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Department of Energy
Richland Operations Office
P.O. Box 550
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AUG 14 1991

Mr. Paul T. Day
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Region 10
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Department of Ecology
Mail Stop PV-11
Olympia, Washington 98504-8711

AUG 26 1991
CORRESPONDENCE CONTROL

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Dear Messrs. Day and Nord:

Reference: Letter, S. H. Wisness, DOE Filed Office, Richland to P. T. Day, EPA, and T. L. Nord, Ecology, "Evaluation of Need for Accelerated Treatment of PFP Wastewater," dated August 1, 1991

CORRECTIONS TO REPORT ON EVALUATION OF NEED FOR ACCELERATED TREATMENT OF PFP WASTEWATER.

Further review of the report transmitted in the referenced letter identified two errors in the report. On page 1, the first sentence of the last paragraph should read: "There was only one process upset which caused a release exceeding the Table II values." The statement "Only one data point exceeded the Table II values." should be deleted. On Page 9, the second and third references are reversed. A corrected copy of this report is attached.

If you have any questions, please contact J. E. Mecca immediately on (509) 376-7476.

Sincerely,

Steven H. Wisness
Hanford Project Manager

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EDMC

Attachment

cc w/att:
R. E. Lerch, WHC
W. G. Ruff, WHC
E. C. Vogt, WHC
R. Stanley, Ecology
A. W. Conklin, Department of Health
T. B. Veneziano, WHC

PLUTONIUM FINISHING PLANT WASTEWATER
EVALUATION OF POTENTIAL TO EXCEED 10 CFR 20 TABLE II VALUES

The wastewater discharged to the 216-Z-20 Crib (Z-20 Crib) during operation of the Plutonium Reclamation Facility (PRF) and the Remote Mechanical C-Line (RMC), two processing areas at the Plutonium Finishing Plant (PFP), was evaluated to determine whether accelerated treatment was necessary due to the potential for the wastewater to contain radionuclides in concentrations which exceed 10 CFR 20 Appendix B Table II Column 2 values (Table II values). Sampling data for the PFP wastewater stream discharged to the Z-20 crib since 1984 were reviewed for this study along with plant administrative discharge controls and engineered barriers. This evaluation concludes that appropriate engineered barriers are in place to prevent release of radionuclides in excess of the Table II values during routine operations and credible process upset conditions. Administrative controls are in place to ensure the engineered barriers are properly maintained and that process upsets are promptly detected and corrected. Thus, no acceleration of wastewater treatment projects is necessary.

1.0 BACKGROUND

The Z-20 Crib was placed into service in September 1981 for disposal of potentially contaminated non-contact process cooling water from PRF and RMC operations, miscellaneous wastewater from laboratory activities, steam condensate, air conditioning condensate, and storm water runoff. These wastewater sources are shown in Figure 1. The Z-20 Crib does not receive process effluents which are known to be radioactively or chemically contaminated. Process effluents which are known to be contaminated are discharged to the 241-Z Tanks and managed in the Double-Shell Tank System. The wastewater discharged to the Z-20 Crib is routinely monitored at Manholes number 7 and 9 for flow, total alpha activity, and pH. Monthly composite samples are analyzed for strontium, cesium, ruthenium, plutonium, and americium.

2.0 WASTEWATER DATA ANALYSIS

Data from the Waste Stream Characterization Report (WHC-EP-0287) and the Annual Effluent Discharge Reports from 1987 to 1990 were reviewed to provide information on past PFP wastewater discharges to the Z-20 Crib. The review was limited to data from 1984 through 1990. This review period included 4 PRF operations campaigns and 7 RMC operations campaigns. This data is provided in Tables 1 and 2 of the Appendix.

There was only one process upset which caused a release which exceeded the Table II values. An equipment failure late in 1984 resulted in a release of Pu-239 and Am-241 to the Z-20 Crib in concentrations exceeding the Table II values. Corrective actions were taken to prevent recurrence. Additional details are provided later in this report.

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The remainder of the data points were below the Table II values. The fact that several operations campaigns have been conducted without resulting in wastewater discharges above Table II values indicates that wastewater discharges during the stabilization campaign should also be below the Table II values.

During this analysis, it was discovered that the Pu-239 data (1979 through 1984) from the Waste Stream Characterization Report was reported as pCi/L when the actual units were μg/L. The correct values are obtained by multiplying each data point by 6.14E+04. The correct Pu-239 values are shown in Table 3 of the Appendix. Missing data points in Appendix may be attributed to insufficient sample volume for analysis, and or non-detectable results from the laboratory.

