

**MAINE YANKEE
INDEPENDENT SPENT FUEL STORAGE INSTALLATION
License No. DPR-36**

**ANNUAL RADIOLOGICAL ENVIRONMENTAL
OPERATING REPORT**

January - December 2008



March 2009

Prepared by:
**Radiological Safety & Control Services
91 Portsmouth Avenue
Stratham, NH 03885-2468**

EXECUTIVE SUMMARY

The Maine Yankee Independent Spent Fuel Storage Facility (ISFSI) has been in operation since 2001. All fuel has been transferred into dry storage casks and placed at the Independent Spent Fuel Storage Facility. The Radiological Environmental Monitoring Program (REMP) for the Maine Yankee ISFSI located in Wiscasset, ME was continued for the period January through December 2008 in compliance with the Maine Yankee Off-Site Dose Calculation Manual (ODCM).

No changes were made to the ODCM during 2008. 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. 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 2008 also show that operating the Maine Yankee ISFSI results in only a small fraction of the 40 CFR Part 190 direct radiation dose limit of 25 mrem/year to members of the public.

In 2007 and again in 2008, samples were collected from Outfall-018. The collection and analysis of these water samples is not required by the Off-site Dose Calculation Manual; however, it is a requirement found in the REMP implementing procedure. These samples were collected and analyzed using the same protocol for standard REMP samples. Review of the results of the samples collected in 2007 and 2008 show no impact from operation of the ISFSI on the environment. Because this sample is not a requirement specified in the ODCM, the results will no longer be presented in this report.

The Outfall-018 sample results reported in the 2007 Annual Radiological Environmental Operating Report were actually from 2006. See Section 7, Correction to the 2007 Annual Report, for details and a sample results table.

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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 2008. It is submitted annually in compliance with Appendix A, of the Off-site 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 plant, and maps showing the location of each of the TLD monitoring locations.
- Section 4: Provides a complete set of TLD data showing measured results (mR), TLD data converted to exposure rates (μR per hour) and calculated doses (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
- Section 7: Provides detail on an error in the 2007 Annual Report along with the corrected sample results.

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 Radiological Environmental Monitoring Program (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 Radiological Environmental Monitoring Program (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 (Reference 3).

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 2008 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 quarterly 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 Independent Spent Fuel Storage Insulation (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 are taken that are not required in the ODCM. The sample locations do not appear in Table 3.1 or 3.2 of this report. For this monitoring period, five Outfall-018 water samples were collected as part of the Maine Yankee ISFSI Radiological Environmental Monitoring Program. The results of these samples are available for review at the site.

**Table 3.1
Radiological Environmental Monitoring Program**

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

**Table 3.2
Radiological Environmental Monitoring Locations**

Station Code	Station Description	Zone*	Distance From ISFSI (km)	Direction From ISFSI
TL-O-36	Wiscasset Fire Station (O)	2	5.2	NW
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

*2 = Control TLD; 1 = Indicator TLD

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

Figure 3.1
 Radiological Environmental Monitoring Locations
 (within 0.288 km)

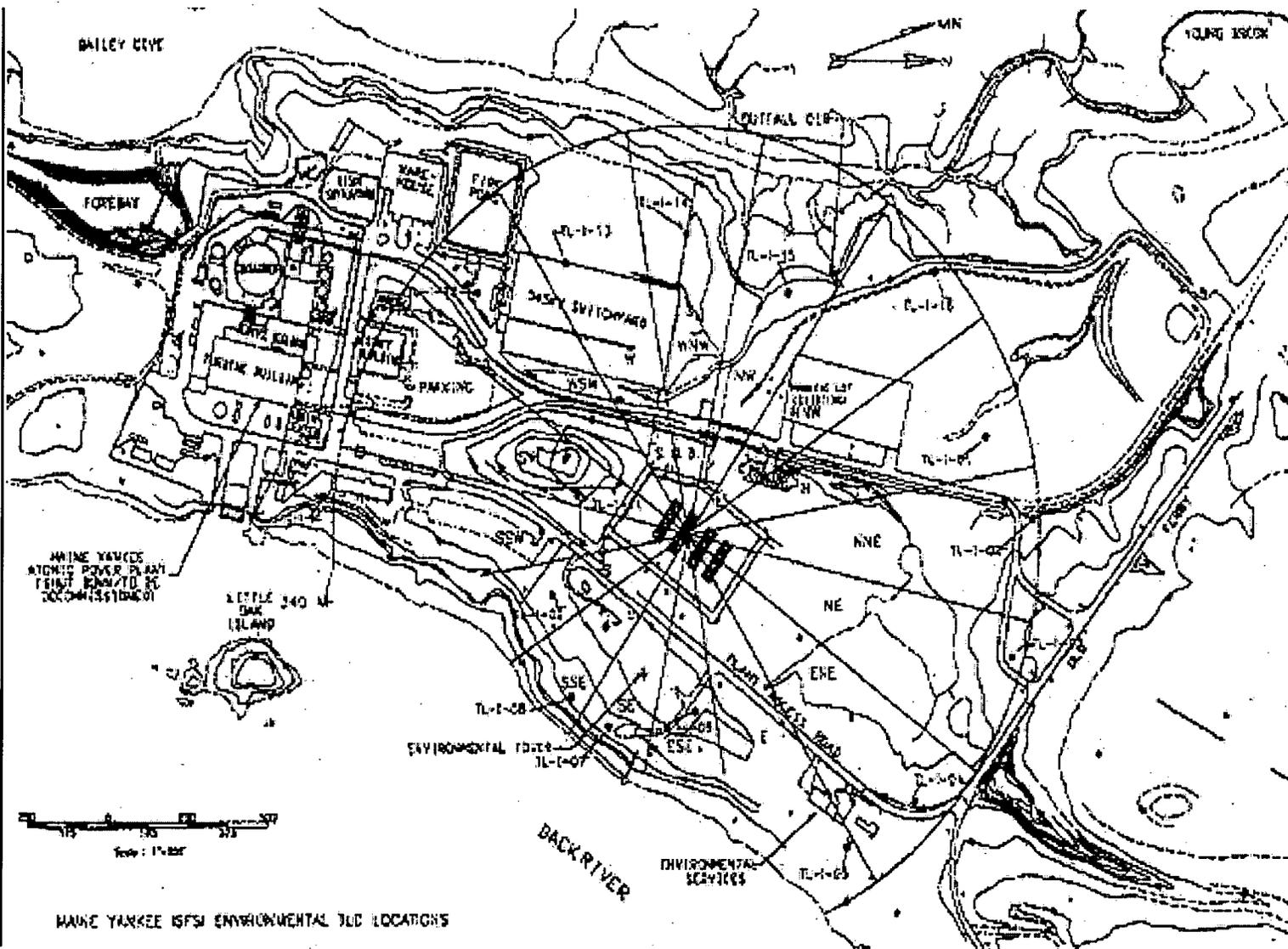
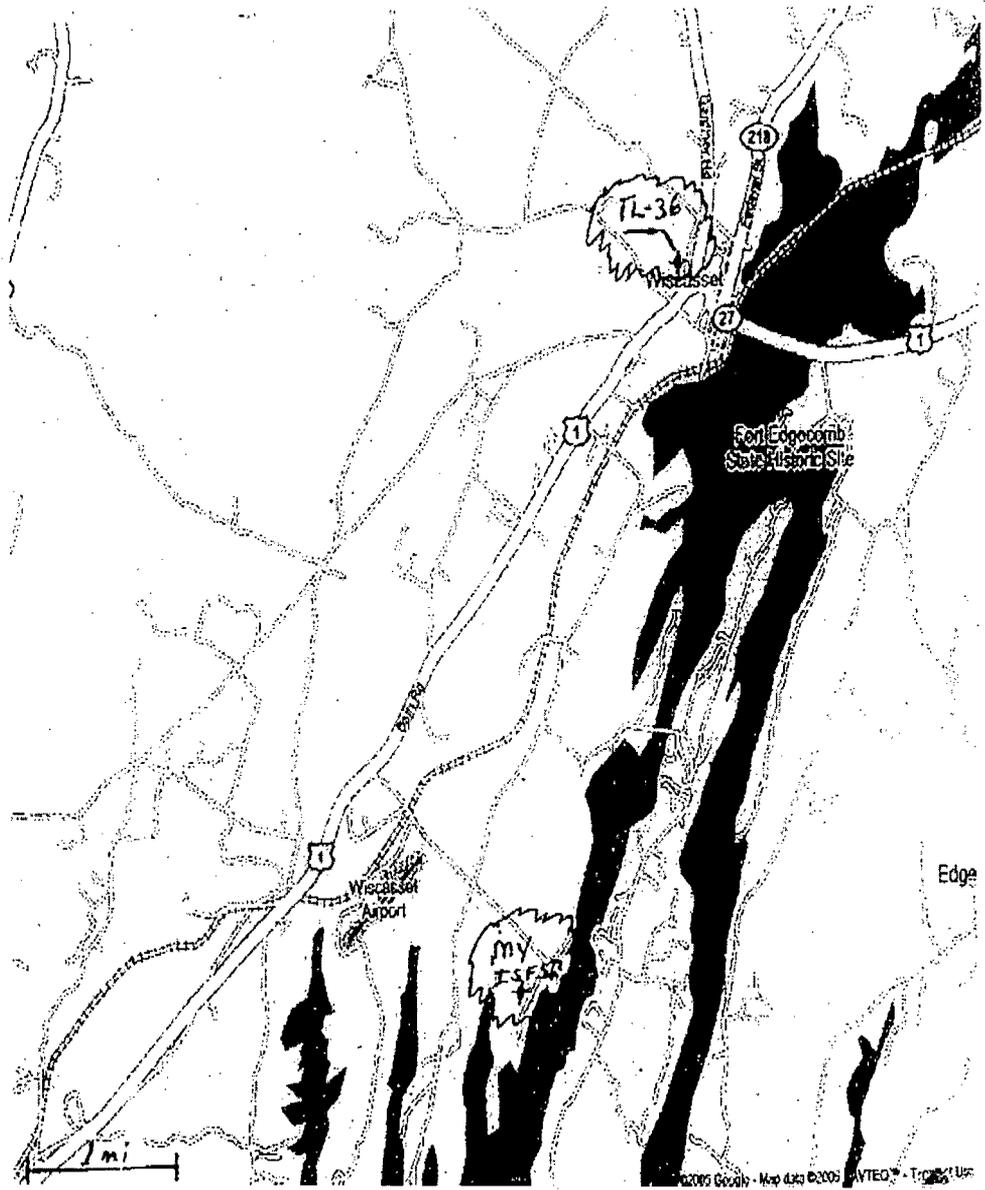


