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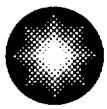

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Nine Mile Point
Nuclear Station

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Constellation Energy Group

April 30, 2002
NMP1L 1662

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

RE: Nine Mile Point Unit 1
Docket No. 50-220
DPR-63

Nine Mile Point Unit 2
Docket No. 50-410
NPF-69

Subject: ***Transmittal of 2001 Annual Radiological Environmental Operating Report***

Gentlemen:

In accordance with the Technical Specifications for Nine Mile Point Nuclear Station Unit 1 and Unit 2, we are enclosing the Annual Radiological Environmental Operating Report for the period January 1, 2001, through December 31, 2001.

Any questions concerning the enclosed report should be directed to Kent Stoffle, Supervisor Environmental Protection at Nine Mile Point at (315) 349-1364.

Very truly yours,

Bruce S. Montgomery
General Manager Nuclear Engineering

BSM/CLW/jm
Enclosure

xc: Mr. H. J. Miller, NRC Regional Administrator, Region I
Mr. G. K. Hunegs, NRC Senior Resident Inspector
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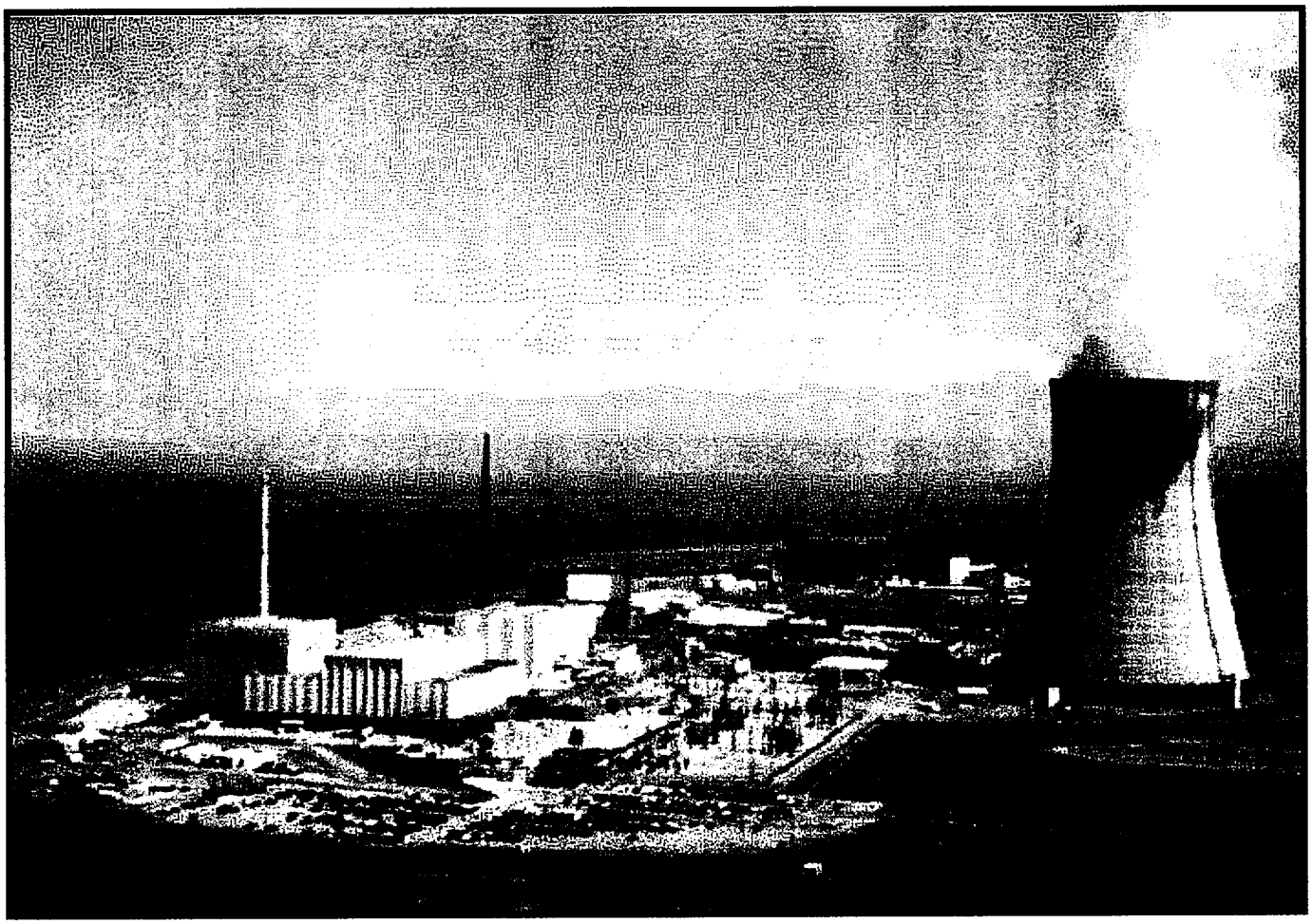
NINE MILE POINT NUCLEAR STATION, LLC

2001 ANNUAL

RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT



NINE MILE POINT NUCLEAR STATION, LLC

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

January 1, 2001 – December 31, 2001

For

NINE MILE POINT NUCLEAR STATION UNIT 1

Facility Operating License DPR-63

Docket Number 50-220

And

NINE MILE POINT NUCLEAR STATION UNIT 2

Facility Operating License NPF-69

Docket No. 50-410

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SECTION 1.0

EXECUTIVE SUMMARY

1.0 EXECUTIVE SUMMARY

The Annual Radiological Environmental Operating Report is published pursuant to Appendix A (Technical Specifications), Section 6.9.1.d to License DPR-63, Docket No. 50-220 for the Nine Mile Point Nuclear Station Unit 1 and Section 5.6.2 to License NPF-69, Docket No. 50-410 for the Nine Mile Point Nuclear Station Unit 2 for the calendar year 2001.

This report describes the Radiological Environmental Monitoring Program (REMP) and its implementation as required by Technical Specifications and the Offsite Dose Calculation Manual. It also contains the analytical results, 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 Asssurance Intercomparison Program required by Nine Mile Point Unit 1 Technical Specifications and Nine Mile Point Unit 2 Offsite Dose Calculation Manual.

The REMP is implemented to measure radioactivity in the aquatic and terrestrial pathways. The aquatic pathways include Lake Ontario fish, surface water, and lakeshore sediment. Measurement results of the samples representing these pathways contained naturally occurring background radionuclides and in two shoreline sediment samples, very small concentrations of Cs-137, which are the result of past atmospheric nuclear testing. The 2001 results were consistent with the previous five year historical data.

Terrestrial pathways are monitored and include airborne particulate and radioiodine, milk, food products and direct radiation. Analysis of all terrestrial radiation pathways demonstrated that there has been no detectable increased radiation levels as a result of plant operation. Again, the 2001 results are consistent with the previous five year historical results and exhibit no adverse trends.

In summary, the analytical results from the 2001 Environmental Monitoring Program demonstrate that the routine operation of Nine Mile Point Unit 1 and Nine Mile Point Unit 2 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 rates or from the processing and storage of radioactive waste at the site. The results of the program continue to demonstrate that the operation of the plant did not result in a measurable dose of any significance to the general population, above natural background levels or adversely impact the environment as a result of radionuclide effluents. The environmental program continues to demonstrate that the dose to a member of the public as a result of the operation of the nuclear facilities at the Nine Mile Point Site remain below the federally required dose limits specified in 10 CFR 20 and 40 CFR 190.

SECTION 2.0

INTRODUCTION

2.0 INTRODUCTION

Nine Mile Point Units 1 and 2 are currently owned by Constellation Nuclear and operated by Nine Mile Point Nuclear Station, LLC. This report is submitted in accordance with Appendix A (Technical Specifications), Section 6.9.1.d to License DPR-63, Docket No. 50-220 for the Nine Mile Point Nuclear Station Unit 1 and Section 5.6.2 to License NPF-69, Docket No. 50-410 for the Nine Mile Point Nuclear Station Unit 2 for the calendar year 2001.

Nine Mile Point Unit 2 implemented Improved Technical Specifications (ITS) on 12/02/00. As part of Nine Mile Point Unit 2's transition to ITS, the Radiological Environmental Monitoring Program (REMP) requirements were removed from the Unit 2 Technical Specifications and relocated to the Unit 2 Offsite Dose Calculation Manual (ODCM). Nine Mile Point Unit 1 REMP requirements continue to reside within the Unit 1 Technical Specifications. Throughout this report references will be made to TS/ODCM. This refers to the Unit 1 Technical Specifications REMP requirements, and Unit 2 Offsite Dose Calculation Manual REMP requirements post-ITS implementation.

2.1 PROGRAM HISTORY

Environmental monitoring of the Nine Mile Point site by various state and private utilities has been on-going since 1964, five years prior to any reactor operations. In 1968, the Niagara Mohawk Power Company began the required pre-operational environmental site testing program. This pre-operational data serves as a reference point to compare later data obtained during reactor operation. In 1969, Nine Mile Point Unit 1, a 615 Megawatt Boiling Water Reactor (BWR) began full power operation. In 1975, the James A. FitzPatrick Nuclear Power Plant, a 870 Megawatt Boiling Water Reactor (BWR), currently owned and operated by Entergy, began full power operation. In 1985, the individual station Effluent Technical Specifications were standardized to the current Radiological Effluent Technical Specifications, much of which is common to both plants. Data generated by the Radiological Environmental Monitoring Program (REMP) is

shared, but each utility reviews and publishes their own annual report. In 1988, the Nine Mile Point Unit 2 reactor, a 1080 Megawatt BWR located between Unit 1 and FitzPatrick, began full power operation. In 1995 Nine Mile Point Unit 2 was uprated to 1207 megawatts.

In summary, three Boiling Water Reactors, which generate approximately 2692 megawatts, have operated collectively at the Nine Mile site since 1988. A large data base of environmental results from the exposure pathways has been collected and analyzed to determine the effect 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 5.5 miles east of the Oswego River from the closest point of the site's restricted boundary and approximately 6.2 miles northeast of the city of Oswego. The nearest metropolitan area is located approximately 23.8 miles southeast of the site. The reactors and support buildings occupy a small shoreline portion of the 900 acre site, which is partially wooded. The land, soil of glacier deposits, rises gently from the lake in all directions. Oswego County is a rural environment, with about 34% 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 NMPNS site.
3. Demonstrate compliance with the various environmental conditions and requirements of applicable state and federal regulatory agencies including Technical Specifications, and 40 CFR Part 190.

SECTION 3.0

PROGRAM DESCRIPTION

3.0 PROGRAM DESCRIPTION

To achieve the objectives listed in Section 2.3, an extensive sampling and analysis program is conducted every year. The Nine Mile Point Nuclear Station (NMPNS) Radiological Environmental Monitoring Program (REMP) consists of sampling and analysis of various media that include:

1. Air
2. Surface Waters
3. Shoreline Sediment
4. Milk
5. Fish
6. Food Products

In addition, direct radiation measurements are performed using thermoluminescent dosimeters (TLDs). These sampling programs are outlined in Table 3.0-1 and Table 3.0-2. The NMPNS 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 NMPNS and James A. FitzPatrick Nuclear Power Plant (JAFNPP). The site staff is assisted by a contracted environmental engineering company, EA Engineering, Science and Technology, Inc. (EA).

TABLE 3.0-1

OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
REQUIRED SAMPLE COLLECTION AND ANALYSIS
Nine Mile Point Unit 1

Exposure Pathway and/or sample	Number of Samples [a] and Locations	Sampling and Collection Frequency [a]	Type of Analysis and Frequency
AIRBORNE			
Radioiodine and Particulates	Samples from five locations: 1) Three samples from off-site locations in different sectors of the highest calculated site average D/Q (based on all site licensed reactors) 2) One sample from the vicinity of an established year round community having the highest calculated site average D/Q (based on all site licensed reactors) 3) One sample from a control location 10 – 17 miles distant and in a least prevalent wind direction [d].	Continuous sampler operation with sample collection weekly or as required by dust loading, whichever is more frequent.	Radioiodine Canisters analyze once/week for I-131. Particulate Samplers Gross beta radioactivity following filter change, [b] Composite (by location) for gamma isotopic analysis [c] once per 3 months, (as a minimum)
Direct Radiation [e]	32 stations with two or more dosimeters to be placed as follows: an inner ring of stations in the general area of the site boundary and an outer ring in the 4 to 5 mile range from the site with a station in each land based sector.(1) The balance of the stations should be placed in special interest areas such as population centers, nearby residences, schools and in 2 or 3 areas to serve as control stations.	Once per 3 months	Gamma dose once per 3 months

(1) At this distance, 8 wind rose sectors are over Lake Ontario

TABLE 3.0-1 (Continued)

OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
REQUIRED SAMPLE COLLECTION AND ANALYSIS
Nine Mile Point Unit 1

Exposure Pathway and/or Sample	Number of Samples [a] and Locations	Sampling and Collection Frequency[a]	Type of Analysis and Frequency
WATERBORNE			
Surface [f]	1) One sample upstream 2) One sample from the site's downstream cooling water intake	Composite sample over 1 month period [g]	Gamma isotopic analysis [c] once/month. Composite for once per 3 months tritium analysis.
Sediment from Shoreline	One sample from a downstream area with existing or potential recreational value	Twice per year	Gamma isotopic analysis [c]
INGESTION			
Milk	1) Samples from milk sampling locations in three locations within 3.5 miles distance having the highest calculated site average D/Q. If there are none, then one sample from milking animals in each of 3 areas 3.5 – 5.0 miles distant having the highest calculated site average D/Q (based on all site licensed reactors) 2) One sample from a milk sampling location at a control location (9-20 miles distant and in a least prevalent wind direction) [d]	Twice per month, April – December (samples will be collected in January – March if I-131 is detected in November and December of the preceding year)	Gamma isotopic [c] and I-131 analysis twice per month when animals are on pasture (April-December); once/month at other times (January-March) if required

TABLE 3.0-1 (Continued)

OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
REQUIRED SAMPLE COLLECTION AND ANALYSIS
Nine Mile Point Unit 1

Exposure Pathway and/or Sample	Number of Samples [a] and Locations	Sampling and Collection Frequency [a]	Type of Analysis and Frequency
Fish	1) One sample each of two commercially or recreationally important species in the vicinity of a plant discharge area [h] 2) One sample each of the same species from an area at least 5 miles distant from the site. [d]	Twice per year	Gamma isotopic analysis [c] on edible portions twice per year
Food Products	1) Samples of three different kinds of broad leaf vegetation (such as vegetables) grown nearest to each of two different off-site locations of highest calculated site average D/Q (based on all licensed site reactors) 2) One sample of each of the similar broad leaf vegetation grown at least 9.3-20 miles distant in a least prevalent wind direction	Once per year during harvest season	Gamma isotopic [c] analysis of edible portions (isotopic to include I-131 or a separate I-131 analysis may be performed) once during the harvest season

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 and may be substituted. Actual locations (distance and directions) from the site shall be provided in the Annual Radiological Environmental Operating Report. Highest D/Q locations are based on historical meteorological data for all site licensed 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 the 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 facility.

(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, such as historical control locations which provide valid background data may be substituted.

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

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

(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 obtaining a representative sample.

(h) In the event commercial or recreational important species are not available as a result of three attempts, then other species may be utilized as available.

TABLE 3.0-2

OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
REQUIRED SAMPLE COLLECTION AND ANALYSIS
Nine Mile Point Unit 2

Exposure Pathway and /or Sample	Number of Samples and Sample Locations [a]	Sampling and Collection Frequency	Type and Frequency of Analysis
Direct Radiation [b]	32 routine monitoring stations either with 2 or more dosimeters or with 1 instrument for measuring and recording dose rate continuously, placed as follows: An inner ring of stations, one in each meteorological sector in the general area of the Site Boundary An outer ring of stations, one in each land base meteorological sector in the 4 to 5-mile(1) range from the site The balance of the stations should be placed in special interest areas such as population centers, nearby residences, schools, and in one or two areas to serve as control stations[c].	Once per 3 months	Gamma dose once per 3 months

(1) At this distance, 8 wind rose sectors, (W, WNW, NW, NNW, N, NNE, NE, and ENE) are over Lake Ontario

TABLE 3.0-2 (Continued)

OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
REQUIRED SAMPLE COLLECTION AND ANALYSIS
Nine Mile Point Unit 2

Exposure Pathway and / or Sample	Number of Samples and Sample Locations [a]	Sample and Collection Frequency	Type and Frequency of Analysis
Airborne Radioiodine and Particulates	Samples from five locations: Three samples from offsite locations close to the site boundary (within one mile) in different sectors of the highest calculated annual site average ground-level D/Q (based on all site licensed reactors) One sample from the vicinity of an established year-round community having the highest calculated annual site average ground-level D/Q (based on all site licensed reactors) One sample from a control location at least 10 miles distant and in a least prevalent wind direction[c]	Continuous sampler operation with sample collection weekly, or more frequently if required by dust loading	Radioiodine Canister I-131 analysis weekly Particulate Sampler Gross beta radioactivity analysis following filter change[d] and gamma isotopic analysis[e] of composite (by location) at least quarterly
Waterborne a. Surface [f]	One sample upstream[c] ; one sample from the site's downstream cooling water intake	Composite sample over 1-month period[g]	

TABLE 3.0-2 (Continued)

OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
REQUIRED SAMPLE COLLECTION AND ANALYSIS
Nine Mile Point Unit 2

Exposure Pathway and/or Sample	Number of Samples and Sample Locations[a]	Sampling and Collection Frequency	Type and Frequency of Analysis
Waterborne (continued)			
b. Ground	Samples from one or two sources, only if likely to be affected[h]	Quarterly grab sample	Gamma isotopic[e] and tritium analysis quarterly
c. Drinking	One sample of each of one to three of the nearest water supplies that could be affected by its discharge[i]	Composite sample over a 2-week period[g] when I-131 analysis is performed; monthly composite otherwise	I-131 analysis on each composite when the dose calculated for the consumption of the water is greater than 1 mrem per year. [j] Composite for gross beta and gamma isotopic analyses[e] monthly. Composite for tritium analysis quarterly
d. Sediment from Shoreline	One sample from a downstream area with existing or potential recreational value	Twice per year	Gamma isotopic analysis[e]

TABLE 3.0-2 (Continued)

OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
REQUIRED SAMPLE COLLECTION AND ANALYSIS
Nine Mile Point Unit 2

Exposure Pathway and/or Sample	Number of Samples and Sample Locations[a]	Sampling and Collection Frequency	Type and Frequency of Analysis
Ingestion			
a. Milk	Samples from Milk Sampling Locations in three locations within 3.5 miles distance having the highest calculated site average D/Q (based on all licensed site reactors). If there are none, then 1 sample from Milk Sampling Locations in each of three areas 3.5 – 5.0 miles distant having the highest calculated site average D/Q (based on all licensed site reactors). One sample from a Milk Sampling Location at a control location 9 – 20 miles distant and in a least prevalent wind direction[c]	Twice per month, April – December (samples will be collected January – March if I-131 is detected in November and December of the preceding year)	Gamma isotopic[e] and I-131 analysis twice/month when animals are on pasture (April – December); once per month at other times (January – March if required)
b. Fish	One sample each of two commercially or recreationally important species in the vicinity of a plant discharge area[k] One sample of the same species in areas not influenced by station discharge[c]	Twice per year	Gamma isotopic analysis[e] on edible portions twice per year

TABLE 3.0-2 (Continued)

OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
REQUIRED SAMPLE COLLECTION AND ANALYSIS
Nine Mile Point Unit 2

Exposure Pathway and/or Sample	Number of Samples and Sample Locations[a]	Sampling and Collection Frequency	Type and Frequency of Analysis
Ingestion (continued)			
c. Food Products	One sample of each principal class of food products from any area that is irrigated by water in which liquid plant wastes have been discharged[l]	At time of harvest[m]	Gamma isotopic[e] analysis of edible portions (isotopic to include I-131)
	Samples of three different kinds of broad leaf vegetation (such as vegetables) grown nearest to each of two different offsite locations of highest calculated site average D/Q (based on all licensed site reactors)	Once per year during the harvest season	Gamma isotopic[e] analysis of edible portions (isotopic to include I-131)
	One sample of each of the similar broad leaf vegetation grown at least 9.3 miles distant in a least prevalent wind direction	Once per year during the harvest season	Gamma isotopic[e] analysis of edible portions (isotopic to include I-131)

NOTES FOR TABLE 3.0-2

(a) Deviations are permitted from the required sampling schedule if specimens are unobtainable because of such circumstances as hazardous conditions, seasonal unavailability, [1] or malfunction of automatic sampling equipment. If specimens are unobtainable because sampling equipment malfunctions, effort shall be made to complete corrective action before the end of the next sampling period. All deviations from the sampling schedule shall be documented in the Annual Radiological Environmental Operating Report. It is recognized that, at times it may not be possible or practical to continue 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 and appropriate substitutions may be made within 30 days in the Radiological Environmental Monitoring Program.

(b) 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 (TLD) is considered to be one phosphor; two or more phosphors in a packet are considered as two or more dosimeters. Film badges shall not be used as dosimeters for measuring direct radiation.

(c) 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.

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

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

(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.

(g) In this program, representative composite sample aliquots shall be collected at time intervals that are very short (e.g., hourly) relative to the compositing period (e.g., monthly) in order to assure obtaining a representative sample.

(h) Groundwater samples shall be taken when this source is tapped for drinking or irrigation purposes in areas where the hydraulic gradient or recharge properties are suitable for contamination.

[1]Seasonal unavailability is meant to include theft and uncooperative residents.

(i) Drinking water samples shall be taken only when drinking water is a dose pathway.

(j) Analysis for I-131 may be accomplished by Ge-Li analysis provided that the lower limit of detection (LLD) for I-131 in water samples can be met. Doses shall be calculated for the maximum organ and age group.

(k) In the event two commercially or recreationally important species are not available, after three attempts of collection, then two samples of one species or other species not necessarily commercially or recreationally important may be utilized.

(l) This Control applies only to major irrigation projects within 9 miles of the site in the general "downcurrent" direction.

(m) If harvest occurs more than once a year, sampling shall be performed during each discrete harvest. If harvest occurs continuously, sampling shall be taken monthly. Attention shall be paid to including samples of tuberous and root food products.

3.1 SAMPLE COLLECTION METHODOLOGY

3.1.1 SURFACE WATER

Surface water samples are taken from the respective inlet canals of the James A. Fitzpatrick Nuclear Power Plant (JAFNPP) and the NRG Energy's Oswego Steam Station. The JAFNPP facility draws water from Lake Ontario on a continuous basis. This is used for the "down-current" 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 "up-current" 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 TS/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.

Sampling for ground water and drinking water, as found in Section 3.12.1 of the Nine Mile Point Unit 2 Offsite Dose Calculation Manual (ODCM), was not required during 2001. There was no Groundwater Source in 2001 that was tapped for drinking or irrigation purposes in areas where the hydraulic gradient or recharge properties were suitable for Contamination, and Drinking Water was not a dose pathway during 2001.

3.1.2 AIR PARTICULATE / IODINE

The air sampling stations required by TS/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 east, east-southeast, and southeast sectors as measured from the center of the Nine Mile Point Nuclear Station Unit 2 Reactor Building. The TS/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 southeast sector at a distance of 1.8 miles and is designated as location R-4. A fifth station required by TS/ODCM is a control location designated as Station R-5. Station R-5 is located 16.4 miles from the site in the NE meteorological sector.

In addition to the TS/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 S sectors and range in distance from 7.2 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 (2 x 1 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 stations are shown in Section 3.3, Figures 3.3-2 and 3.3-3.

3.1.3 MILK

Milk samples are routinely collected from six farms during the year. These farms included five indicator locations and one control location. Samples are collected twice per month, April through December and each sample is analyzed for gamma emitting radionuclides and I-131. Samples are collected in January, February and March in the event that I-131 is detected in November and December of the preceding year.

The selection of milk sample locations is based on maximum deposition calculations (D/Q). Deposition values are generated using average historical meteorological data for the site. The TS/ODCM require three sample locations within 5.0 miles of the site with the highest calculated deposition value. During 2001 there were no milk sample locations within 5.0 miles that were suitable for sampling based on production capabilities. There were however, five optional locations beyond five miles that were sampled as indicator locations for the routine milk sampling program.

The TS/ODCM also required that a sample be collected from a location greater than ten miles from the site and in a least prevalent wind direction. This location is in the southwest sector 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 collected from each indicator and control location during the first half and second half of each month. 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 found in Section 3.3 on Figure 3.3-4. (Refer to Table 3.3-1, Section 3.3 for location designation and descriptions).

3.1.4 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 gardens identified in the annual census that have the highest estimated deposition values (D/Q) based on historical site meteorological data. Control samples are also collected from available locations greater than 9.3 miles distance from the site in a less prevalent wind direction. Control samples are of the same or similar type of vegetation when available.

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

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

3.1.5 FISH SAMPLES

Samples of available fish species are selected from the Nine Mile Point Aquatic Ecology Study which monitors lake fish population. Fish samples are collected twice per year,

once in the spring and again in the fall. Indicator samples are collected from a combination of the four 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. Samples are composed of 0.5 to 1 kilogram of the edible portion only. A minimum of two species are to be collected from each sample location.
b. Samples composed of more than 1 kilogram of a single species from the same location are divided into samples of 1 kilogram each. Sample weights include only the edible portions.
c. Samples are limited to edible and/or sport species when available.

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 on Figure 3.3-5.

3.1.6 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 locations are shown in Section 3.3 on Figure 3.3-5.

3.1.7 TLD (DIRECT RADIATION)

Thermoluminescent dosimeters (TLDs) are used to measure direct radiation (gamma dose) in the environment. TLDs are supplied and processed quarterly by JAFNPP Environmental Laboratory. The laboratory utilizes a Panasonic based system using UD-814 dosimeters. Each dosimeter contains three calcium sulfate elements and one lithium borate element. Two dosimeters are placed at each monitoring location.

Five different regions around site are evaluated using environmental TLDs.

- On-site areas (areas within the site boundary not required by TS/ODCM)
- Site boundary area in each of the 16 meteorological sectors
- An outer ring of TLDs (located four to five miles from the site in the eight land based meteorological sectors)
- Special interest TLDs (located at sites of high population density and use)
- Control TLDs located at sites beyond significant influence of the site.

Special interest TLDs are located at or near large industrial sites, schools, or nearby towns or communities. Control TLDs are located to the southwest, south and northeast of the site at distances of 12.6 to 24.7 miles.

TLDs used for the program are constructed of rectangular teflon wafers impregnated with 25 percent $CaSO_4$:Dy phosphor. Badges are sealed in polyethylene packages to ensure dosimeter integrity. TLD packages are placed in open webbed plastic holders and attached to supporting structures, such as utility poles.

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

3.2 ANALYSES PERFORMED

The majority of environmental sample analyses are performed by the James A. FitzPatrick Nuclear Power Plant (JAFNPP) Environmental Laboratory. During 2001, the tritium analysis for the Site Environmental Monitoring Program was performed by two separate laboratories. Samples collected during the first quarter of the year were analyzed by Environmental Inc.'s midwest laboratory (formerly Teledyne, Midwest Laboratory). Tritium analysis for samples collected during the second, third and fourth quarters of 2001 was performed by Duke Engineering and Services, Environmental Laboratory. The following samples are analyzed at the JAFNPP Environmental Laboratory:

- Air Particulate Filter – gross beta
- Air Particulate Filter Composites – gamma spectral analysis
- Airborne Radioiodine – gamma spectral analysis
- Surface Water Monthly Composites – gamma spectral analysis
- Fish – gamma spectral analysis
- Shoreline Sediment – gamma spectral analysis
- Milk – gamma spectral analysis and I-131
- Direct Radiation – Thermoluminescent Dosimeters (TLDs)
- 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

- Figure 3.3-1 – New York State Map
- Figure 3.3-2 – Off-site Environmental Station and TLD Location Map
- Figure 3.3-3 – On-site Environmental Station and TLD Location Map
- Figure 3.3-4 – Milk Animal Census, Milk Sample Location and Surface Water Sample Location Map
- Figure 3.3-5 – Nearest Resident, Food Product, Shoreline Sediment, Fish Sample Location Map

TABLE 3.3-1

2001 ENVIRONMENTAL SAMPLE LOCATIONS

SAMPLE MEDIUM	MAP DESIGNATION	FIGURE NUMBER	LOCATION DESCRIPTION	DEGREES & DISTANCE (1)
Shoreline Sediment	05*	Figure 3.3-5	Sunset Bay	80° at 1.5 miles
	06	Figure 3.3-5	Langs Beach, Control	230° at 5.8 miles
Fish	02*	Figure 3.3-5	Nine Mile Point Transect	315° at 0.3 miles
	03*	Figure 3.3-5	FitzPatrick Transect	55° at 0.6 miles
	00*	Figure 3.3-5	Oswego Transect	235° at 6.2 miles
Surface Water	3*	Figure 3.3-4	FitzPatrick Inlet	70° at 0.5 miles
	08*	Figure 3.3-4	Oswego Steam Station Inlet	235° at 7.6 miles
	9	Figure 3.3-4	NMP Unit 1 Inlet	305° 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	88° at 1.8 miles
	R-2*	Figure 3.3-3	R-2 Station, Lake Road	104° at 1.1 miles
	R-3*	Figure 3.3-3	R-3 Station, Co. Rt. 29	132° at 1.5 miles
	R-4*	Figure 3.3-3	R-4 Station, Co. Rt. 29	143° at 1.8 miles
	R-5*	Figure 3.3-2	R-5 Station, Montario Point Road	42° at 16.4 miles
	D1	Figure 3.3-3	D1 On-Site Station	69° at 0.2 miles
	G	Figure 3.3-3	G On-Site Station	250° at 0.7 miles
	H	Figure 3.3-3	H On-Site Station	70° at 0.8 miles
	I	Figure 3.3-3	I On-Site Station	98° 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 0.5 miles
	G	Figure 3.3-2	G Off-Site Station, Saint Paul Street	225° at 5.3 miles
	D2	Figure 3.3-2	D2 Off-Site Station, Rt. 64	117° at 9.0 miles
	E	Figure 3.3-2	E Off-Site Station, Rt. 4	160° at 7.2 miles
	F	Figure 3.3-2	F Off-Site Station, Dutch Ridge Road	190° at 7.7 miles

TABLE 3.3-1 (Continued)

2001 ENVIRONMENTAL SAMPLE LOCATIONS

SAMPLE MEDIUM	MAP DESIGNATION	FIGURE NUMBER	LOCATION DESCRIPTION	DEGREES & DISTANCE (1)
Thermoluminescent Dosimeters (TLD)	3	Figure 3.3-3	D1 On-Site Station	69° at 0.2 miles
	4	Figure 3.3-3	D2 On-Site Location	140° at 0.4 miles
	5	Figure 3.3-3	E On-Site Location	175° at 0.4 miles
	6	Figure 3.3-3	F On-Site Location	210° at 0.5 miles
	7*	Figure 3.3-3	G On-Site Station	250° at 0.7 miles
	8	Figure 3.3-2	R-5 Off-Site Station	42° at 16.4 miles
	9	Figure 3.3-2	D1 Off-Site Location	80° at 11.4 miles
	10	Figure 3.3-2	D2 Off-Site Station	117° at 9.0 miles
	11	Figure 3.3-2	E Off-Site Station	160° at 7.2 miles
	12	Figure 3.3-2	F Off-Site Station	190° at 7.7 miles
	13	Figure 3.3-2	G Off-Site Station	225° at 5.3 miles
	14*	Figure 3.3-2	Southwest Oswego - Control	226° at 12.6 miles
	15*	Figure 3.3-2	West Site Boundary	237° at 0.9 miles
	18*	Figure 3.3-3	Energy Information Center	265° at 0.4 miles
	19	Figure 3.3-2	East Site Boundary	81° at 1.3 miles
	23*	Figure 3.3-3	H On-Site Station	70° at 0.8 miles
	24	Figure 3.3-3	I On-Site Station	98° at 0.8 miles
	25	Figure 3.3-3	J On-Site Station	110° at 0.9 miles
	26	Figure 3.3-3	K On-Site Station	132° at 0.5 miles
	27	Figure 3.3-3	North Fence, JAFNPP	60° at 0.4 miles
	28	Figure 3.3-3	North Fence, JAFNPP	68° at 0.5 miles
	29	Figure 3.3-3	North Fence, JAFNPP	65° at 0.5 miles
	30	Figure 3.3-3	North Fence, JAFNPP	57° at 0.4 miles
	31	Figure 3.3-3	North Fence, NMP-1	276° at 0.2 miles
	39	Figure 3.3-3	North Fence, NMP-1	292° at 0.2 miles
	47	Figure 3.3-3	North Fence, JAFNPP	69° at 0.6 miles
	49*	Figure 3.3-2	Phoenix, NY - Control	170° at 19.8 miles
	51	Figure 3.3-2	Oswego Steam Station, East	233° at 7.4 miles
	52	Figure 3.3-2	Fitzhugh Park Elementary School, East	227° at 5.8 miles
	53	Figure 3.3-2	Fulton High School	183° at 13.7 miles
	54	Figure 3.3-2	Mexico High School	115° at 9.3 miles
	55	Figure 3.3-2	Pulaski Gas Substation, Rt. 5	75° at 13.0 miles

TABLE 3.3-1 (Continued)

2001 ENVIRONMENTAL SAMPLE LOCATIONS

SAMPLE MEDIUM	MAP DESIGNATION	FIGURE NUMBER	LOCATION DESCRIPTION	DEGREES & DISTANCE (1)
Thermoluminescent Dosimeters (TLD) (Continued)	56*	Figure 3.3-2	New Haven Elementary School	123° at 5.3 miles
	58*	Figure 3.3-2	County Route 1 and Alcan	220° at 3.1 miles
	75*	Figure 3.3-3	North Fence, NMP-2	5° at 0.1 miles
	76*	Figure 3.3-3	North Fence, NMP-2	25° at 0.1 miles
	77*	Figure 3.3-3	North Fence, NMP-2	45° at 0.2 miles
	78*	Figure 3.3-3	East Boundary, JAFNPP	90° at 1.0 miles
	79*	Figure 3.3-3	County Route 29	115° at 1.1 miles
	80*	Figure 3.3-3	County Route 29	133° at 1.4 miles
	81*	Figure 3.3-3	Miner Road	159° at 1.6 miles
	82*	Figure 3.3-3	Miner Road	181° at 1.6 miles
	83*	Figure 3.3-3	Lakeview Road	200° at 1.2 miles
	84*	Figure 3.3-2	Lakeview Road	225° at 1.1 miles
	85*	Figure 3.3-3	North Fence, NMP-1	294° at 0.2 miles
	86*	Figure 3.3-3	North Fence, NMP-1	315° at 0.1 miles
	87*	Figure 3.3-3	North Fence, NMP-2	341° at 0.1 miles
	88*	Figure 3.3-2	Hickory Grove Road	97° at 4.5 miles
	89*	Figure 3.3-2	Leavitt Road	111° at 4.1 miles
	90*	Figure 3.3-2	Route 104 and Keefe Road	135° at 4.2 miles
	91*	Figure 3.3-2	County Route 51A	156° at 4.8 miles
	92*	Figure 3.3-2	Maiden Lane Road	183° at 4.4 miles
	93*	Figure 3.3-2	County Route 53	205° at 4.4 miles
	94*	Figure 3.3-2	County Route 1 and Kocher Road	223° at 4.7 miles
	95*	Figure 3.3-2	Lakeshore Camp Site	237° at 4.1 miles
	96*	Figure 3.3-2	Creamery Road	199° at 3.6 miles
	97*	Figure 3.3-3	County Route 29	143° at 1.8 miles
	98*	Figure 3.3-2	Lake Road	101° at 1.2 miles
	99	Figure 3.3-2	Nine Mile Point Road	88° at 1.8 miles
	100	Figure 3.3-3	County Route 29 and Lake Road	104° at 1.1 miles
	101	Figure 3.3-3	County Route 29	132° at 1.5 miles
	102	Figure 3.3-2	Oswego County Airport	175° at 11.9 miles
	103	Figure 3.3-3	Energy Center, East	267° at 0.4 miles
	104	Figure 3.3-2	Parkhurst Road	102° at 1.4 miles

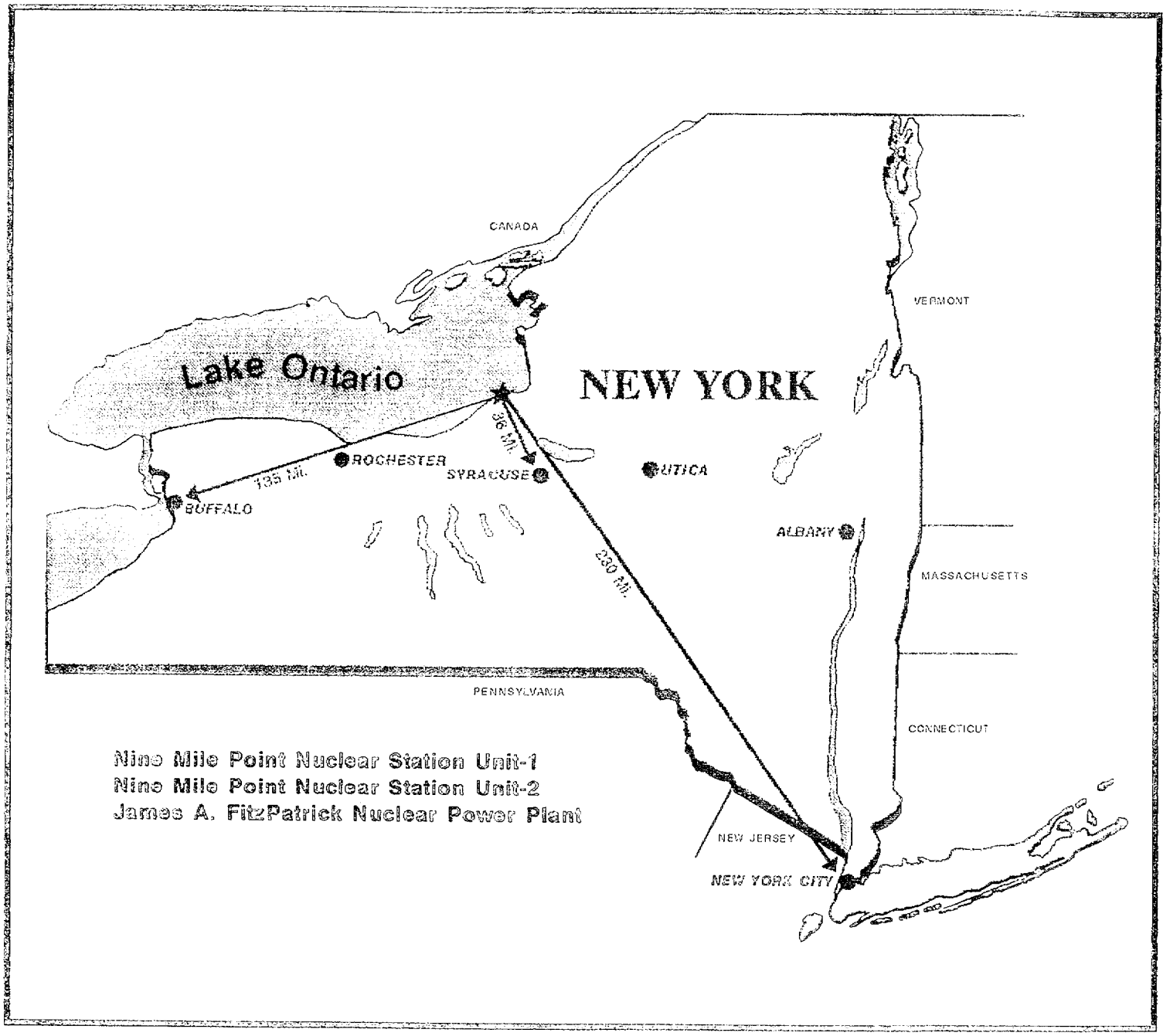
TABLE 3.3-1 (Continued)

