftsmen 2 mechanical/millwright craftsman 2 fitter craftsman 2 craft supervisor 25 total for maintenance
The following are required for a single office crew during maintenance periods and D/D operations: 1 manager 1 secretary 1 janitor 2 expediter 5 total
The following are required to maintain the building HVAC system three shifts per day, seven days per week during all periods (operating campaigns, maintenance periods, and standby periods): 2 power operators (total of 8).
The grand total is 25+5+8 = 38 people
The following are required on a single day shift for stand-by periods: 1 HPT for general support 1 decon operator for general support 1 control room/equipment operator 1 manager 1 secretary 0.5 janitor 5.5 total

The following are required to maintain the building HVAC system three shifts per day, seven days per week during all periods (operating campaigns, maintenance periods, and stand-by periods): 2 power operators (total of 8).
The grand total is 5.5+8 = 13.5 people

Table 4-5. Cost Summary

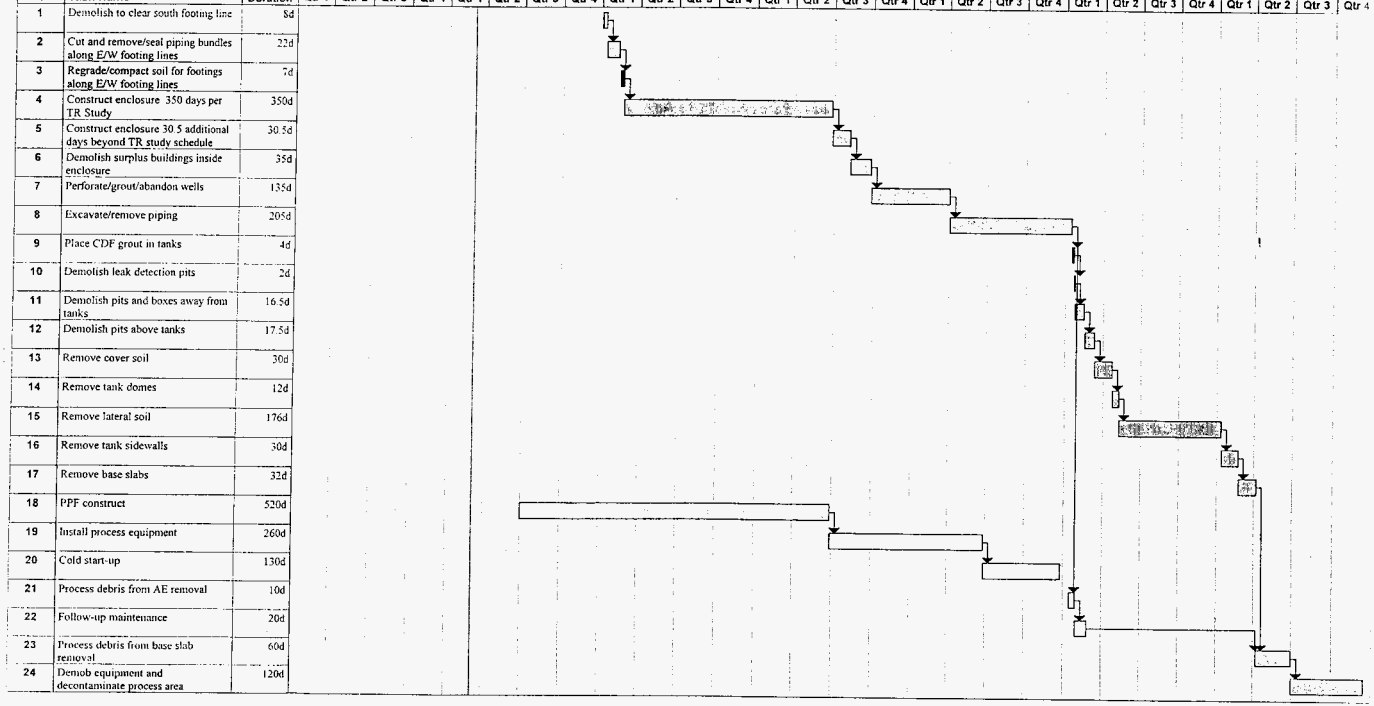
Cost Component	Cost (Note 1)
Post-Retrieval Monitoring and Maintenance	N/A
Capital Engineering and Construction Management PPF Building Construction Process Equipment Project Management	 274,880,000 180,880,000 246,770,000 96,420,000 Total = 798,950,000
Research and Development	N/A
Operating Labor and Materials Cat 1 and Cat 3 Waste Disposal	15,370,000 6,740,000 Total = 22,110,000
Decontamination and Decommissioning	N/A (Note 2)

Note 1: Costs are rounded to the nearest $10,000. Costs are stated in 1999 dollars and do not include escalation. Costs include contingencies averaging 42 percent for capital costs and 54 percent for operating costs.

Note 2: Study scope did not address facility decontamination and decommissioning.

Figure 4.2. AX Tank Farm Process Impacts Study Schedule

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
18	PPF construct	520d
19	Install process equipment	260d
20	Cold start-up	130d
21	Process debris from AE removal	10d
22	Follow-up maintenance	20d
23	Process debris from base slab removal	60d
24	Demob equipment and decontaminate process area	120d



5.0 IMPLEMENTABILITY ISSUES

5.1 DESIGN MATURITY

The material balance for the proposed debris treatment process (see Appendix A) should be regarded as an initial best estimate of process performance. A number of assumptions have been applied to make these calculations regarding decontamination factors and mechanical efficiencies that cannot be independently verified or evaluated at this time. Consequently, assessments regarding the projected efficiency of the proposed process may be either overstated or understated. Continuous refinement of the material balance would be an integral aspect of process design/development should DOE elect to explore this concept in greater detail.

5.2 UTILITY OF NTF PROCESS CONCEPT FOR TREATING LARGE VOLUMES OF CONTAMINATED SOIL

In developing the process logic for this study, primary emphasis was placed on separating tank waste contaminants from metal and concrete substrates. The study does not address the problem of separating contaminants from granular soils in comparable detail. To the extent that contamination of soil is a surface phenomenon (i.e., contamination is sorbed onto the outside surfaces of soil particles), the NTF process should be a highly effective treatment method. However, data from soil washing treatability tests on Hanford Site soils indicate that some waste constituents are capable of interacting chemically with minerals in the soil (e.g., binding as inter-layer cations in sheet silicate minerals), in which form they are difficult to extract by water washing and size separation. The NTF process logic incorporates water washing and size separation as well as mechanical abrasion and acid dissolution (strategies not typically involved in soil washing). It is anticipated that the NTF process would produce a significantly better decontamination factor for soil than has been demonstrated for conventional soil washing (DF=10). However, the NTF process decontamination factor for soil may not be large enough that it could be exploited successfully to reduce contamination in Category 3 soil to Category 1 levels. If significant quantities of Category 3 soil are generated as a consequence of closing tank farms (e.g., from excavation of soil containing leakage losses from tanks during waste retrieval operations), there may be a significant cost incentive (traceable to the large difference in disposal costs for Category 1 and 3 soil) for optimizing the NTF process for enhanced soil decontamination.

5.3 LARGE PROJECTED VOLUME OF CATEGORY 3 WASTE

By comparing information presented elsewhere in this report regarding incoming waste feed volumes and outgoing waste disposal volumes, it may be observed that, for each 1 ft^3 of incoming waste from demolition of AX tanks and ancillary equipment, the NTF process would generate approximately 0.8 ft^3 of Category 1 LLW, 0.5 ft^3 of Category 3 LLW, 8 gal of slightly contaminated evaporator condensate, and 7 gal of concentrated liquid waste (DST returns). Excluding the stream going to DSTs, Category 3 waste generation poses the greatest ongoing disposal cost burden from the NTF process. Clearly, this aspect of the process logic and material balance would be a focus for additional process refinement.

5.4 STORAGE SPACE IN DSTS

According to the TWRS planning basis for DST operations, availability of storage space in DSTs will be an ongoing logistical issue during the Initial SST Retrieval Systems (ISSTRS) Program and beyond Phase 1 of the TWRS Privatization Program. The results of this study suggest that waste processing of heavily contaminated debris from clean closure of SST farms would result in production of large additional volumes of concentrated liquid waste that (per directed study assumption) would be transferred to DSTs. This study does not address the issue of how the additional liquid waste volumes from NTF operations would be accommodated in DST operations.

5.5 ADDITIONAL LIFE-CYCLE COST CONSIDERATIONS

This is the latest in a series of engineering studies that have been prepared to evaluate various aspects of clean and landfill closures of the AX Tank Farm. This study provides estimates of the capital and operating costs to construct the NTF and to process heavily contaminated debris from demolition of AX tanks and ancillary equipment. This waste stream is too heavily contaminated to be disposed without treatment. Additional LLW disposal costs have been identified and quantified in this study as a result of treatment of the heavily contaminated debris.

Waste processing and disposal costs for vitrified DST waste were not formally evaluated as part of the cost estimating for this study. However, COGEMA Engineering has prepared a separate estimate of the number of additional glass logs that could be generated as a result of processing heavily contaminated debris from the AX Tank Farm. For this estimate, it was assumed that the iron in the contaminant inventory in DST returns will be the limiting constituent with regard to waste loading in the glass form, and that the entire inventory would go into HLW glass production (i.e, no distribution of the inventory between HLW and LAW production was assumed). The COGEMA estimate indicates that approximately 202.7 metric tons (MT) of additional HLW glass (equivalent to 72 canisters) would be produced.

Estimated processing and disposal costs for the additional HLW glass are as follows:

- Cost to process: $338,000/MT x 202.7 MT = $ 68,513,000
- Cost to dispose: $960,000/container x 72 containers = $ 69,120,000

Total =$137,633,000

Unit costs are based on a DOE "1996 Storage and Disposal Project Life Cycle Estimate," which includes all Hanford Site and repository storage and disposal costs plus contingency.

5.6 SHIELDED CONTAINERS

There is significant uncertainty regarding the number of special-purpose shielded containers that would be needed to assure that the NTF operation and the tank demolition operation could both

proceed without interruption. The capital estimate identifies costs for 250 containers (with a 50 percent contingency) to support the AX Tank Farm closure project. The receiving hopper inside the NTF is sized to accommodate the contents of approximately 190 boxes, providing some degree of surge separation between the two operations. However, if either operation were to be idled for a period of several days or longer, the other would become impacted by the non-availability of containers to load or unload. At the current level of study detail, this issue may seem inconsequential, though, at some point in the design cycle, there would be significant cost/risk incentives involved in providing an accurate forecast for the number of containers required. Because of the high unit cost of containers, procuring an excessive number would be undesirable. Alternatively, if operations are idled by an interruption in the flow of containers, significant penalties in nonproductive labor costs could be incurred. The eventual decision regarding the appropriate number of containers to support the operation may be driven by considerations (e.g., risk minimization) that cannot be quantified at the present time.

5.7 APPLICATIONS FOR ROBOTICS AND/OR REMOTE-OPERATED EQUIPMENT

The focus of this study was to develop a process concept for treatment (i.e., partial decontamination) of highly radioactive debris from demolition of AX tanks and ancillary equipment. Conceptualization did not include specific consideration of robotics or remote-operated equipment applications. However, certain aspects of the NTF operation could benefit from these types of provisions. The capital cost estimate includes an allowance of $22 million with a 50-percent contingency for specialized equipment (e.g., robotic equipment, manipulators, glove boxes, leaded glass viewing windows). The cost basis for the allowance is the cost entry for similar equipment in the earlier study estimate (Boomer et al 1991). None of these types of equipment items were detailed out in either the previous study or the current study.

5.8 CLOSED-LOOP OPERATION

The proposed process logic (Figure 3.1) offers a high degree of flexibility for optimization. Closed-loop operation is shown for the autogenous grinding step for coarse soil and concrete debris. Similar closed-loop strategies could also be applied to enhance decontamination factors for the metal acid washing and/or fine-solids filtration aspects of the process. If target decontamination factors are achievable while operating in open-loop (single-pass) mode, that would clearly be preferred. Operating in closed-loop mode would negatively impact the plant throughput rate and secondary waste generation (i.e., by increasing volumes of wash water and evaporator condensate). This flexibility enhances overall confidence in the basic workability of the proposed processing concept. However, the details involved in optimizing the process are not currently foreseeable.

6.0 REFERENCES

Boomer, K.D., S.K. Baker, A.L. Boldt, M.D. Britton, L.E. Engelsman, J.D. Galbraith, J.S. Garfield, K.A. Giese, C.E. Goldberg, B.A. Higley, K.J. Hull, L.J. Johnson, R.P. Knight, J.S. Layman, R.S. Marusich, R.J. Parazin, M.G. Piepho, E.J. Slaathaug, T.L. Waldo, C.E. Worcester, 1991. Systems Engineering Study for the Closure of Single-Shell Tanks, Appendix J, WHC-EP-0405 (Draft A), Westinghouse Hanford Co., Richland, Washington.

FDH 1998. Hanford Site Solid Waste Acceptance Criteria, HNF-EP-0063 Rev. 5, Fluor- Daniel Hanford Co., Richland, Washington.

Hendrickson, D.W., T.W. Staehr, S.L. Lambert, D.C. Ramsower, 1998. AX Tank Farm Waste Inventory Study for the Hanford Tanks Initiative (HTI) Project, HNF-SD-HTI-TI- 001 Rev. 0A, COGEMA Engineering Corp., Richland, Washington.

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

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

Skelly, W.A., 1998. AX Tank Farm Tank Removal Study, HNF-3378, COGEMA Engineering Corp., Richland, Washington.

Skelly, W.A., 1998. AX Tank Farm Ancillary Equipment Study, HNF-3441, COGEMA Engineering Corp., Richland, Washington.

WHC 1995. Radioactive Hazardous Materials Packaging Directory, Rev. 1, WHC-SP- 1070, Westinghouse Hanford Co., Richland, Washington.

APPENDIX A

PRE-PROCESSING FACILITY MATERIAL BALANCE

STREAM NUMBER	81	82	87	88	89	91	92	93
DESCRIPTION	Wash Acid	Digester Acid	Caustic	Solidifier	Caustic	Wash Water	Rinse Water	Grinder Water
Vol, m3	157.6632	1771.715	40.11608	350.0093	248.9478	1121.988	2758.094	6297.446
Density, kg/l	1.35	1.35	1.53	1.4	1.53	1	1	1
COMPONENTS, kg								
Aggregate								
Sand/fines								
cement								
metal								
tank waste								
water	91496.79	1028180	30688.8		190445	1121988	2758094	6297446
dissolved solids								
suspended solids								
acid/caustic	121348.5	1363634	30688.8		190445			
other				490013				
TOTAL, kg	212845.3	2391815	61377.6	490013	380890.1	1121988	2758094	6297446

RADIONUCLIDES

Sr, Ci	
Cs, Ci	
TRU, Ci	
Cat-1 Index	
Cat-3 Index	
TRU Index	
Ci fraction solid	
Ci fraction liquid	

NOTES	(11)		(8)		(11)	(13)	(13)

STREAM NUMBER	101	102	103	104	105	106	107	109	111	112	113
DESCRIPTION	Ancillary Scabbling	Ancillary Metal	Tank Soil	Tank Concrete	Tank Metal	Tank Grout	Tank Waste	Consolidat Rubble Fe	Consolidat Metal Fee	Etched Metal	Rinsed Metal
Vol, m3	4.33	241	192.8947	3762.963	1515.924	640	83.69231	4683.88	1756.924	1756.748	1756.748
Density, kg/l	1.35	1.57	1.52	1.35	1.57	1.35	0.65	1.344493	1.57	1.57	1.57
COMPONENTS, kg											
Aggregate	3507.3			3048000				3051507			
Sand/fines	1461.375		293200	1270000		768960		2333621			
cement	876.825			762000		95040		857916.8			
metal		378370			2380000			0	2758370	2730786	2730786
tank waste							54400	54400			
water										24349.19	27278.86
dissolved solids										2396.765	23.4977
suspended solids											
acid/caustic										561.9045	5.508867
other											
TOTAL, kg	5845.5	378370	293200	5080000	2380000	864000	54400	6297446	2758370	2758094	2758094
RADIONUCLIDES											
Sr, Ci	49326	49326	5997	5997	17991	29985	1139434	1230739	67317	1350.75	13.24264
Cs, Ci	2346	2346	300	300	898	1496	56858	61300	3244	65.0925	0.638162
TRU, Ci	60.9	60.9	5.737	5.737	17.21	28.69	1090	1191.064	78.11	1.567317	0.015366
Cat-1 Index	810489.7	14561.91	2225.867	114.101	849.4559	3353.223	974431.8	18802.07	2730.415	54.79264	0.537183
Cat-3 Index	0.256107	0.004601	0.000705	3.62E-05	0.000269	0.001062	0.308736	0.005957	0.000863	1.73E-05	1.7E-07
TRU Index	104.1827	1.609536	0.195668	0.011293	0.072311	0.33206	200.3676	1.891345	0.283174	0.005683	5.57E-05
Ci fraction solid	1	1	1	1	1	1	1	1	1	0	0
Ci fraction liquid	0	0	0	0	0	0	0	0	0	1	1
NOTES	(2,3,5,6)	(2,4,6)	(2,7)	(2,3,5)	(2,4)	(2,8)	(2,9)			(4,10,12)	(4,12)

STREAM NUMBER	114	115	121	122	123	124	125	126	131	132	133
DESCRIPTION	Metal Rinse Ret	Metal Wash Ret	Rubble Course	Rubble Returns	Rubble Wet	Rubble Released	Dryer Off-Gas	Rubble Fines	Digester Overflow	Digester Underflow	Filter Liquid
Vol, m3	2758.094	1212.389	2283.218	0.228322	2282.99	4283.191	2284882	7046.331	4529.967	7025.899	3513.301
Density, kg/l	1	1.1	1.35	1.35	1.35	1.35	0.00129	1.35	1.1	1.1	1.1
COMPONENTS, kg											
Aggregate			3051507	305.1507	3051202	3051202					
Sand/fines			233.3621	0.023336	233.3388	233.3388		2333388	23333.88	2310054	231.0054
cement			85.79168	0.008579	85.7831	85.7831		857831	85.7831	8492.527	0.849253
metal						2730786					
tank waste								54400			
water	2755164	1189136	30518.26	3.051826	30515.21		57794.07	6266927	4057865	4426378	3161825
dissolved solids	2373.268	117050.3							748141.3	816083.4	582940
suspended solids											
acid/caustic	556.3956	27441.6							153537.1	167480.5	119633.7
other							2889703				
TOTAL, kg	2758094	1333628	3082345	308.2345	3082036	5782308	2947498	9512546	4982963	7728489	3864631
RADIONUCLIDES											
Sr, Ci	1337.507	65966.25	9.1305	0.000913	9.129587	22.34986	0.022372	1230730	619759.5	676936.6	482899.9
Cs, Ci	64.45433	3178.908	0.4442	4.44E-05	0.444156	1.081235	0.001082	61299.56	30817.66	33660.8	24012.29
TRU, Ci	1.551951	76.54268	0.010106	1.01E-06	0.010105	0.025446	2.55E-05	1191.054	605.8513	661.7452	472.063
Cat-1 Index	34.55761	3877.364	0.285308	0.285308	0.285308	0.372025	6.98E-07	12498.13	9787.75	6892.88	9833.236
Cat-3 Index	1.09E-05	0.001226	9.03E-08	9.03E-08	9.03E-08	1.18E-07	2.21E-13	0.003959	0.003101	0.002183	0.003115
TRU Index	0.005627	0.573943	3.28E-05	3.28E-05	3.28E-05	4.4E-05	8.64E-08	1.252087	1.215845	0.856241	1.221496
Ci fraction solid	0	0	1	1	1	1	1	1	1.47E-05	0.001335	1.87E-07
Ci fraction liquid	1	1	0	0	0	0	0	0	0.999985	0.998665	1
NOTES		(10,12,14)	(3,12,15)	(3,16)	(3,16)	(3,17)	(17)	(3,15)	(14,21)	(14,20,21)	(14,24)

STREAM NUMBER	134	135	136	137	151	152	153
DESCRIPTION	Centrifuge Overflow	Centrifuge Cake	Filter Cake	Solidifed Solids	Evaporato Condensat	Evaporato Bottoms	DST Returns
Vol, m3	8007.435	30.31943	2972.198	1979.851	4804.712	3639.513	3987.351
Density, kg/l	1.1	1.3	1.3	2.25	1	1.1	1.1
COMPONENTS, kg							
Aggregate							
Sand/fines	2.356489	23562.53	2309823	2333386			
cement	0.008663	86.62369	8491.678	8578.302			
metal							
tank waste							
water	7206791	12899.72	1264553	1321952	4804712	2402079	2670433
dissolved solids	1328703	2378.298	233143.4	300735.4		1328703	1696608
suspended solids							
acid/caustic	272682.7	488.0854	47846.78	0		272682.7	19044.5
other				490013			
TOTAL, kg	8808179	39415.25	3863858	4454664	4804712	4003464	4386086
RADIONUCLIDES							
Sr, Ci	1100680	1979.37	194036.6	196016	733.815	1099946	1099946
Cs, Ci	54731.53	98.42453	9648.509	9746.934	36.48909	54695.04	54695.04
TRU, Ci	1075.979	1.93495	189.6822	191.6172	0.717347	1075.262	1075.262
Cat-1 Index	9833.822	4670.47	4670.47	7082.944	10.92632	21621.35	19735.21
Cat-3 Index	0.003115	0.001479	0.001479	0.002244	3.46E-06	0.006849	0.006252
TRU Index	1.221569	0.490914	0.490914	0.43015	0.001493	2.685829	2.45153
Ci fraction solid	8.38E-10	0.004658	0.004658	1	0	0	0
Ci fraction liquid	1	0.995342	0.995342	0	1	1	1
NOTES	(14,24)	(22,23,24)	(22,23,24)	(8,25,26)	(17)	(14,27)	(14,28)

