



YANKEE ATOMIC ELECTRIC COMPANY

49 Yankee Road, Rowe, Massachusetts 01367

March 9, 2010
BYR 2010-009

UNITED STATES NUCLEAR REGULATORY COMMISSION
Attention: Document Control Desk
Washington, D.C. 20555-0001

Reference: License No. DPR-3 (Docket Nos. 50-29 and 72-31)

Subject: Yankee Atomic Independent Spent Fuel Storage Installation, Annual Radiological Environmental Operating Report and Annual Radioactive Effluent Release Report for 2009

Yankee Atomic Electric Company (YAEC) herewith submits the 2009 Annual Radiological Environmental Operating Report and the Annual Radioactive Effluent Release Report for the Yankee Atomic Independent Spent Fuel Storage Installation. There were no changes made in Off-Site Dose Calculation Manual in 2009.

If you have any questions, please contact me at 413-424-5261 Extension 303. or at rmitchell@3yankees.com.

Sincerely,

YANKEE ATOMIC ELECTRIC CO

Robert Mitchell
ISFSI Manager

Attachments

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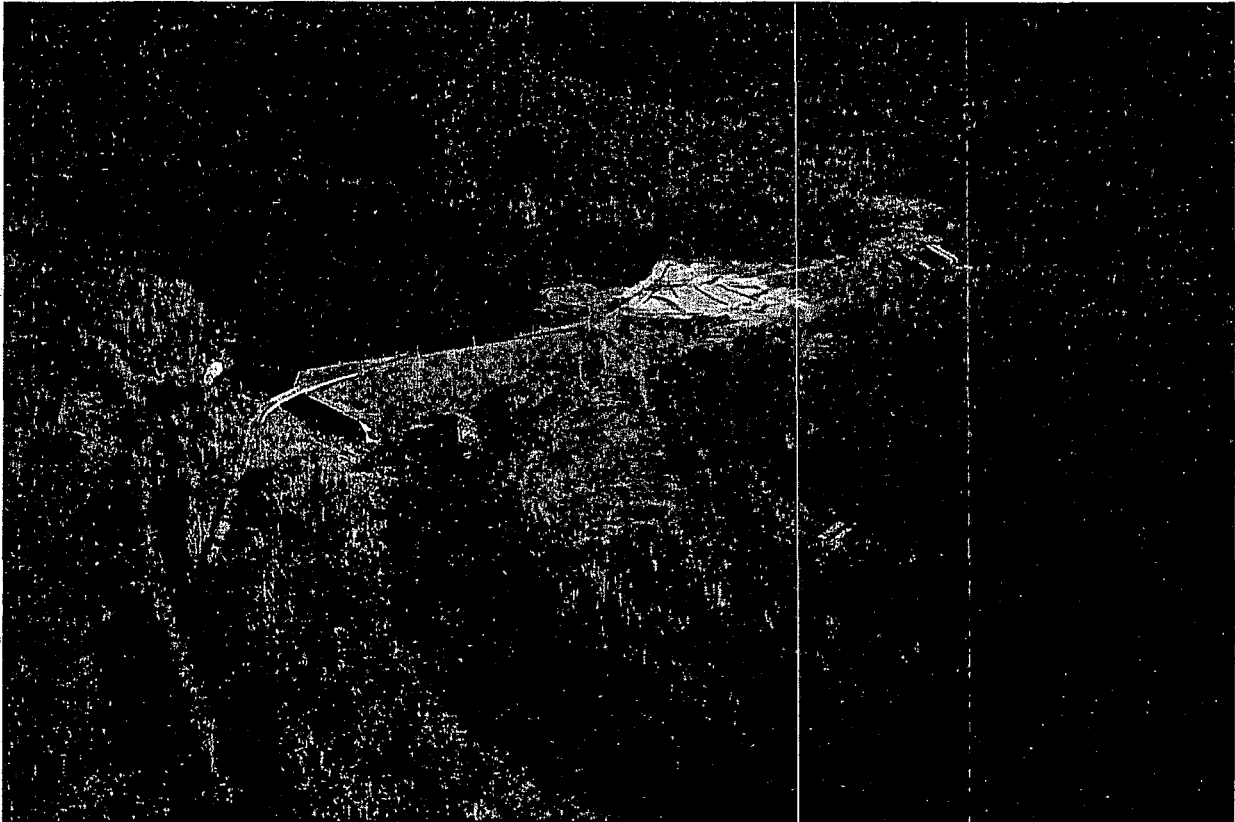
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**YANKEE NUCLEAR POWER STATION
INDEPENDENT SPENT FUEL STORAGE INSTALLATION**

License No. DPR-29

**ANNUAL RADIOLOGICAL ENVIRONMENTAL
OPERATING REPORT**

January - December 2009



March 2010

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EXECUTIVE SUMMARY

Yankee Nuclear Power Station was permanently shutdown in 1991. All fuel has been transferred into dry storage casks and placed at the Independent Spent Fuel Storage Facility. The Radiological Environmental Monitoring Program (REMP) for the Yankee Nuclear Power Station (YNPS) Independent Spent Fuel Storage Installation (ISFSI) located in Rowe, MA was continued for the period January through December 2009 in compliance with the YNPS Off-Site Dose Calculation Manual (ODCM).

No changes were made to the ODCM during 2009. 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 six locations in the vicinity of the ISFSI and one control location 7.6 kilometers away. The results of these measurements showed no significant change in exposure rates and potential doses to members of the public during the monitoring period. The results of the monitoring performed in 2009 also show that operating the YNPS ISFSI results in only a small fraction of the 40 CFR Part 190 direct radiation dose limit of 25 mrem/year to members of the public.

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1.0 INTRODUCTION

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

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

2.0 GENERAL ISFSI AND SITE INFORMATION

The Yankee Nuclear Power Station site is located on over 1800 acres in a predominantly rural area of northwestern Massachusetts, three-quarters of a mile south of the Vermont border. The site resides in the town of Rowe, Massachusetts, approximately 9 air miles east-northeast of North Adams, Massachusetts. The surrounding area is heavily forested and lightly populated. Hills bounding the river valley rise 500 to 1000 feet above the site, reaching elevations of 2100 feet.

The Deerfield River is used extensively for hydroelectric power generation both upstream and downstream of YNPS. The Sherman Dam, immediately adjacent to the site, operates as a hydroelectric generating station. Sherman Pond, the impoundment behind this dam, had been used as a source of cooling water for the former power plant.

The former nuclear power plant was voluntarily shut down on October 1, 1991 after 31 years of operation. The site was involved in the process of decommissioning over the years which involved the disassembly and removal of the plant components and structures and was completed in 2006. This process took place in strict conformance with USNRC regulations. Oversight of the site closure process also took place from the U.S. Environmental Protection Agency, the Massachusetts Department of Environmental Protection, and Massachusetts Department of Public Health.

3.0 PROGRAM DESIGN

The Radiological Environmental Monitoring Program (REMP) for the Yankee Nuclear Power Station ISFSI was designed to provide assurance to regulatory agencies and the public that the station's environmental impact is known and within anticipated limits. The direct dose limit for members of the public from operation of the ISFSI is 25 mrem per year (Reference 3).

The detailed sampling requirements of the REMP are given in the ODCM. The sampling requirements specified in the ODCM are summarized in Table 3.1 of this report. Details of the monitored locations are shown in Table 3.2, as well as Figures 3.1 through 3.3 of this report.

3.1 Monitoring Zones

The REMP is designed to allow comparison of levels of radioactivity in samples from the

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

3.2 Pathways Monitored

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

3.3 Description of Monitoring Program

3.3.1 Direct Radiation

Direct gamma radiation exposure was continuously monitored during 2009 with the use of thermoluminescent dosimeters (TLDs). At each monitoring location, these TLDs are sealed in plastic bags and attached to an object such as a tree, fence or utility pole. The TLDs are posted and retrieved on a quarterly basis. All TLDs are provided and processed by a National Voluntary Laboratory Accreditation Program (NVLAP) certified vendor. The TLDs are placed at various locations around the Independent Spent Fuel Storage Insulation (ISFSI). Table 3.2 lists the Station ID Codes, distances and direction of the TLDs from the ISFSI.

3.3.2 Special Monitoring

Special samples can be taken that are not required in the ODCM. The sample locations do not appear in Table 3.1 or 3.2 of this report. For the monitoring period, no special samples were collected as part of the YNPS ISFSI Radiological Environmental Monitoring Program.

