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JAFP-12-0053
May 14, 2012

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

Subject: 2011 Annual Radiological Environmental Operating Report
James A. FitzPatrick Nuclear Power Plant
Docket No. 50-333
License No. DPR-59

Dear Sir or Madam:

This letter transmits the James A. FitzPatrick Nuclear Power Plant's (JAF) Annual Radiological Environmental Operating Report, for the period of January 1, 2011, through December 31, 2011. This document is submitted in accordance with the Reporting Requirements of the Technical Specifications, Section 5.6.2, and Appendix H of the Technical Requirements Manual, "Offsite Dose Calculation Manual (ODCM)", Part 1, Section 6.1, Annual Radiological Environmental Operating Report.

There are no commitments contained in this letter.

If you have any questions concerning the enclosed report, please contact Laurie Rayle, Chemistry Manager, at (315) 349-6748.

Sincerely,

Joseph Pechacek
Licensing Manager

JP/LR/jo

Enclosure: 2011 Annual Radiological Environmental Operating Report

cc: Next Page

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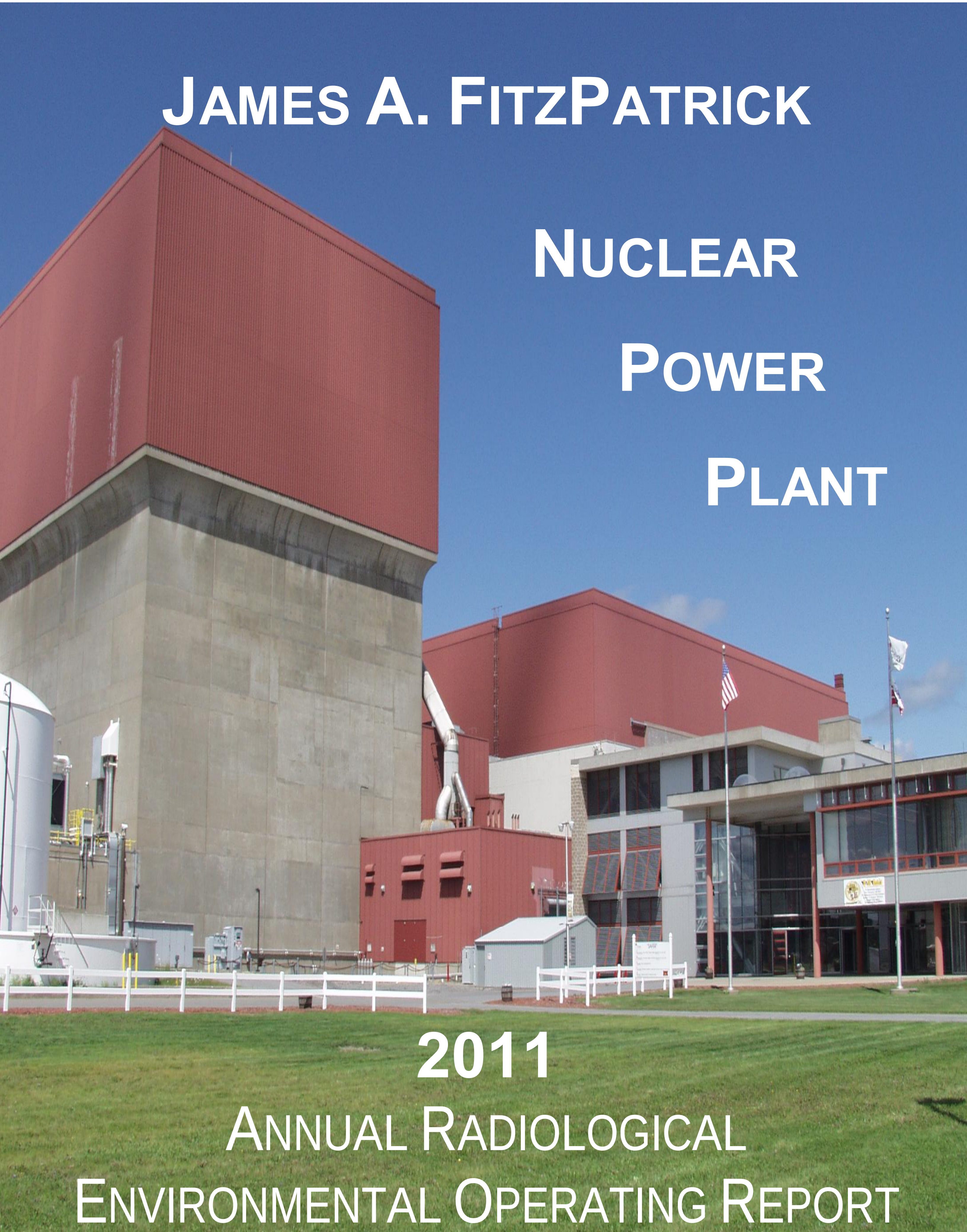

James A. FitzPatrick

Nuclear Power Plant

2011

Annual Radiological Environmental Operating Report

Annual Radiological Environmental Operating Report

January 1, 2011 - December 31, 2011

for

James A. FitzPatrick Nuclear Power Plant

Entergy Nuclear FitzPatrick, LLC

Entergy Nuclear Operations, Inc.

Facility Operating License No. DPR-59

Docket No. 50-333

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1.0 PURPOSE

The Annual Radiological Environmental Operating Report is published in accordance with the James A. FitzPatrick Nuclear Power Plant Offsite Dose Calculation Manual (ODCM), Part I, Section 6.1. The ODCM requires that the results from the annual Radiological Environmental Monitoring Program (REMP) be provided to the Nuclear Regulatory Commission by May 15th of each year.

This report describes the Radiological Environmental Monitoring Program (REMP), the implementation of the program, and the results obtained as required by the Offsite Dose Calculation Manual (ODCM). The report also contains the analytical results tables, data evaluation, dose assessment, and data trends for each environmental sample media. Also included are results of the land use census, historical data, and the Environmental Laboratory's performance in the Quality Assurance Intercomparison.

The REMP is a comprehensive surveillance program, which is implemented to assess the impact of site operations on the environment and compliance with 10CFR20, 40CFR190 and 10CFR72. Samples are collected from the aquatic and terrestrial pathways applicable to the site. The aquatic pathways include Lake Ontario fish, surface waters and lakeshore sediment. The terrestrial pathways include airborne particulate and radioiodine, milk, food products and direct radiation.

During 2011 there were 2,430 analyses performed on environmental media collected as part of the REMP. These results demonstrated that there is no significant or measurable radiological impact from the operation of the James A. FitzPatrick Nuclear Power Plant. The 2011 results for all pathways sampled are consistent with the previous five-year historical results and exhibited no adverse trends.

On March 11, 2011 at 1446, a magnitude 9.0 earthquake struck off the east coast of Japan. The Fukushima Daiichi Nuclear Power Station, operated by Tokyo Electric Power Co., withstood the earthquake but lost all offsite electrical power sources to the site. Forty-one minutes later however, the plant was hit with a series of seven tsunamis and all AC power was lost, and the facility went into a state of emergency. The Nuclear Safety Commission of Japan estimated approximately 17 million curies of iodine-131 equivalent radioactive material was released into the air and 0.127 million curies into the sea between March 11 and April 5. I-131 was detected from the Fukushima event at the James A. FitzPatrick and Nine Mile Point indicator and control air sampling locations from March 22 through April 12.

In summary, the analytical results from the 2011 Radiological Environmental Monitoring Program demonstrate that the routine operation at the James A. FitzPatrick site had no significant or measurable radiological impact on the environment. The program continues to demonstrate that the dose to a member of the public, as a result of the operation of the James A. FitzPatrick Nuclear Power Plant, remains significantly below the federally required dose limits specified in 10CFR20, 40CFR190 and 10CFR72.

2.0 INTRODUCTION

The James A. FitzPatrick Nuclear Power Plant is owned and operated by Entergy Nuclear FitzPatrick, LLC (ENF), Entergy Nuclear Operations, Inc. (ENO). This report is submitted in accordance with Offsite Dose Calculation Manual, Part I, Section 6.1. This report covers the calendar year 2011.

2.1 PROGRAM HISTORY

Environmental monitoring at the Nine Mile Point site has been ongoing since 1964. The program includes five years of pre-operational data, which was conducted prior to any reactor operations. In 1968, the Niagara Mohawk Power Company began the required pre-operational environmental site testing program. This pre-operational data serves as a reference point to compare later data obtained during reactor operation. In 1969, the Nine Mile Point Unit 1 reactor, a 615 megawatt Boiling Water Reactor (BWR) began full power operation. In 1975, the James A. FitzPatrick Nuclear Power Plant, owned and operated at that time by the New York Power Authority, began full power operation. The FitzPatrick plant, an 892 megawatt (rated) BWR, occupies the east sector of the Nine Mile Point site, approximately 0.57 miles east of Nine Mile Point Unit 1. In 1988, the Nine Mile Point Unit 2 reactor also owned and operated by Nine Mile Point Nuclear Station, LLC, began full power operation. This 1207 megawatt BWR is located between the Nine Mile Point Unit 1 and FitzPatrick sites.

In 1985, the individual Plant Effluent Technical Specifications were standardized to the generic Radiological Effluent Technical Specifications, much of which was common to the two reactors, and subsequently Nine Mile Point Unit 2. Subsequent Technical Specification amendments relocated the REMP requirements to the ODCM for all three plants. Data generated by the Radiological Environmental Monitoring Program (REMP) is shared, but each utility reviews and publishes their own annual report. On November 21, 2000 the ownership and operation of the James A. FitzPatrick Nuclear Power Plant was transferred from the New York Power Authority to Entergy Nuclear FitzPatrick, LLC and Entergy Nuclear Operations, Inc. The Facility Operating License No. DPR-59 and Docket No. 50-333 remained the same. On November 7, 2001, the ownership of the Nine Mile Point Unit I and II facilities was transferred to Constellation Energy Nuclear Group. These facilities are operated by Nine Mile Point Nuclear Station, LLC.

In summary, three Boiling Water Reactors, which together generate 2714 megawatts electric (MWe), have operated collectively at the Nine Mile Point site since 1988. A large database of environmental results from the exposure pathways have been collected and analyzed to evaluate the potential impact from reactor operations.

2.2 SITE DESCRIPTION

The Nine Mile Point site is located on the southeast shore of Lake Ontario in the town of Scriba, approximately 6.2 miles northeast of the city of Oswego. The nearest metropolitan area is located approximately 36 miles southeast of the site. The James A. FitzPatrick Nuclear Power Plant and support buildings occupy a small shoreline portion of the 702 acre Entergy site, which is partially wooded. The land, soil of glacier deposits, rises gently from the lake in all directions. Oswego County is a rural environment, with about 15% of the land devoted to agriculture.

2.3 PROGRAM OBJECTIVES

The objectives of the Radiological Environmental Monitoring Program (REMP) are to:

1. Measure and evaluate the effects of plant operation on the environs and to verify the effectiveness of the controls on radioactive material sources.

2. Monitor natural radiation levels in the environs of the James A. FitzPatrick Nuclear Power Plant site.

3. Demonstrate compliance with the requirements of applicable federal regulatory agencies, including Technical Specifications and the Offsite Dose Calculation Manual.

3.0 PROGRAM DESCRIPTION

To achieve the objectives listed in Section 2.3, an extensive sampling and analysis program is conducted every year. The James A. FitzPatrick Nuclear Power Plant (JAFNPP) Radiological Environmental Monitoring Program (REMP) consists of sampling and analysis of various media that include:

- Air
- Fish
- Food Products
- Milk
- Shoreline Sediment
- Surface Waters

In addition, direct radiation measurements are performed using thermoluminescent dosimeters (TLDs). These sampling programs are outlined in Table 3.0-1. The JAF REMP sampling locations are selected and verified by an annual Land Use Census. The accuracy and precision of the program is assured by participation in an Interlaboratory Comparison Quality Assurance Program (ICQAP).

Sample collections for the radiological program are accomplished by a dedicated site environmental staff from both the Nine Mile Point Nuclear Stations (NMPNS) and James A. FitzPatrick Nuclear Power Plant (JAFNPP). The site staff is assisted by a contracted environmental engineering company, EA Engineering, Science and Technology, Inc. (EA).

TABLE 3.0-1
REQUIRED SAMPLE COLLECTION AND ANALYSIS

Exposure Pathway and/or Sample	Number of Samples [(a)] and Locations	Sampling and Collection Frequency [(a)]	Type and Frequency of Analysis
AIRBORNE			
Radioiodine and Particulates	Samples from 5 locations: a. 3 Samples from offsite locations in different sectors of the highest calculated site average D/Q (based on all licensed site reactors) b. 1 sample from the vicinity of a community having the highest calculated site average D/Q (based on all licensed site reactors) c. 1 sample from a control location 9 to 20 miles distant and in the least prevalent wind direction[(d)]	Continuous sample operation with sample collection weekly or as required by dust loading, whichever is more frequent	Radioiodine Canisters: Analyze weekly for I-131 Particulate Samples: Gross beta radioactivity following filter change [(b)], composite (by location) for gamma isotopic[(c)] quarterly (as a minimum)
Direct Radiation[(e)]	32 stations with two or more dosimeters placed as follows: a. An inner ring of stations in the general area of the Site Boundary b. An outer ring in the 4 to 5 mile range from the site with a station in each of the land based sectors. There are 16 land based sectors in the inner ring, and 8 land based sectors in the outer ring c. The balance of the stations (8) are placed in special interest areas such as population centers, nearby residences, schools, and in 2 or 3 areas to serve as control stations	Quarterly	Gamma dose monthly or quarterly

TABLE 3.0-1 (Continued)
REQUIRED SAMPLE COLLECTION AND ANALYSIS

Exposure Pathway and/or Sample	Number of Samples [(a)] and Locations	Sampling and Collection Frequency [(a)]	Type and Frequency of Analysis
WATERBORNE			
Surface[(f)]	a. 1 sample upstream[(d)] b. 1 sample from the site's most downstream cooling water intake	Composite sample over a one month period[(g)]	Gamma isotopic analysis monthly. Composite for Tritium analysis quarterly[(c)]
Sediment from Shoreline	1 sample from a downstream area with existing or potential recreational value	Twice per year	Gamma isotopic analysis semi-annually[(c)]
INGESTION			
Milk	a. Samples from milch animals in 3 locations within 3.5 miles distant having the highest calculated site average D/Q. If there are none, then 1 sample from milch animals in each of 3 areas 3.5 to 5.0 miles distant having the highest calculated site average D/Q (based on all licensed site reactors)[(h)] b. 1 sample from milch animals at a control location (9 to 20 miles distant and in a less prevalent wind direction)[(d)]	Twice per month, April through December (samples will be collected in January through March if I-131 is detected in November and December of the preceding year)	Gamma isotopic and I-131 analysis twice per month when milch animals are on pasture (April through December); monthly (January through March), if required[(c)]

TABLE 3.0-1 (Continued)
REQUIRED SAMPLE COLLECTION AND ANALYSIS

Exposure Pathway and/or Sample	Number of Samples [a] and Locations	Sampling and Collection Frequency [a]	Type and Frequency of Analysis
Fish	a. 1 sample of each of 2 commercially or recreationally important species in the vicinity of a site discharge point	Twice per year	Gamma isotopic[c] analysis of edible portions.
	b. 1 sample of each of 2 species (same as in a. above or of a species with similar feeding habits) from an area at least 5 miles distant from the site[d]		
Food Products	a. In lieu of the garden census as specified in Part 1, Section 5.2, samples of at least 3 different kinds of broad leaf vegetation (such as vegetables) grown nearest each of two different offsite locations of highest predicted site average D/Q (based on all licensed site Reactors) One (1) sample of each of the similar broad leaf vegetation grown at least 9.3 miles distant in a least prevalent wind direction sector[d]	Once during harvest season	Gamma isotopic[c] analysis of edible portions. (Isotopic to include I-131)

NOTES FOR TABLE 3.0-1

(a) It is recognized that, at times, it may not be possible or practical to obtain samples of the media of choice at the most desired location or time. In these instances suitable alternative media and locations may be chosen for the particular pathway in question. Actual locations (distance and directions) from the site shall be provided in the Annual Radiological Environmental Operating Report. Calculated site averaged D/Q values and meteorological parameters are based on historical data (specified in the ODCM) for all licensed site reactors.

(b) Particulate sample filters should be analyzed for gross beta 24 hours or more after sampling to allow for radon and thoron daughter decay. If gross beta activity in air particulate samples is greater than 10 times a historical yearly mean of control samples, gamma isotopic analysis shall be performed on the individual samples.

(c) Gamma isotopic analysis means the identification and quantification of gamma emitting radionuclides that may be attributable to the effluents from the plant.

(d) The purpose of these samples is to obtain background information. If it is not practical to establish control locations in accordance with the distance and wind direction criteria, other sites which provide valid background data may be substituted.

(e) One or more instruments, such as a pressurized ion chamber, for measuring and recording dose rate continuously may be used in place of, or in addition to, integrating dosimeters. For the purpose of this table, a thermoluminescent dosimeter may be considered to be one phosphor and two or more phosphors in a packet may be considered as two or more dosimeters. Film badges shall not be used for measuring direct radiation.

(f) The "upstream sample" shall be taken at a distance beyond significant influence of the discharge. The "downstream sample" shall be taken in an area beyond, but near, the mixing zone, if practical.

(g) Composite samples should be collected with equipment (or equivalent) which is capable of collecting an aliquoit at time intervals which are very short (e.g., hourly) relative to the compositing period (e.g., monthly) in order to ensure that a representative sample is obtained.

(h) A milk sampling location, as required in Table 5.1-1 is defined as a location having at least 10 milking cows present at a designated milk sample location. It has been found from past experience, and as a result of conferring with local farmers, that a minimum of 10 milking cows is necessary to guarantee an adequate supply of milk twice per month for analytical purposes. Locations with less than 10 milking cows are usually utilized for breeding purposes which eliminates a stable supply of milk for samples as a result of suckling calves and periods when the adult animals are dry. In the event that 3 milk sample locations cannot meet the requirement for 10 milking cows, then a sample location having less than 10 milking cows can be used if an adequate supply of milk can reasonably and reliably be obtained based on communications with the farmer.

3.1 SAMPLE COLLECTION METHODOLOGY

3.1.1 SHORELINE SEDIMENTS

Shoreline sediment is collected at one area of existing or potential recreational value. One sample is also collected from a location beyond the influence of the site. Samples are collected as surface scrapings to a depth of approximately one inch. The samples are placed in plastic bags, sealed and shipped to the lab for analysis. Sediment samples are analyzed for gamma emitting radionuclides.

Shoreline sediment sample locations are shown in Section 3.3, Figure 3.3-5.

3.1.2 FISH

Samples of available fish species that are commercially or recreationally important to Lake Ontario; such as Lake Trout, Salmon, Walleye and Smallmouth Bass, are collected twice per year, once in the spring and again in the fall. Indicator samples are collected from a combination of the two onsite sample transects located offshore from the site. One set of control samples are collected at an offsite sample transect located offshore 8-10 miles west of the site. Available species are selected using the following guidelines:

1. A minimum of two species that are commercially or recreationally important are to be collected from each sample location. Samples selected are limited to edible and/or sport species when available.

2. Samples are composed of the edible portion only.

Selected fish samples are frozen immediately after collection and segregated by species and location. Samples are shipped frozen in insulated containers for analysis. Edible portions of each sample are analyzed for gamma emitting radionuclides.

Fish collection locations are shown in Section 3.3, Figure 3.3-5.

3.1.3 SURFACE WATER

Surface water samples are taken from the respective inlet canals of the James A. Fitzpatrick Nuclear Power Plant (JAFNPP) and NRG's Oswego Steam Station. The JAFNPP facility draws water from Lake Ontario on a continuous basis. This is used for the "downstream" or indicator sampling point for the Nine Mile Point site. The Oswego Steam Station inlet canal removes water from Lake Ontario at a point approximately 7.6 miles west of the site. This "upstream" location is considered a control location because of the distance from the site, as well as the result of the lake current patterns and current patterns from the Oswego River located nearby.

Samples from the JAFNPP facility are composited from automatic sampling equipment which discharges into a compositing tank or bottles. Samples are collected monthly from the compositor and analyzed for gamma emitters. Samples from the Oswego Steam Station are also obtained using automatic sampling equipment and collected in a holding tank. Representative samples from this location are obtained weekly and are composited to form a monthly composite sample. The monthly samples are analyzed for gamma emitting radionuclides.

A portion of the monthly sample from each of the locations is saved and composited to form quarterly composite samples, which are analyzed for tritium.

In addition to the sample results for the JAFNPP and Oswego Steam Station collection sites, data is presented for the Nine Mile Point Unit 1 and Unit 2 facility inlet canal samples and from the City of Oswego drinking water supply. The latter three locations are not required by the ODCM. These locations are optional sample points, which are collected and analyzed to enhance the surface water sampling program. Monthly composite samples from these three locations are analyzed for gamma emitting nuclides, and quarterly composite samples are analyzed for tritium.

Surface water sample locations are shown in Section 3.3 on Figure 3.3-4.

3.1.4 AIR PARTICULATE / IODINE

The air sampling stations required by the ODCM are located in the general area of the site boundary. The sampling stations are sited within a distance of 0.2 miles of the site boundary in sectors with the highest calculated deposition factor (D/Q) based on historical meteorological data. These stations (R-1, R-2, and R-3) are located in the E, ESE, and SE sectors as measured from the center of the Nine Mile Point Nuclear Station Unit 2 Reactor Building. The ODCM also requires that a fourth air sampling station be located in the vicinity of a year-round community. This station is located in the SE sector at a distance of 1.8 miles and is designated as Station R-4. A fifth station required by the ODCM is a control location designated as Station R-5. Station R-5 is located 16.2 miles from the site in the NE meteorological sector.

In addition to the five ODCM required locations, there are ten additional sampling stations. Six of these sampling stations are located within the site boundary and are designated as Onsite Stations D1, G, H, I, J, and K. These locations are within the site boundary of the NMPNS and JAFNPP. One air sampling station is located offsite in the southwest sector in the vicinity of the City of Oswego and is designated as Station G Offsite. Three remaining air sampling stations are located in the ESE, SSE, and SSW sectors and range in distance from 7.1 to 9.0 miles. These are designated as Offsite Stations D2, E and F respectively.

Each station collects airborne particulates using glass fiber filters (47 millimeter diameter) and radioiodine using charcoal cartridges (2x1 inch). The samplers run continuously and the charcoal cartridges and particulate filters are changed on a weekly basis. Sample volume is determined by use of calibrated gas flow meters located at the sample discharge. Gross beta analysis is performed on each particulate filter. Charcoal cartridges are analyzed for radioiodine using gamma spectral analysis. The particulate filters are composited quarterly by location and analyzed for gamma emitting radionuclides.

Air sampling station locations are shown in Section 3.3, Figures 3.3-2 and 3.3-3.

3.1.5 TLD (DIRECT RADIATION)

Thermoluminescent dosimeters (TLDs) are used to measure direct radiation (gamma dose) in the environment. Environmental TLDs are supplied and processed quarterly by the AREVA NP Environmental Laboratory. The laboratory utilizes a Panasonic based system using UD-814 dosimeters, which are constructed of rectangular teflon wafers impregnated with 25% $CaSO_4$:Dy phosphor. Each dosimeter contains three calcium sulfate elements and one lithium borate element.

1. **Environmental TLDs**

   Environmental TLDs are placed in five different geographical regions around site to evaluate effects of direct radiation as a result of plant operations. The following is a description of the five TLD geographical categories used in the NMPNS and JAFNPP Environmental Monitoring Program and the TLDs that make up each region:

TLD Geographical Category	Description
Onsite	TLDs placed at various locations within the site boundary, with three exceptions, are not required by the ODCM. (TLD locations comprising this group are: 3, 4, 5, 6, 7*, 18*, 23*, 24, 25, 26, 27, 28, 29, 30, 31, 39, 47, 103, 106 and 107)
Site Boundary	An inner ring of TLDs placed in the general area of the site boundary in each of the sixteen meteorological sectors. This category is required by the ODCM. (TLD locations comprising this group are: 7*, 18*, 23*, 75*, 76*, 77*, 78*, 79*, 80*, 81*, 82*, 83*, 84*, 85*, 86*, and 87*)

TLD Geographical Category	Description
Offsite	An outer ring of TLDs placed 4 to 5 miles from the site in each of the 8 land based meteorological sectors. This category is required by the ODCM. (TLD locations comprising this group are 88*, 89*, 90*, 91*, 92*, 93*, 94*, and 95*)
Special Interest	TLDs placed in special interest areas of high population density and use. These TLDs are located at or near large industrial sites, schools, or nearby towns or communities. This category is required by the ODCM. (TLD locations comprising this group are: 9, 10, 11, 12, 13, 15*, 19, 51, 52, 53, 54, 55, 56*, 58*, 96*, 97*, 98, 99, 100, 101, 102, 108, and 109)
Control	TLDs placed in areas beyond significant influence of the site and plant operations. These TLDs are located to the SW, S and NE of the site at distances of 12.6 to 24.7 miles. This category is also required by the ODCM. (TLD locations comprising this group are 8*, 14*, 49*, 111, 113)

* TLD location required by the ODCM

Although the ODCM requires a total of 32 TLD stations; environmental TLDs are also placed at additional locations not required by the ODCM, within the Onsite, Special Interest and Control TLD categories to supplement the ODCM required Direct Radiation readings.

Two dosimeters are placed at each TLD monitoring location. The TLDs are sealed in polyethylene packages to ensure dosimeter integrity and placed in open webbed plastic holders and attached to supporting structures, such as utility poles.

Environmental TLD locations are shown in Section 3.3, Figures 3.3-2 and 3.3-3.

2. **Independent Spent Fuel Storage Installation (ISFSI)**

   In order to provide adequate spent fuel storage capacity at the FitzPatrick plant, Entergy constructed an Independent Spent Fuel Storage Installation (ISFSI) onsite. On April 25, 2002, the ISFSI facility was placed in service.

   TLDs are used to monitor direct radiation levels in the vicinity of the ISFSI facility. Twelve TLD locations were established around the ISFSI pad on the perimeter fence. Six additional TLD locations are located at varying distances from the pad to determine dose rates at points of interest relative to the storage area and are designated as optional locations. Background data was collected starting in October, 2000 at eight of the TLD locations on the perimeter fence. The remaining locations were established in October 2001.

   Two dosimeters are placed at each TLD monitoring location. The TLDs are sealed in polyethylene packages to ensure dosimeter integrity and placed in the field using a supporting structure such as a fence or other immovable object.

   ISFSI TLD locations are shown in Section 3.3, Table 3.3.1.

3.1.6 MILK

Milk samples are routinely collected from farms during the sampling year. These farms include one indicator location and one control location. Samples are normally collected April through December of the sample year. If plant related radionuclides are detected in samples in November and December of the previous year, milk collections are continued into the following year starting in January. If plant related radionuclides are not detected in the November and December samples, then milk collections do not commence until April of the following sampling year. Milk samples were not collected in January through March of 2011 as there were no positive detections of plant related radionuclides in samples collected during November and December of 2010.

The ODCM also requires that a sample be collected from a control location nine to twenty miles from the site and in a less prevalent wind direction. This location is in the south sector at a distance of 16 miles and serves as the control location.

Milk samples are collected in polyethylene bottles from a bulk storage tank at each sampled farm. Before the sample is drawn, the tank contents are agitated to assure a homogenous mixture of milk and butter fat. The samples are chilled, preserved, and shipped fresh to the analytical laboratory within thirty-six hours of collection in insulated shipping containers.

The milk sample locations are shown in Section 3.3, Figure 3.3-4. (Refer to Section 3.3, Table 3.3-1 for location designation and descriptions.)

3.1.7 FOOD PRODUCTS (VEGETATION)

Food products are collected once per year during the late summer harvest season. A minimum of three different kinds of broad leaf vegetation (edible or inedible) are collected from two different indicator garden locations. Sample locations are selected from available gardens identified in the annual census that have the highest estimated deposition values (D/Q) based on historical site meteorological data. Control samples are also collected from available locations greater than 9.3 miles distance from the site in a less prevalent wind direction. Control samples are of the same or similar type of vegetation when available.

Food product samples are analyzed for gamma emitters using gamma isotopic analysis.

Food product locations are shown in Section 3.3, Figure 3.3-5.

3.1.8 GROUND WATER MONITORING PROGRAM

The Nuclear Energy Institute (NEI) Ground Water Protection Initiative was established to determine the potential impact Nuclear Power Plants may have on the surrounding environment due to unplanned releases of radioactive liquids. Under NEI 07-07, Industry Ground Water Protection Initiative Final Guidance Document, August 2007, ground water monitoring is accomplished through sampling of the water table around the plant and analyzing it for gamma emitters and tritium. In November of 2007, JAF drilled 5 ground water wells along the north edge of the property next to the lake (See Section 3.3, Figure 3.3-7). Samples obtained from these wells are analyzed on a quarterly basis to determine gamma emitters and tritium concentrations. Ground water samples are analyzed for gamma emitters using gamma isotopic analysis and tritium using liquid scintillation detector.

On November 17, 2009, CR-JAF-2009-04166 documented detectable amounts of tritium in the Reactor Building Perimeter Drain Sump. The Reactor Building Perimeter Drain Sump is normally a nonradioactive system. Starting in March 2010, 16 additional monitoring wells were drilled in the area of the reactor building and nearby SSCs (see Section 3.3, Figure 3.3-7). The purpose of these sixteen wells is to provide detailed site-specific data that will assist in determining the source of tritium detected in the Reactor Building Perimeter Drain Sump.

Ground water results are documented in the Annual Radiological Effluent Release Report for 2011.

3.2 ANALYSES PERFORMED

Environmental sample analyses are performed at the James A. FitzPatrick Nuclear Power Plant (JAFNPP) Environmental Laboratory or by a contract laboratory. The following analyses were performed:

1. Air Particulate Filter – Gross Beta
2. Air Particulate Filter Composites – Gamma Spectral Analysis
3. Airborne Radioiodine – Gamma Spectral Analysis
4. Direct Radiation using Thermoluminescent Dosimeters (TLDs) – Analyses performed by a contractor laboratory – Stanford Dosimetry LLC.
5. Fish – Gamma Spectral Analysis
6. Food Products (vegetation) – Gamma Spectral Analysis
7. Milk – Gamma Spectral Analysis and I-131
8. Shoreline Sediment – Gamma Spectral Analysis
9. Special Samples (soil, food, bottom sediment, etc.) – Gamma Spectral Analysis
10. Surface Water Monthly Composites – Gamma Spectral Analysis, I-131
11. Surface Water Quarterly Composite – Tritium
12. Ground Water Quarterly Samples – Tritium

3.3 SAMPLE LOCATIONS

Section 3.3 provides maps illustrating sample locations. Sample locations referenced as letters and numbers on the report period data tables are consistent with designations plotted on the maps.

This section also contains an environmental sample location reference table (Table 3.3-1). This table contains the following information:

1. Sample Medium
2. Location Designation, (this column contains the key for the sample location and is consistent with the designation on the sample location maps and on the sample results data tables)
3. Location Description
4. Degrees and Distance of the sample location from the site

3.3.1 LIST OF FIGURES

TABLE 3.3-1
ENVIRONMENTAL SAMPLE LOCATIONS

SAMPLE MEDIUM	MAP DESIGNATION	FIGURE NUMBER	LOCATION DESCRIPTION	DEGREES & DISTANCE (1) & (2)		
Shoreline Sediment	05*	Figure 3.3-5	Sunset Bay	84º	at	1.2 miles
	06	Figure 3.3-5	Langs Beach, Control	232°	at	4.8 miles
Fish	02*	Figure 3.3-5	Nine Mile Point Transect	290°	at	0.4 miles
	03*	Figure 3.3-5	FitzPatrick Transect	62°	at	0.8 miles
	00*	Figure 3.3-5	Oswego Transect	237°	at	5.9 miles
Surface Water	03*	Figure 3.3-4	FitzPatrick Inlet	53°	at	0.6 miles
	08*	Figure 3.3-4	Oswego Steam Station Inlet	237°	at	7.6 miles
	09	Figure 3.3-4	NMP Unit 1 Inlet	319°	at	0.3 miles
	10	Figure 3.3-4	Oswego City Water	240°	at	7.8 miles
	11	Figure 3.3-4	NMP Unit 2 Inlet (Split intake with two locations)	336°	at	0.3 miles
				353°	at	0.3 miles
Air Radioiodine and Particulates	R-1*	Figure 3.3-2	R-1 Station, Nine Mile Point Road	92°	at	1.8 miles
	R-2*	Figure 3.3-3	R-2 Station, Lake Road	107°	at	1.1 miles
	R-3*	Figure 3.3-3	R-3 Station, Co. Rt. 29	133°	at	1.4 miles
	R-4*	Figure 3.3-3	R-4 Station, Village of Lycoming, Co. Rt. 29	145°	at	1.8 miles
	R-5*	Figure 3.3-2	R-5 Station, Montario Point Rd.	42°	at	16.2 miles
	D-1	Figure 3.3-3	D1 Onsite Station	73°	at	0.3 miles
	G	Figure 3.3-3	G Onsite Station	244°	at	0.7 miles
	H	Figure 3.3-3	H Onsite Station	74°	at	0.8 miles
	I	Figure 3.3-3	I Onsite Station	96°	at	0.8 miles
	J	Figure 3.3-3	J Onsite Station	110°	at	0.9 miles
	K	Figure 3.3-3	K Onsite Station	133°	at	0.5 miles
	G	Figure 3.3-2	G Offsite Station, Saint Paul Street	226°	at	5.4 miles
	D-2	Figure 3.3-2	D2 Offsite Station, Rt. 64	118°	at	9.0 miles
	E	Figure 3.3-2	E Offsite Station, Rt. 4	162°	at	7.1 miles
	F	Figure 3.3-2	F Offsite Station, Dutch Ridge Road	192°	at	7.7 miles

(1) Degrees and distance based on Nine Mile Point Unit 2 Reactor Centerline rounded to the nearest 1/10 of a mile.
(2) Degrees and Distances updated by Global Positioning System (GPS) in 2006.

* Sample location required by ODCM

TABLE 3.3-1 (Continued)
ENVIRONMENTAL SAMPLE LOCATIONS

SAMPLE MEDIUM	MAP DESIGNATION	FIGURE NUMBER	LOCATION DESCRIPTION	DEGREES & DISTANCE (1) & (2)		
Thermoluminescent Dosimeters (TLD) (Continued)	3	Figure 3.3-3	D1 Onsite	71°	at	0.3 miles
	4	Figure 3.3-3	D2 Onsite	143°	at	0.4 miles
	5	Figure 3.3-3	E Onsite	180°	at	0.3 miles
	6	Figure 3.3-3	F Onsite	213°	at	0.5 miles
	7*	Figure 3.3-3	G Onsite	245°	at	0.7 miles
	8*	Figure 3.3-2	R-5 Offsite Control	42°	at	16.2 miles
	9	Figure 3.3-2	D1 Offsite – State Route 3	80°	at	11.4 miles
	10	Figure 3.3-2	D2 Offsite	118°	at	9.0 miles
	11	Figure 3.3-2	E Offsite	162°	at	7.1 miles
	12	Figure 3.3-2	F- Offsite	192°	at	7.6 miles
	13	Figure 3.3-2	G Offsite	226°	at	5.4 miles
	14*	Figure 3.3-2	DeMass Rd., SW Oswego - Control	227°	at	12.5 miles
	15*	Figure 3.3-2	Pole 66, W. Boundary - Bible Camp	240°	at	0.9 miles
	18*	Figure 3.3-3	Energy Info. Center - Lamp Post, SW	268°	at	0.4 miles
	19	Figure 3.3-2	East Boundary - JAF, Pole 9	83°	at	1.4 miles
	23*	Figure 3.3-3	H Onsite	73°	at	0.8 miles
	24	Figure 3.3-3	I Onsite	95°	at	0.8 miles
	25	Figure 3.3-3	J Onsite	109°	at	0.9 miles
	26	Figure 3.3-3	K Onsite	132°	at	0.5 miles
	27	Figure 3.3-3	N. Fence, N. of Switchyard, JAF	60°	at	0.4 miles
	28	Figure 3.3-3	N. Light Pole,N. of Screenhouse, JAF	68°	at	0.5 miles
	29	Figure 3.3-3	N. Fence, N. of W. Side	65°	at	0.5 miles
	30	Figure 3.3-3	N. Fence, (NW) JAF	57°	at	0.4 miles
	31	Figure 3.3-3	N. Fence, (NW) NMP-1	279°	at	0.2 miles
	39	Figure 3.3-3	N. Fence, Rad. Waste-NMP-1	298°	at	0.2 miles
	47	Figure 3.3-3	N. Fence, (NE) JAF	69°	at	0.6 miles
	49*	Figure 3.3-2	Phoenix, NY-Control	168°	at	19.7 miles
	51	Figure 3.3-2	Liberty & Bronson Sts., E of OSS	234°	at	7.3 miles
	52	Figure 3.3-2	E. 12th & Cayuga Sts., Oswego School	227°	at	5.9 miles
	53	Figure 3.3-2	Broadwell & Chestnut Sts. Fulton H.S.	183°	at	13.7 miles

(1) Degrees and distance based on Nine Mile Point Unit 2 Reactor Centerline rounded to the nearest 1/10 of a mile.
(2) Degrees and Distances updated by Global Positioning System (GPS) in 2006.
* Sample location required by ODCM

TABLE 3.3-1 (Continued)
ENVIRONMENTAL SAMPLE LOCATIONS

SAMPLE MEDIUM	MAP DESIGNATION	FIGURE NUMBER	LOCATION DESCRIPTION	DEGREES & DISTANCE (1) & (2)		
Thermoluminescent	54	Figure 3.3-2	Mexico High School	115°	at	9.4 miles
Dosimeters (TLD)	55	Figure 3.3-2	Gas Substation Co. Rt. 5-Pulaski	75°	at	13.0 miles
(Continued)	56*	Figure 3.3-2	Rt. 104-New Haven Sch. (SE Corner)	124°	at	5.2 miles
	58*	Figure 3.3-2	Co Rt. 1A-Novelis (E. of E. Entrance Rd.)	222°	at	3.0 miles
	75*	Figure 3.3-3	Unit 2, N. Fence, N. of Reactor Bldg.	354°	at	0.1 miles
	76*	Figure 3.3-3	Unit 2, N. Fence, N. of Change House	25°	at	0.1 miles
	77*	Figure 3.3-3	Unit 2, N. Fence, N. of Pipe Bldg.	36°	at	0.2 miles
	78*	Figure 3.3-3	JAF. E. of E. Old Lay Down Area	85°	at	1.0 miles
	79*	Figure 3.3-3	Co. Rt. 29, Pole #63, 0.2 mi. S. of Lake Rd.	120°	at	1.2 miles
	80*	Figure 3.3-3	Co. Rt. 29, Pole #54, 0.7 mi. S. of Lake Rd.	136°	at	1.5 miles
	81*	Figure 3.3-3	Miner Rd., Pole #16, 0.5 mi. W. of Rt. 29	159°	at	1.6 miles
	82*	Figure 3.3-3	Miner Rd., Pole # 1-1/2, 1.1 mi. W. of Rt. 29	180°	at	1.6 miles
	83*	Figure 3.3-3	Lakeview Rd., Tree 0.45 mi. N. of Miner Rd.	203°	at	1.2 miles
	84*	Figure 3.3-2	Lakeview Rd., N., Pole #6117, 200ft. N. of Lake Rd.	226°	at	1.1 miles
	85*	Figure 3.3-3	Unit 1, N. Fence, N. of W. Side of Screen House	292°	at	0.2 miles
	86*	Figure 3.3-3	Unit 2, N. Fence, N of W. Side of Screen House	311°	at	0.1 miles
	87*	Figure 3.3-3	Unit 2, N. Fence, N. of E. Side of Screen House	333°	at	0.1 miles
	88*	Figure 3.3-2	Hickory Grove Rd., Pole #2, 0.6 mi. N. of Rt. 1	97°	at	4.5 miles
	89*	Figure 3.3-2	Leavitt Rd., Pole #16, 0.4 mi. S. of Rt.1	112°	at	4.3 miles
	90*	Figure 3.3-2	Rt. 104, Pole #300, 150 ft. E. of Keefe Rd.	135°	at	4.2 miles
	91*	Figure 3.3-2	Rt 51A, Pole #59, 0.8 mi. W. of Rt. 51	157°	at	4.9 miles
	92*	Figure 3.3-2	Maiden Lane Rd., Power Pole, 0.6 mi. S. of Rt. 104	183°	at	4.4 miles
	93*	Figure 3.3-2	Rt. 53 Pole 1-1, 120 ft. S. of Rt. 104	206°	at	4.4 miles
	94*	Figure 3.3-2	Rt. 1, Pole #82, 250 ft. E. of Kocher Rd. (Co. Rt. 63)	224°	at	4.4 miles
	95*	Figure 3.3-2	Novelis W access Rd., Joe Fultz Blvd, Pole #21	239°	at	3.7 miles
	96*	Figure 3.3-2	Creamery Rd., 0.3 mi. S. of Middle Rd., Pole 1-1/2	199°	at	3.6 miles
	97*	Figure 3.3-3	Rt. 29, Pole #50, 200ft. N. of Miner Rd.	145°	at	1.8 miles
	98	Figure 3.3-2	Lake Rd., Pole #145, 0.15 mi. E. of Rt 29	102°	at	1.2 miles

(1) Degrees and distance based on Nine Mile Point Unit 2 Reactor Centerline rounded to the nearest 1/10 of a mile.
(2) Degrees and Distances updated by Global Positioning System (GPS) in 2006.
* Sample location required by ODCM

TABLE 3.3-1 (Continued)
ENVIRONMENTAL SAMPLE LOCATIONS

SAMPLE MEDIUM	MAP DESIGNATION	FIGURE NUMBER	LOCATION DESCRIPTION	DEGREES & DISTANCE (1) & (2)		
Thermoluminescent	99	Figure 3.3-2	NMP Rd., 0.4 mi. N. of Lake Rd., Env. Station R1	92°	at	1.8 miles
Dosimeters (TLD)	100	Figure 3.3-3	Rt. 29 & Lake Rd., Env. Station R2	106°	at	1.1 miles
(Continued)	101	Figure 3.3-3	Rt. 29, 0.7 mi. S. of Lake Rd., Env. Station R3	133°	at	1.4 miles
	102	Figure 3.3-2	EOF/Env. Lab, Rt 176, E. Driveway, Lamp Post	175°	at	11.9 miles
	103	Figure 3.3-3	EIC, East Garage Rd., Lamp Post	268°	at	0.4 miles
	104	Figure 3.3-2	Parkhurst Rd., Pole #23, 0.1 mi. S. of Lake rd.	102°	at	1.4 miles
	105	Figure 3.3-3	Lake view Rd. Pole #36, 0.5 mi. S. of Lake Rd.	199°	at	1.4 miles
	106	Figure 3.3-3	Shoreline Cove, W. of NMP-1, Tree on W. Edge	274°	at	0.3 miles
	107	Figure 3.3-3	Shoreline Cove, W. of NMP-1, 30 ft SSW of #106	273°	at	0.3 miles
	108	Figure 3.3-3	Lake Rd., Pole #142, 300 ft E. of Rt. 29 S.	105°	at	1.1 miles
	109	Figure 3.3-3	Tree North of Lake Rd., 300 ft E. of Rt. 29 N	104°	at	1.1 miles
	111	Figure 3.3-2	Control, State Route 38, Sterling NY	214°	at	21.8 miles
	112	Figure 3.3-2	EOF/Env. Lab, Oswego County Airport	175°	at	11.9 miles
	113	Figure 3.3-2	Control, Baldwinsville, NY	178°	at	24.7miles
Cow's Milk	55	Figure 3.3-4	Indicator Location	97°	at	8.7 miles
	77*	Figure 3.3-4	Control Location	190°	at	16.0 miles
Food Products	48**	Figure 3.3-5	Indicator Location	83°	at	1.5 miles
	133**	Figure 3.3-5	Indicator Location	83°	at	1.6 miles
	144*	Figure 3.3-5	Indicator Location	139°	at	1.6 miles
	484*	Figure 3.3-5	Indicator Location	132°	at	1.4 miles
	C2*	Figure 3.3-5	Control Location	222°	at	15.4 miles
Nearest Residence (NMP)	Based on NMP Unit 2 Centerline – Refer to Figure 3.3-5					
Nearest Residence (JAF)	Based on JAF Centerline – Refer to Figure 3.3-6					

(1) Degrees and distance based on Nine Mile Point Unit 2 Reactor Centerline
(2) Degrees and Distances updated by Global Positioning System (GPS) in 2006.
* Sample location required by ODCM
** Optional sample

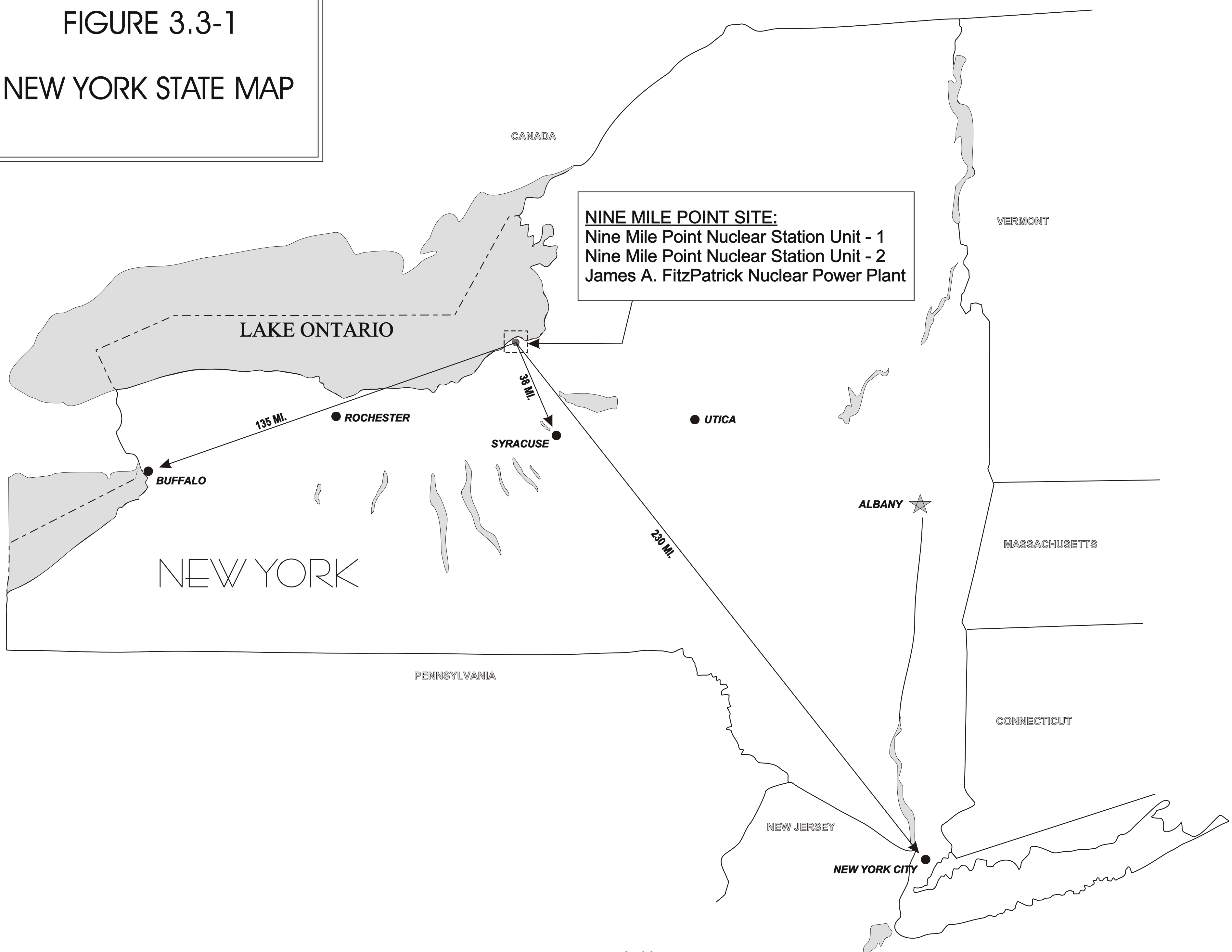
TABLE 3.3-1 (Continued)
ENVIRONMENTAL SAMPLE LOCATIONS

