

**MAINE YANKEE**  
321 Old Ferry Road, Wiscasset, Maine 04578

April 25, 2023  
OMY-23-009  
10 CFR 50.4 and 10 CFR 50.36a(a)(2)

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

Maine Yankee Atomic Power Company  
Maine Yankee Independent Spent Fuel Storage Installation  
NRC License No. DPR-36 (NRC Docket Nos. 50-309 and 72-30)

Subject: Annual Radioactive Effluent Release Report, Annual Radiological Environmental Operating Report, and Changes to the Off-Site Dose Calculation Manual for 2022

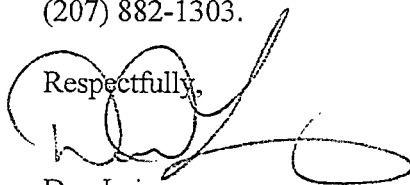
10 CFR 50.36a(a)(2), Section 2)b) of Appendix C of the Maine Yankee Atomic Power Company (Maine Yankee) Quality Assurance Program (QAP) for the Maine Yankee Independent Spent Fuel Storage Installation (ISFSI) and Section 2 of Appendix A of the Off-Site Dose Calculation Manual (ODCM) for the Maine Yankee ISFSI require Maine Yankee to submit an Annual Radioactive Effluent Release Report. Enclosure 1 provides the report for the period of January 1 through December 31, 2022.

Section 2)a) of Appendix C of the Maine Yankee QAP for the Maine Yankee ISFSI and Section 1 of Appendix A of the ODCM for the Maine Yankee ISFSI require the submittal of an Annual Radiological Environmental Operating Report. Enclosure 2 provides the report for the period of January 1 through December 31, 2022.

Section 1)c)(4) of Appendix C of the Maine Yankee QAP for the Maine Yankee ISFSI requires that any changes to the ODCM to be submitted as part of or concurrent with the Annual Radiological Environmental Operating Report. No revisions to the Maine Yankee ISFSI ODCM were issued in 2022.

If you have any questions regarding this submittal, please do not hesitate to contact me at (207) 882-1303.

Respectfully,



Dan Laing  
ISFSI Manager

NMSS26  
1E25  
1E48  
A009  
NMSS

Enclosures:

1. Maine Yankee Independent Spent Fuel Storage Installation, Annual Radioactive Effluent Release Report, January – December 2022.
2. Maine Yankee Independent Spent Fuel Storage Installation, Annual Radiological Environmental Operating Report, January – December 2022.

cc: R. Lorson, NRC Region I Administrator  
A. Dimitriadis, Chief, Decommissioning Branch, NRC, Region I  
Y. Diaz-Sanabria, Chief, Division of Fuel Management, Storage and Transportation  
Licensing Branch  
N. Saunders, State of Maine Radiation Control Manager

OMY-23-009

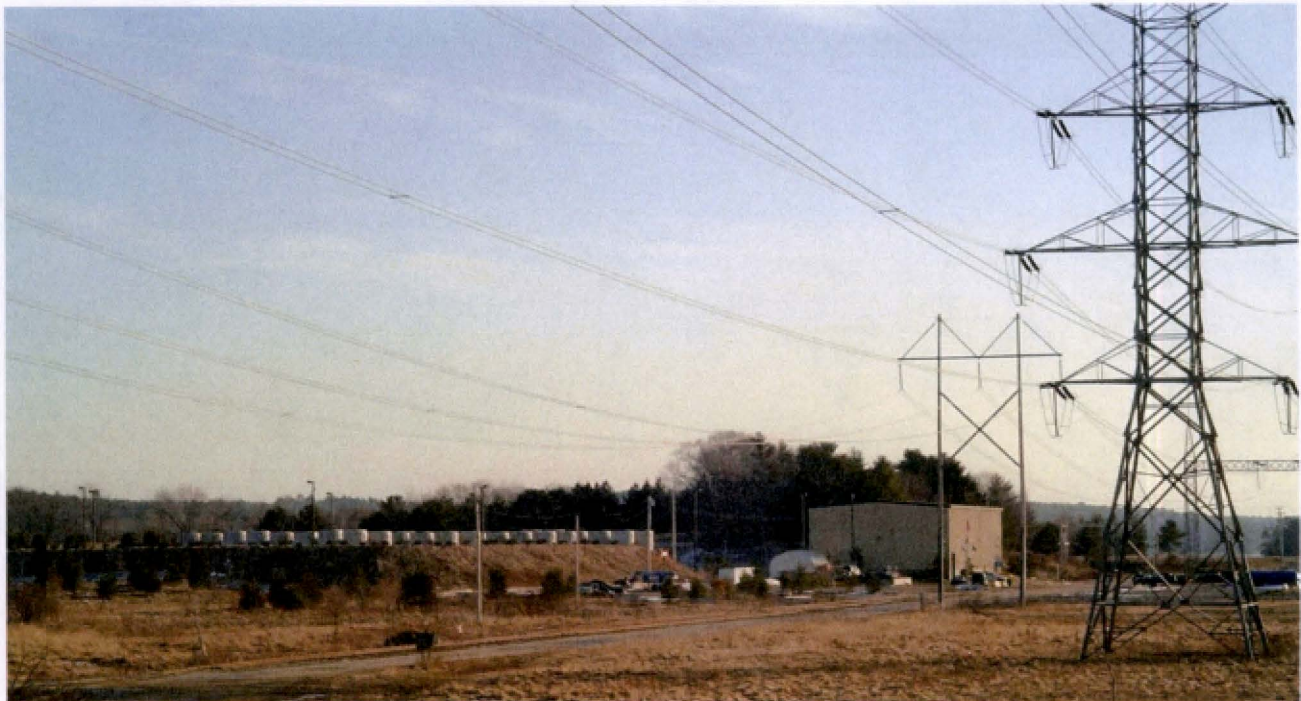
ENCLOSURE 1

MAINE YANKEE  
INDEPENDENT SPENT FUEL STORAGE INSTALLATION  
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT  
JANUARY – DECEMBER 2022

**MAINE YANKEE  
INDEPENDENT SPENT FUEL STORAGE INSTALLATION  
License Nos. DPR-36 and SFGL-14**

**ANNUAL RADIOACTIVE EFFLUENT  
RELEASE REPORT**

**January - December 2022**



**April 2023**

Prepared by:  
**Radiation Safety & Control Services  
93 Ledge Road  
Seabrook, NH 03874**

## **EXECUTIVE SUMMARY**

Tables 1 and 2 summarize the quantity of radioactive gaseous and liquid effluents, respectively, for each quarter of 2022. There were no gaseous or liquid releases in 2022. Table 3 summarizes waste shipped offsite for disposal for each half year of 2022. There was no waste shipped for disposal in 2022.

Appendices A and B indicate the status of reportable items per the requirements of the Offsite Dose Calculation Manual (ODCM). There were no reportable items in 2022. Appendix C presents any changes in the ODCM. The ODCM was not revised in 2022.

