2004 Annual Radiological Environmental Operating Report

James A. FitzPatrick Nuclear Power Plant

Entergy
Nuclear Northeast

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

JANUARY 1, 2004 - DECEMBER 31, 2004

FOR

JAMES A. FITZPATRICK NUCLEAR POWER PLANT

ENTERGY NUCLEAR FITZPATRICK, LLC (ENF)

ENTERGY NUCLEAR OPERATIONS, INC (ENO)

FACILITY OPERATING LICENSE DPR-59

DOCKET NUMBER 50-333

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1.0 EXECUTIVE SUMMARY

The Annual Radiological Environmental Operating Report is published in accordance with the J.A. FitzPatrick N.P.P. 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 REMP program, the implementation of the program, and the results obtained as required by the 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 Program.

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 2004 there were 2310 analyses performed on environmental media collected as part of the required monitoring program. These results demonstrated that there is no significant or measurable radiological impact from the operation of the FitzPatrick plant. Cesium-137 was detected in one aquatic pathway (shoreline sediment) at very low levels and is attributed to fallout from past weapons testing. The 2004 results for all the pathways sampled are consistent with the previous five year historical results and exhibit no adverse trends.

In summary, the analytical results from the 2004 Environmental Monitoring Program demonstrate that the routine operation of the facilities at the Nine Mile Point site had no significant or measurable radiological impact on the environment. No elevated radiation levels were detected in the off-site environment as a result of the hydrogen injection program, the storage of radioactive waste, or the implementation of the Independent Spent Fuel Storage Installation. The results of the REMP program continue to demonstrate that the operation of the plant did not result in a significant measurable dose to a member of the general population, or adversely impact the environment as a result of radiological effluents. The environmental 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 10CFR72.104(a).

2.0 INTRODUCTION

The James A. FitzPatrick N.P.P. 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 2004.

2.1 PROGRAM HISTORY

Environmental monitoring of the Nine Mile Point site has been on-going 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 preoperational 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 881 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 Niagara Mohawk, began full power operation. This 1207 Megawatt BWR is located between Unit 1 and FitzPatrick.

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 is shared, but each utility reviews and publishes their own annual report. On November 21, 2001 the ownership and operation of the James A. FitzPatrick N.P.P. 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 07, 2001, the ownership of the Nine Mile Point Unit I and II facilities was transferred to Constellation Nuclear. These facilities are operated by Nine Mile Point Nuclear Station, LLC.

In summary, three Boiling Water Reactors, which together generate 2703 Megawatts, have operated collectively at the Nine Mile 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 J.A. FitzPatrick generating facility and support buildings occupy 22 acres along the 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 approximately 18% of the land devoted to agriculture.

2.3 PROGRAM OBJECTIVES

The objectives of the Radiological Environmental Monitoring Program 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 JAFNPP 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 NPP Radiological Environmental Monitoring Program (REMP) consists of sampling and analysis of various media that include:

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

In addition, direct radiation measurements are performed using thermoluminescent dosimeters (TLDs). These sampling programs are outlined in Table 3.0-1. The 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 (ICP). In addition to the participation in the ICP Program, sample splits are provided to the New York State Department of Health for cross checking purposes.

Sample collections for the radiological program are accomplished by a dedicated site environmental staff from both the Nine Mile Point Units (NMP) 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

OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

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 off site 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 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)

OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

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 semiannually[(c)].
INGESTION			
Milk	a. Samples from milk 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 milk 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 milk 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)

OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

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 vegetable) grown nearest each of two different off-site locations of highest predicted site average D/Q (based on all licensed site Reactors).	Once during harvest season.	Gamma isotopic(c) analysis of edible portions. (Isotopic to include I-131).
	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)].		

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 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 pocket 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 aliquot at time intervals which are very short (e.g., hourly) relative to the compositing period (e.g., monthly) in order to assure that a representative sample is obtained.

(h) A milk sampling location, as required in Table 3.0-1, 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

One kilogram of 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 1 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 on-site sample transects located off shore from the site. One set of control samples are collected at an off-site sample transect located off shore 8 – 10 miles west of the site. Available species are selected using the following guidelines:

a. 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.

b. Samples are composed of 0.5 to 1 kilogram 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 the 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 require 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 On-Site 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 Off-Site in the southwest sector in the vicinity of the City of Oswego and is designated as Station G Off-Site. 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 Off-Site 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 monthly 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 JAFNPP 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.

A. 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
On-site	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*, 23*, 24, 25, 26, 27, 28, 29, 30, 31, 39, 47, 18*, 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 ODCM. (TLD locations comprising this group are: 75*, 76*, 77*, 78*, 79*, 80*, 81*, 82*, 83*, 84*, 7*, 18*, 85*, 86*, 87* and 23*)

TLD Geographical Category	Description
Off-site Sector	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 require a total of 32 TLD stations, environmental TLDs are also placed at additional locations, not required by the ODCM, within the On-site, 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.

B. 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) on site. 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 four farms during the sampling year. These farms include three indicator locations 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 sampling year. Milk samples were not collected in January through March of 2004 as there were no positive detections of plant related radionuclides in samples collected during November and December of 2003.

In 2004 samples were collected from indicator location 76 and control location 77 twice per month, April through December. Samples from indicator locations 4 and 55 were initially collected once per month starting in April. The sampling frequency was increased for locations 4 and 55 to twice per month in July and continued through December. The increased sample frequency at locations 4 and 55 was implemented to heighten monitoring to detect a possible environmental impact as a result of the increased effluent release rate resulting from the fuel failure that was experienced at the FitzPatrick power plant starting in February of 2004. The failed fuel bundles were removed from the core during the 2004 refueling outage conducted in October.

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 butterfat. Two gallons are sampled from each indicator and control location at each collection. 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 distant 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.

3.2 ANALYSES PERFORMED

Environmental sample analyses are performed at the James A. FitzPatrick Nuclear Power Plant (JAFNPP) Environmental Laboratory. The following samples are analyzed at the JAFNPP Environmental Lab:

- Shoreline Sediment – gamma spectral analysis
- Fish – gamma spectral analysis
- Surface Water Monthly Composites – gamma spectral analysis, I-131
- Surface Water Quarterly Composite - tritium
- Air Particulate Filter – gross beta
- Air Particulate Filter Composites – gamma spectral analysis
- Airborne Radioiodine – gamma spectral analysis
- Direct Radiation – Thermoluminescent Dosimeters (TLDs)
- Milk – gamma spectral analysis and I-131
- Food Products (Vegetation) – gamma spectral analysis
- Special Samples (soil, food products, bottom sediment, etc.) – gamma spectral analysis

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:

- Sample Medium
- 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).
- Location description
- Degrees and distance of the sample location from the site.

3.3.1 LIST OF FIGURES

TABLE 3.3-1
2004 ENVIRONMENTAL SAMPLE LOCATIONS

SAMPLE MEDIUM	MAP DESIGNATION	FIGURE NUMBER	LOCATION DESCRIPTION	DEGREES & DISTANCE (1)		
Shoreline Sediment	05*	Figure 3.3-5	Sunset Bay	82º	at	1.4 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	236°	at	5.9 miles
Surface Water	03*	Figure 3.3-4	FitzPatrick Inlet	54°	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	275°	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	304°	at	0.1 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	106°	at	1.1 miles
	R-3*	Figure 3.3-3	R-3 Station, Co. Rt. 29	134°	at	1.4 miles
	R-4*	Figure 3.3-3	R-4 Station, Co. Rt. 29	145°	at	1.8 miles
	R-5*	Figure 3.3-2	R-5 Station, Montario Point	42°	at	16.2 miles
	D-1	Figure 3.3-3	D1 On-Site Station	73°	at	0.3 miles
	G	Figure 3.3-3	G On-Site Station	244°	at	0.7 miles
	H	Figure 3.3-3	H On-Site Station	74°	at	0.8 miles
	I	Figure 3.3-3	I On-Site Station	96°	at	0.8 miles
	J	Figure 3.3-3	J On-Site Station	110°	at	0.9 miles
	K	Figure 3.3-3	K On-Site Station	132°	at	0.6 miles
	G	Figure 3.3-2	G Off-Site Station, Saint Paul Street	226°	at	5.4 miles
	D-2	Figure 3.3-2	D2 Off-Site Station, Rt. 64	118°	at	9.0 miles
	E	Figure 3.3-2	E Off-Site Station, Rt. 4	162°	at	7.1 miles
	F	Figure 3.3-2	F Off-site Station, Dutch Ridge Road	192°	at	7.7 miles

(1) Degrees and distance based on Nine Mile Point Unit 2 Reactor Centerline

* Sample location required by ODCM

TABLE 3.3-1 (Continued)
2004 ENVIRONMENTAL SAMPLE LOCATIONS

SAMPLE MEDIUM	MAP DESIGNATION	FIGURE NUMBER	LOCATION DESCRIPTION	DEGREES & DISTANCE (1)
Thermoluminescent Dosimeters (TLD) (Continued)	3	Figure 3.3-3	D1 Onsite	73° at 0.3 miles
	4	Figure 3.3-3	D2 Onsite	144° at 0.4 miles
	5	Figure 3.3-3	E Onsite	179° at 0.4 miles
	6	Figure 3.3-3	F Onsite	212° at 0.5 miles
	7*	Figure 3.3-3	G Onsite	244° 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	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 7.7 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	239° at 0.9 miles
	18*	Figure 3.3-3	Energy Info. Center - Lamp Post, SW	266° at 0.4 miles
	19	Figure 3.3-2	East Boundary - JAF, Pole 9	84° at 1.4 miles
	23*	Figure 3.3-3	H Onsite	74° at 0.8 miles
	24	Figure 3.3-3	I Onsite	96° at 0.8 miles
	25	Figure 3.3-3	J Onsite	110° 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	277° at 0.2 miles
	39	Figure 3.3-3	N. Fence, Rad. Waste-NMP-1	295° 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
* Sample location required by ODCM

TABLE 3.3-1 (Continued)
2004 ENVIRONMENTAL SAMPLE LOCATIONS

SAMPLE MEDIUM	MAP DESIGNATION	FIGURE NUMBER	LOCATION DESCRIPTION	DEGREES & DISTANCE (1)
Thermoluminescent	54	Figure 3.3-2	Gas Substation Co. Rt. 5-Pulaski	115° at 9.4 miles
Dosimeters (TLD)	55	Figure 3.3-2	Rt. 104-New Haven Sch. (SE Corner)	75° at 13.0 miles
(Continued)	56*	Figure 3.3-2	Co Rt. 1A-Alcan (E. of E. Entrance Rd.)	124° at 5.2 miles
	58*	Figure 3.3-2	Unit 2, N. Fence, N. of Reactor Bldg.	222° at 3.0 miles
	75*	Figure 3.3-3	Unit 2, N. Fence, N. of Change House	356° at 0.1 miles
	76*	Figure 3.3-3	Unit 2, N. Fence, N. of Pipe Bldg.	28° at 0.1 miles
	77*	Figure 3.3-3	JAF. E. of E. Old Lay Down Area	39° at 0.2 miles
	78*	Figure 3.3-3	Co. Rt. 29, Pole #63, 0.2 mi. S. of Lake Rd.	86° at 0.9miles
	79*	Figure 3.3-3	Co. Rt. 29, Pole #54, 0.7 mi. S. of Lake Rd.	121° at 1.2 miles
	80*	Figure 3.3-3	Miner Rd., Pole #16, 0.5 mi. W. of Rt. 29	137° at 1.5 miles
	81*	Figure 3.3-3	Miner Rd., Pole # 1-1/2, 1.1 mi. W. of Rt. 29	160° at 1.7 miles
	82*	Figure 3.3-3	Lakeview Rd., Tree 0.45 mi. N. of Miner Rd.	180° at 1.6 miles
	83*	Figure 3.3-3	Lakeview Rd., N., Pole #6117, 200ft. N. of Lake Rd.	203° at 1.2 miles
	84*	Figure 3.3-2	Unit 1, N. Fence, N. of W. Side of Screen House	225° at 1.1 miles
	85*	Figure 3.3-3	Unit 2, N. Fence, N of W. Side of Screen House	289° at 0.2 miles
	86*	Figure 3.3-3	Unit 2, N. Fence, N. of E. Side of Screen House	308° at 0.1 miles
	87*	Figure 3.3-3	Hickory Grove Rd., Pole #2, 0.6 mi. N. of Rt. 1	332° at 0.1 miles
	88*	Figure 3.3-2	Gas Substation Co. Rt. 5-Pulaski	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 4.5 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	Alcan 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	103° at 1.2 miles

(1) Degrees and distance based on Nine Mile Point Unit 2 Reactor Centerline

* Sample location required by ODCM

TABLE 3.3-1 (Continued)
2004 ENVIRONMENTAL SAMPLE LOCATIONS

SAMPLE MEDIUM	MAP DESIGNATION	FIGURE NUMBER	LOCATION DESCRIPTION	DEGREES & DISTANCE (1)
Thermoluminescent Dosimeters (TLD) (Continued)	99	Figure 3.3-2	NMP Rd., 0.4 mi. N. of Lake Rd., Env. Station R1	92° at 1.8 miles
	100	Figure 3.3-3	Rt. 29 & Lake Rd., Env. Station R2	106° at 1.1 miles
	101	Figure 3.3-3	Rt. 29, 0.7 mi. S. of Lake Rd., Env. Station R3	134° 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	266° at 0.4 miles
	104	Figure 3.3-2	Parkhurst Rd., Pole #23, 0.1 mi. S. of Lake rd.	103° at 1.4 miles
	105	Figure 3.3-3	Lake view Rd. Pole #36, 0.5 mi. S. of Lake Rd.	198° at 1.4 miles
	106	Figure 3.3-3	Shoreline Cove, W. of NMP-1, Tree on W. Edge	272° at 0.3 miles
	107	Figure 3.3-3	Shoreline Cove, W. of NMP-1, 30 ft SSW of #106	271° 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
Cows Milk	76	Figure 3.3-4	Indicator Location	120° at 6.3 miles
	55	Figure 3.3-4	Indicator Location	97° at 8.7 miles
	4	Figure 3.3-4	Indicator Location	115° at 7.6 miles
	77*	Figure 3.3-4	Control Location	190° at 16.0 miles
Food Products	133*	Figure 3.3-5	Indicator Location	83° at 1.6 miles
	134	Figure 3.3-5	Indicator Location	83° at 1.5 miles
	144	Figure 3.3-5	Indicator Location	140° at 1.6 miles
	132*	Figure 3.3-5	Indicator Location	110° at 1.9 miles
	145*	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

* Sample location required by ODCM

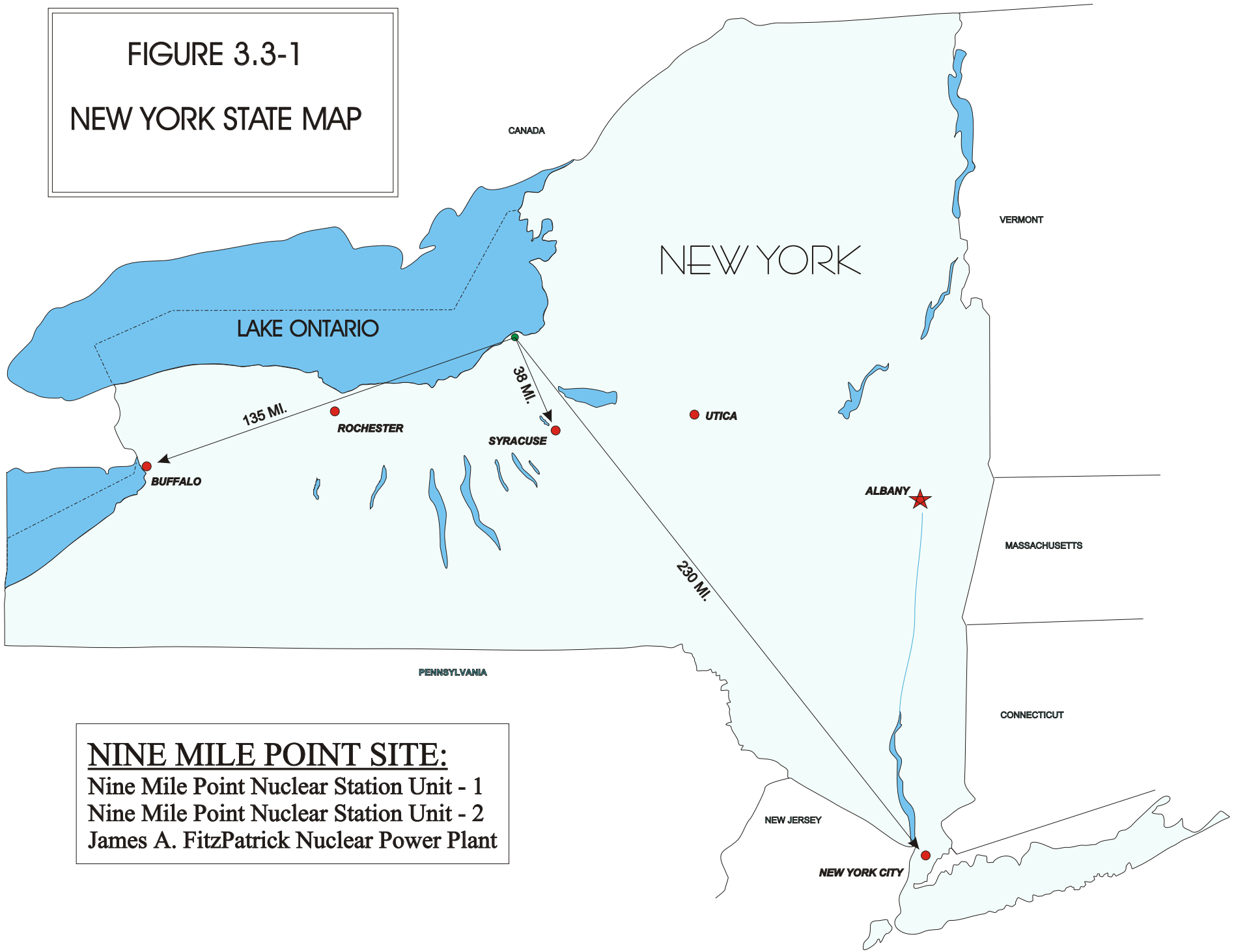
TABLE 3.3-1 (Continued)
2004 ENVIRONMENTAL SAMPLE LOCATIONS

SAMPLE MEDIUM	LOCATION DESIGNATION	LOCATION DESCRIPTION
Thermoluminescent Dosimeters TLD) (Continued)	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

* Sample location required by ODCM
H indicates Optional TLD location

FIGURE 3.3-1

NEW YORK STATE MAP



NINE MILE POINT SITE:

Nine Mile Point Nuclear Station Unit - 1
Nine Mile Point Nuclear Station Unit - 2
James A. FitzPatrick Nuclear Power Plant

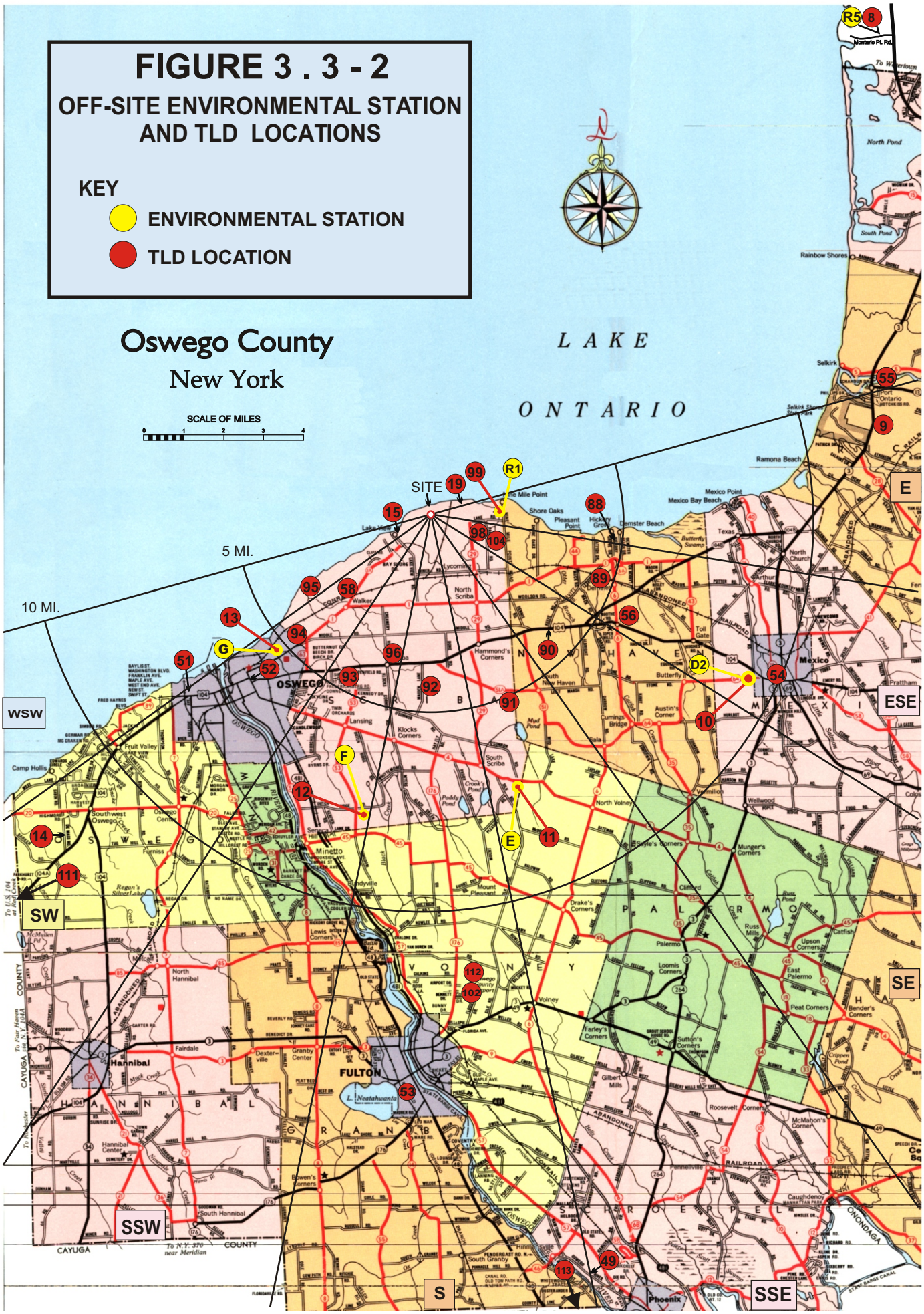


FIGURE 3 . 3 - 2
OFF-SITE ENVIRONMENTAL STATION AND TLD LOCATIONS
KEY
ENVIRONMENTAL STATION
TLD LOCATION
Oswego County
New York
SCALE OF MILES
LAKE ONTARIO
SITE
5 MI.
10 MI.
OSWEGO
FULTON
Hannibal
WSW
SW
SSW
S
SSE
SE
ESE
E

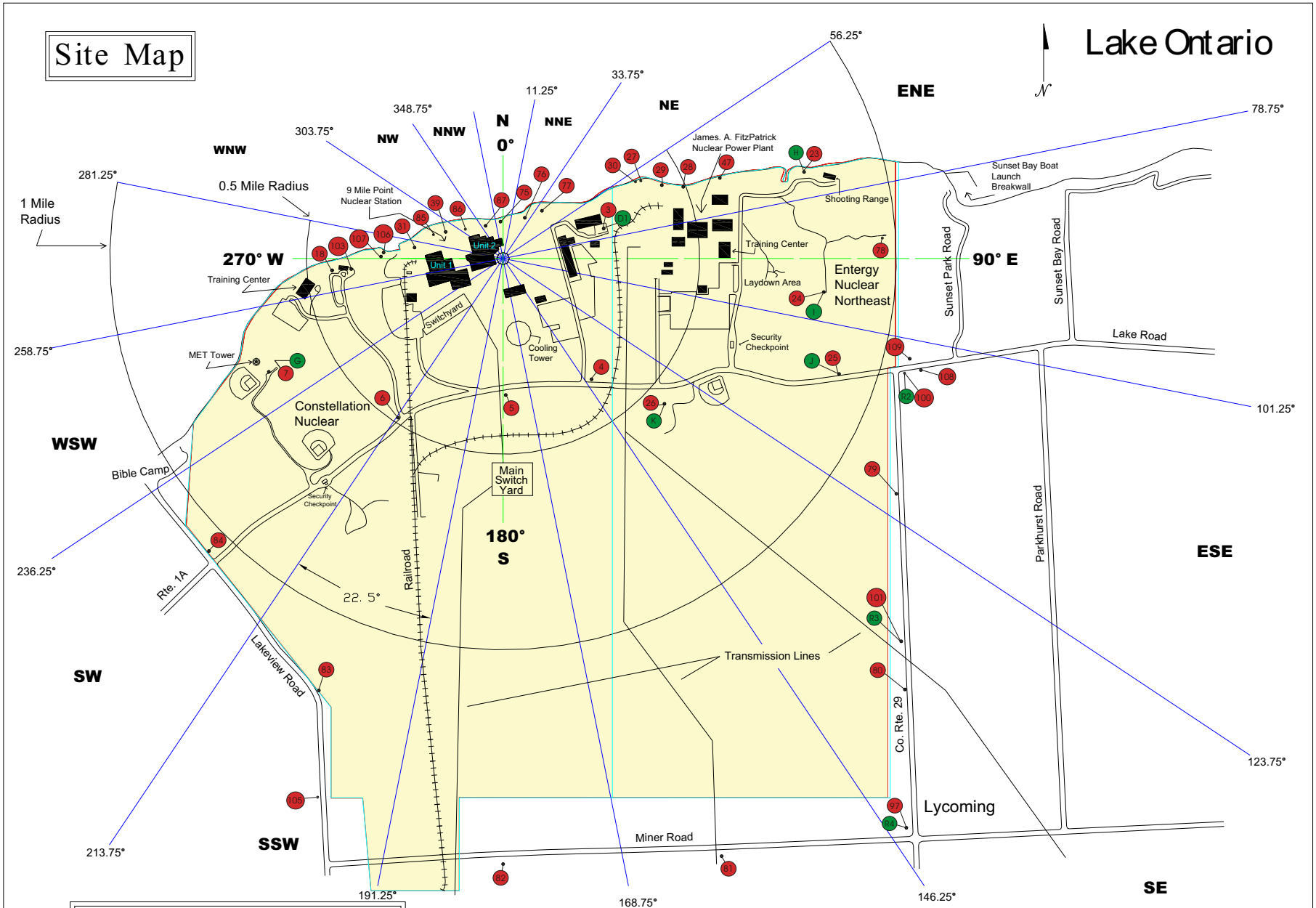
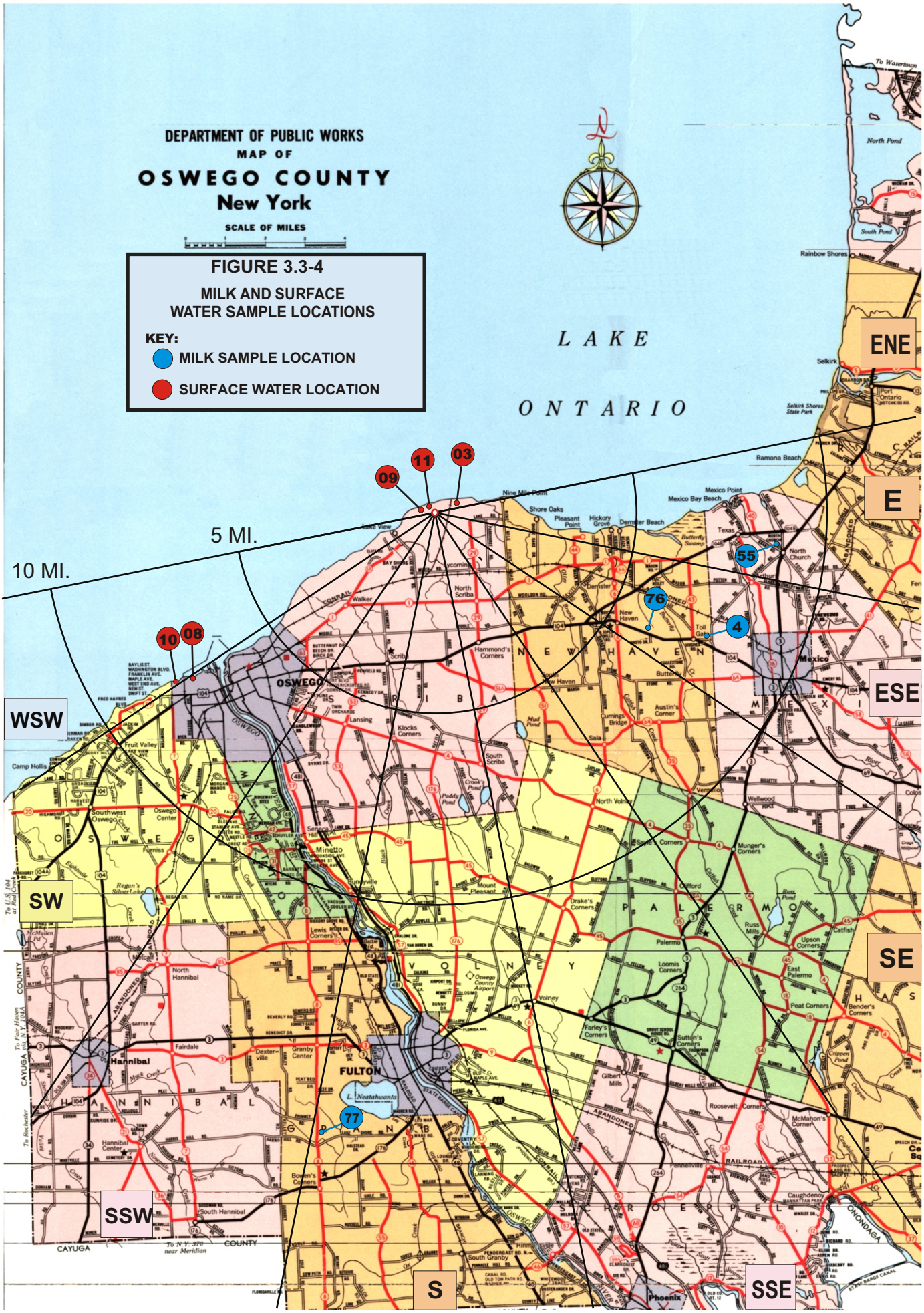
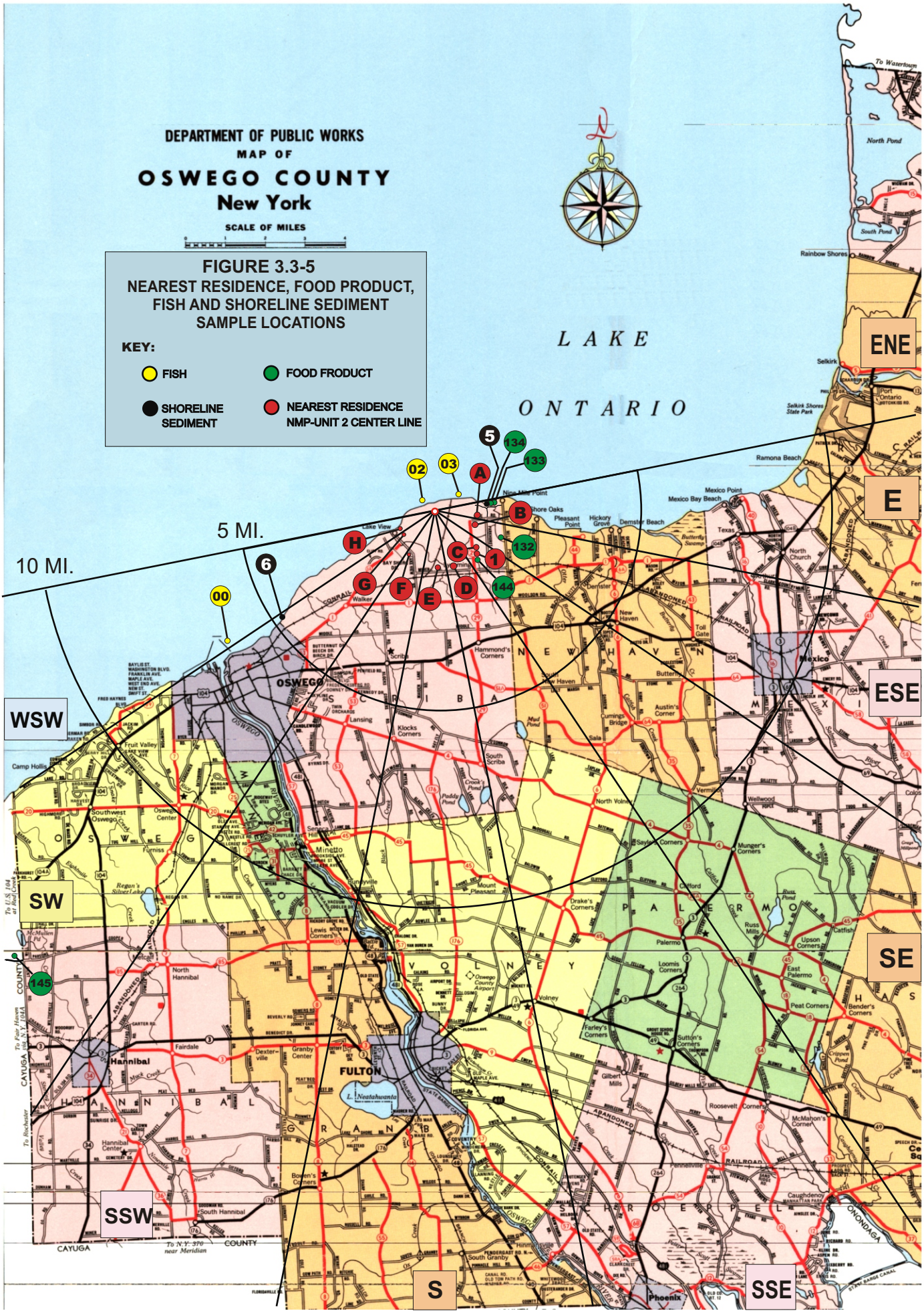


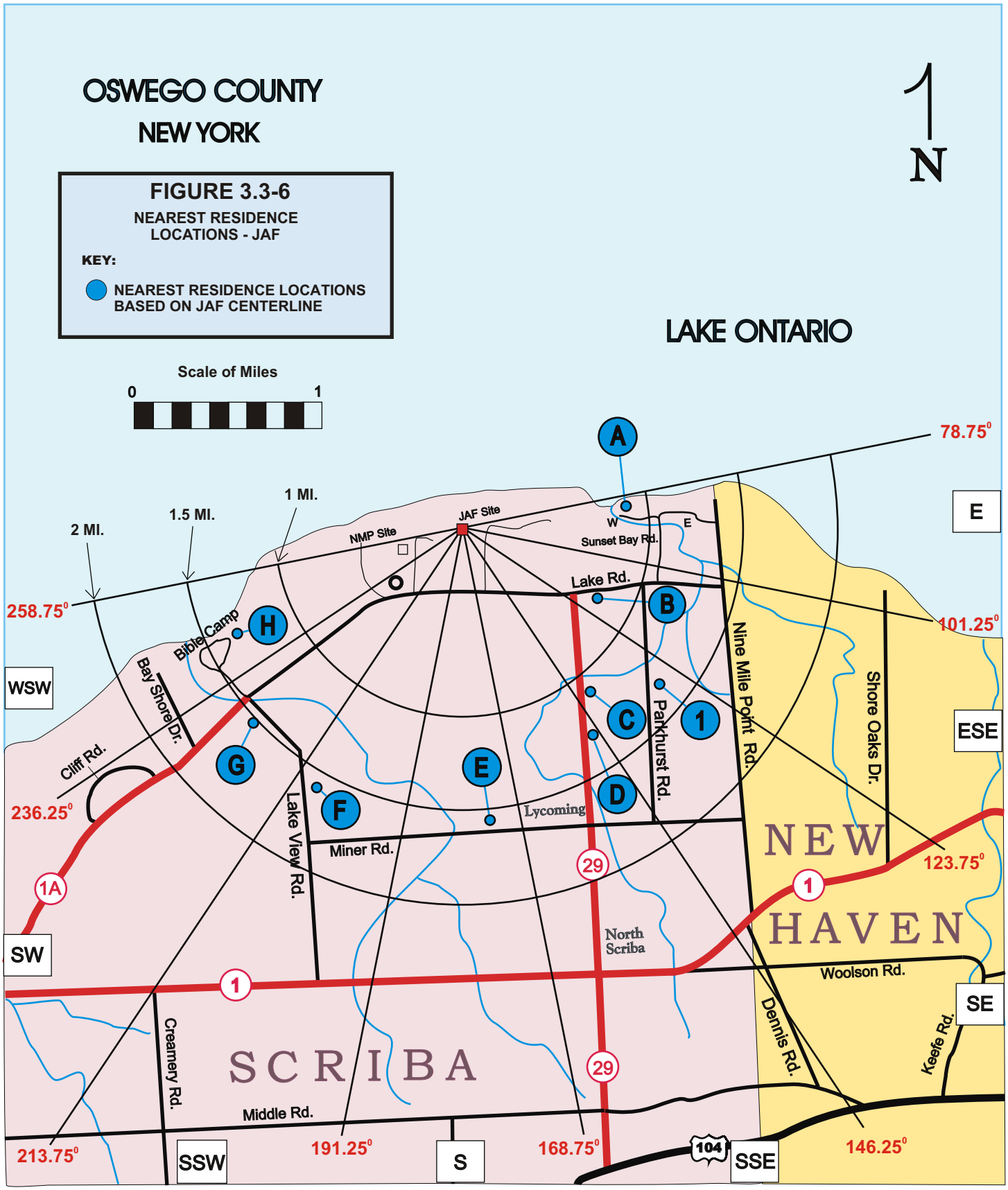
FIGURE 3.3-3
ONSITE ENVIRONMENTAL STATION AND TLD LOCATIONS

KEY:

- ENVIRONMENTAL STATIONS
- TLD LOCATIONS


DEPARTMENT OF PUBLIC WORKS
MAP OF
OSWEGO COUNTY
New York
SCALE OF MILES
FIGURE 3.3-4
MILK AND SURFACE WATER SAMPLE LOCATIONS
KEY:
MILK SAMPLE LOCATION
SURFACE WATER LOCATION
LAKE ONTARIO
5 MI.
10 MI.
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
03
11
09
08
10
55
76
4
77
OSWEGO
FULTON
Hannibal
Phoenix


DEPARTMENT OF PUBLIC WORKS
MAP OF
OSWEGO COUNTY
New York
SCALE OF MILES
FIGURE 3.3-5
NEAREST RESIDENCE, FOOD PRODUCT, FISH AND SHORELINE SEDIMENT SAMPLE LOCATIONS
KEY:
FISH
FOOD PRODUCT
SHORELINE SEDIMENT
NEAREST RESIDENCE NMP-UNIT 2 CENTER LINE
LAKE ONTARIO
5 MI.
10 MI.
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
00
02
03
A
B
C
D
E
F
G
H
1
5
6
132
133
134
144
145
OSWEGO
FULTON
Hannibal


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

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

The following changes were implemented during the 2004 sampling program:

A. Milk Sampling Program

Milk sampling location number 50 was deleted from the sampling program in 2004. This farm is located at a distance of 8.2 miles from the site in the east sector. The sample location was an optional location as it was beyond the five mile distance for required sampling. Location 50 was removed from the program because the owner retired from active dairy farming and the milking herd was sold off.