Figure 3.2
Direct Radiation Monitoring Locations
(outside 1 km)



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 provided in Table 4.1. The direct measurements converted to exposure rates are provided in Table 4.2. The summarized exposure rate results, shown in Table 4.3, are presented in a format similar to that prescribed in the NRC's Radiological Assessment Branch Technical Position on Environmental Monitoring (Reference 1). Table 4.4 provides the estimated direct dose from ISFSI operations as determined by TLDs.

Table 4.1
TLD Measurements by Quarter
(mR)

Station ID	Direction	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
TL-I-02	N	25	28	31	33
TL-I-04	NE	25	22	27	36
TL-I-06	E	44	37	35	38
TL-I-08	SE	27	28	32	37
TL-I-10	S	28	27	30	34
TL-I-12	SW	28	29	34	NR
TL-I-14	W	32	27	30	34
TL-I-15	WNW	34	28	31	32
TL-I-16	NW	30	30	31	35
TL-O-36	Control	24	23	27	31
TL-O-36a	Control Backup	26	25	26	29

Note: NR = no result. The TLD at Station TL-I-12 in the 4th quarter was damaged.

Table 4.2
Exposure Rates from TLD Measurements
(μ R per hour)

Station ID	Direction	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Annual Ave
TL-I-02	N	7.6	7.9	7.1	7.6	7.5
TL-I-04	NE	7.6	4.9	5.3	8.9	6.7
TL-I-06	E	16.4	12.3	9.0	9.8	11.9
TL-I-08	SE	8.5	7.9	7.6	9.4	8.3
TL-I-10	S	9.0	7.4	6.7	8.0	7.8
TL-I-12	SW	9.0	8.4	8.5		8.6
TL-I-14	W	10.8	7.4	6.7	8.0	8.2
TL-I-15	WNW	11.7	7.9	7.1	7.2	8.5
TL-I-16	NW	9.9	8.9	7.1	8.5	8.6
TL-O-36	Control	7.6	5.9	5.1	6.3	6.2

Table 4.3
Environmental TLD Data Summary
(μ R per hour)

Inner Ring TLDs	Control TLD's	Station With Highest Mean	
Mean (Range) (No. Measurements)*	Mean (Range) (No. Measurements)*	Station #	Mean (Range) (No. Measurements)*
8.4	6.2	TL-I-06	11.9
(4.9 – 16.4)	(5.1 – 7.6)		(9.0 – 16.4)
(35)	(8)		(4)

* Each "measurement" is based on quarterly readings

**Table 4.4
Direct Dose from ISFSI Operations
(mrem)**

Station ID	Q1		Q2		Q3		Q4		Annual Dose
	Net TLD Result	Calculated Dose							
TL-I-02	0.0	0.0	4.0	0.2	4.5	0.3	3.0	0.0	0.5
TL-I-04	0.0	0.0	0.0	0.0	0.5	0.0	6.0	0.1	0.1
TL-I-06	19.0	0.3	13.0	0.8	8.5	0.5	8.0	0.1	1.7
TL-I-08	2.0	0.0	4.0	0.2	5.5	0.3	7.0	0.1	0.7
TL-I-10	3.0	0.0	3.0	0.2	3.5	0.2	4.0	0.1	0.5
TL-I-12	3.0	0.0	5.0	0.3	7.5	0.4			0.8
TL-I-14	7.0	0.1	3.0	0.2	3.5	0.2	4.0	0.1	0.5
TL-I-15	9.0	0.1	4.0	0.2	4.5	0.3	2.0	0.0	0.7
TL-I-16	5.0	0.1	6.0	0.4	4.5	0.3	5.0	0.1	0.8

Max Dose => 1.7

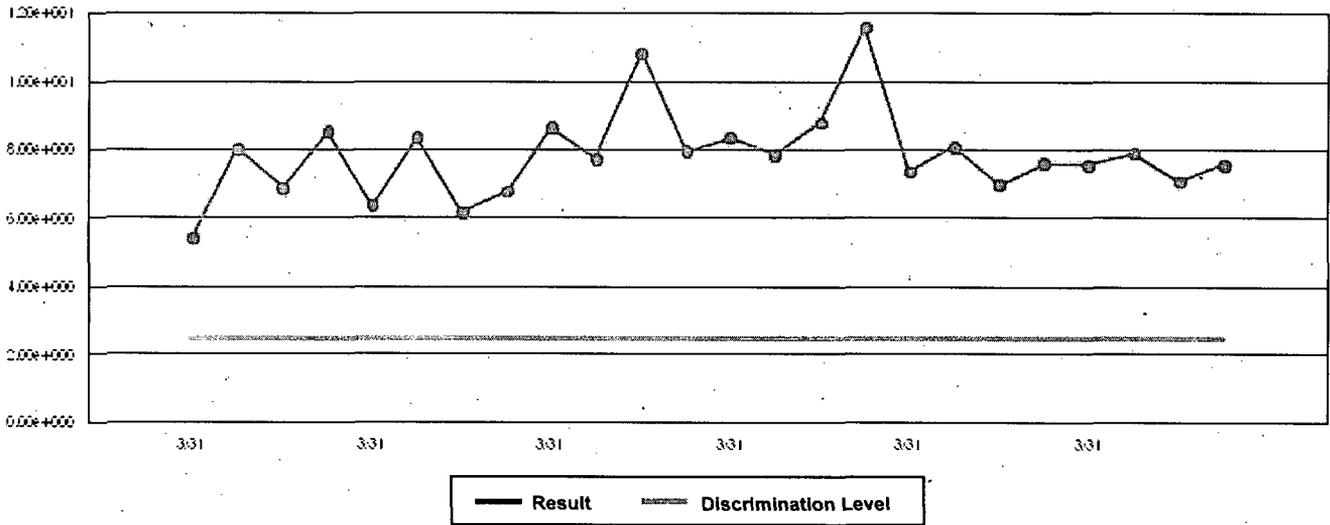
Notes:

1. Doses based on a 32.5 hour occupancy in both of the first and fourth quarters and a 130 hour occupancy in both of the second and third quarters.
2. Some of the net TLD results were negative and rounded up to zero.

