



Three Mile Island Nuclear Station, Unit 1
441 S. P.O. Box 480
Middletown, PA 17057

TMI-21-017
April 27, 2021

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Three Mile Island Nuclear Station, Unit 1
Renewed Facility License No. DPR-50
NRC Docket Nos. 50-289

Three Mile Island Nuclear Station, Unit 2
Possession Only License No. DPR-73
NRC Docket No. 50-320

Subject: 2020 Annual Radiological Effluent Release Report

The 2020 Annual Radioactive Effluent Release Reports required by TMI-1 Technical Specification (TMI-1 TS) 6.9.3.1, TMI-2 Technical Specifications (TMI-2 TS) 6.8.1.2, and Offsite Dose Calculation Manual with description of changes and approval paper required by TMI-1 TS 6.14.11 and TMI-2 6.12, are attached.

Enclosure 1 provides the 2020 Annual Radioactive Effluent Release Report with eleven attachments as follows.

- Attachment 1 contains a summary of the quantities of radioactive liquid and gaseous effluents released from the site as outlined in Reg. Guide 1.21, Rev. 1, with data summarized on a quarterly basis following the format of Appendix B thereof.
- Attachment 2 contains information for each type of solid waste shipped offsite during the report period including the container volume, total curie quantity, principal radionuclides and type of waste.
- Attachment 3 includes a summary of unplanned releases from the site to unrestricted areas of radioactive materials in gaseous and liquid effluents made during the reporting period.
- Attachment 4 describes any changes made during 2020 to the Process Control Program (PCP) documents or to the Offsite Dose Calculation Manual (ODCM) and a listing of new locations for dose calculations and/or environmental monitoring identified by the land use census pursuant to Part 3, Section 8.2 of the ODCM.

- Attachment 5 reports all instrumentation not returned to operable status within 30 days per the TMI ODCM Part 1, Sections 2.1.1.b and 2.1.2.b, and Part 2, Section 2.1.2.b.
- Attachment 6 is quarterly summaries of hourly meteorological data collected for 2020 in the form of joint frequency distribution of wind speed, wind direction and atmospheric stability.
- Attachment 7 is an assessment of the radiation doses due to the radioactive liquid and gaseous effluents released from the respective unit during 2020.
- Attachment 8 is an assessment of the radiation doses from the radioactive liquid and gaseous effluents to members of the public due to their activities inside the site boundary during 2020.
- Attachment 9 is an assessment of the radiation doses to the most likely exposed real individual from reactor releases and other nearby uranium fuel cycle sources including doses from primary effluent pathways and direct radiation for 2020.
- Attachment 10 is a summation of deviations from the sampling and analysis regime specified in the ODCM for TMI-1 and TMI-2.
- Attachment 11 is a summary of Major Changes to Radioactive Waste Treatment Systems IAW FSAR Section 11.2.6.

TMI Process Control Program, RW-AA-100, Revision 12 was not revised in 2020.

There are no commitments in this letter.

Should you have any questions concerning this letter, please contact Mr. Daniel Jordan, Chemistry/Environmental Specialist, at (717) 948-8470.

Respectfully,



Trevor L. Orth
Site Decommissioning Director
Three Mile Island Nuclear Station, Unit 1

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Enclosure:

1. Three Mile Island 2020 Annual Radioactive Effluent Release Report

cc: w/ Enclosure

Regional Administrator – NRC Region I

NRC Project Manager, NMSS – Three Mile Island, Unit 1 and Unit 2

W. Dehaas – Commonwealth of Pennsylvania - Bureau of Radiation Protection

G. Van Noordennen – TMI-2 Solutions, LLC

Enclosure 1

Three Mile Island 2020 Annual Radioactive Effluent Release Report

- Attachment 1: Summary of Radioactive Liquid and Gaseous Effluents Released from TMI during 2020
- Attachment 2: Solid Waste Shipped Offsite During 2020
- Attachment 3: Summary of Unplanned Releases from the TMI Site During 2020
- Attachment 4: Changes to the Process Control Program and the Offsite Dose Calculation Manual During 2020 and a Listing of New Locations for Dose Calculations and/or Environmental Monitoring Identified by the Land use Census
- Attachment 5: Instrumentation Not Returned to Operable Status within 30 days During 2020
- Attachment 6: Annual Summary of Hourly Meteorological Data During 2020
- Attachment 7: Assessment of Radiation Doses due to Radioactive Liquid and Gaseous Effluents Released from TMI During 2020
- Attachment 8: Assessment of Radiation Doses Liquid and Gaseous Effluents Releases to Members of the Public within the TMI Site Boundaries During 2020
- Attachment 9: Assessment of Radiation Dose to Most Likely Exposed Real Individual per 40 CFR 190
- Attachment 10: Deviations from the ODCM Sampling and Analysis Regime During 2020
- Attachment 11: Major Changes to Radioactive Waste Treatment Systems

**Summary of Radioactive Liquid and Gaseous Effluents
Released from TMI during 2020**

Enclosure 1: 2020 Annual Radioactive Effluent Release Report for TMI
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TABLE 1A
EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT 2020
GASEOUS EFFLUENTS – SUMMATION OF ALL RELEASES TMI-1

	UNIT	QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4	EST TOTAL ERROR %
A. FISSION AND ACTIVATION GASES						
1. Total Release	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	25%
2. Avg release rate for period	μCi/S	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
3. Percent of applicable limit	%	*	*	*	*	
B. IODINES						
1. Total Iodine 1131	Ci	<LLD	<LLD	<LLD	<LLD	25%
2. Avg Release Rate for Period	μCi/S	N/A	N/A	N/A	N/A	
3. Percent of applicable limit	%	*	*	*	*	
C. PARTICULATES						
1. Part With half-life >8 days	Ci	<LLD	<LLD	<LLD	<LLD	25%
2. Avg Release Rate for Period	μCi/S	N/A	N/A	N/A	N/A	
3. Percent of applicable limit	%	*	*	*	*	
D. TRITIUM						
1. Total Release	Ci	4.16E+01	3.82E+01	2.98E+01	1.27E+01	15%
2. Avg Release Rate for Period	μCi/S	5.29E+00	4.85E+00	3.75E+00	1.60E+00	
3. Percent of applicable limit	%	*	*	*	*	
E. GROSS ALPHA						
1. Total Release	Ci	<LLD	<LLD	<LLD	<LLD	25%
2. Avg release rate for period	μCi/S	N/A	N/A	N/A	N/A	
3. Percent of applicable limit	μCi/S	*	*	*	*	
F. CARBON 14						
1. Total Release	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	**
2. Avg release rate for period	μCi/S	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
3. Percent of applicable limit	μCi/S	*	*	*	*	

Note: Table 3 contains a listing of TMI ODCM Lower Limit of Detection (LLD)

*ODCM Limits – Listed on Dose Summary Table

**C-14 production was estimated using EPRI Technical Report 1021106 Methodology.

**Enclosure 1: 2020 Annual Radioactive Effluent Release Report for TMI
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**TABLE 1B
EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT GASEOUS EFFLUENTS - GROUND-LEVEL
RELEASES - BATCH MODE TMI-1**

Fission And Activation Gasses	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Ar-41	Ci	<LLD	<LLD	<LLD	<LLD
Kr-85	Ci	<LLD	<LLD	<LLD	<LLD
Kr-85m	Ci	<LLD	<LLD	<LLD	<LLD
Kr-87	Ci	<LLD	<LLD	<LLD	<LLD
Kr-88	Ci	<LLD	<LLD	<LLD	<LLD
Xe-131m	Ci	<LLD	<LLD	<LLD	<LLD
Xe-133	Ci	<LLD	<LLD	<LLD	<LLD
Xe-133m	Ci	<LLD	<LLD	<LLD	<LLD
Xe-135	Ci	<LLD	<LLD	<LLD	<LLD
Xe-135m	Ci	<LLD	<LLD	<LLD	<LLD
Xe-138	Ci	<LLD	<LLD	<LLD	<LLD
Total	Ci	N/A	N/A	<LLD	N/A

Radioiodines	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
I-131	Ci	<LLD	<LLD	<LLD	<LLD
I-132	Ci	<LLD	<LLD	<LLD	<LLD
I-133	Ci	<LLD	<LLD	<LLD	<LLD
Total	Ci	N/A	N/A	N/A	N/A

Particulates	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Cr-51	Ci	<LLD	<LLD	<LLD	<LLD
Mn-54	Ci	<LLD	<LLD	<LLD	<LLD
Co-58	Ci	<LLD	<LLD	<LLD	<LLD
Fe-59	Ci	<LLD	<LLD	<LLD	<LLD
Co-60	Ci	<LLD	<LLD	<LLD	<LLD
Sr-89	Ci	<LLD	<LLD	<LLD	<LLD
Sr-90	Ci	<LLD	<LLD	<LLD	<LLD
Mo-99	Ci	<LLD	<LLD	<LLD	<LLD
Ag-110m	Ci	<LLD	<LLD	<LLD	<LLD
Cs-134	Ci	<LLD	<LLD	<LLD	<LLD
Cs-137	Ci	<LLD	<LLD	<LLD	<LLD
Ba-140	Ci	<LLD	<LLD	<LLD	<LLD
La-140	Ci	<LLD	<LLD	<LLD	<LLD
Ce-141	Ci	<LLD	<LLD	<LLD	<LLD
Ce-144	Ci	<LLD	<LLD	<LLD	<LLD
Total	Ci	N/A	N/A	N/A	N/A

Tritium	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
H3	Ci	<LLD	<LLD	<LLD	<LLD

Note: Table 3 contains a listing of TMI ODCM Lower Limit of Detection (LLD).

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**TABLE 1B (continued)
EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT 2020
GASEOUS EFFLUENTS - GROUND-LEVEL RELEASES - CONTINUOUS MODE
TMI-1**

Fission And Activation Gasses	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Ar-41	Ci	<LLD	<LLD	<LLD	<LLD
Kr-85	Ci	<LLD	<LLD	<LLD	<LLD
Kr-85m	Ci	<LLD	<LLD	<LLD	<LLD
Kr-87	Ci	<LLD	<LLD	<LLD	<LLD
Kr-88	Ci	<LLD	<LLD	<LLD	<LLD
Xe-133	Ci	<LLD	<LLD	<LLD	<LLD
Xe-133m	Ci	<LLD	<LLD	<LLD	<LLD
Xe-135	Ci	<LLD	<LLD	<LLD	<LLD
Xe-138	Ci	<LLD	<LLD	<LLD	<LLD
Total	Ci	N/A	N/A	N/A	N/A

Radioiodines	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
I-131	Ci	<LLD	<LLD	<LLD	<LLD
I-132	Ci	<LLD	<LLD	<LLD	<LLD
I-133	Ci	<LLD	<LLD	<LLD	<LLD
Total	Ci	N/A	N/A	N/A	N/A

Particulates	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Cr-51	Ci	<LLD	<LLD	<LLD	<LLD
Mn-54	Ci	<LLD	<LLD	<LLD	<LLD
Fe-55	Ci	<LLD	<LLD	<LLD	<LLD
Co-57	Ci	<LLD	<LLD	<LLD	<LLD
Co-58	Ci	<LLD	<LLD	<LLD	<LLD
Fe-59	Ci	<LLD	<LLD	<LLD	<LLD
Co-60	Ci	<LLD	<LLD	<LLD	<LLD
Ni-63	Ci	<LLD	<LLD	<LLD	<LLD
Sr-89	Ci	<LLD	<LLD	<LLD	<LLD
Sr-90	Ci	<LLD	<LLD	<LLD	<LLD
Nb-95	Ci	<LLD	<LLD	<LLD	<LLD
Zr-95	Ci	<LLD	<LLD	<LLD	<LLD
Mo-99	Ci	<LLD	<LLD	<LLD	<LLD
Ag-110m	Ci	<LLD	<LLD	<LLD	<LLD
Cs-134	Ci	<LLD	<LLD	<LLD	<LLD
Cs-137	Ci	<LLD	<LLD	<LLD	<LLD
Ba-140	Ci	<LLD	<LLD	<LLD	<LLD
La-140	Ci	<LLD	<LLD	<LLD	<LLD
Ce-141	Ci	<LLD	<LLD	<LLD	<LLD
Ce-144	Ci	<LLD	<LLD	<LLD	<LLD
Total	Ci	N/A	N/A	N/A	N/A

Tritium	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
H3	Ci	<LLD	<LLD	<LLD	1.27E-03

Carbon 14	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
C-14	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Note: Table 3 contains a listing of TMI ODCM Lower Limit of Detection (LLD).

