WHC-EP-0342
Addendum 10

T Plant 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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T Plant Wastewater Stream-Specific Report

K. A. Ayster

Date Published
August 1990

Prepared for the U.S. Department of Energy
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T PLANT WASTEWATER STREAM-SPECIFIC REPORT

K. A. Ayster

ABSTRACT

The proposed wastestream designation for the T Plant wastewater 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.*

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

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EXECUTIVE SUMMARY

The proposed wastestream designation for the T Plant wastewater stream is that this stream is not a dangerous waste, pursuant to the Washington (State) Administrative Code (WAC) 173-303, *Dangerous Waste Regulations*.* A combination of process knowledge and present sampling data was used to determine if the effluent contains a listed dangerous waste (WAC 173-303-080). Sampling data alone is compared to the dangerous waste criteria (WAC 173-303-100) and dangerous waste characteristics (WAC 173-303-090).

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

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LIST OF TERMS

90%CI	90% confidence interval
CH-TRU	contact-handled transuranic
conc	concentration
DCG	derived concentration guide
DWS	drinking water standard
DOE	U.S. Department of Energy
EC	equivalent concentration
Ecology	Washington State Department of Ecology
EP	extraction procedure
EPA	U.S. Environmental Protection Agency
HH	halogenated hydrocarbon
MCL	maximum contamination level
MSDS	Material Safety Data Sheet
NDA	nondestructive assay
NDE	nondestructive examination
SC	specific carcinogen
TRU	transuranic
TRUSAF	Transuranic Waste Storage and Assay Facility
WAC	Washington (State) Administrative Code
WIPP	Waste Isolation Pilot Plant

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T PLANT 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 1990d), 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 (Ecology 1989), *Dangerous Waste Regulations*: process data, sampling data, and dangerous waste regulations.

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

1.2 APPROACH

This report characterizes the 200 West Area T Plant wastewater stream in sufficient detail so that a wastestream designation, in accordance with WAC 173-303, can be proposed, and so that an assessment of the relative effluent priorities can be made with regard to the need for treatment or alternative disposal practices.

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

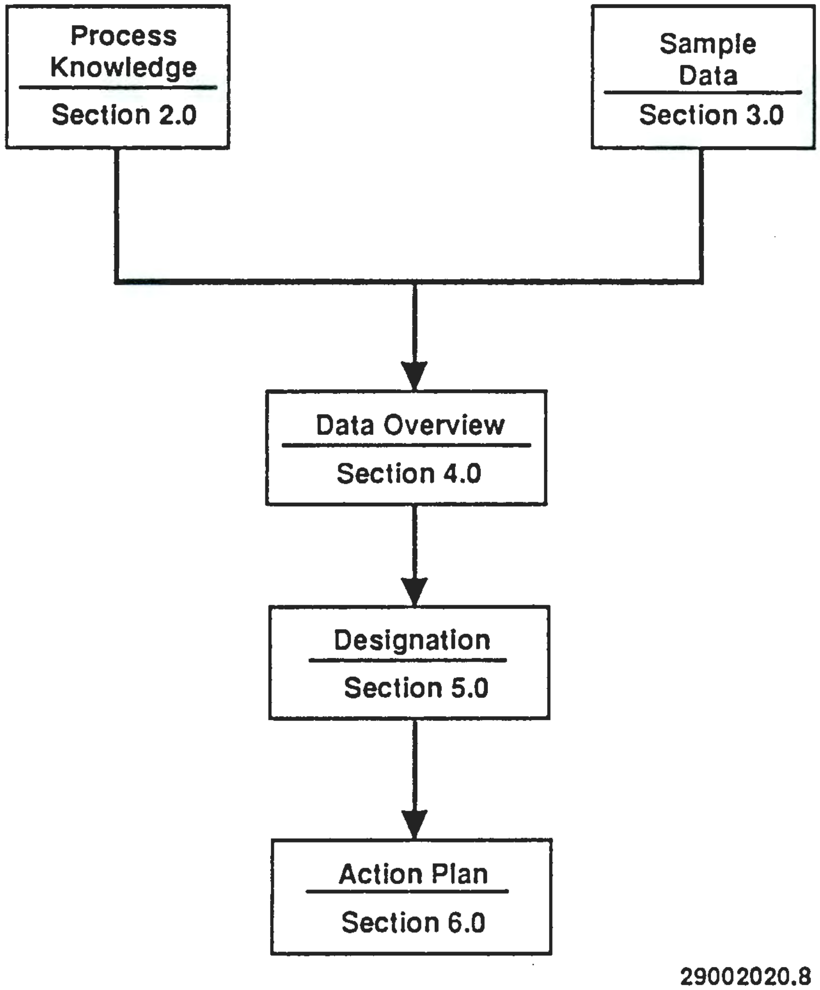
1. Describe both process and sampling data (Sections 2.0 and 3.0, respectively).

2. Compare the data (Section 4.0).

Table 1-1. Stream-Specific Characterization Reports.

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

Figure 1-1. Characterization Strategy.



3. Propose a designation (Section 5.0).

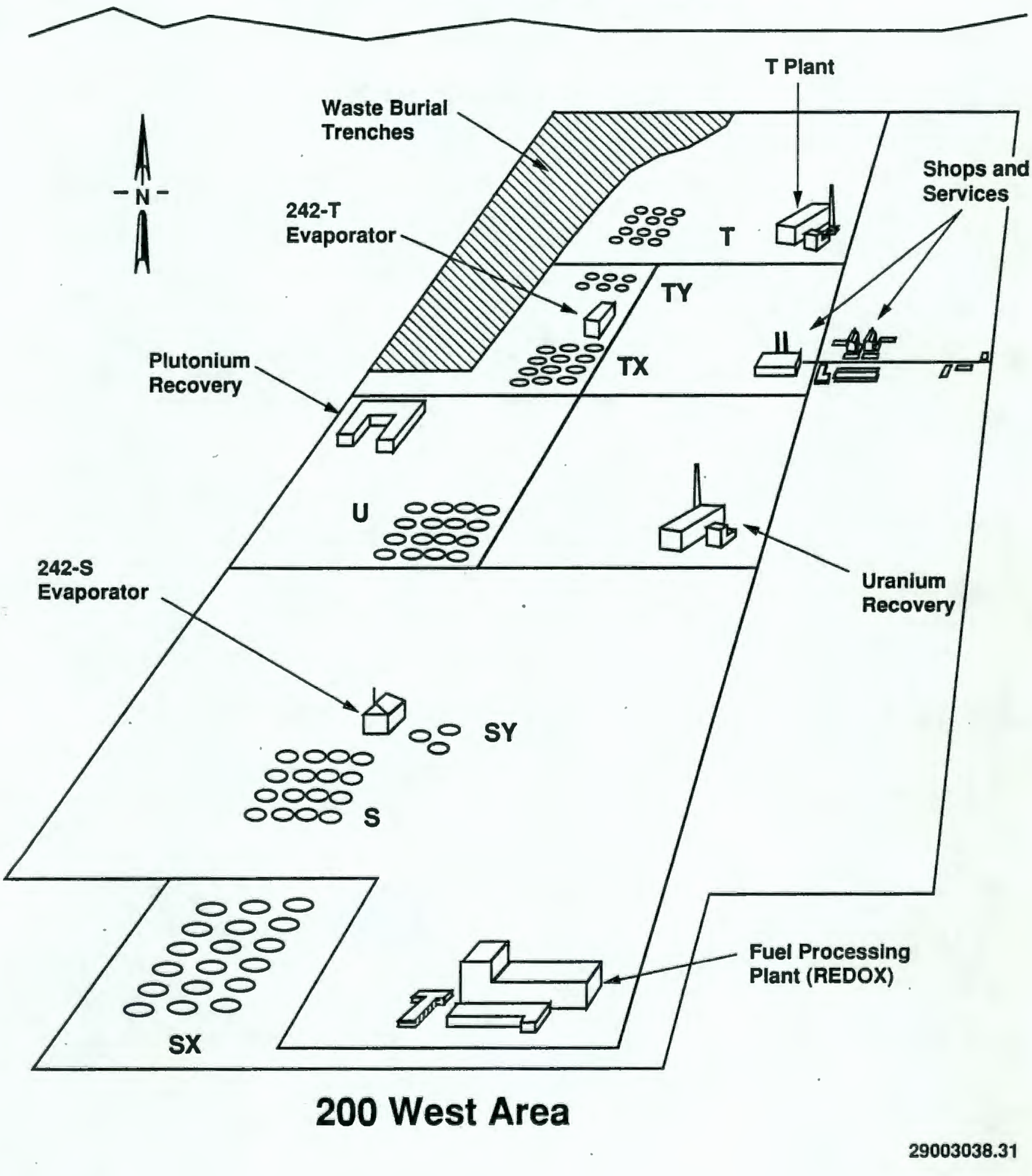
4. Design an action plan, if needed, to obtain additional characterization data (Section 6.0).

1.3 SCOPE

This report characterizes the current T Plant wastewater (excluding discharge from the headend section which is discussed in Addendum 32, *T Plant Laboratory Wastewater*) that enters the soil column at the 216-T-4-2 Ditch. Presently, the only routine effluent entering this ditch comes from T Plant (see Figure 1-2). This report does not address any other wastestream leaving the T Plant, such as solid, gaseous, or sanitary wastes. New data will be used for all evaluations (designation, "loadings", on maximum contamination level [MCL] comparisons, etc).

Historical changes, process campaign changes, and sampling data are considered only if relevant to the characterization of the wastestream as it presently exists. Future configurational and process modifications are addressed only if they will significantly alter the present effluent. The T Plant complex is currently operating as a decontamination and decommissioning facility. This report covers the period from May 1972, when the 216-T-4-2 Ditch was first used, through the end of T Plant's present mission.

Figure 1-2. T Plant Location in 200 West Area.



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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 200 West Area T Plant wastewater stream. 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 and concentration of the constituents of each contributor.

This approach is illustrated in Figure 2-1.

2.1 PHYSICAL LAYOUT

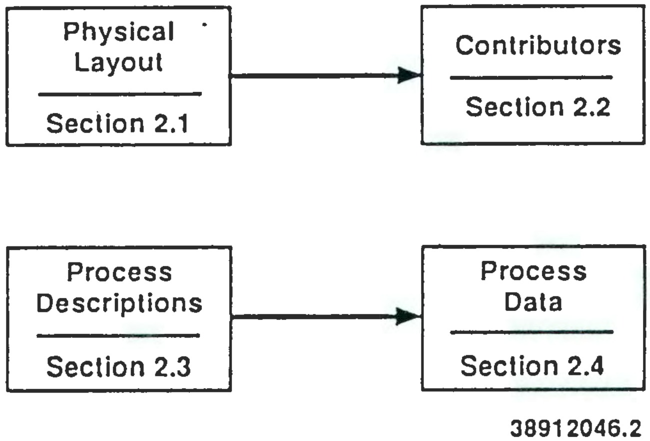
The T Plant complex is located in the 200 West Area (see Figure 2-2). Built in 1944, T Plant was used to extract plutonium and uranium from spent reactor fuel using the bismuth phosphate separation process. The bismuth phosphate process was shut down in 1956. The T Plant complex was converted in 1957 to a decontamination and equipment refurbishment facility. Most of the original process equipment has been removed. The T Plant complex is composed of the buildings shown in Table 2-1 (see also Figure 2-2).

The 211-T Building is the bulk chemical storage area for the T Plant complex. There are four storage tanks no longer in service and scheduled to be decommissioned within the 211-T Area; two 17,000-gal-capacity sodium hydroxide tanks, a 17,000-gal-capacity tank that was used to store low-level radioactive liquid waste, and a 15,000-gal-capacity tank. In addition, there is a new 8,000-gal capacity sodium hydroxide tank with secondary containment.

The 221-T Building provides services in radioactive decontamination, reclamation, and decommissioning of process equipment. The 221-T Building is the original bismuth phosphate separation plant built in 1944. The building was shut down in 1956 and converted to a decontamination facility in 1957. The building is made of reinforced concrete and is 850-ft-long by 68-ft-wide by 74-ft-high and covers an area of 57,800 ft^2. The building consists of a canyon, three galleries (operating, pipe, and electrical), one craneway, and a "headend" facility.

The 221-TA Building contains two ventilation supply fans for the 221-T Building canyon. A preheater, air filter, evaporative cooler, and reheat coil are also located in the 221-TA Building to condition the air supply flowing into the canyon.

Figure 2-1. Process Description Strategy.



9 1 1 1 8 9 5 0 9 4 3

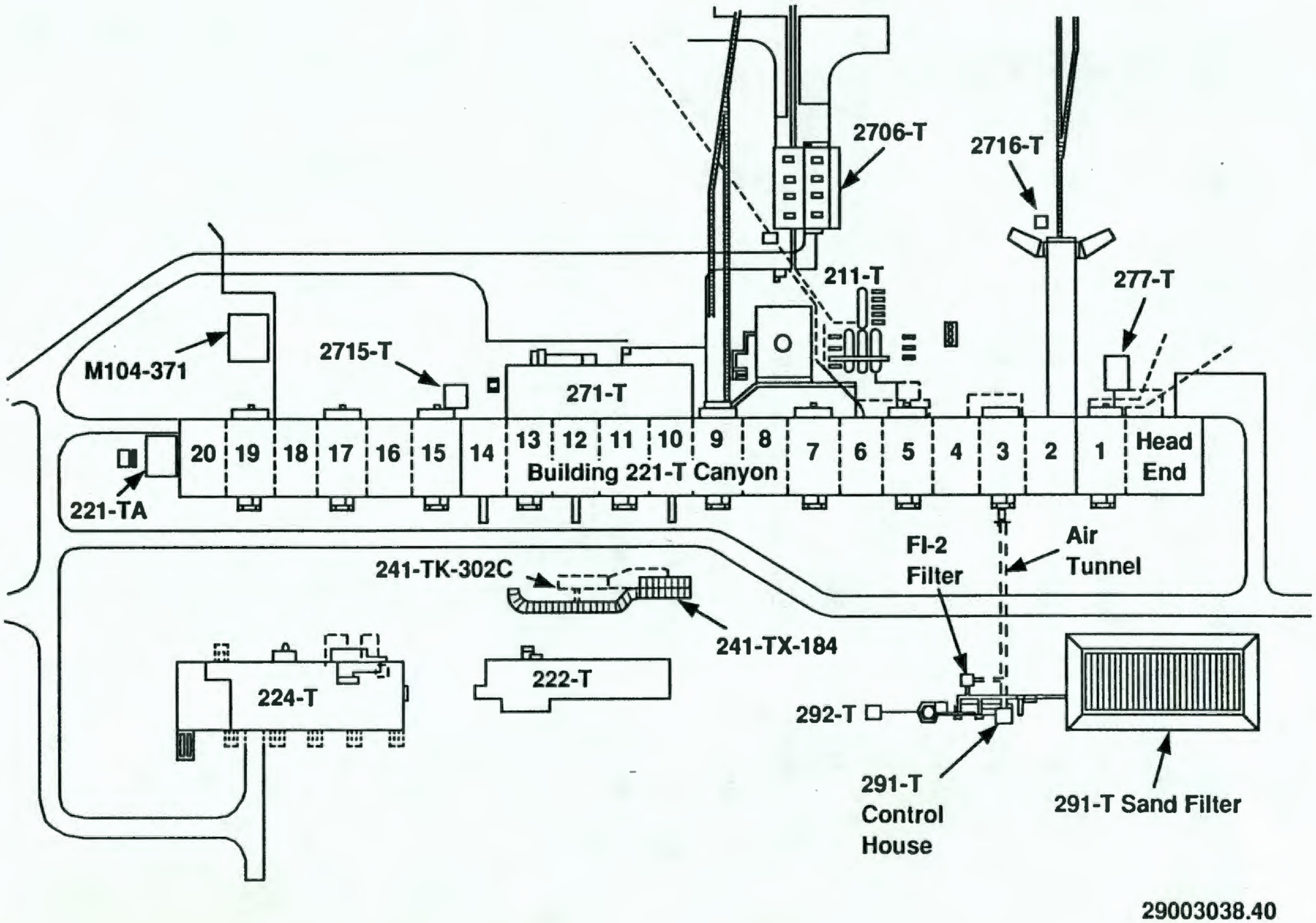


Figure 2-2. Aerial View of the T Plant Complex.

Table 2-1. The T Plant Complex.

Building	Function
211-T*	T Plant chemical storage area
221-T	Equipment decontamination facility
221-TA	Fan house
222-T*	Offices
224-T	Transuranic storage and assay facility
2706-T*	Equipment decontamination
271-T	Shop and offices
2715-T*	Paint storage
2716-T*	Storage
277-T*	Shop and storage building
291-T	Sand filter and stack
292-T*	FP release laboratory
M104-371*	Womens' SWP change trailer

*Does not discharge to the chemical sewer and will not be discussed further in this report.