3.0 ENGINEERED BARRIERS AND ADMINISTRATIVE CONTROLS

Wastewaters discharged to the Z-20 Crib from PRF consist of non-contact cooling waters from process vessel cooling jackets, cooling coils, and condensers. Filtrate generated from oxide production from the RMC line may be evaporated in the PRF filtrate evaporator during RMC operations. The cooling water from the filtrate evaporator condenser is discharged to the Z-20 Crib. This is the only Z-20 Crib wastewater generated during RMC operations.

Several engineered barriers have been provided to isolate the PRF cooling water systems from the process solutions. First, the cooling water system is physically isolated from the process vessels. Second, the process vessels and the cooling systems are constructed of 300 series stainless steel. The 300 series stainless steel was selected for its excellent corrosion resistant qualities, machinability and fatigue strength. Finally, all of the cooling systems are maintained at a higher pressure than the process vessels. This is done to ensure that if a leak should develop, cooling water would flow into the process vessel rather than having contaminated process solutions flow into the cooling water.

In addition, the differential pressure between the process tanks and cooling jackets is monitored continuously on the two PRF tanks which contain concentrated process solutions. If the differential pressure falls to less than 10 psi, the pump in the process tank will automatically shut off. This will increase the differential pressure between the cooling jacket and the process tank to minimize contamination of the cooling water with process solutions.

Administrative controls consist of preventative maintenance, instrument and equipment calibration, operating and administrative procedures, and an early warning system based on wastewater sample data.

Preventative maintenance and calibrations are performed on the process tanks and ancillary equipment on a regular schedule to ensure that all systems function correctly and that there are no leaks in the process tanks/ancillary equipment or in the cooling jackets. Pressure testing is currently scheduled for several PRF process tanks and cooling jackets (WHC, 1990) to ensure that

there are no leaks. If any problems are noted, repairs will be completed prior to PRF restart.
A study was performed by PFP Process Engineering in 1990 (WHC, 1991a) to evaluate the potential process upsets and their consequences. This study included a review of engineered and administrative barriers and concluded that systems were in place to prevent misrouting process solutions to the Z-20 Crib during a process upset.

Operating procedures have been prepared for all process equipment to ensure that the equipment is operated in an appropriate manner and that discharges to the environment are within internal limits. Administrative procedures have been developed for use in the event of upset conditions which cause effluent discharges to exceed Westinghouse Hanford Company (WHC) internal limits to correct problems before releases to the Z-20 Crib exceed regulatory limits or Table II values.

The internal limits and required response actions, which are summarized in Table 1, have been set well below any regulatory limits or the Table II values to provide an early warning system. Data from wastewater samples (WHC, 1991b) taken each shift at Manhole number 4 directly downstream of PRF and from Manhole number 7 and 9 at the point of discharge to the crib (see Figure 1 for locations) are reviewed against these internal limits so that prompt corrective action can be taken if necessary. Table 2 provides a summary of applicable discharge limits and the Table II values.

The internal limits from Table 1 are expressed as total alpha activity. Total alpha activity consists of all alpha-emitting radionuclides, including Pu-239. Thus, if the Pu-239 activity was 5.0 E-06 μCi/ml (the Table II value for Pu-239), the calculated total alpha activity would be 5.19 E-05 μCi/ml. Table 1 indicates that initial response actions are required when the total alpha activity in Z-20 Crib wastewater samples is 2.0 E-06 uCi/ml. This concentration is approximately 25 times below the calculated total alpha activity represented by Pu-239 at the Table II value. This early response action provides assurance that releases during PRF and RMC operations can be promptly detected and corrected.

4.0 PROCESS DISCHARGE HISTORY

Engineered barriers and administrative controls have been effective during past operations campaigns to ensure that process upsets are promptly detected and corrected. Although there has only been one process upset at PFP since 1984 which resulted in radionuclide release to the wastewater in excess of the Table II values, this review included an evaluation of the other three process upset events to show how the early warning system worked to prevent releases in excess of regulatory limits or Table II values. This review also provides information on the corrective actions taken to prevent recurrence.

Tank 38 Cooling Jacket Leak:

Increased alpha activity was observed in the wastewater discharged to the Z-20 Crib from February 27 through March 3, 1984. No internal or external release limits were violated. During this five day period, the event was evaluated

and the source of increased activity was identified as the D-3 waste stream from the 236-Z Building. A small leak was discovered in the cooling water jacket on the Tank 38 recirculation line. The cooling water jacket was replaced on March 3, 1984, and alpha activity to the Z-20 Crib returned to normal.

