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WHC-EP-0342
Addendum 6

B Plant Chemical Sewer Stream-Specific Report

Prepared for the U.S. Department of Energy
Office of Environmental Restoration
and Waste Management

Westinghouse Hanford Company Richland, Washington

Hanford Operations and Engineering Contractor for the
U.S. Department of Energy under Contract DE-AC06-87RL10930

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B Plant Chemical Sewer Stream-Specific Report

K. A. Peterson

Date Published
August 1990

Prepared for the U.S. Department of Energy
Office of Environmental Restoration
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Westinghouse Hanford Company P.O. Box 1970
Richland, Washington 99352

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B Plant CHEMICAL SEWER STREAM-SPECIFIC REPORT

K. A. Peterson

ABSTRACT

The proposed wastestream designation for the B Plant Chemical Sewer (BCE) wastestream is that this stream is not a dangerous waste, pursuant to the Washington (State) Administration Code (WAC) 173-303, Dangerous Waste Regulations.* *A combination of process knowledge and sampling data was used to make this determination.*

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*Ecology, 1989, *Dangerous Waste Regulations*, Washington (State) Administrative Code (WAC) 173-303, Washington State Department of Ecology, Olympia, Washington.

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EXECUTIVE SUMMARY

The proposed wastestream designation for the B Plant Chemical Sewer (BCE) wastewater stream is that the stream is not a dangerous waste, pursuant to the Washington (State) Administrative Code (WAC) 173-303, *Dangerous Waste Regulations*.* This designation, made by applying a combination of process knowledge and sample data for the BCE routine operation (October 1989 to March 1990) was used to determine if the effluent contains a listed dangerous waste (WAC 173-303-080). Sampling data alone is used to compare to the dangerous waste criteria (WAC 173-303-100) and dangerous waste characteristics (WAC 173-303-090). Sample data for the BCE routine operation was from the October 1989 to March 1990 timeframe that is based on the *Liquid Effluent Study Characterization Data* (WHC-EP-0355).**

Resampling of the BCE anion and cation configurations should be performed as discussed in Section 6.0.

*Ecology, 1989, *Dangerous Waste Regulations*, Washington (State) Administrative Code (WAC) 173-303, Washington State Department of Ecology, Olympia, Washington.

**WHC, 1990, *Liquid Effluent Study Characterization Data*, WHC-EP-0355, Westinghouse Hanford Company, Richland, Washington.

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LIST OF TERMS

ALARA	as low as reasonably achievable
AMU	aqueous makeup units
BCE	B Plant Chemical Sewer
CI	confidence interval
DOE	U.S. Department of Energy
EC	equivalent concentration
Ecology	Washington State Department of Ecology
EP	extraction procedure
EPA	U.S. Environmental Protection Agency
FDC	functional design criteria
FPMCS	Facility/Process Monitor and Control System
FY	fiscal year
HEC	Hanford Environmental Compliance
HH	halogenated hydrocarbons
HVAC	heating, ventilation, and air conditioning
IARC	International Agency for Research on Cancer
ISE	ion specific electrode
IWT	Illinois Water Treatment
Mgal	Million Gallons
NCAW	neutralized current acid waste
PAH	polycyclic aromatic hydrocarbons
PUREX	Plutonium-Uranium Extraction
REDOX	Reduction-Oxidation
RTRP	reinforced thermosetting resin pipe
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
VCP	vitrified clay pipe
WAC	Washington (State) Administrative Code
WESF	Waste Encapsulation and Storage Facility
wt%	weight percent

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B PLANT CHEMICAL SEWER STREAM-SPECIFIC REPORT

1.0 INTRODUCTION

1.1 BACKGROUND

In response to the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 1989), comments from the public were received regarding reduction of the discharge of liquid effluents into the soil column. As a result, the U.S. Department of Energy (DOE), with concurrence of the Washington State Department of Ecology (Ecology) and the U.S. Environmental Protection Agency (EPA), committed to assess both the waste disposal and contaminant migration potential of liquid discharges at the Hanford Site (Lawrence 1989).

This assessment is described in the *Liquid Effluent Study Project Plan* (WHC 1990c). A portion of this study consists of characterizing 33 liquid effluent streams. The characterization consists of the following elements: process data, sampling data, and dangerous waste designations pursuant to the Washington (State) Administrative Code (WAC) 173-303 (Ecology 1989).

The results of the characterization study are documented in 33 separate reports, one report for each wastestream. The complete list of stream-specific reports appears in Table 1-1. This document is one of the 33 reports.

1.2 APPROACH

This report characterizes the B Plant Chemical Sewer (BCE) wastestream in sufficient detail to both support a designation per the *Dangerous Waste Regulations*, WAC 173-303, and so that an assessment of the relative effluent priorities can be made with regard to the need for treatment and/or alternative disposal practices.

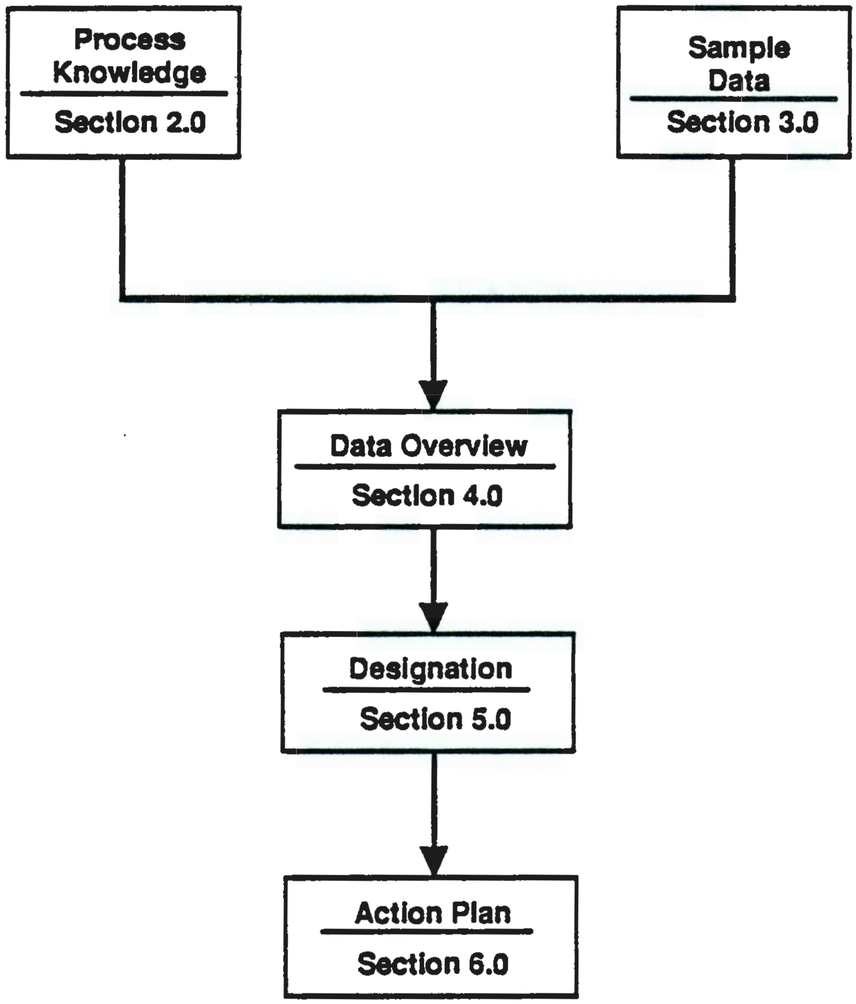
This characterization strategy (see Figure 1-1) is implemented by means of the following steps.

- Describe both the process and sampling data (Sections 2.0 and 3.0, respectively).
- Compare data and stream deposition rates (Section 4.0).

Table 1-1. Stream-Specific Characterization Reports.

WHC-EP-0342	Addendum 1	300 Area Process Wastewater
WHC-EP-0342	Addendum 2	PUREX Plant Chemical Sewer
WHC-EP-0342	Addendum 3	N Reactor Effluent
WHC-EP-0342	Addendum 4	163N Demineralization Plant Wastewater
WHC-EP-0342	Addendum 5	PUREX Plant Steam Condensate
WHC-EP-0342	Addendum 6	B Plant Chemical Sewer
WHC-EP-0342	Addendum 7	UO_3/U Plant Wastewater
WHC-EP-0342	Addendum 8	Plutonium Finishing Plant Wastewater
WHC-EP-0342	Addendum 9	S Plant Wastewater
WHC-EP-0342	Addendum 10	T Plant Wastewater
WHC-EP-0342	Addendum 11	2724-W Laundry Wastewater
WHC-EP-0342	Addendum 12	PUREX Plant Process Condensate
WHC-EP-0342	Addendum 13	222-S Laboratory Wastewater
WHC-EP-0342	Addendum 14	PUREX Plant Ammonia Scrubber Condensate
WHC-EP-0342	Addendum 15	242-A Evaporator Process Condensate
WHC-EP-0342	Addendum 16	B Plant Steam Condensate
WHC-EP-0342	Addendum 17	B Plant Process Condensate
WHC-EP-0342	Addendum 18	2101-M Laboratory Wastewater
WHC-EP-0342	Addendum 19	UO_3 Plant Process Condensate
WHC-EP-0342	Addendum 20	PUREX Plant Cooling Water
WHC-EP-0342	Addendum 21	242-A Evaporator Cooling Water
WHC-EP-0342	Addendum 22	B Plant Cooling Water
WHC-EP-0342	Addendum 23	241-A Tank Farm Cooling Water
WHC-EP-0342	Addendum 24	284-E Powerplant Wastewater
WHC-EP-0342	Addendum 25	244-AR Vault Cooling Water
WHC-EP-0342	Addendum 26	242-A Evaporator Steam Condensate
WHC-EP-0342	Addendum 27	284-W Powerplant Wastewater
WHC-EP-0342	Addendum 28	400 Area Secondary Cooling Water
WHC-EP-0342	Addendum 29	242-S Evaporator Steam Condensate
WHC-EP-0342	Addendum 30	241-AY/AZ Tank Farms Steam Condensate
WHC-EP-0342	Addendum 31	209-E Laboratory Reflector Water
WHC-EP-0342	Addendum 32	T Plant Laboratory Wastewater
WHC-EP-0342	Addendum 33	183-D Filter Backwash Wastewater

Figure 1-1. Characterization Strategy.



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* Propose a designation (Section 5.0).

* Design an action plan, if needed, to obtain additional characterization data (Section 6.0).

1.3 SCOPE

The scope of this report is the characterization of the BCE effluent that enters the soil column. The time perspective of this document is focused on the recent past and the near future (approximately 1987 to 1993). Information outside of this time period was included if the data were relevant to the development of the study.

This report contains "new" sampling data (i.e., October 1989 through March 1990) for one of the three BCE system configurations, routine operations, which was active during this time frame.

2.0 PROCESS KNOWLEDGE

This section presents a qualitative and quantitative process knowledge-based characterization of the chemical and radiological constituents of the BCE. These process data are discussed in terms of the following factors:

- Location and physical layout of the process facility
- General description of the present, past, and future activities of the process
- Identity of the wastestream contributors
- Concentration of the constituents of each contributor.

2.1 PHYSICAL LAYOUT

The B Plant is located in the 200 East Area of the Hanford Site (Figure 2-1). The B Plant is comprised of three main adjoining buildings: 271-B, 221-B, and 225-B (Figure 2-2) (and several auxilary buildings). The 221-B Building, along with its attached service building (271-B), was constructed in 1943; this complex is known as B Plant. Construction of the 225-B Building, the Waste Encapsulation and Storage Facility (WESF), was completed in 1974.

The following subsections contain a brief description of each of the above-listed buildings.

2.1.1 The 221-B Building

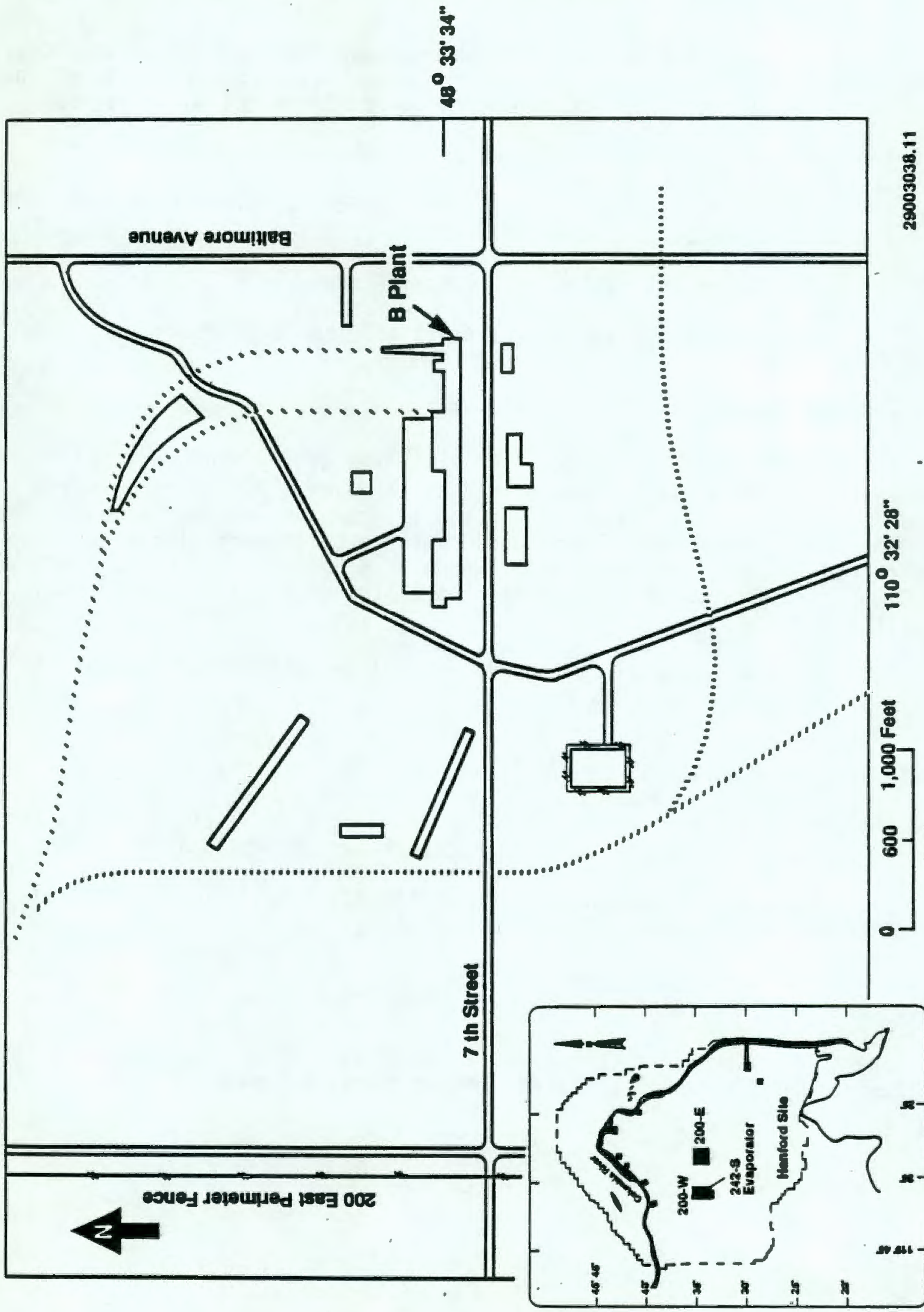
The processing portion of the 221-B Building consists of a canyon and craneway, 40 process cells, a hot pipe trench, and a ventilation tunnel.

The service and operating portion of the 221-B Building consists of an operating gallery, a pipe gallery, and an electrical gallery (Figure 2-3).

2.1.2 The 271-B Building

The service building (271-B) is attached to B Plant and includes offices, aqueous makeup facilities, and maintenance shops.

Figure 2-1. The B Plant Site Plan.



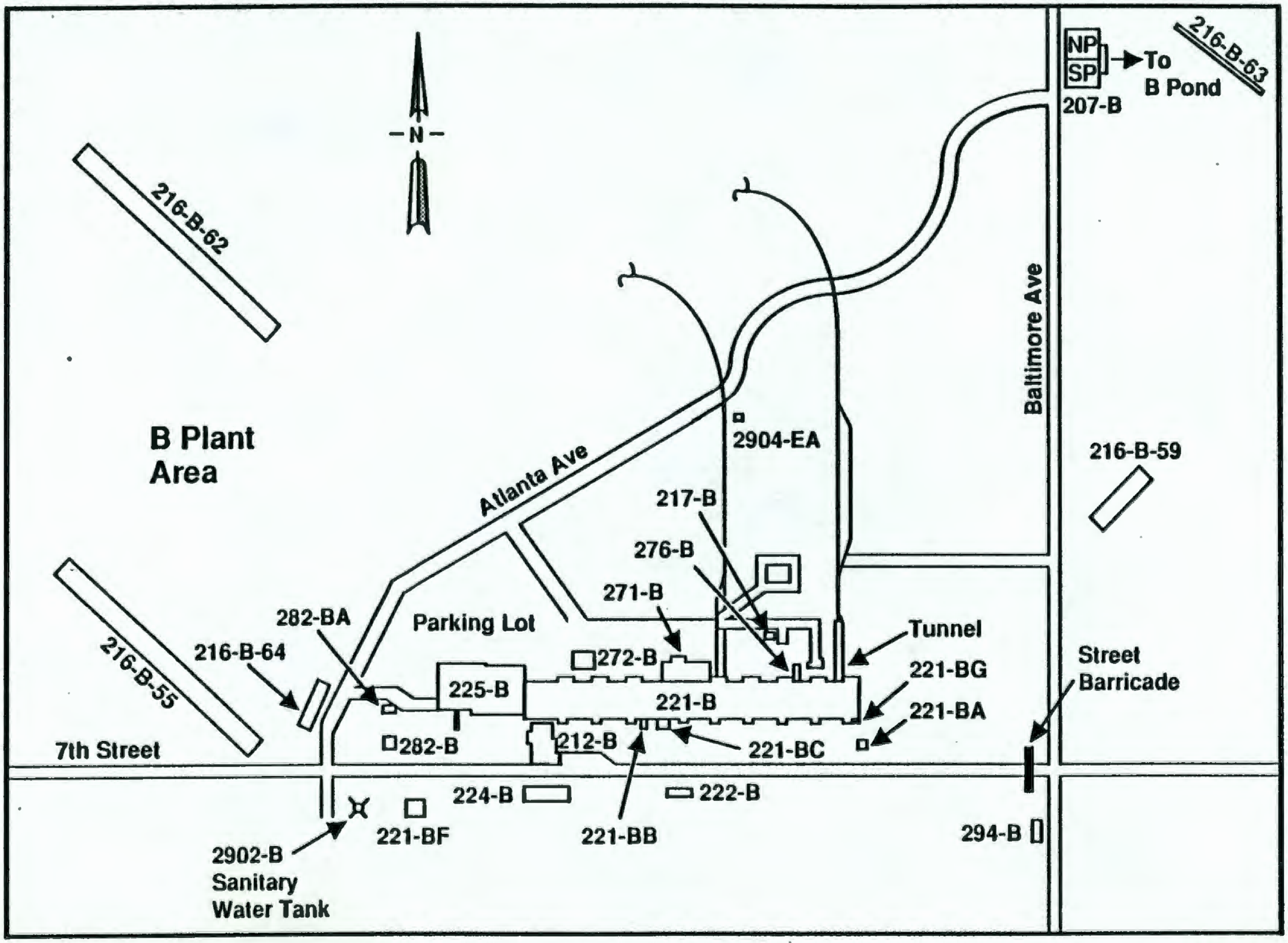


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Figure 2-2. The B Plant and Related Facilities.

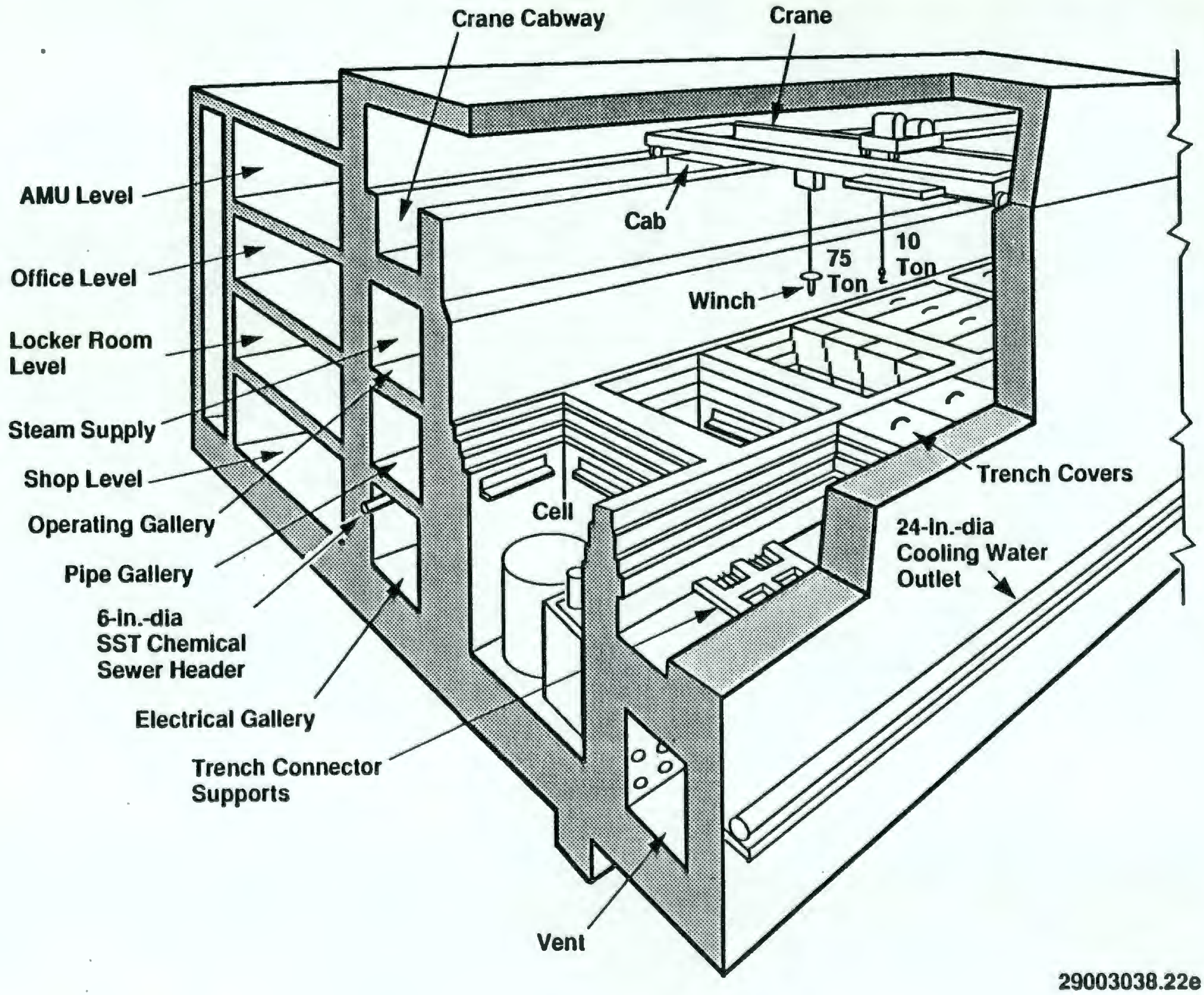

Figure 2-3. The B Plant Schematic (221-B and 271-B Cut-Away).

2.1.3 The 225-B Building

This building's floor plan (building area is approximately 20,000 ft^2) is partitioned into several functional areas: (1) process hot cell areas, (2) the hot cell (canyon) service areas, (3) operating areas, (4) building services areas, and (5) the storage pool area.

2.2 CONTRIBUTORS

The major contributors to the chemical sewer are the 2902-B High Tank (contains potable sanitary water), cooling water from the B Plant and WESF air-compressor aftercoolers, some of the 221-B steam condensate, and the demineralizer effluent. The chemical sewer could also receive minor contributions from chemical makeup overflow systems (sodium hydroxide and sodium nitrite), air conditioning units, and space heaters (radiators). These are controlled to levels that are less than the regulated values. Physical surveillance during the filling of the chemical makeup tanks protects against this possible introduction into the system. The chemical sewer has an average flowrate of less than 150 gal/min.

