Entergy

Entergy Nuclear Northeast
Entergy Nuclear Operations, Inc.
James A. Fitzpatrick NPP
P.O. Box 110
Lycoming, NY 13093
Tel 315 342 3840

April 30, 2002
JAFP-02-0097

United States Nuclear Regulatory Commission
Region 1
457 Allendale Road
King of Prussia, PA 19406

Attention: Hubert J. Miller
Regional Administrator

SUBJECT: JAMES A. FITZPATRICK NUCLEAR POWER PLANT RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT FACILITY OPERATING LICENSE DPR-59, DOCKET NO. 50-333

Gentlemen:

Enclosed please find the 2001 Radiological Environmental Operating Report that covers the operating period of January 1, 2001 through December 31, 2001. This report is submitted in accordance with the requirements of Amendment 93, Section 7.3.d of the James A. FitzPatrick Nuclear Power Plant Technical Specifications. Distribution for this report is in accordance with the Regulatory Guide 10.1, Revision 4.

Very truly yours,

T.A. SULLIVAN

TAS:BG:hm
Enclosures

xc: Document Control Center Desk (USNRC) (18)
JAF NRC Resident Inspector
J. J. Kelly (ENN/WPO)
J. Knubel (ENN/WPO)
C. Widayc (NMPC)
J. Head (ENN/WPO)
S. Baxter (Town of Scriba)
B. Bostian JAF
C. Boucher JAF
WPO Records Management (2)
Reference Center (2)

CERTIFIED MAIL, RETURN RECEIPT REQUESTED

IE25

James A. FitzPatrick Nuclear Power Plant

Annual Radiological Environmental Operating Report

2001

Entergy
Nuclear Northeast

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

JANUARY 1, 2001 – DECEMBER 31, 2001

FOR

JAMES A. FITZPATRICK NUCLEAR POWER PLANT

ENTERGY NUCLEAR FITZPATRICK, LLC (ENF)

ENTERGY NUCLEAR OPERATIONS, INC (ENO)

FACILITY OPERATING LICENSE DPR-59

DOCKET NUMBER 50-333

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

LIST OF TABLES

LIST OF FIGURES

1.0 EXECUTIVE SUMMARY

The Annual Radiological Environmental Operating Report is published pursuant to Section 7.3.d of the Radiological Effluent Technical Specifications (RETS). The RETS require that the results from the Annual Radiological Environmental Monitoring Program (REMP) be provided to the Nuclear Regulatory Commission.

This report describes the REMP program and its implementation and results as required by Technical Specifications. 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 Assurance Intercomparison Program required by Technical Specifications.

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

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

In summary, the analytical results from the 2001 Environmental Monitoring Program demonstrate that the routine operation at the Nine Mile Point site had no significant or measurable radiological impact on the environment. No elevated radiation levels were detected in the off-site environment as a result of the hydrogen injection rates or from the processing and storage of radioactive waste at the site. The results of the program continue to demonstrate that the operation of the plant did not result in a measurable dose of any significance to the general population, above natural background levels or adversely impact the environment as a result of radiological effluents. The environmental program continues to demonstrate that the dose to a member of the public as a result of the operation of the James A. FitzPatrick Nuclear Power Plant remain significantly below the federally required dose limits specified in 10CFR20 and 40CFR190.

2.0 INTRODUCTION

This report is submitted in accordance with Section 7.3.d of the Radiological Effluent Technical Specifications (RETS) to DPR-59, Docket 50-333, Amendment No. 268.

2.1 PROGRAM HISTORY

Environmental monitoring of the Nine Mile Point site has been on-going since 1964. The program includes five years of preoperational data which was conducted prior to any reactor operations. In 1968, the Niagara Mohawk Power Company began the required preoperational environmental site testing program. This pre-operational data serves as a reference point to compare later data obtained during reactor operation. In 1969, the Nine Mile Point Unit 1 reactor, a 615 Megawatt Boiling Water Reactor (BWR) began full power operation. In 1975, the James A. FitzPatrick Nuclear Power Plant, owned and operated at that time by the New York Power Authority, began full power operation. The FitzPatrick Plant, a 870 Megawatt (Rated) BWR, occupies the east sector of the Nine Mile Point site, approximately 1/2 mile from Nine Mile Point Unit 1.

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 Program is shared, but each utility reviews and publishes their own annual report. In 1988, The Nine Mile Point Unit 2 reactor, also owned and operated by Niagara Mohawk, began full power operation. This 1207 Megawatt BWR is located between Unit 1 and FitzPatrick. On November 21, 2001 the ownership and operation of the James A. FitzPatrick N.P.P. was transferred from the New York Power Authority to Entergy Nuclear FitzPatrick, LLC and Entergy Nuclear Operations Inc. The facility operating license No. DPR-59 and Docket No. 50-333 remained the same. On November 07, 2001, the ownership of the Nine Mile Point Unit I and II facilities was transferred to Constellation Nuclear. These facilities are operated by Nine Mile Point Nuclear Station, LLC.

In summary, three Boiling Water Reactors, which together generate 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 southeastern shore of Lake Ontario approximately seven miles east of the Oswego River and the City of Oswego. Syracuse, the nearest metropolitan area, is located 36 miles to the south. The reactors and support buildings occupy a small shoreline portion of the 700 acre site, which is partially wooded. The land, soil of glacial deposits, rises gently from the lake in all directions. Oswego County is a rural environment, with about approximately 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 JAFNPP 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.

4. Provide information by which the general public can evaluate the environmental aspects of nuclear power using unbiased data.

5. Satisfy the community interest regarding the impact of the power plants on the environment.

3.0 PROGRAM DESCRIPTION

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

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

In addition, direct radiation measurements are performed using thermoluminescent dosimeters (TLDs). These sampling programs are outlined in Table 3.0-1. The JAFNPP REMP sampling locations are selected and verified by an annual land use census. The accuracy and precision of the program is assured by participation in an Interlaboratory Comparison Quality Assurance Program (ICP). In addition to the participation in the ICP Program, sample splits are provided to the New York State Department of Health for cross checking purposes.

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

TABLE 3.0-1

OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

REQUIRED SAMPLE COLLECTION AND ANALYSIS

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

TABLE 3.0-1 (Continued)

OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

REQUIRED SAMPLE COLLECTION AND ANALYSIS

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

TABLE 3.0-1 (Continued)

OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

REQUIRED SAMPLE COLLECTION AND ANALYSIS

Exposure Pathway and/or Sample	Number of Samples [a] and Locations	Sampling and Collection Frequency [a]	Type and Frequency of Analysis
FISH			
	a. 1 sample of each of 2 commercially or recreationally important species in the vicinity of a site discharge point.	Twice per year.	Gamma isotopic[c] analysis of edible portions.
	b. 1 sample of each of 2 species (same as in a. above or of a species with similar feeding habits) from an area at least 5 miles distant from the site[d].		
FOOD PRODUCTS			
	a. In lieu of the garden census as specified in 6.2, samples of at least 3 different kinds of broad leaf vegetation (such as vegetable) grown nearest each of two different off-site locations of highest predicted site average D/Q (based on all licensed site Reactors).	Once during harvest season.	Gamma isotopic(c) analysis of edible portions. (Isotopic to include I-131).
	One (1) sample of each of the similar broad leaf vegetation grown at least 9.3 miles distant in a least prevalent wind direction sector[d].		

NOTES FOR TABLE 3.0-1

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

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

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

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

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

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

NOTES FOR TABLE 3.0-1 (Continued)

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

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

3.1 SAMPLE COLLECTION METHODOLOGY

3.1.1 SURFACE WATER

Surface water samples are taken from the respective inlet canals of the JAFNPP and the NRG Energy, Inc., Oswego Steam Station (OSS) located in the City of Oswego. The FitzPatrick Facility draws water from Lake Ontario on a continuous basis. This is used for the "down-current" or indicator sampling point for the Nine Mile Point Site. The OSS 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 its location relative to prevailing lake current directions and flow pattern of the nearby Oswego River.

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

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

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

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

3.1.2 AIR PARTICULATE/IODINE

The air sampling stations required by the Radiological Effluent Technical Specifications (RETS) are located in the general area of the site boundary. The sampling stations are sited within a distance of 0.2 miles of the site boundary in sectors with the highest calculated meteorological deposition factors (D/Q) based on historical meteorological data. These stations (R-1, R-2, and R-3) are located in the east, east-southeast, and southeast sectors as measured from the center of the NMPNS Unit 2 reactor building. The RETS also require that a fourth air sampling station be located in the vicinity of a year round community having the highest calculated dispersion factor (D/Q) based on historical meteorological data. This station is located in the southeast sector at a distance of 1.8 miles and is designated as location R-4. A fifth station required by the RETS is a control location, designated as station R-5. Station R-5 is located 16.4 miles from the site in the northeast meteorological sector.

In addition to the RETS required locations, there are ten additional sampling stations. Six of these sampling stations are located within the site boundary and are designated as on-site stations D1, G, H, I, J, and K. These locations are within the site boundary of the JAFNPP and NMPNS. One air sampling station is located off-site in the southwest sector in the vicinity of the City of Oswego and is designated as station G off-site. Three remaining air sampling stations are located in the ESE, SSE, and S sectors and range in distance from 7.2 to 9.0 miles. These are designated as off-site stations D2, E and F respectively.

Each station collects airborne particulates using glass fiber filters (47 millimeter diameter) and radioiodine using charcoal cartridges (2 x 1 inch). The samplers run continuously and the charcoal cartridges and particulate filters are changed on a weekly basis. Sample volume is determined by use of calibrated gas flow meters located at the sample discharge. Gross beta analysis is performed on each particulate filter. Charcoal cartridges are analyzed for radioiodine using gamma spectral analysis.

The particulate filters are composited monthly by location and analyzed for gamma emitting radionuclides.

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

3.1.3 MILK

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

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

The Technical Specifications also require that a sample be collected from a location greater than ten miles from the site and in a less 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 designations and descriptions).

3.1.4 FOOD PRODUCTS (VEGETATION)

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

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

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

3.1.5 FISH SAMPLES

Samples of available fish species are selected from the Nine Mile Point Aquatic Ecology Study which monitors lake fish populations. 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 at an off-site sample transect located off shore 8 - 10 miles west of the site. Available species are selected using the following guidelines:

a) Samples are composed of 0.5 to 1 kilogram of the edible portion only. A minimum of two species are to be collected from each sample location.

b) Samples composed of more than 1 kilogram of a single species from the same location are divided into samples of 1 kilogram each. Sample weights include only the edible portions.

c) Samples are limited to edible and or sport species when available.

Selected fish samples are frozen immediately after collection and segregated by species and location. Samples are shipped frozen in insulated containers for analysis. Edible portions of each sample are analyzed for gamma emitting radionuclides. Fish collection locations are shown in Section 3.3 on Figure 3.3-5.

3.1.6 SHORELINE SEDIMENTS

One kilogram of shoreline sediment is collected at one area of existing or potential recreational value. One sample is also collected from a location beyond the influence of the site. Samples are collected as surface scrapings to a depth of approximately 1 inch. The samples are placed in plastic bags, sealed and shipped to the lab for analysis. Sediment samples are analyzed for gamma emitting radionuclides.

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

3.1.7 TLD (DIRECT RADIATION)

Thermoluminescent dosimeters (TLDs) are used to measure direct radiation (gamma dose) in the environment. TLDs are supplied and processed quarterly by the J.A. FitzPatrick N.P.P. 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 the site are evaluated using environmental TLDs.

- o On-site areas (areas within the site boundary not required by the RETS)
- o Site boundary area in each of the sixteen meteorological sectors
- o 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 Environmental Laboratory (JAFEL). During 2001, the Tritium analysis for the Site Environmental Monitoring Program was performed by two separate laboratories. Samples collected during the first quarter of the year were analyzed by Environmental Inc.'s Midwest Laboratory (formerly Teledyne, Midwest Laboratory). Tritium analysis for samples collected during the second, third and fourth quarters of 2001 was performed by Duke Engineering and Services, Environmental Laboratory. The following samples are analyzed at the JAFEL:

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

3.3 SAMPLE LOCATION MAPS

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

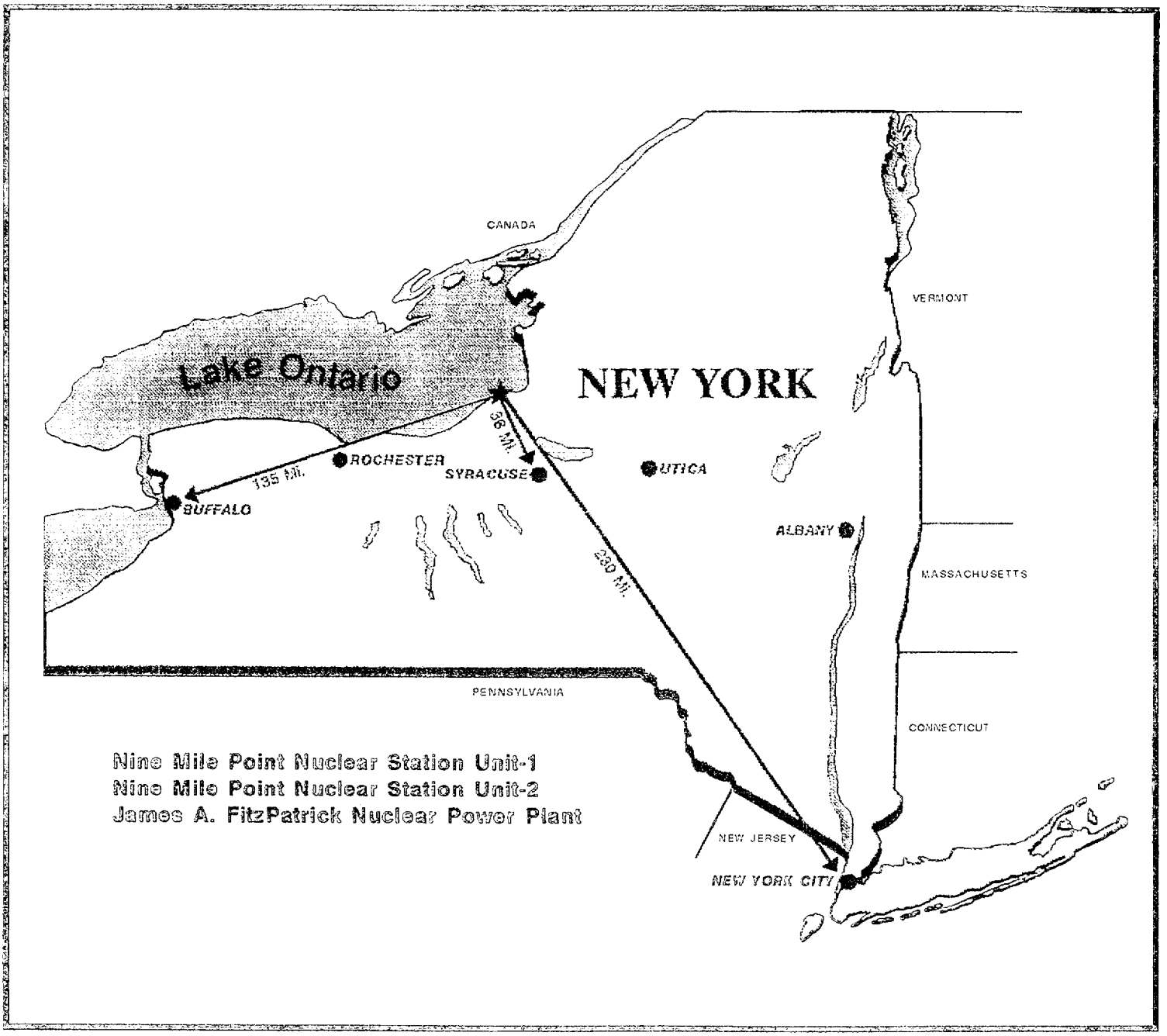
This section also contains an environmental sample location reference table (Table 3.3-1). This table contains the following information:

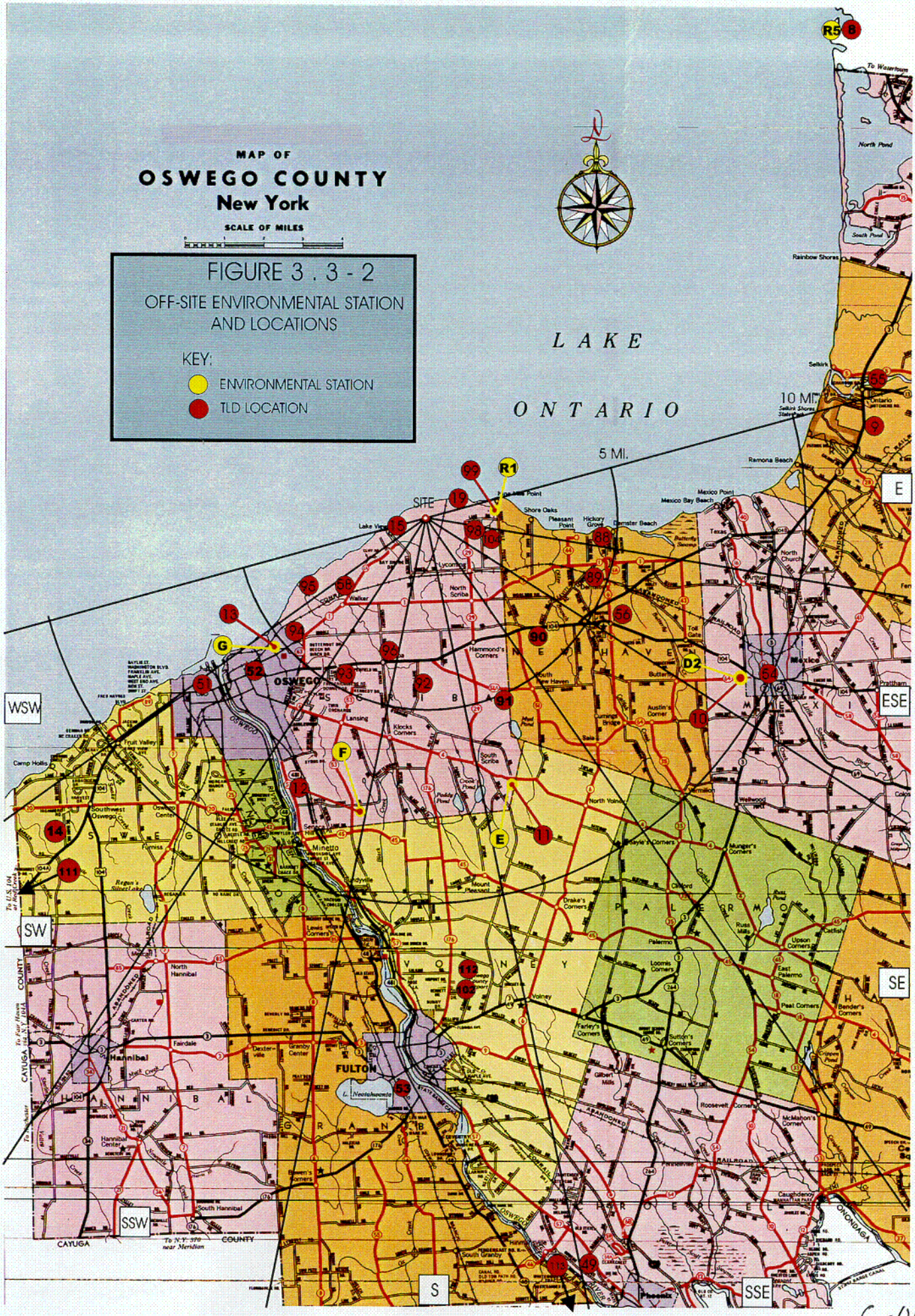
- Sample Medium
- Location designation, (this column contains the key for the sample location and is consistent with the designation on the sample location maps and on the sample results data tables).
- Location description
- Degrees and distance of the sample location from the site.

3.3.1 LIST OF FIGURES

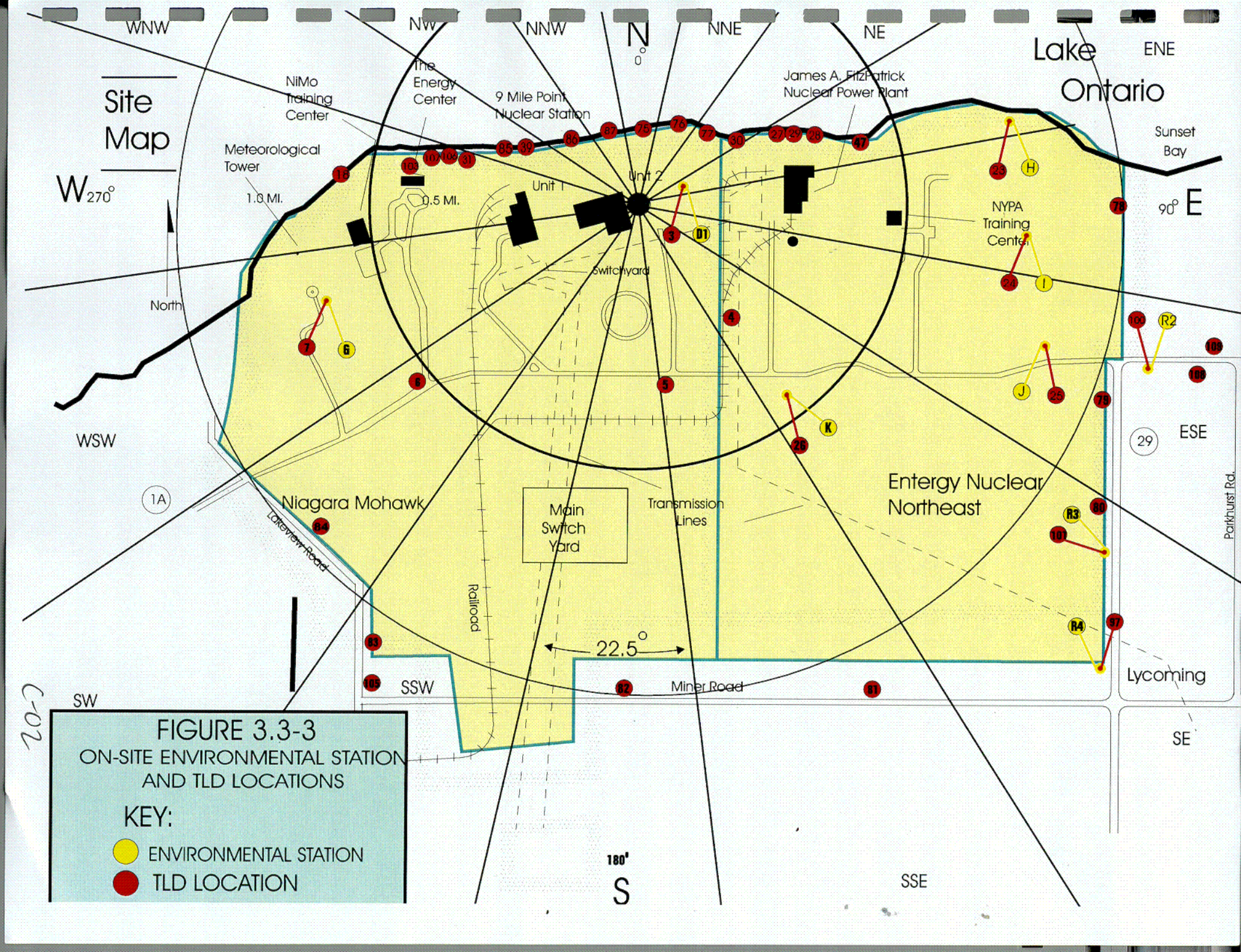
- Figure 3.3-1 - New York State Map
- Figure 3.3-2 - Off-site Environmental Station and TLD Location Map
- Figure 3.3-3 - On-site Environmental Station and TLD Location Map
- Figure 3.3-4 - Milk Animal Census, Milk Sample Location and Surface Water Sample Location Map
- Figure 3.3-5 - Nearest Resident,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

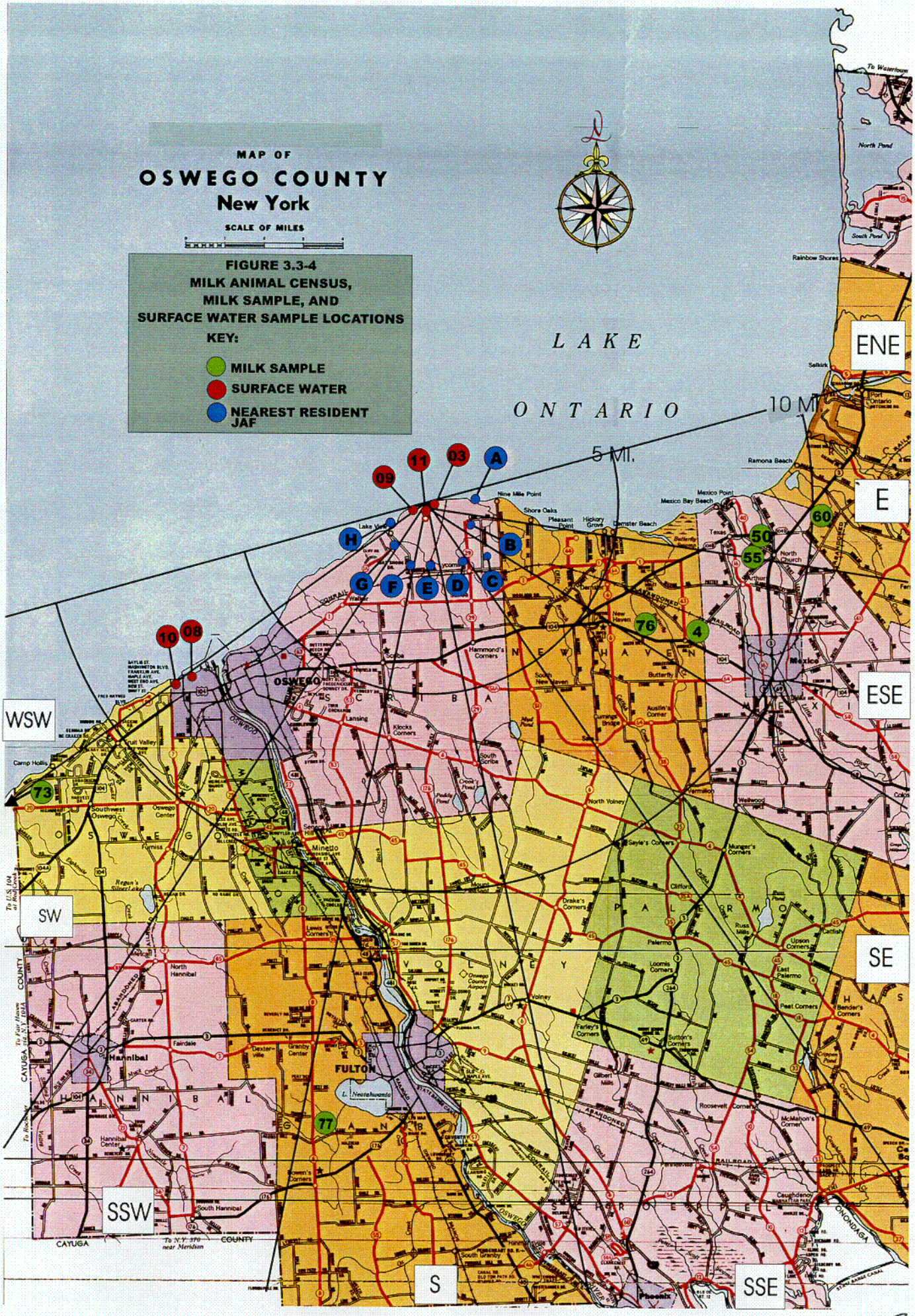
FIGURE 3.3-1
NEW YORK STATE MAP



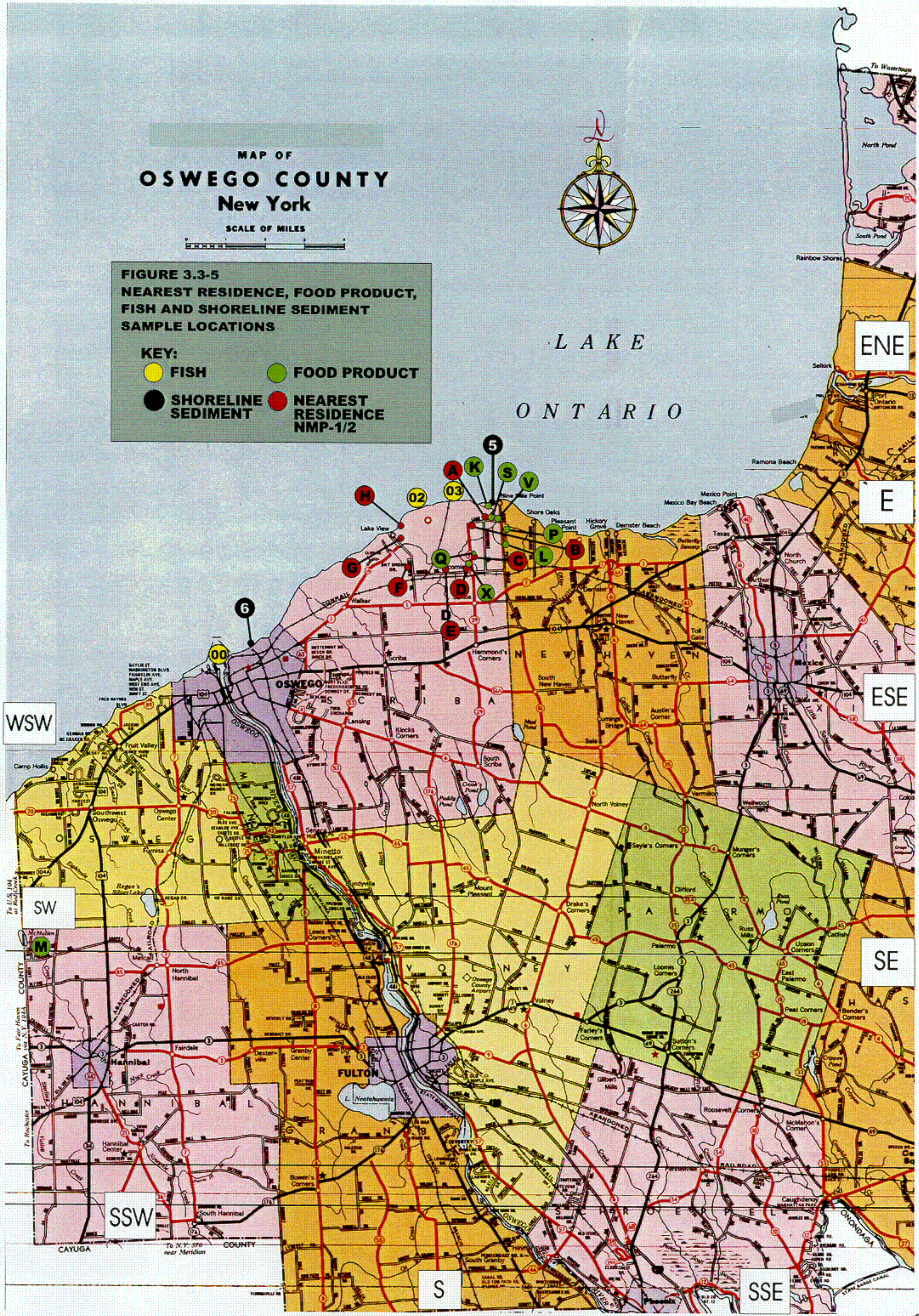

MAP OF
OSWEGO COUNTY
New York
SCALE OF MILES
FIGURE 3 . 3 - 2
OFF-SITE ENVIRONMENTAL STATION AND LOCATIONS
KEY:
ENVIRONMENTAL STATION
TLD LOCATION
LAKE ONTARIO
5 MI.
10 MI.
SITE
OSWEGO
FULTON
Hannibal
WSW
ESE
SW
SE
SSW
SSE
S
E
R1
R5
B
G
D2
F