Originally, the 224-T Building purified plutonium nitrate by the lanthanum fluoride process. The building remained inactive following phase-out of the bismuth phosphate plants until the early 1970's. At that time, the building was modified for storage of plutonium scrap in liquid and solid forms. In 1984, the 224-T Building was targeted to house the transuranic waste storage and assay operation. The removal of plutonium scrap from the 224-T Building was completed in 1985, and the building was officially designated as the Transuranic Waste Storage and Assay Facility (TRUSAF). The TRUSAF operation consists of nondestructive assay (NDA) and nondestructive examination (NDE) of newly generated contact-handled transuranic (CH-TRU) solid waste. These analyses are used to overview sealed, certified CH-TRU solid waste packages, in order to verify general compliance with the Waste Isolation Pilot Plant Waste Acceptance Criteria requirements. All waste packages determined to be acceptable are placed in controlled designated storage areas.

The 271-T Building is the original bismuth phosphate office and support facility and is situated adjacent to the 221-T Building. The building is 160 ft long, 48 ft wide, and 54 ft high. The building is constructed of 1-ft-thick concrete blocks with reinforcing steel beams. The building consists of three floors and a basement. The basement contains the compressor room, fan room for ventilation, machine shops, riggers loft, service elevator, and various offices and store rooms. The first floor contains a chemical makeup room where two storage tanks are located, maintenance shop, and a health physics office. The second floor consists mainly of offices, a lunchroom, restrooms, and the service elevator. The third floor consists of offices, restrooms, an elevator, and storage tanks for nitric acid which are now unused. The third floor also provides access into the craneway and crane cab.

The 291-T Building houses the control room that serves the 291-T exhaust ventilation. The concrete building is 19 ft long by 17 ft wide by 11 ft high.

2.2 CONTRIBUTORS

There are 13 potential contributors to the T Plant wastewater chemical sewer wastestream. Four of the contributors originate from the headend section of the T Plant complex and are not considered in this report, but are discussed in Addendum 32, *T Plant Laboratory Wastewater*. The remaining nine contributors are listed in Table 2-2.

Of the nine potential contributors, three are infrequent sources to the wastestream. These infrequent sources are the floor drains that act as a source only when maintenance chemicals are washed down the drain during cleanup.

Of the nine potential contributors, six are frequent sources to the wastestream. These streams consist of steam condensate, cooling water, and heating coil water.

Table 2-2. List of Potential Contributors (see RHO 1987).

Location	Potential contributor	Estimated (gal/day)
221-T	Electrical gallery sump	0-20
221-T	Pipe and operating gallery floor drains	0-30
221-T	Pipe gallery steam condensate	0-100*
221-TA	Steam condensate	0-20*
224-T	Steam condensate	0-500*
271-T	Compressor cooling water	8,600*
271-T	Floor drains	0-100
271-T	Steam condensate	1,900-2,000*
291-T	Heating coil	2,300-2,500*

*Routine Contributors
NOTE: Nonroutine contributors do not discharge to the chemical sewer every day under normal operating conditions.

Each potential contributor will be discussed separately, with wastestream schematics shown in Figures 2-3 and 2-4, and an overall piping diagram shown in Appendix A, Figure A-1.

Building 221-T effluents are discharged to two manholes. The headers of Sections 3 to 13 empty to manhole 1. The headers of Sections 14 through 18 and Section 20 discharge into manhole 3. There are floor drains located throughout the operating and pipe galleries which collect safety shower water and nonradioactive liquids used during housekeeping and maintenance operations (See Material Data Sheet Inventory, Table A-4). The electrical gallery is provided with sumps located at each of the 18 sections. These sumps collect liquids collected during housekeeping and maintenance activities. These sumps have no drains, therefore, when a sump is full, the sump is sampled and analyzed to ensure that the pH is greater than 2 and less than 12.5. If the solution meets these discharge specifications, a portable sump pump is used to transfer the solution to the chemical sewer at Section 12. If the solution does not meet the pH discharge specifications, it is neutralized until the pH is between 2 and 12.5 and then transferred to the chemical sewer. This is the only monitoring (pH, flowrate, or otherwise) of the T Plant Wastestream that takes place at this time. Steam condensate from steam lines in the pipe galleries leaves the building at Section 15.

Steam condensate from the preheater and reheat coil in the 221-TA Building drain to manhole 5.

The 224-T Building has two outlets from the building to the chemical sewer. Steam condensate and cooling water from the fan room on the first floor empty into manhole 5. Steam condensate and overflow from the hot water tank empty to manhole 6.

The 271-T Building discharges to manholes 2 and 3. Manhole 2 receives effluent from the floor drains on the first and third floor. Manhole 3 receives effluent from a sump that collects effluent from all the floor drains and sinks in the basement, cooling water from air compressors (see Appendix A, Table A-4) and the heating, ventilation, and air conditioning unit, as well as the steam condensate from the second floor.

The 291-T Stack drains effluents from the bottom of the stack and steam condensate from the heating coil for the FI-2 filter unit into manhole 8.

Diagrams for the 207-T Retention Basin and the 216-T-4-2 Ditch are shown in Appendix A, Figures A-2 and A-3.

2.3 PROCESS DESCRIPTIONS

The process is discussed by considering the present, past, and future activities.

Figure 2-3. Wastewater Flow Schematic.

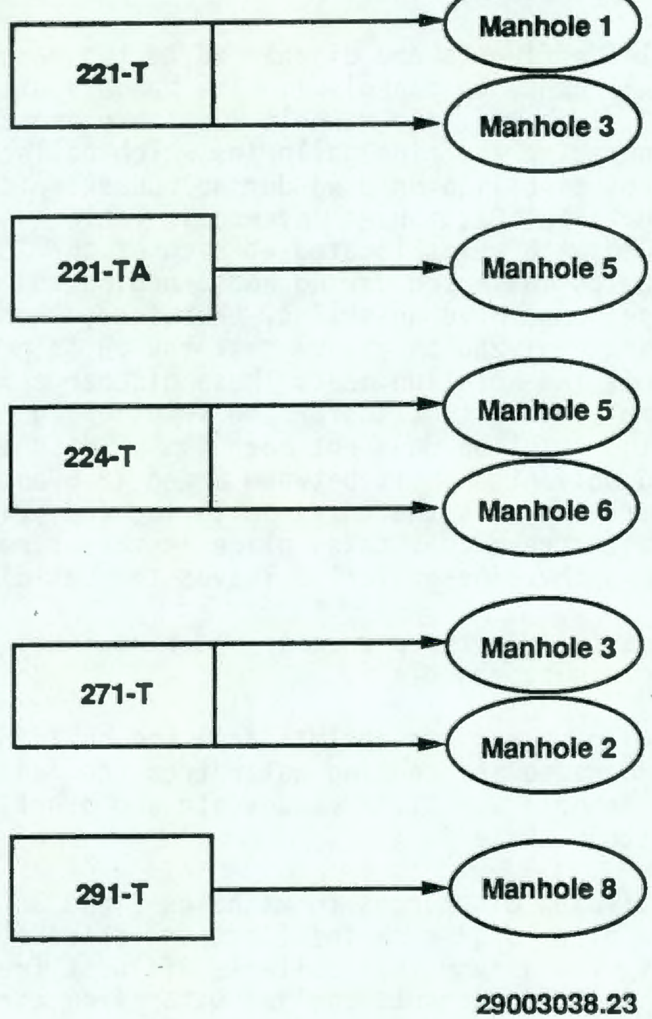
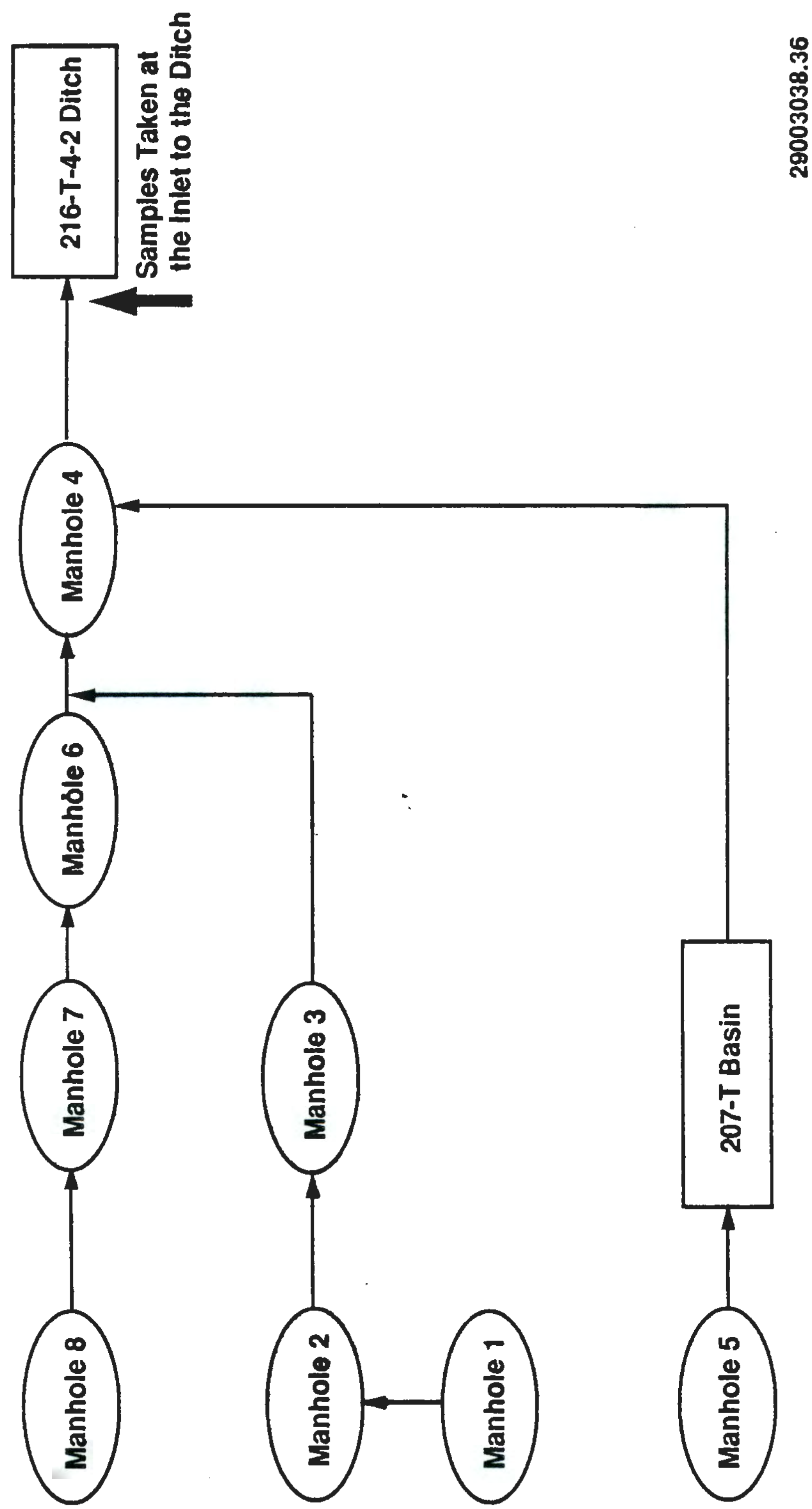


Figure 2-4. Wastewater Flow Schematic (Manholes).



2.3.1 Present Activities

The T Plant complex presently serves as a decontamination and decommissioning facility for the Hanford Site. Radioactive waste from these activities is not discharged to the chemical sewer.

The only routine "processes" that discharge to the chemical sewer are steam condensate, cooling water, and heating coil water. These process uses for each location at the T Plant complex are described below.

Building 221-T uses steam for heating in the canyon area, decontamination activities using steam cleaning, and steam jetting to make liquid transfers within the process tanks. The steam used here for decontamination and liquid transfers within the process tanks is not discharged to the chemical sewer, but is discharged to the double-shell tanks.

Building 221-TA uses steam for the preheater and reheat coil which heat the 221-T canyon area.

Building 224-T uses steam for building heating. Sanitary water is also used for the building's hot water heater and for cooling water in the fan room which supplies the evaporative cooler for building cooling.

Building 271-T uses sanitary water to cool the two air compressors which supply all of the compressed air for T Plant. Steam is used to heat the building and can be used for a steam jet transfer from the basement sump to the chemical sewer at Section 12 if the sump pump fails.

Building 291-T uses steam in heating coils which heat the 221-T canyon air before the air is filtered through high-efficiency particulate air (HEPA) filters in the FI-2 filter unit to help prevent the HEPA filters from getting wet.

Non-routine "processes" consist of floor drains and sumps whose contributors are described in Section 2.2. In a spill, actions must be performed immediately to stop leakages or spills from draining into the chemical sewer. Accidental releases of hazardous substances to the chemical sewer must be reported according to Westinghouse Hanford Company guidelines of the operating procedure for chemical sewer management.

2.3.2 Past Activities

The chemical sewer was routed to the 216-T-4-2 Ditch in May 1972, when use of the original ditch (216-T-4-1) was discontinued.

2.3.3 Future Activities

No change in the overall mission of decontamination and decommissioning is expected for the T Plant complex.

An upgrade of the chemical sewer at the T Plant complex is planned to be started in July 1990. This upgrade to the sewer includes the rerouting of drain headers in the 221-T Building and the 271-T Building to the 271-T sump, which could be sampled before emptying it into the chemical sewer. Presently, the chemical headers and floor drains in the 221-T Building and the 271-T Building directly drain into the chemical sewer. By rerouting these headers to the 271-T sump, the accidental discharge of chemicals to the chemical sewer would be avoided.

2.4 PROCESS DATA

The six routine contributors that make up 99% of the wastestream, based on Table 2-2 data, consist of steam condensate, compressor cooling water, and heating coil water. The only additive other than chlorine that is expected to be found is a corrosion inhibitor, Super Filmeen* 14, added to the boiler water at the powerplant. The material safety data sheet (MSDS) number of the corrosion inhibitor is 12387 and is listed in Appendix A, Table A-4. The MSDS states that the wastestream contains no hazardous ingredients under 29 CFR 1910.1200, d(3) and (4).

The three nonroutine contributors that makeup 1% of the wastestream could possibly contain any of the chemicals stored at T Plant. Twenty-two chemical products were found to be stored or used at the T Plant complex. These chemical products and their constituents are listed in Appendix A, Table A-4. However, none of these chemical products are expected to be in the chemical sewer effluent because they are stored in closed containers and operating procedures prohibit improper disposal of these products into the sewer system.

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*Filmeen is a trademark of Grace Dearborn.

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3.0 SAMPLE DATA

This section provides an evaluation of the sampling data pertaining to the 200 West Area T Plant wastewater stream.

3.1 DATA SOURCE

Two sources of sampling data were used in this analysis: wastestream data and background data.

3.1.1 Wastestream Data

The wastestream data is made up of the chemical data set. All data used in this subsection is contained in *Liquid Effluent Study Characterization Data* (WHC 1990b).

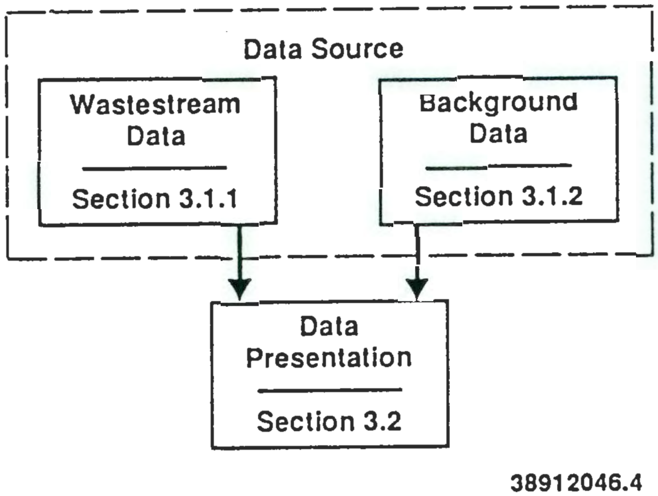
3.1.1.1 Chemical. The chemical data set is comprised of four samples that were taken from October 1989 to March 1990. The samples were taken from the inlet leading to the 216-T-4-2 Ditch. The inlet to the ditch was chosen as the sample location because of ease of access and the fact that it is downstream of all the contributors.

The sampling scheme took representative samples by following SW-846 (EPA 1986) sampling and analytical protocol. This protocol requires that a sufficient number of samples be taken, in a random manner, over a sufficient time period to characterize the variability or uniformity of the stream. This was accomplished by taking grab samples on a part-time random basis. The sampling was randomized by splitting the workdays of the month to be sampled into two 4-hour periods and choosing one of these time periods by using a random number generator. No change in process configuration occurred during sampling. All samples were taken to Contract Laboratory for analysis. The details of the sampling, analytical, quality control, and quality assurance procedures used are contained in Volume 4 of the *Wastestream Characterization Report*.