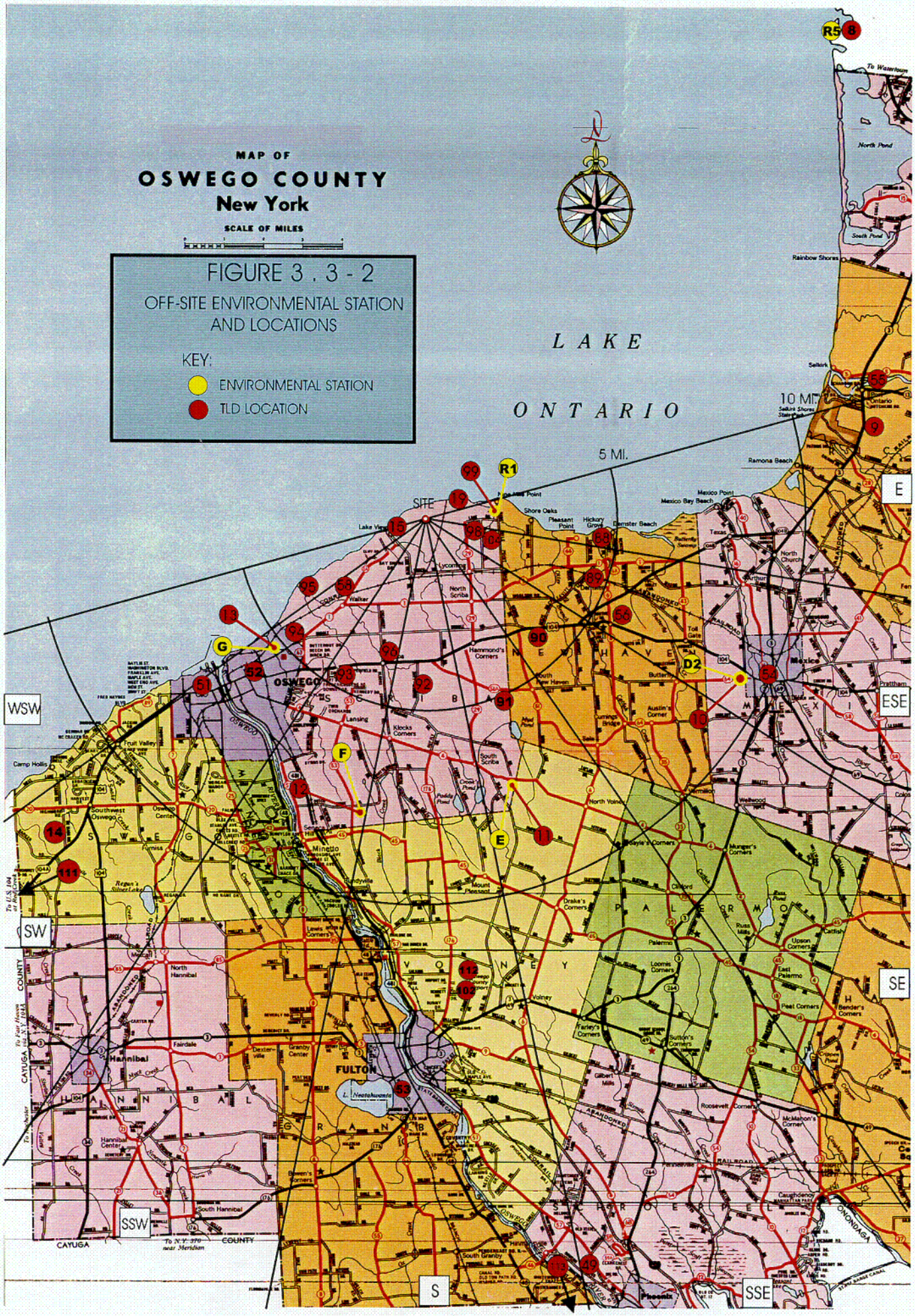
2001 ENVIRONMENTAL SAMPLE LOCATIONS

SAMPLE MEDIUM	MAP DESIGNATION	FIGURE NUMBER	LOCATION DESCRIPTION	DEGREES & DISTANCE (1)
Thermoluminescent Dosimeters (TLD) (Continued)	105	Figure 3.3-3	Lakeview Road	198° at 1.4 miles
	106	Figure 3.3-3	Shoreline Cove, West of NMP-1	274° at 0.3 miles
	107	Figure 3.3-3	Shoreline Cove, West of NMP-1	272° at 0.3 miles
	108	Figure 3.3-3	Lake Road	104° at 1.1 miles
	109	Figure 3.3-3	Lake Road	103° at 1.1 miles
	111	Figure 3.3-2	Sterling, NY - Control	214° at 21.8 miles
	113	Figure 3.3-2	Baldwinsville, NY - Control	178° at 24.7 miles
Cows Milk	76	Figure 3.3-4	Indicator Location	132° at 5.2 miles
	50	Figure 3.3-4	Indicator Location	93° at 8.2 miles
	55	Figure 3.3-4	Indicator Location	95° at 9.0 miles
	60	Figure 3.3-4	Indicator Location	90° at 9.5 miles
	4	Figure 3.3-4	Indicator Location	113° at 7.8 miles
	73*	Figure 3.3-4	Control Location	234° at 13.9 miles
	77	Figure 3.3-4	Control Location	191° at 13.9 miles
Food Products	X	Figure 3.3-5	Indicator Location	153° at 1.5 miles
	Q	Figure 3.3-5	Indicator Location	136° at 1.7 miles
	P	Figure 3.3-5	Indicator Location	101° at 1.9 miles
	L	Figure 3.3-5	Indicator Location	115° at 1.9 miles
	V*	Figure 3.3-5	Indicator Location	97° at 1.8 miles
	S*	Figure 3.3-5	Indicator Location	97° at 1.8 miles
	K*	Figure 3.3-5	Indicator Location	96° at 1.7 miles
	M*	Figure 3.3-5	Control Location	225° at 15.6 miles

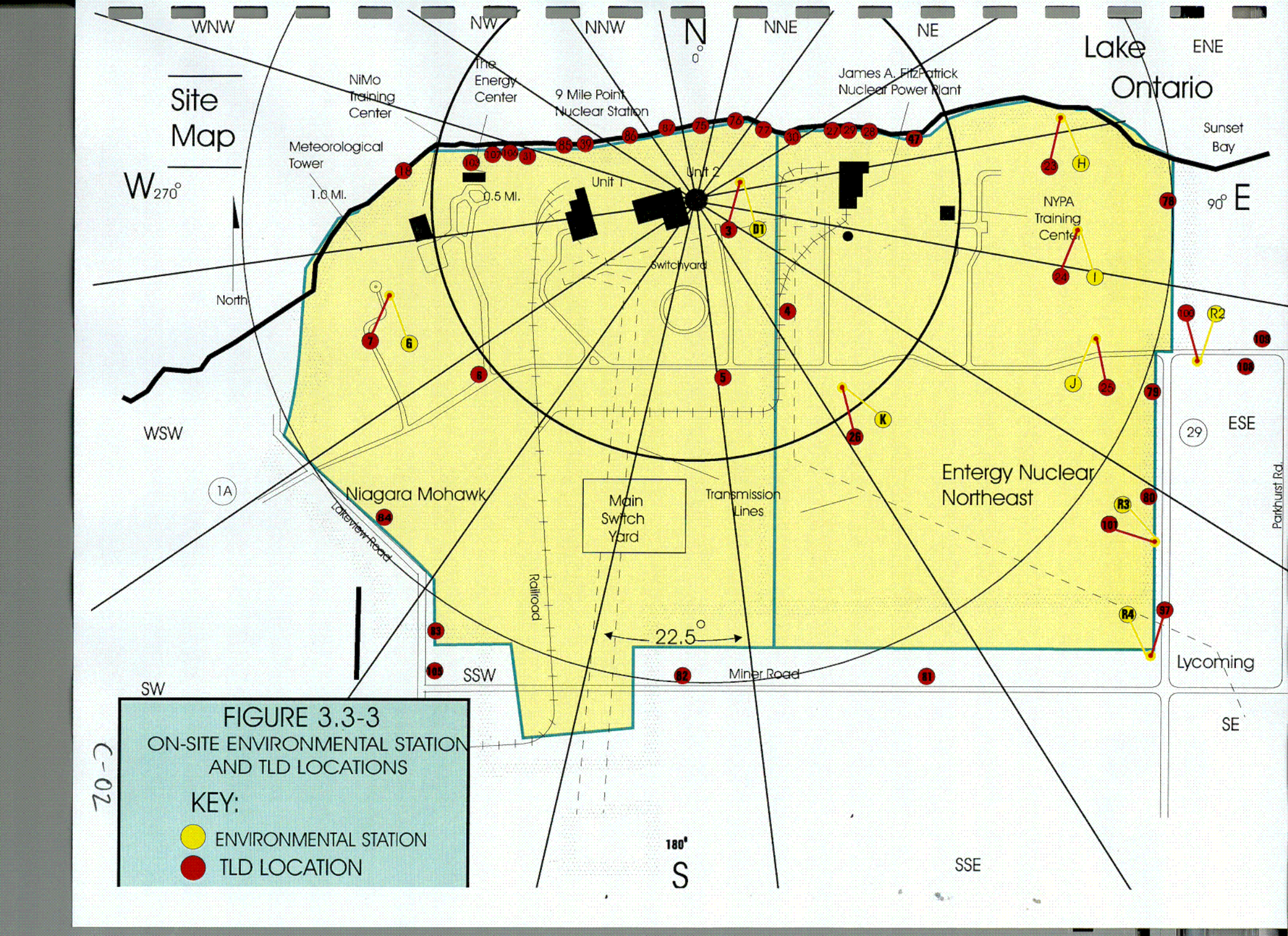
* - TS/ODCM location.
(1) - Degrees and distance based on Nine Mile Point Unit 2 reactor centerline.

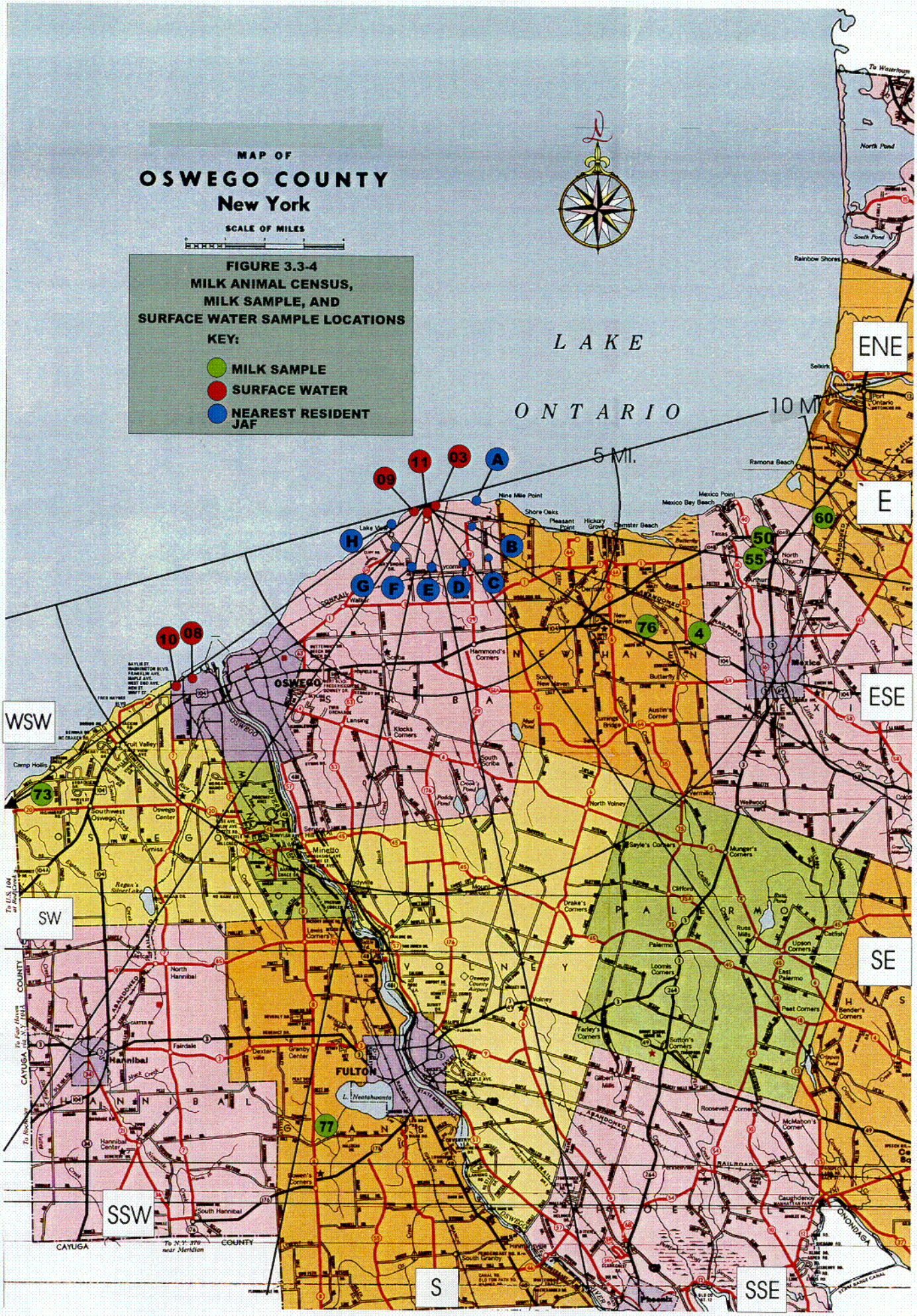
FIGURE 3.3-1
NEW YORK STATE MAP



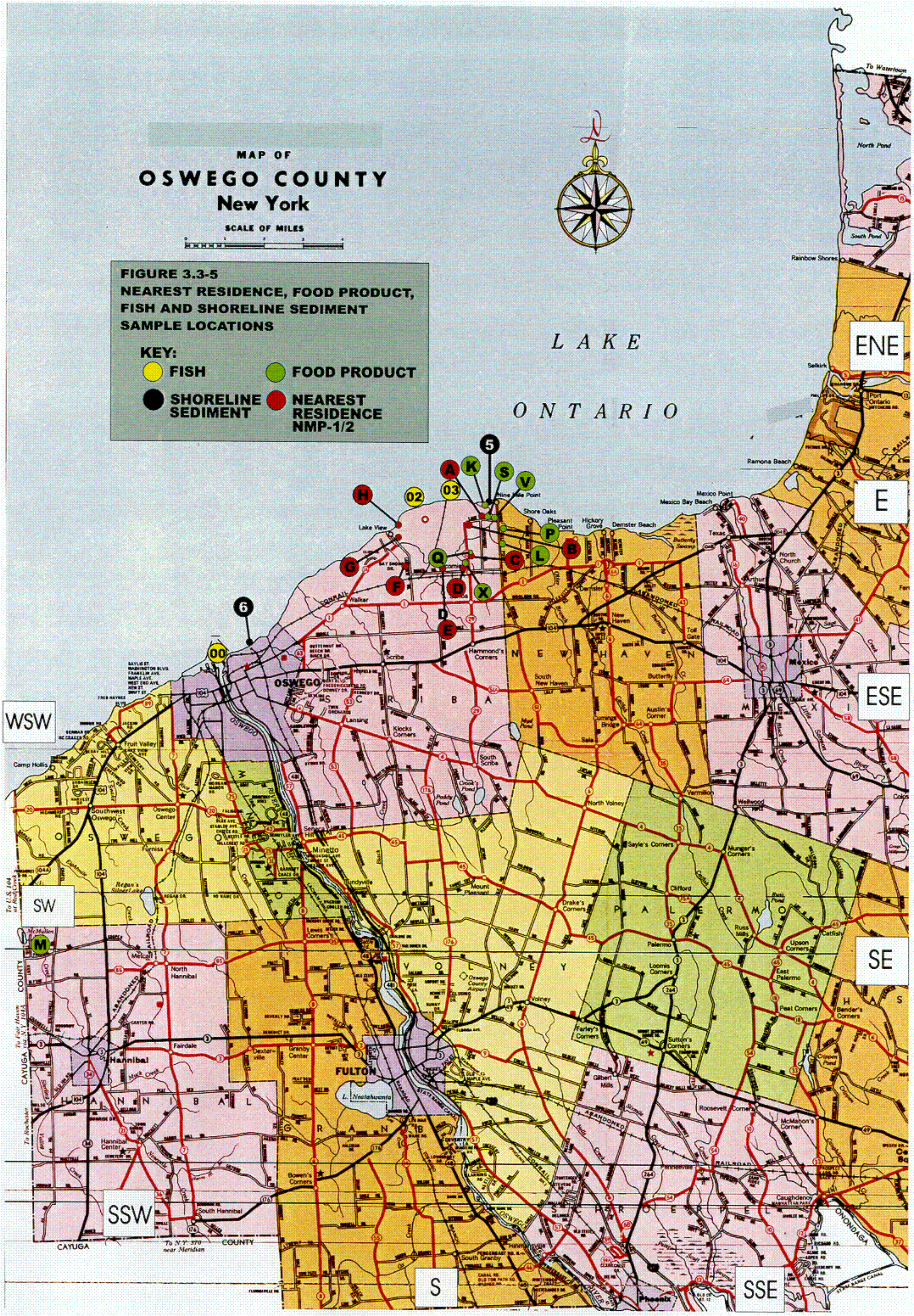

MAP OF
OSWEGO COUNTY
New York
SCALE OF MILES
FIGURE 3 . 3 - 2
OFF-SITE ENVIRONMENTAL STATION AND LOCATIONS
KEY:
ENVIRONMENTAL STATION
TLD LOCATION
LAKE ONTARIO
5 MI.
10 MI.
SITE
OSWEGO
FULTON
Hannibal
Mexico
Phoenix
WSW
ESE
SW
SE
SSW
SSE
S
E
CAYUGA COUNTY
ONONDAGA

C-01


Site Map
WNW
NW
NNW
N
0°
NNE
NE
ENE
Lake Ontario
NiMo Training Center
The Energy Center
9 Mile Point Nuclear Station
James A. FitzPatrick Nuclear Power Plant
Sunset Bay
Meteorological Tower
1.0 MI.
0.5 MI.
Unit 1
Unit 2
W 270°
90° E
NYPA Training Center
Switchyard
North
WSW
ESE
29
1A
Niagara Mohawk
Entergy Nuclear Northeast
Main Switch Yard
Transmission Lines
Lakeview Road
Railroad
Parkhurst Rd.
22.5°
SSW
Miner Road
Lycoming
SW
SE
180°
S
SSE
FIGURE 3.3-3
ON-SITE ENVIRONMENTAL STATION AND TLD LOCATIONS
KEY:
ENVIRONMENTAL STATION
TLD LOCATION
C-02


MAP OF
OSWEGO COUNTY
New York
SCALE OF MILES
FIGURE 3.3-4
MILK ANIMAL CENSUS,
MILK SAMPLE, AND
SURFACE WATER SAMPLE LOCATIONS
KEY:
MILK SAMPLE
SURFACE WATER
NEAREST RESIDENT
JAF
LAKE
ONTARIO
5 MI.
10 MI.
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
OSWEGO
FULTON
Hannibal
Camp Hollis
Selkirk
Rainbow Shores
Ramona Beach
Mexico Point
Mexico Bay Beach
Nine Mile Point
Shore Oaks
Pleasant Point
Hickory Grove
Oswego Center
Southwest Oswego
Minetto
Lansing
Klocks Corners
Hammond's Corners
South New Haven
New Haven
North Church
Mexico
Butterfly
Austin's Corner
Lumings Bridge
North Volney
Sayle's Corners
Munger's Corners
Clifford
Drake's Corners
Palermo
Russ Mills
Upson Corners
Loomis Corners
East Palermo
Peet Corners
Bender's Corners
Volney
Farley's Corners
Sutton's Corners
Gilbert Mills
Roosevelt Corners
McMahon's Corner
Caughdenoy
North Hannibal
Fairdale
Dexterville
Granby Center
Hannibal Center
South Hannibal
Bowen's Corners
South Granby
Phoenix
CAYUGA COUNTY
ONONDAGA
To N.Y. 370 near Meridian
To Watertown
North Pond
South Pond

C-03


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-1/2
LAKE
ONTARIO
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
OSWEGO
FULTON
Mexico
Hannibal
CAYUGA
COUNTY
ONONDAGA

C-04

3.4 LAND USE CENSUS

The TS/ODCM require that a milch animal census and a residence census be conducted annually. 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 TS/ODCM if broadleaf vegetation sampling and analysis is performed.

3.5 CHANGES TO THE REMP PROGRAM

The following changes were implemented during the 2001 sampling program.

A. Food Product/Vegetation

The food product/vegetation sample locations are evaluated each sampling season based on meteorology and product availability. The following sample location changes were implemented in 2001:

- Garden vegetation/food products were collected from location Q for the 2001 sampling program. This location was not sampled in the 2000 program but was utilized in 2001 due to the availability of samples at harvest time. (NMPNS Unit 1 and Unit 2 ODCM Table 5-1 Location No. 62).

B. Milk Sampling

The existing milk sampling program control location (NMPNS Unit 1 and 2 ODCM Table 5-1 Location No. 73) was deleted from the sampling program in August 2001. The last sample collected from this location was in August 20, 2001. The sampling location was retired because the owner ceased milk production and sold the milking herd. The retired control location was replaced by the new control location, which was first sampled on August 06, 2001. The NMPNS Unit 1 and Unit 2 ODCM was revised to reflect the change in control location for the site milk sampling program. The new sampling location is designated as ODCM milk sampling location 77 (NMPNS Unit 1 and Unit 2 Table 5-1 Location No. 77).

Collection Site	U1/U2 ODCM No.	Location*
old milk control	73	13.9 miles @ 234°SW
new milk control	77	13.9 miles @ 191°SW

*Based on Nine Mile Point Unit 2 Reactor Centerline

3.6. DEVIATION AND EXCEPTIONS TO THE PROGRAM

Exceptions to the 2001 sample program concern those samples or monitoring requirements which are required by the TS/ODCM. This section satisfies the reporting requirements of Section 6.9.1.d of the Nine Mile Point Unit 1 Technical Specifications and Section D4.1.2 of the Nine Mile Point Unit 2 Offsite Dose Calculation Manual.

A. The following are deviations from the program specified by the TS/ODCM:

1. The air sampling pump at the R-1 and R-2 Environmental Sampling Station were inoperable for approximately 4.5 hours during the sample period of 02/06/01 through 2/13/01. The inoperability of the sampling pumps was caused by a power outage, which was weather related. No corrective action was implemented.

2. The air sampling pumps at the R-1 Environmental Sampling Station was inoperable for approximately 9 hours during the period 05/22/01 through 05/29/01. The inoperability of the sampling pump was caused by an electrical power outage initiated by NMPC for line maintenance to replace a broken pole in the vicinity. No corrective action was implemented.

3. The air sampling pumps at the R-1 and R-2 Environmental Sampling Stations were inoperable for approximately 3 hours on 06/01/01. the inoperability of the sampling pumps was caused by electrical power outage initiated by NMPC for line maintenance on the distribution system in the vicinity. No corrective action was implemented.

4. The air sampling pump at the R-1 Offsite Environmental Station was inoperable for approximately 3 hours on November 13, 2001 (13:00 hours to 16:00 hours). The inoperability of the sampling pump was caused by an electrical power outage initiated by NMPC for line maintenance to

relocate a utility pole power supply. No corrective action was implemented.

5. The air sampling pumps at the R-1 and R-2 Offsite Environmental Sampling Stations were inoperable for approximately 7 hours on November 17, 2001 (01:30 hours to 08:00 hours). The inoperability of the sampling pumps was caused by a power outage, which was the result of a car accident involving a power pole. No corrective action was implemented.

B. AIR SAMPLING STATION OPERABILITY ASSESSMENT

The TS/ODCM required air sampling program consist of 5 individual sampling locations. The collective operable time period for the 5 air monitoring stations was 43,759 hours out of a possible 43,800. The air sampling availability factor for the report period was 99.91%

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 NMPNS 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

B. Standard Deviation

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

Where,

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

S = standard deviation for the sample population

3.7.2 ESTIMATION OF THE MEAN AND 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 ($\bar{X}$) and the associated propagated error.

A. Mean

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

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)

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

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 TS/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 before-the-fact lower limit of detection, as defined above (in picocurie per unit mass or volume);

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

E = is the counting efficiency (in counts per disintegration);

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

2.22 = is the number of disintegrations per minute per picocurie;

Y = is 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 TS/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 TS/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 TS/ODCM program required LLDs for specific media and radionuclides. The LLDs actually achieved are routinely much lower than those specified by the TS/ODCM.

3.8 COMPLIANCE WITH REQUIRED LOWER LIMITS OF DETECTION

Tables 4.6.20-1 and D 3.5.1-3 of the Nine Mile Point Unit 1 Technical Specifications and Nine Mile Point Unit 2 Offsite Dose Calculation Manual, respectively, specifies the detection capabilities for environmental sample analysis (See Report Table 3.8-1). Section 3.6.20/DSR 3.5.1.1 of the TS/ODCM requires that a discussion of all analyses for which the required LLDs specified were not routinely achieved be included in the Annual Radiological Environmental Operating Report. Section 3.8 is provided pursuant to this requirement.

3.8.1 All sample analyses performed in 2001, as required by the TS/ODCM, achieved the Lower Limit of Detection (LLD) specified by TS/ODCM Tables 4.6.20-1 / D 3.5.1-3.

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/m3)	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.

SECTION 4.0

SAMPLE SUMMARY TABLES – BRANCH TECHNICAL POSITION FORMAT

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

3. Required Lower Limits of Detection (LLD), see Section 3.8, Table 3.8-1. This wording indicates that inclusive data is based on $4.66S_b$ (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 nonroutine reports sent to the Nuclear Regulatory Commission.

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

TABLE 4.0-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY
NINE MILE POINT NUCLEAR STATION UNIT 1 DOCKET NO. 50-220
NINE MILE POINT NUCLEAR STATION UNIT 2 DOCKET NO. 50-410
OSWEGO COUNTY, STATE OF NEW YORK, JANUARY - DECEMBER 2001*

MEDIUM (UNITS)	TYPE AND NUMBER OF ANALYSES*	LLD(a)	INDICATOR LOCATIONS: MEAN (f) RANGE	LOCATION (b) OF HIGHEST ANNUAL MEAN: LOCATION & MEAN (f) RANGE	CONTROL LOCATION: MEAN (f) RANGE	NUMBER OF NONROUTINE REPORTS
Shoreline Sediment*	GSA(4):					
(pCi/kg-dry)	Cs-134	150	<LLD	<LLD	<LLD	0
	Cs-137	180	67 (2/2)	Sunset Bay: 67 (2/2)	<LLD	0
			63-71	1.5 at 80° 63-71		
Fish*	GSA(21): (h)					
(pCi/kg-wet)	Mn-54	130	<LLD	<LLD	<LLD	0
	Fe-59	260	<LLD	<LLD	<LLD	0
	Co-58	130	<LLD	<LLD	<LLD	0
	Co-60	130	<LLD	<LLD	<LLD	0
	Zn-65	260	<LLD	<LLD	<LLD	0
	Cs-134	130	<LLD	<LLD	<LLD	0
	Cs-137	150	<LLD	<LLD	< LLD	0
Surface Water*	H-3 (8):					
(pCi/liter)	H-3	3000(c)	< LLD	< LLD	< LLD	0
	GSA (24):					
	Mn-54	15	<LLD	<LLD	<LLD	0
	Fe-59	30	<LLD	<LLD	<LLD	0
	Co-58	15	<LLD	<LLD	<LLD	0
	Co-60	15	<LLD	<LLD	<LLD	0
	Zn-65	30	<LLD	<LLD	<LLD	0
	Zr-95	15	<LLD	<LLD	<LLD	0
	Nb-95	15	<LLD	<LLD	<LLD	0
	I-131	15(c)	<LLD	<LLD	<LLD	0
	Cs-134	15	<LLD	<LLD	<LLD	0
	Cs-137	18	<LLD	<LLD	<LLD	0
	Ba/La-140	15	<LLD	<LLD	<LLD	0

SECTION 5.0

DATA EVALUATION AND DISCUSSION

TABLE 4.0-1 (Continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY
NINE MILE POINT NUCLEAR STATION UNIT 1 DOCKET NO. 50-220
NINE MILE POINT NUCLEAR STATION UNIT 2 DOCKET NO. 50-410
OSWEGO COUNTY, STATE OF NEW YORK, JANUARY - DECEMBER 2001*

MEDIUM (UNITS)	TYPE AND NUMBER OF ANALYSES*	LLD(a)	INDICATOR LOCATIONS: MEAN (f) RANGE	LOCATION (b) OF HIGHEST ANNUAL MEAN: LOCATION & MEAN (f) RANGE		CONTROL LOCATION: MEAN (f) RANGE	NUMBER OF NONROUTINE REPORTS
TLD* (mrem per standard month)	Gamma Dose(128):	(d)	5.08(120/120) 3.6-10.3	TLD #85 (g) 0.2 at 294°	9.7 (4/4) 8.4-10.3	4.4 (8/8) 3.9-5.0	0
Air Particulates* pCi/m^3	Gross Beta(260):	0.01	0.016(208/208) 0.004-0.037	R-4 1.8 at 143°	0.015(52/52) 0.006-0.037	0.016(52/52) 0.006-0.034	0
	I-131(260):	0.07	<LLD	<LLD		<LLD	0
	GSA(60):						
	Cs-134	0.05	<LLD	<LLD		<LLD	0
	Cs-137	0.06	<LLD	<LLD		<LLD	0
Milk* (pCi/liter)	GSA(100): (e)(h)						
	Cs-134	15	<LLD	<LLD		<LLD	0
	Cs-137	18	<LLD	<LLD		<LLD	0
	Ba/La-140	15	<LLD	<LLD		<LLD	0
	I-131(90):						
	I-131	1	<LLD	<LLD		<LLD	0
Food Products* (pCi/kg-wet) (broadleaf vegetation)	GSA(20):(h)						
	I-131	60	<LLD	<LLD		<LLD	0
	Cs-134	60	<LLD	<LLD		<LLD	0
	Cs-137	80	<LLD	<LLD		<LLD	0

TABLE 4.0-1 (Continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY
NINE MILE POINT NUCLEAR STATION UNIT 1 DOCKET NO. 50-220
NINE MILE POINT NUCLEAR STATION UNIT 2 DOCKET NO. 50-410
OSWEGO COUNTY, STATE OF NEW YORK, JANUARY - DECEMBER 2001*

TABLE NOTES:

* = Data for Table 4 is based on TS/ODCM required samples unless otherwise indicated.

(a) = LLD values as required by the Radiological Technical Specifications (TS/ODCM). LLD units are specified in the medium column.

(b) = Location is distance in miles and direction in compass degrees based on NMP-2 reactor center-line. Units for this column are specified in medium column.

(c) = The TS/ODCM specify an I-131 and tritium LLD value for surface water analysis (non-drinking water) of 15 pCi/liter and 3000 pCi/liter respectively.

(d) = The TS/ODCM do not specify a particular LLD value to environmental TLDs. The NMP-1 and NMP-2 Off-Site Dose Calculation Manuals contain specifications for environmental TLD sensitivities.

(e) = The TS/ODCM criteria for indicator milk sample locations includes locations within 5.0 miles of the site. There are no milk sample locations within 5.0 miles of the site. Therefore, the only sample location required by the Technical Specifications (Unit 2 Offsite Dose Calculation Manual following Improved Technical Specifications Implementation 12/02/00) is the control location. There were five optional indicator locations during 2001.

(f) = Fraction of number of detectable measurements to total number of measurements. Mean and range results are based on detectable measurements only.

(g) = The results for TLD #85 must be evaluated with the knowledge that this TLD is in close proximity (300-500 feet) of the Nine Mile Point Unit 1 reactor building and the radwaste buildings. This TLD, as well as other TLDs in this area, are adjacent to the lake shoreline which is a restricted area to members of the public. There are no residences or private property near this area.

(h) = Data includes results from optional samples in addition to samples required by the TS/ODCM.

5.0 DATA EVALUATION AND DISCUSSION

A. Introduction

Each year the results of the Annual Radiological Environmental Monitoring Program are evaluated considering natural processes in the environment and the collection of past 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 2001 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 (μCi), 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 which 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.

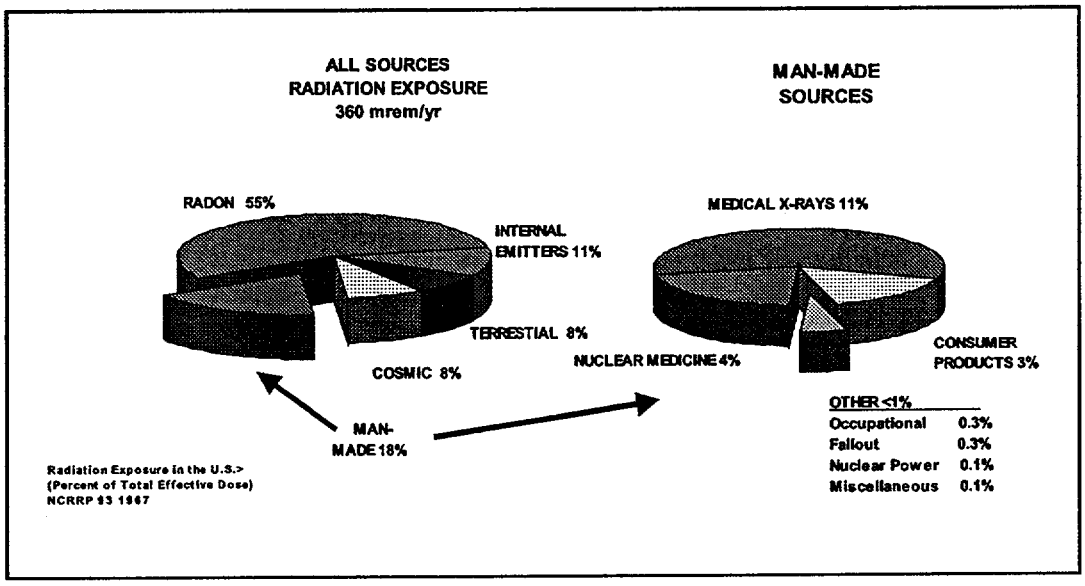
C. Dose/Dose to Man

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 2001 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.



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, radium-226, naturally occurring radionuclide 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 discussed in some cases in Section 5.0 of this report. The data on primary naturally occurring radionuclides are included in Section 6.0, Report Period Analytical Results Tables. 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 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 a number of 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 2001, H-3 and C-137 were the potentially plant-related radionuclides detected in the TS/ODCM samples.

A number of factors must be considered in performing radiological sample data evaluation and interpretation. The evaluation is made at several levels including trend analysis and dose to man. An attempt has been made not only to report the data collected during 2001, but also to assess the significance of the radionuclides detected in the environment as compared to natural and other man-made 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 form all sources, as noted in National Council on Radiation Protection and Measurement (NCRP) Report No. 93, "Ionizing Radiation Exposure of the Population of the United States". 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.

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 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 2001.

The results for each sample medium are discussed in detail in Section 5.0. 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 operating license.
- Provide more comprehensive monitoring than is currently required.

These additional samples may include; aquatic vegetation (cladophora), bottom sediment, mollusk, milk (Sr-90), meat, poultry and soil samples. 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 TS/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 TS/ODCM sample media are included in the data presentation and evaluation. When additional locations are included, the use of this data will be specifically noted in Section 5.0

Section 6.0 contains the analytical results for the sample media addressed in this report. Tables are provided for each required sample medium analyzed during the 2001 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 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 2001 sampling period.

5.1.1 SHORELINE SEDIMENT RESULTS

A. Results Summary

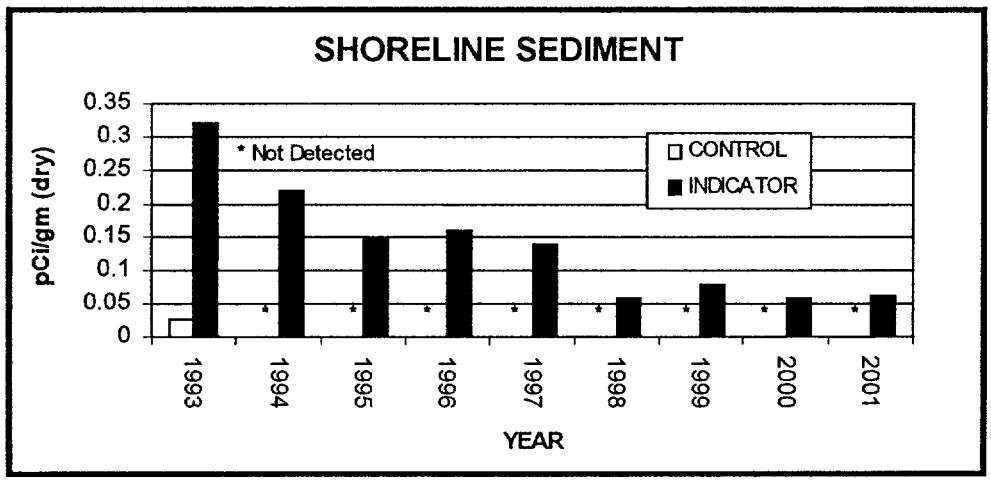
Shoreline sediment samples were obtained in April and October of 2001 at one off-site control location (near Oswego Harbor) and at one indicator location which is an area east of the site considered to have recreational value.