C-01


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


MAP OF
OSWEGO COUNTY
New York
SCALE OF MILES
FIGURE 3.3-4
MILK ANIMAL CENSUS,
MILK SAMPLE, AND
SURFACE WATER SAMPLE LOCATIONS
KEY:
MILK SAMPLE
SURFACE WATER
NEAREST RESIDENT
JAF
LAKE
ONTARIO
5 MI.
10 MI.
N
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
09
11
03
A
B
C
D
E
F
G
H
10
08
60
50
55
76
4
73
77
OSWEGO
FULTON
HANNIBAL
CAYUGA COUNTY
ONONDAGA

C-03



MAP OF
OSWEGO COUNTY
New York
SCALE OF MILES
FIGURE 3.3-5
NEAREST RESIDENCE, FOOD PRODUCT, FISH AND SHORELINE SEDIMENT SAMPLE LOCATIONS
KEY:
FISH
FOOD PRODUCT
SHORELINE SEDIMENT
NEAREST RESIDENCE NMP-1/2
LAKE
ONTARIO
ENE
E
ESE
SE
SSE
S
SSW
SW
WSW
OSWEGO
FULTON
Hannibal
CAYUGA

C-04

TABLE 3.3-1

ENVIRONMENTAL SAMPLE LOCATIONS

SAMPLE MEDIUM	LOCATION DESIGNATION	LOCATION DESCRIPTION	DEGREES AND DISTANCE (1)
Shoreline Sediment	05*	Sunset Bay	80° at 1.5 miles
	06	Langs Beach, Control	230° at 5.8 miles
Fish	02*	Nine Mile Point Transect	315° at 0.3 miles
	03*	FitzPatrick Transect	55° at 0.6 miles
	00*	Oswego Transect	235° at 6.2 miles
Surface Water	03*	FitzPatrick Inlet	70° at 0.5 miles
	08*	Oswego Steam Station	235° at 7.6 miles
	09	Nine Mile Point Unit 1 Inlet	302° at 0.3 miles
	10	Oswego City Water	235° at 7.8 miles
	11	Nine Mile Point Unit 2 Inlet	341° at 0.1 miles
Air Radioiodine And Particulates	R-1*	R-1 Station, Nine Mile Pt. Rd.	88° at 1.8 miles
	R-2*	R-2 Station, Lake Road	104° at 1.1 miles
	R-3*	R-3 Station, Co. Rt. 29	132° at 1.5 miles
	R-4*	R-4 Station, Co. Rt. 29	143° at 1.8 miles
	R-5*	R-5 Station, Montario Point Rd.	42° at 16.4 miles
	D1	D1 On-site Station, On-site	69° at 0.2 miles
	D2	D2 Off-site Station, Co. Rt. 64	117° at 9.0 miles
	E	E Off-site Station, Co. Rt. 4	160° at 7.2 miles
	F	F Off-site Station, Dutch Ridge Rd.	190° at 7.7 miles
	G	G On-site Station, On-site	250° at 0.7 miles
	H	H On-site Station, On-site	70° at 0.8 miles
	I	I On-site Station, On-site	98° at 0.8 miles
	J	J On-site Station, On-site	110° at 0.9 miles
	K	K On-site Station, On-site	132° at 0.5 miles
	G	G Off-site Station, St. Paul St.	225° at 5.3 miles

* Technical Specification location

(1) Based on Nine Mile Point Unit 2 Reactor Centerline

TABLE 3.3-1 (Continued)

ENVIRONMENTAL SAMPLE LOCATIONS

SAMPLE MEDIUM	LOCATION DESIGNATION	LOCATION DESCRIPTION	DEGREES AND DISTANCE (1)
Thermo-Luminescent Dosimeters (TLDs)	3	D1 On-site Station	69° at 0.2 miles
	4	D2 On-site Station	140° at 0.4 miles
	5	E On-site Station	175° at 0.4 miles
	6	F On-site Station	210° at 0.5 miles
	7*	G On-site Station	250° at 0.7 miles
	8*	R-5 Off-site Station (Indicator/Control)	42° at 16.4 miles
	9	D1 Off-site Location	80° at 11.4 miles
	10	D2 Off-site Location	117° at 9.0 miles
	11	E Off-site Location	160° at 7.2 miles
	12	F Off-site Location	190° at 7.7 miles
	13	G Off-site Location	225° at 5.3 miles
	14*	SW Oswego - Control	226° at 12.6 miles
	15*	West Site Boundary	237° at 0.9 miles
	18*	Energy Information Center	265° at 0.4 miles
	19	East Site Boundary	81° at 1.3 miles
	23*	H On-site Station, On-site	70° at 0.8 miles
	24	I On-site Station, On-site	98° at 0.8 miles
	25	J On-site Station, On-site	110° at 0.9 miles
	26	K On-site Station, On-site	132° at 0.5 miles
	27	North Fence, JAFNPP	60° at 0.4 miles
	28	North Fence, JAFNPP	68° at 0.5 miles
	29	North Fence, JAFNPP	65° at 0.5 miles
	30	North Fence, JAFNPP	57° at 0.4 miles
	31	North Fence, NMP-1	276° at 0.2 miles
	39	North Fence, NMP-1	292° at 0.2 miles
	47	North Fence, JAFNPP	69° at 0.6 miles
	49*	Phoenix, NY - Control	170° at 19.8 miles
	51	Oswego Steam Station, East	233° at 7.4 miles
	52	Oswego Elementary School, East	227° at 5.8 miles

* Technical Specification location

(1) Based on Nine Mile Point Unit 2 Centerline

TABLE 3.3-1 (Continued)

ENVIRONMENTAL SAMPLE LOCATIONS

SAMPLE MEDIUM	LOCATION DESIGNATION	LOCATION DESCRIPTION	DEGREES AND DISTANCE (1)
Thermo-	53	Fulton High School	183° at 13.7 miles
Luminescent	54	Mexico High School	115° at 9.3 miles
Dosimeters	55	Pulaski Gas Substation, Route 5	75° at 13.0 miles
(TLDs)	56*	New Haven Elementary School	123° at 5.3 miles
	58*	County Route 1 and Alcan	220° at 3.1 miles
	75*	North Fence, NMP-2	5° at 0.1 miles
	76*	North Fence, NMP-2	25° at 0.1 miles
	77*	North Fence, NMP-2	45° at 0.2 miles
	78*	East Boundary, JAFNPP	90° at 1.0 miles
	79*	County Route 29	115° at 1.1 miles
	80*	County Route 29	133° at 1.4 miles
	81*	Miner Road	159° at 1.6 miles
	82*	Miner Road	181° at 1.6 miles
	83*	Lakeview Road	200° at 1.2 miles
	84*	Lakeview Road	225° at 1.1 miles
	85*	North Fence, NMP-1	294° at 0.2 miles
	86*	North Fence, NMP-1	315° at 0.1 miles
	87*	North Fence, NMP-1	341° at 0.1 miles
	88*	Hickory Grove Road	97° at 4.5 miles
	89*	Leavitt Road	111° at 4.1 miles
	90*	Route 104 and Keefe Road	135° at 4.2 miles
	91*	County Route 51A	156° at 4.8 miles
	92*	Maiden Lane Road	183° at 4.4 miles
	93*	County Route 53	205° at 4.4 miles
	94*	Co. Rt. 1 & Kocher Road (Co. Rt.63)	223° at 4.7 miles
	95*	Lakeshore, ALCAN West Access Road	237° at 4.1 miles
	96*	Creamery Road	199° at 3.6 miles
	97*	County Route 29	143° at 1.8 miles
	98*	Lake Road	101° at 1.2 miles

* Technical Specification location

(1) Based on Nine Mile Point Unit 2 Centerline

TABLE 3.3-1 (Continued)

ENVIRONMENTAL SAMPLE LOCATIONS

SAMPLE MEDIUM	LOCATION DESIGNATION	LOCATION DESCRIPTION	DEGREES AND DISTANCE (1)
Thermo-	99	Nine Mile Point Road	88° at 1.8 miles
Luminescent	100	County Route 29 and Lake Road	104° at 1.1 miles
Dosimeters	101	County Route 29	132° at 1.5 miles
(TLDs)	102	Oswego County Airport	175° at 11.9 miles
	103	Energy Information Center, East	267° at 0.4 miles
	104	Parkhurst Road	102° at 1.4 miles
	105	Lakeview Road	198° at 1.4 miles
	106	Shoreline Cove, East of NMP-1	274° at 0.3 miles
	107	Shoreline Cove, East of NMP-1	272° at 0.3 miles
	108	Lake Road	104° at 1.1 miles
	109	Lake Road	103° at 1.1 miles
	111*	Sterling-Control	214° at 21.8 miles
	112	Emergency Off-Site Facility Env. Lab	179° at 11.9 miles
	113	Baldwinsville-Control	170° at 24.7 miles
Cows Milk	76	Indicator Location	132° at 5.2 miles
	50	Indicator Location	93° at 8.2 miles
	55	Indicator Location	95° at 9.0 miles
	60	Indicator Location	90° at 9.5 miles
	4	Indicator Location	113° at 7.8 miles
	73*	Control Location	234° at 13.9 miles
	77*	Control Location	192° at 13.9 miles
Food Products			
	P	Indicator Location	101° at 1.9 miles
	S*	Indicator Location	98° at 1.7 miles
	K*	Indicator Location	90° at 1.7 miles
	L	Indicator Location	112° at 1.9 miles
	M*	Control Location	225° at 15.6 miles
	V*	Indicator Location	98° at 1.8 miles
	X	Indicator Location	142° at 1.5 miles
	Q	Indicator Location	137° at 1.7 miles

* Technical Specification location

(1) Based on Nine Mile Point Unit 2 Centerline

3.4 LAND USE CENSUS

Technical Specifications require that a milch animal census and a residence census be conducted annually. Milch animals are defined as any animal that is routinely used to provide milk for human consumption.

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

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

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

3.5 CHANGES TO THE REMP PROGRAM

3.5.1 The following changes were implemented during the 2001 sampling program.

A. Food Product/Vegetation

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

- Garden vegetation/food products were collected from location Q for the 2001 sampling program. This location was sampled in the 2000 program but was utilized in 2001 due to the availability of samples at harvest time. (ODCM Table H-1 Location No. 143).

B. Milk Sampling

The existing milk sampling program control location (ODCM location No. 66) was deleted from the sampling program in August 2001. The last sample collected from this location was on August 20, 2001. The sampling location was retired because the owner ceased milk production and sold the milking herd. The retired control location was replaced by the new control location, which was first sampled on August 06, 2001. The ODCM was revised to reflect the change in control location for the site milk sampling program. The new sampling location is designated as ODCM milk sampling location number 77. (ODCM Table H-1 Location No. 77).

Collection Site	ODCM No.	Location*
Old Milk Control	66	13.9 miles @ 234 SW
New Milk Control	77	13.9 miles @ 192 SSW

*Based on Nine Mile Point Unit 2 Reactor Centerline

3.6 DEVIATION AND EXCEPTIONS TO THE PROGRAM

Exceptions to the 2001 sample program concern those samples or monitoring requirements which are required by the Technical Specifications. This section satisfies the reporting requirements of Section 6.1.a of the RETS.

The following are deviations from the program specified by the Technical Specifications:

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

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

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

4. The air sampling pump at the R-1 Offsite Environmental Station was inoperable for approximately 3 hours on November 13, 2001 (13:00 hrs. to 16:00 hrs.). The inoperability of the sampling pump was caused by an electrical power outage initiated by NMPC for line maintenance to relocate a utility pole power supply. No corrective action was implemented.

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

B. AIR SAMPLING STATION OPERABILITY ASSESMENT

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 43,637 hours out of a possible 43,680 hours. The air sampling availability factor for the report period was 99.90 %.

3.7 STATISTICAL METHODOLOGY

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

3.7.1 ESTIMATION OF THE MEAN AND STANDARD DEVIATION

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

A. Mean

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

where,

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

B. Standard Deviation

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

where,

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

S = standard deviation for the sample population.

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

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

The following equations were utilized to estimate the mean (X) and the associated propagated error.

A. Mean

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

where,

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

B. Error of the Mean (Reference 18)

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

where,

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

* Sigma (σ)

Sigma is the greek letter used to represent the mathematical term Standard Deviation. Standard Deviation is a measure of dispersion from the arithmetic mean of a set of numbers.

3.7.3 LOWER LIMIT OF DETECTION (LLD)

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

The LLDs are specified by the Technical Specifications 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 is the a priori lower limit of detection, as defined above (in picocurie per unit mass or volume);

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

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

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

2.22 is the number of disintegrations per minute per picocurie;

Y is the fractional radiochemical yield (when applicable);

λ is the radioactive decay constant for the particular radionuclide;

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

The RETS 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 RETS 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 RETS 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 RETS.

3.8 COMPLIANCE WITH REQUIRED LOWER LIMITS OF DETECTION (LLD)

Table 6.1-3 of the Radiological Effluent Technical Specification (RETS) specifies the detection capabilities for environmental sample analysis (see Report Table 3.8-1). Section 7.3.d of the RETS requires that a discussion of all analyses for which the required LLDs specified were not routinely achieved be included in the Annual Radiological Environmental Operating Report. Section 3.8 is provided pursuant to this requirement.

3.8.1 All sample analyses performed in 2001, as required by the RETS, achieved the Lower Limit of Detection (LLD) specified by RETS Table 6.1-3.

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 4.66 s_b (sigma) of background (see Section 3.7).

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

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

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

7 The number of nonroutine reports sent to the Nuclear Regulatory Commission.

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

RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

JAMES A. FITZPATRICK NUCLEAR POWER PLANT DOCKET NO. 50-333
OSWEGO COUNTY, STATE OF NEW YORK JANUARY - DECEMBER 2001

Medium (Units)	Type and Number of Analysis	LLD	Indicator Locations: Mean (a) Range	Location (b) of Highest Annual Mean: Locations & Mean (a) Designation Range	Control Location: Mean (a) Range	Number of Nonroutine Reports
Surface (Lake) Water (pCi/liter)	H-3 (8):	3000	<LLD	<LLD	<LLD	0
	GSA (24):					
	Mn-54	15	<LLD	<LLD	<LLD	0
	Fe-59	30	<LLD	<LLD	<LLD	0
	Co-58	15	<LLD	<LLD	<LLD	0
	Co-60	15	<LLD	<LLD	<LLD	0
	Zn-65	30	<LLD	<LLD	<LLD	0
	Zr-95	15	<LLD	<LLD	<LLD	0
	Nb-95	15	<LLD	<LLD	<LLD	0
	I-131	15	<LLD	<LLD	<LLD	0
	Cs-134	15	<LLD	<LLD	<LLD	0
	Cs-137	18	<LLD	<LLD	<LLD	0
	Ba/La-140	15	<LLD	<LLD	<LLD	0

RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

JAMES A. FITZPATRICK NUCLEAR POWER PLANT DOCKET NO. 50-333
OSWEGO COUNTY, STATE OF NEW YORK JANUARY - DECEMBER 2001

Medium (units)	Type and Number of Analysis	LLD	Indicator Locations: Mean (a) Range	Location (b) of Highest Annual Mean: Locations & Mean (a) Designation Range	Control Location: Mean (a) Range	Number of Nonroutine Reports
Shoreline Sediment (pCi/g-dry)	GSA (4):					
	Cs-134	0.15	<LLD	<LLD	<LLD	0
	Cs-137	0.18	0.067 (2/2) 0.063 - 0.071	No. 5 0.067 (2/2) 1.5 @ 80° 0.063 - 0.071	<LLD	0
Fish (pCi/g-wet)	GSA (20):					
	Mn-54	0.13	<LLD	<LLD	<LLD	0
	Fe-59	0.26	<LLD	<LLD	<LLD	0
	Co-58	0.13	<LLD	<LLD	<LLD	0
	Co-60	0.13	<LLD	<LLD	<LLD	0
	Zn-65	0.26	<LLD	<LLD	<LLD	0
	Cs-134	0.13	<LLD	<LLD	<LLD	0
	Cs-137	0.15	<LLD	<LLD	<LLD	0

RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

JAMES A. FITZPATRICK NUCLEAR POWER PLANT DOCKET NO. 50-333
OSWEGO COUNTY, STATE OF NEW YORK JANUARY - DECEMBER 2001

Medium (units)	Type and Number of Analysis	LLD	Indicator Locations: Mean (a) Range	Location (b) of Highest Annual Mean: Locations & Mean (a) Designation Range	Control Location: Mean (a) Range	Number of Nonroutine Reports
Food Products (pCi/g-wet)	GSA (20):					
	I-131	0.06	<LLD	<LLD	<LLD	0
	Cs-134	0.06	<LLD	<LLD	<LLD	0
	Cs-137	0.08	<LLD	<LLD	<LLD	0
Milk (f) (pCi/liter)	GSA (100):					
	Cs-134	15	<LLD	<LLD	<LLD	0
	Cs-137	18	<LLD	<LLD	<LLD	0
	Ba/La-140	15	<LLD	<LLD	<LLD	0
	I-131(100):	1	<LLD	<LLD	<LLD	0

RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

JAMES A. FITZPATRICK NUCLEAR POWER PLANT DOCKET NO. 50-333
OSWEGO COUNTY, STATE OF NEW YORK JANUARY - DECEMBER 2001

Medium (units)	Type and Number of Analysis	LLD	Indicator Locations: Mean (a) Range	Location (b) of Highest Annual Mean: Locations & Mean (a) Designation Range	Control Location: Mean (a) Range	Number of Nonroutine Reports
Air Particulate and Radioiodine (d) (pCi/m^3)	G.B. (260):	0.01	0.016 (208/208) 0.004 - 0.037	R-4 0.016 (52/52) 1.8 @ 143° 0.004 - 0.037	0.016 (52/52) 0.006 - 0.034	0
	I-131(260):	0.07	<LLD	<LLD	<LLD	0
	GSA (60):					
	Cs-134	0.05	<LLD	<LLD	<LLD	0
	Cs-137	0.06	<LLD	<LLD	<LLD	0
	Co-60	N/A	<LLD	<LLD	<LLD	0
TLD (mrem per standard month)	Gamma Dose (128):	N/A	5.08 (120/120) (c) 3.6 - 10.3	No. 85 9.7 (4/4) (e) 0.2 @ 294° 8.4 - 10.3	4.4 (8/8) 3.9 - 5.0	0

ANNUAL SUMMARY TABLE NOTES

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

N/A = Not applicable.

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

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

(c) = Indicator TLD locations are: #7, 8, 23, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 15, 18, 56, and 58. Control TLDs are all TLDs located beyond the influence of the site (#14, 49).

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

(e) = This dose is not representative of doses to a member of the public since this area is located near the north shoreline which is in close proximity to the generating facility and is not accessible to members of the public (see Section 5.2.4, TLDs).

(f) = The RETS 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, milk samples are collected from locations greater than 5.0 miles from the site based on the location D/Q values.

5.0 DATA EVALUATION AND DISCUSSION

A. Introduction

Each year the results of the Annual Radiological Environmental Monitoring Program are evaluated considering plant operations at the site, the natural processes in the environment and the archive of historical environmental radiological data. A number of factors are considered in the course of evaluating and interpreting the Annual Environmental Radiological Data. This interpretation can be made using several methods including trend analysis, population dose estimates, risk estimates to the general population based on significance of environmental concentrations, effectiveness of plant effluent controls and specific research areas. The report not only presents the data collected during the 2001 sample program but also assesses the significance of radionuclides detected in the environment. It is important to note that detection of a radionuclide is not, of itself, an indication of environmental significance. Evaluation of the impact of the radionuclide in terms of potential increased dose to man, in relation to natural background, is necessary to determine the true significance of any detection.

B. Units of Measure

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

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

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

C. Dose/Dose to Man

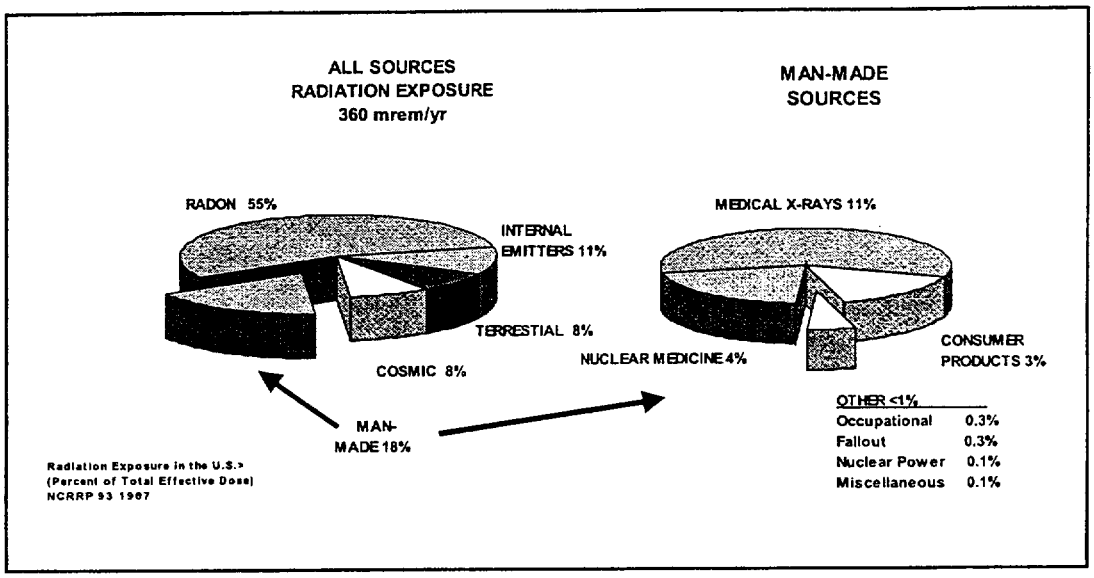
The dose or dose equivalent, simply put, is the amount of ionizing energy deposited or absorbed in living tissue. The amount of energy deposited or ionization caused is dependent on the type of radiation. For example, alpha radiation can cause dense localized ionization that can be up to 20 times the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

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

D. Discussion

There are three separate groups of radionuclides that were measured in the environment in the media analyzed for the 2001 sampling program. The first of these groups consists of those radionuclides that are naturally occurring. The environment contains a significant inventory of naturally occurring radioactive elements. The components of natural or background radiation include the decay of radioactive elements in the earth's crust, a steady stream of high-energy particles from space called cosmic radiation, naturally-occurring radioactive isotopes in the human body like potassium-40, medical procedures, man-made phosphate fertilizers (phosphates and uranium are often found together in nature), and even household items like televisions. In the United States, a person's average annual exposure from background radiation is 360 mrem, as illustrated on the following Background Radiation Chart.

Background Radiation



A number of radionuclides are present in the environment due to sources such as cosmic radiation and fallout from nuclear weapons testing. These radionuclides are expected to be present in many of the environmental samples collected in the vicinity of the Nine Mile Point Site. Some of the radionuclides normally present include:

- *tritium*, present as a result of the interaction of cosmic radiation with the upper atmosphere.
- *beryllium-7*, present as a result of the interaction of cosmic radiation with the upper atmosphere.
- *potassium-40, 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 reported in some cases in Section 6.0 of this report. Comparisons of program samples to natural background radiation are made throughout this section to help put program results into perspective and to aid the reader in determining what, if any, significant impact is demonstrated by the Radiological Environmental Monitoring Program (REMP) results.

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

The third group of radionuclides that may be detected in the environment are those that are related to nuclear power technology. These radionuclides are the byproduct of the operation of light water reactors. These byproduct radionuclides are the same as those produced in atmospheric weapons testing and found in the Chernobyl fallout. This commonality makes an evaluation of the source of these radionuclides that may be detected in environmental samples difficult to determine. During 2001, H-3 and Cs-137 were the potentially plant-related radionuclides detected in the REMP samples.

A number of factors must be considered in performing radiological sample data evaluation and interpretation. The evaluation is made using several approaches including trend analysis and dose to man. An attempt has been made not only to report the data collected during 2001, but also to assess the significance of the radionuclides detected in the environment as compared to natural and other man-made radiation sources. It is important to note that detected concentrations of radionuclides in the local environment as a result of mans technology are very small and are of no or little significance from an environmental or dose to man perspective.

The 1987 per capita dose was determined to be 360 mrem per year from all sources, as noted in NCRP Report No. 93 (Reference 17). This average dose includes such exposure sources as natural radiation, occupational exposure, weapons testing, consumer products and nuclear medicine. The 1987 per capita dose rate due to natural sources was 295 mrem per year. The per capita radiation dose from nuclear power production nation wide is less than one mrem per year (Reference 10).

The natural background gamma radiation in the environs of the Nine Mile Point Site, resulting from radionuclides in the atmosphere and in the ground, accounts for approximately 60 - 65 mrem per year. This dose is a result of radionuclides of cosmic origin (for example, Be-7) and of primordial origin (Ra-226, K-40, and Th-232). A dose of 60 mrem per year, as a background dose, is significantly greater than any possible doses as a result of routine operations at the site during 2001.

The results for each sample medium are discussed in detail in **Section 5.0**. This includes a summary of the results, the estimated environmental impact, a detailed review of any relevant detections with a dose to man estimate where appropriate, and an analysis of possible long term and short term trends.

In the routine implementation of the Radiological Environmental Monitoring Program, additional or optional environmental pathway media are sampled and analyzed. These samples are obtained to:

- Expand the area covered by the program beyond that required by the operating license.

- Provide more comprehensive monitoring than is currently required.
- Monitor the secondary dose to main pathways.
- Maintain the analytical data base established in 1975 when the plant began commercial operation.

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 Technical Specifications. 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 Technical Specification sample media are included in the data presentation and evaluation. When additional locations are included, the use of this data is specifically noted in **Section 5.0**.

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

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

5.1 AQUATIC PROGRAM

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

- o Shoreline Sediment
- o Fish
- o Surface Waters

Section 6.0, Tables 6.1 through 6.4 represent the analytical results for the aquatic samples collected for the 2001 sampling period.

5.1.1 SHORELINE SEDIMENT RESULTS

A. Results Summary

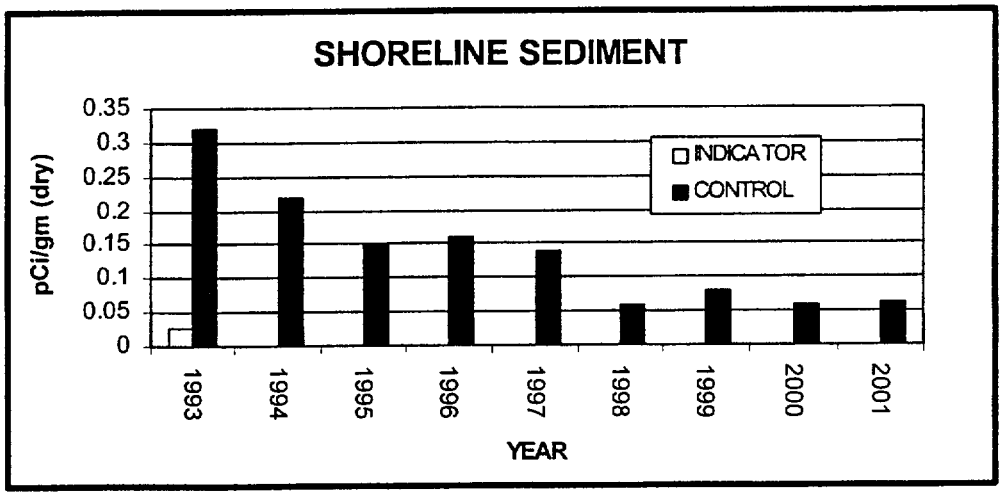
Shoreline sediment samples were obtained in April and October of 2001 at one off-site control location (near Oswego Harbor) and at one indicator location which is an area east of the site considered to have recreational value.

