SEP 30 1996 Sta. 37

ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT 618850

2. To: (Receiving Organization)	3. From: (Originating Organization)	4. Related EDT No.:
Distribution	WHC TWRS Disposal Engineering R. J. Parazin	618825
5. Proj./Prog./Dept./Div.:	6. Cognizant Engr.:	7. Purchase Order No.:
WHC TWRS Disposal Engineering	R. J. Parazin	N/A
8. Originator Remarks:		9. Equip./Component No.:
The attached engineering study is transmitted for approval and release.		N/A
		10. System/Bldg./Facility:
		N/A
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:
		N/A

15. DATA TRANSMITTED

(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Approval Designator	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1	WHC-SD-WM-ES-396		0	TWRS Privatization Phase 1, Liquid Effluent Transfer Systems Engineering Study	N/A	1,3		

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
1	1	Cog.Eng. R. J. Parazin 9/23/96 H5-49	1	1	WHC TWRS Disposal Program K. A. Gasper 9/24/96 G3-21
1	1	Cog. Mgr. J. S. Garfield 9-24-96 H5-49	1	1	RL TWRS Waste Disposal Program T. R. Hoertkorn 9/25/96 B4-55
3		PNNL (CST, IST, WIT Representative) B. A. Reynolds P7-19	3		ICF KH Inf/Land Planning E. F. Yancey G3-10
1	1	WHC Construction Projects P. Felise 9/25/96 B4-55	3		RL Waste Programs Div, Effluent Treatment E. M. Bowers S7-55
3		WHC Liq Effluents, Programs S. S. Lowe H6-29	3		RL TWRS Waste Disposal Program N. L. White B4-55
1	1	WHC Liq Effluents, Facilities D. W. Lindsey (telecon) S6-71			

18.	19.	20.	21. DOE APPROVAL (if required) Ctrl. No.
R. J. Parazin 9/23/96 Signature of EDT Originator Date	P. Felise 9/25/96 Authorized Representative for Receiving Organization Date	J. S. Garfield 9/24/96 Cognizant Manager Date	[] Approved [] Approved w/comments [] Disapproved w/comments

BD-7400-172-1

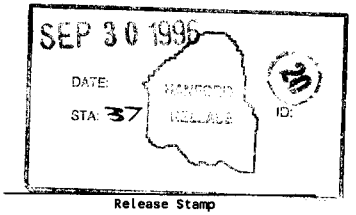
TWRS PRIVATIZATION PHASE 1 LIQUID EFFLUENT TRANSFER SYSTEMS ENGINEERING STUDY

R. J. Parazin
Westinghouse Hanford Company, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-87RL10930

EDT/ECN: 618850 UC: 721
Org Code: 73520 Charge Code: D627F
B&R Code: EW3130000 Total Pages: 112

Key Words: TWRS Privatization, Phase 1, liquid effluent transfer, privatization, privatization contractor, effluent treatment

Abstract: The DOE-RL is pursuing a new business strategy of hiring private contractors for treatment of Hanford tank waste. This 'privatization' initiative includes design, permitting, construction, operations, deactivation and decommissioning of tank waste treatment facilities. The TWRS Privatization Infrastructure Project is part of the first phase of the initiative. It consists of several sub-projects which will provide key physical interfaces and services needed to support the phase 1 mission. One sub-project is to provide transfer systems integrated with 200 Area liquid effluent facilities to service the private contractors. This study deals with transfer systems requirements, alternatives and identifies a preferred alternative.



Release Stamp

Release Approval Date

Approved for Public Release

ENGINEERING STUDY

Privatization Phase I

Liquid Effluent Transfer Systems

prepared by ICF Kaiser Hanford Company
for Westinghouse Hanford Company

September 1996

Prepared by: A. N. Palit — 9/20/96
A.N. Palit, ICF KH/TFRSO Piping Engineer — Date

Concurrence: J.R. Nicholson — 9/20/96
J.R. Nicholson, ICF KH/TFRSO Piping Lead Engineer — Date

Concurrence: M.D. Rickenbach — 9/20/96
M.D. Rickenbach, ICF KH/TFRSO Principal Lead Engineer — Date

Concurrence: J.T. Koberg — 9/20/96
J.T. Koberg, ICF KH/TFRSO Project Manager — Date

TABLE OF CONTENTS

APPENDICES

ABBREVIATIONS

BAT/AKART	best available technology/all known, available, and reasonable treatment
ALARA	as low as reasonably achievable
cu. m	cubic meter
cu. m/yr	cubic meter per year
DRD	Design Requirements Document
DST	double-shell storage tank
DOE	U.S. Department of Energy
DOE-RL	U.S. Department of Energy-Richland Office
DOH	U.S. Department of Health
Ecology	State of Washington Department of Ecology
EPA	U.S. Environmental Protection Agency
ETF	Effluent Treatment Facility
FDC	Functional Design Criteria
FSAD/FSAR	Final Safety Analysis Document/Final Safety Analysis Report
FY	fiscal year
gpm	gallon per minute
HLW	high level waste
ICD	Interface Control Document
IP	Infrastructure Project
LERF	Liquid Effluent Retention Facility
LAW	low activity waste
LCC	life cycle cost
LLW	low level waste
M&I	management and integration
min	minute
NEPA	National Environmental Policy Act of 1969
PC	privatization contractor
PUREX	Plutonium-uranium extraction
RAEP	Radionuclide Air Emission Program
RCRA	Resource Conservation and recovery Act
RO	reverse osmosis
SALDS	state-approved Land Disposal Site
TEDF	Treated Effluent Disposal Facility
TOE	total operating efficiency
TWRS	Tank Waste Remediation System
UV	ultraviolet light-mediated (oxidation)
WAC	Washington Administrative Code
WHC	Westinghouse Hanford Corporation

ENGINEERING STUDY

LIQUID EFFLUENT TRANSFER SYSTEMS

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this report is to establish the performance requirements of the liquid effluent transfer systems and recommend the best mode of transfer between the boundary of the privatization contractors (PC) facilities and the 200 Area liquid effluent facilities.

1.2 BACKGROUND

The U.S. Department of Energy, Richland Operations Office, is pursuing a new business strategy of hiring private contractors for treatment of Hanford Site tank wastes. This strategy, called privatization, includes design, permitting, construction, operation, and deactivation of equipment and facilities for treatment of tank wastes. The Phase I of the privatization includes supernatant pretreatment, low level waste (LLW) immobilization, and an optional high-level waste (HLW) immobilization. The TWRS Privatization Infrastructure Project (IP) is a part of the first phase of the privatization initiative. The IP consists of several sub-projects which will provide key physical interfaces and services needed to support the privatization mission. The liquid effluent transfer is one of the sub-projects.

During Phase I the DST supernate would be provided to two private contractors for pretreatment and immobilization into a low-activity waste (LAW) product from June 2002 through June 2007 (DOE 1996). The PC facilities may run through 2011 if extended by DOE. Optionally, pretreated solids would be processed by one of the two private contractors into a HLW product. The DOE, or its agent, the M&I Contractor is responsible for accepting liquid effluent fluid streams from the PCs for disposal at DOE Hanford Site.

1.3 SCOPE

This report documents tie-in point locations, effluent transfer rates, infrastructure capability, and system maintenance and monitoring requirements. The Life cycle Cost (LCC) Analysis, estimates, and schedules for the design and installation of the identified alternatives are also part of this study.

1.4 ASSUMPTIONS

The high-level assumptions applicable for this study are listed below. Other lower-level technical assumptions are documented at the point of use.

- The effluent tie-in points for both the PC facilities will be located east of the grout vaults approximately between the coordinates N.39550/N.41400 and W.44950/W.43600 as shown in site plan ES-E23377-C-001 (Appendix H).
- Each PC will discharge two fluid streams as follows:

  Radioactive, Dangerous Liquid Effluent
  Non-Radioactive Non-Dangerous Liquid Effluent
- The privatization contractors shall not commingle different waste types.
- The life expectancy of Phase I Privatization is to June 2011.

2.0 SUMMARY AND CONCLUSIONS

2.1 SUMMARY

The study identifies applicable constraints, resolves outstanding issues, and establishes performance requirements required to optimize the overall effluent transfer system performance. The study generates four alternative modes of effluent transfer, provides evaluation of the same, and recommends the most suitable options. Each alternative for underground piping assumes two parallel routings of fluid streams: radioactive/dangerous and non-radioactive/non-dangerous. The alternatives considered are as follows:

Underground piping system

- Alternative 1 Route Northwest of Grout Area (Appendix A, Figures Ia and b)
- Alternative 2 Route Southwest of grout Area (Appendix A, Figures IIa and b)
- Alternative 3 Route North of grout Area (Appendix A, Figures IIIa and b)

Aboveground Transportation System

- Alternative 4 Tractor Tank Trailer Transport System

2.2 CONCLUSIONS

Two alternatives are recommended in section 7.2. However the above ground transportation is not a viable option for the effluent flow rates under consideration.

The most suitable option is summarized as follows:

- Install underground piping southwest of the grout area as detailed in alternative 2 of this study for effluent transfer (Appendix A, Figures IIa and b).

3.0 CONSTRAINTS, ISSUES, AND PERFORMANCE REQUIREMENTS

3.1 CONSTRAINTS

3.1.1 Externally Imposed Constraints

Constraints are requirements that are imposed by external organizations and are typically non-negotiable. The design, installation, operation and maintenance of the liquid effluent transfer system are affected by many state and federal regulations, agreement, and Westinghouse requirements. There are many guidelines and specifications which set forth engineering requirements deemed necessary for safe design and construction of the liquid effluent system in addition to these requirements. The requirements and guidelines presented in these regulations, Orders, and agreements must be followed when designing a new liquid effluent transfer system. The format below establishes a hierarchy into the listed documents to be used during definitive design stage of the liquid effluent transfer system:

DOE Order 6430.1A	General Design Criteria.
DOE Order 5820.2A	Radioactive Waste Management.
WAC 173-303	Dangerous Waste Regulations.
WHC-IP-1043	WHC Occupational ALARA Program.
WHC-SD-G-DGS-30011	Radiological Design Guide.
WHC-CM-4-46	Non-Reactor facility Safety Manual
WHC-SD-GN-DGS-30008	Design Loads for New Underground DSTs and Associated Underground Process Piping.

3.1.2 Treatment Facility Influent Restrictions

Treated Effluent Disposal Facility (TEDF)

The non-radioactive, non-dangerous liquid effluents will be discharged into the Treated Effluent Disposal Facility (TEDF) which does not have any treatment or retention capacity. Strict control at the generating facility interface is therefore essential to operate the TEDF in compliance with the requirements of the following documents:

DOE/RL, Order 5400.xy	Radiation Effluent Monitoring and Environmental Surveillance
DOE/RL, Order 5400.1	General Environmental Protection Program
WAC 173-216	State Waste Discharge Permit Program.
Permit No. ST4502	State Waste Discharge Permit
WHC-SD-W049H-ICD-001	200 Area Treated effluent disposal Facility Interface Control Document

Liquid Effluent Retention Facility (LERF)

The radioactive, dangerous liquid effluent will be discharged into Liquid Effluent Retention Facility (LERF). The LERF is a passive facility which will receive the effluent for temporary storage and subsequent treatment at the Effluent Treatment Facility (ETF). The following documents set guidelines for acceptance of feed streams for treatment at the LERF/ETF complex:

40 CFR 268	Land Disposal Restrictions
WHC-SD-W105-SAR-001	Liquid Effluent Retention Facility FSAR
WAC 173-216	State Waste Discharge Permit Program.
DOE/RL-90-43	LERF Part B Permit Application
Permit No. ST4500	State Waste Discharge Permit
60FR31115	EPA Approval of Delisting Petition, DOE/RL-92-72
WHC-SD-ETF-WAC-001	Acceptance of Feed Streams for Treatment at the LERF/ETF complex.

3.2 ISSUES

This study considers issues that may need clarification or further evaluation to support the functional requirements. The study has performed related required investigation and analysis which are necessary to resolve or otherwise disposition the following issues:

- Discharge Rate Limit for Non-Radioactive/Non-Dangerous Liquid Effluent Processing Service (WHC 1996a, Table 1, Appendix G, Page G-11).

  The maximum discharge flow rate (cu. m/hr) for this waste stream should be established. This parameter is required to size the transfer pipeline appropriately.

  Resolution:

  This study has identified that two PC facilities combined will generate a total 133,000 cubic meters/year (67 gpm) of non-radioactive/non-dangerous liquid effluent. The rate is a bounding figure acknowledged both by the bidding PCs

and DOE-RL during phase 1A negotiations. The postulated volume is subject to further negotiation before the definitive design stage.

- Discharge Rate Limit for Radioactive/Dangerous Liquid Effluent Processing Service Issue (WHC 1996a, Table 1, Appendix G, Page G-11).

  The maximum discharge flow rate (cu. m/hr) for this waste stream should be established. This parameter is required to size the transfer pipeline appropriately.

  Resolution:

  This study has determined that two PC facilities combined will generate a total 100,000 cubic meters/year (50 gpm) of radioactive/ dangerous liquid effluent (WHC 1996b). The rate is a bounding figure acknowledged both by the bidding PCs and DOE-RL during phase 1A negotiations. The postulated volume is subject to further negotiation before the definitive design stage.

- Volume Limit for Non-Radioactive/Non-Dangerous Liquid Effluent Processing Service (WHC 1996a, Table 1, Appendix G, Page G-46).

  The amount of capacity (cu. m/yr) available at the 200 Area TEDF for this specific waste stream is not known. This estimate may need to be annualized.

  Resolution:

  A hydraulic analysis was performed for various TEDF flow scenarios (Murphy, 1995) which included acceptable flows through the H LINE. The result of this study is included in Appendix G. The acceptable scenarios, achieved through administrative control, include a minimum flow rate of 1200 Liters/min (317.1 gpm) through the H LINE. A flow of 757 Liters/min (200 gpm) from the PUREX facility down the H LINE will cease after PUREX deactivation by FY 1997 (Strode 1995). The H LINE can therefore carry total influent flow of 254 Liters/min (67 gpm) generated at two PC facilities beyond FY 1997 and still have spare capacity.

- Volume Limit for Radioactive/Dangerous Liquid Effluent Processing Service (WHC 1996a, Table 1, Appendix G, Page G-46).

  The ETF treatment capacity (gpm or cubic meters/year) for this specific waste stream needs to be established, based on its treatability, the ETF process configuration, and other anticipated waste streams.

Resolution:

The ETF is capable of treating a continuous flow of 568 Liters/min (150 gpm) at 72% total operating efficiency (TOE) based on the current evaporator condensate treatment schedule. The evaporator condensate inflow rate is typically around 227 Liters/min (60 gpm) for 2 months per year which leaves a minimum ETF spare capacity of 341 Liters/min (90 gpm). The PC facilities will generate a total of 189 Liters/min (50 gpm) of radioactive/dangerous liquid effluent which will fit into the ETF spare capacity (Papp 1996).

- Physical and Administrative Interfaces for Non-Radioactive, Non-Dangerous Liquid Effluent (WHC 1996a, Table 1, Appendix G, Page G-46).

  What is the most sensible place to tie the privatization contractors into the non-radioactive, non-dangerous liquid effluent collection system? What administrative requirements should be imposed on the PCs' for transfer of non-radioactive, non-dangerous liquid effluents?

  Resolution:

  This study has determined that the combined non-radioactive, non-dangerous liquid effluent stream from the PCs generating facilities will run west of the grout vault and tie-in to the disposal line designated as H LINE at N41050. The H LINE ties into the cross site transfer line (Appendix H, drawing H-2-140342) for discharge into the Treated Effluent Disposal Facility. The administrative controls are the provisions relating to organization and management, procedures, recordkeeping, reviews, and audits necessary to ensure safe operation of the TEDF. The administrative requirements shall be in compliance with the requirements stipulated in 200 area Treated Effluent Disposal Facility Interface Control Document (Crane 1996) or as negotiated with the PCs.

- Permit Modifications

  A study is needed to identify all necessary ETF and LERF permit modifications and necessary DOE approvals. The study should evaluate the impact to the following documents: State Waste Discharge Permit, RCRA Interim Status Requirements, Delisting approval, Toxic Air Permit, RAEP, and NEPA. additionally, it should evaluate compliance with DOE Orders (WHC 1996a, Table 1, Appendix G, Page G-28).

  Resolution:

The existing operations of the LERF basin, the ETF, and final discharge of the treated effluents to the State Approved Land Disposal Site (SALDS) are in compliance with the special and general conditions stated in the State Waste Discharge Permit No. ST 4500 and other applicable permits including the Resource Conservation and Recovery Act (RCRA) interim status requirements. Additionally air releases are in compliance with applicable Ecology and department of Health permits. The permit modification is required for the discharge of ETF effluent to SALDS for new influent stream from PC facilities. The PC shall submit to DOE all technical information and analysis required to modify or comply with the existing permit to discharge influent to the LERF basin.

- Untreated Liquid Effluents Issue

  Documents regarding the LERF/ETF system capabilities must be evaluated to assess additional requirements for inclusion in the "Untreated Liquid Effluent" requirements (WHC 1996a, Table 1, Appendix G, Page G-45).

  Resolution:

  This study has identified the performance requirements applicable to the untreated radioactive/dangerous liquid effluent transfer system for disposal into the LERF/ETF facility. The documentation with basis appear in the section 3.3. The other lower-level requirements, if any, will be identified during the definitive design stage.

- Non-Radioactive/Non-Dangerous Liquid Effluent Monitoring and Sampling Requirements

  Establish number and schedule of private contractors' effluent characterization and monitoring samples required by M&I contractor (WHC 1996a, Table 1, Appendix G, Page G-24).

  Resolution:

  The PC generating facility monitoring and sampling requirements will be part of the definitive design issues. These requirements are to be negotiated and documented in the appropriate Infrastructure interface control documents (ICD) and then integrated into existing ICD (Crane 1996) for TEDF.

- Radioactive/Dangerous Liquid Effluents Monitoring and Sampling Requirements Issue

  Does the M&I contractor want to monitor and/or sample the private

contractors' effluents? If so, what would be the schedule (WHC 1996a, Table 1, Appendix G, Page G-31)?

Resolution:

The evaluation PC generating facility monitoring and sampling requirements will be part of the definitive design issues. M&I contractor and DOE-RL in consultation with LERF/ETF will negotiate the extent of monitoring and sampling requirements with the PCs. These requirements are to be evaluated and integrated into the administrative control documents for ETF/LERF.

3.3 PERFORMANCE REQUIREMENTS

The following performance requirements are statements of expectations considered essential to optimize overall transfer system performance:

3.3.1 General

- The piping system shall be provided for collection and disposal of effluent liquid from the PC facilities and installed with a slope for gravity draining. The minimum liquid velocity of 61 centimeters (2 feet) per second at the average rate of flow shall be maintained.

  Basis: The requirements are based on the radiological design criteria (Evans 1994).

- The degree of redundancy, reliability, and availability shall correspond to a systematically determined safety classification for all systems, structures, and components (DOE 1989).

  Basis: Design of the effluent transfer piping will be based on the safety classification assigned to it. Materials shall be compatible with the exposed environment. Use of materials that degrade in radiation environment shall be minimized. Acceptable corrosion rate and design life established in Design Requirements Document (DRD) will dictate actual choice of piping materials.

- The contractor generating facility will monitor the waste stream for flow and applicable process upset on a real-time and historical basis and indicating parameters such as pH, conductivity, total alpha, and total beta. Monitoring system will initiate automated corrective actions, as appropriate, to protect the integrity of both the disposal facility and discharged effluent.

  Basis: The requirements are based on the generating facility responsibilities prescribed in the TEDF Interface Control Document (Crane 1996).

3.3.2 Radioactive, Dangerous Liquid Effluent

These effluents cannot be discharged direct into the soil column without treatment (DOE-RL 1987). The effluents are therefore required to be transported from the PCs' site boundaries to the existing LERF/ETF at Hanford Site for storage, treatment and disposal. The PCs shall discharge the waste streams at their respective site boundaries within the current or negotiated future ETF treatability envelope. The effluent shall meet the following ETF waste acceptance requirements as derived from regulatory and facility design criteria:

- The waste stream must be characterized to the degree established in RCRA Part B Permit. Analytical procedures used must be consistent with the RCRA waste analysis plans.

  Basis: The waste stream cannot be designated without accurate and complete characterization data.

- Only the waste codes listed in the Delisting Petition and the RCRA permit can be accepted for treatment at the ETF, unless the permit and the Delisting Petition are modified.

  Basis: The waste identified in the Delisting are excluded from the requirements of hazardous waste regulations under the RCRA. Currently the delisting excludes ETF effluent with waste codes F001 through F005. Future waste generated at the PC facilities must be designated under the RCRA to determine if a modification to the delisting is required.

- The Radionuclide Air Emission Program permit limits the absorbed radiation dose to an individual at the ETF site boundary. The nuclide concentrations in the effluent from the PC facilities must not cause increase in the acceptable dose.

  Basis: Washington State Department of Health (DOH) regulations.

- The waste acceptability criteria for storage and treatment at LERF/ETF are based on the following operability parameters:

  a. Single phase aqueous waste streams containing no separable organics.
  b. Minimize colloidal matter to protect filters in the ETF from plugging.
  c. Minimize scale forming compounds concentrations within limitations of the Ultra Violet/oxidation and Reverse Osmosis units.
  d. Minimize concentrations of corrosive constituent, such as chloride and fluoride.
  e. Minimize concentration of constituents that can absorb UV light to the

extent destruction of targeted organics is significantly compromised.

- The maximum combined discharge flow rate for the waste stream from two contractors shall be 100,000 cubic meters/year (50 gpm).

  Basis: The PC facilities are expected to generate dilute aqueous effluent streams containing low levels of radionuclides and dangerous waste. The probable sources of the effluents are process offgas condensates, ion exchange column washes, and others (WHC 1996b).

- Double walled pipe encasement shall be used in areas of radioactive, dangerous liquid effluent transfer.

  Basis: Piping encasement is provided in order to prevent release of hazardous waste to the environment from primary confinement. A leak detection system shall be installed in accordance with the Washington Administrative Code (WAC) 173-303.

- The PC shall connect its facility to the tie-in provided for the effluent transfer at the PC's site perimeter. The effluent transfer mechanism at the PC facility shall provide motive force to move liquid effluent from the source to the destination.

  Basis: The radioactive, dangerous liquid effluent will tie-in to the existing 242-A Evaporator condensate discharge line PC5000 to the LERF facility (Appendix H, drawing H-2-79604). The effluent transfer mechanism at the PC facility have to overcome the line losses, discharge pressure etc. and move liquid effluent from the source to the destination in the LERF basin.

- The effluent waste stream temperature shall not exceed 38 °C (100 °F).

  Basis: The LERF has no temperature monitoring or control but has accepted process condensate at temperature 38 °C (100 °F). Acceptability of waste stream temperature above 38 °C (100 °F) has to be investigated by a separate study.

- The incoming waste stream shall have a pH range of 2.0 - 12.5.

  Basis: The effluent with a pH value below 2.0 is designated as corrosive in accordance with the Washington Administrative Code (WAC) 173-303-090 (Johnson 1995).

- The concentration of ammonia shall be limited to 1 wt% (10,000 mg/L or 58 M).

Basis: The ammonia concentration exceeding the above limit is considered as an Washington State Extremely Hazardous Waste (Johnson 1995).

3.3.3 Non-Radioactive, Non-Dangerous Liquid Effluents

The PC facilities are expected to generate aqueous non-radioactive, non-dangerous effluent streams. The probable sources of the effluents are equipment washdowns, purge streams from cooling towers, purge streams from steam boilers and others.

- The effluent must meet the 200 Area TEDF Waste acceptance Criteria.

  Basis: An effluent is required to be treated with the best available technology/all known, available, and reasonable treatment (BAT/AKART) at the privatization contractors facility prior to the discharge into the TEDF. The dispositioned aqueous waste must meet the acceptance criteria and associated administrative procedures of the 200 Area TEDF.

- The maximum combined discharge flow rate for the waste stream from two contractors shall be 133,000 cubic meters/year (67 gpm).

  Basis: The PC facilities are expected to generate treated effluent stream to which BAT/AKART has been applied which will be discharged into TEDF. The amount of flow rate is subject to negotiation between the bidding PCs and DOE-RL during phase 1A negotiations.

- The PC shall connect its facility to the tie-in provided for the effluent transfer at the PC's site perimeter. The effluent transfer mechanism at the PC facility shall provide motive force to move liquid effluent from the source to the destination.

  Basis: The non-radioactive, non-dangerous liquid effluent will tie-in to the existing the H LINE (Appendix H, drawing H-2-140342) for discharge into the TEDF. The effluent transfer mechanism at the PC facility have to overcome the line losses, discharge pressure etc. and move liquid effluent from the source to the destination in the TEDF.

4.0 TREATMENT FACILITY DESCRIPTIONS

4.1 TREATED EFFLUENT DISPOSAL FACILITY (TEDF)

The TEDF located in the 200 Area of the Hanford Site provides the 11 mile-long collection piping and disposal systems for the 200 Areas treated effluent streams to which BAT/AKART has been applied. The TEDF collects effluents from several facilities in the 200 Areas and discharges them to two rock-lined disposal ponds

east of the 200 East area without any treatment. The disposal ponds are approximately 20235 square meters (5 acres) in size. The effluent will evaporate and infiltrate through the soil.

4.2 LIQUID EFFLUENT RETENTION FACILITY (LERF)

The LERF is constructed partly below grade on a site located within the eastern periphery of the 200 East Area. At present the facility is used mainly as a RCRA permitable, low level, low hazard interim liquid retention facility for 242-A Evaporator process condensate before subsequent processing in the Effluent Treatment Facility. The effluent stream from PC facilities will be stored in LERF pending ETF treatment. The LERF consists of three retention basins, each with a nominal storage capacity of 6.5 million gallons (25 ML). One basin capacity of retention volume is maintained as the contingency space.

4.3 EFFLUENT TREATMENT FACILITY (ETF)

The ETF is located in the northeast corner of the 200 East Area of the Hanford Site and north of the LERF basin. The ETF treats and disposes of the inventory stored in the LERF basins. The waste streams stored in LERF consists of: 242-A Evaporator process condensate, N-Basin waste water, Ground Water Campaign, and miscellaneous wastes generated from laboratory and decommissioning operations. The Ground Water Campaign will end by 1999. The Surge Tank located in the ETF area provides feed to the ETF. Unloading facility to accommodate waste shipments to the ETF by tank trailer can discharge to the LERF or to the Surge Tank.

5.0 DESCRIPTION OF EFFLUENT TRANSFER ALTERNATIVES

5.1 SELECTION CRITERIA

A criterion is a factor that is used to select a preferred alternative. Selection criteria are required to further evaluate viable alternatives. This section devotes to the development of the criteria which provides the mechanism for evaluating various modes of effluent transfer system.

The selection criteria were chosen in relation to the constraints, issues, and performance requirements described earlier in this study. The relevant criteria chosen for the conduct of alternatives evaluation process are described as follows:

- Constructability: The ease of installation is a measure of constructability. The installation method requiring complex construction technique will cause higher radiation exposure to the personnel.

- Maintainability: Maintainability can be assessed by the complexity and

repairability of the associated systems and components. Each facility shall use appropriate techniques to maintain personnel exposure As Low As Reasonably Achievable (ALARA).

