RADIOACTIVE EFFLUENT RELEASE REPORT

INDIANA & MICHIGAN POWER COMPANY

DONALD C. COOK NUCLEAR PLANT UNIT NOS. 1&2

BRIDGMAN, MICHIGAN

JANUARY 1, 1975 THROUGH JUNE 30, 1978

I. INTRODUCTION

This report discusses and summarizes the radioactive discharges from both Unit I and II of Donald C. Cook Nuclear Plant during the first six months of calendar year 1978. The format presented in Section 5.4.1B of "Appendix B Technical Specifications" for the aforementioned units has been followed in preparing this document.

Unit I started 1978 operating at 100% power. On January 17, the unit was shutdown from 100% due to high conductivity in steam generators caused by acid getting into the condensate system while regenerating resin in the make-up plant. Unit I was returned to service on January 19, 1978. During the month of February, Unit I operated in the deicing mode, and for a period of 7.5 hours lost reserve power when an insulator flashed over and tripped breakers causing an unscheduled outage. No other major unscheduled outages occurred.

On April 6, 1978 during this reporting period, Unit I was removed from service to conduct the Cycle II/III Refueling Outage. This outage began on April 7th, and the unit was returned to full service on June 24, 1978.

The Unit II Facility Operating License, No. DPR-74, was issued on December 23, 1977. Initial fuel loading commenced on December 26 and was completed on January 2, 1978. Post core loading tests were conducted throughout the month of February and initial criticality was achieved on March 10, 1978, after which the turbine/generator system was paralleled to the system on the same date.

On March 29, the Unit was made subcritical. Investigation of condenser vacuum problems revealed failed tubes in "A" condensers. Damage was caused by steam impingement from steam dump valves. In preparation for a unit start-up, the steam leads were pressurized. This outage continued until April 1, 1978.

On April 19th, the Unit was once again removed from service. Cold shutdown was brought about for various maintenance and modification work. Unit II remained out of service until the the end of the month.

Another unplanned outage started May 19, 1978 due to an unidentified reactor coolant system leakage in excess of 1 gpm. It was found that the failed fuel detector safety valve was leaking. Isolating the fuel detector reduced the leakage from 3.26 gpm to .158 gpm. The unit was then kept out of service to perform

(4.c)

moisture separator reheater modifications and remained as such until June 1, 1978.

The next major forced outage occurred in the month of June, after several reoccurring low vacuum trips due to an impulse pressure effect on the low vacuum trip devices from an alternate drain line discharging on the immediate vicinity of the condenser vacuum sensing lines. The sensing valves were relocated to the opposite side of the condenser. Following the outage for moisture separator reheater modifications, power ascension testing continued and the unit attained 97% power.

II. RADIOACTIVE RELEASES

The details and data concerning radioactive discharges from both Units I and II have been handled as joint responses rather than independently for the first six months of 1978. Appendix A presents this information in accordance with the format cited in Section 5.4.1 of Appendix B, Environmental Technical Specification. As in reports preceeding this one, the effluents were well within the limits set forth in Appendix B Environmental Tech Specification for the D.C. Cook Nuclear Plant and Appendix I to 10 CFR Part 50.