A total of four sediment samples were collected for the 2001 sample program, two indicator and two control. Cs-137 was detected in the two samples taken at Sunset Beach which is the indicator location. The Cs-137 concentrations in the 2001 samples ranged from a minimum of 0.063 pCi/g (dry) to a maximum of 0.071 pCi/g (dry). Cs-137 was not detected at the control location during 2001, however, it has been detected in the past in the 1993 sample at a concentration of 0.03 pCi/g (dry). The general lack of
Cs-137 at the control location is attributed to the differences in the sediment types between the two sample locations.

Historical Cs-137 concentrations at previous control locations have ranged from 0.03 to 0.22 pCi/g (dry). 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 2001 indicator samples remain among the lowest measured concentration since sampling began in 1985. Historical mean concentrations measured at the indicator location ranged from a maximum of 0.33 pCi/g (dry) in 1993 to a minimum value of 0.07 pCi/g (dry) in 1998, 2000, and 2001. The results for the 2001 control location were less than the detection limit. No other plant related radionuclides were detected in the 2001 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.

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



B. Data Evaluation and Discussion

Shoreline sediment samples are routinely collected twice per year from the shoreline of Lake Ontario. Samples are collected from one indicator location (Sunset Beach), and one control location (Lang's Beach). The first sample collection was made in April 2001 at both the indicator and control locations. The second shoreline sample collection was made in October 2001, again at both the indicator and the control location. The results of these sample collections are presented in Section 6.0, Table 6-1, Concentrations of Gamma Emitters in Shoreline Sediment Samples. Cesium-137 (Cs-137) and Potassium-40 (K-40) were the significant radionuclides detected in the sediment samples.

Cs-137 was detected in the April and October indicator samples collected for the 2001 program. The measured concentrations for these samples were 0.071 pCi/g (dry) and 0.063 pCi/g (dry). The presence of Cs-137 in certain environmental sample media such as soil, shoreline sediment and fish is routine. Cs-137 is a fission product that is produced in 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 concentration which were the result of plant operation would also contain other plant related isotopes such as Co-60 and Cs-134. The absence of corroborating isotopes would indicate that the source of Cs-137 in sediment sample is from the existing background Cs-137 which is attributed to weapons testing. This assessment is further substantiated by the fact that Cs-137 was detected in the 1993 sediment control samples. Cs-137 has been routinely measured in the control samples of other environmental media such as fish and soil.

The routine 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, which 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 2001 shoreline sediment. 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 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
- The maximum measured concentration of 0.071 pCi/g (dry) remains constant for the year.

Using these conservative parameters the potential dose to the maximum exposed individual (teenager) would be 0.00024 mrem/year to the whole body and 0.00028 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.

D. Data Trends

The mean Cs-137 concentration for the shoreline sediment indicator samples for 2001 was 0.067 pCi/g (dry), which has remained the lowest mean concentration measured since sediment sampling was initiated in 1985. Indicator samples collected in 1985 through 1988 contained no measurable concentrations of Cs-137. The mean values for the previous ten years (1991-2000) ranged from a maximum value of 0.33 pCi/gm (dry) in 1993 to a minimum of 0.07 pCi/gm (dry) in 1998 and 2000. The mean results for the previous five year period ranged from

1989 – 2001 shows the presence of Cs-137 in the indicator samples. The historical data shows an emergence of Cs-137 concentrations in 1989 which continues through 2001. The trend since 1989 shows a reduction in Cs-137 concentrations over the four year period to the concentration of 0.13 pCi/g (dry) measured in 1992. The 1993 sample showed an increase in Cs-137 concentration to 0.33 pCi/g (dry) followed by a reduction in concentration to 0.24 pCi/g (dry) in 1994 and continued general reductions through 2000 and 2001 to 0.07 pCi/g (dry). The overall five year trend for Cs-137 concentrations in shoreline sediment is steady reduction in concentrations from year to year to a low mean concentration of 0.07 pCi/g (dry) in 1998 and remaining low in 1999, 2000, and 2001.

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

Tables 7-1 and 7-2 in Section 7.0 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 2001 sample program. The analytical results for the 2001 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 2001 fish samples is significant in the fact that positive concentrations have been measured in samples collected in the previous 21 years at a combination of both the indicator and/or the control locations. Potassium-40, a naturally occurring radionuclide was detected in the 2001 fish samples.

In previous years, Cs-137 has been routinely detected in a small percentage of the fish samples collected each year. Cs-137 has been measured in fish samples collected at both the indicator and control locations consistently over the last 20 years and beyond. These low levels of Cs-137 represent no significant dose to man or impact on the environment.

The 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 2001 results are consistent with the previous year's results and continue to support the general long term downward trend in fish Cs-137 concentrations over the last 23 years. The Cs-137 mean indicator concentration for 1994 through 2001, as a group, are the lowest measured concentrations since 1976.

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 Nine Mile Point Nuclear Station (NMPNS) Units 1 and 2, and the James A. FitzPatrick Nuclear Power Plant (JAFNPP). 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. Table 6-2 shows individual results for all the samples in units of pCi/g (wet).

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

The total fall fish collection was comprised of eleven individual samples representing four individual species. Brown Trout, Walleye, Smallmouth Bass, and Salmon samples were collected at the NMP indicator sampling location and the control location (Oswego Harbor). Walleye, Smallmouth Bass and Salmon were collected at the JAF indicator location.

Cs-137 was not detected in the fish species collected for the 2001 sample program.

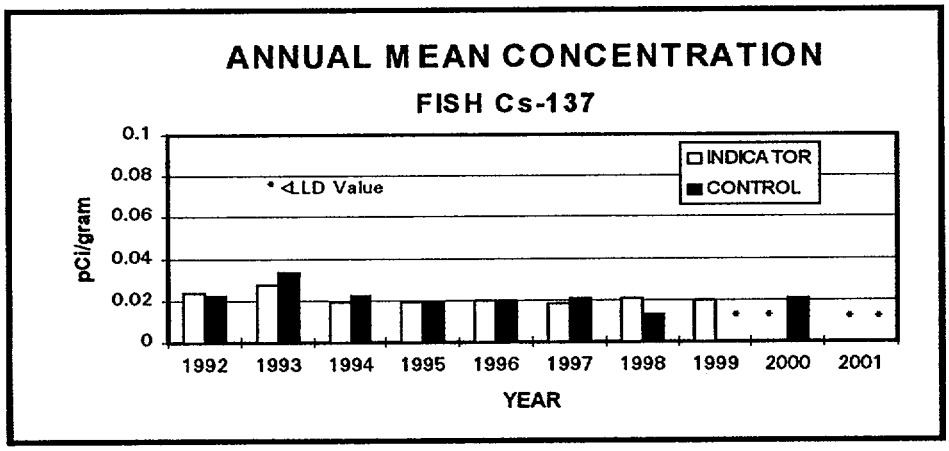
C. Dose Evaluation

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 2001 fish samples demonstrate that there is no attributable dose to man from operations at the site through the aquatic fish to man 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.

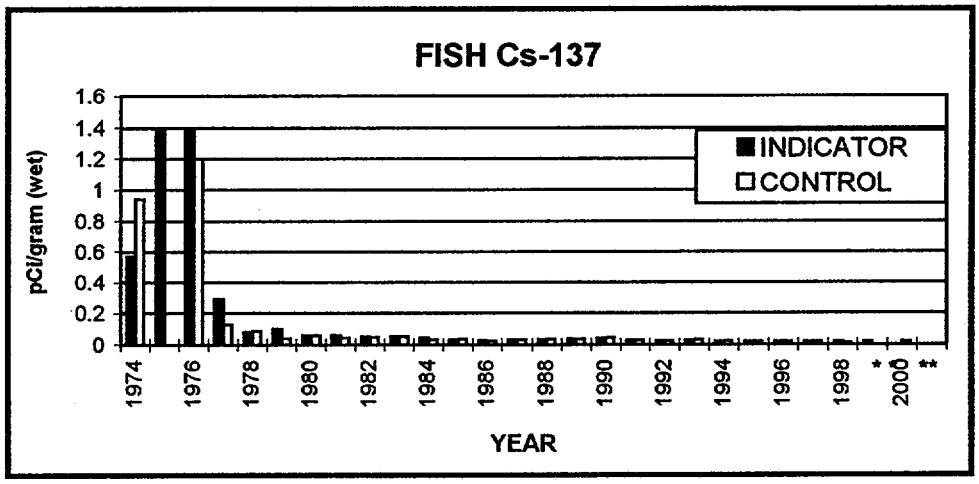
D. Data Trends

Results for the previous five years (1996 through 2000) have shown a generally steady trend for Cs-137 levels in the control and indicator samples. During the period of 1990 through 1994, control and indicator mean results were on a small downward trend with a small rise in 1993. The 1994 through 2001 results as a group are the lowest Cs-137 concentrations measured over the 26 year existence of the sampling program. The graph below illustrates the mean Cs-137 concentrations for 2001 and the previous nine years.



The long term trend shows that mean concentrations of Cs-137 for indicator samples has decreased from a maximum concentration of 1.4 pCi/g (wet) in 1976 to a minimum level of 0.018 pCi/g (wet) measured in 1997. The decreasing trend continued in 2001 with no detectable concentration of Cs-137 in the samples. Control sample Cs-137 results have also decreased from a maximum level of 1.2 pCi/g (wet) in 1976 to less than detectable levels in 2001. Fish results for the 2000 control samples show a decrease in concentrations by a factor of approximately 57 compared to 1976. Indicator results have shown a similar reduction.

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 a result of weapons testing fallout. The general downward trend in concentrations will continue as a function of additional ecological cycling and nuclear decay.



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

5.1.3 SURFACE WATER (LAKE)

A. Results Summary

The TS/ODCM require that monthly surface water samples be taken from the respective inlet water supply of the James A. FitzPatrick Nuclear Power Plant (JAFNPP) and NRG Energy's Oswego Steam Station. In conjunction with the TS/ODCM samples, three additional Lake Ontario surface water locations are sampled and analyzed. These additional locations are the Oswego City Water Intake, the Nine Mile Point Nuclear Station (NMPNS) Unit 1 Intake and the NMPNS Unit 2 Intake. Gamma spectral analysis was performed on 24 monthly composite samples from the TS/ODCM locations and on 36 monthly composite samples from the additional sample locations. The results of the gamma spectral analysis show that only two naturally occurring radionuclides were detected in the 60 samples from the five locations collected for the 2001 Sampling Program. The two naturally occurring radionuclides are K-40 and Ra-226 and are not related to operation of the plants. Monthly composite samples show no presence or buildup of plant related gamma emitting isotopes in the waters of Lake Ontario as a result of the operation of the plants.

Quarterly composite samples collected from the same locations are analyzed for tritium (H-3). Twenty tritium samples were collected and analyzed in 2001, one of these samples showed a positive tritium concentration. The single positive detection of tritium in surface water samples was measured at the Nine Mile Point, Unit 1 inlet canal sample. The measured tritium concentration was 174 ± 88 pCi/l. The results for samples collected for the 2001 program show a significant reduction in the number of positive results from previous years. In 2000, there were positive results for thirteen of the twenty samples collected. The evaluation of surface water sample results demonstrates that there is no measurable radiological impact on the surface waters of Lake Ontario from tritium concentrations related to the operation of the facilities at the Nine Mile

Point site. Individual sample results from the control station were similar or higher than those measured at the indicator location(s). The measured concentrations for previous years indicator and control samples are within the normal historical variations for naturally occurring tritium in surface water. 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. Only K-40 and Ra-226 were detected in samples from the five locations over the course of the 2001 sampling program. Both of these radionuclides are naturally occurring and are not plant related.

Tritium samples are quarterly samples that are a composite of the appropriate monthly samples. Tritium results for the JAFNPP inlet canal samples showed no positive detections for tritium and had a LLD that ranged from < 185 pCi/l to < 270 pCi/l. The TS/ODCM control location (Oswego Steam Station inlet canal) results showed no positive detection and a LLD range of < 162 pCi/l to < 270 pci/l.

Tritium was detected in one of the twelve optional lake samples taken in 2001. The single positive result was 174 ± 88 pCi/l measured at the Nine Mile Point, Unit 1, inlet canal. The remaining samples had an LLD range of < 162 pCi/l to < 280 pCi/l.

Samples collected from the Oswego City water supply showed no detectable tritium concentrations.

A summary of tritium results for the 2001 sample program is listed below:

Sample Location	Tritium Concentration pCi/liter Minimum	Maximum	Mean (Annual)
JAF Inlet	< 185	< 270	< 236
Oswego Steam Inlet	< 162	< 270	< 230
NMP 1 Inlet	< 240	174 ± 88	174 ± 88
NMP 2 Inlet	< 185	< 280	< 239
City Water Intake	< 162	< 280	< 233

C. Dose Evaluation

The measured concentration of tritium in the Nine Mile Point, Unit 1 sample is considered to be representative of natural background levels.

The radiological impact to members of the public from natural background levels of tritium in water is insignificant. This can be illustrated by calculating a dose to the whole body and maximum organ using Regulatory Guide 1.109 methodology. Based on a water ingestion rate of 510 liters/yr and the maximum measured concentration of 174 pCi/l the calculated dose would be 0.018 mrem to the child whole body and 0.018 mrem to the child liver (critical age group/organ). The drinking water sample is from the Oswego City intake which is drawn from Lake Ontario at a location more distant than the control location. The calculated dose from tritium at this location using the LLD concentration of 280 pCi/l would be 0.029 mrem to the child whole body and 0.029 mrem to the child liver. For the purpose of illustration, the maximum hypothetical dose can be calculated using the LLD concentration calculated for the city water supply. Doses from all water

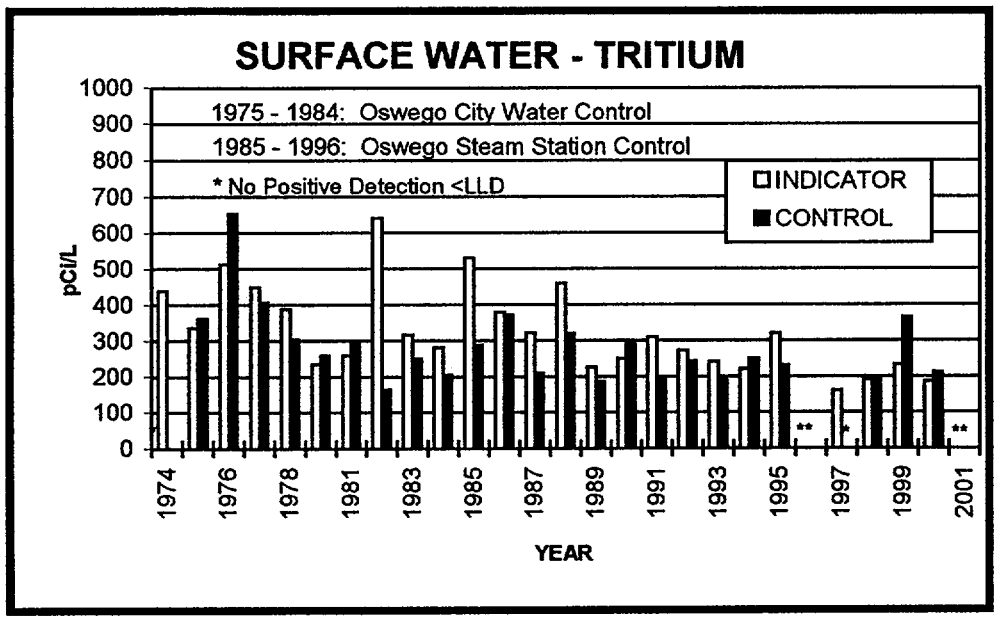
sampled are considered background doses and are negligible compared to the 300 mrem annual dose considered for the overall background annual dose.

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 2001 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 positive tritium concentrations for the period of 1996 –2000 range from 190 pCi/l to 337 pCi/l for the control and 160 pCi/l to 233 pCi/l for the indicator locations. By comparison, the mean 2001 tritium concentrations for the control was < 231 pCi/l and < 236 pCi/l for the indicator locations. 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 , 1991 through 2000, is representative of natural variations in environmental tritium concentrations. The 1999 mean control value of 337 pCi/l is the highest concentration measured since 1989 but is within the variability of results measured over the program life. The ten year historical results are within the range of the normal variance measured in background concentrations from year to year.

The following graph illustrates the concentrations of tritium measured in Lake Ontario over the past 25 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 Oswego Steam Station, the current control location.



Historical data for surface water tritium are presented in Section 7.0, Tables 7-7 and 7-8.

5.2 TERRESTRIAL PROGRAM

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

- Airborne particulate and radioiodine
- Direct radiation
- Milk
- Food Products

Tables 6-5 through 6-12 represent the analytical results for the terrestrial samples collected for the 2001 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 2001 program, a total of 52 samples were collected from control location R-5 and 208 samples were collected from indicator locations R-1, R-2, R-3 and R-4. These five locations are required by the TS/ODCM. Additional air sampling locations are maintained and are discussed in Section 5.2.1.B below. The mean concentration of the control location (R-5) was 0.016 pCi/m^3 in 2001. The mean concentration for the indicator locations was 0.016 pCi/m^3 for 2001. The mean results for the indicator and the control stations were equal in 2001. The consistency of the two mean results demonstrates that there are no increased airborne radioactivity levels in the general vicinity of the site. The indicator results are consistent with concentrations measured over the last thirteen 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 activity. A total of 779 samples were collected and analyzed as part of the 2001 program. Five of the nine off-site locations are required by TS/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 TS/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.

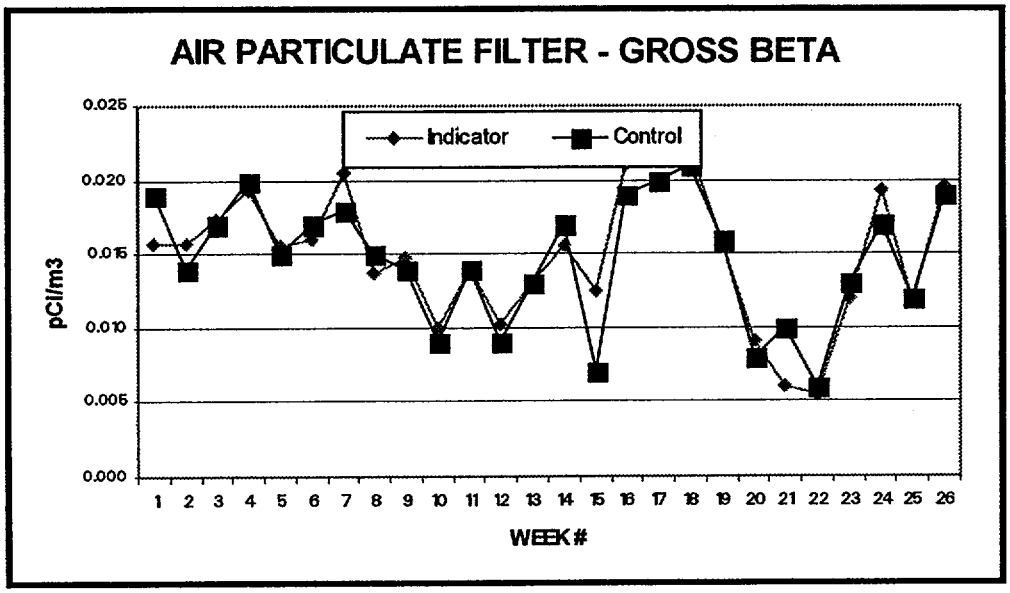
Gross beta analysis requires that the samples be counted no sooner than 24 hours after collection. This allows for the decay of short half-life naturally occurring radionuclides, thereby increasing the sensitivity of the analysis for plant related radionuclides.

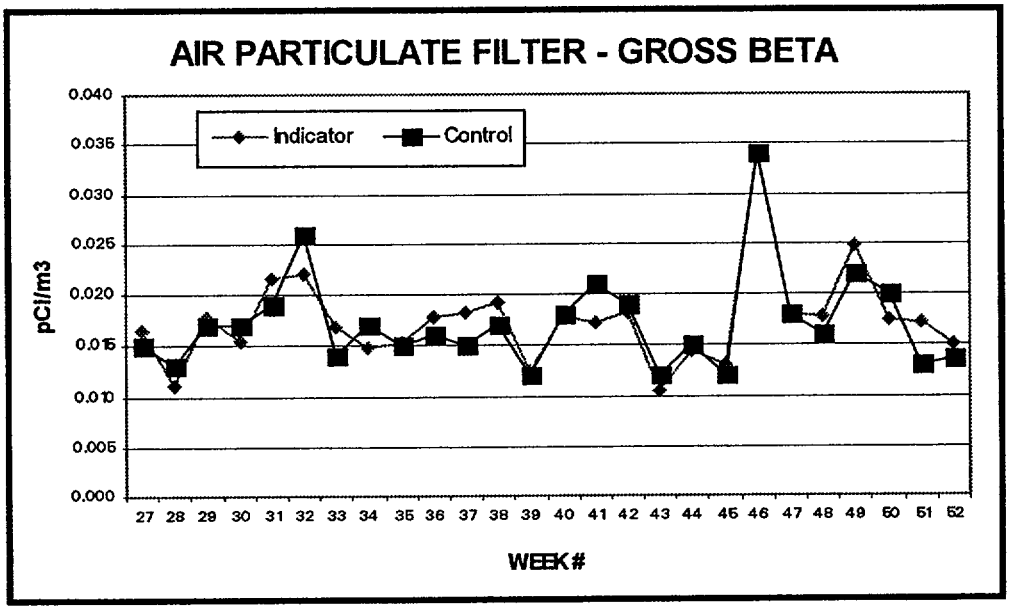
Tables 6-5 and 6-6 in Section 6.0 present the weekly gross beta activity results for the off-site and on-site stations.

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

	Concentration pCi/m^3		
Location	Minimum	Maximum	Mean
R-1	0.004	0.033	0.016
R-2	0.005	0.032	0.016
R-3	0.006	0.034	0.016
R-4	0.006	0.037	0.016
R-5	0.006	0.034	0.016

The mean weekly gross beta concentrations measured in 2001 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

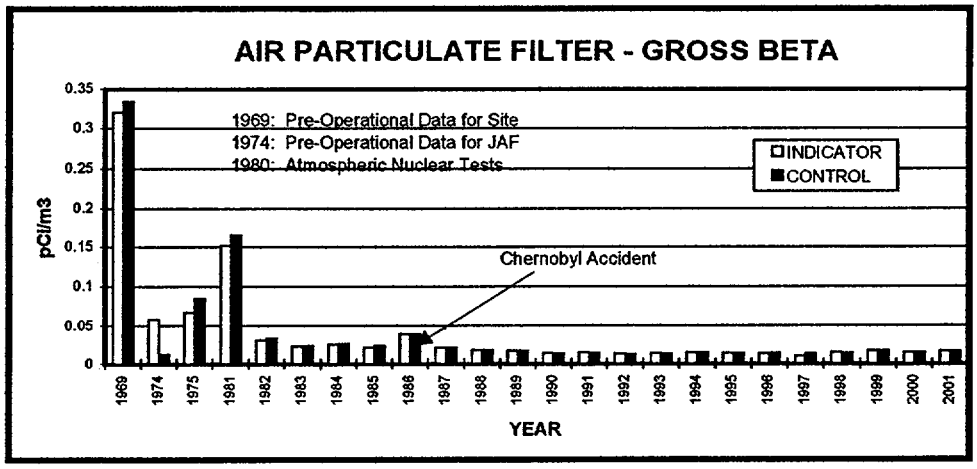
above the land are affected by time related processes such as wind direction, precipitation, snow cover, soil temperature and soil moisture content.

C. Dose Evaluation

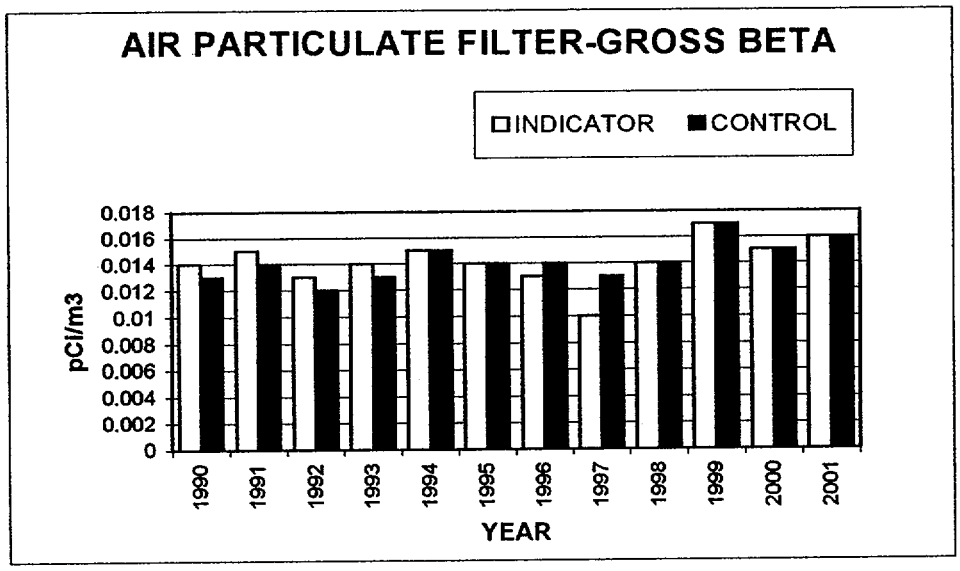
Dose calculations are not performed based on gross beta concentrations. Dose to man as a result of radioactivity in air is calculated using the specific radionuclide and the associated dose factor. See Section 5.2.2.C for dose calculations from air concentrations. The dose received by man from air gross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

D. Data Trends

With the exception of the 1986 sample data, which was effected by the Chernobyl accident, the general trend in air particulate gross beta activity has been one of decreasing activity since 1981. 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 1991 through 2001 is very small. This is illustrated by the following graph.



For the operational period of 1991 – 2001, 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 of 0.017 pCi/m^3 in 1999 to a minimum of 0.010 pCi/m^3 in 1997. The 2001 gross beta results are consistent with previous results over this 10 year period.

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 site. Five of the 15 air monitoring stations are required by TS/ODCM and are located offsite near the site Boundary and offsite as a control location. Ten additional air sampling stations are also maintained as part of the sampling program. Together, these fifteen continuous air sampling stations make up a comprehensive environmental monitoring network for measuring radioactive air particulate concentrations in the environs of the site. Annually, the air monitoring stations provide 780 individual air particulate samples which are assembled by location into 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 2001.

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 locations are in constant operation onsite and in the offsite sectors surrounding the Nine Mile Point Site. Five sampling locations are required by the TS/ODCM and ten optional stations are in operation to provide an effective monitoring network. Composite air filter samples are assembled for each of the fifteen sampling locations. Each of the four weekly air particulate samples

for the month are assembled by location to form monthly composite samples. The monthly composite samples required by TS/ODCM are R-1, R-2, R-3, R-4 and R-5. Other sample locations not required by the TS/ODCM for which analytical results have been provided include six on-site locations and four off-site locations. The analytical results for the 180 air particulate filter composites in 2001 showed no detectable activity.

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

C. Dose Evaluation

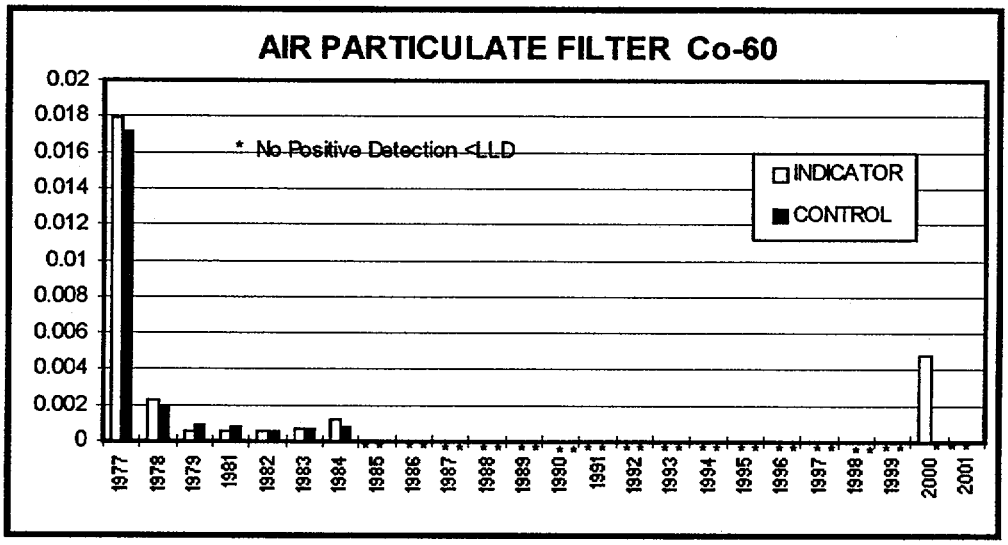
The calculated dose as a result of plant effluents is not evaluated due to the fact no plant related radionuclides were detected in 2001. The monthly air particulate sampling program demonstrated no off-site dose to man from this pathway as a result of operations of the plants located at the Nine Mile Point Site.

D. Data Trends

No plant related radionuclides were detected during 2001 at the off-site air monitoring locations.

The five 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. The maximum yearly mean concentration detected during this

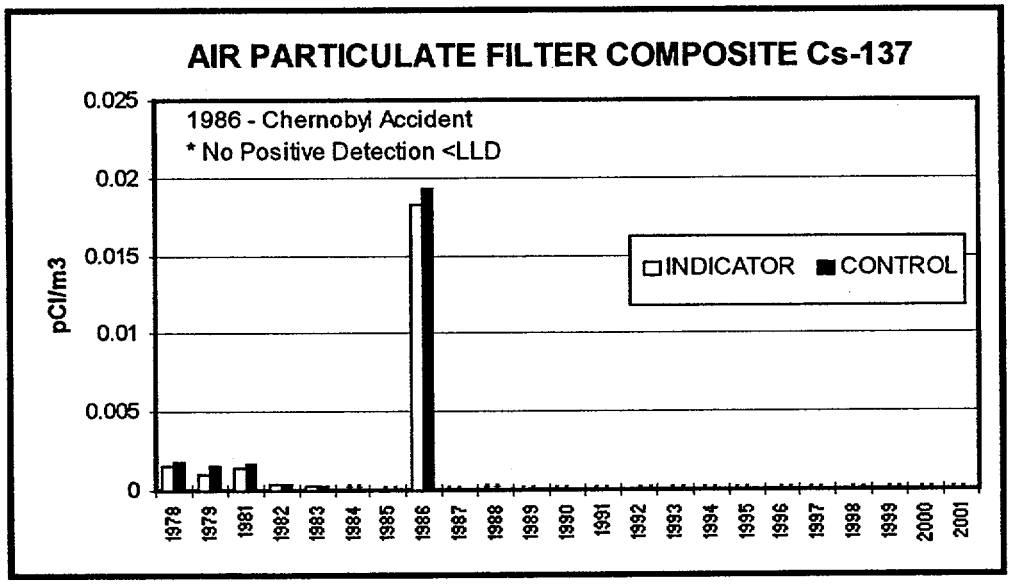
period was in 1977 when the mean for the indicator results was 0.0179 pCi/m^3. The mean control value for this same year was 0.0172 pCi/m^3 The Co-60 in the air particulate samples trended downward during the 1977 through 1984 period to a mean concentration of 0.0008 pCi/m^3 at the control location measured in 1984. Co-60 was detected in an offside 2000 indicator sample and was the first 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 Nine Mile Point Unit 1 Facility. There have been no subsequent measurable concentrations of Co-60 in the environment surrounding the Nine Mile Point Site.



Historical data show 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 maximum concentrations for this period were measured in 1977 with a mean indicator concentration of 0.0043 pCi/m^3 and the corresponding control concentration of 0.0034 pCi/m^3. After 1977, the Cs-137 concentration showed a reduction be a factor of approximately two and remained constant through 1981. In

1982, a second reduction in Cs-137 concentration was measured followed by a further reduction in concentration in 1983. Cs-137 was not detected during 1984 and 1985 in any of the indicator or control air particulate composite samples.

For the period, 1986 to 1991, Cs-137 was detected only in 1986 due to the fallout from the Chernobyl accident. The 1986 mean concentration of Cs-137 for the control location was 0.0193 pCi/m^3. The mean concentration of Cs-137 for the indicator location was 0.0183 pCi/m^3 for this sample period This overall reduction in Cs-137 results since 1977 is attributed to nuclear decay and ecological cycling of Cs-137 initially produced as a result of weapons testing. The decrease in air particulate Cs-137 concentrations since 1977 is clearly illustrated on the following graph of historical data.



In the 1986 samples, a number of other radionuclides were detected in addition to Cs-137. The isotopes, Zr-95, Ce-141, Nb-95, I-131, Ce-144, Mn-54, Ru-103, Ru-106, Ba-140 were all detected. These isotopes were measured in air particulate composite samples as a result of the fallout

from the Chernobyl accident. After 1986, no plant related or fallout radionuclides were detected in any of the off-site 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 the 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 was not detected in any of the 779 samples analyzed for the 2001 program. No radioiodine has been measured off-site at the constant air monitoring stations since 1986 when measurable levels of I-131 were found as a result of fallout from the Chernobyl accident.

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 TS/ODCM. The off-site locations required by TS/ODCM are designated 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 maintained in addition to those required by TS/ODCM. Six of these stations, D-1, G, H, I, J and K, are located on-site. 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 2001 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 2001. The I-131 sampling program demonstrated no offsite dose to man from this pathway as a result of operation of the plants located at Nine Mile Point.

D. Data Trends

No radioiodine has been detected at air sampling locations required by TS/ODCM since 1987.

The prior ten years of data show no positive detection of I-131. This demonstrates that there is no measurable environmental impact or positive trend for iodine buildup due to plant operations during the period from 1991 through 2001. I-131 has been detected twice in the last fifteen year period in 1986 and 1987. The 1986 detection was the result of the Chernobyl accident and the 1987 detection was the result of plant operations.

Iodine –131 (I-131) has been detected in the past at control locations. During 1976, the mean measured off-site I-131 concentration was 0.60 pCi/m^3. The 1977 mean I-131 concentration decreased to 0.32 pCi/m^3 and for 1978 the mean measured concentration decreased by a factor of ten to 0.032 pCi/m^3. During 1979 –1981 and 1983 – 1985, I-131 was not detected at the control location. I-131 was detected once at the control location during 1982 at a concentration of 0.039 pCi/m^3. I-131 was detected at the onsite locations in 1980 through 1983, 1986 and 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 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 of the positive detection of I-131 in 1986 was the direct result of the Chernobyl Nuclear accident.

Historical data for I-131 are presented in Section 7.0, Tables 7-11 and 7-12.

5.2.4 DIRECT RADIATION THERMOLUMINESCENT DOSIMETERS (TLD)

A. Results Summary

Thermoluminescent dosimeters (TLD's) are used to measure direct radiation (gamma dose) in the environment. TLDs were placed at 72 different Environmental TLD locations, collected and read for each quarter of 2001.

The results presented in this report represent an average of the two TLDs placed at each environmental location. TLD results provided in Table 6-10 are comprised of TLD's required by the TS/ODCM and Special Interest TLDs not required by the TS/ODCM.

Five different geographic areas on or around site are evaluated using the TLD network. These areas include:

1. **ON-SITE**, areas within the site boundary not required by the TS/ODCM,
2. **SITE BOUNDARY** in each of the sixteen meteorological sectors,
3. **OFF-SITE SECTOR,** an outer ring of TLDs located four to five miles from the site in the eight land based meteorological sectors,
4. **SPECIAL INTEREST** TLDs located at sites of high population density, and
5. **CONTROL** TLDs located at sites beyond expected influence of the site.

A summary of the measured exposure in each group is as follows:

Location Groups	Dose in mrem per standard month		
	Minimum	Maximum	Mean
On-site indicators	3.8	14.5	5.6
Site Boundary *(1)	3.6	5.3	4.5
Off-site Sectors *	3.6	5.4	4.4
Special Interest *	3.8	5.0	4.3
Controls *	3.9	5.0	4.4

* Location required by TS/ODCM

(1) Only includes results not affected by radwaste direct shine

Site Boundary TLD results from all Site Boundary TLDs ranged from 3.6 to 10.3 mrem per standard month during 2001. The maximum value of 10.3 mrem per standard month represents the Site Boundary maximum dose as measured by Site Boundary TLD number 85. The radwaste building and radwaste shipping activities influence Site Boundary TLDs located along the lakeshore close to the plants. These TLDS are not included in the Site Boundary values presented in the above table.

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.

Net site boundary doses for 2001 show no indication of increased direct radiation above background at or beyond the site boundary. The net positive result measured for the second quarter is very small and is within the range of expected variance for TLD measurements made at these low exposure levels. Additionally the TLD results show that the 2001 injection rates utilized for hydrogen water chemistry does not significantly increase the dose rate at the site boundary or the general off-site dose rate to the general public.

Mean Dose in mrem per standard month for 2001

Quarter	Site Boundary	Control Location	Net Site Boundary
1	4.5	4.5	0.0
2	4.6	4.0	+0.6
3	4.4	4.4	0.0
4	4.6	4.6	0.0

B. Data Evaluation and Discussion

TLDs were collected and read once per quarter during the 2001 sample year. The TLD results are reported in mrem per standard month (Table 6-10). Two TLDs were utilized at each location. The results presented in this report represent an average of the two TLDs. TLD results included on Table 6-10 are comprised of TLDs required by TS/ODCM and special interest TLDs not required by the TS/ODCM.

TLD results are evaluated by organizing environmental TLDs into five different groups as described in Part A of this section.