- Reliability: The reliability can be measured by the estimated design life, and durability of the installed system. Another key aspect is the associated impact of failure on the environment and resulting secondary containment not in compliance with regulations following a failure.

- Schedule: Schedule relates to impacts of a subsystem schedule to the effluent transfer system function. Schedules to consider include system start-up, operation, Tri-Party Agreements, external (DOE, Regulatory) and others.

- Safety: Safety criteria includes radiological, toxicological, industrial, and environmental hazards associated with worksite activities during construction, maintenance, and operation of the effluent system. Controlling radiation exposure to employees at levels that are ALARA shall be the primary goal.

- Environmental: Alternatives are evaluated based on the potential of secondary dangerous waste generation to the environment either during construction or requiring environmental permit or documentation modifications on account of the construction.

- Cost: The cost of an alternative is its total cost including development, capital, life-cycle, and facility/equipment deactivation costs. The cost-effectiveness of the alternatives must be considered since reducing costs is an identified stakeholder value.

5.1.1 Weighing of Selection Criteria

The performance of each alternative is estimated with respect to each criterion. The performance level is judged as poor, average, and good and a corresponding score of 1, 2, and 3 is assigned to three levels. Amongst all alternatives compared, at least one alternative must receive a score of 1 and another 3. The total score of each alternative is the summation of these scores. The numerical score quantify the alternatives and reduce the effect of evaluator bias on the analysis. The alternative scoring the highest is the most preferred one.

5.2 ALTERNATIVES CONSIDERED

The development of various alternatives in this study is primarily based on modes of transporting the liquid effluents from the PCs sites. Two modes of transportation

have been found feasible and these are:

- underground piping systems
- aboveground transportation systems.

5.2.1 Underground Piping System

The alternatives considered under this mode of transportation will be buried piping system. The pipelines would be used to transfer effluents from PC facilities to the disposal sites.

- Alternative 1 Route Northwest of Grout Area

  The proposed common route will begin at coordinates W43650 and N41430 east of the PC facilities, run straight west, and tie-in with the corresponding existing disposal line suitable for the type of the effluent. The route will generally follow the raw water line proposed under alternate #1 (Appendix H, drawing ES-E23377-C-003). The routing will follow the proposed north access road for the privatization phase I stage and require highway fill at low point of the Snow's Creek at W45250. The earthwork and the associated cost is part of the site development cost not included in this study. The ground level at the beginning is at 202.5 meter (664 ft) and finishes at approximately same elevation at corresponding tie-in points. The PC facility at tie-in points have to provide motive force to move the liquid from the source to the destination.

  The non-radioactive, non-dangerous liquid effluent pipeline will tie-in to the H LINE (Appendix H, drawing H-2-140342) at N41480. The H LINE ties in to the east-west cross-site disposal line discharging into the TEDF (Appendix H, drawing H-2-140323). The routing configuration is shown in Figures Ia and V. The radioactive, dangerous liquid effluent pipeline will tie-in to the existing 242-A Evaporator condensate discharge line PC5000 (Appendix H, drawing H-2-79604) at N41480. The waste stream in the line PC5000 from the 242-A Evaporator is transferred to the north side of the LERF basin. The routing configuration is shown in Figure Ib.

  The Evaporator 76.2 cm (3 in.) condensate line is typically under 7031 kg/sq. m 7030 Kg/sq. m (10 psi) pressure with a flow rate of 189 Liters/min (50 gpm) during the evaporator campaign (Galioto 1996). In the event the tie-in to the condensate line is not feasible, a separate effluent line will run parallel to the line PC5000 and discharge into the south end of the LERF basin. The line will follow the groundwater transfer line discharge into the south end of the LERF basin (Appendix H, drawing H-2-827213). The location of groundwater transfer line capped end is shown in Dwg. No. H-2-

140368 (Appendix H). The routing configuration is shown in Figure IV. The total LCC for the project was $2.12M as detailed in section 6.1.7.

- Alternative 2 Route Southwest of Grout Area

  The proposed common route will begin at coordinates W43650 and N39470 east of the PC facilities and continue southwest following the proposed access road for the privatization phase I stage. The route will follow the raw water line proposed under alternate #2 (Appendix H, drawing ES-E23377-C-004) and run in a northwesterly direction parallel to the grout area fence up to W45780 and N40100. The route will continue straight north upto N40275 west of the grout vaults and turn straight west upto W46800 parallel to the access loop to serve the grout facility (Appendix H, drawing H-2-76455). The route will run straight north to N40740 east of AP Tank Farm and then northwest to W46900 and N40880. The route will then turn west, follow 241-AP Tank Farm Perimeter Road to tie-in with the corresponding existing disposal line suitable for the type of the effluent.

  The non-radioactive, non-dangerous liquid effluent pipeline will tie-in to the H LINE (Appendix H, drawing H-2-140342) at N41050. The routing configuration is shown in Figure IIa. The radioactive, dangerous liquid effluent pipeline will tie-in to the existing 242-A Evaporator condensate discharge line PC5000 (Appendix H, drawing H-2-79604) at N41050. The routing configuration is shown in Figure IIb.

- Alternative 3 Route North of Grout Area

  The proposed common route will start at coordinates W44400 and N42185 north of the boundary fence of the grouted waste disposal site and run straight north for approximately 671 m (2200 ft). The route will cross the drain ditch at approximately N43200 and will require approximately 305 m (1000 ft) of fill at a low point of 175 m (574 ft) at N43800 (Appendix H, drawing H-2-79477, sh 15).

  The non-radioactive, non-dangerous liquid effluent pipeline will tie-in to the east-west transfer line (Appendix H, drawing H-2-140368) at W44420. The routing configuration is shown in Figure IIIa. The radioactive, dangerous liquid effluent pipeline will turn west and follow the groundwater transfer line discharge into the south end of the LERF basin (Appendix H, drawing H-2-827213). The routing configuration is shown in Figure IIIb.

5.2.2 Aboveground Transportation System

Alternative 4 Tractor Tank Trailer Transport System

The system consists of transporting the effluent in reusable waste truck tank trailers from storage vessels at the PCs' site to the 200 Area disposal facilities. The compositions of the effluent are required to be administratively controlled to meet the requirements of a fissile exempt shipment in accordance with 49 CFR 173.453. The current vessel size for tank trailer is 18 925 L (5000 gal). The general arrangement of the tank trailer is shown in Figure VI (2 sheets). Two trailers are under the custody of tank farm operations and are used for inter-area transport of radioactive liquid wastes. The LCC analysis of this alternative includes cost of purchasing a new tank trailer. Each vessel has a rupture disk that activates and releases at high tank pressure, a pump-out connection, a vent line connection, and weight factor connections. The connections provided will be utilized by the loading and unloading facilities designed to transfer the effluent to and from the tanker.

The evaluation of this alternative assumes very low volume effluent generation of 1 gpm. The volume figure was arbitrarily selected to keep the LCC comparison with other alternatives within reasonable value. This low volume involves 35 trips per year (Appendix E). Above ground transportation of radioactive/dangerous effluent increases risks associated with environmental and safety hazards.

Approved load-in stations have to be constructed at the PC facilities for this purpose. One storage tank for each type of effluent common for both PCs will be built in the PC facilities to hold accumulated effluent on interim basis. The storage station will have its own pump, filling and vent lines. The venting will be designed to return the overflow to the storage tanks. Adequate floor drains shall be provided to collect the spillage and return to the storage tank.

6.0 IDENTIFICATION OF PREFERRED ALTERNATIVE

6.1 EVALUATION OF ALTERNATIVES

This section determines how well an alternative satisfies each selection criterion. In absence of a tangible means of comparison, engineering judgement has been used for assigning a satisfaction rating to an alternative being evaluated for complying with a selection criterion. The viable alternatives being evaluated in this section were described in the previous section of this report. Alternatives considered by this study include the following:

Alternative one	Underground Piping Northwest of Grout Area
Alternative two	Underground Piping Southwest of Grout Area
Alternative three	Underground Piping North of Grout Area
Alternative four	Tractor Tank Trailer Transportation System

6.1.1 Constructability

Northwest of Grout Area: The non-radioactive, non-dangerous liquid effluent from each PC facility will be combined to form a common line inside the east boundary of their facilities. The radioactive, dangerous liquid effluent will also be combined and follow the same route. The choice of this route was influenced by the location of the additional vault space west of the PC facility area proposed under Immobilized Low-Level Waste Interim Storage Facility. The pipeline installation is very complex involving intricate man machine interface. This option performs poor under installation criterion and a score of 1 is assigned.

Southwest of Grout Area: The common routings for two effluent types originates on the eastern side of the PC facility as indicated above under northwest route. The route continues along the south side of the grout area. This area is relatively much less contaminated than the northwest route. The route is easy to use and less complex to construct. This option performs average, better than northwest route, and a score of 2 is assigned.

North of Grout Area: The common routings for two effluent types originates on the eastern side of the PC facility as indicated above under northwest route. The route will run straight north and will cross the Ditch B-3-3 draining into 216-B-3 Pond. The route will also cross old sites of Ditches 216-B-2 and 216-B-3-1. About 300 ft of this area, commonly designated as B swamp, is heavily contaminated and will require characterization to measure the contamination level. Highest radiation exposure is expected during construction. This option performs same as northwest area under installation criterion and a score of 1 is assigned.

Tractor Tank Trailer: There are at present two 18 925 L (5000 gallon) tank trailers in operation. The LCC analysis takes into account the capital cost of a new tank trailer. The possibility of outright purchase makes this option easy to use and operate with no significant man machine interface problem. The construction effort is zero involving no installation complexity. This option performs good and a score of 3 is assigned.

6.1.2 Maintainability

Northwest of Grout Area: The repairability and condition monitoring of the effluent transfer lines under this option is poor when compared to the tank trailer option and a score of 1 is assigned.

Southwest of Grout Area: This option performs better than the northwest route because of relatively less contaminated area and less ALARA concern. A score of 2 is assigned.

North of Grout Area: The option performs same as northwest area and a poor score of 1 is assigned.

Tractor Tank Trailer: This option is least complex to maintain. System redundancy is achievable due to the presence of more than one trailer. This option performs good and a score of 3 is assigned.

6.1.3 Reliability

Northwest of Grout Area: The underground piping can be durable and have a long design life. This option installs a high integrity barrier against contamination and have least chance of failure. This option performs the best under reliability criterion and a score of 3 is assigned.

Southwest of Grout Area: This option performs the same as underground piping in northwest area and a score of 3 is assigned.

North of Grout Area: This option performs same as underground piping in northwest area and a score of 3 is assigned.

Tractor Tank Trailer: The design life and durability of a trailer is poor in comparison to the underground piping system. The impact of failure on the reliability is the highest as the possibility of accidental spillage is the greatest. This option performs poor and a score of 1 is assigned.

6.1.4 Schedule

Northwest of Grout Area: This option calls for piping installation through a less contaminated area and has less impact on project milestone when compared with the north route option. A score of 2 is assigned.

Southwest of Grout Area: The option performs same as northwest option and a score of 2 is assigned.

North of Grout Area: The implementation of this option may cause disruption of transfer operation as a result of prolonged construction work. The chance of missing the project milestones is the greatest in this case. The least score of 1 is assigned to this option.

Tractor Tank Trailer: The construction of a loading station will be localized in PC facilities and will not face any contamination problem. There is no schedule impact and hence this option receives the highest score of 3.

6.1.5 Safety

Northwest of Grout Area: The hazards involved are less than those in north of grout area. The performance level of average with a score of 2 is assigned.

Southwest of Grout Area: The option performs same as northwest area and an average score of 2 is assigned.

North of Grout Area: The installation work under this option would require construction in a radiologically active area with corresponding exposure of operations and maintenance personnel to both occupational and radiological hazards. The least score of 1 is assigned to this option.

Tractor Tank Trailer: The safety issue during construction is non existing. There is no worksite activities during maintenance except for periodical cleaning for low exposure. The cleaning can be performed with remote operation. The radiation exposure to employees are ALARA. This option receives the highest score of 3.

6.1.6 Environmental

Northwest of Grout Area: Potential problem of secondary waste generation exists in the form of contaminated earth and equipment disposal during construction. This option performs poor and a score of 1 is assigned.

Southwest of Grout Area: The environmental impact is expected to be less than that for the northwest option as the routing runs along less contaminated area. The performance level is average and a score of 2 is assigned.

North of Grout Area: The option performs same as northwest area and a poor score of 1 is assigned.

Tractor Tank Trailer: There is no potential of releasing hazardous materials into the environment during construction. The environmental impact is zero and the highest score of 3 is assigned to this option.

6.1.7 Cost

Northwest of Grout Area: A Life Cycle Cost (LCC) Analysis for construction and installation of two effluent transfer lines running parallel as shown in Figures Ia and b was made and the total LCC for the project was $1.13M (Appendix B). The LCC is based on a capital asset cost estimate of $1.27M to be spent at the service date of May 1998 with no anticipated maintenance during the project design life of 13 years. This is the least expensive option and a good score of 3 is assigned.

A LCC Analysis for construction and installation of an independent radioactive/dangerous liquid effluent transfer lines as shown in Figure IV and described in section 5.2.1 was made and the total LCC for the project was $2.12M (Appendix B, page B-4). The LCC is based on a capital asset cost estimate of $2.38M to be spent at the service date of May 1998 with no anticipated

maintenance during the project design life of 13 years.

Southwest of Grout Area: A LCC Analysis for construction and installation of two effluent transfer lines running parallel as shown in Figures IIa and b was made and the total LCC for the project was $1.32M (Appendix C). The LCC is based on a capital asset cost estimate of $1.48M to be spent at the service date of May 1998 with no anticipated maintenance during the project design life of 13 years. This option is the more expensive than northwest route and an average score of 2 is assigned.

North of Grout Area: A LCC Analysis for construction and installation of two effluent transfer lines running parallel as shown in Figures IIIa and b was made and the total LCC for the project was $2.01M (Appendix D). The LCC is based on a capital asset cost estimate of $2.26M to be spent at the service date of May 1998 with no anticipated maintenance during the project design life of 13 years. This option is much more expensive than southwest route and a poor score of 1 is assigned.

Tractor Tank Trailer: This study assumes outright purchase of one tank trailer. A LCC Analysis for purchase and maintenance of one 18 925 L (5000 gallon) tank trailer was made based on an initial capital investment of $0.07M towards the purchase. The LCC includes an anticipated recurring cost of $151,200 per year for operating and maintenance during the project design life of 13 years. The rationale for this cost is provided in Appendix E (Goodwin 1996, Lowe 1996). The operating cost is based on a low volume effluent generation of 3.79 Liters/min (1 gpm). The total LCC for the project was $1.19M (Appendix E). The operating cost and the LCC will substantally increase with flow rate above 1 gpm. This is the most expensive option and a poor score of 1 is assigned.

A second LCC Analysis for construction and installation of a 56 775 L (15,000 gallons) storage tank and a loading station in the PC facility was made and the total LCC for the project was $0.76M (Appendix F). The LCC is based on a capital asset cost estimate of $0.86M to be spent at the service date of May 1998 with no anticipated maintenance during the project design life of 13 years. This cost will be in addition to the tank trailer cost shown above and makes the option much less favorable for acceptance.

The cost of using the tank trailer for transporting the maximum effluent flow of 254 Liters/min (67 gpm) will be prohibitive. The total operating cost will be $10.13M per year which is 67 times that of 3.79 Liters/min (1 gpm) scenario mentioned above. The operating cost per year only will be almost 5 times more expensive than the total construction cost of the most expensive underground piping option.

TABLE 6.1 Evaluation Matrix for Liquid Effluent Transfer Alternatives

Criteria	Alternative 1 Northwest of Grout Area	Alternative 2 Southwest of Grout Area	Alternative 3 North of Grout Area	Alternative 4 Tank Trailer
Constructability	1	2	1	3
Maintainability	1	2	1	3
Reliability	3	3	3	1
Schedule	2	2	1	3
Safety	2	2	1	3
Environmental	1	2	1	3
Cost	3	2	1	1
Total	13	15	9	17

6.2 PREFERRED ALTERNATIVES

The weighted scores of the alternatives evaluated earlier have been summarized in a tabular form in Table 6-1. The scores in the evaluation matrix were based on engineering judgement and not by an analysis except for the cost criterion. The scoring pattern indicates that there is a difference between the alternatives which establishes the relative superiority amongst them.

The tank trailer options received the highest satisfaction rate of 17. The tank trailer option is contingent upon the flow rate being below 3.79 Liters/min (1 gpm). The operating cost beyond this flow rate under this option becomes prohibitive.

The Alternative 2 route through southwest of the grout area received the highest score of 15 amongst underground piping options. This option is cost effective at the projected high effluent generation rate of 133,000 cubic meters/year (67 gpm).

6.3 UNCERTAINTIES

- The piping layouts and cost estimates are based on reviews of existing site plans which are upper level drawings. Unforeseen interferences could occur

if the drawings do not accurately reflect the elevation of existing piping.

- The flow rates for two types of liquid effluent documented earlier are bounding figures acknowledged by the bidding PCs and DOE-RL during Phase 1A negotiations and not backed by any analysis. Wide variations between the postulated and final negotiated flow rates will severely affect the conclusions of this study.

7.0 IMPLEMENTATION RECOMMENDATIONS

7.1 PERFORMANCE CHARACTERISTICS

This study established the performance requirements of the liquid effluent transfer systems. Based on the preceding discussions the study concludes that the performance requirements be incorporated in the Design Requirements Document (DRD).

7.2 RECOMMENDED ALTERNATIVES

The study reviewed various alternate modes of transfer between the boundary of the privatization contractors (PC) facilities and the 200 Area liquid effluent facilities. The following alternatives are recommended for implementation during the definitive design stage:

- Install underground piping southwest of the grout area as detailed in alternative 2 for high volume of effluent generation.

- Use 18 925 L (5000 gallon) tank trailer as detailed in alternative 4 for low volume of effluent generation below 3.79 Liters/min (1 gpm). The skyrocketing operating cost makes this option non performing for effluent generation above 3.79 Liters/min (1 gpm).

7.3 SUPPLEMENTAL RECOMMENDATIONS

This section introduces and recommends implementation of a new alternative effluent transfer route which has not been discussed in the preceding part of the study. The need evolved due to related studies being performed simultaneously and their outcomes influence upon the recommendation of this study.

It was decided to let the original and independent recommendations stand, "as is" in Para 7.2 and supplement this work with a recommendation based upon an integration with the findings of the other studies. These related studies proposed a north asphalt concrete pavement (ACP) road for the privatization phase I stage shown in Appendix H, drawing ES-E23378-C-002 (Ackerman 1996 Alternative 1

and Fort 1996 Alternative 6). For the reasons noted in Para 7.3.1 & 2, the following effluent piping routing configuration optimizes the use of the site/access road corridor development (earthwork and associated tasks) to the extent that it becomes the preferred alternative PROVIDED site development proceeds as recommended. Details of the routing compatible with the site development/road alternatives is as follows:

Alternative 1A Route North Access Road

The proposed common route begins at coordinates W43650 and N41430 east of the PC facilities and runs straight west upto W45000 similar to that shown in Alternative 1. The route then turns north along the proposed interior road east of the PC facilities up to the proposed north (ACP) road. The route continues west along the north ACP road and tie-in with the corresponding existing disposal line suitable for the type of the effluent. The tie-in points are exactly the same as shown in Alternative 1. The routing configurations for both types of effluents are shown in Figures VIIa and VIIb.

The ground level at the beginning is at 202.5 meter (664 ft) and finishes at approximately same elevation at corresponding tie-in points. The PC facility at tie-in points have to provide motive force to move the liquid from the source to the destination as in the case of alternative I.

7.3.1 Evaluation of Supplemental Alternative

Constructability: The area is relatively free from soil contamination when compared with other underground options. The piping under this option will follow an already established access road and hence the route is easy to construct. This option performs better than all other underground piping option under construction criterion. A good score of 3 is assigned.

Maintainability: The option performs same as Alternative 2 because of relatively less contaminated area than under Alternative 1 and an average score of 2 is assigned.

Reliability: The option performs equally well as any other underground piping option and the same good score of 3 is assigned.

Schedule: The schedule impact under this option is same as those discussed under Alternatives 1 and 2 and the same average score of 2 is assigned.

Safety: The hazards involved are same as those encountered under Alternatives 1 and 2 and the same average score of 2 is assigned.

Environmental: The environmental impact will be less than that in Alternative 1 as

the routing runs along less contaminated areas. An average score of 2 is assigned.

Cost: The route is similar to that of Alternative 1 except for the portion of the Snow's Creek crossing in Alternative 1. The length of piping will be slightly longer under this alternative. However cost savings in contaminated soil removal, burial fees and associated site works expected under this option will compensate the increased cost of piping material. The option performs same as the Alternative 1 and the same good score of 3 is assigned.

7.3.2 Supplemental Recommendation

The total performance score of this alternative is 17 which is the highest among the underground piping options. In the event the preferred road alternative is chosen the following is the revised recommendation under this study:

- Install underground piping along north access road as detailed in alternative 1A for high volume of effluent generation.

8.0 REFERENCES

40 CFR 268, 1991, Land Disposal Restrictions (LDR), Code of Federal Regulations, as amended

60 FR 31115, 1995, EPA Approval of the 200 Area Effluent Treatment Facility Delisting Petition, DOE/RL-92-72, Federal register Notice.

Ackerman, R.L., August 1996, Engineering Study, TWRS Privatization Phase I, Roads and Rail Systems Modifications, ICF Kaiser Hanford Company, Richland, Washington.

Crane, A.F., May 25, 1996, 200 Area Treated Effluent Disposal Facility Interface Control Document, WHC-SD-W049H-ICD-001, Rev. 2, Westinghouse Hanford Company, Richland, Washington.

DOE-RL, 1991, Liquid Effluent Retention Facility Dangerous Waste Permit Application, DOE/RL-90-43, Rev. 0, U.S. Department of Energy, Richland Field Office, Richland, Washington.

DOE-RL, 1988a, Order 5400.xy, Radiation Effluent Monitoring and Environmental Surveillance, U.S. Department of Energy, Richland, Washington.

DOE-RL, 1988b, Order 5400.1, General Environmental Protection Program, U.S. Department of Energy, Richland, Washington.

DOE-RL, 1987, Plan and Schedule to Discontinue Disposal of Contaminated liquids into the Soil Column at the Hanford Site, unnumbered, U.S. Department of Energy, Richland, Washington.

Ecology 1993, Dangerous Waste Regulations, Washington Administrative Code, Chapter 173-303, Washington State Department of Ecology, Olympia, Washington.

Ecology 1995, State Waste Discharge Permit Program, Washington Administrative Code, Chapter 173-216, Washington State Department of Ecology, Olympia, Washington.

Ecology 1995a, State Waste Discharge Permit No. ST4500, Washington State Department of Ecology, Olympia, Washington.

Ecology 1995b, State Waste Discharge Permit No. ST4502, Washington State Department of Ecology, Olympia, Washington.

Evans, R.A., Sept, 27, 1994, Radiological Design Guide, WHC-SD-GN-DGS-30011, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Fort, D.L., 1996, Engineering Study, TWRS Privatization Phase I, Raw and Potable Water Service, WHC-SD-TWR-ES-002, Rev. 0, ICF Kaiser Hanford Company, Richland, Washington.

Galioto, T.M., July, 1996, Telephone Communication, Westinghouse Hanford Company, Richland, Washington.

Goodwin, L.D., July 17, 1996, Telephone Communication, Westinghouse Hanford Company, Richland, Washington.

Johnson, P.G., May 17, 1995, Technical Basis for the Liquid Effluent Retention Facility Operating Specifications, WHC-SD-W105-TM-001, Rev. 3, Westinghouse Hanford Company, Richland, Washington.

Lavender, J.C., 1993, Final Safety Analysis Report, Project W-105, Liquid Effluent Retention Facility, WHC-SD-W105-SAR-001, Rev. 0-C, Westinghouse Hanford Company, Richland, Washington.

Lowe, S.S., September 11, 1996, cc.Mail Comments on TWRS Effluent Transfer Study, Westinghouse Hanford Company, Richland, Washington.

McDonald, F.N., November 18, 1994, Acceptance of Feed Streams for Treatment at the LERF/ETF Complex, WHC-SD-ETF-WAC-001, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Murphy, J.D., 1995, Hydraulic Analysis, Calculation No. W252A-C-02, ICF Kaiser Hanford Co., Richland, Washington.

Papp, I.G., July 1996, Telephone Communication, Westinghouse Hanford Company, Richland, Washington.

Strode, J.N., September 12, 1995, Operational Waste Volume Projection, WHC-SD-WM-ER-029, Rev. 21, Westinghouse Hanford Company, Richland, Washington.

U.S. Department of Energy (DOE), 1988, Radioactive Waste management, DOE Order 5820.2A, U.S. Department of Energy, Washington, D.C.

U.S. Department of Energy (DOE), 1989, General Design Criteria, DOE Order 6430.1A, U.S. Department of Energy, Washington, D.C.

U.S. Department of Energy (DOE), 1996, TWRS Privatization Request for Proposals (RFP) So. No. DE-RP06-96RL13308, memorandum 95-RTI-029 dated February 20, 1996 from J.D. Wagoner, Manager Richland Operations Office, U.S. Department of Energy, Richland, Washington.

WHC, 1995, WHC Occupational ALARA Program, WHC-IP-1043, Rev. 0 Westinghouse Hanford Company, Richland, Washington.

WHC, 1996a, Tank Waste Remediation System Functions and Requirements Documents, WHC-SD-WM-FRD-020, Rev. A Draft Westinghouse Hanford Company, Richland, Washington.

WHC, 1996b, April 24, 1996, Interface Control Document for Radioactive, Dangerous Liquid Effluents, RDD-100 ID 6 (Draft), Westinghouse Hanford Company, Richland, Washington.

WHC, 1988, Non-Reactor Facility Safety Manual, WHC-CM-4-46, Westinghouse Hanford Company, Richland, Washington.

WHC, 1995, Design Loads for New Underground DSTs and Associated Underground Process piping, WHC-SD-GN-DGS-30008, Westinghouse Hanford Company, Richland, Washington.

