HADDAM NECK INDEPENDENT SPENT FUEL STORAGE INSTALLATION
License No. DPR-61
ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

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EXECUTIVE SUMMARY

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 2007 in compliance with the Connecticut Yankee Off-Site Dose Calculation Manual (ODCM). Haddam Neck was permanently shutdown in 1996, and all fuel was transferred into dry cask storage at the facilities Independent Spent Fuel Storage Facility. This annual report was prepared by Radiological Safety & Control Services. Sample collection activities were performed by Radiological Safety & Control Services personnel. Laboratory analyses were performed by General Engineering Laboratory for water and soil, and by Global Dosimetry for direct radiation processing of the thermoluminescent dosimeters (TLD's).

TLDs were used to measure direct gamma exposure in the vicinity of the station and as far away as 1.0 mile. The results of these samples showed no significant change in exposure rate during the monitoring period over the baseline measurements that were collected in 2003. Radiochemical and radiological counting analyses of soil and water samples were performed to detect the presence of any station related radioactivity. These analyses showed no station related radioactivity.
Collected samples included a sediment sample from Dibble Creek, a soil sample from the ISFSI Outfall, and run-off water from the ISFSI pad. The collection and analysis of these samples are not required by the Offsite Dose Calculation Manual, nor are they a requirement found in the REMP. However, these samples were collected and analyzed using the same protocol for standard REMP water samples.

During the monitoring period, a change was made to the ISFSI Radiological Environmental Monitoring Program to eliminate the REMP TLD's from the fence that surrounds the nuclear fuel storage area. The TLD values at these locations have no bearing on offsite dose to a real member 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 Offsite Dose Calculation Manual (ODCM). The remainder of this report is organized as follows:

Section 2: Provides an introduction to the background radioactivity and radiation that is detected in the Haddam Neck environs.

Section 3: Provides a brief description of the Connecticut Yankee site and its environs.

Section 4: Provides a description of the overall REMP design. Included is a summary of the ODCM requirements for REMP sampling, tables listing routine sampling and TLD monitoring locations with compass sectors and distances from the plant, and maps showing the location of each of the sampling and TLD monitoring locations. Tables listing Lower Limit of Detection requirements and Reporting Levels for a standard REMP are also included.

Section 5: Consists of the summarized data in the format specified by the NRC Branch Technical Position on Environmental Monitoring (Reference 1). Also included are complete environmental TLD data.

Section 6: 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 8: Summarizes the requirements and the results of the Land Use Census.

Section 9: References

2.0 NATURALLY OCCURRING AND MAN-MADE BACKGROUND RADIOACTIVITY

Radiation or radioactivity potentially detected in the Haddam Neck environment can be grouped into three categories. The first is "naturally-occurring" radiation and radioactivity. The second is "man-made" radioactivity from sources other than the Connecticut Yankee ISFSI. The third potential source of radioactivity is due to emissions from the former Connecticut Yankee facility and the ISFSI. For the purposes of the Connecticut Yankee REMP, the first two categories are classified as "background" radiation, and are the subject of discussion in this section of the report. The third category is the one that the REMP is designed to detect and evaluate.

2.1 Naturally Occurring Background Radioactivity

Natural radiation and radioactivity in the environment, which provide the major source of human radiation exposure, may be subdivided into three separate categories: "primordial radioactivity," "cosmogenic radioactivity" and "cosmic radiation." "Primordial radioactivity" is made up of those radionuclides that were created with the universe and that have a sufficiently long half-life to be still present on the earth. Included in this category are the radionuclides that these elements have decayed into. A few of the more important radionuclides in this category are Uranium-238 (U-238), Thorium-232 (Th-232), Rubidium-87 (Rb-87), Potassium-40 (K-40), Radium-226 (Ra-226), and Radon-222 (Rn-222). Uranium-238 and Thorium-232 are readily detected in soil and rock, whether through direct field measurements or through laboratory analysis of samples. Radium-226 in the earth can find its way from the soil into ground water, and is often detectable there. Potassium-40 comprises about 0.01 percent of all natural potassium in the earth, and is consequently detectable in most biological substances, including the human body. There are many more primordial radionuclides found in the environment in addition to the major ones discussed above (Reference 2).

The second category of naturally-occurring radiation and radioactivity is "cosmogenic radioactivity." This is produced through the nuclear interaction of high energy cosmic radiation with elements in the earth's atmosphere, and to a much lesser degree in the earth's crust. These radioactive elements are then incorporated into the entire geosphere and atmosphere, including the earth's soil, surface rock, biosphere, sediments, ocean floors, polar ice and atmosphere. The major radionuclides in this category are Carbon-14 (C-14), Hydrogen-3 (H-3 or Tritium), Sodium-22 (Na-22), and Beryllium-7 (Be-7).

The third category of naturally-occurring radiation and radioactivity is "cosmic radiation." This consists of high energy atomic or sub-atomic particles of extra-terrestrial origin and the secondary particles and radiation that are produced through their interaction in the earth's atmosphere. The primary radiation comes mostly from outside of our solar system, and to a lesser degree from the sun. We are protected from most of this radiation by the earth's atmosphere, which absorbs the radiation. Consequently, one can see that with increasing elevation one would be exposed to more cosmic radiation as a direct result of a thinner layer of air for protection. This "direct radiation" is detected in the field with gamma

spectroscopy equipment, high pressure ion chambers and thermoluminescent dosimeters (TLDs).