The first group, **ON-SITE TLDs** include TLD numbers 3, 4, 5, 6, 7, 23, 24, 25 and 26. With the exception of TLD numbers 7 and 23, TLDs within the group are optional and not required by TS/ODCM. These TLDs are located near the generating facilities and at previous or existing on-site air sampling stations. The results for these TLDs are generally consistent with previous years results and range from 3.8 mrem to 14.5 mrem per standard month. The maximum 14.5 is associated with TLD number 3 which is located in close proximity to the James A. Fitzpatrick facility and reflects dose rates due to the hydrogen water chemistry conducted during plant operation. Removing TLD number 3 from this group, results in an onsite TLD range of 3.8 - 5.9 mrem per standard month during 2001.

Other on-site TLDs include special interest TLDs located near the shoreline north of the Unit 1, Unit 2 and Fitzpatrick facilities but in close proximity to radwaste facilities and the Unit 1 reactor building. These TLDs include numbers 27, 28, 29, 30, 31, 39 and 47. Results for these TLDs during 2001 were variable and ranged from 6.1 to 26.8 mrem per standard month. This variation is the result of activities at the radwaste facilities, and operating modes of the generating facilities including hydrogen injection.

SITE BOUNDARY TLDs, the second group of TLDs, are required by the TS/ODCM and are located in the approximate area of the site boundary with one in each of the sixteen 22.5 degree meteorological sectors. These TLDs include numbers 7, 18, 23, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86 and 87. In addition to the evaluation of all Site Boundary TLDs, a subgroup of Site Boundary TLDs is formed and evaluated separately. This Subgroup exludes TLD numbers: 23, 75, 76, 77, 85, 86, and 87. These TLDs are located near the lake shoreline approximately 100 feet inland in close proximity of the reactor building and radwaste facilities of Unit 1 and Unit 2 and the radwaste facilities of the Fitzpatrick facility. These TLDs are influenced by the radwaste building and radwaste shipping activities and are not representative of dose rates at generally accessible areas of the site boundary. Therefore the subgroup to the Site Boundary area is comprised of TLD numbers 7, 18, 78, 79, 80, 81, 82, 83, 84. These TLDs are located near the site boundary in sectors facing the land occupied by members of the public.

Site Boundary TLD results from all Site Boundary TLDs ranged from 3.6 to 10.3 mrem per standard month during 2001. The maximum value of 10.3 mrem per standard month represents the Site Boundary maximum dose as measured by Site Boundary TLD number 85. This TLD is located in the WNW sector along the lake shore and is in close proximity to the NMP Unit 1 plant. The subgroup of Site Boundary TLDs ranged from 3.6 to 5.3 mrem per standard month during 2001. The 2001 results are consistent with those observed in 2000 and previous years.

The third group, **OFF-SITE SECTOR TLDs**, are required by TS/ODCM and are located four to five miles from the site in each of the land based 22.5 degree meteorological sectors. Offsite sector TLDs include numbers 88, 89, 90, 91, 92, 93, 94 and 95. The results of this group of TLDs ranged from 3.6 to 5.4 mrem per

standard month during 2001. This range is consistent with those observed in 2000 and previous years.

The fourth group, **SPECIAL INTEREST TLDs**, are those TLDs located near the site boundary and at special interest areas such as industrial sites, schools, nearby communities, towns the closest residence to the site and the off-site environmental laboratory. Many of these TLDs are required by TS/ODCM while others are optional. This group of TLDs include TLD numbers 9, 10, 11, 12, 13, 14, 19, 51, 52, 53, 54, 55, 56, 58, 96, 58, 97, 98, 99, 100, 101, 102, 108 and 109. TLD numbers 96, 58, 97, 56, 15 and 98 are Special Interest TLDs required by TS/ODCM and ranged 3.8 to 5.0 mrem per standard month for 2001. TLD numbers 108 and 109 are TLD locations that were established to assist in the evaluation of the closest residence. Results ranged from 4.1 to 4.9 mrem per standard month. These results are consistent with control location results which ranged from 3.9 to 5.9 mrem per standard month.

The fifth group of TLDs include those TLDs considered as **CONTROL TLDs**. These TLDs are required by the TS/ODCM and include numbers 14 and 49. Optional control locations are TLD numbers 8, 111, and 113 and were added to the program to expand the database for control TLDs. Results for 2001 ranged from 3.9 to 5.9 mrem per standard month.

A net site boundary dose can be calculated from Site Boundary and Control TLD results. The TLD results from TLDs located near the site boundary in sectors facing the land occupied by members of the public (excluding TLDs near the generating facilities and facing Lake Ontario) are compared to control TLD results. The site boundary TLDs include numbers 78, 79, 80, 81, 82, 83, 84, 7 and 18 and the control TLDs include numbers 8, 4, 49, 111, and 113. Net site boundary doses for each quarter in mrem per standard month are as follows:

	Dose in mrem per standard month		
Quarter	Site Boundary	Control Location *	Net Site Boundary
1	4.5	4.5	0.0
2	4.6	4.0	+0.6
3	4.4	4.4	0.0
4	4.6	4.6	0.0

* TLD no. 8, 4, 45, 111, 113

Overall the environmental direct radiation measurement results for 2001 showed no indication of increased direct radiation above background at or beyond the site boundary as a result of plant operations.

C. Dose Evaluation

TLDs located at the Site Boundary averaged 4.5 mrem per standard month. This average is representative of that portion of the site boundary in sectors facing the land occupied by members of the public (excluding TLDs near the generating facilities and facing Lake Ontario).

TLDs placed at the special interest locations averaged 4.3 mrem per standard month.

The measured mean dose rate in the proximity of the closest resident was 4.5 mrem per standard month. This value is consistent with control measurements of 4.4 mrem per standard month.

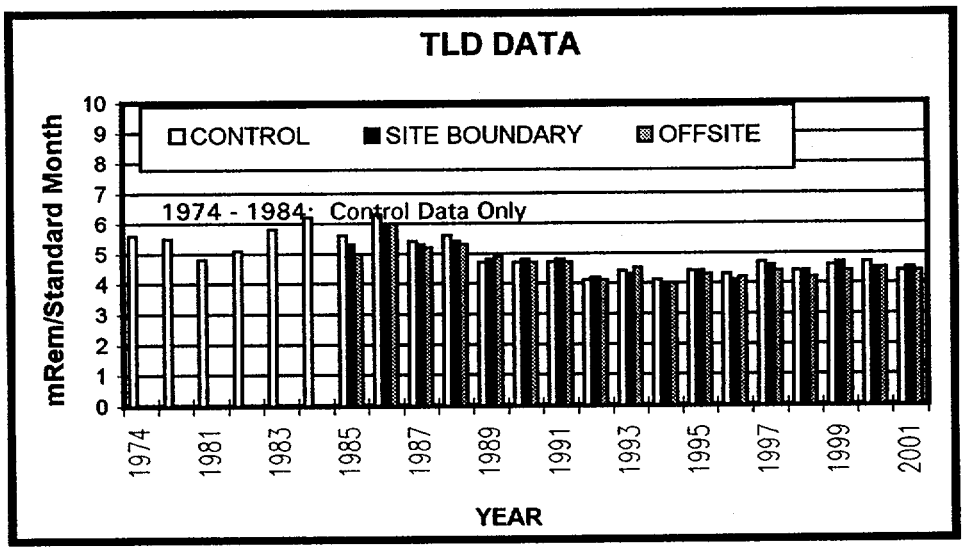
The mean annual dose for each of the geographic location categories demonstrates that there is no statistical difference in the annual dose as a function of distance from the site. The TLD program verifies that operations at the site do

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 categories of measurement locations. These include site boundary TLDs in each meteorological sector, TLDs located off-site in each land based sector at a distance of four to five miles, badges located at special interest areas and TLDs located a control locations. In some instances TLD locations became effective in 1985; therefore these results can only be evaluated for 1985 to present.

The following graph illustrates TLD results for the Control, Site Boundary and Off-site groups from 1985 through 2001:



TLDs located at the site boundary averaged 5.7 mrem per standard month during 2001 (average result includes all site boundary TLD measurements). This result is consistent with the previous five year average of 5.6 mrem per standard month.

TLDs located off-site at a distance of four to five miles from the site in each of the land based meteorological sectors averaged 4.4 mrem per standard month during 2001. This result is also consistent with the previous five year average of 4.4 mrem per standard month determined for this area.

Special interest locations averaged 4.4 mrem per standard month for the period 1996 through 2000. The 2001 results for these locations averaged 4.3 mrem per standard month and is consistent with the previous five year average.

The last group of TLD locations required by the Technical Specifications is the control group. This group utilizes TLD locations positioned well beyond the site. Control results from all Control TLDs for 2001 averaged 4.4 mrem per standard month which is consistent with the previous five year mean of 4.5 mrem per standard month. These results indicate that the 2001 data is representative of the natural background dose rate. The 2001 TLD program results, when compared to the previous five years and pre-operational data, show no significant trends relative to increased dose rates in the environment.

Tables 7-15 through 7-20 show the historical environmental sample data for environmental TLDs.

5.2.5 MILK

A. Results Summary

A total of 200 analyses were performed on the 100 milk samples collected and analyzed for the 2001 program. Each sample was 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 land deposition, grass, cow, dose pathway to man. In 2001, I-131 was not detected in any of the 100 samples collected from the seven milk sampling locations.

Gamma spectral analyses of the bimonthly milk samples showed only naturally occurring radionuclides, such as K-40, were detected in milk samples during the 2001. 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 2001 results demonstrate that routine operations of the NMPNS results in no contribution to the "dose to the public" from the cow/milk pathway.

B. Sampling Overview

Milk samples were collected from five indicator locations and one control location. TS/ODCM require 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 2001. Samples were collected from five farms located beyond the five mile requirement to ensure the continued monitoring of this important pathway. The five indicator locations ranged from 5.2 to 9.5 miles from the site. The control samples were collected from two farms in 2001. The original control location retired its milking herd at the end of

August 2001. A replacement control location was established for the first collection period in August. In August of 2001 milk sampling location No. 76 was added to the sampling program. This location was identified during the 2001 milch animal census and agreed to participate in the sampling program. The geographical location of each sample location is listed below:

Location No.	Direction From Site	Direction (Miles)
76	SE	5.2
55	E	9.0
60	E	9.5
4	ESE	7.8
50	E	8.2
73 Control[(1)]	SW	13.2
77 Control[(2)]	SSW	13.9

[(1)]Retired after 8/20/01 sample

[(2)]Established starting with 8/6/01 sample

Samples were collected at locations from April through December, during the first and second half of each month. Because I-131 was not detected in samples collected during November and December of 2001 additional samples were not required for January through March of 2001 as stipulated in the TS/ODCM.

C. Data Evaluation and Discussion

Each 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 analytical results and sample analysis results for gamma emitters are provided in Section 6.0, Table 6-11.

Iodine-131 was not detected in any indicator or control samples analyzed during 2001. All I-131 milk results were reported as lower limits of detection (LLD). The LLD results for all samples ranged from < 0.31 to < 1.00 pCi/liter. No plant related radionuclides were detected in the 2001 samples. K-40 was the most abundant radionuclide detected in milk samples collected. K-40 is a naturally occurring radionuclide and is found in many of the environmental media samples. K-40 was detected in every indicator and control sample. K-40 concentration for all samples ranged from 1310 to 1920 pCi/liter. During 2001, Cs-137 was not detected in any indicator or control milk samples.

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 as 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 fifteen years Cs-137 was detected in 1986, 1987, and 1988. The mean Cs-137 indicator activities for those years were 8.6, 6.8, and 10.0 pCi/liter, respectively. I-131 was measured in two milk samples in 1997 from a single sample location at

a mean concentration of 0.5 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 2001 data to historical results over the operating life of the plants show that Cs-137 and I-131 levels have decreased significantly since1983.

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

5.2.6 FOOD PRODUCTS (VEGETATION)

A. Results Summary

There were no plant related radionuclides detected in the 20 food product samples collected and analyzed for the 2001 program.

Detectable levels of naturally occurring K-40 were measured in all control and indicator samples collected for the 2001 program. Ra-226, Be-7 and AcTh-228, all naturally occurring radionuclides were also detected intermittently in all of the samples collected in 2001. These results are consistent with the levels measured in 2000 and previous years.

The results of the 2001 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 seven 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 2001 included two varieties that are considered edible broadleaf vegetables. Collard greens were collected at two indicator locations and cabbage at a second indicator 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, bean leaves, rhubarb leaves, grape leaves, zucchini leaves, beet leaves and cucumber leaves were collected for the 2001 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 four locations. Samples were collected during the late-summer/fall harvest season. Each sample was analyzed for gamma emitters using gamma spectroscopy.

The food product results of the 2001 program did not detect any plant related radionuclides. Results for the past five years also demonstrate that there is no buildup of plant related radionuclides in the garden food products grown in areas close to the site.

Naturally occurring Be-7, K-40, Ra-226 and AcTh-228 were detected in food product samples. The concentration of Be-7 in vegetation samples ranged from 0.09 to 1.11 pCi/g (wet). The concentration of K-40 in indicator and control samples ranged from 1.64 to 5.83 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 off-site dose to man from this pathway as a result of operations of the plants located at Nine Mile Point.

D. Data Trends

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

In the previous five year period, Cs-137 was detected in 1997 and 1999 at the indicator location. Since 1976 Cs-137 has been detected in ten separate years. Historical Cs-137 mean concentrations over the last twenty years ranged from a maximum of 0.047 pCi/g (wet) in 1985 to a minimum of 0.008 pCi/g (wet) in 1999. The trend for Cs-137 is a general reduction in concentration to a baseline concentration in the range of 0.01 to 0.013 pCi/g (wet), that is a residual from past atmospheric weapons testing.

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

5.2.7 LAND USE CENSUS RESULTS

A. Results Summary

TS/ODCM require 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 2001 a milk animal census, a nearest resident census and a garden survey were performed.

No changes were required to the 2001 milk sampling program indicator or control locations based on the 2001 milk animal census. The no. 73 milk control location was replaced in August of 2001 due to the milking herd being retired by the owner. Indicator sampling location no. 76 was added to the milk sampling program as an optional sample after being identified in the 2001 milch animal census.

The results of the closest residence census conducted in 2001 required no change to the Off-site Dose Calculation Manual (ODCM) closest resident location.

A garden census, not required by TS/ODCM, is performed to identify appropriate garden sampling locations and dose calculation receptors. Garden samples were collected from a number of locations listed in Table 5-1 of the Unit 1 and Unit 2 ODCMs and identified in the census as active for 2001. See Table 3.3-1 for 2001 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 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 TS/ODCM. A resident census is conducted and is designed to identify the nearest resident in each meteorological sector out to a distance of five miles.

The milk 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 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 a further source of information concerning new milk animal locations in the vicinity of the site.

The number of milk animals located within an approximate ten mile radius of the site was estimated to be 757 cows and 4 goats based on the 2001 land use census. The number of cows has increased by 114 and the number of goats increased by 1 with respect to the 2000 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 noted in the 2001 census for the closest resident in the land based meteorological sectors.

The nearest resident locations are illustrated on a map in Section 3.3, Figure 3.3-5.

5.3 CONCLUSION

The Radiological Effluent Monitoring Program (REMP) is an ongoing program implemented to measure and document the radiological impact of Nine Mile Point Nuclear Station (NMPNS) Unit 1 and Unit 2 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 results of the 2001 REMP 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 REMP continues to demonstrate that the effluents from the site to the environment contribute no significant measurable radiation exposures to the general public as confirmed by the sampling and analysis of environmental media from recognized environmental pathways. No increase in radiation levels beyond the site boundary were measured as a result of the hydrogen water chemistry program based on TLD results. Environmental radiation levels measured at the nearest resident are at the background level. 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 an inventory of Cs-137 that has been deposited universally throughout the environment. The results for the 2001 sample program demonstrate that the concentrations of manmade 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 only one fission product radionuclide in the sample media collected during 2001. Cs-137 was detected in two of the shoreline sediment samples. The source of the Cs-137 measured in these samples is considered to be fallout from past atmospheric nuclear weapons testing. The measured concentrations of Cs-137 in each of the samples was small and consistent with historical values.

Radiation from naturally occurring radionuclides such as K-40 contributed the vast majority of the total annual dose to members of the general public. The contribution to the off-site whole body dose as a 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 all 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 operations remains insignificant.

From the collective results of the 2001 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

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SECTION 6.0

REPORT PERIOD ANALYTICAL RESULTS TABLES

TABLE 6-1

CONCENTRATIONS OF GAMMA EMITTERS IN SHORELINE SEDIMENT SAMPLES

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

STATION CODE(1)	COLLECTION DATE	GAMMA EMITTERS					
		K-40	Co-60	Cs-134	Cs-137	Zn-65	OTHERS†
Sunset Beach (05)	04/25/01	18.8 ± 0.45	<0.076	<0.061	0.071 ± 0.01	<0.096	<LLD
	10/24/01	17.7 ± 0.29	<0.043	<0.028	0.063 ± 0.01	<0.070	<LLD
Lang's Beach (06, Control)	04/25/01	14.1 ± 0.70	<0.064	<0.050	<0.055	<0.150	<LLD
	10/24/01	15.0 ± 0.50	<0.031	<0.037	<0.036	<0.065	<LLD

(1) Corresponds to sample locations noted on the maps in Section 3.3.

† Plant Related Isotopes

TABLE 6-2

CONCENTRATIONS OF GAMMA EMITTERS IN FISH SAMPLES

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					
05/16/01	Smallmouth Bass	3.78 ± 0.21	<0.024	<0.031	<0.075	<0.028	<0.054	<0.019	<0.021	<LLD
05/16/01	Walleye	5.58 ± 0.44	<0.061	<0.055	<0.164	<0.050	<0.129	<0.046	<0.047	<LLD
05/16/01	Lake Trout	5.51 ± 0.34	<0.041	<0.056	<0.134	<0.038	<0.098	<0.043	<0.042	<LLD
09/06/01	Smallmouth Bass	4.56 ± 0.35	<0.033	<0.040	<0.160	<0.030	<0.098	<0.031	<0.032	<LLD
09/06/01	Walleye	5.48 ± 0.38	<0.047	<0.045	<0.142	<0.043	<0.108	<0.042	<0.032	<LLD
09/06/01	Salmon	4.42 ± 0.34	<0.038	<0.039	<0.141	<0.038	<0.090	<0.029	<0.037	<LLD

†Plant Related Radionuclides

TABLE 6-2 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN FISH SAMPLES - 2001

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					
06/01/01	Smallmouth Bass	4.28 ± 0.34	<0.033	<0.040	<0.086	<0.033	<0.099	<0.037	<0.030	<LLD
06/01/01	Walleye	4.07 ± 0.32	<0.033	<0.042	<0.093	<0.037	<0.071	<0.032	<0.030	<LLD
05/23/01	Lake Trout	3.95 ± 0.34	<0.036	<0.038	<0.092	<0.047	<0.098	<0.042	<0.032	<LLD
09/07/01	Smallmouth Bass	4.13 ± 0.31	<0.030	<0.038	<0.154	<0.036	<0.087	<0.032	<0.033	<LLD
09/07/01	Brown Trout	4.37 ± 0.25	<0.028	<0.026	<0.092	<0.033	<0.068	<0.022	<0.025	<LLD
09/18/01	Salmon	3.93 ± 0.31	<0.038	<0.038	<0.128	<0.045	<0.074	<0.030	<0.042	<LLD
09/07/01	Walleye	5.96 ± 0.35	<0.043	<0.046	<0.154	<0.042	<0.106	<0.049	<0.042	<LLD

†Plant Related Radionuclides

TABLE 6-2 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN FISH SAMPLES

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)					
05/17/01	Smallmouth Bass	4.44 ± 0.24	<0.024	<0.027	<0.081	<0.023	<0.055	<0.021	<0.019	<LLD
05/17/01	Walleye	6.03 ± 0.30	<0.030	<0.038	<0.109	<0.040	<0.092	<0.036	<0.031	<LLD
05/17/01	Lake Trout	4.54 ± 0.20	<0.027	<0.033	<0.081	<0.027	<0.067	<0.028	<0.027	<LLD
09/18/01	Smallmouth Bass	4.85 ± 0.37	<0.042	<0.037	<0.117	<0.034	<0.093	<0.041	<0.032	<LLD
09/11/01	Brown Trout	4.33 ± 0.36	<0.028	<0.039	<0.126	<0.051	<0.101	<0.036	<0.036	<LLD
09/11/01	Salmon	4.58 ± 0.34	<0.036	<0.038	<0.104	<0.034	<0.092	<0.034	<0.028	<LLD
09/11/01	Walleye	5.28± 0.23	<0.040	<0.047	<0.136	<0.031	<0.105	<0.034	<0.038	<LLD

†Plant Related Radionuclides

TABLE 6-3

CONCENTRATIONS OF TRITIUM IN SURFACE WATER (QUARTERLY COMPOSITE SAMPLES)

Results in Units of pCi/liter ± 1 Sigma

STATION CODE	PERIOD	DATE	TRITIUM
FITZPATRICK* (03, INLET)	First Quarter	01/03/01-04/03/01	<185
	Second Quarter	04/03/01-07/02/01	<240
	Third Quarter	07/02/01-10/02/01	<270
	Fourth Quarter	10/02/01-01/02/01	<250
OSWEGO STEAM* STATION (08, CONTROL)	First Quarter	12/29/00-03/30/01	<162
	Second Quarter	03/30/01-06/29/01	<240
	Third Quarter	06/29/01-10/01/01	<270
	Fourth Quarter	10/01/01-12/31/01	<250
NINE MILE POINT UNIT 1** (09, INLET)	First Quarter	12/29/00-03/30/01	174 ± 88
	Second Quarter	03/30/01-06/29/01	<240
	Third Quarter	06/29/01-10/01/01	<270
	Fourth Quarter	10/01/01-12/31/01	<250
NINE MILE POINT UNIT 2** (11, INLET)	First Quarter	12/29/00-03/30/01	<185
	Second Quarter	03/30/01-06/29/01	<240
	Third Quarter	06/29/01-10/01/01	<280
	Fourth Quarter	10/01/01-12/31/01	<250
OSWEGO CITY WATER** (10)	First Quarter	12/29/00-03/30/01	<162
	Second Quarter	03/30/01-06/29/01	<240
	Third Quarter	06/29/01-10/01/01	<280
	Fourth Quarter	10/01/01-12/31/01	<250

* Samples required by TS/ODCM
** Optional samples

TABLE 6-4

CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES
Results in Units of pCi/liter ± 1 Sigma

OSWEGO STEAM STATION* (08, CONTROL)***

NUCLIDE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
I-131	<7.43	<7.59	<6.88	<8.35	<6.69	<13.9
Cs-134	<2.24	<2.86	<1.39	<1.41	<2.58	<3.38
Cs-137	<2.40	<2.73	<2.28	<2.37	<2.75	<5.38
Zr-95	<4.02	<5.29	<4.77	<4.55	<6.14	<10.8
Nb-95	<3.08	<3.23	<2.98	<3.22	<3.30	<6.87
Co-58	<2.57	<2.65	<2.58	<2.76	<2.70	<5.53
Mn-54	<2.39	<2.69	<2.38	<2.41	<2.66	<4.94
Fe-59	<5.45	<6.47	<5.42	<5.40	<6.59	<11.6
Zn-65	<6.36	<6.37	<3.06	<3.02	<5.30	<13.4
Co-60	<2.63	<2.87	<2.30	<2.22	<2.48	<5.05
K-40	78.6 ± 10.8	155 ± 15.8	293 ± 14.6	256 ± 13.8	<170 ± 15.3	<343 ± 32.0
Ba/La-140	<7.56	<5.90	<5.33	<5.16	<6.63	<13.4
NUCLIDE	**JULY**	**AUGUST**	**SEPTEMBER**	**OCTOBER**	**NOVEMBER**	**DECEMBER**
I-131	<7.66	<13.9	<11.4	<10.5	<8.79	<14.9
Cs-134	<3.25	<1.93	<4.42	<2.72	<3.29	<4.64
Cs-137	<3.31	<3.13	<3.77	<3.48	<2.82	<3.79
Zr-95	<6.96	<5.53	<8.52	<8.39	<6.65	<8.02
Nb-95	<4.16	<4.00	<6.74	<5.48	<4.03	<5.61
Co-58	<3.26	<3.89	<5.88	<4.44	<3.42	<4.66
Mn-54	<3.12	<2.85	<5.00	<4.25	<3.22	<3.54
Fe-59	<6.91	<9.16	<13.8	<11.0	<9.39	<14.3
Zn-65	<7.61	<6.49	<11.3	<9.34	<7.25	<9.60
Co-60	<2.88	<3.15	<3.49	<4.17	<3.07	<3.48
K-40	155 ± 17.5	265 ± 17.1	139 ± 22.4	363 ± 27.2	333 ± 21.3	341 ± 25.6
Ba/La-140	<9.12	<8.26	<10.8	<11.6	<8.68	<11.30

* Samples required by TS/ODCM

*** Corresponds to sample locations noted on the maps in Section 3.3.

TABLE 6-4 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES
Results in Units of pCi/liter ± 1 Sigma

FITZPATRICK* (03, INLET)***

NUCLIDE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
I-131	<8.04	<6.98	<12.4	<9.43	<12.6	<6.08
Cs-134	<1.93	<2.78	<3.19	<2.29	<2.76	<2.20
Cs-137	<2.85	<2.55	<3.21	<3.66	<3.68	<2.23
Zr-95	<5.47	<5.19	<6.49	<6.42	<7.81	<3.93
Nb-95	<3.68	<3.21	<3.67	<3.73	<5.07	<2.50
Co-58	<3.11	<2.98	<3.30	<3.00	<3.87	<2.69
Mn-54	<2.47	<2.91	<3.12	<2.86	<3.36	<2.23
Fe-59	<6.47	<5.77	<7.67	<6.82	<9.20	<5.14
Zn-65	<6.28	<5.27	<6.27	<6.16	<7.90	<4.68
Co-60	<3.25	<2.34	<2.65	<3.55	<4.44	<2.57
K-40	179 ± 15.7	156 ± 15.2	169 ± 17.6	154 ± 16.8	135 ± 19.0	104 ± 11.9
Ba/La-140	<7.30	<6.73	<10.1	<8.76	<9.34	<5.79
NUCLIDE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
I-131	<9.96	<7.11	<9.96	<11.9	<8.39	<8.88
Cs-134	<3.76	<2.58	<3.79	<3.69	<1.46	<2.15
Cs-137	<3.20	<2.49	<3.81	<4.05	<2.46	<1.77
Zr-95	<6.67	<5.52	<7.76	<8.21	<4.84	<4.02
Nb-95	<4.41	<3.41	<5.12	<3.90	<3.05	<2.92
Co-58	<3.96	<3.04	<4.10	<3.96	<2.52	<2.24
Mn-54	<3.28	<2.71	<4.11	<3.36	<2.37	<2.08
Fe-59	<8.52	<8.50	<10.1	<11.2	<7.97	<6.21
Zn-65	<9.19	<5.81	<7.43	<7.72	<5.50	<4.67
Co-60	<3.78	<2.94	<4.55	<4.41	<2.35	<1.90
K-40	374 ± 22.8	185 ± 15.6	187 ± 22.1	195 ± 21.9	<107 ± 12.0	118 ± 10.1
Ba/La-140	<7.93	<7.49	<8.78	<8.80	<7.30	<6.30

* Samples required by TS/ODCM

*** Corresponds to sample locations noted on the maps in Section 3.3.

TABLE 6-4 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES
Results in Units of pCi/liter ± 1 Sigma

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

NUCLIDE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
I-131	<7.11	<13.3	<5.66	<13.9	<5.41	<7.57
Cs-134	<2.41	<4.45	<1.58	<4.19	<2.47	<3.60
Cs-137	<2.44	<4.53	<2.39	<4.03	<2.26	<3.50
Zr-95	<4.58	<7.98	<4.43	<8.73	<4.46	<6.45
Nb-95	<3.05	<5.79	<2.68	<5.80	<3.03	<4.36
Co-58	<2.51	<5.41	<2.43	<4.77	<2.52	<3.78
Mn-54	<2.09	<4.06	<2.39	<4.36	<2.28	<3.59
Fe-59	<5.39	<12.1	<4.86	<8.66	<5.32	<7.79
Zn-65	<5.51	<11.8	<2.90	<9.07	<5.30	<7.78
Co-60	<2.57	<4.33	<2.24	<4.55	<2.27	<3.58
K-40	86.8 ± 12.0	129 ± 23.6	78.2 ± 11.8	87.1 ± 20.3	108 ± 12.4	102 ± 16.9
Ba/La-140	<6.77	12.1	5.68	12.7	5.28	<8.01
NUCLIDE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
I-131	<6.25	<13.4	<9.96	<8.97	<5.58	<14.4
Cs-134	<2.71	<3.41	<3.82	<3.15	<2.69	<3.95
Cs-137	<3.05	<3.21	<3.91	<3.40	<2.36	<4.38
Zr-95	<5.50	<6.14	<7.11	<7.12	<4.32	<7.50
Nb-95	<3.36	<4.49	<4.56	<3.47	<2.77	<4.98
Co-58	<3.02	<3.90	<4.79	<3.48	<2.72	<5.03
Mn-54	<2.71	<3.63	<4.27	<3.28	<2.60	<4.12
Fe-59	<6.35	<12.2	<8.86	<7.89	<6.66	<15.2
Zn-65	<6.15	<7.01	<9.84	<6.36	<5.62	<11.4
Co-60	<2.61	<3.57	<4.90	<3.36	<2.38	<4.01
K-40	82.4 ± 12.4	86.1 ± 14.9	107 ± 19.4	168 ± 19.4	<113 ± 12.5	<216 ± 25.9
Ba/La-140	<6.60	<7.48	<9.43	<7.60	<5.76	<6.24

** Optional sample location.

*** Corresponds to sample locations noted on the maps in Section 3.3.

TABLE 6-4 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES
Results in Units of pCi/liter ± 1 Sigma

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

NUCLIDE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
I-131	<8.86	<11.6	<12.9	<14.1	<7.21	<10.0
Cs-134	<2.87	<6.05	<2.46	<4.41	<1.68	<3.88
Cs-137	<2.59	<5.32	<3.49	<4.06	<2.71	<3.58
Zr-95	<5.73	<8.47	<6.93	<8.16	<4.83	<7.91
Nb-95	<3.33	<6.44	<4.99	<4.89	<2.29	<4.67
Co-58	<3.08	<5.50	<4.02	<4.74	<2.90	<4.79
Mn-54	<2.85	<4.85	<3.44	<4.05	<2.85	<4.78
Fe-59	<6.81	<9.69	<8.08	<10.8	<5.98	<7.61
Zn-65	<5.86	<10.3	<9.42	<9.23	<3.56	<7.94
Co-60	<2.56	<4.81	<3.87	<4.04	<2.44	<3.91
K-40	154 ± 15.5	194 ± 28.4	319 ± 21.9	148 ± 20.4	75.4 ± 11.8	148 ± 20.7
Ba/La-140	<6.60	<8.77	<8.84	<11.9	<6.12	<12.0
NUCLIDE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
I-131	<8.60	<14.6	<12.3	<9.10	<7.99	<14.1
Cs-134	<2.29	<2.80	<2.63	<3.35	<2.72	<3.52
Cs-137	<3.37	<3.03	<4.07	<3.56	<2.71	<3.48
Zr-95	<6.99	<6.78	<6.35	<6.76	<5.23	<7.78
Nb-95	<3.65	<4.59	<5.16	<4.18	<3.47	<5.08
Co-58	<3.57	<3.85	<4.54	<3.93	<3.05	<4.84
Mn-54	<3.51	<3.41	<4.17	<3.87	<2.69	<3.80
Fe-59	<6.88	<7.90	<13.3	<9.58	<9.16	<13.0
Zn-65	<7.78	<6.90	<5.66	<9.08	<5.98	<9.13
Co-60	<3.55	<2.55	<4.12	<3.41	<2.95	<2.69
K-40	172 ± 19.5	163 ± 17.6	254 ± 22.9	116 ± 16.9	182 ± 15.9	189 ± 24.1
Ba/La-140	<7.29	<12.1	<9.35	<8.72	<7.18	<11.6

** Optional sample location.

*** Corresponds to sample locations noted on the maps in Section 3.3.

TABLE 6-4 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES
Results in Units of pCi/liter ± 1 Sigma

OSWEGO CITY WATER** (10)***

NUCLIDE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
I-131	<8.92	<12.2	<8.97	<14.6	<12.2	<9.45
Cs-134	<2.69	<4.15	<1.47	<2.73	<3.30	<2.08
Cs-137	<2.99	<4.17	<2.31	<3.93	<3.34	<3.02
Zr-95	<5.37	<7.65	<4.83	<8.77	<6.93	<6.58
Nb-95	<3.80	<5.80	<3.15	<6.51	<4.83	<4.21
Co-58	<2.92	<4.94	<2.38	<5.25	<3.62	<3.81
Mn-54	<2.74	<3.90	<2.34	<5.23	<3.23	<3.85
Fe-59	<7.31	<9.90	<5.30	<12.7	<9.00	<7.53
Zn-65	<7.23	<10.1	<5.73	<11.1	<7.01	<4.51
Co-60	<3.25	<5.22	<2.17	<4.03	<3.77	<3.49
K-40	216 ± 18.0	167 ± 25.7	269 ± 13.8	129 ± 23.0	92.9 ± 15.5	294 ± 21.0
Ba/La-140	<7.78	11.8	<5.58	<9.7	9.48	<6.91
NUCLIDE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
I-131	<9.21	<10.1	<11.2	<12.7	<6.96	<12.5
Cs-134	<3.96	<2.44	<4.41	<3.98	<1.48	<2.37
Cs-137	<3.71	<2.21	<3.93	<3.06	<2.38	<3.70
Zr-95	<6.71	<4.33	<7.62	<7.90	<4.50	<6.68
Nb-95	<4.50	<3.22	<5.18	<4.69	<2.99	<4.36
Co-58	<4.02	<2.70	<5.38	<4.12	<2.56	<3.93
Mn-54	<3.88	<2.25	<4.74	<3.53	<2.20	<3.27
Fe-59	<8.33	<6.84	<14.1	<12.0	<6.68	<9.89
Zn-65	<8.44	<4.63	<10.2	<9.42	<2.87	<4.46
Co-60	<3.50	<2.13	<5.76	<3.70	<2.34	<3.49
K-40	372 ± 23.2	<117 ± 11.5	<162 ± 26.4	<206 ± 23.8	262 ± 13.7	289 ± 20.6
Ba/La-140	<7.64	<8.07	<9.33	<10.4	<5.56	<8.51

** Optional sample location.
*** Corresponds to sample locations noted on the maps in Section 3.3.

TABLE 6-5

NMPNS/JAF SITE
ENVIRONMENTAL AIRBORNE PARTICULATE SAMPLES – OFF SITE STATIONS
GROSS BETA ACTIVITY $pCi/m^3 \pm 1$ SIGMA

LOCATION

Week Start Date	R-1* OFF-SITE	R-2* OFF-SITE	R-3* OFF-SITE	R-4* OFF-SITE	R-5* OFF-SITE	D-2 OFF-SITE	E OFF-SITE	F OFF-SITE	G OFF-SITE
01/02/01	0.0193 ± 0.002	0.0142 ± 0.001	0.0153 ± 0.002	0.0153 ± 0.002	0.0189 ± 0.002	0.0151 ± 0.001	0.0166 ± 0.002	0.0163 ± 0.002	0.0182 ± 0.002
01/09/01	0.0183 ± 0.002	0.0152 ± 0.002	0.0155 ± 0.002	0.0139 ± 0.002	0.0140 ± 0.001	0.0159 ± 0.001	0.0113 ± 0.001	0.0169 ± 0.002	0.0175 ± 0.002
01/16/01	0.0182 ± 0.002	0.0174 ± 0.002	0.0163 ± 0.002	0.0177 ± 0.002	0.0172 ± 0.002	0.0138 ± 0.001	0.0139 ± 0.001	0.0137 ± 0.001	0.0157 ± 0.001
01/23/01	0.0188 ± 0.002	0.0168 ± 0.002	0.0202 ± 0.002	0.0212 ± 0.002	0.0203 ± 0.002	0.0208 ± 0.002	0.0196 ± 0.002	0.0217 ± 0.002	0.0379 ± 0.003
01/30/01	0.0157 ± 0.002	0.0146 ± 0.002	0.0143 ± 0.002	0.0170 ± 0.002	0.0150 ± 0.002	0.0151 ± 0.001	0.0116 ± 0.001	0.0135 ± 0.001	0.0168 ± 0.002
02/06/01	0.0163 ± 0.002	0.0148 ± 0.001	0.0174 ± 0.002	0.0162 ± 0.002	0.0168 ± 0.002	0.0159 ± 0.001	0.0166 ± 0.002	0.0153 ± 0.002	0.0179 ± 0.002
02/13/01	0.0221 ± 0.002	0.0186 ± 0.002	0.0205 ± 0.002	0.0201 ± 0.002	0.0176 ± 0.002	0.0178 ± 0.001	0.0189 ± 0.002	0.0212 ± 0.002	0.0219 ± 0.002
02/20/01	0.0126 ± 0.001	0.0133 ± 0.001	0.0162 ± 0.002	0.0134 ± 0.002	0.0149 ± 0.002	0.0116 ± 0.001	0.0131 ± 0.002	0.0134 ± 0.001	0.0145 ± 0.001
02/27/01	0.0145 ± 0.002	0.0141 ± 0.002	0.0131 ± 0.002	0.0169 ± 0.002	0.0136 ± 0.002	0.0175 ± 0.002	0.0141 ± 0.002	0.0144 ± 0.002	0.0142 ± 0.001
03/06/01	0.0112 ± 0.001	0.0089 ± 0.001	0.0094 ± 0.001	0.0110 ± 0.001	0.0089 ± 0.001	0.0110 ± 0.001	0.0103 ± 0.001	0.0121 ± 0.001	0.0100 ± 0.001
03/13/01	0.0132 ± 0.001	0.0159 ± 0.002	0.0135 ± 0.002	0.0134 ± 0.002	0.0138 ± 0.002	0.0104 ± 0.001	0.0128 ± 0.001	0.0142 ± 0.002	0.0151 ± 0.002
03/20/01	0.0115 ± 0.001	0.0097 ± 0.001	0.0087 ± 0.001	0.0096 ± 0.001	0.0092 ± 0.001	0.0069 ± 0.001	0.0106 ± 0.001	0.0092 ± 0.001	0.0072 ± 0.003
03/27/01	0.0175 ± 0.002	0.0104 ± 0.001	0.0130 ± 0.002	0.0110 ± 0.001	0.0126 ± 0.001	0.0086 ± 0.001	0.0113 ± 0.001	0.0122 ± 0.001	0.0072 ± 0.002
04/03/01	0.0152 ± 0.001	0.0181 ± 0.002	0.0135 ± 0.001	0.0153 ± 0.001	0.0170 ± 0.002	0.0137 ± 0.001	0.0162 ± 0.002	0.0117 ± 0.001	0.0146 ± 0.002
04/10/01	0.0136 ± 0.002	0.0100 ± 0.001	0.0132 ± 0.001	0.0128 ± 0.001	0.0075 ± 0.001	0.0127 ± 0.001	0.0098 ± 0.001	0.0122 ± 0.001	0.0113 ± 0.001
04/17/01	0.0205 ± 0.002	0.0204 ± 0.002	0.0227 ± 0.002	0.0198 ± 0.002	0.0191 ± 0.002	0.0167 ± 0.002	0.0224 ± 0.002	0.0159 ± 0.001	0.0160 ± 0.002
04/24/01	0.0235 ± 0.002	0.0258 ± 0.002	0.0216 ± 0.002	0.0233 ± 0.002	0.0204 ± 0.002	0.0220 ± 0.002	0.0212 ± 0.002	0.0234 ± 0.002	0.0223 ± 0.002
05/01/01	0.0212 ± 0.002	0.0189 ± 0.002	0.0286 ± 0.002	0.0204 ± 0.002	0.0205 ± 0.002	0.0215 ± 0.002	0.0223 ± 0.002	0.0219 ± 0.002	0.0179 ± 0.002
05/08/01	0.0171 ± 0.002	0.0150 ± 0.002	0.0155 ± 0.002	0.0146 ± 0.002	0.0163 ± 0.002	0.0162 ± 0.002	0.0170 ± 0.002	0.0150 ± 0.001	0.0164 ± 0.002
05/15/01	0.0089 ± 0.001	0.0082 ± 0.001	0.0076 ± 0.001	0.0111 ± 0.001	0.0084 ± 0.001	0.0086 ± 0.001	0.0074 ± 0.001	0.0082 ± 0.001	0.0112 ± 0.001
05/22/01	0.0061 ± 0.001	0.0050 ± 0.001	0.0072 ± 0.001	0.0062 ± 0.001	0.0102 ± 0.001	0.0068 ± 0.001	0.0074 ± 0.001	0.0070 ± 0.001	0.0086 ± 0.001
05/29/01	0.0042 ± 0.001	0.0046 ± 0.001	0.0062 ± 0.001	0.0067 ± 0.001	0.0058 ± 0.001	0.0058 ± 0.001	0.0081 ± 0.001	0.0063 ± 0.001	0.0067 ± 0.001
06/05/01	0.0133 ± 0.002	0.0107 ± 0.001	0.0100 ± 0.001	0.0136 ± 0.002	0.0130 ± 0.001	0.0106 ± 0.001	0.0135 ± 0.001	0.0120 ± 0.001	0.0115 ± 0.001
06/12/01	0.0205 ± 0.002	0.0201 ± 0.002	0.0180 ± 0.002	0.0185 ± 0.002	0.0172 ± 0.002	0.0191 ± 0.002	0.0169 ± 0.002	0.0202 ± 0.002	0.0198 ± 0.002
06/19/01	0.0110 ± 0.001	0.0105 ± 0.001	0.0139 ± 0.001	0.0113 ± 0.001	0.0121 ± 0.001	0.0118 ± 0.001	0.0110 ± 0.001	0.0100 ± 0.001	0.0131 ± 0.001
06/26/01	0.0182 ± 0.002	0.0204 ± 0.002	0.0192 ± 0.002	0.0214 ± 0.002	0.0191 ± 0.002	0.0155 ± 0.002	0.0183 ± 0.002	0.0186 ± 0.002	0.0146 ± 0.002

