

**HADDAM NECK
INDEPENDENT SPENT FUEL STORAGE INSTALLATION**

License No. DPR-61

**ANNUAL RADIOLOGICAL ENVIRONMENTAL
OPERATING REPORT**

January - December 2012



March 2013

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

EXECUTIVE SUMMARY

Connecticut Yankee's Haddam Neck facility was permanently shutdown in 1996. 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 Connecticut Yankee Independent Spent Fuel Storage Installation (ISFSI) located in East Haddam, CT was continued for the period January through December 2012 in compliance with the Connecticut Yankee Off-Site Dose Calculation Manual (ODCM).

No changes were made to the ODCM during 2012. 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 eight locations in the vicinity of the ISFSI and one control location 2.8 miles 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 over the baseline measurements that were collected in 2003. The results of the monitoring performed in 2012 also show that operating the Haddam Neck 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 Connecticut Yankee in the vicinity of the Haddam Neck Independent Spent Fuel Storage Installation. It is submitted annually in compliance with Section F, 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 Connecticut Yankee site and its environs.
- Section 3:** Provides a description of the overall REMP design. This section includes a summary of the ODCM requirements for REMP sampling, tables listing TLD monitoring locations with compass sectors and distances from the ISFSI Pad, 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:** Provides the status of the Land Use Census.
- Section 7:** References

2.0 GENERAL ISFSI AND SITE INFORMATION

The Haddam Neck ISFSI site is located in the town of East Haddam, Middlesex County, Connecticut, at a point 22 miles south-southeast of Hartford, Connecticut; 25 miles northeast of New Haven, Connecticut; and 16 miles north of Long Island Sound. The site is situated on the east bank of the Connecticut River at an area known as Haddam Neck. The elevation of the site property varies from 10 to 300 feet above sea level, with the area occupied by the ISFSI Pad ranging between 45 and 50 feet above sea level.

The former plant was designed as a single unit pressurized water reactor which sustained its initial chain reaction in July 1967, with commercial operation beginning in January 1968 and a gross power output of 590 Mw (e). After 28 years of operation, the Connecticut Yankee Board of Directors voted in 1996 to permanently close and decommission the power plant. Following two years of planning and preparation, actual decommissioning began in 1998 and was completed in 2006. This site now consists of the Independent Spent Fuel Storage Installation where the fuel from the former plant reactor is stored.

The Radiological Environmental Monitoring Program (REMP) for the ISFSI began pre-operational direct radiation measurements in 2003 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 Haddam Neck 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 Figure 3.1 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 the Monitoring Program

3.3.1 Direct Radiation

Direct gamma radiation exposure was continuously monitored during 2012 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 Installation (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. Three Dibble Creek Sediment samples, three ISFSI Outfall soil samples and three ISFSI Runoff water samples were collected during this period. 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: 9 (8 around perimeter of the site and 1 offsite control location)	Continuous	Quarterly	Gamma dose	Each TLD

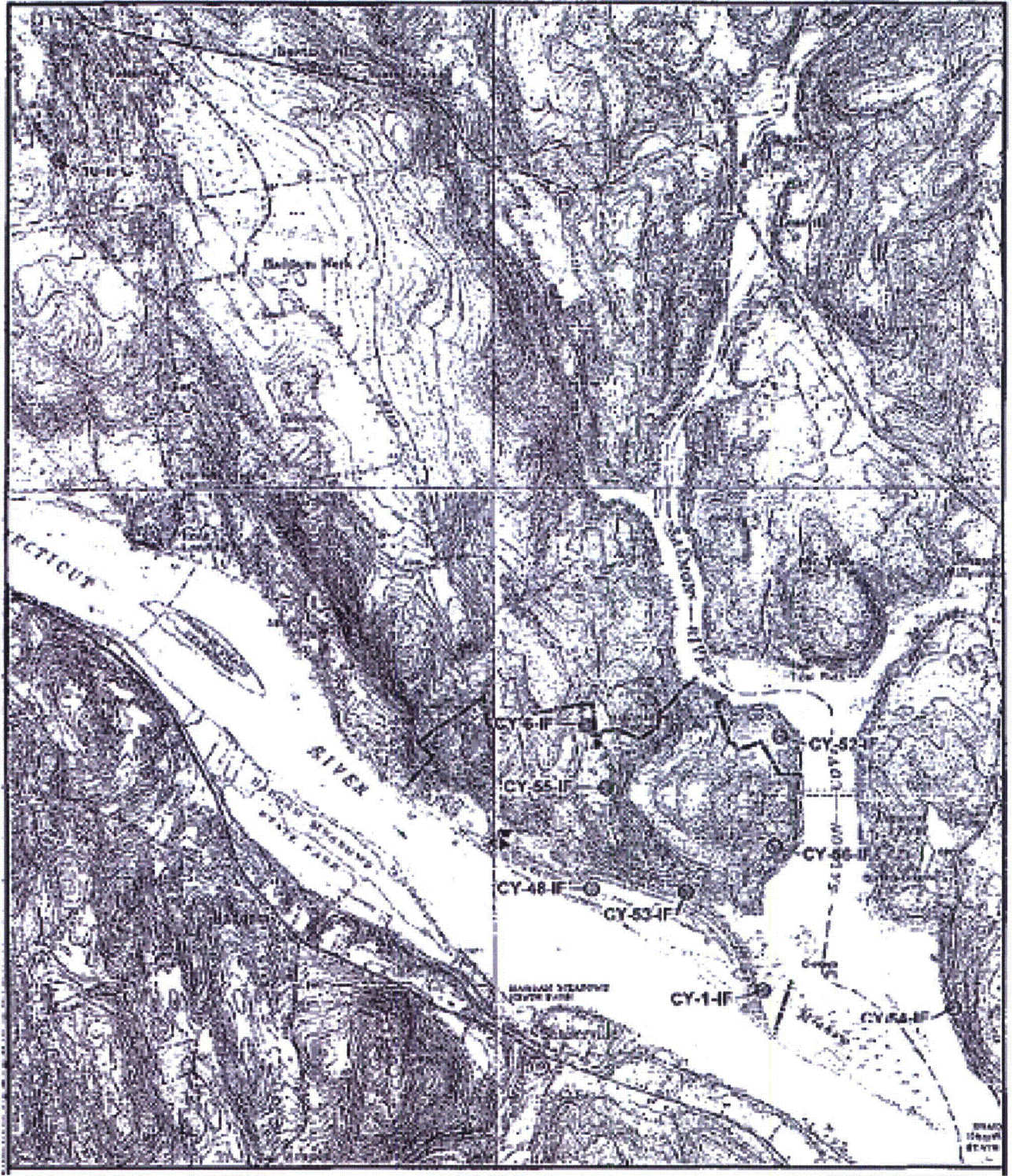
**Table 3.2
Radiological Environmental Monitoring Locations (TLD)**

Station Code	Station Description	Zone *	Distance From ISFSI (miles)	Direction From ISFSI
CY-10-IFC	Hurd Park Road (O)*	2	2.8	NNW
CY-1-IF	Mouth of Discharge Canal (I)**	1	0.5	SSE
CY-6-IF	Substation (I)**	1	0.6	NW
CY-48-IF	Near Historical Met Tower Shack (I)**	1	0.4	WSW
CY-52-IF	Schmidt Cemetery (I)**	1	0.5	NNE
CY-53-IF	ISFSI Haul Route (I)**	1	0.2	SSW
CY-54-IF	Rt 149 Near Mouth of Salmon River (I)**	1	1.0	ESE
CY-55-IF	High Voltage Tower- NW of Pad (I)**	1	0.4	NW
CY-56-IF	Near Historical Burrow Pit (I)**	1	0.2	E

*2 = Control TLD; 1 = Indicator TLD

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

Figure 3.1
Radiological Environmental Monitoring Locations



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 direct measurements presented in Table 4.1 are converted to exposure rates in the following manner:
 - The total TLD exposure time is determined from the anneal and read dates.
 - The total deployment time is determined from the placement and retrieval dates.
 - The non-deployment time is converted to exposure and subtracted from the TLD reading presented in Table 4.1.
 - The resulting net exposure (deployment exposure) is divided by the deployment time in hours to calculate the exposure rate in μR per hour.
 - The calculated exposure rates are presented 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 presents the estimated direct dose from ISFSI operations as determined by TLD data shown in Table 4.1.

Table 4.1
TLD Measurements by Quarter
(mR)

Station ID	Direction	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
CY-1-IF	SSE	22	20	25	37
CY-6-IF	NW	23	19	24	31
CY-48-IF	WSW	22	17	24	36
CY-52-IF	NNE	24	18	26	34
CY-53-IF	SSW	26	22	25	39
CY-54-IF	ESE	22	18	24	
CY-55-IF	NW	24	22	27	37
CY-56-IF	E	24	21	23	37
CY-10-IFC	Control	22	20	22	37
CY-10-IFCa	Control Backup	24	20	26	38

Note: TLD at location CY-54-IF was missing in the 4th quarter at change-out.
 No data for the 4th quarter.

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
CY-1-IF	SSE	4.7	4.9	5.4	8.4	5.8
CY-6-IF	NW	5.2	4.4	4.9	5.7	5.1
CY-48-IF	WSW	4.7	3.6	4.9	7.9	5.3
CY-52-IF	NNE	5.6	4.0	5.9	7.0	5.6
CY-53-IF	SSW	6.5	5.7	5.4	9.3	6.7
CY-54-IF	ESE	4.7	4.0	4.9		4.6
CY-55-IF	NW	5.6	5.7	6.4	8.4	6.5
CY-56-IF	E	5.6	5.3	4.5	8.4	5.9
CY-10-IFC	Control	5.2	4.9	4.9	8.6	5.9

Note: TLD at location CY-54-IF was missing in the 4th quarter at change-out.
 No data for the 4th quarter.

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

Indicator TLDs	Control TLDs	Station With Highest Mean	
Mean (Range) (No. Measurements)*	Mean (Range) (No. Measurements)*	Station #	Mean (Range) (No. Measurements)*
5.7	5.9	CY-53-IF	6.7
(3.6 – 9.3)	(4.9 – 8.6)		(5.4 – 9.3)
(31)	(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	Net TLD Result	Calculated Dose	Net TLD Result	Calculated Dose	Net TLD Result	Calculated Dose	
CY-1-IF	0.00	0.00	0.00	0.00	1.00	0.09	0.00	0.00	0.09
CY-6-IF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CY-48-IF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CY-52-IF	1.00	0.02	0.00	0.00	2.00	0.18	0.00	0.00	0.21
CY-53-IF	3.00	0.07	2.00	0.18	1.00	0.09	1.50	0.03	0.38
CY-54-IF	0.00	0.00	0.00	0.00	0.00	0.00			0.00
CY-55-IF	1.00	0.02	2.00	0.18	3.00	0.27	0.00	0.00	0.48
CY-56-IF	1.00	0.02	1.00	0.09	0.00	0.00	0.00	0.00	0.11

Max Dose => 0.48

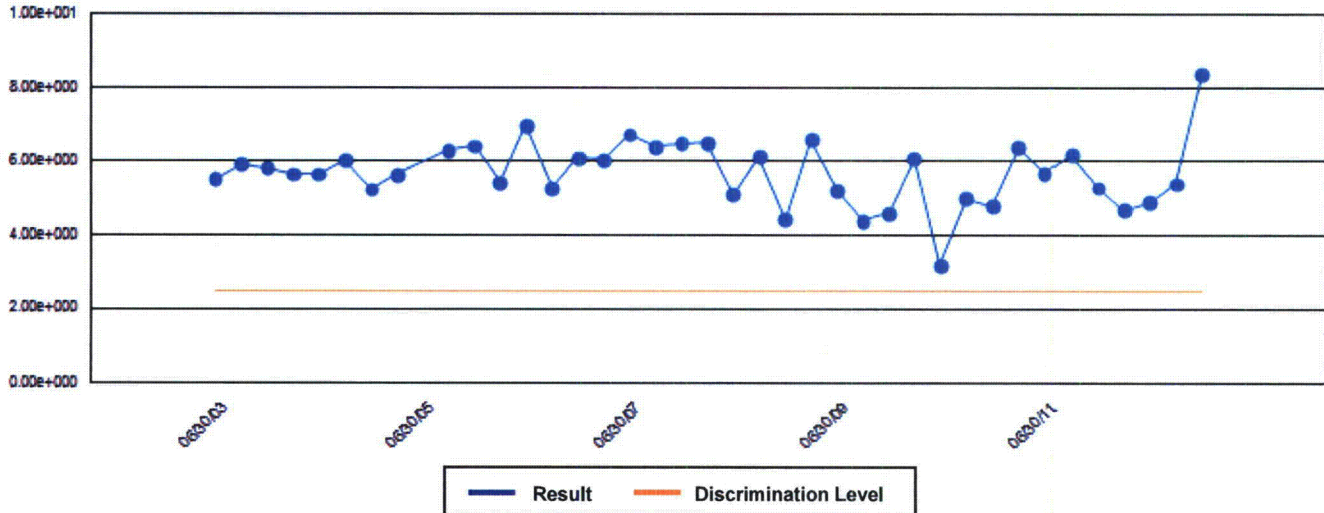
NOTES:

1. Doses based on a 50 hour occupancy in both of the first and fourth quarters and a 200 hour occupancy in both of the second and third quarters.
2. Some of the net TLD results were negative and rounded up to zero.
3. TLD at location CY-54-IF in the 4th quarter was missing at change-out. No data for the 4th quarter.

