

Power Company

Consumers

General Offices: 212 West Michigan Avenue, Jackson, Michigan 49201 • Area Code 517 788-0550

August 29, 1975

ATT, AMART

Division of Reactor Licensing US Nuclear Regulatory Commission Washington, DC 20555

DOCKET 50-155, LICENSE DPR-6 BIG ROCK POINT 'ANT

Attached is a f Section VII of the Big Rock Point Semiannual Report of Operations. The finance contains the effluent release data required to be submitted by 10 Cl >0.36a(a)(2). The remainder of the Semiannual Report will be submitted by October 1, 1975 as stated in our letters of August 7 and August 12, 1975.

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Ralph B. Sewell Nuclear Licensing Administrator

CC: JGKeppler, USNRC File

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VII. RADIOACTIVE EFFLUENT RELEASES

A. Introduction

Releases of radioactive material both to the atmosphere and to Lake Michigan from January 1 to June 30, 1975 were well within the facility licensed limits and the NRC's regulations, particularly Title 10, Code of Federal Regulations, Part 20.

B. Gaseous Effluent

Gaseous releases to the atmosphere totaled 6.95E+03 curies of fission and activation gases. This corresponds to 0.04% of the licensed Technical Specifications limit of 1 Ci/s. Particulate releases totaled 0.013 curie or 0.03% of the licensed limit while halogen releases were measured to be 0.021 (± 50%) curie or 0.04% of the licensed limit. Gross alpha measurements on the particulate filter revealed that the release of alpha emitting nuclides totaled 1.08E-06 curies. Tritium releases for the period totaled 1.88 curies or 1.97E-06% of the limit based upon meteorological dispersion to the point of maximum ground concentration.

1. Gaseous Effluent Calculational Methods

A sample of off-gas is obtained weekly during power operation and analyzed by gamma spectrometry for *six noble gas radionuclides. Based upon the mixture of the six nuclides, a stack release rate, which includes a total of 22 noble gas radionuclides, is determined. The stack release rate is based on a 30-minute holdup time for off-gas plus a 1% contribution from the turbine sealing steam system utilizing a 2-minute holdup. The 1% turbine seal contribution has the same distribution of nuclides as the off-gas corrected for a 2-minute decay period. This is reflected in the monthly totals shown in Appendix A.

Activation gas releases are composed primarily of N-13. The rate of release is power-level dependent and is incorporated in the total monthly releases shown in Appendix A.

Particulate and halogen releases to the atmosphere are measured by counting particulate and charcoal filters weekly. These filters collect

*Xe-138, Kr-87, Kr-88, Kr-85m, Xe-135, Xe-133

stack effluent continuously at a rate of three cubic feet per minute. Determination of release rates in this manner assumes radioactivity is continually being deposited uniformly throughout the week on the filters and, hence, a decay correction to the time of analysis is applied, depending on the half-life of the nuclide observed. The net beta activity, as reported in Appendix A, represents the unidentified portion of the total activity present on the particulate filters (ie, gross beta activity minus the identified isotopic activity). The net unidentified beta activity is corrected for decay based on a half-life of 27.7 years (ie, Sr-90).

Tritium releases to the atmosphere are calculated, based upon measurements made in the primary coolant and containment air and the following:

- a. <u>Off-Gas</u> The average flow rate containing 90% radiolytic gas by volume at primary coolant tritium to hydrogen ratio and at 100% relative humidity is used to determine tritium releases both in vapor and molecular form.
- b. <u>Turbine Sealing Steam</u> The design flow rate at 100% relative humidity and primary coolant tritium to hydrogen ratio.
- c. <u>Containment Ventilation</u> The design flow rate and measured containment building tritium concentration.

The results of these calculations are also shown in Appendix A.

C. Liquid Effluents

Liquid waste releases totaled 1.15 curies of radioactive material. This release corresponds to 3.7% of Technical Specifications limits.

