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DUQUESNE LIGHT COMPANY
SHIPPINGPORT ATOMIC POWER STATION

TEST EVALUATION

DLCS 2180102

PERIODIC CHARACTERIZATION OF RADIOACTIVE WASTE DISPOSAL EFFLUENTS

CORE I SEED 3

First Issue, June 13, 1962

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Purpose

The purpose of this test is to characterize the major nuclides present in the Radioactive Waste Disposal System effluents water and gas.

Conclusion

The radioactive nuclides present in the 1C Surge Tank were effectively reduced to much less than the tolerance for discharge to the local environment, with one circulating pump in service for dilution. The gross beta activity in the 1A test tank was determined to be $(1.19 \pm 0.02) \times 10^{-6}$ $\mu\text{C}/\text{ml}$; the discharge rate was adjusted so that the activity entering the Ohio River was 19 percent less than the allowed (Pennsylvania Radiation Protection Regulation 433) limit as defined by the Duquesne Light Company operating permit with the Commonwealth of Pennsylvania.

The major activity present in all of the liquid samples analyzed was Cobalt-60. The Radioactive Waste Disposal Ion Exchangers and Gas Stripper removed both the activity in particulate form and the soluble activities (that activity which passes through a type HA millipore filter paper - pore size 0.45 microns). The system overall efficiency based on gross gamma activity measurements was 96.2 percent. The system was also effective in removing particulate activity and showed an efficiency of 94.7 percent.

The Cesium-137 activity increased by a factor of two in the sample taken after the 1B Ion Exchanger. The 1B Ion Exchanger was first in a series of four ion exchangers. This is the same phenomenon observed in the first performance of this test (DLCS 2180101) and is related to the fact that this resin had the most service and was depleted in terms of ability to remove Cesium.

The major activity of the Radioactive Waste Disposal Vent Gas System was Xenon-133. The gamma-ray spectrum failed to show the presence of 10.2 year, Krypton-85 which would be the other radionuclide in this system.

The 1B Chemical Waste Tank (water) was also radiochemically analyzed. The major activity was Cobalt-60 which accounted for 64.9 percent of the gross gamma activity. The sample contained 3.6 milligrams of solids per milliliter of sample.

Results

The second performance of this periodic test was begun on November 14, 1961. In accordance with the test procedure, the second performance began approximately three months after the first (DLCS 2180101). The 1C Surge Tank had been valved to receive Reactor Plant effluents from October 31, to November 7, 1961. The

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tank was recirculated for mixing and processing started on November 8, 1961. In accordance with normal operating procedures, the water was pumped from the 1C Surge Tank, through four ion exchangers in series (1B, 1A, 1D and 1C in that order), through the gas stripper and finally to the 1A Test Tank. A general description of the components in the Radioactive Waste Disposal involved in the processing of Reactor Plant liquid and gaseous waste for the performance of this test is presented in Appendix I. A complete operating history of the Radioactive Waste Disposal System Ion Exchangers is presented in Table VI. The table shows the total volume of liquid wastes processed as determined from the hours that the transfer pumps were in service and the average measured flow of the process stream.

Hourly samples were taken of the effluent from the 1C surge tank, the first (1B) and the last (1C) ion exchangers over a 24 hour period. The average gross gamma activity for degassed and non-degassed aliquots of these samples are shown below with the average deviation for the number of observations made:

<u>Location</u>	<u>Number Observed</u>	<u>Non-Degassed cpm/ml</u>	<u>Degassed cpm/ml</u>
1C Surge Tank	24	976 $\pm$ 123	807 $\pm$ 80
1B Ion Exchanger	23	389 $\pm$ 169	320 $\pm$ 135
1C Ion Exchanger	24	75 $\pm$ 20	55 $\pm$ 15

All of the gross gamma activity determinations were made by placing 2 ml of sample in a vial in a well type counter employing a 2 in. x 1-3/4 in. NaI (Tl) Crystal with the system biased at 30 Kev. The samples showed large deviations above the average; however, this is due to the problem of obtaining representative samples of the large volume of water contained in the surge tank. At the end of the 24 hour sampling period, the 1A test tank was sampled and the gross activity determined. The tank was then discharged to the environment.