3.6 DEVIATION AND EXCEPTIONS TO THE PROGRAM

The noted exceptions to the 2004 sample program address only those samples or monitoring requirements, which are required by the ODCM. This section reports samples that were a deviation from the requirements of ODCM Part 1, Table 5.1-1. Part I, Section 5.1.1.c.1 allows for deviations from the program due to hazardous conditions, seasonal unavailability, theft, uncooperative residents, or to malfunction of automatic sampling equipment.

A. ODCM Program Deviations

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

1. Air Sampling Stations

- The air sampling pumps at the site environmental stations R-1, R-3, and R-4 were inoperable for varying lengths of time during the sample period of 5/18/04 through 5/25/04. The inoperability was caused by power outages as a result of a series of thunderstorms during the sample period. The following lengths of inoperability were observed: R-1 (22.4 hrs.), R-3 (6.1 hrs.), and R-4 (6.1 hrs.). Operability was restored as power was restored to the electrical grid. No corrective action was implemented.

- The air sampling pump at the R-5 Offsite Environmental sampling station was inoperable for approximately 1.8 hours during the sample period of August 10 through 17, 2004. The air sample pump was running at the time of sample collection. The sample pump out of service time was determined based on the sample pump run time integrator. The inoperability of the pump was likely due to a short power outage. Severe thunderstorms were experienced in the area of the monitoring station during the sample period. No corrective action was implemented.

- The air sampling pumps at the R-3 and R-4 offsite environmental stations were temporarily inoperable during the sample period of 09/28/04 through 10/06/04. The inoperability was caused by a power outage on the local electrical distribution system. The following lengths of inoperability were observed: R-3 (1.5 hrs.) and R-4 (1.5 hrs.). Operability was restored as power was restored to the electrical grid. The power outage was documented in a Niagara Mohawk news release. No corrective action was implemented.

- The air sampling pump run time integrator at the R-5 Offsite Environmental sampling station indicated three hours of sample pump inoperability over the seven day sample period from 10/12/04 through 10/19/04. The measured integrated sample volume was within the procedural acceptance criteria. The sample pump was running at the time of sample collection and there was no indication of equipment damage. Loss of sample time may have been the result of a local, short-term power outage. No corrective action was implemented.

B. 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 43,878 hours out of a possible 43,920. The air sampling availability factor for the report period was 99.90%.

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):

A. Mean

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

Where,

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

i = individual sample, i.

N, n = total number of samples with positive indications.

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

B. Standard Deviation

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

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, two recounts of samples are performed when the initial count indicates the presence of a plant related radionuclide(s). 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 is available, 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.

A. Mean

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

Where,

$\overline{X}$ = estimate of the mean.
i = individual sample, i.
N,n = total number of samples with positive indications.
X_i = value for sample i above the lower limit of detection.

B. Error of the Mean (Reference 18)

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

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:

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

- 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 much lower than those specified by the ODCM.

3.8 COMPLIANCE WITH REQUIRED LOWER LIMITS OF DETECTION (LLD)

ODCM, Part 1, Table 5.1-3 specify the detection capabilities for environmental sample analysis (see Report Table 3.8-1). ODCM, Part 1, Section 6.1 require 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 2004, as required by the ODCM, achieved the Lower Limit of Detection (LLD) as specified.

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	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 3000 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
  and
- 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 and
- 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 radionuclides 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 accepted, 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 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.

I-131 = Iodine - 131
GSA = Gamma Spectral Analysis
GB = Gross Beta
H-3 = Tritium

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 4-1
RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

JAMES A. FITZPATRICK NUCLEAR POWER PLANT DOCKET NO. 50-333
OSWEGO COUNTY, STATE OF NEW YORK JANUARY - DECEMBER 2004

Medium (Units)	Type and Number of Analysis	LLD	Indicator Locations: Mean (a) Range	Location (b) of Highest Annual Mean: Locations & Mean (a) Designation Range	Control Location: Mean (a) Range	Number of Non-routine Reports
Surface (Lake) Water (pCi/liter)	H-3 (8) :	3000	<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	<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 4-1 (continued)
RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

JAMES A. FITZPATRICK NUCLEAR POWER PLANT DOCKET NO. 50-333
OSWEGO COUNTY, STATE OF NEW YORK JANUARY - DECEMBER 2004

Medium (Units)	Type and Number of Analysis	LLD	Indicator Locations: Mean (a) Range	Location (b) of Highest Annual Mean: Locations & Mean (a) Designation Range	Control Location: Mean (a) Range	Number of Non-routine Reports
Shoreline Sediment (pCi/g-dry)	GSA (4) :					
	Cs-134	0.15	<LLD	<LLD	<LLD	0
	Cs-137	0.18	0.039 (1/2) 0.039 - 0.039	No. 5 0.039 (1/2) 1.4@82° 0.039 - 0.039	<LLD	0
Fish (pCi/g-wet)	GSA (20) :				<LLD	0
	Mn-54	0.13	<LLD	<LLD	<LLD	0
	Fe-59	0.26	<LLD	<LLD	<LLD	0
	Co-58	0.13	<LLD	<LLD	<LLD	0
	Co-60	0.13	<LLD	<LLD	<LLD	0
	Zn-65	0.26	<LLD	<LLD	<LLD	0
	Cs-134	0.13	<LLD	<LLD	<LLD	0
	Cs-137	0.15	<LLD	<LLD	<LLD	0

TABLE 4-1 (continued)
RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

JAMES A. FITZPATRICK NUCLEAR POWER PLANT DOCKET NO. 50-333
OSWEGO COUNTY, STATE OF NEW YORK JANUARY - DECEMBER 2004

Medium (Units)	Type and Number of Analysis	LLD	Indicator Locations: Mean (a) Range	Location (b) of Highest Annual Mean: Locations & Mean (a) Designation Range	Control Location: Mean (a) Range	Number of Non-routine Reports
Food Products (pCi/g-wet)	GSA (16) :					
	I-131	0.06	<LLD	<LLD	<LLD	0
	Cs-134	0.06	<LLD	<LLD	<LLD	0
	Cs-137	0.08	<LLD	<LLD	<LLD	0
Milk (f) (pCi/liter)	GSA (66) :					
	Cs-134	15	<LLD	<LLD	<LLD	0
	Cs-137	18	<LLD	<LLD	<LLD	0
	Ba/La-140	15	<LLD	<LLD	<LLD	0
	I-131 (66):	1	<LLD	<LLD	<LLD	0

TABLE 4-1 (continued)
RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

JAMES A. FITZPATRICK NUCLEAR POWER PLANT DOCKET NO. 50-333
OSWEGO COUNTY, STATE OF NEW YORK JANUARY - DECEMBER 2004

Medium (Units)	Type and Number of Analysis	LLD	Indicator Locations: Mean (a) Range	Location (b) of Highest Annual Mean: Locations & Mean (a) Designation Range	Control Location: Mean (a) Range	Number of Non-routine Reports
Air Particulate and Radioiodine (d) (pCi/m^3)	G.B. (265) :	0.01	0.016 (212/212) 0.003 - 0.036	R-2 0.017 (53/53) 1.1 @ 1.06° 0.008 - 0.036	0.016 (53/53) 0.008 - 0.032	0
	I-131 (265) :	0.07	<LLD	<LLD	<LLD	0
	GSA (60) :					
	Cs-134	0.05	<LLD	<LLD	<LLD	0
	Cs-137	0.06	<LLD	<LLD	<LLD	0
TLD (mrem per standard month)	Gamma Dose (128) :	N/A	5.0 (120/120) (c) 3.0 - 10.8	No. 85 8.6 (4/4) (e) 0.20 @ 289° 7.5 - 10.8	4.5 (8/8) 3.3 - 5.9	

ANNUAL SUMMARY TABLE NOTES

* = Data for the Annual Summary Tables is based on ODCM required samples only.

N/A = Not applicable.

(a) = Fraction of detectable measurement to total measurement.

(b) = Location is distance in miles, and direction in compass degrees. Location numbers keyed to Table 3.3-1 and results table location designation numbers.

(c) = Indicator TLD locations are: #7, 8, 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 (#8, 14, 49).

(d) = Indicator samples from environmental stations R1 off-site, R2 off-site, R3 off-site, and R4 off-site. Control samples are samples from R5 off-site environmental station.

(e) = 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).

(f) = The criteria for required indicator milk sample locations is for locations within 5.0 miles of the site. There are no milk sample locations within 5.0 miles of the site. Therefore, optional milk samples are collected from locations greater than 5.0 miles from the site.

5.0 DATA EVALUATION & DISCUSSION

A. Introduction

Each year the results of the Annual Radiological Environmental Monitoring Program 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 2004 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.

B. 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), one millionth (0.000001) of a curie, and the *picocurie* (pCi), one trillionth (0.000000000001) of a curie. The picocurie 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.

C. Dose/Dose to Man

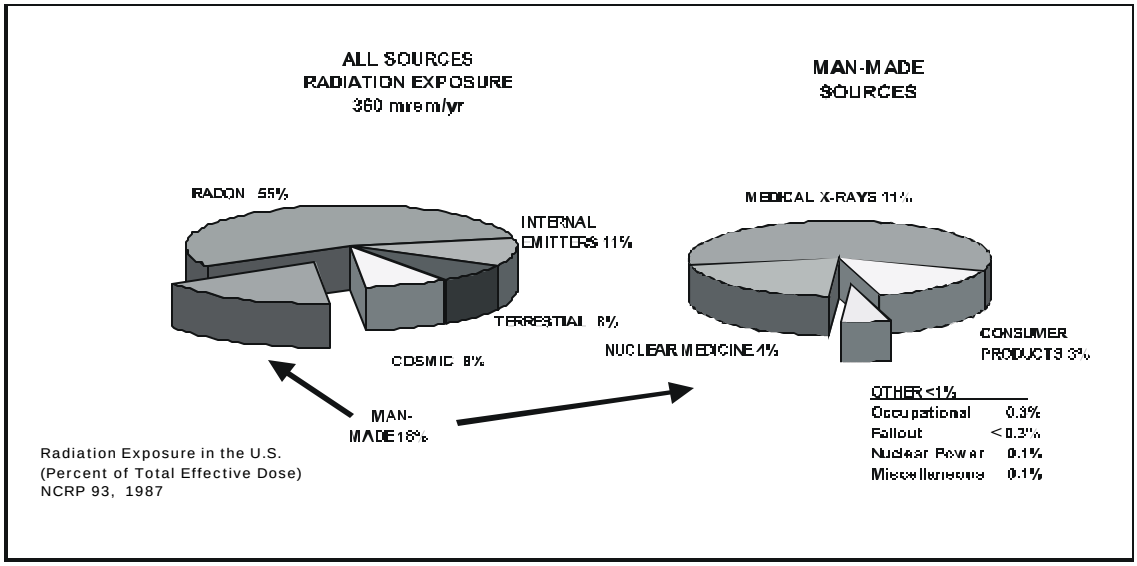
The dose or dose equivalent, simply put, is the amount of ionizing energy deposited or absorbed in living tissue. The amount of energy deposited or ionization caused is dependent on the type of radiation. For example, alpha radiation can cause dense localized ionization that can be up to 20 times the 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 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 measured 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.

D. Discussion

There are three separate groups of radionuclides that were measured in the environment in the media analyzed for the 2004 sampling program. The first of these groups consists of those 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, naturally-occurring radioactive isotopes in the human body like potassium-40, medical procedures, man-made phosphate fertilizers (phosphates and uranium are often found together in nature), and even household items like televisions. In the United States, a person's average annual exposure from background radiation is 360 mrem, as illustrated on the following Background Radiation Chart.

Background Radiation



A number of radionuclides are present in the environment due to sources such as cosmic radiation and fallout from nuclear weapons testing. These radionuclides 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, and
- *Fallout radionuclides* from nuclear weapons testing, including cesium-137, strontium-89, and strontium-90.

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 natural background 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 Radiological Environmental Monitoring Program (REMP) results.

The second group of radionuclides that were detected are a result of the detonation of thermonuclear devices in the earth's atmosphere. Atmospheric nuclear testing during the early 1950s 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 man made 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. In each case, 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. The highest weapons testing concentrations were noted in samples collected for the 1981 Environmental Surveillance Program. Cs-137 was the major byproduct of this testing and is still detected in environmental media.

The third group of radionuclides that may be detected in the environment are those that 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 and found in the Chernobyl fallout. This commonality makes an evaluation of the source of these radionuclides that may be detected in environmental samples difficult to determine. During 2004, a single positive Cs-137 result was the only potentially plant-related radionuclide detected in the REMP samples.

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 2004, but also to assess the significance of the radionuclides detected in the environment as compared to natural and other manmade radiation sources. It is important to note that detected concentrations of radionuclides in the local environment as a result of mans technology are very small and are of no or little significance from an environmental or dose to man perspective.

The 1987 per capita dose was determined to be 360 mrem per year from all sources, as noted in NCRP Report No. 93 (Reference 16). This average dose includes such exposure sources as natural radiation, occupational exposure, weapons testing, consumer products and nuclear medicine. The 1987 per capita dose rate due to natural sources was 295 mrem per year. The per capita radiation dose from nuclear power production nation wide is less than one mrem per year (Reference 10).

The natural background gamma radiation in the environs of the Nine Mile Point Site, resulting from radionuclides in the atmosphere and in the ground, accounts for approximately 60-65 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 60 mrem per year, as a background dose, is significantly greater than any possible doses as a result of routine operations at the site during 2004.

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

In the routine implementation of the Radiological Environmental Monitoring Program, 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 required monitoring program,
- Provide more comprehensive monitoring than is currently required,
- Monitor the secondary dose to man pathways, and
- Maintain the analytical data base established in 1975 when the plant 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 the 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 Section 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 2004 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 represent the analytical results for the aquatic samples collected for the 2004 sampling period.

5.1.1 SHORELINE SEDIMENT RESULTS

A. Results Summary

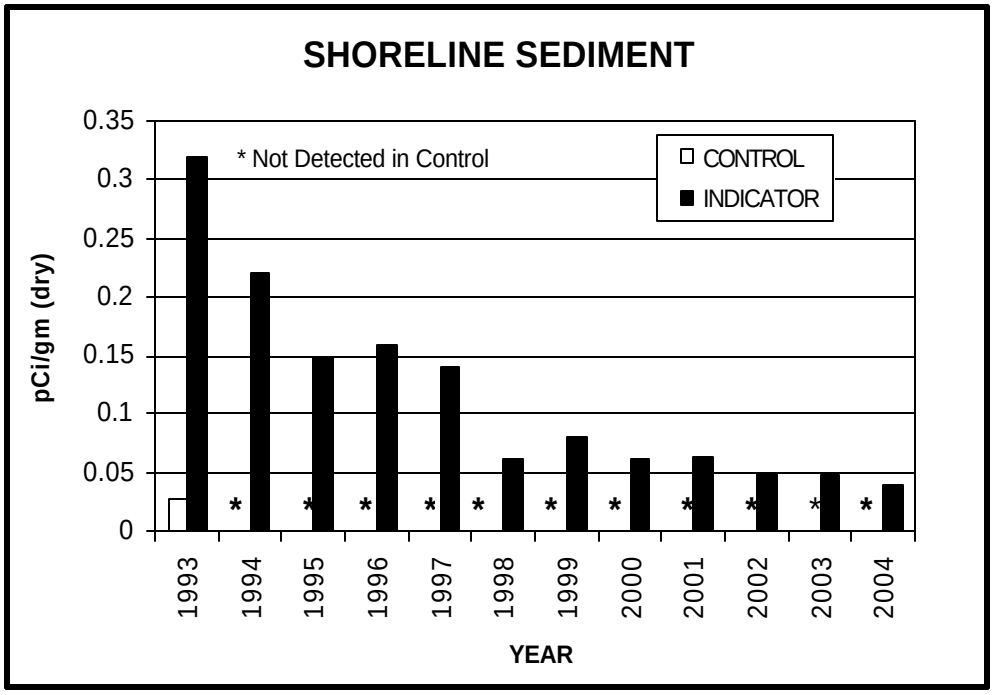
Shoreline sediment samples were obtained in April and October of 2004 at one offsite control location (Lang's Beach located near Oswego Harbor) and at one indicator location (Sunset Bay) which is an area east of the site considered to have recreational value.

A total of four sediment samples were collected for the 2004 sample program, two indicator and two control. Cs-137 was detected in only one of the samples collected from the Sunset Bay indicator location in 2004, measuring 0.039 pCi/g (dry). This is considered a 50% decrease in the number of positive Cs-137 detections made in indicator sample collections compared to the number of samples collected during 2003. These results continue to show a downward trend over the last 10 years. Cs-137 was not detected in samples collected from the control location during 2004; however, Cs-137 has been detected in past control sample. Cs-137 was detected in control samples collected in 1993 at an average concentration of 0.027 pCi/g.

The general lack of Cs-137 at the control location is attributed to the differences in the sediment types between the two sample locations (See Data Evaluation and Discussion). The source of the Cs-137 detected in the indicator shoreline sediment is considered to be the result of fallout from atmospheric nuclear weapons testing and not from operations at the site. The mean concentration of Cs-137 measured in the 2004 indicator sample is the lowest measured concentration since shoreline sediment sampling began in 1985. Historical mean concentrations measured at the indicator location ranged from a maximum of 0.33 pCi/g in 1993 to a minimum of 0.04 pCi/g (dry) in 2004. The results for the 2004 control location were less than the detection limit. No other plant related radionuclides were detected in the 2004 shoreline sediment samples.

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

The following is a graph of the average Cs-137 concentration in shoreline sediment samples over the previous eleven years. This graph illustrates a general downward trend in the Cs-137 concentrations since 1993.



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 2004. The results of these sample collections are presented in Section 6.0, Table 6-1, "Concentrations of Gamma Emitters in Shoreline Sediment Samples – 2004". Cesium–137 (Cs-137) and Potassium–40 (K-40) were the significant radionuclides detected in the sediment samples.

Cs-137 was detected in the indicator sample collected in April for the 2004 program. The measured concentration for this sample was 0.039 pCi/g (dry). The presence of Cs-137 in certain environmental sample media such as soil, shoreline sediment and fish is historically common. Cs-137 is a fission product that is produced in nuclear power reactors and during atmospheric weapons testing. In addition to the Cs-137 found in the environment as a result of past weapons testing, a significant inventory of Cs-137 was also introduced globally as a result of the Chernobyl accident in 1986. Because Cs-137 is found in environmental samples as a result of weapons testing and Chernobyl, it is difficult to accurately determine the source of Cs-137 measured in the sediment sample. It is highly probable that the source of the cesium is from sources other than the operation of plants at the Nine Mile Point Site. It is likely that any sediment sample containing Cs-137 which was the result of plant operation would also contain other plant related isotopes such as Co-60 and Cs-134. The absence of corroborating radionuclides would indicate that the source of Cs-137 in sediment samples is from the existing background Cs-137 which is attributed to weapons testing and the Chernobyl accident. This assessment is further substantiated by the fact that Cs-137 was detected in the 1993 sediment control sample. Historically, Cs-137 has been routinely measured in the control samples of other environmental media such as fish and soil.

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 2004 shoreline sediment sample. 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.

C. Dose Evaluation

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 and the maximum 2004 shoreline sediment indicator Cs-137 concentration 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/m^2 (dry) to a depth of 2.5 cm,
- The shoreline width factor is 0.3, and
- The maximum measured Cs-137 concentration of 0.039 pCi/g (dry)

Using these conservative parameters, the potential dose to the maximum exposed individual (teenager) would be 0.00013 mrem/year to the whole body and 0.00015 mrem/year to the skin. This calculated dose is very small and is insignificant when compared to the natural background annual exposure of approximately 60 mrem as measured by control TLDs in the vicinity of the site.

D. Data Trends

The mean Cs-137 measured concentration for the 2004 shoreline sediment indicator samples was 0.04 pCi/g (dry). This is the lowest mean concentration measured at the indicator locations since shoreline sediment sampling was initiated in 1985.

The previous five years of data show a steady decline in mean concentration values measured at the indicator locations. Over the five year period, concentrations ranged from a high of 0.10 pCi/g (dry) in 1999 to a low value of 0.05 pCi/g (dry) measured in both 2002 and 2003. Cesium-137 was not detected in the control location samples over this same five year period.

The ten year data trend for indicator shoreline sediment samples showed a similar downward trend in concentration measured at the indicator sample locations. Over the ten year period of 1994 through 2003, mean concentration at the indicator location ranged from maximum of 0.37 pCi/g (dry) in 1994 to a minimum value of 0.05 pCi/g (dry) measured in both 2002 and 2003. The mean indicator concentration measured in 2004 of 0.040 pCi/g (dry) continues to support the long term decreasing trend in Cs-137 concentrations 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 were 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 20 fish samples were collected for the 2004 sample program. Species collected were: Smallmouth Bass, Brown Trout, Walleye and Chinook Salmon. The analytical results for the 2004 fish samples showed no detectable concentration of radionuclides that would be attributable to plant operations at the site or past atmospheric weapons testing. The absence of Cs-137 in the 2004 fish samples is significant in the fact that it continues to validate the absence of Cs-137 in fish samples observed. With the exception of 2001, 2003 and 2004, positive concentrations of Cs-137 have been measured in fish samples collected in the previous 20 years 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 2004 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 2004 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 24 years. Cs-137 was not detected in fish samples collected in 2000, 2001, 2003 and 2004. The period of 2000 through 2004 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 2004 in units of pCi/g (wet).

The spring fish collection was made up of 9 individual samples representing three separate species. Walleye, Smallmouth Bass and Brown Trout were collected from all three locations.

The total fall fish collection was comprised of 11 individual samples representing four individual species. Brown Trout, Chinook Salmon and Walleye were collected from all three sampling locations. Smallmouth Bass was collected at the control and JAFNPP indicator locations.

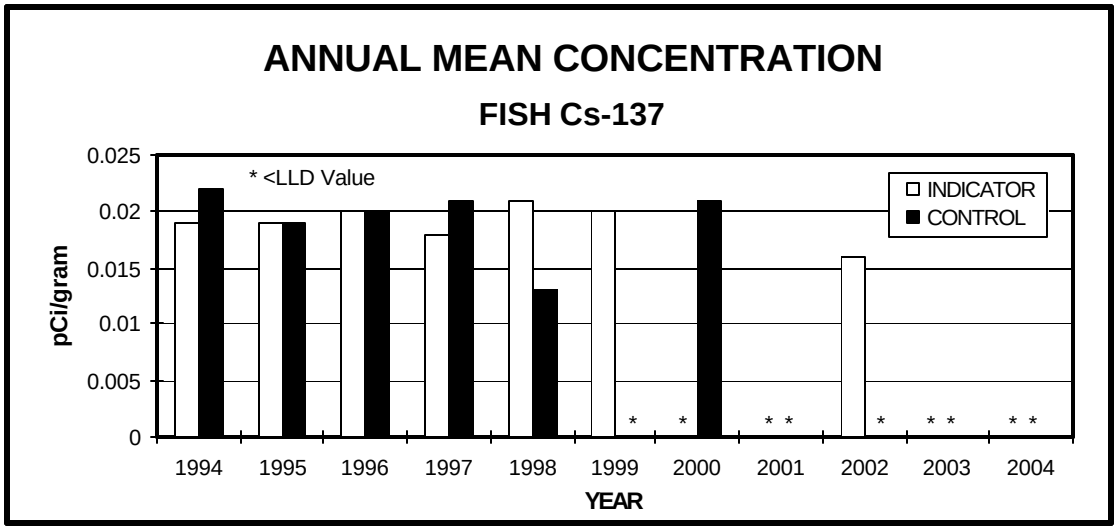
Cs-137 was not detected in any of the fish species collected for the 2004 sample program.

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 2004 fish samples demonstrate 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.

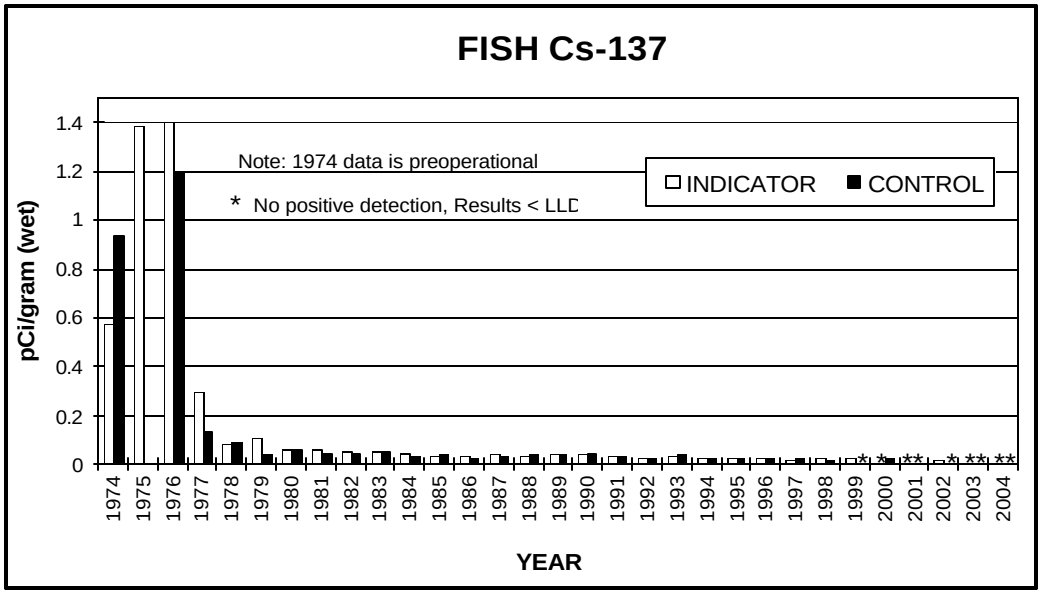
D. Data Trends

The Cs-137 data for fish samples over the previous five years (1999 through 2003) shows that the number of positive detections has decreased over this period. There were no positive detections in either 2001 or 2003 and intermittent detections in the remaining years in the period. The general lack of positive detections was continued in the 2004 sample year. The graph below illustrates the mean control and indicator Cs-137 concentrations for 2004 and the previous ten years.



The ten year data trend shows a consistent level of Cs-137 measured in fish between 1994 and 2000. After 2000 the number of positive detections drops off as noted in the five year trend. The 1994 through 2004 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 nuclear 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 supply 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 2004 Sampling Program. The two naturally occurring radionuclides 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 2004 REMP program. The results for the 2004 samples showed no positive detections of tritium. All results for 2004 were below the established measurement sensitivity and are reported as less than the lower limit of detection (<LLD). There is no indication of a long-term buildup of tritium concentrations in the surface waters adjacent to the site.

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 2004 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 2004 sample program were analyzed to an instrument detection level of 500 pCi/l.

The tritium results for the JAFNPP inlet canal samples contained no positive detections. The 2004 results had LLD values that ranged from <408 pCi/l to <439 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 <421 pCi/l to <439 pCi/l.

Tritium was not detected in any of the twelve optional Lake Ontario samples collected in the 2004 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 "up-stream' direction based on the current patterns in the lake.

No positive detections of tritium were identified in 2004. The following is a summary of LLD results for the 2004 sample program:

Sample Location	Tritium Concentration pCi/liter		
	Minimum	Maximum	Mean (Annual)
JAF Inlet (Indicator)*	<408	<439	<425
Oswego Steam Inlet (Control)*	<421	<439	<429
NMP #1 Inlet	<421	<439	<429
NMP #2 Inlet	<421	<439	<429
Oswego City Water Supply	<421	<439	<429

* Sample location required by ODCM

The above LLD values are far 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

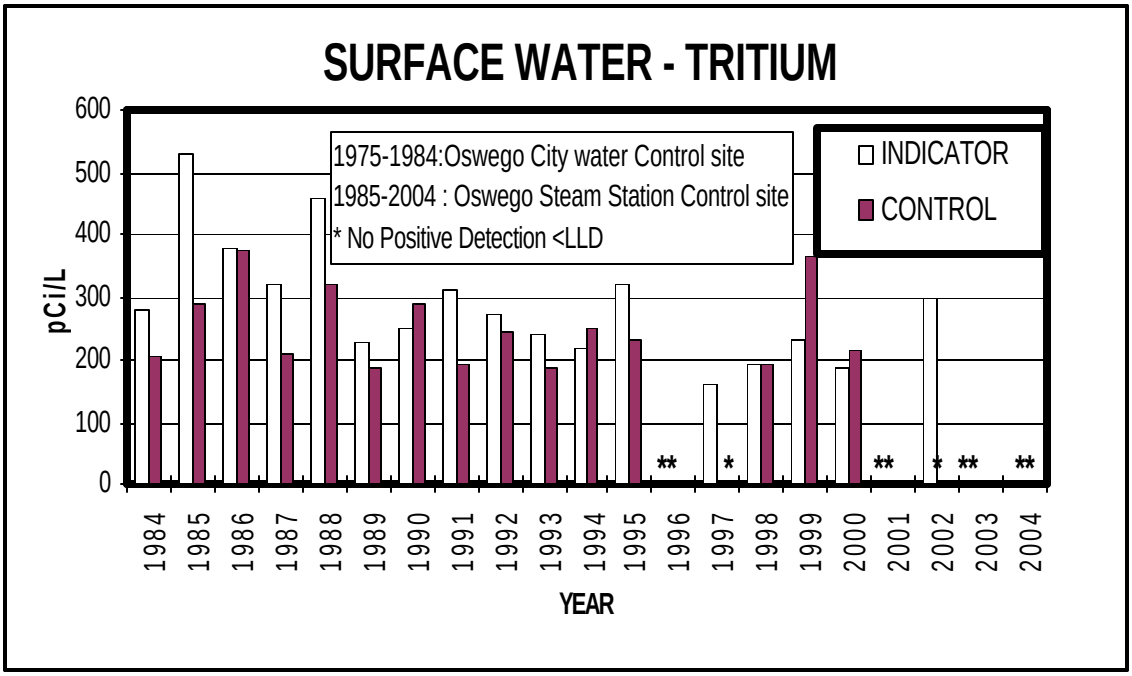
The radiological impact to members of the public from low levels of tritium in water is insignificant. This can be illustrated by calculating a dose to the whole body and maximum organ using the maximum LLD value and Regulatory Guide 1.109 methodology. Based on a water ingestion rate of 510 liters/yr and the maximum 2004 LLD concentration of <439 pCi/l, the calculated dose would be less than 0.045 mrem to the child whole body and less than 0.045 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 2004 lake water samples were consistent with results from the previous five years for both the indicator and control locations. During the previous five year period the maximum mean indicator and control concentrations were measured in 1999. The mean measured tritium concentrations for the previous five year period of 1999 – 2003 ranged from 212 pCi/l to 365 pCi/l for the control and 185 pCi/l to 297 pCi/l for the indicator location. By comparison, the mean 2004 tritium concentrations were < 429 pCi/l and < 425 pCi/l for the control and indicator locations respectively. The previous five year data indicates no significant trends in either the indicator or the control mean concentrations. 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, 1994 through 2003, is representative of natural variations in environmental tritium concentrations with no significant levels of tritium measured. The 1999 mean control value of 337 pCi/l is the highest concentration measured since 1989; however, 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 past 20 years at both an indicator and control location. Prior to 1985, the Oswego City Water Supply results are used as control location data as this location closely approximates the Oswego Steam Station, the current control location.



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

Tables 6-5 through 6-12 represent the analytical results for the terrestrial samples collected for the 2004 reporting period.

5.2.1 AIR PARTICULATE GROSS BETA

A. Results Summary

Weekly, air samples were collected and analyzed for particulate gross beta particulate activity. For the 2004 program, a total of 53 samples were collected from control location R-5 and 212 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 2004 was 0.016 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 2004 was 0.016 pCi/m^3. The mean gross beta results for the indicator and the control stations were equal in 2004. The consistency between the indicator and control means demonstrates that there are no increased airborne radioactivity level in the general vicinity of the site. The indicator results are consistent with concentrations measured over the last fifteen years. This consistency demonstrates that the natural baseline gross beta activity has been reached. The manmade radionuclide contribution to the natural background from atmospheric weapons testing and Chernobyl can no longer be detected above the background concentrations of naturally occurring beta emitting radionuclides.

B. Data Evaluation and Discussion

The air monitoring system consists of fifteen sample locations, six on-site and nine off-site. Each location is sampled weekly for particulate gross beta acitivity. A total of 795 samples were collected and analyzed as part of the 2004 program. Five of the nine off-site 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 off-site and on-site air sample locations are maintained from which weekly samples are collected. The optional off-site locations are designated as D-2, E, F and G. The optional on-site 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.

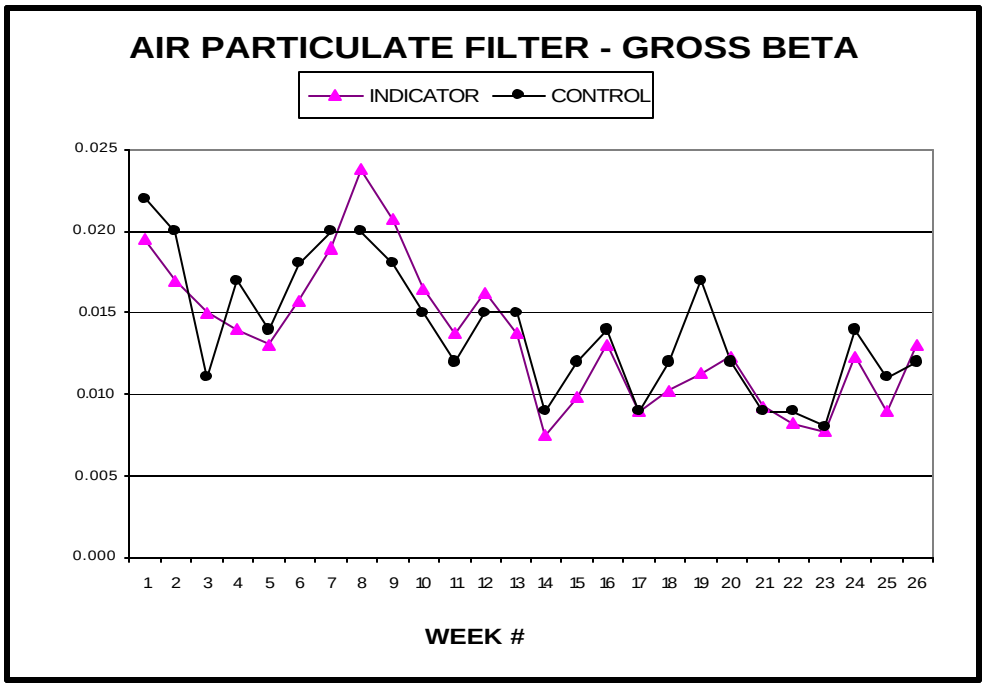
Tables 6-5 and 6-6 in Section 6.0 present the weekly gross beta activity results for samples collected from the off-site and on-site locations.

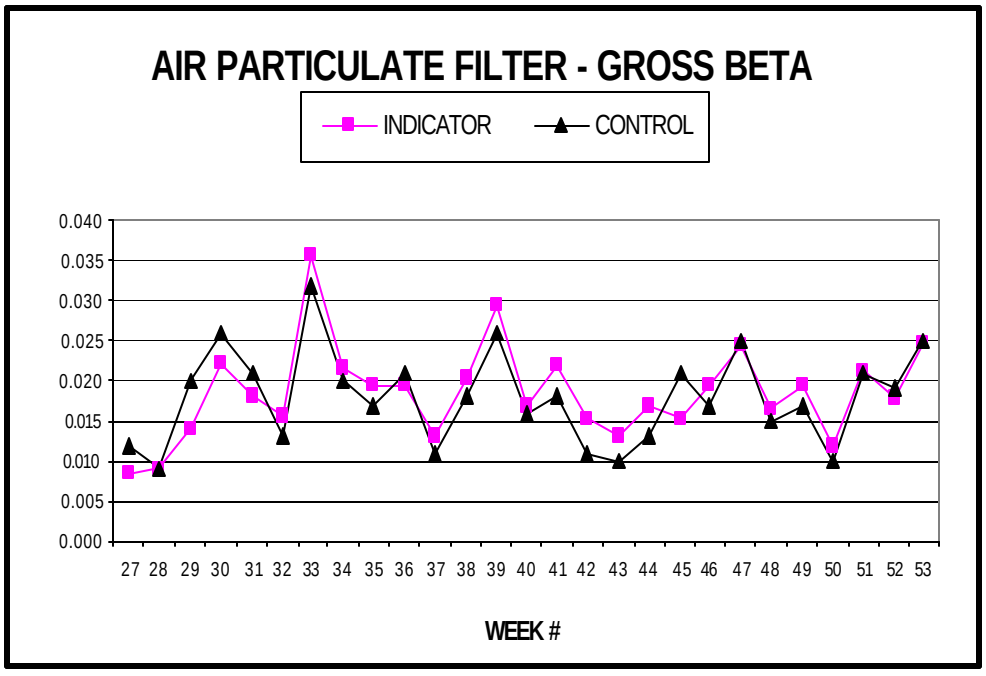
The average annual gross beta indicator concentrations for the ODCM indicator stations (R-1, R-2, R-3 and R-4) was 0.016 pCi/m^3. The off-site ODCM control station (R-5) annual mean gross beta concentration was 0.016 pCi/m^3. The minimum, maximum and average gross beta results for sample locations required by the ODCM were:

	Concentration pCi/m^3		
Location	Minimum	Maximum	Mean
R-1	0.003	0.036	0.014
R-2	0.008	0.036	0.017
R-3	0.007	0.035	0.017
R-4	0.008	0.036	0.016
R-5	0.008	0.032	0.016

R1 – R4 Min = 0.003
Max = 0.036
Ave = 0.016

The mean weekly gross beta concentrations measured in 2004 are illustrated in the graphs below.