**Figure 4.1
Exposure Rate Trend at CY-1-IF**

Trend Report 3/30/2013
 Displays: Samples collected between 06/30/2003 and 12/31/2012

Indicator Locations - CY-1-IF : REMP TLD [Exposure Rate]



Sample Name	Date Collected	Result	2 Sigma Error	Discrimination Level
CY-1-IF-001	06/30/2003	5.5E+000 µR/h † *	7.60E-001	2.5E+000
CY-1-IF-002	09/30/2003	5.9E+000 µR/h † *	5.60E-001	2.5E+000
CY-1-IF-003	12/31/2003	5.8E+000 µR/h † *	3.00E-001	2.5E+000
CY-1-IF-004	03/31/2004	5.7E+000 µR/h † *	4.80E-001	2.5E+000
CY-1-IF-005	06/30/2004	5.7E+000 µR/h † *	8.20E-001	2.5E+000
CY-1-IF-006	09/30/2004	6.0E+000 µR/h † *	8.80E-001	2.5E+000
CY-1-IF-007	12/31/2004	5.3E+000 µR/h † *	3.40E-001	2.5E+000
CY-1-IF-008	03/31/2005	5.6E+000 µR/h † *	5.20E-001	2.5E+000
CY-1-IF-010	09/30/2005	6.3E+000 µR/h † *	7.40E-001	2.5E+000
CY-1-IF-011	12/31/2005	6.4E+000 µR/h † *	7.00E-001	2.5E+000
CY-1-IF-012	03/31/2006	5.4E+000 µR/h † *	6.60E-001	2.5E+000
CY-1-IF-013	06/30/2006	7.0E+000 µR/h † *	9.80E-001	2.5E+000
CY-1-IF-014	09/30/2006	5.3E+000 µR/h † *	6.80E-001	2.5E+000
CY-1-IF-015	12/31/2006	6.1E+000 µR/h † *	5.00E-001	2.5E+000
CY-1-IF-016	03/31/2007	6.1E+000 µR/h † *	6.00E-001	2.5E+000
CY-1-IF-017	06/30/2007	6.8E+000 µR/h † *	6.80E-001	2.5E+000
CY-1-IF-018	09/30/2007	6.4E+000 µR/h † *	6.40E-001	2.5E+000
CY-1-IF-019	12/31/2007	6.5E+000 µR/h † *	6.60E-001	2.5E+000
CY-1-IF-020	03/31/2008	6.5E+000 µR/h † *	6.60E-001	2.5E+000
CY-1-IF-021	06/30/2008	5.1E+000 µR/h † *	5.00E-001	2.5E+000
CY-1-IF-022	09/30/2008	6.2E+000 µR/h † *	6.20E-001	2.5E+000
CY-1-IF-023	12/31/2008	4.4E+000 µR/h † *	4.40E-001	2.5E+000
CY-1-IF-024	03/31/2009	6.6E+000 µR/h † *	6.00E-001	2.5E+000
CY-1-IF-025	06/30/2009	5.2E+000 µR/h † *	6.00E-001	2.5E+000
CY-1-IF-026	09/30/2009	4.4E+000 µR/h † *	4.00E-001	2.5E+000
CY-1-IF-027	12/31/2009	4.6E+000 µR/h † *	4.00E-001	2.5E+000
CY-1-IF-028	03/31/2010	6.1E+000 µR/h † *	6.00E-001	2.5E+000
CY-1-IF-029	06/30/2010	3.2E+000 µR/h † *	4.00E-001	2.5E+000
CY-1-IF-030	09/30/2010	5.0E+000 µR/h † *	4.00E-001	2.5E+000
CY-1-IF-031	12/31/2010	4.8E+000 µR/h † *	4.00E-001	2.5E+000

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

Trend Report

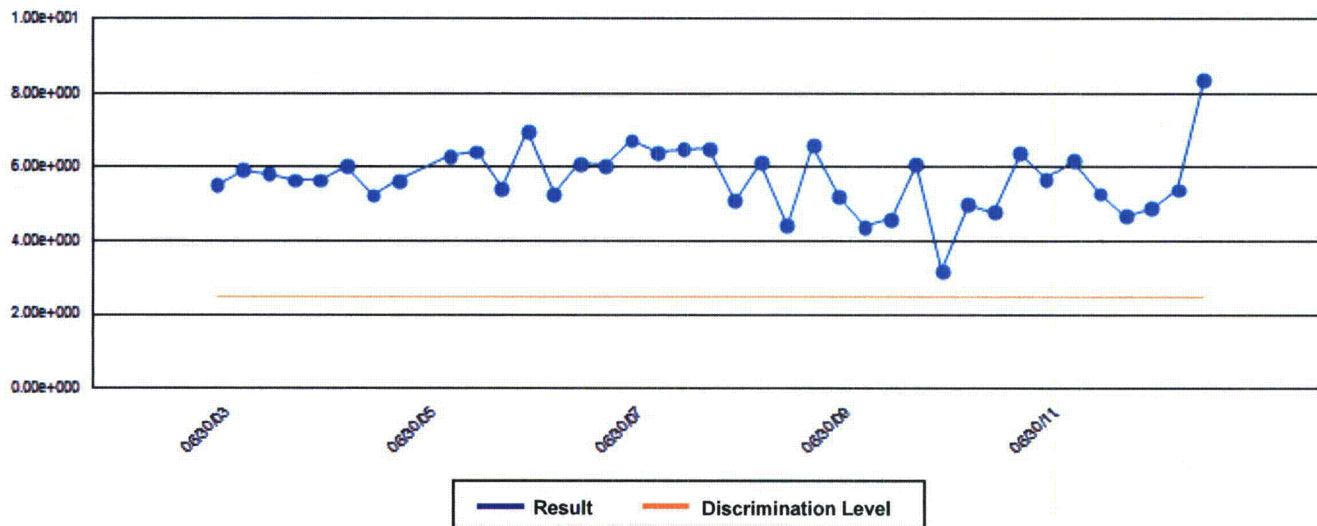
Displays: Samples collected between 06/30/2003 and 12/31/2012

3/30/2013

CY ISFSI

Indicator Locations - CY-1-IF : REMP TLD [Exposure Rate]

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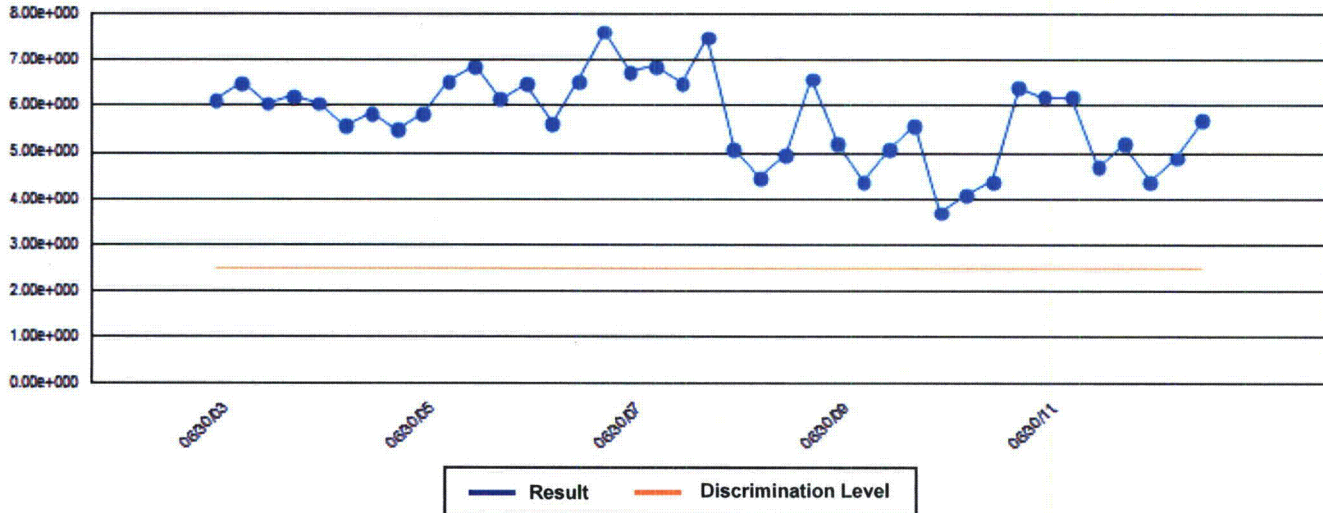
Sample Name	Date Collected	Result	2 Sigma Error	Discrimination Level
CY-1-IF-032	03/31/2011	6.4E+000 μR/h † *	6.00E-001	2.5E+000
CY-1-IF-033	06/30/2011	5.7E+000 μR/h † *	6.00E-001	2.5E+000
CY-1-IF-034	09/30/2011	6.2E+000 μR/h † *	6.00E-001	2.5E+000
CY-1-IF-035	12/31/2011	5.3E+000 μR/h † *	6.00E-001	2.5E+000
CY-1-IF-036	03/31/2012	4.7E+000 μR/h † *	4.00E-001	2.5E+000
CY-1-IF-037	06/30/2012	4.9E+000 μR/h † *	4.00E-001	2.5E+000
CY-1-IF-038	09/30/2012	5.4E+000 μR/h † *	6.00E-001	2.5E+000
CY-1-IF-039	12/31/2012	8.4E+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 CY-6-IF

Trend Report 3/30/2013
Displays: Samples collected between 06/30/2003 and 12/31/2012

Indicator Locations - CY-6-IF : REMP TLD [Exposure Rate]



Sample Name	Date Collected	Result	2 Sigma Error	Discrimination Level
CY-6-IF-001	06/30/2003	6.1E+000 µR/h †*	6.20E-001	2.5E+000
CY-6-IF-002	09/30/2003	6.5E+000 µR/h †*	5.00E-001	2.5E+000
CY-6-IF-003	12/31/2003	6.1E+000 µR/h †*	4.00E-001	2.5E+000
CY-6-IF-004	03/31/2004	6.2E+000 µR/h †*	6.60E-001	2.5E+000
CY-6-IF-005	06/30/2004	6.1E+000 µR/h †*	1.06E+000	2.5E+000
CY-6-IF-006	09/30/2004	5.6E+000 µR/h †*	4.80E-001	2.5E+000
CY-6-IF-007	12/31/2004	5.8E+000 µR/h †*	3.00E-001	2.5E+000
CY-6-IF-008	03/31/2005	5.5E+000 µR/h †*	5.20E-001	2.5E+000
CY-6-IF-009	06/30/2005	5.8E+000 µR/h †*	5.60E-001	2.5E+000
CY-6-IF-010	09/30/2005	6.5E+000 µR/h †*	8.80E-001	2.5E+000
CY-6-IF-011	12/31/2005	6.9E+000 µR/h †*	9.00E-001	2.5E+000
CY-6-IF-012	03/31/2006	6.2E+000 µR/h †*	4.20E-001	2.5E+000
CY-6-IF-013	06/30/2006	6.5E+000 µR/h †*	5.60E-001	2.5E+000
CY-6-IF-014	09/30/2006	5.6E+000 µR/h †*	5.60E-001	2.5E+000
CY-6-IF-015	12/31/2006	6.5E+000 µR/h †*	6.00E-001	2.5E+000
CY-6-IF-016	03/31/2007	7.6E+000 µR/h †*	7.60E-001	2.5E+000
CY-6-IF-017	06/30/2007	6.8E+000 µR/h †*	6.80E-001	2.5E+000
CY-6-IF-018	09/30/2007	6.9E+000 µR/h †*	6.80E-001	2.5E+000
CY-6-IF-019	12/31/2007	6.5E+000 µR/h †*	6.60E-001	2.5E+000
CY-6-IF-020	03/31/2008	7.5E+000 µR/h †*	7.60E-001	2.5E+000
CY-6-IF-021	06/30/2008	5.1E+000 µR/h †*	5.00E-001	2.5E+000
CY-6-IF-022	09/30/2008	4.5E+000 µR/h †*	4.40E-001	2.5E+000
CY-6-IF-023	12/31/2008	5.0E+000 µR/h †*	5.00E-001	2.5E+000
CY-6-IF-024	03/31/2009	6.6E+000 µR/h †*	6.00E-001	2.5E+000
CY-6-IF-025	06/30/2009	5.2E+000 µR/h †*	6.00E-001	2.5E+000
CY-6-IF-026	09/30/2009	4.4E+000 µR/h †*	4.00E-001	2.5E+000
CY-6-IF-027	12/31/2009	5.1E+000 µR/h †*	6.00E-001	2.5E+000
CY-6-IF-028	03/31/2010	5.6E+000 µR/h †*	6.00E-001	2.5E+000
CY-6-IF-029	06/30/2010	3.7E+000 µR/h †*	4.00E-001	2.5E+000
CY-6-IF-030	09/30/2010	4.1E+000 µR/h †*	4.00E-001	2.5E+000