2.2 Man-Made Background Radioactivity

The second source of "background" radioactivity in the Haddam Neck environment is from "man-made" sources not related to the Independent Spent Fuel Storage Installation. The most recent contributor to this category was the fallout from the Chernobyl accident in April of 1986, which was detected in the Haddam Neck environs and other parts of the world. A much greater contributor to this category, however, has been fallout from atmospheric nuclear weapons tests. Tests were conducted from 1945 through 1980 by the United States, the Soviet Union, the United Kingdom, China and France, with the large majority of testing occurring during the periods 1954-1958 and 1961-1962. (A test ban treaty was signed in 1963 by the United States, the Soviet Union and the United Kingdom, but not by France and China.) Atmospheric testing was conducted by the People's Republic of China as recent as October 1980. Much of the fallout detected today is due to this explosion and the last large scale one, done in November of 1976 (Reference 3).

The radioactivity produced by these detonations was deposited worldwide. The amount of fallout deposited in any given area is dependent on many factors, such as the explosive yield of the device, the latitude and altitude of the detonation, the season in which it occurred, and the timing of subsequent rainfall which washes fallout from the troposphere (Reference 4). Most of this fallout has decayed into stable elements, but the residual radioactivity is still detectable at low levels in environmental samples worldwide. The two predominant radionuclides are Cesium-137 (Cs-137) and Strontium-90 (Sr-90) and can be found in soil and in vegetation.

Other potential "man-made" sources of environmental "background" radioactivity include other nuclear power plants, coal-fired power plants, national defense installations, hospitals, research laboratories and industry. These collectively are insignificant on a global scale when compared to the sources discussed above (natural and fallout).

3.0 GENERAL ISFSI AND SITE INFORMATION

The Connecticut Yankee ISFSI 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 plant facilities ranging between 10 and 21 feet above sea level.

The 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 CY 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. This report provides the results of the Radiological Environmental Monitoring Program for the Connecticut Yankee ISFSI in 2007.

The Radiological Environmental Monitoring Program (REMP) for the ISFSI began pre-operational direct radiation measurements in 2003 prior to actual source transfer to the ISFSI. The ISFSI REMP has been in continuous operation since that date.

4.0 PROGRAM DESIGN

The Radiological Environmental Monitoring Program (REMP) for the Connecticut Yankee ISFSI was designed with the following specific objectives in mind. These objectives will continue to be in force, to varying degrees, throughout its operation.

- To provide an early indication of the appearance or accumulation of any radioactive material in the environment caused by ISFSI operation.
- To provide assurance to regulatory agencies and the public that the station's environmental impact is known and within anticipated limits.
- To provide standby monitoring capability for rapid assessment of risk to the general public in the event of unanticipated or accidental releases of radioactive material.

The REMP is a requirement of the ISFSI ODCM. The detailed sampling requirements of the REMP are given in the ODCM. This table is summarized in this report as Table 4.1 in the report.

The required sampling locations are identified in the ODCM. The locations actually monitored during this monitoring period are shown on Tables 4.2, as well as Figures 4.1 of this report.

4.1 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 "indicators stations." The second area is called "controls stations." The distinction between the two is based on relative direction from the plant 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.

4.2 Pathways Monitored

Based on the design of the ISFSI, only one exposure pathway is required by the ODCM. However, there are 2 pathways actually monitored by the REMP. They are the direct radiation, and waterborne pathways. Each of these categories is monitored by the collection of the sample media listed below, and are described in more detail in this section:

Waterborne Pathways;

Water Sampling, Soil Sampling, and Sediment Sampling

NOTE: The soil sampling was collected at the ISFSI outfall where runoff deposited in the river.

Direct Radiation Pathway;

TLD Monitoring

4.3 Descriptions of Monitoring Programs

4.3.1 Water Sampling

Although not required by the ODCM, tri-annual grab samples were collected as part of the REMP from the run-off of the ISFSI pad. The samples were collected and analyzed for the gamma emitters listed in Table 4.3 of this report.

4.3.1.1 Sediment Sampling

Although not required by the ODCM, sediment samples were collected as part of the REMP at Dibble Creek on a semi-annual basis. These samples were monitored for gamma emitters listed in Table 4.3 of this report.

4.3.1.2 Soil Sampling

Although not required by the ODCM, soil samples were collected as part of the REMP at the ISFSI Outfall on a semi-annual basis. These samples were monitored for gamma emitters listed in Table 4.3 of this report.

4.3.2 Direct Radiation

Direct gamma radiation exposure was continuously monitored with the use of thermoluminescent dosimeters (TLDs). Dosimeters' at each monitoring location 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 NVLAP Certified Vendor.

The TLDs are placed around the Independent Spent Fuel Storage Insulation (ISFSI). This type of monitoring was implemented for the ISFSI during this monitoring period. Baseline monitoring began in 2003 prior to ISFSI operation. The ISFSI TLDs are classified as CY-##-IF in Table 5.3 of this report.

4.3.3 Special Monitoring

On occasion, special samples are taken that are not required as a part of the Radiological Environmental Monitoring Program (REMP) or the ODCM. The sample locations vary from year to year and do not appear in the Offsite Dose Calculation Manual, nor do they appear in Table 4.1 or 4.2 of this report. No special samples were collected during this period.