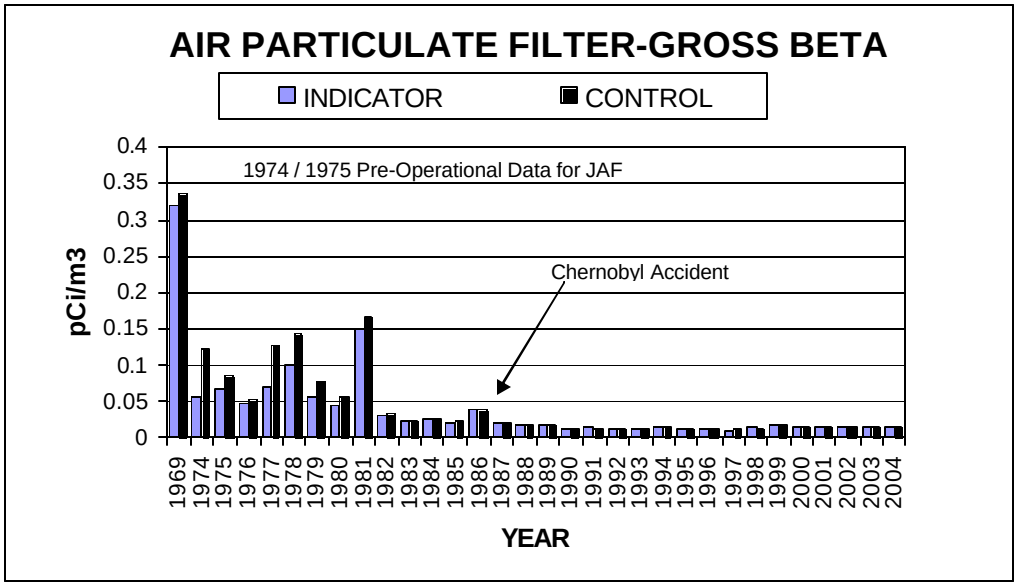
The fluctuations observed in the gross beta activity over the year can be attributed to changes in the environment, especially seasonal changes. The concentrations of naturally occurring radionuclides in the lower levels of the atmosphere directly above the land are affected by time related processes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

C. Dose Evaluation

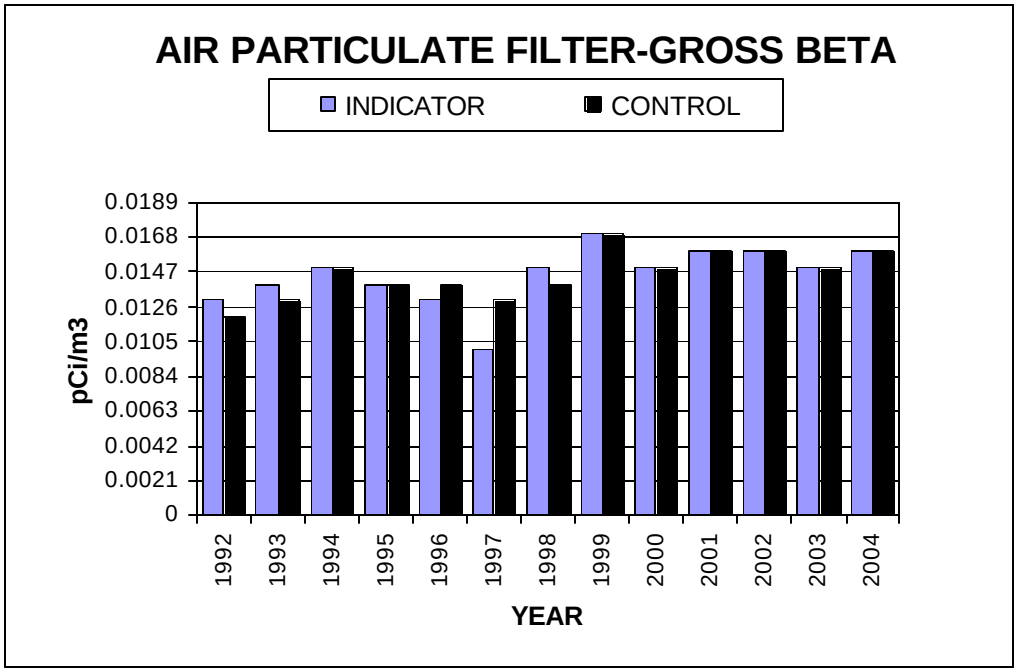
Dose calculations are not performed based on gross beta concentrations. Dose to man as a result of radioactivity in air is calculated using the specific radionuclide and the associated dose factor. See Section 5.2.2.C for dose calculations from air concentrations. The dose received by man from air gross 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 detonated in 1980.



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 1992 through 2004 is very small. This is illustrated by the following graph.



For the operational period of 1992 – 2004, the mean annual gross beta concentration at the control station (R-5) has remained steady with a narrow range of 0.013 pCi/m^3 to 0.017 pCi/m^3. The mean annual concentrations for the indicator stations for this same time period was similar to the control and ranged from a maximum mean of 0.017 pCi/m^3 in 1999 to a minimum mean of 0.010 pCi/m^3 in 1997.

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

5.2.2 MONTHLY 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 off-site near the Site Boundary and off-site 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 795 individual air particulate samples which are assembled by location into 180 monthly composite samples. The monthly composites are analyzed using gamma spectroscopy.

No plant related gamma emitting radionuclides were detected in any of the air particulate filter samples collected during 2004.

The gamma analysis results for the monthly 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 continuous air sampling stations are in constant operation and located both on-site and in the off-site 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 month are assembled by location to form monthly composite samples. The monthly 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 off-site locations. The analytical results for the 180 air particulate filter composites in 2004 showed no detectable activity of plant related radionuclides.

The results of the monthly 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 no plant related radionuclides were detected in 2004. The monthly air particulate sampling program demonstrated no off-site dose to man from this pathway as a result of operations of the plants located at the Nine Mile Point Site.

D. Data Trends

No plant related radionuclides were detected during 2004 at the off-site 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 7-13 and 7-14.

5.2.3 AIRBORNE RADIOIODINE (I-131)

A. Results Summary

Iodine-131 (I-131) was not detected in any of the 795 samples analyzed for the 2004 program. No radioiodine has been measured off-site at the constant air monitoring stations since 1987.

B. Data Evaluation and Discussion

Airborne radioiodine is monitored at the fifteen air sampling stations also used to collect air particulate samples. There are nine off-site locations, five of which are required by the ODCM. The off-site 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 off-site.

Samples are collected using activated charcoal cartridges. They are analyzed weekly for I-131. No Iodine-131 was detected in any of the 2004 samples collected.

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

C. Dose Evaluation

The calculated dose as a result of I-131 was not evaluated due to the fact no I-131 was detected during 2004. The I-131 sampling program demonstrated no off-site dose to man from this pathway as a result of operation of the plants located at Nine Mile Point.

D. Data Trends

No radioiodine has been detected in samples collected from the air sampling locations required by the ODCM since 1987.

There has been no positive detection of I-131 in air samples collected over the last ten years. This demonstrates that there is no measurable environmental impact or positive trend for iodine buildup due to plant operations during the period from 1994 through 2004. I-131 has previously been detected in samples collected during the last sixteen year period 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.

Iodine-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 0.032 pCi/m^3 in 1978. I-131 was not detected in samples collected from the control location during 1979 – 1981 and 1983 – 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 – 1983 and 1986 – 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 2004 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 2004. 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 72 TLDs were placed in the following five geographical locations around the site boundary:

- On-site (areas within the site boundary)
- Site Boundary (area of the site boundary in each of the 16 meteorological sectors)
- Off-site Sector (area four to five miles from the site in each of the eight land based meteorological sectors)
- Special Interest (areas of high population density and use), and
- Control (areas beyond significant influence of the site)

All geographical categories are required by the ODCM with the exception of the On-site area which was optional. Description of the five geographical 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 2004 dose rates for each of the five geographical locations are as follows:

	Dose in mrem per standard month		
Geographic Category	Min	Max	Mean
On-site (Optional)	3.3	13.2	5.4
Site Boundary (Inner Ring) * (1)	3.3	6.4	4.4
Off-site Sectors (Outer Ring) *	3.2	6.7	4.4
Special Interest * (2)	3.0	5.9	4.2
Control * (3)	3.3	5.9	4.6

* Geographical locations required by the ODCM

(1) Only includes TLD results that are not affected by radwaste direct shine (TLD #s 78, 79, 80, 81, 82, 83, 84, 7, 18)

(2) Only includes TLD results required by the ODCM (TLD #s 15, 56, 58, 96, 97, 98

(3) Only includes TLD results required by the ODCM (TLD #s 8, 14, 49)

Comparison of the annual mean dose rates associated with each geographical category conclude that there is no significant difference in annual dose to the public 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, Off-site Sectors and Special Interest (off-site) were well within expected normal variation when compared to the control TLD results.

The results for the 2004 environmental TLD monitoring program indicate that there is no signifcant increase in dose rates as a result of operations at the site. The Hydrogen Water Chemistry systems in use at the FitzPatrick plant did not measurably increase the ambient radiation exposure rate at or beyond the site boundary.

B. Data Evaluation and Discussion

Direct Radiation (Gamma Dose) measurements were taken at 72 different environmental locations during 2004, 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, Off-site 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 Unit 1, Unit 2 and the FitzPatrick facilities.

Onsite TLDs are optional and are subdivided into three categories for which direct radiation results are evaluated. The 2004 direct radiation results for Onsite TLD locations were as follows:

1. Results for TLDs located near the Unit 1, Unit 2 and Fitzpatrick generating facilities and at previous or existing onsite air monitoring stations ranged from 3.3 to 13.2 mrem per standard month.

2. Results for TLDs located near the north shoreline of Unit 1, Unit 2 and Fitzpatrick facilities in close proximity to the Radwaste and Unit 1 Reactor Building ranged from 3.3 to 37.6 mrem per standard month.

3. Results for TLDs located onsite near the Energy Information Center and it's associated shoreline ranged from 3.9 to 6.8 mrem per standard month.

Site Boundary TLD results ranged from 3.3 to 10.8 mrem per standard month in 2004. 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 10.8 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 NMP1 plant. The TLD locations along the lakeshore close to the plants (TLD #s 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 3.3 to 6.4 mrem per standard month resulting in an average dose rate of 4.4 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 3.2 to 6.7 mrem per standard month with an average dose rate of 4.4 mrem per standard month.

Special Interest TLDs from all locations ranged from 3.0 to 6.8 mrem per standard month with a 2004 annual average dose rate of 4.4 mrem per standard month.

The *Control* TLD group required by the ODCM utilizes locations positioned well beyond the site. 2004 Control TLD results ranged from 3.3 to 5.9 mrem per standard month with an annual average dose rate of 4.6 mrem per standard month. These results include both the ODCM required control TLDs and the three additional control TLDs.

C. Dose Evaluation

2004 annual mean dose rates for each geographic location required by the ODCM are as follows:

Site Boundary:	4.4 mrem per standard month (TLD #s: 78, 79, 80, 81, 82, 83, 84, 7, 18)
Off-site Sectors:	4.4 mrem per standard month (TLD #s: 88, 89, 90, 91, 92, 93, 94, 95)
Special Interest:	4.2 mrem per standard month (TLD #s: 15, 56, 58, 96, 97, 98)
Control:	4.6 mrem per standard month (TLD #s: 8, 14, 49)

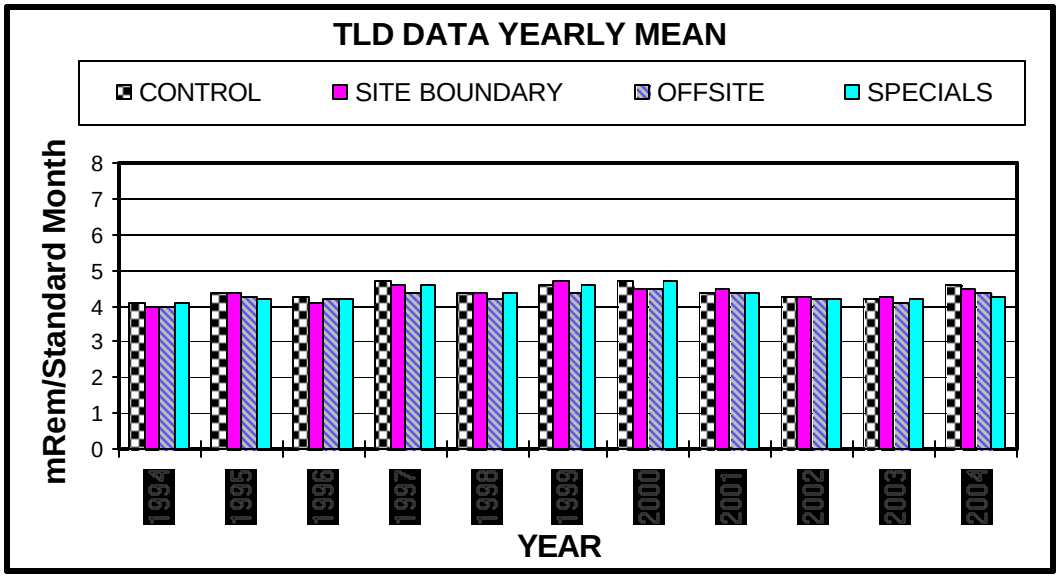
The measured mean dose rate in the proximity of the closest resident was 4.2 mrem per standard month (TLD #s: 108, 109) which is consistent with the control measurements of 4.6 mrem per standard month.

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 off-site 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 off-site 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, Off-site Sector and Special Interest locations became effective in 1985; therefore trends for these results can only be evaluated for 1985 to the present.

The following graph illustrates TLD results for the Control, Site Boundary, Off-site Sectors and Special Interest groups from 1994 through 2004:



TLDs located at the site boundary averaged 4.4 mrem per standard month during 2004 (Site Boundary average results do not include TLDs influenced by radwaste buildings and radwaste shipping activities). This result is consistent with the previous five year average of 4.5 mrem per standard month.

Offsite Sector TLDs averaged 4.4 mrem per standard month during 2004. This result is also consistent with the previous five year average of 4.3 mrem per standard month for offsite sectors.

Special Interest TLD locations averaged 4.2 mrem per standard month during 2004 which is consistent with the previous five year average of 4.4 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. 2004 control results from all (8, 14, 49, 111, 113) Control TLDs averaged 4.3 rem per standard month, consistent with the previous five year average of 4.4 mrem per standard month. The 2004 TLD program results, when compared to the previous seventeen years, show no significant trends relative to increased dose rates in the environment.

Section 7.0, Tables 7-15A through 7-16E show the historical environmental sample data for environmental TLDs.

5.2.5 MILK

A. Results Summary

A total of 48 milk samples were collected during the 2004 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).

Iodine-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 48 milk samples collected in 2004 from the five 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 2004. 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 2004 results demonstrate that routine operations at 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 three indicator locations 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 2004. Samples were collected from four farms located beyond the five mile requirement to ensure the continued monitoring of this important pathway. The three indicator locations ranged from 5.2 to 9.0 miles from the site. The control samples were collected from a farm located 15.6 miles from the site and in a low frequency wind sector (upwind). The geographical location of each sample location is listed below:

Location No.	Direction From Site	Distance (Miles)
76	SE (120°)	6.3
55	E (97°)	8.7
4	ESE (115°)	7.6
77 (Control)	S (190°)	15.4

Samples were collected from Indicator location #76 and Control location #77 from April through December, during the first and second half of each month. The remaining optional sample locations (4, 55) were sampled once each during April and June and twice per month July through December. Samples were not required to be collected during January through March of 2004 as a result of I-131 not detected in samples collected during November and December of 2003 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 2004 are provided in Section 6.0, Table 6-11.

Iodine-131 was not detected in any indicator or control milk samples analyzed during 2004. All I-131 milk results were reported as Lower Limits of Detection (LLD). The LLD results for all samples ranged from < 0.30 to < 0.83 pCi/liter. No plant related radionuclides were detected in any milk sample collected in 2004. 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. The K-40 concentration for all milk samples analyzed ranged from 980 to 1990 pCi/liter. Cs-137 was not detected in any indicator or control milk sample collected in 2004.

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 (Eisenbud) as a result of internally deposited naturally occurring K-40.

E. Data Trends

Man-made radionuclides are not routinely detected in milk samples. In the past sixteen years Cs-137 was 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 2004 data to historical results over the operating life of the plants show that Cs-137 and I-131 levels have decreased significantly since 1983.

Historical data of milk sample results for Cs-137 and I-131 are presented in Section 7.0, Tables 7-17 and 7-18.

5.2.6 FOOD PRODUCTS (VEGETATION)

A. Results Summary

There were no plant related radionuclides detected in the 16 food product samples collected and analyzed for the 2004 program.

Detectable levels of naturally occurring K–40 were measured in all control and indicator samples collected for the 2004 program. Ra-226, Be-7 and AcTh-228, all naturally occurring radionuclides were also detected intermittently in all of the samples collected in 2004. These results are consistent with the levels measured in 2003 and previous years.

The results of the 2004 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 2004 included two varieties considered to be an edible broadleaf vegetable. Cabbage, an edible broadleaf vegetable, was collected from one indicator location. Collards were collected from another indicator location. Neither of these edible broadleaf varieties were available from the control location. The general lack of edible broadleaf vegetation samples was the result of grower preference and such varieties were not available in local gardens. Where broadleaf vegetables were not available, non-edible broadleaf vegetation was collected. Non-edible vegetation consisting of squash leaves, grape leaves, zucchini leaves, and cucumber leaves were collected for the 2004 program. The leaves of these plants were sampled as representative of broadleaf vegetation which is a measurement of radionuclide deposition. In addition to the broadleaf vegetation, tomato samples were collected from three indicator locations and one control location. Samples were collected during the late summer/fall harvest season. Each sample was analyzed for gamma emitters using gamma spectroscopy.

The analysis of food product samples collected during 2004 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 was detected in food product samples. The concentration of Be-7 in vegetation samples ranged from 0.23 to 1.62 pCi/g (wet). The concentration of K-40 in indicator and control samples ranged from 2.03 to 4.59 pCi/g (wet). Ra-226 and AcTh-228 were detected intermittently in the samples. The results for naturally occurring radionuclides are consistent with those 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 off-site dose to man from this pathway as a result of operations of the plant 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 mean concentration of 0.007 pCi/g (wet) in 1999. The trend for Cs-137 is a general reduction in concentration to non-detectable levels in samples collected during the 2000 through 2004 sample programs.

Historical data of food product results are presented in Section 7.0, Tables 7-19 and 7-20.

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 2004 a milk animal census, a nearest resident census and a garden survey were performed.

Based on the 2004 milk census, Milk sampling location number 50 was deleted from the sampling program in 2004. This farm was sampled during the 2003 sampling program; however, was an optional location as it was beyond the five mile distance for required sampling. Location 50 was removed from the program because the owner retired from active dairy farming and the milking herd was sold off.

The results of the closest residence census conducted in 2004 required no change to James A. FitzPatrick N.P.P. Dose Calculation Manual's (ODCM) 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 listed in and identified in the census as active for 2004. See Table 3.3-1 for 2004 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 agency 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 500 cows and 10 goats based on the 2004 land use census. The number of cows has decreased by 140 and the number of goats has increased by 4 when compared to the 2003 census. The goats identified during the census were not milking goats.

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 degrees and distance of each of the nearest residence, are found in Section 6.0, Table 6-14. No changes were identified in the 2004 census for the closest resident in the land based meteorological sectors.

The nearest resident locations are illustrated in Section 3.3, Figure 3.3-6.

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 08, 2002 and May 21, 2002. Based on dose rates measured in the four quarters of 2004, the maximum quarterly dose rate increase above baseline dose rate was 15.2 mrem per standard month measured at the pad north ISFSI perimeter fence. The minimum dose rate increase above the baseline dose rate was 0.2 mrem per standard month measured along the south perimeter fence. The maximum and minimum dose rates above baseline in mrem per standard month are consistent with results measured in 2002 and 2003. The three casks are located on the north end of the pad in close proximity to the north ISFSI perimeter fence. In addition, the radiation effects from hydrogen water chemistry also contribute to the higher dose rates measured at the north fence line of the ISFSI storage facility.

The implementation of the ISFSI project has resulted in no increase in dose at the site boundary or to the public. The analysis of off-site 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 off-site control locations. The results for the Site Boundary, Off-site Sectors, and Special Interest (off-site) were well with in expected normal variation when compared to the Control TLD results. The results for the 2004 site 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 10CFR72.104(a).

The measured results of the 2004 TLD monitoring program demonstrate compliance with the off-site dose limits to members of the public specified in 40CFR190 and 10CFR72.104(a).

B. Data Evaluation and Discussion

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 standardized to units of mrem per standard month. The 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.

The ISFSI pad is located in the southwest corner of the restricted area of the JAF site. The shortest distance from a cask on the storage pad to the controlled area boundary occurs at the Lake Ontario shoreline, approximately 1170 feet to the north of the ISFSI pad. The closest controlled area boundary bordered by land is the FitzPatrick site eastern property line, approximately 4300 feet to the east of the ISFSI pad.

C. Dose Evaluation

The ISFSI pad is designed to accommodate a total of 18 loaded casks and is oriented north/south. The first three casks were loaded two wide on the north end of the pad. The maximum dose rate of 15.2 mrem per standard month above the baseline dose rate was measured at the north perimeter fence TLD location and is due

to the close proximity of the storage casks to the fence and the radiation contribution from hydrogen water chemistry. The lowest measured dose rate of 0.2 mrem per standard month above the baseline dose rate was measured at the southern perimeter fence as expected due to larger distance between the casks and the perimeter fence.

An evaluation of Site Boundary TLDs and Control TLDs results for 2004 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 for 2004.

2004 DOSE IN MREM PER STANDARD MONTH

	Minimum	Maximum	Mean
Site Boundary	3.3	6.4	4.4
Control	3.3	5.9	4.6

D. Data Trends

The ISFSI project was implemented in April of 2002. The maximum quarterly dose rate measured above the baseline on the ISFSI TLDs in 2002 was 18.9 mrem per standard month. The maximum dose rate above the baseline measured in 2004 was 15.2 mrem per standard month. These dose rates and location of measurements are consistent between the two years. In general there was a consistency of all measurements between the dose rates measured in 2002 through 2004. The difference in measured dose rates can be attributed to difference in hydrogen water chemistry availability and plant capacity factor on a quarterly basis.

5.3 CONCLUSION

The Radiological Environmental Monitoring Program (REMP) is an on going 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 Radiological Environmental Monitoring Program, are 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, are determined to be a fraction of limits set forth by the NRC and EPA.

The results of the 2004 Radiological Environmental Surveillance Program continues to clearly demonstrate that there is no significant short term or chronic long term radiological impact on the environment in the vicinity of the Nine Mile Point site. No unusual radiological characteristics were measured or observed in the local environment. The Environmental Monitoring Program 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 Program and the implementation of the ISFSI project. 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 1980s and the 1986 accident at the Chernobyl Nuclear Power Plant. Both of these source terms have contributed to a measurable inventory of Cs-137 in the environment. The results for the 2004 sample program demonstrate that the concentrations of man-made

radionuclides continue to decline. This reduction in environmental background concentrations will allow for the site environmental program to become more sensitive to the measurable impact of plant operations on the environment as time goes on.

The environmental monitoring program detected one potentially plant related radionuclide in the sample media collected during 2004. Cs-137 was detected in one shoreline sediment sample. The source of the Cs-137 measured in this sample is considered to be fallout from past atmospheric nuclear weapons testing. The measured concentration of Cs-137 in the sample was small and consistent with historical results for shoreline sediment. The impact of these Cs-137 concentrations are minimal in terms of dose to man. Dose from man-made sources in the environment are very small when compared to doses 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, as result of plant operations, is extremely small in comparison to the dose contribution from natural background levels and sources other than the plant. Whole body dose in Oswego County due to natural sources is approximately 50-60 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.

From the collective results of the 2004 Radiological Environmental Surveillance Program, it can be concluded that the levels and variation of radioactivity in the environmental samples were consistent with background levels that would be expected for the lakeshore environment of the site.

5.4 REFERENCES

1. James A. FitzPatrick Nuclear Power Plant Offsite Dose Calculation Manual, Revision 9, September, 2004.

2. U.S. Nuclear Regulatory Commission Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluent for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I", October, 1977.

3. Eichholz, G., Environmental Aspects of Nuclear Power, First Edition, Ann Arbor Science Publishers, Inc., Ann Arbor, Michigan, 1976.

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6. National Council on Radiation Protection and Measurements (NCRP), Cesium-137 from the Environment to Man: Metabolism and Dose, NCRP Report No. 52, 1977.

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10. Eisenbud, Merril, Environmental Radioactivity, Third Edition, Academic Press, New York, New York, 1987.

11. Francis, C. W., Radiostrontium Movement in Soils and Uptake in Plants, Environmental Sciences Division, Oak Ridge National Laboratory, U.S. Department of Energy, 1978.

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13. ICRP Publication Number 29, Radionuclide Releases into the Environment: Assessment of Dose to Man, 1979.

14. U.S. Department of Health and Human Services, Preparedness and Response in Radiation Accidents, National Center of Devices and Radiological Health, Rockville, MD 20857, August, 1983.

15. Kathren, Ronald E., Radioactivity in the Environment: Sources, Distribution, and Surveillance, First Edition, Harwood Academic Press, New York, NY, 1984.

16. National Council on Radiation Protection and Measurement (NCRP), Ionizing Radiation Exposure of the Population of the United States, NCRP Report No. 93, 1987

17. Knoll, G., Radiation Detection and Measurement, Second Edition, John Wiley & Sons, New York, New York, 1989.

6.0 REPORT PERIOD ANALYTICAL RESULTS TABLES

6.1 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 values where applicable.

6.2 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).

6.3 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 is reported as the mean of the positive detections and the associated error for that mean (see Section 3.7.2 for methodology).

6.4 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 – 2004

Results in Units of pCi/g (dry) ± 1 Sigma

SAMPLE LOCATION	COLLECTION DATE	GAMMA EMITTERS					
		K-40	Co-60	Cs-134	Cs-137	Zn-65	Others †
Sunset Bay (05)***	04/21/04	17.3 ± 0.465	<0.035	<0.026	0.039 ± 0.014	<0.058	<LLD
	10/20/04	17.4 ± 0.737	<0.044	<0.065	<0.060	<0.095	<LLD
Lang's Beach (06, Control) ***	04/21/04	9.00 ± 0.385	<0.029	<0.029	<0.031	<0.094	<LLD
	10/20/04	11.7 ± 0.380	<0.036	<0.023	<0.031	<0.048	<LLD

† Plant related radionuclides

*** Corresponds to sample locations noted on Figure 3.3-5

TABLE 6-2

CONCENTRATIONS OF GAMMA EMITTERS IN FISH SAMPLES – 2004

Results in Units of pCi/g (wet) ± 1 Sigma

DATE	TYPE	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137	Others †
					FITZPATRICK (03)* **					
06/09/04	Brown Trout	5.24±0.357	<0.034	<0.036	<0.115	<0.036	<0.011	<0.033	<0.036	<LLD
06/08/04	Walleye	4.84±0.342	<0.038	<0.038	<0.118	<0.036	<0.077	<0.036	<0.029	<LLD
06/09/04	Smallmouth Bass	3.81±0.265	<0.028	<0.031	<0.091	<0.036	<0.078	<0.030	<0.028	<LLD
09/17/04	Brown Trout	4.56±0.296	<0.023	<0.032	<0.077	<0.030	<0.061	<0.029	<0.025	<LLD
09/17/04	Chinook Salmon	6.19±0.299	<0.031	<0.035	<0.080	<0.031	<0.072	<0.023	<0.030	<LLD
09/17/04	Walleye	3.74±0.367	<0.042	<0.056	<0.139	<0.045	<0.107	<0.037	<0.042	<LLD
09/17/04	Smallmouth Bass	5.27±0.337	<0.030	<0.030	<0.125	<0.039	<0.079	<0.040	<0.032	<LLD

*** Corresponds to sample location noted on Figure 3.3-5

† Plant related radionuclides

TABLE 6-2 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN FISH SAMPLES – 2004

Results in Units of pCi/g (wet) ± 1 Sigma

DATE	TYPE	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137	Others †
					NINE MILE POINT (02)* **					
06/08/04	Brown Trout	6.13 ± 0.298	<0.036	<0.037	<0.088	<0.035	<0.081	<0.037	<0.030	<LLD
06/08/04	Walleye	4.81 ± 0.304	<0.034	<0.034	<0.060	<0.044	<0.073	<0.026	<0.026	<LLD
06/14/04	Smallmouth Bass	5.82 ± 0.373	<0.035	<0.040	<0.110	<0.044	<0.098	<0.042	<0.040	<LLD
09/17/04	Brown Trout	4.28 ± 0.285	<0.030	<0.031	<0.098	<0.038	<0.054	<0.031	<0.031	<LLD
09/17/04	Chinook Salmon	4.42 ± 0.289	<0.034	<0.031	<0.105	<0.022	<0.067	<0.026	<0.026	<LLD
09/17/04	Walleye	4.67 ± 0.377	<0.043	<0.026	<0.095	<0.036	<0.085	<0.029	<0.035	<LLD

*** Corresponds to sample location noted on Figure 3.3-5

† Plant related radionuclides

TABLE 6-2 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN FISH SAMPLES – 2004

Results in Units of pCi/g (wet) ± 1 Sigma

DATE	TYPE	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137	Others †
					OSWEGO HARBOR (CONTROL) (00)* **					
06/10/04	Brown Trout	4.28±0.279	<0.030	<0.028	<0.079	<0.034	<0.069	<0.027	<0.032	<LLD
06/10/04	Walleye	4.97±0.338	<0.033	<0.034	<0.116	<0.029	<0.075	<0.033	<0.035	<LLD
06/14/04	Smallmouth Bass	6.12±0.367	<0.040	<0.039	<0.100	<0.047	<0.091	<0.039	<0.032	<LLD
09/15/04	Brown Trout	5.06±0.177	<0.021	<0.023	<0.058	<0.021	<0.050	<0.014	<0.021	<LLD
09/15/04	Chinook Salmon	5.16±0.269	<0.037	<0.029	<0.094	<0.034	<0.072	<0.020	<0.027	<LLD
09/15/04	Walleye	4.88±0.272	<0.023	<0.026	<0.075	<0.034	<0.066	<0.025	<0.027	<LLD
09/15/04	Smallmouth Bass	5.30±0.222	<0.024	<0.024	<0.073	<0.022	<0.057	<0.022	<0.023	<LLD

*** Corresponds to sample location noted on Figure 3.3-5

† Plant related radionuclides

TABLE 6-3

CONCENTRATIONS OF TRITIUM IN SURFACE WATER SAMPLES – 2004
(QUARTERLY COMPOSITE SAMPLES)

Results in Units of pCi/l ± 1 Sigma

STATION CODE	PERIOD	DATE	TRITIUM
FITZPATRICK* (03, INLET)***	First Quarter	01/02/04 - 04/01/04	< 432
	Second Quarter	04/01/04 - 07/01/04	< 439
	Third Quarter	07/01/04 - 10/02/04	< 421
	Fourth Quarter	10/02/04 - 01/03/05	< 408
OSWEGO STEAM STATION* (08, CONTROL)***	First Quarter	12/29/03 - 04/02/04	< 432
	Second Quarter	04/02/04 - 07/01/04	< 439
	Third Quarter	07/01/04 - 09/30/04	< 421
	Fourth Quarter	09/30/04 - 12/29/04	< 425
NINE MILE POINT UNIT 1** (09, INLET)***	First Quarter	12/29/03 - 04/02/04	< 432
	Second Quarter	04/02/04 - 07/01/04	< 439
	Third Quarter	07/01/04 - 09/30/04	< 421
	Fourth Quarter	09/30/04 - 12/29/04	< 425
NINE MILE POINT UNIT 2** (11, INLET)***	First Quarter	12/29/03 - 04/02/04	< 432
	Second Quarter	04/02/04 - 07/01/04	< 439
	Third Quarter	07/01/04 - 09/30/04	< 421
	Fourth Quarter	09/30/04 - 12/29/04	< 425
OSWEGO CITY WATER** (10)***	First Quarter	12/29/03 - 04/02/04	< 432
	Second Quarter	04/02/04 - 07/01/04	< 439
	Third Quarter	07/01/04 - 09/30/04	< 421
	Fourth Quarter	09/30/04 - 12/29/04	< 425

* 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 – 2004
Results in Units of pCi/liter ± 1 Sigma
OSWEGO STEAM STATION * (08, CONTROL)***

NUCLIDE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
I-131	<12.2	<8.96	<12.7	<13.9	<11.9	<10.6
Cs-134	<2.57	<2.38	<1.58	<4.82	<2.24	<3.68
Cs-137	<2.44	<2.42	<2.55	<4.11	<3.83	<3.23
Zr-95	<5.46	<5.14	<5.76	<7.38	<7.82	<5.79
Nb-95	<3.90	<3.67	<3.25	<6.03	<5.00	<5.10
Co-58	<3.10	<2.93	<3.36	<5.23	<4.13	<4.29
Mn-54	<2.86	<2.65	<2.62	<4.41	<3.76	<3.69
Zn-65	<3.86	<5.94	<6.51	<11.4	<9.35	<8.89
Fe-59	<8.40	<8.79	<9.25	<15.4	<13.9	<10.4
Co-60	<2.58	<2.62	<2.68	<4.77	<4.85	<4.11
K-40	164 ± 14.4	175 ± 15.6	180 ± 15.3	344 ± 29.4	271 ± 24.4	187 ± 21.5
Ba/La-140	<8.63	<7.27	<8.91	<10.4	<14.8	<7.60
NUCLIDE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
I-131	<15.0	<11.0	<11.3	<8.41	<11.1	<8.93
Cs-134	<3.08	<1.57	<3.48	<1.80	<4.22	<3.85
Cs-137	<4.64	<2.26	<3.42	<2.41	<3.30	<3.60
Zr-95	<9.47	<4.45	<6.74	<4.96	<6.96	<7.22
Nb-95	<5.88	<3.20	<4.00	<3.30	<5.02	<4.39
Co-58	<5.46	<2.68	<3.58	<2.89	<4.32	<4.31
Mn-54	<5.25	<2.31	<3.45	<2.44	<3.86	<4.04
Zn-65	<10.6	<5.11	<7.60	<5.75	<8.11	<9.29
Fe-59	<14.1	<6.48	<10.6	<7.84	<11.7	<11.6
Co-60	<5.22	<2.05	<3.21	<2.50	<3.16	<3.82
K-40	333 ± 29.5	238 ± 13.0	356 ± 21.6	281 ± 16.1	269 ± 22.9	406 ± 26.6
Ba/La-140	<13.1	<6.36	<10.5	<6.38	<10.3	<10.8

* 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 – 2004
Results in Units of pCi/liter ± 1 Sigma
FITZPATRICK* (03, INLET)***

NUCLIDE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
I-131	<10.3	<5.85	<11.9	<8.61	<8.68	<10.9
Cs-134	<4.26	<1.46	<3.27	<2.93	<3.50	<2.66
Cs-137	<3.96	<2.15	<3.42	<2.92	<3.66	<4.28
Zr-95	<9.96	<4.20	<6.73	<5.72	<7.20	<9.22
Nb-95	<5.46	<2.58	<4.50	<3.84	<4.75	<5.58
Co-58	<4.96	<2.42	<4.25	<3.04	<3.94	<4.51
Mn-54	<3.10	<2.26	<3.61	<2.31	<4.16	<3.97
Zn-65	<9.62	<4.86	<4.81	<6.12	<9.71	<9.37
Fe-59	<13.9	<6.31	<11.4	<9.07	<13.6	<14.5
Co-60	<4.62	<2.35	<3.09	<2.90	<5.08	<4.75
K-40	161 ± 23.2	231 ± 12.8	338 ± 21.5	133 ± 13.9	199 ± 23.0	137 ± 22.1
Ba/La-140	<10.3	<4.25	<10.9	<8.04	<12.8	<11.3
NUCLIDE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
I-131	<13.8	<12.9	<9.19	<7.08	<13.8	<7.95
Cs-134	<5.32	<4.55	<2.55	<2.93	<3.36	<1.67
Cs-137	<5.09	<4.91	<2.67	<2.80	<2.90	<2.51
Zr-95	<9.75	<10.2	<4.92	<5.45	<6.67	<4.38
Nb-95	<6.06	<7.00	<3.43	<3.49	<3.63	<2.85
Co-58	<5.11	<5.51	<2.93	<2.81	<3.93	<2.71
Mn-54	<4.86	<5.27	<2.49	<2.78	<3.00	<2.70
Zn-65	<11.9	<12.0	<6.24	<5.88	<6.71	<2.77
Fe-59	<16.2	<14.6	<8.61	<8.80	<10.8	<7.13
Co-60	<5.79	<4.02	<2.65	<2.54	<4.04	<2.36
K-40	332 ± 33.8	208 ± 25.7	142 ± 14.5	126 ± 14.0	167 ± 19.2	264 ± 14.2
Ba/La-140	<14.8	<12.0	<8.07	<6.43	<11.3	<6.89

* 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 – 2004
Results in Units of pCi/liter ± 1 Sigma