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**TABLE 1D
EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT 2020
GASEOUS EFFLUENTS – MIXED MODE RELEASES – BATCH MODE**

Fission And Activation Gasses	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Ar-41	Ci	<LLD	<LLD	<LLD	<LLD
Kr-85	Ci	<LLD	<LLD	<LLD	<LLD
Kr-85m	Ci	<LLD	<LLD	<LLD	<LLD
Kr-87	Ci	<LLD	<LLD	<LLD	<LLD
Kr-88	Ci	<LLD	<LLD	<LLD	<LLD
Xe-131m	Ci	<LLD	<LLD	<LLD	<LLD
Xe-133	Ci	<LLD	<LLD	<LLD	<LLD
Xe-133m	Ci	<LLD	<LLD	<LLD	<LLD
Xe-135	Ci	<LLD	<LLD	<LLD	<LLD
Xe-135m	Ci	<LLD	<LLD	<LLD	<LLD
Xe-138	Ci	<LLD	<LLD	<LLD	<LLD
Total	Ci	N/A	N/A	N/A	N/A

Radioiodines	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
I-131	Ci	<LLD	<LLD	<LLD	<LLD
I-132	Ci	<LLD	<LLD	<LLD	<LLD
I-133	Ci	<LLD	<LLD	<LLD	<LLD
Total	Ci	N/A	N/A	N/A	N/A

Particulates	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Cr-51	Ci	<LLD	<LLD	<LLD	<LLD
Mn-54	Ci	<LLD	<LLD	<LLD	<LLD
Co-58	Ci	<LLD	<LLD	<LLD	<LLD
Fe-59	Ci	<LLD	<LLD	<LLD	<LLD
Co-60	Ci	<LLD	<LLD	<LLD	<LLD
Sr-89	Ci	<LLD	<LLD	<LLD	<LLD
Sr-90	Ci	<LLD	<LLD	<LLD	<LLD
Mo-99	Ci	<LLD	<LLD	<LLD	<LLD
Ag-110m	Ci	<LLD	<LLD	<LLD	<LLD
Cs-134	Ci	<LLD	<LLD	<LLD	<LLD
Cs-137	Ci	<LLD	<LLD	<LLD	<LLD
Ba-140	Ci	<LLD	<LLD	<LLD	<LLD
La-140	Ci	<LLD	<LLD	<LLD	<LLD
Ce-141	Ci	<LLD	<LLD	<LLD	<LLD
Ce-144	Ci	<LLD	<LLD	<LLD	<LLD
Total	Ci	N/A	N/A	N/A	N/A

Tritium	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
H3	Ci	<LLD	<LLD	<LLD	<LLD

Note: Table 3 contains a listing of TMI ODCM Lower Limit of Detection (LLD).

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TABLE 1D (continued)
EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT 2020
GASEOUS EFFLUENTS – MIXED MODE RELEASES - CONTINUOUS MODE TMI-1

Fission And Activation Gasses	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Ar-41	Ci	<LLD	<LLD	<LLD	<LLD
Kr-85	Ci	<LLD	<LLD	<LLD	<LLD
Kr-85m	Ci	<LLD	<LLD	<LLD	<LLD
Kr-87	Ci	<LLD	<LLD	<LLD	<LLD
Kr-88	Ci	<LLD	<LLD	<LLD	<LLD
Xe-133	Ci	<LLD	<LLD	<LLD	<LLD
Xe-133m	Ci	<LLD	<LLD	<LLD	<LLD
Xe-135	Ci	<LLD	<LLD	<LLD	<LLD
Xe-138	Ci	<LLD	<LLD	<LLD	<LLD
Total	Ci	N/A	N/A	N/A	N/A

Radioiodines	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
I-131	Ci	<LLD	<LLD	<LLD	<LLD
I-132	Ci	<LLD	<LLD	<LLD	<LLD
I-133	Ci	<LLD	<LLD	<LLD	<LLD
Total	Ci	N/A	N/A	N/A	N/A

Particulates	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Cr-51	Ci	<LLD	<LLD	<LLD	<LLD
Mn-54	Ci	<LLD	<LLD	<LLD	<LLD
Fe-55	Ci	<LLD	<LLD	<LLD	<LLD
Co-57	Ci	<LLD	<LLD	<LLD	<LLD
Co-58	Ci	<LLD	<LLD	<LLD	<LLD
Fe-59	Ci	<LLD	<LLD	<LLD	<LLD
Co-60	Ci	<LLD	<LLD	<LLD	<LLD
Ni-63	Ci	<LLD	<LLD	<LLD	<LLD
Sr-89	Ci	<LLD	<LLD	<LLD	<LLD
Sr-90	Ci	<LLD	<LLD	<LLD	<LLD
Nb-95	Ci	<LLD	<LLD	<LLD	<LLD
Zr-95	Ci	<LLD	<LLD	<LLD	<LLD
Mo-99	Ci	<LLD	<LLD	<LLD	<LLD
Ag-110m	Ci	<LLD	<LLD	<LLD	<LLD
Cs-134	Ci	<LLD	<LLD	<LLD	<LLD
Cs-137	Ci	<LLD	<LLD	<LLD	<LLD
Ba-140	Ci	<LLD	<LLD	<LLD	<LLD
La-140	Ci	<LLD	<LLD	<LLD	<LLD
Ce-141	Ci	<LLD	<LLD	<LLD	<LLD
Ce-144	Ci	<LLD	<LLD	<LLD	<LLD
Total	Ci	N/A	N/A	N/A	N/A

Tritium	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
H3	Ci	4.16E+01	3.19E+01	2.98E+01	1.27E+01

Carbon 14	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
C-14	Ci	N/A	N/A	N/A	N/A

Note: Table 3 contains a listing of TMI ODCM Lower Limit of Detection (LLD).

**TABLE 2A
EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT 2020
LIQUID EFFLUENTS – SUMMATION OF ALL RELEASES TMI-1**

	UNIT	QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4	EST TOTAL ERROR %
A. Fission and Activation Products						
1. Total Release(Not incl. Tritium,gases,alpha)	Ci	3.52E-05	3.15E-04	2.28E-04	4.48E-04	25%
2. Avg diluted concentration during period	µCi/ml	9.90E-12	4.98E-11	4.93E-11	1.07E-10	
3. Percent of applicable limit	%	*	*	*	*	
B. Tritium						
1. Total Release	Ci	3.23E+01	1.40E+02	5.21E+01	4.93E+01	25%
2. Avg diluted concentration during period	µCi/ml	9.09E-06	2.22E-05	1.13E-05	1.18E-05	
3. Percent of applicable limit	%	*	*	*	*	
C. Dissolved and Entrained Gases						
1. Total Release	Ci	<LLD	<LLD	<LLD	<LLD	15%
2. Avg diluted concentration during period	µCi/ml	0.00E-00	0.00E-00	0.00E-00	0.00E+00	0.00E+00
3. Period of applicable limit	%	*	*	*	*	
D. Gross Alpha Activity						
1. Total Release	Ci	<LLD	<LLD	<LLD	<LLD	25%
E. VOLUME OF WASTE RELEASE (PRIOR TO DILUTION)						
	LITERS	8.45E+07	8.50E+07	8.52E+07	8.80E+07	10%
F. VOLUME OF DILUTION WATER USED						
	LITERS	3.47E+09	6.24E+09	4.54E+09	4.11E+09	10%

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TABLE 2B
EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT 2020
LIQUID EFFLUENTS - BATCH MODE TMI-1

Fission and Activation Products	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
H-3	Ci	3.23E+01	1.40E+02	5.21E+01	3.80E+01
Cr-51	Ci	<LLD	<LLD	<LLD	<LLD
Mn-54	Ci	<LLD	<LLD	<LLD	<LLD
Fe-55	Ci	<LLD	<LLD	<LLD	<LLD
Co-58	Ci	3.21E-06	9.54E-05	1.12E-05	4.53E-06
Fe-59	Ci	<LLD	<LLD	<LLD	<LLD
Co-60	Ci	9.72E-06	2.05E-04	1.94E-04	1.86E-04
Zn-65	Ci	<LLD	<LLD	<LLD	<LLD
Sr-89	Ci	<LLD	<LLD	<LLD	<LLD
Sr-90	Ci	<LLD	<LLD	<LLD	<LLD
Zr-95	Ci	<LLD	<LLD	<LLD	<LLD
Nb-95	Ci	<LLD	<LLD	<LLD	<LLD
Mo-99	Ci	<LLD	<LLD	<LLD	<LLD
Tc-99m	Ci	<LLD	<LLD	<LLD	<LLD
Ag-110m	Ci	<LLD	<LLD	<LLD	<LLD
I-131	Ci	<LLD	<LLD	<LLD	<LLD
Cs-134	Ci	<LLD	<LLD	<LLD	<LLD
Cs-137	Ci	2.23E-05	7.17E-06	2.31E-05	1.81E-05
Ba-140	Ci	<LLD	<LLD	<LLD	<LLD
La-140	Ci	<LLD	<LLD	<LLD	<LLD
Ce-141	Ci	<LLD	<LLD	<LLD	<LLD
Ce-144	Ci	<LLD	<LLD	<LLD	<LLD
Total	Ci	3.23E+01	1.40E+02	5.21E+01	3.80E+01

Dissolved and Entrained Gases	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Kr-87	Ci	<LLD	<LLD	<LLD	<LLD
Kr-88	Ci	<LLD	<LLD	<LLD	<LLD
Xe-133	Ci	<LLD	<LLD	<LLD	<LLD
Xe-133m	Ci	<LLD	<LLD	<LLD	<LLD
Xe-135	Ci	<LLD	<LLD	<LLD	<LLD
Total	Ci	N/A	N/A	N/A	N/A

Note: Table 3 contains a listing of TMI ODCM Lower Limit of Detection (LLD).