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

Trend Report

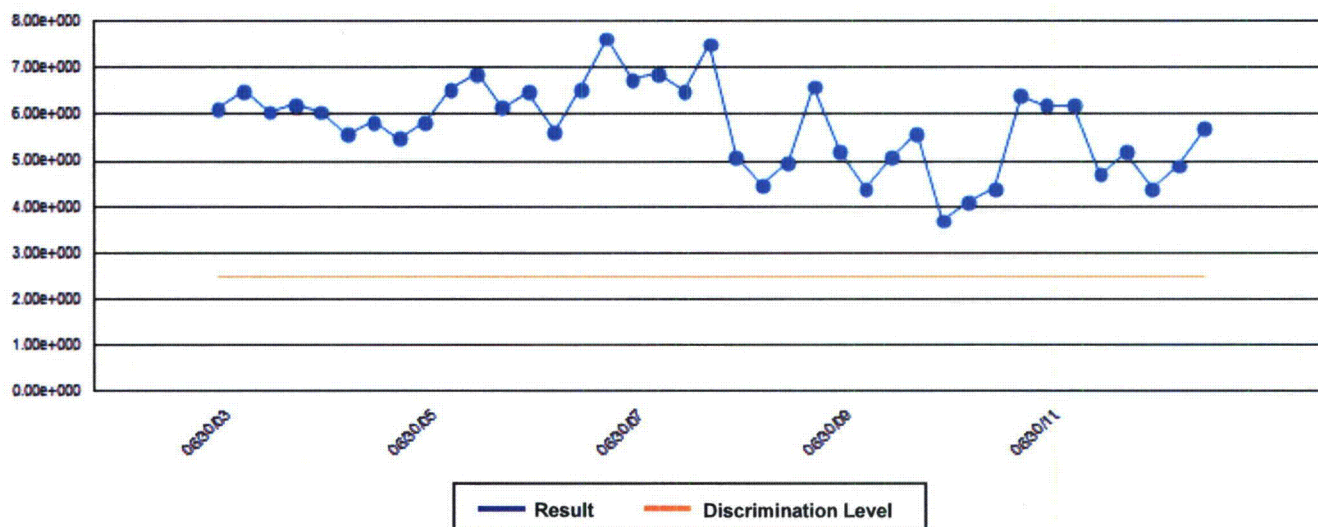
Displays: Samples collected between 06/30/2003 and 12/31/2012

3/30/2013

CY ISFSI

Indicator Locations - CY-6-IF : REMP TLD [Exposure Rate]

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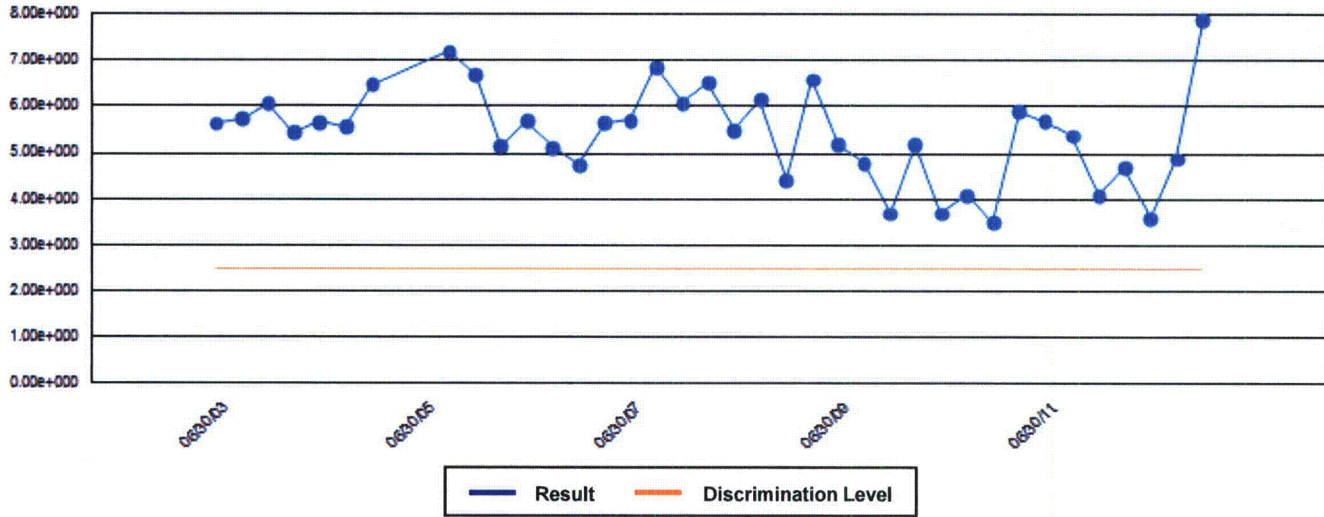
Sample Name	Date Collected	Result	2 Sigma Error	Discrimination Level
CY-6-IF-031	12/31/2010	4.4E+000 µR/h †*	4.00E-001	2.5E+000
CY-6-IF-032	03/31/2011	6.4E+000 µR/h †*	6.00E-001	2.5E+000
CY-6-IF-033	06/30/2011	6.2E+000 µR/h †*	6.00E-001	2.5E+000
CY-6-IF-034	09/30/2011	6.2E+000 µR/h †*	6.00E-001	2.5E+000
CY-6-IF-035	12/31/2011	4.7E+000 µR/h †*	4.00E-001	2.5E+000
CY-6-IF-036	03/31/2012	5.2E+000 µR/h †*	6.00E-001	2.5E+000
CY-6-IF-037	06/30/2012	4.4E+000 µR/h †*	4.00E-001	2.5E+000
CY-6-IF-038	09/30/2012	4.9E+000 µR/h †*	4.00E-001	2.5E+000
CY-6-IF-039	12/31/2012	5.7E+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

Figure 4.3
Exposure Rate Trend at CY-48-IF

Trend Report 3/30/2013
Displays: Samples collected between 06/30/2003 and 12/31/2012

Indicator Locations - CY-48-IF : REMP TLD [Exposure Rate]



Sample Name	Date Collected	Result	2 Sigma Error	Discrimination Level
CY-48-IF-001	06/30/2003	5.7E+000 µR/h † *	5.40E-001	2.5E+000
CY-48-IF-002	09/30/2003	5.8E+000 µR/h † *	4.60E-001	2.5E+000
CY-48-IF-003	12/31/2003	6.1E+000 µR/h † *	4.20E-001	2.5E+000
CY-48-IF-004	03/31/2004	5.5E+000 µR/h † *	1.00E+000	2.5E+000
CY-48-IF-005	06/30/2004	5.7E+000 µR/h † *	9.60E-001	2.5E+000
CY-48-IF-006	09/30/2004	5.6E+000 µR/h † *	5.20E-001	2.5E+000
CY-48-IF-007	12/31/2004	6.5E+000 µR/h † *	7.20E-001	2.5E+000
CY-48-IF-010	09/30/2005	7.2E+000 µR/h † *	7.80E-001	2.5E+000
CY-48-IF-011	12/31/2005	6.7E+000 µR/h † *	9.40E-001	2.5E+000
CY-48-IF-012	03/31/2006	5.2E+000 µR/h † *	1.00E+000	2.5E+000
CY-48-IF-013	06/30/2006	5.7E+000 µR/h † *	6.00E-001	2.5E+000
CY-48-IF-014	09/30/2006	5.1E+000 µR/h † *	5.20E-001	2.5E+000
CY-48-IF-015	12/31/2006	4.8E+000 µR/h † *	4.20E-001	2.5E+000
CY-48-IF-016	03/31/2007	5.7E+000 µR/h † *	5.60E-001	2.5E+000
CY-48-IF-017	06/30/2007	5.7E+000 µR/h † *	5.80E-001	2.5E+000
CY-48-IF-018	09/30/2007	6.9E+000 µR/h † *	6.80E-001	2.5E+000
CY-48-IF-019	12/31/2007	6.1E+000 µR/h † *	6.00E-001	2.5E+000
CY-48-IF-020	03/31/2008	6.5E+000 µR/h † *	6.60E-001	2.5E+000
CY-48-IF-021	06/30/2008	5.5E+000 µR/h † *	5.60E-001	2.5E+000
CY-48-IF-022	09/30/2008	6.2E+000 µR/h † *	6.20E-001	2.5E+000
CY-48-IF-023	12/31/2008	4.4E+000 µR/h † *	4.40E-001	2.5E+000
CY-48-IF-024	03/31/2009	6.6E+000 µR/h † *	6.00E-001	2.5E+000
CY-48-IF-025	06/30/2009	5.2E+000 µR/h † *	6.00E-001	2.5E+000
CY-48-IF-026	09/30/2009	4.8E+000 µR/h † *	4.00E-001	2.5E+000
CY-48-IF-027	12/31/2009	3.7E+000 µR/h † *	4.00E-001	2.5E+000
CY-48-IF-028	03/31/2010	5.2E+000 µR/h † *	6.00E-001	2.5E+000
CY-48-IF-029	06/30/2010	3.7E+000 µR/h † *	4.00E-001	2.5E+000
CY-48-IF-030	09/30/2010	4.1E+000 µR/h † *	4.00E-001	2.5E+000
CY-48-IF-031	12/31/2010	3.5E+000 µR/h † *	4.00E-001	2.5E+000
CY-48-IF-032	03/31/2011	5.9E+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

Trend Report

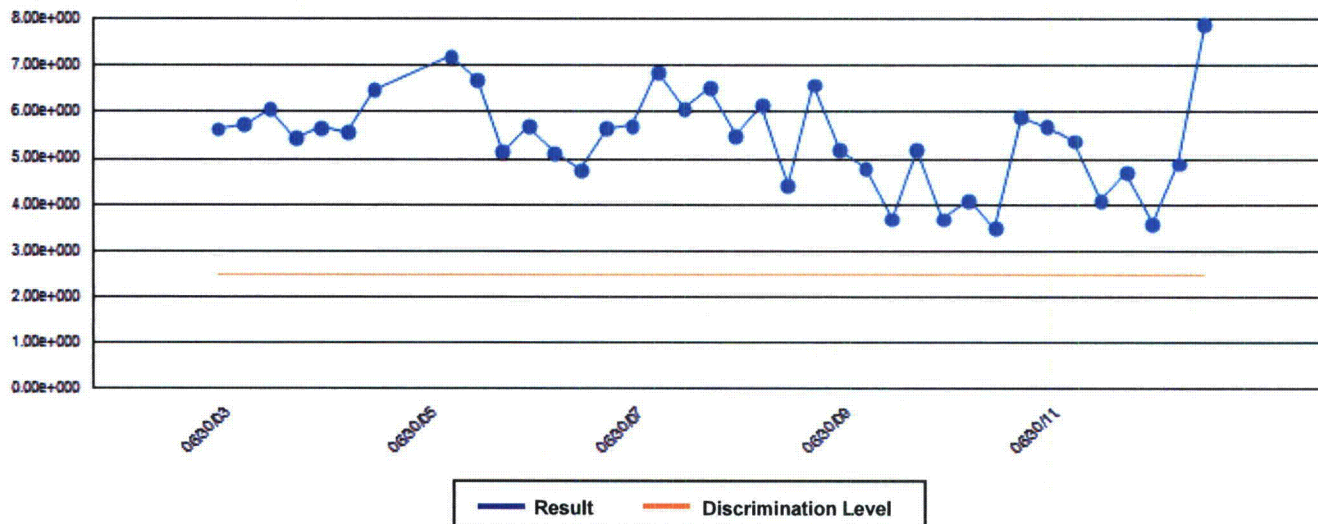
Displays: Samples collected between 06/30/2003 and 12/31/2012

3/30/2013

CY ISFSI

Indicator Locations - CY-48-IF : REMP TLD [Exposure Rate]

Continued...



