WHC-EP-0342
Addendum 32

T Plant Laboratory Wastewater 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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D. W. Jeppson

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August 1990

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Westinghouse
Hanford Company
P.O. Box 1970
Richland, Washington 99352

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ABSTRACT

The proposed wastestream designation for the T Plant Laboratory 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.*

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

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EXECUTIVE SUMMARY

The proposed wastestream designation for the T Plant Laboratory wastestream is that this stream is not a dangerous waste, pursuant to the Washington (State) Administrative Code (WAC) 173-303, *Dangerous Waste Regulations*.* Process data were based on process knowledge of the aerosol testing programs conducted at the 221-T Building Head-End. Effluent sampling data were based on samples obtained downstream of all process contributors. Effluent sampling data consisted of analyses of five samples obtained at the wastewater discharge point from October 1989 through February 1990. The "listed" dangerous waste (WAC 173-303-080) determination was made with process knowledge supplemented with effluent sampling data; the "criteria" (WAC 173-303-100) and "characteristic" (WAC 173-303-90) dangerous waste determinations were made primarily based on effluent sampling data, supplemented with process information.

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

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LIST OF TERMS

AA	atomic absorption spectroscopy
CERCLA	Comprehensive Environmental Response Compensation and Liability Act of 1980
%CI	percent confidence interval
CSTF	Containment Systems Test Facility
CY	calendar year
DCG	derived concentration guides
DOE	U.S. Department of Energy
%EC	percent equivalent concentration
Ecology	Washington State Department of Ecology
EP	Extraction Procedure Toxicity Test
EPA	U.S. Environmental Protection Agency
FY	fiscal year
GC	gas chromatography
HH	halogenated hydrocarbons
IARC	International Agency for Research on Cancer
ICP	inductively-coupled plasma spectroscopy
MCL	maximum contaminant level
MS	mass spectrometry
MSDS	material safety data sheets
NTU	national turbidity unit
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyl
PNL	Pacific Northwest Laboratory
ppb	parts per billion
ppm	parts per million
SARA	Superfund Amendments and Reauthorization Act
TDS	total dissolved solids
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
WAC	Washington (State) Administrative Code
Westinghouse Hanford	Westinghouse Hanford Company

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T PLANT LABORATORY WASTEWATER 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 were received from the public regarding reduction of the discharge of liquid effluents into the soil column. As a result, the U.S. Department of Energy (DOE), with the concurrence of the Washington State Department of Ecology (Ecology) and the U.S. Environmental Protection Agency (EPA), committed to assess the contaminant migration potential of liquid discharges at the Hanford Site (Lawrence 1989).

This assessment is described in the *Liquid Effluent Study Project Plan* (WHC 1990b), a portion of which characterizes 33 liquid effluent streams. This characterization consists of integrating the following elements, pursuant to the Washington (State) Administrative Code (WAC) 173-303, *Dangerous Waste Regulations* (Ecology 1989): process data, sampling data, and dangerous waste regulations.

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

1.2 APPROACH

This addendum characterizes T Plant Laboratory (more specifically referred to here as the 221-T Building Head-End) Wastewater* discharged to the 216-T-1 Ditch in sufficient detail so that a wastestream designation, in accordance with WAC 173-303, can be proposed and that an assessment of the Hanford Site relative effluent priorities can be made with regard to the need for treatment and alternative disposal practices. Effluent sampling data obtained for the period October 1989 through March 1990 were used for the designation with supportive data from other time periods.

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*At the T Plant, the T Plant Laboratory wastewater flow is also referred to, interchangeably, as the 221-T Building Head-End process laboratory wastewater or process sewer flow.

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

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

1. Describe both process knowledge and effluent sampling data (Sections 2.0 and 3.0, respectively).

2. Integrate the information (Section 4.0).

3. Propose a designation (Section 5.0).

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

1.3 SCOPE

This report describes the characterization of the 221-T Building Head-End wastewater effluent stream that enters the soil column at the 216-T-1 Ditch. At the present time the only effluent entering this ditch is the process sewer which originates at the 221-T Building Head-End. The location of the ditch on the Hanford Site is shown in Figure 1-2. This report does not address any other wastestream leaving the building, such as solid waste, gaseous waste, or sanitary waste. The time period covered in this characterization effort was October 1989 to March 1990. Past discharges are included for supportive information and projections from the present to calendar year (CY) 1992 are presented for consideration. Historical data for radioactive waste discharged to the 216-T-1 Ditch between 1945 and 1975 are available in RHO-CD-745, *Input and Decayed Values of Radioactive Liquid Wastes Discharged to the Ground in the 200 Areas through 1975* (Anderson 1976).

This addendum contains the 221-T Building Head-End process description, the 216-T-1 Ditch description, effluent sample analysis results, flowrates and quantities of the wastestream discharged, proposed stream-specific designation with supporting data, and a description of the stream-specific characterization. It should be noted that the 221-T Building Head-End wastewater stream discharged to the 216-T-1 Ditch was divided into two parts (wastewater 1 for plasma torch operation and wastewater 2 for plasma torch standby) for the purpose of wastestream characterization. Wastewater 1 flowrates were much larger than wastewater 2 flowrates, but the wastewater 1 discharge periods occurred only for about 1 to 2 d during every other month. Batch solutions of process chemicals were discharged during wastewater 2 flow periods and not wastewater 1 flow periods. The results of this characterization were compared to the requirements of the WAC 173-303 to designate the wastestream.

Figure 1-1. Characterization Strategy.

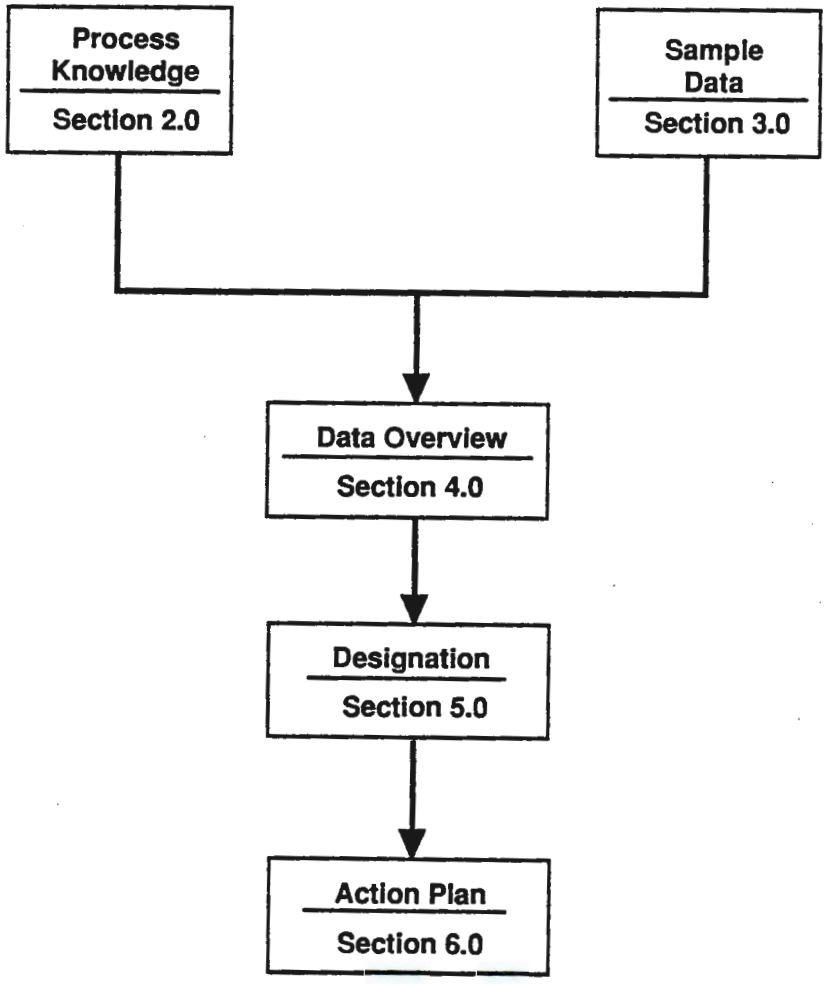

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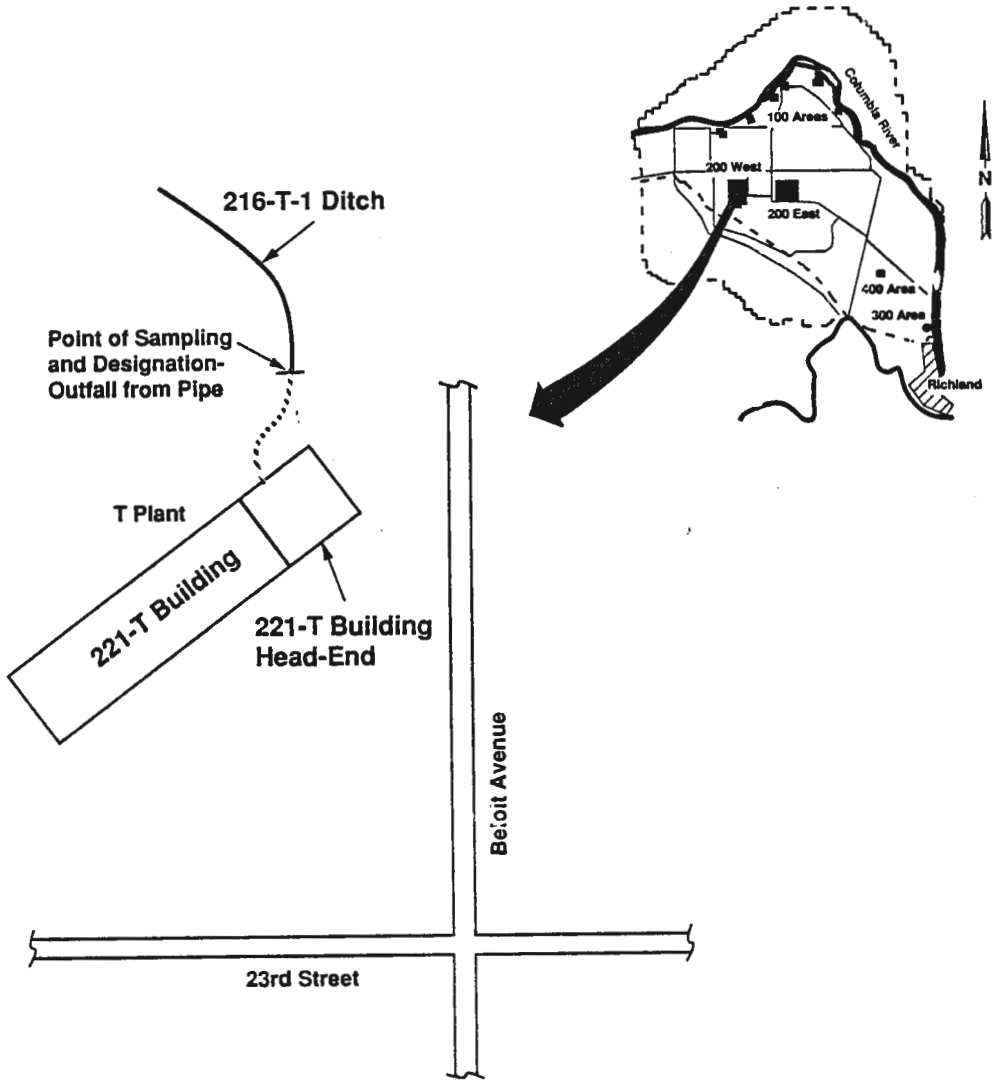
Figure 1-2. Aerial View of the 221-T Building Head-End and the 216-T-1 Ditch.



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2.0 PROCESS KNOWLEDGE

This section presents a qualitative and quantitative process-knowledge-based characterization of the chemical and radiological constituents of the 221-T Building Head-End wastestream discharging to the 216-T-1 Ditch. These process data are discussed in terms of the following factors:

1. Location and physical layout of the process facility
2. A general description of the present, past, and future activities of the process
3. The identity of the wastestream contributors
4. The identity of concentration of the constituents of each contributor.

2.1 FACILITY DESCRIPTION

The 216-T-1 Ditch is located just north of the 221-T Building Head-End. The wastewater line extends underground about 90 m from the 221-T Building Head-End to the 216-T-1 Ditch. The effluent samples were obtained at the point of the wastewater stream outfall from the underground pipe to the 216-T-1 Ditch. The 221-T Building Head-End is located in 200 West Area of the Hanford Site, as shown in Figure 1-2. It consists of a canyon area that extends from the basement floor to the roof. This canyon area has several deck levels and a parapet wall. Four floor levels adjacent to the canyon house an electrical switchgear room, a chemistry laboratory, office areas, a change room, a lunch room, a control room, an instrument shop, a maintenance shop, and storage areas. The floor plans of these levels are shown in Figures 2-1 and 2-2. A cross-sectional view of the 221-T Building Head-End at the main containment vessel is shown in Figure 2-3. There are no effluent monitors for flowrate or constituents for this wastestream. Process batch solutions from experimental operations in the 221-T Building Head-End are collected in holding tanks, sampled for pH, and routed to the effluent wastewater stream when the pH has been verified to be acceptable.

2.2 CONTRIBUTORS

The flow from eight process sewer lines connect to the 6-in.-diameter main header for discharge to the 216-T-1 Ditch. Table 2-1 lists each of these eight lines, their contributors, and activity status for the designated time period. Of the 38 potential contributors, 31 contributed infrequently and 7 contributed routinely. Infrequent contributors included flows from nine process tanks, five floor or safety shower drains, four cooling systems, four steam condensate traps, two sinks, two hoods, two process water lines, one compressed air line condensate trap, one vacuum pump seal water, and one large containment vessel drain. Routine contributors were three process

Figure 2-1. 221-T Building Head-End Layout--Lower Floors.

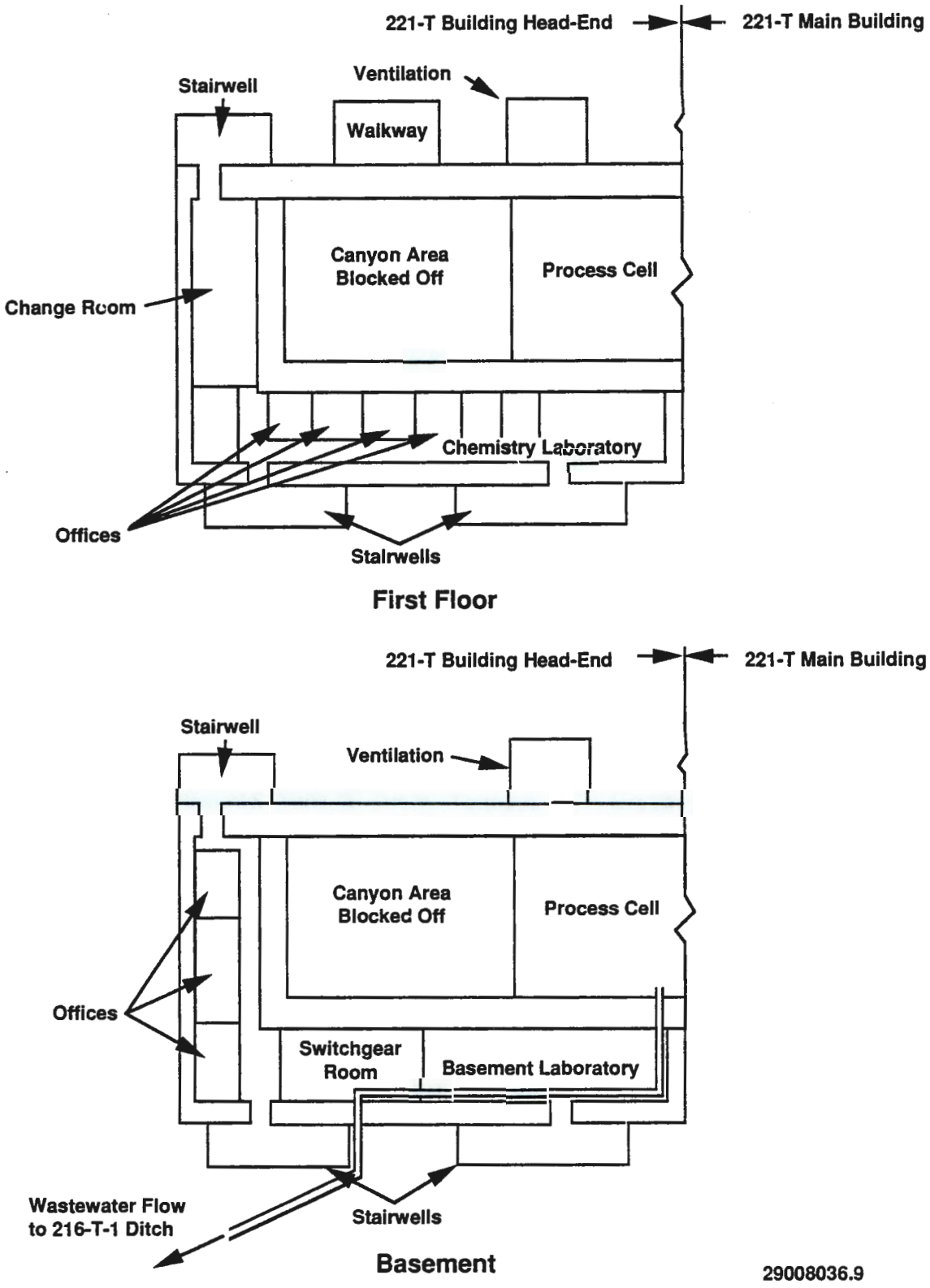
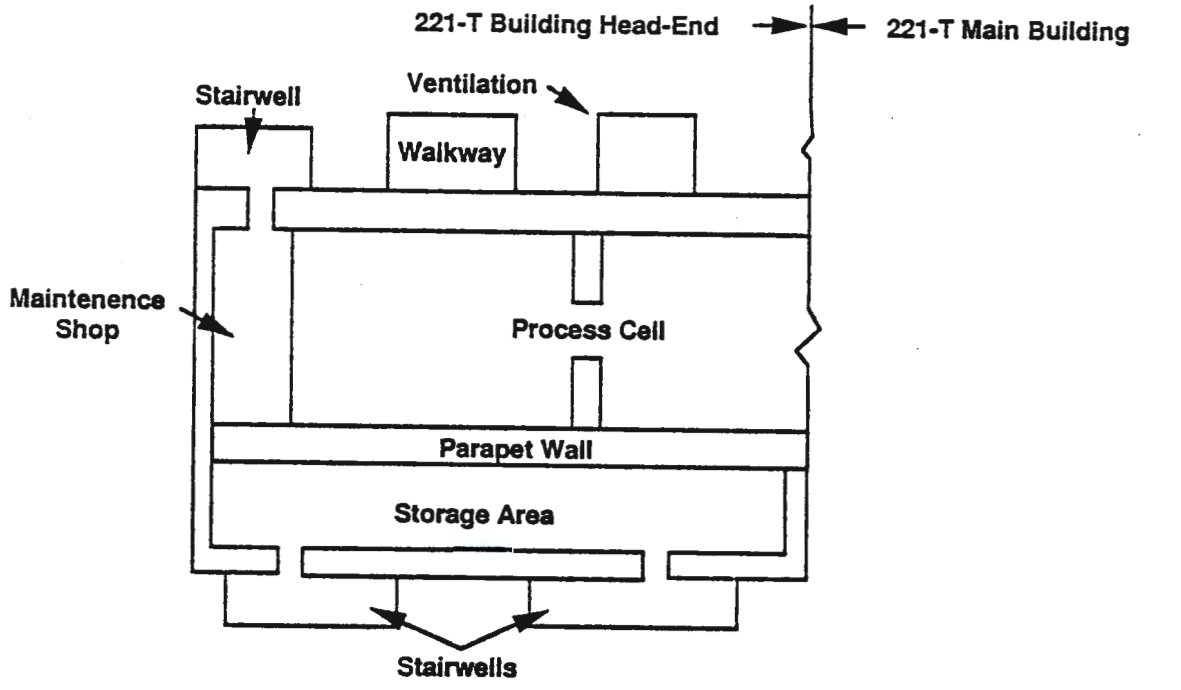


Figure 2-2. 221-T Building Head-End Layout--Upper Floors.



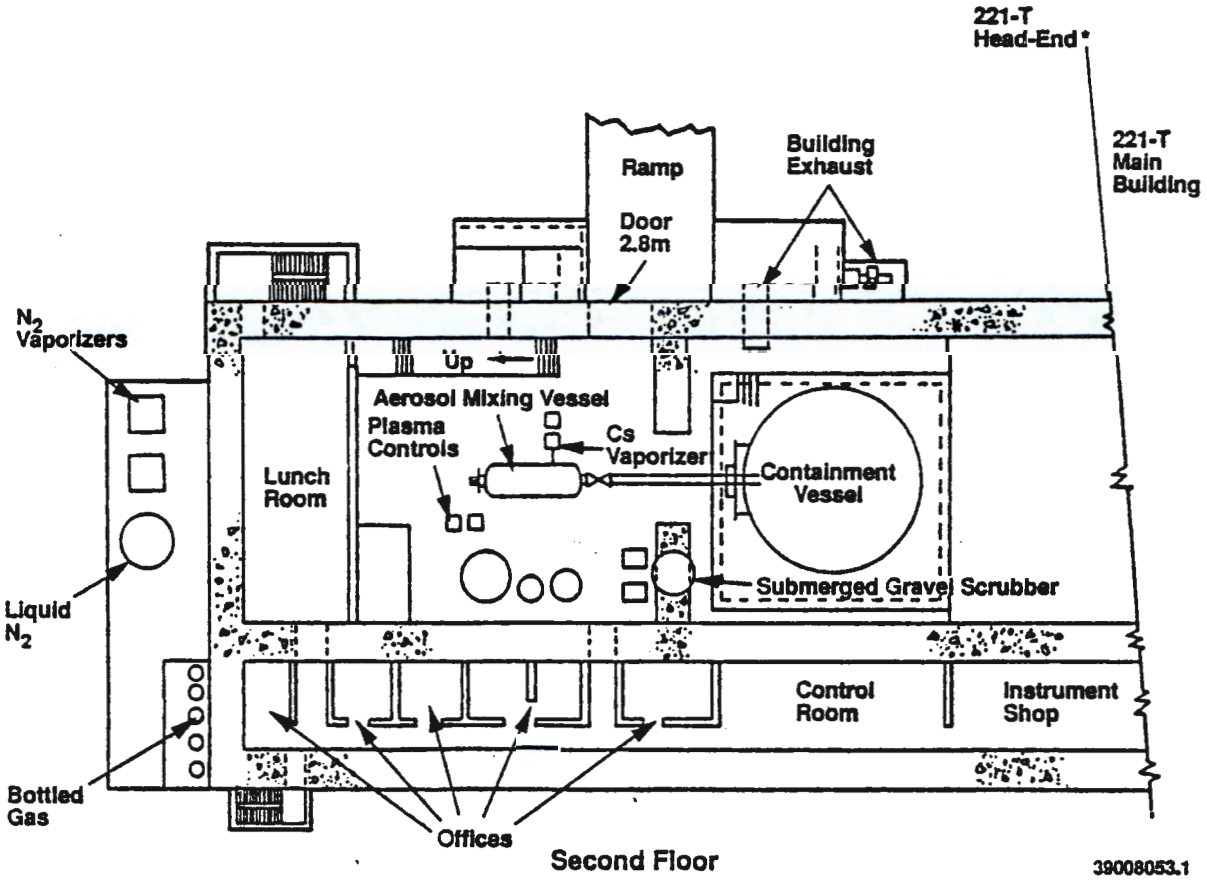


Figure 2-3. 221-T Building Head-End Cross-Sectional View.