**Table 1**

MAINE YANKEE ISFSI  
Effluent and Waste Disposal Annual Report  
2022 Gaseous Effluents-Summation of All Releases

Nuclides Released	Units	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Error
<b>A. Fission and Activation Gases</b>						
Total Release	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Average release rate	μCi/s	N/A*	N/A*	N/A*	N/A*	
Percent of regulatory limit	%	N/A*	N/A*	N/A*	N/A*	
<b>B. Iodines</b>						
Total Iodines released	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Average release rate	μCi/s	N/A*	N/A*	N/A*	N/A*	
Percent of regulatory limit	%	N/A*	N/A*	N/A*	N/A*	
<b>C. Particulates</b>						
Particulates Released	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Average release rate	μCi/s	N/A*	N/A*	N/A*	N/A*	
Percent of regulatory limit	%	N/A*	N/A*	N/A*	N/A*	
Gross alpha radioactivity	Ci	N/A*	N/A*	N/A*	N/A*	
<b>D. Tritium</b>						
Total release	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Average release rate	μCi/s	N/A*	N/A*	N/A*	N/A*	
Percent of regulatory limit	%	N/A*	N/A*	N/A*	N/A*	

N/A\*= Not Applicable

There are no gaseous effluents associated with the Maine Yankee Independent Spent Fuel Storage Installation (ISFSI)

**Table 1A**

MAINE YANKEE ISFSI  
Effluent and Waste Disposal Annual Report  
2022 Gaseous Effluents - Ground Level Releases - Batch Mode

<b>Nuclides Released</b>	<b>Unit</b>	<b>1st Quarter</b>	<b>2nd Quarter</b>	<b>3rd Quarter</b>	<b>4th Quarter</b>	<b>Total</b>
<b>1. Fission Gases</b>						
Krypton-85	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Krypton-85m	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Krypton-87	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Krypton-88	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Xenon-133	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Xenon-135	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Xenon-135m	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Xenon-138	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Unidentified	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Total for period	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
<b>2. Iodines</b>						
Iodine-131	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Iodine-133	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Iodine-135	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Total for period	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
<b>3. Particulates</b>						
Strontium-89	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Strontium-90	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Cesium-134	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Cesium-137	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Cobalt-60	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Barium-Lanthanum-140	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Others-						
Plutonium-238	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Curium-243,244	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Uranium-234	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Uranium-238	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Thorium-232	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Radium-226	Ci	N/A*	N/A*	N/A*	N/A*	N/A*

N/A\*= Not Applicable

There are no gaseous effluents associated with the Maine Yankee Independent Spent Fuel Storage Installation (ISFSI)

**Table 1B**

MAINE YANKEE ISFSI  
Effluent and Waste Disposal Annual Report  
2022 Gaseous Effluents - Ground Level Releases - Continuous Mode

Nuclides Released	Unit	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Total
<b>1. Fission Gases</b>						
Krypton-85	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Krypton-85m	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Krypton-87	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Krypton-88	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Xenon-133	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Xenon-135	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Xenon-135m	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Xenon-138	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Unidentified	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Total for period	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
<b>2. Iodines</b>						
Iodine-131	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Iodine-133	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Iodine-135	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Total for period	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
<b>3. Particulates</b>						
Strontium-89	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Strontium-90	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Cesium-134	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Cesium-137	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Cobalt-60	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Barium-Lanthanum-140	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Others-						
Plutonium-238	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Curium-243,244	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Uranium-234	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Uranium-238	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Thorium-232	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Radium-226	Ci	N/A*	N/A*	N/A*	N/A*	N/A*

N/A\*= Not Applicable

There are no gaseous effluents associated with the Maine Yankee Independent Spent Fuel Storage Installation (ISFSI)



**Table 1C**

**MAINE YANKEE ISFSI  
Effluent and Waste Disposal Annual Report  
2022 Gaseous Effluents - Elevated Releases – Batch Mode**

<b>Nuclides Released</b>	<b>Unit</b>	<b>1st Quarter</b>	<b>2nd Quarter</b>	<b>3rd Quarter</b>	<b>4th Quarter</b>	<b>Total</b>
<b>1. Fission Gases</b>						
Krypton-85	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Krypton-85m	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Krypton-87	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Krypton-88	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Xenon-133	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Xenon-135	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Xenon-135m	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Xenon-138	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Unidentified	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Total for period	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
<b>2. Iodines</b>						
Iodine-131	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Iodine-133	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Iodine-135	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Total for period	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
<b>3. Particulates</b>						
Strontium-89	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Strontium-90	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Cesium-134	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Cesium-137	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Cobalt-60	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Barium-Lanthanum-140	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Others-						
Plutonium-238	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Curium-243,244	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Uranium-234	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Uranium-238	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Thorium-232	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Radium-226	Ci	N/A*	N/A*	N/A*	N/A*	N/A*

N/A\*= Not Applicable

There are no gaseous effluents associated with the Maine Yankee Independent Spent Fuel Storage Installation (ISFSI)

**Table 1D**

**MAINE YANKEE ISFSI  
Effluent and Waste Disposal Annual Report  
2022 Gaseous Effluents - Elevated Releases – Continuous Mode**

<b>Nuclides Released</b>	<b>Unit</b>	<b>1st Quarter</b>	<b>2nd Quarter</b>	<b>3rd Quarter</b>	<b>4th Quarter</b>	<b>Total</b>
<b>1. Fission Gases</b>						
Krypton-85	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Krypton-85m	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Krypton-87	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Krypton-88	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Xenon-133	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Xenon-135	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Xenon-135m	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Xenon-138	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Unidentified	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Total for period	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
<b>2. Iodines</b>						
Iodine-131	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Iodine-133	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Iodine-135	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Total for period	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
<b>3. Particulates</b>						
Strontium-89	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Strontium-90	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Cesium-134	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Cesium-137	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Cobalt-60	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Barium-Lanthanum-140	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Others-						
Plutonium-238	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Curium-243,244	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Uranium-234	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Uranium-238	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Thorium-232	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Radium-226	Ci	N/A*	N/A*	N/A*	N/A*	N/A*

N/A\*= Not Applicable

There are no gaseous effluents associated with the Maine Yankee Independent Spent Fuel Storage Installation (ISFSI)

**Table 2**

MAINE YANKEE ISFSI  
Effluent and Waste Disposal Annual Report  
2022 Liquid Effluents - Summation of All Releases

Nuclides Released	Units	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Error
<b>A. Fission and Activation Products</b>						
Total Release (not including tritium, gases, alpha)	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Average diluted concentration during period	µCi/ml	N/A*	N/A*	N/A*	N/A*	
Percent of applicable limit	%	N/A*	N/A*	N/A*	N/A*	
<b>B. Tritium</b>						
Total Release	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Average diluted concentration during period	µCi/ml	N/A*	N/A*	N/A*	N/A*	
Percent of applicable limit	%	N/A*	N/A*	N/A*	N/A*	
<b>C. Dissolved and Entrained Gases</b>						
Total Release	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Average diluted concentration during period	µCi/ml	N/A*	N/A*	N/A*	N/A*	
Percent of applicable limit	%	N/A*	N/A*	N/A*	N/A*	
<b>D. Gross Alpha Radioactivity</b>						
Total release	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Average diluted concentration during period	µCi/ml	N/A*	N/A*	N/A*	N/A*	
<b>E. Volume of Waste Released (prior to dilution)</b>	Liters	N/A*	N/A*	N/A*	N/A*	
<b>F. Volume of Dilution Water Used During Period</b>	Liters	N/A*	N/A*	N/A*	N/A*	

