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1995 Annual Report on Waste Generation and Waste Minimization Progress as Required by DOE Order 5400.1, Hanford Site

M. D. Betsch

Date Published
September 1996

United States
Department of Energy
P.O. Box 550
Richland, Washington 99352

Approved for Public Release

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Standard Data Report

1995 Annual Report on Waste Generation and Waste Minimization Progress as Required by DOE Order 5400.1

Hanford Site
State: WA
Operations Office: RL

Prepared for:
U.S. Department of Energy, Richland Operations Office

Prepared by:
Westinghouse Hanford Company

Report Date: 09/24/96

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Hanford Site

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I. Executive Summary

While waste generation numbers are important, the true measure of success is waste minimized. Many Waste Minimization/Pollution Prevention (WMin/P2) successes at the Hanford Site occur every day without formal recognition as pollution prevention, as they have become part of a culture of best management practices. As an example, the success of the excess and reuse program, both informal and formal, documents the Wmin/P2 culture that exists in the pollution prevention representatives and employees at the facilities. A few of Hanford's successful projects for 1995 are:

Asbestos Conversion Pilot Project

Asbestos wastes are accumulated in the Hanford Central Landfill. Consideration to employee health was particularly important since asbestosis is a life-threatening disease caused from airborne asbestos fibers. Further, the trenches available at the landfill for asbestos will reach full capacity during fiscal year 1996 based on current asbestos waste stream forecasts, requiring an alternative disposal method.

A service contract was established in 1995 for a pilot project to convert asbestos fibers into a safe, recyclable material using an asbestos conversion system. The asbestos conversion system reduces waste volume by 70 percent and eliminates all regulatory control measures to 100 percent of the waste stream. The system shreds the asbestos containing material and soaks it in a borax and water solution prior to entering a 1,200-degree Celsius furnace for 1 hour. The result is an asbestos-free recyclable aggregate material for reuse as backfill and roadbed cover.

Nitric Acid Shipment to England

Nitric acid, containing a small amount of uranium, was routinely generated and reused in the past at the PUREX Plant as a by-product of nuclear fuel dissolution and chemical separation processes. The acid was no longer needed and posed a potential hazard to the environment, the workers, and the public, and also prevented the completion of the PUREX facility deactivation. Continued storage of the acid would require the construction of new storage tanks at a cost in excess of $2 million and would require continuous surveillance and maintenance. Alternative methods of disposing of the acid could have cost as much as $60 million.

The nitric acid was sold to British Nuclear Fuels Private Limited Company (BNF plc) for reuse in their B-205 MAGNOX commercial nuclear fuels reprocessing plant in Sellafield, England--over 6,000 miles from Hanford. At the National DOE Pollution Prevention Conference XII, Westinghouse Hanford Company received the U.S. Department of Energy Environmental Restoration Award for this activity.

242-A Evaporator Process Condensate Recycling Project

The 242-A Evaporator is used to reduce the volume of radioactive waste. The

242-A Evaporator Modification replaces the use of filtered raw water by recycling a portion of the process condensate effluent through the pump seal water system and the de-entrainment pad sprayers thus reducing both raw water usage and process condensate requiring further treatment. Cumulative savings over the projected operating life of the 242-A Evaporator would exceed $10 M which greatly exceeds the original $230K cost of the modification. Westinghouse Hanford Company received the Radioactive/Hazardous Waste Recycling Award from the U.S. Department of Energy at the National Pollution Prevention Conference XII for this initiative.

Oil Recycling at Hanford's Fleet Maintenance

In 1995, ICF Kaiser Hanford Company obtained a closed loop recycling contract for used oil, the first such contract at a Department of Energy site. The success of the Hanford program is due to the persistence in overcoming significant barriers (lack of a re-refined oil supply, radiological contamination concerns, conflicting government policies) during a three year period. Since obtaining the contract, 45,296 liters ($34,821) of re-refined oil was purchased. This represents 98% of all lubricating oils purchased during that time. Additionally, 38,483 liters of used oil was returned to the vendor for reprocessing, avoiding $17,000 in waste disposal costs.

Coolant Recycling System at a Machine Shop

During machining processes at the ICF Kaiser Hanford Company machine shop, a hazardous waste stream is created from dirty machine coolant. The stream is designated as a Washington state dangerous waste with WP02 (persistence), D007 (chromium) and D008 (Lead) waste codes. As a result there was 13.5 cubic meters of Hazardous waste generated per year at a cost of $138,000 for disposal. A Pollution Prevention Opportunity Assessment was completed and identified savings associated with a recycling system for coolant. A Coolant Recycling system was selected and installed in July 1995 for a total cost of $61,000. The annual cost savings exceeded $121,000 for a Return on Investment of 188%. ICF Kaiser Hanford received the Return on Investment Award from the U.S. Department of Energy at the National Pollution Prevention Conference XII for this project.

II. General Site Information

General Site Mission

The primary mission at the Hanford Site is to clean up the site, provide scientific and technological excellence to meet global needs, and to partner in the economic diversification of the region.

The Hanford Site was established in 1943 to produce plutonium and for the next 40 years the Site worked under a defense production mission. From the late 1980s to the present, the Hanford Site stopped production and now has a complete environmental restoration mission. Its focus is to decommission the reactors and Site facilities, as well as clean up the 1,450 square kilometers of land.

This is an immense and challenging undertaking, which includes content characterization and decommissioning of 149 single shell storage tanks, treating 28 double shell tanks, safely disposing of spent nuclear fuel (80% of DOE's inventory) stored on site, removing over 500 buildings, and dealing with significant solid waste, ground water, and land restoration issues.

The objective is to accomplish the Hanford Site mission of cleanup in a manner that will eliminate potential risks to the public, protect workers, and serve as the DOE model in environmental restoration. Pollution prevention is a key to the success of this cleanup mission.

Other missions at the Hanford Site include energy research and development, as well as waste management and disposal activities. The Hanford Site will continue to be a national resource for scientific, technical, and engineering capabilities and innovation with a special focus on environmental cleanup processes and technologies.

Mailing Address

P.O. Box 550
MSIN S7-55
Richland, WA 99352

CSOs:

Lead CSO - EM
Additional CSOs -

Site Size (acres): 358,400

Number of Employees:

DOE - 555

Contractor - 9200

Data contained in this report represents waste generation in the following states(s):

WA

III. Introduction

GENERAL INTRODUCTION

Non-Routine waste generation represents 18% and Routine waste generation represents 82% of the total waste generated in the TRU, Mixed-TRU, LLW, and Mixed-LLW waste categories. Non-Routine waste generation represents 2% and Routine waste generation represents 98% of the total waste generated in the RCRA Regulated, State Regulated, TSCA Regulated, Mixed-TSCA, and Sanitary waste categories. Clarification of the definitions for Non-Routine and Routine waste may reclassify a portion of the Routine waste as Non-Routine. A detailed analysis will occur in CY 1996 to ensure accuracy of the waste designations from previous years.

In comparing waste reduction quantities from the CY 1994 Annual Report on Waste Generation and Waste Minimization Progress, to the CY 1995 data, waste decreased in all waste categories except Mixed-TSCA. The Mixed-TSCA waste was primarily generated from non-routine activities containing oil, absorbed metals, rags, and PCB's (Non F-listed). Waste decreases resulted from improved work practices including pollution prevention activities. Seventy-five Pollution Prevention Opportunity Assessments were conducted in CY 1995 which resulted in the implementation of 19 waste reduction initiatives. Additionally, funding for these activities was available through EM-77 for implementation success. Expert waste analysts involved in tracking the liquid and solid wastes identified that the CY 1995 waste generation is equivalent to CY 1992. The year 1992 marked the beginning of the major cleanup effort and waste generators were beginning the initial cleanup and closure of site facilities. In CY 1993 and CY 1994 significant spikes were noticed in both liquid and solid wastes which were the result of this cleanup effort. With several of these facilities placed in surveillance and maintenance status in CY 95, a notable reduction in waste is reasonable. The waste analysts believe that this process will by cyclical in that waste generation quantities are driven by the non-routine cleanup activities planned in the various years, especially as these facilities are deactivated and decommissioned.