* Sample locations required by TS/ODCM

TABLE 6-5 (continued)

NMPNS/JAF SITE

ENVIRONMENTAL AIRBORNE PARTICULATE SAMPLES – OFFSITE STATIONS

GROSS BETA ACTIVITY $pCi/m^3 \pm 1$ SIGMA

LOCATION

Week Start Date	R-1* OFF-SITE	R-2* OFF-SITE	R-3* OFF-SITE	R-4* OFF-SITE	R-5* OFF-SITE	D-2 OFF-SITE	E OFF-SITE	F OFF-SITE	G OFF-SITE
07/03/01	0.0172 ± 0.002	0.0166 ± 0.002	0.0146 ± 0.001	0.0165 ± 0.002	0.0151 ± 0.001	0.0166 ± 0.002	0.0156 ± 0.002	0.0160 ± 0.002	0.0161 ± 0.002
07/10/01	0.0124 ± 0.001	0.0096 ± 0.001	0.0115 ± 0.001	0.0101 ± 0.001	0.0128 ± 0.001	0.0077 ± 0.001	0.0103 ± 0.001	0.0092 ± 0.001	0.0096 ± 0.001
07/17/01	0.0179 ± 0.002	0.0179 ± 0.002	0.0189 ± 0.002	0.0161 ± 0.002	0.0174 ± 0.002	0.0200 ± 0.002	0.0164 ± 0.002	0.0176 ± 0.002	0.0182 ± 0.002
07/24/01	0.0170 ± 0.002	0.0148 ± 0.002	0.0160 ± 0.002	0.0139 ± 0.001	0.0168 ± 0.001	0.0177 ± 0.002	0.0146 ± 0.001	0.0163 ± 0.002	0.0164 ± 0.002
07/31/01	0.0198 ± 0.002	0.0223 ± 0.002	0.0229 ± 0.002	0.0214 ± 0.002	0.0193 ± 0.002	0.0221 ± 0.002	0.0194 ± 0.002	0.0203 ± 0.002	0.0222 ± 0.002
08/07/01	0.0215 ± 0.002	0.0209 ± 0.002	0.0225 ± 0.002	0.0237 ± 0.002	0.0264 ± 0.002	0.0289 ± 0.002	0.0270 ± 0.002	0.0231 ± 0.002	0.0242 ± 0.002
08/14/01	0.0167 ± 0.002	0.0135 ± 0.002	0.0188 ± 0.002	0.0169 ± 0.002	0.0140 ± 0.001	0.0215 ± 0.002	0.0174 ± 0.002	0.0146 ± 0.002	0.0161 ± 0.001
08/21/01	0.0135 ± 0.001	0.0132 ± 0.002	0.0169 ± 0.002	0.0153 ± 0.002	0.0166 ± 0.002	0.0163 ± 0.002	0.0140 ± 0.001	0.0153 ± 0.001	0.0154 ± 0.001
08/28/01	0.0146 ± 0.001	0.0172 ± 0.002	0.0157 ± 0.002	0.0128 ± 0.001	0.0145 ± 0.001	0.0152 ± 0.002	0.0177 ± 0.002	0.0146 ± 0.001	0.0145 ± 0.001
09/04/01	0.0174 ± 0.002	0.0160 ± 0.002	0.0173 ± 0.002	0.0207 ± 0.002	0.0156 ± 0.002	0.0215 ± 0.002	0.0154 ± 0.002	0.0156 ± 0.002	0.0174 ± 0.002
09/11/01	0.0179 ± 0.002	0.0214 ± 0.002	0.0151 ± 0.002	0.0194 ± 0.002	0.0149 ± 0.002	0.0194 ± 0.002	0.0203 ± 0.002	0.0205 ± 0.002	0.0153 ± 0.001
09/18/01	0.0194 ± 0.002	0.0223 ± 0.002	0.0185 ± 0.002	0.0184 ± 0.002	0.0173 ± 0.002	0.0164 ± 0.002	0.0211 ± 0.002	0.0171 ± 0.002	0.0202 ± 0.002
09/25/01	0.0112 ± 0.001	0.0149 ± 0.002	0.0124 ± 0.001	0.0123 ± 0.002	0.0117 ± 0.001	0.0139 ± 0.002	0.0150 ± 0.002	0.0131 ± 0.001	0.0125 ± 0.001
10/02/01	0.0163 ± 0.002	0.0196 ± 0.002	0.0174 ± 0.002	0.0182 ± 0.002	0.0185 ± 0.002	0.0192 ± 0.002	0.0191 ± 0.002	0.0183 ± 0.002	0.0195 ± 0.002
10/09/01	0.0185 ± 0.002	0.0190 ± 0.002	0.0153 ± 0.002	0.0165 ± 0.002	0.0215 ± 0.002	0.0169 ± 0.002	0.0149 ± 0.002	0.0178 ± 0.002	0.0146 ± 0.001
10/16/01	0.0150 ± 0.002	0.0190 ± 0.002	0.0195 ± 0.002	0.0186 ± 0.002	0.0194 ± 0.002	0.0194 ± 0.002	0.0184 ± 0.002	0.0187 ± 0.002	0.0159 ± 0.001
10/23/01	0.0087 ± 0.001	0.0117 ± 0.001	0.0124 ± 0.001	0.0095 ± 0.001	0.0122 ± 0.001	0.0126 ± 0.002	0.0105 ± 0.001	0.0130 ± 0.001	0.0103 ± 0.001
10/30/01	0.0162 ± 0.002	0.0131 ± 0.001	0.0143 ± 0.002	0.0153 ± 0.002	0.0149 ± 0.002	0.0163 ± 0.002	0.0162 ± 0.002	0.0135 ± 0.001	0.0137 ± 0.001
11/06/01	0.0113 ± 0.001	0.0140 ± 0.001	0.0135 ± 0.001	0.0125 ± 0.001	0.0120 ± 0.001	0.0092 ± 0.001	0.0117 ± 0.001	0.0156 ± 0.002	0.0115 ± 0.001
11/13/01	0.0327 ± 0.002	0.0315 ± 0.002	0.0342 ± 0.002	0.0367 ± 0.002	0.0336 ± 0.002	0.0327 ± 0.002	0.0292 ± 0.002	0.0294 ± 0.002	0.0273 ± 0.002
11/20/01	0.0189 ± 0.002	0.0179 ± 0.002	0.0185 ± 0.002	0.0169 ± 0.002	0.0185 ± 0.002	0.0137 ± 0.002	0.0192 ± 0.002	0.0177 ± 0.002	0.0162 ± 0.001
11/27/01	0.0213 ± 0.002	0.0180 ± 0.002	0.0168 ± 0.002	0.0152 ± 0.002	0.0156 ± 0.002	0.0181 ± 0.002	0.0152 ± 0.002	0.0176 ± 0.002	0.0168 ± 0.002
12/04/01	0.0251 ± 0.002	0.0253 ± 0.002	0.0230 ± 0.002	0.0257 ± 0.002	0.0224 ± 0.002	0.0221 ± 0.002	0.0280 ± 0.002	0.0245 ± 0.002	0.0255 ± 0.002
12/11/01	0.0173 ± 0.002	0.0187 ± 0.002	0.0155 ± 0.002	0.0181 ± 0.002	0.0196 ± 0.002	0.0173 ± 0.002	0.0185 ± 0.002	0.0187 ± 0.002	0.0171 ± 0.001
12/18/01	0.0141 ± 0.001	0.0180 ± 0.002	0.0177 ± 0.002	0.0186 ± 0.002	0.0134 ± 0.001	0.0192 ± 0.002	0.0180 ± 0.002	0.0161 ± 0.001	0.0170 ± 0.001
12/26/01	0.0128 ± 0.001	0.0153 ± 0.001	0.0150 ± 0.002	0.0171 ± 0.002	0.0136 ± 0.002	0.0130 ± 0.001	0.0200 ± 0.002	0.0184 ± 0.002	0.0125 ± 0.001

* Sample locations required by TS/ODCM

TABLE 6-6

NMPNS/JAF SITE
ENVIRONMENTAL AIRBORNE PARTICULATE SAMPLES - ON-SITE STATIONS
GROSS BETA ACTIVITY $pCi/m^3 \pm 1$ SIGMA

LOCATION

Week Start Date	D1 ON-SITE	G ON-SITE	H ON-SITE	I ON-SITE	J ON-SITE	K ON-SITE
01/03/01	0.0206 ± 0.002	0.0166 ± 0.002	0.0165 ± 0.002	0.0187 ± 0.002	0.0161 ± 0.002	0.0215±0.002
01/08/01	0.0181 ± 0.002	0.0177 ± 0.002	0.0207 ± 0.002	0.0203 ± 0.002	0.0195 ± 0.002	0.0182±0.002
01/15/01	0.0166 ± 0.002	0.0172 ± 0.002	0.0209 ± 0.002	0.0160 ± 0.002	0.0173 ± 0.002	0.0197±0.002
01/22/01	0.0204 ± 0.002	0.0194 ± 0.002	0.0207 ± 0.002	0.0197 ± 0.002	0.0202 ± 0.002	0.0183±0.002
01/29/01	0.0169 ± 0.002	0.0164 ± 0.002	0.0180 ± 0.002	0.0158 ± 0.002	0.0145 ± 0.002	0.0160±0.002
02/05/01	0.0206 ± 0.002	0.0195 ± 0.002	0.0174 ± 0.002	0.0194 ± 0.002	0.0175 ± 0.002	0.0166±0.002
02/12/01	(1)	0.0211 ± 0.002	0.0198 ± 0.002	0.0198 ± 0.002	0.0227 ± 0.002	0.0180±0.001
02/20/01	0.0175 ± 0.002	0.0153 ± 0.002	0.0137 ± 0.002	0.0148 ± 0.002	0.0140 ± 0.002	0.0122±0.002
02/26/01	0.0183 ± 0.002	0.0187 ± 0.002	0.0195 ± 0.002	0.0157 ± 0.002	0.0137 ± 0.002	0.0162±0.002
03/05/01	0.0116 ± 0.002	0.0118 ± 0.001	0.0101 ± 0.001	0.0125 ± 0.002	0.0130 ± 0.002	0.0103±0.001
03/12/01	0.0124 ± 0.001	0.0143 ± 0.002	0.0154 ± 0.002	0.0128 ± 0.001	0.0117 ± 0.001	0.0125±0.001
03/19/01	0.0091 ± 0.001	0.0062 ± 0.001	0.0095 ± 0.001	0.0083 ± 0.001	0.0095 ± 0.001	0.0138±0.002
03/26/01	0.0113 ± 0.001	0.0119 ± 0.001	0.0093 ± 0.001	0.0086 ± 0.001	0.0087 ± 0.001	0.0111±0.001
04/02/01	0.0181 ± 0.002	0.0154 ± 0.002	0.0150 ± 0.002	0.0154 ± 0.001	0.0171 ± 0.002	0.0173±0.002
04/09/01	0.0083 ± 0.001	0.0073 ± 0.001	0.0079 ± 0.001	0.0086 ± 0.001	0.0078 ± 0.001	0.0077±0.001
04/16/01	0.0184 ± 0.002	0.0187 ± 0.002	0.0175 ± 0.002	0.0168 ± 0.002	0.0164 ± 0.002	0.0180±0.002
04/23/01	0.0191 ± 0.002	0.0201 ± 0.002	0.0236 ± 0.002	0.0194 ± 0.002	0.0192 ± 0.002	0.0194±0.002
04/30/01	0.0186 ± 0.002	0.0234 ± 0.002	0.0216 ± 0.002	0.0197 ± 0.002	0.0199 ± 0.002	0.0230±0.002
05/07/01	0.0171 ± 0.002	0.0172 ± 0.002	0.0141 ± 0.002	0.0135 ± 0.002	0.0143 ± 0.002	0.0161±0.002
05/14/01	0.0093 ± 0.001	0.0100 ± 0.001	0.0080 ± 0.001	0.0084 ± 0.001	0.0106 ± 0.001	0.0088±0.001
05/21/01	0.0059 ± 0.001	0.0071 ± 0.001	0.0048 ± 0.001	0.0060 ± 0.001	0.0082 ± 0.001	0.0059±0.001
05/29/01	0.0048 ± 0.001	0.0036 ± 0.001	0.0052 ± 0.001	0.0069 ± 0.001	0.0071 ± 0.002	0.0043±0.001
06/04/01	0.0112 ± 0.001	0.0106 ± 0.001	0.0113 ± 0.001	0.0123 ± 0.001	0.0103 ± 0.001	0.0120±0.002
06/11/01	0.0197 ± 0.002	0.0161 ± 0.002	0.0161 ± 0.002	0.0203 ± 0.002	0.0184 ± 0.002	0.0172±0.002
06/18/01	0.0116 ± 0.001	0.0101 ± 0.001	0.0127 ± 0.001	0.0133 ± 0.001	0.0122 ± 0.002	0.0098±0.001
06/25/01	0.0184 ± 0.002	0.0161 ± 0.002	0.0168 ± 0.002	0.0181 ± 0.002	0.0182 ± 0.002	0.0169±0.002

(1) No Sample Results

TABLE 6-6 (continued)

NMPNS/JAF SITE
ENVIRONMENTAL AIRBORNE PARTICULATE SAMPLES - ON-SITE STATIONS
GROSS BETA ACTIVITY $pCi/m^3 \pm 1$ SIGMA

LOCATION

Week Start Date	D1 ON-SITE	G ON-SITE	H ON-SITE	I ON-SITE	J ON-SITE	K ON-SITE
07/02/01	0.0113 ± 0.001	0.0126 ± 0.002	0.0141 ± 0.002	0.0114 ± 0.001	0.0118 ± 0.001	0.0104 ± 0.001
07/09/01	0.0117 ± 0.001	0.0092 ± 0.001	0.0079 ± 0.001	0.0105 ± 0.001	0.0104 ± 0.001	0.0094 ± 0.001
07/16/01	0.0139 ± 0.001	0.0129 ± 0.002	0.0160 ± 0.002	0.0138 ± 0.002	0.0144 ± 0.001	0.0153 ± 0.002
07/23/01	0.0147 ± 0.001	0.0158 ± 0.002	0.0139 ± 0.002	0.0156 ± 0.002	0.0177 ± 0.002	0.0179 ± 0.002
07/30/01	0.0187 ± 0.002	0.0222 ± 0.002	0.0238 ± 0.002	0.0185 ± 0.002	0.0230 ± 0.002	0.0210 ± 0.002
08/06/01	0.0222 ± 0.002	0.0221 ± 0.002	0.0205 ± 0.002	0.0179 ± 0.002	0.0226 ± 0.002	0.0221 ± 0.002
08/13/01	0.0156 ± 0.002	0.0130 ± 0.001	0.0155 ± 0.002	0.0133 ± 0.001	0.0134 ± 0.001	0.0150 ± 0.002
08/20/01	0.0145 ± 0.001	0.0147 ± 0.001	0.0175 ± 0.002	0.0152 ± 0.002	0.0154 ± 0.002	0.0159 ± 0.002
08/27/01	0.0151 ± 0.001	0.0158 ± 0.001	0.0178 ± 0.001	0.0167 ± 0.001	0.0159 ± 0.001	0.0151 ± 0.001
09/04/01	0.0196 ± 0.002	0.0193 ± 0.002	0.0188 ± 0.002	0.0162 ± 0.002	0.0153 ± 0.002	0.0161 ± 0.002
09/10/01	0.0120 ± 0.001	0.0099 ± 0.001	0.0114 ± 0.001	0.0128 ± 0.002	0.0127 ± 0.001	0.0106 ± 0.001
09/17/01	0.0215 ± 0.002	0.0224 ± 0.002	0.0264 ± 0.002	0.0261 ± 0.002	0.0217 ± 0.002	0.0199 ± 0.002
09/24/01	0.0081 ± 0.001	0.0090 ± 0.001	0.0096 ± 0.001	0.0096 ± 0.001	0.0087 ± 0.001	0.0107 ± 0.001
10/01/01	0.0211 ± 0.002	0.0221 ± 0.002	0.0252 ± 0.002	0.0217 ± 0.002	0.0197 ± 0.002	0.0210 ± 0.002
10/08/01	0.0134 ± 0.001	0.0151 ± 0.002	0.0160 ± 0.002	0.0152 ± 0.002	0.0163 ± 0.002	0.0159 ± 0.002
10/15/01	0.0174 ± 0.002	0.0172 ± 0.002	0.0151 ± 0.002	0.0175 ± 0.002	0.0161 ± 0.002	0.0157 ± 0.002
10/22/01	0.0116 ± 0.001	0.0104 ± 0.001	0.0131 ± 0.001	0.0100 ± 0.001	0.0094 ± 0.001	0.0114 ± 0.001
10/29/01	0.0168 ± 0.002	0.0137 ± 0.001	0.0184 ± 0.002	0.0174 ± 0.002	0.0168 ± 0.002	0.0163 ± 0.002
11/05/01	0.0107 ± 0.001	0.0121 ± 0.001	0.0102 ± 0.001	0.0122 ± 0.001	0.0128 ± 0.001	0.0113 ± 0.001
11/12/01	0.0305 ± 0.002	0.0293 ± 0.002	0.0308 ± 0.002	0.0353 ± 0.002	0.0321 ± 0.002	0.0333 ± 0.002
11/19/01	0.0223 ± 0.002	0.0203 ± 0.002	0.0195 ± 0.002	0.0206 ± 0.002	0.0186 ± 0.002	0.0201 ± 0.002
11/26/01	0.0120 ± 0.002	0.0124 ± 0.001	0.0107 ± 0.001	0.0105 ± 0.001	0.0104 ± 0.001	0.0101 ± 0.001
12/03/01	0.0349 ± 0.002	0.0275 ± 0.002	0.0320 ± 0.002	0.0250 ± 0.002	0.0266 ± 0.002	0.0274 ± 0.002
12/10/01	0.0198 ± 0.002	0.0197 ± 0.002	0.0212 ± 0.002	0.0194 ± 0.002	0.0192 ± 0.002	0.0188 ± 0.002
12/17/01	0.0167 ± 0.001	0.0185 ± 0.001	0.0159 ± 0.001	0.0148 ± 0.001	0.0164 ± 0.001	0.0163 ± 0.001
12/26/01	0.0155 ± 0.002	0.0164 ± 0.002	0.0135 ± 0.002	0.0165 ± 0.002	0.0168 ± 0.002	0.0187 ± 0.002

TABLE 6-7

NMPNS/JAF SITE
ENVIRONMENTAL CHARCOAL CARTRIDGE SAMPLES - OFF-SITE STATIONS
I-131 ACTIVITY $pCi/m^3 \pm 1$ SIGMA

LOCATION

Week Start Date	R-1* OFF-SITE	R-2* OFF-SITE	R-3* OFF-SITE	R-4* OFF-SITE	R-5* OFF-SITE	D-2 OFF-SITE	E OFF-SITE	F OFF-SITE	G OFF-SITE
01/02/01	<0.0151	<0.0129	<0.0216	<0.0162	<0.0200	<0.0113	<0.0150	<0.0143	<0.0126
01/09/01	<0.0107	<0.0130	<0.0159	<0.0156	<0.0184	<0.0119	<0.0136	<0.0127	<0.0128
01/16/01	<0.0140	<0.0134	<0.0152	<0.0154	<0.0122	<0.0122	<0.0122	<0.0194	<0.0137
01/23/01	<0.0161	<0.0196	<0.0192	<0.0186	<0.0238	<0.0124	<0.0171	<0.0166	<0.0390
01/30/01	<0.0143	<0.0186	<0.0175	<0.0069	<0.0179	<0.0078	<0.0142	<0.0167	<0.0118
02/06/01	<0.0217	<0.0156	<0.0163	<0.0136	<0.0182	<0.0129	<0.0132	<0.0104	<0.0160
02/13/01	<0.0154	<0.0217	<0.0112	<0.0148	<0.0116	<0.0165	<0.0102	<0.0178	<0.0117
02/20/01	<0.0108	<0.0123	<0.0146	<0.0148	<0.0118	<0.0128	<0.0149	<0.0132	<0.0110
02/27/01	<0.0155	<0.0131	<0.0088	<0.0174	<0.0135	<0.0161	<0.0165	<0.0198	<0.0155
03/06/01	<0.0126	<0.0117	<0.0165	<0.0231	<0.0191	<0.0204	<0.0144	<0.0173	<0.0163
03/13/01	<0.0131	<0.0182	<0.0120	<0.0171	<0.0229	<0.0181	<0.0181	<0.0200	<0.0204
03/20/01	<0.0124	<0.0167	<0.0217	<0.0179	<0.0192	<0.0171	<0.0170	<0.0195	<0.0644
03/27/01	<0.0109	<0.0129	<0.0191	<0.0258	<0.0178	<0.0115	<0.0140	<0.0142	<0.0521
04/03/01	<0.0174	<0.0148	<0.0152	<0.0148	<0.0294	<0.0264	<0.0119	<0.0169	<0.0224
04/10/01	<0.0168	<0.0146	<0.0125	<0.0103	<0.0195	<0.0176	<0.0151	<0.0158	<0.0125
04/17/01	<0.0199	<0.0267	<0.0308	<0.0240	<0.0329	<0.0273	<0.0219	<0.0143	<0.0300
04/24/01	<0.0154	<0.0058	<0.0183	<0.0259	<0.0282	<0.0271	<0.0262	<0.0203	<0.0301
05/01/01	<0.0234	<0.0285	<0.0229	<0.0190	<0.0389	<0.0575	<0.0177	<0.0246	<0.0251
05/08/01	<0.0258	<0.0060	<0.0152	<0.0303	<0.0388	<0.0316	<0.0371	<0.0313	<0.0385
05/15/01	<0.0230	<0.0310	<0.0272	<0.0382	<0.0208	<0.0192	<0.0056	<0.0272	<0.0261
05/22/01	<0.0356	<0.0247	<0.0205	<0.0301	<0.0265	<0.0215	<0.0161	<0.0256	<0.0349
05/29/01	<0.0372	<0.0317	<0.0310	<0.0403	<0.0307	<0.0197	<0.0243	<0.0327	<0.0370
06/05/01	<0.0206	<0.0336	<0.0236	<0.0343	<0.0273	<0.0158	<0.0292	<0.0235	<0.0260
06/12/01	<0.0181	<0.0346	<0.0344	<0.0380	<0.0307	<0.0306	<0.0333	<0.0221	<0.0357
06/19/01	<0.0359	<0.0328	<0.0302	<0.0248	<0.0305	<0.0195	<0.0220	<0.0259	<0.0294
06/26/01	<0.0308	<0.0259	<0.0235	<0.0199	<0.0260	<0.0223	<0.0238	<0.0301	<0.0229

* Sample locations required by TS/ODCM

TABLE 6-7 (continued)

NMPNS/JAF SITE

ENVIRONMENTAL CHARCOAL CARTRIDGE SAMPLES - OFF-SITE STATIONS

I-131 ACTIVITY $pCi/m^3 \pm 1$ SIGMA

LOCATION

Week Start Date	R-1* OFF-SITE	R-2* OFF-SITE	R-3* OFF-SITE	R-4* OFF-SITE	R-5* OFF-SITE	D-2 OFF-SITE	E OFF-SITE	F OFF-SITE	G OFF-SITE
07/03/01	<0.0326	<0.0336	<0.0295	<0.0247	<0.0156	<0.0234	<0.0306	<0.0291	<0.0367
07/10/01	<0.0166	<0.0320	<0.0286	<0.0358	<0.0300	<0.0250	<0.0260	<0.0297	<0.0231
07/17/01	<0.0171	<0.0296	<0.0249	<0.0295	<0.0273	<0.0294	<0.0188	<0.0209	<0.0213
07/24/01	<0.0339	<0.0399	<0.0240	<0.0326	<0.0263	<0.0250	<0.0266	<0.0327	<0.0318
07/31/01	<0.0249	<0.0287	<0.0322	<0.0260	<0.0171	<0.0255	<0.0324	<0.0294	<0.0278
08/07/01	<0.0268	<0.0235	<0.0337	<0.0192	<0.0282	<0.0282	<0.0264	<0.0264	<0.0150
08/14/01	<0.0254	<0.0253	<0.0293	<0.0279	<0.0200	<0.0205	<0.0177	<0.0309	<0.0172
08/21/01	<0.0149	<0.0324	<0.0244	<0.0230	<0.0259	<0.0185	<0.0292	<0.0056	<0.0181
08/28/01	<0.0188	<0.0230	<0.0353	<0.0308	<0.0270	<0.0281	<0.0335	<0.0171	<0.0245
09/04/01	<0.0315	<0.0221	<0.0386	<0.0274	<0.0215	<0.0355	<0.0213	<0.0315	<0.0263
09/11/01	<0.0344	<0.0327	<0.0237	<0.0336	<0.0158	<0.0247	<0.0239	<0.0378	<0.0180
09/18/01	<0.0310	<0.0344	<0.0428	<0.0333	<0.0254	<0.0322	<0.0323	<0.0328	<0.0186
09/25/01	<0.0217	<0.0314	<0.0309	<0.0244	<0.0256	<0.0381	<0.0324	<0.0178	<0.0260
10/02/01	<0.0365	<0.0253	<0.0290	<0.0249	<0.0303	<0.0315	<0.0284	<0.0172	<0.0291
10/09/01	<0.0241	<0.0210	<0.0246	<0.0369	<0.0229	<0.0284	<0.0250	<0.0370	<0.0187
10/16/01	<0.0304	<0.0201	<0.0243	<0.0308	<0.0269	<0.0377	<0.0177	<0.0397	<0.0262
10/23/01	<0.0304	<0.0199	<0.0251	<0.0310	<0.0375	<0.0254	<0.0496	<0.0348	<0.0272
10/30/01	<0.0167	<0.0280	<0.0259	<0.0059	<0.0266	<0.0249	<0.0316	<0.0206	<0.0248
11/06/01	<0.0060	<0.0272	<0.0164	<0.0202	<0.0289	<0.0217	<0.0174	<0.0274	<0.0359
11/13/01	<0.0226	<0.0262	<0.0193	<0.0248	<0.0269	<0.0313	<0.0225	<0.0246	<0.0279
11/20/01	<0.0264	<0.0187	<0.0313	<0.0258	<0.0262	<0.0236	<0.0234	<0.0152	<0.0205
11/27/01	<0.0252	<0.0156	<0.0252	<0.0273	<0.0392	<0.0221	<0.0219	<0.0196	<0.0281
12/04/01	<0.0158	<0.0154	<0.0371	<0.0305	<0.0199	<0.0158	<0.0322	<0.0218	<0.0225
12/11/01	<0.0257	<0.0262	<0.0190	<0.0313	<0.0200	<0.0282	<0.0205	<0.0259	<0.0256
12/18/01	<0.0224	<0.0052	<0.0231	<0.0257	<0.0301	<0.0257	<0.0286	<0.0190	<0.0200
12/26/01	<0.0317	<0.0158	<0.0265	<0.0256	<0.0273	<0.0060	<0.0273	<0.0263	<0.0223

* Sample locations required by TS/ODCM

TABLE 6-8

NMPNS/JAF SITE
ENVIRONMENTAL CHARCOAL CARTRIDGE SAMPLES - ON-SITE STATIONS

I-131 ACTIVITY $pCi/m^3 \pm 1$ SIGMA

LOCATION

Week Start Date	D1 ON-SITE	G ON-SITE	H ON-SITE	I ON-SITE	J ON-SITE	K ON-SITE
01/03/01	<0.0151	<0.0139	<0.0224	<0.0199	<0.0168	<0.0219
01/08/01	<0.0124	<0.0122	<0.0161	<0.0141	<0.0168	<0.0166
01/15/01	<0.0139	<0.0151	<0.0151	<0.0141	<0.0142	<0.0144
01/22/01	<0.0157	<0.0153	<0.0201	<0.0184	<0.0219	<0.0148
01/29/01	<0.0149	<0.0141	<0.0145	<0.0168	<0.0125	<0.0123
02/05/01	<0.0023	<0.0147	<0.0171	<0.0170	<0.0151	<0.0124
02/12/01	(1)	<0.0127	<0.0113	<0.0130	<0.0103	<0.0148
02/20/01	<0.0149	<0.0024	<0.0228	<0.0115	<0.0139	<0.0194
02/26/01	<0.0123	<0.0117	<0.0106	<0.0165	<0.0123	<0.0178
03/05/01	<0.0139	<0.0148	<0.0114	<0.0134	<0.0181	<0.0154
03/12/01	<0.0133	<0.0182	<0.0177	<0.0110	<0.0165	<0.0170
03/19/01	<0.0171	<0.0180	<0.0204	<0.0150	<0.0128	<0.0220
03/26/01	<0.0115	<0.0163	<0.0156	<0.0103	<0.0181	<0.0201
04/02/01	<0.0190	<0.0157	<0.0135	<0.0147	<0.0190	<0.0210
04/09/01	<0.0112	<0.0184	<0.0108	<0.0202	<0.0169	<0.0155
04/16/01	<0.0249	<0.0276	<0.0330	<0.0225	<0.0291	<0.0240
04/23/01	<0.0211	<0.0221	<0.0243	<0.0343	<0.0272	<0.0228
04/30/01	<0.0333	<0.0280	<0.0267	<0.0251	<0.0319	<0.0251
05/07/01	<0.0180	<0.0163	<0.0197	<0.0214	<0.0170	<0.0222
05/14/01	<0.0181	<0.0295	<0.0160	<0.0217	<0.0290	<0.0332
05/21/01	<0.0051	<0.0225	<0.0403	<0.0354	<0.0062	<0.0275
05/29/01	<0.0262	<0.0228	<0.0324	<0.0336	<0.0276	<0.0355
06/04/01	<0.0206	<0.0211	<0.0173	<0.0322	<0.0257	<0.0322
06/11/01	<0.0262	<0.0314	<0.0269	<0.0417	<0.0282	<0.0068
06/18/01	<0.0253	<0.0367	<0.0315	<0.0376	<0.0237	<0.0246
06/25/01	<0.0236	<0.0362	<0.0233	<0.0285	<0.0271	<0.0287

(1) No sample results

TABLE 6-8 (continued)

NMPNS/JAF SITE
ENVIRONMENTAL CHARCOAL CARTRIDGE SAMPLES - ON-SITE STATIONS
I-131 ACTIVITY $pCi/m^3 \pm 1$ SIGMA

LOCATION

Week Start Date	D1 ON-SITE	G ON-SITE	H ON-SITE	I ON-SITE	J ON-SITE	K ON-SITE
07/02/01	<0.0302	<0.0351	<0.0352	<0.0330	<0.0346	<0.0306
07/09/01	<0.0235	<0.0236	<0.0242	<0.0161	<0.0162	<0.0264
07/16/01	<0.0054	<0.0339	<0.0252	<0.0325	<0.0343	<0.0328
07/23/01	<0.0313	<0.0348	<0.0229	<0.0314	<0.0272	<0.0182
07/30/01	<0.0148	<0.0280	<0.0312	<0.0157	<0.0275	<0.0306
08/06/01	<0.0205	<0.0260	<0.0250	<0.0180	<0.0291	<0.0179
08/13/01	<0.0145	<0.0147	<0.0155	<0.0263	<0.0160	<0.0243
08/20/01	<0.0159	<0.0052	<0.0280	<0.0162	<0.0214	<0.0243
08/27/01	<0.0214	<0.0247	<0.0053	<0.0283	<0.0211	<0.0183
09/04/01	<0.0177	<0.0268	<0.0367	<0.0063	<0.0308	<0.0322
09/10/01	<0.0235	<0.0276	<0.0253	<0.0276	<0.0235	<0.0279
09/17/01	<0.0243	<0.0150	<0.0238	<0.0168	<0.0244	<0.0166
09/24/01	<0.0243	<0.0101	<0.0161	<0.0279	<0.0298	<0.0301
10/01/01	<0.0195	<0.0217	<0.0312	<0.0338	<0.0271	<0.0330
10/08/01	<0.0238	<0.0327	<0.0240	<0.0238	<0.0268	<0.0247
10/15/01	<0.0218	<0.0214	<0.0270	<0.0230	<0.0238	<0.0194
10/22/01	<0.0219	<0.0210	<0.0289	<0.0351	<0.0335	<0.0232
10/29/01	<0.0271	<0.0220	<0.0284	<0.0239	<0.0151	<0.0266
11/05/01	<0.0288	<0.0188	<0.0201	<0.0203	<0.0289	<0.0207
11/12/01	<0.0260	<0.0173	<0.0321	<0.0160	<0.0307	<0.0213
11/19/01	<0.0307	<0.0289	<0.0248	<0.0272	<0.0331	<0.0271
11/26/01	<0.0299	<0.0242	<0.0261	<0.0170	<0.0302	<0.0328
12/03/01	<0.0305	<0.0188	<0.0270	<0.0245	<0.0337	<0.0391
12/10/01	<0.0193	<0.0171	<0.0286	<0.0216	<0.0056	<0.0217
12/17/01	<0.0283	<0.0273	<0.0220	<0.0189	<0.0190	<0.0236
12/26/01	<0.0393	<0.0340	<0.0297	<0.0387	<0.0543	<0.0351

TABLE 6-9

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES

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

R1 OFF-SITE COMPOSITE*

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	48.7 ± 11.2	66.8 ± 13.0	76.0 ± 14.2	132 ± 26.8	60.0 ± 24.3	95 ± 17.2
Zn-65	< 5.06	<7.92	<9.25	<14.2	<23.7	<9.99
Cs-134	< 2.48	<3.02	<3.53	<6.12	<7.63	<3.51
Cs-137	< 2.37	<2.96	<3.73	<1.62	<6.05	<0.70
Zr-95	< 5.61	<6.42	<7.45	<3.82	<12.5	<4.81
Nb-95	< 4.38	<4.33	<5.18	<7.45	<9.60	<5.94
Co-58	< 2.68	<3.90	<3.31	<2.23	<9.50	<4.15
Mn-54	< 3.74	<4.13	<3.61	<5.02	<7.54	<3.99
Co-60	< 3.03	<5.15	<1.33	<3.01	<2.18	<5.14
K-40	< 45.5	110 ± 20.0	<44.6	<30.7	<22.0	<13.2
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	**JULY**	**AUGUST**	**SEPTEMBER**	**OCTOBER**	**NOVEMBER**	**DECEMBER**
Be-7	62.7 ± 24.0	80.8 ± 20.2	105 ± 19.2	62.6 ± 17.8	65.6 ± 14.0	50.3 ± 14.1
Zn-65	<17.7	<9.04	<10.2	<9.90	<6.28	<3.56
Cs-134	<6.43	<1.13	<5.06	<5.60	<3.41	<4.22
Cs-137	<7.75	<4.82	<2.85	<2.47	<0.69	<4.09
Zr-95	<11.9	<7.25	<8.60	<8.43	<4.15	<6.77
Nb-95	<6.39	<5.09	<5.21	<5.70	<1.07	<6.61
Co-58	<5.51	<4.21	<3.06	<5.70	<4.16	<4.95
Mn-54	<1.76	<4.46	<4.59	<4.07	<3.66	<1.33
Co-60	<2.68	<5.33	<5.04	<4.29	<3.47	<2.05
K-40	<27.2	<71.2	<69.3	<55.2	<35.3	<56.8
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* Sample Location Required by TS/ODCM
† Plant Related Radionuclides

