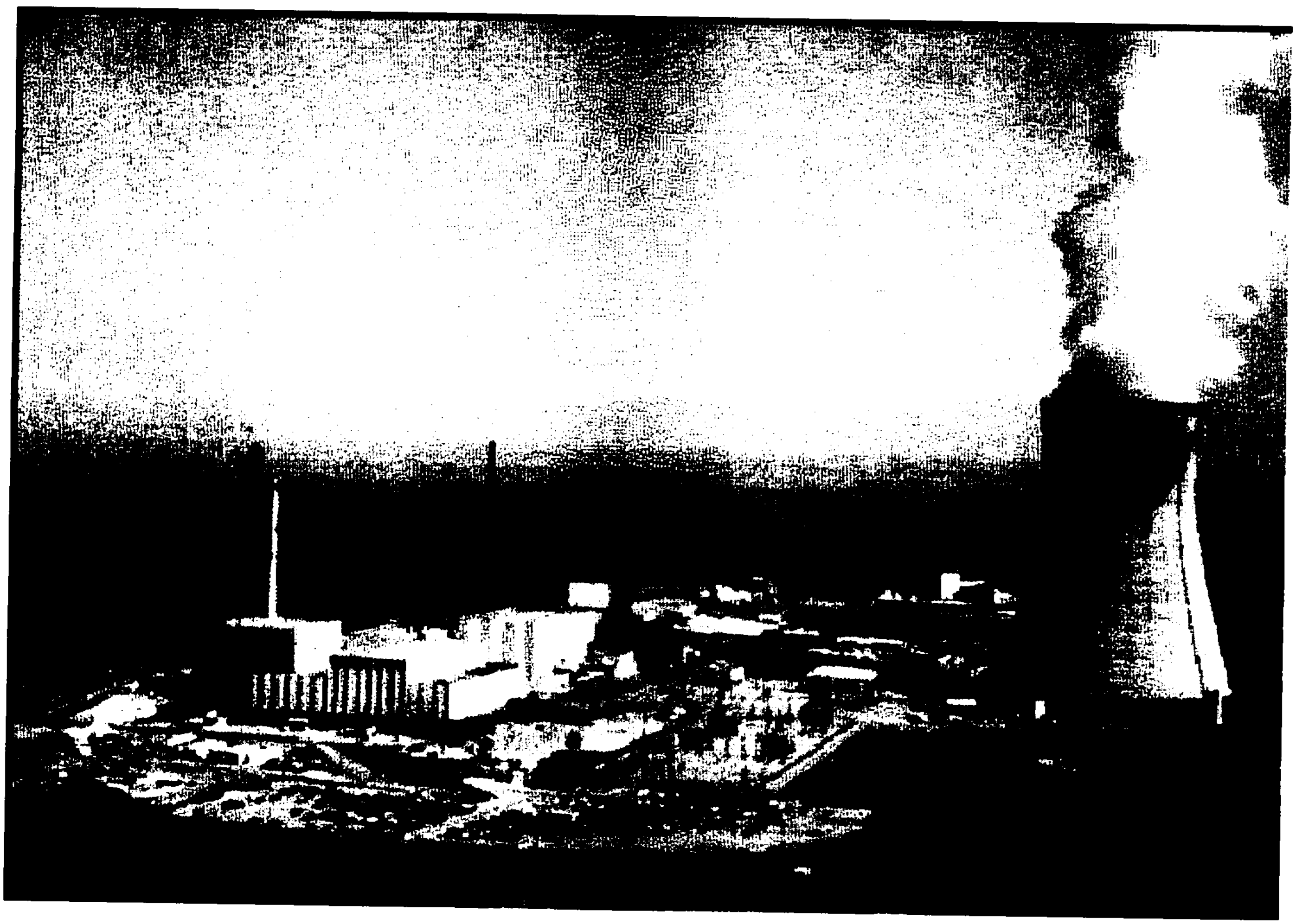
# NIAGARA MOHAWK POWER CORPORATION

# 2000 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT



## NINE MILE POINT NUCLEAR STATION

Niagara Mohawk

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April 30, 2001
NMP1L 1591

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

| RE: | Nine Mile Point Unit 1<br>Docket No. 50-220<br>DPR-63 | Nine Mile Point Unit 2<br>Docket No. 50-410<br>NPF-69 |
|---|---|---|

***Subject:*** ***Transmittal of 2000 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, 2000 through December 31, 2000.

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,

Richard B Abbott

Richard B. Abbott
Vice President Nuclear Engineering

RBA/CLW/cld
Enclosure

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NIAGARA MOHAWK POWER CORPORATION

# ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

January 1, 2000 – December 31, 2000

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 2000.

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). Implementation of the ITS at Nine Mile Point Unit 2 resulted in a relocation of REMP requirements only. Nine Mile Point Unit 1 REMP requirements continue to reside within the Unit 1 Technical Specifications. Through-out this report references will be made to TS/ODCM. This refers to the Unit 1 Technical Specifications REMP requirements, Unit 2 Technical Specifications REMP requirements pre-ITS implementation, and Unit 2 Offsite Dose Calculation Manual REMP requirements post ITS implementation.

This report describes the REMP program 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 TS/ODCM.

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 some sample media, very small concentrations of Cs-137, which are the result of past atmospheric nuclear testing. The 2000 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. One air particulate filter composite sample contained a measurable concentration of Co-60 at a site boundary sampling location. The presence of Co-60 in the sample composite is primarily the result of plant effluents from the Nine Mile Point Unit 1 facility during a Reactor Water Cleanup Filter transfer evolution. Co-60 was not measured in any other location or sample media. The calculated potential dose to man from this pathway was insignificant. Analysis of all terrestrial radiation pathways demonstrated that there has been no detectable increased radiation levels as a result of plant operation. Again, the 2000 results are consistent with the previous five year historical results and exhibit no adverse trends.

In summary, the analytical results from the 2000 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 implemented at the plant during 2000 or from the processing and storage of radioactive waste at the site. The measured concentrations of radionuclides in the off-site environment surrounding the Nine Mile Point Nuclear Stations (NMPNS) are not increasing as a result of plant operation. The 2000 report continues to document a downward trend or stabilization in the concentration of radionuclides in the environment created from past weapons testing. 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.

# SECTION 2.0

# INTRODUCTION

## 2.0 INTRODUCTION

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 2000.

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). Implementation of the ITS at Nine Mile Point Unit 2 resulted in a relocation of REMP requirements only. 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, Unit 2 Technical Specifications REMP requirements pre-ITS implementation, 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 have 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, quarterly 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:<br>1) Three samples from off-site locations in different sectors of the highest calculated site average D/Q (based on all site licensed reactors)<br>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)<br>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.<br><br>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<br>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)<br>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]<br>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)<br>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:<br><br>An inner ring of stations, one in each meteorological sector in the general area of the Site Boundary<br><br>An outer ring of stations, one in each land base meteorological sector in the 4 to 5-mile(1) range from the site<br><br>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:<br><br>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)<br><br>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)<br><br>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<br>I-131 analysis weekly<br><br>Particulate Sampler<br>Gross beta radioactivity analysis following filter change[d] and gamma isotopic analysis[e] of composite (by location) at least quarterly |
| Waterborne<br>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]<br><br>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.

NOTES FOR TABLE 3.0-2 (Continued)

(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 removes water from Lake Ontario on a continuous basis and generally represents a "down-current" sampling point from the Nine Mile Point Unit 1 and Unit 2 facilities. 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 (See Figure 3.3-4).

Samples from the JAFNPP facility are composited from automatic sampling equipment which discharges into a compositing tank. Samples are obtained from the tank monthly and analyzed for gamma emitters. Samples from the Oswego Steam Station are also composited from automatic sampling equipment which discharges to a compositing tank. Samples from this location are obtained weekly and are composited to form monthly composite samples. 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 for each calendar quarter. Quarterly composite samples are analyzed for tritium.

In addition to the JAFNPP and Oswego Steam Station facilities, data is presented for the Nine Mile Point Unit 1 and Unit 2 facility inlet canals and water from the City of Oswego. The latter three locations are not required by the TS/ODCM, but are optional samples. 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 2000. There was no Groundwater Source in 2000 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 2000.

### 3.1.2 AIR PARTICULATE / IODINE

The air sampling stations required by TS/ODCM are located in the general area of the site boundary (within 0.7 miles) in sectors of highest calculated 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 having the highest calculated deposition factor (D/Q) based on historical meteorological data. This station (R-4) is located in the southeast sector. A fifth station (R-5) required by TS/ODCM is located at a site 16.4 miles from the site in a northeast direction. This location is considered a control location.

In addition to the TS/ODCM required locations, there are six sampling stations located within the site boundary (D1, G, H, I, J, and K). These locations generally surround the area occupied by the three generating facilities, but are well within the site boundary. One other air sampling station (G) is located off-site in the southwest sector and is in the vicinity of the City of Oswego. Three remaining air sampling stations (D2, E and F) are located in the east-southeast, south-southeast and south sectors and range in distance from 7.2 to 9.0 miles.

At each station, airborne particulates are collected 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 2000 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 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 in 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

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, for a minimum of two species per location.

b. When two independent species are not available at all sample locations, a species may be divided into two samples for each location. This procedure may be accomplished provided that a sufficient sample size is available for the species in question at all three locations.

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 east-northeast of the site at distances of 12.6 to 19.8 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. Tritium and surface water I-131 analyses were performed by Teledyne Brown Engineering Environmental Services. The following samples are analyzed by 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

Quality assurance samples are analyzed in-house and by Teledyne Brown Engineering N.J. and Teledyne Brown Engineering Midwest.

## 3.3 SAMPLE LOCATION MAPS

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

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

- Sample Medium
- Location designation, (this column contains the key for the sample location and is consistent with the designation on the sample location maps and on the sample results data tables).
- Location description
- Degrees and distance of the sample location from the site.

### 3.3.1 LIST OF FIGURES

## TABLE 3.3-1

## 2000 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)

2000 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)

## 2000 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 |

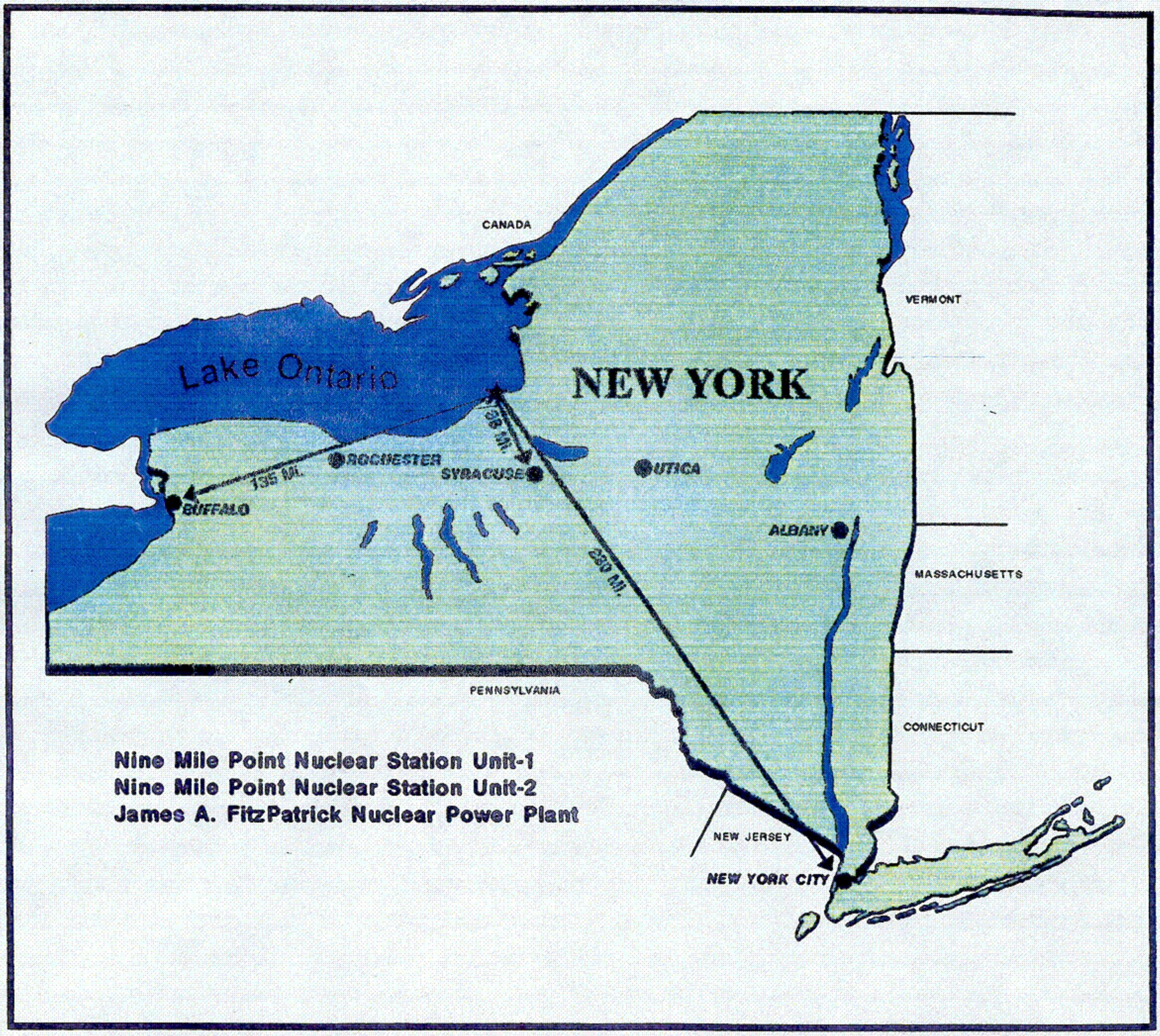
## TABLE 3.3-1 (Continued)

## 2000 ENVIRONMENTAL SAMPLE LOCATIONS

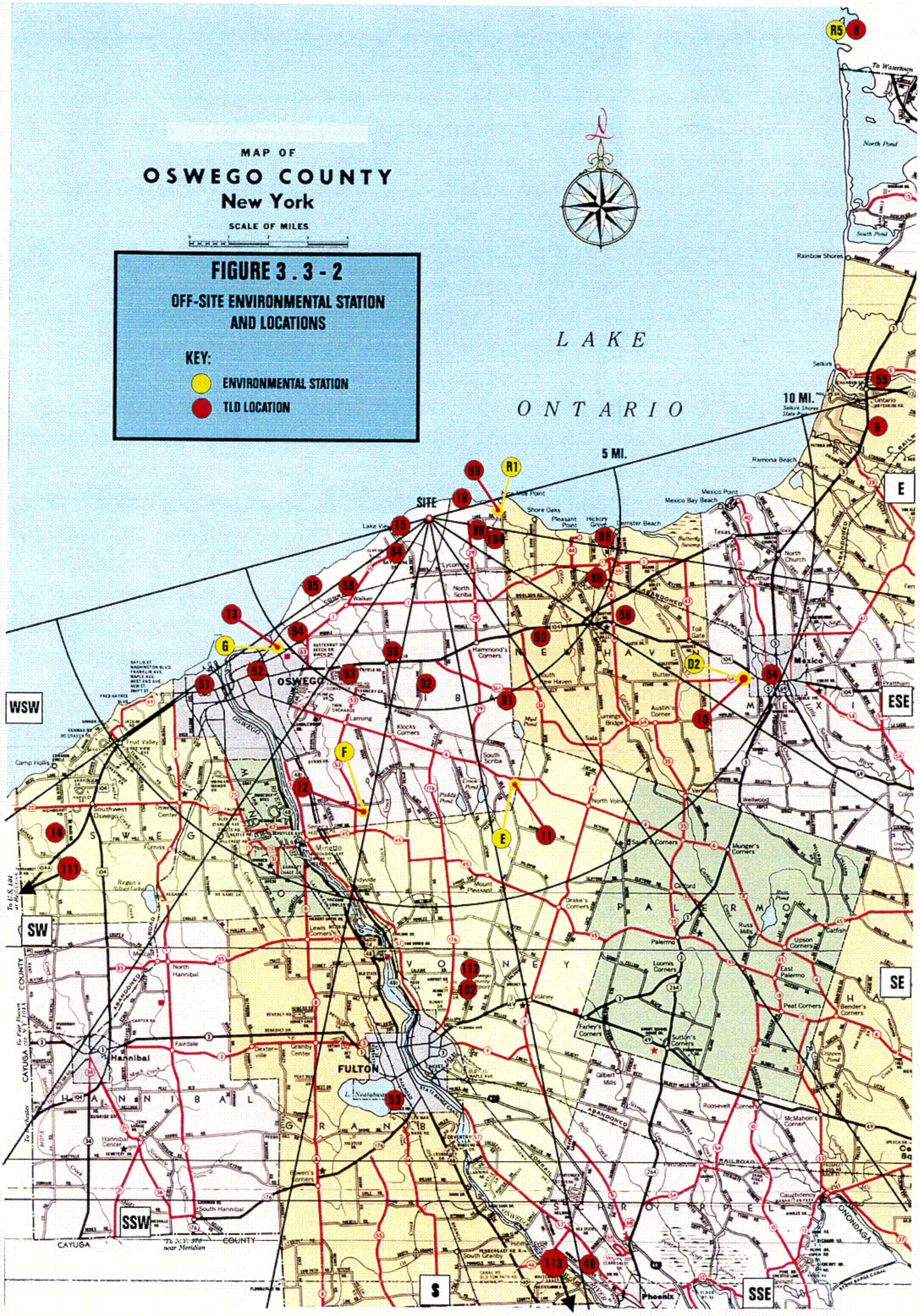
| SAMPLE MEDIUM | MAP DESIGNATION | FIGURE NUMBER | LOCATION DESCRIPTION | DEGREES & DISTANCE (1) |
|---|---|---|---|---|
| Thermoluminescent Dosimeters (TLD) (Continued) | 105 | Figure 3.3-3 | Lakeview Road | 198° at 1.4 miles |
| | 106 | Figure 3.3-3 | Shoreline Cove, West of NMP-1 | 274° at 0.3 miles |
| | 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 | 7 | Figure 3.3-4 | Indicator Location | 107° at 5.5 miles |
| | 50 | Figure 3.3-4 | Indicator Location | 93° at 9.1 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 |
| Food Products | | | | |
| | V* | Figure 3.3-5 | Indicator Location | 98° at 1.9 miles |
| | Z* | Figure 3.3-5 | Indicator Location | 100° at 1.9 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 |
| | R* | 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




C-1


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
SITE
5 MI.
10 MI.
E
ESE
SE
SSE
S
SSW
SW
WSW
R1
R5
G
F
E
D2
OSWEGO
FULTON
Mexico
Hannibal
Phoenix
CAYUGA COUNTY
ONONDAGA

C-2

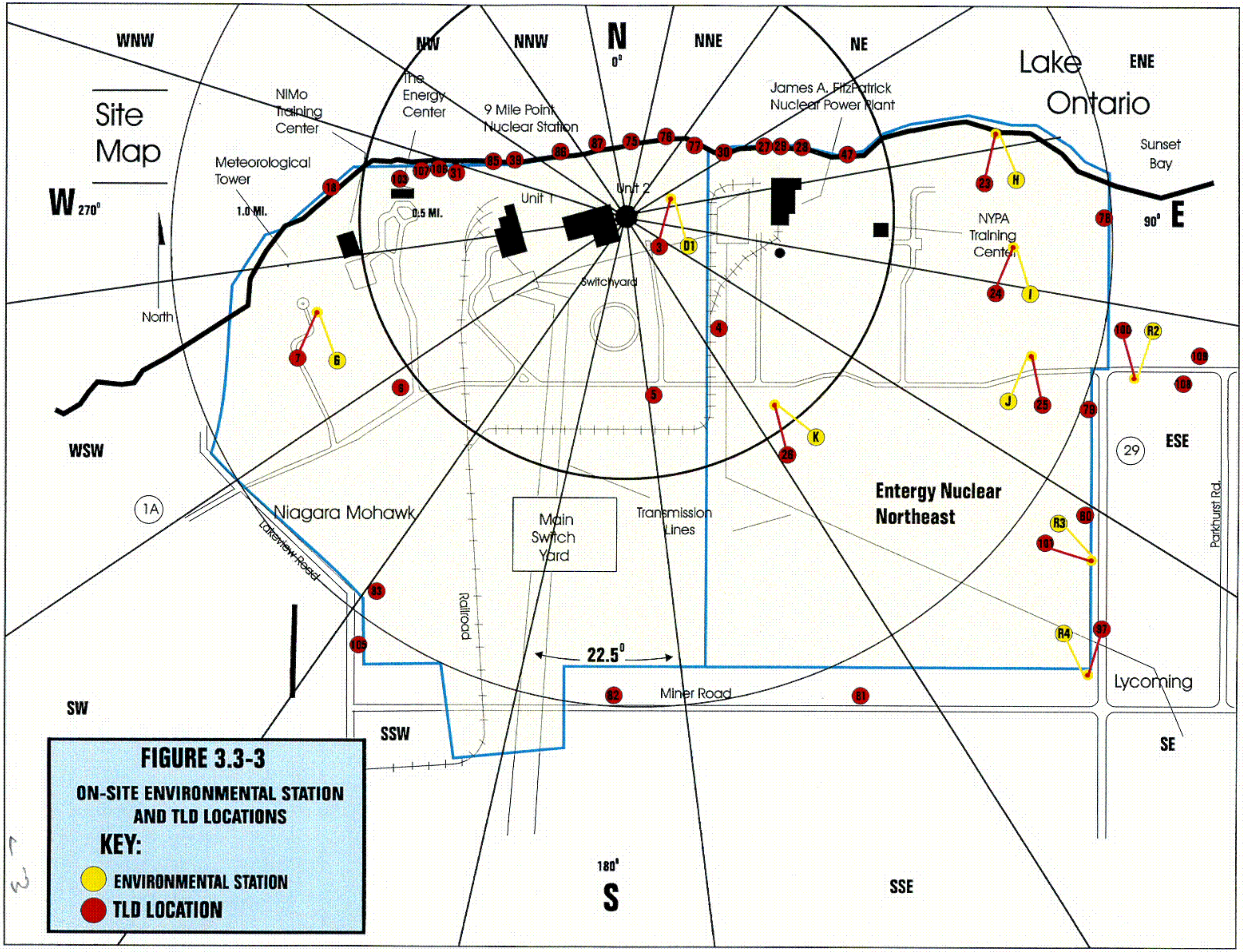
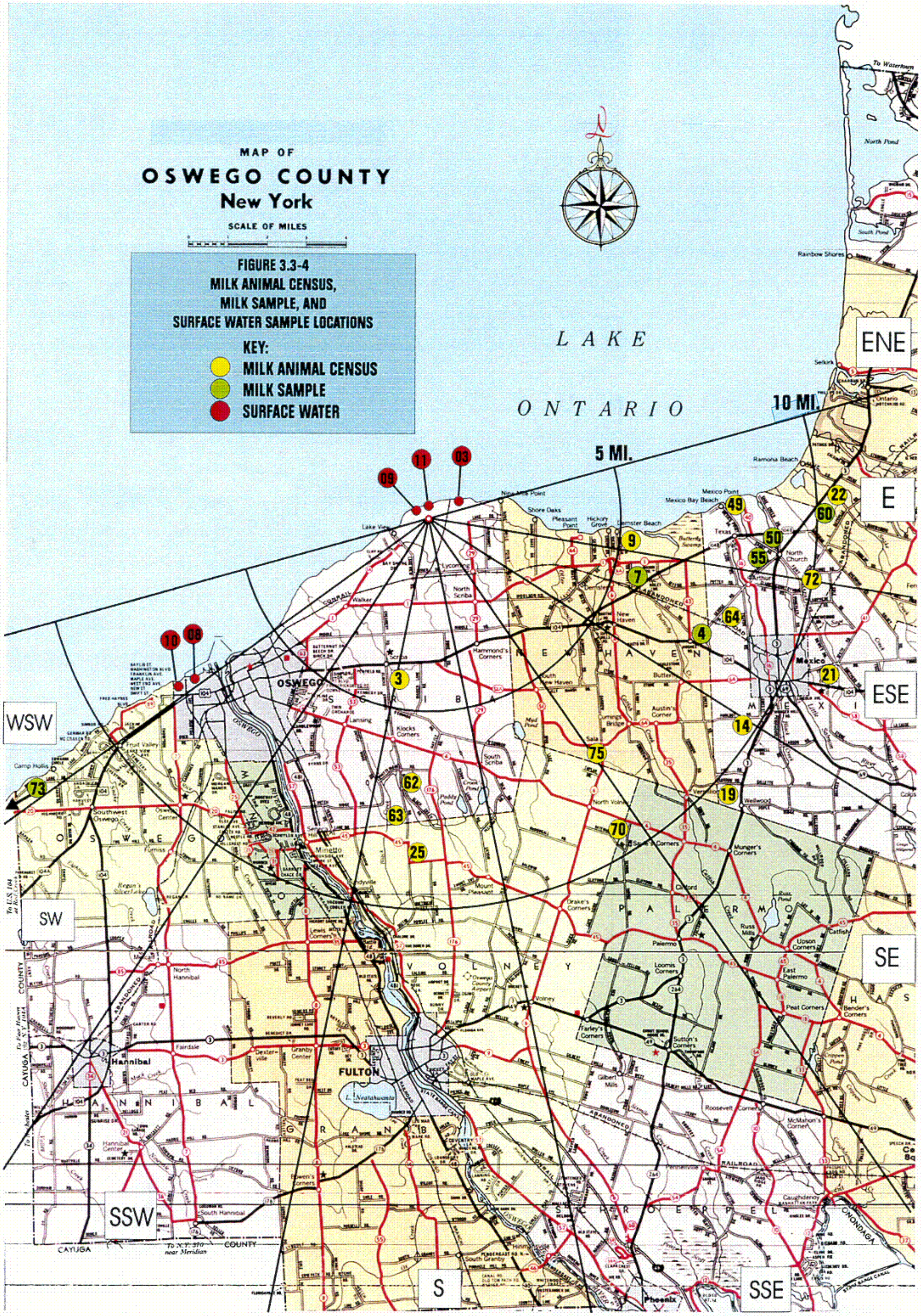



**FIGURE 3.3-3**

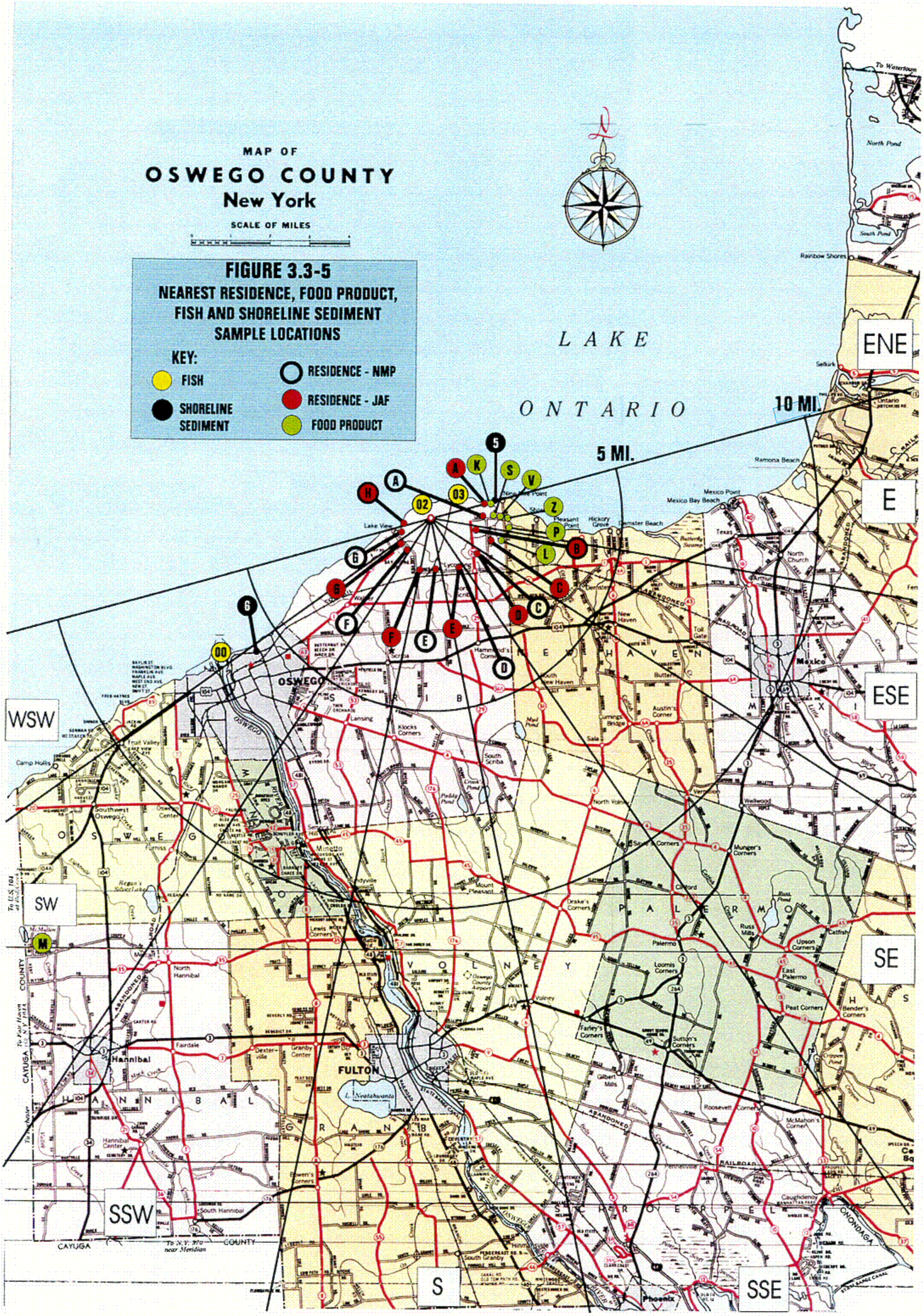
**ON-SITE ENVIRONMENTAL STATION AND TLD LOCATIONS**

**KEY:**

- ENVIRONMENTAL STATION
- TLD LOCATION


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 ANIMAL CENSUS
MILK SAMPLE
SURFACE WATER
LAKE
ONTARIO
5 MI.
10 MI.
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
OSWEGO
FULTON
Mexico
Hannibal
Phoenix
09
11
03
10
08
3
4
7
9
14
19
21
22
25
49
50
55
60
62
63
64
70
72
73
75

C-4


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
SHORELINE SEDIMENT
RESIDENCE - NMP
RESIDENCE - JAF
FOOD PRODUCT
LAKE
ONTARIO
10 MI.
5 MI.
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
OSWEGO
FULTON
NEW HAVEN
SCRIBA
MEXICO
PALERMO
VOLNEY
HANNIBAL
GRANBY
SCHROEPPEL
CAYUGA
COUNTY
ONONDAGA

C-5

## 3.4 LAND USE CENSUS

The TS/ODCM require that a milch animal census and a residence census be conducted annually.

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 2000 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 2000:

- Garden vegetation/food products were collected from locations P and Z for the 2000 sampling program. These locations were sampled in the previous years and were utilized in 2000 due to the availability of samples at harvest time. (NMPNS Unit 1 and Unit 2 ODCM Table 5-1 Location No. 50 and 61).

## 3.6. DEVIATION AND EXCEPTIONS TO THE PROGRAM

Exceptions to the 2000 sample program concern those samples or monitoring requirements which are required by the Technical Specifications. This section addresses the reporting requirements of Section 6.9.1.d of the Nine Mile Point Unit 1 Technical Specifications and Section 5.6.2 of the Nine Mile Point Unit 2 Technical Specifications.

A. The following are deviations from the program specified by the Technical Specifications.

1. The air sampling pump at the R-3 off-site Environmental Sampling Station was inoperable for approximately 39 hours. The pump was inoperable due to an electrical breaker trip at the sampling station. The breaker was reset and the sample pump demonstrated normal operation. Subsequent breaker trips were not experienced. The air sample pump was out of service for a 39 hour period between 01/09/00 (20:00 hrs) and 01/11/00 (11:00 hrs). No corrective action was implemented.

2. The air sampling pumps at the R-1, R-2 and R-5 Environmental Sampling Stations were inoperable for approximately 11 hours on December 18, 2000 (0230 hrs. to 1330 hrs.). The inoperability of the sampling pumps was caused by a power outage which was the result of a severe wind storm No corrective action was implemented.

3. No other sample station inoperability was experienced during 2000 for any of the Technical Specification required air monitoring stations. Inoperability occurrences for the optional air sampling locations were experienced and documented internally for the report period. These periods of inoperability were minimal and are not listed here as their operability is not required by Technical Specifications.

## B. AIR SAMPLING STATION OPERABILITY ASSESSMENT

The Technical Specification required air sampling program consist of 5 individual sampling locations. The collective operable time period for the 5 air monitoring stations was 43,848 hours out of a possible 43,920. The air sampling availability factor for the report period was 99.84%

## 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,

$\overline{X}$ = 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

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

Where,

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

B. Error of the Mean (Reference 18)

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

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 ($\sigma$)

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);

$\lambda$ = the radioactive decay constant for the particular radionuclide;

$\Delta t$ = 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 as specified by the NRC. 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 4.12.1-1 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 3.6.20/3.12.1.a 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 2000, required by the TS/ODCM, achieved the Lower Limit of Detection (LLD) specified by TS/ODCM tables 4.6.20-1 / 4.12.1-1.

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 2000*

| 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* (pCi/kg-dry) | GSA(4): | | | | | |
| | Cs-134 | 150 | <LLD | <LLD | <LLD | 0 |
| | Cs-137 | 180 | 68 (2/2)<br>60-76 | Sunset Bay: 68 (2/2)<br>1.5 at 80° 60-76 | <LLD | 0 |
| Fish* (pCi/kg-wet) | GSA(21): (h) | | | | | |
| | Mn-54 | 130 | <LLD | <LLD | <LLD | 0 |
| | Fe-59 | 260 | <LLD | <LLD | <LLD | 0 |
| | Co-58 | 130 | <LLD | <LLD | <LLD | 0 |
| | Co-60 | 130 | <LLD | <LLD | <LLD | 0 |
| | Zn-65 | 260 | <LLD | <LLD | <LLD | 0 |
| | Cs-134 | 130 | <LLD | <LLD | <LLD | 0 |
| | Cs-137 | 150 | <LLD | <LLD | 21 (1/7)<br>21-21 | 0 |
| Surface Water* (pCi/liter) | H-3 (8): | | | | | |
| | H-3 | 3000(c) | 185(3/4)<br>161-198 | Fitz Inlet 185 (3/4)<br>0.5 at 70° 161-198 | 212 (3/4)<br>196-237 | 0 |
| | GSA (24): | | | | | |
| | Mn-54 | 15 | <LLD | <LLD | <LLD | 0 |
| | Fe-59 | 30 | <LLD | <LLD | <LLD | 0 |
| | Co-58 | 15 | <LLD | <LLD | <LLD | 0 |
| | Co-60 | 15 | <LLD | <LLD | <LLD | 0 |
| | Zn-65 | 30 | <LLD | <LLD | <LLD | 0 |
| | Zr-95 | 15 | <LLD | <LLD | <LLD | 0 |
| | Nb-95 | 15 | <LLD | <LLD | <LLD | 0 |
| | I-131 | 15(c) | <LLD | <LLD | <LLD | 0 |
| | Cs-134 | 15 | <LLD | <LLD | <LLD | 0 |
| | Cs-137 | 18 | <LLD | <LLD | <LLD | 0 |
| | Ba/La-140 | 15 | <LLD | <LLD | <LLD | 0 |

## TABLE 4.0-1 (Continued)

## RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY
## 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 2000*

| 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) | 5.2(120/120)<br>3.4-10.0 | TLD #85 (g)<br>0.2 at 294° | 9.0(4/4)<br>8.2-10.0 | 4.31 (8/8)<br>3.7-5.5 | 0 |
| Air Particulates* pCi/m³ | Gross Beta(260): | 0.01 | 0.015(207/207)<br>0.005-0.033 | R-2<br>1.1 at 104°<br><LLD | 0.015(207/207)<br>0.007-0.033 | 0.015(52/52)<br>0.006-0.027 | 0 |
| | I-131(260): | 0.07 | <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(90): (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 2000*

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 2000. |
| (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. |

# SECTION 5.0

# DATA EVALUATION AND DISCUSSION

# 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 2000 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.

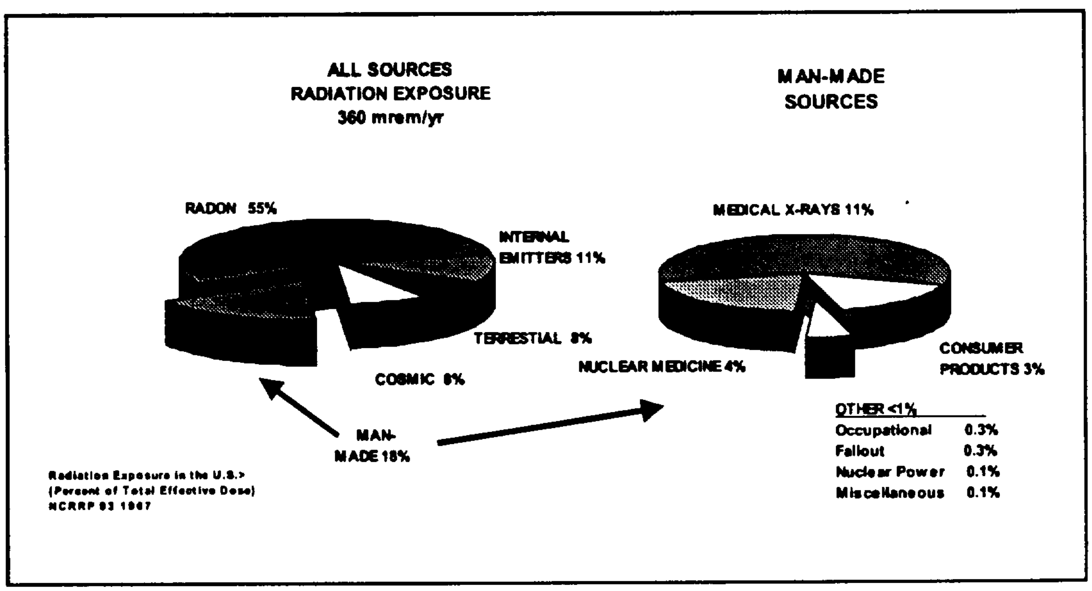
## C. Dose/Dose to Man

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 2000 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 form 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, Results and 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 (REMP) results.