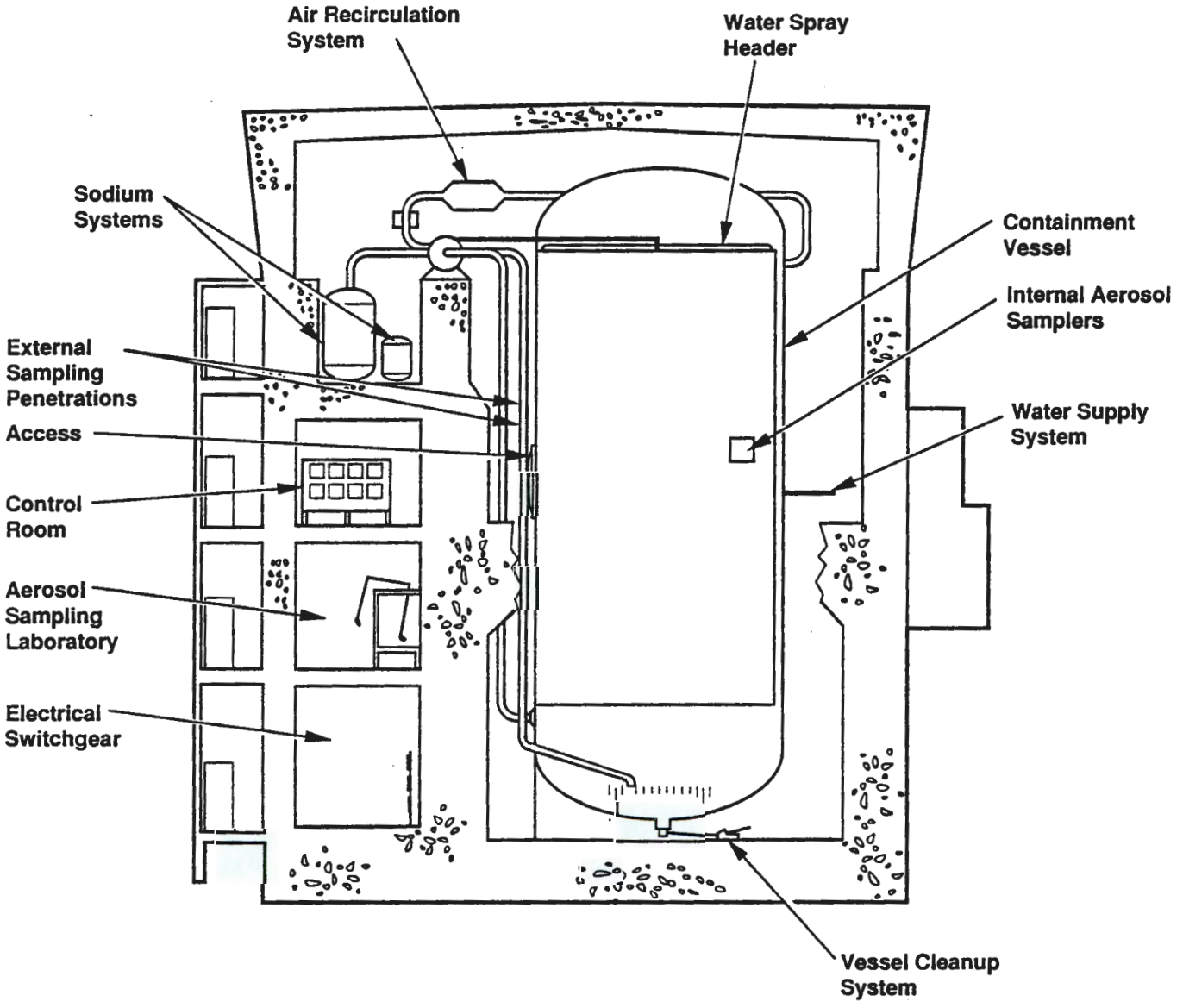


Table 2-1. 221-T Building Head-End Wastewater Contributors.
(sheet 1 of 2)

Main line[a]	Process sewer line	Contributor	Current activity
1	Upper floor sumps	Second floor sump (canyon deck level)	
		Wash pad	Infrequent
		Sink	Infrequent
		Submerged gravel scrubber	Infrequent
		Venturi scrubber	Infrequent
		Fibrous filter	Infrequent
		Tank TK-6	Infrequent
		Tank TK-7	Infrequent
		Tank TK-202	Infrequent
		Aerosol mixing vessel	Infrequent
		Cooling water to plasma torch nozzles	Infrequent
		Cooling water to plasma torch controls	Infrequent
		Floor drain	Infrequent
		Third floor sump	
		Compressed air condensate	Infrequent
		Shower drain	Infrequent
		Demineralized water tank drain	Infrequent
		Resin column drains (2)	Infrequent
		Floor drain	Infrequent
		Roof drain	Routine flow
2	Heating and ventilation system	Second floor heater	
		Steam condensate	Routine flow
		Cooling water	Routine flow
		Third floor heater	
		Steam condensate	Routine flow
		Cooling water	Routine flow
3	Basement laboratory sump	Hood 1	Infrequent
		Hood 2	Infrequent
		Heat exchanger steam condensate	Infrequent
		Steam line steam condensate	Infrequent
		Floor drain	Routine flow
		Sink	Infrequent
4	Welder cooling water line		Infrequent
5	Water from first floor aerosol sampling		Routine flow

Table 2-1. 221-T Building Head-End Wastewater Contributors.
(sheet 2 of 2)

Main line[a]	Process sewer line	Contributor	Current activity
6	Waste tank TK-1 in large vessel cell	Process water Vacuum pump lubricant water Steam condensate Large containment vessel drain	Infrequent Infrequent Infrequent Infrequent
7	Sump in process cell	Cooling water Steam condensate Floor drain	Infrequent Infrequent Infrequent
8	Control room floor drains		Infrequent

[a]Main line numbers correspond to line numbers in Figure 2-4.

water flows, two steam condensate flows, and flows from two drains. A flow diagram of the 216-T-1 Ditch header, eight feeding lines, and associated 38 contributors are shown in Figure 2-4.

2.3 PROCESS DESCRIPTION

2.3.1 Present Activities

Present activities, as defined in this wastestream characterization report, include the 221-T Building Head-End operations conducted from October 1989 through March 1990. Two sets of light-water reactor experiments were conducted during this time. Cooling water, steam condensate, process solutions, and roof and floor drains associated with these tests and the building operating functions were discharged to the 221-T Building Head-End wastewater stream during this time period. The estimated wastewater stream flowrates, time periods of discharge, and quantities of process chemicals discharged during present activities are presented in Section 2.4, "Process Data."

The wastewater flow to the 216-T-1 Ditch was continuous during this 6-mo-duration time period. The wastewater flow consisted of two configurations: wastewater 1, plasma torch operation, and wastewater 2, plasma torch standby. The wastewater 1 flow time period was defined as the time of cooling water flow to the plasma torch. This cooling water flow period was about 1 d (24 h) for each of the two sets of experiments conducted during the 6-mo-duration designation period. The plasma torch was operated to generate manganese aerosol in the aerosol mixing vessel. The torch generated aerosol for about 1 h for each set of experiments conducted. Other cooling water and steam condensate flows contributed to the wastewater 1 stream.

The wastewater 2 flow consisted of process cooling water and steam condensate flows for the time during which there was no cooling water flow to the plasma torch. Process wash solutions were also discharged on a batch basis as part of the wastewater 2 flow. The time of wastewater 2 flow consisted of the 6-mo-duration designation time period minus the 2 d for plasma torch cooling water flow (wastewater 1 flow).

2.3.2 Past Activities

The chemical and radiological constituents of the 221-T Building Head-End wastewater discharged to the 216-T-1 Ditch are identified in this section, using readily available information.

The processes used at 221-T Building Head-End have varied during the history of T Plant. Initially, the Head-End was used to process spent fuel from production reactors. The wastes discharged to the 216-T-1 Ditch from this process are reported in Anderson (1976). These wastes were cooling water and steam condensate from the spent fuel dissolution process. They

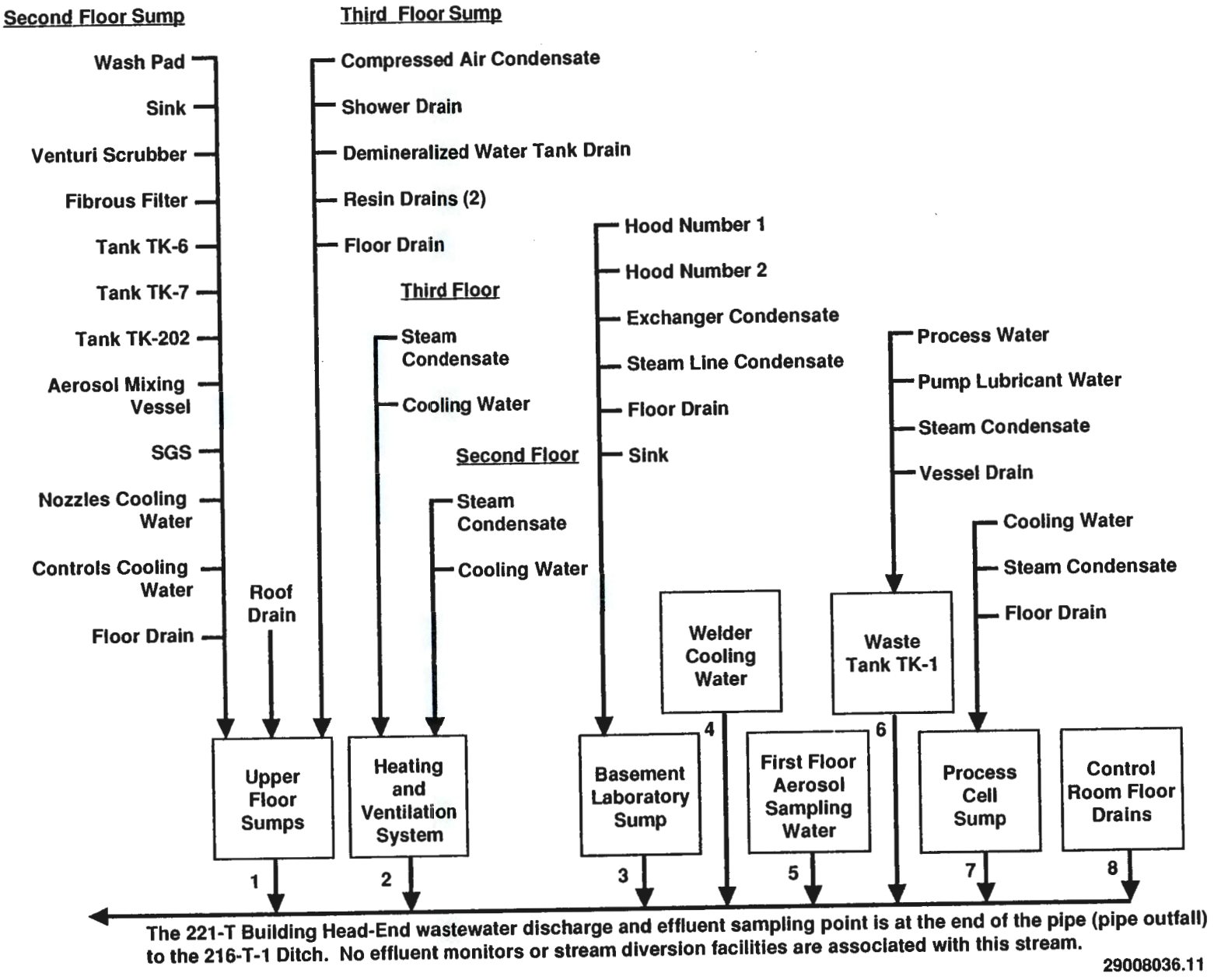


Figure 2-4. 221-T Building Head-End Wastewater Flows.

were discharged from 1945 (the start of facility operations) to 1956. The dissolution equipment was removed from the 221-T Building Head-End, and the radioactivity in the facility was partially decontaminated and stabilized. A testing program was then established for testing with iodine and radioactive cesium in a new containment vessel fabricated in place in the old dissolver cells and canyon. This modified facility was also referred to as the Containment Systems Test Facility (CSTF). This work was started in 1964 and completed in 1969 by Pacific Northwest Laboratory (PNL). A test was conducted with radioactive cobalt during this time. In 1972, a vacuum fractionator was built, and testing began. In 1976, testing was completed and the vacuum fractionator was removed. This work was performed by Atlantic Richfield Hanford Company.

Liquid-metal reactor safety tests were conducted by Westinghouse Hanford Company (Westinghouse Hanford) in the CSTF with nonradioactive sodium, lithium, and sodium iodide between 1976 and 1985. These tests consisted of sodium and lithium pool reaction, spray reaction, and aerosol behavior tests. At the conclusion of the tests, the reacted sodium, lithium, and sodium iodide were dissolved in water and discharged to the 216-T-1 Ditch or, if radioactive as a result of residual contamination from previous activity, transferred to the 221-T Building, cell 5, for sampling and pH adjustment, then transferred to tank farm double-shell tanks for storage as waste and eventual processing through waste evaporators. Unreacted metals were transferred to the 105-DR Reactor Facility for disposal. The determining conditions for routing the solutions was the solution pH, or the 221-T Building need for caustic solution to neutralize decontamination solutions, and the presence of radioactivity. If radioactivity was detected, the pH was in excess of 12.5, or the caustic solution was needed for neutralization, the procedure allowed for the solution to be transferred to the 221-T Building Head-End, otherwise it was discharged to the 216-T-1 Ditch. No solutions accumulated that had a pH of less than 2. The test series included in this time period were AB-1 through -8, NT-1, NAI-1 and -2, AC-1 through -10, SA-1, and LA-4 and -5. The quantities of alkali metals discharged to the 216-T-1 Ditch and periods of time in which the discharges occurred are listed in Appendix A, as reported in the associated tests final reports and the process log.

Light-water reactor tests were conducted by Westinghouse Hanford using nonradioactive cesium, manganese, zinc, lithium sulfate, iodine, and hydrogen iodide between 1985 and 1990. Several related tests were conducted using nonradioactive lithium and lithium-lead alloy in support of the fusion safety program during this same period. The process wastewater discharged to the 216-T-1 Ditch during these test programs consisted of cooling water, steam condensate, and some of the 221-T Building Head-End waste solutions. The used lithium-lead alloy was packaged as solid waste after completion of the tests and shipped offsite as solid waste. The quantities of waste solutions, metals, and other chemicals used for these tests are listed in Appendix A along with the time period for each test for which discharges occurred. These tests were conducted between 1985 and 1990. The test series designations include tests LA-1 through -6, AA-1 through -22, B-123, WIL-1, WIA-1, LPS-1, and LSS-1.

The used process chemicals from the tests that are listed in Section 2.3 were routed to the 216-T-1 Ditch as part of the wastewater 2 stream. No process chemicals were discharged intentionally during wastewater 1 flows with the plasma torch operating. The liquid volume discharge for wastewater 1 flow was about 250 L/min or a total of 11 x 10^6 L for tests conducted between 1985 and 1990. The wastewater 1 stream flows were estimated to extend for 1 to 2 d for each set of light-water reactor tests. The process concentration of constituents was expected to be the same as for sanitary water because the wastewater 1 stream was made up mostly of cooling water with some steam condensate. Variability of the wastewater 1 stream was considered very minor.

The total process chemicals discharged as wastewater 2 flow between 1985 and 1990 were cesium (33.5 kg), manganese (less than 24.0 kg), iodine (3.6 kg), potassium (7.0 kg), zinc (less than 18.5 kg), lithium (47.0 kg), sulfate (325.0 kg), phosphate (33.6 kg), sodium (120.0 kg), borate (124 kg), and ethylenediaminetetraacetic acetate (600.0 kg). The wastewater 2 flow consists mainly of the heating and ventilation cooling water flow with some steam condensate and process solution flow. The total wastewater 2 flow volume during this time was estimated to be an average of about 20 L/min for a total of 5.4 x 10^7 L between December 1985 and March 1990. This process evaluation results in an average concentration of cesium (620 parts per billion [ppb]), manganese (33 ppb), iodine (67 ppb), potassium (130 ppb), zinc (19 ppb), lithium (870 ppb), sulfate (6.0 parts per million [ppm]), phosphate (622 ppb), sodium (2.2 ppm), borate (2.3 ppm), and ethylenediaminetetraacetic acetate (11.1 ppm).

Variability of the wastewater 2 stream concentrations of process chemicals was significant in the past. The process solutions containing the process chemicals were pumped to the stream on a batch basis within 1 h. The process batches accumulated and were discharged after each test. An average of one test every 2 mo was typical. The maximum process evaluation concentrations of the process chemicals were estimated to be cesium (400 ppm), manganese (33 ppb), iodine (60 ppm), potassium (1,400 ppm), zinc (710 ppb), lithium (2,300 ppm), sulfate (16,000 ppm), phosphate (1,700 ppm), sodium (776 ppm), borate (4,800 ppm), and ethylenediaminetetraacetic acetate (5,200 ppm). These values were obtained by determining the concentration of a chemical constituent in the process solution and assuming that it was pumped quickly to the 216-T-1 Ditch, so no dilution credit was taken. Some of these materials were used for only one or two tests and were not routinely discharged. No process solution batches were identified for discharge to wastewater 2 stream after fiscal year (FY) 1990. If future test programs are identified or equipment wash solutions generated, the solutions will be evaluated by process information and chemical analyses. The decision to discharge the solution to the 216-T-1 Ditch or manage the solution as hazardous waste will be made based upon the results of these analyses.

2.3.3 Future Activities

There is currently no testing scheduled to be conducted in the 221-T Building Head-End after March 1990. The 221-T Building Head-End may continue to be used for office space, and the heating and ventilation systems are expected to remain in operation. Steam condensate and cooling water associated with the building heating and air conditioning, along with floor wash water, are the only regular liquid effluents expected to be discharged to the 216-T-1 Ditch after FY 1990. About 2,000 L of lithium hydroxide solution with a pH of less than 12.5 may be discharged in the latter part of FY 1990. The containers of solution are located in a catch pan to retain any solution that might leak.

There is no intention to discard chemical inventory to the wastewater stream for disposal. Any future test or equipment washing solutions will be evaluated based upon process information and chemical analyses; the decision to discharge the solution to the 216-T-1 Ditch or ship the solution to hazardous waste disposal will be made based upon the results of these analyses. The 221-T Building Head-End Wastewater flow in the future is expected to be very similar to the wastewater 2 stream characterized by the effluent samples in the past. There are no facility modifications planned for (or any Tri-Party Agreement milestones associated with) this wastestream.

2.4 PROCESS DATA

Process data information for the "current" October 1989 to March 1990 wastewater characterization period include wastewater flowrates, chemical constituents, estimated concentrations, and variability. Two sets of light-water reactor experiments were conducted during this time period. This resulted in periods of wastewater 1 and wastewater 2 stream flows. Wastewater 1 flow is defined as the period of time in which the plasma torches were operating with cooling water flow. Wastewater 2 flow is defined as the period of time in which the plasma torches were not operating with cooling water flow. Both wastewater 1 and wastewater 2 streams flowed through the main process sewer header to the 216-T-1 Ditch.

The wastewater 1 flows occurred for about 1 d (24 h) for each of two experiments conducted during this 6-mo period. The wastewater 1 stream is made up of essentially "sanitary water" and steam condensate. The flowrate of the wastewater 1 flow is estimated at 250 L/min, or for the 6-mo current period an average of 1.2×10^5 L/mo. Variability in flowrate and constituent content of the wastewater 1 stream was considered very minor. The analytes of the sanitary water and steam condensate are listed in Table 2-2. The sanitary water analysis for the 2724-W Laundry Facility was used because the reported less-than values of the 200 West Area sanitary water analyses (also included in Table 2-2) were too high to be of significance for this evaluation. The sanitary water used at the 2724-W Laundry came from the same supply (200 West Area sanitary water) as that for the 221-T Building Head-End. The steam condensate analyses for the 2724-W Laundry steam condensate was used for the 221-T Building Head-End because the steam supply

Table 2-2. Sanitary Water and Steam Condensate Analysis for 221-T Building Head-End.
(sheet 1 of 4)

Constituent/parameter	Sanitary water[a] (1985-1988) (ppb)			2724-W Laundry sanitary water[c] (1989) (ppb)			2724-W Laundry steam condensate[d] (1989) (ppb)		
	N[b]	Average	Standard deviation	N[b]	Average	Standard deviation	N[b]	Average	Standard deviation
200 West Area Water Data									
Acetone	-	--	--	-	--	--	4	1.10 E+01	1.73 E+00
Alkalinity (method B)	-	--	--	4	5.45 E+04	5.01 E+02	4	2.95 E+04	1.01 E+04
Aluminum	-	--	--	-	--	--	4	5.63 E+02	6.86 E+02
Ammonia	-	--	--	-	--	--	4	6.92 E+01	1.19 E+01
Arsenic	4	<5.00 E+00	1.45 E-08	-	--	--	-	--	--
Arsenic (EP Toxic)	-	--	--	4	<5.00 E+02	0.00 E+00	4	<5.00 E+02	0.00 E+00
Barium	4	<1.15 E+02	1.91 E+01	4	2.90 E+01	1.22 E+00	4	1.80 E+01	8.92 E+00
Barium (EP Toxic)	-	--	--	4	<1.00 E+03	0.00 E+00	4	<1.00 E+03	0.00 E+00
Boron	-	--	--	4	1.77 E+01	8.66 E+00	4	2.30 E+01	8.52 E+00
1-butanol	-	--	--	-	--	--	1	3.90 E+01	--
Cadmium	4	<5.00 E-01	0.00 E+00	-	--	--	4	<2.00 E+00	0.00 E+00
Cadmium (EP Toxic)	-	--	--	4	<1.00 E+02	0.00 E+00	4	<1.00 E+02	0.00 E+00
Calcium	-	--	--	4	1.87 E+04	2.55 E+02	4	7.65 E+03	6.43 E+03
Chromium	4	<6.25 E+00	2.50 E+00	4	--	0.00 E+00	-	--	--
Chromium (EP Toxic)	-	--	--	4	<5.00 E+02	0.00 E+00	4	<5.00 E+02	0.00 E+00
Chloride	-	--	--	4	2.92 E+03	1.48 E+02	4	1.35 E+03	8.61 E+02
Conductivity-field (μS)	-	--	--	4	1.45 E+02	1.39 E+01	4	6.32 E+01	5.39 E+01
Copper	4	<4.00 E+01	2.00 E+01	-	--	--	4	8.17 E+02	6.11 E+02
Coliform (col/100 mL)	-	--	--	-	--	--	-	--	--
Color (units)	4	<6.25 E+03	2.50 E+03	-	--	--	-	--	--
Ignitability (°F)	-	--	--	4	2.11 E+02	1.73 E+00	4	2.06 E+02	4.76 E+00
Iron	4	<2.50 E+02	2.68 E+02	4	3.27 E+01	2.94 E+00	4	2.06 E+03	2.48 E+03
Fluoride	4	<1.08 E+02	1.50 E+01	4	1.28 E+02	7.52 E+00	4	7.50 E+01	--
Lead	4	<5.00 E+00	1.45 E-08	-	--	--	4	1.55 E+01	7.72 E+00
Lead (EP Toxic)	-	--	--	4	<5.00 E+02	0.00 E+00	4	<5.00 E+02	0.00 E+00
Magnesium	-	--	--	4	4.35 E+03	1.38 E+02	4	1.82 E+03	1.39 E+01
Manganese	4	<1.00 E+01	2.90 E-08	-	--	--	4	1.57 E+01	1.59 E+01

Table 2-2. Sanitary Water and Steam Condensate Analysis for 221-T Building Head-End.
(sheet 2 of 4)

