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Waste Minimization Plan for Project W-058

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Abstract: The waste minimization plan for Project W-058, Replacement of the Cross-Site Transfer System, provides waste minimization opportunities for construction and operation of the cross-site transfer system. The plan describes various pollution prevention opportunities in construction and operations and the recommendations for each. The report also describes efforts utilized during design. The recommendations for construction can be implemented immediately, while those for operations will require additional research once the system is complete. Portions of the document will be utilized in construction as a working document.

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WASTE MINIMIZATION PLAN

CONSTRUCTION AND OPERATION OF THE REPLACEMENT CROSS-SITE TRANSFER SYSTEM

PROJECT W-058

Prepared for

Westinghouse Hanford Company

April 1996

Subcontract WHC 380393

Prepared by

ICF Kaiser Hanford Company
Richland, Washington

W058WMP

W058WMP

WASTE MINIMIZATION PLAN

FOR

CONSTRUCTION AND OPERATION OF THE REPLACEMENT CROSS-SITE TRANSFER SYSTEM

PROJECT W-058

Prepared by

ICF Kaiser Hanford Company
Richland, Washington

for

Westinghouse Hanford Company

Technical Author	4/18/96 Date	Technical Author	4/18/96 Date
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Westinghouse Hanford Company

Project Manager	4-19-96 Date

EXECUTIVE SUMMARY

This report addresses the research and development of a waste minimization plan for the construction and operation of Project W-058, "Replacement of the Cross-Site Transfer System," on the Hanford Site. The plan is based on Washington Administrative Code (WAC) 173-307, "Plans." The waste minimization plan identifies areas where pollution prevention/waste minimization principles can be incorporated into the construction and operation of the cross-site transfer system.

Workshops were held with key personnel representing Construction and Operations. Two separate sessions focused on identifying waste streams and identifying potential pollution prevention opportunities. Based on the workshop results and discovery, a list of opportunities were investigated and recorded on the U.S. Department of Energy (DOE)-approved Pollution Prevention Opportunity Assessments (P2OA) worksheets. A P2OA is a DOE-approved team approach to systematically evaluate a process or activity, and develop cost-effective recommendations to reduce the generation of wastes and pollution. The worksheets were used to document the current practice, recommended actions, wastes reductions, cost savings, and cost implementation costs and payback. A summary for Construction and Operations and recommendations follow all the P2OAs. The identified Construction opportunities offer a total project savings of between $81,868 and $112,059 with no implementation cost and immediate payback. The identified Operations opportunity will need further evaluation when the facility is ready for operation and procedures are written for the cross-site transfer system. The cost savings would be $192,200 with an estimated implementation cost of $81,900.

The following Construction opportunities were chosen for implementation:

- Substitution of acetone or ethyl alcohol
- Use of products onsite
- Wood shoring used in radioactive contaminated areas
- Subcontractor use of current recycle programs
- Material safety data sheets (MSDS) review and product substitution
- Reuse of radiological contaminated soil

The MSDS review and product substitution was aided with an extensive listing of products specified in the three project construction specifications. All the pollution prevention opportunities involve either ICF Kaiser Hanford Company Construction Forces or the subcontractors, and sometimes both.

The Operations opportunity that was chosen for implementation was to reuse evaporator condensate as flush water. It is recommended that this opportunity be investigated further for implementation because it is difficult to predict how facility operations will be conducted without the system and procedures in place.

The benefits of developing a waste minimization plan for project W-058 are discussed and summarized in the plan. Some areas where waste minimization is not cost effective are noted. The greatest benefit of the plan is the documentation of what and how each opportunity was analyzed which could be reevaluated as design, construction, and operation change.

TABLE OF CONTENTS

I. INTRODUCTION AND BACKGROUND INFORMATION 1
A. MANAGEMENT AND CORPORATE POLICY 1
B. SCOPE AND OBJECTIVES 1
C. PROJECT AND FACILITY DESCRIPTION 2
D. HISTORICAL AND ANTICIPATED WASTE GENERATION 5
E. POLLUTION PREVENTION/WASTE MINIMIZATION OPPORTUNITIES IDENTIFIED IN DESIGN 7

II. IDENTIFICATION, EVALUATION, AND SCHEDULED IMPLEMENTATION OF POLLUTION PREVENTION OPPORTUNITIES 10
A. METHODOLOGY 10
B. POLLUTION PREVENTION FOR CONSTRUCTION ACTIVITIES 12
C. POLLUTION PREVENTION FOR TANK WASTE TRANSFER OPERATIONS 20

APPENDICES

Appendix A. Pollution Prevention Opportunity Assessment for the Construction of the Cross-Site Transfer System
Appendix B. Table of Products Specified for the Construction of the Cross-Site Transfer System
Appendix C. Pollution Prevention Opportunity Assessment for the Operation of the Cross-Site Transfer System

ABBREVIATIONS

APP	Affirmative Procurement Program
ASTM	American Society for Testing and Materials
CDF	controlled density fill
D&D	Decontamination and Decommissioning
DOE	U.S. Department of Energy
DB/VS	diversion box/ventilation station
EC	environmental coordinator
Ecology	Washington State Department of Ecology
EPA	Environmental Protection Agency
ETF	Effluent Treatment Facility
HWIR	Hazardous Waste Identification Rule
ICF KH	ICF Kaiser Hanford Company
LERF	liquid effluent retention basin
MSDS	material safety data sheet
P20A	Pollution Prevention Opportunity Assessments
PPE	personal protective equipment
RCRA	Resource Conservation and Recovery Act of 1976
SPC	special protective coating
TEDF	Treated Effluent Disposal Facility
TWRS	Tank Waste Remediation System
WAC	Washington Administrative Code
WHC	Westinghouse Hanford Company

WASTE MINIMIZATION PLAN

CONSTRUCTION AND OPERATION OF THE REPLACEMENT CROSS-SITE TRANSFER SYSTEM

PROJECT W-058

I. INTRODUCTION AND BACKGROUND INFORMATION

A. MANAGEMENT AND CORPORATE POLICY

The policy of Westinghouse Hanford Company (WHC) and ICF Kaiser Hanford Company (ICF KH) is to conduct all construction and operation activities of the Project W-058, "Cross-Site Transfer System," in a manner that: safeguards the employees and the surrounding community from unreasonable risk due to environmental releases, promotes beneficial reuse and recycling of waste products; and conserves natural resources, energy, and water. Incorporation of pollution prevention and waste minimization into the design and planning stages of projects is critical to successfully implementing this policy. This waste minimization plan was commissioned and completed in this spirit.

The project W-058 Waste Minimization Plan identifies and evaluates pollution prevention opportunities and recommends opportunities for implementation. WHC and ICF KH management are committed to implementing these opportunities cost-effectively, and continuing to explore additional opportunities to prevent and minimize wastes and environmental releases, and to conserving resources.

B. SCOPE AND OBJECTIVES

The scope of this waste minimization plan is to identify and implement pollution prevention opportunities during the construction and operations of the project W-058 cross-site transfer system. The plan addresses all

wastes types, environmental emissions and impacts, and resources used during construction and operations. The plan meets the intent of WHC-CM-7-5, Section 14 of the "Hanford Site Environmental Compliance Manual."

The objectives of the plan are as follows:

- Identify all waste generating activities associated with the construction and operation of the cross-site transfer system.

- Evaluate each activity according to the following Environmental Protection Agency (EPA) waste management hierarchy.

  - Source reduction
  - Reuse and recycling
  - Treatment
  - Compliant disposal

  Consideration is given to the purchase of products that satisfy mandated affirmative procurement requirements.

- Recommend which evaluated activities should be implemented and develop a strategy to implement the recommendations.

C. PROJECT AND FACILITY DESCRIPTION

Project W-058 will replace the existing cross-site transfer system with a newer system. The transfer line is lacking secondary containment, has outlived its design life, and has no backup system. The new transfer line will start in the 200-West Area at the SY Tank Farm valve boxes and extend east to the 200-East Area 244-A lift station. The tie-in work at the respective tank farms will be completed by ICF KH Construction Forces, while the installation of the transfer line between 200-East and 200-West

Areas will be done by subcontractors under the direction of ICF KH Construction Management. WHC will maintain and operate all equipment and systems associated with the cross-site transfer of tank farm wastes.

1. <u>Construction of Cross-Site Transfer System</u>

   Construction will proceed according to the requirements of the following three construction specifications:

   - **W-058-C1, Buried Pipeline**

     The technical requirements of the buried pipeline that will be performed by a fixed-price subcontractor are in specification W-058-C1. The construction of the buried pipe will consist of two phases of construction. The first phase will include surveying the existing route, potholing to determine interferences, soil types and potential contamination, sagebrush mitigation, and subcontractor mobilization onto the site. The second phase consists of providing the pipe, excavation, assembling and testing of the buried pipe, and backfilling. Although the subcontractors will be working outside of tank farms, they will pass through contaminated areas. Because of the nature of excavation on the Hanford Site, additional contaminated areas may be discovered during the course of this project.

   - **W-058-C2, Pipeline Tie-ins**

     The technical requirements for pipeline tie-ins to the 241-SY-A and 241-SY-B valve boxes in the 200-West Area 241-SY Tank Farm and into the 200-East Area 244-A lift station are in specification W-058-C2. The tie-in work will be performed by ICF KH Construction Forces. The work consists of installation of the piping, instrumentation, and electrical. The C1 contractor will provide approximately 213 m (700 ft) of the

pipeline to ICF KH Construction Forces. The work will be primarily in radiological areas.

- **W-058-C3, Diversion Box/Vent Station**
  The technical requirements for construction of a diversion box, vent station, and related support buildings are in specification W-058-C3. The work will be performed by a fixed-price contractor. The work includes construction of two concrete buildings; construction of two precast support buildings; installation of electrical power to three locations; and modification of the flush water tank at the 241-SY Tank Farm, and related piping tie ins. The work will be performed outside the radiological areas.

2. <u>Operation of the Cross-Site Transfer System</u>
   The completed cross-site transfer system will be used to transfer both slurry and supernatant tank waste from the 200-West Area to the 200-East Area through either of the two parallel, redundant lines. Transfer of supernatant will be possible immediately following completion of project W-058; however, the system will not be capable of transferring slurry until completion of Project W-211, "Initial Tank Retrieval Systems." Project W-211 will design the pump/sluicing system required to retrieve sludge from Tank 102-SY and other tanks in the 200-West Area tank farms. Specific procedures for the transfer of slurry and supernatant will be developed as these systems come on-line. The basic elements for transferring each of these waste types are:

   - **Supernatant Transfer**
     Supernatant will be pumped to Tank 102-SY for accumulation prior to transfer. The waste will then be pumped, using the existing 102-SY transfer pump to the SY valve pit and through

the cross-site transfer system. It is not anticipated that an initial flush of the line will be required, prior to transfer. The waste will be pumped to the 244-A lift station where it will either be diverted to one of the tanks in the 200-East Area, or sent directly to Tank 102-AW, the evaporator feed tank. Following transfer of the supernatant, the line will be flushed with pH-adjusted water. It is anticipated that residual flush water will remain in the line to prevent chloride cracking.

- **Slurry Transfer**

  Tank 102-SY will be used as the primary feed tank. (NOTE: following retrieval of Tank 103-SY contents, circa 1999, Tank 103-SY may also be used as a feed tank.) The waste will be mixed to a homogeneous consistency using the installed mixer pump (project W-211). Prior to transfer, the line will be flushed using pH-adjusted water heated to approximately 93 °C (200 °F). This preflush will ensure that the slurry mixture does not set up in the line during transfer. The slurry mixture will be pumped from the feed tank using the transfer pump (installed for project W-211), through the SY valve pit and to the transfer line. The booster pump will increase pressure, providing the necessary energy to transfer the slurry to the 244-A lift station and into the 200-East Area. The slurry will then be diverted to one of the 200-East Area tanks for storage and future processing.

D. HISTORICAL AND ANTICIPATED WASTE GENERATION

1. Waste Generated Per Pipeline Transfer

Predictions of wastes generated during transfer of supernatant and slurry tank waste are based on recent supernatant transfers and anticipated requirements for the transfer of slurry. During the most

recent transfer of supernatant tank waste on the Hanford Site, the line was flushed with 57 000 L (15,000 gal) of pH-conditioned water before and after transfer. It is not anticipated that a pretransfer flush will be required for future supernatant transfers. For slurry transfer, a pretransfer flush to preheat the pipeline is required. After either the slurry or supernatant transfer, the line will be flushed with pH-conditioned flush water. Under the current operating scenario, all flush water will become low-level mixed waste. Therefore, 57 000 L (15,000 gal) of mixed waste will be generated for each supernatant transfer, and 104 000 L (30,000 gal) of mixed waste will be generated during slurry transfer.

Miscellaneous hazardous and mixed wastes will be generated during the transfer of tank waste and routine maintenance associated with the cross-site transfer system. These wastes include personal protective equipment, absorbents, bleach, used chemicals, and failed equipment.

2. <u>Typical Pipeline Construction</u>

Project W-049H, construction of the 200 Area Treated Effluent Disposal Facility (TEDF), was completed in 1995. As part of project W-049H, 24 km (15 miles) of trenches were excavated to install waste transfer lines connecting facilities in the 200-East Area and 200-West Area with the TEDF, a disposal lagoon in the 200-East Area. During the project, 125 drums (208 L (55 gal) of low-level waste (soil, personal protective equipment [PPE], and debris) and five, 208 L (55 gal) drums of dangerous waste were generated.

Less trenching will be done (10.5 km (6.5 miles) for project W-058, but an equivalent length of pipe 21 km (13 miles) will be installed. Additionally, a diversion box, vent station, and support building are included as part of project W-058. However, projects W-058

and W-049H are similar in their scope, and waste generation from project W-049H provides a boundary for comparison.

E. POLLUTION PREVENTION/WASTE MINIMIZATION OPPORTUNITIES IDENTIFIED IN DESIGN

This section specifically identifies those pollution prevention opportunities that were incorporated in all stages of the project W-058 design. Since the design of the cross-site transfer system preceded the development of this plan, it is important to note those activities which resulted in a decrease in waste generation, environmental emissions, and resource and energy utilization. Specific pollution prevention/waste minimization items are described below.

1. Modification of Existing Tank Instead of Building Two Tanks for Projects W-058 and W-211

Originally, the project W-058 design specified construction of a new tank to supply flush water to the transfer line. Additionally, project W-211 specified construction of a separate tank to provide heated waste for the pretransfer flush, however, during definitive design, this strategy was revisited. Instead of a new tank, an existing unused 178 000 L (47,000 gal) tank, located near the SY Tank Farm valve box was modified to serve both purposes. This resulted in the avoidance of construction waste associated with the construction and the ultimate costs of two new tanks. A life cycle cost analysis was performed on the replacement of a new tank for project W-058. The present value savings are $22,665.

2. Specification of Fly Ash in the Cement Mixtures for Controlled Density Fill and Pipe Bedding

Controlled density fill (CDF) is specified for use as pipe bedding, and as fill for railroad, roadway, and utility undercrossings. It is permissible to substitute CDF for structural backfill in both radiation

and nonradiation zones. A total of 4 600 m^3 (6 000 yd^3) of CDF is specified for project W-058. Approximately 3 520 m^3 (4,600 yd^3) of this will be used for pipe bedding and the remainder will be used as fill at railroad, roadway, and utility undercrossings. The specific mix design for each of these applications will be determined and tested by the supplying vendor and approved by ICF KH. For this analysis, it is assumed that an average of 150 kg/m^3 (250 lb/yd^3) of fly ash will be used for each mix design. Therefore, it is estimated that a minimum of 680 000 kg (1,500,000 lb) of fly ash will be utilized for project W-058. Fly ash, a byproduct of burning coal for energy or steam production, is one of five recovered products that must be included in Federal Affirmative Procurement Programs (APPs). The 680 000 kg of fly ash specified for this project would otherwise have been disposed of as waste material.

3. <u>Specification of Special Protective Coatings</u>

Special protective coatings (SPCs) are specified for all concrete surfaces (floors, walls and ceilings) that have the potential to contact tank waste. SPCs consist of a prime, base, intermediate, and finish coat, that effectively seals the concrete from contact with the radiologically contaminated tank waste. Previously, vinyl coatings have been used for this application, requiring reapplication at least every 5 years, however, vinyl coatings do not protect the concrete from radiological contamination. The SPCs are new products, but estimates are that the life of these coatings may exceed 20 years, significantly reducing waste generation from surface preparation prior to repainting. The use of SPCs reduces the generation of secondary waste during decontamination and decommissioning activities. Additionally, because the coatings can be decontaminated, the radiation dosage to the worker can be minimized, reducing PPE requirements.

4. **The W-058-C3 Diversion Box Design Reduces Worker Exposure to Hazards and Radiation**

The diversion box design was changed from a typically onsite diversion box with large heavy cover blocks that has a high initial cost, extensive enclosures to prevent radiation releases, special areas to laydown cover blocks, extra valves, separate drain lines, and a large maintenance crew. The new design will eliminate most of the drawbacks of the traditional onsite design and include features such as shielding for valve maintenance, no required cranes, confined space ventilation, indoor work environment, utilization of a built-in winch to enter the diversion box/ventilation station (DB/VS), less valves, access control building adjacent to the valve and pump access room, and the elimination of separate drain lines.

5. **Decontamination and Decommissioning (D&D) Design Features**

The transfer system is designed to eliminate solids settling to allow for maintenance and modifications during transfers. The leak detection system is designed to limit secondary containment contamination by shutting down transfers when a leak is detected. A marking system above and below ground facilitates easy identification of where and what the transfer line is for easy identification during D&D work. The DB/VS systems are contact-maintained and are designed to limit the area of the facility that may become contaminated. Stainless steel and decontaminable coatings are used to line the DB/VS for easy decontamination. Process piping is included with cleanout ports. The pumps are designed for complete flushing capabilities. Roof access ports allow for remote flushing of the DB/VS if a leak occurs. There is easy access to the diversion DB/VS through a corridor and airtight door that eliminates contamination spread to other parts of the facility.

II. IDENTIFICATION, EVALUATION, AND SCHEDULED IMPLEMENTATION OF POLLUTION PREVENTION OPPORTUNITIES

A. METHODOLOGY

To identify how to reduce wastes and conserve resources during the construction and operation of the cross-site transfer system, P2OAs were conducted. A P2OA is a DOE-approved team approach to systematically evaluate a process or activity, and develop cost-effective recommendations to reduce the generation of wastes and pollution. Because construction and operations constitute distinct phases, and produce different wastes and pollution, separate P2OAs were conducted for construction and operations. Hanford P2OA worksheets were used to document the results of each P2OA. The completed worksheets are included as appendices A and C.

Each P2OA consisted of the following four steps:

- **Planning and Organization**

  This step consisted of obtaining management commitment, setting goals, and organizing the assessment team. Through interaction with ICF KH and WHC project management, background information was gathered and an outline of the plan was developed and approved.

- **Assessment Preparation**

  This step consisted of compiling process, facility, and waste data; setting priorities; and scheduling the assessments. To accomplish this, the following documents were reviewed.

  — WHC-SD-W058-ES-001, "Engineering Study for Replacement of the Cross-site Transfer System," Project W-058.

- WHC-SD-W058-CDR-001, Rev.0, Conceptual Design Report for "Replacement of the Cross-Site Transfer System," Project W-058.

- W-058-C1, Rev.0, "Buried Pipeline for Replacement of the Cross-site Transfer System."