Under potential accident scenarios, failure to contain chemicals stored or used can contribute to the BCE. An analysis of reasonable accident scenarios indicates that the BCE could receive contributions of hazardous materials via the drains in areas of operation or chemical storage.

In order to prevent such discharges, the B Plant has installed or plans to install significant engineering and administrative controls. Currently, all active storage tanks are equipped with level indicators that are monitored daily by shift personnel or continuously by the use of the Facility/Process Monitor and Control System (FPMCS). Whenever possible, valves leading from chemical tanks to the BCE are locked closed. All hazardous material is disposed in accordance with approved Westinghouse Hanford Company procedures.

An operability test was conducted on the online BCE monitoring system or both the beta radiation and pH monitors. The operability test showed that the pH monitor was accurate to within 0.2 pH units. The operability test also showed that the beta radiation monitor could test and would alarm the presence of strontium and cesium within 1.7 times the administrative control value (5 E-06 µCi/mL and 5 E-05 µCi/mL, respectively).

The gamma monitor, which automatically diverts the contents of the 6-in. stainless steel chemical sewer header to TK-10-1 upon detection of high levels of radioactivity, is for process control and does not detect at administrative control value levels or intended as a release monitor. The monitor is functionally tested for operability.

Secondary containment of potential contributors to the BCE is being installed under project funding as described in Section 2.3.5.

Under normal conditions, the BCE receives only water and nonregulated buffer solution from the contributors discussed previously. However, the potential exists for any chemical used at B Plant for processing or housekeeping to be discharged into the BCE.

Of the approximately 500 commercial products used at B Plant, less than 160 contain ingredients that could affect the designation of the stream based on the listed constituents under WAC 173-303-9903 and -9904 (Ecology 1989). Documentation or knowledge of any of these products being discharged into the BCE could not be found except what is indicated.

2.3 PROCESS DESCRIPTION

2.3.1 Background

The B Plant receives and stores various chemicals from commercial manufacturers for use in the pretreatment of defense wastes, generation of demineralized water, and conditioning of water used in heating, ventilation, and air conditioning (HVAC) units. The BCE can receive spills, chemical drains, water flushes, and other effluents from drains in the 221-B, 217-B, and 271-B Buildings and the 211-B Area where these various chemicals are stored and used (Figure 2-4). The BCE can also receive waste steam condensate, cooling water, HVAC unit wash water, sanitary water, and other effluents from the WESF, 225-BC Air Compressor Building, 212-B Cask Station, 276-B Building, 2902-B Sanitary Water Tank, 222-B HVAC system, and 224-B HVAC and floor drains.

The BCE drains into the 216-B-63 disposal trench where effluents are disposed of through absorption in the soil or evaporation. The BCE consists of a main 15-in. vitrified clay pipe (VCP) that extends north of the 221-B Building to the 216-B-63 Ditch, which is located approximately 2,500 ft northeast of 221-B Building (Figure 2-4). The BCE has several manholes where subheader piping join the main sewer. At manhole number 14, which is located north of the 211-B Chemical Storage Tank Farms, the 15-in. VCP is separated into two 10-in. reinforced thermosetting resin pipe (RTRP) headers and a 4- and 8-in. VCP. One of the 10-in. RTRP headers traverses south from manhole number 14 and connects to a 6-in. RTRP header that runs between the area around the 211-B Area and 221-B Building.

The 6-in. header collects effluents from the sodium hydroxide storage tank area pump basin, sodium hydroxide storage tank cooling coil effluent water, steam condensate and wash water from 221-B HVAC units (east side only). Discharge from 221-B 6-in. stainless steel header in the electrical gallery is routed to Cell 10.

The 8-in. VCP header collects effluent from regeneration of the demineralized water unit in the 217-B Building and from ditches in the 211-B Chemical Storage Tank Farms. The 4-in. VCP header into manhole 14 is capped and not used.

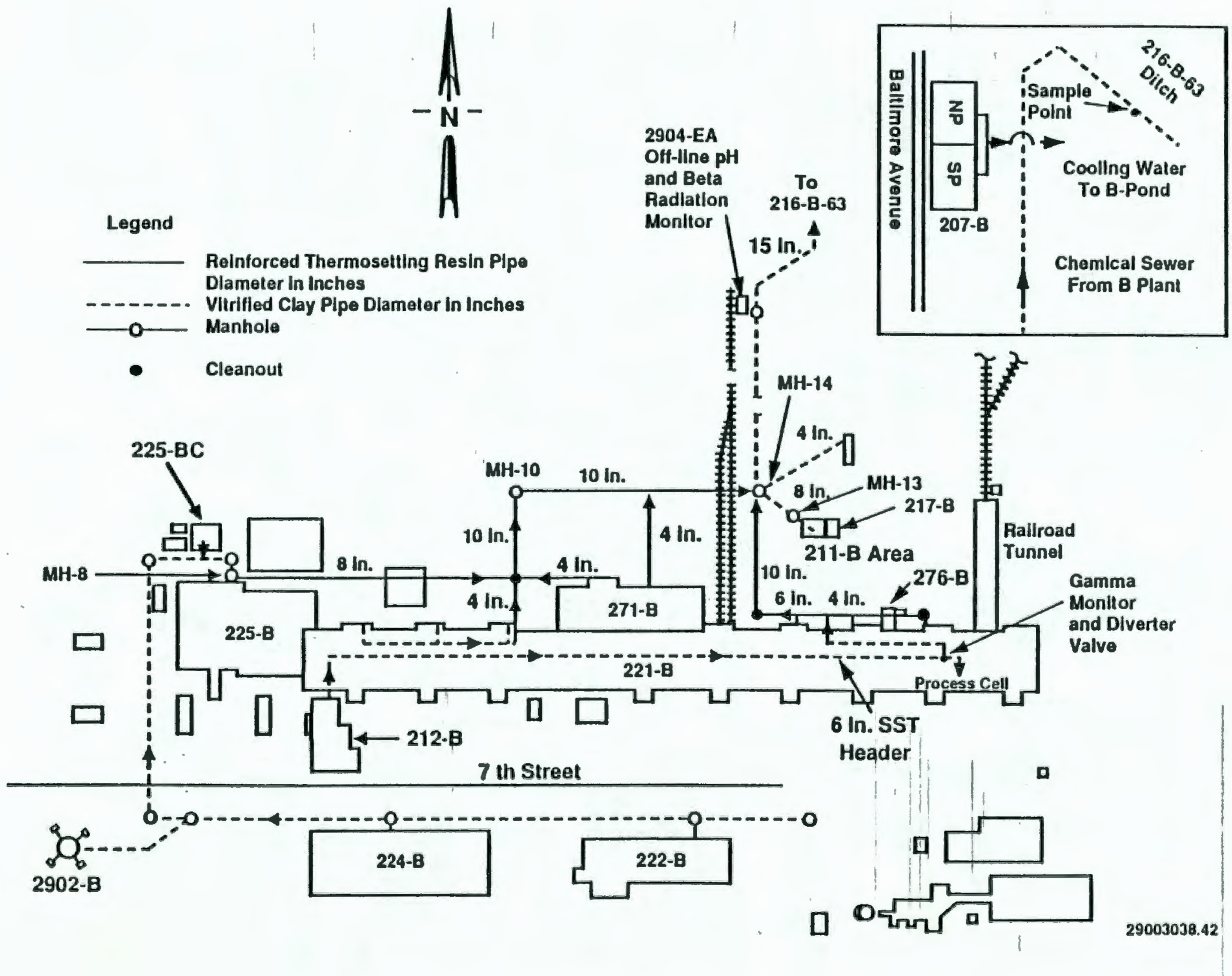

Figure 2-4. Chemical Sewer--B Plant Area Map.

The second 10-in. RTRP header extends west, parallel to 221-B Building, to manhole number 10, which is located northwest of the 271-B Building. This header receives effluents from the floor drains and steam condensate discharge from 271-B Building from a 4-in. RTRP subheader. The 10-in. RTRP traverses south from manhole number 10 and collects cooling water from the air compressors in 271-B Building and then traverses west parallel to 221-B Building. The 10-in. RTRP header joins a 10-in. VCP header at manhole number 8, turns south at the northwest corner of the 225-B Building, extends 150 ft and turns east ending 10 ft east of the 222-B Building. This 10-ft RTRP/VCP header collects steam condensate and wash water from the 221-B HVAC units (west side only), steam condensate from steam lines in 221-B Building, steam condensate from 225-B HVAC system and 225-BC Compressor Building, aqueous makeup units (AMU) tank overflow and floor drains from WESF, water overflow from the 2902-B Sanitary Water Tank, 222-B HVAC system, 224-B HVAC, and floor drains. The 10-in. VCP header also collects rain water from a street drain located northeast of 2902-B Building and south of Seventh Street.

The facility systems that drain into the BCE headers are further described in the following sections. A diagram of the chemical flowpaths at B Plant is shown in Figure 2-5.

2.3.2 System Description

2.3.2.1 Demineralized Water Unit. Demineralized water is generated at the B Plant for use in the WESF capsule storage pool cells and for pretreatment of defense wastes. Demineralized water is generated at the 217-B Building using a commercial water treatment unit that removes cation and anion impurities from a potable water source (sanitary water) using ion exchange resins. The ion exchange resins, supplied by the Illinois Water Treatment (IWT) Company, are C-211 (cation) and A-264 (anion). Periodic regeneration of these ion exchange resins is conducted.

The BCE stream sample data are for routine operation of the 217-B Demineralizer. Sampling of the BCE stream should be performed for the remaining two configurations during both anion and cation regeneration as discussed in Section 6.0. Regenerations are normally performed semiannually.

Sodium hydroxide (anion), sulfuric acid (cation), and buffers are used as process chemicals during the regeneration of the Demineralized Water Unit. The regenerate discharge is collected in a holding tank and neutralized before being discharged into the BCE stream. The regeneration effluent volume is 11,000 gal.

Two floor drains in the 217-B Building collect effluents from tank drains and overflow lines. The effluents are routed to the BCE at manhole number 13 through a 4-in. steel drain pipe connected to an 8-in. steel pipe. A steam condensate line from the building steam heating system exits the building and discharges to the BCE at manhole number 13 through a 4-in. steel header.

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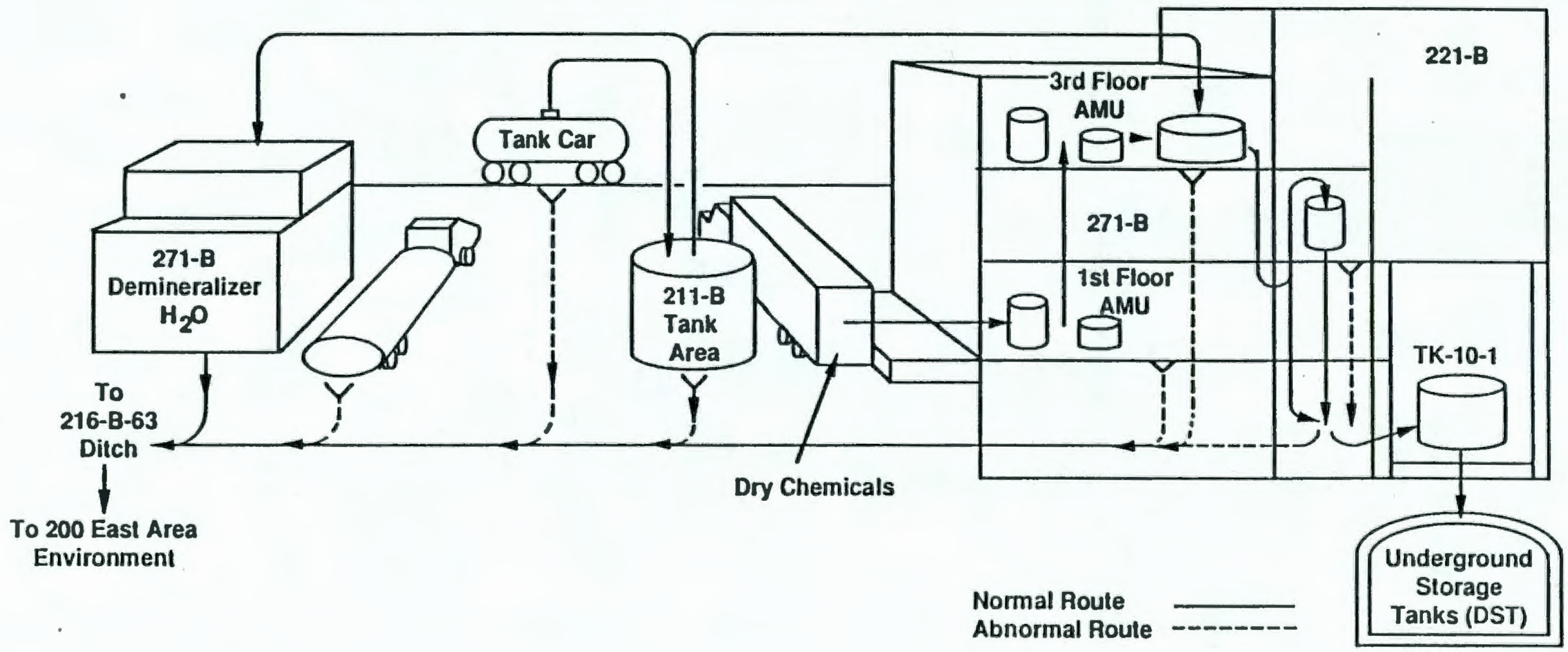

Figure 2-5. Flow of Chemicals at B Plant.

2.3.2.2 221-B Drain System. Chemical wastes and other effluents from 221-B Facilities can be received into a 6-in. stainless steel header that traverses the electrical gallery. The floor drains located throughout the operating and pipe galleries collect chemicals, water from the safety showers, and other common janitorial chemicals used during housekeeping operations. The AMU tanks and scale tanks in the operating gallery drain and overflow into 3-in. drain pipes. The vent headers for these tanks drain to the chemical drain system at Cells 8, 12, 15, 19, 20, and 31 in the operating gallery via funnels. These drains and overflow lines are connected to 3-in. drain pipes that discharge into the 6-in. stainless steel header in the electrical gallery.

The electrical gallery is provided with sumps in 18 locations. These sumps collect chemicals and other liquids used during housekeeping operations. Each sump is provided with a liquid detection device that alarms in the dispatcher's office in the 271-B Building. Alarms are recorded and identified by the automated FPMCSs. The sumps are equipped with pumps that discharge collected liquids into the 6-in. stainless steel header. The contents of the 6-in. header can either be routed to the BCE or retained within the 221-B Building.

Steam condensate from the steam lines in the operating and pipe galleries and cooling water from the instrument air compressor (electrical gallery) are discharged into a 3-in. RTRP header located in the west end of the electrical gallery. This header is routed directly to the chemical sewer via a 4-in. RTRP pipe.

2.3.2.3 271-B Drain System. A drain collection system in the 271-B Building collects effluent from all floor drains and sinks, cooling water from process air compressors, steam condensate from steam area radiators, hot water tanks, heating-cooling coils in AMUs, HVAC unit air washer water and water treatment chemicals, and common janitorial chemicals. Collected liquid effluents are nonradioactive and are discharged into the BCE through a 4-in. RTRP that exits the north side of 271-B Building and combine with the 10-in. RTRP header traversing the north side of 221-B Building.

2.3.2.4 221-B Chemical Storage Tanks. A 6-in. RTRP header on the south side of the 221-B Storage Tanks area receives cooling water from the demineralized water storage tanks heat exchangers and pumps and steam condensate from the sodium hydroxide tanks heat exchangers and heat trace. The 6-in. RTRP header connects to a 10-in. RTRP header that discharges into the BCE at manhole number 14.

A truck loading-unloading location on the north side of the 211-B Storage Tanks area drains to a 4-in. steel header that discharges to the BCE at manhole number 13.

Steam condensate/cooling water from the cooling coils of the vertical chemical storage tanks are collected in two 4-in. steel headers and discharge to the BCE at manhole number 13. A tank car unloading station on the west side of the vertical storage tanks is used to receive and transfer commercial chemicals into storage tanks.

2.3.2.5 Other Effluent Sources. Several other buildings contribute to effluents in the BCE. These buildings include the 276-B floor and vessel overflow drains, WESF AMU floor and vessel overflow drains, 225-BC Compressor cooling water and steam condensate, WESF steam condensate, 212-B Cask Station Drains, 222-B HVAC System, 224-B HVAC System and floor drains, and a street drain located northeast of 2902-B Building and south of Seventh Street.

Physical and administrative controls, including hazardous waste management and handling procedures as well as hazardous material training procedures, are in place at B Plant and WESF to prevent chemicals from entering floor drains. In addition, both sitewide and plant specific environmental compliance manuals provide further guidance in the handling of hazardous materials. A thorough review of the facility consisting of interviews with plant personnel and physical inspections produced evidence that no discharge of chemical products into the BCE stream occur. Also in place at B Plant are specific operating procedures to handle the remote possibility of chemical leaks or spills that include instructions and controls for preventing discharge of hazardous substances to the chemical sewer.

The DOE has established limits to ensure that all federal requirements are met. The DOE policy is to reduce or eliminate releases of dangerous waste to the environment. Westinghouse Hanford Company's policy is that contamination levels will be as low as reasonably achievable (ALARA) (WHC 1987). The B Plant uses sampling, monitoring, and recycling techniques to meet these goals.

2.3.3 Present Activities

This section covers the period between October 1989 and March 1990.

The BCE is an active stream and can receive spills and chemical drainage in addition to water flushes, stream condensate, and other liquid effluents. The October 1989 through March 1990 flowrate for the BCE averaged approximately 130 gal/min. The stream discharges into the 216-B-63 open ditch. The contributors to the BCE stream are listed in Table 2-1. The B Plant and WESF chemicals stored and their locations are listed in Table 2-2.

The BCE was named for its original design intent. Its use for hazardous chemical disposal was abandoned before 1984. The BCE does not communicate with the radioactive processing areas of B Plant and does not come in contact with tank farm wastes.

Table 2-1. Contributing Streams to B Plant Chemical Sewer.
(sheet 1 of 2)

Building	System	Contributor to BCE	Flowrate (gal/d)
271-B	Basement Floor Drains	Steam condensate Raw water Janitor supplies Maintenance supplies	0-1000 (271-B Total)
	1st Level Floor Drains	Sanitary water Janitor supplies	
	2nd Level Floor Drains	Sanitary water Janitor supplies	
	3rd Level Floor Drains	Sanitary water Steam condesate	
271-B	HVAC Unit	Steam condensate Sanitary water Dearborn[a]-727 Dearborn-730	0-2000
271-B	Process Air Comp. Instru. Air Comp.	Raw water Sanitary water	5000-15000
221-B	HVAC Unit	Steam condensate Sanitary water	0-20
221-B	Pipe & Operating	Steam condensate	1000-2000
221-B	Scale Tanks	None	Not Appl.
221-B	Electrical Gallery Sumps	None	Not Appl.
276-B	Floor Drains	Steam condensate	0-1000
217-B	Denineralizer	Sanitary water & neutralized spent regenerant (sulfuric acid, sodium hydroxide, momosodium phosphate sodium carbonate)	1000-5000

[a]Dearborn is a trademark of W. R. Grace & Co., Lake Zurich, Illinois.
HVAC = heating, ventilation, and air conditioning

Table 2-1. Contributing Streams to B Plant Chemical Sewer.
(sheet 2 of 2)

Building	System	Contributor to BCE	Flowrate (gal/d)
211-B Area	Chemical Storage Tanks	Raw water Sanitary water Steam condensate	0-76000
225-B	AMU Makeup Tanks Floor Drains	Steam condensate Raw water	0-500
225-B	HVAC	Sanitary water Condensation	0-50
225-BC	Air Compressor	Raw water	500-5000
224-B	HVAC	Sanitary water Steam condensate Dearborn[a]-730	0-500
222-B	HVAC	Sanitary water Steam condensate Dearborn[a]-730	0-500
212-B	HVAC	Steam condensate	0-50
2902-B	Sanitary Water Storage Tank	Sanitary water	0-88000
225-B	Yard Drains	Rain water	0-1000

[a]Dearborn is a trademark of W. R. Grace & Co., Lake Zurich, Illinois.

Table 2-2. B Plant and Waste Encapsulation and Storage Facility Chemical Storage Locations.
(sheet 1 of 2)

Building	Location	Stored Chemicals
271-B	Basement	Janitors cleaning supplies Maintenance supplies in locked cabinets
	1st Floor	Janitor supplies
	2nd Floor	Janitor supplies
	3rd Floor	Sodium Nitrate Sodium Nitrite Sodium Carbonate Sodium Bicarbonate 1,1,1-Trichlorethane Lanthanum Neodymium Nitrate SS-25 Perchloroethylene Unisol ND-150[c] Celite Zeolon-900 Freon 113 Diatomaceous Earth Turco[a]-Decon 4518/4502 Dearborn[b]-727 Scale Cleen[d] Citric Acid Wedac Monosodium Phosophate Batteries (sulphuric acid) Voltz Super Safety Solvent Diethylene-glycol-monobutyl-ether (light water foam)
211-B Area	Storage Tanks	Nitric Acid EDTA - Ethylenediaminetetraacetic Acid HEDTA - Hydroyethylenediaminetriacetic Acid ANN - Aluminum Nitrate Nanohydrate Sodium Hydroxide

[a]Turco is a trademark of TP Industrial, Inc., Lakewood, California.
[b]Dearborn is a trademark of W. R. Grace & Co., Lake Zurich, Illinois.
[c]ND-150 is a trademark of NCH Corporation.
[d]Scale-Cleen is a trademark of W. R. Grace & Co., New York, New York.

Table 2-2. B Plant and Waste Encapsulation and Storage Facility Chemical Storage Locations. (sheet 2 of 2)

Building	Location	Stored Chemicals
217-B	Demineralizer Building	Sulfuric Acid Sodium Hydroxide
212-B	HVAC Room	Dearborn[b] 4690
225-B	2nd Floor	Tri-sodium Phosphate Phosphoric Acid Hydrochloric Acid

[b]Dearborn is a trademark of W. R. Grace & Co., Lake Zurich, Illinois.

Process chemicals are used during the regeneration of the demineralizer in the 217-B Building and operation of the 221-B/271-B HVAC units. The following chemicals are defined to be BCE process chemicals based on current plant operating needs:

- Sulfuric acid
- Sodium hydroxide
- Sodium bicarbonate
- Sodium carbonate
- Monosodium phosphate
- Dearborn*-727
- Dearcide**-730
- IWT C-211/A-264.

Sodium hydroxide (anion), sulfuric acid (cation), and buffers are used as process chemicals during the regeneration of the demineralizer in the 217-B Building. The regenerate discharge is collected in a holding tank, neutralized, and discharged into the BCE stream. The process chemicals utilized during the operation of the HVAC units include microbiocides used as cooling water treatment for the control of algae, bacteria, and fungi. The HVAC effluent also discharges directly to the BCE stream. It should be noted that evaporative losses of water due to heating and cooling operation can be expected to increase the natural mineral content of this stream above that found in the influent sanitary water.

Potential Chemicals--Physical and administrative barriers have been installed into the BCE system to assist in the prevention of any releases. Unauthorized releases of chemicals into the BCE system are in violation of procedures. However, the potential exists for any chemical present at the Hanford Site to be released into the BCE system. A review of facility operation indicates that no releases have occurred other than those indicated in Section 2.3.4 of this report. The valves that discharge to BCE on all chemical tanks are locked and tagged closed. Administrative procedures require that a tank's contents be known and determined to be nonhazardous before the lock can be removed and the contents discharged.

