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7. Abstract <p>A Pollution Prevention Plan is required for each facility by federal and state regulations, as well as DOE Order. This plan identifies and describes the major waste streams at B Plant Complex. Pollution Prevention goals and accomplishments for past years are presented in this plan. In addition, specific pollution prevention methodologies are presented, as well as the potential for pollution prevention in each waste stream.</p>		
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WHC-SD-WM-EV-025, Rev. 1

B PLANT COMPLEX
POLLUTION PREVENTION PLAN

B PLANT ENVIRONMENTAL ENGINEERING

October 1994

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1.0 INTRODUCTION

1.1 PURPOSE/SCOPE OF PLAN

A pollution prevention program is required by federal and state regulations for hazardous waste generators and treatment, storage, and disposal (TSD) facilities. The U.S. Department of Energy (DOE) has directed Westinghouse Hanford Company (WHC) to develop an effective strategy to minimize the generation of hazardous, radioactive, and mixed wastes at Hanford in compliance with state and federal regulations. WHC has formalized a pollution prevention program composed of management policies, management requirements and procedures.

This plan addresses pollution prevention for B Plant Complex. A pollution prevention team is in place and has been assigned responsibility for implementing the plan. This plan includes actions and goals for reducing volume and toxicity of waste generated, as well as a basis for evaluation of progress. Descriptions of waste streams, current specific goals, general pollution prevention methods, and specific accomplishments are in the appendices of this plan.

Pollution prevention is applied in pre-job planning and in safety briefings. The primary goal is the reduction of hazardous material mass, toxicity, and output volume generated by B Plant Complex. Facility policy is to implement selected options, whenever technically and economically practical, such that contaminants will not be shifted from one part of a process, environmental media, or product to another for the purpose of pollution prevention. B Plant Complex will avoid contamination or exposure of workers in accordance with ALARA (As Low As Reasonably Achievable) policies.

Issuance and implementation of this plan demonstrates B Plant Complex's intent to comply with WHC and DOE requirements as well as State and Federal regulations.

1.2 FACILITY BACKGROUND

1.2.1 Facility Description

B Plant Complex consists of the 221B canyon building and 271B administration building (B Plant), the 225B Waste Encapsulation and Storage Facility (WESF) building, and several surrounding support structures. B Plant was built between 1943 and 1945 and was originally used for plutonium recovery in support of the Manhattan Project. Starting in 1961 extensive modifications were made to B Plant processes to allow for recovery and purification of cesium-137 (Cs) and strontium-90 (Sr) from existing wastes stored at Hanford. Cs/Sr recovery processing was initiated in 1968. The Waste Encapsulation and

Storage Facility (WESF) was added to B Plant Complex in 1974 to allow the Cs-137/Sr-90 waste streams to be converted to solid form and placed in stainless steel capsules. These highly radioactive capsules are stored in pool cells inside WESF.

1.2.2 Material Use

Chemicals and other materials regulated for environmental or occupational reasons which are used at B Plant Complex, and are known to contribute to the waste streams, are listed in a data base maintained by the Hazardous Material Coordinator (HMC). In the past, B Plant Complex was not required to maintain an inventory of chemicals used. However, this situation has been corrected and a chemical inventory has existed since 1991.

At B Plant Complex, chemicals are used for maintenance, cleaning, decontamination, and operations. They may leave the plant as solid, liquid, or gaseous wastes or become part of the product. Any of the chemicals used are subject to radioactive contamination if they are introduced into a radiation zone. In addition, materials and equipment used in a radiation zone may become solid radioactive waste. The following are identified categories of chemicals used at B Plant Complex.

Oxidizers:	concentrated nitric acid
Corrosives:	sulfuric, nitric, citric, phosphoric, and oxalic acids, with sodium hydroxide being the primary caustic
Flammables:	2-propanone, 2-butanone, unleaded gasoline and xylene
Halogenated solvents:	1,1,1 trichloroethane (present as a constituent only) and Freon 113
Toxics:	lead, mercury, paints, thinners, patching compounds, buffers, and cleaners
Carcinogens:	asbestos, paints, patching compounds, and gasoline

1.2.3 Waste Stream Categories

Currently, B Plant Complex waste generation is primarily from clean up and maintenance activities. For a discussion of each waste category see Appendix A. Table 1 shows the major categories of waste produced and the estimated annual quantities.

Table 1. Major B Plant Complex Waste Stream Categories

Waste Stream Category	Annual Estimated Quantity
Solid Mixed Waste	17,067 lbs
Solid Low Level Waste	233,214 lbs
Solid Hazardous Waste	10,830 lbs
Solid Non-Regulated Waste	12,841 lbs
Liquid Mixed Waste (Routine)	21,281 gal
Liquid Mixed Waste (Non-Routine)	180,500 gal
Liquid Radioactive Waste	0 gal
Liquid Hazardous Waste	***
Liquid Non-Regulated Waste	946,080,000 gal
Gaseous Non-Regulated Waste	123,301 cfm

*** included with solid hazardous waste

1.3 B PLANT COMPLEX MISSION

In May 1991, DOE eliminated B Plant Complex from any future processing missions because of the difficulties in bringing it up to current environmental standards. Since that time B Plant Complex has continued to operate, ensuring safe storage and management of approximately 100 megacuries of cesium and strontium capsules in WESF, as well as substantial radioactive contamination and residue from past operations.

The legacy of B Plant's radiochemical separation process missions is a substantial quantity of radioactive inventory. This inventory is in the form of stored organics, kilocurie quantities of solid particulate cesium and strontium contained in underground high-efficiency particulate air (HEPA) filters, and a highly contaminated facility structure.

To deal with this inventory, a Cleanout and Stabilization Program (CSP) is planned. CSP will place B Plant Complex into a safe, cost-effective configuration, allowing for long-term surveillance until final decontamination and decommissioning (D&D).

1.4 REVISIONS TO THE POLLUTION PREVENTION PLAN

In order to remain up-to-date and applicable to the changing status of B Plant Complex, this plan will be reviewed at least annually to reflect changes in

Waste Stream Descriptions (Appendix A), Pollution Prevention Goals/Objectives (Appendix B), Pollution Prevention Accomplishments (Appendix C) and Pollution Prevention Methods/Procedures (Appendix D). Additional revisions will be made if state or federal regulations, internal WHC requirements and/or administrative controls require changes.

2.0 POLLUTION PREVENTION PROGRAM

2.1 B PLANT COMPLEX POLLUTION PREVENTION ORGANIZATION

Pollution prevention is formally controlled by the B Plant Complex Pollution Prevention Team, and directed through the line organizations by the B Plant Complex Director. The Pollution Prevention Team consists of delegate members from Operations and Engineering. The team will monitor effectiveness of methods and prepare reports documenting compliance with site and regulatory goals. Formal team meetings will consider plant goals, plant methods, operating environment, and pollution prevention ideas.

2.2 POLLUTION PREVENTION RESPONSIBILITIES

2.2.1 Complex Director

The Complex Director is responsible for:

- Ensuring B Plant Complex's commitment to achieving a successful pollution prevention program.
- Ensuring that all complex employees are trained in pollution prevention awareness, techniques and requirements.
- Selection and implementation of complex pollution prevention goals and methods based on recommendations of the Pollution Prevention Team.

2.2.2 Environmental Engineering Manager

The Environmental Engineering Manager is responsible for:

- The preparation of a facility-specific pollution prevention plan and revision of the plan as necessary.
- The preparation of facility-specific pollution prevention annual goals.
- Issuing the facility-specific pollution prevention accomplishments for the previous year.
- Ensuring that progress is monitored to meet facility pollution prevention goals. Establishing a schedule and providing quarterly status reports.

2.2.3 Hazardous Material Coordinator (HMC)

The HMC is responsible for:

- Acting as chairman of the Pollution Prevention Team.
- Scheduling meetings on a quarterly basis.
- Issuing agendas and minutes for meetings.

2.2.4 Pollution Prevention Team

The Pollution Prevention Team is responsible for:

- Identifying and describing efforts to reduce the quantity and/or toxicity of generated waste.
- Evaluating employee submittals for pollution prevention goals and methods at quarterly intervals. Minutes of these meetings are documented.
- Recommending goals and methods for implementation to the Complex Director.
- Collecting data to determine effectiveness and impacts of pollution prevention actions.
- Assisting in preparing reports to regulatory units or departments.
- Assisting in preparing annual operating record certification (report) to be issued by Complex Director.
- Ensuring reviews of job plans and work packages for parent organization include potential for pollution prevention.
- Ensuring annual reviews of this plan and its appendices.
- Updating the plan as required.