- W-058-C2, Rev.0, "Pipeline Tie-ins for Replacement of the Cross-Site Transfer System."

- W-058-C3, Rev.0, "Diversion Box/Vent Station for Replacement of the Cross-Site Transfer System."

- TO-430-485, Tank Farm Plant Operating Procedure, "Cross-Site Transfer from 102SY to 104-AP."

Additionally, design, project, and operations personnel were consulted and drawings were reviewed to ensure that the most accurate information was available.

- **Facilitated Assessment**

  In this step, key individuals familiar with the process met in a facilitated session to review background information, generate options, screen and rank the options, and select options for further study. Team members included representatives from WHC Operations, ICF KH Construction Forces and Construction Management, and project W-058 design engineers. Each assessment was facilitated by ICF KH Environmental Programs and Integration and the Tank Waste Remediation System (TWRS) environmental coordinator (EC).

- **Feasibility Analysis**

  Following the assessment, each identified options was evaluated. The evaluation consisted of research and information gathering, quantification of environmental benefits, determination of implementation cost, and a life-cycle analysis.

  Implementation of the P2OA process will follow submission of the waste minimization plan. The plan serves as a template for management to select and implement the most cost-effective options. Critical to successful implementation is an ongoing system of tracking progress. Ways to track and report progress were developed and are presented in sections B.2 and C.3.

B. POLLUTION PREVENTION FOR CONSTRUCTION ACTIVITIES

The results from the P2OA conducted on the project W-058 construction activities are summarized in this section. Two facilitated assessment sessions were conducted on December 12 and 19, 1996. All worksheets, background information, and calculations are included in Appendix A.

1. Description of Waste Generating Processes

The major waste generating processes for the construction of the cross-site transfer line include: excavation; application of paints, sealers and adhesives; and general construction activities. The activity flow diagram, worksheet 2 in Appendix A, contains a summary of the material inputs and product outputs.

To identify all waste generating activities, the C1, C2, and C3 specifications were reviewed. Each material or process that had the potential to contribute to the generation of a waste product or emission was identified and a table identifying each item was developed. The table was used as the basis for the identification of opportunities during the facilitated assessment and is a working

document that will be updated for use throughout the project. The table is included as Appendix B.

2. **Identification, Evaluation and Recommendation of Opportunities**

Eight opportunities were identified for evaluation during the P2OA. Following is a summary of the evaluation of each opportunity.

- **Substitution of Acetone or Ethyl Alcohol**

  Acetone or ethyl alcohol are regulated materials used to clean welding rods prior to welding stainless steel pipe sections. It is recommended that ethyl alcohol or isopropyl alcohol (2-propanol) be specified exclusively. Both these materials are less toxic than acetone. Additionally, subcontractors should participate in the ICF KH rag laundering contract. Used rags are cleaned at an industrial laundry and returned for reuse, eliminating the accumulation of solvent rags as dangerous waste. Implementation of these options will reduce approximately one drum of dangerous waste. The cost savings are $1,400 with no implementation cost and an immediate payback. It is recommended that this opportunity be accepted immediately.

- **Use of Products Onsite**

  Generally, new products are purchased for each job on the Hanford Site; however, chemicals and products remaining from jobs exceed their useful life and often are disposed of as waste. It is recommended that prior to starting work, ICF KH (specification C2) and the subcontractors (specifications C1 and C3) submit a list of required products to the ICF KH TWRS EC, who will network with Hanford Site material coordinators to determine if any of the products are available. The Appendix B table will be used as the baseline for tracking

product use. The TWRS EC is responsible for maintaining the table, and as product changes are made, the TWRS EC will be notified.

Estimates of waste reduction and cost savings cannot be determined at this time. However, for each regulated product used in this manner, both the new product cost and the waste disposal cost will be avoided. There is no cost to implement this option, and immediate implementation is recommended.

- **Wood Shoring Used in Radioactive Contaminated Areas**
  Wood used as shoring material in radioactive areas becomes radiologically contaminated and cannot be used for other purposes. Typically, this wood is disposed of as low-level waste. The following three alternatives to this practice were evaluated.

  — Project W-030 purchased and used new shoring material to complete the upgrade of the ventilation system at the tank farms. It is recommended that this material be collected in a storage container, moved to where wood shoring is required in 200-West Area and 200-East Area, and reused. This will result in not purchasing 5.95 m^3 (210 ft^3) of material at a project cost savings of $15,550. There is no implementation cost and the payback period is immediate.

  — Alternative, decontaminable, aluminum trench shields are available as substitutes to wood shoring. Initial conversations with health physics technicians indicate that the shoring can be released for reuse. Implementation of this option will result in the reduction

of 5.02 m^3 (177 ft^3) of low-level waste, at an annual cost savings of $20,080. Implementation cost is $33,180. If the aluminum shoring is reused on similar Hanford projects, the payback period is 1.5 years.

- If wood shoring cannot be reused it may be possible to decontaminate the wood by shaving off the contaminated surface. A local firm, ATG Technologies, has this capability. The clean, released wood can then be sent to the Richland landfill where it will be chipped and reused for erosion control, landfill cover, or as cardboard feedstock. This will result in the reduction of 5.7 m^3 (200 ft^3) of dangerous waste, for a project cost savings of $11,807. However, the implementation cost is $50,000.

  Although annual savings are roughly equivalent for each alternative, the option to collect and reuse the wood shoring is preferred. This option has no implementation costs with an immediate payback. Additionally, existing contaminated wood from project W-030 could be used, avoiding disposal of this material as waste.

- **Subcontractor Use of Current Recycle Programs**
  ICF KH has existing programs to recycle paper, cardboard, wood, aerosols, batteries, and ferrous and nonferrous metals. With the exception of metals, subcontractors generally do not recycle these materials but dispose of them as solid, sanitary waste. It is recommended that the subcontractors for project W-058 fully utilize existing recycle programs at Hanford or develop their own cost-effective recycling program. Use

of Hanford recycling programs will be coordinated through the TWRS EC. Materials will be segregated at the job site in containers provided by ICF KH. Use of these existing programs will result in the reduction of 378 t of sanitary waste at a cost savings of $59,229. Additional dangerous waste (batteries and aerosols) will be avoided. Information necessary to estimate the total amount of dangerous waste avoided were unavailable. However, costs savings per drum of aerosols is $1,175, and cost savings per drum of batteries is $640.

— **Material Safety Data Sheet (MSDS) Review and Product Substitution**

MSDSs for products to be used for Hanford projects are required to be submitted to ICF KH for review 5 days prior to the start of work. Too often, this part of the contract is not enforced. Additionally, reviews are usually conducted only for worker exposure. The emphasis of this review is to provide adequate personnel protection to the worker. It is recommended that all products used for project W-058 be routed through the TWRS EC for review. The TWRS EC will evaluate the product's use in terms of waste generating potential and work with the subcontractor to identify suitable alternatives. This process has already begun. Specific products in Appendix B are being evaluated for waste generating potential and substitutes. Estimates of waste reduction and cost savings cannot be determined at this time. However, for each substitute of a regulated product, the waste (either dangerous waste or mixed waste) disposal cost and possible PPE requirements will be avoided.

— **Leak Testing and Flushing of Pipeline**

The two parallel pipelines will be hydrotested following installation of each 305 m (1000 ft) section. Additionally, the entire line will be hydrotested and flushed after installation is complete. These activities will result in the generation of up to 1 220 m^3 (322,000 gal) of water. This option investigated the collection and reuse of the hydrotest and flush water. To determine if this flush water could be discharged to ground, an evaluation based on the Washington Administrative Code (WAC) 173-216 requirements was conducted. This evaluation indicated that the flush water could be discharged to ground without a permit. Collection and storage of this water for reuse, therefore, is not cost effective. Implementation of this option is not recommended.

— **Use of Fly Ash in Controlled Density Fill and Pipe Bedding**

A minimum of 680 000 kg of Class F fly ash will be used in the mix design for CDF on project W-058. This fly ash will be purchased by the subcontractor from offsite. As an alternative to offsite purchase, use of Hanford fly ash generated from the 200 and 300 Area powerhouses was investigated. The Hanford fly ash does not meet the American Society for Testing and Materials (ASTM) specifications, and requires additional processing and testing prior to use in the CDF mix. Although the project savings are $50,000 and use of the Hanford fly ash avoids 680 000 kg of waste, implementation costs are $205,000. This option is not recommended for implementation.

— **Reuse of Radiologically Contaminated Soil**

Contaminated soils removed from nonremediation activities such as common trenching for pipeline installation often are managed conservatively as low-level waste or low-level mixed waste. It is recommended that contaminated soils removed from trenching activities be returned to the original excavation as fill. There are no regulatory barriers for the return of radiologically-contaminated soil. The ability to return soil contaminated with dangerous waste constituents is contingent upon approval of a proposed Hanford policy (on management of contaminated soil) by the Washington State Department of Ecology (Ecology). Implementation of this opportunity will result in the avoidance of 2.6 m^3 (90 ft^3) of either low-level waste or low-level mixed waste. Cost savings are estimated at $5,507 (for low-level waste) or $35,880 (for low-level mixed waste). There are no implementation costs and payback is immediate.

3. <u>Scheduled Implementation and Tracking of Recommended Opportunities</u>

Of the eight identified opportunities, six (1,2,3,4,5,8) are recommended for implementation. All have immediate payback with no implementation costs. The key to their successful implementation is to take full advantage of the contract requirements and the existing pollution prevention structure and services within ICF KH. The TWRS EC is responsible for implementing the ICF KH pollution prevention program within the TWRS division. In this capacity, the TWRS EC works closely with field contract engineers in Construction Management, and supervisors in Construction Forces to identify and resolve environmental issues.

The development of this waste minimization plan provides a unique opportunity for proactive environmental management for a large construction activity. Waste-producing activities were identified and quantified, and evaluated for cost-effective implementation.

This is the first construction project on the Hanford Site for which a waste minimization plan has been developed. It is critical, therefore, that accurate records are kept to track the effectiveness of the implemented opportunities. It is recommended that tracking of pollution prevention progress be done on a monthly basis. Subcontractors and Construction Forces personnel shall submit the following information to the TWRS EC at the end of each month.

- Quantities of waste generated by waste type (e.g., low-level waste, low-level mixed waste, dangerous waste, sanitary waste).

- Quantities of wastes recycled by waste category (e.g., wood, metal, paper, cardboard, batteries, aerosols).

- Product substitutions.

- Products used from Hanford excess inventory.

The TWRS EC will compile this information into quarterly reports, and discuss pollution prevention progress with the subcontractors and Construction Forces personnel.

C. POLLUTION PREVENTION FOR TANK WASTE TRANSFER OPERATIONS

The results from the January 17, 1996 P2OA on the tank waste transfer operations is summarized in this section. All worksheets, background information, and calculations are in Appendix C.

1. Description of Waste Generating Processes

Predictions of wastes generated during transfer of supernatant and slurry tank waste are based on recent supernatant transfers and anticipated requirements for the transfer of slurry. During the most recent transfer of supernatant tank waste, the line was flushed with 57 000 L (15,000 gal) before and after transfer. It is not anticipated that a pretransfer flush will be required for future operations. For slurry transfer, a pretransfer flush to preheat the pipeline is required. The flush water will be preheated to 93 °C (200 °F) to prevent the slurry from solidifying during transfer. Under the current operating scenario, all flush water will become low-level mixed waste. Therefore, 57 000 L (15,000 gal) of mixed waste will be generated for each supernatant transfer, and 104 000 L (30,000 gal) of mixed waste will be generated during slurry transfer.

Miscellaneous hazardous and mixed wastes will be generated during the transfer of tank waste and routine maintenance associated with the cross-site transfer system. These wastes include personal protective equipment, absorbents, bleach, used chemicals, and failed equipment.

2. Identification, Evaluation, and Recommendation of Opportunities

Four of the five opportunities evaluated are concerned with reducing the liquid waste generated during tank transfer. Three opportunities address the issue of reusing generated liquid wastes as flush water, but offer different solutions. Another opportunity addresses waste reduction during routine maintenance activities. The remaining

opportunity investigates optimizing tank waste transfers. Each option is discussed briefly below. A separate comparison of the first three options is presented.

- **Reuse Evaporator Condensate as Flush Water**

  It is recommended that concentrate from the 242-A Evaporator be reused as flush waste for the cross-site transfer system. Currently, the condensate water is stored in the liquid effluent retention basins (LERF) prior to treatment at the Effluent Treatment Facility (ETF). Using the condensate will reduce the generation of liquid tank waste by 342 000 L (90,000 gal) per year at an annual savings of $192,200. Implementation costs are $81,900/year and the payback period is 0.43 years.

- **Reuse of Well Purge Water**

  Groundwater wells located on the Hanford Site are periodically sampled to determine the extent and movement of groundwater contamination, and to evaluate the efficiency of treatment and remediation measures. Because the purgewater generated from this effort has the potential to be contaminated, it is managed as a dangerous waste. Per a signed agreement with Ecology, the purge water is trucked to the 200-East Area for treatment by solar evaporation in aboveground modular tanks. It is recommended that the purge water be reused as flush water in the cross-site transfer system. If Ecology will change their policy, this activity will result in the reduction of 342 000 L (90,000 gal) of liquid tank waste per year at an annual savings of $10,900. Implementation costs are estimated to be $87,500 with a payback period of 8 years.

- **Recycle Flush Water**

  The 244-A lift station has a 114 000 L (30,000 gal) catch tank equipped with a transfer pump. The purpose of the catch tank is to collect any leaks or spills occurring during waste transfer. The catch tank must maintain a minimum volume capacity during each tank waste transfer. The transfer pump has the capability to pump the accumulated water in the reverse direction of the normal flow (i.e., from 200-East Area to 200-West Area). It is recommended that the flush water from the post-transfer of slurry and supernatant tank waste be collected in the catch tank and returned to 200-West Area for reuse. The returned flush water may either be sent back to the flush tank for reuse or returned to Tank 102-SY for sluicing or for dilution water. Potential problems with this option include: potential upgrades of the catch tank and flush tank to meet Resource Conservation and Recovery Act of 1976 (RCRA) permit requirements, and the possibllity that the flush tank will become radiologically contaminated. If these issues are adequately addressed, liquid tank waste generation will be reduced by 171 000 L (45,000 gal) each year, at a cost savings of $787,100. The implementation costs are $210,000 with a payback period of 0.27 years.

- **Comparison of Options 1, 2, and 3**

  Option 1 (Reuse of Evaporator Condensate as Flush Water) offers significant savings with a fairly short payback period (0.3 years). Some potential problems exist with implementation of this option (i.e., RCRA permit issues). The potential savings available through this option warrant that an attempt be made to permit the flush tank to hold hazardous waste. If the recently proposed Hazardous Waste Identification Rule (HWIR) is passed, the permit issue should

go away. HWIR would allow the listed Evaporator condensate waste stream to be declassified, thus eliminating the need to upgrade and permit the flush water tank and piping system. Declassification of the Evaporator condensate would benefit more than just project W-058. Other projects and processes could use the Evaporator condensate as a source of raw water as well.

Option 1 should to be investigated as the preferred option for reusing currently generated liquid wastes as flush water. It is recommended that the Evaporator condensate be sampled and analyzed to determine whether or not the listed contaminants in the waste stream fall below the threshold concentrations listed in the proposed HWIR. This will clear the way for the waste stream to be declassified once HWIR is officially adopted. As a fall back, the feasibility of permitting the existing tank and transfer line should be investigated.

Option 2 (Reuse of Well Purge Water as Flush Water) is the least preferable option. It would require upgrading and/or permitting of the existing flush water holding tank and transfer line with only minimal cost savings. Potential regulatory/ political issues may make this option difficult to implement. The method of disposing contaminated purge water is clearly outlined in the Tri-Party Agreement. This agreement does not allow for any flexibility.

Option 3 (Recycle Flush Water) shows the greatest potential cost savings. However, this process will also be the most difficult to implement and has many unanswered questions. For example, will water retrieved from the 244-A catch tank be clean enough to reuse as flush water after the tank is

decontaminated? Another major question is the mechanisms required to get the water from the cross-site transfer system to the flush tank. This P2OA has tried to account for the cost of needed upgrades (e.g., new pump, replacement of flush line, required tank upgrades, etc); however, actual costs may be significantly higher.

An option not originally identified in this P2OA, but that surfaced during subsequent review of this document, is to use water currently discharged to B Pond and to the TEDF as flush water in the cross-site transfer system. Both B Pond and the TEDF are percolation basins that receive essentially clean water that is not regulated by RCRA or WAC 173-303. Use of this water would eliminate the permit issues associated with use of the existing flush tank holding tank and transfer line. Water discharged to B Pond is primarily cooling water coming from several 200-East Area facilities, such as 242-A, the Power Plant, 244-AR, 241-AY/AZ, and B Pond. B Pond will only be operational until December 1996, and then, all water from the above sources will go to the TEDF. There are several points along the transfer line to the TEDF where a tanker truck could make a tie-in to extract water for use as flushing water in the cross-site transfer system. Transportation costs would be similar to those identified under Option 1. However, since TEDF is primarily a percolation pond, no additional treatment takes place. Therefore, avoidable costs of using this water would be minimal, if any. Because of time constraints, this option was not investigated further during this initial assessment. However, use of B Pond water should be investigated further if the other options identified in this P2OA cannot be implemented.

- **Operation and Maintenance of Cross-Site Transfer System**
  Historically, rodent infestation, particularly mice, have presented unique problems at tank farm facilities. By infesting contaminated areas, the rodents spread radiological contamination to other clean areas. Additionally, facility and equipment maintenance activities at tank farm facilities are costly due to the requirements of working in radiation areas. Preventive maintenance and emergency maintenance often are not coordinated, resulting in multiple entries into radiation zones, and redundant scheduling, prejob safety meetings, etc.

  The diversion box and the vent station will be newly constructed, uncontaminated facilities, so rodent radiological contamination will not be an issue. However, measures need to be taken to prevent this type of contamination. Because both facilities will be unmanned, good housekeeping is critical. Following a waste transfer campaign, all potential bedding material (e.g. cardboard, paper) and food sources will be removed from in and around the facility. (NOTE: WHC Pest Management indicates that a 50% reduction in pest infestation can be achieved through good housekeeping practices.)

  A system must be developed to coordinate preventive maintenance activities at the various TWRS cross-site transfer system facilities. For instance, if an emergency repair is required, the schedule should be checked to determine if maintenance activities can be done at the same time. Also, preventative activities can be coordinated with scheduled waste transfers. Annually scheduled maintenance activities include: instrument checks, pressure testing of secondary line, and relief valve checks at 244-A.

- **Optimize Transfer of Tank Waste**

  Tank transfers occur infrequently. The last tank transfer occurred in FY 95, when 1 700 000 L (450,000 gal) of supernatant was pumped over a 5-day period. The estimated cost of this activity was $500,000. The line was flushed before and after the transfer with approximately 114 000 L (30,000 gal) of pH-adjusted raw water.

  It is recommended that, prior to the transfer of either slurry or supernatant waste, the feed tank (102-SY) be filled as completely as possible to allow the maximum transfer of waste. It is estimated that this maximum transfer will be approximately 2 840 000 L (750 000 gal). The amounts of flush water should be minimized as much as possible. For example, it may not be necessary to use 91 000 L (24,000 gal) of flush water following supernatant transfer. The primary purpose of this post-transfer flush is to coat the line with pH-adjusted water to prevent chloride cracking. Analysis should be performed to determine the minimum required quantity.