A monitoring system is installed in the 2904-EA Building (see Figure 2-4) to provide online pH and beta radiation monitoring for the BCE stream. A process control gamma radiation monitor is also located adjacent to the 6-in. chemical sewer header in the B Plant electrical gallery, which upon detection of gross gamma radionuclides, automatically diverts the contents of the 6-in. header to tank TK-10-1. Alarms, located in the dispatcher's office in the 271-B Building, are tied into the FPMCS and identify the following conditions at the BCE:

- High radiation
- System trouble (no flow, power failure, detector failure)
- High or low pH
- Sample system failure.

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*Dearborn is a trademark of W. R. Grace & Co., Lake Zurich, Illionis.
**Dearcide is a trademark of W. R. Grace & Co., New York, New York.

Flow proportional sampling of the BCE stream is performed at an enclosure at the 216-B-63 Ditch. Loss of the upstream beta monitor, located in 2904-EA Building and tied into the FPMCS, requires additional manual sampling of the BCE stream until the monitor has been returned to service.

The B Plant processes radioactive defense wastes for disposal. During the processing of these wastes, a variety of chemicals are used. The policy at B Plant is to not allow regulated chemicals to reach the chemical sewer. In March 1986, a revised management plan was incorporated into the existing chemical sewer management to ensure that all federal and state regulatory requirements were met. Westinghouse Hanford Company has its own policy whereby contamination levels will be ALARA (WHC 1987).

2.3.4 Past Activities

This section covers the period before October 1989.

A number of missions have been performed at B Plant since its construction in 1943. The plant's first mission was the recovery of plutonium using a bismuth phosphate chemical separation process. The process was carried out from April 1945 to October 1952. The B Plant was shut down after the Reduction-Oxidation (REDOX) and Plutonium-Uranium Extraction (PUREX) Plants came online. The B Plant was modified to begin its second mission in 1962; the recovery, purification, and encapsulation of cesium and strontium from wastes received from the tank farms.

In general, contributors to the BCE from 1945 to 1969 included (1) used steam and water from space heaters, tank heaters, and air conditioning units, (2) overflow from chemical tanks, and (3) nonradioactive solutions used in general housekeeping procedures.

On March 22, 1970, approximately 1,000 Ci of ^{90}Sr were released into the previous receiver of the BCE stream, 216-B-2-2 Ditch, because of the failure of a portable manometer system. For contamination containment, the 216-B-2-2 Ditch, which had lead to B Pond, was dammed 1,000 ft downstream from the spill. A majority of the contamination was contained within the ditch; however, a small portion was released into B Pond. The estimated release to B Pond is shown below.

March 22, 1970 Release Data.

Total beta	154 Ci
^{137}Cs	13 Ci
^{90}Sr	50 Ci
^{144}Ce-Pr	54 Ci

The 216-B-63 Ditch, current receiver of the BCE, was excavated 2 mo after the March 22, 1970, release. Following completion of the 216-B-63 Ditch, the BCE stream was permanently diverted from the 216-B-2-2 Ditch.

Project B-496, Chemical Sewer Upgrades (completed on September 30, 1985), relined a major portion of the VCP on the north side of 221/271-B Building with RTRP because of suspected failure of the original VCP.

The incidental releases to the 216-B-63 Ditch from the BCE are listed in Table 2-3 (WHC 1989).

Table 2-3. Incidental Releases (200 East Area).

B Plant Chemical Sewer-- Disposed to the 216-B-63 Ditch		
Date	Constituent	Amount (lb)
March 28, 1987	Corrosive, unknown acid	2,500
April 4, 1987	Corrosive, nitric acid	6,300-(5)

2.3.5 Future Activities

This section covers the period after March 1990.

This section contains a detailed description of project upgrades for the BCE system. The upcoming mission for B Plant is the treatment of selected double-shell tank wastes and wastestreams to accomplish the separation into high-level, transuranic, and low-level waste fractions. This processing will be in preparation for disposal as either a vitrified or cementitious waste form. In an effort to prepare for this mission, B Plant is undergoing a thorough upgrade program. The following functional design criteria (FDC) for the projects listed below may be subject to change.

2.3.5.1 Project W-003. Project W-003, "B-Plant Chemical Sewer Environmental Upgrades," is planned as a fiscal year (FY) 1990 General Plant Project. This project will provide the following upgrades to the BCE.

1. Reroute and replace the existing VCP downstream of the 211-BA Neutralization Facility, thereby eliminating the use of the 216-B-63 Ditch.

2. Replace the VCP between manhole 13 and manhole 14, thus assuring the integrity of the effluent piping.

3. Provide retention capability and treatment of the 217-B Demineralizer cation and anion regeneration effluents upstream of the 211-BA Neutralization Facility.

2.2.5.2 Project W-008. In July 1989, a document was issued providing the FDC for upgrading the BCE system to provide elementary neutralization capabilities to prevent the discharge of corrosive materials to the 216-B-63 Ditch from the BCE. Project W-008, "B Plant Chemical Sewer Neutralization System," is associated with Tri-Party Agreement Milestone M-17-04 and will provide the following upgrades to the BCE system:

1. Elementary inline neutralization, if required, to maintain the pH between 6.0 and 10.0

2. Prevent the discharge of corrosive materials to the environment from the BCE stream.

2.3.5.3 Project W-004. Project W-004, "B Plant AMU Area Upgrade," is associated with Tri-Party Agreement Milestone M-17-04 and provides modifications and upgrades to accomplish the following objectives:

1. Secondary containment for the eight west side 271-B AMU to support full-scale operations of the new mission at B Plant

2. Instrumentation and alarm upgrades for the AMUs for easy identification of potential problems by B Plant process operators

3. Adequate structural support of the concrete floor beneath the designated AMU on third floor of 271-B Building

4. Secondary containment curbs to ensure segregation of incompatible chemicals and containment of hazardous material (110% containment of the largest tank in any curbed area).

2.3.5.4 Project W-010H. Project W-010H, "B Plant Environmental Compliance Upgrades," is associated with Tri-Party Agreement Milestone M-17-04 and is planned as a subpart of the Hanford Environmental Compliance (HEC) 1990 Line Item. The modifications and upgrades to be performed as part of this project include the following:

1. Secondary containment for the vertical and horizontal tanks in the area around the 211-B Building (110% containment of any tank in the curbed area)

2. Instrumentation and alarm upgrades for the 211-B Storage Tanks to provide easy identification of potential problems by B Plant process operators

3. Overhead transfer piping support system in the area around the 211-B Building, to minimize the potential of a release caused by pipe support failure

4. Independent drain system for the scale tanks in the 221-B Operating Gallery

5. Instrumentation, control, and alarm upgrades for the 221-B Operating Gallery Scale Tanks to assist B Plant process operators in the prevention of a release.

2.3.5.5 Project W-120. Project W-120, "B Plant Manhole 14 Upgrade," is planned as a 1990 capital work order project. The upgrade to be performed by this project is to replace manhole 14 with a precast manhole.

2.3.5.6 Summary. Currently, B Plant is in a maintenance outage in preparation for the treatment of double-shell tank wastes as explained earlier in this section. The initiation of treatment operations at B Plant should not affect the content or designation of the BCE stream.

3.0 SAMPLE DATA

This section provides an evaluation of the sampling data pertaining to the BCE wastestream. These data are divided into two categories--wastestream data and feed source data. All of the raw sampling data for the BCE is contained in Appendix B of this report.

3.1 DATA SOURCE

Two sources of sampling data were used in this analysis: wastestream data, for the routine operation configuration, and feed source data.

The sampling scheme took representative samples by following *Test Methods for Evaluating Solid Wastes*, SW-846, procedure sampling and analytical protocol (EPA 1986). This protocol requires that a sufficient number of samples be taken in a random manner over a period of time to characterize variability or uniformity of the stream. In some cases, ASTM procedures were used when more appropriate than *Test Methods for Evaluating Solid Wastes*. This was accomplished by taking grab samples on a partitioned time random basis. The sampling was randomized by splitting each workday of the month to be sampled into two 4-h periods and selecting one of these periods by using a random-number generator. All samples were taken to the contract laboratory for analysis. The details of the sampling, analytical, quality control, and quality assurance procedures utilized are contained in Volume 4 of the *Waste Stream Characterization Report* (WHC 1989).

3.2 DATA PRESENTATION

The analytical methods run on the corresponding samples are identified in Table 3-1.

3.2.1 Wastestream Data

The wastestream data set is composed of four samples collected over a 4-mo time period. This data set contains both radiological and chemical data for the BCE stream (routine operation only, no data for the anion or cation regenerate was taken during this sampling period) taken from October 1989 through March 1990. The dates these samples were taken and the sample identification number are listed in Appendix B of this report. Statistical wastestream data for the BCE are contained in Table 3-2 of this report.

For the BCE system, over 40,000 chemical analytes were of interest. The bulk of these analytes were compiled from a combined mass spectral library from the EPA, the National Institute of Occupational Safety and Health, and the National Bureau of Standards. This library was composed of approximately

Table 3-1. Analytical Methods for Samples.
(sheet 1 of 2)

LEAD#	50705	50752	50756	50984
C of C#	50705	50752	50756	50984
Alkalinity	X	X	X	X
Alpha counting	X	X	X	
^{241}Am	X		X	
Ammonia	X	X	X	X
Arsenic	X	X	X	X
Atomic emission spectroscopy	X	X	X	X
Beta counting	X	X	X	
^{14}C		X	X	
Conductivity-field	X	X	X	X
Curium isotopes	X		X	
Cyanide	X	X	X	X
Direct aqueous injection (GC)	X	X	X	X
Fluoride (LDL)	X	X	X	X
Gamma energy analysis	X	X	X	
Hydrazine	X	X	X	X
Ion chromatography	X	X	X	X
Lead	X	X	X	X
Low-energy photon detection			X	
Mercury	X	X	X	X
pH-field	X	X	X	X
Plutonium isotopes		X		
Selenium	X	X	X	X
Semivolatile organics (GC/MS)	X	X	X	X
Strontium beta counting	X	X	X	
Sulfide	X	X	X	X
Suspended solids	X	X	X	X
Temperature-field	X	X	X	X
Thallium	X	X	X	X
Total carbon	X	X	X	X
Total dissolved solids	X	X	X	X
Total organic carbon	X	X	X	X
Total organic halides (LDL)	X	X	X	X
Total radium alpha counting	X	X	X	
Tritium	X	X	X	
Uranium	X	X	X	
Uranium isotopes	X	X	X	
Volatile organics (GC/MS)	X	X	X	X
LEAD#	50705B	50752B	50756B	50984B
C of C#	50706	50753	50757	50985
Volatile organics (GC/MS)	X	X	X	X
LEAD#	50705T	50752T	50756T	50984T
C of C#	50707	50754	50758	50986
Volatile organics (GC/MS)	X	X	X	X

Table 3-1. Analytical Methods for Samples.
(sheet 2 of 2)

LEAD#	50705E	50752E	50756E	50984E
C of C#	50708	50755	50759	50987
Atomic emission spectroscopy	X	X	X	X
Ignitability	X	X	X	X
Mercury (mixed matrix)	X	X	X	X
Reactive cyanide	X	X	X	X
Reactive sulfide	X	X	X	X

Notes: Procedures that were performed for a given sample are identified by an "X". Procedure references appear with the data.

LEAD# is the Liquid Effluent Analytical Data number that appears in the data reports. C of C# is the chain-of-custody number.

Abbreviations:
- gas chromatography (GC)
- low-detection limit (LDL)
- mass spectrometry (MS).

Table 3-2. B Plant Chemical Statistical Wastestream Data. (sheet 1 of 2)

Constituent	N	MDA	Method	Mean	StdErr	90%CILim	Maximum
Arsenic (EP Toxic)	4	4	n/a	<5.00E+02	0.00E+00	<5.00E+02	<5.00E+02
Barium	4	0	n/a	2.92E+01	8.54E-01	3.06E+01	3.10E+01
Barium (EP Toxic)	4	4	n/a	<1.00E+03	0.00E+00	<1.00E+03	<1.00E+03
Boron	4	1	DL	1.85E+01	7.85E+00	3.14E+01	4.20E+01
Cadmium (EP Toxic)	4	4	n/a	<1.00E+02	0.00E+00	<1.00E+02	<1.00E+02
Calcium	4	0	n/a	1.84E+04	2.10E+02	1.88E+04	1.89E+04
Chloride	4	0	n/a	1.50E+03	1.63E+02	1.77E+03	1.90E+03
Chromium (EP Toxic)	4	4	n/a	<5.00E+02	0.00E+00	<5.00E+02	<5.00E+02
Copper	4	0	n/a	2.12E+01	5.20E+00	2.98E+01	3.60E+01
Fluoride	4	0	n/a	1.39E+02	1.58E+00	1.42E+02	1.43E+02
Iron	4	1	DL	5.32E+01	9.41E+00	6.87E+01	7.00E+01
Lead (EP Toxic)	4	4	n/a	<5.00E+02	0.00E+00	<5.00E+02	<5.00E+02
Magnesium	4	0	n/a	4.15E+03	8.11E+01	4.28E+03	4.32E+03
Manganese	4	2	DL	5.75E+00	4.79E-01	6.53E+00	7.00E+00
Mercury (EP Toxic)	4	4	n/a	<2.00E+01	0.00E+00	<2.00E+01	<2.00E+01
Potassium	4	0	n/a	8.01E+02	5.28E+01	8.87E+02	9.23E+02
Selenium (EP Toxic)	4	4	n/a	<5.00E+02	0.00E+00	<5.00E+02	<5.00E+02
Silicon	4	0	n/a	2.32E+03	6.12E+01	2.42E+03	2.44E+03
Silver (EP Toxic)	4	4	n/a	<5.00E+02	0.00E+00	<5.00E+02	<5.00E+02
Sodium	4	0	n/a	2.12E+03	8.46E+01	2.26E+03	2.27E+03
Strontium	4	0	n/a	9.62E+01	3.25E+00	1.02E+02	1.02E+02
Sulfate	4	0	n/a	1.11E+04	4.02E+02	1.18E+04	1.22E+04
Uranium	3	0	n/a	4.71E-01	3.37E-02	5.35E-01	5.36E-01
Zinc	4	0	n/a	1.27E+01	1.25E+00	1.48E+01	1.60E+01
Acetone	4	3	DL	1.12E+01	1.25E+00	1.33E+01	1.50E+01
Ammonia	4	3	DL	5.52E+01	5.25E+00	6.38E+01	7.10E+01
Unknown amide	1	0	n/a	2.30E+01	n/a	n/a	2.30E+01
Alkalinity (Method B)	4	0	n/a	5.60E+04	7.07E+02	5.72E+04	5.70E+04
Alpha Activity (pCi/L)	3	2	DL	5.55E-01	1.60E-01	8.57E-01	8.22E-01
Beta Activity (pCi/L)	3	2	DL	2.18E+00	4.32E-01	3.00E+00	2.97E+00
Conductivity (μS)	4	0	n/a	1.46E+02	1.17E+01	1.65E+02	1.75E+02
Ignitability (°F)	4	0	n/a	2.09E+02	1.29E+00	2.07E+02	2.06E+02
pH (dimensionless)	4	0	n/a	7.45E+00	1.32E-01	7.67E+00	7.70E+00
Reactivity Cyanide (mg/kg)	4	4	n/a	<1.00E+02	0.00E+00	<1.00E+02	<1.00E+02
Reactivity Sulfide (mg/kg)	4	4	n/a	<1.00E+02	0.00E+00	<1.00E+02	<1.00E+02
TDS	4	0	n/a	5.07E+04	1.49E+03	5.32E+04	5.40E+04
Temperature (°C)	4	0	n/a	2.08E+01	2.28E+00	2.46E+01	2.74E+01
TOC	1	0	n/a	1.10E+03	n/a	n/a	1.10E+03
Total Carbon	4	0	n/a	1.43E+04	5.96E+02	1.53E+04	1.60E+04
TOX (as Cl)	4	0	n/a	4.32E+01	6.76E+00	5.43E+01	5.90E+01
^{242}Cm (pCi/L)	2	1	DL	4.56E-03	7.50E-04	6.87E-03	5.31E-03
^{137}Cs (pCi/L)	2	0	n/a	1.11E+00	6.18E-01	3.01E+00	1.73E+00

Table 3-2. B Plant Chemical Statistical Wastestream Data. (sheet 2 of 2)

Constituent	N	MDA	Method	Mean	StdErr	90%CILim	Maximum
^{14}C (pCi/L)	2	1	DL	4.24E+00	7.35E-01	6.51E+00	4.98E+00
^{3}H (pCi/L)	3	2	DL	1.59E+02	6.68E+01	2.85E+02	2.50E+02
^{90}Sr (pCi/L)	3	1	DL	1.44E-01	3.33E-02	2.07E-01	2.09E-01
^{234}U (pCi/L)	3	0	n/a	1.60E-01	2.34E-02	2.04E-01	1.89E-01
^{238}U (pCi/L)	3	0	n/a	1.37E-01	2.96E-03	1.43E-01	1.43E-01

NOTES:

N is equal to the number of number of test results available. Mean values, standard errors, confidence interval limits and maxima are in ppb (parts per billion) unless indicated otherwise.

The column headed MDA (Minimum Detectable Amount) is the number of results in each data set below the detection limit.

The column headed Method shows the MDA replacement method used: replacement by the detection limit (DL), replacement of single-valued MDAs by the log-normal plotting position method (LM), or replacement of multiple valued MDAs by the normal plotting position method (MR).

The column headed "90%CILim" (90% Confidence Interval Limit) is the lower limit of the one-tailed 90% confidence interval for all ignitability data sets and pH data sets with mean values below 7.25. For all other data sets it is the upper limit of the one-tailed 90% confidence interval.

The column headed "Maximum" is the minimum value in the data set for ignitability, the value furthest from 7.25 for pH, and the maximum value for all other analytes.

40,000 chemical constituents, each with a unique signature on a gas chromatography/mass spectrometer analysis. In addition, inductively coupled plasma and atomic absorption methods were used for the trace metals.

Sampling and monitoring of the BCE stream is provided to document the compliance with the discharge limits listed in the *Environmental Compliance* (WHC 1988a).

3.2.2 Raw Water Feed Data

This section contains information about 200 East Area raw and sanitary data. For the BCE report, only 200 East Area sanitary water was used as a background reference source (see Table 3-3).

The 200 East and West Areas are the major consumers of water delivered via the Export Water System. This system includes the buildings, pumps, valve houses, reservoirs, and distribution piping that deliver water from the Columbia River to the 200 East and West Areas. The river water is pumped into a 25-Mgal 182-B Reservoir for initial settling. The water is then transferred from the 182-B Reservoir to the individual 3-Mgal 200 East and West Area reservoirs for secondary settling. A backup capacity exists in 100-D Area. The raw water is then pumped directly to the raw water distribution piping and to the 283 Water Treatment Plants for sanitary water.

Currently, approximately 9-Mgal of both raw and sanitary water are used in the 200 East Area every 24 h. About one-half that amount (or 4.5 Mgal) are used in the 200 West Area. For both areas, raw water usage exceeds the sanitary water usage by a factor of 5 to 1. One-tenth of the sanitary water is used to produce steam.

As the water enters the 200 East and West treatment plants, on the way to becoming "sanitary water," chlorine is added for pretreatment, as needed, to control algae. Aluminum sulfate is added at a rate of 5% by weight, via a flash mixer, as a coagulant aide. The water is then fed into settling basins through floculators that provide slow mixing to facilitate flocculation. The water then flows through the settling basins, at which time the flocced suspended particles are allowed to settle out.

The water then passes through multimedia filters to remove alum and other particulate matter still in suspension. The filters consist of layers of various grades of gravel, sand, and anthracite coal. The filters reduce turbidity to an average of 0.2 NTU. From the filters, the water flows to two 200,000-gal concrete-lined, covered reservoirs for disinfection. Chlorine is added to maintain a free chlorine residual of 1.5 mg/L.

In addition, each area has storage "high tanks" on the sanitary distribution system that contain 200,000 gal of water in each area. The high tanks serve to maintain pressure on the sanitary system if pumping pressure drops (as backup fire protection).

Table 3-3. Summary of 200 East Area Raw Water and Sanitary Water Data (1985-1988).

Constituent/Parameter [all ppb, exceptions noted]	Raw Water[a] (1986-1987)			Sanitary Water[b] (1985-1988)		
	N[c]	AVG	STD DEV	N	AVG	STD DEV
Arsenic				4	<5.00E+00	NA
Barium	5	2.80E+01	3.40E+00	4	*1.05E+02	1.00E+01
Cadmium	5	2.40E+00	8.94E-01	4	<5.00E-01	NA
Calcium	5	1.84E+04	1.47E+03			
Chromium				4	<1.00E+01	NA
Chloride	5	8.71E+02	2.37E+02	4	3.05E+03	6.76E+02
Conductivity-field (µS)	5	9.32E+01	4.61E+01			
Copper	5	1.06E+01	1.34E+00	4	*2.50E+01	1.00E+01
Color (units)				4	<5.00E+00	NA
Iron	5	6.36E+01	2.57E+01	4	*8.25E+01	5.19E+01
Fluoride				4	*1.13E+02	2.50E+01
Lead				4	<5.00E+00	NA
Magnesium	5	4.19E+03	4.83E+02			
Manganese	5	9.80E+00	3.49E+00	4	<1.00E+01	NA
Mercury				4	<5.00E-01	NA
Nickel	5	1.04E+01	8.94E-01			
Nitrate (as N)	5	9.96E+02	8.79E+02	4	*3.72E+02	5.44E+02
pH (dimensionless)	5	7.41E+00	1.18E+00			
Potassium	5	7.95E+02	6.24E+01			
Selenium				4	<5.00E+00	NA
Silver				4	<1.00E+01	NA
Sodium	5	2.26E+03	2.42E+02	4	2.28E+03	1.26E+02
Sulfate	5	1.06E+04	9.97E+02	4	1.68E+04	3.37E+03
Temperature-field (C)	5	1.64E+01	5.84E+00			
TOC (µg/g)	5	1.36E+03	2.53E+02			
TDS (mg/L)				4	8.10E+01	1.69E+01
Trichloromethane	5	1.18E+01	4.02E+00			
Uranium	4	7.26E-01	2.22E-01			
Zinc	5	2.00E+01	2.12E+01	4	<1.00E+02	NA
Radionuclides (pCi/L)						
Alpha Activity	4	8.85E-01	5.30E-01			
Beta Activity	4	4.47E+00	1.76E+00			

NOTES: Averages denoted by an asterisk include a mix of above- and below-detection limit in computations when the actual values are below the detection limit.

See companion table for inorganic detection limits as compiled from Hanford Environmental Health Foundation.

[a]Compiled from "Substance Toxicity Evaluation of Waste Data Base," provided by F. M. Jungfleisch (this data is an update of the data presented in WHC 1988, Preliminary Evaluation of Hanford Liquid Discharges to Ground, Westinghouse Hanford Company, Richland, Washington.

[b]Compiled from HEHF 1986, Hanford Sanitary Water Quality Surveillance, CY 1985, HEHF-55, Hanford Environmental Health Foundation, Environmental Health Sciences, April 1986, and HEHF-59; HEHF-71; and HEHF-74 (corresponding reports for CY 1986, 1987, and 1988).

[c]N is defined as the number of test results available for a particular analyte. N may reflect both single and multiple data sets.

ppb = parts per billion.
pCi/L = picoCuries/liter.
TOC = total organic carbon.
TOX = total organic halides.
TDS = Total Dissolved Solids.
µS = microsiemen.
µg = microgram.

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4.0 DATA OVERVIEW

This section presents a comparison of the characterization data obtained through both process knowledge and sampling. It will also provide estimates of the stream loadings for radionuclides and chemical constituents.

4.1 DATA COMPARISON

As explained in Section 2.0, chemical drains, water flushes, steam condensate, and other liquid effluents provide potential sources for the BCE system. When comparing process and sampling data for the BCE stream, a thorough review was made of present and past B Plant and WESF operating practices, which included questioning B Plant and other facility personnel. Process knowledge as well as 200 East Area sanitary water data were used as a background or reference point to compare against the sample data.

Table 4-1 provides a comparison of average constituent concentrations to various screening criteria. These criteria are not used here for compliance purposes.

4.2 STREAM DEPOSITION RATES

Table 4-2 has been included to provide deposition rates using the average data from Table 3-2, adjusted according to flow data from Section 2.2.