The Radioactive Waste Disposal process equipment reduced the concentration of activities to well within limits for discharge to the environment. Tolerance levels for the nuclides of interest are listed in Table VII. The values are taken from the National Bureau of Standards Handbook, Number 69, dated June 5, 1959. The change in activity across the process stream indicates that the resin and gas stripper removed both filterable (those activities which pass through a type HA millipore filter) and particulate (crud) activity effectively. The major activity present (Cobalt-60) was used to determine the system performance for both filterable and particulate activities. The change in particulate activity (based on Cobalt-60 activity) observed across the first ion exchanger showed that the resin was retaining the crud with a 49.3 percent efficiency. The four ion exchangers in series had an efficiency of 98.2 percent for activity as particulate matter.

Efficiency (E) is defined as follows:

$$E = \frac{\text{Inlet Activity} - \text{Outlet Activity}}{\text{Inlet Activity}} \times 100$$

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However, it is noted that the efficiency as described above may not represent the absolute efficiency; it is only based throughout this discussion on the "quality" of the water at the time of this test performance.

The 1A Test Tank contained about 2.7 times the particulate activity of the last ion exchanger effluent. This increase could be due to the contamination present on the interior of the test tank (see DLCS 2180101). The overall system efficiency for activated particulate matter is 94.7 percent (based on Co-60 activity).

The overall efficiency of the Radioactive Waste Disposal System process stream for filtrate activities was 96.5 percent (based on Co-60 activity). The last ion exchanger effluent contained 39.9 dpm/ml of cobalt activity while the test tank contained 26.4 dpm/ml of cobalt activity. This decrease across the gas stripper, 33.9 percent of the activity of the last ion exchanger, could only be achieved by adsorption on the system surfaces. The gas stripper provides a large surface area for adsorption to take place on the porous ceramic (Byrel Saddles) pellets contained in the unit.

Decontamination factors were determined for the Radioactive Waste Disposal System as well as various points on the system and are listed in Table IX.

Decontamination factor (DF) is defined as

$$DF = \frac{\text{ACTIVITY OF INLET}}{\text{ACTIVITY OF OUTLET}}$$

The decontamination factors (DF) so determined are representative of the "quality" of water at the time of the performance of this test and have been based on Cobalt-60 activity. The decontamination factors for the system for particulate and filtrate activities were 18.7 and 27.8 respectively.

The first ion exchanger sample showed a negative decontamination factor for Cesium-137, since the water contained 5.4 dpm/ml at the inlet and 11.8 dpm/ml at the effluent. This is related to the long service which this particular ion exchanger had on the process stream (see Table VI). The 1B ion exchanger had been renewed on October 24, 1961, and remained in service until December 23, 1961 when the resin was replaced. All of the ion exchangers had been back flushed and since there are no provisions for air mixing the resins after backwashing to establish a homogenous mixture of anion in cation resin, the beds are assumed to be partially classified.

The Vent Gas System was sampled on January 29, 1962. The sample was characterized using a gamma ray spectrometer. The major gamma emitting nuclide present in the gas sample was Xenon-133 which had a specific activity of 799 dpm/cc at ambient temperature and pressure. A large (250 cc) sample was isolated and allowed to decay for 47 days. The decay period is necessary to remove all interfering radiation from the sample before Krypton-85 can be detected. Krypton-85 transitions have only 0.36 percent gamma-rays associated in their decay scheme. Krypton-85 was not detected in this sample. A gamma ray spectrum of the gas sample counted on the date of sampling (1-29-62) is presented in Figure 5.

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The 1B chemical waste tank was sampled on December 21, 1961. The sample contained a large amount of suspended matter, 3.6 mg/ml. The major activity of both the suspended solids and of the filtrate was Cobalt-60 which accounted for 64.9 percent of the gross gamma ray activity. Because of the large amount of suspended matter, the sample aliquot for the gross gamma activity is doubtful. The problem of physically creating a homogenous mixture and removing a representative sample from the mass is extremely difficult. This difficulty is reflected in the lower percent recovery in the gamma balance which indicates that only 67.3 percent of the gross gamma activity was accounted for. The gamma ray spectrum tend to indicate that Cobalt-60 and Manganese-54 are the major activities and the radiochemical analysis confirm this fact; therefore the low recovery is related to the uncertainty in aliquoting the gross activity sample.

APPENDIX I

The Reactor Plant liquid and gaseous waste material is contained, processed and disposed of in the Radioactive Waste Disposal System.