SAMPLE MEDIUM	LOCATION DESIGNATION	FIGURE NUMBER	LOCATION DESCRIPTION
Thermoluminescent Dosimeters (TLD)	I-1*		ISFSI West Fence, South End of Storage Pad
	I-2*		ISFSI West Fence, Center of Storage Pad
	I-3*		ISFSI West Fence, North End of Storage Pad
	I-4*		ISFSI North Fence, West End of Storage Pad
	I-5*		ISFSI North Fence, Center of Storage Pad
	I-6*		ISFSI North Fence, East End of Storage Pad
	I-7*		ISFSI East Fence, North End of Storage Pad
	I-8*		ISFSI East Fence, Center of Storage Pad
	I-9*		ISFSI East Fence, South End of Storage Pad
	I-10*		ISFSI South Fence, East End of Storage Pad
	I-11*		ISFSI South Fence, Center of Storage Pad
	I-12*		ISFSI South Fence, West End of Storage Pad
	I-13H		ISFSI Building and Grounds Garage, East of Pad
	I-14H		ISFSI Tree ~100 yards South of Pad
	I-15H		ISFSI Transmission Line Tower South of Pad at East /West Access Road
	I-16H		ISFSI Perimeter Fence ~100 yards West of Pad on Pad Centerline
	I-17H		ISFSI North Fence of Main Switch Yard on Pad Centerline
	I-18H		ISFSI North Inner Perimeter Fence at Lake Shore on Pad Centerline
Ground Water Monitoring Monitoring Wells	MW-1A	Figure 3.3-7	Southwest of Reactor Building
	MW-1B	Figure 3.3-7	Southwest of Reactor Building
	MW-2A	Figure 3.3-7	Northwest of Reactor Building
	MW-2B	Figure 3.3-7	Northwest of Reactor Building
	MW-3A	Figure 3.3-7	Northwest of Reactor Building
	MW-3B	Figure 3.3-7	Northwest of Reactor Building
	MW-4A	Figure 3.3-7	Northeast of Reactor Building
	MW-4B	Figure 3.3-7	Northeast of Reactor Building
	MW-5	Figure 3.3-7	Northwest edge of property
	MW-6	Figure 3.3-7	North / Northwest edge of property
	MW-7	Figure 3.3-7	North edge of property
	MW-8	Figure 3.3-7	North / Northeast edge of property
	MW-9	Figure 3.3-7	Northeast edge of property
	MW-10A	Figure 3.3-7	Southeast of Reactor Building
	MW-10B	Figure 3.3-7	Southeast of Reactor Building
	MW-13	Figure 3.3-7	West of Reactor Building
	MW-14	Figure 3.3-7	East of Reactor Building
	MW-15	Figure 3.3-7	South of Reactor Building
	MW-16	Figure 3.3-7	Northwest of Reactor Building
	MW-CST(A)	Figure 3.3-7	West of Reactor Building
	MW-CST(B)	Figure 3.3-7	West of Reactor Building

* Sample location required by ODCM
H indicates Optional TLD location

FIGURE 3.3-1

NEW YORK STATE MAP



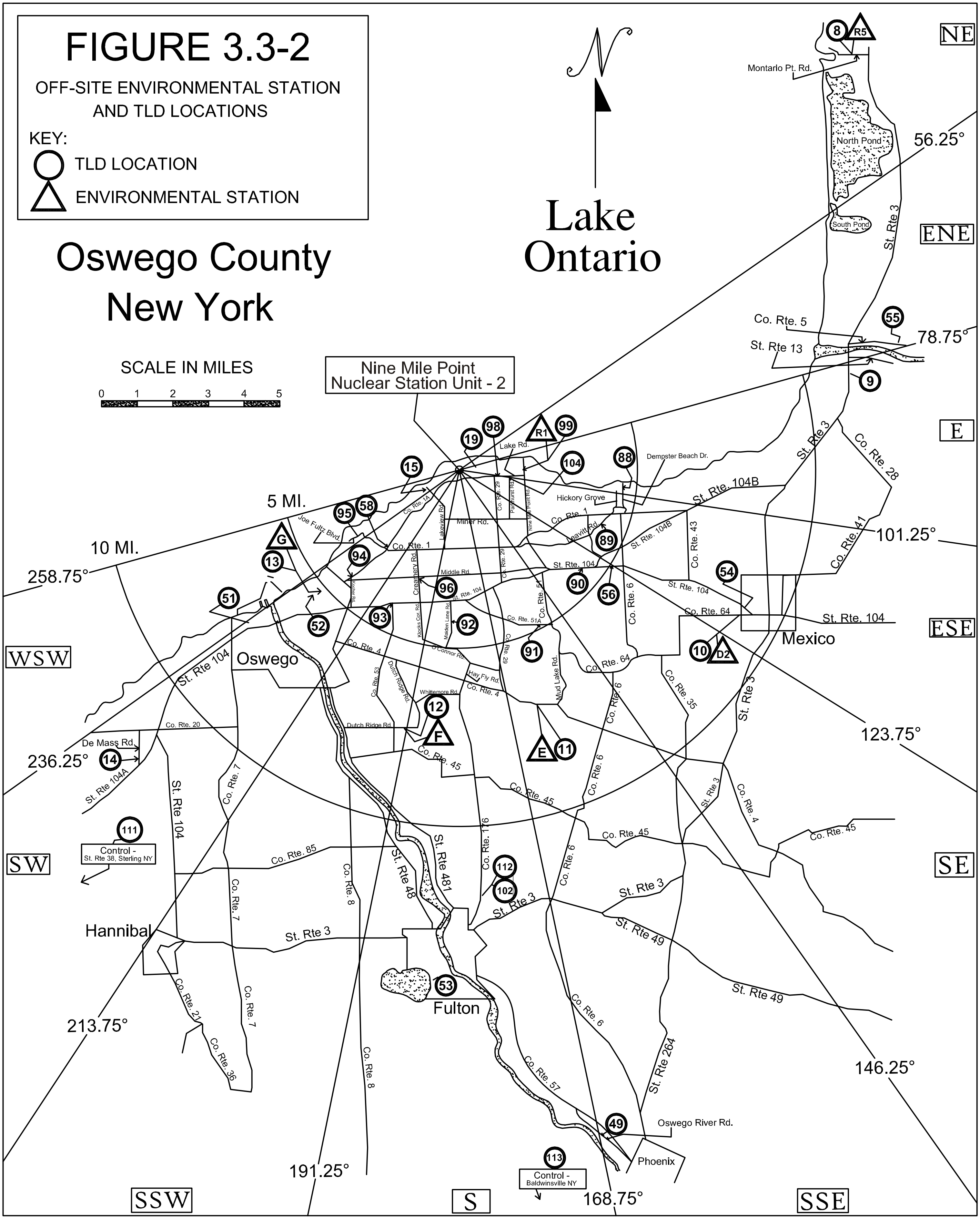


FIGURE 3.3-2
OFF-SITE ENVIRONMENTAL STATION
AND TLD LOCATIONS
KEY:
TLD LOCATION
ENVIRONMENTAL STATION
Oswego County
New York
Lake
Ontario
SCALE IN MILES
0 1 2 3 4 5
Nine Mile Point
Nuclear Station Unit - 2
5 MI.
10 MI.
NE
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
56.25°
78.75°
101.25°
123.75°
146.25°
168.75°
191.25°
213.75°
236.25°
258.75°
North Pond
South Pond
Montario Pt. Rd.
Co. Rte. 5
St. Rte 13
St. Rte 3
Co. Rte. 28
Co. Rte. 41
St. Rte. 104B
St. Rte. 104
Co. Rte. 64
Co. Rte. 43
Dempster Beach Dr.
Hickory Grove
Lake Rd.
Co. Rte. 1
Co. Rte. 1A
Joe Fultz Blvd.
Miner Rd.
Middle Rd.
Co. Rte. 51A
Co. Rte. 4
Co. Rte. 6
Co. Rte. 35
Co. Rte. 45
Co. Rte. 20
De Mass Rd.
St. Rte 104A
St. Rte 104
Co. Rte. 7
Co. Rte. 85
Co. Rte. 8
St. Rte 48
St. Rte 481
Co. Rte. 176
St. Rte 3
St. Rte 49
Co. Rte. 21
Co. Rte. 36
Co. Rte. 57
St. Rte 264
Oswego River Rd.
Hay Fly Rd.
Whittemore Rd.
Dutch Ridge Rd.
Mud Lake Rd.
Oswego
Mexico
Hannibal
Fulton
Phoenix
Control -
St. Rte 38, Sterling NY
Control -
Baldwinsville NY
8
R5
55
9
98
19
R1
99
15
104
88
95
58
G
13
94
89
51
96
90
56
54
52
93
92
91
10
D2
12
F
E
11
14
111
112
102
53
49
113

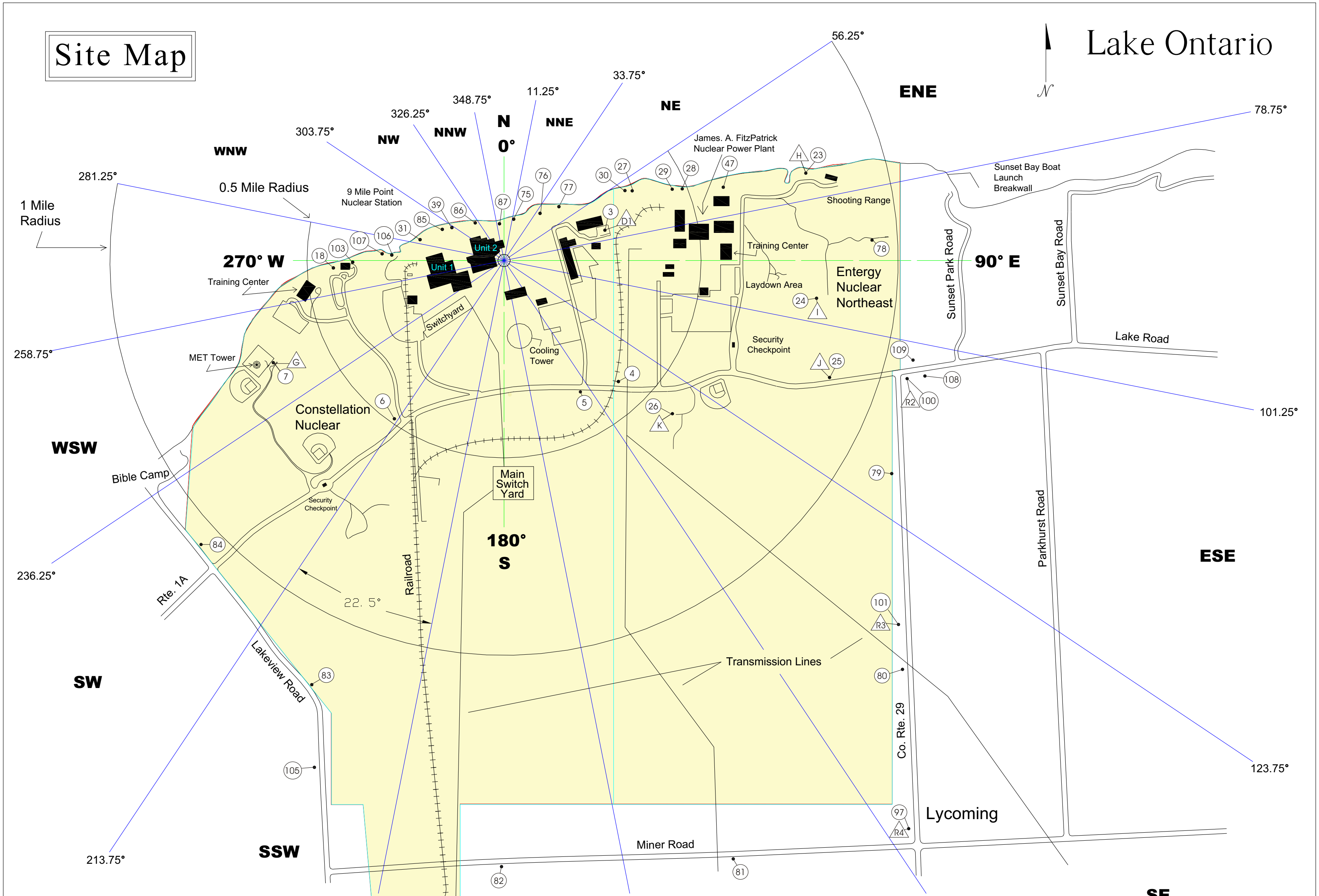


FIGURE 3.3-3
ONSITE ENVIRONMENTAL STATION AND TLD LOCATIONS

KEY:
△ ENVIRONMENTAL STATIONS
○ TLD LOCATIONS

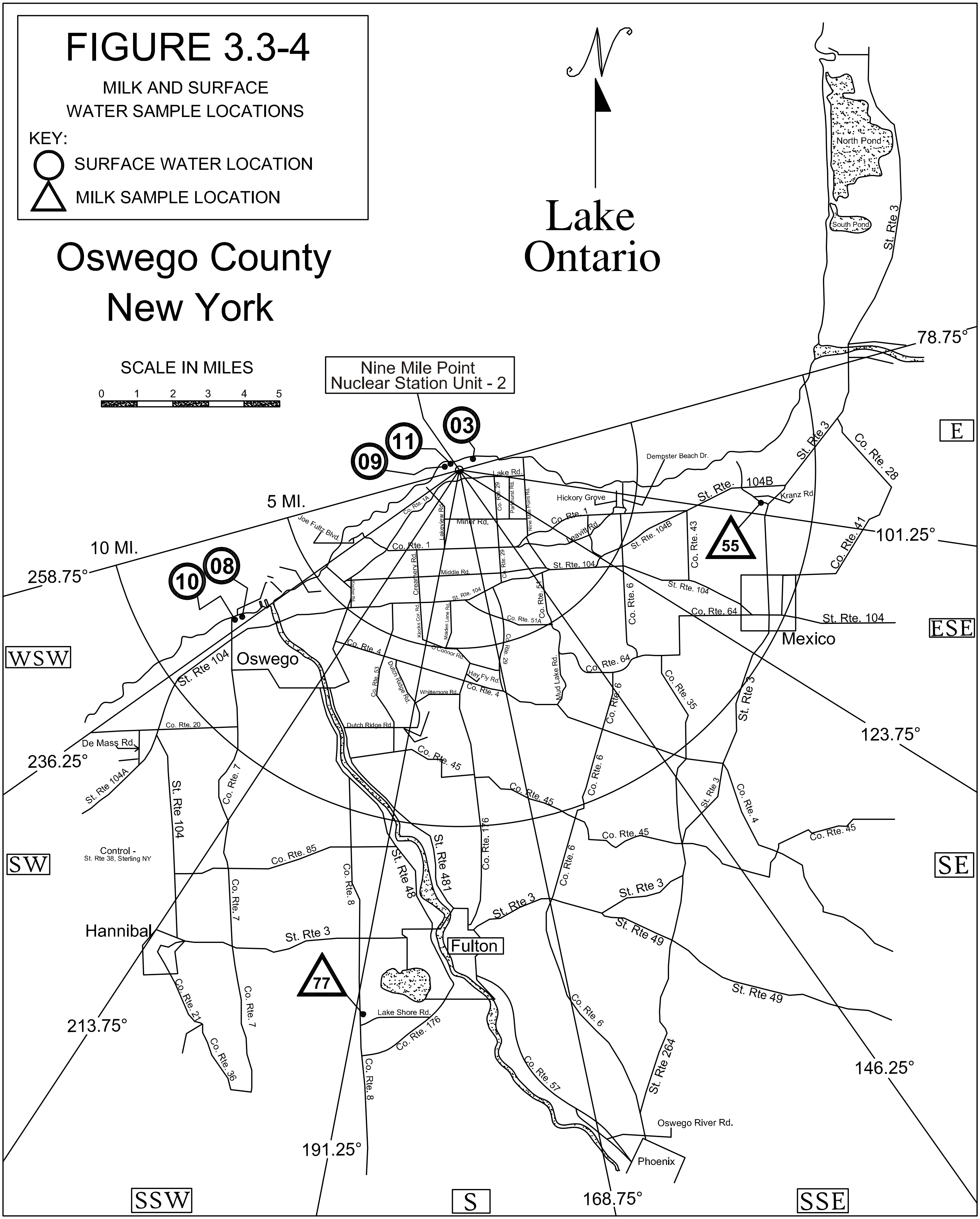


FIGURE 3.3-4

MILK AND SURFACE WATER SAMPLE LOCATIONS

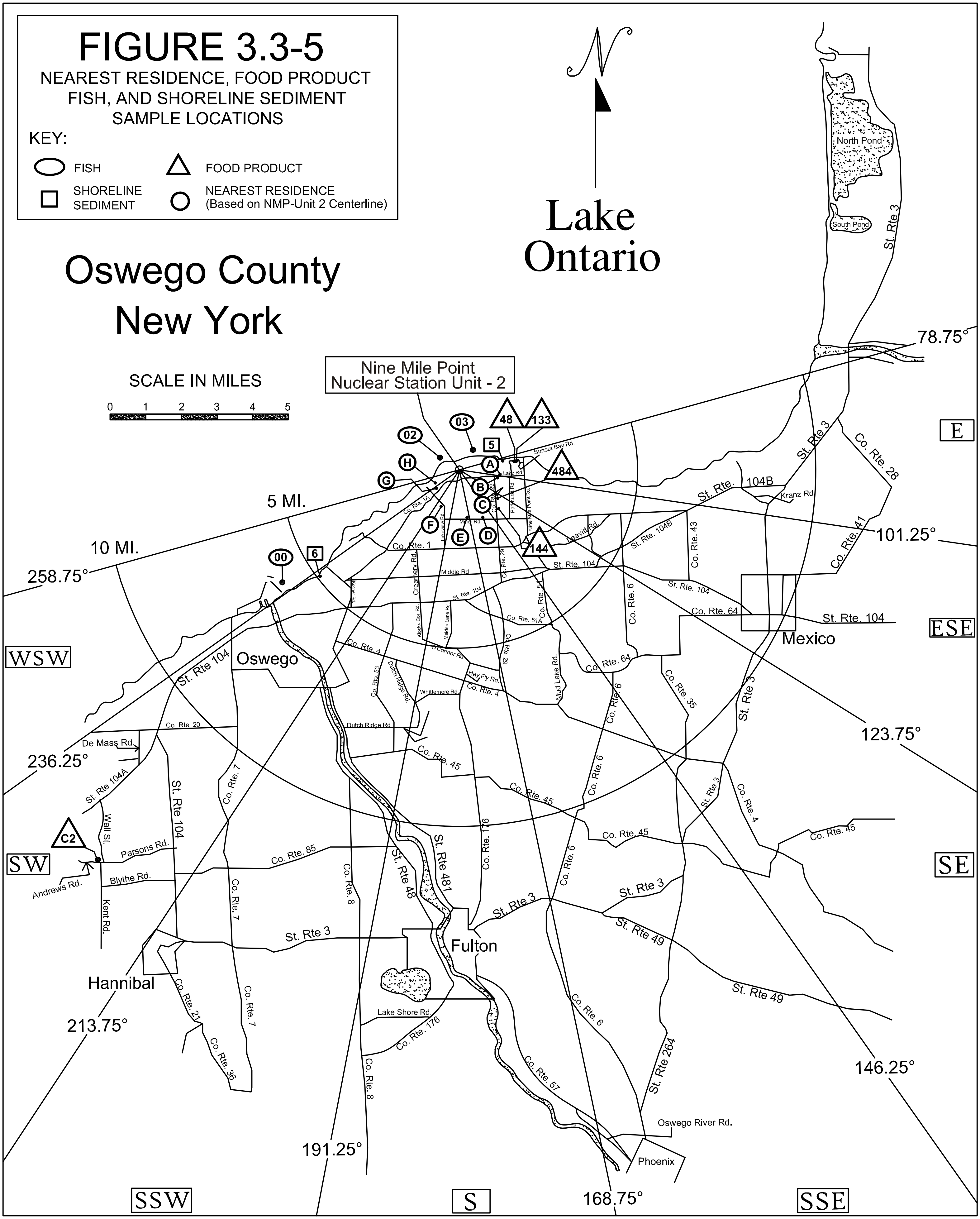
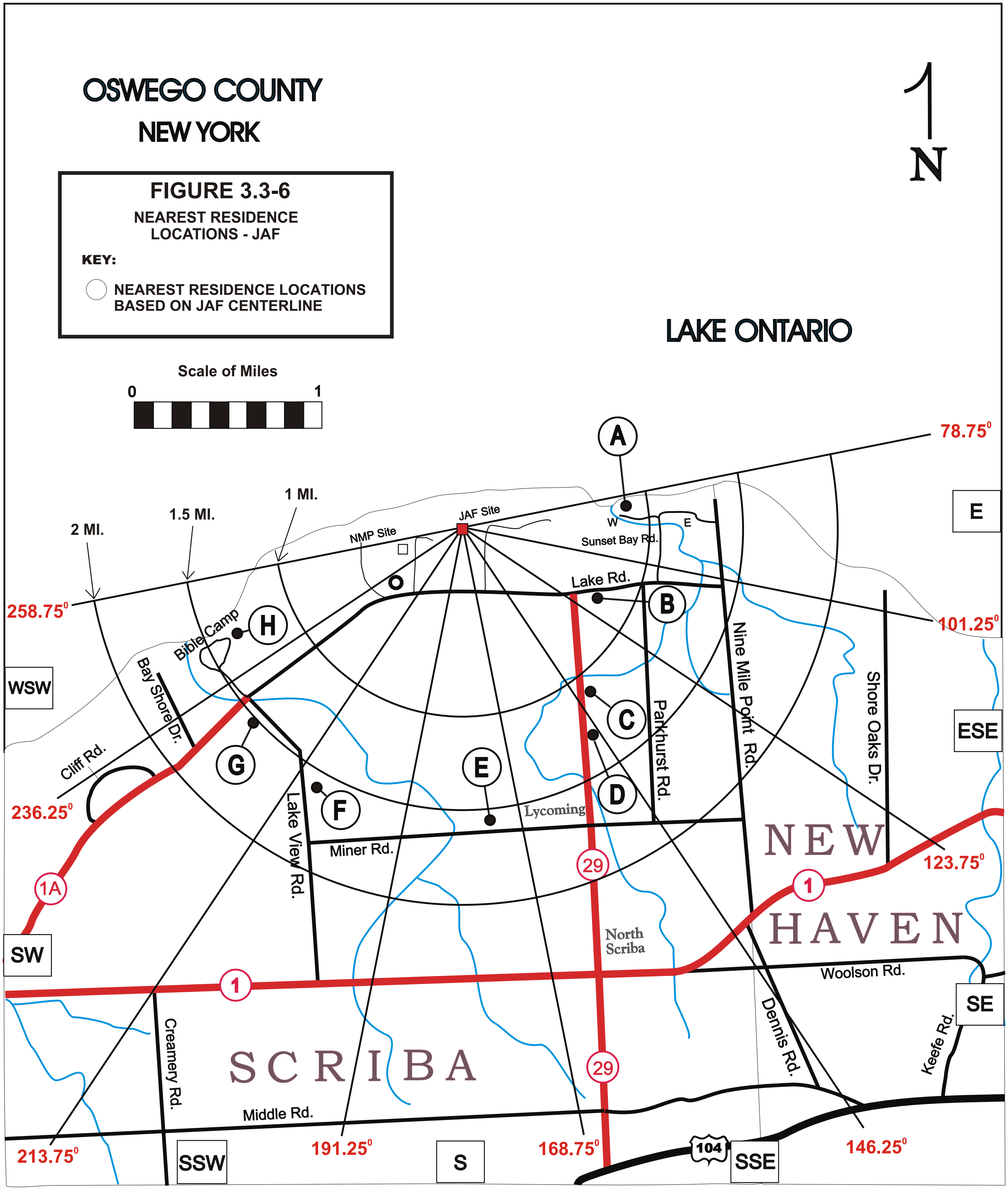


FIGURE 3.3-5
NEAREST RESIDENCE, FOOD PRODUCT FISH, AND SHORELINE SEDIMENT SAMPLE LOCATIONS



OSWEGO COUNTY
NEW YORK
FIGURE 3.3-6
NEAREST RESIDENCE LOCATIONS - JAF
KEY:
NEAREST RESIDENCE LOCATIONS BASED ON JAF CENTERLINE
Scale of Miles
0
1
N
LAKE ONTARIO
A
B
C
D
E
F
G
H
78.75°
101.25°
123.75°
146.25°
168.75°
191.25°
213.75°
236.25°
258.75°
E
ESE
SE
SSE
S
SSW
SW
WSW
2 MI.
1.5 MI.
1 MI.
JAF Site
NMP Site
Sunset Bay Rd.
W
E
Lake Rd.
Bible Camp
Bay Shore Dr.
Cliff Rd.
Lake View Rd.
Miner Rd.
Lycoming
Parkhurst Rd.
Nine Mile Point Rd.
Shore Oaks Dr.
NEW HAVEN
North Scriba
Woolson Rd.
Dennis Rd.
Keefe Rd.
SCRIBA
Creamery Rd.
Middle Rd.
1A
1
29
104

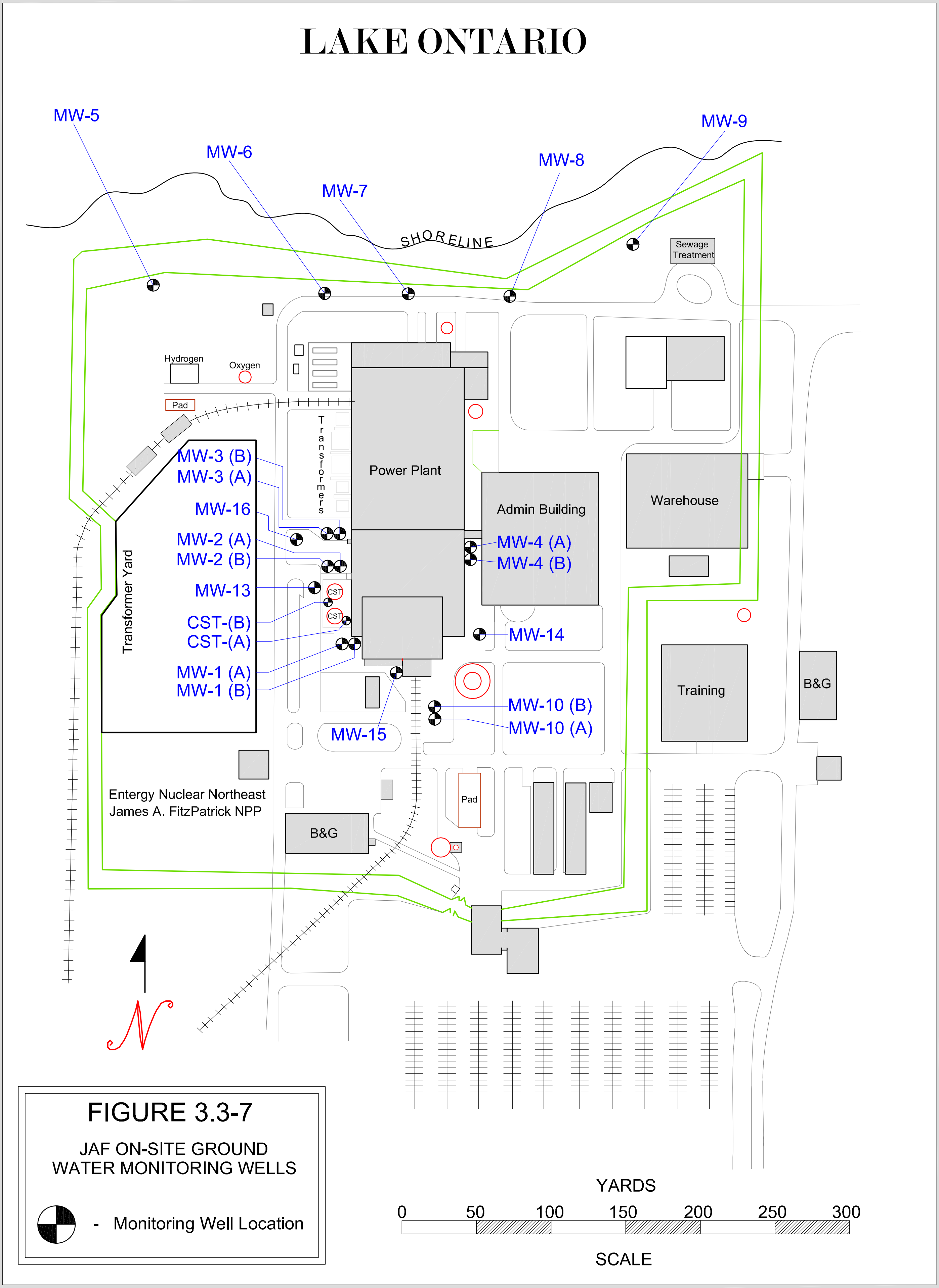


FIGURE 3.3-7

JAF ON-SITE GROUND
WATER MONITORING WELLS

- Monitoring Well Location

3.4 LAND USE CENSUS

The ODCM requires that a milch animal census and a residence census be conducted annually out to a distance of five miles. Milch animals are defined as any animal that is routinely used to provide milk for human consumption.

The milch animal census is an estimation of the number of cows and goats within an approximate ten mile radius of the Nine Mile Point site. The census is done once per year in the summer. It is conducted by sending questionnaires to previous milch animal owners, and by road surveys to locate any possible new owners. In the event that questionnaires are not answered, the owners are contacted by telephone or in person. The Oswego County Cooperative Extension Service was also contacted to provide any additional information.

The residence census is conducted each year to identify the closest residence in each of the 22.5 degree meteorological sectors out to a distance of five miles. A residence, for the purposes of this census, is a residence that is occupied on a part time basis (such as a summer camp), or on a full time, year round basis. Several of the site meteorological sectors are over Lake Ontario, therefore, there are only eight sectors over land where residences are located within five miles.

In addition to the milch animal and residence census, a garden census is performed. The census is conducted each year to identify the gardens near the site that are to be used for the collection of food product samples. The results of the garden census are not provided in this report. The results are used only to identify appropriate sample locations. The garden census is not required by the ODCM if broadleaf vegetation sampling and analysis are performed.

3.5 CHANGES TO THE REMP PROGRAM

There were no changes to the 2011 sampling program.

3.6 DEVIATION AND EXCEPTIONS TO THE PROGRAM

The noted exceptions to the 2011 sample program address only those samples or monitoring requirements which are required by the ODCM, Part I, Table 5.1-1. This section satisfies the reporting requirements of ODCM, Part I, Section 5.1.1.c.1.

3.6.1 ODCM Program Deviations

The following are deviations from the program specified by the ODCM:

1. Loss of power to environmental air sample stations R1 and R2 Offsite for 6.9 hrs each during the week of 2/1/11 to 2/8/11. The stations were found operating during normal weekly sample change outs. Sample volumes for the period are acceptable.

2. Loss of power to environmental air sample stations R3 and R4 Offsite for 4.5 hours each during the sample period 3/8/11 to 3/15/11. The stations were found operating during sample change outs. Sample volumes for the period are acceptable.

3. Loss of power to environmental air sample stations R3 and R4 for 2 hours each during the week of 5/10/11 to 5/17/11. The air sample stations were found operating during normal weekly sample change outs. Sample volumes for the period are acceptable.

4. Loss of power to environmental air sample station R5 for 7.4 hours during the week of 6/7/11 to 6/14/11. The station was found operating during normal weekly change outs. Sample volume for the period was acceptable

5. Loss of power to environmental air sample station R3 Offsite for 6 days during the week of 7/12/11 to 7/19/11. NMP technician found cabinet blower fan inoperable upon arrival. The cabinet blower fan and air sample pump were replaced.

6. Oswego Steam Station (OSS) Inlet Canal Sampler found not working on 7/22/2011. There was no power to the pump. Found that the GFI had been tripped. Building lost power on 7/21/2011 at 0810 hrs. Sampler was out of service for 26 hours.

3.6.2 Air Sampling Station Operability Assessment

The ODCM required air sampling program consists of 5 individual sampling locations. The collective operable time period for the air monitoring stations was 43,622 hours out of a possible 43,800 hours. The air sampling availability factor for the report period was 99.59%.

3.7 STATISTICAL METHODOLOGY

There are a number of statistical calculation methodologies used in evaluating the data from the environmental monitoring program. These methodologies include determination of standard deviation, the mean and associated error for the mean, and the lower limit of detection (LLD).

3.7.1 ESTIMATION OF THE MEAN AND STANDARD DEVIATION

The mean ($\overline{X}$) and standard deviation (s) were used in the reduction of the data generated by the sampling and analysis of the various media in the JAFNPP Radiological Environmental Monitoring Program (REMP). The following equations were utilized to compute the mean ($\overline{X}$) and the standard deviation (s):

1. **Mean**

$$\overline{X} = \frac{\sum_{i=1}^{n} X_i}{N}$$

Where,

$\overline{X}$ = estimate of the mean

i = individual sample

N, n = total number of samples with positive indications

X_i = value for sample i above the lower limit of detection.

2. **Standard Deviation**

$$\mathbf{s} = \left[\frac{\sum_{\mathbf{i}=1}^{\mathbf{n}} (\mathbf{X_i} - \overline{\mathbf{X}})^2}{(\mathbf{N}-1)} \right]^{1/2}$$

Where,

$\overline{X}$ = mean for the values of X

s = standard deviation for the sample population

3.7.2 ESTIMATION OF THE MEAN & THE ESTIMATED ERROR FOR THE MEAN

In accordance with program policy, when the initial count indicates the presence of a plant related radionuclide(s) in a sample, two recounts of the sample may be required. When a radionuclide is positively identified in two or more counts, the analytical result for the radionuclide is reported as the mean of the positive detections and the associated propagated error for that mean. In cases where more than one positive sample result exists, the mean of the sample results and the estimated error for the mean are reported in the Annual Report.

The following equations were utilized to estimate the mean ($\overline{X}$) and the associated propagated error.

1. **Mean**

$$\overline{X} = \frac{\sum_{i=1}^{n} X_i}{N}$$

Where,

$\overline{X}$ = estimate of the mean

i = individual sample

N,n = total number of samples with positive indications

X_i = value for sample i above the lower limit of detection

2. **Error of the Mean (Reference 18)**

$$ERROR\ MEAN = \frac{\left[\sum_{i=1}^{n} (ERROR)^2\right]^{1/2}}{\mathbf{N}}$$

Where,

ERROR MEAN	=	propagated error
i	=	individual sample
ERROR	=	1 sigma* error of the individual analysis
N, n	=	number of samples with positive indications

* Sigma (σ)

Sigma is the Greek letter used to represent the mathematical term Standard Deviation.

Standard Deviation is a measure of dispersion from the arithmetic mean of a set of numbers.

3.7.3 LOWER LIMIT OF DETECTION (LLD)

The LLD is the predetermined concentration or activity level used to establish a detection limit for the analytical procedures.

The LLDs are specified by the ODCM for radionuclides in specific media and are determined by taking into account the overall measurement methods. The equation used to calculate the LLD is:

$$LLD = \frac{4.66\ S_b}{(E)(V)\ (2.22)\ (Y)\ \exp\ (-\lambda \Delta t)}$$

Where:

LLD = the a priori lower limit of detection, as defined above (in picocuries per unit mass or volume)

S_b = the standard deviation of the background counting rate or of the counting rate of a blank sample, as appropriate (in counts per minute)

E = the counting efficiency (in counts per disintegration)

V = the sample size (in units of mass or volume)

2.22 = the number of disintegrations per minute per picocurie

Y = the fractional radiochemical yield (when applicable)

λ = the radioactive decay constant for the particular radionuclide

Δt = the elapsed time between sample collection (or end of the sample collection period) and time of counting

The ODCM LLD formula assumes that:

1. The counting times for the sample and background are equal

2. The count rate of the background is approximately equal to the count rate of the sample

In the ODCM program, LLDs are used to ensure that minimum acceptable detection capabilities are met with specified statistical confidence levels (95% detection probability with 5% probability of a false negative). Table 3.8-1 lists the ODCM program required LLDs for specific media and radionuclides as specified by the NRC. The LLDs actually achieved are routinely lower than those specified by the ODCM.

3.8 COMPLIANCE WITH REQUIRED LOWER LIMITS OF DETECTION (LLD)

ODCM, Part 1, Table 5.1-3 specifies the detection capabilities for environmental sample analysis (see report Table 3.8-1). ODCM, Part 1, Section 6.1 requires that a discussion of all analyses for which the required LLDs specified were not routinely achieved be included in the Annual Radiological Environmental Operating Report. Section 3.8 is provided pursuant to this requirement.

3.8.1 All sample analyses performed in 2011 as required by the ODCM, achieved the Lower Limit of Detection (LLD) as specified by ODCM, Part 1, Table 5.1-3. See report Table 3.8-1 for required LLD values.

TABLE 3.8-1

REQUIRED DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS LOWER LIMIT OF DETECTION (LLD)

Analysis	Water (pCi/l)	Airborne Particulate or Gases (pCi/m^3)	Fish (pCi/kg, wet)	Milk (pCi/l)	Food Products (pCi/kg, wet)	Sediment (pCi/kg, dry)
Gross Beta	4	0.01				
H-3	3000 (a)					
Mn-54	15		130			
Fe-59	30		260			
Co-58, Co-60	15		130			
Zn-65	30		260			
Zr-95, Nb-95	15					
I-131	15 (a)	0.07		1	60	
Cs-134	15	0.05	130	15	60	150
Cs-137	18	0.06	150	18	80	180
Ba/La-140	15			15		

(a) No drinking water pathway exists at the Nine Mile Point site under normal operating conditions due to the direction and distance of the nearest drinking water intake. Therefore, an LLD value of 3,000 pCi/liter is used for H-3 and an LLD value of 15 pCi/liter is used for I-131.

3.9 REGULATORY LIMITS

Two federal agencies, the Nuclear Regulatory Commission and Environmental Protection Agency, have responsibility for regulations promulgated for protecting the public from radiation and radioactivity beyond the site boundary.

3.9.1 The Nuclear Regulatory Commission (NRC):

The NRC, in 10 CFR 20.1301, limits the levels of radiation in unrestricted areas resulting from the possession or use of radioactive materials such that they limit any individual to a dose of:

- less than or equal to 100 mrem per year to the total body

In addition to this dose limit, the NRC has established design objectives for nuclear plant licensees. Conformance to these guidelines ensures that nuclear power reactor effluents are maintained as far below the legal limits as is reasonably achievable.

The NRC; in 10CFR 50, Appendix I, establishes design objectives for the dose to a member of the general public from radioactive material in liquid effluents released to unrestricted areas to be limited to:

- less than or equal to 3 mrem per year to the total body
  or
- less than or equal to 10 mrem per year to any organ

The air dose due to release of Noble gases in gaseous effluents is restricted to:

- less than or equal to 10 mrad per year for gamma radiation or
- less than or equal to 20 mrad per year for beta radiation

The dose to a member of the general public from Iodine-131, tritium, and all particulate radionuclide's with half-lives greater than 8 days in gaseous effluents is limited to:

- less than or equal to 15 mrem per year to any organ

The NRC, in 10CFR72.104(a), establishes criteria for radioactive materials in effluents and direct radiation from an Independent Spent Fuel Storage Installation (ISFSI).

During normal operations and anticipated occurrences, the annual dose equivalent to any real individual who is located beyond the controlled area must not exceed:

- 25 mrem per year to the total body
- 75 mrem per year to the thyroid
  and
- 25 mrem per year to any other organ as a result of :
  1. Planned discharges of radioactive material, radon and its decay products excepted, to the environment
  2. Direct radiation from ISFSI
  3. Any other radiation from fuel cycle operation in the region

3.9.2 Environmental Protection Agency (EPA)

The EPA, in 40CFR190.10, Subpart B, sets forth the environmental standards for the uranium fuel cycle. During normal operation, the annual dose to any member of the public from the entire uranium fuel cycle shall be limited to:

- less than or equal to 25 mrem per year to the total body
- less than or equal to 75 mrem per year to the thyroid
  and
- less than or equal to 25 mrem per year to any other organ

4.0 SAMPLE SUMMARY TABLES IN BRANCH TECHNICAL POSITION FORMAT

All sample data is summarized in table form. The tables are titled "Radiological Environmental Monitoring Program Annual Summary" and use the following format as specified in the NRC Branch Technical Position:

Column

1. Sample Medium

2. Type and Number of Analyses Performed

3. Required Lower Limits of Detection (LLD), see Section 3.8, Table 3.8-1. This wording indicates that inclusive data is based on 4.66 S_b (sigma) of background (See Section 3.7).

4. The mean and range of the positive measured values of the indicator locations.

5. The mean, range, and location of the highest indicator annual mean. Location designations are keyed to Table 3.3-1 in Section 3.3.

6. The mean and range of the positive measured values of the control locations.

7. The number of non-routine reports sent to the Nuclear Regulatory Commission.

NOTE: Only positive measured values are used in statistical calculations.

TABLE 4.0-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY
JAMES A. FITZPATRICK NUCLEAR POWER PLANT DOCKET NO. 50-333
OSWEGO COUNTY, STATE OF NEW YORK, JANUARY – DECEMBER 2011*

MEDIUM (UNITS)	TYPE AND NUMBER OF ANALYSES*	LLD(a)	INDICATOR LOCATIONS: MEAN (f) / RANGE	LOCATION (b) OF HIGHEST ANNUAL MEAN: LOCATION & MEAN (f) / RANGE	CONTROL LOCATION: MEAN (f) / RANGE	NUMBER OF NON-ROUTINE REPORTS
Shoreline Sediment (pCi/kg-dry)	GSA (4):					
	Cs-134	150	<LLD	<LLD	<LLD	0
	Cs-137	180	<LLD	<LLD	<LLD	0
Fish (pCi/kg-wet)	GSA (18): (h)					
	Mn-54	130	<LLD	<LLD	<LLD	0
	Fe-59	260	<LLD	<LLD	<LLD	0
	Co-58	130	<LLD	<LLD	<LLD	0
	Co-60	130	<LLD	<LLD	<LLD	0
	Zn-65	260	<LLD	<LLD	<LLD	0
	Cs-134	130	<LLD	<LLD	<LLD	0
	Cs-137	150	<LLD	<LLD	<LLD	0

TABLE 4.0-1 (continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY
JAMES A. FITZPATRICK NUCLEAR POWER PLANT DOCKET NO. 50-333
OSWEGO COUNTY, STATE OF NEW YORK, JANUARY – DECEMBER 2011*

MEDIUM (UNITS)	TYPE AND NUMBER OF ANALYSES*	LLD(a)	INDICATOR LOCATIONS: MEAN (f) / RANGE	LOCATION (b) OF HIGHEST ANNUAL MEAN: LOCATION & MEAN (f) / RANGE	CONTROL LOCATION: MEAN (f) / RANGE	NUMBER OF NON-ROUTINE REPORTS
Surface Water (pCi/liter)	H-3 (8):					
	H-3	3000(c)	<LLD	<LLD	<LLD	0
	GSA (24):					
	Mn-54	15	<LLD	<LLD	<LLD	0
	Fe-59	30	<LLD	<LLD	<LLD	0
	Co-58	15	<LLD	<LLD	<LLD	0
	Co-60	15	<LLD	<LLD	<LLD	0
	Zn-65	30	<LLD	<LLD	<LLD	0
	Zr-95	15	<LLD	<LLD	<LLD	0
	Nb-95	15	<LLD	<LLD	<LLD	0
	I-131	15(c)	<LLD	<LLD	<LLD	0
	Cs-134	15	<LLD	<LLD	<LLD	0
	Cs-137	18	<LLD	<LLD	<LLD	0
	Ba/La-140	15	<LLD	<LLD	<LLD	0

TABLE 4.0-1 (continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY
JAMES A. FITZPATRICK NUCLEAR POWER PLANT DOCKET NO. 50-333
OSWEGO COUNTY, STATE OF NEW YORK, JANUARY – DECEMBER 2011*

MEDIUM (UNITS)	TYPE AND NUMBER OF ANALYSES*	LLD(a)	INDICATOR LOCATIONS: MEAN (f) / RANGE	LOCATION (b) OF HIGHEST ANNUAL MEAN: LOCATION & MEAN (f) / RANGE	CONTROL LOCATION: MEAN (f) / RANGE	NUMBER OF NON-ROUTINE REPORTS
TLD (mrem per standard month)	Gamma Dose (140)	(d)	4.8 (120/120) (i) 2.9 – 11.6	TLD #85 (g): 10.6 (4/4) 0.2 miles at 292° 9.5 – 11.6	4.0 (20/20) (i) 2.6 – 5.5	0
Air Particulates (pCi/m^3)	Gross Beta (260):	0.01	0.018 (208/208) 0.007 – 0.034	R-1 0.018 (52/52) 1.8 miles at 92° 0.007 – 0.033	0.018 (52/52) 0.008 – 0.034	0
	I-131 (260):	0.07	0.055 (12/208) 0.021 – 0.11	R-1 0.059 (3/52) 1.8 miles at 92° 0.034 – 0.10	0.055 (3/52) 0.034 – 0.093	0
	GSA (20): Cs-134	0.05	<LLD	<LLD	<LLD	0
	Cs-137	0.06	<LLD	<LLD	<LLD	0
Milk (pCi/liter)	GSA (36): (e) (h) Cs-134	15	<LLD	<LLD	<LLD	0
	Cs-137	18	<LLD	<LLD	<LLD	0
	Ba/La-140	15	<LLD	<LLD	<LLD	0
	I-131 (36): I-131	1	<LLD	<LLD	<LLD	0
Food Products (pCi/kg-wet)	GSA (14): (h) I-131	60	<LLD	<LLD	<LLD	0
	Cs-134	60	<LLD	<LLD	<LLD	0
	Cs-137	80	<LLD	<LLD	<LLD	0

TABLE NOTES:

*	=	Data for Table 4.0-1 is based on ODCM required samples only.
(a)	=	LLD values as required by the ODCM. LLD units are specified in the medium column.
(b)	=	Location is distance in miles and direction in compass degrees based on NMP-2 reactor center-line rounded to the nearest 1/10 mile. Units in this column are specified in medium column.
(c)	=	The ODCM specifies an I-131 and tritium LLD value for surface water analysis (non-drinking water) of 15 pCi/liter and 3000 pCi/liter respectively.
(d)	=	The ODCM does not specify a particular LLD value to environmental TLDs.
(e)	=	The ODCM criteria for indicator milk sample locations include locations within 5.0 miles of the site. There are no milk sample locations within 5.0 miles of the site. Therefore, the only sample location required by the ODCM is the control location. There was one optional location for 2011.
(f)	=	Fraction of number of detectable measurements to total number of measurements. Mean and range results are based on detectable measurements only.
(g)	=	This dose is not representative of doses to a member of the public since this area is located near the north shoreline which is in close proximity to the generating facility and is not accessible to members of the public (See Section 5.2.4, TLDs).
(h)	=	Data includes results from optional samples in addition to samples required by the ODCM.
(i)	=	Indicator TLD locations are: #7, 15, 18, 23, 56, 58, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97 and 98. Control TLDs are all TLDs located beyond the influence of the site (TLD #: 8, 14, 49, 111, and 113).

5.0 DATA EVALUATION AND DISCUSSION

Introduction

Each year the results of the annual Radiological Environmental Monitoring Program (REMP) are evaluated considering plant operations at the site, the natural processes in the environment, and the archive of historical environmental radiological data. A number of factors are considered in the course of evaluating and interpreting the annual environmental radiological data. This interpretation can be made using several methods including trend analysis, population dose estimates, risk estimates to the general population based on significance of environmental concentrations, effectiveness of plant effluent controls, and specific research areas. The report not only presents the data collected during the 2011 sample program but also assesses the significance of radionuclides detected in the environment. It is important to note that detection of a radionuclide is not, of itself, an indication of environmental significance. Evaluation of the impact of the radionuclide in terms of potential increased dose to man, in relation to natural background, is necessary to determine the true significance of any detection.

Units of Measure

Some of the units of measure used in this report are explained below.

Radioactivity is the number of atoms in a material that decay per unit of time. Each time an atom decays, radiation is emitted. The *curie* (Ci) is the unit used to describe the activity of a material and indicates the rate at which the atoms are decaying. One curie of activity indicates the decay of 37 billion atoms per second.

Smaller units of the curie are used in this report. Two common units are the *microcurie* (uCi), which is one millionth (0.000001) of a curie, and the *picocurie* (pCi), which is one trillionth (0.000000000001) of a curie. The picocurie (pCi) is the unit of radiation that is routinely used in this report. The mass, or weight, of radioactive material that would result in one curie of activity depends on the disintegration rate or half-life. For example, one gram of radium-226 contains one curie of activity, but it would require about 1.5 million grams of natural uranium to equal one curie. Radium-226 is more radioactive than natural uranium on a weight or mass basis.