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TABLE 2B (continued)
EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT 2020
LIQUID EFFLUENTS - CONTINUOUS MODE TMI-1

Fission and Activation Products	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
H-3	Ci	3.10E-03	6.84E-03	3.44E-03	1.13E+01
Cr-51	Ci	<LLD	<LLD	<LLD	<LLD
Mn-54	Ci	<LLD	<LLD	<LLD	<LLD
Fe-55	Ci	<LLD	<LLD	<LLD	<LLD
Co-58	Ci	<LLD	<LLD	<LLD	<LLD
Fe-59	Ci	<LLD	<LLD	<LLD	<LLD
Co-60	Ci	<LLD	<LLD	<LLD	<LLD
Zn-65	Ci	<LLD	<LLD	<LLD	<LLD
Sr-89	Ci	<LLD	<LLD	<LLD	<LLD
Sr-90	Ci	<LLD	<LLD	<LLD	<LLD
Zr-95	Ci	<LLD	<LLD	<LLD	<LLD
Nb-95	Ci	<LLD	<LLD	<LLD	<LLD
Mo-99	Ci	<LLD	<LLD	<LLD	<LLD
Tc-99m	Ci	<LLD	<LLD	<LLD	<LLD
Ag-110m	Ci	<LLD	<LLD	<LLD	<LLD
I-131	Ci	<LLD	<LLD	<LLD	<LLD
Cs-134	Ci	<LLD	<LLD	<LLD	<LLD
Cs-137	Ci	<LLD	7.49E-06	<LLD	2.39E-04
Ba-140	Ci	<LLD	<LLD	<LLD	<LLD
La-140	Ci	<LLD	<LLD	<LLD	<LLD
Ce-141	Ci	<LLD	<LLD	<LLD	<LLD
Ce-144	Ci	<LLD	<LLD	<LLD	<LLD
Total	Ci	3.10E-03	6.85E-03	3.44E-03	1.13E+01

Dissolved and Entrained Gases	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Kr-87	Ci	<LLD	<LLD	<LLD	<LLD
Kr-88	Ci	<LLD	<LLD	<LLD	<LLD
Xe-133	Ci	<LLD	<LLD	<LLD	<LLD
Xe-133m	Ci	<LLD	<LLD	<LLD	<LLD
Xe-135	Ci	<LLD	<LLD	<LLD	<LLD
Total	Ci	N/A	N/A	N/A	N/A

Note: Table 3 contains a listing of TMI ODCM Lower Limit of Detection (LLD).

**Enclosure 1: 2020 Annual Radioactive Effluent Release Report for TMI
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**EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
2020 SUPPLEMENTAL INFORMATION FACILITY: TMI UNIT 1 LICENSE: DPR 50-289**

1. Regulatory Limits -- Please refer to TMI Offsite Dose Calculation Manual

- A. Fission and Activation Gases:
- B. Iodines:
- C. Particulates, Half-Lives > 8 Days:
- D. Liquid Effluents:

2. Maximum Effluent Concentrations -- 10 Times CFR 20, Appendix B Table II

Provide the maximum effluent concentrations used in determining allowable release rates or concentrations

- A. Fission and Activation Gases:
- B. Iodines:
- C. Particulates, Half-Lives > 8 Days:
- D. Liquid Effluents:

3. Average Energy

Provide the average energy (E-BAR) of the radionuclide mixture in releases of fission and activation gases, if applicable N/A

4. Measurements and Approximations of Total Radioactivity

Provide the methods to measure or approximate the total radioactivity in effluents and the methods used to determine radionuclide composition:

- A. Fission and Activ. Gases: HPGE Spectrometry, Liquid Scintillation
- B. Iodines: HPGE Spectrometry
- C. Particulates: HPGE Spectrometry, Gas Flow Proportional, Beta Spectrometry
- D. Liquid Effluents: HPGE Spectrometry, Liquid Scintillation
- E. Gross Alpha: Gas Flow Proportional
- F. Carbon 14: Estimated using the methodology included in the EPRI Technical Report 1021106.

5. Batch Releases

Provide the following information relating to batch releases of radioactive materials in liquid and gaseous effluents.

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
A. LIQUID (ALL TIMES IN MINUTES)				
1. Number of batch releases	7	37	19	28
2. Total time period for batch releases (min)	3192	17340	13370	82,250
3. Maximum time period for a batch release (min)	1005	815	1095	720
4. Average time period for a batch release (min)	456	469	704	294
5. Minimum time period for a batch release (min)	227	227	15	190
6. Average stream flow during periods of release of effluent into a flowing stream (cfm)	6.37E+06	2.30E+06	4.09E+05	8.38E+05
B. GASEOUS				
1. Number of batch releases	N/A	N/A	N/A	N/A
2. Total time period for batch releases (min)	N/A	N/A	N/A	N/A
3. Maximum time period for a batch release (min)	N/A	N/A	N/A	N/A
4. Average time period for a batch release (min)	N/A	N/A	N/A	N/A
5. Minimum time period for a batch release (min)	N/A	N/A	N/A	N/A

6. Abnormal Releases

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
A. LIQUID				
1. Number of releases	3	3	3	3
2. Total activity released (curies)	2.75E-03	2.75E-03	2.78E-03	2.78E-03
B. GASEOUS				
1. Number of releases	0	0	0	1
2. Total activity released (curies)	0	0	0	1.27E-03

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TABLE 1A
EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT 2020
GASEOUS EFFLUENTS – SUMMATION OF ALL RELEASES TMI-2

	UNIT	QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4	EST TOTAL ERROR %
A. FISSION AND ACTIVATION GASES						
1. Total Release	Ci	<LLD	<LLD	<LLD	<LLD	25%
2. Avg release rate for period	µCi/S	N/A	N/A	N/A	N/A	
3. Percent of applicable limit	%	*	*	*	*	
B. IODINES						
1. Total Iodine I131	Ci	N/A	N/A	N/A	N/A	25%
2. Avg release rate for period	µCi/S	N/A	N/A	N/A	N/A	
3. Percent of applicable limit	%	*	*	*	*	
C. PARTICULATES						
1. Part. With half-life >8 days	Ci	<LLD	<LLD	<LLD	<LLD	25%
2. Avg release rate for period	µCi/S	N/A	N/A	N/A	N/A	
3. Percent of applicable limit	%	*	*	*	*	
4. Gross alpha radioactivity	Ci	<LLD	<LLD	<LLD	<LLD	
D. TRITIUM						
1. Total Release	Ci	2.31E-02	6.29E-02	4.99E-02	1.01E-01	25%
2. Avg release rate for period	µCi/S	2.94E-03	8.01E-03	6.28E-03	1.27E-02	
3. Percent of applicable limit	%	*	*	*	*	

Note: Table 3 contains a listing of TMI ODCM Lower Limit of Detection (LLD).

*ODCM Limits – Listed on Dose summary Table

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TABLE 1D
EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT 2020
GASEOUS EFFLUENTS – MIXED MODE RELEASES - BATCH MODE TMI-2

Fission And Activation Gasses	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Ar-41	Ci	N/A	N/A	N/A	N/A
Kr-85	Ci	N/A	N/A	N/A	N/A
Kr-85m	Ci	N/A	N/A	N/A	N/A
Kr-87	Ci	N/A	N/A	N/A	N/A
Kr-88	Ci	N/A	N/A	N/A	N/A
Xe-133	Ci	N/A	N/A	N/A	N/A
Xe-135	Ci	N/A	N/A	N/A	N/A
Xe-135m	Ci	N/A	N/A	N/A	N/A
Xe-138	Ci	N/A	N/A	N/A	N/A
Total	Ci	N/A	N/A	N/A	N/A

Radioiodines	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
I-131	Ci	N/A	N/A	N/A	N/A
I-133	Ci	N/A	N/A	N/A	N/A
I-135	Ci	N/A	N/A	N/A	N/A
Total	Ci	N/A	N/A	N/A	N/A

Particulates	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Cr-51	Ci	N/A	N/A	N/A	N/A
Mn-54	Ci	N/A	N/A	N/A	N/A
Co-58	Ci	N/A	N/A	N/A	N/A
Fe-59	Ci	N/A	N/A	N/A	N/A
Co-60	Ci	N/A	N/A	N/A	N/A
Sr-89	Ci	N/A	N/A	N/A	N/A
Sr-90	Ci	N/A	N/A	N/A	N/A
Mo-99	Ci	N/A	N/A	N/A	N/A
Ag-110m	Ci	N/A	N/A	N/A	N/A
Cs-134	Ci	N/A	N/A	N/A	N/A
Cs-137	Ci	N/A	N/A	N/A	N/A
Ba-140	Ci	N/A	N/A	N/A	N/A
La-140	Ci	N/A	N/A	N/A	N/A
Ce-141	Ci	N/A	N/A	N/A	N/A
Ce-144	Ci	N/A	N/A	N/A	N/A
Total	Ci	N/A	N/A	N/A	N/A

Tritium	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
H3	Ci	N/A	4.50E-04	N/A	N/A

Note: Table 3 contains a listing of TMI ODCM Lower Limit of Detection (LLD).

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TABLE 1D (continued)
EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT 2020
GASEOUS EFFLUENTS – MIXED MODE RELEASES - CONTINUOUS MODE TMI-2

Fission And Activation Gasses	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Ar-41	Ci	<LLD	<LLD	<LLD	<LLD
Kr-85	Ci	<LLD	<LLD	<LLD	<LLD
Kr-85m	Ci	<LLD	<LLD	<LLD	<LLD
Kr-87	Ci	<LLD	<LLD	<LLD	<LLD
Kr-88	Ci	<LLD	<LLD	<LLD	<LLD
Xe-133	Ci	<LLD	<LLD	<LLD	<LLD
Xe-135	Ci	<LLD	<LLD	<LLD	<LLD
Xe-135m	Ci	<LLD	<LLD	<LLD	<LLD
Xe-138	Ci	<LLD	<LLD	<LLD	<LLD
Total	Ci	N/A	N/A	N/A	N/A

Radioiodines	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
I-131	Ci	N/A	N/A	N/A	N/A
I-133	Ci	N/A	N/A	N/A	N/A
I-135	Ci	N/A	N/A	N/A	N/A
Total	Ci	N/A	N/A	N/A	N/A

Particulates	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Cr-51	Ci	<LLD	<LLD	<LLD	<LLD
Mn-54	Ci	<LLD	<LLD	<LLD	<LLD
Co-58	Ci	<LLD	<LLD	<LLD	<LLD
Fe-59	Ci	<LLD	<LLD	<LLD	<LLD
Co-60	Ci	<LLD	<LLD	<LLD	<LLD
Sr-89	Ci	<LLD	<LLD	<LLD	<LLD
Sr-90	Ci	<LLD	<LLD	<LLD	<LLD
Mo-99	Ci	<LLD	<LLD	<LLD	<LLD
Ag-110m	Ci	<LLD	<LLD	<LLD	<LLD
Cs-134	Ci	<LLD	<LLD	<LLD	<LLD
Cs-137	Ci	<LLD	<LLD	<LLD	<LLD
Ba-140	Ci	<LLD	<LLD	<LLD	<LLD
La-140	Ci	<LLD	<LLD	<LLD	<LLD
Ce-141	Ci	<LLD	<LLD	<LLD	<LLD
Ce-144	Ci	<LLD	<LLD	<LLD	<LLD
Total	Ci	N/A	N/A	N/A	N/A

Tritium	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
H3	Ci	2.31E-02	6.25E-02	4.99E-02	1.01E-01

Note: Table 3 contains a listing of TMI ODCM Lower Limit of Detection (LLD).

