Utility and Infrastructure Needs for Private Tank Waste Processing

B. A. Reynolds

May 1996

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the U.S. Department of Energy
under Contract DE-AC06-76RLO 1830

Pacific Northwest National Laboratory
Richland, Washington 99352

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MEMO

To: Bill Richmond
Tom Hoertkorn
Jeff Voogd
John Holbrook
From: Bruce Reynolds
Subject: Utility and Infrastructure Needs for Privatization
Date: December 15, 1995

Attached for your review and approval is the subject report which meets the deliverable required for infrastructure support in the TWRS Privatization CST MYPP. This report presents a synopsis of the old TWRS baseline, information on the capacity and availability of utilities and infrastructure elements, estimates of privatization utility and infrastructure requirements, identifies issues that need to be resolved to form a firm recommendation, and identified potential risk mitigation alternatives.

This report is intended to provide a technical basis upon which decisions can subsequently be made on recommended utilities, infrastructure, and transportation options. It is not intended to make those decisions here, although it will be clear that some considered options appear more favorable and are so indicated in the text.

Approvals:

Bill Richmond, CST Technical Task

Date 3/13/96

Tom Hoertkorn, DOE Infrastructure

Date 4/26/96

Concurrence:

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Date 2-27-96

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Date 2/27/96

***UTILITY AND INFRASTRUCTURE NEEDS FOR
PRIVATE TANK WASTE PROCESSING***

PREPARED BY:

Bruce Reynolds

12/19/95

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Date

UTILITY AND INFRASTRUCTURE NEEDS FOR PRIVATE TANK WASTE PROCESSING

ABSTRACT

This document supports the development of the Draft TWRS Privatization RFP. The document provides summaries of a wide variety of utility infrastructure and support services that are available at the Hanford site. The needs of the privatization contractors are estimated and compared to the existing infrastructure. Recommendations are presented on the preferred and alternate routes of supplying the identified requirements.

The document does not represent decisions made in the Final TWRS Privatization RFP #DE-RP06-96RL13308 or decisions that will be made in future negotiations between DOE and the privatization contractors.

O 01 - Records Management

A1.1 Project Management Plan

ACRONYMS

O 01.1 - Records Inventory & Disposition

A3.1 Progress Reports (Monthly Reports)

Schedule (RIDS)

BPA
DOT
DSI
DWPF
EPA
ETF
FY
HAZMAT
HEHF
HLAN
HLW
HP
HPS
HVAC
HWPP
IEEE
ISDN
IVDTS
LIMS
LLW
M&O
MSM
MUB
NEPA
PLC
PNL
PUREX
RFP
RMW
SCBA
SPO
SWAT
TEDF
TRU
TRU SAF
TSD
TWRS
WHC

best available treatment/all known, available, and reasonable methods
Bonneville Power Administration
U.S. Department of Transportation
Don't say it, write it! (informal memo)
Defense Waste Processing Facility
U.S. Environmental Protection Agency
Effluent Treatment Facility
Fiscal year
Hazardous materials
Hanford Environmental Health Foundation
Hanford local area network
High-level waste
Horsepower
Health Protection System
Heating, ventilation, and air conditioning
Hanford Waste Processing Plant
Institute of Electrical and Electronics Engineers
Integrated service digital network
Integrated voice data transmission system
Laboratory information management system
Low-level waste
Maintenance and Operations
Master slave manipulator
Mechanical Utility Building
National Environmental Policy Act of 1968
Programmable logic controller
Pacific Northwest Laboratory
Plutonium uranium extraction
Request for proposal
Radioactive mixed waste
Self-contained breathing apparatus
Security police officer
Special weapons assault team
Treated Effluent Disposal Facility
Transuranic (waste)
TRU storage facility
Treatment, storage, and disposal
Tank Waste Remediation System
Westinghouse Hanford Company

A3.2 Project Contributions

C5 General Correspondence

C5.1 Meeting Minutes

F1. Budgets and Forecasts

F1.1 Project Planning Documents

F 02.1

Summaries)

QA Program

T 01 - Technical Reports from Contractor

T 01.1 - Work Plans

O 01 - Records Management

O 01.1 - Records Inventory & Disposition
Schedule (RIDS)

UTILITY AND INFRASTRUCTURE NEEDS FOR PRIVATE TANK WASTE PROCESSING

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UTILITY AND INFRASTRUCTURE NEEDS FOR PRIVATE TANK WASTE PROCESSING

1.0 SUMMARY

The sizes of the Phase 1 Privatization pretreatment/low-level vitrification and high level vitrification facilities have been estimated to be 34 MT/day and 3.4 MT/day, respectively. Personnel estimates range from 151 to 244 for each facility. Table 1.1 summarizes the estimated utilities and/or services needs for these facilities.

The costs of these services may be funded by DOE/TWRS Program at no charge to the contractor, or at a fee to be negotiated, at the discretion of DOE. Capital costs to upgrade the related infrastructure may be funded by DOE/TWRS Program at no charge to the contractor, or for a fee to be negotiated, or may be part of the privatization contractors bid, at the discretion of DOE.

Table 1.1 Summary of Utilities and Services Available

NEED	Utility/Services Available
Raw Water	Up to 200 gpm (757 lpm) (Section 5.3).
Potable Water	Up to 25 gpm (94.6 lpm) (Section 5.1).
Electric	<i>Normal AC:</i> up to 20 MW (Section 4.1). <i>Emergency Power:</i> Not available from DOE/M&O Contractor (Section 4.2). <i>Uninterruptible Power:</i> Not available from DOE/M&O Contractor (Section 4.3). <i>DC Power:</i> Not available from DOE/M&O Contractor (Section 4.4).
Fire	Fire protection is required. Privatization Contractor could negotiate to use fire protection services provided by Hanford Fire Department and DOE (Section 11.11.1).
Police	Police protection is required. Privatization Contractor could negotiate to use police/security services provided by Hanford Patrol and DOE (Section 11.11.2).
Emergency Preparedness	Emergency Preparedness is required. Privatization Contractor could negotiate to use the M&O contractor's Emergency Preparedness organization with its services to comply with all site emergency preparedness requirements (Section 11.11.4).
Medical	Emergency medical, ambulance, and first aid support is required. Privatization Contractor could negotiate with HEHF and DOE for these services (Section 11.11.3).

NEED	Utility/Services Available
Road Services	<i>Roadway:</i> a two lane roadway will be provided to Privatization Contractors' site boundary (Section 11.17). <i>Railway:</i> rail spur will not be extended to Privatization Contractor site, but upgrades will be made at closest rail spur (Section 11.17).
Transportation	Rail and motor vehicle services provided from existing Hanford facilities for transport of radioactive waste. Rail and motor vehicle services for all other uses to be provided by the Privatization Contractor (Section 11.17).
Land for Siting	TBD.
Radioactive Liquid Effluent	Negotiable with DOE at volume and cost to be determined (Section 7.2)
Radioactive Solid Waste Disposal	Negotiable with DOE at volume and cost to be determined (Section 9.0)

Other services that could potentially be provided to the privatization contractor from the DOE/M&O contractor for a negotiated fee, at the discretion of DOE, include:

- 1) Telecommunications
- 2) Radiological Services
- 3) General Purpose Facilities (Warehouse, Shop, etc.)
- 4) Laboratory Services
- 5) Other Emergency Services (Weather, etc.)
- 6) Solid Non-Hazardous Wastes
- 7) Sanitary Wastes
- 8) Chemical Supply Systems
- 9) Liquid Non-Hazardous Waste Disposal

2.0 UTILITY NEEDS

Westinghouse Hanford Company (WHC) estimated the size of pretreatment, low-level waste vitrification, high-level waste vitrification facilities, and the utility requirements to process the contents of all 177 radioactive liquid waste tanks during a multi-decade processing campaign with the current baseline pretreatment and vitrification processes (Leach 1995; Boomer 1994)⁽¹⁾. Combinations of stand-alone, detached functions and combined attached functions were evaluated. For each combination, the costs, sizes, utility requirements, and other evaluation factors were estimated.

The preferred combination by WHC was a combined pretreatment/low-level vitrification facility and a separate detached high-level vitrification facility. This configuration will be used as an enabling assumption in this report. This design will be referred to within this report as the Tank Waste Remediation System (TWRS) Treatment Complex. The scale and utility requirements for the baseline process will be referred to within this report as TWRS utility requirements. Text describing the needed baseline utilities and support services will be provided as a reference against which the existing infrastructure will be compared. This information is included to provide examples of the anticipated role of the infrastructure. However, in some cases alternate equipment or infrastructure are equally viable. It is acknowledged that the location, facilities, utilities, and support services anticipated for the TWRS baseline processes are not necessarily what the provider of treatment services will propose.

The capital costs have also been estimated by WHC for the privatization contractor and the U.S. Department of Energy (DOE) for Phase 1 of privatization (Garfield 1995). The capital costs do not include all identified infrastructure expected to be required in the pretreatment, low-level, high-level, and support facilities in the Phase 1 privatization program. The costs are provided as a rough estimate of the capital costs. They are not to be used as budgetary quality cost estimates, nor do they constitute a commitment until DOE authorizes budgets and work scope. These budgets are not currently identified or authorized.

2.1 REPORT ORGANIZATION

This report is divided into sections describing specific utilities and infrastructure services that may be required in Phase 1 of privatization. Within the discussion of each utility, four separate sub-sections will provide the following information:

- *TWRS Baseline System Description:* a brief description of the utility system as planned for TWRS system to remediate all 177 tanks. Generally, this infrastructure does not currently exist. The information is provided to convey the intent and provide examples of the uses for the utility system.
- *Existing Infrastructure:* a summary of the existing systems and/or equipment at Hanford.
- *Needs:* an analysis of the anticipated utility needs for Phase 1 privatization compared to the existing infrastructure. If the existing capacities of the utilities are able to support the TWRS baseline, there is no reason to believe that Phase 1 privatization would encounter a problem.

⁽¹⁾ *Note:* The Leach publication updates the Boomer publication and contains details not specifically discussed by Boomer. Both references will be used throughout this report, but will not be referenced separately each time.

Comparing the Phase 1 privatization needs to the existing infrastructure will give some idea of the sensitivity of the required utilities to the utilities available.

This section is not intended to be used as a "Requirements" or "Design Review Document." While some specific items, processes, or equipment is discussed, alternate equipment may be equally acceptable if it fulfills the intent, is acceptable to DOE, and is consistent with applicable laws, regulations, and good engineering practice.

This section will also discuss the anticipated operating costs for supplying the utility and the capital costs required by DOE (Garfield 1995) and/or the privatization contractor to install the infrastructure. This report is not a governing nor decision document. The costs of a service may be funded by DOE/TWRS Program at no charge to the contractor, or at a fee to be negotiated, at the discretion of DOE. Capital costs to upgrade the related infrastructure may be funded by DOE/TWRS Program at no charge to the contractor, or for a fee to be negotiated, or may be part of the privatization contractors bid, at the discretion of DOE. The information presented here will abstract the Garfield report referenced:

- *Identified Issues:* This section will describe any identified issues that require resolution. The enabling assumptions also represent some issues where a decision was made to complete this report. This decision is not necessarily in agreement with all of the privatization documents.
- *Risks/Risk Mitigation Alternates:* This section will discuss any risks and/or alternatives to the base requirements that would favor potential risk mitigation, if any.

2.2 NEEDS ESTIMATION METHODS

Ideally, the requirements for each type of utility will be based on a bottom-up summary of the requirements for each type of processing device in the entire flowsheet. This approach has been used to estimate the utility requirements for the TWRS process to remediate all 177 tanks. Unfortunately, this approach can not be taken in this report because it is not possible to predict the types of unit operations or process devices that the privatization contractors might propose.

Consequently, for the purposes of providing some information on the anticipated utility requirements, the quantities of the probable utilities for the Phase 1 privatization plant will be scaled down by the 0.6 (Perry's Chemical Engineering Handbook) rule based on the combined capacity of the pretreatment, low level vitrification and high level vitrification facilities TWRS baseline process. Use of the 0.6 exponent will probably result in a conservative (high-side) estimate of the utilities needed because the Defense Waste Processing Facility (DWPF), Hanford Waste Vitrification Plant (HWVP), and TWRS process baseline includes a number of additional processing steps for flexibility that are not likely to be present in the privatization contractors' flow sheets.

It is recognized that some danger and risk is involved in mis-estimating the utility requirements in this approach⁽²⁾. It is also recognized that different exponents are probably required for different utilities but, due to a lack of knowledge about separate exponents, a single value of 0.6 was used. Note also that this approach only estimates the processing aspects of Phase 1 of privatization and does not include any

⁽²⁾ This is particularly true for solid wastes where only 6 of 177 tank wastes would be processed and only 2 of 177 tanks used will be used as feed staging tanks. On the other hand, two processing facilities will be built and operated for anywhere from 3 to 20 years. Consequently, it is very difficult to scale this particular element.

utility requirements associated with the disposal aspects of the separated wastes⁽³⁾.

The size of the low-level and high-level vitrification plants are 200 and 20 MT/day, respectively, as described by Boomer (1994). A design basis of 34 MT/day for Low-Level Phase 1 Privatization (17 MT/day/plant) and 3.4 MT (design basis still being determined) for the High-Level Phase 1 Privatization Module (officially part of the scope of Phase 1 privatization) for the combined privatization facilities has been assumed (Schmieman 1995).

The derivation and calculation of the scale-down factor based on the 0.6 rule is shown in the following equations:

$$\text{New Quantity} = \text{Old Quantity} * (\text{New Volume} / \text{Old Volume})^{0.6}$$

Specifically estimated Utility, Manpower, and Other Requirements for the privatization contractors:

$$\text{New Quantity} = \text{Old Quantity} \{ (2 * [17] + 3.4) / (200 + 20) \}^{0.6}$$

$$\text{New Quantity} = \text{Old Quantity} * 0.345$$

2.3 ENABLING ASSUMPTIONS

- Utilities requirements will not be prepared for each of the two privatization contractors facilities separately but will be presented as a total requirement.
- High-Level Immobilization will be included in the estimates until a decision is reached that High Level Immobilization is not part of the scope. The capacity of the high-level waste (HLW) immobilization portion of the Phase 1 plant has been estimated at 10% of the Low-Level Capacity.
- The process flow sheet identified and used for the TWRS (Orme 1995) will be used as a basis for estimating utilities until new process flowsheets from privatization are available.
- Unless otherwise specified, the utility requirements will only cover the processing functions and not the disposal functions associated with Phase 1 of privatization. A separate document will be prepared that estimates, if possible, the utility requirements for the disposal functions. These two documents may be combined at a later time.
- It is assumed that many of the utility systems will be co-located into a Mechanical Utility Building (MUB) to combine similar functions. This MUB could be shared between the privatization contractors and run by either one of them, the Maintenance and Operations (M&O), or DOE. It is anticipated that this building would be remote from the radioactive processing facility to ease maintenance and have a low probability of being contaminated. This assumption also implies that the privatization contractors' facilities are in close (< 500 ft) proximity to each other. If site considerations dictate otherwise, separate MUBs are anticipated.

⁽³⁾ This report will either be modified or a separate report will be prepared if disposal associated utility requirements are significant compared to processing requirements and if the disposal utility requirements can be determined.

- Whenever a recommendation is forwarded for the privatization contractor to share a utility or infrastructure, it is assumed that the logistics can be worked out so that neither privatization contractor suffers any loss of operating time or efficiency from doing so. If this is not the case, then separate systems will be needed for each privatization contractor.
- The DOE may choose to have the privatization contractors perform any or all needed infrastructure upgrades to DOE infrastructure and pay the privatization contractors a user fee. The responsibility for operating and maintaining the infrastructure on DOE property will be defined in the interface control documents.
- It is assumed that any utility, infrastructure, or support service to be provided by the government will be accompanied with suitable direction from DOE to the M&Os to provide the item.
- It is assumed that the privatization contractors' site is north and south of the current Grout site. The selected site is the subject of a separate study.

3.0 STEAM AND CONDENSATE

The existing central coal and oil fired steam plants in the 200 Areas are 50 years old, inefficient (\$62/million BTU vs. industrial average of \$10/million BTU), have high operating and maintenance costs (\$18 million in FY 94), and are scheduled to be shut down before the Phase 1 privatization processing starts (Dissel *et al* 1995). Steam line losses have been estimated at 30% while power plant losses are estimated at 20%. The overall efficiency is estimated to be less than 50%.

New steam boilers are anticipated to be placed where steam is needed. Between three and nine new package boilers are anticipated. A recently installed package boiler is currently permitted for emergency service for 200 West Area steam needs. The new steam boilers may be powered by either natural gas, bunker oil, diesel fuel, or propane⁽⁴⁾. This choice of fuel has not yet been made; however, diesel is currently the preferred fuel choice. An advertisement for privatization contractors was placed into the Commerce Business Daily. An RFP for an Energy Saving Performance Contract has been issued. The schedule for response is not known. However, comparable proposals have been submitted for several years and not approved.