Table 4-1. Evaluation of B Plant Chemical Sewage--Routine Operation.

Constituent	Result[a]	SV1[b]	SV2[c]
Barium	2.9E-02	5.0E+00 g	
Chloride	1.5E+00	2.5E+02 h	
Copper	2.1E-02	1.0E+00 h	
Fluoride	1.4E-01	2.0E+00 g	
Iron	5.3E-02	3.0E-01 h	
Manganese	5.7E-03	5.0E-02 h	
Sulfate	1.1E+01	2.5E+02 h	
Zinc	1.3E-02	5.0E+00 h	
Alpha Activity (pCi/L)[n]	5.6E-01	1.5E+01 g	3.0E+01
Beta Activity (pCi/L)	2.2E+00		1.0E+03
^{242}Cm (pCi/L)	4.6E-03		1.0E+03
^{137}Cs (pCi/L)	1.1E+00	1.0E+02 e	3.0E+03
^{14}C (pCi/L)	4.2E+00	3.0E+03 e	7.0E+04
^{3}H (pCi/L)	1.6E+02	9.0E+04 e	2.0E+06
^{90}Sr (pCi/L)	1.4E-01	5.0E+01 e	1.0E+03
^{234}U (pCi/L)	1.6E-01		5.0E+02
^{238}U (pCi/L)	1.4E-01		6.0E+02
TDS	5.1E+01	5.0E+02 h	

[a]Units of results are mg/L unless indicated otherwise. The results are the mean values reported in the Statistics table of chapter 3.

[b]Screening Value 1 (SV1) lists the value first, basis second and an asterisk (*) third if the result exceeds the regulatory value. The basis is the proposed primary MCL (e), the proposed secondary MCL (f), the primary MCL (g), or the secondary MCL (h). The value is the smaller of two MCLs: the proposed primary MCL (or the primary MCL as a default) or the proposed secondary MCL (or the secondary MCL as a default). See WHC-EP-0342, "Hanford Site Stream-Specific Reports", August 1990.

[c]Screening Value 2 (SV2) lists the value first and an asterisk (*) second if the result exceeds the SV2). These values are derived concentration guides obtained from Appendix A of WHC-CM-7-5, "Environmental Compliance Manual," Revision 1, January 1990.

[n]The SV1 and SV2 values for Gross Alpha are used to evaluate Alpha Activity.

[o]The SV2 for Gross Beta is used to evaluate Beta Activity.

Table 4-2. Deposition Rate for B Plant Chemical Sewage--Routine Operation.
Flowrate: 2.18 E+07 L/mo

Constituent	Kg/L*	Kg/mo*
Barium	2.92E-08	6.36E-01
Boron	1.85E-08	4.03E-01
Calcium	1.84E-05	4.01E+02
Chloride	1.50E-06	3.27E+01
Copper	2.12E-08	4.62E-01
Fluoride	1.39E-07	3.03E+00
Iron	5.32E-08	1.16E+00
Magnesium	4.15E-06	9.04E+01
Manganese	5.75E-09	1.25E-01
Potassium	8.01E-07	1.75E+01
Silicon	2.32E-06	5.06E+01
Sodium	2.12E-06	4.62E+01
Strontium	9.62E-08	2.10E+00
Sulfate	1.11E-05	2.42E+02
Uranium	4.71E-10	1.03E-02
Zinc	1.27E-08	2.77E-01
Acetone	1.12E-08	2.44E-01
Ammonia	5.52E-08	1.20E+00
Unknown amide	2.30E-08	5.01E-01
Alpha Activity *	5.55E-13	1.21E-05
Beta Activity *	2.18E-12	4.75E-05
TDS	5.07E-05	1.11E+03
TOC	1.10E-06	2.40E+01
Total Carbon	1.43E-05	3.12E+02
TOX (as Cl)	4.32E-08	9.42E-01
^{242}Cm *	4.56E-15	9.94E-08
^{137}Cs *	1.11E-12	2.42E-05
^{14}C *	4.24E-12	9.24E-05
^{3}H *	1.59E-10	3.47E-03
^{90}Sr *	1.44E-13	3.14E-06
^{234}U *	1.60E-13	3.49E-06
^{238}U *	1.37E-13	2.99E-06

Data collected from October 1989 through March 1990. Flowrate is the average of rates from chapter 2. Constituent concentrations are average values from the Statistics Report in chapter 3. Concentration units of flagged (*) constituents are reported as curies per liter. Deposition rate units of flagged (*) constituents are reported as curies per month.

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5.0 PROPOSED DESIGNATION

This section proposes that the BCE stream not be designated a dangerous waste. This proposed designation uses data from both the effluent source description and present (i.e., October 1989 to March 1990) sample data (Sections 2.0 through 4.0) and complies with the designation requirements of WAC 173-303-070 (Ecology 1989).

The procedure for determining whether a waste is a dangerous or extremely hazardous waste is contained in the Washington State *Dangerous Waste Regulations* (WAC 173-303-070). This procedure is illustrated in Figure 5-1 and includes the following:

- Dangerous Waste Lists (WAC 173-303-080)
- Dangerous Waste Criteria (WAC 173-303-100)
- Dangerous Waste Characteristics (WAC 173-303-090).

5.1 DANGEROUS WASTE LISTS

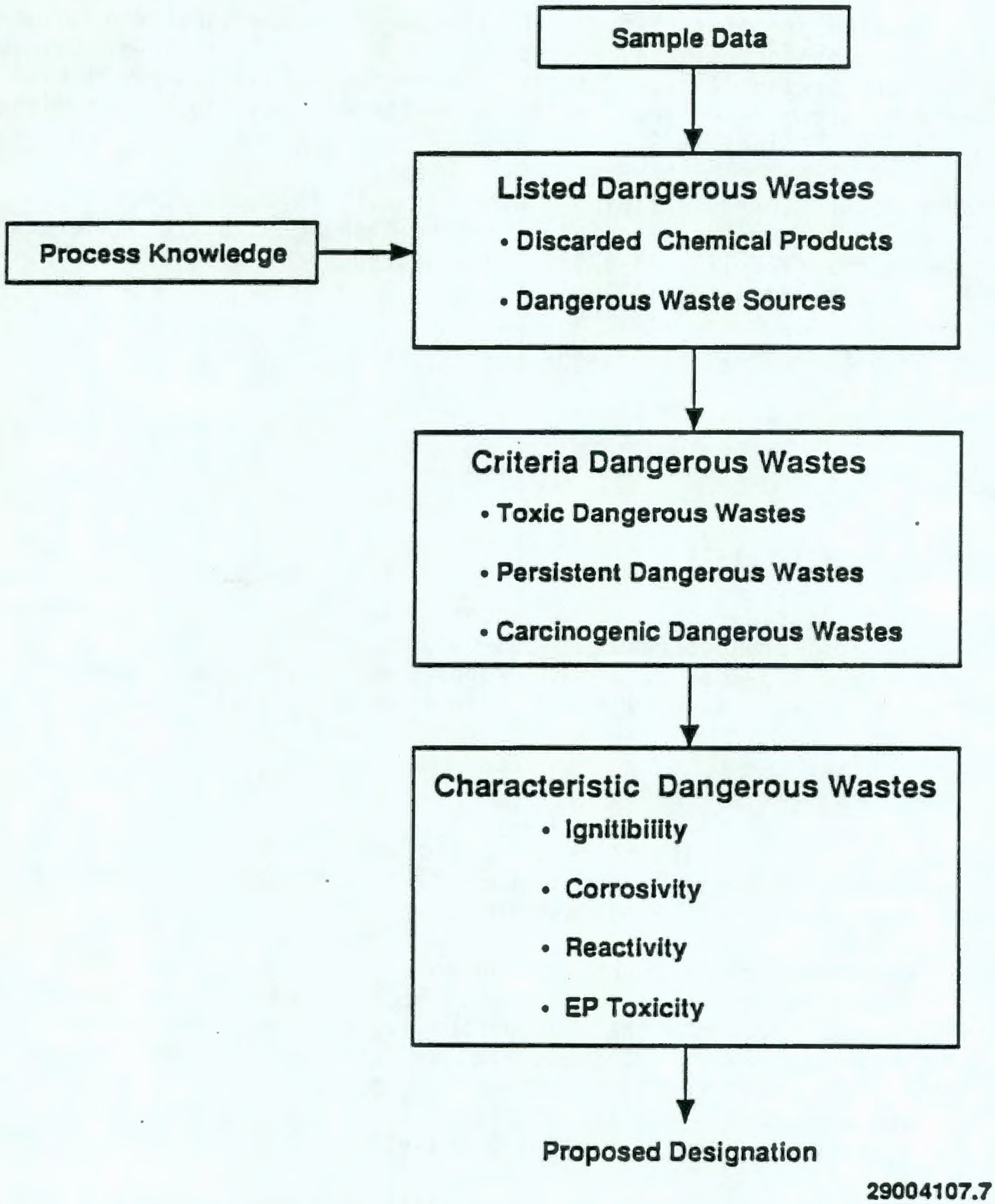
A waste is considered a listed dangerous waste if it either contains a discarded chemical product (WAC 173-303-081) or originates from a dangerous waste source (WAC 173-303-082). The proposed designation was based on a combination of process knowledge and present sampling data.

5.1.1 Discarded Chemical Products

A wastestream constituent is a discarded chemical product (WAC 173-303-081) if it is listed in WAC 173-303-9903 and is characterized by one or more of the following descriptions.

- The listed constituent was the sole active ingredient in a commercial chemical product that had been discarded. Commercial chemical products that, as purchased, contained two or more active ingredients were not designated as discarded chemical products. Products that contained nonactive components such as water, however, were designated if the sole active ingredient in the mixture was listed in WAC 173-303-9903.
- The constituent results from a spill of unused chemicals. (A spill of a discarded chemical product would cause a wastestream to be designated during the time that the discharge is occurring. The approach taken is that the current wastestream would not be designated unless a review of past spill events indicates that the spills are predictable, systematic events that are ongoing or are reasonably anticipated to occur in the future. In this report,

Figure 5-1. Illustration of the Designation Procedure.



9 1 1 1 8 9 5 0 5 5 4

the evaluation of this criterion is based on a review of spill data reported in accordance with the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*).

- The constituent is discarded in the form of a residue resulting from cleanup of a spill of an unused commercial chemical product on the discarded chemical products list. (A chemical product that is used in a process and then released to the wastestream is not a discarded chemical product. Offspecification, unused chemicals, and chemicals that have exceeded a shelf life but have not been used are considered discarded chemical products when not disposed of in accordance with the regulations).

5.1.2 Dangerous Waste Sources

A list of dangerous waste sources is contained in WAC 173-303-9904, pursuant to WAC 173-303-082 (Ecology 1989). There are three major categories of sources in WAC 173-303-9904. The first is nonspecific sources from routine maintenance operations occurring at many industries. The second is specific sources (e.g., wastes from ink formulation, etc.). The third is state sources, which is limited to polychlorinated biphenyl-contaminated transformers and capacitors resulting from salvaging, rebuilding, or discarding activities.

Of the nonspecific sources, only F001 (specific spent halogenated degreasing solvents), F002 (specific spent halogenated solvents), F003 (specific spent nonhalogenated solvents), and F005 (specific spent nonhalogenated solvents) could apply to the BCE stream.

5.2 LISTED WASTE DATA CONSIDERATIONS

The proposed designation of the wastestream described in this report is based on an evaluation of process and sampling data. The following sections describe the types of information used in this designation.

5.2.1 Process Evaluation

The process evaluation began with a thorough review of the processes contributing to the wastestream. Processes were reviewed and compared with the discarded chemical products list and the dangerous waste source list. This process evaluation is necessary because the stream could be a listed waste if a listed waste was known to have been added at any upstream location, even if a listed constituent was not detected at the sample point. The process evaluation included a review of the following information sources:

- Material Safety Data Sheets

- *Superfund Amendments and Reauthorization Act* Title III inventory reports
- Operating procedures
- Process chemical inventories
- Physical inspections, where possible.

Additionally, appropriate interviews with facility personnel were conducted to determine if there were any procedures or laboratory processes that generated a listed waste not evident during other portions of the process evaluation.

If a listed chemical was identified, the specific use of the chemical was evaluated to determine if such use resulted in the generation of a listed waste.

5.2.2 Sampling Data

Present sampling data were used as screening tools to enhance and support the results of the process evaluation. This screening compared the results of the sampling data with the WAC 173-303-9903 and 9904 lists. If a constituent was cited on one or both of these lists, an engineering evaluation was performed to determine if the constituent had entered the wastestream as a discarded chemical product or came from a dangerous waste source.

Screening organic constituents is a relatively simple procedure because analytical data for organic constituents are reported as substances and are easily compared to the WAC 173-303-9903 and -9904 lists. It is not as simple to screen inorganic analytical data because inorganic data are reported as ions rather than as substances. For example, an analysis may show that a wastestream contains the cations sodium and calcium along with the anions chloride and nitrate. The possible combinations of substances include: sodium chloride, sodium nitrate, calcium chloride, and calcium nitrate. In a situation with many cations and anions, however, the list of possible combinations is extensive.

A procedure was developed by Westinghouse Hanford Company for combining the inorganic constituents into substances. This screening procedure is described in WHC (1990b) and is intended to be a tool in the evaluation of a wastestream. The listing of the inorganic substances developed by this screening procedure is not intended to be an indication that the substance was discharged to the wastestream, only that the necessary cations and anions are present and an investigation should be conducted to determine how they entered the wastestream.

5.3 PROPOSED LISTED WASTE DESIGNATION

A process evaluation, along with a review of sampling data, indicated that the BCE did not contain a discarded chemical product or a listed waste source. The following sections discuss the evaluation that was conducted to substantiate this conclusion.

5.3.1 Discarded Chemical Products

As discussed in Section 5.2, a process evaluation of the contributors to the BCE was conducted. This evaluation included a review of Material Safety Data Sheets at the plant for the BCE stream (see Appendix A) and chemical inventories compiled for compliance with the *Superfund Authorization and Recovery Act* Title III requirements for possible listed waste contributors.

Table 5-1 contains a listing of the two potential discarded chemical products, hydrogen fluoride and acetone, identified from sampling data (using the screening procedure described in Section 5.2). Of these two compounds, only one (acetone) was identified as being present in the facility during the process evaluation.

A thorough review including facility interviews and inspections produced no evidence that discharges of these two chemical products into the BCE stream had occurred.

A review of plant operating procedures produced evidence to preclude the introduction of any of these substances into the BCE stream. In addition, the substances detected were not used in past process practices for the BCE stream.

The potential discarded chemical product identified in both the process evaluation and in the screening of the sampling data was acetone.

Based on the considerations and data presented in the following sections, the wastestream does not contain any discarded chemical products.

5.3.1.1 Hydrogen Fluoride. A thorough review of plant chemical inventory data and interviews with plant personnel did not show hydrogen fluoride to be present in any chemical compound used within B Plant.

Hydrogen fluoride (U134) is a possible compound formed from the combination of ion analytes. The presence or absence of this compound is dependent on the source of fluoride because hydrogen is commonly found in the wastewater. Fluoride was detected in four of the four samples (ion specific electrode [ISE] method) at an average concentration level of 139 ppb. The rejection criteria for hydrogen fluoride based on sanitary water supplies is less than 143 ppb as presented in Section 5.2 of WHC-EP-0342. As the average concentration seen in this sample is less than or approximating the rejection criteria, this data will not be considered in the designation of

Table 5-1. Dangerous Waste Designation Report.
(sheet 1 of 2)

Finding: Undesignated

Discarded Chemical Products - WAC 173-303-081

Substance	Review Number	Status	DW Number
Hydrogen fluoride	U134(DW)	Not Discarded	Undesignated
Acetone	U002(DW)	Not Discarded	Undesignated

Dangerous Waste Sources - WAC 173-303-082

Substance	Review Number	Status	DW Number
Acetone	F003	Unlisted Source	Undesignated

Infectous Dangerous Waste - WAC 173-303-083

No regulatory guidance

Dangerous Waste Mixtures - WAC 173-303-084

	Toxic	Persistant		Carcinogenic
Substance	EC%	HH%	PAH%	Total%
Barium chloride	4.65E-09	0.00E+00	0.00E+00	0.00E+00
Calcium tetraborate	4.22E-09	0.00E+00	0.00E+00	0.00E+00
Copper(II) chloride	6.30E-07	0.00E+00	0.00E+00	0.00E+00
Iron(III) fluoride	1.39E-07	0.00E+00	0.00E+00	0.00E+00
Magnesium chloride	7.01E-08	0.00E+00	0.00E+00	0.00E+00
Magnesium sulfate	1.23E-07	0.00E+00	0.00E+00	0.00E+00
Potassium fluoride	1.08E-07	0.00E+00	0.00E+00	0.00E+00
Sodium metasilicate	6.00E-08	0.00E+00	0.00E+00	0.00E+00
Zinc sulfate	3.65E-09	0.00E+00	0.00E+00	0.00E+00
Acetone	1.33E-10	0.00E+00	0.00E+00	0.00E+00
Ammonia	6.38E-08	0.00E+00	0.00E+00	0.00E+00
Total	1.21E-06	0.00E+00	0.00E+00	0.00E+00
DW Number	Undesignated	Undesignated	Undesignated	Undesignated

Dangerous Waste Characteristics - WAC 173-303-090

Characteristic	Value	DW Number
Ignitability (Degrees F)	>206	Undesignated
Corrosivity-pH	7.67	Undesignated
Reactivity Cyanide (mg/kg)	<1.00E+02	Undesignated
Reactivity Sulfide (mg/kg)	<1.00E+02	Undesignated
EP Toxic Arsenic (mg/L)	<5.00E-01	Undesignated
EP Toxic Barium (mg/L)	<1.00E+00	Undesignated
EP Toxic Cadmium (mg/L)	<1.00E-01	Undesignated
EP Toxic Chromium (mg/L)	<5.00E-01	Undesignated
EP Toxic Lead (mg/L)	<5.00E-01	Undesignated
EP Toxic Mercury (mg/L)	<2.00E-02	Undesignated
EP Toxic Selenium (mg/L)	<5.00E-01	Undesignated
EP Toxic Silver (mg/L)	<5.00E-01	Undesignated

Dangerous Waste Criteria - WAC 173-303-100

	Toxic	Persistant		Carcinogenic	
Substance	EC%	HH%	PAH%	Total%	DW Number-Positive
Barium chloride	4.65E-09	0.00E+00	0.00E+00	0.00E+00	
Calcium tetraborate	4.22E-09	0.00E+00	0.00E+00	0.00E+00	
Copper(II) chloride	6.30E-07	0.00E+00	0.00E+00	0.00E+00	
Iron(III) fluoride	1.39E-07	0.00E+00	0.00E+00	0.00E+00	
Magnesium chloride	7.01E-08	0.00E+00	0.00E+00	0.00E+00	

Table 5-1. Dangerous Waste Designation Report.
(sheet 2 of 2)

Dangerous Waste Criteria - WAC 173-303-100 - Continued

Substance	Toxic EC%	Persistant HH%	Persistant PAH%	Carcinogenic Total%	DW Number-Positive
Magnesium sulfate	1.23E-07	0.00E+00	0.00E+00	0.00E+00	
Potassium fluoride	1.08E-07	0.00E+00	0.00E+00	0.00E+00	
Sodium metasilicate	6.00E-08	0.00E+00	0.00E+00	0.00E+00	
Zinc sulfate	3.65E-09	0.00E+00	0.00E+00	0.00E+00	
Acetone	1.33E-10	0.00E+00	0.00E+00	0.00E+00	
Ammonia	6.38E-08	0.00E+00	0.00E+00	0.00E+00	
Total	1.21E-06	0.00E+00	0.00E+00	0.00E+00	
DW Number	Undesignated	Undesignated	Undesignated	Undesignated	

Dangerous Waste Constituents - WAC 173-303-9905

Substance
Hydrogen fluoride
Acetone
Barium and compounds,NOS

Substance names may include MB (monobasic), DB (dibasic), or TB (tribasic) to identify the equivalence of hydrogen ion that have been nutralized from polyprotic weak acids to form their conjugate bases.

Results based on a single datum are noted by an asterisk (*). Others are based on the lower limit of the one-tailed 90% confidence interval for pH data sets with mean values below 7.25 or by the upper limit of the one-tailed 90% confidence interval for all other data sets.

EP Toxic contaminants, ignitability, and reactivity are reported by standard methods when available. In the absence of EP Toxicity data, total contaminant concentrations are evaluated. In lieu of closed cup ignition results, ignitability is estimated from the sum of the contributions of all substances that are ignitable when pure. A waste is flagged as dangerous if sum of the ignitable substances exceeds one percent. Reactivity is by SW-846: 250 mg of cyanide as hydrogen cyanide per kg of waste or 500 mg of sulfide as hydrogen sulfide per kg of waste. Total cyanide and total sulfide are used in lieu of amenable cyanide and amenable sulfide.

Inorganic substances are fomulated and their possible concentrations calculated for designation purposes only. The actual existance in the waste of these substances is not implied and should not be infered.

the wastestream as it is likely that hydrogen fluoride is present in these samples due to the presence of fluoride in the water supply. In addition, increased concentration of fluoride will occur due to evaporative cooling losses as discussed in Section 2.3.3. Because this potential compound has no identified source, it is not considered to be a discarded chemical product in the BCE stream.

5.3.1.2 Acetone. Acetone (U002) is used in B Plant by maintenance and operations as a solvent to remove impurities (e.g., adhesive and grease) from various surfaces. Because of the potential of fire hazards, the use of acetone is tightly controlled to limit the amount of material present. Interviews with personnel in maintenance and operations and reviews of the procedures in place for disposal of spent chemicals in these areas provided no evidence that acetone had been disposed of as the sole active ingredient in an unused or out-of-specification chemical product.

Acetone appeared in one of the four BCE routine operation samples at a concentration of 15 ppb. The rejection criteria for acetone based on blank analysis is less than 37 ppb as presented in Section 5.2 of WHC-EP-0342. As the concentration of acetone seen in this sample is less than the rejection criteria, this data will not be considered in the designation of the wastestream as it is likely that acetone is present in this wastestream sample because of sample contamination.

In addition, acetone was seen in both the transfer and trip blanks on the same day as the detection listed previously. Because the trip and transfer blanks had concentrations of 21 ppb and 14 ppb, respectively, it is apparent that laboratory contamination is the source of this spent solvent. This potential compound is not considered to be a discarded chemical product in the BCE stream.

5.3.2 Dangerous Waste Sources

The process evaluation (see Section 5.2) was also used to determine if the wastestream included any specific waste sources (K and W wastes) or any nonspecific waste sources (F wastes) listed in WAC 173-303-9904.

Sampling data were utilized to enhance the process evaluation. One potential listed solvent was identified by the sampling data; this was acetone. Acetone appears on the B Plant chemical inventories.

Based on the discussion and data presented in the following sections, it is concluded that the wastestream does not have a dangerous waste source.

5.3.2.1 Acetone. As discussed in Section 5.3.1.2, acetone (F003) is used as a solvent at B Plant. No source for the entry of waste acetone into BCE was found to exist at B Plant. It is also concluded that acetone was present in the BCE samples as a result of sample contamination (see Section 5.3.1.2).

5.4 DANGEROUS WASTE CRITERIA

A waste is considered a dangerous waste if it meets any of the following criteria categories (WAC 173-303-100) (Ecology 1989): toxic dangerous waste, persistent dangerous waste, or carcinogenic dangerous waste. A description of the methods used to test the sampling data against the criteria is contained in WHC (1990b). Summaries of the methods, along with the results, are contained in the following sections.

Table 5-2 shows how ion analytes were assigned to neutral substances that are required for designation. The table accounts for charge balancing the ion assemblage (from Table 3-2 [the statistical summary]) and the subsequent formulation of neutral substances. A detailed discussion can be found in WHC (1990b).

5.4.1 Toxic Dangerous Wastes

The procedure for determining if a wastestream is a toxic dangerous waste is as follows (WAC 173-303-101).