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TABLE 2A
EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT 2020
LIQUID EFFLUENTS – SUMMATION OF ALL RELEASES TMI-2

	UNIT	QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4	EST TOTAL ERROR %
A. FISSION AND ACTIVATION PRODUCTS						
1. Total Release (Not incl. Tritium, gases, alpha)	Ci	1.27E-06	4.72E-06	6.49E-06	3.11E-06	25%
2. Avg diluted concentration during period	μCi/ml	1.28E-09	3.07E-09	1.26E-09	4.36E-09	
3. Percent of applicable limit	%	*	*	*	*	
B. TRITIUM						
1. Total Release	Ci	3.08E-06	<LLD	2.73E-06	<LLD	25%
2. Avg diluted concentration during period	μCi/ml	3.11E-09	N/A	5.28E-10	N/A	
3. Percent of applicable limit	%	*	*	*	*	
C. DISSOLVED AND ENTRAINED GASES						
1. Total Release	Ci	<LLD	<LLD	<LLD	<LLD	25%
2. Avg diluted concentration during period	μCi/ml	N/A	N/A	N/A	N/A	
3. Percent of applicable limit	%	*	*	*	*	
D. GROSS ALPHA RADIOACTIVITY						
1. Total Release	Ci	<LLD	<LLD	<LLD	<LLD	25%
E. VOLUME OF WASTE RELEASE (PRIOR TO DILUTION)						
	LITERS	1.21E+03	3.47E+03	1.52E+04	2.49E+03	10%
F. VOLUME OF DILUTION WATER USED						
	LITERS	9.89E+05	1.54E+06	5.15E+06	7.12E+05	10%

Note: Table 3 contains a listing of TMI ODCM Lower Limit of Detection (LLD).

*ODCM Limits – Listed on Dose summary Table

TABLE 2B
EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT 2020
LIQUID EFFLUENTS - BATCH MODE TMI-2

Fission and Activation Products	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
H-3	Ci	3.08E-06	<LLD	2.73E-06	<LLD
Cr-51	Ci	<LLD	<LLD	<LLD	<LLD
Mn-54	Ci	<LLD	<LLD	<LLD	<LLD
Fe-55	Ci	<LLD	<LLD	<LLD	<LLD
Co-58	Ci	<LLD	<LLD	<LLD	<LLD
Fe-59	Ci	<LLD	<LLD	<LLD	<LLD
Co-60	Ci	<LLD	<LLD	<LLD	<LLD
Zn-65	Ci	<LLD	<LLD	<LLD	<LLD
Sr-89	Ci	<LLD	<LLD	<LLD	<LLD
Sr-90	Ci	<LLD	<LLD	<LLD	<LLD
Zr-95	Ci	<LLD	<LLD	<LLD	<LLD
Nb-95	Ci	<LLD	<LLD	<LLD	<LLD
Mo-99	Ci	<LLD	<LLD	<LLD	<LLD
Tc-99m	Ci	<LLD	<LLD	<LLD	<LLD
Ag-110m	Ci	<LLD	<LLD	<LLD	<LLD
I-131	Ci	<LLD	<LLD	<LLD	<LLD
Cs-134	Ci	<LLD	<LLD	<LLD	<LLD
Cs-137	Ci	1.27E-06	4.72E-06	6.47E-06	3.11E-06
Ba-140	Ci	<LLD	<LLD	<LLD	<LLD
La-140	Ci	<LLD	<LLD	<LLD	<LLD
Ce-141	Ci	<LLD	<LLD	<LLD	<LLD
Ce-144	Ci	<LLD	<LLD	<LLD	<LLD
Total	Ci	4.35E-06	4.72E-06	9.22E-06	3.11E-06

Dissolved and Entrained Gases	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Kr-87	Ci	<LLD	<LLD	<LLD	<LLD
Kr-88	Ci	<LLD	<LLD	<LLD	<LLD
Xe-133	Ci	<LLD	<LLD	<LLD	<LLD
Xe-133m	Ci	<LLD	<LLD	<LLD	<LLD
Xe-135	Ci	<LLD	<LLD	<LLD	<LLD
Total	Ci	N/A	N/A	N/A	N/A

Note: Table 3 contains a listing of TMI ODCM Lower Limit of Detection (LLD).

TABLE 2B (continued)
EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT 2020
LIQUID EFFLUENTS - CONTINUOUS MODE TMI-2

Fission and Activation Products	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
H-3	Ci	N/A	N/A	N/A	N/A
Cr-51	Ci	N/A	N/A	N/A	N/A
Mn-54	Ci	N/A	N/A	N/A	N/A
Fe-55	Ci	N/A	N/A	N/A	N/A
Co-58	Ci	N/A	N/A	N/A	N/A
Fe-59	Ci	N/A	N/A	N/A	N/A
Co-60	Ci	N/A	N/A	N/A	N/A
Zn-65	Ci	N/A	N/A	N/A	N/A
Sr-89	Ci	N/A	N/A	N/A	N/A
Sr-90	Ci	N/A	N/A	N/A	N/A
Zr-95	Ci	N/A	N/A	N/A	N/A
Nb-95	Ci	N/A	N/A	N/A	N/A
Mo-99	Ci	N/A	N/A	N/A	N/A
Tc-99m	Ci	N/A	N/A	N/A	N/A
Ag-110m	Ci	N/A	N/A	N/A	N/A
I-131	Ci	N/A	N/A	N/A	N/A
Cs-134	Ci	N/A	N/A	N/A	N/A
Cs-137	Ci	N/A	N/A	N/A	N/A
Ba-140	Ci	N/A	N/A	N/A	N/A
La-140	Ci	N/A	N/A	N/A	N/A
Ce-141	Ci	N/A	N/A	N/A	N/A
Ce-144	Ci	N/A	N/A	N/A	N/A
Total	Ci	N/A	N/A	N/A	N/A

Dissolved and Entrained Gases	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Kr-87	Ci	N/A	N/A	N/A	N/A
Kr-88	Ci	N/A	N/A	N/A	N/A
Xe-133	Ci	N/A	N/A	N/A	N/A
Xe-133m	Ci	N/A	N/A	N/A	N/A
Xe-135	Ci	N/A	N/A	N/A	N/A
Total	Ci	N/A	N/A	N/A	N/A

TABLE 3
ODCM REQUIRED LOWER LIMIT OF DETECTION (LLD)

Gaseous Sampling	
Radioisotope:	LLD Value
Tritium	1E-06 µCi/ml
Principal Gamma Emitters Gas (Kr-87, Kr-88, Xe-133, Xe-133m, Xe-135)	1E-04 µCi/ml
Principal Gamma Emitters Particulate	
Mn-54	1E-11 µCi/ml
Fe-59	1E-11 µCi/ml
Co-58	1E-11 µCi/ml
Co-60	1E-11 µCi/ml
Zn-65	1E-11 µCi/ml
Mo-99	1E-11 µCi/ml
Cs-137	1E-11 µCi/ml
Ce-141	1E-11 µCi/ml
Ce-144	1E-11 µCi/ml
Iodine 131	1E-12 µCi/ml
Gross Alpha	1E-11 µCi/ml
Sr-89	1E-11 µCi/ml
Sr-90	1E-11 µCi/ml

Liquid Sampling	
Radioisotope:	LLD Value
Tritium	1E-05 µCi/ml
Principal Gamma Emitters	
Mn-54	5E-07 µCi/ml
Fe-59	5E-07 µCi/ml
Co-58	5E-07 µCi/ml
Co-60	5E-07 µCi/ml
Zn-65	5E-07 µCi/ml
Mo-99	5E-07 µCi/ml
Cs-134	5E-07 µCi/ml
Cs-137	5E-07 µCi/ml
Ce-141	5E-07 µCi/ml
Ce-144	5E-07 µCi/ml
Iodine 131	1E-06 µCi/ml
Dissolved and Entrained Gases (Kr-87, Kr-88, Xe-133, Xe-133m, Xe-135)	1E-05 µCi/ml
Fe-55	1E-06 µCi/ml
Gross Alpha	1E-07 µCi/ml
Sr-89	5E-08 µCi/ml
Sr-90	5E-08 µCi/ml

Solid Waste Shipped Offsite During 2020

**2020 Annual Radioactive Effluent Release Report
 Solid Waste and Irradiated Fuel Shipments TMI-1**

A. Solid Waste Shipped Offsite for Burial or Disposal (Not irradiated fuel)

1. Types of Waste

Types of Waste	Total Quantity (m³)	Total Activity (Ci)	Period	Est. Total Error %
a. Spent resins, filters, evaporator bottoms, etc.	0	0	01/01/20-12/31/20	+/- 25%
b. Dry compressible waste, contaminated equip, etc.	1.35E+02	7.20E-03	01/01/20-12/31/20	+/- 25%
c. Irradiated components, control rods, etc.	0	0	01/01/20-12/31/20	+/- 25%
d. Other (Oil, Sludge, Sealed Sources)	0	0	01/01/20-12/31/20	+/- 25%

2. Estimate of major nuclide composition (by waste type)

Major Nuclide Composition	%
a. None	
b. Co-60	38.52
Ni-63	39.40
c. None	
d. None	

**2020 Annual Radioactive Effluent Release Report
Solid Waste and Irradiated Fuel Shipments TMI-1**

3. Solid Waste Disposition

<u>Number of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
1	Hittman Transport Services	Energy Solutions LLC 1560 Bear Creek Rd Oak Ridge, TN
4	Hittman Transport Services	Energy Solutions LLC 628 Gallaher Road Kingston, TN

B. Irradiated Fuel Shipments (disposition)

<u>Number of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
None	None	None

C. Changes to the Process Control Program

None

Enclosure 1: 2020 Annual Radioactive Effluent Release Report for TMI
Attachment 2 – Page 4 of 4

2020 Annual Radioactive Effluent Release Report
Solid Waste and Irradiated Fuel Shipments TMI-2

A. Solid Waste Shipped Offsite for Burial or Disposal (Not irradiated fuel)

1. Types of Waste

Types of Waste	Total Quantity (m³)	Total Activity (Ci)	Period	Est. Total Error %
a. Spent resins, filter sludges, evaporator bottoms, etc.	0.00E+00	0.00E+00	01/01/20-12/31/20	+/- 25%
b. Dry compressible waste, contaminated equip, etc.	0.00E+00	0.00E+00	01/01/20-12/31/20	+/- 25%
c. Irradiated components, control rods, etc.	0.00E+00	0.00E+00	01/01/20-12/31/20	+/- 25%
d. Other (describe) radwaste system sump excess water from rain intrusion	0.00E+00	0.00E+00	01/01/20-12/31/20	+/- 25%

2. Estimate of major nuclide composition (by waste type)

Major Nuclide Composition	%
a. None	
b. None	
c. None	
d. None	

3. Solid Waste Disposition

<u>Number of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
None	None	None

B. Irradiated Fuel Shipments (disposition)

<u>Number of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
None	None	None

Summary of Unplanned Releases from the TMI Site During 2020

There were no unplanned releases from TMI-2 in 2020. The unplanned releases for TMI-1 are summarized in the supplemental information in Attachment 1. The information is reported separately for liquid and gaseous releases, and the number of releases is reported for each quarter with a total curies released. The activity for these releases is also included in Tables 2A and 2B.