APPENDIX A

RADIOACTIVE RELEASE DATA

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1978

LIQUID EFFLUENTS

		BATCH MODE	
Nuclides Released	Unit	1st Quarter	2nd Quarter
Stronium - 89	Ci	<1.184 E-4	<1.911 E-4
Stronium - 90	Ci	<1.018 E-4	<1.643 E-4
Cesium - 134	Ci	1.229 E-1	1.251 E-1
Cesium - 137	Ci	1.395 E-1	1.331 E-1
Iodine - 131	Ci	1.163 E-2	3.234 E-3
Cobalt - 58	Ci	5.594 E-2	1.038 E-1
Cobalt - 60	Ci	8.651 E-2	8.238 E-2
Iron - 59	Ci	<1.626 E-4	7.742 E-4
Zinc - 65	Ci	<1.018 E-3	<1.382 E-3
Manganese - 54	Ci	1.573 E-2	1.094 E-2
Chromium - 51	Ci	3.785 E-3	1.011 E-2
Zirconium-niobium - 95	Ci	4.164 E-3	4.917 E-3
Molybolenum - 99	Ci	<7.482 E-6	<1.207 E-5
Technetium - 99m	Ci	<5.628 E-5	<9.081 E-5
Barium-lanthanum - 140	Ci	<3.468 E-4	<5.595 E-4
Cerium - 141	Ci	<1.031 E-4	<1.664 E-4
Cesium - 136	Ci	5.635 E-4	7.840 E-4
Sodium - 24	Ci	2.393 E-3	7.835 E-3
Iodine - 133	Ci	4.436 E-4	1.242 E-4
Cobalt - 57	Ci	7.028 E-5	1.862 E-4
Zirconium - 97	Ci	3.811 E-4	7.196 E-5
Silver - 110m	Ci	1.603 E-4	1.557 E-3
Sb -124	Ci	< 4.782 E-5	1.707 E-2
Sb-125	Ci	< 1.535 E-4	8.074 E-4

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EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1978

LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

	Unit	1st Quarter	2nd Quarter	Est. Total Error, %
FISSION AND ACTIVATION PRODUCTS				
Total release (not including tritium, gases, alpha)	Ci	4.443 E-1	5.028 E-1	3.03
Average diluted concentration during period	µCi/ml	2.359 E-8	2.017 E-8	
Percent of applicable limit	%	.338	.148	
TRITIUM				
Total release	Ci	84.279	208.659	.260
Average diluted concentration during period	µCi/ml	1.182 E-6	2.212 E-6	
Percent of applicable limit	%	.039	.074	
DISSOLVED AND ENTRAINED GASES				
Total release	Ci	6.882 E-1	1.794 E-2	1.70
Average diluted concentration during period	µCi/ml	3.654 E-8	7.198 E-10	
Percent of applicable limit	%	*	*	
GROSS ALPHA RADIOACTIVITY				
Total release	Ci	<2.930 E-3	<9.577 E-3	
VOLUME OF WASTE RELEASED (PRIOR TO DILUTION)	liters	3.2529 E 6	5.2490 E 6	2.00
VOLUME OF DILUTION WATER USED DURING PERIOD	liters	1.8833 E 10	2.4919 E10	3.48

* applicable limit

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EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1978

GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

	Units	1st Quarter	2nd Quarter	Est. Total Error, %
FISSION AND ACTIVATION GASES				
Total release	Ci	9.986 E 3	2.520 E 2	1.4
Average release rate for period	µCi/Sec	1.284 E 3	3.205 E 1	
Percent of technical specification limit	%	6.15	0.19	
IODINES				
Total iodine - 131	Ci	2.964 E-4	9.846 E-3	13.9
Average release rate for period	µCi/Sec	3.812 E-5	1.25 E-3	
Percent of technical specification limit	%	0.007	.225	
PARTICULATES				
Particulates with half-lives > 8 days	Ci	<1.771 E-3	9.637 E-2	18.0
Average release rate for period	µCi/Sec	<2.278 E-4	5.153 E-9	
Percent of technical specification limit	%		9.28 E-7	
Gross alpha radioactivity	Ci	<3.160 E-12	< 3.16 E-12	
TRITIUM				
Total release	Ci	6.840 E-1	1.312 E 1	2.0
Average release ~~of~~ rate for period	µCi/Sec	8.796 E-2	1.669 E 0	
Percent of technical specification limit	%	.67	12.8	

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EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1978