N/A\*= Not Applicable

There are no liquid effluents associated with the Maine Yankee Independent Spent Fuel Storage Installation (ISFSI)

**Table 2A**

**MAINE YANKEE ISFSI  
Effluent and Waste Disposal Annual Report  
2022 Liquid Effluents – Batch Mode**

<b>Nuclides Released</b>	<b>Unit</b>	<b>1st Quarter</b>	<b>2nd Quarter</b>	<b>3rd Quarter</b>	<b>4th Quarter</b>	<b>Totals</b>
Strontium-89	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Strontium-90	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Cesium-134	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Cesium-137	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Iodine-131	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Cobalt-58	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Cobalt-60	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Iron-59	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Zinc-65	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Manganese-54	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Chromium-51	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Zirconium-Niobium-95	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Molybdenum-99	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Technetium-99m	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Barium-Lanthanum-140	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Cerium-141	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Others- Iron-55	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Antimony-125	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Unidentified	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Total for period (above)	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Dissolved and Entrained Gasses	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Tritium	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Gross Alpha	Ci	N/A*	N/A*	N/A*	N/A*	N/A*

N/A\*= Not Applicable

There are no liquid effluents associated with the Maine Yankee Independent Spent Fuel Storage Installation (ISFSI)

**Table 2B**

MAINE YANKEE ISFSI  
Effluent and Waste Disposal Annual Report  
2022 Liquid Effluents – Continuous Mode

<b>Nuclides Released</b>	<b>Unit</b>	<b>1st Quarter</b>	<b>2nd Quarter</b>	<b>3rd Quarter</b>	<b>4th Quarter</b>	<b>Totals</b>
Strontium-89	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Strontium-90	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Cesium-134	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Cesium-137	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Iodine-131	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Cobalt-58	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Cobalt-60	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Iron-59	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Zinc-65	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Manganese-54	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Chromium-51	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Zirconium-Niobium-95	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Molybdenum-99	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Technetium-99m	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Barium-Lanthanum-140	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Cerium-141	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Others- Iron-55	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Antimony-125	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Unidentified	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Total for period (above)	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Dissolved and Entrained Gasses	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Tritium	Ci	N/A*	N/A*	N/A*	N/A*	N/A*
Gross Alpha	Ci	N/A*	N/A*	N/A*	N/A*	N/A*

N/A\*= Not Applicable

There are no liquid effluents associated with the Maine Yankee Independent Spent Fuel Storage Installation (ISFSI)

**Table 3**

MAINE YANKEE ISFSI  
Effluent and Waste Disposal Annual Report  
First Half 2022 Low Level Waste Shipments

<b>Resins, Filters and Evaporator Bottoms</b>		<b>Volume</b>		<b>Curies Shipped</b>
<b>Waste Class</b>	<b>Solidifying Agent</b>	<b>ft<sup>3</sup></b>	<b>m<sup>3</sup></b>	<b>Curies</b>
A		0	0	0
B		0	0	0
C		0	0	0
<b>All</b>		0	0	0
<b>Major radionuclides for above data:</b>				
<b>Dry Active Waste</b>		<b>Volume</b>		<b>Curies Shipped</b>
<b>Waste Class</b>	<b>Solidifying Agent</b>	<b>ft<sup>3</sup></b>	<b>m<sup>3</sup></b>	<b>Curies</b>
A		0	0	0
B		0	0	0
C		0	0	0
<b>All</b>		0	0	0
<b>Major radionuclides for above data:</b>				
<b>Irradiated Components</b>		<b>Volume</b>		<b>Curies Shipped</b>
<b>Waste Class</b>	<b>Solidifying Agent</b>	<b>ft<sup>3</sup></b>	<b>m<sup>3</sup></b>	<b>Curies</b>
A		0	0	0
B		0	0	0
C		0	0	0
<b>All</b>		0	0	0
<b>Major radionuclides for above data:</b>				
<b>Other Waste</b>		<b>Volume</b>		<b>Curies Shipped</b>
<b>Waste Class</b>	<b>Solidifying Agent</b>	<b>ft<sup>3</sup></b>	<b>m<sup>3</sup></b>	<b>Curies</b>
A		0	0	0
B		0	0	0
C		0	0	0
<b>All</b>		0	0	0
<b>Major radionuclides for above data:</b>				

**Table 3A**

MAINE YANKEE ISFSI  
Effluent and Waste Disposal Annual Report  
Second Half 2022 Low Level Waste Shipments

Resins, Filters and Evaporator Bottoms		Volume		Curies Shipped
Waste Class	Solidifying Agent	ft <sup>3</sup>	m <sup>3</sup>	Curies
A		0	0	0
B		0	0	0
C		0	0	0
All		0	0	0
<b>Major radionuclides for above data:</b>				
Dry Active Waste		Volume		Curies Shipped
Waste Class	Solidifying Agent	ft <sup>3</sup>	m <sup>3</sup>	Curies
A		0	0	0
B		0	0	0
C		0	0	0
All		0	0	0
<b>Major radionuclides for above data:</b>				
Irradiated Components		Volume		Curies Shipped
Waste Class	Solidifying Agent	ft <sup>3</sup>	m <sup>3</sup>	Curies
A		0	0	0
B		0	0	0
C		0	0	0
All		0	0	0
<b>Major radionuclides for above data:</b>				
Other Waste		Volume		Curies Shipped
Waste Class	Solidifying Agent	ft <sup>3</sup>	m <sup>3</sup>	Curies
A		0	0	0
B		0	0	0
C		0	0	0
All		0	0	0
<b>Major radionuclides for above data:</b>				

## **Appendix A**

### **Radiation Dose Assessment**

There were no gaseous or liquid effluent releases in 2022. Therefore, an assessment of radiation doses to the most likely exposed member(s) of the public to show compliance with 40CFR190 or 10CFR72.104 from effluents was not required.



## **Appendix B**

### **Unplanned Releases**

There were no unplanned releases of radioactive materials from the site in 2022.

## **Appendix C**

### **Offsite Dose Calculation Manual Changes**

There were no changes to the Offsite Dose Calculation Manual in 2022.