The abnormal liquid releases are monthly releases to account for the tritium in groundwater released into the river.

There was one unplanned gaseous release for TMI-1. During drain down of the Borated Water Storage Tank (BWST), the flange was removed to facilitate draining and venting. The release was captured in permit G-20201013-531-C. It was considered an unplanned release due to this point not normally being a release pathway.

**CHANGES TO THE PROCESS CONTROL PROGRAM AND THE
OFFSITE DOSE CALCULATION MANUAL DURING 2020 AND A LISTING OF
NEW LOCATIONS FOR DOSE CALCULATIONS AND/OR ENVIRONMENTAL
MONITORING IDENTIFIED BY THE LAND USE CENSUS**

1. Changes to the Process Control Program

There were no changes to the TMI Process Control Program in 2020.

2. Changes to the Offsite Dose Calculation Manual

There were no changes to the Offsite Dose Calculation Manual.

3. A listing of new locations for dose calculations and/or environmental monitoring identified by the Land Use Census.

Based on the results of the 2020 Land Use Census, no changes were required to the Radiological Environmental Monitoring Program. There were residences in all sixteen (16) meteorological sectors as identified in this report.

There were gardens identified in all sixteen sectors. The nearest gardens in sectors ESE and SE were updated due to a large cornfield that spans both sectors have been planted since trees were cleared to support the sub-station during the 2019-2020 time frame.

**Enclosure 1: 2020 Annual Radioactive Effluent Release Report for TMI
Attachment 5 – Page 1 of 1**

**Instrumentation Not Returned to Operable
Status Within 30 Days During 2020**

There were no instruments not returned to operable status within 30 days during 2020.

**Enclosure 1: 2020 Annual Radioactive Effluent Release Report for TMI
Attachment 6 - Page 1 of 17**

Annual Summary of Hourly Meteorological Data for 2020

The percent data recovery for meteorological information for 2020 was 99.8 percent. The data is presented by quarter.

**Enclosure1: 2020 Annual Radioactive Effluent Release Report for TMI
Attachment 6 - Page 2 of 17**

Three Mile Island Alpha
 Period of Record: January – March 2020
 Stability Class - **Extremely Unstable** - 145Ft-31Ft Delta-T (F)
 Winds Measured at 98 Feet
 Wind Speed (in mph)

<u>Wind Direction</u>	<u>1 - 3</u>	<u>4 - 7</u>	<u>8 - 12</u>	<u>13 - 18</u>	<u>19 - 24</u>	<u>> 24</u>	<u>Total</u>
N	1	2	1	2	1	0	7
NNE	0	0	0	1	0	0	1
NE	0	0	0	0	0	0	0
ENE	0	1	0	0	0	0	1
E	0	1	0	0	0	0	1
ESE	0	2	1	0	0	0	3
SE	0	3	8	0	0	0	11
SSE	0	3	0	0	0	0	3
S	2	4	2	0	0	0	8
SSW	0	4	4	0	0	0	8
SW	0	5	3	0	0	0	8
WSW	0	0	0	0	0	0	0
W	3	0	0	0	0	0	3
WNW	1	1	0	0	0	0	2
NW	3	1	2	0	0	0	6
NNW	4	7	3	2	2	0	18
Variable	0	0	0	0	0	0	0
Total	14	34	24	5	3	0	80

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 0

Three Mile Island Alpha
 Period of Record: **January - March 2020**
 Stability Class - **Moderately Unstable** - 145Ft-31Ft Delta-T (F)
 Winds Measured at 98 Feet
 Wind Speed (in mph)

<u>Wind Direction</u>	<u>1 - 3</u>	<u>4 - 7</u>	<u>8 - 12</u>	<u>13 - 18</u>	<u>19 - 24</u>	<u>> 24</u>	<u>Total</u>
N	0	1	1	0	0	0	2
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	1	0	0	0	0	1
E	0	0	0	0	0	0	0
ESE	0	1	0	1	0	0	2
SE	0	1	1	1	0	0	3
SSE	0	1	0	0	0	0	1
S	1	3	1	0	0	0	5
SSW	0	2	0	1	0	0	3
SW	1	0	2	0	0	0	3
WSW	1	0	0	0	0	0	1
W	0	1	3	1	0	0	5
WNW	0	0	0	0	0	0	0
NW	1	1	2	4	0	0	8
NNW	1	4	0	5	2	0	12
Variable	0	0	0	0	0	0	0
Total	5	16	10	13	2	0	46

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 0

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Three Mile Island Alpha
 Period of Record: January – March 2020
 Stability Class - **Slightly Unstable** - 145Ft-31Ft Delta-T (F)
 Winds Measured at 98 Feet
 Wind Speed (in mph)

<u>Wind Direction</u>	<u>1 - 3</u>	<u>4 - 7</u>	<u>8 - 12</u>	<u>13 - 18</u>	<u>19 - 24</u>	<u>> 24</u>	<u>Total</u>
N	0	1	2	3	0	0	6
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
SE	0	2	1	1	0	0	4
SSE	0	0	1	0	0	0	1
S	0	3	0	0	0	0	3
SSW	0	1	2	0	0	0	3
SW	1	0	3	0	0	0	4
WSW	0	1	1	0	0	0	2
W	0	0	4	1	0	0	5
WNW	1	0	1	1	0	0	3
NW	4	0	2	1	0	0	7
NNW	2	2	2	1	4	1	12
Variable	0	0	0	0	0	0	0
Total	8	10	19	8	4	1	50

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 0

Three Mile Island Alpha
 Period of Record: **January - March 2020**
 Stability Class - **Neutral** - 145Ft-31Ft Delta-T (F)
 Winds Measured at 98 Feet
 Wind Speed (in mph)

<u>Wind Direction</u>	<u>1 - 3</u>	<u>4 - 7</u>	<u>8 - 12</u>	<u>13 - 18</u>	<u>19 - 24</u>	<u>> 24</u>	<u>Total</u>
N	4	21	23	11	1	0	60
NNE	8	14	0	0	0	0	22
NE	8	14	4	0	0	0	26
ENE	11	20	2	0	0	0	33
E	11	37	5	0	0	0	53
ESE	11	62	17	3	1	0	94
SE	15	39	25	6	0	0	85
SSE	7	28	10	0	0	0	45
S	10	18	8	1	0	0	37
SSW	4	14	8	4	0	0	30
SW	1	4	8	2	0	0	15
WSW	1	12	6	0	0	0	19
W	7	20	22	41	12	0	102
WNW	2	16	35	44	6	1	104
NW	4	16	49	61	24	8	162
NNW	7	18	49	27	12	2	115
Variable	0	0	0	0	0	0	0
Total	111	353	271	200	56	11	1002

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 0

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Three Mile Island Alpha
 Period of Record: January – March 2020
 Stability Class - **Slightly Stable** - 145Ft-31Ft Delta-T (F)
 Winds Measured at 98 Feet
 Wind Speed (in mph)

<u>Wind Direction</u>	<u>1 - 3</u>	<u>4 - 7</u>	<u>8 - 12</u>	<u>13 - 18</u>	<u>19 - 24</u>	<u>> 24</u>	<u>Total</u>
N	26	29	7	1	0	0	63
NNE	20	20	1	0	0	0	41
NE	12	3	0	0	0	0	15
ENE	13	3	0	0	0	0	16
E	25	14	2	0	0	0	41
ESE	21	20	3	3	0	0	47
SE	18	26	5	1	0	0	50
SSE	24	13	1	0	0	0	38
S	14	10	16	4	0	0	44
SSW	14	14	4	5	0	0	37
SW	14	14	11	5	1	0	45
WSW	4	21	5	3	0	0	33
W	10	19	7	4	0	0	40
WNW	6	18	17	10	1	0	52
NW	15	25	23	22	2	0	87
NNW	21	21	11	11	2	0	66
Variable	0	0	0	0	0	0	0
Total	257	270	113	69	6	0	715

Hours of calm in this stability class: 3
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 0

Three Mile Island Alpha
 Period of Record: **January - March 2020**
 Stability Class - **Moderately Stable** - 145Ft-31Ft Delta-T (F)
 Winds Measured at 98 Feet
 Wind Speed (in mph)

<u>Wind Direction</u>	<u>1 - 3</u>	<u>4 - 7</u>	<u>8 - 12</u>	<u>13 - 18</u>	<u>19 - 24</u>	<u>> 24</u>	<u>Total</u>
N	7	4	0	0	0	0	11
NNE	8	1	0	0	0	0	9
NE	7	0	0	0	0	0	7
ENE	3	0	0	0	0	0	3
E	10	0	0	0	0	0	10
ESE	13	5	0	0	0	0	18
SE	12	4	0	0	0	0	16
SSE	9	2	0	0	0	0	11
S	9	4	0	0	0	0	13
SSW	11	6	0	0	0	0	17
SW	3	6	0	0	0	0	9
WSW	10	6	1	0	0	0	16
W	9	2	0	0	0	0	11
WNW	4	2	1	0	0	0	6
NW	5	1	1	0	1	0	8
NNW	4	4	1	1	0	0	10
Variable	0	0	0	0	0	0	0
Total	124	47	2	1	1	0	175

Hours of calm in this stability class: 8
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 0

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Three Mile Island Alpha
 Period of Record: January – March 2020
 Stability Class - **Extremely Stable** - 145Ft-31Ft Delta-T (F)
 Winds Measured at 98 Feet
 Wind Speed (in mph)

<u>Wind Direction</u>	<u>1 – 3</u>	<u>4 - 7</u>	<u>8 - 12</u>	<u>13 - 18</u>	<u>19 - 24</u>	<u>> 24</u>	<u>Total</u>
N	5	3	0	0	0	0	8
NNE	0	0	0	0	0	0	0
NE	4	0	0	0	0	0	4
ENE	1	0	0	0	0	0	1
E	4	3	0	0	0	0	7
ESE	16	1	0	0	0	0	17
SE	6	3	0	0	0	0	9
SSE	11	1	0	0	0	0	12
S	9	0	0	0	0	0	9
SSW	11	3	0	0	0	0	14
SW	10	0	0	0	0	0	10
WSW	3	2	0	0	0	0	5
W	4	2	0	0	0	0	6
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	2	1	0	0	0	0	3
Variable	0	0	0	0	0	0	0
Total	86	19	0	0	0	0	105

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 0

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Three Mile Alpha 2020
 Period of Record: **April – June 2020**
 Stability Class - **Extremely Unstable** - 145Ft-31Ft Delta-T (F)
 Winds Measured at 98 Feet
 Wind Speed (in mph)

<u>Wind Direction</u>	<u>1 - 3</u>	<u>4 - 7</u>	<u>8 - 12</u>	<u>13 - 18</u>	<u>19 - 24</u>	<u>> 24</u>	<u>Total</u>
N	0	3	0	0	0	0	3
NNE	0	1	0	0	0	0	1
NE	0	0	0	0	0	0	0
ENE	1	2	3	0	0	0	6
E	0	3	1	1	1	0	6
ESE	0	4	3	5	0	0	12
SE	0	4	4	2	0	0	10
SSE	0	1	2	0	0	0	3
S	0	1	5	0	0	0	6
SSW	0	4	8	3	0	0	15
SW	0	3	11	0	0	0	14
WSW	1	0	0	0	0	0	1
W	1	3	2	0	0	0	6
WNW	5	3	2	0	0	0	10
NW	2	5	10	1	0	0	18
NNW	1	13	7	0	1	1	23
Variable	0	0	0	0	0	0	0
Total	11	50	58	12	2	1	134