NINE MILE POINT UNIT 1 (09, INLET)*****

NUCLIDE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
I-131	<14.4	<12.2	<14.6	<13.2	<14.0	<8.14
Cs-134	<3.33	<3.49	<3.50	<3.72	<3.08	<2.54
Cs-137	<3.32	<3.59	<3.57	<3.96	<3.09	<2.58
Zr-95	<6.28	<6.94	<7.69	<7.70	<5.73	<5.43
Nb-95	<4.30	<3.52	<4.56	<4.68	<4.80	<3.53
Co-58	<3.92	<3.94	<4.17	<4.68	<3.59	<3.03
Mn-54	<3.33	<3.99	<3.41	<3.85	<3.64	<2.66
Zn-65	<7.34	<8.65	<8.04	<9.54	<7.68	<6.03
Fe-59	<11.5	<12.2	<10.5	<15.4	<11.6	<10.0
Co-60	<3.66	<3.03	<4.07	<3.74	<3.53	<3.10
K-40	179 ± 19.7	177 ± 21.3	203 ± 21.2	192 ± 23.8	165 ± 19.6	176 ± 16.5
Ba/La-140	<9.06	<8.54	<12.5	<11.4	<12.3	<7.54
NUCLIDE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
I-131	<11.9	<10.6	<9.49	<13.1	<7.74	<10.4
Cs-134	<3.72	<2.70	<2.69	<3.80	<2.83	<4.37
Cs-137	<3.59	<2.20	<2.73	<3.40	<2.88	<3.86
Zr-95	<7.08	<5.68	<5.69	<6.66	<5.30	<7.78
Nb-95	<5.52	<3.45	<3.80	<4.68	<3.45	<4.75
Co-58	<4.70	<2.76	<2.87	<3.85	<2.90	<4.90
Mn-54	<3.81	<2.40	<2.67	<3.87	<2.53	<4.94
Zn-65	<9.06	<4.76	<6.30	<7.88	<6.30	<11.3
Fe-59	<13.2	<8.91	<7.99	<10.8	<9.06	<11.9
Co-60	<4.30	<2.36	<2.90	<3.53	<2.74	<4.64
K-40	173 ± 22.4	83.3 ± 12.4	120 ± 13.5	155 ± 19.0	170 ± 15.2	246 ± 25.0
Ba/La-140	<10.3	<9.38	<8.31	<10.2	<7.39	<9.06

** 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 – 2004
Results in Units of pCi/liter ± 1 Sigma

NINE MILE POINT UNIT 2 (11, INLET)*****

NUCLIDE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
I-131	<12.5	<12.6	<10.6	<11.8	<10.3	<9.32
Cs-134	<2.50	<3.35	<2.90	<3.84	<1.63	<2.10
Cs-137	<2.90	<3.12	<3.14	<3.59	<2.94	<3.42
Zr-95	<5.96	<7.59	<6.63	<7.44	<5.34	<5.61
Nb-95	<3.82	<4.80	<3.51	<5.25	<3.55	<4.41
Co-58	<3.11	<3.92	<3.10	<4.32	<3.14	<3.53
Mn-54	<2.55	<3.82	<2.59	<3.60	<2.77	<3.10
Zn-65	<6.70	<7.88	<6.48	<8.43	<5.88	<7.83
Fe-59	<9.23	<13.7	<10.1	<13.9	<9.63	<10.0
Co-60	<3.13	<3.37	<3.33	<4.29	<3.08	<3.29
K-40	150 ± 14.5	182 ± 21.1	126 ± 14.5	108 ± 17.6	126 ± 14.0	368 ± 21.7
Ba/La-140	<7.06	<11.0	<8.30	<10.3	<8.62	<8.18
NUCLIDE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
I-131	<13.9	<14.7	<8.95	<8.09	<7.68	<7.31
Cs-134	<3.98	<3.53	<1.60	<2.81	<1.86	<3.17
Cs-137	<3.45	<2.69	<2.15	<2.88	<2.90	<2.99
Zr-95	<8.15	<6.09	<4.46	<5.61	<5.73	<6.25
Nb-95	<6.26	<4.01	<3.06	<3.45	<3.21	<4.59
Co-58	<4.14	<3.65	<2.57	<2.65	<3.29	<3.24
Mn-54	<4.39	<3.47	<2.24	<2.55	<2.82	<3.06
Zn-65	<9.30	<6.76	<2.96	<7.32	<5.73	<6.92
Fe-59	<14.8	<10.5	<6.40	<8.59	<8.98	<8.56
Co-60	<4.81	<3.21	<2.17	<2.74	<2.75	<3.16
K-40	82.4 ± 18.6	200 ± 17.9	239 ± 13.2	198 ± 16.6	153 ± 16.4	156 ± 16.9
Ba/La-140	<14.7	<10.2	<5.18	<7.37	<7.42	<8.08

** 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 – 2004
Results in Units of pCi/liter ± 1 Sigma

OSWEGO CITY WATER (10)*****

NUCLIDE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
I-131	<13.8	<9.97	<11.7	<12.2	<14.6	<7.93
Cs-134	<2.02	<2.62	<3.25	<2.09	<2.87	<1.48
Cs-137	<3.01	<2.74	<3.29	<3.13	<2.83	<2.28
Zr-95	<6.95	<4.67	<6.00	<5.79	<6.09	<4.46
Nb-95	<4.79	<3.81	<4.62	<3.56	<3.91	<3.07
Co-58	<3.75	<2.90	<3.90	<3.49	<3.42	<2.73
Mn-54	<3.24	<2.73	<3.37	<3.39	<2.95	<2.36
Zn-65	<4.51	<6.01	<5.00	<3.84	<6.90	<3.12
Fe-59	<9.66	<8.65	<11.3	<10.2	<8.43	<6.64
Co-60	<3.61	<2.63	<3.84	<3.23	<2.85	<2.31
K-40	381 ± 22.3	173 ± 15.1	338 ± 22.5	247 ± 17.6	372 ± 19.9	272 ± 14.1
Ba/La-140	<9.58	<7.69	<10.5	<8.00	<10.5	<5.05
NUCLIDE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
I-131	<12.8	<12.9	<13.9	<8.49	<8.02	<7.25
Cs-134	<2.17	<3.10	<3.40	<2.61	<2.93	<3.19
Cs-137	<3.76	<2.88	<3.53	<2.32	<2.52	<2.62
Zr-95	<8.09	<5.57	<6.86	<4.74	<5.27	<5.44
Nb-95	<4.79	<3.47	<4.48	<3.37	<3.52	<3.37
Co-58	<4.06	<2.99	<4.40	<3.20	<2.76	<3.47
Mn-54	<3.39	<2.82	<4.21	<2.51	<2.74	<2.45
Zn-65	<9.47	<7.13	<8.89	<5.38	<5.25	<5.70
Fe-59	<10.5	<8.98	<12.5	<7.95	<7.64	<8.94
Co-60	<4.71	<2.67	<3.35	<2.36	<2.51	<2.79
K-40	105 ± 18.3	186 ± 15.9	194 ± 20.4	95.2 ± 12.5	110 ± 13.8	91.9 ± 15.3
Ba/La-140	<12.1	<9.91	<10.3	<7.05	<6.83	<6.30

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

TABLE 6-5
NMPNS/JAF SITE
ENVIRONMENTAL AIRBORNE PARTICULATE SAMPLES - OFFSITE STATIONS - 2004
GROSS BETA ACTIVITY pCi/ m^3 ± 1 Sigma
LOCATION

Week Start Date	R-1* OFFSITE	R-2* OFFSITE	R-3* OFFSITE	R-4* OFFSITE	R-5* OFFSITE	D-2** OFFSITE	E** OFFSITE	F** OFFSITE	G** OFFSITE
12/30/04	0.0189 ± 0.002	0.0214 ± 0.002	0.0173 ± 0.002	0.0177 ± 0.002	0.0222 ± 0.002	0.0194 ± 0.002	0.0183 ± 0.002	0.0196 ± 0.002	0.0157 ± 0.001
01/06/04	0.0173 ± 0.002	0.0197 ± 0.002	0.0162 ± 0.002	0.0153 ± 0.002	0.0202 ± 0.002	0.0202 ± 0.002	0.0219 ± 0.002	0.0213 ± 0.002	0.0183 ± 0.002
01/13/04	0.0139 ± 0.001	0.0197 ± 0.002	0.0141 ± 0.001	0.0116 ± 0.001	0.0106 ± 0.001	0.0135 ± 0.001	0.0104 ± 0.001	0.0125 ± 0.001	0.0114 ± 0.001
01/20/04	0.0120 ± 0.001	0.0141 ± 0.001	0.0158 ± 0.002	0.0142 ± 0.001	0.0172 ± 0.002	0.0136 ± 0.002	0.0155 ± 0.002	0.0160 ± 0.002	0.0141 ± 0.001
01/27/04	0.0121 ± 0.001	0.0162 ± 0.002	0.0120 ± 0.001	0.0121 ± 0.001	0.0144 ± 0.001	0.0112 ± 0.001	0.0136 ± 0.001	0.0121 ± 0.001	0.0146 ± 0.001
02/03/04	0.0174 ± 0.002	0.0158 ± 0.002	0.0148 ± 0.002	0.0152 ± 0.002	0.0178 ± 0.002	0.0179 ± 0.002	0.0180 ± 0.002	0.0183 ± 0.002	0.0155 ± 0.002
02/10/04	0.0178 ± 0.001	0.0210 ± 0.002	0.0195 ± 0.002	0.0174 ± 0.001	0.0203 ± 0.002	0.0168 ± 0.001	0.0195 ± 0.002	0.0195 ± 0.002	0.0187 ± 0.002
02/18/04	0.0260 ± 0.002	0.0222 ± 0.002	0.0235 ± 0.002	0.0232 ± 0.002	0.0235 ± 0.002	0.0234 ± 0.002	0.0221 ± 0.002	0.0230 ± 0.002	0.0199 ± 0.002
02/24/04	0.0192 ± 0.002	0.0227 ± 0.002	0.0221 ± 0.002	0.0188 ± 0.002	0.0179 ± 0.002	0.0208 ± 0.002	0.0207 ± 0.002	0.0198 ± 0.002	0.0193 ± 0.002
03/02/04	0.0170 ± 0.002	0.0169 ± 0.002	0.0173 ± 0.002	0.0145 ± 0.002	0.0151 ± 0.002	0.0141 ± 0.001	0.0149 ± 0.002	0.0193 ± 0.002	0.0171 ± 0.002
03/09/04	0.0129 ± 0.002	0.0139 ± 0.001	0.0141 ± 0.002	0.0135 ± 0.002	0.0124 ± 0.001	0.0141 ± 0.001	0.0155 ± 0.002	0.0153 ± 0.001	0.0150 ± 0.002
03/16/04	0.0188 ± 0.002	0.0167 ± 0.002	0.0153 ± 0.002	0.0137 ± 0.001	0.0154 ± 0.002	0.0163 ± 0.001	0.0162 ± 0.002	0.0164 ± 0.002	0.0133 ± 0.001
03/23/04	0.0138 ± 0.001	0.0130 ± 0.001	0.0141 ± 0.002	0.0139 ± 0.001	0.0149 ± 0.002	0.0137 ± 0.001	0.0113 ± 0.001	0.0141 ± 0.001	0.0151 ± 0.002
03/30/04	0.0058 ± 0.001	0.0078 ± 0.001	0.0070 ± 0.001	0.0092 ± 0.001	0.0085 ± 0.001	0.0057 ± 0.001	0.0071 ± 0.001	0.0089 ± 0.001	0.0088 ± 0.001
04/06/04	0.0087 ± 0.001	0.0101 ± 0.001	0.0124 ± 0.002	0.0084 ± 0.001	0.0116 ± 0.001	0.0117 ± 0.001	0.0112 ± 0.001	0.0082 ± 0.001	0.0118 ± 0.001
04/13/04	0.0082 ± 0.001	0.0152 ± 0.002	0.0164 ± 0.002	0.0127 ± 0.001	0.0137 ± 0.001	0.0147 ± 0.001	0.0113 ± 0.001	0.0124 ± 0.001	0.0145 ± 0.002
04/20/04	0.0035 ± 0.001	0.0116 ± 0.001	0.0097 ± 0.001	0.0101 ± 0.001	0.0093 ± 0.001	0.0081 ± 0.001	0.0105 ± 0.001	0.0105 ± 0.001	0.0105 ± 0.001
04/27/04	0.0037 ± 0.001	0.0120 ± 0.001	0.0138 ± 0.001	0.0113 ± 0.001	0.0115 ± 0.001	0.0145 ± 0.001	0.0133 ± 0.001	0.0134 ± 0.001	0.0139 ± 0.002
05/04/04	0.0041 ± 0.001	0.0152 ± 0.002	0.0151 ± 0.002	0.0145 ± 0.001	0.0167 ± 0.002	0.0151 ± 0.002	0.0144 ± 0.002	0.0172 ± 0.002	0.0150 ± 0.002
05/11/04	0.0063 ± 0.001	0.0126 ± 0.002	0.0157 ± 0.002	0.0135 ± 0.001	0.0118 ± 0.001	0.0156 ± 0.002	0.0132 ± 0.001	0.0169 ± 0.002	0.0186 ± 0.002
05/18/04	0.0042 ± 0.001	0.0094 ± 0.001	0.0138 ± 0.002	0.0099 ± 0.001	0.0087 ± 0.001	0.0102 ± 0.001	0.0105 ± 0.001	0.0102 ± 0.001	0.0096 ± 0.001
05/25/04	0.0039 ± 0.001	0.0099 ± 0.001	0.0106 ± 0.001	0.0082 ± 0.001	0.0085 ± 0.001	0.0126 ± 0.001	0.0120 ± 0.001	0.0107 ± 0.001	0.0118 ± 0.001
06/02/04	0.0030 ± 0.001	0.0100 ± 0.002	0.0086 ± 0.001	0.0091 ± 0.001	0.0081 ± 0.001	0.0107 ± 0.001	0.0109 ± 0.002	0.0099 ± 0.002	0.0093 ± 0.001
06/08/04	0.0065 ± 0.001	0.0132 ± 0.002	0.0148 ± 0.002	0.0148 ± 0.001	0.0139 ± 0.002	0.0169 ± 0.002	0.0145 ± 0.002	0.0164 ± 0.002	0.0176 ± 0.002
06/15/04	0.0036 ± 0.001	0.0105 ± 0.001	0.0098 ± 0.001	0.0107 ± 0.001	0.0107 ± 0.001	0.0124 ± 0.001	0.0118 ± 0.001	0.0130 ± 0.002	0.0127 ± 0.002
06/22/04	0.0056 ± 0.001	0.0145 ± 0.002	0.0150 ± 0.002	0.0160 ± 0.002	0.0116 ± 0.001	0.0163 ± 0.002	0.0177 ± 0.002	0.0154 ± 0.002	0.0152 ± 0.002

* Sample location required by ODCM

** Optional sample location

TABLE 6-5 (continued)
NMPNS/JAF SITE
ENVIRONMENTAL AIRBORNE PARTICULATE SAMPLES - OFFSITE STATIONS - 2004
GROSS BETA ACTIVITY pCi/ m^3 ± 1 Sigma
LOCATION

Week Start Date	R-1* OFFSITE	R-2* OFFSITE	R-3* OFFSITE	R-4* OFFSITE	R-5* OFFSITE	D-2** OFFSITE	E** OFFSITE	F** OFFSITE	G** OFFSITE
06/29/04	0.0030 ± 0.001	0.0114 ± 0.001	0.0104 ± 0.001	0.0104 ± 0.001	0.0123 ± 0.001	0.0091 ± 0.001	0.0125 ± 0.001	0.0105 ± 0.001	0.0131 ± 0.001
07/07/04	0.0027 ± 0.001	0.0120 ± 0.002	0.0118 ± 0.002	0.0093 ± 0.001	0.0085 ± 0.001	0.0100 ± 0.001	0.0089 ± 0.001	0.0104 ± 0.002	0.0083 ± 0.001
07/13/04	0.0084 ± 0.001	0.0140 ± 0.002	0.0183 ± 0.002	0.0155 ± 0.002	0.0200 ± 0.002	0.0164 ± 0.002	0.0205 ± 0.002	0.0193 ± 0.002	0.0181 ± 0.002
07/20/04	0.0145 ± 0.001	0.0273 ± 0.002	0.0260 ± 0.002	0.0212 ± 0.002	0.0260 ± 0.002	0.0257 ± 0.002	0.0221 ± 0.002	0.0240 ± 0.002	0.0229 ± 0.002
07/27/04	0.0124 ± 0.002	0.0210 ± 0.002	0.0188 ± 0.002	0.0193 ± 0.002	0.0205 ± 0.002	0.0200 ± 0.002	0.0207 ± 0.002	0.0231 ± 0.002	0.0172 ± 0.002
08/03/04	0.0150 ± 0.001	0.0183 ± 0.002	0.0140 ± 0.001	0.0153 ± 0.002	0.0126 ± 0.001	0.0151 ± 0.002	0.0170 ± 0.002	0.0151 ± 0.001	0.0186 ± 0.002
08/10/04	0.0365 ± 0.002	0.0360 ± 0.002	0.0352 ± 0.002	0.0362 ± 0.002	0.0324 ± 0.002	0.0354 ± 0.002	0.0408 ± 0.002	0.0404 ± 0.002	0.0310 ± 0.002
08/17/04	0.0215 ± 0.002	0.0230 ± 0.002	0.0212 ± 0.002	0.0209 ± 0.002	0.0199 ± 0.002	0.0211 ± 0.002	0.0199 ± 0.002	0.0216 ± 0.002	0.0222 ± 0.002
08/24/04	0.0204 ± 0.002	0.0209 ± 0.002	0.0182 ± 0.002	0.0184 ± 0.002	0.0173 ± 0.002	0.0222 ± 0.002	0.0181 ± 0.002	0.0161 ± 0.001	0.0160 ± 0.002
08/31/04	0.0183 ± 0.002	0.0211 ± 0.002	0.0201 ± 0.002	0.0187 ± 0.002	0.0205 ± 0.002	0.0225 ± 0.002	0.0214 ± 0.002	0.0180 ± 0.001	0.0173 ± 0.002
09/08/04	0.0150 ± 0.002	0.0125 ± 0.002	0.0121 ± 0.001	0.0131 ± 0.002	0.0105 ± 0.001	0.0114 ± 0.001	0.0107 ± 0.001	0.0144 ± 0.002	0.0154 ± 0.002
09/14/04	0.0206 ± 0.002	0.0215 ± 0.002	0.0205 ± 0.002	0.0181 ± 0.002	0.0181 ± 0.002	0.0202 ± 0.002	0.0220 ± 0.002	0.0179 ± 0.002	0.0197 ± 0.002
09/21/04	0.0303 ± 0.002	0.0300 ± 0.002	0.0278 ± 0.002	0.0291 ± 0.002	0.0264 ± 0.002	0.0297 ± 0.002	0.0253 ± 0.002	0.0268 ± 0.002	0.0300 ± 0.002
09/28/04	0.0181 ± 0.002	0.0170 ± 0.002	0.0191 ± 0.002	0.0173 ± 0.002	0.0162 ± 0.001	0.0166 ± 0.002	0.0169 ± 0.002	0.0162 ± 0.002	0.0165 ± 0.002
10/05/04	0.0218 ± 0.002	0.0220 ± 0.002	0.0199 ± 0.002	0.0231 ± 0.002	0.0184 ± 0.002	0.0197 ± 0.002	0.0236 ± 0.002	0.0212 ± 0.002	0.0228 ± 0.002
10/12/04	0.0137 ± 0.001	0.0159 ± 0.002	0.0139 ± 0.001	0.0169 ± 0.002	0.0111 ± 0.001	0.0128 ± 0.001	0.0132 ± 0.001	0.0134 ± 0.001	0.0179 ± 0.002
10/19/04	0.0139 ± 0.001	0.0162 ± 0.002	0.0108 ± 0.001	0.0124 ± 0.001	0.0096 ± 0.001	0.0142 ± 0.002	0.0129 ± 0.001	0.0127 ± 0.001	0.0119 ± 0.001
10/26/04	0.0157 ± 0.002	0.0149 ± 0.002	0.0190 ± 0.002	0.0177 ± 0.002	0.0132 ± 0.001	0.0168 ± 0.002	0.0155 ± 0.002	0.0153 ± 0.001	0.0146 ± 0.002
11/02/04	0.0173 ± 0.002	0.0167 ± 0.002	0.0134 ± 0.001	0.0143 ± 0.001	0.0211 ± 0.002	0.0172 ± 0.002	0.0134 ± 0.001	0.0177 ± 0.002	0.0175 ± 0.002
11/09/04	0.0191 ± 0.002	0.0194 ± 0.002	0.0198 ± 0.002	0.0188 ± 0.002	0.0173 ± 0.002	0.0209 ± 0.002	0.0259 ± 0.002	0.0208 ± 0.002	0.0176 ± 0.002
11/16/04	0.0220 ± 0.002	0.0238 ± 0.002	0.0248 ± 0.002	0.0256 ± 0.002	0.0253 ± 0.002	0.0265 ± 0.002	0.0225 ± 0.002	0.0218 ± 0.002	0.0269 ± 0.002
11/23/04	0.0151 ± 0.002	0.0179 ± 0.002	0.0169 ± 0.002	0.0156 ± 0.002	0.0120 ± 0.001	0.0163 ± 0.002	0.0127 ± 0.001	0.0148 ± 0.002	0.0166 ± 0.002
11/30/04	0.0200 ± 0.002	0.0185 ± 0.002	0.0200 ± 0.002	0.0191 ± 0.002	0.0169 ± 0.002	0.0184 ± 0.002	0.0197 ± 0.002	0.0166 ± 0.002	0.0190 ± 0.002
12/07/04	0.0103 ± 0.001	0.0174 ± 0.002	0.0113 ± 0.001	0.0100 ± 0.001	0.0099 ± 0.001	0.0093 ± 0.001	0.0105 ± 0.002	0.0111 ± 0.001	0.0116 ± 0.001
12/14/04	0.0234 ± 0.002	0.0232 ± 0.002	0.0203 ± 0.002	0.0189 ± 0.002	0.0206 ± 0.002	0.0183 ± 0.002	0.0239 ± 0.002	0.0206 ± 0.002	0.0238 ± 0.002
12/21/04	0.0170 ± 0.002	0.0182 ± 0.002	0.0167 ± 0.002	0.0189 ± 0.002	0.0186 ± 0.002	0.0188 ± 0.002	0.0192 ± 0.002	0.0184 ± 0.001	0.0170 ± 0.002
12/28/04	0.0223 ± 0.002	0.0252 ± 0.002	0.0247 ± 0.002	0.0266 ± 0.002	0.0254 ± 0.002	0.0259 ± 0.002	0.0293 ± 0.002	0.0278 ± 0.002	0.0275 ± 0.002

* Sample location required by ODCM
** Optional sample location

TABLE 6-6
NMPNS/JAF SITE
ENVIRONMENTAL AIRBORNE PARTICULATE SAMPLES - ONSITE STATIONS – 2004
GROSS BETA ACTIVITY pCi/ m^3 ± 1 Sigma

LOCATION

Week Start Date	D1** ONSITE	G** ONSITE	H** ONSITE	I** ONSITE	J** ONSITE	K** ONSITE
12/29/04	0.0187 ± 0.002	0.0204 ± 0.002	0.0192 ± 0.002	0.0210 ± 0.002	0.0205 ± 0.002	0.0174 ± 0.002
01/05/04	0.0220 ± 0.002	0.0203 ± 0.002	0.0161 ± 0.001	0.0154 ± 0.002	0.0192 ± 0.002	0.0171 ± 0.002
01/12/04	0.0162 ± 0.002	0.0127 ± 0.001	0.0130 ± 0.001	0.0143 ± 0.001	0.0142 ± 0.001	0.0126 ± 0.001
01/19/04	0.0148 ± 0.002	0.0099 ± 0.001	0.0136 ± 0.001	0.0128 ± 0.001	0.0146 ± 0.001	0.0167 ± 0.002
01/26/04	0.0162 ± 0.002	0.0122 ± 0.001	0.0151 ± 0.001	0.0175 ± 0.002	0.0133 ± 0.001	0.0152 ± 0.001
02/02/04	0.0160 ± 0.002	0.0157 ± 0.002	0.0157 ± 0.001	0.0169 ± 0.002	0.0131 ± 0.001	0.0137 ± 0.002
02/09/04	0.0262 ± 0.002	0.0202 ± 0.002	0.0223 ± 0.002	0.0206 ± 0.002	0.0194 ± 0.001	0.0241 ± 0.002
02/17/04	0.0227 ± 0.002	0.0241 ± 0.002	0.0247 ± 0.002	0.0246 ± 0.002	0.0228 ± 0.002	0.0239 ± 0.002
02/23/04	0.0258 ± 0.002	0.0245 ± 0.002	0.0258 ± 0.002	0.0231 ± 0.002	0.0243 ± 0.002	0.0238 ± 0.002
03/01/04	0.0186 ± 0.002	0.0166 ± 0.002	0.0154 ± 0.002	0.0165 ± 0.002	0.0154 ± 0.002	0.0177 ± 0.002
03/08/04	0.0151 ± 0.002	0.0142 ± 0.001	0.0157 ± 0.001	0.0156 ± 0.002	0.0171 ± 0.002	0.0143 ± 0.002
03/15/04	0.0112 ± 0.001	0.0135 ± 0.001	0.0149 ± 0.001	0.0151 ± 0.002	0.0140 ± 0.001	0.0126 ± 0.001
03/22/04	0.0159 ± 0.002	0.0156 ± 0.002	0.0166 ± 0.002	0.0169 ± 0.002	0.0183 ± 0.002	0.0157 ± 0.002
03/29/04	0.0076 ± 0.001	0.0085 ± 0.001	0.0099 ± 0.001	0.0080 ± 0.001	0.0058 ± 0.001	0.0070 ± 0.001
04/05/04	0.0136 ± 0.002	0.0118 ± 0.002	0.0122 ± 0.002	0.0133 ± 0.002	0.0106 ± 0.001	0.0119 ± 0.001
04/12/04	0.0133 ± 0.002	0.0106 ± 0.001	0.0135 ± 0.001	0.0107 ± 0.001	0.0129 ± 0.001	0.0134 ± 0.001
04/19/04	0.0109 ± 0.001	0.0088 ± 0.001	0.0118 ± 0.001	0.0112 ± 0.001	0.0095 ± 0.001	0.0090 ± 0.001
04/26/04	0.0130 ± 0.002	0.0149 ± 0.002	0.0124 ± 0.001	0.0125 ± 0.001	0.0123 ± 0.001	0.0123 ± 0.001
05/03/04	0.0137 ± 0.002	0.0123 ± 0.002	0.0137 ± 0.001	0.0161 ± 0.002	0.0141 ± 0.002	0.0119 ± 0.001
05/10/04	0.0178 ± 0.002	0.0131 ± 0.002	0.0155 ± 0.002	0.0163 ± 0.002	0.0178 ± 0.002	0.0146 ± 0.002
05/17/04	0.0126 ± 0.002	0.0096 ± 0.001	0.0102 ± 0.001	0.0094 ± 0.001	0.0090 ± 0.001	0.0123 ± 0.001
05/24/04	0.0094 ± 0.001	0.0103 ± 0.001	0.0075 ± 0.001	0.0106 ± 0.001	0.0083 ± 0.001	0.0095 ± 0.001
06/01/04	0.0069 ± 0.002	0.0054 ± 0.001	0.0085 ± 0.001	0.0073 ± 0.001	0.0084 ± 0.001	0.0049 ± 0.001
06/07/04	0.0177 ± 0.002	0.0143 ± 0.002	0.0145 ± 0.001	0.0170 ± 0.002	0.0182 ± 0.002	0.0163 ± 0.002
06/14/04	0.0103 ± 0.001	0.0104 ± 0.001	0.0105 ± 0.001	0.0128 ± 0.002	0.0096 ± 0.001	0.0100 ± 0.001
06/21/04	0.0088 ± 0.001	0.0135 ± 0.001	0.0104 ± 0.001	0.0113 ± 0.001	0.0112 ± 0.001	0.0140 ± 0.002

** Optional sample location

TABLE 6-6 (continued)
NMPNS/JAF SITE
ENVIRONMENTAL AIRBORNE PARTICULATE SAMPLES - ONSITE STATIONS – 2004
GROSS BETA ACTIVITY pCi/ m^3 ± 1 Sigma

LOCATION

Week Start Date	D1** ONSITE	G** ONSITE	H** ONSITE	I** ONSITE	J** ONSITE	K** ONSITE
06/28/04	0.0117 ± 0.001	0.0104 ± 0.001	0.0105 ± 0.001	0.0109 ± 0.001	0.0128 ± 0.001	0.0107 ± 0.001
07/06/04	0.0096 ± 0.001	0.0064 ± 0.001	0.0111 ± 0.002	0.0095 ± 0.001	0.0091 ± 0.001	0.0096 ± 0.001
07/12/04	0.0103 ± 0.001	0.0097 ± 0.001	0.0091 ± 0.001	0.0092 ± 0.001	0.0074 ± 0.001	0.0095 ± 0.001
07/19/04	0.0184 ± 0.002	0.0147 ± 0.001	0.0227 ± 0.002	0.0191 ± 0.002	0.0260 ± 0.002	0.0200 ± 0.002
07/26/04	0.0159 ± 0.002	0.0181 ± 0.002	0.0196 ± 0.002	0.0189 ± 0.002	0.0168 ± 0.001	0.0174 ± 0.002
08/02/04	0.0171 ± 0.002	0.0116 ± 0.001	0.0160 ± 0.002	0.0156 ± 0.002	0.0153 ± 0.002	0.0146 ± 0.002
08/09/04	0.0239 ± 0.002	0.0240 ± 0.002	0.0269 ± 0.002	0.0266 ± 0.002	0.0248 ± 0.002	0.0265 ± 0.002
08/16/04	0.0212 ± 0.002	0.0172 ± 0.002	0.0229 ± 0.002	0.0192 ± 0.002	0.0200 ± 0.002	0.0204 ± 0.002
08/23/04	0.0213 ± 0.002	0.0171 ± 0.002	0.0183 ± 0.002	0.0201 ± 0.002	0.0172 ± 0.002	0.0184 ± 0.002
08/30/04	0.0156 ± 0.001	0.0165 ± 0.001	0.0153 ± 0.001	0.0170 ± 0.001	0.0170 ± 0.002	0.0153 ± 0.001
09/07/04	0.0137 ± 0.002	0.0137 ± 0.001	0.0159 ± 0.002	0.0157 ± 0.002	0.0146 ± 0.002	0.0133 ± 0.002
09/13/04	0.0169 ± 0.002	0.0155 ± 0.001	0.0150 ± 0.001	0.0157 ± 0.002	0.0175 ± 0.002	0.0173 ± 0.002
09/20/04	0.0281 ± 0.002	0.0283 ± 0.002	0.0290 ± 0.002	0.0271 ± 0.002	0.0289 ± 0.002	0.0265 ± 0.002
09/27/04	0.0183 ± 0.002	0.0189 ± 0.002	0.0142 ± 0.001	0.0190 ± 0.002	0.0170 ± 0.002	0.0193 ± 0.002
10/04/04	0.0204 ± 0.002	0.0185 ± 0.002	0.0224 ± 0.002	0.0249 ± 0.002	0.0199 ± 0.002	0.0201 ± 0.002
10/11/04	0.0145 ± 0.002	0.0166 ± 0.002	0.0143 ± 0.001	0.0157 ± 0.002	0.0144 ± 0.002	0.0139 ± 0.001
10/18/04	0.0120 ± 0.001	0.0092 ± 0.001	0.0090 ± 0.001	0.0117 ± 0.001	0.0120 ± 0.001	0.0108 ± 0.001
10/25/04	0.0176 ± 0.002	0.0145 ± 0.002	0.0182 ± 0.002	0.0164 ± 0.002	0.0160 ± 0.002	0.0158 ± 0.002
11/02/04	0.0164 ± 0.002	0.0171 ± 0.002	0.0177 ± 0.002	0.0203 ± 0.002	0.0176 ± 0.002	0.0139 ± 0.001
11/08/04	0.0121 ± 0.001	0.0160 ± 0.002	0.0130 ± 0.001	0.0179 ± 0.002	0.0179 ± 0.002	0.0166 ± 0.002
11/15/04	0.0292 ± 0.002	0.0269 ± 0.002	0.0258 ± 0.002	0.0256 ± 0.002	0.0273 ± 0.002	0.0234 ± 0.002
11/22/04	0.0188 ± 0.002	0.0165 ± 0.002	0.0152 ± 0.002	0.0167 ± 0.002	0.0178 ± 0.002	0.0169 ± 0.002
11/29/04	0.0264 ± 0.003	0.0195 ± 0.002	0.0195 ± 0.002	0.0219 ± 0.002	0.0192 ± 0.002	0.0184 ± 0.002
12/06/04	0.0131 ± 0.002	0.0108 ± 0.001	0.0114 ± 0.001	0.0137 ± 0.002	0.0131 ± 0.001	0.0082 ± 0.001
12/13/04	0.0199 ± 0.002	0.0209 ± 0.002	0.0219 ± 0.002	0.0248 ± 0.002	0.0199 ± 0.002	0.0213 ± 0.002
12/20/04	0.0209 ± 0.002	0.0222 ± 0.002	0.0213 ± 0.002	0.0186 ± 0.002	0.0177 ± 0.002	0.0169 ± 0.002
12/27/04	0.0285 ± 0.002	0.0283 ± 0.002	0.0266 ± 0.002	0.0292 ± 0.002	0.0281 ± 0.002	0.0251 ± 0.002

** Optional sample location

TABLE 6-7
NMPNS/JAF SITE
ENVIRONMENTAL CHARCOAL CARTRIDGE SAMPLES - OFFSITE STATIONS - 2004
I-131 ACTIVITY pCi/ m^3 ± 1 Sigma

LOCATION

Week Start Date	R-1* OFFSITE	R-2* OFFSITE	R-3* OFFSITE	R-4* OFFSITE	R-5* OFFSITE	D-2** OFFSITE	E** OFFSITE	F** OFFSITE	G** OFFSITE
12/30/04	< 0.0186	< 0.0177	< 0.0220	< 0.0244	< 0.0205	< 0.0247	< 0.0199	< 0.0158	< 0.0183
01/06/04	< 0.0143	< 0.0159	< 0.0118	< 0.0203	< 0.0173	< 0.0174	< 0.0146	< 0.0185	< 0.0198
01/13/04	< 0.0216	< 0.0212	< 0.0136	< 0.0178	< 0.0208	< 0.0136	< 0.0164	< 0.0034	< 0.0149
01/20/04	< 0.0162	< 0.0185	< 0.0165	< 0.0195	< 0.0176	< 0.0189	< 0.0166	< 0.0225	< 0.0098
01/27/04	< 0.0214	< 0.0178	< 0.0204	< 0.0179	< 0.0270	< 0.0126	< 0.0165	< 0.0180	< 0.0218
02/03/04	< 0.0195	< 0.0132	< 0.0108	< 0.0127	< 0.0224	< 0.0211	< 0.0168	< 0.0179	< 0.0169
02/10/04	< 0.0281	< 0.0167	< 0.0166	< 0.0191	< 0.0176	< 0.0198	< 0.0086	< 0.0168	< 0.0206
02/18/04	< 0.0283	< 0.0245	< 0.0218	< 0.0206	< 0.0221	< 0.0290	< 0.0135	< 0.0105	< 0.0210
02/24/04	< 0.0184	< 0.0213	< 0.0207	< 0.0149	< 0.0163	< 0.0125	< 0.0187	< 0.0209	< 0.0208
03/02/04	< 0.0225	< 0.0151	< 0.0146	< 0.0228	< 0.0212	< 0.0137	< 0.0131	< 0.0211	< 0.0218
03/09/04	< 0.0196	< 0.0196	< 0.0156	< 0.0260	< 0.0203	< 0.0220	< 0.0179	< 0.0135	< 0.0147
03/16/04	< 0.0192	< 0.0153	< 0.0037	< 0.0158	< 0.0169	< 0.0143	< 0.0255	< 0.0133	< 0.0221
03/23/04	< 0.0195	< 0.0189	< 0.0226	< 0.0136	< 0.0267	< 0.0161	< 0.0238	< 0.0155	< 0.0200
03/30/04	< 0.0193	< 0.0124	< 0.0143	< 0.0203	< 0.0177	< 0.0148	< 0.0197	< 0.0160	< 0.0199
04/06/04	< 0.0217	< 0.0176	< 0.0197	< 0.0216	< 0.0135	< 0.0153	< 0.0272	< 0.0169	< 0.0283
04/13/04	< 0.0226	< 0.0121	< 0.0116	< 0.0202	< 0.0239	< 0.0214	< 0.0155	< 0.0170	< 0.0211
04/20/04	< 0.0170	< 0.0243	< 0.0201	< 0.0135	< 0.0188	< 0.0117	< 0.0197	< 0.0233	< 0.0190
04/27/04	< 0.0259	< 0.0204	< 0.0131	< 0.0132	< 0.0197	< 0.0186	< 0.0196	< 0.0207	< 0.0177
05/04/04	< 0.0233	< 0.0192	< 0.0112	< 0.0195	< 0.0113	< 0.0221	< 0.0272	< 0.0183	< 0.0160
05/11/04	< 0.0259	< 0.0156	< 0.0125	< 0.0167	< 0.0166	< 0.0176	< 0.0196	< 0.0181	< 0.0187
05/18/04	< 0.0202	< 0.0229	< 0.0168	< 0.0129	< 0.0211	< 0.0177	< 0.0208	< 0.0257	< 0.0208
05/25/04	< 0.0147	< 0.0168	< 0.0115	< 0.0188	< 0.0131	< 0.0161	< 0.0171	< 0.0084	< 0.0173
06/02/04	< 0.0170	< 0.0284	< 0.0189	< 0.0231	< 0.0280	< 0.0208	< 0.0227	< 0.0174	< 0.0233
06/08/04	< 0.0206	< 0.0200	< 0.0143	< 0.0192	< 0.0192	< 0.0190	< 0.0205	< 0.0177	< 0.0252
06/15/04	< 0.0180	< 0.0162	< 0.0231	< 0.0169	< 0.0174	< 0.0142	< 0.0199	< 0.0207	< 0.0152
06/22/04	< 0.0161	< 0.0144	< 0.0158	< 0.0184	< 0.0132	< 0.0198	< 0.0168	< 0.0187	< 0.0181

* Sample location required by ODCM

** Optional sample location

TABLE 6-7 (continued)
NMPNS/JAF SITE
ENVIRONMENTAL CHARCOAL CARTRIDGE SAMPLES - OFFSITE STATIONS - 2004
I-131 ACTIVITY pCi/ m^3 ± 1 Sigma
LOCATION

