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WHC-EP-0342
Addendum 30

241-AY/AZ Tank Farms Steam Condensate 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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Tank Farms Environmental Engineering

Date Published
August 1990

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Westinghouse Hanford Company
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Richland, Washington 99352

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241-AY/AZ TANK FARMS STEAM CONDENSATE STREAM-SPECIFIC REPORT

Tank Farms Environmental Engineering

ABSTRACT

The proposed wastestream designation for the 200 East Area 241-AY/AZ Tank Farms Steam Condensate 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, based on historical data for the 200 East Area 241-AY/AZ Tank Farms Steam Condensate wastestream, 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 are compared to the dangerous waste criteria (WAC 173-303-100) and dangerous waste characteristics (WAC 173-303-090). Process knowledge was based on knowledge of the process configuration and operations in the tank farm facilities (including the chemicals that are utilized). Sample data are based on analytical results of samples taken downstream of all process contributors and are limited to the analysis of a single sample from October 11, 1988. This stream currently is being sent to the double-shell tank system and does not go to the soil. Confirmation of the stream designation pursuant to the WAC 173-303 requirements is required shortly after the commencement of any future discharge to the environment.

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

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LIST OF TERMS

BDL	below detection limits
BPJ	Best Professional Judgment
CI	confidence interval
CY	calendar year
DOE	U.S. Department of Energy
EC	equivalent concentration
Ecology	Washington State Department of Ecology
EP	extraction procedure
EPA	U.S. Environmental Protection Agency
FY	fiscal year
GFAA	graphite furnace atomic absorption
HH	halogenated hydrocarbons
HVAC	heating, ventilation, and air conditioning system
IC	ion chromatography
ICAP	inductively coupled plasma spectrometer
LDL	lower detection limit
MSDS	Material Safety Data Sheet
PAH	polycyclic aromatic hydrocarbons
SC	specific carcinogen
TC	total carcinogen
TOC	total organic carbon
TOX	total organic halides
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
WAC	Washington (State) Administrative Code

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241-AY/AZ TANK FARMS STEAM CONDENSATE 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 1990a), a portion of which characterizes 33 liquid effluent streams. This characterization consists of integrating the following elements, pursuant to the Washington (State) Administrative Code, (WAC) 173-303, *Dangerous Waste Regulations* (Ecology 1989): process knowledge, 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 East Area 241-AY/AZ Tank Farms Steam Condensate wastestream in sufficient detail so that a wastestream designation, in accordance with WAC 173-303, can be proposed. This report also provides a means of assessing the relative effluent priorities with regard to the need for treatment and/or alternative disposal practices.

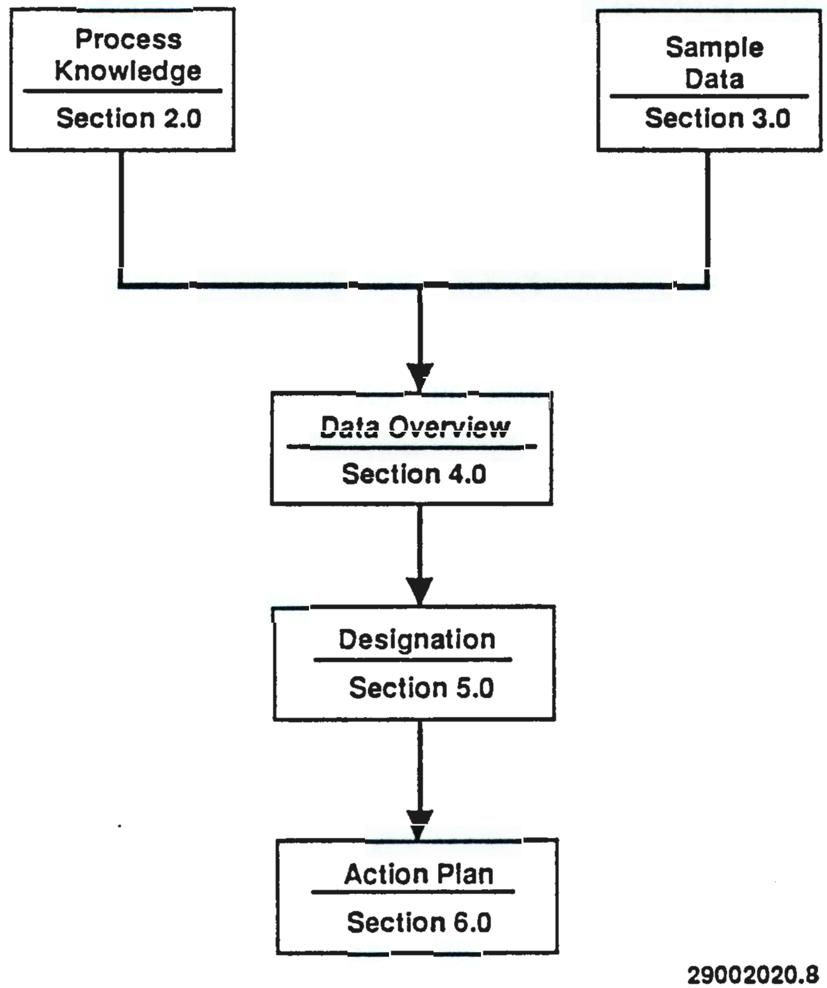
The characterization strategy undertaken in this report (shown in Figure 1-1) is implemented by means of the following steps:

1. Describe the current process based on the knowledge of the system and the chemical/radiological constituents that are known to be present. An historical perspective of the process configuration along with future projects/upgrades has also been presented so the reader can better understand the current status and current/future disposition of the effluent (Section 2.0).

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.



2. Characterize the wastestream by presenting chemical and radioactive analytical results from samples taken over time in the wastestream (Section 3.0).

3. Compare characterization data obtained through both process knowledge and sampling information. Provide an estimate of stream loadings for radionuclides and chemical constituents based on these factors (Section 4.0).

4. Utilize the process knowledge and sample data to propose a dangerous waste designation (Section 5.0).

5. Identify new tasks needed to further characterize the wastestream or to demonstrate continued compliance (Section 6.0).

1.3 SCOPE

The scope of this report is to characterize the current 241-AY/AZ Tank Farms Steam Condensate effluent that is returned to aging-waste tanks in the 241-AY/AZ Tank Farms. This report does not address any other wastestream leaving 241-AY/AZ (e.g., solid waste, gaseous waste, or sanitary waste).

Historical changes, process campaign changes, and sampling data are considered only if relevant to the characterization of the wastestream as it presently exists. Future configuration and process modifications are addressed if they will significantly alter the present effluent.

2.0 PROCESS KNOWLEDGE

This section presents a qualitative and quantitative process knowledge characterization of the chemical and radiological constituents of the 200 East Area 241-AY/AZ Tank Farms Steam Condensate wastestream. The process knowledge is discussed in terms of the following factors:

1. Location and physical layout of the process facility
2. The identity of the wastestream contributors
3. A general description of the present, past, and future activities of the process
4. The identity of constituents that are known to be present in each of the contributors.