2.2.5 All Employees

Employees are responsible for:

- Following approved pollution prevention techniques and procedures.
- Evaluating the potential for pollution prevention in their work.

- Submitting ideas for potential pollution prevention to the Pollution Prevention Team.

2.3 TRAINING

Pollution prevention training for B Plant Complex employees will include awareness/responsibility training provided in the "Generator Hazardous Safety Training" class. Additional required training is specified in the B Plant Complex Waste Management Training Plan. Employees involved in the shipment of mixed waste, radioactive waste and samples will take the required shipper certification courses. These are also listed in the training plan. Facility-specific training on pollution prevention will be accomplished through on-the-job safety meetings/briefings on Material Safety Data Sheets (MSDS's) and competent peer review by workers.

2.4 EMPLOYEE PARTICIPATION/INCENTIVE PROGRAM

The company-wide WHC Pollution Prevention Group is involved in developing a company-wide incentive program to encourage employee participation in the development of pollution prevention measures. In addition to this program, pollution prevention ideas are encouraged as part of the Great Ideas and Employee Concerns programs.

2.5 POLLUTION PREVENTION FOR NEW PROJECTS/DESIGNS

In accordance with established procedures, work packages are reviewed by the appropriate Safety, Quality, Health Physics and/or Environmental approval designators. Pollution prevention opportunities will be considered for every work package.

2.6 POLLUTION PREVENTION STRATEGIES AND TECHNIQUES

2.6.1 Waste Management Practices

A hierarchy of waste management practices places the priority on source reduction, followed by recycling, then treatment, storage and/or disposal. The DOE has defined "waste reduction" to include pollution prevention and treatment of wastes. The waste reduction hierarchy is as follows:

- Priority #1 - Source Reduction
 - Process Modifications
 - Equipment Modifications
 - Operational Changes

- Procedural Changes
- Material Substitution
- Procurement Controls/Management
- Inventory Controls/Management
- Improved Housekeeping
- Preventive Maintenance
- Product Redesign
- Work Planning
- Waste Segregation

- Priority #2 - Recycling

- Product Recovery
- Energy Recovery
- Office Recycling
- Material/Waste Exchanges
- Reclamation
- Salvage Sales

- Priority #3 - Treatment

- Waste Sorting
- Incineration
- Evaporation
- Compaction
- Stabilization
- Decontamination
- Neutralization

Pollution prevention emphasizes the elimination or minimization of waste through source reduction and includes recycling (i.e. using, reusing, or reclaiming) of materials that cannot be eliminated or minimized. Treatment emphasizes physical or chemical modification to reduce waste volume, toxicity, and/or mobility before storage or disposal.

2.6.2 Waste Reduction Techniques

Source reduction is the elimination or reduction of waste generation at the source. Source reduction activities and techniques include substitution of less hazardous materials, process optimization or modifications, technology changes, administrative changes (e.g. inventory control), and housekeeping practices (e.g. waste segregation). Source reduction results in eliminating or reducing the amount of potential waste material exiting from a process or facility.

Recycling techniques are characterized as use, reuse, and reclamation techniques (resource recovery). Use or reuse involves the return of potential waste material either to the originating process as a substitute for an input

material or to another process as an input material. Reclamation is the recovery of a useful or valuable material from a waste stream. Recycling allows potential waste materials to be put to beneficial use instead of going to treatment, storage, or disposal.

Pollution prevention is the elimination or minimization of the generation of waste before treatment, storage or disposal. Pollution prevention is any source reduction or recycling activity that results in (1) reduction of total volume of the waste, (2) reduction of the toxicity of the waste, or (3) both (1) and (2) provided that the reduction is consistent with the general goal of minimizing present and future threats to human health and the environment.

Treatment involves a series of technological processes that reduce the volume, toxicity or mobility of a waste after it has been created. Examples include, but are not limited to, incineration, vitrification, neutralization, chemical extraction, physical separation, solidification, and stabilization.

3.0 WASTE IDENTIFICATION/MINIMIZATION POTENTIAL

3.1 WASTE STREAM DESCRIPTIONS

Solid, liquid, and gaseous waste streams exist at B Plant Complex. The waste streams are broken into radioactive and/or hazardous categories. These are listed in Table 1 and described in Appendix A. Appendix A discusses the origin, regulatory status, cost, environmental/safety impacts, and pollution prevention potential of each waste category.

3.2 PROGRAM SPECIFIC GOALS/OBJECTIVES

Specific goals and objectives for B Plant Complex pollution prevention are summarized in Appendix B. Actions which are supported by the complex and can most likely be accomplished with the present resources are identified.

3.3 PROGRAM ACCOMPLISHMENTS

Pollution prevention accomplishments are included in Appendix C.

3.4 METHODS

A summary of specific methods and procedures for B Plant Complex Pollution Prevention has been included as Appendix D. Pollution prevention is accomplished by applying these general concepts to all activities at the complex.

4.0 REFERENCES

1. WAC-173-303, State of Washington, Administrative Code "Dangerous Waste Regulations"
2. DOE Order 5820.2A "Radioactive Waste Management"
3. DOE Order 5480.1B, "Environment Safety, and Health Program for DOE Operations"
4. DOE Order 5480.2, "Hazardous Waste Management"
5. WHC-CM-7-5, Environmental Compliance Manual, Section 7.0, Appendix J.
6. WHC-CM-1, Company Policies and Charters
7. WHC-CM-1-3, Management Requirements and Procedures, MRP 5.44, "Waste Minimization Program".
8. WHC-CM-6-2, Project Management.
9. 40 CFR 261 "Identification and Listing of Hazardous Waste", *Code of Federal Regulations*, as amended.
10. 49 CFR 172 "Hazardous Materials Table, Special Provisions, Hazardous Material Communications Emergency Response Information and Training Requirements", *Code of Federal Regulations*, as amended.

APPENDIX A
B PLANT COMPLEX WASTE STREAM DESCRIPTIONS

A.1 SOLID MIXED WASTE

B Plant Complex has 3 identifiable sources (streams) within this waste category. These are shown in Table A-1.

Table A-1. B Plant Complex Solid Mixed Waste Streams

Waste Stream	Estimated Annual Quantity	
	POUNDS	GALLONS
Paint Related Waste	27	55
Lead	280	55
Miscellaneous	1162	385

A.1.1 Origin

These waste types have both hazardous and radioactive components. These wastes are usually the result of maintenance/operations activity within radiation zones. If a solid is not known to be radioactively contaminated, but there is a problem accessing all surfaces to assure no radioactivity exists, it is often disposed of with other radioactive material.

An example of this waste type is a high-pressure sodium lamp which has been inside a radiation zone (process canyon or hot cell). The lamps have a mercury vapor component, providing the hazardous designation. The lamp molding is rough, allowing airborne radioactivity to settle onto/into the cracks of the bulb. The radiological control technicians (RCT) will not sign an unconditional release for such solid materials. They must be packaged and stored/disposed of as mixed wastes.

Spills inside radiation zones also fall into this category. Material contaminated by or used to clean up the spill would be part of the waste resulting from spills.

Discussion of the contents of each waste category can be found in the B Plant Complex Waste Certification Plan (WCP), WHC-SD-HWV-PLN-002.

A.1.2 Regulatory Status

Specific discussion of the regulatory status of each item in Table A-1 can be found in the WCP. The designation of each item per WAC-173-303 is also given in the WCP.

Materials in this category are radioactive as a result of contamination acquired in a radiation zone. Radioactive waste at the facility is regulated by DOE Order 5820.2A, DOE-RL Order 5820.2A, Westinghouse Manual WHC-CM-7-5,

and WHC-EP-0063. Anything over 200 milirem per hour (mR/hr) at contact is buried per an agreement with the State of Washington. Lower activity items are stored for future processing.

All radioactive solid wastes are disposed of in accordance with a Storage/Disposal Approval Record (SDAR), or specific waste disposal letter issued by Acceptance Services. Once the waste has been packaged it is assigned a package identification number (PIN).