The second group of radionuclides that were detected are a result of the detonation of thermonuclear devices in the earth's atmosphere. Atmospheric nuclear testing during the early 1950s produced a measurable inventory of radionuclides presently found in the lower atmosphere as well as in ecological systems. In 1963 an Atmospheric Test Ban Treaty was signed. Since the treaty, the global inventory of man made radioactivity in the environment has been greatly reduced through the decay of short lived radionuclides and the removal of radionuclides from the food chain by such natural processes as weathering and sedimentation. This process is referred to in this report as ecological cycling. Since 1963, several atmospheric weapons tests have been conducted by the People's Republic of China. In each case, the usual radionuclides associated with nuclear detonations were detected for several months following the test and then after a peak detection period, diminished to a point where most could not be detected. Although reduced in frequency, atmospheric testing continued in to 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 2000, 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 2000, 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 2000.

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 2000 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 2000 sampling period.

### 5.1.1 SHORELINE SEDIMENT RESULTS

#### A. Results Summary

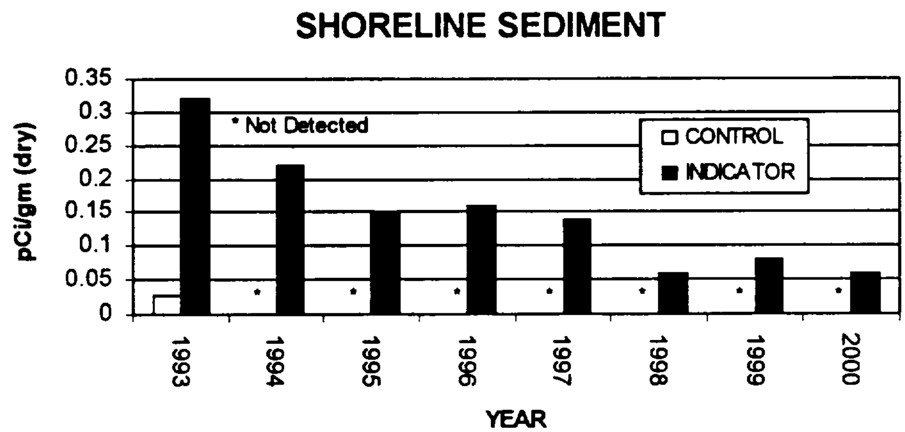
Shoreline sediment samples were obtained in April and October of 2000 at one off-site control location (near Oswego Harbor) and at one indicator location which is an area east of the site considered to have recreational value.

A total of four sediment samples were collected for the 2000 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 ranged from a minimum of 0.060 pCi/g (dry) to a maximum of 0.076 pCi/g (dry). Cs-137 was not detected at the control location during 2000, however, it has been detected intermittently in the past specifically 1979, 1980, 1982 and 1993.

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 2000 indicator samples is 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 in 1993 to a minimum value of 0.07 in 1998 and 2000. The results for the 2000 control location were less than the detection limit. No other plant related radionuclides were detected in the 2000 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 seven years. This graph illustrates a general downward trend in the Cs-137 concentrations since 1993.




**B. Data Evaluation and Discussion**

Shoreline sediment samples are routinely collected twice per year from the shoreline of Lake Ontario. Samples are collected from one indicator location (Sunset Beach), and one control location (Lang's Beach). The first sample collection was made in April 2000 at both the indicator and control locations. The second shoreline sample collection was made in October 2000, again at both the indicator and the control location. The results of these sample collections are presented in Section 6.0, Tables 6-1A and 6-1B. 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 2000 program. The measured concentrations for these samples were 0.060 pCi/g (dry) and 0.076 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 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 1993 sediment control sample. Cs-137 has been 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 2000 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/m2 (dry) to a depth of 2.5 cm.
- The shoreline width factor is 0.3
- The maximum measured concentration of 0.076 pCi/g (dry) remains constant for the year.

Using these conservative parameters the potential dose to the maximum exposed individual (teenager) would be 0.00034 mrem/year to the whole body and 0.00039 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 2000 was 0.068 pCi/g (dry), which is 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 (1990-1999) ranged from a maximum value of 0.28 pCi/gm in

1990 to a minimum of 0.07 pCi/gm in 1998 and 2000. The mean results for the previous five year period ranged from a maximum of 0.16 pCi/gm in 1995 to a minimum of 0.07 pCi/gm in 1998 and 2000.

The presence of Cs-137 in the 1993 control sample was the first positive measurement at the control location since sediment sampling was implemented in 1985. Cs-137 was not detected in the control sample in the 2000 samples.

A review of indicator and control sample results for 1985 – 1988 indicate only naturally occurring radionuclides present in shoreline sediment. The period from 1989 – 2000 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 2000. 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 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 concentration of 0.07 pCi/g (dry) in 1998 and remaining low in 1999 and 2000.

Shoreline sediment sampling 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 21 fish samples were collected for the 2000 sample program. Analysis of the 2000 fish samples resulted in only 1 control sample showing a detectable concentration of Cs-137, a radionuclide related to past weapons testing. Cs-137 was not detected in fish samples collected at the indicator locations. No other plant related radionuclides were detected in the 2000 fish samples.

The 2000 mean results for the walleye control sample was 0.021 pCi/g (wet) which is consistent with the previous five year sample mean for both the indicator and control locations. The absence of Cs-137 in the indicator fish samples is significant in the fact that positive concentrations have been measured in samples collected in the previous 20 years at both the indicator and control locations. Small concentrations of Cs-137 detected in the single fish sample represents approximately 5% of the total fish samples collected from both the on-site and off-site locations. This percentage is lower than the previous year which had positive detections in 9% of the sample collected and down significantly from 1994 when 37% of the samples showed Cs-137 concentrations. No other radionuclides were detected in the 2000 fish samples.

Low levels of Cs-137 has routinely been detected in a small percentage of the fish samples collected each year. These low levels of Cs-137 represent no significant dose to man or impact on the environment. As noted above, the measured concentrations of Cs-137 in the fish samples are the result of fallout from past weapons testing. Comparable concentrations of Cs-137 are routinely found in samples of other aquatic media such as shoreline sediment, bottom sediment and aquatic vegetation. The potential whole body and critical organ doses calculated as a result of fish consumption by humans is extremely small. The dose that could result from the Cs-137 in fish can be considered background exposure because of the sources of the Cs-137.

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 2000 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 24 years.

## 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. Tables 6-2A and 6-2B shows individual results for all the samples in units of pCi/g(wet).

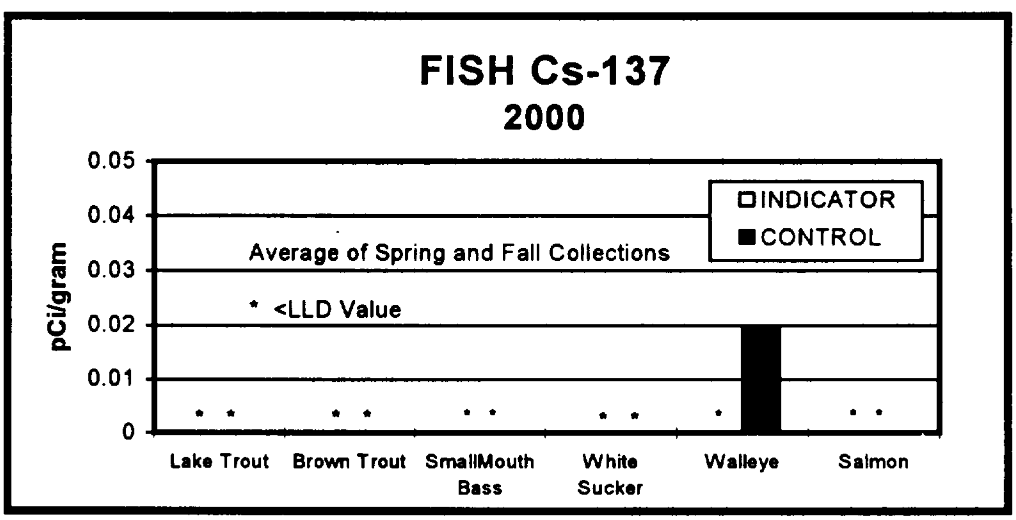
The spring fish collection was made up of twelve individual samples representing four individual species. Brown Trout, Lake Trout, Smallmouth Bass and Walleye were collected from all three sample locations.

The total fall fish collection was comprised of nine individual samples representing three individual species. Brown Trout, Smallmouth Bass, and Chinook Salmon samples were collected at the indicator sampling locations (NMPNS and JAFNPP) and the control location (Oswego Harbor).

Cs-137 was not detected in any of the indicator samples collected during the spring and fall. However, Cs-137 was detected in one of the four control samples collected in the spring at a concentration of 0.02 pCi/g (wet). Cs-137 was not detected in any of the control samples collected during the fall.

The 2000 single positive control sample was slightly higher than the 1998 control mean concentration of 0.013 pCi/gm (wet). Cs-137 was not detected in the 1999 control samples. The 2000 results are consistent with the previous 5 years in terms of mean concentration. The source of the Cs-137 in fish samples is considered to be from existing Cs-137 background concentration in the environment from the weapons testing and Chernobyl.

The following graph presents the measured Cs-137 concentrations for the fish species analyzed for 2000. The Walleye control sample yielded the only measurable Cs-137 concentration for the 2000 samples. Walleye samples from the indicator location showed no detectable Cs-137

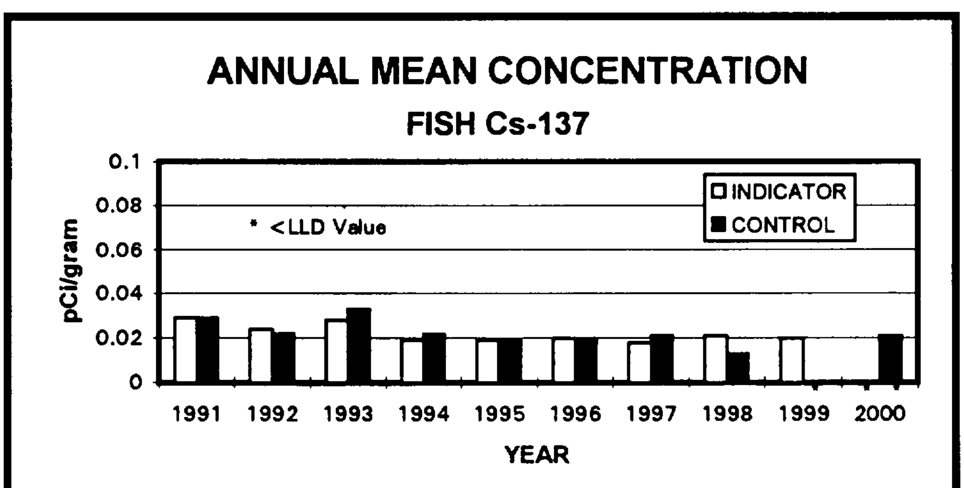


## C. Dose Evaluation

Some Lake Ontario fish species may be considered an important food source due to the local sport fishing industry. With indicator samples showing no detectable plant related radionuclides and Cs-137 only detected in the offsite control location the only dose resulting from fish consumption is considered from background dose. The dose to man from operation of the plants at Nine Mile Point via the fish pathway is of no significance.

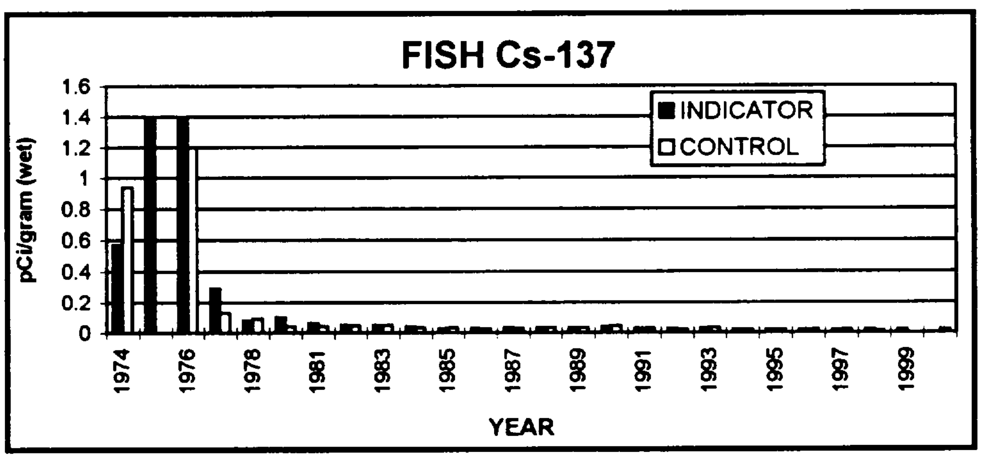
## D. Data Trends

Results for the previous five years (1995 through 1999) 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 1995 through 2000 results as a group are the lowest Cs-137 concentrations measured over the 25 year existence of the sampling program. The graph below illustrates the mean Cs-137 concentrations for 2000 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 less than detectable levels measured in 2000. Control sample C-137 results have also decreased from a maximum level of 1.2 pCi/g (wet) in 1976 to a low level of 0.02 pCi/g (wet) in 2000. The 2000 control concentration showed a very small increase over the 1998 results.

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.




Control sample results have decreased from a maximum level of 1.2 pCi/g (wet) in 1976 to levels that were not detectable in 1999 and 0.026 pCi/g (wet) in 2000.

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 2000 Sampling Program. The two naturally occurring radionuclides are K-40 and Ra-226 and are not related to operations of the plant. 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). 20 tritium samples were collected and analyzed in 2000, 13 samples showed a positive tritium concentration. The 2000 mean tritium concentration for the Oswego Steam Station inlet (control location) was 212 pCi/l based on positive tritium results in three of the four samples. The mean concentration for the JAFNPP inlet, which serves as the indicator location, was 185 pCi/l based on positive detection of tritium in three of the four samples. Tritium results for 2000 also showed positive detections of tritium at the NMPNS Unit 1 and Unit 2 inlet sample locations with a sample mean of 187 pCi/l and 201 pCi/l respectively. 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 based on the concentrations measured. Individual sample results from the control station were similar or higher than those measured at the indicator location(s). The measured concentrations for all the indicator and control samples are within the normal historical variations for naturally occurring tritium in surface water.

## 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 2000 sampling program. Both of these radionuclides are naturally occurring and are not plant related.

K-40 was detected consistently in both of the TS/ODCM required intake canals. The JAFNPP inlet canal samples and Oswego Steam Station samples showed K-40 was detected in all twelve monthly samples. Ra-226 was also routinely detected in samples from both locations required by TS/ODCM. Both K-40 and Ra-226 were also detected at the other optional sample locations.

Tritium samples are quarterly samples that are a composite of the appropriate monthly samples. Tritium concentration for the JAFNPP inlet had a mean of 185 pCi/l for three positive detections and ranged from 161 pCi/l to 198 pCi/l. The TS/ODCM control location (Oswego Steam Station inlet canal) results had a mean of 212 pCi/l with a range of 196 pCi/l to 237 pCi/l.

Tritium was detected in seven of the twelve optional lake samples taken. The calculated mean concentrations for all three locations was 208 pCi/l and ranged from 179 pCi/l to 246 pCi/l.

Samples collected from the Oswego City water supply showed detectable tritium concentrations in the range of 224 pCi/l to 246 pCi/l with a mean of 235 pCi/l.

A summary of tritium results for the 2000 sample program is listed below:

| Sample | Tritium Concentration pCi/liter | | |
|---|---|---|---|
| Location | Minimum | Maximum | Mean (Annual) |
| JAF Inlet | < 176 | 198 | 185 |
| Oswego Steam Inlet | < 180 | 237 | 212 |
| NMP 1 Inlet | < 157 | 188 | 187 |
| NMP 2 Inlet | < 180 | 229 | 201 |
| City Water Intake | < 180 | 246 | 235 |

## C. Dose Evaluation

The Oswego Steam Station is considered a control location because of its distance from the site and the influence of lake current patterns and current patterns from the Oswego River located nearby. The current patterns distinguish the Oswego Steam Station intake and the nearby Oswego City water intake as an "up-current" sampling point and the JAFNPP inlet canal as a "down-current" sampling point. The Nine Mile Point Site is located such that it would not have a radiological impact on the Oswego drinking water supply. The Oswego City water intake is located west of the Oswego Steam Station inlet placing it upstream from the Nine Mile Point Site. The tritium concentrations measured in these upstream or control locations are representative of natural background levels present in Lake Ontario.

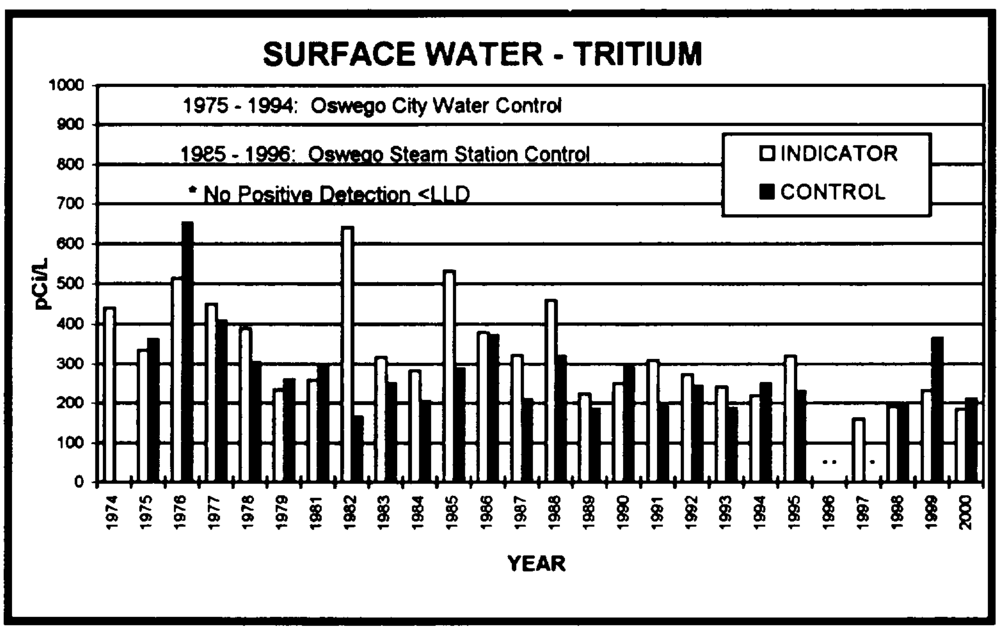
The radiological impact to members of the public from natural background levels of tritium in water is insignificant. This can be illustrated by calculating a dose to the whole body and maximum organ using Regulatory Guide 1.109 methodology. Based on a water ingestion rate of 510 liters/yr and a measured concentration of 246 pCi/l the calculated dose would be 0.025 mrem to the child whole body and 0.026 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 would be 0.025 mrem to the child whole body and 0.026 mrem to the child liver based on a concentration of 246 pCi/l. Doses received as a result of water ingestion are approximately the same regardless of the location. Doses from all water sampled are considered background doses and are negligible compared to the 360 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.

During the previous five year period the maximum mean indicator and control concentrations were measured in 1994 and 1999 respectively. The mean positive tritium concentrations for the period of 1995 – 1999 range from 190 pCi/l to 337 pCi/l for the control and 160 pCi/l to 320 pCi/l for the indicator locations. By comparison, the mean 2000 tritium concentrations for the control was 212 pCi/l and 185 pCi/l for the indicator. 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 data from 1989 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 1986 but is within the variability of results measured over the program life.

The following graph illustrates the concentrations of tritium measured in Lake Ontario over the past 26 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.



## 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 2000 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 2000 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 discussed under Section 5.2.1.B below. The mean concentration of the control location, R-5 was 0.015 pCi/m$^3$ for 2000. The mean concentration for the indicator locations was 0.015 pCi/m$^3$ for 2000. The mean results for the indicator and the control stations were equal for 2000. 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 twelve 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 15 sample locations, 6 on-site and 9 off-site. Each location is sampled weekly for gross beta particulate activity. A total of 778 samples were collected and analyzed as part of the 2000 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.

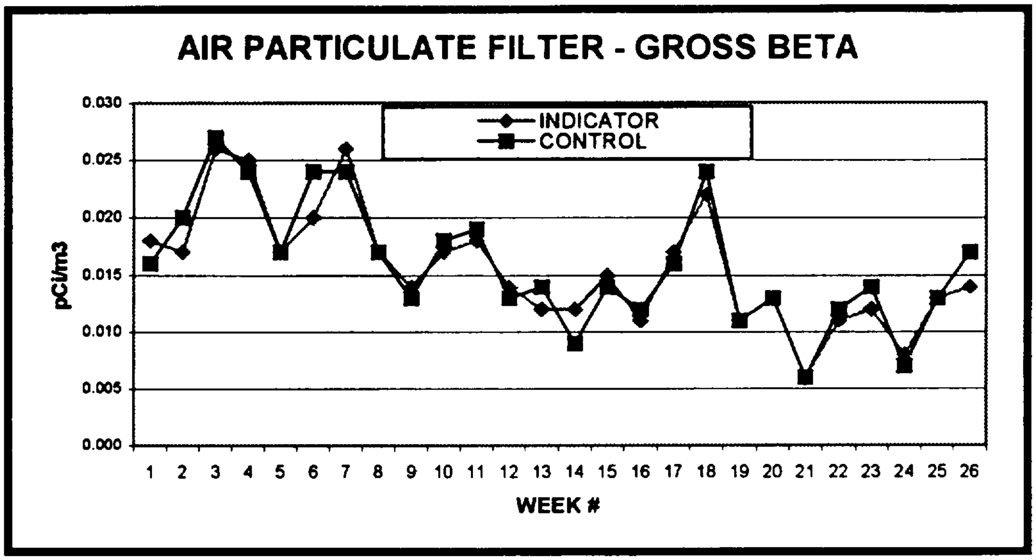
Gross beta analysis requires that the samples be counted no sooner than 24 hours after collection. This allows for the decay of short half-life naturally occurring radionuclides, thereby increasing the sensitivity of the analysis for plant related radionuclides.

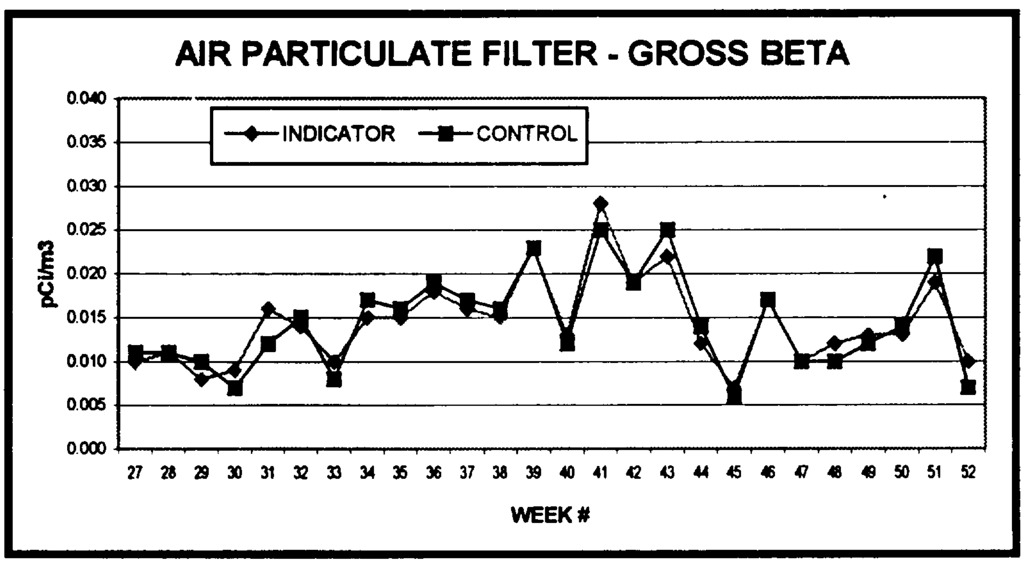
Table 6-5 and 6-6 in Section 6.0 present the weekly gross beta activity results for the off-site and on-site stations.

The average annual gross beta indicator concentrations for the TS/ODCM indicator stations (R-1, R-2, R-3 and R-4) was 0.015 pCi/m$^3$. The off-site TS/ODCM control station (R-5) annual mean concentration was 0.015 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 | 0.007 | 0.028 | 0.015 |
| R-2 | 0.007 | 0.033 | 0.015 |
| R-3 | 0.005 | 0.026 | 0.015 |
| R-4 | 0.005 | 0.029 | 0.015 |
| R-5 | 0.006 | 0.027 | 0.015 |

The mean weekly gross beta concentrations measured in 2000 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.

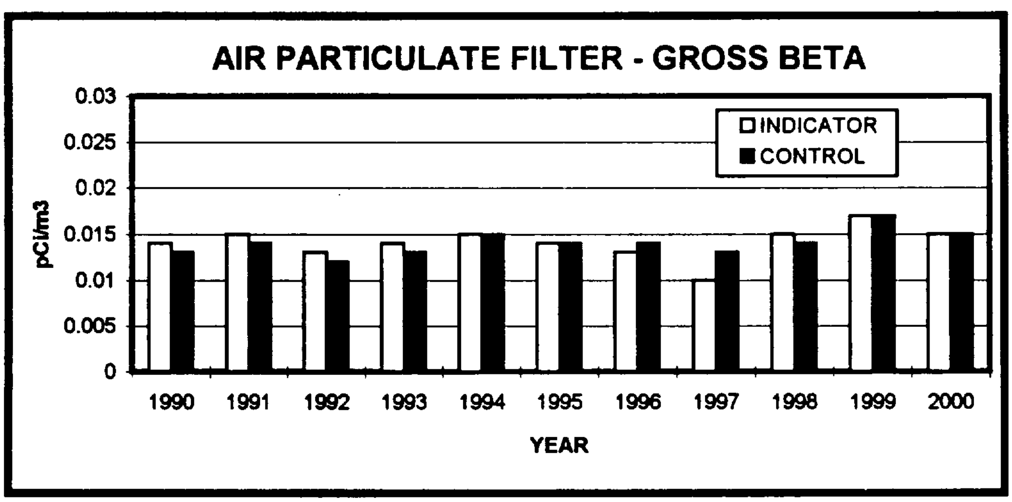
C. **Dose Evaluation**

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 1990 through 2000 is very small. This is illustrated by the following graph.



For the operational period of 1990 – 2000, 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 ranged from a maximum of 0.017 pCi/$m^3$ in 1990 to a minimum of 0.010 pCi/$m^3$ in 1997. The 2000 gross beta results are at approximately mid range relative to this 10 year period.

Historical data of air particulate gross beta activity are presented in Section 7.0.

## 5.2.2 MONTHLY PARTICULATE COMPOSITES (GAMMA EMITTERS)

### A. Results Summary

A comprehensive network of 15 air monitoring stations is maintained around the site. The stations are used to collect air particulate and air borne radioiodine samples on a weekly basis. The air particulate filters are analyzed for gross beta activity and the weekly samples are assembled by location into monthly composite samples. The monthly composites are analyzed using gamma spectroscopy. Plant related radionuclides are not routinely detected in the air composite samples. One plant related isotope was detected in one of the 180 composite samples analyzed for the 2000 program. Cobalt-60 was detected in the R-2 off-site environmental station air particulate filter composite for the month of September 2000. The mean measured concentration was 0.0048 pCi/$m^3$. The R-2 sampling station is located 1.1 miles from the NMPNS Unit Reactor Building in the ESE quadrant at the corner of County Route 29 and Lake Road. A reanalysis by an independent vendor laboratory did not detect the presence of Co-60 in the sample. There was no indication of sample contamination at the analysis laboratory that would account for the presence of the Co-60 in the sample. The concentration of Co-60 detected was very small and is near the threshold of detectability using standard laboratory procedures and processes. The dose to the public that would be associated with this concentration of Co-60 is extremely small and is of little or no significance. The origin of the measured Co-60 concentration is attributed to effluents from the Nine Mile Point Unit 1 facility.

The gamma analysis results for the monthly composite samples routinely showed positive detections of Be-7, K-40, Ra-226 and AcTh-228. Each of these radionuclides is naturally occurring.

Be-7 was detected in all the monthly composite samples for the indicator and control locations. K-40, Ra-226 and AcTh-228 were found intermittently in the monthly composite samples from all locations.

**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 2000 showed no detectable activity with the exception of one composite sample. Cobalt-60 was detected in the R-2 off-site environmental station air particulate filter composite for the month of September 2000. The R-2 sampling station is located 1.1 miles from the NMPNS Unit 2 Reactor building in the ESE quadrant at the corner of County Route 29 and Lake Road. The mean measured concentration of Co-60 was 0.0048 $pCi/m^3$. The composite sample was disassembled and the 5 individual weekly filters making up the monthly composite were counted individually. Co-60 was not detected in the individual filter analysis. The process of compositing the weekly filters into monthly composite samples increases the sensitivity of the analysis due to the collective volume of the composite sample. A reanalysis of the composite sample by an independent vendor laboratory did not detect the presence of Co-60 in the sample. The independent laboratory analysis was reported as less than 0.001 pCi/m$^3$. There was no indication of sample contamination at the analysis laboratory that would have affected the original analysis at the JAFNPP Environmental Laboratory.

The concentration of Co-60 detected was very small and is near the threshold of detectability using standard laboratory procedures and processes. The presence of the Co-60 is the result of airborne effluents from the Nine Mile Point Unit 1 facility. The R-2 air particulate filter gross beta result for week number 39 (9/25/00 – 10/02/00) was slightly elevated when compared to weekly offsite mean results. The gross result for Station R-2 was 0.33 pCi/m$^3$. The 9 station's offsite mean for this week was 0.21 pCi/m$^3$. The higher gross beta result may be an indication that Co-60 was present in the sample. The gamma spectral analysis of this individual filter had a Co-60 result of < 0.014 pCi/m$^3$.

A review of NMPNS and JAFNPP effluent records show a Co-60 concentration above normal operating averages during the week of 9/25/00 through 10/02/00. The level of Co-60 in the Nine Mile Point Unit 1 Stack was above normal operating average but within Technical Specification and Operating Limits. The increased activity occurred as a result of Reactor Water Cleanup Filter Transfer Operations that had occurred during this period. Site meteorological records show that there were periods during the sample week when winds were in the general direction of the R-2 sample station. Based on the analytical results for the R-2 particulate filter composite, JAFNPP and NMPNS operating records and site meteorological records, the Co-60 measured in the R-2 September air particulate filter composite could be attributed primarily to the operation of the NMPNS Unit 1 facility.

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

C. **Dose Evaluation**

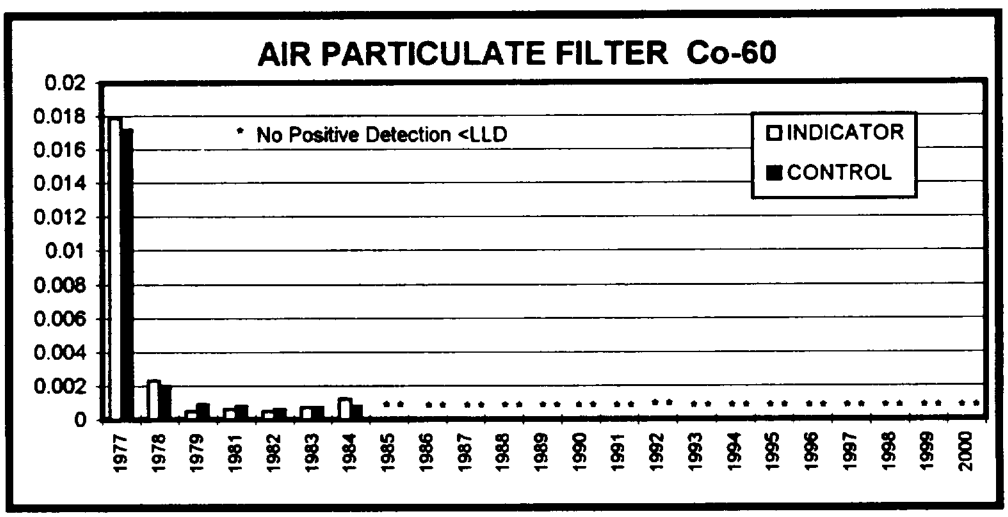
The air particulate sampling program demonstrated that there was no significant dose to man from this pathway as a result of operations of the plants at the site. The calculated dose to man from the measured concentration of Co-60 in the September composite sample can be estimated using calculational methods found in Regulatory Guide 1.109. Based on the usage factors for the inhalation pathway a conservative estimate of the potential dose to man can be calculated. Using the standard man model an adult breaths 8000 $m^3$/year and a teen 3700 $m^3$/year (Regulatory Guide 1.109 maximum exposed age groups) and the measured air concentration for Co-60 of 0.0048 pCi/$m^3$ (mean sample results), the adult whole body dose would be 0.000006 mrem. The teen whole body dose would be 0.000008 mrem. The critical organ dose would calculate to be 0.00349 mrem to the teenager lung The dose calculation is adjusted to 31 days for the sample period with a resulting total inhalation volume of 679 cubic meters.

In summary, these calculated doses are conservative estimates. The potential whole body and organ doses received from the inhalation pathway are extremely small. The doses to man that could be received from the measured concentration are considered to be equivalent to routine background exposures.

D. **Data Trends**

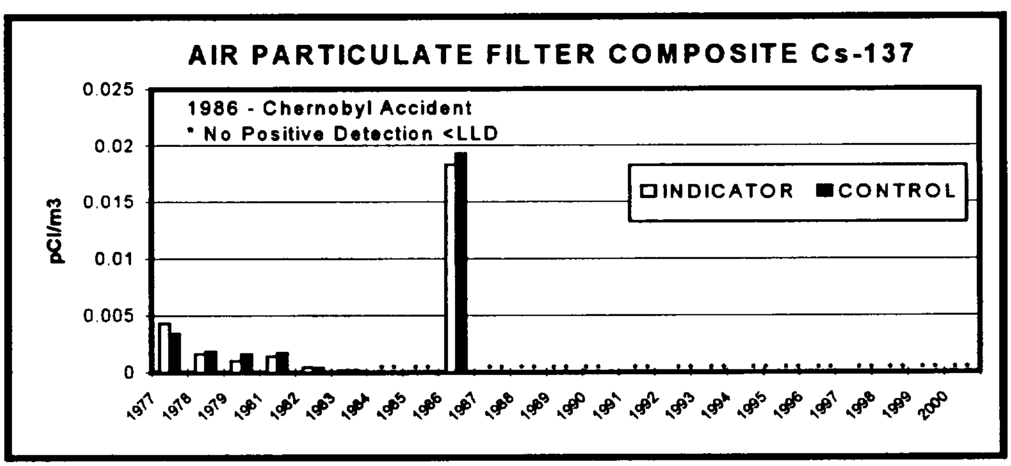
Cobalt-60, a plant related radionuclide was detected during 2000 at one off-site air monitoring location.