  Tank farms Operations personnel indicate that, at present, 1 700 000 L (450 000 gal) may be the maximum transfer possible. This is because Tank 102-SY is currently the only tank available from which to make transfers. Often, tank farm operations cannot afford to wait for the tank to fill completely before making a transfer because space must be left available in Tank 102-SY as a contingency if another tank leaks and waste must be transferred to Tank 102-SY. Therefore, this option may not be implementable in full until several transfers have occurred and more tank space becomes available at 200-West Area. However, once additional tank space

becomes available, the maximum amount of waste should be transferred. This could result in yearly avoidance of up to 114 000 L (30,000 gal) of additional tank waste with an annual cost savings of $1,038,000. Implementation costs have not been determined.

3. **Scheduled Implementation and Tracking of Recommended Opportunities**

Construction of the cross-site transfer system is scheduled for completion in 1997, and the system will be operational in 1998. Based on the analysis conducted, opportunities 1, 4, and 5 are recommended for implementation. However, uncertainties in regulatory interpretation, costs, and future requirements have been identified that may affect the cost/benefit for each option. For this reason, the Operations P2OA should be viewed as a baseline. Each option should be re-evaluated as new information becomes available.

It is recommended that a cross-site P2 team be established with members of this team representing 200-East and 200-West Areas Operations and tank farm projects. The P2 team will be responsible for re-evaluating the recommendations from this P2OA based on new information, identifying new P2 opportunities, documenting the results of this effort, and ensuring that the recommended options are incorporated into the cross-site transfer system operating procedures. It is also recommended that a second P2OA be conducted on the operations of the cross-site transfer system in approximately one year.

APPENDIX A

Pollution Prevention Opportunity Assessment for the Construction of the Cross-Site Transfer System

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 1
TEAM AND ACTIVITY DESCRIPTION

Date 12/12-19/95 **P2OA ID Code** KHP2OA28.HW **Facility** TWRS

Activity Construction of the Cross-Site Transfer System

Team Members (*Leader)	Telephone	MSIN
Jack Mizner*	376-9081	B4-20
Todd Boucher*	373-9954	S2-41
Dan Nunamaker	373-9115	T4-08
David Fort	376-4250	S3-10
Mark Elefson	372-2959	S6-31
Pat Laing	372-3674	E6-22
Don Maez	373-3279	G3-04
Tom Nemzek	372-1299	S5-50
Carl VanKatwijk	376-9385	B4-08
J L Gilbert	372-3088	B4-08
John Gould	376-1157	H6-22
Julia Hiett	373-6115	S5-50
Ann Langevin	376-2729	E6-22
Ray McElroy	373-5926	S4-56

Description of Activity to be Examined in this P2OA

Project W058 will replace the existing cross site transfer line with a newer system. The older transfer line is lacking secondary containment, has outlived its design life, and has no backup which would result in long-term delays. The new transfer line will start in the 200 West Area at the SY Tank Farm valve boxes and extend east to the 200 East, 244-A Lift Station. Following construction, Westinghouse Hanford Company (WHC) will maintain and operate all equipment and systems associated with the cross site transfer of tank farm wastes. The completion of the cross site transfer is addressed by three separate construction specifications, described below.

• C1 Buried Pipeline
The C1 construction specification covers the technical requirements for the fabrication and installation of the buried pipeline. The work will be managed by ICF Kaiser Hanford Co. (ICF KH) and performed by a subcontractor. It will consist of two phases of construction. The first phase will include survey of the existing route, potholing to determine soil types and potential contamination, sagebrush mitigation, and subcontractor set-up on site. The second phase consists of providing the piping, excavation, assembly and testing of the piping, and backfilling. Although the subcontractors will be working outside of tank farms, there is some surface contamination areas they will cross through. Additionally, because of the nature of excavation on the Hanford Site, additional contaminated areas may be discovered during the course of this project.

• C2 Pipeline Tie-Ins
Construction specification C2 covers the technical requirements for pipeline tie-ins to the 241-SY-A & 241-SY-B valve boxes in the 200 West, 241-SY Tank Farm and into the 200 East, 244-A Catch Station. The tie-in work is to be performed by ICF Kaiser Construction Forces. The work consists of construction of the piping, instrumentation, and electrical. The subcontractors will provide approximately 213m (700 feet) of the pipeline to ICF KH Construction Forces. The work will be primarily in radiological areas.

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 1
TEAM AND ACTIVITY DESCRIPTION (Continued)

• C3 Diversion Box/Vent Station
The technical requirements for construction of a diversion box, vent station, and related support buildings are covered under the C3 construction specification. The work will managed by ICF KH and performed by a subcontractor. The work includes: construction of two concrete buildings; construction of 2 precast support buildings; installation of electrical power to three locations; and modification of the existing flush water tank and related piping. The work will be performed outside of radiological areas.

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 2
ACTIVITY FLOW DIAGRAM

Date 12/12-19/95 P2OA ID Code KHP2OA28.HW Facility TWRS

Activity Construction of Cross-Site Transfer System

Chemical and Radioactive Inputs	
Name	Quantity
Paints	
Sealers	
Solvents	
Inert Gases	
Epoxy Adhesives	
Firestop	
Polyurethane(pipe joints)	
Special Protective Coatings	
Muriatic acid(for surface Prep)	
NaOH (operations?)	

Material Inputs	
Name	Quantity
Weld rods	
Bitumen coating	
Equipment (valves, pumps, motors, control centers, switches, electrical junction boxes, compressor, etc.)	
Pipe	
Fiberglass	
Shrinkwrap	
Packaging material (timbers, pallets, banding wire)	
CDF	
Concrete mix	
Rebar	
Asphalt(road repair)	

Energy Inputs	
Name	Quantity

Activity
Activity Time Period:
two years

Outputs include:
Solid (s)
Liquid (l)
Air (a)

Product or Result Output	
Name	Quantity
Pipeline	
Diversion box	
Vent station	

Hazardous Waste Output	
Name	Quantity
Paint related	
Sealer	
Spills (antifreeze-EG)	
RR ties	
Weld rod studs	
Epoxy waste	
Used containers	
Special Protective Coating waste	

Non-Hazardous Waste Output	
Name	Quantity
RTV waste(HW?)	
Old water line	
Old electrical cables	
Old steam line	
Asphalt and concrete (road cuts)	
Insulation scrap	
Used containers	

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 2
ACTIVITY FLOW DIAGRAM (Continued)

Radioactive Waste Output	
Name	Quantity
Contaminated soil	
PPE	
Shoring	

Mixed Waste Output	
Name	Quantity
Contaminated soil	
Demo waste (C-2)	
PPE	

Other	
Name	Quantity
Gas containers (reused)	

Total Input mass ≈ Total Output mass kg In ≈ kg Out

NOTE: Because the subcontracted work on this project is being bid as fixed price contracts, detailed estimates of product use were not made. Additionally, it was difficult to quantify waste generation. For this reasons quantities are not included in the Activity Flow Sheet. Waste quantities, with assumptions, are estimated for specific opportunities.

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION

Date 12/12-19/95 **P2OA ID Code** KHP2OA28.HW **Facility** TWRS

Activity Construction of the Cross-Site Transfer System

P2O No. 1 **P2O Title** Substitution of Acetone or Ethyl Alcohol

Current Practice

Construction of the Cross-Site Transfer System under Project W058 includes the installation of two 10.5 km (6.5 mile) transfer lines. Each transfer line is composed of a primary stainless steel pipe and an outer secondary carbon steel pipe. The transfer line will be coated and assembled in 12m (40 foot) sections offsite and then transferred to the Hanford Site. Field assembly of the stainless steel portion of the transfer line requires cleaning of welding rods before welding. The C3 construction specification (Section 5555, Paragraph 3.2.1.1) specifies that either acetone or ethyl alcohol be used for this purpose. Both of these materials are regulated, pose threats to worker safety, and result in the generation of dangerous wastes.

Recommended Action

Acetone is a flammable material, regulated as a Washington State toxic waste (WT02), a discarded chemical product (U002), and as a RCRA F Listed solvent (F003). Either ethyl alcohol or isopropyl alcohol are effective substitutes for cleaning welding rods. It is recommended that either ethyl alcohol or isopropyl alcohol (2-propanol) be used. Using either Ethyl Alcohol or 2-propanol reduces the safety and health hazards associated with Acetone. The waste materials such as rags will still be regulated as hazardous waste. The materials are safer products compared to acetone. Acetone has a flash point of -17°C (0°F) while ethyl alcohol and 2-propanol have flash points of 12°C (53°F) and 14°C (57°F) respectively.

Additionally, a request has been made on the internet to find a replacement for these types of cleaners. They are primarily used to clean off the impurities from the welding rods before a weld is made. Further discussion with pipefitters reveals that they use a minimal amount of these products to clean welding rods; however, a replacement would be welcomed if it can clean similarly. This is an example of the various substitutions that can be made on a project of this size. Product substitution is an ongoing effort that has to be utilized for waste minimization and pollution prevention.

A second option is to utilize the rag laundry service that ICF KH participates in for dangerous and solid wastes on rags. This rag laundry program has been utilized for rags used in janitorial as well as field work. The rags are collected at central location every month and have both regulated and non-regulated materials on them. The rags are then sent to an industrial laundry and returned for reuse. This will allow the various subcontractors to eliminate the management of a satellite accumulation area comply with dangerous waste regulations. Both of these options are considered together in the following econom c analysis.

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION (Continued)

Calculation of Waste Reduction and/or Energy Savings

With the selection of either ethyl alcohol or 2-propanol there is no waste reduction. The products are less hazardous and are not considered as discarded chemical products under federal environmental laws (RCRA). There is no reduction in personal protective equipment with respect to the use of the alternative products. However, use of the rag laundry contract will eliminate the generation of dangerous waste. It is estimated that one 208L (55 gal) drum of DW will be eliminated.

Calculation of Project Cost Savings

Current Practice

Rag Dangerous Waste	$990	Basis: Cost of off-site disposal of dangerous waste 5 hrs @ $50/hr, $640 direct off-site disposal costs, $100 transportation
Weekly Inspections	$650	Basis: 0.25 hrs * $50/hr * 52 weeks (project duration)

Proposed Practice

Rag Recycle Contract	$240	Basis: $15/month for laundry services.

Cost Savings $1,640 - $240 = $1,400

Calculation of Implementation Cost and Payback

There are no cost savings associated with replacement of acetone, but utilization of the rag laundry contract will eliminate costs, and waste generation. Project cost savings are $1,400 with no implementation costs and an immediate payback.

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION

Date 12/12-19/95 **P2OA ID Code** KHP20A28.HW **Facility** TWRS

Activity Construction of the Cross-Site Transfer System

P2O No. 2 **P2O Title** Use of Products On-site

Current Practice

When a project is started on-site new materials are ordered to complete the work. Materials are not normally shared between different divisions or companies on site. There are a number of excess materials including hazardous chemicals across site that are accumulated from completed projects, that are available for use on other projects. These materials can become very expensive to store and to ultimately dispose of if not used before the product expiration date.

Requesting excess chemical products from on-site inventories can result in waste reduction because the WHC Excess does not accept any chemical that has been partially used. This means that any partially used product that is no longer needed by one group will ultimately end up as waste. Procurement costs and waste cost could be avoided by using a existing products.

Recommended Action

Based on what chemicals are used on-site, a call for available unused materials could be done to utilize existing supplies. This may require some up front planning, but there are many resources on-site that go unused and unnoticed. Some of these resources include: excess material lists, material coordinators, other companies, and EPCRA reporting personnel. In the ever changing work environment at Hanford, there are different construction divisions that could be storing a variety of chemicals.

The greatest benefit to this Pollution Prevention Opportunity is the inventory control that could be accomplished by sharing of materials on site. It becomes a benefit to all involved. Regulatory agencies associated with storage of hazardous chemicals include the following: Occupational Safety and Health Act (OSHA), Environmental Protection Agency (EPA) or Washington State Department of Ecology (WDOE), and National Fire Protection Association (NFPA).

It is recommended that a list of materials needed before the construction begins be developed. On-site resources will then be used to search for existing materials on-site. The list developed has been done for Project W058 based on the construction specifications, (spread sheet in Appendix B). Perhaps the greatest resource overlooked is the various material coordinators in each company. The TWRS Division has successfully deployed excess chemicals. This list is a working document that <u>will be updated</u> throughout the project.

Calculation of Waste Reduction and/or Energy Savings

Avoids the cost of disposal of a chemical product that is past expiration dates or quality and has to be disposed of as dangerous waste.

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION (Continued)

Calculation of Project Cost Savings

Costs are dependant on quantities needed and available. Ultimately cost savings would reflect savings from avoidance purchase and having to excess or dispose of a material.

Calculation of Implementation Cost and Payback

No information known at this time.

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION

Date 12/12-19/95 **P2OA ID Code** KHP2OA28.HW **Facility** TWRS

Activity Construction of the Cross-Site Transfer System

P2O No. 3A **P2O Title** Wood Shoring Used in Radioactive Contaminated Areas

Current Practice

Wood is used in radioactive areas for trench shoring for a variety of different obstructions such as underground electrical and piping that are commonly found around the underground storage tanks at the Hanford Site. The tank farms are considered radiation zones. Once used in a radiation zone, the wood is considered low-level waste at a minimum and will have to be disposed of as such. The reason is because it is difficult to ensure that there has been no internal contamination inside the porous fibers of the wood. The wood can be used for shoring again, but has not been used efficiently in the past. On Project W-030 a variety of new shoring material has been procured to do the work inside of tank farms. This wood shoring is no longer releasable from radioactive zones and, therefore, needs to be managed as LLW or reused.

Recommended Action

Reutilization of wood shoring materials that were used on Project W030, Tank Farms Ventilation Upgrade Project, is highly recommended. There was extensive amounts of wood used on the project which is stored inside of storage containers as potential radioactive materials. These containers will be surveyed on the outside and released from a radioactive zone. The containers can then be moved to another area of the site and placed in a radiation zone and then the wood shoring inside can be reutilized. Approximately 5.95m^3 (210 ft^3) of material will be needed for Project W058 and current, excess wood supplies far exceed the wood demand for Project W058.

Calculation of Waste Reduction and/or Energy Savings

Approximately 5.95m^3 (210 ft^3) of LLW will be avoided if this recommendation is implemented.

Calculation of Project Cost Savings

Procurement of New Shoring	$2,900	Basis: 5.95m^3 (210 ft^3) of wood at $487/$m^3$ ($13.8/$ft^3$)
Low level waste disposal	$12,600	Basis: 5.95m^3 of wood shoring at $2,118/$m^3$ ($60/$ft^3$ for LLW disposal)

Cost Savings for Wood Recycle = $15,550

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION (Continued)

Calculation of Implementation Cost and Payback

No implementation costs should be incurred. Newer material would require movement of the material to each area much like the movement of this shoring material from AY and AZ Tank Farms to the new trenching sites in 200 East and 200 West.

Payback is immediate.

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION

Date 12/12-19/95 **P2OA ID Code** KHP2OA28.HW **Facility** TWRS

Activity Construction of the Cross-Site Transfer System

P2O No. 3B **P2O Title** Alternative Materials for Shoring

Current Practice

Wood is used to shore pipe trenches for tank farm upgrade projects. Because of the potential for radioactive contamination, the used wood shoring cannot be released from tank farm areas. Upon completion of a trench shoring job, reusable wood is loaded into a storage trailer. This trailer is then surveyed out of the tank farm area and transported to a radiation zone lay down yard for reuse of the wood shoring. With proper care, wood shoring can last up to 20 years. However, the used wood shoring is not typically reused for other projects. Eventually, wood shoring must be disposed as low-level waste.

Recommended Action

For future projects requiring trenches in tank farm areas, light-weight aluminum trench shields should be used instead of wood. These trench shields can be assembled into trench boxes meeting OSHA regulations. Trench boxes appear to be the industry standard for trench shoring.

The trench shield panels analyzed here are 1.22m (4ft) high and can be ordered in lengths from 1.5 to 3.7m (5 to 12 feet). Boxes can be assembled in minutes using spreaders at each corner. These spreaders can be ordered in lengths ranging from 508mm (20 in.) to 2413mm (95 in.).

Up to three trench boxes can be stacked on top of each other, making these trench boxes usable down to depths of 3.7m (12 ft). According to the manufacturer, these trench shields are light enough for one person to lift in and out of a trench; two people can lift a stacked assembly of two boxes. A wheel kit is available that attaches at ground level on top of the trench box to make it easier to maneuver the box from inside the trench.

Initial conversations with WHC radiation control technicians (RCTs) indicate that it would not be a problem to release aluminum shoring material from a tank farm area. Being able to release this material would save in disposal costs and make the shoring available for use outside tank farm areas. This assessment assumes that 20% of aluminum shoring material will become contaminated and still have to be disposed as low-level waste.

One potential problem with using trench boxes is underground interferences. Workers may have trouble lowering trench boxes in and out of any trench area intersecting existing underground piping or utility lines. Interferences would also make it more difficult to move trench boxes along the inside of the trench. Interferences may need to continue to be shored with wood.

Another potential problem is the length of time the trenches are left open. Trench boxes work best in areas uncovered for only a short period. Due to the nature and

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION (Continued)

extent of the trench work occurring in tank farm areas, trenches might be left open for several weeks. Trench boxes only provide shoring in the immediate area where work is occurring. Without permanent shoring along every foot of trench area, some sections of the trench may cave in.

Calculation of Waste Reduction and/or Energy Savings

Although some reuse of wood shoring may occur for up to 20 years, the exact quantity of wood actually reused and future disposal costs are difficult to predict. This assessment assumes 100% disposal of wood shoring at 1995 low-level waste disposal costs.

This option would save the disposal of 5.95 m^3 (210 ft^3) of wood shoring (low-level waste). This assessment assumes contamination of 20% of aluminum trench box material. Volume of trench boxes is estimated to be about 1.64 m^3 (58 ft^3); 20% of 1.64 m^3(58 ft^3) is 0.34 m^3 (12 ft^3). This assessment also assumes continued use of 10% of the current volume of wood for trenching around interference areas (i.e., 0.59 m^3 (21 ft^3)). Total waste reduction would, therefore, be 5.95 m^3 - 0.34 m^3 -0.59 m^3 = 5.02 m^3.

Calculation of Project Cost Savings

Current Process

Low-level waste disposal:	$12,600	Basis: 5.95 m^3 of wood shoring; $2,118/$m^3$ ($60/$ft^3$ for LLW disposal)
Lumber:	$2,900	Basis: 5.95 m^3 of wood at $487/$m^3$ ($13.8/$ft^3$)
Shoring installation/ dismantling:	$16,400	Basis: 400 manhours @ $41/hour
Total Cost:	$31,900	

Proposed Process

Trench box disposal:	$720	Basis: 1.64 m^3 of material; 20% is 0.34 m^3 (12 ft^3); $2,118/$m^3$ for LLW disposal.