A.1.3 Cost

The disposal cost of radioactive mixed waste for FY93 was \$133.44 per cubic foot. The cost for FY94 is \$143.96 per cubic foot.

A.1.4 Environmental/Safety Impacts

When handling unknown hazardous material/waste there is potential for adverse impact to the environment and personnel safety. These adverse impacts may be caused by uncontrolled releases, carelessness, lack of training, inadequate procedures or other intangibles. These circumstances are mitigated by personnel awareness, proper training, job safety analyses and engineering methods.

The main safety concerns are uncontrolled releases to the environment, radiation exposure, personnel exposure to toxic materials, and exceeding exposure limit values. Effects vary significantly with quantity, material, and duration of exposure.

A.1.5 Pollution Prevention Potential

This is the most expensive waste category and the facility can benefit from any reductions in this area. Pre-approval of materials entering radiation zones is the most effective way to minimize this type of waste. Rendering this waste non-toxic or non-radioactive is also valuable.

A.2 **SOLID LOW LEVEL WASTE**

B Plant Complex has 4 identifiable sources (streams) within this waste category. These are shown in Table A-2.

Table A-2. B Plant Complex Solid Low Level Waste Streams

Waste Stream	Estimated Annual Quantity	
	POUNDS	FT ³
Compactible Solid Waste	1462	59
Non-Compactible Waste	194,020	7934
Process Equipment (replacement)	35,027	1123
Vegetation	2705	1323

A.2.1 Origin

Low-level wastes (LLW) are dispositioned in accordance with appropriate SDARs. When practical, the LLW is compacted to reduce volume. Current LLW SDARs are maintained in the Disposal Operations office in the 271-B building.

Contact handled items must yield a contact dose of less than 200 mR/hr, contain less than 100 nCi/g transuranic (TRU) within the waste matrix, and are limited to a maximum quantity of TRU dependent on the bulk size of the final container. Spills (unplanned releases) to soil (outdoors) or on a porous floor (indoors) may result in larger volumes of solids in this category.

A.2.2 Regulatory Status

Materials in this category are radioactive as a result of contamination acquired in a radiation zone. Radioactive waste at the facility is regulated by DOE Order 5820.2A, DOE-RL Order 5820.2A, Westinghouse Manual WHC-CM-7-5, and WHC-EP-0063. This material is defined as low level waste. Low level waste is buried.

All solid wastes are disposed of in accordance with the appropriate SDAR or a specific waste disposal letter issued by Acceptance Services. The contaminated material is given a package identification number for tracking purposes. A summary analysis of the contamination is noted on the Low Level Waste Storage/Disposal Request (LLWSR) or on the shipping documents.

A.2.3 Cost

The disposal cost of low-level waste for FY93 was \$46.40 per cubic foot. The cost for FY94 is \$49.46 per cubic foot.

A.2.4 Environmental/Safety Impacts

When handling radioactive material/waste there is potential for adverse impact to the environment and personnel safety. These adverse impacts may be caused

by uncontrolled releases, carelessness, lack of training, inadequate procedures or other intangibles. These circumstances are mitigated by personnel awareness, proper training, job safety analyses and engineering methods.

The main safety concerns are uncontrolled releases to the environment, radiation exposure, personnel exposure to toxic materials, and exceeding exposure limit values. Effects vary significantly with quantity, material, and duration of exposure. Material handling is done by procedure to protect personnel, as well as the environment.

A.2.5 Pollution Prevention Potential

Little can be done to minimize the toxicity or volume of most of the items, therefore material taken into radiation zones is minimized.

A.3 SOLID HAZARDOUS WASTE

B Plant Complex has 10 identifiable sources (streams) within this waste category. These are shown in Table A-3.

Table A-3. B Plant Complex Solid Hazardous Waste Streams

Waste Stream	Estimated Annual Quantity	
	POUNDS	GALLONS
Process Equipment (replacement)	608	288
Waste Lamps	21	55
Ballasts	357	30
Aerosol Cans	194	95
Paint Related Waste	183	130
Lead	326	110
Lead Acid Batteries (recycle)	2670	N/A
Dry Cell Batteries	84	21
Cleaning Agent	326	85
Unplanned Waste (1)	6061	596

(1) Unplanned waste might consist of contaminated soil spills.

A.3.1 Origin

These wastes are usually the result of maintenance and operations activities in which a major component of the waste is a regulated material. There may be non-regulated items which are collected and controlled/contained within the regulated waste.

An example of this waste type would be waste generated by wiping up oil (non-regulated material) with a (regulated) degreasing solvent on a paper towel. Pollution prevention will include using the minimum amount of solvent and toweling necessary. The waste volume is containerized before disposition. Spills also fall into this category. Material contaminated by or used to clean up the spill would be part of the waste resulting from spills.

A.3.2 Regulatory Status

This category of waste is defined in WAC-173-303, WHC-EP-0063 and 40 CFR 261. These wastes are disposed of in accordance with WHC-CM-7-5 and WHC-CM-5-16. Chemicals which may contribute to this category are maintained in a data base by the Hazardous Material Coordinator (HMC).

In order to track waste, a package identification number is assigned to each waste container. The proper shipping name of the contaminated material is determined in accordance with 49 CFR.

A.3.3 Cost

The disposal cost of hazardous waste for FY93 was \$341 per container. The cost for FY94 is \$392 per container.

A.3.4 Environmental/Safety Impacts

When handling hazardous material/waste, there is the potential for adverse impact to the environment and personnel safety. These adverse impacts may be caused by uncontrolled releases, carelessness, lack of training, inadequate procedures or other intangibles. These circumstances are mitigated by personnel awareness, proper training, job safety analyses and engineering methods.

The main safety concerns are uncontrolled releases to the environment, personnel exposure to toxic materials, and exceeding exposure limit values. Effects vary significantly with quantity, material, and duration of exposure. Material handling is done by procedure to protect personnel and the environment.

A.3.5 Pollution Prevention Potential

The waste generated is proportional to the amount of maintenance work being done at the facility. General minimization methods can have significant results when applied to maintenance activities.

A.4 **SOLID NON-REGULATED WASTE**

B Plant Complex has 2 identifiable sources (streams) within this waste category. These are shown in Table A-4.

Table A-4. B Plant Complex Solid Non-Regulated Waste Streams

Waste Stream	Estimated Annual Quantity	
	POUNDS	VOLUME
Miscellaneous Waste	10,524	275 FT ³
Oil Sent for Recycling	2317	330 GAL

A.4.1 Origin

Office wastes, paper, and supplies are collected and controlled by site janitorial services. Regular collection/compaction and transportation to the central landfill is the normal method of disposal.

A.4.2 Regulatory Status

There are no regulations applicable to this waste.

A.4.3 Cost

The cost is unavailable at this time.

A.4.4 Environmental/Safety Impacts

The use of segregation practices results in minimal environmental and no safety impacts in association with this waste form. The environmental impact is the bulk volume of space used at the central landfill.

A.4.5 Pollution Prevention Potential

The total solid waste is controlled by the level of activity at the facility. These items are non-toxic so the only pollution prevention is volume reduction.

A.5 LIQUID MIXED WASTE

B Plant Complex has several identifiable sources (streams) within this waste category. Non-routine sources are shown in Table A-5, while routine sources are shown in Table A-6.

Table A-5. B Plant Complex Non-Routine Liquid Mixed Waste Streams

Waste Stream	Estimated Annual Quantity (GALLONS)
Burial Box Wash Downs	6000 ^(a)
Cell Drain Header Camera Decontamination	2000 ^(b)
Cell Drain Header Cleaning	30,000 ^(c)
Cell Drain Header Integrity Assessment	20,000 ^(d)
Canyon Wash Down	10,000 ^(e)
DOP Test Sand Filter (1 Water Seal Volume)	8000 ^(f)
Aqueous Phase from Organic Solvent Removal	7000
Vessel Flushings	15,000
Jumper Flushings	30,000
Cell Washdown	40,000
Railroad Tunnel Decontamination	4500
Asbestos Removal	8000

- (a) Burial boxes are decontaminated before they are buried. Water volume will be controlled and minimized. Burials reduce fire load in canyon.
- (b) Video camera is required to inspect the cell drain header and needs to be decontaminated and repaired.
- (c) Inspection shows that the cell drain header needs to be cleaned. The volume of water used will be controlled and minimized.
- (d) B Plant Complex will perform a hydrostatic test of the cell drain header. The volume of water is determined by the size of the cell drain header. This work allows time for development of a recovery plan in the event the cell drain header fails the integrity test.
- (e) Due to the solid waste on the canyon deck, wash downs have not been performed in recent years. The wash down is required by ALARA concerns.
- (f) The sand filter must successfully pass a DOP test (probably required to close out project B-625). B Plant could operate with the A & B filters as a back-up to D filter. However, the A & B filters also require DOP testing which generates the same amount of waste.