Appendix A Figures

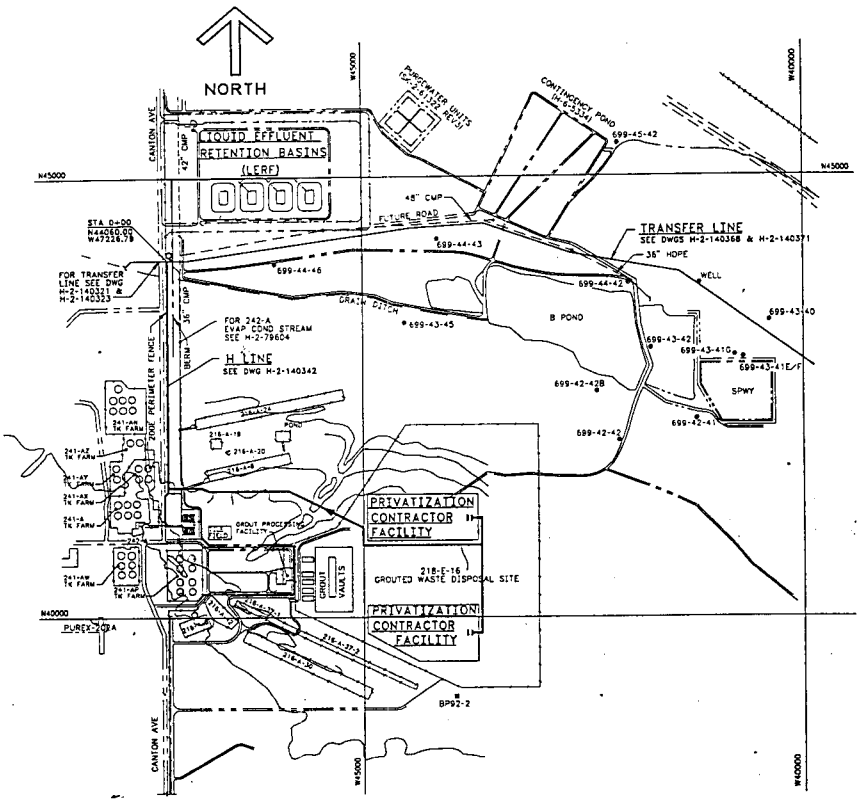
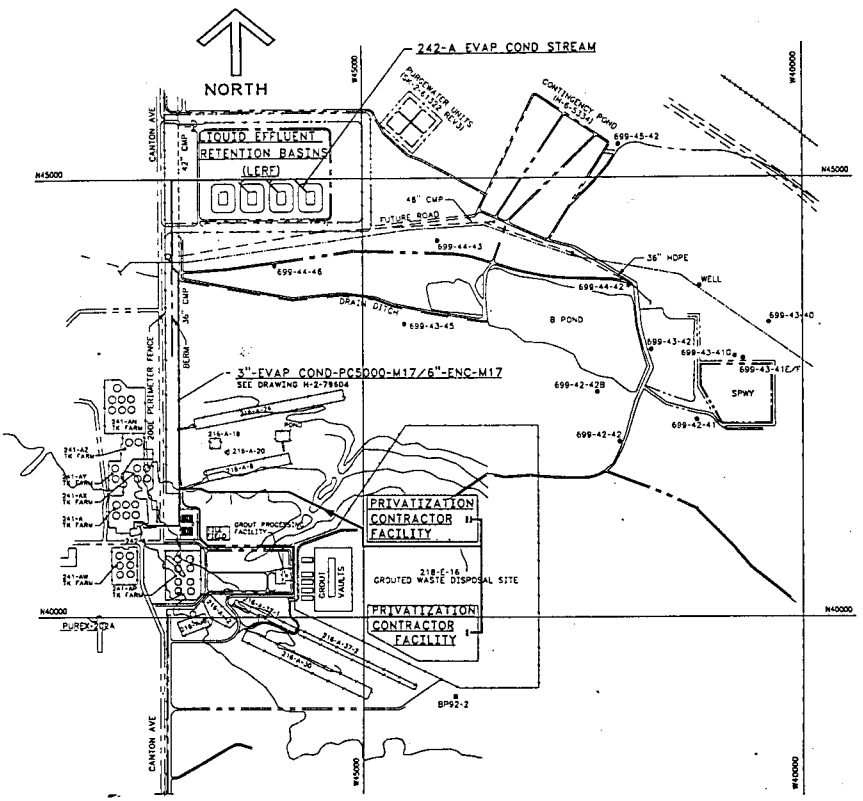


FIGURE I a

ALTERNATIVE 1 ROUTE
NON-RADIOACTIVE, NON-DANGEROUS
LIQUID EFFLUENT TRANSFER SYSTEM



SITE PLAN

500 0 500 1000
SCALE IN FEET

FIGURE I b

ALTERNATIVE 1 ROUTE
RADIOACTIVE, DANGEROUS
LIQUID EFFLUENT TRANSFER SYSTEM

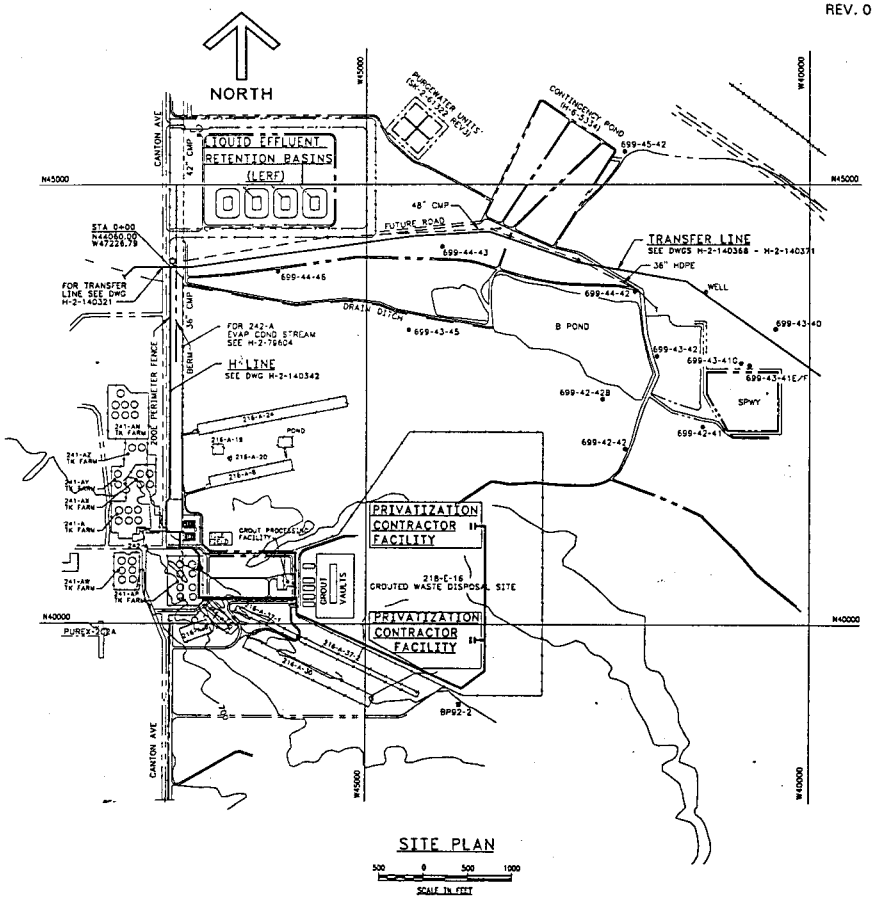


FIGURE II a

ALTERNATIVE 2 ROUTE
NON-RADIOACTIVE, NON-DANGEROUS
LIQUID EFFLUENT TRANSFER SYSTEM

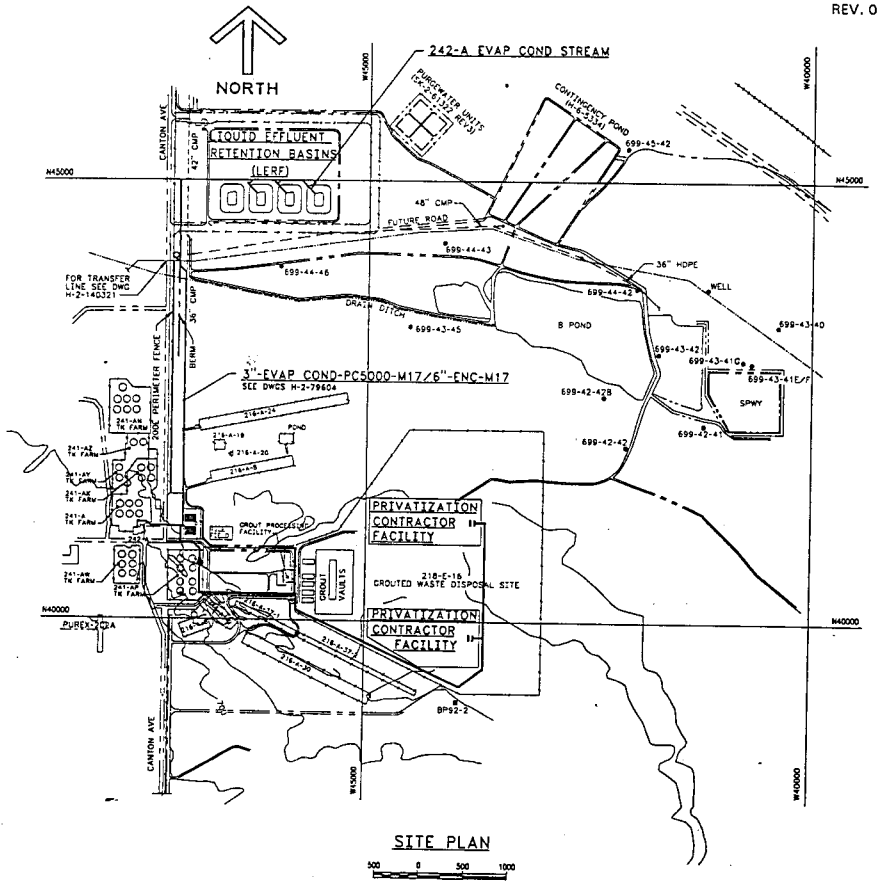
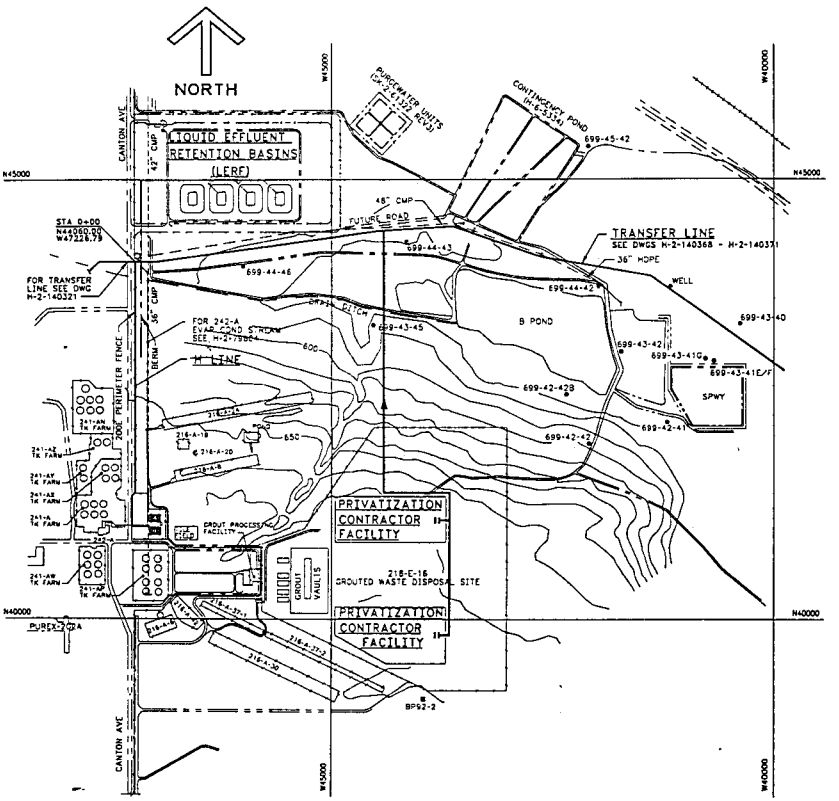


FIGURE II b

ALTERNATIVE 2 ROUTE
RADIOACTIVE, DANGEROUS
LIQUID EFFLUENT TRANSFER SYSTEM

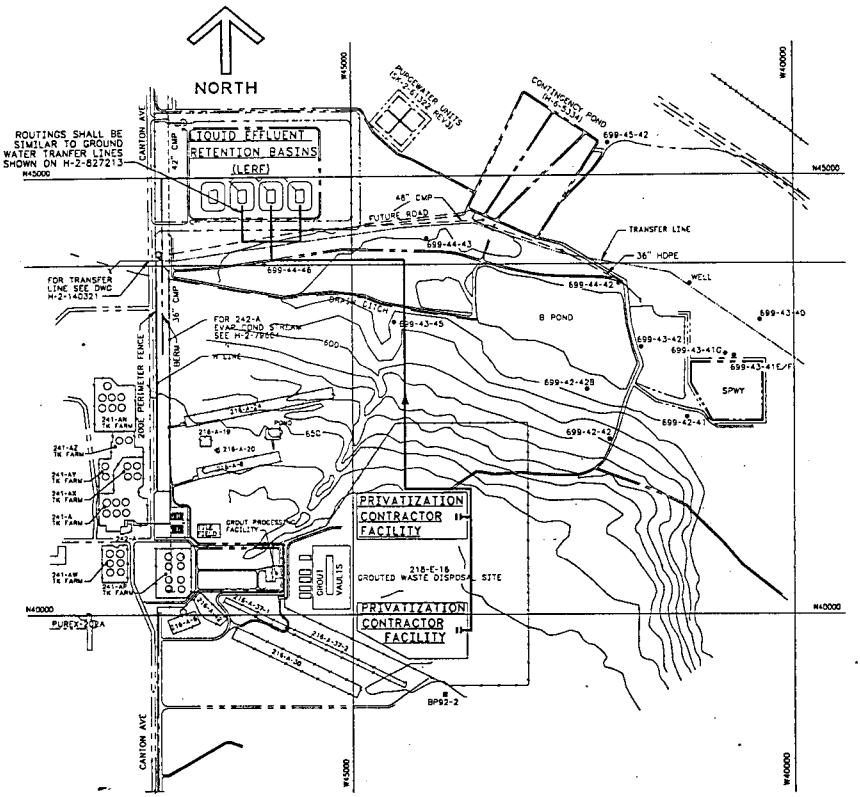


SITE PLAN

500 0 500 1000
SCALE IN FEET

FIGURE III a

ALTERNATIVE 3 ROUTE
NON-RADIOACTIVE, NON-DANGEROUS
LIQUID EFFLUENT TRANSFER SYSTEM

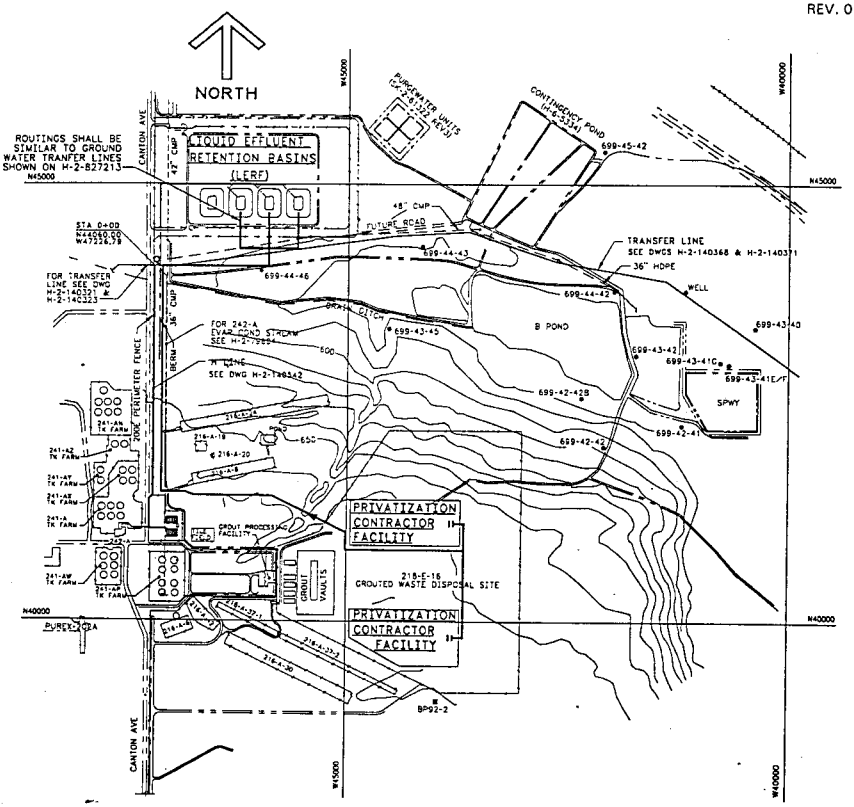


SITE PLAN

500 0 500 1000
SCALE IN FEET

FIGURE III b

ALTERNATIVE 3 ROUTE
RADIOACTIVE, DANGEROUS
LIQUID EFFLUENT TRANSFER SYSTEM

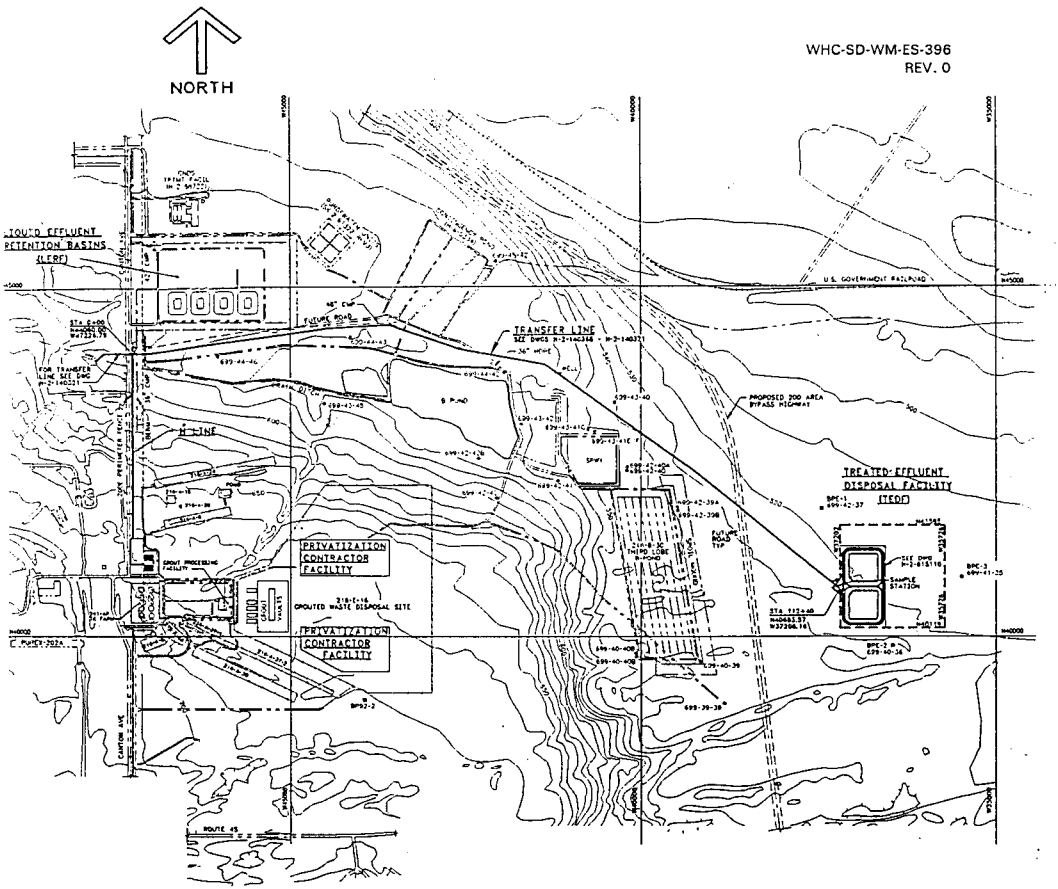


SITE PLAN

500 0 500 1000
SCALE IN FEET

FIGURE IV

DIRECT LERF DISPOSAL
OF RADIOACTIVE, DANGEROUS
LIQUID EFFLUENT TRANSFER SYSTEM

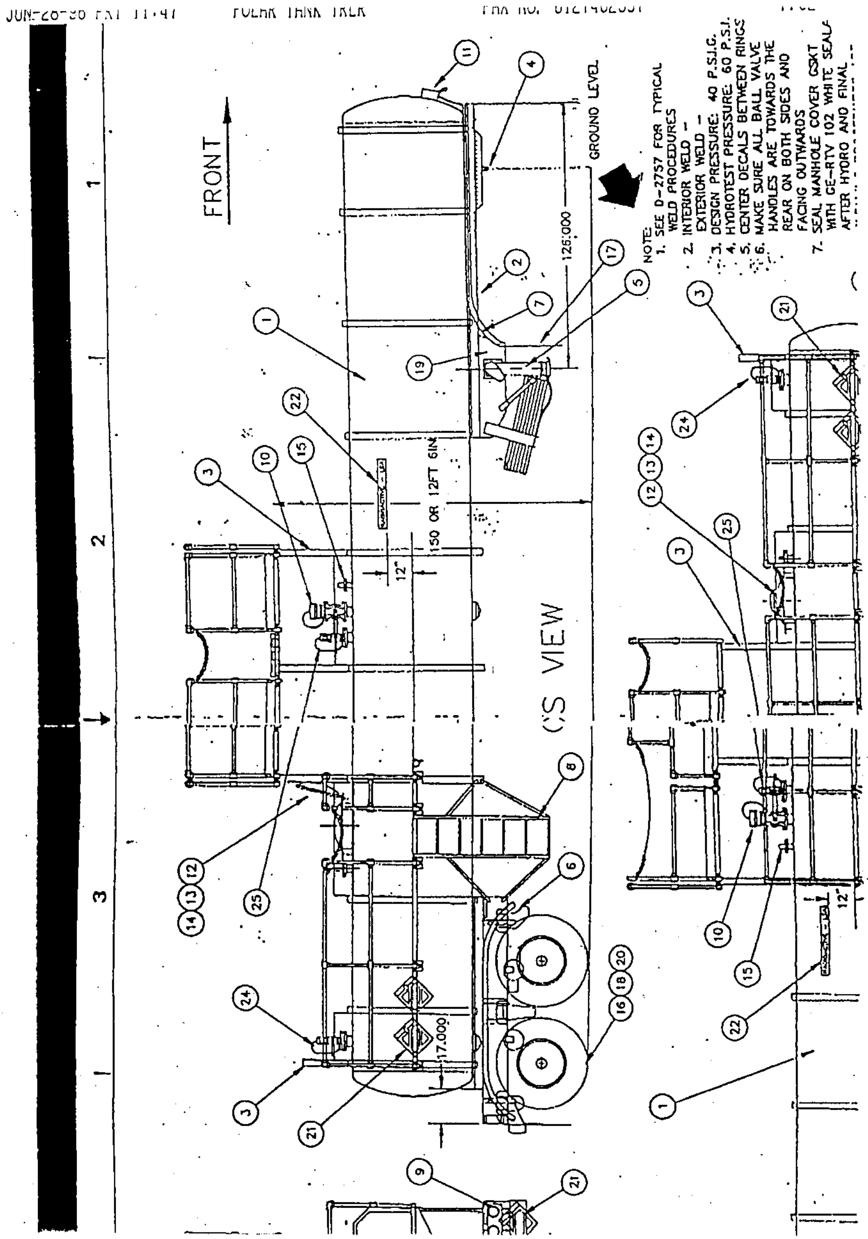


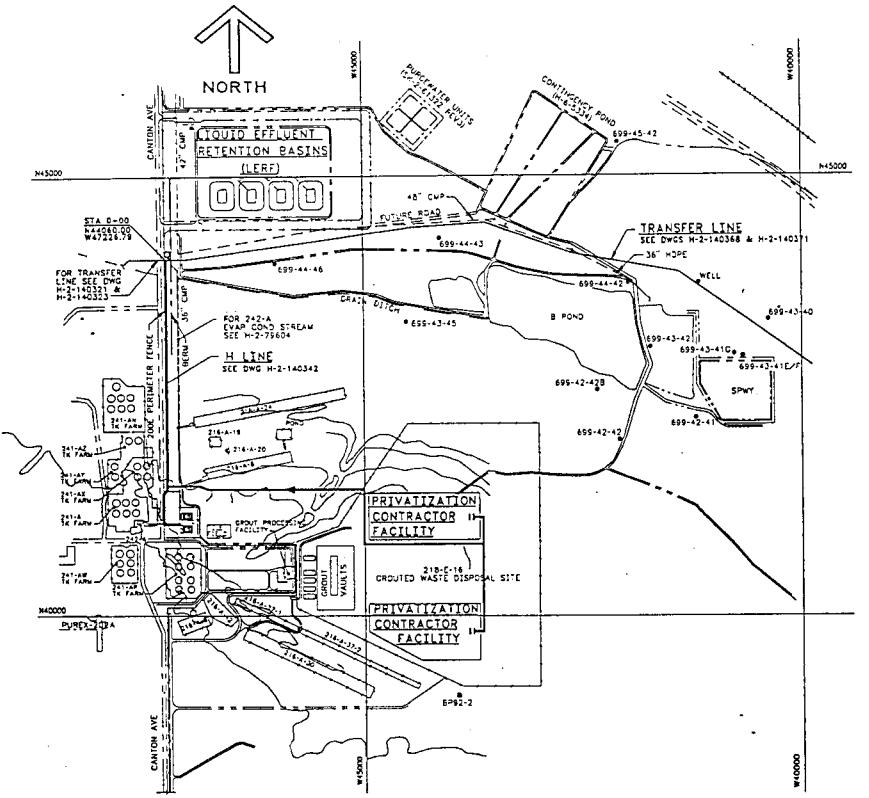
SITE PLAN

500 0 500 1000
SCALE IN FEET

FIGURE V

200 EAST AREA TREATED EFFULENT
DISPOSAL SYSTEM


FRONT
GROUND LEVEL
126.000
150 OR 12FT 6IN
12"
CS VIEW
17.000
NOTE:
1. SEE D-2757 FOR TYPICAL WELD PROCEDURES
2. INTERIOR WELD -
EXTERIOR WELD -
3. DESIGN PRESSURE: 40 P.S.I.G.
4. HYDROTEST PRESSURE: 60 P.S.I.
5. CENTER DECALS BETWEEN RINGS
6. MAKE SURE ALL BALL VALVE HANDLES ARE TOWARDS THE REAR ON BOTH SIDES AND FACING OUTWARDS
7. SEAL MANHOLE COVER GSKT WITH GE-RTV 102 WHITE SEAL
AFTER HYDRO AND FINAL
BEST AVAILABLE COPY



SITE PLAN

500 0 500 1000
SCALE IN FEET

FIGURE VII a

ALTERNATIVE 1A ROUTE
NON-RADIOACTIVE, NON-DANGEROUS
LIQUID EFFLUENT TRANSFER SYSTEM

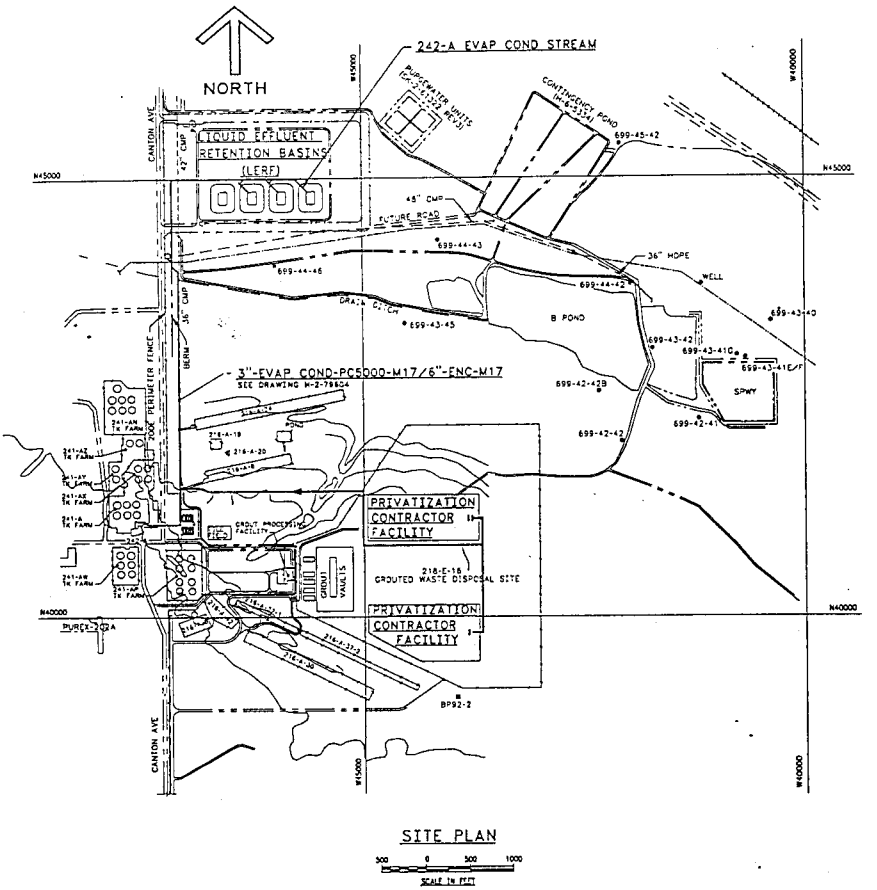


FIGURE VII b

ALTERNATIVE 1A ROUTE
RADIOACTIVE, DANGEROUS
LIQUID EFFLUENT TRANSFER SYSTEM

Appendix B LCC Analysis for Alternatives 1 and 1A Northwest of Grout Area

NIST BLCC4.0 INPUT DATA LISTING

Alternative 1 Route 1 Northwest of Grout Area
FILE NAME: ROUTE 1
FILE LAST MODIFIED ON 07-26-1996/07:52:56
PROJECT ALTERNATIVE: Alternative 1
COMMENT: Route 1 Northwest of Grout Area

GENERAL DATA:

ANALYSIS TYPE: Federal Analysis--Projects Subject to OMB A-94
BASE DATE FOR LCC ANALYSIS: AUG 1996
STUDY PERIOD: 14 YEARS, 10 MONTHS INCLUDING PLANNING/CONSTRUCTION PERIOD
PLANNING/CONSTRUCTION PERIOD: 1 YEARS, 9 MONTHS
SERVICE DATE: MAY 1998
DISCOUNT AND INTEREST RATES ARE Real (exclusive of general inflation)
DISCOUNT RATE: 7.0%
Escalation rates do not include general inflation

CAPITAL ASSET COST DATA:

INITIAL COST (BASE YEAR $)	1,273,000
EXPECTED ASSET LIFE (YRS/MTHS)	13/0
RESALE VALUE FACTOR	0.00%
AVG PRICE ESC RATE(PLAN/CONST)	0.00%
AVG PRICE ESC RATE(SERVICE PD)	0.00%
NUMBER OF REPLACEMENTS	0

COST-PHASING SCHEDULE BY YEAR OF CONSTRUCTION AND AT SERVICE DATE:

1	0.00%
2	0.00%
SERVICE DATE	100.00%

NO REPLACEMENTS

OPERATING, MAINTENANCE, AND REPAIR COST DATA:

ANNUAL RECUR OM&R COST ($): 0
ESCALATION RATE FOR OM&R: 0.00%
No non-annually-recurring OM&R costs reported.