2.1 PHYSICAL LAYOUT

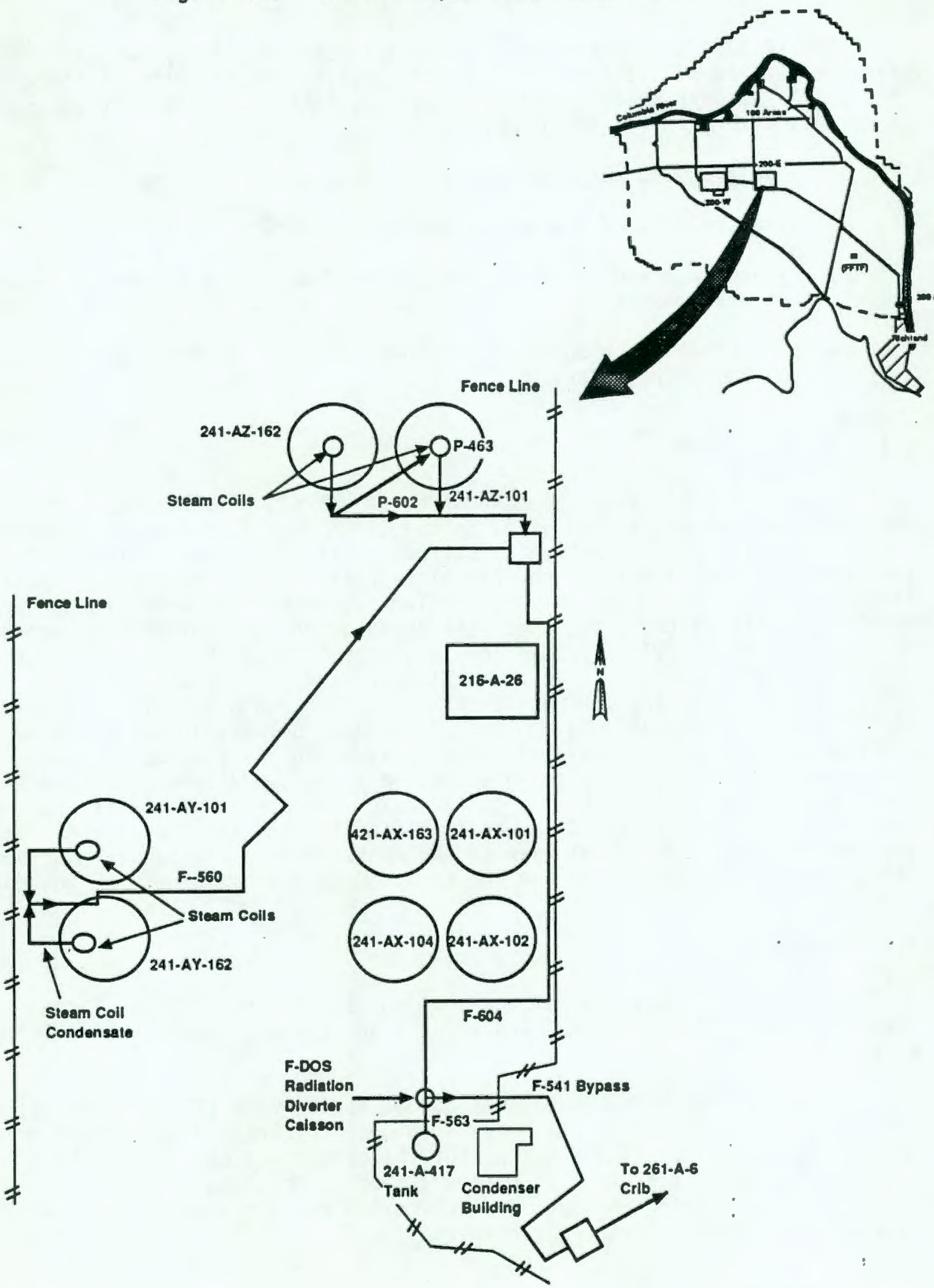
The aging-waste tanks (also known as 241-AY/AZ) are located in the 200 East Area of the Hanford Site, in the 241-A Tank Farm Complex, located northeast of the Plutonium-Uranium Extraction (PUREX) Plant. The 241-AY Tank Farm is located west of the 241-AX Tank Farm and southwest of the 241-AZ Tank Farm. Each of the 241-AY and -AZ Tank Farms has two underground double-shell tanks (DST) equipped with above-ground monitoring and control facilities. These DSTs are used for safe storage of high-level radioactive waste. The primary tank is 75 ft in diameter and the secondary tank is 80 ft in diameter. The concrete exterior is 89 ft in diameter. The dome is 45 ft 9 in. high at the dome center. The steam coil within each tank is constructed of type 304 stainless steel. Although all four aging-waste tanks are equipped to store aging waste, only the two 241-AZ tanks currently contain aging waste. The 241-AY tanks, which contain other wastes, were completed in 1970. Tank 102-AZ was completed in 1974 and tank 101-AZ was finished in 1977. An aerial view of the tanks showing the position of the tanks relative to each other and the surrounding area is shown in Figure 2-1.

2.2 CONTRIBUTORS

Condensates from the steam coils of the 241-AY and -AZ Tank Farms (tanks 101-AY, 102-AY, 101-AZ, and 102-AZ) are the only contributors to this wastestream.

The total flow from these contributors varies from 100 to 1,000 gal/h depending on the number of steam coils in use. Flowrate during the sampling effort was approximately 100 gal/h, but the stream was not in operation for an entire month. This leads to a flowrate of approximately 40 gal/h (1.14 E+05 L/mo) being utilized in Section 4.0 for stream deposition when the average of an entire month is considered.

Figure 2-1. The 241-AY/AZ Tank Farms Site Plan.



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2.3 PROCESS DESCRIPTION

Steam is utilized in the aging-waste steam coils to heat the tank contents and then to maintain either a standby temperature or to obtain a desired water boiloff rate. Steam, at 225 lb/in^2 (gauge), is supplied at a rate of 8,000 lb/h by the 284-E Powerhouse. A corrosion inhibitor, Filmeen*, is added to the steam makeup water at the powerhouse to protect the pipes from corrosion. At the aging-waste tanks, the steam pressure is reduced to 100 lb/in^2 by the use of pressure-regulating valves for use in the steam coils. The steam coils are heated to 200 °F.

2.3.1 Present Activities

The current process configuration for this wastestream is shown in Figure 2-2. It consists of steam condensate streams from tanks 241-AY and -AZ, which drain through direct-buried lines F-560 and F-602, respectively, to the 241-AZ-154 condensate catch tank. The steam condensate flowrate is variable, depending on the amount of steam used and the number of tanks being heated. The flowrate normally varies between approximately 100 and 1,000 gal/h when the steam coils are in use.

The 241-AZ-154 condensate catch tank represents a potential source of additional liquid because the tank is also connected to a drain from the 241-AZ-154 pump pit. The pump pit sits above the catch tank and is covered by a concrete cover block. This concrete cover block prevents inadvertent access or discharges to the catch tank and reduces the potential for run-on entering the catch tank.

The collected condensate is pumped intermittently from the 241-AZ-154 tank to the F-505 radiation diverter caisson. The caisson is equipped with a gamma monitor and a three-way ball valve (diversion valve). The purpose of the monitor/diversion valve combination was to direct flow to one of two disposal sites (crib or DST) depending upon the radiation level. This monitor is currently disabled due to a contamination problem in the weir pit (see Section 2.3.2) and flow is continuously directed to the A-417 catch tank. From the catch tank the liquid is then returned to the DST system. No condensate from this wastestream is currently being discharged to the ground.

This process configuration has been utilized since 1985. This has also served as the primary configuration for several periods of time, including from October 1983 to early 1985.

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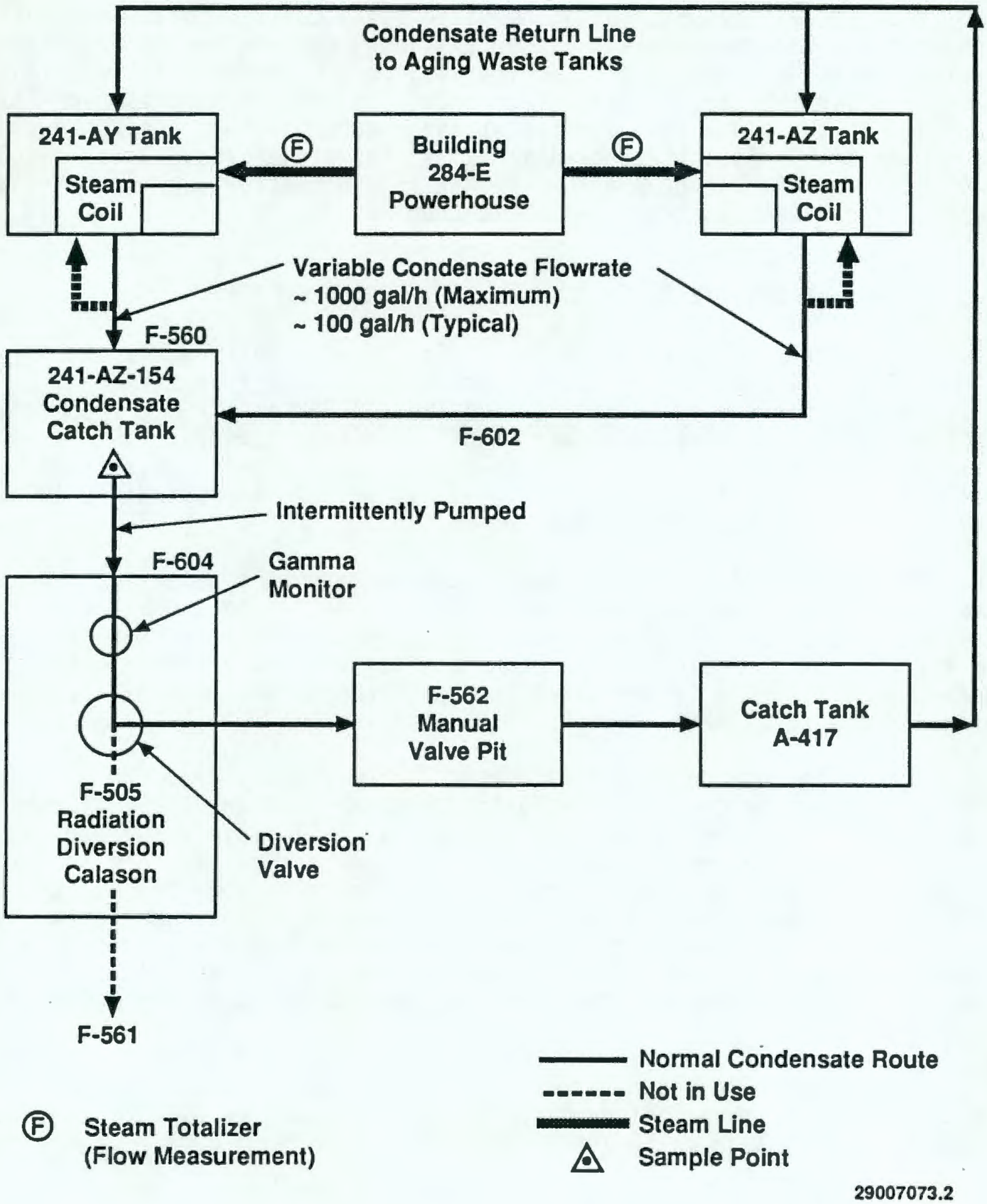
*Filmeen is a registered trademark of Grace Dearborn, Hackettstown, New Jersey.