Table A-6. B Plant Complex Routine Liquid Mixed Waste Stream

Waste Stream	ESTIMATED ANNUAL QUANTITY (GALLONS)
Tank 24-1	25,000

Note: Tank 24-1 is the send off point for waste being transferred to tank farms. All other collection tanks drain into Tank 24-1 for chemical addition to meet tank farms acceptance criteria.

A.5.1 Origin

B Plant Complex has several tanks in the canyon process cells which collect low level liquid waste from various processes throughout the facility. This waste is then routed to Tank 24-1 where various chemical are added to ensure the waste exhibits desired characteristics before transfer to tank farms for storage. It is this chemical addition that causes the liquid waste to be a mixed waste. This comprises the routine liquid mixed waste stream. Tanks which feed 24-1 include 9-1, 9-2, 10-1, 25-2, 29-2 and 39-1. Tanks 25-2 and 29-2 will be removed from the system in the near future. Tank 39-1 is the collection tank for liquid wastes coming out of WESF.

Non-routine liquid mixed waste streams shown in Table A-5 are those which are anticipated to be generated during B Plant's Cleanout and Stabilization Program. This will be a 7 year program to prepare the facility for decontamination and decommissioning. It should commence in the next few years. When this waste is generated, it will be disposed of in the same manner as the routine waste, through Tank 24-1. Thus, the non-routine quantities will be in addition to those presented for the routine waste stream.

Regulated chemicals which become radiologically contaminated during use in the canyon or other radiation areas can also be considered to be liquid mixed waste. However, such wastes are packaged for disposal and therefore are handled as solid mixed waste. Therefore, they are not included as a liquid mixed waste in this plan.

A.5.2 Regulatory Status

The bulk liquid from the tank system was identified and designated in the B Plant Complex Part A Permit.

Materials in this category are radioactive as a result of reprocessing activities. Radioactive waste at the facility is regulated by DOE Order 5820.2A, DOE-RL Order 5820.2A, and Westinghouse Manual WHC-CM-7-5.

A.5.3 Cost

The cost is unavailable at this time.

A.5.4 Environmental/Safety Impacts

When handling unknown hazardous material/waste, there is potential for adverse impact to the environment and personnel safety. These adverse impacts may be caused by uncontrolled releases, carelessness, lack of training, inadequate procedures or other intangibles. These circumstances are mitigated by personnel awareness, proper training, job safety analyses, usage of suitable sized containers, and efficiently engineered methods.

The main safety concerns are uncontrolled releases to the environment, radiation exposure, personnel exposure to toxic materials, and exceeding exposure limit values. Effects vary significantly with quantity, material, and duration of exposure.

A.5.5 Pollution Prevention Potential

The bulk type waste has the most detrimental effect on the success of the waste cleanup mission at Hanford. Tank Farm space is fixed, therefore if the 242-A evaporator is experiencing an outage, there is a fixed limit to operational life. This waste type has the highest potential for positive effects as a result of minimization activities.

Containerized wastes are usually the result of maintenance/operations activities within radiation zones. Minimization can be achieved by accurately forecasting exact amounts needed and leaving the excess outside the zone. Even if a liquid is not known to be radioactively contaminated, it is often disposed of as a radioactive waste with other radioactive liquid generated within a radiation zone.

A.6 LIQUID RADIOACTIVE WASTE

A.6.1 Origin

There are two liquid effluent streams which are classified as radioactive. These are the B Plant Steam Condensate (BCS) and the B Plant Process Condensate (BCP). These two liquid streams are currently not in service.

A.6.2 Regulatory Status

Radioactive waste at the facility is regulated by DOE Order 5820.2A, DOE-RL Order 5820.2A, and Westinghouse Manual WHC-CM-7-5. This material is defined as low level waste. The characterization of bulk liquids has determined that they be given a non-regulated designation.

A.6.3 Cost

The cost is unavailable at this time.

A.6.4 Environmental/Safety Impacts

The main safety concerns are uncontrolled releases into the environment or radiation exposure. Effects vary significantly with quantity, type, and duration of exposure.

A.6.5 Pollution Prevention Potential

Since these waste streams are not in service, a discussion of minimization potential is not provided.

A.7 LIQUID HAZARDOUS WASTE

This type of waste is packaged for disposal. Regulations define packaged liquid hazardous waste as solid waste. These wastes are discussed in section A.3.

A.8 LIQUID NON-REGULATED WASTE

A.8.1 Origin

Many sources of non-regulated container and bulk liquid wastes exist at B Plant Complex.

Liquid non-regulated maintenance materials include several petroleum/oil related products, such as lubricating oil, transmission fluid, and hydraulic fluid. Waste oil is containerized and disposed of under programs administered by Generator Services. Normal maintenance is not expected to generate regulated waste unless the equipment is serviced in a radiation zone or handles regulated materials as a part of the operating function. Analysis will be performed on all uncharacterized waste materials before disposal.

Lavatory and personal wash wastes are handled by discharge to two sanitary sewers at the facility.

Two liquid effluents from the plant are classified as non-regulated streams. The B Plant Cooling Water (CBC) and the B Plant Chemical Sewer (BCE) have no characteristics requiring regulatory control. The most recent annual estimates indicate that the CBC has a flow rate of approximately 1600 gallons per minute and the BCE has a flow rate of approximately 125 gallons per minute.

The BCE handles various flushes, steam condensate, floor drains and other miscellaneous sources which do not contain planned radioactive constituents. This stream will go to the Treated Effluent Disposal Facility (TEDF) when it is completed.

The CBC starts as raw water and is discharged as two sub-streams. The first sub-stream receives discharges from processing vessels with low impact potential such as several processing condensers, B Plant steam condenser, 212-B cask station effluent, and cooling water from the 225-B pools. It is continuously monitored for beta and gamma radiation.

The second sub-stream receives discharges from higher impact potential sources, including B Plant facilities. It is continuously monitored for beta and gamma radiation. If release limits are not met, the sub-stream is diverted to the 216-B-59 retention basin and then recycled through the low level waste cycle of B Plant. If radiation levels are less than release limits, the two sub-streams are combined.

Currently, the BCE and CBC are combined at 207-B, and proportionally sampled at 207-BA before discharge to the 207-B basins.

A.8.2 Regulatory Status

Not applicable for this category of waste. These wastes are non-regulated.

A.8.3 Cost

The cost is unavailable at this time.

A.8.4 Environmental/Safety Impacts

The material is non-hazardous and non-regulated, having minimal impact to the environment and to safe operations. The risk of adverse impact may be caused by uncontrolled releases, carelessness, lack of training, inadequate procedures or other intangibles. Uncontrolled releases of oils may cause personnel injury or be combustible.

Any adverse risks are mitigated via the facility having a history of acceptable operating practices. Safety equipment (fire extinguishers) and materials (absorbent, non-flammable storage cabinets, closed waste drums) are kept close (usually within 15 feet) to the work area. No smoking signs are posted throughout the facility.

A.8.5 Pollution Prevention Potential

Current reduction/recycling techniques for oil-related products have aided in reducing the volume of this waste. Current practices will continue.

The BCE and CBC are generated roughly proportional to the level of processing activity in the plant. Sanitary sewer waste is generated roughly in proportion to the number of staff at the facility.

A.9 GASEOUS NON-REGULATED WASTE

A.9.1 Origin

Various gaseous effluents are produced by ventilation systems which assure that contaminants remain in the facilities. Several sources make up the gaseous waste streams. The individual sources are given in Table A-7.

Table A-7. B Plant Complex Gaseous Non-Regulated Waste Streams

Waste Stream	Estimated Annual Quantity [CUBIC FEET PER MINUTE (CFM)]
B Plant Main Stack (291-B-1)	30,944
221-BB Stack (296-B-5)	1295
WESF Main Stack (296-B-10)	18,377
221-BF Stack (296-B-13)	685
Operating Gallery Exhaust System (296-B-21 through 27)	72,000 ^(a)

(a) Fan 296-B-21 currently not in service.