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: 7 (6 around perimeter of the site and 1 offsite control location) | Continuous | Semi-annual | Gamma dose | Each TLD |

**Table 3.2
Radiological Environmental Monitoring Locations**

| Station Code | Station Description | Zone* | Distance From ISFSI (km) | Direction From ISFSI |
|---------------------|------------------------------|--------------|---------------------------------|-----------------------------|
| GM-27 | Number Nine Road (O)* | 2 | 7.60 | ENE |
| GM-02 | Observation Stand (O)** | 1 | 0.50 | NW |
| GM-06 | Readsboro Road Barrier (O)** | 1 | 1.30 | N |
| GM-15 | Onsite Perimeter (I)** | 1 | 0.24 | NW |
| GM-16 | Onsite Perimeter (I)** | 1 | 0.22 | NNW |
| GM-17 | Onsite Perimeter (I)** | 1 | 0.13 | NNE |
| GM-21 | Onsite Perimeter (I)** | 1 | 0.17 | WSW |

*2 = Control TLD; 1 = Indicator TLD

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

Figure 3.1
Onsite Direct Radiation Monitoring Locations

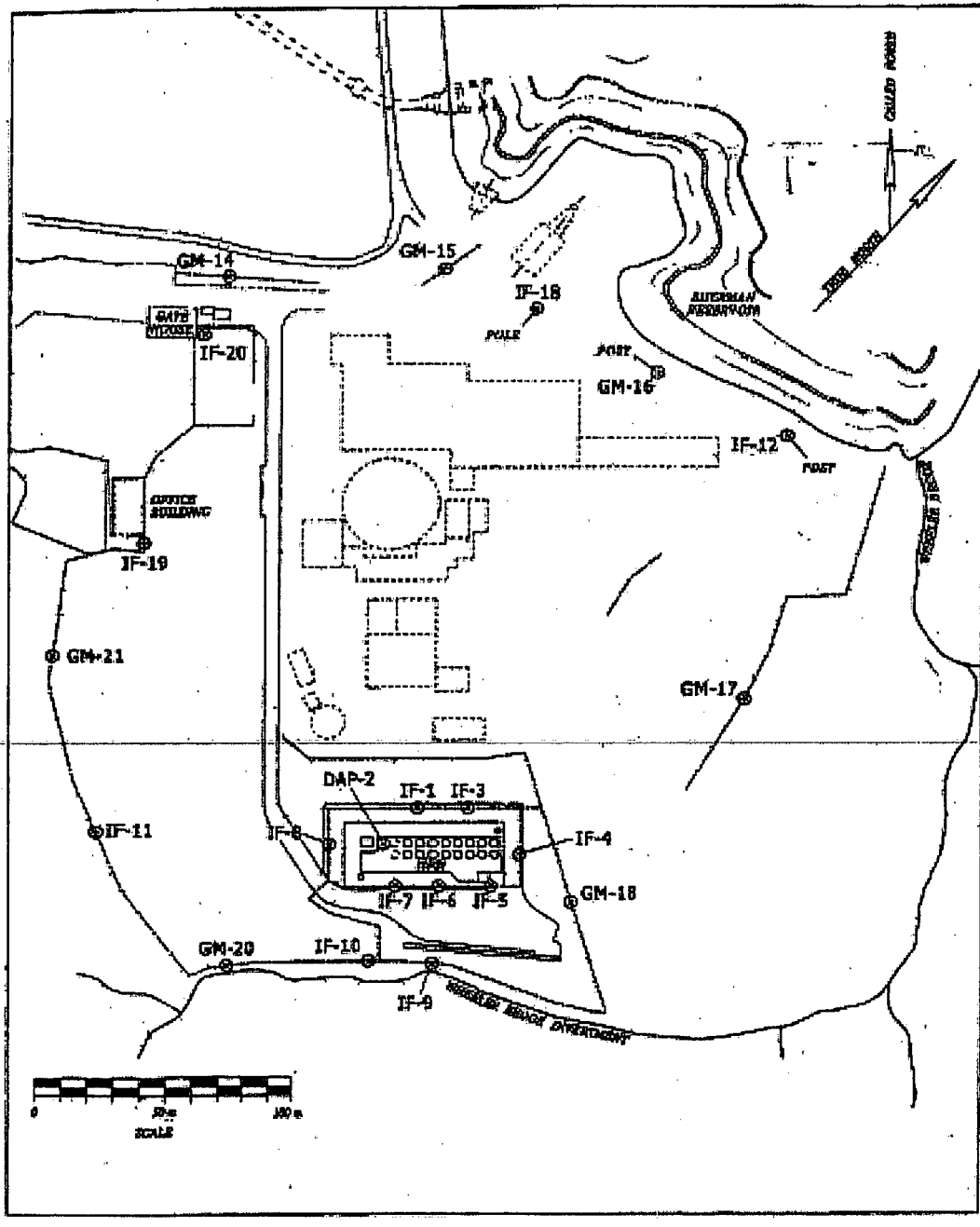


Figure 3.2
Direct Radiation Monitoring Locations (Within 1 mile)

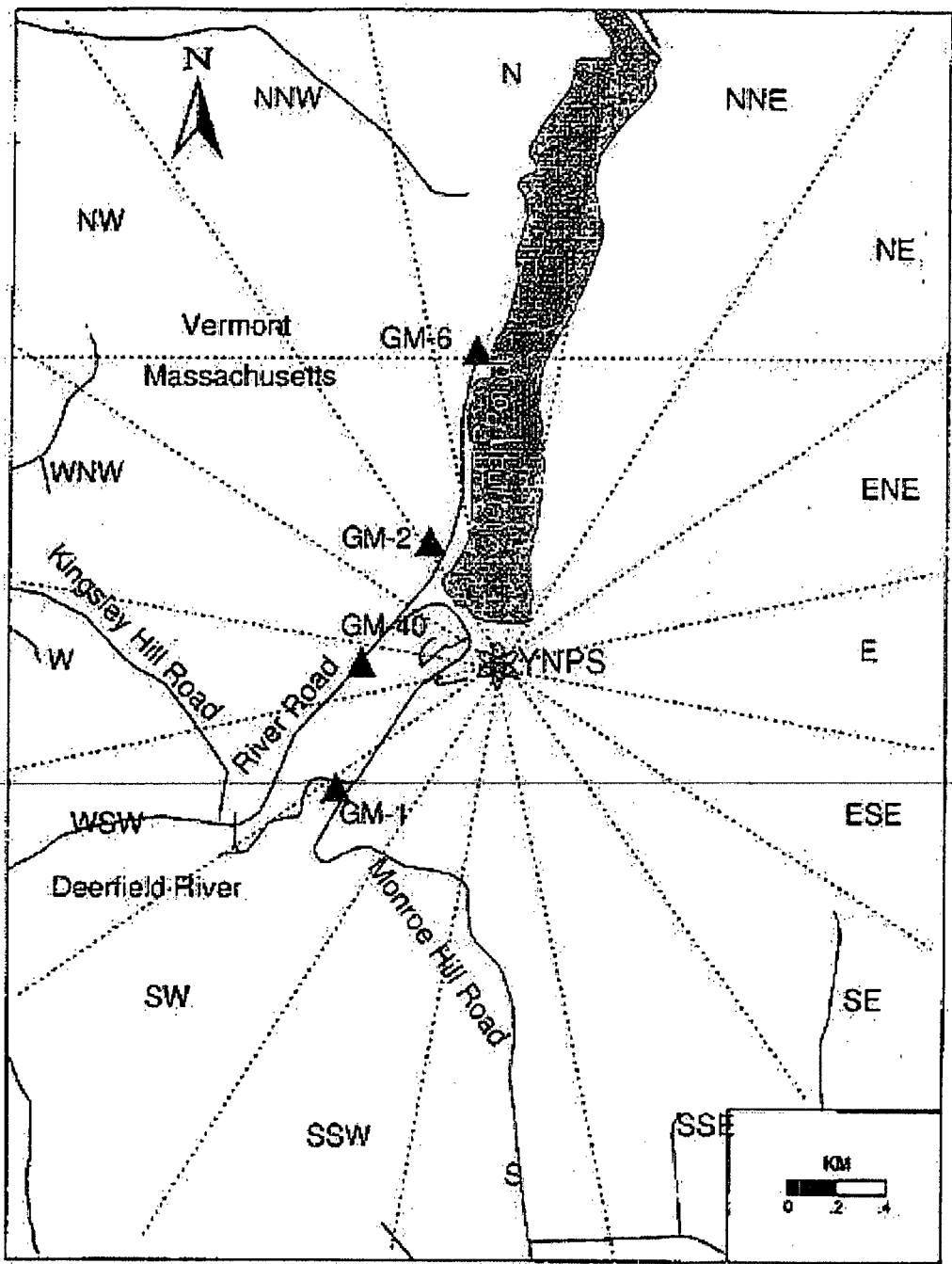
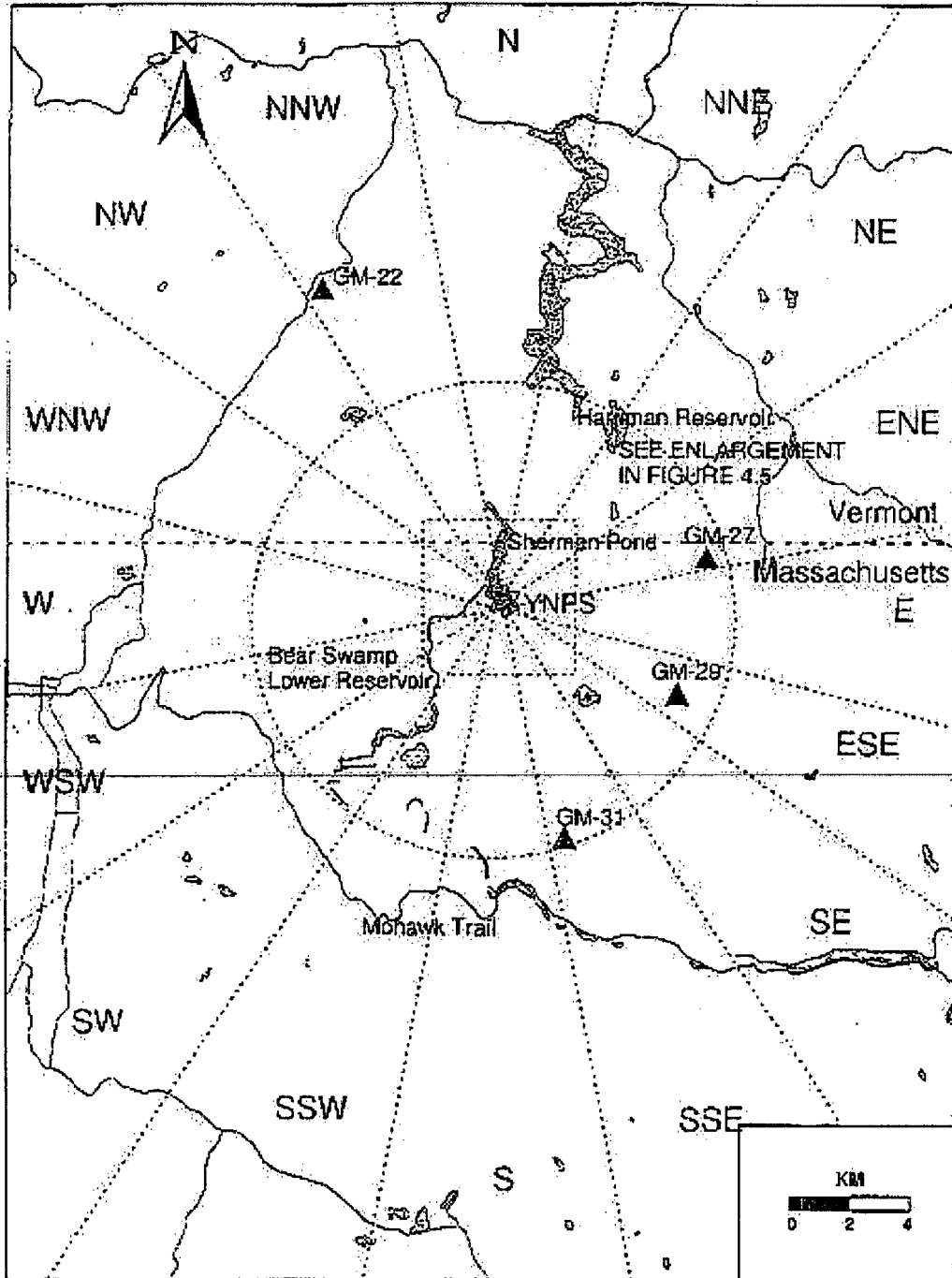


