ENCLOSURE 2

NUREG-0598

DRAFT

Release of Radionuclides into the Susquehanna River from Three Mile Island Nuclear Station during the Period of 3/28/79 - 5/11/79 Data and Analysis

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Foreword

On March 28, 1979, a series of events occurred at Three Mile Island Unit 2, which resulted in the release of approximately 600,000 of gallons contaminated water onto the containment floor. Part of this liquid was discharged into the Susquehanna River over the period of March 28 through May 11. This document presents data for these discharges, and analyses of their consequences. At no time did the releases endanger the health and safety of the public, nor did they result in significant environmental impact.

This document was assembled by members of the Radiological Assessment Branch staff. The analyses in the main body of it document were done by Walt Pasciak, and technical and editorial review was done by Frank J. Congel and Edward F. Branagan, Jr.

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1. Introduction

The purpose of this document is to present data on radionuclide releases made to Susquehanna River as a result of the incident at Three Mile Island Nuclear Station during the period of 3/28/79 through approximately 5/11/79, and to evaluate the health and environmental consequences of those releases. The main body of this document presents methods used to determine the maximum doses that an individual would receive as a result of ingestion of drinking water and fish flesh, and also a method for determining maximum doses that could be received by the fish biota. The calculated doses were well below the current criteria for public health, and protection of the environment. Appendix A contains measurements made at the site prior to dilution with plant and river flow and form the basis for calculating concentrations in the environment and the resulting doses. Appendix B contains data of measurements of concentrations at the discharge and downstream of the discharge, and serve to provide backup evidence for the calculational method. Most of the data of Appendicies A and B were infromally provided by Metropolitan Edicon Co., and their consultant, Porter-Gertz Consultants, Inc. What wasen't supplied by these sources was based on calculations described in the text. Appendix C contains dose calculations made by the license, and is presented for reference (1). The results of their analysis are roughly comparable to the ones presented here and lead to the same conclusions regarding public health and protection of the environment.

2. Effluent release paths and activity released

Figure 1 depicts the liquid release flow paths by which radioactive materials were released into the Susquehanna River. It also lists the total volumetric

release, the average volume per release, and average volume released per day. for each flow path. Table 1 lists the total activity of each nuclide released over the period. The licensee's data in Appendix A show that, except for Iodine-133, the entire spectrum of nuclides were released through the waste evaporator condensate storage tanks (WECST) flow path. Iodine-133, however, was released from all flow paths except the Sec. Neut. path. Table 1 also lists the expected activity that would be released annually under normal operation according to the Final Environmental Statement (FES) for TMI, Unit 2 (1976). As can be seen from comparison of the anticipated normal releases to the actual ones, for many nuclides the actual releases that occurred during the incident were much smaller than (or similar to) the findings of the FES, it can be concluded that these nuclide releases had no significant health or environmental effects. The calculations which follow support this conclusion.

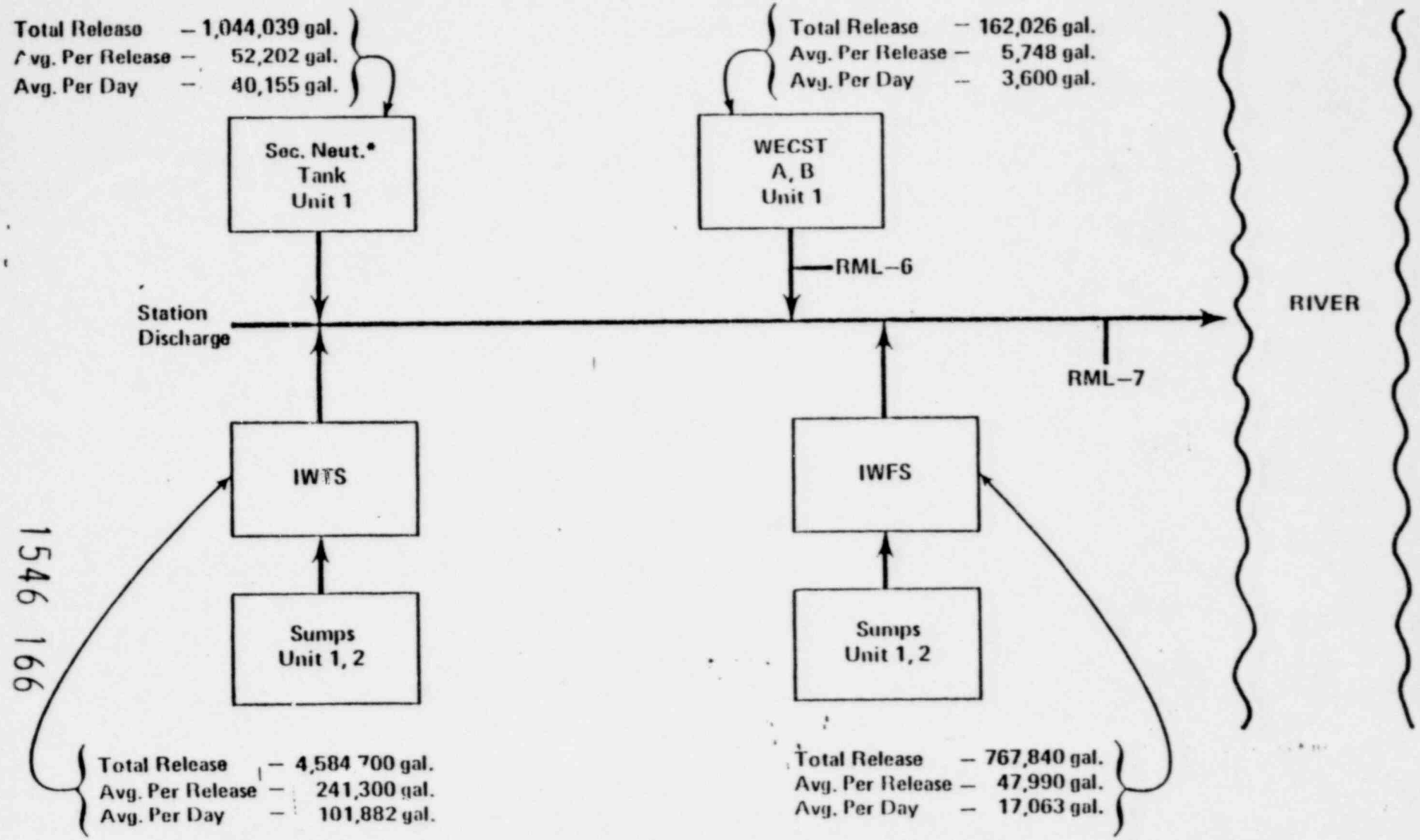
Table 1

Summary of Radionuclides Released to the Susquehanna and releases anticipated in FES

Radionuclide	Activity Released (Ci)	FES Anticipated Annual Release (Ci)	Ratio of Activity Released to FES Annual Release
H-3	12.4	1000.	.01
Cr-51	.00079	.0088	.09
Mn-54	.00041	.00003	1.37
Co-58	.024	.095	.25
Co-60	.0075	.013	.58
Zr-95	.00005	.00072	.69
Nb-95	.00018	.0008	.23
Ag-110m	.0012	-	---
I-131	.239	2.7	.09
I-132	.00034	.052	.01
I-133	.00015	.20	.00
Xe-133	.012	3000. (air)	.00
Cs-134	.0025	.54	.00
Cs-136	.00092	.15	.00
Cs-137	.0062	.41	.02
La-140	.0048	.0032	1.50
Ba-140	.0042	.0030	1.40

Figure 1

Liquid Release Flow Paths



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* The source of water into the Secondary Neutralizing Tank is from the regeneration of the Illinois Water Treatment System demineralizer. Although samples are taken for isotopic analysis there has been no evidence of radioactive contamination of this system, therefore, it is listed to give an idea of the volume of water passing through this system.

3. Concentration of radionuclides in water

At least 17 isotopes were released from the WECST tanks in measurable concentrations as indicated by Table 1. Most of these were released in such low concentrations and at such infrequent intervals that their effect is considered unimportant in comparison. The isotopes of most concern were H-3, Co-58, Co-60, Cs-134, and Cs-137. Figures A-1 through A-4 of Appendix A depict the concentration of each isotope and relate it to the discharge permit number. The discharge permit number can be equated to the period over which the discharge occurred by means of Tabel A-4. As can be seen from Table A-4, successive numbers correspond to successive days, hence the figures display the release over time. In addition to the isotopes described above, I-131 was also released from the WECST tanks as well as from the IWFS and IWTS flow paths. The I-131 that was released is handled separately from those nuclides above because it was released from the three sources.

The concentration of the isotopes, H-3, Co-58, Co-60, Co-134 and Cs-137, in the river water is determined by the figures and by Table A-4. These concentration estimates are made by selecting a concentration value from each figure that is larger than the average value, and dividing that value by 10% of the dilution factor of Table A-4. A detailed discussion of river flows with which the dilution factors were determined is contained in Reference (3). Ten percent is used to be conservative and to not take credit for full river mixing. Table 2 lists the estimates of the concentration in river water determined by this method. The results in this table are used to calculate the dose to humans from consumption of drinking water and from consumption of fish flesh, as well as dose to fishes.

Table 2

Nuclide	Concentration
H-3	$6.2 \times 10^{+1}$ pCi/l
Co-58	6.7×10^{-1} pCi/l
Co-60	1.2×10^{-1} pCi/l
I-131	6.2×10^{-1} pCi/l
Cs-134	3.1×10^{-2} pCi/l
Cs-137	9.3×10^{-2} pCi/l

The above value for I-131 was determined from the data in Table A-6, which lists the I-131 releases between 3/28/79 and 5/11/79 from all known sources. Included in Table A-6 is the time period over which each release was made, the release concentration which takes into consideration plant dilution flow but not river dilution flow, the activity released for each period, and the cumulative activity released. The highest release concentration over the entire period was $2.8 \times 10^{+4}$ pCi/l. This value is conservative in comparison to the data of Table B-1 by over an order of magnitude. The average release rates from the IWTS, IWFS, WECST, and Sec. Neut. flow paths was about 48,000 gal/day. The average flow in the river over this period was about 34,000 cfs. If the discharge flow were fully mixed with the river flow the discharge concentration would be diluted by a factor 4.5×10^{5}. As was done for the other nuclides in Table 2, for this calculation 10% dilution is assumed for conservatism, hence the average river water concentration of I-131 is 6.2×10^{-1} pCi/l, which appears in the above table.

4. Estimation of doses via consumption of fishes

The dose from the fish consumption pathway is determined as follows. The concentration of the nuclide n fish flesh is determined by multiplication of the concentration in water times the bioaccumulation factor. This approach for determining the concentration in fish flesh is conservative as it assumes that the concentration in the flesh has come to equilibrium with the concentration in the water. The time period necessary to reach equilibrium can be long, and with intermittent releases such as occurred at TMI it is doubtful that equilibrium would be reached even if the releases went on indefinitely. Multiplying these concentrations listed in Table 2 by the appropriate bioaccumulation factors of Reg. Guide 1.109 (2) for freshwater fish results in the following concentrations of radionuclides in fishes.

Table 3

Nuclides	Fish Concentrations
H-3	56 pCi/kg
Co-58	33 pCi/kg
Co-60	6 pCi/kg
I-131	9 pCi/kg
Cs-134	62 pCi/kg
Cs-137	182 pCi/kg

Next, it was assumed that an individual could eat 0.25 kg of fish flesh at a meal, and no credit was taken for the decay of the nuclides in catching and preparing the fish. This resulted in an estimated total body dose equivalent an adult individual would get from a meal of fish, based on dose factors in Reg. Guide 1.109, to be as follows.

Table 4

Nuclides	Dose per fish dinner
H-3	1.5×10^{-6} mrem
Co-58	1.4×10^{-5} mrem
Co-60	7.1×10^{-6} mrem
I-131	8.0×10^{-6} mrem
Cs-134	1.9×10^{-3} mrem
Cs-137	3.3×10^{-3} mrem
Total	5.2×10^{-3} mrem

Even if this amount of fish were eaten by a single individual twice daily for three months the dose would still be less than one millirem. On this basis, we conclude that no significant doses or health effects occurred as a result of fish consumption. Because of the unrealistic conservatism built into this calculation, and because the result is so insignificant, calculations are presented only for whole body dose, and not for other body organs. It is not anticipated that significant doses would occur for the other organs.

5. Estimation of Doses via Consumption of Drinking Water

Estimation of the dose by consumption of drinking water is made by multiplication of the consumption of water, by the concentration of nuclides in the water, by the ingestion dose factor. This calculation is based on a sixty day period with a consumption rate of one liter per day. The concentrations given in Table 2 and the dose ingestion factors of Reg. Guide 1.109 result in the following estimated doses.