A.9.2 Regulatory Status

Waste streams are registered with the state.

A.9.3 Cost

The cost is unavailable at this time.

A.9.4 Environmental/Safety Impacts

The material is non-hazardous and non-regulated having minimal impact to the environment and to safe operations. Adverse impact may be caused by uncontrolled releases, negligence, lack of training, or inadequate procedures.

A.9.5 Pollution Prevention Potential

The volume discharged in gaseous waste streams is dependent on ventilation requirements. While the volumetric flow rate is fixed, the concentration of contaminants can be affected by engineering or administrative actions.

APPENDIX B
POLLUTION PREVENTION GOALS AND OBJECTIVES

B-0

B.1 Calendar Year 1990 Waste Minimization Goals at B Plant Complex

1. Suspend Tank Farm Transfer Flushes Cease flushing of transfer lines after transfer of waste to tank farms for unconcentrated solutions. This action is anticipated to result in a reduction of 180,000 gallons, or 27% of the material.
2. Segregation Enforce segregation of radioactive, hazardous, mixed and non-radioactive, non-hazardous wastes. Procedures for segregation will be published in the Waste Certification document planned to be released this year.
3. Employee Incentive Develop a meaningful incentive program for waste minimization. The proposed program consists of a letter from the plant manager and an item from the Thanks program. Determining a reward representing the value of the suggestion to the plant is desirable.
4. Size Reduction Implement use of the 213-W compactor for compactible waste. Develop methods to reduce the volume of wastes sent out as solid radioactive waste at the facility. Methods to fragment or otherwise effect the volume of non-compactible waste will be studied.
5. Procurement Control Research and develop procurement control plan of hazardous materials. This is necessary to evaluate chemical use in order to optimize waste reduction.
6. Minimize Heels Develop methods to minimize the replacing of heels (used for prevention of ventilation system cross ties).
7. Reroute Wastes Study alternate methods to reroute waste in B Plant to reduce the amount of jet eductor dilution (steam as the motive fluid condenses). Amount of reduction of 32,000 gallons, or 5% of the material.
8. Engineer 6H Training Give engineers tips on producing designs or instructions which minimize waste production.
9. All Hands Meeting Waste minimization will be emphasized at two or more of the B Plant 1990 All Hands Meetings.

B.2 Calendar Year 1991 Waste Minimization Goals at B Plant Complex

1. Suspend Tank Farm Transfer Flushes Continue to cease flushing of transfer lines after transfer of waste to tank farms for unconcentrated solutions.
2. Plant Operations Evaluate the use of B Plant Process Condensate (BCP) for waste minimization activities in B Plant associated with transfers to tank farms.
3. Waste Segregation An evaluation of existing facilities for use as waste segregation facilities is currently underway. Status of this evaluation will be reported quarterly. This task meets environmental requirements and also supports B Plant waste minimization programs.
4. Procurement Control Develop procurement control of hazardous materials with the implementation of a Hazardous Materials Coordinator (HMC) in the newly restructured operations organization.
5. Waste Size Reduction All contaminated vegetation will be compacted by use of the compact vegetation truck. In addition, miscellaneous segregated compactible waste from B Plant will be sent to the 213-W compactor. Volume reductions and price cost savings will be reported for each of these waste types quarterly.
6. Minimize Heels Continued development of methods to minimize the replacing of heels (used for prevention of ventilation system cross ties).
7. Water Management Study and evaluation of water management practices to minimize water use in plant operations and waste streams (taking into account both ALARA and no impact to operations).
8. Reroute Wastes Study alternate methods to route waste in B Plant to reduce the amount of jet eductor dilutions (steam as the motive fluid condenses).
9. Chemical Use/Inventory Evaluate use and substitution of less hazardous, alternative materials. Reduce existing unused chemical inventories. Consider existing surplus inventories available through Hanford Inventory Program (HIP) before ordering additional material.
10. All Hands Meeting Waste minimization will be emphasized at two or more B Plant 1991 All Hands Meetings.

B.3 Calendar Year 1992 Waste Minimization Goals at B Plant Complex

1. Solid Waste Volume Reduction Compactible and non-compactible low-level waste will continue to be field segregated at B Plant. The compactible waste will be sent to the 213-W compactor which operates with a compaction ratio of 5 to 1. Also contaminated vegetation which collects at B Plant will be compacted at a 6 to 1 ratio using the compactible vegetation truck. Volume savings, based on appropriate compaction ratios, as well as cost savings from this activity will be reported on a quarterly basis.
2. Pipe Gallery Refurbishment Mixed Waste Reduction A large volume of radioactive mixed waste may be generated from the pipe gallery refurbishment project. B Plant Process Engineering is investigating the option of sand blasting to segregate regulated paint from the pipe. The results of the cost investigation, mixed waste volume reduction, and the associated cost savings will be reported when available.
3. HEPA Filter Mixed Waste Identification High efficiency particulate air (HEPA) filters that have been exposed to di-octyl phthalate (DOP) and/or di-octyl sebacate (DOS) are regulated as a characteristically hazardous waste. B Plant Design Engineering is preparing lists of regulated and non-regulated filters based on process knowledge. This activity will reduce the number of filters which will be treated as mixed waste. Associated volume reduction and cost savings will be reported when available.
4. Concentrator Startup Plan Evaluate the use of the low level waste concentrator for waste minimization activities in B Plant associated with transfers to tank farms. Start up and operate the concentrator to characterize the process and steam condensate waste streams.
5. BCE Water Management Study and evaluate water management practices of contributors to the B Plant Chemical Sewer (BCE) system in an effort to minimize water use in plant operations and reduce the volume of this effluent waste stream (taking into account both ALARA and impact to operations).
6. CBC Water Management Evaluate and identify unneeded contributor streams to minimize cooling water use in plant operations and the B Plant Cooling Water (CBC) effluent waste stream (taking into account both ALARA and impact to operations).
7. Steam Usage Study and evaluate steam usage practices at B Plant and provide options to minimize total steam used in plant operations.
8. Chemical Use/Inventory Evaluate the use and substitution of less hazardous, alternative materials for daily use by Maintenance and

Operations. Reduce or eliminate existing unused chemical inventories. Consider existing surplus materials available through Hanford Inventory Program (HIP) before ordering additional materials.

9. RCRA Listed Constituent Disposal/Elimination Identify and properly dispose of products which, when designated as waste, are considered "listed" wastes. Also, dispose of materials which are regarded as items of environmental concern. (Identification of substitutes may be necessary.) Examples of specific actions may include:

- Eliminate all Acetone from plant inventory.
- Eliminate all Methyl Ethyl Ketone from plant inventory.
- Dispose of all Hg and Red Oil manometers currently in use at the plant.

This goal will be updated as products and materials are identified for disposal or elimination.

10. Procurement Control Develop procurement control of hazardous materials with the implementation of a Hazardous Materials Coordinator (HMC) in Waste Operations organization.
11. Waste Minimization Training The importance of waste minimization awareness on the job will be presented to operations personnel in a training session which will consist of a company generic video along with a B Plant Complex specific presentation to be given by plant management.

B.4 Calendar Year 1993 Waste Minimization Goals at B Plant Complex

1. Plant Operations B Plant Engineering estimates that it will generate 2.5 to 5 million gallons of dilute non-complexed low-level waste (LLW) during its five year Cleanout and Stabilization Program. Efforts to re-start the B Plant LLW concentrator are ongoing in order to minimize the volume of waste sent to Tank farms dangerous waste tanks. During 1992, maintenance on the system was completed to bring the system out of mothball, and preliminary negotiations with regulators were held. In 1993, system operational tests, feed characterization and continued discussions with regulators are scheduled.
2. NCAW Management Transfer of the residual neutralized current acid waste (NCAW) inventory from B Plant back to the double-shell tank system will eliminate the need for continued operation of B Plant's vessel vent system. Because this system employs a steam heater which generates LLW steam condensate, permanent shut-down of the system will result in a reduction of approximately 50,000 gallons of LLW generated per year. The NCAW transfer is scheduled to be completed in April 1993 after which the vessel vent system will be shut down.
3. B Plant Complex Demineralized Water Supply System B Plant currently uses a cation/anion exchange column system for producing demineralized water. This type of a system requires periodic generations to restore the ion exchange capacity of the column resins. The regenerations involve flushing one column with sulfuric acid and the other with sodium hydroxide, which generate a hazardous waste. This system is currently offline and requires regeneration. A new system which utilizes continuous deionization (CDI) technology is currently being installed in B Plant. This system will eliminate the hazardous waste stream involved with regenerations. No regeneration of the old system is anticipated prior to startup of the new CDI system.
4. B Plant Chemical Sewer Water Management During periods of heavy precipitation, the B Plant Chemical Sewer (BCE) receives a significant portion of the storm water runoff at B Plant. B Plant's Design Engineering group is preparing an improved sight drainage plan, to be completed by 8/31/93, that will divert the storm water runoff away from the BCE.