Figure 4.1
Exposure Rate Trend at TL-I-02

Trend Report	02/27/2009
Displays: Samples collected between 03/31/2003 and 01/01/2009	

Indicator Locations - TL-I-02: REMP TLD [Exposure Rate]



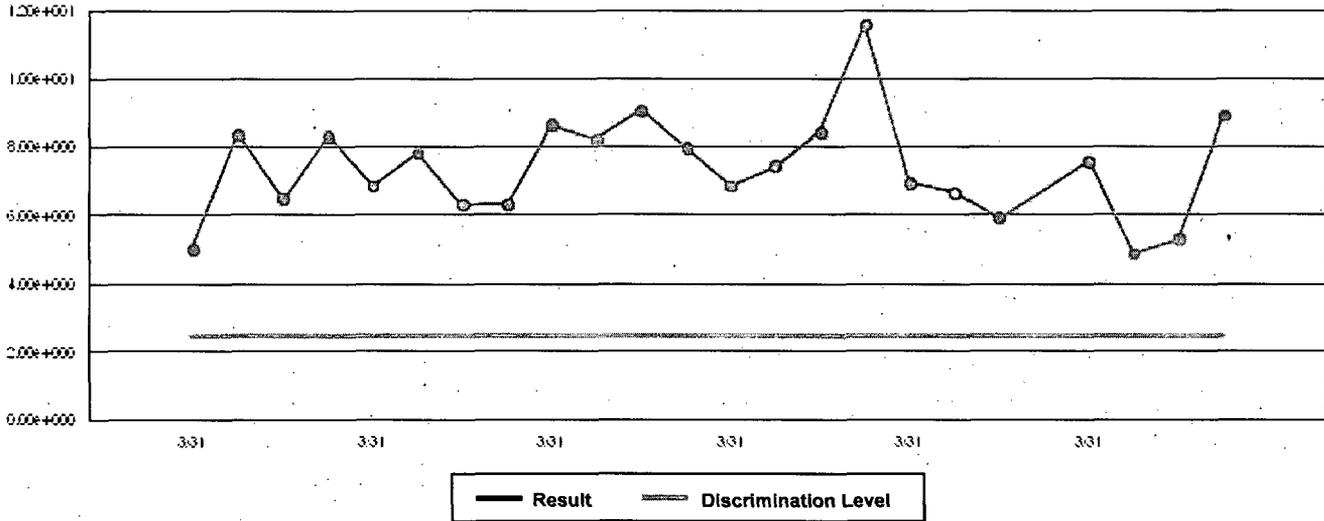
Sample Name	Date Collected	Result	2 Sigma Error	Discrimination Level
TL-I-02-001	03/31/2003	5.4E+000 µR/h†*	1.18E+000	2.5E+000
TL-I-02-002	06/30/2003	8.0E+000 µR/h†*	1.10E+000	2.5E+000
TL-I-02-003	09/30/2003	6.9E+000 µR/h†*	1.00E+000	2.5E+000
TL-I-02-004	12/31/2003	8.5E+000 µR/h†*	9.00E-001	2.5E+000
TL-I-02-005	03/31/2004	6.4E+000 µR/h†*	8.20E-001	2.5E+000
TL-I-02-006	06/30/2004	8.3E+000 µR/h†*	8.00E-001	2.5E+000
TL-I-02-007	09/30/2004	6.2E+000 µR/h†*	6.60E-001	2.5E+000
TL-I-02-008	12/31/2004	6.8E+000 µR/h†*	7.40E-001	2.5E+000
TL-I-02-009	03/31/2005	8.6E+000 µR/h†*	8.60E-001	2.5E+000
TL-I-02-010	06/30/2005	7.8E+000 µR/h†*	7.80E-001	2.5E+000
TL-I-02-011	09/30/2005	1.1E+001 µR/h†*	1.08E+000	2.5E+000
TL-I-02-012	12/31/2005	8.0E+000 µR/h†*	8.00E-001	2.5E+000
TL-I-02-013	03/31/2006	8.4E+000 µR/h†*	8.40E-001	2.5E+000
TL-I-02-014	06/30/2006	7.9E+000 µR/h†*	7.80E-001	2.5E+000
TL-I-02-015	09/30/2006	8.8E+000 µR/h†*	8.80E-001	2.5E+000
TL-I-02-016	12/31/2006	1.2E+001 µR/h†*	1.16E+000	2.5E+000
TL-I-02-017	03/31/2007	7.4E+000 µR/h†*	7.40E-001	2.5E+000
TL-I-02-018	06/30/2007	8.1E+000 µR/h†*	8.00E-001	2.5E+000
TL-I-02-019	09/30/2007	7.0E+000 µR/h†*	7.00E-001	2.5E+000
TL-I-02-020	12/31/2007	7.6E+000 µR/h†*	7.60E-001	2.5E+000
TL-I-02-021	03/31/2008	7.6E+000 µR/h†*	8.00E-001	2.5E+000
TL-I-02-022	06/30/2008	7.9E+000 µR/h†*	8.00E-001	2.5E+000
TL-I-02-023	09/30/2008	7.1E+000 µR/h†*	8.00E-001	2.5E+000
TL-I-02-024	12/31/2008	7.6E+000 µR/h†*	8.00E-001	2.5E+000

Results marked with * are greater than 2 Sigma Error.
Results marked with † are greater than the Discrimination Level

**Figure 4.2
Exposure Rate Trend at TL-I-04**

Trend Report	02/27/2009
Displays: Samples collected between 03/31/2003 and 01/01/2009	

Indicator Locations - TL-I-04: REMP TLD [Exposure Rate]



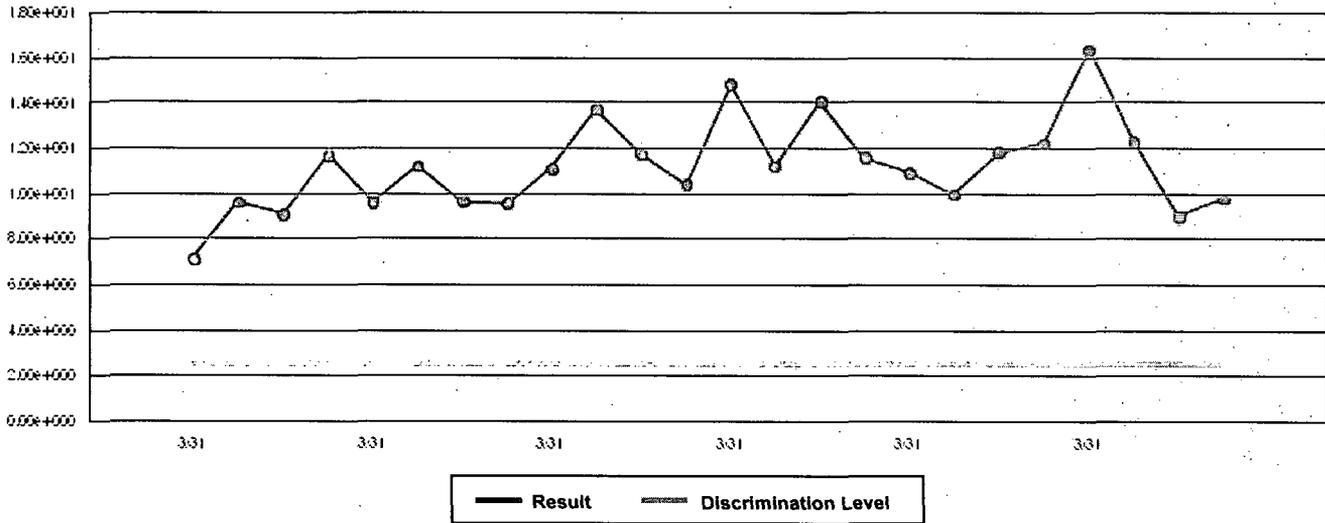
Sample Name	Date Collected	Result	2 Sigma Error	Discrimination Level
TL-I-04-001	03/31/2003	5.1E+000 µR/h†*	1.26E+000	2.5E+000
TL-I-04-002	06/30/2003	8.4E+000 µR/h†*	1.02E+000	2.5E+000
TL-I-04-003	09/30/2003	6.5E+000 µR/h†*	7.20E-001	2.5E+000
TL-I-04-004	12/31/2003	8.3E+000 µR/h†*	1.14E+000	2.5E+000
TL-I-04-005	03/31/2004	6.9E+000 µR/h†*	7.80E-001	2.5E+000
TL-I-04-006	06/30/2004	7.8E+000 µR/h†*	1.08E+000	2.5E+000
TL-I-04-007	09/30/2004	6.3E+000 µR/h†*	6.20E-001	2.5E+000
TL-I-04-008	12/31/2004	6.3E+000 µR/h†*	4.20E-001	2.5E+000
TL-I-04-009	03/31/2005	8.6E+000 µR/h†*	8.60E-001	2.5E+000
TL-I-04-010	06/30/2005	8.2E+000 µR/h†*	8.20E-001	2.5E+000
TL-I-04-011	09/30/2005	9.1E+000 µR/h†*	9.00E-001	2.5E+000
TL-I-04-012	12/31/2005	8.0E+000 µR/h†*	8.00E-001	2.5E+000
TL-I-04-013	03/31/2006	6.9E+000 µR/h†*	6.80E-001	2.5E+000
TL-I-04-014	06/30/2006	7.5E+000 µR/h†*	7.40E-001	2.5E+000
TL-I-04-015	09/30/2006	8.4E+000 µR/h†*	8.40E-001	2.5E+000
TL-I-04-016	12/31/2006	1.2E+001 µR/h†*	1.16E+000	2.5E+000
TL-I-04-017	03/31/2007	7.0E+000 µR/h†*	7.00E-001	2.5E+000
TL-I-04-018	06/30/2007	6.7E+000 µR/h†*	6.60E-001	2.5E+000
TL-I-04-019	09/30/2007	5.9E+000 µR/h†*	6.00E-001	2.5E+000
TL-I-04-021	03/31/2008	7.6E+000 µR/h†*	8.00E-001	2.5E+000
TL-I-04-022	06/30/2008	4.9E+000 µR/h†*	4.00E-001	2.5E+000
TL-I-04-023	09/30/2008	5.3E+000 µR/h†*	6.00E-001	2.5E+000
TL-I-04-024	12/31/2008	8.9E+000 µR/h†*	8.00E-001	2.5E+000