3.1 UTILITY STEAM SYSTEM

TWRS Baseline System Description

The TWRS baseline Utility Steam System would provide steam to various steam jet pumps in processing systems, process equipment decontamination cells, radioactive waste treatment sump jet pumps, space heating, and utility stations in various facilities across the site. The steam trap condensate collection systems are located in the individual facilities. The medium pressure steam and condensate system would take 15 MPa saturated steam from the site steam distributions system and reduces its pressure to 11 MPa. The utility steam is not recycled but is consumed in the process.

The Utility Steam System would consist of two shared electric utility steam generators and associated equipment, condensate collection systems, and steam distribution piping. This equipment is expected to be located in a central MUB. The system would consist of two 7.76 MW generators. They are sized so that the second generator is a spare.

Existing Infrastructure

Utility steam is not available from a central source for supply to the Phase 1 privatization contractors. The closest source of utility steam is expected to be a leased skid-mounted portable boiler at the Plutonium Uranium Extraction (PUREX) plant. It may have some excess capacity (Holle 1995). This boiler will have a capacity of 50,000 lb/h (Murillo 1995). A second back-up boiler with a capacity of 25,000 lb/h is also anticipated. These two boilers are not currently in place and are part of the future boilers discussed earlier. Availability of these boilers is dependent on the PUREX shut down schedule; however, PUREX is expected to be closed and the boilers removed before the startup of Phase 1 of privatization. Another boiler is expected to be installed at the 242-A Evaporator with a capacity of 50,000 lb/h. Steam is not expected for specific dedicated use in the tank farms.

⁽⁴⁾ Natural gas has the lowest fuel cost over a 25-year period, however, it would require installation of a natural gas line to the 200E area. This natural gas line has been estimated to cost \$15M and would be borne by DOE and all sub-contractors since no other customers are available to defray the costs.

Needs

It is anticipated that the privatization contractors will provide their own source of utility steam for their processes.

The utility-steam requirements for use in the TWRS processing plants has been estimated at 11,070 MT/yr for peak annual usage. Peak annual usage is defined as when separations, low-level, high-level, and support systems are all operating. The privatized sites are estimated to require 3800 MT/yr (950 lb/h or 8.9×10^9 BTU) of utility steam.

Identified Issues

The fuel source for the Hanford steam plants needs to be determined. Diesel is being recommended as the preferred fuel. If natural gas is selected and pipeline mains are run, the privatization contractors can tap into the pipelines at low incremental costs and use the cheapest fuel form as well as reduce the equipment required to store and manage diesel fuel on an already small site. Natural gas will probably not be available in the 200 areas.

Risks/Risk Mitigation Alternatives

If the baseline requirements are not practical or possible, two fall-back positions are possible for negotiated fees:

1. Site-size constraints may dictate the use of a common steam facility for both privatization contractors. Should this be the selected route, an independent operator of the steam facility should be selected. If a central facility is the selected option, the total fuel cost would increase by an unknown percentage directly in proportion to the length of the steam pipe. The estimated line loss is between 0% and 30%.
2. The DOE and the M&O contractor could design and locate the steam boiler currently being installed for the PUREX plant to accommodate the current PUREX requirements during cleanup and decommissioning and to also accommodate the combined PUREX post-decommissioning requirements and the privatization companies' requirements. It is expected that PUREX will shut down in the spring of 1997 and may have minimal (if any) future steam requirements.
3. Any existing package boiler, no longer needed due to facility shut down, could be moved to the privatization contractors' site to meet steam needs. Capital costs required to connect steam lines from the perimeter of the fence surrounding the privatization contractors' facility would be borne by the privatization contractors.

3.2 PROCESS STEAM AND CONDENSATE SYSTEM

TWRS Baseline System Description

The TWRS Process Steam & Condensate System would provide closed-loop steam to minimize the amount of potentially radioactive material leaving the area. This steam is provided by packaged steam generators located within the pretreatment and vitrification facilities. The closed loop-process steam system is completely independent of utility steam. The condensate from the steam system may be contaminated with radioactive constituents. If this should occur, it will be routed to the radioactive liquid system for disposition.

Process steam is anticipated to be 1136 kPa (150 psig) steam produced in packaged boilers to provide process steam for the separations and immobilization processing facilities. The steam could be produced from electric steam generators powered by the electrical grid or powered by a combustion boiler. The process steam modules are seen as being sited at the processing plants. A spare generator is required. Since the steam may become radioactively contaminated, precautions are required to contain and treat the steam.

Two alternate configurations are anticipated:

1. One generator serving the separations module and another serving the immobilization module(s) with a third as a swing spare unit.
2. Two generators sharing all processing facilities, one active, one on-line.

Existing Infrastructure

Process steam is not available from a central source for supply to the Phase 1 privatization contractors. A leased skid-mounted portable boiler currently planned at the PUREX plant may have some excess capacity. This boiler will have a capacity of 50,000 lb/h. A second back-up boiler with a capacity of 25,000 lb/h is also anticipated. Availability of these boilers is dependent on the PUREX shut down schedule; however, PUREX is expected to be closed and the boilers removed before the startup of Phase 1 of privatization. Another boiler is expected to be installed at the 242-A Evaporator with a capacity of 50,000 lb/h. Steam is not expected for specific dedicated use in the tank farms.

Needs

It is anticipated that the privatization contractors will provide their own source of process steam.

The annual requirements for TWRS processing have been estimated at 2.2×10^8 kW-h (7.56×10^{11} BTU or 72,200 lb steam/h [Crane 1969]). Approximately 90% of the steam requirement is for pretreatment and low-level vitrification with the remaining 10% for high-level vitrification. For the Phase 1 processing modules, the peak annual usage is estimated to be 7.6×10^7 kW-h (2.6×10^{11} BTU or 28,000 lb steam/h).

The total annual requirements for utility and process steam have been estimated to be 2.7×10^{11} BTU. Fuel costs have been prepared based on consumption of low-sulfur diesel, propane (60.7 ¢/gal), and natural gas (7.5 ¢/10⁶ BTU) at \$2.4M/yr, \$1.6M/yr, and \$1.2M/yr, respectively (Berman 1995). Operating and labor costs are estimated at \$800K/yr and are independent of the fuel source. If condensate is not recovered, the fuel costs are expected to increase by about 15%.

Identified Issues

See Utility Steam (Section 3.1) for discussion.

Risks/Risk Mitigation Alternatives

See discussion under Utility steam (Section 3.1).

4.0 ELECTRICITY

The privatization contractors' site and all supporting infrastructure will require electricity to support the operations of the facilities. Power line(s) will be provided to the perimeter of the site of the privatization contractors' processing facilities. Electricity is currently provided to the Hanford site by the Bonneville Power Administration (BPA) and distributed to DOE customers by ICF Kaiser Hanford Electrical Utilities.

4.1 NORMAL AC ELECTRICAL POWER

TWRS Baseline System Description

The TWRS Normal AC Power System would provide AC power to the TWRS Treatment Complex. It originates from the existing Hanford 230 kV power system (at substation 251-W). It is delivered via overhead lines to a substation/switchgear area where it is expected to be stepped down to 34.5 kV. The 34.5 kV power is converted to 13.8 kV at the switchgear building located at the privatization contractor site. The 13.8 kV power is distributed to individual facilities where unit substations transform it to 4.16 kV or 480 V to meet specific use requirements as specified by the privatization contractor.

Existing Infrastructure

Four 13.8 kV electrical lines from substation 251-W supply electrical power to the vicinity of PUREX, the 242-A Evaporator, and the A-AX-AY tank farms in the 200E Area (Uecker 1995a). These lines currently serve other facilities in the area. The average line loads over a recent two year period are:

<u>Line</u>	<u>MW</u>	<u>Present Use</u>
C8-L5	1	Dedicated to PUREX, 242-A Evaporator, and A-AX-AY tank farms
C8-L6	2 - 4	General area feeder
C8-L7	3 - 5	General area feeder
C8-L8	0.5 - 1	Dedicated to PUREX

The load capacity of each line is limited to 10 MW but could be increased to 13 MW by reconductoring portions of each line. It should be noted that the ability of each line to deliver 10 MW or 13 MW, within service voltage requirements, is limited by the geographical location of the TWRS Treatment Complex. A study is needed to verify that each 13.8 kV electrical utility line can provide 10 MW to the TWRS Treatment Complex within voltage requirements.

The substation 251-W transformers are 40 years old. They are currently rated at 50 MVA, equivalent to 40 MW (based on a power factor of 80%), but have not been operated at the anticipated 40 MW load for more than 20 years. Due to the age of these transformers, the ability of these transformers to continuously deliver 40 MW should be also be studied.

The existing four lines supply electrical needs for waste retrieval and transport functions, as well as for all other facilities in the 200E Area. Therefore the power requirements will increase as processing activity starts up concurrently with Phase 1 of privatization. No attempt has been made to estimate the M&O contractor's electrical operating needs in the 200E Area for these functions as well as electrical operating needs for other facilities in the 200E Area.

The 230 kV transmission line interface between BPA and DOE is located between the Midway substation and the Ashe tap which provides power to the 251-W substation.

Needs

It is anticipated that the Phase 1 privatization contractors will each receive up to 20 MW of electricity from the Hanford 251-W substation. Normal power will be supplied through 13.8 kV distribution lines to the demarcation point. The demarcation point is defined as the connection points of the secondary transformer on the privatization contractor's site. Interior facility distribution is from 13.8 kV to 4.16 kV or 480 V secondary power unit substations, double-ended or single-ended, as required for load reliability. Expected loads range from 1/2 to 250 horsepower (HP) or equivalent and are 480 V, 3 phase. Loads greater than 250 HP are anticipated to operate at 4.16 kV or 13.8 kV, depending on specific load requirements.

The highest anticipated annual usage of normal AC power for the TWRS Treatment Complex has been estimated at 664.6 M kW-h (equivalent to 76 MW). The highest anticipated annual usage for the Phase 1 Privatization processing plants and supporting structures has been estimated at 229 M kW-h (equivalent to 26 MW).

The ability to deliver 40 MW of electricity to the boundary of the privatizing contractors' site is influenced by three factors: 1) sufficient electrical line capacity, 2) sufficient substation 251-W power capacity, and 3) voltage regulation.

The currently used electrical capacity for the existing four lines to the 200 East area varies between 6.5 and 11.0 MW. The excess electrical line capacity at the 251-W substation for these lines is between 29.0 and 33.5 MW. It appears that sufficient electrical line capacity exists in the vicinity of the AP-tank farms to provide electricity to the privatization contractors. However, little excess line capacity exists, and a constraint may occur if all electrical equipment should operate simultaneously. The loads on these four lines should be re-arranged to better use the existing lines and allow cleaner operations.

The current operating philosophy for the 200 areas is to provide enough power from one of the two existing transformers at substation 251-W to supply power to all users in the 200 area. This philosophy limits the total 200 area excess capacity to 20-25 MW. This may not be sufficient to provide power to the privatization contractors. However, if the privatization contractors and other 200 area users will accept curtailed operations, when planned electrical utility maintenance is performed at 251-W substation, then the excess capacity to the 200 areas is approximately 60-65 MW from the 251-W substation. This may be sufficient to provide enough power to the privatization contractors and still retain some extra capacity for increases in electrical power requirements.

Due to the geographical location of the privatization contractor's boundary, voltage degradation could be as much as 20% at 10 MW. Therefore, the ability of each of the 13.8 kV lines to deliver 10 MW to the privatization contractors' boundary within service voltage requirements (at 13.8 kV) should be studied.

The purchase cost of electricity from BPA is currently set at 2.8¢/kWh and will decrease to 2.5¢/kWh in FY 1997. The cost, if purchased from ICF Kaiser Hanford, which includes operation and maintenance of the Hanford electrical utility system is expected to be about 5¢/kWh in FY 1996 (or less as the Hanford Site load increases). The operating cost for the total electricity is expected to be between \$6.4M/year and \$11.5M/year.

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The costs of this service may be funded by DOE/TWRS Program at no charge to the contractor, or at a fee to be negotiated, at the discretion of DOE. Capital costs to upgrade the related infrastructure may be funded by DOE/TWRS Program at no charge to the contractor, or for a fee to be negotiated, or may be part of the privatization contractors bid, at the discretion of DOE.

Identified Issues

The electrical requirements are not known with sufficient accuracy to definitively determine if the existing excess capacity is sufficient to meet the privatization contractors' needs. These needs are extremely important in selecting the preferred delivery option.

The voltage regulation on lines C8-L5, C8-L8 and the two new lines must be determined to see if these lines are suitable for use.

The privatization contractors' reliability needs must be determined. If the privatization contractors need redundant power, then 251-W substation may not have sufficient capacity to provide 20 MW to each contractor. The load in the 200 Areas, excluding the TWRS Treatment Complex, is anticipated to be approximately 20 MW. If redundant power is required, then 20-25 MW would be available at the 251-W substation for the TWRS Treatment Complex. If the privatization contractors do not need redundant power and they, and other 200 Area users, can operate under certain curtailed operations during electrical utility maintenance activities, then 60-65 MW would be available at the 251-W substation. If additional power is required, then other options need to be studied, such as utilizing the Hanford Site 230 kV transmission system. The costs to use the 230 kV system are very high. The contractor should be encouraged to limit the electrical requirements to allow the use of the 13.8 kV delivery system.

Any requirement to tap into the 230 kV lines would need to be coordinated with BPA. BPA will probably not allow the easy upgrade discussed in Risk Mitigation #3 and will require Risk Mitigation #4. If the power needs were sufficiently high, they could also require tapping into the 500 kV line or other scenarios.

The suitability of the existing 251-W substation 50 MVA transformers to deliver 40 MW needs to be determined. Replacement of these transformers will add significant costs.

Risks/Risk-Mitigation Alternates

If the electrical requirements exceed 29 MW (i.e., the excess capacity of the existing four lines), or if the present use does not decrease on the anticipated schedule or if the electrical requirements exceed the 20-25 MW (i.e., the excess capacity of the redundant 251-W substation), then several alternatives exist depending on the anticipated electrical requirements. Selection of the preferred alternate would be based on additional studies on cost and capacity.

- Risk Mitigation #1: Require that the privatization contractor pay for reconductoring part or all of lines C8-L5 and C8-L8 as studies determine to be necessary. They would also install two new 13.8 kV lines from the 251-W substation off existing 600 amp breakers. The two new lines would be routed around the north boundary of 200E to Canton Ave and then south to the privatization contractors site. This is approximately twelve miles of new electrical lines and poles. The estimated cost is approximately \$4.0M (Uecker 1995b).

- Risk Mitigation #2: Require the privatization contractors to include in their proposals the costs for installing a new radial tap directly north of the privatization contractors' processing site that would connect directly into the Hanford Site 230 kV transmission system (BPA grid). A new substation and electrical poles would be required. Reliability requirements would need to be evaluated, since this option does not provide redundant services to the privatization contractors site. The capital costs for this option is estimated to be \$13.3M (Garfield 1995). A variant of this option is for DOE to install this equipment.
- Risk Mitigation #3: Require the privatization contractors to include in their proposals the costs to extend the 230 kV transmission system to the privatization contractors' processing sites to provide redundant services. A new substation and electrical poles would be required. The capital costs for this option is estimated to be \$30 - 70M (Uecker 1995b). A variant of this option is for DOE to install this equipment.
- Risk Mitigation #4: Require the privatization contractors to include in their proposals the costs for installing two 230 kV/115 kV transformers at 251-W substation, then extend two 115 kV lines to the privatization contractor's processing sites. Two new transformers to convert the 230 kV to 115 kV, substation and electrical poles would be required. The capital costs for this option is estimated to be significantly less than the \$30 - 70M required for Risk Mitigation #3. A variant of this option is for DOE to install this equipment.

4.2 EMERGENCY ELECTRICAL POWER

TWRS Baseline System Description

The Emergency Power System would provide emergency power for the Treatment Complex. This system will preferentially provide emergency power to functions required to maintain confinement and bring the processing facilities into a safe shutdown condition upon the loss of normal AC. The Emergency Power System will provide 480 V power from redundant Class IE diesel generators, switchgear, motor control centers, batteries, and uninterruptible power supplies designed to meet Institute of Electrical and Electronics Engineers (IEEE) requirements. The generators will be located in a dedicated Emergency Generator building(s).

Existing Infrastructure

Emergency AC power is not available from a central source for use.

Needs

It is anticipated that emergency power will be provided by the privatization contractor for their use if safety analyses show a vulnerability to loss of the electrical grid.

The generators will be located close to the processing facilities. The utility requirements for emergency power will be dictated by the types of processes and equipment proposed by the privatization contractor. The volumes are anticipated to be much smaller than the normal electrical operating loads.

Identified Issues

It is not known if an emergency/redundant power system is needed and if it is, what the requirements are.

Risks/Risk Mitigation Alternates

An alternate would be to establish redundant electrical grid access; however, this does not truly provide emergency AC power.