A total of four sediment samples were collected for the 2001 sample program, two indicator and two control. Cs-137 was detected in both samples taken at Sunset Beach which is the indicator location. The Cs-137 concentrations in the 2001 samples ranged from a minimum of 0.063 pCi/g (dry) to a maximum of 0.071 pCi/g (dry). Cs-137 was not detected at the control location during 2001. However, it has been detected in the past, in the 1993 sample at a concentration of 0.027 pCi/g.

The general lack of Cs-137 at the control location is attributed to the differences in the sediment types between the two sample locations (See Data Evaluation and Discussion). The source of the Cs-137 detected in the indicator shoreline sediment is considered to be the result of fallout from atmospheric nuclear weapons testing and not from operations at the site. The mean concentration of Cs-137 measured in the 2001 indicator samples, remains among the lowest measured concentrations 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 0.06 pCi/g (dry) in 2000. The results for the 2001 control location were less than the detection limit. No other plant related radionuclides were detected in the 2001 shoreline sediment samples.

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

Below is a graph of the average Cs-137 concentration in shoreline sediment samples over the previous eight years. This graph illustrates a general downward trend in the Cs-137 concentrations since 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 2001 at both the indicator and control locations. The second shoreline sample collection was made in October 2001, again at both the indicator and the control locations. The results of these sample collections are presented in Section 6.0, Table 6-1, "Concentrations of Gamma Emitters in Shorline Sediment Samples". Cesium-137 (Cs-137) and Potassium-40 (K-40) were the significant radionuclides detected in the sediment samples.

Cs-137 was detected in both April and October indicator samples collected for the 2001 program. The measured concentrations for these samples were 0.071 pCi/g (dry) and 0.063 pCi/g (dry). The presence of Cs-137 in certain environmental sample media such as soil, shoreline sediment and fish is routine. Cs-137 is a fission product that is produced in power reactors and during atmospheric weapons testing. In addition to the Cs-137 found in the environment as a result of past weapons testing, a significant inventory of Cs-137 was also introduced globally as a result of the Chernobyl accident in 1986. Because Cs-137 is found in environmental samples as a result of

weapons testing and Chernobyl, it is difficult to accurately determine the source of Cs-137 measured in the sediment sample. It is highly probable that the source of the cesium is from sources other than the operation of plants at the Nine Mile Point Site. It is likely that any sediment sample containing Cs-137 concentration which were the result of plant operation would also contain other plant related isotopes such as Co-60 and Cs-134. The absence of corroborating isotopes would indicate that the source of Cs-137 in sediment sample is from the existing background Cs-137 which is attributed to weapons testing. This assessment is further substantiated by the fact that Cs-137 was detected in the 1993 sediment control sample. Cs-137 has been routinely measured in the control samples of other environmental media such as fish and soil.

The routine absence of Cs-137 in the control samples is attributed to the differences in the sediment types between the two sample locations. Few shoreline regions west of the site contain fine sediment and/or sand which would be representative of the indicator location. It is difficult to obtain control samples, which are comparable in physical and chemical characteristics to the indicator samples. Other factors, which include changing lake level and shoreline erosion, further complicate attempts at consistency in shoreline sediment sampling. Recent soil samples from locations beyond any expected influence from the site have contained levels of Cs-137 equal to or greater than the concentrations found in 2001 shoreline sediment. The Cs-137 is commonly found in soil samples and is attributed to weapons testing fallout. Shoreline samples containing soil or sediment are likely to contain Cs-137.

C. Dose Evaluation

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

- A teenager spends 67 hours per year at the beach area or on the shoreline.
- The sediment has a mass of 40 kg/m^2 (dry) to a depth of 2.5 cm.
- The shoreline width factor is 0.3.
- The maximum measured Cs-137 concentration of 0.071 pCi/g (dry).

Using these conservative parameters, the potential dose to the maximum exposed individual (teenager) would be 0.00024 mrem/year to the whole body and 0.00028 mrem/year to the skin. This calculated dose is very small and is insignificant when compared to the natural background annual exposure of approximately 60 mrem.

D. Data Trends

The mean Cs-137 concentration for the shoreline sediment indicator samples for 2001 was 0.067 pCi/g (dry), which is the second 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 previous ten years 1991 – 2000 ranged from a maximum of 0.32 pCi/g (dry) in 1993 to the minimum of 0.06 pCi/g (dry) in 1998 and 2000. The mean results for the previous five year period ranged from a maximum of 0.16 pCi/g (dry) in 1996 to a minimum of 0.06 pCi/g (dry) in 1998 and 2000.

Cs-137 was not detected at the control location during 2001.

A review of indicator and control sample results for 1985 - 1988 indicate only naturally occurring radionuclides present in shoreline sediment. The period from 1989 - 2001 shows the presence of Cs-137 in the indicator samples. The historical data shows an emergence of Cs-137 concentrations in 1989 which continues through 2001. The trend since 1989 shows a reduction in Cs-137 concentrations over the four year period to the concentration of 0.13 pCi/g (dry) measured in 1992. The 1993 sample showed an increase in Cs-137 concentration to 0.32 pCi/g (dry) followed by a reduction in concentration to 0.22 pCi/g (dry) in 1994 and continued general reductions through 2000 and 2001 to 0.067 pCi/g (dry). The overall five year trend for Cs-137 concentrations in shoreline sediment is a steady reduction in concentrations from year to year to a low concentration of 0.06 pCi/g (dry) in 1998 and remaining low through 2001.

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

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

5.1.2 FISH SAMPLE RESULTS

A. Results Summary

A total of 20 fish samples were collected for the 2001 sample program. The analytical results for the 2001 fish samples showed no detectable concentration of radionuclides that would be attributable to plant operations at the site or past atmospheric weapons testing. The absence of Cs-137 in the 2001 fish samples is significant in the fact that positive concentrations have been measured in samples collected in the previous 21 years at a combination of both the indicator and/or the control locations. Potassium-40, a naturally occurring radionuclide was detected in the 2001 fish samples.

In previous years, Cs-137 has been routinely detected in a small percentage of the fish samples collected each year. Cs-137 has been measured in fish samples at both the indicator and control locations consistently over the last 20 years and beyond. Cesium-137 was also measured in samples collected in 1974, and earlier, which was preoperational for the FitzPatrick Plant. These low levels of Cs-137 represent no significant dose to man or impact on the environment.

The fish sample results demonstrate that plant operations at the Nine Mile Point Site have no measurable radiological environmental impact on the upper levels of the Lake Ontario food chain. The 2001 results are consistent with the previous year's results in that they continue to support the general long term downward trend in fish Cs-137 concentrations over the last 23 years. The Cs-137 mean indicator concentration for 1994 through 2001, as a group, are the lowest measured concentrations since the beginning of the FitzPatrick Environmental Monitoring Program 28 years ago (1974).

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 Unit #1 (#02), and

the James A. FitzPatrick (#03) generating facilities. The Oswego Harbor samples served as control samples while the NMP (#02) and JAF (#03) samples served as indicator samples. All samples were analyzed for gamma emitters. Table 6-2 shows individual results for all the samples in units of pCi/g (wet).

The spring fish collection was made up of nine individual samples representing three separate species. Smallmouth bass, lake trout and walleye were collected from all three sample locations.

The total fall fish collection was comprised of eleven individual samples representing four individual species. Brown trout, walleye, smallmouth bass and salmon samples were collected at the NMP indicator sampling location and the control location (Oswego Harbor). Walleye, smallmouth bass and salmon were collected at the JAF indicator location.

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

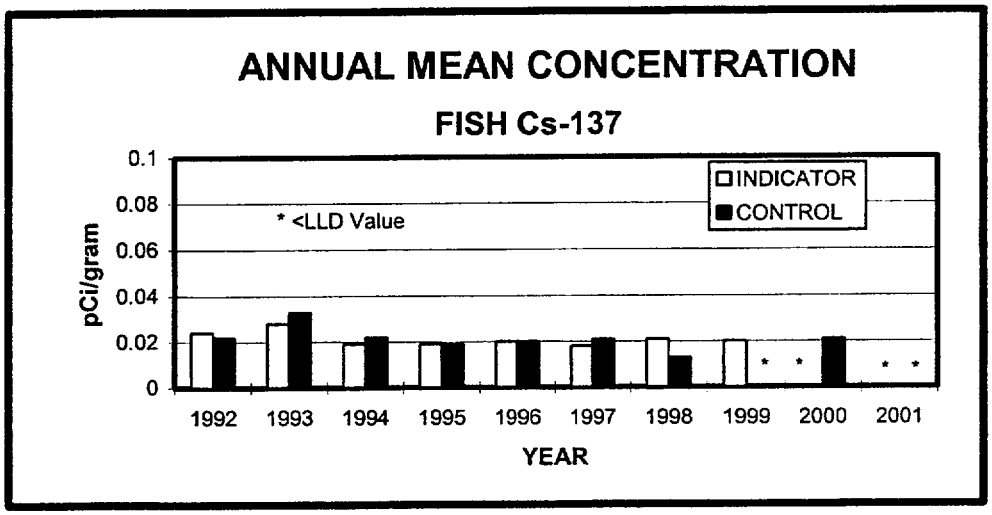
C. Dose Evaluation

Fish represent the highest level in the aquatic food chain and have the potential to be a contributer to the dose to man from the operations at the site. The lack of detectable concentrations of plant related radionuclides in the 2001 fish samples demonstrate that there is no attributable dose to man from operations at the site through the aquatic pathway to man. Some Lake Ontario fish species may be considered an important food source due to the local sport fishing industry. Therefore, these fish are an integral part of the human food chain.

D. Data Trends

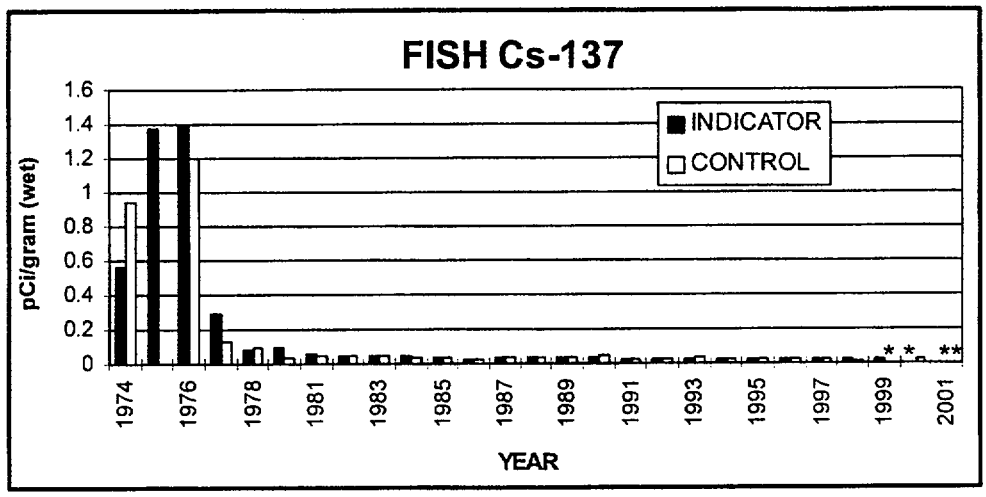
Results for the previous five years (1996 through 2000) have shown a generally steady trend for Cs-137 levels in the control and indicator samples. During the period of 1990 through 1994, control and indicator mean results were on a small downward trend with a small rise in 1993. The 1994 through 2001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

concentrations measured over the 20 year existence of the sampling program. The graph below illustrates the mean Cs-137 concentrations for 2001 and the previous nine years.



Data from 1974 through 2001 shows that the mean concentrations of Cs-137 for indicator samples has decreased from a maximum concentration of 1.4 pCi/g (wet) in 1976 to a minimum level of 0.018 pCi/g (wet) measured in 1997. The decreasing trend continued in 2001 with no detectable concentration of Cs-137 in the samples. Control sample Cs-137 results have also decreased from a maximum level of 1.2 pCi/g (wet) in 1976 to levels that were not detectable in 1999 and 2001.

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



Fish results for the 2000 control samples, the year with the most recent measurable concentration, show a decrease in concentration by a factor of approximately 44 when compared to preoperational data (1974) and by a factor of about 57 compared to 1976. Indicator results have shown a similar reduction.

Tables 7-3 and 7-4 in Section 7.0 show historical environmental sample data for fish. Full size reproductions of the fish result graphs are found in Section 8.0.

5.1.3 SURFACE WATER (LAKE)

A. Results Summary

The Radiological Effluent Technical Specifications (RETS) require that monthly surface water samples be taken from the respective inlet water supply of the James A. FitzPatrick N.P.P. and NRG Energy's Oswego Steam Station. In conjunction with the RETS samples, three additional Lake Ontario surface water locations are sampled and analyzed. These additional locations are the Oswego City Water Intake, the NMP Unit #1 Intake and the NMP Unit #2, Intake. Gamma spectral analysis was performed on 24 monthly composite samples from the RETS locations and on 36 monthly composite samples from the additional sample locations. The results of the gamma spectral analysis show that only naturally occurring radionuclides were detected in the 60 samples from the five locations collected for the 2001 Sampling Program. The two naturally occurring radionuclides detected were K-40 and Ra-226 and are not related to operations of the plant. Monthly composite samples show no presence of plant related gamma emitting isotopes in the waters of Lake Ontario as a result of the operation of the plant.

Quarterly composite samples collected from the same locations are analyzed for tritium (H-3). Twenty tritium samples were collected and analyzed in 2001, one of these samples showed a positive tritium concentration. The single positive detection of tritium in surface water samples was measured at the Nine Mile Point, Unit I, Inlet Canal sample. The measured tritium concentration was 174±88 pCi/l. The results for samples collected for the 2001 program show a significant reduction in the number of positive results from the previous years. In 2000, there were positive tritium results for thirteen of the twenty samples collected. The evaluation of surface water sample results demonstrates that there is no measurable radiological impact on the surface waters of Lake Ontario from tritium concentrations related to the operation of the facilities at the Nine Mile Point Site. Individual sample results from the control station were similar or higher than those measured at the indicator location(s). The measured concentrations for the previous years indicator and control samples were within the normal historical variations for naturally occurring tritium in surface water. There is no indication of a long term buildup of

tritium concentrations in the surface waters adjacent to the site.

B. Data Evaluation and Discussion

Gamma spectral analysis was performed on monthly composite samples from five Lake Ontario sampling locations. Only K-40 and Ra-226 were detected in samples from the five locations over the course of the 2001 sampling program. Both of these radionuclides are naturally occurring and are not plant related.

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

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

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

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

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

C. Dose Evaluation

The measured concentration of tritium in the Nine Mile Point, Unit I sample is considered to be representative of natural background levels based on control location results. 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 l/yr and the maximum measured concentration of 174 pCi/l the calculated dose would be 0.018 mrem to the child whole body and 0.018 mrem to the child liver (critical age group/organ).

The drinking water sample is from the Oswego City intake, which is drawn from Lake Ontario at a location more distant from the site than the control location. For the purpose of illustration, the maximum hypothetical dose can be calculated using the LLD concentration calculated for the city water supply. The calculated dose from tritium at this location, using the LLD concentration of <280 pCi/l, would be 0.029 mrem to the child whole body and 0.029 mrem to the child liver. Doses from all water sampled are considered background doses and are negligible compared to the 300 mrem annual dose considered to the overall background annual dose.

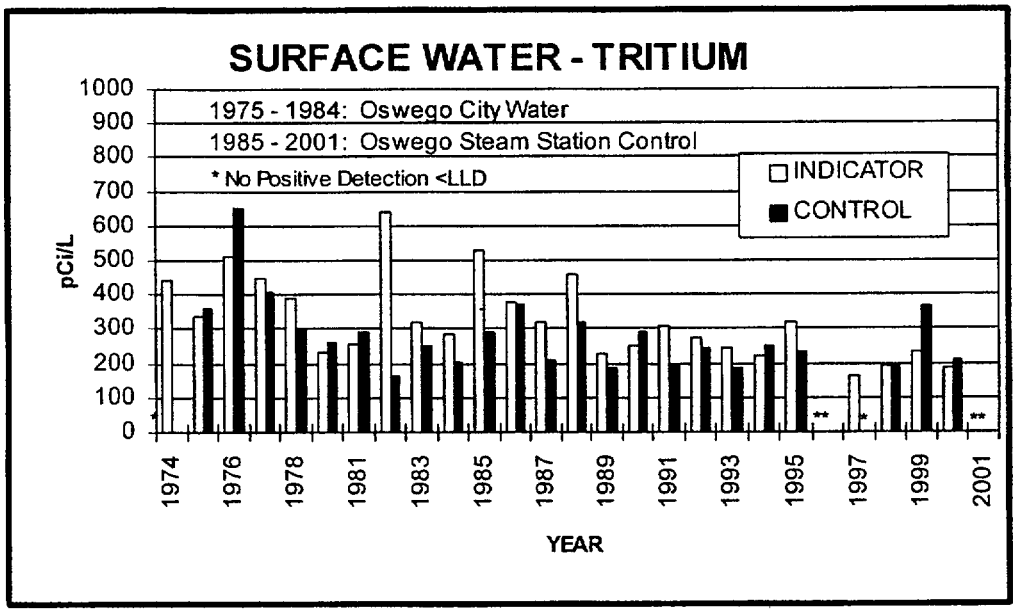
D. Data Trends

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

Tritium results for the 2001 lake water samples were consistent with results from the previous five years for both the indicator and control locations. During the previous five year period the maximum mean indicator and control concentrations were measured in 1996 and 2000 respectively. The mean tritium concentrations for the previous five year period of 1996 - 2000 ranged from 190 pCi/l to 365 pCi/l for the control and 160 pCi/l to 233 pCi/l for the indicator locations. By comparison, the mean 2001 tritium concentrations were <231 pCi/l for the control and <236 pCi/l for the indicator locations. The previous five year data indicates no significant

trends in either the indicator or the control mean concentrations. This previous five year data set is consistent with long term tritium results measured at the site. The indicator data from the previous ten year period, 1991 through 2000, is representative of natural variations in environmental tritium concentrations. The 1999 mean control value of 365 pCi/l is the highest concentration measured since 1986 but is within the variability of results measured over the program life. The ten year historical results are within the range of the normal variance measured in background concentrations from year to year.

The following graph illustrates the concentrations of tritium measured in Lake Ontario over the past 25 years at both an indicator and control location. Prior to 1985, the Oswego, City Water Supply results are used as control location data as this location closely approximates the Oswego Steam Station, the current control location.



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

5.2 TERRESTRIAL PROGRAM

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

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

Tables 6-5 through 6-12 represent the analytical results for the terrestrial samples collected for the 2001 reporting period.

5.2.1 AIR PARTICULATE GROSS BETA

A. Results Summary

Weekly, air samples were collected and analyzed for particulate gross beta particulate activity. For the 2001 program, a total of 53 samples were collected from the control location R-5 and 208 samples were collected from the indicator locations R-1, R-2, R-3 and R-4. These five locations are required by the Technical Specifications. Additional air sampling locations are maintained and are discussed in Section 5.2.1.B below. The mean concentration of the control location. (R-5), was 0.016 pCi/m^3 in 2001. The mean concentration for the indicator locations was 0.016 pCi/m^3 for 2001. The mean results for the indicator and the control stations were equal in 2001. The consistency of the two mean results demonstrates that there are no increased airborne radioactivity levels in the general vicinity of the site. The indicator results are constant with concentrations measured over the last thirteen years. This consistency demonstrates that the natural baseline gross beta activity has been reached. The manmade radionuclide contribution to the natural background from atmospheric weapons testing and Chernobyl can no longer be detected above the background concentrations of naturally occurring beta emitting radionuclides.

B. Data Evaluation and Discussion

The air monitoring system consists of 15 sample locations, six on-site and nine off-site locations, each location is sampled weekly for particulate gross beta activity. A total of 779 samples were collected and analyzed as part of the 2001 program. Five of the nine off-site locations are required by Technical Specifications. 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 Technical Specifications and is located beyond any local influence from the site. In addition, optional off-site and on-site air sample locations are maintained from which weekly samples are collected. The optional off-site locations are designated as D-2, E, F, and G. The optional on-site locations are designated as D-1, G, H, I, J and K.

Gross beta analysis requires that the samples be counted no sooner than 24

hours after collection. This allows for the decay of short half-life naturally occurring radionuclides, thereby increasing the sensitivity of the analysis for plant related radionuclides.

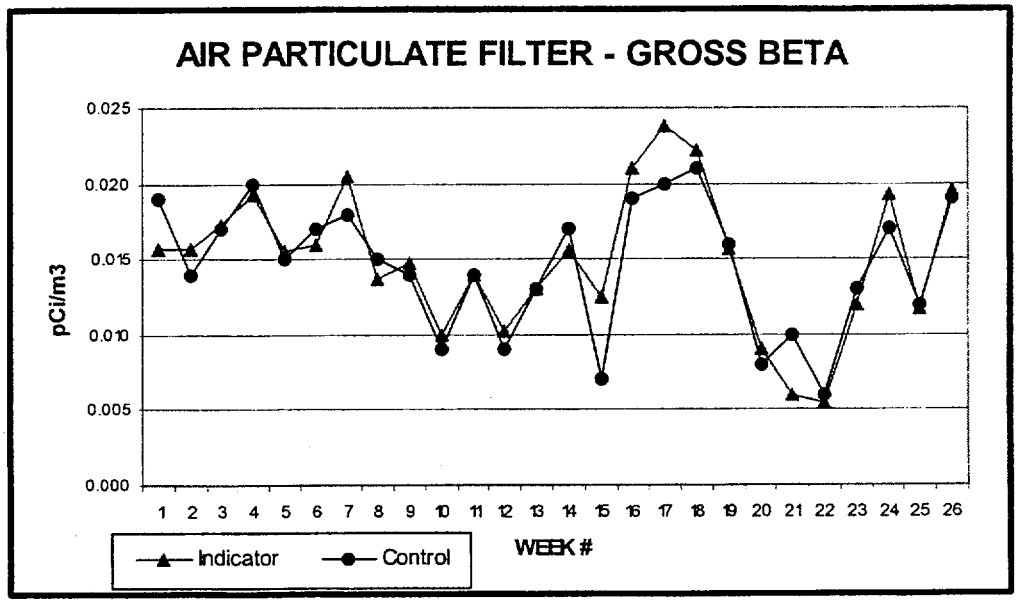
Tables 6-5 and 6-6 in Section 6.0 present the weekly gross beta activity results for the off-site and on-site stations.

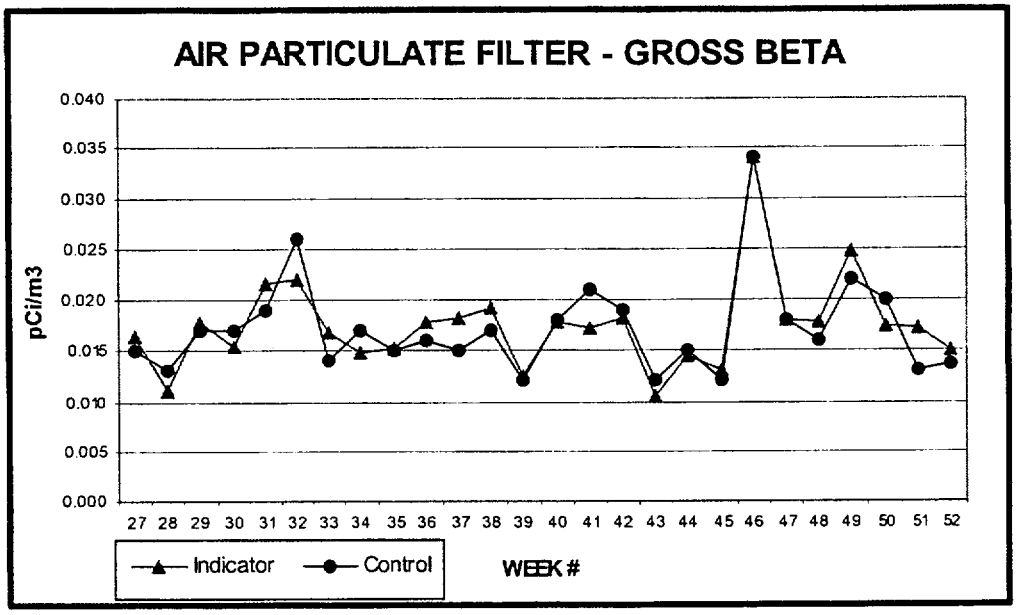
The average annual gross beta indicator concentrations for the Technical Specifications indicator stations (R-1, R-2, R-3 and R-4) was 0.016 pCi/m^3. The off-site station Technical Specification control station (R-5) annual mean concentration was 0.016 pCi/m^3. The minimum, maximum and average gross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

	Concentration pCi/m^3		
Location*	Minimum	Maximum	Average
R-1	0.004	0.033	0.016
R-2	0.005	0.032	0.016
R-3	0.006	0.034	0.016
R-4	0.006	0.037	0.016
R-5 (control)	0.006	0.034	0.016

* Locations required by Technical Specifications

The mean weekly gross beta concentrations measured in 2001 are illustrated in the graphs below.





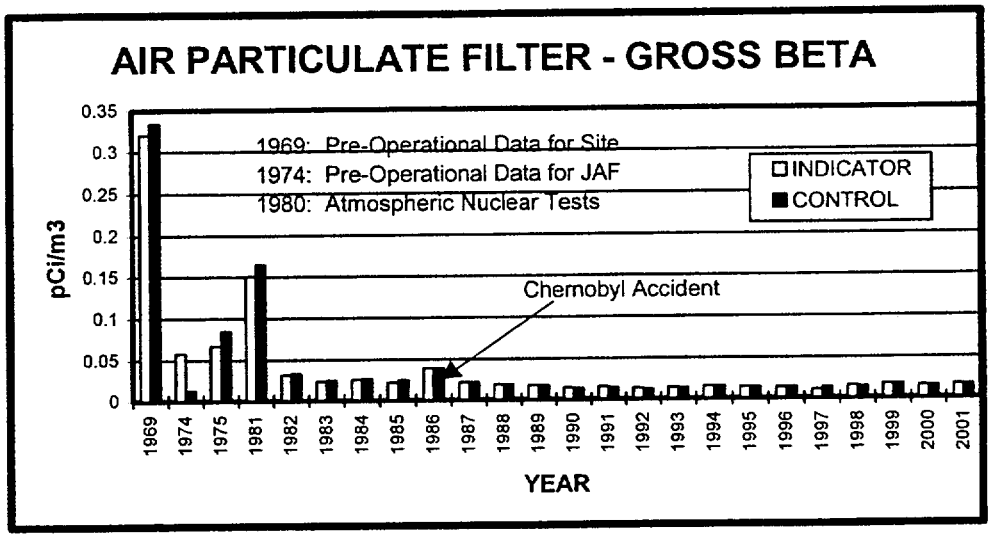
The fluctuations observed in the gross beta activity over the year can be attributed to changes in the environment, especially seasonal changes. The concentrations of naturally occurring radionuclides in the lower levels of the atmosphere directly above land are affected by time related processes such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

C. Dose Evaluation

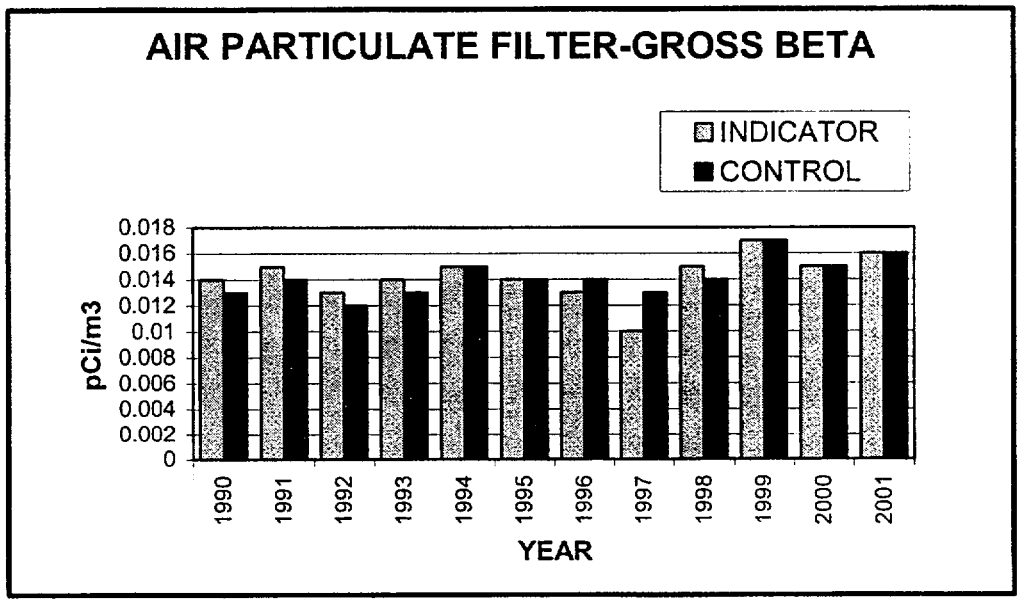
Dose calculations are not performed based on gross beta concentrations. Dose to man as a result of radioactivity in air is calculated using the specific radionuclide and the associated dose factor. See Section 5.2.2.C for dose calculations from air concentrations. The dose received by man from air gross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

D. Data Trends

With the exception of the 1986 sample data, which was effected by the Chernobyl accident, the general trend in air particulate gross beta activity has been one of decreasing activity since 1981. The 1981 samples were affected by fallout from a Chinese atmospheric nuclear test which was detonated in 1980.



