

EXECUTIVE SUMMARY

Three Mile Island Nuclear Station - Unit 2
Effluent Monitoring Report
Second Quarter, 1985

The purpose of this report is to summarize the radioactive liquid and gaseous releases and doses to the public resulting from TMI-2 operations for the second quarter of 1985.

Effluent and real time meteorological data and Susquehanna River flow data were used to calculate the maximum postulated dose to any individual and the total population within 50 miles of the plant. Doses for liquid and gaseous discharges were calculated utilizing the guidelines and methodology set forth in USNRC Regulatory Guide 1.109. During the second quarter of 1985, the maximum hypothetical whole body dose received due to the liquid and gaseous effluents from TMI-2 were 0.000427 mrem and 0.00047 mrem, respectively. The maximum hypothetical dose to any organ as a result of these effluents was 0.0011 mrem from the liquid effluents. The doses which could have been received from liquid and gaseous discharges are each less than 0.1% of the applicable federal regulatory limits found in Appendix I of 10CFR50. The doses are insignificant when compared to approximately 20 mrems received by each individual from natural background radiation during the quarter. No detectable environmental or health effects are expected from the releases.

During the TMI-2 accident in 1979, large volumes of highly radioactive water were generated. The water was processed through demineralizer systems to remove the contamination, is being stored on site in large tanks and has not been discharged. Currently, the only liquid releases from TMI-2 are those from such areas as waste storage sumps, the air intake tunnel sump, and turbine building sumps.

For liquid discharges during the second quarter of 1985, tritium was the most abundant radionuclide released (0.0000725 curies) followed by strontium-90 (0.000035 curies) and cesium-137 (0.000014 curies). For gaseous discharges, the most abundant radionuclide was tritium (2.81 curies). No noble gases (e.g., krypton-85) were released.

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EFFLUENT SUMMARY
THREE MILE ISLAND UNIT 2 LIQUID AND GASEOUS EFFLUENT
(Summary of All Releases)

TYPE EFFLUENT	APRIL	MAY	JUNE	2nd QUARTER 1985
I. Liquid Effluent:				
A. Fission and activation products (not including H-3, gases & alpha)				
1. Total Release (Ci) (Note 2)	7.22E-6	3.85E-6	3.85E-5	4.96E-5
2. Concentration (μ Ci/cc)	1.16E-12	1.04E-12	9.84E-12	4.15E-12
B. Tritium				
1. Total release (Ci)	<LLD	<LLD	7.25E-5	7.25E-5
2. Concentration (μ Ci/cc)	N/A	N/A	2.21E-11	7.69E-12
C. Dissolved and entrained gases				
1. Total release (Ci)	<LLD	<LLD	<LLD	<LLD
2. Concentration (μ Ci/cc)	N/A	N/A	N/A	N/A
D. Gross alpha radioactivity				
1. Total release (Ci)	Note 3	Note 3	Note 3	Note 3
E. Volume of waste released prior to dilution (liters) (Note 1)	1.09E4	1.46E4	1.18E5	1.44E5
F. Volume of dilution water (flow to river in liters from NPDES Report)	2.96E9	3.19E9	3.28E9	9.43E9
G. Number of batch releases: Sumps and sewage	9	6	24	39

- The concentration of radioactive material other than dissolved or entrained noble gases in liquid effluent released to the unrestricted area shall not exceed the values specified in 10CFR 20, Appendix B, Table II.
- Present liquid effluent release limits are 10% of the concentration values specified in 10CFR 20, Appendix B, Table II.
- Liquid effluent releases are also limited to 10CFR 50, Appendix I, not to exceed a dose of 3 mrem total body and 10 mrem to any organ per year.

Note 1) Includes only those releases which were found to contain radioisotopic concentration >LLD.
Note 2) Includes Industrial Waste and Sanitary Waste.
Note 3) These activities are to be verified by composite sampling.