4.3 UNINTERRUPTIBLE ELECTRICAL POWER

TWRS Baseline System Description

The Uninterruptible Power Supply System would provide continuous power to equipment requiring power during short duration periods of power outages or reduced voltage/quality normal electricity. The system consists of rectifiers/battery chargers, inverters, switching components, and batteries.

Existing Infrastructure

Uninterruptible electrical power is not available from a central source.

Needs

Each privatization contractor will provide an uninterruptible power supply to furnish power to critical electrical circuits and data control/process control units.

The units should be as close as possible to the components they serve to minimize line voltage drops. The units may either feed raw electricity from the WHC power grid or generate the required amount of electricity from on-demand generators. The site of the uninterruptible electrical supply unit will depend greatly on the types of equipment and control processes selected by the privatization contractors.

The size of the uninterruptible power supply will not be separately estimated because it varies highly with the proposed process flow sheet.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

If a cost-risk benefit analysis does not show a benefit for having an uninterruptible power supply, it can be removed from the needs.

4.4 DC POWER

TWRS Baseline System Description

Selected equipment or instrumentation may require DC power. Generally, normal power will be provided by AC and backed up with an uninterruptible power source as previously described. No estimates for DC power have been established. No systems requiring DC power have been identified.

Existing Infrastructure

A central source is not available for DC power. Any DC power required for use is generated or provided at the point of use.

Needs

The privatization contractor will provide DC power for any components that require DC power.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

TBD.

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5.0 WATER

Water will be supplied from the Hanford central water distribution network (Rohl 1994). Potable water is supplied on the Hanford site by 15 individual systems, each generally consisting of a raw-water supply, treatment facilities, and distribution piping. All of the systems are operated by DOE contractors. Ten of the systems use Columbia river water, and five systems use groundwater as a raw-water source. Additional details on the sub-systems can be found in the referenced report.

5.1 PROCESS WATER AND DOMESTIC WATER

TWRS Baseline System Description

Process water is supplied from the potable water system. The anticipated TWRS uses include the following: process water tanks, cold chemical make-up tanks, and other users in the pretreatment, vitrification facility(ies), and annex(es), the Bulk Cold Chemical Building, the Waste Staging and Handling Facility, and the MUB, including the demineralizer. It is the source of water for chemical dilution, priming water for pumps, equipment flushing water, and the demineralized water system. It consists of the bulk water storage tank, water supply pumps, and water distribution piping. The process water is anticipated to be used on a once-through basis. Water for domestic uses is supplied from the potable water system also.

Existing Infrastructure

The existing process and domestic water system is supplied from the 283-E Potable water treatment plant at a maximum rate of 2600 gpm at approximately 110 psi. Filtered and treated water flows from the treatment plant to clearwells for storage. The 200 East area has two clearwells, each with a storage capacity of 334,000 gal of potable water. In addition, storage "high tanks" on the distribution system contain 200,000 gal of water. The high tanks also maintain pressure (40 to 60 psi) on the system if pumping pressure drops. The monthly average potable water used varies between 800 and 875 gpm, but has peaked as high as 1200 gpm. Project B-604 will provide a second independent source of raw and sanitary water for a minimum of four hours in the event of loss of the primary water supply. Project B-604 is being planned which will increase the storage capacity of potable water and will result in the shut down of the high tanks. This project is expected to be complete in about 2 years. The 200E area potable water system is considered to be in fair condition, but the system's age and mode of operation contribute to high replacement and repair requirements.

The nearest tie in to the privatization contractor sites is at the corner of 4th and Canton. The potable water line at this point is a 2-in-diameter line with a capacity of approximately 150 gpm.

The potable water is prepared to State of Washington drinking-water requirements under WAC-246290. Typical sanitary water analyses indicate a dissolved solids content of about 100 ppm, < 10 ppm suspended solids, pH = 7.8, and a hardness of 66.0 ppm (expressed as CaCO₃) (Rohl July 13, 1995).

Needs

Potable water requirements for process and domestic uses have been estimated at 259,000 m³/yr (130 gpm) and 89,000 m³/yr (50 gpm) for the TWRS and Phase 1 privatization contractors' plants, respectively. The extension of a 2-in line to the privatization contractor site boundary is negotiable. If additional capacity is required, fees will be negotiated to provide the extra capacity at DOE's discretion.

Potable water could be supplied from existing facilities on the Hanford site by the M&O up to a limit (25 gpm) to each privatization contractor to satisfy a total requirement of 50 gpm. Water could be provided to the perimeter of the privatization contractors' sites. All costs associated with distributing the water within the privatization contractors' site are the responsibility of the privatization contractor. No known limitations exist for the transport distances.

The costs of this service may be funded by DOE/TWRS Program at no charge to the contractor, or at a fee to be negotiated, at the discretion of DOE. Capital costs to upgrade the related infrastructure may be funded by DOE/TWRS Program at no charge to the contractor, or for a fee to be negotiated, or may be part of the privatization contractors bid, at the discretion of DOE.

Identified Issues

The water pressure at the tie-in point will depend on the other uses and could affect the water balance of the 200E system.

Risks/Risk Mitigation Alternates

If the chlorination of sanitary water interferes with the use as process water, special lines can be installed to bypass the chlorination step, or chlorination could be replaced with ozonation for negotiated fees and costs. Alternatively, the privatization contractor could install processing equipment to remove the chlorine by allowing the water to stand for a period of time. The method chosen will depend on the economics of the alternate steps.

5.2 DEMINERALIZED WATER

TWRS Baseline System Description

The TWRS Process Water and Domestic Water System would supply water to the Demineralizer. The demineralized water system consists of the demineralizer, the demineralized water storage tank, the demineralized water supply pumps, and the distribution piping. The largest user of demineralized water is anticipated to be steam systems, which use demineralized water as make-up water. Demineralized water may also be used for non-continuous users, such as fill and make-up of closed-loop water systems, the Process Steam System, the Process Cooling Water System, the Melter Cooling Water system, and the Chilled Water System. Process water is converted to demineralized water by the demineralizer and distributed on demand to the process equipment as needed.

Existing Infrastructure

Demineralized water is not currently distributed or available for sitewide usage.

Needs

Any demineralized water required by the provider of treatment services will need to be prepared locally for the specific purpose. No definitive need has been established for demineralized water at this time nor have any estimates of the potential volumes been generated.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

TBD.

5.3 RAW WATER AND COMPLEX SITE FIRE-WATER SYSTEM

TWRS Baseline System Description

The Export Water System provides raw make-up water for the cooling tower and fire water for the Treatment Complex site fire-water header. The raw-water system consists exclusively of piping, including items like flow meters, pressure gauges, and temperature gauges.

The Treatment Complex Site Fire-Water System would provide water to fire hydrants located throughout the site and risers/sprinklers in support building facilities. The main fire-water header forms a continuous loop around the site. The Fire-Water System would have two independent sources of water (raw water and sanitary water). The Fire-Water System would have a diesel generator to supply electrical power in case of power failures. The Fire-Water System includes water storage tanks, pumps, electrical heaters (to prevent freezing in outdoor storage locations), headers, and distribution piping.

The Process Facility Fire-Water System would provide water for fire suppression to each processing facility. The Process Facility Fire-Water System is nearly identical to the Treatment Complex Site Fire-Water System with the exception that volume flow rate restrictors are used to prevent flooding in the processing cells. Such flooding could result if the entire flow rate entered any one cell.

Existing Infrastructure

The existing infrastructure has a total fire-water capacity in the 200 East fire-water mains of 28,000 gpm supplied by three 6000 gpm electric pumps, one 5000 gpm electric pump, and one 5000 gpm steam pump (Rohl 1994). The water is pumped into a 3,000,000 gal reservoir at 282-E and then into the raw water distribution piping loop. Raw water is supplied at approximately 140-150 psi. Project B-604 will provide two independent sources of raw water and sanitary for fire protection when completed.

The raw water system capacity will decrease to 10,000 gpm at the completion of project B-604.

The nearest tie in to the privatization contractors' sites is at the corner of 4th and Canton. The raw-water line at this point is a 3-in.-diameter line with capacity of 220 gpm. However, since this line may also be used for a fire main, State of Washington fire-protection laws require that a 12-in. main be installed (Rohl 1995). A 12-in. line to the privatization contractors' site boundary could be provided at DOE's discretion. A distribution loop may be required for fire protection which may mean constructing a 12 in pipeline from two points on the existing system.

Typical sanitary water analyses indicate a dissolved solids content of about 70 ppm, <10 ppm suspended solids, pH = 7.9, and a hardness of 66.0 ppm (expressed as CaCO₃) (Rohl July 13, 1995). Raw-water specifications do not exist. The only raw-water treatment is to allow the river water to settle twice.

Needs

Raw water could be supplied from existing facilities on the Hanford site by the M&O, up to a limit (200 gpm) to each contractor for a total of 400 gpm. The costs for raw water and any infrastructure upgrade will be negotiated at DOE's discretion.

It is anticipated that each privatization contractor will design and include into the processing facilities the sprinkler heads and distribution systems for the Process Facility Fire-Water System. No distance constraints are known to limit the site selection for the fire-water systems. The anticipated volumes of water for the TWRS facilities are estimated at 2,370,000 m³/yr (1200 gpm). This is equivalent to 817,000 m³/yr (or 400 gpm) for Phase 1 of privatization.

The capital costs to install the 12-in. pipeline have been estimated at between \$56/ft (for privatization contractor installation) and \$100/ft (for M&O contractor installation), and roughly 2500 ft will be required for both privatization contractors. The capital cost is estimated at between \$140,000 and \$250,000.

The costs of this service may be funded by DOE/TWRS Program at no charge to the contractor, or at a fee to be negotiated, at the discretion of DOE. Capital costs to upgrade the related infrastructure may be funded by DOE/TWRS Program at no charge to the contractor, or for a fee to be negotiated, or may be part of the privatization contractors bid, at the discretion of DOE.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

TBD.

5.4 COOLING WATER (PROCESS AND MELTER)

TWRS Baseline System Description

Process Cooling Water:

The baseline Process Cooling-Water System removes heat from the normal processing operations of the various cooling-water systems and rejects that heat via evaporative cooling in a cooling tower. The actual process cooling-water equipment is located within the separations and immobilization facilities. The process cooling water removes heat from radioactive decay, frictional/process work, melters, and off-gas cooling⁽⁵⁾. It includes a cooling tower, cooling tower water circulation pumps, expansion tanks, high-efficiency particulate air (HEPA) filters, chemical addition tanks, inhibitor addition

⁽⁵⁾ A separate system for melter cooling is anticipated for the TWRS baseline. However, the two cooling-water systems are being combined in this report since the functions are essentially the same.

pump, and distribution piping. Raw water is used for cooling tower make-up, although demineralized water may be used as a back-up. Bleedoff is routed to the 200 area Treated Effluent Disposal Facility. Safety considerations to control and contain any contamination of the cooling water will dictate the exact process configurations and equipment used.

Melter Cooling Water:

The Melter Cooling-Water System is designed with primary and secondary cooling loops. The primary loop would be a closed-loop system to cool the melter by continuously circulating cooling water between the melter and the water cooler. The primary loop contains heat exchangers, recirculation pumps, distribution piping, expansion tanks with HEPA filters on the vent, and chemical addition tanks. The secondary cooling-water loop would be an open system. The secondary cooling-water loop would use cooling-tower water to remove heat from the melter cooling water via the exchanger and expel it to the atmosphere through the cooling tower. A preferred configuration is to have separate primary cooling-water loops for low-level waste (LLW) and HLW immobilization.

This cooling water could become contaminated with radioactive components. If this should occur, the contaminated water would be routed to the radioactive liquid-processing facilities for disposal.

Existing Infrastructure

Cooling water is not currently distributed from a central source on the Hanford site.

Needs

It is anticipated that the privatization contractors will build their own cooling-water systems. The expected configuration is a combined process cooling-water system to service the separations and immobilization facilities. The system would employ closed-loop recirculation to contain any contamination with radioactive materials. Any contaminated process cooling water will be routed to the radioactive-liquid system for disposition.

The volumes of cooling water have been previously reported in Section 5.3.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

A combined cooling-water unit could be built for all cooling-water applications for both privatization contractors.

5.5 PROCESS CHILLED-WATER SYSTEM

TWRS Baseline System Description

The Chilled-Water System has two primary functions:

- 1) Removes energy from process functions (melter off gas) during normal operations,
- 2) Removes energy from heating, ventilation, and air conditioning (HVAC) cooling systems.

Process Chilled Water:

The system is designed with primary and secondary cooling loops. The primary loop is a closed loop-system to cool the melter by continuously circulating chilled water between the melter and the melter off-gas chiller. The primary chilled-water loop would contain heat exchangers, chillers, recirculation pumps, distribution piping, expansion tanks with HEPA filters on the tank vent, and chemical addition tanks. The secondary cooling-water loop would be an open system. The secondary cooling-water loop would use cooling-tower water to remove the heat from the melter chiller water via an exchanger and expel it to the atmosphere through the cooling tower. A preferred configuration is to have separate primary chilled-water loops for LLW and HLW immobilization.

This chilled water could become contaminated with radioactive components. If this should occur, the contaminated water would be routed to the radioactive liquid processing facilities for disposal.

HVAC Chilled Water:

The HVAC Chilled-Water System would provide chilled water for the process facility Supply Air Treatment System and some other process support facilities, including the Regulated Complex Entry Building, Bulk Cold Chemical Building, Analytical Facility, and an MUB. The HVAC Chilled Water System consists of the compressors, evaporators, condensers, pumps, and insulated piping required to provide chilled water to the treatment complex.

The HVAC Chilled-Water System is a closed-loop system. Circulating water is cooled by the chilled-water equipment in the MUB. It is routed to cooling coils in the air handlers at the user facilities. The coils cool and dehumidify the filtered supply air before being introduced into the ventilation air-distribution system. Captured heat is then expelled through condensers in the MUB to the Cooling-Tower System.

Existing Infrastructure

Chilled water is not currently distributed from a central source on the Hanford site.

Needs

The melter off-gas Chilled-Water System would be provided by the privatization contractor. The cooling water for the secondary loop can be procured from the M&O for negotiated fees or could be supplied from the privatization contractors' own sources.

It is anticipated that the privatization contractors will build their own chilled-water systems for their use. However, a combined system for both privatization contractors could be built. The electrical requirements are included in the discussion for electricity.

No requirements for HVAC chilled water are known at this time or have been estimated. It is anticipated that any chilled water required will be supplied by the privatization contractors.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

A shared system between the two privatization contractors would allow the use of larger more efficient units and eliminate duplication of equipment. It should be located as close as practical to the process buildings that it serves to reduce heat gained during transport of the chilled water.

6.0 SANITARY SEWER

TWRS Baseline System Description

The TWRS Sanitary Sewer System receives, collects, and transfers all sanitary domestic sewer wastes from the pretreatment, vitrification and associated office buildings and annexes for processing in a domestic waste-water sewer treatment processing plant.

The sanitary sewer system consists of collection mains and sewage lift stations. Gravity drains will be employed wherever possible. Manholes will be installed a maximum of 400 feet apart and where either the horizontal or vertical pipe alignments change.

Existing Infrastructure

An existing sanitary septic tile system (number 2607-E10) is available at the current grout facility (McKinney 1994). The system consists of two 1000-gal septic tanks in series, a dosing/pumping chamber and two gravity distribution soil absorption fields. Each soil-absorption field is designed to accept 100% of the maximum daily flow. One field is in use at any one time. This septic system is permitted by the State of Washington and is fully compliant. Expanded use of this facility will require state approval (Thornock 1995). It has a capacity of 1100 gal/day with about 400 gal/day of this capacity currently committed. The excess capacity is 700 gal/day.

An existing sanitary septic system (number 2607-EI2) is available at the 242-A Evaporator site (Long 1993). The system consists of a septic tank, a dosing/pumping chamber, and three pressure-distribution soil absorption fields. Each soil absorption field is designed to accept 50% of the maximum daily flow. Two of the three constructed fields are in operation at any one time. This system is permitted by the State of Washington and is fully compliant (Thornock 1995). Expanded use of this facility will require State approval. It has a capacity of 6700 gal/day with an excess capacity of 3300 gal/day. The total excess capacity between the two fields is estimated to be about 4000 gal/day. It should be noted that the flow measurement method is severely out of design. Therefore, the flow rate data could be far from accurate.

An existing non-permitted sanitary septic system at PUREX is not available for use without Department of Health approval or upgrading of the system to Department of Health permitting standards.

Additional sanitary septic-tile systems are spread throughout the site, but are dedicated to separate processing facilities.

Addition of new facilities to support Phase 1 privatization staff will require upgrades to an existing system or installation of a new system.

Needs

The volume of sanitary sewage to be treated is estimated based on the size (i.e., headcount) of the privatization contractors. It has been estimated that a total of 244 people will need to be employed to operate the privatization contractors' facilities. These estimates were made based on the number of expected staff (708) at the TWRS facility. Another separate estimate estimated the number of staff at 151 per privatization contractor.