Cooling water for the B Plant Instrument Air Compressors presently contributes an average of 50 gpm to the BCE. An engineering study, to be completed by 6/30/93, will be undertaken to evaluate decommissioning B Plant's air compressors and supplying surplus compressed air from the WESF Instrument Air Compressors. Schedules and budget requests to decommission the B Plant Instrument Air Compressors will be initiated for FY94 if the study results show that the B Plant Instrument Air Compressors can be shut down.

5. Hazardous Material Substitution B Plant's process air compressors currently use Sulluble 32 lubricating oil. Samples of used Sulluble 32 that were sent out for laboratory analysis contained concentrations of Barium that exceeded the regulatory threshold for a Washington State dangerous waste. B Plant's Maintenance organization has requested that an offsite vendor assist in identifying a non-hazardous substitute for the Sulluble 32 that may be recycled.
6. Use of 100N Sorting and Compaction Facility B Plant Engineering is evaluating shipping low-level radioactive waste to the 100N sorting and compaction facility. The compactible waste fraction will be separated from the non-compactible waste and will be processed through the compaction facility prior to packaging and shipment to the low-level burial grounds. A volume reduction of at least 75% is expected for the amount of compactible low-level waste being sent to burial grounds.
7. Waste Minimization Training A formal waste handling plan for B Plant is currently being developed. The plan will result in the development of some B Plant specific training sessions. The subject of these training sessions will include hazardous waste management, low level radioactive waste management, and waste minimization issues and goals. The plan will be fully developed and implemented by second quarter 1993.
8. Hazardous Material Procurement Control B Plant's Waste Operations group is developing a written procedure that will require signature review by the Hazardous Material Coordinator of all hazardous material procurement. This procedure will seek to reduce both the quantity and toxicity of chemicals brought into the plant.
9. Bulk Liquid Chemical Disposal B Plant currently has a surplus inventory of approximately 4000 gallons each of HEDT and EDTA. B Plant Process Engineering will offer this surplus inventory for sale through the National Chemical Sale to avoid disposing of the chemicals as a waste.

B.5 Calendar Year 1994 Waste Minimization Goals at B Plant Complex

1. Radiation Zone Reduction B Plant Health Physics will clean up or downgrade 20 percent (133,725 square feet) of the total area at B Plant which is currently designated as a radiation zone of some sort.
2. Hazardous Material Reduction B Plant will develop an active program to replace hazardous material in use at B Plant with available non-hazardous substitutes.

B Plant will excess or dispose of all non-essential hazardous materials located at the facility.

B Plant will reduce the total number of hazardous materials in its inventory from the current level of greater than 900 to less than 400 and will maintain an active up-to-date inventory.

The Hazardous Material Coordinator will actively oversee and approve the purchase of hazardous materials to eliminate unnecessary inventory.

3. B Plant Chemical Sewer (BCE) Management B Plant Design Engineering will undertake an engineering study to evaluate shutting down B Plant's Air Compressors and supplying surplus compressed air from the WESF Instrument Air Compressors. Currently, cooling water from the B Plant Process Air Compressors contributes an average of 50 gallons per minute to the BCE.
4. Recycling and Reuse B Plant will continue to recycle lead acid batteries, used oil and scrap metal in accordance with the approved Westinghouse Hanford Company (WHC) procedures.

B Plant will explore the option of sending non-regulated oily and greasy rags to the new laundry facility to be washed and reused instead of disposing of them as waste.

APPENDIX C
PRIOR POLLUTION PREVENTION ACCOMPLISHMENTS

C-0

C.1 CALENDAR YEAR 1986 ACCOMPLISHMENTS

An intensive housecleaning effort was launched to identify and dispose of excess hazardous materials and hazardous waste that had accumulated at the B Plant Complex. Steps taken during 1986 are listed below.

1. All Material Safety Data Sheets (MSDS) were ordered from the Hanford Environmental Health Foundation (HEHF), following another chemical inventory. This was the first step taken in identifying chemical components of products to determine hazards ratings.
2. A pre-designation of chemicals program was launched, assisted by Site Hazardous Waste Engineering Support (SHWES). The pre-identification of hazardous rating enhances B Plant capabilities to meet Environmental Protection Agency and Ecology requirements for waste minimization in substituting less hazardous chemicals where possible.
3. A policy was established with Radiation Health Physics to ensure proper radiological release of packaged waste. This will reduce the volume of mixed waste (MW).
4. A Plant-Level Operations Task Force was formed to address MW issues and develop procedures for low-level radioactive waste, both contact handled and remote handled. Members of Regulatory Compliance, SHWES, and Mixed Waste units participated. The primary focus was on segregation of chemicals, and methods to reduce the MW volumes.
5. Establish mercury vapor bulb-crusher satellite accumulation storage area to reduce the volume of hazardous waste.
6. Eighteen excess electrical transformers were removed. Nine transformers which were found to contain <1 ppm PCB were sold as Excess Equipment, the other nine containing up to 70 ppm PCB were transported to the 212-P area for proper disposal.
7. Excess Tri Butyl Phosphate and D2EHPA were removed from the 276-B area to reduce the potential for release. These solutions were no longer required for processing.
8. A formal study was started to remove mercury from the plant work areas, by replacing the mercury manometers. This resulted in Project W-010 being expanded to include replacing instrumentation in the 211-B area.
9. A formal study was conducted to substitute Freon-113 for 1,1,1-trichloroethane (TCA) (toxic halogenated hydrocarbon) as a decontaminant for the canyon crane. However, with the current (Ecology-induced) tank farm ban on chloro-fluorocarbons, the only advantage to the substitution

is that TCA is a listed CERCLA waste, whereas Freon-113 is not. Studies are ongoing in this matter.

10. Initiated an informal review of the paint-related material waste stream to determine feasibility of reducing volume by separating solvents and prolonging useful life of the individual components. It was determined that methods currently in practice maximized the efficiency of solvents.
11. Initiated an informal review of ethylene glycol waste produced from the chilled water system to determine feasibility of recycling the waste back through the system. It was determined that the waste contained too many contaminants for reuse.
12. Initiated redesign of jumpers in the canyon to eliminate the necessity for lead counterweights.
13. Initiated efforts to determine a substitute for lead shielding in new equipment design and fabrication.

C.2 CALENDAR YEAR 1988 ACCOMPLISHMENTS

1. B Plant Environmental Compliance Manual, WHC-CM-5-30, was developed as an official document designed as a management resource to bring together all of the criteria governing hazardous chemicals/dangerous waste, and to identify compliant procedures for regulatory requirements. Manual items 5.1 and 5.2 contain policies/procedures for waste segregation and waste minimization; the controlled Chemicals Section, item 3.1, requires material substitution and reduced inventory to the lowest practical minimum.
2. Inventory control and a production substitution program were initiated. All store orders and purchase requisitions for chemicals are being routed through the HWC for initial and concurrence. This program is being developed for inventory control, material balance purposes, cradle-to-grave documentation, and waste minimization.
3. Nonroutine jobs will include a pre-job identification of waste as part of Pre-Job Safety Meeting/Pre-Job Safety Checklist, and Hazardous Risk Evaluation. A Pre-job Safety Meeting is documented on form 54-6100-325, or a shift report, whichever is more convenient. Job Safety analysis is required as part of the Pre-job Planning (WHC-CM-4-3, A-2) and documented on form 54-3000-220, or WHC-CM-5-6 checklist.
4. An emphasis will be placed on future contracts to include waste minimization in all jobs at B Plant.