PRE-PROCESSING FACILTY
MATERIAL BALANCE

NOTES-ASSUMPTIONS-REFERENCES

(2)		from this report, SESC-EP-xxx, Rev 0, Jan 99, Table 2.4, Totals column, pgs xxx
(3)	1.35	concrete density at 2.25 and 60% packing density
(4)	1.57	steel density at 7.86 and 20% packing density
(5)	0.6	fraction of aggregate in concrete
	0.25	fraction of sand in concrete
	0.15	fraction of cement in concrete
(6)		50/50 fraction, no basis
(7)	1.52	soil density at 100% packing density
(8)	0.89	fraction of sand in grout
	0.11	fraction of cement in grout
(9)	0.65	kg/l as average waste density of 1.3 with 0.50 packing fraction
(10)	0.01	metal fraction dissolved in wash, Fe + 3HNO3 --> Fe(NO3)3 or 55.85 + 189 = 241.85
(11)	0.1	acid concentration in wash
(12)	0.01	liquid drag-out on a weight fraction basis
(13)	1	ratio of rinse liquid to incoming solids
(14)	1.1	general solution density
(15)	0.9999	fraction of cement converted to fines
(16)	0.0001	fraction failing survey, needing recycle
(17)	0.001	fraction carry over of dust or vapor
(18)	0.99	cement fraction dissolved in digester, CaCO3 + 2HNO3 --> Ca(NO3)2 or 100 + 126 = 164
(19)	1.3	excess acid ratio to dissolver & acid wash
(20)	0.3	slurry fraction in digester underflow
(21)	0.01	solids carry over in digester overflow
(22)	0.6	solids fraction in filter/centrifuge cake
(23)	1.3	filter/centrifuge cake density
(24)	0.0001	filter - centrifuge solids carry through
(25)	2.25	solidified grout density
(26)		neutralization, HNO3 + NaOH --> NaNO3 + H2O or 63 + 40 = 85 + 18
(27)	0.4	solution solubility limit
(28)	1.1	neutralization excess

APPENDIX B

CAPITAL COST ESTIMATE FOR PROPOSED NEW TREATMENT FACILITY

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAA2
FILE NO. Z649SAA2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
CAPITAL COST ESTIMATE, REV 2
PHMCR01 - PROJECT COST SUMMARY

DATE 02/12/99 15:37:34
BY R.OHRT

SORT	DESCRIPTION	ESCALATED TOTAL COST	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
FDNW	FLUOR DANIEL NORTHWEST	474,590,000	42	200,450,000	675,040,000
	SUBTOTAL	474,590,000	42	200,450,000	675,040,000
SITE	SITE ALLOCATIONS	87,210,000	42	36,690,000	123,900,000
	PROJECT TOTAL	561,800,000	42	237,140,000	798,940,000

TYPE OF ESTIMATE: ORDER OF MAGNITUDE — FEBRUARY 12, 1999

FDNW LEAD ESTIMATOR: PO

ESTIMATING MANAGER:

PROJECT MANAGER:

CLIENT:

REMARKS:

P R E - P R O C E S S I N G F A C I L I T Y

C A P I T A L C O S T S

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

FLUOR DANIEL NORTHWEST, INC. | ** IEST - INTERACTIVE ESTIMATING ** | PAGE 2 OF 14
COGEMA ENGINEERING | HTI TASK 7 PROCESS IMPACTS STUDY | DATE 02/12/99 15:37:38
JOB NO. Z649SAA2 | CAPITAL COST ESTIMATE, REV 2 | BY R.OHRT
FILE NO. Z649SAA2 | PHMCR02 - WORK BREAKDOWN STRUCTURE (WBS) SUMMARY

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	SUB TOTAL	SITE ALLOCAT'N	TOTAL DOLLARS
110000	DEFINITIVE DESIGN	46618102	0.00	0	46618102	35	16316335	62934437	13530904	76465341
120000	ENGINEERING/INSPECTION	15539367	0.00	0	15539367	35	5438778	20978145	4510301	25488446
130000	PILOT PLANT	28438322	0.00	0	28438322	35	9953412	38391734	8254222	46645957
140000	PERMITTING	2496000	0.00	0	2496000	35	873600	3369600	724464	4094064
150000	SAFETY ANALYSIS	19737120	0.00	0	19737120	35	6907992	26645112	5728699	32373811
160000	CONSTRUCTION MANAGEMENT	50977052	0.00	0	50977052	45	22939673	73916725	15892095	89808821
SUBTOTAL 1	ENGINEERING	163805963	0.00	0	163805963	38	62429792	226235755	48640687	274876442
320001	SITEWORK	991397	0.00	0	991397	35	346988	1338385	210126	1548512
320002	STRUCTURES	27754710	0.00	0	27754710	35	9714148	37468858	5882610	43351469
320003	FIRE PROTECTION & DETECTION	930702	0.00	0	930702	35	325745	1256447	197262	1453710
320004	HVAC	10603688	0.00	0	10603688	35	3711290	14314978	2247451	16562430
320005	NORMAL ELECTRICAL DISTRIBUTION	4776047	0.00	0	4776047	35	1671616	6447663	1012283	7459946
320006	STANDBY ELECTRICAL DISTRIBUTION	11391309	0.00	0	11391309	35	3986958	15378267	2414387	17792655
320007	UNINTERRUPTABLE POWER SOURCE	867557	0.00	0	867557	35	303644	1171201	183878	1355080
320008	PROCESS EQUIPMENT DECON AND REPAIR	10483531	0.00	0	10483531	35	3669235	14152766	2221984	16374751
320009	COMPRESSED AIR AND GAS	285189	0.00	0	285189	35	99816	385005	60445	445450
320010	PROCESS AIR	296902	0.00	0	296902	35	103915	400817	62928	463746
320011	RAW WATER & FIREWATER	442366	0.00	0	442366	35	154828	597194	93759	690953
320012	DISTRIBUTED CONTROL SYSTEM	15559374	0.00	0	15559374	35	5445780	21005154	3297809	24302964
320013	COMMUNICATIONS	563777	0.00	0	563777	35	197321	761098	119492	880591
320014	ANALYTICAL FACILITIES	13766581	0.00	0	13766581	35	4818303	18584884	2917826	21502711
320016	STACK & FANHOUSE	14440582	0.00	0	14440582	35	5054203	19494785	3060681	22555467
320017	HEALTH PHYSICS MONITORING EQUIPMENT	2647625	0.00	0	2647625	35	926668	3574293	561164	4135457
SUBTOTAL 320	BUILDING	115801337	0.00	0	115801337	35	40530467	156331804	24544093	180875898
325002	CELL DRAINAGE/COLLECTION	2520101	0.00	0	2520101	50	1260050	3780151	593483	4373635
325003	RAD SURVEY EQUIP. FOR WASHED SOLIDS	21236454	0.00	0	21236454	50	10618227	31854681	5001184	36855865
325004	PROCESS MONITORING INSTR. SYSTEM	2412132	0.00	0	2412132	50	1206066	3618198	568057	4186255
325005	AQUEOUS MAKE-UP	2737558	0.00	0	2737558	50	1368779	4106337	644694	4751031
325006	BRIDGE CRANES	3096900	0.00	0	3096900	50	1548450	4645350	729319	5374669
325008	ROBOTICS	22000000	0.00	0	22000000	50	11000000	33000000	5181000	38181000
325010	PROCESS VESSEL VENT	18485871	0.00	0	18485871	50	9242935	27728806	4353422	32082229
325011	MISC SERVICE PIPING	2236343	0.00	0	2236343	50	1118171	3354514	526658	3881173
325012	MATERIAL HANDLING	20884500	0.00	0	20884500	50	10442250	31326750	4918299	36245049
325014	WASH STATION	650550	0.00	0	650550	50	325275	975825	153204	1129029
325016	DRYER	675296	0.00	0	675296	50	337648	1012944	159032	1171976

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAA2
FILE NO. Z649SAA2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
CAPITAL COST ESTIMATE, REV 2
PHMCR02 - WORK BREAKDOWN STRUCTURE (WBS) SUMMARY

PAGE 3 OF 14
DATE 02/12/99 15:37:38
BY R.OHRT

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	SUB TOTAL	SITE ALLOCAT'N	TOTAL DOLLARS
325018	SHIELDED WASTE CONTAINERS	13750000	0.00	0	13750000	50	6875000	20625000	3238125	23863125
325019	WASTE RECEIVING AREA	2641421	0.00	0	2641421	50	1320710	3962131	622054	4584186
325023	SHREDDER	3991235	0.00	0	3991235	50	1995617	5986852	939935	6926788
325024	ACID DIGESTER	1231200	0.00	0	1231200	50	615600	1846800	289947	2136747
325025	ROTARY DRUM FILTER	1717992	0.00	0	1717992	50	858996	2576988	404587	2981575
325026	CENTRIFUGE	717188	0.00	0	717188	50	358594	1075782	168897	1244679
325028	EVAPORATOR	13884750	0.00	0	13884750	50	6942375	20827125	3269858	24096983
325029	GRINDING MILL	1944000	0.00	0	1944000	50	972000	2916000	457812	3373812
325030	STAGING TANKS	1267555	0.00	0	1267555	50	633777	1901332	298509	2199841
325031	CAT 1 LOADING STATION	1825741	0.00	0	1825741	50	912870	2738611	429962	3168573
325032	CAT 3 CONCRETING/LOADING STATION	342264	0.00	0	342264	50	171132	513396	80603	593999
325033	JUMPERS	1942463	0.00	0	1942463	50	971231	2913694	457450	3371144
SUBTOTAL 325	SPECIAL EQUIPMENT	142191514	0.00	0	142191514	50	71095757	213287271	33486101	246773372
SUBTOTAL 32	FIXED PRICE CONSTRUCTION	257992851	0.00	0	257992851	43	111626224	369619075	58030195	427649270
340000	PROJECT MANAGEMENT	52794500	0.00	0	52794500	50	26397250	79191750	17224205	96415955
SUBTOTAL 3	CONSTRUCTION	310787351	0.00	0	310787351	44	138023474	448810825	75254400	524065226
PROJECT TOTAL		474,593,314	0.00	0	474,593,314	42	200,453,267	675,046,581	123,895,088	798,941,669

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAA2
FILE NO. Z649SAA2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
CAPITAL COST ESTIMATE
PHMCR03 - ESTIMATE BASIS SHEET

PAGE 4 OF 14
DATE 02/12/99 12:05:00
BY R.OHRT

1. ESTIMATE PURPOSE

ORDER OF MAGNITUDE ESTIMATE: THIS ESTIMATE WILL BE USED FOR BUDGETING PURPOSES ONLY.

2. ESTIMATE TECHNICAL BASIS

A. THIS ESTIMATE HAS BEEN PREPARED FOR HTI TASK 7 PROCESS IMPACTS STUDY PROJECT AS REQUESTED BY COGEMA ENGINEERING. THE TECHNICAL SCOPE OF WORK WAS BEING DEVELOPED PARALLEL TO THE ESTIMATING EFFORT.
B. THIS ESTIMATE UTILIZES A WORK BREAKDOWN STRUCTURE SIMILAR TO EARLIER ESTIMATES DONE FOR THE CLIENT.
C. THIS ESTIMATE ALSO UTILIZES THE INDUSTRY STANDARD CONSTRUCTION SPECIFICATION INSTITUTE (CSI) SYSTEM PER CUSTOMER DIRECTIVE. THE CSI CODES ARE SEPARATED INTO FOURTEEN CATEGORIES AS SHOWN BELOW:

01 - GENERAL REQUIREMENTS	09 - FINISHES
02 - SITE WORK	10 - SPECIALTIES
03 - CONCRETE	11 - EQUIPMENT
04 - MASONRY	12 - FURNISHINGS
05 - METALS	13 - SPECIAL CONSTRUCTION
06 - WOOD & PLASTICS	14 - CONVEYING SYSTEMS
07 - THERMAL & MOISTURE PROTECTION	15 - MECHANICAL
08 - DOORS & WINDOWS	16 - ELECTRICAL

3. ESTIMATE METHODOLOGY

A. DIRECT COSTS:
A PARAMETRIC TECHNIQUE WAS UTILIZED IN THE REFERRENCED ESTIMATE WHICH WAS THE BASIS FOR MANY OF THE COSTS FOR THIS ESTIMATE. THESE COSTS WERE ESCALATED TO FY 1999 DOLLARS AND IN SOME CASES PRORATED TO REFLECT SIZE RATIOS.
(1) CONSTRUCTION LABOR, MATERIAL AND EQUIPMENT UNITS HAVE BEEN ESTIMATED BASED UPON ONE OR MORE OF THE FOLLOWING COMMERCIAL ESTIMATING RESOURCES, PUBLISHED ESTIMATING MANUALS, IN HOUSE DATABASES, RICHARDSON'S PROCESS PLANT CONSTRUCTION ESTIMATING STANDARDS, PREVIOUS PARAMETRIC ESTIMATES, PRICE QUOTATION FROM VENDOR OR BEST GUESS ALLOWANCE WHEN INSUFFICIENT INFORMATION IS AVAILABLE. SOME UNIT COSTS HAVE BEEN FACTORED/ADJUSTED AS APPROPRIATE TO REFLECT INFLUENCES BY CONTRACT, WORK SITE, OR OTHER IDENTIFIED SPECIAL CONDITIONS.

B. DIRECT COST FACTORS:
(1) SALES TAX HAS BEEN APPLIED TO ALL MATERIALS AND EQUIPMENT PURCHASES AT 8%.
(2) CONSTRUCTION MANAGEMENT FOR FIXED PRICE CONSTRUCTION HAS BEEN APPLIED AT 18.75% OF CONSTRUCTION AND IS SHOWN IN WBS 130000, AND INCLUDES COSTS FOR BID PACKAGE PREPARATION, CONTRACT MANAGEMENT & ADMINISTRATION AND PROJECT MANAGEMENT & PLANNING SUPPORT.

C. INDIRECT COSTS:
FIXED PRICE CONTRACTOR OVERHEAD, PROFIT, BOND AND INSURANCE COSTS HAVE BEEN APPLIED AT THE FOLLOWING PERCENTAGES: LABOR =25%, EQUIPMENT USE =25%, MATERIAL =25%, AND SUBCONTRACT =10%, 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) FIXED PRICE 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 INCORPORATES FACTORS TO COVER ADDITIONAL COSTS FOR WORKMANS COMPENSATION, FICA AND STATE AND FEDERAL UNEMPLOYMENT INSURANCE TO DEVELOPE A FULLY BURDENED RATE BY CRAFT.

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

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

(1) FDH GFS/G&A CONST. MGMT: GFS (5%) AND G&A (15.7%) COMPOUNDED AND APPLIED TO FIXED PRICE CONSTRUCTION MANAGEMENT, 21.5%
(2) FIXED PRICE CONSTRUCTION G&A RATE (15.7%) APPLIED TO FIXED PRICE SUBCONTRACTS.
(3) FDH GFS/G&A - LABOR: GFS (5%) AND G&A (15.7%) COMPOUNDED AND APPLIED TO HOME OFFICE ENGINEERING AT 21.5%.

4. ESCALATION

ESCALATION HAS NOT BEEN INCLUDED AS ALL COSTS ARE IN CURRENT FEBRUARY 1999 DOLLARS.

5. CONTINGENCY

A. DEFINITION OF CONTINGENCY AS PROVIDED BY DOE

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

B. CONTINGENCY ALLOWANCE GUIDELINES

THE DOE GUIDELINE CONTINGENCY ALLOWANCE FOR A PLANNING ESTIMATE UNDER EXPERIMENTAL CONDITIONS IS 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 TO WBS 150000, DESIGN, ENGINEERING INSPECTION, PERMITTING, SAFETY ANALYSIS AND PILOT PLANTS HAVE ALL BEEN APPLIED A CONTINGENCY OF 35%. IN THIS EARLY STAGE THERE ARE MANY UNCERTAINTIES JUSTIFYING A CONTINGENCY OF THIS RANGE. MANY ASSUMPTIONS WERE USED BECAUSE THERE IS STILL A LOT OF RESEARCH REQUIRED BEFORE THE PROCESS REQUIREMENTS ARE WELL ENOUGH DEFINED TO BE ABLE TO ASSESS THE DESIGN AND ENGINEERING MAGNITUDE. ALL ABOVE CATEGORIES ARE UNIQUE AND UNPROVEN AND UNTIL ACTUAL CONSTRUCTION HAS BEEN COMPLETED, THE COSTS WILL BE UNPREDICTABLE TO ANY DEGREE OF CERTAINTY.

WBS 160000 CONSTRUCTION MANAGEMENT, A 45% CONTINGENCY HAS BEEN APPLIED HERE WHICH IS A WEIGHTED AVERAGE OF THE CONTINGENCIES APPLIED TO THE CONSTRUCTION ACTIVITIES (WBS 3200XX & 3250XX). THE REASON FOR THIS METHOD OF CONTINGENCY APPLICATION IS IN KEEPING WITH THE NORMAL PROCEDURE OF CM BEING APPLIED AS A PERCENTAGE OF CONSTRUCTION (IN THIS CASE 18.75%). HOWEVER, THE CUSTOMER WISHED TO VIEW THE CM COST IN ITS OWN WBS AND NOT COMBINED WITH THE OTHER SITE ALLOCATION FACTORS. FOR THE CONTINGENCY DOLLARS TO REMAIN UNCHANGED, THE WEIGHTED FACTOR WAS APPLIED.

WBS 3200XX BUILDING CONSTRUCTION HAS A 35% CONTINGENCY APPLIED. THE INFORMATION ABLE AT THIS TIME IS PRELIMINARY, THE BUILDING FOOTPRINT ITSELF IS SUBJECT TO ADJUSTMENT ONCE EQUIPMENT SIZES, QUANTITIES AND LOCATION BECOME CLEARER. GIVEN THE LACK OF DESIGN AND DRAWINGS, COSTS WERE ESTIMATED BY THE SQUARE FOOT METHOD (ASSUMING A 140,000 SF BUILDING). THE SQUARE FOOT COSTS WERE BASED ON EARLIER PARAMETRIC STUDIES. DUE TO THE COMBINATION OF VARIABLES, A 35% CONTINGENCY WAS FELT JUSTIFIED.

WBS 3250XX SPECIAL EQUIPMENT IS A MIX OF PRORATED EQUIPMENT FROM AN EARLIER PARAMETRIC ESTIMATE, A NEW ESTIMATE BASED ON A VENDOR QUOTE, A BOTTOMS UP ESTIMATE OR A COMBINATION. SINCE NONE OF THE EQUIPMENT HAS BEEN DESIGNED AND DETAILS ARE UNKNOWN, A 50% CONTINGENCY HAS BEEN APPLIED. THIS WAS FELT REASONABLE SINCE THE ACTUAL PROCESSES INVOLVED ARE UNCERTAIN, VENDOR QUOTES FOR SPECIAL EQUIPMENT WERE BUDGETARY NUMBERS ONLY SINCE SPECIFICATIONS HAVE YET TO BE DEVELOPED, AND THE WASTE MATERIAL TO BE PROCESSED IS OF UNKNOWN CHARACTERISTICS.

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 CONSTRUCTION WILL BE PERFORMED IN A CONTAMINATION FREE ATMOSPHERE.

B.) ALL CONSTRUCTION WORK IS ASSUMED TO BE PERFORMED BY A FIXED PRICE CONTRACTOR.

C.) OPERATING COSTS ARE NOT INCLUDED.

D.) DRAWINGS AND SPECIFICATIONS WERE NOT AVAILABLE, ALL QUANTITIES, SIZES, ETC. WERE ALLOWANCES.

E.) CURRENT SCOPE OF WORK ASSUMES THAT THE WASTE VOLUME TO BE TREATED BY FACILITY WILL INCLUDE MINIMAL AMOUNTS OF CONTAMINATED SOIL. IF VOLUMES WERE TO EXCEED ESTIMATES, THE PLANT CAPACITY WOULD NEED TO BE INCREASED.

F.) FOR FURTHER COMMENTS SEE THE DETAIL ESTIMATE SHEETS.