The waste liquid is delivered to one of four surge tanks in the Waste Disposal Yard. Each surge tank has a capacity of 29,100 gal. From the surge tank, the waste liquid is pumped through the waste liquid cooler to four ion exchangers arranged in series flow at an approximate flow rate of 3 gal/min. Each ion exchanger contains approximately 12 cu. ft. of mixed bed resin in the hydrogen-hydroxide form. The effluent from the last ion exchanger then flows to the feed bottoms heat exchanger and then into the gas stripper where most of the volatile material (gases) is removed. The gas stripper consists of a packed tower with counter-flow of low pressure steam and waste liquid. The degassed liquid collects in the bottom of the stripper from where it is pumped back through the other side of the feed bottoms heat exchanger to one of two test tanks, each with a capacity of 5000 gal., in the Waste Disposal Yard for monitoring and subsequent discharge to the environment through the effluent channel at a controlled rate. The flow arrangement used for the performance of this test is illustrated on the diagram below.

All gaseous wastes that originate from the primary reactor systems are processed and disposed of in the Vent Gas System. Four gas decay drums are provided to store the radioactive gas from the Vent Gas System until it can be safely released to the atmosphere. They are welded carbon steel pressure vessels designed for 75 psig at 400 F and have a net operating capacity of 133 cu. ft. The decayed gases are discharged through a sensitive control instrument and highly efficient filter to the suction duct of one of two air dilution fans which discharge the mixture to the stack.

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TABLE I

Activity Distribution of the Hourly Samples
Nov. 14, 1961 - Nov. 15, 1961

<u>Hourly Sample</u>	<u>Gross γ at Sample Time: cpm/ml *</u>					
	<u>Surge 1C</u>		<u>1st Ion Exchange (B)</u>		<u>Last Ion Exchange (C)</u>	
	<u>Non-Degassed</u>	<u>Degassed</u>	<u>Non-Degassed</u>	<u>Degassed</u>	<u>Non-Degassed</u>	<u>Degassed</u>
0930	839	701	448	385	62	40
1030	1318	915	298	255	89	54
1130	955	860	230	227	65	57
1230	1091	936	239	227	54	52
1330	1031	944	245	220	52	43
1430	844	814	226	200	43	42
1530	917	857	215	197	44	38
1630	936	861	239	223	54	44
1730	902	820	239	177	58	38
1830	991	857	355	332	44	36
1930	970	845	203	202	43	40
2030	880	868	272	235	78	58
2130	1086	915	348	---	155	136
2230	995	614	263	218	94	75
2330	837	720	222	203	69	49
0030	1578	783	314	229	83	42
0130	1123	978	567	408	81	56
0230	968	796	648	498	83	74
0330	887	783	772	714	114	51
0430	795	566	652	601	74	61
0530	1050	740	645	446	72	59
0630	751	632	697	535	82	29
0730	847	787	710	675	120	51
0830	840	782	296	261	95	93

** Gross Gamma Activity determined in a 1 3/4 x 2 inch well.
Type NaI (Tl) Crystal biased to 30 Kev. Sample volume 2 ml.

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TABLE II

Sample - 1C Surge

Sample Time - Nov. 14-15, 1961

<u>Nuclide</u>	<u>Specific Activity - dpm/ml *</u>		<u>% Gross γ Activity *</u>
	<u>Filtrate</u>	<u>Insoluble</u>	
Co ⁶⁰	724	832	72.3
Co ⁵⁸	61.5	N.D.	1.7
Mn ⁵⁴	75.8	19.4	2.6
Fe ⁵⁹	17.7	12.8	1.0
Cr ⁵¹	N.D.	N.D.	---
Hf ¹⁸¹	N.D.	11.8	2.0
Zr ⁹⁵	N.D.	N.D.	---
Cs ¹³⁷	5.4	N.D.	0.2
Cs ¹³⁶	N.D.	N.D.	---
Sr ⁸⁹	N.D.	N.D.	---
Sr ⁹⁰	N.D.	N.D.	---
Ba ¹⁴⁰	N.D.	N.D.	---
Total -			79.8

Gross gamma activity (unfiltered) - 992 cpm/ml

* All activities corrected to 11-19-62 for gross gamma balance.

N.D. -- Indicates Not Detectable.