3.1.2 Background Data

The T Plant complex uses sanitary water in the steam, cooling water, and heating coil operations. The origin of this water is the Columbia River. River water is pumped to a plant in the 100 D Area where it is filtered, treated with alum, clarified, and chlorinated. The treated water is then pumped to the 200 West Area where it is stored in two 100,000-gal-capacity concrete-lined reservoirs until needed. Chemical background data for this report is presented in Appendix B, 200 West Area Raw Water and Sanitary Water Data. Raw water is not used in the T Plant processes.

Figure 3-1. Sample Data Strategy.



3.2 DATA PRESENTATION

Over 40,000 chemical analytes were of interest. Most of the analytes were compiled from a combined mass spectral library from the EPA, the National Institute of Occupational Safety and Health, and the National Bureau of Standards. This library was composed of approximately 40,000 chemical constituents, each with a unique gas chromatograph and mass spectrometer analysis signature.

Detection limits used in this report are defined as the Contract Laboratory contract detection limits. These limits are usually moderately higher than the instrument detection limits or "state-of-the-art" detection limits currently reported in scientific literature.

Statistics for the T Plant wastewater are presented in Table 3-1, with the procedures for the samples shown in Table 3-2. Abbreviations for the sample codes shown in Table 3-2 are explained in the data report footnotes (Table C-1). "New data" for T Plant wastewater is shown in Table 3-3, with the total data (old and new) in Appendix C, Table C-1. New data is contained in WHC (1990b) and old data is contained in WHC (1989).

Table 3-1. Statistics for T Plant Wastewater. (sheet 1 of 2)

Constituent	N	MDA	Method	Mean	StdErr	90%CILim	Maximum
Arsenic (EP Toxic)	4	4	n/a	<5.00E+02	0.00E+00	<5.00E+02	<5.00E+02
Barium	4	0	n/a	3.00E+01	1.22E+00	3.20E+01	3.30E+01
Barium (EP Toxic)	4	4	n/a	<1.00E+03	0.00E+00	<1.00E+03	<1.00E+03
Boron	4	1	DL	2.00E+01	5.61E+00	2.92E+01	3.50E+01
Cadmium	4	3	DL	2.00E+00	0.00E+00	2.00E+00	2.00E+00
Cadmium (EP Toxic)	4	4	n/a	<1.00E+02	0.00E+00	<1.00E+02	<1.00E+02
Calcium	4	0	n/a	1.90E+04	1.53E+03	2.16E+04	2.18E+04
Chloride	4	0	n/a	1.17E+03	4.79E+01	1.25E+03	1.30E+03
Chromium (EP Toxic)	4	4	n/a	<5.00E+02	0.00E+00	<5.00E+02	<5.00E+02
Copper	4	2	DL	1.75E+01	5.19E+00	2.60E+01	3.20E+01
Fluoride	4	0	n/a	1.45E+02	9.47E+00	1.60E+02	1.71E+02
Iron	4	0	n/a	5.40E+01	1.41E+01	7.72E+01	9.20E+01
Lead (EP Toxic)	4	4	n/a	<5.00E+02	0.00E+00	<5.00E+02	<5.00E+02
Magnesium	4	0	n/a	3.97E+03	2.34E+02	4.36E+03	4.48E+03
Manganese	4	3	DL	9.00E+00	4.00E+00	1.56E+01	2.10E+01
Mercury (EP Toxic)	4	4	n/a	<2.00E+01	0.00E+00	<2.00E+01	<2.00E+01
Nitrate	4	3	DL	5.00E+02	0.00E+00	5.00E+02	5.00E+02
Potassium	4	0	n/a	7.57E+02	4.79E+01	8.35E+02	8.89E+02
Selenium (EP Toxic)	4	4	n/a	<5.00E+02	0.00E+00	<5.00E+02	<5.00E+02
Silicon	4	0	n/a	2.05E+03	5.68E+01	2.15E+03	2.21E+03
Silver (EP Toxic)	4	4	n/a	<5.00E+02	0.00E+00	<5.00E+02	<5.00E+02
Sodium	4	0	n/a	2.03E+03	1.12E+02	2.22E+03	2.27E+03
Strontium	4	0	n/a	9.55E+01	7.19E+00	1.07E+02	1.12E+02
Sulfate	4	0	n/a	1.01E+04	3.71E+02	1.08E+04	1.08E+04
Uranium	4	0	n/a	4.70E-01	9.31E-02	6.22E-01	6.88E-01
Zinc	4	1	DL	5.42E+01	3.98E+01	1.19E+02	1.72E+02
Ammonia	4	2	DL	5.40E+01	2.83E+00	5.86E+01	6.20E+01
1-Butanol	1	0	n/a	1.20E+01	n/a	n/a	1.20E+01
Unknown amide	1	0	n/a	2.60E+01	n/a	n/a	2.60E+01
Alkalinity (Method B)	4	0	n/a	5.70E+04	1.35E+03	5.92E+04	5.90E+04
Beta Activity (pCi/L)	4	2	DL	2.59E+00	7.50E-01	3.82E+00	4.01E+00
Conductivity (μS)	4	0	n/a	1.47E+02	1.85E+01	1.78E+02	2.00E+02
Ignitability (°F)	4	0	n/a	2.11E+02	1.29E+00	2.09E+02	2.08E+02
pH (dimensionless)	4	0	n/a	7.31E+00	2.00E-01	7.64E+00	7.70E+00
Reactivity Cyanide (mg/kg)	4	4	n/a	<1.00E+02	0.00E+00	<1.00E+02	<1.00E+02
Reactivity Sulfide (mg/kg)	4	4	n/a	<1.00E+02	0.00E+00	<1.00E+02	<1.00E+02
TDS	4	0	n/a	6.05E+04	1.04E+03	6.22E+04	6.30E+04
Temperature (°C)	4	0	n/a	1.63E+01	9.34E-01	1.78E+01	1.81E+01
TOC	1	0	n/a	1.00E+03	n/a	n/a	1.00E+03
Total Carbon	4	0	n/a	1.54E+04	2.06E+02	1.58E+04	1.60E+04

Table 3-1. Statistics for T Plant Wastewater. (sheet 2 of 2)

Constituent	N	MDA	Method	Mean	StdErr	90%CILim	Maximum
TOX (as Cl)	4	2	DL	1.27E+01	2.75E+00	1.73E+01	2.00E+01
^{137}Cs (pCi/L)	4	3	DL	7.67E-01	4.18E-01	1.45E+00	1.86E+00
Radium Total (pCi/L)	3	2	DL	1.08E-01	3.53E-02	1.75E-01	1.48E-01

NOTES:

Mean values, standard errors, confidence interval limits and maxima are in ppb (parts per billion) unless indicated otherwise.

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

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

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

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

Table 3-2. Procedures for T Plant Wastewater Samples. (sheet 1 of 2)

LEAD#	50681	50697	50808	51036
C of C#	50681	50697	50808	51036
Alkalinity	X	X	X	X
Alpha counting	X	X	X	X
Ammonia	X	X	X	X
Arsenic	X	X	X	X
Atomic emission spectroscopy	X	X	X	X
Beta counting	X	X	X	X
Conductivity-field	X	X	X	X
Cyanide	X	X	X	X
Direct aqueous injection (GC)	X	X	X	X
Fluoride (LDL)	X	X	X	X
Gamma energy analysis	X	X	X	X
Hydrazine	X	X	X	X
Ion chromatography	X	X	X	X
Lead	X	X	X	X
Mercury	X	X	X	X
pH-field	X	X	X	X
Selenium	X	X	X	X
Semivolatile organics (GC/MS)	X	X	X	X
Sulfide	X	X	X	X
Suspended solids	X	X	X	X
Temperature-field	X	X	X	X
Thallium	X	X	X	X
Total carbon	X	X	X	X
Total dissolved solids	X	X	X	X
Total organic carbon	X	X	X	X
Total organic halides (LDL)	X	X	X	X
Total radium alpha counting	X	X		X
Tritium		X	X	X
Uranium	X	X	X	X
Volatile organics (GC/MS)	X	X	X	X

LEAD#	50681B	50697T	50808B	51036B
C of C#	50682	50699	50809	51037
Volatile organics (GC/MS)	X	X	X	X

LEAD#	50681T		50808T	51036T
C of C#	50683		50810	51038
Volatile organics (GC/MS)	X		X	X

Table 3-2. Procedures for T Plant Wastewater Samples. (sheet 2 of 2)

LEAD#	50681E	50697E	50808E	51036E
C of C#	50684	50700	50811	51039
Atomic emission spectroscopy	X	X	X	X
Ignitability	X	X	X	X
Mercury (mixed matrix)	X	X	X	X
Reactive cyanide	X	X	X	X
Reactive sulfide	X	X	X	X

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

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

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

Table 3-3. Data for T Plant Wastewater. (sheet 1 of 7)

Constituent	Sample #	Date	Method	Result
Arsenic (EP Toxic)	50681E	10/13/89	ICP	<5.00E+02
Arsenic (EP Toxic)	50697E	10/17/89	ICP	<5.00E+02
Arsenic (EP Toxic)	50808E	11/28/89	ICP	<5.00E+02
Arsenic (EP Toxic)	51036E	3/09/90	ICP	<5.00E+02
Barium	50681	10/13/89	ICP	3.30E+01
Barium	50697	10/17/89	ICP	3.00E+01
Barium	50808	11/28/89	ICP	2.70E+01
Barium	51036	3/09/90	ICP	3.00E+01
Barium (EP Toxic)	50681E	10/13/89	ICP	<1.00E+03
Barium (EP Toxic)	50697E	10/17/89	ICP	<1.00E+03
Barium (EP Toxic)	50808E	11/28/89	ICP	<1.00E+03
Barium (EP Toxic)	51036E	3/09/90	ICP	<1.00E+03
Boron	50681	10/13/89	ICP	2.20E+01
Boron	50697	10/17/89	ICP	<1.00E+01
Boron	50808	11/28/89	ICP	1.30E+01
Boron	51036	3/09/90	ICP	3.50E+01
Cadmium	50681	10/13/89	ICP	2.00E+00
Cadmium	50697	10/17/89	ICP	<2.00E+00
Cadmium	50808	11/28/89	ICP	<2.00E+00
Cadmium	51036	3/09/90	ICP	<2.00E+00
Cadmium (EP Toxic)	50681E	10/13/89	ICP	<1.00E+02
Cadmium (EP Toxic)	50697E	10/17/89	ICP	<1.00E+02
Cadmium (EP Toxic)	50808E	11/28/89	ICP	<1.00E+02
Cadmium (EP Toxic)	51036E	3/09/90	ICP	<1.00E+02
Calcium	50681	10/13/89	ICP	2.18E+04
Calcium	50697	10/17/89	ICP	1.84E+04
Calcium	50808	11/28/89	ICP	1.50E+04
Calcium	51036	3/09/90	ICP	2.10E+04
Chloride	50681	10/13/89	IC	1.30E+03
Chloride	50697	10/17/89	IC	1.10E+03
Chloride	50808	11/28/89	IC	1.10E+03
Chloride	51036	3/09/90	IC	1.20E+03
Chromium (EP Toxic)	50681E	10/13/89	ICP	<5.00E+02
Chromium (EP Toxic)	50697E	10/17/89	ICP	<5.00E+02
Chromium (EP Toxic)	50808E	11/28/89	ICP	<5.00E+02
Chromium (EP Toxic)	51036E	3/09/90	ICP	<5.00E+02
Copper	50681	10/13/89	ICP	<1.00E+01
Copper	50697	10/17/89	ICP	1.80E+01
Copper	50808	11/28/89	ICP	3.20E+01
Copper	51036	3/09/90	ICP	<1.00E+01
Fluoride	50681	10/13/89	IC	<5.00E+02
Fluoride	50681	10/13/89	ISE	1.71E+02
Fluoride	50697	10/17/89	IC	<5.00E+02
Fluoride	50697	10/17/89	ISE	1.46E+02
Fluoride	50808	11/28/89	IC	<5.00E+02
Fluoride	50808	11/28/89	ISE	1.29E+02

Table 3-3. Data for T Plant Wastewater. (sheet 2 of 7)

Constituent	Sample #	Date	Method	Result
Fluoride	51036	3/09/90	IC	<5.00E+02
Fluoride	51036	3/09/90	ISE	1.33E+02
Iron	50681	10/13/89	ICP	9.20E+01
Iron	50697	10/17/89	ICP	3.40E+01
Iron	50808	11/28/89	ICP	3.10E+01
Iron	51036	3/09/90	ICP	5.90E+01
Lead (EP Toxic)	50681E	10/13/89	ICP	<5.00E+02
Lead (EP Toxic)	50697E	10/17/89	ICP	<5.00E+02
Lead (EP Toxic)	50808E	11/28/89	ICP	<5.00E+02
Lead (EP Toxic)	51036E	3/09/90	ICP	<5.00E+02
Magnesium	50681	10/13/89	ICP	4.09E+03
Magnesium	50697	10/17/89	ICP	3.98E+03
Magnesium	50808	11/28/89	ICP	3.35E+03
Magnesium	51036	3/09/90	ICP	4.48E+03
Manganese	50681	10/13/89	ICP	2.10E+01
Manganese	50697	10/17/89	ICP	<5.00E+00
Manganese	50808	11/28/89	ICP	<5.00E+00
Manganese	51036	3/09/90	ICP	<5.00E+00
Mercury (EP Toxic)	50681E	10/13/89	CVAA/M	<2.00E+01
Mercury (EP Toxic)	50697E	10/17/89	CVAA/M	<2.00E+01
Mercury (EP Toxic)	50808E	11/28/89	CVAA/M	<2.00E+01
Mercury (EP Toxic)	51036E	3/09/90	CVAA/M	<2.00E+01
Nitrate	50681	10/13/89	IC	<5.00E+02
Nitrate	50697	10/17/89	IC	<5.00E+02
Nitrate	50808	11/28/89	IC	5.00E+02
Nitrate	51036	3/09/90	IC	<5.00E+02
Potassium	50681	10/13/89	ICP	8.89E+02
Potassium	50697	10/17/89	ICP	6.70E+02
Potassium	50808	11/28/89	ICP	7.07E+02
Potassium	51036	3/09/90	ICP	7.62E+02
Selenium (EP Toxic)	50681E	10/13/89	ICP	<5.00E+02
Selenium (EP Toxic)	50697E	10/17/89	ICP	<5.00E+02
Selenium (EP Toxic)	50808E	11/28/89	ICP	<5.00E+02
Selenium (EP Toxic)	51036E	3/09/90	ICP	<5.00E+02
Silicon	50681	10/13/89	ICP	1.98E+03
Silicon	50697	10/17/89	ICP	1.96E+03
Silicon	50808	11/28/89	ICP	2.06E+03
Silicon	51036	3/09/90	ICP	2.21E+03
Silver (EP Toxic)	50681E	10/13/89	ICP	<5.00E+02
Silver (EP Toxic)	50697E	10/17/89	ICP	<5.00E+02
Silver (EP Toxic)	50808E	11/28/89	ICP	<5.00E+02
Silver (EP Toxic)	51036E	3/09/90	ICP	<5.00E+02
Sodium	50681	10/13/89	ICP	2.27E+03
Sodium	50697	10/17/89	ICP	2.04E+03
Sodium	50808	11/28/89	ICP	1.73E+03
Sodium	51036	3/09/90	ICP	2.09E+03

Table 3-3. Data for T Plant Wastewater. (sheet 3 of 7)