OMY-23-009

ENCLOSURE 2

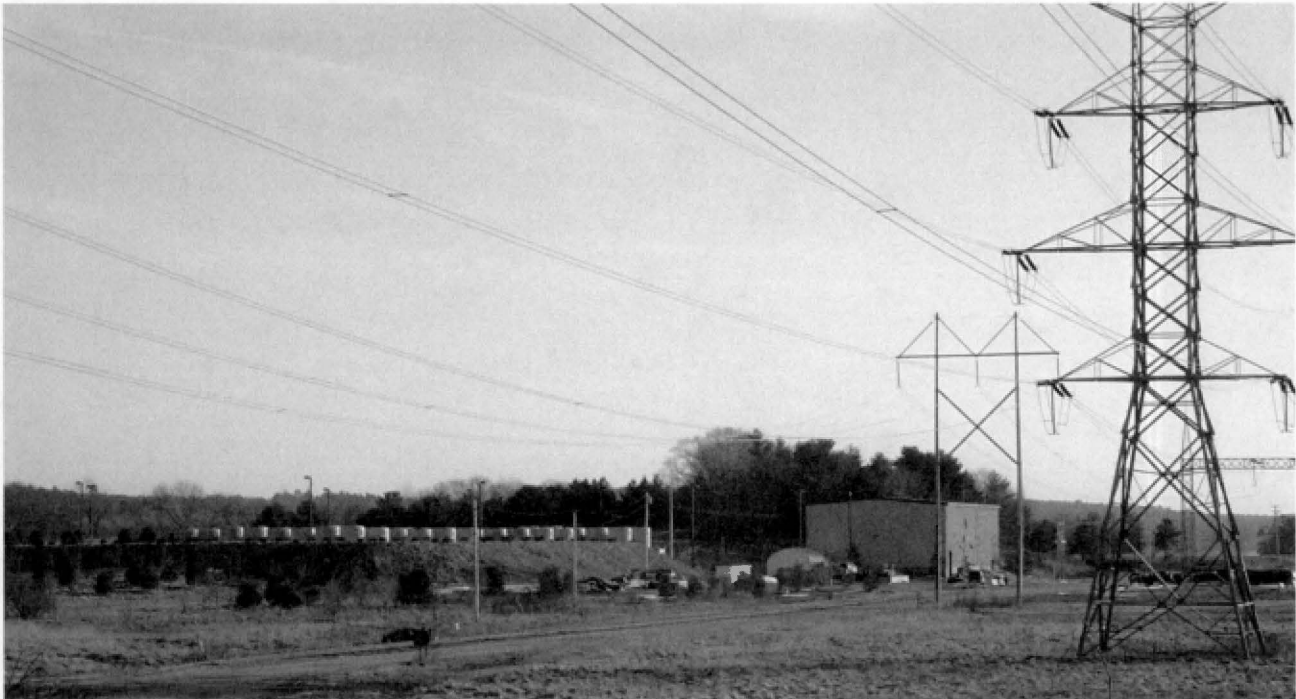
MAINE YANKEE  
INDEPENDENT SPENT FUEL STORAGE INSTALLATION  
ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT  
JANUARY – DECEMBER 2022

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**MAINE YANKEE  
INDEPENDENT SPENT FUEL STORAGE INSTALLATION  
License Nos. DPR-36 and SFGL-14**

**ANNUAL RADIOLOGICAL ENVIRONMENTAL  
OPERATING REPORT**

**January - December 2022**



**April 2023**

Prepared by:  
**Radiation Safety & Control Services  
93 Ledge Road  
Seabrook, NH 03874**

## **EXECUTIVE SUMMARY**

The Maine Yankee Independent Spent Fuel Storage Installation (ISFSI) has been in operation since 2001. All fuel has been transferred into dry storage casks and placed at the Independent Spent Fuel Storage Installation. The Radiological Environmental Monitoring Program (REMP) for the Maine Yankee ISFSI located in Wiscasset, ME was continued for the period January through December 2022 in compliance with the Maine Yankee Offsite Dose Calculation Manual (ODCM).

By design, there are no liquid or gaseous effluents associated with the operation of the ISFSI. Therefore, the ODCM only requires monitoring of direct exposure from the facility. There were no changes to the Offsite Dose Calculation Manual in 2022. TLDs were used to measure direct gamma exposure at nine locations in the vicinity of the ISFSI and one control location 5.2 kilometers away. The results of these measurements showed no significant change in exposure rates and potential doses to members of the public during the monitoring period. The results of the monitoring performed in 2022 also show that operating the Maine Yankee ISFSI results in only a small fraction of the 40 CFR Part 190 and 10 CFR Part 72.104 direct radiation dose limit of 25 mrem/year to members of the public.

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## 1.0 INTRODUCTION

This report summarizes the findings of the Radiological Environmental Monitoring Program (REMP) conducted by Maine Yankee in the vicinity of the Independent Spent Fuel Storage Installation in Wiscasset, Maine during the calendar year 2022. It is submitted annually in compliance with Appendix A of the Offsite Dose Calculation Manual (ODCM). The remainder of this report is organized as follows:

- Section 2: Provides a brief description of the Maine Yankee site and its environs.
- Section 3: Provides a description of the overall REMP design. Included is a summary of the requirements for REMP sampling, tables listing routine TLD monitoring locations with compass sectors and distances from the ISFSI, and maps showing the location of each of the TLD monitoring locations.
- Section 4: Provides a complete set of TLD data in the exposure units of milliroentgen (mR). These TLD data are then converted to a calculated dose equivalent in units of mrem per year. This section also provides the summarized exposure rate data in the format specified by the NRC Branch Technical Position on Environmental Monitoring (Reference 1).
- Section 5: Provides the results of the monitoring program. The performance of the program in meeting ODCM requirements is discussed, and the data acquired during the year is analyzed.
- Section 6: References

## **2.0 GENERAL ISFSI AND SITE INFORMATION**

The Maine Yankee Independent Spent Fuel Storage Installation (ISFSI) is located in the town of Wiscasset, Lincoln County, Maine, approximately six miles northeast of Bath, Maine. The site vicinity is rural and lightly populated.

The ISFSI site is located near Bailey Point, a peninsula bounded to the east by the Back River and to the west by a shallow inlet known as Bailey Cove, both of which are part of the Montsweag Bay-Sheepscot River Estuary. Bailey point is an elongated bedrock ridge with flat or gently rolling topography rising to an average elevation of about 25 feet above sea level.

The REMP for the ISFSI began pre-operational measurements in the 4th quarter of 1999, approximately 2 years prior to the initial spent fuel transfer to the ISFSI. The ISFSI REMP has been in continuous operation since this transfer began.

## **3.0 PROGRAM DESIGN**

The REMP for the Maine Yankee ISFSI was designed to provide assurance to regulatory agencies and the public that the station's environmental impact is known and within anticipated limits. The direct dose limit for members of the public from operation of the ISFSI is 25 mrem per year (References 3 and 4).

The detailed sampling requirements of the REMP are given in the ODCM. The sampling requirements specified in the ODCM are summarized in Table 3.1 of this report. Details of the monitored locations are shown in Table 3.2, as well as Figures 3.1 and 3.2 of this report.

### **3.1 Monitoring Zones**

The REMP is designed to allow comparison of levels of radioactivity in samples from the area possibly influenced by the ISFSI to levels found in areas not influenced by the ISFSI. The first area is called "indicator stations". The second area is called "control stations". The distinction between the two is based on relative direction from the facility and distance. Analysis of survey data from the two zones aids in determining if there is a significant difference between the two areas. It can also help in differentiating between radioactivity or radiation due to releases and that due to other fluctuations in the environment, such as seasonal variations in the natural background.

### **3.2 Pathways Monitored**

Based on the design of the ISFSI, only the direct radiation exposure pathway is monitored by the REMP. This pathway is monitored by the collection of thermoluminescent dosimeters (TLDs) which are described in more detail below.

### **3.3 Description of Monitoring Program**

#### **3.3.1 Direct Radiation**

Direct gamma radiation exposure was continuously monitored during 2022 with the use of thermoluminescent dosimeters (TLDs). At each monitoring location, these TLDs are sealed in plastic bags and attached to an object such as a tree, fence or utility pole. The TLDs are posted and retrieved on a semi-annual basis. All TLDs are provided and processed by a National Voluntary Laboratory Accreditation Program (NVLAP) certified vendor. The TLDs are placed at various locations around the ISFSI. Table 3.2 lists the Station ID Codes, distances and direction of the TLDs from the ISFSI.