TABLE 4.1

ISFSI Radiological Environmental Surveillance Program
(as required by ODCM)

Exposure Pathway and/or Sample Media	Collection			Analysis	
	Number of Sample Locations	Routine Sampling Mode	Collection Frequency	Analysis Type	Analysis Frequency
1. Direct Radiation (TLD)	Total Locations: 9 (8 around perimeter of the site and 1 offsite control locations)	Continuous	Quarterly	Gamma dose	Each TLD

NOTE: The following locations were sampled as required by the REMP, but do not appear in the sampling schedule listed in the ODCM.

Soil sampling for gamma emitters at the ISFSI Outfall- Required sampling interval (semi-annual)
Sediment sampling at Dibble Creek for gamma emitters- Required sampling interval (semi-annual).
Water sampling of the ISFSI Pad run-off for gamma emitters- Required sampling interval (tri-annual).

TABLE 4.2

ISFSI 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

TABLE 4.3

Environmental Lower Limit of Detection (LLD) Sensitivity Requirements

Analysis	Water (pCi/l)	Sediment / Soil pCi/kg
Mn-54	15	
Fe-59	30	
Co-58,60	15	150
Zn-65	15	
Cs-134	15	150
Cs-137	18	180

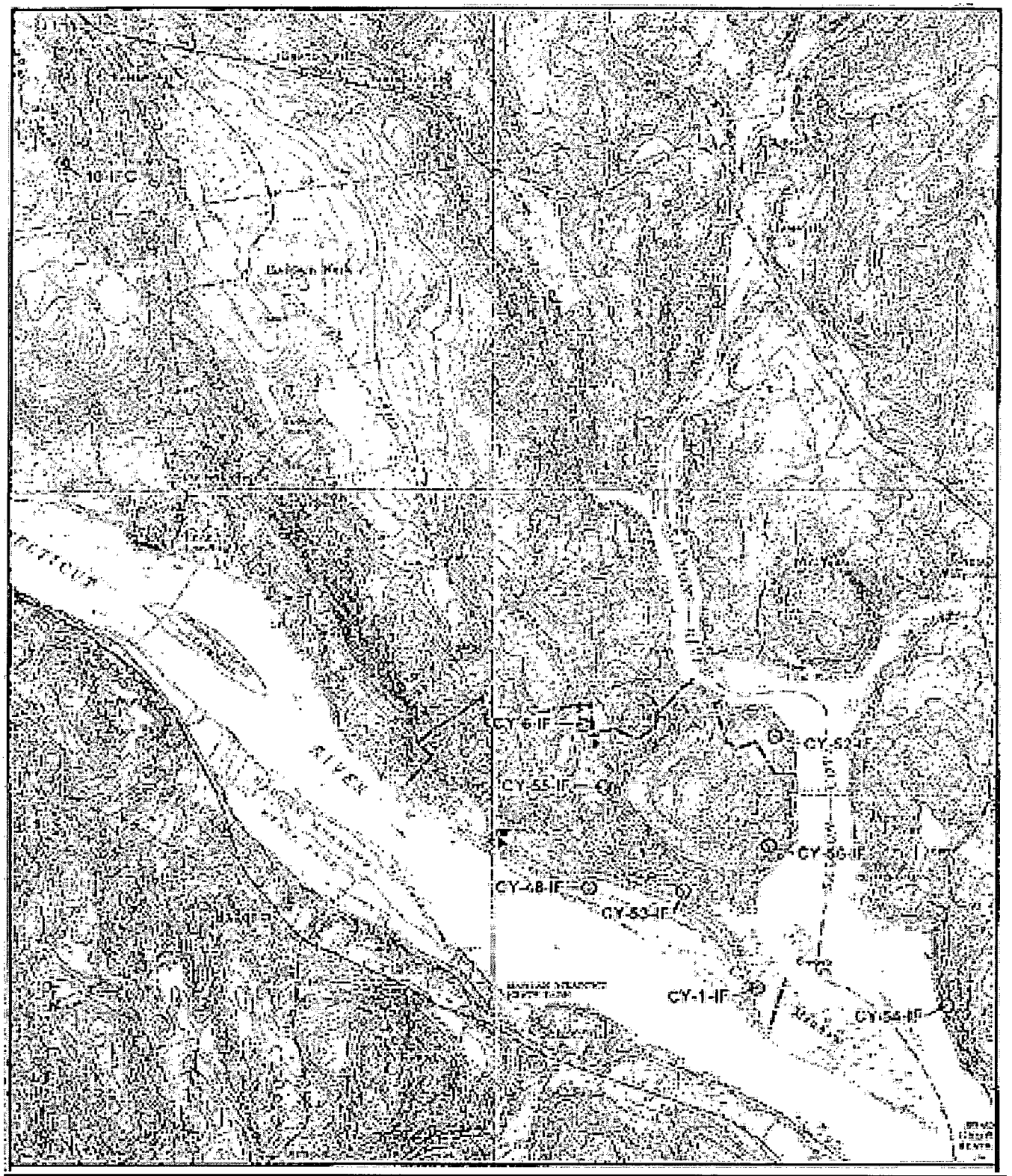
TABLE 4.4

Reporting Levels for Radioactivity Concentrations In Environmental Samples

Analysis	Water (pCi/l)
Mn-54	1000
Fe-59	400
Co-58	1000
Co-60	300
Zn-65	400
Cs-134	30
Cs-137	50

Figure 4.1

Radiological Environmental Monitoring Locations



5.0 RADIOLOGICAL DATA SUMMARY TABLES

This section summarizes the analytical results of the environmental samples, which were collected during the monitoring period. These results, shown in Table 5.1, are presented in a format similar to that prescribed in the NRC's Radiological Assessment Branch Technical Position on Environmental Monitoring (Reference 1). The results are ordered by sample media type and then by radionuclide. The units for each media type are also given.