Nitric Acid Tank Overflow:

On September 26, 1984, an estimated 4447 liters (1,175 gallons) of 57 percent nitric acid overflowed from nitric acid service Tank A-105 located in Aqueous Make Up (AMU) Room 40 of the 236-Z Building. The high level interlock system failed to shut off the nitric acid transfer pump at a preset high level alarm point. This acid was released to the Z-20 Crib through floor drains in the AMU. On October 26, 1984, approximately 92 liters (24 gallons) of 57 percent nitric acid were discharged to the Z-20 Crib when nitric acid service Tank A-105 again overflowed. These acid releases caused dissolution of radionuclides from the contaminated vitreous clay pipe which leads to the crib and resulted in Pu-239 discharges which exceeded RHO-MA-139 internal action limits (see Table 2).

A new catch tank (2735-Z) has been installed to receive any releases from the floor drains under the chemical product tanks in the AMU. Any future releases from these tanks will be collected in the catch tank and either returned to the product tank or properly disposed of.

Tank 120 Diaphragm Rupture:

On December 20, 1984, the eight hour composite wastewater sample contained Pu-239 at a concentration of 1.07 E-03 μCi/ml. This exceeded both internal (RHO-MA-139) limits and the Table II values. PRF operations were immediately suspended. A ruptured differential pressure transmitter diaphragm on Tank 120 was determined to be the source of the contamination to the cooling water jacket. The cooling jacket and differential pressure transmitter for Tank 120 were replaced and the contaminated piping leg from the cooling jacket to the D-3 drain header replaced. The differential pressure transmitter was replaced with a differential pressure transducer to further reduce the possibility of cross-contamination due to a ruptured diaphragm. This transducer is being moved outside the process glovebox to facilitate maintenance and operability. Installation of the transducer will be completed prior to PRF restart.

Tank C-4 Cooling Coil Leak:

On January 23, 1986, the total alpha average for a two week period was determined to exceed the internal limit. The source was determined to be the Tank C-4 cooling coil. The C-4 Tank cooling coil was replaced, the leak stopped, and the liquid effluent sample results returned to normal.

Tank 22 Condenser:

The Tank 22 condenser failed during the 1987 PRF campaign. This failure was detect and the condenser was replaced before any detectable release of radioactivity occurred to the Z-20 crib.

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5.0 CONCLUSIONS

Appropriate engineered barriers are in place to minimize the potential for releases of transuranic radionuclides in excess of the Table II limits during routine operations and credible process upset conditions. Administrative controls are in place to ensure the engineered barriers are properly maintained and that process upsets and leaks are promptly detected and corrected. Thus, no acceleration of wastewater treatment projects is necessary.

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TABLE 1: WHC INTERNAL RELEASE LIMITS AND RESPONSE ACTIONS

TOTAL ALPHA CONCENTRATION (μCi/ml)	SAMPLE FREQUENCY	RESPONSE
2×10^{-6}	SHIFT COMPOSITE SINGLE SAMPLE	RESAMPLE, INVESTIGATE
4×10^{-6} 2×10^{-6}	SHIFT COMPOSITE SINGLE SAMPLE SHIFT COMPOSITE TWO SUCCESSIVE SAMPLES	RESAMPLE, INVESTIGATE, SHUT DOWN PLANT IF NECESSARY
8×10^{-6} 4×10^{-6}	SHIFT COMPOSITE SINGLE SAMPLE SHIFT COMPOSITE TWO SUCCESSIVE SAMPLES	RESAMPLE, SHUT DOWN PLANT
4.5×10^{-5} 4×10^{-6} 2×10^{-6}	SHIFT COMPOSITE SINGLE SAMPLE MONTHLY COMPOSITE YEARLY AVERAGE	RESAMPLE, SHUT DOWN PLANT, ISSUE UNUSUAL OCCURRENCE REPORT
1.5×10^{-4}	INSTANTANEOUS	IMPLEMENT BUILDING EMERGENCY PLAN