The sanitary-sewer capacity needed is based on a standard of 20 gal/day per office worker and 30 gal/day per craft/operating worker. Assuming that the staff are split equally between office and crafts, the sanitary-sewer capacity needed is expected to be between 6100 and 7550 gal/day. (This level is well within the limit of 14,500 gal/day for compliant systems under the Department of Health). The estimated capacity shortfall is about 3000 gal/day. The expected size of the drain field is 1.5-2.0 acres.

Identified Issues

The Washington State Department of Health may not allow the construction of new septic systems and may force upgrades to existing systems.

Risks/Risk Mitigation Alternates

An option is for each privatization contractor to install their own septic systems to fit their individual needs. This will require coordination with the Department of Health.

Another option is for DOE/TWRS Programs to install a single new sanitary septic system with the required capacity (i.e., 7500 gal/day), rather than having two separate permits issued and two separate sanitary septic systems. This assumes that the privatization contractors' sites are close enough to make a shared system practical. The DOE will also provide a 10-in.-diameter pipeline to the boundary of the private site. The privatization contractors' will be responsible for providing connections to the tie-in points. A rough conceptual cost is \$750K.

The privatization contractors' may elect to separately contract with the city of Richland. The Richland sanitary sewer system has significant excess capacity and is interested in adding volume to the system. Approximately 24 miles of sewer lines would need to be run from the city of Richland through the Hanford reservation. A rough conceptual capital cost is \$6M.

7.0 LIQUID-WASTE PROCESSING

7.1 SECONDARY NON-RADIOACTIVE LIQUID-WASTE PROCESSING

TWRS Baseline System Description

The secondary non-radioactive liquid-waste processing system would receive, collect, store, neutralize, and dispose of all non-radioactive liquid wastes from outside of the process facilities and the non-radioactive liquids from the Radioactive Liquid Waste system in a safe and environmentally acceptable manner. Liquid wastes without chemical contamination, chemically contaminated liquid wastes, and wastes with incompatible constituents would be collected separately to prevent them from mixing.

Non-radioactive liquid wastes with little or no chemical contamination may be transferred to the 200 Area Treated Effluent Disposal Facility (TEDF). Each generator must provide Best Available Treatment/All Known, Available, and Reasonable Treatment methods (BAT/AKART) for their wastes.

Non-radioactive liquid wastes with hazardous chemical constituents may require treatment before discharge. The Liquid Effluent Retention Facility (LERF) and the Effluent Treatment Facility (ETF) are available to handle these wastes, provided they meet the acceptance criteria of those facilities. LERF and ETF are discussed in Section 6.2, "Secondary Radioactive Liquid Waste Processing."

Existing Infrastructure

The 200 Area Treated Effluent Disposal Facility (TEDF) is available to accept non-radioactive liquids that meet its acceptable criteria. TEDF simply collects and discharges high quality waste water into the soil column east of the 200-East Area. The "200 Area TEDF Interface Control Document" (Hildebrand 1995) describes the system, outlines generator and facility operator responsibilities, specifies the limits on flow rate and pollutant concentrations, and establishes procedures for adding new waste generators. Additional information can be found in the facility's State Waste Discharge Permit. The current total design capacity of the 200 Area TEDF is 2300 gallon per minute (gpm), 640 gpm permitted discharge rate, and with available excess capacity of 400 gpm. More capacity will be available when the PUREX facility shuts down. Each generator must provide BAT/AKART methods of pollution prevention, control, and treatment. The quality of the discharged water must not exceed the permitted limits for TEDF. These limits are shown in Table 7.1. Coordination with the operators and other users of the facility (the M&O contractor) will be required, including appropriate monitoring, sampling, reporting, and scheduling.

A gravity-fed pipeline from PUREX to TEDF (known as Line H) runs north along Canton Avenue in the 200-East Area. Line H would provide a convenient tie-in point between the privatization contractors' site and TEDF (Elliot 1995). Retention Basin 216-A-42, in close proximity to AP Tank Farm, is connected to Line H and may be an option for temporary hold up of effluents. Use of the basin would require engineering and regulatory review.

In the past, users (WHC and ICF Kaiser) have not been assessed a fixed cost per gallon for disposal to TEDF. However, charging the privatization contractors for effluent services would encourage the privatization contractors to minimize the amount of waste they generate. Waste handling and disposal by TEDF is estimated to cost less than 3¢/gallon.

**Table 7.1 State 216 Discharge Permit Limits for 200-Area TEDF
(Hildebrand 1995, WDOE 1995)**

<i>Parameter</i>	<i>Target Limits</i>
Chloride	58,000 µg/L
Cyanide	50 µg/L
Nitrate	620 µg/L
Sulfate	No Target Limit
Arsenic	15 µg/L
Cadmium	5 µg/L
Chromium	20 µg/L
Iron	258 µg/L
Lead	10 µg/L
Manganese	50 µg/L
Mercury	2 µg/L
Total Dissolved Solids	250,000 µg/L
Conductivity	No Target Limits
pH	6.5-8.5
Gross Alpha	15 pCi/L
Gross Beta	8 pCi/L
Radium, Total	5 pCi/L
Radium-226	No Target Limits
Bis(2-ethylhexyl phthalate)	10 µg/L
Oil and Grease	No Target Limits
Phenol	10 µg/L
WTPH-G	No Target Limits
Carbon Tetrachloride	5 µg/L
Chloroform	No Target Limits
Methylene Chloride	5 µg/L
1,1,1-Trichloroethane	5 µg/L
Trihalomethanes, Total	66 µg/L

Current users discharge anywhere from 5-300 gpm to TEDF (Lowe 1995). One condition of discharging water to TEDF is that waste minimization practices be adopted to reduce the volume of treated effluent being discharged by TEDF under State of Washington and Federal ground water and NEPA permits.

Needs

The TWRS baseline process is estimated (based on engineering judgement) to generate approximately 50 gpm from each of the pretreatment, low level vitrification and high level vitrification system. For Phase 1 privatization, the estimated combined volumes of aqueous waste from both privatization contractors which could be sent to TEDF is less than 50 gpm.

The 200 Area Treated Effluent Disposal Facility is available to accept treated non-radioactive aqueous effluents provided that TEDF waste acceptance criteria and volume limitations are met. Treatment by the privatization contractors will be necessary to meet the BAT/AKART requirement. The preferred alternative for such waste is the shared use of the 200 Area TEDF since it already exists. One to two thousand feet of new pipeline would be required to tie each privatization contractor site into the existing pipeline infrastructure.

The non-radioactive aqueous wastes that do not meet the acceptance criteria of the 200 Area TEDF, requiring treatment before they can be discharged, may be sent to the LERF/ETF. Again, the preferred alternative is the use of the existing facilities. Lines connecting the privatization contractors to the LERF/ETF transfer line will be installed by the M&O Contractor in order to receive radioactive aqueous wastes, as described in Section 7.2.

The costs of this service may be funded by DOE/TWRS Program at no charge to the contractor, or at a fee to be negotiated, at the discretion of DOE. Capital costs to upgrade the related infrastructure may be funded by DOE/TWRS Program at no charge to the contractor, or for a fee to be negotiated, or may be part of the privatization contractors bid, at the discretion of DOE.

Identified Issues

If DOE or the privatization contractors wish to pursue the use of Retention Basin 216-A-42 at PUREX for temporary hold-up of effluents, its suitability should be investigated. Contaminants may be present that would preclude its use. If the privatization contractors need hold-up capacity, they could install tanks on their sites instead.

Risks/Risk Mitigation Alternates

There are no foreseen technical, financial, or administrative obstacles to sending non-radioactive aqueous effluents to the 200-Area TEDF. The facility operators are willing to receive these aqueous wastes provided that the privatization contractors meet the requirements for BAT/AKART, etc. Non-radiological wastes requiring treatment can be sent to the ETF.

The only other option would be to have the privatization contractor treat, store, and dispose its own non-radioactive liquid wastes or transport the wastes to an off-site disposal contractor. Appropriate permits would have to be obtained from the Washington Department of Ecology and the U.S. EPA. However, the 200-Area TEDF was built primarily to satisfy Tri-Party Agreement requirements for a centralized waste handling system with an accompanying waste minimization program. It is unlikely that either Ecology or the DOE would approve a separate disposal facility on-site. And, unless volumes are extremely small shipping waste off-site is likely to be prohibitively expensive. This waste stream is too large to send back to tank farms, an option that is also politically nonviable.

11/7/95

7.2 SECONDARY RADIOACTIVE LIQUID-WASTE PROCESSING

TWRS Baseline System Description

Ten to twenty million gallons of dilute, radioactive aqueous waste streams (mostly process condensates) are expected to be generated by operations at the proposed plants. The secondary radioactive waste processing system would collect, store, and dispose of all radioactive liquid wastes from the process facilities and the Radioactive Liquid Waste system in a safe and environmentally acceptable manner.

Existing Infrastructure

Radioactive liquid wastes may be transferred to the Liquid Effluent Retention Facility (LERF) and the Effluent Treatment Facility (ETF). The LERF consists of three 6.5 million gallon basins (lined and covered surface impoundments). Wastes accumulated at the LERF are then sent by pipeline to the neighboring ETF, which has a treatment capacity of 150 gallons per minute. The ETF provides 1) a treatment system to reduce the concentrations of radioactive and hazardous waste constituents in the effluent streams to acceptable levels, 2) tanks to allow for verification of treated effluent characteristics prior to discharge, and 3) a state-approved land disposal site. The ETF can also have an unloading facility with two 10,000 gallon tanks to receive waste delivered by tanker trucks. Storage in the LERF and treatment at the ETF is expected to cost in the range of \$0.12 to \$0.24 per gallon.

To be received at the LERF, waste must meet acceptance criteria laid out in *Acceptance of Feed Streams for Treatment at the LERF/ETF Complex* (McDonald 1994). These acceptance criteria are currently in the form of guidelines rather than quantitative limits on concentrations of specific chemicals. The criteria can be summarized as follows. It must be within the facility's capability to treat the waste to below its permitted discharge levels. The radiological content of the waste cannot exceed the permit facility inventory (which limits the exposure of the plant operators). The dose rate at the surface of the drums of solid waste cannot exceed 100 mR/hr. Finally, there are some pollutants which, if present in high concentrations, could either harm process equipment or reduce the effectiveness of certain processing stages.

A waste generator wishing to contract with M&O contractor for liquid effluent treatment would work with the Liquid Effluents Program. They would compare the expected constituents and concentrations of the waste to their known envelope of treatability. The current envelope is based on controlled testing and is oriented toward condensate from the 242-A Evaporator, their primary customer. The ETF design basis is available from the M&O contractor. Should a new waste be anticipated to fall outside this envelope, the M&O Liquid Effluents Program is willing to work with a potential customer to expand the envelope of treatability (e.g., by recycling, addition of treatment steps in the ETF process, and modifying permits). A customer could also choose to pretreat its waste to meet the established acceptance criteria. Details of the process for characterizing and accepting a waste that falls outside of the existing envelope are given in the ETF waste acceptance criteria document.

The permits for the LERF/ETF complex are a RCRA permit for operating a waste storage, treatment, and disposal facility; a state air emissions permit (WAC 246-247); and a state water discharge permit (WAC 173-216), issued in June 1995. The current discharge permit only authorizes discharge of treated process condensate from the 242-A Evaporator. However, the discharge permit contains provisions for allowing the treatment of waste waters that originate from other sources. A delisting petition to allow the disposal of the treated process condensate from the ETF has been approved by the EPA. The delisting petition excludes certain wastes from being listed as hazardous wastes on a "generator-specific" basis under RCRA. Included are waste codes F001-F005, and F039 leachate derived

from F001-F005 wastes. The delisting petition and the discharge permit establish enforcement limits (or maximum allowable concentration levels) for a specified list of contaminants which must be met before discharging to the disposal site.

Needs

The LERF/ETF is available to accept treated radioactive aqueous effluents from the privatization contractor for a negotiated fee provided that the effluent meet LERF's feed specifications. The preferred alternative is the use of the LERF/ETF since it already exists. One to two thousand feet of new pipeline (pipe-in-pipe with appropriate leak detection) would be required to tie both privatization contractors sites into the existing pipeline infrastructure.

The costs of this service may be funded by DOE/TWRS Program at no charge to the contractor, or at a fee to be negotiated, at the discretion of DOE. Capital costs to upgrade the related infrastructure may be funded by DOE/TWRS Program at no charge to the contractor, or for a fee to be negotiated, or may be part of the privatization contractors bid, at the discretion of DOE.

Identified Issues

The ETF's current design basis is oriented toward the process condensate generated by the 242-A Evaporator. However, the facility's capabilities are significantly higher. The upper treatability limits on waste contaminant concentrations have not been fully quantified to date. DOE, the M&O Liquid Effluents Program, the Contractor Support Team, and the privatization contractors will have to work together to predict contaminant concentrations in the plants' effluents and ensure that they can be accepted for treatment at ETF. This process will be facilitated by development of an Interface Control Document for radioactive liquid wastes. The M&O feels that waste acceptance will be achievable through expanding the treatability window, waste pretreatment by the privatization contractors or by ETF, reconfiguration or modification of the process equipment at the ETF, and/or modification of permits.

Risks/Risk Mitigation Alternates

Treating the wastes at the existing LERF/ETF facility is the best option. The privatization contractors could potentially build its own treatment facility at the plant and negotiate the applicable permitting with the state and national governments. DOE would have to select a site for land disposal (probably in the 200-W Area), and solid waste generated would still have to be accepted by DOE. This option is unnecessarily duplicative of the facilities DOE has already built and permitted. Furthermore, it is not assured that the state would permit another land disposal site. Building such facilities would be expensive, on the order of tens of millions of dollars. Operating costs would be similar to those for the existing facilities. This option is not recommended except as a fallback position.

Aqueous, radioactive wastes at Hanford are frequently sent to DST storage from PUREX and B-Plant in quantities of 50,000 to 100,000 gallons. However, the projected volume of this stream (5 - 15 million gallons) makes that option unfeasible. Space availability at the double shell tank farms is extremely limited and is the primary factor. Secondly, while evaporator campaigns could reduce the volume of such waste it would require the evaporator to run for approximately 100 days, 24 hours per day. The campaigns probably could not be completed prior to planned closure of the evaporator in 2004. Moreover, the condensate from the evaporator is sent to LERF/ETF. This option is simply a complicated and costly way (\$2.5/gal compared to 12¢ - 24¢/gal at LERF) of adding an additional processing stage between the privatization contractors and LERF/ETF. It is also politically unfavorable to return large amounts of material to tank farms. Unless the waste volume produced is much smaller than projected (perhaps hundreds of thousands of gallons rather than tens of millions), this option is not feasible.

8.0 GASES

The processing facilities may require a spectrum of gases in the processing plants and analytical facilities. Most gases will be used in relatively minor quantities. The exception to this is the potential use of oxygen and natural gas as a combustion feed product for combustion-fired immobilization facilities. These gases are currently supplied to Hanford by commercial privatization contractors.

8.1 OXYGEN

TWRS Baseline System Description

The oxygen supply system would provide gaseous oxygen (95 to 100% pure) to the immobilization combustion melters and to the melter off-gas systems, if required. It is anticipated that the oxygen would be produced locally by the liquefaction and rectification of air. The oxygen system includes a cryogenic unit that produces 118 MT/day of 95 to 100% pure air, oxygen storage tanks, and associated piping. Oxygen is vaporized and piped as a gas to the process facilities.

Existing Infrastructure

Oxygen is not available from a centralized distribution network on the Hanford site.

Needs

Privatization contractors will supply facilities (if required) to use oxygen in the processing flow sheets that they will use. The expected oxygen requirements for Phase 1 privatization are 40 MT/day. It is anticipated that this facility be a dedicated facility for each privatization contractor that requires oxygen with a capacity of roughly 30 MT/day⁽⁶⁾. Due to significant safety problems associated with cryogenic operations of gasses, this facility should be located remotely from the radioactive processing vessels.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

A combined oxygen plant servicing both privatization contractors may be a more economical route.

⁽⁶⁾ The smallest commercial units available for the production of high-purity oxygen are in the 20 to 30 tons per day range.

8.2 NITROGEN

TWRS Baseline System Description

Nitrogen (or comparable inert gases) may be used to provide an inert atmosphere for processing vessels.

Existing Infrastructure

Nitrogen (or other comparable inert gases) are not available from a centralized distribution network on the Hanford site.

Needs

The privatization contractor will provide their own supply of specialty gases as required for their own processes. Nitrogen could probably be provided as a by-product from the oxygen plant. The comments that apply for oxygen would also apply here. No specific requirements for nitrogen have been established at this time.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

The gases could be received and stored in individual cylinders in a bulk cold-chemical storage facility and distributed as needed or could be fed into a central supply manifold and piping and routed to each site that requires them.

8.3 NATURAL GAS

TWRS Baseline System Description

Natural gas could be used to power process steam generators, gas-fired melters, or for other purposes. If natural gas is substituted for any of these functions, the electrical requirements reported in Section 4.0 will change correspondingly.