The trend for the previous five years represents a base line concentration or natural background level for gross beta concentrations. This trend is stable with minor fluctuations due to natural variations. The change in concentrations over the period of 1991 through 2001 is very small. This is illustrated by the following graph.



For the operational period of 1991 - 2001, the mean annual gross beta concentration at the control station (R-5) has remained steady with a narrow range of 0.013 pCi/m^3 to 0.017 pCi/m^3. The mean annual concentrations for the indicator stations for this same time period were similar to the control and ranged from a maximum of 0.017 pCi/m^3 in 1999 to a minimum of 0.010 pCi/m^3 in 1997. The 2001 gross beta results are consistent with previous results over this ten year period.

Historical data and graphic representations of air particulate gross beta activity are presented in Sections 7.0 and 8.0, respectively.

5.2.2 MONTHLY PARTICULATE COMPOSITES (GAMMA EMITTERS)

A. Results Summary

Fifteen air monitoring stations are maintained around the site. Five of the fifteen monitoring stations are required by Technical Specifications and are located offsite near the site boundary and offsite as a control location. Ten additional air sampling stations are also maintained as part of the sampling program. Together, these fifteen continuous air sampling stations make up a comprehensive environmental monitoring network for measuring radioactive air particulate concentrations in the environs of the site. Annually the air monitoring stations provide 780 individual air particulate sample which are assembled by location into 180 monthly composite samples.

No plant related gamma emitting radionuclides were detected in any of the air particulate filter samples collected during 2001.

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

B. Data Evaluation Discussion

A total of fifteen continuous air sampling locations are in constant operation both onsite and in the offsite sectors surrounding the Nine Mile Point Site. Five sampling locations are required by Technical Specifications 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 Technical Specifications are R-1, R-2, R-3, R-4, and R-5. Other sample locations not required by the Technical Specifications for which analytical results have been provided include six on-site locations and four off-site locations. The analytical results for the 180 air particulate filter composites in 2001 showed no detectable activity.

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

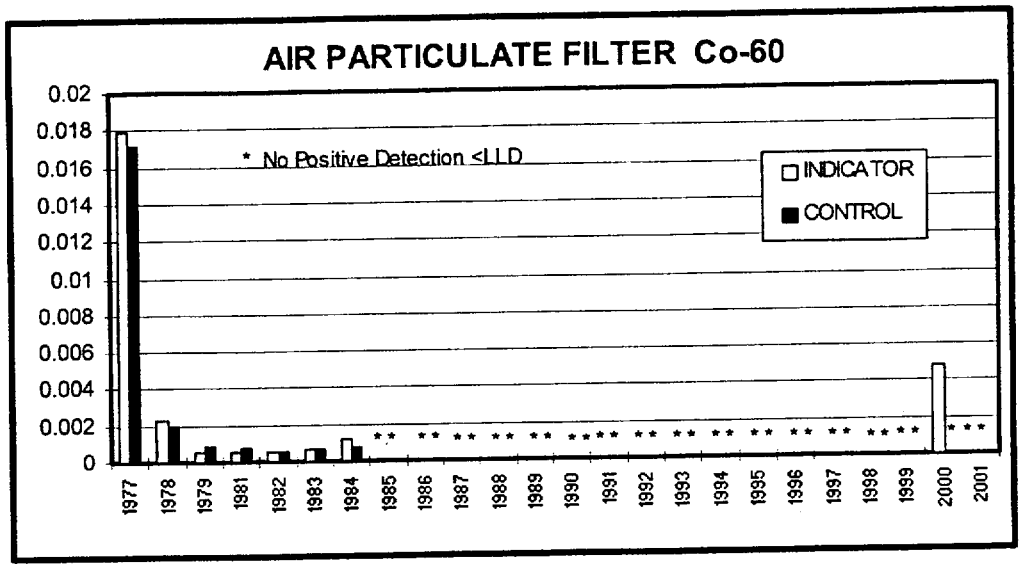
C. Dose Evaluation

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

D. Data Trends

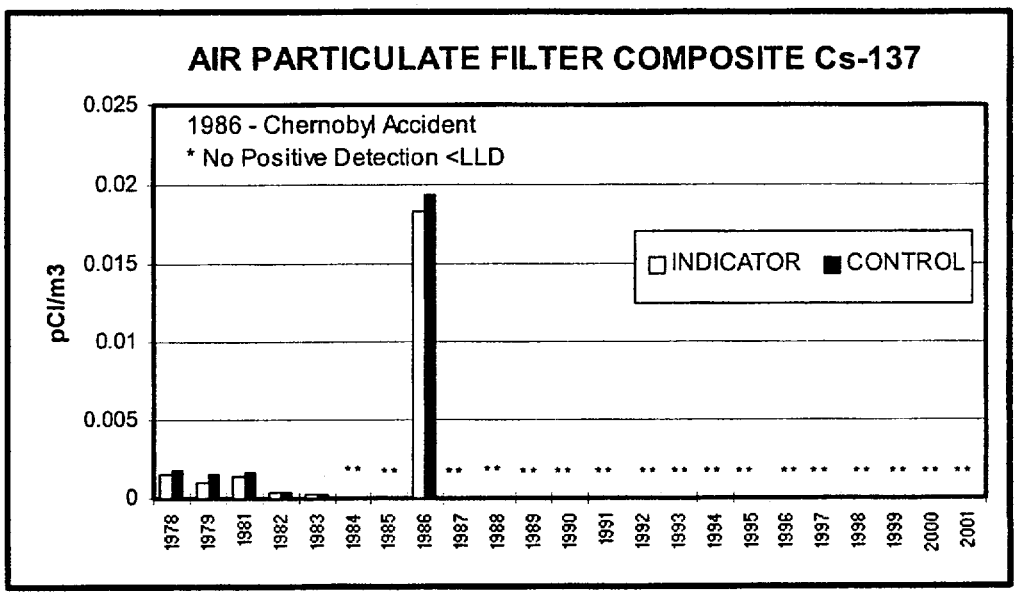
No plant related radionuclides were detected during 2001 at the offsite air monitoring locations.

The five year database of air particulate composite analysis shows that there is no buildup or routine presence of plant related radionuclides in particulate form in the atmosphere around the site. Historically Co-60 was detected in each of the years from 1977 through 1984 at both the indicator and control locations, with the exception of 1980 when Co-60 was not detected at the control location. The presence of Co-60 in the air samples collected during these years was the result of atmospheric weapons testing. The maximum yearly mean concentration detected during this period was in 1977 when the mean for the indicator results was 0.0179 pCi/m^3. The mean control value for this same year was 0.0172 pCi/m^3. The Co-60 in the air particulate samples trended downward during the 1977 through 1984 period to a mean concentration of 0.0008 pCi/m^3 at the control location measured in 1984. Co-60 was detected in an offiste 2000 indicator sample and was the first positive detection of Co-60 since 1984. The detection of Co-60 in the one 2000 sample was an isolated event associated with effluents from the Nine Mile Point Unit I facility. There have been no subsequent measurable concentrations of Co-60 in the environment surrounding the Nine Mile Point site.



Historical data show that Cs-137 is the fission product radionuclide most frequently detected in the air particulate filter composites. Cs-137 was detected in each of the years from 1977 through 1983 at both the control and indicator sampling locations. The maximum concentrations for this period were measured in 1977 with a mean indicator concentration of 0.0043 pCi/m^3 and the corresponding control concentration of 0.0034 pCi/m^3. After 1977, the Cs-137 concentration showed a reduction by a factor of approximately two and remained constant through 1981. In 1982, a second reduction in Cs-137 concentration was measured followed by a further reduction in concentration in 1983. Cs-137 was not detected during 1984 and 1985 in any of the indicator or control air particulate composite samples.

For the period, 1986 to 1991, Cs-137 was detected only in 1986 due to the fallout from the Chernobyl accident. The 1986 mean concentration of Cs-137 for the control location was 0.0193 pCi/m^3. The mean concentration of Cs-137 for the indicator location was 0.0183 pCi/m^3 for 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, with the exception of the 2000 detection noted above.

Current air particulate filter composite results cannot be compared to preoperational data as none exists prior to 1977.

Historical data for air particulate results are presented in Section 7.0, Tables 7-11 and 7-12. Full page graphic presentation of air particulate composite Co-60 and Cs-137 concentrations are presented in Section 8.0.

5.2.3 AIRBORNE RADIOIODINE (I-131)

A. Results Summary

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

B. Data Evaluation and Discussion

Airborne radioiodine is monitored at the fifteen air sampling stations also used to collect air particulate samples. There are nine off-site locations, five of which are required by Technical Specifications. The off-site locations required by Technical Specifications are designated as R-1, R-2, R-3, R-4 and R-5. R-5 is a control station located beyond any local influence from the plant. Ten air sampling locations are maintained in addition to those required by Technical Specifications. Six of these stations, D-1, G, H, I, J and K, are located on-site. D-2, E, F and G are the optional stations located off-site.

Samples are collected using activated charcoal cartridges. They are analyzed weekly for I-131. No I-131 was detected in any of the 2001 samples collected. The analytical data for radioiodine are presented in Section 6.0, Table 6-7 and 6-8.

C. Dose Evaluation

The calculated dose as a result of I-131 was not evaluated due to the fact no I-131 was detected during 2001. The I-131 sampling program demonstrated no offsite dose to man from this pathway as a result of operation of the plants located at Nine Mile Point.

D. Data Trends

No radioiodine has been detected at air sampling locations required by Technical Specifications since 1987.

The prior ten years of data show no positive detection of I-131. This demonstrates that there is no measurable environmental impact or positive trend for iodine buildup due to plant operations during the period from 1991 through 2000. I-131 has been detected twice in the last fifteen year period, in 1986 and 1987. The 1986 detection was the result of the Chernobyl accident and the 1987 detection was the result of plant operations.

Iodine - 131 (I-131) has been detected in the past at control locations. During 1976, the mean measured off-site I-131 concentration was 0.60 pCi/m^3. The 1977 mean I-131 concentration decreased to 0.32 pCi/m^3 and for 1978 the mean measured concentration decreased by a factor of ten to 0.032 pCi/m^3. During 1979 - 1981 and 1983 - 1985, I-131 was not detected at the control locations. 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 on-site 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 samples collected over a five week period in 1986. 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 detections of I-131 in 1986 was the direct result of the Chernobyl Nuclear accident.

Preoperational data for I-131 in air is limited. Results from 1974 showed no positive measurement of I-131. Current data, which showed no measured concentrations of I-131 are consistent with the 1969 and 1974 preoperational data.

Historical data for I-131 are presented in Section 7.0, Tables 7-13 and 7-14. A graphic presentation of airborne radioiodine is presented in Section 8.0.

5.2.4 DIRECT RADIATION THERMOLUMINESCENT DOSIMETERS (TLD)

A. Results Summary

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

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

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

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

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

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

* Location required by TS/ODCM

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

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

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

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

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

* TLD Nos. 4, 8, 45, 111, 113

B. Data Evaluation and Discussion

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

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

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

Other on-site TLDs include special interest TLDs located near the shoreline north of the Unit 1, Unit 2 and Fitzpatrick facilities but in close proximity to radwaste facilities and the Unit 1 reactor building. These TLDs include numbers 27, 28, 29, 30, 31, 39 and 47. Results for these TLDs during 2001

were variable and ranged from 6.1 to 26.8 mrem per standard month. This variation is the result of activities at the radwaste facilities, and operating modes of the generating facilities including hydrogen injection.

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

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

The third group, **OFF-SITE SECTOR TLDs**, are required by TS/ODCM and are located four to five miles from the site in each of the land based 22.5 degree meteorological sectors. Offsite sector TLDs includes numbers 88, 89, 90, 91, 92, 93, 94 and 95. The results of this group of TLDs ranged from 3.6 to 5.4 mrem per standard month during 2001.

The fourth group, **SPECIAL INTEREST TLDs**, are those TLDs located near the site boundary and at special interest areas such as industrial sites, schools,

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

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

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

Quarter	Mean Dose (in mrem per standard month for 2001)		
	Site Boundary	Control Location*	Net Site Boundary
1	4.5	4.5	0.0
2	4.6	4.0	+0.6
3	4.4	4.4	0.0
4	4.6	4.6	0.0

* TLD Nos. 4, 8, 45, 111, 113

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

C. Dose Evaluation

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

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

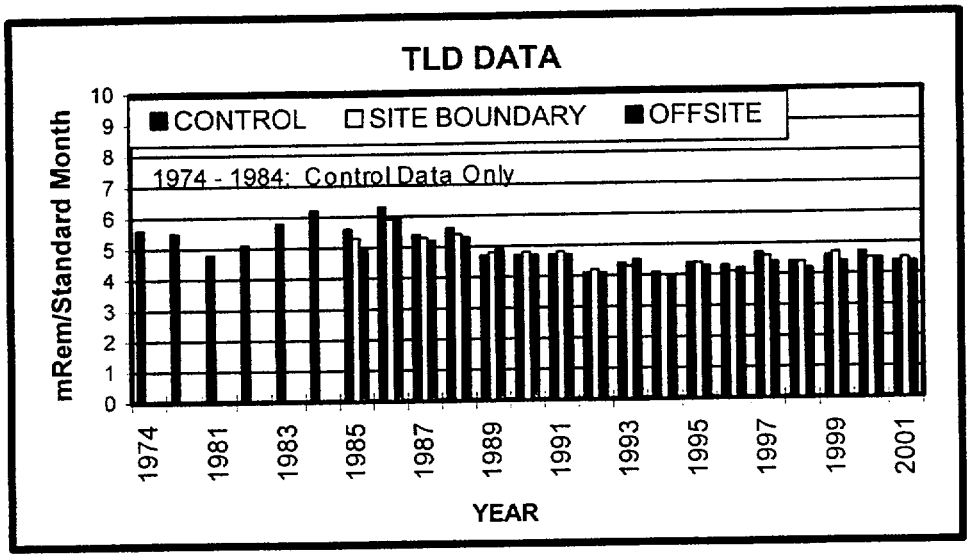
The measured mean dose rate in the proximity of the closest resident was 4.5 mrem per standard month. This value is consistent with control measurements of 4.4 mrem per standard month.

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

D. Data Trends

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

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



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

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

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

The last group of TLD locations required by the Technical Specifications is the control group. This group utilizes TLD locations positioned well beyond the site. Control results from all Control TLDs for 2001 averaged 4.4 mrem per standard month which is consistent with the previous five year mean of 4.5 mrem per standard month. These results indicate that the 2001 data is representative of the natural background dose rate.

The 2001 TLD program results, when compared to the previous five years and pre-operational data, show no significant trends relative to increased dose rates in the environment.

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

5.2.5 MILK

A. Results Summary

A total of 200 analyses were performed on the 100 milk samples collected and analyzed for the 2001 program. Each sample was analyzed for gamma emitting radionuclides using gamma spectroscopy. In addition, each sample undergoes an iodine extraction procedure to determine the presence of Iodine-131 (I-131).

Iodine-131, a possible plant related radionuclide, is measured to evaluate the land deposition-grass-cow-milk dose pathway to man. In 2001, I-131 was not detected in any of the 100 samples collected from the seven milk sampling locations.

Gamma spectral analyses of the bimonthly samples showed only naturally occurring radionuclides, such as K-40, were detected in milk samples during 2001. K-40 was detected in all indicator and control samples. K-40 is a naturally occurring radionuclide and is found in many environmental sample media.

The 2001 results demonstrate that routine operation of the FitzPatrick Plant 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. Technical Specifications require that three sample locations be within five miles of the site. Based on the milk animal census, there were no adequate milk sample locations within five miles of the site in 2001. Samples were collected from five farms located beyond the five mile requirement to ensure the continued monitoring of this important pathway. The five indicator locations ranged from 5.2 to 9.5 miles from the site. The control samples were collected from two farms in 2001. The original control location retired its milking herd at the end of August 2001. A replacement control location was established for the first collection period in August. In August of 2001, milk

sampling location No. 76 was added to the sampling program. This location was identified during the 2001 milch animal census and agreed to participate in the sampling program. The geographical location of each sampling location is listed below:

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

* Retired after 08/20/01 sample.

** Established starting with 08/06/02 sample.

Samples were collected at locations from April through December, during the first and second half of each month. Because I-131 was not detected in samples collected during November and December of 2000 additional samples were not required for January through March of 2001 as stipulated in the Technical Specifications.

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 procedure followed by spectral analysis for each sample. I-131 analytical results and sample analysis results for gamma emitters are provided in Section 6.0, Table 6-11.

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

K-40 concentration for all samples ranged from 1310 to 1920 pCi/liter. During 2001, Cs-137 was not detected in any indicator or control milk samples.

D. Dose Evaluation

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

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

E. Data Trends

Man made radionuclides are not routinely detected in milk samples. In the past fifteen years, Cs-137 was detected in 1986, 1987 and 1988. The mean Cs-137 indicator activities for those years were 8.6, 7.4 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 0.35 pCi/liter and was of undetermined origin. The previous detection was in 1986 with a mean concentration of 13.6 pCi/liter. The 1986 activity was a result of the Chernobyl accident.

The comparison of 2001 data to historical results over the operating life of the plant and preoperational data (1974) show that Cs-137 and I-131 levels have decreased significantly since 1974. The levels of Cs-137 and I-131 detected prior to the plant going into commercial operation were the result of activities not related to power production at the site.

Historical data and a graphic presentation of milk sample results for Cs-137 and I-131 are presented in Section 7.0, Tables 7-17 and 7-18 and in Section 8.0, respectively.

5.2.6 FOOD PRODUCTS (VEGETATION)

A. Results Summary

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

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

The results of the 2001 sampling program demonstrate that there is no measurable impact on the dose to the public from the garden pathway as a result of plant operations.

B. Data Analysis and Discussion

Food product samples were collected from five 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 2001 includes two varieties that are considered edible broadleaf vegetables. Collard greens were collected at two indicator locations and cabbage at a second indicator location. The general lack of edible broadleaf vegetation samples was the result of grower preference and such varieties were not available in local gardens. Where broadleaf vegetables were not available, non-edible broadleaf vegetation was collected. Non-edible broadleaf vegetation consisting of squash leaves, bean leaves, grape leaves, rhubarb leaves, zucchini leaves, beet leaves and cucumber leaves were collected for the 2001 program. The leaves of these plants were sampled as representative of broadleaf vegetation which is a measurement of radionuclide deposition. In addition to the broadleaf

vegetation, tomato samples were collected from four locations. Samples were collected during the late-summer/fall harvest season. Each sample was analyzed for gamma emitters using gamma spectroscopy.

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

Naturally occurring Be-7, K-40, Ra-226 and AcTh-228 were detected in food product samples. The concentration of Be-7 in vegetation samples ranged from 0.09 to 1.11 pCi/g (wet). The concentration of K-40 in indicator and control samples ranged from 1.64 pCi/g (wet) to 5.83 pCi/g (wet). Ra-226 and AcTh-228 were detected intermittently in the samples. The results for naturally occurring radionuclides are consistent with those of prior years. Analytical results for food products are found in Section 6.0, Table 6-12.

C. Dose Evaluation

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

D. Data Trends

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

In the previous five year period, Cs-137 was detected in 1997 and 1999 at the indicator location. Since 1976, Cs-137 has been detected in ten separate years. Historical Cs-137 mean concentrations over the last twenty years ranged from a maximum of 0.047 pCi/g (wet) in 1985 to a minimum level of 0.008 pCi/g (wet) in 1999. The trend for Cs-137 is a general reduction in concentration to a baseline concentration in the range of 0.010 to 0.013 pCi/g (wet) that is a residual from past atmospheric weapons testing.

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

5.2.7 LAND USE CENSUS RESULTS

A. Results Summary

Technical Specifications require that an annual land use census be performed to identify potential new locations for milk sampling and for calculating the dose to man from plant effluents. In 2001 a milk animal census, a nearest resident census and a garden survey were performed.

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

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

A garden census, not required by Technical Specifications, is performed to identify appropriate garden sampling locations and dose calculation receptors. Garden samples were collected from a number of locations listed in Table H-1 of the ODCM and identified in the census as active for 2001. See Table 3.3-1 for 2001 sampling locations.

B. Data Evaluation and Discussion

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

The milk animal census is an estimation of the number of cows and goats

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

The number of milk animals located within an approximate ten mile radius of the site was estimated to be 757 cows and 4 goats based on the 2001 land use census. The number of cows increased by 114 and the number of goats increased by one with respect to the 2000 census. The goats identified during the census were not milking goats.

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

The second type of census conducted is the residence census. The census is conducted in order to identify the closest residence within 5 miles in each of the 22.5 degree land based meteorological sectors. There are only eight sectors over land where residences are located within 5 miles. The water sectors include: N, NNE, NE, ENE, W, WNW, NW and NNW. The results of the residence census, showing the applicable sectors and degrees and distance of each of the nearest residence, are found in Section 6.0, Table 6-14. No changes were noted in the 2001 census for the closest resident in the land based meteorological sectors.

The nearest resident locations are illustrated on a map in Section 3.3, Figure 3.3-4.

5.3 CONCLUSION

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

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

The results of the 2001 Radiological Environmental Surveillance Program continues to clearly demonstrate that there is no significant short term or chronic long term radiological impact on the environment in the vicinity of the Nine Mile Point site. No unusual radiological characteristics were measured or observed in the local environment. The Environmental Monitoring Program continues to demonstrate that the effluents from the site to the environment contribute no significant or even measurable radiation exposures to the general public as confirmed by the sampling and analysis of environmental media from recognized environmental pathways. 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 residence 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 ubiquitous inventory of Cs-137 in the environment. The results for the 2001 sample program demonstrate that the concentrations of manmade

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

The environmental monitoring program detected one fission product radionuclide in the sample media collected during 2001. Cs-137 was detected in shoreline sediment samples. The source of the Cs-137 measured in these samples is considered to be fallout from past atmospheric nuclear weapons testing. The measured concentrations of Cs-137 in each of the samples was small and consistent with historical values. The impact of these Cs-137 concentrations are minimal in terms of dose to man. Dose from man made sources in the environment are very small when compared to doses from naturally occurring sources of radioactivity.

Radiation from naturally occurring radionuclides such as K-40 and Ra-226 contributed the vast majority of the total annual dose to members of the general public. The dose to members of the public as result of plant operations, is extremely small in comparison to the dose contribution from natural background levels and sources other than the plant. Whole body dose in Oswego County due to 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 2001 Radiological Environmental Surveillance Program, it can be concluded that the levels and variation of radioactivity in the environmental samples were consistent with background levels that would be expected for the lakeshore environment of the site.

5.4 REFERENCES

1. Radiological Effluent Technical Specifications, Appendix B to Facility Operating License No. DPR-59 For James A. FitzPatrick Nuclear Power Plant, New York Power Authority, Docket No. 50-333, Amendment 127.

2. U.S. Nuclear Regulatory Commission Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluent for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix 1", October, 1977.

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

4. National Council on Radiation Protection and Measurements (NCRP), Environmental Radiation Measurements, NCRP Report No. 50, 1976.

5. National Council on Radiation Protection and Measurements (NCRP), Natural Background Radiation in the United States, NCRP Report No. 45, 1975.

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

7. National Council on Radiation Protection and Measurements (NCRP), Radiation Exposure from Consumer Products and Miscellaneous Sources, NCRP Report No. 56, 1977.

8. U.S. Nuclear Regulatory Commission Regulatory Guide 4.8, "Environmental Technical Specifications for Nuclear Power Plants", December 1975.

9. U.S. Nuclear Regulatory Commission Branch Technical Position to Regulatory Guide 4.8, "An Acceptable Radiological Environmental Monitoring Program", November, 1979.

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

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

12. Pochin, Edward E., Estimated Population Exposure from Nuclear Power Production and Other Radiation Sources, Organization for Economic Co-operation and Development, 1976.

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

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

15. Kathren, Ronald E., RADIOACTIVITY IN THE ENVIRONMENT: SOURCES, DISTRIBUTION, AND SURVEILLANCE, First Edition, Harwood Academic Press, New York, NY, 1984.

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

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

6.0 REPORT PERIOD ANALYTICAL RESULTS TABLES

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

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

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

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

TABLE 6-1

CONCENTRATIONS OF GAMMA EMITTERS IN SHORELINE SEDIMENT SAMPLES - 2001

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

STATION CODE*	COLLECTION DATE	GAMMA EMITTERS					
		K-40	Co-60	Cs-134	Cs-137	Zn-65	OTHERS**
Sunset Beach (05)	04/25/01	18.8±0.45	<0.076	<0.061	0.071±0.01	<0.096	<LLD
	10/24/01	17.7±0.289	<0.043	<0.028	0.063±0.009	<0.070	<LLD
Lang's Beach (06, Control)	04/25/01	14.1±0.698	<0.064	<0.050	<0.055	<0.150	<LLD
	10/24/01	15.0±0.50	<0.031	<0.037	<0.036	<0.065	<LLD

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

TABLE 6-2

CONCENTRATIONS OF GAMMA EMITTERS IN FISH SAMPLES - 2001

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

DATE	TYPE	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137	OTHERS*
					FITZPATRICK					
05/16/01	Smallmouth Bass	3.78±0.21	<0.024	<0.031	<0.075	<0.028	<0.054	<0.019	<0.021	<LLD
05/16/01	Walleye	5.58±0.44	<0.061	<0.055	<0.164	<0.050	<0.129	<0.046	<0.047	<LLD
05/16/01	Lake Trout	5.51±0.34	<0.041	<0.056	<0.134	<0.038	<0.098	<0.043	<0.042	<LLD
09/06/01	Smallmouth Bass	4.56±0.35	<0.033	<0.040	<0.160	<0.030	<0.098	<0.031	<0.032	<LLD
09/06/01	Walleye	5.48±0.38	<0.047	<0.045	<0.142	<0.043	<0.108	<0.042	<0.032	<LLD
09/06/01	Salmon	4.42±0.34	<0.038	<0.039	<0.141	<0.038	<0.090	<0.029	<0.037	<LLD

*Plant Related Radionuclides

TABLE 6-2 (Continued)

CONCENTRATIONS OF GAMMA EMITTERS IN FISH SAMPLES - 2001

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

DATE	TYPE	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137	OTHERS*
					NINE MILE POINT					
06/01/01	Smallmouth Bass	4.28±0.34	<0.033	<0.040	<0.086	<0.032	<0.099	<0.037	<0.030	<LLD
06/01/01	Walleye	4.07±0.32	<0.033	<0.042	<0.093	<0.037	<0.071	<0.032	<0.030	<LLD
05/23/01	Lake Trout	3.95±0.34	<0.036	<0.038	<0.092	<0.047	<0.098	<0.042	<0.032	<LLD
09/07/01	Smallmouth Bass	4.13±0.31	<0.030	<0.038	<0.154	<0.036	<0.087	<0.032	<0.033	<LLD
09/07/01	Brown Trout	4.37±0.25	<0.028	<0.026	<0.092	<0.033	<0.068	<0.022	<0.025	<LLD
09/18/01	Salmon	3.93±0.31	<0.038	<0.038	<0.128	<0.045	<0.074	<0.030	<0.042	<LLD
09/07/01	Walleye	5.96±0.35	<0.043	<0.046	<0.154	<0.042	<0.106	<0.049	<0.042	<LLD

*Plant Related Radionuclides

TABLE 6-2 (Continued)

CONCENTRATIONS OF GAMMA EMITTERS IN FISH SAMPLES - 2001

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

DATE	TYPE	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137	OTHERS*
					OSWEGO HARBOR (CONTROL)					
05/17/01	Smallmouth Bass	4.44±0.24	<0.024	<0.027	<0.081	<0.023	<0.055	<0.021	<0.019	<LLD
05/17/01	Walleye	6.03±0.30	<0.030	<0.038	<0.109	<0.040	<0.092	<0.036	<0.031	<LLD
05/17/01	Lake Trout	4.54±0.02	<0.027	<0.033	<0.081	<0.027	<0.067	<0.028	<0.027	<LLD
09/18/01	Smallmouth Bass	4.85±0.37	<0.042	<0.037	<0.117	<0.034	<0.093	<0.041	<0.032	<LLD
09/11/01	Brown Trout	4.33±0.36	<0.028	<0.039	<0.126	<0.051	<0.101	<0.036	<0.036	<LLD
09/11/01	Salmon	4.58±0.34	<0.036	<0.038	<0.104	<0.034	<0.092	<0.034	<0.028	<LLD
09/11/01	Walleye	5.28±0.23	<0.040	<0.047	<0.136	<0.031	<0.105	<0.034	<0.038	<LLD

*Plant Related Radionuclides

TABLE 6-3

CONCENTRATIONS OF TRITIUM IN SURFACE WATER

(QUARTERLY COMPOSITE SAMPLES)

Results in Units of pCi/liter ± 1 Sigma

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

* Samples required by Technical Specifications

** Optional samples

Oswego City Water samples are composites of twice per week grab samples

TABLE 6-4

CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES - 2001

Results in Units of pCi/liter ± 1 Sigma

OSWEGO STEAM STATION* (08, CONTROL)**

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

* Samples required by Technical Specifications.