TABLE 6-9 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES

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

R2 OFF-SITE COMPOSITE*

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	68.3 ± 10.6	73.7 ± 11.3	<37.1	137 ± 28.7	76.3 ± 19.0	128 ± 21.0
Zn-65	<5.28	<7.14	<7.33	<14.2	<11.3	<12.8
Cs-134	<2.71	<2.62	<4.95	<4.59	<4.74	<4.10
Cs-137	<1.91	<2.26	<4.14	<6.50	<3.48	<4.43
Zr-95	<5.09	<5.79	<6.29	<3.85	<9.34	<5.94
Nb-95	<3.47	<3.27	<6.65	<11.1	<5.73	<5.73
Co-58	<2.35	<2.96	<5.19	<8.21	<3.67	<5.28
Mn-54	<2.81	<2.18	<4.04	<5.62	<3.05	<3.00
Co-60	<3.75	<3.55	<6.30	<3.02	<1.62	<1.40
K-40	<38.3	64.9 ± 15.2	132 ± 26.9	<87.5	100 ± 27.4	<55.6
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	<45.0	85.1 ± 21.2	96.3 ± 17.2	99.3 ± 18.3	60.0 ± 12.7	68.5 ± 12.4
Zn-65	<13.4	<10.9	<12.4	<13.0	<9.54	<7.79
Cs-134	<6.85	<6.41	<4.79	<3.00	<3.43	<4.63
Cs-137	<1.50	<3.42	<3.53	<2.98	<3.33	<4.23
Zr-95	<3.55	<7.58	<7.30	<7.42	<5.87	<7.31
Nb-95	<6.92	<6.67	<6.44	<5.01	<4.36	<5.76
Co-58	<5.98	<6.77	<5.92	<4.33	<4.18	<4.23
Mn-54	<6.62	<3.89	<2.68	<5.25	<2.61	<3.87
Co-60	<2.86	<2.19	<1.52	<4.79	<4.96	<3.25
K-40	<100	<88.3	<53.2	<51.0	<41.0	91.8 ± 19.7
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* Sample Location Required by TS/ODCM
† Plant Related Radionuclides

TABLE 6-9 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES

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

R3 OFF-SITE COMPOSITE*

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	69.4 ± 11.1	64.4 ± 11.7	102 ± 22.3	120 ± 33.3	89.2 ± 20.2	106 ± 16.0
Zn-65	<9.02	<6.86	<4.06	<28.1	<13.6	<8.74
Cs-134	<3.40	<3.91	<7.22	<6.51	<4.76	<4.34
Cs-137	<1.31	<3.22	<4.31	<6.34	<4.33	<3.92
Zr-95	<5.14	<6.91	<3.06	<13.0	<7.21	<8.00
Nb-95	<3.36	<4.16	<7.79	<8.79	<5.15	<5.46
Co-58	<3.08	<3.60	<1.78	<7.61	<5.93	<3.82
Mn-54	<2.04	<2.62	<4.35	<1.93	<3.50	<1.82
Co-60	<3.54	<4.38	<7.97	<9.06	<4.74	<2.58
K-40	59.3 ± 15.5	117 ± 20.8	<23.6	<96.3	<50.2	107 ± 22.1
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	135 ± 26.2	125 ± 22.3	108 ± 20.9	69.3 ± 17.6	56.4 ± 11.8	56.2 ± 11.5
Zn-65	<14.8	<9.46	<9.52	<2.54	<6.92	<7.06
Cs-134	<5.05	<5.76	<4.06	<3.71	<3.90	<3.17
Cs-137	<6.37	<4.55	<3.10	<3.58	<3.35	<3.06
Zr-95	<9.07	<2.64	<9.40	<6.91	<6.30	<4.94
Nb-95	<6.14	<5.33	<5.82	<7.63	<4.68	<3.88
Co-58	<8.38	<6.41	<6.28	<6.17	<4.11	<3.33
Mn-54	<6.01	<1.29	<3.92	<4.07	<0.76	<3.06
Co-60	<8.98	<5.66	<3.96	<1.46	<4.20	<1.18
K-40	<83.0	<20.2	<42.0	<14.8	<33.6	<12.0
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* Sample Location Required by TS/ODCM
† Plant Related Radionuclides

TABLE 6-9 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES

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

R4 OFF-SITE COMPOSITE*

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	63.0 ± 11.5	43.2 ± 10.6	<32.0	163 ± 28.8	<60.7	96.9 ± 16.0
Zn-65	<9.38	<7.16	<4.46	<19.8	<15.2	<5.70
Cs-134	<2.28	<2.33	<6.78	<6.15	<5.67	<3.26
Cs-137	<2.02	<2.75	<5.86	<5.91	<3.74	<2.74
Zr-95	<5.13	<4.98	<9.67	<14.6	<12.1	<5.67
Nb-95	<3.50	<3.80	<2.33	<9.85	<6.57	<3.09
Co-58	<3.27	<3.19	<6.35	<6.50	<7.05	<4.65
Mn-54	<3.04	<2.63	<1.66	<7.33	<6.04	<2.23
Co-60	<3.34	<0.86	<9.23	<7.97	<6.92	<1.24
K-40	<30.9	<25.1	<67.9	<23.5	<25.9	<35.7
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	103 ± 26.0	<40.0	105 ± 19.1	92.3 ± 17.9	31.4 ± 12.2	67.6 ± 12.9
Zn-65	<11.9	<9.10	<2.57	<7.19	<5.71	<8.03
Cs-134	<8.29	<3.67	<4.09	<5.02	<3.39	<3.21
Cs-137	<5.45	<2.81	<3.62	<2.81	<2.89	<2.84
Zr-95	<9.27	<14.3	<9.10	<8.09	<8.30	<4.34
Nb-95	<7.96	<9.30	<5.50	<3.74	<4.70	<2.95
Co-58	<1.88	<4.26	<4.07	<5.26	<3.70	<2.53
Mn-54	<4.70	<4.55	<5.04	<5.00	<3.64	<3.23
Co-60	<8.67	<6.55	<4.20	<5.44	<1.26	<4.18
K-40	<25.7	<19.4	<15.0	<45.6	102 ± 24.8	<42.5
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* Sample Location Required by TS/ODCM
† Plant Related Radionuclides

TABLE 6-9 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES

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

R5 OFF-SITE COMPOSITE (CONTROL)*

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	47.0 ± 12.8	75.5 ± 12.9	82.4 ± 30.4	135 ± 26.3	87.6 ± 26.9	91.9 ± 15.3
Zn-65	<6.68	<9.23	<20.2	<19.7	< 21.7	<9.88
Cs-134	<3.30	<4.95	<6.35	<5.77	< 6.85	<3.89
Cs-137	<2.91	<2.56	<3.78	<6.59	< 7.82	<3.00
Zr-95	<6.40	<8.15	<9.28	<9.46	< 14.5	<4.38
Nb-95	<4.51	<4.21	<6.46	<6.41	< 8.61	<1.04
Co-58	<3.95	<3.19	<8.86	<6.95	< 7.30	<4.03
Mn-54	<3.86	<3.54	<4.61	<1.76	< 8.10	<3.45
Co-60	<2.34	<2.76	<7.91	<2.68	< 8.54	<1.17
K-40	116 ± 18.6	116 ± 19.9	<27.6	<27.3	< 29.8	<31.1
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	**JULY**	**AUGUST**	**SEPTEMBER**	**OCTOBER**	**NOVEMBER**	**DECEMBER**
Be-7	103 ± 23.0	106 ± 22.7	99.8 ± 19.9	86.7 ± 17.8	68.1 ± 15.4	<35.0
Zn-65	<13.3	<3.54	<12.5	<10.0	<10.9	<6.12
Cs-134	<5.02	<1.14	<6.89	<4.22	<4.23	<3.80
Cs-137	<4.43	<5.70	<3.90	<3.54	<3.51	<4.08
Zr-95	<10.4	<7.00	<10.5	<8.19	<7.98	<8.08
Nb-95	<5.56	<9.28	<6.04	<6.35	<4.00	<5.02
Co-58	<4.79	<4.27	<3.19	<5.44	<3.82	<4.31
Mn-54	<6.08	<5.25	<4.94	<3.04	<2.75	<2.29
Co-60	<2.33	<2.02	<4.27	<3.31	<4.45	<1.29
K-40	<66.8	<55.7	111 ± 27.4	105 ± 21.4	95.4 ± 21.7	<13.2
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* Sample Location Required by TS/ODCM

† Plant Related Radionuclides

TABLE 6-9 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES

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

D2-OFF-SITE COMPOSITE**

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	58.0 ± 11.0	76.8 ± 10.7	92.9 ± 19.5	100 ± 30.7	<66.4	73.8 ± 14.7
Zn-65	<7.16	<4.21	<10.3	<19.1	<19.1	<5.86
Cs-134	<2.21	<2.56	<4.18	<4.77	<6.00	<3.07
Cs-137	<2.40	<1.63	<3.19	<5.23	<6.59	<2.97
Zr-95	<3.32	<4.18	<2.86	<15.2	<17.6	<4.64
Nb-95	<2.93	<2.15	<8.47	<11.5	<10.8	<4.05
Co-58	<2.50	<2.66	<4.80	<7.66	<7.68	<2.70
Mn-54	<2.15	<2.52	<7.35	<1.94	<5.05	<3.82
Co-60	<2.00	<3.29	<5.90	<8.35	<9.20	<4.24
K-40	<26.8	<41.1	<62.9	<85.4	<83.3	<35.7
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	53.7 ± 21.4	73.5 ± 22.0	56.6 ± 18.0	67.0 ± 16.8	107 ± 17.7	65.1 ± 12.6
Zn-65	<4.74	<3.67	<14.7	<12.0	<5.88	<8.35
Cs-134	<8.25	<5.56	<6.23	<4.42	<3.79	<3.85
Cs-137	<3.93	<4.12	<4.19	<0.90	<1.91	<3.92
Zr-95	<12.5	<10.3	<8.23	<7.93	<7.13	<7.36
Nb-95	<8.47	<5.71	<5.56	<4.64	<5.56	<5.32
Co-58	<5.77	<6.11	<4.26	<3.35	<3.72	<4.54
Mn-54	<5.02	<4.42	<4.05	<2.92	<0.82	<2.40
Co-60	<7.20	<5.96	<3.63	<1.65	<4.25	<0.97
K-40	<125	<55.6	<53.9	<16.8	<35.5	110 ± 21.9
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

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

E OFF-SITE COMPOSITE**

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	59.4 ± 11.8	94.5 ± 13.0	70.0 ± 21.0	127 ± 26.1	90.8 ± 21.2	122 ± 17.1
Zn-65	<6.16	<4.60	<10.8	<5.06	<17.9	<8.28
Cs-134	<3.11	<2.55	<5.41	<5.95	<5.22	<4.21
Cs-137	<2.34	<2.49	<4.49	<5.76	<5.95	<2.64
Zr-95	<5.59	<5.71	<8.63	<10.7	<11.0	<7.81
Nb-95	<4.11	<3.56	<7.63	<2.51	<8.79	<5.38
Co-58	<3.27	<3.52	<6.55	<7.04	<1.86	<4.19
Mn-54	<1.40	<2.93	<3.83	<4.88	<5.47	<2.78
Co-60	<4.42	<3.59	<2.28	<8.32	<6.57	<3.78
K-40	65.0 ± 16.5	<34.2	<60.7	<29.8	<24.5	<13.2
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	**JULY**	**AUGUST**	**SEPTEMBER**	**OCTOBER**	**NOVEMBER**	**DECEMBER**
Be-7	<43.1	98.1 ± 18.5	96.4 ± 18.2	75.1 ± 19.2	48.8 ± 12.4	36.1 ± 10.2
Zn-65	<14.6	<3.40	<9.07	<7.73	<8.17	<7.51
Cs-134	<6.49	<2.87	<4.61	<5.25	<3.82	<3.96
Cs-137	<4.84	<4.24	<3.78	<2.20	<2.60	<3.26
Zr-95	<8.96	<2.64	<6.82	<8.87	<5.34	<5.25
Nb-95	<10.0	<6.40	<6.51	<6.55	<4.11	<3.57
Co-58	<4.71	<4.16	<3.14	<5.65	<3.82	<2.44
Mn-54	<1.58	<1.28	<4.71	<4.50	<2.90	<2.80
Co-60	<6.99	<1.93	<4.10	<5.13	<3.56	<1.26
K-40	<82.0	<55.1	<43.2	<43.4	<13.3	<50.9
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Options Sample Location
† Plant Related Radionuclides

TABLE 6-9 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES

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

F OFF-SITE COMPOSITE**

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	55.4 ± 11.1	58.8 ± 9.94	52.2 ± 15.9	132 ± 25.4	53.9 ± 19.3	85.7 ± 15.9
Zn-65	<7.31	<6.17	<2.52	<16.0	<10.9	<8.99
Cs-134	<2.52	<2.98	<4.99	<5.99	<3.68	<2.92
Cs-137	<2.44	<1.85	<3.92	<1.46	<1.24	<0.62
Zr-95	<4.40	<4.27	<8.21	<9.88	<10.9	<6.57
Nb-95	<4.43	<2.84	<6.23	<6.69	<7.50	<4.05
Co-58	<2.75	<2.45	<4.80	<5.76	<4.49	<2.95
Mn-54	<2.38	<2.70	<2.50	<1.74	<3.84	<2.52
Co-60	<2.30	<2.92	<1.46	<7.32	<6.53	<1.11
K-40	<27.0	<27.0	<45.5	<27.4	<76.6	<40.4
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	77.1 ± 22.6	99.0 ± 21.1	72.9 ± 17.6	56.4 ± 13.8	70.4 ± 12.5	55.1 ± 11.6
Zn-65	<11.3	<10.3	<11.2	<12.9	<9.46	<5.24
Cs-134	<5.34	<4.93	<4.48	<4.22	<3.40	<3.71
Cs-137	<1.30	<4.09	<3.97	<3.11	<2.38	<2.09
Zr-95	<13.0	<9.02	<9.59	<5.28	<6.50	<7.48
Nb-95	<5.95	<7.37	<5.54	<6.95	<3.87	<3.57
Co-58	<7.58	<6.41	<3.92	<5.99	<2.94	<3.06
Mn-54	<1.55	<5.98	<3.95	<3.95	<2.05	<2.65
Co-60	<2.40	<5.59	<4.17	<1.42	<1.17	<3.14
K-40	<24.4	<20.9	<42.4	<41.0	<32.3	<11.2
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

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

G OFF-SITE COMPOSITE**

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	77.3 ± 13.8	59.3 ± 10.0	76.3 ± 16.1	141 ± 27.1	92.1 ± 24.4	103 ± 16.7
Zn-65	<4.14	<5.33	<14.8	<21.5	<18.6	<9.82
Cs-134	<3.29	<2.79	<6.27	<6.13	<5.16	<4.91
Cs-137	<2.78	<2.19	<2.99	<8.42	<1.45	<2.50
Zr-95	<6.73	<5.43	<7.76	<20.0	<12.8	<4.75
Nb-95	<4.31	<2.74	<5.11	<13.5	<8.81	<4.83
Co-58	<2.80	<3.18	<4.53	<2.42	<7.45	<4.38
Mn-54	<2.70	<0.50	<4.04	<10.2	<1.74	<3.08
Co-60	<4.24	<3.09	<3.90	<3.37	<7.30	<4.59
K-40	<25.4	<22.5	111 ± 23.6	<34.6	<27.3	<42.4
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	**JULY**	**AUGUST**	**SEPTEMBER**	**OCTOBER**	**NOVEMBER**	**DECEMBER**
Be-7	79.4 ± 24.3	116 ± 19.7	92.4 ± 17.3	58.3 ± 14.7	57.9 ± 14.3	72.9 ± 12.5
Zn-65	<11.3	<10.6	<8.38	<6.42	<5.96	<7.53
Cs-134	<1.43	<4.20	<3.57	<5.04	<3.88	<3.38
Cs-137	<4.73	<2.74	<3.79	<4.25	<2.57	<2.23
Zr-95	<14.3	<11.3	<7.58	<9.45	<3.25	<8.22
Nb-95	<9.69	<6.13	<5.60	<5.95	<3.18	<5.59
Co-58	<6.45	<5.17	<4.83	<4.21	<3.10	<3.63
Mn-54	<5.60	<2.98	<3.45	<4.79	<2.67	<2.82
Co-60	<2.49	<5.04	<5.07	<3.85	<3.04	<3.08
K-40	<25.2	<18.0	<46.7	115 ± 26.5	83.4 ± 18.1	<46.2
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

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

D1 ON-SITE COMPOSITE**

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	63.3 ± 11.8	81.5 ± 17.1	86.0 ± 15.5	104 ± 23.7	118 ± 21.2	101 ± 17.0
Zn-65	<8.13	<13.5	<8.79	<11.3	<3.93	<8.44
Cs-134	<3.31	<5.42	<2.77	<6.96	<5.34	<3.21
Cs-137	<2.55	<4.33	<4.03	<4.71	<3.50	<3.06
Zr-95	<5.15	<7.85	<1.82	<12.9	<1.53	<6.01
Nb-95	<4.13	<6.90	<3.47	<7.61	<7.43	<3.56
Co-58	<3.00	<5.63	<1.06	<6.48	<1.71	<3.01
Mn-54	<2.00	<4.49	<3.07	<6.48	<4.74	<2.58
Co-60	<2.40	<6.85	<6.21	<2.47	<6.42	<5.06
K-40	<37.3	163 ± 26.3	<38.8	<90.0	<59.9	<41.4
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	**JULY**	**AUGUST**	**SEPTEMBER**	**OCTOBER**	**NOVEMBER**	**DECEMBER**
Be-7	137 ± 26.6	75.9 ± 18.4	113 ± 19.0	59.4 ± 19.1	81.8 ± 13.9	63.3 ± 16.7
Zn-65	<4.47	<11.3	<11.7	<10.2	<7.03	<7.33
Cs-134	<5.57	<5.46	<3.93	<0.86	<3.33	<3.28
Cs-137	<1.36	<5.67	<4.73	<3.66	<3.45	<3.73
Zr-95	<13.8	<7.23	<8.86	<5.23	<6.81	<5.19
Nb-95	<6.38	<1.77	<6.02	<4.47	<5.36	<1.10
Co-58	<6.95	<1.46	<6.05	<1.12	<3.06	<3.89
Mn-54	<7.82	<1.22	<4.71	<4.07	<3.65	<0.80
Co-60	<8.50	<1.88	<5.99	<5.00	<4.01	<3.49
K-40	<72.0	<19.1	<15.3	<14.8	<11.9	<33.9
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

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

G ON-SITE COMPOSITE**

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	53.1 ± 11.2	62.7 ± 10.7	51.5 ± 15.1	141 ± 29.6	104 ± 25.6	148 ± 19.3
Zn-65	<7.69	<5.45	<7.79	<15.8	<15.2	<7.99
Cs-134	<3.42	<2.87	<4.32	<6.37	<4.88	<3.54
Cs-137	<2.40	<2.26	<2.55	<5.50	<1.37	<3.07
Zr-95	<5.72	<3.57	<4.96	<4.05	<12.1	<1.73
Nb-95	<3.91	<1.84	<3.48	<9.49	<8.39	<3.42
Co-58	<2.41	<2.09	<3.25	<2.37	<1.93	<3.28
Mn-54	<2.89	<2.67	<3.52	<5.56	<6.03	<3.25
Co-60	<3.45	<2.74	<4.69	<3.23	<6.90	<4.83
K-40	<39.3	<34.2	<43.2	<113	<93.2	<13.6
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	**JULY**	**AUGUST**	**SEPTEMBER**	**OCTOBER**	**NOVEMBER**	**DECEMBER**
Be-7	<54.5	86.2 ± 19.3	68.6 ± 14.7	87.2 ± 16.6	56.7 ± 11.4	62.6 ± 11.7
Zn-65	<16.3	<11.3	<9.16	<7.23	<6.93	<6.33
Cs-134	<6.50	<3.60	<6.16	<3.01	<2.65	<3.14
Cs-137	<5.41	<2.75	<2.29	<5.28	<2.56	<2.00
Zr-95	<16.7	<9.18	<6.09	<9.16	<5.27	<5.09
Nb-95	<6.90	<5.09	<4.14	<3.28	<3.94	<3.50
Co-58	<5.31	<4.20	<5.70	<5.69	<2.82	<4.21
Mn-54	<5.75	<1.22	<4.20	<4.21	<1.95	<3.30
Co-60	<2.74	<1.87	<3.97	<5.02	<1.11	<1.05
K-40	<28.0	<79.9	<50.9	<51.1	<44.8	<10.7
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

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

H ON-SITE COMPOSITE**

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	50.4 ± 12.5	75.2 ± 12.6	55.0 ± 15.3	109 ± 32.8	<64.5	86.0 ± 16.1
Zn-65	<7.11	<5.54	<9.79	<5.38	<13.7	<10.2
Cs-134	<3.41	<4.57	<2.14	<6.31	<6.97	<3.27
Cs-137	<2.37	<2.96	<2.07	<1.67	<6.77	<0.71
Zr-95	<3.41	<5.71	<6.85	<11.4	<11.7	<4.92
Nb-95	<4.44	<4.43	<5.59	<7.82	<10.5	<3.38
Co-58	<2.88	<3.81	<3.13	<6.00	<6.83	<3.64
Mn-54	<2.71	<3.78	<3.35	<2.00	<8.87	<3.12
Co-60	<0.92	<3.73	<3.82	<3.10	<7.95	<3.58
K-40	<9.39	102 ± 18.8	<51.6	<82.4	<108	<38.1
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	<48.8	137 ± 25.2	122 ± 19.0	68.9 ± 15.2	85.2 ± 13.5	30.9 ± 15.6
Zn-65	<22.8	<10.1	<11.4	<7.37	<7.48	8.75
Cs-134	<6.04	<5.96	<4.90	<3.99	<2.85	3.71
Cs-137	<5.04	<5.36	<3.54	<3.04	<2.96	2.58
Zr-95	<10.0	<8.54	<8.87	<7.59	<6.03	8.59
Nb-95	<10.1	<1.66	<7.08	<6.73	<2.77	4.51
Co-58	<7.44	<5.72	<1.17	<4.43	<3.52	3.29
Mn-54	<7.48	<3.73	<4.48	<4.29	<2.65	3.27
Co-60	<2.71	<4.65	<4.07	<5.65	<3.12	3.56
K-40	<78.3	108 ± 27.9	<15.9	<52.1	<33.1	46.0
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

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

I ON-SITE COMPOSITE**

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	56.8 ± 11.2	53.4 ± 11.6	<39.8	120 ± 30.2	108 ± 22.9	108 ± 18.3
Zn-65	<9.70	<8.73	<18.7	<17.3	<13.8	<13.9
Cs-134	<2.98	<3.25	<1.38	<5.57	<6.78	<5.02
Cs-137	<2.56	<2.09	<5.02	<1.57	<1.33	<1.98
Zr-95	<4.97	<4.51	<3.35	<3.73	<11.0	<8.54
Nb-95	<2.92	<4.14	<6.44	<7.34	<6.03	<5.37
Co-58	<2.49	<3.92	<1.95	<7.96	<5.07	<4.58
Mn-54	<3.05	<2.37	<6.49	<5.41	<4.32	<4.29
Co-60	<2.47	<4.20	<2.55	<2.90	<6.54	<4.14
K-40	<9.22	<32.0	<70.9	<29.5	<24.4	<14.5
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	**JULY**	**AUGUST**	**SEPTEMBER**	**OCTOBER**	**NOVEMBER**	**DECEMBER**
Be-7	94.3 ± 23.4	75.2 ± 19.7	83.8 ± 18.9	67.4 ± 20.0	77.5 ± 15.3	61.0 ± 13.9
Zn-65	<4.50	<3.31	<8.92	<6.84	<7.98	<12.1
Cs-134	<4.81	<4.91	<3.39	<4.30	<3.66	<4.03
Cs-137	<4.90	<4.12	<0.82	<3.87	<3.09	<2.85
Zr-95	<11.6	<8.84	<9.23	<9.74	<6.31	<4.74
Nb-95	<10.2	<1.83	<3.79	<6.60	<3.64	<3.78
Co-58	<8.72	<5.93	<4.13	<3.99	<4.12	<3.56
Mn-54	<4.61	<4.26	<5.48	<0.95	<3.21	<2.72
Co-60	<2.58	<1.87	<4.24	<5.21	<3.28	<3.37
K-40	<73.8	<53.5	<15.1	<41.8	<11.7	65.2 ± 16.5
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional Sample
† Plant Related Radionuclides

TABLE 6-9 (continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMPNS SITE AIR PARTICULATE SAMPLES

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

J ON-SITE COMPOSITE**

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	68.6 ± 12.9	41.6 ± 10.8	<49.1	137 ± 29.1	121 ± 26.7	177 ± 18.0
Zn-65	<9.80	<9.83	<3.50	<20.0	<12.2	<10.4
Cs-134	<3.93	<4.44	<3.21	<8.64	<1.43	<5.87
Cs-137	<3.00	<3.33	<4.57	<5.53	<5.90	<3.60
Zr-95	<7.04	<3.85	<11.4	<3.87	<9.66	<9.58
Nb-95	<3.92	<3.73	<1.89	<9.07	<2.32	<5.42
Co-58	<3.13	<3.96	<4.03	<12.6	<5.06	<4.93
Mn-54	<3.04	<2.97	<4.22	<7.79	<6.26	<4.75
Co-60	<2.89	<2.85	<8.39	<3.13	<7.33	<3.08
K-40	123 ± 21.1	123 ± 20.7	<20.3	<97.4	<26.2	108 ± 23.6
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	93.3 ± 24.7	<43.3	111 ± 20.2	85.9 ± 17.1	59.8 ± 13.5	64.4 ± 13.0
Zn-65	<12.2	<10.2	<13.0	<10.3	<9.32	<2.12
Cs-134	<4.83	<5.95	<5.49	<3.24	<3.41	<4.08
Cs-137	<3.72	<3.18	<4.89	<4.46	<2.61	<3.95
Zr-95	<3.27	<7.13	<8.35	<8.94	<8.44	<7.76
Nb-95	<8.16	<6.34	<5.68	<1.36	<5.66	<4.10
Co-58	<1.91	<4.34	<7.18	<5.21	<3.25	<2.39
Mn-54	<6.05	<3.62	<5.88	<4.53	<2.84	<3.51
Co-60	<2.61	<5.52	<4.43	<5.38	<3.46	<3.46
K-40	<72.5	<56.0	<46.9	<57.2	<13.0	<49.2
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

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

K ON-SITE COMPOSITE**

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	38.3 ± 10.9	66.8 ± 10.7	<41.9	123 ± 29.3	73.2 ± 22.9	51.0 ± 15.0
Zn-65	<8.04	<7.61	<13.3	<12.8	<12.0	<6.03
Cs-134	<2.13	<2.99	<3.38	<5.23	<1.42	<2.84
Cs-137	<2.51	<2.26	<4.76	<7.52	<4.70	<2.91
Zr-95	<5.85	<5.48	<10.9	<12.6	<3.31	<6.94
Nb-95	<4.37	<3.04	<7.69	<11.2	<2.29	<4.77
Co-58	<3.05	<2.73	<1.73	<5.82	<1.93	<1.02
Mn-54	<2.26	<2.87	<5.28	<6.32	<6.01	<2.36
Co-60	<3.28	<2.17	<2.21	<9.61	<6.88	<1.32
K-40	<27.7	<8.16	<22.5	<10.2	<25.7	<13.4
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	147 ± 27.9	101 ± 20.6	113 ± 20.0	44.5 ± 16.2	55.3 ± 14.9	54.2 ± 14.0
Zn-65	<12.6	<3.34	<9.63	<6.90	<9.25	<5.66
Cs-134	<7.75	<2.82	<5.93	<3.77	<4.57	<3.30
Cs-137	<4.15	<3.59	<5.14	<2.80	<3.46	<2.92
Zr-95	<9.87	<10.3	<8.61	<6.60	<6.56	<5.75
Nb-95	<8.55	<5.02	<5.35	<6.35	<5.86	<5.63
Co-58	<5.18	<1.51	<5.71	<3.83	<4.09	<3.34
Mn-54	<5.61	<3.41	<3.54	<2.74	<2.11	<2.86
Co-60	<13.7	<5.13	<5.09	<5.74	<4.39	<1.19
K-40	<27.2	<54.1	102 ± 24.3	<52.4	90.1 ± 21.7	<12.1
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional Sample Location
† Plant Related Radionuclides

TABLE 6-10

DIRECT RADIATION MEASUREMENT RESULTS

Results in Units of mrem/std. Month ± 1 Sigma

LOCATION NUMBER	LOCATION	FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER	LOCATION (DISTANCE AND DIRECTION)(1)
3	D1 On-site	12.0 ± 0.4	12.7 ± 0.4	12.1 ± 0.4	14.5 ± 1.3	0.2 miles @ 69°
4	D2 On-site	5.2 ± 0.1	4.7 ± 0.2	4.5 ± 0.1	5.1 ± 0.6	0.4 miles @ 140°
5	E On-site	4.6 ± 0.1	4.4 ± 0.2	4.7 ± 0.4	5.0 ± 0.7	0.4 miles @ 175°
6	F On-site	4.4 ± 0.1	4.1 ± 0.8	4.3 ± 0.2	4.7 ± 0.7	0.5 miles @ 210°
7*	G On-site	4.2 ± 0.2	3.9 ± 0.3	3.8 ± 0.2	4.4 ± 0.3	0.7 miles @ 250°
8	R-5 Off-site Control	5.4 ± 0.3	4.2 ± 0.2	5.4 ± 0.4	5.1 ± 0.6	16.4 miles @ 42°
9	D1 Off-site	4.8 ± 0.3	3.7 ± 0.2	3.9 ± 0.3	4.4 ± 0.2	11.4 miles @ 80°
10	D2 Off-site	4.2 ± 0.2	4.2 ± 0.1	4.3 ± 0.1	4.3 ± 0.3	9.0 miles @ 117°
11	E Off-site	3.9 ± 0.2	4.0 ± 0.4	4.3 ± 0.2	4.5 ± 0.3	7.2 miles @ 160°
12	F Off-site	4.2 ± 0.2	4.3 ± 0.6	4.5 ± 0.2	5.9 ± 0.3	7.7 miles @ 190°
13	G Off-site	5.2 ± 0.1	4.9 ± 0.3	4.5 ± 0.1	4.9 ± 0.3	5.3 miles @ 225°
14*	DeMass Rd., SW Oswego –Control	4.7 ± 0.2	3.9 ± 0.2	4.4 ± 0.2	5.0 ± 0.2	12.6 miles @ 226°
15*	Pole 66, W. Boundary – Bible Camp	4.5 ± 0.2	3.8 ± 0.2	4.0 ± 0.2	3.8 ± 0.2	0.9 miles @ 237°
18*	Energy Info. Center – Lamp Post, SW	5.3 ± 0.2	4.4 ± 0.2	5.0 ± 0.2	4.7 ± 0.5	0.4 miles @ 265°
19	East Boundary-JAF, Pole 9	5.2 ± 0.2	4.5 ± 0.1	4.8 ± 0.1	4.7 ± 0.7	1.3 miles @ 81°
23*	H On-site	5.9 ± 0.2	5.1 ± 0.3	5.2 ± 0.2	5.9 ± 0.5	0.8 miles @ 70°
24	I On-site	5.0 ± 0.2	4.3 ± 0.2	4.8 ± 0.3	5.3 ± 1.1	0.8 miles @ 98°
25	J On-site	4.8 ± 0.3	4.3 ± 0.2	4.8 ± 0.2	4.8 ± 0.2	0.9 miles @ 110°
26	K On-site	4.7 ± 0.4	4.3 ± 0.3	4.2 ± 0.2	4.3 ± 0.7	0.5 miles @ 132°
27	N. Fence, N. of Switchyard, JAF	19.2 ± 1.7	18.9 ± 1.4	18.5 ± 1.2	20.9 ± 1.0	0.4 miles @ 60°
28	N. Light Pole, N. of Screenhouse, JAF	23.3 ± 0.6	19.9 ± 1.1	20.5 ± 0.2	26.8 ± 1.3	0.5 miles @ 68°
29	N. Fence, N. of W. Side	22.0 ± 1.9	20.8 ± 0.9	20.3 ± 1.1	23.4 ± 4.0	0.5 miles @ 65°
30	N. Fence, (NW) JAF	13.0 ± 1.2	13.2 ± 0.5	13.3 ± 0.4	16.1 ± 2.8	0.4 miles @ 57°
31	N. Fence, (NW) NMP-1	8.7 ± 0.4	6.3 ± 0.4	6.7 ± 0.2	7.1 ± 1.0	0.2 miles @ 276°
39	N. Fence, Rad. Waste-NMP-1	10.7 ± 0.5	8.4 ± 0.3	7.7 ± 1.4	8.4 ± 0.7	0.2 miles @ 292°
47	N. Fence, (NE) JAF	6.8 ± 0.4	6.1 ± 0.4	6.5 ± 0.2	8.0 ± 1.3	0.6 miles @ 69°
49*	Phoenix, NY-Control	4.0 ± 0.3	4.1 ± 0.3	4.2 ± 0.2	4.7 ± 0.3	19.8 miles @ 170°
51	Liberty & Bronson Sts., E of OSS	4.7 ± 0.2	4.0 ± 0.2	4.1 ± 0.2	4.9 ± 0.9	7.4 miles @ 233°

TABLE 6-10 (continued)

DIRECT RADIATION MEASUREMENT RESULTS

Results in Units of mrem/std. Month ± 1 Sigma

LOCATION NUMBER	LOCATION	FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER	LOCATION (DISTANCE AND DIRECTION)(1)
52	E.12th & Cayuga Sts., Oswego School	4.6 ± 0.3	3.9 ± 0.2	4.4 ± 0.0	4.5±0.4	5.8 miles @ 227°
53	Broadwell & Chestnut Sts. Fulton H.S.	4.1 ± 0.2	(2)	4.5 ± 0.1	4.6±0.6	13.7 miles @ 183°
54	Liberty St. & Co. Rt. 16 Mexico H.S.	4.1 ± 0.1	4.0 ± 0.2	4.3 ± 0.2	4.5±0.4	9.3 miles @ 115°
55	Gas Substation Co. Rt. 5-Pulaski	4.1 ± 0.3	3.9 ± 0.3	4.4 ± 0.4	4.5±0.4	13.0 miles @ 75°
56*	Rt. 104-New Haven Sch. (SE Corner)	4.1 ± 0.2	4.2 ± 0.2	4.8 ± 0.2	5.0±0.4	5.3 miles @ 123°
58*	Co. Rt. 1A-Alcan (E. of E. Entrance Rd.	4.5 ± 0.3	4.2 ± 0.1	4.2 ± 0.2	4.9±0.1	3.1 miles @ 220°
75*	Unit 2, N. Fence, N. of Reactor Bldg.	7.6 ± 0.4	7.3 ± 0.7	7.0 ± 0.3	7.3±0.8	0.1 miles @ 5°
76*	Unit 2, N. Fence, N. of Change House	6.3 ± 0.3	5.6 ± 0.7	5.6 ± 0.3	6.1±1.4	0.1 miles @ 25°
77*	Unit 2, N. Fence, N. of Pipe Bldg.	6.6 ± 0.3	7.0 ± 0.2	6.4 ± 0.2	7.8±0.4	0.2 miles @ 45°
78*	JAF. E. of E. Old Lay Down Area	4.6 ± 0.2	5.1 ± 0.2	4.8 ± 0.3	4.9±0.3	1.0 miles @ 90°
79*	Co. Rt.29, Pole #63, 0.2 mi. s. of Lake Rd.	4.2 ± 0.1	3.6 ± 0.1	4.3 ± 0.4	4.3±0.6	1.1 miles @ 115°
80*	Co Rt. 29, Pole #54, 0.7 mi. S. of Lake Rd.	4.2 ± 0.1	4.8 ± 0.3	4.3 ± 0.1	4.8±0.8	1.4 miles @ 133°
81*	Miner Rd., Pole #16, 0.5 mi. W. of Rt.29	4.5 ± 0.2	4.6 ± 0.5	4.6 ± 0.3	4.9±0.3	1.6 miles @ 159°
82*	Miner Rd., Pole #1-1/2, 1.1 mi. W. of Rt.29	4.4 ± 0.2	4.9 ± 0.4	3.9 ± 0.1	3.9±0.1	1.6 miles @ 181°
83*	Lakeview Rd., Tree 0.45 mi. N. of Miner Rd.	4.7 ± 0.2	4.6 ± 0.4	4.2 ± 0.2	4.7±0.3	1.2 miles @ 200°
84*	Lakeview Rd., N., Pole #6117, 200ft. N. of Lake Rd.	4.6 ± 0.3	5.3 ± 0.2	4.3 ± 0.3	4.9±0.2	1.1miles @ 225°
85*	Unit 1, N. Fence, N. of W. Side of Screen House	9.9 ± 0.5	10.3 ± 1.0	8.4 ± 0.2	10.3±0.4	0.2 miles @ 294°
86*	Unit 2, N. Fence, of W. Side of Screen House	8.4 ± 0.2	7.4 ± 0.9	7.0 ± 0.2	8.5±0.3	0.1 miles @ 315°
87*	Unit 2, N. Fence. N. of E. Side of Screen House	8.7 ± 0.4	8.2 ± 0.5	7.1 ± 0.3	7.4 ± 1.1	0.1 miles @ 341°
88*	Hickory Grove Rd., Pole#2, 0.6 mi. N. of Rt.1	4.3 ± 0.1	3.9 ± 0.2	4.2 ± 0.2	4.5 ± 0.4	4.8 miles @ 97°
89*	Leavitt Rd., Pole #16, 0.4 mi. S. of Rt.1	4.4 ± 0.2	5.0 ± 0.5	4.7 ± 0.3	5.4 ± 0.2	4.1 miles @ 111°
90*	Rt. 104, Pole #300, 150 ft. E. of Keefe Rd.	4.3 ± 0.2	4.9 ± 0.4	4.1 ± 0.3	4.5 ± 0.4	4.2 miles @ 135°
91*	Rt. 51A, Pole #59, 0.8 mi. W. of Rt.51	4.1 ± 0.2	4.0 ± 0.8	4.2 ± 0.2	4.2 ± 0.4	4.8 miles @ 156°
92*	Maiden Lane Rd., Power Pole, 0.6 mi. S. of Rt. 104	4.3 ± 0.2	5.0 ± 0.4	5.0 ± 0.2	5.4 ± 0.3	4.4 miles @ 183°
93*	Rt. 53 Pole 1-1, 120 ft. S. of Rt. 104	4.7 ± 0.3	4.4 ± 0.4	4.4 ± 0.2	4.3 ± 0.5	4.4 miles @ 205°