Table 5

Nuclides	Dose (60 day)
H-3	3.9×10^{-4} mrem
Co-58	6.7×10^{-5} mrem
Co-60	3.4×10^{-5} mrem
I-131	1.3×10^{-4} mrem
Cs-134	2.2×10^{-4} mrem
Cs-137	3.9×10^{-4} mrem
Total	1.3×10^{-3} mrem

Actually the dose would be expected to be significantly smaller than this because the nearest location at which drinking water is drawn from the river is 4.1 miles downstream and more than 10% dilution would be expected, and secondly the releases were intermittent and during most of the time no releases were being made at all, or the actual concentrations being released were smaller than those used for this calculation.

On the basis of this number we conclude that there were no health effects of any significance associated with this pathway.

6. Doses to fishes from accumulation of radionuclides

The dose equivalent a fish would receive can be calculated from the data of Table 3. This is done here by making the conservative assumption that all the decay energy from radioactive disintegration of nuclides accumulated within a fish is absorbed in the tissues of the fish. Multiplication of each value of Table 3, by its appropriate decay energy, times 60 days, times the appropriate unit conversion fctors results in Table 5, the dose to fishes.

Table 6

Nuclide	mrad/60 days
H-3	0.003
Co-58	0.230
Co-60	0.046
I-131	0.027
Cs-134	3.90
Cs-137	0.650
Total	4.9* mrem/60 days

*The mrad units are equivalent to mrem units in this instance as for this spectrum the principal forms of decay are β particles, indicating a quality factor of 1.

This value is below the 10 CFR Part 50 Appendix I criteria for humans of 5 mrem total body, 15 mrem skin, thus we conclude that these releases will not have a significant effect on the fish populations.

7. Summary

The above calculations resulted in a total body dose of 5.2×10^{-3} mrem due to excessive fish consumption, 1.3×10^{-3} mrem due to drinking water consumption over sixty days, and a dose to fishes of 4.9 mrem over sixty days. In spite of the fact that these results are based on unrealistically conservative assumptions, they are small enough that they indicate that the health and safety of the public was not endangered, nor was there significant environmental impact.

8. References

1. Porter, S. W., Jr., Memorandum to J. Collins on "Data and Flowpaths for TMI Liquid Release Presentations of 5/16/79 and 5/21/79" dated May 15, 1979.

2. U.S. Nuclear Regulatory Commission Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," October 1979.

3. Hickey, Clarence, Jr., Robert B. Samworth, "The Non-Radiological Consequences to the Aquatic Biota and Fisheries of the Susquehana River from the 1979 Accident at Three Mile Island Nuclear Station", Draft August, 1979. Report NUREG-0596, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Washington, DC.

Appendix A

This appendix contains data regarding releases of radionuclides to the Susquehanna River during the period 3/28/79 through 5/10/79. For the most part, it consists of activity and concentration prior to dilution with plant flow or river flow. The first three tables, A-1, A-2, and A-3, list the activity and concentration of isotopes released from the IWTS, IWFS, and WECST flow paths, respectively. Note that only I-131 was released from the first two of these flow paths. Table A-4 gives dilution factors for the releases listed in Table A-3. Table A-5 gives further detail for the releases from the WECST flow path, and the last table, Table A-6, lists the I-131 releases from all three flow paths, consecutively. Figures A-1, A-2, A-3, and A-4 depict the concentration of radionuclides released in highest concentrations over time from the WECST tanks. Figure A-1 is for H-3, A-2 for Co-58, A-3 for Co-60, and A-4 for Cs-134 and Cs-137.

Table A-1

This table lists the concentrations of I-131 released from the Industrial Waste Treatment System. It gives the period over which the discharge was made along with the total activity, gallons discharged, the dilution factor, and discharge rate. Also the calculated discharge concentration is given.

INDUSTRIAL WASTE TREATMENT SYSTEM (IWTS)

(All data refers to I-131)

Start	Stop	(μCi/cc) Avg. I-131	Gallons Discharged	Avg. DF	(μCi/cc) Calc. Conc. at Discharge	Total μCi Discharge	Rate (μCi/hr)
3/28 0400	3/28 0900	6.33×10^{-5}	27,000	400	1.58×10^{-7}	6,469[1]	1290.
3/29 1315	3/29 1410	<MDA (Use 3×10^{-7})	6,600	400	7.5×10^{-10}	7.5[2]	8.
3/29 1610	3/29 1815	<MDA (Use 3×10^{-7})	15,000	400	7.5×10^{-10}	17[3]	8.
3/30 0300	3/30 1600	<MDA (Use 3×10^{-7})	134,700	445	6.74×10^{-10}	153[4]	12.
3/30 1600	3/30 2400	5.8×10^{-5}	69,600	456	1.2×10^{-7}	15,279	1910.
3/31 0010	3/31 2400	1.3×10^{-4}	187,200 (130 gpm avg. disch. rate)	529	2.5×10^{-7}	92,112	3860.
4/1 0001	4/1 2400	8.36×10^{-5}	172,800 (120 gpm avg. disch. rate)	561	1.49×10^{-7}	54,678	2280.
4/2 0001	4/2 1850	5.21×10^{-5}	141,250 (125 gpm avg. disch. rate)	483	1.08×10^{-7}	27,854	1510.
4/6 0310	4/6 0400	2.1×10^{-5}	6,040	113	1.86×10^{-7}	480.1	578.

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IWTS (Continued)

Start	Stop	(μCi/cc) Avg. I-131	Gallons Discharged	Avg. DF	(μCi/cc) Calc. Conc. at Discharge	Total μCi Discharge	Release Rate (μCi/hr)
4/6 0615	4/7 2230	2.02×10^{-5}	218,000	244	7.92×10^{-8}	16,668	414.
4/10 0550	4/13 0535	4.2×10^{-6}	390,510	200	2.1×10^{-8}	6,208	86.
4/14 0515	4/15 0215	2.8×10^{-6}	124,710	360	7.8×10^{-9}	1,322	63.
4/17 1415	4/17 1610	1.2×10^{-6}	4,730	126	9.5×10^{-9}	21.5	11.
4/18 1000	4/18 2400	1.1×10^{-6}	126,000	172	6.4×10^{-9}	524.6	37.
4/19 2400	4/23 0450	1.05×10^{-6}	510,680	150	3.5×10^{-8}	2910.88	38.
4/25 2123	4/27 1113	3.13×10^{-7}	220,000	150	2.5×10^{-9}	261.67	7.
4/27 1200	4/30 2400	2.4×10^{-7}	756,000	190	1.9×10^{-9}	688.8	8.

1 No isotopic analysis available. Used average of IWTS I-131 concentrations from 3/28 to 4/2. Used average dilution factor of 400.

2, 3, 4 Although analysis showed less than MDA, MDA's during that time period were running in the order of 3×10^{-7}. Used 3×10^{-7} for a conservative estimate.

Table A-2

This table lists the concentrations of I-131 released from the Industrial Waste Filtering System. It gives the period over which the discharge was made along with the total activity, gallons discharged, the dilution factor, and discharge rate. Also the calculated discharge concentration is given.

INDUSTRIAL WASTE FILTERING SYSTEM (IWFS)

(All data refers to I-131)

Start	Stop	(μCi/cc) Avg. I-131	Gallons Discharged	Avg. DF	(μCi/cc) Calc. Conc. at Discharge	Total μCi Discharge	Discharge Rate (μCi/hr)
3/30 1200	3/30 1630	$<5.6 \times 10^{-71}$	64,050	467	1.2×10^{-9}	135.8	30.
3/31 0140	3/31 0430	2.5×10^{-62}	25,500	100^3	2.5×10^{-8}	241.3	85.
4/1 0130	4/1 0534	2.5×10^{-62}	36,600	100^3	2.5×10^{-8}	346.3	85.
4/1 1521	4/1 1915	2.5×10^{-62}	41,850	100^3	2.5×10^{-8}	396.	101.
4/2 0515	4/2 1110	2.5×10^{-62}	41,700	100^3	2.5×10^{-8}	394.6	67.
4/6 1930	4/7 0450	3.4×10^{-6}	72,340	67	5.1×10^{-8}	930.9	98.
4/10 0645	4/10 1410	3.8×10^{-7}	56,040	67	5.7×10^{-9}	80.6	11.
4/13 1140	4/14 0117	7.9×10^{-6}	65,430	163	4.8×10^{-8}	1,956.	144.
4/16 1135	4/16 1915	4.3×10^{-7}	63,010	371	1.2×10^{-9}	102.6	13.
4/20 1535	4/20 2125	5.25×10^{-7}	3.86×10^4	150	3.1×10^{-8}	77.	13.
4/23 1910	4/24 0310	4.2×10^{-7}	6.77×10^4	150	3.1×10^{-8}	108.	13.
4/27 1400	4/28 0015	3.8×10^{-8}	5.45×10^4	150	3.1×10^{-8}	7.9	0.8

IWFS

Start	Stop	(µCi/cc) Avg. I-131	Gallons Discharged	Avg. DF	(µCi/cc) Calc. Conc. at Discharge	Total µCi Discharge	Discharge rate (µCi/Hr)
5/1 2119	5/2 0300	3.1×10^{-8}	27,670	400	7.75×10^{-11}	3.25	0.6
5/4 0800	5/4 1320	3.1×10^{-8}	36,430	459	6.75×10^{-11}	4.28	0.8
5/7 1000	5/8 1200	9.3×10^{-11}	50,360	1000	2.63×10^{-8} (2)	.0177	0.0
5/10 0755	5/10 1230	2.85×10^{-8}	26,060	708	3.36×10^{-8} (2)	2.81	0.6
5/14 0940	5/14 2345	3×10^{-8}	80,000	150	1.29×10^{-10}	9.16	2.2
5/18 0845	5/18 1740	1.4×10^{-8}	54,310	150	6.6×10^{-11}	2.89	0.3

(1) Estimated based on previous data

(2) Actual conc based on a sample taken at RML 7 (plant discharge)

Table A-3

This table lists the concentrations of various nuclides released from the WECST tank for each discharge permit. It gives the total activity released under each discharge permit along with the concentration in the tank prior to release.

LIQUID WECST RELEASES

Discharge Permit Number	Radionuclide	Concentration (μCi/cc)	Total Activity (Ci)
45-79-L	^{3}H	3.2E -2	0.547
	^{51}Cr	1.65E -2	3.5E -4
	^{54}Mn	6.244E -6	1.37E -4
	^{58}Co	5.757E -5	1.22E -3
	^{60}Co	4.112E -5	8.74E -4
	^{134}Cs	1.654E -5	3.52E -4
	^{137}Cs	2.096E -5	4.44E -4
	^{95}Zr	2.28E -6	4.83E -5
	^{95}Nb	6.699E -6	1.42E -4
	^{110m}Ag	1.87E -6	3.97E -5
46-79-L	^{58}Co	5E -6	1.4E -4
	^{60}Co	5E -7	1.4E -5
	^{134}Cs	5E -7	1.4E -5
	^{137}Cs	1E -7	2.8E -6
	^{131}I	5E -6	1.4E -4
	^{133}I	5E -6	1.4E -4
47-79-L	^{3}H	3.48E -2	0.547
	^{60}Co	1.75E -5	1.9E -4
	^{137}Cs	1.62E -5	4.52E -4

LIQUID WECST RELEASES (Cont.)

Discharge Permit Number	Radionuclide	Concentration (uCi/cc)	Total Activity (Ci)
48-79-L	^{58}Co	5.37E -5	1.47E -3
	^{60}Co	1.5E -5	4.1E -4
	^{131}I	3.7E -5	1.01E -3
	^{133}Xe	7.92E -5	(2.08E -3)*
49-79-L	^{58}Co	1.6E -6	4.51E -5
	^{60}Co	1.14E -5	3.22E -4
	^{131}I	4.2E -5	1.18E -3
	^{133}Xe	3.43E -5	(7.09E -4)*
50-79-L	^{137}Cs	2.06E -5	5.77E -4
	^{131}I	1.81E -5	5.07E -4
	^{133}Xe	2.04E -5	(5.03E -4)*
51-79-L	^{58}Co	6.38E -6	1.799E -4
	^{137}Cs	5.98E -6	1.686E -4
	^{131}I	4.57E -6	1.289E -4
	^{133}Xe	1.983E -5	(5.6E -4)*
52-79-L	Cancelled		
53-79-L	^{3}H	6.6E -3	0.086
	^{60}Co	9.88E -6	2.79E -4

LIQUID WECST RELEASES (Cont.)

Discharge Permit Number	Radionuclide	Concentration (μCi/cc)	Total Activity (Ci)
	^{131}I	7.08E -6	1.997E -4
	^{133}Xe	2.33E -5	(3.01E -4)*
54-79-L	^{3}H	0.2329	5.66
	^{60}Co	5.97E -5	1.67E -3
	^{134}Cs	1.186E -5	3.32E -4
	^{137}Cs	4.31E -6	1.21E -4
	^{133}Xe	7.46E -5	(1.83E -3)*
	^{95}Nb	1.415E -6	3.959E -5
55-79-L	Cancelled		
56-79-L	^{3}H	0.0125	0.318
	^{58}Co	8.5E -6	1.3E -4
	^{60}Co	1.7E -5	2.6E -4
	^{137}Cs	6.7E -6	1.0E -4
	^{131}I	4E -6	6E -5
57-79-L	^{3}H	0.0295	0.785
	^{58}Co	6.75E -5	1.9E -3
	^{60}Co	1.018E -5	2.87E -4
	^{131}I	5.6E -5	1.59E -3

*All analysis data in parenthesis is questionable because of solubility of xenon, which is a noble gas, in water.