Results marked with * are greater than 2 Sigma Error.
Results marked with † are greater than the Discrimination Level

**Figure 4.3
Exposure Rate Trend at TL-I-06**

Trend Report	02/27/2009
Displays: Samples collected between 03/31/2003 and 01/01/2009	

Indicator Locations - TL-I-06: REMP TLD [Exposure Rate]



Sample Name	Date Collected	Result	2 Sigma Error	Discrimination Level
TL-I-06-001	03/31/2003	7.1E+000 µR/h†*	1.36E+000	2.5E+000
TL-I-06-002	06/30/2003	9.6E+000 µR/h†*	1.00E+000	2.5E+000
TL-I-06-003	09/30/2003	9.1E+000 µR/h†*	1.46E+000	2.5E+000
TL-I-06-004	12/31/2003	1.2E+001 µR/h†*	1.16E+000	2.5E+000
TL-I-06-005	03/31/2004	9.6E+000 µR/h†*	9.40E-001	2.5E+000
TL-I-06-006	06/30/2004	1.1E+001 µR/h†*	1.72E+000	2.5E+000
TL-I-06-007	09/30/2004	9.7E+000 µR/h†*	1.20E+000	2.5E+000
TL-I-06-008	12/31/2004	9.6E+000 µR/h†*	1.24E+000	2.5E+000
TL-I-06-009	03/31/2005	1.1E+001 µR/h†*	1.12E+000	2.5E+000
TL-I-06-010	06/30/2005	1.4E+001 µR/h†*	1.38E+000	2.5E+000
TL-I-06-011	09/30/2005	1.2E+001 µR/h†*	1.18E+000	2.5E+000
TL-I-06-012	12/31/2005	1.0E+001 µR/h†*	1.04E+000	2.5E+000
TL-I-06-013	03/31/2006	1.5E+001 µR/h†*	1.48E+000	2.5E+000
TL-I-06-014	06/30/2006	1.1E+001 µR/h†*	1.12E+000	2.5E+000
TL-I-06-015	09/30/2006	1.4E+001 µR/h†*	1.40E+000	2.5E+000
TL-I-06-016	12/31/2006	1.2E+001 µR/h†*	1.16E+000	2.5E+000
TL-I-06-017	03/31/2007	1.1E+001 µR/h†*	1.10E+000	2.5E+000
TL-I-06-018	06/30/2007	1.0E+001 µR/h†*	1.00E+000	2.5E+000
TL-I-06-019	09/30/2007	1.2E+001 µR/h†*	1.18E+000	2.5E+000
TL-I-06-020	12/31/2007	1.2E+001 µR/h†*	1.22E+000	2.5E+000
TL-I-06-021	03/31/2008	1.6E+001 µR/h†*	1.60E+000	2.5E+000
TL-I-06-022	06/30/2008	1.2E+001 µR/h†*	1.20E+000	2.5E+000
TL-I-06-023	09/30/2008	9.0E+000 µR/h†*	8.00E-001	2.5E+000
TL-I-06-024	12/31/2008	9.8E+000 µR/h†*	1.00E+000	2.5E+000

Results marked with * are greater than 2 Sigma Error.
Results marked with † are greater than the Discrimination Level

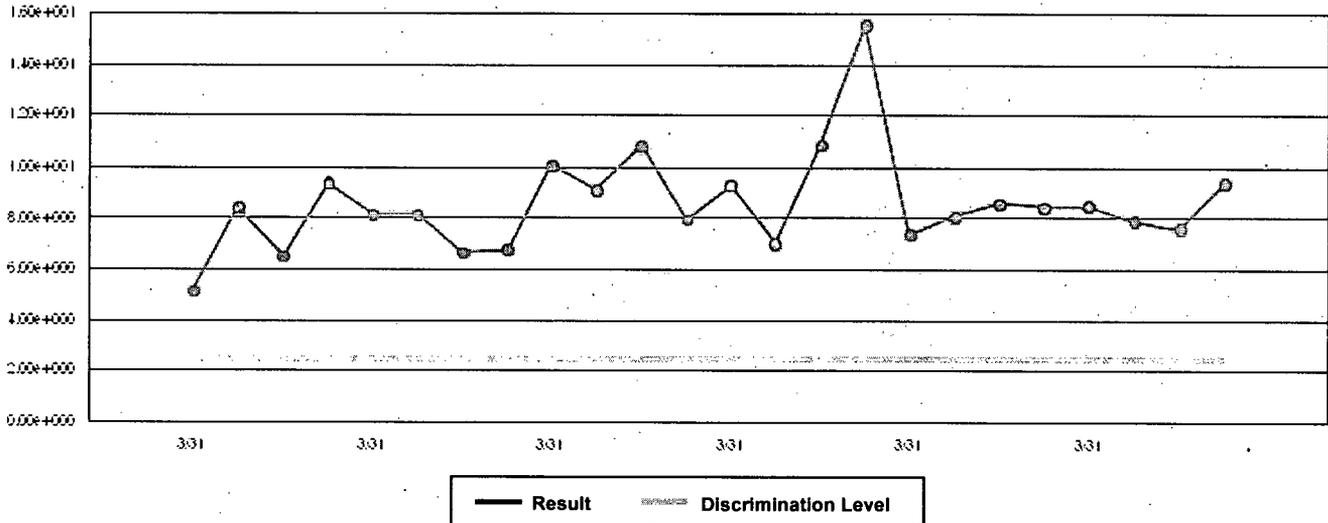
Figure 4.4
Exposure Rate Trend at TL-I-08

Trend Report

02/27/2009

Displays: Samples collected between 03/31/2003 and 01/01/2009

Indicator Locations - TL-I-08: REMP TLD [Exposure Rate]



Sample Name	Date Collected	Result	2 Sigma Error	Discrimination Level
TL-I-08-001	03/31/2003	5.2E+000 µR/h†*	1.18E+000	2.5E+000
TL-I-08-002	06/30/2003	8.4E+000 µR/h†*	1.24E+000	2.5E+000
TL-I-08-003	09/30/2003	6.5E+000 µR/h†*	9.20E-001	2.5E+000
TL-I-08-004	12/31/2003	9.4E+000 µR/h†*	1.00E+000	2.5E+000
TL-I-08-005	03/31/2004	8.2E+000 µR/h†*	1.14E+000	2.5E+000
TL-I-08-006	06/30/2004	8.2E+000 µR/h†*	1.14E+000	2.5E+000
TL-I-08-007	09/30/2004	6.7E+000 µR/h†*	5.80E-001	2.5E+000
TL-I-08-008	12/31/2004	6.8E+000 µR/h†*	5.40E-001	2.5E+000
TL-I-08-009	03/31/2005	1.0E+001 µR/h†*	1.02E+000	2.5E+000
TL-I-08-010	06/30/2005	9.1E+000 µR/h†*	9.20E-001	2.5E+000
TL-I-08-011	09/30/2005	1.1E+001 µR/h†*	1.08E+000	2.5E+000
TL-I-08-012	12/31/2005	8.0E+000 µR/h†*	8.00E-001	2.5E+000
TL-I-08-013	03/31/2006	9.3E+000 µR/h†*	9.40E-001	2.5E+000
TL-I-08-014	06/30/2006	7.0E+000 µR/h†*	7.00E-001	2.5E+000
TL-I-08-015	09/30/2006	1.1E+001 µR/h†*	1.08E+000	2.5E+000
TL-I-08-016	12/31/2006	1.6E+001 µR/h†*	1.56E+000	2.5E+000
TL-I-08-017	03/31/2007	7.4E+000 µR/h†*	7.40E-001	2.5E+000
TL-I-08-018	06/30/2007	8.1E+000 µR/h†*	8.00E-001	2.5E+000
TL-I-08-019	09/30/2007	8.6E+000 µR/h†*	8.60E-001	2.5E+000
TL-I-08-020	12/31/2007	8.5E+000 µR/h†*	8.40E-001	2.5E+000
TL-I-08-021	03/31/2008	8.5E+000 µR/h†*	8.00E-001	2.5E+000
TL-I-08-022	06/30/2008	7.9E+000 µR/h†*	8.00E-001	2.5E+000
TL-I-08-023	09/30/2008	7.6E+000 µR/h†*	8.00E-001	2.5E+000
TL-I-08-024	12/31/2008	9.4E+000 µR/h†*	1.00E+000	2.5E+000