ENERGY COST DATA:
NUMBER OF ENERGY TYPES = 0

NIST BLCC 4.0: DETAILED LCC ANALYSIS

PART I - INITIAL ASSUMPTIONS AND COST DATA

Project alternative: Alternative1

Run date: 07-26-1996 07:53:54

Run type: Federal Analysis--Projects Subject to OMB A-94

Comment: Route 1 Northwest of Grout Area

Input data file: ROUTE1.DAT, last modified: 07-26-1996/07:52:56

LCC output file: ROUTE1.LCC, created: 07-26-1996/07:53:03

Base Date of Study:	AUG 1996
Service Date:	MAY 1998
Study period:	14.83 years (AUG 1996 through MAY 2011)
Plan/constr. period:	1.75 years (AUG 1996 through APR 1998)
Service Period:	13.08 years (MAY 1998 through MAY 2011)
Discount rate:	7.0% Real (exclusive of general inflation)

End-of-year discounting convention

INITIAL CAPITAL ASSET COSTS (NOT DISCOUNTED)
(ADJUSTED FOR PRICE CHANGES DURING PLAN/CONST. PERIOD, IF ANY)

YEAR (BEGINNING)	COST PHASING	YEARLY COST	TOTAL COST
AT SERVICE DATE: MAY 1998		100.0%	$1,273,000
TOTAL INITIAL CAPITAL ASSET COSTS			$1,273,000

PART II - LIFE-CYCLE COST ANALYSIS

DISCOUNT RATE = 7.0% Real (exclusive of general inflation)

PROJECT ALTERNATIVE: Alternative1 RUN DATE: 07-26-1996/07:53:54

	PRESENT VALUE (1997 DOLLARS)	ANNUAL VALUE (1997 DOLLARS)
CASH REQUIREMENTS AS OF SERVICE DATE:		
DURING CONSTRUCTION	$0	$0
AT SERVICE DATE	$1,130,855	$124,162
SUBTOTAL	$1,130,855	$124,162
OPERATING, MAINTENANCE & REPAIR COSTS:	$0	$0
SUBTOTAL	$0	$0
RESALE VALUE OF ORIG CAPITAL COMPONENTS	$0	$0
RESALE VALUE OF CAPITAL REPLACEMENTS	$0	$0
TOTAL LIFE-CYCLE PROJECT COST	$1,130,855	$124,162

NIST BLCC4.0 INPUT DATA LISTING

Alternative 1A: Route 1A Northwest Direct Radioactive/Dangerous Line to LERF South
FILE NAME: ROUTE1A
FILE LAST MODIFIED ON 08-01-1996/07:51:23
PROJECT ALTERNATIVE: Alternate 1A
COMMENT: Route 1A Northwest Direct Rad Line to LERF South

GENERAL DATA:

ANALYSIS TYPE: Federal Analysis--Projects Subject to OMB A-94
BASE DATE FOR LCC ANALYSIS: AUG 1996
STUDY PERIOD: 14 YEARS, 10 MONTHS INCLUDING PLANNING/CONSTRUCTION PERIOD
PLANNING/CONSTRUCTION PERIOD: 1 YEARS, 9 MONTHS
SERVICE DATE: MAY 1998
DISCOUNT AND INTEREST RATES ARE Real (exclusive of general inflation)
DISCOUNT RATE: 7.0%
Escalation rates do not include general inflation

CAPITAL ASSET COST DATA:

INITIAL COST (BASE YEAR $)	2,381,000
EXPECTED ASSET LIFE (YRS/MTHS)	13/0
RESALE VALUE FACTOR	0.00%
AVG PRICE ESC RATE(PLAN/CONST)	0.00%
AVG PRICE ESC RATE(SERVICE PD)	0.00%
NUMBER OF REPLACEMENTS	0

COST-PHASING SCHEDULE BY YEAR OF CONSTRUCTION AND AT SERVICE DATE:

1	0.00%
2	0.00%
SERVICE DATE	100.00%

NO REPLACEMENTS

OPERATING, MAINTENANCE, AND REPAIR COST DATA:

ANNUAL RECUR OM&R COST ($): 0
ESCALATION RATE FOR OM&R: 0.00%
No non-annually-recurring OM&R costs reported.

ENERGY COST DATA:
NUMBER OF ENERGY TYPES = 0

NIST BLCC 4.0: DETAILED LCC ANALYSIS

PART I - INITIAL ASSUMPTIONS AND COST DATA

Project alternative: Alternate 1A

Run date: 08-01-1996 07:52:04

Run type: Federal Analysis--Projects Subject to OMB A-94

Comment: Route 1A Northwest Direct Rad Line to LERF South

Input data file: ROUTE1A.DAT, last modified: 08-01-1996/07:51:23

LCC output file: ROUTE1A.LCC, created: 08-01-1996/07:51:28

Base Date of Study:	AUG 1996
Service Date:	MAY 1998
Study period:	14.83 years (AUG 1996 through MAY 2011)
Plan/constr. period:	1.75 years (AUG 1996 through APR 1998)
Service Period:	13.08 years (MAY 1998 through MAY 2011)
Discount rate:	7.0% Real (exclusive of general inflation)

End-of-year discounting convention

INITIAL CAPITAL ASSET COSTS (NOT DISCOUNTED)
(ADJUSTED FOR PRICE CHANGES DURING PLAN/CONST. PERIOD, IF ANY)

YEAR (BEGINNING)	COST PHASING	YEARLY COST	TOTAL COST
AT SERVICE DATE: MAY 1998		100.0%	$2,381,000
TOTAL INITIAL CAPITAL ASSET COSTS			$2,381,000

PART II - LIFE-CYCLE COST ANALYSIS

DISCOUNT RATE = 7.0% Real (exclusive of general inflation)

PROJECT ALTERNATIVE: Alternate 1A RUN DATE: 08-01-1996/07:52:04

	PRESENT VALUE (1997 DOLLARS)	ANNUAL VALUE (1997 DOLLARS)
CASH REQUIREMENTS AS OF SERVICE DATE:		
DURING CONSTRUCTION	$0	$0
AT SERVICE DATE	$2,115,133	$232,230
SUBTOTAL	$2,115,133	$232,230
OPERATING, MAINTENANCE & REPAIR COSTS:	$0	$0
SUBTOTAL	$0	$0
RESALE VALUE OF ORIG CAPITAL COMPONENTS	$0	$0
RESALE VALUE OF CAPITAL REPLACEMENTS	$0	$0
TOTAL LIFE-CYCLE PROJECT COST	$2,115,133	$232,230

** IEST - INTERACTIVE ESTIMATING **
PRIVITIZATION PHASE 1 LIQUID EFFLUENT TRANSFER
STUDY ESTIMATE (ALTERNATIVE 1)
DOE_R01 - PROJECT COST SUMMARY

COST CODE	DESCRIPTION	ESCALATED TOTAL COST	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
000	ENGINEERING	201,000	35	70,000	271,000
700	SPECIAL EQUIP/PROCESS SYSTEMS	742,000	35	260,000	1,002,000
	(ADJUSTED TO MEET DOE 5100.4)				
	PROJECT TOTAL	943,000	35	330,000	1,273,000

TYPE OF ESTIMATE: STUDY ESTIMATE — JULY 25, 1996	REMARKS: ESTIMATE DOES NOT INCLUDE ESCALATION.
ARCHITECT ENGINEER	
OPERATING CONTRACTOR	

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

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ONSITE INDIRECTS	SUB TOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
110000	DEFINITIVE DESIGN	134000	0	134000	0.00	0	134000	35	46900	180900
120000	CONSTRUCTION ENG/INSP	67000	0	67000	0.00	0	67000	35	23450	90450
SUBTOTAL 1	ENGINEERING	201000	0	201000	0.00	0	201000	35	70350	271350
320001	TRANSFER LINE	534055	117492	651547	0.00	0	651547	35	228041	879589
320002	CONTAMINATED SOIL REMOVAL	2200	484	2684	0.00	0	2684	35	939	3623
SUBTOTAL 32	CONSTRUCTION-FIXED PRICE	536255	117976	654231	0.00	0	654231	35	228980	883212
330000	BURIAL FEES	50000	0	50000	0.00	0	50000	35	17500	67500
SUBTOTAL 33	CONSTRUCTION-O/C	50000	0	50000	0.00	0	50000	35	17500	67500
SUBTOTAL 3	CONSTRUCTION	586255	117976	704231	0.00	0	704231	35	246480	950712
400000	PROJECT MANAGEMENT	37500	0	37500	0.00	0	37500	35	13125	50625
SUBTOTAL 4	PROJECT INTEGRATION	37500	0	37500	0.00	0	37500	35	13125	50625
PROJECT TOTAL		824,755	117,976	942,731	0.00	0	942,731	35	329,955	1,272,687

. DOCUMENTS AND DRAWINGS
==========
DOCUMENTS: (NONE) VERBAL DIRECTION

DRAWINGS: H-2-140367 AND H-2-140368 REF. DRAWINGS FIGURE I

. MATERIAL PRICES
==========
UNIT COSTS REPRESENT CURRENT PRICES FOR SPECIFIED MATERIAL.

. LABOR RATES
==========
A.) ICF-KH HOURLY RATES ARE BASED ON THE 1995 FISCAL YEAR BUDGET LIQUIDATION RATES AS ISSUED BY KEH FINANCE (EFFECTIVE 10-01-94). SEE ALSO THE FY 1995 PLANNING RATES * (REPORT BGHB7012).

. GENERAL REQUIREMENTS/TECHNICAL SERVICES/OVERHEADS
==========
A.) ONSITE CONTRACT ADMINISTRATION AND CONSTRUCTION MANAGEMENT COSTS, ASSOCIATED WITH THE OVERALL MANAGEMENT OF THE FIXED PRICE CONTRACTS, ARE INCLUDED AS A COMPOSITE PERCENTAGE AND LUMP SUM ALLOWANCE (FOR BID PACKAGE PREP) BASED ON THE ESTIMATING FACTOR/BILLING SCHEDULE. THE TOTAL COMPOSITE PERCENTAGE AND LUMP SUM ALLOWANCE ARE APPLIED AGAINST THE TOTAL FIXED PRICE CONTRACT AMOUNT WHICH IS REFLECTED ON THE KEH SUMMARY REPORT DOE_R07, INCLUDED WITH THIS ESTIMATE. (FINAL ESTIMATES MAY BE PARTIALLY MANLOADED AND INCLUDED WITHIN THE ESTIMATE DETAIL)

B.) FIXED PRICE CONTRACTOR OVERHEAD, PROFIT, BOND AND INSURANCE COSTS HAVE BEEN APPLIED AT THE FOLLOWING PERCENTAGES AND ARE REFLECTED IN THE "OH&P/B&I" COLUMN OF THE ESTIMATE DETAIL:
LABOR -20% MATERIAL -20%

. ESCALATION
==========
ESCALATION PERCENTAGES WERE CALCULATED FROM THE AUGUST 1994 UPDATE OF THE ECONOMIC ESCALATION PRICE CHANGE INDICES FOR DOE CONSTRUCTION PROJECTS AS PUBLISHED BY THE "OFFICE OF INFRASTRUCTURE AQUISITION" FM-50.

ROUNDING
==========
U.S. DEPARTMENT OF ENERGY - DOE ORDER 5100.4 PAGE I-32 SUBPARAGRAPH (M), REQUIRES ROUNDING OF ALL GENERAL PLANT PROJECTS (GPP'S) AND LINE ITEM (LI) COST ESTIMATES. REFERENCE: DOE 5100.4, FIGURE I-11, DATED 10-31-84.

REMARKS
=======
A.) ITEMS THAT SHOW UP IN SUBCONTRACT COLUMN ARE UNIT PRICE AND INCLUDE CONTRACTORS OH&P.
B.) ALLOWANCES WERE USED ON THE FOLLOWING ITEMS DUE TO LIMITED INFORMATION AVAILABLE AT TIME OF ESTIMATE: HAND EXCAVATION, HYDROSEEDING, GRAVEL STABILIZATION, RADIOACTIVE SOIL REMOVAL AND BURIAL FEES.
C.) ALL WORK TO BE DONE FIXED PRICE CONSTRUCTION.
D.) DEFINITIVE DESIGN, CONSTRUCTION ENGINEERING/INSPECTION AND PROJECT INTEGRATION WERE PUT IN AS PERCENTAGES OF DIRECT CONSTRUCTION COST AS FOLLOWS: D/D 25%, E/I 10% AND P/I 7%.

OST CODE/WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ONSITE INDIRECTS	SUB TOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
00	ENGINEERING									
10000	DEFINITIVE DESIGN	134000	0	134000	0.00	0	134000	35	46900	180900
20000	CONSTRUCTION ENG/INSP	67000	0	67000	0.00	0	67000	35	23450	90450
TOTAL 000	ENGINEERING	201000	0	201000	0.00	0	201000	35	70350	271350
00	SPECIAL EQUIP/PROCESS SYSTEMS									
20001	TRANSFER LINE	534055	117492	651547	0.00	0	651547	35	228041	879589
20002	CONTAMINATED SOIL REMOVAL	2200	484	2684	0.00	0	2684	35	939	3623
30000	BURIAL FEES	50000	0	50000	0.00	0	50000	35	17500	67500
00000	PROJECT MANAGEMENT	37500	0	37500	0.00	0	37500	35	13125	50625
TOTAL 700	SPECIAL EQUIP/PROCESS SYSTEM	623755	117976	741731	0.00	0	741731	35	259605	1001337
ROJECT TOTAL		824,755	117,976	942,731	0.00	0	942,731	35	329,955	1,272,687

CSI	DESCRIPTION	ESTIMATE SUBTOTAL	ONSITE INDIRECTS	SUB TOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
ENGINEERING										
00	TECHNICAL SERVICES	201000	0	201000	0.00	0	201000	35	70350	271350
	TOTAL ENGINEERING	201,000	0	201,000	0.00	0	201,000	35	70,350	271,350
CONSTRUCTION										
02	SITEWORK	586255	117976	704231	0.00	0	704231	35	246480	950712
19	PROJECT MANAGEMENT	37500	0	37500	0.00	0	37500	35	13125	50625
	TOTAL CONSTRUCTION	623,755	117,976	741,731	0.00	0	741,731	35	259,605	1,001,337
PROJECT TOTAL		824,755	117,976	942,731	0.00	0	942,731	35	329,955	1,272,687

REFERENCE: ESTIMATE BASIS SHEET
COST CODE ACCOUNT SUMMARY

PAGE 3 OF 7
PAGE 4 OF 7

THE U.S. DEPARTMENT OF ENERGY - RICHLAND ORDER 5700.3 "COST ESTIMATING, ANALYSIS AND STANDARDIZATION" DATED 3-27-85, PROVIDES GUIDELINES FOR ESTIMATE CONTINGENCIES. THE GUIDELINE FOR A STUDY ESTIMATE SHOULD HAVE AN OVERALL RANGE OF 20 TO 35% .

CONTINGENCY IS EVALUATED AT THE THIRD COST CODE LEVEL AND SUMMARIZED AT THE PRIMARY AND SECONDARY COST CODE LEVEL OF THE DETAILED COST ESTIMATE.

ENGINEERING — ENGINEERING DOLLARS WERE APPLIED AS A PERCENTAGE OF DIRECT CONSTRUCTION COST. DIFINITIVE DESIGN @ 25% AND CONSTRUCTION ENGINEERING/INSPECTION @ 10%.

AVERAGE ENGINEERING CONTINGENCY 35%

CONSTRUCTION — A CONTINGENCY OF 35% WAS USED DUE TO: THE POSSIBILITY OF ENCOUNTERING EXISTING UNDERGROUND UTILITIES, CONTAMINATED SOIL OR ANY OTHER OBSTRUCTIONS THAT WOULD REQUIRE REMOVAL, REROUTING, ADDITIONAL HAND EXCAVATION OR ADDITIONAL BURIAL FEES.

AVERAGE CONSTRUCTION CONTINGENCY 35%

AVERAGE PROJECT CONTINGENCY 35%

** TEST - INTERACTIVE ESTIMATING **
PRIVITIZATION PHASE 1 LIQUID EFFLUENT TRANSFER
STUDY ESTIMATE (ALTERNATIVE 1)
DOE_R07 - ONSITE INDIRECT COSTS BY WBS

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	CONTRACT ADMINISTRATION %	CONTRACT ADMINISTRATION TOTAL	BID PACK PREP.	OTHER INDIRECTS	TOTAL INDIRECTS
10000	DEFINITIVE DESIGN	134000	0.00	0	0	0	0
20000	CONSTRUCTION ENG/INSP	67000	0.00	0	0	0	0
20001	TRANSFER LINE	534055	22.00	117492	0	0	117492
20002	CONTAMINATED SOIL REMOVAL	2200	22.00	484	0	0	484
30000	BURIAL FEES	50000	0.00	0	0	0	0
00000	PROJECT MANAGEMENT	37500	0.00	0	0	0	0
PROJECT TOTAL		824,755		117,976	0	0	117,976

** IEST - INTERACTIVE ESTIMATING **
PRIVITIZATION PHASE 1 LIQUID EFFLUENT TRANSFER
STUDY ESTIMATE (ALTERNATIVE 4)
DOE_R01 - PROJECT COST SUMMARY

COST CODE	DESCRIPTION	ESCALATED TOTAL COST	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
000	ENGINEERING	397,000	35	139,000	536,000
700	SPECIAL EQUIP/PROCESS SYSTEMS	1,367,000	35	478,000	1,845,000
	(ADJUSTED TO MEET DOE 5100.4)				
	PROJECT TOTAL	1,764,000	35	617,000	2,381,000

TYPE OF ESTIMATE: STUDY ESTIMATE JULY 25, 1996	REMARKS: ESTIMATE DOES NOT INCLUDE ESCALATION.
ARCHITECT ENGINEER	
OPERATING CONTRACTOR	

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

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ONSITE INDIRECTS	SUB TOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
110000	DEFINITIVE DESIGN	265000	0	265000	0.00	0	265000	35	92750	357750
120000	CONSTRUCTION ENG/INSP	132000	0	132000	0.00	0	132000	35	46200	178200
SUBTOTAL 1	ENGINEERING	397000	0	397000	0.00	0	397000	35	138950	535950
320001	TRANSFER LINE	911470	200523	1111993	0.00	0	1111993	35	389198	1501191
320002	CONTAMINATED SOIL REMOVAL	13200	2904	16104	0.00	0	16104	35	5636	21740
SUBTOTAL 32	CONSTRUCTION-FIXED PRICE	924670	203427	1128097	0.00	0	1128097	35	394834	1522931
330000	BURIAL FEES	165000	0	165000	0.00	0	165000	35	57750	222750
SUBTOTAL 33	CONSTRUCTION-O/C	165000	0	165000	0.00	0	165000	35	57750	222750
SUBTOTAL 3	CONSTRUCTION	1089670	203427	1293097	0.00	0	1293097	35	452584	1745681
400000	PROJECT MANAGEMENT	74000	0	74000	0.00	0	74000	35	25900	99900
SUBTOTAL 4	PROJECT INTEGRATION	74000	0	74000	0.00	0	74000	35	25900	99900
PROJECT TOTAL		1,560,670	203,427	1,764,097	0.00	0	1,764,097	35	617,434	2,381,531

1. DOCUMENTS AND DRAWINGS
   ======================
   DOCUMENTS: (NONE) VERBAL DIRECTION

   DRAWINGS: H-2-140367 AND H-2-140368 REF. DRAWINGS FIGURE I

2. MATERIAL PRICES
   ================
   UNIT COSTS REPRESENT CURRENT PRICES FOR SPECIFIED MATERIAL.

3. LABOR RATES
   ============
   A.) ICF-KH HOURLY RATES ARE BASED ON THE 1995 FISCAL YEAR BUDGET LIQUIDATION RATES AS ISSUED BY KEH FINANCE (EFFECTIVE 10-01-94). SEE ALSO THE FY 1995 PLANNING RATES * (REPORT BGHB7012).

4. GENERAL REQUIREMENTS/TECHNICAL SERVICES/OVERHEADS
   ==
   A.) ONSITE CONTRACT ADMINISTRATION AND CONSTRUCTION MANAGEMENT COSTS, ASSOCIATED WITH THE OVERALL MANAGEMENT OF THE FIXED PRICE CONTRACTS, ARE INCLUDED AS A COMPOSITE PERCENTAGE AND LUMP SUM ALLOWANCE (FOR BID PACKAGE PREP) BASED ON THE ESTIMATING FACTOR/BILLING SCHEDULE. THE TOTAL COMPOSITE PERCENTAGE AND LUMP SUM ALLOWANCE ARE APPLIED AGAINST THE TOTAL FIXED PRICE CONTRACT AMOUNT WHICH IS REFLECTED ON THE KEH SUMMARY REPORT DOE_R07, INCLUDED WITH THIS ESTIMATE. (FINAL ESTIMATES MAY BE PARTIALLY MANLOADED AND INCLUDED WITHIN THE ESTIMATE DETAIL)

   B.) FIXED PRICE CONTRACTOR OVERHEAD, PROFIT, BOND AND INSURANCE COSTS HAVE BEEN APPLIED AT THE FOLLOWING PERCENTAGES AND ARE REFLECTED IN THE "OH&P/B&I" COLUMN OF THE ESTIMATE DETAIL:
   LABOR -20% MATERIAL -20%

5. ESCALATION
   ===========
   ESCALATION PERCENTAGES WERE CALCULATED FROM THE AUGUST 1994 UPDATE OF THE ECONOMIC ESCALATION PRICE CHANGE INDICES FOR DOE CONSTRUCTION PROJECTS AS PUBLISHED BY THE "OFFICE OF INFRASTRUCTURE AQUISITION" FM-50.

6. ROUNDING
   =========
   U.S. DEPARTMENT OF ENERGY - DOE ORDER 5100.4 PAGE I-32 SUBPARAGRAPH (M), REQUIRES ROUNDING OF ALL GENERAL PLANT PROJECTS (GPP'S) AND LINE ITEM (LI) COST ESTIMATES. REFERENCE: DOE 5100.4, FIGURE I-11, DATED 10-31-84.

7. REMARKS
   =======
   A.) ITEMS THAT SHOW UP IN SUBCONTRACT COLUMN ARE UNIT PRICE AND INCLUDE CONTRACTORS OH&P.
   B.) ALLOWANCES WERE USED ON THE FOLLOWING ITEMS DUE TO LIMITED INFORMATION AVAILABLE AT TIME OF ESTIMATE: HAND EXCAVATION, HYDROSEEDING, GRAVEL STABILIZATION, RADIOACTIVE SOIL REMOVAL AND BURIAL FEES.
   C.) ALL WORK TO BE DONE FIXED PRICE CONSTRUCTION.
   D.) DEFINITIVE DESIGN, CONSTRUCTION ENGINEERING/INSPECTION AND PROJECT INTEGRATION WERE PUT IN AS PERCENTAGES OF DIRECT CONSTRUCTION COST AS FOLLOWS: D/D 25%, E/I 10% AND P/I 7%.

COST CODE/WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ONSITE INDIRECTS	SUB TOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
000	ENGINEERING									
110000	DEFINITIVE DESIGN	265000	0	265000	0.00	0	265000	35	92750	357750
120000	CONSTRUCTION ENG/INSP	132000	0	132000	0.00	0	132000	35	46200	178200
TOTAL 000	ENGINEERING	397000	0	397000	0.00	0	397000	35	138950	535950
700	SPECIAL EQUIP/PROCESS SYSTEMS									
720001	TRANSFER LINE	911470	200523	1111993	0.00	0	1111993	35	389198	1501191
720002	CONTAMINATED SOIL REMOVAL	13200	2904	16104	0.00	0	16104	35	5636	21740
730000	BURIAL FEES	165000	0	165000	0.00	0	165000	35	57750	222750
400000	PROJECT MANAGEMENT	74000	0	74000	0.00	0	74000	35	25900	99900
TOTAL 700	SPECIAL EQUIP/PROCESS SYSTEM	1163670	203427	1367097	0.00	0	1367097	35	478484	1845581
PROJECT TOTAL		1,560,670	203,427	1,764,097	0.00	0	1,764,097	35	617,434	2,381,531

CSI	DESCRIPTION	ESTIMATE SUBTOTAL	ONSITE INDIRECTS	SUB TOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
IGINEERING										
)0	TECHNICAL SERVICES	397000	0	397000	0.00	0	397000	35	138950	535950
TOTAL ENGINEERING		397,000	0	397,000	0.00	0	397,000	35	138,950	535,950
)NSTRUCTION										
)2	SITEWORK	1089670	203427	1293097	0.00	0	1293097	35	452584	1745681
)9	PROJECT MANAGEMENT	74000	0	74000	0.00	0	74000	35	25900	99900
TOTAL CONSTRUCTION		1,163,670	203,427	1,367,097	0.00	0	1,367,097	35	478,484	1,845,581
:OJECT TOTAL		1,560,670	203,427	1,764,097	0.00	0	1,764,097	35	617,434	2,381,531

REFERENCE: ESTIMATE BASIS SHEET — PAGE 3 OF 7
COST CODE ACCOUNT SUMMARY — PAGE 4 OF 7

THE U.S. DEPARTMENT OF ENERGY - RICHLAND ORDER 5700.3 "COST ESTIMATING, ANALYSIS AND STANDARDIZATION" DATED 3-27-85, PROVIDES GUIDELINES FOR ESTIMATE CONTINGENCIES. THE GUIDELINE FOR A STUDY ESTIMATE SHOULD HAVE AN OVERALL RANGE OF 20 TO 35% .