INTRODUCTION TO SITE GENERATION DATA

Since Hanford has one Cognizant Secretarial Office (CSO), no difficulties were encountered tracking to a single CSO level. The solid containerized waste data was available using a sitewide tracking system and the bulk liquid waste numbers were available through a database which accounts for all liquid waste as reported by individual facilities. Since the waste generation information is generated from a single Site source, the information contained in the 1995 Annual Report is consistent with other environmental reports, given adjustments for different parameters requested in each report. The inventory values for radioactive waste may reflect different definitions of waste types (especially high level and mixed waste), to be consistent with the Integrated Database Report. These numbers were rounded to the nearest 100 cubic meters. LLW inventory data includes waste stored and buried in the 100 Area, 200 Area, and 300/400 Areas. In addition to the reported inventory numbers, there is 109,000 cubic meters of pre-1970 TRU solid waste and associated contaminated soil; and 32,000 cubic meters of TRU contaminated soil from TRU liquids discharged to the soil column.

One small portion of waste was not tracked or reported--sanitary landfill waste that is disposed of in the City of Richland municipal solid waste landfill from leased buildings in Richland. The actual amount of waste is not tracked, although estimates show that the total numbers are within +/- 20% of the reported value. In December 1995, the Site landfill was closed and all sanitary waste is now disposed of in the City of Richland municipal solid waste landfill which is shown in the Site Generation data on page 7.

Measurement points listed in the user's manual were followed and are consistent with State reported data.

In 1994, the distinction of Routine and Non-Routine waste was categorized in the Solid Waste Information Tracking System. Non-Routine waste includes backlog ("legacy") waste reprocessed and major D&D/ER activities based on definitions provided in the CY 1993 report instructions. Primary and secondary waste totals were not tracked and cannot be tracked easily at Hanford. No plans are made to distinguish between these in the near future.

IV. Site Generation Data

Table 1.0 Total Waste Generated in 1995
as Packaged for T/S/D
(does not include process wastewater)

Waste Type	Liquid	Solid	Total	Inventory* Waste (as of 12/94)
High Level Waste	0.00 m3	0.00 m3	0.00 m3	238900.00 m3
Transuranic Waste (TRU)	0.00 m3	64.00 m3	64.00 m3	15700.00 m3
Mixed-TRU	0.00 m3	4.00 m3	4.00 m3	280.00 m3
Low-Level Waste (LLW)	0.00 m3	2859.00 m3	2859.00 m3	615284.00 m3
Mixed-LLW	0.00 m3	487.00 m3	487.00 m3	6427.00 m3
RCRA Regulated		234.00 mt	234.00 mt	139.00 mt
State Regulated		140.00 mt	140.00 mt	19.00 mt
TSCA Regulated		79.70 mt	79.70 mt	20.00 mt
Mixed-TSCA		19.00 mt	19.00 mt	0.00 mt
Sanitary		6824.07 mt	6824.07 mt	

* Total waste generated at the site during calendar year 1995, which is a sum of all wastes generated, regardless of source or activity; also provided for reference is the total amount of waste in inventory at the site, as of 12/94.

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IV. Site Generation Data (cont.)

Table 2.0 Routine * vs. Non-Routine ** Waste

Waste Type		Routine	Non-Routine	Total
High Level Waste	(L)	0.00 m3	0.00 m3	0.00 m3
	(S)	0.00 m3	0.00 m3	0.00 m3
Transuranic Waste (TRU)	(L)	0.00 m3	0.00 m3	0.00 m3
	(S)	64.00 m3	0.00 m3	64.00 m3
Mixed-TRU	(L)	0.00 m3	0.00 m3	0.00 m3
	(S)	4.00 m3	0.00 m3	4.00 m3
Low-Level Waste (LLW)	(L)	0.00 m3	0.00 m3	0.00 m3
	(S)	2234.00 m3	625.00 m3	2859.00 m3
Mixed-LLW	(L)	0.00 m3	0.00 m3	0.00 m3
	(S)	471.00 m3	16.00 m3	487.00 m3
RCRA Regulated		172.00 mt	62.00 mt	234.00 mt
State Regulated		113.00 mt	27.00 mt	140.00 mt
TSCA Regulated		0.70 mt	79.00 mt	79.70 mt
Mixed-TSCA		4.00 mt	15.00 mt	19.00 mt
11e(2) By-Product			0.00 mt	0.00 mt
11e(2) Mixed			0.00 mt	0.00 mt
Sanitary		6824.07 mt	0.00 mt	6824.07 mt

Total waste generated at the site during calendar year 1995, which is a sum of all wastes generated regardless of source or activity

* Routine waste is defined as waste produced from any type of production operation, analytical and/or R&D laboratory operations; T/S/D operations,

"work for others", or any other periodic and recurring work that is considered on-going in nature.

** Non-Routine waste is defined as one-time operations waste: Wastes produced from environmental restoration program activities, including primary and secondary wastes associated with retrieval and remediation operations; "legacy wastes"; and D&D/Transition operations.

Additional Note: The Hanford Solid Waste Information Tracking System defines Non-Routine waste as backlog ("legacy") waste reprocessed and major D&D/ER activities.

IV. Site Generation Data (cont.)

Table 2.1 Process Wastewater* Generation

Waste Type	Volume (1000 Liters)= 1 m3
High Level Waste	0.00 m3
Transuranic Waste (TRU)	0.00 m3
Mixed-TRU	0.00 m3
Low-Level Waste (LLW)	0.00 m3
Mixed-LLW	4829.00 m3
RCRA Regulated	0.00 m3
State Regulated	0.00 m3
TSCA Regulated	0.00 m3
Mixed-TSCA	0.00 m3
Sanitary	12271.00 m3

Total waste generated at the site during calendar year 1995, which is a sum of all wastes generated regardless of source or activity

* Process Wastewater is defined as any water produced during manufacturing or processing operations which comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, by-product, or waste product. This determination is independent of the level and/or nature of the contaminants.

V. Site-Wide WMIN Accomplishments

Hanford continued to integrate pollution prevention activities across the site in CY 1995. Each of the activities below addresses sitewide initiatives from the major contractors at Hanford--Westinghouse Hanford Company (WHC), ICF Kaiser Hanford (ICF KH), Environmental Restoration Contractor Team (ERC), Boeing Computer Services Richland (BCSR), and Hanford Environmental Health Foundation (HEHF).

CENTRALIZED CONSOLIDATION/RECYCLING CENTER

The Department of Energy, Richland Office (DOE-RL) received approval from the Washington State Department of Ecology to operate the Centralized Consolidation/Recycling Center (CCRC) on the Hanford site. The Center was established to collect and consolidate selected waste streams from all site contractors for offsite recycling and onsite reuse. Hanford site users accumulate materials at collection points and ship those materials to the Center for processing. The Center accepts fluorescent lamps, lead acid and gel cel batteries, partially full, or damaged, aerosol containers and Dioctyl Phthalate (DOP) ballasts. A contract was established to recycle fluorescent lamps, and a contract was negotiated to recycle small (i.e. alkaline dry cell) batteries. The aerosol containers are either repaired, or the contents are removed and replaced into pump-type dispensers for reuse. DOP ballasts are disassembled and the metal components are recycled as scrap metal, while the DOP is consolidated and shipped offsite as Washington state-only hazardous waste. The Center's activities are summarized below.

Aerosol Products

A total of 2,141 aerosol cans were received at the CCRC. Of these 1,167 were punctured, 250 were redeployed onsite, and 724 are in inventory for redeployment. This has resulted in the avoidance of approximately 134 containers of hazardous waste, for a cost avoidance of $80,000.

DOP Ballasts

A total of 1320 kilograms of DOP ballasts were received at the CCRC. Dismantling of the ballasts produced 539 kilograms of copper, 48 kilograms of steel, and 13 kilograms of DOP capacitors, and approximately 98% recovery of recyclable material (copper and steel). Waste avoidance was 645 kilograms for a savings of $2,076.

Fluorescent Tubes

A total of 34 drums of crushed fluorescent tubes, and 12,500 linear meters of intact tubes were received at the CCRC. Of these, 19 drums were recycled, 15 drums were disposed, 11,125 linear meters were recycled and 875 linear meters are being accumulated for recycle. Waste avoidance was 7.14 cubic meters, at a cost avoidance of $2,362.

Lead Acid Batteries

Previously lead acid batteries were accumulated at individual facilities until a shipment could be scheduled. The program was managed by Westinghouse Recycle Programs in CY 1995. Under the arrangement, batteries were accumulated at the

CCRC for direct shipment to the offsite recycler. This has improved housekeeping at the facilities, reduced breakage from cold weather, and simplified waste management. In CY 1995, 50,000 kilograms of lead acid batteries were received at the CCRC, and 42,200 kilograms were shipped offsite.