LIQUID WECST RELEASES (Cont.)

Discharge Permit Number	Radionuclide	Concentration (μCi/cc)	Total Activity (Ci)
57-79-L	^{140}La	3.198E -5	9.02E -4
(con'd)	^{133}Xe	1.598E -4	(4.51E -3)*
	^{132}I	1.22E -4	3.44E -3
	^{110m}Ag	2.71E -5	7.63E -4
58-70-L	^{3}H	0.027	0.674
	^{58}Co	3.01E -4	8.55E -3
	^{134}Cs	1.2E -5	3.41E -4
	^{137}Cs	2.98E -5	8.46E -4
	^{131}I	7.44E -5	2.112E -3
	^{133}Xe	7.04E -5	(1.999E -3)*
59-79-L	^{3}H	2.28E -2	1.44E -3
	^{58}Co	5.1E -5	5.92E -5
	^{60}Co	2.1E -6	5.92E -5
	^{134}Cs	1.3E -6	3.67E -5
	^{137}Cs	8.7E -6	2.45E -4
	^{131}I	1.2E -5	3.38E -4
	^{140}Ba	1.3E -6	3.67E -5
	^{140}La	5.0E -6	1.41E -4

*The analysis data in parenthesis is questionable because of solubility of xenon, which is a noble gas, in water.

LIQUID WECST RELEASES (Cont.)

Discharge Permit Number	Radionuclide	Concentration (uCi/cc)	Total Activity (Ci)
60-79-L	^{3}H	0.0265	0.306
	^{58}Co	2.07E -4	3.26E -3
	^{60}Co	1.40E -5	2.20E -4
	^{137}Cs	1.1E -5	1.73E -4
	^{131}I	5.47E -5	8.62E -4
	^{140}La	1.56E -5	2.46E -4
	^{110m}Ag	2.86E -5	4.5E -4
61-79-L	^{3}H	2.17E -2	0.585
	^{58}Co	7.98E -5	2.23E -3
	^{137}Cs	1.26E -5	3.52E -4
	^{131}I	5.46E -5	1.52E -3
62-79-L	^{3}H	1.6E -2	0.393
	^{54}Mn	9.8E -6	2.74E -4
	^{58}Co	7.1E -5	1.99E -3
	^{60}Co	7.8E -5	2.1[illegible]E -3
	^{134}Cs	1.2E -5	3.36E -4
	^{137}Cs	5.3E -5	9.24E -4
	^{131}I	4.3E -5	1.20E -3
	^{140}Ba	1.6E -5	4.48E -4

LIQUID WECST RELEASES (Cont.)

Discharge Permit Number	Radionuclide	Concentration (μCi/cc)	Total Activity (Ci)
63-79-L	^{3}H	9.03E -3	0.175
	^{131}I	1.91E -6	4.37E -5
64-79-L	^{3}H	1.27E -2	0.285
	^{137}Cs	5.3E -5	1.43E -3
	^{131}I	5.5E -5	1.48E -3
65-79-L	^{3}H	1.11E -2	0.248
	^{131}I	2.1E -5	5.92E -4
66-79-L	^{3}H	1.17E -2	0.282
	^{58}Co	1.8E -4	4.95E -4
	^{60}Co	4.9E -6	1.35E -4
	^{134}Cs	4.4E -6	1.21E -4
	^{136}Cs	9.8E -6	2.70E -4
	^{137}Cs	1.3E -5	3.56E -4
	^{131}I	1.7E -5	4.68E -4
	^{140}Ba	4.2E -6	1.15E -4
67-79-L	^{3}H	2.54E -3	6.3E -2
	^{134}Cs	3.8E -6	1.06E -4
	^{131}I	3.01E -6	8.43E -5
68-79-L	^{3}H	8.87E -3	2.18E -1
	^{58}Co	9.06E -6	2.54E -4

LIQUID WECST RELEASES (Cont.)

Discharge Permit Number	Radionuclide	Concentration (μCi/cc)	Total Activity (Ci)
68-79-L (cont.)	^{134}Cs	3.55E -6	9.94E -5
	^{131}I	2.31E -5	6.47E -4
	^{140}La	2.94E -5	8.23E -4
69-79-L	^{3}H	1.44E -2	3.61E -1
	^{137}Cs	8.7E -6	2.44E -4
	^{131}I	2.24E -5	6.27E -4
	^{140}Ba	1.35E -5	3.78E -4
	^{136}Cs	2.47E -5	6.29E -4
70-79-L	^{3}H	1.39E -2	3.43E -1
	^{91}Sr	1.86E -5	5.21E -4
	^{134}Cs	2.0E -6	5.6E -5
	^{137}Cs	9.4E -6	2.63E -4
	^{131}I	2.22E -5	6.21E -4
	^{140}Ba	1.27E -5	3.56E -4
71-79-L	^{58}Co	3.959E -5	1.11E -3
	^{131}I	3.07E -5	8.59E -4
	^{140}La	9.822E -5	2.75E -3
72-79-L	^{3}H	9.79E -3	2.46E -1
	^{51}Cr	1.5E -5	4.29E -4

LIQUID WECST RELEASES (Cont.)

Discharge Permit Number	Radionuclide	Concentration (uCi/cc)	Total Activity (Ci)
72-79-L	^{58}Co	2.3E -5	6.58E -4
(cont.)	^{60}Co	1.0E -6	2.86E -5
	^{134}Cs	1.0E -6	2.86E -5
	^{136}Cs	2.2E -5	6.29E -4
	^{137}Cs	7.2E -6	2.06E -4
	^{131}I	1.7E -5	4.86E -4
	^{140}Ba	7.2E -5	2.06E -4
	^{133}I	5E -7	1.43E -5
73-79-L	^{3}H	1.03E -2	1.55E -1
	^{134}Cs	9.6E -7	1.776E -5
	^{136}Cs	1.2E -6	2.22E -5
	^{131}I	2.8E -5	5.18E -4
	^{140}Ba	4.1E -5	7.58E -4
74-79-L	^{3}H	7.52E -3	1.55E -1
	^{58}Co	3.2E -5	7.75E -4
	^{134}Cs	5E -6	1.21E -4
	^{137}Cs	1.6E -5	3.87E -4
	^{131}I	2.4E -5	5.81E -4
	^{140}Ba	8E -5	1.94E -3

LIQUID WECST RELEASES (Cont.)

Discharge Permit Number	Radionuclide	Concentration (μCi/cc)	Total Activity (Ci)
75-79-L	^{3}H	5.48E -3	5.48E -2
	^{54}Mn	1.03 -6	9.46E -6
	^{58}Co	1.4E -5	1.39E -4
	^{60}Co	9.4E -6	9.36E -5
	^{134}Cs	1.7E -6	1.69E -5
	^{137}Cs	5.4E -6	5.87E -5
	^{131}I	1.2E -5	1.19E -4
	^{140}La	8.5E -6	8.46E -4

Table A-4

This table lists the time period for each discharge permit pertaining to WSCST releases, along with the approximate river flow for the time period. In addition, the volume released for each permit is listed with the appropriate dilution factor. The average dilution factor over the period was 3.2×10^6.

Dilution Factors

Discharge Permit Number	Date and Time On	Date and Time Off	ΔT(hr)	Approx River Flow(CFS)±	Gal. Released	Dilution*** Factor
45-79-L	3/28/79 0320	3/29/79 1230	43.16	104,000	5748**	1.8E+7 **
46-79-L	3/31/79 0240	3/31/79 0710	4.5	62,000	5748	1.1E+6
47-79-L	4/1/79 0720	4/1/79 1504	7.73	55,000	5748	1.7E+6
48-79-L	4/5/79 1813	4/6/79 0750	13.61	124,000	5748	6.8E+6
49-79-L	4/7/79 1745	4/8/79 0150	8.08	68,000*	5748	2.2E+6
50-79-L	4/9/79 0155	4/9/79 0945	7.83	56,000	5748	1.7E+6
51-79-L	4/10/79 1125	4/10/79 1900	7.58	57,400*	5748	1.7E+6
52-79-L	--	--	--	--	--	--
53-79-L	4/12/79 0055	4/12/79 1230	11.75	87,800	5748	4.1E+6
54-79-L	4/13/79 0535	4/14/79 0440	23.05	87,800	5748	8.1E+6
55-79-L	--	--	--	--	--	--
56-79-L	4/13/79 0048	4/13/79 0449	4.01	87,800	5748	1.4E+6
57-79-L	4/15/79 0545	4/15/79 2015	14.50	76,000+	5748	4.4E+6
58-79-L	4/17/79 1345	4/18/79 1048	21.05	68,000	5748	5.7E+6
59-79-L	4/19/79 0135	4/19/79 2005	18.66	62,500	5748	4.7E+6
60-79-L	4/20/79 1830	4/21/79 0255	8.41	55,700	5748	1.9E+6
61-79-L	4/23/79 0500	4/24/79 0230	21.50	38,600+	5748	3.3E+6
62-79-L	4/24/79 0950	4/25/79 0630	20.66	34,800	5748	2.8E+6
63-79-L	4/25/79 1742	4/26/79 1300	19.30	32,000	5748	2.5E+6
64-79-L	4/26/79 2130	4/27/79 1515	17.75	34,000+	5748	2.4E+6
65-79-L	4/27/79 2115	4/28/79 1515	18.00	32,700	5748	2.4E+6
66-79-L	4/30/79 1810	5/11/79 1123	17.21	37,500	5748	2.6E+6

Discharge Permit Number	Date On	and Off	Time ΔT	Approx River Flow(CFS)±	Gal. Released	Dilution Factor
67-79-L	5/1/79 1800	5/2/79 0420	10.30	41,100	6570	1.4E+6
68-79-L	5/2/79 1700	5/2/79 2318	6.30	39,300	6510	8.8E+5**
69-79-L	5/4/79 0900	5/5/79 0415	19.25	32,100	6620	2.1E+6
70-79-L	5/5/79 0940	5/6/79 0005	14.41	31,500	6510	1.6E+6
71-79-L	5/6/79 1715	5/7/79 1130	18.25	32,300	6521	2.0E+6
72-79-L	5/7/79 1422	5/8/79 1310	22.80	30,700	6638	2.4E+6
73-79-L	5/9/79 0020	5/9/79 1140	11.33	28,800	3970	1.9E+6
74-79-L	5/10/79 1925	5/11/79 0750	12.41	26,500	5463	1.4E+6
75-79-L	5/14/79 1925	5/14/79 2255	3.50	22,800	5748	3.2E+5

±Values determined at 7 AM daily.

+These values are for mean daily flow

*Estimated values

**Values of 5748 gal represent a value calculated based on the average of several releases

***Determined by dividing Gal. Released by product of ΔT and Approx. River Flow, and correcting for units.

Table A-5

This table lists data for I-131 releases between 3/28/79 and 5/10/79 from the WECST A & B flow paths. The table gives the discharge permit number, the date and time the release occurred, the volume I-131, I-133 concentrations, I-131, I-133, Co-58, Co-60 activity, flow rate, and the counts per flow rate.