#### **3.3.2 Special Monitoring**

Special samples can be taken that are not required in the ODCM. No special samples were collected in 2022.

**Table 3.1  
Radiological Environmental Monitoring Program**

<b>Exposure Pathway and/or Sample Media</b>	<b>Collection</b>			<b>Analysis</b>	
	<b>Number of Sample Locations</b>	<b>Routine Sampling Mode</b>	<b>Collection Frequency</b>	<b>Analysis Type</b>	<b>Analysis Frequency</b>
Direct Radiation (TLD)	Total Locations: 10 (9 around perimeter of the site and 1 offsite control location)	Continuous	Semi-annual	Gamma dose	Semi-annual

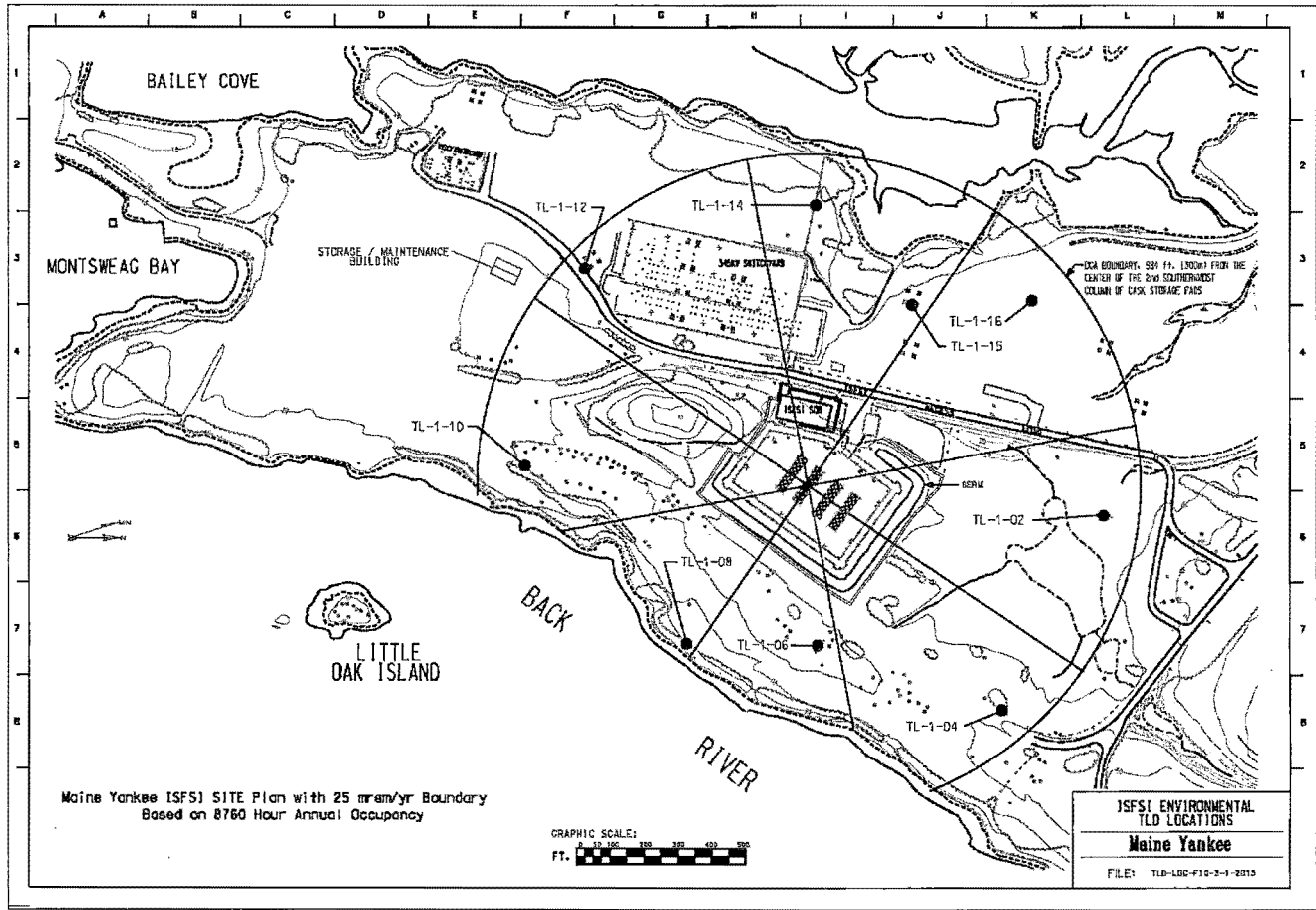
**Table 3.2  
Radiological Environmental Monitoring Locations**

<b>Station Code</b>	<b>Station Description</b>	<b>Zone*</b>	<b>Distance From ISFSI (km)</b>	<b>Direction From ISFSI</b>
TL-I-02	Spent Fuel Storage (I)**	1	< 0.28	N
TL-I-04	Spent Fuel Storage (I)**	1	< 0.28	NE
TL-I-06	Spent Fuel Storage (I)**	1	< 0.28	E
TL-I-08	Spent Fuel Storage (I)**	1	< 0.28	SE
TL-I-10	Spent Fuel Storage (I)**	1	< 0.28	S
TL-I-12	Spent Fuel Storage (I)**	1	< 0.28	SW
TL-I-14	Spent Fuel Storage (I)**	1	< 0.28	W
TL-I-15	Spent Fuel Storage (I)**	1	< 0.28	WNW
TL-I-16	Spent Fuel Storage (I)**	1	< 0.28	NW
TL-O-36	Wiscasset Fire Station (O)	2	5.2	NW

\*2 = Control TLD; 1 = Indicator TLD

\*\*I = Inner Ring TLD; O = Outer Ring TLD

**Figure 3.1**  
**Radiological Environmental Monitoring Locations (within 0.28 km)**



**Figure 3.2**  
**Direct Radiation Monitoring Locations (outside 1 km)**



#### **4.0 RADIOLOGICAL DATA SUMMARY TABLES**

This section summarizes the analytical results of the environmental samples, which were collected during the monitoring period.

- Data from direct radiation measurements made by TLDs are presented in Table 4.1.
- The summarized TLD measurements, shown in Table 4.2, are presented in a format similar to that prescribed in the NRC's Radiological Assessment Branch Technical Position on Environmental Monitoring (Reference 1).
- Table 4.3 presents the estimated direct dose from ISFSI operations as determined by TLD data shown in Table 4.1.



**Table 4.1 TLD Measurements by Half-Year  
(mR)**

<b>Station ID</b>	<b>Direction</b>	<b>1<sup>st</sup> Half-Year</b>	<b>2<sup>nd</sup> Half-Year</b>
TL-I-02	N	29	39
TL-I-04	NE	33	40
TL-I-06	E	38	43
TL-I-08	SE	31	39
TL-I-10	S	36	40
TL-I-12	SW	38	42
TL-I-14	W	35	44
TL-I-15	WNW	36	47
TL-I-16	NW	38	48
TL-O-36	Control	34	37
TL-O-36a	Control Backup	34	41

**Table 4.2 TLD Data Summary  
(mR)**

<b>Indicator TLDs</b>	<b>Control TLDs</b>	<b>Indicator Station With Highest Mean</b>	
Mean (Range) (No. Measurements)*	Mean (Range) (No. Measurements)*	Station #	Mean (Range) (No. Measurements)*
38.7	36.5	TL-I-16	43.0
(29 – 48)	(34 – 41)		(38 – 48)
(18)	(4)		(2)

\* Each "measurement" is based on semi-annual readings.