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

TABLE 6-4 (Continued)

CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES - 2001
Results in Units of pCi/liter ± 1 Sigma

FITZPATRICK* (03, INLET)**

NUCLIDE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
I-131	<8.04	<6.98	<12.4	<9.43	<12.6	<6.08
Cs-134	<1.93	<2.78	<3.19	<2.29	<2.76	<2.20
Cs-137	<2.85	<2.55	<3.21	<3.66	<3.68	<2.23
Zr-95	<5.47	<5.19	<6.49	<6.42	<7.81	<3.93
Nb-95	<3.68	<3.21	<3.67	<3.73	<5.07	<2.50
Co-58	<3.11	<2.98	<3.30	<3.00	<3.87	<2.69
Mn-54	<2.47	<2.91	<3.12	<2.86	<3.36	<2.23
Fe-59	<6.47	<5.77	<7.67	<6.82	<9.20	<5.14
Zn-65	<6.28	<5.27	<6.27	<6.16	<7.90	<4.68
Co-60	<3.25	<2.34	<2.65	<3.55	<4.44	<2.57
K-40	179±15.7	156±15.2	169±17.6	154±16.8	135±19.0	104±11.9
Ba/La-140	<7.30	<6.73	<10.1	<8.76	<9.34	<5.79

NUCLIDE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
I-131	<9.96	<7.11	<9.96	<11.9	<8.39	<8.88
Cs-134	<3.76	<2.58	<3.79	<3.69	<1.46	<2.15
Cs-137	<3.20	<2.49	<3.81	<4.05	<2.46	<1.77
Zr-95	<6.67	<5.52	<7.76	<8.21	<4.84	<4.02
Nb-95	<4.41	<3.41	<5.12	<3.90	<3.05	<2.92
Co-58	<3.96	<3.04	<4.10	<3.96	<2.52	<2.24
Mn-54	<3.28	<2.71	<4.11	<3.36	<2.37	<2.08
Fe-59	<8.52	<8.50	<10.1	<11.2	<7.97	<6.21
Zn-65	<9.19	<5.81	<7.43	<7.72	<5.50	<4.67
Co-60	<3.78	<2.94	<4.55	<4.41	<2.35	<1.90
K-40	374±22.8	185±15.6	187±22.1	195±21.9	<107±12.0	118±10.1
Ba/La-140	<7.93	<7.49	<8.78	<8.80	<7.30	<6.30

* Samples required by Technical Specifications.
** Corresponds to sample locations noted on the maps in Section 3.3.

TABLE 6-4 (Continued)

CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES - 2001

Results in Units of pCi/liter ± 1 Sigma

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

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

* Optional sample location. Samples not required by Technical Specifications.

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

TABLE 6-4 (Continued)

CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES - 2001

Results in Units of pCi/liter ± 1 Sigma

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

NUCLIDE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
I-131	<8.86	<11.6	<12.9	<14.1	<7.21	<10.0
Cs-134	<2.87	<6.05	<2.46	<4.41	<1.68	<3.88
Cs-137	<2.59	<5.32	<3.49	<4.06	<2.71	<3.58
Zr-95	<5.73	<8.47	<6.93	<8.16	<4.83	<7.91
Nb-95	<3.33	<6.44	<4.99	<4.89	<2.29	<4.67
Co-58	<3.08	<5.50	<4.02	<4.74	<2.90	<4.79
Mn-54	<2.85	<4.85	<3.44	<4.05	<2.85	<4.78
Fe-59	<6.81	<9.69	<8.08	<10.8	<5.98	<7.61
Zn-65	<5.86	<10.3	<9.42	<9.23	<3.56	<7.94
Co-60	<2.56	<4.81	<3.87	<4.04	<2.44	<3.91
K-40	154±15.5	194±28.4	319±21.9	148±20.4	75.4±11.8	148±20.7
Ba/La-140	<6.60	<8.77	<8.84	<11.9	<6.12	<12.0

NUCLIDE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
I-131	<8.60	<14.6	<12.3	<9.10	<7.99	<14.1
Cs-134	<2.29	<2.80	<2.63	<3.35	<2.72	<3.52
Cs-137	<3.37	<3.03	<4.07	<3.56	<2.71	<3.48
Zr-95	<6.99	<6.78	<6.35	<6.76	<5.23	<7.78
Nb-95	<3.65	<4.59	<5.16	<4.18	<3.47	<5.08
Co-58	<3.57	<3.85	<4.54	<3.93	<3.05	<4.84
Mn-54	<3.51	<3.41	<4.17	<3.87	<2.69	<3.80
Fe-59	<6.88	<7.90	<13.3	<9.58	<9.16	<13.0
Zn-65	<7.78	<6.90	<5.66	<9.08	<5.98	<9.13
Co-60	<3.55	<2.55	<4.12	<3.41	<2.95	<2.69
K-40	172±19.5	163±17.6	254±22.9	116±16.9	182±15.9	189±24.1
Ba/La-140	<7.29	<12.1	<9.35	<8.72	<7.18	<11.6

* Optional sample location. Samples not required by Technical Specifications.

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

TABLE 6-4 (Continued)

CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES - 2001
Results in Units of pCi/liter ± 1 Sigma

OSWEGO CITY WATER* (10)**

NUCLIDE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
I-131	<8.92	<12.2	<8.97	<14.6	<12.2	<9.45
Cs-134	<2.69	<4.15	<1.47	<2.73	<3.30	<2.08
Cs-137	<2.99	<4.17	<2.31	<3.93	<3.34	<3.02
Zr-95	<5.37	<7.65	<4.83	<8.77	<6.93	<6.58
Nb-95	<3.80	<5.80	<3.14	<6.51	<4.83	<4.21
Co-58	<2.92	<4.94	<2.38	<5.25	<3.62	<3.81
Mn-54	<2.74	<3.90	<2.34	<5.23	<3.23	<3.85
Fe-59	<7.31	<9.90	<5.30	<12.7	<9.00	<7.53
Zn-65	<7.23	<10.1	<5.73	<11.1	<7.01	<4.51
Co-60	<3.25	<5.22	<2.17	<4.03	<3.77	<3.49
K-40	216±18.0	167±25.7	269±13.8	129±23.0	92.9±15.5	294±21.0
Ba/La-140	<7.78	11.8	<5.58	<9.7	9.48	<6.91

NUCLIDE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
I-131	<9.21	<10.1	<11.2	<12.7	<6.96	<12.5
Cs-134	<3.96	<2.44	<4.41	<3.98	<1.48	<2.37
Cs-137	<3.71	<2.21	<3.93	<3.06	<2.38	<3.70
Zr-95	<6.71	<4.33	<7.62	<7.90	<4.50	<6.68
Nb-95	<4.50	<3.22	<5.18	<4.69	<2.99	<4.36
Co-58	<4.02	<2.70	<5.38	<4.12	<2.56	<3.93
Mn-54	<3.88	<2.25	<4.74	<3.53	<2.20	<3.27
Fe-59	<8.33	<6.84	<14.1	<12.0	<6.68	<9.89
Zn-65	<8.44	<4.63	<10.2	<9.42	<2.87	<4.46
Co-60	<3.50	<2.13	<5.76	<3.70	<2.34	<3.49
K-40	372±23.2	<117±11.5	<162±26.4	<206±23.8	262±13.7	289±20.6
Ba/La-140	<7.64	<8.07	<9.33	<10.4	<5.56	<8.51

* Optional sample location. Samples not required by Technical Specifications.
** Corresponds to sample locations noted on the maps in Section 3.3.

TABLE 6-5

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

* Sample locations required by Technical Specifications

TABLE 6-5(Continued)

NMP/JAF SITE

ENVIRONMENTAL AIRBORNE PARTICULATE SAMPLES - OFFSITE STATIONS

GROSS BETA ACTIVITY pCi/m^3 ± SIGMA

LOCATION

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

* Sample locations required by Technical Specifications

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

* No Sample Results

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

* No Sample Results

TABLE 6-7

NMP/JAF SITE
ENVIRONMENTAL CHARCOAL CARTRIDGE SAMPLES - OFF-SITE STATIONS
I-131 ACTIVITY pCi/m^3 ± 1 SIGMA
LOCATION

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

* Sample locations required by Technical Specifications

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

* Sample locations required by Technical Specifications

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

* No Sample Results

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

* No Sample Results

TABLE 6-9

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMP SITE AIR PARTICULATE SAMPLES - 2001

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

R1 OFF-SITE COMPOSITE*

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

* Sample Location Required by Technical Specifications

† Plant Related Radionuclides

TABLE 6-9 (Continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMP SITE AIR PARTICULATE SAMPLES - 2001

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

R2 OFF-SITE COMPOSITE*

NUCLIDE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	68.3±10.6	73.7±11.3	<37.1	137±28.7	76.3±19.0	128±21.0
Zn-65	<5.28	<7.14	<7.33	<14.2	<11.3	<12.8
Cs-134	<2.71	<2.62	<4.95	<4.59	<4.74	<4.10
Cs-137	<1.91	<2.26	<4.14	<6.50	<3.48	<4.43
Zr-95	<5.09	<5.79	<6.29	<3.85	<9.34	<5.94
Nb-95	<3.47	<3.27	<6.65	<11.1	<5.73	<5.73
Co-58	<2.35	<2.96	<5.19	<8.21	<3.67	<5.28
Mn-54	<2.81	<2.18	<4.04	<5.62	<3.05	<3.00
Co-60	<3.75	<3.55	<6.30	<3.02	<1.62	<1.40
K-40	<38.3	65.0±15.2	132±26.9	<87.5	100±27.4	<55.6
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	<45.0	85.1±21.2	96.3±17.2	99.3±18.3	60.0±12.7	68.5±12.4
Zn-65	<13.4	<10.9	<12.4	<13.0	<9.54	<7.79
Cs-134	<6.85	<6.41	<4.79	<3.00	<3.43	<4.63
Cs-137	<1.50	<3.42	<3.53	<2.98	<3.33	<4.23
Zr-95	<3.55	<7.58	<7.30	<7.42	<5.87	<7.31
Nb-95	<6.92	<6.67	<6.44	<5.01	<4.36	<5.76
Co-58	<5.98	<6.77	<5.92	<4.33	<4.18	<4.23
Mn-54	<6.62	<3.89	<2.68	<5.25	<2.61	<3.87
Co-60	<2.86	<2.19	<1.52	<4.79	<4.96	<3.25
K-40	<100	<88.3	<53.2	<51.0	<41.0	91.8±19.7
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* Sample Location Required by Technical Specifications

† Plant Related Radionuclides

TABLE 6-9 (Continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMP SITE AIR PARTICULATE SAMPLES - 2001

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

R3 OFF-SITE COMPOSITE*

NUCLIDE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	69.4±11.1	64.4±11.7	102±22.3	120±33.3	89.2±20.2	106±16
Zn-65	<9.02	<6.86	<4.06	<28.1	<13.6	<8.74
Cs-134	<3.40	<3.91	<7.22	<6.51	<4.76	<4.34
Cs-137	<1.31	<3.22	<4.31	<6.34	<4.33	<3.92
Zr-95	<5.14	<6.91	<3.06	<13.0	<7.21	<8.00
Nb-95	<3.36	<4.16	<7.79	<8.79	<5.15	<5.46
Co-58	<3.09	<3.60	<1.78	<7.61	<5.93	<3.82
Mn-54	<2.04	<2.62	<4.35	<1.93	<3.50	<1.82
Co-60	<3.54	<4.38	<7.97	<9.06	<4.74	<2.58
K-40	59.3±15.5	117±20.8	<23.6	<96.3	<50.2	107±22.1
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	135±26.2	125±22.3	108±20.9	69.3±17.6	56.4±11.8	56.2±11.5
Zn-65	<14.8	<9.46	<9.52	<2.54	<6.92	<7.06
Cs-134	<5.05	<5.76	<4.06	<3.71	<3.90	<3.17
Cs-137	<6.37	<4.55	<3.10	<3.58	<3.35	<3.06
Zr-95	<9.07	<2.64	<9.40	<6.91	<6.30	<4.94
Nb-95	<6.14	<5.33	<5.82	<7.63	<4.68	<3.88
Co-58	<8.38	<6.41	<6.28	<6.17	<4.11	<3.33
Mn-54	<6.01	<1.29	<3.92	<4.07	<0.76	<3.06
Co-60	<8.98	<5.66	<3.96	<1.46	<4.20	<1.18
K-40	<83.0	<20.2	<42.0	<14.8	<33.6	<12.0
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* Sample Location Required by Technical Specifications

† Plant Related Radionuclides

TABLE 6-9 (Continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMP SITE AIR PARTICULATE SAMPLES - 2001

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

R4 OFF-SITE COMPOSITE*

NUCLIDE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	63.0±11.5	43.2±10.7	<32.0	163±28.8	<60.7	96.9±16.0
Zn-65	<9.38	<7.16	<4.46	<19.8	<15.2	<5.70
Cs-134	<2.28	<2.33	<6.78	<6.15	<5.67	<3.26
Cs-137	<2.02	<2.75	<5.86	<5.91	<3.74	<2.74
Zr-95	<5.13	<4.98	<9.67	<14.6	<12.1	<5.67
Nb-95	<3.50	<3.80	<2.33	<9.85	<6.57	<3.09
Co-58	<3.27	<3.19	<6.35	<6.50	<7.05	<4.65
Mn-54	<3.04	<2.63	<1.66	<7.33	<6.04	<2.23
Co-60	<3.34	<0.86	<9.23	<7.97	<6.92	<1.24
K-40	<30.9	<25.1	<67.9	<23.5	<25.9	<35.7
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	103±26.0	<40.0	105±19.1	92.3±17.9	31.4±12.2	67.6±12.9
Zn-65	<11.9	<9.10	<2.57	<7.19	<5.71	<8.03
Cs-134	<8.29	<3.67	<4.09	<5.02	<3.39	<3.21
Cs-137	<5.45	<2.81	<3.62	<2.81	<2.89	<2.84
Zr-95	<9.27	<14.3	<9.10	<8.09	<8.30	<4.34
Nb-95	<7.96	<9.30	<5.50	<3.74	<4.70	<2.95
Co-58	<1.88	<4.26	<4.07	<5.26	<3.70	<2.53
Mn-54	<4.70	<4.55	<5.04	<5.00	<3.64	<3.23
Co-60	<8.67	<6.55	<4.20	<5.44	<1.26	<4.18
K-40	<25.7	<19.4	<15.0	<45.6	102±24.8	<42.5
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* Sample Location Required by Technical Specifications

† Plant Related Radionuclides

TABLE 6-9 (Continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMP SITE AIR PARTICULATE SAMPLES - 2001

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

R5 OFF-SITE COMPOSITE (CONTROL)*

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

* Sample Location Required by Technical Specifications

† Plant Related Radionuclides

TABLE 6-9 (Continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMP SITE AIR PARTICULATE SAMPLES - 2001

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

D2 OFF-SITE COMPOSITE*

NUCLIDE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	58.0±11.0	76.8±10.7	92.9±19.5	100±30.7	<66.4	73.8±14.7
Zn-65	<7.16	<4.21	<10.3	<19.1	<19.1	<5.86
Cs-134	<2.21	<2.56	<4.18	<4.77	<6.00	<3.07
Cs-137	<2.40	<1.63	<3.19	<5.23	<6.59	<2.97
Zr-95	<3.32	<4.18	<2.86	<15.2	<17.6	<4.64
Nb-95	<2.93	<2.15	<8.47	<11.5	<10.8	<4.05
Co-58	<2.50	<2.66	<4.80	<7.66	<7.68	<2.70
Mn-54	<2.15	<2.52	<7.35	<1.94	<5.05	<3.82
Co-60	<2.00	<3.29	<5.90	<8.35	<9.20	<4.24
K-40	<26.8	<41.1	<62.9	<85.4	<83.3	<35.7
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	53.7±21.4	73.5±22.0	56.6±18.0	67.0±16.8	107±17.7	65.1±12.6
Zn-65	<4.74	<3.67	<14.7	<12.0	<5.88	<8.35
Cs-134	<8.25	<5.56	<6.23	<4.42	<3.79	<3.85
Cs-137	<3.93	<4.12	<4.19	<0.90	<1.91	<3.92
Zr-95	<12.5	<10.3	<8.23	<7.93	<7.13	<7.36
Nb-95	<8.47	<5.71	<5.56	<4.64	<5.56	<5.32
Co-58	<5.77	<6.11	<4.26	<3.35	<3.72	<4.54
Mn-54	<5.02	<4.42	<4.05	<2.92	<0.82	<2.40
Co-60	<7.20	<5.96	<3.63	<1.65	<4.25	<0.97
K-40	<125.0	<55.6	<53.9	<16.8	<35.5	110±21.9
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* Optional sample location. Samples not required by Technical Specifications.

† Plant Related Radionuclides

TABLE 6-9 (Continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMP SITE AIR PARTICULATE SAMPLES - 2001

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

E OFF-SITE COMPOSITE*

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

* Optional sample location. Samples not required by Technical Specifications.

† Plant Related Radionuclides

TABLE 6-9 (Continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMP SITE AIR PARTICULATE SAMPLES - 2001

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

F OFF-SITE COMPOSITE*

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

* Optional sample location. Samples not required by Technical Specifications.

† Plant Related Radionuclides

TABLE 6-9 (Continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMP SITE AIR PARTICULATE SAMPLES - 2001

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

G OFF-SITE COMPOSITE*

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

* Optional sample location. Samples not required by Technical Specifications.

† Plant Related Radionuclides

TABLE 6-9 (Continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMP SITE AIR PARTICULATE SAMPLES - 2001

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

D1 ON-SITE COMPOSITE*

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

* Optional sample location. Samples not required by Technical Specifications.

† Plant Related Radionuclides

TABLE 6-9 (Continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMP SITE AIR PARTICULATE SAMPLES - 2001

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

G ON-SITE COMPOSITE*

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

* Optional sample location. Samples not required by Technical Specifications.

† Plant Related Radionuclides

TABLE 6-9 (Continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMP SITE AIR PARTICULATE SAMPLES - 2001

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

H ON-SITE COMPOSITE*

NUCLIDE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Be-7	50.4±12.5	75.2±12.6	55.0±15.3	109±32.8	<64.5	86.0±16.1
Zn-65	<7.11	<5.54	<9.79	<5.38	<13.7	<10.2
Cs-134	<3.41	<4.57	<2.14	<6.31	<6.97	<3.27
Cs-137	<2.37	<2.96	<2.07	<1.67	<6.77	<0.71
Zr-95	<3.41	<5.71	<6.85	<11.4	<11.7	<4.92
Nb-95	<4.44	<4.43	<5.59	<7.82	<10.5	<3.38
Co-58	<2.88	<3.81	<3.13	<6.00	<6.83	<3.64
Mn-54	<2.71	<3.78	<3.35	<2.00	<8.87	<3.12
Co-60	<0.92	<3.73	<3.82	<3.10	<7.95	<3.58
K-40	<9.39	102±18.8	<51.6	<82.4	<108	<38.1
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
NUCLIDE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Be-7	<48.7	137±25.2	122±19.0	68.9±15.2	85.2±13.5	30.9±15.6
Zn-65	<22.8	<10.1	<11.4	<7.37	<7.48	8.75
Cs-134	<6.04	<5.96	<4.90	<3.99	<2.85	3.71
Cs-137	<5.04	<5.36	<3.54	<3.04	<2.96	2.58
Zr-95	<10.0	<8.54	<8.87	<7.59	<6.03	8.59
Nb-95	<10.1	<1.66	<7.08	<6.73	<2.77	4.51
Co-58	<7.44	<5.72	<1.17	<4.43	<3.52	3.29
Mn-54	<7.48	<3.73	<4.48	<4.29	<2.65	3.27
Co-60	<2.71	<4.65	<4.07	<5.65	<3.12	3.56
K-40	<78.3	108±27.9	<15.9	<52.1	<33.1	46.0
Others†	<LLD	<LLD	<LLD	<LLD	LLD	LLD

* Optional sample location. Samples not required by Technical Specifications.

† Plant Related Radionuclides

TABLE 6-9 (Continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMP SITE AIR PARTICULATE SAMPLES - 2001

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

I ON-SITE COMPOSITE*

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

* Optional sample location. Samples not required by Technical Specifications.

† Plant Related Radionuclides

TABLE 6-9 (Continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMP SITE AIR PARTICULATE SAMPLES - 2001

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

J ON-SITE COMPOSITE*

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

* Optional sample location. Samples not required by Technical Specifications.

† Plant Related Radionuclides

TABLE 6-9 (Continued)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES OF JAF/NMP SITE AIR PARTICULATE SAMPLES - 2001

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

K ON-SITE COMPOSITE*

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

* Optional sample location. Samples not required by Technical Specifications.

† Plant Related Radionuclides

TABLE 6-10

DIRECT RADIATION MEASUREMENT RESULTS (2001)

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

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

TABLE 6-10 (Continued)

DIRECT RADIATION MEASUREMENT RESULTS (2001)

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

STATION NUMBER	LOCATION	FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER	LOCATION (DISTANCE AND DIRECTION)**
31	N. Fence, (NW) NMP-1	8.7±0.4	6.3±0.4	6.7±0.2	7.1±1.0	0.2 miles @ 276°
39	N. Fence, Rad. Waste-NMP-1	10.7±0.5	8.4±0.3	7.7±1.4	8.4±0.7	0.2 miles @ 292°
47	N. Fence, (NE) JAF	6.8±0.4	6.1±0.4	6.5±0.2	8.0±1.3	0.6 miles @ 69°
49*	Phoenix, NY-Control	4.0±0.3	4.1±0.3	4.2±0.2	4.7±0.3	19.8 miles @ 170°
51	Liberty & Bronson Sts., E of OSS	4.7±0.2	4.0±0.2	4.1±0.2	4.9±0.9	7.4 miles @ 233°
52	E. 12th & Cayuga Sts., Oswego School	4.6±0.3	3.9±0.2	4.4±0.0	4.5±0.4	5.8 miles @ 227°
53	Broadwell & Chestnut Sts.-Fulton H.S.	4.1±0.2	***	4.5±0.1	4.6±0.6	13.7 miles @ 183°
54	Liberty St. & Co. Rt. 16-Mexico H.S.	4.1±0.1	4.0±0.2	4.3±0.2	4.5±0.4	9.3 miles @ 115°
55	Gas Substation Co. Rt. 5-Pulaski	4.1±0.3	3.9±0.3	4.4±0.4	4.5±0.4	13.0 miles @ 75°
56*	Rt. 104-New Haven SCH. (SE Corner)	4.1±0.2	4.2±0.2	4.8±0.2	5.0±0.4	5.3 miles @ 123°
58*	Co. Rt. 1A-Alcan (E. of E. Entrance Rd.)	4.5±0.3	4.2±0.1	4.2±0.2	4.9±0.1	3.1 miles @ 220°
75*	Unit 2, N. Fence, N. of Reactor Bldg.	7.6±0.4	7.3±0.7	7.0±0.3	7.3±0.8	0.1 miles @ 5°
76*	Unit 2, N. Fence, N. of Change House	6.3±0.3	5.6±0.7	5.6±0.3	6.1±1.4	0.1 miles @ 25°
77*	Unit 2, N. Fence, N. of Pipe Bldg.	6.6±0.3	7.0±0.2	6.4±0.2	7.8±0.4	0.2 miles @ 45°
78*	JAF, E. of E. Old Lay Down Area	4.6±0.2	5.1±0.2	4.8±0.3	4.9±0.3	1.0 miles @ 90°
79*	Co. Rt. 29, Pole #63, 0.2 mi. S. of Lake Rd.	4.2±0.1	3.6±0.1	4.3±0.4	4.3±0.6	1.1 miles @ 115°
80*	Co Rt. 29, Pole #54, 0.7 mi. S. of Lake Rd.	4.2±0.1	4.8±0.3	4.3±0.1	4.8±0.8	1.4 miles @ 133°
81*	Miner Rd., Pole #16, 0.5 mi. W. of Rt. 29	4.5±0.2	4.6±0.5	4.6±0.3	4.9±0.3	1.6 miles @ 159°
82*	Miner Rd., Pole #1-1/2, 1.1 mi. W. of Rt. 29	4.4±0.2	4.9±0.4	3.9±0.1	3.9±0.1	1.6 miles @ 181°
83*	Lakeview Rd., Tree 0.45 mi. N. of Miner Rd.	4.7±0.2	4.6±0.4	4.2±0.2	4.7±0.3	1.2 miles @ 200°
84*	Lakeview Rd., N., Pole #6117, 200 ft. N. of Lake Rd.	4.6±0.3	5.3±0.2	4.3±0.3	4.9±0.2	1.1 miles @ 225°

TABLE 6-10 (Continued)

DIRECT RADIATION MEASUREMENT RESULTS (2001)
Results in Units of mrem/std. Month ± 1 Sigma

STATION NUMBER	LOCATION	FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER	LOCATION (DISTANCE AND DIRECTION)**
85*	Unit 1, N. Fence, N. of W. Side of Screen House	9.9±0.5	10.3±1.0	8.4±0.2	10.3±0.4	0.2 miles @ 294°
86*	Unit 2, N. Fence, N. of W. Side of Screen House	8.4±0.2	7.4±0.9	7.0±0.2	8.5±0.3	0.1 miles @ 315°
87*	Unit 2, N. Fence, N. of E. Side of Screen House	8.7±0.4	8.2±0.5	7.1±0.3	7.4±1.1	0.1 miles @ 341°
88*	Hickory Grove Rd., Pole #2, 0.6 mi. N. of Rt. 1	4.3±0.1	3.9±0.2	4.2±0.2	4.5±0.4	4.8 miles @ 97°
89*	Leavitt Rd., Pole #16, 0.4 mi. S. of Rt. 1	4.4±0.2	5.0±0.5	4.7±0.3	5.4±0.2	4.1 miles @ 111°
90*	Rt. 104, Pole #300, 150 ft. E. of Keefe Rd.	4.3±0.2	4.9±0.4	4.1±0.3	4.5±0.4	4.2 miles @ 135°
91*	Rt. 51A, Pole #59, 0.8 mi. W. of Rt. 51	4.1±0.2	4.0±0.8	4.2±0.2	4.2±0.4	4.8 miles @ 156°
92*	Maiden Lane Rd., Power Pole, 0.6 mi. S. of Rt. 104	4.3±0.2	5.0±0.4	5.0±0.2	5.4±0.3	4.4 miles @ 183°
93*	Rt. 53 Pole 1-1, 120 ft. S. of Rt. 104	4.7±0.3	4.4±0.4	4.4±0.2	4.3±0.5	4.4 miles @ 205°
94*	Rt. 1, Pole #82, 250 ft. E. of Kocher Rd. (Co. Rt. #63)	4.4±0.1	3.8±0.7	4.2±0.1	4.2±0.1	4.7 miles @ 223°
95*	Lakeshore Campsite, from Alcan W. Access Rd., Ple #21, 1.2 mi. N. of Rt. 1	4.4±0.4	3.6±0.1	3.6±0.1	3.7±0.1	4.1 miles @ 237°
96*	Creamery Rd., 0.3 mi. S. of Middle Rd., Pole 1-1/2	4.6±0.2	4.3±0.5	4.3±0.1	4.1±0.1	3.6 miles @ 199°
97*	Rt. 29, Pole #50, 200 ft. N. of Miner Rd.	4.1±0.3	4.2±0.7	4.2±0.1	4.0±0.2	1.8 miles @ 143°
98*	Lake Rd., Pole #145, 0.15 mi. E. of Rt. 29	4.1±0.2	4.5±0.6	4.2±0.3	4.1±0.2	1.2 miles @ 101°
99	NMP Rd., 0.4 mi. N. of Lake Rd., Env. Station R1 Off-site	4.3±0.1	4.8±1.1	4.6±0.4	4.5±0.1	1.8 miles @ 88°

TABLE 6-10 (Continued)

DIRECT RADIATION MEASUREMENT RESULTS (2001)

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

STATION NUMBER	LOCATION	FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER	LOCATION (DISTANCE AND DIRECTION)**
100	Rt. 29 & Lake Rd., Env. Station R2 Off-site	4.6±0.2	3.8±0.6	4.1±0.2	4.2±0.2	1.1 miles @ 104°
101	Rt. 29, 0.7 mi. S. of Lake Rd., Env. Station R3 Off-site	4.0±0.1	3.3±0.2	4.1±0.3	4.0±0.1	1.5 miles @ 132°
102	EOF/Env. Lab, Oswego Co. Airport (Fulton Airport, Rt. 176) E. Driveway, Lamp Post	4.0±0.4	4.2±0.6	4.4±0.2	4.3±0.3	11.9 miles @ 175°
103	EIC, East Garage Rd., Lamp Post, R3 Off-site	5.0±0.1	4.9±0.2	4.5±0.3	4.5±0.2	0.4 miles @ 267°
104	Parkhurst Road, Pole #148-1/2A, 0.1 mi. S. of Lake Rd.	4.2±0.2	3.8±0.4	4.1±0.2	4.1±0.2	1.4 miles @ 102°
105	Lakeview Rd. Pole #6125, 0.6 mi. S. of Lake Rd.	4.3±0.2	4.0±0.6	4.2±0.3	4.1±0.2	1.4 miles @ 198°
106	Shoreline Cove, W. of NMP-1, Tree on W. Edge	5.3±0.3	5.0±0.4	5.2±0.2	5.3±0.2	0.3 miles @ 274°
107	Shoreline Cove, W of NMP-1	5.2±0.3	4.7±0.5	5.3±0.4	5.0±0.1	0.3 miles @ 272°
108	Lake Rd., Pole #142, 300 ft. E. of Rt. 29 S.	4.4±0.1	4.9±0.4	4.3±0.1	4.1±0.1	1.1 miles @ 104°
109	Tree North of Lake Rd., 300 ft. E. of Rt. 29 N.	4.5±0.2	4.9±0.6	4.4±0.2	4.4±0.1	1.1 miles @ 103°
111	Sterling, NY	4.0±0.3	4.4±0.3	3.8±0.1	4.0±0.1	26.4 miles @ 166°
112	EOF/Env. Lab, Oswego Co. Airport	4.5±0.2	3.9±0.4	4.2±0.2	4.2±0.2	11.9 miles @ 175°
113	Control, Baldwinsville, NY	4.3±0.2	3.6±0.2	4.3±0.2	4.1±0.1	21.8 miles @ 214°

* Technical Specification Location

** Direction and distance based on NMP-2 Reactor centerline and sixteen 22.5 degree sector grid.

*** TLD lost in field.

Table 6-11

CONCENTRATIONS OF IODINE-131 AND GAMMA EMITTERS IN MILK

Results in Units of pCi/liter ± 1 Sigma

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

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

* Optional sample location. Samples <u>not</u> required by Technical Specifications.