Figure 2-2. Aging-Waste Steam Condensate Flow Diagram (Present).



2.3.2 Past Activities

The former routing of this wastestream is shown in Figure 2-3. The past stream configuration is the same as the current configuration up to the F-505 caisson. From that point the system was designed to direct flow to the 216-A-08 sample and weir pits and eventually to the 216-A-08 Crib.

A monitoring system in the F-505 caisson was installed to divert the wastestream to a retention facility if an upset condition occurred. This system includes a gamma monitor (radiation detector) that is connected to a diversion valve. The monitor would alarm if the gamma radiation level in the wastestream exceeded a predetermined level above the background radiation level (setpoint determined by radiological controls personnel). An alarm of the monitor also caused the automatic diversion valve to trip and direct flow to the A-417 catch tank (see Section 2.3.1).

A second monitoring system was installed in the 216-A-08 weir/sampling pit area. The main wastestream flowed through the weir pit (see Figure 2-3) where a small portion of the flow was diverted to the sampling pit. A sample pump in the sample pit would then recirculate the flow past a radiation monitor. If the gamma radiation level in the stream exceeded a predetermined level above the background radiation level, then an alarm was activated. This alarm would cause the automatic diversion valve in the F-505 caisson to trip and direct flow to the A-417 catch tank. The alarm would also cause a valve to open and a 600 to 800 ml sample would be directed into a sample bottle in the A-08 sample pit.

The sampling system in the A-08 sample pit was also designed to take samples periodically for process control purposes. The sampler would dispense a small sample into a 5-gal carboy after a preset number of gallons of condensate flowed through the A-08 sample pit. Analysis was performed on these samples at the 222-S Laboratory and used for process control purposes.

The 216-A-08 sample and weir pit were active between 1955 and 1976 and, to a lesser extent, between 1981 and 1985. Earlier practices (1955-1976) allowed the release of tank farm process condensate through the 216-A-08 system. The porous surface of the weir pit allowed some of the contamination to leach into the concrete over a period of time. When attempts were made at routing the steam condensate to the 216-A-08 Crib in the 1980's, they were frequently interrupted when the contaminated weir caused an alarm of the radiation monitor. This alarm would cause a diversion of the waste to the catch tank and away from the A-08 Crib. Several attempts were made to decontaminate the weir pit but were unsuccessful due to radionuclide contamination leaching out of the concrete surfaces of the weir. In 1988, a bypass to the weir was installed but has not been used yet.

2.3.3 Future Activities

Current efforts are being made toward resuming operations to the 216-A-08 Crib with the 216-A-08 weir pit bypassed (Figure 2-4).

Figure 2-3. Aging-Waste Stream Condensate Flow Diagram (Past).

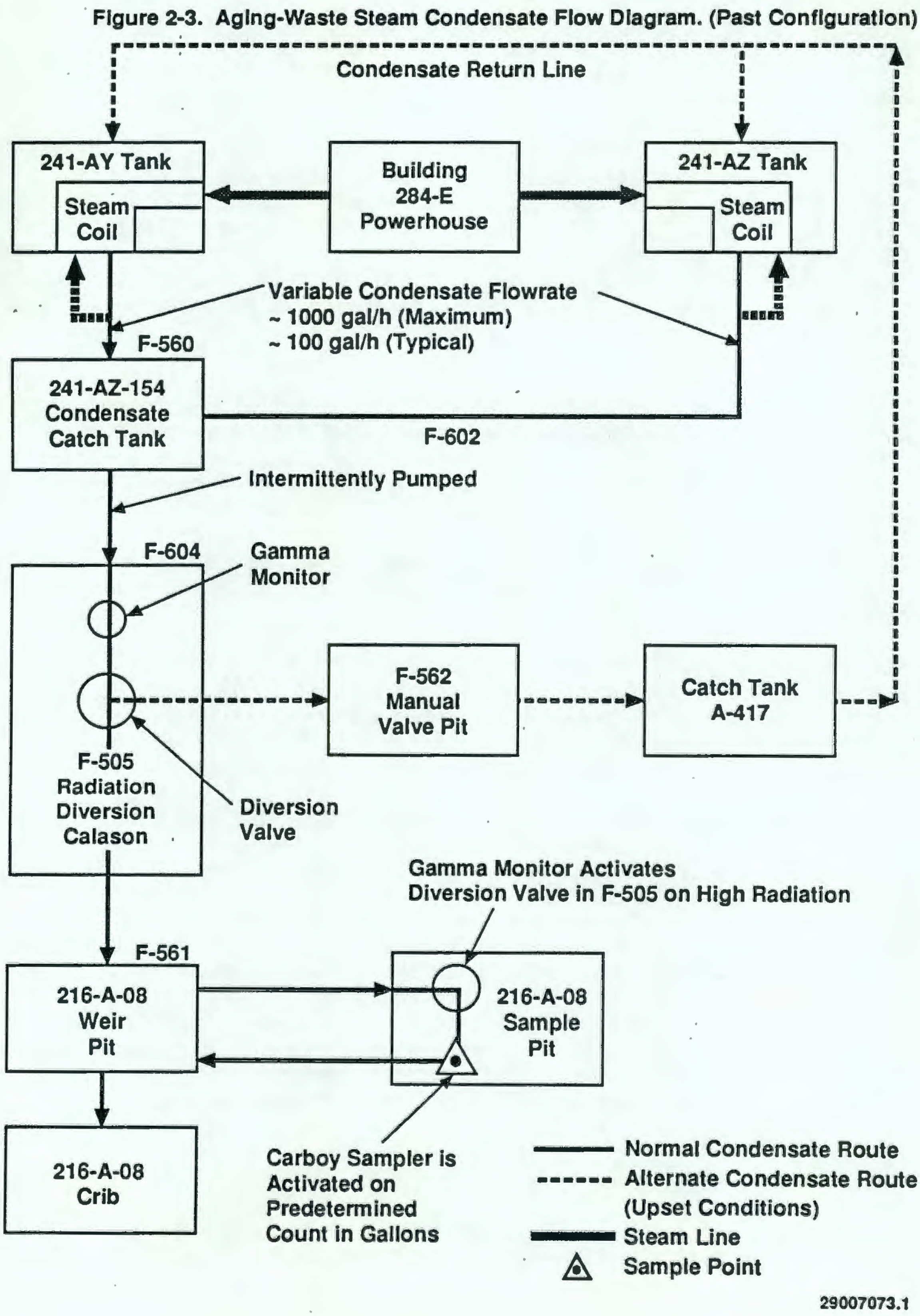
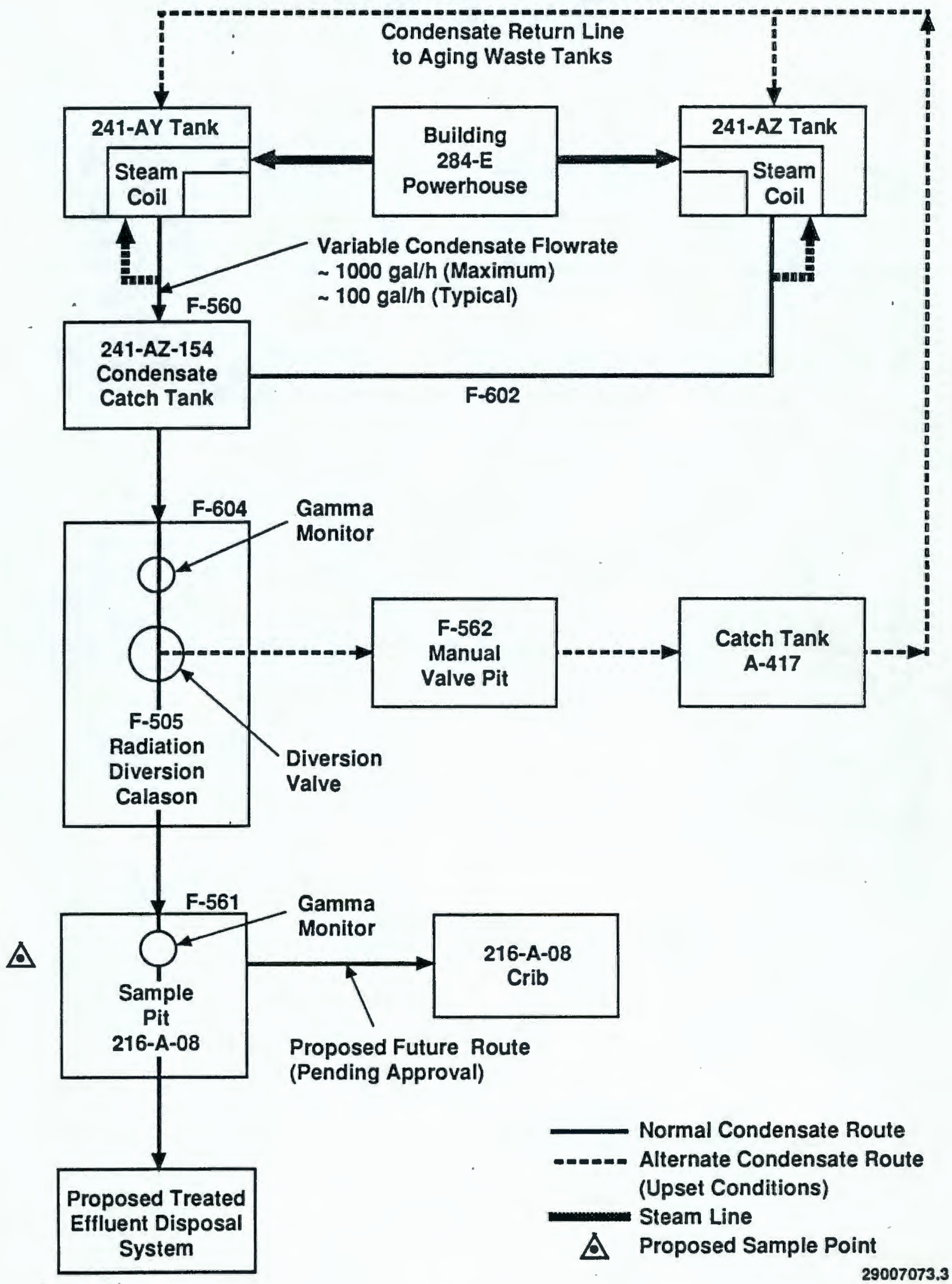