Dose/Dose to Man

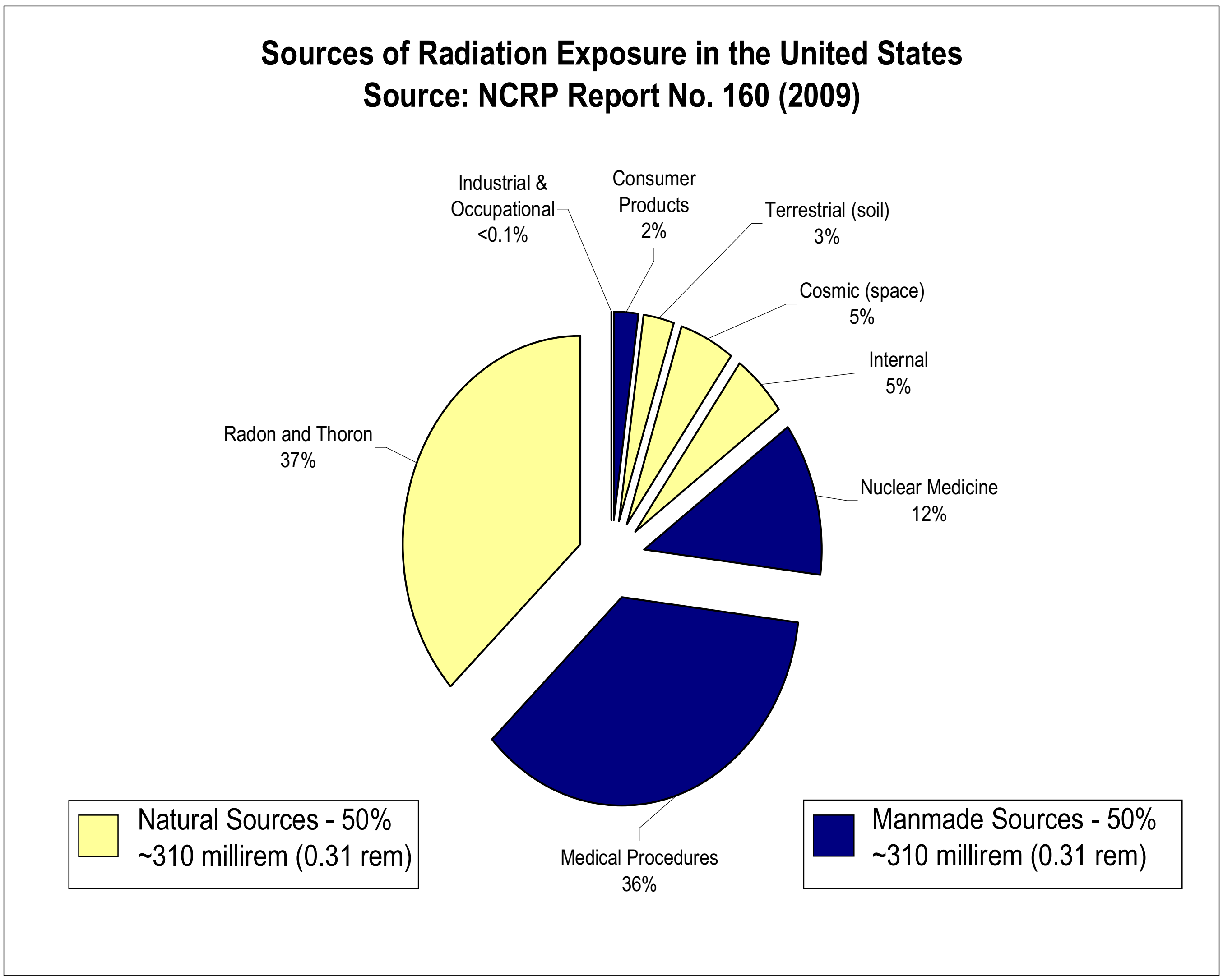
The dose or dose equivalent, simply put, is the amount of ionizing energy deposited or absorbed in living tissue. The amount of energy deposited or ionization caused is dependent on the type of radiation. For example, alpha radiation can cause dense localized ionization that can be up to 20 times the amount of ionization for the same energy imparted as from gamma or x-rays. Therefore, a quality factor must be applied to account for the different ionizing capabilities of various types of radiation. When the quality factor is multiplied by the absorbed dose, the result is the dose equivalent, which is an estimate of the possible biological damage resulting from exposure to any type of ionizing radiation. The dose equivalent is measured in rem (roentgen equivalent man). In terms of environmental radiation, the rem is a large unit. Therefore, a smaller unit, the millirem (mrem) is often used. One millirem (mrem) is equal to 0.001 of a rem.

The term “dose to man” refers to the dose or dose equivalent that is received by members of the general public at or beyond the site boundary. The dose is calculated based on concentrations of radioactive material measured in the environment. The primary pathways that contribute to the dose to man are; the inhalation pathway, the ingestion pathway, and direct radiation.

Discussion

In the United States, a person’s average annual radiation dose is 620 mrem. About half that amount comes from naturally occurring radionuclides. Radon and thoron gases account for two-thirds of this exposure, while cosmic, terrestrial, and internal radiation account for the remainder. The other half comes from manmade sources and is mostly from diagnostic medical procedures.

The pie chart below shows a breakdown of radiation sources that contribute to the average annual U.S. radiation dose of 620 mrem. Nearly three-fourths of this dose is split between radon/thoron gas (naturally occurring) and diagnostic medical procedures (manmade).



There are three separate groups of radionuclides that were measured in the environment and analyzed for the 2011 sampling program.

1. The first of these groups consists of the radionuclides that are naturally occurring. The environment contains a significant inventory of naturally occurring radioactive elements. The components of natural or background radiation include the decay of radioactive elements in the earth's crust, a steady stream of high-energy particles from space called cosmic radiation and naturally-occurring radioactive isotopes in the human body like potassium-40.

   A number of naturally occurring radionuclides are present in the environment. These are expected to be present in many of the environmental samples collected in the vicinity of the Nine Mile Point Site. Some of the radionuclides normally present include:

   - *Tritium*, present as a result of the interaction of cosmic radiation with the upper atmosphere
   - *Beryllium*-7, present as a result of the interaction of cosmic radiation with the upper atmosphere
   - *Potassium*-40 and *Radium*-226, naturally occurring radionuclides found in the human body and throughout the environment

   Beryllium-7 and potassium-40 are especially common in REMP samples. Since they are naturally occurring and are abundant, positive results for these radionuclides are reported in some cases in Section 6.0 of this report. Comparisons of program samples to naturally occurring radiation are made throughout this section to help put program results into perspective and to aid the reader in determining what, if any, significant impact is demonstrated by the REMP results.

2. The second group consists of radionuclides that may be detected in the environment as a result of the detonation of thermonuclear devices in the earth's atmosphere. Atmospheric nuclear testing during the early 1950's produced a measurable inventory of radionuclides presently found in the lower atmosphere, as well as in ecological systems. In 1963, an Atmospheric Test Ban Treaty was signed. Since the treaty, the global inventory of manmade radioactivity in the environment has been greatly reduced through the decay of short lived radionuclides and the removal of radionuclides from the food chain by such natural processes as weathering and sedimentation. This process is referred to in this report as ecological cycling. Since 1963, several atmospheric weapons tests have been conducted by the People's Republic of China and underground weapons testing by India, Pakistan & North Korea. In some cases, the usual radionuclides associated with nuclear detonations were detected for several months following the test, and then after a peak detection period, diminished to a point where most could not be detected. Although reduced in frequency, atmospheric testing continued into the 1980's. The resulting fallout or deposition from these most recent tests has influenced the background radiation in the vicinity of the site and was evident in many of the sample media analyzed over the years. Fallout radionuclides from nuclear weapons testing included Cesium-137 and Strontium-90. The highest weapons testing concentrations were noted in samples collected for the 1981 REMP. Cs-137 was the major byproduct of this testing and is still occasionally detected in a few select number of environmental media.

3. The third group consists of radionuclides that may be detected in the environment are related to nuclear power technology. These radionuclides are the byproduct of the operation of light water reactors. These byproduct radionuclides are the same as those produced in atmospheric weapons testing, found in the Chernobyl and Fukushima Daiichi Nuclear Power Station fallout. During 2011, airborne radioiodine (I-131) was detected in the March and April weekly air samples at the indicator and control air sampling stations. This was attributed to the fallout from the Fukushima accident.

   A number of factors must be considered in performing radiological sample data evaluation and interpretation. The evaluation is made using several approaches including trend analysis and dose to man. An attempt has been made not only to report the data collected during 2011, but also to assess the significance of the radionuclides detected in the environment as compared to naturally occurring and manmade radiation sources. It is important to note that detected concentrations of radionuclides in the local environment as a result of man's technology are very small and are of no or little significance from an environmental or dose to man perspective.

The 2009 per capita average dose was determined to be 620 mrem per year from all sources, as noted in National Council on Radiation Protection and Measurement (NCRP) Report No. 160. This average dose includes such exposure sources as industrial & occupational, consumer products, terrestrial, cosmic, internal, nuclear medicine, medical procedures, radon and thoron. The 2009 per capita dose rate due to naturally occurring sources was 310 mrem per year. The per capita radiation dose from nuclear power production nationwide is less than one mrem per year.

The naturally occurring gamma radiation in the environs of the Nine Mile Point site, resulting from radionuclides in the atmosphere and in the ground, accounts for approximately 50 mrem per year. This dose is a result of radionuclides of cosmic origin (for example, Be-7) and of primordial origin (Ra-226, K-40, and Th-232). A dose of 50 mrem per year, as a background dose, is significantly greater than any possible doses as a result of routine operations at the site during 2011.

The results of each sample medium are discussed in detail in Sections 5.1 and 5.2. This includes a summary of the results, the estimated environmental impact, a detailed review of any relevant findings with a dose to man estimate where appropriate, and an analysis of possible long-term and short-term trends.

During routine implementation of the REMP, additional or optional environmental pathway media are sampled and analyzed. These samples are obtained to:

- Expand the area covered by the program beyond that required by the ODCM
- Provide more comprehensive monitoring than is currently required
- Monitor the secondary dose to man pathways
- Maintain the analytical data base established when the plants began commercial operation

The optional samples that are collected will vary from year to year. In addition to the optional sample media, additional locations are sampled and analyzed for those pathways required by the ODCM. These additional sample locations are obtained to ensure that a variety of environmental pathways are monitored in a comprehensive manner. Data from additional sample locations that are associated with the required ODCM sample media are included in the data presentation and evaluation. When additional locations are included, the use of this data is specifically noted in Sections 5.1 and 5.2.

Section 6.0 contains the analytical results for the sample media addressed in the report. Tables are provided for each required sample medium analyzed during the 2011 program.

Section 7.0, titled Historical Data, contains statistics from previous years' environmental sampling. The process of determining the impact of plant operation on the environment includes the evaluation of past analytical data to determine if trends are changing or developing. As state-of-the-art detection capabilities improve, data comparison is difficult in some cases. For example, Lower Limits of Detections (LLDs) have improved significantly since 1969 due to technological advances in laboratory procedures and analytical equipment.

5.1 AQUATIC PROGRAM

The aquatic program consists of samples collected from three environmental pathways. These pathways are:

- Shoreline Sediment
- Fish
- Surface Waters

Section 6.0, Tables 6-1 through 6-4 present the analytical results for the aquatic samples collected for the 2011 sampling period.

5.1.1 SHORELINE SEDIMENT RESULTS

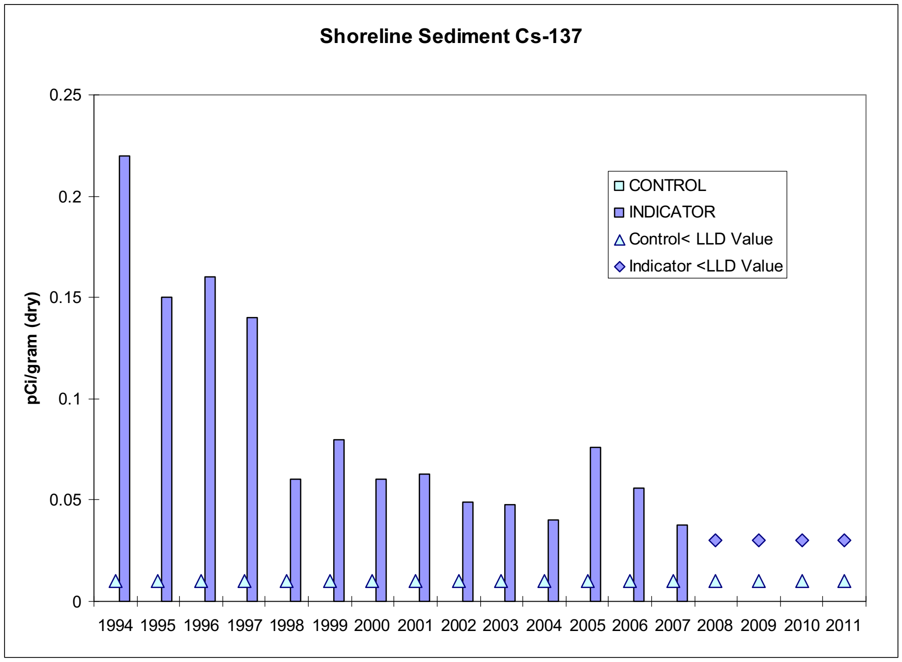
A. Results Summary

Shoreline sediment samples were obtained in April and October of 2011 at one offsite control location (Lang's Beach located near Oswego Harbor) and at one indicator location (Sunset Bay) which is an area east of the site considered to have recreational value.

A total of four sediment samples were collected for the 2011 sample program, two indicator and two control. These results continue to show a downward trend over the last 10 years. Cs-137 was not detected in samples collected from the Sunset Bay indicator location and the Lang's Beach control location during 2011.

The one naturally-occurring radionuclide detected was K-40 and was not related to plant operations. No other plant-related radionuclides were detected in the 2011 shoreline sediment samples.

The following is a graph of the average Cs-137 concentration in shoreline sediment samples over 18 years. This graph illustrates a general downward trend in the Cs-137 concentrations since 1994.



B. Data Evaluation and Discussion

Shoreline sediment samples are routinely collected twice per year from the shoreline of Lake Ontario. Samples are collected from one indicator location (Sunset Bay), and one control location (Lang's Beach). Samples were collected from both the indicator and control locations in April and October 2011. The results of these sample collections are presented in Section 6.0, Table 6-1, "Concentrations of Gamma Emitters in Shoreline Sediment Samples – 2011". Potassium–40 (K-40) was the only significant radionuclide detected in the sediment samples.

C. Dose Evaluation

The calculated potential whole body and skin doses which may result from the measured Cs-137 concentrations in previous years are extremely small and are insignificant when compared to natural background doses.

The radiological impact of Cs-137 measured in the shoreline sediment can be evaluated on the basis of dose to man. In the case of shoreline sediments, the critical pathway is direct radiation to the whole body and skin. Using the parameters provided in Regulatory Guide 1.109, the potential dose to man in mrem per year can be calculated. The following regulatory guide values were used in calculating the dose to man:

- A teenager spends 67 hours per year at the beach area or on the shoreline,
- The sediment has a mass of 40 kg/m2 (dry) to a depth of 2.5 cm,
- The shoreline width factor is 0.3, and
- The maximum 2011 LLD concentration of <0.106 pCi/g (dry).

Using these conservative parameters, the potential dose to the maximum exposed individual (teenager) would be 0.00036 mrem/year to the whole body and 0.00042 mrem/year to the skin. This calculated dose is very small and is insignificant when compared to the natural background annual exposure of approximately 48 mrem as measured by control TLDs in the vicinity of the site.

D. Data Trends

Cs-137 was not detected at the indicator and control sample locations for 2010 as well as 2011.

The previous five years of data show stable mean concentration values measured at the indicator locations. Over the five year period, mean concentrations ranged from a high of 0.06 pCi/g (dry) in 2006 to a low value of 0.04 pCi/g (dry) measured in 2007. Cesium-137 was not detected in the indicator location samples in 2008 to 2010. Cesium-137 was not detected in the control location samples over this same five year period.

The general absence of Cs-137 in the control samples is attributed to the differences in the sediment types between the two sample locations. Few shoreline regions west of the site contain fine sediment and/or sand which would be representative of the indicator location. It is difficult to obtain control samples that are comparable in physical and chemical characteristics to the indicator samples. Other factors, which include changing lake level and shoreline erosion, further complicate attempts at consistency in shoreline sediment sampling. Recent soil samples from locations beyond any expected influence from the site have contained levels of Cs-137 equal to or greater than the concentrations found in the 2011 shoreline sediment samples. The Cs-137 is commonly found in soil samples and is attributed to weapons testing fallout. Shoreline samples containing soil or sediment are likely to contain Cs-137.

The previous ten year data trend for indicator shoreline samples showed an overall downward trend in concentration measured at the indicator sample locations. Over the previous ten year period of 2001 through 2010, mean concentrations at the indicator location ranged from a maximum of 0.08 pCi/g (dry) in 2005 to a minimum of 0.04 pCi/g (dry) measured in 2004 and again in 2007. Cs-137 was not detected at the indicator location for 2008, 2009, 2010, and 2011. This continues to support the long term decreasing trend in Cs-137 concentration in shoreline sediment samples. Cesium-137 was not detected in the control samples collected over the previous ten years.

Shoreline sediment sampling at the indicator location commenced in 1985. Prior to 1985, no data was available for long term trend analysis.

Section 7.0, Tables 7-1 and 7-2 illustrate historical environmental data for shoreline sediment samples.

5.1.2 FISH SAMPLE RESULTS

A. Results Summary

A total of 18 fish samples were collected for the 2011 sample program. Species collected were: brown trout, chinook salmon, lake trout, smallmouth bass, and walleye. The analytical results for the 2011 fish samples showed no detectable concentration of radionuclide that would be attributable to plant operations at the site or past atmospheric weapons testing. Since 2003 no Cs-137 has been measured in fish samples. Over the previous 20 years prior to 2003, Cs-137 has been detected at a combination of both the indicator and/or control locations. (Refer to Tables 7-3 and 7-4). These low levels of Cs-137 represented no significant dose to man or impact on the environment.

The 2011 fish sample results demonstrate that plant operations at the Nine Mile Point Site have no measurable radiological environmental impact on the upper levels of the Lake Ontario food chain. The 2011 results are consistent with previous year's results in that they continue to support the general long-term downward trend in fish Cs-137 concentrations over the last 25 years. Cs-137 was not detected in fish samples collected in 2003 to 2011 from indicator locations. The period of 2000 through 2011 as a group are the lowest results measured since the beginning of the Site Environmental Monitoring Program in 1969.

B. Data Evaluation and Discussion

Fish collections were made utilizing gill nets at one location greater than five miles from the site (Oswego Harbor area) and at two locations in the vicinity of the lake discharges for the NMPNS and the JAFNPP facilities. The Oswego Harbor samples served as control samples while the NMPNS and JAFNPP samples served as indicator samples. All samples were analyzed for gamma emitters. Section 6.0, Table 6-2 shows individual results for all the samples collected in 2011 in units of pCi/g (wet).

The spring fish collection was made up of 9 individual samples representing three separate species. Brown trout, lake trout and walleye were collected.

The total fall fish collection was comprised of 9 individual samples representing three individual species. Brown trout, smallmouth bass, and chinook salmon collected.

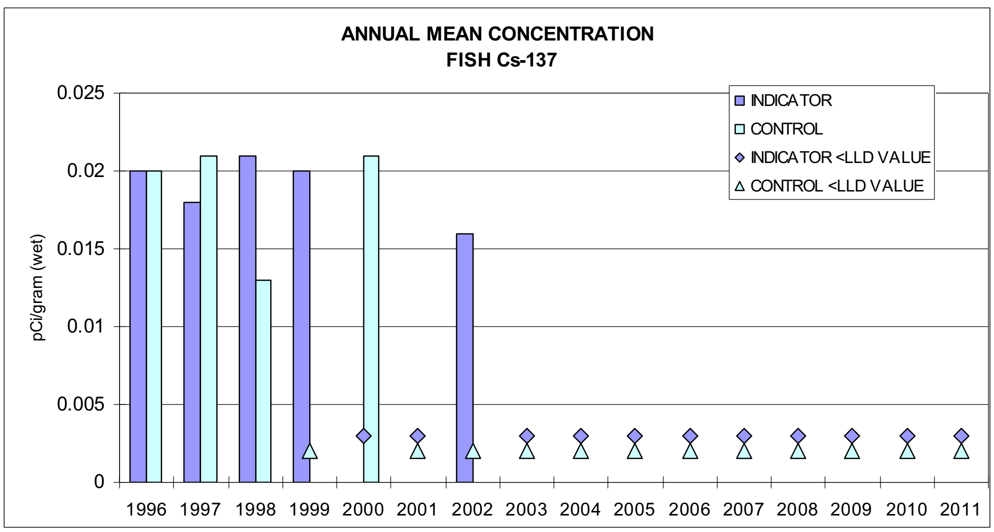
Cs-137 was not detected in any of the fish species collected for the 2011 sample program.

C. Dose Evaluation

Fish represent the highest level in the aquatic food chain and have the potential to be a contributor to the dose to man from the operations at the site. The lack of detectable concentrations of plant-related radionuclides in the 2011 fish samples demonstrates that there is no attributable dose to man from operations at the site through the aquatic pathway. Some Lake Ontario fish species may be considered an important food source due to the local sport fishing industry. Therefore, these fish are an integral part of the human food chain.

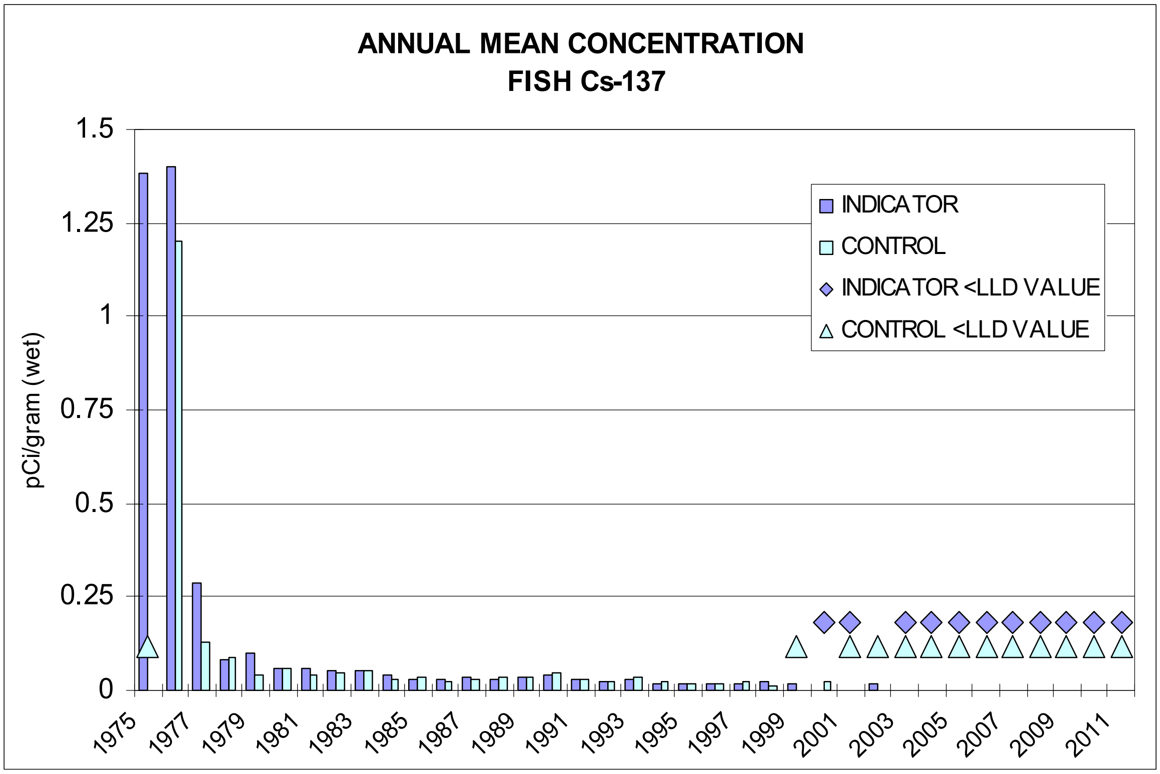
D. Data Trends

The Cs-137 data for fish samples over the previous five years (2006 through 2010) show that the number of positive detections has decreased over this period relative to historical data. There were no positive detections of Cs-137 over the previous five year period at the indicator locations. The graph below illustrates the mean control and indicator Cs-137 concentrations for 2011 and the previous fifteen years.



The data trend shows a consistent level of Cs-137 measured in fish between 1996 and 1998. After 1998, the number of positive detections drops off as noted in the five year trend. The 1995 through 2011 results, as a group, are the lowest Cs-137 concentrations measured over the existence of the sample program.

The general long-term decreasing trend for Cs-137, illustrated in the graph below, is most probably a result of the cesium becoming unavailable to the ecosystem due to ion exchange with soils and sediments and radiological decay. The concentrations of Cs-137 detected in fish since 1976 are considered to be the result of weapons testing fallout. The general downward trend in concentrations will continue as a function of additional ecological cycling and radiological decay.



Section 7.0, Tables 7-3 and 7-4 show historical environmental sample data for fish.

5.1.3 SURFACE WATER (LAKE)

A. Results Summary

The ODCM requires that monthly surface water samples be taken from the respective inlet water supplies of the JAFNPP and NRG Energy's Oswego Steam Station. In conjunction with the required samples, three additional Lake Ontario surface water locations are sampled and analyzed. These additional locations are the Oswego City Water Intake, the NMP1 Intake and the NMP2 Intake. Gamma spectral analysis was performed on 24 monthly composite samples from the ODCM locations and on 36 monthly composite samples collected from the additional sample locations. The results of the gamma spectral analyses showed that only naturally-occurring radionuclides were detected in the 60 samples from the five locations collected for the 2011 Sampling Program. The two naturally-occurring radionuclide detected were K-40 and Ra-226 and were not related to plant operations. Monthly composite samples showed no presence of plant-related gamma emitting isotopes in the waters of Lake Ontario as a result of plant operations.

The monthly surface water samples are composited on a quarterly basis and are analyzed for tritium. A total of 20 samples were analyzed for tritium as part of the 2011 REMP program. The results for the 2011 samples showed no positive detection of tritium.

B. Data Evaluation and Discussion

Gamma spectral analysis was performed on monthly composite samples from five Lake Ontario sampling locations. No plant-related radionuclides were detected in 2011 samples. This is consistent with historical data, which has not shown the presence of plant-related radionuclides in surface water samples.

Tritium samples are quarterly samples that are a composite of the applicable monthly samples for a given location. Tritium samples analyzed for the 2011 sample program were analyzed to an instrument detection level of at least 500 pCi/l.

The tritium results for the JAFNPP inlet canal samples contained no positive detections. The 2011 results had LLD values that ranged from <410 pCi/l to <432 pCi/l. The ODCM Control location (Oswego Steam Station inlet canal) results showed no positive detections and the sample results had LLD values in the range of <412 pCi/l to <432 pCi/l.

Tritium was not detected in any of the twelve optional Lake Ontario samples collected in the 2011 program.

The Oswego City Water inlet is sampled to monitor drinking water quality and is representative of a control location due to its distance from the site. The city water inlet is located 7.8 miles west of the site in an "upstream" direction based on the current patterns in the lake.

The following is a summary of LLD results for the 2011 sample program:

Sample Location	**Tritium Concentration pCi/liter Minimum**	**Maximum**	**Mean (Annual)**
JAF Inlet (Indicator)*	<410	<432	<419
Oswego Steam Inlet (Control)*	<412	<432	<419
NMP #1 Inlet	<417	<432	<419
NMP #2 Inlet	<412	<432	<419
Oswego City Water Supply	<412	<450	<428

* Sample location required by ODCM

The above LLD values are below the ODCM required LLD value of 3000 pCi/l.

Analytical results for surface water samples are found in Section 6.0, Tables 6-3 through 6-4.

C. Dose Evaluation

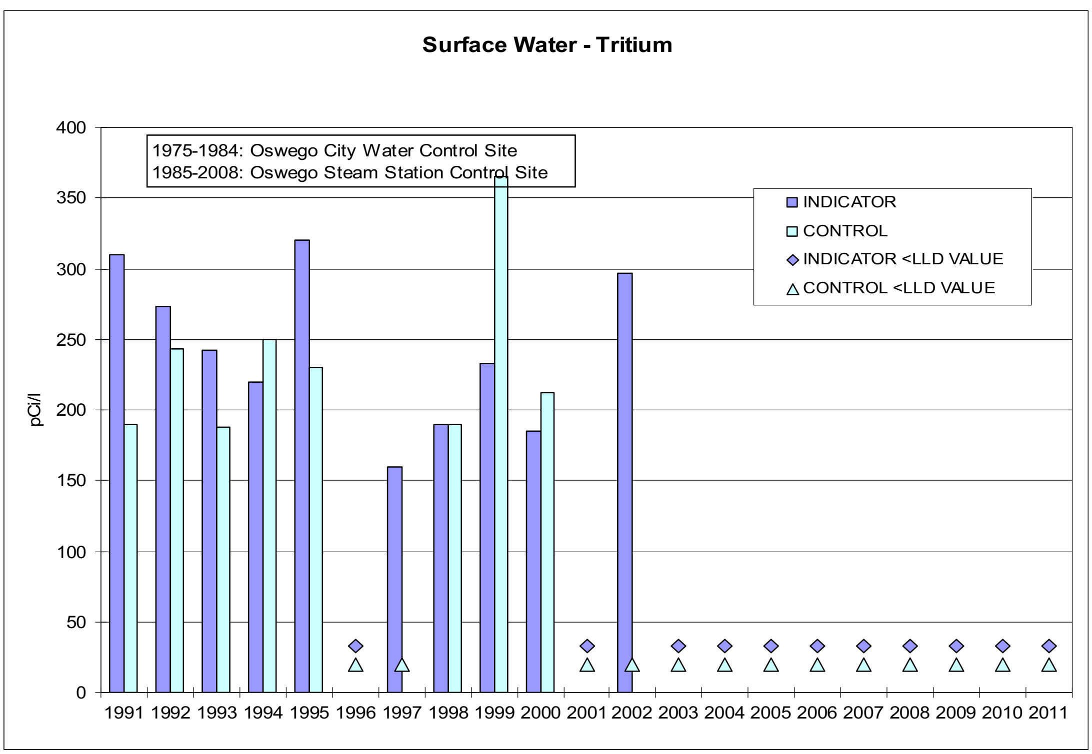
The radiological impact to members of the public from low levels of tritium in water is insignificant. This can be illustrated by calculating a dose to the whole body and maximum organ using the maximum LLD value and Regulatory Guide 1.109 methodology. Based on a water ingestion rate of 510 liters/yr and a maximum LLD concentration of 450 pCi/l, the calculated dose would be less than 0.047 mrem to the child whole body and less than 0.047 mrem to the child liver (critical age group/organ).

D. Data Trends

There are no data trends for gamma emitters such as Cs-137 and Co-60 as historically these radionuclides have not been detected in lake water samples.

Tritium results for the 2011 lake water samples were consistent with results from the previous five years for both the indicator and control locations. The mean 2011 tritium concentrations were <419 pCi/l for the control and <419 pCi/l for the indicator location. For the previous five years, there were no positive detections for the indicator and control locations. This previous five year data set is consistent with long term tritium results measured at the site. The indicator data from the previous ten year period, 2001 through 2010, are representative of natural variations in environmental tritium concentrations with no significant levels of tritium measured. The 1999 mean control value of 365 pCi/l is the highest concentration measured since 1987 and is within the variability of results measured over the life of the program. The ten year historical results are consistent between the control and indicator locations with no large variation in the measured results.

The following graph illustrates the concentrations of tritium measured in Lake Ontario over the previous 20 years at both an indicator and control location. Prior to 1985, the Oswego City Water Supply results were used as control location data as this location closely approximates the Oswego Steam Station, the current control location. There is no existing preoperational data for comparison to recent data.



Historical data for Surface Water Tritium is presented in Section 7.0, Tables 7-7 and 7-8.

5.2 TERRESTRIAL PROGRAM

The terrestrial program consists of samples collected from four environmental pathways. These pathways are:

- Airborne particulate and radioiodine,
- Direct Radiation,
- Milk, and
- Food Products

Section 6.0, Tables 6-5 through 6-12 present the analytical results for the terrestrial samples collected for the 2011 reporting period.

5.2.1 AIR PARTICULATE GROSS BETA

A. Results Summary

Weekly air samples were collected and analyzed for particulate gross beta activity. For the 2011 program, a total of 52 samples were collected from control location R-5 and 208 samples were collected from indicator locations R-1, R-2, R-3, and R-4. These five locations are required by the ODCM. Additional air sampling locations are maintained and are discussed in Section 5.2.1.B below. The mean gross beta concentration for samples collected from the control location (R-5) in 2011 was 0.018 pCi/m^3. The mean gross beta concentration for the samples collected from the indicator locations (R-1, R-2, R-3, and R-4) in 2011 was 0.018 pCi/m^3. The consistency between the indicator and control mean values, demonstrates that there are no increased airborne radioactivity levels in the general vicinity of the site from plant effluents.

B. Data Evaluation and Discussion

The air monitoring system consists of fifteen sample locations, six onsite and nine offsite. Each location is sampled weekly for particulate gross beta activity. A total of 780 samples were collected and analyzed as part of the 2011 program. Five of the nine offsite locations are required by the ODCM. These locations are designated as R-1, R-2, R-3, R-4, and R-5. R-5 is a control location required by the ODCM and is located beyond any local influence from the site. In addition, optional offsite and onsite air sample locations are maintained from which weekly samples are collected. The optional offsite locations are designated as D-2, E, F and G. The optional onsite locations are designated as D-1, G, H, I, J and K.

Gross beta analysis requires that the samples be counted no sooner than 24 hours after collection. This allows for the decay of short half-life naturally-occurring radionuclides, thereby increasing the sensitivity of the analysis for plant-related radionuclides.

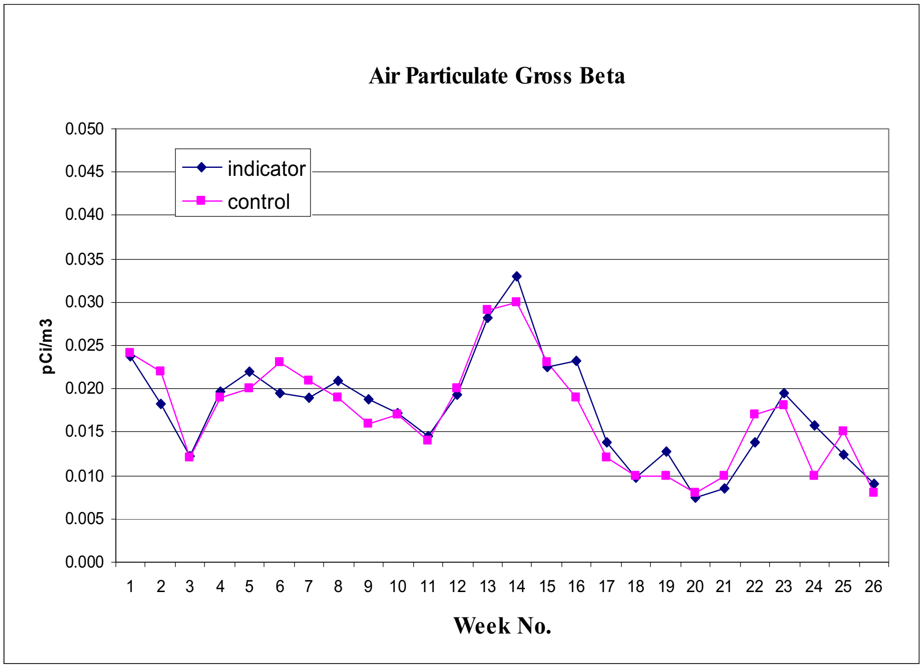
Section 6.0, Tables 6-5 and 6-6 present the weekly gross beta activity results for samples collected from the offsite and onsite locations.

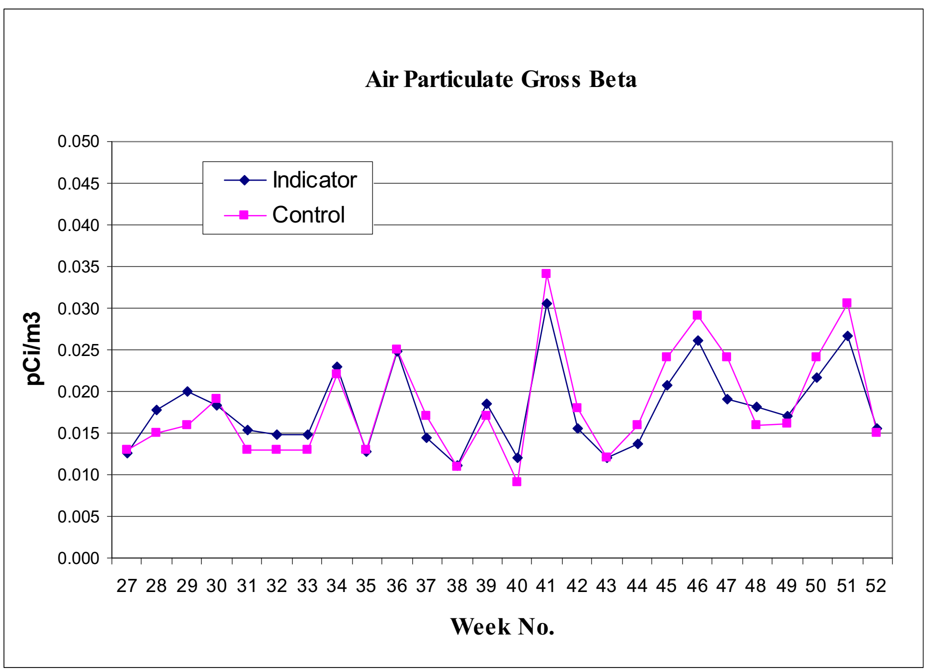
The mean annual gross beta indicator concentrations for the ODCM indicator stations (R-1, R-2, R-3 and R-4) was 0.018 pCi/m3. The offsite ODCM control station (R-5) annual mean gross beta concentration was 0.018 pCi/m3. The minimum, maximum and average gross beta results for sample locations required by the ODCM were as follows:

	Concentration pCi/m^3		
Location	Minimum	Maximum	Mean
R-1	0.007	0.033	0.018
R-2	0.007	0.032	0.017
R-3	0.008	0.034	0.018
R-4	0.008	0.033	0.018
R-5 (control)	0.008	0.034	0.018

R1 – R4 Indicator Stations	Min	0.007
	Max	0.034
	Mean	0.018

The mean weekly gross beta concentrations measured in 2011 are illustrated in the following graphs:





The fluctuations observed in the gross beta activity over the year can be attributed to changes in the environment, especially seasonal changes. The concentrations of naturally-occurring radionuclides in the lower levels of the atmosphere directly above the land are affected by time-related processes such as wind direction, precipitation, snow cover, soil temperature and soil moisture content.

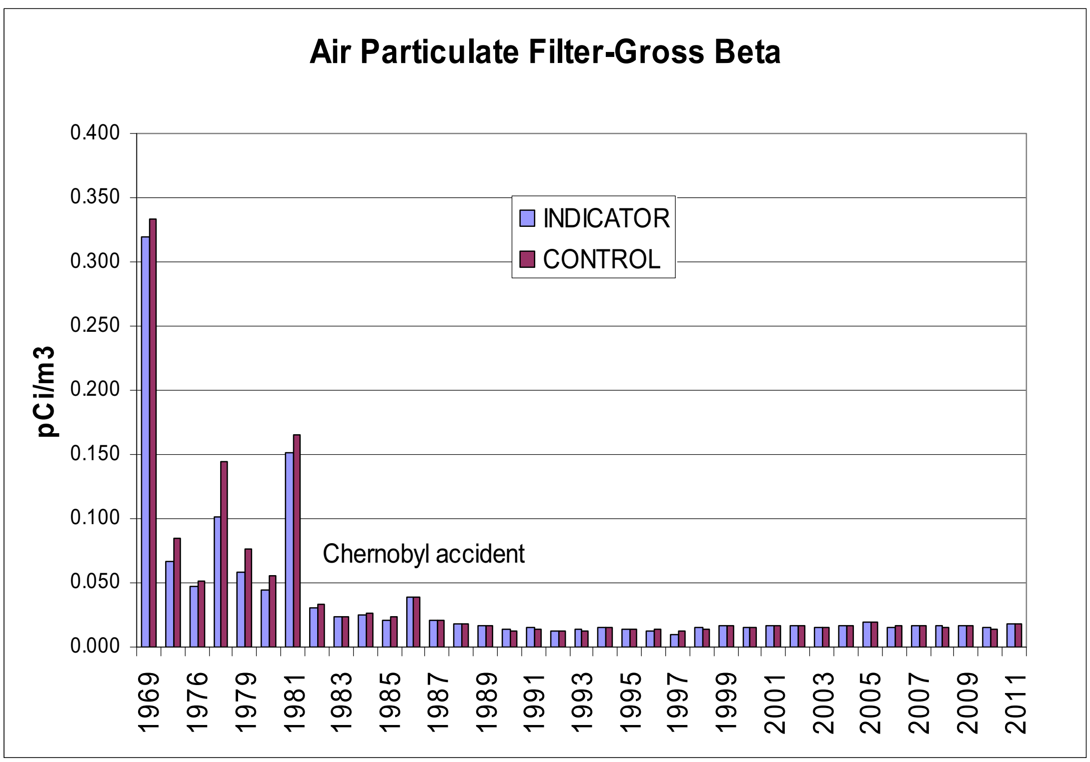
C. Dose Evaluation

Dose calculations are not performed based on gross beta concentrations. Dose to man as a result of radioactivity in air is calculated using the specific radionuclide and the associated dose factor. See Section 5.2.2.C for dose calculations from air concentrations. The dose received by man from air gross beta concentration is a component of the natural background.

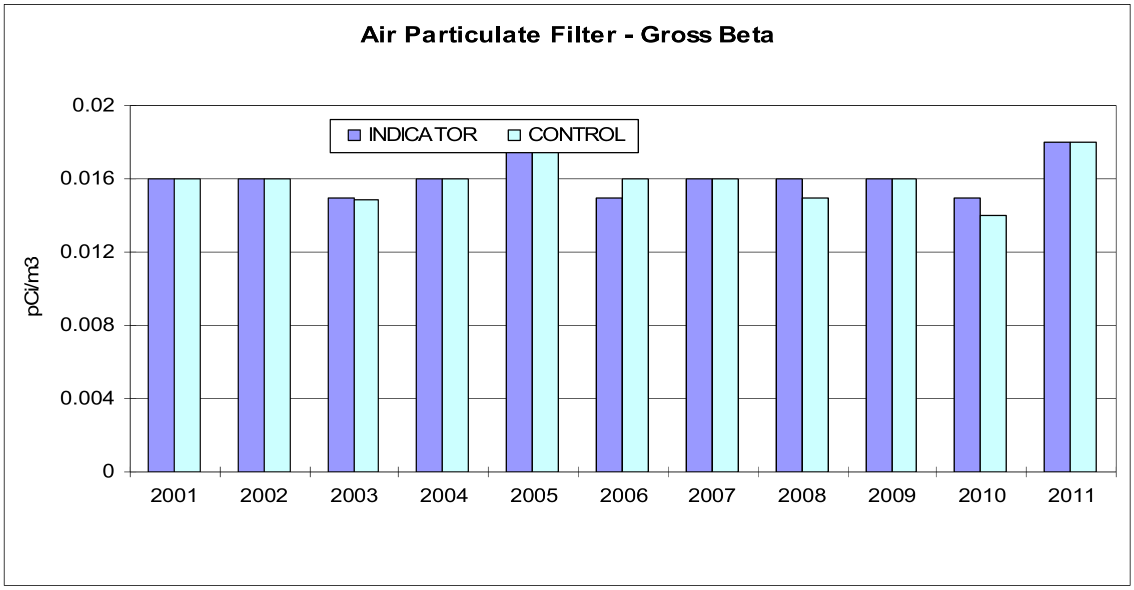
D. Data Trends

With the exception of the 1986 sample data, which was affected by the Chernobyl accident, the general trend in air particulate gross beta activity has been one of decreasing activity since 1981, when the mean control value was 0.165 pCi/m^3. The 1981 samples were affected by fallout from a Chinese atmospheric nuclear test which was carried out in 1980.

The mean gross beta concentration measured in 1969 to 2011 are illustrated in the following graph:



The trend for the previous five years represents a base line concentration or natural background level for gross beta concentrations. This trend is stable with minor fluctuations due to natural variations. The change in concentrations over the period of 2001 through 2011 is very small. This is illustrated by the following graph.



The mean annual gross beta concentration at the control station (R-5) has remained steady with a narrow range of 0.014 pCi/m^3 to 0.019 pCi/m^3. The mean annual concentrations for the indicator stations for this same time period were similar to the control and ranged from a minimum of 0.015 pCi/m^3 to a maximum mean of 0.019 pCi/m^3 in 2005.

Historical data of air particulate gross beta activity are presented in Section 7.0, Tables 7-9 and 7-10.

5.2.2 QUARTERLY PARTICULATE COMPOSITES (GAMMA EMITTERS)

A. Results Summary

Fifteen air monitoring stations are maintained around the Nine Mile Point Site. Five of the 15 air monitoring stations are required by the ODCM and are located offsite near the site boundary and offsite as a control location. Ten additional air sampling stations are also maintained as part of the sampling program. Together, these fifteen continuous air sampling stations make up a comprehensive environmental monitoring network for measuring radioactive air particulate concentrations in the environs of the site. Annually, the air monitoring stations provide 780 individual air particulate samples which are assembled by location into 60 quarterly composite samples. The quarterly composites are analyzed using gamma spectroscopy.

No plant-related gamma emitting radionuclides were detected in any of the air particulate filter samples collected during 2011.

The gamma analysis results for the quarterly composite samples routinely showed positive detections of Be-7, K-40, and Ra-226. Each of these radionuclides is naturally occurring.

B. Data Evaluation Discussion

A total of fifteen air sampling stations are in continuous operation and located both onsite and in the offsite sectors surrounding the Nine Mile Point Site. Five of the fifteen monitoring stations are required by the ODCM and the remaining ten are optional to provide an effective monitoring network. Composite air filter samples are assembled for each of the fifteen sampling locations. Each of the weekly air particulate filters collected for the quarter is assembled by location to form quarterly composite samples. The quarterly composite samples required by the ODCM are composite samples assembled for R-1, R-2, R-3, R-4 and R-5. Other sample locations not required by the ODCM, for which analytical results have been provided, include six onsite locations and four offsite locations. The analytical results for the 60 air particulate filter composites in 2011 showed no detectable activity of plant related radionuclides.

The results of the quarterly composite samples are presented in Section 6.0, Table 6-9.

C. Dose Evaluation

The calculated dose as a result of plant effluents is not evaluated due to the fact that no plant related radionuclides were detected in 2011. The monthly air particulate sampling program demonstrated no offsite dose to man from this pathway as a result of operations of the plants located at the Nine Mile Point Site (NMP).

D. Data Trends

No plant related radionuclides were detected during 2011 at the offsite air monitoring locations.

The ten year database of air particulate composite analysis shows that there is no buildup or routine presence of plant related radionuclides in particulate form in the atmosphere around the site. Historically Co-60 was detected in each of the years from 1977 through 1984 at both the indicator and control locations, with the exception of 1980 when Co-60 was not detected at the control location. The presence of Co-60 in the air samples collected during these years was the result of atmospheric weapons testing. Co-60 was again detected in an offsite 2000 indicator sample and was the only positive detection of Co-60 since 1984. The detection of Co-60 in the one 2000 sample was an isolated event associated with effluents from the NMP1 facility. There have been no subsequent measurable concentrations of Co-60 in the environment surrounding the NMP site.

Historical data shows that Cs-137 is the fission product radionuclide most frequently detected in the air particulate filter composites. Cs-137 was detected in each of the years from 1977 through 1983 at both the control and indicator sampling locations. The presence of Cs-137 in the air samples collected during these years was the result of atmospheric weapons testing. Cs-137 was again detected in 1986 as a result of the Chernobyl accident. Since 1986 there have been no detections of Cs-137 in the environment surrounding the NMP site.