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TABLE 2: LIQUID EFFLUENT DISCHARGE LIMITS AND TABLE II VALUES

RADIONUCLIDE	WHC-CM-7-5 [1]Interim Ctrl Value (μCi/ml)	WHC-CM-7-5 [2]DCG(μCi/ml)	[3]RHO-MA-139 DCG(μCi\ml)	10 CFR TABLE II (μCi/ml)
^{60}Co	5.0E-06	5.0E-06	5.0E-06	3.0E-05
^{90}Sr	2.0E-05	1.0E-06	1.0E-06	3.0E-07
^{103}Ru	5.0E-04	5.0E-05	5.0E-05	None
^{106}Ru	6.0E-05	6.0E-06	6.0E-06	None
^{134}Cs	2.0E-06	2.0E-06	2.0E-06	9.0E-06
^{137}Cs	3.0E-05	3.0E-06	3.0E-06	2.0E-05
^{238}Pu	4.0E-07	4.0E-08	4.0E-06	5.0E-06
^{239}Pu	2.0E-06	3.0E-08	3.0E-06	5.0E-06
^{240}Pu	SAME AS ABOVE	3.0E-08	3.0E-06	5.0E-06
^{241}Pu	2.0E-04	2.0E-06	2.0E-04	2.0E-04
^{241}Am	3.0E-07	3.0E-08	1.0E-07	4.0E-06

[1]Values taken from Table F-2, Interim Concentration Values for PFP Waste water to 216-Z-20, WHC-CM-7-5 Part F, Rev. 1.

[2]DCG - Derived Concentration Guidelines - A concentration of radioactive materials in water. DCG are used for controlling exposure to members of the public. "DCG-public are those concentrations of radionuclides in water that would result in a maximum effective committed dose equivalent of 100 mrem per year using ICRP 30 dose methodology under conditions of continuous exposure or use (i.e.,continuously.....drinking contaminated water)".

[3]These limits were applicable prior to 1988.

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7.0 REFERENCES

WHC, 1990, Pressure Check and Gradual Start Up of PRF Process Cooling Water Users, Workplan PFP-90-PRF-014, Westinghouse Hanford Company, Richland, Washington.

WHC, 1991b, 291-Z Sump and Z-20 Crib Routine Sample Schedules, FSS-Z-080-00003, Rev. C-1, Westinghouse Hanford Company, Richland, Washington.

WHC, 1991a, Reopen Plutonium Reclamation Facility Readiness Review Section 1.1.3, Question 22, Letter 15530-91-WSL-081, Westinghouse Hanford Company, Richland, Washington.

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8.0 BIBLIOGRAPHY

1. WHC-CM-5-8, Plutonium Finishing Plant Administrative Manual, "Non-Routine Release Response, " Westinghouse Hanford Company, Richland, Washington.

2. WHC-CM-7-5, Environmental Compliance, Westinghouse Hanford Company, Richland, Washington.

3. Title 10, Code of Federal Regulatory, Part 20, Appendix B, "Concentrations in Air and Water Above Natural Background", Table II, Col. 2-Water.

4. WHC-EP-041, Westinghouse Hanford Company Effluents Discharges and Solid Waste Management Report for Calendar Year 1987: 200/600/1100 Areas, Westinghouse Hanford Company, Richland, Washington.

5. WHC-EP-041-1, Westinghouse Hanford Company Effluents Discharges and Solid Waste Management Report for Calendar Year 1988: 200/600/1100 Areas, Westinghouse Hanford Company, Richland, Washington.

6. WHC-EP-041-2, Westinghouse Hanford Company Effluents Discharges and Solid Waste Management Report for Calendar Year 1989: 200/600/1100 Areas, Westinghouse Hanford Company, Richland, Washington.

7. WHC-EP-041-3, Westinghouse Hanford Company Effluents Discharges and Solid Waste Management Report for Calendar Year 1990: 200/600/1100 Areas, Westinghouse Hanford Company, Richland, Washington.

8. RHO-MA-139, Environmental Protection Manual, Rockwell Hanford Operations, Richland, Washington.

9. WHC-EP-0287, Waste Stream Characterization Report, Westinghouse Hanford Company, Richland, Washington.

10. WHC-EP-0342, Addendum 8, Plutonium Finishing Plant Wastewater Stream Specific Report, Westinghouse Hanford Company, Richland, Washington.