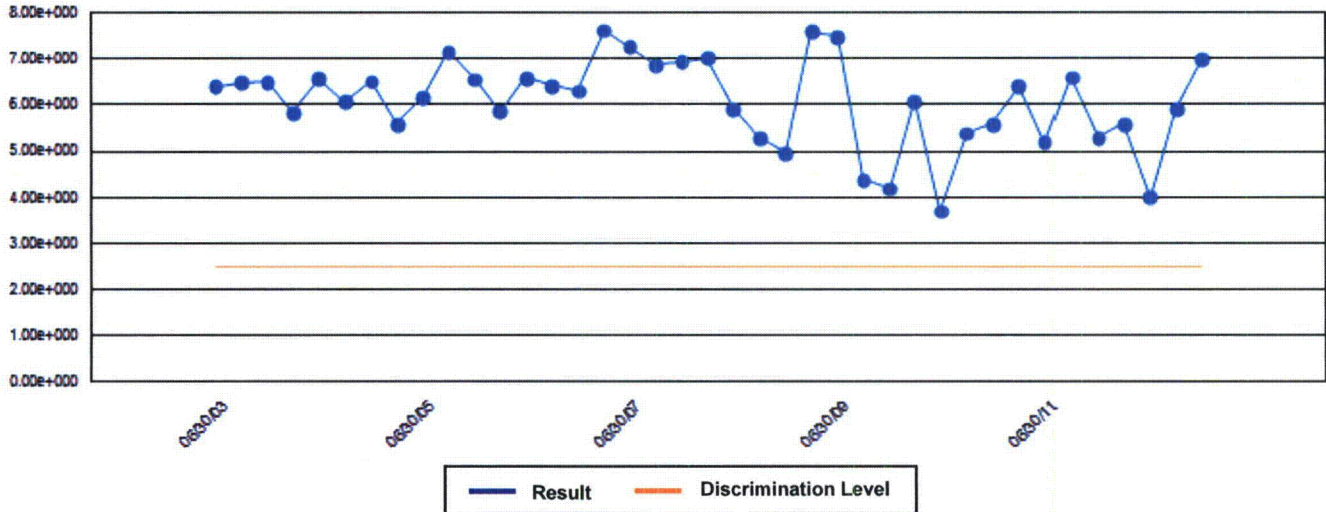
Sample Name	Date Collected	Result	2 Sigma Error	Discrimination Level
CY-48-IF-033	06/30/2011	5.7E+000 µR/h †*	6.00E-001	2.5E+000
CY-48-IF-034	09/30/2011	5.4E+000 µR/h †*	6.00E-001	2.5E+000
CY-48-IF-035	12/31/2011	4.1E+000 µR/h †*	4.00E-001	2.5E+000
CY-48-IF-036	03/31/2012	4.7E+000 µR/h †*	4.00E-001	2.5E+000
CY-48-IF-037	06/30/2012	3.6E+000 µR/h †*	4.00E-001	2.5E+000
CY-48-IF-038	09/30/2012	4.9E+000 µR/h †*	4.00E-001	2.5E+000
CY-48-IF-039	12/31/2012	7.9E+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 4.4
Exposure Rate Trend at CY-52-IF

Trend Report 3/30/2013
Displays: Samples collected between 06/30/2003 and 12/31/2012

Indicator Locations - CY-52-IF : REMP TLD [Exposure Rate]



Sample Name	Date Collected	Result	2 Sigma Error	Discrimination Level
CY-52-IF-001	06/30/2003	6.4E+000 µR/h † *	9.00E-001	2.5E+000
CY-52-IF-002	09/30/2003	6.5E+000 µR/h † *	4.60E-001	2.5E+000
CY-52-IF-003	12/31/2003	6.5E+000 µR/h † *	4.60E-001	2.5E+000
CY-52-IF-004	03/31/2004	5.8E+000 µR/h † *	6.20E-001	2.5E+000
CY-52-IF-005	06/30/2004	6.6E+000 µR/h † *	8.80E-001	2.5E+000
CY-52-IF-006	09/30/2004	6.1E+000 µR/h † *	5.20E-001	2.5E+000
CY-52-IF-007	12/31/2004	6.5E+000 µR/h † *	7.20E-001	2.5E+000
CY-52-IF-008	03/31/2005	5.6E+000 µR/h † *	5.00E-001	2.5E+000
CY-52-IF-009	06/30/2005	6.2E+000 µR/h † *	4.60E-001	2.5E+000
CY-52-IF-010	09/30/2005	7.2E+000 µR/h † *	8.80E-001	2.5E+000
CY-52-IF-011	12/31/2005	6.6E+000 µR/h † *	7.60E-001	2.5E+000
CY-52-IF-012	03/31/2006	5.9E+000 µR/h † *	3.80E-001	2.5E+000
CY-52-IF-013	06/30/2006	6.6E+000 µR/h † *	1.02E+000	2.5E+000
CY-52-IF-014	09/30/2006	6.4E+000 µR/h † *	1.24E+000	2.5E+000
CY-52-IF-015	12/31/2006	6.3E+000 µR/h † *	6.80E-001	2.5E+000
CY-52-IF-016	03/31/2007	7.6E+000 µR/h † *	7.60E-001	2.5E+000
CY-52-IF-017	06/30/2007	7.3E+000 µR/h † *	7.20E-001	2.5E+000
CY-52-IF-018	09/30/2007	6.9E+000 µR/h † *	6.80E-001	2.5E+000
CY-52-IF-019	12/31/2007	6.9E+000 µR/h † *	7.00E-001	2.5E+000
CY-52-IF-020	03/31/2008	7.0E+000 µR/h † *	7.00E-001	2.5E+000
CY-52-IF-021	06/30/2008	5.9E+000 µR/h † *	6.00E-001	2.5E+000
CY-52-IF-022	09/30/2008	5.3E+000 µR/h † *	5.40E-001	2.5E+000
CY-52-IF-023	12/31/2008	5.0E+000 µR/h † *	5.00E-001	2.5E+000
CY-52-IF-024	03/31/2009	7.6E+000 µR/h † *	8.00E-001	2.5E+000
CY-52-IF-025	06/30/2009	7.5E+000 µR/h † *	8.00E-001	2.5E+000
CY-52-IF-026	09/30/2009	4.4E+000 µR/h † *	4.00E-001	2.5E+000
CY-52-IF-027	12/31/2009	4.2E+000 µR/h † *	4.00E-001	2.5E+000
CY-52-IF-028	03/31/2010	6.1E+000 µR/h † *	6.00E-001	2.5E+000
CY-52-IF-029	06/30/2010	3.7E+000 µR/h † *	4.00E-001	2.5E+000
CY-52-IF-030	09/30/2010	5.4E+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

Trend Report

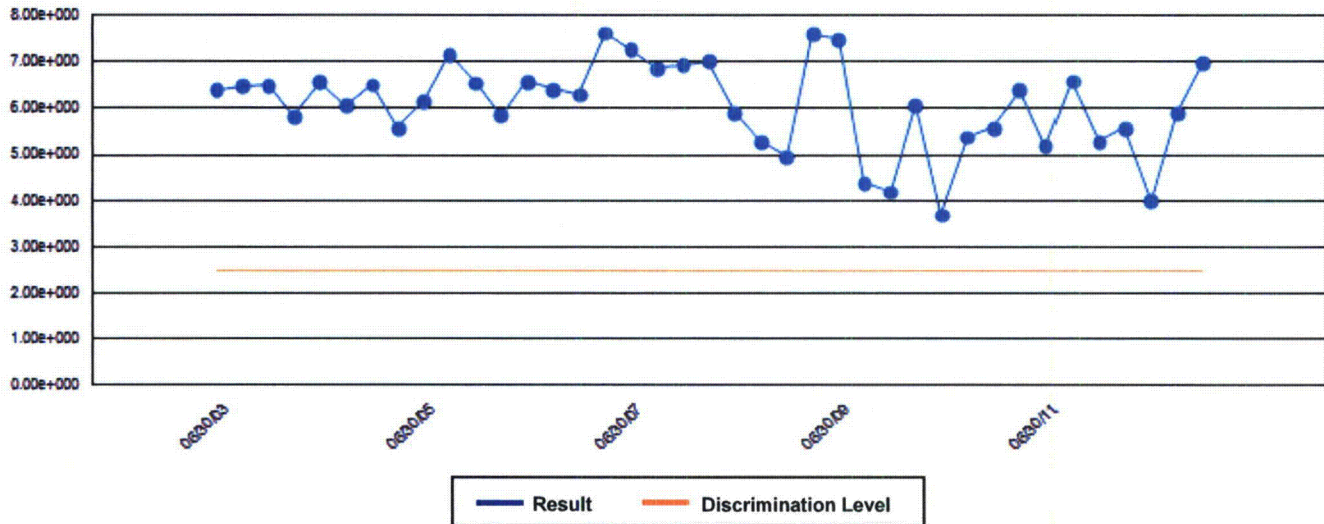
Displays: Samples collected between 06/30/2003 and 12/31/2012

3/30/2013

CY ISFSI

Indicator Locations - CY-52-IF : REMP TLD [Exposure Rate]

Continued...



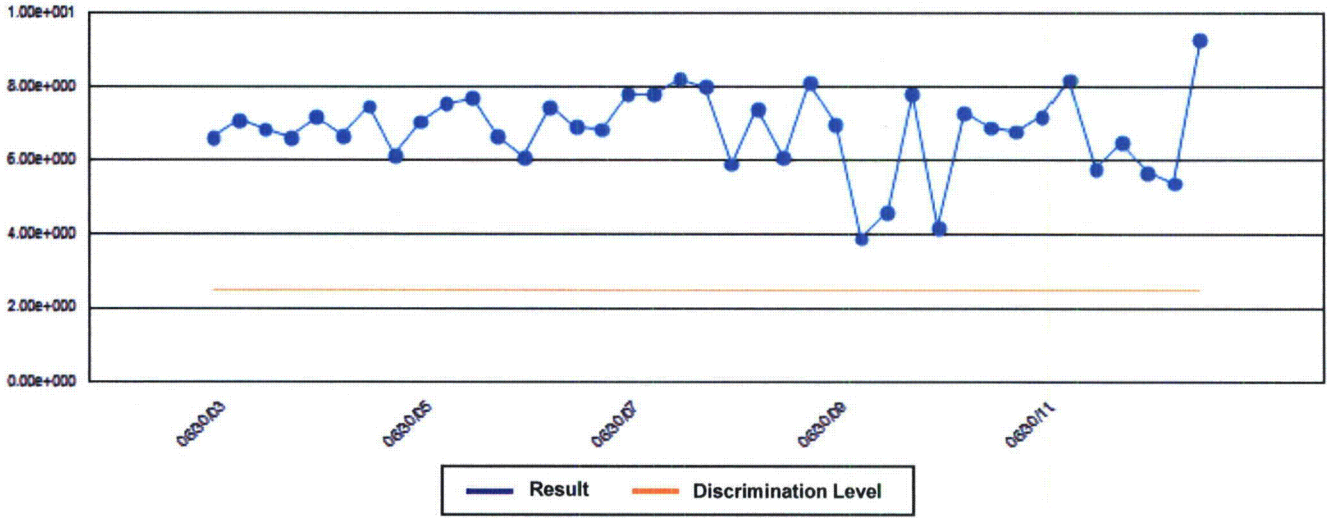
Sample Name	Date Collected	Result	2 Sigma Error	Discrimination Level
CY-52-IF-031	12/31/2010	5.6E+000 μR/h † *	6.00E-001	2.5E+000
CY-52-IF-032	03/31/2011	6.4E+000 μR/h † *	6.00E-001	2.5E+000
CY-52-IF-033	06/30/2011	5.2E+000 μR/h † *	6.00E-001	2.5E+000
CY-52-IF-034	09/30/2011	6.6E+000 μR/h † *	6.00E-001	2.5E+000
CY-52-IF-035	12/31/2011	5.3E+000 μR/h † *	6.00E-001	2.5E+000
CY-52-IF-036	03/31/2012	5.6E+000 μR/h † *	6.00E-001	2.5E+000
CY-52-IF-037	06/30/2012	4.0E+000 μR/h † *	4.00E-001	2.5E+000
CY-52-IF-038	09/30/2012	5.9E+000 μR/h † *	6.00E-001	2.5E+000
CY-52-IF-039	12/31/2012	7.0E+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 4.5
Exposure Rate Trend at CY-53-IF

Trend Report 3/30/2013
 Displays: Samples collected between 06/30/2003 and 12/31/2012

Indicator Locations - CY-53-IF : REMP TLD [Exposure Rate]