LIQUID WECST RELEASES

Discharge Permit Number	Date & Time On	Date & Time Off	Volume (Gal)	^{131}I µCi/cc	^{133}I µCi/cc	^{131}I (µCi)	^{58}Co / ^{60}Co (µCi)	Flow Rate (GPM)	MDCT KGPM
45-79-L WECST-B	3/28/79 0320	3/29/79 1230	4.5E+3	None	None	None	1623 / 1159	8.23	52
46-79-L WECST-A	3/31/79 0240	3/31/79 0710	7.3E+3	5E-6	5E-6	140	140 / 14	27.0	67.2
47-79-L WECST-B	4/01/79 0720	4/01/79 1504	6.19E+3	None	None	None	0 / 489	27.0	Ave. 65.9
48-79-L WECST-A	4/05/79 1813	4/06/79 0750	6.9E+3	3.7E-5	None	1010	1470 / 410	9.3	Ave. 43.6
49-79-L WECST-B	4/07/79 1745	4/08/79 0150	5.44E+3	4.2E-5	None	1180	45 / 322	20.3	22
50-79-L WECST-B	4/09/79 0155	4/09/79 0945	6.5E+3	1.81x10-5	None	443		27.0	34.2
51-79-L WECST-A	4/10/79 1125	4/10/79 1900	4.11E+3	4.6E-6	None	129	180 / 0	27.0	34.2
52-79-L			Cancelled						
53-79-L WECST-B	4/12/79 0055	4/12/79 1230	3.41E+3	7.08E-6	None	200	0 / 270	27.0	34.2
54-79-L WECST-A	4/13/79 0535	4/14/79 0440	6.46E+3	None	None	None	1670 / 0	11.0	34.2
55-79-L			Cancelled						
56-79-L WECST-B	4/13/79 0048	4/13/79 0449	2.84E+3	4E-6	None	60	130 / 260	25.7	34.2
57-79-L WECST-A	4/15/79 0545	4/15/79 2015	7.1E+3	5.64E-5	None	1590	1900 / 287	9.72	54

LIQUID WECST RELEASES

Discharge Permit Number	Date & Time On	Date & Time Off	Volume (Gal)	^{131}I µCi/cc	^{133}I µCi/cc	^{131}I (µCi)	^{58}Co / ^{60}Co (µCi)	Flow Rate (GPM)	MDCT KGPM
58-79-L WECST-A	4/17/79 1345	4/18/79 1048	6.57E+3	7.44E-5	None	2112	8548 / None	6.2	34.2
59-79-L WECST-B	4/19/79 0135	4/19/79 2005	6.52E+3	1.2E-5	None	338	1440 / 59	13.2	34.2
60-79-L WECST-A	4/20/79 1830	4/12/79 0255	3.04E+3	5.47E-5	None	862	3260 / 220	6.39	52
61-79-L WECST-A	4/23/79 0500	4/24/79 0230	7.1E+3	5.46E-5	None	1520	2230 / None	9.7	58
62-79-L WECST-B	4/24/79 0950	4/25/79 0630	6.E49+3	4.3E-5	None	1200	1990 / 2180	6.09	46
63-79-L WECST-A	4//2579 1742	4/26/79 1300	5.11E+3	1.91E-6	None	43.7	0 / 0	13.13	54
64-79-L WECST-B	4/26/79 2130	4/27/79 1515	5,875	5.5E-5	None	1480	0 / 0	9.48	38
65-79-L WECST-A	4/27/79 2115	4/18/79 1515	5,875	2.6E-5	None	592	0 / 0	11.72	38
66-79-L WECST-B	4/30/79 1810	5/01/79 1123	6.345	1.7E-5	None	468	495 / 135	9.81	38
67-79-L WECST-B	5/01/79 1800	5/02/79 0420	6570	$3.01E^{-6}$	None	84.3	0 / 0	12.22	38
68-79-L WECST-A	5/02/79 1700	5/02/79 2318	6510	$2.31E^{-5}$	None	647	254 / 0	20	38
69-79-L WECST-B	5/04/79 0900	5/05/79 0415	6620	$2.24E^{-5}$	None	627	0 / 0	22	38

LIQUID WECST RELEASES

Discharge Permit Number	Date & Time On	Date & Time Off	Volume (Gal)	^{131}I µCi/cc	^{133}I µCi/cc	^{131}I (µCi)	^{58}Co / ^{60}Co (µCi)	Flow Rate (GPM)	MDCT KGPM
70-79-L WECST-A	5/05/79 0940	5/06/79 0005	6510	$2.22E^{-5}$	None	621	0 / 0	10.37	38
71-79-L WECST-B	5/06/79 1715	5/07/79 1130	6521.2	$3.07E^{-5}$	None	859	1110 / 0	9.3	50
72-79-L WECST-A	5/07/79 1930	5/08/79 1310	6638	$1.7E^{-5}$	$<5E^{-7}$	486	658 / 28.6	9.1	50
73-79-L WECST-B	5/09/79 0020	5/09/79 1140	3970	$2.8E^{-5}$	None	518	0 / 0	15.3	52
74-79-L WECST-A	5/10/79 1925	5/11/79 0755	5463	$2.4E^{-5}$	None	581	775 / None	9.5	38

Table A-6

This table lists data for I-131 releases between 3/28/79 and 5/11/79. The data list releases from all sources. The first two columns give the start and stop time and date for each release. The third column is the release source; the fourth column is the concentration at the station discharge based on dilution with plant flow; the fifth column is the concentration at the discharge location based on a grab sample; the sixth column is the activity released over the discharge period; and the last column is the cumulative activity released starting from 3/28/79 at 4:00 a.m.

LIQUID EFFLUENT RELEASES
(All data refers to I-131)

Start	Stop	Tank	[1] (μCi/cc) Concentration at Station Discharge (Dilution Calc.)	[2] (μCi/cc) Concentration at Station Discharge (Grab Samples)	μCi Discharged	Cumulative μCi Discharged
3/28 0400	3/28 0900	IWTS	1.6×10^{-7}	4×10^{-8} at 1100 hrs.	6469[5]	6,469.
3/28 0320	3/28 0655	WECST-B	None		None[3]	6,469.
3/29 0015	3/29 1215	WECST-B	None		None	6,469.
3/29 1315	3/29 1410	IWTS	7.5×10^{-10}	5.4×10^{-10} (7) at 1700 hrs.	7.5	6476.
3/29 1610	3/29 1815	IWTS	7.5×10^{-10}		17.0	6493.
3/30 0020	3/30 0753	SEC. NEUT.	None		None[4]	6493.
3/30 1200	3/30 1630	IWFS	1.2×10^{-9}		135.86	6629.
3/30 0300	3/30 1600	ISTS	6.7×10^{-10}		153	6782
3/30 2020	3/30 2253	SEC. NEUT.	None		None	6782
3/31 0140	3/31 0430	IWFS	2.5×10^{-8}		241.3	7023.
3/30 1600	3/30 2400	IWTS	5.8×10^{-8}		6,981	14004.
3/31 0001	3/31 2400	IWIS	2.7×10^{-7}		92,112	106116.
3/31 0240	3/31 0710	WECST-A	3.0×10^{-9}		140	106256.

LIQUID EFFLUENT RELEASES
(All data refers to I-131)

Start	Stop	Tank	[1] (µCi/cc) Concentration at Station Discharge (Dilution Calc.)	[2] (µCi/cc) Concentration at Station Discharge (Grab Samples)	µCi Discharged	Cumulative µCi Discharged
3/31 2230	4/1 1030	SEC. NEUT.	None		None	106256.
4/1 0650	4/1 1504	WECST-B	None		None	106256.
4/1 0001	4/1 2400	IWTS	1.49×10^{-7}	6.2×10^{-8}(7) 2020 hrs.	54678	160934.
4/1 0130	4/1 0534	IWFS	2.5×10^{-8}		346.3	161280.
4/1 1521	4/1 1915	IWFS	2.5×10^{-8}		396	161676.
4/2 0001	4/2 1850	IWTS	1.08×10^{-7}	1.5×10^{-8}(7) 1130 hrs.	27854	189530.
4/2 1650	4/2 1850	SEC. NEUT.	None		None	189530.
4/2 0515	4/2 1110	IWFS	2.5×10^{-8}		394.6	189925.
4/3 1025	4/3 1915	SEC. NEUT.	None	7.3×10^{-10}(7) 1540 hrs.	None	189925.
4/4				2×10^{-10}(7)		
4/5 1813	4/6 0750	WECST-A	1×10^{-8}	1815 hrs 1.0×10^{-10} 4/5 at 1305 hrs. *(7)	1010	190935.
4/5 1800	4/6 0003	SEC. NEUT.	None		None	190935.
4/6 0310	4/6 0400	IWTS	1.9×10^{-7}		480.1	191415.

LIQUID EFFLUENT RELEASES
(All data refers to I-131)

Start	Stop	Tank	[1] (μCi/cc) Concentration at Station Discharge (Dilution Calc.)	[2] (μCi/cc) Concentration at Station Discharge (Grab Samples)	μCi Discharged	Cumulative μCi Discharged
4/6 0615	4/7 2230	IWTS	7.9×10^{-8}	5.9×10^{-9} (7) 4/6 at 1640 hrs.	16668	208083.
4/6 1930	4/7 0450	IWFS	5.1×10^{-8}		930.9	209014.
4/7 0355	4/7 1430	SEC. NEUT.	None	$<6 \times 10^{-8}$ 6.3×10^{-9} (7) 4/7 at 1045 hrs.	None	209014.
4/7 1745	4/8 0150	WECST-B		$<4 \times 10^{-8}$ $<3 \times 10^{-10}$ (7) 4/8 at 1100 hrs.	1180	210194.5
	4/9 0945	SEC. NEUT.	None	$<4 \times 10^{-8}$	None	210194.5
4/9 0155	4/9 0945	WECST-B		$<4 \times 10^{-8}$ $<2 \times 10^{-10}$ (7) 4/9 at 1910 hrs.	443	210637.5
4/10 0645	4/10 1410	IWFS	5.7×10^{-9}	$<6.5 \times 10^{-8}$ 4.2×10^{-9} (7) 4/10 at 1710 hrs.	80.6	210718.1
4/10 1125	4/10 1900	WECST-A		$<6.5 \times 10^{-8}$	129.0	210847.1
	4/11 1600	SEC. NEUT.	None	$<1.1 \times 10^{-8}$ 1.4×10^{-9} (7) 4/11 at 1620 hrs.	None	210847.1
4/12 0055	4/12 1230	WECST-B		$<3.9 \times 10^{-9}$ (7) 1.5×10^{-9} 4/12 at 2000 hrs.	200.0	211047.1
	4/13 2005	WECST-A	None	$<3.6 \times 10^{-9}$	None	211047.1

LIQUID EFFLUENT RELEASES
(All data refers to I-131)

Start	Stop	Tank	[1] (µCi/cc) Concentration at Station Discharge (Dilution Calc.)	[2] (µCi/cc) Concentration at Station Discharge (Grab Samples)	µCi Discharged	Cumulative µCi Discharged
	4/13 1150	SEC. NEUT.	None	$<3\times10^{-9}$	None	211047.1
4/13 0048	4/13 0449	WECST-B		$<5.1\times10^{-8}$	60.0	211107.1
4/10 0550	4/13 0535	IWTS	2.1×10^{-8}	$<2.3\times10^{-8}$	6,208	217315.1
4/13 1140	4/14 0117	IWFS	4.8×10^{-8}	$<1.6\times10^{-8}$ 1.2×10^{-9} (7) 4/13 at 1230 hrs.	1,956	219271.1
4/13 0535	4/14 0440	WECST-A	None	$<5.1\times10^{-8}$	None	219271.1
4/14 0515	4/15 0215	IWTS	7.8×10^{-9}	$<2.2\times10^{-8}$ 1.9×10^{-9} (7) 4/14 at 1530 hrs.	1325	220596.1
4/15 0545	4/15 2015	WECST-A		$<3.6\times10^{-8}$ 2.3×10^{-9} 4/15 at 1550 hrs.	1590.0	222186.1
4/16 1135	4/16 1915	IWFS	1.2×10^{-9}	$<3.0\times10^{-8}$ $<3\times10^{-10}$ 4/16 at 1610 hrs.	102.6	222288.7
4/17 1415	4/17 1610	IWTS	9.5×10^{-9}	7.5×10^{-8} 7.8×10^{-9} (7) 4/17 at 1810	21.5	222310.2
4/17 1345	4/18 1048	WECST-A		6.5×10^{-8}	2112	224422.2
	4/18 1945	WECST-B	4.6×10^{-9}	7.78×10^{-8} 4.8×10^{-9} (7)	23	224445.2

LIQUID EFFLUENT RELEASES
(All data refers to I-131)

Start	Stop	Tank	[1] (µCi/cc) Concentration at Station Discharge (Dilution Calc.)	[2] (µCi/cc) Concentration at Station Discharge (Grab Samples)	µCi Discharged	Cumulative µCi Discharged
4/18 1000	4/18 2400	IWTS	6.4×10^{-9}	5.1×10^{-8} 4.8×10^{-9} (7) 4/18 at 1930	4.5	224449.7
4/19 2400	4/23 2450	IWTS	3.5×10^{-8}	3.5×10^{-8}	2910.88	227360.58
4/19 0135	4/19 2005	WECST-B		3.7×10^{-8} 3.65×10^{-9} µCi/cc(7) 4/19 at 2150 hrs.	315	227675.58
4/20 1535	4/20 2125	IWFS	3.1×10^{-8}	3.1×10^{-8} 5.75×10^{-9} µCi/cc(7) 4/20 at 2010 hrs.	77	227752.58
4/20 1830	4/21 0255	WECST-A		1.39×10^{-8} 1.65×10^{-9} µCi/cc(7) 4/21 at 1535 hrs.	862	228614.58
4/23 0500	4/24 0230	WECST-A		6.9×10^{-10}	1520	230134.58
	4/23 1856	SEC. NEUT. TANKS	None	3.1×10^{-8} 4.2×10^{-9} (7)	None	230134.58
4/23 1910	4/24 0310	IWFS	3.1×10^{-8}	3.1×10^{-8} 2×10^{-10} (7)	108	230242.58
4/24 0950	4/25 0630	WFCST-B		1.7×10^{-8} 3×10^{-10} (7)	1200	231442.58
	4/25 0755	SEC. NEUT. TANKS	None	2×10^{-8}	None	231442.58
4/25 1742	4/26 1300	WECST-A		1.4×10^{-8} 9.8×10^{-10}	43.7	231486.28
4/25 2123	4/27 1113	IWTS	2.5×10^{-9}	2.5×10^{-9}	261.67	231747.99