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TABLE III

Sample - First Ion Exchanger Outlet (B)

Sample Time - Nov. 14-15, 1961

<u>Nuclide</u>	<u>Specific Activity - dpm/ml *</u>		<u>% Gross δ Activity *</u>
	<u>Filtrate</u>	<u>Insoluble</u>	
Co ⁶⁰	242	422	81.0
Co ⁵⁸	22.7	N.D.	2.3
Mn ⁵⁴	13.3	1.8	1.0
Fe ⁵⁹	10.5	2.8	1.0
Cr ⁵¹	N.D.	N.D.	---
Hf ¹⁸¹	N.D.	N.D.	---
Zr ⁹⁵	N.D.	N.D.	---
Cs ¹³⁷	11.8	N.D.	0.9
Cs ¹³⁶	N.D.	N.D.	---
Sr ⁸⁹	0.85	N.D.	---
Sr ⁹⁰	N.D.	N.D.	---
Ba ¹⁴⁰	N.D.	N.D.	---
Total - 86.2			

Gross gamma activity (unfiltered) - 337 cpm/ml

* - Corrected to November 19, 1961

N. D. - Not Detectable

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TABLE IV

Sample Last Ion Exchanger Outlet (C)

Sample Time - Nov. 14-15, 1961

<u>Nuclide</u>	<u>Specific Activity - dpm/ml *</u>		<u>% Gross γ Activity *</u>
	<u>Filtrate</u>	<u>Insoluble</u>	
Co ⁶⁰	39.9	16.2	79.4
Co ⁵⁸	1.2	N.D.	1.0
Mn ⁵⁴	0.75	4.5	4.4
Fe ⁵⁹	N.D.	2.8	2.4
Cr ⁵¹	N.D.	N.D.	---
Hf ¹⁸¹	N.D.	N.D.	---
Zr ⁹⁵	N.D.	N.D.	---
Cs ¹³⁷	N.D.	N.D.	---
Cs ¹³⁶	N.D.	N.D.	---
Sr ⁸⁹	1.06	N.D.	---
Sr ⁹⁰	N.D.	N.D.	---
Ba ¹⁴⁰	N.D.	N.D.	---
Total -			87.2

Gross gamma activity (unfiltered) - 32.5 cpm/ml

* - Corrected to November 19, 1961

N. D. - Not Detectable

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TABLE V

Sample Test Tank (1A)

Sample Time - Nov. 14-15, 1961

<u>Nuclide</u>	<u>Specific Activity - dpm/ml. *</u>		<u>% Gross γ Activity *</u>
	<u>Filtrate</u>	<u>Insoluble</u>	
Co ⁶⁰	26.4	44.3	84.4
Co ⁵⁸	0.7	N.D.	0.5
Mn ⁵⁴	3.5	2.5	4.2
Fe ⁵⁹	N.D.	N.D.	---
Cr ⁵¹	N.D.	N.D.	---
Hf ¹⁸¹	N.D.	N.D.	---
Zr ⁹⁵	N.D.	N.D.	---
Cs ¹³⁷	N.D.	N.D.	---
Cs ¹³⁶	N.D.	N.D.	---
Sr ⁸⁹	0.27	N.D.	---
Sr ⁹⁰	N.D.	N.D.	---
Ba ¹⁴⁰	N.D.	N.D.	---
Total -			89.1

Gross gamma activity (unfiltered) - 30 cpm/ml

* - Corrected to November 19, 1961

N.D. - Not Detectable

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TABLE VI

Operating History of Ion Exchangers Prior to Test

<u>Date</u>	<u>Time</u>	<u>Total Flow Gal.</u>	<u>Operation</u>
8-18-61	3:00/P	0	Flow Path: C-B-A-D
8-22-61	11:30/A	16650	Replaced resin in 1C Ion Exchanger, Flow Path: B-A-D.
8-23-61	4:30/P	21870	Return 1C Ion Exchanger to service, Flow Path: B-A-D-C.
8-24-61	11:00/A	25200	Change Flow Path from B-A-D-C to B-A-D.
8-24-61	1:00/P	25560	Change Flow from B-A-D to B-A-D-C.
9-5-61	1:55/P	75015	Change Flow from B-A-D-C to A-D-C.
9-13-61	11:20/A	81870	Backflushed 1A, 1B and 1D Ion Exchangers; changed Flow from A-D-C to B-A-D-C.
9-16-61	8:50/A	89310	Backflushed 1B Ion Exchanger; changed Flow from B-A-D-C to A-D-C-B.
9-19-61	9:15/A	93930	Changed Flow from A-D-C-B to A.
9-19-61	2:05/P	94800	Changed Flow from A to A-D.
9-20-61	7:20/A	97680	Replaced resin in 1A and 1D Ion Exchangers.
9-21-61	9:40/A	101310	Changed Flow from A-D to D.
9-21-61	8:45/P	103305	Changed Flow from D to A-D.
9-22-61	1:20/A	104130	Backflushed 1D Ion Exchanger; changed Flow from A-D to D.
9-23-61	8:15/P	111825	Replaced resin in 1C Ion Exchanger; backflushed 1D Ion Exchanger.