Figure 3.3
Offsite Control Location



4.0 RADIOLOGICAL DATA SUMMARY TABLES

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

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

Table 4.1
TLD Measurements by Half-Year
(mR)

| Station ID | Location | 1st Half-Year | 2nd Half-Year |
|-------------------|------------------------|----------------------|----------------------|
| GM-02 | Observation Stand | 39 | 38 |
| GM-06 | Readsboro Road Barrier | 37 | 42 |
| GM-15 | On-site perimeter | 57 | 50 |
| GM-16 | On-site perimeter | 41 | 34 |
| GM-17 | On-site perimeter | 39 | 50 |
| GM-21 | On-site perimeter | 42 | 49 |
| GM-27 | Control | 36 | 38 |

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

| Station ID | Direction | 1st Half-Year | 2nd Half-Year | Annual Ave |
|-------------------|------------------|----------------------|----------------------|-------------------|
| GM-02 | NW | 6.9 | 6.1 | 6.5 |
| GM-06 | N | 6.5 | 7.0 | 6.7 |
| GM-15 | NW | 11.1 | 8.8 | 9.9 |
| GM-16 | NNW | 7.4 | 5.2 | 6.3 |
| GM-17 | NNE | 6.9 | 8.8 | 7.9 |
| GM-21 | WSW | 7.6 | 8.6 | 8.1 |
| GM-27 | Control | 6.2 | 6.1 | 6.2 |

Table 4.3
TLD Data Summary
(μ R per hour)

| Inner Ring TLDs | Control TLDs | Station With Highest Mean | |
|----------------------------------------|----------------------------------------|---------------------------|----------------------------------------|
| Mean (Range) (No. Measurements)* | Mean (Range) (No. Measurements)* | Station # | Mean (Range) (No. Measurements)* |
| 7.6 | 6.2 | GM-15 | 9.9 |
| (5.2 – 11.1) | (6.1 – 6.2) | | (8.8 – 11.1) |
| (12) | (2) | | (2) |
| | | | |

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

Table 4.4
Direct Dose from ISFSI Operations
(mrem)

| Station ID | 1st Half-Year | | 2nd Half-Year | | Annual Dose |
|-----------------------|----------------|-----------------|----------------|-----------------|-------------|
| | Net TLD Result | Calculated Dose | Net TLD Result | Calculated Dose | |
| GM-02 | 3.0 | 0.2 | 0.0 | 0.0 | 0.2 |
| GM-06 | 1.0 | 0.1 | 4.0 | 0.2 | 0.3 |
| GM-15 | 21.0 | 1.2 | 12.0 | 0.7 | 1.9 |
| GM-16 | 5.0 | 0.3 | 0.0 | 0.0 | 0.3 |
| GM-17 | 3.0 | 0.2 | 12.0 | 0.7 | 0.9 |
| GM-21 | 6.0 | 0.3 | 11.0 | 0.6 | 1.0 |
| Max Dose => | | | | | 1.9 |

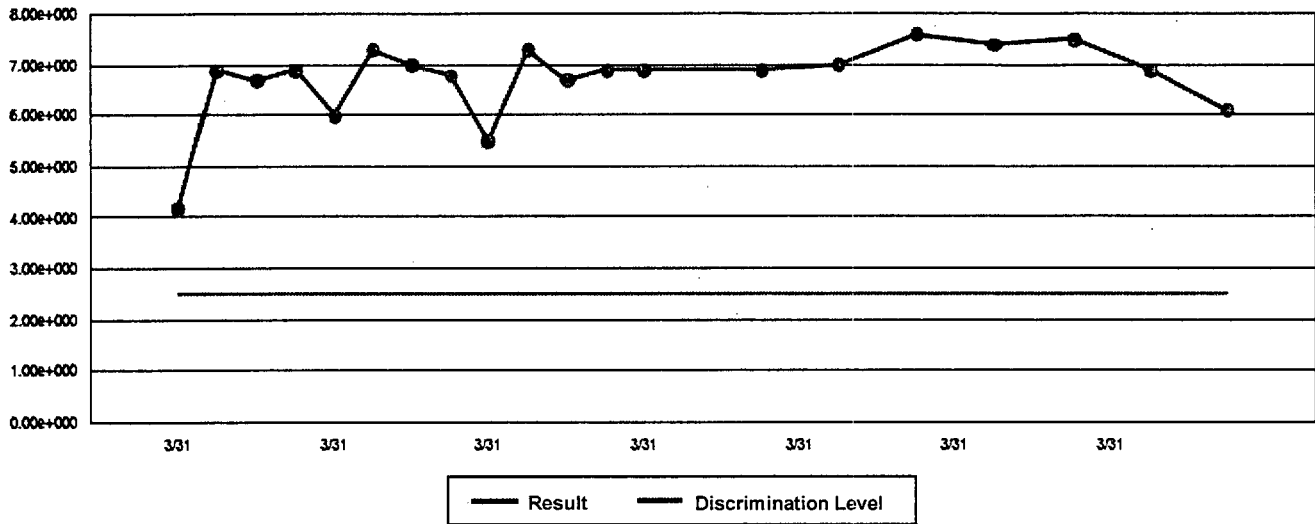
Note:

Doses based on a 250 hour occupancy in both of the first and second half-years

**Figure 4.1
Exposure Rate Trend at GM-2**

Trend Report
 Displays Samples collected between 03/31/2003 and 12/31/2009 3/2/2010

Indicator Locations: GM-02, REMP TLD (Exposure Rate)



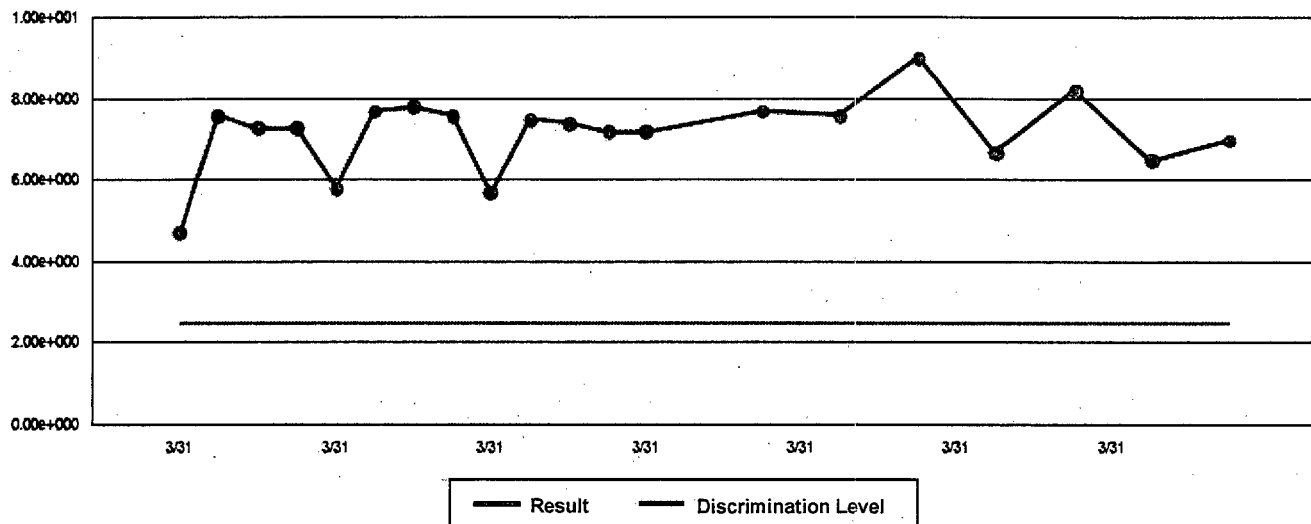
| Sample Name | Date Collected | Result | 2 Sigma Error | Discrimination Level |
|-------------|----------------|------------------------|---------------|----------------------|
| GM-02-001 | 03/31/2003 | 4.2E+000 μ R/h † * | 6.00E-001 | 2.5E+000 |
| GM-02-002 | 06/30/2003 | 6.9E+000 μ R/h † * | 1.00E+000 | 2.5E+000 |
| GM-02-003 | 09/30/2003 | 6.7E+000 μ R/h † * | 8.00E-001 | 2.5E+000 |
| GM-02-004 | 12/31/2003 | 6.9E+000 μ R/h † * | 8.00E-001 | 2.5E+000 |
| GM-02-005 | 03/31/2004 | 6.0E+000 μ R/h † * | 6.00E-001 | 2.5E+000 |
| GM-02-006 | 06/30/2004 | 7.3E+000 μ R/h † * | 1.60E+000 | 2.5E+000 |
| GM-02-007 | 09/30/2004 | 7.0E+000 μ R/h † * | 8.00E-001 | 2.5E+000 |
| GM-02-008 | 12/31/2004 | 6.8E+000 μ R/h † * | 8.00E-001 | 2.5E+000 |
| GM-02-009 | 03/31/2005 | 5.5E+000 μ R/h † * | 6.00E-001 | 2.5E+000 |
| GM-02-010 | 06/30/2005 | 7.3E+000 μ R/h † * | 6.00E-001 | 2.5E+000 |
| GM-02-011 | 09/30/2005 | 6.7E+000 μ R/h † * | 1.00E+000 | 2.5E+000 |
| GM-02-012 | 12/31/2005 | 6.9E+000 μ R/h † * | 6.00E-001 | 2.5E+000 |
| GM-02-013 | 03/31/2006 | 6.9E+000 μ R/h † * | 1.40E+000 | 2.5E+000 |
| GM-02-014 | 12/31/2006 | 6.9E+000 μ R/h † * | 1.00E+000 | 2.5E+000 |
| GM-02-015 | 06/30/2007 | 7.0E+000 μ R/h † * | 6.00E-001 | 2.5E+000 |
| GM-02-016 | 12/31/2007 | 7.6E+000 μ R/h † * | 8.00E-001 | 2.5E+000 |
| GM-02-017 | 06/30/2008 | 7.4E+000 μ R/h † * | 8.00E-001 | 2.5E+000 |
| GM-02-018 | 12/31/2008 | 7.5E+000 μ R/h † * | 8.00E-001 | 2.5E+000 |
| GM-02-019 | 06/30/2009 | 6.9E+000 μ R/h † * | 6.00E-001 | 2.5E+000 |
| GM-02-020 | 12/31/2009 | 6.1E+000 μ R/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 4.2
Exposure Rate Trend at GM-6**