Figure 2-4. Aging-Waste Steam Condensate Flow Diagram (Future).

Figure 2-4. Aging-Waste Steam Condensate Flow Diagram. (Future)



2.4 PROCESS DATA

Use of the steam coils in the 241-AY and -AZ Tank Farms does not introduce chemicals into the steam condensate stream under normal operating conditions. The steam received from the powerhouse and the resulting steam condensate streams from the 241-AY and -AZ Tank Farms are once-through and confined systems.

A corrosion inhibitor added to the steam makeup water at the powerhouse, Super Filmeen 14, is the only product added to the steam condensate stream. This corrosion inhibitor contains both fatty amines and organic acids. The material safety data sheet (MSDS) for this product (Appendix A) does not list chemical ingredients. It does, however, state that the product does not contain EPA hazardous constituents.

The steam supply comprises sanitary water of which minerals are removed with softeners similar to those in ordinary household use. "Sanitary" water is Columbia River water that has been treated with small amounts of aluminum sulfate (alum) and calcium hypochlorite to make it potable.

Waste contained in the DST system is of a radioactive mixed waste nature including small quantities of F003- listed solvent. A leak out of these tanks into the steam coils is prohibited, however, by the differential pressure across the steam coils.

No chemicals are intentionally added to the 241-AY/AZ Tank Farms Steam Condensate wastestream. Chemicals expected to be detected in the steam condensate are those present in sanitary water, those contributed by the corrosion inhibitor, and those that might be contributed by slight corrosion of process piping.

3.0 SAMPLE DATA

This section is intended to characterize the wastestream by presenting chemical and radioactive analytical results from samples taken over time. The discussion identifies the source of the sampling (Section 3.1) and addresses data presentation (Section 3.2).

3.1 DATA SOURCE

The chemical data were obtained for this report from a sample taken at the 241-AZ-154 condensate catch tank on October 11, 1988. The sample analysis was performed at the Contract Laboratory in Richland, Washington. Appendix C contains a complete listing of the analysis performed and results for this sample. The EPA sampling and analytical protocols were followed in obtaining chemical data about the steam condensate.

The fact that limited sampling data are available for this stream can be attributed to two major factors. The first factor involved is that the wastestream is currently being routed to the tank farms and is not being discharged to the soil. A second factor is the difficulty in obtaining samples from the current configuration. A crane is required to remove the concrete cover block on the 241-AZ-154 pump pit to allow sampling. The sample then must be taken in a series of small samples due to physical access restrictions. The combination of these two factors led to only one sample being taken as part of the efforts for this report. This sample was taken under the current process configuration as described in Section 2.3.1. Additional sampling efforts that are recommended after returning the wastestream to the environment are discussed in Section 6.0.

Process control sampling data are also available for the period from 1983 and 1985. The analysis of these samples was performed at the 222-S Laboratory and was intended for process control rather than environmental sampling. The designation process used in this report does not include the 222-S Laboratory data. The process control data were previously presented in WHC-EP-0287, *Waste Steam Characterization Report* (WHC 1989), and are referenced here for completeness.

3.2 DATA PRESENTATION

A total of 10 chemical analytes were detected in quantities greater than the minimum detectable concentrations and are presented in Table 3-1. Additional analytes presented include beta activity, conductivity, pH, temperature, and total organic carbon.

Table 3-1. Statistics for the 241-AY/AZ Tank Farms Steam Condensate.

Constituent	N	MDA	Method	Mean	StdErr	90%CILim	Maximum
Calcium	1	0	n/a	1.42E+02	n/a	n/a	1.42E+02
Copper	1	0	n/a	3.70E+01	n/a	n/a	3.70E+01
Iron	1	0	n/a	8.90E+01	n/a	n/a	8.90E+01
Manganese	1	0	n/a	2.30E+01	n/a	n/a	2.30E+01
Nitrate	1	0	n/a	1.70E+03	n/a	n/a	1.70E+03
Uranium	1	0	n/a	3.93E-01	n/a	n/a	3.93E-01
Zinc	1	0	n/a	8.00E+00	n/a	n/a	8.00E+00
Acetone	1	0	n/a	8.60E+01	n/a	n/a	8.60E+01
Ammonia	1	0	n/a	5.00E+02	n/a	n/a	5.00E+02
2-Butanone	1	0	n/a	1.30E+01	n/a	n/a	1.30E+01
Beta Activity (pCi/L)	1	0	n/a	1.75E+02	n/a	n/a	1.75E+02
Conductivity (μS)	1	0	n/a	5.90E+01	n/a	n/a	5.90E+01
pH (dimensionless)	1	0	n/a	5.19E+00	n/a	n/a	5.19E+00
Temperature (degrees C)	1	0	n/a	5.40E+01	n/a	n/a	5.40E+01
TOC	1	0	n/a	1.10E+03	n/a	n/a	1.10E+03

NOTES:

Mean values, standard errors, confidence interval limits and maximum 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.