- Collect and analyze multiple samples from the wastestream.
- Calculate the upper limit of the one-sided 90%CI for each analyte in the wastestream.
- Formulate substances from the analytical data. NOTE: This step is only required for inorganic analytes because it is not possible to complete the evaluation based on the concentration of cations and anions. This methodology is described in WHC (1990b) and is based on an evaluation of the most toxic substances that can exist in an aqueous environment under normal temperatures and pressures.
- Assign toxic categories to the neutral substances formulated for the wastestream.
- Calculate the contribution of each substance to the percent equivalent concentration (EC%).
- Calculate the EC% by summing the contributions of each substance.
- Designate the wastestream as a toxic dangerous waste if the EC% is greater than 0.001%, per WAC 173-303-9906.

Eleven substances potentially present in the BCE stream were determined to have toxic categories associated with them. These substances are listed in Table 5-1. The individual and sum EC% values for these substances are also listed in Table 5-1. Because the EC% sum is 1.21 E-06, which is less than the cutoff of 0.001%, the wastestream is not a toxic dangerous waste.

Table 5-2. Inorganic Chemistry for B Plant Chemical Sewage--Routine Operation. (sheet 1 of 2)

Constituent	ppb	Ion	Eq/g	Normalized
Charge normalization:				
Barium	3.06E+01	Ba+2	4.46E-10	
Boron	3.14E+01	B4O7-2	1.45E-09	4.32E-09
Calcium	1.88E+04	Ca+2	9.38E-07	
Chloride	1.77E+03	Cl-1	4.99E-08	1.49E-07
Copper	2.98E+01	Cu+2	9.37E-10	
Fluoride	1.42E+02	F-1	7.45E-09	2.22E-08
Iron	6.87E+01	Fe+3	3.69E-09	
Magnesium	4.28E+03	Mg+2	3.52E-07	
Manganese	6.53E+00	Mn+2	2.38E-10	
Potassium	8.87E+02	K+1	2.27E-08	
Silicon	2.42E+03	SiO3-2	1.72E-07	5.14E-07
Sodium	2.26E+03	Na+1	9.83E-08	
Strontium	1.02E+02	Sr+2	2.32E-09	
Sulfate	1.18E+04	SO4-2	2.45E-07	7.29E-07
Uranium	5.35E-01	UO2+2	4.49E-12	
Zinc	1.48E+01	Zn+2	4.53E-10	
Hydrogen Ion (from pH 7.7)		H+	(2.14E-11)	
Hydroxide Ion (from pH)		OH-	(4.66E-10)	
Cation total			1.42E-06	
Anion total			4.76E-07	
Anion normalization factor:	2.979			

Substance formation:

Substance	%	Cation Out	Anion Out
Copper(II) chloride	6.30E-06	0.00E+00	1.48E-07
Iron(III) fluoride	1.39E-05	0.00E+00	1.85E-08
Potassium fluoride	1.08E-04	4.17E-09	0.00E+00
Barium chloride	4.65E-06	0.00E+00	1.47E-07
Zinc sulfate	3.65E-06	0.00E+00	7.29E-07
Magnesium chloride	7.01E-04	2.05E-07	0.00E+00
Calcium tetraborate	4.22E-05	9.34E-07	0.00E+00
Magnesium sulfate	1.23E-03	0.00E+00	5.24E-07
Sodium metasilicate	6.00E-04	0.00E+00	4.15E-07
Potassium metasilicate	3.22E-05	0.00E+00	4.11E-07
Manganese(II) metasilicate	1.56E-06	0.00E+00	4.11E-07
Strontium sulfate	2.13E-05	0.00E+00	5.21E-07
Uranyl sulfate	8.23E-08	0.00E+00	5.21E-07
Calcium sulfate	3.55E-03	4.12E-07	0.00E+00

Table 5-2. Inorganic Chemistry for B Plant Chemical Sewage--Routine Operation.
(sheet 2 of 2)

Statistics based on a single datum are noted by an asterisk (*). With the exception of hydrogen ion and hydroxide, others report the upper limit of the one-tailed 90% confidence interval. Hydrogen ion is based on the lower limit of the one-tailed 90% confidence interval for pH sets with mean values below 7.25 and on the upper limit of the one-tailed 90% confidence interval for pH data sets with mean values of 7.25 or higher. The hydroxide magnitude is equal to 1.00E-20 (Eq/g)**2 divided by the hydrogen ion value (in Eq/g).

Ion concentrations in equivalents per gram (Eq/g) are based on the statistic. Conversions include scale (ppb to g/g), molecular weight (constituent form to ionic form), and equivalents (charges per ion). The column headed "Normalized" shows normalized concentrations (also in Eq/g) calculated by increasing concentrations of cations, excluding Hydrogen ion, or anions, excluding hydroxide, by the normalization factor. The normalization factor is the larger of the cation total, including Hydrogen ion, or anion total, including hydroxide, divided by the smaller total.

Substance names may include MB (monobasic), DB (dibasic), TB (tribasic) to identify the equivalents of hydrogen ion that have been neutralized from polycrotic weak acids to form their conjugate bases.

Substances are formulated in the order listed. The column headed "%" is the percent of the substance in the waste (gms/100gms). Substances formulated with oxygen are based on the residual concentration of the counterion. Other substance concentrations are based on the limiting residual concentration of the cation or anion. The columns headed "Cation Out" and "Anion Out" indicate the residual concentrations (in Eq/g) of each ion after a substance concentration has been calculated.

5.4.2 Persistent Dangerous Wastes

The procedure for determining if a wastestream is a persistent dangerous waste is as follows (WAC 173-303-102).

- Collect multiple grab samples of the wastestream.
- Determine which substances in the wastestream are halogenated hydrocarbons (HH) and which are polycyclic aromatic hydrocarbons (PAH).
- Determine the upper limit of the one-sided 90%CI for the substances of interest.
- Calculate the weight percent (wt%) contribution of each HH% and PAH%.
- Sum the resulting weight percent of the contributor HH% and PAH%.
- Designate the wastestream as persistent if the weight percent contribution of the HH% is greater than 0.01% or if the weight percent contribution of the PAH% is greater than 1.0%, per WAC 173-303-9907.

No substance potentially present in the BCE stream was determined to be HH and no chemical compounds were determined to be PAH. Therefore, the BCE stream is not a persistent dangerous waste.

5.4.3 Carcinogenic Dangerous Wastes

The procedure for determining if a wastestream is a carcinogenic dangerous waste is as follows (WAC 173-303-103).

- Collect multiple grab samples of the wastestream.
- Determine the upper limit of the one-sided 90%CI for the substances of interest.
- Formulate neutral substances from the analytical data.
  NOTE: This step is only required for inorganic analytes because it is not possible to complete the evaluation based on the concentrations of cations and anions. This methodology is described in WHC (1990b) and is based on an evaluation of the carcinogenic substances that can exist in an aqueous environment under normal temperatures and pressures.
- Determine which substances in the wastestream are human or animal carcinogens according to the International Agency for Research on Cancer (IARC).

- Calculate the weight percent concentration for each carcinogen.
- Sum the resulting weight percent contributions.
- Designate the wastestream as carcinogenic if any of the positive carcinogens are above 0.01% or if the total concentration for positive and suspected carcinogens is above 1.0%.

No substance potentially present in the BCE stream was determined to be carcinogenic chemical compounds. The BCE is not a carcinogenic dangerous waste.

5.5 DANGEROUS WASTE CHARACTERISTICS

A waste is considered a dangerous waste if it is ignitable, corrosive, reactive, or extraction procedure (EP) toxic (WAC 173-303-090). A description of the methods used to evaluate the data in terms of these characteristics is contained in WHC (1990b). Summaries of the methods, along with the results, are contained in the following sections.

5.5.1 Ignitability

The lowest flashpoint of any substance found in the BCE was greater than 206 °F. Therefore, the BCE is not an ignitable waste.

5.5.2 Corrosivity

A waste is a corrosive dangerous waste if the stream exhibited a pH of ≤2.0 or ≥12.5. The comparison to this characteristic was based on the lower limit of the 90%CI for a stream with a mean value of pH <7.25 and the upper limit of the one-sided 90%CI for a stream with a mean value of pH ≥7.25. Because the 90% CI of the pH for the wastestream is 7.67, the wastestream is not a corrosive dangerous waste per WAC 173-303-090(6).

5.5.3 Reactivity

An aqueous waste is reactive if the waste contains an amount of cyanide or sulfide that, under modified conditions, could threaten human health or the environment (WAC 173-303-090(7)). A revision to *Test Methods for Evaluating Solid Wastes* (EPA 1986) provides more quantitative indicator levels for cyanide and sulfide. It states that levels of (equivalent) cyanide as hydrogen cyanide below 250 mg/kg or of (equivalent) sulfide as hydrogen sulfide below 500 mg/kg would not be considered reactive.

Total cyanide and total sulfide equivalent concentrations are below 100 mg/kg the detection limit with less than values given. Therefore, this wastestream is not a reactive dangerous waste.

5.5.4 Extraction Procedure Toxicity

A waste is an EP toxic dangerous waste if contaminant results from EP toxicity testing exceed the limits of WAC 173-303-090(8)(c). In the absence of specific EP toxicity test results, total analyte concentrations are used.

No analytes with concentrations above detection limits are on the EP toxic list in the BCE stream. Therefore, the BCE (routine operation) stream is not an EP toxic dangerous waste.

5.6 PROPOSED DESIGNATIONS

Because the BCE stream does not contain any dangerous waste, as defined in WAC 173-303-070, it is proposed that the wastestream not be designated a dangerous waste.

6.0 ACTION PLAN

This section addresses recommendations for future waste characterization tasks for the liquid effluents that are within the scope of the *Liquid Effluent Study Characterization Data* (WHC 1990a). The final extent of, and schedule for, any recommended tasks are subject to negotiation between the Ecology, EPA, and DOE. An implementation schedule for the completion of these tasks will give consideration to other compliance actions already under way as part of the Tri-Party Agreement (Ecology et al. 1989), and on the availability of funding. All effluent monitoring and sampling will be conducted according to DOE Order 5400.1 (*General Environmental Protection Program*, issued November 9, 1988) (DOE 1988).

6.1 FUTURE SAMPLING

The random sampling conducted during the October 1989 to March 1990 period covered the routine operation process configuration of the BCE. Configurations related to regeneration of the ion exchange column (i.e., anion and cation regenerate) were not taken. Future sampling should be performed during operation of the anion and cation regenerate configurations.

6.2 TECHNICAL ISSUES

As described in Section 2.0, the BCE stream was sampled at the 216-B-63 Ditch. This sample point was chosen because it is a common, accessible location downstream of all the contributing wastestreams.

The samples collected at this point are considered to be representative of the types of constituents present in the contributing wastestream during routine operation. As a result, the characterization data presented in this report is considered to be representative of the effluent stream during the routine operation configuration.

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APPENDIX A

PROCESS INFORMATION

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Appendix A. Potential Chemicals.

Chemical	Hazardous Constituents	Hanford MSDS Number
Sulfuric acid,	Sulfuric acid 93-99 wt%	1529A
Sodium hydroxide	Sodium hydroxide 100 wt%	1497B
Sodium carbonate, anhydrous	None listed	1473
Sodium bicarbonate, baking soda	None listed	1480
Monosodium phosphate, sodium diphosphate	None listed	1360
Dearborn*-727	Potassium hydroxide less than 10 wt%	17342
Dearborn*-730	Trichloro-s-triazinetrione 99 wt%	10770
IWT C-211 cation exchange resin (styrene/divinylbenzene copolymer)	None listed	14925
IWT A-264 anion exchange resin	None listed	21902

*Dearborn is a trademark of W. R. Grace & Co., Lake Zurich, Illinois.

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APPENDIX B

SAMPLING DATA FOR B PLANT CHEMICAL SEWER

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Table B-1. New Data for the Period October 1989 through March 1990.
(sheet 1 of 7)

Constituent	Sample #	Date	Method	Result
Arsenic (EP Toxic)	50705E	10/19/89	ICP	<5.00E+02
Arsenic (EP Toxic)	50752E	11/02/89	ICP	<5.00E+02
Arsenic (EP Toxic)	50756E	11/03/89	ICP	<5.00E+02
Arsenic (EP Toxic)	50984E	2/27/90	ICP	<5.00E+02
Barium	50705	10/19/89	ICP	2.90E+01
Barium	50752	11/02/89	ICP	3.00E+01
Barium	50756	11/03/89	ICP	3.10E+01
Barium	50984	2/27/90	ICP	2.70E+01
Barium (EP Toxic)	50705E	10/19/89	ICP	<1.00E+03
Barium (EP Toxic)	50752E	11/02/89	ICP	<1.00E+03
Barium (EP Toxic)	50756E	11/03/89	ICP	<1.00E+03
Barium (EP Toxic)	50984E	2/27/90	ICP	<1.00E+03
Boron	50705	10/19/89	ICP	<1.00E+01
Boron	50752	11/02/89	ICP	1.00E+01
Boron	50756	11/03/89	ICP	1.20E+01
Boron	50984	2/27/90	ICP	4.20E+01
Cadmium (EP Toxic)	50705E	10/19/89	ICP	<1.00E+02
Cadmium (EP Toxic)	50752E	11/02/89	ICP	<1.00E+02
Cadmium (EP Toxic)	50756E	11/03/89	ICP	<1.00E+02
Cadmium (EP Toxic)	50984E	2/27/90	ICP	<1.00E+02
Calcium	50705	10/19/89	ICP	1.86E+04
Calcium	50752	11/02/89	ICP	1.89E+04
Calcium	50756	11/03/89	ICP	1.84E+04
Calcium	50984	2/27/90	ICP	1.79E+04
Chloride	50705	10/19/89	IC	1.90E+03
Chloride	50752	11/02/89	IC	1.50E+03
Chloride	50756	11/03/89	IC	1.50E+03
Chloride	50984	2/27/90	IC	1.10E+03
Chromium (EP Toxic)	50705E	10/19/89	ICP	<5.00E+02
Chromium (EP Toxic)	50752E	11/02/89	ICP	<5.00E+02
Chromium (EP Toxic)	50756E	11/03/89	ICP	<5.00E+02
Chromium (EP Toxic)	50984E	2/27/90	ICP	<5.00E+02
Copper	50705	10/19/89	ICP	1.30E+01
Copper	50752	11/02/89	ICP	2.10E+01
Copper	50756	11/03/89	ICP	3.60E+01
Copper	50984	2/27/90	ICP	1.50E+01
Fluoride	50705	10/19/89	IC	<5.00E+02
Fluoride	50705	10/19/89	ISE	1.40E+02
Fluoride	50752	11/02/89	IC	<5.00E+02
Fluoride	50752	11/02/89	ISE	1.43E+02
Fluoride	50756	11/03/89	IC	<5.00E+02
Fluoride	50756	11/03/89	ISE	1.36E+02
Fluoride	50984	2/27/90	IC	<5.00E+02
Fluoride	50984	2/27/90	ISE	1.37E+02
Iron	50705	10/19/89	ICP	4.60E+01
Iron	50752	11/02/89	ICP	<3.00E+01

Table B-1. New Data for the Period October 1989 through March 1990.
(sheet 2 of 7)

Constituent	Sample #	Date	Method	Result
Iron	50756	11/03/89	ICP	6.70E+01
Iron	50984	2/27/90	ICP	7.00E+01
Lead (EP Toxic)	50705E	10/19/89	ICP	<5.00E+02
Lead (EP Toxic)	50752E	11/02/89	ICP	<5.00E+02
Lead (EP Toxic)	50756E	11/03/89	ICP	<5.00E+02
Lead (EP Toxic)	50984E	2/27/90	ICP	<5.00E+02
Magnesium	50705	10/19/89	ICP	4.09E+03
Magnesium	50752	11/02/89	ICP	4.32E+03
Magnesium	50756	11/03/89	ICP	4.23E+03
Magnesium	50984	2/27/90	ICP	3.95E+03
Manganese	50705	10/19/89	ICP	7.00E+00
Manganese	50752	11/02/89	ICP	<5.00E+00
Manganese	50756	11/03/89	ICP	6.00E+00
Manganese	50984	2/27/90	ICP	<5.00E+00
Mercury (EP Toxic)	50705E	10/19/89	CVAA/M	<2.00E+01
Mercury (EP Toxic)	50752E	11/02/89	CVAA/M	<2.00E+01
Mercury (EP Toxic)	50756E	11/03/89	CVAA/M	<2.00E+01
Mercury (EP Toxic)	50984E	2/27/90	CVAA/M	<2.00E+01
Potassium	50705	10/19/89	ICP	6.88E+02
Potassium	50752	11/02/89	ICP	7.42E+02
Potassium	50756	11/03/89	ICP	8.49E+02
Potassium	50984	2/27/90	ICP	9.23E+02
Selenium (EP Toxic)	50705E	10/19/89	ICP	<5.00E+02
Selenium (EP Toxic)	50752E	11/02/89	ICP	<5.00E+02
Selenium (EP Toxic)	50756E	11/03/89	ICP	<5.00E+02
Selenium (EP Toxic)	50984E	2/27/90	ICP	<5.00E+02
Silicon	50705	10/19/89	ICP	2.20E+03
Silicon	50752	11/02/89	ICP	2.44E+03
Silicon	50756	11/03/89	ICP	2.41E+03
Silicon	50984	2/27/90	ICP	2.23E+03
Silver (EP Toxic)	50705E	10/19/89	ICP	<5.00E+02
Silver (EP Toxic)	50752E	11/02/89	ICP	<5.00E+02
Silver (EP Toxic)	50756E	11/03/89	ICP	<5.00E+02
Silver (EP Toxic)	50984E	2/27/90	ICP	<5.00E+02
Sodium	50705	10/19/89	ICP	2.19E+03
Sodium	50752	11/02/89	ICP	2.15E+03
Sodium	50756	11/03/89	ICP	2.27E+03
Sodium	50984	2/27/90	ICP	1.88E+03
Strontium	50705	10/19/89	ICP	9.70E+01
Strontium	50752	11/02/89	ICP	9.90E+01
Strontium	50756	11/03/89	ICP	1.02E+02
Strontium	50984	2/27/90	ICP	8.70E+01
Sulfate	50705	10/19/89	IC	1.22E+04
Sulfate	50752	11/02/89	IC	1.11E+04
Sulfate	50756	11/03/89	IC	1.08E+04
Sulfate	50984	2/27/90	IC	1.03E+04

Table B-1. New Data for the Period October 1989 through March 1990.
(sheet 3 of 7)

Constituent	Sample #	Date	Method	Result
Uranium	50705	10/19/89	FLUOR	5.36E-01
Uranium	50752	11/02/89	FLUOR	4.54E-01
Uranium	50756	11/03/89	FLUOR	4.23E-01
Zinc	50705	10/19/89	ICP	1.30E+01
Zinc	50752	11/02/89	ICP	1.00E+01
Zinc	50756	11/03/89	ICP	1.60E+01
Zinc	50984	2/27/90	ICP	1.20E+01
Acetone	50705	10/19/89	VOA	1.50E+01
Acetone	50705	10/19/89	ABN	<1.00E+01
Acetone	50705B	10/19/89	VOA	2.10E+01
Acetone	50705T	10/19/89	VOA	1.40E+01
Acetone	50752	11/02/89	VOA	<1.00E+01
Acetone	50752	11/02/89	ABN	<1.00E+01
Acetone	50752B	11/02/89	VOA	<1.00E+01
Acetone	50752T	11/02/89	VOA	<1.00E+01
Acetone	50756	11/03/89	VOA	<1.00E+01
Acetone	50756	11/03/89	ABN	<1.00E+01
Acetone	50756B	11/03/89	VOA	<1.00E+01
Acetone	50756T	11/03/89	VOA	<1.00E+01
Acetone	50984	2/27/90	VOA	<1.00E+01
Acetone	50984	2/27/90	ABN	<1.00E+01
Acetone	50984B	2/27/90	VOA	<1.00E+01
Acetone	50984T	2/27/90	VOA	<1.00E+01
Ammonia	50705	10/19/89	ISE	7.10E+01
Ammonia	50752	11/02/89	ISE	<5.00E+01
Ammonia	50756	11/03/89	ISE	<5.00E+01
Ammonia	50984	2/27/90	ISE	<5.00E+01
Dichloromethane	50705	10/19/89	VOA	<5.00E+00
Dichloromethane	50705B	10/19/89	VOA	<3.00E+00
Dichloromethane	50705T	10/19/89	VOA	1.20E+01
Dichloromethane	50752	11/02/89	VOA	<5.00E+00
Dichloromethane	50752B	11/02/89	VOA	<5.00E+00
Dichloromethane	50752T	11/02/89	VOA	7.00E+00
Dichloromethane	50756	11/03/89	VOA	<5.00E+00
Dichloromethane	50756B	11/03/89	VOA	8.00E+00
Dichloromethane	50756T	11/03/89	VOA	8.00E+00
Dichloromethane	50984	2/27/90	VOA	<5.00E+00
Dichloromethane	50984B	2/27/90	VOA	<5.00E+00
Dichloromethane	50984T	2/27/90	VOA	<5.00E+00
Tetrahydrofuran	50705	10/19/89	VOA	<1.00E+01
Tetrahydrofuran	50705B	10/19/89	VOA	1.70E+01
Tetrahydrofuran	50705T	10/19/89	VOA	<6.00E+00
Tetrahydrofuran	50752	11/02/89	VOA	<1.00E+01
Tetrahydrofuran	50752B	11/02/89	VOA	1.40E+01
Tetrahydrofuran	50752T	11/02/89	VOA	<1.00E+01
Tetrahydrofuran	50756	11/03/89	VOA	<1.00E+01

Table B-1. New Data for the Period October 1989 through March 1990.
(sheet 4 of 7)

Constituent	Sample #	Date	Method	Result
Tetrahydrofuran	50756B	11/03/89	VOA	1.20E+01
Tetrahydrofuran	50756T	11/03/89	VOA	1.20E+01
Tetrahydrofuran	50984	2/27/90	VOA	<1.00E+01
Tetrahydrofuran	50984B	2/27/90	VOA	<6.00E+00
Tetrahydrofuran	50984T	2/27/90	VOA	<6.00E+00
Trichloromethane	50705	10/19/89	VOA	<3.00E+00
Trichloromethane	50705B	10/19/89	VOA	<5.00E+00
Trichloromethane	50705T	10/19/89	VOA	<5.00E+00
Trichloromethane	50752	11/02/89	VOA	<5.00E+00
Trichloromethane	50752B	11/02/89	VOA	<5.00E+00
Trichloromethane	50752T	11/02/89	VOA	<3.00E+00
Trichloromethane	50756	11/03/89	VOA	<3.00E+00
Trichloromethane	50756B	11/03/89	VOA	<3.00E+00
Trichloromethane	50756T	11/03/89	VOA	<3.00E+00
Trichloromethane	50984	2/27/90	VOA	<5.00E+00
Trichloromethane	50984B	2/27/90	VOA	1.20E+01
Trichloromethane	50984T	2/27/90	VOA	8.00E+00
Unknown amide	50756	11/03/89	ABN	2.30E+01
Alkalinity (Method B)	50705	10/19/89	TITRA	5.40E+04
Alkalinity (Method B)	50752	11/02/89	TITRA	5.70E+04
Alkalinity (Method B)	50756	11/03/89	TITRA	5.60E+04
Alkalinity (Method B)	50984	2/27/90	TITRA	5.70E+04
Alpha Activity (pCi/L)	50705	10/19/89	Alpha	<2.68E-01
Alpha Activity (pCi/L)	50752	11/02/89	Alpha	<5.75E-01
Alpha Activity (pCi/L)	50756	11/03/89	Alpha	8.22E-01
Beta Activity (pCi/L)	50705	10/19/89	Beta	2.97E+00
Beta Activity (pCi/L)	50752	11/02/89	Beta	<1.48E+00
Beta Activity (pCi/L)	50756	11/03/89	Beta	<2.09E+00
Conductivity (µS)	50705	10/19/89	COND-Fld	1.75E+02
Conductivity (µS)	50752	11/02/89	COND-Fld	1.33E+02
Conductivity (µS)	50756	11/03/89	COND-Fld	1.53E+02
Conductivity (µS)	50984	2/27/90	COND-Fld	1.22E+02
Ignitability (°F)	50705E	10/19/89	IGNIT	2.08E+02
Ignitability (°F)	50752E	11/02/89	IGNIT	2.12E+02
Ignitability (°F)	50756E	11/03/89	IGNIT	2.10E+02
Ignitability (°F)	50984E	2/27/90	IGNIT	2.06E+02
pH (dimensionless)	50705	10/19/89	PH-Fld	7.60E+00
pH (dimensionless)	50752	11/02/89	PH-Fld	7.41E+00
pH (dimensionless)	50756	11/03/89	PH-Fld	7.70E+00
pH (dimensionless)	50984	2/27/90	PH-Fld	7.10E+00
Reactivity Cyanide (mg/kg)	50705E	10/19/89	DSPEC	<1.00E+02
Reactivity Cyanide (mg/kg)	50752E	11/02/89	DSPEC	<1.00E+02
Reactivity Cyanide (mg/kg)	50756E	11/03/89	DSPEC	<1.00E+02
Reactivity Cyanide (mg/kg)	50984E	2/27/90	DSPEC	<1.00E+02
Reactivity Sulfide (mg/kg)	50705E	10/19/89	DTITRA	<1.00E+02
Reactivity Sulfide (mg/kg)	50752E	11/02/89	DTITRA	<1.00E+02