The left-most column contains the radionuclide of interest, the total number of analyses for that radionuclide during the monitoring period, and the number of measurements which exceeded the NRC Reporting Levels. Measurements exceeding the Reporting Levels are classified as "Non-Routine" measurements. The second column lists the required Lower Limit of Detection (LLD) for those radionuclides that have detection capability requirements. The absence of a value in this column indicates that no LLD is specified for that radionuclide in that media. The target LLD for any analysis is typically 10-15 percent of the most restrictive required LLD. Occasionally, the required LLD is not met. This is usually due to low sample volume. Such cases, if any, are addressed in Section 6.2.

For each radionuclide and media type, the remaining three columns summarize the data for the following categories of monitoring locations: (1) the indicator or Zone 1 stations, which are within the range of influence of the ISFSI and which could conceivably be affected by its operation; (2) the station which had the highest mean concentration during the monitoring period for that radionuclide; and (3) historical control or Zone 2 stations, which are beyond the influence of the ISFSI. Environmental TLD's or direct radiation monitoring stations are grouped into an Inner Ring, and Outer Ring, or Control category.

In each of these columns, for each radionuclide, the following statistical values are given:

- The mean value of all concentrations, including negative values and values considered "not detectable".
- The lowest and highest concentration (LLD values included).
- The number of detectable measurements divided by the total number of measurements. For example, (4/20) would indicate that 4 of the 20 samples collected during the monitoring period, for that sample type and that radionuclide, contained detectable radioactivity.

A sample is considered to yield a "detectable measurement" when the concentration exceeds three times its associated standard deviation. The standard deviation on each measurement represents only the

random uncertainty associated with the radioactive decay process (counting statistics), and not the propagation of all possible uncertainties in the analytical procedure.

The radionuclides reported in this section represent those that: 1) had an LLD requirement, or a Reporting Level listed in Table 2.5, or 2) had a positive measurement of radioactivity, or 3) were of specific interest for any other reason. The radionuclides routinely analyzed and reported for a gamma spectroscopy analysis are: Ac-228, Ag-110m, Be-7, Ce-144, Co-57, Co-58, Co-60, Cr-51, Cs-134, Cs-137, Fe-59, K-40, Mn-54, Nb-95, Ru-103, Rh-106, Sb-124, Sb-125, Zn-65 and Zr-95. In no case did a non-natural radionuclide shown in Table 5.1 appear as a "detectable measurement" during the monitoring period.

Data from direct radiation measurements made by a TLD are provided in Table 5.2 in a format essentially the same as above. The complete listing of quarterly TLD data is provided in Table 5.3.

Table 5.1
ISFSI Radiological Environmental Program Summary
ISFSI Pad Run-off

MEDIUM: Water UNITS: pCi/L

Radionuclides* (No. Analyses) (Non-Routine**)		Required LLD	Indicator Stations Mean Range (No. Detected***)	Station	Station With Highest Mean Mean Range (No. Detected***)	No control stations were established
Mn-54	**(4)**	15	9.68E -01	n/a	N/A Only 1 Station	
	(0)		(1.85E-1 - 2.07E+00) (0/2)			**N/A**
Co-58	**(4)**	15	-8.05E -2	n/a	N/A Only 1 Station	
	(0)		(-7.53E_02 - -1.04E+00) (0/ 2)			**N/A**
Co-60	**(4)**	15	1.45E +00	n/a	N/A Only 1 Station	
	(0)		(-4.13E-1 - 2.59E+00) (0/ 2)			**N/A**
Zr-95	**(4)**	15	-3.27E +00	n/a	N/A Only 1 Station	
	(0)		(-9.61E-01 - -2.62E+00) (0/ 2)			**N/A**
Cs-134	**(4)**	15	-2.98E -1	n/a	N/A Only 1 Station	
	(0)		(-3.16E-2 - 4.12E-1) (0/ 2)			**N/A**
Cs-137	**(4)**	18	-9.27E-01	n/a	N/A Only 1 Station	
	(0)		(-3.21E-01 - 2.34E+00 (0/ 2)			**N/A**

* The radionuclides reported in this table are those that: 1) had an LLD requirement, or a Reporting Level , or 2) had a positive measurement of radioactivity, or 3) were of specific interest for any other reason.

**Non-Routine refers to those radionuclides that exceeded the Reporting Levels.

*** The fraction of sample analyses yielding detectable measurements (i.e. >3 standard deviations) is shown in parentheses.