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 Co-60 in the air particulate samples trended downward during the 1977 through 1984 period to a low mean concentration of 0.0008 pCi/m$^3$ at the control location. The Co-60 concentration measured in the 2000 sample was the first positive detection of Co-60 in the previous 15 years. There is no trend for the presence of Co-60 in air particulate filter samples. The detection of Co-60 in the 2000 sample appears to be an isolated event with no precursors.




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 0.0193 pCi/m$^3$. The mean concentration of Cs-137 for the indicator location was 0.0183 pCi/m$^3$ for the 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.

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 2000 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. The analytical data for radioiodine are presented in Section 6.0, Table 6-7 and 6-8.

#### C. Dose Evaluation

The I-131 airborne sampling program demonstrated no dose to man due to the operation of the plant. No radioiodine was detected in any sampling location.

## 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 1990 through 2000. I-131 has been detected twice since over 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 0.323 $pCi/m^3$ 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.

### 5.2.4 DIRECT RADIATION THERMOLUMINESCENT DOSIMETERS (TLD)

#### A. Results Summary

A total of 72 Environmental TLD locations are used to measure direct radiation levels in the environment. The dosimeters are collected and read each quarter.

The 2000 results are consistent with those observed in 1999 and previous years. The results of the TLD program document and confirm that there are no increased levels of direct radiation at or beyond the site boundary. TLD results are evaluated by organizing the locations into five special groups by geographic location relative to the site. The five groups are on-site, site boundary, off-site, special interest and controls. A summary of the measured exposure in each group is as follows:

| | Dose in mrem per standard month | | |
|---|---|---|---|
| Location Groups | Minimum | Maximum | Mean |
| On-site indicators | 3.7 | 16.5 | 5.6 |
| Site boundary*(1) | 3.6 | 10.0 | 5.5 |
| Off-site indicators* | 3.8 | 7.3 | 4.6 |
| Site interest* | 3.6 | 7.3 | 4.7 |
| Controls* | 3.7 | 5.5 | 4.3 |

* Location required by TS/ODCM

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

The highest dose rate measured at a location required by TS/ODCM was 10.0 mrem per standard month. This TLD, (No. 85) represents the site boundary maximum dose. Location No. 85 is in the WNW sector along the lakeshore and is in close proximity to the NMPNS Unit 1 plant. The TLD locations along the lakeshore close to the plants are influenced by the radwaste building and radwaste shipping activities. These environmental dose rates are not representative of dose rates measured at the remaining site boundary locations. The remaining TLD locations which are located away from the plant are comparable to levels measured at the control or background locations.

Overall, the environmental direct radiation measurement results for 2000 showed no indication of increased direct radiation above background at or beyond the site boundary. This is demonstrated by the net site boundary dose rate. The TLD results show that the 2000 injection rate utilized for hydrogen water chemistry did not significantly increase the dose rate at the site boundary or the general off-site dose rate to the general public.

| Quarter | Dose Rate (mrem per standard month) | | |
|---|---|---|---|
| | Site Boundary | Control Location | Net Site Boundary |
| 1 | 4.1 | 4.5 | - 0.4 |
| 2 | 4.1 | 4.2 | - 0.1 |
| 3 | 5.2 | 5.7 | - 0.5 |
| 4 | 4.4 | 4.4 | 0.0 |

The net site boundary dose was calculated from applicable site boundary TLD results and control TLD results. 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. Control TLDs include numbers 8, 14, 49, 111 and 113.

## B. Data Evaluation and Discussion

Thermoluminescent dosimeters (TLDs) are used to measure direct radiation (gamma dose) in the environment. The TLDs used during 2000 were Panasonic UD-814 dosimeters.

TLDs from 72 environmental locations were collected and read on a quarterly basis during the sample year. The location results are an average of six independent readings per quarter at each location and are reported in mrem per standard month (See Section 6.0, Table 6-10). Of the 72 TLD locations, 33 are required by TS/ODCM.

The majority of the locations required by the TS/ODCM were initiated in 1985 as a result of the issuance of new Technical Specifications by the NRC. Therefore, the majority of 2000 results can only be compared to 1985 – 1999 results. Some locations, including a number required by the TS/ODCM (i.e., numbers 7, 14, 15, 18, 23, 49, 56, and 58) can be compared to earlier results as these TLDs were established prior to 1985.

On-site TLDs are located at special interest areas within the site boundary. With the exception of location numbers 7 and 23, these locations are not required by TS/ODCM. Locations 7 and 23 are located near the generating facilities at previous or existing on-site air sampling stations and are used to evaluate meteorological sectors that do not extend beyond the site boundary. TLDs located at the on-site environmental monitoring stations include numbers 3, 4, 5, 6, 7, 23, 24, 25 and 26. The results for these locations are consistent with the previous year results. The 2000 results for the on-site group ranged from 3.7 to 16.5 mrem per standard month. Other on-site special interest TLDs are located near the north shoreline of the NMPNS Unit 1, NMPNS Unit 2 and JAFNPP facilities. They are in close proximity to radwaste facilities and the NMPNS Unit 1 reactor building. These locations include numbers 27, 28, 29, 30, 31, 39 and 47. Results for these TLDs during 2000 were variable and ranged from 5.9 to 30.6 mrem per standard month. These dose rates vary as a result of activities at the radwaste facilities and the operating modes of the generating plants. The results for 2000 are consistent with the ranges of variability noted in previous years for measurement at or near these locations.

Additional on-site TLD locations are located near the on-site Energy Center and the associated northeast shoreline. These locations include numbers 18, 103, 106 and 107. TLDs 103, 106 and 107 are located east of the Energy Center and west of the Unit 1 facility. TLD number 18 is located on the west side of the Energy Center. Results for this group ranged from 4.0 to 6.9 mrem per standard month for 2000 and were consistent with the 1999 results.

Site boundary 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 75, 76, 77, 23, 78, 79, 80, 81, 82, 83, 84, 7, 18, 85, 86 and 87. TLD numbers 78, 79, 80, 81, 82, 83, 84, 7 and 18 showed results that were consistent with control TLD results and ranged from 3.6 to 10.0 mrem per standard month.

Site boundary TLD results for 2000 were consistent with 1985 – 1999 results. TLD numbers 23, 75, 76, 77 85, 86 and 87 showed results that ranged from 4.8 to 10.0 mrem per standard month. TLDs in this latter group are located near the lake shoreline (approximately 100 feet from the shoreline), but are also located in close proximity to the reactor building and radwaste facilities of NMPNS Unit 1 and Unit 2 and the radwaste facilities of the FitzPatrick plant.

A net site boundary dose can be estimated using site boundary TLD results and control TLD results. Results from TLDs located at the site boundary in land based sectors (excluding TLDs near the generating facilities and along the Lake Ontario shoreline) are compared to control TLD results. The site boundary TLDs include numbers 78, 79, 80, 81, 82, 83, 84, 7 and 18. Control TLDs include numbers 8, 14, 49, 111 and 113. Net site boundary doses for each quarter in mrem per standard month are as follows:

| Quarter | Dose Rate (mrem per standard month) | | |
|---|---|---|---|
| | Site Boundary | Control Location | Net Site Boundary |
| 1 | 4.1 | 4.5 | - 0.4 |
| 2 | 4.1 | 4.2 | - 0.1 |
| 3 | 5.3 | 5.7 | - 0.4 |
| 4 | 4.4 | 4.4 | 0.0 |

Site boundary TLD numbers 75, 76, 77, 23, 85, 86 and 87 were excluded from the net site boundary dose calculation since these TLDs are not representative of doses at areas where a member of the public may be located. These areas are near the north shoreline, which are in close proximity to the generating facilities, and are not accessible to members of the public.

The third group of environmental TLDs is located four to five miles from the site in each of the eight land based 22.5 degree meteorological sectors. These locations are required by the TS/ODCM and are referred to as off-site sector TLDs. At this distance, badges are not present in eight of the sixteen meteorological sectors which are located over Lake Ontario.

Results for this group of TLDs during 2000 showed a range of 3.4 to 6.6 mrem per standard month. The range of results is caused by differences in the natural physical conditions of each site and the varying concentrations of naturally occurring radionuclides in the ground at each of the locations. These results are consistent with control TLD results during 2000 and with the 1986 – 1999 results. These TLDs were established in 1985 and include numbers 88, 89, 90, 91, 92, 93, 94 and 95.

The fourth group of environmental TLDs is located near the site boundary and at special interest areas. Included in this group are monitoring locations at industrial sites, schools, nearby communities, off-site air sampling stations, the closest residence to the site, and the off-site environmental laboratory. Many of these TLDs are required by the TS/ODCM. The remaining locations for this group are optional. This group of locations include numbers 9, 10, 11, 12, 13, 15, 19, 51, 52, 53, 54, 55, 56, 58, 96, 97, 98, 99, 100, 101, 102, 108 and 109. TLD numbers 108 and 109 are locations that were established during 1988 and were added to assist in the evaluation of the nearest residence. In 2000, results for this fourth group ranged from 3.5 to 6.6 mrem per standard month and ranged 4.2 to 5.8 mrem per standard month for the nearest resident TLD locations. All of the TLD results from this fourth group were within the general variation of the control TLDs. Results during 2000 were consistent with the results for previous years.

The fifth category of TLDs is used to measure the dose rate at the control locations. These TLDs are required by the TS/ODCM and include numbers 14 and 49. Optional control locations are numbers 8, 111 and 113. Location 111 was added to the program during 1988 to expand the data base for control measurements. Results for all control locations from 2000 ranged from 3.7 to 7.3 mrem per standard month. Results form 2000 were consistent with previous years results.

## C. Dose Evaluation

TLDs located at the boundary averaged 4.5 mrem per standard month (TLD Nos. 7, 18, 78, 79, 80, 81, 82, 83, 84)

TLDs placed at the special interest locations averaged 4.5 mrem per standard month. (TLD Nos. 15, 56, 58, 96, 97, 98)

The control TLD results averaged 4.7 mrem per standard month in 2000 (TLD Nos. 8, 14, 49, 111, 113)

The measured mean dose rate in the proximity of the closest resident was 4.7 mrem per standard month (TLD Nos. 108 and109), which is consistent with the control measurements which was 4.7 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 (16 locations), TLDs located off-site in each land based sector at a distance of four to five miles (8 locations), TLDs located at special interest areas (6 locations) and TLDs located at control locations (5 locations). As noted previously, many of the present TLD locations became effective in 1985 and these results can only be evaluated for 1985 –2000.

TLDs located at the site boundary averaged 5.8 mrem per standard month during 1990. During 1995, 1996, 1997, 1998 and 1999 site boundary dose rates averaged 5.4, 5.2, 5.9, 5.4, and 5.8 respectively. As noted previously, this group of TLDs exhibits fluctuating results because several of these TLDs are located in close proximity to the generating facilities and are influenced by operational modes. During 2000 site boundary measurements averaged 5.6 mrem per standard month which is consistent with the previous five years.

TLDs located off-site at a distance of four to five miles from the site in each of the land based meteorological sectors (off-site sectors) averaged 4.8 mrem per standard month during 1990. During the previous five years, 1995 through 1999, the annual off-site sector dose rates averaged 4.2, 4.2, 4.5, 4.2 and 4.4 mrem per standard month, respectively. Results for the group averaged 4.3 mrem standard month over the five year period. The 2000 mean dose of 4.5 mrem per standard month is consistent with the previous five year mean and each individual yearly mean.

Special interest locations averaged 4.3 mrem per standard month over the previous five year period (1995 – 1999). The 2000 results for these locations averaged 4.5 mrem per standard month. This is consistent with the previous five year average of 4.3 mrem per standard month.

The last group of TLD locations required by the TS/ODCM is the control group. This group (TLD Nos. 8, 14, 49, 111 and 113) utilizes locations positioned well beyond the site. Results from 1986 for the control group averaged 6.3 mrem per standard month. A marked increase was noted in the second quarter of 1986. The increase may have been a result of the Chernobyl accident. Results for 1995, 1996, 1997, 1998 and 1999 averaged 4.4, 4.3, 4.7, 4.4 and 4.6 mrem per standard month, respectively with a five year mean of 4.5 mrem per standard month. Control results for 2000 averaged 4.7 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 2000 data is representative of the natural background dose rate.

The 2000 TLD program results, when compared to the previous five years and NMPNS Unit 2 and JAFNPP pre-operational data, show no significant trends relative to increase 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 198 analyses were performed on the 99 milk samples collected and analyzed for the 2000 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 2000, I-131 was not detected in any of the 99 samples collected from the six milk sampling locations. It is noted that one of the six milk sampling locations used to collect milk samples during the first half of the sample period went out of business and sold their herd to another farm of which milk samples are obtained.

Gamma spectral analyses of the bimonthly milk samples detected only naturally occurring radionuclides such as K-40 and Ra-226 during the 2000 sample program. K-40 was detected in all indicator and control samples and Ra-226 was detected intermittently. K-40 and Ra-226 are naturally occurring radionuclides and are found in many environmental sample media.

The 2000 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 2000. 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 5.5 to 9.5 miles from the site. The control samples were collected from a farm 13.2 miles from the site and in a low frequency wind sector (upwind). With the exception of indicator location No. 7 and the control location, each of the reported locations has been sampled since 1989. In August of 2000 milk sampling location No. 50 was removed from the sampling program. The milking herd at this location was sold off and milk production at this location ceased. Milk samples were collected from this location from April 3, 2000 through August 7, 2000. The geographical location of each sample location is listed below:

| Location No. | Direction From Site | Direction (Miles) |
|---|---|---|
| 50 | E | 9.1 |
| 55 | E | 9.0 |
| 60 | E | 9.5 |
| 4 | ESE | 7.8 |
| 7 | ESE | 5.5 |
| 73 Control | SW | 13.2 |

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 1999 additional samples were not required for January through March of 2000 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, Tables 6-11A and 6-11B respectively.

Iodine-131 was not detected in any indicator or control samples analyzed during 2000. 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 2000 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 956 to 1830 pCi/liter. Ra-226 was detected intermittently in the milk samples and is a naturally occurring radionuclide. During 2000, 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 2000 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 2000 program.

Detectable levels of naturally occurring K-40 were measured in all control and indicator samples collected for the 2000 program. Ra-226, Be-7 and AcTh-228, all naturally occurring radionuclides were also detected intermittently in all of the samples collected in 2000. These results are consistent with the levels measured in 1999 and previous years.

The results of the 2000 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 collection of annual food product samples became a requirement as a result of Technical Specification Amendment 127 in 1985. 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 2000 included one variety that is considered edible broadleaf vegetables. Collard greens were collected at three indicator locations. 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, pepper leaves, grape leaves and cucumber leaves were collected for the 2000 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 two 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 2000 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 0.14 to 2.08 pCi/g (set). The concentration of K-40 in indicator and control samples ranged from 1.78 to 7.86 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 6-12A and 6-12B.

## 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 three of those years at the indicator location. Since 1976 Cs-137 has been detected in ten separate years. These historical Cs-137 concentrations ranged from a maximum of 0.047 pCi/g (wet) in 1985 to a minimum of 0.007 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.

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

### 5.2.6 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 2000 a milk animal census, a nearest resident census and a garden survey were performed.

No changes were required to milk sampling indicator or control locations in 2000 based on the 2000 milk animal census.

The results of the closest residence census conducted in 2000 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 those locations listed in Table 5-1 of the Unit 1 and Unit 2 ODCMs and identified in the census as active for 2000. See Table 3.3-1 for 2000 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 643 cows and 3 goats based on the 2000 land use census. The number of cows has decreased by 53 and the number of goats decreased by 3 with respect to the 1999 census. The goats identified during the census were not milking goats.

The locations identified as a result of the milk animal census are illustrated on a map in Section 3.3, Figure 3.3-4.

The results of the milk animal census are found in Section 6.0, Table 6-13.

The second type of census 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 2000 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 2000 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 in the environment 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 2000 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 two fission product radionuclides in the sample media collected during 2000. Cs-137 was detected in shoreline sediment samples and fish 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.

Cobalt-60 was detected in one of the 180 air particulate filter composite samples analyzed during 2000. The presence of Co-60 in the air composite sample is attributed to effluents from Nine Mile Point Unit 1. The measured concentration was very small and isolated to a one- week period. The program results for the 2000 sampling program demonstrate that Co-60 is not an extensive or chronic constituent in the environment. The program results document that this was an isolated incident with no previous or subsequent presence in environmental media based on ten years of historical data. The maximum dose calculated dose to man from the inhalation pathway could be 0.00349 mrem to the lung of the critical individual. This calculated dose to man is a conservative estimate and is extremely small relative to routine background exposures.

Radiation from naturally occurring radionuclides such as K-40 and Ra-226 contributed the vast majority of the total annual dose to members of the general public. The 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 operation remains insignificant.

From the collective results of the 2000 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 6-1A

## CONCENTRATION OF GAMMA EMITTERS IN SHORELINE SEDIMENT SAMPLES

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

| SAMPLE LOCATION | COLLECTION DATE | Be-7 | K-40 | Co-60 | Cs-134 | Cs-137 | Ra-226 | AcTh-228 | Other |
|---|---|---|---|---|---|---|---|---|---|
| Langs Beach | 04/26/00 | <0.26 | 15.0 ± 0.42 | <0.03 | <0.03 | <0.04 | 1.63 ± 0.27 | 0.65 ± 0.06 | <LLD |
| (Control) | 10/25/00 | <0.26 | 14.2 ± 0.35 | <0.04 | <0.04 | <0.04 | 0.98 ± 0.20 | 0.45 ± 0.04 | <LLD |
| Sunset Beach | 04/26/00 | <0.37 | 18.9 ± 0.37 | <0.06 | <0.06 | 0.06 ± 0.01 | 2.10 ± 0.21 | 0.84 ± 0.05 | <LLD |
| (Off-Site)* | 10/25/00 | <0.37 | 21.4 ± 0.38 | <0.05 | <0.04 | 0.08 ± 0.01 | 2.34 ± 0.24 | 0.90 ± 0.05 | <LLD |

*Sample required by the TS/ODCM

## TABLE 6-1B

## CONCENTRATION OF GAMMA EMITTERS IN SHORELINE SEDIMENT SAMPLES

**Results in units of pCi/kg (dry) ± 1 sigma**

| SAMPLE LOCATION | COLLECTION DATE | Be-7 | K-40 | Co-60 | Cs-134 | Cs-137 | Ra-226 | AcTh-228 | OTHERS |
|---|---|---|---|---|---|---|---|---|---|
| Langs Beach | 04/26/00 | <265 | 15000 ± 415 | <34 | <30 | <37 | 1630 ± 266 | 650 ± 56 | <LLD |
| (Control) | 10/25/00 | <264 | 14200 ± 354 | <38 | <42 | <35 | 980 ± 200 | 453 ± 43 | <LLD |
| Sunset Beach | 04/26/00 | <366 | 18900 ± 370 | <63 | <56 | 60 ± 8 | 2100 ± 210 | 840 ± 50 | <LLD |
| (Off-Site)* | 10/25/00 | <372 | 21400 ± 380 | <54 | <44 | 76 ± 11 | 2340 ± 240 | 900 ± 51 | <LLD |

* Sample required by the TS/ODCM

# TABLE 6-2A

## CONCENTRATION OF GAMMA EMITTERS IN FISH SAMPLES

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

| SAMPLE DATE | SAMPLE TYPE | GAMMA EMITTERS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Fe-59 | Co-58 | K-40 | Mn-54 | Co-60 | Cs-134 | Cs-137 | Zn-65 | Ra-226 | OTHER |
| **J. A. FITZPATRICK - 03** | | | | | | | | | | | |
| 06/13/00 | Walleye | <0.05 | <0.02 | 5.79 ± 0.20 | <0.02 | <0.02 | <0.01 | <0.02 | <0.05 | 0.62 ± 0.14 | <LLD |
| 06/20/00 | Lake Trout | <0.05 | <0.02 | 4.43 ± 0.22 | <0.03 | <0.03 | <0.02 | <0.02 | <0.06 | 0.50 ± 0.14 | <LLD |
| 06/20/00 | Brown Trout | <0.03 | <0.01 | 2.19 ± 0.12 | <0.01 | <0.02 | <0.01 | <0.01 | <0.03 | 0.32 ± 0.10 | <LLD |
| 06/20/00 | Smallmouth Bass | <0.04 | <0.02 | 5.34 ± 0.19 | <0.02 | <0.02 | <0.02 | <0.02 | <0.05 | 0.73 ± 0.14 | <LLD |
| 09/14/00 | Smallmouth Bass | <0.07 | <0.03 | 5.39 ± 0.27 | <0.03 | <0.03 | <0.04 | <0.03 | <0.07 | 0.53 ± 0.23 | <LLD |
| 09/14/00 | Brown Trout | <0.05 | <0.03 | 4.70 ± 0.24 | <0.03 | <0.02 | <0.02 | <0.02 | <0.05 | 0.61 ± 0.14 | <LLD |
| 09/14/00 | Chinook Salmon | <0.08 | <0.03 | 4.56 ± 0.29 | <0.03 | <0.04 | <0.03 | <0.03 | <0.07 | 0.62 ± 0.19 | <LLD |
| **NINE MILE POINT - 02** | | | | | | | | | | | |
| 05/23/00 | Smallmouth Bass | <0.09 | <0.03 | 5.05 ± 0.26 | <0.03 | <0.03 | <0.03 | <0.03 | <0.07 | 0.35 ± 0.13 | <LLD |
| 06/08/00 | Walleye | <0.06 | <0.03 | 4.98 ± 0.21 | <0.02 | <0.02 | <0.02 | <0.02 | <0.05 | 0.30 ± 0.09 | <LLD |
| 06/08/00 | Lake Trout | <0.07 | <0.03 | 4.51 ± 0.25 | <0.02 | <0.03 | <0.03 | <0.03 | <0.06 | 0.52 ± 0.14 | <LLD |
| 06/08/00 | Brown Trout | <0.05 | <0.02 | 3.77 ± 0.18 | <0.02 | <0.02 | <0.02 | <0.02 | <0.05 | 0.33 ± 0.10 | <LLD |
| 09/26/00 | Smallmouth Bass | <0.09 | <0.04 | 4.51 ± 0.37 | <0.03 | <0.06 | <0.04 | <0.04 | <0.11 | 0.55 ± 0.24 | <LLD |
| 09/26/00 | Brown Trout | <0.06 | <0.03 | 5.58 ± 0.27 | <0.03 | <0.03 | <0.02 | <0.03 | <0.07 | 0.45 ± 0.20 | <LLD |
| 09/26/00 | Chinook Salmon | <0.09 | <0.04 | 4.85 ± 0.36 | <0.04 | <0.05 | <0.03 | <0.04 | <0.11 | 0.33 ± 0.21 | <LLD |

## TABLE 6-2A (Continued)

## CONCENTRATION OF GAMMA EMITTERS IN FISH SAMPLES

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

| | | GAMMA EMITTERS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE DATE | SAMPLE TYPE | Fe-59 | Co-58 | K-40 | Mn-54 | Co-60 | Cs-134 | Cs-137 | Zn-65 | Ra-226 | OTHER |
| OSWEGO HARBOR (CONTROL) - 00 | | | | | | | | | | | |
| 05/17/00 | Walleye | <0.07 | <0.02 | 4.40 ± 0.12 | <0.02 | <0.02 | <0.02 | 0.02 ± 0.004 | <0.05 | 0.59 ± 0.06 | <LLD |
| 05/17/00 | Lake Trout | <0.11 | <0.03 | 3.70 ± 0.22 | <0.03 | <0.03 | <0.03 | <0.03 | <0.06 | 0.44 ± 0.13 | <LLD |
| 05/17/00 | Brown Trout | <0.07 | <0.03 | 5.85 ± 0.20 | <0.02 | <0.02 | <0.02 | <0.02 | <0.03 | 0.77 ± 0.13 | <LLD |
| 05/17/00 | Smallmouth Bass | <0.09 | <0.03 | 4.64 ± 0.21 | <0.02 | <0.02 | <0.02 | <0.02 | <0.06 | 0.71 ± 0.11 | <LLD |
| 09/20/00 | Smallmouth Bass | <0.06 | <0.03 | 4.31 ± 0.25 | <0.02 | <0.03 | <0.02 | <0.03 | <0.07 | 0.51 ± 0.18 | <LLD |
| 09/20/00 | Brown Trout | <0.06 | <0.03 | 4.11 ± 0.23 | <0.02 | <0.03 | <0.02 | <0.02 | <0.06 | 0.51 ± 0.18 | <LLD |
| 09/20/00 | Chinook Salmon | <0.05 | <0.02 | 4.22 ± 0.22 | <0.02 | <0.02 | <0.02 | <0.02 | <0.06 | 0.62 ± 0.14 | <LLD |

## TABLE 6-2B

## CONCENTRATION OF GAMMA EMITTERS IN FISH SAMPLES

**Results in units of pCi/kg (wet) ± 1 sigma**

| | | GAMMA EMITTERS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE DATE | SAMPLE TYPE | Fe-59 | Co-58 | K-40 | Mn-54 | Co-60 | Cs-134 | Cs-137 | Zn-65 | Ra-226 | OTHER |
| **J. A. FITZPATRICK - 03** | | | | | | | | | | | |
| 06/13/00 | Walleye | <54 | <22 | 5790 ± 20 | <23 | <24 | <13 | <22 | <53 | 620 ± 140 | <LLD |
| 06/20/00 | Lake Trout | <53 | <24 | 4430 ± 219 | <26 | <26 | <22 | <22 | <59 | 500 ± 140 | <LLD |
| 06/20/00 | Brown Trout | <31 | <14 | 2190 ± 120 | <13 | <16 | <12 | <14 | <29 | 320 ± 100 | <LLD |
| 06/20/00 | Smallmouth Bass | <44 | <22 | 5340 ± 190 | <24 | <18 | <22 | <20 | <54 | 730 ± 140 | <LLD |
| 09/14/00 | Smallmouth Bass | <67 | <33 | 5390 ± 268 | <30 | <34 | <35 | <30 | <68 | 531 ± 234 | <LLD |
| 09/14/00 | Brown Trout | <52 | <26 | 4700 ± 240 | <26 | <20 | <21 | <24 | <54 | 612 ± 145 | <LLD |
| 09/14/00 | Chinook Salmon | <83 | <33 | 4560 ± 289 | <25 | <36 | <28 | <26 | <74 | 619 ± 193 | <LLD |
| **NINE MILE POINT - 02** | | | | | | | | | | | |
| 05/23/00 | Smallmouth Bass | <88 | <32 | 5050 ± 263 | <26 | <31 | <26 | <27 | <69 | 346 ± 130 | <LLD |
| 06/08/00 | Walleye | <60 | <26 | 4980 ± 210 | <20 | <21 | <22 | <20 | <51 | 300 ± 92 | <LLD |
| 06/08/00 | Lake Trout | <67 | <26 | 4510 ± 250 | <20 | <28 | <30 | <26 | <57 | 520 ± 140 | <LLD |
| 06/08/00 | Brown Trout | <47 | <24 | 3770 ± 180 | <20 | <21 | <20 | <20 | <46 | 328 ± 104 | <LLD |
| 09/26/00 | Smallmouth Bass | <87 | <38 | 4510 ± 372 | <34 | <55 | <39 | <36 | <107 | 546 ± 239 | <LLD |
| 09/26/00 | Brown Trout | <63 | <31 | 5580 ± 270 | <32 | <30 | <20 | <33 | <74 | 453 ± 200 | <LLD |
| 09/26/00 | Chinook Salmon | <89 | <37 | 4850 ± 362 | <36 | <47 | <31 | <38 | <113 | 326 ± 206 | <LLD |

## TABLE 6-2B (Continued)

## CONCENTRATION OF GAMMA EMITTERS IN FISH SAMPLES

**Results in units of pCi/kg (wet) ± 1 sigma**

| | | GAMMA EMITTERS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE DATE | SAMPLE TYPE | Fe-59 | Co-58 | K-40 | Mn-54 | Co-60 | Cs-134 | Cs-137 | Zn-65 | Ra-226 | OTHER |
| OSWEGO HARBOR(CONTROL) - 00 | | | | | | | | | | | |
| 05/17/00 | Walleye | <70 | <24 | 4400 ± 120 | <19 | <20 | <18 | 21 ± 4 | <52 | 590 ± 61 | <LLD |
| 05/17/00 | Lake Trout | <108 | <34 | 3700 ± 220 | <26 | <27 | <28 | <25 | <65 | 444 ± 130 | <LLD |
| 05/17/00 | Brown Trout | <70 | <30 | 5850 ± 200 | <24 | <23 | <23 | <21 | <33 | 777 ± 130 | <LLD |
| 05/17/00 | Smallmouth Bass | <92 | <34 | 4640 ± 210 | <23 | <22 | <21 | <23 | <58 | 710 ± 110 | <LLD |
| 09/20/00 | Smallmouth Bass | <59 | <27 | 4310 ± 251 | <25 | <29 | <22 | <26 | <74 | 507 ± 179 | <LLD |
| 09/20/00 | Brown Trout | <64 | <27 | 4110 ± 232 | <21 | <25 | <22 | <25 | <60 | 505 ± 177 | <LLD |
| 09/20/00 | Chinook Salmon | <47 | <21 | 4220 ± 215 | <19 | <22 | <21 | <19 | <60 | 624 ± 135 | <LLD |

## TABLE 6-3

## CONCENTRATION OF GAMMA EMITTERS IN SURFACE WATER SAMPLES

### Results in units of pCi/liter ± 1 sigma

LOCATION: NINE MILE POINT U-1 (INLET)** 2000

| NUCLIDE | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE |
|---|---|---|---|---|---|---|
| K-40 | 175 ± 15 | 156 ± 18 | 54 ± 10 | 177 ± 16 | 260 ± 14 | 57 ± 9 |
| Ra-226 | 99 ± 17 | <72.6 | 50 ± 17 | 77 ± 25 | 95 ± 22 | 80 ± 15 |
| Cs-134 | <2.34 | <3.11 | <2.87 | <2.74 | <2.52 | <2.40 |
| Cs-137 | <2.73 | <3.22 | <2.92 | <2.84 | <2.45 | <2.48 |
| Zr-95 | <5.11 | <6.76 | <5.48 | <5.91 | <4.71 | <4.89 |
| Nb-95 | <4.06 | <4.46 | <3.86 | <3.49 | <3.15 | <3.43 |
| Co-58 | <3.71 | <3.62 | <3.25 | <3.05 | <2.78 | <2.75 |
| Mn-54 | <2.72 | <3.45 | <2.84 | <3.27 | <2.68 | <2.32 |
| Fe-59 | <7.34 | <9.18 | <6.65 | <6.90 | <5.55 | <5.96 |
| Co-60 | <3.24 | <3.71 | <3.23 | <3.07 | <2.21 | <2.62 |
| Zn-65 | <5.57 | <7.44 | <5.64 | <6.76 | <3.56 | <4.90 |
| I-131 | <11.7 | <11.2 | <10.7 | <8.02 | <8.25 | <9.88 |
| Ba/La-140 | <11.6 | <9.03 | <9.70 | <7.35 | <6.16 | <9.15 |

| NUCLIDE | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER |
|---|---|---|---|---|---|---|
| K-40 | 155 ± 14 | 186 ± 16 | 182 ± 17 | 150 ± 18 | 273 ± 14 | 66 ± 11 |
| Ra-226 | 127 ± 19 | 107 ± 19 | 77 ± 24 | <75.8 | 125 ± 22 | 86 ± 16 |
| Cs-134 | <2.54 | <2.45 | <1.60 | <3.76 | <1.55 | <2.33 |
| Cs-137 | <2.62 | <2.32 | <2.72 | <3.60 | <2.07 | <2.09 |
| Zr-95 | <4.73 | <4.82 | <5.33 | <6.34 | <4.22 | <4.12 |
| Nb-95 | <3.46 | <3.06 | <4.05 | <4.41 | <2.67 | <3.10 |
| Co-58 | <3.08 | <2.61 | <2.79 | <3.83 | <2.57 | <2.54 |
| Mn-54 | <2.80 | <2.64 | <2.60 | <3.04 | <2.38 | <2.41 |
| Fe-59 | <6.99 | <7.04 | <6.52 | <8.76 | <5.31 | <5.13 |
| Co-60 | <2.62 | <2.67 | <3.14 | <3.30 | <2.18 | <2.63 |
| Zn-65 | <5.35 | <6.02 | <6.78 | <8.15 | <3.14 | <5.36 |
| I-131 | <9.55 | <8.69 | <9.77 | <11.1 | <7.19 | <8.20 |
| Ba/La-140 | <7.09 | <6.84 | <9.29 | <9.80 | <5.60 | <6.68 |

** - Optional sample

## TABLE 6-3 (continued)

## CONCENTRATION OF GAMMA EMITTERS IN SURFACE WATER SAMPLES

### Results in units of pCi/liter ± 1 sigma

LOCATION: NINE MILE POINT U-2 (INLET)** 2000

| NUCLIDE | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE |
|---|---|---|---|---|---|---|
| K-40 | 209 ± 13 | 188 ± 19 | 176 ± 18 | 271 ± 14 | 62 ± 10 | 251 ± 13 |
| Ra-226 | 82 ± 18 | 71 ± 27 | 110 ± 23 | 92 ± 18 | 69 ± 13 | 91 ± 14 |
| Cs-134 | <1.38 | <3.57 | <3.03 | <1.35 | <2.47 | <2.10 |
| Cs-137 | <2.06 | <3.97 | <3.09 | <2.17 | <2.34 | <2.31 |
| Zr-95 | <5.16 | <6.43 | <5.63 | <4.29 | <4.79 | <4.39 |
| Nb-95 | <3.60 | <4.40 | <3.76 | <2.60 | <3.09 | <2.68 |
| Co-58 | <2.56 | <4.76 | <3.36 | <2.41 | <2.94 | <2.54 |
| Mn-54 | <2.25 | <4.07 | <2.94 | <2.39 | <2.30 | <2.18 |
| Fe-59 | <6.70 | <8.95 | <9.36 | <5.22 | <6.22 | <5.30 |
| Co-60 | <2.27 | <3.42 | <2.99 | <2.40 | <2.40 | <2.21 |
| Zn-65 | <5.81 | <8.90 | <6.78 | <5.28 | <5.30 | <3.12 |
| I-131 | <14.9 | <13.4 | <13.2 | <6.71 | <7.15 | <8.52 |
| Ba/La-140 | <9.40 | <9.16 | <12.2 | <5.09 | <5.52 | <5.44 |

| NUCLIDE | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER |
|---|---|---|---|---|---|---|
| K-40 | 178 ± 16 | 147 ± 18 | 111 ± 12 | 150 ± 22 | 193 ± 17 | 155 ± 14 |
| Ra-226 | 50 ± 17 | 109 ± 23 | 61 ± 18 | <91.2 | 51 ± 23 | 149 ± 23 |
| Cs-134 | <2.70 | <3.71 | <2.04 | <4.24 | <2.84 | <2.45 |
| Cs-137 | <2.42 | <3.84 | <2.15 | <3.99 | <2.63 | <2.62 |
| Zr-95 | <6.07 | <7.29 | <4.88 | <7.74 | <6.24 | <5.21 |
| Nb-95 | <3.64 | <4.67 | <2.95 | <4.51 | <3.95 | <3.35 |
| Co-58 | <2.97 | <4.69 | <2.72 | <4.06 | <2.78 | <3.12 |
| Mn-54 | <2.81 | <3.69 | <2.14 | <3.72 | <2.64 | <2.90 |
| Fe-59 | <7.06 | <9.39 | <6.45 | <10.9 | <6.48 | <6.96 |
| Co-60 | <3.74 | <4.34 | <2.24 | <3.93 | <3.47 | <3.13 |
| Zn-65 | <7.35 | <8.36 | <5.29 | <8.59 | <6.79 | <5.87 |
| I-131 | <11.40 | <11.2 | <9.87 | <13.1 | <7.61 | <10.3 |
| Ba/La-140 | <8.84 | <9.23 | <8.54 | <14.0 | <7.02 | <7.63 |