CONTINGENCY IS EVALUATED AT THE THIRD COST CODE LEVEL AND SUMMARIZED AT THE PRIMARY AND SECONDARY COST CODE LEVEL OF THE DETAILED COST ESTIMATE.

ENGINEERING — ENGINEERING DOLLARS WERE APPLIED AS A PERCENTAGE OF DIRECT CONSTRUCTION COST. DIFINITIVE DESIGN @ 25% AND CONSTRUCTION ENGINEERING/INSPECTION @ 10%.

AVERAGE ENGINEERING CONTINGENCY 35%

CONSTRUCTION — A CONTINGENCY OF 35% WAS USED DUE TO: THE POSSIBILITY OF ENCOUNTERING EXISTING UNDERGROUND UTILITIES, CONTAMINATED SOIL OR ANY OTHER OBSTRUCTIONS THAT WOULD REQUIRE REMOVAL, REROUTING, ADDITIONAL HAND EXCAVATION OR ADDITIONAL BURIAL FEES.

AVERAGE CONSTRUCTION CONTINGENCY 35%

AVERAGE PROJECT CONTINGENCY 35%

BS	DESCRIPTION	ESTIMATE SUBTOTAL	CONTRACT ADMINISTRATION %	CONTRACT ADMINISTRATION TOTAL	BID PACK PREP.	OTHER INDIRECTS	TOTAL INDIRECTS
10000	DEFINITIVE DESIGN	265000	0.00	0	0	0	0
20000	CONSTRUCTION ENG/INSP	132000	0.00	0	0	0	0
20001	TRANSFER LINE	911470	22.00	200523	0	0	200523
20002	CONTAMINATED SOIL REMOVAL	13200	22.00	2904	0	0	2904
30000	BURIAL FEES	165000	0.00	0	0	0	0
90000	PROJECT MANAGEMENT	74000	0.00	0	0	0	0
ROJECT TOTAL		1,560,670		203,427	0	0	203,427

Appendix C LCC Analysis for Alternative 2 Southwest of Grout Area

NIST BLCC4.0 INPUT DATA LISTING

Alternative 2: Route 2 Southwest of Grout Area
FILE NAME: ROUTE2
FILE LAST MODIFIED ON 07-26-1996/07:56:56
PROJECT ALTERNATIVE: Alternative2
COMMENT: Route 2 Southwest of Grout Area

GENERAL DATA:

ANALYSIS TYPE: Federal Analysis--Projects Subject to OMB A-94
BASE DATE FOR LCC ANALYSIS: AUG 1996
STUDY PERIOD: 14 YEARS, 10 MONTHS INCLUDING PLANNING/CONSTRUCTION PERIOD
PLANNING/CONSTRUCTION PERIOD: 1 YEARS, 9 MONTHS
SERVICE DATE: MAY 1998
DISCOUNT AND INTEREST RATES ARE Real (exclusive of general inflation)
DISCOUNT RATE: 7.0%
Escalation rates do not include general inflation

CAPITAL ASSET COST DATA:

INITIAL COST (BASE YEAR $)	1,484,000
EXPECTED ASSET LIFE (YRS/MTHS)	13/0
RESALE VALUE FACTOR	0.00%
AVG PRICE ESC RATE(PLAN/CONST)	0.00%
AVG PRICE ESC RATE(SERVICE PD)	0.00%
NUMBER OF REPLACEMENTS	0

COST-PHASING SCHEDULE BY YEAR OF CONSTRUCTION AND AT SERVICE DATE:

1	0.00%
2	0.00%
SERVICE DATE	100.00%

NO REPLACEMENTS

OPERATING, MAINTENANCE, AND REPAIR COST DATA:

ANNUAL RECUR OM&R COST ($): 0
ESCALATION RATE FOR OM&R: 0.00%
No non-annually-recurring OM&R costs reported.

ENERGY COST DATA:
NUMBER OF ENERGY TYPES = 0

NIST BLCC 4.0: DETAILED LCC ANALYSIS

PART I - INITIAL ASSUMPTIONS AND COST DATA

Project alternative: Alternative2

Run date: 07-26-1996 07:57:18

Run type: Federal Analysis--Projects Subject to OMB A-94

Comment: Route 2 Southwest of Grout Area

Input data file: ROUTE2.DAT, last modified: 07-26-1996/07:56:56

LCC output file: ROUTE2.LCC, created: 07-26-1996/07:56:59

Base Date of Study:	AUG 1996
Service Date:	MAY 1998
Study period:	14.83 years (AUG 1996 through MAY 2011)
Plan/constr. period:	1.75 years (AUG 1996 through APR 1998)
Service Period:	13.08 years (MAY 1998 through MAY 2011)
Discount rate:	7.0% Real (exclusive of general inflation)

End-of-year discounting convention

INITIAL CAPITAL ASSET COSTS (NOT DISCOUNTED)
(ADJUSTED FOR PRICE CHANGES DURING PLAN/CONST. PERIOD, IF ANY)

YEAR (BEGINNING)	COST PHASING	YEARLY COST	TOTAL COST
AT SERVICE DATE: MAY 1998		100.0%	$1,484,000
TOTAL INITIAL CAPITAL ASSET COSTS			$1,484,000

PART II - LIFE-CYCLE COST ANALYSIS

DISCOUNT RATE = 7.0% Real (exclusive of general inflation)

PROJECT ALTERNATIVE: Alternative2 RUN DATE: 07-26-1996/07:57:18

	PRESENT VALUE (1997 DOLLARS)	ANNUAL VALUE (1997 DOLLARS)
CASH REQUIREMENTS AS OF SERVICE DATE:		
DURING CONSTRUCTION	$0	$0
AT SERVICE DATE	$1,318,294	$144,742
SUBTOTAL	$1,318,294	$144,742
OPERATING, MAINTENANCE & REPAIR COSTS:	$0	$0
SUBTOTAL	$0	$0
RESALE VALUE OF ORIG CAPITAL COMPONENTS	$0	$0
RESALE VALUE OF CAPITAL REPLACEMENTS	$0	$0
TOTAL LIFE-CYCLE PROJECT COST	$1,318,294	$144,742

** IEST - INTERACTIVE ESTIMATING **
PRIVITIZATION PHASE 1 LIQUID EFFLUENT TRANSFER
STUDY ESTIMATE (ATLERNATIVE 2)
DOE_R01 - PROJECT COST SUMMARY

COST CODE	DESCRIPTION	ESCALATED TOTAL COST	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
000	ENGINEERING	237,000	35	83,000	320,000
700	SPECIAL EQUIP/PROCESS SYSTEMS	862,000	35	302,000	1,164,000
	(ADJUSTED TO MEET DOE 5100.4)				
	PROJECT TOTAL	1,099,000	35	385,000	1,484,000

TYPE OF ESTIMATE	STUDY ESTIMATE	JULY 25, 1996
ARCHITECT ENGINEER		
OPERATING CONTRACTOR		

REMARKS: ESTIMATE DOES NOT INCLUDE ESCALATION

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

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ONSITE INDIRECTS	SUB TOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
110000	DEFINITIVE DESIGN	158000	0	158000	0.00	0	158000	35	55300	213300
120000	CONSTRUCTION ENG/INSP	79000	0	79000	0.00	0	79000	35	27650	106650
SUBTOTAL 1	ENGINEERING	237000	0	237000	0.00	0	237000	35	82950	319950
320001	TRANSFER LINE	626920	137922	764842	0.00	0	764842	35	267695	1032537
320002	CONTAMINATED SOIL REMOVAL	2200	484	2684	0.00	0	2684	35	939	3623
SUBTOTAL 32	CONSTRUCTION-FIXED PRICE	629120	138406	767526	0.00	0	767526	35	268634	1036160
330000	BURIAL FEES	50000	0	50000	0.00	0	50000	35	17500	67500
SUBTOTAL 33	CONSTRUCTION-O/C	50000	0	50000	0.00	0	50000	35	17500	67500
SUBTOTAL 3	CONSTRUCTION	679120	138406	817526	0.00	0	817526	35	286134	1103660
400000	PROJECT MANAGEMENT	44000	0	44000	0.00	0	44000	35	15400	59400
SUBTOTAL 4	PROJECT INTEGRATION	44000	0	44000	0.00	0	44000	35	15400	59400
PROJECT TOTAL		960,120	138,406	1,098,526	0.00	0	1,098,526	35	384,484	1,483,010

. DOCUMENTS AND DRAWINGS

DOCUMENTS: (NONE) VERBAL DIRECTION

DRAWINGS: H-2-140367 AND H-2-140368 REF. DRAWINGS FIGURE I

. MATERIAL PRICES

UNIT COSTS REPRESENT CURRENT PRICES FOR SPECIFIED MATERIAL.

. LABOR RATES

A.) ICF-KH HOURLY RATES ARE BASED ON THE 1995 FISCAL YEAR BUDGET LIQUIDATION RATES AS ISSUED BY KEH FINANCE (EFFECTIVE 10-01-94). SEE ALSO THE FY 1995 PLANNING RATES * (REPORT BGHB7012).

. GENERAL REQUIREMENTS/TECHNICAL SERVICES/OVERHEADS

A.) ONSITE CONTRACT ADMINISTRATION AND CONSTRUCTION MANAGEMENT COSTS, ASSOCIATED WITH THE OVERALL MANAGEMENT OF THE FIXED PRICE CONTRACTS, ARE INCLUDED AS A COMPOSITE PERCENTAGE AND LUMP SUM ALLOWANCE (FOR BID PACKAGE PREP) BASED ON THE ESTIMATING FACTOR/BILLING SCHEDULE. THE TOTAL COMPOSITE PERCENTAGE AND LUMP SUM ALLOWANCE ARE APPLIED AGAINST THE TOTAL FIXED PRICE CONTRACT AMOUNT WHICH IS REFLECTED ON THE KEH SUMMARY REPORT DOE_R07, INCLUDED WITH THIS ESTIMATE. (FINAL ESTIMATES MAY BE PARTIALLY MANLOADED AND INCLUDED WITHIN THE ESTIMATE DETAIL)

B.) FIXED PRICE CONTRACTOR OVERHEAD, PROFIT, BOND AND INSURANCE COSTS HAVE BEEN APPLIED AT THE FOLLOWING PERCENTAGES AND ARE REFLECTED IN THE "OH&P/B&I" COLUMN OF THE ESTIMATE DETAIL:
LABOR -20% MATERIAL -20%

. ESCALATION

ESCALATION PERCENTAGES WERE CALCULATED FROM THE AUGUST 1994 UPDATE OF THE ECONOMIC ESCALATION PRICE CHANGE INDICES FOR DOE CONSTRUCTION PROJECTS AS PUBLISHED BY THE "OFFICE OF INFRASTRUCTURE AQUISITION" FM-50.

. ROUNDING

U.S. DEPARTMENT OF ENERGY - DOE ORDER 5100.4 PAGE I-32 SUBPARAGRAPH (M), REQUIRES ROUNDING OF ALL GENERAL PLANT PROJECTS (GPP'S) AND LINE ITEM (LI) COST ESTIMATES. REFERENCE: DOE 5100.4, FIGURE I-11, DATED 10-31-84.

. REMARKS

A.) ITEMS THAT SHOW UP IN SUBCONTRACT COLUMN ARE UNIT PRICE AND INCLUDE CONTRACTORS OH&P.
B.) ALLOWANCES WERE USED ON THE FOLLOWING ITEMS DUE TO LIMITED INFORMATION AVAILABLE AT TIME OF ESTIMATE: HAND EXCAVATION, HYDROSEEDING, GRAVEL STABILIZATION, RADIOACTIVE SOIL REMOVAL AND BURIAL FEES.
C.) ALL WORK TO BE DONE FIXED PRICE CONSTRUCTION.
D.) DEFINITIVE DESIGN, CONSTRUCTION ENGINEERING/INSPECTION AND PROJECT INTEGRATION WERE PUT IN AS PERCENTAGES OF DIRECT CONSTRUCTION COST AS FOLLOWS: D/D 25%, E/I 10% AND P/I 7%.

COST CODE/WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ONSITE INDIRECTS	SUB TOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
000	ENGINEERING									
110000	DEFINITIVE DESIGN	158000	0	158000	0.00	0	158000	35	55300	213300
120000	CONSTRUCTION ENG/INSP	79000	0	79000	0.00	0	79000	35	27650	106650
TOTAL 000	ENGINEERING	237000	0	237000	0.00	0	237000	35	82950	319950
700	SPECIAL EQUIP/PROCESS SYSTEMS									
320001	TRANSFER LINE	626920	137922	764842	0.00	0	764842	35	267695	1032537
320002	CONTAMINATED SOIL REMOVAL	2200	484	2684	0.00	0	2684	35	939	3623
330000	BURIAL FEES	50000	0	50000	0.00	0	50000	35	17500	67500
400000	PROJECT MANAGEMENT	44000	0	44000	0.00	0	44000	35	15400	59400
TOTAL 700	SPECIAL EQUIP/PROCESS SYSTEM	723120	138406	861526	0.00	0	861526	35	301534	1163060
PROJECT TOTAL		960,120	138,406	1,098,526	0.00	0	1,098,526	35	384,484	1,483,010

CSI	DESCRIPTION	ESTIMATE SUBTOTAL	ONSITE INDIRECTS	SUB TOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
ENGINEERING										
00	TECHNICAL SERVICES	237000	0	237000	0.00	0	237000	35	82950	319950
TOTAL ENGINEERING		237,000	0	237,000	0.00	0	237,000	35	82,950	319,950
CONSTRUCTION										
02	SITEWORK	679120	138406	817526	0.00	0	817526	35	286134	1103660
19	PROJECT MANAGEMENT	44000	0	44000	0.00	0	44000	35	15400	59400
TOTAL CONSTRUCTION		723,120	138,406	861,526	0.00	0	861,526	35	301,534	1,163,060
PROJECT TOTAL		960,120	138,406	1,098,526	0.00	0	1,098,526	35	384,484	1,483,010

REFERENCE: ESTIMATE BASIS SHEET — PAGE 3 OF 7
COST CODE ACCOUNT SUMMARY — PAGE 4 OF 7

THE U.S. DEPARTMENT OF ENERGY - RICHLAND ORDER 5700.3 "COST ESTIMATING, ANALYSIS AND STANDARDIZATION" DATED 3-27-85, PROVIDES GUIDELINES FOR ESTIMATE CONTINGENCIES. THE GUIDELINE FOR A STUDY ESTIMATE SHOULD HAVE AN OVERALL RANGE OF 20 TO 35% .

CONTINGENCY IS EVALUATED AT THE THIRD COST CODE LEVEL AND SUMMARIZED AT THE PRIMARY AND SECONDARY COST CODE LEVEL OF THE DETAILED COST ESTIMATE.

ENGINEERING — ENGINEERING DOLLARS WERE APPLIED AS A PERCENTAGE OF DIRECT CONSTRUCTION COST. DIFINITIVE DESIGN @ 25% AND CONSTRUCTION ENGINEERING/INSPECTION @ 10%.

AVERAGE ENGINEERING CONTINGENCY 35%

CONSTRUCTION — A CONTINGENCY OF 35% WAS USED DUE TO: THE POSSIBILITY OF ENCOUNTERING EXISTING UNDERGROUND UTILITIES, CONTAMINATED SOIL OR ANY OTHER OBSTRUCTIONS THAT WOULD REQUIRE REMOVAL, REROUTING, ADDITIONAL HAND EXCAVATION OR ADDITIONAL BURIAL FEES.

AVERAGE CONSTRUCTION CONTINGENCY 35%

AVERAGE PROJECT CONTINGENCY 35%

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	CONTRACT ADMINISTRATION %	CONTRACT ADMINISTRATION TOTAL	BID PACK PREP.	OTHER INDIRECTS	TOTAL INDIRECTS
110000	DEFINITIVE DESIGN	158000	0.00	0	0	0	0
120000	CONSTRUCTION ENG/INSP	79000	0.00	0	0	0	0
320001	TRANSFER LINE	626920	22.00	137922	0	0	137922
320002	CONTAMINATED SOIL REMOVAL	2200	22.00	484	0	0	484
330000	BURIAL FEES	50000	0.00	0	0	0	0
400000	PROJECT MANAGEMENT	44000	0.00	0	0	0	0
PROJECT TOTAL		960,120		138,406	0	0	138,406

Appendix D LCC Analysis for Alternative 3 North of Grout Area

NIST BLCC4.0 INPUT DATA LISTING

Alternative 3: Route 3 North of Grout Area
FILE NAME: ROUTE3
FILE LAST MODIFIED ON 07-26-1996/07:59:50
PROJECT ALTERNATIVE: Alternative3
COMMENT: Route 3 North of Grout Area

GENERAL DATA:

ANALYSIS TYPE: Federal Analysis--Projects Subject to OMB A-94
BASE DATE FOR LCC ANALYSIS: AUG 1996
STUDY PERIOD: 14 YEARS, 10 MONTHS INCLUDING PLANNING/CONSTRUCTION PERIOD
PLANNING/CONSTRUCTION PERIOD: 1 YEARS, 9 MONTHS
SERVICE DATE: MAY 1998
DISCOUNT AND INTEREST RATES ARE Real (exclusive of general inflation)
DISCOUNT RATE: 7.0%
Escalation rates do not include general inflation

CAPITAL ASSET COST DATA:

INITIAL COST (BASE YEAR $)	2,260,000
EXPECTED ASSET LIFE (YRS/MTHS)	13/0
RESALE VALUE FACTOR	0.00%
AVG PRICE ESC RATE(PLAN/CONST)	0.00%
AVG PRICE ESC RATE(SERVICE PD)	0.00%
NUMBER OF REPLACEMENTS	0

COST-PHASING SCHEDULE BY YEAR OF CONSTRUCTION AND AT SERVICE DATE:

	1	0.00%
	2	0.00%
SERVICE DATE		100.00%

NO REPLACEMENTS

OPERATING, MAINTENANCE, AND REPAIR COST DATA:

ANNUAL RECUR OM&R COST ($):	0
ESCALATION RATE FOR OM&R:	0.00%

No non-annually-recurring OM&R costs reported.

ENERGY COST DATA:
NUMBER OF ENERGY TYPES = 0

NIST BLCC 4.0: DETAILED LCC ANALYSIS

PART I - INITIAL ASSUMPTIONS AND COST DATA

Project alternative: Alternative3

Run date: 07-26-1996 09:36:46

Run type: Federal Analysis--Projects Subject to OMB A-94

Comment: Route 3 North of Grout Area

Input data file: ROUTE3.DAT, last modified: 07-26-1996/09:36:22

LCC output file: ROUTE3.LCC, created: 07-26-1996/09:36:27

Base Date of Study: AUG 1996

Service Date: MAY 1998

Study period: 14.83 years (AUG 1996 through MAY 2011)

Plan/constr. period: 1.75 years (AUG 1996 through APR 1998)

Service Period: 13.08 years (MAY 1998 through MAY 2011)

Discount rate: 7.0% Real (exclusive of general inflation)

End-of-year discounting convention

INITIAL CAPITAL ASSET COSTS (NOT DISCOUNTED)
(ADJUSTED FOR PRICE CHANGES DURING PLAN/CONST. PERIOD, IF ANY)

YEAR (BEGINNING)	COST PHASING	YEARLY COST	TOTAL COST
AT SERVICE DATE:	MAY 1998	100.0%	$2,260,000
TOTAL INITIAL CAPITAL ASSET COSTS			$2,260,000

PART II - LIFE-CYCLE COST ANALYSIS

DISCOUNT RATE = 7.0% Real (exclusive of general inflation)

PROJECT ALTERNATIVE: Alternative3 RUN DATE: 07-26-1996/09:36:46

	PRESENT VALUE (1997 DOLLARS)	ANNUAL VALUE (1997 DOLLARS)
CASH REQUIREMENTS AS OF SERVICE DATE:		
DURING CONSTRUCTION	$0	$0
AT SERVICE DATE	$2,007,644	$220,428
SUBTOTAL	$2,007,644	$220,428
OPERATING, MAINTENANCE & REPAIR COSTS:		
SUBTOTAL	$0	$0
RESALE VALUE OF ORIG CAPITAL COMPONENTS	$0	$0
RESALE VALUE OF CAPITAL REPLACEMENTS	$0	$0
TOTAL LIFE-CYCLE PROJECT COST	$2,007,644	$220,428

** IEST - INTERACTIVE ESTIMATING **
PRIVITIZATION PHASE 1 LIQUID EFFLUENT TRANSFER
STUDY ESTIMATE (ALTERNATIVE 3)
DOE_R01 - PROJECT COST SUMMARY

COST CODE	DESCRIPTION	ESCALATED TOTAL COST	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
000	ENGINEERING	366,000	35	128,000	494,000
700	SPECIAL EQUIP/PROCESS SYSTEMS	1,308,000	35	458,000	1,766,000
	(ADJUSTED TO MEET DOE 5100.4)				
	PROJECT TOTAL	1,674,000	35	586,000	2,260,000

TYPE OF ESTIMATE	STUDY ESTIMATE	JULY 25, 1996
ARCHITECT ENGINEER		
OPERATING CONTRACTOR		

REMARKS: ESTIMATE DOES NOT INCLUDE ESCALATION

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

** IEST - INTERACTIVE ESTIMATING **
PRIVITIZATION PHASE 1 LIQUID EFFLUENT TRANSFER
STUDY ESTIMATE (ALTERNATIVE 3)
DOE_R02 - WORK BREAKDOWN STRUCTURE SUMMARY

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ONSITE INDIRECTS	SUB TOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
110000	DEFINITIVE DESIGN	244000	0	244000	0.00	0	244000	35	85400	329400
120000	CONSTRUCTION ENG/INSP	122000	0	122000	0.00	0	122000	35	42700	164700
SUBTOTAL 1	ENGINEERING	366000	0	366000	0.00	0	366000	35	128100	494100
320001	TRANSFER LINE	973200	214104	1187304	0.00	0	1187304	35	415556	1602860
320002	CONTAMINATED SOIL REMOVAL	2200	484	2684	0.00	0	2684	35	939	3623
SUBTOTAL 32	CONSTRUCTION-FIXED PRICE	975400	214588	1189988	0.00	0	1189988	35	416495	1606483
330000	BURIAL FEES	50000	0	50000	0.00	0	50000	35	17500	67500
SUBTOTAL 33	CONSTRUCTION-O/C	50000	0	50000	0.00	0	50000	35	17500	67500
SUBTOTAL 3	CONSTRUCTION	1025400	214588	1239988	0.00	0	1239988	35	433995	1673983
400000	PROJECT MANAGEMENT	68000	0	68000	0.00	0	68000	35	23800	91800
SUBTOTAL 4	PROJECT INTEGRATION	68000	0	68000	0.00	0	68000	35	23800	91800
PROJECT TOTAL		1,459,400	214,588	1,673,988	0.00	0	1,673,988	35	585,895	2,259,883

1. DOCUMENTS AND DRAWINGS

DOCUMENTS: (NONE) VERBAL DIRECTION

DRAWINGS: H-2-140367 AND H-2-140368 REF. DRAWINGS FIGURE 1

2. MATERIAL PRICES

UNIT COSTS REPRESENT CURRENT PRICES FOR SPECIFIED MATERIAL.

3. LABOR RATES

A.) ICF-KH HOURLY RATES ARE BASED ON THE 1995 FISCAL YEAR BUDGET LIQUIDATION RATES AS ISSUED BY KEH FINANCE (EFFECTIVE 10-01-94). SEE ALSO THE FY 1995 PLANNING RATES * (REPORT BGHB7012).

4. GENERAL REQUIREMENTS/TECHNICAL SERVICES/OVERHEADS

A.) ONSITE CONTRACT ADMINISTRATION AND CONSTRUCTION MANAGEMENT COSTS, ASSOCIATED WITH THE OVERALL MANAGEMENT OF THE FIXED PRICE CONTRACTS, ARE INCLUDED AS A COMPOSITE PERCENTAGE AND LUMP SUM ALLOWANCE (FOR BID PACKAGE PREP) BASED ON THE ESTIMATING FACTOR/BILLING SCHEDULE. THE TOTAL COMPOSITE PERCENTAGE AND LUMP SUM ALLOWANCE ARE APPLIED AGAINST THE TOTAL FIXED PRICE CONTRACT AMOUNT WHICH IS REFLECTED ON THE KEH SUMMARY REPORT DOE_R07, INCLUDED WITH THIS ESTIMATE. (FINAL ESTIMATES MAY BE PARTIALLY MANLOADED AND INCLUDED WITHIN THE ESTIMATE DETAIL)

B.) FIXED PRICE CONTRACTOR OVERHEAD, PROFIT, BOND AND INSURANCE COSTS HAVE BEEN APPLIED AT THE FOLLOWING PERCENTAGES AND ARE REFLECTED IN THE "OH&P/B&I" COLUMN OF THE ESTIMATE DETAIL:
LABOR -20% MATERIAL -20%

5. ESCALATION

ESCALATION PERCENTAGES WERE CALCULATED FROM THE AUGUST 1994 UPDATE OF THE ECONOMIC ESCALATION PRICE CHANGE INDICES FOR DOE CONSTRUCTION PROJECTS AS PUBLISHED BY THE "OFFICE OF INFRASTRUCTURE AQUISITION" FM-50.

6. ROUNDING

U.S. DEPARTMENT OF ENERGY - DOE ORDER 5100.4 PAGE I-32 SUBPARAGRAPH (M), REQUIRES ROUNDING OF ALL GENERAL PLANT PROJECTS (GPP'S) AND LINE ITEM (LI) COST ESTIMATES. REFERENCE: DOE 5100.4, FIGURE I-11, DATED 10-31-84.

7. REMARKS

A.) ITEMS THAT SHOW UP IN SUBCONTRACT COLUMN ARE UNIT PRICE AND INCLUDE CONTRACTORS OH&P.
B.) ALLOWANCES WERE USED ON THE FOLLOWING ITEMS DUE TO LIMITED INFORMATION AVAILABLE AT TIME OF ESTIMATE: HAND EXCAVATION, HYDROSEEDING, GRAVEL STABILIZATION, RADIOACTIVE SOIL REMOVAL AND BURIAL FEES.
C.) ALL WORK TO BE DONE FIXED PRICE CONSTRUCTION.
D.) DEFINITIVE DESIGN, CONSTRUCTION ENGINEERING/INSPECTION AND PROJECT INTEGRATION WERE PUT IN AS PERCENTAGES OF DIRECT CONSTRUCTION COST AS FOLLOWS: D/D 25%, E/I 10% AND P/I 7%.