Table 5.1 (Continued)
ISFSI Radiological Environmental Program Summary
Dibble Creek

MEDIUM: Sediment UNITS: pCi/g

Radionuclides* (No. Analyses) (Non-Routine**)		Required LLD	Indicator Stations Mean Range (No. Detected***)	Station	Station With Highest Mean Mean Range (No. Detected***)	No control stations were established
Mn-54	**(3)**		3.54E -3	n/a	N/A Only 1 Station	
	(0)		(-8.56E-3 - 2.93E-2) (0/3)			**N/A**
Co-58	**(3)**	0.15	-8.61E -2	n/a	N/A Only 1 Station	
	(0)		(-1.62E-2 - 7.45E-3) (0/3)			**N/A**
Co-60	**(3)**	0.15	-2.95E -2	n/a	N/A Only 1 Station	
	(0)		(-6.85E-3 - 8.18E-3) (0/3)			**N/A**
Zn-65	**(3)**		7.61E -2	n/a	N/A Only 1 Station	
	(0)		(1.65E-2 - 1.14E-1) (0/3)			**N/A**
Cs-134	**(3)**	0.15	3.81E -2	n/a	N/A Only 1 Station	
	(0)		(2.09E-2 - 5.12E-2) (0/3)			**N/A**
Cs-137	**(3)**	0.18	4.28E-1	n/a	N/A Only 1 Station	
	(0)		(2.33E-1 - 8.01E-1) (0/3)			**N/A**

* The radionuclides reported in this table are those that: 1) had an LLD requirement, or a Reporting Level , or 2) had a positive measurement of radioactivity, or 3) were of specific interest for any other reason.

**Non-Routine refers to those radionuclides that exceeded the Reporting Levels.

*** The fraction of sample analyses yielding detectable measurements (i.e. >3 standard deviations) is shown in parentheses.

Table 5.1 (Continued)
ISFSI Radiological Environmental Program Summary
ISFSI Outfall

MEDIUM: Soil UNITS: pCi/g

Radionuclides* (No. Analyses) (Non-Routine**)		Required LLD	Indicator Stations Mean Range (No. Detected***)	Station	Station With Highest Mean Mean Range (No. Detected***)	No control stations were established
Mn-54	(3)		3.87E -2	n/a	N/A Only 1 Station	
	(0)		(2.44E-2 - 4.65E-1) (0/3)			N/A
Co-58	(3)	0.15	-9.86E -3	n/a	N/A Only 1 Station	
	(0)		(-1.93E-2 - 2.23E-2) (0/3)			N/A
Co-60	(3)	0.15	-8.39E -3	n/a	N/A Only 1 Station	
	(0)		(-5.61E-3 - 9.14E-3) (0/3)			N/A
Zn-65	(3)		8.70E -03	n/a	N/A Only 1 Station	
	(0)		(-1.97E-2 - 2.74E-2) (0/3)			N/A
Cs-134	(3)	0.15	5.55E -2	n/a	N/A Only 1 Station	
	(0)		(5.50E-2 - 5.61E-2) (0/3)			N/A
Cs-137	(3)	0.15	1.54E-1	n/a	N/A Only 1 Station	
	(0)		(1.16E-1 - 1.78E-1) (0/3)			N/A

* The radionuclides reported in this table are those that: 1) had an LLD requirement, or a Reporting Level , or 2) had a positive measurement of radioactivity, or 3) were of specific interest for any other reason.

**Non-Routine refers to those radionuclides that exceeded the Reporting Levels.

*** The fraction of sample analyses yielding detectable measurements (i.e. >3 standard deviations) is shown in parentheses.

TABLE 5.2

ENVIRONMENTAL TLD DATA SUMMARY

(μR/hr)

INNER RING TLDs	**(CONTROL TLD'S)**	**STATION WITH HIGHEST MEAN**	
MEAN (RANGE) (NO. MEASUREMENTS)*	MEAN (RANGE) (NO. MEASUREMENTS)*	STA. NO.	MEAN (RANGE) (NO. MEASUREMENTS)*
7.16 (5.7 – 10.8) (32)	6.91 (6.45 – 7.6) (4)	CY-55-11-IF	8.35 (7.4 – 10.8) (4)

* Each "measurement" is based on quarterly readings

TABLE 5.3

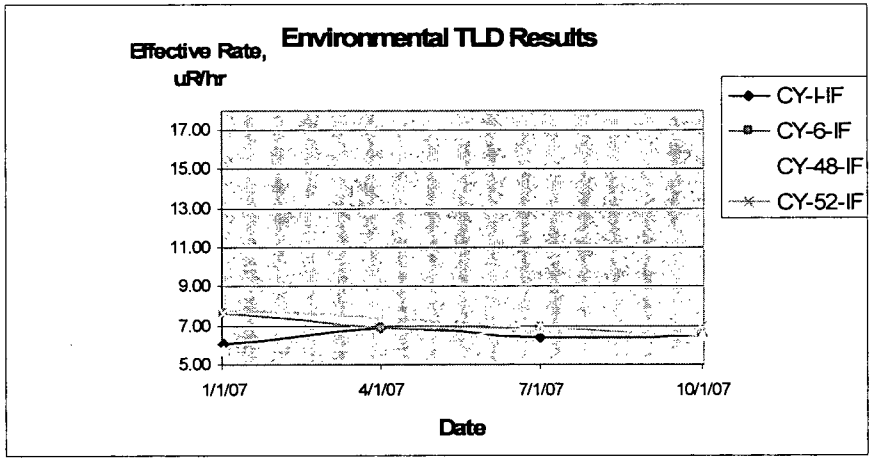
Environmental TLD Measurements
(Micro-R per hour)