After 1986, no plant related or fallout radionuclides were detected in any of the offsite air particulate composite samples with the exception of the isolated detection of Co-60 in 2000 in a single sample. A review of the past five year's data for air particulate filter composites indicates no plant related radiological impact on the environment. All previous historical positive detections of fission product radionuclides were associated with atmospheric weapons testing or the Chernobyl accident, with the exception of the 2000 detection noted above.

Historical data for air particulate results are presented in Section 7.0, Tables 7-11 and 7-12.

5.2.3 AIRBORNE RADIOIODINE (I-131)

A. Results Summary

From 1988 through 2010, no radioiodine (I-131) has been measured offsite at any of the monitoring stations.

During the 2011 air sampling program, airborne radioiodine was detected in 15 of the 260 weekly samples collected at the five sampling stations required by the Offsite Dose Calculation Manual (ODCM). I-131 was detected at both the indicator and control stations during the weeks of March 29, April 5, and April 12. The measurable concentrations of I-131 are attributed to fallout from the Fukushima Daiichi event that occurred on March 11, 2011 and not operations at the site. Observed detectable concentrations of I-131 ranged from 0.021 to 0.11 pCi/m^3 for the indicator stations, and 0.034 to 0.093 pCi/m^3 for the control station.

I-131 was also detected in 30 of the 515 weekly samples collected from the ten optional sampling stations. The positive detections of I-131 were observed during the same weeks of March and April as noted above for the ODCM required stations. These measurable concentrations of I-131 are also attributed to fallout from the Fukushima Daiichi event. Observed detectable concentrations of I-131 ranged from 0.025 to 0.111 pCi/m^3 for the ten optional onsite and offsite stations.

B. Data Evaluation and Discussion

Airborne radioiodine (I-131) is monitored at the fifteen air sampling stations also used to collect air particulate samples. There are nine offsite locations, five of which are required by the ODCM. The offsite locations required by the ODCM are designated as R-1, R-2, R-3, R-4 and R-5. R-5 is a control station located beyond any local influence from the plant. Ten air sampling locations are also maintained in addition to those required by the ODCM. Six of these stations D-1, G, H, I, J and K are located onsite. D-2, E, F and G are the optional stations located offsite. Samples are collected using activated charcoal cartridges. They are analyzed weekly for I-131.

The analytical data for radioiodine are presented in Section 6.0, Tables 6-7 and 6-8.

C. Dose Evaluation

The I-131 sampling program demonstrated no offsite dose to man from this pathway as a result of operation of the plants located at Nine Mile Point.

The impact of I-131 concentrations as a result of the Fukushima Daiichi fallout can be assessed by projecting a maximum organ dose (thyroid) and whole body dose to the critical individual. The critical individual, in this case, would be a child. Using standard Regulatory Guide 1.109 methodology and an inhalation rate of 3700 m^3 per year, the thyroid and whole body doses were calculated.

The calculated doses due to the average I-131 concentration from the indicator stations (0.055 pCi/m^3) were 0.05 mrem/yr to the thyroid and 8.6E-05 mrem/yr to the whole body of the above mentioned critical individual. The calculated doses due to the average I-131 concentration from the control station (0.055 pCi/m^3) were 0.05 mrem/yr to the thyroid and 8.6E-05 mrem/yr to the whole body. The calculated doses from the indicator stations and control station were identical.

The calculated dose is very small when compared to the natural background annual exposure of approximately 50 mrem as measured by control TLDs in the vicinity of the site.

D. Data Trends

In 2011, I-131 was detected at all 15 sampling locations over a three week period. The positive detections were the result of the Fukushima event.

Prior to then, there has been no positive detection of I-131 in air samples collected over the last five years (2006 - 2010) and also over the last ten years (2001 – 2010). This demonstrates that there is no measurable environmental impact or positive trend for iodine buildup due to plant operations during the period from 1998 through 2011. I-131 has previously been detected in samples collected in 1986 and 1987. The 1986 detection of I-131 was the result of the Chernobyl accident and the 1987 detection was the result of plant operations.

I-131 has been detected in the past at control locations. Control samples collected during 1976 had a mean I-131 concentration of 0.60 pCi/m^3. During 1977 this mean decreased to 0.32 pCi/m^3, and further decreased by a factor of ten to 0.03 pCi/m^3 in 1978. I-131 was not detected in samples collected from the control location during 1979 – 1981 and 1983 to 1985. I-131 was detected once at the control location during 1982 at a concentration of 0.039 pCi/m^3.

Iodine-131 has been detected in samples collected from the onsite indicator locations during 1980 to 1983 and 1986 to 1987. The mean concentrations ranged from 0.013 pCi/m^3 in 1980 to a maximum of 0.119 pCi/m^3 in 1986. The maximum mean indicator I-131 concentration of 0.119 pCi/m^3 was the result of the Chernobyl accident. I-131 was detected in a total of 75 weekly samples collected during the 1986 sample program. The 1986 measured concentrations ranged from a minimum of 0.023 pCi/m^3 to a maximum of 0.36 pCi/m^3. Each positive detection of I-131 in samples collected in 1986 was the direct result of the Chernobyl Nuclear accident.

Historical data for I-131 are presented in Section 7.0, Tables 7-13 and 7-14.

5.2.4 DIRECT RADIATION THERMOLUMINESCENT DOSIMETERS (TLD)

A. Results Summary

Thermoluminescent dosimeters (TLDs) are used to measure direct radiation (gamma dose) in the environment. As part of the 2011 environmental monitoring program, TLDs were placed at a total of 72 different environmental TLD locations (32 required by the ODCM and 40 optional locations). These TLDs were placed, collected and read each quarter of 2011. As a result of placing two TLDs at each location, the results presented in this report are the average of two TLD readings obtained for a given location.

The TLDs were placed in the following five geographical locations around the site boundary:

- Onsite (areas within the site boundary, includes TLD #s 3, 4, 5, 6, 7, 23, 24, 25, 26; TLD #s 18, 27, 28, 29, 30, 31, 39, 47, 103, 106, 107 are excluded)
- Site Boundary (area of the site boundary in each of the 16 meteorological sectors: Only includes TLD results that are not affected by radwaste building direct shine, includes TLD #s 7, 18, 78, 79, 80, 81, 82, 83, 84; TLD #s: 23, 75, 76, 77, 85, 86, 87 are excluded)
- Offsite Sector (area four to five miles from the site in each of the eight land based meteorological sectors, includes TLD #s: 88, 89, 90, 91, 92, 93, 94, 95)
- Special Interest (areas of high population density, includes TLD #s 15, 56, 58, 96, 97)
- Control (areas beyond significant influence of the site, includes TLD #s 8, 14, 49)

All geographical locations are required by the ODCM with the exception of the Onsite area which was optional. Description of the five geograpical categories and the designation of specific TLD locations that make up each category is presented in Section 3.1.5, TLD (Direct Radiation) of this report.

A summary of the 2011 dose rates for each of the five geographical locations is as follows:

Geographic Category	Dose in mrem per standard month		
	Min	Max	Mean
Onsite (Optional)	3.1	13.0	5.1
Site Boundary (Inner Ring) *	3.1	5.3	4.1
Offsite Sectors (Outer Ring) *	3.0	5.3	4.0
Special Interest *	2.9	4.9	3.9
Control *	2.6	5.5	4.1

* Geographical locations required by the ODCM

Comparison of annual mean dose rates associated with each geographical location indicate that there is no statistical difference in annual dose as a function of distance from the site boundary. The measured annual dose rate at the nearest resident to the site was consistent with the dose rates measured at the site boundary and control locations. The results for the Site Boundary, Offsite Sectors and Special Interest (Offsite) were well within expected normal variation when compared to the Control TLD results.

The results for the 2011 environmental TLD monitoring program indicate that there was no significant increase in dose rates as a result of operations at the site. The Hydrogen Water Chemistry system and the Independent Spent Fuel Storage Installation (ISFSI) in use at the Fitzpatrick plant did not measurably increase the ambient radiation exposure rate beyond the site boundary.

B. Data Evaluation and Discussion

Direct Radiation (Gamma Dose) measurements were taken at 72 different environmental locations during 2011, 32 of which are required by the ODCM. These locations are grouped into five geographical location categories for evaluation of results. The five categories include: Onsite, Site Boundary, Offsite Sector, Special Interest and Control locations. All categories are required by the ODCM with the exception of the Onsite TLDs. Onsite TLDs are placed at various locations within the site boundary to provide additional information on direct radiation levels at and around the NMP1, NMP2 and JAFNPP facilities.

Onsite TLD results ranged from 3.1 to 13.0 mrem per standard month resulting in an average dose rate of 5.1 mrem per standard month in 2011.

Site Boundary TLD results ranged from 3.1 to 11.6 mrem per standard month in 2011. This range included all TLDs placed in each of the 16 meteorological sectors in the general area of the site boundary. The highest dose rate measured at a location required by the ODCM was 11.6 mrem per standard month. This TLD, (TLD 85) represents the site boundary maximum dose and is located in the WNW sector along the lake shore in close proximity to the NMP 2 plant. The TLD locations along the lakeshore close to the plants (TLD #s 23, 75, 76, 77, 85, 86 and 87) are influenced by radwaste buildings and radwaste shipping activities. These locations and are not accessible to members of the public and the TLD results for these areas are not representative of dose rates measured at the remaining site boundary locations. The remaining Site Boundary TLD locations, which are located away from the plant ranged from 3.1 to 5.3 mrem per standard month resulting in an average dose rate of 4.1 mrem per standard month.

Offsite Sector TLDs, required by the ODCM, located 4 to 5 miles from the site in each of the 8 land based meteorological sectors ranged from 3.0 to 5.3 mrem per standard month with an average dose rate of 4.0 mrem per standard month.

Special Interest TLDs from all locations ranged from 2.9 to 4.9 mrem per standard month with a 2011 annual average dose rate of 3.9 mrem per standard month.

The Control TLD group required by the ODCM utilizes locations positioned well beyond the site. 2011 Control TLD results ranged from 2.6 to 5.5 mrem per standard month with an annual average dose rate of 4.1 mrem per standard month. These results include both the ODCM required control TLDs and the additional control TLDs.

TLD analysis results are presented in Section 6.0, Table 6-10.

C. Dose Evaluation

2011 annual mean dose rates for each geographic location required by the ODCM (excluding TLD #s 23, 75, 76, 77, 85, 86, 87) are as follows:

Site Boundary: 4.1 mrem per standard month (TLD #s: 7,18, 78, 79, 80, 81, 82, 83, 84)

Offsite Sectors: 4.0 mrem per standard month (TLD #s: 88, 89, 90, 91, 92, 93, 94, 95)

Special Interest: 3.9 mrem per standard month (TLD #s: 15, 56, 58, 96, 97)

Control: 4.1 mrem per standard month (TLD #s 8, 14, 49)

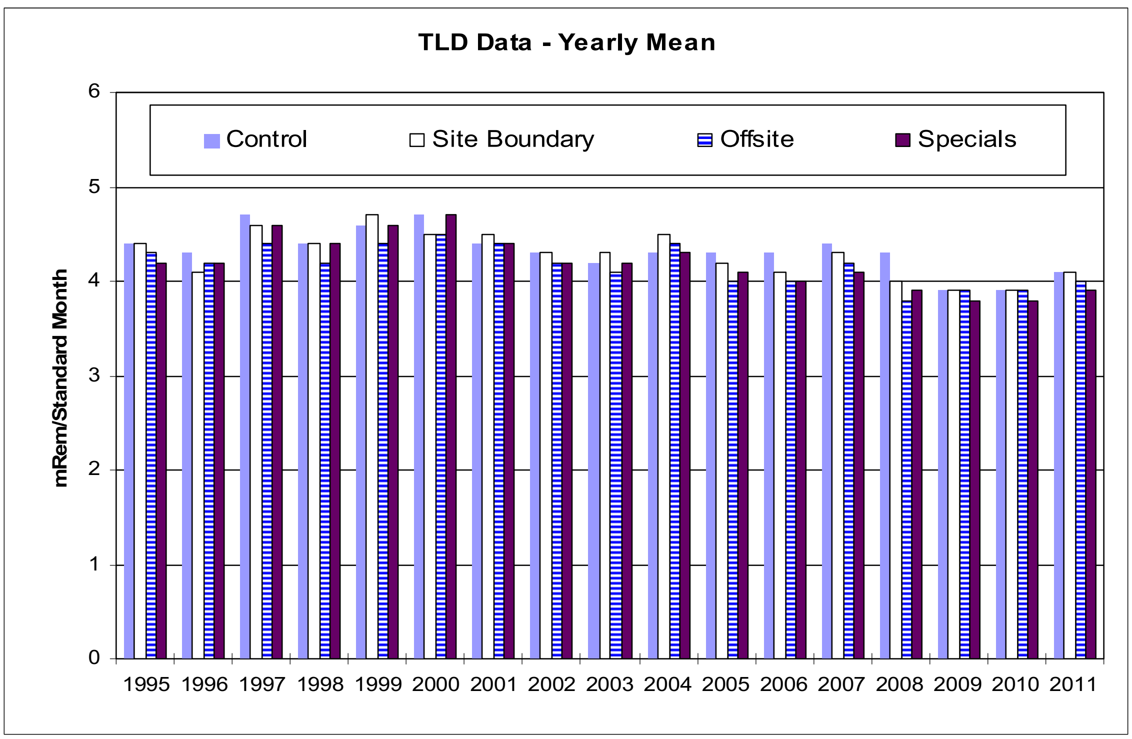
The measured mean dose rate in the proximity of the closest resident was 4.2 mrem per standard month (TLD #s: 108, 109) which is consistent with the control measurements of 4.1 mrem per standard month.

The mean annual dose for each of the geographic location categories demonstrates that there is no statistical difference in the annual dose as a function of distance from the site. The TLD program verifies that operations at the site do not measurably contribute to the levels of direct radiation present in the offsite environment.

D. Data Trends

A comparison of historical TLD results can be made using the different geographical categories of measurement locations. These include Site Boundary TLDs located in each of the 16 meteorological sectors, TLDs located offsite in each land based sector at a distance of 4 to 5 miles from the site, TLDs located at special interest areas and TLDs located at control locations. Site Boundary, Offsite Sector and Special Interest TLD locations became effective in 1985; therefore, trends for these results can only be evaluated from 1985 to the present.

The following graph illustrates TLD results for the Control, Site Boundary, Offsite Sectors and Special Interest groups from 1995 through 2011:



TLDs located at the site boundary averaged 4.1 mrem per standard month during 2011 (Site Boundary average results do not include TLDs influenced by radwaste buildings and radwaste shipping activities: TLDs 23, 75, 76, 77, 85, 86, 87). This result is consistent with the previous five year average of 4.1 mrem per standard month.
Offsite Sector TLDs averaged 4.0 mrem per standard month during 2011. This result is also consistent with the previous five year average of 4.0 mrem per standard month for offsite sectors.

Special Interest TLD locations averaged 3.9 mrem per standard month during 2011 which is consistent with the previous five year average of 4.1 mrem per standard month.

The last group of TLD locations required by the ODCM is the Control Group. This group utilized TLD locations positioned well beyond the site. 2011 control results from all Control TLDs averaged 4.1 mrem per standard month, consistent with the previous five year average of 4.1 mrem per standard month. The 2011 TLD program results, when compared to the previous ten years, showed no significant trends relative to increased dose rates in the environment.

5.2.5 MILK

A. Results Summary

A total of 36 milk samples were collected during the 2011 program and analyzed for gamma emitting radionuclides using gamma spectroscopy. In addition, each sample undergoes an iodine extraction procedure to determine the presence of Iodine-131 (I-131).

I–131, a possible plant related radionuclide, is measured to evaluate the cow/milk dose pathway to man. I-131 was not detected in any of the 36 milk samples collected in 2011 from the two milk sample locations.

Gamma spectral analyses of the milk samples showed only naturally occurring radionuclides, such as K-40, were detected in milk samples collected during 2011. K-40 was detected in all indicator and control samples. K-40 is a naturally occurring radionuclide and is found in many environmental sample media.

The 2011 results demonstrate that routine operations of the Nine Mile Point Site resulted in no measurable contribution to the dose to the public from the cow/milk pathway.

B. Sampling Overview

Milk samples were collected from one indicator location and one control location. The ODCM requires that three sample locations be within five miles of the site. Based on the milk animal census, there were no adequate milk sample locations within five miles of the site in 2011. Samples were collected from two farms located beyond the five-mile requirement to ensure the continued monitoring of this important pathway. The indicator location was located 8.8 miles from the site. The control samples were collected from a farm located 16.0 miles from the site and in a low frequency wind sector (upwind). The geographic location of each sample location is listed below:

Location No.	Direction From Site	Distance (Miles)
55	E	8.8
77 (Control)	SSW	16.0

Indicator location #55 and Control location #77 were sampled from April through December. Sampling occurs during the first and second half of each month. Samples were not required to be collected during January through March of 2011 as a result of I-131 not having been detected in samples collected during November and December of 2010, as stipulated in the ODCM.

C. Data Evaluation and Discussion

Each milk sample is analyzed for gamma emitters using gamma spectral analysis. The I-131 analysis is performed using resin extraction followed by spectral analysis for each sample. I-131 and gamma analysis results for milk samples collected during 2011 are provided in Section 6.0, Table 6-11.

Iodine-131 was not detected in any indicator or control milk samples analyzed during 2011. All I-131 milk results were reported as Lower Limits of Detection (LLD). No plant-related radionuclides were detected in any milk sample collected in 2011. K-40 was the most abundant radionuclide detected, and found in every indicator and control sample collected. K-40 is a naturally-occurring radionuclide and is found in many of the environmental media samples. Cs-137 was not detected in any indicator or control milk sample collected in 2011.

D. Dose Evaluation

The calculated dose as a result of plant effluents is not evaluated due to the fact that no plant related radionuclides were detected.

The dose to man from naturally occurring concentrations of K-40 in milk and other environmental media can be calculated. This calculation illustrates that the dose received due to exposure from plant effluents is negligible compared to the dose received from naturally occurring radionuclides. Significant levels of K-40 have been measured in environmental samples. A 70 kilogram (154 pound) adult contains approximately 0.1 microcuries of K-40 as a result of normal life functions (inhalation, consumption, etc.). The dose to bone tissue is about 20 mrem per year as a result of internal deposition of naturally-occurring K-40.

E. Data Trends

Man-made radionuclides are not routinely detected in milk samples. In the past twenty years, Cs-137 was only detected in 1986, 1987, and 1988. The mean Cs-137 indicator activities for those years were 8.6, 7.4 and 10.0 pCi/liter, respectively. I-131 was measured in two milk samples collected in 1997 from a single sample location, having a mean concentration of 0.35 pCi/liter and was of undetermined origin. The previous detection was in 1986 with a mean concentration of 13.6 pCi/liter. The 1986 activity was a result of the Chernobyl accident.

The comparison of 2011 data to historical results over the operating life of the plants shows that Cs-137 and I-131 levels in milk have decreased significantly since 1988.

Historical data of milk sample results for Cs-137 and I-131 are presented in Section 7.0, Tables 7-21 and 7-22.

5.2.6 FOOD PRODUCTS (VEGETATION)

A. Results Summary

There were no plant-related radionuclides detected in the 14 food product samples collected and analyzed for the 2011 program.

Detectable levels of naturally occurring K–40 were measured in the control and most of the indicator samples collected for the 2011 program. Be-7 a naturally-occurring radionuclide, was also detected intermittently in samples collected in 2011. These results are consistent with the levels measured in 2010 and previous years.

The results of the 2011 sampling program demonstrate that there is no measurable impact on the dose to the public from the garden pathway as a result of plant operations.

B. Data Analysis and Discussion

Food product samples were collected from four indicator locations and one control location. The indicator locations are represented by nearby gardens in areas of highest D/Q (deposition factor) values based on historical meteorology and an annual garden census. The control location was a garden 15 miles away in a predominately upwind direction.

Food product samples collected during 2011 did not include any varieties considered to be an edible broadleaf vegetables. Non-edible vegetation consisting of brussel sprout leaves, cabbage, corn leaves, grape leaves, horseradish leaves, rhubarb leaves, squash leaves, and tomatoes were collected for the 2011 program. The leaves of these plants were sampled as representative of broadleaf vegetation which is a measurement of radionuclide deposition. Samples were collected during the late summer/fall harvest season. Each sample was analyzed for gamma emitters using gamma spectroscopy. At least one sample from each location was analyzed for C-14.

The analysis of food product samples collected during 2011 did not detect any plant-related radionuclides. Results for the past five years also demonstrate that there is no buildup of plant-related radionuclides in the garden food products grown in areas close to the site.

Naturally-occurring Be-7, K-40, Ra-226 and AcTh-228 were detected in food product samples. The results for naturally-occurring radionuclides are consistent with the data of prior years.

Analytical results for food products are found in Section 6.0, Table 6-12.

C. Dose Evaluation

The calculated dose as a result of plant effluents is not evaluated due to the fact that no plant-related radionuclides were detected. The food product sampling program demonstrated no measurable offsite dose to man from this pathway as a result of operations of the plants located at Nine Mile Point.

D. Data Trends

Food product/vegetation sample results for the last five years demonstrate that there is no chronic deposition or buildup of plant-related radionuclides in the garden food products in the environs near the site.

The last positive indication was for Cs-137 which was detected at one indicator location in 1999 with a concentration of 0.007 pCi/g (wet).

Historically, Cs-137 had been detected in ten separate years since 1976 ranging from a maximum mean concentration of 0.047 pCi/g (wet) in 1985 to a minimum of 0.004 pCi/g (wet) in 1980. The trend for Cs-137 is a general reduction in concentration to non detectable levels in samples collected during the 2000 through 2011 sample programs.

Historical data of food product results are presented in Section 7.0, Tables 7-23 and 7-24.

5.2.7 LAND USE CENSUS RESULTS

A. Results Summary

The ODCM requires that an annual land use census be performed to identify potential new locations for milk sampling and for calculating the dose to man from plant effluents. In 2011, a milk animal census, a nearest resident census and a garden survey were performed.

The results of the closest residence census conducted in 2011 required no change to Fitzpatrick ODCM's closest resident location.

A garden census, not required by the ODCM, is performed to identify appropriate garden sampling locations and dose calculation receptors. Garden samples were collected from a number of locations identified in the census as active for 2011. See Table 3.3-1 for 2011 sampling locations.

B. Data Evaluation and Discussion

A land use census is conducted each year to determine the utilization of land in the vicinity of the Nine Mile Point site. The land use census consists of two types of surveys. A milk animal census is conducted to identify all milk animals within a distance of 10 miles from the site. The census, covering areas out to a distance of 10 miles exceeds the 5 mile distance required by the ODCM. A resident census is conducted and is designed to identify the nearest resident in each meteorological sector out to a distance of 5 miles.

The milk animal census is an estimation of the number of cows and goats within an approximate 10 mile radius of the Nine Mile Point Site. The annual census is conducted during the first half of the grazing season by sending questionnaires to previous milk animal owners and also by road surveys to locate any possible new locations. In the event the questionnaires are not answered, the owners are contacted by telephone or in person. The local county agricultural extension service is also contacted as an additional source of information concerning new milk animal locations in the vicinity of the site.

The number of milk animals located within an approximate 10 mile radius of the site was estimated to be 352 cows and no goats based on the 2011 land use census. The number of cows has decreased by 57 when compared to the 2010 census. The results of the milk animal census are found in Section 6.0, Table 6-13.

The second type of census conducted is a residence census. The census is conducted in order to identify the closest residence within 5 miles in each of the 22.5 degree land-based meteorological sectors. There are only eight sectors over land where residences are located within 5 miles. The water sectors include: N, NNE, NE, ENE, W, WNW, NW and NNW. The results of the residence census, showing the applicable sectors and direction and distance of each of the nearest residence, are found in Section 6.0, Table 6-14. There were no changes identified in the 2011 census for the closest resident in the land based meteorological sectors. The nearest resident locations are illustrated in Section 3.3, Figure 3.3-5.

5.2.8 DIRECT RADIATION, THERMOLUMINESCENT DOSIMETERS (TLD)

Independent Spent Fuel Storage Installation (ISFSI)

A. Results Summary

Thermoluminescent Dosimeters (TLDs) are used to measure direct radiation (gamma dose) in the localized environment of the ISFSI pad. Eighteen TLD locations are in place around the perimeter of the ISFSI pad. TLDs were placed at these locations prior to loading the first storage casks for baseline dose rate determination in the general area of the pad.

On April 25, 2002, the ISFSI facility was placed in service with the installation of the first storage cask on the pad. Two subsequent storage casks were moved to the storage facility on May 8, 2002 and May 21, 2002. A second series of six storage casks were added to the storage facility starting on September 6, 2005. The sixth and last cask in this series was placed in the storage facility on November 12, 2005 bringing the total number of casks in storage to nine. During the Fall of 2010, 6 casks were safely loaded and stored on the storage pad bringing the total number of casks in storage to fifteen. The tenth cask was moved to the storage facility on July 14, 2010 and the fifteenth cask was moved to the storage facility on October 5, 2010.

The increase in dose rate is limited to the general area of the storage facility. The implementation and loading of the ISFSI project has resulted in no increase in dose at the site boundary or to the public. The analysis of offsite doses from direct radiation measurements, presented in Section 5.2.4 of this report, concludes that there is no significant difference in annual dose to the public at or beyond the site boundary. The measured annual dose rate at the nearest residence to the site was consistent with the dose rates measured at the site boundary and the offsite control locations. The results for the Site Boundary, Offsite Sectors, and Special Interest (offsite) were well within expected normal variation when compared to the Control TLD results. The results for the 2011 environmental TLD monitoring program indicate that there is no significant increase in dose rates as a result of operations at the site. The use of hydrogen injection and the implementation of the Independent Spent Fuel Storage Installation (ISFSI) at the FitzPatrick plant did not measurably increase the ambient radiation exposure rate at or beyond the site boundary. The lack of a dose rate increase at or beyond the site boundary is consistent with design calculations performed to evaluate compliance with 10 CFR72.104(a).

The measured results of the 2011 TLD monitoring program demonstrate compliance with the offsite dose limits to members of the public specified in 40CFR190 and 10CFR72.104(a).

B. Program Design

An array of eight TLD locations was established around the perimeter of the ISFSI pad 18 months prior to facility usage. Six months prior to the facility becoming operational, an additional 10 TLD locations were established at areas of interest on the facility perimeter. These preoperational TLDs were used for baseline dose rate determination. The TLDs are placed, collected and read each quarter. Two dosimeters are placed at each location and the average of the two dosimeters is reported. The quarterly results are compared to baseline data to assess the contribution to ambient dose rates in the vicinity of the storage facility from casks as they are placed on the storage pad.

C. Dose Evaluation

A maximum dose rate of 23.8 mrem per standard month above the baseline dose rate was measured at the south perimeter fence. The lowest measured dose rate of 2011 was 1.9 mrem per standard month above the baseline dose rate and was also measured at the southern perimeter fence.

An evaluation of Site Boundary TLDs and Control TLDs results for 2011 shows that there is no increase in dose rate at or beyond the site boundary. A detailed discussion of this evaluation is found in Section 5.2.4. The Environmental TLD results for this period show no significant difference in control and site boundary dose rates compared to 2010.

2011 DOSE IN MREM PER STANDARD MONTH

	Minimum	Maximum	Mean
Site Boundary	3.1	5.3	4.1
Control	2.6	5.5	4.1

5.3 CONCLUSION

The Radiological Environmental Monitoring Program (REMP) is an ongoing program implemented to measure and document the radiological impact of JAFNPP operations on the local environment. The program is designed to detect and evaluate small changes in the radiological environment surrounding the site. Environmental media representing food sources consumed at the higher levels of the food chain, such as fish, food products and milk, are part of a comprehensive sampling program. Results of all samples are reviewed closely to determine any possible impact to the environment or to man. In addition, program results are evaluated for possible short and long term historical trends.

The federal government has established dose limits to protect the public from radiation and radioactivity. The Nuclear Regulatory Commission (NRC) specifies a whole body dose limit of 100 mrem/yr to be received by the maximum exposed member of the general public. This limit is set forth in Section 1301, Part 20, Title 10 of the U.S. Code of Federal Regulations (10CFR20). The Environmental Protection Agency (EPA) limits the annual whole body dose to 25 mrem/yr, which is specified in Section 10, Part 190, Title 40, of the Code of Federal Regulations (40CFR190). Radiation exposure to members of the public, calculated based on the results of the REMP, is extremely small. The dose to members of the public from operations at the Nine Mile Point site, based on environmental measurement and calculations made from effluent releases, is determined to be a fraction of limits set forth by the NRC and EPA.

The REMP continues to demonstrate that the effluents from the site to the environment contribute no significant or even measurable radiation exposures to the general public as confirmed by the sampling and analysis of environmental media from recognized environmental pathways. Based on TLD results there was no measurable increase in radiation levels beyond the site boundary as a result of the hydrogen water chemistry programs. Environmental radiation levels measured at the nearest residence are at the background level based on control station TLD results. The only measurable radiological impact on the environment continues to be the result of atmospheric weapons testing conducted in the early 1980's, the 1986 accident at the Chernobyl Nuclear Power Plant, and the March 11, 2011 accident at the Fukushima Daiichi Nuclear Power Station.

The REMP did not detect any plant-related radionuclide in the sample media collected during 2011. Dose from man-made sources in the environment is very small when compared to the dose originating from naturally-occurring sources of radioactivity.

Radiation from naturally-occurring radionuclides such as K-40 and Ra-226 contributed the vast majority of the total annual dose to members of the general public. The dose to members of the public, resulting from plant operations, is extremely small in comparison to the dose contribution from natural background levels and sources other than the plants. The whole body dose in Oswego County due to natural sources is approximately 50 mrem per individual per year as demonstrated by control environmental TLDs. The fraction of the annual dose to man, attributable to site operation, remains insignificant.

Based upon the overall results of the 2011 Radiological Environmental Monitoring Program, it can be concluded that the levels and variation of radioactivity in the environment samples were consistent with background levels that effluents from the site to the environment contribute no significant or even measurable radiation exposures to the general public.

5.4 REFERENCES

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16. Institute of Nuclear Power Operations, Special Report on the Nuclear Accident at the Fukushima Daiichi Nuclear Power Station, INPO 11-005, November 2011.

6.0 REPORT PERIOD ANALYTICAL RESULTS TABLES

Environmental sample data is summarized in table format. Tables are provided for select sample media and contain data based on actual values obtained over the year. These values are comprised of both positive values and LLD (Lower Limit of Detection) values where applicable.

The LLD is the smallest concentration of radioactive material in a sample that will be detected with 95% probability and with 5% probability of falsely concluding that a blank observation represents a "real" signal (see Section 3.7.3 for detailed explanation).

When the initial count of a sample indicates the presence of radioactivity, two recounts are normally performed. When a radionuclide is positively identified in two or more counts, the analytical results for that radionuclide are reported as the mean of the positive detections and the associated error for that mean (see Section 3.7.2 for methodology).

Many of the tables are footnoted with the term "Plant Related Radionuclides". Plant Related Radionuclides are radionuclides that are produced in the reactor; as a result of plant operation, either through the activation or fission process.

TABLE 6-1
CONCENTRATIONS OF GAMMA EMITTERS IN SHORELINE SEDIMENT SAMPLES – 2011
Results in Units of pCi/kg (dry) ± 1 Sigma

Sample Location ***	Collection Date	GAMMA EMITTERS					
		K-40	Co-60	Cs-134	Cs-137	Zn-65	Others †
Sunset Bay (05) *	04/25/11	22240 ± 1124	< 106.6	< 76.0	< 75.7	< 251.5	< LLD
	10/24/11	21330 ± 1267	< 74.5	< 62.2	< 106.0	< 329.6	< LLD
Lang's Beach (06, Control)	04/25/11	12500 ± 905	< 106.0	< 92.6	< 68.1	< 183.9	< LLD
	10/24/11	10820 ± 722	< 48.2	< 48.7	< 49.8	< 146.9	< LLD

* Sample required by the ODCM
*** Corresponds to sample location noted on Figure 3.3-5
† Plant related radionuclides

TABLE 6-2
CONCENTRATIONS OF GAMMA EMITTERS IN FISH SAMPLES – 2011
Results in Units of pCi/kg (wet) ± 1 Sigma
FITZPATRICK * (03)***

Date	Description	GAMMA EMITTERS								
		K-40	Mn-54	Co-58	Fe-59	Co-60	Cs-134	Cs-137	Zn-65	Others †
5/10/2011	BROWN TROUT	4611 ± 388	< 51	< 48	< 125	< 51	< 61	< 50	< 110	< LLD
5/10/2011	LAKE TROUT	4392 ± 379	< 41	< 46	< 85	< 42	< 40	< 41	< 112	< LLD
5/10/2011	WALLEYE	3645 ± 406	< 42	< 42	< 147	< 62	< 43	< 54	< 113	< LLD
9/22/2011	BROWN TROUT	3032 ± 330	< 35	< 41	< 112	< 24	< 42	< 38	< 78	< LLD
9/22/2011	SMALLMOUTH BASS	4782 ± 383	< 41	< 43	< 122	< 45	< 42	< 45	< 95	< LLD
9/22/2011	CHINOOK SALMON	5132 ± 458	< 54	< 44	< 121	< 53	< 47	< 33	< 108	< LLD

* Sample required by the ODCM
*** Corresponds to sample location noted on Figure 3.3-5
† Plant related radionuclides

TABLE 6-2 (Continued)
CONCENTRATIONS OF GAMMA EMITTERS IN FISH SAMPLES – 2011
Results in Units of pCi/kg (wet) ± 1 Sigma
NINE MILE POINT * (02)***

Date	Description	GAMMA EMITTERS								
		K-40	Mn-54	Co-58	Fe-59	Co-60	Cs-134	Cs-137	Zn-65	Others †
5/10/2011	BROWN TROUT	4511 ± 413	< 40	< 50	< 135	< 53	< 42	< 43	< 117	< LLD
5/10/2011	LAKE TROUT	3708 ± 358	< 56	< 43	< 78	< 39	< 37	< 48	< 132	< LLD
5/10/2011	WALLEYE	5921 ± 525	< 67	< 71	< 200	< 75	< 67	< 61	< 215	< LLD
9/22/2011	BROWN TROUT	4150 ± 341	< 40	< 34	< 94	< 45	< 42	< 47	< 101	< LLD
9/22/2011	SMALLMOUTH BASS	4084 ± 348	< 36	< 41	< 81	< 42	< 35	< 40	< 86	< LLD
9/22/2011	CHINOOK SALMON	3664 ± 317	< 28	< 33	< 93	< 36	< 43	< 41	< 100	< LLD

* Sample required by the ODCM
*** Corresponds to sample location noted on Figure 3.3-5
† Plant related radionuclides

TABLE 6-2 (Continued)
CONCENTRATIONS OF GAMMA EMITTERS IN FISH SAMPLES – 2011
Results in Units of pCi/kg (wet) ± 1 Sigma
OSWEGO HARBOR (CONTROL) * (00)***

Date	Description	GAMMA EMITTERS								
		K-40	Mn-54	Co-58	Fe-59	Co-60	Cs-134	Cs-137	Zn-65	Others †
5/10/2011	BROWN TROUT	5066 ± 489	< 56	< 68	< 196	< 57	< 66	< 45	< 162	< LLD
5/10/2011	LAKE TROUT	4910 ± 454	< 59	< 43	< 140	< 52	< 43	< 51	< 129	< LLD
5/10/2011	WALLEYE	6392 ± 463	< 50	< 46	< 111	< 54	< 50	< 47	< 123	< LLD
9/22/2011	BROWN TROUT	4242 ± 369	< 30	< 40	< 80	< 41	< 42	< 37	< 107	< LLD
9/22/2011	SMALLMOUTH BASS	5344 ± 445	< 43	< 57	< 131	< 62	< 53	< 59	< 153	< LLD
9/22/2011	CHINOOK SALMON	4162 ± 336	< 43	< 32	< 98	< 34	< 33	< 42	< 78	< LLD

* Sample required by the ODCM
*** Corresponds to sample location noted on Figure 3.3-5
† Plant related radionuclides

TABLE 6-3
CONCENTRATIONS OF TRITIUM IN SURFACE WATER SAMPLES – 2011

(QUARTERLY COMPOSITE SAMPLES)

Results in Units of pCi/l ± 1 Sigma

STATION CODE	PERIOD	DATE		TRITIUM
FITZPATRICK* (03, INLET)***	First Quarter	12/28/10	04/01/11	< 410
	Second Quarter	04/01/11	06/28/11	< 432
	Third Quarter	06/28/11	09/26/11	< 420
	Fourth Quarter	09/26/11	12/28/11	< 413
OSWEGO STEAM STATION* (08, CONTROL)***	First Quarter	12/27/10	04/01/11	< 417
	Second Quarter	04/01/11	07/01/11	< 432
	Third Quarter	07/01/11	09/29/11	< 412
	Fourth Quarter	09/29/11	12/30/11	< 413
NINE MILE POINT UNIT 1** (09, INLET)***	First Quarter	12/27/10	04/01/11	< 417
	Second Quarter	04/01/11	07/01/11	< 432
	Third Quarter	07/01/11	09/29/11	< 412
	Fourth Quarter	09/29/11	12/30/11	< 413
NINE MILE POINT UNIT 2** (11, INLET)***	First Quarter	12/27/10	04/01/11	< 417
	Second Quarter	04/01/11	07/01/11	< 432
	Third Quarter	07/01/11	09/29/11	< 412
	Fourth Quarter	09/29/11	12/30/11	< 413
OSWEGO CITY WATER** (10)***	First Quarter	12/27/10	04/01/11	< 417
	Second Quarter	04/01/11	07/01/11	< 432
	Third Quarter	07/01/11	09/29/11	< 412
	Fourth Quarter	09/29/11	12/30/11	< 450

* Sample location required by ODCM
** Optional Sample location
*** Corresponds to sample location noted on Figure 3.3-4

TABLE 6-4
CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES – 2011
Results in Units of pCi/liter ± 1 Sigma
OSWEGO STEAM STATION * (08, CONTROL)***

Date	1/28/2011	2/25/2011	4/1/2011	4/29/2011	6/3/2011	7/1/2011
NUCLIDE						
I-131	< 0.91	< 0.97	< 0.66	< 0.80	< 0.60	< 0.71
Cs-134	< 2.46	< 3.33	< 1.71	< 3.02	< 2.52	< 2.93
Cs-137	< 3.12	< 3.29	< 2.73	< 2.83	< 2.54	< 2.82
Zr-95	< 6.75	< 5.51	< 5.49	< 6.07	< 4.78	< 4.93
Nb-95	< 4.53	< 4.08	< 3.93	< 3.47	< 3.47	< 3.58
Co-58	< 3.28	< 3.22	< 2.68	< 3.64	< 3.09	< 2.83
Mn-54	< 2.99	< 2.74	< 2.53	< 3.09	< 2.43	< 2.54
Fe-59	< 10.45	< 11.95	< 10.21	< 9.18	< 9.61	< 9.65
Zn-65	< 7.73	< 8.52	< 3.38	< 6.99	< 2.98	< 7.11
Co-60	< 3.06	< 3.50	< 2.84	< 3.19	< 2.70	< 2.35
K-40	25.24 ± 11.80	176 ± 18.11	242.1 ± 15.91	225.1 ± 18.66	161.9 ± 14.59	82.86 ± 11.82
Ba/La-140	< 11.49	< 9.46	< 8.82	< 9.90	< 7.35	< 8.62
Date	7/28/2011	9/2/2011	9/29/2011	10/28/2011	12/2/2011	12/30/2011
NUCLIDE						
I-131	< 0.75	< 0.63	< 0.46	< 0.91	< 0.81	< 0.88
Cs-134	< 1.81	< 2.62	< 2.50	< 2.19	< 2.13	< 1.72
Cs-137	< 2.64	< 2.21	< 2.63	< 3.31	< 2.99	< 2.74
Zr-95	< 5.11	< 4.37	< 4.98	< 6.97	< 5.24	< 5.73
Nb-95	< 4.03	< 2.88	< 3.41	< 4.26	< 3.47	< 3.90
Co-58	< 3.03	< 2.50	< 2.47	< 3.79	< 3.39	< 3.22
Mn-54	< 2.43	< 2.42	< 2.38	< 3.48	< 2.98	< 2.93
Fe-59	< 8.52	< 8.60	< 8.00	< 10.49	< 7.74	< 8.05
Zn-65	< 3.34	< 5.17	< 6.27	< 5.24	< 6.02	< 6.42
Co-60	< 2.54	< 2.55	< 2.84	< 4.18	< 2.58	< 2.73
K-40	179.5 ± 15.22	81.52 ± 11.04	174.4 ± 14.70	226.3 ± 21.32	166.5 ± 15.69	193.9 ± 14.88
Ba/La-140	< 7.15	< 7.17	< 7.06	< 10.70	< 8.26	< 7.19

* Sample Location required by ODCM

*** Corresponds to sample location noted on Figure 3.3-4

TABLE 6-4 (continued)
CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES – 2011
Results in Units of pCi/liter ± 1 Sigma
OSWEGO CITY WATER (10)*****

Date	1/28/2011	2/25/2011	4/1/2011	4/29/2011	6/3/2011	7/1/2011
NUCLIDE						
I-131	< 12.29	< 12.67	< 10.13	< 12.18	< 9.35	< 12.97
Cs-134	< 2.06	< 2.65	< 2.96	< 2.34	< 1.39	< 2.33
Cs-137	< 2.45	< 2.82	< 2.78	< 3.31	< 2.09	< 3.23
Zr-95	< 5.60	< 5.49	< 5.44	< 6.18	< 3.94	< 5.30
Nb-95	< 3.54	< 3.72	< 3.95	< 4.20	< 2.78	< 3.63
Co-58	< 2.80	< 2.68	< 2.92	< 4.33	< 2.18	< 3.56
Mn-54	< 2.70	< 2.89	< 2.77	< 3.28	< 1.85	< 2.71
Fe-59	< 8.67	< 8.88	< 7.28	< 12.13	< 5.80	< 9.36
Zn-65	< 7.10	< 6.76	< 6.59	< 4.84	< 4.49	< 7.21
Co-60	< 2.35	< 3.02	< 2.91	< 3.55	< 1.80	< 3.08
K-40	107.9 ± 13.19	51.5 ± 11.52	195.2 ± 15.15	254.3 ± 20.86	17.71 ± 7.39	32.32 ± 11.70
Ba/La-140	< 8.29	< 7.06	< 7.73	< 9.86	< 6.10	< 9.97
Date	7/28/2011	9/2/2011	9/29/2011	10/28/2011	12/2/2011	12/30/2011
NUCLIDE						
I-131	< 10.73	< 10.92	< 9.82	< 10.02	< 13.73	< 13.91
Cs-134	< 1.69	< 2.02	< 3.59	< 1.90	< 2.41	< 2.35
Cs-137	< 2.38	< 2.32	< 3.01	< 2.70	< 3.50	< 3.74
Zr-95	< 3.97	< 4.62	< 5.15	< 5.37	< 6.98	< 7.41
Nb-95	< 3.29	< 3.44	< 3.80	< 3.41	< 4.85	< 5.32
Co-58	< 2.71	< 2.82	< 2.82	< 3.35	< 4.09	< 4.77
Mn-54	< 2.26	< 2.54	< 3.06	< 3.01	< 3.82	< 3.50
Fe-59	< 8.28	< 8.05	< 7.80	< 8.45	< 12.94	< 14.47
Zn-65	< 5.10	< 5.61	< 6.68	< 6.78	< 8.43	< 9.10
Co-60	< 2.23	< 2.47	< 3.36	< 2.68	< 4.18	< 4.45
K-40	46.14 ± 7.85	40.27 ± 11.22	50.08 ± 11.24	182.7 ± 14.64	236.8 ± 21.38	287.9 ± 22.99
Ba/La-140	< 7.24	< 9.81	< 9.14	< 7.19	< 12.29	< 12.62

** Optional sample location
*** Corresponds to sample location noted on Figure 3.3-4

TABLE 6-4 (continued)
CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES – 2011
Results in Units of pCi/liter ± 1 Sigma
FITZPATRICK* (03, INLET)***

Date	1/31/2011	3/1/2011	4/1/2011	5/2/2011	6/1/2011	6/28/2011
NUCLIDE						
I-131	< 0.42	< 0.55	< 0.46	< 0.46	< 0.60	< 0.62
Cs-134	< 2.42	< 1.81	< 2.56	< 1.60	< 3.94	< 2.78
Cs-137	< 2.80	< 2.53	< 3.80	< 2.10	< 3.45	< 2.12
Zr-95	< 5.95	< 4.33	< 7.82	< 3.72	< 6.88	< 4.59
Nb-95	< 4.47	< 3.45	< 4.74	< 2.70	< 4.86	< 3.03
Co-58	< 3.47	< 2.80	< 4.52	< 2.38	< 3.89	< 2.56
Mn-54	< 3.11	< 2.64	< 3.83	< 2.61	< 4.09	< 2.39
Fe-59	< 10.18	< 7.86	< 13.08	< 5.81	< 12.68	< 7.34
Zn-65	< 8.33	< 6.75	< 6.40	< 4.91	< 9.57	< 5.97
Co-60	< 3.06	< 2.75	< 3.72	< 1.91	< 3.72	< 2.89
K-40	110.9 ± 16.82	< 27.16	< 43.43	< 24.52	< 44.75	47.1 ± 12.27
Ba/La-140	< 8.01	< 6.66	< 11.18	< 6.06	< 6.33	< 5.31
Date	8/1/2011	8/30/2011	9/26/2011	10/31/2011	12/1/2011	12/28/2011
NUCLIDE						
I-131	< 0.45	< 0.53	< 0.55	< 0.67	< 0.47	< 0.62
Cs-134	< 6.19	< 2.61	< 5.18	< 2.17	< 2.01	< 4.38
Cs-137	< 4.89	< 4.47	< 4.66	< 2.90	< 2.75	< 3.61
Zr-95	< 10.08	< 7.37	< 8.54	< 5.53	< 5.29	< 6.13
Nb-95	< 5.94	< 4.58	< 6.73	< 4.05	< 3.23	< 4.68
Co-58	< 5.77	< 4.11	< 4.40	< 2.62	< 3.14	< 4.71
Mn-54	< 5.28	< 3.46	< 5.20	< 2.89	< 2.84	< 3.90
Fe-59	< 19.62	< 10.83	< 17.48	< 7.77	< 8.02	< 11.01
Zn-65	< 12.26	< 9.94	< 11.73	< 3.19	< 6.23	< 9.78
Co-60	< 5.49	< 4.25	< 5.82	< 3.14	< 2.97	< 4.64
K-40	332.1 ± 31.69	< 43.41	174 ± 24.52	26.96 ± 8.45	37.76 ± 11.05	< 49.65
Ba/La-140	< 14.42	< 11.69	< 11.42	< 7.07	< 7.41	< 8.10

* Sample Location required by ODCM
*** Corresponds to sample location noted on Figure 3.3-4

TABLE 6-4 (Continued)
CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES – 2011
Results in Units of pCi/liter ± 1 Sigma
NINE MILE POINT UNIT 1 ** (09, INLET)***