Results marked with * are greater than 2 Sigma Error.
Results marked with † are greater than the Discrimination Level

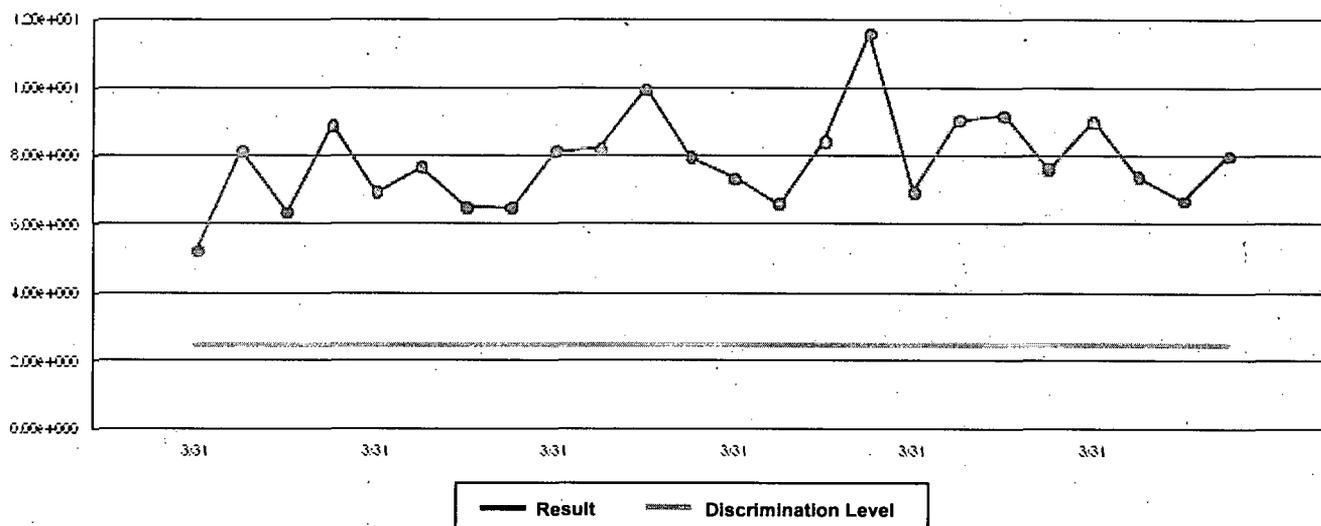
Figure 4.5
Exposure Rate Trend at TL-I-10

Trend Report

02/27/2009

Displays: Samples collected between 03/31/2003 and 01/01/2009

Indicator Locations - TL-I-10: REMP TLD [Exposure Rate]



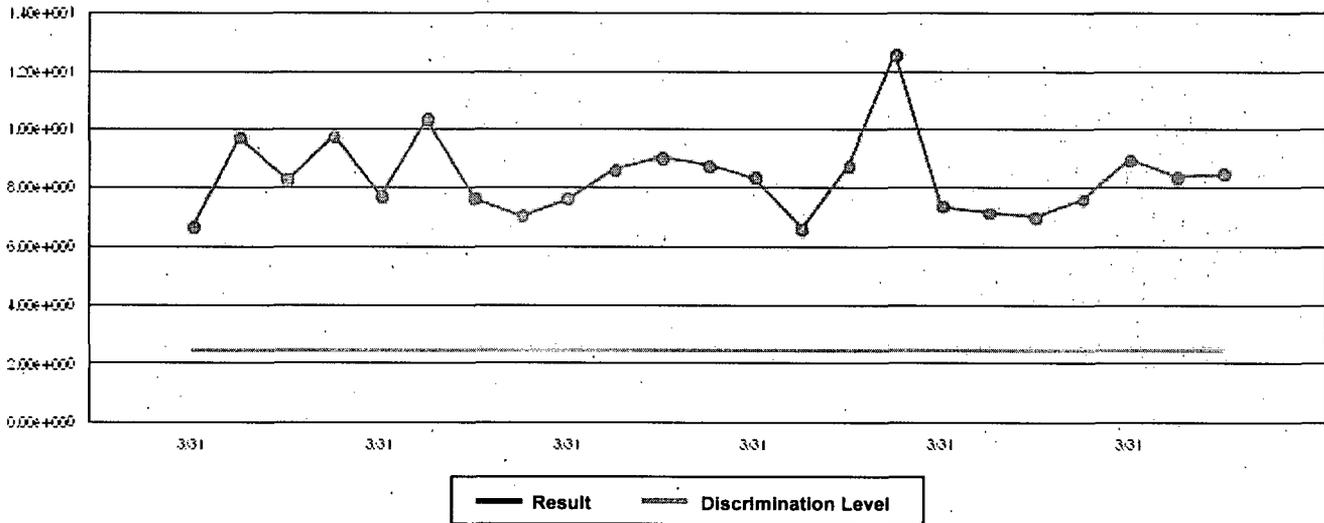
Sample Name	Date Collected	Result	2 Sigma Error	Discrimination Level
TL-I-10-001	03/31/2003	5.2E+000 µR/h†*	1.18E+000	2.5E+000
TL-I-10-002	06/30/2003	8.2E+000 µR/h†*	1.04E+000	2.5E+000
TL-I-10-003	09/30/2003	6.4E+000 µR/h†*	1.10E+000	2.5E+000
TL-I-10-004	12/31/2003	8.9E+000 µR/h†*	8.60E-001	2.5E+000
TL-I-10-005	03/31/2004	6.9E+000 µR/h†*	8.60E-001	2.5E+000
TL-I-10-006	06/30/2004	7.7E+000 µR/h†*	1.06E+000	2.5E+000
TL-I-10-007	09/30/2004	6.5E+000 µR/h†*	8.40E-001	2.5E+000
TL-I-10-008	12/31/2004	6.5E+000 µR/h†*	9.60E-001	2.5E+000
TL-I-10-009	03/31/2005	8.1E+000 µR/h†*	8.20E-001	2.5E+000
TL-I-10-010	06/30/2005	8.2E+000 µR/h†*	8.20E-001	2.5E+000
TL-I-10-011	09/30/2005	1.0E+001 µR/h†*	1.00E+000	2.5E+000
TL-I-10-012	12/31/2005	8.0E+000 µR/h†*	8.00E-001	2.5E+000
TL-I-10-013	03/31/2006	7.4E+000 µR/h†*	7.40E-001	2.5E+000
TL-I-10-014	06/30/2006	6.6E+000 µR/h†*	6.60E-001	2.5E+000
TL-I-10-015	09/30/2006	8.4E+000 µR/h†*	8.40E-001	2.5E+000
TL-I-10-016	12/31/2006	1.2E+001 µR/h†*	1.16E+000	2.5E+000
TL-I-10-017	03/31/2007	7.0E+000 µR/h†*	7.00E-001	2.5E+000
TL-I-10-018	06/30/2007	9.0E+000 µR/h†*	9.00E-001	2.5E+000
TL-I-10-019	09/30/2007	9.2E+000 µR/h†*	9.20E-001	2.5E+000
TL-I-10-020	12/31/2007	7.6E+000 µR/h†*	7.60E-001	2.5E+000
TL-I-10-021	03/31/2008	9.0E+000 µR/h†*	8.00E-001	2.5E+000
TL-I-10-022	06/30/2008	7.4E+000 µR/h†*	8.00E-001	2.5E+000
TL-I-10-023	09/30/2008	6.7E+000 µR/h†*	6.00E-001	2.5E+000
TL-I-10-024	12/31/2008	8.0E+000 µR/h†*	8.00E-001	2.5E+000

Results marked with * are greater than 2 Sigma Error.
Results marked with † are greater than the Discrimination Level

**Figure 4.6
Exposure Rate Trend at TL-I-12**

Trend Report	02/27/2009
Displays: Samples collected between 03/31/2003 and 01/01/2009	

Indicator Locations - TL-I-12: REMP TLD [Exposure Rate]



