Attachment 3

Semi-Annual Radioactive Effluent Release Report

For the Year 1987

Quarters 3 and 4

(Revision)

RADIOLOGICAL IMPACT ON MAN

Sampling and analysis of liquid and gaseous effluents were performed in accordance with the frequencies, types of analysis, and Lower Limit of Detection (LLD) outlined in the PNPP Unit 1 Technical Specifications.

Radioactive material was detected at low levels in liquid and gaseous effluent samples analyzed. Dose calculations, using measured effluent flow and meteorological data, resulted in dose to individuals at levels below 10CFR20 and 10CFR50, Appendix I limits. Direct radiation resulting from plant operation did not contribute any measurable dose to members of the public for the reporting period and, as there are no other nearby fuel cycle sources, 40CFR190 limits were not exceeded.

Summaries of maximum individual and population doses resulting from liquid and gaseous radioactive effluent releases are given, in Regulatory Guide 1.21 format, in Attachment 1.

Technical Specification 6.9.1.7 requires assessment of radiation doses from radioactive liquid and gaseous effluent to members of the public while onsite. These onsite doses are assessed relative to offsite dose values, which are adjusted for appropriate dilution, dispersion, and occupancy factors for onsite activities.

The onsite liquid effluent pathway of concern is shore exposure while fishing along the Lake Erie coast. Occupancy is assumed to be 60 hours per year and the dilution factor for the point of exposure is 10. Ratioing this exposure pathway to doses calculated for offsite locations yields the following onsite dose values.

ONSITE DOSE FOR LIQUID EFFLUENTS

	Total Body	Organ
Quarters 3 & 4	3.8 E-5 mrem	4.5 E-5 mrem (skin)
Quarter 3	6.8 E-6 mrem	8.2 E-6 mrem (skin)
Quarter 4	3.1 E-5 mrem	3.7 E-5 mrem (skin)

Several cases are considered for onsite gaseous effluent exposure to members of the public including traversing a public road within the site boundary, shoreline fishing, non-plant related training, car pooling, and job interviews. The onsite activity with the highest dose potential, relative to gaseous effluents, is shoreline fishing. Occupancy is again assumed to be 60 hours per year. Accounting for this and the difference between annual average dispersion values for the onsite point of concern, 6.6 E-5 s/m^3, (a unity occupancy factor is assumed for this calculation), the following maximum onsite dose values are generated.

ONSITE DOSE FOR GASEOUS EFFLUENTS

	Total Body	Organ
Quarters 3 & 4	8.6 E-3 mrem	1.1 E-2 mrem (skin)
Quarter 3	5.1 E-3 mrem	9.1 E-3 mrem (skin)
Quarter 4	5.3 E-3 mrem	5.7 E-3 mrem (skin)

Average total body dose to individual members of the public is determined for the population that lives within fifty miles of the plant for gaseous effluents (2.42 E6 persons) and the population that receives drinking water from intakes within fifty miles for liquid effluents (2.37 E6 persons). these doses are calculated using the total population dose figures found in Attachment 1.

AVERAGE INDIVIDUAL TOTAL BODY DOSES

	Gases	Liquids
Quarters 3 & 4	2.3 E-6 mrem	8.4 E-6 mrem
Quarter 3	6.2 E-8 mrem	2.3 E-6 mrem
Quarter 4	2.2 E-6 mrem	6.1 E-6 mrem

LIQUID EFFLUENTS

For the third quarter of 1987 there were 57 batch and 58 continuous releases. Batch release total waste volume for the third quarter was 6.0 E6 liters; total continuous release waste volume was 4.7 E9 liters; total plant discharge during periods of release was 2.3 E10 liters.

For the fourth quarter of 1987 there were 97 batch and 88 continuous releases. Batch release total waste volume for the fourth quarter was 1.1 E7 liters; total continuous release waste volume was 4.5 E9 liters; total plant discharge during periods of release was 2.3 E10 liters.

Summaries of the radionuclide total curie activities, average diluted concentrations, and percentage of MPC (in Regulatory Guide 1.21 format) are included in Attachment 3.

If a radionuclide was not detected, zero activity was used for that isotope in dose calculations. A zero activity indicates that the radionuclide was not present at a level greater than the Lower Level of Detection (LLD) of the instrumentation used. In all cases, these LLDs were less than the levels required by Technical Specifications. The following are typical LLDs.