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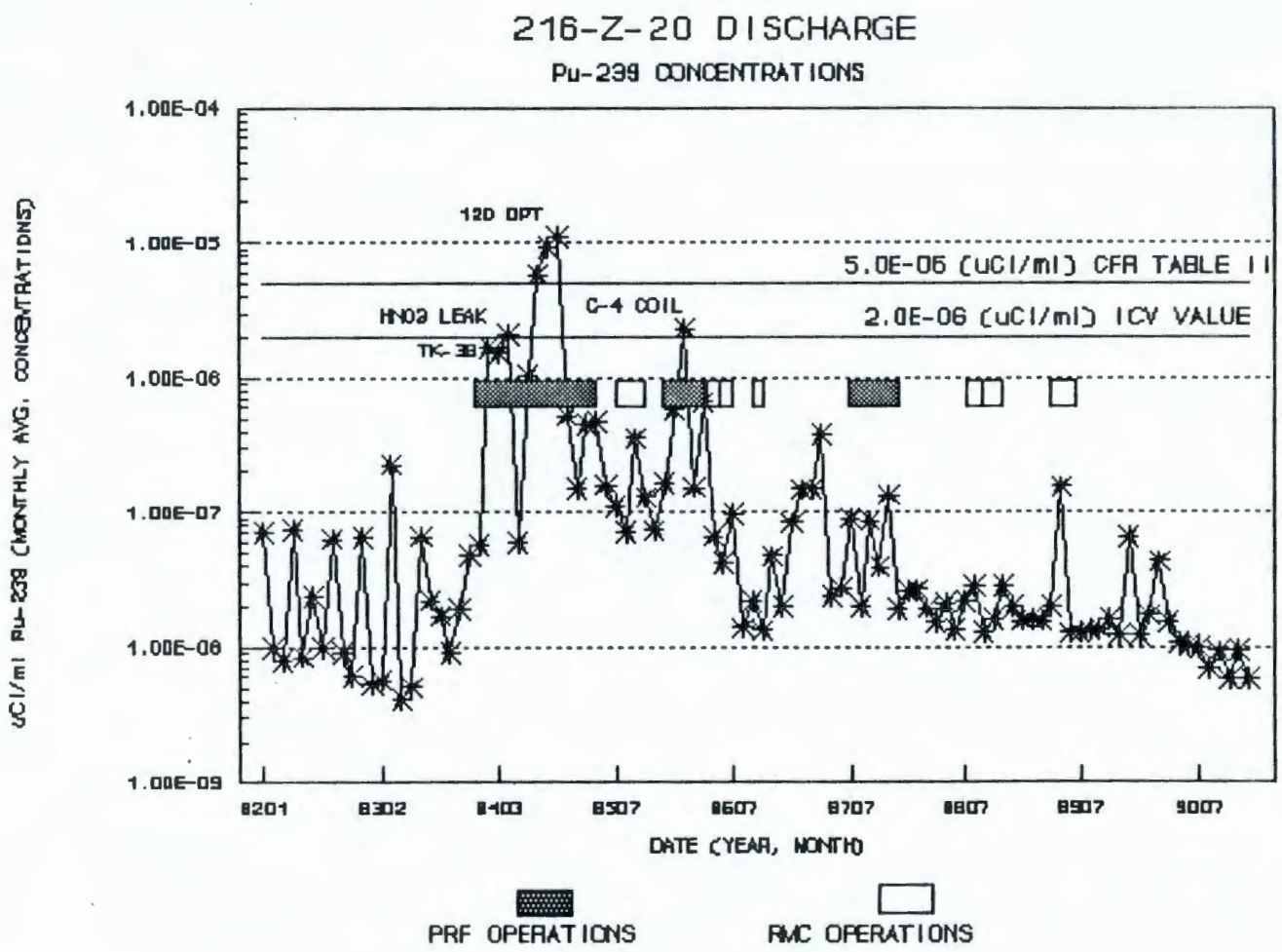
Figure 2



APPENDIX

APPENDIX

TABLE 1
PFP WASTEWATER DATA FOR PU-239

DATE	µCi/ml
8402	1.68E-06
8403	1.50E-06
8405	2.11E-06
8407	6.01E-08
8410	1.03E-06
8411	5.81E-06
8412	9.15E-06
8501	1.10E-05
8502	5.21E-07
8503	1.49E-07
8504	4.50E-07
8505	4.70E-07
8506	1.59E-07
8507	1.10E-07
8508	7.10E-08
8509	3.57E-07
8510	1.29E-07
8511	7.36E-08
8512	1.63E-07
8601	5.76E-07
8602	2.33E-06
8603	1.52E-07
8604	6.56E-07
8605	6.60E-08
8606	4.20E-08
8607	9.60E-08