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAA2
FILE NO. Z649SAA2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
CAPITAL COST ESTIMATE, REV 2
PHMCR04 - COMPANY/WBS SUMMARY

DATE 02/12/99 15:37:41
BY R.OHRT

SORT CODE/WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	SUB TOTAL	SITE ALLOCAT'N	TOTAL DOLLARS
FDNW	FLUOR DANIEL NORTHWEST									
110000	DEFINITIVE DESIGN	46618102	0.00	0	46618102	35	16316335	62934437	13530904	76465341
120000	ENGINEERING/INSPECTION	15539367	0.00	0	15539367	35	5438778	20978145	4510301	25488446
130000	PILOT PLANT	28438322	0.00	0	28438322	35	9953412	38391734	8254222	46645957
140000	PERMITTING	2496000	0.00	0	2496000	35	873600	3369600	724464	4094064
150000	SAFETY ANALYSIS	19737120	0.00	0	19737120	35	6907992	26645112	5728699	32373811
160000	CONSTRUCTION MANAGEMENT	50977052	0.00	0	50977052	45	22939673	73916725	15892095	89808821
	SUBTOTAL 1 ENGINEERING	163805963	0.00	0	163805963	38	62429792	226235755	48640687	274876442
320001	SITEWORK	991397	0.00	0	991397	35	346988	1338385	210126	1548512
320002	STRUCTURES	27754710	0.00	0	27754710	35	9714148	37468858	5882610	43351469
320003	FIRE PROTECTION & DETECTION	930702	0.00	0	930702	35	325745	1256447	197262	1453710
320004	HVAC	10603688	0.00	0	10603688	35	3711290	14314978	2247451	16562430
320005	NORMAL ELECTRICAL DISTRIBUTION	4776047	0.00	0	4776047	35	1671616	6447663	1012283	7459946
320006	STANDBY ELECTRICAL DISTRIBUTION	11391309	0.00	0	11391309	35	3986958	15378267	2414387	17792655
320007	UNINTERRUPTABLE POWER SOURCE	867557	0.00	0	867557	35	303644	1171201	183878	1355080
320008	PROCESS EQUIPMENT DECON AND REPA	10483531	0.00	0	10483531	35	3669235	14152766	2221984	16374751
320009	COMPRESSED AIR AND GAS	285189	0.00	0	285189	35	99816	385005	60445	445450
320010	PROCESS AIR	296902	0.00	0	296902	35	103915	400817	62928	463746
320011	RAW WATER & FIREWATER	442366	0.00	0	442366	35	154828	597194	93759	690953
320012	DISTRIBUTED CONTROL SYSTEM	15559374	0.00	0	15559374	35	5445780	21005154	3297809	24302964
320013	COMMUNICATIONS	563777	0.00	0	563777	35	197321	761098	119492	880591
320014	ANALYTICAL FACILITIES	13766581	0.00	0	13766581	35	4818303	18584884	2917826	21502711
320016	STACK & FANHOUSE	14440582	0.00	0	14440582	35	5054203	19494785	3060681	22555467
320017	HEALTH PHYSICS MONITORING EQUIPM	2647625	0.00	0	2647625	35	926668	3574293	561164	4135457
	SUBTOTAL 320 BUILDING	115801337	0.00	0	115801337	35	40530467	156331804	24544093	180875898
325002	CELL DRAINAGE/COLLECTION	2520101	0.00	0	2520101	50	1260050	3780151	593483	4373635
325003	RAD SURVEY EQUIP. FOR WASHED SOL	21236454	0.00	0	21236454	50	10618227	31854681	5001184	36855865
325004	PROCESS MONITORING INSTR. SYSTEM	2412132	0.00	0	2412132	50	1206066	3618198	568057	4186255
325005	AQUEOUS MAKE-UP	2737558	0.00	0	2737558	50	1368779	4106337	644694	4751031
325006	BRIDGE CRANES	3096900	0.00	0	3096900	50	1548450	4645350	729319	5374669
325008	ROBOTICS	22000000	0.00	0	22000000	50	11000000	33000000	5181000	38181000
325010	PROCESS VESSEL VENT	18485871	0.00	0	18485871	50	9242935	27728806	4353422	32082229
325011	MISC SERVICE PIPING	2236343	0.00	0	2236343	50	1118171	3354514	526658	3881173
325012	MATERIAL HANDLING	20884500	0.00	0	20884500	50	10442250	31326750	4918299	36245049

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAA2
FILE NO. Z649SAA2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
CAPITAL COST ESTIMATE, REV 2
PHMCR04 - COMPANY/WBS SUMMARY

DATE 02/12/99 15:37:41
BY R.OHRT

SORT CODE/WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	SUB TOTAL	SITE ALLOCAT'N	TOTAL DOLLARS
325014	WASH STATION	650550	0.00	0	650550	50	325275	975825	153204	1129029
325016	DRYER	675296	0.00	0	675296	50	337648	1012944	159032	1171976
325018	SHIELDED WASTE CONTAINERS	13750000	0.00	0	13750000	50	6875000	20625000	3238125	23863125
325019	WASTE RECEIVING AREA	2641421	0.00	0	2641421	50	1320710	3962131	622054	4584186
325023	SHREDDER	3991235	0.00	0	3991235	50	1995617	5986852	939935	6926788
325024	ACID DIGESTER	1231200	0.00	0	1231200	50	615600	1846800	289947	2136747
325025	ROTARY DRUM FILTER	1717992	0.00	0	1717992	50	858996	2576988	404587	2981575
325026	CENTRIFUGE	717188	0.00	0	717188	50	358594	1075782	168897	1244679
325028	EVAPORATOR	13884750	0.00	0	13884750	50	6942375	20827125	3269858	24096983
325029	GRINDING MILL	1944000	0.00	0	1944000	50	972000	2916000	457812	3373812
325030	STAGING TANKS	1267555	0.00	0	1267555	50	633777	1901332	298509	2199841
325031	CAT 1 LOADING STATION	1825741	0.00	0	1825741	50	912870	2738611	429962	3168573
325032	CAT 3 CONCRETING/LOADING STATION	342264	0.00	0	342264	50	171132	513396	80603	593999
325033	JUMPERS	1942463	0.00	0	1942463	50	971231	2913694	457450	3371144
SUBTOTAL 325	SPECIAL EQUIPMENT	142191514	0.00	0	142191514	50	71095757	213287271	33486101	246773372
SUBTOTAL 32	FIXED PRICE CONSTRUCTIO	257992851	0.00	0	257992851	43	111626224	369619075	58030195	427649270
340000	PROJECT MANAGEMENT	52794500	0.00	0	52794500	50	26397250	79191750	17224205	96415955
SUBTOTAL 3	CONSTRUCTION	310787351	0.00	0	310787351	44	138023474	448810825	75254400	524065226
TOTAL FDNW	FLUOR DANIEL NORTHWEST	474593314	0.00	0	474593314	42	200453267	675046581	123895088	798941669
PROJECT TOTAL		474,593,314	0.00	0	474,593,314	42	200,453,267	675,046,581	123,895,088	798,941,669

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAA2
FILE NO. Z649SAA2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
CAPITAL COST ESTIMATE, REV 2
PHMCR05 - CONSTRUCTION MANAGEMENT/OTHER COST SUMMARY

DATE 02/12/99 15:37:43
BY R.OHRT

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	CONSTRUCTION MANAGEMENT %	CONSTRUCTION MANAGEMENT TOTAL	OTHER COSTS	SUB TOTAL	TOTAL
110000	DEFINITIVE DESIGN	46618102	0.00	0	0	0	46618102
120000	ENGINEERING/INSPECTION	15539367	0.00	0	0	0	15539367
130000	PILOT PLANT	28438322	0.00	0	0	0	28438322
140000	PERMITTING	2496000	0.00	0	0	0	2496000
150000	SAFETY ANALYSIS	19737120	0.00	0	0	0	19737120
160000	CONSTRUCTION MANAGEMENT	50977052	0.00	0	0	0	50977052
SUBTOTAL 1	ENGINEERING	163805963		0	0	0	********
320001	SITEWORK	991397	0.00	0	0	0	991397
320002	STRUCTURES	27754710	0.00	0	0	0	27754710
320003	FIRE PROTECTION & DETECTION	930702	0.00	0	0	0	930702
320004	HVAC	10603688	0.00	0	0	0	10603688
320005	NORMAL ELECTRICAL DISTRIBUTION	4776047	0.00	0	0	0	4776047
320006	STANDBY ELECTRICAL DISTRIBUTION	11391309	0.00	0	0	0	11391309
320007	UNINTERRUPTABLE POWER SOURCE	867557	0.00	0	0	0	867557
320008	PROCESS EQUIPMENT DECON AND REPAIR	10483531	0.00	0	0	0	10483531
320009	COMPRESSED AIR AND GAS	285189	0.00	0	0	0	285189
320010	PROCESS AIR	296902	0.00	0	0	0	296902
320011	RAW WATER & FIREWATER	442366	0.00	0	0	0	442366
320012	DISTRIBUTED CONTROL SYSTEM	15559374	0.00	0	0	0	15559374
320013	COMMUNICATIONS	563777	0.00	0	0	0	563777
320014	ANALYTICAL FACILITIES	13766581	0.00	0	0	0	13766581
320016	STACK & FANHOUSE	14440582	0.00	0	0	0	14440582
320017	HEALTH PHYSICS MONITORING EQUIPMENT	2647625	0.00	0	0	0	2647625
SUBTOTAL 320	BUILDING	115801337		0	0	0	********
325002	CELL DRAINAGE/COLLECTION	2520101	0.00	0	0	0	2520101
325003	RAD SURVEY EQUIP. FOR WASHED SOLIDS	21236454	0.00	0	0	0	21236454
325004	PROCESS MONITORING INSTR. SYSTEM	2412132	0.00	0	0	0	2412132
325005	AQUEOUS MAKE-UP	2737558	0.00	0	0	0	2737558
325006	BRIDGE CRANES	3096900	0.00	0	0	0	3096900
325008	ROBOTICS	22000000	0.00	0	0	0	22000000
325010	PROCESS VESSEL VENT	18485871	0.00	0	0	0	18485871
325011	MISC SERVICE PIPING	2236343	0.00	0	0	0	2236343
325012	MATERIAL HANDLING	20884500	0.00	0	0	0	20884500
325014	WASH STATION	650550	0.00	0	0	0	650550
325016	DRYER	675296	0.00	0	0	0	675296

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 10 OF 14
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:43
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 PHMCR05 - CONSTRUCTION MANAGEMENT/OTHER COST SUMMARY

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	CONSTRUCTION %	MANAGEMENT TOTAL	OTHER COSTS	SUB TOTAL	TOTAL
325018	SHIELDED WASTE CONTAINERS	13750000	0.00	0	0	0	13750000
325019	WASTE RECEIVING AREA	2641421	0.00	0	0	0	2641421
325023	SHREDDER	3991235	0.00	0	0	0	3991235
325024	ACID DIGESTER	1231200	0.00	0	0	0	1231200
325025	ROTARY DRUM FILTER	1717992	0.00	0	0	0	1717992
325026	CENTRIFUGE	717188	0.00	0	0	0	717188
325028	EVAPORATOR	13884750	0.00	0	0	0	13884750
325029	GRINDING MILL	1944000	0.00	0	0	0	1944000
325030	STAGING TANKS	1267555	0.00	0	0	0	1267555
325031	CAT 1 LOADING STATION	1825741	0.00	0	0	0	1825741
325032	CAT 3 CONCRETING/LOADING STATION	342264	0.00	0	0	0	342264
325033	JUMPERS	1942463	0.00	0	0	0	1942463
SUBTOTAL 325	SPECIAL EQUIPMENT	142191514		0	0	0	********
SUBTOTAL 32	FIXED PRICE CONSTRUCTION	257992851		0	0	0	********
340000	PROJECT MANAGEMENT	52794500	0.00	0	0	0	52794500
SUBTOTAL 3	CONSTRUCTION	310787351		0	0	0	********
PROJECT TOTAL		474,593,314		0	0	0	474,593,314

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAA2
FILE NO. Z649SAA2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
CAPITAL COST ESTIMATE, REV 2
PHMCR06 - SITE ALLOCATIONS BY WBS

DATE 02/12/99 15:37:24
BY R.OHRT

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	46618102	0	0	0	10022891	0	10022891
120000	ENGINEERING/INSPECTION	15539367	0	0	0	3340963	0	3340963
130000	PILOT PLANT	28438322	0	0	0	6114239	0	6114239
140000	PERMITTING	2496000	0	0	0	536640	0	536640
150000	SAFETY ANALYSIS	19737120	0	0	0	4243480	0	4243480
160000	CONSTRUCTION MANAGEMENT	50977052	0	0	0	10960066	0	10960066
SUBTOTAL 1	ENGINEERING	163805963	0	0	0	35218282	0	35218282
320001	SITEWORK	991397	0	0	155649	0	0	155649
320002	STRUCTURES	27754710	0	0	4357489	0	0	4357489
320003	FIRE PROTECTION & DETECTION	930702	0	0	146120	0	0	146120
320004	HVAC	10603688	0	0	1664779	0	0	1664779
320005	NORMAL ELECTRICAL DISTRIBUTION	4776047	0	0	749839	0	0	749839
320006	STANDBY ELECTRICAL DISTRIBUTION	11391309	0	0	1788435	0	0	1788435
320007	UNINTERRUPTABLE POWER SOURCE	867557	0	0	136206	0	0	136206
320008	PROCESS EQUIPMENT DECON AND REPAIR	10483531	0	0	1645914	0	0	1645914
320009	COMPRESSED AIR AND GAS	285189	0	0	44774	0	0	44774
320010	PROCESS AIR	296902	0	0	46613	0	0	46613
320011	RAW WATER & FIREWATER	442366	0	0	69451	0	0	69451
320012	DISTRIBUTED CONTROL SYSTEM	15559374	0	0	2442821	0	0	2442821
320013	COMMUNICATIONS	563777	0	0	88512	0	0	88512
320014	ANALYTICAL FACILITIES	13766581	0	0	2161353	0	0	2161353
320016	STACK & FANHOUSE	14440582	0	0	2267171	0	0	2267171
320017	HEALTH PHYSICS MONITORING EQUIPMENT	2647625	0	0	415677	0	0	415677
SUBTOTAL 320	BUILDING	115801337	0	0	18180809	0	0	18180809
325002	CELL DRAINAGE/COLLECTION	2520101	0	0	395655	0	0	395655
325003	RAD SURVEY EQUIP. FOR WASHED SOLIDS	21236454	0	0	3334123	0	0	3334123
325004	PROCESS MONITORING INSTR. SYSTEM	2412132	0	0	378704	0	0	378704
325005	AQUEOUS MAKE-UP	2737558	0	0	429796	0	0	429796
325006	BRIDGE CRANES	3096900	0	0	486213	0	0	486213
325008	ROBOTICS	22000000	0	0	3454000	0	0	3454000
325010	PROCESS VESSEL VENT	18485871	0	0	2902281	0	0	2902281
325011	MISC SERVICE PIPING	2236343	0	0	351105	0	0	351105
325012	MATERIAL HANDLING	20884500	0	0	3278866	0	0	3278866
325014	WASH STATION	650550	0	0	102136	0	0	102136
325016	DRYER	675296	0	0	106021	0	0	106021

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAA2
FILE NO. Z649SAA2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
CAPITAL COST ESTIMATE, REV 2
PHMCR06 - SITE ALLOCATIONS BY WBS

DATE 02/12/99 15:37:24
BY R.OHRT

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
325018	SHIELDED WASTE CONTAINERS	13750000	0	0	2158750	0	0	2158750
325019	WASTE RECEIVING AREA	2641421	0	0	414703	0	0	414703
325023	SHREDDER	3991235	0	0	626623	0	0	626623
325024	ACID DIGESTER	1231200	0	0	193298	0	0	193298
325025	ROTARY DRUM FILTER	1717992	0	0	269724	0	0	269724
325026	CENTRIFUGE	717188	0	0	112598	0	0	112598
325028	EVAPORATOR	13884750	0	0	2179905	0	0	2179905
325029	GRINDING MILL	1944000	0	0	305208	0	0	305208
325030	STAGING TANKS	1267555	0	0	199006	0	0	199006
325031	CAT 1 LOADING STATION	1825741	0	0	286641	0	0	286641
325032	CAT 3 CONCRETING/LOADING STATION	342264	0	0	53735	0	0	53735
325033	JUMPERS	1942463	0	0	304966	0	0	304966
SUBTOTAL 325	SPECIAL EQUIPMENT	142191514	0	0	22324067	0	0	22324067
SUBTOTAL 32	FIXED PRICE CONSTRUCTION	257992851	0	0	40504877	0	0	40504877
340000	PROJECT MANAGEMENT	52794500	131986	0	0	11350817	0	11482803
SUBTOTAL 3	CONSTRUCTION	310787351	131986	0	40504877	11350817	0	51987681
PROJECT TOTAL		474,593,314	131,986	0	40,504,877	46,569,099	0	87,205,963

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 13 OF 14
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:45
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 PHMCR07 - SITE ALLOCATION ESCALATION/CONTINGENCY REPORT

WBS	DESCRIPTION	SITE ALLOC SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
110000	DEFINITIVE DESIGN	10022891	0.00	0	10022891	35	3508012	13530904
120000	ENGINEERING/INSPECTION	3340963	0.00	0	3340963	35	1169337	4510301
130000	PILOT PLANT	6114239	0.00	0	6114239	35	2139983	8254222
140000	PERMITTING	536640	0.00	0	536640	35	187824	724464
150000	SAFETY ANALYSIS	4243480	0.00	0	4243480	35	1485218	5728699
160000	CONSTRUCTION MANAGEMENT	10960066	0.00	0	10960066	45	4932029	15892095
SUBTOTAL 1	ENGINEERING	35218282	0.00	0	35218282	38	13422405	48640687
320001	SITEWORK	155649	0.00	0	155649	35	54477	210126
320002	STRUCTURES	4357489	0.00	0	4357489	35	1525121	5882610
320003	FIRE PROTECTION & DETECTION	146120	0.00	0	146120	35	51142	197262
320004	HVAC	1664779	0.00	0	1664779	35	582672	2247451
320005	NORMAL ELECTRICAL DISTRIBUTION	749839	0.00	0	749839	35	262443	1012283
320006	STANDBY ELECTRICAL DISTRIBUTION	1788435	0.00	0	1788435	35	625952	2414387
320007	UNINTERRUPTABLE POWER SOURCE	136206	0.00	0	136206	35	47672	183878
320008	PROCESS EQUIPMENT DECON AND REPAIR	1645914	0.00	0	1645914	35	576070	2221984
320009	COMPRESSED AIR AND GAS	44774	0.00	0	44774	35	15671	60445
320010	PROCESS AIR	46613	0.00	0	46613	35	16314	62928
320011	RAW WATER & FIREWATER	69451	0.00	0	69451	35	24308	93759
320012	DISTRIBUTED CONTROL SYSTEM	2442821	0.00	0	2442821	35	854987	3297809
320013	COMMUNICATIONS	88512	0.00	0	88512	35	30979	119492
320014	ANALYTICAL FACILITIES	2161353	0.00	0	2161353	35	756473	2917826
320016	STACK & FANHOUSE	2267171	0.00	0	2267171	35	793509	3060681
320017	HEALTH PHYSICS MONITORING EQUIPMENT	415677	0.00	0	415677	35	145487	561164
SUBTOTAL 320	BUILDING	18180809	0.00	0	18180809	35	6363283	24544093
325002	CELL DRAINAGE/COLLECTION	395655	0.00	0	395655	50	197827	593483
325003	RAD SURVEY EQUIP. FOR WASHED SOLIDS	3334123	0.00	0	3334123	50	1667061	5001184
325004	PROCESS MONITORING INSTR. SYSTEM	378704	0.00	0	378704	50	189352	568057
325005	AQUEOUS MAKE-UP	429796	0.00	0	429796	50	214898	644694
325006	BRIDGE CRANES	486213	0.00	0	486213	50	243106	729319
325008	ROBOTICS	3454000	0.00	0	3454000	50	1727000	5181000
325010	PROCESS VESSEL VENT	2902281	0.00	0	2902281	50	1451140	4353422
325011	MISC SERVICE PIPING	351105	0.00	0	351105	50	175552	526658
325012	MATERIAL HANDLING	3278866	0.00	0	3278866	50	1639433	4918299
325014	WASH STATION	102136	0.00	0	102136	50	51068	153204
325016	DRYER	106021	0.00	0	106021	50	53010	159032

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 14 OF 14
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:45
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 PHMCR07 - SITE ALLOCATION ESCALATION/CONTINGENCY REPORT

WBS	DESCRIPTION	SITE ALLOC SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
325018	SHIELDED WASTE CONTAINERS	2158750	0.00	0	2158750	50	1079375	3238125
325019	WASTE RECEIVING AREA	414703	0.00	0	414703	50	207351	622054
325023	SHREDDER	626623	0.00	0	626623	50	313311	939935
325024	ACID DIGESTER	193298	0.00	0	193298	50	96649	289947
325025	ROTARY DRUM FILTER	269724	0.00	0	269724	50	134862	404587
325026	CENTRIFUGE	112598	0.00	0	112598	50	56299	168897
325028	EVAPORATOR	2179905	0.00	0	2179905	50	1089952	3269858
325029	GRINDING MILL	305208	0.00	0	305208	50	152604	457812
325030	STAGING TANKS	199006	0.00	0	199006	50	99503	298509
325031	CAT 1 LOADING STATION	286641	0.00	0	286641	50	143320	429962
325032	CAT 3 CONCRETING/LOADING STATION	53735	0.00	0	53735	50	26867	80603
325033	JUMPERS	304966	0.00	0	304966	50	152483	457450
SUBTOTAL 325	SPECIAL EQUIPMENT	22324067	0.00	0	22324067	50	11162033	33486101
SUBTOTAL 32	FIXED PRICE CONSTRUCTION	40504877	0.00	0	40504877	43	17525317	58030195
340000	PROJECT MANAGEMENT	11482803	0.00	0	11482803	50	5741401	17224205
SUBTOTAL 3	CONSTRUCTION	51987681	0.00	0	51987681	45	23266719	75254400
PROJECT TOTAL		87,205,963	0.00	0	87,205,963	42	36,689,124	123,895,088

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAA2
FILE NO. Z649SAA2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
CAPITAL COST ESTIMATE, REV 2
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 1
DATE 02/12/99 15:37:47
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										
110000.00	ENGINEERING										
110000.0000100	********** DEFINITIVE DESIGN ********** AT 15% OF WBS 3	000	1 LS	748044	46618102	0	0	0	0	0	46618102
SUBTOTAL	ENGINEERING			748,044	46,618,102	0	0	0	0	0	46,618,102
TOTAL	COST CODE 00000 WBS 110000 (ESCALATION 0.00% - CONTINGENCY 35.00 %)			748,044	46,618,102	0	0	0	0	0	46,618,102
TOTAL WBS 110000 DEFINITIVE DESIGN				748,044	46,618,102	0	0	0	0	0	46,618,102

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 2
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 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
120000	ENGINEERING/INSPECTION										
120000.00	ENGINEERING										
120000.0000100	********** ENGINEERING/INSPECTION **********	000	1 LS	249348	15539367	0	0	0	0	0	15539367
	AT 5% OF WBS 3										
SUBTOTAL	ENGINEERING			249,348	15,539,367	0	0	0	0	0	15,539,367
TOTAL	COST CODE 00000			249,348	15,539,367	0	0	0	0	0	15,539,367
	WBS 120000										
	(ESCALATION 0.00% - CONTINGENCY 35.00 %)										
TOTAL WBS 120000 ENGINEERING/INSPECTION				249,348	15,539,367	0	0	0	0	0	15,539,367