Week Start Date	R-1* OFFSITE	R-2* OFFSITE	R-3* OFFSITE	R-4* OFFSITE	R-5* OFFSITE	D-2** OFFSITE	E** OFFSITE	F** OFFSITE	G** OFFSITE
06/29/04	< 0.0186	< 0.0149	< 0.0220	< 0.0172	< 0.0139	< 0.0133	< 0.0229	< 0.0181	< 0.0185
07/07/04	< 0.0204	< 0.0197	< 0.0208	< 0.0179	< 0.0239	< 0.0202	< 0.0177	< 0.0200	< 0.0189
07/13/04	< 0.0238	< 0.0191	< 0.0159	< 0.0196	< 0.0235	< 0.0210	< 0.0147	< 0.0179	< 0.0211
07/20/04	< 0.0146	< 0.0140	< 0.0153	< 0.0239	< 0.0126	< 0.0167	< 0.0143	< 0.0159	< 0.0198
07/27/04	< 0.0266	< 0.0037	< 0.0154	< 0.0094	< 0.0258	< 0.0234	< 0.0198	< 0.0145	< 0.0151
08/03/04	< 0.0169	< 0.0242	< 0.0269	< 0.0252	< 0.0167	< 0.0209	< 0.0149	< 0.0163	< 0.0218
08/10/04	< 0.0169	< 0.0167	< 0.0143	< 0.0187	< 0.0176	< 0.0169	< 0.0111	< 0.0159	< 0.0169
08/17/04	< 0.0182	< 0.0167	< 0.0184	< 0.0121	< 0.0196	< 0.0245	< 0.0158	< 0.0145	< 0.0240
08/24/04	< 0.0278	< 0.0198	< 0.0207	< 0.0186	< 0.0156	< 0.0235	< 0.0221	< 0.0152	< 0.0149
08/31/04	< 0.0139	< 0.0125	< 0.0191	< 0.0198	< 0.0155	< 0.0095	< 0.0154	< 0.0140	< 0.0129
09/08/04	< 0.0253	< 0.0264	< 0.0177	< 0.0133	< 0.0233	< 0.0187	< 0.0305	< 0.0182	< 0.0168
09/14/04	< 0.0159	< 0.0332	< 0.0268	< 0.0226	< 0.0120	< 0.0314	< 0.0198	< 0.0191	< 0.0327
09/21/04	< 0.0133	< 0.0190	< 0.0116	< 0.0161	< 0.0138	< 0.0146	< 0.0179	< 0.0150	< 0.0181
09/28/04	< 0.0150	< 0.0133	< 0.0204	< 0.0149	< 0.0184	< 0.0133	< 0.0226	< 0.0148	< 0.0146
10/05/04	< 0.0225	< 0.0214	< 0.0135	< 0.0137	< 0.0161	< 0.0227	< 0.0207	< 0.0151	< 0.0155
10/12/04	< 0.0176	< 0.0151	< 0.0149	< 0.0185	< 0.0202	< 0.0229	< 0.0178	< 0.0125	< 0.0113
10/19/04	< 0.0176	< 0.0254	< 0.0256	< 0.0226	< 0.0253	< 0.0204	<0.0206	< 0.0269	< 0.0191
10/26/04	< 0.0225	< 0.0171	< 0.0238	< 0.0289	< 0.0201	< 0.0162	< 0.0253	< 0.0180	< 0.0228
11/02/04	< 0.0158	< 0.0200	< 0.0122	< 0.0222	< 0.0218	< 0.0036	< 0.0155	< 0.0119	< 0.0220
11/09/04	< 0.0135	< 0.0136	< 0.0149	< 0.0209	< 0.0197	< 0.0191	< 0.0168	< 0.0109	< 0.0181
11/16/04	< 0.0281	< 0.0206	< 0.0186	< 0.0177	< 0.0186	< 0.0246	< 0.0189	< 0.0207	< 0.0192
11/23/04	< 0.0232	< 0.0259	< 0.0200	< 0.0250	< 0.0158	< 0.0204	< 0.0238	< 0.0192	< 0.0253
11/30/04	< 0.0285	< 0.0257	< 0.0181	< 0.0200	< 0.0227	< 0.0244	< 0.0208	< 0.0161	< 0.0180
12/07/04	< 0.0265	< 0.0214	< 0.0252	< 0.0189	< 0.0152	< 0.0256	< 0.0236	< 0.0166	< 0.0215
12/14/04	< 0.0160	< 0.0244	< 0.0212	< 0.0175	< 0.0186	< 0.0179	< 0.0256	<0.0166	< 0.0143
12/21/04	< 0.0367	< 0.0177	< 0.0440	< 0.0157	< 0.0156	< 0.0137	< 0.0270	< 0.0191	< 0.0144
12/28/04	<0.0182	<0.0129	<0.0223	<0.0240	<0.0260	<0.0290	<0.0196	<0.0171	<0.0136

* Sample location required by ODCM

** Optional sample location

TABLE 6-8
NMPNS/JAF SITE
ENVIRONMENTAL CHARCOAL CARTRIDGE SAMPLES - ONSITE STATIONS - 2004
I-131 ACTIVITY pCi/m3 ± 1 Sigma
LOCATION

Week Start Date	D1** ONSITE	G** ONSITE	H** ONSITE	I** ONSITE	J** ONSITE	K** ONSITE
12/29/03	< 0.0163	< 0.0215	< 0.0175	< 0.0102	< 0.0169	< 0.0208
01/05/04	< 0.0274	< 0.0293	< 0.0190	< 0.0145	< 0.0184	< 0.0230
01/12/04	< 0.0325	< 0.0180	< 0.0146	< 0.0186	< 0.0207	< 0.0217
01/19/04	< 0.0199	< 0.0178	< 0.0120	< 0.0152	< 0.0173	< 0.0200
01/26/04	< 0.0347	< 0.0160	< 0.0189	< 0.0127	< 0.0186	< 0.0243
02/02/04	< 0.0057	< 0.0217	< 0.0151	< 0.0128	< 0.0221	< 0.0236
02/09/04	< 0.0177	< 0.0103	< 0.0136	< 0.0136	< 0.0158	< 0.0204
02/17/04	< 0.0289	< 0.0218	< 0.0158	< 0.0191	< 0.0203	< 0.0223
02/23/04	< 0.0151	< 0.0187	< 0.0177	< 0.0247	< 0.0242	< 0.0153
03/01/04	< 0.0198	< 0.0172	< 0.0165	< 0.0190	< 0.0239	< 0.0214
03/08/04	< 0.0269	< 0.0134	< 0.0072	< 0.0238	< 0.0195	< 0.0213
03/15/04	< 0.0274	< 0.0209	< 0.0125	< 0.0199	< 0.0208	< 0.0281
03/22/04	< 0.0206	< 0.0159	< 0.0161	< 0.0206	< 0.0142	< 0.0226
03/29/04	< 0.0339	< 0.0289	< 0.0178	< 0.0250	< 0.0152	< 0.0166
04/05/04	< 0.0195	< 0.0102	< 0.0251	< 0.0202	< 0.0201	< 0.0141
04/12/04	< 0.0171	< 0.0193	< 0.0134	< 0.0235	< 0.0128	< 0.0233
04/19/04	< 0.0243	< 0.0214	< 0.0290	< 0.0188	< 0.0159	< 0.0284
04/26/04	< 0.0196	< 0.0258	< 0.0189	< 0.0205	< 0.0254	< 0.0212
05/03/04	< 0.0236	< 0.0169	< 0.0146	< 0.0225	< 0.0198	< 0.0173
05/10/04	< 0.0205	< 0.0184	< 0.0204	< 0.0144	< 0.0150	< 0.0217
05/17/04	< 0.0332	< 0.0184	< 0.0135	< 0.0174	< 0.0243	< 0.0244
05/24/04	< 0.0190	< 0.0159	< 0.0125	< 0.0172	< 0.0270	< 0.0163
06/01/04	< 0.0231	< 0.0252	< 0.0151	< 0.0233	< 0.0234	< 0.0259
06/07/04	< 0.0271	< 0.0199	< 0.0142	< 0.0206	< 0.0247	< 0.0248
06/14/04	< 0.0200	< 0.0209	< 0.0131	< 0.0166	< 0.0196	< 0.0223
06/21/04	< 0.0205	< 0.0223	< 0.0219	< 0.0146	< 0.0164	< 0.0130

** Optional sample location

TABLE 6-8 (continued)
NMPNS/JAF SITE
ENVIRONMENTAL CHARCOAL CARTRIDGE SAMPLES - ONSITE STATIONS - 2004
I-131 ACTIVITY pCi/ m^3 ± 1 Sigma
LOCATION

Week Start Date	D1** ONSITE	G** ONSITE	H** ONSITE	I** ONSITE	J** ONSITE	K** ONSITE
06/28/04	< 0.0151	< 0.0032	< 0.0222	< 0.0140	< 0.0212	< 0.0150
07/06/04	< 0.0192	< 0.0267	< 0.0285	< 0.0211	< 0.0153	< 0.0236
07/12/04	< 0.0143	< 0.0142	< 0.0259	< 0.0176	< 0.0264	< 0.0186
07/19/04	< 0.0260	< 0.0122	< 0.0209	< 0.0165	< 0.0187	< 0.0097
07/26/04	< 0.0319	< 0.0172	< 0.0181	< 0.0207	< 0.0178	< 0.0254
08/02/04	< 0.0235	< 0.0132	< 0.0144	< 0.0238	< 0.0132	< 0.0183
08/09/04	< 0.0172	< 0.0183	< 0.0170	< 0.0219	< 0.0179	< 0.0135
08/16/04	< 0.0232	< 0.0136	< 0.0196	< 0.0097	< 0.0181	< 0.0258
08/23/04	< 0.0130	< 0.0115	< 0.0226	< 0.0177	< 0.0126	< 0.0163
08/30/04	< 0.0239	< 0.0174	< 0.0119	< 0.0172	< 0.0239	< 0.0186
09/07/04	< 0.0268	< 0.0135	< 0.0200	< 0.0183	< 0.0212	< 0.0254
09/13/04	< 0.0188	< 0.0182	< 0.0150	< 0.0186	< 0.0149	< 0.0203
09/20/04	< 0.0178	< 0.0134	< 0.0164	< 0.0170	< 0.0162	< 0.0200
09/27/04	< 0.0157	< 0.0181	< 0.0211	< 0.0167	< 0.0149	< 0.0153
10/04/04	< 0.0165	< 0.0184	< 0.0227	< 0.0111	< 0.0238	< 0.0232
10/11/04	< 0.0289	< 0.0137	< 0.0152	< 0.0218	< 0.0162	< 0.0186
10/18/04	< 0.0180	< 0.0153	< 0.0232	< 0.0217	< 0.0149	< 0.0172
10/25/04	< 0.0181	< 0.0250	< 0.0142	< 0.0266	< 0.0200	< 0.0218
11/02/04	< 0.0246	< 0.0201	< 0.0155	< 0.0197	< 0.0099	< 0.0195
11/08/04	< 0.0289	< 0.0125	< 0.0161	< 0.0126	< 0.0243	< 0.0206
11/15/04	< 0.0150	< 0.0155	< 0.0159	< 0.0184	< 0.0142	< 0.0169
11/22/04	< 0.0158	< 0.0227	< 0.0234	< 0.0131	< 0.0193	< 0.0268
11/29/04	< 0.0671	< 0.0220	< 0.0170	< 0.0199	< 0.0135	< 0.0216
12/06/04	< 0.0198	< 0.0182	< 0.0247	< 0.0143	< 0.0201	< 0.0224
12/13/04	< 0.0213	< 0.0203	< 0.0212	< 0.0247	< 0.0264	< 0.0189
12/20/04	< 0.0176	< 0.0160	< 0.0331	< 0.0225	< 0.0192	< 0.0204
12/27/04	< 0.0290	< 0.0282	< 0.0142	< 0.0185	< 0.0269	< 0.0240

** Optional sample location

TABLE 6-9

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES

OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2004

Results in Units of 10E-3 pCi/ m^3 ± 1 Sigma

R1 OFFSITE COMPOSITE*

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	76.4 ± 17.9	110 ± 14.5	105 ± 16.5	89.0 ± 14.6	29.7 ± 9.68	<33.1
Zn-65	<12.2	<6.97	<9.56	<8.54	<4.89	<12.8
Cs-134	<2.66	<3.36	<3.38	<2.53	<3.19	<3.28
Cs-137	<2.57	<2.43	<2.50	<2.21	<3.09	<4.03
Zr-95	<9.07	<5.17	<6.89	<4.59	<4.59	<10.4
Nb-95	<4.26	<4.60	<4.57	<5.34	<3.35	<7.16
Co-58	<1.33	<2.06	<3.43	<3.76	<2.25	<1.53
Mn-54	<4.16	<2.72	<2.84	<2.38	<3.75	<5.08
Co-60	<6.35	<3.25	<2.25	<3.61	<2.95	<2.18
K-40	<17.9	<34.7	100 ± 19.0	<8.71	<10.5	<63.3
Others †	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	26.5 ± 11.0	94.4 ± 16.4	102 ± 18.4	56.4 ± 11.9	59.4 ± 16.0	84.0 ± 18.9
Zn-65	<7.13	<5.24	<11.7	<7.73	<10.2	<3.01
Cs-134	<2.96	<3.96	<4.28	<3.03	<4.80	<2.86
Cs-137	<2.36	<2.06	<3.34	<1.74	<2.79	<5.16
Zr-95	<6.62	<4.85	<7.85	<1.45	<9.17	<7.71
Nb-95	<4.55	<3.28	<6.51	<4.76	<4.81	<4.21
Co-58	<4.98	<2.38	<3.49	<2.19	<4.77	<3.77
Mn-54	<3.24	<3.05	<3.03	<3.03	<2.79	<4.09
Co-60	<4.30	<1.11	<3.75	<3.17	<1.47	<4.70
K-40	<39.9	<32.3	<14.6	<29.6	<40.8	<17.6
Others †	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* Sample location required by ODCM

† Plant related radionuclides

TABLE 6-9 (continued)
CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES
OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2004
Results in Units of 10E-3 pCi/ m^3 ± 1 Sigma

R2 OFFSITE COMPOSITE*

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	79.6 ± 13.8	96.6 ± 14.1	95.1 ± 13.9	93.0 ± 21.4	73.2 ± 10.4	114 ± 17.0
Zn-65	<5.18	<8.34	<9.48	<8.65	<7.08	<10.6
Cs-134	<3.46	<3.13	<2.26	<2.64	<1.88	<3.85
Cs-137	<2.39	<2.49	<2.86	<3.76	<2.11	<3.08
Zr-95	<6.13	<6.50	<4.21	<7.87	<4.28	<6.84
Nb-95	<4.22	<2.95	<3.52	<6.67	<3.69	<4.41
Co-58	<3.07	<3.37	<4.04	<3.94	<3.02	<3.56
Mn-54	<3.41	<3.32	<1.90	<3.11	<1.88	<3.23
Co-60	<3.93	<3.59	<2.59	<4.05	<2.61	<4.42
K-40	<36.2	98.5 ± 19.4	88.4 ± 18.3	<61.0	<7.00	<15.8
Others †	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	55.9 ± 13.0	83.0 ± 13.3	74.6 ± 18.1	45.6 ± 13.2	57.2 ± 16.9	68.4 ± 13.3
Zn-65	<5.64	<6.21	<11.7	<1.93	<9.26	<7.43
Cs-134	<3.23	<3.23	<5.18	<0.69	<4.91	<1.81
Cs-137	<2.74	<2.42	<5.25	<0.61	<2.66	<3.27
Zr-95	<6.60	<4.65	<10.0	<6.21	<10.6	<1.41
Nb-95	<3.90	<3.15	<5.57	<2.89	<5.48	<3.57
Co-58	<2.93	<0.64	<4.78	<3.61	<5.79	<3.91
Mn-54	<3.23	<2.31	<3.57	<2.09	<4.23	<3.34
Co-60	<1.19	<2.22	<6.29	<2.88	<3.56	<1.06
K-40	<12.1	<23.6	148 ± 29.7	<30.5	114 ± 26.6	<29.4
Others †	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* Sample location required by ODCM
† Plant related radionuclides

TABLE 6-9 (continued)
CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES
OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2004
Results in Units of 10E-3 pCi/ m^3 ± 1 Sigma

R3 OFFSITE COMPOSITE*

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	58.0 ± 11.6	107 ± 16.7	110 ± 13.7	130 ± 18.4	98.1 ± 12.3	46.7 ± 15.8
Zn-65	<6.09	<8.46	<6.73	<9.51	<3.01	<14.5
Cs-134	<3.84	<3.31	<2.51	<3.48	<1.42	<3.91
Cs-137	<3.99	<2.64	<2.41	<3.33	<1.79	<3.26
Zr-95	<5.88	<6.86	<4.61	<4.62	<3.93	<7.83
Nb-95	<3.18	<5.80	<4.61	<6.00	<3.38	<7.04
Co-58	<3.04	<4.70	<2.99	<4.29	<2.19	<5.58
Mn-54	<3.91	<2.28	<2.71	<3.18	<1.55	<2.84
Co-60	<4.02	<4.45	<2.84	<3.77	<2.67	<1.60
K-40	<33.8	<35.8	<26.1	87.7 ± 17.2	<21.2	<75.8
Others †	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	85.8 ± 13.3	71.8 ± 11.9	81.3 ± 14.7	63.7 ± 15.4	42.4 ± 15.1	76.0 ± 17.6
Zn-65	<1.82	<4.60	<11.9	<2.12	<9.39	<8.11
Cs-134	<2.64	<2.47	<3.96	<3.96	<4.67	<5.04
Cs-137	<2.28	<1.79	<3.76	<3.49	<2.46	<3.66
Zr-95	<6.56	<5.14	<1.69	<7.79	<2.03	<9.88
Nb-95	<4.04	<3.48	<4.20	<5.76	<7.21	<6.10
Co-58	<3.81	<2.62	<2.84	<3.21	<4.44	<3.73
Mn-54	<2.91	<3.26	<4.46	<2.74	<3.32	<4.05
Co-60	<2.96	<2.20	<4.28	<3.29	<1.58	<1.71
K-40	<36.2	42.4 ± 14.8	<36.1	<51.2	<60.8	<17.4
Others †	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* Sample location required by ODCM
† Plant related radionuclides

TABLE 6-9 (continued)
CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES
OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2004
Results in Units of 10E-3 pCi/ m^3 ± 1 Sigma

R4 OFFSITE COMPOSITE*

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	42.3 ± 12.2	79.6 ± 12.6	105 ± 17.1	153 ± 18.1	97.5 ± 13.3	103 ± 18.1
Zn-65	<6.94	<7.32	<9.33	<7.59	<6.32	<8.68
Cs-134	<3.15	<3.27	<3.46	<4.24	<2.29	<4.25
Cs-137	<2.99	<2.29	<2.81	<2.95	<2.23	<3.68
Zr-95	<1.51	<5.33	<5.55	<6.80	<6.32	<9.31
Nb-95	<4.96	<3.27	<5.74	<5.76	<2.13	<5.74
Co-58	<2.86	<1.94	<4.24	<3.75	<1.82	<4.96
Mn-54	<3.15	<1.97	<3.33	<3.63	<2.55	<4.47
Co-60	<1.16	<2.31	<4.20	<2.99	<3.86	<3.04
K-40	<11.8	<21.6	98.6 ± 20.3	73.2 ± 16.4	<26.9	98.9 ± 25.6
Others †	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	84.0 ± 14.0	90.2 ± 12.4	82.0 ± 17.0	57.5 ± 13.1	72.3 ± 15.6	50.6 ± 13.5
Zn-65	<8.93	<6.18	<13.5	<10.5	<10.1	<2.27
Cs-134	<4.28	<3.18	<4.41	<3.98	<4.05	<3.89
Cs-137	<2.78	<2.60	<2.99	<3.20	<3.21	<2.04
Zr-95	<5.61	<3.47	<7.64	<5.96	<8.12	<4.92
Nb-95	<5.09	<2.35	<6.30	<6.28	<4.77	<3.39
Co-58	<3.43	<2.35	<3.84	<3.93	<4.06	<4.53
Mn-54	<2.61	<1.75	<3.32	<3.35	<3.50	<2.20
Co-60	<3.59	<2.40	<4.00	<3.90	<3.81	<1.30
K-40	92.1 ± 19.3	<20.2	<14.9	87.8 ± 16.9	<40.4	<45.4
Others †	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* Sample location required by ODCM
† Plant related radionuclides

TABLE 6-9 (continued)
CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES
OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2004
Results in Units of 10E-3 pCi/ m^3 ± 1 Sigma

R5 OFFSITE COMPOSITE*

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	69.5 ± 18.1	109 ± 12.6	70.5 ± 14.3	135 ± 18.9	118 ± 11.9	88.0 ± 17.1
Zn-65	<8.91	<3.48	<8.48	<5.96	<4.68	<13.4
Cs-134	<4.40	<2.71	<3.57	<2.73	<1.80	<4.71
Cs-137	<3.23	<2.12	<2.41	<2.92	<1.61	<4.17
Zr-95	<6.76	<4.48	<6.87	<4.84	<2.29	<6.65
Nb-95	<4.01	<2.69	<4.89	<5.75	<3.62	<6.51
Co-58	<4.38	<2.01	<3.64	<6.12	<2.59	<5.03
Mn-54	<3.74	<3.61	<2.74	<2.96	<1.89	<3.52
Co-60	<5.32	<3.45	<3.72	<1.23	<2.83	<5.41
K-40	89.3 ± 22.3	<28.3	100 ± 16.3	<35.4	33.3 ± 10.5	<57.4
Others †	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	61.2 ± 12.6	76.1 ± 13.5	71.5 ± 16.2	52.8 ± 13.3	<33.1	63.0 ± 13.1
Zn-65	<9.71	<8.53	<13.0	<8.32	<15.3	<6.29
Cs-134	<3.92	<3.15	<5.31	<3.10	<6.76	<1.78
Cs-137	<3.07	<2.61	<3.37	<1.78	<4.06	<2.30
Zr-95	<7.39	<4.84	<7.81	<1.49	<7.59	<5.08
Nb-95	<4.55	<3.57	<5.95	<3.75	<5.18	<4.07
Co-58	<0.90	<3.72	<4.45	<2.81	<4.15	<2.95
Mn-54	<3.52	<3.55	<4.67	<2.40	<3.07	<1.98
Co-60	<4.49	<2.87	<4.85	<1.13	<5.99	<1.05
K-40	<12.1	63.9 ± 16.2	161 ± 26.6	<11.5	118 ± 24.7	<10.6
Others †	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* Sample location required by ODCM
† Plant related radionuclides

TABLE 6-9 (continued)
CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES
OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2004
Results in Units of 10E-3 pCi/ m^3 ± 1 Sigma

D2 OFFSITE COMPOSITE**

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	72.9 ± 16.0	108 ± 16.8	92.9 ± 12.4	165 ± 17.5	108 ± 12.8	73.9 ± 16.0
Zn-65	<8.34	<8.51	<5.01	<6.02	<6.00	<8.67
Cs-134	<5.43	<2.74	<2.27	<2.66	<2.60	<2.24
Cs-137	<4.59	<2.66	<1.91	<1.85	<2.28	<2.31
Zr-95	<2.29	<6.18	<4.18	<7.78	<3.83	<9.26
Nb-95	<4.28	<5.58	<4.43	<4.63	<3.08	<4.20
Co-58	<1.33	<2.98	<2.08	<3.07	<2.78	<2.71
Mn-54	<3.28	<3.04	<2.65	<2.42	<2.24	<3.55
Co-60	<6.36	<3.16	<3.35	<3.37	<2.23	<4.21
K-40	<51.0	<47.6	<27.4	<22.0	69.4 ± 14.2	<15.1
Others †	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	84.9 ± 13.6	86.7 ± 13.2	58.5 ± 15.8	62.5 ± 13.3	<46.8	49.0 ± 14.3
Zn-65	<8.73	<8.36	<13.3	<2.03	<11.4	<3.00
Cs-134	<3.50	<3.56	<4.46	<3.71	<5.02	<5.80
Cs-137	<2.37	<2.88	<4.24	<0.63	<3.53	<4.11
Zr-95	<6.64	<6.66	<7.02	<1.52	<13.7	<2.24
Nb-95	<3.93	<4.37	<5.54	<5.43	<8.40	<6.13
Co-58	<3.41	<3.13	<3.63	<3.69	<6.60	<3.75
Mn-54	<2.52	<2.71	<3.15	<2.83	<1.56	<4.08
Co-60	<3.90	<2.18	<4.90	<4.20	<6.56	<5.91
K-40	<12.1	149 ± 18.7	<60.4	<38.7	<24.7	<17.5
Others †	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional sample location
† Plant related radionuclides

TABLE 6-9 (continued)
CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES
OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2004
Results in Units of 10E-3 pCi/ m^3 ± 1 Sigma

E OFFSITE COMPOSITE**

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	59.2 ± 14.9	88.7 ± 12.8	104 ± 16.4	128 ± 16.6	104 ± 12.2	91.7 ± 16.8
Zn-65	<9.12	<8.25	<7.96	<4.07	<6.97	<10.1
Cs-134	<3.40	<2.16	<3.65	<3.04	<2.87	<3.84
Cs-137	<1.95	<2.64	<2.83	<2.15	<1.95	<2.82
Zr-95	<5.97	<3.15	<7.38	<4.46	<4.59	<9.05
Nb-95	<5.84	<4.37	<4.98	<5.20	<3.52	<4.41
Co-58	<2.46	<2.39	<3.23	<3.66	<1.93	<4.61
Mn-54	<2.64	<2.91	<3.35	<3.20	<2.07	<4.16
Co-60	<3.25	<3.27	<3.78	<3.51	<2.27	<1.19
K-40	<34.4	<30.1	90.7 ± 18.6	<8.47	93.5 ± 14.4	100 ± 24.4
Others †	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	60.8 ± 12.3	46.2 ± 13.1	77.6 ± 16.2	64.4 ± 13.1	74.0 ± 15.8	82.8 ± 15.8
Zn-65	<7.97	<9.07	<2.49	<5.14	<11.3	<7.03
Cs-134	<0.64	<3.18	<3.89	<0.68	<3.96	<3.87
Cs-137	<1.79	<2.82	<3.70	<1.62	<4.20	<2.82
Zr-95	<7.13	<1.50	<6.70	<6.08	<7.67	<1.86
Nb-95	<5.37	<4.92	<6.96	<0.98	<4.12	<3.68
Co-58	<2.26	<4.55	<3.47	<3.54	<3.16	<2.80
Mn-54	<0.75	<2.78	<3.01	<2.60	<4.80	<3.00
Co-60	<3.27	<1.18	<5.18	<2.82	<5.88	<1.41
K-40	<11.7	<34.2	<55.3	<37.6	<43.4	<14.3
Others †	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional sample location
† Plant related radionuclides

TABLE 6-9 (continued)
CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES
OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2004
Results in Units of 10E-3 pCi/ m^3 ± 1 Sigma

F OFFSITE COMPOSITE**

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	53.7 ± 12.7	90.3 ± 11.6	97.9 ± 13.9	114 ± 19.5	93.9 ± 14.2	<45.0
Zn-65	<6.66	<5.45	<7.61	<11.5	<5.62	<10.5
Cs-134	<2.48	<2.60	<4.20	<3.49	<2.73	<5.00
Cs-137	<2.87	<2.72	<2.68	<2.90	<2.81	<5.44
Zr-95	<5.31	<5.60	<5.39	<8.28	<3.31	<13.2
Nb-95	<3.66	<2.45	<4.72	<7.87	<2.40	<5.06
Co-58	<2.75	<2.66	<4.44	<3.71	<3.98	<4.60
Mn-54	<2.35	<1.92	<3.00	<2.93	<3.17	<1.45
Co-60	<3.17	<2.86	<4.06	<4.84	<0.94	<6.47
K-40	<37.1	<26.5	91.3 ± 16.3	<49.5	<9.59	<23.2
Others †	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	90.3 ± 13.6	73.7 ± 10.6	57.8 ± 14.6	60.5 ± 14.1	67.9 ± 16.2	89.5 ± 13.6
Zn-65	<8.48	<6.23	<7.53	<7.87	<7.01	<5.03
Cs-134	<3.26	<2.61	<3.81	<3.54	<4.81	<2.93
Cs-137	<0.60	<2.17	<1.89	<3.42	<3.25	<2.32
Zr-95	<6.15	<5.49	<4.71	<5.40	<1.93	<5.13
Nb-95	<2.86	<3.96	<4.06	<3.72	<6.28	<2.78
Co-58	<3.58	<2.39	<4.53	<3.64	<3.24	<2.98
Mn-54	<0.72	<2.07	<0.83	<4.07	<3.55	<2.00
Co-60	<1.09	<3.51	<3.29	<3.22	<3.86	<1.06
K-40	<30.1	<21.1	<12.8	107 ± 21.8	<51.6	<42.7
Others †	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional sample location
† Plant related radionuclides

TABLE 6-9 (continued)
CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES
OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2004
Results in Units of 10E-3 pCi/ m^3 ± 1 Sigma

G OFFSITE COMPOSITE**

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	55.1 ± 14.1	94.4 ± 13.2	90.1 ± 16.4	134 ± 16.0	111 ± 12.4	98.1 ± 18.7
Zn-65	<10.6	<6.39	<7.34	<6.82	<7.22	<12.4
Cs-134	<3.42	<2.55	<3.01	<3.02	<1.82	<7.09
Cs-137	<3.39	<2.19	<3.63	<2.39	<1.88	<5.68
Zr-95	<1.66	<6.46	<5.64	<5.53	<4.86	<8.35
Nb-95	<4.54	<3.89	<6.58	<3.75	<3.33	<5.38
Co-58	<3.84	<2.08	<4.06	<4.22	<2.11	<5.95
Mn-54	<4.29	<1.82	<3.38	<3.49	<2.50	<3.81
Co-60	<4.47	<3.19	<3.47	<3.68	<2.18	<4.64
K-40	<45.3	<35.5	<52.0	<25.9	<18.3	119 ± 31.5
Others †	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	67.9 ± 15.4	70.1 ± 12.8	65.8 ± 18.5	68.4 ± 13.2	100 ± 19.8	74.7 ± 15.9
Zn-65	<8.94	<5.86	<7.52	<9.81	<11.5	<7.38
Cs-134	<4.56	<2.88	<6.89	<5.14	<6.08	<5.10
Cs-137	<3.16	<2.40	<0.92	<2.89	<5.32	<4.73
Zr-95	<6.54	<4.62	<7.39	<5.23	<10.9	<7.58
Nb-95	<3.69	<3.13	<7.07	<5.57	<6.60	<5.70
Co-58	<3.27	<2.38	<1.25	<3.90	<5.93	<2.70
Mn-54	<4.73	<2.69	<3.73	<3.81	<4.33	<0.85
Co-60	<3.83	<3.07	<1.65	<4.16	<6.50	<3.48
K-40	73.8 ± 20.5	<32.8	<69.7	92.6 ± 20.4	138 ± 27.8	<46.5
Others †	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional sample location
† Plant related radionuclides

TABLE 6-9 (continued)
CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES
OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2004
Results in Units of 10E-3 pCi/ m^3 ± 1 Sigma

D1 ONSITE COMPOSITE**

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	59.1 ± 16.0	79.1 ± 15.6	76.3 ± 16.6	119 ± 16.5	94.7 ± 15.2	97.0 ± 19.1
Zn-65	<10.5	<7.78	<7.59	<7.88	<6.31	<7.18
Cs-134	<4.88	<3.79	<3.29	<3.15	<3.61	<2.34
Cs-137	<3.04	<3.68	<2.69	<2.33	<2.52	<4.69
Zr-95	<8.80	<5.69	<5.73	<4.89	<7.18	<7.98
Nb-95	<4.62	<3.23	<4.10	<3.74	<4.96	<3.51
Co-58	<5.10	<5.04	<2.56	<4.00	<2.94	<5.72
Mn-54	<4.79	<3.09	<3.81	<2.74	<3.25	<3.21
Co-60	<4.21	<1.31	<2.63	<4.25	<3.81	<4.39
K-40	<49.5	<38.1	115 ± 22.7	<34.8	<10.7	<41.1
Others †	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	71.4 ± 12.1	104 ± 15.8	71.4 ± 17.2	90.0 ± 14.9	83.7 ± 16.2	75.4 ± 24.9
Zn-65	<5.13	<7.14	<10.5	<7.80	<2.91	<14.4
Cs-134	<2.73	<2.89	<4.51	<3.38	<4.54	<5.81
Cs-137	<2.63	<2.22	<3.51	<2.46	<3.32	<4.44
Zr-95	<6.85	<7.45	<8.75	<1.63	<7.96	<10.8
Nb-95	<2.87	<4.66	<6.63	<6.77	<5.48	<5.95
Co-58	<4.35	<3.28	<5.37	<3.57	<5.30	<7.82
Mn-54	<3.97	<2.83	<3.68	<3.37	<3.53	<1.56
Co-60	<3.06	<1.20	<3.90	<1.23	<6.04	<2.40
K-40	<29.6	<57.3	124 ± 26.0	<12.5	<64.7	<24.5
Others †	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional sample location
† Plant related radionuclides

TABLE 6-9 (continued)
CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES
OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2004
Results in Units of 10E-3 pCi/ m^3 ± 1 Sigma

G ONSITE COMPOSITE**

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	59.9 ± 12.5	105 ± 13.8	98.2 ± 14.4	133 ± 17.7	110 ± 13.0	69.7 ± 16.7
Zn-65	<6.24	<7.05	<7.13	<7.54	<5.71	<11.8
Cs-134	<2.36	<3.14	<3.26	<2.74	<2.05	<3.94
Cs-137	<1.96	<2.01	<2.23	<3.17	<1.97	<3.82
Zr-95	<5.07	<5.76	<1.18	<8.41	<4.77	<8.89
Nb-95	<0.96	<5.20	<4.06	<7.52	<2.32	<5.78
Co-58	<2.95	<2.70	<3.36	<4.08	<2.23	<4.66
Mn-54	<3.25	<2.11	<2.77	<3.40	<1.70	<3.61
Co-60	<2.95	<0.87	<0.86	<4.22	<2.63	<7.16
K-40	<10.5	<35.0	<23.7	115 ± 19.7	<34.2	<46.3
Others †	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	78.0 ± 14.1	101 ± 12.8	73.0 ± 15.3	67.6 ± 13.8	85.2 ± 17.4	67.7 ± 13.8
Zn-65	<6.33	<6.32	<11.3	<5.34	<7.88	<5.16
Cs-134	<3.24	<2.93	<2.92	<2.74	<4.59	<3.00
Cs-137	<3.80	<1.79	<3.91	<2.90	<3.64	<2.05
Zr-95	<6.11	<3.66	<6.61	<5.41	<12.2	<7.53
Nb-95	<4.55	<2.91	<3.59	<4.37	<1.50	<2.89
Co-58	<3.73	<1.51	<3.42	<4.21	<5.41	<3.58
Mn-54	<2.22	<2.62	<4.41	<2.37	<3.98	<3.71
Co-60	<3.54	<2.53	<3.60	<1.12	<6.99	<3.54
K-40	84.3 ± 18.4	<21.4	<38.1	<11.4	<67.0	<11.0
Others †	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional sample location
† Plant related radionuclides

TABLE 6-9 (continued)
CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES
OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2004
Results in Units of 10E-3 pCi/ m^3 ± 1 Sigma

H ONSITE COMPOSITE**

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	66.2 ± 13.9	75.8 ± 11.6	98.1 ± 13.7	156 ± 18.1	98.1 ± 12.0	127 ± 18.5
Zn-65	<8.76	<8.15	<6.52	<8.04	<4.26	<10.7
Cs-134	<4.50	<3.46	<2.23	<2.62	<1.79	<5.83
Cs-137	<2.74	<2.66	<1.51	<2.09	<1.86	<3.61
Zr-95	<5.25	<6.69	<3.83	<5.71	<4.81	<7.95
Nb-95	<3.98	<4.12	<3.21	<4.78	<2.37	<4.40
Co-58	<3.21	<2.69	<2.97	<3.38	<2.83	<5.22
Mn-54	<3.78	<2.74	<2.28	<2.03	<1.82	<4.68
Co-60	<0.84	<3.33	<2.17	<2.11	<3.15	<4.00
K-40	<8.39	93.1 ± 19.1	<25.4	<36.3	<23.6	143 ± 24.9
Others †	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	59.1 ± 13.4	101 ± 13.7	74.7 ± 16.1	61.9 ± 11.6	78.4 ± 18.2	<34.6
Zn-65	<5.16	<6.67	<8.19	<5.30	<12.6	<3.03
Cs-134	<2.75	<3.12	<2.88	<4.47	<6.21	<3.61
Cs-137	<2.05	<2.57	<3.17	<2.97	<4.19	<3.71
Zr-95	<4.16	<5.72	<7.54	<4.28	<6.11	<7.81
Nb-95	<4.27	<2.97	<4.44	<5.36	<6.80	<1.58
Co-58	<4.37	<2.71	<3.36	<2.49	<5.28	<3.81
Mn-54	<3.71	<2.67	<3.72	<3.11	<5.47	<4.78
Co-60	<3.07	<2.26	<4.96	<1.11	<5.07	<4.71
K-40	<29.8	<8.06	<45.8	<30.6	114 ± 23.3	<50.4
Others †	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional sample location
† Plant related radionuclides

TABLE 6-9 (continued)
CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES
OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2004
Results in Units of 10E-3 pCi/ m^3 ± 1 Sigma

I ONSITE COMPOSITE**

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	54.9 ± 16.5	97.0 ± 13.0	97.3 ± 16.8	96.9 ± 18.0	105 ± 14.4	69.8 ± 17.3
Zn-65	<12.2	<5.84	<9.10	<7.31	<8.04	<2.65
Cs-134	<2.67	<3.18	<2.27	<3.69	<2.00	<4.18
Cs-137	<2.58	<2.75	<2.44	<3.93	<1.54	<3.07
Zr-95	<2.31	<4.59	<7.57	<8.45	<6.83	<8.95
Nb-95	<1.61	<4.09	<5.73	<4.89	<3.61	<5.21
Co-58	<3.88	<2.36	<2.97	<2.89	<4.50	<5.02
Mn-54	<1.14	<2.68	<2.45	<0.79	<2.91	<5.16
Co-60	<17.6	<2.41	<4.69	<5.58	<3.78	<1.55
K-40	<51.1	<22.5	84.0 ± 19.1	<34.3	<10.8	<51.7
Others †	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	100 ± 15.0	98.4 ± 12.7	63.9 ± 14.3	67.7 ± 15.7	74.4 ± 18.0	71.8 ± 13.5
Zn-65	<9.25	<6.44	<2.31	<9.72	<14.5	<7.60
Cs-134	<4.42	<2.93	<3.30	<4.29	<3.90	<3.02
Cs-137	<3.40	<1.67	<0.73	<3.46	<3.18	<2.06
Zr-95	<6.39	<4.24	<9.04	<6.04	<2.08	<4.20
Nb-95	<4.43	<3.81	<5.06	<6.36	<1.43	<4.31
Co-58	<4.48	<1.67	<1.01	<4.06	<5.94	<3.10
Mn-54	<3.02	<2.80	<0.87	<3.84	<2.69	<2.62
Co-60	<3.20	<2.89	<3.46	<5.20	<1.60	<3.56
K-40	77.3 ± 18.5	<26.5	<36.6	<37.5	<16.3	<11.0
Others †	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional sample location
† Plant related radionuclides