Constituent	Sample #	Date	Method	Result
Strontium	50681	10/13/89	ICP	1.12E+02
Strontium	50697	10/17/89	ICP	9.50E+01
Strontium	50808	11/28/89	ICP	7.70E+01
Strontium	51036	3/09/90	ICP	9.80E+01
Sulfate	50681	10/13/89	IC	1.05E+04
Sulfate	50697	10/17/89	IC	1.02E+04
Sulfate	50808	11/28/89	IC	9.10E+03
Sulfate	51036	3/09/90	IC	1.08E+04
Uranium	50681	10/13/89	FLUOR	6.88E-01
Uranium	50697	10/17/89	FLUOR	2.33E-01
Uranium	50808	11/28/89	FLUOR	4.88E-01
Uranium	51036	3/09/90	FLUOR	4.70E-01
Zinc	50681	10/13/89	ICP	1.72E+02
Zinc	50697	10/17/89	ICP	7.00E+00
Zinc	50808	11/28/89	ICP	<5.00E+00
Zinc	51036	3/09/90	ICP	3.30E+01
Acetone	50681	10/13/89	VOA	<1.00E+01
Acetone	50681	10/13/89	ABN	<1.00E+01
Acetone	50681B	10/13/89	VOA	<6.00E+00
Acetone	50681T	10/13/89	VOA	1.70E+01
Acetone	50697	10/17/89	VOA	<6.00E+00
Acetone	50697	10/17/89	ABN	<1.00E+01
Acetone	50697B	10/17/89	VOA	<1.00E+01
Acetone	50697T	10/17/89	VOA	<1.00E+01
Acetone	50808	11/28/89	VOA	<1.00E+01
Acetone	50808	11/28/89	ABN	<1.00E+01
Acetone	50808B	11/28/89	VOA	<1.00E+01
Acetone	50808T	11/28/89	VOA	<1.00E+01
Acetone	51036	3/09/90	VOA	<1.00E+01
Acetone	51036	3/09/90	ABN	<1.00E+01
Acetone	51036B	3/09/90	VOA	<1.00E+01
Acetone	51036T	3/09/90	VOA	<5.00E+00
Ammonia	50681	10/13/89	ISE	6.20E+01
Ammonia	50697	10/17/89	ISE	5.40E+01
Ammonia	50808	11/28/89	ISE	<5.00E+01
Ammonia	51036	3/09/90	ISE	<5.00E+01
1-Butanol	50681	10/13/89	DIGC	<1.00E+04
1-Butanol	50697	10/17/89	DIGC	<1.00E+04
1-Butanol	50808	11/28/89	DIGC	<1.00E+04
1-Butanol	51036	3/09/90	VOA	1.20E+01
1-Butanol	51036	3/09/90	DIGC	<1.00E+04
1-Butanol	51036B	3/09/90	VOA	1.00E+01
1-Butanol	51036T	3/09/90	VOA	1.10E+01
Dichloromethane	50681	10/13/89	VOA	<5.00E+00
Dichloromethane	50681B	10/13/89	VOA	4.10E+02
Dichloromethane	50681T	10/13/89	VOA	4.20E+02
Dichloromethane	50697	10/17/89	VOA	<5.00E+00

Table 3-3. Data for T Plant Wastewater. (sheet 4 of 7)

Constituent	Sample #	Date	Method	Result
Dichloromethane	50697B	10/17/89	VOA	<3.00E+00
Dichloromethane	50697T	10/17/89	VOA	1.20E+01
Dichloromethane	50808	11/28/89	VOA	<5.00E+00
Dichloromethane	50808B	11/28/89	VOA	6.00E+00
Dichloromethane	50808T	11/28/89	VOA	6.00E+00
Dichloromethane	51036	3/09/90	VOA	<5.00E+00
Dichloromethane	51036B	3/09/90	VOA	<5.00E+00
Dichloromethane	51036T	3/09/90	VOA	<5.00E+00
Tetrahydrofuran	50681	10/13/89	VOA	<1.00E+01
Tetrahydrofuran	50681B	10/13/89	VOA	<1.00E+01
Tetrahydrofuran	50681T	10/13/89	VOA	<1.00E+01
Tetrahydrofuran	50697	10/17/89	VOA	<1.00E+01
Tetrahydrofuran	50697B	10/17/89	VOA	1.40E+01
Tetrahydrofuran	50697T	10/17/89	VOA	<1.00E+01
Tetrahydrofuran	50808	11/28/89	VOA	<1.00E+01
Tetrahydrofuran	50808B	11/28/89	VOA	<8.00E+00
Tetrahydrofuran	50808T	11/28/89	VOA	<6.00E+00
Tetrahydrofuran	51036	3/09/90	VOA	<1.00E+01
Tetrahydrofuran	51036B	3/09/90	VOA	<1.00E+01
Tetrahydrofuran	51036T	3/09/90	VOA	<6.00E+00
Trichloromethane	50681	10/13/89	VOA	<5.00E+00
Trichloromethane	50681B	10/13/89	VOA	<5.00E+00
Trichloromethane	50681T	10/13/89	VOA	<5.00E+00
Trichloromethane	50697	10/17/89	VOA	<5.00E+00
Trichloromethane	50697B	10/17/89	VOA	<5.00E+00
Trichloromethane	50697T	10/17/89	VOA	<5.00E+00
Trichloromethane	50808	11/28/89	VOA	<5.00E+00
Trichloromethane	50808B	11/28/89	VOA	7.00E+00
Trichloromethane	50808T	11/28/89	VOA	6.00E+00
Trichloromethane	51036	3/09/90	VOA	<5.00E+00
Trichloromethane	51036B	3/09/90	VOA	<5.00E+00
Trichloromethane	51036T	3/09/90	VOA	<5.00E+00
Unknown amide	50697	10/17/89	ABN	2.60E+01
Alkalinity (Method B)	50681	10/13/89	TITRA	5.80E+04
Alkalinity (Method B)	50697	10/17/89	TITRA	5.80E+04
Alkalinity (Method B)	50808	11/28/89	TITRA	5.30E+04
Alkalinity (Method B)	51036	3/09/90	TITRA	5.90E+04
Beta Activity (pCi/L)	50681	10/13/89	Beta	<1.93E+00
Beta Activity (pCi/L)	50697	10/17/89	Beta	<7.96E-01
Beta Activity (pCi/L)	50808	11/28/89	Beta	4.01E+00
Beta Activity (pCi/L)	51036	3/09/90	Beta	3.63E+00
Conductivity (µS)	50681	10/13/89	COND-Fld	1.21E+02
Conductivity (µS)	50697	10/17/89	COND-Fld	1.22E+02
Conductivity (µS)	50808	11/28/89	COND-Fld	2.00E+02
Conductivity (µS)	51036	3/09/90	COND-Fld	1.47E+02
Ignitability (°F)	50681E	10/13/89	IGNIT	2.12E+02
Ignitability (°F)	50697E	10/17/89	IGNIT	2.10E+02

Table 3-3. Data for T Plant Wastewater. (sheet 5 of 7)

Constituent	Sample #	Date	Method	Result
Ignitability (°F)	50808E	11/28/89	IGNIT	2.08E+02
Ignitability (°F)	51036E	3/09/90	IGNIT	2.14E+02
pH (dimensionless)	50681	10/13/89	PH-Fld	6.80E+00
pH (dimensionless)	50697	10/17/89	PH-Fld	7.20E+00
pH (dimensionless)	50808	11/28/89	PH-Fld	7.55E+00
pH (dimensionless)	51036	3/09/90	PH-Fld	7.70E+00
Reactivity Cyanide (mg/kg)	50681E	10/13/89	DSPEC	<1.00E+02
Reactivity Cyanide (mg/kg)	50697E	10/17/89	DSPEC	<1.00E+02
Reactivity Cyanide (mg/kg)	50808E	11/28/89	DSPEC	<1.00E+02
Reactivity Cyanide (mg/kg)	51036E	3/09/90	DSPEC	<1.00E+02
Reactivity Sulfide (mg/kg)	50681E	10/13/89	DTITRA	<1.00E+02
Reactivity Sulfide (mg/kg)	50697E	10/17/89	DTITRA	<1.00E+02
Reactivity Sulfide (mg/kg)	50808E	11/28/89	DTITRA	<1.00E+02
Reactivity Sulfide (mg/kg)	51036E	3/09/90	DTITRA	<1.00E+02
TDS	50681	10/13/89	TDS	5.80E+04
TDS	50697	10/17/89	TDS	6.10E+04
TDS	50808	11/28/89	TDS	6.30E+04
TDS	51036	3/09/90	TDS	6.00E+04
Temperature (°C)	50681	10/13/89	TEMP-Fld	1.75E+01
Temperature (°C)	50697	10/17/89	TEMP-Fld	1.81E+01
Temperature (°C)	50808	11/28/89	TEMP-Fld	1.56E+01
Temperature (°C)	51036	3/09/90	TEMP-Fld	1.40E+01
TOC	50681	10/13/89	TOC	<1.80E+03
TOC	50697	10/17/89	TOC	<1.50E+03
TOC	50808	11/28/89	TOC	<1.20E+03
TOC	51036	3/09/90	TOC	1.00E+03
Total Carbon	50681	10/13/89	TC	1.50E+04
Total Carbon	50697	10/17/89	TC	1.60E+04
Total Carbon	50808	11/28/89	TC	1.54E+04
Total Carbon	51036	3/09/90	TC	1.54E+04
TOX (as Cl)	50681	10/13/89	LTOX	1.40E+01
TOX (as Cl)	50697	10/17/89	LTOX	<8.00E+00
TOX (as Cl)	50808	11/28/89	LTOX	2.00E+01
TOX (as Cl)	51036	3/09/90	LTOX	<9.00E+00
^{137}Cs (pCi/L)	50681	10/13/89	GEA	<4.34E-02
^{137}Cs (pCi/L)	50697	10/17/89	GEA	<1.89E-01
^{137}Cs (pCi/L)	50808	11/28/89	GEA	<9.76E-01
^{137}Cs (pCi/L)	51036	3/09/90	GEA	1.86E+00
Radium Total (pCi/L)	50681	10/13/89	Alpha-Ra	<1.39E-01
Radium Total (pCi/L)	50697	10/17/89	Alpha-Ra	1.48E-01
Radium Total (pCi/L)	51036	3/09/90	Alpha-Ra	<3.79E-02

Sample# is the number of the sample. See Section 3.0 for corresponding chain-of-custody number. Date is the sampling date. Results are in ppb (parts per billion) unless otherwise indicated. The following table lists the methods that are coded in the method column.

Table 3-3. Data for T Plant Wastewater. (sheet 6 of 7)

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

Table 3-3. Data for T Plant Wastewater. (sheet 7 of 7)

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

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

References:

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

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

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

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

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

4.0 DATA OVERVIEW

The purpose of this section is to compare sampling data with various other baseline data (such as process knowledge) and "screening" values, such as drinking water standards (DWS) and derived concentration guidelines (DCG) (for radionuclide levels). This comparison will place the quality and character of the T Plant wastewater into perspective against these other standards.

4.1 DATA COMPARISON

Table 4-1 compares sample data averages with both the DWSs (in maximum contamination level [MCL] form). Note that both the primary and secondary MCL are used in this comparison. Samples compared had results that were not positive results (i.e., not a "less-than value") and had a DWS or a DCG. All the sample data constituents are less than the MCL standards.

4.2 STREAM DEPOSITION RATES

Table 4-2 provides deposition rates using the sample data averages from Table 3-1 adjusted using the using the maximum flowrates from Table 2-2. The list of constituents is found in Table 4-1.

Table 4-1. Evaluation of T Plant Wastewater.

Constituent	Result[a]	SV1[b]	SV2[c]
Barium	3.0E-02	5.0E+00 g	
Cadmium	2.0E-03	5.0E-03 e	
Chloride	1.2E+00	2.5E+02 h	
Copper	1.8E-02	1.0E+00 h	
Fluoride	1.4E-01	2.0E+00 g	
Iron	5.4E-02	3.0E-01 h	
Manganese	9.0E-03	5.0E-02 h	
Nitrate	5.0E-01	4.5E+01 e	
Sulfate	1.0E+01	2.5E+02 h	
Zinc	5.4E-02	5.0E+00 h	
Beta Activity (pCi/L)	2.6E+00		1.0E+03
^{137}Cs (pCi/L)	7.7E-01	1.0E+02 e	3.0E+03
TDS	6.0E+01	5.0E+02 h	

[a]Units of results are mg/L unless indicated otherwise. The results are the mean values reported in the Statistics table of Section 3.0.

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

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

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

Table 4-2. Deposition Rate for T Plant Wastewater
Flowrate: 1.60 E+06 L/mo.

Constituent	Kg/L*	Kg/mo*
Barium	3.00E-08	4.80E-02
Boron	2.00E-08	3.20E-02
Cadmium	2.00E-09	3.20E-03
Calcium	1.90E-05	3.04E+01
Chloride	1.17E-06	1.87E+00
Copper	1.75E-08	2.80E-02
Fluoride	1.45E-07	2.32E-01
Iron	5.40E-08	8.64E-02
Magnesium	3.97E-06	6.35E+00
Manganese	9.00E-09	1.44E-02
Nitrate	5.00E-07	8.00E-01
Potassium	7.57E-07	1.21E+00
Silicon	2.05E-06	3.28E+00
Sodium	2.03E-06	3.25E+00
Strontium	9.55E-08	1.53E-01
Sulfate	1.01E-05	1.62E+01
Uranium	4.70E-10	7.52E-04
Zinc	5.42E-08	8.67E-02
Ammonia	5.40E-08	8.64E-02
1-Butanol	1.20E-08	1.92E-02
Unknown amide	2.60E-08	4.16E-02
Beta Activity *	2.59E-12	4.14E-06
TDS	6.05E-05	9.68E+01
TOC	1.00E-06	1.60E+00
Total Carbon	1.54E-05	2.46E+01
TOX (as Cl)	1.27E-08	2.03E-02
^{137}Cs *	7.67E-13	1.23E-06
Radium Total *	1.08E-13	1.73E-07

Data collected from October 1989 through March 1990. Flowrate is the maximum of rates from Section 2.0. Constituent concentrations are average values from the Statistics Report in Section 3.0. Concentration units of flagged (*) constituents are reported as curies per liter. Deposition rate units of flagged (*) constituents are reported as curies per month.

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5.0 DESIGNATION

This section proposes that the T Plant wastewater stream not be designated a dangerous waste. This proposed designation uses data from both the effluent source description and present sample data (Sections 2.0 through 4.0) and complies with the designation requirements of WAC 173-303-070.

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

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

5.1 DANGEROUS WASTE LISTS

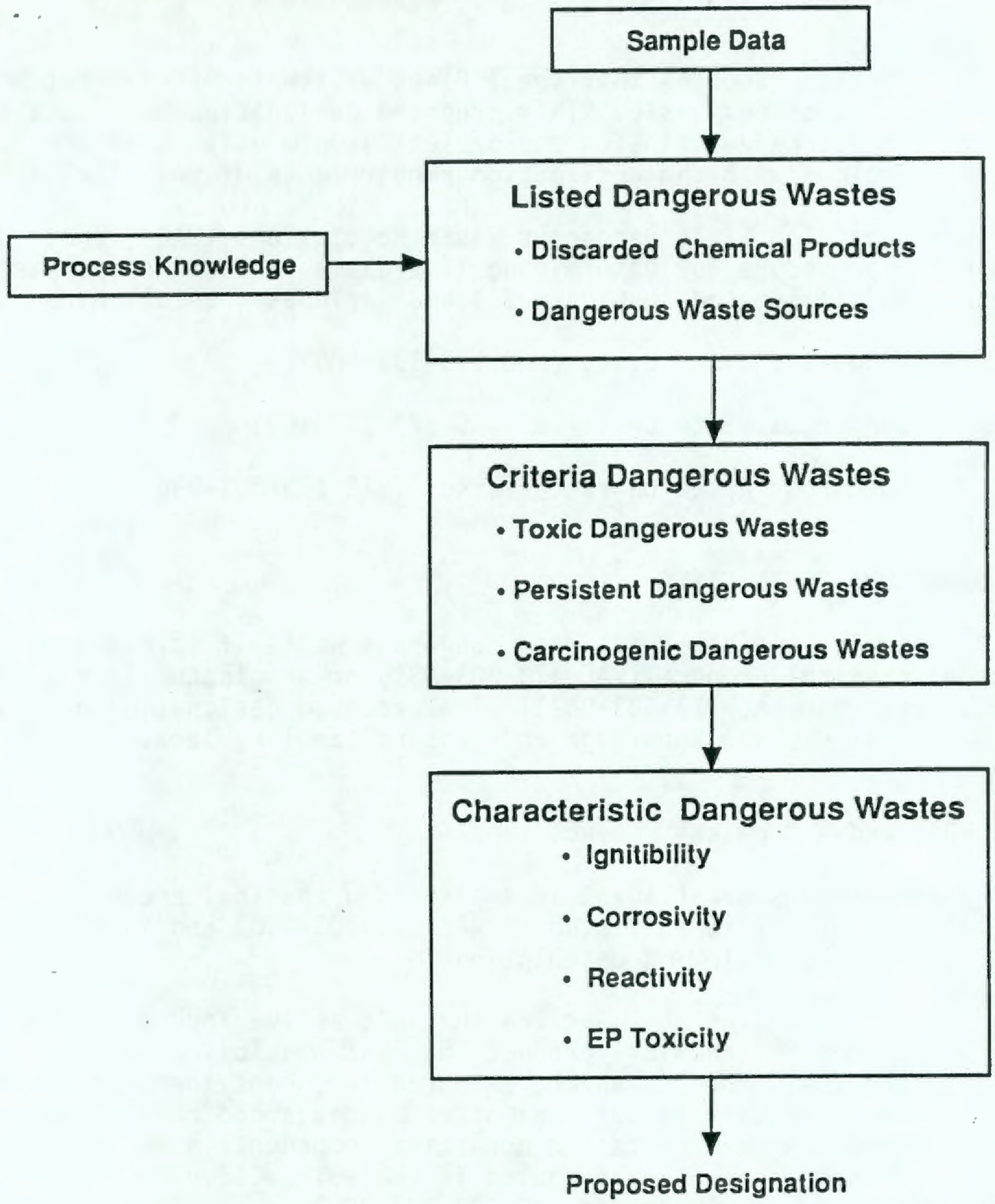
A waste is considered a listed dangerous waste if it either contains a discarded chemical product (WAC 173-303-081) or originates from a dangerous waste source (per WAC 173-303-082). The proposed designation was based on a combination of process knowledge and present sampling data.