† Plant Related Radionuclides

Table 6-11 (Continued)

CONCENTRATIONS OF IODINE-131 AND GAMMA EMITTERS IN MILK

Results in Units of pCi/liter ± 1 Sigma

SAMPLE LOCATION No. 55*						
COLLECTION DATE	I-131	K-40	Cs-134	Cs-137	Ba/La-40	OTHERS †
04/09/01	< 0.34	1480±64	< 4.72	< 4.16	< 5.02	<LLD
04/23/01	< 0.31	1490±66	< 5.73	< 4.98	< 6.21	<LLD
05/07/01	< 0.86	1530±97	< 7.70	< 7.47	< 9.39	<LLD
05/21/01	< 0.64	1510±83	< 7.29	< 6.49	< 5.99	<LLD
06/04/01	< 0.58	1710±74	< 3.96	< 5.45	< 7.30	<LLD
06/18/01	< 0.44	1700±64	< 3.24	< 5.32	< 5.19	<LLD
07/09/01	< 0.68	1590±74	< 5.64	< 5.39	< 8.86	<LLD
07/23/01	< 0.68	1770±107	< 11.1	< 9.85	< 10.9	<LLD
08/06/01	< 0.54	1750±74	< 7.42	< 6.42	< 8.54	<LLD
08/20/01	< 0.59	1600±74	< 5.64	< 4.59	< 5.73	<LLD
09/10/01	< 0.45	1510±73	< 6.23	< 5.49	< 6.62	<LLD
09/24/01	< 0.57	1580±60	< 3.22	< 5.06	< 4.70	<LLD
10/09/01	< 0.37	1310±74	< 5.16	< 6.71	< 7.75	<LLD
10/22/01	< 0.55	1590±61	< 3.61	< 5.39	< 6.02	<LLD
11/05/01	< 0.56	1460±79	< 7.55	< 6.25	< 4.70	<LLD
11/19/01	< 0.47	1470±73	< 3.51	< 6.33	< 5.84	<LLD
12/03/01	< 0.38	1730±87	< 7.40	< 6.42	< 8.83	<LLD
12/17/01	< 0.40	1520±81	< 7.31	< 7.65	< 10.1	<LLD

SAMPLE LOCATION No. 60*						
COLLECTION DATE	I-131	K-40	Cs-134	Cs-137	Ba/La-40	OTHERS †
04/09/01	< 0.49	1740±74	< 4.12	< 6.77	< 5.23	<LLD
04/23/01	< 0.50	1780±53	< 2.61	< 4.48	< 3.43	<LLD
05/07/01	< 0.81	1610±93	< 6.48	< 7.09	< 7.13	<LLD
05/21/01	< 0.57	1540±80	< 6.14	< 5.47	< 6.05	<LLD
06/04/01	< 0.50	1870±76	< 7.04	< 6.54	< 7.53	<LLD
06/18/01	< 0.71	1740±89	< 9.21	< 8.15	< 8.20	<LLD
07/08/01	< 0.57	1610±70	< 6.89	< 7.27	< 9.15	<LLD
07/22/01	< 0.56	1730±101	< 6.40	< 5.59	< 5.68	<LLD
08/05/01	< 0.77	1440±71	< 5.85	< 4.95	< 7.87	<LLD
08/19/01	< 0.68	1490±80	< 5.80	< 7.21	< 7.61	<LLD
09/10/01	< 0.48	1760±88	< 6.83	< 6.79	< 8.26	<LLD
09/24/01	< 0.79	1500±79	< 6.34	< 6.71	< 7.27	<LLD
10/08/01	< 0.41	1400±70	< 6.13	< 5.76	< 6.52	<LLD
10/22/01	< 0.63	1470±79	< 6.65	< 7.15	< 8.03	<LLD
11/05/01	< 0.49	1550±78	< 4.79	< 6.02	< 8.81	<LLD
11/19/01	< 0.40	1490±76	< 4.79	< 5.77	< 6.90	<LLD
12/03/01	< 0.42	1640±61	< 3.14	< 5.12	< 5.99	<LLD
12/17/01	< 0.51	1550±83	< 7.86	< 6.57	< 5.45	<LLD

* Optional sample location. Samples <u>not</u> required by Technical Specifications.

† Plant Related Radionuclides

Table 6-11 (Continued)

CONCENTRATIONS OF IODINE-131 AND GAMMA EMITTERS IN MILK

Results in Units of pCi/liter ± 1 Sigma

SAMPLE LOCATION No. 76 (Control)**						
COLLECTION DATE	I-131	K-40	Cs-134	Cs-137	Ba/La-40	OTHERS †
04/09/01 04/23/01	Sample location not established prior to 09/10/01 (1)					
05/07/01 05/21/01						
06/04/01 06/18/01						
07/09/01 07/23/01						
08/06/01 08/20/01						
09/10/01	< 0.53	1560±74	< 5.19	< 5.39	< 6.13	<LLD
09/24/01	< 0.65	1540±73	< 6.72	< 5.24	< 7.88	<LLD
10/09/01	< 0.44	1380±70	< 3.45	< 6.59	< 7.81	<LLD
10/22/01	< 0.43	1530±80	< 6.04	< 6.02	< 8.43	<LLD
11/05/01	< 0.51	1440±72	< 3.40	< 5.66	< 6.12	<LLD
11/19/01	< 0.47	1550±74	< 6.28	< 5.76	< 6.18	<LLD
12/03/01	< 0.51	1600±78	< 3.81	< 4.94	< 5.82	<LLD
12/17/01	< 0.35	1580±60	< 3.24	< 5.17	< 6.33	<LLD

SAMPLE LOCATION No. 73 (Control)**						
COLLECTION DATE	I-131	K-40	Cs-134	Cs-137	Ba/La-40	OTHERS †
04/09/01	< 0.32	1410±59	< 4.07	< 4.66	< 3.63	<LLD
04/23/01	< 0.35	1510±65	< 4.78	< 5.10	< 5.01	<LLD
05/07/01	< 0.85	1440±80	< 6.02	< 5.77	< 7.80	<LLD
05/21/01	< 0.74	1750±64	< 5.48	< 4.78	< 4.76	<LLD
06/04/01	< 0.69	1480±94	< 7.30	< 7.97	< 6.76	<LLD
06/18/01	< 0.52	1440±72	< 5.19	< 5.88	< 6.12	<LLD
07/09/01	< 0.64	1720±64	< 5.32	< 5.01	< 4.51	<LLD
07/23/01	< 0.49	1600±88	< 6.40	< 5.82	< 8.16	<LLD
08/06/01	< 0.59	1680±83	< 7.59	< 5.74	< 8.43	<LLD
08/20/01	< 0.46	1550±82	< 6.34	< 7.21	< 7.84	<LLD
09/10/01 09/24/01	Sample location discontinued following 08/20/01. (2)					
10/09/01 10/22/01						
11/05/01 11/19/01						
12/03/01 12/17/01						

** Control location required by Technical Specifications.

† Plant Related Radionuclides

(1) New sampling location. Sampling began 09/10/01.

(2) Herd sold at this Control location after 08/20/01.

Table 6-11 (Continued)

CONCENTRATIONS OF IODINE-131 AND GAMMA EMITTERS IN MILK

Results in Units of pCi/liter ± 1 Sigma

SAMPLE LOCATION No. 77 (Control)**						
COLLECTION DATE	I-131	K-40	Cs-134	Cs-137	Ba/La-40	OTHERS†
04/09/01 04/23/01	Sample Location not established prior to 8/6/01(3)					
05/07/01 05/21/01						
06/04/01 06/18/01						
07/09/01 07/23/01						
08/06/01	< 0.48	1650±86	< 7.18	< 6.64	< 7.40	<LLD
08/20/01	< 0.59	1790±65	< 3.73	< 5.82	< 3.83	<LLD
09/10/01	< 0.51	1620±82	< 6.04	< 6.93	< 7.08	<LLD
09/24/01	< 0.46	1610±61	< 3.22	< 5.50	< 6.37	<LLD
10/09/01	< 0.48	1570±84	< 7.83	< 7.26	< 5.14	<LLD
10/22/01	< 0.52	1610±61	< 3.29	< 5.06	< 6.36	<LLD
11/05/01	< 0.47	1660±62	< 5.63	< 5.23	< 6.17	<LLD
11/19/01	< 0.38	1860±88	< 7.40	< 6.64	< 11.1	<LLD
12/03/01	< 0.46	1530±72	< 6.36	< 5.66	< 7.60	<LLD
12/17/01	< 0.44	1760±90	< 7.62	< 6.85	< 9.31	<LLD

** Control location required by Technical Specifications.

† Plant Related Radionuclides

(3) New sampling location. Sampling began 08/06/01.

TABLE 6-12

CONCENTRATIONS OF GAMMA EMITTERS IN VARIOUS FOOD PRODUCTS

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

COLLECTION SITE	SAMPLE DATE	DESCRIPTION	Be-7	K-40	I-131	Cs-134	Cs-137	Zn-65
Whaley (Q)	9/24/01	Squash Leaves	0.845±0.085	4.64±0.231	<0.022	<0.020	<0.019	<0.050
		Cabbage	0.090±0.047	3.85±0.174	<0.016	<0.018	<0.014	<0.042
Hall (X)	9/24/01	Squash Leaves	1.110±0.060	1.91±0.113	<0.011	<0.009	<0.010	<0.028
		Tomatoes	<0.049	2.08±0.086	<0.008	<0.007	<0.006	<0.019
		Rhubarb Leaves	0.313±0.035	3.44±0.137	<0.011	<0.010	<0.011	<0.026
Lee* (V)	9/24/01	Squash Leaves	0.318±0.058	2.19±0.150	<0.017	<0.018	<0.013	<0.035
Battles* (S)	9/24/01	Tomatoes	<0.070	1.64±0.096	<0.009	<0.010	<0.009	<0.020
Vitullo* (P)	9/24/01	Tomatoes	<0.074	1.69±0.095	<0.011	<0.008	<0.009	<0.021
		Collards	0.273±0.066	3.30±0.223	<0.023	<0.025	<0.023	<0.054
Culeton* (K)	9/24/01	Squash Leaves	0.898±0.672	3.34±0.177	<0.016	<0.017	<0.013	<0.042
		Collards	0.199±0.048	4.23±0.207	<0.016	<0.012	<0.017	<0.045
		Grape Leaves	0.789±0.071	2.26±0.165	<0.018	<0.022	<0.018	<0.046
		Tomatoes	<0.068	2.30±0.105	<0.009	<0.010	<0.008	<0.023
Barton (L)	9/24/01	Zucchini Leaves	0.497±0.058	3.75±0.196	<0.016	<0.012	<0.016	<0.042
		Beet Leaves	0.149±0.044	5.83±0.228	<0.016	<0.017	<0.013	<0.043
Flack* (M) (Control)	9/25/01	Cucumber Leaves	0.583±0.049	2.41±0.113	<0.014	<0.009	<0.012	<0.029
		Grape Leaves	0.710±0.643	2.35±0.154	<0.017	<0.017	<0.017	<0.038
		Squash Leaves	0.249±0.041	2.75±0.152	<0.014	<0.015	<0.012	<0.034
		Rhubarb Leaves	<0.090	3.66±0.133	<0.012	<0.008	<0.012	<0.031
		Bean Leaves	0.419±0.044	3.42±0.153	<0.011	<0.016	<0.012	<0.036

Note: Other Plant Related Radionuclides <LLD

* Samples required by Technical Specification

TABLE 6-13

MILK ANIMAL CENSUS 2001

TOWN OR AREA[a]	NUMBER ON CENSUS MAP	DEGREES[1]	DISTANCE[1] (miles)	NUMBER OF MILK ANIMALS
Scriba	62	183°	6.7	2G[2]
New Haven	75	146°	7.5	2G[2]
	9	95°	5.2	48C
	4*	113°	7.8	85C
	76*	132°	5.3	58C
	64	107°	7.9	47C
Mexico	14	120°	9.8	56C
	19	132°	10.5	38C
	60*	90°	9.5	30C
	50*	93°	9.1	100C
	55*	95°	9.0	56C
	21	112°	10.5	80C
	72	98°	9.9	37C
Sterling (Control)[3]	73**	234°	13.9	50C
Richland	22	85°	10.2	2C
Granby (Control)[4]	77**	192°	13.9	70C

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

NOTES:

C = Cows
G = Goats
* = Milk sample location
** = Milk sample control location

(1) = Degrees and distance are based on NMP-2 Reactor Building Centerline.
(2) = Goats are not currently producing milk or any milk product for human consumption.
(3) = Control milk location until August 2001, owner sold milking herd.
(4) = Replacement control location beginning September 2001.
(a) = Census performed out to a distance of approximately 10 miles

TABLE 6-14

2001 RESIDENCE CENSUS

LOCATION	MAP DESIGNATION[b]	METEROLOGICAL SECTOR	DEGREES[a]	DISTANCE[a]
*		N	-	-
*		NNE	-	-
*		NE	-	-
*		ENE	-	-
Sunset Bay	A	E	82°	0.9 miles
Lake Road	B	ESE	119°	0.7 miles
Parkhurst Road	C	SE	127°	1.2 miles
County Route 29	D	SSE	149°	1.2 miles
Miner Road	E	S	173°	1.6 miles
Lakeview Road	F	SSW	210°	1.7 miles
Lakeview Road	G	SW	233°	1.5 miles
Bible Camp Retreat	H	WSW	249°	1.3 miles
*		W	-	-
*		WNW	-	-
*		NW	-	-
*		NNW	-	-

* This meteorological sector is over Lake Ontario. There are no residences within five miles.
(a) Based on J.A. FitzPatrick Nuclear Power Plant Reactor Centerline.
(b) Corresponds to Figure 3.3-4.

7.0 HISTORICAL DATA TABLES

Sample Statistics from Previous Environmental Sampling

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

Special Considerations:

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

2. Sample data listed as 1974 and 1978 through 1997 was taken from the respective environmental operating reports for Nine Mile Point Nuclear Station and James A. FitzPatrick Nuclear Power Plant.

3. Only measured values were used for statistical calculations.

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

TABLE 7-1

HISTORICAL ENVIRONMENTAL SAMPLE DATA

SHORELINE SEDIMENT

Results in pCi/g (dry)

LOCATION: CONTROL *									
Isotope	Cs-134			Cs-137			Co-60		
Year	Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.	Mean
1969†	**	**	**	**	**	**	**	**	**
1974†	**	**	**	**	**	**	**	**	**
1975†	**	**	**	**	**	**	**	**	**
1982	**	**	**	**	**	**	**	**	**
1983	**	**	**	**	**	**	**	**	**
1984	**	**	**	**	**	**	**	**	**
1985	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1986	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1987	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD	0.027	0.027	0.027	<LLD	<LLD	<LLD
1994	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1998	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

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

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

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

TABLE 7-2

HISTORICAL ENVIRONMENTAL SAMPLE DATA

SHORELINE SEDIMENT

Results in pCi/g (dry)

LOCATION: INDICATOR *									
Isotope	Cs-134			Cs-137			Co-60		
Year	Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.	Mean
1969†	**	**	**	**	**	**	**	**	**
1974†	**	**	**	**	**	**	**	**	**
1975†	**	**	**	**	**	**	**	**	**
1982	**	**	**	**	**	**	**	**	**
1983	**	**	**	**	**	**	**	**	**
1984	**	**	**	**	**	**	**	**	**
1985	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1986	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1987	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD	0.25	0.32	0.29	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD	0.28	0.30	0.29	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD	0.12	0.14	0.13	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD	0.12	0.14	0.13	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD	0.18	0.46	0.32	<LLD	<LLD	<LLD
1994	<LLD	<LLD	<LLD	0.06	0.37	0.22	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD	0.14	0.15	0.15	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD	0.15	0.17	0.16	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD	0.11	0.17	0.14	<LLD	<LLD	<LLD
1998	<LLD	<LLD	<LLD	0.06	0.06	0.06	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD	0.06	0.10	0.08	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD	0.06	0.07	0.06	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD	0.06	0.07	0.07	<LLD	<LLD	<LLD

* Sunset Beach - closest off-site location with recreational value.

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

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

TABLE 7-3

HISTORICAL ENVIRONMENTAL SAMPLE DATA

FISH

Results in pCi/g (wet)

LOCATION: CONTROL *			
Isotope	Cs-137		
Year	Min.	Max.	Mean
1969†	No Data	No Data	No Data
1974†	0.94	0.94	0.94
1975†	<MDL	<MDL	<MDL
1976	1.2	1.2	1.2
1982	0.027	0.055	0.047
1983	0.040	0.060	0.050
1984	0.015	0.038	0.032
1985	0.026	0.047	0.034
1986	0.021	0.032	0.025
1987	0.017	0.040	0.031
1988	0.023	0.053	0.034
1989	0.028	0.043	0.034
1990	0.033	0.079	0.045
1991	0.021	0.034	0.029
1992	0.019	0.026	0.022
1993	0.030	0.036	0.033
1994	0.014	0.031	0.022
1995	0.017	0.023	0.019
1996	0.018	0.022	0.020
1997	0.012	0.030	0.021
1998	0.013	0.013	0.013
1999	<LLD	<LLD	<LLD
2000	0.021	0.021	0.021
2001	<LLD	<LLD	<LLD

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

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

TABLE 7-4

HISTORICAL ENVIRONMENTAL SAMPLE DATA

FISH

Results in pCi/g (wet)

LOCATION: INDICATOR * (NMP/JAF)			
Isotope	Cs-137		
Year	Min.	Max.	Mean
1969†	0.01	0.13	0.06
1974†	0.08	4.40	0.57
1975†	1.10	1.70	1.38
1976	0.50	3.90	1.4
1982	0.034	0.064	0.050
1983	0.030	0.060	0.050
1984	0.033	0.061	0.043
1985	0.018	0.045	0.030
1986	0.009	0.051	0.028
1987	0.024	0.063	0.033
1988	0.022	0.054	0.032
1989	0.020	0.044	0.034
1990	0.027	0.093	0.040
1991	0.018	0.045	0.029
1992	0.014	0.030	0.024
1993	0.018	0.035	0.028
1994	0.015	0.023	0.019
1995	0.016	0.022	0.019
1996	0.016	0.025	0.020
1997	0.014	0.023	0.018
1998	0.021	0.021	0.021
1999	0.018	0.021	0.020
2000	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD

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

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

TABLE 7-5

HISTORICAL ENVIRONMENTAL SAMPLE DATA

SURFACE WATER

Results in pCi/liter

LOCATION: CONTROL †						
Isotope	Cs-137			Co-60		
Year	Min.	Max.	Mean	Min.	Max.	Mean
1969††	*	*	*	*	*	*
1974††	*	*	*	*	*	*
1975††	*	*	*	*	*	*
1982	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1983	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1984	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1985	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1986	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1987	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1994	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1998	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* No gamma analysis performed (not required).

† Location was the City of Oswego Water Supply for 1969 - 1984 and the Oswego Steam Station inlet canal for 1985 - 2001.

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

TABLE 7-6

HISTORICAL ENVIRONMENTAL SAMPLE DATA

SURFACE WATER

Results in pCi/liter

LOCATION: INDICATOR †						
Isotope	Cs-137			Co-60		
Year	Min.	Max.	Mean	Min.	Max.	Mean
1969††	*	*	*	*	*	*
1974††	*	*	*	*	*	*
1975††	*	*	*	*	*	*
1982	0.43	0.43	0.43	1.6	2.4	1.9
1983	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1984	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1985	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1986	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1987	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1994	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1998	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* No gamma analysis performed (not required).

† Indicator location was the NMP 1 Inlet Canal for the period 1969 - 1973, and the JAF Inlet Canal for 1974 - 2001.

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

TABLE 7-7

HISTORICAL ENVIRONMENTAL SAMPLE DATA

SURFACE WATER TRITIUM

Results in pCi/liter

LOCATION: CONTROL *			
Isotope	Tritium		
Year	Min.	Max.	Mean
1969†	No Data	No Data	No Data
1974†	<MDL	<MDL	<MDL
1975†	311	414	362
1982	112	307	165
1983	230	280	250
1984	190	220	205
1985	230	430	288
1986	250	550	373
1987	140	270	210
1988	240	460	320
1989	143	217	186
1990	260	320	290
1991	180	200	190
1992	190	310	243
1993	160	230	188
1994	250	250	250
1995	230	230	230
1996	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD
1998	190	190	190
1999	220	510	365
2000	196	237	212
2001	<LLD	<LLD	<LLD

* Control location is the City of Oswego, drinking water for 1969 - 1984 and the Oswego Steam Station inlet canal for 1985 - 2001.

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

TABLE 7-8

HISTORICAL ENVIRONMENTAL SAMPLE DATA

SURFACE WATER TRITIUM

Results in pCi/liter

LOCATION: INDICATOR *			
Isotope	Tritium		
Year	Min.	Max.	Mean
1969†	No Data	No Data	No Data
1974†	380	500	440
1975†	124	482	335
1982	194	2780	641
1983	190	560	317
1984	110	370	282
1985	250	1200**	530
1986	260	500	380
1987	160	410	322
1988	430	480	460
1989	135	288	225
1990	220	290	250
1991	250	390	310
1992	240	300	273
1993	200	280	242
1994	180	260	220
1995	320	320	320
1996	<LLD	<LLD	<LLD
1997	160	160	160
1998	190	190	190
1999	180	270	233
2000	161	198	185
2001	<LLD	<LLD	<LLD

* Indicator location was the NMP-1 Inlet Canal during the period 1969-1973, and the JAF Inlet Canal for 1974-2001.

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

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

TABLE 7-9

HISTORICAL ENVIRONMENTAL SAMPLE DATA

AIR PARTICULATE GROSS BETA

Results in pCi/m^3

LOCATION: CONTROL *			
Isotope	Gross Beta		
Year	Min.	Max.	Mean
1969†	0.130	0.540	0.334
1974†	0.001	0.808	0.121
1975†	0.008	0.294	0.085
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	0.007	0.028	0.014
1992	0.006	0.020	0.012
1993	0.007	0.022	0.013
1994	0.008	0.025	0.015
1995	0.006	0.023	0.014
1996	0.008	0.023	0.014
1997	0.006	0.025	0.013
1998	0.004	0.034	0.014
1999	0.010	0.032	0.017
2000	0.006	0.027	0.015
2001	0.006	0.034	0.016

* Locations used for 1977 - 1984 were C off-site, D1 off-site, D2 off-site, E off-site, F off-site, and G off-site. Control location R-5 off-site was used for 1985-2001 (formerly C off-site location).

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

TABLE 7-10

HISTORICAL ENVIRONMENTAL SAMPLE DATA

AIR PARTICULATE GROSS BETA

Results in pCi/m^3

LOCATION: INDICATOR *			
Isotope	Gross Beta		
Year	Min.	Max.	Mean
1969†	0.130	0.520	0.320
1974†	0.003	0.885	0.058
1975†	0.001	0.456	0.067
1982	0.001	0.113	0.031
1983	0.003	0.062	0.023
1984	0.001	0.058	0.025
1985	0.001	0.044	0.021
1986	0.007	0.289	0.039
1987	0.009	0.040	0.021
1988	0.007	0.040	0.018
1989	0.007	0.041	0.017
1990	0.006	0.023	0.014
1991	0.006	0.033	0.015
1992	0.005	0.024	0.013
1993	0.005	0.023	0.014
1994	0.006	0.024	0.015
1995	0.004	0.031	0.014
1996	0.006	0.025	0.013
1997	0.001	0.018	0.010
1998	0.002	0.040	0.015
1999	0.009	0.039	0.017
2000	0.005	0.033	0.015
2001	0.004	0.037	0.016

* Locations used for 1969 - 1973 were D1 on-site, D2 on-site, E on-site, F on-site and G on-site. Locations used for 1974 - 1984 were D1 on-site, D2 on-site, E on-site, F on-site, G on-site, H on-site, I on-site, J on-site and K on-site, as applicable. 1985 - 2001 locations were R-1 off-site, R-2 off-site, R-3 off-site, and R-4 off-site.

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

TABLE 7-11

HISTORICAL ENVIRONMENTAL SAMPLE DATA

AIR PARTICULATES

Results in pCi/m^3

LOCATION: CONTROL **						
Isotope	Cs-137			Co-60		
Year	Min.	Max.	Mean	Min.	Max.	Mean
1969†	*	*	*	*	*	*
1974†	*	*	*	*	*	*
1975†	*	*	*	*	*	*
1982	0.0002	0.0009	0.0004	0.0004	0.0007	0.0006
1983	0.0002	0.0002	0.0002	0.0007	0.0007	0.0007
1984	<LLD	<LLD	<LLD	0.0004	0.0012	0.0008
1985	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1986	0.0075	0.0311	0.0193	<LLD	<LLD	<LLD
1987	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1994	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1998	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

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

** Locations included composites of off-site air monitoring locations for 1977 - 1984. Sample location included only R-5 air monitoring location for 1985 - 2001.

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

TABLE 7-12

HISTORICAL ENVIRONMENTAL SAMPLE DATA

AIR PARTICULATES

Results in pCi/m^3

LOCATION: INDICATOR **						
Isotope	Cs-137			Co-60		
Year	Min.	Max.	Mean	Min.	Max.	Mean
1969†	*	*	*	*	*	*
1974†	*	*	*	*	*	*
1975†	*	*	*	*	*	*
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	<0.0048	<0.0048	<0.0048
2001	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

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

** Locations included composites of on-site air monitoring locations for 1977 - 1984. Sample locations included R-1 through R-4 air monitoring locations for 1985 - 2001.

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

TABLE 7-13

HISTORICAL ENVIRONMENTAL SAMPLE DATA

AIR RADIOIODINE

Results in pCi/m^3

LOCATION: CONTROL *			
Isotope	Iodine-131		
Year	Min.	Max.	Mean
1969†	**	**	**
1974†	**	**	**
1975†	<MDL	<MDL	<MDL
1982	0.039	0.039	0.039
1983	<LLD	<LLD	<LLD
1984	<LLD	<LLD	<LLD
1985	<LLD	<LLD	<LLD
1986	0.041	0.332	0.151
1987	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD
1994	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD
1998	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD

* Locations D1 off-site, D2 off-site, E off-site, F off-site and G off-site used for 1976 - 1984. Location R-5 off-site used for 1985 - 2001.

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

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

TABLE 7-14

HISTORICAL ENVIRONMENTAL SAMPLE DATA
AIR RADIOIODINE

Results in pCi/m^3

LOCATION: INDICATOR *			
Isotope	Iodine-131		
Year	Min.	Max.	Mean
1969†	**	**	**
1974†	**	**	**
1975†	0.25	0.30	0.28
1982	0.002	0.042	0.016
1983	0.022	0.035	0.028
1984	<LLD	<LLD	<LLD
1985	<LLD	<LLD	<LLD
1986	0.023	0.360	0.119
1987	0.011	0.018	0.014
1988	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD
1994	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD
1998	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD

* Locations used for 1976 - 1984 were D1 on-site, D2 on-site, E on-site, F on-site, G on-site, H on-site, I on-site, J on-site and K on-site, as applicable. Locations used for 1985 - 2001 were R-1 off-site, R-2 off-site, R-3 off-site, and R-4 off-site.

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

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

TABLE 7-15A

HISTORICAL ENVIRONMENTAL SAMPLE DATA

ENVIRONMENTAL TLD

Results in mrem/standard month

LOCATION: CONTROL **			
Year	Min.	Max.	Mean
Preop†	*	*	*
1974†	2.7	8.9	5.6
1975†	4.8	6.0	5.5
1982	3.8	6.1	5.1
1983	4.9	7.2	5.8
1984	4.7	8.2	6.2
1985	4.5	7.6	5.6
1986	5.3	7.5	6.3
1987	4.6	6.6	5.4
1988	4.4	6.8	5.6
1989	2.9	6.4	4.7
1990	3.7	6.0	4.7
1991	3.8	5.8	4.7
1992	2.6	5.1	4.1
1993	3.4	5.7	4.4
1994	3.1	5.0	4.1
1995	3.4	5.7	4.4
1996	3.4	5.6	4.3
1997	3.7	6.2	4.7
1998	3.7	5.6	4.4
1999	3.6	7.1	4.6
2000	3.7	7.3	4.7
2001	3.6	5.4	4.4

* Data not available.

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

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

TABLE 7-15B

HISTORICAL ENVIRONMENTAL SAMPLE DATA

ENVIRONMENTAL TLD

Results in mrem per standard month

LOCATION: RETS CONTROL **			
Year	Min.	Max.	Mean
Preop†	*	*	*
1974†	2.7	8.9	5.6
1975†	4.8	6.0	5.5
1982	3.8	6.1	5.1
1983	4.9	7.2	5.8
1984	4.7	8.2	6.2
1985	4.4	6.8	5.4
1986	5.5	7.2	6.3
1987	4.6	5.8	5.2
1988	4.8	6.8	5.4
1989	2.9	6.4	4.1
1990	3.7	6.0	4.8
1991	3.8	5.3	4.6
1992	2.6	4.7	3.9
1993	3.4	5.3	4.4
1994	3.1	4.6	3.9
1995	3.4	4.9	4.2
1996	3.4	5.6	4.2
1997	3.9	5.2	4.6
1998	3.7	4.8	4.2
1999	3.7	4.7	4.4
2000	3.7	5.5	4.3
2001	3.9	5.0	4.4

* Data not available.