** - Optional sample

## TABLE 6-3 (continued)

## CONCENTRATION OF GAMMA EMITTERS IN SURFACE WATER SAMPLES

**Results in units of pCi/liter ± 1 sigma**

LOCATION: OSWEGO STEAM STATION* **2000**

| NUCLIDE | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE |
|---|---|---|---|---|---|---|
| K-40 | 174 ± 19 | 174 ± 17 | 66 ± 9 | 223 ± 22 | 62 ± 9 | 196 ± 20 |
| Ra-226 | 149 ± 26 | 110 ± 19 | 45 ± 19 | <84.8 | 70 ± 16 | 95 ± 22 |
| Cs-134 | <3.13 | <2.59 | <2.37 | <3.99 | <2.38 | <3.74 |
| Cs-137 | <2.94 | <2.79 | <2.40 | <4.01 | <2.43 | <4.11 |
| Zr-95 | <5.95 | <6.06 | <5.19 | <8.58 | <5.14 | <7.34 |
| Nb-95 | <4.92 | <4.16 | <3.47 | <4.84 | <2.98 | <4.39 |
| Co-58 | <4.41 | <3.62 | <2.81 | <3.92 | <2.37 | <4.55 |
| Mn-54 | <3.45 | <3.20 | <2.36 | <4.11 | <2.48 | <3.82 |
| Fe-59 | <8.65 | <7.90 | <6.36 | <9.74 | <5.72 | <8.88 |
| Co-60 | <3.38 | <3.47 | <2.03 | <4.66 | <2.58 | <4.43 |
| Zn-65 | <8.50 | <6.49 | <5.24 | <9.85 | <4.61 | <9.33 |
| I-131 | <14.8 | <8.84 | <8.32 | <10.30 | <6.38 | <11.70 |
| Ba/La-140 | <11.1 | <7.81 | <7.79 | <10.30 | <7.06 | <7.37 |
| **NUCLIDE** | **JULY** | **AUGUST** | **SEPTEMBER** | **OCTOBER** | **NOVEMBER** | **DECEMBER** |
| K-40 | 86 ± 11 | 213 ± 28 | 67 ± 11 | 200 ± 24 | 98 ± 12 | 162 ± 15 |
| Ra-226 | 56 ± 14 | 118 ± 47 | 51 ± 11 | 52 ± 31 | 54 ± 16 | 84 ± 22 |
| Cs-134 | <2.24 | <4.98 | <1.35 | <3.63 | <2.31 | <2.96 |
| Cs-137 | <2.16 | <4.67 | <2.15 | <3.89 | <2.15 | <2.57 |
| Zr-95 | <4.86 | <8.32 | <4.88 | <9.44 | <4.05 | <5.70 |
| Nb-95 | <2.82 | <7.75 | <3.34 | <5.64 | <2.78 | <3.57 |
| Co-58 | <2.64 | <5.43 | <2.78 | <5.26 | <2.54 | <3.14 |
| Mn-54 | <2.49 | <5.38 | <1.95 | <4.93 | <2.15 | <2.58 |
| Fe-59 | <6.03 | <13.1 | <6.00 | <10.3 | <5.52 | <6.27 |
| Co-60 | <2.47 | <5.25 | <2.57 | <4.63 | <2.41 | <3.25 |
| Zn-65 | <4.91 | <13.4 | <5.84 | <12.6 | <5.30 | <6.01 |
| I-131 | <7.34 | <13.6 | <7.27 | <14.4 | <5.86 | <10.4 |
| Ba/La-140 | <7.03 | <13.0 | <6.66 | <11.4 | <4.80 | <8.61 |

* - Sample required by the TS/ODCM

## TABLE 6-3 (continued)

## CONCENTRATION OF GAMMA EMITTERS IN SURFACE WATER SAMPLES

### Results in units of pCi/liter ± 1 sigma

LOCATION: OSWEGO CITY WATER** — 2000

| NUCLIDE | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE |
|---|---|---|---|---|---|---|
| K-40 | 216 ± 17 | 126 ± 18 | 264 ± 17 | 245 ± 22 | 212 ± 21 | 167 ± 15 |
| Ra-226 | 62 ± 20 | 95 ± 19 | 53 ± 19 | 94 ± 24 | 97 ± 24 | 122 ± 19 |
| Cs-134 | <3.13 | <3.13 | <2.90 | <3.76 | <3.71 | <2.27 |
| Cs-137 | <2.66 | <2.92 | <2.72 | <4.30 | <3.46 | <2.34 |
| Zr-95 | <6.76 | <5.99 | <5.91 | <7.74 | <7.26 | <5.03 |
| Nb-95 | <4.10 | <4.79 | <4.25 | <4.53 | <4.66 | <3.33 |
| Co-58 | <3.79 | <5.18 | <3.36 | <3.63 | <4.32 | <3.23 |
| Mn-54 | <2.86 | <3.32 | <3.60 | <3.57 | <3.57 | <2.68 |
| Fe-59 | <8.79 | <8.68 | <7.36 | <9.43 | <9.86 | <6.84 |
| Co-60 | <3.45 | <4.53 | <2.40 | <4.26 | <3.82 | <3.21 |
| Zn-65 | <6.89 | <8.35 | <8.05 | <7.60 | <7.61 | <5.35 |
| I-131 | <14.7 | <11.2 | <14.5 | <12.2 | <12.8 | <9.81 |
| Ba/La-140 | <12.1 | <11.2 | <8.38 | <10.7 | <12.4 | <7.82 |
| **NUCLIDE** | **JULY** | **AUGUST** | **SEPTEMBER** | **OCTOBER** | **NOVEMBER** | **DECEMBER** |
| K-40 | 163 ± 15 | 195 ± 18 | 163 ± 17 | 268 ± 20 | 264 ± 24 | 272 ± 14 |
| Ra-226 | 107 ± 17 | 103 ± 25 | 82 ± 27 | 66 ± 28 | 97 ± 31 | 97 ± 21 |
| Cs-134 | <2.49 | <3.23 | <1.83 | <2.19 | <2.69 | <1.51 |
| Cs-137 | <2.60 | <3.20 | <3.13 | <3.28 | <4.00 | <2.13 |
| Zr-95 | <5.40 | <6.91 | <5.33 | <6.49 | <7.15 | <3.97 |
| Nb-95 | <3.61 | <5.14 | <3.77 | <4.79 | <4.87 | <2.70 |
| Co-58 | <3.11 | <4.10 | <3.04 | <4.07 | <4.49 | <2.55 |
| Mn-54 | <2.84 | <3.29 | <2.89 | <3.22 | <3.93 | <2.36 |
| Fe-59 | <6.13 | <8.63 | <7.53 | <7.80 | <9.35 | <5.68 |
| Co-60 | <2.71 | <4.03 | <2.83 | <3.03 | <4.15 | <2.06 |
| Zn-65 | <5.82 | <7.71 | <5.79 | <8.69 | <11.1 | <3.08 |
| I-131 | <9.78 | <14.9 | <13.9 | <12.8 | <10.6 | <8.93 |
| Ba/La-140 | <8.09 | <12.50 | <9.83 | <8.71 | <10.7 | <5.78 |

** - Optional sample

## TABLE 6-3 (continued)

## CONCENTRATION OF GAMMA EMITTERS IN SURFACE WATER SAMPLES

**Results in units of pCi/liter ± 1 sigma**

LOCATION: JAMES A. FITZPATRICK (INLET)* **2000**

| NUCLIDE | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE |
|---|---|---|---|---|---|---|
| K-40 | 153 ± 15 | 209 ± 19 | 162 ± 14 | 254 ± 13 | 189 ± 21 | 74.1 ± 10 |
| Ra-226 | 104 ± 16 | <72.9 | 118 ± 16 | 86 ± 16 | 114 ± 21 | 81 ± 20 |
| Cs-134 | <2.22 | <3.60 | <2.43 | <1.36 | <4.18 | <2.33 |
| Cs-137 | <2.70 | <3.15 | <2.60 | <2.32 | <4.53 | <2.29 |
| Zr-95 | <5.38 | <6.59 | <4.74 | <4.24 | <8.20 | <4.57 |
| Nb-95 | <4.20 | <3.84 | <3.68 | <2.80 | <4.92 | <3.13 |
| Co-58 | <3.39 | <4.06 | <3.11 | <2.42 | <4.44 | <2.70 |
| Mn-54 | <2.71 | <3.73 | <2.69 | <2.30 | <4.00 | <2.24 |
| Fe-59 | <7.11 | <9.86 | <6.01 | <5.26 | <8.36 | <5.56 |
| Co-60 | <2.71 | <4.00 | <2.89 | <2.12 | <4.14 | <2.64 |
| Zn-65 | <6.52 | <7.70 | <6.81 | <5.29 | <7.38 | <5.25 |
| I-131 | <9.89 | <9.69 | <7.80 | <6.80 | <11.4 | <6.93 |
| Ba/La-140 | <10.2 | <7.94 | <5.86 | <5.20 | <10.9 | <6.20 |

| NUCLIDE | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER |
|---|---|---|---|---|---|---|
| K-40 | 158 ± 15 | 262 ± 18 | 58 ± 12 | 182 ± 23 | 190 ± 17 | 87 ± 11 |
| Ra-226 | 48 ± 18 | 75 ± 20 | 61 ± 19 | 153 ± 31 | 47 ± 21 | 46 ± 15 |
| Cs-134 | <2.50 | <1.92 | <1.31 | <3.38 | <2.68 | <2.37 |
| Cs-137 | <2.69 | <3.22 | <2.20 | <3.92 | <2.76 | <2.13 |
| Zr-95 | <5.74 | <5.68 | <5.26 | <7.87 | <5.47 | <4.24 |
| Nb-95 | <3.38 | <3.78 | <3.29 | <5.41 | <4.26 | <2.78 |
| Co-58 | <3.06 | <3.54 | <2.56 | <4.69 | <3.08 | <2.50 |
| Mn-54 | <3.16 | <2.96 | <2.33 | <3.94 | <2.89 | <2.28 |
| Fe-59 | <6.71 | <7.78 | <6.24 | <9.39 | <9.01 | <6.20 |
| Co-60 | <2.86 | <3.18 | <2.35 | <4.66 | <3.10 | <2.44 |
| Zn-65 | <6.89 | <6.95 | <6.08 | <9.24 | <7.05 | <5.56 |
| I-131 | <9.03 | <9.96 | <13.5 | <13.8 | <10.1 | <6.61 |
| Ba/La-140 | <7.70 | <8.08 | <9.38 | <10.8 | <7.93 | <5.92 |

* - Sample required by the TS/ODCM

## TABLE 6-4

## CONCENTRATION OF TRITIUM IN SURFACE WATER SAMPLES (QUARTERLY COMPOSITE SAMPLES)

**Results in units of pCi/liter ± 1 sigma**

| LOCATION | PERIOD | DATE | TRITIUM |
|---|---|---|---|
| JAF INLET * | First Quarter | 12/28/99 - 03/31/00 | 198±87 |
| | Second Quarter | 03/31/00 - 07/05/00 | <176 |
| | Third Quarter | 07/05/00 - 09/28/00 | 161±85 |
| | Fourth Quarter | 09/28/00 - 01/02/01 | 197±97 |
| NMP-1 INLET ** | First Quarter | 12/30/99 - 03/31/00 | <158 |
| | Second Quarter | 03/31/00 - 06/30/00 | 186±95 |
| | Third Quarter | 06/30/00 - 09/29/00 | <157 |
| | Fourth Quarter | 09/29/00 - 12/29/00 | 188±97 |
| NMP-2 INLET ** | First Quarter | 12/30/99 - 03/31/00 | 196±87 |
| | Second Quarter | 03/31/00 - 06/30/00 | 229±97 |
| | Third Quarter | 06/30/00 - 09/29/00 | 179±86 |
| | Fourth Quarter | 09/29/00 - 12/29/00 | <180 |
| OSWEGO CITY WATER ** | First Quarter | 12/30/99 - 03/31/00 | 224±88 |
| | Second Quarter | 03/31/00 - 06/30/00 | 246±98 |
| | Third Quarter | 06/30/00 - 09/29/00 | <180 |
| | Fourth Quarter | 09/29/00 - 12/29/00 | <180 |
| OSWEGO STEAM STATION * (CONTROL) | First Quarter | 12/30/99 - 03/31/00 | 237±89 |
| | Second Quarter | 03/31/00 - 06/30/00 | 196±96 |
| | Third Quarter | 06/30/00 - 09/2900 | 204±87 |
| | Fourth Quarter | 09/29/00 - 12/29/00 | <180 |

* - Sample required by the TS/ODCM
**- Optional sample.

## TABLE 6-5
### NMP / 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* | R-2 OFF* | R-3 OFF* | R-4 OFF* | R-5 OFF* | D-2 OFF | E-OFF | F-OFF | G-OFF |
|---|---|---|---|---|---|---|---|---|---|
| 01/04/00 | 0.020±0.002 | 0.016±0.001 | 0.018±0.002 | 0.017±0.001 | 0.016±0.001 | 0.018±0.002 | 0.018±0.002 | 0.017±0.001 | 0.017±0.001 |
| 01/11/00 | 0.016±0.002 | 0.017±0.002 | 0.018±0.002 | 0.015±0.001 | 0.020±0.002 | 0.011±0.001 | 0.019±0.002 | 0.017±0.002 | 0.017±0.001 |
| 01/18/00 | 0.025±0.002 | 0.025±0.002 | 0.026±0.002 | 0.028±0.002 | 0.027±0.002 | 0.025±0.002 | 0.028±0.002 | 0.029±0.002 | 0.020±0.001 |
| 01/25/00 | 0.025±0.002 | 0.026±0.002 | 0.024±0.002 | 0.024±0.002 | 0.024±0.002 | 0.022±0.002 | 0.028±0.002 | 0.024±0.002 | 0.021±0.001 |
| 02/01/00 | 0.018±0.002 | 0.015±0.001 | 0.018±0.002 | 0.016±0.001 | 0.017±0.002 | 0.018±0.002 | 0.016±0.001 | 0.018±0.002 | 0.016±0.001 |
| 02/08/00 | 0.021±0.002 | 0.019±0.002 | 0.020±0.002 | 0.018±0.002 | 0.024±0.002 | 0.024±0.002 | 0.021±0.002 | 0.020±0.002 | 0.022±0.001 |
| 02/15/00 | 0.028±0.002 | 0.025±0.002 | 0.026±0.002 | 0.024±0.002 | 0.024±0.002 | 0.023±0.002 | 0.025±0.002 | 0.025±0.002 | 0.025±0.002 |
| 02/22/00 | 0.017±0.002 | 0.018±0.002 | 0.016±0.002 | 0.018±0.002 | 0.017±0.002 | 0.016±0.001 | 0.017±0.002 | 0.019±0.001 | 0.019±0.001 |
| 02/29/00 | 0.016±0.002 | 0.016±0.001 | 0.013±0.001 | 0.012±0.001 | 0.013±0.001 | 0.015±0.001 | 0.013±0.001 | 0.014±0.001 | 0.013±0.001 |
| 03/07/00 | 0.021±0.002 | 0.016±0.002 | 0.016±0.002 | 0.016±0.002 | 0.018±0.002 | 0.015±0.002 | 0.018±0.002 | 0.016±0.001 | 0.017±0.002 |
| 03/14/00 | 0.019±0.002 | 0.018±0.002 | 0.018±0.002 | 0.017±0.002 | 0.019±0.002 | 0.018±0.002 | 0.019±0.002 | 0.018±0.001 | 0.018±0.001 |
| 03/21/00 | 0.013±0.001 | 0.014±0.001 | 0.013±0.001 | 0.016±0.002 | 0.012±0.001 | 0.012±0.001 | 0.013±0.001 | 0.014±0.001 | 0.014±0.001 |
| 03/28/00 | 0.010±0.001 | 0.013±0.001 | 0.014±0.001 | 0.012±0.001 | 0.014±0.001 | 0.013±0.001 | 0.013±0.001 | 0.012±0.001 | 0.011±0.001 |
| 04/04/00 | 0.010±0.001 | 0.010±0.001 | 0.014±0.001 | 0.013±0.001 | 0.009±0.001 | 0.013±0.001 | 0.010±0.001 | 0.010±0.001 | 0.010±0.001 |
| 04/11/00 | 0.014±0.001 | 0.016±0.001 | 0.015±0.001 | 0.015±0.002 | 0.014±0.001 | 0.016±0.002 | 0.013±0.001 | 0.015±0.001 | 0.016±0.001 |
| 04/18/00 | 0.012±0.001 | 0.010±0.001 | 0.012±0.001 | 0.011±0.001 | 0.012±0.001 | 0.010±0.001 | 0.012±0.001 | 0.011±0.001 | 0.009±0.001 |
| 04/25/00 | 0.017±0.002 | 0.015±0.001 | 0.018±0.002 | 0.018±0.002 | 0.016±0.002 | 0.014±0.002 | 0.019±0.002 | 0.016±0.001 | 0.013±0.001 |
| 05/02/00 | 0.019±0.002 | 0.023±0.002 | 0.022±0.002 | 0.025±0.002 | 0.024±0.002 | 0.021±0.002 | 0.022±0.002 | 0.020±0.002 | 0.021±0.002 |
| 05/09/00 | 0.012±0.001 | 0.010±0.001 | 0.011±0.001 | 0.012±0.001 | 0.011±0.001 | 0.003±0.001 | 0.011±0.001 | 0.001±0.001 | (1) |
| 05/16/00 | 0.012±0.001 | 0.013±0.001 | 0.013±0.001 | 0.014±0.001 | 0.013±0.001 | 0.012±0.001 | 0.011±0.001 | 0.011±0.001 | 0.014±0.001 |
| 05/23/00 | 0.007±0.001 | 0.007±0.001 | 0.005±0.001 | 0.007±0.001 | 0.006±0.001 | 0.006±0.001 | 0.008±0.001 | 0.007±0.001 | 0.007±0.001 |
| 05/30/00 | 0.008±0.001 | 0.012±0.001 | 0.012±0.001 | 0.011±0.001 | 0.012±0.001 | 0.011±0.001 | 0.010±0.001 | 0.010±0.001 | 0.012±0.001 |

* Sample locations required by TS/ODCM

(1) No sample results due to torn filter

## TABLE 6-5 (continued)
### NMP / JAF SITE
### ENVIRONMENTAL AIRBORNE PARTICULATE SAMPLES – OFF-SITE STATIONS
### GROSS BETA ACTIVITY pCi/m$^3$ ± 1 Sigma

**LOCATION**

| Week Start Date | R-1 OFF* | R-2 OFF* | R-3 OFF* | R-4 OFF* | R-5 OFF* | D-2 OFF | E-OFF | F-OFF | G-OFF |
|---|---|---|---|---|---|---|---|---|---|
| 06/06/00 | 0.011±0.001 | 0.012±0.001 | 0.013±0.001 | 0.014±0.001 | 0.014±0.001 | 0.015±0.002 | 0.014±0.002 | 0.016±0.001 | 0.013±0.001 |
| 06/13/00 | 0.009±0.001 | 0.007±0.001 | 0.008±0.001 | 0.007±0.001 | 0.007±0.001 | 0.006±0.001 | 0.008±0.001 | 0.006±0.001 | 0.010±0.001 |
| 06/20/00 | 0.013±0.001 | 0.013±0.001 | 0.011±0.001 | 0.013±0.001 | 0.013±0.001 | 0.010±0.001 | 0.013±0.001 | 0.014±0.001 | 0.014±0.001 |
| 06/27/00 | 0.014±0.001 | 0.015±0.001 | 0.012±0.001 | 0.016±0.001 | 0.017±0.001 | 0.017±0.001 | 0.015±0.001 | 0.014±0.001 | 0.015±0.001 |
| 07/05/00 | 0.011±0.002 | 0.010±0.001 | 0.010±0.002 | 0.010±0.001 | 0.011±0.002 | 0.009±0.001 | 0.014±0.002 | 0.012±0.002 | 0.011±0.001 |
| 07/11/00 | 0.010±0.001 | 0.013±0.001 | 0.011±0.001 | 0.011±0.001 | 0.011±0.001 | 0.012±0.001 | 0.010±0.001 | 0.012±0.001 | 0.009±0.001 |
| 07/18/00 | 0.007±0.001 | 0.009±0.001 | 0.008±0.001 | 0.007±0.001 | 0.010±0.001 | 0.009±0.001 | 0.009±0.001 | 0.012±0.001 | 0.008±0.001 |
| 07/25/00 | 0.010±0.001 | 0.010±0.001 | 0.008±0.001 | 0.008±0.001 | 0.007±0.001 | 0.008±0.001 | 0.010±0.001 | 0.009±0.001 | 0.011±0.001 |
| 08/01/00 | 0.015±0.002 | 0.015±0.002 | 0.015±0.002 | 0.017±0.002 | 0.012±0.002 | 0.016±0.002 | 0.012±0.001 | 0.015±0.002 | 0.016±0.002 |
| 08/08/00 | 0.016±0.001 | 0.014±0.001 | 0.013±0.001 | 0.013±0.001 | 0.014±0.001 | 0.014±0.001 | 0.017±0.002 | 0.017±0.002 | 0.015±0.001 |
| 08/15/00 | 0.011±0.001 | 0.011±0.001 | 0.011±0.001 | 0.010±0.001 | 0.008±0.001 | 0.008±0.001 | 0.007±0.001 | 0.012±0.001 | 0.011±0.001 |
| 08/22/00 | 0.014±0.002 | 0.016±0.002 | 0.018±0.002 | 0.013±0.002 | 0.017±0.002 | 0.018±0.002 | 0.017±0.002 | 0.015±0.002 | 0.018±0.002 |
| 08/29/00 | 0.016±0.002 | 0.014±0.001 | 0.017±0.002 | 0.015±0.002 | 0.016±0.002 | 0.016±0.002 | 0.013±0.001 | 0.013±0.001 | 0.014±0.001 |
| 09/05/00 | 0.017±0.002 | 0.019±0.002 | 0.020±0.002 | 0.018±0.002 | 0.018±0.002 | 0.020±0.002 | 0.019±0.002 | 0.018±0.002 | 0.015±0.001 |
| 09/12/00 | 0.016±0.002 | 0.021±0.002 | 0.016±0.002 | 0.013±0.001 | 0.017±0.002 | 0.017±0.002 | 0.016±0.002 | 0.017±0.002 | 0.016±0.001 |
| 09/19/00 | 0.014±0.001 | 0.014±0.001 | 0.015±0.001 | 0.016±0.002 | 0.016±0.001 | 0.014±0.001 | 0.014±0.001 | 0.014±0.001 | 0.015±0.001 |
| 09/26/00 | 0.018±0.002 | 0.033±0.002 | 0.020±0.002 | 0.020±0.002 | 0.023±0.002 | 0.020±0.002 | 0.021±0.002 | 0.020±0.002 | 0.016±0.004 |
| 10/03/00 | 0.012±0.001 | 0.013±0.001 | 0.015±0.001 | 0.014±0.001 | 0.012±0.001 | 0.011±0.001 | 0.012±0.001 | 0.011±0.001 | 0.011±0.001 |
| 10/10/00 | 0.026±0.002 | 0.029±0.002 | 0.026±0.002 | 0.029±0.002 | 0.025±0.002 | 0.025±0.002 | 0.025±0.002 | 0.024±0.002 | 0.027±0.002 |
| 10/17/00 | 0.020±0.002 | 0.020±0.002 | 0.018±0.002 | 0.018±0.002 | 0.019±0.002 | 0.020±0.002 | 0.021±0.002 | 0.018±0.002 | 0.018±0.002 |
| 10/24/00 | 0.022±0.002 | 0.024±0.002 | 0.020±0.002 | 0.021±0.002 | 0.025±0.002 | 0.023±0.002 | 0.022±0.002 | 0.020±0.002 | 0.021±0.002 |
| 10/31/00 | 0.014 ±0.001 | 0.011 ±0.001 | 0.011 ±0.001 | 0.013 ±0.002 | 0.014 ±0.001 | 0.013 ±0.001 | 0.014 ±0.001 | 0.014 ±0.001 | 0.012 ±0.001 |
| 11/07/00 | 0.007 ±0.001 | 0.008 ±0.001 | 0.006 ±0.001 | 0.005 ±0.001 | 0.006 ±0.001 | 0.009 ±0.001 | 0.007 ±0.001 | 0.007 ±0.001 | 0.006 ±0.001 |
| 11/14/00 | 0.017 ±0.002 | 0.014 ±0.001 | 0.017 ±0.002 | 0.019 ±0.002 | 0.017 ±0.002 | 0.019 ±0.002 | 0.017 ±0.002 | 0.019 ±0.002 | 0.016 ±0.001 |

## TABLE 6-5 (continued)

**NMP / 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* | R-2 OFF* | R-3 OFF* | R-4 OFF* | R-5 OFF* | D-2 OFF | E-OFF | F-OFF | G-OFF |
|---|---|---|---|---|---|---|---|---|---|
| 11/21/00 | 0.009±0.001 | 0.011±0.001 | 0.011±0.001 | 0.010±0.001 | 0.010±0.001 | 0.008±0.001 | 0.011±0.001 | 0.013±0.001 | 0.009±0.001 |
| 11/28/00 | 0.013±0.001 | 0.012±0.001 | 0.012±0.001 | 0.013±0.002 | 0.010±0.001 | 0.010±0.001 | 0.011±0.001 | 0.011±0.001 | 0.011±0.001 |
| 12/05/00 | 0.012±0.001 | 0.015±0.001 | 0.012±0.001 | 0.012±0.001 | 0.012±0.001 | 0.013±0.001 | 0.013±0.001 | 0.013±0.001 | 0.015±0.001 |
| 12/12/00 | 0.014±0.002 | 0.012±0.001 | 0.011±0.001 | 0.014±0.001 | 0.014±0.001 | 0.013±0.001 | 0.013±0.001 | 0.016±0.001 | 0.014±0.001 |
| 12/19/00 | 0.017±0.002 | 0.021±0.002 | 0.018±0.002 | 0.019±0.002 | 0.022±0.002 | 0.015±0.001 | 0.022±0.002 | 0.021±0.002 | 0.020±0.002 |
| 12/26/00 | 0.010±0.001 | 0.010±0.001 | 0.009±0.001 | 0.010±0.001 | 0.007±0.001 | 0.009±0.001 | 0.011±0.001 | 0.011±0.001 | 0.008±0.001 |

* Sample locations required by the TS/ODCM

**TABLE 6-6**
**NMP / 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 |
|---|---|---|---|---|---|---|
| 01/03/00 | 0.016±0.002 | 0.018±0.001 | 0.017±0.002 | 0.015±0.002 | 0.017±0.002 | 0.017±0.002 |
| 01/10/00 | 0.017±0.002 | 0.017±0.002 | 0.016±0.002 | 0.018±0.002 | 0.019±0.002 | 0.018±0.002 |
| 01/17/00 | 0.025±0.002 | 0.024±0.002 | 0.024±0.002 | (1) | 0.021±0.002 | 0.023±0.002 |
| 01/24/00 | 0.033±0.002 | 0.029±0.002 | 0.031±0.002 | 0.030±0.002 | 0.025±0.002 | 0.029±0.002 |
| 01/31/00 | 0.020±0.002 | 0.019±0.002 | 0.022±0.002 | 0.020±0.002 | 0.019±0.002 | 0.018±0.002 |
| 02/07/00 | 0.026±0.002 | 0.022±0.002 | 0.021±0.002 | 0.022±0.002 | 0.019±0.002 | 0.021±0.002 |
| 02/14/00 | 0.028±0.002 | 0.028±0.002 | 0.023±0.002 | 0.027±0.002 | 0.022±0.002 | 0.025±0.002 |
| 02/22/00 | 0.021±0.002 | 0.018±0.002 | 0.021±0.002 | 0.020±0.002 | 0.020±0.002 | 0.017±0.002 |
| 02/28/00 | 0.011±0.001 | 0.012±0.001 | 0.013±0.001 | 0.013±0.001 | 0.013±0.001 | 0.011±0.001 |
| 03/06/00 | 0.014±0.001 | 0.016±0.001 | 0.012±0.002 | 0.016±0.002 | 0.018±0.002 | 0.014±0.001 |
| 03/13/00 | 0.017±0.002 | 0.018±0.001 | 0.018±0.002 | 0.016±0.002 | 0.016±0.001 | 0.016±0.001 |
| 03/20/00 | 0.012±0.001 | 0.015±0.001 | 0.012±0.001 | 0.013±0.001 | 0.015±0.001 | 0.013±0.001 |
| 03/27/00 | 0.012±0.001 | 0.013±0.001 | 0.013±0.001 | 0.014±0.001 | 0.014±0.001 | 0.014±0.001 |
| 04/03/00 | 0.011±0.001 | 0.012±0.001 | 0.009±0.001 | 0.013±0.001 | 0.012±0.001 | 0.013±0.001 |
| 04/10/00 | 0.015±0.001 | 0.016±0.002 | 0.013±0.001 | 0.014±0.001 | 0.016±0.002 | 0.015±0.001 |
| 04/17/00 | 0.013±0.001 | 0.007±0.001 | 0.012±0.001 | 0.009±0.001 | 0.009±0.001 | 0.011±0.001 |
| 04/24/00 | 0.020±0.002 | 0.014±0.001 | 0.016±0.002 | 0.017±0.002 | 0.018±0.002 | 0.016±0.002 |
| 05/01/00 | 0.020±0.002 | 0.020±0.002 | 0.018±0.002 | 0.019±0.002 | 0.020±0.002 | 0.018±0.002 |
| 05/08/00 | 0.011±0.001 | 0.010±0.001 | 0.010±0.001 | 0.010±0.001 | 0.014±0.001 | 0.001±0.001 |
| 05/15/00 | 0.001±0.001 | 0.014±0.001 | 0.012±0.001 | 0.011±0.001 | 0.011±0.001 | 0.012±0.001 |
| 05/22/00 | 0.004±0.001 | 0.005±0.001 | 0.006±0.001 | 0.006±0.001 | 0.004±0.001 | 0.005±0.001 |
| 05/30/00 | 0.010±0.001 | 0.011±0.001 | 0.008±0.001 | 0.010±0.001 | 0.009±0.001 | 0.009±0.001 |
| 06/05/00 | 0.016±0.002 | 0.014±0.001 | 0.015±0.001 | 0.013±0.001 | 0.013±0.001 | 0.014±0.002 |
| 06/12/00 | 0.008±0.001 | 0.008±0.001 | 0.006±0.001 | 0.006±0.001 | 0.008±0.001 | 0.009±0.001 |
| 06/19/00 | 0.012±0.001 | 0.010±0.001 | 0.013±0.001 | 0.016±0.001 | 0.010±0.001 | 0.011±0.001 |
| 06/26/00 | 0.010±0.001 | 0.011±0.001 | 0.012±0.001 | 0.013±0.001 | 0.011±0.001 | 0.012±0.001 |

# TABLE 6-6 (continued)
## NMP / JAF SITE
## ENVIRONMENTAL AIRBORNE PARTICULATE SAMPLES – ON-SITE STATIONS
## GROSS BETA ACTIVITY pCi/m$^3$ ± 1 Sigma

**LOCATION**

| Week Start Date | D1 ON-SITE | G ON-SITE | H ON-SITE | I ON-SITE | J ON-SITE | K ON-SITE |
|---|---|---|---|---|---|---|
| 07/03/00 | 0.011±0.001 | 0.008±0.001 | 0.012±0.001 | 0.013±0.001 | 0.011±0.001 | 0.010±0.001 |
| 07/10/00 | 0.013±0.001 | 0.009±0.001 | 0.009±0.001 | 0.011±0.001 | 0.009±0.001 | 0.009±0.001 |
| 07/17/00 | 0.008±0.001 | 0.007±0.001 | 0.008±0.001 | 0.007±0.001 | 0.007±0.001 | 0.006±0.001 |
| 07/24/00 | 0.011±0.001 | 0.011±0.001 | 0.010±0.001 | 0.008±0.001 | 0.010±0.001 | 0.009±0.001 |
| 07/31/00 | 0.012±0.001 | 0.012±0.001 | 0.012±0.001 | 0.014±0.001 | 0.012±0.001 | 0.011±0.001 |
| 08/07/00 | 0.013±0.001 | 0.014±0.001 | 0.015±0.001 | 0.012±0.001 | 0.013±0.002 | 0.011±0.001 |
| 08/14/00 | 0.011±0.001 | 0.009±0.001 | 0.009±0.001 | 0.007±0.001 | 0.010±0.001 | 0.010±0.001 |
| 08/21/00 | 0.014±0.001 | 0.010±0.001 | 0.013±0.001 | 0.014±0.002 | 0.013±0.001 | 0.015±0.002 |
| 08/28/00 | 0.017±0.001 | 0.017±0.001 | 0.016±0.001 | 0.013±0.001 | 0.014±0.001 | 0.015±0.001 |
| 09/05/00 | 0.020±0.002 | 0.015±0.002 | 0.019±0.002 | 0.019±0.002 | 0.022±0.002 | 0.017±0.002 |
| 09/11/00 | 0.012±0.001 | 0.012±0.001 | 0.012±0.001 | 0.014±0.001 | 0.015±0.002 | 0.014±0.001 |
| 09/18/00 | 0.019±0.002 | 0.013±0.001 | 0.014±0.001 | 0.016±0.002 | 0.017±0.002 | 0.018±0.002 |
| 09/25/00 | 0.017±0.002 | 0.021±0.002 | 0.019±0.002 | 0.015±0.001 | 0.020±0.002 | 0.020±0.002 |
| 10/02/00 | 0.018±0.002 | 0.016±0.001 | 0.014±0.001 | 0.014±0.001 | 0.016±0.002 | 0.016±0.002 |
| 10/09/00 | 0.029±0.002 | 0.029±0.002 | 0.027±0.002 | 0.028±0.002 | 0.029±0.002 | 0.024±0.002 |
| 10/16/00 | 0.018±0.002 | 0.018±0.002 | 0.018±0.002 | 0.018±0.002 | 0.019±0.002 | 0.020±0.002 |
| 10/23/00 | 0.027±0.002 | 0.023±0.002 | 0.024±0.002 | 0.022±0.002 | 0.022±0.002 | 0.020±0.002 |
| 10/30/00 | 0.011±0.001 | 0.011±0.001 | 0.011±0.001 | 0.009±0.001 | 0.011±0.001 | 0.010±0.001 |
| 11/06/00 | 0.009±0.001 | 0.008±0.001 | 0.009±0.001 | 0.006±0.001 | 0.007±0.001 | 0.008±0.001 |
| 11/14/00 | 0.018±0.002 | 0.015±0.002 | 0.019±0.002 | 0.015±0.002 | 0.016±0.002 | 0.016±0.002 |
| 11/20/00 | 0.010±0.001 | 0.009±0.001 | 0.008±0.001 | 0.008±0.001 | 0.008±0.001 | 0.009±0.001 |
| 11/27/00 | 0.012±0.001 | 0.011±0.001 | 0.012±0.001 | 0.010±0.001 | 0.013±0.002 | 0.012±0.001 |
| 12/04/00 | 0.014±0.001 | 0.014±0.001 | 0.016±0.002 | 0.013±0.002 | 0.014±0.002 | 0.016±0.002 |
| 12/11/00 | 0.013±0.001 | 0.013±0.001 | 0.015±0.002 | 0.014±0.002 | 0.012±0.001 | 0.014±0.002 |
| 12/18/00 | 0.023±0.002 | 0.019±0.001 | 0.024±0.002 | 0.021±0.002 | 0.016±0.001 | 0.022±0.002 |
| 12/26/01 | 0.009±0.001 | 0.010±0.001 | 0.010±0.001 | 0.008±0.001 | 0.009±0.001 | 0.010±0.001 |