5.1.1 Discarded Chemical Product

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

- The listed constituent was the sole active ingredient in a commercial chemical product that has been discarded. Commercial chemical products which, as purchased, contained two or more active ingredients were not designated as discarded chemical products. Products that contained nonactive components such as water, however, were so designated if the sole active ingredient in the mixture was listed in WAC 173-303-9903.
- The constituent results from a spill of unused chemicals. A spill of a discarded chemical product would cause a wastestream to be designated during the time that the discharge is occurring. The approach taken is that the current wastestream would not be designated unless a review of past spill events indicates that the spills are predictable, systematic events that are ongoing or are reasonably anticipated to occur in the future. In this report, 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 (EPA 1980)*.

Figure 5-1. Illustration of the Designation Procedure.



29004107.7

- 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 chemicals, unused chemicals, and chemicals that have exceeded a shelf life but have not been used are considered discarded chemical products.)

5.1.2 Dangerous Waste Sources

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

5.2 LISTED WASTE DATA CONSIDERATIONS

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

5.2.1 Process Evaluation

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

- Material Safety Data Sheets
- *Superfund Amendments and Reauthorization Act* (SARA) (EPA 1988) Inventory reports
- Operating procedures
- Essential chemical inventories
- Physical inspections, where possible.

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

5.2.2 Sampling Data

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

Screening organic constituents is a relatively simple procedure because analytical data for organic constituents are reported as substances and are easily compared to the WAC 173-303-9903 and -9904 lists. It is not as simple to screen inorganic analytical data because inorganic data are reported as ions or elements 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 neutral substances in this simple example 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 *Wastestream Designation of 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 substances were 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.

Table 5-1 documents how ion analytes were assigned to neutral substances that are required for designation. The table accounts for charge balancing the ion assemblage (from Table 3-1, the statistical summary) and the subsequent formulation of neutral substances. A detailed discussion can be found in *Wastestream Designation of Liquid Effluent Analytical Data* (WHC 1990c).

5.3 PROPOSED LISTED WASTE DESIGNATION

A process evaluation, along with a review of sampling data, indicated that the T Plant wastewater stream did not contain a discarded chemical product or a listed waste source. Dangerous waste mixtures are handled in the Dangerous Waste Criteria section. The following sections discuss the evaluation that was conducted to substantiate this conclusion.

5.3.1 Discarded Chemical Products

As discussed in Section 5.2, a process evaluation of the contributors to the T Plant wastewater stream was conducted. This evaluation included a

Table 5-1. Inorganic Chemistry for T Plant Wastewater.
(sheet 1 of 2)

Constituent	ppb	Ion	Eq/g	Normalized
Charge normalization:				
Barium	3.20E+01	Ba+2	4.66E-10	
Boron	2.92E+01	B407-2	1.35E-09	4.91E-09
Cadmium	2.00E+00	Cd+2	3.56E-11	
Calcium	2.16E+04	Ca+2	1.08E-06	
Chloride	1.25E+03	Cl-1	3.54E-08	1.29E-07
Copper	2.60E+01	Cu+2	8.18E-10	
Fluoride	1.60E+02	F-1	8.44E-09	3.07E-08
Iron	7.72E+01	Fe+3	4.14E-09	
Magnesium	4.36E+03	Mg+2	3.59E-07	
Manganese	1.56E+01	Mn+2	5.66E-10	
Nitrate	5.00E+02	NO3-1	8.06E-09	2.93E-08
Potassium	8.35E+02	K+1	2.14E-08	
Silicon	2.15E+03	SiO3-2	1.53E-07	5.55E-07
Sodium	2.22E+03	Na+1	9.64E-08	
Strontium	1.07E+02	Sr+2	2.45E-09	
Sulfate	1.08E+04	SO4-2	2.24E-07	8.14E-07
Uranium	6.22E-01	UO2+2	5.23E-12	
Zinc	1.19E+02	Zn+2	3.65E-09	
Hydrogen Ion (from pH 7.6)		H+	(2.29E-11)	
Hydroxide Ion (from pH)		OH-	(4.37E-10)	
Cation total			1.56E-06	
Anion total			4.30E-07	
Anion normalization factor:	3.635			

Substance formation:

Substance	%	Cation out	Anion out
Cadmium chloride	3.26E-07	0.00E+00	1.28E-07
Copper(II) chloride	5.50E-06	0.00E+00	1.28E-07
Uranyl nitrate	1.03E-07	0.00E+00	2.93E-08
Iron(III) fluoride	1.56E-05	0.00E+00	2.65E-08
Potassium fluoride	1.24E-04	0.00E+00	5.15E-09
Barium chloride	4.85E-06	0.00E+00	1.27E-07
Sodium fluoride	2.16E-05	9.13E-08	0.00E+00
Zinc nitrate	3.46E-05	0.00E+00	2.57E-08
Magnesium chloride	6.06E-04	2.32E-07	0.00E+00
Magnesium nitrate	2.02E-04	2.06E-07	0.00E+00
Calcium tetraborate	4.79E-05	1.07E-06	0.00E+00
Magnesium sulfate	1.24E-03	0.00E+00	6.08E-07

Table 5-1. Inorganic Chemistry for T Plant Wastewater.
(sheet 2 of 2)

Substance formation: Substance	%	Cation out	Anion out
Sodium metasilicate	5.57E-04	0.00E+00	4.64E-07
Manganese(II) metasilicate	3.71E-06	0.00E+00	4.64E-07
Strontium sulfate	2.25E-05	0.00E+00	6.06E-07
Calcium sulfate	4.12E-03	4.65E-07	0.00E+00

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

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

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

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

review of MSDSs at the plant and chemical inventories compiled for compliance with the SARA Title III requirements for possible listed waste contributors. One chemical product, Freon 12, used at the T Plant complex appears on the WAC 173-303-9903 list (MSDS Number 1236) and is listed in Table A-4.

Performance of the activities described in Section 5.2.1 and review of spill records did not produce evidence of the discharge of any of this chemical product into the T Plant wastewater stream. Westinghouse Hanford Company operating procedures prohibit the improper disposal of chemicals into the wastestream.

5.3.1.1 Hydrogen Fluoride. Hydrogen fluoride (U134) was identified from sampling data of the T Plant wastewater. Hydrogen fluoride was identified by the ionic pairing of fluoride and hydrogen in the wastestream. Because fluoride is found in the sanitary water supplying T Plant (Table B-1) in a concentration nearly equaling that found in the wastestream (Table 3-1), and because hydrogen fluoride is not stored at T Plant (Table A-4), the detection of fluoride does not suggest the introduction of hydrogen fluoride to the wastestream at T Plant.

5.3.1.2 1-Butanol. 1-butanol (U031) was identified in one sample (March 9, 1990) of the T Plant wastewater. The concentration of 1-butanol in the sample of the wastewater was 1.20 E+01 ppb. Because 1-butanol was not stored or used at T Plant, and the concentration of 1-butanol seen in the sample of this wastewater stream is at the same level (10 ppb) as the blanks, this data will not be considered in the designation of the wastestream as it is likely that 1-butanol is presented in this wastestream sample due to sample contamination.

Based on the considerations and data presented in the previous sections, it is concluded that the wastestream does not contain any discarded chemical products.

5.3.2 Dangerous Waste Sources

The process evaluation (see Section 5.2) was also used to determine if the wastestream included any specific waste sources (K and W wastes) or any nonspecific waste sources (F wastes) in the Dangerous Waste Source List, WAC 173-303-9904. Sampling data were used to enhance the process evaluation.

5.3.2.1 1-Butanol. Since 1-butanol (F003) is not stored or used at T Plant (see Material Safety Data Sheet Inventory, Table A-4), the 1-butanol cannot be a source per WAC 173-303-9904. See Section 5.3.1.2 for complete discussion.

Based on the discussion and data presented in the following sections, it is concluded that the wastestream contributors are not listed dangerous waste sources.

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. A description of the methods used to test the sampling data against the criteria is contained in WHC (1990). 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 (WAC 173-303-101) is described below.

- Collect and analyze multiple samples from the wastestream.
- Calculate the upper limit of the one-sided 90% confidence interval (90%CI) for each analyte in the wastestream.
- Formulate substances from the analytical data. NOTE: This step is only required for inorganic analytes since it is not possible to complete the evaluation based on the concentration of cations and anions. This methodology is described in WHC (1990) 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 detected or, in the case of inorganics, postulated to be in 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.

Fifteen substances potentially present in the T Plant wastewater stream were determined to have toxic categories associated with them. The individual and sum EC% values for these substances are listed in Table 5-2. Since the EC% sum is 1.22 E-06, which is less than the limit of 0.001%, the wastestream is not a toxic dangerous waste.

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

Finding: Undesignated

Discarded Chemical Products - WAC 173-303-081

Substance	Review Number	Status	DW Number
Hydrogen fluoride	U134(DW)	Not Discarded	Undesignated
*1-Butanol	U031(DW)	Not Discarded	Undesignated

Dangerous Waste Sources - WAC 173-303-082

Substance	Review Number	Status	DW Number
*1-Butanol	F003	Unlisted Source	Undesignated

Infectous Dangerous Waste - WAC 173-303-083

No regulatory guidance

Dangerous Waste Mixtures - WAC 173-303-084

	Toxic	Persistant		Carcinogenic
Substance	EC%	HH%	PAH%	Total%
Barium chloride	4.85E-09	0.00E+00	0.00E+00	0.00E+00
Cadmium chloride	3.26E-09	0.00E+00	0.00E+00	3.26E-07
Calcium tetraborate	4.79E-09	0.00E+00	0.00E+00	0.00E+00
Copper(II) chloride	5.50E-07	0.00E+00	0.00E+00	0.00E+00
Iron(III) fluoride	1.56E-07	0.00E+00	0.00E+00	0.00E+00
Magnesium chloride	6.06E-08	0.00E+00	0.00E+00	0.00E+00
Magnesium nitrate	2.02E-08	0.00E+00	0.00E+00	0.00E+00
Magnesium sulfate	1.24E-07	0.00E+00	0.00E+00	0.00E+00
Potassium fluoride	1.24E-07	0.00E+00	0.00E+00	0.00E+00
Sodium fluoride	2.16E-08	0.00E+00	0.00E+00	0.00E+00
Sodium metasilicate	5.57E-08	0.00E+00	0.00E+00	0.00E+00
Uranyl nitrate	1.03E-09	0.00E+00	0.00E+00	0.00E+00
Zinc nitrate	3.46E-08	0.00E+00	0.00E+00	0.00E+00
Ammonia	5.86E-08	0.00E+00	0.00E+00	0.00E+00
*1-Butanol	1.20E-10	0.00E+00	0.00E+00	0.00E+00
Total	1.22E-06	0.00E+00	0.00E+00	3.26E-07
DW Number	Undesignated	Undesignated	Undesignated	Undesignated

Dangerous Waste Characteristics - WAC 173-303-090

Characteristic	Value	DW Number
Ignitability (Degrees F)	>208	Undesignated
Corrosivity-pH	7.64	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 for T Plant Wastewater. (sheet 2 of 2)

Substance	Toxic EC%	Persistant HH%	Persistant PAH%	Carcinogenic Total%	DW Number-Positive
Barium chloride	4.85E-09	0.00E+00	0.00E+00	0.00E+00	
Cadmium chloride	3.26E-09	0.00E+00	0.00E+00	3.26E-07	Undesignated
Calcium tetraborate	4.79E-09	0.00E+00	0.00E+00	0.00E+00	
Copper(II) chloride	5.50E-07	0.00E+00	0.00E+00	0.00E+00	
Iron(III) fluoride	1.56E-07	0.00E+00	0.00E+00	0.00E+00	
Magnesium chloride	6.06E-08	0.00E+00	0.00E+00	0.00E+00	
Magnesium nitrate	2.02E-08	0.00E+00	0.00E+00	0.00E+00	
Magnesium sulfate	1.24E-07	0.00E+00	0.00E+00	0.00E+00	
Potassium fluoride	1.24E-07	0.00E+00	0.00E+00	0.00E+00	
Sodium fluoride	2.16E-08	0.00E+00	0.00E+00	0.00E+00	
Sodium metasilicate	5.57E-08	0.00E+00	0.00E+00	0.00E+00	
Uranyl nitrate	1.03E-09	0.00E+00	0.00E+00	0.00E+00	
Zinc nitrate	3.46E-08	0.00E+00	0.00E+00	0.00E+00	
Ammonia	5.86E-08	0.00E+00	0.00E+00	0.00E+00	
*1-Butanol	1.20E-10	0.00E+00	0.00E+00	0.00E+00	
Total	1.22E-06	0.00E+00	0.00E+00	3.26E-07	
DW Number	Undesignated	Undesignated	Undesignated	Undesignated	

Dangerous Waste Constituents - WAC 173-303-9905

Substance
Hydrogen fluoride
Barium and compounds,NOS
Cadmium 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.

5.4.2 Persistent Dangerous Wastes

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

- Collect multiple grab samples of the wastestream.
- Determine which substances in the wastestream are halogenated hydrocarbons (HH) and which are polycyclic aromatic hydrocarbons (PAH).
- Determine the upper limit of the 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.

No substances potentially present in the T Plant wastewater stream were determined to be HH, and no substances were determined to be PAH. Therefore, the T Plant wastestream is not a persistent dangerous waste.

5.4.3 Carcinogenic Dangerous Wastes

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

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

- Sum the resulting wt% contributions.
- Designate the wastestream as carcinogenic if any of the positive carcinogens are above 0.01% or if the total concentration of positive and suspected carcinogens are above 1.0%.

No positive carcinogens were identified in the wastestream, and the total wt% of suspected carcinogens is 3.26 E-07. Therefore, the T Plant wastewater stream is not a carcinogenic dangerous waste.

5.5 DANGEROUS WASTE CHARACTERISTICS

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

5.5.1 Ignitability

Based on closed-cup testing that shows the mean flashpoint of the wastewater is 2.11 E+02 °F, the T Plant wastewater is not an ignitable waste.

5.5.2 Corrosivity

A waste is a corrosive dangerous waste if the stream exhibited a pH of ≤2.0 or ≥12.5. The comparison to this characteristic was based on the lower limit of the 90%CI for a stream with a mean value of pH <7.25 and the upper limit of the one-sided 90%CI for a stream with a mean value of pH ≥7.25. Because the pH values observed during sampling were 7.64 (i.e., upper limit of the one-sided 90%CI), 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 (EPA 1986) provides more quantitative indicator levels for cyanide and sulfide. It states that levels of (equivalent) hydrogen cyanide below 250 ppm or of (equivalent) hydrogen sulfide below 500 ppm would not be considered reactive.

Total sulfide and total cyanide detected were less than 100 mg/kg. This wastestream is not a reactive dangerous waste.

5.5.4 Extraction Procedure Toxicity

A waste is an EP toxic dangerous waste if contaminant results from EP toxicity testing exceed the limits of WAC 173-303-090(8)(c). Two analytes with concentrations (i.e., upper limit of the one-sided 90%CI) above detection limits are on the EP toxic list and were found in the T Plant wastewater stream.

A waste is EP toxic dangerous waste if contaminant results from EP toxicity testing exceed the limits of WAC 173-303-090 (8)(c). No analytes with concentrations within or above the ranges given in the EP toxicity list of WAC 173-303-090 were found in the T Plant wastewater. Therefore, T Plant wastewater is not an EP toxic dangerous waste.

5.6 PROPOSED DESIGNATIONS

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

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6.0 FUTURE ACTIONS

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

6.1 FUTURE SAMPLING

The random sampling conducted during the October 1989 to March 1990 time period covered the normal operating condition of T Plant. No unsampled configurations occurred during the sampling period. Future sampling should be unnecessary.

6.2 TECHNICAL ISSUES

As shown and described in Sections 2.0 and 3.0, the effluent was sampled at the inlet to the 216-T-4-2 Ditch. This sample point was chosen because it is a common, accessible location downstream of all the contributing wastestreams. The samples collected at this point are considered to be representative of the types of constituents in the contributing wastestreams. As a result, the characterization data presented in this report is considered to be representative of the effluent stream.