4.0 DATA OVERVIEW

The purpose of this section is to compare the characterization data obtained through both process knowledge and sampling of the wastestream. This section will also provide an estimate of the stream loadings based on radionuclide and chemical constituents.

4.1 DATA COMPARISON

Process knowledge indicates that the stream condensate effluent should be similar to the sanitary water background because no chemicals are added to the stream with the exception of the corrosion inhibitor. To confirm this the sample data results presented in Section 3.0 were compared with the sanitary water background data mean. The sanitary water data are presented in Appendix B.

To perform an adequate comparison, a ratio of the wastestream mean concentration and the sanitary water mean concentration has been used to determine analytes of interest. This comparison of the wastestream to the sanitary water is presented in Table 4-1. Chemical analytes were detected for copper, manganese, acetone, ammonium, methyl ethyl ketone, and total beta at concentrations greater than those expected in sanitary water.

Increases in the metallic analytes may be explained by corrosion. Carbon steels, which are in common use in Hanford Site facilities, contain up to 1.65% manganese and 0.4% copper (Jastrzebski 1976).

Unexplained increases were also observed for acetone, ammonium, methyl ethyl ketone, and total beta. These chemicals are not added to the stream and the closed nature of the system prevents inadvertent addition of chemicals. Two separate reasons preclude the possibility of a leak into the steam coils from the aging-waste tanks:

1. The system is designed to prevent a leak from the aging-waste tanks into the steam coils during operation of this wastestream. The higher pressure in the steam coils when compared with the liquid pressure in the tanks prevents a leak from the tanks into the steam coils. If a leak were to occur, it would actually flow out of the coils and into the tanks.

2. The solution which the coils are in contact with is highly radioactive (1×10^{11} pCi/L). A leak into the coils would yield a much higher level of beta than that shown on Table 4-1. The estimated size of a leak necessary to achieve the acetone levels found in the one sample would yield a beta activity of ~9×10^{5} pCi/L at the 154-AZ catch tank. This is over 5,000 times higher than the 175 pCi/L detected at the 154-AZ catch tank in October 1988.

Table 4-1. Comparison of Chemical Sample Data to Sanitary Water Data (parts per billion unless otherwise stated; ratios are dimensionless).

Analyte	Sample result	Sanitary water average	Ratio[a]
Acetone	86	BDL	NA
Ammonia	500	BDL	NA
Calcium	142	19,000	0.007
Conductivity-field (μS)	58.5	93	0.63
Copper	37	55	0.67
Iron	89	83	1.07
Manganese	23	10.0	2.3
Methyl ethyl ketone	13	BDL	NA
Nitrate	1,700	2,500	0.68
pH-field	5.19	7.41	0.70
Temperature (°C)	54	15.5	3.48
Total organic carbon	1,100	1,400	0.79
Uranium	0.393	0.73	0.54
Zinc	8.00	21	0.38
Total Beta	175	NA	NA

[a] Ratio is sample result/background average.
BDL = Below detectable limits.
NA = Not available.

The fact that some steam stripping of the aging waste in the steam coils (assuming a leak has occurred) could occur was also considered. A comparison was performed to the 242-A Evaporator, which is in fact a system that performs a "distillation" similar to steam stripping on DST waste. The unfiltered process condensate from the evaporator exhibits an average total beta activity of over 3×10^3 pCi/L and contains a similar level of acetone as found in the one sample from the aging-waste steam condensate. This is an activity level almost 20 times higher than the detected levels in the steam condensate. This confirms that even with a leak and some "steam stripping" occurring, the radionuclide levels are significantly lower in the October 11, 1988, sample than would be expected.

The factors described above preclude the introduction of these materials either intentionally or as the result of a leak.

Table 4-2 presents a comparison of average constituent concentrations to various screening criteria. These criteria are not used for compliance purposes but are presented here for completeness of the report. The analytes presented in this table are those constituents that have a derived concentration guide/maximum concentration limit and were detected in the wastestream.

4.2 STREAM DEPOSITION RATES

Table 4-3 has been included to provide deposition rates using the average data from Table 3-1 adjusted according to flow data from Section 2.0.

Table 4-2. Comparison of Sample Data to Various Guidelines.

Constituent	Result[a]	SV1[b]	SV2[c]
Copper	3.7E-02	1.0E+00 h	
Iron	8.9E-02	3.0E-01 h	
Manganese	2.3E-02	5.0E-02 h	
Nitrate	1.7E+00	4.5E+01 e	
Zinc	8.0E-03	5.0E+00 h	
Beta Activity (pCi/L)	1.8E+02		1.0E+03

[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 (Table 3-1).

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

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

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

Table 4-3. Stream Loading Rates.
Flow Rate: 1.14E+05 L/mo

Constituent	Kg/L*	Kg/mo*
Calcium	1.42E-07	1.61E-02
Copper	3.70E-08	4.20E-03
Iron	8.90E-08	1.01E-02
Manganese	2.30E-08	2.61E-03
Nitrate	1.70E-06	1.93E-01
Uranium	3.93E-10	4.46E-05
Zinc	8.00E-09	9.08E-04
Acetone	8.60E-08	9.77E-03
Ammonia	5.00E-07	5.68E-02
2-Butanone	1.30E-08	1.48E-03
Beta Activity*	1.75E-10	1.99E-05
TOC	1.10E-06	1.25E-01

NOTES:
Data collected during October 1988. Condensate routed to double-shell tanks since 1985. Flow rate is estimated in 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.

5.0 DESIGNATION

The purpose of this section is to utilize process knowledge and sampling data to propose a designation of the wastestream in accordance with the requirements of WAC 173-303, *Dangerous Waste Regulations* (Ecology 1989).

The evaluation of the 241-AY/AZ Tank Farms Steam Condensate wastestream performed to compose this report indicates that the wastestream should not be designated as a dangerous waste. This proposed designation uses data from both the effluent source description and historical sample data (Sections 2.0 through 4.0) and complies with the designation requirements of WAC 173-303-070.

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

The proposed designation is based upon the sample data collected on October 11, 1988. The designation strategy is shown in Figure 5-1.

5.1 DANGEROUS WASTE LISTS

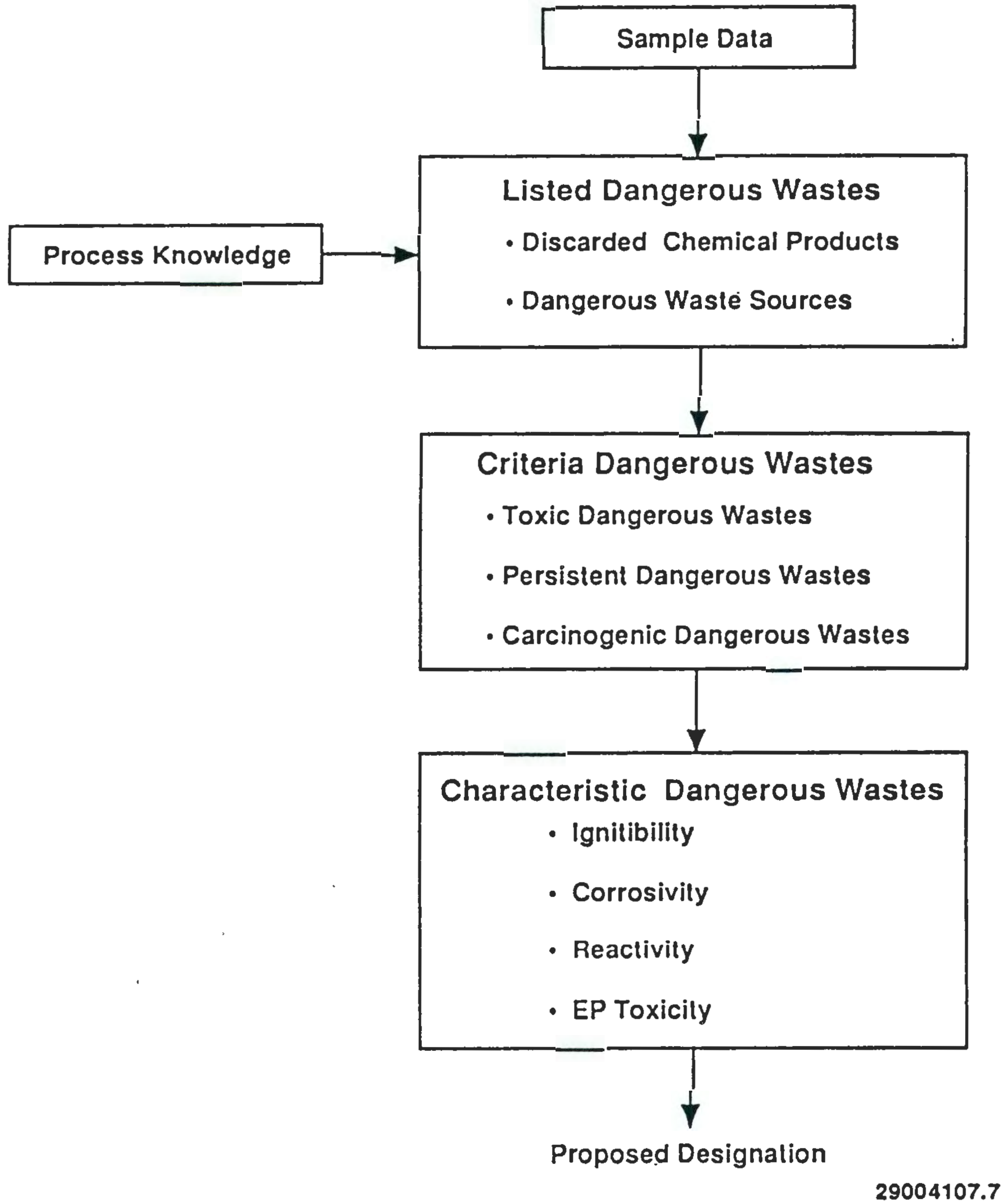
A waste is considered a listed dangerous waste if it either contains a discarded chemical product (WAC 173-303-081) or originates from a dangerous waste source (WAC 173-303-082). The proposed designation was based on a combination of process knowledge and sampling data.