LIQUID EFFLUENT RELEASES
(All data refers to I-131)

Start	Stop	Tank	[1] (μCi/cc) Concentration at Station Discharge (Dilution Calc.)	[2] (μCi/cc) Concentration at Station Discharge (Grab Samples)	μCi Discharged	Cumulative μCi Discharged
4/26 2130	4/27 1515	WECST-B		1.4×10^{-8} 1.5×10^{-9} (7)	1480	233227.55
4/27	4/28 0015	IWFS	3.1×10^{-8}	3.1×10^{-8} 1.1×10^{-9}	7.9	233235.85
-	4/28 0425	SEC. NEUT. TANKS	None	3.1×10^{-8} 1.1×10^{-9} (7)	None	233235.85
-	4/28 1515	WECST-A		3.1×10^{-8}	592	233827.85
-	4/29 0830	SEC. NEUT. TANKS	None	3.1×10^{-8} 4.0×10^{-10} (7)	None	233827.85
-	4/30 1515	SEC. NEUT. TANKS	None	3.1×10^{-8}	None	233827.85
4/27 1200	4/30 2400	IWTS	1.9×10^{-9}	3.1×10^{-8} 1.7×10^{-9} (7)	688.8	234516.65
4/30 1810	5.1 1123	WECST-A			1960	236476.65
5/1 1800	5/2 0420	WECST-B			196	236672.65
5/1 1801	5/2 0620	U-1 SEC. NEUT.	$<3\times10^{-7}$		None	236672.65
5/1 2119	5/2 0300	IWFS	$<3.1\times10^{-8}$		None	236672.65
5/2 1700	5/2 2318	WECST-A	2.31×10^{-5}		182	236854.65
5/3 2155	5/4 1434	U-1 SEC. NEUT. TANK	$<3\times10^{-7}$		None	236859.55

LIQUID EFFLUENT RELEASES
(All data refers to I-131)

Start	Stop	Tank	[1] (μCi/cc) Concentration at Station Discharge (Dilution Calc.)	[2] (μCi/cc) Concentration at Station Discharge (Grab Samples)	μCi Discharged	Cumulative μCi Discharged
5/4 0800	5/4 1320	IWFS	$<3.1\times10^{-8}$			
5/4 0900	5/5 0415	WECST-B	2.24×10^{-5}		194	237098.65
5/5 0945	5/6 0005	WECST-A	2.22×10^{-5}		182	237230.65
5/6 0013	5/6 0950	U-1 SEC. NEUT.	$<3\times10^{-7}$			237230.65
5/6 1515	5/7 1130	WECST-A	3.07×10^{-5}		422	237652.65
5/7 0325	5/7 1040	U-1 SEC. NEUT.	$<8\times10^{-8}$			237652.65
5/7 1000	5/8 1200	IWFS	9.3×10^{-11}		.0177	237652.67
5/7 1422	5/8 1305	AWECST	1.7×10^{-5}		269	237921.67
5/9 0020	5/9 1140	BWECST	2.8×10^{-5}		131	238052.67
5/9 1135	5/9 1840	U-1 SEC. NEUT.	None	2.35×10^{-8}	None	238061.85
5/9 1225	5/11 1010	IWTS	1.56×10^{-9}	2.65×10^{-8}	205	238266.85
5/10 0755	5/10 1230	IWFS	$<2.85\times10^{-8}$		2.8	238269.65
5/10 30	5/10 2215	U-1 SEC. NEUT.	None		None	238269.65

LIQUID EFFLUENT RELEASES
(All data refers to I-131)

Start	Stop	Tank	[1] (µCi/cc) Concentration at Station Discharge (Dilution Calc.)	[2] (µCi/cc) Concentration at Station Discharge (Grab Samples)	µCi Discharged	Cumulative µCi Discharged
5/10 1925	5/11 0750	WECST-A			383	238652.65
5/11 05	5/11 2110	U-1 SEC. NEUT.	None	2.65×10^{-8}	None	238652.65
5/12 15	5/13 1000	U-1 SEC. NEUT.	None	3.69×10^{-8}	None	238652.65
5/14 0940	5/14 2345	IWFS	3×10^{-8}	3.1×10^{-8}	9.16	238661.31
5/14 25	5/14 2255	WECST-B		3.1×10^{-8}	120	23878.81
5/15 1105	5/15 1535	IWTS	7.3×10^{-10}	2.92×10^{-8}	10.4	238792.21
5/15 10	5/16 0855	U-1 SEC. NEUT.	None	2.59×10^{-8}	None	238729.21
5/16 0425	5/18 2130	IWTS	2.09×10^{-10}	3.64×10^{-8}	79.81	238872.02
5/18 30	5/18 0725	U-1 SEC. NEUT.	None	1.69×10^{-8}	None	238872.02
5/18 45	5/18 1740	IWFS	1.4×10^{-8}		2.89	238874.91
5/19 30	5/19 0448	U-1 SEC. NEUT.	None	1.2×10^{-8}	None	238874.91
5/19 40		WECST-A				
5/9 1135	5/9 1840	U-1 SEC. NEUT.	4×10^{-8}			

LIQUID EFFLUENT RELEASES
(All data refers to I-131)

Start	Stop	Tank	[1] (μCi/cc) Concentration at Station Discharge (Dilution Calc.)	[2] (μCi/cc) Concentration at Station Discharge (Grab Samples)	μCi Discharged	Cumulative μCi Discharged
5/9 1225	5/11 1010	IWTS	2.3×10^{-7}		205	238257.99
5/10 0755	5/10 1230	IWFS	2.85×10^{-8}			
5/10 1030	5/10 2215	U-1 SEC. NEUT.	5.9×10^{-9}			
5/10 1925	5/11 0750	AWECST	2.4×10^{-5}		383	238640.99

NOTES

1. Calculated based on average tank sample and known dilution factor (df) data during the period of time that the tank was being released. Discharges for IWTS are averaged over a 24 hour period.

2. Calculated by averaging the station discharge (RML-7) grab samples taken during the time the tank was being released. If the number appearing in this column is a "less than" (<) number, all the numbers averaged were less than MDA numbers and the MDA's were used for the purpose of averaging. This calculation is conservative in that it overestimates the actual I-131 concentration at the station discharge. (See Attachment 7 for RML-7 grab samples).

3. WECST Tank releases are controlled by procedure HP 1621 which limits the release concentration to 0.1 MPC. The HP 1621 permit takes the specific activity of all the isotopes in the tank, assumes a dilution factor from MDCT flow and calculates a release rate so that 0.1 MPC is not exceeded while discharging. (See Attachments 4, 5 and 6).

4. The source of water into the Secondary Neutralizing Tank is from the regeneration of the Illinois Water Treatment System demineralizers. The

Illinois Water Treatment System produces demin water by taking pretreated river water form upstream of the station discharge and sending it through demineralizers. The water from the regeneration of these demineralizers does to the Secondard Neutralizing Tank. All isotopic samples on this tank after 4/2/79 showed no detectable I-131 or I-133.

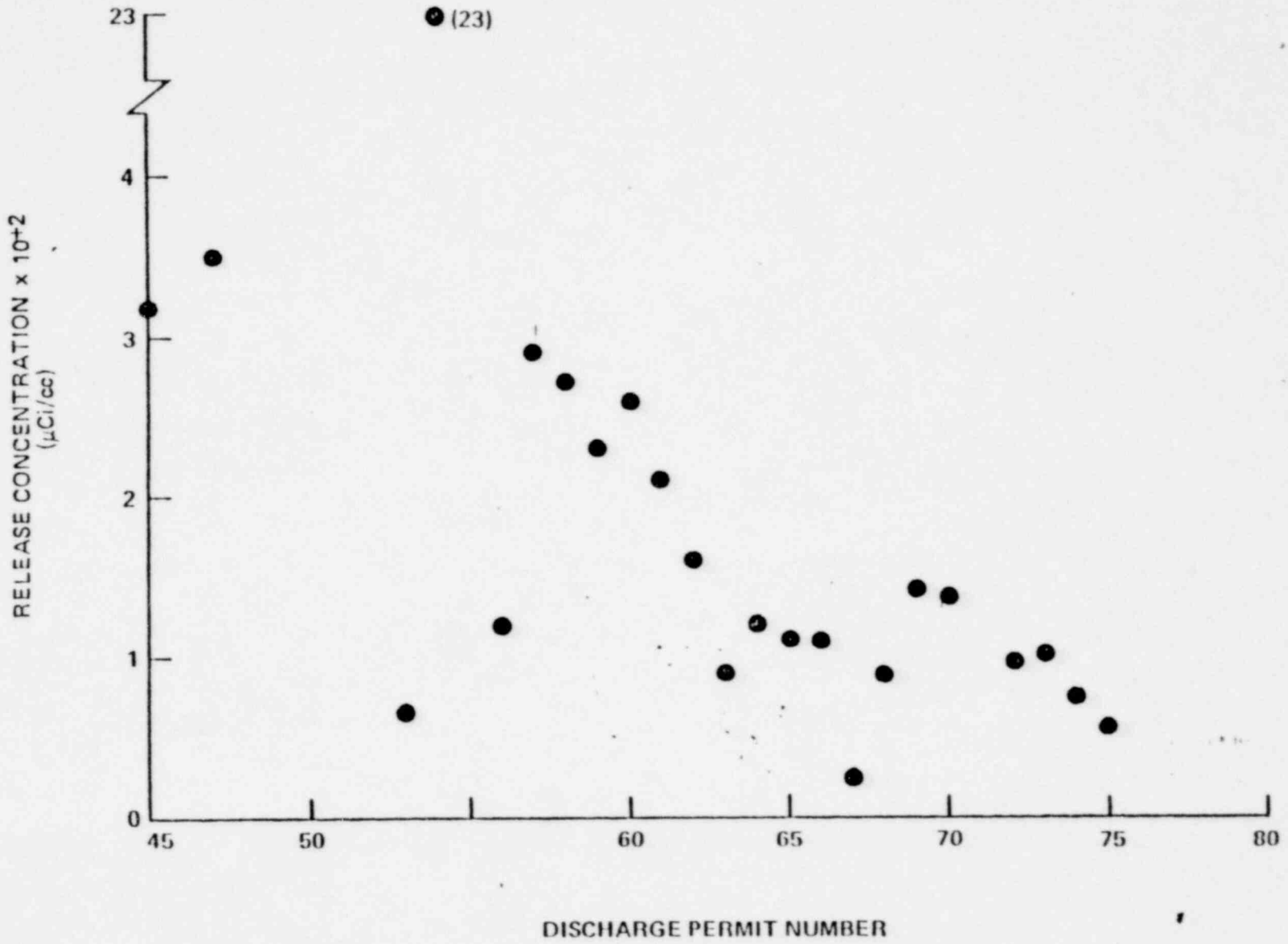
Since the input to this tank is essentially river water from upstream of the station discharge, it is reasonable to assume that form 3/28 at 0400 to 4/2 at 1850, no I-131 was released from this tank.

5. See Table A-1 for IWTS calculations/assumptions.
6. See Table A-2 for IWFS calculations/assumptions.
7. Data from REMP performed by Porter-Gertz Consultants.