(1) No sample results due to lost filter or pump failure

# TABLE 6-7
## NMP / 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* | R-2 OFF* | R-3 OFF* | R-4 OFF* | R-5 OFF* | D-2 OFF | E-OFF | F-OFF | G-OFF |
|---|---|---|---|---|---|---|---|---|---|
| 01/04/00 | <0.019 | <0.014 | <0.017 | <0.017 | <0.021 | <0.016 | <0.014 | <0.011 | <0.012 |
| 01/11/00 | <0.011 | <0.016 | <0.014 | <0.007 | <0.017 | <0.014 | <0.013 | <0.019 | <0.012 |
| 01/18/00 | <0.018 | <0.012 | <0.014 | <0.018 | <0.018 | <0.014 | <0.018 | <0.016 | <0.016 |
| 01/25/00 | <0.017 | <0.014 | <0.020 | <0.012 | <0.024 | <0.014 | <0.020 | <0.016 | <0.016 |
| 02/01/00 | <0.018 | <0.012 | <0.018 | <0.013 | <0.014 | <0.014 | <0.020 | <0.017 | <0.011 |
| 02/08/00 | <0.015 | <0.020 | <0.018 | <0.012 | <0.018 | <0.038 | <0.012 | <0.015 | <0.014 |
| 02/15/00 | <0.025 | <0.017 | <0.015 | <0.016 | <0.015 | <0.016 | <0.024 | <0.013 | <0.017 |
| 02/22/00 | <0.013 | <0.013 | <0.020 | <0.016 | <0.018 | <0.022 | <0.018 | <0.016 | <0.020 |
| 02/29/00 | <0.014 | <0.013 | <0.014 | <0.016 | <0.018 | <0.014 | <0.018 | <0.014 | <0.018 |
| 03/07/00 | <0.014 | <0.015 | <0.014 | <0.017 | <0.017 | <0.014 | <0.009 | <0.015 | <0.019 |
| 03/14/00 | <0.015 | <0.014 | <0.012 | <0.015 | <0.019 | <0.015 | <0.018 | <0.015 | <0.011 |
| 03/21/00 | <0.018 | <0.013 | <0.019 | <0.021 | <0.014 | <0.016 | <0.021 | <0.017 | <0.012 |
| 03/28/00 | <0.016 | <0.013 | <0.017 | <0.018 | <0.017 | <0.014 | <0.020 | <0.012 | <0.014 |
| 04/04/00 | <0.014 | <0.014 | <0.017 | <0.015 | <0.016 | <0.019 | <0.018 | <0.017 | <0.019 |
| 04/11/00 | <0.013 | <0.018 | <0.019 | <0.016 | <0.019 | <0.018 | <0.016 | <0.016 | <0.017 |
| 04/18/00 | <0.015 | <0.018 | <0.023 | <0.015 | <0.020 | <0.016 | <0.017 | <0.017 | <0.024 |
| 04/25/00 | <0.016 | <0.012 | <0.017 | <0.021 | <0.019 | <0.013 | <0.016 | <0.013 | <0.019 |
| 05/02/00 | <0.016 | <0.022 | <0.016 | <0.013 | <0.024 | <0.018 | <0.014 | <0.010 | <0.017 |
| 05/09/00 | <0.014 | <0.018 | <0.014 | <0.016 | <0.012 | <0.017 | <0.015 | <0.016 | <0.013 |
| 05/16/00 | <0.011 | <0.016 | <0.020 | <0.017 | <0.014 | <0.013 | <0.018 | <0.016 | <0.011 |
| 05/23/00 | <0.010 | <0.012 | <0.018 | <0.012 | <0.014 | <0.018 | <0.017 | <0.012 | <0.012 |
| 05/30/00 | <0.023 | <0.011 | <0.019 | <0.015 | <0.015 | <0.020 | <0.016 | <0.017 | <0.011 |

* Sample locations required by TS/ODCM

## TABLE 6-7 (continued)
### NMP / 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* | R-2 OFF* | R-3 OFF* | R-4 OFF* | R-5 OFF* | D-2 OFF | E-OFF | F-OFF | G-OFF |
|---|---|---|---|---|---|---|---|---|---|
| 06/06/00 | <0.015 | <0.021 | <0.021 | <0.015 | <0.020 | <0.020 | <0.012 | <0.010 | <0.013 |
| 06/13/00 | <0.015 | <0.015 | <0.018 | <0.019 | <0.014 | <0.013 | <0.014 | <0.018 | <0.015 |
| 06/20/00 | <0.016 | <0.016 | <0.024 | <0.021 | <0.018 | <0.015 | <0.015 | <0.013 | <0.015 |
| 06/27/00 | <0.015 | <0.014 | <0.020 | <0.010 | <0.014 | <0.017 | <0.015 | <0.011 | <0.012 |
| 07/05/00 | <0.016 | <0.018 | <0.019 | <0.019 | <0.024 | <0.017 | <0.023 | <0.016 | <0.021 |
| 07/11/00 | <0.011 | <0.013 | <0.021 | <0.018 | <0.024 | <0.012 | <0.009 | <0.016 | <0.016 |
| 07/18/00 | <0.017 | <0.014 | <0.017 | <0.020 | <0.014 | <0.010 | <0.015 | <0.019 | <0.014 |
| 07/25/00 | <0.013 | <0.014 | <0.011 | <0.017 | <0.019 | <0.022 | <0.011 | <0.015 | <0.014 |
| 08/01/00 | <0.017 | <0.015 | <0.014 | <0.020 | <0.013 | <0.014 | <0.015 | <0.014 | <0.013 |
| 08/08/00 | <0.015 | <0.016 | <0.014 | <0.015 | <0.015 | <0.015 | <0.018 | <0.014 | <0.014 |
| 08/15/00 | <0.016 | <0.014 | <0.020 | <0.017 | <0.015 | <0.020 | <0.013 | <0.016 | <0.015 |
| 08/22/00 | <0.017 | <0.013 | <0.018 | <0.017 | <0.013 | <0.015 | <0.014 | <0.017 | <0.015 |
| 08/29/00 | <0.021 | <0.026 | <0.025 | <0.020 | <0.022 | <0.020 | <0.027 | <0.024 | <0.024 |
| 09/05/00 | <0.022 | <0.020 | <0.017 | <0.021 | <0.019 | <0.015 | <0.025 | <0.020 | <0.018 |
| 09/12/00 | <0.019 | <0.013 | <0.015 | <0.014 | <0.018 | <0.020 | <0.011 | <0.014 | <0.014 |
| 09/19/00 | <0.015 | <0.012 | <0.015 | <0.016 | <0.014 | <0.015 | <0.020 | <0.012 | <0.012 |
| 09/26/00 | <0.008 | <0.017 | <0.015 | <0.015 | <0.014 | <0.018 | <0.014 | <0.011 | <0.057 |
| 10/03/00 | <0.014 | <0.016 | <0.012 | <0.021 | <0.019 | <0.016 | <0.014 | <0.018 | <0.016 |
| 10/10/00 | <0.010 | <0.015 | <0.013 | <0.015 | <0.017 | <0.018 | <0.019 | <0.012 | <0.017 |
| 10/17/00 | <0.013 | <0.013 | <0.012 | <0.013 | <0.021 | <0.018 | <0.011 | <0.010 | <0.014 |
| 10/24/00 | <0.017 | <0.013 | <0.015 | <0.017 | <0.012 | <0.014 | <0.020 | <0.012 | <0.016 |
| 10/31/00 | <0.013 | <0.016 | <0.019 | <0.021 | <0.017 | <0.011 | <0.015 | <0.013 | <0.017 |
| 11/01/00 | <0.013 | <0.016 | <0.020 | <0.013 | <0.015 | <0.018 | <0.017 | <0.014 | <0.010 |

* Sample locations required by TS/ODCM

## TABLE 6-7 (continued)
### NMP / 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* | R-2 OFF* | R-3 OFF* | R-4 OFF* | R-5 OFF* | D-2 OFF | E-OFF | F-OFF | G-OFF |
|---|---|---|---|---|---|---|---|---|---|
| 11/14/00 | <0.012 | <0.010 | <0.015 | <0.016 | <0.016 | <0.012 | <0.010 | <0.017 | <0.012 |
| 11/21/00 | <0.012 | <0.015 | <0.018 | <0.015 | <0.014 | <0.013 | <0.015 | <0.015 | <0.016 |
| 11/28/00 | <0.016 | <0.018 | <0.016 | <0.016 | <0.014 | <0.016 | <0.012 | <0.014 | <0.012 |
| 12/05/00 | <0.015 | <0.013 | <0.008 | <0.017 | <0.016 | <0.019 | <0.010 | <0.013 | <0.016 |
| 12/12/00 | <0.014 | <0.014 | <0.014 | <0.016 | <0.020 | <0.018 | <0.013 | <0.015 | <0.012 |
| 12/19/00 | <0.009 | <0.015 | <0.014 | <0.014 | <0.016 | <0.013 | <0.012 | <0.012 | <0.013 |
| 12/26/00 | <0.016 | <0.012 | <0.015 | <0.014 | <0.013 | <0.016 | <0.013 | <0.014 | <0.016 |

* Sample locations required by TS/ODCM

# TABLE 6-8
## NMP / 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 |
|---|---|---|---|---|---|---|
| 01/03/00 | <0.016 | <0.018 | <0.018 | <0.023 | <0.022 | <0.019 |
| 01/10/00 | <0.015 | <0.024 | <0.018 | <0.026 | <0.012 | <0.026 |
| 01/17/00 | <0.016 | <0.017 | <0.012 | (1) | <0.014 | <0.018 |
| 01/24/00 | <0.023 | <0.013 | <0.014 | <0.019 | <0.015 | <0.018 |
| 01/31/00 | <0.022 | <0.023 | <0.018 | <0.031 | <0.017 | <0.017 |
| 02/07/00 | <0.017 | <0.020 | <0.018 | <0.018 | <0.018 | <0.020 |
| 02/14/00 | <0.004 | <0.013 | <0.013 | <0.012 | <0.017 | <0.014 |
| 02/22/00 | <0.011 | <0.010 | <0.021 | <0.021 | <0.018 | <0.014 |
| 02/28/00 | <0.013 | <0.011 | <0.016 | <0.018 | <0.018 | <0.014 |
| 03/06/00 | <0.014 | <0.012 | <0.021 | <0.016 | <0.012 | <0.013 |
| 03/13/00 | <0.011 | <0.015 | <0.014 | <0.020 | <0.012 | <0.013 |
| 03/20/00 | <0.010 | <0.010 | <0.014 | <0.018 | <0.019 | <0.010 |
| 03/27/00 | <0.016 | <0.015 | <0.016 | <0.015 | <0.020 | <0.021 |
| 04/03/00 | <0.014 | <0.016 | <0.016 | <0.011 | <0.018 | <0.016 |
| 04/10/00 | <0.014 | <0.013 | <0.013 | <0.014 | <0.017 | <0.016 |
| 04/17/00 | <0.011 | <0.014 | <0.023 | <0.017 | <0.014 | <0.015 |
| 04/24/00 | <0.016 | <0.013 | <0.023 | <0.017 | <0.012 | <0.013 |
| 05/01/00 | <0.014 | <0.014 | <0.013 | <0.016 | <0.017 | <0.017 |
| 05/08/00 | <0.012 | <0.014 | <0.015 | <0.019 | <0.018 | <0.017 |
| 05/15/00 | <0.013 | <0.015 | <0.015 | <0.014 | <0.010 | <0.016 |
| 05/22/00 | <0.013 | <0.012 | <0.012 | <0.012 | <0.015 | <0.013 |
| 05/30/00 | <0.014 | <0.018 | <0.017 | <0.017 | <0.022 | <0.018 |
| 06/05/00 | <0.016 | <0.017 | <0.013 | <0.015 | <0.016 | <0.017 |
| 06/12/00 | <0.011 | <0.014 | <0.014 | <0.014 | <0.013 | <0.012 |
| 06/19/00 | <0.019 | <0.011 | <0.015 | <0.018 | <0.016 | <0.020 |
| 06/26/00 | <0.014 | <0.016 | <0.015 | <0.015 | <0.017 | <0.023 |

(1) No sample results due to lost filter or pump failure

# TABLE 6-8 (continued)
## NMP / 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 |
|---|---|---|---|---|---|---|
| 07/03/00 | <0.023 | <0.013 | <0.014 | <0.014 | <0.016 | <0.013 |
| 07/10/00 | <0.008 | <0.013 | <0.009 | <0.015 | <0.018 | <0.020 |
| 07/17/00 | <0.011 | <0.018 | <0.016 | <0.014 | <0.020 | <0.015 |
| 07/24/00 | <0.016 | <0.015 | <0.017 | <0.012 | <0.018 | <0.016 |
| 07/31/00 | <0.016 | <0.013 | <0.016 | <0.015 | <0.019 | <0.015 |
| 08/07/00 | <0.012 | <0.012 | <0.014 | <0.011 | <0.014 | <0.015 |
| 08/14/00 | <0.009 | <0.014 | <0.014 | <0.011 | <0.013 | <0.013 |
| 08/21/00 | <0.017 | <0.016 | <0.013 | <0.014 | <0.013 | <0.016 |
| 08/28/00 | <0.016 | <0.018 | <0.016 | <0.015 | <0.016 | <0.016 |
| 09/05/00 | <0.026 | <0.028 | <0.017 | <0.036 | <0.029 | <0.019 |
| 09/11/00 | <0.014 | <0.016 | <0.017 | <0.017 | <0.010 | <0.017 |
| 09/18/00 | <0.010 | <0.012 | <0.017 | <0.014 | <0.014 | <0.022 |
| 09/25/00 | <0.015 | <0.011 | <0.016 | <0.015 | <0.016 | <0.017 |
| 10/02/00 | <0.018 | <0.017 | <0.014 | <0.021 | <0.017 | <0.023 |
| 10/09/00 | <0.009 | <0.013 | <0.012 | <0.016 | <0.018 | <0.022 |
| 10/16/00 | <0.013 | <0.014 | <0.012 | <0.015 | <0.019 | <0.017 |
| 10/23/00 | <0.011 | <0.015 | <0.016 | <0.013 | <0.013 | <0.015 |
| 10/30/00 | <0.014 | <0.014 | <0.016 | <0.014 | <0.017 | <0.015 |
| 11/06/00 | <0.011 | <0.012 | <0.012 | <0.015 | <0.016 | <0.012 |
| 11/14/00 | <0.021 | <0.016 | <0.019 | <0.017 | <0.022 | <0.017 |
| 11/20/00 | <0.014 | <0.018 | <0.016 | <0.016 | <0.020 | <0.020 |
| 11/27/00 | <0.013 | <0.017 | <0.016 | <0.020 | <0.016 | <0.018 |
| 12/04/00 | <0.013 | <0.015 | <0.011 | <0.020 | <0.022 | <0.014 |
| 12/11/00 | <0.018 | <0.015 | <0.018 | <0.024 | <0.011 | <0.020 |
| 12/18/00 | <0.009 | <0.012 | <0.013 | <0.013 | <0.018 | <0.023 |
| 12/26/00 | <0.016 | <0.013 | <0.015 | <0.017 | <0.009 | <0.013 |

## TABLE 6-9

## CONCENTRATION OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF NMP AIR PARTICULATE SAMPLES

### R-1 OFF-SITE STATION *

**Results in units of $10^{-3}$ pCi/m$^3$ ± 1 sigma**

| NUCLIDES | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE |
|---|---|---|---|---|---|---|
| | | | 2000 | | | |
| Co-60 | <4.0 | <3.4 | <3.3 | <3.1 | <2.6 | <0.8 |
| Mn-54 | <2.3 | <3.2 | <1.3 | <3.1 | <2.3 | <3.0 |
| Cs-134 | <4.2 | <2.4 | <1.7 | <3.6 | <2.6 | <2.4 |
| Cs-137 | <5.0 | <2.4 | <2.6 | <3.3 | <2.4 | <1.9 |
| Nb-95 | <10.9 | <2.6 | <3.0 | <3.6 | <3.7 | <2.6 |
| Zr-95 | <12.7 | <5.0 | <3.6 | <4.2 | <5.7 | <1.1 |
| Ce-141 | <4.9 | <3.1 | <2.9 | <4.9 | <4.2 | <2.8 |
| Ce-144 | <2.7 | <8.0 | <7.6 | <14.8 | <13.1 | <6.8 |
| Ru-106 | <49.7 | <24.1 | <22.8 | <27.1 | <31.5 | <28.5 |
| Ru-103 | <5.2 | <2.8 | <2.0 | <3.8 | <3.8 | <3.1 |
| Be-7 | 116 ± 25 | 89.5 ± 13 | 86.9 ± 10 | 126 ± 15 | 94.0 ± 12 | 59.0 ± 10 |
| K-40 | <41.8 | <29.6 | <7.2 | 87.9 ± 17 | 88.8 ± 16 | <33.8 |
| BaLa-140 | <14.9 | <15.4 | <10.3 | <14.0 | <8.7 | <11.7 |
| Ra-226 | <52.4 | <29.2 | <23.1 | <46.3 | <42.5 | <27.2 |
| I-131 | <17.2 | <10.7 | <8.9 | <13.3 | <12.1 | <5.0 |
| Others(1) | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |

| NUCLIDES | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER |
|---|---|---|---|---|---|---|
| Co-60 | <4.8 | <4.6 | <0.7 | <6.9 | <3.3 | <2.0 |
| Mn-54 | <2.8 | <3.1 | <1.6 | <5.2 | <1.9 | <2.4 |
| Cs-134 | <3.3 | <4.7 | <1.7 | <2.4 | <2.7 | <2.3 |
| Cs-137 | <2.4 | <3.4 | <2.1 | <3.0 | <2.7 | <2.1 |
| Nb-95 | <5.3 | <4.2 | <2.6 | <7.3 | <4.8 | <3.8 |
| Zr-95 | <4.6 | <7.2 | <5.7 | <9.0 | <6.2 | <4.4 |
| Ce-141 | <3.1 | <5.4 | <3.0 | <4.0 | <2.9 | <3.3 |
| Ce-144 | <11.0 | <17.3 | <7.7 | <14.3 | <8.9 | <7.5 |
| Ru-106 | <26.8 | <38.4 | <17.5 | <33.6 | <28.9 | <21.4 |
| Ru-103 | <4.6 | <5.5 | <2.2 | <5.2 | <1.9 | <2.2 |
| Be-7 | 46.7 ± 12 | 72.2 ± 15 | 68.9 ± 11 | <43.5 | 37.0 ± 11 | 71.3 ± 10 |
| K-40 | <31.5 | <38.4 | 38.2 ± 11 | <43.0 | <22.6 | 52.8 ± 13 |
| BaLa-140 | <10.8 | <20.9 | <7.3 | <8.9 | <12.1 | <12.2 |
| Ra-226 | <39.7 | <60.1 | <23.6 | <50.8 | <27.5 | <28.7 |
| I-131 | <9.8 | <21.5 | <7.8 | <29.2 | <10.8 | <7.8 |
| Others(1) | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |

* - Location required by the TS/ODCM
(1) - Other plant related radionuclides.

## TABLE 6-9 (Continued)

## CONCENTRATION OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF NMP AIR PARTICULATE SAMPLES

## R-2 OFF-SITE STATION *

**Results in units of $10^{-3}$pCi/m$^3$ $\pm$ 1 sigma**

| NUCLIDES | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE |
|---|---|---|---|---|---|---|
| | | | 2000 | | | |
| Co-60 | <3.9 | <3.7 | <2.6 | <3.4 | <0.8 | <3.1 |
| Mn-54 | <2.3 | <2.1 | <1.9 | <1.7 | <2.3 | <2.9 |
| Cs-134 | <4.1 | <2.4 | <2.3 | <2.7 | <1.9 | <1.5 |
| Cs-137 | <4.9 | <2.6 | <2.8 | <2.8 | <1.3 | <2.0 |
| Nb-95 | <8.4 | <3.5 | <2.9 | <4.6 | <3.7 | <2.7 |
| Zr-95 | <4.3 | <4.2 | <3.3 | <6.9 | <5.0 | <4.4 |
| Ce-141 | <4.1 | <3.0 | <3.2 | <3.4 | <2.9 | <3.2 |
| Ce-144 | <13.9 | <10.3 | <8.1 | <12.5 | <7.8 | <7.7 |
| Ru-106 | <61.4 | <25.5 | <22.7 | <32.2 | <21.7 | <19.2 |
| Ru-103 | <6.4 | <3.7 | <3.1 | <3.4 | <2.3 | <3.2 |
| Be-7 | <46.1 | 88.6 ± 13 | 91.3 ± 12 | 154 ± 16 | 82.6 ± 12 | 49.3 ± 9 |
| K-40 | <40.9 | <24.2 | <25.6 | <45.3 | <29.4 | <22.5 |
| BaLa-140 | <14.6 | <9.4 | <12.3 | <3.4 | <8.8 | <8.7 |
| Ra-226 | <47.0 | <32.8 | <36.1 | <27.0 | <34.0 | <29.4 |
| I-131 | <11.7 | <12.7 | <9.0 | <8.1 | <9.0 | <8.8 |
| Others(1) | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| **NUCLIDES** | **JULY** | **AUGUST** | **SEPTEMBER** | **OCTOBER** | **NOVEMBER** | **DECEMBER** |
| Co-60 | <2.9 | <5.1 | 4.8 ± 1 | <5.0 | <3.6 | <2.7 |
| Mn-54 | <3.6 | <3.0 | <2.0 | <3.8 | <2.9 | <1.7 |
| Cs-134 | <2.6 | <4.1 | <2.1 | <2.8 | <2.6 | <2.1 |
| Cs-137 | <3.2 | <3.0 | <2.0 | <3.2 | <2.2 | <1.6 |
| Nb-95 | <4.5 | <4.7 | <2.6 | <4.5 | <3.3 | <2.6 |
| Zr-95 | <7.3 | <9.0 | <4.8 | <10.8 | <2.9 | <5.0 |
| Ce-141 | <3.3 | <6.0 | <3.2 | <5.1 | <3.1 | <2.7 |
| Ce-144 | <9.1 | <17.8 | <8.1 | <16.5 | <8.3 | <7.5 |
| Ru-106 | <30.0 | <42.0 | <34.1 | <32.8 | <15.0 | <19.6 |
| Ru-103 | <2.6 | <5.0 | <3.2 | <3.9 | <3.0 | <2.4 |
| Be-7 | 72.5 ± 13 | 55.9 ± 15 | 73.0 ± 6 | 56.0 ± 14 | 28.7 ± 10 | 39.8 ± 8 |
| K-40 | <29.4 | <46.6 | <25.1 | <53.9 | 44.0 ± 15 | 52.9 ± 11 |
| BaLa-140 | <13.3 | <17.2 | <3.9 | <21.8 | <8.7 | <2.6 |
| Ra-226 | <43.2 | <59.0 | <33.4 | <48.7 | <24.2 | <23.9 |
| I-131 | <9.9 | <18.5 | <7.5 | <23.0 | <7.8 | <8.7 |
| Others(1) | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |

* - Location required by theTS/ODCM
(1) - Other plant related radionuclides.

## TABLE 6-9 (Continued)

## CONCENTRATION OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF NMP AIR PARTICULATE SAMPLES

## R-3 OFF-SITE STATION *

**Results in units of $10^{-3}$pCi/m$^3$ $\pm$ 1 sigma**

| NUCLIDES | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE |
|---|---|---|---|---|---|---|
| | | | 2000 | | | |
| Co-60 | <14.7 | <4.0 | <2.4 | <3.5 | <3.5 | <3.2 |
| Mn-54 | <2.4 | <1.9 | <2.6 | <1.8 | <2.2 | <2.5 |
| Cs-134 | <6.2 | <2.3 | <3.3 | <3.1 | <2.4 | <2.0 |
| Cs-137 | <1.9 | <2.6 | <2.6 | <2.7 | <2.4 | <2.0 |
| Nb-95 | <3.0 | <3.9 | <3.0 | <5.0 | <3.0 | <3.2 |
| Zr-95 | <16.4 | <4.9 | <5.4 | <6.2 | <5.8 | <5.9 |
| Ce-141 | <4.6 | <3.4 | <3.7 | <3.4 | <3.6 | <3.3 |
| Ce-144 | <11.0 | <8.0 | <11.3 | <11.9 | <10.3 | <7.0 |
| Ru-106 | <50.5 | <21.6 | <25.2 | <23.0 | <23.2 | <23.4 |
| Ru-103 | <5.3 | <3.0 | <3.9 | <3.6 | <3.5 | <2.1 |
| Be-7 | <13.9 | 88.6 ± 12 | 109 ± 12 | 109 ± 14 | 86.2 ± 12 | 69.5 ± 10 |
| K-40 | <111 | <22.6 | 106 ± 16 | <48.3 | <41.7 | <8.3 |
| BaLa-140 | <15.2 | <9.0 | <8.2 | <10.3 | <11.8 | <14.8 |
| Ra-226 | <57.2 | <33.3 | <33.3 | <34.7 | <34.9 | <30.2 |
| I-131 | <19.5 | <8.8 | <12.5 | <10.7 | <10.3 | <11.0 |
| Others(1) | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| **NUCLIDES** | **JULY** | **AUGUST** | **SEPTEMBER** | **OCTOBER** | **NOVEMBER** | **DECEMBER** |
| Co-60 | <3.1 | <3.6 | <2.3 | <1.4 | <1.2 | <2.2 |
| Mn-54 | <3.2 | <5.6 | <2.6 | <2.7 | <3.2 | <1.5 |
| Cs-134 | <2.7 | <4.9 | <2.9 | <3.4 | <3.2 | <2.8 |
| Cs-137 | <3.0 | <4.3 | <2.2 | <3.4 | <2.8 | <2.0 |
| Nb-95 | <4.9 | <6.7 | <3.2 | <6.8 | <3.1 | <1.7 |
| Zr-95 | <6.3 | <6.2 | <4.9 | <7.2 | <6.4 | <3.6 |
| Ce-141 | <4.1 | <4.5 | <3.4 | <4.8 | <3.6 | <2.6 |
| Ce-144 | <14.1 | <16.2 | <9.7 | <13.8 | <11.0 | <7.3 |
| Ru-106 | <33.7 | <31.2 | <25.0 | <27.0 | <37.9 | <14.1 |
| Ru-103 | <4.0 | <6.8 | <2.8 | <4.8 | <3.4 | <2.9 |
| Be-7 | 57.1 ± 12 | 75.5 ± 15 | 64.6 ± 11 | 83.1 ± 19 | <28.0 | 49.9 ± 9 |
| K-40 | <41.6 | 89.0 21 | 82.5 ± 14 | <14.4 | 86.1 ± 21 | <18.7 |
| BaLa-140 | <16.6 | <23.1 | <6.2 | <30.7 | <15.0 | <9.5 |
| Ra-226 | <38.7 | <68.1 | <34.4 | <42.6 | <38.2 | <25.7 |
| I-131 | <11.2 | <18.4 | <11.6 | <29.9 | <8.9 | <6.6 |
| Others(1) | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |

* - Location required by thE TS/ODCM
(1) - Other plant related radionuclides.

**TABLE 6-9 (Continued)**

**CONCENTRATION OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF NMP AIR PARTICULATE SAMPLES**

**R-4 OFF-SITE STATION***

**Results in units of $10^{-3}$pCi/m$^3$ $\pm$ 1 sigma**

| NUCLIDES | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE |
|---|---|---|---|---|---|---|
| | | | 2000 | | | |
| Co-60 | <3.9 | <0.8 | <3.9 | <5.4 | <2.1 | <1.1 |
| Mn-54 | <3.3 | <2.8 | <2.6 | <4.2 | <2.8 | <2.6 |
| Cs-134 | <2.5 | <2.4 | <2.9 | <4.7 | <1.9 | <2.3 |
| Cs-137 | <3.5 | <2.1 | <2.9 | <2.8 | <2.0 | <2.4 |
| Nb-95 | <5.6 | <3.6 | <4.0 | <4.5 | <2.7 | <3.1 |
| Zr-95 | <8.2 | <4.5 | <5.8 | <8.5 | <5.5 | <7.7 |
| Ce-141 | <4.3 | <3.2 | <3.5 | <4.9 | <3.0 | <3.8 |
| Ce-144 | <15.2 | <10.0 | <9.9 | <10.6 | <6.9 | <10.2 |
| Ru-106 | <33.0 | <27.4 | <28.3 | <45.9 | <25.2 | <21.0 |
| Ru-103 | <5.1 | <2.1 | <2.9 | <4.9 | <2.7 | <3.8 |
| Be-7 | 62.1 ± 14 | 83.7 ± 12 | 103 ± 13 | 119 ± 18 | 94.3 ± 12 | 73.1 ± 13 |
| K-40 | <13.9 | <29.3 | 102 ± 17 | <41.2 | <28.8 | <44.8 |
| BaLa-140 | <5.1 | <13.2 | <9.3 | <5.3 | <7.6 | <4.4 |
| Ra-226 | <48.1 | <29.1 | <38.4 | <43.9 | <32.8 | <33.8 |
| I-131 | <11.4 | <11.6 | <9.9 | <15.1 | <7.3 | <7.2 |
| Others(1) | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| **NUCLIDES** | **JULY** | **AUGUST** | **SEPTEMBER** | **OCTOBER** | **NOVEMBER** | **DECEMBER** |
| Co-60 | <3.6 | <6.8 | <4.1 | <3.5 | <2.9 | <3.5 |
| Mn-54 | <3.8 | <1.5 | <3.0 | <6.2 | <3.8 | <2.7 |
| Cs-134 | <3.4 | <3.6 | <2.2 | <4.2 | <4.2 | <2.6 |
| Cs-137 | <3.0 | <5.5 | <3.0 | <4.3 | <3.2 | <2.4 |
| Nb-95 | <5.0 | <8.5 | <3.9 | <7.8 | <2.7 | <3.8 |
| Zr-95 | <7.4 | <3.0 | <3.2 | <11.9 | <5.8 | <1.2 |
| Ce-141 | <4.7 | <5.1 | <3.3 | <6.9 | <4.4 | <3.2 |
| Ce-144 | <10.4 | <14.8 | <10.6 | <19.2 | <13.5 | <7.8 |
| Ru-106 | <23.9 | <55.8 | <21.7 | <39.2 | <34.9 | <18.3 |
| Ru-103 | <4.0 | <4.8 | <3.3 | <6.5 | <3.9 | <3.0 |
| Be-7 | 49.9 ± 11 | <37.1 | 81.2 ± 12 | 102 ± 19 | 57.5 ± 12 | 53.3 ± 11 |
| K-40 | 77.3 ± 18 | <69.8 | <27.1 | 111 ± 26 | 109 ± 19 | <9.8 |
| BaLa-140 | <11.0 | <9.2 | <16.7 | <25.7 | <7.7 | <10.7 |
| Ra-226 | <41.4 | <62.2 | <34.2 | <60.2 | <47.4 | <34.6 |
| I-131 | <10.7 | <19.1 | <12.3 | <36.6 | <15.8 | <10.3 |
| Others(1) | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |

* - Location required by the TS/ODCM
(1) - Other plant related radionuclides.

TABLE 6-9 (Continued)

CONCENTRATION OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF NMP AIR PARTICULATE SAMPLES

R-5 OFF-SITE STATION * (CONTROL)

Results in units of $10^{-3}$pCi/m$^3$ $\pm$ 1 sigma

| NUCLIDES | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE |
|---|---|---|---|---|---|---|
| | | | 2000 | | | |
| Co-60 | <4.0 | <3.3 | <2.9 | <4.4 | <3.3 | <3.1 |
| Mn-54 | <2.3 | <1.9 | <2.7 | <4.6 | <3.5 | <3.1 |
| Cs-134 | <4.1 | <2.9 | <2.5 | <4.0 | <2.4 | <2.9 |
| Cs-137 | <4.9 | <2.3 | <2.7 | <3.2 | <3.5 | <2.0 |
| Nb-95 | <3.0 | <3.7 | <4.2 | <3.4 | <5.0 | <4.5 |
| Zr-95 | <1.3 | <4.9 | <6.6 | <4.2 | <5.1 | <5.3 |
| Ce-141 | <5.8 | <2.7 | <3.2 | <4.9 | <3.4 | <4.1 |
| Ce-144 | <9.2 | <8.4 | <10.9 | <14.8 | <10.9 | <10.8 |
| Ru-106 | <49.0 | <25.0 | <25.2 | <34.4 | <31.1 | <27.8 |
| Ru-103 | <5.2 | <3.7 | <2.9 | <3.4 | <2.6 | <3.0 |
| Be-7 | <37.2 | 100 ± 14 | 102 ± 14 | 117 ± 15 | 89.0 ± 14 | 89.3 ± 11 |
| K-40 | <41.1 | <22.8 | <41.4 | 121 ± 21 | <57.1 | 54.3 ± 14 |
| BaLa-140 | <53.0 | <11.6 | <4.0 | <15.1 | <11.8 | <8.8 |
| Ra-226 | <42.3 | <34.4 | <38.3 | <40.7 | <42.2 | <35.0 |
| I-131 | <18.4 | <9.5 | <11.4 | <12.1 | <11.7 | <10.0 |
| Others(1) | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| **NUCLIDES** | **JULY** | **AUGUST** | **SEPTEMBER** | **OCTOBER** | **NOVEMBER** | **. DECEMBER** |
| Co-60 | <3.9 | <6.8 | <2.3 | <4.8 | <3.4 | <1.8 |
| Mn-54 | <3.1 | <5.5 | <2.1 | <4.1 | <8.6 | <2.2 |
| Cs-134 | <2.9 | <4.7 | <1.8 | <2.2 | <13.6 | <2.2 |
| Cs-137 | <2.4 | <4.3 | <1.2 | <3.8 | <11.6 | <1.7 |
| Nb-95 | <5.0 | <7.3 | <2.4 | <4.9 | <21.0 | <3.8 |
| Zr-95 | <7.5 | <8.5 | <3.0 | <9.6 | <20.1 | <5.0 |
| Ce-141 | <3.5 | <4.5 | <2.7 | <5.4 | <30.6 | <2.2 |
| Ce-144 | <9.9 | <13.9 | <8.1 | <10.6 | <69.8 | <6.4 |
| Ru-106 | <34.5 | <34.1 | <24.1 | <36.3 | <96.1 | <17.8 |
| Ru-103 | <3.3 | <3.8 | <1.1 | <4.3 | <15.4 | <2.2 |
| Be-7 | 75.5 ± 13 | <32.1 | 81.7 ± 11 | 108 ± 18 | 175 ± 54 | 71.6 ± 11 |
| K-40 | <41.8 | <24.4 | <30.0 | <56.4 | <116 | <22.3 |
| BaLa-140 | <17.5 | <9.2 | <7.0 | <8.0 | <48.3 | <7.3 |
| Ra-226 | <42.1 | <53.5 | 15.9 ± 9 | <46.8 | <177 | <25.7 |
| I-131 | <9.4 | <19.0 | <7.5 | <27.9 | <41.4 | <7.5 |
| Others(1) | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |

* - Location required by theTS/ODCM
(1) - Other plant related radionuclides.