Sample Name	Date Collected	Result	2 Sigma Error	Discrimination Level
CY-53-IF-001	06/30/2003	6.6E+000 µR/h † *	6.60E-001	2.5E+000
CY-53-IF-002	09/30/2003	7.1E+000 µR/h † *	4.60E-001	2.5E+000
CY-53-IF-003	12/31/2003	6.8E+000 µR/h † *	4.00E-001	2.5E+000
CY-53-IF-004	03/31/2004	6.6E+000 µR/h † *	5.20E-001	2.5E+000
CY-53-IF-005	06/30/2004	7.2E+000 µR/h † *	1.00E+000	2.5E+000
CY-53-IF-006	09/30/2004	6.7E+000 µR/h † *	6.60E-001	2.5E+000
CY-53-IF-007	12/31/2004	7.5E+000 µR/h † *	3.60E-001	2.5E+000
CY-53-IF-008	03/31/2005	6.2E+000 µR/h † *	7.20E-001	2.5E+000
CY-53-IF-009	06/30/2005	7.1E+000 µR/h † *	1.08E+000	2.5E+000
CY-53-IF-010	09/30/2005	7.5E+000 µR/h † *	8.20E-001	2.5E+000
CY-53-IF-011	12/31/2005	7.7E+000 µR/h † *	1.04E+000	2.5E+000
CY-53-IF-012	03/31/2006	6.7E+000 µR/h † *	4.20E-001	2.5E+000
CY-53-IF-013	06/30/2006	6.1E+000 µR/h † *	6.00E-001	2.5E+000
CY-53-IF-014	09/30/2006	7.5E+000 µR/h † *	8.60E-001	2.5E+000
CY-53-IF-015	12/31/2006	6.9E+000 µR/h † *	5.80E-001	2.5E+000
CY-53-IF-016	03/31/2007	6.8E+000 µR/h † *	6.80E-001	2.5E+000
CY-53-IF-017	06/30/2007	7.8E+000 µR/h † *	7.80E-001	2.5E+000
CY-53-IF-018	09/30/2007	7.8E+000 µR/h † *	7.80E-001	2.5E+000
CY-53-IF-019	12/31/2007	8.2E+000 µR/h † *	8.20E-001	2.5E+000
CY-53-IF-020	03/31/2008	8.0E+000 µR/h † *	8.00E-001	2.5E+000
CY-53-IF-021	06/30/2008	5.9E+000 µR/h † *	6.00E-001	2.5E+000
CY-53-IF-022	09/30/2008	7.4E+000 µR/h † *	7.40E-001	2.5E+000
CY-53-IF-023	12/31/2008	6.1E+000 µR/h † *	6.00E-001	2.5E+000
CY-53-IF-024	03/31/2009	8.1E+000 µR/h † *	8.00E-001	2.5E+000
CY-53-IF-025	06/30/2009	7.0E+000 µR/h † *	8.00E-001	2.5E+000
CY-53-IF-026	09/30/2009	3.9E+000 µR/h † *	4.00E-001	2.5E+000
CY-53-IF-027	12/31/2009	4.6E+000 µR/h † *	4.00E-001	2.5E+000
CY-53-IF-028	03/31/2010	7.8E+000 µR/h † *	8.00E-001	2.5E+000
CY-53-IF-029	06/30/2010	4.2E+000 µR/h † *	4.00E-001	2.5E+000
CY-53-IF-030	09/30/2010	7.3E+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

Trend Report

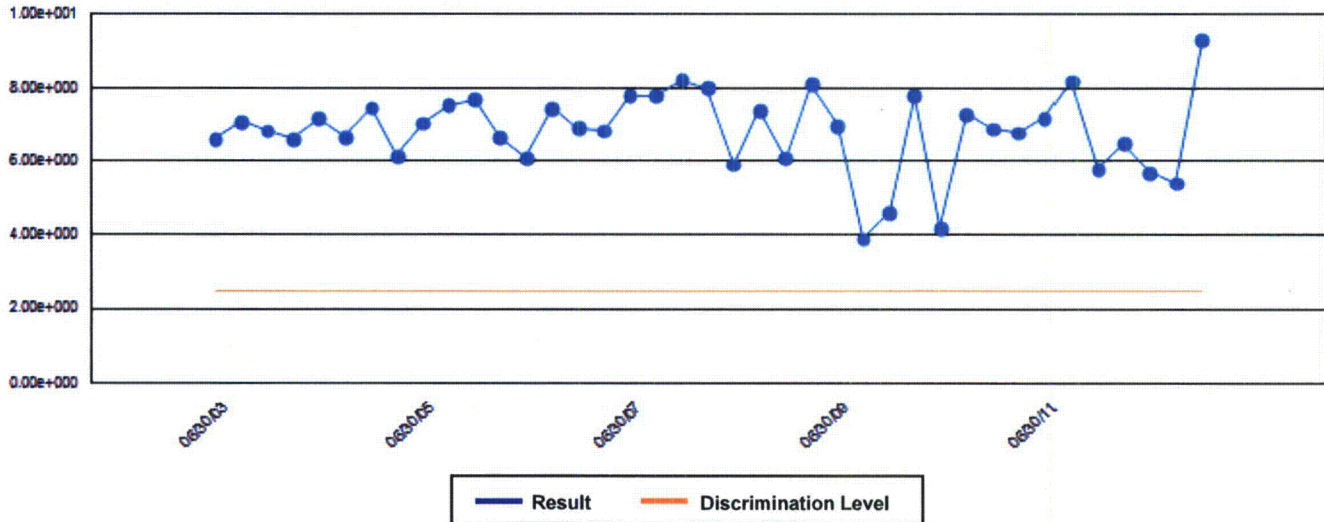
Displays: Samples collected between 06/30/2003 and 12/31/2012

3/30/2013

CY ISFSI

Indicator Locations - CY-53-IF : REMP TLD [Exposure Rate]

Continued...



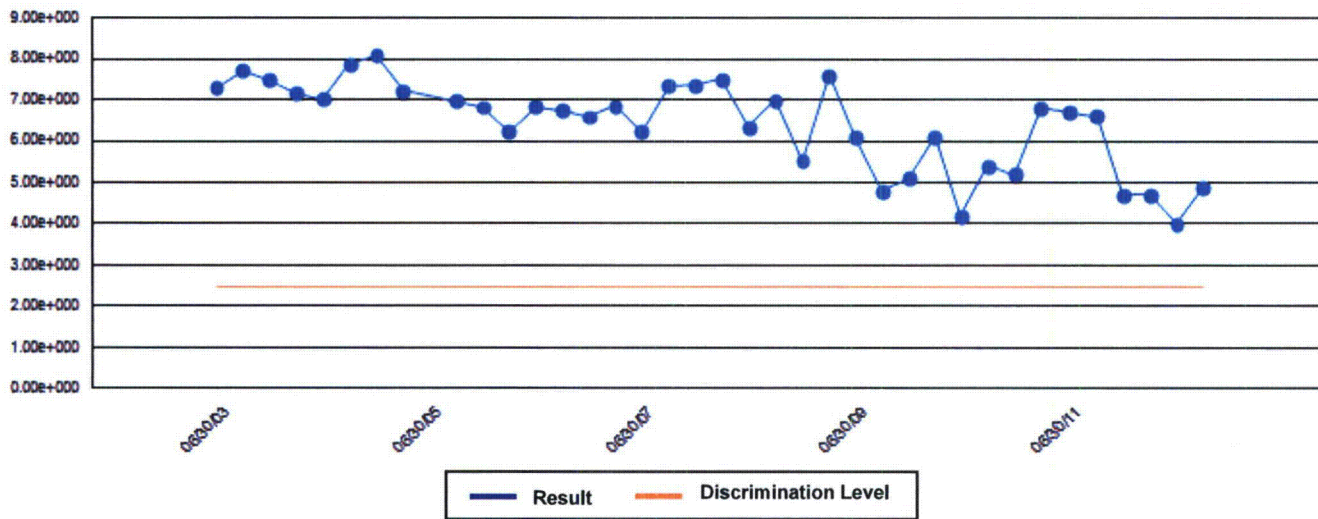
Sample Name	Date Collected	Result	2 Sigma Error	Discrimination Level
CY-53-IF-031	12/31/2010	6.9E+000 μ R/h †*	6.00E-001	2.5E+000
CY-53-IF-032	03/31/2011	6.8E+000 μ R/h †*	6.00E-001	2.5E+000
CY-53-IF-033	06/30/2011	7.2E+000 μ R/h †*	8.00E-001	2.5E+000
CY-53-IF-034	09/30/2011	8.2E+000 μ R/h †*	8.00E-001	2.5E+000
CY-53-IF-035	12/31/2011	5.8E+000 μ R/h †*	6.00E-001	2.5E+000
CY-53-IF-036	03/31/2012	6.5E+000 μ R/h †*	6.00E-001	2.5E+000
CY-53-IF-037	06/30/2012	5.7E+000 μ R/h †*	6.00E-001	2.5E+000
CY-53-IF-038	09/30/2012	5.4E+000 μ R/h †*	6.00E-001	2.5E+000
CY-53-IF-039	12/31/2012	9.3E+000 μ R/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 4.6
Exposure Rate Trend at CY-54-IF

Trend Report 3/30/2013
Displays: Samples collected between 06/30/2003 and 12/31/2012

Indicator Locations - CY-54-IF : REMP TLD [Exposure Rate]



Sample Name	Date Collected	Result	2 Sigma Error	Discrimination Level
CY-54-IF-001	06/30/2003	7.3E+000 µR/h † *	7.40E-001	2.5E+000
CY-54-IF-002	09/30/2003	7.7E+000 µR/h † *	6.80E-001	2.5E+000
CY-54-IF-003	12/31/2003	7.5E+000 µR/h † *	5.20E-001	2.5E+000
CY-54-IF-004	03/31/2004	7.2E+000 µR/h † *	4.60E-001	2.5E+000
CY-54-IF-005	06/30/2004	7.0E+000 µR/h † *	9.40E-001	2.5E+000
CY-54-IF-006	09/30/2004	7.9E+000 µR/h † *	1.40E+000	2.5E+000
CY-54-IF-007	12/31/2004	8.1E+000 µR/h † *	5.00E-001	2.5E+000
CY-54-IF-008	03/31/2005	7.2E+000 µR/h † *	1.12E+000	2.5E+000
CY-54-IF-010	09/30/2005	7.0E+000 µR/h † *	1.02E+000	2.5E+000
CY-54-IF-011	12/31/2005	6.8E+000 µR/h † *	8.00E-001	2.5E+000
CY-54-IF-012	03/31/2006	6.2E+000 µR/h † *	4.40E-001	2.5E+000
CY-54-IF-013	06/30/2006	6.8E+000 µR/h † *	7.60E-001	2.5E+000
CY-54-IF-014	09/30/2006	6.7E+000 µR/h † *	7.60E-001	2.5E+000
CY-54-IF-015	12/31/2006	6.6E+000 µR/h † *	5.40E-001	2.5E+000
CY-54-IF-016	03/31/2007	6.8E+000 µR/h † *	6.80E-001	2.5E+000
CY-54-IF-017	06/30/2007	6.2E+000 µR/h † *	6.20E-001	2.5E+000
CY-54-IF-018	09/30/2007	7.3E+000 µR/h † *	7.40E-001	2.5E+000
CY-54-IF-019	12/31/2007	7.4E+000 µR/h † *	7.40E-001	2.5E+000
CY-54-IF-020	03/31/2008	7.5E+000 µR/h † *	7.60E-001	2.5E+000
CY-54-IF-021	06/30/2008	6.3E+000 µR/h † *	6.40E-001	2.5E+000
CY-54-IF-022	09/30/2008	7.0E+000 µR/h † *	7.00E-001	2.5E+000
CY-54-IF-023	12/31/2008	5.5E+000 µR/h † *	5.60E-001	2.5E+000
CY-54-IF-024	03/31/2009	7.6E+000 µR/h † *	8.00E-001	2.5E+000
CY-54-IF-025	06/30/2009	6.1E+000 µR/h † *	6.00E-001	2.5E+000
CY-54-IF-026	09/30/2009	4.8E+000 µR/h † *	4.00E-001	2.5E+000
CY-54-IF-027	12/31/2009	5.1E+000 µR/h † *	6.00E-001	2.5E+000
CY-54-IF-028	03/31/2010	6.1E+000 µR/h † *	6.00E-001	2.5E+000
CY-54-IF-029	06/30/2010	4.2E+000 µR/h † *	4.00E-001	2.5E+000
CY-54-IF-030	09/30/2010	5.4E+000 µR/h † *	6.00E-001	2.5E+000
CY-54-IF-031	12/31/2010	5.2E+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

Trend Report

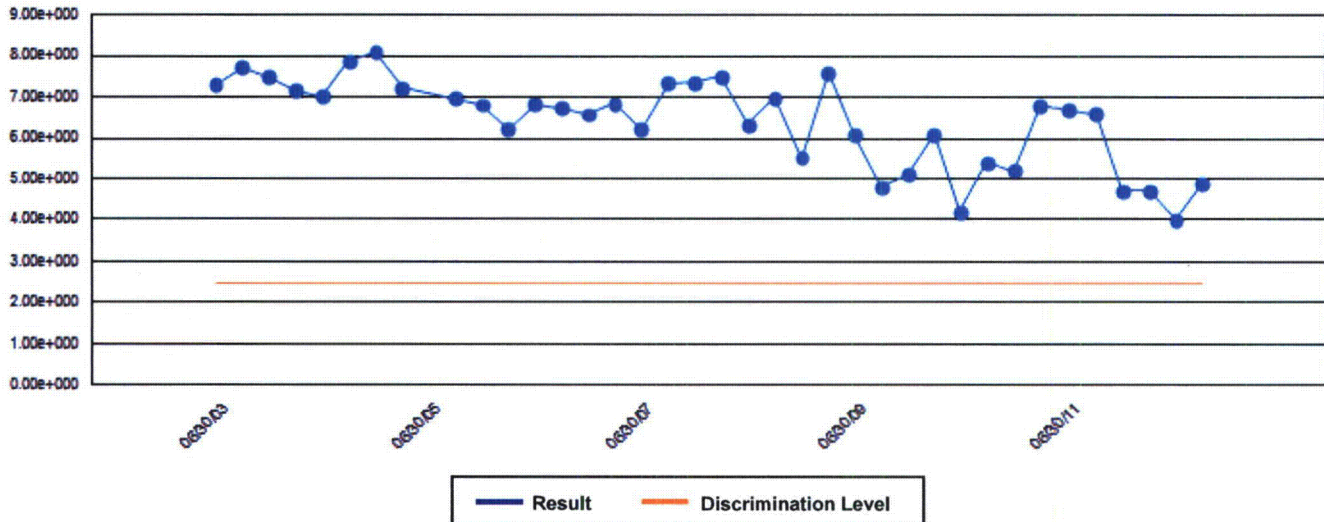
Displays: Samples collected between 06/30/2003 and 12/31/2012

3/30/2013

CY ISFSI

Indicator Locations - CY-54-IF : REMP TLD [Exposure Rate]

Continued...