GASEOUS EFFLUENTS - ELEVATED RELEASE

		CONTINUOUS MODE		BATCH MODE	
Nuclides Released	Unit	1st Quarter	2 nd Quarter	1st Quarter	2nd Quarter
FISSION GASES					
Krypton - 85	Ci			6.979 E 1	5.462 E 1
Krypton - 85m	Ci			7.430 E-1	7.042 E-1
Krypton - 87	Ci				1.221 E-1
Krypton - 88	Ci				1.364 E 0
Xenon - 133	Ci	4.173 E 2	7.340 E 1	9.384 E 3	1.156 E 2
Xenon - 135	Ci	4.009 E 0		3.671 E 1	5.439 E 0
Xenon - 135m	Ci				
Xenon - 138	Ci				
Xenon - 133m	Ci			7.388 E 1	7.141 E-1
Total for period	Ci	4.213 E 2	7.340 E 1	9.565 E 3	1.786 E 2
IODINES					
Iodine - 131	Ci	2.122 E-4	7.850 E-4	8.424 E-5	9.061 E-3
Iodine - 133	Ci	2.664 E-5	1.387 E-5		1.033 E-5
Iodine - 135	Ci				
Total for period	Ci	2.389 E-4	7.989 E-4	8.424 E-5	9.071 E-3
PARTICULATES					
Strotium - 89	Ci				
Strotium - 90	Ci				
Cesium - 134	Ci				8.621 E-10
Cesium - 137	Ci				5.316 E-6
Barium-lanthanum - 140	Ci				
Cobalt - 58	Ci		4.596 E-6		4.325 E-2
Cobalt - 60	Ci		1.505 E-5		4.087 E-2
Cesium -138			1.706 E-6		3.196 E-4
Magnesium - 54					2.023 E-3
Chromium - 51					4.883 E-3
Zirconium - 95					8.010 E-5
Niobium - 95					1.340 E-4
Antimony -124					4.781 E-3
Rubidium - 88					2.137 E-2

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1978

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. Solid waste shipped offsite for burial or disposal

1. Type of waste	Unit	6-month period	Est. Total Error, %
a. Spent resins, filter sludges, evaporator bottoms, etc.	m^3	6.113 E 2	1
	Ci	1.398 E 2	4
b. Dry compressible waste, contaminated equipment, etc.	m^3	2.031 E 2	1
	Ci	2.026 E 1	200
c. Irradiated components, control rods, etc.	m^3		
	Ci		
d. Other	m^3		
	Ci		

2. Estimate of major nuclide composition

a.	CS-137	% 55.5
	CS-134	% 40.4
	CO-58 & 60	% 4.0
b.	Co-60	% 85.0
	Co-58	% 15.0

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
17	Truck	Sheffield, Ill
37	Truck	Barnell, S. C.