5.1.1 Discarded Chemical Products

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

- The listed constituent is the sole active ingredient in a commercial chemical.
- The constituent results from a spill of unused commercial chemical products. (A spill of a discarded chemical product would cause a wastestream to be designated during the time 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*.)

Figure 5-1. Designation Strategy.



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

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 operations occurring at many industries. The second is specific sources (e.g., wastes from ink formulation, etc.). The third is state sources, which are limited to polychlorinated biphenyl (PCB)-contaminated transformers and capacitors resulting from salvaging, rebuilding, or discarding activities.

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:

- MSDSs
- *Superfund Amendments and Reauthorization Act* (SARA) Title III Inventory reports
- Operating procedures
- Process 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

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 chemical substances. For example, an analysis may show that a wastestream contains the cations sodium and calcium along with the anions chloride and nitrate. The possible combinations of substances include: sodium chloride, sodium nitrate, calcium chloride, and calcium nitrate. In a situation with many cations and anions, however, the list of possible combinations is extensive.

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

5.3 PROPOSED LISTED WASTE DESIGNATIONS

A process evaluation, along with a review of sampling data, indicated that the 241-AY/AZ Tank Farms Steam Condensate wastestream did not contain a discarded chemical product or a listed waste source. The following sections discuss the evaluation that was conducted to substantiate this conclusion in addition to the data comparison presented in Section 4.1.

5.3.1 Discarded Chemical Products

Sample results presented in Section 3.0 indicate that two constituents are present in the 241-AY/AZ Tank Farms Steam Condensate wastestream that are potentially discarded chemical products. These two chemicals, acetone and 2-butanone, are presented in Table 5-1 as part of the designation procedures for this report. An evaluation determined that neither of these chemicals can be present in the wastestream as a discarded chemical product. This conclusion is based on the design of the system and an evaluation of chemicals utilized at the facility. More detailed discussion of these two factors is presented here for clarity.

Table 5-1. Dangerous Waste Designation Report for 241-AY/AZ Tank Farms Steam Condensate. (sheet 1 of 2)

Dangerous Waste Data Designation Report for 241-AY/AZ Tank Farms Steam Condensate

Finding: Undesignated

Discarded Chemical Products - WAC 173-303-081

Substance	Review Number	Status	DW Number
*Acetone	U002(DW)	Not Discarded	Undesignated
*2-Butanone	U159(DW)	Not Discarded	Undesignated

Dangerous Waste Sources - WAC 173-303-082

Substance	Review Number	Status	DW Number
*Acetone	F003	Unlisted Source	Undesignated
*2-Butanone	F005	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%
*Calcium nitrate	7.75E-09	0.00E+00	0.00E+00	0.00E+00
*Copper(II) nitrate	1.46E-07	0.00E+00	0.00E+00	0.00E+00
*Uranyl nitrate	8.67E-10	0.00E+00	0.00E+00	0.00E+00
*Zinc nitrate	3.09E-09	0.00E+00	0.00E+00	0.00E+00
*Acetone	8.60E-10	0.00E+00	0.00E+00	0.00E+00
*Ammonia	5.00E-07	0.00E+00	0.00E+00	0.00E+00
*2-Butanone	1.30E-10	0.00E+00	0.00E+00	0.00E+00
Total	6.58E-07	0.00E+00	0.00E+00	0.00E+00
DW Number	Undesignated	Undesignated	Undesignated	Undesignated

Dangerous Waste Characteristics - WAC 173-303-090

Characteristic	Value	DW Number
Ignitables % (Calc.)	9.90E-06	Undesignated
*Corrosivity-pH	5.19	Undesignated
Total Cyanide (mg/kg)	0.00E+00	Undesignated
Total Sulfide (mg/kg)	0.00E+00	Undesignated
EP Toxic Contaminants	0.00E+00	Undesignated

Dangerous Waste Criteria - WAC 173-303-100

	Toxic	Persistant		Carcinogenic	
Substance	EC%	HH%	PAH%	Total%	DW Number-Positive
*Calcium nitrate	7.75E-09	0.00E+00	0.00E+00	0.00E+00	
*Copper(II) nitrate	1.46E-07	0.00E+00	0.00E+00	0.00E+00	
*Uranyl nitrate	8.67E-10	0.00E+00	0.00E+00	0.00E+00	
*Zinc nitrate	3.09E-09	0.00E+00	0.00E+00	0.00E+00	
*Acetone	8.60E-10	0.00E+00	0.00E+00	0.00E+00	
*Ammonia	5.00E-07	0.00E+00	0.00E+00	0.00E+00	
*2-Butanone	1.30E-10	0.00E+00	0.00E+00	0.00E+00	
Total	6.58E-07	0.00E+00	0.00E+00	0.00E+00	
DW Number	Undesignated	Undesignated	Undesignated	Undesignated	

Dangerous Waste Constituents - WAC 173-303-9905

Substance
*Acetone

Table 5-1. Dangerous Waste Designation Report for 241-AY/AZ Tank Farms Steam Condensate. (sheet 2 of 2)

Dangerous Waste Data Designation Report for 241-AY/AZ Tank Farms Steam Condensate

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.

5.3.1.1 Wastestream Process Configuration. The 241-AY/AZ Tank Farms Steam Condensate wastestream is a once through and confined system with limited access for discarded chemical products to enter the stream (detailed discussion in Section 2.3.1). The only location where such an addition could occur is a the 241-AZ-154 condensate catch tank pump pit drain. Addition at this point is precluded, however, by the concrete cover block that encloses the pump pit. A crane is required to remove this cover block which prevents the possibility of an unintentional addition of a discarded chemical product.

5.3.1.2 Chemicals Present at Tank Farms. An evaluation of chemical inventory at the tank farms facility was also performed (discussed in Section 5.2) to identify materials used at the plant that could potentially enter the wastestream. This evaluation included a review of MSDSs at the plant and chemical inventories compiled for compliance with the SARA Title III requirements. Neither of the chemicals in question (acetone and 2-butanone) were identified as being present at the tank farms facility.

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

5.3.2 Dangerous Waste Sources

A combination of sampling data and the process evaluation presented in Section 5.2 was 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. Two potentially listed solvents, acetone and 2-butanone, were present in the sampling data. An evaluation determined that neither of these chemicals can be present in the wastestream from a listed waste source. This conclusion is based on the design of the system to prevent a leak into the wastestream, an evaluation of chemicals utilized at the facility (presented in Section 5.3.1), and laboratory contamination concerns.

The following three sections present the basis for the conclusion that no constituents are present in the wastestream from a listed waste source.