1985 EFFLUENT SUMMARY
THREE MILE ISLAND UNIT 2 LIQUID AND GASEOUS EFFLUENTS (Continued)
(Summary of All Releases)

TYPE EFFLUENT	APRIL	MAY	JUNE	2nd QUARTER 1985
	<u>Unit 2</u>	<u>Unit 2</u>	<u>Unit 2</u>	
II. Gaseous Effluent				
A. Fission & activation gases				
1. Total release (Ci)	<LLD	<LLD	<LLD	<LLD
2. Release rate (Ci/sec)	N/A	N/A	N/A	N/A
B. Iodine-131 released (Ci):	As of 01/01/81 there was less than 1E-15 curies of I-131 left in Unit 2; therefore, no release of I-131 can be detected.			
C. Particulates with half-lives >8 days:				
1. Total releases (not including α)(Ci)	1.21E-6	4.62E-6	6.47E-7	6.48E-6
2. Release rate (Ci/sec)	4.67E-7	1.72E-6	2.50E-7	8.24E-7
3. Gross alpha radio-activity (Ci)	<LLD	2.38E-7	5.43E-9	2.43E-7
D. Tritium				
1. Total release (Ci)	6.76E-1	1.27E0	8.66E-1	2.81E0
2. Release rate (Ci/sec)	2.61E-1	4.74E-1	3.34E-1	3.58E-1
E. Seconds in period reported	2.5920E6	2.6784E6	2.5920E6	7.8624E6
F. Number of batch releases	0	0	0	0

- The concentration of radioactive material in gaseous effluents released to the unrestricted area shall not exceed the values specified in 10CFR 20, Appendix B, Table II.
- 10CFR 50 dose to individual for: a) 10 mRad/yr, gamma radiation; b) 20 mRad/yr, beta radiation; and c) 15 mrem/yr to any organ.

1985 UNIT 2 LIQUID RADIONUCLIDE RELEASES BY ISOTOPE (Ci)

RADIONUCLIDE	APRIL	MAY	JUNE	2nd QUARTER 1985
Fission and activation products (not including alpha, H-3 & gases)	<LLD	<LLD	<LLD	<LLD
Ag-110m	<LLD	<LLD	<LLD	<LLD
Ce-144	<LLD	<LLD	<LLD	<LLD
Co-58	<LLD	<LLD	<LLD	<LLD
Co-60	<LLD	<LLD	<LLD	<LLD
Cs-134	<LLD	<LLD	<LLD	<LLD
Cs-137	2.72E-6	5.28E-7	1.11E-5	1.43E-5
I-131	<LLD	<LLD	<LLD	<LLD
Sr-90	*	*	*	*
Unidentified Beta	4.50E-6	3.32E-6	2.74E-5	3.52E-5
TOTAL	7.22E-6	3.85E-6	3.85E-5	4.96E-5
H-3	<LLD	<LLD	7.25E-5	7.25E-5

*These activities are to be verified by composite sampling.

1985 UNIT 2 GASEOUS RADIONUCLIDE RELEASES BY ISOTOPE (Ci)

RADIONUCLIDE	APRIL	MAY	JUNE	2nd QUARTER 1985
<u>Fission and activation gases</u>	<u>Unit 2</u>	<u>Unit 2</u>	<u>Unit 2</u>	<u>Total</u>
Kr-85	<LLD	<LLD	<LLD	<LLD

Total

Particulates (half lives >8 days)

Unidentified β ,	1.21E-6	4.62E-6	6.47E-7	6.48E-6
Cs-137	<LLD	<LLD	<LLD	<LLD
Cs-134	<LLD	<LLD	<LLD	<LLD
Gross alpha	<LLD	2.38E-7	5.43E-9	2.43E-7

TOTAL (including alpha)	1.21E-6	4.86E-6	6.52E-7	6.72E-6
TOTAL (minus alpha)	1.21E-6	4.62E-6	6.47E-7	6.48E-6

Tritium (^3H)	6.76E-1	1.27E0	8.66E-1	2.81E0
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INTERPRETATION OF DOSE SUMMARY TABLE

The Dose Summary Table (Table 1) presents the maximum hypothetical doses to an individual and the general population resulting from the release of gaseous and liquid effluents from TMI-2 during the second quarter reporting period of 1985.

A. Liquid (Individual)

The first two lines of Table 1 present the maximum hypothetical dose to an individual. Presented are the whole body and critical organ doses. Calculations are performed on the four age groups and eight organs recommended in Regulatory Guide 1.109. The pathways considered for TMI are drinking water, consumption of fish, and standing on the shoreline influenced by TMI effluents. The latter two pathways are considered to be the primary recreational activities associated with the Susquehanna River in the vicinity of TMI. The "receptor" would be that individual who consumes water from the Susquehanna River and fish residing in the plant discharge, while occupying an area of shoreline influenced by the plant discharge.

After calculating the doses to all age groups for all eight organs resulting from the three pathways described above, the Dose Summary Table presents the maximum whole body dose and affected age group along with the organ and associated age group that received the largest dose.