Satellite Accumulation Areas
Approximately 80 Satellite Accumulation Areas were eliminated at the Hanford site, resulting in a cost avoidance of $104,000.

RECYCLE PROGRAMS
Hanford's recycle programs include scrap paper, cardboard, wood, metal, software, and print toner cartridges. These programs were established by Westinghouse Hanford Company for the Hanford site which is made up of several different companies, many subcontractors, and contains over 400 office buildings and numerous facilities. Communication regarding the programs is shared through the site's weekly newspaper, electronic mail, electronic bulletin board, and presentations at training sessions or staff meetings. These programs have successfully diverted more than 4,500 metric tons of solid waste from the landfill. The Recycle Program's activities are summarized below.

Office Paper
Over 400 buildings across the Hanford site participate in scrap paper recycling which includes phone books and newspaper. Employees are encouraged to use a desk top recycling tray to collect scrap paper, and once full, the trays are emptied into large bags which are conveniently located throughout the buildings. Employees are provided a list of what is acceptable and not acceptable for recycling. In April, 1995, the program was expanded to include carbonless paper, glossy paper, manila file folders, vellum paper, magazines, and catalogs. The scrap paper vendor is on a regular schedule to empty the bags and take the scrap paper to their shop to be sorted and bailed. The vendor is invoiced for a percentage of the market value. In 1995, Hanford recycled 596 metric tons of paper, saving 2,297 cubic yards of landfill space, and earning over $61,000 in revenue.

Cardboard
In September 1995, a new cardboard recycling program was implemented. The program requires a vendor to provide containers for the collection of scrap cardboard, then to empty the containers on a regular basis and deliver the cardboard to a local recycler. There were 43 containers located throughout Hanford and in the first year of the program, 18.5 metric tons have been captured for recycling, a 275% increase in the rate of recycling compared to the previous year.

Wood
Over 20 metric tons of wood was recycled in 1995. Wood pallets are picked up by a vendor where they are rebuilt and sold back to Westinghouse at a reduced cost. Other scrap wood is sent to the City of Richland municipal solid waste landfill where it is chipped at no charge to Westinghouse and used for ground cover.

Scrap Metal
Scap metal recycling includes ferrous and non-ferrous steel, copper/brass, lead,

scrap furniture, and appliances. Facilities are provided with luggers to collect scrap ferrous and non-ferrous metals separately. Full luggers, along with the other scrap metal items are picked up by a contracted vendor. In 1995, 3,846 metric tons of scrap metal was recycled, earning over $590,000 in revenue.

Software
In February 1995, an agreement was reached with GreenDisk, Inc. to recycle obsolete software packages and diskettes from the Hanford site. Prior to this agreement, all software and software packages designated for disposal were destroyed and disposed of in the landfill as sensitive scrap. The switch from landfilling to recycling is transparent to the software user. Obsolete software continues to be processed through the Software Accountability office where, once it is designated for disposal, is prepared for shipment to GreenDisk. At GreenDisk, the software packages are disassembled and all components are sorted for recycling. Paper materials are recycled through a bonded recycler and the shrink wrap and Tyvek are recycled or reused. All program disks are degaussed, reformatted, and overlabeled and non-program disks are physically destroyed and recycled.

Since the first shipment went out in March 1995, through December 1995, a total of 49,056 kilograms have been diverted from the landfill saving more than $12,750 in disposal costs. This program costs $7,850 to operate, resulting in a net savings of $4,900. GreenDisk manufactured recycled diskettes are purchased through Westinghouse Hanford Company's Central Stores Inventory where they are available to the Hanford site to close the recycling loop. In 1995, 450 boxes or 4,500 recycled diskettes were purchased and comparable in price to conventional brands of non-recycled disks.

Toner Cartridges
Hewlett Packard (HP) LaserJet II and III print toner cartridges have been recycled at Hanford for several years. In 1995, the program expanded to include HP Laserjet IV printer toner cartridges. When a spent cartridge is replaced in a printer, it is placed into the new cartridge box, labeled for recycling, and placed in the building's receiving/delivery area. They are picked up during routine deliveries and returned to the shipping department where they are palletized for vendor pick up. More than 10,000 HP print toner cartridges were remanufactured/recycled in 1995.

A new program was implemented in October 1995 to collect all other types of print toner cartridges for remanufacturing/recycling. The collection process is the same for all the print toner cartridges. The vendor picks up the miscellaneous print toner cartridges and designates those of value for remanufacturing and recycling and disposes the rest. In December the first shipment of approximately 80 miscellaneous toner cartridges was picked up. For 1995, a total of 9.2 metric tons of print toner cartridges were diverted from the landfill.

CONCRETE RECYCLING FROM D&D/ER PROJECTS
Bechtel Hanford Inc. crushed and recycled 249.48 metric tons of concrete in CY 1995. Concrete is first decontaminated in place, then excavated, crushed and recycled. Large sections of concrete are broken into smaller sections, and then eventually are crushed into the size of gravel. The size-reduced concrete is

then piled and used onsite for various purposes such as construction backfill, road beds, and cover material.

PROPERTY MANAGEMENT TRAINING
A Property Management training course was developed by Westinghouse Recycle Programs to teach employees about reutilization and disposal of property, as well as recycling, and was presented to 225 employees. This includes a segment on the proper procedure for redeploying excess chemicals.

POLLUTION PREVENTION FACILITY-SPECIFIC TRAINING
Westinghouse Pollution Prevention program developed facility-specific training for the Decontamination and Decommissioning personnel in CY 1994. The training was further designed for Transition Projects and Laboratory personnel in CY 1995. The training can be used as a safety meeting, or as a special introductory course in waste minimization for a particular group within the above mentioned areas. The tailored training is developed by first conducting a facility walk-through to gather pollution prevention success stories as well as identifying opportunities for pollution prevention implementation. These stories are the basis of the training for personnel to identify waste minimization practices and opportunities in their own work activities.

SITEWIDE STRATEGIC POLLUTION PREVENTION OPPORTUNITY ASSESSMENTS
Hanford's Sitewide Strategic Pollution Prevention Opportunity Assessment (PPOA) process is a pro-active way to look at waste generating activities which are common to all contractors and identify opportunities to reduce the largest waste generating sources. A detailed investigation on Hanford's waste streams identified 22 priority areas and waste streams for sitewide consideration. Three assessments were conducted in CY 1995 on (1) Hazardous Chemical Procurement; (2) Non-Radioactive Asbestos Waste; and (3) Well Utilization.

ENERGY CONSERVATION
The Federal Government has been challenged to serve as a role model for the wise and efficient use of energy. Energy management staff at the Hanford Site have successfully met this challenge, documented by reduced mortgage costs which allows more taxpayer dollars to be focused into the actual cleanup of the Site. The group is responsible for lowering mortgage costs due to reduced energy consumption by $1,500,000 annually from the 1985 benchmark, based on validated energy savings from Site championed projects. Resource and Energy Managements community service program was expanded to include mentoring of Washington State University Seniors in developing resource and energy opportunities within the Pullman, WA public schools.

V. Site-Wide WMIN Accomplishments (cont.)

Table 3.0 Site-Wide Recycling Activities

Paper Products		
Office paper	596.00	mt
Corrugated cardboard	18.50	mt
Phone books	w/paper	mt
Newspaper	w/paper	mt
Aluminum cans	N/T	mt
Glass	N/T	mt
Plastic	6.20	mt
Styrofoam	0.00	mt
Scrap metals		
Stainless steel	215.00	mt
Copper	w/stain	mt
Iron	3574.00	mt
Aluminum	w/stain	mt
Lead	57.00	mt
Zinc	w/stain	mt
Other: (see discussion below)	0.00	mt
Precious metals		
Silver	0.04	mt
Gold	0.00	mt
Platinum	0.00	mt
Other: (see discussion below)	0.00	mt
Toner cartridges	9.10	mt
Batteries	54.70	mt
Engine oils	51.85	mt
Tires	12.98	mt
Food waste	0.00	mt
Concrete	249.48	mt
Wood (chips, compost)	21.80	mt
Other: (see discussion below)	151.62	mt

Percentage of Sanitary Waste Recycled:
(quantity recycled) / (waste disposed + waste recycled) = 42.38 %

N/T = Not Tracked in CY 1995. Hanford recycles these components but does not track the quantity.