Date	1/28/2011	2/25/2011	4/1/2011	4/29/2011	6/3/2011	7/1/2011
NUCLIDE						
I-131	< 13.57	< 12.91	< 11.75	< 7.32	< 11.13	< 13.10
Cs-134	< 1.96	< 4.43	< 3.28	< 1.45	< 3.25	< 1.97
Cs-137	< 2.67	< 3.06	< 3.19	< 1.83	< 3.05	< 2.83
Zr-95	< 5.99	< 6.96	< 6.58	< 3.85	< 5.32	< 5.93
Nb-95	< 4.27	< 4.63	< 4.13	< 2.51	< 3.47	< 4.13
Co-58	< 2.77	< 4.48	< 3.30	< 1.92	< 3.53	< 3.61
Mn-54	< 2.69	< 3.78	< 3.19	< 2.03	< 2.97	< 3.06
Fe-59	< 9.48	< 11.00	< 8.93	< 5.41	< 10.47	< 10.30
Zn-65	< 6.89	< 8.38	< 6.61	< 4.50	< 7.10	< 7.13
Co-60	< 2.81	< 4.00	< 3.36	< 1.90	< 2.67	< 2.79
K-40	45.94 ± 10.77	< 39.11	68.96 ± 14.11	39.86 ± 7.82	47.79 ± 14.77	208.6 ± 17.21
Ba/La-140	< 8.71	< 12.67	< 11.71	< 5.60	< 10.75	< 10.60
Date	7/28/2011	9/2/2011	9/29/2011	10/28/2011	12/2/2011	12/30/2011
NUCLIDE						
I-131	< 12.48	< 8.98	< 9.73	< 10.48	< 11.37	< 10.30
Cs-134	< 1.97	< 1.35	< 3.12	< 2.22	< 2.53	< 2.05
Cs-137	< 2.81	< 1.98	< 2.63	< 2.71	< 2.57	< 2.57
Zr-95	< 6.43	< 3.49	< 5.47	< 5.16	< 7.53	< 5.20
Nb-95	< 4.04	< 2.75	< 3.38	< 3.44	< 4.63	< 3.62
Co-58	< 2.80	< 2.33	< 3.05	< 3.51	< 3.70	< 2.62
Mn-54	< 3.22	< 1.91	< 2.87	< 2.84	< 2.46	< 2.41
Fe-59	< 9.46	< 5.91	< 8.55	< 10.75	< 10.18	< 7.62
Zn-65	< 6.98	< 4.32	< 6.07	< 7.59	< 7.06	< 6.53
Co-60	< 2.49	< 1.87	< 2.23	< 2.93	< 3.40	< 2.95
K-40	121.2 ± 15.04	< 20.07	160.6 ± 15.57	36.35 ± 13.29	34.35 ± 13.07	130.1 ± 14.19
Ba/La-140	< 10.17	< 6.39	< 7.90	< 7.33	< 11.05	< 7.28

** Optional Sample Location

*** Corresponds to sample location noted on Figure 3.3-4

TABLE 6-4 (Continued)
CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES – 2011
Results in Units of pCi/liter ± 1 Sigma
NINE MILE POINT UNIT 2 ** (11, INLET)***

Date	1/28/2011	2/25/2011	4/1/2011	4/29/2011	6/3/2011	7/1/2011
NUCLIDE						
I-131	< 12.51	< 11.01	< 14.65	< 9.31	< 13.73	< 10.17
Cs-134	< 1.55	< 3.38	< 2.22	< 2.84	< 2.35	< 1.66
Cs-137	< 2.27	< 3.35	< 3.02	< 2.44	< 3.46	< 2.23
Zr-95	< 4.34	< 7.03	< 5.69	< 5.04	< 6.80	< 4.65
Nb-95	< 3.20	< 3.98	< 3.93	< 3.29	< 4.65	< 2.77
Co-58	< 2.51	< 3.15	< 3.68	< 2.75	< 4.51	< 1.97
Mn-54	< 2.15	< 3.68	< 3.11	< 2.34	< 3.53	< 2.17
Fe-59	< 6.81	< 8.89	< 10.96	< 6.94	< 12.30	< 7.34
Zn-65	< 5.02	< 8.12	< 6.89	< 5.09	< 8.65	< 4.74
Co-60	< 2.35	< 3.30	< 3.11	< 2.53	< 3.09	< 2.61
K-40	46.5 ± 8.13	67.7 ± 15.68	261.7 ± 19.50	< 21.59	200.1 ± 20.78	36.3 ± 8.68
Ba/La-140	< 8.37	< 9.76	< 9.27	< 6.75	< 11.10	< 7.39
Date	7/28/2011	9/2/2011	9/29/2011	10/28/2011	12/2/2011	12/30/2011
NUCLIDE						
I-131	< 14.78	< 8.00	< 11.78	< 13.44	< 9.56	< 14.51
Cs-134	< 2.41	< 2.41	< 3.53	< 2.48	< 1.65	< 4.12
Cs-137	< 2.03	< 2.02	< 3.59	< 3.48	< 2.10	< 3.34
Zr-95	< 4.65	< 4.54	< 6.24	< 8.24	< 4.44	< 6.82
Nb-95	< 2.90	< 3.29	< 4.52	< 4.82	< 3.29	< 4.90
Co-58	< 2.45	< 2.53	< 3.48	< 4.32	< 2.60	< 4.25
Mn-54	< 2.08	< 2.16	< 3.36	< 3.50	< 2.48	< 4.08
Fe-59	< 8.04	< 8.02	< 12.75	< 14.70	< 7.43	< 11.86
Zn-65	< 5.41	< 4.84	< 8.11	< 8.90	< 4.88	< 8.91
Co-60	< 2.21	< 2.41	< 3.97	< 4.31	< 2.50	< 3.90
K-40	46.47 ± 9.01	174.4 ± 12.88	206.8 ± 21.13	225.2 ± 20.99	30.56 ± 9.21	204.2 ± 20.16
Ba/La-140	< 9.83	< 5.66	< 10.32	< 11.94	< 6.91	< 10.83

** Optional Sample Location

*** Corresponds to sample location noted on Figure 3.3-4

TABLE 6-5
ENVIRONMENTAL AIRBORNE PARTICULATE SAMPLES - OFFSITE SAMPLE LOCATIONS - 2011
GROSS BETA ACTIVITY pCi/ m^3 ± 1 Sigma

Week End Date	R-1 *	R-2 *	R-3 *	R-4 *	R-5 *	D-2 **	E **	F **	G **
01/04/11	0.027 ± 0.002	0.022 ± 0.001	0.023 ± 0.002	0.023 ± 0.002	0.024 ± 0.002	0.025 ± 0.002	0.025 ± 0.002	0.023 ± 0.002	0.022 ± 0.002
01/11/11	0.021 ± 0.001	0.021 ± 0.001	0.015 ± 0.001	0.016 ± 0.001	0.022 ± 0.001	0.022 ± 0.001	0.018 ± 0.001	0.017 ± 0.001	0.017 ± 0.001
01/18/11	0.014 ± 0.001	0.012 ± 0.001	0.011 ± 0.001	0.012 ± 0.001	0.012 ± 0.001	0.009 ± 0.001	0.013 ± 0.001	0.011 ± 0.001	0.013 ± 0.001
01/25/11	0.021 ± 0.001	0.019 ± 0.001	0.021 ± 0.001	0.018 ± 0.001	0.019 ± 0.001	0.020 ± 0.001	0.022 ± 0.002	0.017 ± 0.001	0.022 ± 0.002
02/01/11	0.023 ± 0.002	0.023 ± 0.002	0.021 ± 0.002	0.021 ± 0.002	0.020 ± 0.001	0.023 ± 0.002	0.020 ± 0.002	0.023 ± 0.002	0.023 ± 0.002
02/08/11	0.021 ± 0.001	0.018 ± 0.001	0.018 ± 0.001	0.021 ± 0.001	0.023 ± 0.001	0.019 ± 0.001	0.025 ± 0.002	0.019 ± 0.001	0.021 ± 0.001
02/15/11	0.022 ± 0.002	0.017 ± 0.001	0.018 ± 0.001	0.019 ± 0.001	0.021 ± 0.001	0.021 ± 0.001	0.021 ± 0.001	0.018 ± 0.001	0.018 ± 0.001
02/22/11	0.023 ± 0.002	0.020 ± 0.001	0.021 ± 0.001	0.020 ± 0.001	0.019 ± 0.001	0.017 ± 0.001	0.021 ± 0.001	0.017 ± 0.001	0.019 ± 0.001
03/01/11	0.019 ± 0.001	0.019 ± 0.001	0.019 ± 0.001	0.018 ± 0.001	0.016 ± 0.001	0.016 ± 0.001	0.020 ± 0.001	0.020 ± 0.001	0.018 ± 0.001
03/08/11	0.019 ± 0.001	0.017 ± 0.001	0.018 ± 0.001	0.015 ± 0.001	0.017 ± 0.001	0.021 ± 0.001	0.018 ± 0.001	0.021 ± 0.001	0.019 ± 0.001
03/15/11	0.014 ± 0.001	0.013 ± 0.001	0.015 ± 0.001	0.016 ± 0.001	0.014 ± 0.001	0.018 ± 0.001	0.015 ± 0.001	0.015 ± 0.001	0.014 ± 0.001
03/22/11	0.024 ± 0.002	0.021 ± 0.001	0.015 ± 0.001	0.017 ± 0.001	0.020 ± 0.001	0.019 ± 0.001	0.020 ± 0.001	0.018 ± 0.001	0.017 ± 0.001
03/29/11	0.030 ± 0.002	0.028 ± 0.002	0.027 ± 0.002	0.028 ± 0.002	0.029 ± 0.002	0.030 ± 0.002	0.028 ± 0.002	0.030 ± 0.002	0.030 ± 0.002
04/05/11	0.033 ± 0.002	0.032 ± 0.002	0.034 ± 0.002	0.033 ± 0.002	0.030 ± 0.002	0.035 ± 0.002	0.030 ± 0.002	0.030 ± 0.002	0.039 ± 0.002
04/12/11	0.023 ± 0.002	0.020 ± 0.001	0.023 ± 0.002	0.024 ± 0.002	0.023 ± 0.002	0.025 ± 0.002	0.024 ± 0.002	0.022 ± 0.002	0.022 ± 0.002
04/19/11	0.022 ± 0.001	0.025 ± 0.002	0.022 ± 0.002	0.024 ± 0.002	0.019 ± 0.001	0.023 ± 0.002	0.022 ± 0.002	0.021 ± 0.001	0.020 ± 0.001
04/26/11	0.015 ± 0.001	0.013 ± 0.001	0.013 ± 0.001	0.014 ± 0.001	0.012 ± 0.001	0.012 ± 0.001	0.014 ± 0.001	0.011 ± 0.001	0.013 ± 0.001
05/03/11	0.011 ± 0.001	0.011 ± 0.001	0.008 ± 0.001	0.009 ± 0.001	0.010 ± 0.001	0.011 ± 0.001	0.012 ± 0.001	0.055 ± 0.002	0.012 ± 0.001
05/10/11	0.014 ± 0.001	0.015 ± 0.001	0.010 ± 0.001	0.012 ± 0.001	0.010 ± 0.001	0.013 ± 0.001	0.012 ± 0.001	0.008 ± 0.001	0.012 ± 0.001
05/17/11	0.007 ± 0.001	0.007 ± 0.001	0.008 ± 0.001	0.008 ± 0.001	0.008 ± 0.001	0.007 ± 0.001	0.007 ± 0.001	0.008 ± 0.001	0.006 ± 0.001
05/24/11	0.009 ± 0.001	0.007 ± 0.001	0.009 ± 0.001	0.009 ± 0.001	0.010 ± 0.001	0.009 ± 0.001	0.010 ± 0.001	0.011 ± 0.001	0.008 ± 0.001
06/01/11	0.011 ± 0.001	0.010 ± 0.001	0.013 ± 0.001	0.014 ± 0.001	0.014 ± 0.001	0.014 ± 0.001	0.014 ± 0.001	0.012 ± 0.001	0.015 ± 0.001
06/07/11	0.019 ± 0.001	0.018 ± 0.001	0.021 ± 0.002	0.020 ± 0.002	0.018 ± 0.001	0.019 ± 0.002	0.022 ± 0.002	0.016 ± 0.001	0.021 ± 0.002
06/14/11	0.017 ± 0.001	0.015 ± 0.001	0.015 ± 0.001	0.016 ± 0.001	0.010 ± 0.001	0.016 ± 0.001	0.016 ± 0.001	0.014 ± 0.001	0.017 ± 0.001
06/21/11	0.011 ± 0.001	0.012 ± 0.001	0.013 ± 0.001	0.014 ± 0.001	0.015 ± 0.002	0.014 ± 0.001	0.012 ± 0.001	0.011 ± 0.001	0.015 ± 0.001
06/28/11	0.009 ± 0.001	0.010 ± 0.001	0.008 ± 0.001	0.009 ± 0.001	0.008 ± 0.001	0.009 ± 0.001	0.011 ± 0.001	0.010 ± 0.001	0.008 ± 0.001

* Sample location required by ODCM

** Optional sample location

TABLE 6-5 (Continued)
ENVIRONMENTAL AIRBORNE PARTICULATE SAMPLES - OFFSITE SAMPLE LOCATIONS - 2011
GROSS BETA ACTIVITY pCi/ m^3 ± 1 Sigma

Week End Date	R-1 *	R-2 *	R-3 *	R-4 *	R-5 *	D-2 **	E **	F **	G **
07/06/11	0.013 ± 0.001	0.013 ± 0.001	0.012 ± 0.001	0.013 ± 0.001	0.013 ± 0.001	0.011 ± 0.001	0.014 ± 0.001	0.014 ± 0.001	0.013 ± 0.001
07/12/11	0.019 ± 0.002	0.020 ± 0.002	0.017 ± 0.001	0.015 ± 0.001	0.015 ± 0.001	0.018 ± 0.001	0.017 ± 0.001	0.018 ± 0.001	0.020 ± 0.002
07/19/11	0.018 ± 0.001	0.017 ± 0.001	0.021 ± 0.002	0.015 ± 0.001	0.016 ± 0.001	0.016 ± 0.001	0.016 ± 0.001	0.016 ± 0.001	0.018 ± 0.001
07/26/11	0.019 ± 0.001	0.018 ± 0.001	0.017 ± 0.001	0.019 ± 0.001	0.019 ± 0.001	0.018 ± 0.001	0.019 ± 0.001	0.017 ± 0.001	0.019 ± 0.001
08/02/11	0.015 ± 0.001	0.015 ± 0.001	0.016 ± 0.001	0.016 ± 0.001	0.013 ± 0.001	0.014 ± 0.001	0.014 ± 0.001	0.015 ± 0.001	0.019 ± 0.001
08/09/11	0.013 ± 0.001	0.016 ± 0.001	0.015 ± 0.001	0.015 ± 0.001	0.013 ± 0.001	0.017 ± 0.001	0.014 ± 0.001	0.017 ± 0.001	0.019 ± 0.001
08/16/11	0.013 ± 0.001	0.016 ± 0.001	0.016 ± 0.001	0.014 ± 0.001	0.013 ± 0.001	0.014 ± 0.001	0.013 ± 0.001	0.011 ± 0.001	0.014 ± 0.001
08/23/11	0.024 ± 0.002	0.023 ± 0.001	0.022 ± 0.001	0.023 ± 0.001	0.022 ± 0.001	0.019 ± 0.001	0.019 ± 0.001	0.022 ± 0.001	0.019 ± 0.001
08/30/11	0.012 ± 0.001	0.011 ± 0.001	0.014 ± 0.001	0.012 ± 0.001	0.013 ± 0.001	0.013 ± 0.001	0.014 ± 0.001	0.014 ± 0.001	0.015 ± 0.001
09/07/11	0.026 ± 0.001	0.024 ± 0.001	0.025 ± 0.001	0.024 ± 0.001	0.025 ± 0.001	0.025 ± 0.001	0.024 ± 0.001	0.024 ± 0.001	0.025 ± 0.001
09/13/11	0.015 ± 0.001	0.012 ± 0.001	0.016 ± 0.001	0.015 ± 0.001	0.017 ± 0.001	0.016 ± 0.001	0.018 ± 0.001	0.018 ± 0.001	0.018 ± 0.001
09/20/11	0.011 ± 0.001	0.011 ± 0.001	0.010 ± 0.001	0.012 ± 0.001	0.011 ± 0.001	0.013 ± 0.001	0.012 ± 0.001	0.009 ± 0.001	0.013 ± 0.001
09/27/11	0.020 ± 0.001	0.017 ± 0.001	0.017 ± 0.001	0.020 ± 0.001	0.017 ± 0.001	0.015 ± 0.001	0.017 ± 0.001	0.019 ± 0.001	0.022 ± 0.002
10/04/11	0.014 ± 0.001	0.011 ± 0.001	0.012 ± 0.001	0.011 ± 0.001	0.009 ± 0.001	0.010 ± 0.001	0.010 ± 0.001	0.009 ± 0.001	0.011 ± 0.001
10/11/11	0.030 ± 0.002	0.032 ± 0.002	0.032 ± 0.002	0.028 ± 0.002	0.034 ± 0.002	0.030 ± 0.002	0.030 ± 0.002	0.028 ± 0.002	0.030 ± 0.002
10/18/11	0.015 ± 0.001	0.016 ± 0.001	0.014 ± 0.001	0.017 ± 0.001	0.018 ± 0.002	0.017 ± 0.001	0.020 ± 0.001	0.015 ± 0.001	0.022 ± 0.001
10/25/11	0.014 ± 0.001	0.011 ± 0.001	0.011 ± 0.001	0.012 ± 0.001	0.012 ± 0.001	0.012 ± 0.001	0.011 ± 0.001	0.012 ± 0.001	0.013 ± 0.001
11/01/11	0.014 ± 0.001	0.012 ± 0.001	0.016 ± 0.001	0.013 ± 0.001	0.016 ± 0.001	0.014 ± 0.001	0.013 ± 0.001	0.012 ± 0.001	0.016 ± 0.001
11/08/11	0.019 ± 0.001	0.021 ± 0.001	0.022 ± 0.001	0.021 ± 0.001	0.024 ± 0.002	0.021 ± 0.001	0.021 ± 0.001	0.022 ± 0.002	0.024 ± 0.002
11/15/11	0.026 ± 0.002	0.026 ± 0.002	0.027 ± 0.002	0.026 ± 0.002	0.029 ± 0.002	0.024 ± 0.002	0.027 ± 0.002	0.027 ± 0.002	0.028 ± 0.002
11/22/11	0.018 ± 0.001	0.019 ± 0.001	0.020 ± 0.001	0.019 ± 0.001	0.024 ± 0.002	0.020 ± 0.001	0.019 ± 0.001	0.019 ± 0.001	0.021 ± 0.002
11/30/11	0.016 ± 0.001	0.018 ± 0.001	0.019 ± 0.001	0.019 ± 0.001	0.016 ± 0.001	0.016 ± 0.001	0.017 ± 0.001	0.017 ± 0.001	0.016 ± 0.001
12/06/11	0.018 ± 0.001	0.016 ± 0.001	0.016 ± 0.001	0.018 ± 0.001	0.016 ± 0.001	0.017 ± 0.001	0.016 ± 0.001	0.013 ± 0.001	0.017 ± 0.001
12/13/11	0.023 ± 0.002	0.021 ± 0.001	0.022 ± 0.002	0.021 ± 0.001	0.024 ± 0.002	0.020 ± 0.001	0.020 ± 0.001	0.021 ± 0.001	0.025 ± 0.002
12/20/11	0.028 ± 0.002	0.027 ± 0.002	0.027 ± 0.002	0.025 ± 0.002	0.031 ± 0.002	0.027 ± 0.002	0.028 ± 0.002	0.028 ± 0.002	0.032 ± 0.002
12/28/11	0.017 ± 0.001	0.014 ± 0.001	0.015 ± 0.001	0.016 ± 0.001	0.015 ± 0.001	0.015 ± 0.001	0.014 ± 0.001	0.018 ± 0.001	0.014 ± 0.001

* Sample location required by ODCM

** Optional sample location

TABLE 6-6
ENVIRONMENTAL AIRBORNE PARTICULATE SAMPLES - ONSITE SAMPLE LOCATIONS - 2011
GROSS BETA ACTIVITY pCi/ m^3 ± 1 Sigma

Week End Date	D-1 **			G **			H **			I **			J **			K **		
01/03/11	0.022	±	0.001	0.018	±	0.001	0.023	±	0.001	0.019	±	0.001	0.022	±	0.002	0.019	±	0.001
01/10/11	0.023	±	0.001	0.022	±	0.001	0.019	±	0.001	0.019	±	0.001	0.019	±	0.001	0.022	±	0.001
01/17/11	0.013	±	0.001	0.012	±	0.001	0.013	±	0.001	0.012	±	0.001	0.008	±	0.001	0.013	±	0.001
01/24/11	0.017	±	0.001	0.017	±	0.001	0.018	±	0.001	0.019	±	0.001	0.018	±	0.001	0.020	±	0.001
01/31/11	0.021	±	0.001	0.021	±	0.001	0.023	±	0.002	0.025	±	0.002	0.020	±	0.001	0.020	±	0.001
02/07/11	0.022	±	0.001	0.019	±	0.001	0.021	±	0.001	0.021	±	0.001	0.018	±	0.001	0.020	±	0.001
02/14/11	0.020	±	0.001	0.021	±	0.001	0.019	±	0.001	0.019	±	0.001	0.021	±	0.001	0.019	±	0.001
02/21/11	0.020	±	0.001	0.016	±	0.001	0.019	±	0.001	0.017	±	0.001	0.018	±	0.001	0.017	±	0.001
02/28/11	0.017	±	0.001	0.017	±	0.001	0.018	±	0.001	0.020	±	0.001	0.020	±	0.001	0.018	±	0.001
03/07/11	0.020	±	0.001	0.016	±	0.001	0.020	±	0.001	0.018	±	0.001	0.016	±	0.001	0.017	±	0.001
03/14/11	0.015	±	0.001	0.014	±	0.001	0.014	±	0.001	0.012	±	0.001	0.014	±	0.001	0.011	±	0.001
03/21/11	0.020	±	0.001	0.019	±	0.001	0.020	±	0.001	0.020	±	0.001	0.021	±	0.002	0.020	±	0.001
03/28/11	0.027	±	0.002	0.023	±	0.002	0.025	±	0.002	0.024	±	0.002	0.026	±	0.002	0.025	±	0.002
04/04/11	0.036	±	0.002	0.041	±	0.002	0.032	±	0.002	0.038	±	0.002	0.035	±	0.002	0.033	±	0.002
04/11/11	0.021	±	0.001	0.024	±	0.002	0.024	±	0.002	0.022	±	0.002	0.023	±	0.002	0.021	±	0.001
04/18/11	0.021	±	0.001	0.019	±	0.001	0.021	±	0.002	0.021	±	0.002	0.019	±	0.001	0.018	±	0.001
04/25/11	0.013	±	0.001	0.014	±	0.001	0.014	±	0.001	0.017	±	0.001	0.015	±	0.001	0.016	±	0.001
05/02/11	0.010	±	0.001	0.011	±	0.001	0.010	±	0.001	0.012	±	0.001	0.010	±	0.001	0.009	±	0.001
05/09/11	0.013	±	0.001	0.011	±	0.001	0.013	±	0.001	0.010	±	0.001	0.011	±	0.001	0.014	±	0.001
05/16/11	0.009	±	0.001	0.011	±	0.001	0.008	±	0.001	0.008	±	0.001	0.009	±	0.001	0.007	±	0.001
05/23/11	0.006	±	0.001	0.008	±	0.001	0.006	±	0.001	0.008	±	0.001	0.007	±	0.001	0.007	±	0.001
05/31/11	0.009	±	0.001	0.012	±	0.001	0.010	±	0.001	0.008	±	0.001	0.010	±	0.001	0.009	±	0.001
06/06/11	0.020	±	0.001	0.021	±	0.002	0.016	±	0.001	0.021	±	0.002	0.021	±	0.002	0.021	±	0.002
06/13/11	0.021	±	0.001	0.015	±	0.001	0.021	±	0.001	0.019	±	0.001	0.018	±	0.001	0.017	±	0.001
06/20/11	0.013	±	0.001	0.011	±	0.001	0.013	±	0.001	0.013	±	0.001	0.014	±	0.001	0.012	±	0.001
06/27/11	0.007	±	0.001	0.009	±	0.001	0.010	±	0.001	0.010	±	0.001	0.010	±	0.001	0.009	±	0.001

** Optional sample location

TABLE 6-6 (Continued)
ENVIRONMENTAL AIRBORNE PARTICULATE SAMPLES - ONSITE SAMPLE LOCATIONS - 2011
GROSS BETA ACTIVITY pCi/ m^3 ± 1 Sigma

Week End Date	D-1 **	G **	H **	I **	J **	K **
07/05/11	0.015 ± 0.001	0.011 ± 0.001	0.013 ± 0.001	0.013 ± 0.001	0.015 ± 0.001	0.013 ± 0.001
07/11/11	0.017 ± 0.001	0.012 ± 0.001	0.018 ± 0.001	0.015 ± 0.001	0.013 ± 0.001	0.018 ± 0.001
07/18/11	0.019 ± 0.001	0.017 ± 0.001	0.020 ± 0.001	0.018 ± 0.001	0.018 ± 0.001	0.019 ± 0.001
07/25/11	0.021 ± 0.002	0.019 ± 0.001	0.021 ± 0.001	0.018 ± 0.001	0.022 ± 0.002	0.018 ± 0.001
08/01/11	0.013 ± 0.001	0.014 ± 0.001	0.016 ± 0.001	0.017 ± 0.001	0.015 ± 0.001	0.016 ± 0.001
08/08/11	0.017 ± 0.001	0.015 ± 0.001	0.015 ± 0.001	0.014 ± 0.001	0.015 ± 0.001	0.018 ± 0.001
08/15/11	0.019 ± 0.001	0.016 ± 0.001	0.018 ± 0.001	0.015 ± 0.001	0.014 ± 0.001	0.015 ± 0.001
08/22/11	0.020 ± 0.001	0.023 ± 0.002	0.023 ± 0.001	0.021 ± 0.001	0.021 ± 0.001	0.023 ± 0.002
08/29/11	0.013 ± 0.001	0.012 ± 0.001	0.016 ± 0.001	0.015 ± 0.001	0.012 ± 0.001	0.014 ± 0.001
09/06/11	0.026 ± 0.001	0.025 ± 0.001	0.026 ± 0.001	0.023 ± 0.001	0.024 ± 0.001	0.021 ± 0.001
09/12/11	0.010 ± 0.001	0.014 ± 0.001	0.011 ± 0.001	0.011 ± 0.001	0.011 ± 0.001	0.010 ± 0.001
09/19/11	0.013 ± 0.001	0.016 ± 0.001	0.015 ± 0.001	0.015 ± 0.001	0.014 ± 0.001	0.012 ± 0.001
09/26/11	0.017 ± 0.001	0.019 ± 0.001	0.017 ± 0.001	0.017 ± 0.001	0.016 ± 0.001	0.017 ± 0.001
10/03/11	0.015 ± 0.001	0.014 ± 0.001	0.013 ± 0.001	0.016 ± 0.001	0.015 ± 0.001	0.015 ± 0.001
10/10/11	0.022 ± 0.001	0.021 ± 0.001	0.024 ± 0.002	0.026 ± 0.002	0.024 ± 0.002	0.025 ± 0.002
10/17/11	0.024 ± 0.002	0.019 ± 0.001	0.023 ± 0.002	0.025 ± 0.002	0.024 ± 0.002	0.020 ± 0.001
10/24/11	0.015 ± 0.001	0.014 ± 0.001	0.008 ± 0.001	0.008 ± 0.001	0.007 ± 0.001	0.012 ± 0.001
10/31/11	0.011 ± 0.001	0.013 ± 0.001	0.012 ± 0.001	0.012 ± 0.001	0.012 ± 0.001	0.016 ± 0.001
11/07/11	0.022 ± 0.001	0.018 ± 0.001	0.020 ± 0.001	0.019 ± 0.001	0.019 ± 0.001	0.020 ± 0.001
11/14/11	0.026 ± 0.002	0.031 ± 0.002	0.029 ± 0.002	0.023 ± 0.002	0.027 ± 0.002	0.027 ± 0.002
11/21/11	0.022 ± 0.001	0.023 ± 0.002	0.023 ± 0.002	0.022 ± 0.001	0.022 ± 0.001	0.023 ± 0.002
11/28/11	0.019 ± 0.001	0.019 ± 0.001	0.018 ± 0.001	0.017 ± 0.001	0.020 ± 0.001	0.018 ± 0.001
12/05/11	0.016 ± 0.001	0.017 ± 0.001	0.016 ± 0.001	0.017 ± 0.001	0.014 ± 0.001	0.013 ± 0.001
12/12/11	0.021 ± 0.001	0.019 ± 0.001	0.021 ± 0.001	0.022 ± 0.002	0.020 ± 0.001	0.023 ± 0.002
12/19/11	0.028 ± 0.002	0.029 ± 0.002	0.028 ± 0.002	0.028 ± 0.002	0.027 ± 0.002	0.024 ± 0.002
12/27/11	0.021 ± 0.001	0.019 ± 0.001	0.019 ± 0.001	0.020 ± 0.001	0.018 ± 0.001	0.021 ± 0.001

** Optional sample location

TABLE 6-7
ENVIRONMENTAL CHARCOAL CARTRIDGE SAMPLES - OFFSITE SAMPLE LOCATIONS – 2011
I-131 ACTIVITY pCi/ m3 ± 1 Sigma

Week End Date	R-1 *	R-2 *	R-3 *	R-4 *	R-5 *	D-2 **	E **	F **	G **
01/04/11	< 0.018	< 0.019	< 0.019	< 0.019	< 0.020	< 0.017	< 0.019	< 0.024	< 0.026
01/11/11	< 0.019	< 0.013	< 0.019	< 0.020	< 0.022	< 0.019	< 0.019	< 0.017	< 0.017
01/18/11	< 0.019	< 0.013	< 0.018	< 0.021	< 0.021	< 0.014	< 0.015	< 0.019	< 0.025
01/25/11	< 0.026	< 0.016	< 0.025	< 0.019	< 0.016	< 0.027	< 0.022	< 0.009	< 0.015
02/01/11	< 0.021	< 0.015	< 0.018	< 0.022	< 0.021	< 0.017	< 0.020	< 0.017	< 0.021
02/08/11	< 0.020	< 0.014	< 0.014	< 0.020	< 0.024	< 0.017	< 0.009	< 0.021	< 0.018
02/15/11	< 0.019	< 0.021	< 0.016	< 0.015	< 0.016	< 0.019	< 0.020	< 0.019	< 0.021
02/22/11	< 0.016	< 0.021	< 0.017	< 0.019	< 0.017	< 0.016	< 0.013	< 0.022	< 0.024
03/01/11	< 0.016	< 0.020	< 0.021	< 0.016	< 0.019	< 0.016	< 0.014	< 0.025	< 0.016
03/08/11	< 0.014	< 0.012	< 0.012	< 0.025	< 0.019	< 0.016	< 0.014	< 0.029	< 0.023
03/15/11	< 0.016	< 0.027	< 0.017	< 0.024	< 0.019	< 0.023	< 0.023	< 0.027	< 0.017
03/22/11	< 0.016	< 0.017	< 0.016	< 0.017	< 0.023	< 0.010	< 0.015	< 0.014	< 0.013
03/29/11	3.415E-02 ± .007	3.230E-02 ± .006	3.130E-02 ± .006	4.185E-02 ± .006	3.440E-02 ± .006	2.625E-02 ± .006	2.770E-02 ± .007	4.150E-02 ± .007	3.230E-02 ± .006
04/05/11	9.950E-02 ± .009	1.095E-01 ± .010	8.810E-02 ± .009	9.765E-02 ± .009	9.330E-02 ± .009	7.825E-02 ± .008	1.025E-01 ± .009	8.070E-02 ± .008	1.105E-01 ± .011
04/12/11	4.360E-02 ± .007	3.265E-02 ± .006	2.070E-02 ± .007	3.440E-02 ± .006	3.875E-02 ± .007	3.780E-02 ± .006	2.895E-02 ± .006	2.990E-02 ± .006	4.350E-02 ± .007
04/19/11	< 0.023	< 0.016	< 0.015	< 0.020	< 0.019	< 0.014	< 0.021	< 0.016	< 0.014
04/26/11	< 0.018	< 0.022	< 0.016	< 0.015	< 0.024	< 0.018	< 0.016	< 0.017	< 0.015
05/03/11	< 0.019	< 0.018	< 0.013	< 0.016	< 0.028	< 0.023	< 0.023	< 0.148	< 0.022
05/10/11	< 0.019	< 0.014	< 0.016	< 0.014	< 0.024	< 0.019	< 0.021	< 0.020	< 0.016
05/17/11	< 0.022	< 0.017	< 0.018	< 0.016	< 0.027	< 0.020	< 0.021	< 0.018	< 0.013
05/24/11	< 0.023	< 0.018	< 0.018	< 0.019	< 0.021	< 0.010	< 0.021	< 0.020	< 0.016
06/01/11	< 0.016	< 0.013	< 0.013	< 0.017	< 0.019	< 0.018	< 0.018	< 0.018	< 0.018
06/07/11	< 0.028	< 0.025	< 0.019	< 0.017	< 0.021	< 0.023	< 0.022	< 0.021	< 0.018
06/14/11	< 0.020	< 0.015	< 0.010	< 0.016	< 0.019	< 0.016	< 0.016	< 0.014	< 0.015
06/21/11	< 0.023	< 0.019	< 0.014	< 0.018	< 0.025	< 0.016	< 0.020	< 0.020	< 0.018
06/28/11	< 0.024	< 0.019	< 0.020	< 0.016	< 0.020	< 0.022	< 0.020	< 0.018	< 0.015

* ODCM Required Sample Location ** Optional Sample Location

TABLE 6-7 (Continued)
ENVIRONMENTAL CHARCOAL CARTRIDGE SAMPLES - OFFSITE SAMPLE LOCATIONS – 2011
I-131 ACTIVITY pCi/ m^3 ± 1 Sigma

Week End Date	R-1 *	R-2 *	R-3 *	R-4 *	R-5 *	D-2 **	E **	F **	G **
07/06/11	< 0.013	< 0.015	< 0.016	< 0.014	< 0.017	< 0.014	< 0.012	< 0.015	< 0.009
07/12/11	< 0.022	< 0.019	< 0.016	< 0.018	< 0.025	< 0.016	< 0.021	< 0.021	< 0.019
07/19/11	< 0.016	< 0.015	< 0.014	< 0.016	< 0.022	< 0.019	< 0.019	< 0.014	< 0.021
07/26/11	< 0.022	< 0.016	< 0.018	< 0.014	< 0.027	< 0.018	< 0.015	< 0.016	< 0.015
08/02/11	< 0.021	< 0.012	< 0.016	< 0.018	< 0.020	< 0.018	< 0.017	< 0.017	< 0.018
08/09/11	< 0.024	< 0.016	< 0.014	< 0.017	< 0.024	< 0.029	< 0.021	< 0.016	< 0.015
08/16/11	< 0.009	< 0.021	< 0.021	< 0.020	< 0.018	< 0.017	< 0.021	< 0.020	< 0.017
08/23/11	< 0.019	< 0.013	< 0.014	< 0.016	< 0.022	< 0.019	< 0.017	< 0.022	< 0.015
08/30/11	< 0.018	< 0.018	< 0.023	< 0.020	< 0.015	< 0.016	< 0.011	< 0.022	< 0.021
09/07/11	< 0.020	< 0.023	< 0.016	< 0.015	< 0.017	< 0.022	< 0.014	< 0.012	< 0.019
09/13/11	< 0.016	< 0.018	< 0.024	< 0.024	< 0.015	< 0.017	< 0.016	< 0.014	< 0.021
09/20/11	< 0.017	< 0.012	< 0.011	< 0.020	< 0.016	< 0.014	< 0.011	< 0.010	< 0.013
09/27/11	< 0.018	< 0.014	< 0.012	< 0.016	< 0.013	< 0.019	< 0.011	< 0.022	< 0.021
10/04/11	< 0.023	< 0.021	< 0.014	< 0.016	< 0.018	< 0.016	< 0.016	< 0.015	< 0.022
10/11/11	< 0.013	< 0.016	< 0.019	< 0.025	< 0.020	< 0.012	< 0.017	< 0.018	< 0.023
10/18/11	< 0.022	< 0.020	< 0.013	< 0.021	< 0.020	< 0.015	< 0.018	< 0.018	< 0.023
10/25/11	< 0.024	< 0.012	< 0.014	< 0.023	< 0.030	< 0.019	< 0.021	< 0.019	< 0.016
11/01/11	< 0.019	< 0.014	< 0.019	< 0.020	< 0.018	< 0.019	< 0.011	< 0.014	< 0.014
11/08/11	< 0.015	< 0.024	< 0.016	< 0.020	< 0.019	< 0.018	< 0.015	< 0.026	< 0.019
11/15/11	< 0.014	< 0.020	< 0.017	< 0.023	< 0.017	< 0.016	< 0.018	< 0.017	< 0.021
11/22/11	< 0.020	< 0.019	< 0.017	< 0.016	< 0.021	< 0.022	< 0.019	< 0.013	< 0.020
11/30/11	< 0.016	< 0.015	< 0.009	< 0.014	< 0.022	< 0.024	< 0.016	< 0.018	< 0.014
12/06/11	< 0.016	< 0.013	< 0.018	< 0.016	< 0.019	< 0.024	< 0.022	< 0.020	< 0.019
12/13/11	< 0.023	< 0.020	< 0.012	< 0.018	< 0.018	< 0.019	< 0.020	< 0.023	< 0.021
12/20/11	< 0.016	< 0.017	< 0.016	< 0.020	< 0.019	< 0.017	< 0.024	< 0.016	< 0.012
12/28/11	< 0.013	< 0.015	< 0.019	< 0.012	< 0.020	< 0.019	< 0.019	< 0.016	< 0.016

* ODCM Required Sample Location
** Optional Sample Location

TABLE 6-8
ENVIRONMENTAL CHARCOAL CARTRIDGE SAMPLES - ONSITE SAMPLE LOCATIONS – 2011
I-131 ACTIVITY pCi/ m^3 ± 1 Sigma

Week End Date	D-1 **	G **	H **	I **	J **	K **
01/03/11	< 0.017	< 0.015	< 0.018	< 0.022	< 0.024	< 0.021
01/10/11	< 0.022	< 0.022	< 0.014	< 0.027	< 0.027	< 0.024
01/17/11	< 0.017	< 0.017	< 0.019	< 0.017	< 0.020	< 0.034
01/24/11	< 0.022	< 0.021	< 0.017	< 0.025	< 0.019	< 0.021
01/31/11	< 0.020	< 0.019	< 0.012	< 0.025	< 0.022	< 0.020
02/07/11	< 0.023	< 0.016	< 0.013	< 0.021	< 0.023	< 0.020
02/14/11	< 0.020	< 0.018	< 0.019	< 0.020	< 0.023	< 0.017
02/21/11	< 0.019	< 0.015	< 0.018	< 0.026	< 0.019	< 0.021
02/28/11	< 0.016	< 0.020	< 0.019	< 0.016	< 0.013	< 0.019
03/07/11	< 0.014	< 0.022	< 0.018	< 0.020	< 0.012	< 0.023
03/14/11	< 0.021	< 0.012	< 0.016	< 0.018	< 0.022	< 0.023
03/21/11	< 0.019	< 0.016	< 0.016	< 0.018	< 0.023	< 0.017
03/28/11	2.506E-02 ± .009	3.856E-02 ± .009	3.962E-02 ± .009	4.573E-02 ± .011	3.904E-02 ± .010	3.283E-02 ± .009
04/04/11	9.465E-02 ± .009	1.002E-01 ± .009	7.805E-02 ± .009	9.710E-02 ± .009	8.790E-02 ± .009	8.675E-02 ± .009
04/11/11	3.565E-02 ± .007	3.340E-02 ± .006	3.905E-02 ± .007	5.130E-02 ± .006	4.615E-02 ± .008	4.635E-02 ± .007
04/18/11	< 0.023	< 0.012	< 0.016	< 0.009	< 0.022	< 0.018
04/25/11	< 0.018	< 0.012	< 0.010	< 0.029	< 0.013	< 0.017
05/02/11	< 0.016	< 0.016	< 0.021	< 0.022	< 0.024	< 0.016
05/09/11	< 0.018	< 0.018	< 0.026	< 0.017	< 0.016	< 0.021
05/16/11	< 0.023	< 0.023	< 0.012	< 0.013	< 0.020	< 0.023
05/23/11	< 0.013	< 0.017	< 0.017	< 0.013	< 0.015	< 0.022
05/31/11	< 0.016	< 0.019	< 0.011	< 0.023	< 0.017	< 0.015
06/06/11	< 0.020	< 0.022	< 0.021	< 0.017	< 0.019	< 0.019
06/13/11	< 0.010	< 0.015	< 0.015	< 0.016	< 0.020	< 0.016
06/20/11	< 0.020	< 0.018	< 0.017	< 0.013	< 0.024	< 0.021
06/27/11	< 0.013	< 0.021	< 0.015	< 0.028	< 0.021	< 0.022

** Optional Sample Location

TABLE 6-8 (Continued)
ENVIRONMENTAL CHARCOAL CARTRIDGE SAMPLES - ONSITE SAMPLE LOCATIONS – 2011
I-131 ACTIVITY pCi/ m^3 ± 1 Sigma

Week End Date	D-1 **	G **	H **	I **	J **	K **
07/05/11	< 0.021	< 0.017	< 0.014	< 0.017	< 0.015	< 0.019
07/11/11	< 0.024	< 0.020	< 0.017	< 0.013	< 0.028	< 0.018
07/18/11	< 0.017	< 0.016	< 0.010	< 0.017	< 0.015	< 0.016
07/25/11	< 0.019	< 0.014	< 0.012	< 0.022	< 0.021	< 0.019
08/01/11	< 0.019	< 0.015	< 0.016	< 0.020	< 0.018	< 0.018
08/08/11	< 0.016	< 0.020	< 0.012	< 0.020	< 0.021	< 0.014
08/15/11	< 0.025	< 0.016	< 0.016	< 0.021	< 0.025	< 0.016
08/22/11	< 0.019	< 0.017	< 0.021	< 0.018	< 0.021	< 0.018
08/29/11	< 0.014	< 0.018	< 0.009	< 0.018	< 0.027	< 0.018
09/06/11	< 0.016	< 0.016	< 0.014	< 0.011	< 0.015	< 0.021
09/12/11	< 0.022	< 0.019	< 0.019	< 0.022	< 0.028	< 0.020
09/19/11	< 0.016	< 0.015	< 0.026	< 0.021	< 0.015	< 0.011
09/26/11	< 0.016	< 0.015	< 0.014	< 0.018	< 0.026	< 0.023
10/03/11	< 0.019	< 0.015	< 0.018	< 0.012	< 0.028	< 0.023
10/10/11	< 0.018	< 0.020	< 0.028	< 0.034	< 0.020	< 0.017
10/17/11	< 0.018	< 0.016	< 0.014	< 0.017	< 0.013	< 0.015
10/24/11	< 0.022	< 0.019	< 0.016	< 0.017	< 0.024	< 0.021
10/31/11	< 0.018	< 0.016	< 0.019	< 0.017	< 0.019	< 0.019
11/07/11	< 0.018	< 0.020	< 0.017	< 0.022	< 0.019	< 0.021
11/14/11	< 0.022	< 0.022	< 0.017	< 0.014	< 0.020	< 0.018
11/21/11	< 0.012	< 0.017	< 0.014	< 0.016	< 0.019	< 0.018
11/28/11	< 0.017	< 0.013	< 0.014	< 0.018	< 0.023	< 0.013
12/05/11	< 0.012	< 0.013	< 0.016	< 0.020	< 0.018	< 0.021
12/12/11	< 0.015	< 0.014	< 0.017	< 0.020	< 0.021	< 0.024
12/19/11	< 0.027	< 0.020	< 0.023	< 0.020	< 0.010	< 0.014
12/27/11	< 0.018	< 0.020	< 0.018	< 0.018	< 0.015	< 0.019

** Optional sample location

TABLE 6-9
CONCENTRATIONS OF GAMMA EMITTERS IN QUARTERLY COMPOSITES
OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2011
Results in Units of 10E-3 pCi/ m^3 ± 1 Sigma

OFFSITE SAMPLE LOCATIONS - 1ST QTR 2011

Nuclide	R-1 *	R-2 *	R-3 *	R-4 *	R-5 *	D-2 **	E **	F **	G **
Be-7	103.6 ± 12.0	112.4 ± 12.1	92.8 ± 10.8	113.0 ± 13.2	119.5 ± 12.6	98.9 ± 11.8	96.9 ± 11.8	99.5 ± 11.4	103.6 ± 12.4
Cs-134	< 1.3	< 2.0	< 1.7	< 1.7	< 1.5	< 1.9	< 2.2	< 1.7	< 2.0
Cs-137	< 1.2	< 1.3	< 1.1	< 0.3	< 1.2	< 1.3	< 1.2	< 1.2	< 1.7
Zr-95	< 3.6	< 2.8	< 3.4	< 3.1	< 3.0	< 4.9	< 3.5	< 2.7	< 3.2
Nb-95	< 2.7	< 2.7	< 3.7	< 2.6	< 2.5	< 2.1	< 3.9	< 2.5	< 3.0
Co-58	< 1.6	< 1.2	< 1.7	< 1.8	< 2.5	< 0.5	< 2.2	< 1.7	< 2.4
Mn-54	< 1.1	< 1.5	< 1.6	< 1.0	< 1.0	< 2.0	< 1.5	< 1.2	< 1.3
Zn-65	< 4.0	< 2.2	< 4.4	< 2.8	< 3.7	< 3.3	< 4.8	< 4.0	< 3.8
Co-60	< 1.7	< 1.5	< 1.2	< 1.8	< 2.1	< 1.9	< 1.3	< 1.0	< 2.2
K-40	< 20.0	< 14.7	< 4.5	< 18.7	< 5.3	< 5.4	< 19.9	23.5 ± 6.2	< 11.6

OFFSITE SAMPLE LOCATIONS - 2ND QTR 2011

Nuclide	R-1 *	R-2 *	R-3 *	R-4 *	R-5 *	D-2 **	E **	F **	G **
Be-7	81.8 ± 11.4	72.6 ± 10.8	92.4 ± 12.4	87.1 ± 11.9	82.6 ± 12.1	75.2 ± 11.2	91.6 ± 13.0	93.3 ± 12.6	99.3 ± 12.2
Cs-134	< 1.4	< 1.8	< 2.0	< 1.7	< 1.8	< 1.8	< 1.5	< 2.0	< 1.7
Cs-137	< 1.0	< 1.3	< 1.4	< 1.2	< 1.5	< 1.0	< 1.8	< 1.9	< 0.8
Zr-95	< 3.7	< 3.8	< 4.6	< 4.8	< 3.3	< 3.4	< 4.9	< 2.7	< 3.2
Nb-95	< 3.6	< 2.5	< 2.2	< 4.1	< 3.7	< 2.0	< 3.2	< 0.8	< 2.8
Co-58	< 2.1	< 1.7	< 2.5	< 2.0	< 1.5	< 1.9	< 2.5	< 2.5	< 2.4
Mn-54	< 1.6	< 1.6	< 1.5	< 1.6	< 1.5	< 1.3	< 1.0	< 2.0	< 1.0
Zn-65	< 3.5	< 3.7	< 3.0	< 4.1	< 3.7	< 3.7	< 5.5	< 3.7	< 1.0
Co-60	< 1.4	< 0.5	< 2.1	< 1.9	< 2.1	< 0.5	< 1.7	< 1.6	< 2.1
K-40	< 5.2	< 18.1	< 17.2	< 4.4	< 19.3	< 20.1	< 22.0	31.3 ± 8.4	< 14.7

* ODCM Required Sample Loction
** Optional Sample Location

TABLE 6-9 (Continued)
CONCENTRATIONS OF GAMMA EMITTERS IN QUARTERLY COMPOSITES
OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2011
Results in Units of 10E-3 pCi/ m^3 ± 1 Sigma

OFFSITE SAMPLE LOCATIONS - 3RD QTR 2011

Nuclide	R-1 *	R-2 *	R-3 *	R-4 *	R-5 *	D-2 **	E **	F **	G **
Be-7	98.4 ± 12.4	101.9 ± 12.7	94.4 ± 12.4	83.5 ± 10.3	94.4 ± 12.0	73.8 ± 11.9	108.7 ± 11.8	100.8 ± 12.1	95.6 ± 11.2
Cs-134	< 2.3	< 1.9	< 2.1	< 1.4	< 2.1	< 1.3	< 1.7	< 1.8	< 1.3
Cs-137	< 1.2	< 1.0	< 1.3	< 0.9	< 0.8	< 1.3	< 1.0	< 1.1	< 1.1
Zr-95	< 3.1	< 4.2	< 3.5	< 3.1	< 4.0	< 4.8	< 2.7	< 3.2	< 3.0
Nb-95	< 0.8	< 4.5	< 2.6	< 2.6	< 2.6	< 3.2	< 3.2	< 2.6	< 2.8
Co-58	< 2.3	< 1.7	< 2.2	< 2.2	< 1.8	< 1.9	< 1.2	< 1.5	< 1.9
Mn-54	< 1.7	< 1.4	< 1.3	< 1.6	< 1.8	< 1.4	< 1.1	< 1.7	< 1.3
Zn-65	< 4.4	< 4.1	< 3.2	< 3.5	< 4.5	< 3.7	< 3.1	< 3.5	< 3.1
Co-60	< 1.6	< 1.3	< 0.5	< 1.7	< 2.5	< 1.6	< 1.2	< 1.9	< 1.2
K-40	42.1 ± 10.7	< 4.5	< 4.7	< 4.4	< 5.5	< 15.1	< 4.2	< 4.2	< 12.3