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION (Continued)

Trench box assembly/ installation/movement:	$4,920	Basis: 30% of manpower estimate to install/remove wood shoring; 120 hours @ $41/hour.
Shoring around interferences	$1,640	Basis: 10% of original estimate for shoring installation/ dismantling; 40 hours @ $41/hour)
Wood shoring disposal	$1,250	Basis: use of 10% of wood = 0.595 m^3 (21 ft^3); LLW disposal @ $2,118/$m^3$
Lumber	$290	Basis: 0.595 m^3 @ $487/$m^3$
Total Cost	$8,820	

Total Cost Savings = $31,900 - $8,820 = $23,080

Calculation of Implementation Cost and Payback

Trench shields	$31,300	Basis: Ten, 1.22m by 2.13m (4ft by 7ft) trench shield assemblies @ $3,130 an assembly; quote from Ultra Shore Products
Spreader assemblies	$1,880	(Basis: Forty, 762mm (30") spreaders @ $47 a spreader; quote from Ultra Shore Products
Implementation Costs:	$33,180	

Payback: $33,180 = 1.6 years (19 months)

This payback assumes that the trench shields will be available to other Hanford projects.

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION

Date 12/12-19/95 **P2OA ID Code** KHP2OA28.HW **Facility** TWRS

Activity Construction of the Cross-Site Transfer System

P2O No. 3C **P2O Title** Reduction of Low Level Waste with Available Technologies

Current Practice

ICF KH construction forces are using wood to shore trenches excavated for the installation of new vertilation piping (Project W030) at the AY and AZ tank farms. Upon project completion, reusable wood will be loaded into a storage trailer and surveyed out to another radiation zone area for possible reuse. Unusable wood will be disposed as low-level waste. It is estimated that with proper care, some of the wood can be reused for up to 20 years.

Recommended Action

Rather than dispose of wood shoring as low-level waste, it may be possible to use a planer to shave off surface contamination until the wood is clean. AJG Richland is currently equipped to handle this type of operation. A dust catcher with a HEPA filter is attached to the planer to collect shaving material. Wood shavings can then be used as burial box filler material. Clean wood can either be excessed or reused onsite.

This option may be more cost-effective than trying to reuse wood in future tank farm areas. According to conversations with a WHC Radiological Control Technician (RCT), very little of the wood shoring material ends up being reused anyway. The initial project delivers the used shoring wood to a holding yard behind B-Plant in good faith that it will be reused. However, subsequent projects do not appear to be using this material. Project W-030 is a good example. Project personnel purchased all new wood for shoring rather than reuse existing wood shoring material. RCTs in charge of the B-Plant lay down yard recently had to dispose of over seven storage boxes of tank farm wood that was not being reused at a cost of more than $700,000.

Calculation of Waste Reduction and/or Energy Savings

The amount of shaving required to remove contamination from shoring wood would vary depending on the extent of contamination. This assessment will assume a 95% waste volume reduction, or 5.66 m^3 (200 ft^3).

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION (Continued)

Calculation of Project Cost Savings

Current Process

Disposal	$12,600	Basis: 5.95 m^3 (210 ft^3) @ $2,118/$m^3$ ($60/$ft^3$)

Proposed Process:

Disposal	$593	(Basis: 0.28 m^3 (10 ft^3) @ $2,118/$m^3$)
Transportation to ATG	$200	(Basis: 2 people, 2 hours @ $50/hr)
Total Savings	$793	

Total Cost Savings = $12,600 - $793 = $11,807

Calculation of Implementation Cost and Payback

Wood Shaving Contract:	$50,000	(Basis: Cost estimate is only a guess. Although ATG Richland has the necessary equipment, they do not currently provide this service. Costs would have to be negotiated through Procurement.)
Total Implementation Costs:	$50,000	

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION

Date 12/12-19/95 **P2OA ID Code** KHP2OA28.HW **Facility** TWRS

Activity Construction of the Cross-Site Transfer System

P2O No. 4 **P2O Title** Subcontractor Use of Current Recycle Programs

Current Practice

Paper, cardboard, aerosol, wood, and batteries that are commonly recycled by ICF Kaiser construction forces is not recycled by subcontractors. Generally subcontractors recycle metal when possible. Normally solid wastes with recycle value are sent to the Hanford Landfill and disposed of. Since the switch to the Richland Landfill for solid waste disposal, other recycling opportunities have been identified but are not normally used by the subcontractors.

Recommended Action

Utilization of on-site recycling programs is highly recommended and achievable. There are several on-site programs that involve little extra effort to participate. Costs for disposal can become very expensive, but recycling can offset these costs. These programs do involve some initial planning and staging areas for materials. Subcontractors have the option of utilizing a recycle center themselves, but need to report the quantities recycled before project closeout. The following five recommended actions will increase recycling and support waste minimization/pollution prevention:

Wood
* Segregate wood from other solid wastes
* Acceptable: Clean lumber, vegetation, tree limbs, brush, laminated lumber, and plywood
* Not acceptable: Sheet rock, concrete/cinder blocks, objects longer that ten feet, and creosoted lumber
* Deliver to Richland Landfill

Paper
* Separate items such as catalogues/magazines, newsprint, and telephone books
* Use list provided for acceptable paper for recycling
* Place items into bins provided by Westinghouse Hanford Company (WHC)
* Materials are collected by off-site contractor on a set schedule

Cardboard
* Flatten and place only corrugated cardboard in designated dumpster (normally white with words CARDBOARD RECYCLING)
* Dumpster is emptied every other Monday by off-site recycling contractor

Batteries
* Collect batteries for recycle on-site
* Place in designated containers and log information about battery
* When full notify ICF KH TWRS Environmental Coordinator
* Batteries that qualify are: zinc chloride, ni-cad, alkaline, nickel iron, mercury, silver, lithium and carbonaire. All batteries except ni-cad dry wet-cell must be of the dry-cell variety.

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION (Continued)

Aerosols	* Collect all aerosol cans for recycle * Enter the aerosols onto the log sheet * ICF KH will pick up and recycle on a regular basis
Ferrous Metal	* Segregate metals that are metallic in nature (e.g. carbon steel, tin, etc. and copper wire that is coated) * ICF KH will pick up and recycle on a regular basis
Non-Ferrous Metal	* Segregate nonferrous metals which are those that are non-magnetic in nature (e.g. stainless steel, aluminum, etc.) * ICF KH will pick up and recycle on a regular basis

This is the first project in the TWRS Division that will utilize on-site recycle programs. This was partially done in the past but never to this extent. The overall benefit is a waste volume reduction that represents a savings for the contractor and ICF Kaiser Hanford Company. Participation by subcontractors in the on-site recycling programs will involve minimal extra effort. In many cases it will eliminate satellite accumulation areas for waste streams like batteries and aerosols. There are other potential waste streams that could be recycled. These include the end caps that are shipped with the piping from the company who fabricates the transfer line off-site. These end caps are normally made of plastic that are recyclable. Another program that could be used is the rag laundry program that is currently utilized by ICF KH Construction Forces. This allows for the cleaning and reuse of any rag for a relatively low cost compared to collection and disposal of dangerous waste.

Some of these items have already been included in the waste management plan developed by the subcontractors. Cardboard and paper recyclers have been located at the prime contractors job trailer in 200 East Area. It is important at this point to share this waste management plan with all sub tier contractors. All recycling programs should be set up as soon as possible and definitely before the assembly of the transfer lines. In addition, the rag recycling contract will allow for additional waste reductions. This opportunity should be investigated immediately. If not possible then rags will have to be drummed as hazardous waste.

In addition, since a construction project is a dynamic system, other recycling opportunities should be assessed during construction. Often design may change and material changes will offer new recyclable materials.

Calculation of Waste Reduction and/or Energy Savings

The use of on-site recycle programs will eliminate the creation of hazardous and non-hazardous waste. The hazardous wastes normally cost about $990 per container on-site. There would be at least two containers for this project, one for aerosols and one for batteries. Non hazardous wastes cost $154/metric ton ($140/ton) to dispose of at the Richland Landfill. Wood, paper and cardboard waste volumes are difficult to predict but for each ton we save $154 in tipping fees. Metal wastes that are recycled are quite dense and, therefore, cost more to dispose of in the landfill as opposed to recycling. The following is an analysis of the cost savings for each waste stream that is recycled. Quantities were estimated and a cost per ton was established based on these assumptions. The cost per ton can be used to establish cost savings once the

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION (Continued)

mass of solid wastes that have been recycled are known. Estimates of quantities of waste recycled are:

Wood - 363 metric tons
Metal - 8.16 metric tons
Paper - 2.72 metric tons
Cardboard - 3.63 metric tons
TOTAL: 378 metric tons

Calculation of Project Cost Savings

The following cost savings are based on assumed waste volumes. These volumes can be multiplied by the cost per ton savings to get actual cost savings.

Wood Recycle

Current Practice

Wood Disposal	$55,900	Basis: 363 metric tons @ $154/metric tons($140/ton)
Transportation	$ 0	Basis: Will have to be hauled for recycle as well as for disposal.

Total Cost for Disposal= $55,900 or $154/metric ton

Proposed Process

Wood Recycle	$ 0	Basis: Wood is free disposal at Richland Landfill.
Transportation	$ 0	Basis: Will have to be transported for recycle as well as for disposal.

Total Cost to Recycle = $ 0

Total Cost Savings for Wood Recycle = $50,900 - $0 = $50,900

Paper Recycle

Current Practice

Paper Disposal	$419	Basis: 2.72 metric tons (3 tons) for 16 months of project @ $154/metric ton.
Loading Costs	$ 37	Basis: 1.5 hrs * $50/hr *1/2 load

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION (Continued)

Total Cost for Disposal = $456 or $168/metric ton

Proposed Process

Paper Recycle	$ 0	Basis: Paper Recycle Program supplies transportation and bins.

Total Cost for recycle = $ 0

Total Cost Savings for Paper Recycle = $456 - $0 = $456

Cardboard

Current Practice

Cardboard Disposal	$560	Basis: Assumed 3.63 metric tons (4 tons) of Cardboard
Loading	$112	Basis: 1.5 hrs * $50/hr * 1.5 load

Total Cost for Disposal = $ 672 or $185/metric ton

Proposed Process

Cardboard Recycle	$ 0	Basis: Recycle program provides bins and transportation.

Total Cost to Recycle = $0

Total Cost Savings for Cardboard Recycle = $672 - $0 = $672

Batteries

Current Practice

Battery Disposal	$990	Basis: Disposal of 1 drum at $990/drum
Weekly Inspections of Satellite Accumulation Areas	$650	Basis: 0.25 hrs * $50/hr * 52 weeks (project duration)

Total Cost for Disposal = $1,640

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION (Continued)

Proposed Process

Battery Recycle	$990	Basis: Cost to recycle batteries is approximately equal to disposal costs

Total Cost for Recycle = $990

Total Cost Savings for Battery Recycle = $1,640 - $990 = $640

Aerosols

Current Practice

Aerosol Disposal	$990	Basis: Cost of Aerosol Satellite Accumulation Area.
Weekly Inspections	$585	Basis: 0.25 hrs * $50/hr * 52 weeks (project duration).

Total Cost for Aerosol Disposal = $1,575

Proposed Process

Recycle Aerosols	$400	Basis: Cost to recycle each container at 400 Area Consolidation Recycle Center.

Total Cost for Aerosol Recycle = $400

Total Cost Savings for Recycle = $1,575 - $400 = $1,175

Ferrous & Non Ferrous Metal

Option 1

Current Practice

Metal Disposal	$1,386	Basis: Assume 8.16 metric tons (9 tons)@ $154/ton disposal.
Labor	$450	Basis: 6 loads * 1.5 hrs/load * $50/hr

Total Cost for Metal Disposal = $1,836

Proposed Practice

Metal Recycle	$450	Basis: 6 loads * 1.5 hrs/load * $50/hr

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION (Continued)

Lugger Cost	$1,000	Basis: Cost to maintain 2 luggers.

Total Cost to Recycle Metal = $1,450

Total Cost Savings for Metal Recycle (Option 1) = $1,836 - $1,450 = $386

Option 2

Current Practice
Same as Option 1

Proposed Practice

Contractor Recycles	$ 660	Basis: 6 loads * 2.5 hrs/load * $50/hr
Metal Recycle Value	$1,420	Basis: 3.63 metric tons of (4 tons) ferrous metal @ $88/metric ton ($80/ton) and 4.54 metric tons (5 tons) of non-ferrous metal @ $241/metric ton ($210/ton)

Total Cost Savings for Metal Recycle (Option 2) = $760 (Direct saving to Subcontractor) + $1,836 in disposal avoidance to Project W058

TOTAL COST SAVINGS (for all recycling) = $59,229

Calculation of Implementation Cost and Payback

No cost is associated with implementation of this recommendation. The manhours required to accumulate materials for recycle on certain programs are assumed to be equivalent to those required for disposal. All these programs are set up on-site now and require no extra effort on behalf of the subcontractors.

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION

Date 12/12-19/95 **P2OA ID Code** KHP2OA28.HW **Facility** TWRS

Activity Construction of the Cross-Site Transfer System

P2O No. 5 **P2O Title** MSDS Review and Product Substitution

Current Practice

Hazardous materials that are used for various jobs on the Hanford Site are not typically reviewed for the regulator obligations of waste disposal. They are commonly reviewed by Industrial Hygiene and Safety for personal protective equipment requirements and worker safety. The review by Safety and Health professionals is supposed to be done five days before the use of a product. Enforcement of this five day notification in the past has not been effective. In addition, waste management is dealt with when a product is applied and there are wastes such as personal protective equipment, rags, etc. The approach is a reactive approach rather than a proactive approach to waste management.

Recommended Action

All materials used for project W058 will be reviewed for waste generation potential and possible substitution. This can be done by submitting the Material Safety Data Sheet (MSDS) to the ICF KH TWRS Environmental Coordinator for review and suggested substitution. The contract allows for one substitution request per product which eliminates waste generation and the liabilities of all involved parties. This will allow for preparation of waste management before the different stages of the project begin.

Partial implementation is ongoing for this project and has been somewhat successful. The guide specifications were used to develop a list of products that are specified for construction and the designation of name brand product as waste has been reviewed. Certain materials in the specifications do not call out specific name brand products but instead gives the product properties required. Products supplied by the subcontractor should be reviewed for waste management purposes. A list of those products specified by the construction specifications is contained in Appendix B. This list states each location of each product specification, product/material if known, use/activity, dangerous waste codes associated with the product, and opportunities/recommendations. This will aid the contractors in selecting non-regulated products up front in the project.

These product reviews will identify potential problem areas associated with worker safety, health and environment. If the product is non regulated as a dangerous waste then it most likely less harmful to workers. Once non-regulated materials are found and they are adequate substitutes, then the guide specifications for other projects should include the non regulated products that can be used.

The review of all materials in the guide specifications has proven beneficial. However, those materials that are not called out by name that the subcontractor will provide, should also be reviewed for waste designation. This process can be accomplished by simply sending MSDS to the ICF KH TWRS Environmental Coordinator for a waste designation. Industrial Hygiene can also have a look at hazardous chemicals and

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION (Continued)

can compare personal protective equipment requirements for each product. Two to three product MSDS should be used to increase odds of finding a non regulated material.

Calculation of Waste Reduction and/or Energy Savings

Waste reduction is very dependant on quantities and type of materials used. Whether products are regulated as dangerous waste or not, will determine proper disposal. In the case of work in radioactive areas, a material that is low level waste will cost $\$2,118/m^3$ ($\$60/ft^3$) compared to a low level mixed waste cost (low level and dangerous waste) $\$13,800/m^3$ ($\$391/ft^3$). This is 6.5 times the cost for specifying a non-dangerous waste for radiation waste.

Calculation of Project Cost Savings

Each avoided barrel of dangerous waste will eliminate approximately $990 per barrel regardless of barrel size. This cost does not include countless manhours of managing, designation, oversight, and paperwork associated with dangerous wastes. These costs would have to push costs up to approximately 2 to 3 times this amount. In addition, when a material that is selected is hazardous normally there are additional Industrial Safety and Health costs. These costs would include monitoring, personal protective equipment, and control and storage. These cost are difficult to quantify because they are very dependant on the products quantities utilized and stored.

Calculation of Implementation Cost and Payback

No implementation cost would be incurred. Cost to contractors may include time to issue a product substitution request and approval by ICF KH Project Management.

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION

Date 12/12-19/95 **P2OA ID Code** KHP20A28.HW **Facility** TWRS

Activity Construction of the Cross-Site Transfer System

P2O No. 6 **P2O Title** Leak Testing and Flushing of Pipeline

Current Practice

Construction of the Cross-Site Transfer System under Project W058 includes two 11.3 km (7 mile) transfer lines. Each transfer line is composed of an primary stainless steel pipe and an outer secondary carbon steel pipe. Leak testing of transfer lines can be done with three media: air, water, or nitrogen. The current methods to test a pipeline is either hydro (water) or air. The testing method chosen will normally be done with the media that would commonly be transferred in the line. So water will be used on the inner line and air on the outer secondary line.

Each line will be tested in sections and then the entire line will be tested. The water used for hydrotesting is normally discharged to the ground. This can require a permit if the quantity is enough. Flushing of these lines when complete may lead to as much as 1 218 770 liters (322,000 gallons) of water. The water must meet State Discharge Permit Criteria in Washington Administrative Code (WAC) 173-216 to in order to be discharged to the ground.

Regulatory Analysis/Recommended Action

There are three criteria that must be meet in order to discharge to the ground. The average annual flow must be less than 38 lpm (10 gpm), the instantaneous flow rate must be less than 569 lpm (150 gpm), and the water must meet the Ground Water Quality Criteria in WAC 173-200. If these criteria can not be meet the water will have to be collected. The Ground Water Quality Criteria are have been achieved in the past because there are generally no chemicals introduced into the hydro test water or flush. Based on preliminary calculations, the project will easily meet the first two criteria.

Pipeline Length = 2 pipelines at 6.5 miles = 13 miles (68,640 ft) = 20,922 m
Pipeline Area = 3.14 $(0.25ft)^2$ / 4 = 0.0491 ft^2 or 4.56 X 10^{-3} m^2
Volume of entire line = 104.61 m^3 or 104,610 liters (27,635 gallons)

Expected Hydro Tests and Flushing of Line = 70* (1000 ft) @ 462,757 gal + 1 (final test) @ 25,709 gal + 1 flush @20,000 gal = 508,466 gal or 1 924 753 liters
*Note: This 70 value includes tests of the same section of pipe to the vent station from both 200 East and 200 West because the first section will be tested up to 35 times before final testing. Hydro testing is done every thousand feet of pipeline.

Annual Average Flow Rate
1,924,753 liters/year * year/365 days * 1day/24 hrs * 1hr/60 min = 3.7 lpm (annually)
The value is well below the required limit of 38 lpm.

Instantaneous Flow Rate
Assume that the highest rate for the pipeline flush is 1.83 m/s (6 ft/s) flow rate for the transfer lines.

$$1.83 \text{ m/s} * 5.0 \times 10^{-3} \text{ m}^2 * 1000 \text{ l/m}^3 * 60 \text{ s/min} = 549 \text{ l/min}$$

The value is still below the regulatory limit of 569 lpm.

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION (Continued)

Based upon regulatory analysis no additional permitting will be required. It is recommended that on the final flush the water used could be stored in the flush tank designed for the transfer line if complete. Other reuse of the water is cost prohibitive because the cost of potable water that is used for hydro testing is $.0038/liter ($0.001/gal) which is approximately $97 dollars for water cost on the final flush.

Calculation of Waste Reduction and/or Energy Savings

Not applicable.