COST CODE/WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ONSITE INDIRECTS	SUB TOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
000	ENGINEERING									
110000	DEFINITIVE DESIGN	244000	0	244000	0.00	0	244000	35	85400	329400
120000	CONSTRUCTION ENG/INSP	122000	0	122000	0.00	0	122000	35	42700	164700
TOTAL 000	ENGINEERING	366000	0	366000	0.00	0	366000	35	128100	494100
700	SPECIAL EQUIP/PROCESS SYSTEMS									
320001	TRANSFER LINE	973200	214104	1187304	0.00	0	1187304	35	415556	1602860
320002	CONTAMINATED SOIL REMOVAL	2200	484	2684	0.00	0	2684	35	939	3623
330000	BURIAL FEES	50000	0	50000	0.00	0	50000	35	17500	67500
500000	PROJECT MANAGEMENT	68000	0	68000	0.00	0	68000	35	23800	91800
TOTAL 700	SPECIAL EQUIP/PROCESS SYSTEM	1093400	214588	1307988	0.00	0	1307988	35	457795	1765783
PROJECT TOTAL		1,459,400	214,588	1,673,988	0.00	0	1,673,988	35	585,895	2,259,883

CSI	DESCRIPTION	ESTIMATE SUBTOTAL	ONSITE INDIRECTS	SUB TOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
ENGINEERING										
00	TECHNICAL SERVICES	366000	0	366000	0.00	0	366000	35	128100	494100
TOTAL ENGINEERING		366,000	0	366,000	0.00	0	366,000	35	128,100	494,100
CONSTRUCTION										
02	SITEWORK	1025400	214588	1239988	0.00	0	1239988	35	433995	1673983
19	PROJECT MANAGEMENT	68000	0	68000	0.00	0	68000	35	23800	91800
TOTAL CONSTRUCTION		1,093,400	214,588	1,307,988	0.00	0	1,307,988	35	457,795	1,765,783
PROJECT TOTAL		1,459,400	214,588	1,673,988	0.00	0	1,673,988	35	585,895	2,259,883

REFERENCE: ESTIMATE BASIS SHEET
COST CODE ACCOUNT SUMMARY

PAGE 3 OF 7
PAGE 4 OF 7

THE U.S. DEPARTMENT OF ENERGY - RICHLAND ORDER 5700.3 "COST ESTIMATING, ANALYSIS AND STANDARDIZATION" DATED 3-27-85, PROVIDES GUIDELINES FOR ESTIMATE CONTINGENCIES. THE GUIDELINE FOR A STUDY ESTIMATE SHOULD HAVE AN OVERALL RANGE OF 20 TO 35% .

CONTINGENCY IS EVALUATED AT THE THIRD COST CODE LEVEL AND SUMMARIZED AT THE PRIMARY AND SECONDARY COST CODE LEVEL OF THE DETAILED COST ESTIMATE.

ENGINEERING — ENGINEERING DOLLARS WERE APPLIED AS A PERCENTAGE OF DIRECT CONSTRUCTION COST. DIFINITIVE DESIGN @ 25% AND CONSTRUCTION ENGINEERING/INSPECTION @ 10%.

AVERAGE ENGINEERING CONTINGENCY 35%

CONSTRUCTION — A CONTINGENCY OF 35% WAS USED DUE TO: THE POSSIBILITY OF ENCOUNTERING EXISTING UNDERGROUND UTILITIES, CONTAMINATED SOIL OR ANY OTHER OBSTRUCTIONS THAT WOULD REQUIRE REMOVAL, REROUTING, ADDITIONAL HAND EXCAVATION OR ADDITIONAL BURIAL FEES.

AVERAGE CONSTRUCTION CONTINGENCY 35%

AVERAGE PROJECT CONTINGENCY 35%

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	CONTRACT ADMINISTRATION %	CONTRACT ADMINISTRATION TOTAL	BID PACK PREP.	OTHER INDIRECTS	TOTAL INDIRECTS
110000	DEFINITIVE DESIGN	244000	0.00	0	0	0	0
120000	CONSTRUCTION ENG/INSP	122000	0.00	0	0	0	0
320001	TRANSFER LINE	973200	22.00	214104	0	0	214104
320002	CONTAMINATED SOIL REMOVAL	2200	22.00	484	0	0	484
330000	BURIAL FEES	50000	0.00	0	0	0	0
400000	PROJECT MANAGEMENT	68000	0.00	0	0	0	0
PROJECT TOTAL		1,459,400		214,588	0	0	214,588

Appendix E LCC Analysis for Alternative 4 Tractor Tank Trailer

Tank Trailer Operating Cost Estimate

Assumption: The effluent generation rate Flow = 1 gallon/min

Day Shift = 8 hr/day Operation = 365 day/yr

Annual flow rate = (Flow) x (Day Shift) x (Operation)

= (1 gallon/min) x (60 min/hr) x (8 hr/day) x (365 day/yr)

= 1 x 60 x 8 x 365 x gallon/yr

= 175,200 gallon/yr

Tank Trailer Capacity = 5000 gallon

No. of trips per year = (Annual flow rate) / (Capacity)

= (175,200 gallon/yr) / (5000 gallon)

= (175200/5000)/yr

= 35 / yr

Estimated cost per trip:

Loading = 50 man hr (Goodwin 1996)
Unloading = 4 man hr (ETF Field Data Lowe 1996)

Total labor = Loading + Unloading

= 50 + 4 = 54 hr

Labor rate = $80/hr Cost per trip = (Labor rate) x (Total labor)
= ($80/hr) x (54 hr)
= $4,320

Total Operating Cost = (Cost per trip) x (No. of trips per year)

= ($4,320) x (35/yr)

= $151,200/yr

NIST BLCC4.0 INPUT DATA LISTING

Alternative 4: Tractor Tank Trailer

FILE NAME: ROUTE4
FILE LAST MODIFIED ON 07-26-1996/12:52:43
PROJECT ALTERNATIVE: Alternative4
COMMENT: Alternative 4 Tractor Tank Trailer

GENERAL DATA:

ANALYSIS TYPE: Federal Analysis--Projects Subject to OMB A-94
BASE DATE FOR LCC ANALYSIS: AUG 1996
STUDY PERIOD: 14 YEARS, 10 MONTHS INCLUDING PLANNING/CONSTRUCTION PERIOD
PLANNING/CONSTRUCTION PERIOD: 1 YEARS, 9 MONTHS
SERVICE DATE: MAY 1998
DISCOUNT AND INTEREST RATES ARE Real (exclusive of general inflation)
DISCOUNT RATE: 7.0%
Escalation rates do not include general inflation

CAPITAL ASSET COST DATA:

INITIAL COST (BASE YEAR $)	66,500
EXPECTED ASSET LIFE (YRS/MTHS)	13/0
RESALE VALUE FACTOR	0.00%
AVG PRICE ESC RATE(PLAN/CONST)	0.00%
AVG PRICE ESC RATE(SERVICE PD)	0.00%
NUMBER OF REPLACEMENTS	0

COST-PHASING SCHEDULE BY YEAR OF CONSTRUCTION AND AT SERVICE DATE:

	1	0.00%
	2	0.00%
SERVICE DATE		100.00%

NO REPLACEMENTS

OPERATING, MAINTENANCE, AND REPAIR COST DATA:

ANNUAL RECUR OM&R COST ($): 151,200
ESCALATION RATE FOR OM&R: 0.00%

NON-AN RECURRING OM&R COSTS (YRS/MTHS FROM SERVICE DATE; COST IN BASE YEAR $):

Y/M	COST
5/0	10000

ENERGY COST DATA:

NUMBER OF ENERGY TYPES = 0

NIST BLCC 4.0: DETAILED LCC ANALYSIS

PART I - INITIAL ASSUMPTIONS AND COST DATA

Project alternative: Alternative4

Run date: 07-26-1996 12:53:08

Run type: Federal Analysis--Projects Subject to OMB A-94

Comment: Alternative 4 Tractor Tank Trailer

Input data file: ROUTE4.DAT, last modified: 07-26-1996/12:52:43

LCC output file: ROUTE4.LCC, created: 07-26-1996/12:52:45

Base Date of Study:	AUG 1996
Service Date:	MAY 1998
Study period:	14.83 years (AUG 1996 through MAY 2011)
Plan/constr. period:	1.75 years (AUG 1996 through APR 1998)
Service Period:	13.08 years (MAY 1998 through MAY 2011)
Discount rate:	7.0% Real (exclusive of general inflation)

End-of-year discounting convention

INITIAL CAPITAL ASSET COSTS (NOT DISCOUNTED)
(ADJUSTED FOR PRICE CHANGES DURING PLAN/CONST. PERIOD, IF ANY)

YEAR (BEGINNING)	COST PHASING	YEARLY COST	TOTAL COST
AT SERVICE DATE:	MAY 1998	100.0%	$66,500
TOTAL INITIAL CAPITAL ASSET COSTS			$66,500

PART II - LIFE-CYCLE COST ANALYSIS

DISCOUNT RATE = 7.0% Real (exclusive of general inflation)

PROJECT ALTERNATIVE: Alternative 4 RUN DATE: 07-26-1996/12:53:08

	PRESENT VALUE (1997 DOLLARS)	ANNUAL VALUE (1997 DOLLARS)
CASH REQUIREMENTS AS OF SERVICE DATE:		
DURING CONSTRUCTION	$0	$0
AT SERVICE DATE	$59,074	$6,486
SUBTOTAL	$59,074	$6,486
OPERATING, MAINTENANCE & REPAIR COSTS:		
ANNUALLY RECURRING COSTS (NON-ENERGY)	$1,127,191	$123,759
NON-ANNUALLY RECURRING COSTS	$6,334	$695
SUBTOTAL	$1,133,525	$124,455
RESALE VALUE OF ORIG CAPITAL COMPONENTS	$0	$0
RESALE VALUE OF CAPITAL REPLACEMENTS	$0	$0
TOTAL LIFE-CYCLE PROJECT COST	$1,192,600	$130,941

Polar®
Tank Trailer, Inc.

12810 County Road 17
Holdingford, MN 56340-9773
320/746-2255
FAX 320/746-2937

TELECOPIER COVER LETTER

DATE: 6-26 TIME STARTED: _____

PLEASE DELIVER THE FOLLOWING PAGES TO: ADITYA PALIT

COMPANY/FIRM: WESTINGHOUSE

TELECOPIER NUMBER: 509-373-4115

COMMENTS: APPROXIMATE PRICE FOR UPGRADING UNIT TO D.O.T. 412 = $66,500.00 Delivered

CONFIRMATION REQUESTED: YES _____ NO _____

WE ARE TRANSMITTING 3 PAGES (INCLUDING THIS COVER LETTER).

PLEASE CALL BACK IF TRANSMISSION IS NOT COMPLETE.

OPERATOR'S NAME: RICK RALPH

F001 5/96

Author: Steven S (Steve) Lowe at ~WHC302
Date: 9/11/96 2:26 PM
Subject: Comments on TWRS Effluent Transfer Study
---------- Message Contents ----------

Bob:
Here's some comments on the Liquid Effluent Transfer Study by TWRS privatization. I'll bring down the EDT later this afternoon.

1. (Section 4.3, line 7) Take out the word "hazardous." The unloading facility can accommodate other waste types, not just hazardous.

2. (Sections 6.1.5 and 6.1.6) Evaluation of tank trailers against Safety and Environmental criteria should consider the possibility for human error. Scores should be less than 3 for this option and these criteria.

3. (Section 6.1.6) Environmental impact for the tank trailer opetion is zero here, but Section 6.1.3 Reliability says the tank trailer option has the greatest environmental impact.

4. (Page E-1) The labor for unloading tank trailers should be 4 hr (3 people at 1 hr 20 min each) not 50 hr, based on field data for the ETF receiving waste water from the Emergency Dump Basin at N Reactor in 5000 gal batches.

Steve Lowe
376-4027

Appendix F Life Cycle Cost Analysis for Storage Tank/Loading station

NIST BLCC4.0 INPUT DATA LISTING

Alternative: Storage Tank and Loading station
FILE NAME: LOADSTAT
FILE LAST MODIFIED ON 08-01-1996/11:21:14
PROJECT ALTERNATIVE: Load Station
COMMENT: Storage Tank and Loadout Station

GENERAL DATA:

ANALYSIS TYPE: Federal Analysis--Projects Subject to OMB A-94
BASE DATE FOR LCC ANALYSIS: AUG 1996
STUDY PERIOD: 14 YEARS, 10 MONTHS INCLUDING PLANNING/CONSTRUCTION PERIOD
PLANNING/CONSTRUCTION PERIOD: 1 YEARS, 9 MONTHS
SERVICE DATE: MAY 1998
DISCOUNT AND INTEREST RATES ARE Real (exclusive of general inflation)
DISCOUNT RATE: 7.0%
Escalation rates do not include general inflation

CAPITAL ASSET COST DATA:

INITIAL COST (BASE YEAR $)	855,000
EXPECTED ASSET LIFE (YRS/MTHS)	13/0
RESALE VALUE FACTOR	0.00%
AVG PRICE ESC RATE(PLAN/CONST)	0.00%
AVG PRICE ESC RATE(SERVICE PD)	0.00%
NUMBER OF REPLACEMENTS	0

COST-PHASING SCHEDULE BY YEAR OF CONSTRUCTION AND AT SERVICE DATE:

	1	0.00%
	2	0.00%
SERVICE DATE		100.00%

NO REPLACEMENTS

OPERATING, MAINTENANCE, AND REPAIR COST DATA:

ANNUAL RECUR OM&R COST ($): 0
ESCALATION RATE FOR OM&R: 0.00%
No non-annually-recurring OM&R costs reported.

ENERGY COST DATA:
NUMBER OF ENERGY TYPES = 0

NIST BLCC 4.0: DETAILED LCC ANALYSIS

PART I - INITIAL ASSUMPTIONS AND COST DATA

Project alternative: Load Station

Run date: 08-01-1996 11:21:37

Run type: Federal Analysis--Projects Subject to OMB A-94

Comment: Storage Tank and Loadout Station

Input data file: LOADSTAT.DAT, last modified: 08-01-1996/11:21:14

LCC output file: LOADSTAT.LCC, created: 08-01-1996/11:21:16

Base Date of Study: AUG 1996

Service Date: MAY 1998

Study period: 14.83 years (AUG 1996 through MAY 2011)

Plan/constr. period: 1.75 years (AUG 1996 through APR 1998)

Service Period: 13.08 years (MAY 1998 through MAY 2011)

Discount rate: 7.0% Real (exclusive of general inflation)

End-of-year discounting convention

INITIAL CAPITAL ASSET COSTS (NOT DISCOUNTED)
(ADJUSTED FOR PRICE CHANGES DURING PLAN/CONST. PERIOD, IF ANY)

YEAR (BEGINNING)	COST PHASING	YEARLY COST	TOTAL COST
AT SERVICE DATE: MAY 1998	100.0%	$855,000	
TOTAL INITIAL CAPITAL ASSET COSTS			$855,000

PART II - LIFE-CYCLE COST ANALYSIS

DISCOUNT RATE = 7.0% Real (exclusive of general inflation)

PROJECT ALTERNATIVE: Load Station RUN DATE: 08-01-1996/11:21:37

	PRESENT VALUE (1997 DOLLARS)	ANNUAL VALUE (1997 DOLLARS)
CASH REQUIREMENTS AS OF SERVICE DATE:		
DURING CONSTRUCTION	$0	$0
AT SERVICE DATE	$759,529	$83,392
SUBTOTAL	$759,529	$83,392
OPERATING, MAINTENANCE & REPAIR COSTS:	$0	$0
SUBTOTAL	$0	$0
RESALE VALUE OF ORIG CAPITAL COMPONENTS	$0	$0
RESALE VALUE OF CAPITAL REPLACEMENTS	$0	$0
TOTAL LIFE-CYCLE PROJECT COST	$759,529	$83,392

** IEST - INTERACTIVE ESTIMATING **
TANK FARM RESTORATION & SAFE OPERATIONS
LOAD-IN/LOAD-OUT OPTION
DOE_R01 - PROJECT COST SUMMARY

COST CODE	DESCRIPTION	ESCALATED TOTAL COST	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
020	TITLE II	82,000	20	16,000	98,000
030	TITLE III	40,000	20	8,000	48,000
060	PROJECT MANAGEMENT	42,000	20	8,000	50,000
	(ADJUSTED TO MEET DOE 5100.4)	1,000		3,000	4,000
		165,000	21	35,000	200,000
550	OTHER STRUCTURES	86,000	35	30,000	116,000
600	UTILITIES	319,000	25	80,000	399,000
700	SPECIAL EQUIP/PROCESS SYSTEMS	109,000	26	29,000	138,000
	(ADJUSTED TO MEET DOE 5100.4)	1,000		1,000	2,000
TOTAL CONSTRUCTION COST		515,000	25	140,000	655,000
TOTAL ESTIMATED CONSTRUCTION COST		680,000	26	175,000	855,000

TYPE OF ESTIMATE STUDY SEPTEMBER 19, 1996	REMARKS:
ARCHITECT ENGINEER	
OPERATING CONTRACTOR	

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

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ONSITE INDIRECTS	SUB TOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
5B1101	DEFINITIVE DESIGN	81500	0	81500	0.00	0	81500	20	16300	9780
5B1201	ENG/INSPECTION	40000	0	40000	0.00	0	40000	20	8000	4800
SUBTOTAL 5B1	DESIGN ONSITE E/C	121500	0	121500	0.00	0	121500	20	24300	14580
5B4382	PIPING SYSTEMS	36025	16362	52387	0.00	0	52387	25	13097	6548
5B4384	LOAD-OUT STATION	69365	17064	86429	0.00	0	86429	35	30249	11667
5B4385	BELOW GRADE PIPING	24884	6121	31005	0.00	0	31005	30	9302	4030
5B4386	ABOVE GRADE PIPING SYS	214094	52667	266761	0.00	0	266761	25	66690	33345
5B4387	ELECTRICAL	62944	15484	78428	0.00	0	78428	25	19607	9803
SUBTOTAL 5B43	LOAD-OUT SYSTEM	407312	107698	515010	0.00	0	515010	27	138945	65395
SUBTOTAL 5B4	FIXED PRICE CONSTRUCTION	407312	107698	515010	0.00	0	515010	27	138945	65395
6B1101	WHC PROJECT MANAGEMENT	42300	0	42300	0.00	0	42300	20	8460	5076
SUBTOTAL 6B1	WHC PROJECT MANAGEMENT	42300	0	42300	0.00	0	42300	20	8460	5076
PROJECT TOTAL		571,112	107,698	678,810	0.00	0	678,810	25	171,705	850,51

1. DOCUMENTS AND DRAWINGS

DOCUMENTS: NONE

DRAWINGS: NONE

2. MATERIAL PRICES

UNIT COSTS REPRESENT CURRENT PRICES FOR SPECIFIED MATERIAL. VENDOR INFORMATION WAS OBTAINED FOR THE FOLLOWING ITEMS:

3. LABOR RATES

A.) ICF-KH HOURLY RATES ARE BASED ON THE 1996 FISCAL YEAR BUDGET LIQUIDATION RATES AS ISSUED BY KEH FINANCE (EFFECTIVE 3-08-96). SEE ALSO THE FY 1996 PLANNING RATES * (REPORT BGHB7012).

B.) BASE CRAFT RATES ARE AS ISSUED BY KEH FINANCE (EFFECTIVE 10-01-95). RATES INCLUDE FRINGE BENEFITS, LABOR INSURANCE, TAXES, TRAVEL,DEPARTMENTAL OVERHEADS AND G&A/SWS.
* SEE HANFORD SOFT REPORTING, FDS BUDGET GUIDELINE HANDBOOK, SECTION 2 - COMPANY INFORMATION, FY 1996 PLANNING RATES.

4. GENERAL REQUIREMENTS/TECHNICAL SERVICES/OVERHEADS

A.) ONSITE CONTRACT ADMINISTRATION AND CONSTRUCTION MANAGEMENT COSTS, ASSOCIATED WITH THE OVERALL MANAGEMENT OF THE FIXED PRICE CONTRACTS, ARE INCLUDED AS A COMPOSITE PERCENTAGE AND LUMP SUM ALLOWANCE (FOR BID PACKAGE PREP) BASED ON THE ESTIMATING FACTOR/BILLING SCHEDULE. THE TOTAL COMPOSITE PERCENTAGE AND LUMP SUM ALLOWANCE ARE APPLIED AGAINST THE TOTAL FIXED PRICE CONTRACT AMOUNT WHICH IS REFLECTED ON THE KEH SUMMARY REPORT DOE_R07, INCLUDED WITH THIS ESTIMATE. (FINAL ESTIMATES MAY BE PARTIALLY MANLOADED AND INCLUDED WITHIN THE ESTIMATE DETAIL)

B.) FIXED PRICE CONTRACTOR OVERHEAD, PROFIT, BOND AND INSURANCE COSTS HAVE BEEN APPLIED AT THE FOLLOWING PERCENTAGES AND ARE REFLECTED IN THE "OH&P/B&I" COLUMN OF THE ESTIMATE DETAIL:
LABOR - 0% MATERIAL - 0% EQUIPMENT USAGE - 0% EQUIPMENT - 0% SUBCONTRACTS - 0%

5. ESCALATION

ESCALATION PERCENTAGES WERE CALCULATED FROM THE JANUARY 1996 UPDATE OF THE ECONOMIC ESCALATION PRICE CHANGE INDICES FOR DOE CONSTRUCTION PROJECTS AS PUBLISHED BY THE "OFFICE OF INFRASTRUCTURE AQUISITION" FM-50.

6. ROUNDING

U.S. DEPARTMENT OF ENERGY - DOE ORDER 5100.4 PAGE I-32 SUBPARAGRAPH (M), REQUIRES ROUNDING OF ALL GENERAL PLANT PROJECTS (GPP'S) AND LINE ITEM (LI) COST ESTIMATES. REFERENCE: DOE 5100.4, FIGURE I-11, DATED 10-31-84.

7. REMARKS

A.) ESCALATION WAS NOT APPLIED AS THE SCHEDULE FOR THIS WORK IS UNKNOWN AT THIS TIME.
B.) THIS ESTIMATE WAS BASED ON THE CAUSTIC LOAD-IN STATION FOUND IN PROJECT W-211 "INITIAL TANK RETRIEVAL SYSTEMS".

COST CODE/WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ONSITE INDIRECTS	SUB TOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
020	TITLE II									
5B1101	DEFINITIVE DESIGN	81500	0	81500	0.00	0	81500	20	16300	9780
TOTAL 020	TITLE II	81500	0	81500	0.00	0	81500	20	16300	9780
030	TITLE III									
5B1201	ENG/INSPECTION	40000	0	40000	0.00	0	40000	20	8000	4800
TOTAL 030	TITLE III	40000	0	40000	0.00	0	40000	20	8000	4800
060	PROJECT MANAGEMENT									
6B1101	WHC PROJECT MANAGEMENT	42300	0	42300	0.00	0	42300	20	8460	5076
TOTAL 060	PROJECT MANAGEMENT	42300	0	42300	0.00	0	42300	20	8460	5076
550	OTHER STRUCTURES									
5B4384	LOAD-OUT STATION	69365	17064	86429	0.00	0	86429	35	30249	116679
TOTAL 550	OTHER STRUCTURES	69365	17064	86429	0.00	0	86429	35	30249	116679
600	UTILITIES									
5B4382	PIPING SYSTEMS	36025	16362	52387	0.00	0	52387	25	13097	65484
5B4386	ABOVE GRADE PIPING SYS	214094	52667	266761	0.00	0	266761	25	66690	333451
TOTAL 600	UTILITIES	250119	69029	319148	0.00	0	319148	25	79787	398935
700	SPECIAL EQUIP/PROCESS SYSTEMS									
5B4385	BELOW GRADE PIPING	24884	6121	31005	0.00	0	31005	30	9302	40307
5B4387	ELECTRICAL	62944	15484	78428	0.00	0	78428	25	19607	98036

ICF KAISER HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. W-314/P5T134
FILE NO. W314SBC1

** IEST - INTERACTIVE ESTIMATING **
TANK FARM RESTORATION & SAFE OPERATIONS
LOAD-IN/LOAD-OUT OPTION
DOE_R04 - COST CODE ACCOUNT SUMMARY

DATE 08/01/96 09:47:11
BY FC DAY

COST CODE/WBS	DESCRIPTION	ESTIMATE SUBTOTAL	ONSITE INDIRECTS	SUB TOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
TOTAL 700	SPECIAL EQUIP/PROCESS SYSTEM	87828	21605	109433	0.00	0	109433	26	28909	13834
PROJECT TOTAL		571,112	107,698	678,810	0.00	0	678,810	25	171,705	850,51

ICF KAISER HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. W-314/P5T134
FILE NO. W314SBC1

** IEST - INTERACTIVE ESTIMATING **
TANK FARM RESTORATION & SAFE OPERATIONS
LOAD-IN/LOAD-OUT OPTION
DOE_R05 - ESTIMATE SUMMARY BY CSI DIVISION

DATE 08/01/96 09:25:43
BY FC DAY

CSI	DESCRIPTION	ESTIMATE SUBTOTAL	ONSITE INDIRECTS	SUB TOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
CONSTRUCTION										
00	TECHNICAL SERVICES	163800	0	163800	0.00	0	163800	20	32760	19656
02	SITEWORK	15575	3832	19407	0.00	0	19407	29	5674	2508
03	CONCRETE	41482	10205	51687	0.00	0	51687	35	18090	6977
05	METALS	2420	595	3015	0.00	0	3015	35	1055	407
09	FINISHES	18863	4640	23503	0.00	0	23503	35	8226	3172
15	MECHANICAL	241144	66821	307965	0.00	0	307965	25	76991	38495
16	ELECTRICAL	87828	21605	109433	0.00	0	109433	26	28909	13834
TOTAL CONSTRUCTION		571,112	107,698	678,810	0.00	0	678,810	25	171,705	850,51
PROJECT TOTAL		571,112	107,698	678,810	0.00	0	678,810	25	171,705	850,51

** IEST - INTERACTIVE ESTIMATING **
TANK FARM RESTORATION & SAFE OPERATIONS
LOAD-IN/LOAD-OUT OPTION
DOE_R06 - CONTINGENCY ANALYSIS BASIS SHEET

REFERENCE: ESTIMATE BASIS SHEET PAGE OF
COST CODE ACCOUNT SUMMARY PAGE OF

THE U.S. DEPARTMENT OF ENERGY - RICHLAND ORDER 5700.3 "COST ESTIMATING, ANALYSIS AND STANDARDIZATION" DATED 3-27-85, PROVIDES GUIDELINES FOR ESTIMATE CONTINGENCIES. THE GUIDELINE FOR A STUDY ESTIMATE SHOULD HAVE AN OVERALL RANGE OF 20 TO 50 %.

CONTINGENCY IS EVALUATED AT THE THIRD COST CODE LEVEL AND SUMMARIZED AT THE PRIMARY AND SECONDARY COST CODE LEVEL OF THE DETAILED COST ESTIMATE.

020 TITLE II
5B11

030 TITLE III — A 20% CONTINGENCY WAS APPLIED TO TITLE II, TITLE III DESIGN AND WHC PROJECT MGMT. AS THE COST WAS CALCULATED AS PERCENTAGE OF DIRECT CONSTRUCTION. THESE COSTS COULD BE IMPACTED UPON A DETAILED PLANNING EFFORT.