| | |
|---------------------------------------------------------------|----------|
| Trend Report | 3/2/2010 |
| Displays: Samples collected between 03/31/2003 and 12/31/2009 | |

| |
|------------------------------------------------------|
| Indicator Locations - GM-06 REMP TLD [Exposure Rate] |
|------------------------------------------------------|



| Sample Name | Date Collected | Result | 2 Sigma Error | Discrimination Level |
|-------------|----------------|-------------------|---------------|----------------------|
| GM-06-001 | 03/31/2003 | 4.7E+000 µR/h † * | 6.00E-001 | 2.5E+000 |
| GM-06-002 | 06/30/2003 | 7.6E+000 µR/h † * | 6.00E-001 | 2.5E+000 |
| GM-06-003 | 09/30/2003 | 7.3E+000 µR/h † * | 8.00E-001 | 2.5E+000 |
| GM-06-004 | 12/31/2003 | 7.3E+000 µR/h † * | 1.00E+000 | 2.5E+000 |
| GM-06-005 | 03/31/2004 | 5.8E+000 µR/h † * | 6.00E-001 | 2.5E+000 |
| GM-06-006 | 06/30/2004 | 7.7E+000 µR/h † * | 1.20E+000 | 2.5E+000 |
| GM-06-007 | 09/30/2004 | 7.8E+000 µR/h † * | 6.00E-001 | 2.5E+000 |
| GM-06-008 | 12/31/2004 | 7.6E+000 µR/h † * | 8.00E-001 | 2.5E+000 |
| GM-06-009 | 03/31/2005 | 5.7E+000 µR/h † * | 8.00E-001 | 2.5E+000 |
| GM-06-010 | 06/30/2005 | 7.5E+000 µR/h † * | 6.00E-001 | 2.5E+000 |
| GM-06-011 | 09/30/2005 | 7.4E+000 µR/h † * | 8.00E-001 | 2.5E+000 |
| GM-06-012 | 12/31/2005 | 7.2E+000 µR/h † * | 1.00E+000 | 2.5E+000 |
| GM-06-013 | 03/31/2006 | 7.2E+000 µR/h † * | 1.00E+000 | 2.5E+000 |
| GM-06-014 | 12/31/2006 | 7.7E+000 µR/h † * | 8.00E-001 | 2.5E+000 |
| GM-06-015 | 06/30/2007 | 7.6E+000 µR/h † * | 4.00E-001 | 2.5E+000 |
| GM-06-016 | 12/31/2007 | 9.0E+000 µR/h † * | 8.00E-001 | 2.5E+000 |
| GM-06-017 | 06/30/2008 | 6.7E+000 µR/h † * | 6.00E-001 | 2.5E+000 |
| GM-06-018 | 12/31/2008 | 8.2E+000 µR/h † * | 8.00E-001 | 2.5E+000 |
| GM-06-019 | 06/30/2009 | 6.5E+000 µR/h † * | 6.00E-001 | 2.5E+000 |
| GM-06-020 | 12/31/2009 | 7.0E+000 µR/h † * | 6.00E-001 | 2.5E+000 |

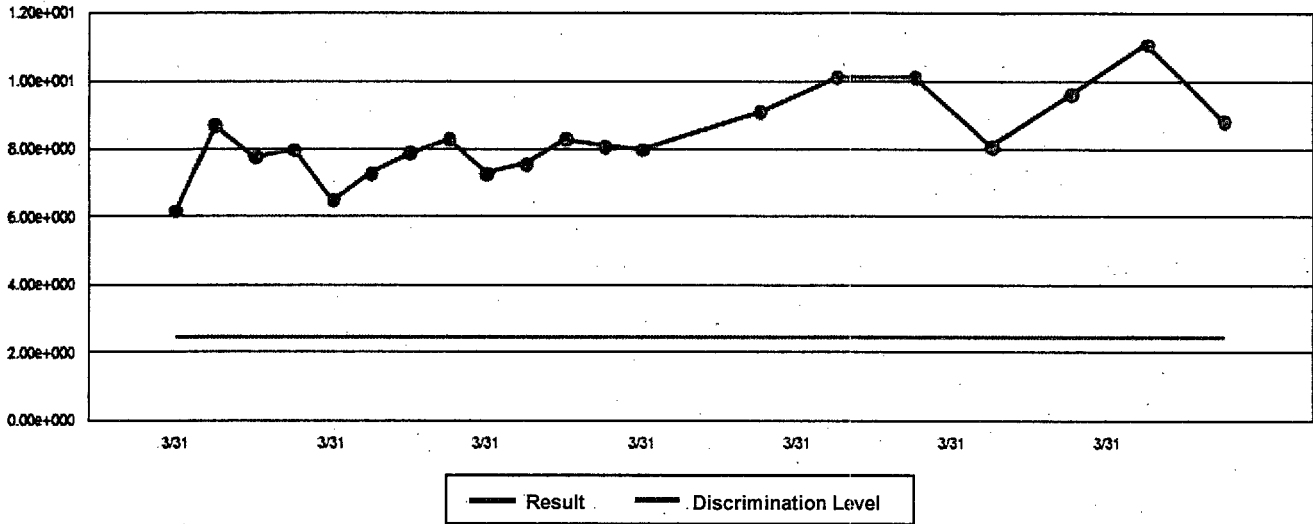
Results marked with * are greater than 2 Sigma Error.
Results marked with † are greater than the Discrimination Level

**Figure 4.3
Exposure Rate Trend at GM-15**

Trend Report
Displays Samples collected between 03/31/2003 and 12/31/2009

3/2/2010

Indicator Locations: GM-15 REMP TLD Exposure Rate



| Sample Name | Date Collected | Result | 2 Sigma Error | Discrimination Level |
|-------------|----------------|-------------------|---------------|----------------------|
| GM-15-001 | 03/31/2003 | 6.2E+000 µR/h † * | 8.00E-001 | 2.5E+000 |
| GM-15-002 | 06/30/2003 | 8.7E+000 µR/h † * | 8.00E-001 | 2.5E+000 |
| GM-15-003 | 09/30/2003 | 7.8E+000 µR/h † * | 1.00E+000 | 2.5E+000 |
| GM-15-004 | 12/31/2003 | 8.0E+000 µR/h † * | 1.00E+000 | 2.5E+000 |
| GM-15-005 | 03/31/2004 | 6.5E+000 µR/h † * | 6.00E-001 | 2.5E+000 |
| GM-15-006 | 06/30/2004 | 7.3E+000 µR/h † * | 1.20E+000 | 2.5E+000 |
| GM-15-007 | 09/30/2004 | 7.9E+000 µR/h † * | 8.00E-001 | 2.5E+000 |
| GM-15-008 | 12/31/2004 | 8.3E+000 µR/h † * | 6.00E-001 | 2.5E+000 |
| GM-15-009 | 03/31/2005 | 7.3E+000 µR/h † * | 1.60E+000 | 2.5E+000 |
| GM-15-010 | 06/30/2005 | 7.6E+000 µR/h † * | 4.00E-001 | 2.5E+000 |
| GM-15-011 | 09/30/2005 | 8.3E+000 µR/h † * | 6.00E-001 | 2.5E+000 |
| GM-15-012 | 12/31/2005 | 8.1E+000 µR/h † * | 8.00E-001 | 2.5E+000 |
| GM-15-013 | 03/31/2006 | 8.0E+000 µR/h † * | 8.00E-001 | 2.5E+000 |
| GM-15-014 | 12/31/2006 | 9.1E+000 µR/h † * | 8.00E-001 | 2.5E+000 |
| GM-15-015 | 06/30/2007 | 1.0E+001 µR/h † * | 6.00E-001 | 2.5E+000 |
| GM-15-016 | 12/31/2007 | 1.0E+001 µR/h † * | 1.00E+000 | 2.5E+000 |
| GM-15-017 | 06/30/2008 | 8.1E+000 µR/h † * | 8.00E-001 | 2.5E+000 |
| GM-15-018 | 12/31/2008 | 9.6E+000 µR/h † * | 1.00E+000 | 2.5E+000 |
| GM-15-019 | 06/30/2009 | 1.1E+001 µR/h † * | 1.20E+000 | 2.5E+000 |
| GM-15-020 | 12/31/2009 | 8.8E+000 µR/h † * | 8.00E-001 | 2.5E+000 |