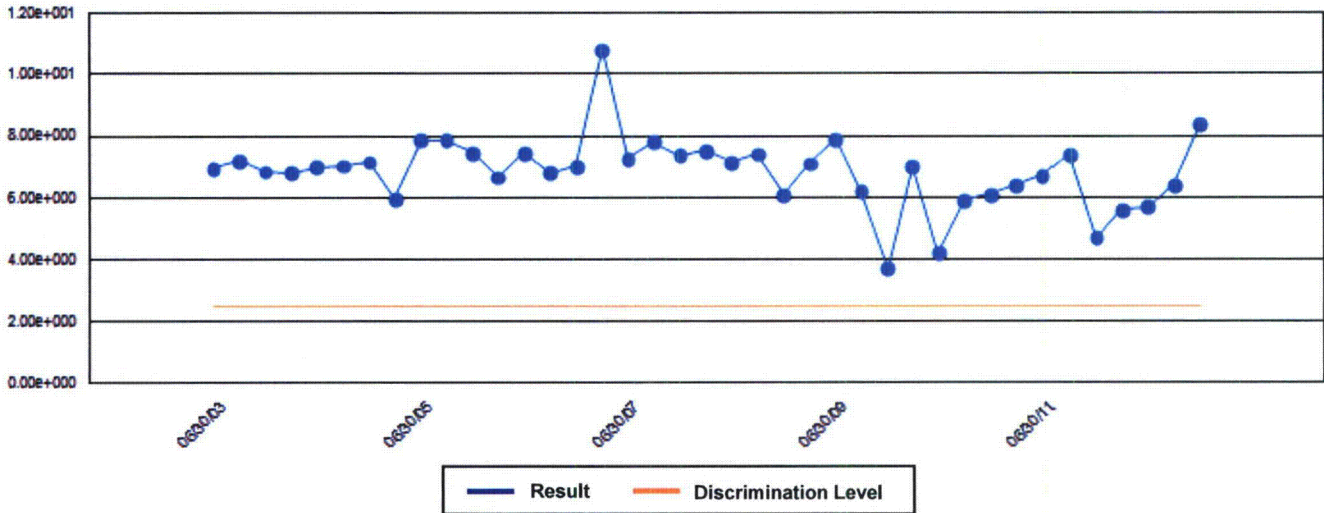
Sample Name	Date Collected	Result	2 Sigma Error	Discrimination Level
CY-54-IF-032	03/31/2011	6.8E+000 µR/h †*	6.00E-001	2.5E+000
CY-54-IF-033	06/30/2011	6.7E+000 µR/h †*	6.00E-001	2.5E+000
CY-54-IF-034	09/30/2011	6.6E+000 µR/h †*	6.00E-001	2.5E+000
CY-54-IF-035	12/31/2011	4.7E+000 µR/h †*	4.00E-001	2.5E+000
CY-54-IF-036	03/31/2012	4.7E+000 µR/h †*	4.00E-001	2.5E+000
CY-54-IF-037	06/30/2012	4.0E+000 µR/h †*	4.00E-001	2.5E+000
CY-54-IF-038	09/30/2012	4.9E+000 µR/h †*	4.00E-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 CY-55-IF

Trend Report 3/30/2013
Displays: Samples collected between 06/30/2003 and 12/31/2012

Indicator Locations - CY-55-IF : REMP TLD [Exposure Rate]



Sample Name	Date Collected	Result	2 Sigma Error	Discrimination Level
CY-55-IF-001	06/30/2003	7.0E+000 µR/h †*	6.60E-001	2.5E+000
CY-55-IF-002	09/30/2003	7.2E+000 µR/h †*	4.40E-001	2.5E+000
CY-55-IF-003	12/31/2003	6.8E+000 µR/h †*	5.40E-001	2.5E+000
CY-55-IF-004	03/31/2004	6.8E+000 µR/h †*	1.04E+000	2.5E+000
CY-55-IF-005	06/30/2004	7.0E+000 µR/h †*	1.10E+000	2.5E+000
CY-55-IF-006	09/30/2004	7.0E+000 µR/h †*	1.26E+000	2.5E+000
CY-55-IF-007	12/31/2004	7.2E+000 µR/h †*	4.40E-001	2.5E+000
CY-55-IF-008	03/31/2005	6.0E+000 µR/h †*	4.80E-001	2.5E+000
CY-55-IF-009	06/30/2005	7.9E+000 µR/h †*	1.60E+000	2.5E+000
CY-55-IF-010	09/30/2005	7.9E+000 µR/h †*	1.52E+000	2.5E+000
CY-55-IF-011	12/31/2005	7.5E+000 µR/h †*	9.00E-001	2.5E+000
CY-55-IF-012	03/31/2006	6.7E+000 µR/h †*	6.40E-001	2.5E+000
CY-55-IF-013	06/30/2006	7.5E+000 µR/h †*	7.60E-001	2.5E+000
CY-55-IF-014	09/30/2006	6.8E+000 µR/h †*	7.80E-001	2.5E+000
CY-55-IF-015	12/31/2006	7.0E+000 µR/h †*	5.80E-001	2.5E+000
CY-55-IF-016	03/31/2007	1.1E+001 µR/h †*	1.08E+000	2.5E+000
CY-55-IF-017	06/30/2007	7.3E+000 µR/h †*	7.20E-001	2.5E+000
CY-55-IF-018	09/30/2007	7.8E+000 µR/h †*	7.80E-001	2.5E+000
CY-55-IF-019	12/31/2007	7.4E+000 µR/h †*	7.40E-001	2.5E+000
CY-55-IF-020	03/31/2008	7.5E+000 µR/h †*	7.60E-001	2.5E+000
CY-55-IF-021	06/30/2008	7.2E+000 µR/h †*	7.20E-001	2.5E+000
CY-55-IF-022	09/30/2008	7.4E+000 µR/h †*	7.40E-001	2.5E+000
CY-55-IF-023	12/31/2008	6.1E+000 µR/h †*	6.00E-001	2.5E+000
CY-55-IF-024	03/31/2009	7.1E+000 µR/h †*	8.00E-001	2.5E+000
CY-55-IF-025	06/30/2009	7.9E+000 µR/h †*	8.00E-001	2.5E+000
CY-55-IF-026	09/30/2009	6.2E+000 µR/h †*	6.00E-001	2.5E+000
CY-55-IF-027	12/31/2009	3.7E+000 µR/h †*	4.00E-001	2.5E+000
CY-55-IF-028	03/31/2010	7.0E+000 µR/h †*	6.00E-001	2.5E+000
CY-55-IF-029	06/30/2010	4.2E+000 µR/h †*	4.00E-001	2.5E+000
CY-55-IF-030	09/30/2010	5.9E+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

Trend Report

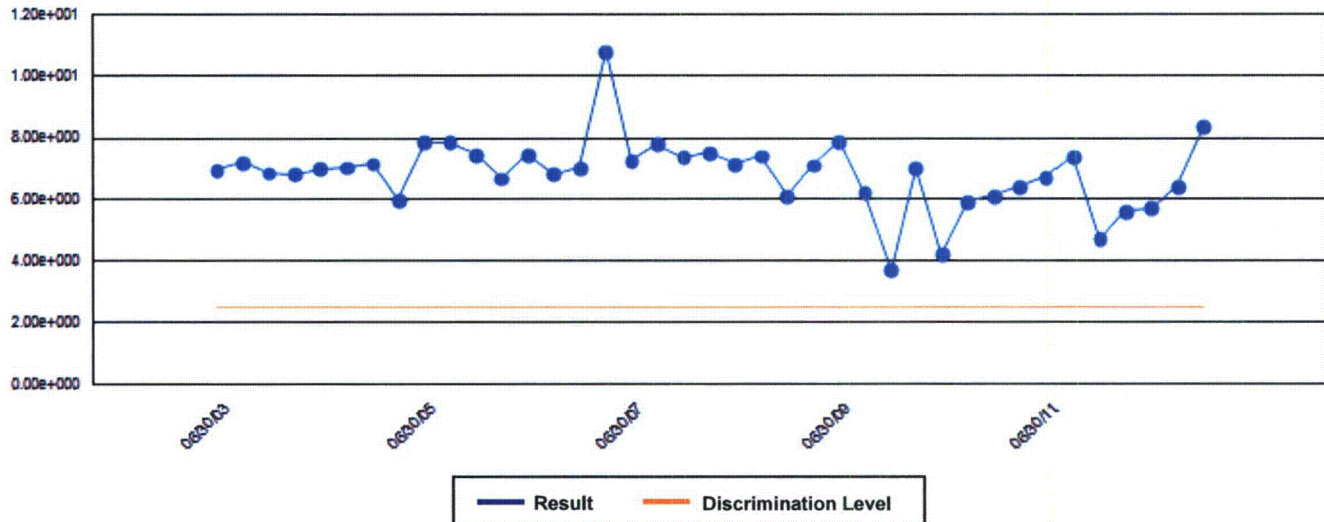
Displays: Samples collected between 06/30/2003 and 12/31/2012

3/30/2013

CY ISFSI

Indicator Locations - CY-55-IF : REMP TLD [Exposure Rate]

Continued...



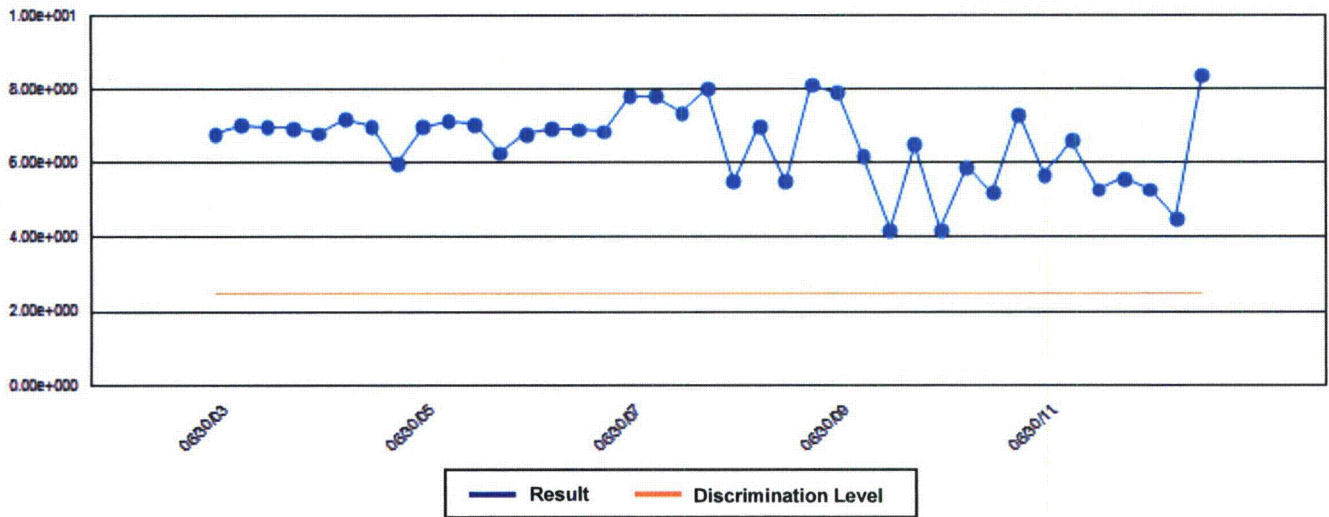
Sample Name	Date Collected	Result	2 Sigma Error	Discrimination Level
CY-55-IF-031	12/31/2010	6.1E+000 µR/h † *	6.00E-001	2.5E+000
CY-55-IF-032	03/31/2011	6.4E+000 µR/h † *	6.00E-001	2.5E+000
CY-55-IF-033	06/30/2011	7.4E+000 µR/h † *	6.00E-001	2.5E+000
CY-55-IF-034	09/30/2011	6.7E+000 µR/h † *	8.00E-001	2.5E+000
CY-55-IF-035	12/31/2011	4.7E+000 µR/h † *	4.00E-001	2.5E+000
CY-55-IF-036	03/31/2012	5.6E+000 µR/h † *	6.00E-001	2.5E+000
CY-55-IF-037	06/30/2012	5.7E+000 µR/h † *	6.00E-001	2.5E+000
CY-55-IF-038	09/30/2012	6.4E+000 µR/h † *	6.00E-001	2.5E+000
CY-55-IF-039	12/31/2012	8.4E+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 CY-56-IF