060 PROJECT MGMT.
6B11 WHC PROJ MGMT

550 OTHER STRUCTURES
5B43B4 LOAD-OUT STATION

600 UTILIITES
5B43B2
5B43B6

700 SPECIAL EQUIP/PROCESS SYSTEMS
5B43B5 BELOW GRADE PIPING
5B43B7 ELECTRICAL

AN AVERAGE CONTINGENCY OF 21% WAS APPLIED TO THE REFERENCED COST CODES AS THE METHOD OF PREFORMANCE CURRENTLY PLANNED IS BY FIXED PRICE CONSTRUCTION. CONTINGENCY ALLOWS FOR CHANGES IN THIS DUE TO SITING OF THIS WORK IN AN AREA WITH POTENTIAL CONTAMINATION.

AVERAGE CONSTRUCTION CONTINGENCY 27 %

AVERAGE PROJECT CONTINGENCY 25 %

WBS	DESCRIPTION	ESTIMATE SUBTOTAL	CONTRACT ADMINISTRATION %	CONTRACT ADMINISTRATION TOTAL	BID PACK PREP.	OTHER INDIRECTS	TOTAL INDIRECTS
5B11	DEFINITIVE DESIGN	81500	0.00	0	0	0	0
5B12	ENG/INSPECTION	40000	0.00	0	0	0	0
5B43	LOAD-OUT SYSTEM	407312	24.60	100198	7500	0	107698
6B11	WHC PROJECT MANAGEMENT	42300	0.00	0	0	0	0
PROJECT TOTAL		571,112		100,198	7,500	0	107,698

Appendix G Hydraulic Analysis for H LINE Tie-Ins

KAISER ENGINEERS HANFORD

CALCULATION IDENTIFICATION AND INDEX

Date 11-15-95

This sheet shows the status and description of the attached Design Analysis sheets.

Discipline CIVIL WO/Job No. C01981 Calculation No. W252A-C-02

Project No. & Name W-252A B-POND TIE-IN TO TEDF

Calculation Item HYDRAULIC ANALYSIS

These calculations apply to:

Dwg. No. H-2-825692, H-2-825693, H-2-825694, H-2-825695 Rev. No. 0

Dwg. No. Rev. No.

Other (Study, CDR) Rev. No.

The status of these calculations is:

[ ] Preliminary Calculations

[X] Final Calculations

[ ] Check Calculations (On Calculation Dated)

[ ] Void Calculation (Reason Voided)

Incorporated in Final Drawings? [X] Yes [ ] No

This calculation verified by independent "check" calculations? [ ] Yes [X] No

Original and Revised Calculation Approvals:

	Rev. 0 Signature/Date	Rev. 1 Signature/Date	Rev. 2 Signature/Date
Originator	JOE MURPHY 11-15-95		
Checked by	D McSlane 11-20-95		
Approved by	D McSlane 11-20-95		
Checked Against Approved Vendor Data			

INDEX

KAISER ENGINEERS HANFORD

Calc. No. W252A-C-02
Revision 0
Page No. 1 of 3

DESIGN ANALYSIS

Client WHC
Subject HYDRAULIC ANALYSIS
Location TEDF

WO/Job No. C01981
Date 11-15-95 By JD Murphy
Checked 11-20-95 By D McShane
Revised By

OBJECTIVE

This calculation will size the pumps and piping that will lift water from the new Diversion Box and pump it into the 14" TEDF line. Different flow scenarios involving the other sources of flow on the TEDF system(Pump Station #1 and #2, H-line and other small sources) will also be investigated and tabulated.

CRITERIA

1. DOE Order 6430.1A

METHODS

Cybernet ver. 2.10 computer program.

REFERENCES

1. Haestad Methods Cybernet User Manual
2. Paco Pump Catalog
3. Dwg H-2-140367 thru H-2-140371
4. Dwg H-6-2431,H-6-2432,H-6-5334,H-6-5335
4. Calc #W049H-C-07

ASSUMPTIONS

The Cybernet Model for W-049 TEDF is used as a background for this model. The new pump station is added and a 14" line running parallel to the 10" line near the disposal ponds is also added to eliminate some head loss. The same roughness of pipe used in the TEDF calculation is assumed.

The pumps will turn on at 1/2 foot above the top of the 36" HDPE pipe at the existing upstream diversion structure near the contigency ponds(see drawing H-6-2431). The overflow elevation of the new diversion box is set at 576.5 ft which is well below the top of the existing diversion structure upstream. Different pumping scenarios for TEDF will be included in this calculation.

DESIGN ANALYSIS

Client WHC

Subject HYDRAULIC ANALYSIS

Location TEDF

WO/Job No. C01981

Date 11-15-95 By JD Murphy

Checked 11-20-95 By [signature]

Revised By

CALCULATIONS

The Cybernet input and output are shown in Appendix A and C. The results of the calculation is as shown on the following table.

W252/TEDF FLOW SCENARIOS

SCENARIO DESCRIPTION	W252 FLOW (gpm)	H-LINE FLOW (gpm)	PUMP STATION #1 (gpm)	PUMP STATION #2 (gpm)	Conclusion
1) Pump station #1 pumping with both small pumps, pump station #2 on. W-252 pump station on.	2777	97.7	608.28	596.9	No good. small flow in H-line, Pump not pumping 2855 gpm.
2) Pump station #1 pumping with both small pumps, Pump station #2 off. W-252 Pump station on.	2856.5	552.5	608.3	0.00	OK
3) Pump station #1 pumping with one small pump, Pump station #2 is on. W-252 Pump station on.	2789.2	227.36	449.21	604.5	No Good. Pump not pumping 2855 gpm.
4) Pump station #1 pumping with one big pump, Pump station #2 on. W-252 pump station on.	2660	0.00	940.06	566.8	No good. Flow backs up H-line.
5) Pump station #1 is pumping with one big pump, Pump station #2 is off. W-252 pump station on.	2802.7	317.1	940.06	0.00	No Good. Pump not pumping 2855 gpm
6) Pump station #1 off. Pump station #2 on. W-252 pump station on.	2854.1	544	0.00	621.1	OK
7) Pump stations #1 and #2 off. H-line flowing at design flows of 770 gpm. W252 pump station on.	3068.3	770	0.00	0.00	OK

An additional run was done with a flow control valve controlling the TEDF flow upstream of the W252A tie-in. This was done to determine the maximum TEDF flow at which the W252 pump would still pump 2855 gpm. The maximum TEDF flow that would still allow the W252 pump to discharge the design flow of 2855 gpm was found to be 1160 gpm.

KAISER ENGINEERS HANFORD

DESIGN ANALYSIS

Calc. No. W252A-C-02
Revision 0
Page No. 3 of 3

Client WHC
Subject HYDRAULIC ANALYSIS
Location TEDF

WO/Job No. C01981
Date 11-15-95 By JD Murphy
Checked 11-20-95 By
Revised By

CONCLUSION

The TEDF flow with the new addition of the W252A pump station, which pumps the flows in the HDPE 36" line into the TEDF line, will have to be monitored and controlled while the W252 pumps are in operation. The maximum flow that can be from the sum of the the sources upstream of the tie-in is 1160 gpm. The above table shows some possible pumping combinations to achieve this. Also, the flow out of the #1 and #2 pump station can be throttled by the use of existing valves. For example, in the pumping scenarios that are shown as "No Good", the flows out of either pump station can be throttled to achieve a total flow of less than 1160 gpm including H-line.

Appendix H Reference Drawings

H-2-79604, Rev. 2 Piping Plot and Key plans 242-A Evap Cond Stream

H-2-140323, Rev. 1 Civil 200E Site

H-2-140342, Rev. 2 Civil Line H STA 0+00 to STA 32+23

H-2-140368, Rev. 1 Civil Disposal Line STA 0+00 to STS 30+00

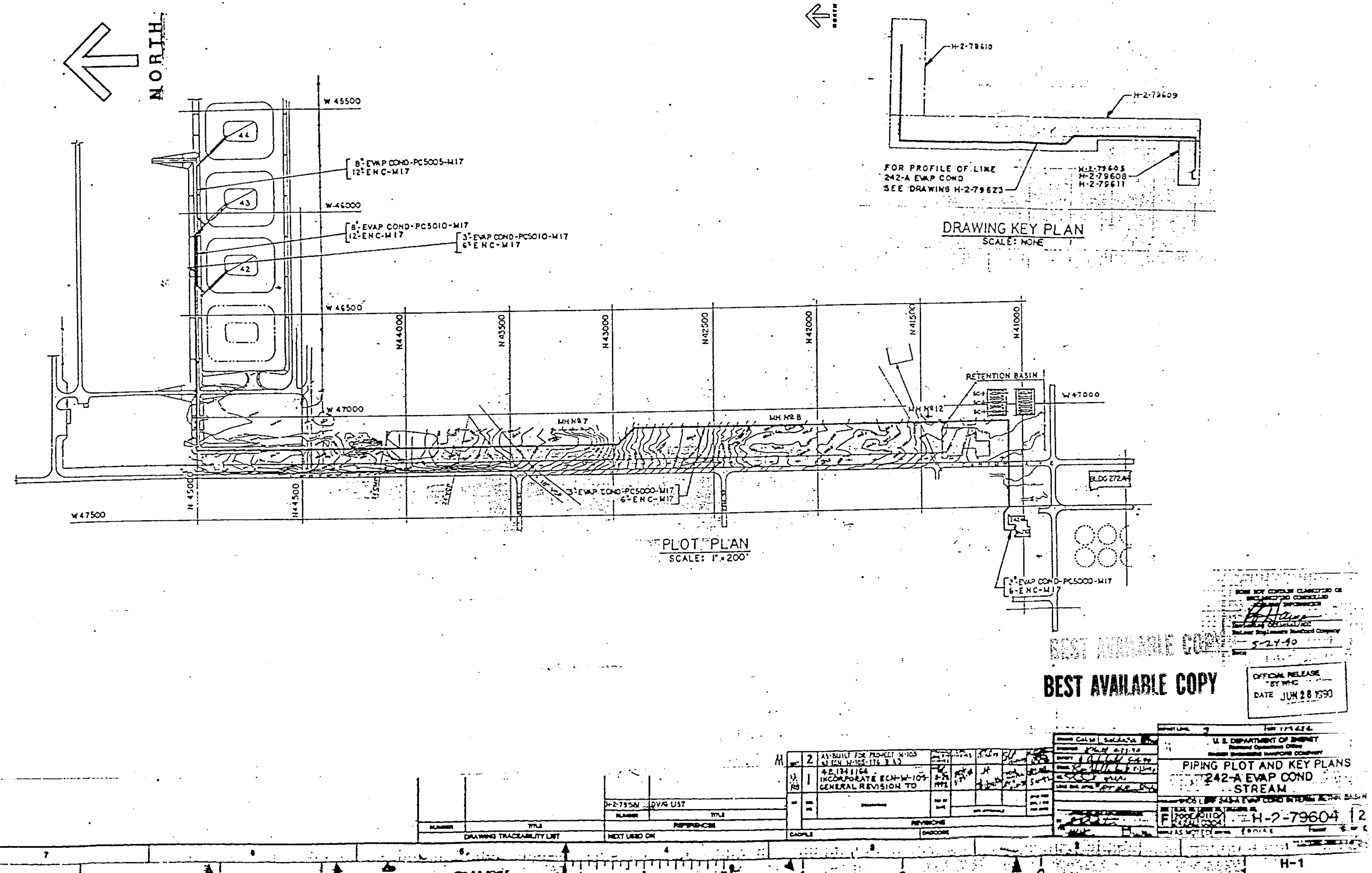
H-2-827213, Rev. 0 Civil 200E Site Plan

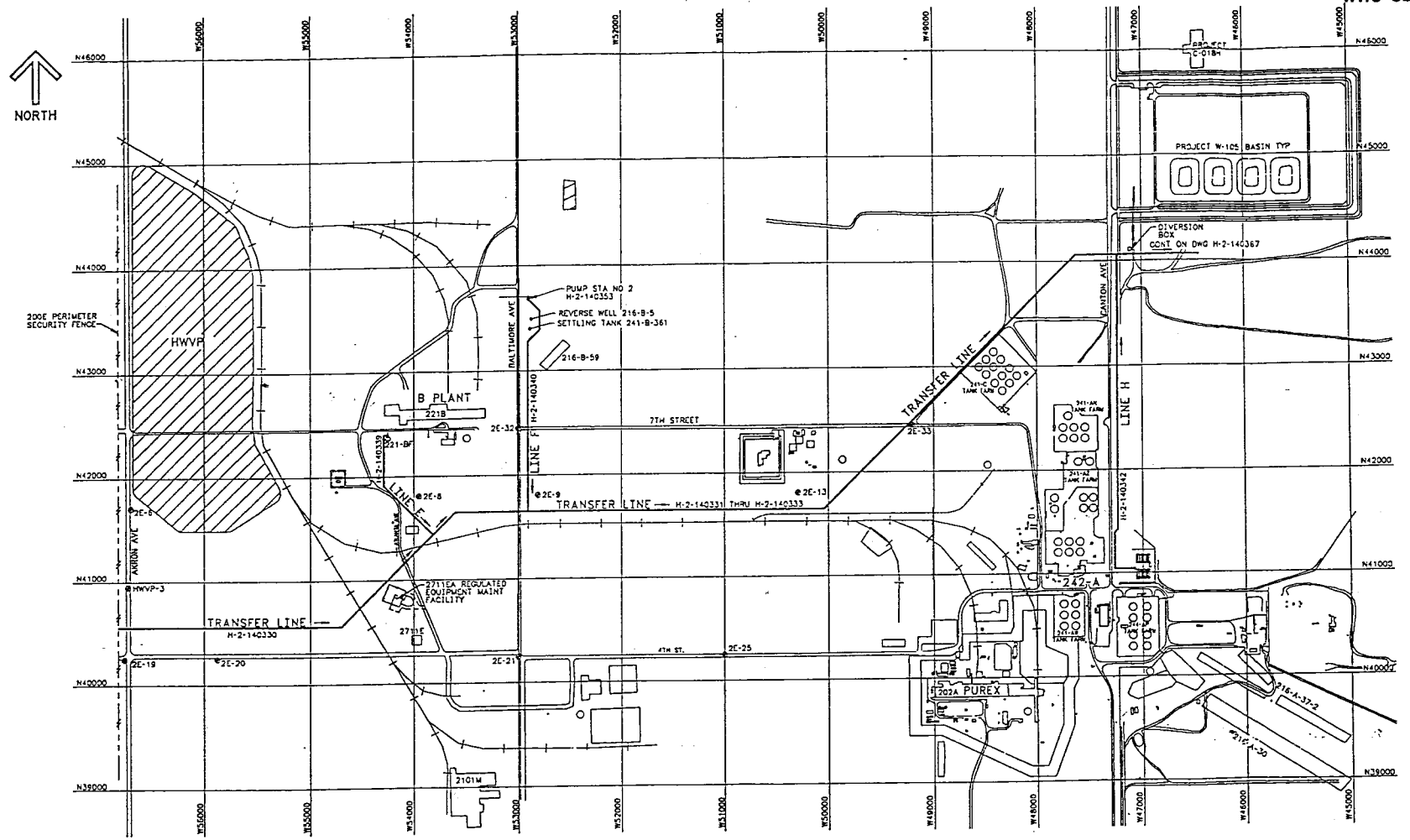
ES-E23377-C-001 Site Plan Access Road

ES-E23377-C-003 Alternate #1

ES-E23377-C-004 Alternate #2

ES-E23378-C-002 Site Plan


NORTH
W 45500
W 46000
W 46500
W 47000
W 47500
8" EVAP COND-PC5005-M17
12" ENC-M17
8" EVAP COND-PC5010-M17
12" ENC-M17
3" EVAP COND-PC5010-M17
6" ENC-M17
44
43
42
N 44000
N 43500
N 43000
N 42500
N 42000
N 41500
N 41000
N 45000
N 44500
MH No 7
MH No 8
MH No 12
RETENTION BASIN
BLDG 272AW
3" EVAP COND-PC5000-M17
6" ENC-M17
PLOT PLAN
SCALE: 1" = 200'
H-2-79610
H-2-79609
H-2-79608
H-2-79611
FOR PROFILE OF LINE
242-A EVAP COND
SEE DRAWING H-2-79623
DRAWING KEY PLAN
SCALE: NONE
BEST AVAILABLE COPY
OFFICIAL RELEASE BY WHC
DATE JUN 28 1990
AS-BUILT FOR PROJECT W-105
INCORPORATE ECN-W-105-
GENERAL REVISION TO
DRAWING TRACEABILITY LIST
NEXT USED ON
REFERENCES
REVISIONS
U.S. DEPARTMENT OF ENERGY
PIPING PLOT AND KEY PLANS
242-A EVAP COND
STREAM
H-2-79604
2



200E SITE

400 0 400 800
SCALE IN FEET

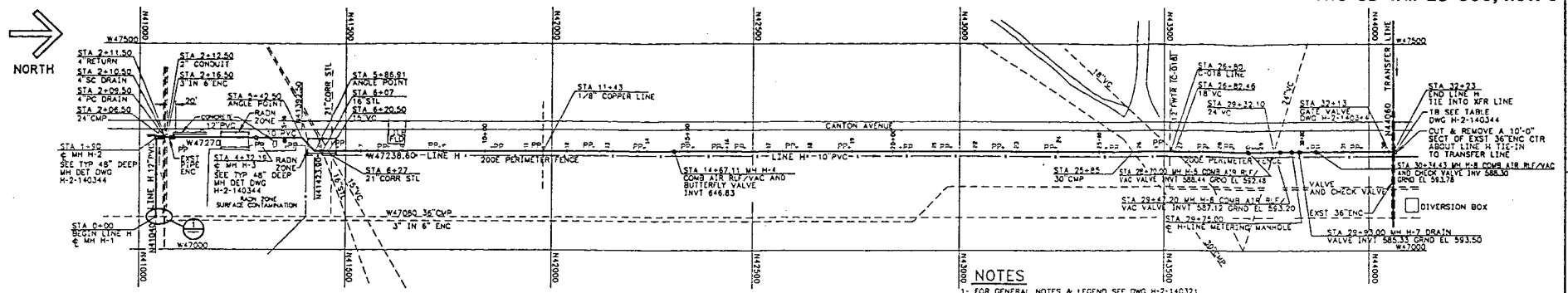
RC CROSKREY		159009	
GA LISLE		U.S. DEPARTMENT OF ENERGY	
JD MURPHY		RICHLAND FIELD OFFICE	
J ARCHIBALD		KAISER ENGINEERS HANFORD COMPANY	
JD AKFORD		CIVIL	
BR FILLTON		200E SITE	
GA LISLE		PROJECT W-049H, 200 AREA TEDF COLLECTION SYSTEM	
MC CANNIGAN	2-27-93	F 2000	H-2-140323 1
		SHEET SHOWN	CR9737

1 a) ECN W-049H-104 7 A3 — AS-BUILT FOR PROJ W-049H

M B140323A 2J-1BU-ACD2-17.0-NN

2 PLOT SCALE: 1=400 | KEHCAD | H-2

H-2-140330 DRAWING LIST / AREA MAP



PLAN - LINE H

SCALE 1"=100'

NOTES

1- FOR GENERAL NOTES & LEGEND SEE DWG H-2-140321

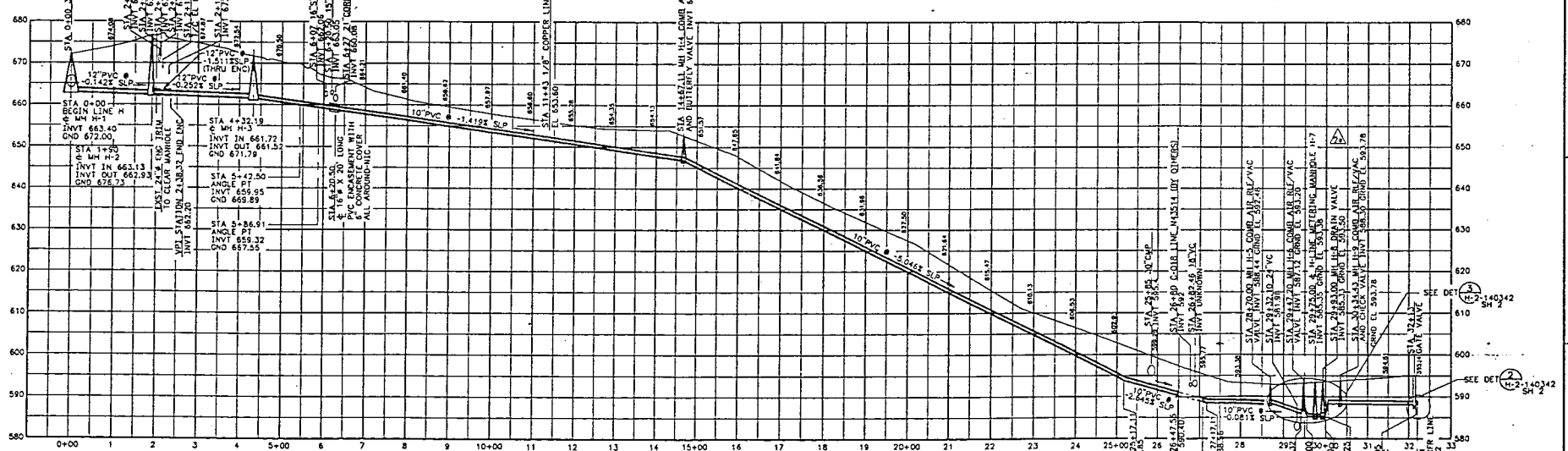
2- MINIMUM DEPTH OF COVER OVER LINE H SHALL BE 2'-6"

3- LINE H MATL FROM STA 0+00 TO STA 4+32.19 SHALL BE 1AW PIPE CODE G-1 & FROM STA 4+32.19 TO STA 32+23 SHALL BE 1AW PIPE CODE P-1 OF SECT 02650 OF THE SPEC. THE WTR TEST PRESSURE BETWEEN STA 4+32.19 TO STA 14+67.11 SHALL BE 30 PSIG ALL OTHER AREAS SHALL BE AS SPECIFIED IN THE SPEC.

4- CONSTRUCTION TOLERANCES FROM STA 0+00 TO STA 4+32.19 INCLUDING MH
HORIZONTAL ± .10'
VERTICAL ± .02'

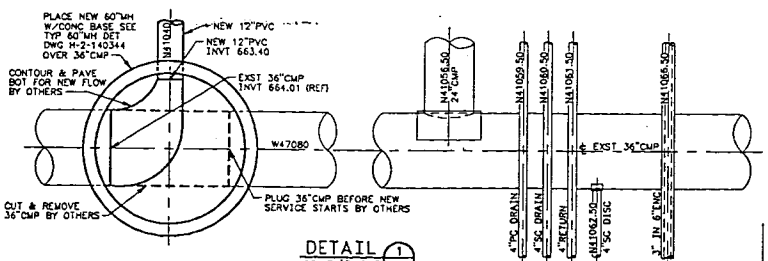
5- CONSTRUCTION TOLERANCES FROM STA 4+32.19 TO STA 32+23
HORIZONTAL ± 0.5'
VERTICAL ± .10'

6- 48" DIAMETER MANHOLE BASES MAY BE PRECHANNELED BEFORE INSTALLATION.