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 3

Three Mile Island Alpha
 Period of Record: **April - June 2020**
 Stability Class - **Moderately Unstable** - 145Ft-31Ft Delta-T (F)
 Winds Measured at 98 Feet
 Wind Speed (in mph)

<u>Wind Direction</u>	<u>1 - 3</u>	<u>4 - 7</u>	<u>8 - 12</u>	<u>13 - 18</u>	<u>19 - 24</u>	<u>> 24</u>	<u>Total</u>
N	0	3	2	0	0	0	5
NNE	0	0	0	0	0	0	0
NE	0	1	0	0	0	0	1
ENE	0	2	0	0	0	0	2
E	0	3	3	1	0	0	7
ESE	1	3	3	6	0	0	13
SE	0	5	4	1	1	0	11
SSE	0	3	2	0	0	0	5
S	0	1	0	0	0	0	1
SSW	1	3	2	2	0	0	8
SW	1	3	1	0	0	0	5
WSW	1	1	1	0	0	0	3
W	1	1	0	1	0	0	3
WNW	1	2	3	0	0	0	6
NW	0	1	5	3	1	0	10
NNW	0	2	5	3	0	0	10
Variable	0	0	0	0	0	0	0
Total	6	34	31	17	2	0	90

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 3

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Three Mile Island Alpha
 Period of record: **April – June 2020**
 Stability Class - **Slightly Unstable** - 145Ft-31Ft Delta-T (F)
 Winds Measured at 98 Feet
 Wind Speed (in mph)

<u>Wind Direction</u>	<u>1 - 3</u>	<u>4 - 7</u>	<u>8 - 12</u>	<u>13 - 18</u>	<u>19 - 24</u>	<u>> 24</u>	<u>Total</u>
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	2	0	0	0	0	2
ENE	0	3	0	0	0	0	3
E	0	2	1	0	0	0	3
ESE	0	3	2	1	0	0	6
SE	0	2	4	1	0	0	7
SSE	1	5	2	0	0	0	8
S	0	3	0	0	0	0	3
SSW	3	3	4	1	0	0	11
SW	2	1	1	0	0	0	4
WSW	0	0	1	0	0	0	1
W	1	0	2	1	0	0	4
WNW	1	5	4	7	2	2	21
NW	3	2	8	8	1	1	23
NNW	1	6	6	4	0	0	17
Variable	0	0	0	0	0	0	0
Total	12	37	35	23	3	3	113

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 3

Three Mile Island Alpha
 Period of Record: **April - June 2020**
 Stability Class - **Neutral** - 145Ft-31Ft Delta-T (F)
 Winds Measured at 98 Feet
 Wind Speed (in mph)

<u>Wind Direction</u>	<u>1 - 3</u>	<u>4 - 7</u>	<u>8 - 12</u>	<u>13 - 18</u>	<u>19 - 24</u>	<u>> 24</u>	<u>Total</u>
N	4	15	16	4	2	0	41
NNE	2	16	1	1	0	0	20
NE	8	13	2	0	0	0	23
ENE	4	25	0	0	0	0	29
E	6	49	9	3	0	0	67
ESE	6	42	29	11	2	0	90
SE	11	40	25	1	0	0	77
SSE	8	39	24	2	0	0	73
S	7	25	15	1	0	0	48
SSW	6	28	19	3	0	0	56
SW	8	19	8	0	0	0	35
WSW	3	12	9	3	1	0	28
W	5	16	23	13	2	0	59
WNW	7	16	53	49	11	3	139
NW	3	15	61	55	26	8	168
NNW	7	17	44	34	9	1	112
Variable	0	0	0	0	0	0	0
Total	95	387	338	180	53	12	1065

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 3

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Three Mile Island Alpha
 Period of Record: **April – June 2020**
 Stability Class - **Slightly Stable** - 145Ft-31Ft Delta-T (F)
 Winds Measured at 98 Feet
 Wind Speed (in mph)

<u>Wind Direction</u>	<u>1 - 3</u>	<u>4 - 7</u>	<u>8 - 12</u>	<u>13 - 18</u>	<u>19 - 24</u>	<u>> 24</u>	<u>Total</u>
N	9	27	6	1	0	0	43
NNE	6	13	1	0	0	0	20
NE	4	11	0	0	0	0	15
ENE	6	8	0	0	0	0	14
E	12	14	0	0	0	0	26
ESE	16	19	0	0	0	0	35
SE	25	10	2	5	0	0	42
SSE	14	13	1	0	0	0	28
S	16	15	4	0	0	0	35
SSW	14	16	5	2	0	0	37
SW	9	12	5	1	0	0	27
WSW	11	19	7	0	0	0	37
W	6	24	8	4	0	0	42
WNW	10	18	5	0	2	0	35
NW	3	12	21	10	1	0	47
NNW	1	14	8	1	3	0	27
Variable	0	0	0	0	0	0	0
Total	162	245	73	24	6	0	510

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 3

Three Mile Island Alpha
 Period of Record: **April - June 2020**
 Stability Class - **Moderately Stable** - 145Ft-31Ft Delta-T (F)
 Winds Measured at 98 Feet
 Wind Speed (in mph)

<u>Wind Direction</u>	<u>1 - 3</u>	<u>4 - 7</u>	<u>8 - 12</u>	<u>13 - 18</u>	<u>19 - 24</u>	<u>> 24</u>	<u>Total</u>
N	4	3	0	0	0	0	7
NNE	4	0	0	0	0	0	4
NE	5	0	0	0	0	0	5
ENE	8	6	0	0	0	0	14
E	5	4	0	0	0	0	9
ESE	10	6	0	0	0	0	16
SE	19	4	0	0	0	0	23
SSE	13	2	0	0	0	0	15
S	18	2	0	0	0	0	20
SSW	13	0	0	0	0	0	13
SW	8	2	0	0	0	0	10
WSW	4	0	0	0	0	0	4
W	10	3	0	0	0	0	13
WNW	6	0	0	0	0	0	6
NW	6	5	1	0	0	0	12
NNW	10	6	0	0	0	0	16
Variable	0	0	0	0	0	0	0
Total	143	43	1	0	0	0	187

Hours of calm in this stability class: 1
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 3

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Three Mile Island Alpha
 Period of Record: **April – June 2020**
 Stability Class - **Extremely Stable** - 145Ft-31Ft Delta-T (F)
 Winds Measured at 98 Feet
 Wind Speed (in mph)

<u>Wind Direction</u>	<u>1 - 3</u>	<u>4 - 7</u>	<u>8 - 12</u>	<u>13 - 18</u>	<u>19 - 24</u>	<u>> 24</u>	<u>Total</u>
N	4	0	0	0	0	0	4
NNE	0	1	0	0	0	0	1
NE	2	0	0	0	0	0	2
ENE	0	0	0	0	0	0	0
E	2	1	0	0	0	0	3
ESE	4	3	0	0	0	0	7
SE	4	3	0	0	0	0	7
SSE	9	0	0	0	0	0	9
S	16	0	0	0	0	0	16
SSW	12	0	0	0	0	0	12
SW	9	0	0	0	0	0	9
WSW	1	1	0	0	0	0	2
W	1	0	0	0	0	0	1
WNW	2	0	0	0	0	0	2
NW	1	2	0	0	0	0	3
NNW	2	1	0	0	0	0	3
Variable	0	0	0	0	0	0	0
Total	69	12	0	0	0	0	81

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability cl: 0
 Hours of missing stability measurements in all stability classes: 3

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Three Mile Island Alpha
 Period of Record: **July - September 2020**
 Stability Class - **Extremely Unstable** - 145Ft-31Ft Delta-T (F)
 Winds Measured at 98 Feet
 Wind Speed (in mph)

<u>Wind Direction</u>	<u>1 - 3</u>	<u>4 - 7</u>	<u>8 - 12</u>	<u>13 - 18</u>	<u>19 - 24</u>	<u>> 24</u>	<u>Total</u>
N	1	4	0	0	0	0	5
NNE	0	5	1	0	0	0	6
NE	0	2	1	0	0	0	3
ENE	0	6	0	0	0	0	6
E	0	3	1	0	0	0	4
ESE	0	0	0	0	0	0	0
SE	0	5	3	0	0	0	8
SSE	0	3	0	0	0	0	3
S	0	2	2	0	0	0	4
SSW	0	9	7	2	0	0	18
SW	2	5	4	0	0	0	11
WSW	5	0	0	2	0	0	7
W	1	0	2	0	0	0	3
WNW	10	5	0	0	0	0	15
NW	6	5	3	0	0	0	14
NNW	3	16	1	0	0	0	20
Variable	0	0	0	0	0	0	0
Total	28	70	25	4	0	0	127

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 0

Three Mile Island Alpha
 Period of Record: **July - September 2020**
 Stability Class - **Moderately Unstable** - 145Ft-31Ft Delta-T (F)
 Winds Measured at 98 Feet
 Wind Speed (in mph)

<u>Wind Direction</u>	<u>1 - 3</u>	<u>4 - 7</u>	<u>8 - 12</u>	<u>13 - 18</u>	<u>19 - 24</u>	<u>> 24</u>	<u>Total</u>
N	1	3	2	0	0	0	6
NNE	0	2	0	0	0	0	2
NE	1	0	0	0	0	0	1
ENE	0	5	0	0	0	0	5
E	0	2	0	0	0	0	2
ESE	0	1	1	0	0	0	2
SE	0	6	0	0	0	0	6
SSE	0	3	0	0	0	0	3
S	0	7	1	0	0	0	8
SSW	1	6	5	0	0	0	12
SW	1	12	2	1	0	0	16
WSW	1	2	0	1	0	0	4
W	1	1	0	0	0	0	2
WNW	1	2	1	0	0	0	4
NW	7	4	1	2	0	0	14
NNW	4	7	3	1	0	0	15
Variable	0	0	0	0	0	0	0
Total	18	63	16	5	0	0	102

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 0

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Three Mile Island Alpha
 Period of Record: **July - September 2020**
 Stability Class - **Slightly Unstable** - 145Ft-31Ft Delta-T (F)
 Winds Measured at 98 Feet
 Wind Speed (in mph)

<u>Wind Direction</u>	<u>1 - 3</u>	<u>4 - 7</u>	<u>8 - 12</u>	<u>13 - 18</u>	<u>19 - 24</u>	<u>> 24</u>	<u>Total</u>
N	1	2	2	1	0	0	6
NNE	0	3	0	0	0	0	3
NE	0	3	0	0	0	0	3
ENE	0	3	2	0	0	0	5
E	0	1	2	0	0	0	3
ESE	0	5	2	0	0	0	7
SE	0	6	5	0	0	0	11
SSE	1	3	1	0	0	0	5
S	2	7	0	0	0	0	9
SSW	0	8	4	0	0	0	12
SW	1	9	0	0	0	0	10
WSW	1	3	1	1	0	0	6
W	4	0	5	1	0	0	10
WNW	4	5	1	0	0	0	10
NW	5	5	5	1	0	0	16
NNW	3	4	1	4	0	0	22
Variable	0	0	0	0	0	0	0
Total	22	67	31	8	0	0	128