Constituent/parameter	Sanitary water[a] (1985-1988) (ppb)			2724-W Laundry sanitary water[c] (1989) (ppb)			2724-W Laundry steam condensate[d] (1989) (ppb)		
	N[b]	Average	Standard deviation	N[b]	Average	Standard deviation	N[b]	Average	Standard deviation
200 West Area Water Data (cont.)									
Mercury	4	<5.00 E-01	0.00 E+00	-	--	--	-	--	--
Mercury (EP Toxic)	-	--	--	4	<2.00 E+01	0.00 E+00	4	<2.00 E+01	0.00 E+00
Nitrate	4	<8.50 E+01	4.12 E+01	4	5.00 E+02	0.00 E+00	-	--	--
pH (dimensionless)	-	--	--	4	7.10 E+00	2.94 E-01	4	6.98 E+00	8.42 E-01
Potassium	-	--	--	4	7.28 E+02	4.71 E+01	4	3.27 E+02	1.94 E+02
Reactivity cyanide (mg/kg)	-	--	--	4	<1.00 E+02	0.00 E+00	4	<1.00 E+02	0.00 E+00
Reactivity sulfide (mg/kg)	-	--	--	4	<1.00 E+02	0.00 E+00	4	<1.00 E+02	0.00 E+00
Selenium	4	<4.25 E+00	1.50 E+00	-	--	--	-	--	--
Selenium (EP Toxic)	-	--	--	4	<5.00 E+02	0.00 E+00	4	<5.00 E+02	0.00 E+00
Silicon	-	--	--	4	2.14 E+03	8.82 E+00	4	1.75 E+03	8.49 E+02
Silver	4	<6.25 E+00	2.50 E+00	4	1.00 E+01	0.00 E+00	-	--	--
Silver (EP Toxic)	-	--	--	4	<5.00 E+02	0.00 E+00	4	<5.00 E+02	0.00 E+00
Sodium	4	2.20 E+03	1.15 E+02	4	2.05 E+03	1.11 E+02	4	8.85 E+02	6.15 E+02
Strontium	-	--	--	4	9.47 E+01	2.60 E+00	4	3.92 E+01	3.15 E+01
Sulfate	4	1.47 E+04	1.16 E+03	4	1.40 E+04	3.85 E+02	4	5.50 E+03	4.88 E+03
Sulfide	-	--	--	-	--	--	-	--	--
Suspended solids (mg/L)	-	--	--	-	--	--	4	2.02 E+04	1.61 E+03
Temperature-field (°C)	-	--	--	4	1.31 E+01	6.41 E+00	4	6.63 E+01	8.66 E+00
Titanium	-	--	--	-	--	--	4	8.75 E+01	4.76 E+01
Total carbon (μg/g)	-	--	--	4	1.51 E+04	1.48 E+02	4	4.53 E+03	2.77 E+03
TOC (μg/g)	-	--	--	-	--	--	-	--	--
TOX (μg chlorine/L)	-	--	--	4	1.42 E+02	1.13 E+01	4	2.52 E+01	2.79 E+01
TDS (mg/L)	4	7.95 E+04	1.28 E+04	4	5.37 E+04	2.65 E+04	4	2.70 E+04	2.25 E+04
Trichloromethane	-	--	--	4	2.82 E+01	6.88 E+00	4	1.17 E+01	1.17 E+01
Uranium	-	--	--	3	2.54 E-01	7.72 E-02	3	3.45 E-01	1.43 E-01
Zinc	4	<1.03 E+02	4.50 E+01	4	5.85 E+01	2.70 E+01	4	3.02 E+01	2.44 E+01

Table 2-2. Sanitary Water and Steam Condensate Analysis for 221-T Building Head-End.
(sheet 3 of 4)

Constituent/parameter	Sanitary water[a] (1985-1988) (ppb)			2724-W Laundry sanitary water[c] (1989) (ppb)			2724-W Laundry steam condensate[d] (1989) (ppb)		
	N[b]	Average	Standard deviation	N[b]	Average	Standard deviation	N[b]	Average	Standard deviation
Radionuclides (pCi/L)									
Alpha activity	No data available.			-	--	--	-	--	--
Beta activity				3	4.33 E+00	3.15 E+00	-	--	--
^{241}Am				-	--	--	2	5.77 E-03	1.66 E-03
^{60}Co				-	--	--	3	7.13 E-01	3.14 E-01
^{137}Cs				-	--	--	3	1.80 E+00	1.21 E+00
^{129}I				-	--	--	3	1.19 E-01	6.94 E-02
^{131}I				-	--	--	-	--	--
^{238}Pu				-	--	--	2	1.57 E-03	1.27 E-03
^{239}Pu				-	--	--	4	7.82 E-03	6.27 E-03
^{90}Sr				-	--	--	4	1.80 E-01	1.60 E-01
^{234}U				-	--	--	4	8.90 E-02	6.65 E-02
^{235}U				-	--	--	3	1.43 E-02	7.13 E-03
^{238}U				-	--	--	3	9.39 E-02	2.16 E-02
Organic Data[e]									
1,1,1-trichloroethane	1	5.00 E-01	0.00 E+00	No data available.			No data available.		
1,1-dichloroethylene	1	<4.00 E-01	0.00 E+00						
1,2-dichloroethane	1	<4.00 E-01	0.00 E+00						
1,3,5-trimethylbenzene	1	<3.00 E-01	0.00 E+00						
Benzene	1	4.00 E-01	0.00 E+00						
Bromodichloromethane	5	<1.59 E+00	6.88 E-01						
Bromoform	5	<6.00 E-01	2.20 E-01						
Carbon tetrachloride	1	<4.00 E-01	0.00 E+00						
Chlorodibromomethane	5	<6.20 E-01	2.17 E-01						
Chloroform	5	2.20 E+01	1.26 E+01						
Difluorodichloromethane	2	<5.00 E-01	0.00 E+00						
Ethylbenzene	1	<2.00 E-01	0.00 E+00						

Table 2-2. Sanitary Water and Steam Condensate Analysis for 221-T Building Head-End.
(sheet 4 of 4)

Constituent/parameter	Sanitary water[a] (1985-1988) (ppb)			2724-W Laundry sanitary water[c] (1989) (ppb)			2724-W Laundry steam condensate[d] (1989) (ppb)		
	N[b]	Average	Standard deviation	N[b]	Average	Standard deviation	N[b]	Average	Standard deviation
Organic Data[e] (cont.)									
o-xylene	1	<3.00 E-01	0.00 E+00	No data available.			No data available.		
p-chlorotoluene	1	<5.00 E-01	0.00 E+00						
p-dichlorobenzene	1	<7.00 E-01	0.00 E+00						
Tetrachloroethylene	1	<6.00 E-01	0.00 E+00						
Toluene	1	4.00 E-01	0.00 E+00						
Trichloroethylene	1	<5.00 E-01	0.00 E+00						
Vinyl chloride	1	1.00 E+00	0.00 E+00						

NOTE: Measurements are in ppb except where noted.

[a]Compiled from *Hanford Sanitary Water Quality Surveillance* for calendar years 1985, 1986, 1987, and 1988 (HEHF 1986, 1987, 1988, 1989).

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

[c]Compiled from Substance Toxicity Evaluation of Waste Data Base (this data is an update of the data presented in *Preliminary Evaluation of Hanford Liquid Discharges to Ground*) (Jungfleisch 1988).

[d]Data from sampling campaign conducted between October 1, 1989, and March 30, 1990, in support of the stream-specific reports.

[e]Organic data given in this table was compiled by HEHF. Data sets included first quarter 1987 and quarterly 1988 data. The total trihalomethane concentration for the 200 West Area appear in the HEHF reports for calendar years 1987 and 1988 (HEHF 1988, 1989).

EP = Extraction Procedure Toxicity Test

originates at the same source and no other analyses were available. The sanitary water and steam condensate analyses for the 2724-W Laundry reflect CYs 1989 and 1990 and correspond to the current characterization period.

The sanitary water supply 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-capacity 182-B Reservoir and Pump House in the 100 Area for initial settling. The water is then transferred from the 182-B Reservoir to the individual 3-Mgal-capacity 200 Area reservoirs for secondary settling. A backup capacity exists in the 100-D Area.

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

The water is then passed 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 anthracitic coal. The filters reduce turbidity to an average of 0.2 NTU. From the filters, the water flows to two 200,000-gal-capacity, concrete-lined covered reservoirs for disinfection. Chlorine is added to maintain a free chlorine residual of 1.5 mg/L.

The wastewater 2 stream flow period extended for the 6-mo period minus the 2 d of wastewater 1 flow for which the plasma torches operated. The wastewater 2 stream was made up of sanitary water, steam condensate, and periodic discharges of batches of process solutions. The flowrate of the wastewater 2 stream was estimated to be 20 L/min or 8.74×10^5 L/mo.

The total process chemicals discharged as part of the wastewater 2 flow between October 1989 and March 1990 were cesium (2.78 kg), manganese (less than 2.22 kg), iodine (0.42 kg), potassium (11.8 kg), phosphate (28.6 kg), sodium (9.4 kg), borate (2.7 kg), and ethylenediaminetetraacetic acetate (12.5 kg). The wastewater 2 flow consists mainly of the heating and ventilation cooling water flow with some steam condensate and process solution flow. The total estimated wastewater 2 flow volume during this time period, October 1989 to March 1990, was 5.2×10^6 L. This process evaluation results in average concentrations of cesium (537 ppb), manganese (33 ppb), iodine (81 ppb), potassium (2.27 ppm), phosphate (5.5 ppm), sodium (1.8 ppm), borate (514 ppb), and ethylenediaminetetraacetic acetate (2.4 ppm).

Variability of the wastewater 2 stream concentrations of process chemicals was significant during the October 1989 to March 1990 period but is expected to be only minor in the future. The accumulated batches of process solutions containing the above process chemicals were each pumped to the wastestream in about a 1-h time period. The maximum process evaluation concentrations of the process chemicals were estimated to be cesium

(572 ppm), manganese (33 ppb), iodine (57 ppm), potassium (74 ppm), phosphate (360 ppm), sodium (140 ppm), borate (600 ppm), and ethylenediaminetetraacetic acetate (2100 ppm). These values were obtained by determining the concentration of a chemical constituent in the process solution and assuming that it was pumped quickly to the 216 T-1 Ditch so no dilution credit with associated cooling water flow was taken.

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3.0 EFFLUENT SAMPLING RESULTS AND EVALUATION

This section provides an evaluation of the effluent sampling data pertaining to the 221-T Building Head-End wastewater discharged to the 216-T-1 Ditch. These data include both chemical data and radiological data. The discussion identifies the source of the sampling (Section 3.1) and presents the effluent sample results and data reduction (Section 3.2).

3.1 DATA SOURCE

Effluent sampling results of the 221-T Building Head-End wastewater stream are presented for the wastewater 1 and wastewater 2 streams. The chemical and radiological data sets comprise the analytical results of five wastewater samples obtained at the point of discharge (pipe outfall) to the 216-T-1 Ditch from October 1989 through March 1990. One sample was obtained during plasma torch operation (wastewater 1) and four samples were obtained when the plasma torch was not in operation (wastewater 2). The plasma torch operated to produce manganese aerosol for both experiments conducted during this 6-mo period.

Data reported by the laboratory under the primary sample number (see Section 3.0) are listed in the data reports with the primary sample number. Data for VOA blanks are listed in the data reports by the primary sample number and the suffix "B." Data for VOA transfer blanks are listed in the data reports by the primary sample number and the suffix "T." Data from Extraction Procedure Toxicity Testing (listed as EP Toxic in the tables) ignitability testing, reactivity testing and laboratory measurements of pH and conductivity are listed in the data reports by the primary sample number with the suffix "E" (for "extract," a term only applicable to the EP Toxicity Testing portion).

3.2 DATA PRESENTATION

More than 40,000 analytes were evaluated on each effluent sample analyzed. The bulk of these analytes were compiled from a combined mass-spectral library from the EPA, the National Institute for Occupational Safety and Health, and the National Bureau of Standards. Detection values were based on the contract laboratory's contract detection limits. These limits are usually moderately higher than the instrument detection limits or "state-of-the-art" detection limits currently reported in the scientific literature. The details of the sampling, analytical, quality control, and quality assurance procedures used are contained in Volume 4, Appendix 29, of WHC-EP-0287, *Waste Stream Characterization Report* (WHC 1989). The error introduced by the laboratory is not addressed in this report. Thirty-three analytes were detected at the 221-T Building Head-End wastewater stream.

The analytical procedures used for the characterization effort of the wastewater effluent samples are identified in Table 3-1. A statistical data summary of the wastewater 2 sample results (for samples obtained from October 1989 through March 1990), showing the mean, maximum, standard error, and the upper 90% confidence interval (90%CI) concentrations for each of the detected analytes is shown in Table 3-2. A statistical data summary of wastewater 1 sample results was not generated because only one sample was obtained for this configuration in this time period. The results of each sample are presented in Tables 3-3 and 3-4 for the wastewater 1 and wastewater 2 streams, respectively. A complete listing of all effluent sampling results (samples obtained between December 1985 and March 1990) for these wastestreams is contained in Appendix B.

Sixteen chemical analytes were identified in the wastewater 1 stream to be greater than detectable limits. Twenty-five chemical analytes were identified in the wastewater 2 stream to be greater than detectable limits. Of the 25 analytes, 8 (aluminum, lead, nitrate, acetone, ammonia, cobalt-60 [^{60}Co], cesium-137 [^{137}Cs], and radium total) were detected in only one of four samples.

Table 3-1. Procedures for 221-T Building Head-End Wastewater Samples Analysis. (sheet 1 of 2)

LEAD# / CofC#	Wastewater 2				Wastewater 1
	50733 50733	50776 50776	50800 50800	50838 50838	50971 50971
Alkalinity	X	X	X	X	X
Alpha counting	X	X	X	X	
Ammonia	X	X	X	X	X
Arsenic	X	X	X	X	X
Atomic emission spectroscopy	X	X	X	X	X
Beta counting		X	X	X	
Conductivity-field	X	X	X	X	X
Cyanide	X	X	X	X	X
Direct aqueous injection (GC)	X	X	X	X	X
Fluoride (LDL)	X	X	X	X	X
Gamma energy analysis	X	X	X	X	
Hydrazine	X	X	X	X	X
Ion chromatography	X	X	X	X	X
Lead	X	X	X	X	X
Mercury	X	X	X	X	X
pH-field	X	X	X	X	X
Selenium	X	X	X	X	X
Semivolatile organics (GC/MS)	X	X	X	X	X
Sulfide	X	X	X	X	X
Suspended solids	X	X	X	X	X
Temperature-field	X	X	X	X	X
Thallium	X	X	X	X	X
Total carbon	X	X	X	X	X
Total dissolved solids	X	X	X	X	X
Total organic carbon	X	X	X	X	X
Total organic halides (LDL)	X	X	X	X	X
Total radium alpha counting	X	X	X	X	
Tritium	X		X	X	
Reactive sulfide	X	X	X	X	
Uranium	X	X	X	X	
Volatile organics (GC/MS)	X	X	X	X	X
LEAD# CofC#	50733B 50734	50776B 50777	50800B 50801	50838B 50839	50971B 50973
Volatile organics (GC/MS)	X	X	X	X	X
LEAD# CofC#			50800T 50802	50838T 50840	50971T 50974
Volatile organics (GC/MS)			X	X	X

Table 3-1. Procedures for 221-T Building Head-End Wastewater Samples Analysis. (sheet 2 of 2)

LEAD# / CofC#	Wastewater 2				Wastewater 1
	50733 / 50733	50776 / 50776	50800 / 50800	50838 / 50838	50971 / 50971
Atomic emission spectroscopy	X	X	X	X	X
Ignitability	X	X	X	X	X
Mercury (mixed matrix)	X	X	X	X	X
Reactive cyanide	X	X	X	X	X
Reactive sulfide					X

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

Sample number suffixes:
- B = blank
- E = extract
- T = transfer blank

CofC# = chain-of-custody number
GC = gas chromatography
LEAD# = liquid effluent analytical data number that appears in the data reports
LDL = low-detection limit
MS = mass spectrometry

Table 3-2. Statistics for 221-T Building Head-End Wastewater 2 Stream--Plasma Torch Standby. (sheet 1 of 2)

Constituent	N[a]	MDA[b]	Method[c]	Mean value (ppb)	Standard error (ppb)	90%CI limit[d] (ppb)	Maximum[e] (ppb)
Aluminum	4	3	DL	1.62 E+02	1.20 E+01	1.82 E+02	1.98 E+02
Arsenic (EP Toxic)	4	4	NA	<5.00 E+02	0.00 E+00	<5.00 E+02	<5.00 E+02
Barium	4	0	NA	2.70 E+01	1.22 E+00	2.90 E+01	2.90 E+01
Barium (EP Toxic)	4	4	NA	<1.00 E+03	0.00 E+00	<1.00 E+03	<1.00 E+03
Boron	4	1	DL	1.32 E+01	1.11 E+00	1.51 E+01	1.50 E+01
Cadmium (EP Toxic)	4	4	NA	<1.00 E+02	0.00 E+00	<1.00 E+02	<1.00 E+02
Calcium	4	0	NA	1.74 E+04	7.43 E+02	1.86 E+04	1.85 E+04
Chloride	4	0	NA	3.25 E+03	2.96 E+02	3.73 E+03	4.10 E+03
Chromium (EP Toxic)	4	4	NA	<5.00 E+02	0.00 E+00	<5.00 E+02	<5.00 E+02
Copper	4	0	NA	1.45 E+01	2.84 E+00	1.92 E+01	2.30 E+01
Fluoride	4	0	NA	1.30 E+02	9.10 E+00	1.45 E+02	1.54 E+02
Iron	4	0	NA	2.63 E+02	8.16 E+01	3.97 E+02	5.01 E+02
Lead	4	3	DL	7.00 E+00	2.00 E+00	1.03 E+01	1.30 E+01
Lead (EP Toxic)	4	4	NA	<5.00 E+02	0.00 E+00	<5.00 E+02	<5.00 E+02
Magnesium	4	0	NA	3.82 E+03	2.05 E+02	4.16 E+03	4.20 E+03
Manganese	4	0	NA	1.23 E+02	3.55 E+01	1.81 E+02	2.28 E+02
Mercury (EP Toxic)	4	4	NA	<2.00 E+01	0.00 E+00	<2.00 E+01	<2.00 E+01
Nitrate	4	3	DL	5.25 E+02	2.50 E+01	5.66 E+02	6.00 E+02
Potassium	4	0	NA	6.85 E+02	4.24 E+01	7.54 E+02	7.62 E+02
Selenium (EP Toxic)	4	4	NA	<5.00 E+02	0.00 E+00	<5.00 E+02	<5.00 E+02
Silicon	4	0	NA	2.00 E+03	7.69 E+01	2.12 E+03	2.10 E+03
Silver (EP Toxic)	4	4	NA	<5.00 E+02	0.00 E+00	<5.00 E+02	<5.00 E+02
Sodium	4	0	NA	1.95 E+03	1.46 E+02	2.19 E+03	2.19 E+03
Strontium	4	0	NA	8.60 E+01	4.67 E+00	9.37 E+01	9.10 E+01
Sulfate	4	0	NA	1.22 E+04	7.04 E+02	1.34 E+04	1.30 E+04
Uranium	4	0	NA	3.86 E-01	1.10 E-01	5.66 E-01	7.08 E-01
Zinc	4	0	NA	6.02 E+01	4.07 E+01	1.27 E+02	1.82 E+02
Acetone	4	3	DL	1.17 E+01	1.75 E+00	1.46 E+01	1.70 E+01
Ammonia	4	3	DL	5.15 E+01	1.50 E+00	5.40 E+01	5.60 E+01
Trichloromethane	4	0	NA	2.65 E+01	3.97 E+00	3.30 E+01	3.50 E+01
Unknown	1	0	NA	4.50 E+01	NA	NA	4.50 E+01
Alkalinity (method B)	4	0	NA	4.87 E+04	2.63 E+03	5.31 E+04	5.20 E+04
Alpha activity (pCi/L)	4	2	DL	7.62 E-01	3.34 E-01	1.31 E+00	1.64 E+00
Beta activity (pCi/L)	3	0	NA	3.78 E+00	9.20 E-01	5.52 E+00	5.53 E+00
Conductivity (μS)	4	0	NA	1.63 E+02	3.52 E+00	1.69 E+02	1.69 E+02
Ignitability (°F)	4	0	NA	2.11 E+02	5.00 E-01	2.11 E+02	2.10 E+02
pH (dimensionless)	4	0	NA	7.37 E+00	3.03 E-01	7.86 E+00	6.47 E+00
Reactivity cyanide (mg/kg)	4	4	NA	<1.00 E+02	0.00 E+00	<1.00 E+02	<1.00 E+02
Reactivity sulfide (mg/kg)	4	4	NA	<1.00 E+02	0.00 E+00	<1.00 E+02	<1.00 E+02
TDS	4	0	NA	5.71 E+04	1.73 E+04	8.55 E+04	9.20 E+04
Temperature (°C)	4	0	NA	3.09 E+01	5.91 E+00	4.06 E+01	4.76 E+01
Total carbon	4	0	NA	1.29 E+04	6.79 E+02	1.40 E+04	1.38 E+04

Table 3-2. Statistics for 221-T Building Head-End Wastewater 2 Stream--Plasma Torch Standby. (sheet 2 of 2)

Constituent	N[a]	MDA[b]	Method[c]	Mean value (ppb)	Standard error (ppb)	90%CI limit[d] (ppb)	Maximum[e] (ppb)
TOX (as Cl)	4	0	NA	1.99 E+02	2.14 E+01	2.34 E+02	2.55 E+02
^{60}Co (pCi/L)	4	3	DL	1.14 E+00	5.84 E-01	2.09 E+00	2.83 E+00
^{137}Cs (pCi/L)	4	3	DL	1.34 E+00	7.12 E-01	2.51 E+00	3.46 E+00
Radium total (pCi/L)	4	3	DL	1.34 E-01	5.94 E-02	2.31 E-01	3.10 E-01

NOTE: Measurements are in ppb except where noted.

[a]N = Number--the total number of results in each data set reported for this stream configuration.

[b]MDA = minimum detectable amount--the number of results in each data set below the detection limit.

[c]Method = replacement method used:
DL = replacement by the detection limit
LM = replacement of single-valued MDAs by the log-normal plotting position method
MR = replacement of multiple valued MDAs by the normal plotting position method
NA = not applicable.

[d]90%CI limit = 90% confidence interval limit--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.

[e]Maximum = 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.