Calculation of Project Cost Savings

Not applicable

Calculation of Implementation Cost and Payback

Not applicable

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION

Date 12/12-19/95 **P2OA ID Code** KHP2OA28.HW **Facility** TWRS

Activity Construction of the Cross-Site Transfer System

P2O No. 7 **P2O Title** Controlled Density Fill

Current Practice

Controlled Density Fill (CDF) is specified for use as pipe bedding, and as fill for railroad, roadway, and utility undercrossings. Additionally, it permissible to substitute CDF for structural backfill in both radiation and non-radiation zones. A total of 4600 m^3 (6000 yd^3) of CDF is specified for project W-058. Approximately, 3520 m^3 (4600 yd^3) of this will be used for pipe bedding, and the remainder will be used fill at railroad, roadway, and utility undercrossings. The specific mix design for each of these applications will be determined and tested by the supplying vendor, and approved by ICF KH. For this analysis, it is assumed that an average of 150 kg/m^3 (250 lb/yd^3) of fly ash will be used for each mix design. Therefore, it is estimated that a minimum of 680 000 kg (1 500 000 lb) of fly ash will be utilized for project W058. At a cost of approximately $40/ton(english), $30,000 will be incurred to purchase fly ash for this project.

Recommended Action

As a result of burning coal to produce steam for the Hanford site, fly ash is produced at the 200E and 300 area powerhouses. Currently, this fly ash is being collected at the powerhouses, and trucked to the 200W area where it os accumulated in large piles. Since the ash does not designate as a dangerous waste and is not radiologically contaminated, there are no plans for the ultimate disposal for this material. Use of this fly ash in the CDF mix would eliminate the need to maintain and dispose of the fly ash, and make beneficial use of this material as a component of the CDF mixture.

The fly ash from the Hanford site was characterized several years ago as part of a co-disposal project. (This project investigate the use of fly ash as a replacement for backfill at low-level and mixed waste disposal pits). As a result, a mix was developed and approved for use at Hanford. To date, however, the fly ash has not been used for this co-disposal application. The ash is actually a mixture of fly ash and bottom ash with a significant amount of unburned organic material (i.e. coal), estimated at up to 20% by weight. The ash is a mixture of fine to coarse aggregate. Testing indicated that the Hanford fly ash did not meet the standards of a Class F fly ash, according to the American Society of Testing and Materials (ASTM) C 618 standard.

The guide specifications for project W058 require the use of Class F fly ash in CDF and pipe bedding mixes. This does not immediately discount the use of the Hanford fly ash. However, a mix which meets the performance requirements for the CDF and pipe bedding mixes would need to be developed. A compressive strength of 345 to 690 kPa (50 - 100 psi) is required for CDF; a compressive strength of 3 103 to 2 447 kPa (450 - 500 psi) is required for pipe bedding. Following this approach, the ash may have to be further processed prior to use. Processing could include sieving to meet particle size requirements, drying to achieve a consistent saturated surface dry (SSD) density, and burning to reduce the organic content.

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION (Continued)

Calculation of Waste Reduction and/or Energy Savings

Implementation of this option would eliminate the need to dispose of 680,000 kg of fly ash as waste.

Calculation of Project Cost Savings

Current Process		
Fly Ash costs for CDF $40/ton) (for pipe bedding)	$23,000	(Basis: 575 tons @
Fly Ash costs for CDF $40/ton) (for backfill)	$ 7,000	(Basis: 175 tons @
Fly Ash Disposal costs	$60,000	(Basis: 750 tons @ $140/ton, according to current disposal costs at the Richland Landfill)
Transportation		
TOTAL	$90,000	
Proposed Process		
Fly Ash costs for CDF (for pipe bedding)	$ 0	
Fly Ash costs for CDF (for backfill)	$ 0	
Fly Ash Disposal costs	$ 0	
Transportation Costs	$	
TOTAL	$ 0	
TOTAL SAVINGS	$90,000	

Calculation of Implementation Cost and Payback

Testing of Hanford fly ash	$ 5,000	(Basis: Estimate from Steve Phillips, WHC)
Purchase of Batch Plant	$ 200,000	(Basis: Estimate from Steve Phillips
Operation of Batch Plant		
Change Guide Specification	$ 3,000	(Basis: 40 hours @ $75/hr)

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION (Continued)

IMPLEMENTATION COSTS $ 205,000

PAYBACK = IMPLEMENTATION COSTS/TOTAL SAVINGS = $ 205,000/$ 90,000 = 2.28 years

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION

Date 12/12-19/95 **P2OA ID Code** KHP20A28.HW **Facility** TWRS

Activity Construction of the Cross-Site Transfer System

P2O No. 8 **P2O Title** Reuse of contaminated soil resulting from excavation of trenches for project W-058

Current Practice

Project W-058 will excavate soil along a 10.5 km (6.5 mile) corridor in the 600 area of the Hanford site (between the 200 West and 200 East areas) for placement of the cross site transfer line, construction of a diversion box and vent station, and tie-in to the 241-SY valve box and the 244-A lift station. It is expected that contaminated soils will be encountered in the area around the 241-SY valve box and the 244-A lift station. Additionally contamination may also be found at railroad crossings, or in other areas of the 600 area. The C-1, C-2, and C-3 Construction Specifications recommends salvage of in-situ soils to re-use for backfilling and compaction. However, the use or re-use of contaminated material is forbidden. Contaminated soil may designate as either low-level radioactive waste (LLW), dangerous waste (DW), or low-level mixed waste (LLMW), which contains both radioactive and dangerous constituents, (LLMW). Contaminated soils from project W-058 are expected to be either LLW or LLMW.

Contaminated soil is typically placed in 208 L (55 gal) drums with other contaminated material (i.e., PPE, plastic), and disposed. Clean fill then is used for backfilling or compaction material.

Recommended Action

It is recommended that contaminated, excavated soils be returned to the original excavation as fill. This is consistent with established precedence for radiologically contaminated soils, and proposed management of soils contaminated with dangerous waste (DW) constituents. Radiologically contaminated soils have been returned to the original excavation for other Hanford projects (W049H, L044, W087). This determination is based on an evaluation by Radiological Control Technicians (RCTs). Currently, soils contaminated with DW constituents cannot be returned to the original excavation, but must be removed and managed as DW. WHC Environmental Services has drafted a policy on "Management of Contaminated Soil from Non-remediation Activities at the Hanford Site", and submitted this policy to Washington State Department of Ecology (WA DOE) for approval. The policy states that unless such action would create As-Low-as-Reasonably-Allowed (ALARA) concerns, the contaminated soil will be returned to the original excavation. WA DOE has verbally agreed with the policy, but have not yet issued a formal response.

Returning contaminated soil to the original excavation during non-remediation activities such as common trenching for pipeline installation avoids the generation of additional waste and the associated management costs. The contaminated soils will eventually be managed as waste during closure of the cross-site transfer line.

It is also recommended that contaminated soils be segregated from PPEs and contaminated debris. If the soil is mixed with these other waste streams, the mixture must be managed as either LLW or LLMW, and it will no longer be possible to reuse the soil as fill.

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION (Continued)

Project W058 will excavate approximately 9.1 m (30 ft) of trench in the SY Tank Farms (200W) and 12.2 m (12.2 ft) of trench at the 244A Lift Station (200E). The depth of the trenches at the SY Tank Farms will less than 1.2m (4ft), and will require the installation of shielding around the installed pipe line for worker protection. For this reason, the removed soils cannot be returned to the original excavation, and must be managed as waste (LLW or LLMW). The trenches in at the 244A Lift station will be deeper, greater than 1.5 m (5 ft), and additional shielding is not required. Removed soils from 244A should be returned to the excavated trench as fill.

Calculation of Waste Reduction and/or Energy Savings

Assume that the trench in the 244-A lift station is 12.2 m (40 ft) in length, 1.5 m (5 ft) deep and 1.5 m (5 ft) wide. The volume of the excavated soil is 2.6 m^3 (90 ft^3). Assuming a density of 1 600 kg/m^3 (100 lbs/ft^3), the mass of excavated soil is 4 080 kg (9,000 lb).

Calculation of Project Cost Savings

Current Process

Disposal of Soil as Waste disposal	$ 5,507 - $ 35,880	(Basis: Avoided waste is 2.6m^3 of $2118/$m^3$ for LLW and $13,800/$m^3$ for LLMW)

Proposed Process

Return Soil to Excavation	$ 0

Cost Savings range from $ 5,507 - $ 35,880.

Calculation of Implementation Cost and Payback

There are no costs associated with the implementation of this option, therefore, payback is immediate.

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 4
POLLUTION PREVENTION OPPORTUNITIES SUMMARY

Date 12/12-19/95 P2OA ID Code KHP2OA28.HW Facility TWRS

Activity Construction of the Cross-Site Transfer System

P2O No.	P2O Title	Waste Class Reduced	Project Waste Reduction or Energy Savings	Estimated Project Savings	Estimated Implementation Cost	Payback (years)
1	Substitution of Acetone or Ethyl Alcohol	DW, MW	Unknown	1,400	None	Immediate
2	Use of Products Onsite	DW	Unknown	Unknown	None	NA
3A	Wood Shoring Used in Radioactive Areas	LLW	$5.95m^3$	15,550	None	Immediate
3B	Alternative Materials for Shoring	LLW	$5.02m^3$	20,080	33,180	1.5 years
3C	Reduction of Low Level Waste with Available Technologies	LLW	$5.66m^3$	11,807	50,000	NA
4	Subcontractor Use of Current Recycle Programs	SW, DW	378 metric tons (SW)	59,229	None	Immediate
5	MSDS Review and Product Substitution	SW, DW, LLW, MW	Unknown	Unknown	Unknown	None
6	Leak Testing and Flushing of Pipeline	NA	NA	NA	NA	NA
7	Control Density Fill	SW	680 000 kg	90,000	205,000	2.28 years
8	Reuse of Contaminated Soil Resulting from Excavation of Trenches for Project W-058	LLW, MW	$2.6\ m^3$	5,507 to 35,880	None	Immediate

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 5
FINAL SUMMARY

Date 12/12-19/95 **P2OA ID Code** KHP20A28.HW **Facility** TWRS

Activity Construction of the Cross-Site Transfer System

Proposed Opportunities and Discussion

Of the three wood shoring opportunities, 3A is preferred. Although annual savings are roughly equivalent for each of the options, 3A has no implementation costs with an immediate payback. Additionally, it will make use of existing, contaminated wood from project W030, avoiding disposal of this material as waste.

Opportunities 1, 2, 4, and 5 all have immediate payback with no implementation costs. The key to their successful implementation is to take full advantage of the contract requirements and the existing pollution prevention structure and services within ICF KH. The TWRS division EC is responsible for implementing the ICF KH Pollution Prevention program within the TWRS division. In this capacity, he works closely with Field Contract Engineers in Construction Management, and Supervisors in Construction Forces to identify and resolve environmental issues.

Opportunity 7 is not cost effective. Although the annual savings are $50,000 and use of the Hanford fly ash avoids 680 000 kg of waste, implementation costs are $205,000. The payback period is 4.1 years. Beneficial reuse of the Hanford fly ash should continue to be investigated, however. It may be suitable for use as road bedding for instance. If a project is identified which requires greater quantities of fly ash, this option may be cost effective.

Reuse options considered in Opportunity 6 are not cost effective because the volume of water generated from hydrotesting and flushing of the transfer lines does not require a permit and may be discharged to ground.

Opportunity 8 is a cost effective option. However, if the contaminated soil contains DW constituents, approval of the Hanford site contaminated soil policy by WA DOE is required. If this does not occur prior to excavation at the 244-A Lift station, it may be impossible to implement this opportunity. If the soil contains only radiological contamination, then implementation is straightforward.

Recommendations and Schedule for Implementation

Opportunities 1, 2, 3A, 4, 5, and 8 should be implemented as soon as possible. Implementation of these opportunities depends on taking full advantage of existing contract language and using the existing ICF KH Pollution Prevention structure. Tracking of pollution prevention progress will be done on a monthly basis. Subcontractors and Construction Forces personnel shall submit the following information to the TWRS EC at the end of each month.

- Quantities of waste generated by waste type (i.e. LLW, LLMW, DW, SW)
- Quantities of wastes recycled by waste category (i.e. wood, metal, paper, cardboard, batteries, aerosols)
- Product substitutions
- Products used from Hanford excess inventory

The EC will this compile this information into quarterly reports, and discuss pollution prevention progress with subcontractors and Construction Forces personnel.

APPENDIX B

Table of Products Specified for the Construction of the Cross-Site Transfer System

W058 P2 Opportunities

SPEC #	SECTION	PARA	PRODUCT / MATERIAL	USE / ACTIVITY	WASTE CODES	OPPORTUNITY / RECOMMENDATION	QTY
C-1	2200	2.1.2.1, 2.1.2.2	Soils, well-graded	Backfill, Structural or common	N/A	Replace with CDF; reuse excavated soils	
C-1	2200	2.1.2.3	Sand	Bedding for underground piping and conduit	N/A	Use excavated material, if possible, or controlled density fill	
C-1	2200	2.1.2.3	Controlled Density fill	Backfill, Structural or common	N/A	Maximize use of CDF	
C-1	2200	2.1.5	Plastic Sheet markers	Marks buried installation	N/A	NONE. The tape is a Safety Class I requirement	
C-1	2200	3.1.1	Shoring materials	Trenching	N/A	Review CESH 14 and 24	
C-1	2235	2.1.2.3	Crushed Rock	Shoulder	N/A	Investigate use of crushed concrete at 100 area	
C-1	2342	3.2.1	Pipeline	Abandonment if defects exist.	SW	NONE. Removal and recycling of old pipe is not feasible. Efforts to ensure that subsidence did not occur would be cost prohibitive.	
C-1	2512	2.1.1	Liquid asphalt for prime coat MC-50, AR-4000W	Paving	UNK	Submit at least three product MSDS for review and predetermination.	
C-1	2512	2.1.2	Tack Coat, Liquid asphalt grade MC-250	Paving	UNK	Submit at least three product MSDS for review and predetermination.	
C-1	2900	2.1.1	Seed, M 41-10, Section 9-14.2	Landscaping	N/A	NONE	
C-1	2900	2.1.2	Mulch, Weyerhauser Co., Silva-Fiber m 41-10,Section 9-14.4(2)	Landscaping	N/A	NONE	
C-1	2900	2.1.3	Tacktifier, M41-10, Section 9-14.4(7) Type A	Landscaping	UNK	NONE	
C-1	2900	2.1.4	Fertilizer, M 41-10, Section 9-14.3 (16-20-0, 38-0-0)	Landscaping	UNK	NONE	
C-1	2900	2.1.5	Gravel, stabilization	Walkways	N/A	Investigate use of crushed concrete at 100 area	

W058 P2 Opportunities

SPEC #	SECTION	PARA	PRODUCT / MATERIAL	USE / ACTIVITY	WASTE CODES	OPPORTUNITY / RECOMMENDATION	QTY
C-1	3300	2.2.1.1	Fly Ash	Cast-in-place concrete	N/A	Encourage use per affirmative procurement requirements	
C-1	3300	2.2.4	Master Builders Masterflow 713 (ASTM C 1107)	Joint Material - Non shrink grout	NONE	Substitute product for other regulated materials.	
C-1	3300	2.2.4	Sika Grout 212 (ASTM C 1107)	Joint Material - Non shrink grout	NONE	Substitute product for other regulated materials.	
C-1	3300	2.2.5	Wood, steel, plywood, or concrete pressed wood	Concrete forms	N/A	Purchase material with recycled content, and reuse selected material to maximum possible	
C-1	3300	2.2.6	Burke Release No.1, Burke Co.	Form Coating Material	UNK	Predetermination	
C-1	3300	2.2.6	Form Shield, AC Horn Inc.	Form Coating Material	D001	Utilize a non regulated product.	
C-1	3300	2.2.6	Magic Kote, Symons Corp.	Form Coating Material	NONE	Substitute product for other regulated materials.	
C-1	15140	2.2.4	Masterflow 713 (ASTM C 1107)	Joint Material - Non shrink grout	NONE	Substitute product for other regulated materials.	
C-1	15140	2.2.4	Sika Grout 212 (ASTM C 1107)	Joint Material - Non shrink grout	NONE	Substitute product for other regulated materials.	
C-1	15260	2.2.1.2	110 System, Polymer Development Lab., Inc.	Insulation, Rigid polyurethane, sprayed foam-in-place 2-component system	UNK	Predetermination	
C-1	15260	2.2.1.2	BC114, Burtin Urethane Corp.	Insulation, Rigid polyurethane, sprayed foam-in-place 2-component system	UNK	Predetermination	
C-1	15260	2.2.1.2	Universal foam Systems, Inc.	Rigid polyurethane insulation, sprayed foam-in-place 2-component system	UNK	Predetermination	
C-1	15260	2.2.1.2	Urethane foam PSi-S200 25 systems, Polythane Systems Insulation	Rigid polyurethane insulation, sprayed foam-in-place 2-component system	UNK	Predetermination	

W058 P2 Opportunities

SPEC #	SECTION	PARA	PRODUCT / MATERIAL	USE / ACTIVITY	WASTE CODES	OPPORTUNITY / RECOMMENDATION	QTY.
C-1	15260	2.2.1.3	Selected by Supplier to meet, direct buried, 0 to 180 F, 1 X e7 Rad (total accumulated dose).	Sealant: piping insulation repair	UNK	Submit three product MSDS for review and predesignation.	
C-1	15260	2.2.1.5	Waterproof shrink sleeves for field joints selected by the supplier: Direct buried, 0 to 180 f, 1 x e7 rad (total accumulated dose)	Shrink Sleeve: piping insulation	UNK	Submit three product MSDS for review and predesignation.	
C-1	15493	3.1.5.1	Zinc Coatings (ASTM A 780)	Coating, exterior protective for field joint connections and special piping sections	UNK	Submit three product MSDS for review and predesignation.	
C-1	15493	3.1.6.3	Water	Flushing of installed pipe	N/A	Use water for dust control	
C-1	15493	3.2.2.2	Water	Leak/Pressure testing of carrier pipe	N/A	Use water for dust control	
C-1	15493	3.2.2.3	Air	Leak/Pressure testing of secondary pipe	NONE	Consider safety concerns.	
C-1	15493	3.2.2.3	Nitrogen	Leak/Pressure testing of secondary pipe	N/A	Recommend use of air, except where combustion potential exists	
C-1	15493	3.2.2.5	Bubble Test Vacuum	Containment testing	UNK	Investigate	
C-1	16640	2.2.9	RTV Silicone, FS TT-S-00230C	Sealant: corrosion monitoring	UNK	Submit three product MSDS for review and predesignation.	
C-1	3300	3.3.1	Curing Compound. (ASTM 301). No suggested brand but needs to be tinted or applied to surfaces marked to show the extent of spraying.	Concrete curing Agent	UNK	Submit three product MSDS for review and predesignation.	