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 0

Three Mile Island Alpha
 Period of Record: **July - September 2020**
 Stability Class - **Neutral** - 145Ft-31Ft Delta-T (F)
 Winds Measured at 98 Feet
 Wind Speed (in mph)

<u>Wind Direction</u>	<u>1 - 3</u>	<u>4 - 7</u>	<u>8 - 12</u>	<u>13 - 18</u>	<u>19 - 24</u>	<u>> 24</u>	<u>Total</u>
N	10	14	13	5	0	0	42
NNE	8	15	2	0	0	0	25
NE	13	20	0	0	0	0	33
ENE	13	25	4	0	0	0	42
E	14	19	2	1	0	0	36
ESE	13	27	6	0	0	0	46
SE	14	65	30	1	0	0	110
SSE	11	34	6	0	0	0	51
S	13	37	3	0	0	0	53
SSW	18	43	13	1	0	0	75
SW	25	28	9	1	0	0	63
WSW	16	19	12	1	0	0	48
W	11	16	21	8	1	0	57
WNW	7	6	16	1	0	0	30
NW	15	6	38	7	0	0	66
NNW	16	14	13	9	0	0	52
Variable	0	0	0	0	0	0	0
Total	217	388	188	35	1	0	829

Hours of calm in this stability class: 1
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 0

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Three Mile Island Alpha
 Period of Record: **July - September 2020**
 Stability Class - **Slightly Stable** - 145Ft-31Ft Delta-T (F)
 Winds Measured at 98 Feet
 Wind Speed (in mph)

<u>Wind Direction</u>	<u>1 - 3</u>	<u>4 - 7</u>	<u>8 - 12</u>	<u>13 - 18</u>	<u>19 - 24</u>	<u>> 24</u>	<u>Total</u>
N	15	36	7	0	0	0	58
NNE	10	13	1	0	0	0	24
NE	10	6	0	0	0	0	16
ENE	18	7	0	0	0	0	25
E	31	16	0	0	0	0	47
ESE	31	15	0	0	0	0	46
SE	35	17	0	0	0	0	52
SSE	30	18	0	0	0	0	48
S	31	17	0	0	0	0	48
SSW	15	21	2	0	0	0	38
SW	22	30	5	0	0	0	57
WSW	20	23	2	0	0	0	45
W	10	47	6	0	0	0	63
WNW	11	20	6	0	0	0	37
NW	13	9	11	2	0	0	35
NNW	3	19	7	1	0	0	30
Variable	0	0	0	0	0	0	0
Total	305	314	47	3	0	0	669

Hours of calm in this stability class: 5
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 0

Three Mile Island Alpha
 Period of Record: **July - September 2020**
 Stability Class - **Moderately Stable** - 145Ft-31Ft Delta-T (F)
 Winds Measured at 98 Feet
 Wind Speed (in mph)

<u>Wind Direction</u>	<u>1 - 3</u>	<u>4 - 7</u>	<u>8 - 12</u>	<u>13 - 18</u>	<u>19 - 24</u>	<u>> 24</u>	<u>Total</u>
N	4	10	0	0	0	0	14
NNE	2	0	0	0	0	0	2
NE	1	2	0	0	0	0	3
ENE	6	2	0	0	0	0	8
E	9	9	0	0	0	0	18
ESE	26	6	0	0	0	0	32
SE	21	4	0	0	0	0	25
SSE	42	1	0	0	0	0	43
S	33	1	0	0	0	0	34
SSW	26	0	0	0	0	0	26
SW	12	1	0	0	0	0	13
WSW	18	5	0	0	0	0	23
W	3	4	0	0	0	0	7
WNW	10	3	1	0	0	0	14
NW	5	3	0	0	0	0	8
NNW	13	3	0	0	0	0	16
Variable	0	0	0	0	0	0	0
Total	231	54	1	0	0	0	286

Hours of calm in this stability class: 2
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 0

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Three Mile Island Alpha
 Period of Record: **July - September 2020**
 Stability Class - **Extremely Stable** - 145Ft-31Ft Delta-T (F)
 Winds Measured at 98 Feet
 Wind Speed (in mph)

<u>Wind Direction</u>	<u>1 - 3</u>	<u>4 - 7</u>	<u>8 - 12</u>	<u>13 - 18</u>	<u>19 - 24</u>	<u>> 24</u>	<u>Total</u>
N	1	1	0	0	0	0	2
NNE	2	0	0	0	0	0	2
NE	1	0	0	0	0	0	1
ENE	1	0	0	0	0	0	1
E	0	0	0	0	0	0	0
ESE	4	1	0	0	0	0	5
SE	3	0	0	0	0	0	3
SSE	6	0	0	0	0	0	6
S	5	0	0	0	0	0	5
SSW	12	0	0	0	0	0	12
SW	7	0	0	0	0	0	7
WSW	2	1	0	0	0	0	3
W	2	1	0	0	0	0	3
WNW	4	0	0	0	0	0	4
NW	0	1	0	0	0	0	1
NNW	2	1	0	0	0	0	3
Variable	0	0	0	0	0	0	0
Total	52	6	0	0	0	0	58

Hours of calm in this stability class: 1
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measureme in all stability classes: 0

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Three Mile Island Alpha
 Period of Record: **October – December 2020**
 Stability Class - **Extremely Unstable** - 145Ft-31Ft Delta-T (F)
 Winds Measured at 98 Feet
 Wind Speed (in mph)

<u>Wind Direction</u>	<u>1 - 3</u>	<u>4 - 7</u>	<u>8 - 12</u>	<u>13 - 18</u>	<u>19 - 24</u>	<u>> 24</u>	<u>Total</u>
N	0	3	0	0	0	0	3
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
SE	1	0	0	0	0	0	1
SSE	0	2	1	0	0	0	3
S	0	1	6	0	0	0	7
SSW	0	2	2	1	0	0	5
SW	0	3	3	0	0	0	6
WSW	0	1	1	0	0	0	2
W	1	0	0	0	0	0	1
WNW	0	2	1	0	0	0	3
NW	0	1	6	0	0	0	7
NNW	0	4	3	0	0	0	7
Variable	0	0	0	0	0	0	0
Total	2	19	23	1	0	0	45

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 3

Three Mile Island Alpha
 Period of Record: **October - December 2020**
 Stability Class - **Moderately Unstable** - 145Ft-31Ft Delta-T (F)
 Winds Measured at 98 Feet
 Wind Speed (in mph)

<u>Wind Direction</u>	<u>1 - 3</u>	<u>4 - 7</u>	<u>8 - 12</u>	<u>13 - 18</u>	<u>19 - 24</u>	<u>> 24</u>	<u>Total</u>
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
SE	1	1	0	0	0	0	2
SSE	0	1	0	0	0	0	1
S	0	6	1	0	0	0	7
SSW	0	2	1	2	0	0	5
SW	1	1	2	0	0	0	4
WSW	0	1	0	0	0	0	1
W	0	0	2	0	0	0	2
WNW	0	1	2	0	0	0	3
NW	0	0	4	2	0	0	6
NNW	1	0	3	2	0	0	6
Variable	0	0	0	0	0	0	0
Total	3	13	15	6	0	0	37

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 3

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Three Mile Island Alpha
 Period of Record: **October – December 2020**
 Stability Class - **Slightly Unstable** - 145Ft-31Ft Delta-T (F)
 Winds Measured at 98 Feet
 Wind Speed (in mph)

<u>Wind Direction</u>	<u>1 - 3</u>	<u>4 - 7</u>	<u>8 - 12</u>	<u>13 - 18</u>	<u>19 - 24</u>	<u>> 24</u>	<u>Total</u>
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	1	0	0	0	0	0	1
ESE	1	0	0	0	0	0	1
SE	0	1	0	0	0	0	1
SSE	0	4	0	0	0	0	4
S	0	4	3	0	0	0	7
SSW	0	0	0	0	0	0	0
SW	0	1	1	0	0	0	2
WSW	0	0	1	0	0	0	1
W	0	0	1	0	0	0	1
WNW	0	0	3	0	0	0	3
NW	1	3	1	5	0	0	10
NNW	1	0	3	0	1	0	5
Variable	0	0	0	0	0	0	0
Total	4	13	13	5	1	0	36

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 3

Three Mile Island Alpha
 Period of Record: **October - December 2020**
 Stability Class - **Neutral** - 145Ft-31Ft Delta-T (F)
 Winds Measured at 98 Feet
 Wind Speed (in mph)

<u>Wind Direction</u>	<u>1 - 3</u>	<u>4 - 7</u>	<u>8 - 12</u>	<u>13 - 18</u>	<u>19 - 24</u>	<u>> 24</u>	<u>Total</u>
N	9	20	15	6	0	0	50
NNE	8	8	2	0	0	0	18
NE	8	15	4	0	0	0	27
ENE	5	18	3	0	0	0	26
E	3	14	25	0	0	0	42
ESE	15	17	2	0	0	0	34
SE	8	29	3	0	0	0	40
SSE	15	30	4	0	0	0	49
S	9	15	13	1	0	0	38
SSW	3	8	17	0	0	0	28
SW	5	17	11	4	0	0	37
WSW	8	5	20	11	0	0	44
W	5	17	26	21	0	0	69
WNW	7	15	45	36	7	0	110
NW	12	26	58	62	25	2	185
NNW	10	22	32	18	1	0	83
Variable	0	0	0	0	0	0	0
Total	130	276	280	159	33	2	880

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 3

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Three Mile Island Alpha
 Period of Record: **October – December 2020**
 Stability Class - **Slightly Stable** - 145Ft-31Ft Delta-T (F)
 Winds Measured at 98 Feet
 Wind Speed (in mph)

<u>Wind Direction</u>	<u>1 - 3</u>	<u>4 - 7</u>	<u>8 - 12</u>	<u>13 - 18</u>	<u>19 - 24</u>	<u>> 24</u>	<u>Total</u>
N	17	19	2	0	0	0	38
NNE	10	7	0	0	0	0	17
NE	18	4	0	0	0	0	22
ENE	13	8	1	0	0	0	22
E	17	7	3	0	0	0	27
ESE	24	27	2	0	0	0	53
SE	24	42	9	1	0	0	76
SSE	22	36	7	3	0	0	68
S	17	24	4	1	0	0	46
SSW	11	14	7	0	0	0	32
SW	12	13	5	0	0	0	30
WSW	7	13	2	0	1	0	23
W	10	37	23	6	1	0	77
WNW	5	27	22	9	0	0	63
NW	16	21	18	12	2	0	69
NNW	15	24	5	5	0	0	49
Variable	0	0	0	0	0	0	0
Total	238	323	110	37	4	0	712

Hours of calm in this stability class: 2
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 3

Three Mile Island Alpha
 Period of Record: **October - December 2020**
 Stability Class - **Moderately Stable** - 145Ft-31Ft Delta-T (F)
 Winds Measured at 98 Feet
 Wind Speed (in mph)