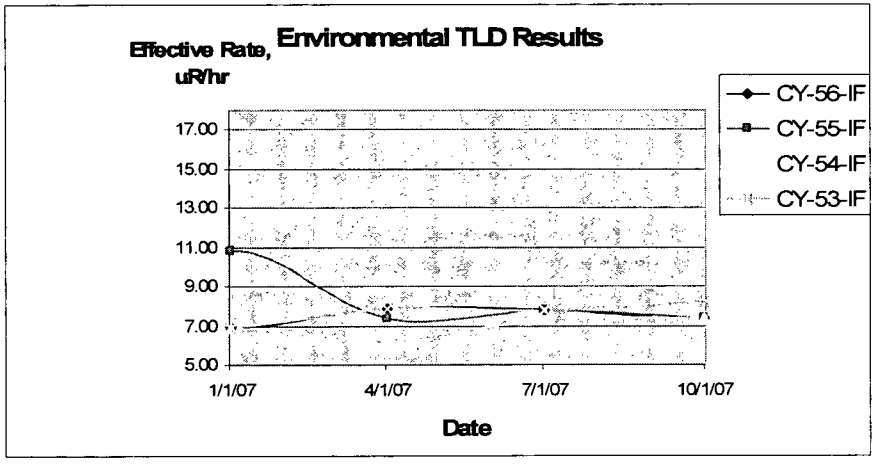
Sta. No.	Description	1st Quarter Exp.	2nd Quarter Exp.	3rd Quarter Exp.	4th Quarter Exp.	Annual Ave. Exp.
CY-I-IF	SSE	6.1	6.9	6.4	6.5	6.47
CY-6-IF	NW	7.6	6.9	6.9	6.5	6.97
CY-48-IF	WSW	5.7	5.8	6.9	6.1	6.12
CY-52-IF	NNE	7.6	7.4	6.9	6.9	7.20
CY-53-IF	SSW	6.9	7.9	7.8	8.2	7.70
CY-54-IF	ESE	6.9	6.3	7.3	7.4	6.97
CY-55-IF	NW	10.8	7.4	7.8	7.4	8.35
CY-56-IF	E	6.9	7.9	7.8	7.4	7.50
Control Stations						
CY-10-IFC	NNW	6.7	6.9	6.45	7.6	6.91

FIGURE 5.1

2007 Environmental TLD Measurements

(TL-I-1 THRU TL-I-16)