Radionuclide	LLD (μCi/ml)
Mn-54	2.4 E-8
Fe-59	5.8 E-8
Co-58	1.9 E-8
Co-60	3.4 E-8
Zn-65	4.6 E-8
Mo-99	2.1 E-7
I-131	2.3 E-8
Cs-134	2.3 E-8
Cs-137	2.6 E-8
Ce-141	3.2 E-8
Ce-144	1.3 E-7
Sr-89	3.0 E-8
Sr-90	3.7 E-8
Fe-55	5.7 E-9
H-3	4.6 E-6
Gross Alpha	6.0 E-8

Attachment 1 (Continued - Page 1 of 3)
Radiological Impact on Man (Dose Summaries)
1987: Quarters 3 & 4

SUMMARY OF MAXIMUM INDIVIDUAL DOSES

LIQUID 87 7 1 1-87123124
GASEOUS 87 7 1 1-87123124
AIR 87 7 1 1-87123124

EFFLUENT	APPLICABLE ORGAN	ESTIMATED DOSE (MREM)	AGE GROUP	LOCATION DIST (M)	DIR (TOWARD)	% OFLIMIT APPLICABLE LIMIT	(MR)
LIQUID	TOTAL BODY	1.01E-04	CHILD	RECEPTOR 1		3.4E-03	3.0
LIQUID	GI-TRACT	3.89E-04	ADULT	RECEPTOR 1		3.9E-03	10.0
NOBLE GAS	AIR DOSE (GAMMA-MRAD)	2.07E-02		280.	NNW	2.1E-01	10.0
NOBLE GAS	AIR DOSE (BETA-MRAD)	1.08E-02		280.	NNW	5.4E-02	20.0
NOBLE GAS	T.BODY	5.59E-02	ALL	280.	NNW	1.1E+00	5.0
NOBLE GAS	SKIN	1.03E-01	ALL	280.	NNW	6.9E-01	15.0
IODINE& PARTICULATES	THYROID	2.37E-02	TEEN	294.	N	1.7E-01	15.0

SUMMARY OF POPULATION DOSES

LIQUID 87 7 1 1-87123124
GASEOUS 87 7 1 1-87123124

EFFLUENT	APPLICABLE ORGAN	ESTIMATED POPULATION DOSE (PERSON-REM)
LIQUID	TOTAL BODY	2.0E-02
LIQUID	THYROID	8.6E-03
GASEOUS	TOTAL BODY	5.5E-03
GASEOUS	THYROID	6.3E-03

Attachment 1 (Continued - Page 2 of 3)
Radiological Impact on Man (Dose Summaries)
1987: Quarter 3

SUMMARY OF MAXIMUM INDIVIDUAL DOSES

LIQUID 87 7 1 1-87 93024
GASEOUS 87 7 1 1-87 93024
AIR 87 7 1 1-87 93024

EFFLUENT	APPLICABLE ORGAN	ESTIMATED DOSE (MREM)	AGE GROUP	LOCATION DIST (M)	DIR (TOWARD)	% OFLIMIT APPLICABLE LIMIT	(MR)
LIQUID	TOTAL BODY	3.01E-05	CHILD	RECEPTOR 1		1.0E-03	3.0
LIQUID	GI-TRACT	1.06E-04	ADULT	RECEPTOR 1		1.1E-03	10.0
NOBLE GAS	AIR DOSE (GAMMA-MRAD)	1.71E-02		280.	NNW	1.7E-01	10.0
NOBLE GAS	AIR DOSE (BETA-MRAD)	8.51E-03		280.	NNW	4.3E-02	20.0
NOBLE GAS	T.BODY	4.71E-02	ALL	280.	NNW	9.4E-01	5.0
NOBLE GAS	SKIN	8.50E-02	ALL	280.	NNW	5.7E-01	15.0
IODINE& PARTICULATES	THYROID	2.36E-03	INFANT	280.	NNW	1.6E-02	15.0

SUMMARY OF POPULATION DOSES

LIQUID 87 7 1 1-87 93024
GASEOUS 87 7 1 1-87 93024

EFFLUENT	APPLICABLE ORGAN	ESTIMATED POPULATION DOSE (PERSON-REM)
LIQUID	TOTAL BODY	5.5E-03
LIQUID	THYROID	2.6E-03
GASEOUS	TOTAL BODY	1.5E-04
GASEOUS	THYROID	5.6E-04

Attachment 1 (Continued - Page 3 of 3)
Radiological Impact on Man (Dose Summaries)
1987: Quarter 4