TABLE 6-10 (continued)

DIRECT RADIATION MEASUREMENT RESULTS

Results in Units of mrem/std. Month ± 1 Sigma

LOCATION NUMBER	LOCATION	FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER	LOCATION (DISTANCE AND DIRECTION)(1)
94*	Rt. 1, Pole #82, 250 ft. E. of Kocher Rd. (Co. Rt. #63)	4.4 ± 0.1	3.8 ± 0.7	4.2 ± 0.1	4.2 ± 0.1	4.7 miles @ 223°
95*	Lakeshore Campsite, from alcanW. Access Rd., Ple#21, 1.2 mi. N. of Rt.1	4.4 ± 0.4	3.6 ± 0.1	3.6 ± 0.1	3.7 ± 0.1	4.1 miles @ 237°
96*	Creamery Rd., 0.3 mi. S. of Middle Rd., Pole 1-1/2	4.6 ± 0.2	4.3 ± 0.5	4.3 ± 0.1	4.1 ± 0.1	3.6 miles @ 199°
97*	Rt. 29, Pole #50, 200 ft. N. of Miner Rd.	4.1 ± 0.3	4.2 ± 0.7	4.2 ± 0.1	4.0 ± 0.2	1.8 miles @ 143°
98*	Lake Rd., Pole #145, 0.15 mi. E. of Rt. 29	4.1 ± 0.2	4.5 ± 0.6	4.2 ± 0.3	4.1 ± 0.2	1.2 miles @ 101°
99	NMP Rd., 0.4 mi. N. of Lake Rd., Env. Station R1 Off-site	4.3 ± 0.1	4.8 ± 1.1	4.6 ± 0.4	4.5 ± 0.1	1.8 miles @ 88°
100	Rt. 29 & Lake Rd., Env. Station R2 Off-site	4.6 ± 0.2	3.8 ± 0.6	4.1 ± 0.2	4.2 ± 0.2	1.1 miles @ 104°
101	Rt. 29, 0.7 mi. S. of Lake Rd., Env. Station R3 Off-site	4.0 ± 0.1	3.3 ± 0.2	4.1 ± 0.3	4.0 ± 0.1	1.5 miles @ 132°
102	EOF/Env. Lab, Oswego Co. Airport (Fulton Airport, Rt. 176) E. Driveway, Lamp Post	4.0 ± 0.4	4.2 ± 0.6	4.4 ± 0.2	4.3 ± 0.3	11.9 miles @ 175°
103	EIC, East Garage Rd., Lamp Post, R3 Off-site	5.0 ± 0.1	4.9 ± 0.2	4.5 ± 0.3	4.5 ± 0.2	0.4 miles @ 267°
104	Parkhurst Road, Pole #148-1/2A, 0.1 mi. S. of Lake Rd.	4.2 ± 0.2	3.8 ± 0.4	4.1 ± 0.2	4.1 ± 0.2	1.4 miles @ 102°
105	Lakeview Rd. Pole #6125, 0.6 mi. S. of Lake Rd.	4.3 ± 0.2	4.0 ± 0.6	4.2 ± 0.3	4.1 ± 0.2	1.4 miles @ 198°
106	Shoreline Cove, W. of NMP-1, Tree on W. Edge	5.3 ± 0.3	5.0 ± 0.4	5.2 ± 0.2	5.3 ± 0.2	0.3 miles @ 274°
107	Shoreline Cove, W. of NMP-1	5.2 ± 0.3	4.7 ± 0.5	5.3 ± 0.4	5.0 ± 0.1	0.3 miles @ 272°
108	Lake Rd., Pole #142, 300 ft. E. of Rt. 29 S.	4.4 ± 0.1	4.9 ± 0.4	4.3 ± 0.1	4.1 ± 0.1	1.1 miles @ 104°
109	Tree North of Lake Rd., 300 ft. E. of Rt. 29 N.	4.5 ± 0.2	4.9 ± 0.6	4.4 ± 0.2	4.4 ± 0.1	1.1 miles @ 103°
111	Sterling, NY	4.0 ± 0.3	4.4 ± 0.3	3.8 ± 0.1	4.0 ± 0.1	26.4 miles @ 166°
112	EOF/Env. Lab, Oswego Co. Airport	4.5 ± 0.2	3.9 ± 0.4	4.2 ± 0.2	4.2 ± 0.2	11.9 miles @ 175°
113	Control, Baldwinsville, NY	4.3 ± 0.2	3.6 ± 0.2	4.3 ± 0.2	4.1 ± 0.1	21.8 miles @ 214°

(1) Direction and distance based on NMP-2 reactor centerline and sixteen 22.5o sector grid.
(2) TLD lost in the field.
* TS/ODCM

TABLE 6-11

CONCENTRATIONS OF IODINE-131 AND GAMMA EMITTERS IN MILK

Results in Units of pCi/liter ± 1 Sigma

SAMPLE LOCATION No. 4						
COLLECTION DATE	I-131	K-40	Cs-134	Cs-137	Ba/La	OTHERS†
04/09/01	< 0.37	1600 ± 67	< 5.67	< 5.70	< 3.97	<LLD
04/23/01	< 0.37	1630 ± 71	< 5.55	< 5.03	< 7.05	<LLD
05/07/01	< 0.82	1920 ± 109	< 11.0	< 10.4	< 11.2	<LLD
05/21/01	< 0.74	1550 ± 83	< 8.23	< 6.49	< 6.52	<LLD
06/04/01	< 0.77	1560 ± 67	< 5.07	< 4.62	< 8.67	<LLD
06/18/01	< 0.65	1430 ± 81	< 7.93	< 5.84	< 7.81	<LLD
07/09/01	< 0.71	1520 ± 82	< 7.07	< 5.84	< 7.88	<LLD
07/23/01	< 0.45	1520 ± 97	< 7.84	< 7.09	< 7.42	<LLD
08/06/01	< 0.55	1780 ± 89	< 6.90	< 6.70	< 6.86	<LLD
08/20/01	< 0.49	1650 ± 75	< 5.42	< 5.39	< 5.71	<LLD
09/10/01	< 0.42	1800 ± 65	< 3.60	< 5.63	< 5.27	<LLD
09/24/01	< 0.43	1400 ± 78	< 7.00	< 6.36	< 8.01	<LLD
10/09/01	< 0.52	1600 ± 81	< 6.88	< 6.14	< 8.08	<LLD
10/22/01	< 0.51	1610 ± 86	< 7.94	< 7.56	< 8.31	<LLD
11/05/01	< 0.43	1660 ± 87	< 7.94	< 7.06	< 9.82	<LLD
11/19/01	< 0.43	1620 ± 75	< 6.36	< 6.33	< 6.87	<LLD
12/03/01	< 0.50	1560 ± 81	< 6.17	< 6.88	< 7.52	<LLD
12/17/01	< 0.40	1580 ± 80	< 6.53	< 5.51	< 7.67	<LLD

SAMPLE LOCATION No. 50						
COLLECTION DATE	I-131	K-40	Cs-134	Cs-137	Ba/La	OTHERS†
04/09/01	< 0.41	1560 ± 69	< 5.13	< 5.28	< 5.73	<LLD
04/23/01	< 0.40	1630 ± 72	< 7.75	< 6.94	< 6.00	<LLD
05/07/01	< 0.62	1530 ± 94	< 7.51	< 9.03	< 9.27	<LLD
05/21/01	< 0.50	1820 ± 91	< 9.28	< 8.25	< 7.20	<LLD
06/04/01	< 0.46	1760 ± 53	< 2.71	< 4.38	< 4.24	<LLD
06/18/01	< 0.51	1480 ± 79	< 5.25	< 6.71	< 9.18	<LLD
07/09/01	< 0.45	1680 ± 83	< 6.34	< 7.04	< 8.43	<LLD
07/23/01	< 0.63	1540 ± 93	< 7.12	< 8.33	< 9.14	<LLD
08/06/01	< 0.56	1430 ± 72	< 5.71	< 5.59	< 4.72	<LLD
08/20/01	< 0.65	1580 ± 82	< 5.61	< 5.32	< 9.18	<LLD
09/10/01	< 0.37	1440 ± 78	< 5.79	< 5.49	< 9.01	<LLD
09/24/01	< 0.54	1580 ± 81	< 6.65	< 6.01	< 7.51	<LLD
10/09/01	< 0.58	1430 ± 79	< 5.35	< 7.15	< 6.14	<LLD
10/22/01	< 0.57	1840 ± 90	< 6.56	< 7.65	< 11.9	<LLD
11/05/01	< 0.57	1490 ± 80	< 7.21	< 5.86	< 10.8	<LLD
11/19/01	< 0.54	1450 ± 79	< 5.50	< 5.35	< 5.88	<LLD
12/03/01	< 0.41	1470 ± 79	< 7.55	< 6.25	< 8.03	<LLD
12/17/01	< 0.42	1380 ± 69	< 6.65	< 5.95	< 5.69	<LLD

TABLE 6-11 (continued)

CONCENTRATIONS OF IODINE-131 AND GAMMA EMITTERS IN MILK

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†
04/09/01	< 0.34	1480 ± 64	< 4.72	< 4.16	< 5.02	<LLD
04/23/01	< 0.31	1490 ± 66	< 5.73	< 4.98	< 6.21	<LLD
05/07/01	< 0.86	1530 ± 97	< 7.70	< 7.47	< 9.39	<LLD
05/21/01	< 0.64	1510 ± 83	< 7.29	< 6.49	< 5.99	<LLD
06/04/01	< 0.58	1710 ± 74	< 3.96	< 5.45	< 7.30	<LLD
06/18/01	< 0.44	1700 ± 64	< 3.24	< 5.32	< 5.19	<LLD
07/09/01	< 0.68	1590 ± 74	< 5.64	< 5.39	< 8.86	<LLD
07/23/01	< 0.68	1770 ± 107	< 11.1	< 9.85	< 10.9	<LLD
08/06/01	< 0.54	1750 ± 74	< 7.42	< 6.42	< 8.54	<LLD
08/20/01	< 0.59	1600 ± 74	< 5.64	< 4.59	< 5.73	<LLD
09/10/01	< 0.45	1510 ± 73	< 6.23	< 5.49	< 6.62	<LLD
09/24/01	< 0.57	1580 ± 60	< 3.22	< 5.06	< 4.70	<LLD
10/09/01	< 0.37	1310 ± 74	< 5.16	< 6.71	< 7.75	<LLD
10/22/01	< 0.55	1590 ± 61	< 3.61	< 5.39	< 6.02	<LLD
11/05/01	< 0.56	1460 ± 79	< 7.55	< 6.25	< 4.70	<LLD
11/19/01	< 0.47	1470 ± 73	< 3.51	< 6.33	< 5.84	<LLD
12/03/01	< 0.38	1730 ± 87	< 7.40	< 6.42	< 8.83	<LLD
12/17/01	< 0.40	1520 ± 81	< 7.31	< 7.65	< 10.1	<LLD

SAMPLE LOCATION No. 60						
COLLECTION DATE	I-131	K-40	Cs-134	Cs-137	Ba/La	OTHERS†
04/09/01	< 0.49	1740 ± 74	< 4.12	< 6.77	< 5.23	<LLD
04/23/01	< 0.50	1780 ± 53	< 2.61	< 4.48	< 3.43	<LLD
05/07/01	< 0.81	1610 ± 93	< 6.48	< 7.09	< 7.13	<LLD
05/21/01	< 0.57	1540 ± 80	< 6.14	< 5.47	< 6.05	<LLD
06/04/01	< 0.50	1870 ± 76	< 7.04	< 6.54	< 7.53	<LLD
06/18/01	< 0.71	1740 ± 89	< 9.21	< 8.15	< 8.2	<LLD
07/08/01	< 0.57	1610 ± 70	< 6.89	< 7.27	< 9.15	<LLD
07/22/01	< 0.56	1730 ± 101	< 6.40	< 5.59	< 5.68	<LLD
08/05/01	< 0.77	1440 ± 71	< 5.85	< 4.95	< 7.87	<LLD
08/19/01	< 0.68	1490 ± 80	< 5.80	< 7.21	< 7.61	<LLD
09/10/01	< 0.48	1760 ± 88	< 6.83	< 6.79	< 8.26	<LLD
09/24/01	< 0.79	1500 ± 79	< 6.34	< 6.71	< 7.27	<LLD
10/08/01	< 0.41	1400 ± 70	< 6.13	< 5.76	< 6.52	<LLD
10/22/01	< 0.63	1470 ± 79	< 6.65	< 7.15	< 8.03	<LLD
11/05/01	< 0.49	1550 ± 78	< 4.79	< 6.02	< 8.81	<LLD
11/19/01	< 0.40	1490 ± 76	< 4.79	< 5.77	< 6.9	<LLD
12/03/01	< 0.42	1640 ± 61	< 3.14	< 5.12	< 5.99	<LLD
12/17/01	< 0.51	1550 ± 83	< 7.86	< 6.57	< 5.45	<LLD

TABLE 6-11 (continued)

CONCENTRATIONS OF IODINE-131 AND GAMMA EMITTERS IN MILK

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†
April	Sample Location not established prior to 9/10/01					
May						
June						
July						
August						
09/10/01	< 0.53	1560 ± 74	< 5.19	< 5.39	< 6.13	<LLD
09/24/01	< 0.65	1540 ± 73	< 6.72	< 5.24	< 7.88	<LLD
10/09/01	< 0.44	1380 ± 70	< 3.45	< 6.59	< 7.81	<LLD
10/22/01	< 0.43	1530 ± 80	< 6.04	< 6.02	< 8.43	<LLD
11/05/01	< 0.51	1440 ± 72	< 3.40	< 5.66	< 6.12	<LLD
11/19/01	< 0.47	1550 ± 74	< 6.28	< 5.76	< 6.18	<LLD
12/03/01	< 0.51	1600 ± 78	< 3.81	< 4.94	< 5.82	<LLD
12/17/01	< 0.35	1580 ± 60	< 3.24	< 5.17	< 6.33	<LLD

SAMPLE LOCATION No. 73 (Control)*						
COLLECTION DATE	I-131	K-40	Cs-134	Cs-137	Ba/La	OTHERS†
04/09/01	< 0.32	1410 ± 59	< 4.07	< 4.66	< 3.63	<LLD
04/23/01	< 0.35	1510 ± 65	< 4.78	< 5.10	< 5.01	<LLD
05/07/01	< 0.85	1440 ± 80	< 6.02	< 5.77	< 7.80	<LLD
05/21/01	< 0.74	1750 ± 64	< 5.48	< 4.78	< 4.76	<LLD
06/04/01	< 0.69	1480 ± 94	< 7.30	< 7.97	< 6.76	<LLD
06/18/01	< 0.52	1440 ± 72	< 5.19	< 5.88	< 6.12	<LLD
07/09/01	< 0.64	1720 ± 64	< 5.32	< 5.01	< 4.51	<LLD
07/23/01	< 0.49	1600 ± 88	< 6.40	< 5.82	< 8.16	<LLD
08/06/01	< 0.59	1680 ± 83	< 7.59	< 5.74	< 8.43	<LLD
08/20/01	< 0.46	1550 ± 82	< 6.34	< 7.21	< 7.84	<LLD
September	Sample Location discontinued following 8/20/01					
October						
November						
December						

TABLE 6-11 (continued)

CONCENTRATIONS OF IODINE-131 AND GAMMA EMITTERS IN MILK

Results in Units of pCi/liter ± 1 Sigma

SAMPLE LOCATION No. 77 (Control)*						
COLLECTION DATE	I-131	K-40	Cs-134	Cs-137	Ba/La	OTHERS†
April	Sample Location not established prior to 8/6/01					
May						
June						
July						
08/06/01	< 0.48	1650 ± 86	< 7.18	< 6.64	< 7.40	<LLD
08/20/01	< 0.59	1790 ± 65	< 3.73	< 5.82	< 3.83	<LLD
09/10/01	< 0.51	1620 ± 82	< 6.04	< 6.93	< 7.08	<LLD
09/24/01	< 0.46	1610 ± 61	< 3.22	< 5.50	< 6.37	<LLD
10/09/01	< 0.48	1570 ± 84	< 7.83	< 7.26	< 5.14	<LLD
10/22/01	< 0.52	1610 ± 61	< 3.29	< 5.06	< 6.36	<LLD
11/05/01	< 0.47	1660 ± 62	< 5.63	< 5.23	< 6.17	<LLD
11/19/01	< 0.38	1860 ± 88	< 7.40	< 6.64	< 11.1	<LLD
12/03/01	< 0.46	1530 ± 72	< 6.36	< 5.66	< 7.60	<LLD
12/17/01	< 0.44	1760 ± 90	< 7.62	< 6.85	< 9.31	<LLD

(1) New Sample location. Sampling began 9/10/01
(2) No data, herd sold at this Control location after 8/20/01
(3) No data, New Control location sampling began 8/6/01
* Control location required by Technical Specifications
† Plant related radionuclides

TABLE 6-12

CONCENTRATIONS OF GAMMA EMITTERS IN FOOD PRODUCTS

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
Q	9/24/01	Squash Leaves	0.845 ± 0.085	4.64 ± 0.231	<0.022	<0.020	<0.019	<0.050
		Cabbage	0.090 ± 0.047	3.85 ± 0.174	<0.016	<0.018	<0.014	<0.042
X	9/24/01	Squash Leaves	1.110 ± 0.060	1.91 ± 0.113	<0.011	<0.009	<0.010	<0.028
		Tomatoes	<0.049	2.08 ± 0.086	<0.008	<0.007	<0.006	<0.019
		Rhubarb Leaves	0.313 ± 0.035	3.44 ± 0.137	<0.011	<0.010	<0.011	<0.026
V*	9/24/01	Squash Leaves	0.318 ± 0.058	2.19 ± 0.150	<0.017	<0.018	<0.013	<0.035
S*	9/24/01	Tomatoes	<0.070	1.64 ± 0.096	<0.009	<0.010	<0.009	<0.020
P	9/24/01	Tomatoes	<0.074	1.69 ± 0.095	<0.011	<0.008	<0.009	<0.021
		Collards	0.273 ± 0.066	3.30 ± 0.223	<0.023	<0.025	<0.023	<0.054
K*	9/24/01	Squash Leaves	0.898 ± 0.672	3.34 ± 0.177	<0.016	<0.017	<0.013	<0.042
		Collards	0.199 ± 0.048	4.23 ± 0.207	<0.016	<0.012	<0.017	<0.045
		Grape Leaves	0.789 ± 0.071	2.26 ± 0.165	<0.018	<0.022	<0.018	<0.046
		Tomatoes	<0.068	2.30 ± 0.105	<0.009	<0.010	<0.008	<0.023
L	9/24/01	Zucchini Leaves	0.497 ± 0.058	3.75 ± 0.196	<0.016	<0.012	<0.016	<0.042
		Beet Leaves	0.149 ± 0.044	5.83 ± 0.228	<0.016	<0.017	<0.013	<0.043
M* (Control)	9/25/01	Cucumber Leaves	0.583 ± 0.049	2.41 ± 0.113	<0.014	<0.009	<0.012	<0.029
		Grape Leaves	0.710 ± 0.643	2.35 ± 0.154	<0.017	<0.017	<0.017	<0.038
		Squash Leaves	0.249 ± 0.041	2.75 ± 0.152	<0.014	<0.015	<0.012	<0.034
		Rhubarb Leaves	<0.090	3.66 ± 0.133	<0.012	<0.008	<0.012	<0.031
		Bean Leaves	0.419 ± 0.044	3.42 ± 0.153	<0.011	<0.016	<0.012	<0.036

Note: Other Plant Related Radionuclides <LLD
* Samples required by Technical Specifications

TABLE 6-13

MILK ANIMAL CENSUS 2001

TOWN OR AREA (a)	NUMBER ON CENSUS MAP (1)	DEGREES (2)	DISTANCE (2) (miles)	NUMBER OF MILK ANIMALS
Scriba	62	183°	6.7	2G[3]
New Haven	75	146°	7.5	2G[3]
	9	95°	5.2	48C
	4*	113°	7.8	85C
	76*	132°	5.2	58C
	64	107°	7.9	47C
Mexico	14	120°	9.8	56C
	19	132°	10.5	38C
	60*	90°	9.5	30C
	50*	93°	8.2	100C
	55*	95°	9.0	56C
	21	112°	10.5	80C
	72	98°	9.9	37C
Sterling (Control)[4]	73**	234°	13.9	50C
Richland	22	85°	10.2	2C
Granby (Control)[5]	77**	191°	13.9	70C

MILKING ANIMAL TOTALS: 757 Cows
(including control locations) 4 Goats

MILKING ANIMAL TOTALS: 637 Cows
(excluding control locations) 4 Goats

NOTES:

C = Cows
G = Goats
* = Milk sample location
** = Milk sample control location
(1) = Reference Figure 3.3-4
(2) = Degrees and distance are based on NMP-2 reactor building centerline
(3) = Goat is not currently producing milk or any milk produced is utilized by the owner
(4) = Control Milk location until August 2001, owner went out of business
(5) = Replacement control location
(a) = Census performed out to a distance of approximately 10 miles

TABLE 6-14

2001 RESIDENCE CENSUS

LOCATION	MAP LOCATION (1)	METEOROLOGICAL SECTOR	DEGREES (2)	DISTANCE (2)
*		N	-	-
*		NNE	-	-
*		NE	-	-
*		ENE	-	-
Lake Road	A	E	97°	1.3 miles
Lake Road	B	ESE	102°	1.1 miles
County Route 29	C	SE	130°	1.4 miles
Miner Road	D	SSE	163°	1.6 miles
Miner Road	E	S	170°	1.6 miles
Lakeview Road	F	SSW	207°	1.2 miles
Bible Camp Retreat	G	SW	234°	0.9 miles
Bible Camp Retreat	H	WSW	238°	0.9 miles
*		W	-	-
*		WNW	-	-
*		NW	-	-
*		NNW	-	-

NOTES:

* This meteorological sector is over Lake Ontario. There is no residence within five miles
(1) Corresponds to Figure 3.3-5
(2) Based on NMP2 reactor centerline

SECTION 7.0

HISTORICAL DATA TABLES

TABLE 7-1

HISTORICAL ENVIRONMENTAL SAMPLE DATA
SHORELINE SEDIMENT (CONTROL) [1]

	Cs-137 (pCi/g (dry))			Co-60 (pCi/g (dry))		
YEAR	MIN.	MAX.	MEAN	MIN.	MAX.	MEAN
1979 (2)	0.22	0.22	0.22	LLD	LLD	LLD
1980	0.07	0.09	0.08	LLD	LLD	LLD
1981	LLD	LLD	LLD	LLD	LLD	LLD
1982	0.05	0.05	0.05	LLD	LLD	LLD
1983	LLD	LLD	LLD	LLD	LLD	LLD
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	0.03	0.03	0.03	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

(1) Control location was at an area beyond the influence of the site (westerly direction).
(2) Sampling was initiated in 1979. Sampling was not required prior to 1979.

TABLE 7-2

HISTORICAL ENVIRONMENTAL SAMPLE DATA
SHORELINE SEDIMENT (INDICATOR) [1]

	Cs-137 (pCi/g (dry))			Co-60 (pCi/g (dry))		
YEAR	MIN.	MAX.	MEAN	MIN	MAX.	MEAN
1979	(2)	(2)	(2)	(2)	(2)	(2)
1980	(2)	(2)	(2)	(2)	(2)	(2)
1981	(2)	(2)	(2)	(2)	(2)	(2)
1982	(2)	(2)	(2)	(2)	(2)	(2)
1983	(2)	(2)	(2)	(2)	(2)	(2)
1984	(2)	(2)	(2)	(2)	(2)	(2)
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	0.25	0.34	0.30	LLD	LLD	LLD
1990	0.28	0.28	0.28	LLD	LLD	LLD
1991	0.11	0.16	0.14	LLD	LLD	LLD
1992	0.10	0.16	0.13	LLD	LLD	LLD
1993	0.17	0.49	0.33	LLD	LLD	LLD
1994	0.08	0.39	0.24	LLD	LLD	LLD
1995	0.16	0.17	0.16	LLD	LLD	LLD
1996	0.13	0.18	0.16	LLD	LLD	LLD
1997	0.13	0.18	0.16	LLD	LLD	LLD
1998	0.07	0.07	0.07	LLD	LLD	LLD
1999	0.06	0.09	0.08	LLD	LLD	LLD
2000	0.06	0.08	0.07	LLD	LLD	LLD
2001	0.06	0.07	0.07	LLD	LLD	LLD

(1) Location was off-site at Sunset Beach (closest location with recreational value).
(2) Sampling initiated in 1985 as required by the new Technical Specifications.

TABLE 7-3

HISTORICAL ENVIRONMENTAL SAMPLE DATA
FISH (CONTROL) [1]

	Cs-137 (pCi/g (wet))		
YEAR	MIN.	MAX.	MEAN
1976	1.2	1.2	1.2
1977	0.13	0.13	0.13
1978	0.04	0.20	0.09
1979	0.03	0.06	0.04
1980	0.03	0.11	0.06
1981	0.028	0.062	0.043
1982	0.027	0.055	0.046
1983	0.041	0.057	0.049
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	0.033
1989	0.020	0.033	0.029
1990	0.025	0.079	0.043
1991	0.016	0.045	0.030
1992	0.019	0.024	0.022
1993	0.023	0.041	0.032
1994	0.012	0.035	0.024
1995	0.014	0.020	0.016
1996	0.014	0.018	0.016
1997	0.019	0.043	0.031
1998	0.013	0.013	0.013
1999	LLD	LLD	LLD
2000	0.02	0.02	0.02
2001	LLD	LLD	LLD

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

TABLE 7-4

HISTORICAL ENVIRONMENTAL SAMPLE DATA
FISH (INDICATOR) [1]

	Cs-137 (pCi/g (wet))		
YEAR	MIN.	MAX.	MEAN
1976	0.5	3.9	1.4
1977	0.13	0.79	0.29
1978	0.03	0.10	0.08
1979	0.02	0.55	0.10
1980	0.03	0.10	0.06
1981	0.03	0.10	0.06
1982	0.034	0.064	0.048
1983	0.033	0.056	0.045
1984	0.033	0.061	0.043
1985	0.018	0.044	0.030
1986	0.009	0.051	0.028
1987	0.024	0.063	0.033
1988	0.020	0.074	0.034
1989	0.020	0.043	0.035
1990	0.024	0.115	0.044
1991	0.021	0.035	0.027
1992	0.013	0.034	0.026
1993	0.021	0.038	0.030
1994	0.011	0.028	0.020
1995	0.016	0.019	0.018
1996	0.014	0.016	0.015
1997	0.015	0.017	0.016
1998	0.021	0.021	0.021
1999	0.016	0.018	0.017
2000	LLD	LLD	LLD
2001	LLD	LLD	LLD

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

TABLE 7-5

HISTORICAL ENVIRONMENTAL SAMPLE DATA
SURFACE WATER (CONTROL) [3]

	Cs-137 (pCi/liter)			Co-60 (pCi/liter)		
YEAR	MIN.	MAX.	MEAN	MIN.	MAX.	MEAN
1976	(1)	(1)	(1)	(1)	(1)	(1)
1977	(2)	(2)	(2)	(2)	(2)	(2)
1978	LLD	LLD	LLD	(2)	(2)	(2)
1979	2.5	2.5	2.5	LLD	LLD	LLD
1980	LLD	LLD	LLD	LLD	LLD	LLD
1981	LLD	LLD	LLD	1.4	1.4	1.4
1982	LLD	LLD	LLD	LLD	LLD	LLD
1983	LLD	LLD	LLD	LLD	LLD	LLD
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

(1) No gamma analyses performed (not required).
(2) Data showed instrument background results.
(3) Location was the City of Oswego Water Supply for 1976 - 1984 and the Oswego Steam Station inlet canal for 1985 - 2001

TABLE 7-6

HISTORICAL ENVIRONMENTAL SAMPLE DATA
SURFACE WATER (INDICATOR) [3]

	Cs-137 (pCi/liter)			Co-60 (pCi/liter)		
YEAR	MIN.	MAX.	MEAN	MIN.	MAX.	MEAN
1976	(1)	(1)	(1)	(1)	(1)	(1)
1977	(2)	(2)	(2)	(2)	(2)	(2)
1978	LLD	LLD	LLD	(2)	(2)	(2)
1979	LLD	LLD	LLD	LLD	LLD	LLD
1980	LLD	LLD	LLD	LLD	LLD	LLD
1981	LLD	LLD	LLD	LLD	LLD	LLD
1982	0.43	0.43	0.43	1.6	2.4	1.9
1983	LLD	LLD	LLD	LLD	LLD	LLD
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

(1) No gamma analyses performed (not required).
(2) Data showed instrument background results.
(3) Location was the J. A. FitzPatrick inlet canal.

TABLE 7-7

HISTORICAL ENVIRONMENTAL SAMPLE DATA
SURFACE WATER TRITIUM (CONTROL) [1]

	TRITIUM (pCi/liter)		
YEAR	MIN.	MAX.	MEAN
1976	440	929	652
1977	300	530	408
1978	215	490	304
1979	174	308	259
1980	211	290	257
1981	211	328	276
1982	112	307	165
1983	230	280	250
1984	190	220	205
1985	230	370	278
1986	250	550	373
1987	140	270	210
1988	240	460	320
1989	180	660	373
1990	260	320	290
1991	180	200	190
1992	190	310	242
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	337
2000	196	237	212
2001	LLD	LLD	LLD

(1) Control location is the City of Oswego drinking water for 1976 - 1984 and the Oswego Steam Station inlet canal for 1985 - 2001

TABLE 7-8

HISTORICAL ENVIRONMENTAL SAMPLE DATA
SURFACE WATER TRITIUM (INDICATOR) [1]

	TRITIUM (pCi/liter)		
YEAR	MIN.	MAX.	MEAN
1976	365	889	627
1977	380	530	455
1978	377	560	476
1979	176	276	228
1980	150	306	227
1981	212	388	285
1982	194	311	266
1983	249	560	347
1984	110	370	280
1985	250	1200 (2)	530
1986	260	500	380
1987	160	410	322
1988	430	480	460
1989	210	350	280
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

(1) Indicator location is the FitzPatrick inlet canal.
(2) Suspect sample contamination. Recollected samples showed normal levels of tritium.

TABLE 7-9

HISTORICAL ENVIRONMENTAL SAMPLE DATA
AIR PARTICULATE GROSS BETA (CONTROL) (1)

	GROSS BETA (pCi/m^3)		
YEAR	MIN.	MAX.	MEAN
1977	0.001	0.484	0.125
1978	0.01	0.66	0.16
1979	0.010	0.703	0.077
1980	0.009	0.291	0.056
1981	0.016	0.549	0.165
1982	0.011	0.078	0.033
1983	0.007	0.085	0.024
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	0.006	0.028	0.014
1992	0.006	0.020	0.012
1993	0.007	0.022	0.013
1994	0.008	0.025	0.014
1995	0.006	0.023	0.014
1996	0.009	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

(1) 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 - 2001(formerly C off-site location).

TABLE 7-10

HISTORICAL ENVIRONMENTAL SAMPLE DATA
AIR PARTICULATE GROSS BETA (INDICATOR) (1)

	GROSS BETA (pCi/m^3)		
YEAR	MIN.	MAX.	MEAN
1977	0.002	0.326	0.106
1978	0.01	0.34	0.11
1979	0.001	0.271	0.058
1980	0.002	0.207	0.044
1981	0.004	0.528	0.151
1982	0.001	0.113	0.031
1983	0.002	0.062	0.023
1984	0.002	0.058	0.025
1985	0.010	0.044	0.023
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	0.005	0.023	0.014
1991	0.007	0.033	0.015
1992	0.005	0.024	0.012
1993	0.005	0.025	0.014
1994	0.006	0.025	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	0.014
1999	0.009	0.039	0.017
2000	0.005	0.033	0.015
2001	0.004	0.037	0.016

(1) Locations used for 1977 - 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 – 2001 locations were R-1 off-site, R-2 off-site, R-3 off-site, and R-4 off-site.

TABLE 7-11

HISTORICAL ENVIRONMENTAL SAMPLE DATA
AIR RADIOIODINE (CONTROL) [1]

	IODINE-131 (pCi/m³)		
YEAR	MIN.	MAX.	MEAN
1976	0.01	5.88	0.60
1977	0.02	0.82	0.32
1978	0.03	0.04	0.03
1979	LLD	LLD	LLD
1980	LLD	LLD	LLD
1981	LLD	LLD	LLD
1982	0.039	0.039	0.039
1983	LLD	LLD	LLD
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

(1) 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 - 2001.

TABLE 7-12

HISTORICAL ENVIRONMENTAL SAMPLE DATA
AIR RADIOIODINE (INDICATOR) (1)

	IODINE-131 (pCi/m^3)		
YEAR	MIN	MAX	MEAN
1976	0.01	2.09	0.33
1977	0.02	0.73	0.31
1978	0.02	0.07	0.04
1979	LLD	LLD	LLD
1980	0.013	0.013	0.013
1981	0.016	0.042	0.029
1982	0.002	0.042	0.016
1983	0.022	0.035	0.028
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

(1) 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 - 2001 were R1 off-site, R-2 off-site, R-3 off-site, and R-4 off-site.

TABLE 7-13

HISTORICAL ENVIRONMENTAL SAMPLE DATA
AIR PARTICULATES (CONTROL) [1]

	Cs-137 (pCi/m³)			Co-60 (pCi/m³)		
YEAR	MIN.	MAX.	MEAN	MIN.	MAX.	MEAN
1977	0.0002	0.0112	0.0034	0.0034	0.0347	0.0172
1978	0.0008	0.0042	0.0018	0.0003	0.0056	0.0020
1979	0.0008	0.0047	0.0016	0.0005	0.0014	0.0009
1980	0.0015	0.0018	0.0016	LLD	LLD	LLD
1981	0.0003	0.0042	0.0017	0.0003	0.0012	0.0008
1982	0.0002	0.0009	0.0004	0.0004	0.0007	0.0006
1983	0.0002	0.0002	0.0002	0.0007	0.0007	0.0007
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

(1) Locations included composites of C, D1, E, F, and G off-site air monitoring locations for 1977 - 1984. Sample location included only R-5 air monitoring location for 1985 - 2001.

TABLE 7-14

HISTORICAL ENVIRONMENTAL SAMPLE DATA
AIR PARTICULATES (INDICATOR) [1]

	Cs-137 (pCi/m^3)			Co-60 (pCi/m^3)		
YEAR	MIN.	MAX.	MEAN	MIN.	MAX.	MEAN
1977	0.0001	0.0105	0.0043	0.0003	0.0711	0.0179
1978	0.0003	0.0026	0.0016	0.0003	0.0153	0.0023
1979	0.0003	0.0020	0.0010	0.0003	0.0007	0.0005
1980	0.0005	0.0019	0.0011	0.0016	0.0016	0.0016
1981	0.0002	0.0045	0.0014	0.0002	0.0017	0.0006
1982	0.0001	0.0006	0.0004	0.0003	0.0010	0.0005
1983	0.0002	0.0003	0.0002	0.0003	0.0017	0.0007
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	0.048	0.048	0.048
2001	LLD	LLD	LLD	LLD	LLD	LLD

(1) Locations included composites of D1, D2, E, F, G, H, I, J, and K on-site air monitoring locations for 1977 - 1984. Locations included R-1 through R-4 air monitoring locations for 1985 - 2001.

TABLE 7-15
HISTORICAL ENVIRONMENTAL SAMPLE DATA
ENVIRONMENTAL TLD (CONTROL) [2]

YEAR	DOSE (mrem per standard month) MIN	MAX	MEAN
Preop	(1)	(1)	(1)
1970	6.0	7.3	6.7
1971	2.0	6.7	4.3
1972	2.2	6.2	4.4
1973	2.2	6.9	4.7
1974	2.7	8.9	5.6
1975	4.8	6.0	5.5
1976	3.2	7.2	5.4
1977	4.0	8.0	5.3
1978	3.3	4.7	4.3
1979	3.3	5.7	4.7
1980	3.8	5.8	4.9
1981	3.5	5.9	4.8
1982	3.8	6.1	5.1
1983	4.9	7.2	5.8
1984	4.7	8.2	6.2
1985	4.5 (4.4)*	7.6 (6.8)*	5.6 (5.4)*
1986	5.3 (5.5)*	7.5 (7.2)*	6.3 (6.3)*
1987	4.6 (4.6)*	6.6 (5.8)*	5.4 (5.2)*
1988	4.4 (4.8)*	6.8 (6.8)*	5.6 (5.4)*
1989	2.9 (2.9)*	6.4 (5.6)*	4.7 (4.6)*
1990	3.7 (3.7)*	6.0 (5.9)*	4.7 (4.6)*
1991	3.8 (3.8)*	5.4 (5.3)*	4.5 (4.3)*
1992	2.6 (2.6)*	5.0 (4.7)*	4.1 (3.9)*
1993	3.4 (3.4)*	5.6 (5.2)*	4.4 (4.3)*
1994	3.1 (3.1)*	5.0 (4.6)*	4.1 (3.9)*
1995	3.4 (3.4)*	5.7 (4.9)*	4.4 (4.2)*
1996	3.4 (3.4)*	5.6 (5.6)*	4.3 (4.2)*
1997	3.7 (3.9)*	6.2 (5.2)*	4.7 (4.6)*
1998	3.7 (3.7)*	5.6 (4.8)*	4.4 (4.2)*
1999	3.6 (3.7)*	7.1 (4.7)*	4.6 (4.4)*
2000	3.7 (3.7)*	7.3 (5.5)*	4.7 (4.3)*
2001	3.6 (3.9)*	5.4 (5.0)*	4.4 (4.4)*

(1) Data not available.
(2) TLD #8, 14, 49, 111 and 113 where applicable.
( )* TLD result based on the TS/ODCM required locations (TLD #14 and 49).