** TLD #14 established 1974, TLD #49 established 1980.

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

TABLE 7-16A

HISTORICAL ENVIRONMENTAL SAMPLE DATA
ENVIRONMENTAL TLD

Results in mrem per standard month

LOCATION: SITE BOUNDARY **			
Year	Min.	Max.	Mean
Preop†	*	*	*
1974†	*	*	*
1975†	*	*	*
1982	*	*	*
1983	*	*	*
1984	*	*	*
1985	4.9(4.1)	5.9(12.6)	5.3(6.2)
1986	5.4(4.4)	6.8(18.7)	5.9(7.0)
1987	4.7(4.4)	5.9(14.3)	5.3(6.1)
1988	5.0(3.4)	6.1(17.9)	5.4(6.4)
1989	4.5(2.8)	5.2(15.4)	4.8(5.9)
1990	4.5(3.6)	5.4(14.9)	4.8(6.4)
1991	4.3(3.2)	5.5(16.7)	4.8(6.0)
1992	3.7(3.2)	4.6(10.4)	4.2(5.1)
1993	3.8(3.3)	4.8(11.7)	4.3(5.4)
1994	2.8(2.8)	4.9(12.4)	4.0(5.2)
1995	3.5(3.5)	5.1(9.6)	4.4(5.4)
1996	3.2(3.2)	5.3(9.1)	4.1(5.2)
1997	3.5(3.5)	5.9(10.2)	4.6(5.9)
1998	3.7(3.7)	5.1(9.4)	4.4(5.4)
1999	3.3(3.3)	7.5(12.3)	4.7(5.8)
2000	3.6(3.6)	6.8(10.0)	4.5(5.6)
2001	3.6(3.6)	5.3(10.3)	5.7(4.5)

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

** TLD #7, 18 and 23 established 1972 - 1974.

TLD # 75-87 established 1985.

TLD #23, 75, 76, 77, 85, 86 and 87 are in close proximity to operational buildings along the north boundary. This boundary is the lakeshore and is considered to be generally not accessible to the public. The doses from these locations are not included in the historical data statistics, but are shown in the summary table as ( ) data.

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

TABLE 7-16B

HISTORICAL ENVIRONMENTAL SAMPLE DATA

ENVIRONMENTAL TLD

Results in mrem per standard month

LOCATION: OFF-SITE SECTORS **			
Year	Min.	Max.	Mean
Preop†	*	*	*
1974†	*	*	*
1975†	*	*	*
1982	*	*	*
1983	*	*	*
1984	*	*	*
1985	4.0	7.1	5.0
1986	4.6	8.6	6.0
1987	4.3	6.0	5.2
1988	3.8	7.0	5.3
1989	2.5	6.8	4.9
1990	3.6	6.3	4.7
1991	3.6	5.8	4.7
1992	2.9	5.0	4.1
1993	3.4	6.3	4.5
1994	3.0	5.1	4.0
1995	3.2	5.2	4.3
1996	3.2	5.3	4.2
1997	3.5	5.8	4.4
1998	3.5	5.0	4.2
1999	3.6	5.6	4.4
2000	3.4	6.6	4.5
2001	3.6	5.4	4.4

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

** TLD locations initiated in 1985 as required by the New Technical Specifications. Includes TLD numbers 88, 89, 90, 91, 92, 93, 94 and 95.

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

TABLE 7-16C

HISTORICAL ENVIRONMENTAL SAMPLE DATA

ENVIRONMENTAL TLD

Results in mrem per standard month

LOCATION: SITE INTEREST **			
Year	Min.	Max.	Mean
Preop†	*	*	*
1974†	*	*	*
1975†	*	*	*
1982	*	*	*
1983	*	*	*
1984	*	*	*
1985	3.9	6.8	5.3
1986	4.8	8.2	6.1
1987	3.5	6.0	5.1
1988	3.9	6.6	5.3
1989	2.1	6.4	4.9
1990	3.2	6.3	4.8
1991	2.9	5.6	4.4
1992	3.0	4.8	4.1
1993	3.2	5.8	4.5
1994	2.9	4.8	4.1
1995	3.6	4.8	4.2
1996	3.2	5.1	4.2
1997	3.5	6.2	4.6
1998	3.7	5.6	4.4
1999	3.6	7.1	4.6
2000	3.6	7.3	4.7
2001	3.8	5.4	4.4

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

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

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

TABLE 7-16D

HISTORICAL ENVIRONMENTAL SAMPLE DATA

ENVIRONMENTAL TLD

Results in mrem per standard month

LOCATION: ON-SITE INDICATOR **			
Year	Min.	Max.	Mean
Preop†	*	*	*
1974†	3.1	10.6	5.7
1975†	4.6	16.0	7.3
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	13.1	6.0
1990	3.6	12.9	5.5
1991	3.2	11.6	5.4
1992	3.2	5.6	4.3
1993	3.1	13.6	5.2
1994	2.8	14.3	5.1
1995	3.5	28.6	6.2
1996	3.1	32.6	6.4
1997	3.5	28.8	8.1
1998	3.6	28.8	6.2
1999	3.3	28.4	6.6
2000	3.7	16.5	5.6
2001	3.8	14.5	5.6

* No data available.

** Includes TLD numbers 3, 4, 5, 6 and 7 (1970 - 1973). Includes TLD numbers 3, 4, 5, 6, 7, 23, 24, 25 and 26 (1974 - 2000). Locations are existing or previous on-site environmental air monitoring locations.

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

TABLE 7-16E

HISTORICAL ENVIRONMENTAL SAMPLE DATA

ENVIRONMENTAL TLD

Results in mrem per standard month

LOCATION: OFF-SITE INDICATOR **			
Year	Min.	Max.	Mean
Preop†	*	*	*
1974†	2.4	8.9	5.3
1975†	4.5	7.1	5.5
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	6.1	4.8
1991	3.4	5.8	4.5
1992	3.1	5.2	4.1
1993	3.2	5.7	5.0
1994	3.0	5.1	4.1
1995	3.9	5.7	4.4
1996	3.3	5.5	4.1
1997	3.7	6.2	4.7
1998	3.9	5.6	4.5
1999	3.8	7.1	4.6
2000	3.8	7.3	4.6
2001	3.7	5.9	4.6

* No data available.

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

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

TABLE 7-17

HISTORICAL ENVIRONMENTAL SAMPLE DATA

MILK

Results in pCi/liter

LOCATION: CONTROL **						
Isotope	Cs-137			I-131		
Year	Min.	Max.	Mean	Min.	Max.	Mean
1969†	*	*	*	*	*	*
1974†	*	*	*	*	*	*
1975†	*	*	*	*	*	*
1982	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1983	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1984	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1985	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1986	5.3	12.4	8.4	0.8	29.0	13.6
1987	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1994	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1998	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* No data available (sample not required).

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

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

TABLE 7-18

HISTORICAL ENVIRONMENTAL SAMPLE DATA

MILK

Results in pCi/liter

LOCATION: INDICATOR						
Isotope	Cs-137			I-131		
Year	Min.	Max.	Mean	Min.	Max.	Mean
1969†	*	*	*	*	*	*
1974†	1.6	39	10.5	0.70	2.00	1.23
1975†	6.0	22	16	0.01	2.99	0.37
1982	3.1	18.0	6.3	<LLD	<LLD	<LLD
1983	5.1	5.1	5.1	<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	9.4	7.4	<LLD	<LLD	<LLD
1988	10.0	10.0	10.0	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1994	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD	0.25	.044	0.35
1998	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* No data available (sample not required).

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

TABLE 7-19

HISTORICAL ENVIRONMENTAL SAMPLE DATA

FOOD PRODUCTS ††

Results in pCi/g (wet)

LOCATION: CONTROL *			
Isotope	Cs-137		
Year	Min.	Max.	Mean
1969†	**	**	**
1974†	**	**	**
1975†	**	**	**
1982	<LLD	<LLD	<LLD
1983	<LLD	<LLD	<LLD
1984	<LLD	<LLD	<LLD
1985	<LLD	<LLD	<LLD
1986	<LLD	<LLD	<LLD
1987	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD
1992	<LLD	<LLD	<LLD
1993	0.008	0.008	0.008
1994	<LLD	<LLD	<LLD
1995	<LLD	<LLD	<LLD
1996	<LLD	<LLD	<LLD
1997	<LLD	<LLD	<LLD
1998	<LLD	<LLD	<LLD
1999	<LLD	<LLD	<LLD
2000	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD

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

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

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

†† Data comprised of broadleaf and non-broadleaf vegetation (1980-1984). Data comprised of broadleaf vegetation only (1985-2001).

TABLE 7-20

HISTORICAL ENVIRONMENTAL SAMPLE DATA

FOOD PRODUCTS ††

Results in pCi/g (wet)

LOCATION: INDICATOR *			
Isotope	Cs-137		
Year	Min.	Max.	Mean
1969†	**	**	**
1974†	0.04	0.34	0.142
1975†	<MDL	<MDL	<MDL
1982	<LLD	<LLD	<LLD
1983	<LLD	<LLD	<LLD
1984	<LLD	<LLD	<LLD
1985	0.047	0.047	0.047
1986	<LLD	<LLD	<LLD
1987	<LLD	<LLD	<LLD
1988	0.008	0.008	0.008
1989	0.011	0.011	0.011
1990	<LLD	<LLD	<LLD
1991	0.039	0.039	0.039
1992	<LLD	<LLD	<LLD
1993	<LLD	<LLD	<LLD
1994	0.006	0.012	0.010
1995	0.011	0.012	0.012
1996	<LLD	<LLD	<LLD
1997	0.013	0.013	0.013
1998	<LLD	<LLD	<LLD
1999	0.007	0.007	0.007
2000	<LLD	<LLD	<LLD
2001	<LLD	<LLD	<LLD

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

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

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

†† Data comprised of broadleaf and non-broadleaf vegetation (1976-1984). Data comprised of broadleaf vegetation only (1985-2001).

8.0 GRAPHICAL PRESENTATIONS

1. DATA GRAPHS

This section includes graphic representation of selected sample results.

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

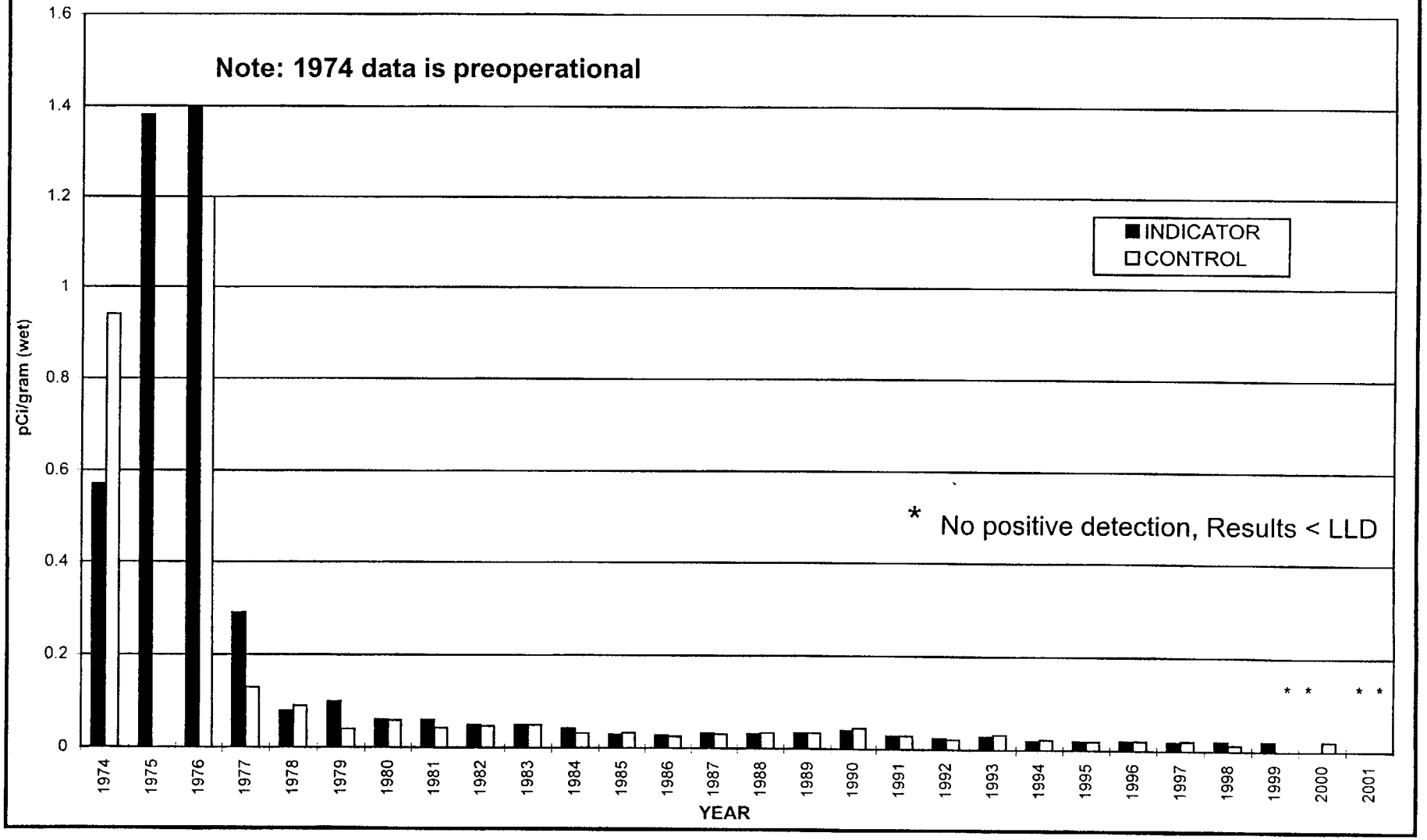
2. SAMPLE LOCATIONS

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

JAMES A. FITZPATRICK N.P.P.

FISH Cs-137

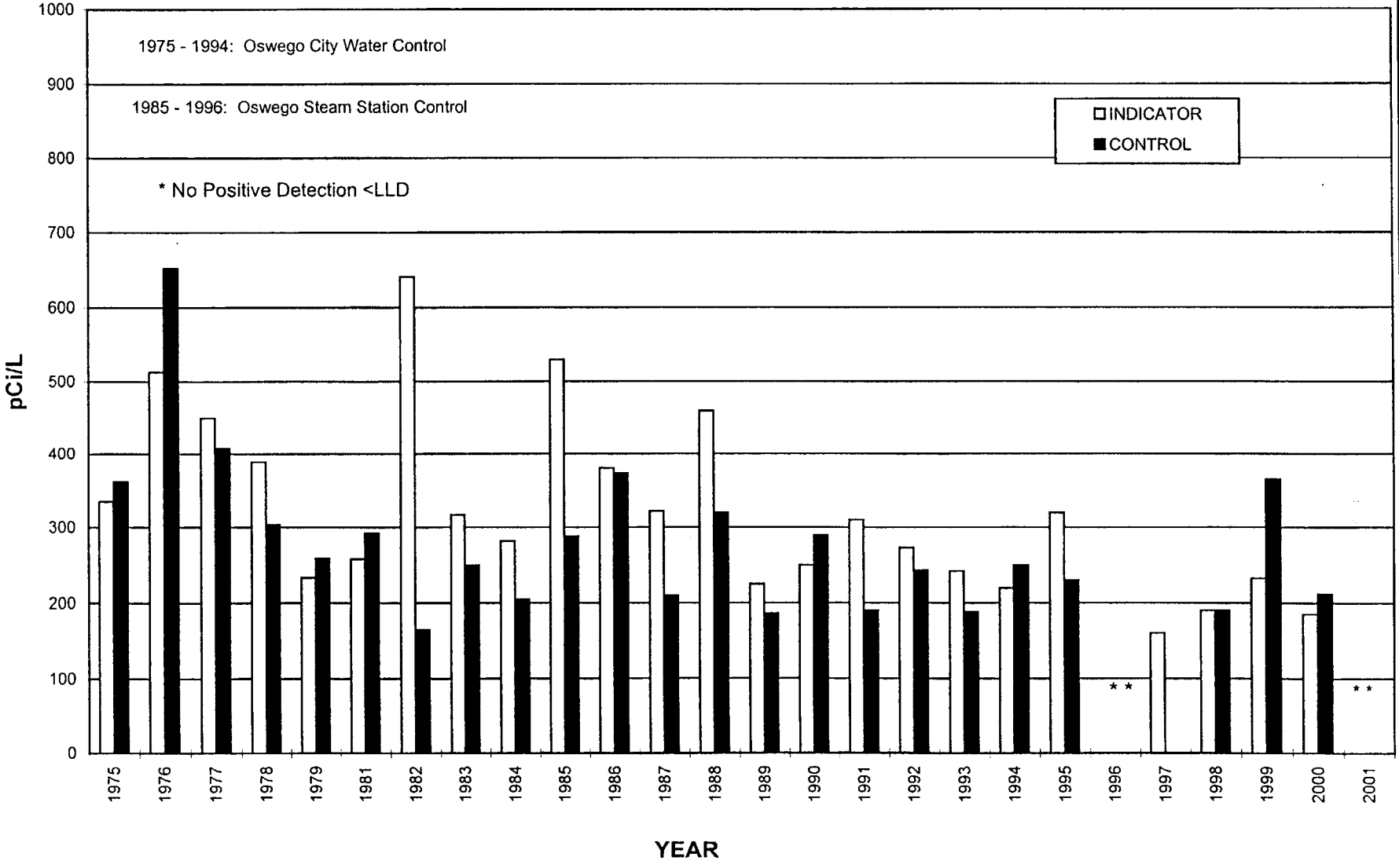
Figure 8.1



JAMES A. FITZPATRICK N.P.P.

SURFACE WATER - TRITIUM

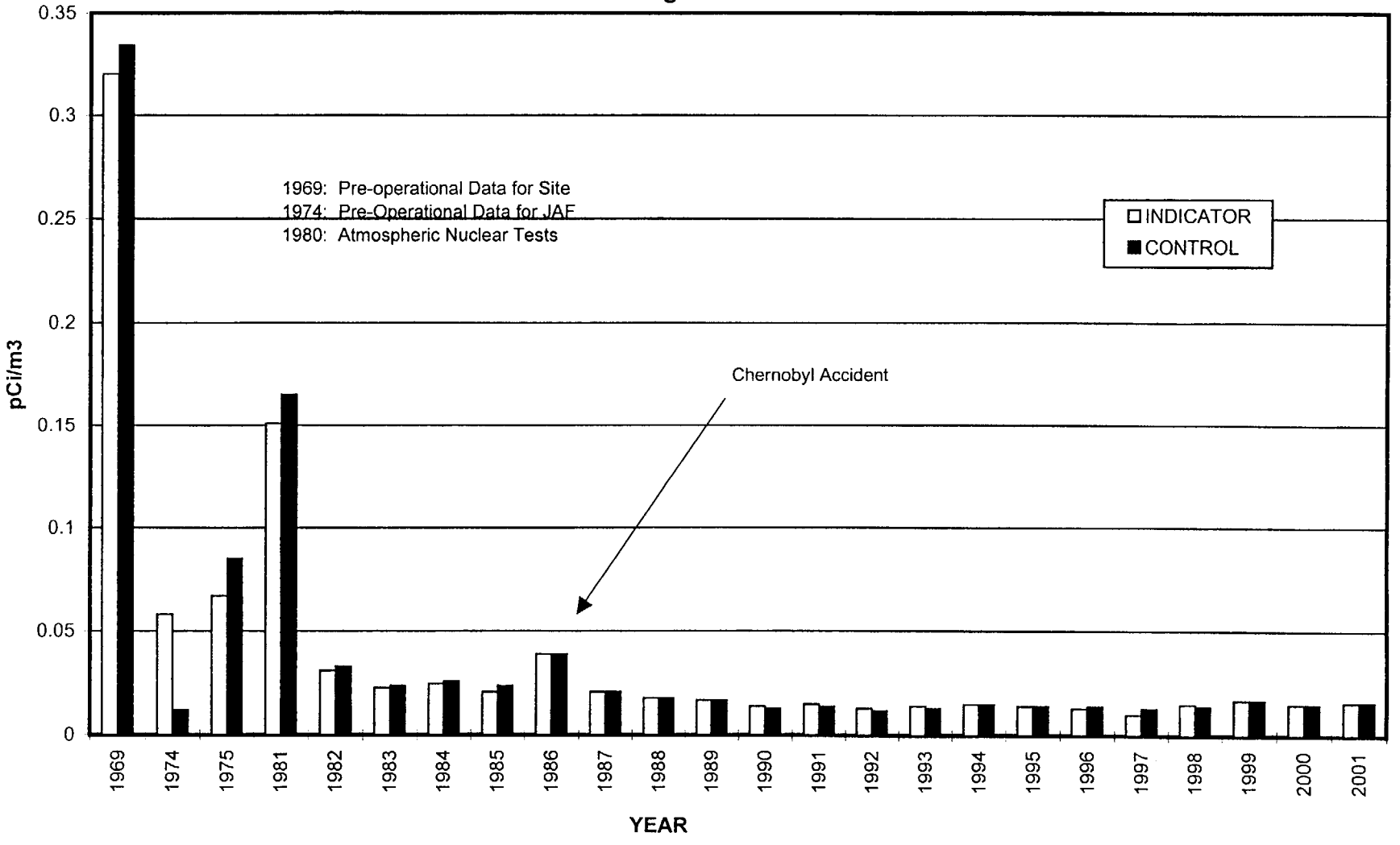
Figure 8.2



JAMES A. FITZPATRICK N.P.P.

AIR PARTICULATE FILTER - GROSS

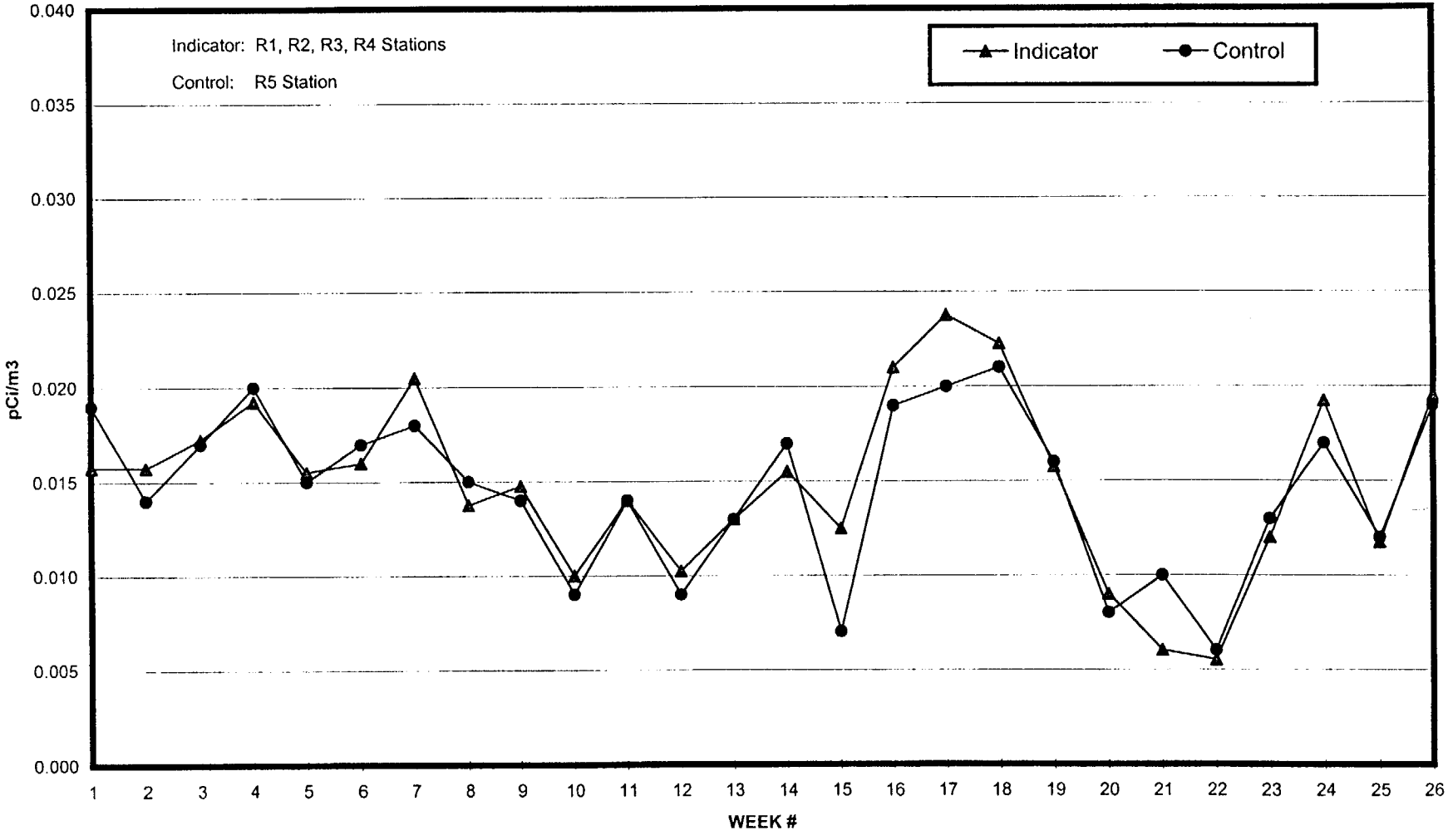
Figure 8.3



JAMES A. FITZPATRICK N.P.P.

AIR PARTICULATE FILTER - GROSS BETA

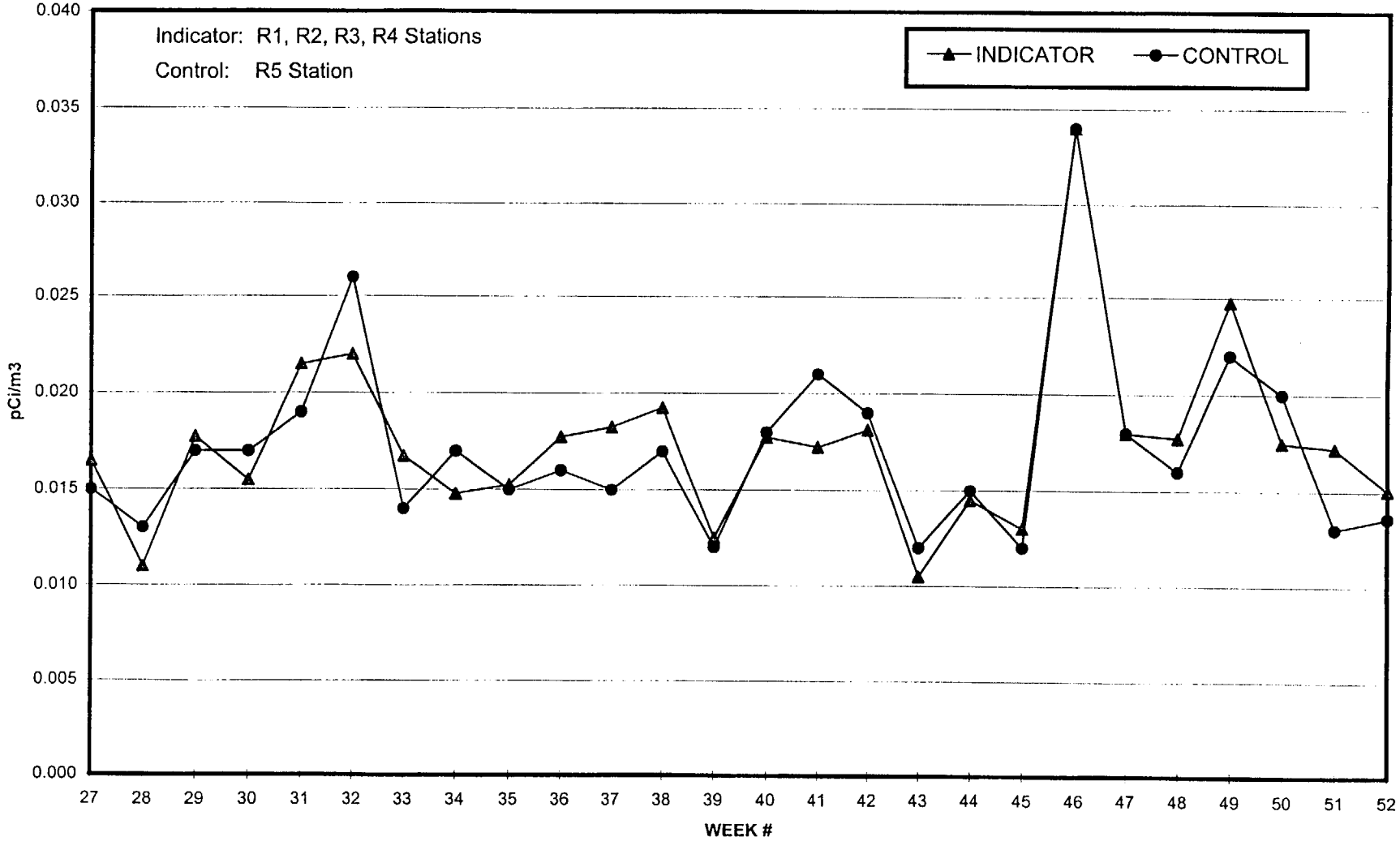
Figure 8.4

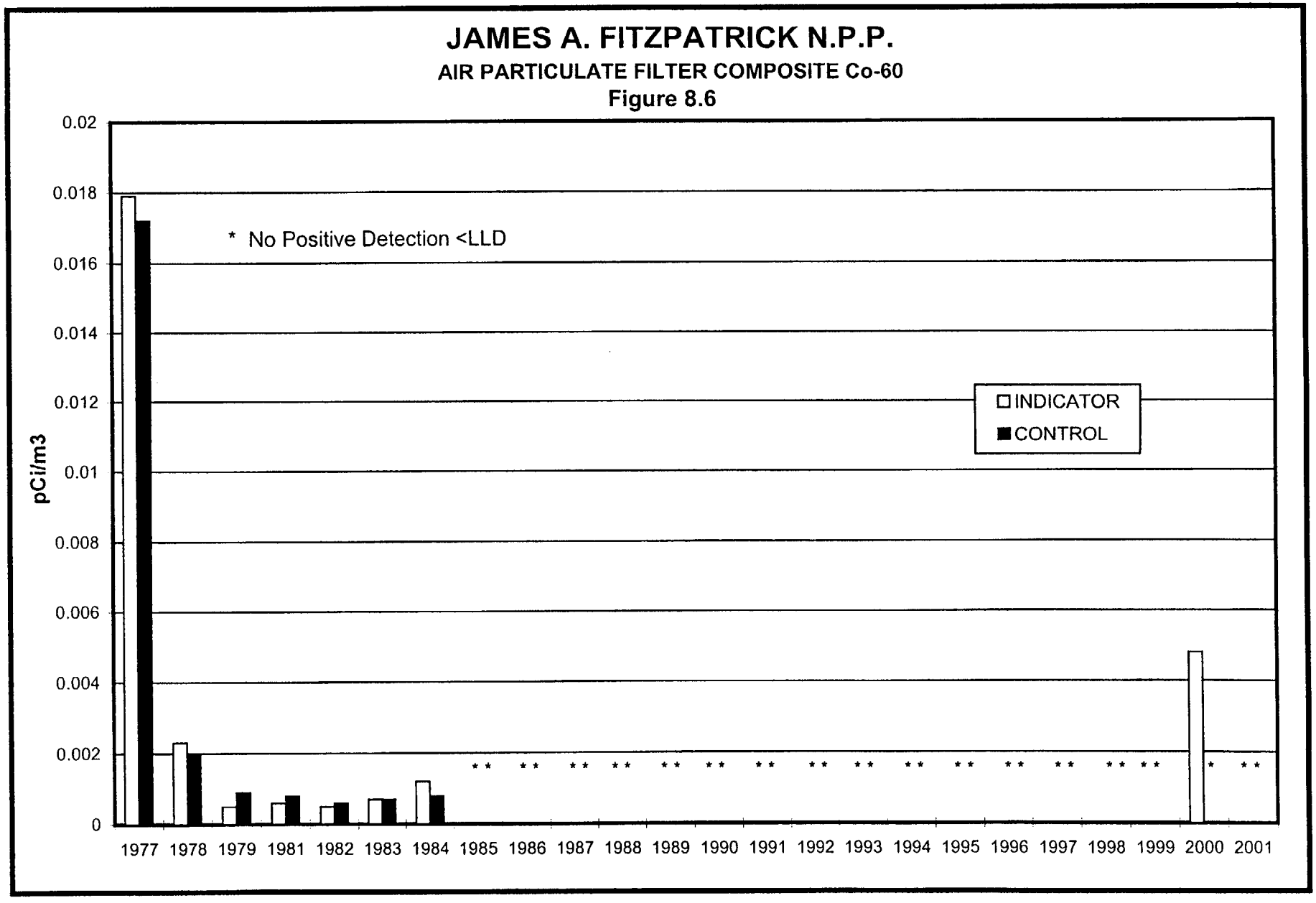


JAMES A. FITZPATRICK N.P.P.