**Table 4.3 Direct Dose from ISFSI Operations  
(mrem)**

Station ID	1 <sup>st</sup> Half-Year		2 <sup>nd</sup> Half-Year		Annual Dose
	Net TLD Result	Calculated Dose	Net TLD Result	Calculated Dose	
TL-I-02	0.00	0.00	0.00	0.00	0.00
TL-I-04	0.00	0.00	1.00	0.04	0.04
TL-I-06	4.00	0.15	4.00	0.15	0.30
TL-I-08	0.00	0.00	0.00	0.00	0.00
TL-I-10	2.00	0.07	1.00	0.04	0.11
TL-I-12	4.00	0.15	3.00	0.11	0.26
TL-I-14	1.00	0.04	5.00	0.19	0.23
TL-I-15	2.00	0.07	8.00	0.30	0.37
TL-I-16	4.00	0.15	9.00	0.33	0.48
			<b>Max Dose =&gt;</b>		<b>0.48</b>

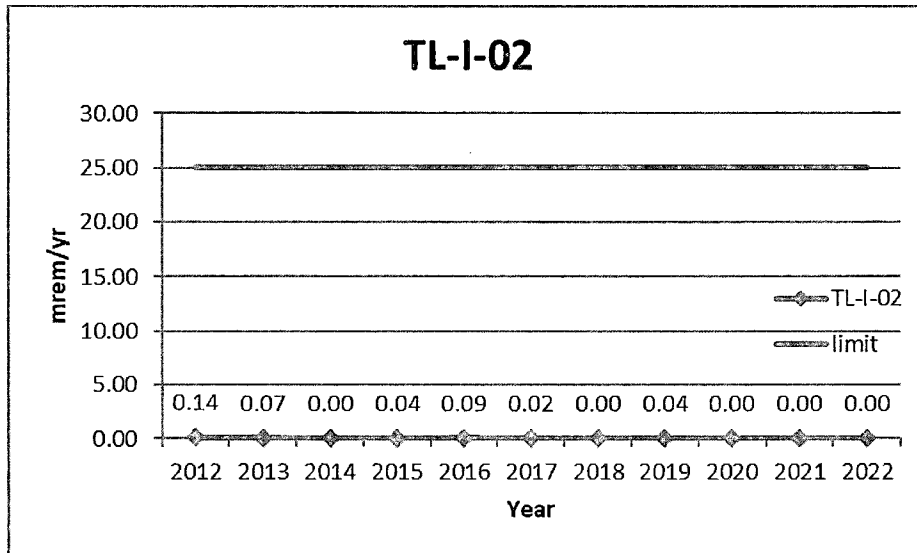
**Note:**

Doses based on a 162.5 hour occupancy in both of the first and second half-years.

## **Radiological Environmental Monitoring Program Trending**

A series of graphs of REMP TLD data have been developed and are provided for trending purposes. The trending is developed for each of the indicator locations based on the annual historical doses. The trending is provided for the "real members of the public" based on the guidance provided in the ODCM. The analysis of the trends and associated data shows very small annual doses with minor fluctuations in the data. In this report, the uncorrected TLD results have been summarized and the annual doses, calculated for "real members of the public" based upon guidance in the ODCM, have been plotted for trending.

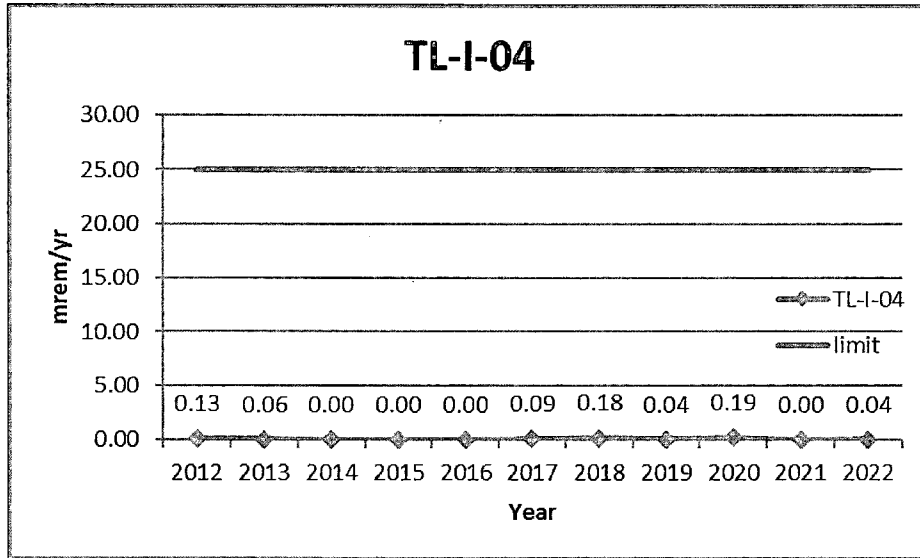
**Figure 4.1 Annual Dose Trend at TL-I-02**



**Annual Doses (mrem/yr)**

Location	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
TL-I-02	0.14	0.07	0.00	0.04	0.09	0.02	0.00	0.04	0.00	0.00	0.00

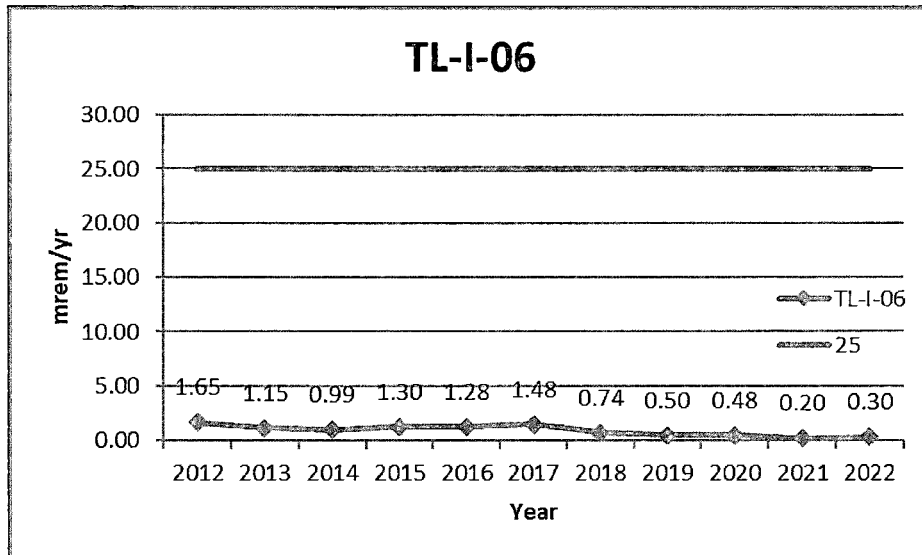
**Figure 4.2 Annual Dose Trend at TL-I-04**