W058 P2 Opportunities

SPEC #	SECTION	PARA	PRODUCT / MATERIAL	USE / ACTIVITY	WASTE CODES	OPPORTUNITY / RECOMMENDATION	QTY
C-2	2200	2.1.2.1, 2.1.2.2	Soils, well-graded	Backfill, Structural or common	N/A	Replace with CDF; reuse excavated soils	
C-2	2200	2.1.2.3	Controlled Density fill	Backfill, Structural or common	N/A	Maximize use of CDF	
C-2	2200	2.1.2.4	Sand	Bedding for underground piping and conduit	N/A	Use excavated material, if possible, or controlled density fill	
C-2	2200	2.1.4	Crushed rock	Stabilization, workways and other uses.	N/A	Investigate use of crushed concrete at 100 area	
C-2	2200	2.1.4	Crushed Rock	Stabilization material for walkways and diversion box service areas	N/A	Investigate use of crushed concrete at 100 area	
C-2	2200	2.1.5	Plastic Sheet markers	Marks buried insulation	N/A	NONE. The tape is a Safety Class I requirement	
C-2	2200	3.1.7.1	Excavated Soil	Backfill, Structural or common	N/A or LLW	Reuse excavated soil to maximum extent possible, according to Hanford site contaminated soil policy	
C-2	3300	2.2.4.1	WSDOT M 41-10, Section 9-26, Type II, Grade 2, Class B or C	Epoxy resin for joints	UNK	Submit three product MSDS for review and predesignation.	
C-2	3300	2.2.5	Wood, steel, plywood, or concrete pressed wood	Concrete forms	N/A	Purchase material with recycled content, and reuse selected material to maximum possible	
C-2	3300	2.2.5	Masterflow 713, ASTM C 1107; Master Builders	Joint Material - Non shrink grout	NONE	Substitute product for other regulated materials.	
C-2	3300	2.2.5	Silka Grout 212, ASTM C 1107: Sika Corp.	Joint Material - Non shrink grout	NONE	Substitute product for other regulated materials.	
C-2	3300	2.2.7	Burke Release No. 1, Burke CO.	Form Coating Material	UNK	Predetermination	
C-2	3300	2.2.7	Form Shield, AC Horn Inc.	Form Coating Material	D001	Utilize a non regulated product.	
C-2	3300	2.2.7	Magic Kote, Symons Corp.	Form Coating Material	NONE	Predetermination	

W058 P2 Opportunities

SPEC #	SECTION	PARA	PRODUCT / MATERIAL	USE / ACTIVITY	WASTE CODES	OPPORTUNITY / RECOMMENDATION	QTY.
C-2	5500	2.2.4	Masterflow 713, ASTM C 1107; Master Builders	Joint Material - Non shrink grout	UNK	Predetermination	
C-2	5500	2.2.4	Silka Grout 212, ASTM C 1107: Sika Corp.	Joint Material - Non shrink grout	NONE	Substitute product for other regulated materials.	
C-2	9900	1.1.1.3	SP 2-89	Hand Tool Cleaning	UNK	Submit three product MSDS for review and predesignation.	
C-2	9900	1.1.1.3	SP 3-89	Power Tool Cleaning	UNK	Submit three product MSDS for review and predesignation.	
C-2	9900	1.1.1.3	SP 1-82	Solvent Cleaning	UNK	Submit three product MSDS for review and predesignation.	
C-2	9900	3.2.2.2	Blasting medium, liquid or dry abrasive	Surface Finishing	UNK	Recommend Green Diamond	
C-2	9900	3.5.2.1	Paint/Finish, Ext. 6-A, Custom Grade, alkyd gloss enamel	Concrete, concrete masonry units, masonry, stucco, stone, and brick	UNK	Submit three product MSDS for review and predesignation.	
C-2	9900	3.5.2.1	Paint/Finish, Ext. 12-A, Custom Grade, alkyd semi-gloss enamel	Ferrous metal	UNK	Submit three product MSDS for review and predesignation.	
C-2	9900	3.5.2.1	Paint/Finish, Ext. 14-A, Custom Grade, alkyd semi-gloss enamel	Galvanized (zinc coated) metal	UNK	Submit three product MSDS for review and predesignation.	
C-2	15493	2.2.2.1	Goldend No. 7298	Teflon paste, non-hardening	UNK	Predetermination	
C-2	15493	2.2.2.1	JC-30, Federal Process Co.	Teflon paste, non-hardening	NONE	Substitute product for other regulated materials.	
C-2	15493	2.2.2.1	Slic-Tite, Lake Chemical Co.	Teflon paste, non-hardening	NONE	Substitute product for other regulated materials.	
C-2	15493	2.2.3.1	Scotchkote 312, 3M Company	Coating, protective for pipe in contact with earth	WT02	Submit three product MSDS for review and predesignation.	
C-2	15493	2.2.4	Zinc exterior coating	Coating, protective, for secondary containment pipe field joints that will be insulation	UNK	Submit three product MSDS for review and predesignation.	

W058 P2 Opportunities

SPEC #	SECTION	PARA	PRODUCT / MATERIAL	USE / ACTIVITY	WASTE CODES	OPPORTUNITY / RECOMMENDATION	QTY
C-2	15493	2.2.5	Carboline 893 with Carbonline 890	Special Protective Coating (SPC), Chemical resistant, for ferrous metal coating inside pits	UNK	Possible as a product.	
C-2	15493	2.2.5	Keeler & Long No. 3200 with No. L-1 Series	Special Protective Coating (SPC), Chemical resistant, for ferrous metal coating inside pits	UNK	Possible as a product.	
C-2	15493	2.2.5	Steelcote Colormastic DTO with Colormastic DT	Special Protective Coating (SPC), Chemical resistant, for ferrous metal coating inside pits	UNK	Predetermination	
C-2	15493	2.2.5	Ameron, Amerlock 400 with Amerlock 351	Special Protective Coating (SPC), Chemical resistant, for ferrous metal coating inside pits	UNK	Predetermination	
C-2	15493	2.2.8.1	FS TT-S-00230, Type II, Class A, 1-component polyurethane, non-sag type, light-colored	Sealant, penetration, non-firestopping for insulation jacket	UNK	Submit three product MSDS for review and predesignation.	
C-2	15493	3.2.2.3	Water	Flushing of installed pipe	N/A	Use water for dust control	
C-2	15493	3.2.3.2	Water	Leak/Pressure testing of carrier pipe	N/A	Use water for dust control	
C-2	15493	3.2.3.3	Air	Leak/Pressure testing of secondary pipe	NONE	Consider safety concerns.	
C-2	15493	3.2.3.3	Nitrogen	Leak/Pressure testing of secondary pipe	N/A	Recommend use of air, except where combustion potential exists	
C-2	15493	3.2.3.4	Bubble Test Vacuum	Containment testing	UNK	Investigate	
C-2	16400	2.2.10.1	FS TT-S-00230, Type II, Class B, polysulfide base, light colored	Sealant, penetration, nonfirestopping	UNK	Submit three product MSDS for review and predesignation.	
C-2	16400	2.2.6	Polywater, American Polywater Corp.	Wire Pulling Compound	NONE	Substitute product for other regulated materials.	
C-2	16400	2.2.6	Y-er Eas, Electro Co.	Wire Pulling Compound	UNK	Predetermination	
C-2	16400	2.2.6	Yellow 77, Ideal Co.	Wire Pulling Compound	UNK	Predetermination	
C-2	16400	2.2.8	3M Company, Scotchfil	Insulating Putty	NONE	Substitute product for other regulated materials.	

W058 P2 Opportunities

SPEC #	SECTION	PARA	PRODUCT / MATERIAL	USE / ACTIVITY	WASTE CODES	OPPORTUNITY / RECOMMENDATION	QTY.
C-2	16400	2.2.8	Airseal, Kearney Co.	Insulating Putty	UNK	Predetermination	
C-2	16400	2.2.8	GE No.8389	Insulating Putty	UNK	Predetermination	
C-2	16400	2.2.9	Duct Seal, Gardner-Bender	Conduit Sealing Compound	UNK	Predetermination	
C-2	16400	2.2.9	Sealex, Porcelain Products Co.	Conduit Sealing Compound	UNK	Predetermination	
C-2	16640	2.2.10	110 System, Polymer Development Lab., Inc.	Insulation, Rigid polyurethane, sprayed foam-in-place 2-component system	UNK	Predetermination	
C-2	16640	2.2.10	BC114, Burtin Urethane Corp.	Insulation, Rigid polyurethane, sprayed foam-in-place 2-component system	UNK	Predetermination	
C-2	16640	2.2.10	Universal foam Systems, Inc.	Rigid polyurethane insulation, sprayed foam-in-place 2-component system	UNK	Predetermination	
C-2	16640	2.2.10	Urethane foam PSi-S200 25 systems, Polythane Systems Insulation	Rigid polyurethane insulation, sprayed foam-in-place 2-component system	UNK	Predetermination	
C-2	16640	2.2.9	Clear RTV Silicone, FS TT-S-00230	Sealant	UNK	Submit three product MSDS for review and predesignation.	
C-3	2200	2.1.2.1, 2.1.2.2	Soils, well-graded	Backfill, Structural or common	N/A	Replace with CDF; reuse excavated soils	
C-3	2200	2.1.2.3	Controlled Density fill	Backfill, Structural or common	N/A	Maximize use of CDF	
C-3	2200	2.1.4	Crushed rock	Stabilization, workways and other uses.	N/A	Investigate use of crushed concrete at 100 area	
C-3	2200	2.1.5	Plastic Sheet markers	Marks buried insulation	UNK	NONE. The tape is a Safety Class I requirement	
C-3	2200	3.1.2	Wood	Trenching	N/A	Reusable trenching	
C-3	2200	3.1.2, 3.1.8	Excavated Soil	Backfill, Structural or common	LLW	Reuse excavated soil to maximum extent possible, according to Hanford site contaminated soil policy	

W058 P2 Opportunities

SPEC #	SECTION	PARA	PRODUCT / MATERIAL	USE / ACTIVITY	WASTE CODES	OPPORTUNITY / RECOMMENDATION	QTY
C-3	3300	2.2.4.1	WSDOT M 41-10, Section 9-26, Type II, Grade 2, Class B or C	Epoxy resin for joints	UNK	Submit three product MSDS for review and predesignation.	
C-3	3300	2.2.4.2	FS TT-S-00230, Type II, Class A , nonsag type	Expansion joint filler, Type II, 1-component polyurethane sealant	UNK	Submit three product MSDS for review and predesignation.	
C-3	3300	2.2.5	Masterflow 713, ASTM C 1107; Master Builders	Joint Material - Non shrink grout	NONE	Substitute product for other regulated materials.	
C-3	3300	2.2.5	Silka Grout 212, ASTM C 1107: Sika Corp.	Joint Material - Non shrink grout	NONE	Substitute product for other regulated materials.	
C-3	3300	2.2.6	Wood, steel, plywood, or concrete pressed wood	Concrete forms	N/A	Purchase material with recycled content, and reuse selected material to maximum possible	
C-3	3300	2.2.7.1	Burke Release No. 1, Burke CO.	From Coating material	UNK	Predetermination	
C-3	3300	2.2.7.1	Form Shield, AC Horn Inc.	From Coating material	D001	Utilize a non regulated product.	
C-3	3300	2.2.7.1	Magic Kote, Symons Corp.	From Coating material	NONE	Substitute product for other regulated materials.	
C-3	3300	2.2.7.2	Kolor-Poxy Clear Sealer, Polyamide epoxy, Keeler & Long, Inc.	Coating for formed surfaces that will receive decontaminable coating. Must be compatible to coating system applied to cured concrete surface.	UNK	Predetermination	
C-3	3300	2.2.7.2	Steelcote EP0-Lux 185A Clear, Polyamide epoxy	For formed surfaces that will receive decontaminable coating. Must be compatible with applied coating.	UNK	Predetermination	
C-3	3300	2.2.7.2	Ameron, Nu-Klad 105A, Polyamide epoxy coating	Coating for formed surfaces that will receive decontaminable coating. Must be compatible to coating system applied to cured concrete surface.	UNK	Predetermination	

W058 P2 Opportunities

SPEC #	SECTION	PARA	PRODUCT / MATERIAL	USE / ACTIVITY	WASTE CODES	OPPORTUNITY / RECOMMENDATION	QTY.
C-3	5555	3.2.1.1	Acetone	Preweld preparation - cleaning	WT02, D001, U002, F003	Specify an alternative	
C-3	5555	3.2.1.1	Ethyl Alcohol	Preweld preparation - cleaning	D001	Use 2-Propanol	
C-3	7150	2.2.1	Asphalt Primer, ASTM D 41	Roofing, damp-proofing, and waterproofing	UNK	Submit at least three product MSDS for review and predetermination.	
C-3	7150	2.2.2	Asphalt, ASTM D 449, Type II	Roofing and waterproofing	UNK	Specify asphalt with no or low tar (carcinogen) content	
C-3	7150	2.2.3	Asphalt saturated felt, ASTM D 226, Type I	damproofing and waterproofing	UNK	Submit at least three product MSDS for review and predetermination.	
C-3	7200	2.2.1	Amofoam-CM, Amoco	Perimeter Insulation	N/A	Recommend using one without CFCs	
C-3	7200	2.2.1	Cellofoam EPS (registered trademark)	Perimeter Insulation	N/A	Recommend using one without CFCs	
C-3	7200	2.2.1	Styrofoam Square Edge, Dow Chemical Co.	Perimeter Insulation	N/A	Recommend using one without CFCs	
C-3	7200	2.2.2	Polystyrene-compatible adhesive (manufacturer approved)	Adhesive for perimeter insulation	UNK	Submit at least three product MSDS for review and predetermination.	
C-3	7200	2.2.2	Dow Chemical Co., Styrofoam No. 1	Adhesive, for perimeter insulation	UNK	Predetermination	
C-3	7200	2.2.2	Dow Chemical CO., Styrofoam No. 7	Adhesive, for perimeter insulation	UNK	Predetermination	
C-3	7270	2.2.1	Bio-Fire K-10 with recommended primer, Bio-Fire Shield Inc.	Fire barrier mortar	UNK	Predetermination	
C-3	7270	2.2.2	Dow Corning, 2-part, liquid silicone elastomer	Fire stop foam	UNK	Predetermination	
C-3	7270	2.2.3	Biotherm, 1-part silicone sealant, Bio-Fire Shield Inc.	Fire rated sealant	UNK	Predetermination	

W058 P2 Opportunities

SPEC #	SECTION	PARA	PRODUCT / MATERIAL	USE / ACTIVITY	WASTE CODES	OPPORTUNITY / RECOMMENDATION	QTY
C-3	7270	2.2.3	Dow Corning Type 3-6548 RTV	Fire rated sealant	UNK	Predetermination	
C-3	7270	2.2.3	GE Type RTV 800	Fire rated sealant	UNK	Predetermination	
C-3	7270	2.2.3	Semco PR 855 RTV	Fire rated sealant	UNK	Predetermination	
C-3	7270	2.2.4	Mineral wool	Fire barrier filler	UNK	Submit at least three product MSDS for review and predetermination.	
C-3	7270	2.2.5	Plywood, mineral fiber matting, mineral fiber putty, or applicable combination	Damming material	UNK	Submit at least three product MSDS for review and predetermination.	
C-3	7510	2.2.1	Roofing Cement, According to manufacturers specifications	Roofing cement	UNK	Submit at least three product MSDS for review and predetermination.	
C-3	7510	2.2.2	Asphalt Primer, ASTM D41	Roofing, damp-proofing, and waterproofing		Submit at least three product MSDS for review and predetermination.	
C-3	7510	2.2.3	Asphalt, ASTM D 312, Type III	Roofing Asphalt	UNK	Specify asphalt with no or low tar (carcinogen) content	
C-3	7510	2.2.5	Vapor Retarder, ASTM D 2178, Type IV	Waterproofing	UNK	Submit at least three product MSDS for review and predetermination.	
C-3	7510	2.2.8	Polyisocyanurate rigid board, FS HH-I-1972/GEN	Roofing insulation	UNK	Predetermination	
C-3	7510	2.2.12.1	Fiberglass ply sheets, ASTM D 2178, Type VI	Roofing	UNK	Predetermination	
C-3	7510	2.2.12.2	Fire rated capsheet, ASTM D 5147, Class A	Roofing	UNK	Predetermination	
C-3	7525	2.2.2	Expanded perlite board, ASTM C 728, Class i	Insulation	UNK	Predetermination	
C-3	7525	2.2.3	Perlite base board, ASTM C 728	Roof Crickets	UNK	Predetermination	

W058 P2 Opportunities

SPEC #	SECTION	PARA	PRODUCT / MATERIAL	USE / ACTIVITY	WASTE CODES	OPPORTUNITY / RECOMMENDATION	QTY
C-3	7525	2.2.7	Schuller cold application, or approved substitute	Adhesive for field of roof	UNK	Submit at least three product MSDS for review and predetermination.	
C-3	7525	2.2.8	Schuller MBR utility cement, or approved substitute	Cement for terminations an base flashing	UNK	Submit at least three product MSDS for review and predetermination.	
C-3	7525	2.2.10.1	ASTM D 5147, SBS modified base ply sheet	Base ply	UNK	Submit at least three product MSDS for review and predetermination.	
C-3	7525	2.2.10.2	ASTM D 5147, fire resistant, Class A, SBS modified bitumen membrane cap sheet	Cap sheet	UNK	Submit at least three product MSDS for review and predetermination.	
C-3	7525	2.2.9	Primer, ASTM D 41	Prime concrete deck	UNK	Submit at least three product MSDS for review and predetermination.	
C-3	7525	2.2.12	Galvicon, Southern products Inc.	Zinc-rich coating	UNK	Predetermination	
C-3	7525	2.2.12	ZRC, ZRC Products Co.	Zinc-rich coating	UNK	Predetermination	
C-3	7900	2.2.5	Expansion Joint Compound Watson Bowman & Acme Corp. "W" Series or ASTM D 994	Bituminous Type	UNK	Predetermination	
C-3	7900	2.2.7.1	Sealant, Dow Corning Type 3-6548 RTV	Fire Barrier Sealant	UNK	Predetermination	
C-3	7630	2.2.2	Solder, ASTM B 32, 50% Tin, 50% lead	Solder sheet metal	UNK	Submit at least three product MSDS for review and predetermination.	
C-3	7630	2.2.3	Bituminous plastic cement, FS SS-C-153, Type I	Attache sheet metal to roof	UNK	Submit at least three product MSDS for review and predetermination.	
C-3	7900	2.2.7.1	Sealant, General Electric Type RTV 800	Fire Barrier Sealant	UNK	Predetermination	

W058 P2 Opportunities

SPEC #	SECTION	PARA	PRODUCT / MATERIAL	USE / ACTIVITY	WASTE CODES	OPPORTUNITY / RECOMMENDATION	QTY.
C-3	7900	2.2.7.1	Sealant, RTV Silicone Foam PR 855 RTV	Fire Barrier Sealant	UNK	Predetermination	
C-3	7900	3.1.2	Cleaner, Citri Safe by Inland Technology	Joint Cleaner	WT02, D001	Suggest less hazardous material	
C-3	7900	2.2.2.1	Sealant, Type I polyurethane, FS TT-S-00230, Type I, Class A Single Component, self leveling	Joint Sealer	UNK	Submit at least three product MSDS for review and predetermination.	
C-3	7900	2.2.2.2	Sealant, Type II, I-component polyurethane FS TT-S-00230, Type II Class A nonsag type	Joint Sealer	UNK	Submit at least three product MSDS for review and predetermination.	
C-3	7900	2.2.2.3	Sealant, Type III, I-component silicone FS TT-S-001543	Joint Sealer	UNK	Submit at least three product MSDS for review and predetermination.	
C-3	7900	2.2.7.2	Caulking, 3M Company CP-25	Joints	WT02, D001, WP01, D035	Suggest less hazardous material	
C-3	7900	2.2.7.3	Putty, 3M Company 303	Joints	WT02, D001, WP01	Suggest less hazardous material	
C-3	7900	2.2.3	Sealant Primer, recommended by sealant manufacturer	Priming of Joints	UNK	Submit at least three product MSDS for review and predetermination.	
C-3	8100	2.2.1.4	Foamed in place polyurethane or isocyanate (R value =7) for exterior doors	Core Insulation	UNK	Submit at least three product MSDS for review and predetermination.	