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TABLE VI (CONT'D)

Operating History of Ion Exchangers Prior to Test

<u>Date</u>	<u>Time</u>	<u>Total Flow Gal.</u>	<u>Operation</u>
9-24-61	6:55/A	113745	Backflushed 1D Ion Exchanger.
9-24-61	6:10/P	115860	Backflushed 1D Ion Exchanger.
9-26-61	3:30/A	121485	Replaced resin in 1B Ion Exchanger; change flow from D to D-C.
9-29-61	10:15/P	135545	Backflushed 1C and 1D Ion Exchangers.
9-30-61	4:30/A	136670	Backflushed 1C and 1D Ion Exchangers.
9-30-61	2:00/P	138380	Changed Flow from D-C to D.
9-30-61	5:15/P	138965	Backflushed 1D Ion Exchanger.
10-1-61	1:20/A	140420	Changed Flow from D to C.
10-1-61	9:30/A	141890	Backflushed 1C Ion Exchanger.
10-1-61	6:55/P	143585	Backflushed 1C Ion Exchanger
10-2-61	4:40/P	147500	Changed Flow from C to B.
10-4-61	3:50/A	150710	Backflushed 1B Ion Exchanger.
10-4-61	12:30/P	152270	Backflushed 1B Ion Exchanger.
10-5-61	12:01/P	156500	Backflushed 1A, 1B and 1D Ion Exchangers; changed Flow from B to B-A-D.
10-13-61	10:45/A	167930	Backflushed 1A, 1B and 1D Ion Exchangers.
10-14-61	10:00/A	172115	Backflushed 1A, 1B and 1D Ion Exchangers.
10-15-61	9:05/A	176270	Changed Flow from B-A-D to A-D.
10-15-61	7:40/P	178175	Changed Flow from A-D to B-A-D.

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<u>Date</u>	<u>Time</u>	<u>Total Flow Gal.</u>	<u>Operation</u>
10-16-61	2:45/P	181610	Changed Flow from B-A-D to A-D.
10-18-61	12:30/A	183260	Changed Flow from A-D to B-A-D.
10-18-61	4:00/P	186050	Changed Flow from B-A-D to D.
10-19-61	9:00/A	189110	Backflushed 1A, 1B and 1D Ion Exchangers; changed Flow from D to B.
10-20-61	1:20/P	193280	Replaced resin 1C Ion Exchanger; backflushed 1B Ion Exchanger; changed flow from B to B-A-D-C.
10-20-61	8:30/P	194570	Changed Flow from B-A-D-C to A-D-C.
10-22-61	9:15/P	196865	Backflushed 1A, 1C and 1D Ion Exchangers.
10-23-61	2:00/P	202040	Backflushed 1A, 1B, 1C and 1D Ion Exchangers; changed Flow from A-D-C to B-A-D-C.
10-24-61	5:30/A	204650	Changed Flow from B-A-D-C to A-D-C.
10-24-61	8:05/A	205115	Changed Flow from A-D-C to B-A-D-C.
10-24-61	11:45/A	205775	Replaced resin in 1B Ion Exchanger; changed Flow from B-A-D-C to D-C.
10-25-61	1:50/P	206600	Backflushed 1A, 1B, 1C and 1D Ion Exchangers; changed Flow from D-C to A-D-B-C.
10-27-61	6:45/A	213935	Backflushed 1A Ion Exchanger; changed Flow from A-D-C-B to D-C-B.
11-6-61	12:01/P	224435	Changed Flow from D-C-B to C-B-A; backflushed 1D Ion Exchanger.
11-10-61	2:00/P	237755	Replaced resin in 1C Ion Exchanger.