OFFSITE SAMPLE LOCATIONS - 4TH QTR 2011

Nuclide	R-1 *	R-2 *	R-3 *	R-4 *	R-5 *	D-2 **	E **	F **	G **
Be-7	104.5 ± 12.1	96.3 ± 11.4	78.3 ± 9.7	75.8 ± 10.5	85.7 ± 11.2	100.0 ± 12.9	91.7 ± 12.1	78.9 ± 10.6	104.6 ± 11.7
Cs-134	< 2.0	< 2.1	< 1.5	< 1.4	< 1.6	< 1.7	< 2.1	< 2.0	< 2.0
Cs-137	< 1.2	< 1.0	< 1.2	< 1.0	< 0.9	< 1.3	< 1.3	< 0.9	< 1.2
Zr-95	< 4.0	< 2.8	< 3.6	< 0.9	< 4.1	< 3.9	< 5.4	< 3.7	< 3.6
Nb-95	< 3.0	< 2.3	< 3.0	< 3.2	< 2.4	< 3.2	< 3.3	< 3.5	< 1.8
Co-58	< 3.0	< 2.0	< 1.4	< 2.0	< 2.0	< 2.2	< 2.3	< 2.4	< 1.8
Mn-54	< 1.9	< 1.7	< 1.6	< 1.4	< 1.4	< 1.9	< 1.3	< 0.9	< 2.1
Zn-65	< 3.7	< 2.7	< 2.3	< 1.0	< 2.4	< 3.6	< 3.3	< 3.3	< 2.7
Co-60	< 1.8	< 1.7	< 1.4	< 1.4	< 1.5	< 0.5	< 1.4	< 1.8	< 1.2
K-40	< 15.5	< 14.7	< 14.7	< 18.3	< 4.5	< 16.5	< 14.6	< 15.4	< 11.6

* ODCM Required Sample Loction
** Optional Sample Location

TABLE 6-9 (Continued)
CONCENTRATIONS OF GAMMA EMITTERS IN QUARTERLY COMPOSITES OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2011
Results in Units of 10E-3 pCi/ m^3 ± 1 Sigma

ONSITE SAMPLE LOCATIONS - 1ST QTR 2011

Nuclide	D-1 **	G **	H **	I **	J **	K **
Be-7	103.4 ± 12.6	103.3 ± 12.5	99.8 ± 13.0	121.0 ± 12.8	115.7 ± 12.3	107.2 ± 13.0
Cs-134	< 1.9	< 2.1	< 1.9	< 1.8	< 0.3	< 2.2
Cs-137	< 1.7	< 1.4	< 1.0	< 0.9	< 1.2	< 1.9
Zr-95	< 3.6	< 4.6	< 3.6	< 4.0	< 3.1	< 3.2
Nb-95	< 3.0	< 3.6	< 3.3	< 1.8	< 3.4	< 2.7
Co-58	< 2.4	< 2.2	< 2.4	< 1.2	< 2.1	< 1.5
Mn-54	< 2.2	< 1.7	< 1.5	< 1.4	< 1.6	< 2.0
Zn-65	< 3.8	< 3.9	< 3.1	< 3.1	< 4.6	< 3.9
Co-60	< 0.5	< 0.5	< 1.2	< 1.5	< 1.4	< 2.5
K-40	< 5.4	< 5.4	< 18.9	< 20.1	< 5.2	53.0 ± 10.4

ONSITE SAMPLE LOCATIONS - 2ND QTR 2011

Nuclide	D-1 **	G **	H **	I **	J **	K **
Be-7	107.1 ± 12.7	88.8 ± 12.4	86.2 ± 11.8	94.1 ± 13.0	98.3 ± 12.0	94.7 ± 11.3
Cs-134	< 2.1	< 1.8	< 1.7	< 1.4	< 1.9	< 1.9
Cs-137	< 1.3	< 1.3	< 1.2	< 1.1	< 0.7	< 1.2
Zr-95	< 4.1	< 3.9	< 3.3	< 3.8	< 4.8	< 4.1
Nb-95	< 3.5	< 3.1	< 2.9	< 5.0	< 3.9	< 3.0
Co-58	< 1.6	< 2.5	< 2.2	< 1.5	< 2.3	< 0.5
Mn-54	< 2.1	< 1.7	< 1.8	< 1.3	< 1.8	< 1.6
Zn-65	< 3.8	< 2.5	< 1.0	< 3.8	< 3.4	< 3.1
Co-60	< 1.9	< 0.5	< 0.5	< 0.5	< 1.2	< 0.4
K-40	< 11.4	< 15.4	< 14.8	< 17.1	< 15.2	< 17.8

** Optional Sample Location

TABLE 6-9 (Continued)
CONCENTRATIONS OF GAMMA EMITTERS IN QUARTERLY COMPOSITES
OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2011
Results in Units of 10E-3 pCi/ m^3 ± 1 Sigma

ONSITE SAMPLE LOCATIONS - 3RD QTR 2011

Nuclide	D-1 **	G **	H **	I **	J **	K **
Be-7	77.4 ± 10.6	108.1 ± 12.9	83.1 ± 11.8	102.3 ± 11.8	104.4 ± 12.0	85.0 ± 11.0
Cs-134	< 1.5	< 1.8	< 1.9	< 1.3	< 1.6	< 1.8
Cs-137	< 1.1	< 1.2	< 0.8	< 1.2	< 1.5	< 1.1
Zr-95	< 3.0	< 0.8	< 3.5	< 3.9	< 3.7	< 4.7
Nb-95	< 3.5	< 3.6	< 2.9	< 3.3	< 2.2	< 2.7
Co-58	< 1.9	< 1.3	< 2.1	< 2.0	< 1.2	< 1.6
Mn-54	< 1.3	< 1.1	< 1.9	< 1.3	< 1.3	< 1.7
Zn-65	< 3.6	< 4.1	< 3.7	< 2.9	< 3.1	< 3.1
Co-60	< 1.5	< 1.5	< 1.6	< 1.3	< 1.5	< 1.2
K-40	< 12.2	< 15.7	< 21.5	29.6 ± 7.0	< 15.3	< 15.3

ONSITE SAMPLE LOCATIONS - 4TH QTR 2011

Nuclide	D-1 **	G **	H **	I **	J **	K **
Be-7	86.3 ± 10.5	84.7 ± 11.0	72.9 ± 10.5	94.8 ± 10.7	89.5 ± 12.3	110.4 ± 12.8
Cs-134	< 1.9	< 1.4	< 1.5	< 1.7	< 1.9	< 2.0
Cs-137	< 1.0	< 1.2	< 0.9	< 1.1	< 1.2	< 1.1
Zr-95	< 3.6	< 4.3	< 3.0	< 2.1	< 4.4	< 3.1
Nb-95	< 3.5	< 3.8	< 2.5	< 2.2	< 3.6	< 3.3
Co-58	< 1.2	< 1.4	< 1.3	< 1.6	< 0.5	< 1.8
Mn-54	< 1.8	< 1.0	< 1.2	< 1.3	< 1.7	< 1.5
Zn-65	< 4.1	< 2.3	< 2.6	< 3.1	< 5.1	< 4.2
Co-60	< 1.5	< 1.1	< 1.4	< 1.5	< 0.5	< 0.5
K-40	< 20.9	< 11.6	< 18.0	< 12.2	< 16.2	< 23.3

** Optional Sample Location

TABLE 6-10
DIRECT RADIATION MEASUREMENT RESULTS – 2011
Results in Units of mrem/std. Month ± 1 Sigma

LOCATION NUMBER		FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER	DEGREES & DISTANCE (1)
3	D1 Onsite	10.98 ± 0.46	12.98 ± 0.44	12.45 ± 0.57	10.35 ± 0.31	69° at 0.2 miles
4	D2 Onsite	3.83 ± 0.18	5.14 ± 0.23	4.04 ± 0.25	4.07 ± 0.19	140° at 0.4 miles
5	E Onsite	3.88 ± 0.18	5.09 ± 0.20	4.61 ± 0.22	4.12 ± 0.16	175° at 0.4 miles
6	F Onsite	3.25 ± 0.18	4.41 ± 0.28	3.97 ± 0.28	3.52 ± 0.13	210° at 0.5 miles
7*	G Onsite	3.13 ± 0.18	4.47 ± 0.23	4.01 ± 0.17	3.52 ± 0.20	250° at 0.7 miles
8*	R-5 Offsite Control	4.08 ± 0.22	5.45 ± 0.27	5.10 ± 0.30	4.49 ± 0.14	42° at 16.4 miles
9	D1 Offsite	3.50 ± 0.21	4.61 ± 0.25	4.23 ± 0.28	3.85 ± 0.21	80° at 11.4 miles
10	D2 Offsite	3.31 ± 0.24	4.16 ± 0.20	4.50 ± 0.25	3.72 ± 0.20	117° at 9.0 miles
11	E Offsite	3.32 ± 0.19	4.60 ± 0.28	3.99 ± 0.20	3.73 ± 0.12	160° at 7.2 miles
12	F- Offsite	3.18 ± 0.18	4.67 ± 0.22	4.18 ± 0.28	3.81 ± 0.14	190° at 7.7 miles
13	G Offsite	3.40 ± 0.20	4.80 ± 0.30	4.14 ± 0.24	3.92 ± 0.24	225° at 5.3 miles
14*	DeMass Rd SW Oswego - Control	3.22 ± 0.18	4.67 ± 0.23	4.27 ± 0.23	3.78 ± 0.17	226° at 12.6 miles
15*	Pole 66 W Boundary - Bible Camp	3.26 ± 0.19	4.36 ± 0.22	3.70 ± 0.17	3.51 ± 0.11	237° at 0.9 miles
18*	Energy Info Center - Lamp Post SW	4.13 ± 0.22	4.55 ± 0.17	5.29 ± 0.28	4.27 ± 0.16	265° at 0.4 miles
19	East Boundary - JAF Pole 9	4.01 ± 0.20	4.99 ± 0.21	4.64 ± 0.20	4.28 ± 0.17	81° at 1.3 miles
23*	H Onsite	4.48 ± 0.20	5.92 ± 0.32	5.18 ± 0.25	4.79 ± 0.25	70° at 0.8 miles
24	I Onsite	3.83 ± 0.25	4.67 ± 0.22	4.54 ± 0.26	3.96 ± 0.12	98° at 0.8 miles
25	J Onsite	3.75 ± 0.21	4.83 ± 0.24	4.45 ± 0.22	4.06 ± 0.17	110° at 0.9 miles
26	K Onsite	3.57 ± 0.23	4.79 ± 0.23	4.28 ± 0.21	3.76 ± 0.15	132° at 0.5 miles
27	N Fence N of Switchyard JAF	18.50 ± 1.11	21.52 ± 1.35	20.45 ± 1.24	18.29 ± 0.88	60° at 0.4 miles
28	N Light Pole N of Screenhouse JAF	22.24 ± 1.31	28.82 ± 1.42	27.76 ± 1.29	23.72 ± 0.88	68° at 0.5 miles
29	N Fence N of W Side	20.87 ± 1.25	26.30 ± 1.47	21.89 ± 0.91	23.61 ± 1.42	65° at 0.5 miles
30	N Fence (NW) JAF	10.11 ± 0.57	11.77 ± 0.82	11.16 ± 0.70	11.38 ± 0.95	57° at 0.4 miles
31	N Fence (NW) NMP-1	6.42 ± 0.32	8.03 ± 0.34	7.19 ± 0.31	7.29 ± 0.33	276° at 0.2 miles
39	N Fence Rad Waste-NMP-1	10.17 ± 0.44	12.26 ± 0.45	11.15 ± 0.56	10.68 ± 0.36	292° at 0.2 miles
47	N Fence (NE) JAF	6.02 ± 0.25	7.33 ± 0.33	6.74 ± 0.38	6.95 ± 0.39	69° at 0.6 miles
49*	Phoenix NY-Control	2.61 ± 0.12	4.22 ± 0.22	3.38 ± 0.17	3.89 ± 0.23	163° at 19.8 miles
51	Liberty & Bronson Sts E of OSS	3.33 ± 0.20	5.08 ± 0.43	4.07 ± 0.20	4.07 ± 0.15	233° at 7.4 miles
52	E 12th & Cayuga Sts Oswego School	3.22 ± 0.16	4.52 ± 0.20	3.99 ± 0.21	3.89 ± 0.13	227° at 5.8 miles
53	Broadwell & Chestnut Sts Fulton HS	3.29 ± 0.16	5.10 ± 0.31	4.30 ± 0.25	4.27 ± 0.16	183° at 13.7 miles
54	Liberty St & Co Rt 16 Mexico HS	3.30 ± 0.22	4.14 ± 0.22	4.38 ± 0.31	3.92 ± 0.20	115° at 9.3 miles
55	Gas Substation Co Rt 5-Pulaski	3.21 ± 0.21	4.74 ± 0.21	4.03 ± 0.22	4.07 ± 0.14	75° at 13.0 miles
56*	Rt 104-New Haven Sch (SE Corner)	2.87 ± 0.18	4.06 ± 0.21	4.35 ± 0.22	3.81 ± 0.15	123° at 5.3 miles
58*	Co Rt 1A-Alcan (E of E Entrance Rd)	3.55 ± 0.21	4.91 ± 0.24	4.43 ± 0.26	4.24 ± 0.21	220° at 3.1 miles
75*	Unit 2 N Fence N of Reactor Bldg	6.78 ± 0.43	8.23 ± 0.28	7.55 ± 0.41	7.39 ± 0.33	5° at 0.1 miles
76*	Unit 2 N Fence N of Change House	5.19 ± 0.26	6.54 ± 0.25	5.78 ± 0.32	5.44 ± 0.22	25° at 0.1 miles
77*	Unit 2 N Fence N of Pipe Bldg	5.96 ± 0.32	7.30 ± 0.29	6.55 ± 0.45	6.66 ± 0.22	45° at 0.2 miles

(1) Direction and distance based on NMP-2 reactor centerline.

TABLE 6-10 (Continued)
DIRECT RADIATION MEASUREMENT RESULTS – 2011
Results in Units of mrem/std. Month ± 1 Sigma

LOCATION NUMBER		FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER	DEGREES & DISTANCE (1)
78*	JAF E of E Old Lay Down Area	3.76 ± 0.20	5.07 ± 0.21	4.52 ± 0.26	4.41 ± 0.15	90° at 1.0 miles
79*	Co Rt 29 Pole #63 02 mi S of Lake Rd	3.44 ± 0.21	4.56 ± 0.21	4.17 ± 0.18	3.90 ± 0.20	115° at 1.1 miles
80*	Co Rt 29 Pole #54 07 mi S of Lake Rd	3.33 ± 0.15	4.74 ± 0.24	4.31 ± 0.26	3.99 ± 0.25	133° at 1.4 miles
81*	Miner Rd Pole #16 05 mi W of Rt 29	3.38 ± 0.15	4.55 ± 0.24	4.11 ± 0.20	3.81 ± 0.14	159° at 1.6 miles
82*	Miner Rd Pole # 1-1/2 11 mi W of Rt 29	3.31 ± 0.17	4.72 ± 0.23	4.02 ± 0.19	3.79 ± 0.18	181° at 1.6 miles
83*	Lakeview Rd Tree 045 mi N of Miner Rd	3.33 ± 0.15	3.99 ± 0.18	4.44 ± 0.20	3.74 ± 0.14	200° at 1.2 miles
84*	Lakeview Rd N Pole #6117 200ft N of Lake Rd	3.59 ± 0.21	4.59 ± 0.25	4.15 ± 0.21	4.13 ± 0.15	225° at 1.1 miles
85*	Unit 1 N Fence N of W Side of Screen House	9.46 ± 0.37	11.58 ± 0.45	10.91 ± 0.57	10.58 ± 0.50	294° at 0.2 miles
86*	Unit 2 N Fence N of W Side of Screen House	7.30 ± 0.50	8.74 ± 0.41	8.27 ± 0.46	8.24 ± 0.33	315° at 0.1 miles
87*	Unit 2 N Fence N of E Side of Screen House	7.48 ± 0.38	8.92 ± 0.34	8.11 ± 0.48	8.01 ± 0.26	341° at 0.1 miles
88*	Hickory Grove Rd Pole #2 06 mi N of Rt 1	3.39 ± 0.21	4.55 ± 0.22	4.12 ± 0.19	3.91 ± 0.23	97° at 4.5 miles
89*	Leavitt Rd Pole #16 04 mi S of Rt1	3.67 ± 0.18	5.02 ± 0.23	4.46 ± 0.23	4.22 ± 0.21	111° at 4.1 miles
90*	Rt 104 Pole #300 150 ft E of Keefe Rd	3.42 ± 0.17	4.51 ± 0.18	4.59 ± 0.24	3.88 ± 0.17	135° at 4.2 miles
91*	Rt 51A Pole #59 08 mi W of Rt 51	3.00 ± 0.18	4.58 ± 0.22	3.80 ± 0.20	3.77 ± 0.18	156° at 4.8 miles
92*	Maiden Lane Rd Power Pole 06 mi S of Rt 104	3.42 ± 0.19	5.25 ± 0.23	4.31 ± 0.21	4.31 ± 0.22	183° at 4.4 miles
93*	Rt 53 Pole 1-1 120 ft S of Rt 104	3.27 ± 0.14	4.67 ± 0.24	4.00 ± 0.21	3.91 ± 0.20	205° at 4.4 miles
94*	Rt 1 Pole #82 250 ft E of Kocher Rd (Co Rt 63)	3.10 ± 0.15	4.42 ± 0.23	3.71 ± 0.18	3.62 ± 0.27	223° at 4.7 miles
95*	Alcan W access Rd Joe Fultz Blvd Pole #21	3.10 ± 0.15	4.22 ± 0.19	3.46 ± 0.18	3.61 ± 0.27	237° at 4.1 miles
96*	Creamery Rd 03 mi S of Middle Rd Pole 1-1/2	3.12 ± 0.17	4.46 ± 0.23	4.00 ± 0.19	3.83 ± 0.16	199° at 3.6 miles
97*	Rt 29 Pole #50 200ft N of Miner Rd	3.30 ± 0.19	4.71 ± 0.24	3.92 ± 0.21	3.97 ± 0.24	143° at 1.8 miles
98	Lake Rd Pole #145 015 mi E of Rt 29	3.41 ± 0.16	4.66 ± 0.22	4.26 ± 0.27	4.19 ± 0.24	101° at 1.2 miles
99	NMP Rd 04 mi N of Lake Rd Env Station R1	3.51 ± 0.19	4.92 ± 0.24	4.25 ± 0.22	4.22 ± 0.15	88° at 1.8 miles
100	Rt 29 & Lake Rd Env Station R2	3.45 ± 0.15	4.65 ± 0.22	4.06 ± 0.19	4.08 ± 0.14	104° at 1.1 miles
101	Rt 29 07 mi S of Lake Rd Env Station R3	3.21 ± 0.20	4.31 ± 0.21	3.97 ± 0.31	3.68 ± 0.13	132° at 1.5 miles
102	EOF/Env Lab Rt 176 E Driveway Lamp Post	3.15 ± 0.16	4.57 ± 0.32	3.86 ± 0.21	4.00 ± 0.14	175° at 11.9 miles
103	EIC East Garage Rd Lamp Post	3.89 ± 0.21	4.57 ± 0.19	4.80 ± 0.25	4.53 ± 0.18	267° at 0.4 miles
104	Parkhurst Rd Pole #23 01 mi S of Lake rd	3.40 ± 0.20	4.48 ± 0.20	4.18 ± 0.21	4.13 ± 0.17	102° at 1.4 miles
105	Lake view Rd Pole #36 05 mi S of Lake Rd	3.44 ± 0.23	4.19 ± 0.23	4.68 ± 0.33	4.14 ± 0.21	198° at 1.4 miles
106	Shoreline Cove W of NMP-1 Tree on W Edge	4.19 ± 0.21	5.13 ± 0.24	6.03 ± 0.31	5.54 ± 0.21	274° at 0.3 miles
107	Shoreline Cove W of NMP-1 30 ft SSW of #106	4.07 ± 0.20	5.04 ± 0.22	5.48 ± 0.27	5.17 ± 0.20	272° at 0.3 miles
108	Lake Rd Pole #142 300 ft E of Rt 29 S	3.56 ± 0.17	4.77 ± 0.21	4.20 ± 0.17	4.15 ± 0.16	104° at 1.1 miles
109	Tree North of Lake Rd 300 ft E of Rt 29 N	3.39 ± 0.15	4.70 ± 0.26	4.29 ± 0.28	4.25 ± 0.25	103° at 1.1 miles
111	State Route 38 Sterling NY - Control	3.03 ± 0.20	4.50 ± 0.22	3.87 ± 0.18	3.84 ± 0.14	166° at 26.4 miles
112	EOF/Env Lab Oswego County Airport	3.52 ± 0.16	4.76 ± 0.21	3.87 ± 0.27	4.13 ± 0.18	175° at 11.9 miles
113	Baldwinsville NY - Control	2.98 ± 0.16	4.34 ± 0.20	3.57 ± 0.18	3.87 ± 0.16	214° at 21.8 miles

(1) Direction and distance based on NMP-2 reactor centerline.

* TLD required by ODCM

TABLE 6-11
CONCENTRATIONS OF IODINE-131 AND GAMMA EMITTERS IN MILK – 2011
Results in Units of pCi/liter ± 1 Sigma
Sample Location ** No. 55 ***

Date	I-131	Cs-134	Cs-137	K-40	Ba/La-140	Others †
04/11/11	< 0.588	< 5.54	< 5.24	1686 ± 66.6	< 5.17	<LLD
04/25/11	< 0.528	< 4.00	< 5.61	1571 ± 71.4	< 5.48	<LLD
05/09/11	< 0.472	< 8.12	< 6.01	1349 ± 77.3	< 4.71	<LLD
05/23/11	< 0.634	< 7.52	< 5.23	1335 ± 62.1	< 3.22	<LLD
06/06/11	< 0.480	< 7.57	< 6.37	1419 ± 81.3	< 8.07	<LLD
06/20/11	< 0.595	< 6.25	< 5.79	1643 ± 77.6	< 7.15	<LLD
07/11/11	< 0.580	< 3.40	< 4.97	1565 ± 70.6	< 5.83	<LLD
07/27/11	< 0.506	< 12.81	< 10.41	1820 ± 107.8	< 12.30	<LLD
08/08/11	< 0.621	< 12.94	< 10.79	1755 ± 109.4	< 12.34	<LLD
08/22/11	< 0.423	< 7.66	< 8.19	1692 ± 104.5	< 10.43	<LLD
09/06/11	< 0.597	< 3.64	< 4.82	1530 ± 60.5	< 4.69	<LLD
09/19/11	< 0.530	< 8.12	< 7.78	1587 ± 84.6	< 3.73	<LLD
10/03/11	< 0.656	< 4.49	< 6.88	1564 ± 82.6	< 4.72	<LLD
10/17/11	< 0.651	< 6.04	< 10.19	1657 ± 100.4	< 6.78	<LLD
11/07/11	< 0.627	< 4.39	< 7.55	1594 ± 76.6	< 8.67	<LLD
11/21/11	< 0.700	< 8.01	< 6.32	1544 ± 81.4	< 6.96	<LLD
12/06/11	< 0.705	< 12.39	< 9.35	1631 ± 103.5	< 9.01	<LLD
12/19/11	< 0.616	< 7.67	< 6.98	1307 ± 74.4	< 7.43	<LLD

** Sample Location is Optional
*** Corresponds to sample location noted on Figure 3.3-4
† Plant related radionuclides

TABLE 6-11(Continued)
CONCENTRATIONS OF IODINE-131 AND GAMMA EMITTERS IN MILK – 2011
Results in Units of pCi/liter ± 1 Sigma
Sample Location * No. 77 (Control) ***

Date	I-131	Cs-134	Cs-137	K-40	Ba/La-140	Others †
04/11/11	< 0.470	< 6.96	< 7.73	1540 ± 83.2	< 7.87	<LLD
04/25/11	< 0.519	< 4.91	< 5.71	1567 ± 84.0	< 7.36	<LLD
05/09/11	< 0.430	< 7.53	< 4.61	1458 ± 67.4	< 6.76	<LLD
05/23/11	< 0.540	< 8.19	< 7.37	1340 ± 73.9	< 7.22	<LLD
06/06/11	< 0.642	< 8.09	< 5.71	1385 ± 68.1	< 4.65	<LLD
06/20/11	< 0.629	< 5.66	< 8.34	1762 ± 103.9	< 8.96	<LLD
07/11/11	< 0.729	< 8.87	< 6.20	1588 ± 84.3	< 8.03	<LLD
07/27/11	< 0.522	< 9.08	< 6.46	1540 ± 84.8	< 7.88	<LLD
08/08/11	< 0.801	< 10.59	< 11.09	1543 ± 100.5	< 6.92	<LLD
08/22/11	< 0.412	< 4.67	< 6.87	1506 ± 84.7	< 6.89	<LLD
09/06/11	< 0.415	< 8.94	< 7.90	1815 ± 93.0	< 8.20	<LLD
09/19/11	< 0.638	< 4.27	< 5.41	1545 ± 71.0	< 6.15	<LLD
10/03/11	< 0.584	< 3.95	< 6.36	1413 ± 68.1	< 6.47	<LLD
10/17/11	< 0.562	< 4.33	< 6.33	1651 ± 79.7	< 5.62	<LLD
11/07/11	< 0.712	< 9.05	< 7.47	1603 ± 87.3	< 8.72	<LLD
11/21/11	< 0.575	< 4.25	< 5.86	1391 ± 66.8	< 6.34	<LLD
12/06/11	< 0.699	< 11.37	< 10.03	1662 ± 101.0	< 10.35	<LLD
12/19/11	< 0.814	< 4.30	< 5.05	1392 ± 68.4	< 4.08	<LLD

** Sample Location is required by the ODCM
*** Corresponds to sample location noted on Figure 3.3-4
† Plant related radionuclides

TABLE 6-12
CONCENTRATIONS OF GAMMA EMITTERS IN FOOD PRODUCTS - 2011
Results in Units of pCi/kg (wet) ± 1 sigma

Location ***	Date	Description	Be-7	K-40	I-131	Cs-134	Cs-137	Zn-65	C-14	Others†
C2* Flack	9/7/2011	Horseradish Leaves	1834 ± 84	3905 ± 161	< 18.4	< 12	< 15.2	< 34	< 3060	<LLD
	9/7/2011	Squash Leaves	2482 ± 69	2523 ± 96	< 12.7	< 10.1	< 7.9	< 24.3	††	<LLD
	9/7/2011	Tomatoes	< 46	1884 ± 83	< 8.8	< 5.1	< 6.2	< 20.1	< 2770	<LLD
	9/7/2011	Rhubarb Leaves	303 < 49	3929 ± 163	< 18.9	< 10.6	< 13.3	< 39.5	††	<LLD

Location ***	Date	Description	Be-7	K-40	I-131	Cs-134	Cs-137	Zn-65	C-14	Others†
133 ** Culeton	9/6/2011	Rhubarb Leaves	266 ± 32	3280 ± 109	< 13.6	< 12.3	< 8.9	< 23.3	††	<LLD
	9/6/2011	Tomatoes	†††	†††	†††	†††	†††	†††	< 1950	<LLD

Location ***	Date	Description	Be-7	K-40	I-131	Cs-134	Cs-137	Zn-65	C-14	Others†
144* Whaley	9/6/2011	Corn Leaves	3323 ± 129	4246 ± 210	< 30.8	< 16.2	< 20.5	< 54.3	††	<LLD
	9/6/2011	Horseradish Leaves	1656 ± 77	< 183	< 22.4	< 11.6	< 15.1	< 40.2	††	<LLD
	9/6/2011	Tomatoes	< 54	2307 ± 77	< 8	< 6.2	< 5.8	< 16.4	< 2910	<LLD

Location ***	Date	Description	Be-7	K-40	I-131	Cs-134	Cs-137	Zn-65	C-14	Others†
484* O'Connor	9/6/2011	Tomatoes	< 88	2309 ± 114	< 17.6	< 8.4	< 10.6	< 32.6	††	<LLD
	9/6/2011	Squash Leaves	2557 ± 87	4640 ± 162	< 20.6	< 10.1	< 12.3	< 36.6	< 2740	<LLD
	9/6/2011	Brussel Sprouts	291 ± 62	2442 ± 161	< 26.6	< 13.7	< 18.5	< 44.8	††	<LLD
	9/6/2011	Cabbage	274 ± 57	2672 ± 164	< 34.7	< 16	< 19.3	< 54.7	††	<LLD

Location ***	Date	Description	Be-7	K-40	I-131	Cs-134	Cs-137	Zn-65	C-14	Others†
48** Kronenbitter	9/6/2011	Tomatoes	< 67	2297 ± 97	< 10.9	< 5.2	< 7.2	< 19.2	††	<LLD
	9/6/2011	Grape Leaves	2016 ± 87	3551 ± 161	< 21.4	< 13.6	< 16.4	< 38.2	< 3000	<LLD

* Sample Location Required by the ODCM
** Sample Location is Optional
*** Corresponds to Sample Location noted on Figure 3.3-5
† Plant Related Radionuclides
†† Carbon-14 analysis not performed on this sample
††† Sample only analyzed for Carbon-14

TABLE 6-13

MILK ANIMAL CENSUS 2011

Town or Area[(a)]	Location Designation[(1)]	Degrees[(2)]	Distance[(2)] (Miles)	Number of Milk Animals (Cows)
Scriba	62	184°	6.6	0
New Haven	9	98°	4.8	40
	64	108°	7.8	26
	78	128°	8.0	19
Mexico	14	125°	9.1	55
	60	91°	9.5	0
	55*	97°	8.8	54
	21	112°	10.4	61
	72	100°	9.6	34
	50	93°	8.7	0
Granby (Control)	77**	190°	16.0	63

MILKING ANIMAL TOTALS: 352
(including control locations)

MILKING ANIMAL TOTALS: 289
(excluding control locations)

NOTES:
- * Milk sample location
- ** Milk sample control location
- (1) Reference Figure 3.3-4
- (2) Degrees and distance are based on NMP-2 Reactor Building centerline
- (a) Census performed out to a distance of approximately 10 miles

TABLE 6-14
2011 RESIDENCE CENSUS

Meteorological Sector	Location	Map Location[1]	Direction[2]	Distance[2]
N	*	-	-	-
NNE	*	-	-	-
NE	*	-	-	-
ENE	*	-	-	-
E	80 Sunset Bay Road	A	83°	1.04 miles
ESE	161 Lake Road	B	116°	0.70 miles
SE	1216 County Route 29	C	143°	1.07 miles
SSE	1146 County Route 29	D	152°	1.29 miles
S	268 Miner Road	E	173°	1.59 miles
SSW	210 Lakeview Road	F	213°	1.65 miles
SW	319 Lakeview Road	G	230°	1.45 miles
WSW	Bayshore Drive	H	242°	1.81 miles
W	*	-	-	-
WNW	*	-	-	-
NW	*	-	-	-
NNW	*	-	-	-

NOTES:
* This meteorological sector is over Lake Ontario. There is no residence within five miles
(1) Corresponds to Figure 3.3-6
(2) Direction and distance are based on JAF Reactor Building centerline

7.0 HISTORICAL DATA TABLES

Sample Statistics from Previous Environmental Sampling

The mean, minimum value and maximum value were calculated for selected sample mediums and isotopes.

Special Considerations:

1. Sample data listed as 1969 was taken from the NINE MILE POINT, PREOPERATION SURVEY, 1969 and ENVIRONMENTAL MONITORING REPORT FOR NIAGARA MOHAWK POWER CORPORATION NINE MILE POINT NUCLEAR STATION, NOVEMBER, 1970.

2. Sample results listed as 1974 and 1975 were taken from the respective Annual Radiological Environmental Operating Reports for Nine Mile Point Unit 1 Nuclear Station. Sample results listed as 1986 through the current year were taken from the respective James A. FitzPatrick Nuclear Power Plant Annual Radiological Environmental Operating Reports.

3. Only measured values were used for statistical calculations.

4. The term MDL was used prior to 1979 to represent the concept of Lower Limit of Detection (LLD). MDL = Minimum Detectable Level.

TABLE 7-1

HISTORICAL ENVIRONMENTAL SAMPLE DATA

SHORELINE SEDIMENT

Results in pCi/g (dry)

LOCATION: CONTROL *									
Isotope	**Cs-134**			**Cs-137**			**Co-60**		
Year	**Min.**	**Max.**	**Mean**	**Min.**	**Max.**	**Mean**	**Min.**	**Max.**	**Mean**
1969†	**	**	**	**	**	**	**	**	**
1974†	**	**	**	**	**	**	**	**	**
1975†	**	**	**	**	**	**	**	**	**
1986	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1987	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD	0.027	0.027	0.027	<LLD	<LLD	<LLD
1994	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1998	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2002	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2003	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2004	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2005	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2006	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2007	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2008	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2009	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2010	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2011	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* Langs Beach – beyond influence of the site in a westerly direction.

** No data. Sample not required until new technical specifications implemented in 1985.

† 1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.

TABLE 7-2
HISTORICAL ENVIRONMENTAL SAMPLE DATA
SHORELINE SEDIMENT
Results in pCi/g (dry)

LOCATION: INDICATOR *									
Isotope	Cs-134			Cs-137			Co-60		
Year	Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.	Mean
1969†	**	**	**	**	**	**	**	**	**
1974†	**	**	**	**	**	**	**	**	**
1975†	**	**	**	**	**	**	**	**	**
1986	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1987	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD	0.25	0.32	0.29	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD	0.28	0.30	0.29	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD	0.12	0.14	0.13	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD	0.12	0.14	0.13	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD	0.18	0.46	0.32	<LLD	<LLD	<LLD
1994	<LLD	<LLD	<LLD	0.06	0.37	0.22	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD	0.14	0.15	0.15	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD	0.15	0.17	0.16	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD	0.11	0.17	0.14	<LLD	<LLD	<LLD
1998	<LLD	<LLD	<LLD	0.06	0.06	0.06	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD	0.06	0.10	0.08	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD	0.06	0.07	0.06	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD	0.06	0.07	0.07	<LLD	<LLD	<LLD
2002	<LLD	<LLD	<LLD	0.05	0.05	0.05	<LLD	<LLD	<LLD
2003	<LLD	<LLD	<LLD	0.04	0.05	0.05	<LLD	<LLD	<LLD
2004	<LLD	<LLD	<LLD	0.04	0.04	0.04	<LLD	<LLD	<LLD
2005	<LLD	<LLD	<LLD	0.06	0.09	0.08	<LLD	<LLD	<LLD
2006	<LLD	<LLD	<LLD	0.06	0.06	0.06	<LLD	<LLD	<LLD
2007	<LLD	<LLD	<LLD	0.04	0.04	0.04	<LLD	<LLD	<LLD
2008	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2009	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2010	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2011	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* Sunset Beach - closest offsite location with recreational value.

** No data. Sample not required until new technical specifications implemented in 1985.

† 1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.

TABLE 7-3
HISTORICAL ENVIRONMENTAL SAMPLE DATA
FISH
Results in pCi/g (wet)

LOCATION: CONTROL *			
Isotope	**Cs-137**		
Year	**Min.**	**Max.**	**Mean**
1969†	No Data	No Data	No Data
1974†	0.94	0.94	0.94
1975†	<MDL	<MDL	<MDL
1986	0.021	0.032	0.025
1987	0.017	0.040	0.031
1988	0.023	0.053	0.034
1989	0.028	0.043	0.034
1990	0.033	0.079	0.045
1991	0.021	0.034	0.029
1992	0.019	0.026	0.022
1993	0.030	0.036	0.033
1994	0.014	0.031	0.022
1995	0.017	0.023	0.019
1996	0.018	0.022	0.020
1997	0.012	0.030	0.021
1998	0.013	0.013	0.013
1999	<LLD	<LLD	<LLD
2000	0.021	0.021	0.021
2001	<LLD	<LLD	<LLD
2002	<LLD	<LLD	<LLD
2003	<LLD	<LLD	<LLD
2004	<LLD	<LLD	<LLD
2005	<LLD	<LLD	<LLD
2006	<LLD	<LLD	<LLD
2007	<LLD	<LLD	<LLD
2008	<LLD	<LLD	<LLD
2009	<LLD	<LLD	<LLD
2010	<LLD	<LLD	<LLD
2011	<LLD	<LLD	<LLD

* Control location was at an area beyond the influence of the site (westerly direction).

† 1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.

TABLE 7-4
HISTORICAL ENVIRONMENTAL SAMPLE DATA
FISH
Results in pCi/g (wet)

LOCATION: INDICATOR * (NMP/JAF)			
Isotope	Cs-137		
Year	Min.	Max.	Mean
1969†	0.01	0.13	0.06
1974†	0.08	4.40	0.57
1975†	1.10	1.70	1.38
1986	0.009	0.051	0.028
1987	0.024	0.063	0.033
1988	0.022	0.054	0.032
1989	0.020	0.044	0.034
1990	0.027	0.093	0.040
1991	0.018	0.045	0.029
1992	0.014	0.030	0.024
1993	0.018	0.035	0.028
1994	0.015	0.023	0.019
1995	0.016	0.022	0.019
1996	0.016	0.025	0.020
1997	0.014	0.023	0.018
1998	0.021	0.021	0.021
1999	0.018	0.021	0.020
2000	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD
2002	0.016	0.016	0.016
2003	<LLD	<LLD	<LLD
2004	<LLD	<LLD	<LLD
2005	<LLD	<LLD	<LLD
2006	<LLD	<LLD	<LLD
2007	<LLD	<LLD	<LLD
2008	<LLD	<LLD	<LLD
2009	<LLD	<LLD	<LLD
2010	<LLD	<LLD	<LLD
2011	<LLD	<LLD	<LLD

* Indicator locations are in the general area of the NMP-1 and J.A. FitzPatrick cooling water discharge structures.

† 1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.

TABLE 7-5
HISTORICAL ENVIRONMENTAL SAMPLE DATA
SURFACE WATER
Results in pCi/liter

LOCATION: CONTROL †						
Isotope	**Cs-137**			**Co-60**		
Year	**Min.**	**Max.**	**Mean**	**Min.**	**Max.**	**Mean**
1969††	*	*	*	*	*	*
1974††	*	*	*	*	*	*
1975††	*	*	*	*	*	*
1986	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1987	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1994	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1998	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2002	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2003	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2004	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2005	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2006	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2007	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2008	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2009	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2010	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2011	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* No gamma analysis performed (not required).

† Location was the City of Oswego Water Supply for 1969-1984 and the Oswego Steam Station inlet canal for 1985-Present.

†† 1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.

TABLE 7-6
HISTORICAL ENVIRONMENTAL SAMPLE DATA
SURFACE WATER
Results in pCi/liter

LOCATION: INDICATOR †						
Isotope	**Cs-137**			**Co-60**		
Year	**Min.**	**Max.**	**Mean**	**Min.**	**Max.**	**Mean**
1969††	*	*	*	*	*	*
1974††	*	*	*	*	*	*
1975††	*	*	*	*	*	*
1986	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1987	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1994	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1998	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2002	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2003	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2004	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2005	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2006	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2007	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2008	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2009	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2010	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2011	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* No gamma analysis performed (not required).

† Indicator location was the NMP 1 Inlet Canal for the period 1969-1973, and the JAF Inlet Canal for 1974-Present.

†† 1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.

TABLE 7-7

HISTORICAL ENVIRONMENTAL SAMPLE DATA

SURFACE WATER TRITIUM

Results in pCi/liter

LOCATION: CONTROL *			
Isotope	**Tritium**		
Year	**Min.**	**Max.**	**Mean**
1969†	No Data	No Data	No Data
1974†	<MDL	<MDL	<MDL
1975†	311	414	362
1986	250	550	373
1987	140	270	210
1988	240	460	320
1989	143	217	186
1990	260	320	290
1991	180	200	190
1992	190	310	243
1993	160	230	188
1994	250	250	250
1995	230	230	230
1996	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD
1998	190	190	190
1999	220	510	365
2000	196	237	212
2001	<LLD	<LLD	<LLD
2002	<LLD	<LLD	<LLD
2003	<LLD	<LLD	<LLD
2004	<LLD	<LLD	<LLD
2005	<LLD	<LLD	<LLD
2006	<LLD	<LLD	<LLD
2007	<LLD	<LLD	<LLD
2008	<LLD	<LLD	<LLD
2009	<LLD	<LLD	<LLD
2010	<LLD	<LLD	<LLD
2011	<LLD	<LLD	<LLD

* Control location is the City of Oswego, drinking water for 1969-1984 and the Oswego Steam Station inlet canal for 1985-Present.

† 1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.

TABLE 7-8
HISTORICAL ENVIRONMENTAL SAMPLE DATA
SURFACE WATER TRITIUM
Results in pCi/liter

LOCATION: INDICATOR *			
Isotope	**Tritium**		
Year	**Min.**	**Max.**	**Mean**
1969†	No Data	No Data	No Data
1974†	380	500	440
1975†	124	482	335
1986	260	500	380
1987	160	410	322
1988	430	480	460
1989	135	288	225
1990	220	290	250
1991	250	390	310
1992	240	300	273
1993	200	280	242
1994	180	260	220
1995	320	320	320
1996	<LLD	<LLD	<LLD
1997	160	160	160
1998	190	190	190
1999	180	270	233
2000	161	198	185
2001	<LLD	<LLD	<LLD
2002	297	297	297
2003	<LLD	<LLD	<LLD
2004	<LLD	<LLD	<LLD
2005	<LLD	<LLD	<LLD
2006	<LLD	<LLD	<LLD
2007	<LLD	<LLD	<LLD
2008	<LLD	<LLD	<LLD
2009	<LLD	<LLD	<LLD
2010	<LLD	<LLD	<LLD
2011	<LLD	<LLD	<LLD

* Indicator location was the NMP-1 Inlet Canal during the period 1969-1973, and the JAF Inlet Canal for 1974-Present.

† 1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.

TABLE 7-9
HISTORICAL ENVIRONMENTAL SAMPLE DATA
AIR PARTICULATE GROSS BETA
Results in pCi/m^3

LOCATION: CONTROL *			
Isotope	**Gross Beta**		
Year	**Min.**	**Max.**	**Mean**
1969†	0.130	0.540	0.334
1974†	0.001	0.808	0.121
1975†	0.008	0.294	0.085
1986	0.008	0.272	0.039
1987	0.009	0.037	0.021
1988	0.008	0.039	0.018
1989	0.007	0.039	0.017
1990	0.003	0.027	0.013
1991	0.007	0.028	0.014
1992	0.006	0.020	0.012
1993	0.007	0.022	0.013
1994	0.008	0.025	0.015
1995	0.006	0.023	0.014
1996	0.008	0.023	0.014
1997	0.006	0.025	0.013
1998	0.004	0.034	0.014
1999	0.010	0.032	0.017
2000	0.006	0.027	0.015
2001	0.006	0.034	0.016
2002	0.008	0.027	0.016
2003	0.004	0.032	0.015
2004	0.008	0.032	0.016
2005	0.008	0.034	0.019
2006	0.007	0.033	0.016
2007	0.008	0.028	0.016
2008	0.007	0.031	0.015
2009	0.007	0.030	0.016
2010	0.004	0.026	0.014
2011	0.008	0.034	0.018

* Locations used for 1977-1984 were C offsite, D1 offsite, D2 offsite, E offsite, F offsite, and G offsite. Control location R-5 offsite was used for 1986-Present (formerly C offsite location).

† 1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.

TABLE 7-10

HISTORICAL ENVIRONMENTAL SAMPLE DATA

AIR PARTICULATE GROSS BETA

Results in pCi/m^3

LOCATION: INDICATOR *			
Isotope	**Gross Beta**		
Year	**Min.**	**Max.**	**Mean**
1969†	0.130	0.520	0.320
1974†	0.003	0.885	0.058
1975†	0.001	0.456	0.067
1986	0.007	0.289	0.039
1987	0.009	0.040	0.021
1988	0.007	0.040	0.018
1989	0.007	0.041	0.017
1990	0.006	0.023	0.014
1991	0.006	0.033	0.015
1992	0.005	0.024	0.013
1993	0.005	0.023	0.014
1994	0.006	0.024	0.015
1995	0.004	0.031	0.014
1996	0.006	0.025	0.013
1997	0.001	0.018	0.010
1998	0.002	0.040	0.015
1999	0.009	0.039	0.017
2000	0.005	0.033	0.015
2001	0.004	0.037	0.016
2002	0.006	0.026	0.016
2003	0.005	0.035	0.015
2004	0.003	0.036	0.016
2005	0.007	0.041	0.019
2006	0.005	0.035	0.015
2007	0.007	0.028	0.016
2008	0.004	0.030	0.016
2009	0.006	0.032	0.016
2010	0.005	0.030	0.015
2011	0.007	0.034	0.018

* Locations used for 1969-1973 were D1 onsite, D2 onsite, E onsite, F onsite and G onsite. Locations used for 1974-1984 were D1 onsite, D2 onsite, E onsite, F onsite, G onsite, H onsite, I onsite, J onsite and K onsite, as applicable. 1986 – Present: locations were R-1 offsite, R-2 offsite, R-3 offsite, and R-4 offsite.

† 1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.

TABLE 7-11
HISTORICAL ENVIRONMENTAL SAMPLE DATA
AIR PARTICULATES
Results in pCi/m^3

LOCATION: CONTROL **						
Isotope	**Cs-137**			**Co-60**		
Year	**Min.**	**Max.**	**Mean**	**Min.**	**Max.**	**Mean**
1969†	*	*	*	*	*	*
1974†	*	*	*	*	*	*
1975†	*	*	*	*	*	*
1986	0.0075	0.0311	0.0193	<LLD	<LLD	<LLD
1987	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1994	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1998	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2002	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2003	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2004	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2005	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2006	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2007	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2008	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2009	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2010	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2011	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* No data available (not required prior to 1977).

** Locations included composites of offsite air monitoring locations for 1977-1984. Sample location included only R-5 air monitoring location for 1985-Present.

† 1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.

TABLE 7-12
HISTORICAL ENVIRONMENTAL SAMPLE DATA
AIR PARTICULATES
Results in pCi/m^3

LOCATION: INDICATOR **						
Isotope	**Cs-137**			**Co-60**		
Year	**Min.**	**Max.**	**Mean**	**Min.**	**Max.**	**Mean**
1969†	*	*	*	*	*	*
1974†	*	*	*	*	*	*
1975†	*	*	*	*	*	*
1986	0.0069	0.0364	0.0183	<LLD	<LLD	<LLD
1987	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1994	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1998	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD	0.0048	0.0048	0.0048
2001	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2002	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2003	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2004	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2005	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2006	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2007	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2008	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2009	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2010	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2011	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* No data available (not required prior to 1977).

** Locations included composites of onsite air monitoring locations for 1977-1984. Sample locations included R-1 through R-4 air monitoring locations for 1985-Present.

† 1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.

TABLE 7-13
HISTORICAL ENVIRONMENTAL SAMPLE DATA
AIR RADIOIODINE
Results in pCi/m^3

LOCATION: CONTROL *			
Isotope	**Iodine-131**		
Year	**Min.**	**Max.**	**Mean**
1969†	**	**	**
1974†	**	**	**
1975†	<MDL	<MDL	<MDL
1986	0.041	0.332	0.151
1987	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD
1994	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD
1998	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD
2002	<LLD	<LLD	<LLD
2003	<LLD	<LLD	<LLD
2004	<LLD	<LLD	<LLD
2005	<LLD	<LLD	<LLD
2006	<LLD	<LLD	<LLD
2007	<LLD	<LLD	<LLD
2008	<LLD	<LLD	<LLD
2009	<LLD	<LLD	<LLD
2010	<LLD	<LLD	<LLD
2011	0.034‡	0.093‡	0.055‡

* Locations D1 offsite, D2 offsite, E offsite, F offsite and G offsite used for 1976-1984. Location R-5 offsite used for 1985-Present.
** No results - I-131 analysis not required.
† 1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.
‡ Iodine concentrations attributed to fallout from Fukushima accident.