1. Liquid Effluent Calculational Methods

The release pathway to Lake Michigan for all liquid effluents is through the plant's condenser circulating water discharge canal. A flow rate of 49,000-52,000 gpm dilution for liquid effluents is obtained through the use of the condenser circulating water pumps, two at 24,500 gpm each and house service water pumps, two at 2,100 gpm each.

Each collected tank of liquid is sampled, analyzed for radioactive content, and discharged at a controlled rate to ssure that permissible concentrations are not exceeded in the canal prior to dilution in Lake Michigan during the time of discharge. Each sample is analyzed by gamma spectrometry to identify as many of the component nuclides as possible. (See Aopendix B for results.) Permissible concentrations in the canal are determined from the following:

$$\Sigma \frac{C_i}{MPC_i} \leq 1$$

where C_i is the concentration of the <u>i</u>th isotope in the canal at the given concentration measured in the tank diluted by the known canal flow rate. Those isotopes not identified by gamma spectrometry but measured by gross beta analysis are presumed to be Sr-90 and released on that basis.

Tritium, Sr-89 and Sr-90 analyses were performed by a contractor laboratory on monthly composite samples. Results of the June tritium analysis were not available for this report but will be included in the next Semiannual Report.

D. Solid Wastes

A total of £155,009.5 curies of radioactive material was shipped off site during the period covered by this report. Of the total, irradiated cobalt accounted for 154,000 curies, spent resin 1,006 curies and solid radwaste 3.5 curies. (See Appendix C.)

E. Environmental Dose Calculations

Levels of radioactive materials in environmental media indicate that public intake is well below 1% of that which could result from continuous exposure to the concentration values listed in Appendix B, Table II, 10 CFR, Part 20. Therefore, calculated off-site doses are not presented for the period. Off-site dose calculations covering the entire year will be presented in the next Semiannual Report.

APPENDIX A, TABLE 1

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Consumers Power Company Big Rock Point Plant, Docket No 50-155 Atmospheric Release of Radioactive Material

	<u>Units</u>	January	February	March	April	May	June	Total
Total Noble Gases	Curies	2.20E+03	-	-	- 10	-	4.75E+03	6.95E+03
Total Halogens		1.98E-02	3.36E-04	1.24E-04	000-	-	4.23E-04	2.07E-02
Total Particulates (B, y)		9.63E-03	4.68E-04	2.17E-04	1.45E-03	9.41E-04	6.89E-04	1.34E-02
Total Tritium		5.62E-01	1.38E-01	1.53E-01	1.48E-01	1.53E-01	7.23E-01	1.88E+00
Total Particulates - Gross Alpha		2.00E-07	1.07E-07	2.48E-07	1.75E-07	1.78E-04	1.69E-07	1.08E-06
Maximum Noble Gas Release Rate	uCi/s	1.86E+03		-			2.72E+03	2.72E+03
Percent of Technical Specifications	*							
Noble Gases		8.21E-02				100.00	1.83E-01	4.44E-02
Halogens		2.06E-01	1.16E-02	3.84E-03	1.1.1.1.4		4.66E-03	3.86E-02
Particulates (B, Y)		8.56E-02	1.16E-02	1.57E-02	2.83E-02	2.13E-02	2.75E-02	3.20E-02
Isotopes Released	Curies							
Halogen								
I-131		2.25E-03	3.35E-04	1.24E-04			5.22E-05	2.76E-03
I-133		1.75E-02			1947		3.71E-04	1.79E-02
Particulates								
Ca-134		2.57E-05	5.01E-06			1.06E-04	3.58E-05	1.67E-04
Ca-137		5.19E-04	2.36E-04	5.61E-05	1.23E-05	1.65E-04	4.67E-05	1.04E-03
BaLa-140		6.99E-03	4.17E-06	3.13E-06		-		7.00E-03
Mn-54		2.62E-04	1.88E-06		3.90E-05	3.45E-05	1.17E-05	3.49E-04
Co-60		2.97E-04	1.67E-04	1.18E-04	1.22E-03	4.67E-04	6.24E-05	2.33E-03
Co-58		5.28E-05		-	1 755 01	1 695 01	E 225 01	5.20E-05
Net Unidentified beta		1.405-03	2.432-05	3.935-05	1.176-04	1.005-04	2.335-04	2.475-03
Noble Gases								1.19.2576
Xe-138		5.55E+02			-	-	1.42E+03	1.98E+03
Kr-87		2.70E+02		-		-	8.00E+02	1.07E+03
Kr-88		2.24E+02	-		-		4.12E+02	6.36E+02
Kr-85m		1.00E+02		-	-		2.08E+02	3.08E+02
Xe-135		4.24E+02		-	-	-	8.38E+02	1.26E+03
Xe-133		1.526+02	-	-	-		2.505+02	4.10E+02
Xe=143						-	D	13 11 13 13
Kr 02		-						13 A A A A B
Ve-111								160 - A Q
Km-02						C	- 12 - LQ	
Kr=01		<1					<1	<1
Xe-140		1.04E+00		-	_		2.16E+00	3.20E+00
Kr-90		1.20E+01		-			2.49E+01	3.69E+01
Xe-139		1.78E+01		-			3.69E+01	5.47E+01
Kr-89		2.60E+01					5.38E+01	7.98E+01
Xe-137		4.52E+01	-		-		9.37E+01	1.39E+02
Xe-135m		9.41E+01		-	-		1.95E+02	2.89E+02
Kr-83m		5.47E+01	-		-	-	1.13E+02	1.68E+02
Xe-133m		4.78E+00				1 -	9.89E+00	1.47E+01
Xe-131m		<1	-		-		<1	<1
Kr-85		<1	-	-	-	-	<]	<1
N-13		2.18E+02	-	-	11 - 1 - 2	1. S. A.	2.84E+02	5.02E+02