## TABLE 6-9 (Continued)

## CONCENTRATION OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF NMP AIR PARTICULATE SAMPLES

### D-2 OFF-SITE STATION **

### Results in units of $10^{-3}$pCi/m$^3$ $\pm$ 1 sigma

| NUCLIDES | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE |
|---|---|---|---|---|---|---|
| | | | 2000 | | | |
| Co-60 | <4.9 | <2.4 | <3.0 | <1.0 | <1.9 | <0.8 |
| Mn-54 | <3.2 | <2.5 | <2.1 | <2.2 | <3.4 | <2.6 |
| Cs-134 | <3.9 | <2.3 | <2.4 | <2.6 | <3.4 | <2.4 |
| Cs-137 | <2.0 | <2.3 | <2.4 | <3.6 | <2.9 | <2.2 |
| Nb-95 | <4.9 | <4.0 | <3.2 | <3.7 | <3.8 | <3.6 |
| Zr-95 | <4.9 | <6.3 | <4.7 | <7.8 | <5.0 | <5.2 |
| Ce-141 | <5.0 | <2.9 | <3.2 | <3.4 | <4.8 | <3.5 |
| Ce-144 | <14.5 | <10.5 | <9.4 | <11.5 | <12.3 | <7.8 |
| Ru-106 | <35.4 | <28.8 | <23.5 | <34.1 | <27.0 | <24.5 |
| Ru-103 | <3.2 | <3.3 | <2.5 | <3.1 | <2.9 | <3.1 |
| Be-7 | 87.1 ± 14 | 99.2 ± 14 | 87.0 ± 11 | 89.4 ± 15 | 50.6 ± 10 | 78.2 ± 11 |
| K-40 | <74.7 | <42.4 | 78.9 ± 13 | <36.9 | 104 ± 18 | <35.1 |
| BaLa-140 | <5.4 | <17.9 | <7.1 | <3.6 | <2.6 | <14.2 |
| Ra-226 | <46.7 | <38.7 | <34.6 | <37.1 | <45.9 | <31.4 |
| I-131 | <13.5 | <9.6 | <8.5 | <10.5 | <13.4 | <7.3 |
| Others(1) | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| **NUCLIDES** | **JULY** | **AUGUST** | **SEPTEMBER** | **OCTOBER** | **NOVEMBER** | **DECEMBER** |
| Co-60 | <3.8 | <2.2 | <3.5 | <1.5 | <3.2 | <2.8 |
| Mn-54 | <3.4 | <5.8 | <2.0 | <2.5 | <1.7 | <2.0 |
| Cs-134 | <2.1 | <4.6 | <2.7 | <3.3 | <2.3 | <1.8 |
| Cs-137 | <3.2 | <5.4 | <2.0 | <3.4 | <2.1 | <1.2 |
| Nb-95 | <3.7 | <7.8 | <3.7 | <7.0 | <3.6 | <2.0 |
| Zr-95 | <6.6 | <7.7 | <3.0 | <7.4 | <5.3 | <2.9 |
| Ce-141 | <3.8 | <5.2 | <2.8 | <5.2 | <3.5 | <2.5 |
| Ce-144 | <11.0 | <14.1 | <8.1 | <13.3 | <8.5 | <7.2 |
| Ru-106 | <5.9 | <45.1 | <29.1 | <35.9 | <24.3 | <17.5 |
| Ru-103 | <3.7 | <5.0 | <3.1 | <4.5 | <3.0 | <2.4 |
| Be-7 | 62.9 ± 13.0 | <29.2 | 59.0 ± 12 | 69.4 ± 16 | 29.7 ± 9 | 46.3 ± 8 |
| K-40 | <11.2 | <22.1 | <9.5 | <41.3 | <28.5 | 64.0 ± 15 |
| BaLa-140 | <11.4 | <8.6 | <16.0 | <30.7 | <3.1 | <2.5 |
| Ra-226 | <31.6 | <45.3 | <25.5 | <47.2 | <22.2 | <23.9 |
| I-131 | <12.5 | <16.3 | <11.8 | <29.3 | <7.1 | <7.8 |
| Others(1) | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |

** - Optional sample location.
(1) - Other plant related radionuclides.

**TABLE 6-9 (Continued)**

**CONCENTRATION OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF NMP AIR PARTICULATE SAMPLES**

**E OFF-SITE STATION ****

**Results in units of $10^{-3}$pCi/m$^{3}$ $\pm$ 1 sigma**

| NUCLIDES | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE |
|---|---|---|---|---|---|---|
| | | | 2000 | | | |
| Co-60 | <6.0 | <2.6 | <3.7 | <2.8 | <4.9 | <2.8 |
| Mn-54 | <3.0 | <3.2 | <1.9 | <3.0 | <2.1 | <3.1 |
| Cs-134 | <3.6 | <3.7 | <1.7 | <3.0 | <2.5 | <2.1 |
| Cs-137 | <2.2 | <2.8 | <1.9 | <1.8 | <3.1 | <2.0 |
| Nb-95 | <6.3 | <3.1 | <2.9 | <4.2 | <3.5 | <2.9 |
| Zr-95 | <6.6 | <5.1 | <5.0 | <4.5 | <4.6 | <5.1 |
| Ce-141 | <4.3 | <4.1 | <3.0 | <4.3 | <3.2 | <3.7 |
| Ce-144 | <11.9 | <11.4 | <8.6 | <9.6 | <7.1 | <8.5 |
| Ru-106 | <21.1 | <33.7 | <21.3 | <18.3 | <17.4 | <26.7 |
| Ru-103 | <3.8 | <3.7 | <2.6 | <4.1 | <2.6 | <2.4 |
| Be-7 | 65.9 ± 13 | 58.4 ± 10 | 82.0 ± 11 | 102 ± 15 | 73.8 ± 11 | 65.8 ± 10 |
| K-40 | <47.5 | 108 ± 17 | <28.4 | <38.2 | <24.1 | <8.3 |
| BaLa-140 | <5.3 | <11.6 | <2.6 | <10.6 | <16.6 | <9.2 |
| Ra-226 | <48.7 | <38.4 | <24.6 | <38.7 | <30.8 | <26.5 |
| I-131 | <12.6 | <13.7 | <6.2 | <10.1 | <11.5 | <10.0 |
| Others(1) | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |

| NUCLIDES | JULY | AUGUST | SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER |
|---|---|---|---|---|---|---|
| Co-60 | <4.2 | <6.3 | <2.6 | <1.5 | <3.9 | <2.4 |
| Mn-54 | <2.5 | <6.7 | <2.2 | <4.0 | <3.4 | <2.5 |
| Cs-134 | <2.2 | <3.4 | <2.7 | <4.3 | <3.3 | <2.8 |
| Cs-137 | <1.6 | <4.0 | <2.2 | <2.3 | <0.6 | <2.5 |
| Nb-95 | <3.6 | <9.0 | <3.3 | <6.2 | <3.2 | <3.5 |
| Zr-95 | <6.5 | <2.8 | <3.6 | <5.9 | <7.2 | <4.9 |
| Ce-141 | <4.2 | <3.9 | <3.4 | <5.4 | <4.2 | <2.9 |
| Ce-144 | <9.8 | <12.9 | <11.0 | <8.4 | <11.0 | <7.4 |
| Ru-106 | <35.6 | <46.4 | <28.2 | <34.8 | <32.6 | <19.3 |
| Ru-103 | <4.1 | <5.8 | <3.0 | <4.6 | <2.4 | <2.8 |
| Be-7 | 51.7 ± 11 | <42.1 | 83.2 ± 12 | 77.1 ± 17 | 47.1 ± 11 | 64.6 ± 11 |
| K-40 | <30.6 | <64.9 | 93.3 ± 15 | <57.1 | <33.6 | <22.5 |
| BaLa-140 | <14.6 | <24.1 | <9.5 | <23.1 | <15.7 | <9.4 |
| Ra-226 | <38.1 | <43.4 | <27.8 | <43.4 | <43.5 | <26.8 |
| I-131 | <10.3 | <16.8 | <12.0 | <26.3 | <13.5 | <8.6 |
| Others(1) | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |

** - Optional sample location
(1) - Other plant related radionuclides.

**TABLE 6-9 (Continued)**

**CONCENTRATION OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF NMP AIR PARTICULATE SAMPLES**

**F OFF-SITE STATION ***

**Results in units of $10^{-3}$pCi/m$^3$ $\pm$ 1 sigma**

| NUCLIDES | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE |
|---|---|---|---|---|---|---|
| | | | 2000 | | | |
| Co-60 | <3.8 | <2.2 | <2.2 | <3.8 | <2.2 | <2.6 |
| Mn-54 | <8.0 | <2.4 | <2.0 | <3.4 | <1.4 | <2.5 |
| Cs-134 | <4.0 | <2.6 | <1.7 | <3.4 | <2.0 | <1.2 |
| Cs-137 | <6.9 | <2.6 | <1.9 | <4.3 | <2.4 | <1.8 |
| Nb-95 | <2.9 | <3.8 | <2.0 | <5.9 | <2.8 | <2.6 |
| Zr-95 | <15.4 | <3.6 | <4.4 | <5.8 | <6.4 | <4.3 |
| Ce-141 | <4.7 | <2.6 | <2.5 | <3.9 | <3.1 | <2.5 |
| Ce-144 | <14.3 | <9.4 | <5.8 | <12.4 | <7.6 | <6.9 |
| Ru-106 | <17.3 | <17.2 | <21.4 | <38.4 | <32.8 | <19.9 |
| Ru-103 | <8.1 | <2.0 | <2.4 | <2.6 | <3.1 | <1.9 |
| Be-7 | 89.1 ± 22 | 67.2 ± 10 | 101 ± 10 | 82.3 ± 15 | 86.2 ± 12 | 69.7 ± 10 |
| K-40 | <39.4 | <21.8 | <6.1 | <13.5 | <34.9 | <21.5 |
| BaLa-140 | <40.4 | <8.7 | <8.6 | <13.0 | <11.1 | <2.9 |
| Ra-226 | <49.5 | <35.7 | <27.0 | <39.1 | <30.5 | <23.5 |
| I-131 | <21.5 | <9.6 | <6.2 | <8.6 | <8.6 | <10.1 |
| Others(1) | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| **NUCLIDES** | **JULY** | **AUGUST** | **SEPTEMBER** | **OCTOBER** | **NOVEMBER** | **DECEMBER** |
| Co-60 | <3.6 | <2.2 | <0.7 | <3.9 | <2.8 | <0.6 |
| Mn-54 | <3.5 | <1.4 | <1.9 | <0.9 | <3.3 | <1.7 |
| Cs-134 | <3.4 | <3.8 | <2.0 | <2.6 | <3.7 | <2.3 |
| Cs-137 | <2.6 | <3.8 | <2.0 | <2.6 | <2.8 | <2.1 |
| Nb-95 | <4.7 | <5.3 | <2.5 | <6.6 | <4.3 | <3.5 |
| Zr-95 | <5.3 | <12.8 | <4.8 | <9.1 | <6.3 | <3.5 |
| Ce-141 | <4.3 | <4.4 | <2.8 | <4.3 | <3.8 | <2.4 |
| Ce-144 | <11.3 | <13.4 | <6.7 | <12.1 | <12.6 | <8.2 |
| Ru-106 | <26.1 | <45.1 | <19.7 | <30.5 | <29.4 | <15.2 |
| Ru-103 | <3.8 | <5.6 | <2.2 | <5.1 | <3.3 | <2.6 |
| Be-7 | 48.6 ± 11 | <23.4 | 63.1 ± 11 | 86.1 ± 18 | 40.6 ± 10 | 54.7 ± 9 |
| K-40 | <38.8 | <63.1 | 49.0 ± 13 | <14.0 | 105 ± 18 | 42.4 ± 12 |
| BaLa-140 | <19.8 | <23.4 | <8.0 | <20.7 | <6.7 | <7.2 |
| Ra-226 | <30.7 | <48.3 | <21.0 | <44.9 | <41.4 | <22.4 |
| I-131 | <11.7 | <18.3 | <7.8 | <29.2 | <10.0 | <7.7 |
| Others(1) | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |

** - Optional sample location.
(1) - Other plant related radionuclides.

**TABLE 6-9 (Continued)**

**CONCENTRATION OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF NMP AIR PARTICULATE SAMPLES**

**G OFF-SITE STATION ****

**Results in units of $10^{-3}$pCi/m$^3$ $\pm$ 1 sigma**

| NUCLIDES | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE |
|---|---|---|---|---|---|---|
| | | | 2000 | | | |
| Co-60 | <3.3 | <2.8 | <2.2 | <4.2 | <3.3 | <4.3 |
| Mn-54 | <3.1 | <2.6 | <1.4 | <2.6 | <1.4 | <1.7 |
| Cs-134 | <2.7 | <2.6 | <1.7 | <3.2 | <1.9 | <1.6 |
| Cs-137 | <1.7 | <2.0 | <1.5 | <2.7 | <2.4 | <2.7 |
| Nb-95 | <3.6 | <3.0 | <2.8 | <4.2 | <2.6 | <4.0 |
| Zr-95 | <6.9 | <4.9 | <4.1 | <6.5 | <5.6 | <4.6 |
| Ce-141 | <4.2 | <3.0 | <2.8 | <3.9 | <3.3 | <2.5 |
| Ce-144 | <15.0 | <8.0 | <7.5 | <11.6 | <7.1 | <7.3 |
| Ru-106 | <32.5 | <28.5 | <16.2 | <26.1 | <18.3 | <19.4 |
| Ru-103 | <3.2 | <2.7 | <2.4 | <2.6 | <2.6 | <0.6 |
| Be-7 | 72.9 ± 14 | 93.2 ± 11 | 78.7 ± 10 | 124 ± 14 | 98.0 ± 13 | 70.0 ± 12 |
| K-40 | <44.9 | <33.3 | <22.3 | 104 ± 19 | <27.6 | <35.8 |
| BaLa-140 | <16.6 | <2.8 | <8.9 | <7.5 | <2.8 | <14.0 |
| Ra-226 | <36.6 | <25.9 | 38.4 ± 10 | <46.9 | <24.6 | <28.9 |
| I-131 | <9.3 | <9.9 | <7.4 | <12.6 | <8.9 | <9.3 |
| Others(1) | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| **NUCLIDES** | **JULY** | **AUGUST** | **SEPTEMBER** | **OCTOBER** | **NOVEMBER** | **DECEMBER** |
| Co-60 | <4.9 | <5.8 | <1.9 | <3.8 | <2.0 | <0.9 |
| Mn-54 | <3.2 | <5.4 | <1.9 | <3.2 | <1.9 | <1.9 |
| Cs-134 | <2.8 | <4.4 | <2.0 | <4.0 | <1.8 | <2.4 |
| Cs-137 | <2.7 | <3.6 | <1.7 | <4.1 | <2.0 | <2.5 |
| Nb-95 | <3.6 | <5.0 | <2.9 | <7.6 | <2.9 | <2.0 |
| Zr-95 | <4.7 | <9.2 | <4.2 | <7.2 | <5.9 | <5.7 |
| Ce-141 | <3.0 | <4.4 | <2.6 | <6.4 | <2.9 | <3.2 |
| Ce-144 | <9.9 | <16.9 | <8.5 | <15.6 | <9.3 | <8.0 |
| Ru-106 | <14.0 | <42.5 | <18.3 | <42.6 | <20.4 | <16.7 |
| Ru-103 | <3.1 | <5.3 | <3.0 | <5.8 | <2.0 | <3.3 |
| Be-7 | 58.4 ± 11 | 56.2 ± 14 | 63.5 ± 11 | 84.9 ± 19 | 31.4 ± 9 | 63.9 ± 11 |
| K-40 | <27.3 | <59.4 | <28.6 | 149 ± 26 | <20.4 | <35.4 |
| BaLa-140 | <9.0 | <8.1 | <10.4 | <6.3 | <7.5 | <3.6 |
| Ra-226 | <34.0 | <36.4 | <23.7 | <50.5 | <24.8 | <30.6 |
| I-131 | <7.8 | <3.5 | <10.3 | <28.5 | <8.7 | <11.6 |
| Others(1) | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |

** - Optional sample location.
(1) - Other plant related radionuclides.

**TABLE 6-9 (Continued)**

**CONCENTRATION OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF NMP AIR PARTICULATE SAMPLES**

**D-1 ON-SITE STATION****

**Results in units of $10^{-3}$pCi/m$^3$ $\pm$ 1 sigma**

| NUCLIDES | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE |
|---|---|---|---|---|---|---|
| | | | 2000 | | | |
| Co-60 | <2.3 | <2.3 | <0.9 | <3.4 | <4.1 | <4.8 |
| Mn-54 | <5.6 | <2.3 | <2.4 | <3.3 | <2.9 | <2.7 |
| Cs-134 | <3.0 | <2.8 | <2.2 | <2.2 | <2.4 | <2.1 |
| Cs-137 | <3.6 | <2.0 | <2.4 | <2.5 | <2.3 | <2.8 |
| Nb-95 | <4.9 | <2.7 | <2.0 | <8.4 | <2.6 | <4.8 |
| Zr-95 | <7.2 | <4.6 | <5.9 | <3.5 | <3.8 | <6.8 |
| Ce-141 | <3.6 | <2.8 | <3.0 | <4.0 | <3.1 | <3.2 |
| Ce-144 | <9.5 | <8.4 | <6.5 | <10.7 | <7.4 | <10.5 |
| Ru-106 | <41.1 | <20.8 | <20.1 | <36.8 | <19.1 | <21.7 |
| Ru-103 | <4.3 | <2.8 | <3.0 | <3.2 | <2.9 | <3.8 |
| Be-7 | 79.5 ± 15 | 63.1 ± 12 | 97.0 ± 12 | 90.5 ± 14 | 61.7 ± 10 | 77.9 ± 13 |
| K-40 | <23.6 | <34.9 | <31.8 | <34.2 | <29.0 | <46.3 |
| BaLa-140 | <30.2 | <12.1 | <3.7 | <10.2 | <8.8 | <13.2 |
| Ra-226 | <39.3 | <33.3 | <37.1 | <30.8 | <32.7 | <42.8 |
| I-131 | <14.5 | <9.9 | <9.8 | <9.6 | <9.1 | <11.0 |
| Others(1) | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| **NUCLIDES** | **JULY** | **AUGUST** | **SEPTEMBER** | **OCTOBER** | **NOVEMBER** | **DECEMBER** |
| Co-60 | <2.7 | <5.3 | <1.8 | <4.8 | <4.4 | <0.6 |
| Mn-54 | <3.4 | <3.6 | <2.5 | <3.2 | <3.0 | <1.6 |
| Cs-134 | <2.2 | <5.0 | <1.6 | <3.1 | <2.6 | <1.6 |
| Cs-137 | <2.3 | <4.2 | <1.5 | <2.7 | <2.3 | <1.6 |
| Nb-95 | <3.1 | <4.9 | <3.0 | <4.0 | <3.1 | <2.2 |
| Zr-95 | <4.6 | <9.3 | <4.0 | <5.5 | <5.4 | <4.2 |
| Ce-141 | <3.0 | <5.4 | <3.0 | <6.5 | <3.3 | <2.3 |
| Ce-144 | <8.1 | <16.1 | <6.8 | <11.6 | <9.4 | <6.6 |
| Ru-106 | <34.1 | <45.6 | <18.2 | <26.2 | <23.1 | <14.4 |
| Ru-103 | <3.0 | <5.4 | <2.7 | <5.4 | <2.6 | <2.5 |
| Be-7 | 75.5 ± 12 | <41.3 | 82.5 ± 11 | 101 ± 19 | 50.1 ± 11 | 65.4 ± 10 |
| K-40 | <27.5 | <37.7 | 56.3 ± 12 | <14.3 | <8.0 | <27.4 |
| BaLa-140 | <10.4 | <14.6 | <7.2 | <23.9 | <3.1 | <6.8 |
| Ra-226 | <25.4 | <57.4 | <22.2 | <33.4 | <23.8 | <20.4 |
| I-131 | <10.8 | <19.6 | <7.2 | <28.7 | <10.4 | <5.6 |
| Others(1) | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |

** - Optional sample location.
(1) - Other plant related radionuclides.

## TABLE 6-9 (Continued)

## CONCENTRATION OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF NMP AIR PARTICULATE SAMPLES

## G ON-SITE STATION *

**Results in units of $10^{-3}$pCi/m$^3$ ± 1 sigma**

| NUCLIDES | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE |
|---|---|---|---|---|---|---|
| | | | 2000 | | | |
| Co-60 | <3.6 | <3.1 | <2.1 | <2.6 | <3.7 | <2.7 |
| Mn-54 | <6.0 | <2.9 | <2.3 | <2.4 | <2.2 | <2.8 |
| Cs-134 | <1.4 | <2.1 | <2.2 | <2.0 | <1.9 | <2.6 |
| Cs-137 | <1.6 | <1.7 | <2.2 | <2.5 | <1.8 | <2.3 |
| Nb-95 | <2.7 | <3.5 | <2.6 | <3.2 | <3.1 | <2.6 |
| Zr-95 | <4.0 | <5.1 | <4.1 | <4.1 | <5.3 | <2.9 |
| Ce-141 | <0.9 | <3.6 | <2.9 | <3.1 | <3.2 | <3.0 |
| Ce-144 | <13.7 | <9.7 | <9.2 | <11.0 | <7.6 | <7.4 |
| Ru-106 | <65.6 | <25.0 | <23.8 | <26.5 | <25.6 | <24.0 |
| Ru-103 | <7.7 | <2.8 | <2.6 | <3.0 | <3.6 | <2.5 |
| Be-7 | <42.9 | 62.7 ± 10 | 108 ± 11 | 93.3 ± 13 | 86.5 ± 11 | 73.4 ± 11 |
| K-40 | <98.4 | <32.8 | 77.2 ± 12 | <40.0 | <7.7 | <31.9 |
| BaLa-140 | <38.2 | <3.1 | <10.3 | <10.0 | <13.4 | <9.3 |
| Ra-226 | <43.3 | <26.9 | <32.2 | <28.1 | <28.0 | <29.4 |
| I-131 | <20.3 | <8.8 | <9.9 | <9.8 | <8.7 | <11.1 |
| Others(1) | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| **NUCLIDES** | **JULY** | **AUGUST** | **SEPTEMBER** | **OCTOBER** | **NOVEMBER** | **DECEMBER** |
| Co-60 | <4.3 | <5.2 | <3.4 | <5.6 | <4.3 | <2.6 |
| Mn-54 | <3.8 | <3.9 | <2.0 | <4.6 | <3.2 | <2.4 |
| Cs-134 | <2.1 | <4.5 | <2.2 | <4.0 | <2.6 | <2.1 |
| Cs-137 | <2.2 | <4.4 | <3.1 | <2.9 | <3.5 | <2.0 |
| Nb-95 | <5.1 | <5.8 | <4.2 | <7.6 | <3.6 | <2.1 |
| Zr-95 | <4.2 | <7.8 | <3.7 | <10.4 | <6.4 | <3.0 |
| Ce-141 | <3.8 | <5.3 | <2.5 | <6.9 | <3.9 | <2.1 |
| Ce-144 | <10.9 | <17.0 | <9.2 | <14.2 | <11.4 | <6.7 |
| Ru-106 | <28.7 | <39.7 | <24.7 | <42.1 | <25.2 | <22.3 |
| Ru-103 | <2.5 | <4.6 | <2.9 | <4.9 | <3.9 | <2.4 |
| Be-7 | 48.1 ± 10 | 82.9 ± 15 | 83.1 ± 12 | 97.9 ± 20 | <32.0 | 46.5 ± 8 |
| K-40 | <41.1 | <13.1 | <25.2 | 95.4 ± 24 | <46.3 | 57.5 ± 12 |
| BaLa-140 | <13.0 | <14.3 | <13.7 | <28.5 | <12.3 | <7.5 |
| Ra-226 | <35.8 | <59.2 | <32.7 | <59.2 | <37.7 | <20.4 |
| I-131 | <10.5 | <20.8 | <13.1 | <30.3 | <12.6 | <8.2 |
| Others(1) | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |

** - Optional sample location.
(1) - Other plant related radionuclides.

## TABLE 6-9 (Continued)

## CONCENTRATION OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF NMP AIR PARTICULATE SAMPLES

## H ON-SITE STATION **

**Results in units of $10^{-3}$pCi/m$^3$ $\pm$ 1 sigma**

| NUCLIDES | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE |
|---|---|---|---|---|---|---|
| | | | 2000 | | | |
| Co-60 | <11.6 | <3.3 | <2.4 | <4.1 | <2.6 | <2.1 |
| Mn-54 | <2.4 | <3.0 | <2.2 | <3.4 | <2.2 | <2.4 |
| Cs-134 | <4.2 | <3.1 | <1.2 | <3.5 | <2.3 | <2.3 |
| Cs-137 | <1.9 | <2.5 | <2.1 | <3.5 | <1.7 | <1.3 |
| Nb-95 | <8.8 | <3.4 | <2.1 | <5.0 | <3.6 | <4.0 |
| Zr-95 | <4.5 | <5.1 | <3.6 | <9.2 | <5.7 | <4.8 |
| Ce-141 | <4.3 | <4.2 | <3.4 | <4.2 | <3.0 | <3.5 |
| Ce-144 | <17.9 | <13.6 | <7.2 | <11.9 | <7.6 | <8.2 |
| Ru-106 | <18.5 | <30.3 | <21.0 | <35.6 | <29.7 | <18.8 |
| Ru-103 | <5.3 | <3.5 | <3.1 | <3.3 | <2.1 | <2.7 |
| Be-7 | <14.1 | 86.3 ± 12 | 84.3 ± 11 | 89.5 ± 16 | 91.7 ± 12 | 67.6 ± 11 |
| K-40 | <111 | 141 ± 21 | <35.8 | <40.2 | <30.8 | <27.7 |
| BaLa-140 | <15.8 | <9.4 | <11.8 | <14.8 | <12.0 | <9.1 |
| Ra-226 | <67.5 | <42.1 | <21.8 | <47.4 | <34.2 | <26.4 |
| I-131 | <18.8 | <13.2 | <9.3 | <12.6 | <9.6 | <8.8 |
| Others(1) | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| **NUCLIDES** | **JULY** | **AUGUST** | **SEPTEMBER** | **OCTOBER** | **NOVEMBER** | **DECEMBER** |
| Co-60 | <0.9 | <1.2 | <2.0 | <4.0 | <1.8 | <0.6 |
| Mn-54 | <2.3 | <4.4 | <3.0 | <4.0 | <2.9 | <1.9 |
| Cs-134 | <2.4 | <4.2 | <2.1 | <1.8 | <4.0 | <2.2 |
| Cs-137 | <2.8 | <4.2 | <1.8 | <2.8 | <2.6 | <1.9 |
| Nb-95 | <3.8 | <6.8 | <3.1 | <5.4 | <3.9 | <3.0 |
| Zr-95 | <3.4 | <9.4 | <3.9 | <5.8 | <7.3 | <3.9 |
| Ce-141 | <3.0 | <6.8 | <3.2 | <5.8 | <4.1 | <2.4 |
| Ce-144 | <8.7 | <18.7 | <9.9 | <11.7 | <12.5 | <6.4 |
| Ru-106 | <30.3 | <49.2 | <24.6 | <31.6 | <31.6 | <16.6 |
| Ru-103 | <3.9 | <4.9 | <2.7 | <4.0 | <3.8 | <2.2 |
| Be-7 | 61.2 ± 12 | 75.2 ± 16 | 64.3 ± 11 | 62.0 ± 16 | 38.5 ± 11 | 53.2 ± 9 |
| K-40 | <38.1 | <45.1 | 120 ± 16 | <14.9 | 86.8 ± 18 | <24.6 |
| BaLa-140 | <12.5 | <22.7 | <13.4 | <8.8 | <9.3 | <2.5 |
| Ra-226 | <32.9 | <54.2 | <33.5 | <35.7 | <40.2 | <30.3 |
| I-131 | <10.6 | <16.0 | <12.0 | <23.6 | <14.3 | <6.4 |
| Others(1) | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |

** - Optional sample location.
(1) - Other plant related radionuclides.

**TABLE 6-9 (Continued)**

**CONCENTRATION OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF NMP AIR PARTICULATE SAMPLES**

**I ON-SITE STATION ****

**Results in units of $10^{-3}$pCi/m$^3$ $\pm$ 1 sigma**

| NUCLIDES | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE |
|---|---|---|---|---|---|---|
| | | | 2000 | | | |
| Co-60 | <5.8 | <3.1 | <3.5 | <3.0 | <4.0 | <2.8 |
| Mn-54 | <9.6 | <2.7 | <2.4 | <3.4 | <3.4 | <1.9 |
| Cs-134 | <7.6 | <2.4 | <2.0 | <2.9 | <2.7 | <1.8 |
| Cs-137 | <2.6 | <1.3 | <1.4 | <2.6 | <2.5 | <2.1 |
| Nb-95 | <12.5 | <3.6 | <3.0 | <4.0 | <4.5 | <3.3 |
| Zr-95 | <6.4 | <6.3 | <4.3 | <6.3 | <5.7 | <2.9 |
| Ce-141 | <6.7 | <3.2 | <3.0 | <4.8 | <3.3 | <3.0 |
| Ce-144 | <24.2 | <9.1 | <7.6 | <12.5 | <9.0 | <6.7 |
| Ru-106 | <105 | <19.5 | <28.9 | <37.1 | <24.3 | <26.1 |
| Ru-103 | <7.6 | <3.9 | <2.5 | <2.8 | <2.8 | <2.2 |
| Be-7 | <68.5 | 79.3 ± 13 | 78.9 ± 10 | 83.8 ± 13 | 84.9 ± 12 | 91.0 ± 12 |
| K-40 | <60.1 | <40.8 | <24.7 | 98.7 ± 17 | <23.6 | <8.2 |
| BaLa-140 | <22.5 | <10.0 | <10.3 | <15.3 | <14.5 | <3.4 |
| Ra-226 | <69.0 | <33.9 | <27.9 | <43.4 | <33.0 | <30.0 |
| I-131 | <23.2 | <11.5 | <8.1 | <13.7 | <9.8 | <9.5 |
| Others(1) | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| **NUCLIDES** | **JULY** | **AUGUST** | **SEPTEMBER** | **OCTOBER** | **NOVEMBER** | **DECEMBER** |
| Co-60 | <2.8 | <4.7 | <2.3 | <8.0 | <3.2 | <2.3 |
| Mn-54 | <2.2 | <4.1 | <1.8 | <4.1 | <2.3 | <1.2 |
| Cs-134 | <3.0 | <3.8 | <1.8 | <3.5 | <2.4 | <2.5 |
| Cs-137 | <1.8 | <3.8 | <2.4 | <2.1 | <2.2 | <2.2 |
| Nb-95 | <3.9 | <7.8 | <3.1 | <7.7 | <3.5 | <1.7 |
| Zr-95 | <6.7 | <8.9 | <4.5 | <7.4 | <5.5 | <3.2 |
| Ce-141 | <4.2 | <6.7 | <2.9 | <4.6 | <3.1 | <2.1 |
| Ce-144 | <10.9 | <17.5 | <7.6 | <14.6 | <7.7 | <7.9 |
| Ru-106 | <20.7 | <49.3 | <19.9 | <27.7 | <26.0 | <23.8 |
| Ru-103 | <2.2 | <4.6 | <3.0 | <6.4 | <2.2 | <2.1 |
| Be-7 | 64.8 ± 11 | 78.0 ± 16 | 86.2 ± 10 | 101 ± 19 | 45.5 ± 11 | 48.8 ± 9 |
| K-40 | <29.5 | <38.8 | <33.9 | <53.4 | <27.8 | 29.0 ± 13 |
| BaLa-140 | <10.9 | <15.1 | <11.9 | <28.8 | <10.8 | <9.6 |
| Ra-226 | <34.8 | <62.2 | <24.7 | <43.7 | <20.1 | <24.1 |
| I-131 | <9.1 | <21.2 | <8.5 | <26.6 | <7.7 | <7.5 |
| Others(1) | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |

** - Optional sample location.
(1) - Other plant related radionuclides.

**TABLE 6-9 (Continued)**

**CONCENTRATION OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF NMP AIR PARTICULATE SAMPLES**

**J ON-SITE STATION ****

**Results in units of $10^{-3}$pCi/m$^3$ $\pm$ 1 sigma**

| NUCLIDES | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE |
|---|---|---|---|---|---|---|
| | | | 2000 | | | |
| Co-60 | <4.1 | <4.6 | <1.8 | <3.5 | <4.1 | <4.4 |
| Mn-54 | <8.7 | <3.0 | <2.2 | <3.0 | <1.9 | <2.8 |
| Cs-134 | <1.6 | <3.0 | <2.0 | <3.4 | <2.5 | <2.8 |
| Cs-137 | <6.4 | <2.3 | <1.8 | <3.0 | <2.1 | <2.6 |
| Nb-95 | <11.3 | <4.8 | <2.6 | <3.6 | <4.8 | <3.4 |
| Zr-95 | <13.1 | <7.6 | <4.4 | <6.0 | <5.3 | <8.5 |
| Ce-141 | <5.4 | <4.2 | <2.6 | <2.7 | <3.2 | <3.4 |
| Ce-144 | <14.6 | <9.8 | <6.5 | <11.4 | <7.2 | <8.3 |
| Ru-106 | <18.7 | <25.1 | <17.1 | <23.4 | <24.2 | <32.7 |
| Ru-103 | <2.0 | <3.8 | <2.3 | <3.3 | <2.9 | <3.5 |
| Be-7 | <14.2 | 71.7 ± 14 | 95.5 ± 11 | 128 ± 16 | 85.9 ± 12 | 59.7 ± 13 |
| K-40 | <140 | <42.3 | <19.0 | <9.9 | <29.2 | <33.6 |
| BaLa-140 | <55.0 | <3.5 | <7.7 | <10.6 | <11.5 | <14.0 |
| Ra-226 | <44.0 | <34.2 | <25.4 | <25.8 | <31.9 | <31.1 |
| I-131 | <19.1 | <11.5 | <10.6 | <11.8 | <9.7 | <14.4 |
| Others(1) | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| **NUCLIDES** | **JULY** | **AUGUST** | **SEPTEMBER** | **OCTOBER** | **NOVEMBER** | **DECEMBER** |
| Co-60 | <2.9 | <3.9 | <2.5 | <5.2 | <2.6 | <0.9 |
| Mn-54 | <2.3 | <5.4 | <2.7 | <4.0 | <2.9 | <2.6 |
| Cs-134 | <2.9 | <4.4 | <3.0 | <2.4 | <2.7 | <2.8 |
| Cs-137 | <3.6 | <4.8 | <3.0 | <2.3 | <2.8 | <2.1 |
| Nb-95 | <3.9 | <4.6 | <3.6 | <5.4 | <3.4 | <3.4 |
| Zr-95 | <5.7 | <7.7 | <5.6 | <7.4 | <7.1 | <1.2 |
| Ce-141 | <3.6 | <6.9 | <3.7 | <6.0 | <3.1 | <2.9 |
| Ce-144 | <13.0 | <18.4 | <9.8 | <11.6 | <10.6 | <8.7 |
| Ru-106 | <24.9 | <46.8 | <28.4 | <36.3 | <29.6 | <23.5 |
| Ru-103 | <3.3 | <6.4 | <2.6 | <5.4 | <3.0 | <2.7 |
| Be-7 | 76.8 ± 14 | 92.7 ± 19 | 78.5 ± 12 | 79.6 ± 18 | <29.6 | 65.8 ± 12 |
| K-40 | <29.8 | 128 ± 28 | <27.0 | <15.3 | 79.7 ± 18 | <33.1 |
| BaLa-140 | <11.4 | <23.4 | <17.0 | <9.1 | <13.3 | <10.3 |
| Ra-226 | <43.7 | <68.7 | <32.1 | <38.2 | <36.8 | <35.0 |
| I-131 | <11.7 | <24.0 | <12.7 | <23.6 | <11.4 | <11.0 |
| Others(1) | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |

** - Optional sample location
(1) - Other plant related radionuclides

## TABLE 6-9 (Continued)

## CONCENTRATION OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF NMP AIR PARTICULATE SAMPLES

## K ON-SITE STATION **

### Results in units of $10^{-3}$pCi/m$^3$ $\pm$ 1 sigma

| NUCLIDES | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE |
|---|---|---|---|---|---|---|
| | | | 2000 | | | |
| Co-60 | <3.9 | <3.0 | <2.7 | <2.8 | <5.0 | <0.7 |
| Mn-54 | <2.3 | <2.9 | <1.5 | <3.1 | <3.9 | <3.3 |
| Cs-134 | <6.7 | <3.5 | <1.9 | <2.0 | <2.5 | <3.0 |
| Cs-137 | <1.8 | <2.3 | <2.1 | <2.0 | <2.6 | <3.2 |
| Nb-95 | <14.1 | <3.5 | <2.7 | <4.2 | <4.2 | <3.8 |
| Zr-95 | <4.4 | <4.8 | <3.3 | <3.5 | <6.2 | <5.5 |
| Ce-141 | <4.2 | <4.8 | <2.9 | <3.6 | <4.6 | <4.6 |
| Ce-144 | <14.0 | <12.5 | <7.2 | <11.1 | <10.4 | <12.1 |
| Ru-106 | <48.9 | <26.9 | <21.6 | <28.5 | <34.7 | <30.0 |
| Ru-103 | <7.6 | <3.6 | <2.4 | <3.6 | <2.7 | <3.1 |
| Be-7 | <13.6 | 78.8 ± 13 | 90.9 ± 11 | 113 ± 14 | 84.3 ± 14 | 57.1 ± 11 |
| K-40 | <107 | 111 ± 18 | <23.4 | <10.3 | <12.2 | 77.1 ± 15 |
| BaLa-140 | <15.4 | <12.4 | <12.9 | <10.8 | <15.8 | <10.2 |
| Ra-226 | <51.4 | <37.7 | <22.9 | <40.9 | <32.3 | <36.5 |
| I-131 | <20.4 | <15.2 | <10.8 | <13.5 | <12.9 | <15.0 |
| Others(1) | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |
| **NUCLIDES** | **JULY** | **AUGUST** | **SEPTEMBER** | **OCTOBER** | **NOVEMBER** | **DECEMBER** |
| Co-60 | <1.1 | <4.9 | <2.4 | <3.4 | <3.4 | <1.8 |
| Mn-54 | <1.9 | <4.7 | <2.8 | <4.4 | <2.2 | <2.1 |
| Cs-134 | <2.8 | <5.4 | <2.0 | <4.9 | <4.3 | <2.0 |
| Cs-137 | <2.7 | <5.7 | <2.6 | <4.2 | <2.1 | <1.6 |
| Nb-95 | <4.1 | <6.9 | <4.1 | <6.5 | <4.4 | <3.0 |
| Zr-95 | <7.6 | <9.4 | <4.7 | <6.3 | <5.8 | <4.6 |
| Ce-141 | <4.0 | <6.6 | <3.6 | <7.4 | <3.7 | <2.5 |
| Ce-144 | <12.0 | <18.3 | <10.3 | <19.3 | <8.8 | <8.0 |
| Ru-106 | <30.8 | <43.7 | <25.6 | <45.7 | <23.3 | <17.3 |
| Ru-103 | <2.8 | <5.1 | <3.0 | <3.2 | <2.6 | <1.9 |
| Be-7 | 45.3 ± 10 | 57.9 ± 14 | 86.1 ± 13 | 47.7 ± 19 | 56.9 ± 11 | 35.8 ± 9 |
| K-40 | <31.5 | 100 ± 26 | 114 ± 17 | 105 ± 24 | <8.5 | <23.3 |
| BaLa-140 | <4.1 | <15.8 | <12.1 | <7.5 | <13.2 | <2.7 |
| Ra-226 | <36.4 | <63.5 | 18.8 ± 11 | <67.9 | <25.6 | <25.0 |
| I-131 | <12.5 | <21.3 | <13.2 | <34.7 | <9.3 | <6.7 |
| Others(1) | <LLD | <LLD | <LLD | <LLD | <LLD | <LLD |

** - Optional sample location.
(1) - Other plant related radionuclides.

## TABLE 6-10

## DIRECT RADIATION MEASUREMENT RESULTS

**Results in units of mrem/standard month ± 1 sigma**

| LOCATION NUMBER | LOCATION | JANUARY THROUGH MARCH | APRIL THROUGH JUNE | JULY THROUGH SEPTEMBER | OCTOBER THROUGH DECEMBER | LOCATION (DIRECTION & DISTANCE)(2) |
|---|---|---|---|---|---|---|
| **2000** | | | | | | |
| 3 | D1 On Site | 16.5 ± 1.3 | 12.4 ± 0.7 | 12.7 ± 1.4 | 8.9 ± 0.2 | 0.2 miles @ 69° |
| 4 | D2 On Site | 4.4 ± 0.2 | 4.3 ± 0.2 | 7.1 ± 1.0 | 4.7 ± 0.0 | 0.4 miles @ 140° |
| 5 | E On Site | 5.0 ± 0.4 | 4.5 ± 0.3 | 5.2 ± 0.5 | 5.2 ± 0.7 | 0.4 miles @ 175° |
| 6 | F On Site | 3.7 ± 0.3 | 4.3 ± 0.3 | 6.5 ± 0.4 | 3.9 ± 0.2 | 0.5 miles @ 210° |
| 7* | G On Site | 3.9 ± 0.2 | 3.9 ± 0.1 | 4.4 ± 0.5 | 3.9 ± 0.3 | 0.7 miles @ 250° |
| 8 | R-5 Off Site-Control | 4.8 ± 0.2 | 5.0 ± 0.3 | 7.3 ± 0.6 | 5.6 ± 0.5 | 16.4 miles @ 42° |
| 9 | D1 Off Site | 4.1 ± 0.1 | 4.0 ± 0.2 | 5.1 ± 1.0 | 4.1 ± 0.2 | 11.4 miles @ 80° |
| 10 | D2 Off Site | 4.4 ± 0.3 | 4.5 ± 0.2 | 4.8 ± 0.5 | 4.3 ± 0.2 | 9.0 miles @ 117° |
| 11 | E Off Site | 4.7 ± 0.3 | 4.3 ± 0.2 | 5.0 ± 0.3 | 4.4 ± 0.3 | 7.2 miles @ 160° |
| 12 | F Off Site | 4.5 ± 0.2 | 3.9 ± 0.1 | 3.8 ± 0.2 | 4.3 ± 0.1 | 7.7 miles @ 190° |
| 13 | G Off Site | 4.5 ± 0.2 | 4.3 ± 0.2 | 4.3 ± 0.3 | 4.4 ± 0.2 | 5.3 miles @ 225° |
| 14* | DeMass Rd., SW Oswego-Control | 4.5 ± 0.3 | 4.1 ± 0.2 | 4.4 ± 0.3 | 4.3 ± 0.1 | 12.6 miles @ 226° |
| 15* | Pole 66, W. Boundary-Bible Camp | 4.0 ± 0.1 | 3.6 ± 0.1 | 3.9 ± 0.3 | 3.8 ± 0.1 | 0.9 miles @ 237° |
| 18* | Energy Info. Center - Lamp Post, SW. | 4.8 ± 0.1 | 4.2 ± 0.3 | 4.2 ± 0.4 | 4.7 ± 0.3 | 0.4 miles @ 265° |
| 19 | East Boundary-JAF, Pole 9 | 4.6 ± 0.4 | 4.2 ± 0.1 | 4.3 ± 0.4 | 4.7 ± 0.2 | 1.3 miles @ 81° |
| 23* | H On Site | 5.4 ± 0.3 | 5.2 ± 0.3 | 4.8 ± 0.4 | 5.2 ± 0.2 | 0.8 miles @ 70° |
| 24 | I On Site | 4.5 ± 0.4 | 4.4 ± 0.3 | 4.7 ± 0.4 | 4.6 ± 0.2 | 0.8 miles @ 98° |
| 25 | J On Site | 4.2 ± 0.3 | 4.2 + 0.4 | 4.8 ± 0.2 | 4.6 ± 0.3 | 0.9 miles @ 110° |
| 26 | K On Site | 4.7 ± 0.2 | 4.3 ± 0.2 | 4.1 ± 0.3 | 4.8 ± 0.1 | 0.5 miles @ 132° |
| 27 | N. Fence, N. of Switchyard, JAF | 23.7 ± 1.1 | 19.7 ± 1.2 | 17.5 ± 1.0 | 11.4 ± 0.5 | 0.4 miles @ 60° |
| 28 | N. Light Pole, N. of Screenhouse, JAF | 30.6 ± 3.3 | 22.5 ± 1.1 | 23.2 ± 0.3 | 21.6 ± 0.6 | 0.5 miles @ 68° |
| 29 | N. Fence, N. of W. Side Screenhouse, JAF | 29.7 ± 1.7 | 23.9 ± 1.9 | 21.2 ± 1.2 | 14.7 ± 0.4 | 0.5 miles @ 65° |

## TABLE 6-10 (Continued)

## DIRECT RADIATION MEASUREMENT RESULTS

**Results in units of mrem/standard month ± 1 sigma**

| LOCATION NUMBER | LOCATION | JANUARY THROUGH MARCH | APRIL THROUGH JUNE | JULY THROUGH SEPTEMBER | OCTOBER THROUGH DECEMBER | LOCATION (DIRECTION & DISTANCE) (2) |
|---|---|---|---|---|---|---|
| **2000** | | | | | | |
| 30 | N Fence (NW) JAF | 17.2 ± 1.0 | 13.0 ± 0.3 | 15.7 ± 2.3 | 9.6 ± 0.3 | 0.4 miles @ 57° |
| 31 | N Fence (NW) NMP-1 | 6.7 ± 0.3 | 6.7 ± 0.3 | 9.4 ± 0.8 | 7.8 ± 0.1 | 0.2 miles @ 276° |
| 39 | N Fence, Rad Waste, NMP-1 | 8.1 ± 0.4 | 8.2 ± 0.3 | (1) | 11.2 ± 0.4 | 0.2 miles @ 292° |
| 47 | N Fence, NE, JAF | 7.7 ± 0.5 | 6.4 ± 0.4 | 8.5 ± 1.7 | 5.9 ± 0.3 | 0.6 miles @ 69° |
| 49* | Phoenix, NY-Control | 3.8 ± 0.3 | 3.7 ± 0.1 | 5.5 ± 0.4 | 4.2 ± 0.1 | 19.8 miles @ 170° |
| 51 | Liberty & Bronson Sts., E. of OSS | 4.1 ± 0.3 | 4.5 ± 0.2 | 5.8 ± 0.7 | 4.7 ± 0.4 | 7.4 miles @ 233° |
| 52 | East 12th & Cayuga Sts., Osw. School | 4.4 ± 0.2 | 4.3 ± 0.4 | 5.3 ± 0.3 | 4.6 ± 0.2 | 5.8 miles @ 227° |
| 53 | Broadwell & Chestnut Sts., Fulton H.S. | 4.4 ± 0.3 | 4.5 ± 0.2 | 5.8 ± 0.8 | 4.7 ± 0.2 | 13.7 miles @ 183° |
| 54 | Liberty St., & Co Rt 16, Mexico H.S. | 4.2 ± 0.5 | 4.3 ± 0.2 | 5.4 ± 0.6 | 4.4 ± 0.2 | 9.3 miles @ 115° |
| 55 | Gas Substation & Co Rt 5 - Pulaski | 4.2 ± 0.4 | 4.3 ± 0.4 | 5.5 ± 1.2 | 4.5 ± 0.2 | 13.0 miles @ 75° |
| 56* | Rt 104 - New Haven School (SE Corner) | 5.5 ± 0.9 | 4.7 ± 0.3 | 4.9 ± 0.4 | 4.6 ± 0.2 | 5.3 miles @ 123° |
| 58* | Co Rt 1A - Alcan (E. of E. Entrance Rd.) | 4.3 ± 0.5 | 4.8 ± 0.2 | 5.5 ± 0.5 | 4.6 ± 0.2 | 3.1 miles @ 220° |
| 75* | Unit 2, N. Fence, N. of Reactor Bldg. | 6.6 ± 0.3 | 6.6 ± 0.2 | 9.1 ± 0.8 | 7.0 ± 0.4 | 0.1 miles @ 5° |
| 76* | Unit 2, N. Fence, N. of Change House | 5.1 ± 0.3 | 6.0 ± 0.6 | 8.4 ± 1.7 | 5.7 ± 0.4 | 0.1 miles @ 25° |
| 77* | Unit 2, N. Fence, N. of Pipe Bldg. | 6.4 ± 0.1 | 6.3 ± 0.5 | 8.3 ± 0.9 | 6.2 ± 0.2 | 0.2 miles @ 45° |
| 78* | JAF, E. of E. Old Lay Down Area | 4.3 ± 0.0 | 4.6 ± 0.3 | 6.0 ± 0.8 | 4.8 ± 0.3 | 1.0 miles @ 90° |
| 79* | Co Rt 29, Pole #63, 0.2 mi. S. of Lake Rd | 3.7 ± 0.2 | 4.4 ± 0.4 | 6.2 ± 1.1 | 4.2 ± 0.2 | 1.1 miles @ 115° |
| 80* | Co Rt 29, Pole #54, 0.7 mi. S. of Lake Rd | 3.7 ± 0.2 | 4.2 ± 0.4 | 5.5 ± 1.3 | 4.5 ± 0.2 | 1.4 miles @ 133° |
| 81* | Miner Rd., Pole #16, 0.5 mi. W. of Rt 29 | 4.2 ± 0.3 | 3.8 ± 0.2 | 4.6 ± 0.2 | 4.4 ± 0.1 | 1.6 miles @ 159° |
| 82* | Miner Rd., Pole #1 1/2, 1.1 mi. W of Rt 29 | 4.0 ± 0.2 | 4.0 ± 0.2 | 5.5 ± 1.0 | 4.5 ± 0.2 | 1.6 miles @ 181° |
| 83* | Lakeview Rd, Tree, 0.45 mi. N. of Miner Rd | 4.2 ± 0.4 | 3.6 ± 0.2 | 5.1 ± 0.3 | 4.5 ± 0.2 | 1.2 miles @ 200° |

## TABLE 6-10 (Continued)

## DIRECT RADIATION MEASUREMENT RESULTS

**Results in units of mrem/standard month ± 1 sigma**

| LOCATION NUMBER | LOCATION | JANUARY THROUGH MARCH | APRIL THROUGH JUNE | JULY THROUGH SEPTEMBER | OCTOBER THROUGH DECEMBER | LOCATION (DIRECTION & DISTANCE) (2) |
|---|---|---|---|---|---|---|
| **2000** | | | | | | |
| 84* | Lakeview Rd. N, Pole #6117, 200 Ft. N. of Lake Rd. | 4.0 ± 0.4 | 3.9 ± 0.2 | 5.7 ± 0.4 | 4.5 ± 0.1 | 1.1 miles @ 225° |
| 85* | Unit 1, N. Fence, N. of W. Side of Screen House | 8.4 ± 0.5 | 8.2 ± 0.3 | 10.0 ± 0.6 | 9.4 ± 0.4 | 0.2 miles @ 294° |
| 86* | Unit 2, N. Fence, N. of W. Side of Screen House | 6.3 ± 0.3 | 5.9 ± 0.3 | 8.3 ± 0.4 | 7.1 ± 0.3 | 0.1 miles @ 315° |
| 87* | Unit 2, N Fence, N. of E. Side of Screen House | 6.1 ± 0.4 | 6.1 ± 0.3 | 8.4 ± 1.0 | 7.6 ± 0.4 | 0.1 miles @ 341° |
| 88* | Hickory Grove Rd., Pole #2, 0.6 mi. N. of Rt. 1 | 4.4 ± 0.3 | 4.0 ± 0.1 | 3.6 ± 0.1 | 4.4 ± 0.1 | 4.8 miles @ 97° |
| 89* | Leavitt Rd., Pole #16, 0.4 mi. S. of Rt 1 | 4.7 ± 0.4 | 4.3 ± 0.2 | 5.9 ± 0.6 | 4.9 ± 0.2 | 4.1 miles @ 111° |
| 90* | Rt. 104, Pole #300, 150 Ft. E of Keefe Rd. | 3.9 ± 0.4 | 3.8 ± 0.4 | 5.0 ± 0.8 | 4.3 ± 0.1 | 4.2 miles @ 135° |
| 91* | Rt. 51A, Pole #59, 0.8 mi. W. of Rt. 51 | 3.8 ± 0.3 | 4.1 ± 0.3 | 5.7 ± 1.1 | 4.2 ± 0.3 | 4.8 miles @ 156° |
| 92* | Maiden Lane Rd., Power Pole, 0.6 mi., S of Rt. 104 | 4.9 ± 0.5 | 4.8 ± 0.2 | 5.9 ± 0.9 | 4.9 ± 0.2 | 4.4 miles @ 183° |
| 93* | Rt. 53, Pole 1-1, 120 Ft. S. of 104 | 3.7 ± 0.2 | 3.8 ± 0.2 | 6.6 ± 0.4 | 4.4 ± 0.4 | 4.4 miles @ 205° |
| 94* | Rt. 1, Pole #82, 250 Ft. E. of Kocher Rd. | 3.7 ± 0.2 | 3.7 ± 0.2 | 5.4 ± 0.8 | 4.1 ± 0.2 | 4.7 miles @ 223° |
| 95* | Lakeshore Camp Site, from Alcan W. Access Rd., Pole #21, 1.2 mi. N. of Rt. 1 | 3.9 ± 0.3 | 3.4 ± 0.3 | 4.5 ± 0.4 | 3.9 ± 0.2 | 4.1 miles @ 237° |
| 96* | Creamery Rd., 0.3 mi. S. of Middle Rd., Pole 1 1/2 | 3.8 ± 0.2 | 3.7 ± 0.2 | 5.5 ± 0.5 | 4.3 ± 0.2 | 3.6 miles @ 199° |
| 97* | Rt. 29, Env. Station R4, 200 Ft. N. of Miner Rd. | 3.8 ± 0.2 | 4.1 ± 0.2 | 6.3 ± 0.9 | 4.4 ± 0.2 | 1.8 miles @ 143° |
| 98* | Lake Rd., Pole #145, 0.15 mi. E. of Rt. 29 | 4.0 ± 0.5 | 4.0 ± 0.2 | 5.6 ± 0.6 | 4.2 ± 0.1 | 1.2 miles @ 101° |

## TABLE 6-10 (Continued)

## DIRECT RADIATION MEASUREMENT RESULTS

**Results in units of mrem/standard month ± 1 sigma**

| LOCATION NUMBER | LOCATION | JANUARY THROUGH MARCH | APRIL THROUGH JUNE | JULY THROUGH SEPTEMBER | OCTOBER THROUGH DECEMBER | LOCATION (DIRECTION & DISTANCE) (2) |
|---|---|---|---|---|---|---|
| **2000** | | | | | | |
| 99 | NMP Rd., 0.4 miles N. of Lake Rd., Env. Station R1 Off-Site | 3.9 ± 0.3 | 4.3 ± 0.1 | 5.5 ± 0.7 | 4.6 ± 0.3 | 1.8 miles @ 88° |
| 100 | Rt. 29 and Lake Rd., Env. Station R2 Off-Site | 3.7 ± 0.1 | 4.5 ± 0.2 | 6.5 ± 0.9 | 4.5 ± 0.1 | 1.1 miles @ 104° |
| 101 | Rt. 29, 0.7 mi. S. of Lake Rd., Env. Station R3 Off-Site | 3.5 ± 0.2 | 4.4 ± 0.2 | 5.1 ± 0.4 | 4.2 ± 0.1 | 1.5 miles @ 132° |
| 102 | EOF/Env. Lab, Oswego Co. Airport (Fulton Airport), Rt. 176, E. Driveway Lamp Post | 3.6 ± 0.3 | 4.5 ± 0.2 | 6.6 ± 0.8 | 4.3 ± 0.3 | 11.9 miles @ 175° |
| 103 | EIC, East Garage Rd., Lamp Post | 4.0 ± 0.4 | 5.1 ± 0.3 | 6.9 ±1.2 | 4.8 ± 0.2 | 0.4 miles @ 267° |
| 104 | Parkhurst Road, Pole 148 1/2-A, 0.1 mi. S. of Lake Rd. | 3.7 ± 0.4 | 4.2 ± 0.3 | 5.3 ± 0.7 | 4.3 ± 0.2 | 1.4 miles @ 102° |
| 105 | Lakeview Road, Pole 6125, 0.6 mi. S. of Lake Rd. | 4.2 ± 0.2 | 4.5 ± 0.3 | 5.3 ± 0.8 | 4.4 ± 0.2 | 1.4 miles @ 198° |
| 106 | Shoreline Cove, E of NMP-1, Tree on W Edge | 5.0 ± 0.3 | 5.6 ± 0.3 | 6.8 ± 0.7 | 5.8 ± 0.4 | 0.3 miles @ 274° |
| 107 | Shoreline Cove, E of NMP-1, Tree 30 Ft. S. of TLD #106 | 4.8 ± 0.3 | 5.4 ± 0.4 | 6.2 ± 0.7 | 5.6 ± 0.2 | 0.3 miles @ 272° |
| 108 | Lake Rd. Pole #142 - 300' East of Co. Rt. 29 (S) | 4.2 ± 0.5 | 4.4 ± 0.2 | 5.8 ± 0.2 | 4.3 ± 0.2 | 1.1 miles @ 104° |
| 109 | Lake Rd. Tree 300' E. of Co. Rt. 29 (N) | 4.2 ± 0.2 | 4.6 ± 0.2 | 5.8 ± 0.5 | 4.6 ± 0.3 | 1.1 miles @ 103° |
| 111 | Sterling, NY - Control Blasiak Residence | 4.7 ± 0.7 | 4.2 ± 0.3 | 5.4 ± 0.3 | 4.1 ± 0.2 | 26.4 miles @ 166° |
| 113 | Baldwinsville, NY - Control Coates Residence | 4.9 ± 0.2 | 4.0 ± 0.2 | 5.7 ± 0.6 | 4.0 ± 0.2 | 21.8 miles @ 214° |

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

## TABLE 16-11A

## CONCENTRATION OF IODINE - 131 IN MILK (1)

### Results in units of pCi/liter

| LOCATION | 1st half April | 2nd half April | 1st half May | 2nd half May | 1st half June | 2nd half June |
|---|---|---|---|---|---|---|
| 60 | <0.54 | <0.46 | <0.53 | <0.54 | <0.44 | <0.54 |
| 55 | <0.46 | <0.42 | <0.46 | <0.45 | <0.39 | <0.49 |
| 50 | <0.39 | <0.51 | <0.42 | <0.51 | <0.50 | <0.41 |
| 4 | <0.47 | <0.48 | <0.53 | <0.39 | <0.50 | <0.44 |
| 7 | <0.40 | <0.51 | <0.46 | <0.45 | <0.50 | <0.50 |
| 73* | <0.52 | <0.40 | <0.35 | <0.45 | <0.40 | <0.36 |
| **LOCATION** | **1st half July** | **2nd half July** | **1st half August** | **2nd half August** | **1st half September** | **2nd half September** |
| 60 | <0.57 | <0.45 | <0.46 | <0.40 | <0.54 | <0.37 |
| 55 | <0.38 | <0.45 | <0.38 | <0.46 | <0.40 | <0.31 |
| 50 | <0.42 | <0.39 | <0.47 | <0.38 | <0.52 | <0.46 |
| 4 | <0.42 | <0.35 | <0.37 | <0.54 | <0.57 | <0.44 |
| 7 | <0.53 | <0.39 | <0.37 | ND | ND | ND |
| 73* | <0.51 | <0.44 | <0.40 | <0.34 | <0.52 | <0.35 |
| **LOCATION** | **1st half October** | **2nd half October** | **1st half November** | **2nd half November** | **1st half December** | **2nd half December** |
| 60 | <0.36 | <0.41 | <0.43 | <0.38 | <0.49 | <0.50 |
| 55 | <0.49 | <0.37 | <0.39 | <0.44 | <0.48 | <0.35 |
| 50 | <0.40 | <0.31 | <0.35 | <0.34 | <0.46 | <0.48 |
| 4 | <0.35 | <0.35 | <0.38 | <0.34 | <0.53 | <0.37 |
| 7 | ND | ND | ND | ND | ND | ND |
| 73* | <0.50 | <0.46 | <0.48 | <0.37 | <0.36 | <0.32 |

* - Control Result. TS/ODCM
(1) Iodine - 131 results are corrected for decay to the sample stop date.
ND - No Data. Herd sold at this location following 08/07/00 sampling.

## TABLE 6-11B

### CONCENTRATION OF GAMMA EMITTERS IN MILK

**Results in units of pCi/liter ± 1 sigma**

| LOCATION | NUCLIDES | 1st half April | 2nd half April | 1st half May | 2nd half May | 1st half June | 2nd half June |
|---|---|---|---|---|---|---|---|
| 60 | K-40 | 1600 ± 69 | 1540 ± 59 | 1430 ± 57 | 1700 ± 87 | 1340 ± 56 | 1480 ± 65 |
| | Cs-134 | <6.20 | <4.61 | <4.41 | <7.12 | <4.33 | <5.88 |
| | Cs-137 | <6.43 | <4.79 | <4.29 | <6.87 | <4.55 | <5.32 |
| | Ba/La-140 | <6.77 | <4.23 | <5.41 | <7.97 | <4.45 | <5.41 |
| | Ra-226 | <128 | <95.5 | <96.7 | 162 ± 53 | <93.5 | <115 |
| | Others | <LLD | LLD | LLD | LLD | LLD | LLD |
| 55 | K-40 | 1540 ± 83 | 1620 ± 87 | 1440 ± 62 | 1470 ± 81 | 1500 ± 63 | 1460 ± 57 |
| | Cs-134 | <6.47 | <7.41 | <5.04 | <6.47 | <4.43 | <4.72 |
| | Cs-137 | <6.42 | <7.31 | <3.99 | <7.30 | <4.89 | <4.97 |
| | Ba/La-140 | <9.07 | <9.89 | <5.81 | <10.1 | <4.15 | <4.60 |
| | Ra-226 | <1.66 | 109 ± 39 | 95.6 ± 30 | <150 | 114 ± 25 | 98.8 ± 35 |
| | Others | LLD | LLD | LLD | LLD | LLD | LLD |
| 50 | K-40 | 1340 ± 55 | 1490 ± 64 | 1560 ± 67 | 1400 ± 57 | 1550 ± 83 | 1590 ± 65 |
| | Cs-134 | <4.65 | <3.96 | <5.39 | <3.87 | <6.91 | <4.84 |
| | Cs-137 | <5.13 | <4.89 | <4.90 | <4.85 | <6.57 | <4.32 |
| | Ba/La-140 | <5.45 | <6.21 | <4.96 | <5.27 | <7.80 | <4.22 |
| | Ra-226 | <99.7 | 136 ± 34 | 77.8 ± 25 | <91.1 | <166 | 116 ± 27 |
| | Others | LLD | LLD | LLD | LLD | LLD | LLD |
| 4 | K-40 | 1670 ± 51 | 1750 ± 52.0 | 1530 ± 82 | 1540 ± 59 | 1420 ± 57 | 1640 ± 85 |
| | Cs-134 | <2.36 | <3.81 | <7.79 | <4.36 | <4.72 | <7.88 |
| | Cs-137 | <4.38 | <4.10 | <7.57 | <4.91 | <5.02 | <7.16 |
| | Ba/La-140 | <3.42 | <3.43 | <7.80 | <5.49 | <4.09 | <9.77 |
| | Ra-226 | 81.1 ± 27 | 93.5 ± 33 | <170 | <99.7 | <107 | <157 |
| | Others | LLD | LLD | LLD | LLD | LLD | LLD |
| 7 | K-40 | 1580 ± 68 | 1740 ± 52 | 1320 ± 60 | 1490 ± 65 | 1760 ± 52 | 1510 ± 48 |
| | Cs-134 | <4.70 | <3.95 | <5.18 | <5.02 | <4.54 | <3.69 |
| | Cs-137 | <5.71 | <4.51 | <5.02 | <5.32 | <4.30 | <4.18 |
| | Ba/La-140 | <6.86 | <4.49 | <5.65 | <5.28 | <5.02 | <4.45 |
| | Ra-226 | <111 | 98.2 ± 38 | 149 ± 34 | <105 | <99.7 | 89 + 34 |
| | Others | LLD | LLD | LLD | LLD | LLD | LLD |
| 73* (Control) | K-40 | 1510 ± 64 | 1410 ± 63 | 1740 ± 52 | 1680 ± 51 | 1550 ± 83 | 1360 ± 55 |
| | Cs-134 | <4.43 | <4.62 | <2.34 | <4.25 | <7.52 | <3.77 |
| | Cs-137 | <4.47 | <4.62 | <4.16 | <4.24 | <6.57 | <4.29 |
| | Ba/La-140 | <5.20 | <6.53 | <3.80 | <3.69 | <6.60 | <4.05 |
| | Ra-226 | 104 ± 30 | <107 | 87.3 ± 34 | 85.3 ± 29 | 81.8 ± 29 | <90.2 |
| | Others | LLD | LLD | LLD | LLD | LLD | LLD |

* - TS/ODCM

**TABLE 6-11B (Continued)**

**CONCENTRATION OF GAMMA EMITTERS IN MILK**

**Results in units of pCi/liter ± 1 sigma**

| LOCATION | NUCLIDES | 1st half July | 2nd half July | 1st half August | 2nd half August | 1st half September | 2nd half September |
|---|---|---|---|---|---|---|---|
| 60 | K-40 | 1730 ± 51 | 1750 ± 52 | 1550 ± 83 | 1560 ± 65 | 1410 ± 62 | 1360 ± 56 |
| | Cs-134 | <4.11 | <4.02 | <7.80 | <4.94 | <4.09 | <4.21 |
| | Cs-137 | <3.86 | <4.10 | <7.16 | <4.96 | <5.09 | <4.02 |
| | Ba/La-140 | <4.08 | <4.89 | <7.47 | <6.00 | <5.60 | <5.03 |
| | Ra-226 | 117 ± 31 | 112 ± 32 | <148 | 85.7 ± 31 | 115 ± 33 | <84.0 |
| | Others | LLD | LLD | LLD | LLD | LLD | LLD |
| 55 | K-40 | 1590 ± 67 | 1360 ± 79 | 1520 ± 83 | 1560 ± 90 | 1560 ± 83 | 1650 ± 51 |
| | Cs-134 | <5.15 | <6.59 | <6.81 | <5.75 | <5.05 | <2.77 |
| | Cs-137 | <5.97 | <8.07 | <7.30 | <7.06 | <7.31 | <4.01 |
| | Ba/La-140 | <6.14 | <7.82 | <8.71 | <7.38 | <7.43 | <3.80 |
| | Ra-226 | <113 | <147 | 117 ± 48 | 104 ± 42 | <146 | 119 ± 46 |
| | Others | LLD | LLD | LLD | LLD | LLD | LLD |
| 50 | K-40 | 1570 ± 64 | 1550 ± 66 | 1570 ± 65 | 1500 ± 68 | 1430 ± 63 | 1250 ± 53 |
| | Cs-134 | <4.38 | <4.83 | <4.38 | <4.58 | <4.54 | <4.36 |
| | Cs-137 | <4.54 | <5.82 | <4.32 | <5.48 | <4.82 | <4.54 |
| | Ba/La-140 | <5.23 | <6.13 | <5.68 | <5.50 | <4.78 | <4.89 |
| | Ra-226 | 96.6 ± 23 | <116 | 103 ± 32 | 115 ± 36 | 115 ± 31 | 96.9 ± 25 |
| | Others | LLD | LLD | LLD | LLD | LLD | LLD |
| 4 | K-40 | 1560 ± 84 | 1360 ± 55 | 1700 ± 86 | 1680 ± 82 | 1830 ± 53 | 1640 ± 86 |
| | Cs-134 | <7.42 | <4.15 | <6.70 | <5.46 | <2.74 | <6.44 |
| | Cs-137 | <7.30 | <4.35 | <7.43 | <5.72 | <4.18 | <7.31 |
| | Ba/La-140 | <9.12 | <5.65 | <9.49 | <7.50 | <3.80 | <7.37 |
| | Ra-226 | 102 ± 40 | <93.1 | 95.2 ± 42 | <138 | 91.2 ± 31 | 87.4 ± 38 |
| | Others | LLD | LLD | LLD | LLD | LLD | LLD |
| 7 | K-40 | 1180 ± 52 | 956 ± 47 | 1120 ± 56 | ND | ND | ND |
| | Cs-134 | <4.15 | <4.76 | <4.75 | | | |
| | Cs-137 | <4.55 | <4.01 | <4.76 | | | |
| | Ba/La-140 | <3.62 | <4.10 | <5.26 | | | |
| | Ra-226 | <95.9 | 63.9 ± 21 | 111 ± 33 | | | |
| | Others | LLD | LLD | LLD | | | |
| 73* (Control) | K-40 | 1700 ± 51 | 1600 ± 66 | 1510 ± 64 | 1590 ± 67 | 1620 ± 85 | 1540 ± 67 |
| | Cs-134 | <2.54 | <4.99 | <4.43 | <5.44 | <6.25 | <4.72 |
| | Cs-137 | <3.73 | <4.61 | <4.61 | <4.96 | <7.86 | <5.95 |
| | Ba/La-140 | <4.58 | <4.99 | <5.04 | <4.95 | <7.38 | <5.57 |
| | Ra-226 | 106 ± 41 | 134 ± 24 | 128 ± 35 | <107 | 133 ± 38 | 72.1 ± 32 |
| | Others | LLD | LLD | LLD | LLD | LLD | LLD |

* - TS/ODCM
ND - No Data. Herd sold at this location following 08/07/00 sampling.

TABLE 6-11BContinued)

CONCENTRATION OF GAMMA EMITTERS IN MILK

Results in units of pCi/liter $\pm$ 1 sigma

| LOCATION | NUCLIDES | 1st half October | 2nd half October | 1st half November | 2nd half November | 1st half December | 2nd half December |
|---|---|---|---|---|---|---|---|
| 60 | K-40 | 1390 ± 62 | 1480 ± 65 | 1470 ±63 | 1480 ± 70 | 1660 ± 83 | 1470 ± 67 |
| | Cs-134 | <4.44 | <5.56 | <4.81 | <5.09 | <6.43 | <5.15 |
| | Cs-137 | <3.83 | <5.47 | <4.24 | <5.17 | <6.30 | <5.53 |
| | Ba/La-140 | <6.03 | <5.43 | <6.05 | <5.66 | <7.95 | <4.74 |
| | Ra-226 | 72.6 ± 41 | <120 | 140 ± 37 | <12.6 | <146 | <104 |
| | Others | LLD | LLD | LLD | LLD | LLD | LLD |
| 55 | K-40 | 1540 ± 85 | 1560 ± 67 | 1480 ± 66 | 1460 ± 66 | 1600 ± 68 | 1540 ± 66 |
| | Cs-134 | <8.32 | <4.50 | <3.33 | <3.11 | <5.92 | <5.17 |
| | Cs-137 | <7.15 | <4.51 | <5.23 | <4.62 | <5.32 | <5.22 |
| | Ba/La-140 | <6.24 | <5.56 | <6.22 | <6.27 | <6.03 | <7.49 |
| | Ra-226 | <154 | 77.6 ± 43 | <121 | 77.5 ± 41 | <119 | 152 ± 43 |
| | Others | LLD | LLD | LLD | LLD | LLD | LLD |
| 50 | K-40 | 1590 ± 68 | 1440 ± 58 | 1740 ± 52 | 1460 ± 64 | 1500 ± 82 | 1470 ± 58 |
| | Cs-134 | <5.33 | <3.91 | <2.65 | <4.33 | <6.39 | <4.20 |
| | Cs-137 | <6.34 | <4.22 | <3.78 | <4.62 | <6.72 | <4.34 |
| | Ba/La-140 | <4.98 | <3.97 | <4.50 | <4.98 | <7.66 | <4.78 |
| | Ra-226 | <115 | <79.8 | 131 ± 37 | 132 ± 38 | <166 | <89 |
| | Others | LLD | LLD | LLD | LLD | LLD | LLD |
| 4 | K-40 | 1740 ± 52 | 1730 ± 68 | 1570 ± 60 | 1630 ± 68 | 1580 ± 69 | 1500 ± 66 |
| | Cs-134 | <2.56 | <4.90 | <4.36 | <5.50 | <5.21 | <6.14 |
| | Cs-137 | <4.45 | <4.32 | <4.28 | <5.78 | <4.70 | <6.06 |
| | Ba/La-140 | <4.06 | <5.22 | <5.47 | <6.84 | <5.81 | <6.63 |
| | Ra-226 | 88.0 ± 32 | <106 | 73.3 ± 31 | <118 | 72.6 ± 41 | <127 |
| | Others | LLD | LLD | LLD | LLD | LLD | LLD |
| 7 | K-40<br>Cs-134<br>Cs-137<br>Ba/La-140<br>Ra-226<br>Others | ND | ND | ND | ND | ND | ND |
| 73** (Control) | K-40 | 1390 ± 65 | 1590 ± 85 | 1370 ± 65 | 1460 ± 58 | 1510 ± 72 | 1570 ± 68 |
| | Cs-134 | <4.26 | <7.31 | <4.67 | <3.87 | <5.11 | <5.26 |
| | Cs-137 | <4.41 | <7.29 | <5.76 | <4.05 | <5.06 | <5.98 |
| | Ba/La-140 | <5.85 | <7.80 | <5.28 | <5.41 | <6.61 | <7.14 |
| | Ra-226 | 89.3 ± 36 | <151 | <107 | <89.7 | 91.1 ± 34 | <110 |
| | Others | LLD | LLD | LLD | LLD | LLD | LLD |

* - TS/ODCM
ND - No Data.  Herd sold at this location following 08/07/00 sampling.