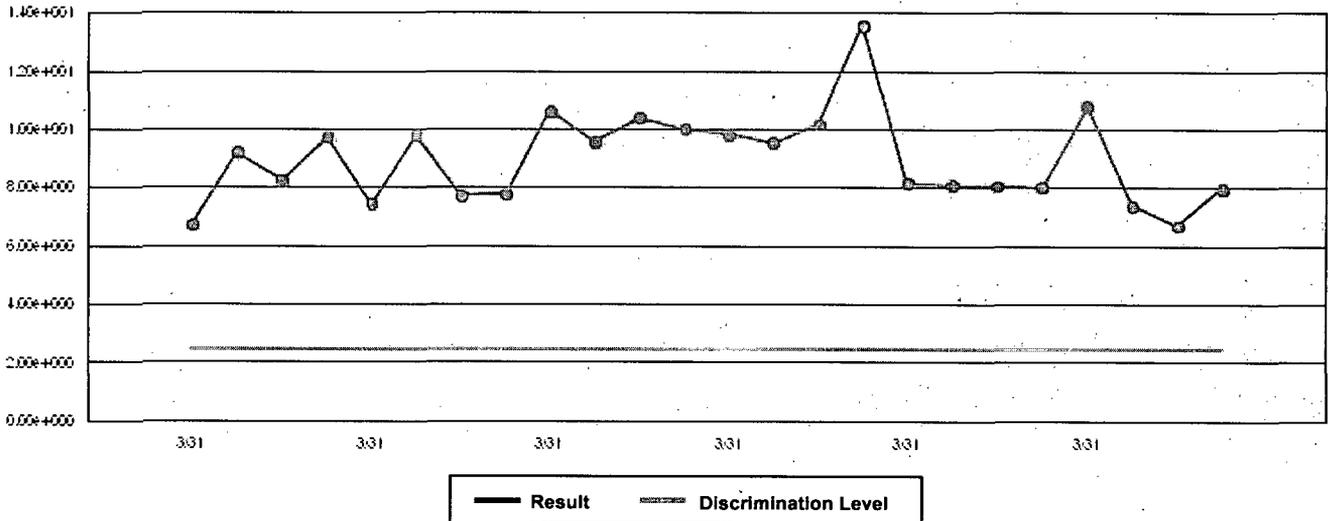
Sample Name	Date Collected	Result	2 Sigma Error	Discrimination Level
TL-I-12-001	03/31/2003	6.7E+000 µR/h†*	1.30E+000	2.5E+000
TL-I-12-002	06/30/2003	9.7E+000 µR/h†*	1.38E+000	2.5E+000
TL-I-12-003	09/30/2003	8.3E+000 µR/h†*	1.14E+000	2.5E+000
TL-I-12-004	12/31/2003	9.8E+000 µR/h†*	7.80E-001	2.5E+000
TL-I-12-005	03/31/2004	7.7E+000 µR/h†*	1.50E+000	2.5E+000
TL-I-12-006	06/30/2004	1.0E+001 µR/h†*	1.14E+000	2.5E+000
TL-I-12-007	09/30/2004	7.6E+000 µR/h†*	7.00E-001	2.5E+000
TL-I-12-008	12/31/2004	7.1E+000 µR/h†*	7.40E-001	2.5E+000
TL-I-12-009	03/31/2005	7.6E+000 µR/h†*	7.60E-001	2.5E+000
TL-I-12-010	06/30/2005	8.7E+000 µR/h†*	8.60E-001	2.5E+000
TL-I-12-011	09/30/2005	9.1E+000 µR/h†*	9.00E-001	2.5E+000
TL-I-12-012	12/31/2005	8.8E+000 µR/h†*	8.80E-001	2.5E+000
TL-I-12-013	03/31/2006	8.4E+000 µR/h†*	8.40E-001	2.5E+000
TL-I-12-014	06/30/2006	6.6E+000 µR/h†*	6.60E-001	2.5E+000
TL-I-12-015	09/30/2006	8.8E+000 µR/h†*	8.80E-001	2.5E+000
TL-I-12-016	12/31/2006	1.3E+001 µR/h†*	1.26E+000	2.5E+000
TL-I-12-017	03/31/2007	7.4E+000 µR/h†*	7.40E-001	2.5E+000
TL-I-12-018	06/30/2007	7.2E+000 µR/h†*	7.20E-001	2.5E+000
TL-I-12-019	09/30/2007	7.0E+000 µR/h†*	7.00E-001	2.5E+000
TL-I-12-020	12/31/2007	7.6E+000 µR/h†*	7.60E-001	2.5E+000
TL-I-12-021	03/31/2008	9.0E+000 µR/h†*	8.00E-001	2.5E+000
TL-I-12-022	06/30/2008	8.4E+000 µR/h†*	8.00E-001	2.5E+000
TL-I-12-023	09/30/2008	8.5E+000 µR/h†*	8.00E-001	2.5E+000

Results marked with * are greater than 2 Sigma Error.
Results marked with † are greater than the Discrimination Level

Figure 4.7
Exposure Rate Trend at TL-I-14

Trend Report	02/27/2009
Displays: Samples collected between 03/31/2003 and 01/01/2009	

Indicator Locations - TL-I-14: REMP TLD [Exposure Rate]



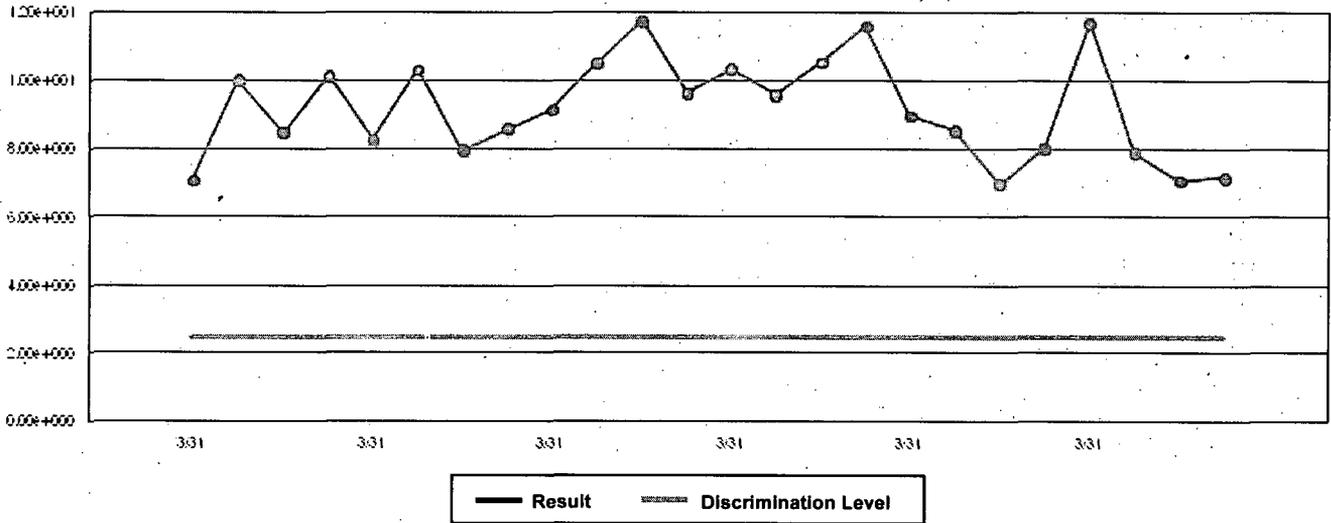
Sample Name	Date Collected	Result	2 Sigma Error	Discrimination Level
TL-I-14-001	03/31/2003	6.7E+000 µR/h†*	1.26E+000	2.5E+000
TL-I-14-002	06/30/2003	9.2E+000 µR/h†*	1.04E+000	2.5E+000
TL-I-14-003	09/30/2003	8.3E+000 µR/h†*	9.20E-001	2.5E+000
TL-I-14-004	12/31/2003	9.7E+000 µR/h†*	1.00E+000	2.5E+000
TL-I-14-005	03/31/2004	7.4E+000 µR/h†*	8.00E-001	2.5E+000
TL-I-14-006	06/30/2004	9.8E+000 µR/h†*	1.28E+000	2.5E+000
TL-I-14-007	09/30/2004	7.8E+000 µR/h†*	8.80E-001	2.5E+000
TL-I-14-008	12/31/2004	7.8E+000 µR/h†*	9.20E-001	2.5E+000
TL-I-14-009	03/31/2005	1.1E+001 µR/h†*	1.06E+000	2.5E+000
TL-I-14-010	06/30/2005	9.6E+000 µR/h†*	9.60E-001	2.5E+000
TL-I-14-011	09/30/2005	1.0E+001 µR/h†*	1.04E+000	2.5E+000
TL-I-14-012	12/31/2005	1.0E+001 µR/h†*	1.00E+000	2.5E+000
TL-I-14-013	03/31/2006	9.8E+000 µR/h†*	9.80E-001	2.5E+000
TL-I-14-014	06/30/2006	9.6E+000 µR/h†*	9.60E-001	2.5E+000
TL-I-14-015	09/30/2006	1.0E+001 µR/h†*	1.02E+000	2.5E+000
TL-I-14-016	12/31/2006	1.4E+001 µR/h†*	1.36E+000	2.5E+000
TL-I-14-017	03/31/2007	8.2E+000 µR/h†*	8.20E-001	2.5E+000
TL-I-14-018	06/30/2007	8.1E+000 µR/h†*	8.00E-001	2.5E+000
TL-I-14-019	09/30/2007	8.1E+000 µR/h†*	8.00E-001	2.5E+000
TL-I-14-020	12/31/2007	8.1E+000 µR/h†*	8.00E-001	2.5E+000
TL-I-14-021	03/31/2008	1.1E+001 µR/h†*	1.00E+000	2.5E+000
TL-I-14-022	06/30/2008	7.4E+000 µR/h†*	8.00E-001	2.5E+000
TL-I-14-023	09/30/2008	6.7E+000 µR/h†*	6.00E-001	2.5E+000
TL-I-14-024	12/31/2008	8.0E+000 µR/h†*	8.00E-001	2.5E+000