**Annual Doses (mrem/yr)**

Location	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
TL-I-04	0.13	0.06	0.00	0.00	0.00	0.09	0.18	0.04	0.19	0.00	0.04

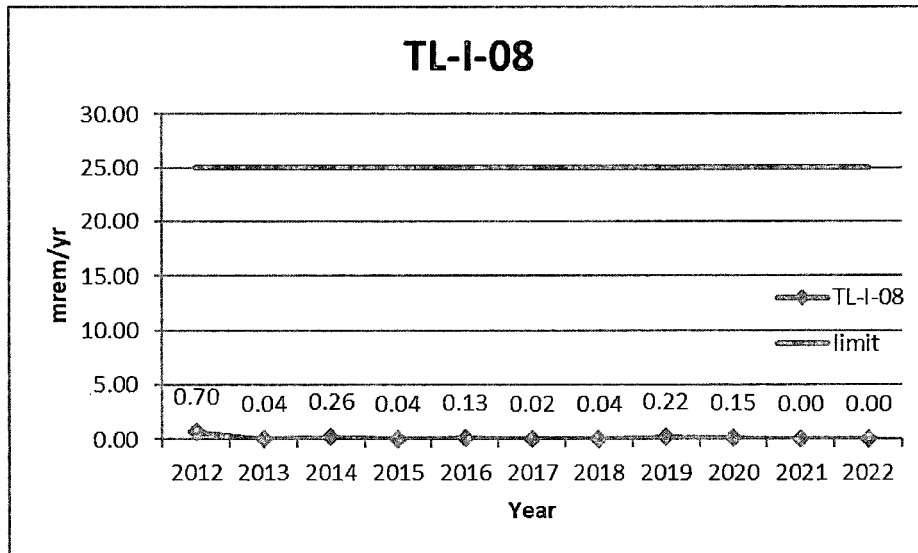
**Figure 4.3 Annual Dose Trend at TL-I-06**



**Annual Doses (mrem/yr)**

Location	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
TL-I-06	1.65	1.15	0.99	1.30	1.28	1.48	0.74	0.50	0.48	0.20	0.30

**Figure 4.4 Annual Dose Trend at TL-I-08**

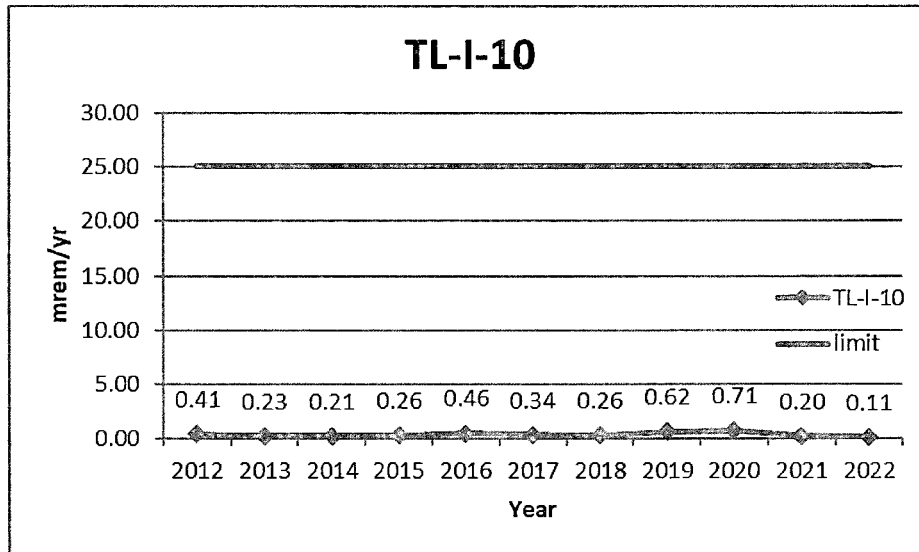


**Annual Doses (mrem/yr)**

Location	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
TL-I-08	0.70	0.04	0.26	0.04	0.13	0.02	0.04	0.22	0.15	0.00	0.00



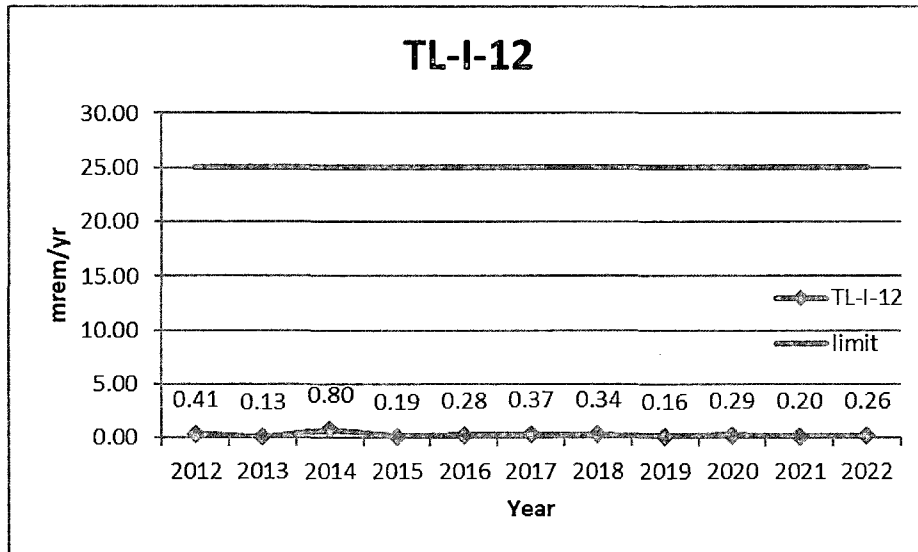
**Figure 4.5 Annual Dose Trend at TL-I-10**



**Annual Doses (mrem/yr)**

Location	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
TL-I-10	0.41	0.23	0.21	0.26	0.46	0.34	0.26	0.62	0.71	0.20	0.11

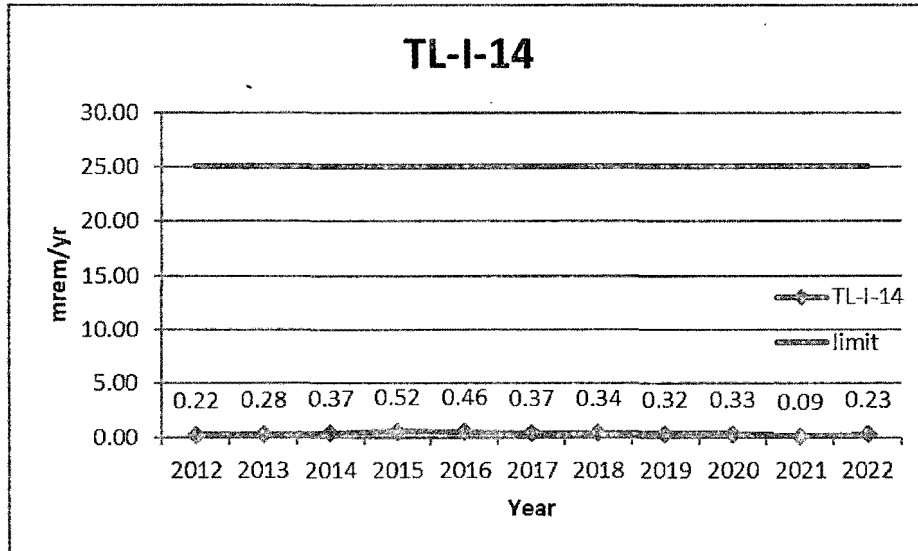
**Figure 4.6 Annual Dose Trend at TL-I-12**