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 3
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 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
130000	PILOT PLANT										
130000.00	ENGINEERING										
130000.0000100	********** PILOT PLANT **********	000	1 LS	595193	28438322	0	0	0	0	0	28438322
130000.0000102	USE 20% OF WBS 325	000	0	0	0	0	0	0	0	0	0
SUBTOTAL	ENGINEERING			595,193	28,438,322	0	0	0	0	0	28,438,322
TOTAL	COST CODE 00000			595,193	28,438,322	0	0	0	0	0	28,438,322
	WBS 130000										
	(ESCALATION 0.00% - CONTINGENCY 35.00 %)										
TOTAL WBS 130000 PILOT PLANT				595,193	28,438,322	0	0	0	0	0	28,438,322

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAA2
FILE NO. Z649SAA2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
CAPITAL COST ESTIMATE, REV 2
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 4
DATE 02/12/99 15:37:47
BY R.OHRT

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
140000	PERMITTING										
140000.00	ENGINEERING										
140000.0000100	********** PERMITTING **********	000	1 LS	0	0	0	0	0	0	0	0
140000.0000102	PRODUCE RCRA PART B PERMIT, ASSUME 20 MANYEAR OF LABOR	000	1 LS	41600	2496000	0	0	0	0	0	2496000
SUBTOTAL	ENGINEERING			41,600	2,496,000	0	0	0	0	0	2,496,000
TOTAL	COST CODE 00000			41,600	2,496,000	0	0	0	0	0	2,496,000
	WBS 140000										
	(ESCALATION 0.00% - CONTINGENCY 35.00 %)										
TOTAL WBS 140000 PERMITTING				41,600	2,496,000	0	0	0	0	0	2,496,000

FLUOR DANIEL NORTHWEST, INC. — ** IEST - INTERACTIVE ESTIMATING ** — PAGE 5
COGEMA ENGINEERING — HTI TASK 7 PROCESS IMPACTS STUDY — DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 — CAPITAL COST ESTIMATE, REV 2 — BY R.OHRT
FILE NO. Z649SAA2 — 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
150000	SAFETY ANALYSIS										
150000.00	ENGINEERING										
150000.0000100	********** SAFETY ANALYSIS **********	000	1 LS	104000	9868560	0	0	0	0	0	9868560
150000.0000102	ASSUME 50 MANYEAR OF LABOR	000	1 LS	104000	9868560	0	0	0	0	0	9868560
SUBTOTAL	ENGINEERING			208,000	19,737,120	0	0	0	0	0	19,737,120
TOTAL	COST CODE 00000			208,000	19,737,120	0	0	0	0	0	19,737,120
	WBS 150000										
	(ESCALATION 0.00% - CONTINGENCY 35.00 %)										
TOTAL WBS 150000 SAFETY ANALYSIS				208,000	19,737,120	0	0	0	0	0	19,737,120

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 6
COGEMA ENGINEERING HT1 TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 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
160000	CONSTRUCTION MANAGEMENT										
160000.20	CONSTRUCTION MANAGEMENT										
160000.2000050	********** CONSTRUCTION MANAGEMENT **********	501	0	0	0	0	0	0	0	0	0
160000.2000100	CONSTRUCTION MANAGEMENT, AT 18.75% OF CONSTRUCTION (WBS 32) AND INCLUDES COSTS FOR BID PACKAGE PREPARATION,	501	1 LS	685544	50977052	0	0	0	0	0	50977052
160000.2000101	CONTRACT MANAGEMENT & ADMINISTRATION AND PROJECT MANAGEMENT & PLANNING SUPPORT.	501	0	0	0	0	0	0	0	0	0
SUBTOTAL	CONSTRUCTION MANAGEMENT			685,544	50,977,052	0	0	0	0	0	50,977,052
TOTAL	COST CODE 50120			685,544	50,977,052	0	0	0	0	0	50,977,052
	WBS 160000										
	(ESCALATION 0.00% - CONTINGENCY 45.00 %)										
TOTAL WBS 160000 CONSTRUCTION MANAGEMENT				685,544	50,977,052	0	0	0	0	0	50,977,052

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 7
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 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
320001	SITEWORK										
320001.02	SITEWORK										
320001.0200100	SITEWORK COST FOR CLEAR AND GRUB.	501	10 AC	100	3293	3000	0	0	0	1573	7866
320001.0200110	LEVEL SITE, ASSUME MOVE AN AVERAGE OF 18", COMPACT, INCLUDES WATER TRUCK.	501	24200 CY	2749	90525	54450	0	0	0	36244	181219
320001.0200120	PAVING AND ROADS	501	29040 SY	958	31547	17424	285754	0	0	83681	418406
320001.0200130	SITEWORK COST FOR LIGHTING, ALLOWANCE.	501	6 ACR	480	18725	0	18000	0	0	9181	45906
320001.0200140	SITEWORK COST FOR UTILITIES, ALLOWANCE.	501	1 LS	5000	138100	0	100000	0	0	59525	297625
SUBTOTAL	SITEWORK			9,287		74,874		0		190,204	
					282,190		403,754		0		951,022
	SALES TAX 8.00 %						32300		0		32300
	OH&P (ON MARKUPS ONLY)									8075	8075
TOTAL	COST CODE 50102			9,287		74,874		0		198,279	
	WBS 320001				282,190		436,054		0		991,397
	(ESCALATION 0.00% - CONTINGENCY 35.00 %)										
TOTAL WBS 320001 SITEWORK				9,287		74,874		0		198,279	
					282,190		436,054		0		991,397

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 8
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 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
320002	STRUCTURES										
320002.02	SITEWORK										
320002.0200100	EXCAVATE AND BACKFILL FOR BUILDING, ASSUMES 20,000 CY.	501	20000 CY	2400	79032	45000	0	0	0	31008	155040
SUBTOTAL	SITEWORK			2,400	79,032	45,000	0	0	0	31,008	155,040
TOTAL	COST CODE 50102			2,400		45,000		0		31,008	
	WBS 320002				79,032		0		0		155,040
	(ESCALATION 0.00% - CONTINGENCY		35.00 %)								
320002.03	CONCRETE										
320002.0300101	ERECT BUILDING, INCLUDING CONCRETE, STEEL, WALLS, FLOORS,INSULATION, DOORS, WINDOWS, FURNISHINGS AND	501	140000 SF	373800	13725936	0	7735000	0	0	5365234	26826170
320002.0300102	MECHANICAL.	501	0	0	0	0	0	0	0	0	0
SUBTOTAL	CONCRETE			373,800		0		0		5,365,234	
					13,725,936		7,735,000		0		26,826,170
	SALES TAX 8.00 %						618800		0		618800
	OH&P (ON MARKUPS ONLY)									154700	154700
TOTAL	COST CODE 50103			373,800		0		0		5,519,934	
	WBS 320002				13,725,936		8,353,800		0		27,599,670
	(ESCALATION 0.00% - CONTINGENCY		35.00 %)								
TOTAL WBS 320002 STRUCTURES				376,200		45,000		0		5,550,942	
					13,804,968		8,353,800		0		27,754,710

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAA2
FILE NO. Z649SAA2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
CAPITAL COST ESTIMATE, REV 2
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 9
DATE 02/12/99 15:37:47
BY R.OHRT

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
320003	FIRE PROTECTION & DETECTION										
320003.15	MECHANICAL										
320003.1500100	INSTALL MECHANICAL PORTION OF FIRE PROTECTION AND DETECTION SYSTEM.	501	1 JOB	10000	344500	0	326528	0	0	167757	838785
320003.1500110	THE ABOVE COSTS WERE ESCALATED FROM "SOLID WASTE TREATMENT FACILITY" PARAMETRIC STUDY, DOCUMENT	501	0	0	0	0	0	0	0	0	0
320003.1500111	NUMBER WHC-EP-0405	501	0	0	0	0	0	0	0	0	0
SUBTOTAL	MECHANICAL			10,000		0		0		167,757	
					344,500		326,528		0		838,785
	SALES TAX 8.00 %						26122		0		26122
	OH&P (ON MARKUPS ONLY)									6530	6530
TOTAL	COST CODE 50115			10,000		0		0		174,287	
	WBS 320003				344,500		352,650		0		871,437
	(ESCALATION 0.00% - CONTINGENCY 35.00 %)										
320003.16	ELECTRICAL										
320003.1600100	INSTALL ELECTRICAL/INSTRUMENTATION PORTION OF FIRE PROTECTION AND DETECTION SYSTEM.	501	1 JOB	700	27307	0	18615	0	0	11481	57403
320003.1600110	THE ABOVE COSTS WERE ESCALATED FROM "SOLID WASTE TREATMENT FACILITY" PARAMETRIC STUDY, DOCUMENT	501	0	0	0	0	0	0	0	0	0
320003.1600111	NUMBER WHC-EP-0405.	501	0	0	0	0	0	0	0	0	0
SUBTOTAL	ELECTRICAL			700		0		0		11,481	
					27,307		18,615		0		57,403
	SALES TAX 8.00 %						1489		0		1489
	OH&P (ON MARKUPS ONLY)									372	372
TOTAL	COST CODE 50116			700		0		0		11,853	
	WBS 320003				27,307		20,104		0		59,264
	(ESCALATION 0.00% - CONTINGENCY 35.00 %)										
TOTAL WBS 320003 FIRE PROTECTION & DETECTION				10,700		0		0		186,140	
					371,807		372,754		0		930,702

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 10
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 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
320004	HVAC										
320004.15	MECHANICAL										
320004.1500100	INSTALL MECHANICAL PORTION OF HVAC - DUCT, EQUIPMENT, PIPING & VALVES.	501	140000 SF	70000	2581600	0	2800000	0	0	1345400	6727000
320004.1500110	THE ABOVE COSTS WERE ESCALATED FROM "SOLID WASTE TREATMENT FACILITY" PARAMETRIC STUDY, DOCUMENT	501	0	0	0	0	0	0	0	0	0
320004.1500111	NUMBER WHC-EP-0405, THEN REDUCED BY HALF TO REFLECT SINGLE FLOOR INSTEAD OF A 2 STORY LAYOUT.	501	0	0	0	0	0	0	0	0	0
SUBTOTAL	MECHANICAL			70,000		0		0		1,345,400	
					2,581,600		2,800,000		0		6,727,000
	SALES TAX 8.00 %						224000		0		224000
	OH&P (ON MARKUPS ONLY)									56000	56000
TOTAL	COST CODE 50115			70,000		0		0		1,401,400	
	WBS 320004				2,581,600		3,024,000		0		7,007,000
	(ESCALATION 0.00% - CONTINGENCY	35.00 %)									
320004.16	ELECTRICAL										
320004.1600100	INSTALL ELECTRICAL/INSTRU-MENTATION PORTION OF THE HVAC SYSTEM.	501	140000 SF	35000	1365350	0	1400000	0	0	691338	3456688
320004.1600110	THE ABOVE COSTS WERE ESCALATED FROM "SOLID WASTE TREATMENT FACILITY" PARAMETRIC STUDY, DOCUMENT	501	0	0	0	0	0	0	0	0	0
320004.1600111	NUMBER WHC-EP-0405, THEN REDUCED BY HALF TO REFLECT SINGLE FLOOR INSTEAD OF A 2 STORY LAYOUT.	501	0	0	0	0	0	0	0	0	0
SUBTOTAL	ELECTRICAL			35,000		0		0		691,338	
					1,365,350		1,400,000		0		3,456,688
	SALES TAX 8.00 %						112000		0		112000
	OH&P (ON MARKUPS ONLY)									28000	28000
TOTAL	COST CODE 50116			35,000		0		0		719,338	
	WBS 320004				1,365,350		1,512,000		0		3,596,688

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 11
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 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
	(ESCALATION 0.00% - CONTINGENCY 35.00 %)										
TOTAL WBS 320004 HVAC			105,000			0		0		2,120,738	
					3,946,950		4,536,000		0		10,603,688

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 12
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 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
320005	NORMAL ELECTRICAL DISTRIBUTION										
320005.16	ELECTRICAL										
320005.1600050	NORMAL ELECTRICAL DISTRIBUTION EQUIPMENT, INCLUDES MCC'S, TRANSFORMERS, SWITCHGEAR, LOAD CENTER'S, ETC.	501	140000 SF	0	0	0	1020040	0	0	255010	1275050
320005.1600100	INSTALL NORMAL ELECTRICAL DISTRIBUTION SYSTEM.	501	140000 SF	44996	1755294	0	892500	0	0	661949	3309743
320005.1600110	THE ABOVE COSTS WERE ESCALATED FROM "SOLID WASTE TREATMENT FACILITY" PARAMETRIC STUDY, DOCUMENT	501	0	0	0	0	0	0	0	0	0
320005.1600111	NUMBER WHC-EP-0405.	501	0	0	0	0	0	0	0	0	0
SUBTOTAL	ELECTRICAL			44,996		0		0		916,959	
					1,755,294		1,912,540		0		4,584,793
	SALES TAX 8.00 %						153003		0		153003
	OH&P (ON MARKUPS ONLY)									38250	38250
TOTAL	COST CODE 50116			44,996		0		0		955,209	
	WBS 320005				1,755,294		2,065,543		0		4,776,047
	(ESCALATION 0.00% - CONTINGENCY 35.00 %)										
TOTAL WBS 320005 NORMAL ELECTRICAL DISTRIBUTION				44,996		0		0		955,209	
					1,755,294		2,065,543		0		4,776,047

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 13
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 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
320006	STANDBY ELECTRICAL DISTRIBUTION										
320006.16	ELECTRICAL										
320006.1600050	STANDBY ELECTRICAL DISTRIBUTION EQUIPMENT, INCLUDES STANDBY GENERATORS, MCC'S, SWITCHGEAR, LOAD CTRS, ETC.	501	1 LS	0	0	0	8032500	0	0	2008125	10040625
320006.1600100	INSTALL STANDBY ELECTRICAL DISTRIBUTION SYSTEM.	501	1 JOB	6200	241862	0	181560	0	0	105856	529278
320006.1600110	THE ABOVE COSTS WERE *ESCALATED FROM* "SOLID WASTE TREATMENT FACILITY" PARAMETRIC STUDY, DOCUMENT	501	0	0	0	0	0	0	0	0	0
320006.1600111	NUMBER WHC-EP-0405.	501	0	0	0	0	0	0	0	0	0
SUBTOTAL	ELECTRICAL			6,200		0		0		2,113,981	
					241,862		8,214,060		0		10,569,903
	SALES TAX 8.00 %						657124		0		657124
	OH&P (ON MARKUPS ONLY)									164281	164281
TOTAL	COST CODE 50116			6,200		0		0		2,278,262	
	WBS 320006				241,862		8,871,184		0		11,391,309
	(ESCALATION 0.00% - CONTINGENCY 35.00 %)										
TOTAL WBS 320006 STANDBY ELECTRICAL DISTRIBUTION				6,200		0		0		2,278,262	
					241,862		8,871,184		0		11,391,309

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAA2
FILE NO. Z649SAA2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
CAPITAL COST ESTIMATE, REV 2
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 14
DATE 02/12/99 15:37:47
BY R.OHRT

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
320007	UNINTERRUPTABLE POWER SOURCE										
320007.16	ELECTRICAL										
320007.1600100	INSTALL UNINTERRUPTABLE POWER SUPPLY SYSTEM.	501	1 JOB	1600	62416	0	584842	0	0	161815	809073
320007.1600110	THE ABOVE COSTS WERE ESCALATED FROM "SOLID WASTE TREATMENT FACILITY" PARAMETRIC STUDY, DOCUMENT	501	0	0	0	0	0	0	0	0	0
320007.1600111	NUMBER WHC-EP-0405.	501	0	0	0	0	0	0	0	0	0
SUBTOTAL	ELECTRICAL			1,600		0		0		161,815	
					62,416		584,842		0		809,073
	SALES TAX 8.00 %						46787		0		46787
	OH&P (ON MARKUPS ONLY)									11696	11696
TOTAL	COST CODE 50116			1,600		0		0		173,511	
	WBS 320007				62,416		631,629		0		867,557
	(ESCALATION 0.00% - CONTINGENCY 35.00 %)										
TOTAL WBS 320007 UNINTERRUPTABLE POWER SOURCE				1,600		0		0		173,511	
					62,416		631,629		0		867,557

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 15
COGEMA ENGINEERING HT1 TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 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
320008	PROCESS EQUIPMENT DECON AND REPAIR										
320008.15	MECHANICAL										
320008.1500050	PROCESS DECONTAMINATION EQUIPMENT & REPAIR PROCUREMENT.	501	1 LS	0	0	0	5100000	0	0	1275000	6375000
320008.1500100	INSTALL MECHANICAL PORTION OF PROCESS EQUIPMENT DECON & REPAIR.	501	1 LS	31100	1375242	0	251175	0	0	406604	2033021
SUBTOTAL	MECHANICAL			31,100	1,375,242	0	5,351,175	0	0	1,681,604	8,408,021
	SALES TAX 8.00 %						428094		0		428094
	OH&P (ON MARKUPS ONLY)									107023	107023
TOTAL	COST CODE 50115			31,100	0	0		0	0	1,788,627	
	WBS 320008				1,375,242		5,779,269		0		8,943,138
	(ESCALATION 0.00% - CONTINGENCY 35.00 %)										
320008.16	ELECTRICAL										
320008.1600100	INSTALL ELECTRICAL PORTION OF PROCESS EQUIPMENT DECON AND REPAIR.	501	1 LS	20400	795804	0	404175	0	0	299995	1499974
SUBTOTAL	ELECTRICAL			20,400	795,804	0	404,175	0	0	299,995	1,499,974
	SALES TAX 8.00 %						32334		0		32334
	OH&P (ON MARKUPS ONLY)									8083	8083
TOTAL	COST CODE 50116			20,400	0	0		0	0	308,078	
	WBS 320008				795,804		436,509		0		1,540,391
	(ESCALATION 0.00% - CONTINGENCY 35.00 %)										
TOTAL WBS 320008 PROCESS EQUIPMENT DECON AND REPAIR				51,500	0	0		0	0	2,096,706	
					2,171,046		6,215,778		0		10,483,530

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 16
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 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
320009	COMPRESSED AIR AND GAS										
320009.15	MECHANICAL										
320009.1500100	INSTALL COMPRESSED AIR AND GAS SYSTEM.	501	1 JOB	4300	190146	0	35190	0	0	56334	281670
320009.1500110	THE ABOVE COSTS WERE ESCALATED FROM "SOLID WASTE TREATMENT FACILITY" PARAMETRIC STUDY, DOCUMENT	501	0	0	0	0	0	0	0	0	0
320009.1500111	NUMBER WHC-EP-0405.	501	0	0	0	0	0	0	0	0	0
SUBTOTAL	MECHANICAL			4,300		0		0		56,334	
					190,146		35,190		0		281,670
	SALES TAX 8.00 %						2815		0		2815
	OH&P (ON MARKUPS ONLY)									703	703
TOTAL	COST CODE 50115			4,300		0		0		57,037	
	WBS 320009				190,146		38,005		0		285,189
	(ESCALATION 0.00% - CONTINGENCY 35.00 %)										
TOTAL WBS 320009 COMPRESSED AIR AND GAS				4,300		0		0		57,037	
					190,146		38,005		0		285,189

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 17
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 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
320010	PROCESS AIR										
320010.15	MECHANICAL										
320010.1500100	INSTALL MECHANICAL PORTION OF PROCESS WATER SYSTEM.	501	1 JOB	3080	136198	0	60562	0	0	49190	245950
320010.1500110	THE ABOVE COSTS WERE ESCALATED FROM "SOLID WASTE TREATMENT FACILITY" PARAMETRIC STUDY, DOCUMENT	501	0	0	0	0	0	0	0	0	0
320010.1500111	NUMBER WHC-EP-0405.	501	0	0	0	0	0	0	0	0	0
SUBTOTAL	MECHANICAL			3,080		0		0		49,190	
					136,198		60,562		0		245,950
	SALES TAX 8.00 %						4844		0		4844
	OH&P (ON MARKUPS ONLY)									1211	1211
TOTAL	COST CODE 50115			3,080		0		0		50,401	
	WBS 320010				136,198		65,406		0		252,006
	(ESCALATION 0.00% - CONTINGENCY	35.00 %)									
320010.16	ELECTRICAL										
320010.1600100	INSTALL ELECTRICAL/INSTRU-MENTATION PORTION OF THE PROCESS WATER SYSTEM.	501	1 JOB	250	9753	0	24225	0	0	8495	42473
320010.1600110	THE ABOVE COSTS WERE ESCALATED FROM "SOLID WASTE TREATMENT FACILITY" PARAMETRIC STUDY, DOCUMENT	501	0	0	0	0	0	0	0	0	0
320010.1600111	NUMBER WHC-EP-0405.	501	0	0	0	0	0	0	0	0	0
SUBTOTAL	ELECTRICAL			250		0		0		8,495	
					9,753		24,225		0		42,473
	SALES TAX 8.00 %						1938		0		1938
	OH&P (ON MARKUPS ONLY)									484	484
TOTAL	COST CODE 50116			250		0		0		8,979	
	WBS 320010				9,753		26,163		0		44,895
	(ESCALATION 0.00% - CONTINGENCY	35.00 %)									
TOTAL WBS 320010 PROCESS AIR				3,330		0		0		59,380	
					145,951		91,569		0		296,901

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAA2
FILE NO. Z649SAA2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
CAPITAL COST ESTIMATE, REV 2
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 18
DATE 02/12/99 15:37:47
BY R.OHRT

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
320011	RAW WATER & FIREWATER										
320011.15	MECHANICAL										
320011.1500100	INSTALL RAW WATER AND FIRE WATER SYSTEM.	501	1 JOB	6200	274164	0	73823	0	0	86997	434984
320011.1500110	THE ABOVE COSTS WERE ESCALATED FROM "SOLID WASTE TREATMENT FACILITY" PARAMETRIC STUDY, DOCUMENT	501	0	0	0	0	0	0	0	0	0
320011.1500111	NUMBER WHC-EP-0405.	501	0	0	0	0	0	0	0	0	0
SUBTOTAL	MECHANICAL			6,200		0		0		86,997	
					274,164		73,823		0		434,984
	SALES TAX 8.00 %						5905		0		5905
	OH&P (ON MARKUPS ONLY)									1476	1476
TOTAL	COST CODE 50115			6,200		0		0		88,473	
	WBS 320011				274,164		79,728		0		442,366
	(ESCALATION 0.00% - CONTINGENCY 35.00 %)										
TOTAL WBS 320011 RAW WATER & FIREWATER				6,200		0		0		88,473	
					274,164		79,728		0		442,366