APPENDIX C

Pollution Prevention Opportunity Assessment for the Operation of the Cross-Site Transfer System

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 1
TEAM AND ACTIVITY DESCRIPTION

Date 1/17/96 **P2OA ID Code** KHP2OA27.LLW **Facility** TWRS

Activity Operation and Maintenance of the Cross Site Transfer System

Team Members (*Leader)	Telephone	MSIN
Jack Mizner*	376-0981	B4-20
Todd Boucher	373-9954	S2-41
Ron Del Mar	376-1967	B4-20
Pat Laing	372-3674	G3-14
Pete Owen	373-2226	T4-01
Bob Nicholson	373-2986	S5-05
Dan Nunamaker	373-9115	T4-08

Description of Activity to be Examined in this P2OA

Project W-058 will replace the existing cross-site transfer line with a new system. The old transfer line does not meet regulatory permit requirements for transfer of mixed waste; the transfer line lacks secondary containment; it has outlived its design life; and it has no backup. The new transfer system will consist of two separate, parallel lines. Each line will be constructed to meet WAC 173-303 requirements and will consist of a 76-mm (3-inch) stainless steel pipe encased in a 152-mm (6-inch) carbon steel pipe. Leak detection probes will be installed in the annulus between the two pipes.

The new transfer line will originate in the 200-West Area at the SY Tank Farm valve boxes, and extend east to the 244-A Lift Station in the 200-E Area. The new system will be capable of transferring both liquid supernatant and solid slurry through either of two parallel, redundant lines. Transfer of supernatant will be possible immediately upon completion of project W-058; however, the system will not be capable of transferring slurry until after the completion of project W-211, Retrieval of Tank 102-SY. Project W-211 will design the pump/sluicing system required to retrieve sludge from 102-SY and other tanks at 200-W.

Tank 102-SY will be used as the feed tank for both supernatant and slurry transfers. The transfer pump in 102-SY will transfer the tank waste to the SY valve box. The existing SY-102 transfer pump will be the primary pump for supernatant transfers. Additional pumping capacity will be required for slurry transfers. Project W-058 will install a booster pump in the transfer line; project W-211 will install a larger transfer pump in 102-SY to provide the required added pumping capability for slurry transfers.

Westinghouse Hanford Company (WHC) will maintain and operate all equipment and systems associated with the cross-site transfer of tank farm wastes. Since the transfer line has not yet been completed, specific operating and maintenance procedures have not been developed. Therefore, the following resources were used to provide the necessary background for this P2OA:

- Operating and maintenance procedures and processes for current and historical cross-site transfers.
- Design documents.
- TWRS personnel expertise.

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 1
TEAM AND ACTIVITY DESCRIPTION (Continued)

Figures 1 and 2 show the general operating procedures for cross-site transfers of supernatant and slurry.

Figure 1 - Transfer of Supernatant Tank Waste

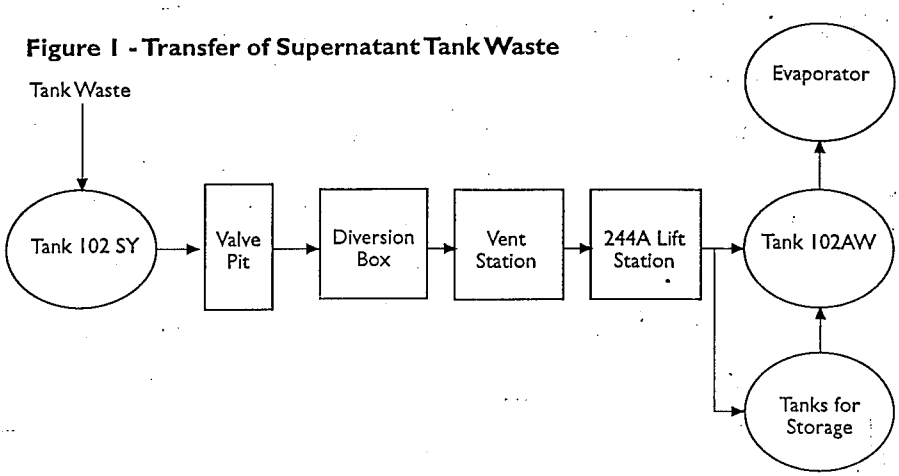
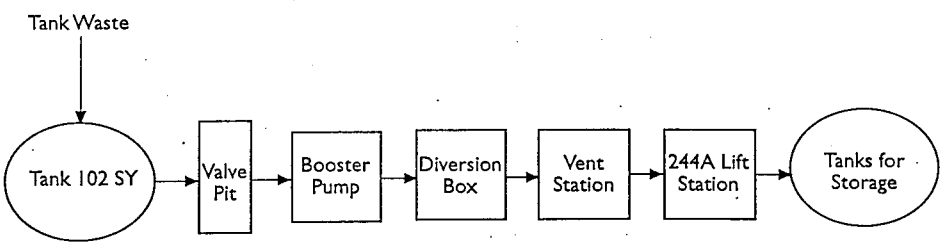


Figure 2 - Transfer of Slurry Tank Waste



Following supernatant transfer, the line will be flushed with about 57 000 liters (15,000 gallons) of pH-adjusted water. Some of the flush water will remain in the line to prevent chloride cracking. Occasionally, the line may also be flushed prior to the transfer as well; however, this should not be standard practice for supernatant transfers.

Preparation for slurry transfer will be more complicated. Prior to transfer, the line will be flushed with about 57 000 liters (15,000 gallons) of water to about 93 degrees C (200 degrees F). This pre-transfer flush will prevent the slurry from solidifying during transfer. Following slurry transfer, the line will be flushed with another 57 000 liters (15,000 gallons) of pH-adjusted water.

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 1
TEAM AND ACTIVITY DESCRIPTION (Continued)

The data in this P2OA assumes that four transfers will be performed each year; two supernatant transfers and two slurry transfers.

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 1
TEAM AND ACTIVITY DESCRIPTION (Continued)

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 2
ACTIVITY FLOW DIAGRAM

Date 1/17/96 P2OA ID Code KHP2OA27.LLW Facility TWRS

Activity Operation and Maintenance of the Cross-Site Transfer System

Chemical and Radioactive Inputs

Name	Quantity
NaOH	1 600 kg
Flush water	228 000 L
Supernatant	11 300 000 L
Slurry	11 300 000 L
Heated water	114 000 L

Material Inputs

Name	Quantity
PPE	
valves, pumps	
plastic	
rags	
absorbents	
bleach	
simple green	

Energy Inputs

Name	Quantity
steam	

Activity

Activity Time Period:

one year

Outputs include:
Solid (s)
Liquid (l)
Air (a)

Product or Result Output

Name	Quantity
Compliant transfer of tank waste	

Hazardous Waste Output

Name	Quantity
NaOH associated (rags, containers)	

Non-Hazardous Waste Output

Name	Quantity

Radioactive Waste Output

Name	Quantity
bleach	
simple green	
rodent droppings	

Mixed Waste Output

Name	Quantity
slurry	11 300 000 L
supernatant	11 300 000 L
flush water	228 000 L
heated water	114 000 L
Contaminated chemicals	
failed equip.	
plastic rags	
absorbents	

Other

Name	Quantity

Total Input mass ≈ Total Output mass kg In ≈ kg Out

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION

Date 1/17/96 **P2OA ID Code** KHP2OA27.LLW **Facility** TWRS

Activity Operation and Maintenance of the Cross-Site Transfer System

P2O No. 1 **P2O Title** Reuse Evaporator Condensate as Flush Water

Current Practice

Raw water will be used to flush the cross-site line transfer following each transfer of tank waste from 200-W to 200-E. In addition, heated water will be flushed through the line prior to sludge transfers to prevent the sludge from settling in the line during transfer. Flush water will be stored in a nearby 180 000 liter (47,000 gallon) tank. Prior to use, flush water will be treated with NaOH to raise the pH to above 11.5 to prevent chloride cracking in the transfer line. Total annual volume of flush water required to transfer slurry and supernatant waste is estimated to be about 228 000 liters (60,000 gallons). An additional 114 000 liters (30,000 gallons) per year will be heated and flushed through the line prior to transfer of slurry waste.

Flush water is treated through the 242-A Evaporator. Evaporator condensate water is stored in Liquid Effluent Retention Facility (LERF) basins. Eventually, this waste stream will be fed through the new Effluent Treatment Facility (ETF) for final treatment and discharge.

Recommended Action

Condensate from the 242-A Evaporator can be reused as flush water for the cross-site transfer line. This will conserve water and avoid the cost of treating this water through the ETF. Depending on the volume of waste being treated, ETF treatment costs will range anywhere from $0.13 to $1.32 per liter ($0.50 to $5 a gallon). This P2OA will assume an average treatment cost of $0.66 per liter ($2.50 per gallon).

Evaporator condensate water can be piped or trucked back to the flush water holding tank at 200-W. This P2OA will assume use of trucks to transport the water. Evaporator condensate is potentially contaminated (F-listed) with trace amounts of ammonia and volatile contaminants, such as acetone, MEK, and toluene. Some characterization will be required prior to reuse to avoid potential incompatibility problems with the waste being transferred in the cross-site transfer line.

Another potential problem is RCRA permit issues associated with handling and storing hazardous waste at the flush tank. The flush tank is an underground stainless steel tank encased in a concrete basin. Although the contaminant levels in the Evaporator condensate are likely to be below treatment standards, handling and storage of this waste still requires a permitted RCRA facility. The basic requirement of a permitted facility is to have leak detection and collection capabilities. The regulations do allow for some exemption for existing facilities if an assessment is performed that shows the tank to be structurally sound and compatible with the wastes to be stored to "ensure that it will not collapse, rupture, or fail." Such an assessment must include a leak test, internal inspection, and other tank integrity examinations.
The feasibility of permitting the flush tank to hold Evaporator condensate needs to be investigated further. The tank was originally designed to hold nitric acid; it may already meet RCRA criteria for storing hazardous waste.

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION (Continued)

The flush tank is a flat-bottomed stainless steel tank about 6 meters (20 feet) deep and 6 meters (20 feet) in diameter. The tank sits in an open concrete enclosure. The walls of the concrete enclosure extend up to above grade level. The annulus space between the concrete walls and the stainless steel tank walls is about 3 meters (10 feet) wide. Sump pumps are housed in the annulus area for retrieving any liquid between the primary tank and concrete enclosure. At this point, the project does not plan to install leak detection devices in the annulus; however, the top of the annulus is open to the environment and wide enough to allow for easy and effective visual inspection. It may be necessary to routinely pump out water resulting from natural precipitation to keep the annulus as dry as possible. Part of the current project scope is to coat the concrete in the annulus with some type of sealant to prevent cracking and loss of containment integrity. If required, a leak test can be performed by simply filling the tank with water and monitoring the annulus for leaks. No pressure tests can be performed because the tank is not pressurized.

The line from the flush tank to the cross-site transfer line is a single pipe and does not have leak detection and collection capabilities. Use of this line to transfer hazardous waste will have to be evaluated, along with the evaluation of the tank. In a worst-case scenario, this line will have to be replaced with a double-encased, pipe-in-pipe line. The estimated cost of upgrading this line is included as an implementation cost below.

One possible solution to the RCRA permit issue is an EPA proposal recently published in the Federal Register called the Hazardous Waste Identification Rule (HWIR) (appearing December 21, 1995). If passed, HWIR will allow companies that generate listed hazardous waste to declare these waste streams nonhazardous if concentrations of listed constituents fall below established thresholds. The listed contaminants found in Evaporator condensate are, in many cases, orders of magnitude below the suggested threshold for some of these listed wastes. For example, the threshold for MEK is 78 parts per million; Evaporator condensate concentrations of MEK are likely in the parts per billion range. The proposed rule establishes a protocol for getting a waste stream "delisted", which includes a sampling and analysis plan and ongoing recordkeeping to verify that contaminants continue to fall below threshold values.

A side benefit of reusing Evaporator condensate as flush water is that it will minimize the level of required flush water pretreatment. Evaporator condensate has a pH of about 10, as compared a pH of around 7 for raw water. Use of Evaporator condensate will require that less NaOH be added to bring the flush water pH up to the required level of 11.5. This will also minimize the purchase and handling of a hazardous material.

Calculation of Waste Reduction and/or Energy Savings

Implementation of this option will avoid the treatment of about 342 000 liters (90,000 gallons) a year of evaporator condensate through the Effluent Treatment Facility.

Calculation of Annual Cost Savings

Current Process

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION (Continued)

Tank storage	$837,900	(Basis: 342 000 L [90,000 gal] @ $2.45/L [$9.3/gal]*
Evaporator disposal	$550,000	(Basis: 342 000 L [90,000 gal] @ $1.61/L [$6.09/gal])*
ETF disposal	$225,700	(Basis: 342 000 L [90,000 gal] @ $0.66/L [$2.5/gal])
Raw water	$90	(Basis: 342 000 L [90,000 gal] @ $0.000264/L [$0.001/gal])
NaOH treatment	$2,800	(Basis: 8 drums/year @ $350/drum)
Total	$1,617,100	

Proposed Process

Tank storage	$837,900	(Basis: 342 000 L [90,000 gal] @ $2.45/L [$9.3/gal]*
Evaporator disposal	$555,600	(Basis: 342 000 L [90,000 gal] @ $1.61 [$6.09/gal])*
NaOH treatment	$1,400	(Basis: 4 drums/year @ $350/drum)
Transportation	$12,000	(Basis: 342 000 L [120,000 gal]; 36 trucks @ 9 500 L (2,500 gal)/truck; 3 hrs/trip, 2 people @ $55/hr)
Characterization	$18,000	(Basis: 36 samples @ $500/sample)
Fuel	$30	(Basis: 5 miles/trip @ $10 miles/gal @ $1.50/gal)
Total	$1,424,900	

Savings $1,617,100 - $1,424,900 = $192,200

* Costs based on draft report, Cost Analysis for Management of Double-Shell Tank Waste (WHC-SD-WE-ER-079, Rev. 1)

Calculation of Implementation Cost and Payback

Regulatory interpretation	$8,400	(Basis: 120 hours @ $70/hr)

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION (Continued)

Leak test	$3,500	(Basis: 2 days, 4 people @ $55/hr)
Double-encased pipeline	$70,000	(Basis: 152.5 m [500 ft of line]; $459.3/m [$140/foot] to fabricate piping, dig trenches, and install lines -- estimate from ICF KH. Estimating)
Total Cost	$81,900	
Payback:	$81,900/192,200 = 0.43 years	

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION

Date 1/17/96 **P2OA ID Code** KHP2OA27.LLW **Facility** TWRS

Activity Operation and Maintenance of the Cross-Site Transfer System

P2O No. 2 **P2O Title** Reuse of Well Purge Water as Flush Water

Current Practice

Raw water will be used to flush the cross-site line transfer following each transfer of tank waste from 200-W to 200-E. In addition, heated water will be flushed through the line prior to sludge transfers to prevent the sludge from settling in the line during transfer. Flush water will be stored in a nearby 180 000 liter (47,000 gallon) tank. Prior to use, flush water will be treated with NaOH to raise the pH to above 11.5 to prevent chloride cracking in the transfer line. Total annual volume of flush water required to transfer slurry and supernatant waste is estimated to be about 228 000 liters (60,000 gallons). An additional 114 000 liters (30,000 gallons) per year will be heated and flushed through the line prior to transfer of slurry waste.

Groundwater monitoring wells are located throughout the Hanford Site. Samples are extracted from these wells periodically to determine the extent and movement of groundwater contamination. Well sampling protocol requires that a certain amount of water be purged from each well prior to sampling to assure that sampling results are representative of actual aquifer conditions. This purge water has the potential to be contaminated with whatever contaminants are in the aquifer; therefore, the purge water must be sampled and managed as a waste stream. Per an agreement signed between the Department of Energy, Ecology, and EPA (WHC-MR-0039), contaminated purge water must be trucked to the 200-E area where it is discharged to above-ground modular tanks for treatment by solar evaporation. The purge water is a RCRA characteristic waste, due primarily to concentrations of carbon tetrachloride.

Recommended Action

The above-referenced agreement does not allow for reuse of purge water in any other process. However, reuse of the purge water in the cross-site transfer line as flush water (where it will eventually be treated through the Evaporator) may actually be environmentally preferable over treatment by evaporation, where potential contaminants are released into the atmosphere.

Reusing purge water as flush water in the cross-site transfer line should be investigated further. If DOE can make a strong case that such reuse of the purge water is smart management (both from the perspective of economics and environmental protection), then Ecology and EPA might be willing to revise the agreement accordingly. The advantages of this option are many:

- Conserve raw water.
- Avoid disposal and treatment of purge water at the modular tanks.
- Minimize release of potentially hazardous constituents to the environment through the solar evaporation process.
- Add no additional costs to project. Purge water is being trucked to the modular tanks anyway. Diversion of some of this water to the cross-site transfer line should not add any cost. Depending on the location of the wells, it may actually reduce costs by shortening travel time.

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION (Continued)

In the past, purge water from groundwater wells was merely dumped to the ground. However, due to the potential for trace contamination of hazardous constituents in the groundwater (such as carbon tetrachloride), current practice now requires this purge water to be sampled prior to discharge. Contaminated water is stored in modular tanks at 200-E, where the water is allowed to dissipate through solar evaporation. Any volatile contaminants in the water are released to the atmosphere; non-volatile components (such as carbon tetrachloride) settle in the bottom of the tanks. However, the level of contamination is very low (in the parts per billion range) and does not pose any problems for use in the cross-site transfer line. However, the purge water is still characterized as a RCRA hazardous waste; therefore, use of the purge water in the cross-site transfer line would require permitting/upgrade of the flush water holding tank and transfer line (see discussion under Option 1, Use of Evaporator Condensate at Flush Water). Still would likely add significant implementation costs to this proposal, thus overshadowing any cost benefits.

Past efforts to revise the purge water agreement have met still resistance from both WHC RCRA Permitting and Ecology. There appears to be strong opposition to reopening the agreement for any reason. Because of the political sensitivity associated with this issue, use of purge water may not be a viable option. Still, a cost analysis follows.

Calculation of Waste Reduction and/or Energy Savings

About 342 000 liters (90,000 gallons) of purge water going to the modular tanks will be eliminated each year.