Existing Infrastructure

A natural gas pipeline does not exist on the Hanford site nor are there any definite plans to install one. The use of natural gas has been considered in the past (and may be reconsidered) to feed the steam plants on the Hanford reservation. If natural gas is selected as the fuel source for the steam plants and a pipeline is installed, these gas lines might be in place before treatment in Phase 1 of privatization starts.

Needs

Two potential requirements for natural gas have been identified. A potential energy source for combustion-immobilization equipment is natural gas (kerosene is the baseline). The distributed steam generators may also use natural gas as fuel. A back-up propane system should also be installed to provide up to 36 hr of back-up fuel. If additional back-up fuel were required, it could be replenished by local privatization contractors until the primary fuel supply was restored.

If natural gas is selected, feed lines could be added to the 200E gas line as required to the site boundary of the Phase 1 privatization.

If the privatization contractors decide to use natural gas they will provide the necessary pipes, valves, and other equipment to take the natural gas from the boundary of the processing plant to the use site(s). The M&O or DOE will provide siting information and assessments of the pipeline route to avoid the use of contaminated areas. The DOE, privatization contractor, or the natural gas provider (depending on whom the privatization contractor elects to purchase the natural gas) will provide a feeder line to the boundary of the processing facility.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

The alternate fuel sources being considered include diesel, kerosene, and propane. None of these are available from a central distribution source. The privatization contractors will need to supply storage containers and piping to use these if selected.

8.4 INSTRUMENT AIR

TWRS Baseline System Description

Instrument air is a special class of compressed air that has been dewatered and scrubbed of oils. It can be used for actuating process controllers and for pneumatic instrumentation..

Existing Infrastructure

Instrument air is not available from a centralized distribution source on the Hanford site.

Needs

It is anticipated that the privatization contractors will supply their own source of instrument air, if required. Instrument air requirements have been estimated at 13.4 Mm³/yr and 4.6 Mm³/yr for the TWRS and Phase 1 privatization plants, respectively. The instrument air is expected to be equally split between pretreatment, low-level and high-level processing.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

Electronic control valves and instrumentation do not require instrument air. These types of devices are also more amenable to the anticipated process control system.

8.5 COMPRESSED AIR

TWRS Baseline System Description

The compressed air system would provide plant air for spargers, jets, general maintenance use, and breathing air. The air compressors provide a continuous supply of plant and instrument air at varying flow rates to users throughout the site.

The compressed air system is divided into three sub-systems: plant air, instrument air, and breathing air. The plant air sub-system includes compressors, filters, and an air receiver. The instrument air subsystem included compressors, filters, air dryers, and an air receiver. The breathing air subsystem includes bottled breathing quality air, filters, manifolds, and carts.

This utility source would be located in the MUB. Within the MUB, one set of compressors provides both the instrument air and plant air. A set of three 50% capacity compressors provides for the needs and maintains one compressor as a spare. Bottled breathing air is purchased from an approved supplier and stored in a dedicated breathing air bottle storage area.

Existing Infrastructure

Compressed air is not available from a central distribution source on the Hanford site.

Needs

It is anticipated that the privatization contractors will provide their own compressed air.

Compressed-air requirements (including instrument air) have been estimated at 84.2 Mm³/yr and 29.0 Mm³/yr for the TWRS and Phase 1, respectively. The vast bulk of this would be consumed in the low-level immobilization facility.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

TBD.

8.6 VACUUM

TWRS Baseline System Description

The TWRS Health Protection System (HPS) Vacuum System would provide a continuous vacuum for the continuous air monitors and samplers at various locations in the treatment facilities. The system discharges to the HVAC Exhaust Plenum. The samples are used to determine the quality (radioactivity) of air that any personnel within the monitored area will breathe.

The HPS Vacuum System includes piping, HEPA filters, and blowers. This system provides vacuum for alpha-beta continuous air monitors, beta continuous air monitors, and record air samplers. Two 100% flow capacity, motor-driven vacuum blowers (one operating and one spare) are provided for each system installed. The blowers pull a vacuum on the system header through a HEPA filter(s). The HPS Vacuum Systems will be designed and operated so that no single point failure will result in the loss of the monitoring function. The HEPA filters remove submicron particulates from the gas stream.

It is anticipated that separate Vacuum Facilities will be installed for each processing facility:

- An HPS Vacuum system for the vitrification facility,
- An HPS Vacuum system for the separations facility,
- An HPS Vacuum system for the Canister/Cask Handling Facility,
- An HPS Vacuum system for the Fan/Filter Facilities,
- An HPS Vacuum system for the Regulated Facility Entry Facilities and the Analytical Laboratories.

Existing Infrastructure

Vacuum is not available from a central distribution source on the Hanford site.

Needs

The privatization contractors will supply their own vacuum system, if required. The vacuum systems are anticipated to be closely connected to the facilities that they serve. Utility requirements have not been established for this utility.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

TBD.

9.0 SOLID WASTE SYSTEM

TWRS Baseline System Description

The TWRS Solid Waste system would collect, survey, segregate, decontaminate, and package solid wastes (failed, used, or spent equipment and materials) generated from treating tank wastes. The system consists of the facilities and equipment required to collect, survey, segregate, decontaminate, prepare for re-use, package, assay, and temporarily store solid wastes. The system should be located within the Hanford site and provide temporary storage for eight weeks worth of solid wastes.

Solid wastes are segregated into radioactive and non-radioactive wastes. Radioactive wastes will be further segregated into ten sub categories (as defined in WHC-EP-0063, Hanford Site Solid Waste Acceptance Criteria [Willis 1993]). Of the ten sub categories defined, only the following six have been determined to be generated during TWRS pretreatment and vitrification.

- High Level Waste (HLW)
- Transuranic Waste (TRU)
- Low-Level Waste, Category I (LLW)
- Low-Level Waste, Category 3
- Low Level Waste, Greater than Category 3
- Radioactive Mixed Waste Components (RMW) of each of the above five categories.

Existing Infrastructure

The Central Waste Complex consists of 26 major above-ground steel shed buildings with capacities ranging between 1,000 and 10,000 55-gal drums (Carlson 1994). The total above-ground capacity is about 65,000 55-gal drums. These buildings are about 70% full, leaving a current excess capacity of 19,500 55-gal drums. Fifty-five gallon drums are the preferred container; however boxes up to 4 ft x 4 ft x 8 ft are routinely accepted. The fees for 55-gal drums are fairly standardized and are not expected to change substantially for the next few years. Special items requiring unusual containers (large, long, etc.) are accepted; however, the costs required to temporarily store these are estimated on a case-by-case basis and little general guidance can be given.

A TRU storage facility (TRU SAF) has a capacity to store 2000 55-gal drums of TRU waste. Only 55-gal drums can be accepted. According to waste projection studies (Valero 1995) and the assumption that future waste isotopes will be similar to past receipts, the excess capacity for existing TRU storage at both TRU SAF and the CWC is roughly estimated to become depleted in 1998. WIPP and new treatment options may become available to alleviate TRU and TRUM storage needs. Regardless, Project W-112 will provide three additional storage buildings, which could potentially extend the availability of such storage until as late as 2003.

The complex also contains numerous small specialized trailers or boxes to temporarily store segregated specially classified materials. The complex also contains at least nine burial grounds for low-level wastes (six in the 200W area and three in the 200E area). The capacity of the burial grounds is very large and no capacity constraints are foreseen with the privatization contractors' low-level wastes.

The Central Waste Complex could be available for use by the privatization contractor facilities. For FY 1995, the solid waste storage/disposal rates and assessments for routine radioactive and non-radioactive hazardous wastes to existing site users were (McCarthy 1994):

- Low-level waste: \$36.01/ft³
- Radioactive mixed waste: \$120.24/ft³
- TRU waste: \$178.46/ft³

Additional charges are imposed for Category 3 wastes that require either contact handling (\$81.78/ft³) or remote handling (\$143.15/ft³). A fee of \$300.00 per shipment will be charged for direct offsite shipments of non-radioactive hazardous waste to cover personnel support.

Additional costs can be incurred by the generator (as required by DOE Orders) if in the process of verification of the contents, discrepancies between the claimed and actual shipments are found. A tracking process will be used to determine the performance of the generator. If a generator is found to be out of compliance, the verification requirements may be increased from the baseline of 1% for low-level wastes or 5% for mixed wastes up to 100% verification or refusal of receipt of wastes. If CWC finds non-compliant solid wastes, the generator may have the wastes returned for rework at the generator, or pay to have the material corrected by the Central Waste Complex.

Procedure WHC-EP-0063 (Willis 1993) is in the process of being revised and the revisions are expected to be approved before the response is submitted to the RFP. This WHC procedure is in compliance with DOE Orders 5820.2A Chapter 111, Sections 3.d(1), 3.e(3), and 3.e(4) as well as WHC procedure WAS 173-303-300 (1), (2), (3), (4), and (5)(g). Revisions to the acceptance criteria that are expected to result in streamlined operations and lower costs are being prepared and implemented. Shipping orders, manifests, solid waste disposal records, and other records storage are virtually always maintained on paper records with minimal electronic data storage.

The transportation of wastes is governed by U.S. Department of Transportation (DOT) regulations and WHC procedure WHC-CM-2-14 (WHC 1992). This last procedure has been adopted by Bechtel Hanford, ICF Kaiser and is becoming the standard procedure for all Hanford contractors.

Needs

The costs of this service may be funded by DOE/TWRS Program at no charge to the contractor, or at a fee to be negotiated, at the discretion of DOE. Capital costs to upgrade the related infrastructure may be funded by DOE/TWRS Program at no charge to the contractor, or for a fee to be negotiated, or may be part of the privatization contractors bid, at the discretion of DOE.

Table 9.1 shows the total volumes of solid waste estimated to be produced in the entire multi-decade processing campaign for TWRS pretreatment, low-level vitrification, and high-level vitrification (Poulter 1995). Table 9.2 shows the total projected volumes of solid waste estimated to be produced in Phase 1 pretreatment, low-level immobilization, and high-level immobilization. As discussed in the introduction, these values are probably a conservative (high side) estimate by perhaps as much as a factor of ten based on only 6 of 177 tanks being processed.

Table 9.1 Estimated Solid Waste Produced During Operation of the Pretreatment, Low-Level Vitrification, and High-Level Vitrification Facilities (Poulter 1995)

<i>Solid Waste Classification</i>	<i>Separations/Low-Level Vitrification</i>		<i>High-Level Vitrification</i>	
	<i>kg</i>	<i>55-gal Drum</i>	<i>kg</i>	<i>55-gal Drum</i>
Transuranic	0	0	510,000	2,249
Low Level Category 1	1,398,000	6,164	640,000	2,822
Mixed Low Level Category 1	1,860	410	3,400	750
Low Level Category 3	0	0	202,000	890
Mixed Low Level Category 3	0	0	230	51
Low Level > Category 3	3,464,000	15,273	72,100	318
TOTALS	4,863,860	21,847	1,427,730	7,080

Table 9.2 Estimated Solid Waste Produced During Operation of the Phase 1 Privatization Pretreatment, Low-Level Immobilization, and High-Level Immobilization (Poulter 1995)

<i>Solid Waste Classification</i>	<i>Separations/Low-Level Vitrification</i>		<i>High-Level Vitrification</i>	
	<i>kg</i>	<i>55-gal Drum</i>	<i>kg</i>	<i>55-gal Drum</i>
Transuranic	0	0	175,950	776
Low Level Category 1	482,300	2,126	220,800	973
Mixed Low Level Category 1	640	141	1,170	259
Low Level Category 3	0	0	69,690	307
Mixed Low Level Category 3	0	0	80	17
Low Level > Category 3	1,195,000	5,270	24,880	110
TOTALS	1,677,940	7,592	492,570	2,497

Solid wastes will be disassembled and packaged according to applicable federal, state, local, and DOE orders, as well as any requirements of the treatment, storage, and disposal (TSD) facility. For the Hanford Central Waste Complex, the appropriate procedure is WHC-EP-0063 (Willis 1993). Packaged wastes will be decontaminated and assayed to determine the isotope content prior to placement in the TSD facility. It is assumed that this system will package solid wastes into 55-gal drums and must be able to handle and safely dispose of a failed melter full of glass. The system will be able to accommodate larger packages required for certain wastes (such as a melter), which can not be cut-up to fit within the 55-gal drums.

The volume of solid waste generated in Waste Tank Safety and Operations (primarily operations and ventilation) and Tank Waste Disposal (primarily retrieval) TWRS is estimated to be 10,009 55-gal drums of TRU/TRU mixed waste, 1,366,816 drums of low-level mixed waste, and 556,105 drums of LLW (Carlson 1994) for a total of 1,932,930 drums.

The volume of solid waste generated by Phase 1 Separation and LLW represents 0.39% of the solid waste generated by other sources. The volume of solid waste generated by the potential Phase 1 HLW represents 0.13% of the solid waste generated by other sources.

Since the volumes of solid wastes are small compared to other sources, it could be beneficial to have the privatization contractors use the Central Waste Complex. It is recognized that solid waste handling facilities within each privatization contractors' facility have advantages in that less solid waste is generated and that the waste generated is handled fewer times.

If the privatization contractors choose to dispose of the solid wastes in a different facility, the facility must be able to accept wastes from defense nuclear facilities as opposed to commercial nuclear facilities.

Identified Issues

Future waste storage need projections for the Central Waste Complex will need to consider waste projections from the privatization contractors when planning additional facility construction to accommodate any predicted shortfall in storage facilities.

Risks/Risk Mitigation Alternates

1. Should the privatization contractors elect to build their own solid waste facility, the package drums must conform to the previously referenced specifications for acceptance. The preferred route would be to use the Hanford site system.

9.1 NON HAZARDOUS WASTE GARBAGE

TWRS Baseline System Description

The TWRS baseline is to dispose of sanitary non-hazardous solid waste at the local municipal landfill site in Richland, Washington.

Existing Infrastructure

A sanitary landfill exists on the Hanford site. It is in the process of being closed down with anticipated closure in December 1995, and an absolute shut down of March 1996 (Mauseth 1995). Local municipal sanitary landfills will be taking the sanitary wastes from the 300 and 200 areas. A contract is in place between DOE and the City of Richland for this service. The current disposal fee is approximately \$54/ton. Medical wastes, non-regulated drummed wastes, and asbestos waste can not go to the local municipal landfill. Separate contracts are being prepared for these materials.

Needs

It is anticipated that the privatization contractor will provide for hauling and disposal of their own non-hazardous garbage.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

The privatization contractors could also transfer the solid wastes to the M&O contractor for hauling and disposal. Regardless of who does the hauling or whether the landfill is on- or off-site, the privatization contractor would need to comply with WAC 173-304 "Minimum Functional Standards for Solid Waste Handling." The privatization contractors would be required to warrant that the solid wastes provided meet this specification. If any fines or penalties are levied against the M&O due to failure to meet the specification, the privatization contractors would pay for any fines or penalties.

10.0 TELECOMMUNICATIONS SYSTEM

TWRS Baseline System Description

The telecommunications system consists of all equipment required to provide internal and external communications functions for the privatization contractors' Treatment Complex. The external telecommunications system will provide for telephone, emergency response, and data transfer in and out of the Private Treatment Complex, while the internal telecommunications system will provide for communications within the complex. The telecommunications system includes voice, video, spectrum-dependent communications, and data communications required to support facility operations, maintenance, management, and emergency response. Additions to the existing system are per WHC-S-0403, Standard Specifications for Hanford Site Telecommunications Systems and Facilities (WHC 1995).

Land-based trunk lines will enter the Treatment Complex at a single location and be routed to distribution equipment in the telecommunications room of the emergency response center. Distribution equipment will then route both hard wired and wireless communications to the various facilities within the complex.

Existing Infrastructure

The existing telecommunications infrastructure for the 200E Area consists of a 5ESS remote switch module connected to a host unit in the 300 Area⁽⁷⁾. This system is capable of providing both standard telephone service and integrated service digital network (ISDN) service. The ISDN service is a method for providing two circuit switched 64 kbps channels and one 16 kbps packet switched channels on a single telephone pair. Depending upon the location, sufficient telephone facilities should be available for use. The 5ESS is a very feature-rich telephone system and can offer a variety of services such as call waiting, call forwarding, camp-on, etc. The exact configurations will depend upon the customer's needs.

Copper cable, coaxial cable, and optical fiber facilities are available at several locations near the Grout facility. Tie-in points are available to the buried underground fiber optic and buried integrated voice data transmission system (IVDTS) cable at the 012 Canton USW-8 and 012 Grout USW-6 pads near building MO-297 at the site location south of the Grout complex. They are also available near building MO-392 and 243 Grout Loop USW-8 near building 243-G8 at the site location north of the Grout complex. Other tie-in points are also available. These facilities support the voice, data, and special circuit requirements for the Area.

Needs

The privatization contractor should connect to the Hanford local area network (HLAN) to exchange e:Mail, data, and alarm information.