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAA2
FILE NO. Z649SAA2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
CAPITAL COST ESTIMATE, REV 2
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
320012	DISTRIBUTED CONTROL SYSTEM										
320012.16	ELECTRICAL										
320012.1600050	DISTRIBUTED CONTROL SYSTEM ALLOWANCE FOR DCS HARDWARE, SOFTWARE & VENDOR SERVICES FOR CONTROL ROOM & BLDG.	501	1 LS	0	0	0	11220000	0	0	2805000	14025000
320012.1600100	INSTALL DISTRIBUTED CONTROL SYSTEM (DCS).	501	1 JOB	6000	234060	0	88740	0	0	80700	403500
320012.1600110	THE ABOVE COSTS WERE ESCALATED FROM "SOLID WASTE TREATMENT FACILITY" PARAMETRIC STUDY, DOCUMENT	501	0	0	0	0	0	0	0	0	0
320012.1600111	NUMBER WHC-EP-0405.	501	0	0	0	0	0	0	0	0	0
SUBTOTAL	ELECTRICAL			6,000		0		0		2,885,700	
					234,060		11,308,740		0		14,428,500
	SALES TAX 8.00 %						904699		0		904699
	OH&P (ON MARKUPS ONLY)									226174	226174
TOTAL	COST CODE 50116			6,000		0		0		3,111,874	
	WBS 320012				234,060		12,213,439		0		15,559,374
	(ESCALATION 0.00% - CONTINGENCY 35.00 %)										
TOTAL WBS 320012 DISTRIBUTED CONTROL SYSTEM				6,000		0		0		3,111,874	
					234,060		12,213,439		0		15,559,374

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAA2
FILE NO. Z649SAA2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
CAPITAL COST ESTIMATE, REV 2
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 20
DATE 02/12/99 15:37:47
BY R.OHRT

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
320013	COMMUNICATIONS										
320013.16	ELECTRICAL										
320013.1600100	INSTALL COMMUNICATIONS SYSTEM.	501	1 JOB	7700	300377	0	139485	0	0	109966	549828
320013.1600110	THE ABOVE COSTS WERE ESCALATED FROM "SOLID WASTE TREATMENT FACILITY" PARAMETRIC STUDY, DOCUMENT	501	0	0	0	0	0	0	0	0	0
320013.1600111	NUMBER WHC-EP-0405.	501	0	0	0	0	0	0	0	0	0
SUBTOTAL	ELECTRICAL			7,700		0		0		109,966	
					300,377		139,485		0		549,828
	SALES TAX 8.00 %						11158		0		11158
	OH&P (ON MARKUPS ONLY)									2789	2789
TOTAL	COST CODE 50116			7,700		0		0		112,755	
	WBS 320013				300,377		150,643		0		563,776
	(ESCALATION 0.00% - CONTINGENCY 35.00 %)										
TOTAL WBS 320013 COMMUNICATIONS				7,700		0		0		112,755	
					300,377		150,643		0		563,776

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAA2
FILE NO. Z649SAA2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
CAPITAL COST ESTIMATE, REV 2
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 21
DATE 02/12/99 15:37:47
BY R.OHRT

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
320014	ANALYTICAL FACILITIES										
320014.15	MECHANICAL										
320014.1500050	ANALYTICAL EQUIPMENT ALLOWANCE - COMPUTER HARDWARE/ SOFTWARE & VENDOR SERVICES FOR CONTROL ROOM & BUILDING.	501	1 LS	0	0	0	8287500	0	0	2071875	10359375
320014.1500100	INSTALL MECHANICAL PORTION OF ANALYTICAL SYSTEM.	501	1 JOB	29200	1291224	0	201578	0	0	373201	1866003
320014.1500110	THE ABOVE COSTS WERE ESCALATED FROM "SOLID WASTE TREATMENT FACILITY" PARAMETRIC STUDY, DOCUMENT	501	0	0	0	0	0	0	0	0	0
320014.1500111	NUMBER WHC-EP-0405.	501	0	0	0	0	0	0	0	0	0
SUBTOTAL	MECHANICAL			29,200		0		0		2,445,076	
					1,291,224		8,489,078		0		12,225,378
	SALES TAX 8.00 %						679126		0		679126
	OH&P (ON MARKUPS ONLY)									169781	169781
TOTAL	COST CODE 50115			29,200		0		0		2,614,857	
	WBS 320014				1,291,224		9,168,204		0		13,074,285
	(ESCALATION 0.00% - CONTINGENCY		35.00 %)								
320014.16	ELECTRICAL										
320014.1600100	INSTALL ELECTRICAL/INSTRUMENTATION FOR ANALYTICAL SYSTEM.	501	1 JOB	7900	308179	0	227460	0	0	133910	669549
320014.1600110	THE ABOVE COSTS WERE ESCALATED FROM "SOLID WASTE TREATMENT FACILITY" PARAMETRIC STUDY, DOCUMENT	501	0	0	0	0	0	0	0	0	0
320014.1600111	NUMBER WHC-EP-0405.	501	0	0	0	0	0	0	0	0	0
SUBTOTAL	ELECTRICAL			7,900		0		0		133,910	
					308,179		227,460		0		669,549
	SALES TAX 8.00 %						18196		0		18196
	OH&P (ON MARKUPS ONLY)									4549	4549
TOTAL	COST CODE 50116			7,900		0		0		138,459	
	WBS 320014				308,179		245,656		0		692,295
	(ESCALATION 0.00% - CONTINGENCY		35.00 %)								

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAA2
FILE NO. Z649SAA2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
CAPITAL COST ESTIMATE, REV 2
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 22
DATE 02/12/99 15:37:47
BY R.OHRT

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
TOTAL WBS 320014 ANALYTICAL FACILITIES			37,100			0		0		2,753,316	
				1,599,403			9,413,861			0	13,766,580

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAA2
FILE NO. Z649SAA2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
CAPITAL COST ESTIMATE, REV 2
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 23
DATE 02/12/99 15:37:47
BY R.OHRT

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
320016	STACK & FANHOUSE										
320016.15	MECHANICAL										
320016.1500050	STACK & FANHOUSE ALLOWANCE, BASED ON PREVIOUS ESTIMATE Z466AAA2 DATED 09/18/97, PLUS AN ADDITIONAL AMOUNT OF	501	1 LS	93477	3447432	0	7504661	0	0	2738023	13690116
320016.1500051	$2 MILLION FOR THE ADDED DUCTWORK REQUIRED FOR THE NEW CONFIGURATION.	501	0	0	0	0	0	0	0	0	0
SUBTOTAL	MECHANICAL			93,477		0		0		2,738,023	
					3,447,432		7,504,661		0		13,690,116
	SALES TAX 8.00 %						600372		0		600372
	OH&P (ON MARKUPS ONLY)									150093	150093
TOTAL	COST CODE 50115			93,477		0		0		2,888,116	
	WBS 320016				3,447,432		8,105,033		0		14,440,582
	(ESCALATION 0.00% - CONTINGENCY 35.00 %)										
TOTAL WBS 320016 STACK & FANHOUSE				93,477		0		0		2,888,116	
					3,447,432		8,105,033		0		14,440,582

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAA2
FILE NO. Z649SAA2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
CAPITAL COST ESTIMATE, REV 2
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 24
DATE 02/12/99 15:37:47
BY R.OHRT

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
320017	HEALTH PHYSICS MONITORING EQUIPMENT										
320017.15	MECHANICAL										
320017.1500050	HEALTH PHYSICS MONITORING EQUIPMENT ALLOWANCE	501	1 LS	10000	390100	0	1600000	0	0	497525	2487625
SUBTOTAL	MECHANICAL			10,000		0		0		497,525	
					390,100		1,600,000		0		2,487,625
	SALES TAX 8.00 %						128000		0		128000
	OH&P (ON MARKUPS ONLY)									32000	32000
TOTAL	COST CODE 50115			10,000		0		0		529,525	
	WBS 320017				390,100		1,728,000		0		2,647,625
	(ESCALATION 0.00% - CONTINGENCY 35.00 %)										
TOTAL WBS 320017 HEALTH PHYSICS MONITORING EQUIPMENT				10,000		0		0		529,525	
					390,100		1,728,000		0		2,647,625

FLUOR DANIEL NORTHWEST, INC. | ** IEST - INTERACTIVE ESTIMATING ** | PAGE 25
COGEMA ENGINEERING | HTI TASK 7 PROCESS IMPACTS STUDY | DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 | CAPITAL COST ESTIMATE, REV 2 | BY R.OHRT
FILE NO. Z649SAA2 | 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
325002	CELL DRAINAGE/COLLECTION										
325002.15	MECHANICAL										
325002.1500050	RADIOACTIVE LIQUID WASTE DRAINAGE/COLLECTION SYSTEM PROCUREMENT.	700	1 LS	0	0	0	382500	0	0	95625	478125
325002.1500100	INSTALL MECHANICAL PORTION OF CELL DRAINAGE/COLLECTION SYSTEM.	700	1 JOB	13500	596970	0	506302	0	0	275818	1379090
325002.1500110	THE ABOVE COSTS WERE ESCALATED FROM "SOLID WASTE TREATMENT FACILITY" PARAMETRIC STUDY, DOCUMENT	700	0	0	0	0	0	0	0	0	0
325002.1500111	NUMBER WHC-EP-0405.	700	0	0	0	0	0	0	0	0	0
SUBTOTAL	MECHANICAL			13,500		0		0		371,443	
					596,970		888,802		0		1,857,215
	SALES TAX 8.00 %						71104		0		71104
	OH&P (ON MARKUPS ONLY)									17776	17776
TOTAL	COST CODE 70015			13,500		0		0		389,219	
	WBS 325002				596,970		959,906		0		1,946,095
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
325002.16	ELECTRICAL										
325002.1600100	INSTALL ELECTRICAL/INSTRU-MENTATION PORTION OF THE CELL DRAINAGE COLLECTION SYSTEM.	700	1 JOB	5100	198951	0	240975	0	0	109982	549908
325002.1600110	THE ABOVE COSTS WERE ESCALATED FROM "SOLID WASTE TREATMENT FACILITY" PARAMETRIC STUDY, DOCUMENT	700	0	0	0	0	0	0	0	0	0
325002.1600111	NUMBER WHC-EP-0405.	700	0	0	0	0	0	0	0	0	0
SUBTOTAL	ELECTRICAL			5,100		0		0		109,982	
					198,951		240,975		0		549,908
	SALES TAX 8.00 %						19278		0		19278
	OH&P (ON MARKUPS ONLY)									4819	4819
TOTAL	COST CODE 70016			5,100		0		0		114,801	
	WBS 325002				198,951		260,253		0		574,005

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAA2
FILE NO. Z649SAA2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
CAPITAL COST ESTIMATE, REV 2
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 26
DATE 02/12/99 15:37:47
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 %)										
TOTAL WBS 325002 CELL DRAINAGE/COLLECTION				18,600			0	0		504,020	
					795,921		1,220,159		0		2,520,100

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 27
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 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
325003	RAD SURVEY EQUIP. FOR WASHED SOLIDS										
325003.15	MECHANICAL										
325003.1500050	RADIATION MONITORING EQUIPMENT ALLOWANCE FOR HARDWARE, SOFTWARE AND VENDOR SERVICES.	700	1 LS	0	0	0	13937500	0	0	3484375	17421875
325003.1500051	4 SEPARATE STATIONS TO SURVEY WASTE STREAMS CONTAINING CAT 1 & CAT 3 LLW.	700	0	0	0	0	0	0	0	0	0
325003.1500100	INSTALL MECHANICAL PORTION OF THE RADIATION SURVEY AND MONITORING SYSTEM.	700	1 JOB	9000	397980	0	143948	0	0	135482	677410
325003.1500110	THE ABOVE COSTS WERE ESCALATED FROM "SOLID WASTE TREATMENT FACILITY" PARAMETRIC STUDY, DOCUMENT	700	0	0	0	0	0	0	0	0	0
325003.1500111	NUMBER WHC-EP-0405.	700	0	0	0	0	0	0	0	0	0
SUBTOTAL	MECHANICAL			9,000		0		0		3,619,857	
					397,980		14,081,448		0		18,099,285
	SALES TAX 8.00 %						1126515		0		1126515
	OH&P (ON MARKUPS ONLY)									281628	281628
TOTAL	COST CODE 70015			9,000		0		0		3,901,485	
	WBS 325003				397,980		15,207,963		0		19,507,429
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
325003.16	ELECTRICAL										
325003.1600100	INSTALL ELECTRICAL/INSTRUMENTATION PORTION OF THE RADIATION SURVEY AND MONITORING SYSTEM.	700	1 JOB	23100	901131	0	446378	0	0	336877	1684386
325003.1600110	THE ABOVE COSTS WERE ESCALATED FROM "SOLID WASTE TREATMENT FACILITY" PARAMETRIC STUDY, DOCUMENT	700	0	0	0	0	0	0	0	0	0
325003.1600111	NUMBER WHC-EP-0405.	700	0	0	0	0	0	0	0	0	0
SUBTOTAL	ELECTRICAL			23,100		0		0		336,877	
					901,131		446,378		0		1,684,386
	SALES TAX 8.00 %						35710		0		35710

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAA2
FILE NO. Z649SAA2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
CAPITAL COST ESTIMATE, REV 2
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 28
DATE 02/12/99 15:37:47
BY R.OHRT

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)									8927	8927
TOTAL	COST CODE 70016			23,100		0		0		345,804	
	WBS 325003				901,131		482,088		0		1,729,023
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
TOTAL WBS 325003 RAD SURVEY EQUIP. FOR WASHED SOLIDS				32,100		0		0		4,247,290	
					1,299,111		15,690,052		0		21,236,453

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 29
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 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
325004	PROCESS MONITORING INSTR. SYSTEM										
325004.16	ELECTRICAL										
325004.1600050	MIS PROCUREMENT ALLOWANCE - COMPUTER HARDWARE/SOFTWARE & VENDOR SERVICES FOR CONTROL ROOM & BUILDING.	700	1 LS	0	0	0	0	2167500	0	216750	2384250
325004.1600100	INSTALL PROCESS MONITORING INSTRUMENTATION SYSTEM (MIS)	700	1 JOB	300	11703	0	9818	0	0	5380	26901
325004.1600110	THE ABOVE COSTS WERE ESCALATED FROM "SOLID WASTE TREATMENT FACILITY" PARAMETRIC STUDY, DOCUMENT	700	0	0	0	0	0	0	0	0	0
325004.1600111	NUMBER WHC-EP-0405.	700	0	0	0	0	0	0	0	0	0
SUBTOTAL	ELECTRICAL			300		0		2,167,500		222,130	
					11,703		9,818		0		2,411,151
	SALES TAX 8.00 %						785		0		785
	OH&P (ON MARKUPS ONLY)									196	196
TOTAL	COST CODE 70016			300		0		2,167,500		222,326	
	WBS 325004				11,703		10,603		0		2,412,132
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
TOTAL WBS 325004 PROCESS MONITORING INSTR. SYSTEM				300		0		2,167,500		222,326	
					11,703		10,603		0		2,412,132

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAA2
FILE NO. Z649SAA2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
CAPITAL COST ESTIMATE, REV 2
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 30
DATE 02/12/99 15:37:47
BY R.OHRT

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
325005	AQUEOUS MAKE-UP										
325005.15	MECHANICAL										
325005.1500050	STORAGE AND MIXING TANKS FOR ACID AND CAUSTIC. 2 STORAGE TANKS AT 50,000 GAL AND 2 MIXING TANKS AT 10,000 GAL.	700	1 LS	0	0	0	255000	0	0	63750	318750
325005.1500100	INSTALL MECHANICAL PORTION OF CHEMICAL RECEIPT AND MAKE-UP SYSTEM.	700	1 JOB	14600	645612	0	453900	0	0	274878	1374390
325005.1500110	THE ABOVE COSTS WERE ESCALATED FROM "SOLID WASTE TREATMENT FACILITY" PARAMETRIC STUDY, DOCUMENT	700	0	0	0	0	0	0	0	0	0
325005.1500111	NUMBER WHC-EP-0405.	700	0	0	0	0	0	0	0	0	0
SUBTOTAL	MECHANICAL			14,600		0		0		338,628	
					645,612		708,900		0		1,693,140
	SALES TAX 8.00 %						56712		0		56712
	OH&P (ON MARKUPS ONLY)									14178	14178
TOTAL	COST CODE 70015			14,600		0		0		352,806	
	WBS 325005				645,612		765,612		0		1,764,030
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
325005.16	ELECTRICAL										
325005.1600100	INSTALL ELECTRICAL/INSTRU-MENTATION FOR CHEMICAL RECEIPT AND MAKE-UP SYSTEM.	700	1 JOB	11200	436912	0	316583	0	0	188374	941869
325005.1600110	THE ABOVE COSTS WERE ESCALATED FROM "SOLID WASTE TREATMENT FACILITY" PARAMETRIC STUDY, DOCUMENT	700	0	0	0	0	0	0	0	0	0
325005.1600111	NUMBER WHC-EP-0405.	700	0	0	0	0	0	0	0	0	0
SUBTOTAL	ELECTRICAL			11,200		0		0		188,374	
					436,912		316,583		0		941,869
	SALES TAX 8.00 %						25326		0		25326
	OH&P (ON MARKUPS ONLY)									6331	6331
TOTAL	COST CODE 70016			11,200		0		0		194,705	
	WBS 325005				436,912		341,909		0		973,527

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAA2
FILE NO. Z649SAA2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
CAPITAL COST ESTIMATE, REV 2
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

DATE 02/12/99 15:37:47
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 %)										
TOTAL WBS 325005 AQUEOUS MAKE-UP				25,800			0		0	547,511	
					1,082,524		1,107,521			0	2,737,557

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 32
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 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
325006	BRIDGE CRANES										
325006.11	EQUIPMENT										
325006.1100050	********** PROCESS AREA BRIDGE CRANE **********	700	0	0	0	0	0	0	0	0	0
325006.1100055	NUCLEAR SERVICE BRIDGE CRANE OVER PROCESS AREA SPANNING 100 FT WITH A 500 FT RUN, 30 TON AND 5 TON HOOKS WITH	700	1 EA	0	0	0	910000	0	0	227500	1137500
325006.1100060	30 FT LIFT. TO BE USED FOR MAINTENANCE, SET UP AND REMOVAL OF SKIDS, ETC.	700	0	0	0	0	0	0	0	0	0
325006.1100065	QUOTE PER AMERICAN CRANE & EQUIPMENT CORPORATION, 01/07/99.	700	0	0	0	0	0	0	0	0	0
325006.1100070	SHIPPING	700	1 EA	0	0	0	30000	0	0	7500	37500
325006.1100075	INSTALLATION	700	1 EA	10000	367200	0	0	0	0	91800	459000
325006.1100150	********** BRIDGE CRANE IN WASTE RECEIVING AREA **********	700	0	0	0	0	0	0	0	0	0
325006.1100155	30 FT WIDE X 180 FT TRAVEL, WITH 5 TON ELECTROMAGNET AND 10 TON GRAPPLE.	700	1 EA	0	0	0	790000	0	0	197500	987500
325006.1100160	QUOTE PER AMERICAN CRANE & EQUIPMENT CORPORATION, 01/07/99.	700	0	0	0	0	0	0	0	0	0
325006.1100165	SHIPPING	700	1 EA	0	0	0	20000	0	0	5000	25000
325006.1100170	INSTALLATION	700	1 EA	6000	220320	0	0	0	0	55080	275400
SUBTOTAL	EQUIPMENT			16,000		0		0		584,380	
					587,520		1,750,000		0		2,921,900
	SALES TAX 8.00 %						140000		0		140000
	OH&P (ON MARKUPS ONLY)									35000	35000
TOTAL	COST CODE 70011			16,000		0		0		619,380	
	WBS 325006				587,520		1,890,000		0		3,096,900
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
TOTAL WBS 325006 BRIDGE CRANES				16,000		0		0		619,380	
					587,520		1,890,000		0		3,096,900

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 33
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 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
325008	ROBOTICS										
325008.11	EQUIPMENT										
325008.1100000	********** ROBOTICS **********	700	0	0	0	0	0	0	0	0	0
325008.1100005	ALLOWANCE FOR ROBOTICS, MANIPULATORS, GLOVEBOXES AND/OR LEADED GLASS VIEWING WINDOWS.	700	1 LS	0	0	0	0	20000000	0	2000000	22000000
325008.1100006	(CURRENTLY NOT DETAILED)	700	0	0	0	0	0	0	0	0	0
SUBTOTAL	EQUIPMENT			0		0		20,000,000		2,000,000	
					0		0		0		22,000,000
TOTAL	COST CODE 70011			0		0		20,000,000		2,000,000	
	WBS 325008				0		0		0		22,000,000
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
TOTAL WBS 325008 ROBOTICS				0		0		20,000,000		2,000,000	
					0		0		0		22,000,000