EP = Extraction Procedure Toxicity Test
TDS = total dissolved solids
TOC = total organic carbon
TOX = total organic halides

Table 3-3. Effluent Sample Results for 221-T Building Head-End Wastewater 1--Plasma Torch Operation. (sheet 1 of 3)

Constituent	Sample number[a]	Sampling date	Method[c]	Result (ppb)
Arsenic (EP Toxic)	50971E	02/22/90	ICP	<5.00 E+02
Barium	50971	02/22/90	ICP	2.50 E+01
Barium (EP Toxic)	50971E	02/22/90	ICP	<1.00 E+03
Boron	50971	02/22/90	ICP	2.40 E+01
Cadmium (EP Toxic)	50971E	02/22/90	ICP	<1.00 E+02
Calcium	50971	02/22/90	ICP	1.78 E+04
Chloride	50971	02/22/90	IC	2.70 E+03
Chromium (EP Toxic)	50971E	02/22/90	ICP	<5.00 E+02
Fluoride	50971	02/22/90	IC	<5.00 E+02
Fluoride	50971	02/22/90	ISE	1.13 E+02
Iron	50971	02/22/90	ICP	1.25 E+02
Lead (EP Toxic)	50971E	02/22/90	ICP	<5.00 E+02
Magnesium	50971	02/22/90	ICP	4.10 E+03
Manganese	50971	02/22/90	ICP	4.50 E+01
Mercury (EP Toxic)	50971E	02/22/90	CVAA/M	<2.00 E+01
Potassium	50971	02/22/90	ICP	7.01 E+02
Selenium (EP Toxic)	50971E	02/22/90	ICP	<5.00 E+02
Silicon	50971	02/22/90	ICP	2.11 E+03
Silver (EP Toxic)	50971E	02/22/90	ICP	<5.00 E+02
Sodium	50971	02/22/90	ICP	1.93 E+03
Strontium	50971	02/22/90	ICP	8.70 E+01
Sulfate	50971	02/22/90	IC	1.36 E+04
Zinc	50971	02/22/90	ICP	2.90 E+01
Ammonia	50971	02/22/90	ISE	6.90 E+01
2-butanone	50971	02/22/90	VOA	<1.00 E+01
2-butanone	50971B	02/22/90	VOA	1.30 E+01
2-butanone	50971T	02/22/90	VOA	1.30 E+01
Dichloromethane	50971	02/22/90	VOA	<5.00 E+00
Dichloromethane	50971B	02/22/90	VOA	5.00 E+00
Dichloromethane	50971T	02/22/90	VOA	<5.00 E+00
Trichloromethane	50971	02/22/90	VOA	1.50 E+01
Trichloromethane	50971B	02/22/90	VOA	7.00 E+00
Trichloromethane	50971T	02/22/90	VOA	<4.00 E+00
Unknown	50971	02/22/90	ABN	2.20 E+01
Alkalinity (method B)	50971	02/22/90	TITRA	5.40 E+04
Conductivity (μS)	50971	02/22/90	COND-Fld	1.49 E+02
Ignitability (°F)[b]	50971E	02/22/90	IGNIT	2.10 E+02
pH (dimensionless)	50971	02/22/90	PH-Fld	7.47 E+00
Reactivity cyanide (mg/kg)	50971E	02/22/90	DSPEC	<1.00 E+02
Reactivity sulfide (mg/kg)	50971E	02/22/90	DTITRA	<1.00 E+02

Table 3-3. Effluent Sample Results for 221-T Building Head-End Wastewater 1--Plasma Torch Operation. (sheet 2 of 3)

Constituent	Sample number[a]	Sampling date	Method[c]	Result (ppb)
TDS	50971	02/22/90	TDS	7.80 E+04
Temperature (°C)	50971	02/22/90	TEMP-Fld	2.44 E+01
Total carbon	50971	02/22/90	TC	1.39 E+04
TOX (as Cl)	50971	02/22/90	LTOX	8.00 E+01

NOTE: Measurements are in ppb unless noted.
AA = atomic absorption spectroscopy
EP = Extraction Procedure Toxicity Test
GC = gas chromatography
ICP = inductively-coupled plasma spectroscopy
MS = mass spectrometry
TDS = total dissolved solids
TOC = total organic carbon
TOX = total organic halides

[a] See Table 3-1 for corresponding chain-of-custody number and explanation of sample number suffix.

[b] Ignitability is the maximum temperature of the test (no sample actually ignited).

[c] Methods code:

Code	Analytical Method	Reference[d]
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

Table 3-3. Effluent Sample Results for 221-T Building Head-End Wastewater 1--Plasma Torch Operation. (sheet 3 of 3)

Code	Analytical Method	Reference[d]
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
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

[d]Reference:

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 3-4. Effluent Sample Results for 221-T Building Head-End Wastewater 2--Plasma Torch Standby. (sheet 1 of 7)

Constituent	Sample number[a]	Sampling date	Method[c]	Result (ppb)
Aluminum	50733	10/26/89	ICP	1.98 E+02
Aluminum	50776	11/17/89	ICP	<1.50 E+02
Aluminum	50800	11/28/89	ICP	<1.50 E+02
Aluminum	50838	12/14/89	ICP	<1.50 E+02
Arsenic (EP Toxic)	50733E	10/26/89	ICP	<5.00 E+02
Arsenic (EP Toxic)	50776E	11/17/89	ICP	<5.00 E+02
Arsenic (EP Toxic)	50800E	11/28/89	ICP	<5.00 E+02
Arsenic (EP Toxic)	50838E	12/14/89	ICP	<5.00 E+02
Barium	50733	10/26/89	ICP	2.60 E+01
Barium	50776	11/17/89	ICP	2.90 E+01
Barium	50800	11/28/89	ICP	2.90 E+01
Barium	50838	12/14/89	ICP	2.40 E+01
Barium (EP Toxic)	50733E	10/26/89	ICP	<1.00 E+03
Barium (EP Toxic)	50776E	11/17/89	ICP	<1.00 E+03
Barium (EP Toxic)	50800E	11/28/89	ICP	<1.00 E+03
Barium (EP Toxic)	50838E	12/14/89	ICP	<1.00 E+03
Boron	50733	10/26/89	ICP	1.50 E+01
Boron	50776	11/17/89	ICP	<1.00 E+01
Boron	50800	11/28/89	ICP	1.40 E+01
Boron	50838	12/14/89	ICP	1.40 E+01
Cadmium (EP Toxic)	50733E	10/26/89	ICP	<1.00 E+02
Cadmium (EP Toxic)	50776E	11/17/89	ICP	<1.00 E+02
Cadmium (EP Toxic)	50800E	11/28/89	ICP	<1.00 E+02
Cadmium (EP Toxic)	50838E	12/14/89	ICP	<1.00 E+02
Calcium	50733	10/26/89	ICP	1.77 E+04
Calcium	50776	11/17/89	ICP	1.85 E+04
Calcium	50800	11/28/89	ICP	1.81 E+04
Calcium	50838	12/14/89	ICP	1.52 E+04
Chloride	50733	10/26/89	IC	4.10 E+03
Chloride	50776	11/17/89	IC	3.20 E+03
Chloride	50800	11/28/89	IC	2.90 E+03
Chloride	50838	12/14/89	IC	2.80 E+03
Chromium (EP Toxic)	50733E	10/26/89	ICP	<5.00 E+02
Chromium (EP Toxic)	50776E	11/17/89	ICP	<5.00 E+02
Chromium (EP Toxic)	50800E	11/28/89	ICP	<5.00 E+02
Chromium (EP Toxic)	50838E	12/14/89	ICP	<5.00 E+02
Copper	50733	10/26/89	ICP	2.30 E+01
Copper	50776	11/17/89	ICP	1.10 E+01
Copper	50800	11/28/89	ICP	1.20 E+01
Copper	50838	12/14/89	ICP	1.20 E+01
Fluoride	50733	10/26/89	IC	<5.00 E+02
Fluoride	50733	10/26/89	ISE	1.54 E+02
Fluoride	50776	11/17/89	IC	<5.00 E+02
Fluoride	50776	11/17/89	ISE	1.33 E+02
Fluoride	50800	11/28/89	IC	<5.00 E+02
Fluoride	50800	11/28/89	ISE	1.23 E+02

Table 3-4. Effluent Sample Results for 221-T Building Head-End Wastewater 2--Plasma Torch Standby. (sheet 2 of 7)

Constituent	Sample number[a]	Sampling date	Method[c]	Result (ppb)
Fluoride	50838	12/14/89	IC	<5.00 E+02
Fluoride	50838	12/14/89	ISE	1.11 E+02
Iron	50733	10/26/89	ICP	5.01 E+02
Iron	50776	11/17/89	ICP	1.85 E+02
Iron	50800	11/28/89	ICP	2.31 E+02
Iron	50838	12/14/89	ICP	1.36 E+02
Lead	50733	10/26/89	GFAA	1.30 E+01
Lead	50776	11/17/89	GFAA	<5.00 E+00
Lead	50800	11/28/89	GFAA	<5.00 E+00
Lead	50838	12/14/89	GFAA	<5.00 E+00
Lead (EP Toxic)	50733E	10/26/89	ICP	<5.00 E+02
Lead (EP Toxic)	50776E	11/17/89	ICP	<5.00 E+02
Lead (EP Toxic)	50800E	11/28/89	ICP	<5.00 E+02
Lead (EP Toxic)	50838E	12/14/89	ICP	<5.00 E+02
Magnesium	50733	10/26/89	ICP	3.87 E+03
Magnesium	50776	11/17/89	ICP	4.20 E+03
Magnesium	50800	11/28/89	ICP	3.97 E+03
Magnesium	50838	12/14/89	ICP	3.24 E+03
Manganese	50733	10/26/89	ICP	2.28 E+02
Manganese	50776	11/17/89	ICP	1.03 E+02
Manganese	50800	11/28/89	ICP	9.00 E+01
Manganese	50838	12/14/89	ICP	7.20 E+01
Mercury (EP Toxic)	50733E	10/26/89	CVAA/M	<2.00 E+01
Mercury (EP Toxic)	50776E	11/17/89	CVAA/M	<2.00 E+01
Mercury (EP Toxic)	50800E	11/28/89	CVAA/M	<2.00 E+01
Mercury (EP Toxic)	50838E	12/14/89	CVAA/M	<2.00 E+01
Nitrate	50733	10/26/89	IC	6.00 E+02
Nitrate	50776	11/17/89	IC	<5.00 E+02
Nitrate	50800	11/28/89	IC	<5.00 E+02
Nitrate	50838	12/14/89	IC	<5.00 E+02
Potassium	50733	10/26/89	ICP	7.62 E+02
Potassium	50776	11/17/89	ICP	7.19 E+02
Potassium	50800	11/28/89	ICP	6.93 E+02
Potassium	50838	12/14/89	ICP	5.65 E+02
Selenium (EP Toxic)	50733E	10/26/89	ICP	<5.00 E+02
Selenium (EP Toxic)	50776E	11/17/89	ICP	<5.00 E+02
Selenium (EP Toxic)	50800E	11/28/89	ICP	<5.00 E+02
Selenium (EP Toxic)	50838E	12/14/89	ICP	<5.00 E+02
Silicon	50733	10/26/89	ICP	2.08 E+03
Silicon	50776	11/17/89	ICP	2.04 E+03
Silicon	50800	11/28/89	ICP	2.10 E+03
Silicon	50838	12/14/89	ICP	1.77 E+03
Silver (EP Toxic)	50733E	10/26/89	ICP	<5.00 E+02
Silver (EP Toxic)	50776E	11/17/89	ICP	<5.00 E+02
Silver (EP Toxic)	50800E	11/28/89	ICP	<5.00 E+02
Silver (EP Toxic)	50838E	12/14/89	ICP	<5.00 E+02

Table 3-4. Effluent Sample Results for 221-T Building Head-End Wastewater 2--Plasma Torch Standby. (sheet 3 of 7)

Constituent	Sample number[a]	Sampling date	Method[c]	Result (ppb)
Sodium	50733	10/26/89	ICP	2.19 E+03
Sodium	50776	11/17/89	ICP	2.14 E+03
Sodium	50800	11/28/89	ICP	1.93 E+03
Sodium	50838	12/14/89	ICP	1.55 E+03
Strontium	50733	10/26/89	ICP	9.10 E+01
Strontium	50776	11/17/89	ICP	9.10 E+01
Strontium	50800	11/28/89	ICP	9.00 E+01
Strontium	50838	12/14/89	ICP	7.20 E+01
Sulfate	50733	10/26/89	IC	1.30 E+04
Sulfate	50776	11/17/89	IC	1.27 E+04
Sulfate	50800	11/28/89	IC	1.30 E+04
Sulfate	50838	12/14/89	IC	1.01 E+04
Uranium	50733	10/26/89	FLUOR	3.44 E-01
Uranium	50776	11/17/89	FLUOR	2.37 E-01
Uranium	50800	11/28/89	FLUOR	2.56 E-01
Uranium	50838	12/14/89	FLUOR	7.08 E-01
Zinc	50733	10/26/89	ICP	1.82 E+02
Zinc	50776	11/17/89	ICP	1.10 E+01
Zinc	50800	11/28/89	ICP	2.10 E+01
Zinc	50838	12/14/89	ICP	2.70 E+01
Acetone	50733	10/26/89	VOA	1.70 E+01
Acetone	50733	10/26/89	ABN	<1.00 E+01
Acetone	50733B	10/26/89	VOA	<1.00 E+01
Acetone	50776	11/17/89	VOA	<1.00 E+01
Acetone	50776	11/17/89	ABN	<1.00 E+01
Acetone	50776B	11/17/89	VOA	<1.00 E+01
Acetone	50800	11/28/89	VOA	<1.00 E+01
Acetone	50800	11/28/89	ABN	<1.00 E+01
Acetone	50800B	11/28/89	VOA	<1.00 E+01
Acetone	50800T	11/28/89	VOA	<1.00 E+01
Acetone	50838	12/14/89	VOA	<1.00 E+01
Acetone	50838	12/14/89	ABN	<1.00 E+01
Acetone	50838B	12/14/89	VOA	<1.00 E+01
Acetone	50838T	12/14/89	VOA	<1.00 E+01
Ammonia	50733	10/26/89	ISE	5.60 E+01
Ammonia	50776	11/17/89	ISE	<5.00 E+01
Ammonia	50800	11/28/89	ISE	<5.00 E+01
Ammonia	50838	12/14/89	ISE	<5.00 E+01
2-butanone	50733	10/26/89	VOA	<1.00 E+01
2-butanone	50733B	10/26/89	VOA	<1.00 E+01
2-butanone	50776	11/17/89	VOA	<1.00 E+01
2-butanone	50776B	11/17/89	VOA	<1.00 E+01
2-butanone	50800	11/28/89	VOA	<1.00 E+01
2-butanone	50800B	11/28/89	VOA	<1.00 E+01
2-butanone	50800T	11/28/89	VOA	<1.00 E+01
2-butanone	50838	12/14/89	VOA	<1.00 E+01

Table 3-4. Effluent Sample Results for 221-T Building Head-End Wastewater 2--Plasma Torch Standby. (sheet 4 of 7)

Constituent	Sample number[a]	Sampling date	Method[c]	Result (ppb)
2-butanone	50838B	12/14/89	VOA	1.40 E+01
2-butanone	50838T	12/14/89	VOA	<1.00 E+01
Dichloromethane	50733	10/26/89	VOA	<5.00 E+00
Dichloromethane	50733B	10/26/89	VOA	5.00 E+00
Dichloromethane	50776	11/17/89	VOA	<5.00 E+00
Dichloromethane	50776B	11/17/89	VOA	<5.00 E+00
Dichloromethane	50800	11/28/89	VOA	<5.00 E+00
Dichloromethane	50800B	11/28/89	VOA	6.00 E+00
Dichloromethane	50800T	11/28/89	VOA	5.00 E+00
Dichloromethane	50838	12/14/89	VOA	<5.00 E+00
Dichloromethane	50838B	12/14/89	VOA	6.00 E+00
Dichloromethane	50838T	12/14/89	VOA	1.40 E+03
Trichloromethane	50733	10/26/89	VOA	3.50 E+01
Trichloromethane	50733B	10/26/89	VOA	<5.00 E+00
Trichloromethane	50776	11/17/89	VOA	2.90 E+01
Trichloromethane	50776B	11/17/89	VOA	<4.00 E+00
Trichloromethane	50800	11/28/89	VOA	2.60 E+01
Trichloromethane	50800B	11/28/89	VOA	1.10 E+01
Trichloromethane	50800T	11/28/89	VOA	8.00 E+00
Trichloromethane	50838	12/14/89	VOA	1.60 E+01
Trichloromethane	50838B	12/14/89	VOA	<5.00 E+00
Trichloromethane	50838T	12/14/89	VOA	<5.00 E+00
Unknown	50776	11/17/89	ABN	4.50 E+01
Alkalinity (method B)	50733	10/26/89	TITRA	5.00 E+04
Alkalinity (method B)	50776	11/17/89	TITRA	5.20 E+04
Alkalinity (method B)	50800	11/28/89	TITRA	5.20 E+04
Alkalinity (method B)	50838	12/14/89	TITRA	4.10 E+04
Alpha activity (pCi/L)	50733	10/26/89	Alpha	<1.20 E-01
Alpha activity (pCi/L)	50776	11/17/89	Alpha	<3.91 E-01
Alpha activity (pCi/L)	50800	11/28/89	Alpha	1.64 E+00
Alpha activity (pCi/L)	50838	12/14/89	Alpha	8.98 E-01
Beta activity (pCi/L)	50776	11/17/89	Beta	3.40 E+00
Beta activity (pCi/L)	50800	11/28/89	Beta	2.41 E+00
Beta activity (pCi/L)	50838	12/14/89	Beta	5.53 E+00
Conductivity (µS)	50733	10/26/89	COND-Fld	1.53 E+02
Conductivity (µS)	50776	11/17/89	COND-Fld	1.66 E+02
Conductivity (µS)	50800	11/28/89	COND-Fld	1.69 E+02
Conductivity (µS)	50838	12/14/89	COND-Fld	1.65 E+02
Ignitability (°F)[b]	50733E	10/26/89	IGNIT	>2.12 E+02
Ignitability (°F)[b]	50776E	11/17/89	IGNIT	>2.10 E+02
Ignitability (°F)[b]	50800E	11/28/89	IGNIT	>2.12 E+02
Ignitability (°F)[b]	50838E	12/14/89	IGNIT	>2.12 E+02
pH (dimensionless)	50733	10/26/89	PH-Fld	7.60 E+00
pH (dimensionless)	50776	11/17/89	PH-Fld	6.47 E+00
pH (dimensionless)	50800	11/28/89	PH-Fld	7.60 E+00
pH (dimensionless)	50838	12/14/89	PH-Fld	7.80 E+00

Table 3-4. Effluent Sample Results for 221-T Building Head-End Wastewater 2--Plasma Torch Standby. (sheet 5 of 7)

Constituent	Sample number[a]	Sampling date	Method[c]	Result (ppb)
Reactivity cyanide (mg/kg)	50733E	10/26/89	DSPEC	<1.00 E+02
Reactivity cyanide (mg/kg)	50776E	11/17/89	DSPEC	<1.00 E+02
Reactivity cyanide (mg/kg)	50800E	11/28/89	DSPEC	<1.00 E+02
Reactivity cyanide (mg/kg)	50838E	12/14/89	DSPEC	<1.00 E+02
Reactivity sulfide (mg/kg)	50733E	10/26/89	DTITRA	<1.00 E+02
Reactivity sulfide (mg/kg)	50776E	11/17/89	DTITRA	<1.00 E+02
Reactivity sulfide (mg/kg)	50800E	11/28/89	DTITRA	<1.00 E+02
Reactivity sulfide (mg/kg)	50838E	12/14/89	DTITRA	<1.00 E+02
TDS	50733	10/26/89	TDS	9.50 E+03
TDS	50776	11/17/89	TDS	6.80 E+04
TDS	50800	11/28/89	TDS	9.20 E+04
TDS	50838	12/14/89	TDS	5.90 E+04
Temperature (°C)	50733	10/26/89	TEMP-Fld	2.89 E+01
Temperature (°C)	50776	11/17/89	TEMP-Fld	1.97 E+01
Temperature (°C)	50800	11/28/89	TEMP-Fld	2.76 E+01
Temperature (°C)	50838	12/14/89	TEMP-Fld	4.76 E+01
Total carbon	50733	10/26/89	TC	1.35 E+04
Total carbon	50776	11/17/89	TC	1.35 E+04
Total carbon	50800	11/28/89	TC	1.38 E+04
Total carbon	50838	12/14/89	TC	1.09 E+04
TOX (as Cl)	50733	10/26/89	LTOX	2.04 E+02
TOX (as Cl)	50776	11/17/89	LTOX	1.82 E+02
TOX (as Cl)	50800	11/28/89	LTOX	1.54 E+02
TOX (as Cl)	50838	12/14/89	LTOX	2.55 E+02
^{60}Co (pCi/L)	50733	10/26/89	GEA	<2.77 E-01
^{60}Co (pCi/L)	50776	11/17/89	GEA	2.83 E+00
^{60}Co (pCi/L)	50800	11/28/89	GEA	<9.74 E-01
^{60}Co (pCi/L)	50838	12/14/89	GEA	<4.60 E-01
^{137}Cs (pCi/L)	50733	10/26/89	GEA	<3.93 E-01
^{137}Cs (pCi/L)	50776	11/17/89	GEA	<8.32 E-01
^{137}Cs (pCi/L)	50800	11/28/89	GEA	<6.76 E-01
^{137}Cs (pCi/L)	50838	12/14/89	GEA	3.46 E+00
Radium total (pCi/L)	50733	10/26/89	Alpha-Ra	<6.09 E-02
Radium total (pCi/L)	50776	11/17/89	Alpha-Ra	3.10 E-01
Radium total (pCi/L)	50800	11/28/89	Alpha-Ra	<6.59 E-02
Radium total (pCi/L)	50838	12/14/89	Alpha-Ra	<9.77 E-02

NOTE: Measurements are in ppb unless noted.
AA = atomic absorption spectroscopy
EP = Extraction Procedure Toxicity Test
GC = gas chromatography
ICP = inductively-coupled plasma spectroscopy
MS = mass spectrometry
TDS = total dissolved solids
TOX = total organic halides

Table 3-4. Effluent Sample Results for 221-T Building Head-End Wastewater 2--Plasma Torch Standby. (sheet 6 of 7)

[a] See Table 3-1 for corresponding chain-of-custody number and explanations of sample number suffix.

[b] Ignitability is the maximum temperature of the test (no sample actually ignited).

[c] Methods code:

Code	Analytical Method	Reference[d]
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

Table 3-4. Effluent Sample Results for 221-T Building Head-End Wastewater 2--Plasma Torch Standby. (sheet 7 of 7)

Code	Analytical Method	Reference[d]
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

[d]Reference:

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.

4.0 DATA OVERVIEW

This section compares characterization data obtained through process knowledge with wastestream effluent sampling results. Estimates of the wastestream loadings for radionuclides and chemical constituents will also be provided in this section.

4.1 DATA COMPARISON

Comparison of the average wastestream 1 and wastestream 2 analytes to the maximum contaminant levels (MCL) addressed by the drinking water standard and the derived concentration guides (DCG) values established by the DOE are presented in Tables 4-1 and 4-2. This comparison includes both radiological and nonradiological constituent concentrations to help identify potential requirements for possible wastestream treatment with available technology for further constituent reductions. These comparisons are not designation related and are not used for compliance purposes.

4.2 WASTESTREAM DEPOSITION RATES

Tables 4-3 and 4-4 use the process flow information presented in Section 2.4 and the average analyte effluent sample analyses, Table 3-2, to calculate a deposition rate associated with the wastestreams.

4.3 PROCESSING DATA CONSIDERATIONS

This section presents a comparison of the processing data set (see Section 2.0) with the effluent sampling data set (see Section 3.0) to determine the identity and concentration levels of the chemical analytes present in the 221-T Building Head-End wastewater discharged to the 216-T-1 Ditch wastestream. Recommendations for release determinations are made in this section. For the wastewater 1 stream, the analyte concentrations as determined by effluent sample analyses were very near the same, or greater than, the analyte concentrations as determined from process information. For the wastewater 1 stream designation, the effluent sampling data were used because they agreed well with the process information, but the concentrations of some analytes were reported to be slightly greater in the effluent samples. For the wastewater 2 stream, processing information results were compared with the effluent measurements.

Concentrations of 28 different nonradioactive analytes were reported in the wastewater 2 stream: 28 determined by process characterization and 22 determined by effluent sampling evaluations (22 of the analytes were determined by both methods). Eight of these analytes had a greater concentration on average when determined from the process information than from the effluent sampling upper 90%CI. Four of these analytes (cesium, iodide, ethylenediaminetetraacetic acetate, and phosphate) were determined

Table 4-1. Evaluation of 221-T Building Head-End Wastewater 1 Stream--Plasma Torch Operation.