Table B-1. New Data for the Period October 1989 through March 1990.
(sheet 5 of 7)

Constituent	Sample #	Date	Method	Result
Reactivity Sulfide (mg/kg)	50756E	11/03/89	DTITRA	<1.00E+02
Reactivity Sulfide (mg/kg)	50984E	2/27/90	DTITRA	<1.00E+02
TDS	50705	10/19/89	TDS	5.00E+04
TDS	50752	11/02/89	TDS	4.70E+04
TDS	50756	11/03/89	TDS	5.20E+04
TDS	50984	2/27/90	TDS	5.40E+04
Temperature (°C)	50705	10/19/89	TEMP-Fld	2.74E+01
Temperature (°C)	50752	11/02/89	TEMP-Fld	1.86E+01
Temperature (°C)	50756	11/03/89	TEMP-Fld	2.03E+01
Temperature (°C)	50984	2/27/90	TEMP-Fld	1.71E+01
TOC	50705	10/19/89	TOC	<1.60E+03
TOC	50752	11/02/89	TOC	<1.20E+03
TOC	50756	11/03/89	TOC	<1.20E+03
TOC	50984	2/27/90	TOC	1.10E+03
Total Carbon	50705	10/19/89	TC	1.60E+04
Total Carbon	50752	11/02/89	TC	1.42E+04
Total Carbon	50756	11/03/89	TC	1.32E+04
Total Carbon	50984	2/27/90	TC	1.39E+04
TOX (as Cl)	50705	10/19/89	LTOX	4.30E+01
TOX (as Cl)	50752	11/02/89	LTOX	4.50E+01
TOX (as Cl)	50756	11/03/89	LTOX	5.90E+01
TOX (as Cl)	50984	2/27/90	LTOX	2.60E+01
^{242}Cm (pCi/L)	50705	10/19/89	AEA	<3.81E-03
^{242}Cm (pCi/L)	50756	11/03/89	AEA	5.31E-03
^{137}Cs (pCi/L)	50705	10/19/89	GEA	1.73E+00
^{137}Cs (pCi/L)	50752	11/02/89	GEA	4.95E-01
^{14}C (pCi/L)	50752	11/02/89	LSC	4.98E+00
^{14}C (pCi/L)	50756	11/03/89	LSC	<3.51E+00
^{3}H (pCi/L)	50705	10/19/89	LSC	<1.99E+02
^{3}H (pCi/L)	50752	11/02/89	LSC	<2.90E+01
^{3}H (pCi/L)	50756	11/03/89	LSC	2.50E+02
^{90}Sr (pCi/L)	50705	10/19/89	Beta	1.24E-01
^{90}Sr (pCi/L)	50752	11/02/89	Beta	<9.89E-02
^{90}Sr (pCi/L)	50756	11/03/89	Beta	2.09E-01
^{234}U (pCi/L)	50705	10/19/89	AEA	1.89E-01
^{234}U (pCi/L)	50752	11/02/89	AEA	1.78E-01
^{234}U (pCi/L)	50756	11/03/89	AEA	1.14E-01
^{238}U (pCi/L)	50705	10/19/89	AEA	1.43E-01
^{238}U (pCi/L)	50752	11/02/89	AEA	1.36E-01
^{238}U (pCi/L)	50756	11/03/89	AEA	1.33E-01

Sample# is the number of the sample. See chapter three for corresponding chain-of-custody number. Date is the sampling date. Results are in ppb (parts per billion) unless otherwise indicated. The following table lists the methods that are coded in the method column.

Table B-1. New Data for the Period October 1989 through March 1990.
(sheet 6 of 7)

Code	Analytical Method	Reference
ABN	Semivolatile Organics (GC/MS)	USEPA-8270
AEA	^{241}Am	UST-20Am01
AEA	Curium Isotopes	UST-20Am/Cm01
AEA	Plutonium Isotopes	UST-20Pu01
AEA	Uranium Isotopes	UST-20U01
ALPHA	Alpha Counting	EPA-680/4-75/1
ALPHA-Ra	Total Radium Alpha Counting	ASTM-D2460
BETA	Beta Counting	EPA-680/4-75/1
BETA	^{90}Sr	UST-20Sr02
COLIF	Coliform Bacteria	USEPA-9131
COLIFMF	Coliform Bacteria (Membrane Filter)	USEPA-9132
COND-Fld	Conductivity-Field	ASTM-D1125A
COND-Lab	Conductivity-Laboratory	ASTM-D1125A
CVAA	Mercury	USEPA-7470
CVAA/M	Mercury-Mixed Matrix	USEPA-7470
DIGC	Direct Aqueous Injection (GC)	UST-70DIGC
DIMS	Direct Aqueous Injection (GC/MS)	"USEPA-8240"
DSPEC	Reactive Cyanide (Distillation, Spectroscopy)	USEPA-CHAPTER 7
DTITRA	Reactive Sulfide (Distillation, Titration)	USEPA-CHAPTER 7
FLUOR	Uranium (Fluorometry)	ASTM-D2907-83
GEA	Gamma Energy Analysis Spectroscopy	ASTM-D3649-85
GFAA	Arsenic (AA, Furnace Technique)	USEPA-7060
GFAA	Lead (AA, Furnace Technique)	USEPA-7421
GFAA	Selenium (AA, Furnace Technique)	USEPA-7740
GFAA	Thallium (AA, Furnace Technique)	USEPA-7841
IC	Ion Chromatography	EPA-600/4-84-01
ICP	Atomic Emission Spectroscopy (ICP)	USEPA-6010
ICP/M	Atomic Emission Spectroscopy (ICP)-Mixed Matrix	USEPA-6010
IGNIT	Pensky-Martens Closed-Cup Ignitability	USEPA-1010
ISE	Fluoride-Low Detection Limit	ASTM-D1179-80-B
ISE	Ammonium Ion	ASTM-D1426-D
LALPHA	Alpha Activity-Low Detection Limit	EPA-680/4-75/1
LEPD	^{129}I	UST-20I02
LSC	^{14}C	UST-20C01
LSC	Tritium	UST-20H03
LTOX	Total Organic Halides-Low Detection Limit	USEPA-9020
PH-Fld	pH-Field	USEPA-9040
PH-Lab	pH-Laboratory	USEPA-9040
SPEC	Total and Amenable Cyanide (Spectroscopy)	USEPA-9010
SPEC	Hydrazine-Low Detection Limit (Spectroscopy)	ASTM-D1385
SSOLID	Suspended Solids	SM-208D
TC	Total Carbon	USEPA-9060
TDS	Total Dissolved Solids	SM-208B
TEMP-Fld	Temperature-Field	Local

Table B-1. New Data for the Period October 1989 through March 1990.
(sheet 7 of 7)

Code	Analytical Method	Reference
TITRA	Alkalinity-Method B (Titration)	ASTM-D1067B
TITRA	Sulfides (Titration)	USEPA-9030
TOC	Total Organic Carbon	USEPA-9060
TOX	Total Organic Halides	USEPA-9020
VOA	Volatile Organics (GC/MS)	USEPA-8240

Analytical Method Acronyms:
- atomic absorption spectroscopy (AA)
- gas chromatography (GC)
- mass spectrometry (MS)
- inductively-coupled plasma spectroscopy (ICP).

References:

ASTM - "1986 Annual Book of ASTM Standards", American Society for Testing and Materials, Philadelphia, Pennsylvania.

EPA - Various methods of the U.S. Environmental Protection Agency, Washington, D.C.

UST - Methods of the contract laboratory.

SM - "Standard Methods for the Examination of Water and Wastewater," 16th ed., American Public Health Association, American Water Works Association and Water Pollution Control Federation, Washington, D.C.

USEPA - "Test Methods for Evaluating Solid Waste Physical/Chemical Methods", 3rd ed., SW-846, U.S. Environmental Protection Agency, Washington, D.C.

Table B-2. Total Data. (sheet 1 of 20)

Constituent	Sample #	Date	Method	Result
B Plant Chemical Sewage -- Anion Exchange Regenerate				
Aluminum	50029	4/09/86	ICP	4.99E+02
Aluminum	50101	7/31/86	ICP	<3.12E+03
Aluminum	50281	4/13/87	ICP	4.03E+02
Aluminum	50328	7/23/87	ICP	1.07E+03
Aluminum	50370	12/29/87	ICP	1.95E+03
Antimony	50029	4/09/86	ICP	<1.00E+02
Antimony	50101	7/31/86	ICP	2.28E+02
Antimony	50281	4/13/87	ICP	<1.00E+02
Antimony	50328	7/23/87	ICP	<1.00E+02
Antimony	50370	12/29/87	ICP	<1.00E+02
Barium	50029	4/09/86	ICP	1.15E+02
Barium	50101	7/31/86	ICP	5.80E+01
Barium	50281	4/13/87	ICP	8.80E+01
Barium	50328	7/23/87	ICP	6.80E+01
Barium	50370	12/29/87	ICP	1.45E+02
Cadmium	50029	4/09/86	ICP	<2.00E+00
Cadmium	50281	4/13/87	ICP	<2.00E+00
Cadmium	50328	7/23/87	ICP	<2.00E+00
Cadmium	50370	12/29/87	ICP	8.00E+00
Calcium	50029	4/09/86	ICP	1.72E+05
Calcium	50101	7/31/86	ICP	2.17E+04
Calcium	50281	4/13/87	ICP	7.22E+04
Calcium	50328	7/23/87	ICP	4.51E+04
Calcium	50370	12/29/87	ICP	1.35E+05
Chloride	50029	4/09/86	IC	1.36E+03
Chloride	50101	7/31/86	IC	1.44E+05
Chloride	50281	4/13/87	IC	<3.10E+05
Chloride	50328	7/23/87	IC	9.50E+04
Chloride	50370	12/29/87	IC	1.36E+05
Chromium	50029	4/09/86	ICP	<1.00E+01
Chromium	50101	7/31/86	ICP	3.80E+02
Chromium	50281	4/13/87	ICP	5.00E+01
Chromium	50328	7/23/87	ICP	1.06E+02
Chromium	50370	12/29/87	ICP	2.65E+02
Copper	50029	4/09/86	ICP	8.90E+01
Copper	50101	7/31/86	ICP	2.49E+02
Copper	50281	4/13/87	ICP	9.80E+01
Copper	50328	7/23/87	ICP	2.33E+02
Copper	50370	12/29/87	ICP	6.19E+02
Fluoride	50029	4/09/86	IC	2.84E+03
Fluoride	50101	7/31/86	IC	<2.50E+04
Fluoride	50281	4/13/87	IC	<5.00E+05
Fluoride	50328	7/23/87	IC	1.02E+04
Fluoride	50328	7/23/87	ISE	2.60E+03

Table B-2. Total Data. (sheet 2 of 20)

Constituent	Sample #	Date	Method	Result
Fluoride	50370	12/29/87	IC	2.85E+04
Fluoride	50370	12/29/87	ISE	2.38E+03
Iron	50029	4/09/86	ICP	1.67E+03
Iron	50101	7/31/86	ICP	1.39E+04
Iron	50281	4/13/87	ICP	2.01E+03
Iron	50328	7/23/87	ICP	3.14E+03
Iron	50370	12/29/87	ICP	7.23E+03
Lead	50281	4/13/87	GFAA	2.00E+01
Lead	50328	7/23/87	GFAA	1.40E+01
Lead	50370	12/29/87	GFAA	8.10E+01
Magnesium	50029	4/09/86	ICP	4.84E+04
Magnesium	50101	7/31/86	ICP	4.44E+03
Magnesium	50281	4/13/87	ICP	6.93E+03
Magnesium	50328	7/23/87	ICP	7.58E+03
Magnesium	50370	12/29/87	ICP	6.74E+03
Manganese	50029	4/09/86	ICP	4.40E+01
Manganese	50101	7/31/86	ICP	2.84E+02
Manganese	50281	4/13/87	ICP	3.70E+01
Manganese	50328	7/23/87	ICP	9.80E+01
Manganese	50370	12/29/87	ICP	1.47E+02
Mercury	50029	4/09/86	CVAA	1.33E+00
Mercury	50101	7/31/86	CVAA	2.00E+00
Mercury	50281	4/13/87	CVAA	3.60E-01
Mercury	50328	7/23/87	CVAA	6.80E-01
Mercury	50370	12/29/87	CVAA	5.40E-01
Nickel	50029	4/09/86	ICP	<1.00E+01
Nickel	50101	7/31/86	ICP	3.60E+01
Nickel	50281	4/13/87	ICP	<1.00E+01
Nickel	50328	7/23/87	ICP	1.00E+01
Nickel	50370	12/29/87	ICP	2.80E+01
Nitrate	50029	4/09/86	IC	<5.00E+02
Nitrate	50101	7/31/86	IC	<2.50E+04
Nitrate	50281	4/13/87	IC	<2.20E+04
Nitrate	50328	7/23/87	IC	5.26E+03
Phosphate	50029	4/09/86	IC	<1.00E+03
Phosphate	50101	7/31/86	IC	1.71E+07
Phosphate	50281	4/13/87	IC	8.04E+06
Phosphate	50328	7/23/87	IC	4.50E+06
Phosphate	50370	12/29/87	IC	1.46E+07
Potassium	50029	4/09/86	ICP	6.57E+03
Potassium	50101	7/31/86	ICP	6.84E+03
Potassium	50281	4/13/87	ICP	1.52E+03
Potassium	50328	7/23/87	ICP	2.19E+03
Potassium	50370	12/29/87	ICP	3.95E+03
Sodium	50029	4/09/86	ICP	4.13E+05

Table B-2. Total Data. (sheet 3 of 20)

Constituent	Sample #	Date	Method	Result
Sodium	50101	7/31/86	ICP	9.13E+06
Sodium	50281	4/13/87	ICP	1.64E+06
Sodium	50328	7/23/87	ICP	3.47E+06
Sodium	50370	12/29/87	ICP	5.40E+06
Strontium	50029	4/09/86	ICP	6.69E+02
Strontium	50101	7/31/86	ICP	<3.00E+02
Strontium	50281	4/13/87	ICP	3.15E+02
Strontium	50328	7/23/87	ICP	<3.00E+02
Strontium	50370	12/29/87	ICP	4.35E+02
Sulfate	50029	4/09/86	IC	2.90E+06
Sulfate	50101	7/31/86	IC	5.34E+05
Sulfate	50281	4/13/87	IC	<4.93E+05
Sulfate	50328	7/23/87	IC	4.35E+05
Sulfate	50370	12/29/87	IC	5.40E+05
Uranium	50029	4/09/86	FLUOR	4.63E+00
Uranium	50101	7/31/86	FLUOR	3.62E+00
Uranium	50281	4/13/87	FLUOR	7.37E-01
Uranium	50328	7/23/87	FLUOR	9.33E-01
Uranium	50370	12/29/87	FLUOR	4.50E-01
Vanadium	50029	4/09/86	ICP	<5.00E+00
Vanadium	50101	7/31/86	ICP	7.00E+00
Vanadium	50281	4/13/87	ICP	<5.00E+00
Vanadium	50328	7/23/87	ICP	<5.00E+00
Vanadium	50370	12/29/87	ICP	7.00E+00
Zinc	50029	4/09/86	ICP	4.24E+02
Zinc	50101	7/31/86	ICP	4.40E+02
Zinc	50281	4/13/87	ICP	2.42E+02
Zinc	50328	7/23/87	ICP	5.97E+02
Zinc	50370	12/29/87	ICP	7.85E+02
Acetone	50101	7/31/86	VOA	4.70E+01
Acetone	50370	12/29/87	VOA	1.10E+01
Ammonia	50029	4/09/86	ISE	<5.00E+01
Ammonia	50101	7/31/86	ISE	1.75E+02
Ammonia	50281	4/13/87	ISE	9.60E+01
Ammonia	50328	7/23/87	ISE	6.40E+01
Ammonia	50370	12/29/87	ISE	7.20E+01
Bis(2-ethylhexyl) phthalate	50029	4/09/86	ABN	<1.00E+01
Bis(2-ethylhexyl) phthalate	50101	7/31/86	ABN	<1.00E+01
Bis(2-ethylhexyl) phthalate	50281	4/13/87	ABN	<1.00E+01
Bis(2-ethylhexyl) phthalate	50328	7/23/87	ABN	<1.00E+01
Bis(2-ethylhexyl) phthalate	50370	12/29/87	ABN	1.00E+01
Dichloromethane	50029	4/09/86	VOA	<1.00E+01
Dichloromethane	50101	7/31/86	VOA	<1.00E+01
Dichloromethane	50101B	7/31/86	VOA	1.50E+02
Dichloromethane	50281	4/13/87	VOA	<1.00E+01

Table B-2. Total Data. (sheet 4 of 20)

Constituent	Sample #	Date	Method	Result
Dichloromethane	50281B	4/13/87	VOA	3.80E+01
Dichloromethane	50328	7/23/87	VOA	<1.00E+01
Dichloromethane	50328B	7/23/87	VOA	1.34E+01
Dichloromethane	50370	12/29/87	VOA	<1.00E+01
Dichloromethane	50370B	12/29/87	VOA	<1.00E+01
Hexadecanoic acid	50281	4/13/87	ABN	2.00E+01
Octacosane	50281	4/13/87	ABN	1.10E+02
1,1,1-Trichloromethane	50029	4/09/86	VOA	<1.00E+01
1,1,1-Trichloromethane	50101	7/31/86	VOA	<1.00E+01
1,1,1-Trichloromethane	50101B	7/31/86	VOA	<1.00E+01
1,1,1-Trichloromethane	50281	4/13/87	VOA	<1.00E+01
1,1,1-Trichloromethane	50281B	4/13/87	VOA	<1.00E+01
1,1,1-Trichloromethane	50328	7/23/87	VOA	<1.00E+01
1,1,1-Trichloromethane	50328B	7/23/87	VOA	<1.00E+01
1,1,1-Trichloromethane	50370	12/29/87	VOA	<5.00E+00
1,1,1-Trichloromethane	50370B	12/29/87	VOA	6.00E+00
Trichloromethane	50029	4/09/86	VOA	<1.00E+01
Trichloromethane	50101	7/31/86	VOA	1.40E+01
Trichloromethane	50101B	7/31/86	VOA	<1.00E+01
Trichloromethane	50281	4/13/87	VOA	1.40E+01
Trichloromethane	50281B	4/13/87	VOA	<1.00E+01
Trichloromethane	50328	7/23/87	VOA	<6.60E+00
Trichloromethane	50328B	7/23/87	VOA	<1.00E+01
Trichloromethane	50370	12/29/87	VOA	1.30E+01
Trichloromethane	50370B	12/29/87	VOA	1.70E+01
Unknown	50101	7/31/86	ABN	4.00E+01
Unknown	50281	4/13/87	ABN	1.20E+01
Unknown aliphatic HC	50029	4/09/86	ABN	1.30E+01
Alpha Activity (pCi/L)	50029	4/09/86	Alpha	3.14E+00
Alpha Activity (pCi/L)	50101	7/31/86	Alpha	3.75E+01
Alpha Activity (pCi/L)	50328	7/23/87	Alpha	5.28E+00
Beta Activity (pCi/L)	50029	4/09/86	Beta	5.05E+01
Beta Activity (pCi/L)	50101	7/31/86	Beta	1.35E+02
Beta Activity (pCi/L)	50281	4/13/87	Beta	3.90E+01
Beta Activity (pCi/L)	50328	7/23/87	Beta	3.41E+01
Beta Activity (pCi/L)	50370	12/29/87	Beta	2.12E+01
Conductivity (μS)	50101	7/31/86	COND-Fld	1.60E+04
Conductivity (μS)	50281	4/13/87	COND-Fld	5.04E+03
Conductivity (μS)	50328	7/23/87	COND-Fld	5.04E+03
Conductivity (μS)	50370	12/29/87	COND-Fld	8.79E+03
pH (dimensionless)	50029	4/09/86	PH-Fld	2.28E+00
pH (dimensionless)	50101	7/31/86	PH-Fld	7.22E+00
pH (dimensionless)	50281	4/13/87	PH-Fld	7.03E+00
pH (dimensionless)	50328	7/23/87	PH-Fld	7.72E+00
pH (dimensionless)	50370	12/29/87	PH-Fld	7.02E+00

Table B-2. Total Data. (sheet 5 of 20)

Constituent	Sample #	Date	Method	Result
Temperature (°C)	50029	4/09/86	TEMP-Fld	1.50E+01
Temperature (°C)	50101	7/31/86	TEMP-Fld	3.03E+01
Temperature (°C)	50281	4/13/87	TEMP-Fld	1.57E+01
Temperature (°C)	50328	7/23/87	TEMP-Fld	2.71E+01
Temperature (°C)	50370	12/29/87	TEMP-Fld	1.90E+01
TOC	50101	7/31/86	TOC	2.54E+04
TOC	50281	4/13/87	TOC	1.66E+04
TOC	50328	7/23/87	TOC	1.45E+04
TOC	50370	12/29/87	TOC	3.18E+04
TOX (as Cl)	50029	4/09/86	TOX	<6.28E+01
TOX (as Cl)	50101	7/31/86	TOX	2.23E+02
TOX (as Cl)	50281	4/13/87	LTOX	1.29E+02
TOX (as Cl)	50328	7/23/87	LTOX	1.36E+02
TOX (as Cl)	50370	12/29/87	LTOX	1.32E+02
B Plant Chemical Sewage -- Cation Exchange Regenerate				
Aluminum	50016	9/12/85	ICP	<1.50E+02
Aluminum	50030	4/15/86	ICP	1.63E+02
Aluminum	50103	8/01/86	ICP	5.06E+02
Aluminum	50218	1/09/87	ICP	1.62E+02
Aluminum	50279	4/10/87	ICP	3.14E+02
Aluminum	50326	7/21/87	ICP	8.03E+02
Aluminum	50350	10/02/87	ICP	9.43E+02
Barium	50016	9/12/85	ICP	2.80E+01
Barium	50030	4/15/86	ICP	2.30E+01
Barium	50103	8/01/86	ICP	8.20E+01
Barium	50218	1/09/87	ICP	2.90E+01
Barium	50279	4/10/87	ICP	2.80E+01
Barium	50326	7/21/87	ICP	7.00E+01
Barium	50350	10/02/87	ICP	5.70E+01
Cadmium	50016	9/12/85	ICP	2.00E+00
Cadmium	50030	4/15/86	ICP	<2.00E+00
Cadmium	50103	8/01/86	ICP	2.00E+00
Cadmium	50218	1/09/87	ICP	<2.00E+00
Cadmium	50279	4/10/87	ICP	<2.00E+00
Cadmium	50326	7/21/87	ICP	3.00E+00
Cadmium	50350	10/02/87	ICP	<2.00E+00
Calcium	50016	9/12/85	ICP	1.68E+04
Calcium	50030	4/15/86	ICP	1.79E+04
Calcium	50103	8/01/86	ICP	1.25E+05
Calcium	50218	1/09/87	ICP	2.29E+04
Calcium	50279	4/10/87	ICP	3.64E+04
Calcium	50326	7/21/87	ICP	4.03E+04
Calcium	50350	10/02/87	ICP	3.65E+04
Chloride	50016	9/12/85	IC	1.11E+03
Chloride	50030	4/15/86	IC	1.37E+04
Chloride	50103	8/01/86	IC	<2.50E+04