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7.0 REFERENCES

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APPENDIX A

SUPPORT INFORMATION FOR T PLANT WASTEWATER

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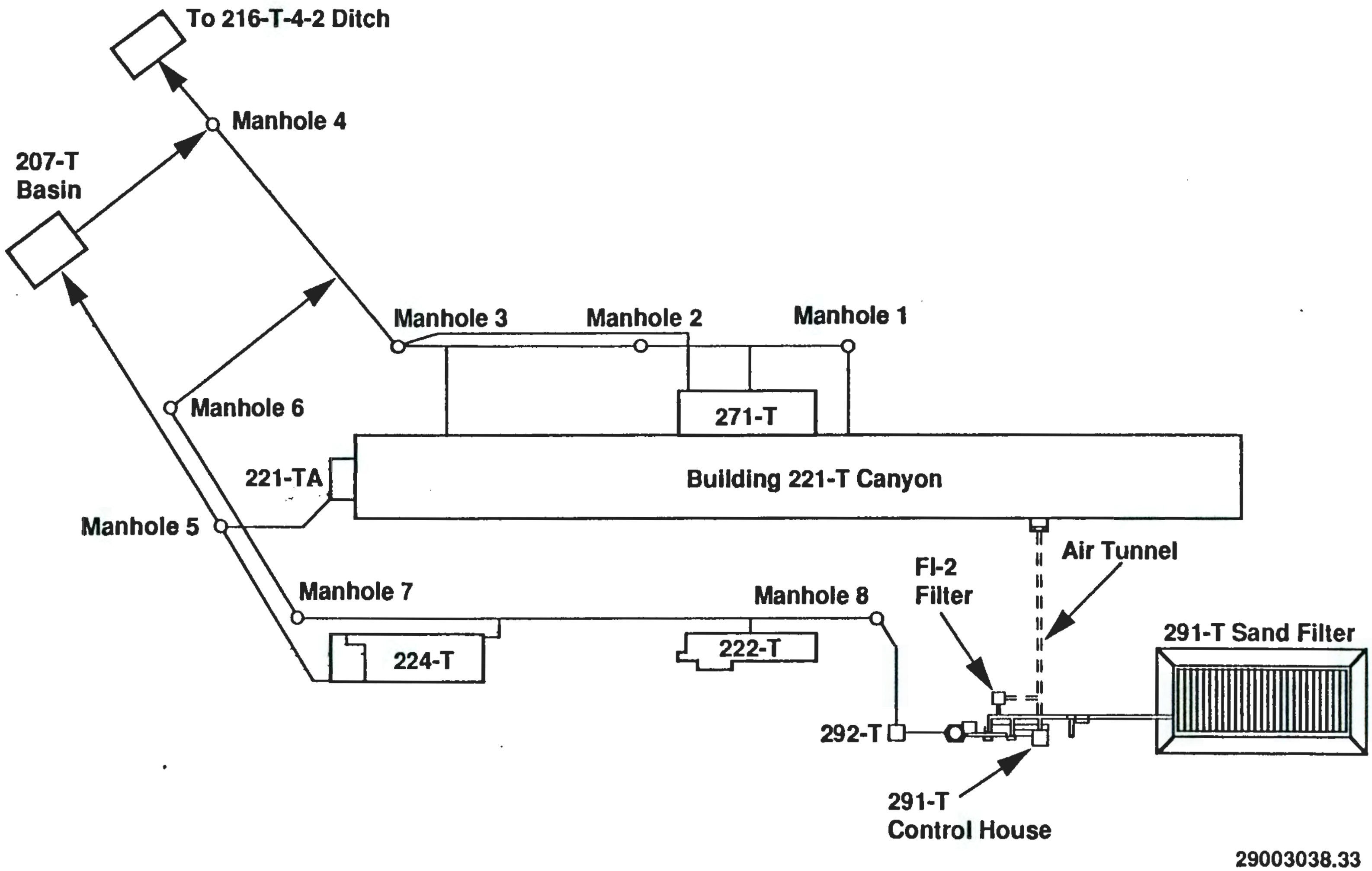
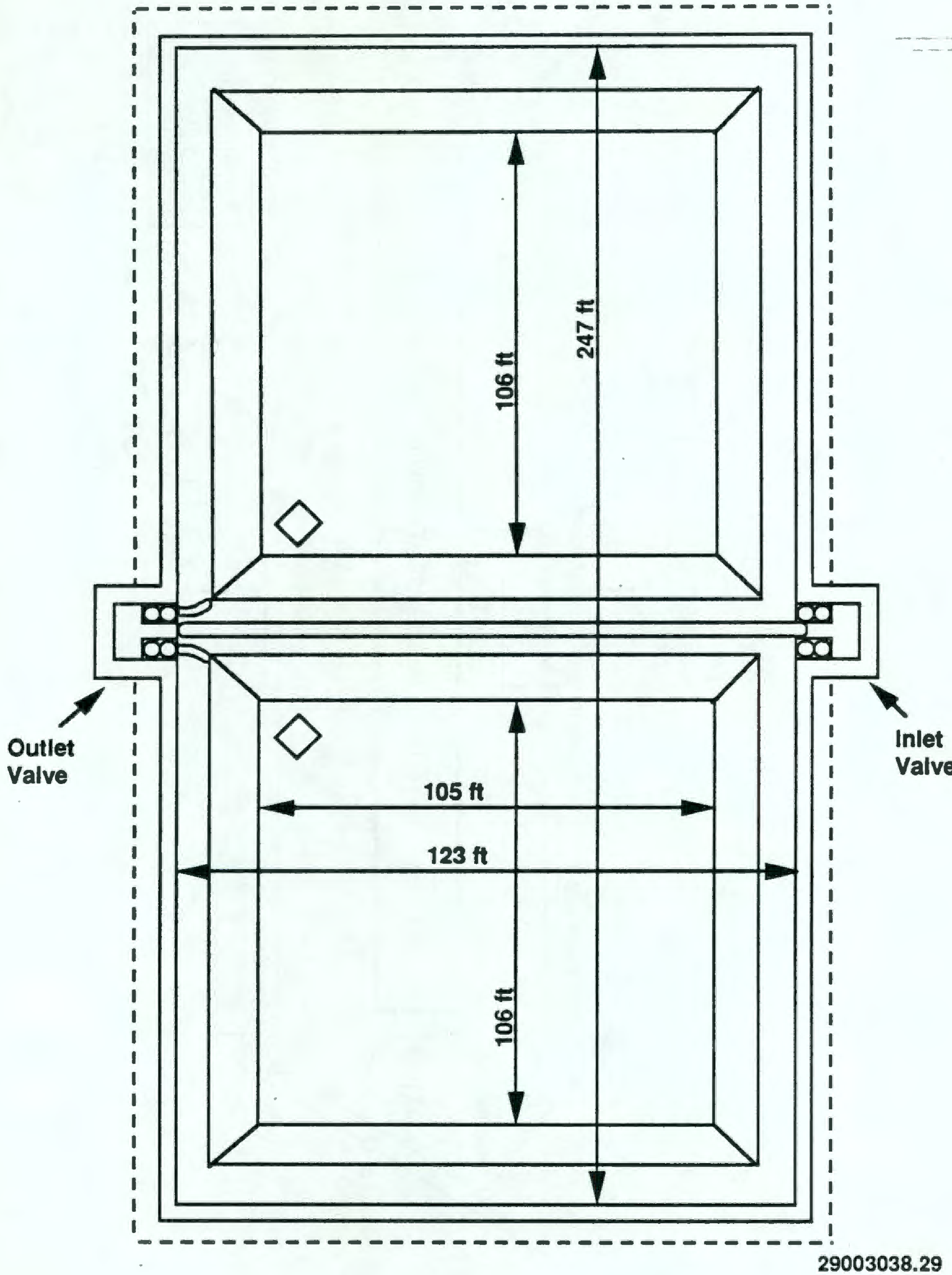


Figure A-1. Piping Diagram of the T Plant.

Figure A-2. Diagram for the 207-T Retention Basin.



9 1 1 1 8 9 5 1 0 1 2

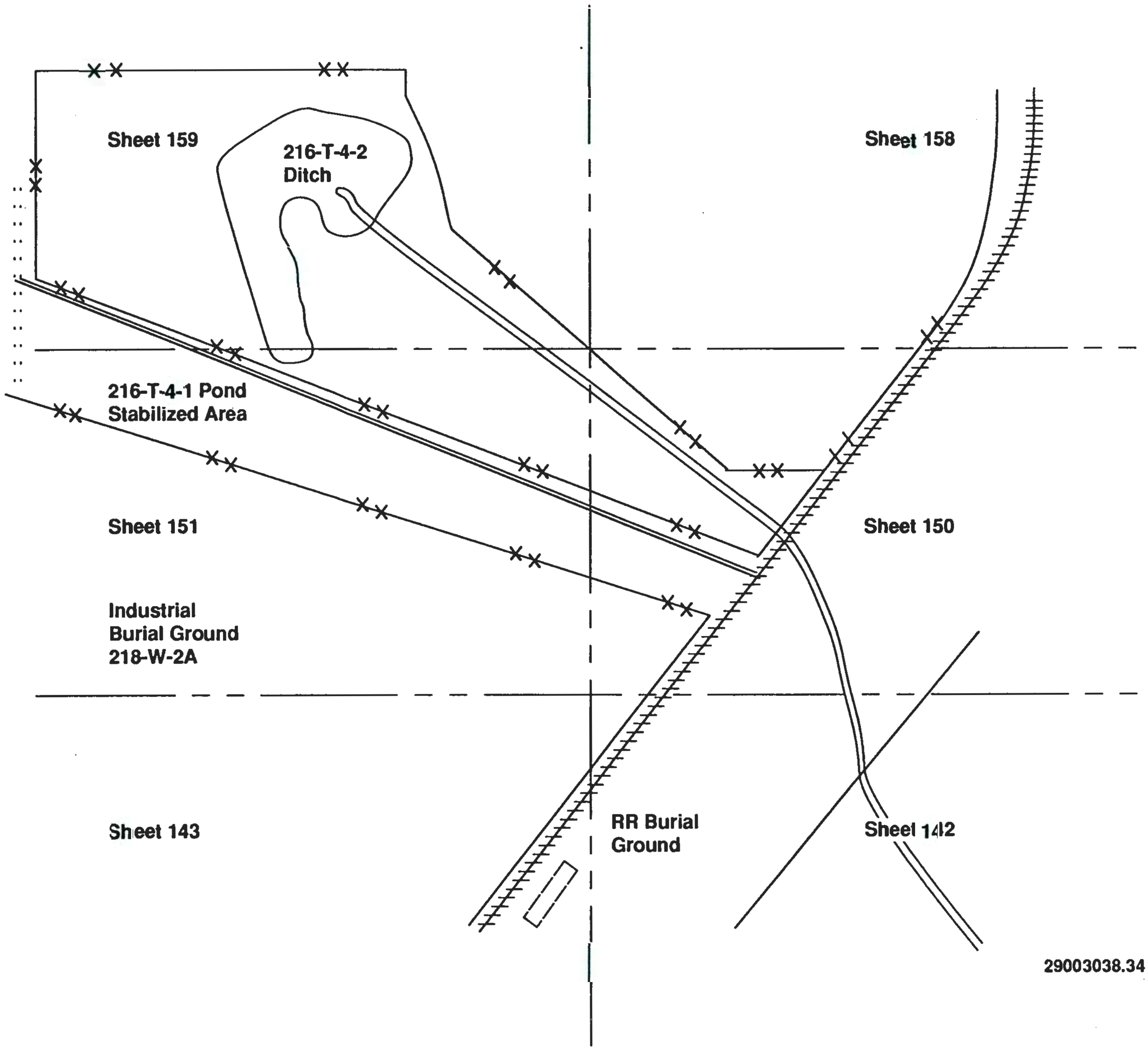


Figure A-3. Diagram for the 216-T-4-2 Ditch.

Table A-4. T Plant Material Safety Data Sheet Inventory. (sheet 1 of 2)

MSDS # (1)	Product Name	Chemical Constituent	Percentage (wt%)
168	Krylon Int./Ext. Enamel or Engine Color	67-64-1 Acetone	36-37
168	Krylon Int./Ext. Enamel or Engine Color	71-36-3 Butyl Alcohol	0.2-2.5
168	Krylon Int./Ext. Enamel or Engine Color	74-98-6 Propane	16-17
168	Krylon Int./Ext. Enamel or Engine Color	78-93-3 Methyl Ethyl Ketone	8-17
168	Krylon Int./Ext. Enamel or Engine Color	103-16-1 Methyl Isobutyl Ketone	2-4
168	Krylon Int./Ext. Enamel or Engine Color	103-65-6 2-Propane, 1-Methoxy-, Acetate	7-8
168	Krylon Int./Ext. Enamel or Engine Color	103-88-3 Tuluene	2-3
168	Krylon Int./Ext. Enamel or Engine Color	1330-20-7 Xylene	6-14
10768	Dearcide 717	Quaternary Amine -(n-Alkyl Dimethyl	
10768	Dearcide 717	Benzyl Ammonium Chloride)	12.5
10768	Dearcide 717	Bis (Tri-n-Butyltin) Oxide	
10769	Dearcide 722	Poly (oxyethylene (Dimethyliminio)·ethylene	2.25
10769	Dearcide 722	(dimethylimnio) ethylene-dichloride)	15
10988	Endcor 4690	Potassium hydroxide	<10.0
11955	Polymate 922	Potassium hydroxide(45%)	<10
12183	Scale-Cleen	Sulfamic acid	app. 95
1236	FREON 12	Dichlorodifluoromethane	ca 100
12387	Super Eilmeen 14	No hazardous constituents	0
12557	Turco Decon 4502	Potassium hydroxide	77
12557	Turco Decon 4502	Potassium chromate	3
12557	Turco Decon 4502	Potassium permanganate	20
12558	Turcon Decon 4512A	Phosphoric acid	56
12559	Turco Decon 4518	Oxalic acid	90
12560	Turco Decon 4521	Ammonium Oxalate	80
12560	Turco Decon 4521	Oxalic acid	15
12815	Alkaline Rust Remover	Sodium hydroxide	70
12815	Alkaline Rust Remover	Kerosene	1
1288	Lead	Lead	99.8
13334	Turco 5865	No hazardous constituents	0
13415	Metalworking Fluid	Highly refined base oils (CAS 64742-52-5, 64741-96-4)	90
13415	Metalworking Fluid	Inhibitors, anitweld and extreme pressure agents,	
13415	Metalworking Fluid	chlorinated paraffin wax (CAS 63449-39-8)	10
13425	D-Tar	Aromatic Petroleum Distillate	70-80
13425	D-Tar	O-Dichlordenzene	10-15
13425	D-Tar	P-Dichlordenzene	10-15
13425	D-Tar	Octylphenoxypolyethoxyethanol	5-10
13454	Shiny-Side	Sodium hydroxide	20
13454	Shiny-Side	Phosphate ester	20
13456	SS-80	Aliphatic Petroleum Distillate	50-55
13456	SS-80	1, 1, 1-Trichloroethane	app. 37
13456	SS-80	Methylene chloride	9-13

Table A-4. T Plant Material Safety Data Sheet Inventory. (sheet 2 of 2)

DS # (1)	Product Name	Chemical Constituent	Percentage (wt%)
3556	Turco Decon 4501A	Potassium hydroxide	25
3556	Turco Decon 4501A	Tetrahdroxy ethylenediamine	3
3556	Turco Decon 4501A	Monohydroxyethyl trihydroxypropyl ethylene diamine	5
4298	CTD-Plus	Methylene Chloride	70-75
4298	CTD-Plus	Dimethyl formamide	1-5
4298	CTD-Plus	Tetrahydrofuran	1-5
4402	Turco Airmulso	Aliphatic petroleum solvent	50
4402	Turco Airmulso	Sodium chromate	>0.5

NOTES: (1) MSDS = Material Safety Data Sheet. 22 Individual MSDS sheets.