Results marked with * are greater than 2 Sigma Error.
Results marked with † are greater than the Discrimination Level

**Figure 4.8
Exposure Rate Trend at TL-I-15**

Trend Report	02/27/2009
Displays: Samples collected between 03/31/2003 and 01/01/2009	

Indicator Locations - TL-I-15: REMP TLD [Exposure Rate]



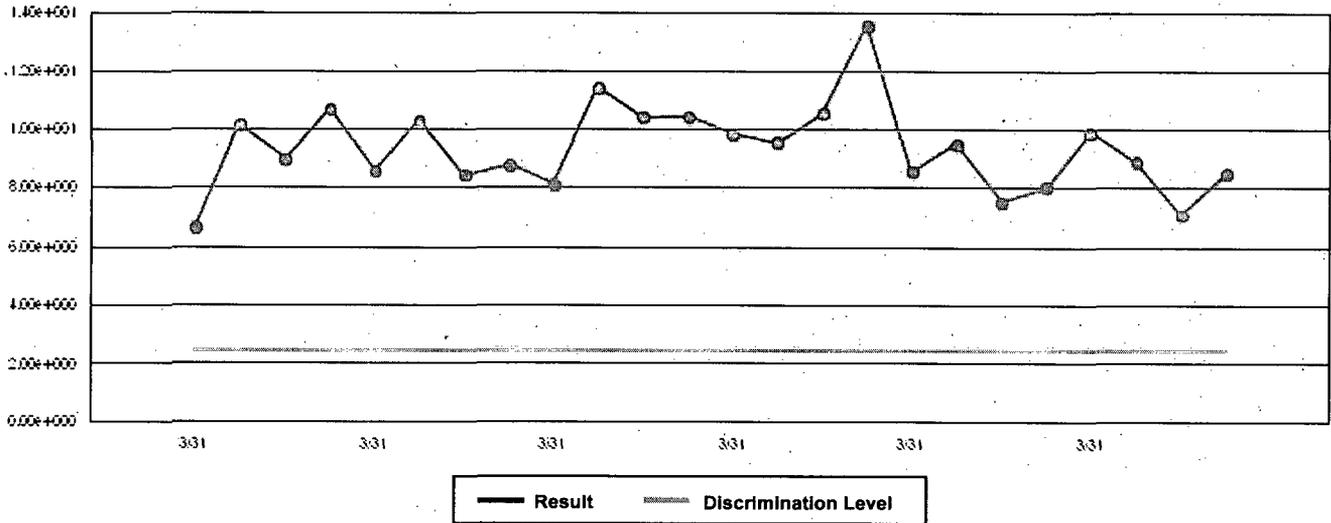
Sample Name	Date Collected	Result	2 Sigma Error	Discrimination Level
TL-I-15-001	03/31/2003	7.1E+000 μ R/h†*	1.62E+000	2.5E+000
TL-I-15-002	06/30/2003	1.0E+001 μ R/h†*	1.34E+000	2.5E+000
TL-I-15-003	09/30/2003	8.5E+000 μ R/h†*	8.00E-001	2.5E+000
TL-I-15-004	12/31/2003	1.0E+001 μ R/h†*	1.08E+000	2.5E+000
TL-I-15-005	03/31/2004	8.3E+000 μ R/h†*	8.00E-001	2.5E+000
TL-I-15-006	06/30/2004	1.0E+001 μ R/h†*	1.06E+000	2.5E+000
TL-I-15-007	09/30/2004	8.0E+000 μ R/h†*	8.40E-001	2.5E+000
TL-I-15-008	12/31/2004	8.6E+000 μ R/h†*	6.00E-001	2.5E+000
TL-I-15-009	03/31/2005	9.1E+000 μ R/h†*	9.20E-001	2.5E+000
TL-I-15-010	06/30/2005	1.1E+001 μ R/h†*	1.06E+000	2.5E+000
TL-I-15-011	09/30/2005	1.2E+001 μ R/h†*	1.18E+000	2.5E+000
TL-I-15-012	12/31/2005	9.6E+000 μ R/h†*	9.60E-001	2.5E+000
TL-I-15-013	03/31/2006	1.0E+001 μ R/h†*	1.04E+000	2.5E+000
TL-I-15-014	06/30/2006	9.6E+000 μ R/h†*	9.60E-001	2.5E+000
TL-I-15-015	09/30/2006	1.1E+001 μ R/h†*	1.06E+000	2.5E+000
TL-I-15-016	12/31/2006	1.2E+001 μ R/h†*	1.16E+000	2.5E+000
TL-I-15-017	03/31/2007	9.0E+000 μ R/h†*	9.00E-001	2.5E+000
TL-I-15-018	06/30/2007	8.6E+000 μ R/h†*	8.60E-001	2.5E+000
TL-I-15-019	09/30/2007	7.0E+000 μ R/h†*	7.00E-001	2.5E+000
TL-I-15-020	12/31/2007	8.1E+000 μ R/h†*	8.00E-001	2.5E+000
TL-I-15-021	03/31/2008	1.2E+001 μ R/h†*	1.20E+000	2.5E+000
TL-I-15-022	06/30/2008	7.9E+000 μ R/h†*	8.00E-001	2.5E+000
TL-I-15-023	09/30/2008	7.1E+000 μ R/h†*	8.00E-001	2.5E+000
TL-I-15-024	12/31/2008	7.2E+000 μ R/h†*	8.00E-001	2.5E+000

Results marked with * are greater than 2 Sigma Error.
Results marked with † are greater than the Discrimination Level.

Figure 4.9
Exposure Rate Trend at TL-I-16

Trend Report	02/27/2009
Displays: Samples collected between 03/31/2003 and 01/01/2009	

Indicator Locations - TL-I-16: REMP TLD [Exposure Rate]



Sample Name	Date Collected	Result	2 Sigma Error	Discrimination Level
TL-I-16-001	03/31/2003	6.7E+000 µR/h†*	1.22E+000	2.5E+000
TL-I-16-002	06/30/2003	1.0E+001 µR/h†*	1.48E+000	2.5E+000
TL-I-16-003	09/30/2003	9.0E+000 µR/h†*	1.16E+000	2.5E+000
TL-I-16-004	12/31/2003	1.1E+001 µR/h†*	1.16E+000	2.5E+000
TL-I-16-005	03/31/2004	8.6E+000 µR/h†*	9.80E-001	2.5E+000
TL-I-16-006	06/30/2004	1.0E+001 µR/h†*	1.14E+000	2.5E+000
TL-I-16-007	09/30/2004	8.4E+000 µR/h†*	1.16E+000	2.5E+000
TL-I-16-008	12/31/2004	8.8E+000 µR/h†*	8.80E-001	2.5E+000
TL-I-16-009	03/31/2005	8.1E+000 µR/h†*	8.20E-001	2.5E+000
TL-I-16-010	06/30/2005	1.1E+001 µR/h†*	1.14E+000	2.5E+000
TL-I-16-011	09/30/2005	1.0E+001 µR/h†*	1.04E+000	2.5E+000
TL-I-16-012	12/31/2005	1.0E+001 µR/h†*	1.04E+000	2.5E+000
TL-I-16-013	03/31/2006	9.8E+000 µR/h†*	9.80E-001	2.5E+000
TL-I-16-014	06/30/2006	9.6E+000 µR/h†*	9.60E-001	2.5E+000
TL-I-16-015	09/30/2006	1.1E+001 µR/h†*	1.06E+000	2.5E+000
TL-I-16-016	12/31/2006	1.4E+001 µR/h†*	1.36E+000	2.5E+000
TL-I-16-017	03/31/2007	8.6E+000 µR/h†*	8.60E-001	2.5E+000
TL-I-16-018	06/30/2007	9.5E+000 µR/h†*	9.60E-001	2.5E+000
TL-I-16-019	09/30/2007	7.5E+000 µR/h†*	7.60E-001	2.5E+000
TL-I-16-020	12/31/2007	8.1E+000 µR/h†*	8.00E-001	2.5E+000
TL-I-16-021	03/31/2008	9.9E+000 µR/h†*	1.00E+000	2.5E+000
TL-I-16-022	06/30/2008	8.9E+000 µR/h†*	8.00E-001	2.5E+000
TL-I-16-023	09/30/2008	7.1E+000 µR/h†*	8.00E-001	2.5E+000
TL-I-16-024	12/31/2008	8.5E+000 µR/h†*	8.00E-001	2.5E+000