The stainless steel category is a non-ferrous metal total (215 mt). The iron category is a ferrous metal total (3,574 mt).

The other category includes software recycling (49 mt) and chemical exchange (reuse), both on-site and off-site. The chemical value comes from 77,922 liters (assumed specific gravity 1.0) and 16 mt of solid chemicals, reused or sold for reuse. Also included in the other category are DOP ballasts (0.20 mt), aerosols (0.16 mt), and fluorescent tubes (5.3 mt) recycled at the Centralized Consolidation Recycling Center. Additionally, 1.62 mt of engine oil recycled for energy recovery and 1.34 mt of hydraulic oil also are included in the other category.

VII. CSO Specific Information

CSO: EM
Summary Statement of Operational Status and its affect on Waste Generation.

Today, Hanford's mission is focused on site cleanup. The majority of Hanford's efforts involve the management and disposition of the waste left from defense production and the restoration of the Site environment. Waste generation is anticipated to increase as a result of Hanford's change in mission. Therefore, a key component to cleanup is instilling a culture of pollution prevention, including, source reduction, recycling, and reuse of materials, into all Hanford activities.

Table 4.0 CSO: EM Waste Generation.

Waste Type		Routine	Non Routine	Total	Process Wastewaters
High Level Waste	(L)	0.00 m3	0.00 m3	0.00 m3	
	(S)	0.00 m3	0.00 m3	0.00 m3	0.00 m3
Transuranic Waste	(L)	0.00 m3	0.00 m3	0.00 m3	
	(S)	64.00 m3	0.00 m3	64.00 m3	0.00 m3
Mixed Transuranic	(L)	0.00 m3	0.00 m3	0.00 m3	
	(S)	4.00 m3	0.00 m3	4.00 m3	0.00 m3
Low Level Waste	(L)	0.00 m3	0.00 m3	0.00 m3	
	(S)	2234.00 m3	625.00 m3	2859.00 m3	0.00 m3
Mixed-LLW	(L)	0.00 m3	0.00 m3	0.00 m3	
	(S)	471.00 m3	16.00 m3	487.00 m3	4829.00 m3
RCRA Regulated		172.00 mt	62.00 mt	234.00 mt	0.00 m3
State Regulated		113.00 mt	27.00 mt	140.00 mt	0.00 m3
TSCA Regulated		0.70 mt	79.00 mt	79.70 mt	0.00 m3

Mixed TSCA	4.00 mt	15.00 mt	19.00 mt	0.00 m3
11e(2) By Product		0.00 m3	0.00 m3	
11e(2) Mixed		0.00 m3	0.00 m3	

VI. PPOA Accomplishments

Pollution Prevention Activity:
BCSR Excess Computers

CSO: EM-70

Source Reduction Activity:
or Recycling Activity: R99

-------- **PPOA Objective:** --------

Redeploy excess computers onsite and offsite.

-------- **PPOA Description:** --------

Approximately 1,200 excess computers sat idle due to Hanford's downsizing.

Personal computers no longer needed in an organization were returned to a company-wide pool for redistribution. Redistribution avoids purchasing new equipment, depreciation of unused computers, and allows equipment to be released and donated to schools when it is no longer of value to the site.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
SANITARY	Solid	1650	kg	$120,000

VI. PPOA Accomplishments

Pollution Prevention Activity:
BCSR Silver Recovery

CSO: EM-70

Source Reduction Activity:
or Recycling Activity: R99

-------- PPOA Objective: --------

Recover silver from negatives, photographic paper, and fixer through a silver recovery process.

-------- PPOA Description: --------

Numerous photos are taken at the Hanford Site, resulting in approximately 27 drums of negatives and photographic paper disposed of annually in addition to the photographic fixer. Because film negatives and paper contain silver, they are designated as hazardous waste. The chemicals used to develop the negatives are considered a hazardous waste because of the silver content. Special provisions exist in WAC-173-303-525 which allow for recycling and recovery of silver.

BCSR recovered the silver from negatives, photographic paper, and fixer through a silver recovery process. Identified Eastern Smelting to receive the recovered silver.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
STATE	Solid	51660	kg	$17,770

VI. PPOA Accomplishments

Pollution Prevention Activity:
BHI Scrap Metal

CSO: EM-40

Source Reduction Activity:
or Recycling Activity: R99

-------- PPOA Objective: --------

Recycle metal from D&D projects.

-------- PPOA Description: --------

The D&D project encounters large quantities of metals, some of which have surface contamination. In the past, approaches that disposed of the entire bulk of the metal were considered. However, the waste disposal cost structure that the Environmental Restoration program currently works under makes it more cost effective to remove possible surface contamination, and recycle the clean metal.

In the case of Building 190-D, where there was a substantial quantity of "clean" copper and structural steel, the value of the recycled metal was considered to be part of the payment of the demolition contractor. In the case of the 107-KE Basins, cost effective removal of radioactive contamination from the surface of the steel was a key element in making the recycling economically feasible.

Tasks with large volumes of material set up contracts to recycle the metals derived from that task. Very small tasks work with the onsite Excess Program to recycle metals.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
LLW	Solid	5197	m3	$60,000

VI. PPOA Accomplishments

Pollution Prevention Activity:
ICF KH Fly Ash Substitution in Backfill Material

CSO: EM-70

Source Reduction Activity:
or Recycling Activity: R99

-------- PPOA Objective: --------

Increase purchasing of recycled products promoting affirmative procurement practices.

-------- PPOA Description: --------

Used concrete or controlled density fill with fly ash as a backfill opportunity within the tank farms. The controlled density fill allows for backfill without need for compaction or testing. Therefore, it minimizes radiation workers using PPE and overall time spent in radiation zones. Fly ash is one product that DOE suggests to procure under the affirmative procurement program.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
SANITARY	Solid	220000	kg	$7,700

VI. PPOA Accomplishments

Pollution Prevention Activity:
ICF KH Freon

CSO: EM-70

Source Reduction Activity:
or Recycling Activity: R99

-------- PPOA Objective: --------

Implement a closed-loop freon recovery system.

-------- PPOA Description: --------

Freon was evacuated from equipment using a freon recovery unit. When a repair is made, the freon is placed back into the system in a closed-loop environment.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
RCRA	Solid	33	kg	$3,346

VI. PPOA Accomplishments

Pollution Prevention Activity:
ICF KH Laundered Shop Towels

CSO: EM-70

Source Reduction Activity:
or Recycling Activity: R99

-------- PPOA Objective: --------

Reuse shop towels.

-------- PPOA Description: --------

In the past, shop rags were used once and disposed of as waste. A one-year contract was established with a local laundry service for leased shop rags. Shop rags contaminated with automotive oils and greases, antifreeze, gasoline, diesel, parts washer solvents, brake fluids, battery acid, aerosol products, paints, and thinners are cleaned and returned for reuse.

The laundry services processes the shop rags to local environmental standards and meets all requirements for the proper disposal of pre-treatment and/or recycling residuals.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
RCRA	Solid	1960	kg	$44,271

VI. PPOA Accomplishments

Pollution Prevention Activity:
ICF KH Machine/Coolant Oil

CSO: EM-70

Source Reduction Activity:
or Recycling Activity: R99

-------- PPOA Objective: --------

Implement a system to recycle oil and metal turnings from the machining process.

-------- PPOA Description: --------

During the machining process, machine oil and coolant oil are mixed, creating approximately 52 drums of hazardous waste annually. Because different oils were used for the machining process, it was necessary to sample each drum of generated waste for designation prior to disposal. Metal turnings from the fabrication process were coated with oils. As a result, the metal could not be recycled and was disposed of as sanitary waste.

Purchased a recycling system to separate the coolant from the machine oil. The coolant is reused in the machining process and the small quantity of machine oil is disposed of as RCRA waste.

Purchased an oil extractor to remove oils from the metal turnings. The metal is sent to a scrap metal recycler.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
RCRA	Solid	4089.6	kg	$121,000

VI. PPOA Accomplishments

Pollution Prevention Activity:
ICF KH Paint Thinners

CSO: EM-70

Source Reduction Activity:
or Recycling Activity: R19

-------- PPOA Objective: --------

Recover spent solvents.

-------- PPOA Description: --------

A still was used to recover usable product from spent paint brush wash solvents.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
RCRA	Solid	122	kg	$5,563

VI. PPOA Accomplishments

Pollution Prevention Activity:
ICF KH Petroleum Residue from UST

CSO: EM-70

Source Reduction Activity:
or Recycling Activity: R99

-------- **PPOA Objective:** --------

Reuse residual product from tank rinse.