Table B-2. Total Data. (sheet 6 of 20)

Constituent	Sample #	Date	Method	Result
Chloride	50218	1/09/87	IC	3.89E+03
Chloride	50279	4/10/87	IC	<3.12E+04
Chloride	50326	7/21/87	IC	1.16E+04
Chloride	50350	10/02/87	IC	6.59E+03
Copper	50016	9/12/85	ICP	1.00E+01
Copper	50030	4/15/86	ICP	1.50E+01
Copper	50103	8/01/86	ICP	4.80E+01
Copper	50218	1/09/87	ICP	3.10E+01
Copper	50279	4/10/87	ICP	3.50E+01
Copper	50326	7/21/87	ICP	6.70E+01
Copper	50350	10/02/87	ICP	9.30E+01
Cyanide	50016	9/12/85	SPEC	1.69E+01
Cyanide	50030	4/15/86	SPEC	<1.00E+01
Cyanide	50103	8/01/86	SPEC	1.00E+01
Cyanide	50218	1/09/87	SPEC	<1.00E+01
Cyanide	50279	4/10/87	SPEC	<1.00E+01
Cyanide	50326	7/21/87	SPEC	<1.00E+01
Cyanide	50350	10/02/87	SPEC	<1.00E+01
Fluoride	50016	9/12/85	IC	1.51E+03
Fluoride	50030	4/15/86	IC	7.45E+03
Fluoride	50103	8/01/86	IC	<2.50E+04
Fluoride	50218	1/09/87	IC	8.34E+03
Fluoride	50279	4/10/87	IC	<5.00E+04
Fluoride	50326	7/21/87	IC	1.35E+04
Fluoride	50350	10/02/87	IC	4.49E+03
Fluoride	50350	10/02/87	ISE	1.75E+02
Iron	50016	9/12/85	ICP	1.64E+02
Iron	50030	4/15/86	ICP	2.32E+02
Iron	50103	8/01/86	ICP	1.40E+03
Iron	50218	1/09/87	ICP	4.10E+02
Iron	50279	4/10/87	ICP	7.80E+02
Iron	50326	7/21/87	ICP	1.83E+03
Iron	50350	10/02/87	ICP	2.54E+03
Lead	50016	9/12/85	ICP	<3.00E+01
Lead	50218	1/09/87	GFAA	5.30E+00
Lead	50279	4/10/87	GFAA	9.00E+00
Lead	50326	7/21/87	GFAA	1.20E+01
Lead	50350	10/02/87	GFAA	2.60E+01
Magnesium	50016	9/12/85	ICP	3.58E+03
Magnesium	50030	4/15/86	ICP	4.16E+03
Magnesium	50103	8/01/86	ICP	5.39E+04
Magnesium	50218	1/09/87	ICP	4.93E+04
Magnesium	50279	4/10/87	ICP	3.24E+04
Magnesium	50326	7/21/87	ICP	3.67E+04
Magnesium	50350	10/02/87	ICP	3.54E+04

Table B-2. Total Data. (sheet 7 of 20)

Constituent	Sample #	Date	Method	Result
Manganese	50016	9/12/85	ICP	1.40E+01
Manganese	50030	4/15/86	ICP	8.00E+00
Manganese	50103	8/01/86	ICP	5.50E+01
Manganese	50218	1/09/87	ICP	7.00E+00
Manganese	50279	4/10/87	ICP	1.60E+01
Manganese	50326	7/21/87	ICP	7.60E+01
Manganese	50350	10/02/87	ICP	1.54E+02
Mercury	50016	9/12/85	CVAA	<1.00E-01
Mercury	50030	4/15/86	CVAA	<1.00E-01
Mercury	50103	8/01/86	CVAA	2.60E+00
Mercury	50218	1/09/87	CVAA	7.00E-01
Mercury	50279	4/10/87	CVAA	2.40E+00
Mercury	50326	7/21/87	CVAA	5.00E+00
Mercury	50350	10/02/87	CVAA	5.40E+00
Nickel	50016	9/12/85	ICP	<1.00E+01
Nickel	50030	4/15/86	ICP	1.10E+01
Nickel	50103	8/01/86	ICP	<1.00E+01
Nickel	50218	1/09/87	ICP	<1.00E+01
Nickel	50279	4/10/87	ICP	<1.00E+01
Nickel	50326	7/21/87	ICP	<1.00E+01
Nickel	50350	10/02/87	ICP	<1.00E+01
Nitrate	50016	9/12/85	IC	5.30E+02
Nitrate	50030	4/15/86	IC	1.93E+03
Nitrate	50103	8/01/86	IC	<2.50E+04
Nitrate	50218	1/09/87	IC	<2.50E+03
Nitrate	50279	4/10/87	IC	<5.00E+04
Nitrate	50326	7/21/87	IC	<4.16E+03
Nitrate	50350	10/02/87	IC	<2.50E+03
Phosphate	50016	9/12/85	IC	<1.00E+03
Phosphate	50030	4/15/86	IC	<1.00E+03
Phosphate	50103	8/01/86	IC	<5.00E+04
Phosphate	50218	1/09/87	IC	<5.00E+03
Phosphate	50279	4/10/87	IC	<1.00E+05
Phosphate	50326	7/21/87	IC	<1.00E+03
Phosphate	50350	10/02/87	IC	5.85E+03
Potassium	50016	9/12/85	ICP	1.22E+03
Potassium	50030	4/15/86	ICP	9.61E+02
Potassium	50103	8/01/86	ICP	1.48E+04
Potassium	50218	1/09/87	ICP	1.11E+04
Potassium	50279	4/10/87	ICP	9.25E+03
Potassium	50326	7/21/87	ICP	1.29E+04
Potassium	50350	10/02/87	ICP	8.05E+03
Sodium	50016	9/12/85	ICP	1.53E+05
Sodium	50030	4/15/86	ICP	6.48E+05
Sodium	50103	8/01/86	ICP	4.66E+06

Table B-2. Total Data. (sheet 8 of 20)

Constituent	Sample #	Date	Method	Result
Sodium	50218	1/09/87	ICP	3.47E+06
Sodium	50279	4/10/87	ICP	5.87E+06
Sodium	50326	7/21/87	ICP	3.56E+06
Sodium	50350	10/02/87	ICP	3.86E+06
Strontium	50016	9/12/85	ICP	<3.00E+02
Strontium	50030	4/15/86	ICP	<3.00E+02
Strontium	50103	8/01/86	ICP	4.55E+02
Strontium	50218	1/09/87	ICP	<3.00E+02
Strontium	50279	4/10/87	ICP	<3.00E+02
Strontium	50326	7/21/87	ICP	<3.00E+02
Strontium	50350	10/02/87	ICP	<3.00E+02
Sulfate	50016	9/12/85	IC	1.03E+04
Sulfate	50030	4/15/86	IC	1.33E+05
Sulfate	50103	8/01/86	IC	5.04E+06
Sulfate	50218	1/09/87	IC	4.08E+06
Sulfate	50279	4/10/87	IC	<4.15E+06
Sulfate	50326	7/21/87	IC	4.23E+06
Sulfate	50350	10/02/87	IC	2.80E+06
Sulfide	50016	9/12/85	TITRA	<1.00E+03
Sulfide	50030	4/15/86	TITRA	<1.00E+03
Sulfide	50103	8/01/86	TITRA	1.19E+03
Sulfide	50218	1/09/87	TITRA	<1.00E+03
Sulfide	50279	4/10/87	TITRA	<1.00E+03
Sulfide	50326	7/21/87	TITRA	<1.00E+03
Sulfide	50350	10/02/87	TITRA	5.54E+04
Uranium	50016	9/12/85	FLUOR	5.05E-01
Uranium	50030	4/15/86	FLUOR	3.53E+00
Uranium	50103	8/01/86	FLUOR	2.74E+00
Uranium	50218	1/09/87	FLUOR	7.27E+00
Uranium	50279	4/10/87	FLUOR	3.33E+00
Uranium	50326	7/21/87	FLUOR	2.31E-01
Uranium	50350	10/02/87	FLUOR	4.39E+00
Vanadium	50016	9/12/85	ICP	<5.00E+00
Vanadium	50030	4/15/86	ICP	<5.00E+00
Vanadium	50103	8/01/86	ICP	8.00E+00
Vanadium	50218	1/09/87	ICP	6.00E+00
Vanadium	50279	4/10/87	ICP	7.00E+00
Vanadium	50326	7/21/87	ICP	6.00E+00
Vanadium	50350	10/02/87	ICP	1.00E+01
Zinc	50016	9/12/85	ICP	1.20E+01
Zinc	50030	4/15/86	ICP	6.70E+01
Zinc	50103	8/01/86	ICP	1.20E+02
Zinc	50218	1/09/87	ICP	2.10E+01
Zinc	50279	4/10/87	ICP	3.50E+01
Zinc	50326	7/21/87	ICP	8.60E+01
Zinc	50350	10/02/87	ICP	1.34E+02

Table B-2. Total Data. (sheet 9 of 20)

Constituent	Sample #	Date	Method	Result
Acetone	50030	4/15/86	VOA	2.90E+01
Ammonia	50016	9/12/85	ISE	<5.00E+01
Ammonia	50030	4/15/86	ISE	<5.00E+01
Ammonia	50103	8/01/86	ISE	9.80E+01
Ammonia	50218	1/09/87	ISE	6.90E+01
Ammonia	50279	4/10/87	ISE	1.00E+02
Ammonia	50326	7/21/87	ISE	<5.00E+01
Ammonia	50350	10/02/87	ISE	6.80E+01
1-Butanol	50016	9/12/85	VOA	1.20E+01
Dichloromethane	50016	9/12/85	VOA	<1.00E+01
Dichloromethane	50030	4/15/86	VOA	<1.00E+01
Dichloromethane	50103	8/01/86	VOA	<1.00E+01
Dichloromethane	50103B	8/01/86	VOA	1.40E+02
Dichloromethane	50218	1/09/87	VOA	<1.00E+01
Dichloromethane	50218B	1/09/87	VOA	6.80E+01
Dichloromethane	50279	4/10/87	VOA	<1.00E+01
Dichloromethane	50279B	4/10/87	VOA	4.00E+01
Dichloromethane	50350	10/02/87	VOA	<1.00E+01
Dichloromethane	50350B	10/02/87	VOA	<1.00E+01
Trichloromethane	50016	9/12/85	VOA	<1.00E+01
Trichloromethane	50030	4/15/86	VOA	1.02E+01
Trichloromethane	50103	8/01/86	VOA	1.10E+01
Trichloromethane	50103B	8/01/86	VOA	<1.00E+01
Trichloromethane	50218	1/09/87	VOA	<1.00E+01
Trichloromethane	50218B	1/09/87	VOA	<1.00E+01
Trichloromethane	50279	4/10/87	VOA	<1.00E+01
Trichloromethane	50279B	4/10/87	VOA	<1.00E+01
Trichloromethane	50350	10/02/87	VOA	1.80E+01
Trichloromethane	50350B	10/02/87	VOA	2.40E+01
Unknown	50103	8/01/86	ABN	2.50E+01
Unknown	50218	1/09/87	ABN	8.00E+01
Unknown	50350	10/02/87	ABN	1.60E+01
Unknown aliphatic HC	50030	4/15/86	ABN	2.10E+02
Unknown aliphatic HC	50279	4/10/87	ABN	5.30E+01
Unknown aliphatic HC	50326	7/21/87	ABN	3.10E+01
Unknown aliphatic HC	50350	10/02/87	ABN	2.40E+01
Unknown aromatic HC	50326	7/21/87	ABN	7.00E+00
Alpha Activity (pCi/L)	50016	9/12/85	Alpha	3.74E-01
Alpha Activity (pCi/L)	50030	4/15/86	Alpha	1.25E+01
Alpha Activity (pCi/L)	50103	8/01/86	Alpha	2.62E+01
Alpha Activity (pCi/L)	50218	1/09/87	Alpha	1.91E+01
Alpha Activity (pCi/L)	50279	4/10/87	Alpha	6.02E+01
Alpha Activity (pCi/L)	50326	7/21/87	Alpha	9.14E+00
Alpha Activity (pCi/L)	50350	10/02/87	Alpha	2.74E+00
Beta Activity (pCi/L)	50016	9/12/85	Beta	1.51E+01
Beta Activity (pCi/L)	50030	4/15/86	Beta	2.72E+01

Table B-2. Total Data. (sheet 10 of 20)

Constituent	Sample #	Date	Method	Result
Beta Activity (pCi/L)	50103	8/01/86	Beta	8.31E+01
Beta Activity (pCi/L)	50218	1/09/87	Beta	7.65E+01
Beta Activity (pCi/L)	50279	4/10/87	Beta	7.29E+01
Beta Activity (pCi/L)	50350	10/02/87	Beta	7.89E+00
Conductivity (µS)	50016	9/12/85	COND-Fld	1.21E+03
Conductivity (µS)	50103	8/01/86	COND-Fld	1.60E+04
Conductivity (µS)	50218	1/09/87	COND-Fld	1.14E+04
Conductivity (µS)	50279	4/10/87	COND-Fld	1.27E+04
Conductivity (µS)	50326	7/21/87	COND-Fld	1.53E+04
Conductivity (µS)	50350	10/02/87	COND-Fld	1.02E+04
pH (dimensionless)	50016	9/12/85	PH-Fld	1.16E+01
pH (dimensionless)	50030	4/15/86	PH-Fld	1.27E+01
pH (dimensionless)	50103	8/01/86	PH-Fld	8.70E+00
pH (dimensionless)	50218	1/09/87	PH-Fld	8.97E+00
pH (dimensionless)	50279	4/10/87	PH-Fld	9.78E+00
pH (dimensionless)	50326	7/21/87	PH-Fld	9.82E+00
pH (dimensionless)	50350	10/02/87	PH-Fld	1.03E+01
Temperature (°C)	50016	9/12/85	TEMP-Fld	2.37E+01
Temperature (°C)	50030	4/15/86	TEMP-Fld	1.50E+01
Temperature (°C)	50103	8/01/86	TEMP-Fld	3.03E+01
Temperature (°C)	50218	1/09/87	TEMP-Fld	1.64E+01
Temperature (°C)	50279	4/10/87	TEMP-Fld	1.63E+01
Temperature (°C)	50326	7/21/87	TEMP-Fld	2.71E+01
Temperature (°C)	50350	10/02/87	TEMP-Fld	2.75E+01
TOC	50016	9/12/85	TOC	1.82E+03
TOC	50030	4/15/86	TOC	5.23E+04
TOC	50103	8/01/86	TOC	2.69E+03
TOC	50218	1/09/87	TOC	1.84E+03
TOC	50279	4/10/87	TOC	2.48E+03
TOC	50326	7/21/87	TOC	4.00E+03
TOC	50350	10/02/87	TOC	4.36E+03
TOX (as Cl)	50016	9/12/85	TOX	<7.60E+00
TOX (as Cl)	50030	4/15/86	TOX	1.33E+02
TOX (as Cl)	50103	8/01/86	TOX	<5.64E+01
TOX (as Cl)	50218	1/09/87	LTOX	4.88E+01
TOX (as Cl)	50279	4/10/87	LTOX	3.76E+01
TOX (as Cl)	50326	7/21/87	LTOX	3.72E+01
TOX (as Cl)	50350	10/02/87	LTOX	7.67E+01
Data for B Plant Chemical Sewage -- Routine				
Arsenic (EP Toxic)	50705E	10/19/89	ICP	<5.00E+02
Arsenic (EP Toxic)	50752E	11/02/89	ICP	<5.00E+02
Arsenic (EP Toxic)	50756E	11/03/89	ICP	<5.00E+02
Arsenic (EP Toxic)	50984E	2/27/90	ICP	<5.00E+02
Barium	50081	6/30/86	ICP	2.80E+01
Barium	50141	9/26/86	ICP	2.40E+01
Barium	50165	10/27/86	ICP	2.50E+01

B-2. Total Data. (sheet 11 of 20)

Constituent	Sample #	Date	Method	Result
Barium	50256	3/16/87	ICP	2.40E+01
Barium	50285	4/16/87	ICP	2.40E+01
Barium	50705	10/19/89	ICP	2.90E+01
Barium	50752	11/02/89	ICP	3.00E+01
Barium	50756	11/03/89	ICP	3.10E+01
Barium	50984	2/27/90	ICP	2.70E+01
Barium (EP Toxic)	50705E	10/19/89	ICP	<1.00E+03
Barium (EP Toxic)	50752E	11/02/89	ICP	<1.00E+03
Barium (EP Toxic)	50756E	11/03/89	ICP	<1.00E+03
Barium (EP Toxic)	50984E	2/27/90	ICP	<1.00E+03
Boron	50705	10/19/89	ICP	<1.00E+01
Boron	50752	11/02/89	ICP	1.00E+01
Boron	50756	11/03/89	ICP	1.20E+01
Boron	50984	2/27/90	ICP	4.20E+01
Cadmium	50081	6/30/86	ICP	<2.00E+00
Cadmium	50141	9/26/86	ICP	3.00E+00
Cadmium	50165	10/27/86	ICP	3.00E+00
Cadmium	50256	3/16/87	ICP	<2.00E+00
Cadmium	50285	4/16/87	ICP	<2.00E+00
Cadmium	50705	10/19/89	ICP	<2.00E+00
Cadmium	50752	11/02/89	ICP	<2.00E+00
Cadmium	50756	11/03/89	ICP	<2.00E+00
Cadmium	50984	2/27/90	ICP	<2.00E+00
Cadmium (EP Toxic)	50705E	10/19/89	ICP	<1.00E+02
Cadmium (EP Toxic)	50752E	11/02/89	ICP	<1.00E+02
Cadmium (EP Toxic)	50756E	11/03/89	ICP	<1.00E+02
Cadmium (EP Toxic)	50984E	2/27/90	ICP	<1.00E+02
Calcium	50081	6/30/86	ICP	1.72E+04
Calcium	50141	9/26/86	ICP	1.80E+04
Calcium	50165	10/27/86	ICP	1.86E+04
Calcium	50256	3/16/87	ICP	1.93E+04
Calcium	50285	4/16/87	ICP	1.95E+04
Calcium	50705	10/19/89	ICP	1.86E+04
Calcium	50752	11/02/89	ICP	1.89E+04
Calcium	50756	11/03/89	ICP	1.84E+04
Calcium	50984	2/27/90	ICP	1.79E+04
Chloride	50081	6/30/86	IC	9.60E+02
Chloride	50141	9/26/86	IC	1.93E+03
Chloride	50165	10/27/86	IC	9.13E+02
Chloride	50256	3/16/87	IC	1.49E+03
Chloride	50285	4/16/87	IC	1.11E+03
Chloride	50705	10/19/89	IC	1.90E+03
Chloride	50752	11/02/89	IC	1.50E+03
Chloride	50756	11/03/89	IC	1.50E+03
Chloride	50984	2/27/90	IC	1.10E+03

Table B-2. Total Data. (sheet 12 of 20)

Constituent	Sample #	Date	Method	Result
Chromium (EP Toxic)	50705E	10/19/89	ICP	<5.00E+02
Chromium (EP Toxic)	50752E	11/02/89	ICP	<5.00E+02
Chromium (EP Toxic)	50756E	11/03/89	ICP	<5.00E+02
Chromium (EP Toxic)	50984E	2/27/90	ICP	<5.00E+02
Copper	50081	6/30/86	ICP	<1.00E+01
Copper	50141	9/26/86	ICP	<1.00E+01
Copper	50165	10/27/86	ICP	1.20E+01
Copper	50256	3/16/87	ICP	<1.00E+01
Copper	50285	4/16/87	ICP	<1.00E+01
Copper	50705	10/19/89	ICP	1.30E+01
Copper	50752	11/02/89	ICP	2.10E+01
Copper	50756	11/03/89	ICP	3.60E+01
Copper	50984	2/27/90	ICP	1.50E+01
Fluoride	50081	6/30/86	IC	<5.00E+02
Fluoride	50141	9/26/86	IC	<5.00E+02
Fluoride	50165	10/27/86	IC	<5.00E+02
Fluoride	50256	3/16/87	IC	<5.00E+02
Fluoride	50285	4/16/87	IC	<5.00E+02
Fluoride	50705	10/19/89	IC	<5.00E+02
Fluoride	50705	10/19/89	ISE	1.40E+02
Fluoride	50752	11/02/89	IC	<5.00E+02
Fluoride	50752	11/02/89	ISE	1.43E+02
Fluoride	50756	11/03/89	IC	<5.00E+02
Fluoride	50756	11/03/89	ISE	1.36E+02
Fluoride	50984	2/27/90	IC	<5.00E+02
Fluoride	50984	2/27/90	ISE	1.37E+02
Iron	50081	6/30/86	ICP	7.70E+01
Iron	50141	9/26/86	ICP	6.90E+01
Iron	50165	10/27/86	ICP	7.40E+01
Iron	50256	3/16/87	ICP	<5.00E+01
Iron	50285	4/16/87	ICP	5.90E+01
Iron	50705	10/19/89	ICP	4.60E+01
Iron	50752	11/02/89	ICP	<3.00E+01
Iron	50756	11/03/89	ICP	6.70E+01
Iron	50984	2/27/90	ICP	7.00E+01
Lead	50141	9/26/86	GFAA	5.10E+00
Lead	50165	10/27/86	GFAA	1.16E+01
Lead	50256	3/16/87	GFAA	<5.00E+00
Lead	50285	4/16/87	GFAA	<5.00E+00
Lead	50705	10/19/89	GFAA	<5.00E+00
Lead	50752	11/02/89	GFAA	<5.00E+00
Lead	50756	11/03/89	GFAA	<5.00E+00
Lead	50984	2/27/90	GFAA	<5.00E+00
Lead (EP Toxic)	50705E	10/19/89	ICP	<5.00E+02
Lead (EP Toxic)	50752E	11/02/89	ICP	<5.00E+02

Table B-2. Total Data. (sheet 13 of 20)

Constituent	Sample #	Date	Method	Result
Lead (EP Toxic)	50756E	11/03/89	ICP	<5.00E+02
Lead (EP Toxic)	50984E	2/27/90	ICP	<5.00E+02
Magnesium	50081	6/30/86	ICP	4.01E+03
Magnesium	50141	9/26/86	ICP	3.94E+03
Magnesium	50165	10/27/86	ICP	3.94E+03
Magnesium	50256	3/16/87	ICP	4.39E+03
Magnesium	50285	4/16/87	ICP	4.57E+03
Magnesium	50705	10/19/89	ICP	4.09E+03
Magnesium	50752	11/02/89	ICP	4.32E+03
Magnesium	50756	11/03/89	ICP	4.23E+03
Magnesium	50984	2/27/90	ICP	3.95E+03
Manganese	50081	6/30/86	ICP	1.00E+01
Manganese	50141	9/26/86	ICP	7.00E+00
Manganese	50165	10/27/86	ICP	7.00E+00
Manganese	50256	3/16/87	ICP	<5.00E+00
Manganese	50285	4/16/87	ICP	<5.00E+00
Manganese	50705	10/19/89	ICP	7.00E+00
Manganese	50752	11/02/89	ICP	<5.00E+00
Manganese	50756	11/03/89	ICP	6.00E+00
Manganese	50984	2/27/90	ICP	<5.00E+00
Mercury (EP Toxic)	50705E	10/19/89	CVAA/M	<2.00E+01
Mercury (EP Toxic)	50752E	11/02/89	CVAA/M	<2.00E+01
Mercury (EP Toxic)	50756E	11/03/89	CVAA/M	<2.00E+01
Mercury (EP Toxic)	50984E	2/27/90	CVAA/M	<2.00E+01
Nitrate	50081	6/30/86	IC	2.64E+03
Nitrate	50141	9/26/86	IC	<5.00E+02
Nitrate	50165	10/27/86	IC	1.21E+03
Nitrate	50256	3/16/87	IC	<5.00E+02
Nitrate	50285	4/16/87	IC	<5.00E+02
Nitrate	50705	10/19/89	IC	<5.00E+02
Nitrate	50752	11/02/89	IC	<5.00E+02
Nitrate	50756	11/03/89	IC	<5.00E+02
Nitrate	50984	2/27/90	IC	<5.00E+02
Phosphate	50081	6/30/86	IC	<1.00E+03
Phosphate	50141	9/26/86	IC	3.19E+03
Phosphate	50165	10/27/86	IC	<1.00E+03
Phosphate	50256	3/16/87	IC	<1.00E+03
Phosphate	50285	4/16/87	IC	<1.00E+03
Phosphate	50705	10/19/89	IC	<1.00E+03
Phosphate	50752	11/02/89	IC	<1.00E+03
Phosphate	50756	11/03/89	IC	<1.00E+03
Phosphate	50984	2/27/90	IC	<1.00E+03
Potassium	50081	6/30/86	ICP	8.19E+02
Potassium	50141	9/26/86	ICP	1.02E+03
Potassium	50165	10/27/86	ICP	8.86E+02