5. Waste segregation, a very important part of waste minimization, reduces the volume of radioactive and acutely hazardous waste. The following policies have been implemented:
 - Signs posted on each B Plant canyon entrance advising employees that supervision's permission is needed to take chemicals into the canyon.
 - Restricting introduction of chemicals into a radiation zone to only the necessary amount for adequate job performance; correct disposal methods will be pre-determined to prevent having to repackage mixed waste (ALARA); waste will be removed from the canyon in separate containers to permit contact-handled shipment, whenever possible.
 - Waste will be segregated into Department of Transportation hazardous class at time of generation.
 - Nonregulated waste (oil) will not be put into a container which previously held a regulated chemical.
6. Individual unit managers submitted a list of excess chemicals in their inventory, which was sent to all WHC Hazardous Waste Coordinators. Many chemicals have been shipped to other facilities.
7. Consolidate discarding of excess chemicals so the maximum amount can be lab-packed into one disposal drum. This offer was extended to all WHC facilities regarding used mercury.

C.3 CALENDAR YEAR 1989 ACCOMPLISHMENTS

1. B Plant Waste Minimization Plan, WHC-SD-WM-EV-025, was initiated and developed as an official document which addresses waste minimization efforts at B Plant Complex. The plan includes actions and goals for reducing the volume and toxicity of waste generated. The plan also establishes a basis for the evaluation of progress toward waste minimization goals and activities. Descriptions of waste streams, specific current goals, general waste minimization methods, and specific accomplishments are in the appendices of the plan.

C.4 CALENDAR YEAR 1990 ACCOMPLISHMENTS

1. Tank Farm Transfer Flushes were suspended as of March 30, 1990. The flushing of transfer lines after transfer of waste to Tank Farms was eliminated and was anticipated to result in a 27% reduction of waste material, or 180,000 gallons. The actual reduction, when combined with

the steam jet dilution volume (5712 gallons) saved when use of Tank 29-2 was eliminated, was a total of 170,712 gallons. This resulted in an average volume reduction of 35.1% and a savings of approximately \$1,365,700 (based on \$8 per gallon of waste transferred to Tank Farms).

2. Segregation of radioactive, hazardous, mixed and non-radioactive, non-hazardous wastes is currently practiced at B Plant Complex. A procedure, "Perform Handling of Compactible and Noncompactible Waste," (BO-100-017) was issued. This procedure outlines the particular methods of segregation of solid waste which were already in place.
3. Employee Incentive program for waste minimization at B Plant was developed. The incentive program is accomplished through the "Thanks!" program and is comprised of letters from the plant manager to a person(s) who has demonstrated exemplary performance at B Plant in the area of waste minimization.
4. Size reduction of compactible waste is ongoing via use of the 213-W Waste Compactor. Procedure BO-100-017, "Perform Handling of Compactible and Noncompactible Waste," describes the segregation of waste so that the compactible waste can be sent to the Compactor.
5. Minimization of Heels is accomplished by replacing heels (used for the prevention of ventilation system cross ties) with Tank 25-1 waste solution to provide a water seal. The previous practice and use of demineralized water for this purpose was eliminated as of May 25, 1990. A total of 32,500 gallons were saved during CY 1990, resulting in a savings of approximately \$260,400 (based on \$8 per gallon of waste transferred to Tank Farms).
6. Reroute wastes was a modification implemented in June, 1990, to further reduce waste at B Plant. The modification was completed to pump waste from Tank 24-1 to Tank 25-1 directly. Prior to this modification, the waste was transferred through the Cell 23 Concentrator to Tank 23-1, and then to Tank 25-1 using a jet steam. From July, 1990 through the end of CY 1990, this modification resulted in a 10,718 gallon reduction in waste generation by eliminating the steam jet dilution factor. This reduction resulted in a savings of \$85,744 (based on \$8 per gallon of waste transferred to Tank Farms).
7. Engineer 6H Training, the Facility Specific Hazards Training Course, was completed. In addition to the 6H Training, engineers were given an additional hour of training considering material conservation. Methods to minimize waste when preparing procedures, work plans, and designs were discussed. Points on deciding the accuracy of a Material Safety Data Sheet (MSDS) or Hazard Classes were also discussed at the training session. A list of further resources was established.

8. All Hands Meetings were held twice during CY 1990 where the transition of management, effects of reorganization, and waste minimization were discussed.

C.5 CALENDAR YEAR 1991 ACCOMPLISHMENTS

1. Existing inventory of unused hazardous material was significantly reduced at B Plant during 1991. The following table summarizes the materials which were removed from B Plant inventory. Although attempts were made by B Plant Waste Operations to exchange the material, no potential users were identified and the inventory was discarded as waste material.

PRODUCT ELIMINATED	AMOUNT DISPOSED
55% Nitric Acid	3600 kg
45% Nitric Acid	19000 kg
25% Nitric Acid	4300 kg
Dearborn 727	55 gallons
Dearborn 874	55 gallons
Turco 4518	220 gallons
Turco 4521	475 lbs
Turco 4502	500 lbs
1,1,1 Trichlorethane	220 gallons
Freon 113	165 gallons
Sodium Nitrate	35 gallons
Unisol	220 gallons
"Voltz"	35 gallons

2. An engineering analysis was performed to show that the B Plant vessel ventilation heater could be operated at a lower temperature. As a result, the plant operating procedure was changed and the shifts were trained. This new procedure has significantly reduced the volume of steam condensate that is generated from the heater. Since these changes were implemented in May, 1991, steam condensate flow was reduced by approximately 0.2 gpm. The total volume reduction from May through December, 1991, was 60,480 gallons, resulting in a savings of \$124,468 [based on Tank farm disposal costs of \$22 per gallon for 10% of the

waste (grout) and \$0.62 per gallon for 90% of the waste (overheads from the evaporator)].

C.6 CALENDAR YEAR 1992 ACCOMPLISHMENTS

1. The pipe gallery project will use an abrasive blast unit to segregate the regulated lead paint from the abandoned piping removed from the gallery. This will allow for disposal of the paint chips as mixed waste and the clean pipe as excess, and will result in a significant savings in burial costs. The machine was delivered in May 1992 and has proven effective. However, the pipe gallery project was suspended at mid-year due to budget cuts. Funding to complete the pipe gallery project has been included in the FY 1993 budget with operation scheduled to begin January 25, 1993.
2. A Hazardous Material Coordinator (HMC) has been added to the B Plant Waste Operations group. To aid in the reduction of the quantity of Hazardous Wastes being generated at "the front end," the HMC will perform the following functions:
 - Guidance for the control and storage of the Hazardous Material Inventory (HMI).
 - Prejob review of work packages which will provide guidance for handling and disposal of hazardous wastes.
 - Review of procurement orders for hazardous materials which will allow for the evaluation of product substitutions and ensure that the HMI of excessed chemicals be used whenever possible.
 - Periodic evaluations of chemical inventories to reduce or eliminate existing unused inventories.
3. Existing inventory of unused hazardous material was significantly reduced at B Plant during the past year. All maintenance areas have been inspected and determined to be free of Acetone and Methyl Ethyl Ketone.
4. Waste minimization was emphasized at waste handling training sessions during 1992. A formal "Subject-Matter-Expert" training session was presented to all craft and operations personnel at B Plant Complex. The training focused on waste handling procedures and issues, including waste minimization.