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1978

MDA GASEOUS EFFLUENTS - ELEVATED RELEASE

		CONTINUOUS MODE		BATCH MODE	
Nuclides Released	Unit	1st Quarter	2nd Quarter	1st Quarter	2nd Quarter
FISSION GASES					
Krypton - 85	Ci	<8.119 E 3	<9.064 E 3	<5.975 E 1	<2.870 E 0
Krypton - 85m	Ci	<2.553 E 1	<2.850 E 1	<1.519 E-1	<7.297 E-3
Krypton - 87	Ci	<3.771 E 1	<4.210 E 1	<2.775 E-1	<1.333 E-2
Krypton - 88	Ci	<5.429 E 1	<6.061 E 1	<3.994 E-1	<1.919 E-2
Xenon - 133	Ci	<6.407 E 1	<7.153 E 1	<4.714 E-1	<2.265 E-2
Xenon - 135	Ci	<1.629 E 2	<1.819 E 2	<1.198 E 0	<5.758 E-2
Xenon - 135m	Ci	<6.114 E 2	<6.826 E 2	<4.498 E 0	<2.161 E-1
Xenon - 138	Ci	<3.169 E 2	<3.538 E 2	<2.332 E 0	<1.120 E-1
Xenon - 133m	Ci	<1.340 E 2	<1.496 E 2	<9.861 E-1	<4.737 E-2
Total for period	Ci	<9.526 E 3	<1.064 E 4	<7.006 E 1	<3.366 E 0
IODINES					
Iodine - 131	Ci	<4.174 E-6	<4.660 E-6	<1.807 E-4	<9.429 E-6
Iodine - 133	Ci	<6.153 E-6	<6.869 E-6	<2.663 E-4	<1.390 E-5
Iodine - 135	Ci	<1.141 E-5	<1.274 E-5	<4.915 E-4	<2.565 E-5
Total for period	Ci	<2.174 E-5	<2.427 E-5	<9.385 E-4	<4.898 E-5
PARTICULATES					
Strotium - 89	Ci	<3.084 E-6	<3.443 E-6		
Strotium - 90	Ci	<1.066 E-6	<1.190 E-6		
Cesium - 134	Ci	<6.231 E-6	<6.956 E-6	<2.697 E-4	<1.408 E-5
Cesium - 137	Ci	<6.060 E-6	<6.765 E-6	<2.623 E-4	<1.369 E-5
Barium-lanthanum - 140	Ci	<2.762 E-5	<3.084 E-5	<1.195 E-3	<6.238 E-5

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Release Number	Start	Time	Stop	Time	XE-133 Ci	XE-133m Ci	XE-135 Ci	KR-85 Ci	KR-85m Ci	Kr-87 Ci	Kr-88 Ci	Ar-41 Ci	I-131 Ci	I-133 Ci	H3 Ci	Co-57 Ci	Co-58 Ci	Mn-54 Ci	Fe-59 Ci	Zr-95 Ci	Nb-95 Ci	Co-60 Ci	Cs-134 Ci	Ba-95 Ci	C
78- 1	1-7-78	/1500	1-8-78	/2022	2.047E3	1.625E1	5.982E0	6.915E1	7.429E-1			2.075E0			1.819E-7										
78- 2	1-7-78	/1500	1-8-78	/2022	3.187E3	2.311E1	1.664E1								1.174E-7										
78- 3	1-7-78	/1500	1-9-78	/2022	3.529E-1	2.470E-3	1.841E-3		6.237E-6			1.532E-4			1.477E-6										
78- 4	1-14-78	/0551	1-15-78	/1640	1405.50	11.582	2.700								1.111E-7										
78- 5	1-14-78	/0551	1-15-78	/1640	2509.32	20.670	10.273					6.012			2.781E-7										
78- 6	1-14-78	/0551	1-15-78	/1640	184.56	1.514	.739					3.786E-1	8.429E-5												
78- 7	3-9-78	/2100	3-9-78	/2117	24.133	2.949E-1	2.267E-1								1.[illegible]E-6										
	3-9-78	/2150	3-9-78	/2243																					
78- 8	3-10-78	/0238	3-10-78	/0328	7.493	5.442E-2	2.105E-2	6.376E-1							5.138E-5										
78- 9	3-10-78	/1300	3-10-78	/1402	18.495	7.010E-1	8.163E-2																		
78-10	Not Released																								
78-[illegible]	3-31-78	/0300	4-1-78	/0440	417.305		4.009						2.122E-4	2.664E-5	6.147E-1										
78-11	Not Released																								
78-12	4-4-78	/0045	4-5-78	/0108	3.917E0	3.431E-2	4.911E-2																		
78-13	4-4-78	/0935	4-5-78	/1125	.2402		.0771					6.027E-2				1.209E-7	3.802E-6	1.05[illegible]E-5							
78-14	Not Released																				6.[illegible]E-6				
78-15	4-5-78	/0107	4-[illegible]-78	/0217	1.249E-1		3.271E-1		5.096E-2		8.843E-2														
78-16	4-6-78	/0620	4-[illegible]-78	/0953	3.850E0	4.194E-2	4.710E-1														6.242[illegible]-6	6.69[illegible]E-7	3.121E-6		
78-17	4-7-78	/0832	4-[illegible]-78	/1120	2.550E1	2.039E-1	1.406E-1	6.125E-1	9.846E-3			4.310E-2													
78-18	4-7-78	/0635	4-7-78	/1120	4.324E1	2.493E-1	8.109E-2	1.420E0	5.473E-3			1.696E-2													
78-19	4-7-78	/0635	4-7-78	/1120	5.923E-1		3.371E-3																		
78-20	4-9-78	/0810	4-[illegible]-78	/1055	1.173E1	5.205E-2	1.570E-2																		