-------- **PPOA Description:** --------

Project L-049 consisted of the installation of new Underground Storage Tanks (UST) and the removal of two outdated diesel storage tanks. As part of the clean-out of underground storage tanks, the tanks were thoroughly cleaned using water rather than a toxic material to remove the residual material. The collected aqueous residual product was then shipped from the Hanford site for product recovery.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
RCRA	Solid	6600	kg	$61,500

VI. PPOA Accomplishments

Pollution Prevention Activity:
ICF KH Reuse LLW Soil

CSO: EM-70

Source Reduction Activity: W19
or Recycling Activity:

-------- PPOA Objective: --------

Identify a method to reuse radioactive soil.

-------- PPOA Description: --------

Project L-047 consisted of an electrical upgrade of the entire 300 Area, primarily converting outdated above ground electrical components to underground electrical lines. During extensive excavation of many electrical lines, low level radioactive soil was encountered in some areas. Rather than package and ship this contaminated soil, the decision was made with the regulators to reuse this soil as backfill and thus minimize radioactive waste generation.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
LLW	Solid	13.1	m3	$40,000

VI. PPOA Accomplishments

Pollution Prevention Activity:
ICF KH Reuse Non-Regulated Paint Related Chemicals

CSO: EM-70

Source Reduction Activity:
or Recycling Activity: R99

-------- **PPOA Objective:** --------

Reuse non-regulated excess paint products.

-------- **PPOA Description:** --------

Excess paint related products were redistributed.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
SANITARY	Solid	613	kg	$1,319

VI. PPOA Accomplishments

Pollution Prevention Activity:
ICF KH Reuse Regulated Paint Related Chemicals

CSO: EM-70

Source Reduction Activity:
or Recycling Activity: R99

-------- PPOA Objective: --------

Reuse regulated excess paint products.

-------- PPOA Description: --------

Excess paint related products were redistributed.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
RCRA	Solid	402	kg	$1,357

VI. PPOA Accomplishments

Pollution Prevention Activity:
ICF KH Steam Cleaning Water

CSO: EM-70

Source Reduction Activity:
or Recycling Activity: R99

-------- PPOA Objective: --------

Recycle vehicle wash water.

-------- PPOA Description: --------

Steam cleaning water from vehicle washing was recycled and reused. For the first half of the year, the water was treated and tested prior to discharge at the City of Richland Waste Water Treatment Plant. The treatment system was modified to reduce waste generation during treatment and testing. The water is stored onsite following treatment for reuse.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
SANITARY	Process Wastewater	454	m3	$128,000

VI. PPOA Accomplishments

Pollution Prevention Activity:
ICF KH Ucartherm Heat Transfer Fluid

CSO: EM-70

Source Reduction Activity:
or Recycling Activity: R99

-------- PPOA Objective: --------

Recycle ethylene glycol mixture.

-------- PPOA Description: --------

Heat Transfer Fluid was left over from a project and had no further use. The material was primarily an ethylene glycol mixture used as a coolant. The fluid was sent to recycle onsite.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
STATE	Solid	472	kg	$1,128

VI. PPOA Accomplishments

Pollution Prevention Activity:
ICF KH Used Automotive Antifreeze

CSO: EM-70

Source Reduction Activity:
or Recycling Activity: R99

-------- PPOA Objective: --------

Recycle used automotive antifreeze onsite.

-------- PPOA Description: --------

Recycled used automotive antifreeze by filtration.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
STATE	Solid	3123	kg	$13,428

VI. PPOA Accomplishments

Pollution Prevention Activity:
ICF KH Used Oil Filters

CSO: EM-70

Source Reduction Activity:
or Recycling Activity: R99

-------- PPOA Objective: --------

Recycle used oil filters.

-------- PPOA Description: --------

All used automotive oil filters are drained, crushed, and recycled as scrap metal reducing the volume of sanitary waste sent to the landfill. The recycling costs equal what it would cost to dispose of the crushed oil filters in the landfill.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
SANITARY	Solid	3636	kg	$0

VI. PPOA Accomplishments

Pollution Prevention Activity:
ICF KH Used Parts Washer Solvent

CSO: EM-70

Source Reduction Activity:
or Recycling Activity: R99

-------- PPOA Objective: --------

Filter parts washer solvents for reuse.

-------- PPOA Description: --------

Filtered and reused parts washer solvents. This activity reduced new product replacement costs.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
RCRA	Solid	1329	kg	$7,708

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC 222-S Laboratory Mercury

CSO: EM-30

Source Reduction Activity:
or Recycling Activity: R99

-------- PPOA Objective: --------

Recycle mercury onsite.

-------- PPOA Description: --------

Waste mercury is generated from broken barometers, thermometers, and other equipment that utilize mercury in the laboratory. Purified the mercury by filtration and distillation for reuse onsite.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
MLLW	Liquid	0.0025	m3	$1,200

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC 222-S Labs Microscale Chemistry

CSO: EM-30

Source Reduction Activity: W52
or Recycling Activity:

-------- PPOA Objective: --------

Change from macroscale chemical instrumentation to microscale chemistry.

-------- PPOA Description: --------

Outdated macroscale chemical instrumentation, such as ion chromatography and spectrophotometry, generates excessive amounts of mixed laboratory waste.

Developed and implemented microchemical instrumentation at 222-S Laboratories. The instrumentation was modified to accommodate radioactive samples. The microscale instrumentation is applicable to most DOE laboratories.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
MLLW	Solid	6	m3	$131,300

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC 222-S Labs Offsite Sample Returns

CSO: EM-30

Source Reduction Activity: W19
or Recycling Activity:

-------- PPOA Objective: --------

Change procedures to bulk offsite samples outside the zone.

-------- PPOA Description: --------

The Analytical Laboratory receives offsite radioactive samples that are stored in containers. These containers were brought inside the laboratory hot cells for analysis. The packing materials and sample containers were disposed of as low level waste.

Re-examined the disposal of offsite sample returns through the Pollution Prevention Opportunity Assessment process. It identified that the most cost effective pollution prevention opportunity was to bulk the samples outside the zone. A procedure was written to handle offsite samples in this manner to reduce the toxicity of waste from mixed to hazardous and low level. The packing materials and sample containers were disposed of as sanitary waste.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
MLLW	Solid	26	m3	$55,000

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC 222-S Labs Recycle Methylene Chloride

CSO: EM-30

Source Reduction Activity:
or Recycling Activity: R99

-------- PPOA Objective: --------

Distill and recycle used methylene chloride.

-------- PPOA Description: --------

Methylene chloride is used to extract organic compounds from environmental and tank samples. Used methylene chloride was lab packed and sent to the Central Waste Complex as mixed waste.

Purchased a water cooler and a complete distillation apparatus to distill 300 to 500 liters per year of used methylene chloride to reagent grade methylene chloride. The distilled methylene chloride was reused at DOE Hanford facilities and made available through sale to industry.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
MLLW	Liquid	0.6	m3	$34,400

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC 222-S Labs Single Rinse Tanks

CSO: EM-30

Source Reduction Activity: W19
or Recycling Activity:

-------- PPOA Objective: --------

Single rinse instead of triple rinse tank trailer.

-------- PPOA Description: --------

A 20,000 liter tank trailer was planned to transport approximately 2,500 liters of laboratory waste 8 times a year. Once empty, the tank trailer required a triple rinse at 10% of its volume.

Purchased a 4,000 liter tank trailer designed to meet the definition of empty when the contents are removed. A single rinse is still necessary, generating approximately 170 liters of rinsate. The rinsate is included in the waste stream at the time of unloading.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
MLLW	Liquid	45	m3	$240,000

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC 2703E Kaolin Clay

CSO: EM-30

Source Reduction Activity:
or Recycling Activity: R99

-------- PPOA Objective: --------

Redeploy excess Kaolin Clay.

-------- PPOA Description: --------

The 2703E Laboratory had 11 drums of Kaolin Clay which was no longer needed. A Declaration of Excess document was prepared and the clay was redeployed to a local vendor.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
SANITARY	Solid	68.2	kg	$200

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC 300 Area LEF Reduced Steam Condensate

CSO: EM-30

Source Reduction Activity: W19
or Recycling Activity:

-------- PPOA Objective: --------

Replace steam lines to reduce condensate discharged to the process sewer and the ground.