TABLE 7-14
HISTORICAL ENVIRONMENTAL SAMPLE DATA
AIR RADIOIODINE
Results in pCi/m^3

LOCATION: INDICATOR *			
Isotope	**Iodine-131**		
Year	**Min.**	**Max.**	**Mean**
1969†	**	**	**
1974†	**	**	**
1975†	0.25	0.30	0.28
1986	0.023	0.360	0.119
1987	0.011	0.018	0.014
1988	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD
1994	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD
1998	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD
2002	<LLD	<LLD	<LLD
2003	<LLD	<LLD	<LLD
2004	<LLD	<LLD	<LLD
2005	<LLD	<LLD	<LLD
2006	<LLD	<LLD	<LLD
2007	<LLD	<LLD	<LLD
2008	<LLD	<LLD	<LLD
2009	<LLD	<LLD	<LLD
2010	<LLD	<LLD	<LLD
2011	0.021‡	0.11‡	0.055‡

* Locations used for 1976-1984 were D1 onsite, D2 onsite, E onsite, F onsite, G onsite, H onsite, I onsite, J onsite and K onsite, as applicable. Locations used for 1985 - Present, were R-1 offsite, R-2 offsite, R-3 offsite, and R-4 offsite.

** No results. I-131 analysis not required.

† 1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.

‡ Iodine concentrations attributed to fallout from Fukushima accident.

TABLE 7-15
HISTORICAL ENVIRONMENTAL SAMPLE DATA
ENVIRONMENTAL TLD
Results in mrem/standard month

LOCATION: CONTROL **			
Year	**Min.**	**Max.**	**Mean**
Preop†	(1)	(1)	(1)
1974†	2.7	8.9	5.6
1975†	4.8	6.0	5.5
1976	3.2	7.2	5.4
1977	4.0	8.0	5.3
1978	3.3	4.7	4.3
1979	3.3	5.7	4.7
1980	3.8	5.8	4.9
1981	3.5	5.9	4.8
1982	3.8	6.1	5.1
1983	4.9	7.2	5.8
1984	4.7	8.2	6.2
1986	5.3 (5.5)*	7.5 (7.2)*	6.3 (6.3)*
1987	4.6 (4.6)*	6.6 (5.8)*	5.4 (5.2)*
1988	4.4 (4.8)*	6.8 (6.8)*	5.6 (5.4)*
1989	2.9 (2.9)*	6.4 (5.6)*	4.7 (4.6)*
1990	3.7 (3.7)*	6.0 (5.9)*	4.8 (4.6)*
1991	3.8 (3.8)*	5.4 (5.3)*	4.5 (4.3)*
1992	2.6 (2.6)*	5.0 (4.7)*	4.1 (3.9)*
1993	3.4 (3.4)*	5.6 (5.2)*	4.4 (4.3)*
1994	3.1 (3.1)*	5.0 (4.6)*	4.1 (3.9)*
1995	3.4 (3.4)*	5.7 (4.9)*	4.4 (4.2)*
1996	3.4 (3.4)*	5.6 (5.6)*	4.3 (4.2)*
1997	3.7 (3.9)*	6.2 (5.2)*	4.7 (4.6)*
1998	3.7 (3.7)*	5.6 (4.8)*	4.4 (4.2)*
1999	3.6 (3.7)*	7.1 (4.7)*	4.6 (4.4)*
2000	3.7 (3.7)*	7.3 (5.5)*	4.7 (4.3)*
2001	3.6 (3.9)*	5.4 (5.0)*	4.4 (4.4)*
2002	3.4 (3.4)*	5.5 (5.2)*	4.3 (4.1)*
2003	3.4 (3.4)*	5.5 (4.8)*	4.2 (4.2)*
2004	3.3 (3.3)*	5.9 (5.9)*	4.3 (4.5)*
2005	3.3 (3.4)*	5.1 (4.5)*	4.1 (4.0)*
2006	3.3 (3.3)*	5.3 (5.3)*	4.1 (4.3)*
2007	3.2 (3.2)*	5.8 (5.8)*	4.4 (4.6)*
2008	3.3 (3.3)*	5.1 (5.1)*	4.1 (4.3)*
2009	3.2 (3.2)*	4.8 (4.8)*	3.9 (4.0)*
2010	2.8 (2.8)*	4.6 (4.6)*	3.9 (3.9)*
2011	2.6 (2.6)*	5.5 (5.5)*	4.0 (4.1)*

* Data in parentheses is RETS control data and is determined using TLDs #8, 14 and 49.

** TLD #8 and 14 established 1974, TLD #49 established 1980, TLD #111 established 1988, TLD #113 established 1991.

(1) Data not available.

† 1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for JAFNPP.

TABLE 7-16
HISTORICAL ENVIRONMENTAL SAMPLE DATA
ENVIRONMENTAL TLD
Results in mrem per standard month

LOCATION: SITE BOUNDARY **			
Year	**Min.**	**Max.**	**Mean**
Preop†	*	*	*
1974†	*	*	*
1975†	*	*	*
1986	5.4	6.8	5.9
1987	4.7	5.9	5.3
1988	5.0	6.1	5.4
1989	4.5	5.2	4.8
1990	4.5	5.4	4.8
1991	4.3	5.5	4.8
1992	3.7	4.6	4.2
1993	3.8	4.8	4.3
1994	2.8	4.9	4.0
1995	3.5	5.1	4.4
1996	3.2	5.3	4.1
1997	3.5	5.9	4.6
1998	3.7	5.1	4.4
1999	3.3	7.5	4.7
2000	3.6	6.8	4.5
2001	3.6	5.3	4.5
2002	3.5	5.1	4.3
2003	3.2	4.9	4.3
2004	3.3	6.4	4.4
2005	3.4	4.8	4.2
2006	3.5	4.7	4.1
2007	3.2	5.4	4.3
2008	3.2	4.8	4.0
2009	3.1	4.5	3.9
2010	3.3	4.3	3.9
2011	3.1	5.3	4.1

* Data not available (not required prior to 1985).
TLD #23, 75, 76, 77, 85, 86 and 87 are in close proximity to operational buildings along the north boundary. This boundary is the lakeshore and is considered to be generally not accessible to the public. These locations are not used in the site boundary dose determination.

† 1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.

** TLD's used for statistics: 7, 18, 78, 79, 80, 81, 82, 83 & 84.

TABLE 7-17
HISTORICAL ENVIRONMENTAL SAMPLE DATA
ENVIRONMENTAL TLD
Results in mrem per standard month

LOCATION: OFFSITE SECTORS **			
Year	**Min.**	**Max.**	**Mean**
Preop†	*	*	*
1974†	*	*	*
1975†	*	*	*
1986	4.6	8.6	6.0
1987	4.3	6.0	5.2
1988	3.8	7.0	5.3
1989	2.5	6.8	4.9
1990	3.6	6.3	4.7
1991	3.6	5.8	4.7
1992	2.9	5.0	4.1
1993	3.4	6.3	4.5
1994	3.0	5.1	4.0
1995	3.2	5.2	4.3
1996	3.2	5.3	4.2
1997	3.5	5.8	4.4
1998	3.5	5.0	4.2
1999	3.6	5.6	4.4
2000	3.4	6.6	4.5
2001	3.6	5.4	4.4
2002	3.1	5.3	4.2
2003	3.4	4.8	4.1
2004	3.2	6.7	4.4
2005	3.2	4.7	4.0
2006	3.3	4.4	4.0
2007	3.1	5.1	4.2
2008	3.2	4.5	3.8
2009	3.3	4.5	3.9
2010	3.0	4.4	3.9
2011	3.0	5.3	4.0

* Data not available (not required prior to 1985).
** Includes TLD numbers 88, 89, 90, 91, 92, 93, 94 and 95.
† 1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.

TABLE 7-18
HISTORICAL ENVIRONMENTAL SAMPLE DATA
ENVIRONMENTAL TLD
Results in mrem per standard month

LOCATION: SPECIAL INTEREST **			
Year	**Min.**	**Max.**	**Mean**
Preop†	*	*	*
1974†	*	*	*
1975†	*	*	*
1986	4.8	8.2	6.1
1987	3.5	6.0	5.1
1988	3.9	6.6	5.3
1989	2.1	6.4	4.9
1990	3.2	6.3	4.8
1991	2.9	5.6	4.4
1992	3.0	4.8	4.1
1993	3.2	5.8	4.5
1994	2.9	4.8	4.1
1995	3.6	4.8	4.2
1996	3.2	5.1	4.2
1997	3.5	6.2	4.6
1998	3.7	5.6	4.4
1999	3.6	7.1	4.6
2000	3.6	7.3	4.7
2001	3.8	5.4	4.4
2002	3.5	5.5	4.2
2003	3.4	5.5	4.3
2004	3.0	5.9	4.2
2005	3.4	5.1	4.1
2006	3.5	5.3	4.1
2007	3.0	5.8	4.3
2008	3.1	5.1	4.0
2009	3.1	4.5	3.8
2010	3.2	4.7	3.9
2011	2.9	4.9	4.0

* Data not available (not required prior to 1985).
** Include TLD numbers 15, 56, 58, 96, 97 and 98.
† 1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.

TABLE 7-19
HISTORICAL ENVIRONMENTAL SAMPLE DATA
ENVIRONMENTAL TLD
Results in mrem per standard month

LOCATION: ONSITE INDICATOR **			
Year	**Min.**	**Max.**	**Mean**
Preop†	*	*	*
1974†	3.1	10.6	5.7
1975†	4.6	16.0	7.3
1986	4.7	16.1	7.0
1987	4.0	11.4	5.8
1988	4.4	11.9	6.0
1989	2.7	13.1	6.0
1990	3.6	12.9	5.5
1991	3.2	11.6	5.4
1992	3.2	5.6	4.3
1993	3.1	13.6	5.2
1994	2.8	14.3	5.1
1995	3.5	28.6	6.2
1996	3.1	32.6	6.4
1997	3.5	28.8	8.1
1998	3.6	28.8	6.2
1999	3.3	28.4	6.6
2000	3.7	16.5	5.6
2001	3.8	14.5	5.6
2002	3.5	13.6	5.3
2003	3.2	12.9	5.3
2004	3.3	13.2	5.4
2005	3.4	14.1	5.4
2006	3.5	14.4	5.3
2007	3.2	14.8	5.6
2008	3.2	13.8	5.2
2009	3.1	13.6	4.9
2010	3.3	13.3	4.8
2011	3.1	13.0	5.1

* No data available.

** Includes TLD numbers 3, 4, 5, 6 and 7 (1970 – 1973). Includes TLD numbers 3, 4, 5, 6, 7, 23, 24, 25 and 26 (1974 – Present).

† 1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.

TABLE 7-20

HISTORICAL ENVIRONMENTAL SAMPLE DATA

ENVIRONMENTAL TLD

Results in mrem per standard month

LOCATION: OFFSITE INDICATOR **			
Year	**Min.**	**Max.**	Mean
Preop†	*	*	*
1974†	2.4	8.9	5.3
1975†	4.5	7.1	5.5
1986	5.0	7.6	6.1
1987	4.4	6.6	5.2
1988	4.2	6.6	5.4
1989	2.8	6.4	4.6
1990	3.8	6.1	4.8
1991	3.4	5.8	4.5
1992	3.1	5.2	4.1
1993	3.2	5.7	5.0
1994	3.0	5.1	4.1
1995	3.9	5.7	4.4
1996	3.3	5.5	4.1
1997	3.7	6.2	4.7
1998	3.9	5.6	4.5
1999	3.8	7.1	4.6
2000	3.8	7.3	4.6
2001	3.7	5.9	4.6
2002	3.6	5.5	4.4
2003	3.1	5.5	4.4
2004	3.2	6.5	4.5
2005	3.6	5.1	4.2
2006	3.9	5.3	4.2
2007	3.4	4.9	4.3
2008	3.3	4.5	4.0
2009	3.3	4.1	3.8
2010	3.5	4.0	3.7
2011	3.2	4.8	4.0

* No data available.

** Includes TLD numbers 9, 10, 11, 12 and 13.

† 1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.

TABLE 7-21

HISTORICAL ENVIRONMENTAL SAMPLE DATA

MILK

Results in pCi/liter

LOCATION: CONTROL **						
Isotope	**Cs-137**			**I-131**		
Year	**Min.**	**Max.**	**Mean**	**Min.**	**Max.**	**Mean**
1969†	*	*	*	*	*	*
1974†	*	*	*	*	*	*
1975†	*	*	*	*	*	*
1986	5.3	12.4	8.4	0.8	29.0	13.6
1987	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1994	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1998	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2002	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2003	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2004	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2005	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2006	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2007	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2008	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2009	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2010	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2011	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* No data available (sample not required).

** Location used was an available milk sample location in a least prevalent wind direction greater than ten miles from the site.

† 1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.

TABLE 7-22

HISTORICAL ENVIRONMENTAL SAMPLE DATA

MILK

Results in pCi/liter

LOCATION: INDICATOR						
Isotope	**Cs-137**			**I-131**		
Year	**Min.**	**Max.**	**Mean**	**Min.**	**Max.**	**Mean**
1969†	*	*	*	*	*	*
1974†	1.6	39	10.5	0.70	2.00	1.23
1975†	6.0	22	16	0.01	2.99	0.37
1986	6.1	11.1	8.6	0.3	30.0	5.2
1987	5.5	9.4	7.4	<LLD	<LLD	<LLD
1988	10.0	10.0	10.0	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1994	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD	0.25	0.44	0.35
1998	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2002	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2003	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2004	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2005	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2006	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2007	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2008	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2009	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2010	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2011	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* No data available (sample not required).

† 1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.

TABLE 7-23

HISTORICAL ENVIRONMENTAL SAMPLE DATA

FOOD PRODUCTS

Results in pCi/g (wet)

LOCATION: CONTROL *			
Isotope	**Cs-137**		
Year	**Min.**	**Max.**	**Mean**
1969†	**	**	**
1974†	**	**	**
1975†	**	**	**
1986	<LLD	<LLD	<LLD
1987	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD
1993	0.008	0.008	0.008
1994	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD
1998	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD
2002	<LLD	<LLD	<LLD
2003	<LLD	<LLD	<LLD
2004	<LLD	<LLD	<LLD
2005	<LLD	<LLD	<LLD
2006	<LLD	<LLD	<LLD
2007	<LLD	<LLD	<LLD
2008	<LLD	<LLD	<LLD
2009	<LLD	<LLD	<LLD
2010	<LLD	<LLD	<LLD
2011	<LLD	<LLD	<LLD

* Locations was an available food product sample location in a least prevalent wind direction greater than ten miles from the site.

** No data available (control samples not required).

† 1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.

TABLE 7-24
HISTORICAL ENVIRONMENTAL SAMPLE DATA
FOOD PRODUCTS
Results in pCi/g (wet)

LOCATION: INDICATOR *			
Isotope	**Cs-137**		
Year	**Min.**	**Max.**	**Mean**
1969†	**	**	**
1974†	0.04	0.34	0.142
1975†	<MDL	<MDL	<MDL
1986	<LLD	<LLD	<LLD
1987	<LLD	<LLD	<LLD
1988	0.008	0.008	0.008
1989	0.011	0.011	0.011
1990	<LLD	<LLD	<LLD
1991	0.039	0.039	0.039
1992	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD
1994	0.006	0.012	0.010
1995	0.011	0.012	0.012
1996	<LLD	<LLD	<LLD
1997	0.013	0.013	0.013
1998	<LLD	<LLD	<LLD
1999	0.007	0.007	0.007
2000	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD
2002	<LLD	<LLD	<LLD
2003	<LLD	<LLD	<LLD
2004	<LLD	<LLD	<LLD
2005	<LLD	<LLD	<LLD
2006	<LLD	<LLD	<LLD
2007	<LLD	<LLD	<LLD
2008	<LLD	<LLD	<LLD
2009	<LLD	<LLD	<LLD
2010	<LLD	<LLD	<LLD
2011	<LLD	<LLD	<LLD

* Indicator locations were available downwind locations within ten miles of the site and with high deposition potential.

** No data available (control samples not required).

† 1969 data is considered to be pre-operational for the site. 1974 and 1975 data is considered to be pre-operational for the JAFNPP.

8.0 QUALITY ASSURANCE / QUALITY CONTROL PROGRAM

8.1 PROGRAM DESCRIPTION

The Offsite Dose Calculation Manual (ODCM), Part 1, Section 5.3 requires that the licensee participate in an Interlaboratory Comparison Program. The Interlaboratory Comparison Program shall include sample media for which samples are routinely collected and for which comparison samples are commercially available. Participation in an Interlaboratory Comparison Program ensures that independent checks on the precision and accuracy of the measurement of radioactive material in the environmental samples are performed as part of the Quality Assurance Program for environmental monitoring. To fulfill the requirement for an Interlaboratory Comparison Program, the James A. FitzPatrick Nuclear Power Plant (JAF) Environmental Laboratory has engaged the services of Eckert & Ziegler Analytics, Incorporated in Atlanta, Georgia.

Analytics supplies sample media as blind sample spikes, which contain certified levels of radioactivity unknown to the analysis laboratory. These samples are prepared and analyzed by the JAF Environmental Laboratory using standard laboratory procedures. Analytics issues a statistical summary report of the results. The JAF Environmental Laboratory uses predetermined acceptance criteria methodology for evaluating the laboratory's performance.

The JAF Environmental Laboratory also analyzes laboratory blanks. The analysis of laboratory blanks provides a means to detect and measure radioactive contamination of analytical samples. The analysis of analytical blanks also provides information on the adequacy of background subtraction. Laboratory blank results are analyzed using control charts.

8.2 PROGRAM SCHEDULE

SAMPLE MEDIA	LABORATORY ANALYSIS	SAMPLE PROVIDER ECKERT & ZIEGLER ANALYTICS
Water	Gross Beta	3
Water	Tritium	5
Water	I-131	4
Water	Mixed Gamma	4
Air	Gross Beta	3
Air	I-131	4
Air	Mixed Gamma	2
Milk	I-131	3
Milk	Mixed Gamma	3
Soil	Mixed Gamma	1
Vegetation	Mixed Gamma	2
TOTAL SAMPLE INVENTORY		**34**

8.3 ACCEPTANCE CRITERIA

Each sample result is evaluated to determine the accuracy and precision of the laboratory's analysis result. The sample evaluation method is discussed below.

8.3.1 SAMPLE RESULTS EVALUATION

Samples provided by Analytics are evaluated using what is specified as the NRC method. This method is based on the calculation of the ratio of results reported by the participating laboratory (QC result) to the Vendor Laboratory Known value (reference result).

An Environmental Laboratory analytical result is evaluated using the following calculation:

The value for the error resolution is calculated.

$$\text{The error resolution} = \frac{\text{Reference Result}}{\text{Reference Results Error (1 sigma)}}$$

Using the appropriate row under the Error Resolution column in Table 8.3.1 below, a corresponding Ratio of Agreement interval is given.

The value for the ratio is then calculated.

$$\text{Ratio of Agreement} = \frac{\text{QC Result}}{\text{Reference Result}}$$

If the value falls within the agreement interval, the result is acceptable.

TABLE 8.3.1

ERROR RESOLUTION	RATIO OF AGREEMENT
< 4	No Comparison
4 to 7	0.5 to 2.0
8 to 15	0.6 to 1.66
16 to 50	0.75 to 1.33
51 to 200	0.8 to 1.25
>200	0.85 to 1.18

This acceptance test is generally referred to as the “NRC” method. The acceptance criteria is contained in Procedure EN-CY-102. The NRC method generally results in an acceptance range of approximately ± 25% of the Known value when applied to sample results from the Eckert & Ziegler Analytics Interlaboratory Comparison Program. This method is used as the procedurally required assessment method and requires the generation of a deviation from QA/QC program report when results are unacceptable.

8.4 PROGRAM RESULTS SUMMARY

The Interlaboratory Comparison Program numerical results are provided on Table 8-1.

8.4.1 ECKERT & ZIEGLER ANALYTICS QA SAMPLES RESULTS

Thirty-four QA blind spike samples were analyzed as part of Analytics 2011 Interlaboratory Comparison Program. The following sample media were evaluated as part of the comparison program.

- Air Charcoal Cartridge: I-131
- Air Particulate Filter: Mixed Gamma Emitters, Gross Beta
- Water: I-131, Mixed Gamma Emitters, Tritium, Gross Beta
- Soil: Mixed Gamma Emitters
- Milk: I-131, Mixed Gamma Emitters
- Vegetation: Mixed Gamma Emitters

The JAF Environmental Laboratory performed 133 individual analyses on the 34 QA samples. Of the 133 analyses performed, 133 were in agreement using the NRC acceptance criteria for a 100% agreement ratio.

There were no nonconformities in the 2011 program.

8.4.2 NUMERICAL RESULTS TABLES

TABLE 8-1
INTERLABORATORY INTERCOMPARISON PROGRAM
Gross Beta Analysis of Air Particulate Filter

DATE	SAMPLE ID NO.	MEDIUM	ANALYSIS	JAF ELAB RESULTS pCi ±1 sigma				REFERENCE LAB* pCi ±1 sigma			RATIO (1)	
06/16/2011	E7633-05	Filter	GROSS BETA		93.2	±	1.4	85.5	±	1.43	1.08	A
					91.1	±	1.3					
					91.7	±	1.4					
				Mean =	92.0	±	0.8					
06/16/2011	E7618-09	Filter	GROSS BETA		76.1	±	1.2	72.9	±	1.22	1.06	A
					79.3	±	1.3					
					76.4	±	1.2					
				Mean =	77.3	±	0.7					
12/08/2011	E8254-05	Filter	GROSS BETA		101.2	±	2.7	89.6	±	1.5	1.11	A
					99.6	±	2.7					
					100.8	±	2.7					
					99.8	±	2.7					
					98.9	±	2.7					
					97.9	±	2.7					
					105.4	±	2.8					
					108.3	±	2.8					
					99.7	±	2.7					
					91.4	±	2.7					
					91.4	±	2.7					
					98.1	±	2.8					
				Mean =	99.4	±	0.8					

(1) Ratio = Reported/Analytics.
* Sample provided by Analytics, Inc.

A=Acceptable
U=Unacceptable

TABLE 8-1 (Continued)
Tritium Analysis of Water

DATE	SAMPLE ID NO.	MEDIUM	ANALYSIS	JAF ELAB RESULTS pCi/liter ±1 sigma				REFERENCE LAB* pCi/liter ±1 sigma			RATIO (1)	
3/17/2011	E7476-05	Water	H-3		4314	±	163	4530	±	75.7	1.00	A
					4673	±	166					
					4650	±	166					
				Mean =	4546	±	95					
6/16/2011	E7632-05	Water	H-3		833	±	134	905	±	15.1	0.98	A
					923	±	135					
					908	±	135					
				Mean =	888	±	78					
9/15/2011	E8121-05	Water	H-3		915	±	131	792	±	132	1.21	A
					1002	±	132					
					957	±	132					
				Mean =	958	±	76					
12/8/2011	E8181-09	Water	H-3		10617	±	209	10900	±	182	0.94	A
					10199	±	208					
					10082	±	211					
				Mean =	10299	±	121					
12/8/2011	E8182-09	Water	H-3		10339	±	206	10900	±	182	0.94	A
					10320	±	208					
					10090	±	210					
				Mean =	10250	±	120					

(1) Ratio = Reported/Analytics.
* Sample provided by Analytics, Inc.

A=Acceptable
U=Unacceptable

TABLE 8-1 (Continued)
Gross Beta Analysis of Water

DATE	SAMPLE ID NO.	MEDIUM	ANALYSIS	JAF ELAB RESULTS pCi/liter ±1 sigma				REFERENCE LAB* pCi/liter ±1 sigma			RATIO (1)	
03/17/2011	E7479-05	Water	GROSS BETA		250.6	±	2.50	247	±	4.13	1.02	A
					252.2	±	2.50					
					253.6	±	2.50					
					255.2	±	2.50					
				Mean =	252.9	±	1.30					
06/16/2011	E7638-05	Water	GROSS BETA		233.0	±	2.40	251	±	4.18	0.93	A
					232.0	±	2.40					
					234.0	±	2.40					
				Mean =	233.0	±	1.39					
09/15/2011	E8126-05	Water	GROSS BETA		253.8	±	3.30	249	±	4.16	1.02	A
					256.9	±	3.30					
					250.4	±	3.30					
				Mean =	253.7	±	1.90					

(1) Ratio = Reported/Analytics.
* Sample provided by Analytics, Inc.

A=Acceptable
U=Unacceptable

TABLE 8-1 (Continued)
I-131 Gamma Analysis of Air Charcoal

DATE	SAMPLE ID NO.	MEDIUM	ANALYSIS	JAF ELAB RESULTS pCi ±1 sigma				REFERENCE LAB* pCi ±1 sigma			RATIO (1)	
3/17/2011	E7437-09	Air	I-131		96.3	±	3.3	96.2	±	1.61	1.01	A
					97.3	±	1.5					
					98	±	3.2					
				Mean =	97.2	±	1.57					
6/16/2011	E7636-05	Air	I-131		95.3	±	2.7	86.7	±	1.45	1.08	A
					100	±	2.7					
					86.1	±	2.8					
				Mean =	93.8	±	1.57					
9/15/2011	E8125-05	Air	I-131		80.5	±	3	80.5	±	1.34	1.03	A
					83.2	±	3.2					
					84.0	±	3.1					
				Mean =	82.6	±	1.80					
9/15/2011	E8127-09	Air	I-131		72.3	±	4.3	80.5	±	1.34	0.93	A
					72.1	±	4.5					
					80.6	±	4.6					
				Mean =	75.0	±	2.60					

(1) Ratio = Reported/Analytics. A=Acceptable
* Sample provided by Analytics, Inc. U=Unacceptable

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis of Water

DATE	SAMPLE ID NO.	MEDIUM	ANALYSIS	JAF ELAB RESULTS pCi/liter ±1 sigma				REFERENCE LAB* pCi/liter ±1 sigma			RATIO (1)	
3/17/2011	E7477-05	Water	Cr-51		186	±	18.5	196.0	±	3.27	1.04	A
					205	±	10					
					222	±	25.7					
				Mean =	204	±	11.1					
			Cs-134		94	±	3.32	85.6	±	1.43	1.08	A
					92	±	2.32					
					91	±	5.06					
				Mean =	92.2	±	2.2					
			Cs-137		143	±	3.86	135.0	±	2.25	1.04	A
					142	±	2.49					
					134	±	5.55					
				Mean =	140	±	2.4					
			Co-58		81	±	2.96	74.4	±	1.24	1.04	A
					77	±	1.97					
					74	±	4.54					
				Mean =	77.2	±	1.9					
			Mn-54		187	±	4.33	175.0	±	2.92	1.06	A
					183	±	2.82					
					189	±	6.38					
				Mean =	186	±	2.7					
			Fe-59		121	±	4.09	115.0	±	1.91	1.05	A
					128	±	2.83					
					115	±	6.221					
				Mean =	121.0	±	2.7					
			Zn-65		198	±	7.05	172.0	±	2.87	1.12	A
					191	±	4.62					
					187	±	10.3					
				Mean =	192	±	4.4					
			Co-60		117	±	2.65	113.0	±	1.88	1.03	A
					115	±	1.8					
					116	±	3.97					
				Mean =	116	±	1.7					
			I-131		92.6	±	3.25	94.0	±	1.57	1.01	A
					95.9	±	2.12					
					95.3	±	4.53					
				Mean =	94.6	±	1.99					
			I-131**		90	±	0.95	94.0	±	1.57	0.94	A
					84.1	±	2.19					
					90.9	±	2.14					
				Mean =	88.3	±	1.1					

(1) Ratio = Reported/Analytics.
A=Acceptable
* Sample provided by Analytics, Inc.
U=Unacceptable
** Result determined by Resin Extraction/Gamma Spectral Analysis.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis of Water

DATE	SAMPLE ID NO.	MEDIUM	ANALYSIS	JAF ELAB RESULTS pCi/liter ±1 sigma				REFERENCE LAB* pCi/liter ±1 sigma			RATIO (1)	
6/16/2011	E7617-09	Water	Ce-141		92	±	7.08					
					92	±	7.37					
					88	±	7.26	94	±	1.56	0.95	A
					87	±	7.68					
				Mean =	89.6	±	4.26					
			Cr-51		197	±	31.8					
					183	±	36.8					
					267	±	32.1	241	±	4.03	0.96	A
					277	±	45.4					
				Mean =	231	±	22.2					
			Cs-134		211	±	11.8					
					222	±	11.6					
					208	±	10.6	222	±	3.71	0.98	A
					225	±	13.9					
				Mean =	217	±	7.2					
			Cs-137		168	±	5.77					
					156	±	5.73					
					164	±	5.25	161	±	2.7	1.00	A
					156	±	6.66					
				Mean =	161	±	3.5					
			Co-58		190	±	6.17					
					175	±	5.95					
					188	±	5.93	177	±	2.96	1.04	A
					183	±	7.07					
				Mean =	184	±	3.7					
			Mn-54		165	±	5.71					
					183	±	6.12					
					169	±	5.41	161	±	2.69	1.07	A
					174	±	7.25					
				Mean =	173	±	3.7					
			Fe-59		157	±	6.81					
					145	±	6.86					
					173	±	8.93	144	±	2.41	1.10	A
					155	±	6.68					
				Mean =	158	±	4.4					
			Zn-65		316	±	12.4					
					298	±	12.1					
					323	±	12.0	305	±	5.09	1.03	A
					316	±	15.3					
				Mean =	313	±	7.7					
			Co-60		226	±	5.07					
					232	±	5.17					
					243	±	4.79	228	±	3.8	1.02	A
					225	±	6.21					
				Mean =	232	±	3.2					
			I-131		110	±	7.24					
					101	±	7.44					
					106	±	7.37	101	±	1.68	1.07	A
					115	±	9.22					
				Mean =	108	±	3.9					
			I-131**		97.3	±	1.33					
					97.8	±	1.52	101	±	1.68	0.96	A
					94.3	±	1.47					
				Mean =	96.5	±	0.8					

(1) Ratio = Reported/Analytics. A=Acceptable
* Sample provided by Analytics, Inc. U=Unacceptable
** Result determined by Resin Extraction/Gamma Spectral Analysis.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis of Water

DATE	SAMPLE ID NO.	MEDIUM	ANALYSIS	JAF ELAB RESULTS pCi/liter ±1 sigma				REFERENCE LAB* pCi/liter ±1 sigma			RATIO (1)	
9/15/2011	E8122-05	Water	Ce-141		47.5	±	4.7	53.2	±	0.89	1.00	A
					52.8	±	4.9					
					59.9	±	4.2					
				Mean =	53.4	±	2.7					
			Cr-51		165.0	±	23.9	180.0	±	3.01	0.97	A
					175.0	±	23.5					
					184.0	±	19.8					
				Mean =	175.0	±	13.0					
			Cs-134		98.6	±	7.0	102.0	±	1.71	0.93	A
					88.6	±	7.8					
					97.5	±	6.7					
				Mean =	94.9	±	4.1					
			Cs-137		91.0	±	3.7	90.7	±	1.51	1.00	A
					94.1	±	4.5					
					88.0	±	3.5					
				Mean =	91.0	±	4.1					
			Co-58		75.9	±	3.6	77.7	±	1.30	1.05	A
					83.7	±	4.4					
					84.3	±	3.4					
				Mean =	81.3	±	2.2					
			Mn-54		117.0	±	4.3	120.0	±	2.01	1.01	A
					118.0	±	4.9					
					128.0	±	3.9					
				Mean =	121.0	±	2.5					
			Fe-59		51.7	±	3.8	43.7	±	0.73	1.09	A
					44.4	±	4.3					
					47.3	±	3.6					
				Mean =	47.8	±	2.3					
			Zn-65		149.0	±	7.9	144.0	±	2.40	1.02	A
					143.0	±	8.9					
					148.0	±	7.0					
				Mean =	147.0	±	4.6					
			Co-60		124.0	±	3.3	125.0	±	2.09	0.98	A
					122.0	±	3.8					
					123.0	±	3.0					
				Mean =	123.0	±	1.9					
			I-131		85.9	±	4.5	79.9	±	1.33	1.03	A
					82.0	±	5.2					
					79.1	±	4.1					
				Mean =	82.3	±	2.7					
			I-131**		79.3	±	1.0	79.9	±	1.33	0.97	A
					76.1	±	1.3					
					76.3	±	1.3					
				Mean =	77.2	±	0.7					

(1) Ratio = Reported/Analytics. A=Acceptable
* Sample provided by Analytics, Inc. U=Unacceptable
** Result determined by Resin Extraction/Gamma Spectral Analysis.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis of Water

DATE	SAMPLE ID NO.	MEDIUM	ANALYSIS	JAF ELAB RESULTS pCi/liter ±1 sigma				REFERENCE LAB* pCi/liter ±1 sigma			RATIO (1)	
12/8/2011	E8183-09	Water			501	±	40.8					
					612	±	38.1					
			Cr-51		566	±	36.1	566	±	9.45	0.99	A
					589	±	34.9					
					546	±	37.7					
				Mean =	563	±	25.5					
					159	±	13.4					
					168	±	11.7					
			Cs-134		170	±	9.3	171		2.86	0.99	A
					178	±	10.8					
					174	±	10.7					
				Mean =	169.8	±	7.6					
					216	±	7.5					
					213	±	6.7					
			Cs-137		209	±	5.7	210		3.5	1.03	A
					212	±	6					
					228	±	6.5					
				Mean =	215.6	±	4.4					
					229	±	7.8					
					236	±	7					
			Co-58		224	±	5.7	221		3.69	1.04	A
					221	±	6.3					
					237	±	6.5					
				Mean =	229.4	±	4.5					
					249	±	8.1					
					264	±	7.2					
			Mn-54		269	±	6.2	241		4.02	1.08	A
					261	±	6.6					
					262	±	6.9					
				Mean =	261	±	4.8					
					214	±	8.5					
					203	±	77.3					
			Fe-59		203	±	6.4	183		3.06	1.11	A
					204	±	7					
					188	±	7.3					
				Mean =	202.4	±	4.9					
					320	±	14.4					
					311	±	12.7					
			Zn-65		330	±	10.3	291		4.87	1.08	A
					306	±	11.3					
					307	±	12.2					
				Mean =	314.8	±	8.3					
					286	±	6.5					
					287	±	5.7					
			Co-60		282	±	4.8	270		4.51	1.06	A
					288	±	5.2					
					287	±	5.5					
				Mean =	286	±	3.8					
					92.5	±	5.5					
					100.0	±	5.3					
			I-131		99.6	±	5.5	88.7	±	1.48	1.05	A
					84.9	±	5.4					
					86.6	±	5.6					
				Mean =	92.7	±	3.6					
					107	±	1.9					
					116	±	2.1					
			I-131**		108	±	2.8	88.7		1.48	1.25	A
					111	±	2.5					
				Mean =	110.5	±	1.3					

(1) Ratio = Reported/Analytics. A=Acceptable U=Unacceptable
* Sample provided by Analytics, Inc. ** Result determined by Resin Extraction/Gamma Spectral Analysis.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis of Milk

DATE	SAMPLE ID NO.	MEDIUM	ANALYSIS	JAF ELAB RESULTS pCi/liter ±1 sigma				REFERENCE LAB* pCi/liter ±1 sigma			RATIO (1)	
3/17/2011	E7438-09	MILK	Cr-51		264.0	±	41.3	298	±	4.98	0.97	A
					312.0	±	23.2					
					295.0	±	55.9					
				Mean =	290.3	±	16.0					
			Cs-134		135.0	±	7.5	130	±	2.18	1.04	A
					133.0	±	4.7					
					136.0	±	9.8					
				Mean =	134.7	±	3.1					
			Cs-137		206.0	±	8.8	205	±	3.43	1.03	A
					208.0	±	5.0					
					219.0	±	10.6					
				Mean =	211.0	±	3.5					
			Co-58		126.0	±	7.2	113	±	1.89	1.07	A
					122.0	±	4.0					
					116.0	±	9.3					
				Mean =	121.3	±	2.9					
			Mn-54		282.0	±	10.0	266	±	4.45	1.05	A
					275.0	±	5.6					
					279.0	±	12.0					
				Mean =	278.7	±	5.5					
			Fe-59		174.0	±	10.7	175	±	2.91	1.06	A
					184.0	±	6.0					
					198.0	±	14.0					
				Mean =	185.3	±	6.2					
			Zn-65		275.0	±	17.1	261	±	4.36	1.13	A
					287.0	±	9.6					
					324.0	±	21.3					
				Mean =	295.3	±	9.6					
			Co-60		184.0	±	6.6	172	±	2.87	1.00	A
					169.0	±	3.6					
					161.0	±	7.8					
				Mean =	171.3	±	3.6					
			I-131		108.0	±	8.4	97	±	1.62	1.07	A
					104.0	±	4.5					
					97.5	±	9.5					
				Mean =	103.2	±	4.5					
			I-131**		95.4	±	6.5	97	±	1.62	1.00	A
					103.0	±	2.6					
					91.8	±	3.6					
				Mean =	96.7	±	2.6					

(1) Ratio = Reported/Analytics.
* Sample provided by Analytics, Inc.
** Result determined by Resin Extraction/Gamma Spectral Analysis.

A=Acceptable
U=Unacceptable

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis of Milk

DATE	SAMPLE ID NO.	MEDIUM	ANALYSIS	JAF ELAB RESULTS pCi/liter ±1 sigma				REFERENCE LAB* pCi/liter ±1 sigma			RATIO (1)	
6/16/2011	E7634-05	MILK	Ce-141		86.1	±	5.9	80	±	1.33	1.07	A
					85.7	±	8.0					
					84.7	±	7.2					
				Mean =	85.5	±	4.1					
			Cr-51		209.0	±	26.4	206	±	3.44	1.08	A
					221.0	±	42.4					
					238.0	±	37.0					
				Mean =	222.7	±	20.7					
			Cs-134		181.0	±	9.4	190	±	3.17	0.91	A
					179.0	±	12.5					
					159.0	±	13.1					
				Mean =	173.0	±	6.8					
			Cs-137		135.0	±	4.7	138	±	2.3	1.00	A
					145.0	±	6.5					
					136.0	±	6.4					
				Mean =	138.7	±	3.4					
			Co-58		158.0	±	4.9	152.0	±	2.53	1.02	A
					153.0	±	6.6					
					153.0	±	7.0					
				Mean =	154.7	±	3.6					
			Mn-54		136.0	±	4.8	138	±	2.3	1.00	A
					141.0	±	6.8					
					138.0	±	6.5					
				Mean =	138.3	±	3.5					
			Fe-59		133.0	±	5.6	123	±	2.06	1.10	A
					145.0	±	8.6					
					127.0	±	7.7					
				Mean =	135.0	±	4.3					
			Zn-65		266.0	±	10.0	261	±	4.35	1.01	A
					262.0	±	14.4					
					261.0	±	13.8					
				Mean =	263.0	±	7.4					
			Co-60		196.0	±	4.1	195	±	3.25	1.02	A
					196.0	±	5.9					
					205.0	±	5.7					
				Mean =	199.0	±	3.1					
			I-131		112.0	±	5.24	103	±	1.72	0.99	A
					92.3	±	7.65					
					101.0	±	8.95					
				Mean =	101.8	±	4.3					
			I-131**		92.3	±	1.2	103	±	1.72	0.89	A
					89.8	±	1.7					
					92.5	±	1.3					
				Mean =	91.5	±	0.8					

(1) Ratio = Reported/Analytics. A=Acceptable
* Sample provided by Analytics, Inc. U=Unacceptable
** Result determined by Resin Extraction/Gamma Spectral Analysis.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis of Milk

DATE	SAMPLE ID NO.	MEDIUM	ANALYSIS	JAF ELAB RESULTS pCi/liter ±1 sigma	REFERENCE LAB* pCi/liter ±1 sigma	RATIO (1)	
9/15/2011	E8124-05	MILK	Ce-141	79.2 ± 7.5 64.7 ± 5.2 69.8 ± 6.4 Mean = 71.2 ± 3.7	67 ± 1.11	1.07	A
			Cr-51	187.0 ± 35.5 243.0 ± 25.8 224.0 ± 29.3 Mean = 218.0 ± 17.6	226 ± 3.78	0.96	A
			Cs-134	112.0 ± 11.7 124.0 ± 8.5 116.0 ± 9.5 Mean = 117.3 ± 5.8	128 ± 2.14	0.92	A
			Cs-137	111.0 ± 6.0 111.0 ± 4.5 115.0 ± 4.9 Mean = 112.3 ± 3.0	114 ± 1.9	0.99	A
			Co-58	104.0 ± 5.8 107.0 ± 4.4 93.1 ± 4.5 Mean = 101.4 ± 2.9	98 ± 1.63	1.04	A
			Mn-54	168.0 ± 6.9 157.0 ± 5.1 154.0 ± 5.6 Mean = 159.7 ± 3.4	151 ± 2.52	1.06	A
			Fe-59	61.9 ± 7.0 65.8 ± 4.9 55.2 ± 5.4 Mean = 61.0 ± 3.4	55 ± 0.915	1.11	A
			Zn-65	194.0 ± 13.6 191.0 ± 9.4 199.0 ± 10.6 Mean = 194.7 ± 6.5	180 ± 3.01	1.08	A
			Co-60	159.0 ± 5.3 165.0 ± 4.1 155.0 ± 4.4 Mean = 159.7 ± 2.7	157 ± 2.62	1.02	A
			I-131	86.9 ± 6.6 97.9 ± 5.3 97.7 ± 5.8 Mean = 94.2 ± 3.4	89.2 ± 1.49	1.06	A
			I-131**	79.8 ± 1.1 79.5 ± 1.0 78.5 ± 1.6 Mean = 79.3 ± 0.7	89.2 ± 1.49	0.89	A

(1) Ratio = Reported/Analytics. A=Acceptable
* Sample provided by Analytics, Inc. U=Unacceptable
** Result determined by Resin Extraction/Gamma Spectral Analysis.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis of Air Particulate Filter

DATE	SAMPLE ID NO.	MEDIUM	ANALYSIS	JAF ELAB RESULTS pCi ±1 sigma	REFERENCE LAB* pCi ±1 sigma	RATIO (1)
3/17/2011	E7478-05	FILTER	Cr-51	221.0 ± 15.9	230 ± 3.84	0.98 A
				224.0 ± 18.0		
				233.0 ± 13.7		
				Mean = 226.0 ± 9.2		
			Cs-134	117.0 ± 4.5	101 ± 1.68	1.13 A
				111.0 ± 4.9		
				115.0 ± 3.8		
				Mean = 114.0 ± 2.6		
			Cs-137	169.0 ± 4.5	158 ± 2.64	1.04 A
				159.0 ± 4.8		
				165.0 ± 3.8		
				Mean = 164.0 ± 2.5		
			Co-58	90.0 ± 3.5	87.3 ± 1.46	1.01 A
				84.0 ± 4.1		
				90.0 ± 3.2		
				Mean = 88.1 ± 2.1		
			Mn-54	211.0 ± 5.2	205 ± 3.43	1.06 A
				221.0 ± 5.8		
				218.0 ± 4.5		
				Mean = 217.0 ± 3.0		
			Fe-59	144.0 ± 5.2	134 ± 2.24	1.09 A
				138.0 ± 6.1		
				156.0 ± 4.6		
				Mean = 146.0 ± 3.1		
			Zn-65	226.0 ± 8.8	201 ± 3.36	1.07 A
				212.0 ± 9.8		
				208.0 ± 7.6		
				Mean = 215.0 ± 5.0		
			Co-60	127.0 ± 3.4	132 ± 2.21	0.98 A
				132.0 ± 3.8		
				130.0 ± 2.9		
				Mean = 130.0 ± 1.9		

(1) Ratio = Reported/Analytics. A=Acceptable
* Sample provided by Analytics, Inc. U=Unacceptable

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis of Air Particulate Filter

DATE	SAMPLE ID NO.	MEDIUM	ANALYSIS	JAF ELAB RESULTS pCi ±1 sigma	REFERENCE LAB* pCi ±1 sigma	RATIO (1)	
9/15/2011	E8123-05	FILTER	Ce-141	6.84E+01 ± 2.80E+00 7.11E+01 ± 2.70E+00 7.35E+01 ± 2.80E+00 Mean = 7.10E+01 ± 1.60E+00	6.96E+01 ± 1.16E+00	1.02	A
			Cr-51	2.17E+02 ± 1.84E+01 2.32E+02 ± 1.79E+01 2.28E+02 ± 1.80E+01 Mean = 2.26E+02 ± 1.05E+01	2.36E+02 ± 3.94E+00	0.96	A
			Cs-134	1.15E+02 ± 8.70E+00 1.15E+02 ± 8.50E+00 1.11E+02 ± 8.20E+00 Mean = 1.14E+02 ± 4.89E+00	1.34E+02 ± 2.23E+00	0.85	A
			Cs-137	1.24E+02 ± 4.30E+00 1.14E+02 ± 4.20E+00 1.15E+02 ± 4.00E+00 Mean = 1.18E+02 ± 2.41E+00	1.19E+02 ± 1.98E+00	0.99	A
			Co-58	1.04E+02 ± 4.10E+00 1.08E+02 ± 4.10E+00 1.08E+02 ± 4.00E+00 Mean = 1.07E+02 ± 2.35E+00	1.02E+02 ± 1.70E+00	1.05	A
			Mn-54	1.75E+02 ± 5.20E+00 1.67E+02 ± 5.10E+00 1.79E+02 ± 4.80E+00 Mean = 1.74E+02 ± 2.91E+00	1.57E+02 ± 2.63E+00	1.11	A
			Fe-59	6.17E+01 ± 4.90E+00 6.86E+01 ± 4.80E+00 6.35E+01 ± 4.30E+00 Mean = 6.46E+01 ± 2.70E+00	5.72E+01 ± 9.55E-01	1.13	A
			Zn-65	1.97E+02 ± 1.01E+01 2.18E+02 ± 9.80E+00 2.25E+02 ± 9.00E+00 Mean = 2.13E+02 ± 5.57E+00	1.88E+02 ± 3.14E+00	1.13	A
			Co-60	1.61E+02 ± 4.20E+00 1.59E+02 ± 4.10E+00 1.64E+02 ± 3.90E+00 Mean = 1.61E+02 ± 2.35E+00	1.64E+02 ± 2.74E+00	0.98	A

(1) Ratio = Reported/Analytics. A=Acceptable
* Sample provided by Analytics, Inc. U=Unacceptable

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis of Soil

DATE	SAMPLE ID NO.	MEDIUM	ANALYSIS	JAF ELAB RESULTS pCi/g ±1 sigma	REFERENCE LAB* pCi/g ±1 sigma	RATIO (1)
6/16/2011	E7635-05	SOIL	Ce-141	0.189 ± 0.022	0.154 ± 0.003	1.24 A
				0.189 ± 0.020		
				0.193 ± 0.021		
				Mean = 0.190 ± 0.012		
			Cr-51	0.316 ± 0.010	0.397 ± 0.007	0.86 A
				0.365 ± 0.009		
				0.342 ± 0.009		
				Mean = 0.341 ± 0.005		
			Cs-134	0.358 ± 0.003	0.366 ± 0.006	0.97 A
				0.363 ± 0.003		
				0.349 ± 0.004		
				Mean = 0.357 ± 0.002		
			Cs-137	0.308 ± 0.019	0.355 ± 0.006	0.95 A
				0.354 ± 0.019		
				0.347 ± 0.021		
				Mean = 0.336 ± 0.011		
			Co-58	0.292 ± 0.018	0.292 ± 0.005	1.00 A
				0.295 ± 0.017		
				0.290 ± 0.020		
				Mean = 0.292 ± 0.011		
			Mn-54	0.304 ± 0.017	0.266 ± 0.004	1.09 A
				0.281 ± 0.017		
				0.285 ± 0.020		
				Mean = 0.290 ± 0.010		
			Fe-59	0.233 ± 0.020	0.238 ± 0.004	1.03 A
				0.253 ± 0.021		
				0.248 ± 0.023		
				Mean = 0.245 ± 0.012		
			Zn-65	0.522 ± 0.033	0.502 ± 0.008	1.08 A
				0.557 ± 0.034		
				0.553 ± 0.039		
				Mean = 0.544 ± 0.020		
			Co-60	0.402 ± 0.015	0.375 ± 0.006	1.03 A
				0.386 ± 0.015		
				0.369 ± 0.017		
				Mean = 0.386 ± 0.009		

(1) Ratio = Reported/Analytics. A=Acceptable
* Sample provided by Analytics, Inc. U=Unacceptable

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis of Vegetation

DATE	SAMPLE ID NO.	MEDIUM	ANALYSIS	JAF ELAB RESULTS pCi/g ±1 sigma				REFERENCE LAB* pCi/g ±1 sigma			RATIO (1)	
6/16/2011	E7637-05	VEG	Ce-141		0.274	±	0.013	0.307	±	0.005	0.92	A
					0.270	±	0.015					
					0.304	±	0.014					
				Mean =	0.283	±	0.008					
			Cr-51		0.739	±	0.073	0.792	±	0.013	1.00	A
					0.767	±	0.088					
					0.863	±	0.071					
				Mean =	0.790	±	0.045					
			Cs-134		0.664	±	0.035	0.729	±	0.012	0.89	A
					0.660	±	0.004					
					0.629	±	0.003					
				Mean =	0.651	±	0.012					
			Cs-137		0.494	±	0.016	0.530	±	0.009	0.95	A
					0.506	±	0.019					
					0.511	±	0.015					
				Mean =	0.504	±	0.010					
			Co-58		0.579	±	0.017	0.583	±	0.010	0.99	A
					0.556	±	0.019					
					0.595	±	0.015					
				Mean =	0.577	±	0.010					
			Mn-54		0.520	±	0.017	0.530	±	0.009	0.96	A
					0.512	±	0.019					
					0.487	±	0.015					
				Mean =	0.506	±	0.010					
			Fe-59		0.487	±	0.019	0.474	±	0.008	1.03	A
					0.514	±	0.023					
					0.470	±	0.017					
				Mean =	0.490	±	0.011					
			Zn-65		1.100	±	0.037	1.000	±	0.017	1.01	A
					0.941	±	0.043					
					0.983	±	0.031					
				Mean =	1.008	±	0.022					
			Co-60		0.718	±	0.015	0.748	±	0.013	0.94	A
					0.716	±	0.017					
					0.680	±	0.013					
				Mean =	0.705	±	0.009					

(1) Ratio = Reported/Analytics. A=Acceptable
* Sample provided by Analytics, Inc. U=Unacceptable

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis of Vegetation

DATE	SAMPLE ID NO.	MEDIUM	ANALYSIS	JAF ELAB RESULTS pCi/g ±1 sigma	REFERENCE LAB* pCi/g ±1 sigma	RATIO (1)
9/15/2011	E8128-09	VEG	Ce-141	0.151 ± 0.013 0.167 ± 0.017 0.163 ± 0.015 Mean = 0.160 ± 0.009	0.169 ± 0.003	0.95 A
			Cr-51	0.632 ± 0.082 0.553 ± 0.114 0.662 ± 0.009 Mean = 0.616 ± 0.047	0.573 ± 0.010	1.07 A
			Cs-134	0.332 ± 0.029 0.343 ± 0.032 0.271 ± 0.033 Mean = 0.315 ± 0.018	0.325 ± 0.005	0.97 A
			Cs-137	0.299 ± 0.014 0.256 ± 0.016 0.281 ± 0.016 Mean = 0.279 ± 0.009	0.288 ± 0.005	0.97 A
			Co-58	0.273 ± 0.014 0.256 ± 0.016 0.258 ± 0.016 Mean = 0.262 ± 0.009	0.247 ± 0.004	1.06 A
			Mn-54	0.400 ± 0.016 0.430 ± 0.020 0.366 ± 0.019 Mean = 0.399 ± 0.011	0.382 ± 0.006	1.04 A
			Fe-59	0.158 ± 0.016 0.155 ± 0.021 0.109 ± 0.019 Mean = 0.141 ± 0.011	0.139 ± 0.002	1.01 A
			Zn-65	0.419 ± 0.029 0.493 ± 0.039 0.477 ± 0.036 Mean = 0.463 ± 0.020	0.457 ± 0.008	1.01 A
			Co-60	0.388 ± 0.013 0.366 ± 0.015 0.395 ± 0.015 Mean = 0.383 ± 0.008	0.397 ± 0.007	0.96 A

(1) Ratio = Reported/Analytics. A=Acceptable
* Sample provided by Analytics, Inc. U=Unacceptable

8.5 REFERENCES

8.5.1 Radioactivity and Radiochemistry, The Counting Room: Special Edition, 1994 Caretaker Publications, Atlanta, Georgia.