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Operating History of Ion Exchangers Prior to Test

<u>Date</u>	<u>Time</u>	<u>Total Flow Gal.</u>	<u>Operation</u>
11-13-61	12:25/P	250430	Backflushed 1B, 1C and 1D Ion Exchangers; changed Flow from C-B-A to B-A-D-C.
11-15-61	9:45/P	258485	Backflushed 1B Ion Exchanger.
11-17-61	12:15/A	263255	Backflushed 1B Ion Exchanger.
11-30-61	9:00/A	275915	Changed Flow from B-A-D-C to B.
11-30-61	1:45/P	276770	Changed Flow from B to B-A-D-C.
12-23-61	6:25/P	300205	Replaced resin in 1B Ion Exchanger; changed flow from B-A-D-C to A-D-C.
12-29-61	3:15/P	305200	Changed Flow from A-D-C to B-A-D-C.
12-31-61	11:59/P	315415	End DLCS 21801.

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TABLE VII

Maximum Permissible Concentrations of
Radio Nuclides in Air and Water

<u>Nuclide</u>	<u>Half Life</u>	<u>MPC (168 Hr. Week) *</u>	
		<u>Air</u> <u>µc/cc</u>	<u>Water</u> <u>µc/cc</u>
Co ⁶⁰	5.2 Years	10 ⁻⁷	5 x 10 ⁻⁴
Mn ⁵⁴	310 Days	3 x 10 ⁻⁷	10 ⁻³
Cs ¹³⁷	28 Years	2 x 10 ⁻⁸	2 x 10 ⁻⁴
Ba ¹⁴⁰	12.8 Days	4 x 10 ⁻⁸	3 x 10 ⁻⁴
La ¹⁴⁰	40.8 Hours	5 x 10 ⁻⁸	2 x 10 ⁻⁴
Cr ⁵¹	27 Days	4 x 10 ⁻⁶	2 x 10 ⁻²
Fe ⁵⁹	45 Days	10 ⁻⁷	6 x 10 ⁻⁴
Sr ⁸⁹	50.5 Days	10 ⁻⁸	10 ⁻⁴
Sr ⁹⁰	19 Years	10 ⁻¹⁰	10 ⁻⁶
Y ⁹⁰	64 Hours	4 x 10 ⁻⁸	2 x 10 ⁻⁴
Xe ¹³³	5.36 Days	3 x 10 ⁻⁶	
Xe ¹³⁵	9.2 Hours	10 ⁻⁶	
Kr ⁸⁵	10.2 Years	3 x 10 ⁻⁶	

* NBS Handbook 69, Dated June 5, 1959

DUQUESNE LIGHT COMPANY
POWER STATIONS DEPARTMENT
SHIPPINGPORT ATOMIC POWER STATION

PERIODIC CHARACTERIZATION OF RADIO-
ACTIVE WASTE DISPOSAL SYSTEM EFFLUENTS
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TABLE VIII

Sample - 1B Chemical Waste Tank
Gross γ Activity (Unfiltered) - Jan. 2, 1962 - 665 cpm/ml *
Sample Time - December 19, 1961

<u>Nuclide</u>	<u>Specific Activity - dpm/ml*</u>		<u>% Gross γ Activity *</u>
	<u>Filtrate</u>	<u>Insoluble</u>	
Co ⁶⁰	174	755	64.9
Co ⁵⁸	N.D.	N.D.	---
Fe ⁵⁹	N.D.	25.4	1.1
Mn ⁵⁴	13.2	70.0	3.3
Cs ¹³⁷	N.D.	N.D.	---
Cs ¹³⁶	N.D.	N.D.	---
Hf-181	N.D.	N.D.	---
Zr-95	N.D.	N.D.	---
Total -			67.3

* - Corrected to January 2, 1962

N.D. - Not Detectable

In a 25 ml sample, there was 82.29 mg of suspended material.

TABLE IX

Calculated Decontamination Factors

<u>Sample Point</u>	<u>Specific Activity of Cobalt-60 dpm/ml</u>			<u>Decontamination Factor Surge Tank to Sample Point</u>		
	<u>Total</u>	<u>Filtrate</u>	<u>Particulate</u>	<u>Total</u>	<u>Filtrate</u>	<u>Particulate</u>
1C Surge Tank	1556	724	832	-	-	-
1B Ion Exchanger Effluent	644	242	422	2	3	2
1C Ion Exchanger Effluent	56	40	16	28	18	52
1A Test Tank	70	26	44	22	28	19

TEST EVALUATION DLCS 2180102

PERIODIC CHARACTERIZATION OF RADIOACTIVE WASTE DISPOSAL SYSTEM EFFLUENTS

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