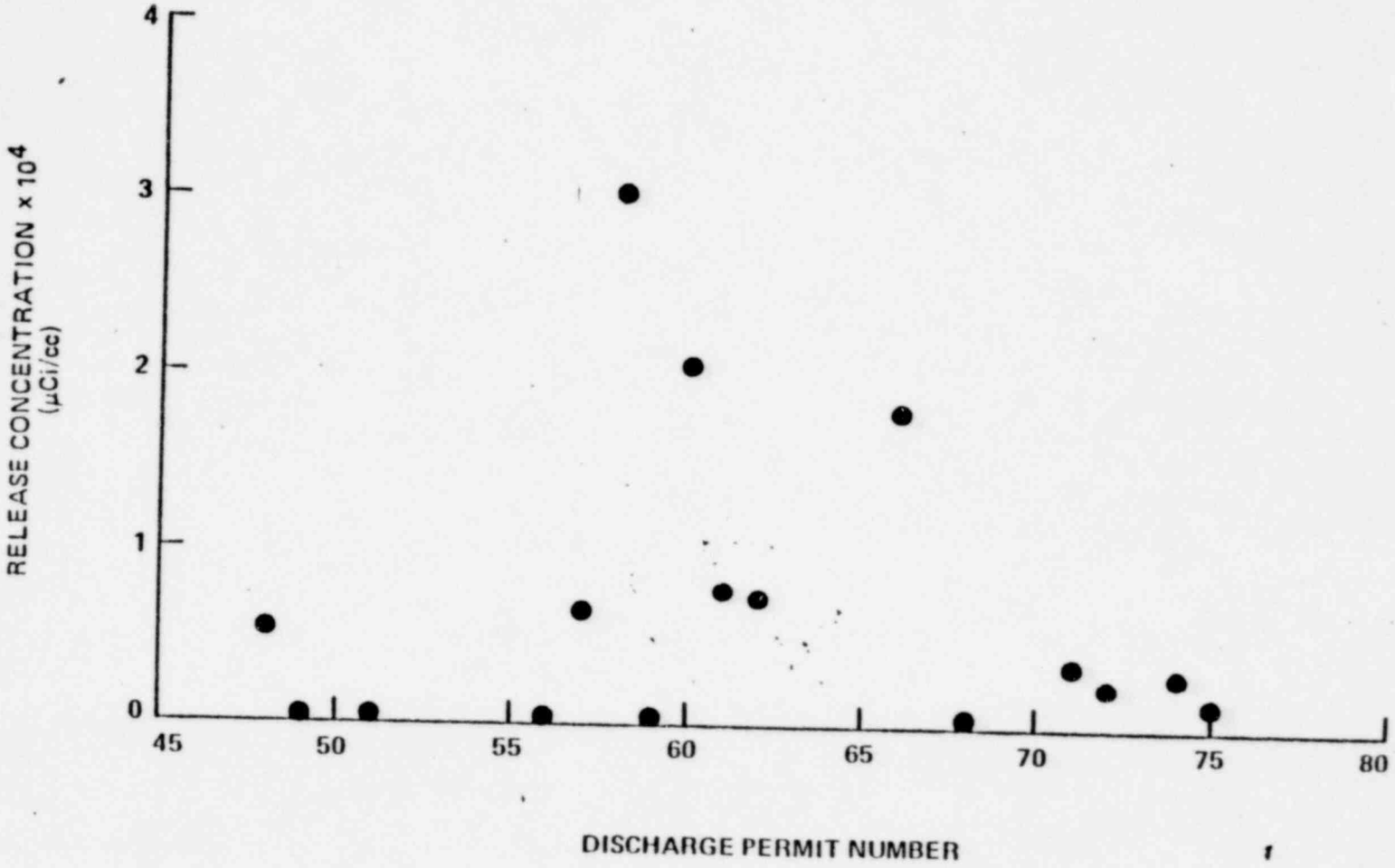
Figures A-1 thru A-4

These figures depict the concentration of H-3, Co-58, Co-60, Cs-134, and Cs-137 released from the WECST tanks for various discharge intervals. The horizontal axis gives the discharge permit number which is monotonically related to time. Table A-4 relates the discharge permit numbers to the time periods.

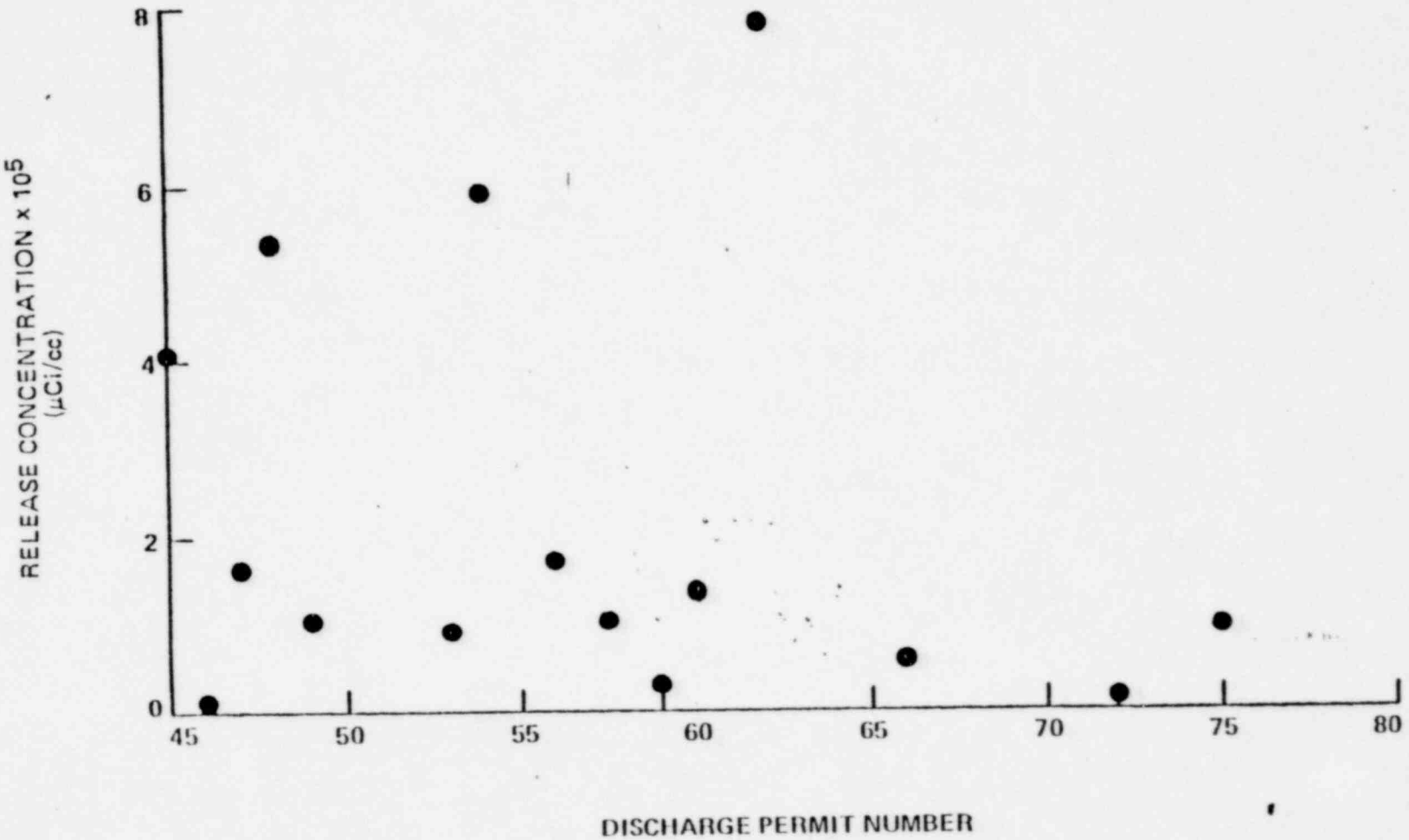
^{3}H LIQUID WECST RELEASE CONCENTRATION



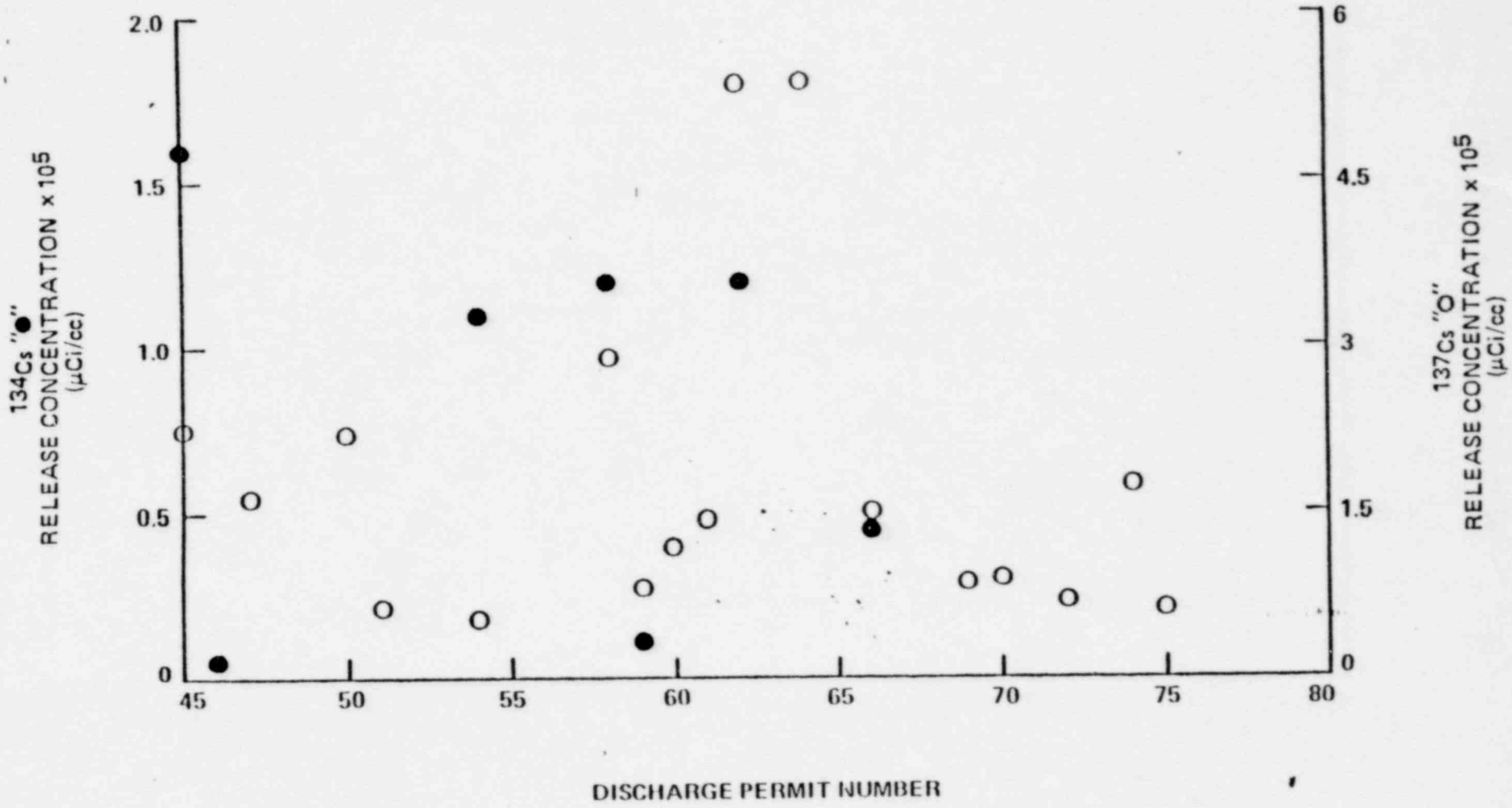
^{58}Co LIQUID WECST RELEASE CONCENTRATION



^{60}Co LIQUID WECST RELEASE CONCENTRATION



LIQUID WECST RELEASE CONCENTRATION
^{134}Cs & ^{137}Cs



Appendix B

This appendix contains data on concentration levels of I-131, measured at the discharge and at the East dike for the period of 4/5/79 through 5/19/79. Table B-1 contains the data for the discharge and Table B-2 for the East dike. As the East dike samples (B-2) are from the opposite side of the island as the radwaste discharge they serve to indicate ambient levels.

Table B-1

This table gives the time and dates for which grab samples for I-131 in discharge water were taken. Except for a few cases, the measured discharge concentration was less than 40. pCi/ℓ, with a mode of about 31. pCi/ℓ. These values are based on minimum detectable activity levels as almost all of the sample measurements resulted in null detection.

Grab Samples at Station Discharge
(All data refers to I-131. "less than" values indicate less than MDA)

Date	Time	Concentration (μCi/cc)
4/7/79	0400	$<1\times10^{-7}$
	0800	$<4\times10^{-8}$
	1200	$<4\times10^{-8}$
	1600	$<4\times10^{-8}$
	2000	$<4\times10^{-8}$
	2400	$<4\times10^{-8}$
4/8/79	0400	$<4\times10^{-8}$
	0900	$<4\times10^{-8}$
	1600	$<4\times10^{-8}$
	2000	$<4\times10^{-8}$
	2400	$<4\times10^{-8}$
4/9/79	0400	$<4\times10^{-8}$
	0800	$<4\times10^{-8}$
	1200	$<4\times10^{-8}$
	1600	$<1\times10^{-7}$
	2000	$<1\times10^{-7}$
	2400	$<2.4\times10^{-8}$
4/10/79	0400	$<2.4\times10^{-8}$
	0800	2.9×10^{-8}
	1200	$<1\times10^{-7}$
	1600	$<3\times10^{-8}$
	2000	$<2.9\times10^{-8}$
	2400	$<3\times10^{-8}$
4/11/79	0400	$<2.9\times10^{-8}$
	1000	$<6.02\times10^{-9}$
	1200	$<3.66\times10^{-9}$
	1600	$<6.58\times10^{-9}$
	2000	$<6.28\times10^{-9}$
	2400	$<3.05\times10^{-9}$
4/12/79	0400	$<5.65\times10^{-9}$
	0800	$<3.05\times10^{-9}$
	1200	$<3.05\times10^{-9}$
	2000	$<3.05\times10^{-9}$
	2400	$<5.12\times10^{-8}$