Trend Report 3/30/2013
 Displays: Samples collected between 06/30/2003 and 12/31/2012

Indicator Locations - CY-56-IF : REMP TLD [Exposure Rate]



Sample Name	Date Collected	Result	2 Sigma Error	Discrimination Level
CY-56-IF-001	06/30/2003	6.8E+000 µR/h † *	7.00E-001	2.5E+000
CY-56-IF-002	09/30/2003	7.0E+000 µR/h † *	4.80E-001	2.5E+000
CY-56-IF-003	12/31/2003	7.0E+000 µR/h † *	8.00E-001	2.5E+000
CY-56-IF-004	03/31/2004	6.9E+000 µR/h † *	6.80E-001	2.5E+000
CY-56-IF-005	06/30/2004	6.8E+000 µR/h † *	1.00E+000	2.5E+000
CY-56-IF-006	09/30/2004	7.2E+000 µR/h † *	2.68E+000	2.5E+000
CY-56-IF-007	12/31/2004	7.0E+000 µR/h † *	3.40E-001	2.5E+000
CY-56-IF-008	03/31/2005	6.0E+000 µR/h † *	4.40E-001	2.5E+000
CY-56-IF-009	06/30/2005	7.0E+000 µR/h † *	5.80E-001	2.5E+000
CY-56-IF-010	09/30/2005	7.1E+000 µR/h † *	1.10E+000	2.5E+000
CY-56-IF-011	12/31/2005	7.0E+000 µR/h † *	9.00E-001	2.5E+000
CY-56-IF-012	03/31/2006	6.3E+000 µR/h † *	6.40E-001	2.5E+000
CY-56-IF-013	06/30/2006	6.8E+000 µR/h † *	7.60E-001	2.5E+000
CY-56-IF-014	09/30/2006	6.9E+000 µR/h † *	6.60E-001	2.5E+000
CY-56-IF-015	12/31/2006	6.9E+000 µR/h † *	5.60E-001	2.5E+000
CY-56-IF-016	03/31/2007	6.8E+000 µR/h † *	6.80E-001	2.5E+000
CY-56-IF-017	06/30/2007	7.8E+000 µR/h † *	7.80E-001	2.5E+000
CY-56-IF-018	09/30/2007	7.8E+000 µR/h † *	7.80E-001	2.5E+000
CY-56-IF-019	12/31/2007	7.4E+000 µR/h † *	7.40E-001	2.5E+000
CY-56-IF-020	03/31/2008	8.0E+000 µR/h † *	8.00E-001	2.5E+000
CY-56-IF-021	06/30/2008	5.5E+000 µR/h † *	5.60E-001	2.5E+000
CY-56-IF-022	09/30/2008	7.0E+000 µR/h † *	7.00E-001	2.5E+000
CY-56-IF-023	12/31/2008	5.5E+000 µR/h † *	5.60E-001	2.5E+000
CY-56-IF-024	03/31/2009	8.1E+000 µR/h † *	8.00E-001	2.5E+000
CY-56-IF-025	06/30/2009	7.9E+000 µR/h † *	8.00E-001	2.5E+000
CY-56-IF-026	09/30/2009	6.2E+000 µR/h † *	6.00E-001	2.5E+000
CY-56-IF-027	12/31/2009	4.2E+000 µR/h † *	4.00E-001	2.5E+000
CY-56-IF-028	03/31/2010	6.5E+000 µR/h † *	6.00E-001	2.5E+000
CY-56-IF-029	06/30/2010	4.2E+000 µR/h † *	4.00E-001	2.5E+000
CY-56-IF-030	09/30/2010	5.9E+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

Trend Report

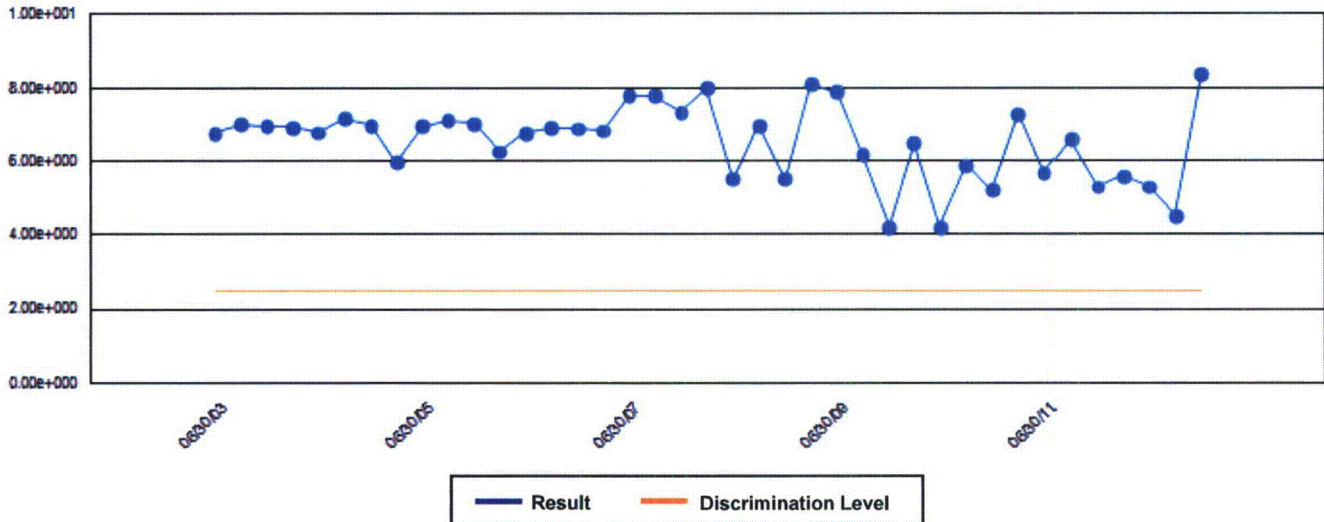
Displays: Samples collected between 06/30/2003 and 12/31/2012

3/30/2013

CY ISFSI

Indicator Locations - CY-56-IF : REMP TLD [Exposure Rate]

Continued...



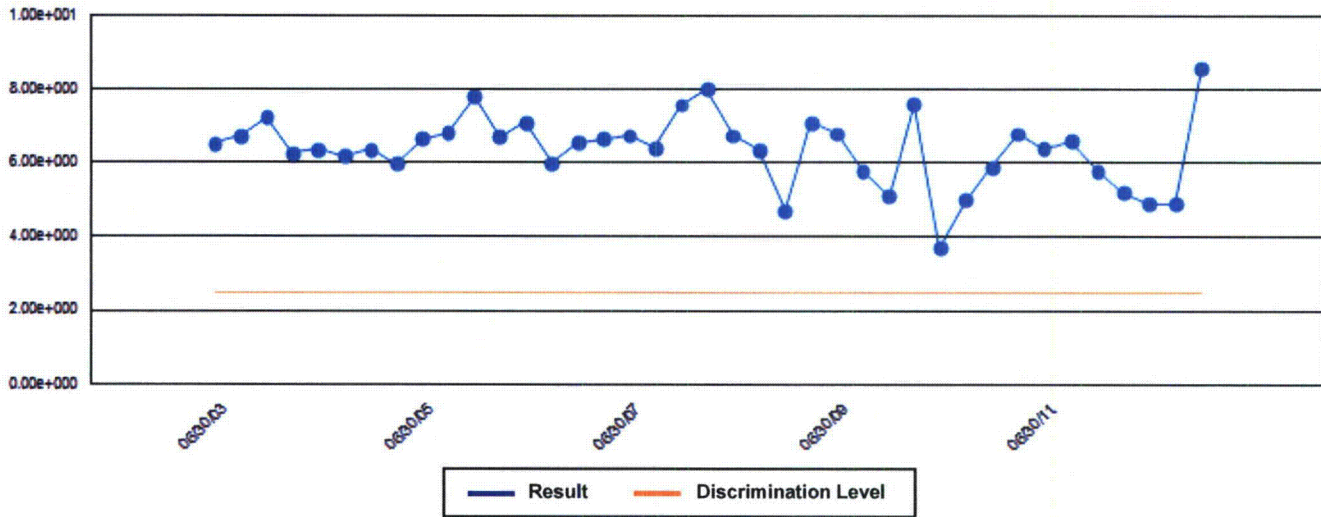
Sample Name	Date Collected	Result	2 Sigma Error	Discrimination Level
CY-56-IF-031	12/31/2010	5.2E+000 μR/h † *	6.00E-001	2.5E+000
CY-56-IF-032	03/31/2011	7.3E+000 μR/h † *	8.00E-001	2.5E+000
CY-56-IF-033	06/30/2011	5.7E+000 μR/h † *	6.00E-001	2.5E+000
CY-56-IF-034	09/30/2011	6.6E+000 μR/h † *	6.00E-001	2.5E+000
CY-56-IF-035	12/31/2011	5.3E+000 μR/h † *	6.00E-001	2.5E+000
CY-56-IF-036	03/31/2012	5.6E+000 μR/h † *	6.00E-001	2.5E+000
CY-56-IF-037	06/30/2012	5.3E+000 μR/h † *	6.00E-001	2.5E+000
CY-56-IF-038	09/30/2012	4.5E+000 μR/h † *	4.00E-001	2.5E+000
CY-56-IF-039	12/31/2012	8.4E+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 4.9
Exposure Rate Trend at Control Location CY-10-IFC

Trend Report 3/30/2013
 Displays: Samples collected between 06/30/2003 and 12/31/2012

Control Location - CY-10-IFC : REMP TLD [Exposure Rate]



Sample Name	Date Collected	Result	2 Sigma Error	Discrimination Level
CY-10-IFC-001	06/30/2003	6.5E+000 µR/h † *	7.00E-001	2.5E+000
CY-10-IFC-002	09/30/2003	6.7E+000 µR/h † *	6.00E-001	2.5E+000
CY-10-IFC-003	12/31/2003	7.2E+000 µR/h † *	9.00E-001	2.5E+000
CY-10-IFC-004	03/31/2004	6.3E+000 µR/h † *	5.80E-001	2.5E+000
CY-10-IFC-005	06/30/2004	6.4E+000 µR/h † *	1.12E+000	2.5E+000
CY-10-IFC-006	09/30/2004	6.2E+000 µR/h † *	5.80E-001	2.5E+000
CY-10-IFC-007	12/31/2004	6.4E+000 µR/h † *	3.80E-001	2.5E+000
CY-10-IFC-008	03/31/2005	6.0E+000 µR/h † *	6.00E-001	2.5E+000
CY-10-IFC-009	06/30/2005	6.7E+000 µR/h † *	4.60E-001	2.5E+000
CY-10-IFC-010	09/30/2005	6.8E+000 µR/h † *	6.60E-001	2.5E+000
CY-10-IFC-011	12/31/2005	7.8E+000 µR/h † *	9.00E-001	2.5E+000
CY-10-IFC-012	03/31/2006	6.7E+000 µR/h † *	5.40E-001	2.5E+000
CY-10-IFC-013	06/30/2006	7.1E+000 µR/h † *	5.60E-001	2.5E+000
CY-10-IFC-014	09/30/2006	6.0E+000 µR/h † *	5.80E-001	2.5E+000
CY-10-IFC-015	12/31/2006	6.6E+000 µR/h † *	7.80E-001	2.5E+000
CY-10-IFC-016	03/31/2007	6.7E+000 µR/h † *	6.60E-001	2.5E+000
CY-10-IFC-017	06/30/2007	6.8E+000 µR/h † *	6.80E-001	2.5E+000
CY-10-IFC-018	09/30/2007	6.4E+000 µR/h † *	6.40E-001	2.5E+000
CY-10-IFC-019	12/31/2007	7.6E+000 µR/h † *	7.60E-001	2.5E+000
CY-10-IFC-020	03/31/2008	8.0E+000 µR/h † *	8.00E-001	2.5E+000
CY-10-IFC-021	06/30/2008	6.8E+000 µR/h † *	6.80E-001	2.5E+000
CY-10-IFC-022	09/30/2008	6.4E+000 µR/h † *	6.40E-001	2.5E+000
CY-10-IFC-023	12/31/2008	4.7E+000 µR/h † *	4.80E-001	2.5E+000
CY-10-IFC-024	03/31/2009	7.1E+000 µR/h † *	8.00E-001	2.5E+000
CY-10-IFC-025	06/30/2009	6.8E+000 µR/h † *	6.00E-001	2.5E+000
CY-10-IFC-026	09/30/2009	5.8E+000 µR/h † *	6.00E-001	2.5E+000
CY-10-IFC-027	12/31/2009	5.1E+000 µR/h † *	6.00E-001	2.5E+000
CY-10-IFC-028	03/31/2010	7.6E+000 µR/h † *	8.00E-001	2.5E+000
CY-10-IFC-029	06/30/2010	3.7E+000 µR/h † *	4.00E-001	2.5E+000
CY-10-IFC-030	09/30/2010	5.0E+000 µR/h † *	4.00E-001	2.5E+000