5.3.2.1 Process Configuration Design. In addition to the once through and confined design of the system (described in Section 5.3.1.1), the system was designed to prevent a leak into the steam coils from the tank. Section 4.1 describes the positive pressure that is maintained on the inside of the steam coils that would force a leak of material into the DSTs. This prevents the waste contained in the DSTs from entering this wastestream.

Section 4.1 also discusses the concentration levels of constituents that would be present in the steam condensate if a leak were to occur in the steam coils. The sample data contains radionuclide levels that are several thousand times lower than would be expected should a leak occur. The use of radionuclides as a "tracer" of a leak in this fashion shows that the constituents found in the analytical data are not present from a leak.

5.3.2.2 Acetone. Acetone was detected in the wastestream sample at a concentration of 86 ppb. The sample blank that accompanied this sample was analyzed to have an acetone concentration of 14 ppb. This is above the minimum detectable concentration for acetone, which is 10 ppb at the contract laboratory.

The contract laboratory that was used has shown sample blank contamination for acetone in both the past and recent (October 1989 to March 1990) sampling campaigns. The 90% one-sided confidence interval for acetone, based on blank results from the recent sampling campaign, was 37 ppb as presented in Section 5.2 of WHC-EP-0342. The same laboratory and analytical procedures were utilized in both the sample for this wastestream and the recent campaign.

Both the individual sample blank and the recent sampling campaign have shown detectable acetone contamination at the contract laboratory. Acetone is not present or used at the facility and the steam condensate system is designed to prevent a leak into the steam coils. Based on this discussion, the acetone detected in the single sample must be attributed to sample contamination.

5.3.2.3 2-Butanone. 2-Butanone was detected in the wastestream sample at a concentration of 13 ppb. The sample blank that accompanied this sample was analyzed to have a 2-butanone concentration of less than the minimum detectable concentration for 2-butanone (10 ppb at the contract laboratory).

The contract laboratory that was used has shown sample blank contamination for 2-butanone in both the past and recent (October 1989 to March 1990) sampling campaigns. The 90% one-sided confidence interval for 2-butanone, based on blank results from the recent sampling campaign, was 59 ppb as presented in Section 5.2 of WHC-EP-0342. The same laboratory and analytical procedures were utilized in both the sample for this wastestream and the recent campaign.

The 2-butanone concentration in this stream was only 3 ppb above the detection limit and well below the rejection criteria for new data of 59 ppb. The 2-butanone is not present or used at the facility and the steam condensate system is designed to prevent a leak into the steam coils. Based on this discussion, the 2-butanone detected in this wastestream must be attributed to sample contamination.

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 (1990b). Summaries of the methods, along with the results, are contained in the following sections.

5.4.1 Toxic Dangerous Wastes

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

- 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 based on an evaluation of the most toxic substances that can exist in an aqueous environment under normal temperatures and pressures (WHC 1990b).
- Assign toxic categories to the substances formulated for the wastestream.
- Calculate the contribution of each substance to the percent equivalent concentration (EC%).
- Calculate the EC% by summing the contributions of each substance.
- Designate the wastestream as a toxic dangerous waste if the EC% sum is greater than 0.001% in accordance with WAC 173-303-9906.

Seven substances potentially present in the 241-AY/AZ Tank Farms Steam Condensate wastestream were determined to have toxic categories associated with them. These substances are listed in Table 5-1 along with their toxic categories. The individual and sum EC% values for these substances are listed in Table 5-1. Since the EC% sum is 6.58 E-07%, which is less than the designation limit of 1.0 E-03 (i.e., 0.001%), the wastestream is not a toxic dangerous waste.

5.4.2 Persistent Dangerous Wastes

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

- Collect multiple grab samples of the wastestream.

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

No substances potentially present in the 241-AY/AZ Tank Farms Steam Condensate wastewater were determined to be HH and no substances were determined to be PAH. The 241-AY/AZ Tank Farms Steam Condensate 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 based on an evaluation of the carcinogenic substances that can exist in an aqueous environment under normal temperatures and pressures (WHC 1990b).
- Determine which substances in the wastestream are human or animal carcinogens according to the International Agency for Research on Cancer (IARC).
- Calculate the weight percent concentration for each carcinogen.
- Sum the resulting weight percent.
- Designate the wastestream as carcinogenic if any of the positive carcinogens are above 0.01% or if the total concentration for positive and suspected carcinogens is above 1.0%.

No substances potentially present in the 241-AY/AZ Tank Farms Steam Condensate wastestream were determined to be carcinogenic chemical compounds. Therefore, the 241-AY/AZ Tank Farms Steam Condensate wastestream is not a carcinogenic dangerous waste.

5.5 DANGEROUS WASTE CHARACTERISTICS

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

5.5.1 Ignitability

Because of the dilute aqueous nature of these wastes, flashpoint testing was not performed on initial samples collected from the wastestream; instead an ignitability index was calculated for the samples and was based on the sum of the percent concentrations of all ignitable contributors in the wastestream. Pure substances with a flashpoint <140 °F were considered ignitable. Using Best Professional Judgment (BPJ), samples which exhibited an ignitability index below 1.0% were not considered ignitable.

Two chemical substances (acetone and 2-butanone) present in the 241-AY/AZ Tank Farms Steam Condensate wastestream are ignitable. The value of the index calculated from these constituents (presented in Table 5-1) is 9.90 E-06%. Therefore, the 241-AY/AZ Tank Farms Steam Condensate wastestream is not an ignitable waste.

5.5.2 Corrosivity

A waste is a corrosive dangerous waste if it has a pH of $\leq$2.0 or $\geq$12.5. The pH value detected for the 241-AY/AZ Tank Farms Steam Condensate is 5.19. The wastestream is not a corrosive dangerous waste based on this pH result (WAC 173-303-090[6]).

5.5.3 Reactivity

An aqueous waste is reactive if the waste contains an amount of cyanide or sulfide under conditions sufficient to threaten human health or the environment (WAC 173-303-090(7)). A recent revision to *Test Methods for Evaluating Solid Waste* (SW-846) (EPA 1986) provides more quantitative indicator levels for cyanide and sulfide. It states that levels of (equivalent) cyanide (as HCN) below 250 mg/kg or of (equivalent) sulfide (as H_2S) below 500 mg/kg would not be considered reactive.

For samples collected before July 1989, total cyanide and total sulfide were used to evaluate reactivity. The revised SW-846 procedure was used for samples collected since July 1989.

Total cyanide was undetected. Total sulfide was undetected. The equivalent concentrations are 0 mg/kg for cyanide (as HCN) and 0 mg/kg for sulfide (as H_2S). This wastestream is not a reactive dangerous waste.

5.5.4 Extraction Procedure Toxicity

A waste is an extraction procedure (EP) toxic dangerous waste if contaminant results from EP toxicity testing exceed the limits of WAC 173-303-090(8)(c). In the absence of specific EP toxicity test results, total analyte concentrations are used. No analytes with concentrations above detection limits on the EP toxic list were found in this wastestream. Therefore, this wastestream is not an EP toxic dangerous waste.

5.6 PROPOSED DESIGNATIONS

The 241-AY/AZ Tank Farms Steam Condensate wastestream 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. This designation is based on the fact that no hazardous chemicals are added to the stream and that a leak would occur out of the steam coils rather than into the coils.

No data exist that are representative of the flowpath to the crib that has been utilized in the past. The contaminated sample weir was bypassed, but the stream has not been returned to the crib since that time. Confirmation that the contamination is from the weir is needed shortly after commencing any continued discharge of this stream to the environment.

6.0 ACTION PLAN

This purpose of this section is to address recommendations for future waste characterization tasks for this wastestream. The final extent of and schedule for any recommended tasks are subject to negotiation between Ecology, the EPA, and DOE. An implementation schedule for the completion of these tasks will consider other compliance actions already underway as part of the Tri-Party Agreement (Ecology et al. 1989), and the availability of funding. All effluent monitoring and sampling will be conducted according to DOE Order 5400.1, *General Environmental Protection Program* (DOE 1988).

6.1 FUTURE SAMPLING

The sampling utilized in this report was not performed during the recent sampling campaign of October 1989 to March 1990. The fact that limited sampling data are available for this stream can be attributed to two major factors. The first factor involved is that the wastestream is currently being routed to the tank farms and is not being discharged to the soil. The second factor is the difficulty in obtaining samples from the current configuration (see Section 3.1). This stream will require additional sampling shortly after commencement of any future operations which return the stream to the 216-A-08 Crib. The required sampling will be performed to confirm the designation contained in this report and will occur after the wastestream is being routed to the crib for disposal.