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APPENDIX

DATE	µCi/ml
8608	1.39E-08
8609	2.16E-08
8610	1.33E-08
8611	4.72E-08
8612	2.00E-08
8701	8.40E-08
8702	1.48E-07
8703	1.48E-07
8704	3.77E-07
8705	2.37E-08
8706	2.75E-08
8707	9.06E-08
8708	1.99E-08
8709	8.64E-08
8710	3.92E-08
8711	1.33E-07
8712	1.90E-08
8801	2.63E-08
8802	2.66E-08
8803	1.95E-08
8804	1.52E-08
8805	2.11E-08
8806	1.35E-08
8807	2.17E-08
8808	2.81E-08
8809	1.29E-08
8810	1.59E-08
8811	2.82E-08

APPENDIX

DATE	μCi/ml
8812	2.01E-08
8901	1.57E-08
8902	1.66E-08
8903	1.55E-08
8904	2.00E-08
8905	1.55E-07
8906	1.27E-08
8907	1.26E-08
8908	1.32E-08
8909	1.37E-08
8910	1.60E-08
8911	1.24E-08
8912	6.56E-08
9001	1.23E-08
9002	1.73E-08
9003	4.33E-08
9004	1.52E-08
9005	1.07E-08
9006	1.03E-08
9007	1.00E-08
9008	7.03E-09
9009	9.38E-09
9010	5.75E-09
9011	9.58E-09
9012	5.90E-09

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APPENDIX

TABLE 2
PFP WASTEWATER DATA

DATE	Sr-90	Cs-137	Pu-238	Pu-241	Am-241
8401					
8402	4.49E-08	5.82E-08			2.14E-07
8403	1.81E-08	3.70E-08			8.95E-07
8404					
8405	7.00E-09	6.74E-08			1.78E-07
8406	8.00E-09	4.80E-08			
8407	1.00E-08	4.80E-08			
8408	1.50E-07	4.80E-08			
8409	1.00E-08	4.80E-08			
8410	1.00E-08	3.91E-08			1.65E-06
8411	2.40E-08	4.80E-08			6.35E-07
8412	1.00E-08	4.76E-08			1.25E-07
8501				4.22E-05	4.35E-06
8502				9.79E-07	1.68E-07
8503				3.10E-07	2.77E-07
8504				1.60E-06	2.20E-07
8505				1.54E-06	2.20E-07
8506				5.65E-07	2.39E-07
8507				3.41E-07	4.49E-07
8508				2.81E-07	9.44E-07
8509				1.03E-06	3.45E-07
8510				2.33E-07	3.47E-07
8511				1.30E-07	3.80E-07
8512				3.70E-07	1.63E-07
8601				3.08E-06	1.63E-06
8602				2.89E-06	7.01E-07

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APPENDIX

DATE	Sr-90	Cs-137	Pu-238	Pu-241	Am-241
8603				3.04E-07	6.92E-07
8604				1.65E-06	4.76E-07
8605				2.08E-07	2.20E-07
8606				2.14E-07	3.53E-07
8607				4.68E-07	3.62E-07
8608				5.99E-08	4.80E-07
8609				8.98E-08	1.71E-07
8610				6.20E-08	1.46E-07
8611				1.93E-07	1.28E-06
8612				8.02E-08	5.45E-07
8701	2.70E-08	1.71E-08	1.40E-08	3.20E-07	4.26E-07
8702	2.20E-08	1.98E-08	1.88E-08	5.68E-07	3.20E-07
8703			1.78E-08	5.53E-07	2.81E-07
8704	2.01E-08	2.08E-08	8.40E-09	9.79E-07	1.36E-07
8705	2.30E-08	1.05E-08	2.62E-09	4.95E-08	3.26E-08
8706	1.79E-08	1.11E-08	6.24E-09	5.84E-08	3.10E-07
8707	1.64E-08	1.63E-08	1.19E-08	3.06E-07	1.24E-07
8708	9.29E-09	2.05E-08	4.93E-09	7.84E-08	2.87E-08
8709	2.50E-08	2.20E-08	1.46E-08	2.35E-07	3.83E-08
8710	1.78E-08	1.90E-08	4.55E-09	1.10E-07	1.61E-08
8711	1.73E-08	1.71E-08	3.72E-09	3.22E-07	1.29E-08
8712	2.70E-08	1.75E-08	2.43E-09	2.29E-08	4.59E-08
8801			4.55E-09	4.66E-08	9.42E-09
8802			2.20E-09	5.11E-08	1.21E-08
8803			8.77E-10	4.05E-08	1.75E-08
8804			1.28E-08	2.79E-08	1.90E-08
8805			3.33E-09	6.42E-08	1.52E-08
8806			5.07E-09	6.40E-08	2.45E-08