APPENDIX B, TABLE 1

Consumers Power Company Big Rock Point Plant, Docket No 50-155 Radioactive Liquid Releases

	Units	January	February	March	April	May	June	Total
Total Radioactivity Released (Except Tritium, Dissolved Gases and Alpha)	Curies	4.22E-01	7.64E-02	1.98E-01		1.59E-01	2.92E-01	1.15E+00
V lume of Waste Discharge	Liters	7.69E+04	4.01E+04	3.72E+04	100	9.89E+04	1.06E+04	2.94E+05
Average Concentration of Waste Prior to Discharge	uCi/ml	5.49E-03	1.90E-03	5.32E-03		1.60E-03	7.18E-03	3.91E-03
Volume of Circulating Discharge Water	Liters	8.45E+09	7.78E+09	8.26E+09	8.50E+09	8.52E+09	8.18E+09	4.97E+10
Average Concentration Released (Except Tritium, Dissolved Gases and Alpha)	uCi/ml	5.002-08	9.81E-09	2.30E-06		1.86E-08	3.57E-08	2.31E-08
Maximum Concentration (Except Tritium, Dissolved Gases and Alpha)	uCi/ml	9.05E-07	4.97E-07	5.77E-07	-	6.90E-07	3.94E-07	9.05E-07
Percent of Applicable Limits	×	5.87E+00	1.08E+00	4.17E+00	1 A A	3.28E+00	7.78E+00	3.70E+00
	Curies	7.69E-01	1.12E-01	4.84E-01	-	2.37E+00	NA ⁽¹⁾	- S.
Average Tritium Concentration Released	uCi/ml	9.10E-08	1.44E-08	5.85E-08	-	2.76E-07		
Total Gross Alpha Released	Curies	1.64E-05	2.77E-05	5.72E-06	-	2.75E-05	4.12E-06	8.14E-05
Average Alpha Concentration	uCi/ml	1.94E-12	3.56E-12	6.92E-13		3.23E-12	5.04E-13	1.64E-12
Isotopes Zn=65 1-131 Fe=59 Cs=134	Curies	1.57E-02 7.60E-03 3.58E-02	1.09E-02	6.25E-03 1.39E-02		2.93E-03 1.12E-03 7.84E-03	9.92E-04 2.61E-02	2.59E-02 7.60E-03 1.12E-03 9.43E-02
Cs-137 Br'.a-140 Co-58		1.93E-01 1.52E-03	3.62E-02 -	4.21E-02 - -	Ξ	2.54E-02 1.84E-04	5.24E-02 - -	3.49E-01 1.52E-03 1.84E-04
Co-60		1.89E-02	4.25E-03	2.02E-02	·	3.45E-02	2.06E-02	9.85E-02
Mr1-54		1.21E-02	7.04E-04	9.46E-03	-	3.67E-03	1.84E-03	2.78E-02
Br-89		1.31E-03	-	4.46E-05	-	9.89E-05	8.53E-05	1.54E-03
Sr-90		2.46E-04	4.01E-05	1.15E-04		1.48E-04	7.71E-05	6.26E-04
"Total Identified Re_cased Radioactivity		3.00E-01	5.21E-02	9.21E-02	-	7.59E-02	1.02E-01	6.08E-01
•Percent of Total Identified	\$	7.112+01	6.82E+01	4.65E-01	-	4.77E+01	3.50E+01	5.29E+01