[illegible]	Start	Time	Stop	Time																			
GJ8 21	4-9-78	/0810	5-27-78	/1055	8.787E-1	3.951E-3	8.151E-4							6.732E-4									
GJ8 22	4-9-78	/0910	5-27-78	/1055	1.394E1	7.323E-2	1.969E07	7.295E-1						6.975E-3	2.598E-6	1.196E1	6.171E-7	2.817E-1	4.804E-1	8.816E-5		1.564E-7		1.398E-6
GJ8 23	Not Released																						
GJ8 24	Not Released																						
GJ8 25	Not Released																						
GJ8 26	4-20-78	/0955	5-2-78	/0919	6.190E0											5.019E-1							
GJ8 27	4-20-78	/1014	5-2-78	/0919	5.512E-1											3.648E-1							
GJ8 28	4-20-78	/0958	5-2-78	/0919	6.596E0											1.679E-7							
GJ8 29	5-3-78	/1410	5-3-78	/1532	4.292E-1	1.094E-4		1.862E-1						3.479E-5		7.537E-7							
GJ8 30	5-4-78	/1415	5-4-78	/1511	2.112E-1	8.837E-4	8.610E-1	1.597E-1	6.096E-3	4.309E-3	1.337E-2	6.806E-1	2.476E-5			3.829E-7	3.598E-5						
GJ8 31	5-5-78	/0550	5-5-78	/0755	1.559E-2		1.722E-2		4.939E-3			4.665E-1	7.084E-5	1.578E-7		7.461E-5				1.684E-5		4.086E-5	
GJ8 32	5-5-78	/2130	5-5-78	/0220	2.303E-1		1.364E-1		5.041E-2		9.837E-2	3.127E0				4.581E-4		6.249E-1					
GJ8 33	Not Released																						
GJ8 34	Not Released																						
GJ8 35	5-6-78	/1519	5-6-78	/1612	1.453E-1		3.219E-1		9.804E-2	2.907E-2	1.762E-1	5.297E0	5.013E-5			4.714E-4							
GJ8 36	5-6-78	/1710	5-6-78	/1800	1.257E-1		4.464E-1	1.301E0	9.673E-2		1.495E-1	4.532E0				1.631E-4							
GJ8 37	5-7-78	/1955	5-7-78	/2055	1.293E-1	2.735E-2	2.907E-1	8.274E-1			3.147E-2	6.565E-1	1.305E-5	1.219E-6		2.795E-4							
GJ8 38	5-9-78	/0225	5-9-78	/0510	4.555E-2	4.243E-3	5.245E-2	9.365E-1				3.240E-2	8.554E-7					1.117E-5		3.271E-5			
GJ8 39	5-9-78	/2170	5-9-78	/2220	3.250E-1	1.663E-2	5.849E-1		3.148E-2		1.690E-2	1.710E-1				4.811E-5		1.693E-5					
GJ8 40	5-9-78	/2252	5-10-78	/0000	1.975E-1		2.552E-1		6.625E-2		1.565E-1	4.861E0				1.084E-4		1.559E-6					
GJ8 41	5-11-78	/2230	5-11-78	/2321	1.960E-1		4.441E-1		6.299E-2	3.197E-2	1.028E-1	2.928E0	3.229E-6	9.697E-7		6.895E-4		5.193E-4		2.118E-4			