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APPENDIX

DATE	Sr-90	Cs-137	Pu-238	Pu-241	Am-241
8807			1.15E-08	7.63E-08	3.89E-08
8808			1.45E-08	1.02E-07	1.45E-08
8809			7.69E-09	1.35E-07	3.04E-08
8810			7.78E-09	5.72E-08	3.12E-08
8811			5.80E-09	6.84E-08	2.89E-08
8812			4.55E-09	6.65E-08	1.59E-08
8901	1.62E-08	1.82E-08	4.57E-09	3.93E-08	9.13E-09
8902	1.20E-08	1.61E-08	1.54E-09	3.58E-08	9.60E-09
8903	1.27E-08	3.76E-08	3.41E-09	7.23E-08	1.80E-08
8904	1.28E-08	1.97E-08	7.19E-09	5.51E-08	1.44E-08
8905	9.85E-09	2.29E-08	1.33E-08	5.14E-07	1.41E-08
8906	1.27E-08	2.18E-08	2.12E-09	4.30E-08	1.49E-08
8907	1.82E-07	2.74E-08	4.97E-09	3.60E-08	9.90E-09
8908	1.36E-08	2.89E-08	5.84E-09	2.81E-08	1.17E-08
8909	1.39E-08	2.62E-08	5.86E-09	6.09E-08	1.16E-08
8910	1.28E-08	2.06E-08	6.07E-09	3.45E-08	1.21E-08
8911	1.63E-08	2.72E-08	5.51E-09	2.54E-08	1.10E-08
8912	1.95E-08	3.14E-08	3.37E-09	1.11E-07	1.32E-08
9001	2.7E-08	6.1E-08	1.2E-08	5.7E-08	2.5E-08
9002	2.0E-08	6.2E-08		4.6E-08	2.5E-08
9003	2.3E-08	6.1E-08		1.6E-07	2.0E-07
9004	1.2E-08	6.2E-08	1.0E-08	5.8E-08	1.2E-08
9005	1.7E-08	7.2E-08	1.0E-08	4.1E-08	1.2E-08
9006	1.7E-08	4.1E-08	1.0E-08	3.9E-08	1.2E-08
9007	1.6E-08	7.4E-08	1.0E-08	4.6E-08	1.2E-08
9008	1.7E-08	6.9E-08	5.9E-09	3.7E-08	3.5E-09
9009	1.3E-08	7.1E-08	5.8E-09	5.0E-08	6.6E-09
9010	1.3E-08	7.1E-08	5.8E-09	2.9E-08	3.1E-09

APPENDIX

DATE	Sr-90	Cs-137	Pu-238	Pu-241	Am-241
9011	1.5E-08	5.2E-08	5.7E-09	7.3E-08	1.1E-08
9012	1.5E-08	5.8E-08	5.9E-09	4.5E-08	1.2E-08

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APPENDIX

TABLE 3
CORRECTED Pu-239 VALUES

DATE	µCi/ml
7901	5.45E-07
7902	1.79E-07
7903	8.96E-08
7904	2.95E-07
7905	9.52E-08
7906	9.09E-08
7907	8.78E-08
7908	3.56E-08
7909	3.43E-09
7910	1.95E-08
7911	1.41E-08
7912	1.60E-08
8001	9.95E-09
8002	8.53E-08
8003	4.84E-09
8004	7.80E-09
8005	3.65E-09
8006	7.00E-09
8007	8.23E-09
8008	7.12E-09
8009	7.00E-09
8010	4.80E-09
8011	4.60E-09
8012	7.12E-09
8101	9.70E-01
8102	1.23E-08

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APPENDIX

DATE	μCi/ml-07
8103	1.04E-07
8104	4.30E-09
8105	5.90E-08
8106	2.30E-08
8107	2.46E-08
8108	2.82E-08
8109	2.05E-08
8110	2.50E-08
8111	2.40E-08
8112	2.70E-08
8201	7.18E-08
8203	1.00E-08
8204	7.98E-09
8205	7.49E-08
8206	8.47E-09
8207	2.40E-08
8208	1.00E-08
8209	6.32E-08
8210	9.03E-09
8211	6.10E-09
8212	6.51E-08
8301	5.27E-09
8302	5.71E-09
8303	2.26E-07
8304	4.10E-09
8305	5.04E-09
8306	6.64E-08
8307	2.23E-08