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

Trend Report

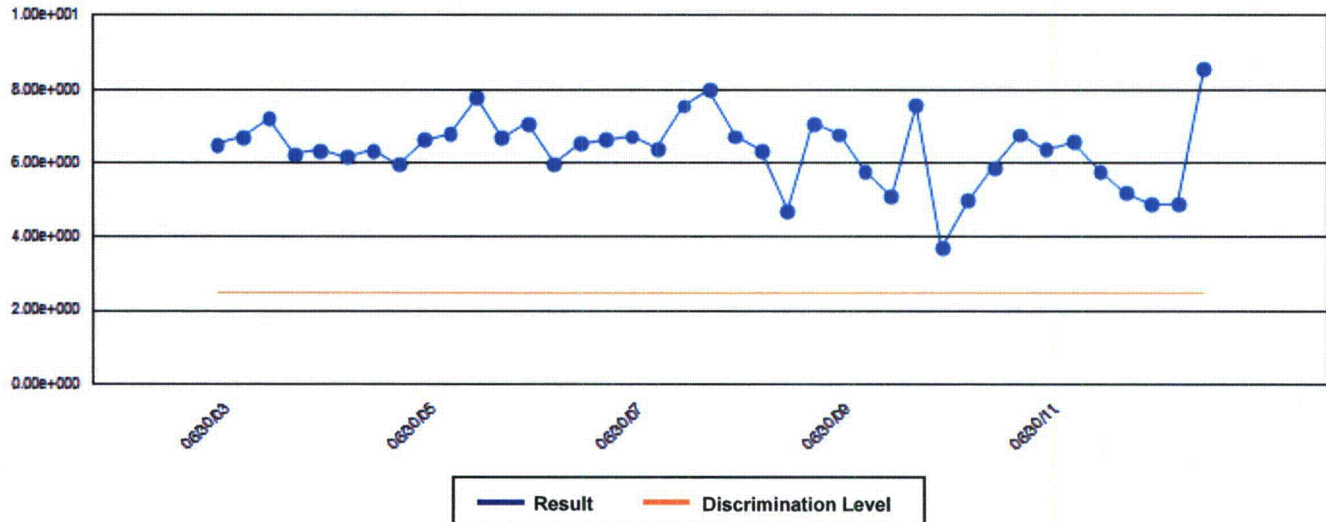
Displays: Samples collected between 06/30/2003 and 12/31/2012

3/30/2013

CY ISFSI

Control Location - CY-10-IFC : REMP TLD [Exposure Rate]

Continued...



Sample Name	Date Collected	Result	2 Sigma Error	Discrimination Level
CY-10-IFC-031	12/31/2010	5.9E+000 µR/h † *	6.00E-001	2.5E+000
CY-10-IFC-032	03/31/2011	6.8E+000 µR/h † *	6.00E-001	2.5E+000
CY-10-IFC-033	06/30/2011	6.4E+000 µR/h † *	6.00E-001	2.5E+000
CY-10-IFC-034	09/30/2011	6.6E+000 µR/h † *	6.00E-001	2.5E+000
CY-10-IFC-035	12/31/2011	5.8E+000 µR/h † *	6.00E-001	2.5E+000
CY-10-IFC-036	03/31/2012	5.2E+000 µR/h † *	6.00E-001	2.5E+000
CY-10-IFC-037	06/30/2012	4.9E+000 µR/h † *	4.00E-001	2.5E+000
CY-10-IFC-038	09/30/2012	4.9E+000 µR/h † *	4.00E-001	2.5E+000
CY-10-IFC-039	12/31/2012	8.6E+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

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.

Two deviations of the sampling requirements occurred during this monitoring period. The first deviation is the TLD at location CY-54-IF was missing at the time of the 4th quarter change-out; therefore, no data is available for that location for the 4th quarter. The second deviation is an inadvertent exposure of the 4th quarter TLDs by a calibration source at the RSCS home office. This event is documented in RSCS Condition Report # 13-17. This event does not affect the calculation of the 4th quarter dose because both the control and monitoring location TLDs were exposed. It does, however, affect the exposure rate values. This event has resulted in the 4th quarter exposure rates to be between 1.12 and 1.71 times higher than the average, as determined from 2010 - 2012 3rd quarter data, at each location.

5.2 Direct Radiation Pathway

5.2.1 Exposure Rates

Direct radiation is continuously measured at 8 indicator locations surrounding the Haddam Neck ISFSI, along with 1 control location (Hurd Park Road) 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 no significant difference between the indicator and control location exposure rates. Figures 4.1 through 4.9 show exposure rate trends of the monitoring locations since 2003. Review of Figures 4.1 through 4.9 shows no significant difference between the pre-operational and operational exposure rates 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

The ODCM specifies that a cumulative dose estimate from direct radiation is required to be determined semi-annually. This 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. The ODCM states that 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 2012 dose estimate assumes a total of 500 hours occupancy for the dose calculation; of which 50 hours are used in both the first and fourth quarters and 200 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 Connecticut or Salmon Rivers for boating and fishing; 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 not along either river but at a location near the center of the site at Station ID number CY-55-IF. The maximum calculated annual dose at that location is 0.48 mrem. This value is only 2 percent of the 25 mrem per year limit. The calculated annual dose to members of the public at the mouth of the Discharge Canal was 0.09 mrem. The calculated annual dose to members of the public at Route 149 near the mouth of the Salmon River was 0.00 mrem.

6.0 LAND USE CENSUS

The most recent census remained in effect for 2012; therefore, no changes were made to the monitoring program.

7.0 REFERENCES

1. USNRC Radiological Assessment Branch Technical Position, "An Acceptable Radiological Environmental Monitoring Program," Revision 1, November 1979.
2. Haddam Neck Off-site Dose Calculation Manual, Revision 23.
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".

CY-13-025

ENCLOSURE 2

HADDAM NECK
INDEPENDENT SPENT FUEL STORAGE INSTALLATION
ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
JANUARY – DECEMBER 2012

April 2013

**HADDAM NECK
INDEPENDENT SPENT FUEL STORAGE INSTALLATION**
License No. DPR-61

**ANNUAL RADIOACTIVE EFFLUENT
RELEASE REPORT**

January - December 2012



March 2013

Prepared by:

**Radiation Safety & Control Services
91 Portsmouth Avenue
Stratham, NH 03885-2468**

EXECUTIVE SUMMARY

Tables 1 and 2 summarize the quantity of radioactive gaseous and liquid effluents, respectively, for each quarter of 2012. There were no gaseous or liquid releases in 2012. Table 3 summarizes waste shipped off-site for disposal for each half year of 2012. There was no waste shipped in 2012.

Appendices A through C indicate the status of reportable items per the requirements of the Off-site Dose Calculation Manual (ODCM). There were no reportable items in 2012.

Table 1

HADDAM NECK ISFSI
Effluent and Waste Disposal Annual Report
2012 Gaseous Effluents-Summation of All Releases

Nuclides Released	Units	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Error
A. Fission and Activation Gases						
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. Iodines						
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*	
C. Particulates						
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*	
D. Tritium						
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 Haddam Neck Independent Spent Fuel Storage Installation (ISFSI)

Table 1A

**HADDAM NECK ISFSI
Effluent and Waste Disposal Annual Report
2012 Gaseous Effluents - Ground Level Releases - Batch Mode**

Nuclides Released	Unit	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Total
1. Fission Gases						
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*
2. Iodines						
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*
3. Particulates						
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 Haddam Neck Independent Spent Fuel Storage Installation (ISFSI)

Table 1B

HADDAM NECK ISFSI
Effluent and Waste Disposal Annual Report
2012 Gaseous Effluents - Ground Level Releases - Continuous Mode

Nuclides Released	Unit	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Total
1. Fission Gases						
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*
2. Iodines						
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*
3. Particulates						
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 Haddam Neck Independent Spent Fuel Storage Installation (ISFSI)

Table 1C

HADDAM NECK ISFSI
Effluent and Waste Disposal Annual Report
2012 Gaseous Effluents - Elevated Releases – Batch Mode

Nuclides Released	Unit	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Total
1. Fission Gases						
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*
2. Iodines						
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*
3. Particulates						
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 Haddam Neck Independent Spent Fuel Storage Installation (ISFSI)

Table 1D

**HADDAM NECK ISFSI
Effluent and Waste Disposal Annual Report
2012 Gaseous Effluents - Elevated Releases – Continuous Mode**

Nuclides Released	Unit	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Total
1. Fission Gases						
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*
2. Iodines						
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*
3. Particulates						
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 Haddam Neck Independent Spent Fuel Storage Installation (ISFSI)

Table 2

HADDAM NECK ISFSI
Effluent and Waste Disposal Annual Report
2012 Liquid Effluents - Summation of All Releases

Nuclides Released	Unit	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Error
A. Fission and Activation Products						
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. Tritium						
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*	
C. Dissolved and Entrained Gases						
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*	
D. Gross Alpha Radioactivity						
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*	
E. Volume of Waste Released (prior to dilution)	Liters	N/A*	N/A*	N/A*	N/A*	
F. Volume of Dilution Water Used During Period	Liters	N/A*	N/A*	N/A*	N/A*	

N/A*= Not Applicable

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

Table 2A

**HADDAM NECK ISFSI
Effluent and Waste Disposal Annual Report
2012 Liquid Effluents – Batch Mode**

Nuclides Released	Unit	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Totals
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 Haddam Neck Independent Spent Fuel Storage Installation (ISFSI)

Table 2B

**HADDAM NECK ISFSI
Effluent and Waste Disposal Annual Report
2012 Liquid Effluents – Continuous Mode**

Nuclides Released	Unit	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Totals
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-Lathanium-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 Haddam Neck Independent Spent Fuel Storage Installation (ISFSI)

Table 3

HADDAM NECK ISFSI
Effluent and Waste Disposal Annual Report
First Half 2012 Low Level Waste Shipments

Resins, Filters and Evaporator Bottoms		Volume		Curies Shipped
Waste Class	Solidifying Agent	ft³	m³	Curies
A		0	0	0
B		0	0	0
C		0	0	0
All		0	0	0
Major radionuclides for above data:				
Dry Active Waste		Volume		Curies Shipped
Waste Class	Solidifying Agent	ft³	m³	Curies
A		0	0	0
B		0	0	0
C		0	0	0
All		0	0	0
Major radionuclides for above data:				
Irradiated Components		Volume		Curies Shipped
Waste Class	Solidifying Agent	ft³	m³	Curies
A		0	0	0
B		0	0	0
C		0	0	0
All		0	0	0
Major radionuclides for above data:				
Other Waste		Volume		Curies Shipped
Waste Class	Solidifying Agent	ft³	m³	Curies
A		0	0	0
B		0	0	0
C		0	0	0
All		0	0	0
Major radionuclides for above data:				

Table 3A

HADDAM NECK ISFSI
Effluent and Waste Disposal Annual Report
Second Half 2012 Low Level Waste Shipments

Resins, Filters and Evaporator Bottoms		Volume		Curies Shipped
Waste Class	Solidifying Agent	ft³	m³	Curies
A		0	0	0
B		0	0	0
C		0	0	0
All		0	0	0
Major radionuclides for above data:				
Dry Active Waste		Volume		Curies Shipped
Waste Class	Solidifying Agent	ft³	m³	Curies
A		0	0	0
B		0	0	0
C		0	0	0
All		0	0	0
Major radionuclides for above data:				
Irradiated Components		Volume		Curies Shipped
Waste Class	Solidifying Agent	ft³	m³	Curies
A		0	0	0
B		0	0	0
C		0	0	0
All		0	0	0
Major radionuclides for above data:				
Other Waste		Volume		Curies Shipped
Waste Class	Solidifying Agent	ft³	m³	Curies
A		0	0	0
B		0	0	0
C		0	0	0
All		0	0	0
Major radionuclides for above data:				

Appendix A

Radiation Dose Assessment

There were no gaseous or liquid effluent releases in 2012. 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
Abnormal Releases

There were no abnormal releases of radioactive materials from the site in 2012.

Appendix C

Off-site Dose Calculation Manual Changes

There were no changes to the Off-site Dose Calculation Manual in 2012.