TABLE 7-16
HISTORICAL ENVIRONMENTAL SAMPLE DATA
ENVIRONMENTAL TLD (SITE BOUNDARY) (2)

	DOSE (mrem per standard month)		
YEAR	MIN.	MAX.	MEAN
Preop	(1)	(1)	(1)
1970	(1)	(1)	(1)
1971	(1)	(1)	(1)
1972	(1)	(1)	(1)
1973	(1)	(1)	(1)
1974	(1)	(1)	(1)
1975	(1)	(1)	(1)
1976	(1)	(1)	(1)
1977	(1)	(1)	(1)
1978	(1)	(1)	(1)
1979	(1)	(1)	(1)
1980	(1)	(1)	(1)
1981	(1)	(1)	(1)
1982	(1)	(1)	(1)
1983	(1)	(1)	(1)
1984	(1)	(1)	(1)
1985	4.1	12.6	6.2
1986	4.4	18.7	7.0
1987	4.4	14.3	6.1
1988	3.4	17.9	6.4
1989	2.8	15.4	5.9
1990	3.6	14.8	5.8
1991	3.2	16.7	5.7
1992	3.2	10.4	4.8
1993	3.3	11.6	5.3
1994	2.8	12.4	5.2
1995	3.5	9.6	5.4
1996	3.2	9.1	5.2
1997	3.5	10.2	5.9
1998	3.7	9.4	5.4
1999	3.3	12.3	5.8
2000	3.6	10.0	5.5
2001	3.6	10.3	5.7

(1) No data available (not required prior to 1985).
(2) TLD locations initiated in 1985 as required by the new Technical Specifications. Includes TLD numbers 75, 76, 77, 23, 78, 79, 80, 81, 82, 83, 84, 7, 18, 85, 86, and 87.

TABLE 7-17
HISTORICAL ENVIRONMENTAL SAMPLE DATA
ENVIRONMENTAL TLD (Off-Site Sectors) (2)

	DOSE (mrem per standard month)		
YEAR	MIN.	MAX.	MEAN
Preop	(1)	(1)	(1)
1970	(1)	(1)	(1)
1971	(1)	(1)	(1)
1972	(1)	(1)	(1)
1973	(1)	(1)	(1)
1974	(1)	(1)	(1)
1975	(1)	(1)	(1)
1976	(1)	(1)	(1)
1977	(1)	(1)	(1)
1978	(1)	(1)	(1)
1979	(1)	(1)	(1)
1980	(1)	(1)	(1)
1981	(1)	(1)	(1)
1982	(1)	(1)	(1)
1983	(1)	(1)	(1)
1984	(1)	(1)	(1)
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	5.6	4.5
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	4.2
1996	3.2	5.3	4.2
1997	3.5	5.8	4.5
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

(1) No data available (not required prior to 1985).
(2) TLD locations initiated in 1985 as required by the new Technical Specifications. Includes TLD numbers 88, 89, 90, 91, 92, 93, 94, and 95.

TABLE 7-18
HISTORICAL ENVIRONMENTAL SAMPLE DATA
ENVIRONMENTAL TLD (Special Interest) (2) (3)

	DOSE (mrem per standard month)		
YEAR	MIN	MAX	MEAN
Preop	(1)	(1)	(1)
1970	(1)	(1)	(1)
1971	(1)	(1)	(1)
1972	(1)	(1)	(1)
1973	(1)	(1)	(1)
1974	(1)	(1)	(1)
1975	(1)	(1)	(1)
1976	(1)	(1)	(1)
1977	(1)	(1)	(1)
1978	(1)	(1)	(1)
1979	(1)	(1)	(1)
1980	(1)	(1)	(1)
1981	(1)	(1)	(1)
1982	(1)	(1)	(1)
1983	(1)	(1)	(1)
1984	(1)	(1)	(1)
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	7.0	4.8
1990	3.2	6.3	4.7
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	4.0
1995	3.4	4.9	4.3
1996	3.2	5.3	4.2
1997	3.5	5.4	4.5
1998	3.7	4.9	4.3
1999	3.6	5.5	4.4
2000	3.6	6.3	4.5
2001	3.8	5.0	4.3

(1) No data available (not required prior to 1985).
(2) TLD locations initiated in 1985 as required by the new Technical Specifications. TLD's included are numbers 96, 58, 97, 56, 15, and 98.
(3) TLD locations include critical residences and populated areas near the site.

TABLE 7-19
HISTORICAL ENVIRONMENTAL SAMPLE DATA
ENVIRONMENTAL TLD (On-Site Indicator) (2)

YEAR	DOSE (mrem per standard month)		
	MIN	MAX	MEAN
Preop	(1)	(1)	(1)
1970	4.7	9.0	6.0
1971	1.5	7.7	4.7
1972	2.3	8.2	4.9
1973	3.0	24.4	6.6
1974	3.1	10.6	5.7
1975	4.6	16.0	7.3
1976	3.7	18.8	6.9
1977	3.0	15.3	5.7
1978	3.0	9.0	4.3
1979	2.7	8.3	4.3
1980	3.9	12.0	5.3
1981	4.1	11.8	5.8
1982	3.9	13.0	6.3
1983	5.0	16.5	6.9
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	14.5	6.0
1990	3.6	12.9	5.5
1991	3.2	11.6	5.1
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	7.7
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

(1) No data available.
(2) 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 - 2001). Locations are existing or previous on-site environmental air monitoring locations.

TABLE 7-20
HISTORICAL ENVIRONMENTAL SAMPLE DATA
ENVIRONMENTAL TLD (Off-Site Indicator) [2]

	DOSE (mrem per standard month)		
YEAR	MIN	MAX	MEAN
Preop	(1)	(1)	(1)
1970	5.0	8.0	6.7
1971	1.1	7.7	4.5
1972	1.8	6.6	4.4
1973	2.2	6.9	4.1
1974	2.4	8.9	5.3
1975	4.5	7.1	5.5
1976	3.4	7.2	5.2
1977	3.7	8.0	5.3
1978	2.7	4.7	3.7
1979	3.0	5.7	4.0
1980	3.1	5.8	4.6
1981	3.6	5.9	4.7
1982	4.0	6.2	5.2
1983	4.6	7.2	5.6
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	6.0	4.8
1991	3.4	5.4	4.3
1992	3.1	5.2	4.1
1993	3.2	5.6	4.3
1994	3.0	5.0	4.0
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	4.4
1999	3.8	7.1	4.6
2000	3.8	7.3	4.6
2001	3.7	5.9	4.5

(1) No data available.
(2) Includes TLD numbers 8, 9, 10, 11, 12, and 13 (off-site environmental air monitoring locations).

TABLE 7-21

HISTORICAL ENVIRONMENTAL SAMPLE DATA
MILK (CONTROL) [2]

	Cs-137 (pCi/liter)			I-131 (pCi/liter)		
YEAR	MIN.	MAX.	MEAN	MIN.	MAX.	MEAN
1976	(1)	(1)	(1)	(1)	(1)	(1)
1977	(1)	(1)	(1)	(1)	(1)	(1)
1978	2.4	7.8	5.8	LLD	LLD	LLD
1979	LLD	LLD	LLD	LLD	LLD	LLD
1980	3.6	5.6	4.5	1.4	1.4	1.4
1981	3.9	3.9	3.9	LLD	LLD	LLD
1982	LLD	LLD	LLD	LLD	LLD	LLD
1983	LLD	LLD	LLD	LLD	LLD	LLD
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

(1) No data available (samples not required).
(2) Location used was an available milk sample location in a least prevalent wind direction greater than ten miles from the site.

TABLE 7-22

HISTORICAL ENVIRONMENTAL SAMPLE DATA
MILK (INDICATOR) [1]

	Cs-137 (pCi/liter)			I-131 (pCi/liter)		
YEAR	MIN.	MAX.	MEAN	MIN.	MAX.	MEAN
1976	4.0	15.0	9.3	0.02	45.00	3.20
1977	11.0	22.0	17.1	0.01	49.00	6.88
1978	3.4	33.0	9.9	0.19	0.19	0.19
1979	3.2	53.0	9.4	LLD	LLD	LLD
1980	3.2	21.0	8.1	0.3	8.8	3.8
1981	3.5	29.0	8.6	LLD	LLD	LLD
1982	3.5	14.0	5.7	LLD	LLD	LLD
1983	3.3	10.9	7.2	LLD	LLD	LLD
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	8.1	6.8	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	0.50	0.50	0.50
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

(1) Locations sampled were available downwind locations within ten miles with high radionuclide deposition potential.

TABLE 7-23

HISTORICAL ENVIRONMENTAL SAMPLE DATA
FOOD PRODUCTS (CONTROL) [2]

	Cs-137 (pCi/g (wet))		
YEAR	MIN	MAX	MEAN
1976	(1)	(1)	(1)
1977	(1)	(1)	(1)
1978	(1)	(1)	(1)
1979	(1)	(1)	(1)
1980 (3)	0.02	0.02	0.02
1981	LLD	LLD	LLD
1982	LLD	LLD	LLD
1983	LLD	LLD	LLD
1984	LLD	LLD	LLD
1985 (4)	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	0.007	0.007	0.007
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

(1) No data available (control samples not required).
(2) Location was an available food product sample location in a least prevalent wind direction greater than ten miles from the site.
(3) Data comprised of broadleaf and non-broadleaf vegetation (1980 - 1984).
(4) Data comprised of broadleaf vegetation only (1985 - 2001).

TABLE 7-24

HISTORICAL ENVIRONMENTAL SAMPLE DATA
FOOD PRODUCTS (INDICATOR) [1]

	Cs-137 (pCi/g (wet))		
YEAR	MIN.	MAX.	MEAN
1976 (2)	LLD	LLD	LLD
1977	LLD	LLD	LLD
1978	LLD	LLD	LLD
1979	0.004	0.004	0.004
1980	0.004	0.060	0.036
1981	LLD	LLD	LLD
1982	LLD	LLD	LLD
1983	LLD	LLD	LLD
1984	LLD	LLD	LLD
1985 (3)	0.047	0.047	0.047
1986	LLD	LLD	LLD
1987	LLD	LLD	LLD
1988	0.008	0.008	0.008
1989	0.009	0.009	0.009
1990	LLD	LLD	LLD
1991	0.040	0.040	0.040
1992	LLD	LLD	LLD
1993	LLD	LLD	LLD
1994	0.004	0.011	0.008
1995	0.010	0.012	0.011
1996	LLD	LLD	LLD
1997	0.012	0.012	0.012
1998	LLD	LLD	LLD
1999	0.008	0.008	0.008
2000	LLD	LLD	LLD
2001	LLD	LLD	LLD

(1) Indicator locations were available downwind locations within ten miles of the site and with high radionuclide deposition potential.
(2) Data comprised of broadleaf and non-broadleaf vegetation (1976 - 1984).
(3) Data comprised of broadleaf vegetation only (1985 - 2001).

SECTION 8.0

QUALITY ASSURANCE/QUALITY CONTROL PROGRAM

8.0 QUALITY ASSURRANCE/QUALITY CONTROL PROGRAM

8.1 PROGRAM DESCRIPTION

NMP Unit 1 Technical Specifications (TS) Section 3.6.21 and NMP Unit 2 Offsite Dose Calculation Manual (ODCM) Section 3.12.3 requires that each licensee participate in an Interlaboratory Comparison Program. The Interlaboratory Comparison Program shall include sample media for which samples are routinely collected and for which cross-check 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 TS/ODCM requirement for an Interlaboratory Comparison Program, the JAFNPP Environmental Laboratory has engaged the services of two independent laboratories to provide quality assurance cross-check 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 requested 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.

During 2001, the tritium analysis for the JAFNPP Environmental Laboratory was performed by Environmental Inc., Midwest Laboratory for samples collected during the first quarter of the year. Tritium analysis for samples collected during the second, third and fourth quarter of 2001 was performed by Duke Engineering and Services, Environmental Laboratory.

8.2 PROGRAM SCHEDULE

SAMPLE MEDIA	LABORATORY ANALYSIS	SAMPLE PROVIDER ANALYTICS	EML	YEARLY TOTAL
Water	Gross Beta	0	2	2
Water	Tritium	1	2	3
Water	I-131	2	0	2
Water	Mixed Gamma	2	2	4
Air	Gross Beta	2	2	4
Air	I-131	2	0	2
Air	Mixed Gamma	2	2	4
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	10	27

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 cross-check 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 worth 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 Cross-Check 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' 2001 Interlaboratory Comparison Program. The following sample media were evaluated as part of the Cross-Check 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, 79 were in agreement using the NRC acceptance criteria for a 97.5% agreement ratio.

Sample non-conformities are discussed in Section 8.4.2 below.

8.4.2 ANALYTICS SAMPLE NONCONFORMITIES

8.4.2.1 Analytics Sample E-2677-05

Nonconformity No. 01-08, Cr-51 in Soil

Nonconformity No. 01-09, Zn-65 in Soil

A spiked mixed gamma in soil sample was received from Analytics, Inc. and was analyzed in accordance with standard laboratory procedures. The sample

contained a total of nine radionuclides for analyisis. Nine of the nine radionuclides present were quantified. Seven of the nine radionuclides were quantified within the acceptable range. The results for Cr-51 and Zn-65 were determined to be outside the QA Acceptance Criteria. The soil sample was analyzed on six different detectors with the following reported results for Cr-51 and Zn-65.

	Mean	**Known**	
	Activity pCi/g	**Activity pCi/g**	**Ratio**
Cr-51	0.626±0.116	0.455±0.008	1.38
Zn-65	0.270±0.032	0.368±0.018	0.73

An evaluation of the Cr-51 result was performed. The spectrum and peak search results were examined with no abnormalities identified. Cr-51 decays by electron capture with a 27.7 day half-life and a gamma ray energy of 320 KeV with a yield of 9.8%. No secondary gamma energies are produced in the Cr-51 decay scheme. This low gamma energy yield and short half-life will result in very low net counts for samples containing environmental levels of Cr-51. The average net count rate of the six analyses was less than one count per minute. The counting error for the six analyses was high and ranged from 26% to 62%. The sample matrix of soil has a relatively high density, which would have a high self-absorption factor for the low energy gamma associated with Cr-51.

The combination of the following; low sample activity and resulting very small net count rate, short half-life, low gamma energy, small gamma yield and high sample density, resulted in an inaccurate sample result. The wide range of the associated counting errors demonstrates the low confidence level in the reported results. The poor analytical results for this sample is not routine and does not indicate a programmatic deficiency in the analysis of Cr-51 in soil samples or other environmental media. Confidence in the accurate analysis of Cr-51 can be easily demonstrated by other Cr-51 analytical results both in the aggregate sample results for the 2001 QA program and historical QA results. There was a second

nonconformity associated with Cr-51 in soil for a sample submitted by a laboratory client in 2001. Physical parameters and conditions that affected this sample are the same that were identified in this nonconformity.

The Cr-51 results for other Quality Assurance samples analyzed as part of the 2001 program were all acceptable, with the exception of E-2694-09, and are summarized below:

2001 Cr-51 Results

Sample ID	Medium	JAF	Reference Lab	Ratio
E-2601-05	WATER pCi/liter	224±28	242±4	0.93
E-2812-05	WATER pCi/liter	261±23	265±4	0.98
E-2602-05	FILTER pCi/filter	190±17	201±3	0.95
E-2813-05	FILTER pCi/filter	214±31	266±4	0.80
E-2676-05	MILK pCi/liter	179±27	224±4	0.80
E-2814-05	MILK pCi/liter	348±25	366±6	0.95
E-2679-05	VEGETATION pCi/kg	318±73	373±6	0.85
E-2853-09*	SOIL* pCi/kg	469±130	404±20	1.16
E-2542-09*	SOIL* pCi/kg	530±102	479±8	1.11
E-2694-09*	SOIL* pCi/kg	585±79	455±8	1.29**
E-2951-09*	SOIL* pCi/kg	624±70	631±11	0.99
			Mean Ratio =	98.3

* Blind spike sample provided by laboratory client

**Nonconformity result

A review of historical QA data for 2000 was also performed to determine if this is a recurring systematic error or bias. In 2000, six QA samples were analyzed which contained Cr-51. The mean ratio for these samples relative to the Known (reference) Value is 0.95. There were no Cr-51 nonconformities in the 2000 Crosscheck Program. The current and historical data demonstrate that there is no

systematic error or significant bias for the analysis of Cr-51 in environmental samples.

In summary, 2001 QA sample E-2677-05 had a very low net count rate, which resulted in a poorly defined spectrum peak. The low Cr-51 activity in a high-density sample matrix resulted in an inaccuracy in the measured results. This nonconformity does not represent a systematic error or programmatic deficiency in the laboratory analysis program.

The Zn-65 result for sample E-2677-05 were also evaluated to be outside the Acceptance Criteria with a ratio of 0.73. The reported Zn-65 results were 0.363±0.068, 0.0285±0.055 and 0.162±0.066 pCi/kg. The individual results ratios relative to the known were 0.99, 0.77 and 0.44 respectively. The ratios for the 0.363 pCi/kg and 0.285 pCi/kg were within the Acceptance Criteria. The ratio for the 0.162 pCi/kg results of 44 is significantly outside the acceptance range. Based on the known results, the 0.162 pCi/kg result is considered an outlier. A review of the peak search and raw spectrum shows that there was a possible interference peak with a centroid of 1120 KeV.

In soil samples, Ra-226 is a naturally occurring radionuclide, which produces a secondary peak at 1120 KeV. When the 1115 KeV (Zn-65) peak is manually defined and the interfering 1120 KeV was eliminated, the calculated result for Zn-65 is 0.358±0.078 pCi/kg, which has an acceptable reference ratio of 0.97. In most cases, the computer algorithm can differentiate the two adjacent peaks and correct for interferences from overlapping (doublet) peaks. In this particular sample spectrum, there was a low number of total counts in the 1110, to 1130 KeV area of the spectrum. The computer did not identify the counts in the 1120 KeV area as a second peak due to the low activity and subsequent poor peak shape. By not identifying the peak at 1120 KeV the software did not resolve this section of the spectrum as a double peak.

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 2001, eleven spiked samples were analyzed which contained certified concentrations of Zn-65 and other radionuclides. This sample set included four additional samples. The results are as follows:

2001 Zn-65 Results

		Reference		
Sample ID	**Medium**	**JAF**	**Lab**	**Ratio**
E-2601-05	WATER pCi/liter	201±9	186±9	1.08
E-2812-05	WATER pCi/liter	187±6	184±3	1.02
E-2602-05	FILTER pCi/filter	170±9	155±3	1.10
E-2813-05	FILTER pCi/filter	192±7	185±3	1.04
E-2676-05	MILK pCi/liter	182±9	182±3	1.01
E-2814-05	MILK pCi/liter	261±8	254±4	1.03
E-2679-05	VEGETATION pCi/kg	284±24	302±5	0.94
E-2853-09*	SOIL* pCi/kg	255±20	281±5	0.91
E-2542-09*	SOIL* pCi/kg	354±27	369±6	0.96
E-2694-09*	SOIL* pCi/kg	414±25	368±6	1.13
E-2951-09*	SOIL* pCi/kg	255±17	262±4	0.97
			Mean Ratio =	1.02

* Provided by Lab client-NOT reported in Annual Report

The mean ratio for all eleven Zn-65 results was 1.02 and the ratio for the four soil samples was 0.99. Both of these mean ratio values and the eleven individual ratio values for Zn-65 are excellent indicators that the routine measurement of Zn-65 in environmental media is very 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.

8.4.3 ENVIRONMENTAL MEASUREMENTS LABORATORY (EML)

In 2001, JAFNPP Environmental Laboratory participated in both the EML Quality Assessment Programs, QAP-54 and QAP-55. 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 18 radionuclides were evaluated for the samples included in QAP-54 and QAP-55. Using the EML acceptance criteria, 17 of 18 radionuclides analyses (94.4%) were evaluated to be acceptable. Results for the EML cross Check Program can be viewed on-line at www.eml.doe.gov.

A summary of the JAFNPP Environmental Laboratory results is as follows:

Matrix	Total Analyses	Acceptable	Not Acceptable
Air	10	10	0
Water	8	7	1
Total Evaluation	18	17	1
Percentage		94.4%	5.6%

8.4.3.1 EML Sample QAP-54, Gross Beta in Water

Nonconformity No. 2001-04

The JAFNPP Environmental Laboratory reported results of 1.22 ± 0.02 Bq/ml.
The EML activity was 1297 ± 100 Bq/L.

The cause of this error was technician error in reporting the data to the EML website.
The JAFNPP appropriate result was 1220 ± 18.5Bq/L.
The ratio of the JAF/EML results was 0.94.
This ratio is consistent with other gross beta in water results.

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

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (1)	RATIO (2)
06/14/01	E-2675-05	AIR pCi/filter	GROSS BETA	73.8±2.9 76.2±2.9 74.2±2.9 Mean = 74.7±1.7	76±1.3	0.98, A
12/06/01	E-2907A-05	AIR pCi/filter	GROSS BETA	75.0±2.3 76.7±2.4 73.8±2.3 Mean = 75.1±1.4	67±3	1.12, A

(1) Results reported as activity ± 1 sigma.
(2) 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 of Water (pCi/liter)

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (1)	RATIO (2)
03/22/01	E-2600-05	WATER pCi/liter	H-3	3108±173 3382±179 3090±173 Mean = 3193±101	3114±52	1.03, A

(1) Results reported as activity ± 1 sigma. Sample Analyzed by Environmental Inc., Midwest Laboratory

(2) Ratio = Reported/Analytics (See Section 8.3).

(*) Samples 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 NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (1)	RATIO (2)
03/22/01	E-2601-05	WATER pCi/liter	I-131**	85.4±2.0 83.7±2.1 85.5±2.4 Mean = 84.9±1.3	90±2	0.94, A
06/14/01	E-2678A-05	AIR pCi/cc	I-131	70.9±6.1 73.0±5.8 86.4±6.4 Mean = 76.8±3.5	82±1	0.94, A
06/14/01	E-2676-05	MILK pCi/liter	I-131**	60.5±2.7 67.7±2.9 65.0±3.9 Mean = 64.4±1.9	69.0±1	0.93, A
09/20/01	E-2814-05	MILK pCi/liter	I-131**	85.4±5.1 83.2±2.0 78.8±1.9 Mean = 82.5±1.9	91.0±2	0.91, A
09/20/01	E-2815-05	AIR pCi/cc	I-131	65.2±6.9 64.2±5.2 72.4±4.7 Mean = 67.3±3.3	68.0±1	0.99, A
09/20/01	E-2812-05	WATER pCi/liter	I-131**	60.3±1.1 49.3±1.4 57.2±1.3 Mean = 55.6±0.7	60.0±1	0.93, A

(1) Results reported as activity ± 1 sigma.
(2) Ratio = Reported/Analytics (See Section 8.3).
(*) Samples 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 NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (1)	RATIO (2)
03/22/01	E-2601-05	WATER pCi/liter	Ce-141	89.8±8.9 89.7±8.4 112.0±11.0 Mean = 97.2±5.5	94±2	1.03, A
			Cr-51	215.0±44.5 268.0±39.6 190.0±58.2 Mean = 224.3±27.8	242±4	0.93, A
			Cs-134	119.0±12.1 122.0±6.3 112.0±8.5 Mean = 117.7±5.4	129±2	0.91, A
			Cs-137	91.9±6.3 98.5±5.7 94.1±8.1 Mean = 94.8±3.9	102±2	0.93, A
			Mn-54	108.0±6.9 114.0±6.2 107.0±8.5 Mean = 109.7±4.2	101±2	1.09, A
			Fe-59	85.2±11.2 106.0±9.4 77.8±14.4 Mean = 89.7±6.8	84±1	1.07, A
			Zn-65	195.0±14.7 201.0±12.7 208.0±17.6 Mean = 201.3±8.7	186±9	1.08, A
			Co-60	149.0±6.0 154.0±5.2 143.0±7.0 Mean = 148.7±3.5	147±2	1.01, A
			Co-58	47.6±5.1 44.3±4.7 49.0±6.5 Mean = 47.0±3.2	48±1	0.98, A

(1) Results reported as activity ± 1 sigma.
(2) 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 NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (1)	RATIO (2)
09/20/01	E-2812-05	WATER pCi/liter	Ce-141	81.3±7.7 88.7±7.5 89.1±6.8 Mean = 86.4±4.2	88±1	0.98, A
			Cr-51	232.0±42.3 240.0±36.6 312.0±40.7 Mean =261.3±23.1	265±4	0.98, A
			Cs-134	116.0±5.7 109.0±5.2 110.0±5.3 Mean = 111.7±3.1	116±2	0.97, A
			Cs-137	228.0±7.2 226.0±6.5 220.0±6.8 Mean = 224.7±3.9	232±4	0.97, A
			Mn-54	142.0±6.3 149.0±5.6 141.0±6.1 Mean = 144.0±3.5	149±2	0.97, A
			Fe-59	66.7±6.2 68.7±5.9 64.2±6.2 Mean = 66.5±3.5	62±1	1.08, A
			Zn-65	184.0±11.7 199.0±10.5 179.0±10.5 Mean = 187.3±6.3	184±3	1.02, A
			Co-60	204.0±5.5 197.0±4.9 194.0±5.2 Mean = 198.3±3.0	193±3	1.03, A
			Co-58	132.0±6.2 134.0±5.5 125.0±6.1 Mean = 130.3±3.4	128±2	1.02, A

(1) Results reported as activity ± 1 sigma.
(2) 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 NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (1)	RATIO (2)
03/22/01	E-2602-05	FILTER pCi/filter	Ce-141	74.8±5.3 69.5±4.8 67.2±5.1 Mean = 70.5±2.9	78±1	0.91, A
			Cr-51	184.0±29.4 180.0±28.2 206.0±30.4 Mean =190.0±16.9	201±3	0.95, A
			Cs-134	95.8±7.7 93.9±11.9 101.0±7.0 Mean = 96.9±5.3	107±2	0.91, A
			Cs-137	69.0±6.0 79.7±5.9 71.0±5.8 Mean = 73.2±3.4	84±1	0.87, A
			Mn-54	93.8±7.7 81.5±6.7 90.8±6.7 Mean = 88.7±4.1	84±1	1.06, A
			Fe-59	70.8±12.0 65.1±11.1 73.3±10.4 Mean = 69.7±6.5	70±1	1.00, A
			Zn-65	176.0±16.1 177.0±14.6 158.0±14.3 Mean = 170.3±8.7	155±3	1.10, A
			Co-60	103.0±6.4 118.0±6.3 133.0±6.1 Mean = 118.0±3.6	122±2	0.97, A
			Co-58	35.3±5.8 41.5±4.6 41.3±5.2 Mean = 39.4±3.0	40±1	0.98, A

(1) Results reported as activity ± 1 sigma.
(2) 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 NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (1)	RATIO (2)
09/20/01	E-2813-05	FILTER pCi/filter	Ce-141	81.3±7.5 92.3±6.9 83.5±6.7 Mean = 85.7±4.1	88±1	0.98, A
			Cr-51	213.0±55.5 214.0±52.8 215.0±52.1 Mean =214.0±30.9	266±4	0.80, A
			Cs-134	98.5±5.3 106.0±5.5 112.0±5.4 Mean = 105.5±3.1	116±2	0.91, A
			Cs-137	218.0±6.1 223.0±6.7 224.0±6.7 Mean = 221.7±3.8	232±4	0.96, A
			Mn-54	154.0±5.9 153.0±6.5 153.0±6.6 Mean = 153.3±3.7	149±2	1.03, A
			Fe-59	58.9±8.6 57.3±8.6 70.0±9.2 Mean = 62.1±5.1	62±1	1.00, A
			Zn-65	180.0±11.3 208.0±12.1 188.0±12.9 Mean = 192.0±7.0	185±3	1.04, A

(1) Results reported as activity ± 1 sigma.
(2) 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 NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (1)	RATIO (2)
09/20/01	E-2813-05 (Cont)	FILTER pCi/filter	Co-60	186.0±4.9 186.0±5.5 182.0±5.5 Mean = 184.7±3.1	194±3	0.95, A
			Co-58	117.0±6.8 133.0±7.1 123.0±7.2 Mean = 124.3±4.1	129±2	0.96, A

(1) Results reported as activity ± 1 sigma.
(2) 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 NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (1)	RATIO (2)
06/14/01	E-2676-05	MILK pCi/liter	Ce-141	166.0±10.9 152.0±13.1 172.0±11.1 Mean = 163.3±6.4	163±3	1.00, A
			Cr-51	217.0±51.1 152.0±62.1 168.0±42.8 Mean =179.0±27.3	224±4	0.80, A
			Cs-134	122.0±7.7 123.0±8.1 124.0±7.2 Mean = 123.0±4.4	134±2	0.92, A
			Cs-137	115.0±7.9 127.0±8.7 131.0±7.0 Mean = 124.3±4.3	121±2	1.02, A
			Mn-54	164.0±9.7 151.0±9.9 151.0±8.1 Mean = 155.3±5.2	150±3	1.03, A
			Fe-59	110.0±13.8 95.5±15.9 86.4±11.7 Mean = 97.3±7.4	88±1	1.10, A
			Zn-65	187.0±17.5 168.0±18.9 193.0±14.9 Mean = 182.7±9.3	182±3	1.01, A
			Co-60	148.0±7.0 132.0±7.1 144.0±6.0 Mean = 141.3±3.8	135±2	1.04, A
			Co-58	94.0±8.0 96.5±8.4 98.0±6.6 Mean = 96.2±4.3	96±2	1.00, A

(1) Results reported as activity ± 1 sigma.
(2) 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 NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (1)	RATIO (2)
09/20/01	E-2814-05	MILK pCi/liter	Ce-141	116.0±9.1 118.0±8.1 111.0±9.1 Mean = 115.0±5.1	121±2	0.95, A
			Cr-51	360.0±44.1 350.0±40.6 333.0±45.1 Mean =347.7±25.0	366±6	0.95, A
			Cs-134	157.0±6.7 152.0±5.4 147.0±6.2 Mean = 152.0±3.5	160±3	0.95, A
			Cs-137	301.0±8.0 317.0±7.4 303.0±8.1 Mean = 307.0±4.5	319±5	0.96, A
			Mn-54	209.0±7.2 208.0±6.5 217.0±7.4 Mean = 211.3±4.0	205±3	1.03, A
			Fe-59	81.8±7.2 93.6±6.8 94.6±7.4 Mean = 90.0±4.1	86±1	1.05, A
			Zn-65	265.0±13.5 256.0±12.2 262.0±13.2 Mean = 261.0±7.5	254±4	1.03, A
			Co-60	268.0±6.3 263.0±5.6 261.0±6.2 Mean = 264.0±3.5	266±4	0.99, A
			Co-58	178.0±7.1 173.0±6.1 189.0±7.1 Mean = 180.0±3.9	177±3	1.02, A

(1) Results reported as activity ± 1 sigma.
(2) 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 NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (1)	RATIO (2)
06/14/01	E-2677-05	SOIL pCi/gram	Ce-141	0.371±0.037 0.340±0.038 0.371±0.041 Mean =0.361±0.021	0.330±0.006	1.09, A
			Cr-51	0.415±0.178 0.771±0.205 0.693±0.220 Mean =0.626±0.116	0.455±0.008	1.38, D NC 01-08
			Cs-134	0.276±0.031 0.254±0.028 0.252±0.034 Mean =0.261±0.017	0.272±0.005	0.96, A
			Cs-137	0.330±0.029 0.338±0.027 0.383±0.033 Mean =0.350±0.016	0.373±0.006	0.94, A
			Mn-54	0.366±0.031 0.347±0.027 0.375±0.032 Mean =0.363±0.017	0.305±0.005	1.19, A
			Fe-59	0.229±0.047 0.105±0.041 0.178±0.052 Mean =0.171±0.026	0.178±0.003	0.96, A
			Zn-65	0.363±0.068 0.285±0.055 0.162±0.066 Mean =0.270±0.032	0.368±0.018	0.73, D NC 01-09
			Co-60	0.273±0.022 0.289±0.020 0.310±0.023 Mean =0.291±0.012	0.274±0.005	1.06, A
			Co-58	0.173±0.026 0.179±0.025 0.220±0.029 Mean =0.191±0.015	0.196±0.003	0.97, A

(1) Results reported as activity ± 1 sigma.

(2) Ratio = Reported/Analytics (See Section 8.3).

(*) Sample provided by Analytics, Inc.

(A) Evaluation Results, Acceptable.

(D) Evaluation Results, Disagreement.

(NC) Nonconformity report number.

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

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (1)	RATIO (2)
6/14/01	E-2679-05	VEGETATION pCi/gram	Ce-141	0.274±0.022 0.304±0.023 0.288±0.022 Mean =0.289±0.014	0.271±0.005	1.07,A
			Cr-51	0.283±0.119 0.344±0.123 0.327±0.104 Mean =0.318±0.073	0.373±0.006	0.85,A
			Cs-134	0.176±0.021 0.241±0.020 0.264±0.017 Mean =0.227±0.012	0.224±0.004	1.01,A
			Cs-137	0.202±0.020 0.197±0.019 0.225±0.017 Mean =0.208±0.011	0.202±0.003	1.03,A
			Mn-54	0.276±0.021 0.269±0.022 0.266±0.019 Mean =0.270±0.013	0.250±0.004	1.08,A
			Fe-59	0.174±0.037 0.153±0.038 0.180±0.030 Mean =0.169±0.021	0.146±0.003	1.16,A
			Zn-65	0.305±0.040 0.219±0.042 0.327±0.035 Mean =0.284±0.024	0.302±0.005	0.94,A
			Co-60	0.231±0.016 0.262±0.017 0.244±0.013 Mean =0.246±0.009	0.225±0.004	1.09,A
			Co-58	0.184±0.019 0.177±0.019 0.157±0.016 Mean =0.173±0.011	0.160±0.003	1.08,A

(1) Results reported as activity ± 1 sigma.
(2) 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	JAE ENV ID NUMBER	MEDIUM	ANALYSIS	JAE RESULT (1)	REFERENCE LABORATORY* (1)	RATIO (2)
03/01/01	QAP-54	WATER Bq/liter	Cs-137	69.2±2.6 76.2±3.1 69.2±2.2 Mean = 71.5±1.5	73±3.7	0.98, A
			Co-60	98.4±2.5 105.5±3.0 103.6±2.1 Mean = 102.5±1.5	98.2±3.6	1.04, A
09/01/01	QAP-55	WATER Bq/liter	Cs-137	49.6±2.1 43.3±2.4 46.3±2.5 Mean = 46.4±1.3	45.1±2.5	1.03, A
			Co-60	219.4±3.1 211.6±3.7 205.4±3.9 Mean = 212.1±2.1	209.0±7.6	1.01, A

(1) Results reported as activity ± 1 sigma.
(2) 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 Air Particulate Filters (Bq/filter)

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (1)	RATIO (2)
03/01/01	QAP-54	FILTER Bq/filter	Cs-134	2.2±0.3 2.3±0.4 2.6±0.2 Mean = 2.4±0.2	2.83±0.16	0.85, A
			Co-60	17.9±0.3 18.1±0.3 18.8±0.3 Mean = 18.3±0.2	19.44±0.5	0.94, A
			Mn-54	6.5±0.3 6.4±0.3 7.0±0.3 Mean = 6.7±0.2	6.52±0.28	1.03, A
			Cs-137	8.8±0.3 8.0±0.3 8.5±0.3 Mean = 8.4±0.2	8.76±0.34	0.96, A
09/01/01	QAP-55	FILTER Bq/filter	Mn-54	82.5±0.8 84.7±0.8 86.2±0.8 Mean = 84.5±0.5	81.15±4.76	1.04, A
			Co-60	16.6±0.3 16.4±0.3 16.7±0.3 Mean = 16.6±0.2	17.5±0.47	0.95, A
			Cs-134	13.2±0.4 13.2±0.4 13.3±0.4 Mean = 13.3±0.2	12.95±0.36	1.03, A
			Cs-137	16.5±0.4 16.0±0.3 17.4±0.4 Mean = 16.6±0.2	17.1±0.58	0.97, A

(1) Results reported as activity ± 1 sigma.
(2) 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 Water (Bq/liter)

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (1)	RATIO (2)
03/01/01	QAP-54	WATER Bq/liter	GROSS BETA	1.28±0.03 1.14±0.03 1.24±0.03 Mean = 1.22±0.02	1297±100	0.00, N
				1284±300 1140±300 1236±300 Mean = 1220±200	(Note 1)	0.94, A
09/01/01	QAP-55	WATER Bq/liter	GROSS BETA	7189±32.62 7091±32.40 7327±32.92 Mean =7202±18.85	7970±800	0.90, A

(1) Results reported as activity ± 1 sigma.
(2) Ratio = Reported/EML (See Section 8.3).
(*) Sample provided by Environmental Measurements Lab., Dept. of Energy.
(A) Evaluation Results, Acceptable.
(N) Evaluation Results, Not Acceptable.

Note 1: The results for this sample were incorrectly reported in units of Bq/ml. This resulted in a non-conformity, which was corrected by reporting the results in the required units of Bq/liter.

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

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (1)	RATIO (2)
03/01/01	QAP-54	WATER Bq/liter	H-3	87.0±6.1 88.6±3.8(B) 88.9±6.1 Mean = 88.2±3.1	79.3±2.0	1.11, A
09/01/01	QAP-55	WATER Bq/liter	H-3	231.3±3.6 237.3±3.6(C) 234.5±3.6 Mean = 234.4±2.1	207±2.69	1.13, A

(1) Results reported as activity ± 1 sigma.
(2) Ratio = Reported/EML (See Section 8.3).
(*) Sample provided by Environmental Measurements Lab., Dept. of Energy.
(A) Evaluation Results, Acceptable.
(B) Analysis performed by vendor laboratory: Environmental Inc. Midwest Laboratory
(C) Analysis performed by vendor laboratory: Duke Engineering and Services, Environmental Laboratory, Marlborough MA.

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

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (1)	RATIO (2)
03/01/01	QAP-54	AIR Bq/filter	GROSS BETA	2.69±0.08 2.57±0.08 2.67±0.08 Mean = 2.64±0.05	2.58±0.15	1.02, A
09/01/01	QAP-55	AIR Bq/filter	GROSS BETA	11.52±0.10 11.48±0.10 11.48±0.10 Mean =11.49±0.06	12.77±1.28	0.90, A

(1) Results reported as activity ± 1 sigma.
(2) 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 613, June 2001.

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