C.7 CALENDAR YEAR 1993 ACCOMPLISHMENTS

1. Transfer of the residual neutralized current acid waste (NCAW) inventory from B Plant back to Tank Farms double-shell tank system was completed. This eliminated the need for continued operation of B Plant's vessel vent system. Because this system employs a steam heater which generates low level waste (LLW) steam condensate, permanent shut-down of the system will result in a reduction of approximately 50,000 gallons of LLW per year. The vessel vent system will now only be operated during organic consolidation and transfers.
2. Installation of a new continuous deionization (CDI) system has been completed at B Plant. This system will eliminate the hazardous waste stream generated during regeneration of the old system.
3. B Plant's process air compressors currently use Sullube 32 lubricating oil during operation. Previously, samples of used Sullube 32 sent out for laboratory analysis showed concentrations of Barium exceeding the regulatory threshold for a Washington State Dangerous Waste. Subsequent sample results, however, have indicated that the Barium concentration in Sullube 32 is below the dangerous waste threshold. Therefore, locating a non-dangerous substitute for Sullube 32 will not receive further attention.
4. B Plant Waste Operations shipped the first load of compactible, low level waste to the 100N Sorting and Compaction Facility on October 6, 1993 and has continued to do so. For CY 1993, B Plant Waste Operations shipped a total of 6-4x4x8 plywood boxes of compactible waste (768 cubic feet) to the 100N Compaction Facility. From these six boxes, 16-55 gallon drums (118 cubic feet) of low-level waste were generated for disposal at the low-level waste burial grounds. This was an 85% reduction in the volume of compactible, low-level waste from B Plant during those three months. At a disposal cost of \$46.40 per cubic foot of low-level waste, this represented a cost savings of almost \$30,000.
5. A formal solid waste management training plan for B Plant has been developed and issued. This training plan includes specific information regarding waste minimization activities and goals at B Plant.
6. The B Plant Hazardous Material Procurement Control procedure is in place and functioning satisfactorily. Procurements are being reviewed by the Hazardous Material Coordinator prior to purchasing. Full compliance with this procedure has been required since October 25, 1993.
7. During 1993, B Plant transferred approximately 21,400 gallons of bulk chemicals with no identifiable use at B Plant to alternate chemical users. This included 3,300 gallons of aluminum nitrate nonahydrate (ANN) to Plutonium Finishing Plant (PFP) in June 1993, 11,300 gallons of

ANN to Westinghouse Idaho Nuclear Company at the Idaho National Engineering Laboratory in July/August 1993, and 2,900 gallons of (HEDTA) and 3,900 gallons of (EDTA) to an offsite chemical broker in September 1993. Disposition of these chemicals as a usable product to alternate users prevented the generation of approximately 21,400 gallons of dangerous waste. A cost savings of almost \$44,000 was realized as a result of this action.

8. The low level waste system is continually monitored and checked for additional sources that can be eliminated. The canyon supply fan float valves were identified as creating a source that can be minimized. These float valves frequently stick open and go out of calibration, creating a fluctuation of 40-350 gallons per day into the Low Level Waste system. An alternate method of float valve and sump operation was designed to eliminate this problem.
9. Lists of hazardous materials which B Plant work groups want excessed were received by the Hazardous Material Coordinator (HMC). These materials were no longer needed and/or have been replaced by less hazardous materials. The HMC coordinated with WHC Asset Recovery (formerly Excess, Surplus Sale, and Shipping) to get these materials excessed as quickly as possible. Some of the hazardous materials which were identified for excessing included:
 - 3400 pounds of lead.
 - 35 gallon drum of ND-165.
 - 18-two and a half gallon bottles of disinfecting cleaner.
 - 144 aerosol cans of oven cleaner.
 - 49 quarts of multipurpose cleaner.
 - 20 aerosol cans of foam cleaner.
 - 19-one gallon pails of miscellaneous paint. (excessed to Kaiser in November 1993)
10. Manipulator boot changeout frequencies in WESF were extended based on an evaluation encompassing the past five years of standby hot cell operation. Manipulator boot frequencies were extended in four of the seven hot cells, resulting in reduced operating costs and waste minimization. Manipulator boots are packaged as category III waste in the WESF A cell and transported to storage in B Plant cell 4.
11. Previously, Turco Products, Inc. Fabrifilm was used as a fixative during K-3 HEPA filter change outs. Fabrifilm is a regulated waste under both U.S. Environmental Protection Agency (EPA) and Washington Department of Ecology (WDOE) regulations. From a list of several possible non-hazardous substitution products, American Cyanamid Arrowspray 70A was chosen to be used as the fixative for the K-3 filter change outs which took place during September 1993. Arrowspray 70A performed as expected, reducing the volume of mixed waste produced and minimizing the exposure

of operation personnel to hazardous substances. The cost of Arrowspray 70A is \$.12 per square yard of application vs. \$1.24 per square yard for Fabrifilm. This represents a cost reduction of 90% for any given application.

In the past, B Plant used inhibited 1,1,1 Trichloroethane (TCA), a listed hazardous waste, to decontaminate the 75-ton canyon crane before maintenance work and to prevent contamination from falling off the crane and spreading in the canyon. This practice generated waste which required disposal as a mixed waste. In June, the canyon crane was decontaminated using 80 gallons of PF-145HP HIGH PERFORMANCE DEGREASER SOLVENT and a 7 to 1 water/ND-150 mix, both non-regulated, non-hazardous substances. Disposal as a low-level waste instead of as a mixed waste resulted in a cost reduction of \$930.

12. B Plant has a program in place to recycle its lead acid batteries according to the established Westinghouse Hanford lead acid battery recycling plan. This action reduces the amount of regulated waste which requires disposal. The program recycled approximately 2600 pounds of lead acid batteries in 1993, saving as much as \$5000 in disposal costs.
13. B Plant accumulates used oil for recycling and energy recovery. This action was initiated to reduce disposal costs and waste volume. Approximately 200 gallons of used oil were recycled in 1993.
14. B Plant has a program in place to recycle scrap metal according to the established Westinghouse Hanford procedure. This action was initiated to reduce waste volume. Approximately 10,000 pounds of scrap metal were recycled at B plant in 1993.
15. B Plant's Design Engineering group evaluated installing volume displacement material in two HEPA filter water seals. The water seals are utilized to prevent air flow to the HEPAs when they are not in service and the installation of volume displacement material would reduce the quantity of low-level waste generated when the seals are drained. B Plant Design Engineering's study showed this to be a poor alternative and it will no longer be considered.
16. During 1993, a total of 8,032 square feet of radiologically contaminated areas were either decontaminated for free release as an uncontrolled area or downgraded to a less restrictive radiation area. The majority of this area was a result of the clean up of the B Plant Pipe Gallery, the steam lines and the 291-B area. This decontamination reduces the need to use anti-contamination clothing and minimizes the amount of low-level waste generated as a result of work in radiation areas.
17. Previously, B Plant's electricians cut conduit using a threader, Mallory rigid thread cutting oil, rags for wiping, and a bucket for filings.

This process resulted in significant amounts of used cutting oil, oily rags and filings which were disposed of as a regulated waste. To minimize this waste stream, the electricians obtained a bucket/receptacle with a sieve near the bottom and were able to strain the filings from the used cutting oil. This process enables them to recycle the cutting oil for multiple uses, reducing the frequency with which it must be disposed.

18. In late October, B Plant received a self-contained, CO₂ based radiological decontamination facility for a 3 month trial period. The facility began operation in mid-November. The facility was used to decontaminate tools and equipment which were radiologically contaminated. The process successfully decontaminated about 1600 pounds of lead sheets, as well as approximately 60 different tools and pieces of equipment. Of those 60, over a third were free released for use outside of radiation areas. The lead sheets were unconditionally released to be excessed offsite.

APPENDIX D
POLLUTION PREVENTION METHODS/PROCEDURES

D-0

Handling hazardous material/waste has potential for adverse impact to the environment and personnel safety. These adverse impacts may be from uncontrolled releases, carelessness, lack of training, inadequate procedures or other intangibles. These circumstances are mitigated by proper training, personnel awareness/involvement, job safety analyses and engineered methods.

D.1 Safety

The main safety concerns are uncontrolled releases to the environment, radiation exposure, personnel exposure to toxic materials, and exceeding exposure limit values. Effects vary significantly with quantity, material, and duration of exposure.

D.2 Minimization Potential

Minimization can be achieved by accurately forecasting amounts needed. Individuals are instructed to take only what is required to accomplish a job. Line and staff members preview all work for waste reduction opportunities.

There is great pollution prevention potential for activities which generate large quantities of waste. To reduce waste, information may be incorporated into procedures, work plans, or training. The following are being used:

- Employees are made aware of the cost associated with disposal of hazardous waste.
- Materials of least toxicity are specified for a task.
- Compactible materials are so processed (DOE requirement only).
- Recyclable materials are segregated and so processed.

D.3 Engineered Methods

Pollution prevention is applied in all phases of the pre-job planning, and in safety briefings of workers so that the least level of contamination is encountered. Worker exposures are minimized in accordance with the ALARA program, and wastes generated in the processes have minimal toxicity, volume and impacts.

D.4 New Projects

Pollution prevention opportunities will be considered for every work package. In accordance with established procedures, work packages are reviewed by the appropriate Safety, Quality, Health Physics and/or Environmental approval designators.

per 100
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1000