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 34
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 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
325010	PROCESS VESSEL VENT										
325010.15	MECHANICAL										
325010.1500050	PROCESS VESSEL VENT EQUIPMENT - SCRUBBER, EXHAUSTER, BLOWER, HEATER, DEMISTER, PUMPS AND FILTERS.	700	1 LS	0	0	0	7777500	0	0	1944375	9721875
325010.1500100	INSTALL MECHANICAL PORTION OF PROCESS VESSEL VENT SYSTEM.	700	1 LS	30200	1335444	0	1530000	0	0	716361	3581805
SUBTOTAL	MECHANICAL			30,200		0		0		2,660,736	
					1,335,444		9,307,500		0		13,303,680
	SALES TAX 8.00 %						744600		0		744600
	OH&P (ON MARKUPS ONLY)									186150	186150
TOTAL	COST CODE 70015			30,200		0		0		2,846,886	
	WBS 325010				1,335,444		10,052,100		0		14,234,430
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
325010.16	ELECTRICAL										
325010.1600100	INSTALL ELECTRICAL PORTION OF PROCESS VESSEL VENT SYSTEM.	700	1 LS	53300	2079233	0	1224000	0	0	825808	4129041
SUBTOTAL	ELECTRICAL			53,300		0		0		825,808	
					2,079,233		1,224,000		0		4,129,041
	SALES TAX 8.00 %						97920		0		97920
	OH&P (ON MARKUPS ONLY)									24480	24480
TOTAL	COST CODE 70016			53,300		0		0		850,288	
	WBS 325010				2,079,233		1,321,920		0		4,251,441
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
TOTAL WBS 325010 PROCESS VESSEL VENT				83,500		0		0		3,697,174	
					3,414,677		11,374,020		0		18,485,871

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAA2
FILE NO. Z649SAA2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
CAPITAL COST ESTIMATE, REV 2
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

DATE 02/12/99 15:37:47
BY R.OHRT

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
325011	MISC SERVICE PIPING										
325011.15	MECHANICAL										
325011.1500100	ADDITIONAL ALLOWANCE FOR PROCESS PIPING. ASSUME .1 LF/SF (X 140,000 SF) = 14000 LF.	700	14000 LF	25200	1114344	0	624750	0	0	434774	2173868
325011.1500110	ABOVE COSTS WERE PRORATED & ESCALATED FROM "SOLID WASTE TREATMENT FACILITY" PARAMETRIC STUDY, DOCUMENT	700	0	0	0	0	0	0	0	0	0
325011.1500111	NUMBER WHC-EP-0405.	700	0	0	0	0	0	0	0	0	0
SUBTOTAL	MECHANICAL			25,200		0		0		434,774	
					1,114,344		624,750		0		2,173,868
	SALES TAX 8.00 %						49980		0		49980
	OH&P (ON MARKUPS ONLY)									12495	12495
TOTAL	COST CODE 70015			25,200		0		0		447,269	
	WBS 325011				1,114,344		674,730		0		2,236,343
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
TOTAL WBS 325011 MISC SERVICE PIPING				25,200		0		0		447,269	
					1,114,344		674,730		0		2,236,343

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 36
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 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
325012	MATERIAL HANDLING										
325012.14	CONVEYING SYSTEMS										
325012.1400000	********** MATERIAL HANDLING SYSTEM **********	700	0	0	0	0	0	0	0	0	0
325012.1400002	APPROXIMATELY 840 LF OF CONVEYOR IN MULTIPLE RUNS, AND 140 BASKETS 2.2' X 2.2' X 3'L SST W/PAYLOAD OF 1000#	700	1 LS	5000	183600	0	15300000	0	0	3870900	19354500
SUBTOTAL	CONVEYING SYSTEMS			5,000			0		0	3,870,900	
					183,600		15,300,000		0		19,354,500
	SALES TAX 8.00 %						1224000		0		1224000
	OH&P (ON MARKUPS ONLY)									306000	306000
TOTAL	COST CODE 70014			5,000			0		0	4,176,900	
	WBS 325012				183,600		16,524,000		0		20,884,500
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
TOTAL WBS 325012 MATERIAL HANDLING				5,000			0		0	4,176,900	
					183,600		16,524,000		0		20,884,500

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 37
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 PHMCROB - 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
325014	WASH STATION										
325014.15	MECHANICAL										
325014.1500000	********** WASH STATION **********	700	0	0	0	0	0	0	0	0	0
325014.1500002	2 REQ'D, 1 METER DEEP X 1.5M WIDE X 5M LONG POOL. ALL SST W/200 GPM RECIRC. PUMP & 85 GPM TRANSFER PUMP, ALLOWANCE	700	1 LS	2000	88440	0	400000	0	0	122110	610550
SUBTOTAL	MECHANICAL			2,000		0		0		122,110	
					88,440		400,000		0		610,550
	SALES TAX 8.00 %						32000		0		32000
	OH&P (ON MARKUPS ONLY)									8000	8000
TOTAL	COST CODE 70015			2,000		0		0		130,110	
	WBS 325014				88,440		432,000		0		650,550
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
TOTAL WBS 325014 WASH STATION				2,000		0		0		130,110	
					88,440		432,000		0		650,550

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 38
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 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
325016	DRYER										
325016.15	MECHANICAL										
325016.1500000	********** DRYER **********	700	0	0	0	0	0	0	0	0	0
325016.1500002	INSULATED UNIT, 56 FT LONG X 12 FT HIGH X 6 FT WIDE WITH HEAT INPUT OF 2 MILLION BTU/HR.	700	1 EA	2300	84456	0	0	460000	0	67114	611570
325016.1500010	INSTALL DUCT, ASSUME 230' OF 18" DIA SST 16GA.	700	1 LS	690	25447	0	8050	0	0	8374	41871
325016.1500020	INSTALL ELECTRICAL CABLE (ALLOWANCE)	700	1 LS	368	14356	0	2300	0	0	4164	20820
325016.1500100	PRICE BASED ON QUOTATION BY STEVE GEE AT KLEENAIR PROD. 1-800-275-5152.	700	0	0	0	0	0	0	0	0	0
SUBTOTAL	MECHANICAL			3,358		0		460,000		79,652	
					124,259		10,350		0		674,261
	SALES TAX 8.00 %						828		0		828
	OH&P (ON MARKUPS ONLY)									207	207
TOTAL	COST CODE 70015			3,358		0		460,000		79,859	
	WBS 325016				124,259		11,178		0		675,296
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
TOTAL WBS 325016 DRYER				3,358		0		460,000		79,859	
					124,259		11,178		0		675,296

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 39
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 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
325018	SHIELDED WASTE CONTAINERS										
325018.15	MECHANICAL										
325018.1500000	********** SHIELDED WASTE CONTAINERS **********	700	0	0	0	0	0	0	0	0	0
325018.1500002	4 FT HIGH X 4 FT WIDE X 12 FT LONG WITH 4" THK STEEL WALLS, COMPLETE WITH HARDWARE FOR LIFTING/UNLOADING.	700	250 EA	0	0	0	0	12500000	0	1250000	13750000
325018.1500003	ALLOWANCE.	700	0	0	0	0	0	0	0	0	0
SUBTOTAL	MECHANICAL			0	0	0	0	12,500,000	0	1,250,000	13,750,000
TOTAL	COST CODE 70015			0	0	0	0	12,500,000	0	1,250,000	13,750,000
	WBS 325018										
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
TOTAL WBS 325018 SHIELDED WASTE CONTAINERS				0	0	0	0	12,500,000	0	1,250,000	13,750,000

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 40
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 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
325019	WASTE RECEIVING AREA										
325019.11	EQUIPMENT										
325019.1100000	FOUR-COMPARTMENT AREA FOR DELIVERING AND PICKING UP SHIELDED TRANSPORT BOXES	700	0	0	0	0	0	0	0	0	0
325019.1100050	********** DUMP MECHANISM FOR SHIELDED BOXES **********	700	0	0	0	0	0	0	0	0	0
325019.1100055	THIS MECHANISM OPENS THE BOX LID, ENGAGES THE CLASPERS ON THE BOX, RAISES, ROTATES AND DUMPS BOX, LOWERS AND CLOSES	700	0	0	0	0	0	0	0	0	0
325019.1100060	THE BOX.	700	0	0	0	0	0	0	0	0	0
325019.1100070	FABRICATION ALLOWANCE	700	1 LS	0	0	0	0	500000	0	50000	550000
325019.1100075	INSTALLATION ALLOWANCE	700	1 LS	5000	183600	0	0	0	0	45900	229500
325019.1100100	********** RECEIVING HOPPER **********	700	0	0	0	0	0	0	0	0	0
325019.1100105	THE RECEIVING HOPPER, APPROX 100 FT LONG, 15 FT WIDE AND 15 FT DEEP. INCLUDES SPRAY RING & VIBRATORY PAN FEEDER.	700	0	0	0	0	0	0	0	0	0
325019.1100120	FABRICATION ALLOWANCE, ASSUMING 50,000 LB AND .02 MH/LB	700	1 LS	1000	36720	0	100000	0	0	34180	170900
325019.1100200	********** DECON AND RAD SURVEY EQUIPMENT IN THIRD COMPARTMENT **********	700	0	0	0	0	0	0	0	0	0
325019.1100205	THIS COST HAS BEEN TAKEN FROM A SIMILAR STUDY FOR THE AX TANK FARM ENCLOSURE STRUCTURE AND ESCALATED.	700	1 LS	8827	390330	1800	871500	13030	0	317211	1593871
SUBTOTAL	EQUIPMENT			14,827		1,800		513,030		447,291	
					610,650		971,500		0		2,544,271
	SALES TAX 8.00 %						77720		0		77720
	OH&P (ON MARKUPS ONLY)									19430	19430
TOTAL	COST CODE 70011			14,827		1,800		513,030		466,721	
	WBS 325019				610,650		1,049,220		0		2,641,421

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAA2
FILE NO. Z649SAA2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
CAPITAL COST ESTIMATE, REV 2
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
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
TOTAL WBS 325019 WASTE RECEIVING AREA				14,827	610,650	1,800	1,049,220	513,030	0	466,721	2,641,421

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 42
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 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
325023	SHREDDER										
325023.11	EQUIPMENT										
325023.1100000	********** SHREDDER **********	700	0	0	0	0	0	0	0	0	0
	4 TON/HR CAPACITY										
325023.1100002	SHREDDER UNIT TO REDUCE ALL METAL TO 1-2" SHARDS AND HAVE 1" THICK PLATE CUTTING CAPACITY.	700	0	0	0	0	0	0	0	0	0
325023.1100054	SHREDDER - ALLOWANCE	700	1 EA	2580	94738	0	2868750	0	0	740872	3704360
SUBTOTAL	EQUIPMENT			2,580		0		0		740,872	
					94,738		2,868,750		0		3,704,360
	SALES TAX 8.00 %						229500		0		229500
	OH&P (ON MARKUPS ONLY)									57375	57375
TOTAL	COST CODE 70011			2,580		0		0		798,247	
	WBS 325023				94,738		3,098,250		0		3,991,235
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
TOTAL WBS 325023 SHREDDER				2,580		0		0		798,247	
					94,738		3,098,250		0		3,991,235

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 43
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 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
325024	ACID DIGESTER										
325024.15	MECHANICAL										
325024.1500000	********** ACID DIGESTER **********	700	0	0	0	0	0	0	0	0	0
325024.1500002	LEACH TOWER WITH AUGER LIFT. MULTI-HEARTH FURNACE DESIGN OF 5' DIA X 12' HIGH.	700	1 EA	18000	660960	0	300000	0	0	240240	1201200
325024.1500003	6 TON/HR SOLIDS, 15 GAL/MIN ACID FEED. (ALLOWANCE)	700	0	0	0	0	0	0	0	0	0
SUBTOTAL	MECHANICAL			18,000		0		0		240,240	
					660,960		300,000		0		1,201,200
	SALES TAX 8.00 %						24000		0		24000
	OH&P (ON MARKUPS ONLY)									6000	6000
TOTAL	COST CODE 70015			18,000		0		0		246,240	
	WBS 325024				660,960		324,000		0		1,231,200
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
TOTAL WBS 325024 ACID DIGESTER				18,000		0		0		246,240	
					660,960		324,000		0		1,231,200

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 44
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 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
325025	ROTARY DRUM FILTER										
325025.15	MECHANICAL										
325025.1500000	********** ROTARY DRUM FILTER **********	700	0	0	0	0	0	0	0	0	0
325025.1500002	ROTARY DRUM FILTER WITH 3 TON/HR SOLIDS CAKE AND 20 GPM FILTERED LIQUID, ALL SST CONSTRUCTION. (ALLOW)	700	2 EA	0	0	0	0	1500000	0	150000	1650000
325025.1500010	FABRICATE SKID	700	1 EA	600	22032	0	3000	0	0	6258	31290
325025.1500015	SET IN PLACE	700	1 EA	120	4406	1500	0	0	0	1477	7383
325025.1500020	MECHANICAL HOOK-UP	700	1 EA	240	10613	0	1500	0	0	3028	15141
325025.1500025	ELECTRICAL HOOK-UP	700	1 EA	240	9362	0	1500	0	0	2716	13578
SUBTOTAL	MECHANICAL			1,200		1,500		1,500,000		163,479	
					46,413		6,000		0		1,717,392
	SALES TAX 8.00 %						480		0		480
	OH&P (ON MARKUPS ONLY)									120	120
TOTAL	COST CODE 70015			1,200		1,500		1,500,000		163,599	
	WBS 325025				46,413		6,480		0		1,717,992
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
TOTAL WBS 325025 ROTARY DRUM FILTER				1,200		1,500		1,500,000		163,599	
					46,413		6,480		0		1,717,992

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 45
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 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
325026	CENTRIFUGE										
325026.15	MECHANICAL										
325026.1500000	********** CENTRIFUGE **********	700	0	0	0	0	0	0	0	0	0
325026.1500002	CENTRIFUGE WITH A FEED RATE OF 50 GPM OF LIQUID WITH TRACE SOLIDS.	700	1 EA	1000	36720	0	497250	0	0	133493	667463
325026.1500010	ABOVE COSTS WERE PRORATED & ESCALATED FROM "SOLID WASTE TREATMENT FACILITY" PARAMETRIC STUDY, DOCUMENT	700	0	0	0	0	0	0	0	0	0
325026.1500011	NUMBER WHC-EP-0405.	700	0	0	0	0	0	0	0	0	0
SUBTOTAL	MECHANICAL			1,000		0		0		133,493	
					36,720		497,250		0		667,463
	SALES TAX 8.00 %						39780		0		39780
	OH&P (ON MARKUPS ONLY)									9945	9945
TOTAL	COST CODE 70015			1,000		0		0		143,438	
	WBS 325026				36,720		537,030		0		717,188
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
TOTAL WBS 325026 CENTRIFUGE				1,000		0		0		143,438	
					36,720		537,030		0		717,188

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 46
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 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
325028	EVAPORATOR										
325028.15	MECHANICAL										
325028.1500000	********** EVAPORATOR **********	700	0	0	0	0	0	0	0	0	0
325028.1500002	UNIT TO EVAPORATE 1750 GAL/ HR OF WATER FROM A SOLUTION OF 20% DISSOLVED SOLIDS.	700	2 EA	0	0	0	0	12622500	0	1262250	13884750
325028.1500010	ABOVE COSTS WERE PRORATED & ESCALATED FROM "SOLID WASTE TREATMENT FACILITY" PARAMETRIC STUDY, DOCUMENT	700	0	0	0	0	0	0	0	0	0
325028.1500011	NUMBER WHC-EP-0405.	700	0	0	0	0	0	0	0	0	0
SUBTOTAL	MECHANICAL			0	0	0	0	12,622,500	0	1,262,250	13,884,750
TOTAL	COST CODE 70015			0	0	0	0	12,622,500	0	1,262,250	13,884,750
	WBS 325028										
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
TOTAL WBS 325028 EVAPORATOR				0	0	0	0	12,622,500	0	1,262,250	13,884,750

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 47
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 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
325029	GRINDING MILL										
325029.15	MECHANICAL										
325029.1500000	********** GRINDING MILL ********** 10 TON/HR	700	0	0	0	0	0	0	0	0	0
325029.1500002	FULLY AUTOGENOUS GRINDING MILL, APPROX 12'DIA X 10'L, 375-HP MOTOR, INCLUDES *MOTOR, LINER, FEED AND*	700	1 LS	0	0	0	1000000	0	0	250000	1250000
325029.1500003	DISCHARGE CHUTES. QUOTE PER FFE MINERALS, BETHLEHEM, PA (610) 264-6171.	700	0	0	0	0	0	0	0	0	0
325029.1500004	SUPPORTS, FOUNDATION AND INSTALLATION	700	1 LS	10000	367200	0	100000	0	0	116800	584000
SUBTOTAL	MECHANICAL			10,000		0		0		366,800	
					367,200		1,100,000		0		1,834,000
	SALES TAX 8.00 %						88000		0		*88000*
	OH&P (ON MARKUPS ONLY)									22000	22000
TOTAL	COST CODE 70015			10,000		0		0		388,800	
	WBS 325029				367,200		1,188,000		0		1,944,000
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
TOTAL WBS 325029 GRINDING MILL				10,000		0		0		388,800	
					367,200		1,188,000		0		1,944,000

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 48
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 PHMCR0B - 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
325030	STAGING TANKS										
325030.15	MECHANICAL										
325030.1500000	********** STAGING TANKS **********	700	0	0	0	0	0	0	0	0	0
325030.1500002	PER QUOTE FROM STEEL STRUCTURES, INC. (800) 774-4774, HORIZONTAL STORAGE TANK, 180" OD X 72' LONG, 304 SST,	700	2 EA	0	0	0	500000	0	0	125000	625000
325030.1500003	INCLUDES LIFTING LUGS, 4 - 4" NOZZLES, 2 - 12" NOZZLES AND 2 - 18" MANWAYS. 80,000 LB.	700	0	0	0	0	0	0	0	0	0
325030.1500005	SHIPPING COST FOR TANKS.	700	2 EA	0	0	0	40000	0	0	10000	50000
325030.1500006	SET TANKS, 100,000 GAL EA.	700	2 EA	128	4700	2000	0	0	0	1675	8375
325030.1500010	EXCAVATE HOLE FOR VAULT, BACKFILL AND HAUL.	700	7500 CY	0	0	0	0	52500	0	5250	57750
325030.1500015	FORM AND POUR VAULT, 40' X 80' X 20' DEEP, 2 FT WALLS AND COVER BLOCKS.	700	830 CY	0	0	0	0	415000	0	41500	456500
325030.1500020	PUMPS, 2 MIXING AND 2 TRANSFER PUMPS, 50-100 GPM.	700	1 LS	200	7344	0	5000	0	0	3086	15430
SUBTOTAL	MECHANICAL			328	12,044	2,000	545,000	467,500	0	186,511	1,213,055
	SALES TAX 8.00 %						43600		0		43600
	OH&P (ON MARKUPS ONLY)									10900	10900
TOTAL	COST CODE 70015			328		2,000		467,500		197,411	
	WBS 325030				12,044		588,600		0		1,267,555
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
TOTAL WBS 325030 STAGING TANKS				328	12,044	2,000	588,600	467,500	0	197,411	1,267,555

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAA2
FILE NO. Z649SAA2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
CAPITAL COST ESTIMATE, REV 2
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 49
DATE 02/12/99 15:37:47
BY R.OHRT

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
325031	CAT 1 LOADING STATION										
325031.11	EQUIPMENT										
325031.1100000	FOUR-COMPARTMENT AREA FOR DELIVERING AND PICKING UP 20-TON RO/RO TRAILERS.	700	0	0	0	0	0	0	0	0	0
325031.1100050	********** STORAGE HOPPER **********	700	0	0	0	0	0	0	0	0	0
325031.1100055	THE HOPPER IS APPROX 50 FT LONG, 20 FT WIDE AND 20 FT DEEP WITH SPRAY RING, SLOPED FLOOR WITH VIBRATORY PAN	700	0	0	0	0	0	0	0	0	0
325031.1100060	FEEDER.	700	0	0	0	0	0	0	0	0	0
325031.1100080	FABRICATION ALLOWANCE, ASSUMING 40,000 LB AND .02 MH/LB	700	1 LS	800	29376	0	80000	0	0	27344	136720
325031.1100200	********** DECON AND RAD SURVEY EQUIP-MENT IN THIRD COMPARTMENT **********	700	0	0	0	0	0	0	0	0	0
325031.1100205	THIS COST HAS BEEN TAKEN FROM A SIMILAR STUDY FOR THE AX TANK FARM ENCLOSURE STRUCTURE AND ESCALATED.	700	1 LS	8827	390330	1800	871500	13030	0	317211	1593871
SUBTOTAL	EQUIPMENT			9,627		1,800		13,030		344,555	
					419,706		951,500		0		1,730,591
	SALES TAX 8.00 %						76120		0		76120
	OH&P (ON MARKUPS ONLY)									19030	19030
TOTAL	COST CODE 70011			9,627		1,800		13,030		363,585	
	WBS 325031				419,706		1,027,620		0		1,825,741
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
TOTAL WBS 325031 CAT 1 LOADING STATION				9,627		1,800		13,030		363,585	
					419,706		1,027,620		0		1,825,741

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 50
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 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
325032	CAT 3 CONCRETING/LOADING STATION										
325032.15	MECHANICAL										
325032.1500000	********** CAT 3 CONCRETING/LOADING STATION **********	700	0	0	0	0	0	0	0	0	0
325032.1500002	FOR BULK CONTAINERS OF PALLET SIZE TO ADD AND MIX CEMENT AGENTS TO TARGET MATERIAL. 4 CY/HR CAPACITY.	700	1 LS	1500	66330	0	187500	0	0	63458	317288
SUBTOTAL	MECHANICAL			1,500		0		0		63,458	
					66,330		187,500		0		317,288
	SALES TAX 8.00 %						15000		0		15000
	OH&P (ON MARKUPS ONLY)									3750	3750
TOTAL	COST CODE 70015			1,500		0		0		67,208	
	WBS 325032				66,330		202,500		0		336,038
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
325032.16	ELECTRICAL										
325032.1600002	ELECTRICAL PORTION OF LOADING STATION, CONTROLS AND CONNECTIONS.	700	1 LS	100	3901	0	1000	0	0	1225	6126
SUBTOTAL	ELECTRICAL			100		0		0		1,225	
					3,901		1,000		0		6,126
	SALES TAX 8.00 %						80		0		80
	OH&P (ON MARKUPS ONLY)									20	20
TOTAL	COST CODE 70016			100		0		0		1,245	
	WBS 325032				3,901		1,080		0		6,226
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
TOTAL WBS 325032 CAT 3 CONCRETING/LOADING STATION				1,600		0		0		68,453	
					70,231		203,580		0		342,264