-------- PPOA Description: --------

Steam heat utilized at the 340 Facility generated approximately 12,000 cubic meters of condensate which was discharged to the process sewer and the ground. Daily operations in the vicinity of aging steam lines with clogging steam traps and failing insulation was becoming a safety issue. Continued use of the steam system would have required extensive maintenance and/or upgrades.

Purchased and installed HVAC components to replace the units utilizing steam. The abandoned steam lines were removed, disposed of, and the steam was capped at the supply point.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
SANITARY	Process Wastewater	12000	m3	$27,590

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC 300 Area TEDF Compressed-Air Delivery System

CSO: EM-30

Source Reduction Activity: W19
or Recycling Activity:

-------- PPOA Objective: --------

Eliminate oily waste from the air delivery system at the 300 Area Treatment Effluent Disposal Facility (TEDF).

-------- PPOA Description: --------

The compressed-air delivery system at the 300 Area TEDF generates condensate that contains trace amounts of dissolved oil. This waste cannot be managed at the facility and must be absorbed and disposed of as solid sanitary waste.

Westinghouse Hanford Company TEDF personnel purchased a small capacity oil-free air compressor pack. All bearings were sealed and the pistons use teflon rings, providing self lubrication. This eliminated all oily waste from the air delivery system.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
SANITARY	Solid	1875	kg	$324

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC 300 Area TEDF Regulated Used Oil

CSO: EM-30

Source Reduction Activity: W89
or Recycling Activity:

-------- PPOA Objective: --------

Replace regulated oil with an alternative lubricant.

-------- PPOA Description: --------

This activity resulted from the implementation of a Pollution Prevention Opportunity Assessment performed in 1995. A mechanical piece of equipment was scheduled for service and the vendor specifications required the use of an oil which is regulated in the State of Washington as a persistent, dangerous waste, due to the presence of asphalt. An alternative lubricant was identified and used in place of the hazardous product.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
STATE	Solid	176	kg	$274

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC 300 Area TEDF Steam Condensate

CSO: EM-30

Source Reduction Activity: W52
or Recycling Activity:

-------- PPOA Objective: --------

Replace steam system units utilizing steam.

-------- PPOA Description: --------

Steam was used for heating the 340 Facility, generating about 12,000 cubic meters of condensate per year which was discharged to the sanitary sewer, a french drain, and the ground. Continued use of the steam system would have required extensive maintenance and/or upgrades. The project installed new HVAC components to replace the units utilizing steam.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
SANITARY	Process Wastewater	12039	m3	$27,590

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC 300 Area TEDF Water Treatment Sludge

CSO: EM-30

Source Reduction Activity: W55
or Recycling Activity:

-------- PPOA Objective: --------

Institute bulk handling practices for sludge byproduct.

-------- PPOA Description: --------

This activity involved the use of bulk handling for disposal of Treatment Effluent and Disposal Facility (TEDF) sludge byproduct, which was managed as LLW.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
LLW	Liquid	28	m3	$23,000

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC B Plant Emergency Well Pump Test Water

CSO: EM-60

Source Reduction Activity: W13
or Recycling Activity:

-------- PPOA Objective: --------

Minimize testing requirements.

-------- PPOA Description: --------

The frequency of testing on two diesel-driven emergency well pumps was extended from every two weeks to every 2 months. This is a reduction of over 77% in the testing requirements.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
SANITARY	Solid	15000000	kg	$5,845

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC B Plant Paint Related Waste

CSO: EM-60

Source Reduction Activity: W73
or Recycling Activity:

-------- PPOA Objective: --------

Replace hazardous paint products with non-regulated products.

-------- PPOA Description: --------

The B Plant/WESF painters now use almost exclusively latex-based paints which are determined to be non-regulated for disposal. In addition, paint brushes are stored in a refrigerator after use which keeps the brushes soft and available for future use.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
RCRA	Solid	400	kg	$4,900

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC B Plant Sodium Hydroxide Solution

CSO: EM-60

Source Reduction Activity:
or **Recycling Activity:** R99

-------- PPOA Objective: --------

Excess liquid sodium hydroxide.

-------- PPOA Description: --------

Fourteen thousand gallons of low quality, off specification sodium hydroxide was stored in a bulk chemical storage tank at B Plant. With B Plant's new mission to transition to shutdown, no foreseeable use for the sodium hydroxide could be identified and a decision was made to remove it from the facility.

All of the sodium hydroxide was redeployed for use at a pulp and paper mill in Montana after 10 months of seeking a user.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
RCRA	Solid	63690	kg	$26,000

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC Engineering Testing Lab Tank Waste Simulant

CSO: EM-30

Source Reduction Activity: W19
or Recycling Activity:

-------- PPOA Objective: --------

Change procedures to allow for lower pH limits.

-------- PPOA Description: --------

A tank waste simulant was needed to test a variety of equipment for use in the tank farms. The original plan called for the simulant to be mixed to a pH of >12.5 to mimic the conditions found in most tank farm waste.

After review by the Hazardous Material Specialist, the recommendation was made to keep the Ph of the mixture at or below 11.5. The cognizant engineer agreed to the recommendation. Reducing the pH of the mixture eliminated the D002 waste code that the material would have received as a waste. The resulting mixture did not designate as a dangerous waste when discarded.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
RCRA	Solid	8814	kg	$6,000

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC Equipment Testing Lab Absorbed Liquids

CSO: EM-30

Source Reduction Activity: W89
or Recycling Activity:

-------- PPOA Objective: --------

Reuse aerosol cans for testing.

-------- PPOA Description: --------

The Equipment Testing Lab received a test plan that called for testing a commercially available puncturing device for aerosol cans. Aerosol cans (empty to full) were needed in order to perform the testing. Rather than use new product cans for testing, an inquiry was made to other generators onsite for aerosol cans. The 300 Area Janitorial Support supplied the Equipment Testing Lab with 88 aerosol cans for testing. The cans were either old product or had valves that would not operate.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
RCRA	Solid	40	kg	$450

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC Equipment Testing Lab Tank Waste Simulants

CSO: EM-30

Source Reduction Activity:
or Recycling Activity: R99

-------- PPOA Objective: --------

Excess waste simulant.

-------- PPOA Description: --------

One 30-gallon drum of waste simulant was excessed to the Pacific Northwest National Labs when testing was completed.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
RCRA	Solid	212	kg	$500

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC FFTF 105DR Large Sodium Fire Facility

CSO: EM-60

Source Reduction Activity:
or Recycling Activity: R99

-------- PPOA Objective: --------

Sort and recycle wastes from the 105DR Large Sodium Fire Facility.

-------- PPOA Description: --------

Cleanup by Westinghouse Hanford Company of the 105DR Large Sodium Fire Facility required the removal of large amounts of hardware including tanks, vessels, pans, liners, ventilation lines, and large scrubbers.

Reduced cleanup costs by sorting and recycling wastes. Established a waste pad, satellite storage areas, and recycle storage areas for segregation.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
RCRA	Solid	15500	kg	$262,500

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC FFTF Aqueous Film Forming Foam

CSO: EM-60

Source Reduction Activity: W11
or Recycling Activity:

-------- PPOA Objective: --------

Reuse non-regulated Aqueous Film Forming Foam and feed water.

-------- PPOA Description: --------

Approximately 2,100 gallons of Aqueous Film Forming Foam (AFFF) and feed water were generated due to the shutdown of the incontainment fire system. The concentrations of the hazardous ingredients were suspected to be regulated near the main tank, but the product downstream was considered non-regulated. All 42 drums were sampled and only the six drums containing the AFFF were regulated. The 36 non-regulated drums of feedwater were used for dust control in the 400 Area.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
STATE	Solid	6545.4	kg	$14,500

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC FFTF CRADA with LM Manufacturing

CSO: EM-60

Source Reduction Activity:
or Recycling Activity: R99

-------- PPOA Objective: --------

Dismantle and redeploy test equipment used in the Fast Flux Test Facility (FFTF).

-------- PPOA Description: --------

With the shutdown of the FFTF, there was no longer a need for the test loops and associated equipment used to develop and test liquid sodium and sodium/potassium metal equipment and processes.

A private company, LM Manufacturing (LM) signed a Cooperative Research and Development Agreement (CRADA) with Westinghouse to use the dismantled loop Magnetohydrodynamic electrical generator.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
SANITARY	Solid	80	kg	$100,000

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC FFTF Ion Exchange Fuel Washing Assembly

CSO: EM-60

Source Reduction Activity:
or Recycling Activity: R99

-------- PPOA Objective: --------

Recycle and reuse wash water generated during fuel washing procedures.