Start	Stop	Xe-133 Ci	Xe-133m Ci	Xe-135 Ci	Kr-85 Ci	Kr-85m Ci	Kr-87 Ci	Kr-88 Ci	Ar-41 Ci	I-131	I-133	H-3	Co-57	Co-58	Fe-59	Cr-51	Zr-95	Mn-54	Co-60	Sr-89	Sr-90
5-15-78/1310	5-15-78/1342	4.420E-1		6.180E-1	1.736E0			9.780E-2	2.510E0									5.130E-5			
5-20-78/1706	5-20-78/1215			2.990E-3	6.895E-1				4.218E-2			9.990E-4									
5-20-78/1706	5-20-78/1215			7.666E-2					1.856E0			2.169E-2									
5-20-78/0837	5-20-78/1215				1.437E0							2.555E-4									
5-25-78/1943	5-25-78/2012													6.206E-6							
5-25-78/1957	5-25-78/2012																				
6-2-78/2152	6-2-78/2342	2.127E-2		3.297E-1	3.009E1	9.840E-2	5.552E-2	2.010E-1	2.700E0			6.139E-5						1.130E-5		2.009E-5	
6-3-78/0320	6-3-78/0512	4.124E-2		4.604E-1	1.193E1	1.304E-1		2.796E-1	2.609E0			7.853E-5									
6-4-78/1730	6-4-78/2000	1.353E-1	6.272E-3	1.445E-1	9.025E-2	1.356E-2	2.052E-4	6.844E-3	1.307E-2			2.699E-5						2.025E-7			
6-8-78/1730	6-8-78/1852	1.187E-2			2.241E-1					3.274E-7		2.486E-5									
6-12-78/0643	6-12-78/0730	1.133E-2			2.870E-1					1.167E-7		9.262E-6									
6-12-78/1010	6-13-78/0640									3.000E-5		2.476E-7						a	2.125E-5		
6-12-78/1010	6-13-78/0640											1.292E-1									
6-12-78/1010	6-13-78/0640																				
6-12-78/1510	6-12-78/1630	1.312E-2			1.279E-1					1.645E-6		2.096E-5							5.359E-1		
6-13-78/0121	6-13-78/0205	1.072E-2	2.307E-4	2.304E-4	2.210E-1				5.089E-5	2.984E-7		4.267E-9		8.248E-8					1.917E-7		
6-13-78/1316	6-13-78/1430	1.425E-2	1.384E-4	9.957E-5	2.164E-1					2.894E-7		2.296E-9									
6-13-78/1700	6-13-78/1742	2.091E-2	2.635E-4	1.451E-4	2.251E-1					8.709E-8		1.009E-5									
6-13-78/2153	6-13-78/2235	2.644E-2	4.243E-4	1.307E-3	2.397E-1	5.760E-5			2.665E-4			2.263E-5									
Not Released																					
6-15-78/0245	6-15-78/0325	2.799E-2		1.810E-3	2.476E-1				5.015E-4			6.029E06									
Continuous 6-1-78/00	7-1-78/0000	2.340E1								7.854E-4	1.387E-5	6.441E-1		4.596E-6					1.505E-5	1.206E-6	

RADIOACTIVE EFFLUENT RELEASE REPORT

INDIANA & MICHIGAN POWER COMPANY
DONALD C. COOK NUCLEAR PLANT UNIT NOS. 1 & 2
BRIDGMAN, MICHIGAN

July 1, 1978 through December 31, 1978

dupe 7903290147

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Docket Nos. 50-315 & 50-316
License Nos. DPR-58 & DPR-74

4.D

Donald C. Cook Nuclear Plant • Units 1 & 2

Semi-Annual Radioactive Effluent Release Report

January 1 - June 30, 1979