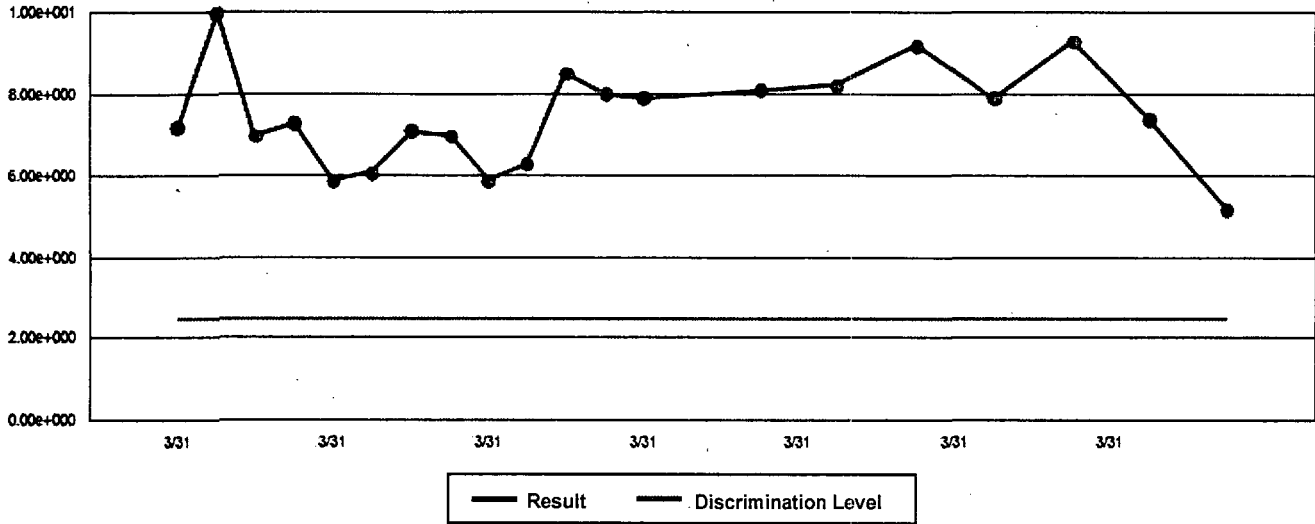
Results marked with * are greater than 2 Sigma Error.
Results marked with † are greater than the Discrimination Level

**Figure 4.4
Exposure Rate Trend at GM-16**

Trend Report
Displays samples collected between 03/31/2003 and 12/31/2009

3/2/2010

Indicator Locations: GM-16 REMP-TLD Exposure Rate



| Sample Name | Date Collected | Result | 2 Sigma Error | Discrimination Level |
|-------------|----------------|-------------------|---------------|----------------------|
| GM-16-001 | 03/31/2003 | 7.2E+000 μR/h † * | 1.00E+000 | 2.5E+000 |
| GM-16-002 | 06/30/2003 | 1.0E+001 μR/h † * | 6.00E-001 | 2.5E+000 |
| GM-16-003 | 09/30/2003 | 7.0E+000 μR/h † * | 6.00E-001 | 2.5E+000 |
| GM-16-004 | 12/31/2003 | 7.3E+000 μR/h † * | 8.00E-001 | 2.5E+000 |
| GM-16-005 | 03/31/2004 | 5.9E+000 μR/h † * | 8.00E-001 | 2.5E+000 |
| GM-16-006 | 06/30/2004 | 6.1E+000 μR/h † * | 1.60E+000 | 2.5E+000 |
| GM-16-007 | 09/30/2004 | 7.1E+000 μR/h † * | 1.00E+000 | 2.5E+000 |
| GM-16-008 | 12/31/2004 | 7.0E+000 μR/h † * | 6.00E-001 | 2.5E+000 |
| GM-16-009 | 03/31/2005 | 5.9E+000 μR/h † * | 6.00E-001 | 2.5E+000 |
| GM-16-010 | 06/30/2005 | 6.3E+000 μR/h † * | 4.00E-001 | 2.5E+000 |
| GM-16-011 | 09/30/2005 | 8.5E+000 μR/h † * | 8.00E-001 | 2.5E+000 |
| GM-16-012 | 12/31/2005 | 8.0E+000 μR/h † * | 1.00E+000 | 2.5E+000 |
| GM-16-013 | 03/31/2006 | 7.9E+000 μR/h † * | 8.00E-001 | 2.5E+000 |
| GM-16-014 | 12/31/2006 | 8.1E+000 μR/h † * | 8.00E-001 | 2.5E+000 |
| GM-16-015 | 06/30/2007 | 8.2E+000 μR/h † * | 6.00E-001 | 2.5E+000 |
| GM-16-016 | 12/31/2007 | 9.2E+000 μR/h † * | 1.00E+000 | 2.5E+000 |
| GM-16-017 | 06/30/2008 | 7.9E+000 μR/h † * | 8.00E-001 | 2.5E+000 |
| GM-16-018 | 12/31/2008 | 9.3E+000 μR/h † * | 1.00E+000 | 2.5E+000 |
| GM-16-019 | 06/30/2009 | 7.4E+000 μR/h † * | 8.00E-001 | 2.5E+000 |
| GM-16-020 | 12/31/2009 | 5.2E+000 μR/h † * | 6.00E-001 | 2.5E+000 |

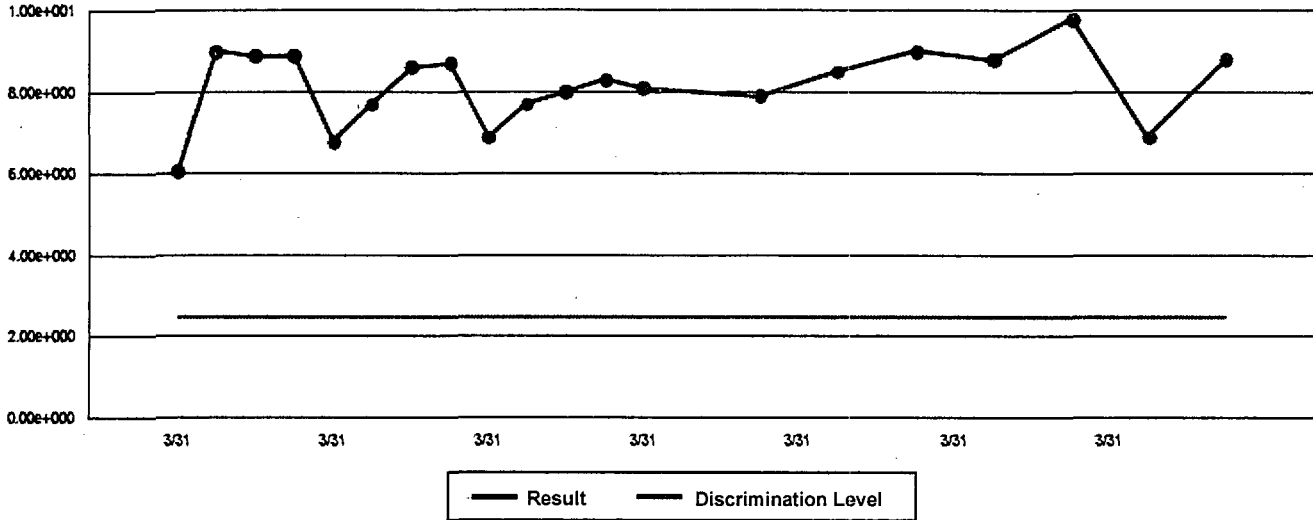
Results marked with * are greater than 2 Sigma Error.
Results marked with † are greater than the Discrimination Level

**Figure 4.5
Exposure Rate Trend at GM-17**

Trend Report
Displays Samples collected between 03/31/2003 and 12/31/2009

3/27/2010

Indicator Locations - GM-17 - REMP TLD - Exposure Rate



| Sample Name | Date Collected | Result | 2 Sigma Error | Discrimination Level |
|-------------|----------------|-------------------|---------------|----------------------|
| GM-17-001 | 03/31/2003 | 6.1E+000 μR/h † * | 6.00E-001 | 2.5E+000 |
| GM-17-002 | 06/30/2003 | 9.0E+000 μR/h † * | 8.00E-001 | 2.5E+000 |
| GM-17-003 | 09/30/2003 | 8.9E+000 μR/h † * | 8.00E-001 | 2.5E+000 |
| GM-17-004 | 12/31/2003 | 8.9E+000 μR/h † * | 1.40E+000 | 2.5E+000 |
| GM-17-005 | 03/31/2004 | 6.8E+000 μR/h † * | 6.00E-001 | 2.5E+000 |
| GM-17-006 | 06/30/2004 | 7.7E+000 μR/h † * | 1.40E+000 | 2.5E+000 |
| GM-17-007 | 09/30/2004 | 8.6E+000 μR/h † * | 1.20E+000 | 2.5E+000 |
| GM-17-008 | 12/31/2004 | 8.7E+000 μR/h † * | 8.00E-001 | 2.5E+000 |
| GM-17-009 | 03/31/2005 | 6.9E+000 μR/h † * | 1.20E+000 | 2.5E+000 |
| GM-17-010 | 06/30/2005 | 7.7E+000 μR/h † * | 6.00E-001 | 2.5E+000 |
| GM-17-011 | 09/30/2005 | 8.0E+000 μR/h † * | 8.00E-001 | 2.5E+000 |
| GM-17-012 | 12/31/2005 | 8.3E+000 μR/h † * | 8.00E-001 | 2.5E+000 |
| GM-17-013 | 03/31/2006 | 8.1E+000 μR/h † * | 8.00E-001 | 2.5E+000 |
| GM-17-014 | 12/31/2006 | 7.9E+000 μR/h † * | 8.00E-001 | 2.5E+000 |
| GM-17-015 | 06/30/2007 | 8.5E+000 μR/h † * | 1.20E+000 | 2.5E+000 |
| GM-17-016 | 12/31/2007 | 9.0E+000 μR/h † * | 8.00E-001 | 2.5E+000 |
| GM-17-017 | 06/30/2008 | 8.8E+000 μR/h † * | 8.00E-001 | 2.5E+000 |
| GM-17-018 | 12/31/2008 | 9.8E+000 μR/h † * | 1.00E+000 | 2.5E+000 |
| GM-17-019 | 06/30/2009 | 6.9E+000 μR/h † * | 6.00E-001 | 2.5E+000 |
| GM-17-020 | 12/31/2009 | 8.8E+000 μR/h † * | 8.00E-001 | 2.5E+000 |