-------- PPOA Description: --------

All the irradiated fuel assemblies from the Fast Flux Test Facility (FFTF) must be washed to remove residual sodium and other radioactive contaminants before they are placed in casks for dry storage. An ion exchange system was used to enable the radioactive wash water to be reused rather than single passed in the system.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
LLW	Process Wastewater	662.4	m3	$1,700,000

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC FFTF Mobiltherm

CSO: EM-60

Source Reduction Activity:
or Recycling Activity: R99

-------- PPOA Objective: --------

Excess chemicals from shutdown and defueling operations.

-------- PPOA Description: --------

During shutdown and defueling, the system that used Mobiltherm was decommissioned. The Mobiltherm was removed from the system to drums and stored for disposal. A local vendor was contracted to reuse the Mobiltherm for energy recovery rather than dispose of it as waste.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
STATE	Solid	6909	kg	$25,000

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC FMEF HEPA Filter Modification

CSO: EM-60

Source Reduction Activity: W19
or Recycling Activity:

-------- PPOA Objective: --------

Modify drums with round HEPA filters.

-------- PPOA Description: --------

Round and square HEPA filters were purchased for projects in the 400 Area which were subsequently canceled. Vacuum cleaners equipped with HEPA filters are used to collect contaminated debris and filter the discharged air. The vacuum cleaner bags are changed in a containment area and the contents transferred to a drum for burial.

Building 333 built chip collectors out of 30 and 55-gallon drums. Round HEPA filters are mounted to the lid for filtering air before it reaches the vacuum cleaner. The modified drum acts as a collection facility. Changing the vacuum cleaner bags in containment areas is no longer necessary since the debris is already in its shipping container. The excess HEPA filters were redeployed across the site through the traditional excess process.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
LLW	Solid	24	m3	$10,000

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC K Basins 90-Day Waste Storage Pad

CSO: EM-30

Source Reduction Activity: W25
or Recycling Activity:

-------- **PPOA Objective:** --------

Reuse existing storage onsite as a 90-day waste storage pad.

-------- **PPOA Description:** --------

The K Basins Maintenance Department acquired a 3-door portable storage unit as excess from the PUREX facility. The unit did not meet the needs of the Maintenance Department, and it was given to the Operations Analysis and Waste Handling group and transformed into a 90-day waste storage pad.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
SANITARY	Solid	1587	kg	$310,000

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC K Basins Chemicals Redeployed

CSO: EM-30

Source Reduction Activity:
or Recycling Activity: R99

-------- PPOA Objective: --------

Redeploy excess chemicals.

-------- PPOA Description: --------

Numerous chemicals were scheduled for disposal due to a change in mission at 1706-KE. Instituted a "garage sale" of chemicals for redeployment onsite.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
RCRA	Solid	300	kg	$28,300

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC K Basins ECOROK Containers

CSO: EM-30

Source Reduction Activity: W49
or Recycling Activity:

-------- PPOA Objective: --------

Redesignate ECOROK containers as Type B containers for shipping.

-------- PPOA Description: --------

Twenty five ECOROK containers were originally purchased as temporary storage containers at K Basins for spent transuranic cartridge filters generated at K Basins. These cartridge filters were required to meet the Washington State Department of Health permit. They were scheduled for repackaging at a later date to Type B containers in order to ship. As an ALARA and Waste Minimization effort, it was decided to qualify the ECOROK containers as Type B containers and eliminate repackaging. This saved on labor, exposure, and purchasing of new containers to overpack the ECOROK containers.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
TRU	Solid	100	m3	$190,000

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC KE Laboratory Redeploy Tanks Onsite

CSO: EM-30

Source Reduction Activity:
or Recycling Activity: R99

-------- **PPOA Objective:** --------

Redeploy idle stainless steel tanks.

-------- **PPOA Description:** --------

Two new double shell, 3,000 gallon stainless steel tanks were sitting idle and no longer needed at the 1706 KE Laboratory. The tanks were originally purchased for a project which was subsequently canceled.

Sent an electronic message to a site pollution prevention network list of 100 individuals onsite announcing the availability of the tanks for excess. Received five responses and redeployed the two tanks, based on need, to the 2703E Chemical Engineering Laboratories.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
SANITARY	Solid	2260	kg	$27,000

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC PFP Inactivation of Maintenance Procedures

CSO: EM-60

Source Reduction Activity: W19
or Recycling Activity:

-------- PPOA Objective: --------

Inactivate procedures.

-------- PPOA Description: --------

Facility preventive maintenance procedures were reviewed for applicability of inactivation. Ninety-seven monitoring system components on process systems not operating were identified that required maintenance personnel to access radiological contamination areas within the plant. Performance of the procedures on these systems would have involved an estimated 240 individual tasks that required two personnel in completing each task. By inactivating the procedures, the volume of low level waste such as tools and PPE, that would have been generated in the course of performing the activities has been avoided.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
LLW	Solid	0.63	m3	$800

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC PFP PCB Contaminated Oil

CSO: EM-60

Source Reduction Activity: W19
or Recycling Activity:

-------- PPOA Objective: --------

Change procedures to reduce the number of flushes performed in the Remote Mechanical A Line (RMA) hydraulic system.

-------- PPOA Description: --------

Waste minimization actions were incorporated into a workplan to flush the Remote Mechanical A Line (RMA) hydraulic system. The plan was modified to reduce the number of flushes to be performed from two to one. Approximately 80 feet of the hydraulic system was determined unneeded for operation and was drained and isolated prior to the flushing operation. The modification to the work activities reduced the generation, shipment, and storage costs of six low level mixed waste drums and approximately 48 gallons of PCB contaminated fluid.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
MTSCA	Solid	1305	kg	$6,400

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC PFP Unused Carbon Tetrachloride

CSO: EM-60

Source Reduction Activity:
or Recycling Activity: R99

-------- PPOA Objective: --------

Redeploy unused carbon tetrachloride to offsite users.

-------- PPOA Description: --------

A large volume of carbon tetrachloride had been purchased to support the operation of the Plutonium Reclamation Facility. As a result of developing the Plutonium Finishing Plant Interim Action Plan and sludge stabilization, the carbon tetrachloride in storage was determined to be an excess material. Fifty, 55-gallon drums of the product were shipped to Westinghouse Excess for distribution to offsite users.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
RCRA	Solid	15500	kg	$19,500

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC PUREX Chemical Equipment Excess

CSO: EM-60

Source Reduction Activity:
or Recycling Activity: R99

-------- PPOA Objective: --------

Redeploy fire extinguishers offsite.

-------- PPOA Description: --------

As the U03 and PUREX facilities deactivated, 1,390 pounds of unneeded fire extinguishers became available for excess. The fire extinguishers were excessed to other facilities or sent offsite for future use.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
STATE	Solid	631	kg	$3,000

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC PUREX Contaminated Tools/Equipment

CSO: EM-60

Source Reduction Activity: W13
or Recycling Activity:

-------- PPOA Objective: --------

Reuse contaminated tools in radioactive zones.

-------- PPOA Description: --------

PUREX maintained tool cribs in several contamination areas. The tools are color coded to help keep each tool in its specified location. When craftspeople are assigned to a task in a specific location, the appropriate tools are already in place, eliminating the need to introduce new tools into the contamination areas which would eventually be considered LLW.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
LLW	Solid	5	m3	$17,000

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC PUREX Fire Foam

CSO: EM-60

Source Reduction Activity:
or Recycling Activity: R99

-------- PPOA Objective: --------

Excess fire foam offsite.

-------- PPOA Description: --------

The PUREX Facility deactivated a fire system. Approximately 405 gallons of fire foam resulted from the system deactivation. The fire foam was excessed to offsite fire departments as product for future use.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
STATE	Solid	1535	kg	$11,250

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC PUREX Flush Solutions

CSO: EM-60

Source Reduction Activity: W19
or Recycling Activity:

-------- **PPOA Objective:** --------

Reuse rinsate to flush tanks prior to disposal.