Constituent	Result (mg/L)[a]	SV1 (mg/L)[b]	SV2 (mg/L)[c]
Barium	2.5 E-02	5.0 E+00[b.3]	
Chloride	2.7 E+00	2.5 E+02[b.4]	
Fluoride	1.1 E-01	2.0 E+00[b.3]	
Iron	1.2 E-01	3.0 E-01[b.4]	
Manganese	4.5 E-02	5.0 E-02[b.4]	
Sulfate	1.4 E+01	2.5 E+02[b.4]	
Zinc	2.9 E-02	5.0 E+00[b.4]	
Trichloromethane[d]	1.5 E-02	1.0 E-01[b.3]	
TDS	7.8 E+01	5.0 E+02[b.4]	

NOTE: Measurements are in mg/L except where noted.

[a]The results are the mean values reported in Table 3-3.

[b]Screening value 1 (SV1) lists the value first, basis second and an asterisk (*) third if the result exceeds the regulatory value; bases are listed below:

[b.1]The proposed primary MCL

[b.2]The proposed secondary MCL

[b.3]The primary MCL

[b.4]The secondary MCL.

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* (WHC 1990d).

[c]Screening value 2 (SV2) lists the value first and a plus (+) 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* (WHC 1990e).

[d]The SV1 value for trihalomethanes is used to evaluate trichloromethane results.

Table 4-2. Evaluation of 221-T Building Head-End Wastewater 2 Stream--Plasma Torch Standby.

Constituent	Result (mg/L)[a]	SV1 (mg/L)[b]	SV2 (mg/L)[c]
Aluminum	1.6 E-01	5.0 E-02[b.2*]	
Barium	2.7 E-02	5.0 E+00[b.3]	
Chloride	3.2 E+00	2.5 E+02[b.4]	
Copper	1.5 E-02	1.0 E+00[b.4]	
Fluoride	1.3 E-01	2.0 E+00[b.3]	
Iron	2.6 E-01	3.0 E-01[b.4]	
Lead	7.0 E-03	5.0 E-02[b.3]	
Manganese	1.2 E-01	5.0 E-02[b.4*]	
Nitrate	5.3 E-01	4.5 E+01[b.1]	
Sulfate	1.2 E+01	2.5 E+02[b.4]	
Zinc	6.0 E-02	5.0 E+00[b.4]	
Trichloromethane[d]	2.6 E-02	1.0 E-01[b.3]	
Alpha activity (pCi/L)[e]	7.6 E-01	1.5 E+01[b.3]	3.0 E+01
Beta activity (pCi/L)[f]	3.8 E+00		1.0 E+03
^{60}Co (pCi/L)	1.1 E+00	2.0 E+02[b.1]	5.0 E+03
^{137}Cs (pCi/L)	1.3 E+00	1.0 E+02[b.1]	3.0 E+03
TDS	5.7 E+01	5.0 E+02[b.4]	

NOTE: Measurements are in mg/L except where noted.

[a] The results are the mean values reported in Table 3-3.

[b] Screening value 1 (SV1) lists the value first, basis second and an asterisk (*) third if the result exceeds the regulatory value; bases are listed below:

[b.1] The proposed primary MCL

[b.2] The proposed secondary MCL

[b.3] The primary MCL

[b.4] The secondary MCL.

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* (WHC 1990d).

[c] Screening value 2 (SV2) lists the value first and a plus (+) 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* (WHC 1990e).

[d] The SV1 value for trihalomethanes is used to evaluate trichloromethane results.

[e] The SV1 and SV2 values for gross alpha are used to evaluate alpha activity.

[f] The SV2 for gross beta is used to evaluate beta activity.

TDS = total dissolved solids

Table 4-3. Deposition Rate for 221-T Building Head-End Wastewater 1 Stream--Plasma Torch Operation.

Constituent	Concentration (kg/L)[a]	Deposition rate (kg/mo)[b]
Barium	2.50 E-08	3.00 E-03
Boron	2.40 E-08	2.88 E-03
Calcium	1.78 E-05	2.14 E+00
Chloride	2.70 E-06	3.24 E-01
Fluoride	1.13 E-07	1.36 E-02
Iron	1.25 E-07	1.50 E-02
Magnesium	4.10 E-06	4.92 E-01
Manganese	4.50 E-08	5.40 E-03
Potassium	7.01 E-07	8.41 E-02
Silicon	2.11 E-06	2.53 E-01
Sodium	1.93 E-06	2.32 E-01
Strontium	8.70 E-08	1.04 E-02
Sulfate	1.36 E-05	1.63 E+00
Zinc	2.90 E-08	3.48 E-03
Ammonia	6.90 E-08	8.28 E-03
Trichloromethane	1.50 E-08	1.80 E-03
Unknown	2.20 E-08	2.64 E-03
TDS	7.80 E-05	9.36 E+00
Total carbon	1.39 E-05	1.67 E+00
TOX (as Cl)	8.00 E-08	9.60 E-03

NOTE: The plasma torch operation flowrate is 1.20 E+05 L/mo. The flowrate is the average of rates from Section 2.0. The data was collected from October 1989 through March 1990.

[a]Constituent concentrations are average values from Table 3-2. Concentration units of flagged (*) constituents are reported as curies per liter.

[b]Deposition rate units of flagged (*) constituents are reported as curies per month.

Table 4-4. Deposition Rate for 221-T Building Head-End Wastewater 2 Stream--Plasma Torch Standby.

Constituent	Concentration (kg/L)[a]	Deposition rate (kg/mo)[b]
Aluminum	1.62 E-07	1.42 E-01
Barium	2.70 E-08	2.36 E-02
Boron	1.32 E-08	1.15 E-02
Calcium	1.74 E-05	1.52 E+01
Chloride	3.25 E-06	2.84 E+00
Copper	1.45 E-08	1.27 E-02
Fluoride	1.30 E-07	1.14 E-01
Iron	2.63 E-07	2.30 E-01
Lead	7.00 E-09	6.12 E-03
Magnesium	3.82 E-06	3.34 E+00
Manganese	1.23 E-07	1.07 E-01
Nitrate	5.25 E-07	4.59 E-01
Potassium	6.85 E-07	5.98 E-01
Silicon	2.00 E-06	1.75 E+00
Sodium	1.95 E-06	1.70 E+00
Strontium	8.60 E-08	7.51 E-02
Sulfate	1.22 E-05	1.07 E+01
Uranium	3.86 E-10	3.37 E-04
Zinc	6.02 E-08	5.26 E-02
Acetone	1.17 E-08	1.02 E-02
Ammonia	5.15 E-08	4.50 E-02
Trichloromethane	2.65 E-08	2.32 E-02
Unknown	4.50 E-08	3.93 E-02
Alpha activity*	7.62 E-13	6.66 E-07
Beta activity*	3.78 E-12	3.30 E-06
TDS	5.71 E-05	4.99 E+01
Total carbon	1.29 E-05	1.13 E+01
TOX (as Cl)	1.99 E-07	1.74 E-01
^{60}Co*	1.14 E-12	9.96 E-07
^{137}Cs*	1.34 E-12	1.17 E-06
Radium total*	1.34 E-13	1.17 E-07

NOTE: The plasma torch standby flowrate is 8.74 E+05 L/mo. The flowrate is the average of rates from Section 2.0. The data was collected from October 1989 through March 1990.

[a]Constituent concentrations are average values from Table 3-2. Concentration units of flagged (*) constituents are reported as curies per liter.

[b]Deposition rate units of flagged (*) constituents are reported as curies per month.

TDS = total dissolved solids

TOX = total organic halides

to be present in significant concentrations by processing information but were not reported in the effluent sampling evaluations or were below the detection limits.

These four water-soluble process chemicals used in laboratory testing were discharged to the 216-T-1 Ditch infrequently and during short periods of time and probably would not be detected by the random infrequent effluent samples obtained for the wastewater 2 stream. For these four analytes, the concentrations determined by process information yield more accurate quantative release information than the effluent sampling measurements.

Copper, iron, and lead were found to be in the effluent samples at a greater concentration than in the values determined through sanitary water analyses. It was noted that these three analytes in the steam condensate are sufficiently concentrated to account for the concentrations reported in the wastestream effluent samples (see Table 2-2). With a few exceptions, no other known sources of these elements were used in the testing program: the containment vessel paint (which contained lead, but was removed by sand blasting and solid waste disposal in early 1989), two fusion safety tests using lead conducted in 1987 (for which the lead was packaged and shipped offsite for solid waste disposal), the 221-T Building Head-End piping system, which consists of copper tubing, iron pipe, and cast-iron drain pipe with lead joints. It may be possible that these metal pipes and/or joint materials dissolve slightly to result in the effluent concentrations measured in the effluent samples. The concentrations of these elements in the effluent are expected to be more accurate than the values reported from the processing information.

5.0 PROPOSED DESIGNATION

This section proposes that the 221-T Building Head-End Wastestream (T Plant Laboratory Wastewater) not be designated a dangerous waste. This proposed designation uses data from both the effluent source description and effluent sampling data (Sections 2.0 and 3.0) and complies with the designation requirements of WAC 173-303-070, "Designation of Dangerous Waste." A review of the process chemicals and their maximum batch concentrations (Section 2.4) indicates that these chemicals do not significantly impact the wastestream designation.

The *Dangerous Waste Regulations*, WAC 173-303 (Ecology 1989) contains the procedure for determining if a waste is dangerous. 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 dangerous waste if it either contains a discarded chemical product (WAC 173-303-081, "Discarded Chemical Products") or originates from a dangerous waste source (WAC 173-303-082, "Dangerous Waste Sources"). The proposed designation was based on a combination of processing knowledge and effluent sampling data.

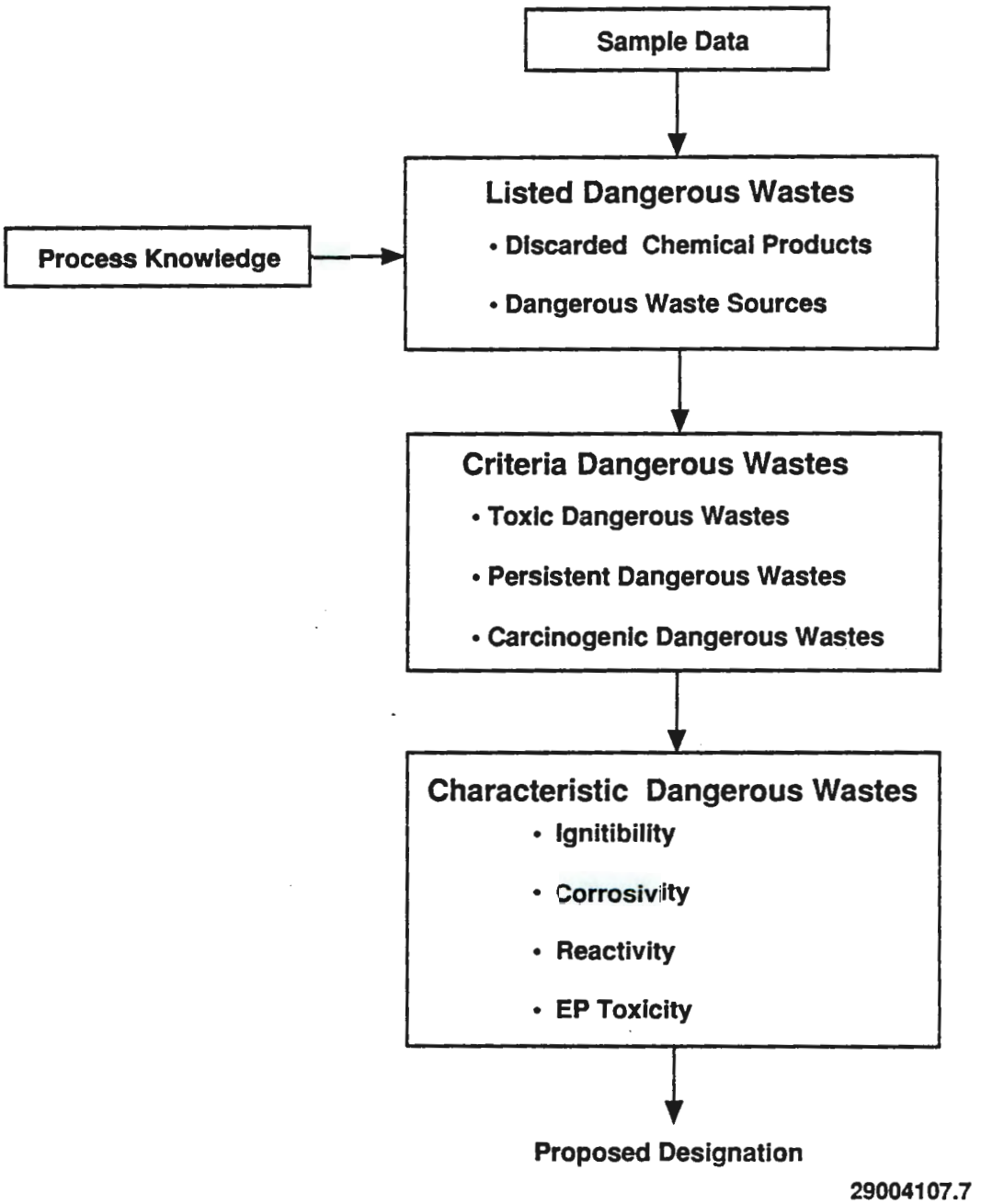
5.1.1 Discarded Chemical Products

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

- The listed constituent is the sole active ingredient in a commercial chemical product that has been discarded. (Commercial chemical products that, as purchased, contain two or more active ingredients are not designated as discarded chemical products. Products that contain nonactive components such as water, however, are designated if the sole active ingredient in the mixture is listed in WAC 173-303-9903.)

- The constituent results from a spill of unused commercial chemical products. (A spill of a discarded chemical product would cause a wastestream to be designated during the time that the discharge occurs. 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

Figure 5-1. Illustration of the Designation Procedure.



or are reasonably anticipated to occur in the future. In this report, 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 [CERCLA].)

- 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. Off-specification, 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, "Dangerous Waste Sources List," pursuant to WAC 173-303-082, "Dangerous Waste Sources." Three major categories of sources are defined in WAC 173-303-9904: (1) nonspecific sources from routine operations occurring at many industries, (2) specific sources (e.g., wastes from ink formulation), and (3) state sources, which may be limited to polychlorinated biphenyl (PCB)-contaminated transformers and capacitors resulting from salvaging, rebuilding, or discarding activities.

Of the nonspecific sources, only F003 (specific spent nonhalogenated solvents) applies to this wastestream.

5.2 LISTED WASTE DATA CONSIDERATIONS

The proposed designation of the wastestream described in this report is based on an evaluation of processing and effluent 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 sources list. This process evaluation is necessary because the wastestream 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 sampling point. The process evaluation included a review of the following information sources:

- Material Safety Data Sheets (MSDS)

- Superfund Amendments and Reauthorization Act (SARA) inventory reports
- Operating procedures
- Process chemical inventories
- Physical inspections, where possible.

Additionally, discussions with facility personnel were conducted to determine if there were any procedures or laboratory processes that generated a listed waste which may not have been evident during other portions of the processing 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 Effluent Sampling Data

Effluent 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 for combining the inorganic constituents into substances. This screening procedure is described in WHC-EP-0334, *Wastestream Designation for Liquid Effluent Analytical Data* (WHC 1990c) 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 effluent sampling data, indicated that the 221-T Building Head-End wastestream 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. Dangerous waste mixtures are addressed in Section 5.4, "Dangerous Waste Criteria."

5.3.1 Discarded Chemical Products

As discussed in Section 5.2, a process evaluation was conducted on the possible contributors to the 221-T Building Head-End wastestream. This evaluation included a review of MSDSs kept at the T Plant and chemical inventories compiled for compliance with SARA, Title III, requirements for possible listed waste contributors. Two chemical products (acetone and mercury), which either are or have been stored at the 221-T Building Head-End, appear on the WAC 173-303-9903 list. In addition, chloroform is expected to be present in the sanitary water at low concentrations as a result of the chlorination treatment of sanitary water before it is used in the facility.

Mercury was present in the process laboratory as a barometer fluid during the October 1989 through March 1990 designation period. Discussions with facility personnel indicated that there were no known mercury spills or discarding of mercury into the wastestream during the last 10 yr. A catch pan is positioned under the barometer to contain any mercury that may leak and prevent drainage to the floor drains. Mercury was not detected in the effluent samples of the wastewater 1 or 2 streams taken during the October 1989 through March 1990 designation period. Unused mercury was stored in areas that were not subject to discharge to wastewater stream drains if a spill occurred. Mercury would not be considered a discarded chemical product in the 221-T Building Head-End wastewater 1 or 2 streams.

Discussions with operations personnel and facility inspections supported the conclusion that no chemical products were discharged into the 221-T Building Head-End wastestream.

- **Wastewater 1**--Two potentially discarded chemical products (hydrogen fluoride and trichloromethane) were identified from wastewater 1 stream effluent sampling data (Table 5-1) using the screening procedure previously described in Section 5.2. Neither of the two compounds was identified as a chemical product present in the T Plant.

- **Wastewater 2**--Three potentially discarded chemical products (acetone, hydrogen fluoride, and trichloromethane) were identified from wastewater 2 stream effluent sampling data (Table 5-2) using the screening procedure previously described in Section 5.2. Of these three compounds, only one (acetone) was identified as a chemical product present in the facility.

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

Dangerous Waste Data Designation Report for T Plant Laboratory Wastewater-Plasma Torch Operation

Finding: Undesignated

Discarded Chemical Products - WAC 173-303-081

Substance	Review Number	Status	DW Number
*Hydrogen fluoride	U134(DW)	Not Discarded	Undesignated
*Trichloromethane	U044(EHW)	Not Discarded	Undesignated

Dangerous Waste Sources - WAC 173-303-082

Substance	Review Number	Status	DW Number
None	None	Not applicable	None

Infectous Dangerous Waste - WAC 173-303-083

No regulatory guidance

Dangerous Waste Mixtures - WAC 173-303-084

Substance	Toxic EC%	Persistant HH%	Persistant PAH%	Carcinogenic Total%
*Barium chloride	3.79E-09	0.00E+00	0.00E+00	0.00E+00
*Calcium tetraborate	2.81E-09	0.00E+00	0.00E+00	0.00E+00
*Iron(III) fluoride	2.53E-07	0.00E+00	0.00E+00	0.00E+00
*Magnesium chloride	9.38E-08	0.00E+00	0.00E+00	0.00E+00
*Magnesium sulfate	8.46E-08	0.00E+00	0.00E+00	0.00E+00
*Potassium fluoride	5.05E-08	0.00E+00	0.00E+00	0.00E+00
*Sodium metasilicate	5.12E-08	0.00E+00	0.00E+00	0.00E+00
*Zinc sulfate	7.16E-09	0.00E+00	0.00E+00	0.00E+00
*Ammonia	8.90E-08	0.00E+00	0.00E+00	0.00E+00
*Trichloromethane	1.50E-07	1.50E-06	0.00E+00	1.50E-06
Total	7.65E-07	1.50E-06	0.00E+00	1.50E-06
DW Number	Undesignated	Undesignated	Undesignated	Undesignated

Dangerous Waste Characteristics - WAC 173-303-090

Characteristic	Value	DW Number
Ignitability (Degrees F)	>210	Undesignated
*Corrosivity-pH	7.47	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

Substance	Toxic EC%	Persistant HH%	Persistant PAH%	Carcinogenic Total%	DW Number-Positive
*Barium chloride	3.79E-09	0.00E+00	0.00E+00	0.00E+00	
*Calcium tetraborate	2.81E-09	0.00E+00	0.00E+00	0.00E+00	
*Iron(III) fluoride	2.53E-07	0.00E+00	0.00E+00	0.00E+00	
*Magnesium chloride	9.38E-08	0.00E+00	0.00E+00	0.00E+00	
*Magnesium sulfate	8.46E-08	0.00E+00	0.00E+00	0.00E+00	
*Potassium fluoride	5.05E-08	0.00E+00	0.00E+00	0.00E+00	

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

Dangerous Waste Data Designation Report for T Plant Laboratory Wastewater-Plasma Torch Operation

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

Substance	Toxic EC%	Persistant HH%	Persistant PAH%	Carcinogenic Total%	DW Number-Positive
*Sodium metasilicate	5.12E-08	0.00E+00	0.00E+00	0.00E+00	
*Zinc sulfate	7.16E-09	0.00E+00	0.00E+00	0.00E+00	
*Ammonia	6.90E-08	0.00E+00	0.00E+00	0.00E+00	
*Trichloromethane	1.50E-07	1.50E-06	0.00E+00	1.50E-06	Undesignated
Total	7.65E-07	1.50E-06	0.00E+00	1.50E-06	
DW Number	Undesignated	Undesignated	Undesignated	Undesignated	

Dangerous Waste Constituents - WAC 173-303-9905

Substance
*Hydrogen fluoride
*Trichloromethane
*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.

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

Dangerous Waste Data Designation Report for T Plant Laboratory Wastewater-Plasma Torch Standby

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
Trichloromethane	U044(EHW)	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%
Aluminum nitrate	2.49E-07	0.00E+00	0.00E+00	0.00E+00
Aluminum sulfate	9.61E-11	0.00E+00	0.00E+00	0.00E+00
Barium chloride	4.40E-09	0.00E+00	0.00E+00	0.00E+00
Calcium tetraborate	1.77E-09	0.00E+00	0.00E+00	0.00E+00
Copper(II) chloride	4.05E-07	0.00E+00	0.00E+00	0.00E+00
Iron(III) chloride	7.66E-09	0.00E+00	0.00E+00	0.00E+00
Iron(III) fluoride	7.49E-07	0.00E+00	0.00E+00	0.00E+00
Lead chloride	1.38E-08	0.00E+00	0.00E+00	0.00E+00
Magnesium chloride	1.29E-07	0.00E+00	0.00E+00	0.00E+00
Magnesium sulfate	4.23E-08	0.00E+00	0.00E+00	0.00E+00
Sodium metasilicate	5.82E-08	0.00E+00	0.00E+00	0.00E+00
Uranyl nitrate	9.37E-10	0.00E+00	0.00E+00	0.00E+00
Zinc nitrate	3.68E-08	0.00E+00	0.00E+00	0.00E+00
Acetone	1.46E-10	0.00E+00	0.00E+00	0.00E+00
Ammonia	5.40E-08	0.00E+00	0.00E+00	0.00E+00
Trichloromethane	3.30E-07	3.30E-06	0.00E+00	3.30E-06
Total	2.08E-06	3.30E-06	0.00E+00	3.30E-06
DW Number	Undesignated	Undesignated	Undesignated	Undesignated

Dangerous Waste Characteristics - WAC 173-303-090

Characteristic	Value	DW Number
Ignitability (Degrees F)	>210	Undesignated
Corrosivity-pH	7.86	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

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

Dangerous Waste Data Designation Report for T Plant Laboratory Wastewater-Plasma Torch Standby

Dangerous Waste Criteria - WAC 173-303-100

Substance	Toxic EC%	Persistant HH%	Persistant PAH%	Carcinogenic Total%	DW Number-Positive
Aluminum nitrate	2.49E-07	0.00E+00	0.00E+00	0.00E+00	
Aluminum sulfate	9.61E-11	0.00E+00	0.00E+00	0.00E+00	
Barium chloride	4.40E-09	0.00E+00	0.00E+00	0.00E+00	
Calcium tetraborate	1.77E-09	0.00E+00	0.00E+00	0.00E+00	
Copper(II) chloride	4.05E-07	0.00E+00	0.00E+00	0.00E+00	
Iron(III) chloride	7.66E-09	0.00E+00	0.00E+00	0.00E+00	
Iron(III) fluoride	7.49E-07	0.00E+00	0.00E+00	0.00E+00	
Lead chloride	1.38E-08	0.00E+00	0.00E+00	0.00E+00	
Magnesium chloride	1.29E-07	0.00E+00	0.00E+00	0.00E+00	
Magnesium sulfate	4.23E-08	0.00E+00	0.00E+00	0.00E+00	
Sodium metasilicate	5.82E-08	0.00E+00	0.00E+00	0.00E+00	
Uranyl nitrate	9.37E-10	0.00E+00	0.00E+00	0.00E+00	
Zinc nitrate	3.68E-08	0.00E+00	0.00E+00	0.00E+00	
Acetone	1.46E-10	0.00E+00	0.00E+00	0.00E+00	
Ammonia	5.40E-08	0.00E+00	0.00E+00	0.00E+00	
Trichloromethane	3.30E-07	3.30E-06	0.00E+00	3.30E-06	Undesignated
Total	2.08E-06	3.30E-06	0.00E+00	3.30E-06	
DW Number	Undesignated	Undesignated	Undesignated	Undesignated	

Dangerous Waste Constituents - WAC 173-303-9905

Substance
Hydrogen fluoride
Acetone
Trichloromethane
Barium and compounds,NOS
Lead 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 potentially discarded chemical product, identified in both the process evaluation and in the screening of the effluent sampling data for wastewater 1 and wastewater 2 streams, was acetone. Tables 5-3 and 5-4 document how ion analytes were assigned to neutral substances that are required for designation. The tables account for charge balancing the ion assemblage (from the statistical summaries in Tables 3-1 and 3-2, respectively) and the subsequent formulation of neutral substances. A detailed discussion can be found in WHC-EP-0334 (WHC 1990c).