To operate and maintain the system is the prime consideration used in defining the configuration for this system. Centralized telecommunications distribution equipment in one location provides a single point of contact between the privatization contractors' facilities, the M&O contractor, the technology provider, DOE, the privatization contractors' home offices, and the outside world. It provides an efficient

⁽⁷⁾ The IVDTS Purchase Order (WHC 1993) covers a majority of the telecommunications backbone.

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system to route and transfer communications and information with the Hanford complex. Maintenance and repair of the system will be greatly simplified with all the components in a single location.

The costs of this service may be funded by DOE/TWRS Program at no charge to the contractor, or at a fee to be negotiated, at the discretion of DOE. Capital costs to upgrade the related infrastructure may be funded by DOE/TWRS Program at no charge to the contractor, or for a fee to be negotiated, or may be part of the privatization contractors bid, at the discretion of DOE.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

TBD.

11.0 OTHER INFRASTRUCTURE

Other infrastructure is defined as facilities (and equipment) required to enable the operation of the processing plants, but which are not directly associated with the processing plants. These structures are not considered to be utilities per se, but do not fit under any other definition neatly. Several of these facilities may be co-located into a common building(s). These buildings can potentially use existing Hanford structure or be a new combined facility built specifically to support both privatization contractors. The sizes of buildings shown in the following sections assume that a shared facility is used. If separate facilities are required for each privatization contractor, the size of each facility would decrease by 34%. Where possible, the sizes and costs of these needed infrastructure elements are estimated. Sizes are based on Boomer's study (1994).

11.1 SAMPLE ANALYTICAL LABORATORY

TWRS Baseline System Description

The TWRS Sample Analytical Laboratory would analyze the solid, liquid, and gas samples collected in the facilities. Samples are taken to fulfill process control, including process diagnosis and history, waste form qualification, process gas analysis, process waste analysis, wastewater analysis, environmental sample analysis, incoming feed product certification testing, outgoing product certification testing, and incoming raw material certification testing. The samples would be taken within the processing facilities and conveyed by pneumatic rabbit system⁽⁸⁾. A sample tracking system built around a laboratory information system (LIMS) would record and monitor the analytical requirements and results for each sample and make the results available to the computer and telecommunications network.

The analytical facility is expected to be equipped with analytical radiochemical cells where undiluted, high radiological activity samples are remotely handled. Sample preparation, dilution, and limited sample analysis occurs in the analytical cells. Diluted and/or low radiological activity samples are analyzed in analytical laboratories. Analyzers within the laboratories are located in the hoods to contain radioactivity. Other rooms within the analytical facility include service rooms, receiving rooms, counting rooms, equipment and stock rooms, solid waste handling areas, and analytical instruments rooms. Radiological liquid wastes are collected in catch tanks located in the basement.

Separate analytical facilities may be built within the bulk-chemical storage and warehouse to perform quality assurance testing and to reduce the load on the radiological laboratories.

Existing Infrastructure

Analytical services at the Hanford site are provided by on-site laboratories, including the 222-S laboratory and the 325 laboratory, offsite laboratories in the commercial sector, other DOE laboratories, and mobile laboratories on site.

⁽⁸⁾ Pneumatic rabbit systems are mature processes that have been demonstrated in several nuclear processing applications.

Services provided by Hanford Analytical Services organization encompass sampling, screening, analysis, analytical methods development, laboratory scale development and data support. Specifically included are analytical monitoring the quality of site drinking water, environmental and effluent monitoring, industrial hygiene analysis, and chemical processing and waste management activities, including RCRA analyses. For samples that are sent to offsite laboratories for analyses, this organization is responsible for data and sample management, specifically preparation of field documentation requesting analysis and specifying chain-of-custody, and also assigns the laboratory to which the samples will be sent.

The 222-S laboratory (operated by WHC in the 200-W Area) contains 6500 m² (70,000 ft²) of lab space, and includes 150 hoods and analytical hot cell space for 12 remote manipulators. Analytical support for environmental and effluent monitoring, chemical processing and waste management activities, including the processing and analysis of tank waste core samples, is provided at 222-S. The Sampling and Mobile Laboratories (S&ML) organization is chartered to conduct non-routine RCRA/CERCLA protocol sampling throughout the Hanford Site. The S&ML collects samples and packages and ships them to their lab destination, on or offsite. Sampling services include, but are not limited to, the sampling of soil, water, gas vapor, oil, sludge, tar, concrete, facility effluents, and other such media. The S&ML maintains an extensive inventory of protocol sampling equipment and supplies and has a fleet of fully equipped sampling trucks and trailers to handle both radiologically contaminated and non-radiological work.

The PNL Analytical Chemistry Laboratory (ACL) is located in the 325 building. The lab provides analytical chemistry support services for a wide spectrum of Hanford Site programs, including research and development, environmental and safety monitoring program, and tank characterization and safety investigations. In the High-Level Radiochemistry Facility, also in the 325 building, Hanford waste tank core samples are extruded, homogenized, and sub-sampled; most of the physical testing on this core material is done in this facility. The Shielded Analytical Laboratory group contains a set of six hot cells designed specifically for the performance of analytical chemistry activities on highly radioactive samples. Included in the capability of the ACL are: 1) a full range of radiochemical, inorganic, and organic analysis capabilities, and 2) ability to prepare all data packages to EPA Contract Laboratory Program (CLP) standards.

Needs

A sample analytical facility(s) is expected to be provided by the privatization contractors.

The sample analytical facility is expected to be a dedicated, close proximity, external facility. One analytical facility per privatization contractor is the recommended strategy. To minimize the delay in waiting for sample results and because of the number of samples anticipated for analysis, each treatment function should have its own dedicated set of analytical instrumentation. It may be possible to share some of the less highly used equipment, but this has not been determined.

Analysis of the analytical tasks anticipated to be necessary for the immobilization of the Hanford site tank wastes yields an expected capital instrumentation cost of \$983,000 and annual operating costs of \$6,390,000 per privatization contractor (Hendrickson 1995). These costs include a comprehensive suite of analytes and analytical techniques that are performed offline on discrete samples in an analytical lab. On-line continuous monitoring requirements and costs, such as pressure, temperature, flow, and routine analyses of off-gases for permit monitoring are included as a percent of the system cost. Essential material analysis embedded in material cost (e.g., caustic assay, purity of glassformers, etc.) were not addressed.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

The use of WHC or Battelle, Pacific Northwest Laboratory can not be recommended at this time as a viable alternative to the construction of a new laboratory by the privatization contractor. To be considered as a viable alternative, provisions must be made to give first priority to production operations by the privatization contractors and second priority to ongoing technology development or tank farms operations work.

A single shared facility between the two privatization contractors would be a preferred arrangement because it would not install duplicate equipment and would reduce the site space required. However, administrative procedures would need to be installed to prevent biasing of the results to any one privatization contractors' favor. An independent contracted testing laboratory or existing on-site laboratory could provide this service provided that the privatization contractors schedule, quality, and economic expectations are met.

11.2 COLD CHEMICALS SUPPLY, FEED, AND VENT SYSTEM

TWRS Baseline System Description

The TWRS Cold Chemicals Supply, Feed, and Vent System would include all facilities required to receive, store, prepare, and distribute cold chemicals (or cold-chemical solutions) to process users and to neutralization and decontamination facilities. It would include bulk storage tanks, bulk storage bins, chemical make-up tanks, feed tanks, sump tanks, ventilation facilities, blowers, vacuum exhaust, and appurtenances, such as pumps, agitators, heaters, and distribution facilities. Glass former bins and transport equipment are part of this system. The system is sized to provide a minimum of a 30-day supply of chemicals, except for storage bins. Storage bins (which are located in the bulk handling area) would be sized to accommodate a rail car shipment or a 16-day supply, whichever is larger.

Cold-chemical solutions and decontamination solutions would be prepared in make-up tanks located in the bulk cold-chemical building. Glass-former formulations would be prepared in mixers in the bulk chemical buildings and transported pneumatically to the process facilities. Automated conveying and mixing of other chemicals has not currently been defined, but may be used as needed, depending on the melter technology selected.

The cold-chemical feed system consists of chemical feed tanks and decontamination solution tanks that provide intermediate storage for the chemicals used in the in-cell process equipment and decontamination facilities. The hardware is an integral part of the processing facilities, but is not discussed here.

Some chemicals (ammonia, molten sulfur, bulk glass formers and glass frit) should be stored as close as possible to the process facility to minimize operational concerns associated with these chemicals. However, ammonia and kerosene, which are highly flammable, will need special safety precautions and may need to be stored remotely.

Existing Infrastructure

A bulk chemical storage and preparation facility was installed at Hanford to support the Grout facility. It is currently unused and available. The facility generically was designed to serve the same purpose; however, some upgrades would be required to provide alternate pumps and pneumatic conveying systems. A detailed trade study would be required to determine if the facility's size is appropriate for the privatization contractors uses.

Needs

The privatization contractors will provide their own supply of, storage for, and ventilation of, bulk chemicals and specialty chemicals, including storage as needed. The preferred configuration is for one common shared bulk cold-chemical facility adjacent to the process facilities to minimize transportation logistics. The shared facility could be operated by either of the two privatization contractors' or a third privatization contractor. The bulk cold-chemical facility is estimated to require a footprint area of 565 m² based on a 37.8-m by 43.3-m (1640 m²) facility specified for the TWRS Processing Complex.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

1. The privatization contractors may use the M&O existing chemical ordering, receiving, and distribution system for a negotiated fee.
2. If the privatization contractor elect to separately sub-contract or install their own dedicated facilities for this support.

11.3 PROCESS FACILITY VENT SYSTEM

TWRS Baseline System Description

The Process Facility Vent System would provide vapor control in overhead vent lines from cold-chemical feed tanks, drain catch tanks, and other potentially radioactive sources in the separations and vitrification facilities. Separate vent systems will be provided in the separations and vitrification facilities. Each system discharges the vent gases through HEPA filters to the dedicated HVAC exhaust stack and finally releases them to the atmosphere. The process facility vent system will also prevent out-migration of the cold-chemical feed tanks' vent gases in to the operating areas.

Existing Infrastructure

No current infrastructure exists to support vent facilities for the privatization contractors.

Needs

The privatization contractors will provide vent systems of their own design to meet operating, safety, and environmental regulations for gaseous emissions. Consequently, details for capacities, vacuum levels, and other parameters have not been established and will be expected from the

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privatization contractors. It is anticipated that the facility vent systems will be integrated with and/or co-located with other mechanical utilities (i.e., compressed air, chilled water, cooling water, etc.) in a mechanical utility building. This mechanical utility building is estimated to require a footprint of 820 m² based on an identified footprint of 2,380 m² from the TWRS complex.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

TBD.

11.4 MAJOR EQUIPMENT ASSEMBLY*TWRS Baseline System Description*

The Major Equipment Assembly function would provide for the assembly of new in-cell equipment before installation in the process facilities. It would consist of an enclosed assembly area, bridge crane, and other items and equipment required to assemble new in-cell equipment.

Existing Infrastructure

Infrastructure serving this purpose is currently available for many Hanford operational facilities but is dedicated to that use. Infrastructure for the use of the privatization contractor may or may not be available, depending on the M&O contractor's current usage.

Needs

This facility requires ready access by rail and motor vehicle. It is possible that this service could be made available. It is anticipated that the Major Equipment Assembly area will be co-located with other fabrication and repair shops. The size of the common facility has been estimated at 1,385 m², based on identified needs in the TWRS complex of 45.7 m by 87.8 m by 22.9 m high (footprint of 4,012 m²).

The costs of this service may be funded by DOE/TWRS Program at no charge to the contractor, or at a fee to be negotiated, at the discretion of DOE. Capital costs to upgrade the related infrastructure may be funded by DOE/TWRS Program at no charge to the contractor, or for a fee to be negotiated, or may be part of the privatization contractors bid, at the discretion of DOE.

Identified Issues

If major equipment is assembled remotely from the privatization contractors' site and is to be transported by roads, what frequency and weights are anticipated?

Risks/Risk Mitigation Alternates

TBD.

11.5 SPARE PARTS FABRICATION

TWRS Baseline System Description

The TWRS Spare Parts Fabrication function would provide for manufacturing and assembling small equipment items and spare parts required for the operation and maintenance of the Treatment Complex. It would consist of enclosed area, work benches, tool cribs, and other items required to assemble or manufacture small equipment items and spare parts.

Existing Infrastructure

Infrastructure serving this purpose is currently available for many Hanford operational facilities but is dedicated to that use. Infrastructure for the use of the privatization contractor may or may not be available, depending on the M&O contractor's current usage.

Needs

This facility requires ready access by rail and motor vehicle. It is anticipated that this service can be provided from an existing Hanford facility. It is anticipated that the spare-parts fabrication facility will be co-located with the major-equipment assembly facility.

The costs of this service may be funded by DOE/TWRS Program at no charge to the contractor, or at a fee to be negotiated, at the discretion of DOE. Capital costs to upgrade the related infrastructure may be funded by DOE/TWRS Program at no charge to the contractor, or for a fee to be negotiated, or may be part of the privatization contractors bid, at the discretion of DOE.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

TBD.

11.6 TREATMENT COMPLEX MANAGEMENT AND SUPPORT SYSTEM

TWRS Baseline System Description

The TWRS Treatment Complex Management and Support System would provide facilities for the management and support of the privatization contractors' treatment complex operations. This system would provide office space for management and support personnel as well as facilities postal services, plant records retention, reprographics, training, and public outreach displays. These facilities would be located in the Operations Support Building

Existing Infrastructure

Infrastructure serving this purpose is currently available for many Hanford operational facilities but is dedicated to that use. Infrastructure for the use of the privatization contractor may or may not be available, depending on the M&O contractor's current usage.

Needs

The privatization contractors are responsible for providing or procuring the Management and Support systems needed for their own operations. The facility will be connected to the operations plant via the telecommunication system to enable data transfer.

The anticipated size of the two-story employee support services or operations support building has been estimated at a footprint of 960 m², based on an identified footprint of 2,790 m² for the TWRS Operations Support Building.

Identified Issues

ALARA principles versus productivity enhancements due to close proximity to the operating facility have to be studied.

Risks/Risk Mitigation Alternates

Facilities may be available within M&O or DOE facilities and could potentially be leased for negotiated fees.

Facilities in the City of Richland or other locations could be used for some of the administrative support functions.

11.7 REGULATED TWRS TREATMENT COMPLEX ENTRY SYSTEM

TWRS Baseline System Description

The TWRS Regulated Treatment Complex Entry System would control the entry and exit from the Treatment Complex. The Treatment Complex consists of both radioactive and nonradioactive areas. This system is composed of unregulated change areas, lockers, showers, and radiation monitors. It is located in the Regulated Complex Entry Building.

Existing Infrastructure

Infrastructure serving this purpose is currently available for many Hanford operational facilities but is dedicated to that use. Infrastructure for the use of the privatization contractor may or may not be available, depending on the M&O contractor's current usage.

Needs

It is anticipated that separate Regulated Treatment Complex Entry Systems will be provided by each privatization contractor. The Complex Entry system will be located at the privatization contractors' processing facilities and only allow access by authorized individuals. Personnel, depending on their destination, are not necessarily required to change to uniforms. It is anticipated that the Regulated Facility Entry System will be immediately adjacent to the Complex Entry System.

The regulated Complex Entry Building is estimated to be a two-story structure with a required footprint of 961 m², based on the size of the Regulated TWRS Complex Entry Building of 45.7 m by 61 m (2,790 m²). The required Regulated Complex Entry Building will probably be somewhat larger than the calculated area due to finite quantized sizes for the equipment and functions required.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

The Regulated Treatment Complex Entry System and the Regulated Facility Entry System could be combined provided that:

- The two privatization contractors' facilities are close to each other and
- Security and confidentiality issues can be worked out between the privatization contractors.

11.8 REGULATED FACILITY ENTRY SYSTEM

TWRS Baseline System Description

The TWRS Regulated Facility Entry System would control the entry to and exit from facilities that pose a threat of radiological contamination to the workers. Personnel wishing to enter or exit these facilities must first pass through this system. This system is composed of step-off pads, regulated change areas, lockers, hand sinks and showers, full body monitors, hand and foot monitors, and portal monitors.

Personnel wishing to visit the potentially radiological contamination areas will change to the uniforms specified by the privatization contractors. The anticipated areas where this regulated facility entry system would be employed include the Analytical Facility and the main process facilities.

Existing Infrastructure

Infrastructure serving this purpose is currently available for many Hanford operational facilities but is dedicated to that use. Infrastructure for the use of the privatization contractor may or may not be available, depending on the M&O contractor's current usage.

Needs

The Regulated Facility Entry system will be provided by each Privatization Contractor for its own operations. Personnel from one privatization contractor may not visit the other privatization contractor without permission from the site being visited. The regulated entry system(s) are in immediate proximity to the processing facilities.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

See Section 11.7 for discussion of alternatives.