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APPENDIX B

200 WEST AREA RAW WATER AND SANITARY WATER DATA

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Table B-1. Summary of 200 West Area Raw Water and Sanitary Water Data (1985-1989). (sheet 1 of 3)

Constituent/Parameter [all ppb, exceptions noted]	Raw Water[2] (1986-1987)			Sanitary Water[1] (1985-1988)		
	N[4]	AVG	STD DEV	N	AVG	STD DEV
Acetone						
Alkalinity (Method B)						
Aluminum	5	1.78E+02	5.64E+01			
Ammonia						
Arsenic				4	<5.00E+00	1.45E-08
Arsenic (EP Toxic)						
Barium	5	2.94E+01	1.36E+00	4	<1.15E+02	1.91E+01
Barium (EP Toxic)						
Boron						
1-Butanol						
Cadmium				4	<5.00E-01	0.00E+00
Cadmium (EP Toxic)						
Calcium	5	1.76E+04	2.42E+03			
Chromium				4	<6.25E+00	2.50E+00
Chromium (EP Toxic)						
Chloride						
Conductivity-field (μS)	5	9.40E+01	4.16E+01			
Copper	5	1.52E+01	7.12E+00	4	<4.00E+01	2.00E+01
Coliform (col./100 mL)						
Color (units)				4	<6.25E+03	2.50E+03
Ignitability (°F)						
Iron	5	1.14E+02	1.28E+02	4	<2.50E+02	2.68E+02
Fluoride				4	<1.08E+02	1.50E+01
Lead	3	8.13E+00	4.43E+00	4	<5.00E+00	1.45E-08
Lead (EP Toxic)						
Magnesium	5	4.12E+03	4.84E+02			
Manganese	5	1.68E+01	1.78E+01	4	<1.00E+01	2.90E-08
Mercury				4	<5.00E-01	0.00E+00
Mercury (EP Toxic)						
Nitrate				4	<8.50E+01	4.12E+01
pH (dimensionless)	5	6.52E+00	9.30E-01			
Potassium	5	7.88E+02	3.80E+01			

Table B-1. Summary of 200 West Area Raw Water and Sanitary Water Data (1985-1989). (sheet 2 of 3)

Constituent/Parameter [all ppb, exceptions noted]	Raw Water[2] (1986-1987)			Sanitary Water[1] (1985-1988)		
	N[4]	AVG	STD DEV	N	AVG	STD DEV
Reactivity Cyanide (mg/kg)						
Reactivity Sulfide (mg/kg)						
Selenium				4	<4.25E+00	1.50E+00
Selenium (EP Toxic)						
Silicon						
Silver				4	<6.25E+00	2.50E+00
Silver (EP Toxic)						
Sodium	5	2.23E+03	8.30E+01	4	2.20E+03	1.15E+02
Strontium						
Sulfate	5	9.83E+03	1.25E+03	4	1.47E+04	1.16E+03
Sulfide	5	1.00E+03	7.72E-05			
Suspended Solids (mg/L)						
Temperature-field (C)	5	1.48E+01	6.08E+00			
Titanium						
Total Carbon (μg/g)						
TOC (μg/g)	5	1.61E+03	4.26E+02			
TOX (μg (Cl)/L)	4	1.44E+01	7.19E+00			
TDS (mg/L)				4	7.95E+04	1.28E+04
Trichloromethane						
Uranium						
Zinc	5	7.60E+00	8.00E-01	4	<1.03E+02	4.50E+01
Radionuclides (pCi/L)						
Alpha Activity	5	2.30E+00	3.12E+00			
Beta Activity	5	1.05E+01	1.31E+01			
^{241}Am						
^{60}Co						
^{137}Cs						
^{129}I						
^{131}I						

Table B-1. Summary of 200 West Area Raw Water and Sanitary Water Data (1985-1989). (sheet 3 of 3)

Constituent/Parameter [all ppb, exceptions noted]	Raw Water[2] (1986-1987)			Sanitary Water[1] (1985-1988)		
	N[4]	AVG	STD DEV	N	AVG	STD DEV
^{238}Pu						
^{239}Pu						
^{90}Sr						
^{234}U						
^{235}U						
^{238}U						

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

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

[3]Data from sampling campaign conducted October 1, 1989, to March 30, 1990, in support of Stream Specific Reports.

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

ppb = parts per billion
μS = microSiemens
μg = micrograms
TOC = Total Organic Carbon
TOX = Total Organic Halides.

Table B-2. 200 West Sanitary Water--Organic Data (1987-1988).[a]

Constituent/Parameter [all ppb, exceptions noted]	200 West[b]		
	N	AVG	STD DEV
1,1,1-Trichloroethane	1	<DL[c]	NA
1,1 Dichloroethylene	1	<DL	NA
1,2,-Dichloroethane	1	<DL	NA
1,3,5-Trimethylbenzene	1	<DL	NA
Benzene	1	<DL	NA
Bromodichloromethane	5	1.59E+00	6.88E-01
Bromoform	5	<DL	NA
Carbon Tetrachloride	1	<DL	NA
Chlorodibromomethane	5	<DL	NA
Chloroform	5	2.20E+01	1.26E+01
Difluorodichloromethane	2	<DL	NA
Ethlylbenzene	1	<DL	NA
o-Xylene	1	<DL	NA
p-Chlorotoluene	1	<DL	NA
p-Dichlorobenzene	1	<DL	NA
Tetrachloroethylene	1	<DL	NA
Toluene	1	<DL	NA
Trichloroethylene	1	<DL	NA
Vinyl Chloride	1	<DL	NA

[a]The data given in this table were compiled by Hanford Environmental Health Foundation (HEHF). Data sets included first quarter 1987 and quarterly 1988 data. The total trihalomethane concentration for the 200 and 300 Areas appear in *Hanford Sanitary Water Quality Surveillance Report for CY 1988*, HEHF-74 (HEHF 1989), and *Hanford Sanitary Water Quality Surveillance Report for CY 1989*, HEHF-76 (Thurman 1990).

[b]N is defined as the number of test results available for a particular analyte; N may reflect both single and multiple data sets. For N = 1 the sole available data entry is listed as "avg."

[c]See companion table for organic detection limits as compiled from HEHF data.

DL = detection limit
pbb = parts per billion.

APPENDIX C

TOTAL DATA FOR T PLANT WASTEWATER

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Table C-1. Data for T Plant Wastewater. (sheet 1 of 10)

Constituent	Sample #	Date	Method	Result
Aluminum	50025	12/13/85	ICP	<1.50E+02
Aluminum	50038	5/06/86	ICP	3.61E+02
Aluminum	50119	8/27/86	ICP	<1.50E+02
Aluminum	50174	11/07/86	ICP	<1.50E+02
Aluminum	50210	1/05/87	ICP	<1.50E+02
Aluminum	50681	10/13/89	ICP	<1.50E+02
Aluminum	50697	10/17/89	ICP	<1.50E+02
Aluminum	50808	11/28/89	ICP	<1.50E+02
Aluminum	51036	3/09/90	ICP	<1.50E+02
Arsenic (EP Toxic)	50681E	10/13/89	ICP	<5.00E+02
Arsenic (EP Toxic)	50697E	10/17/89	ICP	<5.00E+02
Arsenic (EP Toxic)	50808E	11/28/89	ICP	<5.00E+02
Arsenic (EP Toxic)	51036E	3/09/90	ICP	<5.00E+02
Barium	50025	12/13/85	ICP	2.10E+01
Barium	50038	5/06/86	ICP	2.90E+01
Barium	50119	8/27/86	ICP	3.10E+01
Barium	50174	11/07/86	ICP	2.50E+01
Barium	50210	1/05/87	ICP	2.80E+01
Barium	50681	10/13/89	ICP	3.30E+01
Barium	50697	10/17/89	ICP	3.00E+01
Barium	50808	11/28/89	ICP	2.70E+01
Barium	51036	3/09/90	ICP	3.00E+01
Barium (EP Toxic)	50681E	10/13/89	ICP	<1.00E+03
Barium (EP Toxic)	50697E	10/17/89	ICP	<1.00E+03
Barium (EP Toxic)	50808E	11/28/89	ICP	<1.00E+03
Barium (EP Toxic)	51036E	3/09/90	ICP	<1.00E+03
Boron	50681	10/13/89	ICP	2.20E+01
Boron	50697	10/17/89	ICP	<1.00E+01
Boron	50808	11/28/89	ICP	1.30E+01
Boron	51036	3/09/90	ICP	3.50E+01
Cadmium	50025	12/13/85	ICP	<2.00E+00
Cadmium	50038	5/06/86	ICP	<2.00E+00
Cadmium	50119	8/27/86	ICP	<2.00E+00
Cadmium	50174	11/07/86	ICP	<2.00E+00
Cadmium	50210	1/05/87	ICP	<2.00E+00
Cadmium	50681	10/13/89	ICP	2.00E+00
Cadmium	50697	10/17/89	ICP	<2.00E+00
Cadmium	50808	11/28/89	ICP	<2.00E+00
Cadmium	51036	3/09/90	ICP	<2.00E+00
Cadmium (EP Toxic)	50681E	10/13/89	ICP	<1.00E+02
Cadmium (EP Toxic)	50697E	10/17/89	ICP	<1.00E+02
Cadmium (EP Toxic)	50808E	11/28/89	ICP	<1.00E+02
Cadmium (EP Toxic)	51036E	3/09/90	ICP	<1.00E+02
Calcium	50025	12/13/85	ICP	1.12E+04
Calcium	50038	5/06/86	ICP	1.67E+04
Calcium	50119	8/27/86	ICP	1.97E+04
Calcium	50174	11/07/86	ICP	1.64E+04

Table C-1. Data for T Plant Wastewater. (sheet 2 of 10)

Constituent	Sample #	Date	Method	Result
Calcium	50210	1/05/87	ICP	1.50E+04
Calcium	50681	10/13/89	ICP	2.18E+04
Calcium	50697	10/17/89	ICP	1.84E+04
Calcium	50808	11/28/89	ICP	1.50E+04
Calcium	51036	3/09/90	ICP	2.10E+04
Chloride	50025	12/13/85	IC	7.89E+02
Chloride	50038	5/06/86	IC	1.15E+03
Chloride	50119	8/27/86	IC	1.90E+03
Chloride	50174	11/07/86	IC	6.48E+02
Chloride	50210	1/05/87	IC	8.22E+02
Chloride	50681	10/13/89	IC	1.30E+03
Chloride	50697	10/17/89	IC	1.10E+03
Chloride	50808	11/28/89	IC	1.10E+03
Chloride	51036	3/09/90	IC	1.20E+03
Chromium (EP Toxic)	50681E	10/13/89	ICP	<5.00E+02
Chromium (EP Toxic)	50697E	10/17/89	ICP	<5.00E+02
Chromium (EP Toxic)	50808E	11/28/89	ICP	<5.00E+02
Chromium (EP Toxic)	51036E	3/09/90	ICP	<5.00E+02
Copper	50025	12/13/85	ICP	3.40E+01
Copper	50038	5/06/86	ICP	3.70E+01
Copper	50119	8/27/86	ICP	<1.00E+01
Copper	50174	11/07/86	ICP	2.20E+01
Copper	50210	1/05/87	ICP	6.50E+01
Copper	50681	10/13/89	ICP	<1.00E+01
Copper	50697	10/17/89	ICP	1.80E+01
Copper	50808	11/28/89	ICP	3.20E+01
Copper	51036	3/09/90	ICP	<1.00E+01
Fluoride	50025	12/13/85	IC	<5.00E+02
Fluoride	50038	5/06/86	IC	<5.00E+02
Fluoride	50119	8/27/86	IC	<5.00E+02
Fluoride	50174	11/07/86	IC	<5.00E+02
Fluoride	50210	1/05/87	IC	<5.00E+02
Fluoride	50681	10/13/89	IC	<5.00E+02
Fluoride	50681	10/13/89	ISE	1.71E+02
Fluoride	50697	10/17/89	IC	<5.00E+02
Fluoride	50697	10/17/89	ISE	1.46E+02
Fluoride	50808	11/28/89	IC	<5.00E+02
Fluoride	50808	11/28/89	ISE	1.29E+02
Fluoride	51036	3/09/90	IC	<5.00E+02
Fluoride	51036	3/09/90	ISE	1.33E+02
Iron	50025	12/13/85	ICP	5.80E+01
Iron	50038	5/06/86	ICP	4.86E+02
Iron	50119	8/27/86	ICP	<5.00E+01
Iron	50174	11/07/86	ICP	1.01E+02
Iron	50210	1/05/87	ICP	3.00E+02
Iron	50681	10/13/89	ICP	9.20E+01
Iron	50697	10/17/89	ICP	3.40E+01

Table C-1. Data for T Plant Wastewater. (sheet 3 of 10)

Constituent	Sample #	Date	Method	Result
Iron	50808	11/28/89	ICP	3.10E+01
Iron	51036	3/09/90	ICP	5.90E+01
Lead (EP Toxic)	50681E	10/13/89	ICP	<5.00E+02
Lead (EP Toxic)	50697E	10/17/89	ICP	<5.00E+02
Lead (EP Toxic)	50808E	11/28/89	ICP	<5.00E+02
Lead (EP Toxic)	51036E	3/09/90	ICP	<5.00E+02
Magnesium	50025	12/13/85	ICP	2.83E+03
Magnesium	50119	8/27/86	ICP	4.40E+03
Magnesium	50174	11/07/86	ICP	3.56E+03
Magnesium	50210	1/05/87	ICP	3.48E+03
Magnesium	50681	10/13/89	ICP	4.09E+03
Magnesium	50697	10/17/89	ICP	3.98E+03
Magnesium	50808	11/28/89	ICP	3.35E+03
Magnesium	51036	3/09/90	ICP	4.48E+03
Manganese	50025	12/13/85	ICP	2.00E+01
Manganese	50038	5/06/86	ICP	1.20E+01
Manganese	50119	8/27/86	ICP	<5.00E+00
Manganese	50174	11/07/86	ICP	1.10E+01
Manganese	50210	1/05/87	ICP	3.70E+01
Manganese	50681	10/13/89	ICP	2.10E+01
Manganese	50697	10/17/89	ICP	<5.00E+00
Manganese	50808	11/28/89	ICP	<5.00E+00
Manganese	51036	3/09/90	ICP	<5.00E+00
Mercury	50025	12/13/85	CVAA	<1.00E-01
Mercury	50038	5/06/86	CVAA	<1.00E-01
Mercury	50119	8/27/86	CVAA	1.00E-01
Mercury	50174	11/07/86	CVAA	<1.00E-01
Mercury	50210	1/05/87	CVAA	<1.00E-01
Mercury	50681	10/13/89	CVAA	<1.00E-01
Mercury	50697	10/17/89	CVAA	<1.00E-01
Mercury	50808	11/28/89	CVAA	<1.00E-01
Mercury	51036	3/09/90	CVAA	<1.00E-01
Mercury (EP Toxic)	50681E	10/13/89	CVAA/M	<2.00E+01
Mercury (EP Toxic)	50697E	10/17/89	CVAA/M	<2.00E+01
Mercury (EP Toxic)	50808E	11/28/89	CVAA/M	<2.00E+01
Mercury (EP Toxic)	51036E	3/09/90	CVAA/M	<2.00E+01
Nitrate	50025	12/13/85	IC	6.83E+02
Nitrate	50038	5/06/86	IC	1.07E+03
Nitrate	50119	8/27/86	IC	1.19E+03
Nitrate	50174	11/07/86	IC	9.78E+02
Nitrate	50210	1/05/87	IC	1.07E+03
Nitrate	50681	10/13/89	IC	<5.00E+02
Nitrate	50697	10/17/89	IC	<5.00E+02
Nitrate	50808	11/28/89	IC	5.00E+02
Nitrate	51036	3/09/90	IC	<5.00E+02
Potassium	50025	12/13/85	ICP	7.62E+02
Potassium	50038	5/06/86	ICP	9.39E+02

Table C-1. Data for T Plant Wastewater. (sheet 4 of 10)

Constituent	Sample #	Date	Method	Result
Potassium	50119	8/27/86	ICP	8.92E+02
Potassium	50174	11/07/86	ICP	7.81E+02
Potassium	50210	1/05/87	ICP	8.71E+02
Potassium	50681	10/13/89	ICP	8.89E+02
Potassium	50697	10/17/89	ICP	6.70E+02
Potassium	50808	11/28/89	ICP	7.07E+02
Potassium	51036	3/09/90	ICP	7.62E+02
Selenium (EP Toxic)	50681E	10/13/89	ICP	<5.00E+02
Selenium (EP Toxic)	50697E	10/17/89	ICP	<5.00E+02
Selenium (EP Toxic)	50808E	11/28/89	ICP	<5.00E+02
Selenium (EP Toxic)	51036E	3/09/90	ICP	<5.00E+02
Silicon	50681	10/13/89	ICP	1.98E+03
Silicon	50697	10/17/89	ICP	1.96E+03
Silicon	50808	11/28/89	ICP	2.06E+03
Silicon	51036	3/09/90	ICP	2.21E+03
Silver (EP Toxic)	50681E	10/13/89	ICP	<5.00E+02
Silver (EP Toxic)	50697E	10/17/89	ICP	<5.00E+02
Silver (EP Toxic)	50808E	11/28/89	ICP	<5.00E+02
Silver (EP Toxic)	51036E	3/09/90	ICP	<5.00E+02
Sodium	50025	12/13/85	ICP	4.10E+03
Sodium	50038	5/06/86	ICP	4.13E+03
Sodium	50119	8/27/86	ICP	2.91E+03
Sodium	50174	11/07/86	ICP	2.12E+03
Sodium	50210	1/05/87	ICP	1.83E+03
Sodium	50681	10/13/89	ICP	2.27E+03
Sodium	50697	10/17/89	ICP	2.04E+03
Sodium	50808	11/28/89	ICP	1.73E+03
Sodium	51036	3/09/90	ICP	2.09E+03
Strontium	50025	12/13/85	ICP	<3.00E+02
Strontium	50038	5/06/86	ICP	<3.00E+02
Strontium	50119	8/27/86	ICP	<3.00E+02
Strontium	50174	11/07/86	ICP	<3.00E+02
Strontium	50210	1/05/87	ICP	<3.00E+02
Strontium	50681	10/13/89	ICP	1.12E+02
Strontium	50697	10/17/89	ICP	9.50E+01
Strontium	50808	11/28/89	ICP	7.70E+01
Strontium	51036	3/09/90	ICP	9.80E+01
Sulfate	50025	12/13/85	IC	7.30E+03
Sulfate	50038	5/06/86	IC	1.11E+04
Sulfate	50119	8/27/86	IC	1.12E+04
Sulfate	50174	11/07/86	IC	9.08E+03
Sulfate	50210	1/05/87	IC	8.39E+03
Sulfate	50681	10/13/89	IC	1.05E+04
Sulfate	50697	10/17/89	IC	1.02E+04
Sulfate	50808	11/28/89	IC	9.10E+03
Sulfate	51036	3/09/90	IC	1.08E+04