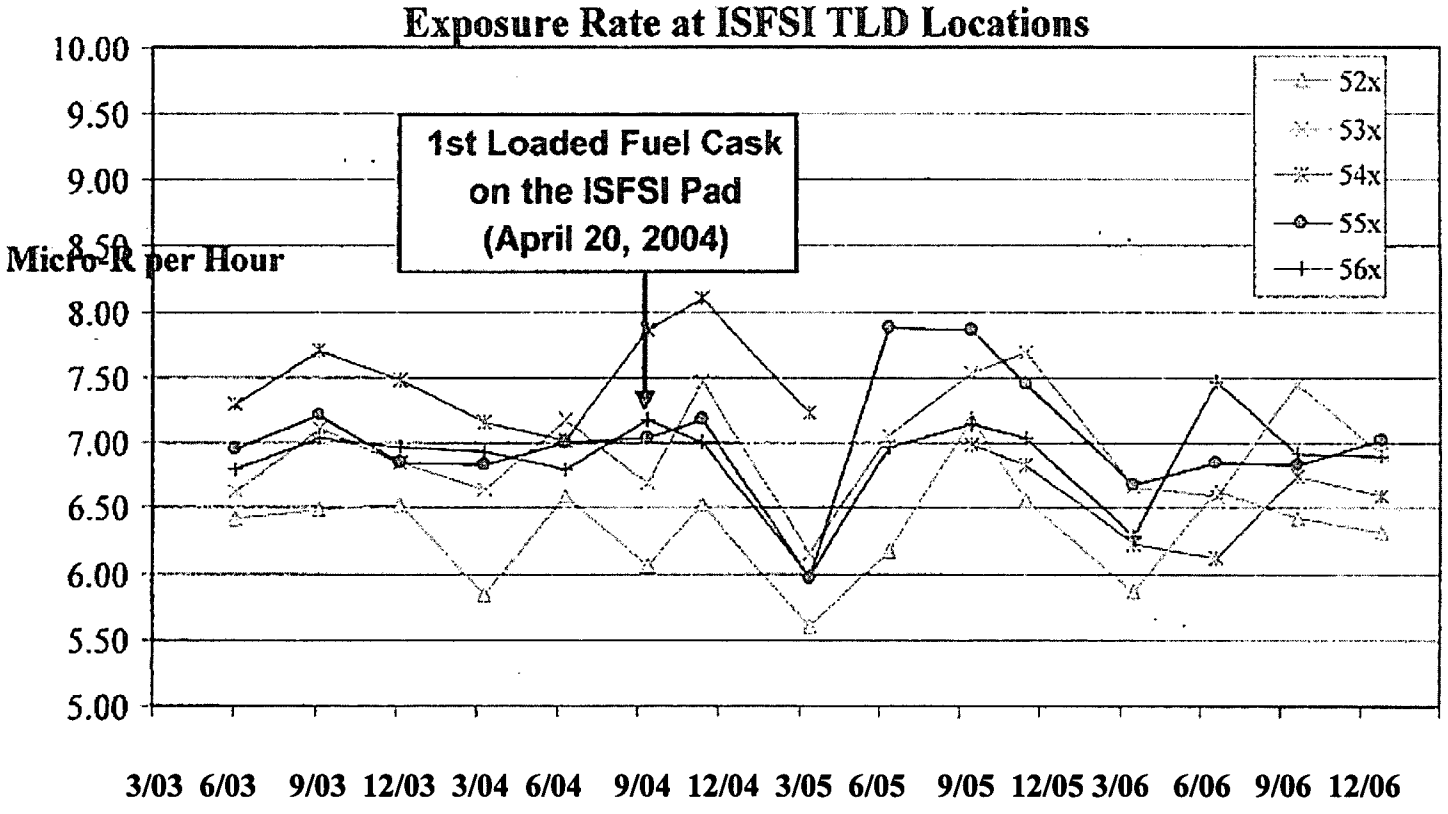


The date axis corresponds to the "Deployment Date" of the TLD's for that period.

Background correction is not applied

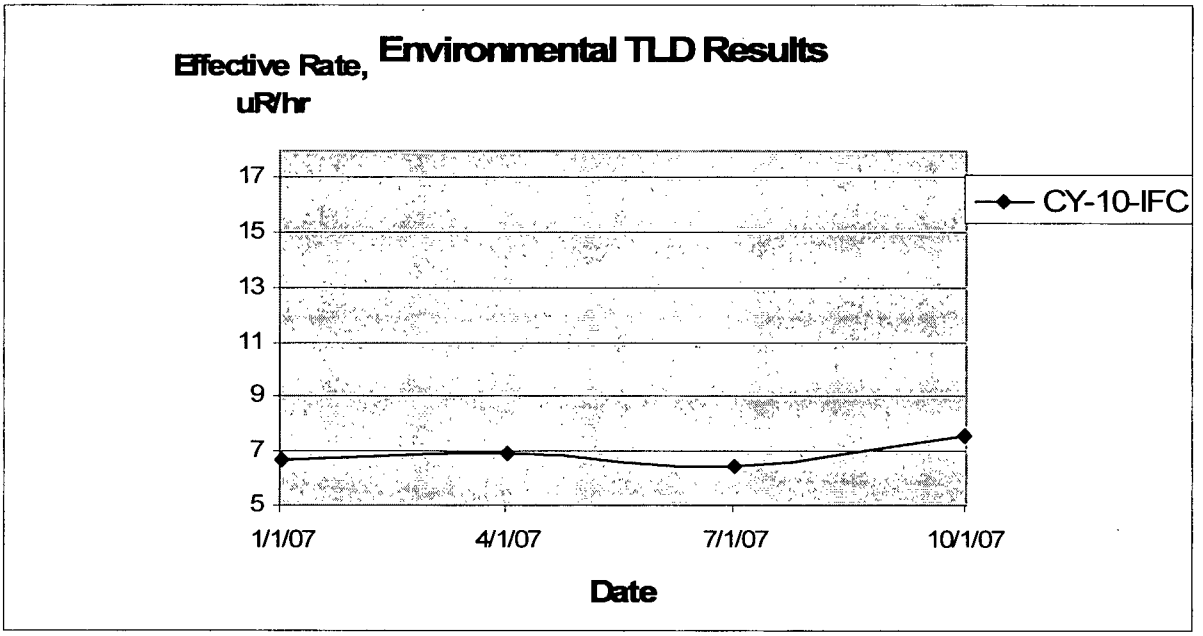
FIGURE 5.2

Historical Trend of ISFSI Environmental TLD Measurements
(Micro-R per hour)



Background correction is not applied

FIGURE 5.3
Environmental Control Location (Background)
TLD Measurements



The date axis corresponds to the "Deployment Date" of the TLD's for that period.

6.0 ANALYSIS OF ENVIRONMENTAL RESULTS

6.1 Sampling Program Deviations

The REMP allows for deviation in the sampling schedule "if samples are unobtainable due to hazardous conditions, to seasonal unavailability 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 any radiological environmental monitoring program.

No deviations of the ODCM sampling requirements occurred during the monitoring year.

6.2 Comparison of Achieved LLDs with Requirements

Typical Lower Limits of Detection (LLDs) for environmental sample analyses are listed in Table 4.3 of this report. Occasionally an LLD is not achievable due to a situation such as a low sample volume caused by sampling equipment malfunction. In such a case, a discussion of the situation is required. The target LLD for any analysis performed by GEL Engineering was at minimum 10-15 percent of the most restrictive required LLD.

For each analysis having an LLD requirement, the *a posteriori* (after the fact) LLD calculated for that analysis was compared with the required LLD. All samples analysis met the required LLD:

6.3 Comparison of Results against Reporting Levels

Notification to the NRC is required (via the Annual Radioactive Effluent Release Report) whenever a Reporting Level is exceeded. Reporting Levels are the environmental concentrations that relate to the ALARA design dose objectives of 10 CFR 50, Appendix I. It should be noted that environmental concentrations are averaged over calendar quarters for the purposes of this comparison, and that Reporting Levels apply only to measured levels of radioactivity due to effluents. Reporting levels are indicated in Table 4.4 of this report.