For the second quarter of 1985 the calculated maximum whole body dose received by anyone would have been $4.27\text{E-}4$ mrem to an adult. Similarly, the maximum organ dose would have been $1.10\text{E-}3$ mrem to the bone of an adult. (Note: The unidentified beta inventory is treated as Sr-90)

B. Gaseous (Individual)

There are seven major pathways considered in the dose calculations for gaseous effluents. These are: (1) plume, (2) inhalation, consumption of (3) cow milk, (4) goat milk, (5) vegetables, (6) meat, and (7) standing on contaminated ground.

Lines 3 and 4 present the maximum plume exposure at or beyond the site boundary. The notation of "air dose" is interpreted to mean that these doses are not to an individual, but are considered to be the maximum dose that would have occurred at or beyond the site boundary. The Dose Summary Table presents the distance in meters to the location in the affected sector (compass point) where the theoretical maximum plume exposure occurred. It should be noted that real-time meteorology was used in all dose calculations for gaseous effluents.

With respect to the gaseous release for the second quarter of 1985, the plume exposure at or near the site boundary would have been 0 mrad and 0 mrad, gamma and beta dose respectively.

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Lines 5 and 6 present the largest calculated dose to a receptor (individual) in the maximally affected sector(s). The location of the receptor is described by both distance (meters) and direction from the site.

Plume exposures to an individual, regardless of age, from gaseous effluents during the second quarter were 0 mrem and 0 mrem, whole body and skin, respectively.

The Iodines and Particulates section described in line 7 represents the maximum exposed organ due to iodine and particulates. This does not include the whole body plume exposure which was separated out by line 5. The doses presented in this section again reflect the maximum exposed organ for the appropriate age group.

The second quarter exposure due to the iodines and particulates would have resulted in a maximum dose of $4.70\text{E-}4$ mrem to the total body of a child residing 620 meters from the site in the east sector. No other organ of any age group would have received a greater dose.

C. Liquid and Gaseous (Population)

Lines 8 - 11 present the person-rem doses resulting from the liquid and gaseous effluents. These doses are summed over all pathways and the affected populations. Liquid person-rem is based upon the population encompassed within the region from the TMI outfall extending down to the Chesapeake Bay. The person-rem for gaseous effluents are based upon the 1980 population projections of the FSAR and consider the population out to a distance of 50 miles around TMI. Population doses are summed over all distances and sectors to give an aggregate dose.

Based upon the calculations performed for the second quarter, liquid effluents resulted in a whole body population dose of $3.4\text{E-}3$ person-rem with a maximum critical organ population dose to the bone of $1.3\text{E-}2$ person-rem. Gaseous effluents resulted in a whole body population dose of $2.1\text{E-}2$ person-rem with a maximum critical organ population dose to the GI-tract, liver, thyroid, kidney and lung of $2.1\text{E-}2$ person-rem.

UNIT 2
Quarter Dose Report

SUMMARY OF MAXIMUM INDIVIDUAL DOSES FOR UNIT FROM
April 1, 1985 through June 30, 1985

Effluent	Applicable Organ	Estimated Dose (mrem)	Age Group	Location Dist Dir (m) (toward)	% of Applicable Limit		10CFR50 App. I Limits (mrem)	
					Quarterly	Annual	Quarterly	Annual
(1)Liquid	Total Body	4.27E-4	Adult	Receptor 1	2.9E-2	1.4E-2	1.5	3.0
(2)Liquid	Bone	1.10E-3	Adult	Receptor 1	2.2E-2	1.1E-2	5.0	10.0
(3)Noble Gas	Air Dose (gamma-mrad)	0	-	-	-	-	5.0	10.0
(4)Noble Gas	Air Dose (beta-mrad)	0	-	-	-	-	10.0	20.0
(5)Noble Gas	Total Body	0	-	-	--	-	--	5.0
(6)Noble Gas	Skin	0	-	-	--	-	--	15.0
(7)Iodine & Particulates	Total Body	4.70E-4	Child	620 E	6.3E-3	3.1E-3	7.5	15.0

SUMMARY OF MAXIMUM POPULATION DOSES FOR UNIT 2 FROM
April 1, 1985 through June 30, 1985

<u>Effluent</u>	<u>Applicable Organ</u>	<u>Estimated Population Dose (person-rem)</u>
(8) Liquid	Total Body	3.4E-3
(9) Liquid	Bone	1.3E-2
(10) Gaseous	Total Body	2.1E-2
(11) Gaseous	GI-trct, liver, kidney, thyrd, lung	2.1E-2