Table B-2. Total Data. (sheet 14 of 20)

Constituent	Sample #	Date	Method	Result
Potassium	50256	3/16/87	ICP	7.46E+02
Potassium	50285	4/16/87	ICP	9.58E+02
Potassium	50705	10/19/89	ICP	6.88E+02
Potassium	50752	11/02/89	ICP	7.42E+02
Potassium	50756	11/03/89	ICP	8.49E+02
Potassium	50984	2/27/90	ICP	9.23E+02
Selenium (EP Toxic)	50705E	10/19/89	ICP	<5.00E+02
Selenium (EP Toxic)	50752E	11/02/89	ICP	<5.00E+02
Selenium (EP Toxic)	50756E	11/03/89	ICP	<5.00E+02
Selenium (EP Toxic)	50984E	2/27/90	ICP	<5.00E+02
Silicon	50705	10/19/89	ICP	2.20E+03
Silicon	50752	11/02/89	ICP	2.44E+03
Silicon	50756	11/03/89	ICP	2.41E+03
Silicon	50984	2/27/90	ICP	2.23E+03
Silver (EP Toxic)	50705E	10/19/89	ICP	<5.00E+02
Silver (EP Toxic)	50752E	11/02/89	ICP	<5.00E+02
Silver (EP Toxic)	50756E	11/03/89	ICP	<5.00E+02
Silver (EP Toxic)	50984E	2/27/90	ICP	<5.00E+02
Sodium	50081	6/30/86	ICP	2.89E+03
Sodium	50141	9/26/86	ICP	5.44E+03
Sodium	50165	10/27/86	ICP	2.00E+03
Sodium	50256	3/16/87	ICP	2.00E+03
Sodium	50285	4/16/87	ICP	4.68E+03
Sodium	50705	10/19/89	ICP	2.19E+03
Sodium	50752	11/02/89	ICP	2.15E+03
Sodium	50756	11/03/89	ICP	2.27E+03
Sodium	50984	2/27/90	ICP	1.88E+03
Strontium	50081	6/30/86	ICP	<3.00E+02
Strontium	50141	9/26/86	ICP	<3.00E+02
Strontium	50165	10/27/86	ICP	<3.00E+02
Strontium	50256	3/16/87	ICP	<3.00E+02
Strontium	50285	4/16/87	ICP	<3.00E+02
Strontium	50705	10/19/89	ICP	9.70E+01
Strontium	50752	11/02/89	ICP	9.90E+01
Strontium	50756	11/03/89	ICP	1.02E+02
Strontium	50984	2/27/90	ICP	8.70E+01
Sulfate	50081	6/30/86	IC	1.08E+04
Sulfate	50141	9/26/86	IC	1.07E+04
Sulfate	50165	10/27/86	IC	9.52E+03
Sulfate	50256	3/16/87	IC	1.39E+04
Sulfate	50285	4/16/87	IC	1.35E+04
Sulfate	50705	10/19/89	IC	1.22E+04
Sulfate	50752	11/02/89	IC	1.11E+04
Sulfate	50756	11/03/89	IC	1.08E+04
Sulfate	50984	2/27/90	IC	1.03E+04

Table B-2. Total Data. (sheet 15 of 20)

Constituent	Sample #	Date	Method	Result
Uranium	50081	6/30/86	FLUOR	4.73E-01
Uranium	50141	9/26/86	FLUOR	5.83E-01
Uranium	50165	10/27/86	FLUOR	7.51E-01
Uranium	50256	3/16/87	FLUOR	3.31E-01
Uranium	50285	4/16/87	FLUOR	6.39E-01
Uranium	50705	10/19/89	FLUOR	5.36E-01
Uranium	50752	11/02/89	FLUOR	4.54E-01
Uranium	50756	11/03/89	FLUOR	4.23E-01
Zinc	50081	6/30/86	ICP	9.00E+00
Zinc	50141	9/26/86	ICP	9.00E+00
Zinc	50165	10/27/86	ICP	6.30E+01
Zinc	50256	3/16/87	ICP	1.10E+01
Zinc	50285	4/16/87	ICP	8.00E+00
Zinc	50705	10/19/89	ICP	1.30E+01
Zinc	50752	11/02/89	ICP	1.00E+01
Zinc	50756	11/03/89	ICP	1.60E+01
Zinc	50984	2/27/90	ICP	1.20E+01
Acetone	50705	10/19/89	VOA	1.50E+01
Acetone	50705	10/19/89	ABN	<1.00E+01
Acetone	50705B	10/19/89	VOA	2.10E+01
Acetone	50705T	10/19/89	VOA	1.40E+01
Acetone	50752	11/02/89	VOA	<1.00E+01
Acetone	50752	11/02/89	ABN	<1.00E+01
Acetone	50752B	11/02/89	VOA	<1.00E+01
Acetone	50752T	11/02/89	VOA	<1.00E+01
Acetone	50756	11/03/89	VOA	<1.00E+01
Acetone	50756	11/03/89	ABN	<1.00E+01
Acetone	50756B	11/03/89	VOA	<1.00E+01
Acetone	50756T	11/03/89	VOA	<1.00E+01
Acetone	50984	2/27/90	VOA	<1.00E+01
Acetone	50984	2/27/90	ABN	<1.00E+01
Acetone	50984B	2/27/90	VOA	<1.00E+01
Acetone	50984T	2/27/90	VOA	<1.00E+01
Ammonia	50081	6/30/86	ISE	<5.00E+01
Ammonia	50141	9/26/86	ISE	<5.00E+01
Ammonia	50165	10/27/86	ISE	2.40E+02
Ammonia	50256	3/16/87	ISE	<5.00E+01
Ammonia	50285	4/16/87	ISE	<5.00E+01
Ammonia	50705	10/19/89	ISE	7.10E+01
Ammonia	50752	11/02/89	ISE	<5.00E+01
Ammonia	50756	11/03/89	ISE	<5.00E+01
Ammonia	50984	2/27/90	ISE	<5.00E+01
Dichloromethane	50081	6/30/86	VOA	<1.00E+01
Dichloromethane	50081B	6/30/86	VOA	1.70E+02
Dichloromethane	50141	9/26/86	VOA	<1.00E+01

Table B-2. Total Data. (sheet 16 of 20)

Constituent	Sample #	Date	Method	Result
Dichloromethane	50141B	9/26/86	VOA	1.30E+02
Dichloromethane	50165	10/27/86	VOA	<1.00E+01
Dichloromethane	50256	3/16/87	VOA	<1.00E+01
Dichloromethane	50256B	3/16/87	VOA	4.60E+01
Dichloromethane	50285	4/16/87	VOA	<1.00E+01
Dichloromethane	50285B	4/16/87	VOA	3.80E+01
Dichloromethane	50705	10/19/89	VOA	<5.00E+00
Dichloromethane	50705B	10/19/89	VOA	<3.00E+00
Dichloromethane	50705T	10/19/89	VOA	1.20E+01
Dichloromethane	50752	11/02/89	VOA	<5.00E+00
Dichloromethane	50752B	11/02/89	VOA	<5.00E+00
Dichloromethane	50752T	11/02/89	VOA	7.00E+00
Dichloromethane	50756	11/03/89	VOA	<5.00E+00
Dichloromethane	50756B	11/03/89	VOA	8.00E+00
Dichloromethane	50756T	11/03/89	VOA	8.00E+00
Dichloromethane	50984	2/27/90	VOA	<5.00E+00
Dichloromethane	50984B	2/27/90	VOA	<5.00E+00
Dichloromethane	50984T	2/27/90	VOA	<5.00E+00
Tetrahydrofuran	50705	10/19/89	VOA	<1.00E+01
Tetrahydrofuran	50705B	10/19/89	VOA	1.70E+01
Tetrahydrofuran	50705T	10/19/89	VOA	<6.00E+00
Tetrahydrofuran	50752	11/02/89	VOA	<1.00E+01
Tetrahydrofuran	50752B	11/02/89	VOA	1.40E+01
Tetrahydrofuran	50752T	11/02/89	VOA	<1.00E+01
Tetrahydrofuran	50756	11/03/89	VOA	<1.00E+01
Tetrahydrofuran	50756B	11/03/89	VOA	1.20E+01
Tetrahydrofuran	50756T	11/03/89	VOA	1.20E+01
Tetrahydrofuran	50984	2/27/90	VOA	<1.00E+01
Tetrahydrofuran	50984B	2/27/90	VOA	<6.00E+00
Tetrahydrofuran	50984T	2/27/90	VOA	<6.00E+00
Trichloromethane	50081	6/30/86	VOA	<1.00E+01
Trichloromethane	50081B	6/30/86	VOA	<1.00E+01
Trichloromethane	50141	9/26/86	VOA	<1.00E+01
Trichloromethane	50141B	9/26/86	VOA	<1.00E+01
Trichloromethane	50165	10/27/86	VOA	<1.00E+01
Trichloromethane	50256	3/16/87	VOA	<1.00E+01
Trichloromethane	50256B	3/16/87	VOA	<1.00E+01
Trichloromethane	50285	4/16/87	VOA	<1.00E+01
Trichloromethane	50285B	4/16/87	VOA	<1.00E+01
Trichloromethane	50705	10/19/89	VOA	<3.00E+00
Trichloromethane	50705B	10/19/89	VOA	<5.00E+00
Trichloromethane	50705T	10/19/89	VOA	<5.00E+00
Trichloromethane	50752	11/02/89	VOA	<5.00E+00
Trichloromethane	50752B	11/02/89	VOA	<5.00E+00
Trichloromethane	50752T	11/02/89	VOA	<3.00E+00

Table B-2. Total Data. (sheet 17 of 20)

Constituent	Sample #	Date	Method	Result
Trichloromethane	50756	11/03/89	VOA	<3.00E+00
Trichloromethane	50756B	11/03/89	VOA	<3.00E+00
Trichloromethane	50756T	11/03/89	VOA	<3.00E+00
Trichloromethane	50984	2/27/90	VOA	<5.00E+00
Trichloromethane	50984B	2/27/90	VOA	1.20E+01
Trichloromethane	50984T	2/27/90	VOA	8.00E+00
Unknown amide	50756	11/03/89	ABN	2.30E+01
Alkalinity (Method B)	50705	10/19/89	TITRA	5.40E+04
Alkalinity (Method B)	50752	11/02/89	TITRA	5.70E+04
Alkalinity (Method B)	50756	11/03/89	TITRA	5.60E+04
Alkalinity (Method B)	50984	2/27/90	TITRA	5.70E+04
Alpha Activity (pCi/L)	50081	6/30/86	Alpha	8.27E-02
Alpha Activity (pCi/L)	50141	9/26/86	Alpha	8.39E-01
Alpha Activity (pCi/L)	50165	10/27/86	Alpha	3.53E-01
Alpha Activity (pCi/L)	50256	3/16/87	Alpha	3.56E-01
Alpha Activity (pCi/L)	50285	4/16/87	Alpha	3.29E-01
Alpha Activity (pCi/L)	50705	10/19/89	Alpha	<2.68E-01
Alpha Activity (pCi/L)	50752	11/02/89	Alpha	<5.75E-01
Alpha Activity (pCi/L)	50756	11/03/89	Alpha	8.22E-01
Beta Activity (pCi/L)	50081	6/30/86	Beta	3.06E+02
Beta Activity (pCi/L)	50141	9/26/86	Beta	7.90E+00
Beta Activity (pCi/L)	50165	10/27/86	Beta	1.78E+02
Beta Activity (pCi/L)	50256	3/16/87	Beta	8.35E+00
Beta Activity (pCi/L)	50285	4/16/87	Beta	1.17E+00
Beta Activity (pCi/L)	50705	10/19/89	Beta	2.97E+00
Beta Activity (pCi/L)	50752	11/02/89	Beta	<1.48E+00
Beta Activity (pCi/L)	50756	11/03/89	Beta	<2.09E+00
Conductivity (µS)	50081	6/30/86	COND-Fld	1.34E+02
Conductivity (µS)	50141	9/26/86	COND-Fld	1.50E+02
Conductivity (µS)	50165	10/27/86	COND-Fld	1.45E+02
Conductivity (µS)	50256	3/16/87	COND-Fld	1.19E+02
Conductivity (µS)	50285	4/16/87	COND-Fld	1.36E+02
Conductivity (µS)	50705	10/19/89	COND-Fld	1.75E+02
Conductivity (µS)	50752	11/02/89	COND-Fld	1.33E+02
Conductivity (µS)	50756	11/03/89	COND-Fld	1.53E+02
Conductivity (µS)	50984	2/27/90	COND-Fld	1.22E+02
Ignitability (°F)	50705E	10/19/89	IGNIT	2.08E+02
Ignitability (°F)	50752E	11/02/89	IGNIT	2.12E+02
Ignitability (°F)	50756E	11/03/89	IGNIT	2.10E+02
Ignitability (°F)	50984E	2/27/90	IGNIT	2.06E+02
pH (dimensionless)	50081	6/30/86	PH-Fld	6.40E+00
pH (dimensionless)	50141	9/26/86	PH-Fld	6.32E+00
pH (dimensionless)	50165	10/27/86	PH-Fld	5.40E+00
pH (dimensionless)	50256	3/16/87	PH-Fld	5.22E+00
pH (dimensionless)	50285	4/16/87	PH-Fld	5.70E+00
pH (dimensionless)	50705	10/19/89	PH-Fld	7.60E+00
pH (dimensionless)	50752	11/02/89	PH-Fld	7.41E+00

Table B-2. Total Data. (sheet 18 of 20)

Constituent	Sample #	Date	Method	Result
pH (dimensionless)	50756	11/03/89	PH-Fld	7.70E+00
pH (dimensionless)	50984	2/27/90	PH-Fld	7.10E+00
Reactivity Cyanide (mg/kg)	50705E	10/19/89	DSPEC	<1.00E+02
Reactivity Cyanide (mg/kg)	50752E	11/02/89	DSPEC	<1.00E+02
Reactivity Cyanide (mg/kg)	50756E	11/03/89	DSPEC	<1.00E+02
Reactivity Cyanide (mg/kg)	50984E	2/27/90	DSPEC	<1.00E+02
Reactivity Sulfide (mg/kg)	50705E	10/19/89	DTITRA	<1.00E+02
Reactivity Sulfide (mg/kg)	50752E	11/02/89	DTITRA	<1.00E+02
Reactivity Sulfide (mg/kg)	50756E	11/03/89	DTITRA	<1.00E+02
Reactivity Sulfide (mg/kg)	50984E	2/27/90	DTITRA	<1.00E+02
TDS	50705	10/19/89	TDS	5.00E+04
TDS	50752	11/02/89	TDS	4.70E+04
TDS	50756	11/03/89	TDS	5.20E+04
TDS	50984	2/27/90	TDS	5.40E+04
Temperature (°C)	50081	6/30/86	TEMP-Fld	2.55E+01
Temperature (°C)	50141	9/26/86	TEMP-Fld	2.89E+01
Temperature (°C)	50256	3/16/87	TEMP-Fld	1.70E+01
Temperature (°C)	50285	4/16/87	TEMP-Fld	1.79E+01
Temperature (°C)	50705	10/19/89	TEMP-Fld	2.74E+01
Temperature (°C)	50752	11/02/89	TEMP-Fld	1.86E+01
Temperature (°C)	50756	11/03/89	TEMP-Fld	2.03E+01
Temperature (°C)	50984	2/27/90	TEMP-Fld	1.71E+01
TOC	50081	6/30/86	TOC	2.51E+03
TOC	50141	9/26/86	TOC	1.70E+03
TOC	50165	10/27/86	TOC	1.24E+03
TOC	50256	3/16/87	TOC	1.07E+03
TOC	50285	4/16/87	TOC	1.33E+03
TOC	50705	10/19/89	TOC	<1.60E+03
TOC	50752	11/02/89	TOC	<1.20E+03
TOC	50756	11/03/89	TOC	<1.20E+03
TOC	50984	2/27/90	TOC	1.10E+03
Total Carbon	50705	10/19/89	TC	1.60E+04
Total Carbon	50752	11/02/89	TC	1.42E+04
Total Carbon	50756	11/03/89	TC	1.32E+04
Total Carbon	50984	2/27/90	TC	1.39E+04
TOX (as Cl)	50081	6/30/86	TOX	<2.78E+01
TOX (as Cl)	50141	9/26/86	TOX	<4.59E+01
TOX (as Cl)	50165	10/27/86	TOX	<1.00E+02
TOX (as Cl)	50256	3/16/87	LTOX	6.12E+01
TOX (as Cl)	50285	4/16/87	LTOX	2.82E+01
TOX (as Cl)	50705	10/19/89	LTOX	4.30E+01
TOX (as Cl)	50752	11/02/89	LTOX	4.50E+01
TOX (as Cl)	50756	11/03/89	LTOX	5.90E+01
TOX (as Cl)	50984	2/27/90	LTOX	2.60E+01
^{242}Cm (pCi/L)	50705	10/19/89	AEA	<3.81E-03
^{242}Cm (pCi/L)	50756	11/03/89	AEA	5.31E-03

Table B-2. Total Data. (sheet 19 of 20)

Constituent	Sample #	Date	Method	Result
^{137}Cs (pCi/L)	50705	10/19/89	GEA	1.73E+00
^{137}Cs (pCi/L)	50752	11/02/89	GEA	4.95E-01
^{14}C (pCi/L)	50752	11/02/89	LSC	4.98E+00
^{14}C (pCi/L)	50756	11/03/89	LSC	<3.51E+00
^{3}H (pCi/L)	50705	10/19/89	LSC	<1.99E+02
^{3}H (pCi/L)	50752	11/02/89	LSC	<2.90E+01
^{3}H (pCi/L)	50756	11/03/89	LSC	2.50E+02
^{90}Sr (pCi/L)	50705	10/19/89	Beta	1.24E-01
^{90}Sr (pCi/L)	50752	11/02/89	Beta	<9.89E-02
^{90}Sr (pCi/L)	50756	11/03/89	Beta	2.09E-01
^{234}U (pCi/L)	50705	10/19/89	AEA	1.89E-01
^{234}U (pCi/L)	50752	11/02/89	AEA	1.78E-01
^{234}U (pCi/L)	50756	11/03/89	AEA	1.14E-01
^{238}U (pCi/L)	50705	10/19/89	AEA	1.43E-01
^{238}U (pCi/L)	50752	11/02/89	AEA	1.36E-01
^{238}U (pCi/L)	50756	11/03/89	AEA	1.33E-01

Sample# is the number of the sample. See chapter three for corresponding chain-of-custody number. Date is the sampling date. Results are in ppb (parts per billion) unless otherwise indicated. The following table lists the methods that are coded in the method column.

Code	Analytical Method	Reference
ABN	Semivolatile Organics (GC/MS)	USEPA-8270
AEA	^{241}Am	UST-20Am01
AEA	Curium Isotopes	UST-20Am/Cm01
AEA	Plutonium Isotopes	UST-20Pu01
AEA	Uranium Isotopes	UST-20U01
ALPHA	Alpha Counting	EPA-680/4-75/1
ALPHA-Ra	Total Radium Alpha Counting	ASTM-D2460
BETA	Beta Counting	EPA-680/4-75/1
BETA	^{90}Sr	UST-20Sr02
COLIF	Coliform Bacteria	USEPA-9131
COLIFMF	Coliform Bacteria (Membrane Filter)	USEPA-9132
COND-Fld	Conductivity-Field	ASTM-D1125A
COND-Lab	Conductivity-Laboratory	ASTM-D1125A
CVAA	Mercury	USEPA-7470
CVAA/M	Mercury-Mixed Matrix	USEPA-7470
DIGC	Direct Aqueous Injection (GC)	UST-70DIGC
DIMS	Direct Aqueous Injection (GC/MS)	"USEPA-8240"
DSPEC	Reactive Cyanide (Distillation, Spectroscopy)	USEPA-CHAPTER 7
DTITRA	Reactive Sulfide (Distillation, Titration)	USEPA-CHAPTER 7
FLUOR	Uranium (Fluorometry)	ASTM-D2907-83
GEA	Gamma Energy Analysis Spectroscopy	ASTM-D3649-85
GFAA	Arsenic (AA, Furnace Technique)	USEPA-7060
GFAA	Lead (AA, Furnace Technique)	USEPA-7421

Table B-2. Total Data. (sheet 20 of 20)

Code	Analytical Method	Reference
GFAA	Selenium (AA, Furnace Technique)	USEPA-7740
GFAA	Thallium (AA, Furnace Technique)	USEPA-7841
IC	Ion Chromatography	EPA-600/4-84-01
ICP	Atomic Emission Spectroscopy (ICP)	USEPA-6010
ICP/M	Atomic Emission Spectroscopy (ICP)-Mixed Matrix	USEPA-6010
IGNIT	Pensky-Martens Closed-Cup Ignitability	USEPA-1010
ISE	Fluoride-Low Detection Limit	ASTM-D1179-80-B
ISE	Ammonium Ion	ASTM-D1426-D
LALPHA	Alpha Activity-Low Detection Limit	EPA-680/4-75/1
LEPD	^{129}I	UST-20I02
LSC	^{14}C	UST-20C01
LSC	Tritium	UST-20H03
LTOX	Total Organic Halides-Low Detection Limit	USEPA-9020
PH-Fld	pH-Field	USEPA-9040
PH-Lab	pH-Laboratory	USEPA-9040
SPEC	Total and Amenable Cyanide (Spectroscopy)	USEPA-9010
SPEC	Hydrazine-Low Detection Limit (Spectroscopy)	ASTM-D1385
SSOLID	Suspended Solids	SM-208D
TC	Total Carbon	USEPA-9060
TDS	Total Dissolved Solids	SM-208B
TEMP-Fld	Temperature-Field	Local
TITRA	Alkalinity-Method B (Titration)	ASTM-D1067B
TITRA	Sulfides (Titration)	USEPA-9030
TOC	Total Organic Carbon	USEPA-9060
TOX	Total Organic Halides	USEPA-9020
VOA	Volatile Organics (GC/MS)	USEPA-8240

Analytical Method Acronyms:
- atomic absorption spectroscopy (AA)
- gas chromatography (GC)
- mass spectrometry (MS)
- inductively-coupled plasma spectroscopy (ICP).

References:

ASTM - "1986 Annual Book of ASTM Standards," American Society for Testing and Materials, Philadelphia, Pennsylvania.

EPA - Various methods of the U.S. Environmental Protection Agency, Washington, D.C.

UST - Methods of the United States Testing Company, Incorporated, Richland, Washington.

SM - "Standard Methods for the Examination of Water and Wastewater," 16th ed., American Public Health Association, American Water Works Association and Water Pollution Control Federation, Washington, D.C.

USEPA - "Test Methods for Evaluating Solid Waste Ph ysical/Chemical Methods", 3rd ed., SW-846, U.S. Environmental Protection Agency, Washington, D.C.

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