**Annual Doses (mrem/yr)**

Location	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
TL-I-12	0.41	0.13	0.80	0.19	0.28	0.37	0.34	0.16	0.29	0.20	0.26

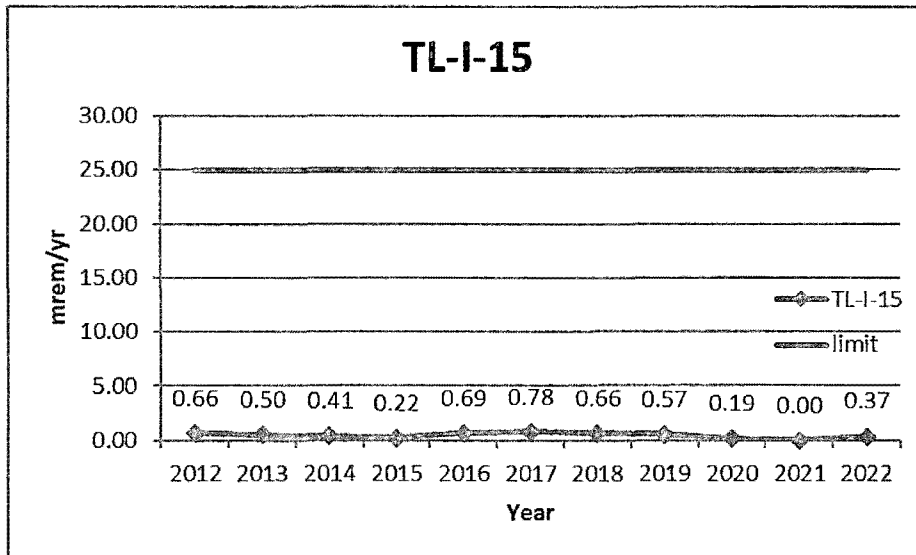
**Figure 4.7 Annual Dose Trend at TL-I-14**



**Annual Doses (mrem/yr)**

Location	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
TL-I-14	0.22	0.28	0.37	0.52	0.46	0.37	0.34	0.32	0.33	0.09	0.23

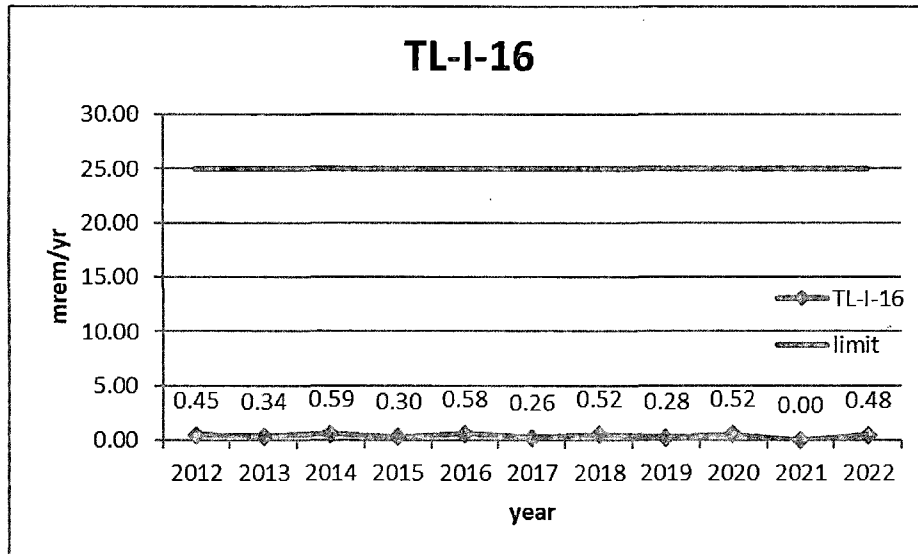
**Figure 4.8 Annual Dose Trend at TL-I-15**



**Annual Doses (mrem/yr)**

Location	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
TL-I-15	0.66	0.50	0.41	0.22	0.69	0.78	0.66	0.57	0.19	0.00	0.37

**Figure 4.9 Annual Dose Trend at TL-I-16**



**Annual Doses (mrem/yr)**

Location	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
TL-I-16	0.45	0.34	0.59	0.30	0.58	0.26	0.52	0.28	0.52	0.00	0.48

## **5.0 ANALYSIS OF ENVIRONMENTAL RESULTS**

### **5.1 Sampling Program Deviations**

A sampling program deviation is defined as samples that are unobtainable due to hazardous conditions or to malfunction of sampling equipment. Such deviations do not compromise the program's effectiveness and in fact are considered insignificant with respect to what is normally anticipated for this Radiological Environmental Monitoring Program.

There was a deviation of the sampling program documented in 2021. The REMP TLDs were not provided to the site in a timely manner to allow changeout at the end of 2021. This was due to issues at the TLD supplier's facility. The new TLDs were installed on February 1, 2022. All REMP locations were continuously monitored in 2022. This condition has no impact on the REMP since it remained within the surveillance frequency of +25%.

### **5.2 Direct Radiation Pathway**

#### **5.2.1 Annual Dose Trends**

Direct radiation is continuously measured at 9 indicator locations surrounding the Maine Yankee ISFSI, along with 1 control location (Wiscasset Fire Station) using thermoluminescent dosimeters (TLDs). These dosimeters are collected every six months for readout at the NVLAP certified dosimetry services vendor.

Review of the data in Figures 4.1 through 4.9 shows no significant difference in annual doses over time at the indicator locations and their relation to the 25 mrem/yr limit.

#### **5.2.2 Direct Doses from ISFSI Operations**

A dose estimate is the potential dose to any real member of the public that could use portions of the site or be present adjacent to the site for recreational activities throughout the year. Direct exposure above background can be estimated by subtracting the average TLD value of the control station from the indicator location measurements. As in previous years, the 2022 dose estimate assumes a total of 325 hours occupancy for the dose calculation; of which 162.5 hours are used in both the first and second half-years. The most likely location for exposure

to a member of the public from the ISFSI is along the Back River, Bailey Cove or Montsweag Bay for boating and fishing and the mud flats in the Cove or Bay exposed at low tides which is worked by clam diggers and worm diggers; however, the time estimates are conservatively applied to all monitoring locations.

Table 4.3 presents the results of the dose calculations. The highest calculated dose is at Station ID number TL-I-16. The maximum calculated annual dose at those locations is 0.48 mrem. This value is only 1.9 percent of the 25 mrem per year limit. It is noted that most of the mud flat region in Bailey Cove that is used by the public is situated further away from this Station. As a result, actual exposures from direct radiation would be much less than the maximum calculated value.

## **6.0 REFERENCES**

1. USNRC Radiological Assessment Branch Technical Position, "An Acceptable Radiological Environmental Monitoring Program," Revision 1, November 1979.
2. Maine Yankee Offsite Dose Calculation Manual, Revision 36.
3. 40 CFR Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operation".
4. 10 CFR Part 72.104, "Criteria for Radioactive Materials in Effluents and Direct Radiation from an ISFSI or MRS".