(1) NA: Not available; will be included in next Semiannual Report.

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APPENDIX C

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Off-Site Shipment of Radioactive Material

Shipment Number	Date	Transfer From	Transfer To	Badioactive Material	Disposition
370	1/ 9/75	DPR-6	Argonne National Laboratory - Exempt	1 Gal Liquid Waste Sample (~0.1 mCi)	Analysis
371	1/15/75	DPR-6	NECo, Morehead, KY (16-NSF-1)	Solid Waste (3.486 Ci)	Burial
372	2/14/75	Received 6	4 uCi Na-22 Source for	Flux Wire Calibration	
373	2/19/75	DPR-6	Isotope Products Lab Burbank, CA (1509-59	Na-22 Source (64 µC1)	Return
374	3/ 6/75	DPR-6	Battelle Institute West Jefferson, OH (34-06854-05)	8 Co-60 Rods (154,000 Ci)	Processing
375	5/20/75	Received 4	4.2 µCi Na-22 Source fo	r Flux Wire Calibration	
376	5/24/75	Received 0	.1 mCi Each of Ra-226 a	nd Se-75 for Instrument Calibration	
377	6/11/75	DPR-6	NECo, Morehead, KY (16-NSF-1)	Spent Resin (~70 Ci)	Burial
378	6/13/75	DPR-6	NECo, Morehead, KY (16-NSF-1)	Spent Resin (96 Ci)	Burial
379	6/16/75	DPR-6	NECo, Morehead, KY (16-NSF-1)	Spent Resin (84 Ci)	Burial
380	6/17/75	DPR	NECo, Morehead, KY (16-NSF-1)	Spent Resin (108 Ci)	Burial
381	6/18/75	DPR-6	NECo, Morehead, KY (16-NSF-1)	Spent Resin (125 Ci)	Burial
382	6/19/75	DPR-6	NECo, Morehead, KY (16-NSF-1)	Spent Resin (54 Ci)	Burial
383	6/25/75	DPR-6	NECo, Morehead, KY (16-NSF-1)	Spent Resin (50 Ci)	Burial
384	6/24/75	DPR-6	NECo, Morehead, KY (16-NSF-1)	Spent Resin (30 Ci)	Burial
385	6/25/75	DPR-6	NECo, Morehead, KY (16-NSF-1)	Spent Resin (90 Ci)	Burial
386	6/26/75	DPR-6	NECo, Morehead, KY (16-NSF-1)	Spent Resin (75 Ci)	Burial
387	6/26/75	DPR-6	NECo, Morehead, KY (16-NSF-1)	Spent Resin (124 Ci)	Burial
388	6/27/75	DPR-6	NECo, Morehead, KY	Spent Resin (100 Ci)	Burial

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