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 51
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 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
325033	JUMPERS										
325033.15	MECHANICAL										
325033.1500000	********** JUMPERS **********	700	0	0	0	0	0	0	0	0	0
325033.1500001	MECHANICAL JUMPERS ALLOWANCE FOR IN CELL EQUIPMENT.	700	50 EA	0	0	0	0	1275000	0	127500	1402500
325033.1500010	ABOVE COSTS WERE PRORATED & ESCALATED FROM "SOLID WASTE TREATMENT FACILITY" PARAMETRIC STUDY, DOCUMENT	700	0	0	0	0	0	0	0	0	0
325033.1500011	NUMBER WHC-EP-0405.	700	0	0	0	0	0	0	0	0	0
SUBTOTAL	MECHANICAL			0	0	0	0	1,275,000	0	127,500	1,402,500
TOTAL	COST CODE 70015			0	0	0	0	1,275,000	0	127,500	1,402,500
	WBS 325033										
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
325033.16	ELECTRICAL										
325033.1600001	ELECTRICAL JUMPERS ALLOWANCE FOR IN CELL EQUIPMENT.	700	25 EA	0	0	0	0	490875	0	49088	539963
325033.1600010	ABOVE COSTS WERE PRORATED & ESCALATED FROM "SOLID WASTE TREATMENT FACILITY" PARAMETRIC STUDY, DOCUMENT	700	0	0	0	0	0	0	0	0	0
325033.1600011	NUMBER WHC-EP-0405.	700	0	0	0	0	0	0	0	0	0
SUBTOTAL	ELECTRICAL			0	0	0	0	490,875	0	49,088	539,963
TOTAL	COST CODE 70016			0	0	0	0	490,875	0	49,088	539,963
	WBS 325033										
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
TOTAL WBS 325033 JUMPERS				0	0	0	0	1,765,875	0	176,588	1,942,463

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 52
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:37:47
JOB NO. Z649SAA2 CAPITAL COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAA2 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
340000	PROJECT MANAGEMENT										
340000.19	PROJECT MANAGEMENT										
340000.1900100	PROJECT MANAGEMENT, BASED ON 15% OF CONSTRUCTION	000	1 LS	550000	52794500	0	0	0	0	0	52794500
SUBTOTAL	PROJECT MANAGEMENT			550,000	52,794,500	0	0	0	0	0	52,794,500
TOTAL	COST CODE 00019			550,000	52,794,500	0	0	0	0	0	52,794,500
	WBS 340000										
	(ESCALATION 0.00% - CONTINGENCY 50.00 %)										
TOTAL WBS 340000 PROJECT MANAGEMENT				550,000	52,794,500	0	0	0	0	0	52,794,500

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAA2
FILE NO. Z649SAA2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
CAPITAL COST ESTIMATE, REV 2
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
REPORT TOTAL				4,122,339		126,974		52,009,435		45,357,443	
				256,839,390		120,260,070				0	474,593,312

APPENDIX C

OPERATING COST ESTIMATE
FOR
AX TANK FARM THROUGH PROPOSED NEW TREATMENT FACILITY

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAB2
FILE NO. Z649SAB2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
OPERATING COST ESTIMATE, REV 2
PHMCR01 - PROJECT COST SUMMARY

PAGE 1 OF 8
DATE 02/12/99 15:52:25
BY R.OHRT

SORT	DESCRIPTION	ESCALATED TOTAL COST	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
LMHC	LOCKHEED MARTIN HANFORD CORP.	9,160,000	65	5,930,000	15,090,000
WMH	WASTE MANAGEMENT HANFORD	4,880,000	35	1,710,000	6,590,000
	SUBTOTAL	14,040,000	54	7,640,000	21,680,000
SITE	SITE ALLOCATIONS	320,000	35	110,000	430,000
	PROJECT TOTAL	14,360,000	54	7,750,000	22,110,000

TYPE OF ESTIMATE: ORDER OF MAGNITUDE — FEBRUARY 12, 1999

FDNW LEAD ESTIMATOR: RO — ESTIMATING MANAGER:

PROJECT MANAGER:

CLIENT:

REMARKS:

PRE-PROCESSING FACILITY

OPERATING COSTS

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

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAB2
FILE NO. Z649SAB2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
OPERATING COST ESTIMATE, REV 2
PHMCR02 - WORK BREAKDOWN STRUCTURE (WBS) SUMMARY

DATE 02/12/99 15:52:28
BY R.OHRT

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	SUB TOTAL	SITE ALLOCAT'N	TOTAL DOLLARS
340001	COLD START-UP - 130 DAYS	2087887	0.00	0	2087887	35	730760	2818647	0	2818647
340002	STANDBY PERIOD - 20 DAYS	77246	0.00	0	77246	35	27036	104282	0	104282
340003	PROCESS ANC. EQUIP DEBRIS - 10 DAYS	274947	0.00	0	274947	100	274919	549866	0	549866
340004	MAINTENANCE PERIOD - 20 DAYS	277006	0.00	0	277006	35	96952	373958	0	373958
340005	STANDBY PERIOD - 245 DAYS	946261	0.00	0	946261	35	331191	1277452	0	1277452
340006	PROCESSING TANK DEBRIS - 60 DAYS	2335709	0.00	0	2335709	100	2335475	4671184	0	4671184
340007	DECON/DEMOB PROC EQUIP - 120 DAYS	1662035	0.00	0	1662035	100	1661868	3323903	0	3323903
341000	CONSUMABLES	1348423	0.00	0	1348423	35	471948	1820371	425602	2245973
342000	DISPOSAL COSTS	5030517	0.00	0	5030517	34	1708002	6738519	0	6738519
SUBTOTAL 34	LMHC OPERATING COSTS	14040031	0.00	0	14040031	54	7638154	21678185	425602	22103788
PROJECT TOTAL		14,040,031		0		54		21,678,185		22,103,788
			0.00		14,040,031		7,638,154		425,602	

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAB2
FILE NO. Z649SAB2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
OPERATING COST ESTIMATE, REV 2
PHMCR03 - ESTIMATE BASIS SHEET

PAGE 3 OF 8
DATE 02/12/99 10:06:08
BY R.OHRT

1. ESTIMATE PURPOSE

ORDER OF MAGNITUDE ESTIMATE: THIS ESTIMATE WILL TO BE USED FOR BUDGETING PURPOSES ONLY.

2. ESTIMATE TECHNICAL BASIS

A. THIS ESTIMATE HAS BEEN PREPARED FOR HTI TASK 7 PROCESS IMPACTS STUDY AS REQUESTED BY COGEMA ENGINEERING.
B. THIS ESTIMATE HAS BEEN BASED ON A CUSTOMER PROVIDED SCHEDULE LISTING CREW AND DURATION FOR EACH ACTIVITY.

3. ESTIMATE METHODOLOGY

A. DIRECT COSTS:
DIRECT COSTS ARE SHOWN FOR THE LISTED CREWS BASED ON THE OPERATION SCHEDULE PROVIDED BY THE CUSTOMER.
THE LABOR RATES FOR LOCKHEED MARTIN HANFORD CORP. AND WASTE MANAGEMENT HANFORD HAVE BEEN PROVIDED BY FDNW PROJECT MANAGEMENT FOR INCLUSION INTO THIS ESTIMATE.

B. DIRECT COST FACTORS:
(1) SALES TAX HAS BEEN APPLIED TO ALL MATERIALS AND EQUIPMENT PURCHASES AT 8%.
(2) PHMC SUBCONTRACTOR STANDARD LABOR RATES ARE THOSE LISTED IN THE FINANCIAL DATA SYSTEM (FDS) FDST 321R REPORT ORGANIZATION RATES PLUS ADDERS.

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

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

(1) FDH G&A WASTE DISPOSAL @ 15.7%.

4. ESCALATION

ESCALATION HAS NOT BEEN INCLUDED AS ALL COSTS ARE IN CURRENT JANUARY 1999 DOLLARS.

5. CONTINGENCY

A. DEFINITION OF CONTINGENCY AS PROVIDED BY DOE

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

B. CONTINGENCY ALLOWANCE GUIDELINES

THE DOE GUIDELINE CONTINGENCY ALLOWANCE FOR A PLANNING ESTIMATE UNDER EXPERIMENTAL CONDITIONS IS 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 34000X OPERATIONS HAS AN APPLIED CONTINGENCY OF 35% EXCEPT AS NOTED BELOW. 35% WAS USED BECAUSE THE ASSUMED CREW SIZE MAY PROVE TO BE TOO OPTIMISTIC AND ACTUAL CONDITIONS MAY WARRANT ADDITIONAL PERSONNEL.
A 100% CONTINGENCY WAS APPLIED TO THE PROCESSING AND DECONTAMINATION ACTIVITIES BECAUSE THESE PORTIONS HAVE THE POSSIBILITY OF DOUBLING SHOULD DEBRIS NEED TO BE REPROCESSED A SECOND OR MAYBE THIRD TIME TO ACHIEVE ACCEPTABLE LEVELS. DECONTAMINATION/DEMOB, SIMILARLY, COULD EXPERIENCE COST GROWTH EXCEEDING ESTIMATED AMOUNTS BECAUSE AT THIS TIME IT IS NOT KNOWN WHAT RADIATION LEVELS WILL BE EXPERIENCED OR WHAT THE EQUIPMENT CONFIGURATIONS WILL BE THAT WOULD REQUIRE DECONTAMINATION.

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.) IT HAS BEN ASSUMED THAT ALL EQUIPMENT CAN BE DECONTAMINATED AND/OR REUSED, NO DISPOSAL COSTS HAVE BEEN INCLUDED FOR CONTAMINATED EQUIPMENT.

B.) CURRENT ASSUMPTION IS THAT THE WASTE VOLUME TO BE TREATED BY FACILITY WILL INCLUDE MINIMAL AMOUNTS OF CONTAMINATED SOIL. IF VOLUMES WERE TO EXCEED ESTIMATES, THE OPERATIONS DURATION WOULD NEED TO BE INCREASED.

C.) IT WAS ASSUMED THAT THE WASTE VOLUMES FROM THE AX TANKS ARE FAIRLY WELL DEFINED.

D.) THE RADIOLOGICAL INVENTORIES OF WASTE VOLUME MAY BE DIFFERENT THAN ANTICIPATED.

E.) IT HAS BEEN ASSUMED THAT THE MATERIAL PROCESSING RATE OF THE PPF WILL BE THE SAME AS THAT OF THE DEBRIS BEING PRODUCED AT TANK FARMS, THUS NO INTERIM STORAGE FACILITY OR EXCESS INVENTORY OF SHIELDED BOXES WERE INCLUDED IN THE ESTIMATE.

F.) MINIMAL CLOSED LOOP OPERATION IS ANTICIPATED TO REACH TARGET DECONTAMINATION FACTORS, COSTS FOR REHANDLING OF WASTE STREAM ARE TO BE ADDRESSED AS A CONTINGENCY FACTOR.

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAB2
FILE NO. Z649SAB2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
OPERATING COST ESTIMATE, REV 2
PHMCR05 - CONSTRUCTION MANAGEMENT/OTHER COST SUMMARY

DATE 02/12/99 15:52:32
BY R.OHRT

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	CONSTRUCTION MANAGEMENT %	CONSTRUCTION MANAGEMENT TOTAL	OTHER COSTS	SUB TOTAL	TOTAL
340001	COLD START-UP - 130 DAYS	2087887	0.00	0	0	0	2087887
340002	STANDBY PERIOD - 20 DAYS	77246	0.00	0	0	0	77246
340003	PROCESS ANC. EQUIP DEBRIS - 10 DAYS	274947	0.00	0	0	0	274947
340004	MAINTENANCE PERIOD - 20 DAYS	277006	0.00	0	0	0	277006
340005	STANDBY PERIOD - 245 DAYS	946261	0.00	0	0	0	946261
340006	PROCESSING TANK DEBRIS - 60 DAYS	2335709	0.00	0	0	0	2335709
340007	DECON/DEMOB PROC EQUIP - 120 DAYS	1662035	0.00	0	0	0	1662035
341000	CONSUMABLES	1348423	0.00	0	0	0	1348423
342000	DISPOSAL COSTS	5030517	0.00	0	0	0	5030517
SUBTOTAL 34	LMHC OPERATING COSTS	14040031		0	0	0	14040031
PROJECT TOTAL		14,040,031		0	0	0	14,040,031

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAB2
FILE NO. Z649SAB2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
OPERATING COST ESTIMATE, REV 2
PHMCR06 - SITE ALLOCATIONS BY WBS

DATE 02/12/99 15:52:14
BY R.OHRT

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
340001	COLD START-UP - 130 DAYS	2087887	0	0	0	0	0	0
340002	STANDBY PERIOD - 20 DAYS	77246	0	0	0	0	0	0
340003	PROCESS ANC. EQUIP DEBRIS - 10 DAYS	274947	0	0	0	0	0	0
340004	MAINTENANCE PERIOD - 20 DAYS	277006	0	0	0	0	0	0
340005	STANDBY PERIOD - 245 DAYS	946261	0	0	0	0	0	0
340006	PROCESSING TANK DEBRIS - 60 DAYS	2335709	0	0	0	0	0	0
340007	DECON/DEMOB PROC EQUIP - 120 DAYS	1662035	0	0	0	0	0	0
341000	CONSUMABLES	1348423	0	0	0	0	315261	315261
342000	DISPOSAL COSTS	5030517	0	0	0	0	0	0
SUBTOTAL 34	LMHC OPERATING COSTS	14040031	0	0	0	0	315261	315261
PROJECT TOTAL		14,040,031	0	0	0	0	315,261	315,261

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 8 OF 8
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:52:34
JOB NO. Z649SAB2 OPERATING COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAB2 PHMCR07 - SITE ALLOCATION ESCALATION/CONTINGENCY REPORT

WBS	DESCRIPTION	SITE ALLOC SUBTOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
340001	COLD START-UP - 130 DAYS	0	0.00	0	0	0	0	0
340002	STANDBY PERIOD - 20 DAYS	0	0.00	0	0	0	0	0
340003	PROCESS ANC. EQUIP DEBRIS - 10 DAYS	0	0.00	0	0	0	0	0
340004	MAINTENANCE PERIOD - 20 DAYS	0	0.00	0	0	0	0	0
340005	STANDBY PERIOD - 245 DAYS	0	0.00	0	0	0	0	0
340006	PROCESSING TANK DEBRIS - 60 DAYS	0	0.00	0	0	0	0	0
340007	DECON/DEMOB PROC EQUIP - 120 DAYS	0	0.00	0	0	0	0	0
341000	CONSUMABLES	315261	0.00	0	315261	35	110341	425602
342000	DISPOSAL COSTS	0	0.00	0	0	0	0	0
SUBTOTAL 34	LMHC OPERATING COSTS	315261	0.00	0	315261	35	110341	425602
PROJECT TOTAL		315,261	0.00	0	315,261	35	110,341	425,602

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 1
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:52:36
JOB NO. Z649SAB2 OPERATING COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAB2 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
340001	COLD START-UP - 130 DAYS										
340001.06	ENVIRONMENTAL WORK										
340001.0610000	********** NORMAL OPERATION - DAY **********	700	0	0	0	0	0	0	0	0	0
340001.0610001	HOURS BELOW ARE FOR 1 DAY SHIFT FOR 130 DAYS	700	0	0	0	0	0	0	0	0	0
340001.0610010	1 TRAFFIC MASTER FOR INCOMING TRUCKS	700	130 DAY	1040	49691	0	0	0	0	0	49691
340001.0610012	2 RPT'S FOR INCOMING TRUCKS	700	130 DAY	2080	99382	0	0	0	0	0	99382
340001.0610014	2 DECON OPERATORS FOR INCOMING TRUCKS	700	130 DAY	2080	99382	0	0	0	0	0	99382
340001.0610016	8 PLANT OPERATORS	700	130 DAY	8320	397530	0	0	0	0	0	397530
340001.0610018	3 CONTROL ROOM OPERATORS	700	130 DAY	3120	149074	0	0	0	0	0	149074
340001.0610022	1 TRAFFIC MASTER FOR OUT GOING TRUCKS	700	130 DAY	1040	49691	0	0	0	0	0	49691
340001.0610024	2 RPT'S FOR OUT GOING TRUCKS	700	130 DAY	2080	99382	0	0	0	0	0	99382
340001.0610026	2 DECON OPERATORS FOR OUT GOING TRUCKS	700	130 DAY	2080	99382	0	0	0	0	0	99382
340001.0610030	1 SHIFT SUPERVISOR	700	130 DAY	1040	64813	0	0	0	0	0	64813
340001.0610032	1 CONTROL ROOM SUPERVISOR	700	130 DAY	1040	64813	0	0	0	0	0	64813
340001.0610034	1 PACKAGING SUPERVISOR	700	130 DAY	1040	64813	0	0	0	0	0	64813
340001.0610036	2 ELECTRICAL/INSTR CRAFTSMEN	700	130 DAY	2080	99382	0	0	0	0	0	99382
340001.0610038	1 MECHANICAL CRAFTSMAN	700	130 DAY	1040	49691	0	0	0	0	0	49691
340001.0610040	1 FITTER CRAFTSMAN	700	130 DAY	1040	49691	0	0	0	0	0	49691
340001.0610042	1 CRAFT SUPERVISOR	700	130 DAY	1040	49691	0	0	0	0	0	49691
340001.0610100	********** NORMAL OPERATION - GRAVEYARD **********	700	0	0	0	0	0	0	0	0	0
340001.0610102	1 CRAFT SUPERVISOR	700	130 DAY	1040	0	0	0	0	0	0	0
340001.0610104	1 EXPEDITER	700	130 DAY	1040	0	0	0	0	0	0	0
340001.0610106	1 MILLWRIGHT	700	130 DAY	1040	49691	0	0	0	0	0	49691
340001.0610108	1 FITTER	700	130 DAY	1040	49691	0	0	0	0	0	49691
340001.0610110	2 ELECTRICAL/INSTRUMENTATION	700	130 DAY	2080	99382	0	0	0	0	0	99382
340001.0610200	********** NORMAL OPERATION - OFFICE **********	700	0	0	0	0	0	0	0	0	0

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 2
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:52:36
JOB NO. Z649SAB2 OPERATING COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAB2 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
340001.0610202	1 MANAGER	700	130 DAY	1040	64813	0	0	0	0	0	64813
340001.0610204	1 SECRETARY	700	130 DAY	1040	29817	0	0	0	0	0	29817
340001.0610206	1 JANITOR	700	130 DAY	1040	49691	0	0	0	0	0	49691
340001.0610208	1 EXPEDITER	700	130 DAY	1040	49691	0	0	0	0	0	49691
340001.0610300	********** NORMAL OPER. - HVAC MAINT. **********	700	0	0	0	0	0	0	0	0	0
340001.0610301	2 POWER OPERATORS PER SHIFT FOR A TOTAL OF 21 SHIFTS PER WEEK.	700	130 DAY	4368	208703	0	0	0	0	0	208703
SUBTOTAL	ENVIRONMENTAL WORK			44,928	2,087,887	0	0	0	0	0	2,087,887
TOTAL	COST CODE 70006			44,928	2,087,887	0	0	0	0	0	2,087,887
	WBS 340001										
	(ESCALATION 0.00% - CONTINGENCY 35.00 %)										
TOTAL WBS 340001 COLD START-UP - 130 DAYS				44,928	2,087,887	0	0	0	0	0	2,087,887

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 3
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:52:36
JOB NO. Z649SAB2 OPERATING COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAB2 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
340002	STANDBY PERIOD - 20 DAYS										
340002.06	ENVIRONMENTAL WORK										
340002.0610300	********** STANDBY PHASE - HVAC MAINT. **********	700	0	0	0	0	0	0	0	0	0
340002.0610301	2 POWER OPERATORS PER SHIFT FOR A TOTAL OF 21 SHIFTS PER WEEK.	700	20 DAY	672	32108	0	0	0	0	0	32108
340002.0630000	********** STANDBY PHASE - DAY SHIFT **********	700	0	0	0	0	0	0	0	0	0
340002.0630002	1 RPT FOR GENERAL SUPPORT	700	20 DAY	160	7645	0	0	0	0	0	7645
340002.0630004	1 DECON OPERATOR FOR GENERAL SUPPORT	700	20 DAY	160	7645	0	0	0	0	0	7645
340002.0630006	1 CONTROL RM/EQUIPMENT OPER.	700	20 DAY	160	7645	0	0	0	0	0	7645
340002.0630008	1 MANAGER	700	20 DAY	160	9971	0	0	0	0	0	9971
340002.0630010	1 SECRETARY	700	20 DAY	160	4587	0	0	0	0	0	4587
340002.0630012	1 JANITOR	700	20 DAY	160	7645	0	0	0	0	0	7645
SUBTOTAL	ENVIRONMENTAL WORK			1,632	77,246	0	0	0	0	0	77,246
TOTAL	COST CODE 70006			1,632		0		0		0	
	WBS 340002				77,246		0		0		77,246
	(ESCALATION 0.00% - CONTINGENCY 35.00 %)										
TOTAL WBS 340002 STANDBY PERIOD - 20 DAYS				1,632		0		0		0	
					77,246		0		0		77,246

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAB2
FILE NO. Z649SAB2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
OPERATING COST ESTIMATE, REV 2
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 4
DATE 02/12/99 15:52:36
BY R.OHRT