11.9 EMPLOYEE SUPPORT SYSTEM

TWRS Baseline System Description

The Employee Support System would provide for amenities required to enhance worker comfort and morale. This system would consist of facilities above and beyond the normal lunch rooms, vending machines, or any other items customarily provided with a working facility. The amenities are aimed at enhancing the work environment. Some examples of these amenities include cafeterias, day care, or recreational facilities.

Existing Infrastructure

Infrastructure serving this purpose is currently available for many Hanford operational facilities but is dedicated to that use. Infrastructure for the use of the privatization contractor may or may not be available, depending on the M&O contractor's current usage.

Needs

The privatization contractors will either provide or provide access to employee support services (which are common worker expectations) aimed at enhancing the work environment. Some facilities available in the Hanford complex (routine medical facilities, day care facilities, recreational facilities, and cafeterias) that are provided to M&O personnel will be made available to the privatization contractors.

Utilities for the Employee Support System will not be specifically estimated separately from the general utility requirements. They are expected to be small compared to the processing functions. The utilities that will be used by these services include solids waste, trash, sanitary sewer, and drinking water.

The costs of this service may be funded by DOE/TWRS Program at no charge to the contractor, or at a fee to be negotiated, at the discretion of DOE. Capital costs to upgrade the related infrastructure may be funded by DOE/TWRS Program at no charge to the contractor, or for a fee to be negotiated, or may be part of the privatization contractors bid, at the discretion of DOE.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

TBD.

11.10 PROCESS FACILITY OPERATIONAL CONTROL SYSTEM

TWRS Baseline System Description

The process Facility Operational Control System would provide operational control for the TWRS Treatment Complex processing facilities. This system would monitor and control remote operations (cranes, etc.), pretreatment operations, vitrification operations, and canister handling activities. This system would provide for emergency shutdown of the process facilities in the event of an accident and the ability to shut down the process when the process control system is impaired. This system would consist of control consoles, instruments, connective wiring, transmitters, and other items required to

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provide, monitor, and control the process facilities. The safe shutdown portion of the system is considered to be redundant, Safety Class 1, independent of the distributed control system, and likely to be composed of programmable logic controllers (PLCs). The Safety Class 1 shutdown controls would be located in the Emergency Response Control Building.

It is anticipated that the monitoring and control system will employ digital supervisory data acquisition and process control computers and use computer automation wherever possible. The monitoring and control system is designed to fill four functions (WHC May 1995):

- Information management, for the purpose of maintaining interfaces with external systems and providing plant information to management independently of operations. The information management section will include summary technical data, logistical data, efficiency and cost data, and other operational/business information as needed.
- Control, for the purpose of controlling plant items and maintaining effective operations and safety through the monitoring and processing of information. Plant control will, in general, be operated from a central location. However, local control stations will be provided where actions to be taken must be viewed by an operator local to the area. Conventional and statistical process control techniques will be used.
- Instrumentation, for the purpose of detecting process conditions and equipment status using instrumentation, and adjustment of parameters using final control elements. The sampling of the inputs and outputs to the process will be maximized while using minimal sampling of the process. This enables feed-forward control, based on the output of the process, to occur and provides improved quality of the products. The system may employ smart instruments and transmitters designed to ease the load on the central processing unit.
- Protection, for the purpose of protecting the plant personnel, capital equipment, the environment, and the public in the event of abnormal conditions.

Existing Infrastructure

Instrumentation is currently installed in the AP-106 and 108 tanks. The instruments include a thermocouple tree consisting of 19 thermocouples and roughly 40 other thermocouples in the annulus spaces or on the inner tank. Approximately eight of the thermocouples are in the tank waste. Pressure and level instruments are also installed. A combination of pneumatic and electronic instrumentation is used; however, the majority of the instruments are vintage 1985 and are not electronic. Leads from the instruments are run to an instrument building that contains alarm panels and several types of strip chart recorders and other indicating gauges. Leads from key instruments are also routed to the control center in the 242-A Evaporator. The instruments are monitored once per minute, trended, and historical trend charts are saved to back-up tape. Essentially no process control in the tank farm is run from this control center. Valves are not switched automatically.

The 242-A evaporator employs a distributed control system based on a DEC VaxStation(s) 4000-60 and D-3 software. Statistical process control algorithms are not used. A laboratory information management system does not exist to feed the results of analytical testing back to the evaporator. The operators report that this system is extremely easy to reconfigure, expand, and use. No operational difficulties have been experienced.

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A Mikon distributed control system is employed elsewhere on the Hanford site, specifically in the effluent treatment facilities (TEDF and Effluent Treatment Facility [ETF]) and has been reportedly plagued with startup and operational problems. It is, however, functioning and performing. The Mikon software is run on a Sun Sparc workstation under the UNIX operating system.

A distributed control center housed in a control room used for the Grout facility currently exists. It is based on General Electric Series 6 programmable logic controllers. It is not currently being used. Information is not available on the capacity of the unit or the types of signals that can be handled. This equipment is not considered to be suitable for use by the privatization contractors.

Needs

It is anticipated that each privatization contractor will size, specify, and program the distributed control system of their choice for the facilities and processes used in their plant. The data must be available to the telecommunications network for remote usage. The process control network must be able to accept data from either the privatization contractors' dedicated analytical testing facility or an external sub-contracted analytical facility(s) for use in statistical process control of the processes. The control systems employed by the privatization contractors need to be consistent and compatible with the Hanford systems. It is anticipated that any tie-ins to the existing instrumentation will be made at the tank and not within the instrument control building. (The leads going to the current instrument control building will be maintained.) Critical alarm conditions should be multiplexed back to the 242-A evaporator room as a back-up measure.

The safe shutdown portion of the control system should be located remotely from the processing facilities so that in the event of an accident, the ability to shut down the facility is not impaired. The process control systems themselves are anticipated to be located in separate control rooms for each privatization contractor.

The size of the anticipated control rooms is estimated to be 100 m², based on identified control-room size from the TWRS Complex of 27.4 m by 38.1 m (307 m²).

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

It may be possible to share a control room provided that this is agreeable to each of the privatization contractors. Doing so may offer simplifications in maintenance and operability of the process control facilities.

11.11 PERSONNEL PROTECTION SYSTEM

TWRS Baseline System Description

The Personnel Protection System would provide for worker safety within the Privatization Treatment Complex. The personnel protection infrastructure system would include emergency exits, fire walls, shield walls, air locks, change areas, step off pads, alarms, radiation monitors, air samplers, and other items required to ensure worker safety. The system is distributed to all areas within the complex that may pose a threat to the worker population.

Existing Infrastructure

The only infrastructure on the Hanford site that is available for use by the privatization contractor is the alarms system. (See Section 11.11.4). Infrastructure does not exist on the Hanford site that is convenient or appropriate for use for this need for any of the other personnel protection sub-systems. Infrastructure serving this purpose is available for many other operational facilities, but it is dedicated to those facilities.

Needs

The privatization contractors will provide personnel protection systems for their workers. The utilities that are required specifically for these services include electricity and ventilation. The quantities will not be separately estimated from the general requirements. The utilities required for these services are expected to be very small compared to the utility requirements for the processing systems.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

TBD.

11.11.1 Fire

TWRS Baseline System Description

The TWRS baseline system is to use the Hanford Fire Department for fire-protection support.

Existing Infrastructure

The Hanford Fire Department provides fire-protection support, emergency services, and inspection-services support to the Hanford Site to comply with DOE Orders 5480.7 (1994) and 5480.7a. These services are currently provided for a fee based on building space of about \$1.25/ft². However, this can change on a case-by-case basis. The Hanford Fire Department has sufficient capacity to serve the additional privatization contractors' facilities without any additional infrastructure being built. Service agreements have already been set up to provide fire protection services to private entities (i.e., the Port of Benton for the 400 areas, Kaiser Aluminum for Building 313 and to the U.S. Ecology southwest of the 200E Area.).

The Hanford Fire Department provides a management infrastructure to provide incident command and control for emergency response activities and to provide overall management for support activities. The management staff has the training, knowledge, and experience to cover any credible emergency requiring emergency fire, medical, rescue, or hazardous materials (HAZMAT) response. Specifically, the Fire department (Swift 1995) does the following:

- Responds to emergency situations within 5 to 7 min with back-up response crews (if needed) within 10 to 12 min.
- Provides fire response teams 24 hour per day every day for fires in buildings, structures, wild lands, nuclear facility fires, and HAZMAT incidents.

- Provides 24 hour per day every day emergency dispatching services.
- Provides emergency medical services 24 hour per day every day.
- Provides emergency rescue services 24 hour per day every day.
- Provides response to material spills/release and confines/contains the spilled material to best protect the site employees and site environment.
- Assists programmatic organizations in monitoring, handling, and/or repackaging radiological material where such repackaging is required to satisfy emergency or non-emergency safety concerns.
- Provides a site Fire Marshall who manages a program of fire prevention, investigation, education, and permits.
- Ensures that required inspections are performed on ignitable and reactive waste storage sites.
- Provides self-contained breathing apparatus (SCBA), and cylinder maintenance, and testing/servicing for all Hanford contractors that use SCBA.
- Provides operational assurance testing of fire alarms, fire suppression, and fire water distribution systems according to National Fire Protection Associations codes and standards and other applicable DOE, state, and local regulations.
- Deactivates fire-alarm suppression systems to support facility activities as needed.
- Performs fire-watch services during off hours for additional hourly costs.
- Participates in up to 12 site/facility emergency drills per year.
- Provides emergency services to meet current requirements for safety documents, building emergency plans, assessment documents, and emergency management procedures.

The Hanford Fire Department also provides preventative maintenance, repair and testing on fire systems for negotiated fees on a case-by-case basis. These services are in accordance with the National Fire Protection Agency (NFPA) codes and standards and applicable DOE, state, and local regulations.

Needs

Fire protection is required for the privatization contractors' facilities. It is anticipated that the privatization contractors will be provided with fire-protection services from the Hanford Fire Department and DOE.

The costs of this service may be funded by DOE/TWRS Program at no charge to the contractor, or at a fee to be negotiated, at the discretion of DOE. Capital costs to upgrade the related infrastructure may be funded by DOE/TWRS Program at no charge to the contractor, or for a fee to be negotiated, or may be part of the privatization contractors bid, at the discretion of DOE.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

TBD.

11.11.2 Police/Security

TWRS Baseline System Description

The TWRS Baseline system is to use the Hanford Patrol and Benton County Sheriff's office.

Existing Infrastructure

Hanford Patrol is a staff organization that provides skilled, trained, and equipped protective forces in compliance with DOE Orders 5621.2c and 5632.7a as well as applicable state and local regulations and/or agreements (Champion 1995). The staff operates 24 direct security/rover posts on an around-the-clock basis throughout the entire year as well as 6-day-shift direct posts. A 24-h Shift Commander post and 24-h Patrol Operations center is staffed with at least two certified dispatchers. The Patrol Operations center serves to deploy security assets site wide, provides 911 services, dispatches Hanford Patrol and Benton County Sheriffs Office patrolmen, and provides fire, ambulance, and other emergency services. A fully staffed seven-staff-member Security Police Officer (SPO) III team (special weapons assault team [SWAT]) will be on call 24 hours per day. Routine patrols of the Hanford site are conducted. Two- and four-wheel drive vehicles are used to patrol outside of the protected area fences. Five roving patrols are conducted on a 24-h basis. The security police officers observe, assess, preserve evidence, report security situations, interdict, contain, neutralize, search, and arrest as required.

Hanford Patrol is supported by 34 experienced security professionals and four clerk/secretaries to ensure safe efficient conduct of operations, documentation, training and qualifications.

Two levels of service are provided; General site security and Augmented security, as directed by DOE Order numbers 5632.1c and 5632.7a. General site security is funded from a site assessment fee. Existing capacity is sufficient to provide coverage for the added privatization work force. If augmented security were to be required to comply with the DOE orders, additional guards would be required. These 24-h guards can be provided through Hanford Patrol at about \$40/h or approximately \$350K per year each (Champion 1995).

Needs

Police security protection is required for the privatization contractors' facilities. It is anticipated that the privatization contractors will be provided with the patrol/security services by Hanford Patrol and DOE and further will abide by all regulations governing the Hanford site.

The costs of this service may be funded by DOE/TWRS Program at no charge to the contractor, or at a fee to be negotiated, at the discretion of DOE. Capital costs to upgrade the related infrastructure may be funded by DOE/TWRS Program at no charge to the contractor, or for a fee to be negotiated, or may be part of the privatization contractors bid, at the discretion of DOE.

Identified Issues

Is security according to DOE Orders 5621.1c and 5632.7a required or can a lesser security system be used (i.e., standard industrial security)? Will any aspect of the privatization contractors process dictate a higher level of security than the general security described above? It should be noted that the privatization contractors will be operated within the Hanford reservation boundary, and therefore the privatization contractors may be able to piggyback onto many of the security features.

Risks/Risk Mitigation Alternates

The privatization contractors' may elect to hire separate security agencies to comply with the orders and regulations required.

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11.11.3 Medical

TWRS Baseline System Description

The TWRS baseline uses the Hanford Environmental Health Foundation (HEHF) to provide work-related emergency treatment of medical problems, routine physicals, and other services to the Hanford site. HEHF does not provide medical coverage for private or non-work-related health problems. It does not provide serious or critical care for injuries resulting from work-related accidents. These cases would be transferred to one of the area's hospitals for more extensive treatment and care.

Existing Infrastructure

The HEHF Health Foundation provides medical support to DOE and Hanford site contractors (Maher 1995). The services are broken into three primary programs:

- Health Maintenance Programs designed to maintain and improve employee health by preventing illness and injury. Specific programs include Healthy Lifestyle Education, Employee Assistance Programs, Screenings, Monitoring and Follow-Up, Safety Promotion and Accident Prevention, and Industrial Hygiene Consultation.
- Health Surveillance Programs designed to reduce health and safety risks to the worker through prevention and early detection of illness and injury. Identification and elimination of workplace health and safety risks before the occurrence is the primary purpose of the program. Specific programs include evaluations, industrial hygiene field services, and analysis.
- Health Services programs designed to improve employee health and expedite a return to productive and physically satisfying employment. Immediate care services enable employees to receive same day on-site information and treatment for occupationally related illness and injury (first aid). Specific programs are Acute Injury and Illness Management and Physical Medicine.

The staff at HEHF consists of health specialists in the fields of general and occupational medicine, occupational health nursing, ergonomics, exercise physiology, and industrial hygiene.

Needs

Emergency Medical services are required to be available for the privatization contractors' staff. It is anticipated that the privatization contractors will be provided with the emergency medical, ambulance, and first aid support from HEHF/Hanford Fire/DOE at DOE's discretion.

The privatization contractors may choose to subcontract with HEHF for routine medical services. The HEHF has sufficient excess capacity to provide services without incurring any additional costs. Fees are generally charged on a per-person basis, although some may be charged on a per-use basis.

The costs of this service may be funded by DOE/TWRS Program at no charge to the contractor, or at a fee to be negotiated, at the discretion of DOE. Capital costs to upgrade the related infrastructure may be funded by DOE/TWRS Program at no charge to the contractor, or for a fee to be negotiated, or may be part of the privatization contractors bid, at the discretion of DOE.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

The privatization contractors may separately contract with a routine health support company.

11.11.4 Emergency Preparedness

TWRS Baseline System Description

The TWRS baseline process is to use the existing Hanford Emergency Preparedness program and organization to insure compliance with existing Emergency Preparedness requirements.

Existing Infrastructure

The WHC Emergency Preparedness organization provides emergency preparedness support to the Hanford Site to insure compliance with existing Emergency Preparedness requirements contained in DOE 5500.1B, 5500.2B, 5500.3A, 5500.10 (or their replacement) and other State and Federal requirements for emergency preparedness and response activities. Infrastructure currently exists to support the additional privatization contractor and associated facilities without any additional infrastructure being established. The existing Hanford Emergency Response organization is established to respond to all Hanford emergency events and provide emergency management support for mitigation of emergency events at Hanford. Specifically the WHC Emergency Preparedness organization provides:

- Occurrence Notification Activities to comply with DOE 5000.3B (or its replacement).
- Emergency Response organizations to staff and manage Hanford Emergency Centers.
- The Emergency Duty Officer who is available to respond to Hanford Emergency Events as the Liaison to the Building Manager or Incident Commander at the scene of an emergency event.
- An emergency response program for response to transportation emergency events at or beyond Hanford.
- Support to facilities for development and maintenance of a compliant Building Emergency Plan and Hanford Facility Contingency Plan.
- Development and issue of Hazards Assessments for the purposes of quantifying the hazards associated with each facility.
- Conduct and maintenance of the Hanford Emergency Exercise Program.
- Development and coordination of the Hanford Emergency Response Plan and the Emergency Readiness Assurance Plan.
- Development and maintenance of WHC Emergency Management Procedures (i.e. emergency event recognition and classification, and initial response).
- Support to DOE-RL for offsite interface and planning associated with Emergency Management.
- Participate in appraisals and surveillance of Hanford facilities to insure compliance with Emergency Management requirements.
- Provide training to the Hanford Site Emergency Response Organization.
- Provide resources to maintain the DOE Region 8 Radiological Assistance Program.
- Provide interface with all Hanford Contractors for Emergency Preparedness activities.