Date	Time	Concentration (μCi/cc)
4/13/79	0400	$<5.12 \times 10^{-8}$
	0800	$<3.05 \times 10^{-9}$
	1200	$<3.05 \times 10^{-9}$
	1600	$<3.05 \times 10^{-9}$
	2000	$<5.12 \times 10^{-9}$
	2400	$<5.12 \times 10^{-8}$
4/14/79	0400	$<5.12 \times 10^{-8}$
	0800	$<3.05 \times 10^{-9}$
	1200	$<3.05 \times 10^{-9}$
	1600	$<3.05 \times 10^{-9}$
	2000	$<5.12 \times 10^{-8}$
	2400	$<5.12 \times 10^{-8}$
4/15/79	0400	$<5.12 \times 10^{-8}$
	0800	$<3.05 \times 10^{-8}$
	1200	$<3.05 \times 10^{-8}$
	1600	$<3.05 \times 10^{-8}$
	2000	$<5.12 \times 10^{-8}$
	2400	$<5.12 \times 10^{-8}$
4/16/79	0400	$<5.12 \times 10^{-8}$
	0800	$<3.05 \times 10^{-8}$
	1200	$<3.05 \times 10^{-8}$
	1600	$<3.05 \times 10^{-8}$
	2000	$<5.12 \times 10^{-8}$
4/17/79	0800	$<7.08 \times 10^{-8}$
	1200	$<7.02 \times 10^{-8}$
	1600	$<7.48 \times 10^{-8}$
	2000	$<5.12 \times 10^{-8}$
	2400	$<7.6 \times 10^{-8}$
4/18/79	0400	$<7.67 \times 10^{-8}$
	0800	$<4.58 \times 10^{-8}$
	1200	$<5.19 \times 10^{-8}$
	1800	7.78×10^{-8}
	2000	$<3.05 \times 10^{-8}$
	2400	$<4.43 \times 10^{-8}$
4/19/79	0400	$<3.05 \times 10^{-8}$
	0800	$<4.7 \times 10^{-8}$
	1200	$<3.1 \times 158^{-8}$
	1600	$<4.43 \times 10^{-8}$

Date	Time	Concentration (uCi/cc)
4/19/79 (cont.)	2000	$<3.1\times10^{-8}$
	2400	$<3.15\times10^{-8}$
4/20/79	0400	$<3.05\times10^{-8}$
	0800	$<3.05\times10^{-8}$
	1200	$<3.1\times10^{-8}$
	1600	$<3.1\times10^{-8}$
	2000	$<3.1\times10^{-8}$
	2400	$<3.05\times10^{-8}$
4/21/79	0400	$<3.05\times10^{-8}$
	0800	$<3.05\times10^{-8}$
	1200	$<3.05\times10^{-8}$
	1600	$<3.05\times10^{-8}$
	2000	2.93×10^{-8}
	2400	$<3.05\times10^{-8}$
4/22/79	0400	$<3.05\times10^{-8}$
	0800	$<3.05\times10^{-8}$
	1200	$<3.05\times10^{-8}$
	1600	$<3.05\times10^{-8}$
	2000	$<3.53\times10^{-8}$
	2400	$<3.1\times10^{-8}$
4/23/79	0400	$<3.1\times10^{-8}$
	0800	$<3.1\times10^{-8}$
	1200	$<3.1\times10^{-8}$
	1600	$<3.1\times10^{-8}$
	2000	$<3.1\times10^{-8}$
	2400	$<3.1\times10^{-8}$
4/24/79	0400	$<3.1\times10^{-8}$
	0800	$<3.05\times10^{-8}$
	1200	1.9×10^{-7}
	1600	$<4.6\times10^{-8}$
	2000	$<1.5\times10^{-9}$
	2400	$<1.5\times10^{-9}$
4/25/79	0400	$<4.6\times10^{-8}$
	0800	$<3.1\times10^{-8}$
	1200	$<3.1\times10^{-8}$
	1600	$<3.1\times10^{-8}$
	2000	$<3.1\times10^{-8}$
	2400	$<3.1\times10^{-8}$

Date	Time	Concentration (uCi/cc)
4/25/79	0400	$<3.1\times10^{-8}$
	0800	$<3.1\times10^{-8}$
	1200	$<3.1\times10^{-8}$
	1600	$<3.1\times10^{-8}$
	2000	$<3.1\times10^{-8}$
	2400	$<3.1\times10^{-8}$
4/27/79	0400	$<3.1\times10^{-8}$
	0800	$<3.05\times10^{-8}$
	1200	$<3.05\times10^{-8}$
	1600	$<3.1\times10^{-8}$
	2000	$<3.1\times10^{-8}$
	2400	$<5.65\times10^{-8}$
4/28/79	0400	$<3.1\times10^{-8}$
	0800	$<3.05\times10^{-8}$
	1200	$<3.05\times10^{-8}$
	1600	Sample lost
	2000	$<3.1\times10^{-8}$
	2400	$<3.1\times10^{-8}$
4/29/79	0400	$<3.1\times10^{-8}$
	0800	$<1.5\times10^{-8}$
	1200	$<3\times10^{-8}$
	1600	$<3.1\times10^{-8}$
	2000	$<3.1\times10^{-8}$
	2400	$<3.1\times10^{-8}$
4/30/79	0400	$<3.1\times10^{-8}$
	0800	$<3.05\times10^{-8}$
	1200	$<3.1\times10^{-8}$
	1600	$<3.1\times10^{-8}$
	2000	$<3.1\times10^{-8}$
	2400	$<3.1\times10^{-8}$
5/1/79	0001	<3.1E -8
	0400	<3.1E -8
	0800	<3.1E -8
	1200	<3.1E -8
	1600	<3.1E -8
	2000	<3.1E -8

Date	Time	Concentration (μCi/cc)
5/2/79	0001	<3.1E -8
	0400	<3.1E -8
	0800	<3.1E -8
	1200	<3.1E -8
	1600	<3.1E -8
	2000	<3.1E -8
5/3/79	0001	<3.1E -8
	0400	<3.1E -8
	0800	<3.1E -8
	1200	<3.1E -8
	1600	<3.1E -8
	2000	<3.1E -8
5/4/79	0001	<3.1E -8
	0400	<3.1E -8
	0800	<3.1E -8
	1200	<3.1E -8
5/5/79	0001	<2.9E -8
	0400	<6.4E -8
	0800	<4E -8
	1200	<3E -8
	1600	<3.3E -8
	2000	<3.1E -8
5/6/79	0001	<3.1E -8
	0400	<3.1E -8
	0800	<3.1E -8
	1200	<3.1E -8
	1600	<3.1E -8
	2000	<3.1E -8
5/7/79	0001	<3.1E -8
	0400	<3.1E -8
	0800	<3.1E -8
	1200	<3.1E -8
	1600	<2.3E -8
	2000	<2.9E -8

Date	Time	Concentration (uCi/cc)
5/8/79	0800	<2.93E -8
	1200	<2.38E -8
	1600	<1.3E -8
	2000	<5.2E -9
5/9/79	0001	<1.5E -8
	0400	<1.7E -8
	0800	<3E -8
	1200	<2.6E -8
	1600	<2.5E -8
	2000	<2.82E -8
5/10/79	0001	<1.6E -8
	0400	<1.6E -8
	0800	<3.71E -8
	1200	<3E -8
	1600	<3.4E -8
	2000	<3E -8
5/11/79	0001	<3.1E -8
	0400	<2.8E -8
	0800	<3.3E -8
	1200	<3.6E -8
	1600	<1.37E -8
	2000	<1.37E -8
5/12/79	0001	<1.38E -8
	0400	<2.96E -8
	0800	<3.2E -8
	1200	<1.8E -11
	1600	<1.4E -8
	2000	<3.5E -8
5/13/79	0058	<3.0E -8
	1200	<9.78E -8
	0358	<2.8E -8
	1600	<3.2E -8
	2000	<3.2E -8
5/14/79	0015	<3.4E -8
	1020	<3.1E -8
	0800	<3.1E -8
	1230	<2.9E -8
	1607	<3.2E -8
	2004	<2.9E -8

Date	Time	Concentration (uCi/cc)
5/15/79	0005	<2.6E -8
	0400	<3.2E -8
	0800	<2.8E -8
	1210	<3.3E -8
	1600	<2.6E -8
	2000	<3.0E -8
5/16/79	0001	<2.9E -8
	0400	<3E -8
	0800	<2.8E -8
	1200	<3.3E -8
	1600	<1.3E -8
	2000	<1.9E -8
5/17/79	0005	<3.8E -8
	0402	<1.9E -8
	1215	<2.0E -8
	1600	<1.8E -8
	2000	<3.07E -8
5/18/79	0003	<1.3E -8
	0800	<2.19E -8
	0900	<2.59E -8
	1600	<1.15E -8
	2000	<1.25E -8
5/19/79	0300	<1.20E -8
	0400	<1.28E -8
	0805	<1.2E -8

Table B-2

This table summarizes measurements of I-131 in plant discharge water along the East dike for the period of 4/5/79 through 5/18/79. For a considerable number of measurements, the levels of I-131 were below the minimum detectable activity level.

East Dike Discharge Analysis

SAMPLE IDENTIFICATION NUMBER	DATE & TIME SAMPLED	CONCENTRATION (μCi/ml)	FRACTION of (MPC)$_W$
OBW 156 (ED)	4/05/79 1355	< 3E -7 (MDA)**	< 1.0
OBW 155 (Ed Discharge)	4/05/79 1555	< 3E -7	< 1.0
OBW 222 (ED)	4/06/79 1700	< 7.4E -8	< 0.25
OBW 223 (ED)	4/06/79 1700	< 7.4E -8	< 0.25
OBW 224 (ED)	4/06/79 1700	4.4E -8	0.15
OBS 266 (ED)	4/07/79 1200	1.8E -7	0.6
OBW 269 (ED)	4/07/79 1200	1.2E -7	0.4
OBW 324 (ED)	4/08/79 0630	< 4E -8	< 0.133
OBW 330 (ED)	4/08/79 1830	< 4E -8	< 0.133
OBW 352 (ED)	4/09/79 1700	< 3E -7	< 1.0
0070 (ED)	4/10/79 0552	< 3.0E -8	< 0.1
389 (ED)	4/10/79 1400	< 3.05E -9	< 0.01
OBW 390 (ED)	4/10/79 1640	< 3.0E -8	< 0.1
OBW 426 (ED)	4/11/79 0615	< 3.23E -9	< 0.01

*East Dike (ED)
**Minimum Detectable Activity

East Dike Discharge Analysis

SAMPLE IDENTIFICATION NUMBER	DATE & TIME SAMPLED	CONCENTRATION (μCi/ml)	FRACTION of (MPC) W
0157 (ED)	4/11/79 1700	6.58E -8	0.22
0177 (Ed)	4/12/79 0500	< 3.05E -9	< 0.01
0228 (ED)	4/12/79 1700	< 8.85E -9	< 0.03
276 (ED)	4/13/79 0500	< 4.58E -9	< 0.015
0326 (ED)	4/13/79 1705	< 3.05E -8	< 0.1
0372 (ED)	4/14/79 0500	< 3.05E -9	< 0.01
0457 (ED)	4/14/79 1700	< 5.12E -7	< 0.17
0494 (ED)	4/15/79 0500	< 3.05E -8	< 0.01
0601 (ED)	4/15/79 1700	7.93E -8	0.26
0664 (ED)	4/16/79 0500	< 4.58E -8	< 0.15
0762 (ED)	4/16/79 1700	< 5.12E -8	< 0.171
0829 (ED)	4/17/79 0500	SAMPLE LOST	
0929 (ED)	4/17/79 1700	1.51E -7	0.5
0972 (ED)	4/18/79 0500	1.85E -9	0.62
1094 (ED)	4/18/79 1700	2E -7	0.67

East Dike Discharge Analysis

SAMPLE IDENTIFICATION NUMBER	DATE & TIME SAMPLED	CONCENTRATION (μCi/ml)	FRACTION of (MPC) W
1120 (ED)	4/18/79 2130	2.01E -7	0.67
1148 (Ed)	4/19/79 0500	1.98E -7	0.66
1160 (ED VALVE LEAK OFF)	4/19/79 1700	1.5E -7	0.5
1255 (ED)	4/19/79 1700	1.48E -9	0.49
1267 (ED)	4/19/79 1400	1.5E -7	0.5
1268 (ED VALVE LEAK OFF)	4/19/79 1400	1.42E -7	0.47
1308 (ED DISCHARGE)	4/19/79 1820	7.32E -8	0.244
1311 (EAST DIKE CHANNEL RUN OFF)	4/19/79 1940	1.68E -7	0.56
1439 (ED)	4/21/79 0500	1.39E -7	0.46
1531 (ED)	4/21/79 1700	< 4.58E -8	< 0.15
1574 (ED)	4/22/79 0500	1.4E -7	0.47
1688 (ED)	4/22/79 1700	SAMPLE LOST	
1744 (ED VALVE LEAK OFF)	4/22/79 1820	1.12E -7	0.37
1746 (ED)	4/22/79 1825	< 4.58E -8	< 0.15