5.3.1.1 Wastewater 1 Stream (Plasma Torch Operation). One compound (trichloromethane) and one possible combination of detected analytes (hydrogen fluoride) (on the 9903 list as U134 and U044, respectively) were identified in the effluent sample results from the wastewater 1 stream. Trichloromethane was reported in the sample taken February 22, 1990, at a concentration of 15 ppb. Fluoride was reported in the same sample at 113 ppb.

5.3.1.1.1 Trichloromethane. A review of plant chemical inventory data and discussions with plant personnel did not show trichloromethane to be present in any chemical compound used within the 221-T Building Head-End.

Trichloromethane was detected (at 15 ppb) in the only wastewater 1 effluent sample taken during the designation time period. The rejection criteria for trichloromethane based on sanitary water supplied to the 221-T Building Head-End was less than 50 ppb as presented in Section 5.2 of WHC-EP-0342. As the concentration of trichloromethane in this sample is less than the rejection criteria, trichloromethane will not be considered a discarded chemical product in the wastewater 1 stream. It is likely that trichloromethane is present in this stream as a result of the presence of trichloromethane in the facility sanitary water supply.

5.3.1.1.2 Hydrogen Fluoride. A review of T Plant chemical inventory data and discussions with T Plant personnel did not show hydrogen fluoride to be present in any chemical compound used within the 221-T Building Head-End.

Fluoride was detected (at 113 ppb) in the only wastewater 1 sample taken during the designation time period. The rejection criteria for fluoride based upon sanitary water supplied to 221-T Building Head-End is less than 143 ppb as presented in Section 5.2 of WHC-EP-0342. As the concentration of fluoride in the wastewater 1 sample is less than the rejection criteria, then hydrogen fluoride is not considered a discarded chemical product. It is likely that the fluoride concentration is present in the wastestream sample as a result of the presence of fluoride in the facility sanitary water supply.

5.3.1.2 Wastewater 2 Stream (Plasma Torch Standby). Two compounds (acetone and trichloromethane) and one possible combination of detected analytes (hydrogen fluoride) were identified as potential discarded chemical products from effluent sampling of the wastewater 2 stream.

Table 5-3. Inorganic Chemistry Report for Wastewater 1--Operation.
(sheet 1 of 2)

Charge Normalization

Constituent	Value (ppb)[a]	Ion	Ion Concentration (Eq/g)[b]	Normalized (Eq/g)
*Barium	2.50 E+01	Ba^{+2}	3.64 E-10	
*Boron	2.40 E+01	$B_4O_7^{-2}$	1.11 E-09	2.88 E-09
*Calcium	1.78 E+04	Ca^{+2}	8.88 E-07	
*Chloride	2.70 E+03	Cl^{-1}	7.62 E-08	1.97 E-07
*Fluoride	1.13 E+02	F^{-1}	5.95 E-09	1.54 E-08
*Iron	1.25 E+02	Fe^{+3}	6.71 E-09	
*Magnesium	4.10 E+03	Mg^{+2}	3.37 E-07	
*Manganese	4.50 E+01	Mn^{+2}	1.64 E-09	
*Potassium	7.01 E+02	K^{+1}	1.79 E-08	
*Silicon	2.11 E+03	SiO_3^{-2}	1.50 E-07	3.89 E-07
*Sodium	1.93 E+03	Na^{+1}	8.39 E-08	
*Strontium	8.70 E+01	Sr^{+2}	1.99 E-09	
*Sulfate	1.36 E+04	SO_4^{-2}	2.83 E-07	7.34 E-07
*Zinc	2.90 E+01	Zn^{+2}	8.87 E-10	
*Hydrogen ion (from pH 7.5)		H^+	(3.39 E-11)	
*Hydroxide ion (from pH)		OH^-	(2.95 E-10)	
Cation total			1.34 E-06	
Anion total			5.17 E-07	

Anion normalization factor 2.590

Substance Formation

Substance[c]	Percent (g/100 g)[d]	Cation out[e]	Anion out[e]
*Iron(III) fluoride	2.53 E-05	0.00 E+00	8.69 E-09
*Potassium fluoride	5.05 E-05	9.24 E-09	0.00 E+00
*Barium chloride	3.79 E-06	0.00 E+00	1.97 E-07
*Zinc sulfate	7.16 E-06	0.00 E+00	7.33 E-07
*Magnesium chloride	9.38 E-04	1.41 E-07	0.00 E+00
*Calcium tetraborate	2.81 E-05	8.85 E-07	0.00 E+00
*Magnesium sulfate	8.46 E-04	0.00 E+00	5.92 E-07
*Sodium metasilicate	5.12 E-04	0.00 E+00	3.05 E-07
*Potassium metasilicate	7.12 E-05	0.00 E+00	2.96 E-07
*Manganese(II) metasilicate	1.07 E-05	0.00 E+00	2.94 E-07
*Strontium sulfate	1.82 E-05	0.00 E+00	5.90 E-07
*Calcium sulfate	4.02 E-03	2.95 E-07	0.00 E+00

Table 5-3. Inorganic Chemistry Report for Wastewater 1--Operation.
(sheet 1 of 2)

[a] 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 1.00 E-20 (Eq/g)**2 divided by the hydrogen ion value (in "Ion concentration [Eq/g]").

[b] 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.

[c] Substance names may include MB (monobasic), DB (diasic), TB (tribasic) to identify the equivalents of hydrogen ion that have been neutralized from polyprotic weak acids to form their conjugate bases. Substances are formulated in the order listed.

[d] The percent of the substance in the waste (g/100 g).

[e] 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 "Cation Out" and "Anion Out" columns indicate the residual concentrations (in Eq/g) of each ion after a substance concentration has been calculated.

Table 5-4. Inorganic Chemistry Report for Wastewater 2--Standby.
(sheet 1 of 2)

Charge Normalization				
Constituent	Value (ppb)[a]	Ion	Ion Concentration (Eq/g)[b]	Normalized (Eq/g)
*Aluminum	1.82 E+02	Al^{+3}	2.02 E-08	
Barium	2.90 E+01	Ba^{+2}	4.22 E-10	
Boron	1.51 E+01	$B_4O_7^{-2}$	6.97 E-10	1.81 E-09
Calcium	1.86 E+04	Ca^{+2}	9.28 E-07	
Chloride	3.73 E+03	Cl^{-1}	1.05 E-07	2.74 E-07
Copper	1.92 E+01	Cu^{+2}	6.03 E-10	
Fluoride	1.45 E+02	F^{-1}	7.64 E-09	1.99 E-08
Iron	3.97 E+02	Fe^{+3}	2.13 E-08	
*Lead	1.03 E+01	Pb^{+2}	9.92 E-11	
Magnesium	4.16 E+03	Mg^{+2}	3.42 E-07	
Manganese	1.81 E+02	Mn^{+2}	6.60 E-09	
*Nitrate	5.66 E+02	$NO3^{-1}$	9.13 E-09	2.38 E-08
Potassium	7.54 E+02	K^{+1}	1.93 E-08	
Silicon	2.12 E+03	SiO_3^{-2}	1.51 E-07	3.94 E-07
Sodium	2.19 E+03	Na^{+1}	9.53 E-08	
Strontium	9.37 E+01	Sr^{+2}	2.14 E-09	
Sulfate	1.34 E+04	$SO4^{-2}$	2.78 E-07	7.24 E-07
Uranium	5.66 E-01	$UO2^{+2}$	4.76 E-12	
Zinc	1.27 E+02	Zn^{+2}	3.88 E-09	
Hydrogen ion (from pH 7.9)		H^+	(1.37 E-11)	
Hydroxide ion (from pH)		OH^-	(7.30 E-10)	
Cation total			1.44 E-06	
Anion total			5.53 E-07	
Anion normalization factor	2.604			

Substance Formation			
Substance[c]	Percent (g/100 g)[d]	Cation out[e]	Anion out[e]
Copper(II) chloride	4.05 E-06	0.00 E+00	2.74 E-07
*Uranyl nitrate	9.37 E-08	0.00 E+00	2.38 E-08
Iron(III) fluoride	7.49 E-05	1.42 E-09	0.00 E+00
*Lead chloride	1.38 E-06	0.00 E+00	2.74 E-07
Barium chloride	4.40 E-06	0.00 E+00	2.73 E-07
*Zinc nitrate	3.68 E-05	0.00 E+00	1.99 E-08
Iron(III) chloride	7.66 E-06	0.00 E+00	2.72 E-07
*Aluminum nitrate	2.49 E-04	3.20 E-10	0.00 E+00
Magnesium chloride	1.29 E-03	7.02 E-08	0.00 E+00
Calcium tetraborate	1.77 E-05	9.26 E-07	0.00 E+00

Table 5-4. Inorganic Chemistry Report for Wastewater 2--Standby.
(sheet 2 of 2)

Substance Formation (cont.)			
Substance[c]	Percent (g/100 g)[d]	Cation out[e]	Anion out[e]
Magnesium sulfate	4.23 E-04	0.00 E+00	6.54 E-07
Sodium metasilicate	5.82 E-04	0.00 E+00	2.99 E-07
*Aluminum sulfate	9.61 E-07	0.00 E+00	6.53 E-07
Potassium metasilicate	1.49 E-04	0.00 E+00	2.79 E-07
Manganese(II) metasilicate	4.33 E-05	0.00 E+00	2.73 E-07
Strontium sulfate	1.96 E-05	0.00 E+00	6.51 E-07
Calcium sulfate	4.43 E-03	2.75 E-07	0.00 E+00

[a]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 1.00 E-20 (Eq/g)**2 divided by the hydrogen ion value (in "Ion concentration [Eq/g]").

[b]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.

[c]Substance names may include MB (monobasic), DB (diasic), TB (tribasic) to identify the equivalents of hydrogen ion that have been neutralized from polyprotic weak acids to form their conjugate bases. Substances are formulated in the order listed.

[d]The percent of the substance in the waste (g/100 g).

[e]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 "Cation Out" and "Anion Out" columns indicate the residual concentrations (in Eq/g) of each ion after a substance concentration has been calculated.

5.3.1.2.1 Acetone. Acetone was used in 221-T Building Head-End in the first-floor chemical laboratory, an area not serviced with sink or floor drains that drain to the 216-T-1 Ditch. About 230 g of acetone was used in the chemical laboratory during the first 5 mo of this 6-mo designation period. This acetone evaporated to the building ventilation system during the course of its use. Acetone was removed from the facility for the last month of the designation period, and nonlisted solvents have been substituted as an alternative. Discussions with personnel in this facility and reviews of procedures in place for disposal of unused or spent chemicals in this area provide no evidence that acetone had been disposed of as the sole active ingredient in an unused or out-of-specification chemical product or as a waste solvent or as a component of the 221-T Building Head-End wastewater.

The rejection criteria for acetone based upon blank sample analyses is 37 ppb as presented in Section 5.2 of WHC-EP-0342. Since the concentration of acetone in the only sample for which acetone was detected in this wastewater stream (17 ppb) is less than this rejection criteria, it is likely that the concentration of acetone reported in the one wastewater stream sample was a result of sample contamination. Acetone would not be considered a discarded chemical product in the wastewater 2 stream.

5.3.1.2.2 Trichloromethane. A review of T Plant chemical inventory data and discussions with T Plant personnel did not show trichloromethane to be present in any chemical compound used within the 221-T Building Head-End.

Trichloromethane was detected in all four of the wastewater 2 effluent samples taken during the designation time period. The reported values were 35, 29, 26, and 16 ppb for the samples taken October 26, November 17, November 28, and December 14, 1989, respectively. The rejection criteria for trichloromethane based on sanitary water supplied to the 221-T Building Head-End was less than 50 ppb as presented in Section 5.2 of WHC-EP-0342. As the concentrations of trichloromethane in these samples were less than the rejection criteria, trichloromethane was not considered a discarded chemical product in the wastewater 2 stream. It is likely that trichloromethane is present in this stream as a result of the presence of trichloromethane in the facility sanitary water supply.

5.3.1.1.2 Hydrogen Fluoride. A review of T Plant chemical inventory data and discussions with T Plant personnel did not show hydrogen fluoride to be present in any chemical compound used within the 221-T Building Head-End.

Fluoride was detected in all of the wastewater 2 samples taken during the designation time period. The reported values were 154, 133, 123, and 111 ppb for the effluent wastestream samples obtained October 26, November 17, November 28, and December 14, 1989, respectively. The rejection criteria for fluoride based upon sanitary water supplied to 221-T Building Head-End was less than 143 ppb as presented in Section 5.2 of WHC-EP-0342. As the concentration of fluoride in the wastewater 2 sample was less than the

rejection criteria, or very near it, it is likely that the fluoride concentration is present in the wastestream sample as a result of the presence of fluoride in the facility sanitary water supply. Data for 2724-W Laundry Sanitary Water (Table 2-2) indicate some potential higher variation in fluoride for 1989.

5.3.2 Dangerous Waste Sources

The process evaluation discussed in 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).

As discussed previously, the effluent sampling data was used to enhance the process evaluation. Acetone is the only substance identified as a potential dangerous waste source by sampling data. As discussed in Section 5.3.1.2.1, the use of acetone was limited to areas not serviced by sewer drains and discussions with T Plant personnel did not indicate any improper disposal of spent acetone to the drains. As previously discussed in Section 5.3.1.2.1, the detection of the acetone once at a very low level is not inconsistent with potential sample contamination.

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

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): toxic dangerous waste, persistent dangerous waste, or carcinogenic dangerous waste. This section includes evaluation of dangerous waste mixtures (WAC 173-303-084, "Dangerous Waste Mixtures"). A description of the methods used to test the sampling data against the criteria is contained in WHC-EP-0334 (WHC 1990c). Summaries of the methods, along with the results, are contained in the following sections.

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, "Toxic Dangerous Waste").

- 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-EP-0334 (WHC 1990c) 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 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, "Toxic Dangerous Waste Mixtures Graph."

A total of 27 substances potentially present in the 221-T Building Head-End wastewater 1 and 2 streams were determined to have toxic categories associated with them. These compounds, and their individual and sum %EC values, are listed in Tables 5-1 and 5-2.

The %EC sum for wastewater 1 is 7.7 E-07 and for wastewater 2 is 2.1 E-06. Process knowledge (Appendix Table A-1) indicates that no additional toxic materials were identified. Because these values are each less than 1.0 E-03 (i.e., 0.001%), the wastestream is not a toxic dangerous waste.

The three highest contributors to the %EC are ammonia, trichloromethane, and copper (II) chloride.

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, "Persistent Dangerous Wastes").

- 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 wt% of the contributors separately.

- Designate the wastestream as persistent if the wt% contribution of the HH is greater than 0.01%, or if the wt% contribution of the PAH is greater than 1.0%, per WAC 173-303-9907.

The HH and PAH substances for the wastewater 1 and wastewater 2 streams are listed in Tables 5-1 and 5-2. One HH substance (trichloromethane) and no PAH substances were identified for the wastewater 1 stream. One HH substance (trichloromethane) and no PAH substances were identified for the wastewater 2 stream. The total percentage of HH was 1.5 E-06 for the wastewater 1 stream and 3.3 E-06 for the wastewater 2 stream. There were no HH or PAH substances in the process batches discharged to the wastewater streams as shown in Appendix Table A-1. Because the total percentage of HH was less than 0.01%, and there was no PAH detected in the wastewater 1 or wastewater 2 streams, both are designated as 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, "Carcinogenic Dangerous Waste").

- Collect multiple grab samples of the wastestream.

- Determine the upper limit of the one-sided 90%CI for the substances of interest.

- 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-EP-0334 (WHC 1990c) and is based on an evaluation of the carcinogenic substances that 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 wt% concentration for each carcinogen.

- Sum the resulting wt% contributors.

- Designate the wastestream as carcinogenic if any of the positive carcinogens are greater than 0.01% or if the total concentration for positive and suspected carcinogens is greater than 1.0%.

The carcinogenic substances that possibly were discharged to the wastewater 1 and 2 streams, based upon the selected concentration of analytes in the effluent wastestreams, are listed in Tables 5-1 and 5-2, respectively. There was one possible substance (trichloromethane) identified for the wastewater 1 and wastewater 2 streams. The percentage concentrations of trichloromethane for wastewater 1 and wastewater 2 streams are listed in Tables 5-1 and 5-2, respectively. There were no carcinogenic substances in the process batches discharged to the wastewater streams as shown in Appendix Table A-1. The sum of the wt% for wastewater 1 is 1.5 E-06 and for wastewater 2 is 3.3 E-06. These values are well below the WAC 173-303 index threshold limit sum of 1.0%. Each wt% is well below the individual limit of less than 0.01%. The wastewater 1 and 2 streams are not designated as carcinogenic dangerous waste.

5.5 DANGEROUS WASTE CHARACTERISTICS

A waste is considered a dangerous waste if it is ignitable, corrosive, reactive, or extraction procedure toxic (WAC 173-303-090). A description of the methods used to evaluate the data in terms of these characteristics is contained in WHC-EP-0334 (WHC 1990c). Summaries of the methods, along with the results, are contained in the following sections.

5.5.1 Ignitability

A wastestream is ignitable if it has an ignitability of less than 140 °F. The ignitability of wastewater 1 and 2 stream samples are reported in Tables 5-1 and 5-2 at greater than 210 °F. The wastestreams are undesignated as a result of ignitability.

5.5.2 Corrosivity

A waste is a corrosive dangerous waste if it has a pH of less than or equal to 2.0 or greater than or equal to 12. Because the pH values observed during effluent sampling were between 6.4 and 7.9, depending upon the operating configuration chosen, and the pH values derived from process data are between 5 and 12, the wastestream is not a corrosive dangerous waste (WAC 173-303-090[6]).

5.5.3 Reactivity

An aqueous waste is reactive if the waste contains an amount of cyanide or sulfide sufficient to threaten human health or the environment (WAC 173-303-090[7]). A recent revision to SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods* (EPA 1986) provides more quantitative indicator levels for cyanide and sulfide. It states that levels of (equivalent) hydrogen cyanide less than 250 mg/kg or of (equivalent) hydrogen sulfide less than 500 mg/kg are not considered reactive.

No sulfide or cyanide was found in the wastewater 1 and 2 effluent sampling data listed in Tables 5-1 and 5-2. All effluent sampling results indicated less than 100 mg/kg in the wastewater 1 and 2 streams. No process solutions containing sulfide or cyanide were discharged to the wastewater streams as shown in Appendix Table A-1. The 221-T Building Head-End wastestream is not a reactive dangerous waste.

5.5.4 Extraction Procedure Toxicity

A waste is an Extraction Procedure Toxic dangerous waste if individual chemical analytes exceed limits of WAC 173-303-090(8)(c). All chemical anlalytes for the wastewater 1 and 2 streams were below the Extraction Procedure Toxic values as shown in Tables 5-1 and 5-2. Two Extraction Procedure Toxic listed analytes (barium and lead) of the wastewater 1 stream and five Extraction Procedure Toxic listed analytes (barium, cadmium, chromium, lead, and mercury) of the wastewater 2 stream had concentrations greater than detection limits. The concentrations of these analytes are listed in Tables 5-1 and 5-2. No process solutions containing Extraction Procedure Toxic analytes were discharged to the wastewater streams as listed in Appendix Table A-1. Because the barium concentration of 0.006 to 0.032 mg/L does not exceed the limit of 100 mg/L, the cadmium concentration of 0.003 mg/L does not exceed the limit of 1.0 mg/L, the chromium concentration of 0.01 to 0.028 mg/L does not exceed the limit of 5.00 mg/L, the lead concentration of 0.16 mg/L does not exceed the limit of 5 mg/L, and the mercury concentration of 0.0004 mg/L does not exceed the limit of 0.2 mg/L, the 221-T Building Head-End wastestream is not Extraction Procedure Toxic dangerous waste.

5.6 PROPOSED DESIGNATION

Based on the process evaluation for the October 1989 through March 1990 time period and analytical results of the effluent samples taken during this time period, it was determined that the 221-T Building Head-End wastewater stream does not contain any dangerous waste as defined in WAC 173-303-070. It is proposed that the wastewater stream not be designated as a dangerous waste.

6.0 ACTION PLAN

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

6.1 FUTURE SAMPLING

The random sampling conducted during the October 1989 to March 1990 period covered the following process configurations: (1) wastewater 1, plasma torch operation and (2) wastewater 2, plasma torch standby. The wastewater 1, plasma torch operation, configuration extended for only a total of 2 d during the October 1989 through March 1990 period. The wastewater 2, plasma torch standby, configuration extended for the remaining days or bulk of this 6-mo-long time period. Currently, it is not planned to operate the plasma torch in the future or to perform additional experiments at the 221-T Building Head-End where the T Plant would operate in the wastewater 1 configuration. If experiments were to be identified and conducted at the facility in the future, a minimum of continued effluent sampling will be recommended for the wastewater 1 configuration. Exact recommendations will depend on the actual experiments identified and each experiment conducted will be evaluated for compliance and effluent sampling requirements before authorization to conduct the experiment.

The facility will continue to operate in the wastewater 2, plasma torch standby configuration. There are no experiments identified to be performed in this configuration at this time. The building heating and ventilation system, cooling water and steam condensate, and floor drains will continue to be the sources for the wastewater 2 stream in the future. Continued sampling of the wastewater 2 stream is recommended.

6.2 TECHNICAL ISSUES

No technical issues have been identified. As described in Section 2.0, the effluent was sampled at the discharge point to the 216-T-1 Ditch. This sample point was chosen because it is a common, accessible location downstream of all the contributing wastestreams.