TABLE 6-9 (continued)
CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES
OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2004
Results in Units of 10E-3 pCi/ m^3 ± 1 Sigma

J ONSITE COMPOSITE**

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	72.5 ± 15.6	89.8 ± 13.3	111 ± 15.6	122 ± 17.2	95.4 ± 11.6	84.6 ± 18.4
Zn-65	<7.49	<4.49	<7.83	<8.20	<3.73	<11.1
Cs-134	<3.71	<2.77	<3.86	<3.36	<2.72	<4.65
Cs-137	<0.65	<2.31	<2.46	<3.01	<2.00	<5.99
Zr-95	<1.57	<4.63	<5.59	<7.08	<4.30	<5.75
Nb-95	<4.64	<2.80	<5.10	<5.20	<3.41	<6.10
Co-58	<3.43	<2.07	<4.47	<3.75	<2.04	<4.24
Mn-54	<2.52	<1.80	<2.95	<3.35	<1.94	<1.11
Co-60	<3.09	<3.16	<2.87	<2.29	<2.60	<5.84
K-40	<12.0	50.8 ± 15.3	109 ± 19.0	98.8 ± 17.7	<16.4	<17.3
Others †	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	72.3 ± 12.4	113 ± 14.8	81.7 ± 17.8	56.9 ± 15.0	59.1 ± 16.5	81.2 ± 16.5
Zn-65	<8.51	<9.56	<11.2	<8.49	<9.08	<12.1
Cs-134	<2.78	<2.31	<6.54	<4.86	<4.20	<3.63
Cs-137	<2.07	<2.49	<4.52	<3.32	<3.32	<0.94
Zr-95	<4.21	<5.49	<8.23	<5.13	<5.75	<9.10
Nb-95	<4.83	<3.75	<5.62	<3.56	<5.85	<1.59
Co-58	<3.11	<4.24	<4.68	<3.82	<1.16	<3.83
Mn-54	<3.06	<3.15	<4.02	<3.92	<4.23	<3.25
Co-60	<3.11	<4.17	<3.10	<2.48	<1.51	<1.74
K-40	<11.1	116 ± 21.7	79.1 ± 20.6	<42.6	<41.8	<50.5
Others †	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional sample location
† Plant related radionuclides

TABLE 6-9 (continued)
CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES
OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES - 2004
Results in Units of 10E-3 pCi/ m^3 ± 1 Sigma

K ONSITE COMPOSITE**

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	51.5 ± 13.7	84.1 ± 15.0	80.8 ± 16.3	146 ± 19.3	107 ± 13.0	92.5 ± 20.4
Zn-65	<5.64	<7.31	<8.81	<7.48	<5.60	<13.1
Cs-134	<2.96	<2.72	<3.11	<2.34	<2.38	<5.37
Cs-137	<2.74	<3.46	<3.96	<2.89	<2.43	<3.98
Zr-95	<4.51	<6.20	<7.62	<10.5	<3.69	<8.76
Nb-95	<3.98	<5.49	<5.26	<1.37	<3.55	<4.55
Co-58	<3.42	<5.11	<4.24	<4.37	<2.61	<3.86
Mn-54	<2.90	<2.90	<3.49	<3.83	<1.82	<4.54
Co-60	<3.38	<6.32	<5.91	<5.11	<2.37	<5.36
K-40	<39.6	<52.7	<36.4	<12.3	66.1 ± 16.9	82.5 ± 22.3
Others †	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	93.6 ± 15.3	87.5 ± 13.1	<46.6	52.3 ± 15.0	77.1 ± 17.3	62.4 ± 12.3
Zn-65	<9.13	<8.38	<10.1	<9.76	<11.0	<1.92
Cs-134	<3.67	<3.96	<6.77	<2.91	<5.98	<3.57
Cs-137	<3.19	<2.79	<4.59	<2.37	<2.58	<2.68
Zr-95	<6.31	<6.11	<2.75	<7.48	<9.85	<4.22
Nb-95	<4.71	<3.32	<5.12	<3.14	<4.19	<2.93
Co-58	<4.43	<2.99	<1.60	<4.76	<5.66	<4.77
Mn-54	<2.67	<3.45	<5.06	<3.53	<3.68	<0.72
Co-60	<3.66	<3.72	<5.82	<3.10	<4.36	<2.86
K-40	66.6 ± 17.8	144 ± 21.0	<21.8	<32.8	128 ± 24.6	<11.1
Others †	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional sample location
† Plant related radionuclides

TABLE 6-10
DIRECT RADIATION MEASUREMENT RESULTS - 2004
Results in Units of mrem/std. Month ± 1 Sigma

LOCATION NUMBER	LOCATION	FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER	DEGREES & DISTANCE (1)
3	D1 Onsite	9.8 ± 0.2	13.2 ± 1.2	12.6 ± 1.1	11.8 ± 0.6	73° at 0.3 miles
4	D2 Onsite	4.3 ± 0.4	4.1 ± 0.2	5.5 ± 0.8	4.1 ± 0.2	144° at 0.4 miles
5	E Onsite	4.1 ± 0.3	4.9 ± 0.4	6.9 ± 0.5	4.5 ± 0.2	179° at 0.4 miles
6	F Onsite	3.5 ± 0.2	4.1 ± 0.3	5.4 ± 0.5	3.7 ± 0.3	212° at 0.5 miles
7*	G Onsite	3.3 ± 0.1	4.0 ± 0.2	4.7 ± 0.3	3.5 ± 0.1	244° at 0.7 miles
8*	R-5 Offsite Control	4.4 ± 0.2	5.0 ± 0.4	5.8 ± 0.4	4.4 ± 0.1	42° at 16.2 miles
9	D1 Offsite	3.5 ± 0.2	4.1 ± 0.3	5.4 ± 0.6	3.4 ± 0.2	80° at 11.4 miles
10	D2 Offsite	3.6 ± 0.2	4.3 ± 0.4	6.5 ± 1.3	3.6 ± 0.3	118° at 9.0 miles
11	E Offsite	3.6 ± 0.2	4.4 ± 0.3	5.6 ± 0.6	3.9 ± 0.2	162° at 7.1 miles
12	F- Offsite	3.2 ± 0.2	4.2 ± 0.3	6.0 ± 0.8	4.6 ± 0.1	192° at 7.7 miles
13	G Offsite	3.8 ± 0.2	4.3 ± 0.1	6.0 ± 0.7	4.7 ± 0.1	226° at 5.4 miles
14*	DeMass Rd., SW Oswego - Control	3.8 ± 0.2	4.8 ± 0.2	5.9 ± 1.0	4.6 ± 0.2	227° at 12.5 miles
15*	Pole 66, W. Boundary - Bible Camp	3.5 ± 0.2	3.8 ± 0.2	5.1 ± 0.1	4.0 ± 0.2	239° at 0.9 miles
18*	Energy Info. Center - Lamp Post, SW	3.9 ± 0.2	4.5 ± 0.2	6.0 ± 0.2	4.7 ± 0.3	266° at 0.4 miles
19	East Boundary - JAF, Pole 9	3.8 ± 0.2	4.7 ± 0.7	5.8 ± 0.8	4.8 ± 0.1	84° at 1.4 miles
23*	H Onsite	4.7 ± 0.3	5.0 ± 0.4	6.9 ± 0.9	5.3 ± 0.2	74° at 0.8 miles
24	I Onsite	3.9 ± 0.3	4.5 ± 0.5	5.8 ± 0.5	4.4 ± 0.2	96° at 0.8 miles
25	J Onsite	3.4 ± 0.1	4.5 ± 0.2	5.3 ± 0.2	4.5 ± 0.3	110° at 0.9 miles
26	K Onsite	3.5 ± 0.3	4.2 ± 0.2	6.0 ± 0.5	4.5 ± 0.3	132° at 0.5 miles
27	N. Fence, N. of Switchyard, JAF	14.6 ± 0.5	19.0 ± 0.6	19.3 ± 1.3	18.3 ± 1.2	60° at 0.4 miles
28	N. Light Pole,N. of Screenhouse, JAF	24.0 ± 1.8	29.6 ± 0.5	33.4 ± 3.4	37.6 ± 1.8	68° at 0.5 miles
29	N. Fence, N. of W. Side	21.1 ± 1.7	25.8 ± 1.4	23.3 ± 3.1	25.1 ± 2.4	65° at 0.5 miles
30	N. Fence, (NW) JAF	12.4 ± 0.4	13.4 ± 0.8	14.8 ± 1.2	13.9 ± 1.1	57° at 0.4 miles
31	N. Fence, (NW) NMP-1	6.1 ± 0.3	7.3 ± 0.5	8.9 ± 1.3	7.2 ± 0.3	277° at 0.2 miles

TABLE 6-10 (continued)
DIRECT RADIATION MEASUREMENT RESULTS - 2004
Results in Units of mrem/std. Month ± 1 Sigma

LOCATION NUMBER	LOCATION	FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER	DEGREES & DISTANCE (1)
39	N. Fence, Rad. Waste-NMP-1	8.3 ± 0.4	8.4 ± 0.5	10.4 ± 0.9	10.0 ± 0.8	295° at 0.2 miles
47	N. Fence, (NE) JAF	6.3 ± 0.2	6.8 ± 0.3	7.8 ± 1.1	7.4 ± 0.4	69° at 0.6 miles
49*	Phoenix, NY-Control	3.3 ± 0.2	3.8 ± 0.2	5.7 ± 1.0	4.0 ± 0.3	168° at 19.7 miles
51	Liberty & Bronson Sts., E of OSS	3.7 ± 0.2	4.3 ± 0.4	5.8 ± 0.7	4.2 ± 0.4	234° at 7.3 miles
52	E. 12th & Cayuga Sts., Oswego School	3.6 ± 0.3	4.4 ± 0.1	6.8 ± 0.7	4.3 ± 0.2	227° at 5.9 miles
53	Broadwell & Chestnut Sts. Fulton H.S.	3.6 ± 0.2	4.8 ± 0.3	6.6 ± 1.2	4.4 ± 0.3	183° at 13.7 miles
54	Liberty St. & Co. Rt. 16 Mexico H.S.	3.8 ± 0.2	3.9 ± 0.2	5.2 ± 0.3	4.2 ± 0.2	115° at 9.4 miles
55	Gas Substation Co. Rt. 5-Pulaski	4.3 ± 0.4	4.1 ± 0.2	5.5 ± 0.4	3.9 ± 0.3	75° at 13.0 miles
56*	Rt. 104-New Haven Sch. (SE Corner)	3.0 ± 0.5	3.7 ± 0.2	5.3 ± 0.4	3.7 ± 0.1	124° at 5.2 miles
58*	Co Rt. 1A-Alcan (E. of E. Entrance Rd.)	3.9 ± 0.2	4.5 ± 0.1	5.8 ± 0.4	4.1 ± 0.3	222° at 3.0 miles
75*	Unit 2, N. Fence, N. of Reactor Bldg.	7.0 ± 0.3	7.5 ± 0.6	8.6 ± 0.7	7.1 ± 0.3	356° at 0.1 miles
76*	Unit 2, N. Fence, N. of Change House	5.2 ± 0.4	5.9 ± 0.3	6.8 ± 0.5	5.4 ± 0.2	28° at 0.1 miles
77*	Unit 2, N. Fence, N. of Pipe Bldg.	5.7 ± 0.5	6.7 ± 0.8	8.6 ± 1.4	6.2 ± 0.2	39° at 0.2 miles
78*	JAF. E. of E. Old Lay Down Area	4.0 ± 0.3	4.5 ± 0.2	6.3 ± 1.0	4.4 ± 0.2	86° at 0.9miles
79*	Co. Rt. 29, Pole #63, 0.2 mi. S. of Lake Rd.	3.6 ± 0.2	3.8 ± 0.3	5.1 ± 0.5	3.7 ± 0.3	121° at 1.2 miles
80*	Co. Rt. 29, Pole #54, 0.7 mi. S. of Lake Rd.	3.6 ± 0.2	4.1 ± 0.2	6.0 ± 0.8	4.1 ± 0.2	137° at 1.5 miles
81*	Miner Rd., Pole #16, 0.5 mi. W. of Rt. 29	3.5 ± 0.2	4.0 ± 0.1	6.4 ± 0.7	3.8 ± 0.2	160° at 1.7 miles
82*	Miner Rd., Pole # 1-1/2, 1.1 mi. W. of Rt. 29	3.4 ± 0.2	4.0 ± 0.2	5.2 ± 0.2	3.7 ± 0.4	180° at 1.6 miles
83*	Lakeview Rd., Tree 0.45 mi. N. of Miner Rd.	3.6 ± 0.2	4.0 ± 0.3	5.8 ± 0.7	4.1 ± 0.4	203° at 1.2 miles
84*	Lakeview Rd., N., Pole #6117, 200ft. N. of Lake Rd.	3.7 ± 0.1	4.2 ± 0.3	6.1 ± 0.8	4.2 ± 0.2	225° at 1.1 miles
85*	Unit 1, N. Fence, N. of W. Side of Screen House	7.6 ± 0.5	7.5 ± 0.5	10.8 ± 0.6	8.3 ± 0.7	289° at 0.2 miles
86*	Unit 2, N. Fence, N of W. Side of Screen House	6.9 ± 0.3	6.7 ± 0.1	9.9 ± 1.1	7.4 ± 0.3	308° at 0.1 miles
87*	Unit 2, N. Fence, N. of E. Side of Screen House	7.4 ± 0.2	7.1 ± 0.3	9.5 ± 1.5	7.6 ± 0.7	332° at 0.1 miles
88*	Hickory Grove Rd., Pole #2, 0.6 mi. N. of Rt. 1	3.4 ± 0.1	4.2 ± 0.3	5.7 ± 0.8	4.2 ± 0.3	97° at 4.5 miles

TABLE 6-10 (continued)
DIRECT RADIATION MEASUREMENT RESULTS - 2004
Results in Units of mrem/std. Month ± 1 Sigma

LOCATION NUMBER	LOCATION	FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER	DEGREES & DISTANCE (1)
89*	Leavitt Rd., Pole #16, 0.4 mi. S. of Rt.1	3.8 ± 0.2	5.0 ± 0.3	5.4 ± 0.4	4.4 ± 0.3	112° at 4.3 miles
90*	Rt. 104, Pole #300, 150 ft. E. of Keefe Rd.	3.4 ± 0.3	4.3 ± 0.3	6.7 ± 0.7	4.5 ± 0.2	135° at 4.2 miles
91*	Rt 51A, Pole #59, 0.8 mi. W. of Rt. 51	3.2 ± 0.2	3.8 ± 0.2	5.6 ± 0.5	4.2 ± 0.1	157° at 4.9 miles
92*	Maiden Lane Rd., Power Pole, 0.6 mi. S. of Rt. 104	3.7 ± 0.2	4.4 ± 0.1	5.8 ± 0.7	4.8 ± 0.2	183° at 4.5 miles
93*	Rt. 53 Pole 1-1, 120 ft. S. of Rt. 104	3.5 ± 0.2	4.4 ± 0.3	5.1 ± 0.3	4.4 ± 0.2	206° at 4.4 miles
94*	Rt. 1, Pole #82, 250 ft. E. of Kocher Rd. (Co. Rt. 63)	3.3 ± 0.2	4.0 ± 0.3	4.8 ± 0.3	4.3 ± 0.1	224° at 4.4 miles
95*	Alcan W access Rd., Joe Fultz Blvd, Pole #21	3.3 ± 0.1	3.6 ± 0.2	4.6 ± 0.2	3.8 ± 0.2	239° at 3.7 miles
96*	Creamery Rd., 0.3 mi. S. of Middle Rd., Pole 1-1/2	3.5 ± 0.2	4.1 ± 0.3	4.9 ± 0.4	4.2 ± 0.2	199° at 3.6 miles
97*	Rt. 29, Pole #50, 200ft. N. of Miner Rd.	3.6 ± 0.3	3.9 ± 0.1	5.2 ± 0.3	4.2 ± 0.2	145° at 1.8 miles
98*	Lake Rd., Pole #145, 0.15 mi. E. of Rt 29	3.7 ± 0.2	4.2 ± 0.2	5.9 ± 0.7	4.1 ± 0.1	103° at 1.2 miles
99	NMP Rd., 0.4 mi. N. of Lake Rd., Env. Station R1	3.8 ± 0.3	4.4 ± 0.2	5.6 ± 0.6	4.4 ± 0.1	92° at 1.8 miles
100	Rt. 29 & Lake Rd., Env. Station R2	3.7 ± 0.2	4.0 ± 0.2	5.5 ± 0.6	4.1 ± 0.2	106° at 1.1 miles
101	Rt. 29, 0.7 mi. S. of Lake Rd., Env. Station R3	3.5 ± 0.2	3.6 ± 0.3	5.0 ± 0.9	3.6 ± 0.1	134° at 1.4 miles
102	EOF/Env. Lab, Rt 176, E. Driveway, Lamp Post	3.4 ± 0.1	3.9 ± 0.3	5.1 ± 0.5	3.8 ± 0.4	175° at 11.9 miles
103	EIC, East Garage Rd., Lamp Post	4.2 ± 0.2	4.5 ± 0.2	6.2 ± 0.4	4.1 ± 0.2	266° at 0.4 miles
104	Parkhurst Rd., Pole #23, 0.1 mi. S. of Lake rd.	3.6 ± 0.2	4.1 ± 0.2	5.3 ± 0.5	4.5 ± 0.1	103° at 1.4 miles
105	Lake view Rd. Pole #36, 0.5 mi. S. of Lake Rd.	3.7 ± 0.2	4.0 ± 0.2	5.1 ± 0.3	3.6 ± 0.2	198° at 1.4 miles
106	Shoreline Cove, W. of NMP-1, Tree on W. Edge	4.4 ± 0.3	4.8 ± 0.2	6.8 ± 0.6	4.8 ± 0.2	272° at 0.3 miles
107	Shoreline Cove, W. of NMP-1, 30 ft SSW of #106	4.2 ± 0.2	4.7 ± 0.2	6.2 ± 0.2	4.5 ± 0.2	271° at 0.3 miles
108	Lake Rd., Pole #142, 300 ft E. of Rt. 29 S.	3.7 ± 0.3	4.3 ± 0.2	5.0 ± 0.1	3.9 ± 0.4	105° at 1.1 miles
109	Tree North of Lake Rd., 300 ft E. of Rt. 29 N	3.8 ± 0.3	3.8 ± 0.2	5.3 ± 0.7	3.9 ± 0.3	104° at 1.1 miles
111	Control, State Route 38, Sterling NY	3.3 ± 0.2	3.6 ± 0.2	4.6 ± 0.3	3.4 ± 0.3	214° at 21.8miles
112	EOF/Env. Lab, Oswego County Airport	3.9 ± 0.3	4.0 ± 0.3	5.3 ± 0.5	3.5 ± 0.2	175° at 11.9 miles
113	Control, Baldwinsville, NY	3.4 ± 0.2	3.6 ± 0.1	4.4 ± 0.4	3.4 ± 0.1	178° at 24.7miles

(1) Direction and distance based on NMP-2 reactor centerline and sixteen 22.5^{o} sector grid

* TLD required by ODCM

TABLE 6-11
CONCENTRATIONS OF IODINE-131 AND GAMMA EMITTERS IN MILK - 2004
Results in Units of pCi/liter ± 1 Sigma

SAMPLE LOCATION*** No.55**						
Collection Date	I-131	K-40	Cs-134	Cs-137	Ba/La	Others †
04/05/04	<0.441	1570 ± 84	<5.35	<5.58	<5.51	< LLD
05/03/04	<0.420	1500 ± 84	<6.56	<6.82	<7.64	< LLD
06/07/04	<0.450	1340 ± 67	<5.30	<6.55	<5.98	< LLD
07/12/04	<0.404	1540 ± 79	<5.74	<5.52	<7.27	< LLD
07/26/04	<0.311	1490 ± 89	<6.93	<8.55	<8.49	< LLD
08/09/04	<0.444	1430 ± 77	<6.84	<5.42	<7.59	< LLD
08/23/04	<0.382	1510 ± 79	<6.00	<6.55	<8.08	< LLD
09/13/04	<0.347	1430 ± 77	<5.85	<6.55	<5.16	< LLD
09/27/04	<0.430	1460 ± 80	<6.72	<6.83	<8.10	< LLD
10/11/04	<0.328	1620 ± 104	<9.08	<7.11	<6.78	< LLD
10/25/04	<0.381	1520 ± 78	<4.03	<5.63	<5.51	< LLD
11/08/04	<0.323	1570 ± 84	<4.98	<7.22	<7.88	< LLD
11/22/04	<0.584	1880 ± 90	<9.28	<7.77	<9.37	< LLD
12/06/04	<0.359	1990 ± 109	<9.30	<9.63	<9.30	< LLD
12/20/04	<0.364	1510 ± 63	<4.62	<4.16	<4.86	< LLD

SAMPLE LOCATION*** No.4**						
Collection Date	I-131	K-40	Cs-134	Cs-137	Ba/La	Others †
04/05/04	<0.351	1530 ± 64	<4.77	<4.69	<5.34	< LLD
05/03/04	<0.369	1770 ± 74	<5.90	<6.38	<7.15	< LLD
06/07/04	<0.330	1510 ± 84	<7.69	<7.91	<8.77	< LLD
07/12/04	<0.380	1860 ± 93	<8.87	<6.94	<8.42	< LLD
07/26/04	<0.331	1680 ± 97	<6.07	<9.87	<11.7	< LLD
08/09/04	<0.419	1600 ± 87	<8.09	<8.39	<5.98	< LLD
08/23/04	<0.335	1340 ± 74	<6.94	<5.60	<8.01	< LLD
09/13/04	<0.393	1500 ± 76	<6.29	<5.36	<6.45	< LLD
09/27/04	<0.642	1480 ± 100	<8.45	<8.13	<9.54	< LLD
10/11/04	<0.328	1560 ± 80	<6.24	<6.70	<6.28	< LLD
10/25/04	<0.315	1760 ± 89	<7.92	<6.63	<7.99	< LLD
11/08/04	<0.827	1390 ± 74	<5.30	<6.47	<6.88	< LLD
11/22/04	<0.469	1540 ± 79	<5.99	<7.50	<7.98	< LLD
12/06/04	<0.309	1460 ± 94	<8.67	<7.53	<9.36	< LLD
12/20/04	<0.474	1630 ± 70	<6.91	<5.09	<6.57	< LLD

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

TABLE 6-11 (continued)
CONCENTRATIONS OF IODINE-131 AND GAMMA EMITTERS IN MILK - 2004
Results in Units of pCi/liter ± 1 Sigma

SAMPLE LOCATION No.*** 76**						
Collection Date	I-131	K-40	Cs-134	Cs-137	Ba/La	Others †
04/05/04	<0.349	1580 ± 49	<2.86	<4.05	<3.78	< LLD
04/19/04	<0.529	1400 ± 65	<4.81	<5.38	<6.92	< LLD
05/03/04	<0.409	1500 ± 67	<5.31	<5.46	<6.83	< LLD
05/17/04	<0.340	1470 ± 75	<5.45	<5.99	<6.76	< LLD
06/07/04	<0.407	1720 ± 93	<6.96	<8.71	<10.2	< LLD
06/21/04	<0.481	1360 ± 61	<5.03	<4.59	<6.03	< LLD
07/12/04	<0.454	1560 ± 82	<6.12	<7.50	<7.21	< LLD
07/27/04	<0.441	1420 ± 78	<5.89	<6.98	<6.74	< LLD
08/09/04	<0.335	1500 ± 102	<7.82	<8.13	<10.2	< LLD
08/23/04	<0.399	1520 ± 100	<8.40	<7.89	<7.86	< LLD
09/13/04	<0.494	1370 ± 76	<8.26	<5.41	<8.08	< LLD
09/27/04	<0.499	980 ± 67	<7.40	<7.22	<7.35	< LLD
10/11/05	<0.384	1470 ± 79	<7.05	<5.93	<9.13	< LLD
10/25/04	<0.303	1630 ± 60	<3.45	<4.84	<5.22	< LLD
11/09/04	<0.400	1320 ± 63	<4.59	<5.12	<5.84	< LLD
11/21/04	<0.623	1320 ± 93	<10.9	<5.89	<9.93	< LLD
12/05/04	<0.394	1390 ± 91	<7.32	<10.2	<11.2	< LLD
12/20/04	<0.335	1310 ± 62	<6.04	<5.48	<5.05	< LLD

SAMPLE LOCATION No.77*** (Control)						
Collection Date	I-131	K-40	Cs-134	Cs-137	Ba/La	Others †
04/05/04	<0.318	1520 ± 65	<4.49	<5.55	<3.67	< LLD
04/19/04	<0.408	1520 ± 68	<5.32	<5.30	<6.84	< LLD
05/03/04	<0.547	1660 ± 67	<5.92	<5.10	<6.25	< LLD
05/17/04	<0.398	1610 ± 95	<7.09	<6.95	<9.80	< LLD
06/07/04	<0.368	1680 ± 67	<4.79	<4.82	<7.47	< LLD
06/21/04	<0.427	1710 ± 72	<6.03	<5.83	<8.42	< LLD
07/12/04	<0.477	1670 ± 62	<5.53	<5.35	<5.56	< LLD
07/26/04	<0.438	1720 ± 68	<3.52	<5.70	<5.87	< LLD
08/09/04	<0.313	1570 ± 60	<3.40	<5.20	<5.86	< LLD
08/23/04	<0.684	1580 ± 60	<5.80	<4.99	<4.68	< LLD
09/13/04	<0.333	1520 ± 101	<8.66	<8.81	<9.52	< LLD
09/27/04	<0.427	1670 ± 62	<3.51	<5.10	<4.86	< LLD
10/11/04	<0.452	1310 ± 72	<6.06	<5.22	<5.97	< LLD
10/25/04	<0.347	1340 ± 77	<5.85	<6.25	<6.35	< LLD
11/08/04	<0.346	1540 ± 59	<3.27	<5.25	<4.88	< LLD
11/22/04	<0.462	1660 ± 62	<3.27	<4.72	<3.78	< LLD
12/06/04	<0.448	1460 ± 117	<6.44	<9.88	<9.45	< LLD
12/20/04	<0.405	1470 ± 65	<5.80	<5.24	<6.35	< LLD

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

TABLE 6-12

CONCENTRATIONS OF GAMMA EMITTERS IN FOOD PRODUCTS - 2004

Results in Units of pCi/g (wet) ± 1 sigma

COLLECTION SITE	SAMPLE DATE	DESCRIPTION	Be-7	K-40	I-131	Cs-134	Cs-137	Zn-65
133 *	09/20/04	Squash Leaves	1.62 ± 0.057	4.36 ± 0.130	<0.012	<0.008	<0.010	<0.017
		Tomatoes	<0.060	2.27 ± 0.091	<0.007	<0.008	<0.008	<0.016
		Collards	0.228 ± 0.055	4.59 ± 0.203	<0.018	<0.019	<0.017	<0.047
132 *	09/20/04	Tomatoes	<0.060	2.03 ± 0.087	<0.007	<0.005	<0.007	<0.021
		Squash Leaves	1.40 ± 0.073	3.16 ± 0.150	<0.015	<0.020	<0.013	<0.034
		Zucchini Leaves	0.442 ± 0.057	4.18 ± 0.190	<0.020	<0.013	<0.020	<0.050
134 **	09/20/03	Grape Leaves	1.79 ± 0.140	4.52 ± 0.302	<0.030	<0.034	<0.030	<0.090
		Tomatoes	<0.090	3.49 ± 0.150	<0.012	<0.015	<0.014	<0.032
144 **	09/20/04	Cucumber Leaves	1.45 ± 0.072	3.10 ± 0.150	<0.015	<0.017	<0.013	<0.042
		Tomatoes	<0.051	2.80 ± 0.100	<0.007	<0.005	<0.008	<0.018
		Squash Leaves	0.929 ± 0.073	4.57 ± 0.229	<0.019	<0.021	<0.016	<0.052
		Cabbage	0.243 ± 0.048	4.55 ± 0.163	<0.019	<0.013	<0.017	<0.039
145 * (Control)	09/16/04	Squash Leaves	0.845 ± 0.050	3.68 ± 0.135	<0.012	<0.010	<0.011	<0.028
		Cucumber Leaves	1.46 ± 0.075	2.42 ± 0.149	<0.017	<0.017	<0.012	<0.030
		Tomatoes	<0.055	2.62 ± 0.097	<0.008	<0.008	<0.007	<0.017
		Grape Leaves	1.61 ± 0.069	2.93 ± 0.120	<0.019	<0.011	<0.014	<0.035

* Sample Location required by ODCM
** Optional sample location
Note: Other plant related radionuclides <LLD

TABLE 6-13

MILK ANIMAL CENSUS 2004

TOWN OR AREA [a]	LOCATION DESIGNATION	DEGREES [1]	DISTANCE [1] (miles)	NUMBER OF MILK ANIMALS
Scriba	62	184°	6.7	1G[2]
New Haven	75	145°	7.6	9G[2]
	9	97°	4.8	40C
	4*	115°	7.6	90C
	64	107°	7.9	51C
Mexico	14	123°	9.4	55C
	60	92°	9.5	20C
	76*	120°	6.3	30C
	50	93°	8.7	NONE
	55*	97°	8.7	51C
	21	112°	10.3	60C
	72	100°	9.6	38C
Sterling	73	234°	13.1	NONE
Richland	22	90°	9.7	NONE
Volney	25	183°	8.7	NONE
Granby (Control)	77**	190°	16.0	65C

MILKING ANIMAL TOTALS: 500 Cows
(including control locations) 10 Goats

MILKING ANIMAL TOTALS: 435 Cows
(excluding control locations) 10 Goats

NOTES:

C = Cows
G = Goats
* = Milk sample location
** = Milk sample control location
(1) = Degrees and distance are based on NMP-2 reactor building centerline
(2) = Goat is not currently producing milk or any milk produced is utilized by the owner
NONE = No cows or goats at that location. Location was a previous location with cows and/or goats
(a) = Census performed out to a distance of approximately 10 miles

TABLE 6-14

2004 RESIDENCE CENSUS

LOCATION	MAP LOCATION (1)	METEOROLOGICAL SECTOR	DEGREES (2)	DISTANCE (2)
*		N	-	-
*		NNE	-	-
*		NE	-	-
*		ENE	-	-
West Sunset Bay Road	A	E	84°	0.9 miles
Lake Road	B	ESE	118°	0.7 miles
County Route 29	C(3)	SE	143°	1.1 miles
County Route 29	D	SSE	148°	1.3 miles
Miner Road	E	S	173°	1.6 miles
Lakeview Road	F	SSW	212°	1.7 miles
Lakeview Road	G	SW	229°	1.5 miles
Bible Camp Retreat	H	WSW	247°	1.3 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) Based on JAF reactor centerline
(3) In October 2004, a new home was built and occupied in the SE sector. The new home replaces location (Parkhurst Road, 127° @ 1.3 miles - Figure 3.3-6, Nearest Residence Location 1) as the nearest residence in that sector.

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 1985 through 2003 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†	**	**	**	**	**	**	**	**	**
1984	**	**	**	**	**	**	**	**	**
1985	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
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

* 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†	**	**	**	**	**	**	**	**	**
1984	**	**	**	**	**	**	**	**	**
1985	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
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

* Sunset Beach - closest off-site 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
1976	1.2	1.2	1.2
1984	0.015	0.038	0.032
1985	0.026	0.047	0.034
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

* 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
1976	0.50	3.90	1.4
1984	0.033	0.061	0.043
1985	0.018	0.045	0.030
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

* 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††	*	*	*	*	*	*
1984	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1985	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
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

* 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 - 2004.

†† 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††	*	*	*	*	*	*
1984	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1985	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
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

* 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 - 2004.

†† 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
1984	190	220	205
1985	230	430	288
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

* Control location is the City of Oswego, drinking water for 1969 - 1984 and the Oswego Steam Station inlet canal for 1985 - 2004.

† 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
1984	110	370	282
1985	250	1200**	530
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

* Indicator location was the NMP-1 Inlet Canal during the period 1969-1973, and the JAF Inlet Canal for 1974-2004.

** Suspect sample contamination. Recollected samples showed normal levels of tritium.

† 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
1984	0.013	0.051	0.026
1985	0.013	0.043	0.024
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

* Locations used for 1977 - 1984 were C off-site, D1 off-site, D2 off-site, E off-site, F off-site, and G off-site. Control location R-5 off-site was used for 1985-2004 (formerly C off-site 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
1984	0.001	0.058	0.025
1985	0.001	0.044	0.021
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

* Locations used for 1969 - 1973 were D1 on-site, D2 on-site, E on-site, F on-site and G on-site. Locations used for 1974 - 1984 were D1 on-site, D2 on-site, E on-site, F on-site, G on-site, H on-site, I on-site, J on-site and K on-site, as applicable. 1985 - 2004 locations were R-1 off-site, R-2 off-site, R-3 off-site, and R-4 off-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 7-11
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
1984	<LLD	<LLD	<LLD
1985	<LLD	<LLD	<LLD
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

* Locations D1 off-site, D2 off-site, E off-site, F off-site and G off-site used for 1976 - 1984. Location R-5 off-site used for 1985 – 2004.

** 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.

TABLE 7-12
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
1984	<LLD	<LLD	<LLD
1985	<LLD	<LLD	<LLD
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

* Locations used for 1976 - 1984 were D1 on-site, D2 on-site, E on-site, F on-site, G on-site, H on-site, I on-site, J on-site and K on-site, as applicable. Locations used for 1985 - 2004 were R-1 off-site, R-2 off-site, R-3 off-site, and R-4 off-site.

** 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.

TABLE 7-13
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†	*	*	*	*	*	*
1984	<LLD	<LLD	<LLD	0.0004	0.0012	0.0008
1985	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
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

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

** Locations included composites of off-site air monitoring locations for 1977 - 1984. Sample location included only R-5 air monitoring location for 1985 - 2004.

† 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 7-14
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†	*	*	*	*	*	*
1984	<LLD	<LLD	<LLD	0.0007	0.0017	0.0012
1985	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
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

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

** Locations included composites of on-site air monitoring locations for 1977 - 1984. Sample locations included R-1 through R-4 air monitoring locations for 1985 - 2004.

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

LOCATION: CONTROL **			
Year	**Min.**	**Max.**	**Mean**
Preop†	*	*	*
1974†	2.7	8.9	5.6
1975†	4.8	6.0	5.5
1984	4.7	8.2	6.2
1985	4.5	7.6	5.6
1986	5.3	7.5	6.3
1987	4.6	6.6	5.4
1988	4.4	6.8	5.6
1989	2.9	6.4	4.7
1990	3.7	6.0	4.7
1991	3.8	5.8	4.7
1992	2.6	5.1	4.1
1993	3.4	5.7	4.4
1994	3.1	5.0	4.1
1995	3.4	5.7	4.4
1996	3.4	5.6	4.3
1997	3.7	6.2	4.7
1998	3.7	5.6	4.4
1999	3.6	7.1	4.6
2000	3.7	7.3	4.7
2001	3.6	5.4	4.4
2002	3.4	5.5	4.3
2003	3.4	5.5	4.2
2004	3.3	5.9	4.3

* Data not available.

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

† 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 7-15B
HISTORICAL ENVIRONMENTAL SAMPLE DATA
ENVIRONMENTAL TLD
Results in mrem per standard month

LOCATION: RETS CONTROL **			
Year	**Min.**	**Max.**	**Mean**
Preop†	*	*	*
1974†	2.7	8.9	5.6
1975†	4.8	6.0	5.5
1984	4.7	8.2	6.2
1985	4.4	6.8	5.4
1986	5.5	7.2	6.3
1987	4.6	5.8	5.2
1988	4.8	6.8	5.4
1989	2.9	6.4	4.1
1990	3.7	6.0	4.8
1991	3.8	5.3	4.6
1992	2.6	4.7	3.9
1993	3.4	5.3	4.4
1994	3.1	4.6	3.9
1995	3.4	4.9	4.2
1996	3.4	5.6	4.2
1997	3.9	5.2	4.6
1998	3.7	4.8	4.2
1999	3.7	4.7	4.4
2000	3.7	5.5	4.3
2001	3.9	5.0	4.4
2002	3.4	5.2	4.1
2003	3.4	4.8	4.2
2004	3.3	5.9	4.6

* Data not available.

** TLD #s 8 & 14 established 1974, TLD #49 established 1980.

† 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 7-16A

HISTORICAL ENVIRONMENTAL SAMPLE DATA

ENVIRONMENTAL TLD

Results in mrem per standard month

LOCATION: SITE BOUNDARY **			
Year	**Min.**	**Max.**	**Mean**
Preop†	*	*	*
1974†	*	*	*
1975†	*	*	*
1984	*	*	*
1985	4.9 (4.1)	5.9(12.6)	5.3(6.2)
1986	5.4(4.4)	6.8(18.7)	5.9(7.0)
1987	4.7(4.4)	5.9(14.3)	5.3(6.1)
1988	5.0(3.4)	6.1(17.9)	5.4(6.4)
1989	4.5(2.8)	5.2(15.4)	4.8(5.9)
1990	4.5(3.6)	5.4(14.9)	4.8(6.4)
1991	4.3(3.2)	5.5(16.7)	4.8(6.0)
1992	3.7(3.2)	4.6(10.4)	4.2(5.1)
1993	3.8(3.3)	4.8(11.7)	4.3(5.4)
1994	2.8(2.8)	4.9(12.4)	4.0(5.2)
1995	3.5(3.5)	5.1(9.6)	4.4(5.4)
1996	3.2(3.2)	5.3(9.1)	4.1(5.2)
1997	3.5(3.5)	5.9(10.2)	4.6(5.9)
1998	3.7(3.7)	5.1(9.4)	4.4(5.4)
1999	3.3(3.3)	7.5(12.3)	4.7(5.8)
2000	3.6(3.6)	6.8(10.0)	4.5(5.6)
2001	3.6(3.6)	5.3(10.3)	4.5(5.7)
2002	3.5(3.5)	5.1(9.4)	4.3(5.4)
2003	3.2(3.2)	4.9(8.9)	4.3(5.4)
2004	3.3(3.3)	6.4(10.8)	4.4(5.6)

* Data not available (not required prior to 1985).