Results marked with * are greater than 2 Sigma Error.
Results marked with † are greater than the Discrimination Level

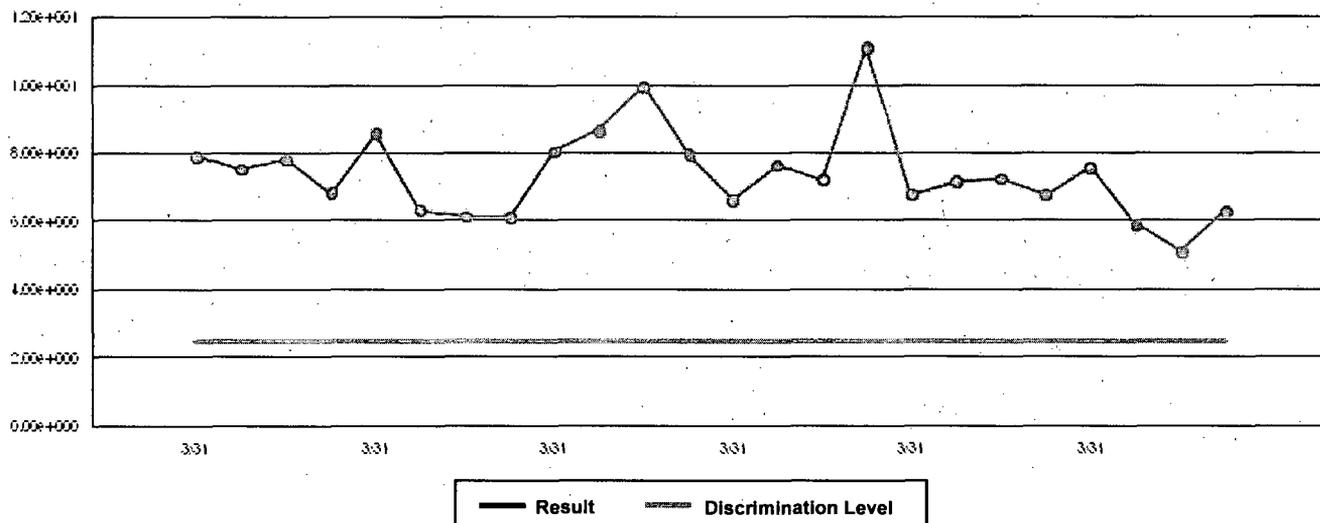
Figure 4.10
Exposure Rate Trend at Control Location TL-O-36

Trend Report

02/27/2009

Displays: Samples collected between 03/31/2003 and 01/01/2009

Control Location - TL-O-36: REMP TLD [Exposure Rate]



Sample Name	Date Collected	Result	2 Sigma Error	Discrimination Level
TL-O-36-001	03/31/2003	7.9E+000 μR/h†*	1.68E+000	2.5E+000
TL-O-36-002	06/30/2003	7.5E+000 μR/h†*	1.04E+000	2.5E+000
TL-O-36-003	09/30/2003	7.8E+000 μR/h†*	1.34E+000	2.5E+000
TL-O-36-004	12/31/2003	6.8E+000 μR/h†*	6.80E-001	2.5E+000
TL-O-36-005	03/31/2004	8.6E+000 μR/h†*	6.80E-001	2.5E+000
TL-O-36-006	06/30/2004	6.3E+000 μR/h†*	6.80E-001	2.5E+000
TL-O-36-007	09/30/2004	6.1E+000 μR/h†*	5.60E-001	2.5E+000
TL-O-36-008	12/31/2004	6.1E+000 μR/h†*	4.80E-001	2.5E+000
TL-O-36-009	03/31/2005	8.1E+000 μR/h†*	8.00E-001	2.5E+000
TL-O-36-010	06/30/2005	8.7E+000 μR/h†*	8.60E-001	2.5E+000
TL-O-36-011	09/30/2005	1.0E+001 μR/h†*	1.00E+000	2.5E+000
TL-O-36-012	12/31/2005	8.0E+000 μR/h†*	8.00E-001	2.5E+000
TL-O-36-013	03/31/2006	6.6E+000 μR/h†*	6.60E-001	2.5E+000
TL-O-36-014	06/30/2006	7.7E+000 μR/h†*	7.60E-001	2.5E+000
TL-O-36-015	09/30/2006	7.2E+000 μR/h†*	7.20E-001	2.5E+000
TL-O-36-016	12/31/2006	1.1E+001 μR/h†*	1.12E+000	2.5E+000
TL-O-36-017	03/31/2007	6.8E+000 μR/h†*	6.80E-001	2.5E+000
TL-O-36-018	06/30/2007	7.2E+000 μR/h†*	7.20E-001	2.5E+000
TL-O-36-019	09/30/2007	7.3E+000 μR/h†*	7.20E-001	2.5E+000
TL-O-36-020	12/31/2007	6.8E+000 μR/h†*	6.80E-001	2.5E+000
TL-O-36-021	03/31/2008	7.6E+000 μR/h†*	8.00E-001	2.5E+000
TL-O-36-022	06/30/2008	5.9E+000 μR/h†*	6.00E-001	2.5E+000
TL-O-36-023	09/30/2008	5.1E+000 μR/h†*	6.00E-001	2.5E+000
TL-O-36-024	12/31/2008	6.3E+000 μR/h†*	6.00E-001	2.5E+000

Results marked with * are greater than 2 Sigma Error.
Results marked with † are greater than the Discrimination Level

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.

One deviation occurred 2008. There is no data at location TL-I-12 for the 4th quarter. Although the TLD was deployed for the quarter, the dosimetry processor determined that the TLD was physically damaged and prevented readout. The location of the TLD has an insignificant impact in terms of calculation offsite dose to any real member of the public.

5.2 Direct Radiation Pathway

5.2.1 Exposure Rates

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 calendar quarter for readout at the NVLAP certified dosimetry services vendor.

Review of the data in Tables 4.2 and 4.3 shows that all indicator locations were slightly elevated in comparison to the control location exposure rates. Figures 4.1 through 4.10 provide exposure rate trends of the monitoring locations since 2003. Review of Figures 4.1 through 4.10 shows no significant difference in exposure rates over time at either the indicator or control locations. The data listed under each of the trend graphs show values for the result errors and discrimination levels. Note that these values are estimated and are shown only for information.

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 2008 dose estimate assumes a total of 325 hours occupancy for the dose calculation; of which 32.5 hours are used in both the first and fourth quarters and 130 hours are used in both the second and third quarters. 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 4.4 presents the results of the dose calculations. The highest calculated dose is at Station ID number TL-I-06. The maximum calculated annual dose at that location is 1.7 mrem. This value is only 7 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 Off-site Dose Calculation Manual, Revision 33.
3. 40 CFR Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operation".

7.0 CORRECTION TO THE 2007 ANNUAL REPORT

During a review of the 2007 Annual Radiological Environmental Operating Report, it was determined that 2006 Outfall-018 sample data was erroneously shown in Table 5.1 of the report. A Condition Report was written to document the issue. The cause was determined to be personnel error and inattention to detail. Only one sample from Outfall-018 was collected in 2007. The sample was sent for gamma spec analysis. None of the results were positive. A summary of the 2007 Outfall-018 sample results is shown on Table 7.1. A review of the correct results does not change the conclusions of the original report.

Table 7.1
2007 Outfall-018 Sample Results Summary
(pCi/L)

Radionuclide	Result	2 Sigma Error	MDC
Cs-134	-1.90E+00	3.59E+00	5.50E+00
Cs-137	6.70E-01	2.73E+00	4.80E+00
Co-58	-9.90E+00	2.41E+01	3.20E+01
Co-60	-2.70E+00	2.86E+00	3.70E+00
Fe-59	2.20E+01	1.23E+02	2.20E+02
Mn-54	-2.80E+00	4.08E+00	6.00E+00
Nb-95	1.70E+01	1.92E+02	3.30E+02
Zr-95	-4.70E+01	4.39E+01	6.00E+01