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APPENDIX A

PROCESS BATCH SOLUTION DISCHARGES TO 221-T BUILDING HEAD-END WASTEWATER 2 STREAM

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Table A-1. Volume, Chemical Quantity, and Dates of Process Solution Discharges. (sheet 1 of 4)

Test	Date	Process solution volume (L)	Sodium (kg)	Iodine (g)	Lithium (kg)	Sodium Hydroxide (kg)	Boric acid (kg)	EDTA (kg)
			Liquid-metal reactor tests					
AB1	October 6 to November 13, 1977	19,625	38	0	0	--	--	--
AB2	November 16, 1977, January 11, 1978	23,933	43	0	0	--	--	--
AB3	January 30 to February 1, 1978	16,726	48	0	0	--	--	--
AB4	July 2 to 8, 1981	21,158	48	0	0	--	--	--
AB5	September 21 to October 4, 1982	33,387	223	0	0	--	--	--
AB6	July 26 to August 3, 1983	21,624	205	352	0	--	--	--
AB7	September to October 1984		8	301	0	--	--	--
NT1	June 5 to 7, 1978	12,800	82	0	0	--	--	--
AC1	February 20 to 26, 1979	18,266	704	0	0	--	--	--
AC2	April 24 to May 2, 1979	35,900	(600)	0	0	--	--	--
AC3	June 11 to 20, 1979	43,400	474	596	0	--	--	--
AC4	September 18 to October 2, 1979	32,600	(400)	312	0	--	--	--
AC5	December 27 to Jan 4, 1979	25,700	1,220	0	0	--	--	--

Table A-1. Volume, Chemical Quantity, and Dates of Process Solution Discharges. (sheet 2 of 4)

Test	Date	Process solution volume (L)	Sodium (kg)	Iodine (g)	Lithium (kg)	Sodium Hydroxide (kg)	Boric acid (kg)	EDTA (kg)
AC6	March 24 to 28, 1980	21,500	1,062	0	0	--	--	--
AC7	June 18 to 25, 1980	30,000	1,210	0	0	--	--	--
AC8	September 16 to October 2, 1980	39,000	1,229	0	0	--	--	--
AC9	November 18 to December 16, 1980	34,300	887	0	0	--	--	--
AC10	February 9 to 16, 1981	19,600	1,198	0	0	--	--	--
LA4	April 14 to 21, 1981	17,300	0	0	3.6	--	--	--
LA5	June 4, 1981	20,600	0	0	6.7	--	--	--
SA1	August 2 to 24, 1984	29,700	650	0	0	--	--	--
			Light-Water Reactor Tests					
LA1	November 11 to 20, 1985	21,900	1.9	4.3	0	--	--	--
LA2	February 27 to May 27, 1986	47,600	<0.5	<1.0	0	--	--	--
LA3	April 17 to June 11, 1986		3.0	15.6	0	--	--	--
LA4	August 28 to September 17, 1986	45,300	2.9	2.3	0	--	--	--
LA5	January 28 to September 17, 1986	3,130	0	0	0	--	--	--

Table A-1. Volume, Chemical Quantity, and Dates of Process Solution Discharges. (sheet 3 of 4)

Test	Date	Process solution volume (L)	Sodium (kg)	Iodine (g)	Lithium (kg)	Sodium Hydroxide (kg)	Boric acid (kg)	EDTA (kg)
LA6	February 10 to April 16, 1987[a]	39,400	1.2	3.4	0[a]	--	--	--
			Cesium (kg)	Maganese (kg)	Iodine (kg)	Sodium Hydroxide (kg)	Boric acid (kg)	EDTA (kg)
AA1,2 22.2	April 5 to 18, 1988	17,300	2	2	0.3	13.8	--	--
AA3,4 25.2	May 16 to June 1, 1988	5,000	2	2	0.3	6.8	--	--
AA5,6 5.9	July 5 to 18, 1988	8,900	2	2	0.3	1.6	--	--
AA7,8 19.6	August 1 to 8, 1988	13,700	2	2	0.3	5.3	--	--
AA9,10 25.9	September 6 to 13, 1988	16,100	2	2	0.3	7.0	--	--
AA11/ 26.6 AA12	October 14 to November 1, 1988	16,000	2	2	0.3	7.2	--	--
AA13/ AA14	March 15 to April 7, 1989	5,900	2	2	0.3	--	--	--
AA15/ AA16	May 15 to July 12, 1989	910	2	2	0.3	--	--	--
AA17/ AA18	June 28, 1989, to June 1990	465	2	2	0.3	1.7	6.2	1.6

Table A-1. Volume, Chemical Quantity, and Dates of Process Solution Discharges. (sheet 4 of 4)

Test	Date	Process solution volume (L)	Cesium (kg)	Manganese (kg)	Iodine (kg)	Sodium Hydroxide (kg)	Boric acid (kg)	EDTA (kg)
AA19/ AA20B	July 20 to August 24, 1989	6,020	2	2	0.3	--	--	--
B 123	November 28, 1989, to January 1990[b]	93,600	0.68	1.45	0.21	12.2	--	5.5
AA21/ AA22	February 22 to March 1990	3,600	2.1	0.77	0.21	0.64	2.4	9.0

[a] 18.5 kg of zinc and 372 kg of lithium sulphate were discharged.
[b] Potassium bihydrogen phosphate (41 kg) was also discharged from this test.
EDTA = ethylenediaminetetraacetic acetate

APPENDIX B

221-T BUILDING HEAD-END WASTEWATER EFFLUENT SAMPLING DATA

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Table B-1. 221-T Building Head-End Wastewater Effluent Sampling Data. (Sheet 1 of 15)

Wastewater 1--Plasma Torch Operation				
Constituent	Sample number[a]	Sampling date	Method[c]	Result (ppb)
Aluminum	50024	12/13/85	ICP	2.55 E+02
Aluminum	50043	05/15/86	ICP	1.75 E+02
Aluminum	50115	08/21/86	ICP	2.49 E+02
Aluminum	50971	02/22/90	ICP	<1.50 E+02
Arsenic (EP Toxic)	50971E	02/22/90	ICP	<5.00 E+02
Barium	50024	12/13/85	ICP	6.00 E+00
Barium	50043	05/15/86	ICP	3.00 E+01
Barium	50115	08/21/86	ICP	3.20 E+01
Barium	50971	02/22/90	ICP	2.50 E+01
Barium (EP Toxic)	50971E	02/22/90	ICP	<1.00 E+03
Boron	50971	02/22/90	ICP	2.40 E+01
Cadmium (EP Toxic)	50971E	02/22/90	ICP	<1.00 E+02
Calcium	50024	12/13/85	ICP	1.11 E+03
Calcium	50043	05/15/86	ICP	1.84 E+04
Calcium	50115	08/21/86	ICP	1.79 E+04
Calcium	50971	02/22/90	ICP	1.78 E+04
Chloride	50043	05/15/86	IC	2.23 E+03
Chloride	50115	08/21/86	IC	3.86 E+03
Chloride	50971	02/22/90	IC	2.70 E+03
Chromium (EP Toxic)	50971E	02/22/90	ICP	<5.00 E+02
Copper	50024	12/13/85	ICP	2.26 E+02
Copper	50043	05/15/86	ICP	<1.00 E+01
Copper	50115	08/21/86	ICP	1.40 E+01
Copper	50971	02/22/90	ICP	<1.00 E+01
Fluoride	50043	05/15/86	IC	<5.00 E+02
Fluoride	50115	08/21/86	IC	<5.00 E+02
Fluoride	50971	02/22/90	IC	<5.00 E+02
Fluoride	50971	02/22/90	ISE	1.13 E+02
Iron	50024	12/13/85	ICP	1.17 E+03
Iron	50043	05/15/86	ICP	1.95 E+02
Iron	50115	08/21/86	ICP	4.08 E+02
Iron	50971	02/22/90	ICP	1.25 E+02
Lead	50024	12/13/85	ICP	1.60 E+02
Lead	50971	02/22/90	GFAA	<5.00 E+00
Lead (EP Toxic)	50971E	02/22/90	ICP	<5.00 E+02
Magnesium	50024	12/13/85	ICP	6.42 E+02
Magnesium	50043	05/15/86	ICP	4.26 E+03
Magnesium	50115	08/21/86	ICP	3.94 E+03
Magnesium	50971	02/22/90	ICP	4.10 E+03
Manganese	50024	12/13/85	ICP	6.42 E+02
Manganese	50043	05/15/86	ICP	7.20 E+01
Manganese	50115	08/21/86	ICP	3.60 E+01
Manganese	50971	02/22/90	ICP	4.50 E+01

Table B-1. 221-T Building Head-End Wastewater Effluent Sampling Data. (Sheet 2 of 15)

Wastewater 1--Plasma Torch Operation (cont.)

Constituent	Sample number[a]	Sampling date	Method[c]	Result (ppb)
Mercury (EP Toxic)	50971E	02/22/90	CVAA/M	<2.00 E+01
Nitrate	50024	12/13/85	IC	1.66 E+03
Nitrate	50043	05/15/86	IC	9.89 E+02
Nitrate	50115	08/21/86	IC	<5.00 E+02
Nitrate	50971	02/22/90	IC	<5.00 E+02
Potassium	50024	12/13/85	ICP	1.56 E+02
Potassium	50043	05/15/86	ICP	8.05 E+02
Potassium	50115	08/21/86	ICP	7.24 E+02
Potassium	50971	02/22/90	ICP	7.01 E+02
Selenium (EP Toxic)	50971E	02/22/90	ICP	<5.00 E+02
Silicon	50971	02/22/90	ICP	2.11 E+03
Silver (EP Toxic)	50971E	02/22/90	ICP	<5.00 E+02
Sodium	50024	12/13/85	ICP	2.68 E+03
Sodium	50043	05/15/86	ICP	2.55 E+03
Sodium	50115	08/21/86	ICP	2.18 E+03
Sodium	50971	02/22/90	ICP	1.93 E+03
Strontium	50043	05/15/86	ICP	<3.00 E+02
Strontium	50115	08/21/86	ICP	<3.00 E+02
Strontium	50971	02/22/90	ICP	8.70 E+01
Sulfate	50043	05/15/86	IC	1.33 E+04
Sulfate	50115	08/21/86	IC	1.16 E+04
Sulfate	50971	02/22/90	IC	1.36 E+04
Uranium	50024	12/13/85	FLUOR	6.67 E-02
Uranium	50043	05/15/86	FLUOR	5.86 E+00
Uranium	50115	08/21/86	FLUOR	2.35 E-01
Zinc	50024	01/13/85	ICP	2.16 E+02
Zinc	50043	05/15/86	ICP	8.00 E+00
Zinc	50115	08/21/86	ICP	4.00 E+01
Zinc	50971	02/22/90	ICP	2.90 E+01
Acetone	50024	12/13/85	VOA	1.60 E+01
Acetone	50971	02/22/90	VOA	<1.00 E+01
Acetone	50971	02/22/90	ABN	<1.00 E+01
Acetone	50971B	02/22/90	VOA	<1.00 E+01
Acetone	50971T	02/22/90	VOA	<1.00 E+01
Ammonia	50043	05/15/86	ISE	<5.00 E+01
Ammonia	50115	08/21/86	ISE	<5.00 E+01
Ammonia	50971	02/22/90	ISE	6.90 E+01
2-butanone	50043	05/15/86	VOA	<1.00 E+01
2-butanone	50043B	05/15/86	VOA	<1.00 E+01
2-butanone	50115	08/21/86	VOA	<1.00 E+01
2-butanone	50971	02/22/90	VOA	<1.00 E+01
2-butanone	50971B	02/22/90	VOA	1.30 E+01

Table B-1. 221-T Building Head-End Wastewater Effluent Sampling Data. (Sheet 3 of 15)

Wastewater 1--Plasma Torch Operation (cont.)

Constituent	Sample number[a]	Sampling date	Method[c]	Result (ppb)
2-butanone	50971T	02/22/90	VOA	1.30 E+01
Dichloromethane	50043	05/15/86	VOA	<1.00 E+01
Dichloromethane	50043B	05/15/86	VOA	1.90 E+02
Dichloromethane	50115	08/21/86	VOA	1.10 E+01
Dichloromethane	50971	02/22/90	VOA	<5.00 E+00
Dichloromethane	50971B	02/22/90	VOA	5.00 E+00
Dichloromethane	50971T	02/22/90	VOA	<5.00 E+00
Trichloromethane	50043	05/15/86	VOA	2.40 E+01
Trichloromethane	50043B	05/15/86	VOA	<1.00 E+01
Trichloromethane	50115	08/21/86	VOA	4.50 E+01
Trichloromethane	50971	02/22/90	VOA	1.50 E+01
Trichloromethane	50971B	02/22/90	VOA	7.00 E+00
Trichloromethane	50971T	02/22/90	VOA	<4.00 E+00
Unknown	50971	02/22/90	ABN	2.20 E+01
Alkalinity (method B)	50971	02/22/90	TITRA	5.40 E+04
Alpha activity (pCi/L)	50024	12/13/85	Alpha	4.74 E-01
Alpha activity (pCi/L)	50043	05/15/86	Alpha	9.01 E-01
Alpha activity (pCi/L)	50115	08/21/86	Alpha	3.16 E-01
Beta activity (pCi/L)	50024	12/13/85	Beta	1.76 E+01
Beta activity (pCi/L)	50043	05/15/86	Beta	8.92 E+00
Beta activity (pCi/L)	50115	08/21/86	Beta	4.47 E+00
Conductivity (μS)	50024	12/13/85	COND-Fld	1.30 E+01
Conductivity (μS)	50043	05/15/86	COND-Fld	1.50 E+01
Conductivity (μS)	50115	08/21/86	COND-Fld	1.52 E+02
Conductivity (μS)	50971	02/22/90	COND-Fld	1.49 E+02
Ignitability (°F)[b]	50971E	02/22/90	IGNIT	2.10 E+02
pH (dimensionless)	50024	12/13/85	PH-Fld	6.30 E+00
pH (dimensionless)	50043	05/15/86	PH-Fld	7.73 E+00
pH (dimensionless)	50115	08/21/86	PH-Fld	5.90 E+00
pH (dimensionless)	50971	02/22/90	PH-Fld	7.47 E+00
Reactivity cyanide (mg/kg)	50971E	02/22/90	DSPEC	<1.00 E+02
Reactivity sulfide (mg/kg)	50971E	02/22/90	DTITRA	<1.00 E+02
TDS	50971	02/22/90	TDS	7.80 E+04
Temperature (°C)	50043	05/15/86	TEMP-Fld	2.10 E+01
Temperature (°C)	50115	08/21/86	TEMP-Fld	3.62 E+01
Temperature (°C)	50971	02/22/90	TEMP-Fld	2.44 E+01
TOC	50024	12/13/85	TOC	2.03 E+03
TOC	50043	05/15/86	TOC	1.78 E+03
TOC	50115	08/21/86	TOC	1.67 E+03
TOC	50971	02/22/90	TOC	<9.00 E+02
Total carbon	50971	02/22/90	TC	1.39 E+04
TOX (as Cl)	50024	12/13/85	TOX	1.19 E+01
TOX (as Cl)	50043	05/15/86	TOX	1.18 E+02

Table B-1. 221-T Building Head-End Wastewater Effluent Sampling Data. (Sheet 4 of 15)

Constituent	Sample number[a]	Sampling date	Method[c]	Result (ppb)
Wastewater 1--Plasma Torch Operation (cont.)				
TOX (as Cl)	50115	08/21/86	TOX	1.77 E+02
TOX (as Cl)	50971	02/22/90	LTOX	8.00 E+01
Wastewater 2--Plasma Torch Standby				
Aluminum	50206	12/23/86	ICP	4.03 E+02
Aluminum	50246	03/04/87	ICP	1.23 E+03
Aluminum	50356	11/10/87	ICP	<1.50 E+02
Aluminum	50390	03/08/88	ICP	3.73 E+02
Aluminum	50733	10/26/89	ICP	1.98 E+02
Aluminum	50776	11/17/89	ICP	<1.50 E+02
Aluminum	50800	11/28/89	ICP	<1.50 E+02
Aluminum	50838	12/14/89	ICP	<1.50 E+02
Arsenic (EP Toxic)	50733E	10/26/89	ICP	<5.00 E+02
Arsenic (EP Toxic)	50776E	11/17/89	ICP	<5.00 E+02
Arsenic (EP Toxic)	50800E	11/28/89	ICP	<5.00 E+02
Arsenic (EP Toxic)	50838E	12/14/89	ICP	<5.00 E+02
Barium	50206	12/23/86	ICP	6.00 E+00
Barium	50246	03/04/87	ICP	1.10 E+01
Barium	50356	11/10/87	ICP	9.00 E+00
Barium	50390	03/08/88	ICP	1.00 E+01
Barium	50733	10/26/89	ICP	2.60 E+01
Barium	50776	11/17/89	ICP	2.90 E+01
Barium	50800	11/28/89	ICP	2.90 E+01
Barium	50838	12/14/89	ICP	2.40 E+01
Barium (EP Toxic)	50733E	10/26/89	ICP	<1.00 E+03
Barium (EP Toxic)	50776E	11/17/89	ICP	<1.00 E+03
Barium (EP Toxic)	50800E	11/28/89	ICP	<1.00 E+03
Barium (EP Toxic)	50838E	12/14/89	ICP	<1.00 E+03
Boron	50733	10/26/89	ICP	1.50 E+01
Boron	50776	11/17/89	ICP	<1.00 E+01
Boron	50800	11/28/89	ICP	1.40 E+01
Boron	50838	12/14/89	ICP	1.40 E+01
Cadmium	50206	12/23/86	ICP	3.00 E+00
Cadmium	50246	03/04/87	ICP	<2.00 E+00
Cadmium	50356	11/10/87	ICP	<2.00 E+00
Cadmium	50390	03/08/88	ICP	<2.00 E+00
Cadmium	50733	10/26/89	ICP	<2.00 E+00
Cadmium	50776	11/17/89	ICP	<2.00 E+00
Cadmium	50800	11/28/89	ICP	<2.00 E+00
Cadmium	50838	12/14/89	ICP	<2.00 E+00
Cadmium (EP Toxic)	50733E	10/26/89	ICP	<1.00 E+02
Cadmium (EP Toxic)	50776E	11/17/89	ICP	<1.00 E+02

Table B-1. 221-T Building Head-End Wastewater Effluent Sampling Data. (Sheet 5 of 15)

Wastewater 2--Plasma Torch Standby (cont.)

Constituent	Sample number[a]	Sampling date	Method[c]	Result (ppb)
Cadmium (EP Toxic)	50800E	11/28/89	ICP	<1.00 E+02
Cadmium (EP Toxic)	50838E	12/14/89	ICP	<1.00 E+02
Calcium	50206	12/23/86	ICP	1.28 E+03
Calcium	50246	03/04/87	ICP	1.37 E+03
Calcium	50356	11/10/87	ICP	1.87 E+03
Calcium	50390	03/08/88	ICP	8.19 E+02
Calcium	50733	10/26/89	ICP	1.77 E+04
Calcium	50776	11/17/89	ICP	1.85 E+04
Calcium	50800	11/28/89	ICP	1.81 E+04
Calcium	50838	12/14/89	ICP	1.52 E+04
Chloride	50206	12/23/86	IC	<5.00 E+02
Chloride	50246	03/04/87	IC	<5.00 E+02
Chloride	50356	11/10/87	IC	<5.00 E+02
Chloride	50390	03/08/88	IC	<5.00 E+02
Chloride	50733	10/26/89	IC	4.10 E+03
Chloride	50776	11/17/89	IC	3.20 E+03
Chloride	50800	11/28/89	IC	2.90 E+03
Chloride	50838	12/14/89	IC	2.80 E+03
Chromium	50206	12/23/86	ICP	<1.00 E+01
Chromium	50246	03/04/87	ICP	2.80 E+01
Chromium	50356	11/10/87	ICP	<1.00 E+01
Chromium	50390	03/08/88	ICP	1.00 E+01
Chromium	50733	10/26/89	ICP	<1.00 E+01
Chromium	50776	11/17/89	ICP	<1.00 E+01
Chromium	50800	11/28/89	ICP	<1.00 E+01
Chromium	50838	12/14/89	ICP	<1.00 E+01
Chromium (EP Toxic)	50733E	10/26/89	ICP	<5.00 E+02
Chromium (EP Toxic)	50776E	11/17/89	ICP	<5.00 E+02
Chromium (EP Toxic)	50800E	11/28/89	ICP	<5.00 E+02
Chromium (EP Toxic)	50838E	12/14/89	ICP	<5.00 E+02
Copper	50206	12/23/86	ICP	2.89 E+02
Copper	50246	03/04/87	ICP	3.04 E+02
Copper	50356	11/10/87	ICP	3.50 E+01
Copper	50390	03/08/88	ICP	7.40 E+01
Copper	50733	10/26/89	ICP	2.30 E+01
Copper	50776	11/17/89	ICP	1.10 E+01
Copper	50800	11/28/89	ICP	1.20 E+01
Copper	50838	12/14/89	ICP	1.20 E+01
Fluoride	50206	12/23/86	IC	<5.00 E+02
Fluoride	50246	03/04/87	IC	<5.00 E+02
Fluoride	50356	11/10/87	IC	<5.00 E+02
Fluoride	50356	11/10/87	ISE	3.50 E+01
Fluoride	50390	03/08/88	IC	<5.00 E+02

Table B-1. 221-T Building Head-End Wastewater Effluent Sampling Data. (Sheet 6 of 15)

Wastewater 2--Plasma Torch Standby (cont.)

Constituent	Sample number[a]	Sampling date	Method[c]	Result (ppb)
Fluoride	50390	03/08/88	ISE	<2.00 E+01
Fluoride	50733	10/26/89	IC	<5.00 E+02
Fluoride	50733	10/26/89	ISE	1.54 E+02
Fluoride	50776	11/17/89	IC	<5.00 E+02
Fluoride	50776	11/17/89	ISE	1.33 E+02
Fluoride	50800	11/28/89	IC	<5.00 E+02
Fluoride	50800	11/28/89	ISE	1.23 E+02
Fluoride	50838	12/14/89	IC	<5.00 E+02
Fluoride	50838	12/14/89	ISE	1.11 E+02
Iron	50206	12/23/86	ICP	1.36 E+03
Iron	50246	03/04/87	ICP	3.55 E+03
Iron	50356	11/10/87	ICP	2.78 E+02
Iron	50390	03/08/88	ICP	1.62 E+03
Iron	50733	10/26/89	ICP	5.01 E+02
Iron	50776	11/17/89	ICP	1.85 E+02
Iron	50800	11/28/89	ICP	2.31 E+02
Iron	50838	12/14/89	ICP	1.36 E+02
Lead	50206	12/23/86	GFAA	3.34 E+01
Lead	50246	03/04/87	GFAA	6.00 E+01
Lead	50356	11/10/87	GFAA	6.00 E+00
Lead	50390	03/08/88	GFAA	4.90 E+01
Lead	50733	10/26/89	GFAA	1.30 E+01
Lead	50776	11/17/89	GFAA	<5.00 E+00
Lead	50800	11/28/89	GFAA	<5.00 E+00
Lead	50838	12/14/89	GFAA	<5.00 E+00
Lead (EP Toxic)	50733E	10/26/89	ICP	<5.00 E+02
Lead (EP Toxic)	50776E	11/17/89	ICP	<5.00 E+02
Lead (EP Toxic)	50800E	11/28/89	ICP	<5.00 E+02
Lead (EP Toxic)	50838E	12/14/89	ICP	<5.00 E+02
Magnesium	50206	12/23/86	ICP	2.71 E+02
Magnesium	50246	03/04/87	ICP	5.96 E+02
Magnesium	50356	11/10/87	ICP	3.84 E+02
Magnesium	50390	03/08/88	ICP	2.27 E+02
Magnesium	50733	10/26/89	ICP	3.87 E+03
Magnesium	50776	11/17/89	ICP	4.20 E+03
Magnesium	50800	11/28/89	ICP	3.97 E+03
Magnesium	50838	12/14/89	ICP	3.24 E+03
Manganese	50206	12/23/86	ICP	8.40 E+01
Manganese	50246	03/04/87	ICP	2.33 E+02
Manganese	50356	11/10/87	ICP	5.40 E+01
Manganese	50390	03/08/88	ICP	5.50 E+01
Manganese	50733	10/26/89	ICP	2.28 E+02
Manganese	50776	11/17/89	ICP	1.03 E+02

Table B-1. 221-T Building Head-End Wastewater Effluent Sampling Data. (Sheet 7 of 15)

Wastewater 2--Plasma Torch Standby (cont.)