Table C-1. Data for T Plant Wastewater. (sheet 5 of 10)

Constituent	Sample #	Date	Method	Result
Uranium	50025	12/13/85	FLUOR	2.24E-01
Uranium	50038	5/06/86	FLUOR	8.54E-01
Uranium	50119	8/27/86	FLUOR	6.49E-01
Uranium	50174	11/07/86	FLUOR	8.97E-01
Uranium	50210	1/05/87	FLUOR	2.63E+00
Uranium	50681	10/13/89	FLUOR	6.88E-01
Uranium	50697	10/17/89	FLUOR	2.33E-01
Uranium	50808	11/28/89	FLUOR	4.88E-01
Uranium	51036	3/09/90	FLUOR	4.70E-01
Zinc	50025	12/13/85	ICP	5.80E+01
Zinc	50038	5/06/86	ICP	1.80E+01
Zinc	50119	8/27/86	ICP	9.00E+00
Zinc	50174	11/07/86	ICP	1.80E+01
Zinc	50210	1/05/87	ICP	2.60E+01
Zinc	50681	10/13/89	ICP	1.72E+02
Zinc	50697	10/17/89	ICP	7.00E+00
Zinc	50808	11/28/89	ICP	<5.00E+00
Zinc	51036	3/09/90	ICP	3.30E+01
Acetone	50681	10/13/89	VOA	<1.00E+01
Acetone	50681	10/13/89	ABN	<1.00E+01
Acetone	50681B	10/13/89	VOA	<6.00E+00
Acetone	50681T	10/13/89	VOA	1.70E+01
Acetone	50697	10/17/89	VOA	<6.00E+00
Acetone	50697	10/17/89	ABN	<1.00E+01
Acetone	50697B	10/17/89	VOA	<1.00E+01
Acetone	50697T	10/17/89	VOA	<1.00E+01
Acetone	50808	11/28/89	VOA	<1.00E+01
Acetone	50808	11/28/89	ABN	<1.00E+01
Acetone	50808B	11/28/89	VOA	<1.00E+01
Acetone	50808T	11/28/89	VOA	<1.00E+01
Acetone	51036	3/09/90	VOA	<1.00E+01
Acetone	51036	3/09/90	ABN	<1.00E+01
Acetone	51036B	3/09/90	VOA	<1.00E+01
Acetone	51036T	3/09/90	VOA	<5.00E+00
Ammonia	50025	12/13/85	ISE	<5.00E+01
Ammonia	50038	5/06/86	ISE	<5.00E+01
Ammonia	50119	8/27/86	ISE	<5.00E+01
Ammonia	50174	11/07/86	ISE	<5.00E+01
Ammonia	50210	1/05/87	ISE	<5.00E+01
Ammonia	50681	10/13/89	ISE	6.20E+01
Ammonia	50697	10/17/89	ISE	5.40E+01
Ammonia	50808	11/28/89	ISE	<5.00E+01
Ammonia	51036	3/09/90	ISE	<5.00E+01
1-Butanol	50681	10/13/89	DIGC	<1.00E+04
1-Butanol	50697	10/17/89	DIGC	<1.00E+04
1-Butanol	50808	11/28/89	DIGC	<1.00E+04
1-Butanol	51036	3/09/90	VOA	1.20E+01

Table C-1. Data for T Plant Wastewater. (sheet 6 of 10)

Constituent	Sample #	Date	Method	Result
1-Butanol	51036	3/09/90	DIGC	<1.00E+04
1-Butanol	51036B	3/09/90	VOA	1.00E+01
1-Butanol	51036T	3/09/90	VOA	1.10E+01
Dichloromethane	50025	12/13/85	VOA	<1.00E+01
Dichloromethane	50038	5/06/86	VOA	<1.00E+01
Dichloromethane	50038B	5/06/86	VOA	<1.00E+01
Dichloromethane	50119	8/27/86	VOA	<1.00E+01
Dichloromethane	50119B	8/27/86	VOA	1.40E+02
Dichloromethane	50174	11/07/86	VOA	<1.00E+01
Dichloromethane	50174B	11/07/86	VOA	1.03E+02
Dichloromethane	50210	1/05/87	VOA	<1.00E+01
Dichloromethane	50210B	1/05/87	VOA	5.30E+01
Dichloromethane	50681	10/13/89	VOA	<5.00E+00
Dichloromethane	50681B	10/13/89	VOA	4.10E+02
Dichloromethane	50681T	10/13/89	VOA	4.20E+02
Dichloromethane	50697	10/17/89	VOA	<5.00E+00
Dichloromethane	50697B	10/17/89	VOA	<3.00E+00
Dichloromethane	50697T	10/17/89	VOA	1.20E+01
Dichloromethane	50808	11/28/89	VOA	<5.00E+00
Dichloromethane	50808B	11/28/89	VOA	6.00E+00
Dichloromethane	50808T	11/28/89	VOA	6.00E+00
Dichloromethane	51036	3/09/90	VOA	<5.00E+00
Dichloromethane	51036B	3/09/90	VOA	<5.00E+00
Dichloromethane	51036T	3/09/90	VOA	<5.00E+00
Tetrahydrofuran	50681	10/13/89	VOA	<1.00E+01
Tetrahydrofuran	50681B	10/13/89	VOA	<1.00E+01
Tetrahydrofuran	50681T	10/13/89	VOA	<1.00E+01
Tetrahydrofuran	50697	10/17/89	VOA	<1.00E+01
Tetrahydrofuran	50697B	10/17/89	VOA	1.40E+01
Tetrahydrofuran	50697T	10/17/89	VOA	<1.00E+01
Tetrahydrofuran	50808	11/28/89	VOA	<1.00E+01
Tetrahydrofuran	50808B	11/28/89	VOA	<8.00E+00
Tetrahydrofuran	50808T	11/28/89	VOA	<6.00E+00
Tetrahydrofuran	51036	3/09/90	VOA	<1.00E+01
Tetrahydrofuran	51036B	3/09/90	VOA	<1.00E+01
Tetrahydrofuran	51036T	3/09/90	VOA	<6.00E+00
Trichloromethane	50025	12/13/85	VOA	<1.00E+01
Trichloromethane	50038	5/06/86	VOA	<1.00E+01
Trichloromethane	50038B	5/06/86	VOA	<1.00E+01
Trichloromethane	50119	8/27/86	VOA	<1.00E+01
Trichloromethane	50119B	8/27/86	VOA	<1.00E+01
Trichloromethane	50174	11/07/86	VOA	<1.00E+01
Trichloromethane	50174B	11/07/86	VOA	<1.00E+01
Trichloromethane	50210	1/05/87	VOA	<1.00E+01
Trichloromethane	50210B	1/05/87	VOA	<1.00E+01
Trichloromethane	50681	10/13/89	VOA	<5.00E+00
Trichloromethane	50681B	10/13/89	VOA	<5.00E+00

Table C-1. Data for T Plant Wastewater. (sheet 7 of 10)

Constituent	Sample #	Date	Method	Result
Trichloromethane	50681T	10/13/89	VOA	<5.00E+00
Trichloromethane	50697	10/17/89	VOA	<5.00E+00
Trichloromethane	50697B	10/17/89	VOA	<5.00E+00
Trichloromethane	50697T	10/17/89	VOA	<5.00E+00
Trichloromethane	50808	11/28/89	VOA	<5.00E+00
Trichloromethane	50808B	11/28/89	VOA	7.00E+00
Trichloromethane	50808T	11/28/89	VOA	6.00E+00
Trichloromethane	51036	3/09/90	VOA	<5.00E+00
Trichloromethane	51036B	3/09/90	VOA	<5.00E+00
Trichloromethane	51036T	3/09/90	VOA	<5.00E+00
Unknown amide	50697	10/17/89	ABN	2.60E+01
Alkalinity (Method B)	50681	10/13/89	TITRA	5.80E+04
Alkalinity (Method B)	50697	10/17/89	TITRA	5.80E+04
Alkalinity (Method B)	50808	11/28/89	TITRA	5.30E+04
Alkalinity (Method B)	51036	3/09/90	TITRA	5.90E+04
Alpha Activity (pCi/L)	50025	12/13/85	Alpha	1.87E+00
Alpha Activity (pCi/L)	50038	5/06/86	Alpha	5.28E-01
Alpha Activity (pCi/L)	50119	8/27/86	Alpha	3.61E-01
Alpha Activity (pCi/L)	50174	11/07/86	Alpha	3.96E-01
Alpha Activity (pCi/L)	50210	1/05/87	Alpha	2.18E+00
Alpha Activity (pCi/L)	50681	10/13/89	Alpha	<6.88E-01
Alpha Activity (pCi/L)	50697	10/17/89	Alpha	<4.42E-01
Alpha Activity (pCi/L)	50808	11/28/89	Alpha	<4.45E-01
Alpha Activity (pCi/L)	51036	3/09/90	Alpha	<2.06E-01
Beta Activity (pCi/L)	50025	12/13/85	Beta	4.51E+02
Beta Activity (pCi/L)	50038	5/06/86	Beta	2.07E+01
Beta Activity (pCi/L)	50119	8/27/86	Beta	1.63E+01
Beta Activity (pCi/L)	50174	11/07/86	Beta	4.68E+01
Beta Activity (pCi/L)	50210	1/05/87	Beta	5.50E+01
Beta Activity (pCi/L)	50681	10/13/89	Beta	<1.93E+00
Beta Activity (pCi/L)	50697	10/17/89	Beta	<7.96E-01
Beta Activity (pCi/L)	50808	11/28/89	Beta	4.01E+00
Beta Activity (pCi/L)	51036	3/09/90	Beta	3.63E+00
Conductivity (µS)	50025	12/13/85	COND-Fld	1.16E+02
Conductivity (µS)	50038	5/06/86	COND-Fld	1.40E+01
Conductivity (µS)	50119	8/27/86	COND-Fld	1.42E+02
Conductivity (µS)	50174	11/07/86	COND-Fld	1.29E+02
Conductivity (µS)	50210	1/05/87	COND-Fld	1.20E+02
Conductivity (µS)	50681	10/13/89	COND-Fld	1.21E+02
Conductivity (µS)	50697	10/17/89	COND-Fld	1.22E+02
Conductivity (µS)	50808	11/28/89	COND-Fld	2.00E+02
Conductivity (µS)	51036	3/09/90	COND-Fld	1.47E+02
Ignitability (°F)	50681E	10/13/89	IGNIT	2.12E+02
Ignitability (°F)	50697E	10/17/89	IGNIT	2.10E+02
Ignitability (°F)	50808E	11/28/89	IGNIT	2.08E+02
Ignitability (°F)	51036E	3/09/90	IGNIT	2.14E+02

Table C-1. Data for T Plant Wastewater. (sheet 8 of 10)

Constituent	Sample #	Date	Method	Result
pH (dimensionless)	50025	12/13/85	PH-Fld	7.05E+00
pH (dimensionless)	50038	5/06/86	PH-Fld	6.72E+00
pH (dimensionless)	50119	8/27/86	PH-Fld	7.30E+00
pH (dimensionless)	50174	11/07/86	PH-Fld	5.20E+00
pH (dimensionless)	50210	1/05/87	PH-Fld	5.24E+00
pH (dimensionless)	50681	10/13/89	PH-Fld	6.80E+00
pH (dimensionless)	50697	10/17/89	PH-Fld	7.20E+00
pH (dimensionless)	50808	11/28/89	PH-Fld	7.55E+00
pH (dimensionless)	51036	3/09/90	PH-Fld	7.70E+00
Reactivity Cyanide (mg/kg)	50681E	10/13/89	DSPEC	<1.00E+02
Reactivity Cyanide (mg/kg)	50697E	10/17/89	DSPEC	<1.00E+02
Reactivity Cyanide (mg/kg)	50808E	11/28/89	DSPEC	<1.00E+02
Reactivity Cyanide (mg/kg)	51036E	3/09/90	DSPEC	<1.00E+02
Reactivity Sulfide (mg/kg)	50681E	10/13/89	DTITRA	<1.00E+02
Reactivity Sulfide (mg/kg)	50697E	10/17/89	DTITRA	<1.00E+02
Reactivity Sulfide (mg/kg)	50808E	11/28/89	DTITRA	<1.00E+02
Reactivity Sulfide (mg/kg)	51036E	3/09/90	DTITRA	<1.00E+02
TDS	50681	10/13/89	TDS	5.80E+04
TDS	50697	10/17/89	TDS	6.10E+04
TDS	50808	11/28/89	TDS	6.30E+04
TDS	51036	3/09/90	TDS	6.00E+04
Temperature (°C)	50025	12/13/85	TEMP-Fld	1.94E+01
Temperature (°C)	50038	5/06/86	TEMP-Fld	1.81E+01
Temperature (°C)	50119	8/27/86	TEMP-Fld	2.86E+01
Temperature (°C)	50174	11/07/86	TEMP-Fld	2.31E+01
Temperature (°C)	50210	1/05/87	TEMP-Fld	1.99E+01
Temperature (°C)	50681	10/13/89	TEMP-Fld	1.75E+01
Temperature (°C)	50697	10/17/89	TEMP-Fld	1.81E+01
Temperature (°C)	50808	11/28/89	TEMP-Fld	1.56E+01
Temperature (°C)	51036	3/09/90	TEMP-Fld	1.40E+01
TOC	50025	12/13/85	TOC	1.69E+03
TOC	50038	5/06/86	TOC	4.37E+03
TOC	50119	8/27/86	TOC	1.56E+03
TOC	50174	11/07/86	TOC	<6.03E+02
TOC	50210	1/05/87	TOC	<8.01E+02
TOC	50681	10/13/89	TOC	<1.80E+03
TOC	50697	10/17/89	TOC	<1.50E+03
TOC	50808	11/28/89	TOC	<1.20E+03
TOC	51036	3/09/90	TOC	1.00E+03
Total Carbon	50681	10/13/89	TC	1.50E+04
Total Carbon	50697	10/17/89	TC	1.60E+04
Total Carbon	50808	11/28/89	TC	1.54E+04
Total Carbon	51036	3/09/90	TC	1.54E+04
TOX (as Cl)	50025	12/13/85	TOX	<5.60E+00
TOX (as Cl)	50038	5/06/86	TOX	<1.74E+01
TOX (as Cl)	50119	8/27/86	TOX	<3.68E+01
TOX (as Cl)	50174	11/07/86	TOX	<1.00E+02

Table C-1. Data for T Plant Wastewater. (sheet 9 of 10)

Constituent	Sample #	Date	Method	Result
TOX (as Cl)	50210	1/05/87	LTOX	<2.00E+01
TOX (as Cl)	50681	10/13/89	LTOX	1.40E+01
TOX (as Cl)	50697	10/17/89	LTOX	<8.00E+00
TOX (as Cl)	50808	11/28/89	LTOX	2.00E+01
TOX (as Cl)	51036	3/09/90	LTOX	<9.00E+00
^{137}Cs (pCi/L)	50681	10/13/89	GEA	<4.34E-02
^{137}Cs (pCi/L)	50697	10/17/89	GEA	<1.89E-01
^{137}Cs (pCi/L)	50808	11/28/89	GEA	<9.76E-01
^{137}Cs (pCi/L)	51036	3/09/90	GEA	1.86E+00
Radium Total (pCi/L)	50681	10/13/89	Alpha-Ra	<1.39E-01
Radium Total (pCi/L)	50697	10/17/89	Alpha-Ra	1.48E-01
Radium Total (pCi/L)	51036	3/09/90	Alpha-Ra	<3.79E-02

Sample# is the number of the sample. See Section 3.0 for corresponding chain-of-custody number. Date is the sampling date. Results are in ppb (parts per billion) unless otherwise indicated. The following table lists the methods that are coded in the method column.

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

Table C-1. Data for T Plant Wastewater. (sheet 10 of 10)

Constituent	Sample #	Date	Method	Result

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

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

References:

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

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

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

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

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