PROFILE - LINE H

SCALE VERTICAL 1"=10'
HORIZONTAL 1"=100'



DETAIL 1

SCALE 3/4"=1'-0"

FOR PROFILE OF THIS SECT SEE ECN C-018H-5 BY OTHERS

12"X10" REDUCER REQD

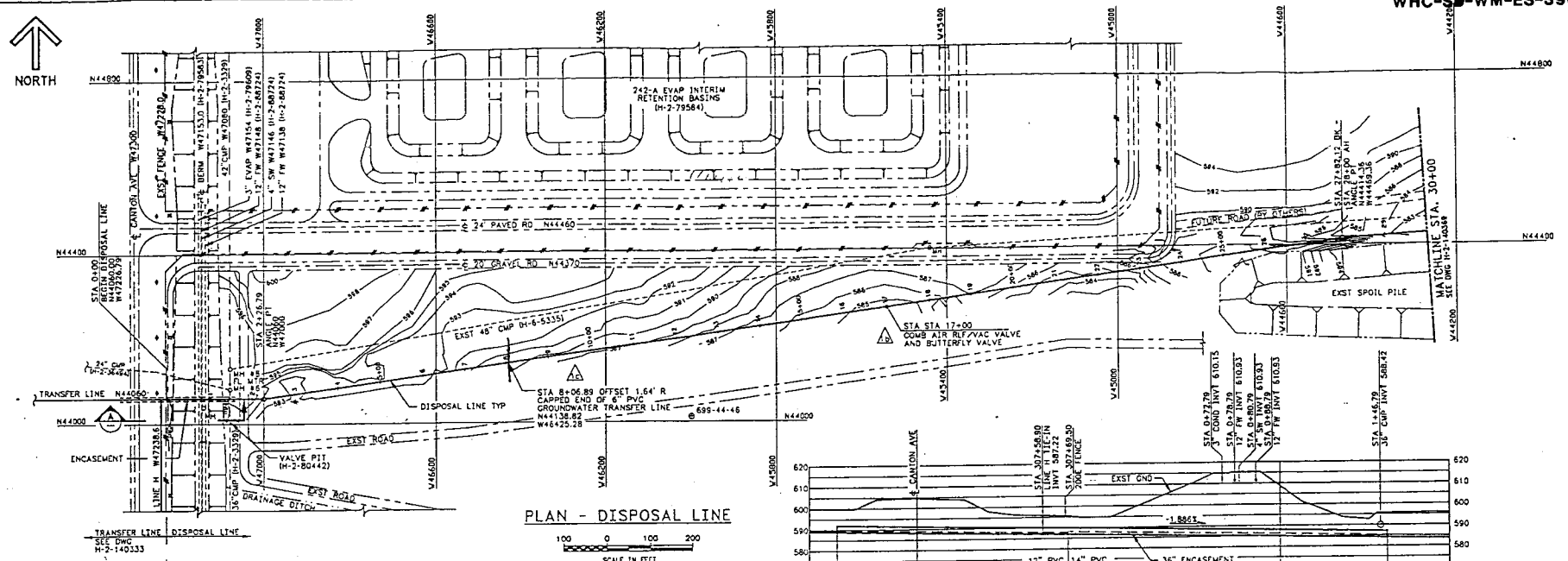
REV	DESCRIPTION	ECN	APPROVALS
2	AS-BUILT FOR PROJ W-049H per ECN W-049H-104 Z A1 ES05.02 per ECN W-049H-130 Z E-F1-2; per ECN W-049H-148 Z 02 EF1.7 per ECN W-049H-90 Z BC1.2 per ECN W-049H-103 Z EJ7 per ECN W-049H-80 Z E3 C.07 per ECN W-049H-69 Z C5;B7.05; per ECN W-049H-62 Z C.06; per ECN W-049H-44 & 49 Z EC1.2 per ECN W-049H-34 Z C1.1;B6 per ECN W-049H-40 Z F6-B2.06-8; per ECN W-049H-11 Z E1.2 per ECN W-049H-2 Z E1-3 per ECN W-049H-1 Z D5;B2;E1-3	615992 Z C2	LDS CEN 3/95
1			LDS ART 8/94

DRAWING RC CROSKREY	DATE 7/27/93	APP	159009
APPROVED A LISLE	7/27	U.S. DEPARTMENT OF ENERGY	
APPROVED JD MURPHY	7/27	RICHLAND FIELD OFFICE	
APPROVED J ARCHIBALD	7/27	KAISER ENGINEERS HANFORD COMPANY	
APPROVED JD AXFORD	7/27	CIVIL	
APPROVED BR FILLION	7/27	LINE H	
APPROVED A LISLE	7/27	STA 0+00 TO STA 32+23	
APPROVED MC CARRIGAN	7/27/93	W-049H, 200 AREA TEDF COLLECTION SYSTEM	
WHC	DATE 7/27/93	F 200E 0105 H-2-140342 2	
FIELD	SHOWN	CAD NO. CR9732 SHEET 1 OF 2	

B1403424 7JUL93M:ACD2:17.0:NN

PLOT SCALE: 1=100 KEHCAD

H-3

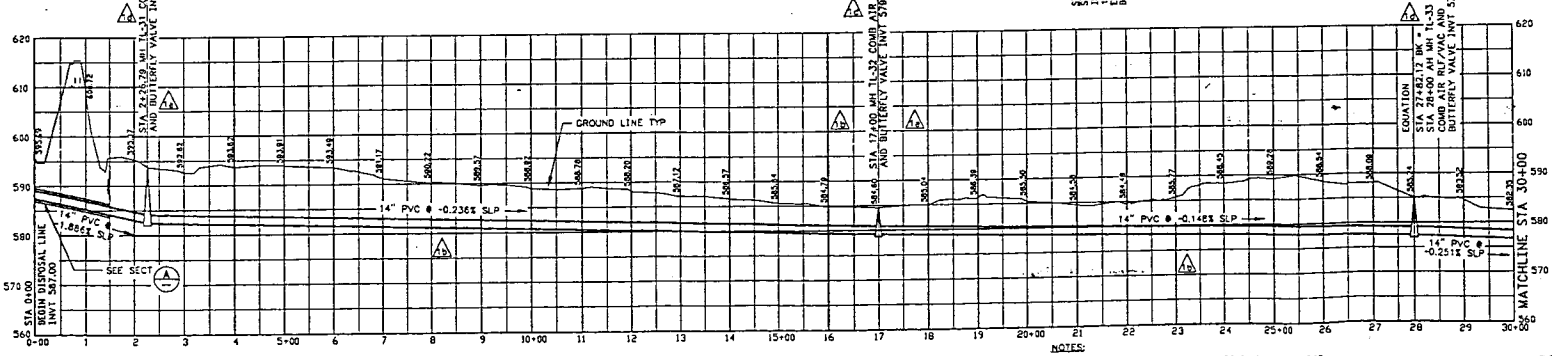


PLAN - DISPOSAL LINE

SCALE IN FEET

SECTION

SCALE: 1" = 20'



PROFILE - DISPOSAL LINE

SCALE: 1"=100' (HORIZONTAL)
1"=10' (VERTICAL)

VALVE TABLE

MANHOLE	BUTTERFLY VALVE NO	AIR RLF/VAC VALVE NO	GATE VALVE NO
TL-31	68T-BV-31	68T-VBAR-31	68T-GV-31
TL-32	68T-BV-32	68T-VBAR-32	68T-GV-32
TL-33	68T-BV-33	68T-VBAR-33	68T-GV-33

NOTES:

1- FOR DISPOSAL LINE SITE PLAN SEE DWG H-2-140367
2- FOR TYPICAL PIPE TRENCH SEE DWG H-2-140367
3- COMBINATION AIR RELIEF/VACUUM VALVES ON DISPOSAL LINE TO BE 2". FOR TYP DET SEE DWG H-2-140344
4- CONSTRUCTION TOLERANCES FOR PLACING PIPE
HORIZONTAL ± .10'
VERTICAL ± .10'

AS-BUILT FOR PROJ W-049H
C7/8-C2/A7-8
BECN W-049H-126 7 B-C4: LDS
BECN W-049H-103 7 B-C5-6 RSC
BECN W-049H-36 7 B-C14 B3,4 B,M
BECN W-049H-1 7 B-C4,7

H-3-140336 DRAWING LIST / AREA MAP

B140368A 2J-TBM-ACD2:12.0:NN

DJ WHITISH — III — 159009
CA LISLE
JD MURPHY
J ARCHIBALD
JD AXFORD
BR FILLION
CA LISLE
MC CARRIGAN — WHC — 7/22/93

U.S. DEPARTMENT OF ENERGY
RICHLAND FIELD OFFICE
KAISER ENGINEERS HANFORD COMPANY

CIVIL
DISPOSAL LINE
STA 0+00 TO STA 30+00

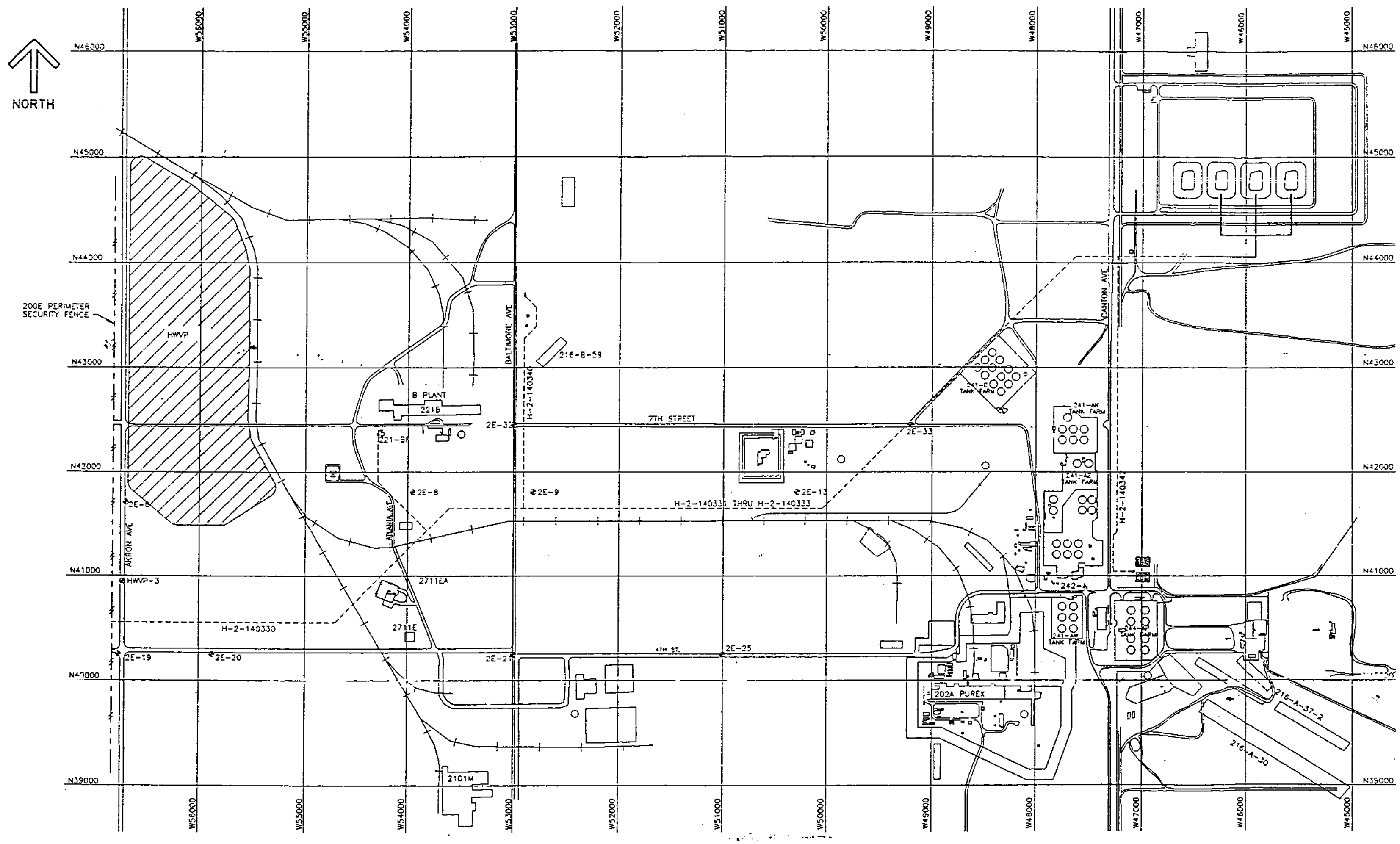
W-049H, 200 AREA TEDF COLLECTION SYSTEM

F 6000 9401 H-2-140368 1

SHOWN CR9761 1 OF 1

2 PLOT SCALE: 1=100 KEHCAD

H-4



200E SITE PLAN

400 0 400 800

SCALE IN FEET

DRAFT

PRELIMINARY

3 | 1 | 7-12-96

U.S. DEPARTMENT OF ENERGY
Richland Operations Office
ICF KAISER HANFORD COMPANY

TK EHRHARD

CIVIL
200E SITE PLAN

WO 27833, GROUNDWATER PIPELINE TIE-IN

WHC

200E | 0110 | H-2-827213 | 0

SHOWN | 1 of 1

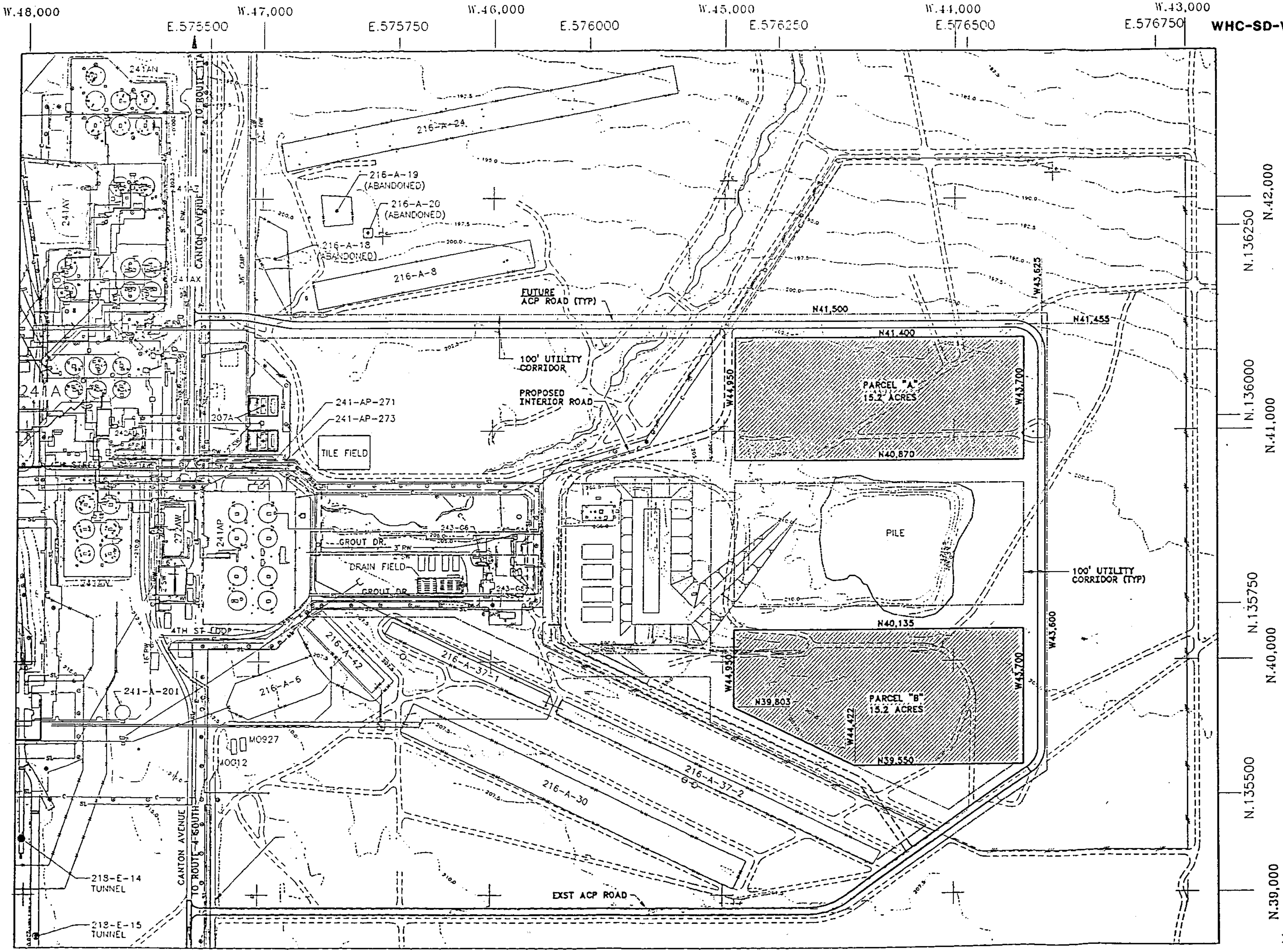
DWG NO	TITLE	REF NUMBER	TITLE
DRAWING TRACEABILITY LIST		NEXT USED ON H-2-827211	REFERENCES

REVISIONS

CADFILE B827213A CADCODE DOS 6.22 ACD2 12.0 SS

2 PLOT SCALE: 1=4800

GTITLE.DWG (1/96) KEH 2297.00



LEGEND

W.46,000 N.40,000 HANFORD PLANT COORDINATES (FEET)

E.576,000 N.135,750 WASHINGTON STATE COORDINATES (METERS)

SITE PLAN

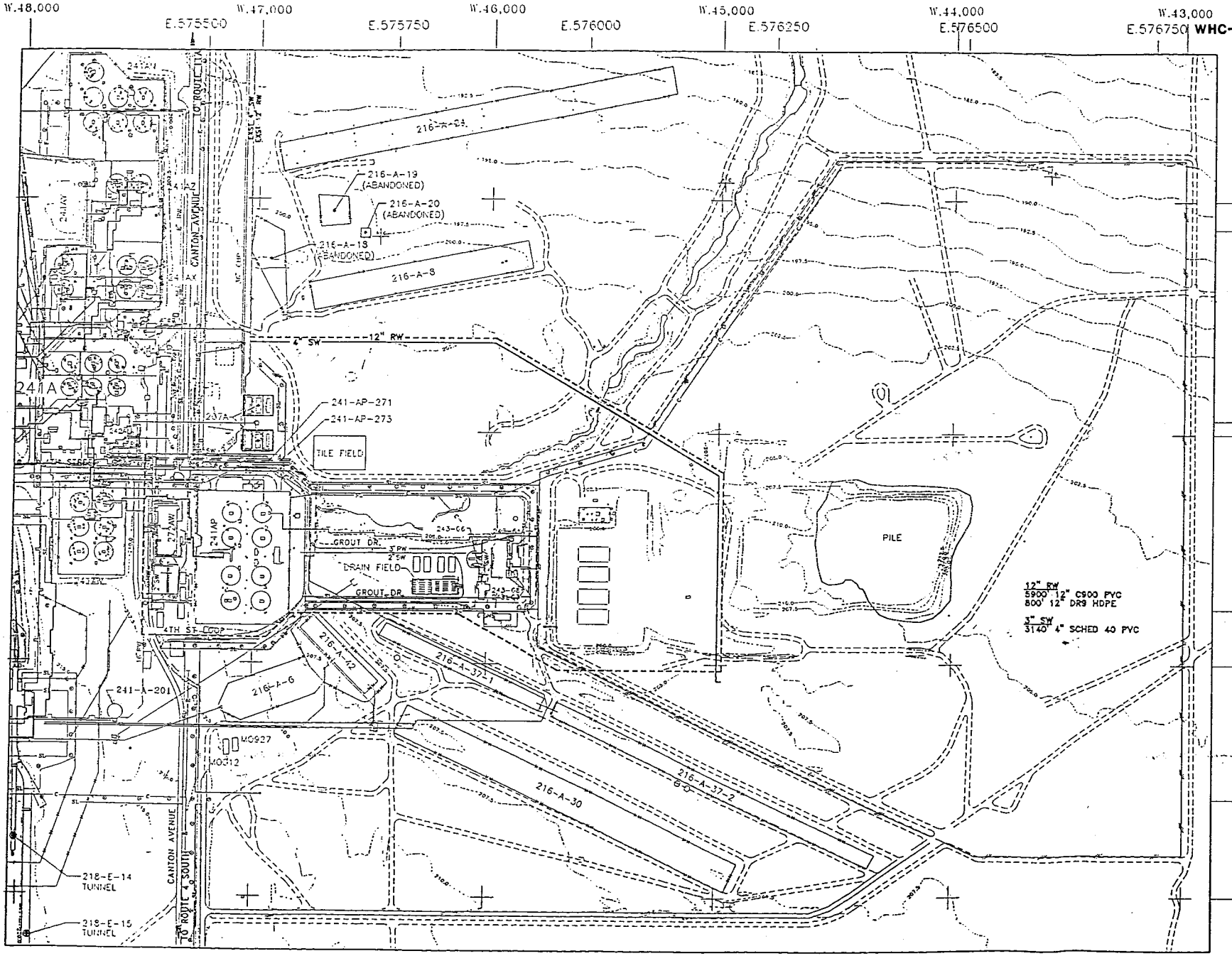
SCALE: 1:4500

0 45 90 180 270 360

1 cm = 45 meters

BEST AVAILABLE COPY

ES-E23377-C-001



LEGEND

W.46,000 N.40,000 HANFORD PLANT COORDINATES (FEET)

E.576,000 N.135,750 WASHINGTON STATE COORDINATES (METERS)

SITE PLAN

SCALE: 1:4500

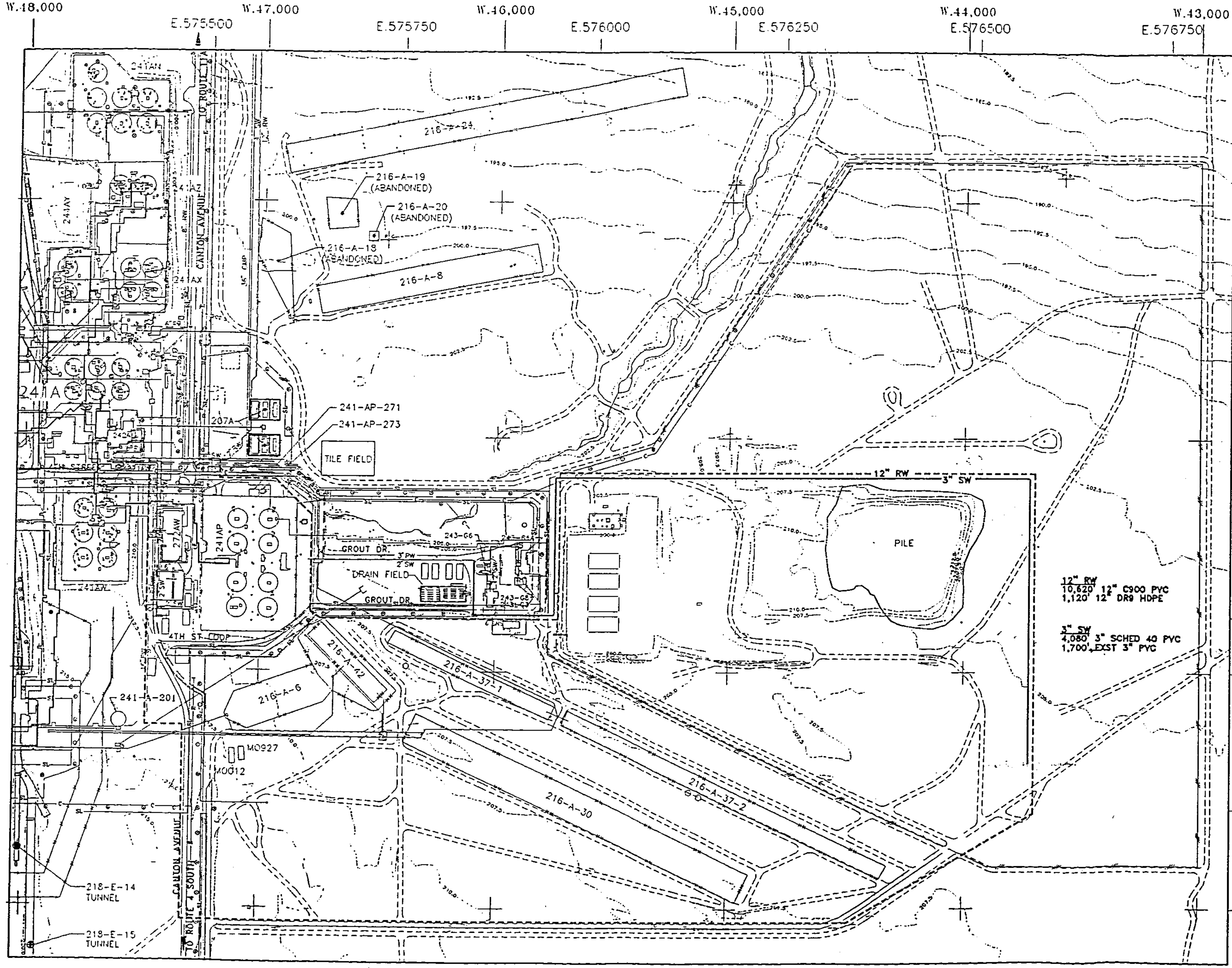
0 45 90 180 270 360

1 cm = 45 meters

BEST AVAILABLE COPY

ALTERNATE #1

ES-E23377-C-003



SITE PLAN

SCALE: 1:4500

0 45 90 180 270 360

1 cm = 45 meters

LEGEND

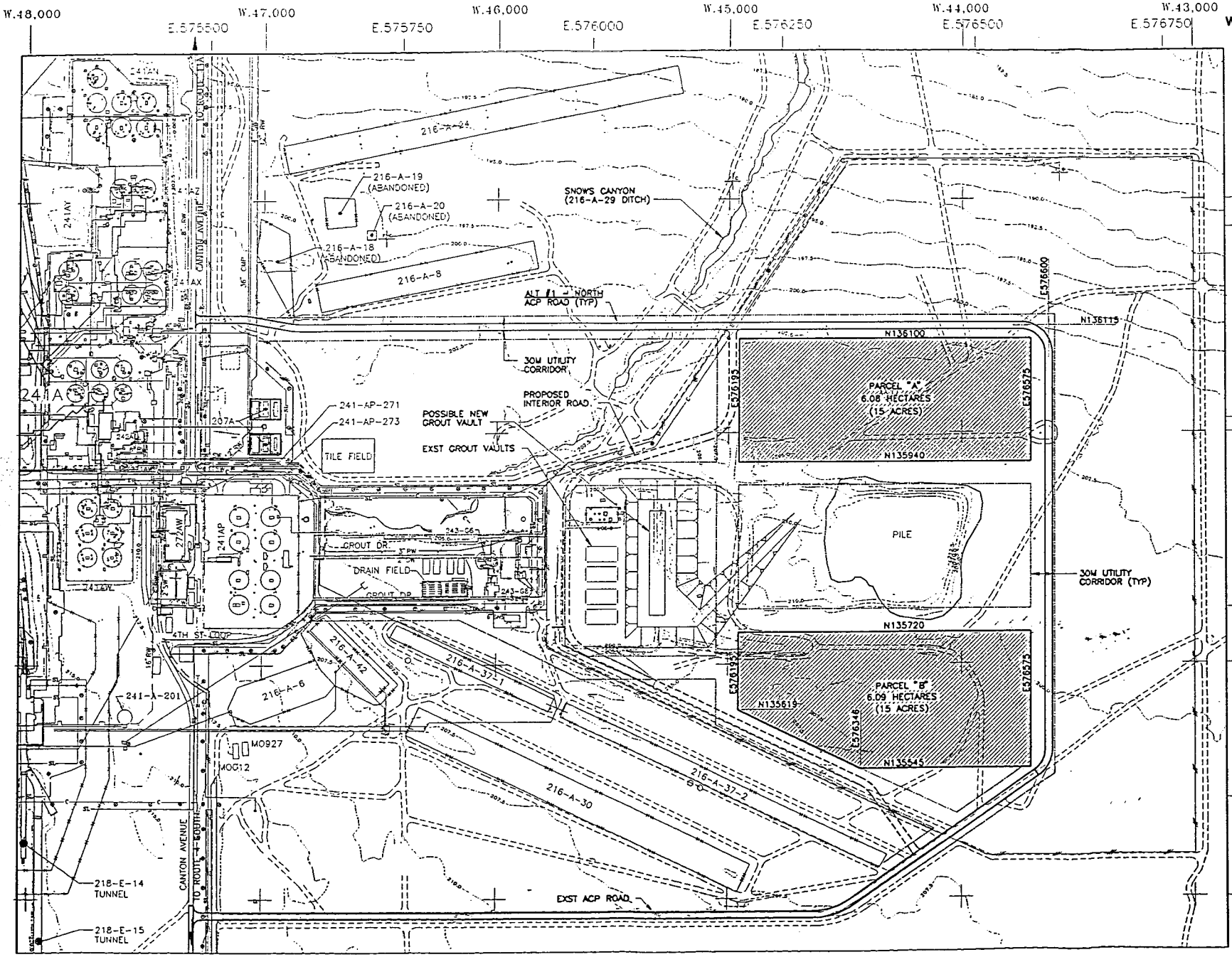
W.46,000 N.40,000 HANFORD PLANT COORDINATES (FEET)

E.576,000 N.135,750 WASHINGTON STATE COORDINATES (METERS)

BEST AVAILABLE COPY

ALTERNATE #2

ES-E23377-C-004



LEGEND

W.46,000 HANFORD PLANT COORDINATES (FEET)
N.40,000

E.576,000 WASHINGTON STATE COORDINATES (METERS)
N.135,750

SITE PLAN

SCALE: 1:4500

0 45 90 180 270 360

1 cm = 45 meters

Drawn by TA DAVIN

Cad File E23377C1

BEST AVAILABLE COPY

ES-E23378-C-002

DISTRIBUTION SHEET

To	From	Page 1 of 1
Distribution	WHC TWRS Process Design R. J. Parazin	Date 09/25/96
Project Title/Work Order		EDT No. 618850
TWRS Privatization Phase I Liquid Effluent Transfer Systems Engineering Study		ECN No. N/A

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
U.S. Department of Energy Richland Operations Office					
E. M. Bowers	S7-55	x			
N. R. Brown	K6-51	x			
T. R. Hoertkorn	B4-55	x			
D. J. Ortiz	A2-45	x			
W. A. Rutherford	A2-45	x			
R. B. Simmons-Green	S7-53	x			
ICF Kaiser Hanford Company					
D. L. Fort	G3-12	x			
J. T. Koberg	G3-12				x
M. D. Rickenbach	G3-12	x			
E. F. Yancey	G3-10	x			
Pacific Northwest National Laboratory					
B. A. Reynolds	P7-19	x			
Westinghouse Hanford Company					
W. L. Adams	S5-13	x			
R. U. Elwell	S7-12	x			
P. Felise	B4-55	x			
J. S. Garfield	H5-49	x			
K. A. Gasper	G3-21	x			
M. N. Islam	R3-08	x			
A. R. Johnson	H6-20	x			
D. W. Lindsey	S6-71	x			
S. S. Lowe	H6-29	x			
P. C. Miller	R1-51	x			
R. J. Parazin(2)	H5-49	x			
L. E. Thomas	R3-08	x			
Central Files (original + 1)	A3-88	x			