East Dike Discharge Analysis

SAMPLE IDENTIFICATION NUMBER	DATE & TIME SAMPLED	CONCENTRATION (uCi/ml)	FRACTION of (MPC) W
1729 (ED)	4/23/79 0500	1.0E -7	0.33
1854 (Ed)	4/23/79 1700	< 3.1E -8	< 0.10
1880 (ED)	4/24/79 0556	< 4.6E -8	< 0.15
1989 (ED CHANNEL RUN OFF)	4/24/79	< 3.1E -8	< 0.10
2036 (ED)	4/25/79 0500	< 3.1E -8	< 0.1
2153 (ED)	4/25/79 1700	< 4.6E -8	< 0.17
2223 (ED)	4/26/79 0547	1.25E -7	0.42
2313 (ED)	4/26/79 1700	< 4.6E -8	< 0.15
2339 (ED)	4/27/79 0500	< 4.58E -8	< 0.15
2466 (ED)	4/27/79 1700	1.2E -7	0.4
2544 (ED)	4/28/79 0500	< 4.68E -8	< 0.16
2641 (ED)	4/28/79 1700	< 4.6E -8	< 0.15
2687 (ED)	4/29/79 0500	< 3.1E -8	< 0.1
2777 (ED)	4/29/79 1700	6E -8	0.2
2838 (ED)	4/30/79 0500	< 3.05E -8	< 0.1

East Dike Discharge Analysis

SAMPLE IDENTIFICATION NUMBER	DATE & TIME SAMPLED	CONCENTRATION (μCi/ml)	FRACTION of (MPC) W
2936 (ED)	4/30/79 1700	< 4.6E - 8	< 0.15
3002 (ED)	5/01/79 0515	< 3.1E - 8	< 0.10
3088 (ED)	5/01/79 1530	7.02E - 8	0.234
3148 (ED)	5/02/79 0555	8.0E - 8	0.267
3241 (ED)	5/02/79 1700	< 3.05E - 8	< 0.10
3292 (ED)	5/03/79 0630	7.3E - 8	0.243
3412 (ED)	5/03/79 1645	9.6E - 8	0.32
3545 (ED)	5/04/79 1700	< 3.05E - 8	< 0.10
3611 (ED)	5/05/79 0500	< 4.E - 8	< 0.13
3696 (ED)	5/05/79 1656	7.3E - 8	0.24
4036 (ED)	5/06/79 0500	< MDL 4E - 8	< 0.13
4113 (ED)	5/06/79 1700	< MDL 3.1E - 8	< 0.1
4168 (ED)	5/07/79 0500	8E - 8	0.27
4251 (ED)	5/07/79 1700	< 3.3E - 8	< 0.11
4311 (ED)	5/08/79 0500	< MDL 2.96E - 8	< 0.09

East Dike Discharge Analysis

SAMPLE IDENTIFICATION NUMBER	DATE & TIME SAMPLED	CONCENTRATION (μCi/ml)	FRACTION of (MPC) W
4392 (ED)	5/08/79 1700	< MDL 2.0E - 8	< 0.06
4465 (ED)	5/09/79 0500	< MDL 3.2E - 8	< 0.11
4526 (ED)	5/09/79 1700	< MDL 3.21E - 8	< 0.11
4585 (ED)	5/10/79 0500	< 5.3E - 8	< 0.18
4664 (ED)	5/10/79 1700	< 2.4E - 8	< 0.08
4727 (ED)	5/11/79 0500	< MDL 3.5E - 8	< 0.12
4809 (ED)	5/11/79 1700	< MDL 3.4E - 8	< 0.11
4835 (ED)	5/12/79 0500	< 2.4 E-11	< 0.00008
4885 (ED)	5/12/79 1600	< 3.05 E-8	< 0.1
4919 (ED)	5/13/79 0500	< 3.05 E-8	< 0.10
5000 (ED)	5/13/79 1700	< 3 E-8	< 0.1
5049 (ED)	5/14/79 0500	< 1.2 E-8	< 0.04
5138 (ED)	5/14/79 1700	5.5 E-8	0.18
5196 (ED)	5/15/79 0500	SAMPLE LOST	
5275 (ED)	5/15/79 1700	< 3.3E-8	< 0.11

Appendix C

This appendix contains the licensee's analysis of the data for this period. It is presented for reference. Table I is a comparison of doses to maximum individual for drinking water, fish consumption, and boating activity, Table II gives data on effluent releases for the period, Table III depicts the liquid release flow paths, Table IV summarizes the radionuclides that were released, Table V summarizes the H-3 concentrations at the Columbia water treatment plant, and Table VI discusses gross gamma measurements. Many of the data presented here are redundant with earlier portions of this document, and are presented here only to keep the licensee's analysis intact.

5/15/79

TABLE I

COMPARISONS OF DOSES TO MAXIMUM INDIVIDUAL DRINKING TREATED SUSQUEHANNA RIVER WATER DOWNSTREAM OF TMI

Note that the people drinking water downstream of TMI received the same dose as people drinking water upstream of TMI. Note that the 1979 dose did not change significantly from the 1978 dose.

Pathway	(6) Nuclide	Critical Organ	Columbia (1) (2) Intake Actual Environmental Sample Downstream Dose 3/28 to 5/11 1979	1978	3/28 to 5/11 Upstream Control mrem Dose from Actual Measurements in the Environment 1979	(3) Calculated from Release Data Downstream Dose 3/28 to 5/11 1979	(4) Forty-Five Day Fraction of Allowable Technical Specification Dose	(5) 45 day mrem Natural Background
			mrem			mrem		
Drinking Water	^{131}I	Thyroid	<0.04	<0.05	<0.04	0.011	0.6 mrem	none
Drinking Water	^{3}H	Whole Body	0.002	0.002	0.002	0.00003	0.6 mrem	.0004
Eating Fish	^{131}I	Thyroid	<0.02	<0.02	<0.02	0.004	0.6 mrem	none
Eating Fish	^{3}H	Whole Body	0.00005	0.00005	0.00004	0.00004	0.6 mrem	.00001
Boating	^{131}I	Whole Body	<0.0000003	<0.000002	<0.000001	0.0000003	0.6 mrem	none

NOTES TO TABLE I

1. All data extrapolated to 5/11 from actual environmental monitoring results available through~5/3. Dose to maximum individual.
2. All results less than minimum detectable activities are averaged as if the minimum detectable activity were present.
3. Realistic model using Reg. Guide 1.109 for ingestion dose factors and fish concentration factors.
4. The Tech Spec allowable annual dose to the population per site from liquids (exclusive of noble gases) is 5 mrem/yr.
5. Based on 730 liters H_2O/yr, 21 Kgr. fish/yr; a background ^{3}H of~250 pCi/liter.
6. The resultant dose from all other radionuclides discharged were a factor of 100 less than ^{131}I, except for ^{3}H.

TABLE II

TMI EFFLUENT WATER RELEASE FOR THE PERIODS

3/28/79-5/11/79 vs. 3/28/78-5/11/78

Year	Total Volume for Units 1 & 2 Released (ft)	Total Activity (Ci)	^{131}I Activity (Ci)	^{3}H Activity (Ci)	Total Curies excluding ^{3}H & ^{131}I
1978	1.55E +9	16.0	<MDA*	15.9	0.1
1979	3.86E +9	12.7	0.239	12.4	0.06**

* Minimum Detectable Activity

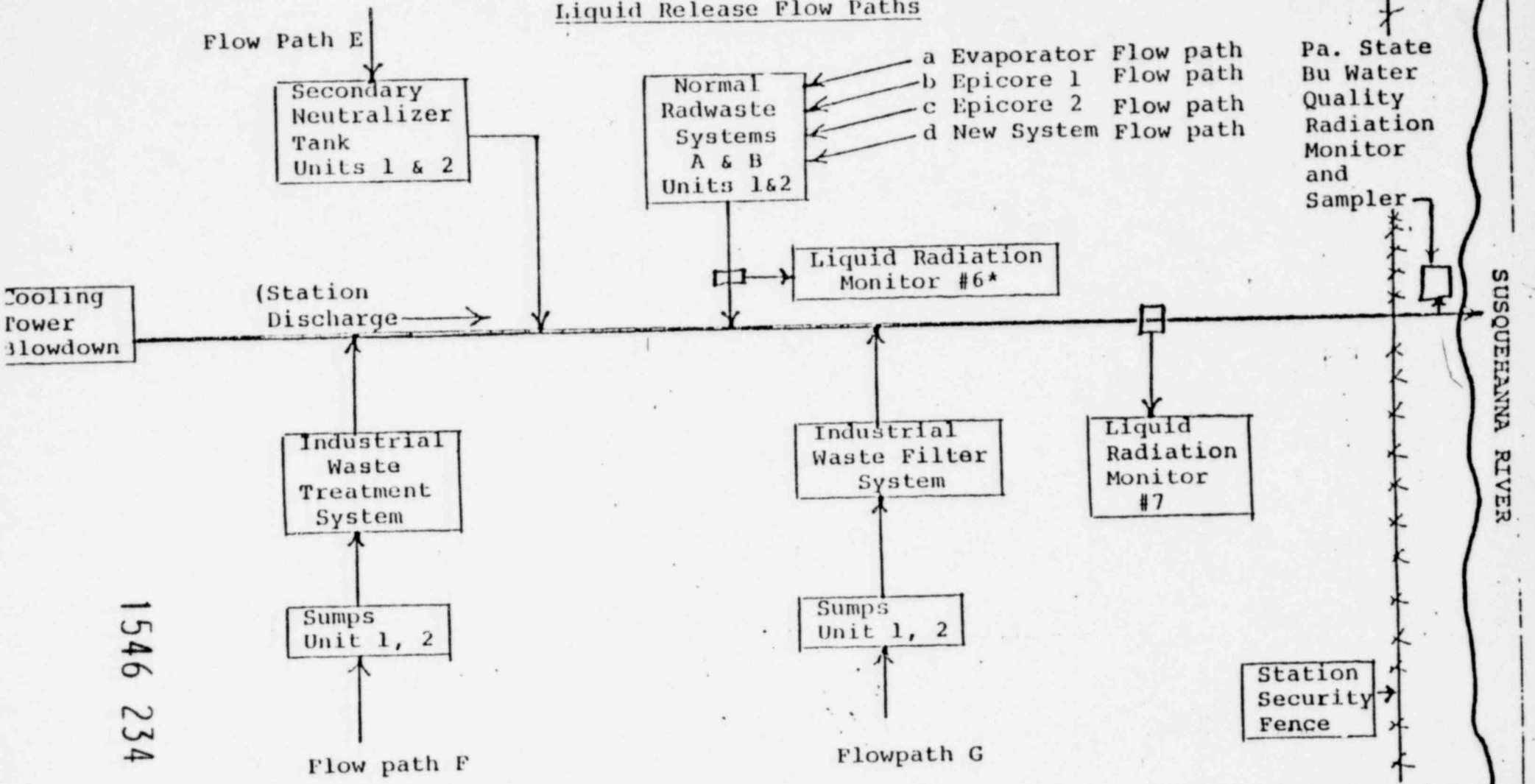
** Due primarily to refueling of Unit 1

5/15/79

TABLE III

Three Mile Island

Liquid Release Flow Paths



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*Liquid radiation monitors consist of a shielded sodium iodide crystal, a single channel analyzer, a strip chart recorder in each control room and alarms in both control rooms. Monitor #6 automatically closes the discharge valve when it alarms.

TABLE IV

SUMMARY OF RADIONUCLIDES
RELEASED TO THE SUSQUEHANNA RIVER

Radionuclide	3/28/-5/11/78 Activity (Ci)	3/28/-5/11/79 Activity (Ci)
^{3}H	17	12
^{51}Cr	2E -3	7E -4
^{54}Mn	1E -3	4E -4
^{58}Co	7E -2	2E -2
^{60}Co	1E -3	7E -3
^{95}Nb-^{95}Zr	4E -3	2E -4
^{110m}Ag	4E -3	1E -3
^{131}I	1E -4	0.2
^{132}I	0	3E -4
^{133}I	0	1E -4
^{133}Xe	2E -2	1.2E -2
^{134}Cs	2E -2	2E -3
^{136}Cs	1E -4	9E -4
^{137}Cs	1E -2	6E -3
^{140}Ba-^{140}La	4E -5	9E -3
Total (less H^3 +I's)	1.32E -1	5.92 E-2

TABLE V

SUMMARY OF ^{3}H CONCENTRATION
AT COLUMBIA WATER TREATMENT PLANT

2/21 - 6/1/74	Ave 230± 170 pCi/l
6/5 - 12/31/74	Ave 303± 200 pCi/l
1/75 - 6/75	Ave 239± 246 pCi/l
7/75 - 12/75	Ave 300± 270 pCi/l
1/76 - 12/76	Ave 169± 100 pCi/l
1/77 - 12/77	Ave 196± 44 pCi/l
1/78 - 12/78	Ave 297± 240 pCi/l

General Ave 248

5/15/79

TABLE VI

GROSS GAMMA MEASUREMENTS

Except for small quantities of naturally occurring Potassium -40 and Radium -226, no gamma emitting radionuclides were measured in the Susquehanna River during the period 3/28/79 through 5/11/79. The control station measurements made upstream from TMI were greater than the downstream measurements for the ^{40}K and ^{226}Ra.