SUMMARY OF MAXIMUM INDIVIDUAL DOSES

LIQUID 8710 1 1-87123124
GASEOUS 8710 1 1-87123124
AIR 8710 1 1-87123124

EFFLUENT	APPLICABLE ORGAN	ESTIMATED DOSE (MREM)	AGE GROUP	LOCATION DIST (M)	DIR (TOWARD)	% OFLIMIT APPLICABLE LIMIT	(MR)
LIQUID	TOTAL BODY	7.07E-05	CHILD	RECEPTOR 1		2.4E-03	3.0
LIQUID	GI-TRACT	2.83E-04	ADULT	RECEPTOR 1		2.8E-03	10.0
NOBLE GAS	AIR DOSE (GAMMA-MRAD)	1.05E-02		273.	NW	1.0E-01	10.0
NOBLE GAS	AIR DOSE (BETA-MRAD)	6.75E-03		273.	NW	3.4E-02	20.0
NOBLE GAS	T.BODY	2.58E-02	ALL	273.	NW	5.2E-01	5.0
NOBLE GAS	SKIN	5.32E-02	ALL	273.	NW	3.5E-01	15.0
IODINES PARTICULATES	THYROID	2.44E-02	TEEN	294.	N	1.6E-01	15.0

SUMMARY OF POPULATION DOSES

LIQUID 8710 1 1-87123124
GASEOUS 8710 1 1-87123124

EFFLUENT	APPLICABLE ORGAN	ESTIMATED POPULATION DOSE (PERSON-REM)
LIQUID	TOTAL BODY	1.4E-02
LIQUID	THYROID	6.0E-03
GASEOUS	TOTAL BODY	5.4E-03
GASEOUS	THYROID	5.7E-03

Attachment 3 (Continued - Page 1 of 2)
Liquid Effluents

QUARTER 3 : START DATE 87070101 END DATE 87093024
QUARTER 4 : START DATE 87100101 END DATE 87123124

LIQUID EFFLUENTS

	UNITS	QUARTER 3	QUARTER 4
A. FISSION AND ACTIVATION PRODUCTS			
1. TOTAL RELEASE (EXCL. TRIT., GASES, ALPHA)	CI	2.92E-03	9.78E-03
2. AVERAGE DILUTED CONC. DURING PERIOD	UCI/ML	2.24E-10	4.25E-10
3. PERCENT OF MPC	%	9.85E-04	1.57E-03
B. TRITIUM			
1. TOTAL RELEASE	CI	8.64E-01	1.84E+00
2. AVERAGE DILUTED CONC. DURING PERIOD	UCI/ML	6.65E-08	7.96E-08
3. PERCENT OF MPC	%	1.24E-02	1.36E-02
C. DISSOLVED AND ENTRAINED GASES			
1. TOTAL RELEASE	CI	0.00E+00	1.84E-04
2. AVERAGE DILUTED CONC. DURING PERIOD	UCI/ML	0.00E+00	7.97E-12
3. PERCENT OF MPC	%	0.00E+00	3.98E-06
D. GROSS ALPHA RADIOACTIVITY			
1. TOTAL RELEASE	CI	0.00E+00	1.55E-03
E. VOLUME WASTE RELEASED (PRIOR TO DILUTION)	LITERS	4.70E+09	4.48E+09
F. VOLUME DILUTION WATER USED DURING PERIOD	LITERS	1.30E+10	2.30E+10

Attachment 3 (Continued - Page 2 of 2)
Liquid Effluents

LIQUID EFFLUENTS

QUARTER 3 : START DATE 87070101 END DATE 87093024
QUARTER 4 : START DATE 87100101 END DATE 87123124

		CONTINUOUS MODE		BATCH MODE	
NUCLIDES RELEASED	UNITS	QUARTER 3	QUARTER 4	QUARTER 3	QUARTER 4
H3	CI	0.00E+00	0.00E+00	8.64E-01	1.84E+00
CR51	CI	0.00E+00	0.00E+00	1.07E-03	4.87E-03
MN54	CI	0.00E+00	0.00E+00	8.48E-04	2.36E-03
FE59	CI	0.00E+00	0.00E+00	6.22E-05	1.68E-04
CO58	CI	0.00E+00	0.00E+00	8.42E-04	1.70E-03
CO60	CI	0.00E+00	0.00E+00	9.79E-05	6.65E-04
TOTAL FOR PERIOD (ABOVE)	CI	0.00E+00	0.00E+00	8.66E-01	1.84E+00
XE133	CI	0.00E+00	0.00E+00	0.00E+00	1.10E-04
XE135	CI	0.00E+00	0.00E+00	0.00E+00	7.32E-05