<u>Wind Direction</u>	<u>1 - 3</u>	<u>4 - 7</u>	<u>8 - 12</u>	<u>13 - 18</u>	<u>19 - 24</u>	<u>> 24</u>	<u>Total</u>
N	9	2	0	0	0	0	11
NNE	4	1	0	0	0	0	5
NE	3	0	0	0	0	0	3
ENE	6	1	0	0	0	0	7
E	13	2	0	0	0	0	15
ESE	22	2	0	0	0	0	24
SE	20	6	0	0	0	0	26
SSE	28	5	0	0	0	0	33
S	29	1	0	0	0	0	30
SSW	29	4	3	0	0	0	36
SW	20	2	0	0	0	0	22
WSW	12	4	0	0	0	0	16
W	15	5	0	0	0	0	20
WNW	11	3	0	0	0	0	14
NW	6	9	1	0	0	0	16
NNW	7	3	2	0	0	0	12
Variable	0	0	0	0	0	0	0
Total	234	50	6	0	0	0	290

Hours of calm in this stability class: 10
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 3

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Three Mile Island Alpha
 Period of Record: **October - December 2020**
 Stability Class - **Extremely Stable** - 145Ft-31Ft Delta-T (F)
 Winds Measured at 98 Feet
 Wind Speed (in mph)

<u>Wind Direction</u>	<u>1 - 3</u>	<u>4 - 7</u>	<u>8 - 12</u>	<u>13 - 18</u>	<u>19 - 24</u>	<u>> 24</u>	<u>Total</u>
N	4	6	1	0	0	0	11
NNE	1	0	0	0	0	0	1
NE	0	1	0	0	0	0	1
ENE	2	0	0	0	0	0	2
E	6	0	0	0	0	0	6
ESE	17	1	0	0	0	0	18
SE	32	2	0	0	0	0	34
SSE	24	1	0	0	0	0	25
S	26	1	0	0	0	0	27
SSW	21	4	0	0	0	0	25
SW	8	1	0	0	0	0	9
WSW	2	0	0	0	0	0	2
W	5	1	0	0	0	0	6
WNW	2	1	0	0	0	0	3
NW	5	1	1	0	0	0	7
NNW	3	1	0	0	0	0	4
Variable	0	0	0	0	0	0	0
Total	158	21	2	0	0	0	181

Hours of calm in this stability class: 12
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 3

Assessment of Radiation Doses Due to Radioactive Liquid and Gaseous Effluents Released from TMI During 2020

TMI-1

The attached table presents the maximum hypothetical doses to an individual and the general population resulting from TMI-1 releases of gaseous and liquid effluents. Provided below is a brief explanation of the table.

A. Liquid (Individual)

Calculations were performed on the four age groups and seven organs recommended in Regulatory Guide 1.109. The pathways considered for TMI-1 were the consumption of drinking water and fish. These two pathways are considered to be the primary recreational activities associated with the Susquehanna River in the vicinity of TMI. The "critical receptor" or Receptor 1 was that individual who 1) consumed Susquehanna River water from the nearest downstream drinking water supplier (Wrightsville Water Supply) and 2) consumed fish residing in the vicinity of the TMI-1 liquid discharge.

For the calculated maximum whole body (or total body) dose from TMI-1 liquid effluents was 2.10E-02 mrem to an adult (line 1). The maximum organ dose was 2.69E-02 mrem to the liver of an adult (line 2).

B. Gaseous (Individual)

There were five major pathways considered in the dose calculations for TMI-1 gaseous effluents. These were: (1) plume exposure (2) inhalation, consumption of; (3) cow milk, (4) vegetables and fruits and (5) meat.

Since there were no noble gases released from TMI-1 during 2020, the gamma and beta doses (lines 3 and 4 respectively) were zero.

The maximum organ dose due to the release of iodines, particulates and tritium from TMI-1 in was 2.39E-02 mrem to the liver, total body, thyroid, kidney, lung and G.I. tract of a child. This dose again reflects the maximum exposed organ for the appropriate age group (line 5).

For TMI-1 liquid and gaseous effluents resulted in maximum hypothetical doses that were a small fraction of the quarterly and yearly ODCM dose limits.

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TMI-1							
SUMMARY OF MAXIMUM INDIVIDUAL DOSES FOR TMI-1 FROM January 1, 2019 through December 31, 2020							
Effluent	Applicable Organ	Estimated Dose (mrem)	Age Group	% of ODCM Dose Limit		ODCM Dose Limit (mrem)	
				Quarter	Annual	Quarter	Annual
(1) Liquid	Total Body	2.10E-02	Adult	1.40E+0	7.0E-01	1.5	3
(2) Liquid	Liver	2.69E-02	Adult	4.86E-01	2.43E-01	5	10
(3) Noble Gas	Air Dose (gamma-mrad)	0.00E+00	-	0.00E+00	0.00E+00	5	10
(4) Noble Gas	Air Dose (beta-mrad)	0.00E+00	-	0.00E+00	0.00E+00	10	20
(5) Iodine, Tritium & Particulates	Liver, Total Body, Thyroid, Kidney, Lung, GI Tract	2.39E-02	Child	3.19E-01	1.60E-01	7.5	15

TMI-2

The attached table presents the maximum hypothetical doses to an individual and the general population resulting from TMI-2 releases of gaseous and liquid effluents. Provided below is a brief explanation of the table.

A. Liquid (Individual)

Calculations were performed on the four age groups and seven organs recommended in Regulatory Guide 1.109. The pathways considered for TMI-2 were the consumption of drinking water and fish. These two pathways are considered to be the primary recreational activities associated with the Susquehanna River in the vicinity of TMI. The "critical receptor" or Receptor 1 was that individual who 1) consumed Susquehanna River water from the nearest downstream drinking water supplier (Wrightsville Water Supply) and 2) consumed fish residing in the vicinity of the TMI-2 liquid discharge.

For the calculated maximum whole body (or total body) dose from TMI-2 liquid effluents was $4.74E-04$ mrem to an adult (line 1). The maximum organ dose was $7.54E-04$ mrem to the liver of a teen (line 2).

B. Gaseous (Individual)

There were five major pathways considered in the dose calculations for TMI-2 gaseous effluents. These were: (1) plume exposure (2) inhalation, consumption of; (3) cow milk, (4) vegetables and fruits and (5) meat.

Since there were no noble gases released from TMI-2 during 2020, the gamma and beta air doses (lines 3 and 4, respectively) were zero.

The maximum organ dose due to the release of particulates and tritium from TMI-2 in was $4.62E-05$ mrem to the liver, total body, thyroid, kidney, lung, and GI tract of a child (line 5).

For TMI-2 liquid and gaseous effluents resulted in maximum hypothetical doses that were a small fraction of the quarterly and yearly ODCM dose limits.

TMI-2 SUMMARY OF MAXIMUM INDIVIDUAL DOSES FOR TMI-2 FROM January 1, 2019 through December 31, 2020							
Effluent	Applicable Organ	Estimated Dose (mrem)	Age Group	% of ODCM Dose Limit		ODCM Dose Limit (mrem)	
				Quarter	Annual	Quarter	Annual
(1) Liquid	Total Body	4.74E-04	Adult	3.16E-02	1.58E-02	1.5	3
(2) Liquid	Liver	7.54E-04	Teen	1.51E-02	7.54E-03	5	10
(3) Noble Gas	Air Dose (gamma-mrad)	0	-	0	0	5	10
(4) Noble Gas	Air Dose (beta-mrad)	0	-	0	0	10	20
(5) Tritium & Particulate	Liver, Total Body, Thyroid, Kidney, Lung & GI Tract	4.62E-05	Child	6.16E-04	3.08E-04	7.5	15

Assessment of Radiation Doses from Liquid and Gaseous Effluents Releases to Members of the Public within the TMI Site Boundaries During 2020

The Offsite Dose Calculation Manual requires an assessment of the radiation doses from radioactive liquid and gaseous effluents to members of the public due to their activities inside the site boundary during the reporting period. The estimated dose to a member of the public at or within the TMI Site Boundary $1.89\text{E-}2$ mrem for 2020.

The following are the assumptions made in this assessment:

Access to the TMI Owner Controlled Area is limited to only those persons who have business related activities that support the operation of the facility. Therefore, based on the definition of a 'member of the public' in NUREG-1301, there is no credible scenario for this individual to receive non-occupational dose inside the TMI Owner Controlled Area. The scenario selected will be recreational use of the Susquehanna River and shoreline next to the Owner Controlled Area fence. Based on the two definitions of Site Boundary in the ODCM, this scenario is AT the Site Boundary for liquid releases but INSIDE the Site Boundary for gaseous releases.

A member of the public stays next to the owner controlled area for 67 hours. The 67 hours is based upon Reg. Guide 1.109 shoreline recreation period given in Table E-5. This is a table of recommended values to be used for the maximum exposed individual in lieu of site-specific data. Three Mile Island is co-located with other islands in the Lake Frederick area of the Susquehanna River. This area is used recreationally for boating and fishing over the summer months. The application of the 67 hours of recreational use from Reg. Guide 1.109 is appropriate.

The highest dose from liquid releases is characterized by release L20201019-927-C. This release was from U-1 Turbine Plant Discharge. The total body dose from release L20201019-927-C was $4.47\text{E-}03$ mrem.

The highest dose from a single airborne release is characterized by release G20200107-475-C. This release was from TMI's Unit 1 ventilation system. The release contained airborne tritium from spent fuel pool evaporation. This release occurred over 167.5 hours. The entire dose from this release will be applied to the 67 hour recreational use period. The application of the total dose from this release to 67 hours is conservative. The maximum individual dose from release G20200107-475-C was $1.44\text{E-}02$ mrem to the thyroid of a child.

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The highest fence line direct radiation result (assumed to be equal to dose) will be added to the dose from the highest liquid and gaseous releases to yield the hypothetical maximum dose to a member of the public within the site boundaries.

Using the new ANSI/HPS Standard N13.37, Environmental Dosimetry, as suggested in DG-4019 to calculate facility related dose, the highest facility related dose detected at any of the monitoring locations was 0.000 mR.

Calculations:

The dose from liquid release L20201019-927-C was 0.00447 mrem.

The dose from gas release G20200107-475-C was 0.0144 mrem.

Total Dose Calculation

$0.00447 \text{ mrem} + 0.0144 \text{ mrem} + 0.000 \text{ mrem} = 0.0189 \text{ mrem}$

**Assessment of Radiation Dose to Most Likely
Exposed Real Individual per 40 CFR 190**

Dose calculations were performed to demonstrate compliance with 40 CFR 190 (ODCM Part IV Section 2.10). Gaseous and liquid effluents released from TMI-1 and TMI-2 in 2020 resulted in maximum individual doses (regardless of age group) of 0.034 mrem to the thyroid and 0.052 mrem to any other organ including the whole (total) body.

**Deviations from the ODCM Sampling and
Analysis Regime During 2020**

Per Table 3.2-1, a weekly composite is required from a continuous release source. On two occasions, there was no sample in the compositor for the turbine building sump. On both occasions, the flow totalizer for the turbine building sump was unchanged. This indicated there was no flow from this sump for the week. Therefore, there was nothing to collect. There was no sampling equipment malfunction. These events are documented in IR's 04369213 and 04391433.

There were no other sampling deviations.

Major Changes to Radioactive Waste Treatment Systems

The following information is for inclusion in the TMI-1/2 Radiological Effluents Report pursuant to Tech Spec Amendment 284.

UFSAR Section 11.2.6 requires reporting of Major changes to Radioactive Waste Treatment Systems. Major changes are interpreted to mean changes that would alter how the system functions or changes that would affect operational exposures, offsite dose rates or integrated doses. There were no major changes to the liquid, gaseous, or solid radioactive waste treatment systems at TMI-1 during the year of 2020.