# TABLE 6-12A

## CONCENTRATION OF GAMMA EMITTERS IN FOOD PRODUCTS

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

| LOCATION | DATE | SAMPLE TYPE | Be-7 | K-40 | I-131 | Cs-134 | Cs-137 | Ra-226 | AcTh-228 | OTHER |
|---|---|---|---|---|---|---|---|---|---|---|
| V* | 9/18/00 | Pepper Leaves | 0.36 ± 0.03 | 6.69 ± 0.15 | < 0.01 | < 0.01 | < 0.01 | 0.20 ± 0.05 | 0.02 ± 0.01 | < LLD |
| | 9/18/00 | Squash Leaves | 0.82 ± 0.03 | 2.75 ± 0.07 | < 0.01 | < 0.01 | < 0.01 | 0.20 ± 0.03 | 0.03 ± 0.01 | < LLD |
| S* | 9/18/00 | Pepper Leaves | 0.44 ± 0.03 | 6.57 ± 0.13 | < 0.01 | < 0.01 | < 0.01 | 0.22 ± 0.04 | < 0.03 | < LLD |
| R* | 9/18/00 | Collards | 0.16 ± 0.02 | 5.38 ± 0.08 | < 0.01 | < 0.01 | < 0.01 | 0.31 ± 0.03 | < 0.04 | < LLD |
| P* | 9/19/00 | Collards | 0.21 ± 0.02 | 3.52 ± 0.09 | < 0.01 | < 0.01 | < 0.01 | 0.32 ± 0.06 | 0.08 ± 0.01 | < LLD |
| K* | 9/18/00 | Pepper Leaves | 0.34 ± 0.01 | 3.66 + 0.05 | < 0.01 | < 0.003 | < 0.004 | 0.10 ± 0.02 | 0.03 ± 0.01 | < LLD |
| | 9/18/00 | Collards | 0.14 ± 0.03 | 3.98 ± 0.12 | < 0.01 | < 0.01 | < 0.01 | 0.16 ± 0.06 | 0.04 ± 0.01 | < LLD |
| | 9/18/00 | Tomatoes | < 0.05 | 1.78 ± 0.04 | < 0.01 | < 0.01 | < 0.01 | 0.12 ± 0.03 | < 0.02 | < LLD |
| | 9/18/00 | Squash Leaves | 0.67 ± 0.02 | 2.37 ± 0.04 | < 0.01 | < 0.004 | < 0.004 | 0.16 ± 0.02 | 0.02 ± 0.01 | < LLD |
| L* | 9/25/00 | Squash Leaves | 0.46 ± 0.04 | 3.59 ± 0.11 | < 0.01 | < 0.01 | < 0.01 | 0.40 ± 0.07 | 0.02 + 0.01 | < LLD |
| | 9/25/00 | Cucumber Leaves | 1.00 ± 0.05 | 3.11 ± 0.13 | < 0.01 | < 0.01 | < 0.01 | < 0.22 | 0.03 ± 0.02 | < LLD |
| | 9/25/00 | Pepper Leaves | 0.38 ± 0.03 | 7.39 ± 0.12 | < 0.01 | < 0.01 | < 0.01 | 0.38 ± 0.07 | 0.07 ± 0.01 | < LLD |
| | 9/25/00 | Collards | 0.19 ± 0.04 | 4.94 ± 0.16 | < 0.02 | < 0.01 | < 0.01 | 0.18 ± 0.09 | < 0.06 | < LLD |
| Z* | 9/25/00 | Squash Leaves | 2.08 ± 0.06 | 2.87 ± 0.10 | < 0.01 | < 0.01 | < 0.01 | 0.34 ± 0.06 | 0.03 ± 0.01 | < LLD |
| | 9/25/00 | Grape Leaves | 0.70 ± 0.05 | 3.40 ± 0.13 | < 0.01 | < 0.01 | < 0.01 | < 0.22 | < 0.05 | < LLD |
| M* (Control) | 9/18/00 | Squash Leaves | 0.66 ± 0.02 | 2.98 ± 0.06 | < 0.01 | < 0.004 | < 0.004 | 0.19 ± 0.03 | 0.03 ± 0.01 | < LLD |
| | 9/19/00 | Grape Leaves | 1.19 ± 0.03 | 3.17 ± 0.07 | < 0.01 | < 0.01 | < 0.01 | 0.30 ± 0.04 | < 0.03 | < LLD |
| | 9/18/00 | Tomatoes | < 0.03 | 2.07 ± 0.05 | < 0.01 | < 0.003 | < 0.004 | 0.07 ± 0.02 | < 0.01 | < LLD |
| | 9/18/00 | Pepper Leaves | 0.21 ± 0.02 | 7.86 ± 0.09 | < 0.01 | < 0.01 | < 0.01 | 0.19 ± 0.04 | 0.03 ± 0.01 | < LLD |
| | 9/18/00 | Cucumber Leaves | 0.74 ± 0.03 | 2.50 ± 0.07 | < 0.01 | < 0.01 | < 0.01 | 0.10 ± 0.04 | 0.03 ± 0.01 | < LLD |

- TS/ODCM

## TABLE 6-12B

### CONCENTRATION OF GAMMA EMITTERS IN FOOD PRODUCTS

**Results in units of pCi/kg (wet) ± 1 sigma**

| LOCATION | DATE | SAMPLE TYPE | Be-7 | K-40 | I-131 | Cs-134 | Cs-137 | Ra-226 | AcTh-228 | OTHER |
|---|---|---|---|---|---|---|---|---|---|---|
| V* | 9/18/00 | Pepper Leaves | 357 ± 30 | 6690 ± 150 | < 9 | < 9 | < 10 | 204 ± 52 | 21 ± 9 | < LLD |
| | 9/18/00 | Squash Leaves | 816 ± 27 | 2750 ± 73 | < 6 | < 5 | < 5 | 204 ± 31 | 28 ± 6 | < LLD |
| S* | 9/18/00 | Pepper Leaves | 441 ± 29 | 6570 ± 13 | < 8 | < 8 | < 8 | 218 ± 42 | < 32 | < LLD |
| R* | 9/18/00 | Collards | 159 ± 17 | 5380 ± 81 | < 13 | < 8 | < 8 | 311 ± 34 | < 35 | < LLD |
| P* | 9/19/00 | Collards | 206 ± 23 | 3520 ± 89 | < 9 | < 8 | < 9 | 320 ± 59 | 80 ± 12 | < LLD |
| K* | 9/18/00 | Pepper Leaves | 340 ± 14 | 3665 ± 51 | < 9 | < 3 | < 4 | 102 ± 21 | 26 ± 5 | < LLD |
| | 9/18/00 | Collards | 140 ± 27 | 3980 ± 119 | < 9 | < 8 | < 9 | 156 ± 59 | 38 ± 13 | < LLD |
| | 9/18/00 | Tomatoes | < 48 | 1780 ± 42 | < 11 | < 6 | < 5 | 122 ± 26 | < 23 | < LLD |
| | 9/18/00 | Squash Leaves | 667 ± 15 | 2370 ± 37 | < 9 | < 4 | < 4 | 156 ± 20 | 20 ± 5 | < LLD |
| L* | 9/25/00 | Squash Leaves | 455 ± 36 | 3590 ± 113 | < 9 | < 9 | < 8 | 393 ± 68 | 20 ± 12 | < LLD |
| | 9/25/00 | Cucumber Leaves | 1000 ± 52 | 3110 ± 129 | < 12 | < 12 | < 13 | < 217 | 29 ± 15 | < LLD |
| | 9/25/00 | Pepper Leaves | 3840 + 30 | 7390 ± 125 | < 10 | < 6 | < 9 | 381 ± 69 | 68 ± 13 | < LLD |
| | 9/25/00 | Collards | 193 ± 41 | 4940 ± 161 | < 15 | < 7 | < 14 | 181 ± 92 | < 55 | < LLD |
| Z* | 9/25/00 | Squash Leaves | 2080 ± 56 | 2870 ± 99 | < 9 | < 9 | < 9 | 337 ± 58 | 29 ± 13 | < LLD |
| | 9/25/00 | Grape Leaves | 695 ± 47 | 3400 ± 132 | < 12 | < 12 | < 12 | < 216 | < 47 | < LLD |
| M* (Control) | 9/18/00 | Squash Leaves | 662 ± 19 | 2980 ± 56 | < 10 | < 4 | < 4 | 188 ± 28 | 30 ± 6 | < LLD |
| | 9/19/00 | Grape Leaves | 1190 ± 30 | 3170 ± 68 | < 10 | < 7 | < 7 | 300 ± 43 | < 33 | < LLD |
| | 9/18/00 | Tomatoes | < 30 | 2070 ± 49 | < 5 | < 3 | < 4 | 72 ± 20 | < 13 | < LLD |
| | 9/18/00 | Pepper Leaves | 214 ± 17 | 7860 ± 91 | < 6 | < 5 | < 5 | 188 ± 37 | 29 ± 8 | < LLD |
| | 9/18/00 | Cucumber Leaves | 742 ± 28 | 2500 ± 72 | < 6 | < 5 | < 6 | 101 ± 44 | 26 ± 8 | < LLD |

• TS/ODCM

# TABLE 6-13

## MILK ANIMAL CENSUS

## 2000

| TOWN OR AREA(a) | NO. ON CENSUS MAP(1) | DEGREES(2) | DISTANCE(2) | NO. OF MILK ANIMALS |
|---|---|---|---|---|
| Scriba | 3 | 190° | 4.5 | None |
| | 62 | 183° | 6.7 | 1G (3) |
| | 63 | 185° | 8.0 | None |
| New Haven | 75 | 146° | 7.5 | 2G (3) |
| | 9 | 95° | 5.2 | 45C |
| | 4* | 113° | 7.8 | 80C |
| | 7* | 107° | 5.5 | None |
| | 64 | 107° | 7.9 | 48C |
| Mexico | 14 | 120° | 9.8 | 56C |
| | 19 | 132° | 10.5 | 42C |
| | 60* | 90° | 9.5 | 30C |
| | 50* | 93° | 9.1 | 125C |
| | 55* | 95° | 9.0 | 57C |
| | 21 | 112° | 10.5 | 80C |
| | 49 | 88° | 7.9 | None |
| | 72 | 98° | 9.9 | 30C |
| Sterling | 73** | 234° | 13.9 | 50C |
| Richland | 22 | 85° | 10.2 | None |
| Volney | 70 | 147° | 9.4 | None |
| | 25 | 182° | 9.5 | None |

MILKING ANIMAL TOTALS: (including control locations) — 643 Cows, 3 Goats

MILKING ANIMAL TOTALS: (excluding control locations) — 593 Cows, 3 Goats

NOTES:

| | | |
|---|---|---|
| C | = | Cows |
| G | = | Goats |
| * | = | Milk sample location |
| ** | = | Milk sample control location |
| (1) | = | References 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 |
| None | = | No cows or goats at that location. Location was a previous location with cows and/or goats. |
| (a) | = | Census performed out to a distance of approximately 10 miles |

TABLE 6-14

2000 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 | -- | -- |

* 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 |

(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 |

(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 |

(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 |

(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 |

(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 - 2000.

# 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 |

(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 |

(1) Control location is the City of Oswego drinking water for 1976 - 1984 and the Oswego Steam Station inlet canal for 1985 - 2000.

## TABLE 7-8

## HISTORICAL ENVIRONMENTAL SAMPLE DATA
## SURFACE WATER TRITIUM (INDICATOR) (1)

| YEAR | TRITIUM (pCi/liter) 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 |

(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 |

(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 - 2000 (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 |

(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 - 2000 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/m$^3$) | | |
|---|---|---|---|
| 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 |

(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 - 2000.

## 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 |

(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 - 2000 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 |

(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 - 2000.

TABLE 7-14

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

| | Cs-137 (pCi/m³) | | | Co-60 (pCi/m³) | | |
|---|---|---|---|---|---|---|
| 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 |

(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 - 1999.

## 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)* |

(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 |

(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)

| YEAR | DOSE (mrem per standard month) 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 |

(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)

| YEAR | DOSE (mrem per standard month) 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 |

(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 |

(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 - 2000). 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 |

(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 |

(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 |

(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 |

(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 - 2000).

# 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 |

(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 - 2000).

# SECTION 8.0

# QUALITY ASSURANCE/QUALITY CONTROL PROGRAM

## 8.0 QA/QC 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 require 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 known levels of radioactivity. 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 known amounts 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.

Environmental Midwest Laboratory performs the tritium analysis for the JAFNPP Environmental Laboratory samples. To provide a quality assurance check on the Midwest Lab, tritium samples from Analytics and EML are provided by the JAFNPP 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.

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

Using the appropriate row under the Error Resolution column in Table 9.3.1 below, a corresponding Ratio of Agreement interval is given.

The value for the ratio is then calculated.

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

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

**TABLE 9.3.1**

| 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 (QAP)

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 1n Table 9-1.

### 8.4.1 ANALYTICS QA SAMPLES RESULTS

Seventeen QA blind spike samples were analyzed as part of Analytics' 2000 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 JAFNPP Environmental Laboratory performed 81 individual analysis on the seventeen QA samples. Of the 81 analysis 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

### 8.4.1.1.1 Analytics Sample E-2094-05
**Nonconformity No. 2000-04, Cs-134 in Air Filter**

A single air filter from Analytics was analyzed for gamma emitters. Eight of the nine isotopes present were in agreement with the reference value. Cs-134 activity was not in agreement. The cause of the nonconformity was determined to be coincidence summing of the Cs-134 peak at 604 KeV, which is the primary peak for quantifying this isotope. This coincidence summing causes the counts observed for Cs-134 to be lower than expected with a resulting under reporting of activity. ACTS No. 00-53189 was generated to provide a corrective action to address the coincidence counting bias on a program level. In response to this requirement, coincidence counting correction factors were determined using the QA sample results data base. The correction factors were implemented using gamma analysis software.

### 8.4.2.2 Analytics Sample E-2354-05
**Nonconformity No. 2000-09, Cs-134 in Air Filter**

A single air filter from Analytics was analyzed for gamma emitters. Eight of the nine isotopes were in agreement with the reference value. Cs-134 was not in agreement. The cause of the nonconformity was the coincident summing of the Cs-134 peak at 604 KeV. The corrective action was discussed in 9.4.2.1. A re-analysis of the original gamma spectrums using the coincidence summing correction factors produced results that were in agreement with the known value.

### 8.4.3 ENVIRONMENTAL MEASUREMENTS LABORATORY (EML)

In 2000, JAFNPP Environmental Laboratory participated in both the EML Quality Assessment Programs, QAP-52 and QAP-53. 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 19 radionuclides were evaluated for the samples included in QAP-52 and QAP-53. Using the EML acceptance criteria, 18 of 19 radionuclide analyses (94.7%) were evaluated to be acceptable or acceptable with warning. One of 19 sample result was not acceptable (5.3%). 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 | 11 | 10 | 1 |
| Water | 8 | 8 | 0 |
| Total Evaluation | 19 | 18 | 1 |
| Percentage | | 94.7% | 5.3% |

### 8.4.3.1 EML Nonconformity

**Nonconformity 2000-05, QAP-52, Ru-106 in Air Filter**

A single air filter from EML was analyzed for gamma emitters. Using the standard single filter geometry, all results were in agreement with the exception of Ru-106. The apparent cause of the nonconformity was the low Ru-106 activity contained in the sample. Ru-106 was detected in only one of the three sample analyses. The second and third analysis reported Ru-106 results as less than detectable concentrations (LLD). The Ru-106 activity was reported using the single positive result. Because of the low activity level present in the sample the resulting count rate for Ru-106 for this sample was less than 0.7 counts per minute. The one sigma associated counting error was 30% for the 2 hour count time. By comparison, the associated one sigma counting error for Co-60 was less than 2.5% for the sample count time. There was no corrective action associated with this nonconformity. Future QA samples results will be evaluated when less that 3 positive results are obtained for a specific radionuclide. Based on the evaluation it will be determined if the results can be reported with the appropriate level of confidence.

## 8.5 REFERENCES


8.5.1 Semi-Annual Report of the Department of Energy, Office of Environmental Management, Quality Assessment Program, EML 608, March 2000.

8.5.2 Semi-Annual Report of the Department of Energy, Office of Environmental Management, Quality Assessment Program, EML 611, September 2000.

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

# 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) |
|---|---|---|---|---|---|---|
| 06/22/00 | E-2235-05 | AIR | Gross Beta | 48.2±1.7<br>50.4±1.7<br>51.3±1.7<br>Mean =50±1 | 57±1 | 0.88, A |
| 12/07/00 | E-2493-05 | AIR | Gross Beta | 71.2±2.0<br>67.4±1.2<br>69.0±2.0<br>Mean =69.2±1.2 | 72±1 | 0.96, A |

(1) Results reported as activity ± 1 sigma.

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

(*) Samples 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) |
|---|---|---|---|---|---|---|
| 03/23/00 | E-2092-05 | WATER | H-3 | 4170±194 | 4170±70 | 1.0, 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) |
|---|---|---|---|---|---|---|
| 03/23/00 | E-2093-05 | WATER pCi/liter | I-131** | 74.3±0.97<br>76.2±1.07<br>75.0±1.19<br>Mean =75.2±0.6 | 74±1.3 | 1.02, A |
| 06/22/00 | E-2238-05 | AIR pCi/cc | I-131 | 61.1±6.0<br>68.8±6.1<br>63.4±5.8<br>Mean =64.4±3.4 | 72.0±1.3 | 0.89, A |
| 06/22/00 | E-2236-05 | MILK pCi/liter | I-131** | 76.2±1.2<br>72.3±1.6<br>72.2±1.4<br>Mean =73.6±0.8 | 81.0±1.3 | 0.91, A |
| 09/21/00 | E-2355-05 | MILK pCi/liter | I-131** | 53.0±1.0<br>50.0±1.3<br>57.1±1.5<br>Mean =53.4±0.7 | 58.0±1.0 | 0.92, A |
| 09/21/00 | E-2356-05 | AIR pCi/cc | I-131 | 89.7±6.4<br>84.8±5.2<br>81.3±5.2<br>Mean =85.3±3.3 | 83.0±1.3 | 1.02, A |
| 09/21/00 | E-2353-05 | WATER pCi/liter | I-131** | 71.8±1.1<br>74.0±1.6<br>74.4±1.4<br>Mean =73.4±0.6 | 75.0±1.3 | 0.97, 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) |
|---|---|---|---|---|---|---|
| 03/23/00 | E-2093-05 | WATER | Ce-141 | 471±8.6<br>471±8.6<br>463±11.6<br>Mean = 459±6 | 427±7 | 1.07, A |
| | | | Cr-51 | 215±20.9<br>270±24.3<br>217±39.0<br>Mean =234±17 | 238±4 | 0.98, A |
| | | | Cs-134 | 124±3.0<br>128±3.8<br>128±4.9<br>Mean = 127±2 | 139±2 | 0.91, A |
| | | | Cs-137 | 127±4.1<br>134±4.3<br>116±6.6<br>Mean = 126±3 | 128±2 | 0.98, A |
| | | | Mn-54 | 166±4.7<br>171±4.7<br>170±7.9<br>Mean = 169±3 | 159±3 | 1.06, A |
| | | | Fe-59 | 96.7±6.0<br>101±6.2<br>106±10.9<br>Mean = 101±5 | 92±2 | 1.10, A |
| | | | Zn-65 | 211±8.4<br>221±8.5<br>198±14.1<br>Mean = 210±6 | 196±3 | 1.07, A |
| | | | Co-60 | 123±3.2<br>114±3.1<br>115±5.2<br>Mean = 117±2 | 116±2 | 1.01, A |
| | | | Co-58 | 45.0±2.9<br>47.8±3.0<br>48.7±5.0<br>Mean = 47±2 | 44±0.7 | 1.07,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) |
|---|---|---|---|---|---|---|
| 09/21/00 | E-2353-05 | WATER | Ce-141 | 222±11.6<br>214±7.5<br>196±7.3<br>Mean = 211±5 | 191±3.3 | 1.1, A |
| | | | Cr-51 | 197±46.0<br>258±33.1<br>255±36.7<br>Mean = 227±23 | 230±4.0 | 0.99, A |
| | | | Cs-134 | 116±6.9<br>116±3.8<br>111±8.9<br>Mean = 114±4 | 128±2.0 | 0.89, A |
| | | | Cs-137 | 223±9.2<br>226±5.3<br>203±6.8<br>Mean = 217±4 | 218±4.0 | 1.0, A |
| | | | Mn-54 | 82.3±6.7<br>112±4.2<br>87.4±5.3<br>Mean = 94±3 | 89±1.3 | 1.06, A |
| | | | Fe-59 | 48.7±11.4<br>65.5±6.8<br>46.6±8.1<br>Mean = 54±5 | 54±1.0 | 1.00, A |
| | | | Zn-65 | 122±13.3<br>140±8.3<br>120±10.0<br>Mean = 127±6 | 134±2.3 | 0.95, A |
| | | | Co-60 | 243.0±7.7<br>257±4.5<br>259±6.0<br>Mean = 253±4 | 246±4.0 | 1.03, A |
| | | | Co-58 | 48.4±6.1<br>56.9±3.4<br>65.9±4.8<br>Mean = 57±3 | 60±1.0 | 0.95, 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) |
|---|---|---|---|---|---|---|
| 03/23/00 | E-2094-05 | FILTER | Ce-141 | 269±4.4<br>265±4.4<br>258±4.3<br>Mean = 264±2 | 293±5.0 | 0.9, A |
| | | | Cs-134 | 68.8±1.9<br>70.4±1.9<br>68.7±2.5<br>Mean = 69±1 | 95±1.7 | 0.73, N<br>NC 2000-4 |
| | | | Cs-137 | 77.9±2.7<br>82.2±2.8<br>76.9±2.7<br>Mean = 79±2 | 88±1.3 | 0.9, A |
| | | | Mn-54 | 110±3.5<br>105±3.4<br>108±3.6<br>Mean = 108±2 | 109±1.3 | 0.99, A |
| | | | Fe-59 | 56.9±5.1<br>62.6±4.9<br>63.4±5.2<br>Mean = 61±3 | 63±1.0 | 0.97, A |
| | | | Zn-65 | 134±6.4<br>138±6.6<br>125±6.5<br>Mean = 132±4 | 132±2.3 | 1.00, A |
| | | | Co-60 | 71.6±2.4<br>69.0±2.4<br>67.6±2.4<br>Mean = 69±1 | 80±1.3 | 0.87, A |
| | | | Cr-51 | 154±14.4<br>148±14.8<br>138±13.3<br>Mean = 147±8 | 163±2.7 | 0.9, A |
| | | | Co-58 | 26.4±2.1<br>25.6±2.2<br>28.7±2.3<br>Mean = 26.9±1 | 30±0.7 | 0.9, A |

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

## 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) |
|---|---|---|---|---|---|---|
| 09/21/00 | E-2354-05 | FILTER | Ce-141 | 106±4.0<br>101±4.5<br>102±3.9<br>Mean = 103±2 | 102±1.7 | 1.01, A |
| | | | Cr-51 | 125±20.0<br>139±23.9<br>108±20.7<br>Mean = 124±13 | 123±2.0 | 1.01, A |
| | | | Cs-134 | 51.2±3.5<br>46.0±4.1<br>53.8±6.4<br>Mean = 50±3 | 68±1.0 | 0.74, N<br>NC 2000-9 |
| | | | Cs-137 | 119±4.8<br>108±5.8<br>121±5.0<br>Mean = 116±3 | 117±2.0 | 0.99, A |
| | | | Mn-54 | 65.4±4.0<br>54.7±5.0<br>48.6±3.8<br>Mean = 56±3 | 48±0.7 | 1.17, A |
| | | | Fe-59 | 41.3±6.7<br>34.1±8.5<br>30.8±6.9<br>Mean = 35±4 | 29±0.3 | 1.21, A |
| | | | Zn-65 | 79.3±7.7<br>81.3±9.6<br>81.2±8.4<br>Mean = 81±5 | 72±1.3 | 1.13, A |
| | | | Co-60 | 134±4.4<br>139±5.8<br>123±4.6<br>Mean = 132±3 | 132±2.7 | 1.0, A |
| | | | Co-58 | 34.1±3.1<br>30.9±4.0<br>27.8±3.4<br>Mean = 31±2 | 32±0.7 | 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.
(n) Evaluation Results, Not Acceptable. (NC) Nonconformity

## TABLE 8-1 (Continued)

## INTERLABORATORY INTERCOMPARISON PROGRAM

### Gamma Analysis of Milk (pCi/liter)

| DATE | JAF ENV ID NUMBER | MEDIUM | ANALYSIS | JAF RESULT (1) | REFERENCE LABORATORY * (1) | RATIO (2) |
|---|---|---|---|---|---|---|
| 06/22/00 | E-2236-05 | MILK | Ce-141 | 65.7±5.3<br>68.6±5.2<br>61.5±5.2<br>Mean =65±3 | 69±1 | 0.94, A |
| | | | Cr-51 | 194±28.5<br>188±27.6<br>218±24.4<br>Mean =200±16 | 211±3.7 | 0.95, A |
| | | | Cs-134 | 80.4±3.2<br>81.7±3.0<br>81.8±3.2<br>Mean =81±2 | 91±1.7 | 0.89, A |
| | | | Cs-137 | 193±6.1<br>206±5.8<br>196±4.8<br>Mean =198±3 | 190±3.3 | 1.04, A |
| | | | Mn-54 | 126±5.3<br>120±4.8<br>122±4.1<br>Mean =123±3 | 118±2 | 1.04, A |
| | | | Fe-59 | 40.9±6.5<br>49.0±6.4<br>55.1±5.9<br>Mean =48±4 | 50±1.0 | 0.97, A |
| | | | Zn-65 | 144±9.5<br>148±8.8<br>141±7.3<br>Mean =144±5 | 148±2.3 | 0.91, A |
| | | | Co-60 | 150±4.6<br>142±4.1<br>148±3.5<br>Mean =147±2 | 142±2.3 | 1.04, A |
| | | | Co-58 | 98±5.1<br>108±4.8<br>105±4.0<br>Mean =104±3 | 104±1.7 | 1.0, 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 Milk (pCi/liter)

| DATE | JAF ENV ID NUMBER | MEDIUM | ANALYSIS | JAF RESULT (1) | REFERENCE LABORATORY * (1) | RATIO (2) |
|---|---|---|---|---|---|---|
| 09/21/00 | E-2355-05 | MILK | Ce-141 | 160±7.0<br>163±8.3<br>181±10.7<br>Mean =168±5 | 164±2.7 | 1.02, A |
| | | | Cr-51 | 208±30.3<br>138±36.6<br>209±46.2<br>Mean =185±22 | 198±3.3 | 0.93, A |
| | | | Cs-134 | 96.4±3.5<br>95.0±4.4<br>90.8±6.4<br>Mean =94±3 | 110±2 | 0.85, A |
| | | | Cs-137 | 194±5.1<br>178±6.5<br>196±8.0<br>Mean =189±47 | 188±3 | 1.01, A |
| | | | Mn-54 | 88.9±3.9<br>84.5±5.0<br>73.4±6.2<br>Mean =82±3 | 77±1.3 | 1.06, A |
| | | | Fe-59 | 46.3±6.1<br>25.8±7.6<br>77.4±11.8<br>Mean =50±5 | 47±0.7 | 1.06, A |
| | | | Zn-65 | 117±7.6<br>102±10.5<br>124±13.4<br>Mean =114±6 | 115±2 | 0.99, A |
| | | | Co-60 | 221±4.3<br>212±5.6<br>215±7.1<br>Mean =216±3 | 212±3.7 | 1.02, A |
| | | | Co-58 | 52.7±3.1<br>52.7±4.6<br>46.6±5.5<br>Mean =51±3 | 51±1 | 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 of Soil (pCi/g)

| DATE | JAF ENV ID NUMBER | MEDIUM | ANALYSIS | JAF RESULT (1) | REFERENCE LABORATORY* (1) | RATIO (2) |
|---|---|---|---|---|---|---|
| 06/22/00 | E-2237-05 | SOIL | Ce-141 | 0.178±0.02<br>0.160±0.02<br>0.196±0.02<br>Mean=0.178±0.01 | 0.175±0.003 | 1.02, A |
| | | | Cs-134 | 0.220±0.01<br>0.241±0.02<br>0.218±0.01<br>Mean=0.217±0.01 | 0.232±0.004 | 0.94, A |
| | | | Cs-137 | 0.644±0.03<br>0.544±0.03<br>0.583±0.03<br>Mean=0.590±0.02 | 0.610±0.010 | 0.97, A |
| | | | Mn-54 | 0.278±0.02<br>0.306±0.02<br>0.299±0.02<br>Mean=0.294±0.01 | 0.300±0.005 | 0.98, A |
| | | | Co-60 | 0.275±0.02<br>0.336±0.02<br>0.369±0.02<br>Mean=0.360±0.01 | 0.359±0.006 | 1.00, A |
| | | | Zn-65 | 0.333±0.04<br>0.275±0.04<br>0.418±0.04<br>Mean=0.342±0.02 | 0.375±0.006 | 0.91, A |
| | | | Co-58 | 0.266±0.02<br>0.267±0.02<br>0.283±0.02<br>Mean=0.272±0.01 | 0.263±0.004 | 1.03, A |
| | | | Fe-59 | 0.124±0.03<br>0.155±0.03<br>0.127±0.03<br>Mean=0.135±0.02 | 0.128±0.002 | 1.05, A |
| | | | Cr-51 | 0.480±0.11<br>0.472±0.11<br>0.517±0.12<br>Mean=0.49±0.07 | 0.536±0.009 | 0.91, 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 Vegetation

| DATE | JAF ENV ID NUMBER | MEDIUM | ANALYSIS | JAF RESULT (1) | REFERENCE LABORATORY * (1) | RATIO (2) |
|---|---|---|---|---|---|---|
| 06/22/00 | E-2239A-05 | VEGETATION | Ce-141 | 0.085±0.006<br>0.088±0.006<br>0.082±0.007<br>Mean=0.085±0.004 | 0.089±0.001 | 0.96, A |
| | | | Cs-134 | 0.098±0.003<br>0.101±0.005<br>0.104±0.004<br>Mean=0.101±0.002 | 0.118±0.002 | 0.86, A |
| | | | Cs-137 | 0.259±0.006<br>0.257±0.007<br>0.259±0.007<br>Mean=0.258±0.004 | 0.245±0.004 | 1.05, A |
| | | | Mn-54 | 0.160±0.005<br>0.158±0.006<br>0.146±0.006<br>Mean=0.155±0.003 | 0.152±0.003 | 1.02, A |
| | | | Zn-65 | 0.214±0.010<br>0.160±0.011<br>0.179±0.014<br>Mean=0.185±0.007 | 0.190±0.003 | 0.97, A |
| | | | Co-60 | 0.189±0.004<br>0.198±0.005<br>0.187±0.006<br>Mean=0.191±0.003 | 0.183±0.003 | 1.04, A |
| | | | Co-58 | 0.136±0.005<br>0.132±0.006<br>0.118±0.006<br>Mean=0.129±0.003 | 0.134±0.002 | 0.96, A |
| | | | Fe-59 | 0.060±0.008<br>0.055±0.010<br>0.069±0.012<br>Mean=0.061±0.006 | 0.065±0.001 | 0.94, A |
| | | | Cr-51 | 0.281±0.031<br>0.218±0.380<br>0.282±0.037<br>Mean=0.260±0.020 | 0.272±0.005 | 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.
(N) Evaluation Results, Not Acceptable.

## TABLE 8-1 (Continued)

# INTERLABORATORY INTERCOMPARISON PROGRAM

### Gamma Analysis of Water

| DATE | JAF ENV ID NUMBER | MEDIUM | ANALYSIS | JAF RESULT (1) | REFERENCE LABORATORY * (1) | RATIO (2) |
|---|---|---|---|---|---|---|
| 03/01/00 | QAP-52 | WATER Bq/liter | Cs-137 | 104±2.2<br>110±1.7<br>111±1.9<br>Mean= 108±1.12 | 103.0±4.0 | 1.05, A |
| | | | Co-60 | 55.5±1.4<br>54.0±1.0<br>53.3±1.1<br>Mean= 54.3±0.7 | 48.9±1.8 | 1.11, A |
| 09/01/00 | QAP-53 | WATER Bq/liter | Cs-137 | 64.8±2.2<br>67.3±1.4<br>61.1±1.7<br>Mean= 64.4±1.0 | 67.0±3.5 | 0.96, A |
| | | | Co-60 | 70.3±2.0<br>76.6±1.3<br>71.8±1.6<br>Mean= 72.9±0.9 | 73.7±2.9 | 0.99, A |

(1) Results reported as activity ± 1 sigma.

(2) Ratio = Reported/EML.

(*) 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) |
|---|---|---|---|---|---|---|
| 03/01/00 | QAP-52 | FILTER | Co-57 | 4.92±0.07<br>4.81±0.08<br>4.96±0.08<br>Mean=4.90±0.04 | 5.31±0.22 | 0.92, A |
| | | | Co-60 | 4.88±0.12<br>5.11±0.14<br>4.92±0.12<br>Mean=4.97±0.07 | 5.32±0.26 | 0.93, A |
| | | | Mn-54 | 26.97±0.33<br>26.71±0.39<br>28.19±0.33<br>Mean=27.3±0.2 | 27.2±0.8 | 1.0, A |
| | | | Cs-137 | 5.59±0.15<br>5.66±0.17<br>5.92±0.15<br>Mean=5.72±0.09 | 6.1±0.3 | 0.94, A |
| | | | Ru-106 | 2.81±0.83<br>Mean=2.81±0.8 | 2.01±1.94 | 1.40, N<br>NC 2000-5 |
| 09/01/00 | QAP-53 | FILTER | Mn-54 | 44.03±0.24<br>46.62±0.62<br>46.99±0.62<br>Mean=44.7±0.4 | 43.2±1.3 | 1.04, A |
| | | | Co-60 | 8.40±0.09<br>8.33±0.22<br>8.07±0.22<br>Mean=8.3±0.1 | 8.43±0.48 | 0.98, A |
| | | | Co-57 | 14.2±0.20<br>14.8±0.18<br>14.5±0.19<br>Mean=14.1±0.1 | 14.5±0.46 | 0.97, A |
| | | | Cs-137 | 7.14±0.30<br>7.29±0.26<br>7.55±0.26<br>Mean=7.1±0.2 | 7.41±0.36 | 0.96, A |

(1) Results reported as activity ± 1 sigma.
(2) Ratio = Reported/EML.
(A) Evaluation Results, Acceptable.
(N) Evaluation Results, Not Acceptable. (NC) Nonconformity

## 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) |
|---|---|---|---|---|---|---|
| 03/01/00 | QAP-52 | WATER | GROSS BETA | 811±16<br>824±16<br>805±16<br><br>Mean=814±9.1 | 690±70 | 1.18,A |
| 09/01/00 | QAP-53 | WATER | GROSS BETA<br>LBC A | 960±13<br>993±13<br>1005±13<br>Mean=986±7 | 950±90 | 1.04,A |
| | | | | 980±15<br>1077±15<br>988±15<br>Mean=1015±8 | 950±90 | 1.07,A |

(1) Results reported as activity ± 1 sigma.

(2) Ratio = Reported/EML.

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

(A) Evaluation Results, Acceptable.

# 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) |
|---|---|---|---|---|---|---|
| 03/01/00 | QAP-52 | WATER | H-3 | 95±6 | 79.4±2.5 | 1.20, A |
| 09/01/00 | QAP-53 | WATER | H-3 | 113±6 | 91.3±0.3 | 1.24, A |

(1) Results reported as activity ± 1 sigma.

(2) Ratio = Reported/EML.

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

(†) Analysis performed by Environmental Inc. Midwest Laboratory.

(A) Evaluation Results, Acceptable.

(N) Evaluation Results, Not Acceptable.

## 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 Y* (1) | RATIO (2) |
|---|---|---|---|---|---|---|
| 03/01/00 | QAP-52 | AIR | GROSS BETA | 2.71±0.04<br>2.71±0.04<br>2.77±0.04<br>Mean=2.73±0.02 | 2.42±0.2 | 1.13, A |
| 09/01/00 | QAP-53 | AIR | GROSS BETA LBC A | 1.49±0.06<br>1.49±0.06<br>1.43±0.06<br>Mean=1.46±0.03 | 1.52±0.15 | 0.96, A |
| | | | LBC C | 1.55±0.07<br>1.61±0.07<br>1.43±0.06<br>Mean=1.53±0.04 | 1.52±0.15 | 1.01, A |

(1) Results reported as activity ± 1 sigma.

(2) Ratio = Reported/EML.

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

(A) Evaluation Results, Acceptable.