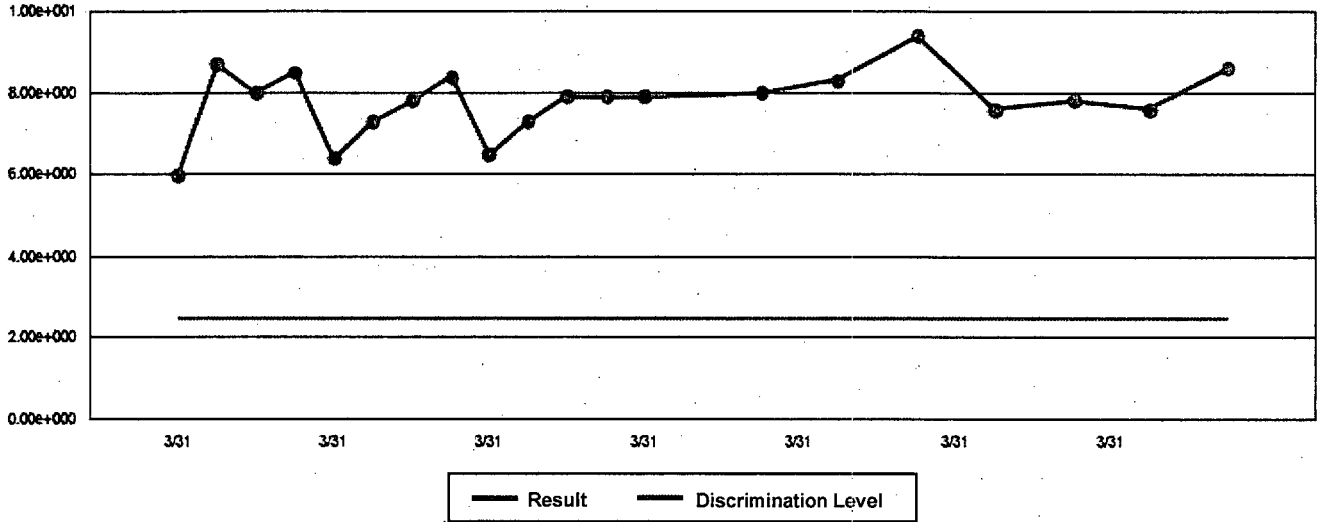
Results marked with * are greater than 2 Sigma Error.
Results marked with † are greater than the Discrimination Level

**Figure 4.6
Exposure Rate Trend at GM-21**

Trend Report
Displays: Samples collected between 03/31/2003 and 12/31/2009

3/2/2010

Indicator Locations: GM-21, REMP-TLD [Exposure Rate]



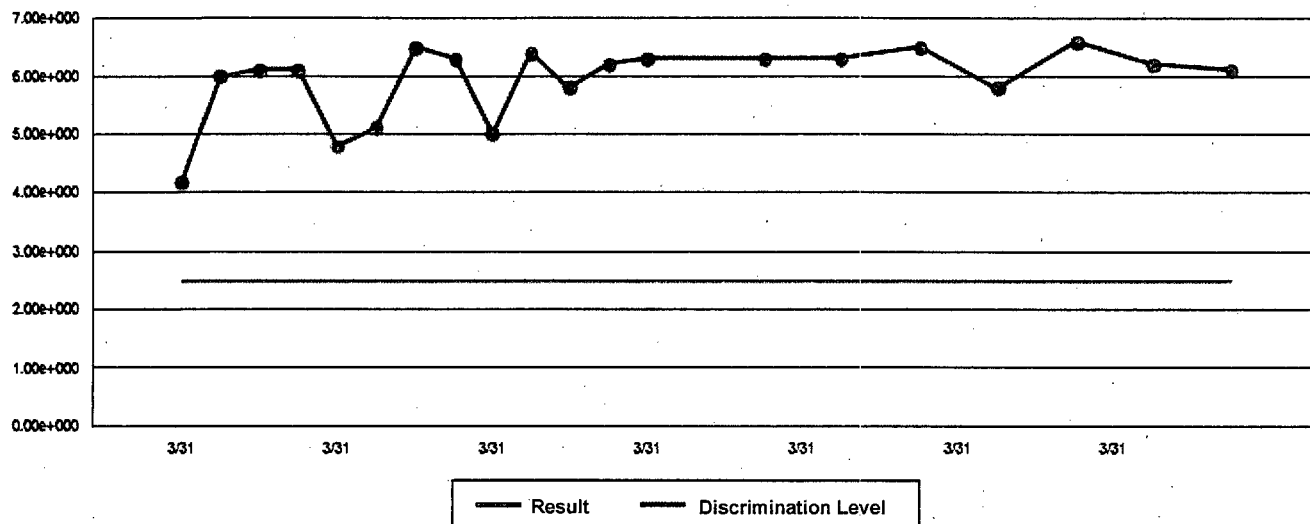
| Sample Name | Date Collected | Result | 2 Sigma Error | Discrimination Level |
|-------------|----------------|------------------------------|---------------|----------------------|
| GM-21-001 | 03/31/2003 | 6.0E+000 $\mu\text{R/h}$ † * | 8.00E-001 | 2.5E+000 |
| GM-21-002 | 06/30/2003 | 8.7E+000 $\mu\text{R/h}$ † * | 1.00E+000 | 2.5E+000 |
| GM-21-003 | 09/30/2003 | 8.0E+000 $\mu\text{R/h}$ † * | 8.00E-001 | 2.5E+000 |
| GM-21-004 | 12/31/2003 | 8.5E+000 $\mu\text{R/h}$ † * | 1.20E+000 | 2.5E+000 |
| GM-21-005 | 03/31/2004 | 6.4E+000 $\mu\text{R/h}$ † * | 6.00E-001 | 2.5E+000 |
| GM-21-006 | 06/30/2004 | 7.3E+000 $\mu\text{R/h}$ † * | 1.20E+000 | 2.5E+000 |
| GM-21-007 | 09/30/2004 | 7.8E+000 $\mu\text{R/h}$ † * | 6.00E-001 | 2.5E+000 |
| GM-21-008 | 12/31/2004 | 8.4E+000 $\mu\text{R/h}$ † * | 1.00E+000 | 2.5E+000 |
| GM-21-009 | 03/31/2005 | 6.5E+000 $\mu\text{R/h}$ † * | 6.00E-001 | 2.5E+000 |
| GM-21-010 | 06/30/2005 | 7.3E+000 $\mu\text{R/h}$ † * | 8.00E-001 | 2.5E+000 |
| GM-21-011 | 09/30/2005 | 7.9E+000 $\mu\text{R/h}$ † * | 8.00E-001 | 2.5E+000 |
| GM-21-012 | 12/31/2005 | 7.9E+000 $\mu\text{R/h}$ † * | 8.00E-001 | 2.5E+000 |
| GM-21-013 | 03/31/2006 | 7.9E+000 $\mu\text{R/h}$ † * | 1.40E+000 | 2.5E+000 |
| GM-21-014 | 12/31/2006 | 8.0E+000 $\mu\text{R/h}$ † * | 8.00E-001 | 2.5E+000 |
| GM-21-015 | 06/30/2007 | 8.3E+000 $\mu\text{R/h}$ † * | 8.00E-001 | 2.5E+000 |
| GM-21-016 | 12/31/2007 | 9.4E+000 $\mu\text{R/h}$ † * | 1.00E+000 | 2.5E+000 |
| GM-21-017 | 06/30/2008 | 7.6E+000 $\mu\text{R/h}$ † * | 8.00E-001 | 2.5E+000 |
| GM-21-018 | 12/31/2008 | 7.8E+000 $\mu\text{R/h}$ † * | 8.00E-001 | 2.5E+000 |
| GM-21-019 | 06/30/2009 | 7.6E+000 $\mu\text{R/h}$ † * | 8.00E-001 | 2.5E+000 |
| GM-21-020 | 12/31/2009 | 8.6E+000 $\mu\text{R/h}$ † * | 8.00E-001 | 2.5E+000 |

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

Figure 4.7
Exposure Rate Trend at Control Location GM-27

| | |
|------------------------------------------------------------------------------|----------|
| Trend Report Displays Samples collected between 03/31/2003 and 12/31/2009 | 3/2/2010 |
|------------------------------------------------------------------------------|----------|