6.2 TECHNICAL ISSUES

As described in Section 2.0, the effluent was sampled at the 241-AZ-154 condensate catch tank. This location was utilized because it is the only accessible location downstream of all of the contributing wastestreams.

The samples collected at this point are considered representative of the types of constituents present in the contributing wastestreams in the current configuration.

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7.0 REFERENCES

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APPENDIX A

FILMEEN* MATERIAL SAFETY DATA SHEET

*Filmeen is a registered trademark of Grace Dearborn, Hackettstown, New Jersey.

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Discontinued Product

Material Safety Data Sheet MSDS #12387

Emergency Phone 312-438-8241

Section 1 Product Identification

TRADE NAME	PRODUCT TYPE	CODE IDENT.
SUPER FILMEEN 14	Return line treatment	12-174

DOT SHIPPING NAME: Compound Boiler Cleansing, Preserving, Scale Removing Liquid

Section 2 Hazardous Ingredients

CAS NUMBER | % | EXPOSURE CRITERIA

Does not contain hazardous constituents under 29 CFR 1910.1200, d(3) & (4).

HIMS 2-0-0

Section 3 Physical Data

BOILING POINT, 760 mm Hg	ND	MELTING POINT	NA
FREEZING POINT	32 F	VAPOR PRESSURE	ND
SPECIFIC GRAVITY ($H_2O = 1$)	0.98	SOLUBILITY IN H_2O	Emulsion
VAPOR DENSITY (AIR = 1)	ND	EVAPORATION RATE (Bu Ac = 1)	< 1
% VOLATILES BY VOLUME	ND	pH	8-9

APPEARANCE & ODOR

White emulsion/characteristic odor

Section 4 Fire & Explosion Hazard Data

FLASH POINT (& METHOD USED)	FLAMMABLE LIMITS IN AIR % BY VOLUME LOWER	UPPER	AUTO IGNITION TEMPERATURE
NA, water-based product	NA	NA	NA

EXTINGUISHING MEDIA: FOAM CO2 DRY CHEMICAL

SPECIAL FIRE FIGHTING PROCEDURES:

Firefighters should wear full protective gear.

UNUSUAL FIRE AND EXPLOSION HAZARD:

None known

Section 5 Reactivity Data

STABILITY (NORMAL CONDITIONS)	CONDITIONS TO AVOID
Stable	Extreme heat

INCOMPATABILITY (MATERIALS TO AVOID)

Strong oxidizing agents

HAZARDOUS DECOMPOSITION PRODUCTS

CO, CO2, nitrogen oxides

HAZARDOUS POLYMERIZATION	CONDITIONS TO AVOID
Will not occur	NA

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9 1 1 2 0 4 7 0 9 1 8

Material Safety Data Sheet (continued) SUPER FILMEEN 14 CONTINUED

Section 6 Health Hazard Information

TOXICITY INFORMATION:

No TLV established for product.

MSDS #12387

EFFECTS OF OVEREXPOSURE:

INHALATION: Inhalation of vapors or mist may irritate nasal passages.

INGESTION: Harmful if swallowed.

SKIN OR EYE CONTACT: Prolonged or frequent skin contact may cause irritation.

EMERGENCY AND FIRST AID PROCEDURES

INHALATION: Remove affected persons to fresh air and treat symptoms.

INGESTION: If conscious, induce vomiting and feed citrus juice. Contact physician.

SKIN CONTACT: Wash with soap and water. Remove and wash contaminated clothing.

EYE CONTACT: Flush eyes with water and seek medical attention.

Section 7 Special Protection Information

VENTILATION REQUIREMENTS

Use adequate mechanical ventilation.

RESPIRATORY PROTECTION (SPECIFY TYPE)

None special

EYE PROTECTION

Safety glasses or goggles

GLOVES

Recommended

OTHER PROTECTIVE CLOTHING AND EQUIPMENT

Long sleeve work shirt and pants.

Section 8 Spill or Leak Procedures

STEPS TO TAKE IF MATERIAL IS RELEASED OR SPILLED

Collect using absorbent; place in container for proper disposal. Flush area of spill with water.

WASTE DISPOSAL METHOD

Dispose using authorized scavenger service in authorized landfill. For additional disposal instruction, contact your state water pollution control agency. This product is NOT an EPA Hazardous Waste.

Section 9 Special Precautions

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Keep container closed to prevent contamination or loss of water from emulsion by evaporation. Keep from freezing.

OTHER PRECAUTIONS

For industrial use only. Keep out of reach of children.

PREPARED BY: S. Morss DATE: 6/20/88

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APPENDIX B

SANITARY WATER CHEMICAL BACKGROUND DATA

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Table B-1. Summary of 200 East Area Raw Water and Sanitary Water Data (1985-1988).

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

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

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

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

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

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

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

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APPENDIX C

CHEMICAL DATA

C-1. SAMPLE/ANALYTE INFORMATION

LEAD#	50472
C of C#	50472
Alpha counting	X
Ammonia	X
Atomic emission spectroscopy	X
Beta counting	X
Conductivity-field	X
Cyanide	X
Direct aqueous injection (GC/MS)	X
Fluoride (LDL)	X
Ion chromatography	X
Lead	X
Mercury	X
pH-field	X
Semivolatile organics (GC/MS)	X
Sulfide	X
Temperature-field	X
Total organic carbon	X
Uranium	X
Volatile organics (GC/MS)	X
LEAD#	50472B
C of C#	50473
Volatile organics (GC/MS)	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).

C.2. RAW ANALYTICAL DATA

Constituent	Sample#	Date	Method	Result
Calcium	50472	10/11/88	ICP	1.42E+02
Copper	50472	10/11/88	ICP	3.70E+01
Iron	50472	10/11/88	ICP	8.90E+01
Manganese	50472	10/11/88	ICP	2.30E+01
Nitrate	50472	10/11/88	IC	1.70E+03
Uranium	50472	10/11/88	FLUOR	3.93E-01
Zinc	50472	10/11/88	ICP	8.00E+00
Acetone	50472	10/11/88	VOA	8.60E+01
Acetone	50472B	10/11/88	VOA	1.40E+01
Ammonia	50472	10/11/88	ISE	5.00E+02
2-Butanone	50472	10/11/88	VOA	1.30E+01
2-Butanone	50472B	10/11/88	VOA	<1.00E+01
Beta Activity (pCi/L)	50472	10/11/88	Beta	1.75E+02
Conductivity (μS)	50472	10/11/88	COND-Fld	5.90E+01
pH (dimensionless)	50472	10/11/88	PH-Fld	5.19E+00
Temperature (degrees C)	50472	10/11/88	TEMP-Fld	5.40E+01
TOC	50472	10/11/88	TOC	1.10E+03

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

Code	Analytical Method	Reference
ABN	Semivolatile Organics (GC/MS)	USEPA-8270
AEA	[2]Americium-241	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	Strontium-90	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

Code	Analytical Method	Reference
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	Iodine-129	UST-20I02
LSC	C-14	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.

C.3. INORGANIC CHEMISTRY DATA

Constituent	ppb	Ion	Eq/g	Normalized
Charge normalization:				
*Calcium	1.42E+02	Ca+2	7.09E-09	9.44E-09
*Copper	3.70E+01	Cu+2	1.16E-09	1.55E-09
*Iron	8.90E+01	Fe+3	4.78E-09	6.37E-09
*Manganese	2.30E+01	Mn+2	8.37E-10	1.12E-09
*Nitrate	1.70E+03	NO3-1	2.74E-08	
*Uranium	3.93E-01	UO2+2	3.30E-12	4.40E-12
*Zinc	8.00E+00	Zn+2	2.45E-10	3.26E-10
*Hydrogen Ion (from pH 5.2)		H+	(6.46E-09)	
*Hydroxide Ion (from pH)		OH-	(1.55E-12)	
Cation total			2.06E-08	
Anion total			2.74E-08	
Cation normalization factor:	1.333			

Substance formation: Substance	%	Cation Out	Anion Out
*Copper(II) nitrate	1.46E-05	0.00E+00	2.59E-08
*Uranyl nitrate	8.67E-08	0.00E+00	2.59E-08
*Zinc nitrate	3.09E-06	0.00E+00	2.55E-08
*Calcium nitrate	7.75E-05	0.00E+00	1.61E-08
*Manganese(II) nitrate	9.99E-06	0.00E+00	1.50E-08

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.

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