Needs

It is anticipated that the privatization contractor will be required to integrate emergency planning activities with the existing Hanford contractor organizations. At a minimum, the privatization contractor will use the Hanford wide alarm system to broadcast any emergency notification and will be required to participate in any and all drills and emergency preparations.

The costs of this service may be funded by DOE/TWRS Program at no charge to the contractor, or at a fee to be negotiated, at the discretion of DOE. Capital costs to upgrade the related infrastructure may be funded by DOE/TWRS Program at no charge to the contractor, or for a fee to be negotiated, or may be part of the privatization contractors bid, at the discretion of DOE.

Identified Issues

Hazards Assessments have been conducted of the TWRS facilities and emergency planning activities implemented based on the analyzed hazards. Should any of the activities of the privatization contractor fall outside of the analyzed activities, the privatization contractor would be required to perform additional emergency planning to insure requirements are met. The privatization contractor will be expected to participate in the Hanford Emergency Response Organization to the extent practical.

Risks/Risk Mitigation Alternates

The privatization contractor may elect to use the existing Hanford Emergency Preparedness organizations to provide the necessary services or decide to establish it's own emergency response organization that would interface with the remainder of the Hanford Emergency Response organizations.

11.12 MAINTENANCE AND REPAIR SYSTEM

TWRS Baseline System Description

The Maintenance and Repair System would provide for the maintenance and repair of failed non-contaminated equipment, failed contaminated equipment, and failed Master Slave Manipulators (MSMs). This system consists of wash down and decontamination areas, repair areas, and tools and equipment required to remove, maintain, and repair failed equipment and manipulators.

Failed non-contaminated equipment is failed equipment located in areas that will not be radioactively contaminated and will not require decontamination before it can be contact maintained and/or repaired. This equipment includes large items that can be maintained or repaired in-place or smaller items that can be removed and placed in a shop for bench work. It is assumed that equipment requiring major overhaul will be removed and shipped offsite to a refurbishing contractor. Therefore, maintenance and repair facilities to perform this latter scale of work will not be provided.

Failed contaminated equipment is located in areas that can become contaminated and must be remotely maintained and/or repaired in-place; remotely removed and remotely maintained and/or repaired; or be remotely removed, decontaminated and contact maintained and/or repaired. Contaminated equipment that must be remotely maintained and/or repaired includes-but is not limited to-centrifuges, venturi scrubbers, metal HEPA filters, cyclone separators, and cullet roll crushers. Contact-maintained contaminated equipment includes, but is not limited to, in-cell pumps and agitators.

The MSMs are of a three piece construction where the hot or "contaminated" portion will be removed from the hot side. This portion of the MSM must be removed from its installed position and moved to an area where it can be decontaminated before it is moved to a repair station. The MSM cold portion and wall piece would require similar handling. It should be noted that the Analytical facility has the largest number and greatest usage of MSM.

Existing Infrastructure

Infrastructure serving this purpose is currently available for many Hanford operational facilities but is dedicated to that use. Infrastructure for the use of the privatization contractor may or may not be available, depending on the M&O contractor's current usage.

Needs

It is anticipated that the privatization contractors will provide repair and maintenance facilities near the process facilities and analytical facilities to reduce the potential for contamination during transport. It is anticipated that this system will be co-located in a mechanical utility building.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

TBD.

11.13 SUPPLY AIR TREATMENT SYSTEM

TWRS Baseline System Description

The Supply Air Treatment System would provide incoming ventilation air for the Treatment Complex processing facilities. Incoming air is filtered then conditioned before being distributed throughout each process facility.

The Supply Air Treatment System would be broken down into two subsystems: a Zone 1 system and a Zone 2 and 3 system. The Zone 1 system is once through and Zones 2 and 3 are cascaded. The Supply Air Treatment System would comprise the following major components: supply fans, roughing filters, high efficiency filters, preheaters, chilled-water coils, ductwork, and controls and instrumentation.

Existing Infrastructure

Infrastructure serving this purpose is currently available for many Hanford operational facilities but is dedicated to that use. Infrastructure for the use of the privatization contractor probably would not be available to the privatization contractor.

Needs

It is anticipated that the privatization contractors will provide ventilation air to their facilities. It is expected that the ventilation-air supply system will be located at the processing facility. It is anticipated that this system will be co-located in a mechanical utility building.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

TBD.

11.14 EXHAUST AIR TREATMENT SYSTEM

TWRS Baseline System Description

The TWRS Exhaust Air Treatment System would filter, sample, and monitor the air exhausted from the Treatment Complex process facilities. This system is broken into two subsystems: a Zone 1 system and a Zone 2 & 3 system.

Ventilation air would be drawn through the facility and through a double filtration system by a negative pressure supplied by exhaust fans. The filtered air would be exhausted to the atmosphere through an exhaust stack. The main components of the Zone 1 exhaust system include high efficiency filters, HEPA filters, exhaust fans, and exhaust stack. The main components of the Zone 2 and 3 exhaust system are high efficiency filters, two stages of HEPA filters, exhaust fans, and an exhaust stack.

Existing Infrastructure

Infrastructure serving this purpose is currently available for many Hanford operational facilities but is dedicated to that use. Infrastructure for the use of the privatization contractor probably would not be available to the privatization contractor.

Needs

It is anticipated that each privatization contractor will provide exhaust air facilities for its processing facilities. The exhaust equipment is expected to be located at the processing facilities. It is anticipated that this system will be co-located in a mechanical utility building.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

TBD.

11.15 SHIPPING AND RECEIVING SYSTEM

TWRS Baseline System Description

The shipping and receiving system would provide for the receipt, inspection, and inventory control of equipment, spare parts, and miscellaneous goods delivered to the Treatment Complex. It provides for the packaging and distribution of these items to the process and process support facilities within the complex.

Existing Infrastructure

Infrastructure for this purpose exists on the Hanford site as a site-wide central infrastructure serving all Hanford contractors.

Needs

The shipping and receiving system is anticipated to be provided by the privatization contractors for their own operations.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

The Hanford site shipping receiving system could be used for packages to the privatization contractors' sites for negotiated fees. This could reduce the amount of infrastructure required to be erected by each privatization contractor. It is anticipated that the logistical, administrative, and cost burden imposed by using the Hanford site shipping and receiving system would make this a non-viable option.

11.16 WAREHOUSING, STORAGE, AND SERVICE YARD

TWRS Baseline System Description

The Warehousing and Storage System would provide for the environmental protection and storage of equipment, spare parts, and miscellaneous goods required to operate and maintain the Treatment Complex.

The Storage and Service Yard would store equipment, vehicles, and materials that are required to operate and maintain the Treatment Complex, but do not require environmental protection. It would also provide for outside maintenance and repair of vehicles and large equipment.

Existing Infrastructure

Infrastructure for this purpose exists at the Hanford site. However, the infrastructure serving this purpose is available for many other operational facilities and is dedicated to those facilities. The current capability of 14,053 m² (151,268 ft²) will drop to 9869 m² (106,130 ft²) after 1995 and to 8919 m² (96,000 ft²) after the year 2000 in the 200-E area. The demand for storage space is expected to be equal to the supply. It is anticipated that additional warehousing will need to be constructed to meet the requirements for either TWRS or Privatization Processing.

The current plan is to demolish facilities with a fair or poor rating by the year 2000. At this point, the total Hanford warehousing capability is expected to be about 37,161 m² or 400,000 ft². Much of this capacity is already connected to existing programs (Trost 1995).

Needs

The warehousing system is anticipated to be provided by the privatization contractors for their own operations. The existing warehousing and storage facilities in the 200 areas are 40-years old, energy inefficient, and are being torn down. It does not seem likely that these existing facilities will be available for use by the privatization contractors.

This facility requires ready access by rail and motor vehicle. It is anticipated that this service can be provided from existing Hanford facilities.

The costs of this service may be funded by DOE/TWRS Program at no charge to the contractor, or at a fee to be negotiated, at the discretion of DOE. Capital costs to upgrade the related infrastructure may be funded by DOE/TWRS Program at no charge to the contractor, or for a fee to be negotiated, or may be part of the privatization contractors bid, at the discretion of DOE.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

TBD.

11.17 TRANSPORTATION

The privatization contractors' operations site and all related infrastructures will require transportation services.

TWRS Baseline System Description

The impact of the TWRS baseline to transportation is in part described in Figure 11.1 which shows the projected volume of site rail traffic and the impact of the current TWRS baseline.

The transportation needs of the Hanford Site are expected to change as various environmental cleanup activities proceed. The current demand for transportation (both internal and external to the site) is at the lowest level predicted over the next 26 years because of the ongoing mission transition from production to clean up. As shown in Figure 11.1, future rail traffic projections can be expected to increase dramatically from the current level.

The reasons for the increased rail demand include the movement of spent fuel from the KE/KW Basins to the 200 Areas and the movement of construction materials for TWRS Plants starting in 1998. The reasons for the increased demand after the year 2000 include the movement of glass frit from off-site locations to TWRS vitrification plants and the movement of TWRS chemicals beginning in 2004. The increased demand includes greater activity for the 200 Areas cleanup and TWRS projects as well as projects such as the ERDF (Environmental Restoration Disposal Facility), CWMC (Central Waste Management Complex) and In-Situ Burial Ground closures (these aren't included in Figure 11.1).

Figure 11.1 Rail Cars Per Year - Low Projection
(Trost 1995)

Because the 200 Area Plateau will be the center of activity in the future, the average daily roadway traffic in the 200 Areas is expected to remain at the present level over the next 20 to 30 years. Average daily traffic is expected to increase during TWRS peak construction periods, where peak traffic will occur at shift change. There is the potential of having up to 1000 construction workers during peak TWRS construction periods.

Existing Infrastructure

The primary roadway and rail system access to the 200 Areas will be maintained throughout the foreseeable future. It is anticipated that roadways will be maintained to 80,000 lb gross limit capability (per RCW 46.44.041) and rail lines to FRA Class 3 (40 mph) standards. Specifically, roadways and rail to and within the 200 Areas and the rail spur to the vicinity of the Phase 1 privatization contractors' site (PUREX spur) will be maintained to these standards throughout the foreseeable future. The current road system requires upgrades to maintain the existing capacity as identified in the Shannon Wilson Geotechnical and Pavement Studies dated December 1993.

Loads over 80,000 pounds that are not suitable for rail transport due to geometry/size conditions may utilize barge transport to the Port of Benton dock near the 300 Area where it could then be transferred to a specialized weight-distributing tractor trailer and transported to the 200 East Area Privatization Contractors via site roadways. The barge slip on the Columbia river is not under federal ownership. Its use must be negotiated with the Port of Benton.

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Historically, site contractors were provided with transportation services for transporting personnel throughout the site on an as-needed basis. In FY 95, as a result of the dramatic change in site mission and other realities, these services were eliminated with the exception of limited day shift intra-area taxi (bus) service between 3000, 700, 200 and 100 Areas and inter-area taxi (van) service in the 300/3000/RCH Areas and the 200 E/W Areas. Because of the limited nature and future uncertainties associated with these remaining services they will not be offered to the privatization contractors.

Needs

It is anticipated that the Phase 1 privatization contractors will utilize both roadway and rail systems to support construction, operations and decommissioning of their facilities. A two lane roadway will be provided to the privatization contractors' perimeter fence lines. A rail spur will not be extended to the privatization contractor site. However, upgrades will be performed as required, at the rail spur closest to the privatization contractors' site (PUREX spur) for the off-loading of assemblies, equipment and bulk materials.

The rail spur which services the PUREX facility is approximately 3300 feet (1000 meters) from the proposed privatization contractors' site. A suitable roadway with appropriate clearances to transfer materials from the rail spur to the privatization contractor site will be installed. Currently, a partial roadway exists from the rail spur to the proposed privatization contractor site.

Transfers of packaged hazardous and radioactive wastes associated with Phase 1 will be performed by both the privatization contractors and the M&O contractor, respectively. Roadways will also be used for these transfers. Some of these may require road closures during the transfers to satisfy safety and regulatory requirements. No additional roadway or rail construction is anticipated to accommodate these transfers.

The costs of this service may be funded by DOE/TWRS Program at no charge to the contractor, or at a fee to be negotiated, at the discretion of DOE. Capital costs to upgrade the related infrastructure may be funded by DOE/TWRS Program at no charge to the contractor, or for a fee to be negotiated, or may be part of the privatization contractors bid, at the discretion of DOE.

Identified Issues

It is unclear at this time what will be the extent of needed roadway/upgrades and the resulting increase in maintenance directly related to support of Phase 1 privatization. A bounding estimate for the upgrade work would be less than \$400K: \$300K in roadway upgrades, use if the PUREX rail spur must be coordinated with PUREX operations (there is significant potential for encountering soil contamination in this area. Therefore, the \$300K estimate could be off an order of magnitude) and \$100K for rail spur upgrades. These costs will be passed on to the Phase 1 privatization contractor or the DOE at DOE's discretion.

If, however, privatization contractors' request additional roadways, roadway access, rail line extensions, etc., these could be negotiated on a cost recovery basis to the government and/or the privatization contractor(s) could be allowed to add the upgrades at their expense, consistent with prevailing system requirements.

It is important to understand that in the future, the bulk of funding to maintain roadway and rail systems will originate with TWRS because its utilization will almost singly dominate these services. This cost element cannot be overlooked in out-year planning.

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The funding of site roadway and rail upgrade projects and enhancements is uncertain, but it is reasonable to assume that the burden of transport systems maintenance, etc. will fall to the TWRS program. Site projects that will require transportation infrastructure additions, i.e. new road or rail access, etc., will be expected to fund these as part of the project.

Risks/Risk-Mitigation Alternates

Privatization contractors may consider alternate modes of transportation or points of access beyond those noted here. For example, handling of glass frit/formers may necessitate rail off-loading at a different site within the 200E Area for accumulation/storage then truck transport to the privatization contractor site. If privatization contractor transport requirements exceed or deviate from the noted site transport system capabilities, then the following alternative should be considered:

- Require the privatization contractor to identify transport needs which exceed those to be provided and include with their proposal alternatives with cost bases, which will meet their needs.
- Negotiate with the privatization contractors on a cost recovery basis, to accommodate the transport alternate or deviation.

11.18 RADIOLOGICAL SERVICES

TWRS Baseline System Description

The TWRS baseline obtains radiological services from within WHC (Radiological Controls Organization) and from PNL (Site Services Organization).

Existing Infrastructure

WHC Radiological Controls organization provides dosimetry administrative and technical evaluation services to WHC and its subcontractors. WHC also provides Radiological Control Technician (RCT) services and radiological engineering support to field work for WHC and its subcontractors. Nuclear safety reviews are conducted in support of project planning. The staff at WHC Radiological Controls consists of: East Tank Farms RadCon, five managers, ten engineers/analysts, forty-eight RCTs; West Tank Farm RadCon, three managers, five engineers/analysts, twenty-two RCTs; WHC Radiological Engineering, one manager, twenty-three engineers/analysts, two non-exempt clerical position; WHC dosimetry, one manager, three health physicists, four record specialists, and four non-exempt.

The above services are provided to assure compliance with DOE Radiation Protection for Occupational Workers regulations (10 CFR 835) the DOE Radiological Control Manual, the Privacy Act of 1974, and the Freedom of Information Act of 1966.

Needs

Radiological services are required. It is anticipated that the privatization contractors could be provided radiological dosimetry and other services by DOE. WHC Radiological Controls and PNL Site Services anticipate having the capacity to provide these services to the privatization contractors without incurring any additional costs, assuming the level of services is commensurate with those currently being used. All other radiological control services may be contracted by the privatization contractors, as needed.

The costs of this service may be funded by DOE/TWRS Program at no charge to the contractor, or at a fee to be negotiated, at the discretion of DOE. Capital costs to upgrade the related infrastructure may be funded by DOE/TWRS Program at no charge to the contractor, or for a fee to be negotiated, or may be part of the privatization contractors bid, at the discretion of DOE.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

TBD.

11.19 METEOROLOGICAL/CLIMATOLOGICAL SERVICES

TWRS Baseline System Description

The TWRS baseline obtains meteorological/climatological services from Battelle Pacific Northwest Laboratory (PNL).

Existing Infrastructure

TWRS receives meteorological/climatological services from PNL. These services are available through a full-service weather station operated for the DOE by PNL. In addition to normal weather related information, TWRS is the weather station's major site customer for 72-hour forecasts, heat stress forecasting, and wind threshold information.

Needs

This service will be available to the privatization contractors as an available and optional service.

The costs of this service may be funded by DOE/TWRS Program at no charge to the contractor, or at a fee to be negotiated, at the discretion of DOE. Capital costs to upgrade the related infrastructure may be funded by DOE/TWRS Program at no charge to the contractor, or for a fee to be negotiated, or may be part of the privatization contractors bid, at the discretion of DOE.

Identified Issues

TBD.

Risks/Risk Mitigation Alternates

TBD.

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