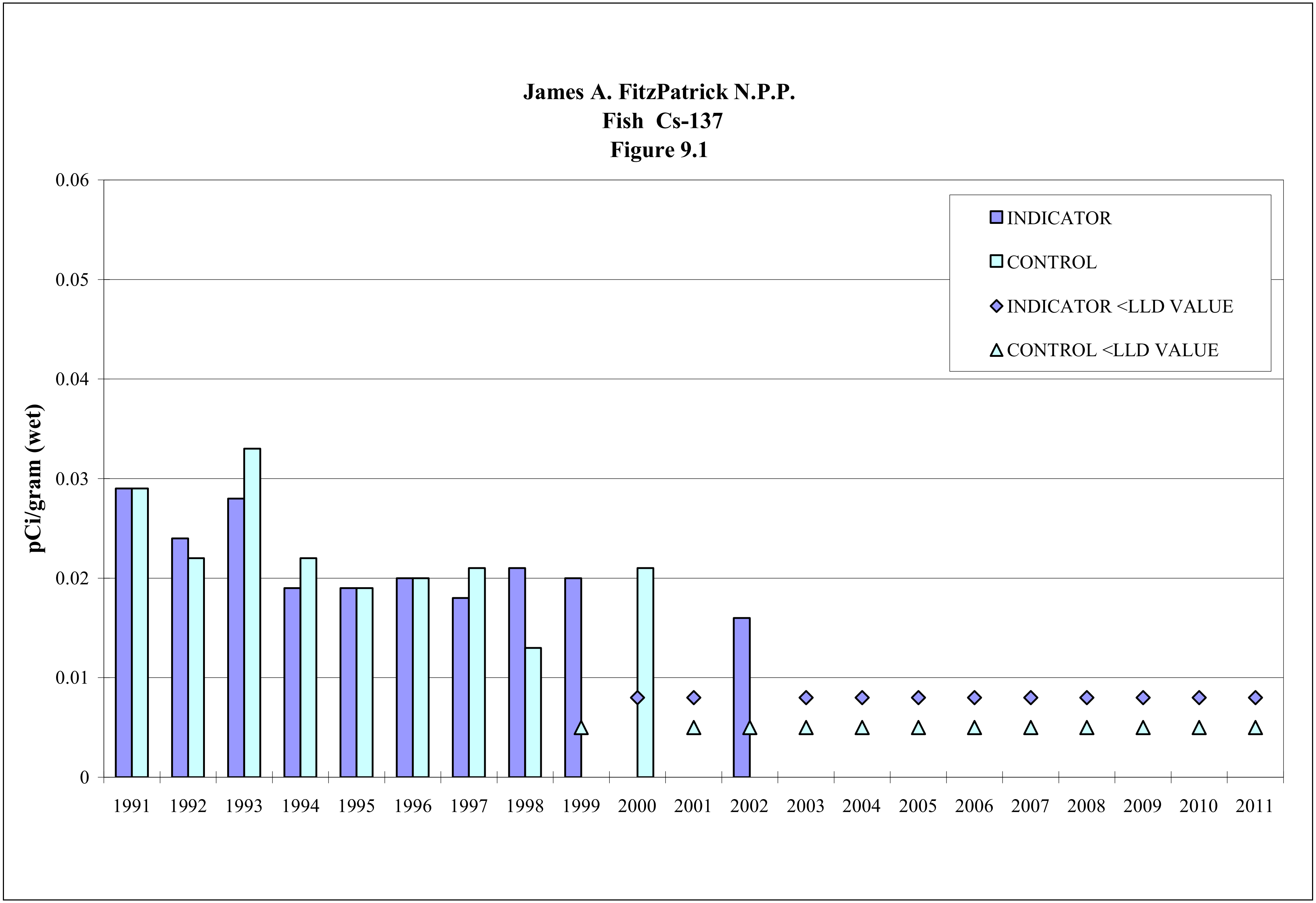
8.5.2 Data Reduction and Error Analysis for the Physical Sciences, Bevington P.R., McGraw Hill, New York (1969).

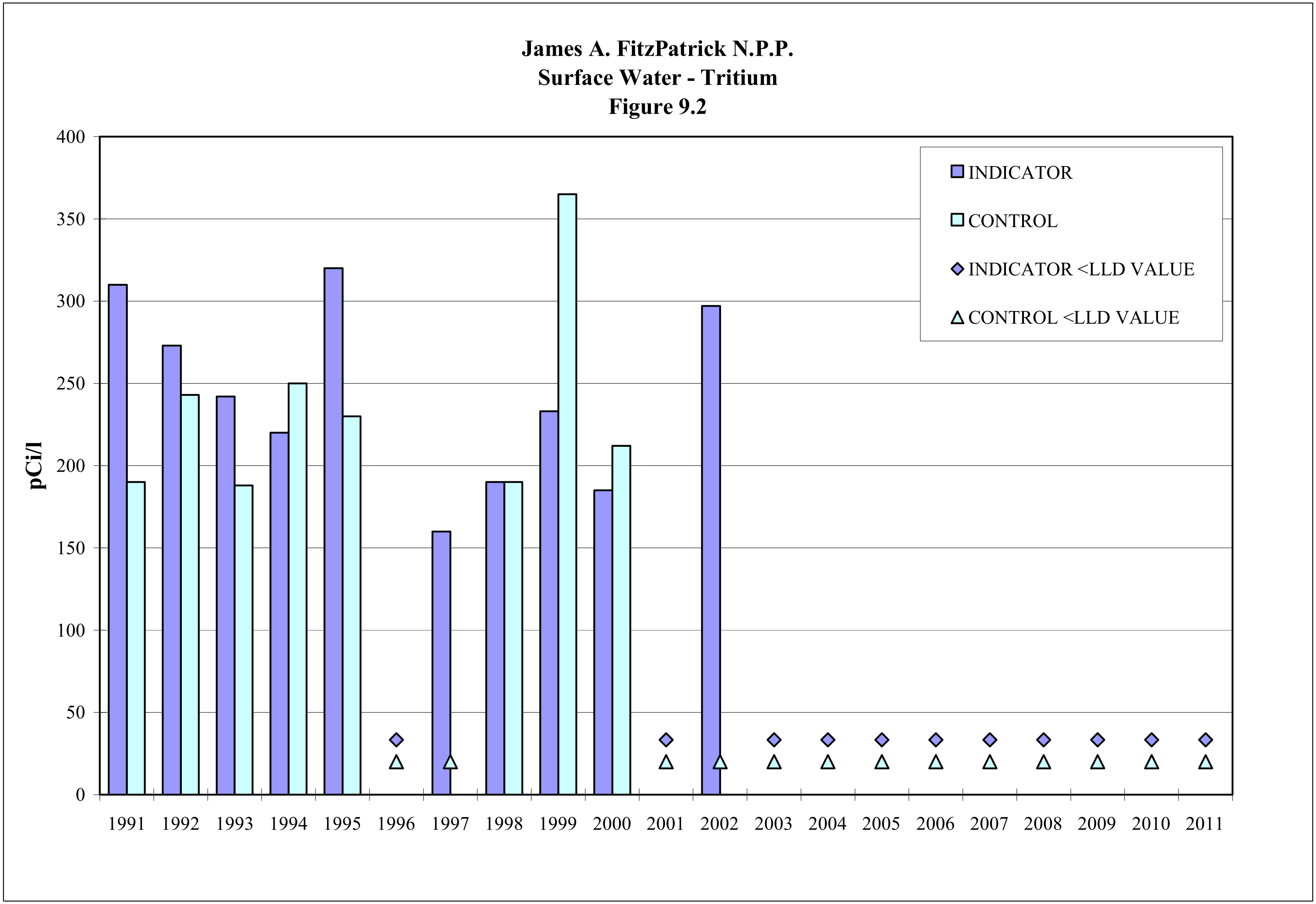
9.0 GRAPHICAL PRESENTATIONS

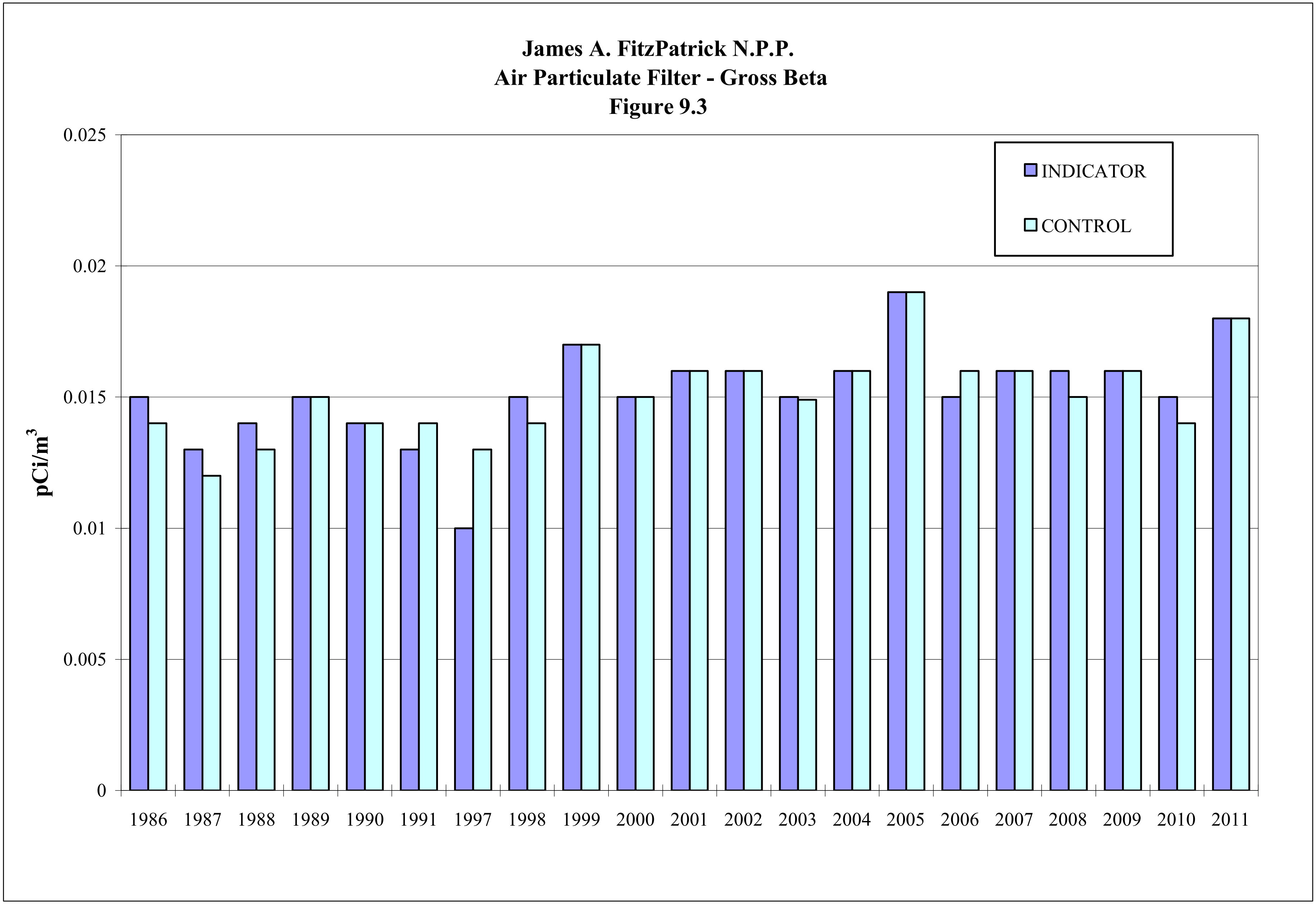
This section includes graphic representation of selected sample results.

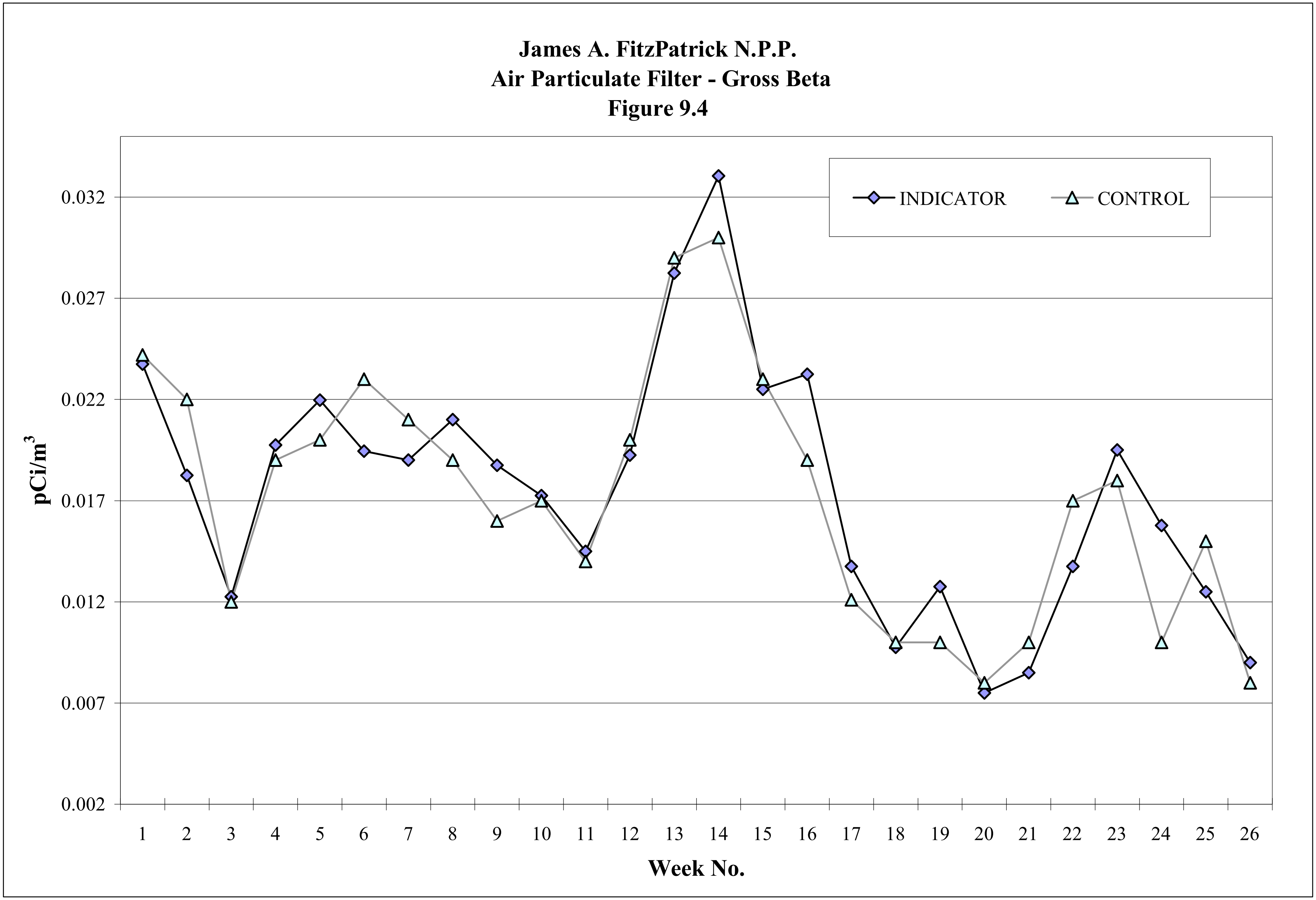
For graphic representation, results reported LLD are considered to be at the "Zero" level of activity.

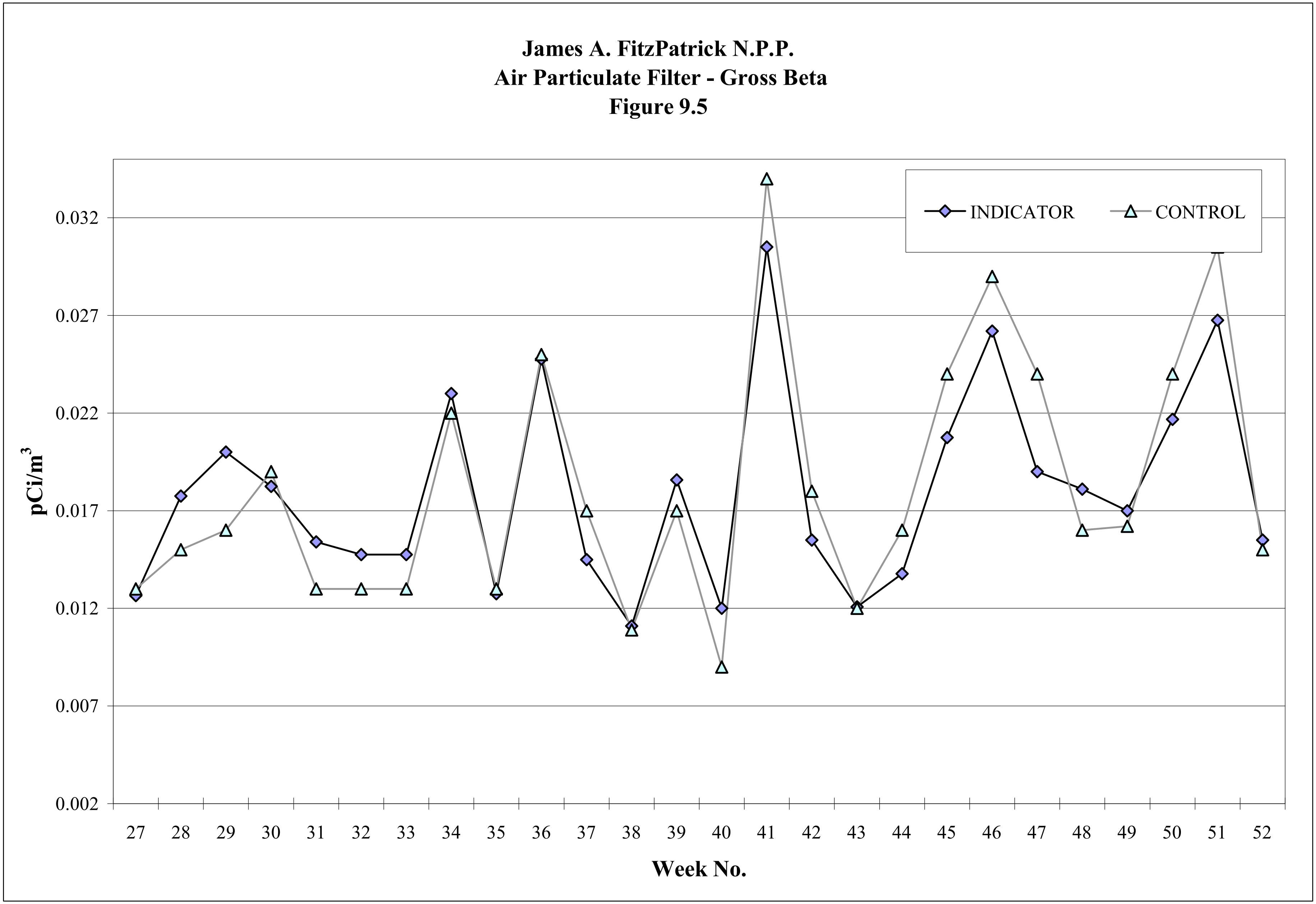
Sample location results specified as "Indicator" and "Control" on the graphs can be referenced back to Section 3.3 for specific locations.


James A. FitzPatrick N.P.P.
Fish Cs-137
Figure 9.1
pCi/gram (wet)
0.06
0.05
0.04
0.03
0.02
0.01
0
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
INDICATOR
CONTROL
INDICATOR <LLD VALUE
CONTROL <LLD VALUE

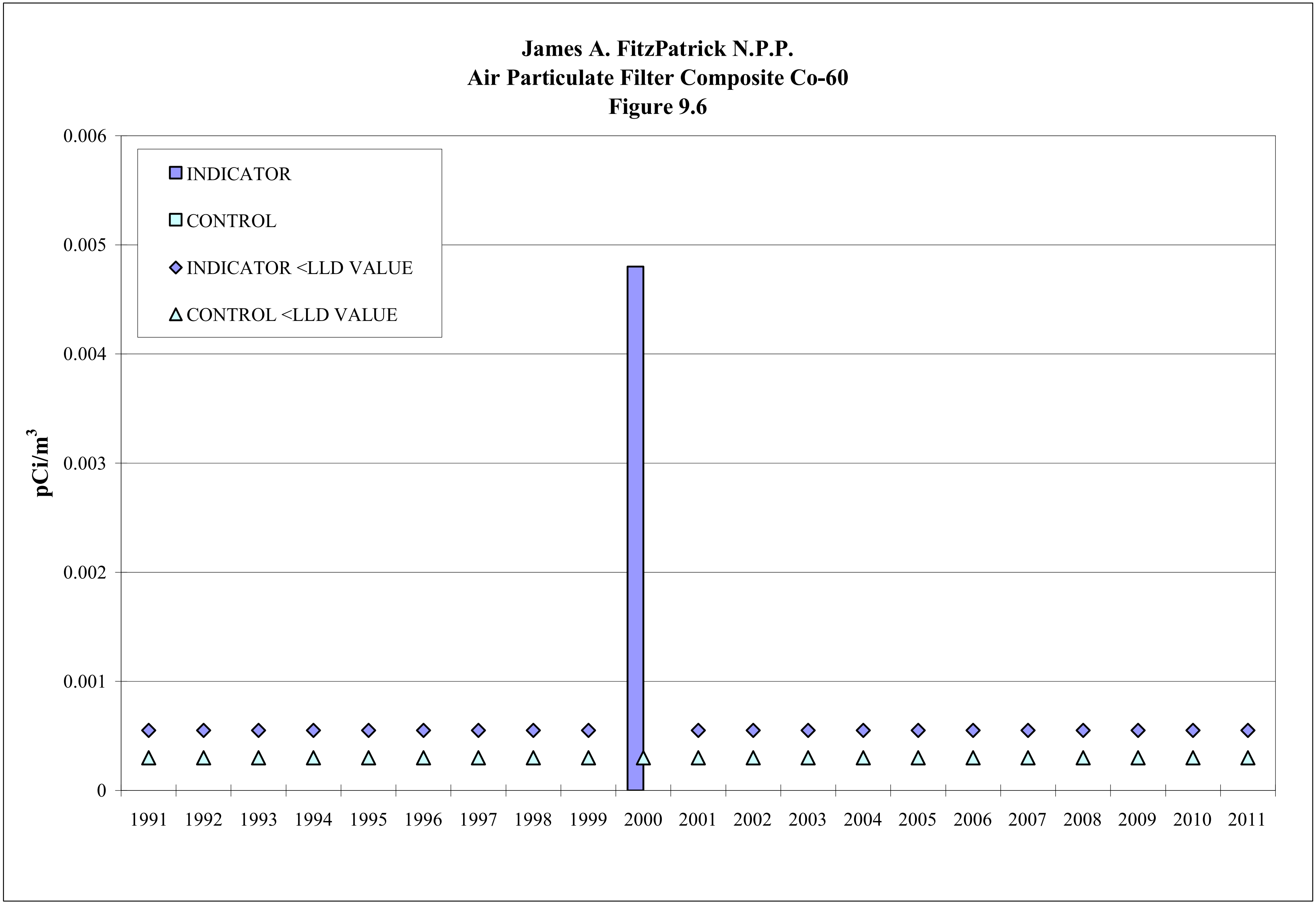

James A. FitzPatrick N.P.P.
Surface Water - Tritium
Figure 9.2
pCi/l
0
50
100
150
200
250
300
350
400
INDICATOR
CONTROL
INDICATOR <LLD VALUE
CONTROL <LLD VALUE
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011

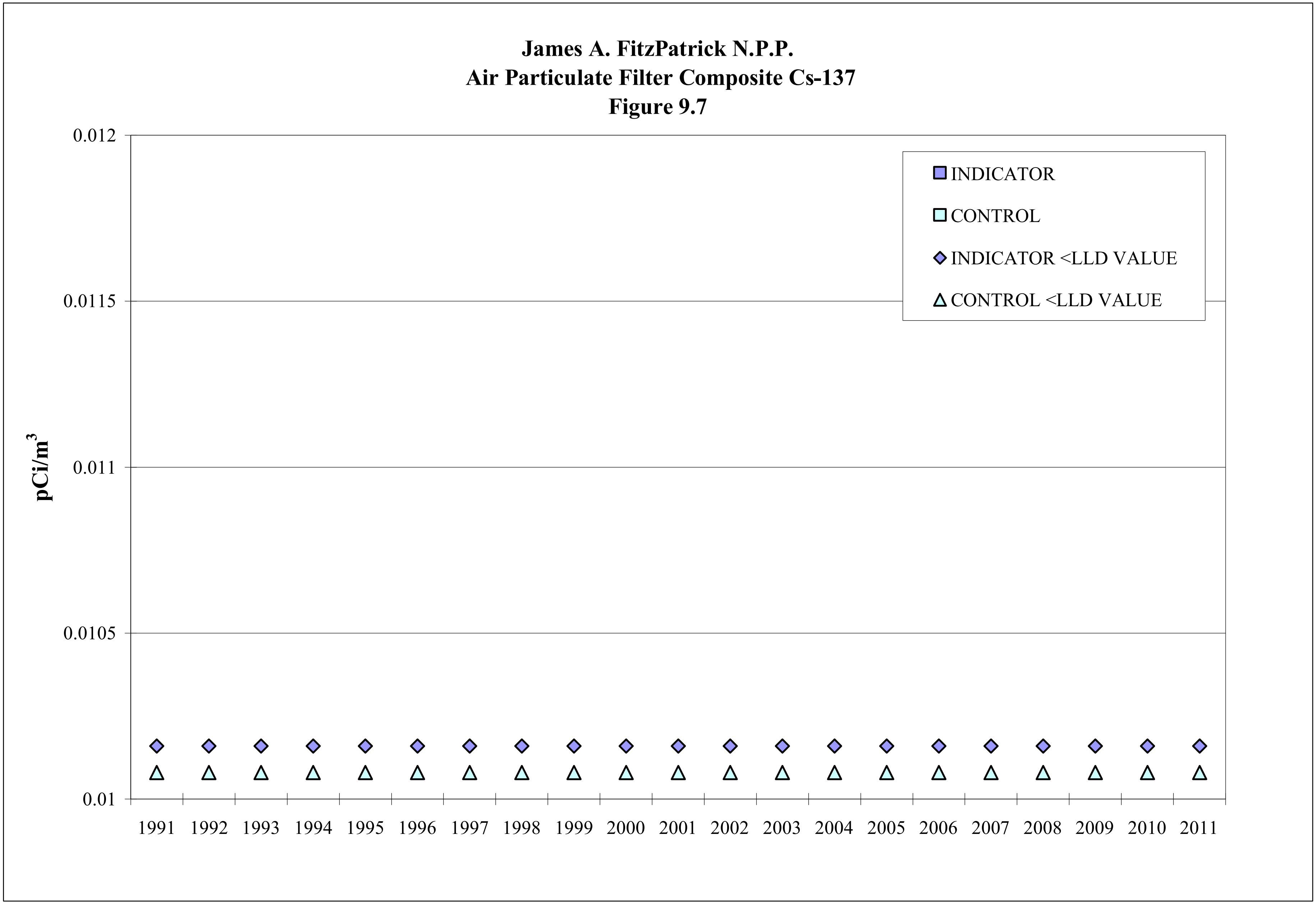

James A. FitzPatrick N.P.P.
Air Particulate Filter - Gross Beta
Figure 9.3
pCi/m3
0.025
0.02
0.015
0.01
0.005
0
INDICATOR
CONTROL
1986
1987
1988
1989
1990
1991
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011


James A. FitzPatrick N.P.P.
Air Particulate Filter - Gross Beta
Figure 9.4
INDICATOR
CONTROL
pCi/m3
0.032
0.027
0.022
0.017
0.012
0.007
0.002
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
Week No.

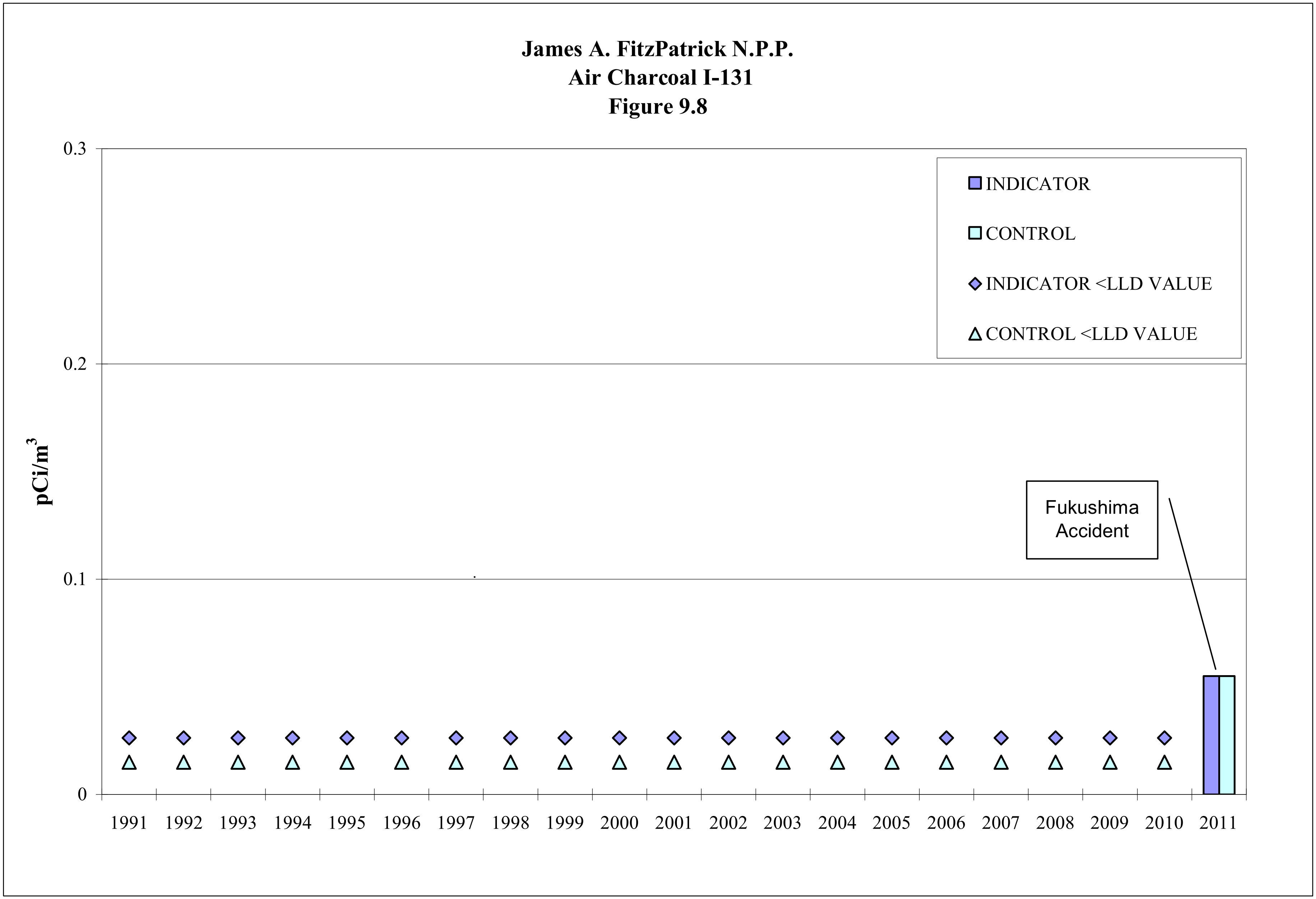


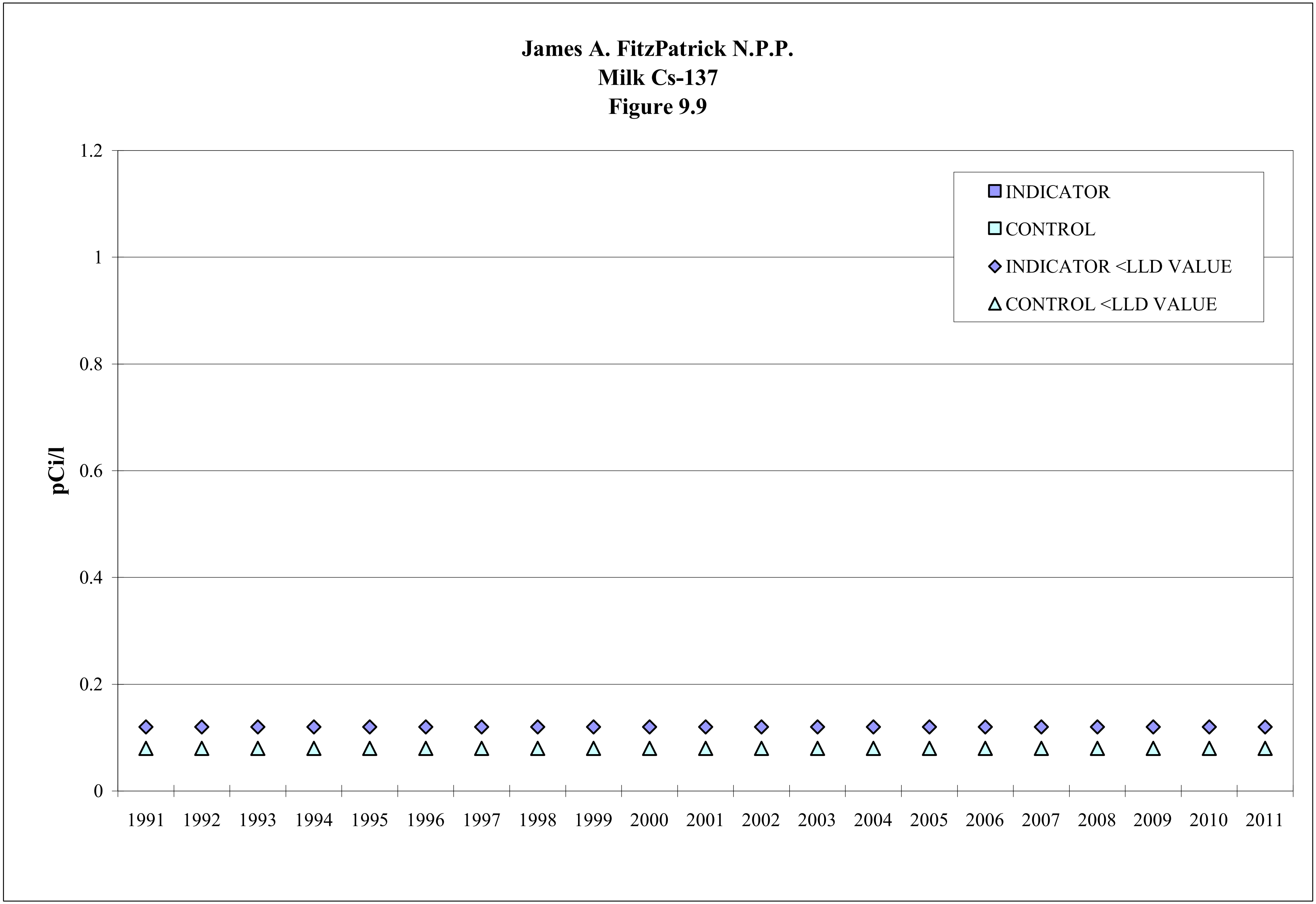
James A. FitzPatrick N.P.P.
Air Particulate Filter - Gross Beta
Figure 9.5
INDICATOR
CONTROL
pCi/m3
0.032
0.027
0.022
0.017
0.012
0.007
0.002
27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
Week No.


James A. FitzPatrick N.P.P.
Air Particulate Filter Composite Co-60
Figure 9.6
pCi/m3
0.006
0.005
0.004
0.003
0.002
0.001
0
INDICATOR
CONTROL
INDICATOR <LLD VALUE
CONTROL <LLD VALUE
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011

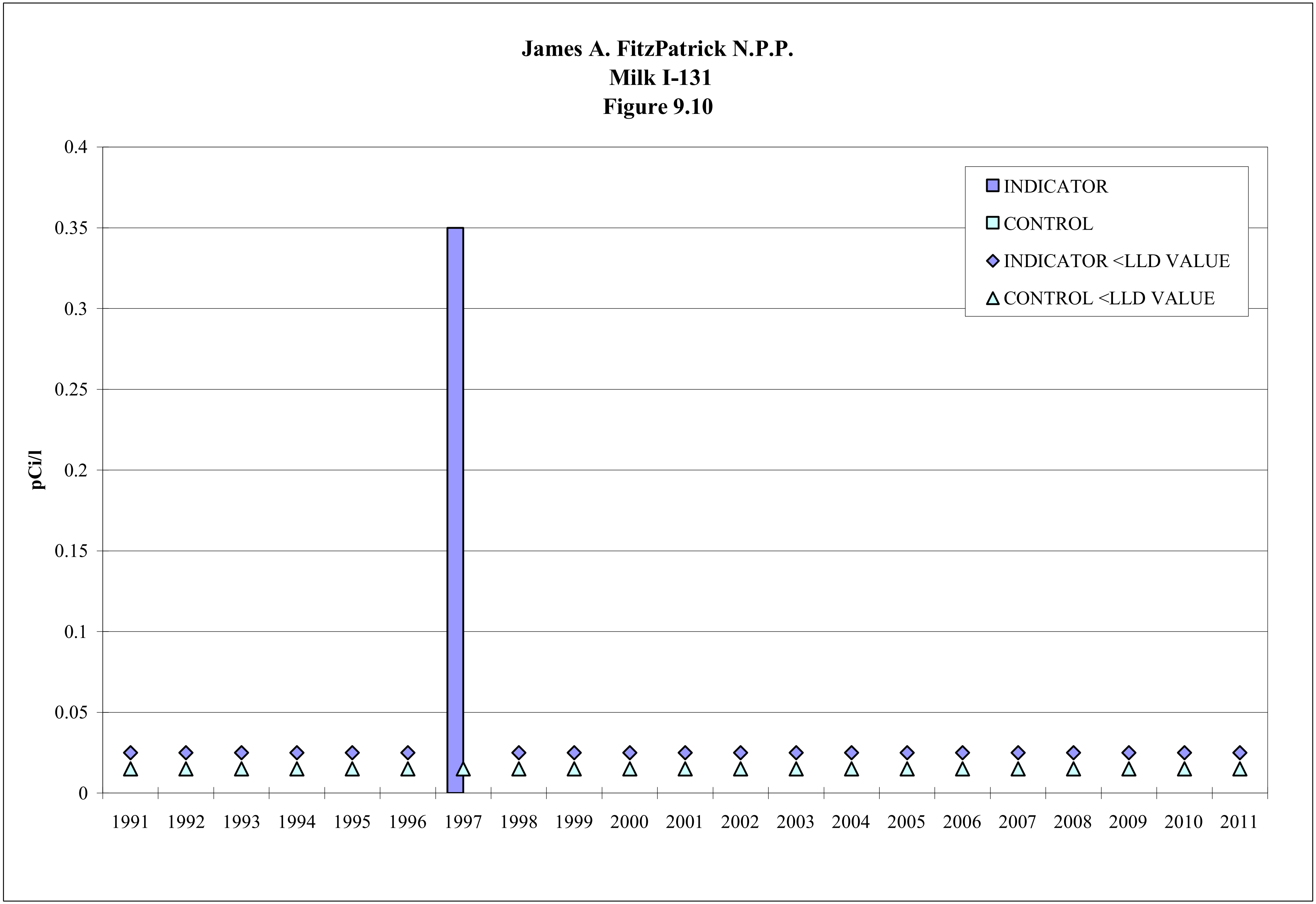


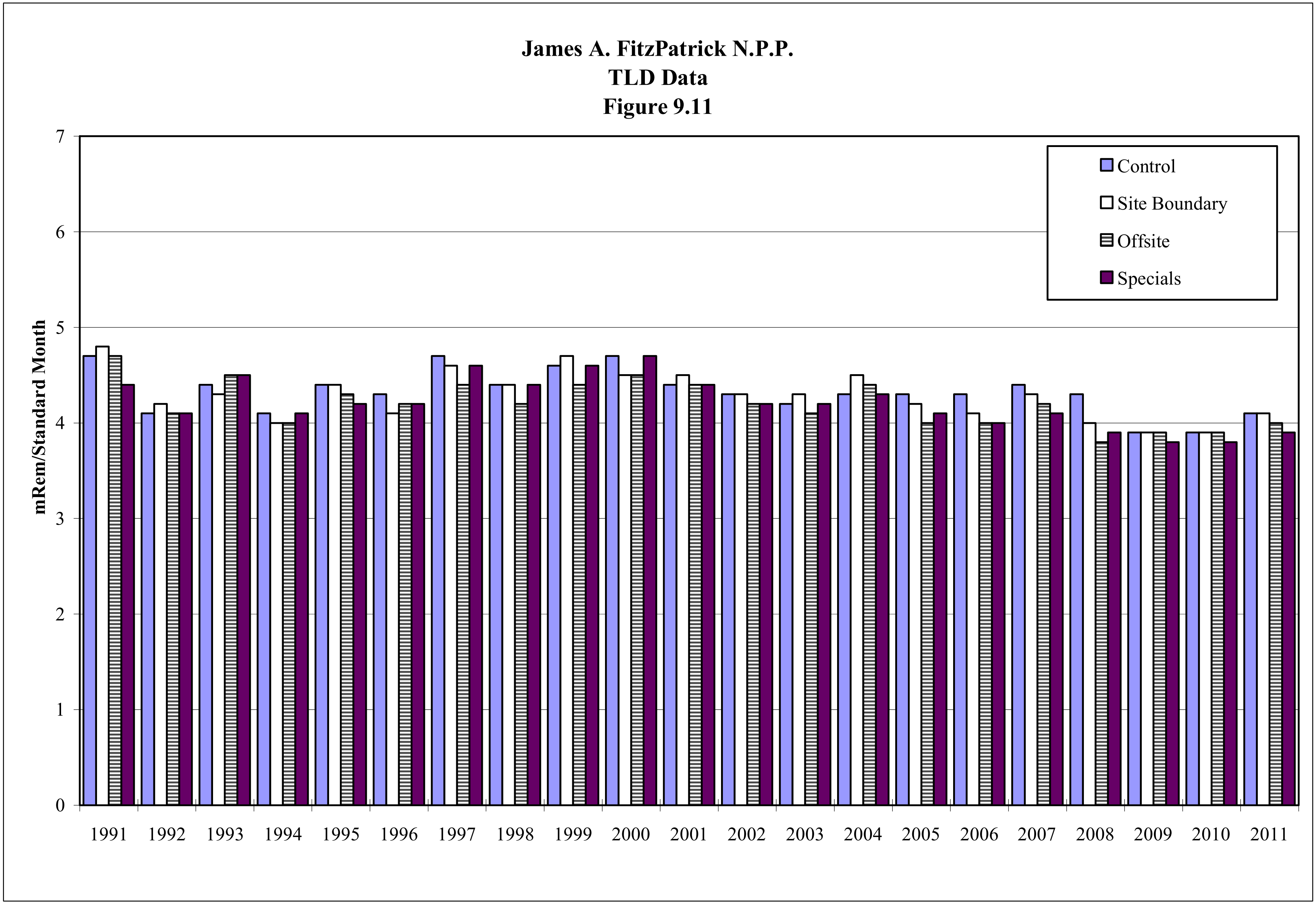
James A. FitzPatrick N.P.P.
Air Particulate Filter Composite Cs-137
Figure 9.7
pCi/m3
0.012
0.0115
0.011
0.0105
0.01
INDICATOR
CONTROL
INDICATOR <LLD VALUE
CONTROL <LLD VALUE
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011


James A. FitzPatrick N.P.P.
Air Charcoal I-131
Figure 9.8
pCi/m3
0.3
0.2
0.1
0
INDICATOR
CONTROL
INDICATOR <LLD VALUE
CONTROL <LLD VALUE
Fukushima Accident
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011



James A. FitzPatrick N.P.P.
Milk Cs-137
Figure 9.9
pCi/l
1.2
1
0.8
0.6
0.4
0.2
0
1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011
INDICATOR
CONTROL
INDICATOR <LLD VALUE
CONTROL <LLD VALUE


James A. FitzPatrick N.P.P.
Milk I-131
Figure 9.10
pCi/l
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
INDICATOR
CONTROL
INDICATOR <LLD VALUE
CONTROL <LLD VALUE
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011


James A. FitzPatrick N.P.P.
TLD Data
Figure 9.11
mRem/Standard Month
0
1
2
3
4
5
6
7
Control
Site Boundary
Offsite
Specials
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011