Calculation of Annual Cost Savings

Current Practice

Modular tank disposal	$10,800	(Basis: Yearly operating cost of modular tanks is $60,000. The tanks receive about 7 570 L/day [2,000 gal/day]. Assuming 250 working days/year, annual waste volume is 1 892 500 L [500,000 gal]. Cost per liter is $0.0317)
Tank storage	$837,900	(Basis: 342 000 L [90,000 gal] @ $2.45/L [$9.3/gal]*
Evaporator disposal	$550,600	(Basis: 342 000 L [90,000 gal] @ $1.61/L [$6.09/gal])*
ETF disposal	$225,700	(Basis: 342 000 L [90,000 gal] @ $0.66/L [$2.5/gal])
Raw water	$90	(Basis: 342 000 L [90,000 gal] @ $0.000264/L [$0.001/gal])
NaOH treatment	$2,800	(Basis: 8 drums/year @ $350/drum)

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION (Continued)

Transportation	$7,920	(Basis: 342 000 [90,000 gal] @ 9 500 L/truck is 36 truck trips; 2 hrs/trip @ $55/hr, 2 people)
Fuel	$30	(Basis: 5 miles/trip @ 10 miles/gal @ $1.50/gal)
Total	$1,635,850	

Proposed Process

Tank storage	$837,900	(Basis: 342 000 L [90,000 gal] @ $2.45/L [$9.3/gal]*
Evaporator disposal	$550,600	(Basis: 342 000 L [90,000 gal] @ $1.61/L [$6.09/gal])*
ETF disposal	$225,700	(Basis: 342 000 L [90,000 gal] @ $0.66/L [$2.5/gal])
NaOH treatment	$2,800	(Basis: 8 drums/year @ $350/drum)
Transportation **	$7,920	(Basis: 342 000 [90,000 gal] @ 9 500 L/truck is 36 truck trips; 2 hrs/trip @ $55/hr, 2 people)
Fuel	$30	(Basis: 5 miles/trip @ 10 miles/gal @ $1.50/gal)
Total	$1,624,950	
Savings	$1,635,850 - $1,624,950 = $10,900	

* Costs based on draft report, Cost Analysis for Management of Double-Shell Tank Waste (WHC-SD-WE-ER-079, Rev. 1)

** Cost of transporting purge water should not be an added cost. Purge water is already being trucked to the modular tanks.

Calculation of Implementation Cost and Payback

Negotiation with EPA/Ecology	$14,000	(Basis: 200 hrs @ $70/hr)***
Tank leak test	$3,500	(Basis: 2 days, 4 people @ $55/hr)
Double-encased pipeline	$70,000	(Basis: 152.5 m [500 ft of line]; $459.3/m [$140/foot] to fabricate piping, dig trenches, and install lines -- estimate from ICF KH. Estimating)

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION (Continued)

Payback: $87,500/$10,900 = 8 years

*** Estimate is a guess. This figure could vary greatly depending on complexity of negotiations.

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION

Date 1/17/96 **P2OA ID Code** KHP2OA27.LLW **Facility** TWRS

Activity Operation and Maintenance of the Cross-Site Transfer System

P2O No. 3 **P2O Title** Recycle Flush water

Current Practice

Raw water will be used to flush the cross-site transfer line following the transfer of slurry and supernatant tank waste from the valve pit in 200-W to the 244-A lift station in 200 E. The water will be stored in a flush water tank. Prior to being introduced into the cross-site transfer line, the water will be treated with NaOH to raise the pH above 11.5 to prevent chloride cracking. Total annual volume of flush water is estimated to be 228 000 liters (60,000 gallons). An additional 114 000 liters per year (30,000 gallons) will be heated and flushed through the line prior to transfer of slurry waste to prevent the settling of waste in the line.

Flush water will go to a holding tank in 200-E prior to being treated at the 242-A Evaporator. Evaporator condensate is collected and stored in the LERF basins at 200-E. Eventually, this water will go to the ETF for final treatment and discharge.

Recommended Action

The 244-A Lift Station has a 114 000 liter (30,000 gallon) catch tank equipped with a transfer pump. The purpose of the catch tank is to collect any leaks or spills occurring during waste transfer. The catch tank must maintain a minimum volume capacity during each tank waste transfer. The transfer pump has the capability to pump the accumulated water in the reverse direction of the normal flow (i.e., from 200-E to 200-W).

The feasibility of collecting flush water in the 244-A catch tank, and then pumping the water back to 200-W for reuse should be investigated. The catch tank will probably not be available for the heated water flushed through the line prior to transfers, because collected water would take up room in the catch tank potentially needed to contain leaks occurring during the waste transfer (a safety concern). However, the water flushed through the line following each transfer could be collected in the catch tank, since this would not interfere with the need for this tank space during the transfer.

The pump at the 244-A Lift Station is powerful enough to push the water back to the valve pit at the SY tank farm. However, it is not certain at this time if the capability exists to pump the water back to the flush tank from the valve pit. According to tank farm operations personnel, the flush tank and flush system would require extensive modifications to allow contaminated water to be pumped back into the flush tank. At a minimum, required upgrades would include a new pump; replacement of the flush water line with a double-encased line; and a leak integrity test to certify the flush tank to RCRA permit requirements.

Alternatively, the flush water could be sent back to tank 102 SY to be used in slurry transfers if more dilution is required, or as tank cooling water. At this time, there does not appear to be any tank space available near the SY tank farm to hold water for sluicing or cooling purposes. However, slurry transfers will not begin until after all the supernatant has been transferred. By this time, additional tanks space may be

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION (Continued)

available to hold recycled flush water. The best estimate is that such tank space will not become available for another 10 years.

A big problem with this option is the current condition of the 244-A catch tank. Because of contamination resulting from past usage, any water coming out of the catch tank would likely be a dangerous mixed waste. In addition to the RCRA permit issues raised in the writeup on option 2, radioactive levels may require that the flush tank be fenced off as a radiation area to reduce exposure to below acceptable limits. One option is to decontaminate the catch tank as part of project startup and maintenance activities. Cleaning up the facility would have the additional benefit of reducing exposure to workers during routine maintenance activities. However, even if the tank were decontaminated on a regular basis, there is no guarantee that the flush water would be clean enough to send back into the flush tank. Another option is to find an alternate location to store the water at 200-W. At this time, tank space is limited and storing the flush water at another location does not appear to be an option.

Calculation of Waste Reduction and/or Energy Savings

Collection of all post-transfer flush water for reuse will avoid the generation of 228 000 liters (60,000 gallons) a year. This assessment assumes that reuse of this water is limited; i.e, eventually the water will become too contaminated to serve any purpose as flush water. The 228 000 liters (60,000 gallon) estimate is based on four transfers a year, each requiring 57 000 liters (15,000) gallons of flush water. This assessment assumes that flush water can be reused four times before it needs to be disposed, resulting in a yearly waste generation of 57 000 liters (15,000 gallons). Total waste reduction is, therefore, 171 000 liters (45,000 gallons).

Calculation of Annual Cost Savings

Current Process

Raw water	$60	(Basis: 228 000 L [60,000 gal] @ $0.000264/L [$0.001/gal])
Tank storage	$558,600	(Basis: 228 000 L [60,000 gal] @ $2.45 [$9.30/gal])*
Evaporator disposal	$367,000	(Basis: 228 000 L [60,000 gal] @ $1.61/L [$6.09/gal])*
ETF disposal	$150,500	(Basis: 228 000 L [60,000 gal] @ $0.66 [$2.5/gal])
Total	$1,076,160	

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION (Continued)

Proposed Process

Raw water	$15	(Basis: 57 000 L [15,000 gal] @ $0.000264 [$0.001/gal])
Tank storage	$139,650	(Basis: 57 000 L [15,000 gal] @ $2.45 [$9.30/gal])*
Evaporator disposal	$91,800	(Basis: 57 000 L [15,000 gal] @ $1.61/L [$6.09/gal])*
ETF disposal	$37,600	(Basis: 57 000 L [15,000 gal] @ $0.66/L [$2.5/gal])
Annual catch basin decon	$20,000	(Basis: rough estimate from tank farm operations)
Total	$289,065	
Savings	$1,076,160 - $289,065 = $787,100	

* Costs based on draft report, Cost Analysis for Management of Double-Shell Tank Waste (WHC-SD-WE-ER-079, Rev. 1)

Calculation of Implementation Cost and Payback

Initial catch basin decon	$40,000	(Basis: rough estimate from tank farm operations)
Leak test/ integrity test	$50,000	(Basis: At this point this is a wild guess. Awaiting input from W-058 engineers.)
Double-encased pipeline	$70,000	(Basis: 152.5 m [500 ft of line]; $459.3/m [$140/foot] to fabricate piping, dig trenches, and install lines -- estimate from ICF K.. Estimating)
Pump	$50,000	(Basis: Capital cost for a Vertical Turbine Pump listed in WHC-SD-WE-ES-365)
Total	$210,000	
Payback	$210,000/$787,100 = 0.27 years	

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION

Date 1/17/96 **P2OA ID Code** KHP2OA27.LLW **Facility** TWRS

Activity Operation and Maintenance of the Cross-Site Transfer System

P2O No. 4 **P2O Title** Maintenance of the Cross-Site Transfer System, Diversion Box, Vent Station, 200-W Valve Pit and 244-A Lift Station

Current Practice

Historically, rodent infestation, particularly mice have presented unique problems at Tanks Farm facilities. By infesting contaminated areas, the rodents spread radiological contamination to other clean areas.

Facility and equipment maintenance activities at Tank Farm facilities are costly, due to the requirements of working in radiation areas. Preventive maintenance and emergency maintenance are often not coordinated, resulting in multiple entries into radiation zones, and redundant scheduling, pre-job safety meetings, etc.

Recommended Action

The diversion box and the vent station will be newly constructed, uncontaminated facilities, so historical rodent radiological contamination will not be an issue. However, measures need to be taken to prevent this type of contamination. Because both facilities will be unmanned, good housekeeping is critical. Following a waste transfer campaign, all potential bedding material (e.g. cardboard, paper) and food sources will be removed from in and around the facility. (NOTE: WHC Pest Management indicates that a 50% reduction in pest infestation can be achieved through good housekeeping practices.)

A system must be developed to coordinate preventive maintenance activities at the various TWRS cross-site transfer line facilities. For instance, if an emergency repair is required, the schedule should be checked to determine if maintenance activities can be done at the same time. The same is true of scheduled waste transfers; coordinate preventative activities. Annually scheduled maintenance activities include: instrument checks, pressure testing of secondary line, and relief valve checks at 244-A.

Calculation of Waste Reduction and/or Energy Savings

No information available at this time.

Calculation of Annual Cost Savings

No information available at this time.

Calculation of Implementation Cost and Payback

No information available at this time.

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION

Date 1/17/96 **P2OA ID Code** KHP2OA27.LLW **Facility** TWRS

Activity Operation and Maintenance of the Cross-Site Transfer System

P2O No. 5 **P2O Title** Optimize transfer of tank waste

Current Practice

Tank transfers occur infrequently. The last tank transfer occurred on in FY 95, when 1 1 700 000 liters (450,000 gal) of supernatant was pumped over a five-day period. The estimated cost of this activity was $500,000. The line was flushed before and after the transfer with approximately 114 000 liters (30,000 gallons) of pH-adjusted raw water (57 000 liters before the transfer, and 57 000 liters following the transfer).

Recommended Action

Prior to the transfer of either slurry or supernatant waste, the feed tank (102 SY) should be filled as completely as possible to allow the maximum transfer of waste. It is estimated that this maximum transfer will be approximately 2 840 000 liters (750,000 gallons. Additionally, the amounts of flush water should be minimized as much as possible. For example, it may not be necessary to use 57 000 liters (15,000 gallons) of flush water following supernatant transfer. The primary purpose of this post-transfer flush is to coat the line with pH-adjusted water to prevent chloride cracking. Analysis should be performed to determine the minimum required quantity.

Further discussion with tank farm operations has indicated that, at present, 1 700 000 liters (450,000 gallons) may be the maximum transfer possible. This is because currently there is only one tank available from which to make transfers (i.e., 102-SY). Often, tank farm operations cannot afford to wait for the tank to fill completely before making a transfer, because space must also be left available in 102-SY as a contingency in the event another tank leaks and waste must be transferred to 102-SY. Therefore, this option may not be implementable in full until after several transfers have occurred and more tank space becomes available at 200-W. The following cost analysis shows the cost benefit of maximizing transfers (i.e., 2 840 000 liters per transfer), versus the current practice of transferring only 1 700 000 liters at a time. The cost baseline is the most-recently completed transfer, which cost an estimated $500,000. This cost included maintenance activities, pre-maintenance checks, procedural modifications, safety walk-throughs, pre- and post-job safety meetings, record keeping, QA/QC inspections, PPEs, waste management and disposal, etc.

Calculation of Waste Reduction and/or Energy Savings

There are currently about four transfers planned a year. At 1 700 000 liters (450,000 gallons) a transfer, this adds up to an annual waste transfer of 6 813 000 liters (1,800,000 gallons). Assuming the same annual waste volume, at least one transfer a year can be eliminated at the maximum transfer capacity of 2 840 000 liters (750,000 gallons) (assume a supernatant transfer). Total waste reduction would be the amount of flush water used for one transfer (i.e., 114 000 liters.)

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION (Continued)

Calculation of Annual Cost Savings

Current Process

Transfers	$2,000,000	(Basis: 4 transfers/year @ $500,000/transfer)
Waste storage	$16,691,850	(Basis: 6 813 000 L [1,800,000 gal] @ $2.45/L [$9.30/gal])*
Waste treatment (Evaporator	$10,968,930	(Basis: 6 813 000 L [1,800,000 gal] @ $1.61/L [$6.09/gal])*
Flush water tank storage	$837,900	(Basis: 342 000 L [90,000 gal] @ $2.45/L ($9.30/gal])*
Flush water treatment (Evaporator)	$550,600	(Basis: 342 000 L [90,000 gal] @ $1.61/L ($6.09/gal])*
ETF treatment	$225,700	(Basis: 342 000 L [90,000 gal] @ $0.66/L ($2.50/gal])
Total	$31,274,980	

Proposed Process

Transfers	$1,500,000	(Basis: 3 transfers/year @ $500,000/transfer)
Waste storage	$16,691,850	(Basis: 6 813 000 L [1,800,000 gal] @ $2.45/L [$9.30/gal])*
Waste treatment (Evaporator	$10,968,930	(Basis: 6 813 000 L [1,800,000 gal] @ $1.61/L [$6.09/gal])*
Flush water tank storage	$558,600	(Basis: 228 000 L [60,000 gal] @ $2.45/L [$9.30/gal])*
Flush water treatment (Evaporator)	$367,100	(Basis: 228 000 L [60,000 gal] @ $1.61/L [$6.09/gal])*
ETF treatment	$150,500	(Basis: 228 000 L [60,000 gal] @ $0.66/L [$2.50/gal])

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 3
POLLUTION PREVENTION OPPORTUNITY DESCRIPTION (Continued)

Total	$30,236,980
Savings	$31,274,980 - $30,236,980 = $1,038,000

* Costs based on draft report, Cost Analysis for Management of Double-Shell Tank Waste (WHC-SD-WE-ER-079, Rev. 1)

Calculation of Implementation Cost and Payback

No implementation costs identified at this time. Implementation of this option depends on future availability of tank space in the 200-W Area.

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 4
POLLUTION PREVENTION OPPORTUNITIES SUMMARY

Date 1/17/96 P2OA ID Code KHP2OA27.LLW Facility TWRS

Activity Operation and Maintenance of the Cross-Site Transfer System

P2O No.	P2O Title	Waste Class Reduced	Annual Waste Reduction or Energy Savings	Estimated Annual Savings	Estimated Implementation Cost	Payback (years)
1	Reuse of Evaporator Condensate as Flush Water	LLW	342 000 L	$192,200	$81,900	0.43
2	Reuse of Well Purge Water as Flush Water	LLW	342 000 L	$10,900	$87,500	8
3	Recycle Flush Water	LLW	171 000 L	$787,100	$210,000	0.27
4	Maintenance	LLW	--	--	--	--
5	Optimize Transfers of Waste	LLW	114 000 L	$1,038,000	--	--

Notes and Other Benefits

244-S Tank
Another idea investigated in this P2OA was to use the 244-S tank as an alternate holding tank for flush water. The 244-S tank is the primary routing point for waste coming from the 222-S laboratory. The advantage of using the 244-S tank is that it is already approved for holding mixed waste; therefore, higher activity waste water could be used for tank flushing purposes. This would increase the potential sources of waste water available for tank flushing purposes. However, according to ICF KH design engineers, waste coming from the 222-S laboratory is too radioactive to allow the 244-S tank to be used for flush water. Therefore, this ideas was not pursued further.

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 4
POLLUTION PREVENTION OPPORTUNITIES SUMMARY (Continued)

B Pond Water
An option not originally identified in this P2OA, but that surfaced during subsequent review of this document, is to use water currently discharged to B Pond and the Treated Effluent Disposal Facility (TEDF) as flush water in the cross-site transfer line. Both B Pond and TEDF are percolation basins that receive essentially clean water that is not regulated by RCRA or the State. Use of this water would eliminate the permit issues associated with use of the existing flush tank holding tank and transfer line. Water discharged to B Pond is primarily cooling water coming from several 200-E facilities, such as 242-A, the Power Plant, 244-AR, 241-AY/AZ, and B Pond. B Pond will only be operational until December of 1996. At this time, all water from the above sources will go to TEDF. There are several points along the transfer line to TEDF where a tanker truck could make a tie-in to extract water for use as flushing water in the cross-site transfer line. Transportation costs would be similar to those identified under Option 1, Reuse of Evaporator Condensate as Flush Water. However, since TEDF is primarily a percolation pond, no additional treatment takes place. Therefore, avoidable costs of using this water would be minimal, if any.

Because of time constraints, this option was not investigated further during this initial assessment. However, use of TEDF water should be investigated further if the other options identified in this P2OA cannot be implemented.

POLLUTION PREVENTION OPPORTUNITY ASSESSMENT

WORKSHEET 5
FINAL SUMMARY

Date 1/17/96 **P2OA ID Code** KHP2OA27.LLW **Facility** TWRS

Activity Operation of the Cross-Site Transfer System

Proposed Opportunities and Discussion

Option 3 (Recycle Flush Water) and Option 5 (Optimize Transfers of Waste) show the greatest potential savings. However, these two options will also be the most difficult to implement. There are still many questions associated with Option 3; for example, will water retrieved from the 244-A catch tank be clean enough to reuse as flush water after the tank is decontaminated? Another big question is the mechanisms required to get the water back into the flush tank from the cross-site transfer line to the flush tank. This P2OA has tried to account for the cost of needed upgrades (e.g., new pump, replacement of flush line, required tank upgrades, etc); however, actual costs may be significantly higher.

Implementation of Option 5 depends on the availability of new tank space in the 200-W Area. According to tank farm operations personnel, required tanks space may not be available for another 10 years.

Option 1 (Reuse of Evaporator Condensate as Flush Water) also offers significant savings with a fairly short payback period (0.3 years). Again, some potential problems exist with implementation of this option (i.e., RCRA permit issues); however, these problems do not appear to be insurmountable. The potential savings available through this option warrant that an attempt be made to permit the flush tank to hold hazardous waste. If the recently proposed Hazardous Waste Identification Rule (HWIR) is passed, the permit issue should totally go away. HWIR would allow the listed Evaporator condensate waste stream to be declassified, thus eliminating the need to upgrade and permit the flush water tank and piping system. Declassification of the Evaporator condensate would benefit more than just this project. Other projects and processes could use the Evaporator condensate as a source of raw water as well.

Option 2 (Reuse of Well Purge Water as Flush Water) is the least preferable option, as it would require upgrade and/or permitting of the existing flush water holding tank and transfer line with only minimal cost savings. Also, potential regulatory/political issues may make this option difficult to implement. Currently, the method of disposing contaminated purge water is clearly outlined in the Tri-Party Agreement. This agreement does not allow for any flexibility.

Recommendations and Schedule for Implementation

Option 1 should to be investigated as the preferred solution. It is recommended that the Evaporator condensate be sampled and analyzed to determine whether or not the listed contaminants in this waste stream fall below the threshold concentrations listed in the proposed HWIR. This will clear the way for this waste stream to be declassified once HWIR is officially adopted. As a fall back, the feasibility of permitting the existing tank and transfer line should to be investigated.

As an alternative, use of B Pond water as flush water should be investigated further.

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