Control Location - GM-27 REMP TLD [Exposure Rate]



| Sample Name | Date Collected | Result | 2 Sigma Error | Discrimination Level |
|-------------|----------------|------------------|---------------|----------------------|
| GM-27-001 | 03/31/2003 | 4.2E+000 µR/h †* | 4.00E-001 | 2.5E+000 |
| GM-27-002 | 06/30/2003 | 6.0E+000 µR/h †* | 6.00E-001 | 2.5E+000 |
| GM-27-003 | 09/30/2003 | 6.1E+000 µR/h †* | 6.00E-001 | 2.5E+000 |
| GM-27-004 | 12/31/2003 | 6.1E+000 µR/h †* | 8.00E-001 | 2.5E+000 |
| GM-27-005 | 03/31/2004 | 4.8E+000 µR/h †* | 4.00E-001 | 2.5E+000 |
| GM-27-006 | 06/30/2004 | 5.1E+000 µR/h †* | 1.20E+000 | 2.5E+000 |
| GM-27-007 | 09/30/2004 | 6.5E+000 µR/h †* | 6.00E-001 | 2.5E+000 |
| GM-27-008 | 12/31/2004 | 6.3E+000 µR/h †* | 4.00E-001 | 2.5E+000 |
| GM-27-009 | 03/31/2005 | 5.0E+000 µR/h †* | 6.00E-001 | 2.5E+000 |
| GM-27-010 | 06/30/2005 | 6.4E+000 µR/h †* | 4.00E-001 | 2.5E+000 |
| GM-27-011 | 09/30/2005 | 5.8E+000 µR/h †* | 6.00E-001 | 2.5E+000 |
| GM-27-012 | 12/31/2005 | 6.2E+000 µR/h †* | 6.00E-001 | 2.5E+000 |
| GM-27-013 | 03/31/2006 | 6.3E+000 µR/h †* | 1.00E+000 | 2.5E+000 |
| GM-27-014 | 12/31/2006 | 6.3E+000 µR/h †* | 6.00E-001 | 2.5E+000 |
| GM-27-015 | 06/30/2007 | 6.3E+000 µR/h †* | 6.00E-001 | 2.5E+000 |
| GM-27-016 | 12/31/2007 | 6.5E+000 µR/h †* | 6.00E-001 | 2.5E+000 |
| GM-27-017 | 06/30/2008 | 5.8E+000 µR/h †* | 6.00E-001 | 2.5E+000 |
| GM-27-018 | 12/31/2008 | 6.6E+000 µR/h †* | 6.00E-001 | 2.5E+000 |
| GM-27-019 | 06/30/2009 | 6.2E+000 µR/h †* | 6.00E-001 | 2.5E+000 |
| GM-27-020 | 12/31/2009 | 6.1E+000 µR/h †* | 6.00E-001 | 2.5E+000 |

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

5.0 ANALYSIS OF ENVIRONMENTAL RESULTS

5.1 Sampling Program Deviations

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

No deviations of the sampling requirements occurred during this monitoring period.

5.2 Direct Radiation Pathway

5.2.1 Exposure Rates

Direct radiation is continuously measured at 6 indicator locations surrounding the YNPS ISFSI, along with 1 control location at Number Nine Road using thermoluminescent dosimeters (TLDs). These dosimeters are collected semi-annually for readout at the NVLAP certified dosimetry services vendor.

Review of the data in Tables 4.2 and 4.3 shows that all indicator locations were slightly elevated in comparison to the control location exposure rates. Figures 4.1 through 4.7 provide exposure rate trends of the monitoring locations since 2003. Review of Figures 4.1 through 4.7 shows no significant difference in exposure rates over time at either the indicator or control locations. The data listed under each of the trend graphs show values for the result errors and discrimination levels. Note that these values are estimated and are shown only for information.

5.2.2 Direct Doses from ISFSI Operations

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 2009 dose estimate assumes a total of 500 hours occupancy for the dose calculation; of which 250 hours are

used in both the first and second half-years. The most likely location for exposure to a member of the public from the ISFSI is in Sherman Reservoir 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 at Station ID number GM-15. The maximum calculated annual dose at that location is 1.9 mrem. This value is only 8 percent of the 25 mrem per year limit. For reference, this location is less than 800 feet from the ISFSI. This represents a very conservative dose estimate because a member of the public would normally be situated further away in the reservoir.

6.0 REFERENCES

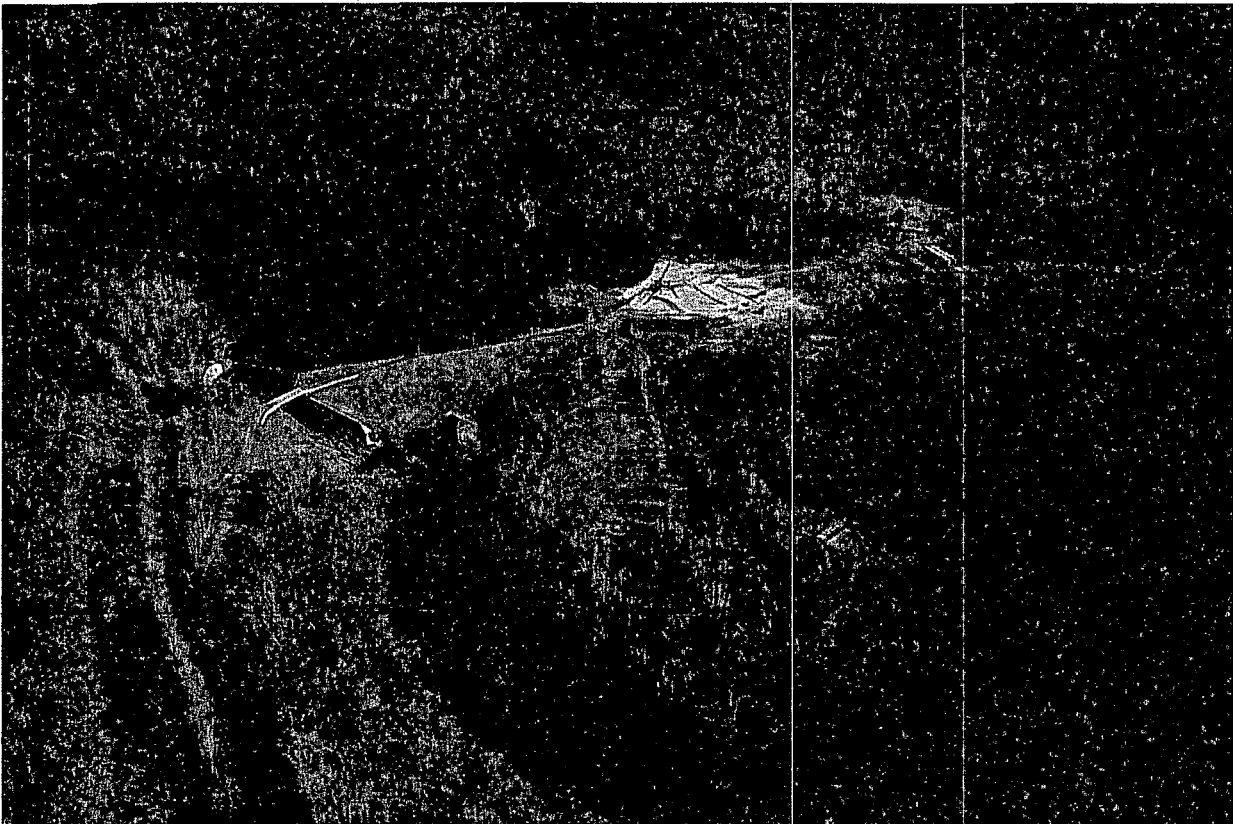
1. USNRC Radiological Assessment Branch Technical Position, "An Acceptable Radiological Environmental Monitoring Program," Revision 1, November 1979.
 2. Yankee Nuclear Power Station Off-site Dose Calculation Manual, Revision 21.
 3. 40 CFR Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operation".
-

**YANKEE NUCLEAR POWER STATION
INDEPENDENT SPENT FUEL STORAGE INSTALLATION**

License No. DPR-29

**ANNUAL RADIOACTIVE EFFLUENT
RELEASE REPORT**

January - December 2009



March 2010

Prepared by:

Radiological 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 2009. There were no gaseous or liquid releases in 2009. Table 3 summarizes waste shipped off-site for disposal for each half year of 2009. There were no waste shipments in 2009. There was one shipment of contaminated equipment to an authorized licensee for decontamination and re-use. Records of this shipment are available for review at the site.

Appendices A through D indicate the status of reportable items per the requirements of the Off-site Dose Calculation Manual (ODCM). There were no reportable items in 2009.

Table 1A

YNPS ISFSI
 Effluent and Waste Disposal Annual Report
 First and Second Quarters, 2009
 Gaseous Effluents-Summation of All Releases

| Nuclides Released | Unit | 1st Quarter | 2nd Quarter | Est. Total Error, % |
|----------------------------------------|---------|-------------|-------------|---------------------|
| A. Fission and Activation Gases | | | | |
| 1. Total Release | Ci | N/A* | N/A* | N/A* |
| 2. Average release rate for period | μCi/sec | N/A* | N/A* | |
| 3. Percent of regulatory limit | % | N/A* | N/A* | |
| B. Iodines | | | | |
| 1. Total Iodine-131 | Ci | N/A* | N/A* | N/A* |
| 2. Average release rate for period | μCi/sec | N/A* | N/A* | |
| 3. Percent of regulatory limit | % | N/A* | N/A* | |
| C. Particulates | | | | |
| 1. Particulates with T-1/2 > 8 days | Ci | N/A* | N/A* | N/A* |
| 2. Average release rate for period | μCi/sec | N/A* | N/A* | |
| 3. Percent of regulatory limit | % | N/A* | N/A* | |
| 4. Gross alpha radioactivity | Ci | N/A* | N/A* | |
| D. Tritium | | | | |
| 1. Total release | Ci | N/A* | N/A* | N/A* |
| 2. Average release rate for period | μCi/sec | N/A* | N/A* | |
| 3. Percent of regulatory limit | % | N/A* | N/A* | |

N/A*= Not Applicable

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

Table 1A

YNPS ISFSI
 Effluent and Waste Disposal Annual Report
 Third and Fourth Quarters, 2009
 Gaseous Effluents-Summation of All Releases

| Nuclides Released | Unit | 3rd Quarter | 4th Quarter | Est. Total Error, % |
|----------------------------------------|---------|-------------|-------------|---------------------|
| A. Fission and Activation Gases | | | | |
| 1. Total Release | Ci | N/A* | N/A* | N/A* |
| 2. Average release rate for period | µCi/sec | N/A* | N/A* | |
| 3. Percent of regulatory limit | % | N/A* | N/A* | |
| B. Iodines | | | | |
| 1. Total Iodine-131 | Ci | N/A* | N/A* | N/A* |
| 2. Average release rate for period | µCi/sec | N/A* | N/A* | |
| 3. Percent of regulatory limit | % | N/A* | N/A* | |
| C. Particulates | | | | |
| 1. Particulates with T-1/2 > 8 days | Ci | N/A* | N/A* | N/A* |
| 2. Average release rate for period | µCi/sec | N/A* | N/A* | |
| 3. Percent of regulatory limit | % | N/A* | N/A* | |
| 4. Gross alpha radioactivity | Ci | N/A* | N/A* | |
| D. Tritium | | | | |
| 1. Total release | Ci | N/A* | N/A* | N/A* |
| 2. Average release rate for period | µCi/sec | N/A* | N/A* | |
| 3. Percent of regulatory limit | % | N/A* | N/A* | |

N/A*= Not Applicable

There are no gaseous effluents associated with the Yankee Nuclear Power Station Independent Spent Fuel Storage Installation (ISFSI).