-------- **PPOA Description:** --------

As the PUREX Facility flushes chemical tanks for deactivation, the rinsate is used to flush other tanks prior to disposal at the Tank Farms as radioactive water. The reuse of rinsate has eliminated at least 100,000 gallons of radioactive water sent to the Tank Farms for storage and eventual treatment in calendar year 1995.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
LLW	Liquid	379	m3	$1,739,084

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC PUREX HEPA Filter "Defrocking"

CSO: EM-60

Source Reduction Activity: W12
or Recycling Activity:

-------- PPOA Objective: --------

Segregate HEPA filter materials.

-------- PPOA Description: --------

In the past, High Efficiency Particulate Air (HEPA) filters which had been tested with dioctyl phthalate (DOP) were regulated as a Washington State carcinogenic waste (mixed waste). The filters are encased in a plywood housing and would not fit into a 55-gallon drum. Therefore, B-25 metal boxes were used to package the waste for storage. PUREX devised a method of removing the filter material from the plywood housing, enabling the filter material to be packaged in 55-gallon drums, and the plywood to be disposed of a LLW.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
MLLW	Solid	4.7	m3	$21,350

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC PUREX Radioactive Nitric Acid

CSO: EM-60

Source Reduction Activity:
or Recycling Activity: R99

-------- PPOA Objective: --------

Redeploy excess radioactive nitric acid offsite.

-------- PPOA Description: --------

Nitric acid containing a small amount of uranium was routinely generated and reused in the past at the PUREX Plant as a by-product of nuclear fuel dissolution and chemical separation processes. The acid was no longer needed and posed a potential hazard to the environment, the workers, and the public, and also prevented the completion of the PUREX facility deactivation. Continued storage of the acid would require the construction of new storage tanks at a cost in excess of $2 million and would require continuous surveillance and maintenance. Alternative methods of disposing of the acid could have cost as much as $60 million.

The nitric acid was sold to British Nuclear Fuels Private Limited Company for reuse in their B-205 MAGNOX commercial nuclear fuels reprocessing plant in Sellafield, England.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
MLLW	Liquid	1665	m3	$5,000,000

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC PUREX Redeployment of Lab Equipment/Supplies

CSO: EM-60

Source Reduction Activity:
or Recycling Activity: R99

-------- PPOA Objective: --------

Redeploy excess laboratory equipment and supplies offsite.

-------- PPOA Description: --------

Due to deactivation activities, the PUREX Analytical Laboratory has redeployed approximately 3,000 cubic feet of lab equipment and supplies which were no longer needed to other Hanford laboratories. This equipment/supplies would have been considered waste had a use not been found at other laboratories. The equipment/supplies redeployed from the PUREX Laboratory in 1995 is worth approximately $900,000 not including disposal costs if considered waste.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
LLW	Solid	85	m3	$900,000

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC Pest Management Integrated Pest Management

CSO: EM-30

Source Reduction Activity: W19
or Recycling Activity:

-------- PPOA Objective: --------

Introduce integrated pest management practices at Hanford.

-------- PPOA Description: --------

An integrated program to control arthropod, rodent and nuisance wildlife pests was necessary at Hanford.

Integrated Pest Management (IPM) strategies and products were selected, reflecting pollution prevention and ALARA principles. Pests are controlled by habitat modification and population reduction strategies. These include grooming vegetation, landscape management, sealing holes and cracks in buildings, removing nesting and harborage materials, trapping, and appropriate pesticide application.

All pesticides used onsite are approved by the commercial pesticide applicator. A screening criteria is used which reflects waste minimization and ALARA practices such as low applied solution concentration, minimum human contact, biodegradable, and non-carcinogenic chemicals.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
RCRA	Solid	40	kg	$470

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC Solid Waste Sign Making Equipment

CSO: EM-30

Source Reduction Activity: W58
or Recycling Activity:

-------- PPOA Objective: --------

Purchase sign making equipment to eliminate screen printing.

-------- PPOA Description: --------

Signs are required for labeling drums and posting regulatory information. Screen printing the signs generates hazardous waste from paint and thinners used in the process. Signs purchased through Central Stores are purchased in large quantities and often only a small number are eventually used.

The Solid Waste Division purchased sign making equipment to make fast, inexpensive vinyl signs without any waste. The sign is first scanned into a computer. The exact size and appropriate colors are plotted, and the sign is printed on the imaging system as needed. The system uses non-hazardous ink cartridges that are recycled by an offsite vendor.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
RCRA	Solid	9300	kg	$38,000

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC T Plant Contaminated Equipment

CSO: EM-30

Source Reduction Activity: W71
or Recycling Activity:

-------- PPOA Objective: --------

Reuse equipment after decontamination practices.

-------- PPOA Description: --------

T Plant recycled various types of equipment by decontamination in the 2706 T Facility. The types of equipment included gas cylinders, trucks, railcars and various cranes. Decontamination in the T Plant canyon was primarily for tank farm auger parts.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
MLLW	Solid	298.32	m3	$506,824

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC T Plant Zone Reduction

CSO: EM-30

Source Reduction Activity: W19
or Recycling Activity:

-------- PPOA Objective: --------

Minimize radioactive zone areas.

-------- PPOA Description: --------

Zone reduction reduces the amount of personal protective equipment generated from work in these areas. This reduction significantly reduces the time and cost necessary to perform work. The savings result from reduced waste generated, PPE required, reduced manpower, and reduced survey equipment.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
LLW	Solid	8.38	m3	$10,600

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC Tank Farms 242-A Evaporator Process Condensate

CSO: EM-30

Source Reduction Activity: W52
or Recycling Activity:

-------- PPOA Objective: --------

Reduce filtered raw water introduced into the 242-A Evaporator process.

-------- PPOA Description: --------

The generation of liquid mixed waste at the 242-A Evaporator was reduced through a process modification that recycles process condensate from the process condensate collection tank to the intake of the filtered raw water system that feeds the pump seal water system and the deentrainment pad sprayers.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
MLLW	Process Wastewater	534	m3	$859,000

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC Tank Farms Decontamination of Drill Strings

CSO: EM-30

Source Reduction Activity: W71
or Recycling Activity:

-------- PPOA Objective: --------

Decontaminate drill strings.

-------- PPOA Description: --------

Augers used to routinely sample the Tank Farm waste tanks are sent to the T Plant canyon for decontamination and then reuse by Tank Farms. Examination of core drilling waste in a Pollution Prevention Opportunity Assessment identified that decontamination of drill strings would significantly reduce solid waste disposal volumes and costs.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
LLW	Solid	475	m3	$473,000

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC Tank Farms Down Posting

CSO: EM-30

Source Reduction Activity: W19
or Recycling Activity:

-------- PPOA Objective: --------

Change posting in the 242-A Evaporator condenser room from surface contamination area to radiation buffer area.

-------- PPOA Description: --------

The 242-A Evaporator condenser room consists of five floors posted as surface contamination areas. Personnel protective equipment (PPE) was required before entry and dosimeter readings were required upon exit.

Westinghouse had the condenser room surveyed by health physics technicians and contaminated valves were bagged, allowing the entire room to be posted as a radiation buffer area. With the area posted as a buffer area, personnel can wear lab coats with only hand and foot counter required upon exit, saving disposal and laundry of PPE.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
LLW	Solid	5	m3	$5,916

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC Tank Farms Surface Decontamination

CSO: EM-30

Source Reduction Activity: W19
or Recycling Activity:

-------- PPOA Objective: --------

Prevent the spread of surface contamination, reducing and controlling the sources of contamination, and cleaning up or stabilizing areas already contaminated.

-------- PPOA Description: --------

Prevented the spread of surface contamination by reducing and controlling the sources of contamination and cleaning up or stabilizing areas already contaminated. This work eliminated costs associated with personnel protective equipment, reducing radiological surveys for workers exiting the zone, eliminating the need for vehicle surveys and increased productivity since workers can enter and exit the zones much quicker and perform better.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
LLW	Solid	38935	m3	$243,000

VI. PPOA Accomplishments

Pollution Prevention Activity:
WHC Tank Farms Tank Contacted Waste

CSO: EM-30

Source Reduction Activity: W71
or Recycling Activity:

-------- PPOA Objective: --------

Flush and reuse manual tapes.

-------- PPOA Description: --------

Manual tapes are used as a backup for measuring liquid levels in the single-shell and double-shell tanks. In the past, manual tapes were replaced rather than flushed and reused. Disposal of tank contacted waste has been reduced by implementation of a process which flushes the manual tapes and reuses them.

Savings associated with this accomplishment

Waste type	Waste form	Waste amount	Units	Savings
HLW	Solid	0.6	m3	$124,000