Constituent	Sample number[a]	Sampling date	Method[c]	Result (ppb)
Manganese	50800	11/28/89	ICP	9.00 E+01
Manganese	50838	12/14/89	ICP	7.20 E+01
Mercury	50206	12/23/86	CVAA	1.30 E-01
Mercury	50246	03/04/87	CVAA	4.00 E-01
Mercury	50356	11/10/87	CVAA	2.00 E-01
Mercury	50390	03/08/88	CVAA	1.00 E-01
Mercury	50733	10/26/89	CVAA	<1.00 E-01
Mercury	50776	11/17/89	CVAA	<1.00 E-01
Mercury	50800	11/28/89	CVAA	<1.00 E-01
Mercury	50838	12/14/89	CVAA	<1.00 E-01
Mercury (EP Toxic)	50733E	10/26/89	CVAA/M	<2.00 E+01
Mercury (EP Toxic)	50776E	11/17/89	CVAA/M	<2.00 E+01
Mercury (EP Toxic)	50800E	11/28/89	CVAA/M	<2.00 E+01
Mercury (EP Toxic)	50838E	12/14/89	CVAA/M	<2.00 E+01
Nickel	50206	12/23/86	ICP	<1.00 E+01
Nickel	50246	03/04/87	ICP	1.50 E+01
Nickel	50356	11/10/87	ICP	<1.00 E+01
Nickel	50390	03/08/88	ICP	<1.00 E+01
Nickel	50733	10/26/89	ICP	<1.00 E+01
Nickel	50776	11/17/89	ICP	<1.00 E+01
Nickel	50800	11/28/89	ICP	<1.00 E+01
Nickel	50838	12/14/89	ICP	<1.00 E+01
Nitrate	50206	12/23/86	IC	<5.00 E+02
Nitrate	50246	03/04/87	IC	<5.00 E+02
Nitrate	50356	11/10/87	IC	8.12 E+02
Nitrate	50390	03/08/88	IC	<5.00 E+02
Nitrate	50733	10/26/89	IC	6.00 E+02
Nitrate	50776	11/17/89	IC	<5.00 E+02
Nitrate	50800	11/28/89	IC	<5.00 E+02
Nitrate	50838	12/14/89	IC	<5.00 E+02
Potassium	50206	12/23/86	ICP	1.47 E+02
Potassium	50246	03/04/87	ICP	3.63 E+02
Potassium	50356	11/10/87	ICP	2.08 E+02
Potassium	50390	03/08/88	ICP	1.71 E+02
Potassium	50733	10/26/89	ICP	7.62 E+02
Potassium	50776	11/17/89	ICP	7.19 E+02
Potassium	50800	11/28/89	ICP	6.93 E+02
Potassium	50838	12/14/89	ICP	5.65 E+02
Selenium (EP Toxic)	50733E	10/26/89	ICP	<5.00 E+02
Selenium (EP Toxic)	50776E	11/17/89	ICP	<5.00 E+02
Selenium (EP Toxic)	50800E	11/28/89	ICP	<5.00 E+02
Selenium (EP Toxic)	50838E	12/14/89	ICP	<5.00 E+02
Silicon	50733	10/26/89	ICP	2.08 E+03

Table B-1. 221-T Building Head-End Wastewater Effluent Sampling Data. (Sheet 8 of 15)

Wastewater 2--Plasma Torch Standby (cont.)

Constituent	Sample number[a]	Sampling date	Method[c]	Result (ppb)
Silicon	50776	11/17/89	ICP	2.04 E+03
Silicon	50800	11/28/89	ICP	2.10 E+03
Silicon	50838	12/14/89	ICP	1.77 E+03
Silver (EP Toxic)	50733E	10/26/89	ICP	<5.00 E+02
Silver (EP Toxic)	50776E	11/17/89	ICP	<5.00 E+02
Silver (EP Toxic)	50800E	11/28/89	ICP	<5.00 E+02
Silver (EP Toxic)	50838E	12/14/89	ICP	<5.00 E+02
Sodium	50206	12/23/86	ICP	2.85 E+02
Sodium	50246	03/04/87	ICP	1.47 E+03
Sodium	50356	11/10/87	ICP	4.42 E+02
Sodium	50390	03/08/88	ICP	3.65 E+02
Sodium	50733	10/26/89	ICP	2.19 E+03
Sodium	50776	11/17/89	ICP	2.14 E+03
Sodium	50800	11/28/89	ICP	1.93 E+03
Sodium	50838	12/14/89	ICP	1.55 E+03
Strontium	50206	12/23/86	ICP	<3.00 E+02
Strontium	50246	03/04/87	ICP	<3.00 E+02
Strontium	50356	11/10/87	ICP	<2.00 E+01
Strontium	50390	03/08/88	ICP	<2.00 E+01
Strontium	50733	10/26/89	ICP	9.10 E+01
Strontium	50776	11/17/89	ICP	9.10 E+01
Strontium	50800	11/28/89	ICP	9.00 E+01
Strontium	50838	12/14/89	ICP	7.20 E+01
Sulfate	50206	12/23/86	IC	<5.00 E+02
Sulfate	50246	03/04/87	IC	2.06 E+03
Sulfate	50356	11/10/87	IC	1.55 E+03
Sulfate	50390	03/08/88	IC	2.33 E+03
Sulfate	50733	10/26/89	IC	1.30 E+04
Sulfate	50776	11/17/89	IC	1.27 E+04
Sulfate	50800	11/28/89	IC	1.30 E+04
Sulfate	50838	12/14/89	IC	1.01 E+04
Uranium	50206	12/23/86	FLUOR	8.59 E-02
Uranium	50246	03/04/87	FLUOR	4.18 E-01
Uranium	50356	11/10/87	FLUOR	4.63 E-02
Uranium	50390	03/08/88	FLUOR	5.03 E-01
Uranium	50733	10/26/89	FLUOR	3.44 E-01
Uranium	50776	11/17/89	FLUOR	2.37 E-01
Uranium	50800	11/28/89	FLUOR	2.56 E-01
Uranium	50838	12/14/89	FLUOR	7.08 E-01
Vanadium	50206	12/23/86	ICP	<5.00 E+00
Vanadium	50246	03/04/87	ICP	<5.00 E+00
Vanadium	50356	11/10/87	ICP	<5.00 E+00
Vanadium	50390	03/08/88	ICP	5.00 E+00

Table B-1. 221-T Building Head-End Wastewater Effluent Sampling Data. (Sheet 9 of 15)

Wastewater 2--Plasma Torch Standby (cont.)

Constituent	Sample number[a]	Sampling date	Method[c]	Result (ppb)
Vanadium	50733	10/26/89	ICP	<5.00 E+00
Vanadium	50776	11/17/89	ICP	<5.00 E+00
Vanadium	50800	11/28/89	ICP	<5.00 E+00
Vanadium	50838	12/14/89	ICP	<5.00 E+00
Zinc	50206	12/23/86	ICP	6.00 E+01
Zinc	50246	03/04/87	ICP	1.60 E+02
Zinc	50356	11/10/87	ICP	1.40 E+03
Zinc	50390	03/08/88	ICP	1.52 E+03
Zinc	50733	10/26/89	ICP	1.82 E+02
Zinc	50776	11/17/89	ICP	1.10 E+01
Zinc	50800	11/28/89	ICP	2.10 E+01
Zinc	50838	12/14/89	ICP	2.70 E+01
Acetone	50733	10/26/89	VOA	1.70 E+01
Acetone	50733	10/26/89	ABN	<1.00 E+01
Acetone	50733B	10/26/89	VOA	<1.00 E+01
Acetone	50776	11/17/89	VOA	<1.00 E+01
Acetone	50776	11/17/89	ABN	<1.00 E+01
Acetone	50776B	11/17/89	VOA	<1.00 E+01
Acetone	50800	11/28/89	VOA	<1.00 E+01
Acetone	50800	11/28/89	ABN	<1.00 E+01
Acetone	50800B	11/28/89	VOA	<1.00 E+01
Acetone	50800T	11/28/89	VOA	<1.00 E+01
Acetone	50838	12/14/89	VOA	<1.00 E+01
Acetone	50838	12/14/89	ABN	<1.00 E+01
Acetone	50838B	12/14/89	VOA	<1.00 E+01
Acetone	50838T	12/14/89	VOA	<1.00 E+01
Ammonia	50206	12/23/86	ISE	1.28 E+02
Ammonia	50246	03/04/87	ISE	7.00 E+01
Ammonia	50356	11/10/87	ISE	1.33 E+02
Ammonia	50390	03/08/88	ISE	<5.00 E+01
Ammonia	50733	10/26/89	ISE	5.60 E+01
Ammonia	50776	11/17/89	ISE	<5.00 E+01
Ammonia	50800	11/28/89	ISE	<5.00 E+01
Ammonia	50838	12/14/89	ISE	<5.00 E+01
2-butanone	50206	12/23/86	VOA	<1.00 E+01
2-butanone	50206B	12/23/86	VOA	<1.00 E+01
2-butanone	50246	03/04/87	VOA	<1.00 E+01
2-butanone	50246B	03/04/87	VOA	<1.00 E+01
2-butanone	50356	11/10/87	VOA	<1.00 E+01
2-butanone	50356B	11/10/87	VOA	<1.00 E+01
2-butanone	50390	03/08/88	VOA	<1.00 E+01
2-butanone	50390B	03/08/88	VOA	<1.00 E+01
2-butanone	50733	10/26/89	VOA	<1.00 E+01

Table B-1. 221-T Building Head-End Wastewater Effluent Sampling Data. (Sheet 10 of 15)

Wastewater 2--Plasma Torch Standby (cont.)

Constituent	Sample number[a]	Sampling date	Method[c]	Result (ppb)
2-butanone	50733B	10/26/89	VOA	<1.00 E+01
2-butanone	50776	11/17/89	VOA	<1.00 E+01
2-butanone	50776B	11/17/89	VOA	<1.00 E+01
2-butanone	50800	11/28/89	VOA	<1.00 E+01
2-butanone	50800B	11/28/89	VOA	<1.00 E+01
2-butanone	50800T	11/28/89	VOA	<1.00 E+01
2-butanone	50838	12/14/89	VOA	<1.00 E+01
2-butanone	50838B	12/14/89	VOA	1.40 E+01
2-butanone	50838T	12/14/89	VOA	<1.00 E+01
2-chloronapthalene	50206	12/23/86	ABN	3.10 E+01
2-chloronapthalene	50246	03/04/87	ABN	<1.00 E+01
2-chloronapthalene	50356	11/10/87	ABN	<1.00 E+01
2-chloronapthalene	50390	03/08/88	ABN	<1.00 E+01
2-chloronapthalene	50733	10/26/89	ABN	<1.00 E+01
2-chloronapthalene	50776	11/17/89	ABN	<1.00 E+01
2-chloronapthalene	50800	11/28/89	ABN	<1.00 E+01
2-chloronapthalene	50838	12/14/89	ABN	<1.00 E+01
Dichloromethane	50206	12/23/86	VOA	<1.00 E+01
Dichloromethane	50206B	12/23/86	VOA	<1.00 E+01
Dichloromethane	50246	03/04/87	VOA	<1.00 E+01
Dichloromethane	50246B	03/04/87	VOA	4.70 E+01
Dichloromethane	50356	11/10/87	VOA	<6.00 E+00
Dichloromethane	50356B	11/10/87	VOA	<5.00 E+00
Dichloromethane	50390	03/08/88	VOA	<1.00 E+01
Dichloromethane	50390B	03/08/88	VOA	<1.00 E+01
Dichloromethane	50733	10/26/89	VOA	<5.00 E+00
Dichloromethane	50733B	10/26/89	VOA	5.00 E+00
Dichloromethane	50776	11/17/89	VOA	<5.00 E+00
Dichloromethane	50776B	11/17/89	VOA	<5.00 E+00
Dichloromethane	50800	11/28/89	VOA	<5.00 E+00
Dichloromethane	50800B	11/28/89	VOA	6.00 E+00
Dichloromethane	50800T	11/28/89	VOA	5.00 E+00
Dichloromethane	50838	12/14/89	VOA	<5.00 E+00
Dichloromethane	50838B	12/14/89	VOA	6.00 E+00
Dichloromethane	50838T	12/14/89	VOA	1.40 E+03
1,1,1-trichloromethane	50206	12/23/86	VOA	<1.00 E+01
1,1,1-trichloromethane	50206B	12/23/86	VOA	<1.00 E+01
1,1,1-trichloromethane	50246	03/04/87	VOA	<1.00 E+01
1,1,1-trichloromethane	50246B	03/04/87	VOA	<1.00 E+01
1,1,1-trichloromethane	50356	11/10/87	VOA	<5.00 E+00
1,1,1-trichloromethane	50356B	11/10/87	VOA	1.30 E+01
1,1,1-trichloromethane	50390	03/08/88	VOA	<5.00 E+00
1,1,1-trichloromethane	50390B	03/08/88	VOA	<5.00 E+00

Table B-1. 221-T Building Head-End Wastewater Effluent Sampling Data. (Sheet 11 of 15)

Wastewater 2--Plasma Torch Standby (cont.)

Constituent	Sample number[a]	Sampling date	Method[c]	Result (ppb)
1,1,1-trichloromethane	50733	10/26/89	VOA	<5.00 E+00
1,1,1-trichloromethane	50733B	10/26/89	VOA	<5.00 E+00
1,1,1-trichloromethane	50776	11/17/89	VOA	<5.00 E+00
1,1,1-trichloromethane	50776B	11/17/89	VOA	<5.00 E+00
1,1,1-trichloromethane	50800	11/28/89	VOA	<5.00 E+00
1,1,1-trichloromethane	50800B	11/28/89	VOA	<5.00 E+00
1,1,1-trichloromethane	50800T	11/28/89	VOA	<5.00 E+00
1,1,1-trichloromethane	50838	12/14/89	VOA	<5.00 E+00
1,1,1-trichloromethane	50838B	12/14/89	VOA	<5.00 E+00
1,1,1-trichloromethane	50838T	12/14/89	VOA	<5.00 E+00
Trichloromethane	50206	12/23/86	VOA	<1.00 E+01
Trichloromethane	50206B	12/23/86	VOA	<1.00 E+01
Trichloromethane	50246	03/04/87	VOA	<1.00 E+01
Trichloromethane	50246B	03/04/87	VOA	<1.00 E+01
Trichloromethane	50356	11/10/87	VOA	<5.00 E+00
Trichloromethane	50356B	11/10/87	VOA	1.70 E+01
Trichloromethane	50390	03/08/88	VOA	<5.00 E+00
Trichloromethane	50390B	03/08/88	VOA	<5.00 E+00
Trichloromethane	50733	10/26/89	VOA	3.50 E+01
Trichloromethane	50733B	10/26/89	VOA	<5.00 E+00
Trichloromethane	50776	11/17/89	VOA	2.90 E+01
Trichloromethane	50776B	11/17/89	VOA	<4.00 E+00
Trichloromethane	50800	11/28/89	VOA	2.60 E+01
Trichloromethane	50800B	11/28/89	VOA	1.10 E+01
Trichloromethane	50800T	11/28/89	VOA	8.00 E+00
Trichloromethane	50838	12/14/89	VOA	1.60 E+01
Trichloromethane	50838B	12/14/89	VOA	<5.00 E+00
Trichloromethane	50838T	12/14/89	VOA	<5.00 E+00
Unknown	50776	11/17/89	ABN	4.50 E+01
Alkalinity (method B)	50733	10/26/89	TITRA	5.00 E+04
Alkalinity (method B)	50776	11/17/89	TITRA	5.20 E+04
Alkalinity (method B)	50800	11/28/89	TITRA	5.20 E+04
Alkalinity (method B)	50838	12/14/89	TITRA	4.10 E+04
Alpha activity (pCi/L)	50246	03/04/87	Alpha	2.71 E-01
Alpha activity (pCi/L)	50356	11/10/87	Alpha	8.32 E-02
Alpha activity (pCi/L)	50390	03/08/88	Alpha	7.84 E-02
Alpha activity (pCi/L)	50733	10/26/89	Alpha	<1.20 E-01
Alpha activity (pCi/L)	50776	11/17/89	Alpha	<3.91 E-01
Alpha activity (pCi/L)	50800	11/28/89	Alpha	1.64 E+00
Alpha activity (pCi/L)	50838	12/14/89	Alpha	8.98 E-01
Beta activity (pCi/L)	50206	12/23/86	Beta	7.87 E+00
Beta activity (pCi/L)	50246	03/04/87	Beta	2.27 E+01
Beta activity (pCi/L)	50356	11/10/87	Beta	1.26 E+01

Table B-1. 221-T Building Head-End Wastewater Effluent Sampling Data. (Sheet 12 of 15)

Wastewater 2--Plasma Torch Standby (cont.)

Constituent	Sample number[a]	Sampling date	Method[c]	Result (ppb)
Beta activity (pCi/L)	50390	03/08/88	Beta	1.89 E+01
Beta activity (pCi/L)	50776	11/17/89	Beta	3.40 E+00
Beta activity (pCi/L)	50800	11/28/89	Beta	2.41 E+00
Beta activity (pCi/L)	50838	12/14/89	Beta	5.53 E+00
Conductivity (µS)	50206	12/23/86	COND-Fld	1.00 E+01
Conductivity (µS)	50246	03/04/87	COND-Fld	1.70 E+01
Conductivity (µS)	50356	11/10/87	COND-Fld	2.40 E+01
Conductivity (µS)	50390	03/08/88	COND-Fld	7.20 E+01
Conductivity (µS)	50733	10/26/89	COND-Fld	1.53 E+02
Conductivity (µS)	50776	11/17/89	COND-Fld	1.66 E+02
Conductivity (µS)	50800	11/28/89	COND-Fld	1.69 E+02
Conductivity (µS)	50838	12/14/89	COND-Fld	1.65 E+02
Ignitability (°F)[b]	50733E	10/26/89	IGNIT	2.12 E+02
Ignitability (°F)[b]	50776E	11/17/89	IGNIT	2.10 E+02
Ignitability (°F)[b]	50800E	11/28/89	IGNIT	2.12 E+02
Ignitability (°F)[b]	50838E	12/14/89	IGNIT	2.12 E+02
pH (dimensionless)	50206	12/23/86	PH-Fld	8.53 E+00
pH (dimensionless)	50246	03/04/87	PH-Fld	5.54 E+00
pH (dimensionless)	50356	11/10/87	PH-Fld	7.68 E+00
pH (dimensionless)	50390	03/08/88	PH-Fld	6.15 E+00
pH (dimensionless)	50733	10/26/89	PH-Fld	7.60 E+00
pH (dimensionless)	50776	11/17/89	PH-Fld	6.47 E+00
pH (dimensionless)	50800	11/28/89	PH-Fld	7.60 E+00
pH (dimensionless)	50838	12/14/89	PH-Fld	7.80 E+00
Reactivity cyanide (mg/kg)	50733E	10/26/89	DSPEC	<1.00 E+02
Reactivity cyanide (mg/kg)	50776E	11/17/89	DSPEC	<1.00 E+02
Reactivity cyanide (mg/kg)	50800E	11/28/89	DSPEC	<1.00 E+02
Reactivity cyanide (mg/kg)	50838E	12/14/89	DSPEC	<1.00 E+02
Reactivity sulfide (mg/kg)	50733E	10/26/89	DTITRA	<1.00 E+02
Reactivity sulfide (mg/kg)	50776E	11/17/89	DTITRA	<1.00 E+02
Reactivity sulfide (mg/kg)	50800E	11/28/89	DTITRA	<1.00 E+02
Reactivity sulfide (mg/kg)	50838E	12/14/89	DTITRA	<1.00 E+02
TDS	50733	10/26/89	TDS	9.50 E+03
TDS	50776	11/17/89	TDS	6.80 E+04
TDS	50800	11/28/89	TDS	9.20 E+04
TDS	50838	12/14/89	TDS	5.90 E+04
Temperature (°C)	50206	12/23/86	TEMP-Fld	2.24 E+01
Temperature (°C)	50246	03/04/87	TEMP-Fld	1.90 E+01
Temperature (°C)	50356	11/10/87	TEMP-Fld	1.50 E+01
Temperature (°C)	50390	03/08/88	TEMP-Fld	1.88 E+01
Temperature (°C)	50733	10/26/89	TEMP-Fld	2.89 E+01
Temperature (°C)	50776	11/17/89	TEMP-Fld	1.97 E+01
Temperature (°C)	50800	11/28/89	TEMP-Fld	2.76 E+01

Table B-1. 221-T Building Head-End Wastewater Effluent Sampling Data. (Sheet 13 of 15)

Wastewater 2--Plasma Torch Standby (cont.)

Constituent	Sample number[a]	Sampling date	Method[c]	Result (ppb)
Temperature (°C)	50838	12/14/89	TEMP-Fld	4.76 E+01
TOC	50206	12/23/86	TOC	1.05 E+03
TOC	50246	03/04/87	TOC	2.34 E+03
TOC	50356	11/10/87	TOC	<6.02 E+02
TOC	50390	03/08/88	TOC	<9.05 E+02
TOC	50733	10/26/89	TOC	<1.70 E+03
TOC	50776	11/17/89	TOC	<1.20 E+03
TOC	50800	11/28/89	TOC	<1.10 E+03
TOC	50838	12/14/89	TOC	<1.00 E+03
Total carbon	50733	10/26/89	TC	1.35 E+04
Total carbon	50776	11/17/89	TC	1.35 E+04
Total carbon	50800	11/28/89	TC	1.38 E+04
Total carbon	50838	12/14/89	TC	1.09 E+04
TOX (as Cl)	50206	12/23/86	LTOX	3.02 E+01
TOX (as Cl)	50246	03/04/87	LTOX	<2.00 E+01
TOX (as Cl)	50356	11/10/87	LTOX	<8.85 E+00
TOX (as Cl)	50390	03/08/88	LTOX	<1.50 E+00
TOX (as Cl)	50733	10/26/89	LTOX	2.04 E+02
TOX (as Cl)	50776	11/17/89	LTOX	1.82 E+02
TOX (as Cl)	50800	11/28/89	LTOX	1.54 E+02
TOX (as Cl)	50838	12/14/89	LTOX	2.55 E+02
^{60}Co (pCi/L)	50733	10/26/89	GEA	<2.77 E-01
^{60}Co (pCi/L)	50776	11/17/89	GEA	2.83 E+00
^{60}Co (pCi/L)	50800	11/28/89	GEA	<9.74 E-01
^{60}Co (pCi/L)	50838	12/14/89	GEA	<4.60 E-01
^{137}Cs (pCi/L)	50733	10/26/89	GEA	<3.93 E-01
^{137}Cs (pCi/L)	50776	11/17/89	GEA	<8.32 E-01
^{137}Cs (pCi/L)	50800	11/28/89	GEA	<6.76 E-01
^{137}Cs (pCi/L)	50838	12/14/89	GEA	3.46 E+00
Radium total (pCi/L)	50733	10/26/89	Alpha-Ra	<6.09 E-02
Radium total (pCi/L)	50776	11/17/89	Alpha-Ra	3.10 E-01
Radium total (pCi/L)	50800	11/28/89	Alpha-Ra	<6.59 E-02
Radium total (pCi/L)	50838	12/14/89	Alpha-Ra	<9.77 E-02

NOTE: Measurements are in ppb unless noted.
AA = atomic absorption spectroscopy
EP = Extraction Procedure Toxicity Test
GC = gas chromatography
ICP = inductively-coupled plasma spectroscopy
MS = mass spectrometry
TDS = total dissolved solids
TOC = total organic carbon
TOX = total organic halides

Table B-1. 221-T Building Head-End Wastewater Effluent Sampling Data. (Sheet 14 of 15)

[a] See Table 3-1 for corresponding chain-of-custody number and explanations of sample number suffix.

[b] Ignitability is the maximum temperature of the test (no sample actually ignited).

[c] Methods code:

Code	Analytical Method	Reference[d]
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

Table B-1. 221-T Building Head-End Wastewater Effluent Sampling Data. (Sheet 15 of 15)

Code	Analytical Method	Reference[d]
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

[d]Reference:

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.

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