** TLD #7, 18 and 23 established 1972 – 1974.
TLD # 75-87 established 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. The doses from these locations are not included in the historical data statistics, but are shown in the summary table as ( ) data.

† 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 7-16B

HISTORICAL ENVIRONMENTAL SAMPLE DATA

ENVIRONMENTAL TLD

Results in mrem per standard month

LOCATION: OFF-SITE SECTORS **			
Year	**Min.**	**Max.**	**Mean**
Preop†	*	*	*
1974†	*	*	*
1975†	*	*	*
1984	*	*	*
1985	4.0	7.1	5.0
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

* Data not available (not required prior to 1985).

** TLD locations initiated in 1985 as required by the New Technical Specifications. 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 7-16C

HISTORICAL ENVIRONMENTAL SAMPLE DATA

ENVIRONMENTAL TLD

Results in mrem per standard month

LOCATION: SPECIAL INTEREST **			
Year	**Min.**	**Max.**	**Mean**
Preop†	*	*	*
1974†	*	*	*
1975†	*	*	*
1984	*	*	*
1985	3.9	6.8	5.3
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

* Data not available (not required prior to 1985).

** TLD locations initiated in 1985 as required by the New Technical Specifications. Includes TLD numbers 8, 15, 56, 58, 96, 97 and 98, which are located near critical residences and populated areas near 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 7-16D

HISTORICAL ENVIRONMENTAL SAMPLE DATA

ENVIRONMENTAL TLD

Results in mrem per standard month

LOCATION: ON-SITE INDICATOR **			
Year	**Min.**	**Max.**	**Mean**
Preop†	*	*	*
1974†	3.1	10.6	5.7
1975†	4.6	16.0	7.3
1984	4.6	13.2	7.0
1985	4.7	15.9	6.3
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

* 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 - 2004). Locations are existing or previous on-site environmental air monitoring locations.

† 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 7-16E

HISTORICAL ENVIRONMENTAL SAMPLE DATA

ENVIRONMENTAL TLD

Results in mrem per standard month

LOCATION: OFF-SITE INDICATOR **			
Year	**Min.**	**Max.**	**Mean**
Preop†	*	*	*
1974†	2.4	8.9	5.3
1975†	4.5	7.1	5.5
1984	4.6	8.2	6.1
1985	4.6	7.7	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

* No data available.

** Includes TLD numbers 8, 9, 10, 11, 12 and 13 (off-site environmental air monitoring locations).

† 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 7-17
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†	*	*	*	*	*	*
1984	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1985	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
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

* 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 7-18
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
1984	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1985	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
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	.044	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

* 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 7-19
HISTORICAL ENVIRONMENTAL SAMPLE DATA
FOOD PRODUCTS
Results in pCi/g (wet)

LOCATION: CONTROL *			
Isotope	**Cs-137**		
Year	**Min.**	**Max.**	**Mean**
1969†	**	**	**
1974†	**	**	**
1975†	**	**	**
1984	<LLD	<LLD	<LLD
1985	<LLD	<LLD	<LLD
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

* 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.

Data comprised of broadleaf and non-broadleaf vegetation (1980-1984). Data comprised of broadleaf vegetation only (1985-2004).

TABLE 7-20
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
1984	<LLD	<LLD	<LLD
1985	0.047	0.047	0.047
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

* 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.

Data comprised of broadleaf and non-broadleaf vegetation (1984). Data comprised of broadleaf vegetation only (1985-2004).

8.0 QA/QC 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 JAF Environmental Laboratory has engaged the services of two independent laboratories to provide quality assurance comparison samples. The two laboratories are Analytics, Incorporated in Atlanta, Georgia and the U.S. Department of Energy's Environmental Measurements Laboratory (EML) in New York City.

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 using standard laboratory procedures. The results are submitted to Analytics, which issues a statistical summary report. The JAFNPP Environmental Laboratory uses predetermined acceptance criteria methodology for evaluating the laboratory's performance for Analytic's sample results.

In addition to the Analytics Program, the JAF Environmental Laboratory participated in the Environmental Measurements Laboratory (EML) Quality Assessment Program (QAP). EML supplies sample media as blind sample spikes to approximately 127 laboratories worldwide. These samples, containing a spiked amount of low level activity, are analyzed using standard laboratory procedures. The results are submitted to the Environmental Measurements Laboratory for statistical evaluation. Reports are provided to each participating laboratory, which provide an evaluation of the laboratory's performance.

In 2004, the program provided by Environmental Measurements Laboratory was scaled back as a result of the laboratory being reorganized under the Federal Department of Homeland Security as part of the Science and Technology directorate. Under the reorganization, the laboratory no longer provided spiked cross check samples to commercial laboratories. The JAF Environmental lab was eligible to participate in the first of two annual quality assessment programs (QAP-0403) in 2004 before the program was restructured.

8.2 PROGRAM SCHEDULE

SAMPLE MEDIA	LABORATORY ANALYSIS	SAMPLE PROVIDER ANALYTICS	EML	YEARLY TOTAL
Water	Gross Beta	0	1	1
Water	Tritium	1	1	2
Water	I-131	2	0	2
Water	Mixed Gamma	2	1	3
Air	Gross Beta	2	1	3
Air	I-131	2	0	2
Air	Mixed Gamma	2	1	3
Milk	I-131	2	0	2
Milk	Mixed Gamma	2	0	2
Soil	Mixed Gamma	1	0	1
Vegetation	Mixed Gamma	1	0	1
TOTAL SAMPLE INVENTORY		**17**	**5**	**22**

8.3 ACCEPTANCE CRITERIA

Each sample result is evaluated to determine the accuracy and precision of the laboratory's analysis result. The evaluation method for the QA sample results is dependent on the supplier of the sample. The sample evaluation methods are discussed below.

8.3.1 ANALYTICS SAMPLE RESULTS

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.

$$\text{The error resolution} = \frac{\text{Reference Result}}{\text{Reference Results Error}}$$

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
≤ 3	0.4-2.5
3.1 to 7.5	0.5-2.0
7.6 to 15.5	0.6-1.66
15.6 to 50.5	0.75-1.33
50.6 to 200	0.8-1.25
>200	0.85-1.18

Again, this acceptance test is generally referred to as the "NRC" method. The acceptance criteria is contained in Procedure DVP-04.01 and was taken from the Criteria of Comparing Analytical Results (USNRC) and Bevington, P.R., Data Reduction and Error Analysis for the Physical Sciences, McGraw-Hill, New York, (1969). The NRC method generally results in an acceptance range of approximately ± 25% of the Known value when applied to sample results from the Analytics Inc. Interlaboratory Comparison Program. This method is used as the procedurally required assessment method and requires the generation of a nonconformity report when results are unacceptable.

8.3.2 ENVIRONMENTAL MEASUREMENTS LABORATORY (EML)

The laboratory's analytical performance is evaluated by EML based on the historical analytical capabilities for individual analyte/matrix pairs. The statistical criteria for Acceptable Performance, "A", has been chosen by EML to be between the 15th and 85th percentile of the cumulative normalized distribution, which can be viewed as the middle 70% of all historic measurements. The Acceptable With Warning criteria, "W", is between the 5th and 15th percentile and between the 85th and 95th percentile. In other words, the middle 70% of all reported values are acceptable, while the other 5th-15th (10%) and 85th-95th percentiles (10%) are in the warning area. The Not Acceptable criteria, "N", is established at less than the 5th percentile and greater than the 95th percentile, that is, the outer 10% of the historical data. Using five years of historical analytical data, the EML, determined performance results using the percentile criteria summarized below:

Result	Cumulative Normalized Distribution
Acceptable ("A")	15% - 85%
Acceptable with Warning ("W")	5% - 15% or 85% - 95%
Not Acceptable ("N")	<5% or >95%

8.4 PROGRAM RESULTS SUMMARY

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

8.4.1 ANALYTICS QA SAMPLES RESULTS

Seventeen QA blind spike samples were analyzed as part of Analytics 2004 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
- Soil: Mixed Gamma Emitters
- Milk: I-131, Mixed Gamma Emitters
- Vegetation: Mixed Gamma Emitters

The JAF Environmental Laboratory performed 81 individual analyses on the seventeen QA samples. Of the 81 analyses performed, 80 were in agreement using the NRC acceptance criteria for a 98.8% agreement ratio.

Sample non-conformities are discussed in Section 8.4.1.1.

8.4.1.1 ANALYTICS SAMPLE NONCONFORMITIES

Analytics Sample E-4166-05, ZN-65 in Soil
Nonconformity No. 2004-01

A spiked mixed gamma in soil sample supplied by Analytics, Inc., was analyzed in accordance with standard laboratory procedures. The sample contained a total of nine radionuclides for analysis. Nine of the nine radionuclides present were quantified. Eight of the nine radionuclides were quantified within the acceptable range. The mean result for Zn-65 was determined to be outside the QA Acceptance Criteria resulting in a sample nonconformity. The soil sample was analyzed five times using four different detectors with the mean Zn-65 result reported as 334 pCi/kg. The known result for the sample was 262 pCi/kg as determined by the supplier. One of the five reported results was 292 pCi/kg and resulted in an agreement when compared to the known of 262 pCi/kg with a ratio of 1.11. The remaining 4 individual results were outside the acceptance criteria and had ratios to the known value that ranged from 1.29 to 1.34. All of the analysis had relatively high associated counting errors, which ranged from 8.3% to 18.3%.

An evaluation of the Zn-65 result was performed. The spectrum and peak search results were examined with no anomalies identified. Zn-65 decays by electron capture with a 244 day half-life and a gamma ray energy of 1115 KeV with a yield of 50.75%. No significant secondary gamma energies are produced in the Zn-65 decay scheme. The average net count rates of the five analyses were low and ranged from a high of 1.50 counts per minute to a low of 0.93 counts per minute. The low activity in the sample resulted in high associated counting errors as noted above.

In soil samples, Ra-226 is a naturally occurring radionuclide, which produces a secondary peak at 1120 KeV. The presence of Ra-226 (1120 KeV) and Zn-65 (1115 KeV) in the sample resulted in a doublet peak formation in this region of the spectrum. In most cases, the computer algorithm can differentiate the two adjacent peaks and correct for interferences from overlapping (doublet) peaks. In these sample spectrums, there was a low number of total counts in the 1110 to 1130 KeV area. The low count rate and subsequent poor peak shape made it difficult for the algorithm to select an exact background for determining the total counts in the peak. In addition, low count rate made it difficult to define the two peaks contained in the doublet. In addition to the complicated nature of the spectrum, the settling of the soil media in the counting geometry may have effected the homogeneity of the sample and produced a positive bias in the collective sample results. To determine if this was a programmatic or systematic error inherent to the software/analysis system, an extent of condition was performed using another spiked sample result for any similar nonconformities. In 2004, eleven spiked samples were analyzed which contained certified concentrations of Zn-65 and other radionuclides. This sample set included four additional soil samples.

The results are as follows:

2004 Zn-65 Results

Sample ID	Medium	JAF	Supplier	Ratio
E-4053-05	Water pCi/liter	146±6	143±5	1.03
E-4319-05	Water pCi/liter	165±6	178±6	0.93
E-4054-05	Filter pCi/filter	98±5	95±3	1.03
E-4320-05	Filter pCi/filter	141±6	120±4	1.18
E-4321-05	Milk pCi/liter	155±7	167±6	0.93
E-4165-05	Milk pCi/liter	94±5	99±3	0.94
E-4168-05	Vegetation pCi/kg	260±17	232±8	1.12
E-4154-09†	Soil pCi/kg	289±20	262±5	1.10
E-4051-09*	Soil pCi/kg	289±17	252±6	1.15
E-4253-09*	Soil pCi/kg	239±12	248±6	0.96
E-4373-09*	Soil pCi/kg	336±22	329±6	1.02

Mean Ratio = 1.04

* Provided by laboratory client, NOT reported in Annual Report

† Duplicate sample of E-4165-05 provided by laboratory client, NOT reported in Annual Report

A duplicate sample of this sample (E-4166-05) was submitted to the laboratory as a blind spike (E-4154-09). This sample was made from the exact supplier stock as the non-conformity sample. The Zn-65 result for this duplicate sample was in full agreement with the known value on all five of the analysis performed. The mean Zn-65 result for the duplicate sample was 289±20 pCi/Kg for a ratio to the known value of 1.10 (See results in the table above). The mean ratio for all eleven Zn-65 results was 1.04. The mean ratio for the four soil sample Zn-65 results was 1.06. The mean ratio value for the eleven samples noted above and each individual ratio values for each of Zn-65 results are excellent indicators that the routine measurement of Zn-65 in environmental media is accurate. These results demonstrate that there is no systematic error or bias for the analysis of Zn-65 in soil or other environmental sample media. No corrective action was implemented as a result of this non-conformity.

8.4.2 ENVIRONMENTAL MEASUREMENTS LABORATORY (EML)

In 2004, JAF Environmental Laboratory participated in both the EML Quality Assessment Programs, QAP-0403. Sample sets consisted of the following sample media:

- Water: Gross Beta, Mixed Gamma Emitters
- Water: Tritium
- Air Particulate Filter: Mixed Gamma Emitters/Gross Beta

A total of 5 samples containing 8 individual radionuclides were evaluated for the samples included in QAP-0403. Using the EML acceptance criteria, 8 of 8 radionuclides analyses (100%) were evaluated to be acceptable. Results for the EML cross Check Program are contained in Table 8-1 and results for all participants can be viewed on-line at www.eml.doe.gov. A summary of the JAF Environmental Laboratory results is as follows:

Matrix	Total Analyses	Acceptable	Not Acceptable
Air	4	4	0
Water	4	4	0
Total	8	8	0
Percentage		100%	0.0%

There were no sample nonconformities with samples analyzed for the Environmental Measurements Laboratory program

TABLE 8-1
INTERLABORATORY INTERCOMPARISON PROGRAM
Gross Beta Analysis of Air Particulate Filters (pCi/filter)

DATE	JAF ENV ID NO.	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LAB* (2)	RATIO (3)
6/17/2004	E-4164-05	AIR pCi/filter	GROSS BETA	159.8 ± 3.1 158.5 ± 3.1 155.7 ± 3.1 Mean = 158.0 ± 1.8	166.0 ± 5.5	0.95 A
12/9/2004	E-4376-05	AIR pCi/filter	GROSS BETA	223.2 ± 2.1 219.7 ± 2.1 222.4 ± 2.1 Mean = 221.8 ± 1.2	225.0 ± 7.5	0.99 A

(1) Results reported as activity ±1 sigma.
(2) Results reported as activity ±2 sigma.
(3) Ratio = Reported/Analytics (See Section 8.3).
(*) Sample provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Tritium Analysis Water (pCi/liter)

DATE	JAF ENV ID NO.	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LAB* (2)	RATIO (3)
3/25/2004	E-4052-05	WATER pCi/liter	H-3	4681 ± 171 4699 ± 171 4716 ± 171 Mean = 4699 ± 99	4700 ± 300	1.00 A

(1) Results reported as activity ±1 sigma. Sample analyzed by JAF Environmental Laboratory
(2) Results reported as activity ±2 sigma.
(3) Ratio = Reported/Analytics (See Section 8.3).
(*) Sample provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Iodine Analysis of Water, Air and Milk

DATE	JAF ENV ID NO.	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LAB* (2)	RATIO (3)
3/25/2004	E-4053-05	WATER pCi/liter	I-131**	92.9 ± 1.9 94.1 ± 1.7 90.7 ± 1.8 Mean = 92.6 ± 1.0	90.2 ± 3.0	1.03 A
6/17/2004	E-4167-05	AIR pCi/cc	I-131	83.8 ± 5.6 78.3 ± 5.8 80.4 ± 4.9 Mean = 80.8 ± 3.1	83.1 ± 2.8	0.97 A
6/17/2004	E-4165-05	MILK pCi/liter	I-131**	53.0 ± 1.7 55.4 ± 2.2 56.9 ± 2.0 Mean = 55.1 ± 0.8	58.2 ± 1.9	0.95 A
9/16/2004	E-4322-05	AIR pCi/cc	I-131	72.4 ± 5.2 75.0 ± 4.8 73.5 ± 4.9 Mean = 73.6 ± 2.9	76.7 ± 2.6	0.96 A
9/16/2004	E-4319-05	WATER pCi/liter	I-131**	69.7 ± 1.1 67.2 ± 1.2 71.7 ± 1.0 Mean = 69.5 ± 0.6	70.8 ± 2.4	0.98 A
9/16/2004	E-4321-05	MILK pCi/liter	I-131**	74.1 ± 1.2 72.7 ± 1.1 75.1 ± 1.3 Mean = 74.0 ± 0.7	83.5 ± 2.8	0.89 A

(1) Results reported as activity ±1 sigma.
(2) Results reported as activity ±2 sigma.
(3) Ratio = Reported/Analytics (See Section 8.3).
(*) Sample provided by Analytics, Inc.
(**) Result determined by Resin Extraction/Gamma Spectral Analysis.
(A) Evaluation Results, Acceptable.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis Water (pCi/liter)

DATE	JAF ENV ID NO.	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LAB* (2)	RATIO (3)
3/25/2004	E-4053-05	WATER pCi/liter	Ce-141	81.5 ± 10.4 86.2 ± 1.1 89.0 ± 9.4 80.4 ± 7.8 Mean = 84.3 ± 4.0	85.0 ± 2.8	0.99 A
			Cr-51	362.0 ± 48.1 325.0 ± 6.6 431.0 ± 47.7 305.0 ± 35.8 Mean = 355.8 ± 19.2	326.0 ± 10.9	1.09 A
			Cs-134	83.3 ± 1.4 85.9 ± 7.0 84.5 ± 5.7 Mean = 84.6 ± 3.1	89.7 ± 3.0	0.94 A
			Cs-137	174.0 ± 9.3 178.0 ± 1.1 174.0 ± 9.0 Mean = 175.3 ± 4.3	185.0 ± 6.2	0.95 A
			Mn-54	116.0 ± 7.9 116.0 ± 1.0 116.0 ± 7.8 115.0 ± 5.9 Mean = 115.8 ± 3.1	114.0 ± 3.8	1.02 A
			Fe-59	66.3 ± 8.8 59.5 ± 1.1 64.4 ± 8.1 70.9 ± 5.7 Mean = 65.3 ± 3.3	56.7 ± 1.9	1.15 A
			Zn-65	161.0 ± 15.2 149.0 ± 1.7 124.0 ± 14.5 151.0 ± 10.8 Mean = 146.3 ± 5.9	143.0 ± 4.8	1.03 A
			Co-60	143.0 ± 6.8 153.0 ± 0.8 145.0 ± 6.6 153.0 ± 5.0 Mean = 148.5 ± 2.7	153.0 ± 5.1	0.97 A
			Co-58	114.0 ± 8.3 116.0 ± 1.0 118.0 ± 7.8 112.0 ± 5.9 Mean = 115.0 ± 3.2	112.0 ± 3.7	1.03 A

(1) Results reported as activity ±1 sigma.
(2) Results reported as activity ±2 sigma.
(3) Ratio = Reported/Analytics (See Section 8.3).
(*) Sample provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis Water (pCi/liter)

DATE	JAF ENV ID NO.	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LAB* (2)	RATIO (3)
9/16/2004	E-4319-05	WATER pCi/liter	Ce-141	251.0 ± 9.1 257.0 ± 8.6 255.0 ± 7.8 Mean = 254.3 ± 4.9	250.0 ± 8.3	1.02 A
			Cr-51	163.0 ± 30.9 209.0 ± 31.8 173.0 ± 30.4 Mean = 181.7 ± 17.9	223.0 ± 7.5	0.81 A
			Cs-134	91.6 ± 5.8 90.0 ± 9.2 97.9 ± 5.4 Mean = 93.2 ± 4.1	96.4 ± 3.2	0.97 A
			Cs-137	217.0 ± 7.2 206.0 ± 6.8 206.0 ± 6.6 Mean = 209.7 ± 4.0	215.0 ± 7.2	0.98 A
			Mn-54	182.0 ± 6.9 169.0 ± 6.4 175.0 ± 6.3 Mean = 175.3 ± 3.8	181.0 ± 6.1	0.97 A
			Fe-59	83.6 ± 6.6 99.6 ± 6.4 96.7 ± 6.1 Mean = 93.3 ± 3.7	91.6 ± 3.1	1.02 A
			Zn-65	178.0 ± 11.4 156.0 ± 10.2 161.0 ± 10.1 Mean = 165.0 ± 6.1	178.0 ± 5.9	0.93 A
			Co-60	117.0 ± 4.4 132.0 ± 4.5 119.0 ± 4.1 Mean = 122.7 ± 2.5	125.0 ± 4.2	0.98 A
			Co-58	100.0 ± 5.6 89.4 ± 5.2 90.2 ± 5.0 Mean = 93.2 ± 3.1	94.6 ± 3.2	0.99 A

(1) Results reported as activity ±1 sigma.
(2) Results reported as activity ±2 sigma.
(3) Ratio = Reported/Analytics (See Section 8.3).
(*) Sample provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis of Air Particulate Filters (pCi/filter)

DATE	JAF ENV ID NO.	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LAB* (2)	RATIO (3)
3/25/2004	E-4054-05	FILTER pCi/filter	Ce-141	51.1 ± 2.9 52.8 ± 3.6 57.2 ± 2.9 Mean = 53.7 ± 1.8	56.6 ± 1.9	0.95 A
			Cr-51	192.0 ± 21.1 214.0 ± 25.4 194.0 ± 19.7 Mean = 200.0 ± 12.8	217.0 ± 7.2	0.92 A
			Cs-134	55.0 ± 4.1 52.4 ± 5.0 50.3 ± 4.0 Mean = 52.6 ± 2.5	59.7 ± 2.0	0.88 A
			Cs-137	116.0 ± 5.0 131.0 ± 6.4 116.0 ± 4.9 Mean = 121.0 ± 3.1	123.0 ± 4.1	0.98 A
			Mn-54	79.2 ± 4.6 77.4 ± 5.5 76.0 ± 4.3 Mean = 77.5 ± 2.8	75.8 ± 2.5	1.02 A
			Fe-59	33.7 ± 4.7 37.1 ± 5.7 40.2 ± 4.7 Mean = 37.0 ± 2.9	37.8 ± 1.3	0.98 A
			Zn-65	87.7 ± 8.6 109.0 ± 11.1 97.7 ± 8.3 Mean = 98.1 ± 5.4	95.1 ± 3.2	1.03 A
			Co-60	105.0 ± 4.3 95.7 ± 5.0 91.3 ± 4.0 Mean = 97.3 ± 2.6	102.0 ± 3.4	0.96 A
			Co-58	78.3 ± 4.6 71.6 ± 5.5 71.9 ± 4.4 Mean = 73.9 ± 2.8	74.6 ± 2.5	0.99 A

(1) Results reported as activity ±1 sigma.
(2) Results reported as activity ±2 sigma.
(3) Ratio = Reported/Analytics (See Section 8.3).
(*) Sample provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis of Air Particulate Filters (pCi/filter)

DATE	JAF ENV ID NO.	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LAB* (2)	RATIO (3)
9/16/2004	E-4320-05	FILTER pCi/filter	Ce-141	183.0 ± 5.0 195.0 ± 5.7 173.0 ± 5.1 Mean = 183.7 ± 3.0	168.0 ± 5.6	1.09 A
			Cr-51	132.0 ± 20.9 128.0 ± 21.5 142.0 ± 21.7 Mean = 134.0 ± 12.3	150.0 ± 5.0	0.89 A
			Cs-134	60.4 ± 8.4 74.8 ± 5.3 76.0 ± 4.8 Mean = 70.4 ± 3.7	64.9 ± 2.2	1.08 A
			Cs-137	148.0 ± 5.7 155.0 ± 6.2 149.0 ± 5.3 Mean = 150.7 ± 3.3	145.0 ± 4.8	1.04 A
			Mn-54	154.0 ± 6.0 143.0 ± 6.0 135.0 ± 5.3 Mean = 144.0 ± 3.3	122.0 ± 4.1	1.18 A
			Fe-59	78.7 ± 6.1 78.7 ± 6.3 73.3 ± 5.4 Mean = 76.9 ± 3.4	61.6 ± 2.1	1.25 A
			Zn-65	144.0 ± 10.4 145.0 ± 10.8 135.0 ± 9.1 Mean = 141.3 ± 5.8	120.0 ± 4.0	1.18 A
			Co-60	87.0 ± 3.8 73.7 ± 3.9 82.3 ± 3.5 Mean = 81.0 ± 2.1	84.3 ± 2.8	0.96 A
			Co-58	77.0 ± 4.8 69.2 ± 4.9 64.2 ± 4.2 Mean = 70.1 ± 2.7	63.7 ± 2.1	1.10 A

(1) Results reported as activity ±1 sigma.
(2) Results reported as activity ±2 sigma.
(3) Ratio = Reported/Analytics (See Section 8.3).
(*) Sample provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis Milk (pCi/liter)

DATE	JAF ENV ID NO.	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LAB* (2)	RATIO (3)
6/17/2004	E-4165-05	MILK pCi/liter	Ce-141	161.0 ± 6.1 157.0 ± 11.1 153.0 ± 7.6 155.0 ± 10.9 141.0 ± 6.4 166.0 ± 8.2 Mean = 155.5 ± 3.5	157.0 ± 5.2	0.99 A
			Cr-51	274.0 ± 30.6 143.0 ± 47.8 239.0 ± 31.3 228.0 ± 44.0 225.0 ± 28.6 195.0 ± 37.9 Mean = 217.3 ± 15.3	228.0 ± 7.6	0.95 A
			Cs-134	96.6 ± 4.6 96.6 ± 7.6 92.5 ± 4.2 97.9 ± 7.2 104.0 ± 4.6 93.6 ± 5.8 Mean = 96.9 ± 2.4	101.0 ± 3.4	0.96 A
			Cs-137	147.0 ± 5.5 134.0 ± 8.8 147.0 ± 5.5 141.0 ± 8.3 151.0 ± 5.4 139.0 ± 6.4 Mean = 143.2 ± 2.8	156.0 ± 5.2	0.92 A
			Mn-54	68.9 ± 4.2 64.4 ± 7.4 65.9 ± 4.6 62.4 ± 6.3 71.7 ± 4.2 76.9 ± 5.2 Mean = 68.4 ± 2.2	70.5 ± 2.4	0.97 A
			Fe-59	37.5 ± 5.1 45.3 ± 9.1 53.6 ± 6.3 50.3 ± 7.9 60.3 ± 5.4 51.8 ± 5.8 Mean = 49.8 ± 2.8	44.5 ± 1.5	1.12 A
			Zn-65	113.0 ± 8.9 76.5 ± 14.0 95.4 ± 9.4 88.2 ± 13.5 90.6 ± 8.5 99.2 ± 10.3 Mean = 93.8 ± 4.5	99.3 ± 3.3	0.94 A
			Co-60	172.0 ± 4.7 172.0 ± 7.7 180.0 ± 4.9 160.0 ± 7.1 175.0 ± 4.7 175.0 ± 5.3 Mean = 172.3 ± 2.4	172.0 ± 5.7	1.00 A
			Co-58	45.2 ± 3.8 38.4 ± 6.3 40.7 ± 3.7 45.3 ± 5.9 40.9 ± 3.7 49.8 ± 4.6 Mean = 43.4 ± 1.9	46.2 ± 1.5	0.94 A

(1) Results reported as activity ±1 sigma.
(2) Results reported as activity ±2 sigma.
(3) Ratio = Reported/Analytics (See Section 8.3).
(*) Sample provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis Milk (pCi/liter)

DATE	JAF ENV ID NO.	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LAB* (2)	RATIO (3)
9/16/2004	E-4321-05	MILK pCi/liter	Ce-141	226.0 ± 8.5 220.0 ± 9.1 230.0 ± 8.6 Mean = 225.3 ± 5.0	235.0 ± 7.8	0.96 A
			Cr-51	256.0 ± 35.5 212.0 ± 32.7 145.0 ± 37.0 Mean = 204.3 ± 20.3	210.0 ± 7.0	0.97 A
			Cs-134	84.0 ± 9.5 81.4 ± 9.6 75.7 ± 11.2 Mean = 80.4 ± 5.9	90.6 ± 3.0	0.89 A
			Cs-137	193.0 ± 6.6 188.0 ± 6.8 179.0 ± 7.9 Mean = 186.7 ± 4.1	202.0 ± 6.7	0.92 A
			Mn-54	180.0 ± 6.5 185.0 ± 6.9 169.0 ± 7.9 Mean = 178.0 ± 4.1	171.0 ± 5.7	1.04 A
			Fe-59	90.6 ± 6.4 92.6 ± 7.2 97.5 ± 8.6 Mean = 93.6 ± 4.3	86.1 ± 2.9	1.09 A
			Zn-65	173.0 ± 11.4 150.0 ± 11.4 143.0 ± 13.3 Mean = 155.3 ± 7.0	167.0 ± 5.6	0.93 A
			Co-60	108.0 ± 4.2 116.0 ± 4.5 122.0 ± 5.5 Mean = 115.3 ± 2.8	118.0 ± 3.9	0.98 A
			Co-58	83.7 ± 5.2 88.4 ± 5.7 81.5 ± 6.3 Mean = 84.5 ± 3.3	89.0 ± 3.0	0.95 A

(1) Results reported as activity ±1 sigma.
(2) Results reported as activity ±2 sigma.
(3) Ratio = Reported/Analytics (See Section 8.3).
(*) Sample provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis Soil (pCi/gram)

DATE	JAF ENV ID NO.	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LAB* (2)	RATIO (3)
6/17/2004	E-4166-05	SOIL pCi/gram	Ce-141	0.378 ± 0.034 0.493 ± 0.025 0.503 ± 0.043 0.467 ± 0.022 0.414 ± 0.032 Mean = 0.451 ± 0.015	0.413 ± 0.014	1.09 A
			Cr-51	0.502 ± 0.162 0.617 ± 0.110 0.825 ± 0.110 0.932 ± 0.183 Mean = 0.719 ± 0.054	0.601 ± 0.020	1.20 A
			Cs-134	0.302 ± 0.028 0.244 ± 0.032 0.370 ± 0.033 0.286 ± 0.016 0.279 ± 0.262 Mean = 0.296 ± 0.012	0.267 ± 0.009	1.11 A
			Cs-137	0.568 ± 0.034 0.525 ± 0.022 0.480 ± 0.041 0.534 ± 0.020 0.518 ± 0.032 Mean = 0.525 ± 0.012	0.516 ± 0.017	1.02 A
			Mn-54	0.227 ± 0.025 0.215 ± 0.016 0.178 ± 0.032 0.203 ± 0.015 0.183 ± 0.024 Mean = 0.201 ± 0.011	0.186 ± 0.006	1.08 A
			Fe-59	0.149 ± 0.049 0.129 ± 0.031 0.120 ± 0.026 0.101 ± 0.037 Mean = 0.126 ± 0.013	0.117 ± 0.004	1.08 A
			Zn-65	0.342 ± 0.044 0.292 ± 0.029 0.338 ± 0.062 0.348 ± 0.029 0.352 ± 0.046 Mean = 0.334 ± 0.019	0.262 ± 0.009	1.27 D NC #2004-01
			Co-60	0.539 ± 0.026 0.461 ± 0.017 0.466 ± 0.031 0.476 ± 0.016 0.500 ± 0.025 Mean = 0.488 ± 0.011	0.453 ± 0.015	1.08 A
			Co-58	0.127 ± 0.022 0.140 ± 0.016 0.112 ± 0.028 0.112 ± 0.014 0.079 ± 0.022 Mean = 0.114 ± 0.009	0.122 ± 0.004	0.93 A

(1) Results reported as activity ±1 sigma.
(2) Results reported as activity ±2 sigma.
(3) Ratio = Reported/Analytics (See Section 8.3).
(*) Sample provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.
(D) Evaluation Results, Not Acceptable
(NC) Non Conformity number

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis Vegetation (pCi/gram)

DATE	JAF ENV ID NO.	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LAB* (2)	RATIO (3)
6/17/2004	E-4168-05	VEGETATION pCi/gram	Ce-141	0.371 ± 0.010 0.370 ± 0.022 0.346 ± 0.025 0.330 ± 0.020 Mean = 0.354 ± 0.010	0.365 ± 0.012	0.97 A
			Cr-51	0.478 ± 0.054 0.511 ± 0.011 0.670 ± 0.013 0.617 ± 0.010 Mean = 0.569 ± 0.051	0.531 ± 0.018	1.07 A
			Cs-134	0.234 ± 0.007 0.256 ± 0.020 0.278 ± 0.025 0.238 ± 0.019 Mean = 0.252 ± 0.010	0.235 ± 0.008	1.07 A
			Cs-137	0.353 ± 0.008 0.381 ± 0.022 0.340 ± 0.025 0.388 ± 0.021 Mean = 0.366 ± 0.010	0.363 ± 0.012	1.01 A
			Mn-54	0.179 ± 0.006 0.200 ± 0.018 0.154 ± 0.023 0.170 ± 0.017 Mean = 0.176 ± 0.009	0.164 ± 0.005	1.07 A
			Fe-59	0.085 ± 0.010 0.108 ± 0.025 0.140 ± 0.028 0.107 ± 0.022 Mean = 0.110 ± 0.011	0.104 ± 0.003	1.06 A
			Zn-65	0.251 ± 0.014 0.300 ± 0.039 0.240 ± 0.047 0.249 ± 0.031 Mean = 0.260 ± 0.017	0.232 ± 0.008	1.12 A
			Co-60	0.405 ± 0.007 0.390 ± 0.019 0.409 ± 0.025 0.412 ± 0.019 Mean = 0.404 ± 0.010	0.400 ± 0.013	1.01 A
			Co-58	0.106 ± 0.006 0.114 ± 0.016 0.121 ± 0.022 0.101 ± 0.016 Mean = 0.111 ± 0.008	0.108 ± 0.004	1.03 A

(1) Results reported as activity ±1 sigma.
(2) Results reported as activity ±2 sigma.
(3) Ratio = Reported/Analytics (See Section 8.3).
(*) Sample provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis Water (Bq/liter)

DATE	JAF ENV ID NO.	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LAB* (2)	RATIO (3)
3/1/2004	QAP-0403	WATER Bq/liter	Cs-137	52.5 ± 2.9 47.4 ± 2.7 50.0 ± 2.8 52.2 ± 3.4 50.7 ± 2.6 Mean = 50.5 ± 1.3	52.0 ± 2.7	0.972 A
			Co-60	156.1 ± 3.7 161.3 ± 3.9 159.5 ± 3.8 159.5 ± 4.7 159.5 ± 3.7 Mean = 159.2 ± 1.8	163.2 ± 5.9	0.975 A

(1) Results reported as activity ±1 sigma.
(2) Results reported as activity ±2 sigma.
(3) Ratio = Reported/EML(See Section 8.3).
(*) Sample provided by Environmental Measurements Lab., Dept. of Energy.
(A) Evaluation Results, Acceptable.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis of Air Particulate Filters (Bq/filter)

DATE	JAF ENV ID NO.	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LAB* (2)	RATIO (3)
3/1/2004	QAP-0403	FILTER Bq/filter	Co-60	35.0 ± 0.5 36.1 ± 0.5 35.6 ± 0.4 Mean = 35.6 ± 0.3	35.4 ± 0.85	1.006 A
			Cs-134	19.4 ± 0.4 20.8 ± 0.4 20.2 ± 0.4 Mean = 20.1 ± 0.2	18.2 ± 0.40	1.104 W
			Cs-137	27.9 ± 0.5 28.0 ± 0.5 27.8 ± 0.4 Mean = 27.9 ± 0.3	26.4 ± 0.86	1.057 A

(1) Results reported as activity ±1 sigma.
(2) Results reported as activity ±2 sigma.
(3) Ratio = Reported/EML (See Section 8.3).
(*) Sample provided by Environmental Measurements Lab., Dept. of Energy.
(A) Evaluation Results, Acceptable.
(W) Acceptable with Warning.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gross Beta Analysis of Water (Bq/liter)

DATE	JAF ENV ID NO.	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LAB* (2)	RATIO (3)
3/1/2004	QAP-0403	WATER Bq/liter	GROSS BETA	1109 ± 30 1115 ± 30 1090 ± 30 Mean = 1105 ± 17	1170 ± 117	0.944 A

(1) Results reported as activity ±1 sigma.

(2) Results reported as activity ±2 sigma.

(3) Ratio = Reported/EML (See Section 8.3).

(*) Sample provided by Environmental Measurements Lab., Dept. of Energy.

(A) Evaluation Results, Acceptable.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Tritium Analysis Water (Bq/liter)

DATE	JAF ENV ID NO.	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LAB* (2)	RATIO (3)
3/1/2004	QAP-0403	WATER Bq/liter	H-3	233.4 ± 7.8 224.9 ± 7.8 238.3 ± 8.0 232.0 ± 7.9 235.3 ± 8.0 Mean = 232.8 ± 3.5	186.6 ± 3.3	1.25 A

(1) Results reported as activity ±1 sigma.
(2) Results reported as activity ±2 sigma.
(3) Ratio = Reported/EML (See Section 8.3).
(*) Sample provided by Environmental Measurements Lab., Dept. of Energy.
(A) Evaluation Results, Acceptable.

TABLE 8-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gross Beta Analysis of Air (Bq/filter)

DATE	JAF ENV ID NO.	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LAB* (2)	RATIO (3)
3/1/2004	QAP-0403	AIR Bq/filter	GROSS BETA	2.8 ± 0.08 2.6 ± 0.08 2.7 ± 0.08 2.6 ± 0.08 2.6 ± 0.08 2.7 ± 0.08 Mean = 2.7 ± 0.05	2.85 ± 0.28	0.94 A

(1) Results reported as activity ±1 sigma.
(2) Results reported as activity ±2 sigma.
(3) Ratio = Reported/EML (See Section 8.3).
(*) Sample provided by Environmental Measurements Lab., Dept. of Energy.
(A) Evaluation Results, Acceptable.

8.5 REFERENCES

8.5.1 Semi-Annual Report of the Department of Energy, Office of Environmental Management, Quality Assessment Program, EML 621, June 2004.