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PLUTONIUM FINISHING PLANT LIQUID EFFLUENT DIAGRAM

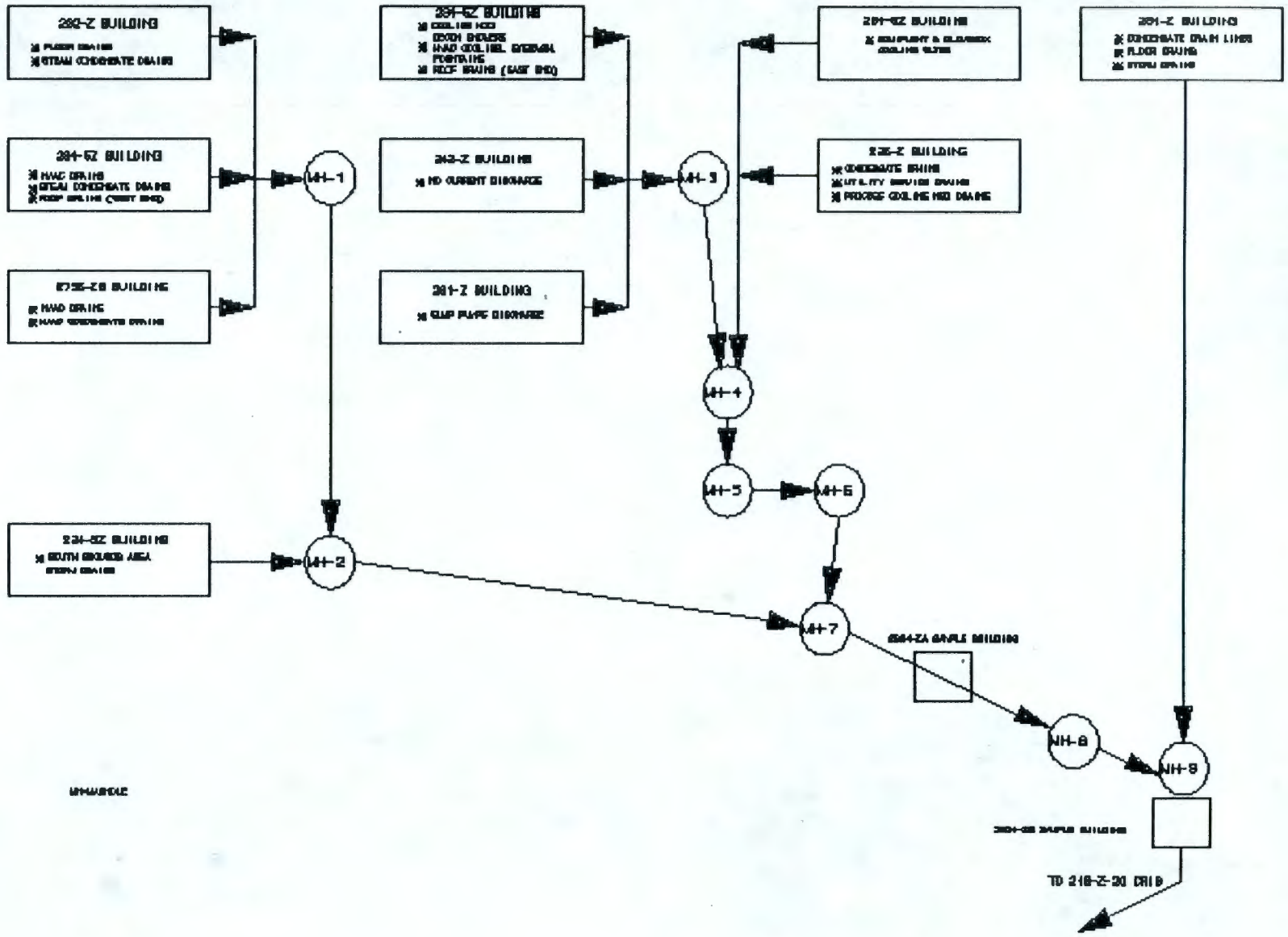

Figure 1: PFP Liquid Effluent Diagram

APPENDIX

DATE	μCi/ml
8308	1.70E-08
8309	9.10E-09
8310	1.93E-08
8311	4.81E-08
8312	5.70E-08
8402	1.68E-06
8403	1.50E-06
8405	2.11E-06
8407	6.01E-08
8410	1.03E-06
8411	5.81E-06
8412	9.15E-06

NOTE: Appendix tables may include less than values which are reported at the detection limit. Values recorded in Table 2 for the calendar year 1990 are reported to two (2) significant figures per request of DOE to WHC Environmental Protection.

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