Table 1B

YNPS ISFSI
 Effluent and Waste Disposal Annual Report
 First and Second Quarters, 2009
 Gaseous Effluents-Elevated Releases

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

N/A*= Not Applicable

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

Table 1B

YNPS ISFSI
Effluent and Waste Disposal Annual Report
Third and Fourth Quarters, 2009
Gaseous Effluents-Elevated Releases

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

N/A*= Not Applicable

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

Table 1C

YNPS ISFSI
Effluent and Waste Disposal Annual Report
First and Second Quarters, 2009
Gaseous Effluents-Ground Level Releases

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

N/A*= Not Applicable

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

Table 1C

YNPS ISFSI
Effluent and Waste Disposal Annual Report
Third and Fourth Quarters, 2009
Gaseous Effluents-Ground Level Releases

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

N/A*= Not Applicable

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

Table 2A

YNPS ISFSI
 Effluent and Waste Disposal Annual Report
 First and Second Quarters, 2009
 Liquid Effluents-Summation of All Releases

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

N/A*= Not Applicable

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

Table 2A

YNPS ISFSI
 Effluent and Waste Disposal Annual Report
 Third and Fourth Quarters, 2009
 Liquid Effluents-Summation of All Releases

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

N/A*= Not Applicable

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

Table 2B

YNPS ISFSI
Effluent and Waste Disposal Annual Report
First and Second Quarters, 2009
Liquid Effluents

| Nuclides Released | Unit | Continuous Mode | | Batch Mode | |
|--------------------------|------|-----------------|-------------|-------------|-------------|
| | | 1st Quarter | 2nd Quarter | 1st Quarter | 2nd Quarter |
| Strontium-89 | Ci | N/A* | N/A* | N/A* | N/A* |
| Strontium-90 | Ci | N/A* | N/A* | N/A* | N/A* |
| Cesium-134 | Ci | N/A* | N/A* | N/A* | N/A* |
| Cesium-137 | Ci | N/A* | N/A* | N/A* | N/A* |
| Iodine-131 | Ci | N/A* | N/A* | N/A* | N/A* |
| Cobalt-58 | Ci | N/A* | N/A* | N/A* | N/A* |
| Cobalt-60 | Ci | N/A* | N/A* | N/A* | N/A* |
| Iron-59 | Ci | N/A* | N/A* | N/A* | N/A* |
| Zinc-65 | Ci | N/A* | N/A* | N/A* | N/A* |
| Manganese-54 | Ci | N/A* | N/A* | N/A* | N/A* |
| Chromium-51 | Ci | N/A* | N/A* | N/A* | N/A* |
| Zirconium-Niobium-95 | Ci | N/A* | N/A* | N/A* | N/A* |
| Molybdenum-99 | Ci | N/A* | N/A* | N/A* | N/A* |
| Technetium-99m | Ci | N/A* | N/A* | N/A* | N/A* |
| Barium-Lanthanum-140 | Ci | N/A* | N/A* | N/A* | N/A* |
| Cerium-141 | Ci | N/A* | N/A* | N/A* | N/A* |
| Others- Iron-55 | Ci | N/A* | N/A* | N/A* | N/A* |
| Antimony-125 | Ci | N/A* | N/A* | N/A* | N/A* |
| Unidentified | Ci | N/A* | N/A* | N/A* | N/A* |
| Total for period (above) | Ci | N/A* | N/A* | N/A* | N/A* |
| Xenon-133 | Ci | N/A* | N/A* | N/A* | N/A* |
| Xenon-135 | Ci | N/A* | N/A* | N/A* | N/A* |

N/A*= Not Applicable

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

Table 2B

YNPS ISFSI
Effluent and Waste Disposal Annual Report
Third and Fourth Quarters, 2009
Liquid Effluents

| Nuclides Released | Unit | Continuous Mode | | Batch Mode | |
|--------------------------|------|-----------------|-------------|-------------|-------------|
| | | 3rd Quarter | 4th Quarter | 3rd Quarter | 4th Quarter |
| Strontium-89 | Ci | N/A* | N/A* | N/A* | N/A* |
| Strontium-90 | Ci | N/A* | N/A* | N/A* | N/A* |
| Cesium-134 | Ci | N/A* | N/A* | N/A* | N/A* |
| Cesium-137 | Ci | N/A* | N/A* | N/A* | N/A* |
| Iodine-131 | Ci | N/A* | N/A* | N/A* | N/A* |
| Cobalt-58 | Ci | N/A* | N/A* | N/A* | N/A* |
| Cobalt-60 | Ci | N/A* | N/A* | N/A* | N/A* |
| Iron-59 | Ci | N/A* | N/A* | N/A* | N/A* |
| Zinc-65 | Ci | N/A* | N/A* | N/A* | N/A* |
| Manganese-54 | Ci | N/A* | N/A* | N/A* | N/A* |
| Chromium-51 | Ci | N/A* | N/A* | N/A* | N/A* |
| Zirconium-Niobium-95 | Ci | N/A* | N/A* | N/A* | N/A* |
| Molybdenum-99 | Ci | N/A* | N/A* | N/A* | N/A* |
| Technetium-99m | Ci | N/A* | N/A* | N/A* | N/A* |
| Barium-Lanthanum-140 | Ci | N/A* | N/A* | N/A* | N/A* |
| Cerium-141 | Ci | N/A* | N/A* | N/A* | N/A* |
| Others- Iron-55 | Ci | N/A* | N/A* | N/A* | N/A* |
| Antimony-125 | Ci | N/A* | N/A* | N/A* | N/A* |
| Unidentified | Ci | N/A* | N/A* | N/A* | N/A* |
| Total for period (above) | Ci | N/A* | N/A* | N/A* | N/A* |
| Xenon-133 | Ci | N/A* | N/A* | N/A* | N/A* |
| Xenon-135 | Ci | N/A* | N/A* | N/A* | N/A* |

N/A*= Not Applicable

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

Table 3
YNPS ISFSI
Effluent and Waste Disposal Semiannual Report
First Half, 2009
Solid Waste and Irradiated Fuel Shipments

A. Solid Waste Shipped Off-Site for Burial or Disposal (Not Irradiated Fuel)

| 1. Type of Waste | Unit | 6-Month Period | Est. Total Error, % |
|-------------------------------------------------------------|----------------|----------------|---------------------|
| a. Spent resins, filter sludges, evaporator bottoms, etc. | m ³ | 0.0 | |
| | Ci | 0.0 | |
| b. Dry compressible waste, contaminated equipment, etc. | m ³ | 0.0 | |
| | Ci | 0.0 | |
| c. Irradiated components, control rods, etc. | m ³ | 0.0 | |
| | Ci | 0.0 | |
| 2. Estimate of major nuclide composition (by type of waste) | | | |
| a. No Shipments | % | 0 | |
| b. No Shipments | % | 0 | |
| c. No Shipments | % | 0 | |

3. Solid Waste Disposition

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

B. Irradiated Fuel Shipments (Disposition)

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

Table 3
YNPS ISFSI
Effluent and Waste Disposal Semiannual Report
Second Half, 2009
Solid Waste and Irradiated Fuel Shipments

A. Solid Waste Shipped Off-Site for Burial or Disposal (Not Irradiated Fuel)

| 1. Type of Waste | Unit | 6-Month Period | Est. Total Error, % |
|-------------------------------------------------------------|----------------|----------------|---------------------|
| a. Spent resins, filter sludges, evaporator bottoms, etc. | m ³ | 0.0 | |
| | Ci | 0.0 | |
| b. Dry compressible waste, contaminated equipment, etc. | m ³ | 0.0 | |
| | Ci | 0.0 | |
| c. Irradiated components, control rods, etc. | m ³ | 0.0 | |
| | Ci | 0.0 | |
| 2. Estimate of major nuclide composition (by type of waste) | | | |
| a. No Shipments | % | 0 | |
| b. No Shipments | % | 0 | |
| c. No Shipments | % | 0 | |

3. Solid Waste Disposition

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

B. Irradiated Fuel Shipments (Disposition)

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

Appendix A

Radioactive Effluent Doses

There were no gaseous or liquid effluent releases in 2009. Therefore, an assessment of radiation doses to member(s) of the public allowed for recreational activities inside the site boundary was not required.

Appendix B

40CFR190 Limits

The limits specified in 40CFR190 were not exceeded in 2009. Therefore, an assessment of radiation doses to the most likely exposed real member(s) of the public was not required.

Appendix C
Unplanned Releases

There were no unplanned releases of radioactive materials in effluents in 2009.

Appendix D

Off-site Dose Calculation Manual Changes

There were no changes to the Off-site Dose Calculation Manual in 2009.