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

8.5.3 Data Reduction and Error Analysis for the Physical Sciences, Bevington P.R., McGraw Hill, New York (1969).3

9.0 GRAPHICAL PRESENTATIONS

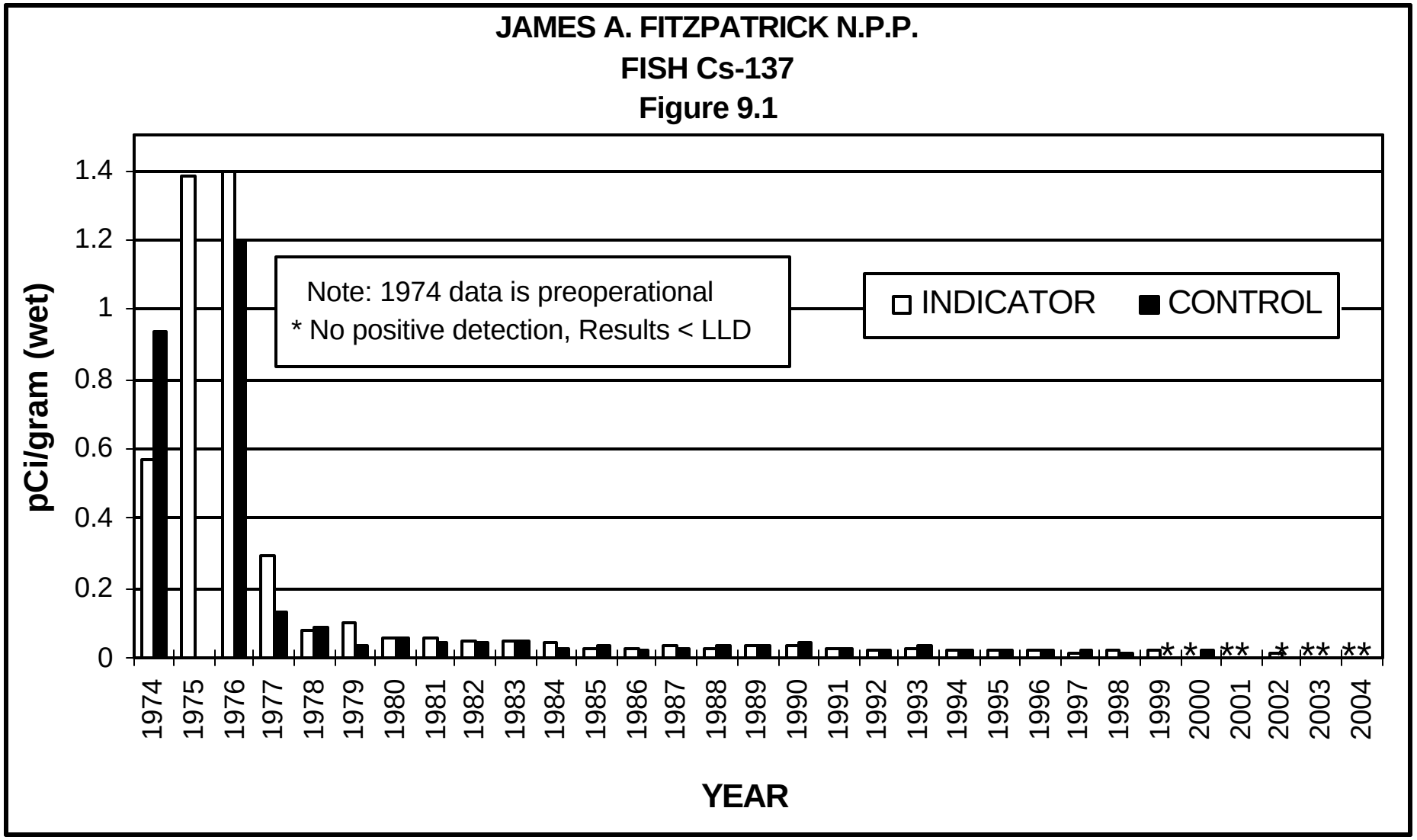
1. DATA GRAPHS

This section includes graphic representation of selected sample results.

For graphic representation, results reported as MDL or LLD were considered to be at the "zero" level of activity. MDL and LLD results were indicated where possible.

2. SAMPLE LOCATIONS

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)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Note: 1974 data is preoperational
* No positive detection, Results < LLD
INDICATOR
CONTROL
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
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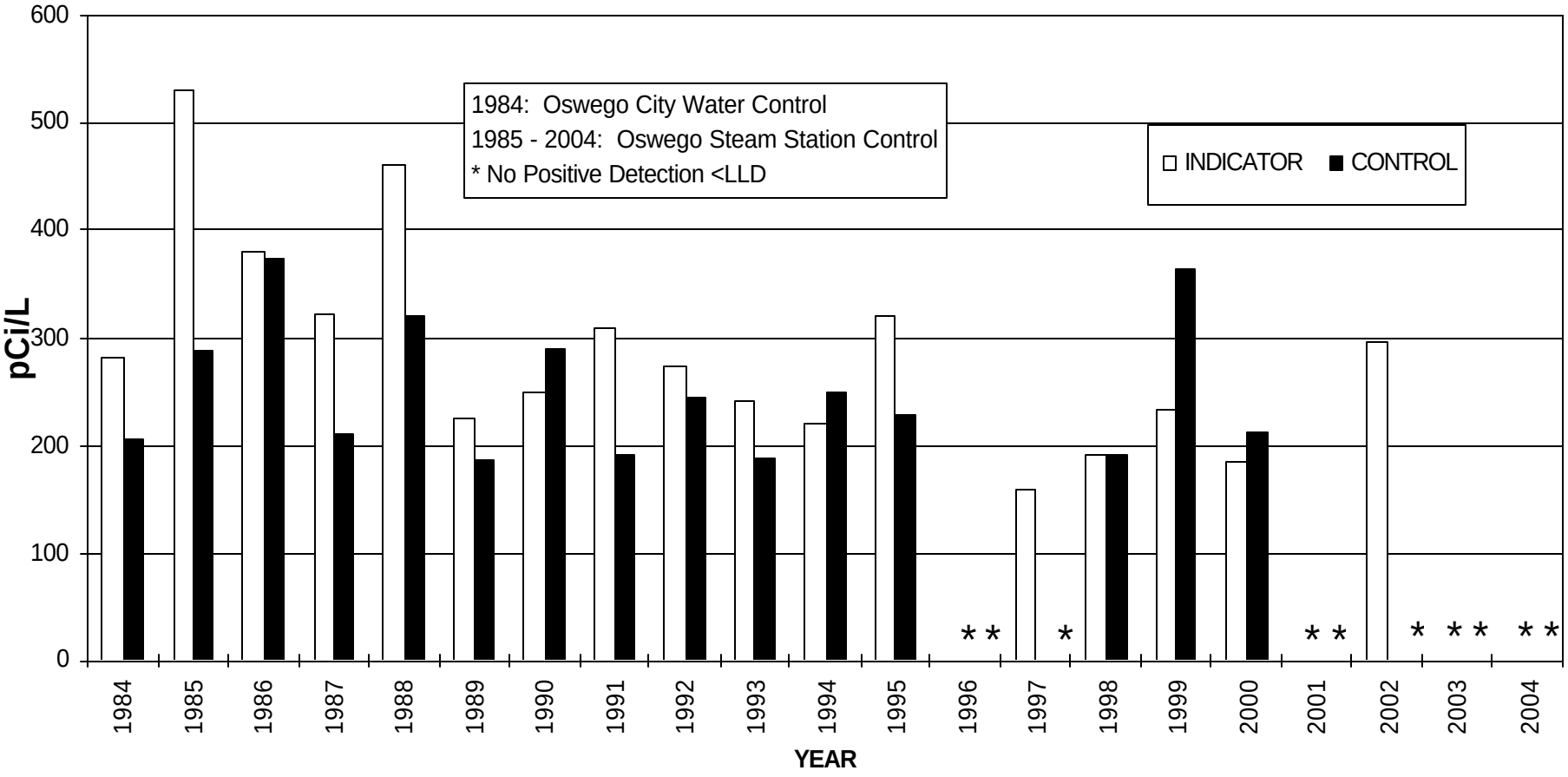
2002
2003
2004
YEAR

JAMES A. FITZPATRICK N.P.P.
SURFACE WATER - TRITIUM
Figure 9.2



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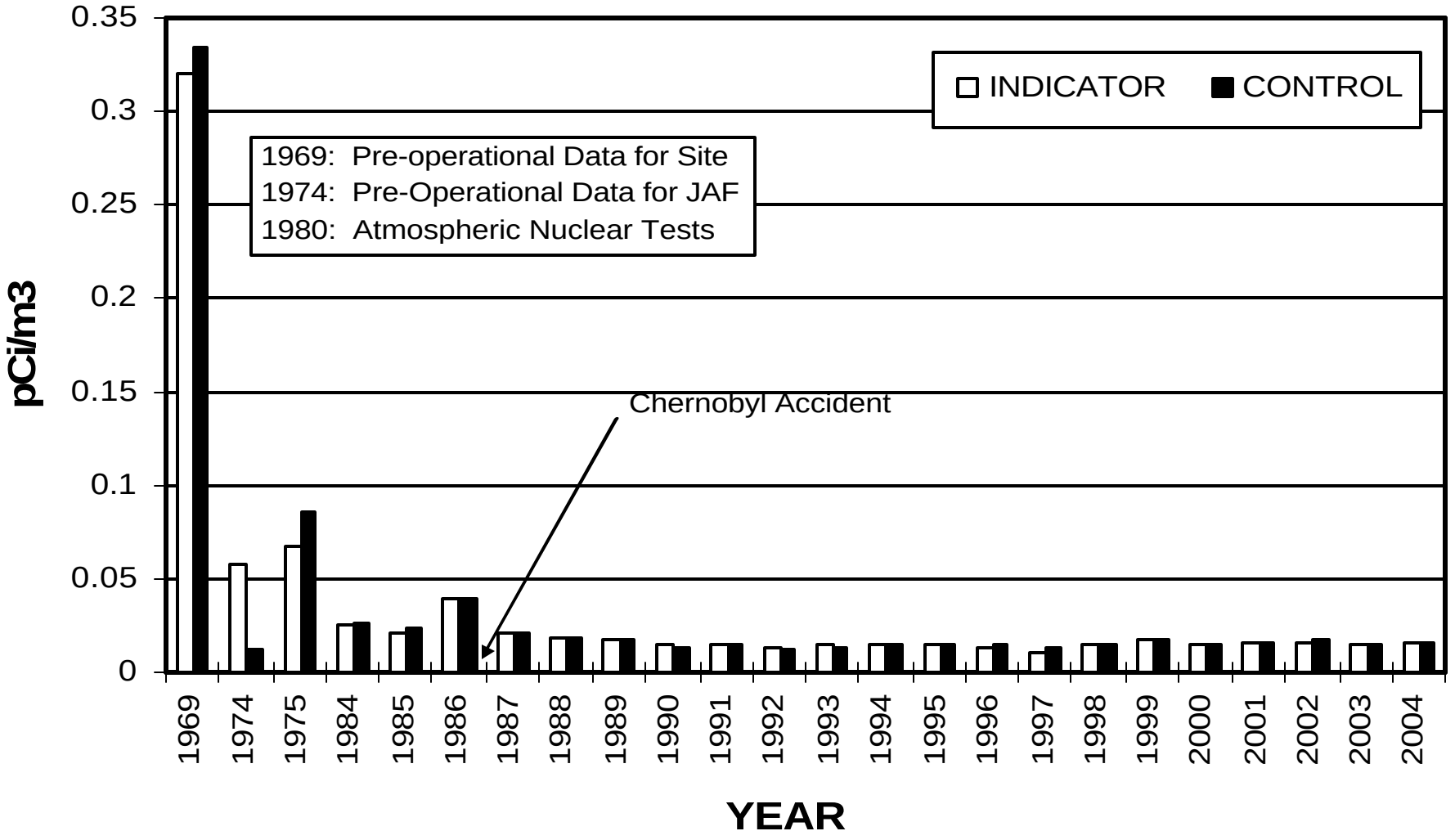
AIR PARTICULATE FILTER - GROSS BETA
Figure 9.3



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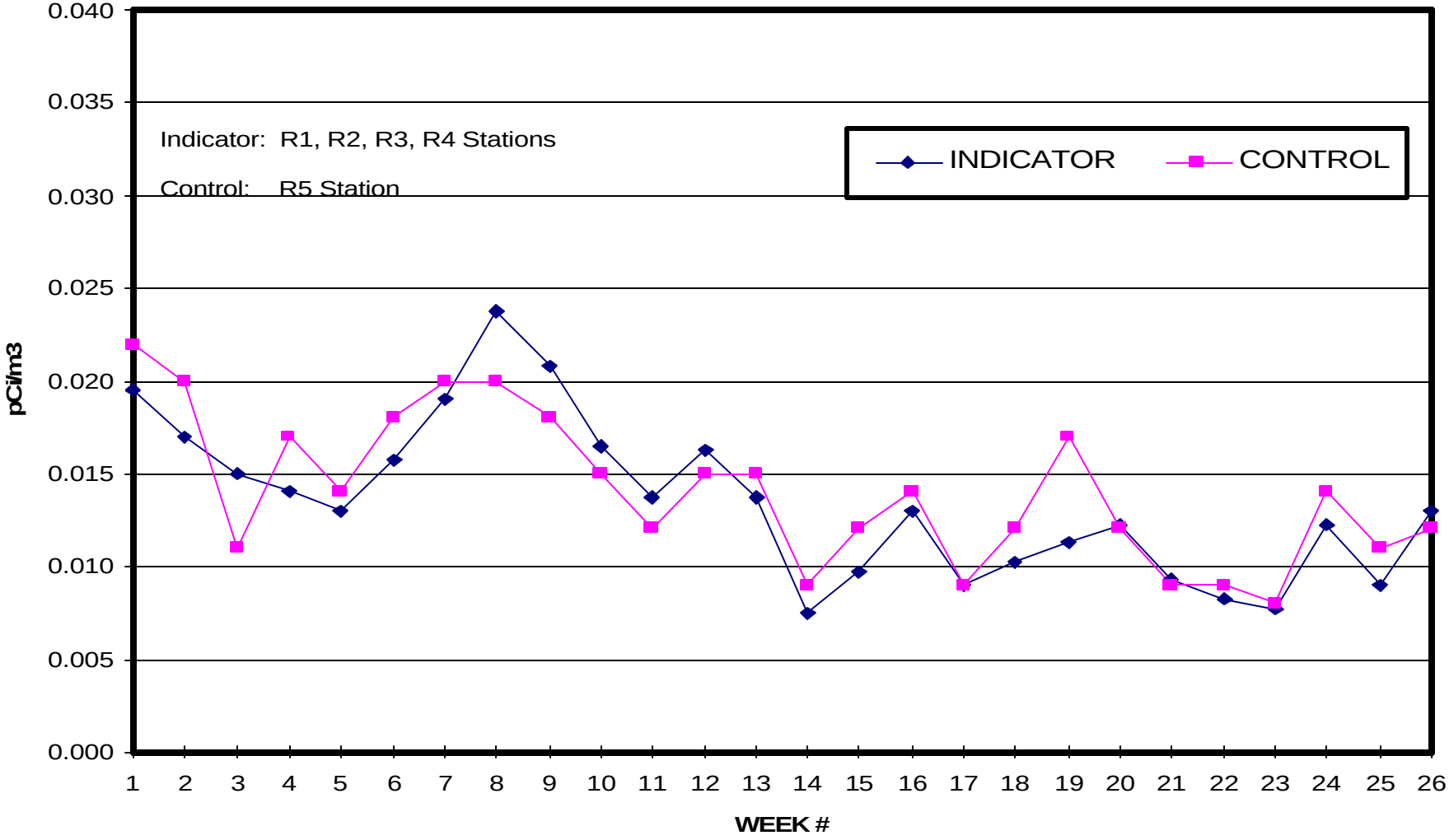
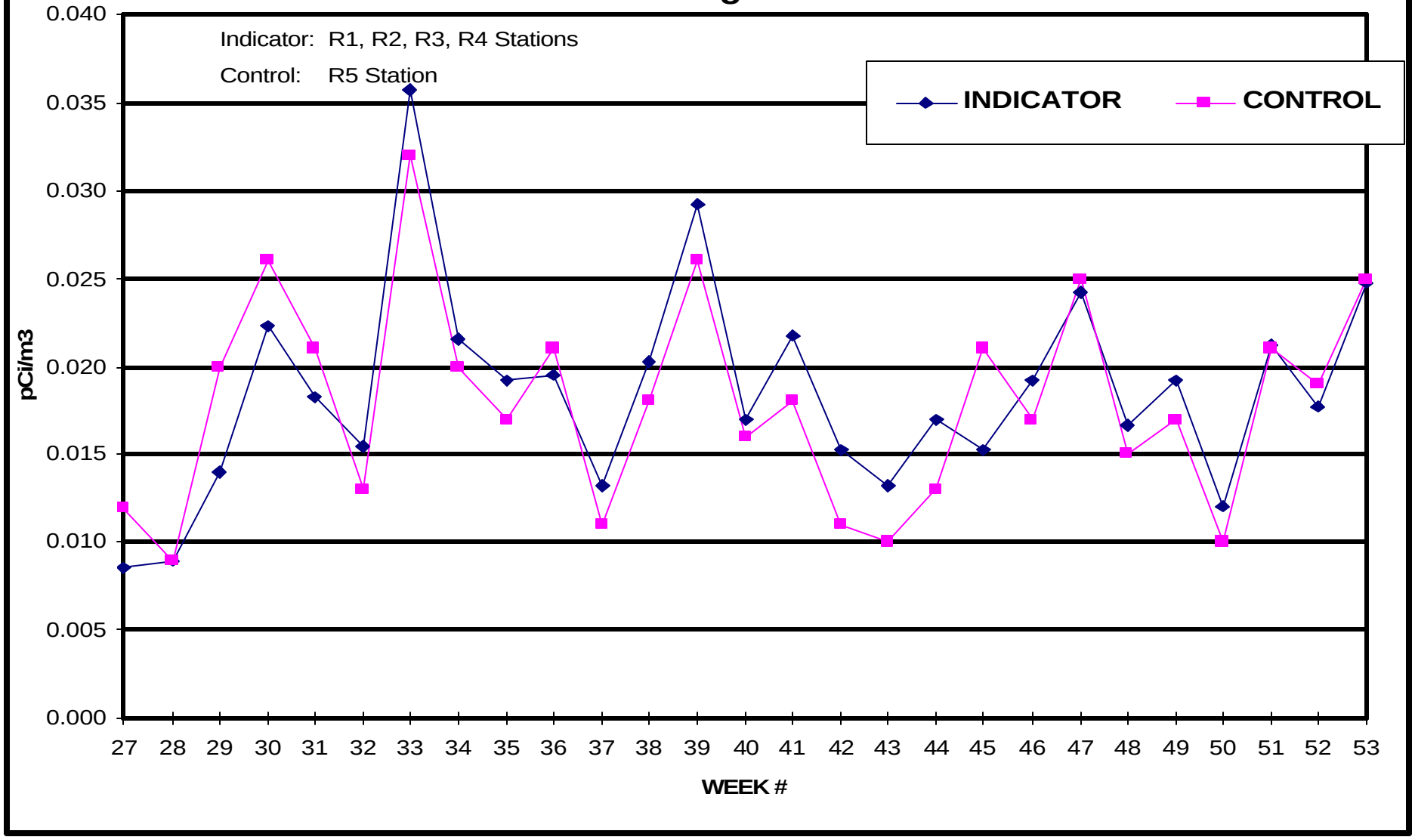
AIR PARTICULATE FILTER - GROSS BETA

Figure 9.4



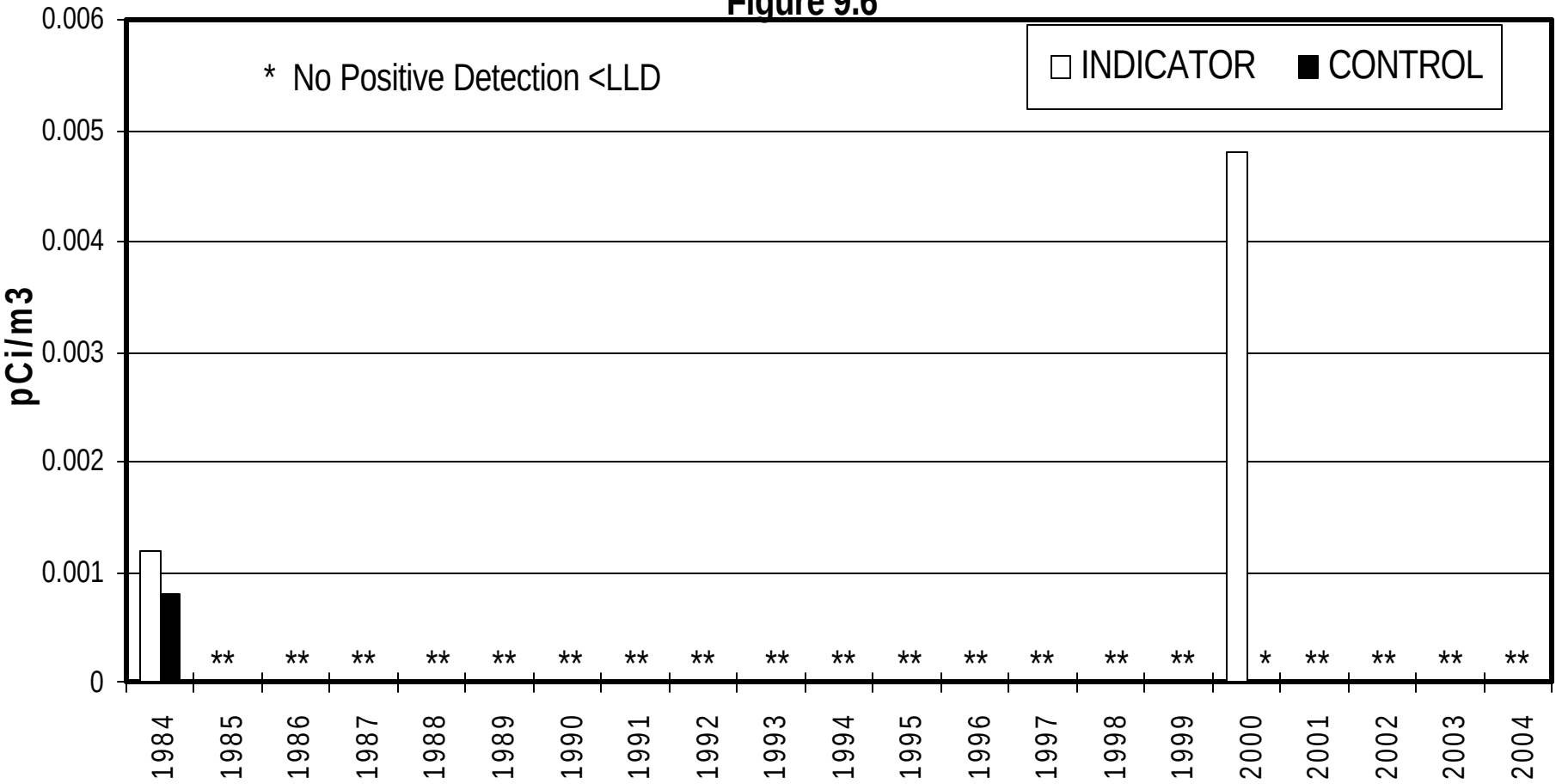
JAMES A. FITZPATRICK N.P.P.
AIR PARTICULATE FILTER - GROSS
Figure 9.5



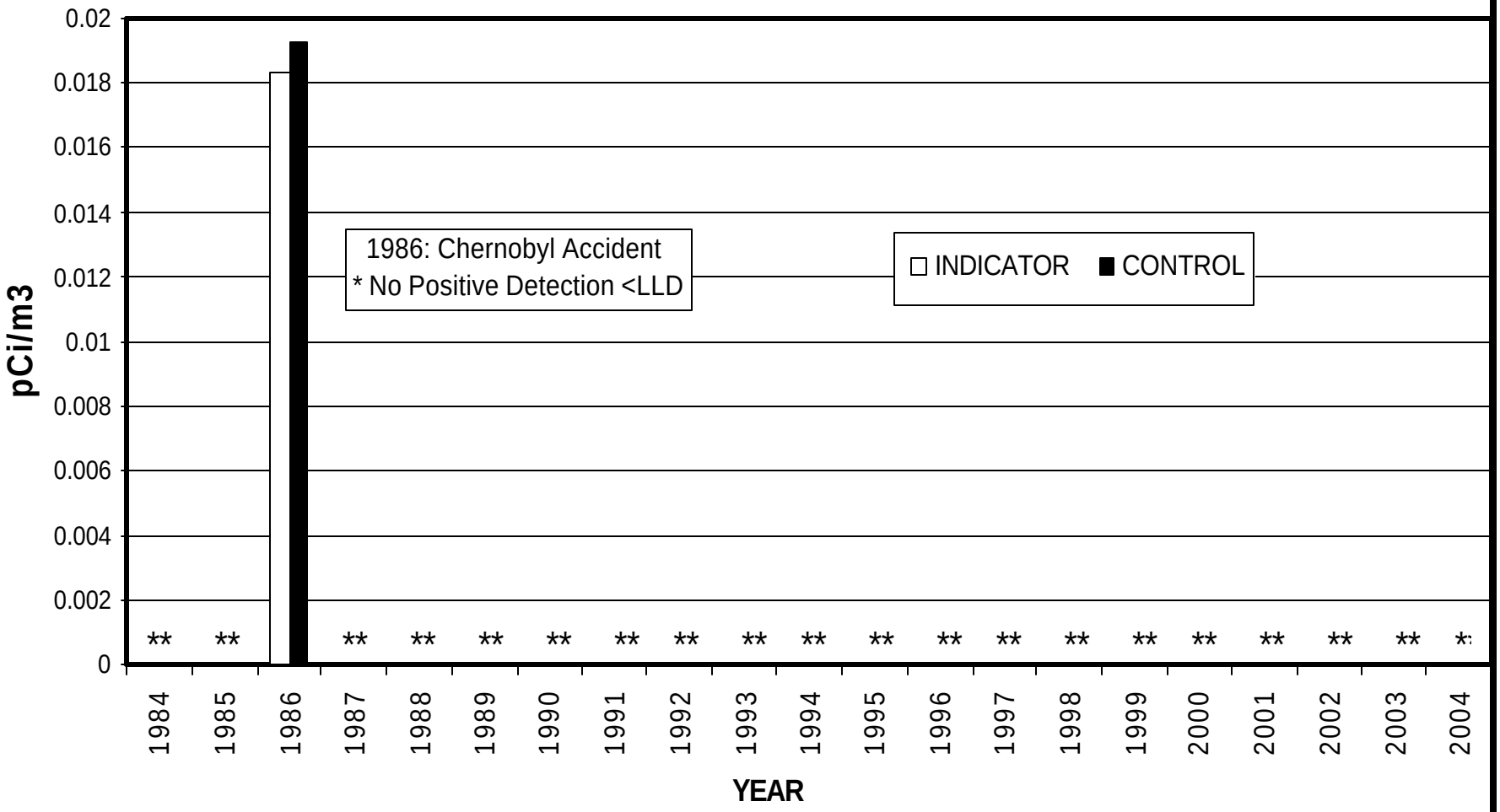
JAMES A. FITZPATRICK N.P.P.

AIR PARTICULATE FILTER COMPOSITE Co-60

Figure 9.6



JAMES A. FITZPATRICK N.P.P.
AIR PARTICULATE FILTER COMPOSITE Cs-137
Figure 9.7



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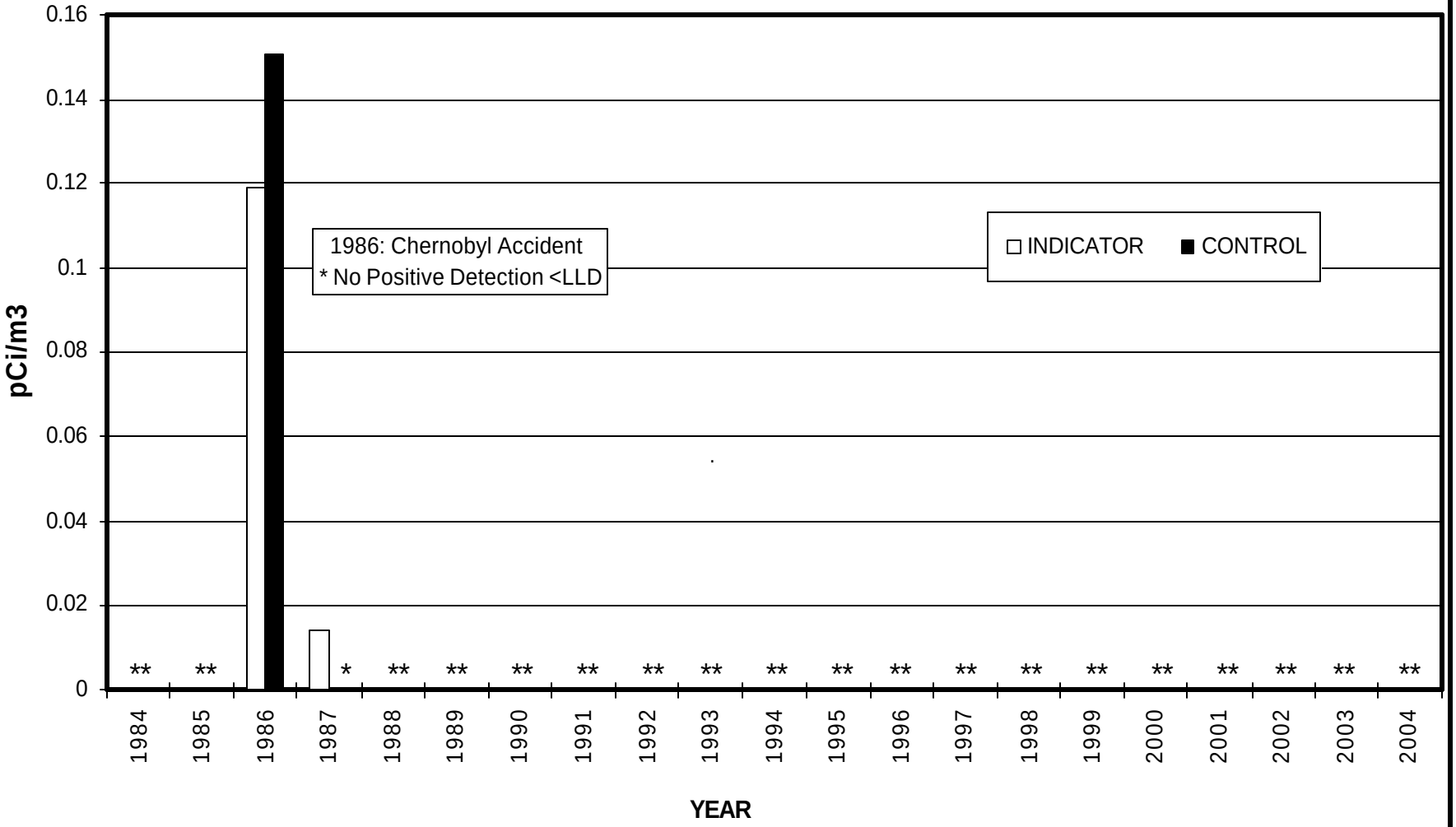
AIR RADIOIODINE I-131
Figure 9.8



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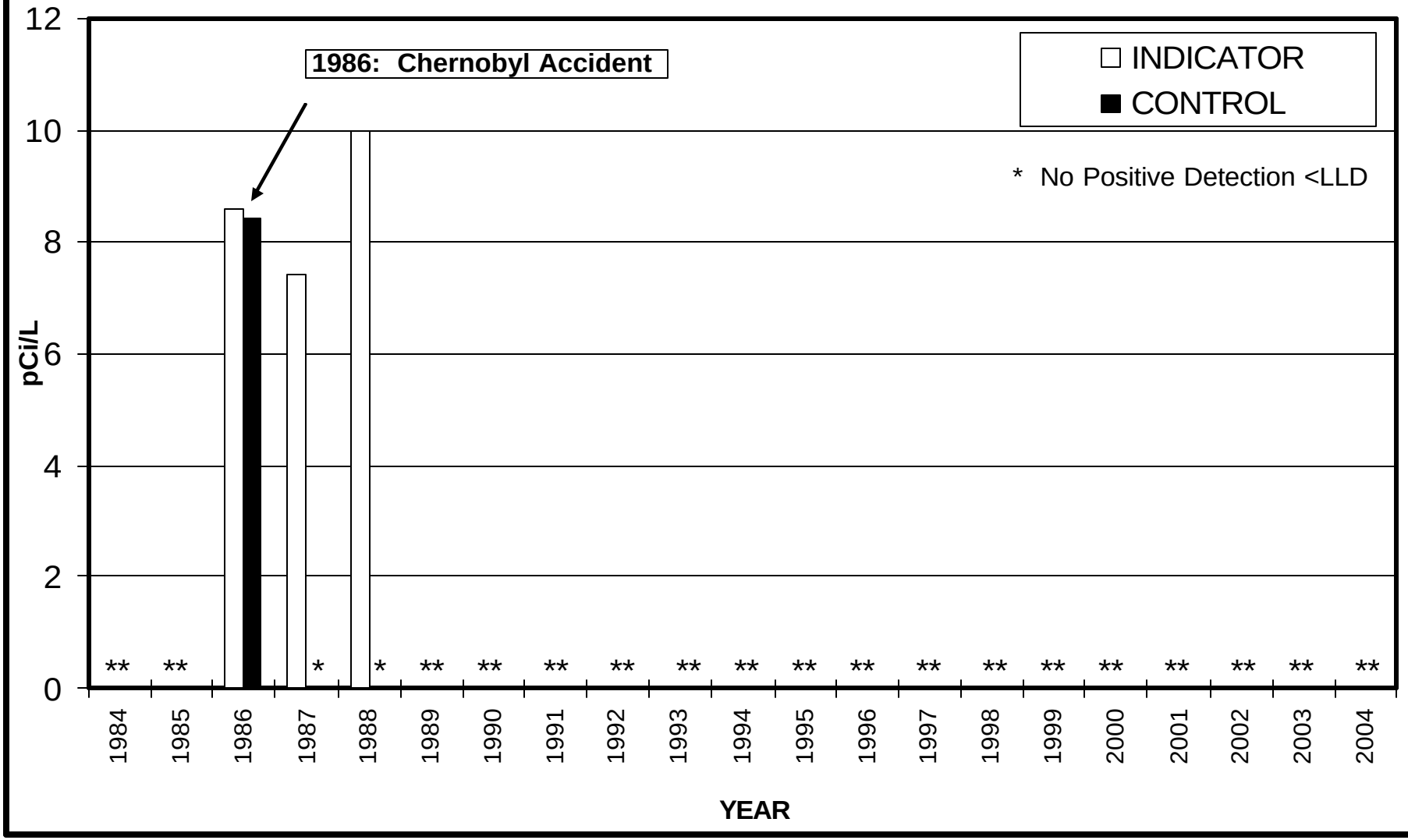
MILK Cs-137

Figure 9.9



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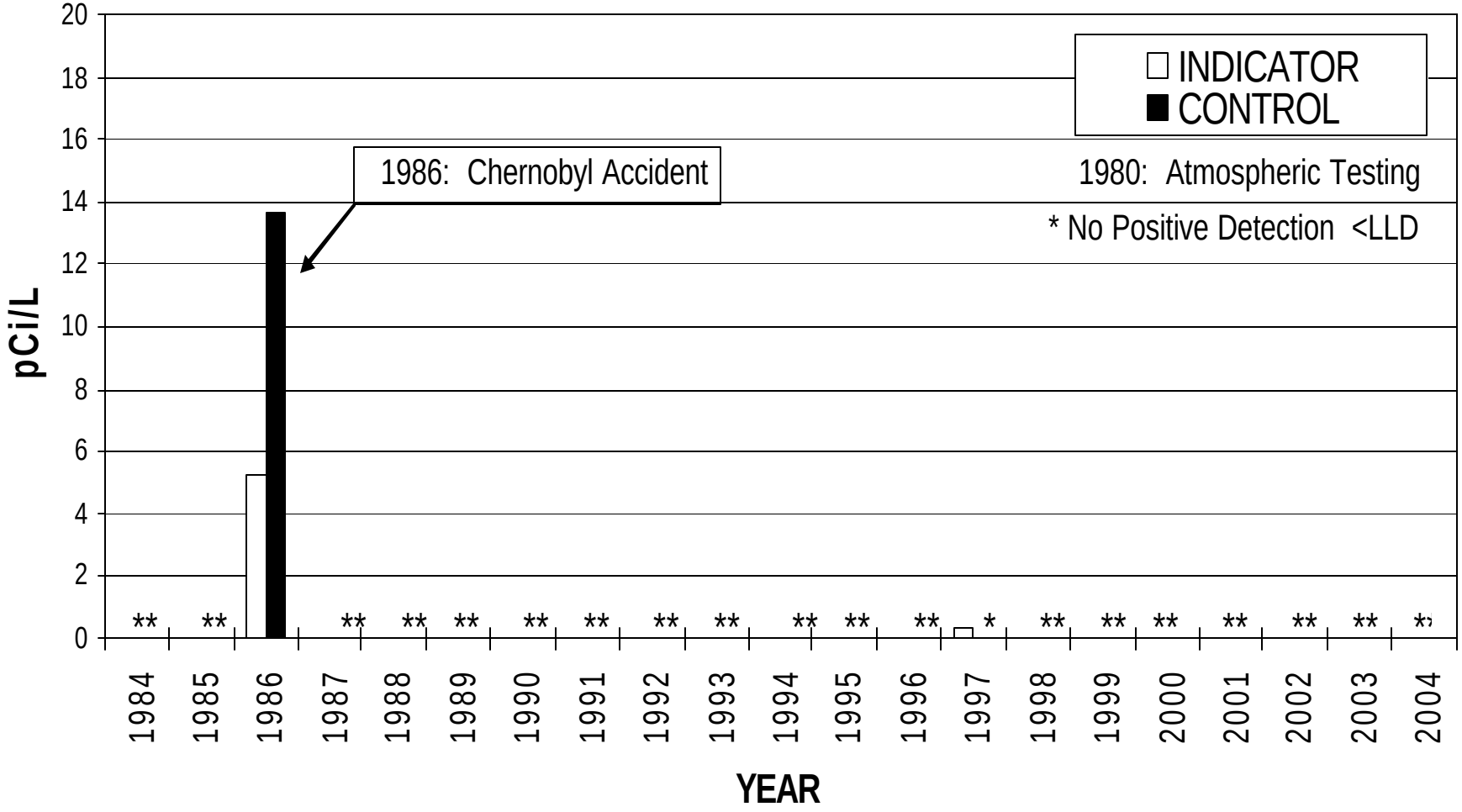
MILK RADIOIODINE I-131

Figure 9.10



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TLD DATA
Figure 9.11