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
340003	PROCESS ANC. EQUIP DEBRIS - 10 DAYS										
340003.06	ENVIRONMENTAL WORK										
340003.0610000	********** PROCESS ANCILLARY EQUIPMENT DEBRIS - DAY AND SWING SHIFT **********	700	0	0	0	0	0	0	0	0	0
340003.0610001	HOURS BELOW ARE FOR 2 SHIFTS DAY AND SWING FOR 10 DAYS	700	0	0	0	0	0	0	0	0	0
340003.0610010	1 TRAFFIC MASTER FOR INCOMING TRUCKS	700	10 DAY	160	7645	0	0	0	0	0	7645
340003.0610012	2 RPT'S FOR INCOMING TRUCKS	700	10 DAY	320	15290	0	0	0	0	0	15290
340003.0610014	2 DECON OPERATORS FOR INCOMING TRUCKS	700	10 DAY	320	15290	0	0	0	0	0	15290
340003.0610016	8 PLANT OPERATORS	700	10 DAY	1280	61158	0	0	0	0	0	61158
340003.0610018	3 CONTROL ROOM OPERATORS	700	10 DAY	480	22934	0	0	0	0	0	22934
340003.0610022	1 TRAFFIC MASTER FOR OUT GOING TRUCKS	700	10 DAY	160	7645	0	0	0	0	0	7645
340003.0610024	2 RPT'S FOR OUT GOING TRUCKS	700	10 DAY	320	15290	0	0	0	0	0	15290
340003.0610026	2 DECON OPERATORS FOR OUT GOING TRUCKS	700	10 DAY	320	15290	0	0	0	0	0	15290
340003.0610030	1 SHIFT SUPERVISOR	700	10 DAY	160	9971	0	0	0	0	0	9971
340003.0610032	1 CONTROL ROOM SUPERVISOR	700	10 DAY	160	9971	0	0	0	0	0	9971
340003.0610034	1 PACKAGING SUPERVISOR	700	10 DAY	160	9971	0	0	0	0	0	9971
340003.0610036	2 ELECTRICAL/INSTR CRAFTSMEN	700	10 DAY	320	15290	0	0	0	0	0	15290
340003.0610038	1 MECHANICAL CRAFTSMAN	700	10 DAY	160	7645	0	0	0	0	0	7645
340003.0610040	1 FITTER CRAFTSMAN	700	10 DAY	160	7645	0	0	0	0	0	7645
340003.0610042	1 CRAFT SUPERVISOR	700	10 DAY	160	7645	0	0	0	0	0	7645
340003.0610100	********** MAINTENANCE DURING ANCILLARY EQUIP. PROCESS - GRAVEYARD **********	700	0	0	0	0	0	0	0	0	0
340003.0610102	1 CRAFT SUPERVISOR	700	10 DAY	80	0	0	0	0	0	0	0
340003.0610104	1 EXPEDITER	700	10 DAY	80	0	0	0	0	0	0	0
340003.0610106	1 MILLWRIGHT	700	10 DAY	80	3822	0	0	0	0	0	3822
340003.0610108	1 FITTER	700	10 DAY	80	3822	0	0	0	0	0	3822
340003.0610110	2 ELECTRICAL/INSTRUMENTATION	700	10 DAY	160	7645	0	0	0	0	0	7645
340003.0610200	********** OFFICE DURING ANCILLARY	700	0	0	0	0	0	0	0	0	0

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 5
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:52:36
JOB NO. Z649SAB2 OPERATING COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAB2 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
	EQUIPMENT PROCESSING **********										
340003.0610202	1 MANAGER	700	10 DAY	80	4986	0	0	0	0	0	4986
340003.0610204	1 SECRETARY	700	10 DAY	80	2294	0	0	0	0	0	2294
340003.0610206	1 JANITOR	700	10 DAY	80	3822	0	0	0	0	0	3822
340003.0610208	1 EXPEDITER	700	10 DAY	80	3822	0	0	0	0	0	3822
340003.0610300	********** HVAC MAINT. DURING ANCILLARY EQUIPMENT DEBRIS PROCESSING **********	700	0	0	0	0	0	0	0	0	0
340003.0610301	2 POWER OPERATORS PER SHIFT FOR A TOTAL OF 21 SHIFTS PER WEEK.	700	10 DAY	336	16054	0	0	0	0	0	16054
SUBTOTAL	ENVIRONMENTAL WORK			5,776		0		0		0	
					274,947		0		0		274,947
TOTAL	COST CODE 70006			5,776		0		0		0	
	WBS 340003				274,947		0		0		274,947
	(ESCALATION 0.00% - CONTINGENCY 99.99 %)										
TOTAL WBS 340003 PROCESS ANC. EQUIP DEBRIS - 10 DAYS				5,776		0		0		0	
					274,947		0		0		274,947

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAB2
FILE NO. Z649SAB2

** 1EST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
OPERATING COST ESTIMATE, REV 2
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

DATE 02/12/99 15:52:36
BY R.OHRT

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
340004	MAINTENANCE PERIOD - 20 DAYS										
340004.06	ENVIRONMENTAL WORK										
340004.0620000	********** MAINTENANCE PHASE - DAYS **********	700	0	0	0	0	0	0	0	0	0
340004.0620010	4 RPT'S FOR GENERAL MAINTENANCE SUPPORT	700	20 DAY	640	30579	0	0	0	0	0	30579
340004.0620012	4 DECON OPERATORS FOR GENERAL MAINTENANCE SUPPORT	700	20 DAY	640	30579	0	0	0	0	0	30579
340004.0620014	4 CONTROL ROOM AND EQUIPMENT OPERATORS	700	20 DAY	640	30579	0	0	0	0	0	30579
340004.0620016	1 SHIFT SUPERVISOR	700	20 DAY	160	9971	0	0	0	0	0	9971
340004.0620018	1 CONTROL ROOM SUPERVISOR	700	20 DAY	160	9971	0	0	0	0	0	9971
340004.0620020	1 PACKAGING SUPERVISOR	700	20 DAY	160	9971	0	0	0	0	0	9971
340004.0620022	4 ELECT/INSTRU. CRAFTSMEN	700	20 DAY	640	39885	0	0	0	0	0	39885
340004.0620024	2 MECH/MILLWRIGHT CRAFTSMEN	700	20 DAY	320	15290	0	0	0	0	0	15290
340004.0620026	2 FITTER CRAFTSMEN	700	20 DAY	320	15290	0	0	0	0	0	15290
340004.0620028	2 CRAFT SUPERVISORS	700	20 DAY	320	15290	0	0	0	0	0	15290
340004.0620100	********** MAINTENANCE PHASE - OFFICE **********	700	0	0	0	0	0	0	0	0	0
340004.0620102	1 MANAGER	700	20 DAY	160	9971	0	0	0	0	0	9971
340004.0620104	1 SECRETARY	700	20 DAY	160	4587	0	0	0	0	0	4587
340004.0620106	1 JANITOR	700	20 DAY	160	7645	0	0	0	0	0	7645
340004.0620108	2 EXPEDITERS	700	20 DAY	320	15290	0	0	0	0	0	15290
340004.0620300	********** MAINT. PHASE - HVAC MAINT. **********	700	0	0	0	0	0	0	0	0	0
340004.0620302	2 POWER OPERATORS PER SHIFT FOR A TOTAL OF 21 SHIFTS PER WEEK.	700	20 DAY	672	32108	0	0	0	0	0	32108
SUBTOTAL	ENVIRONMENTAL WORK			5,472	277,006	0	0	0	0	0	277,006
TOTAL	COST CODE 70006 WBS 340004 (ESCALATION 0.00% - CONTINGENCY 35.00 %)			5,472	277,006	0	0	0	0	0	277,006
TOTAL WBS 340004 MAINTENANCE PERIOD - 20 DAYS				5,472	277,006	0	0	0	0	0	277,006

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 7
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:52:36
JOB NO. Z649SAB2 OPERATING COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAB2 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
340005	STANDBY PERIOD - 245 DAYS										
340005.06	ENVIRONMENTAL WORK										
340005.0610300	********** STANDBY PHASE - HVAC MAINT. **********	700	0	0	0	0	0	0	0	0	0
340005.0610301	2 POWER OPERATORS PER SHIFT FOR A TOTAL OF 21 SHIFTS PER WEEK.	700	245 DAY	8232	393325	0	0	0	0	0	393325
340005.0630000	********** STANDBY PHASE - DAY SHIFT **********	700	0	0	0	0	0	0	0	0	0
340005.0630002	1 RPT FOR GENERAL SUPPORT	700	245 DAY	1960	93649	0	0	0	0	0	93649
340005.0630004	1 DECON OPERATOR FOR GENERAL SUPPORT	700	245 DAY	1960	93649	0	0	0	0	0	93649
340005.0630006	1 CONTROL RM/EQUIPMENT OPER.	700	245 DAY	1960	93649	0	0	0	0	0	93649
340005.0630008	1 MANAGER	700	245 DAY	1960	122147	0	0	0	0	0	122147
340005.0630010	1 SECRETARY	700	245 DAY	1960	56193	0	0	0	0	0	56193
340005.0630012	1 JANITOR	700	245 DAY	1960	93649	0	0	0	0	0	93649
SUBTOTAL	ENVIRONMENTAL WORK			19,992		0		0		0	
					946,261		0		0		946,261
TOTAL	COST CODE 70006			19,992		0		0		0	
	WBS 340005				946,261		0		0		946,261
	(ESCALATION 0.00% - CONTINGENCY	35.00 %)									
TOTAL WBS 340005 STANDBY PERIOD - 245 DAYS				19,992		0		0		0	
					946,261		0		0		946,261

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 8
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:52:36
JOB NO. Z649SAB2 OPERATING COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAB2 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
340006	PROCESSING TANK DEBRIS - 60 DAYS										
340006.06	ENVIRONMENTAL WORK										
340006.0610000	********** PROCESS TANK DEBRIS **********	700	0	0	0	0	0	0	0	0	0
340006.0610001	HOURS BELOW ARE FOR 3 SHIFTS PER DAY FOR 60 DAYS.	700	0	0	0	0	0	0	0	0	0
340006.0610010	1 TRAFFIC MASTER FOR INCOMING TRUCKS	700	60 DAY	1440	68803	0	0	0	0	0	68803
340006.0610012	2 RPT'S FOR INCOMING TRUCKS	700	60 DAY	2880	137606	0	0	0	0	0	137606
340006.0610014	2 DECON OPERATORS FOR INCOMING TRUCKS	700	60 DAY	2880	137606	0	0	0	0	0	137606
340006.0610016	8 PLANT OPERATORS	700	60 DAY	11520	550426	0	0	0	0	0	550426
340006.0610018	3 CONTROL ROOM OPERATORS	700	60 DAY	4320	206410	0	0	0	0	0	206410
340006.0610022	1 TRAFFIC MASTER FOR OUT GOING TRUCKS	700	60 DAY	1440	68803	0	0	0	0	0	68803
340006.0610024	2 RPT'S FOR OUT GOING TRUCKS	700	60 DAY	2880	137606	0	0	0	0	0	137606
340006.0610026	2 DECON OPERATORS FOR OUT GOING TRUCKS	700	60 DAY	2880	137606	0	0	0	0	0	137606
340006.0610030	1 SHIFT SUPERVISOR	700	60 DAY	1440	89741	0	0	0	0	0	89741
340006.0610032	1 CONTROL ROOM SUPERVISOR	700	60 DAY	1440	89741	0	0	0	0	0	89741
340006.0610034	1 PACKAGING SUPERVISOR	700	60 DAY	1440	89741	0	0	0	0	0	89741
340006.0610036	2 ELECTRICAL/INSTR CRAFTSMEN	700	60 DAY	2880	137606	0	0	0	0	0	137606
340006.0610038	1 MECHANICAL CRAFTSMAN	700	60 DAY	1440	68803	0	0	0	0	0	68803
340006.0610040	1 FITTER CRAFTSMAN	700	60 DAY	1440	68803	0	0	0	0	0	68803
340006.0610042	1 CRAFT SUPERVISOR	700	60 DAY	1440	68803	0	0	0	0	0	68803
340006.0610100	********** MAINTENANCE DURING ANCILLARY EQUIP. PROCESS - GRAVEYARD **********	700	0	0	0	0	0	0	0	0	0
340006.0610102	1 CRAFT SUPERVISOR	700	60 DAY	480	0	0	0	0	0	0	0
340006.0610104	1 EXPEDITER	700	60 DAY	480	0	0	0	0	0	0	0
340006.0610106	1 MILLWRIGHT	700	60 DAY	480	22934	0	0	0	0	0	22934
340006.0610108	1 FITTER	700	60 DAY	480	22934	0	0	0	0	0	22934
340006.0610110	2 ELECTRICAL/INSTRUMENTATION	700	60 DAY	960	45869	0	0	0	0	0	45869
340006.0610200	********** OFFICE DURING ANCILLARY	700	0	0	0	0	0	0	0	0	0

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 9
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:52:36
JOB NO. Z649SAB2 OPERATING COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAB2 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
	EQUIPMENT PROCESSING										
	**********										
340006.0610202	1 MANAGER	700	60 DAY	480	29914	0	0	0	0	0	29914
340006.0610204	1 SECRETARY	700	60 DAY	480	13762	0	0	0	0	0	13762
340006.0610206	1 JANITOR	700	60 DAY	480	22934	0	0	0	0	0	22934
340006.0610208	1 EXPEDITER	700	60 DAY	480	22934	0	0	0	0	0	22934
340006.0610300	**********	700	0	0	0	0	0	0	0	0	0
	HVAC MAINT. DURING ANCILLARY EQUIPMENT DEBRIS PROCESSING										
	**********										
340006.0610301	2 POWER OPERATORS PER SHIFT FOR A TOTAL OF 21 SHIFTS PER WEEK.	700	60 DAY	2016	96324	0	0	0	0	0	96324
SUBTOTAL	ENVIRONMENTAL WORK			48,576		0		0		0	
					2,335,709		0		0		2,335,709
TOTAL	COST CODE 70006			48,576		0		0		0	
	WBS 340006				2,335,709		0		0		2,335,709
	(ESCALATION 0.00% - CONTINGENCY 99.99 %)										
TOTAL WBS 340006 PROCESSING TANK DEBRIS - 60 DAYS				48,576		0		0		0	
					2,335,709		0		0		2,335,709

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 10
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:52:36
JOB NO. Z649SAB2 OPERATING COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAB2 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
340007	DECON/DEMOB PROC EQUIP - 120 DAYS										
340007.06	ENVIRONMENTAL WORK										
340007.0620000	********** MAINTENANCE - DAY SHIFT **********	700	0	0	0	0	0	0	0	0	0
340007.0620010	4 RPT'S FOR GENERAL MAINTENANCE SUPPORT	700	120 DAY	3840	183475	0	0	0	0	0	183475
340007.0620012	4 DECON OPERATORS FOR GENERAL MAINTENANCE SUPPORT	700	120 DAY	3840	183475	0	0	0	0	0	183475
340007.0620014	4 CONTROL ROOM AND EQUIPMENT OPERATORS	700	120 DAY	3840	183475	0	0	0	0	0	183475
340007.0620016	1 SHIFT SUPERVISOR	700	120 DAY	960	59827	0	0	0	0	0	59827
340007.0620018	1 CONTROL ROOM SUPERVISOR	700	120 DAY	960	59827	0	0	0	0	0	59827
340007.0620020	1 PACKAGING SUPERVISOR	700	120 DAY	960	59827	0	0	0	0	0	59827
340007.0620022	4 ELECT/INSTRU. CRAFTSMEN	700	120 DAY	3840	239309	0	0	0	0	0	239309
340007.0620024	2 MECH/MILLWRIGHT CRAFTSMEN	700	120 DAY	1920	91738	0	0	0	0	0	91738
340007.0620026	2 FITTER CRAFTSMEN	700	120 DAY	1920	91738	0	0	0	0	0	91738
340007.0620028	2 CRAFT SUPERVISORS	700	120 DAY	1920	91738	0	0	0	0	0	91738
340007.0620100	********** MAINTENANCE PHASE - OFFICE **********	700	0	0	0	0	0	0	0	0	0
340007.0620102	1 MANAGER	700	120 DAY	960	59827	0	0	0	0	0	59827
340007.0620104	1 SECRETARY	700	120 DAY	960	27523	0	0	0	0	0	27523
340007.0620106	1 JANITOR	700	120 DAY	960	45869	0	0	0	0	0	45869
340007.0620108	2 EXPEDITERS	700	120 DAY	1920	91738	0	0	0	0	0	91738
340007.0620300	********** MAINT. PHASE - HVAC MAINT. **********	700	0	0	0	0	0	0	0	0	0
340007.0620302	2 POWER OPERATORS PER SHIFT FOR A TOTAL OF 21 SHIFTS PER WEEK.	700	120 DAY	4032	192649	0	0	0	0	0	192649
SUBTOTAL	ENVIRONMENTAL WORK			32,832	1,662,035	0	0	0	0	0	1,662,035
TOTAL	COST CODE 70006			32,832	1,662,035	0	0	0	0	0	1,662,035
	WBS 340007										
	(ESCALATION 0.00% - CONTINGENCY 99.99 %)										
TOTAL WBS 340007 DECON/DEMOB PROC EQUIP - 120 DAYS				32,832	1,662,035	0	0	0	0	0	1,662,035

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 11
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:52:36
JOB NO. Z649SAB2 OPERATING COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAB2 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
341000	CONSUMABLES										
341000.06	ENVIRONMENTAL WORK										
341000.0600000	********** CONSUMABLES **********	700	0	0	0	0	0	0	0	0	0
341000.0600002	NITRIC ACID, 57% SOLUTION	700	510000 GAL	0	0	0	1020000	0	0	0	1020000
341000.0600004	CAUSTIC, 50% SOLUTION	700	76400 GAL	0	0	0	152800	0	0	0	152800
341000.0600006	PORTLAND CEMENT	700	541 TON	0	0	0	75740	0	0	0	75740
SUBTOTAL	ENVIRONMENTAL WORK			0		0		0		0	
					0		1,248,540		0		1,248,540
	SALES TAX 8.00 %						99883		0		99883
TOTAL	COST CODE 70006			0		0		0		0	
	WBS 341000				0		1,348,423		0		1,348,423
	(ESCALATION 0.00% - CONTINGENCY 35.00 %)										
TOTAL WBS 341000 CONSUMABLES				0		0		0		0	
					0		1,348,423		0		1,348,423

FLUOR DANIEL NORTHWEST, INC. ** IEST - INTERACTIVE ESTIMATING ** PAGE 12
COGEMA ENGINEERING HTI TASK 7 PROCESS IMPACTS STUDY DATE 02/12/99 15:52:36
JOB NO. Z649SAB2 OPERATING COST ESTIMATE, REV 2 BY R.OHRT
FILE NO. Z649SAB2 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
342000	DISPOSAL COSTS											
342000.06	ENVIRONMENTAL WORK											
342000.0600000	********** DISPOSAL COSTS **********	700	0		0	0	0	0	0	0	0	0
342000.0600002	CATEGORY 1 LLW TO ERDF AT $60/TON.	700	6360	TON	0	0	0	0	381600	0	0	381600
342000.0600004	PHMC G&A AT 15.7% AND GFS AT 5.2% FOR A TOTAL OF 21.7% OR $13.02/TON.	700	6360	TON	0	0	0	0	82807	0	0	82807
342000.0600010	CATEGORY 3 LLW TO LLBG AT $51.83/CF.	700	70000	CF	0	0	0	0	3628100	0	0	3628100
342000.0600012	PHMC G&A AT 15.7% AND GFS AT 5.2% FOR A TOTAL OF 21.7% OR $11.25/CF.	700	70000	CF	0	0	0	0	787500	0	0	787500
342000.0600100	3 TEAMSTERS	700	60	DAY	1512	72243	0	0	0	0	0	72243
342000.0600102	3 LABORERS	700	60	DAY	1512	72243	0	0	0	0	0	72243
342000.0600104	3 FLATBEDS	700	60	DAY	0	0	4080	1800	0	0	0	5880
342000.0600200	WASTE WATER TREATMENT AT 200 ETF, ASSUME 1.2 MILLION GAL, PRODUCT OF STREAM 151 EVAPORATOR CONDENSATE.	700	******	GAL	0	0	0	0	0	0	0	0
342000.0600201	ACCORDING TO MARK BOWMAN AT WMH, THERE WOULD BE NO INTERNAL CHARGE FOR THE PROCESSING.	700	0		0	0	0	0	0	0	0	0
SUBTOTAL	ENVIRONMENTAL WORK				3,024		4,080		4,880,007		0	
						144,486		1,800		0		5,030,373
	SALES TAX 8.00 %							144		0		144
TOTAL	COST CODE 70006				3,024		4,080		4,880,007		0	
	WBS 342000					144,486		1,944		0		5,030,517
	(ESCALATION 0.00% - CONTINGENCY 35.00 %)											
TOTAL WBS 342000 DISPOSAL COSTS					3,024		4,080		4,880,007		0	
						144,486		1,944		0		5,030,517

FLUOR DANIEL NORTHWEST, INC.
COGEMA ENGINEERING
JOB NO. Z649SAB2
FILE NO. Z649SAB2

** IEST - INTERACTIVE ESTIMATING **
HTI TASK 7 PROCESS IMPACTS STUDY
OPERATING COST ESTIMATE, REV 2
PHMCR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 13
DATE 02/12/99 15:52:36
BY R.OHRT

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB-CONTRACT	EQUIP-MENT	OH&P / B & I	TOTAL DOLLARS
REPORT TOTAL				162,232		4,080		4,880,007			0
					7,805,577		1,350,367		0		14,040,031

DISTRIBUTION SHEET

To	From	Page 1 of 1
DISTRIBUTION	D. L. Becker	Date 3-17-99
Project Title/Work Order		EDT No. 619524
AX Tank Farm Process Impacts Study, HNF-4098, 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	H0-22	X			
T.M. BROUNS	K9-69	X			
H.L. BUDWEG	A3-03	X			
T.J. CONRADS	R3-73				X
V.F. FITZPATRICK	R2-89	X			
E.A. FREDENBURG	R1-04	X			
J.S. GARFIELD	R3-73	X			
J.C. HENDERSON	B2-05				X
D.L. NICHOLS	B2-05				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
J.C. SONNICHSEN	H6-26	X			
W.J. STOKES	R3-75				X
C.D. WEST	A0-21	X			