During the monitoring period, no reporting levels were exceeded.

6.4 Data Analysis by Media Type

The data for each media type is discussed below. Whenever a specific measurement result is

presented, it is given as the concentration plus or minus one standard deviation. This standard deviation represents only the random uncertainty associated with the radioactive decay process (counting statistics), and not the propagation of all possible uncertainties in the analytical procedure. A sample is considered to yield a "detectable measurement" when the concentration exceeds three times its associated standard deviation.

6.4.1 Waterborne Pathways

6.4.1.1 Water Samples

Although not specifically required by the ODCM, tri-annual grab samples are collected from the run-off of the ISFSI pad. For the purpose of this report, 4 sample sets were collected, due to a missed sample in the year 2006. The missed sample was made up for during the 2007 monitoring, but within the +/- 25% allowance period of the 2006 sample schedule date.

Table 5.1 shows that no plant derived radionuclides were detected in samples. The samples were collected for gamma spectroscopy analysis. All concentrations are included in Table 5.1 regardless of whether they are considered "detectable" or "not detectable". When activity is not detected, the MDA value is used for the sample concentration.

6.4.1.2 Sediment

Although not specifically required by the ODCM, semi-annual grab samples were collected from Dibble Creek. For this reporting period, a set of 3 samples were collected throughout the year and are reported in Table 5.1.

Table 5.1 shows that no plant derived radionuclides were detected in samples. The samples were collected for gamma spectroscopy analysis. All concentrations are included in Table 5.1 regardless of whether they are considered "detectable" or "not detectable". When activity is not detected, the MDA value is used for the sample concentration.

6.4.1.3 Soil

Although not specifically required by the ODCM, semi-annual grab samples were collected from the Outfall of the Connecticut Yankee ISFSI. For this reporting period, a set of 3 samples were collected throughout the year and are reported in Table 5.1

Table 5.1 shows that no plant derived radionuclides were detected in samples. The samples were collected for gamma spectroscopy analysis. All concentrations are included in Table 5.1 regardless of whether they are considered "detectable" or "not detectable". When activity is not detected, the

MDA value is used for the sample concentration

6.4.2 Direct Radiation Pathway

Direct radiation is continuously measured at 8 locations surrounding the Connecticut Yankee ISFSI, along with 1 control location (Hurd Park Road) using thermoluminescent dosimeters (TLDs). These dosimeters are collected every calendar quarter for readout at the dosimetry services vendor and compared against the offsite control location dosimeters.

As can be seen in Table 5.3, there is a distinct annual cycle at both indicator and control locations. The lowest point of the cycle occurs during the winter months. This is due primarily to the attenuating effect of the snow cover on radon emissions and on direct irradiation by naturally-occurring radionuclides in the soil. Differing amounts of these naturally-occurring radionuclides in the underlying soil, rock or nearby building materials result in different radiation levels between one field site and another.

7.0 LAND USE CENSUS

The Connecticut Yankee ODCM (Section E) discusses the need for a Land Use Census on an annual basis. The Census identifies the locations of the nearest milk animal, the nearest residence and the nearest garden of greater than 500 square feet producing fresh leafy vegetables in each of the 16 meteorological sectors within a distance of five miles of the plant.

Pursuant to this section of the ODCM, the current status of the Haddam Neck site is not expected to change in a manner that would affect the Environmental Monitoring Program. Therefore, the most recent census is adequate to support the requirements of Section IV.B.3 of Appendix I to 10 CFR Part 50. If any location yields a potential dose commitment of 20% or greater than a currently-sampled location, the new location is added to the routine environmental sampling program in replacement of the location with the lowest calculated dose (which is eliminated from the program). For the monitoring period covered, no such new milk animal location was identified. Consequently, no changes were made to the sampling program.

The locations identified during the Census may be found in Table 7.1.

TABLE 7.1

2007 LAND USE CENSUS LOCATIONS

SECTOR	NEAREST RESIDENCE km
N	1.18
NNE	1.74
NE	1.69
ENE	1.75
E	2.12
ESE	2.75
SE	1.34
SSE	1.20
S	1.04
SSW	0.93
SW	1.03
WSW	1.22
W	1.40
WNW	0.64
NW	1.09
NNW	1.55

8.0 REFERENCES

1. USNRC Radiological Assessment Branch Technical Position, "An Acceptable Radiological Environmental Monitoring Program," Revision 1, November 1979.

2. NCRP Report No. 94, *Exposure of the Population in the United States and Canada from Natural Background Radiation*, National Council on Radiation Protection and Measurements, 1987.

3. *Ionizing Radiation: Sources and Biological Effects*, United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), 1982 Report to the General Assembly.

4. Kathren, Ronald L., *Radioactivity and the Environment - Sources, Distribution, and Surveillance*, Harwood Academic Publishers, New York, 1984.

5. NRC Generic Letter 89-01, Subject: Implementation of Programmatic Controls for Radiological Effluent Technical Specifications in the Administrative Controls Section of the Technical Specifications and the Relocation of Procedural Details of RETS to the Offsite Dose Calculation Manual or to the Process Control Program. Dated January 31, 1989.

6. USNRC Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977.