AIR PARTICULATE FILTER - GROSS BETA

Figure 8.5

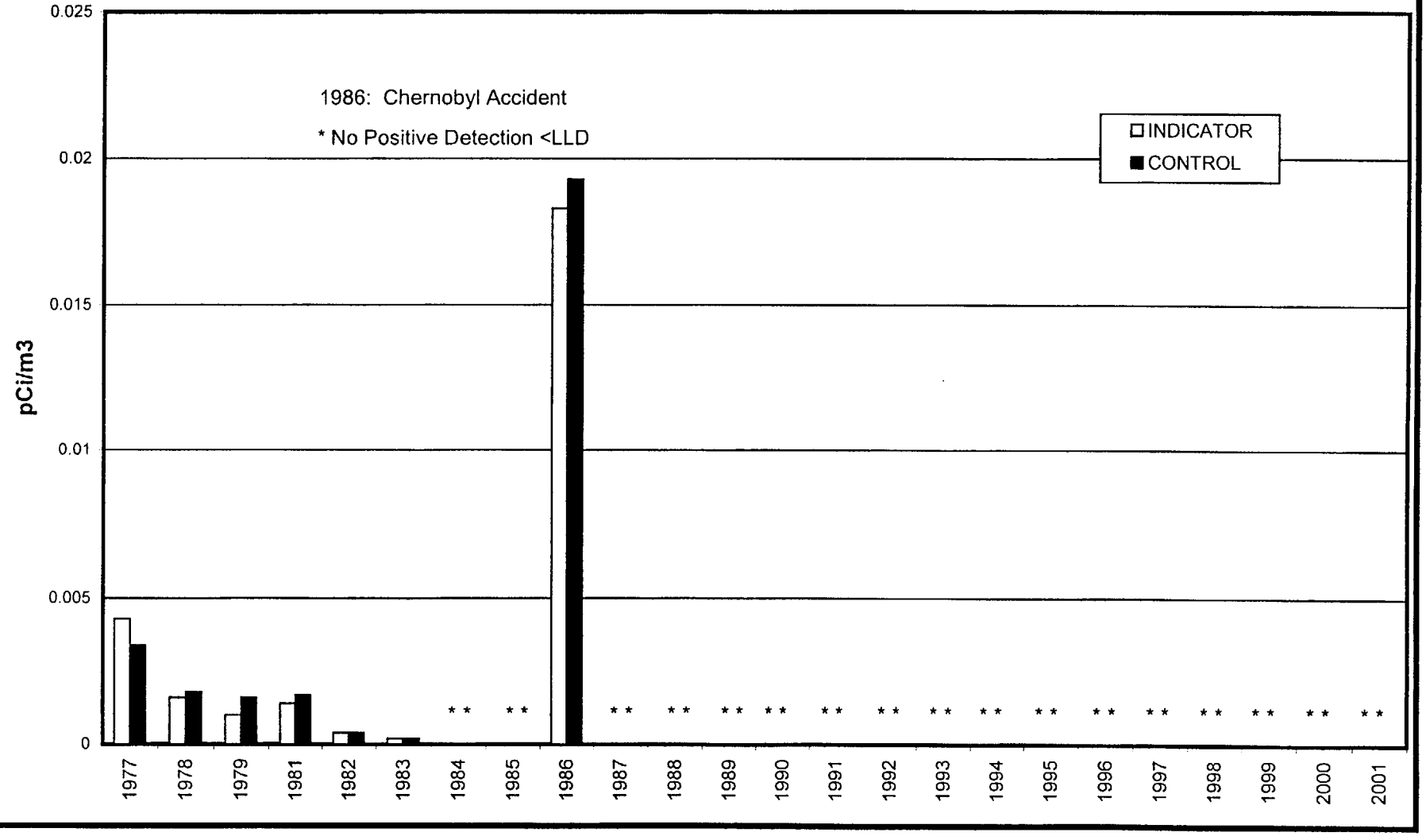



JAMES A. FITZPATRICK N.P.P.
AIR PARTICULATE FILTER COMPOSITE Co-60
Figure 8.6
* No Positive Detection <LLD
INDICATOR
CONTROL
pCi/m3
0.02
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
1977 1978 1979 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001

JAMES A. FITZPATRICK N.P.P.

AIR PARTICULATE FILTER COMPOSITE Cs-137

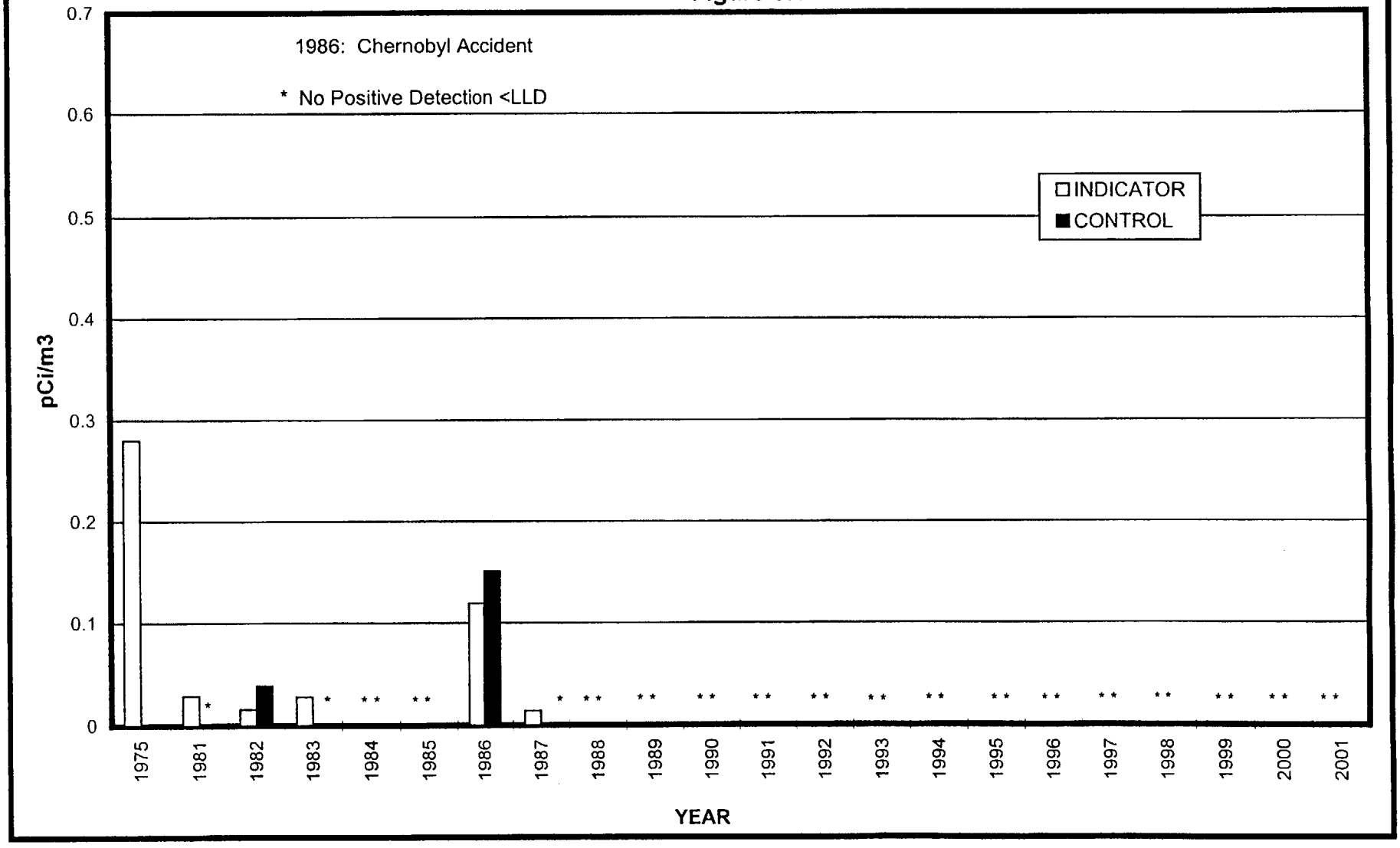
Figure 8.7

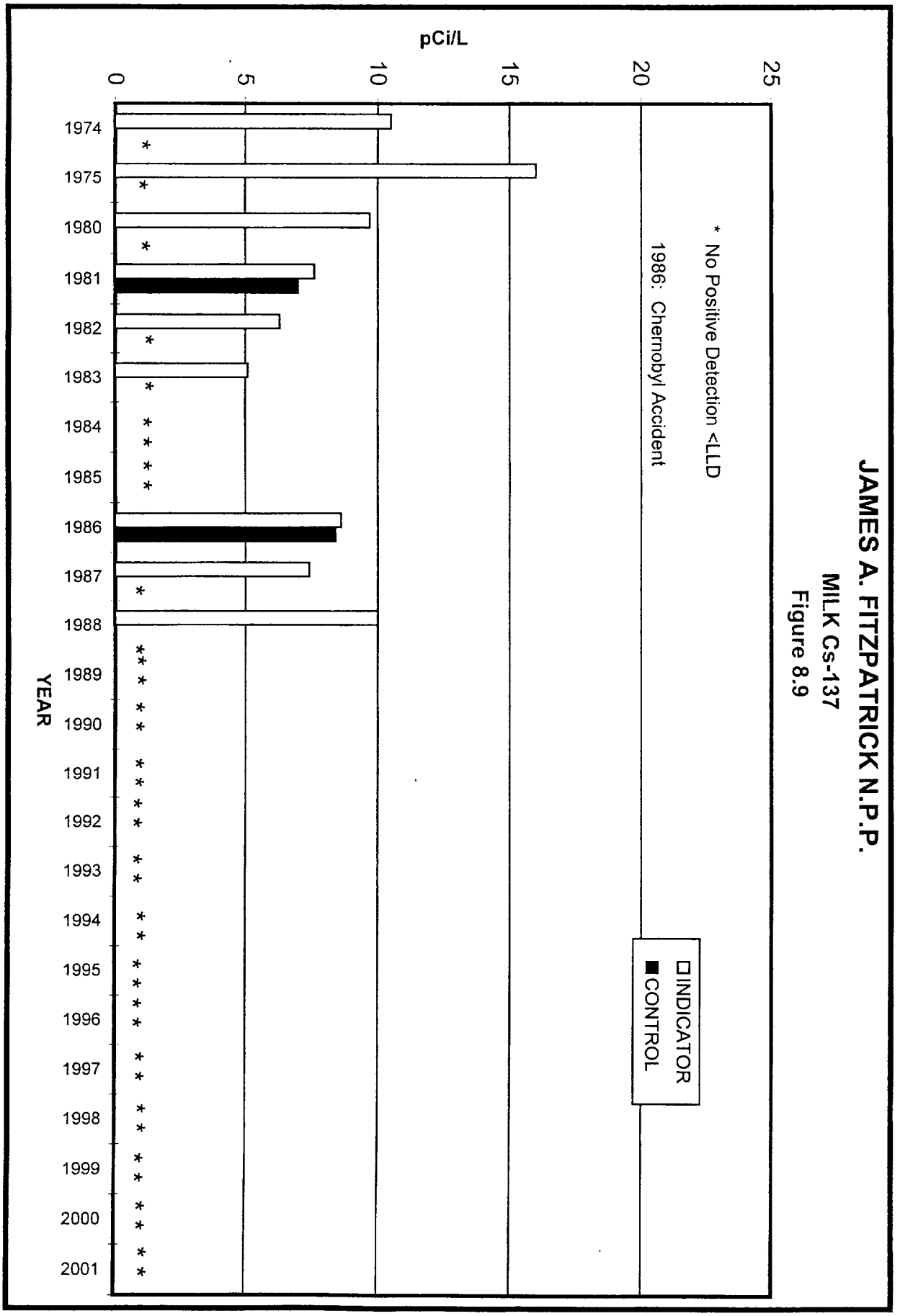


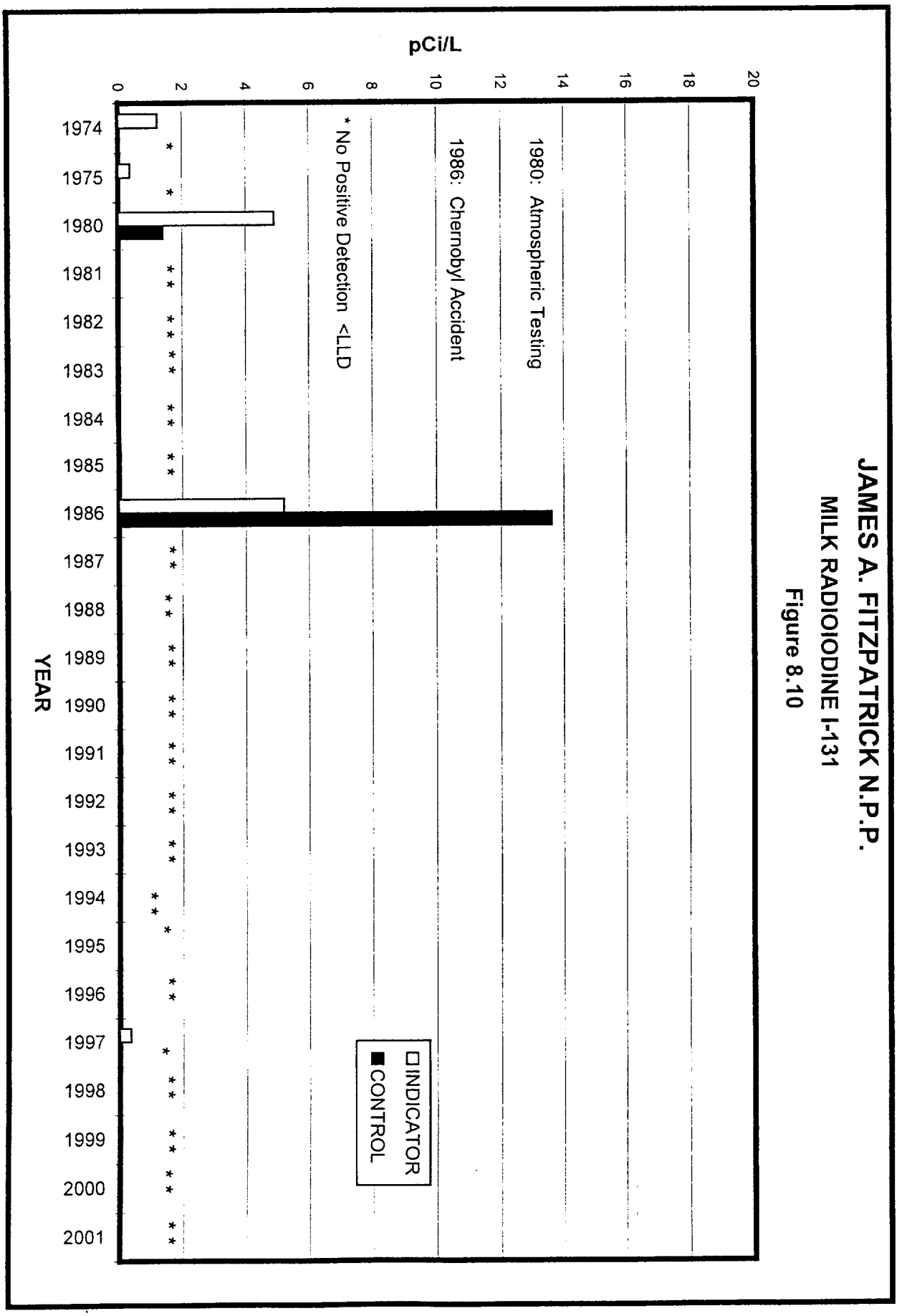
JAMES A. FITZPATRICK N.P.P.

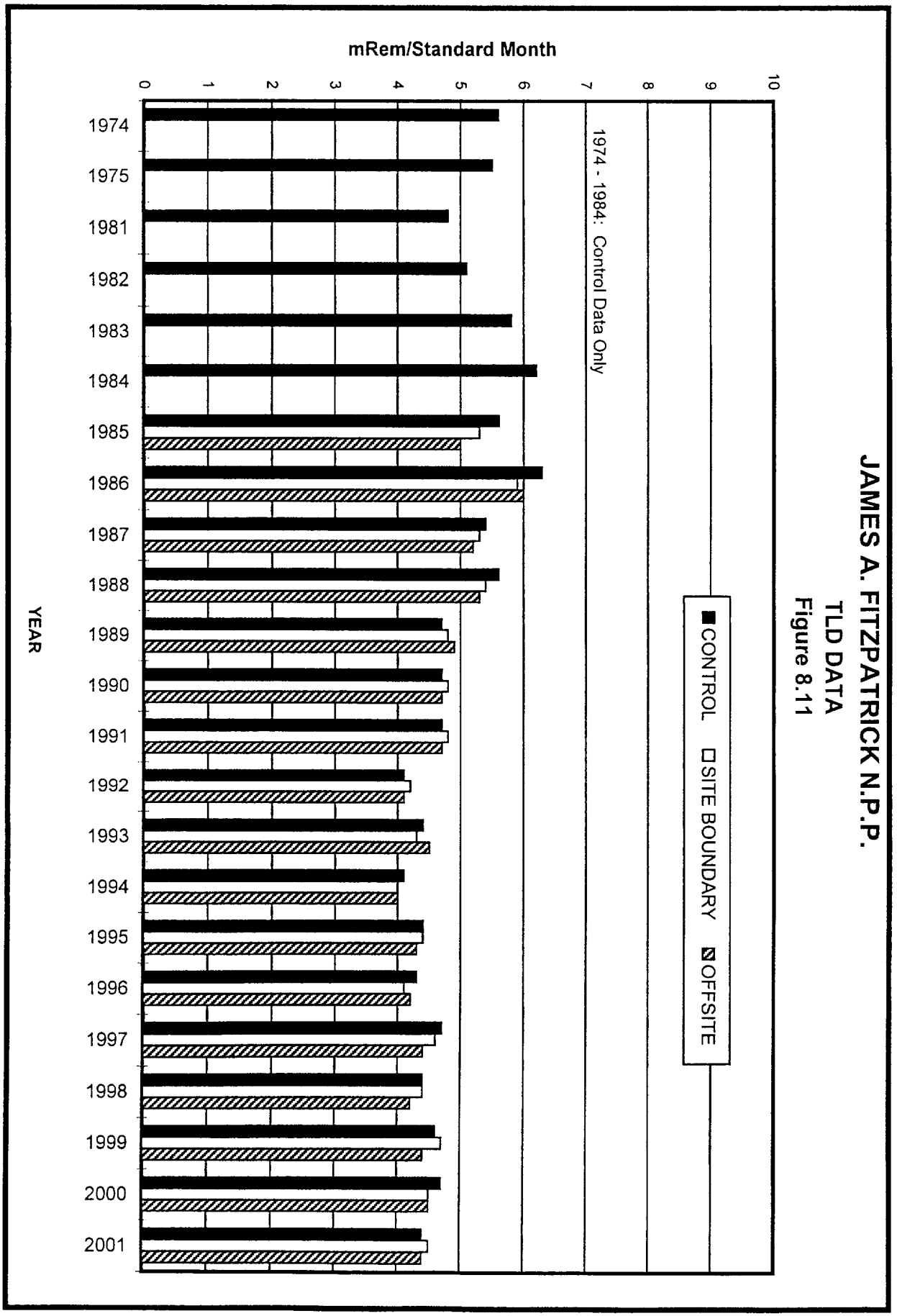
AIR-RADIOIODINE I-131

Figure 8.8




JAMES A. FITZPATRICK N.P.P.
MILK Cs-137
Figure 8.9
pCi/L
0
5
10
15
20
25
YEAR
1974
1975
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
* No Positive Detection <LLD
1986: Chernobyl Accident
INDICATOR
CONTROL


JAMES A. FITZPATRICK N.P.P.
MILK RADIOIODINE I-131
Figure 8.10
pCi/L
0
2
4
6
8
10
12
14
16
18
20
1974
1975
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
YEAR
1980: Atmospheric Testing
1986: Chernobyl Accident
* No Positive Detection <LLD
INDICATOR
CONTROL


JAMES A. FITZPATRICK N.P.P.
TLD DATA
Figure 8.11
CONTROL
SITE BOUNDARY
OFFSITE
1974 - 1984: Control Data Only
mRem/Standard Month
0
1
2
3
4
5
6
7
8
9
10
1974
1975
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
YEAR

9.0 QA/QC PROGRAM

9.1 PROGRAM DESCRIPTION

Section 6.3 of the Radiological Effluent Technical Specification (RETS) requires that each licensee participate in an Interlaboratory Comparison Program. The Interlaboratory Comparison Program shall include sample media for which samples are routinely collected and for which cross-check samples are commercially available. Participation in an Interlaboratory Comparison Program ensures that independent checks on the precision and accuracy of the measurement of radioactive material in the environmental samples are performed as part of the Quality Assurance Program for environmental monitoring. To fulfill the Technical Specification requirement for an Interlaboratory Comparison Program, the JAF Environmental Laboratory has engaged the services of two independent laboratories to provide quality assurance cross-check samples. The two laboratories are Analytics, Incorporated in Atlanta, Georgia and the U.S. Department of Energy's Environmental Measurements Laboratory (EML) in New York City.

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

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

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

9.2 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

9.3 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.

9.3.1 ANALYTICS SAMPLE RESULTS

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

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

The value for the error resolution is calculated.

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

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

The value for the ratio is then calculated.

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

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

TABLE 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.

9.3.2 ENVIRONMENTAL MEASUREMENTS LABORATORY (EML)

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

Acceptable criteria, "N", is established at less than the 5th percentile and greater than the 95th percentile, that is, the outer 10% of the historical data. Using five years worth of historical analytical data, the EML, determined performance results using the percentile criteria summarized below:

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

9.4 PROGRAM RESULTS SUMMARY

The Interlaboratory Cross-Check Program numerical results are provided on Table 9-1.

9.4.1 ANALYTICS QA SAMPLES RESULTS

Seventeen QA blind spike samples were analyzed as part of Analytics' 2001 Interlaboratory Comparison Program. The following sample media were evaluated as part of the Cross-Check Program.

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

The JAF Environmental Laboratory performed 81 individual 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 9.4.2 below.

9.4.2 ANALYTICS SAMPLE NONCONFORMITIES

9.4.2.1 Analytics Sample E-2677-05
Nonconformity No. 01-08, Cr-51 in Soil
Nonconformity No. 01-09, Zn-65 in Soil

A spiked mixed gamma in soil sample was received from Analytics, Inc. and was analyzed in accordance with standard laboratory procedures. The sample contained a total of nine radionuclides for analyisis. Nine of the nine radionuclides present were quantified. Seven of the nine radionuclides were quantified within the acceptable range. The results for Cr-51 and Zn-65 were determined to be outside the QA Acceptance Criteria. The soil sample was

analyzed on six different detectors with the following reported results for Cr-51 and Zn-65.

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

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

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

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

2001 Cr-51 Results

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

* Blind spike sample provided by laboratory client

** Nonconformity result

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

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

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

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

To determine if this was a programmatic or systematic error inherent to the software/analysis system, an extent of condition was performed using another spiked sample result for any similar nonconformities. In 2001, eleven spiked samples were analyzed which contained certified concentrations of Zn-65 and other radionuclides. This sample set included four additional samples. The results are as follows:

2001 Zn-65 Results

Sample ID	Medium	JAF	Reference Lab	Ratio
E-2601-05	WATER pCi/liter	201±9	186±9	1.08
E-2812-05	WATER pCi/liter	187±6	184±3	1.02
E-2602-05	FILTER pCi/filter	170±9	155±3	1.10
E-2813-05	FILTER pCi/filter	192±7	185±3	1.04
E-2676-05	MILK pCi/liter	182±9	182±3	1.01
E-2814-05	MILK pCi/liter	261±8	254±4	1.03
E-2679-05	VEGETATION pCi/kg	284±24	302±5	0.94
E-2853-09*	SOIL* pCi/kg	255±20	281±5	0.91
E-2542-09*	SOIL* pCi/kg	354±27	369±6	0.96
E-2694-09*	SOIL* pCi/kg	414±25	368±6	1.13
E-2951-09*	SOIL* pCi/kg	255±17	262±4	0.97
* Provided by Lab client-NOT reported in Annual Report			Mean Ratio	1.02

The mean ratio for all eleven Zn-65 results was 1.02 and the ratio for the four soil samples was 0.99. Both of these mean ratio values and the eleven individual ratio values for Zn-65 are excellent indicators that the routine measurement of Zn-65 in environmental media is very accurate. These results demonstrate that there is no systematic error or bias for the analysis of Zn-65 in soil or other environmental sample media. No corrective action was implemented as a result of this non-conformity.

9.4.3 ENVIRONMENTAL MEASUREMENTS LABORATORY (EML)

In 2001, JAF Environmental Laboratory participated in both the EML Quality Assessment Programs, QAP-54 and QAP-55. Sample sets consisted of the following sample media:

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

A total of 18 radionuclides were evaluated for the samples included in QAP-54 and

QAP-55. Using the EML acceptance criteria, 17 of 18 radionuclides analyses (94.4%) were evaluated to be acceptable. Results for the EML cross Check Program can be viewed on-line at www.eml.doe.gov.

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

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

9.4.3.1 EML Sample QAP-54, Gross Beta in Water Nonconformity No. 2001-04

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

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

TABLE 9-1
INTERLABORATORY INTERCOMPARISON PROGRAM
Gross Beta Analysis of Air Particulate Filters (pCi/filter)

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

(1) Results reported as activity ± 1 sigma.
(2) Ratio = Reported/Analytics (See Section 9.3).
(*) Sample provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.

TABLE 9-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Tritium Analysis of Water (pCi/liter)

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

(1) Results reported as activity ± 1 sigma. Sample Analyzed by Environmental Inc., Midwest Laboratory
(2) Ratio = Reported/Analytics (See Section 9.3).
(*) Samples provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.

TABLE 9-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Iodine Analysis of Water, Air and Milk

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

(1) Results reported as activity ± 1 sigma.
(2) Ratio = Reported/Analytics (See Section 9.3).
(*) Samples provided by Analytics, Inc.
(**) Result determined by Resin Extraction/Gamma Spectral Analysis.
(A) Evaluation Results, Acceptable.

TABLE 9-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis Water (pCi/liter)

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

(1) Results reported as activity ± 1 sigma.
(2) Ratio = Reported/Analytics (See Section 9.3).
(*) Sample provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.

TABLE 9-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis Water (pCi/liter)

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

(1) Results reported as activity ± 1 sigma.
(2) Ratio = Reported/Analytics (See Section 9.3).
(*) Sample provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.

TABLE 9-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis of Air Particulate Filters (pCi/filter)

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

(1) Results reported as activity ± 1 sigma.
(2) Ratio = Reported/Analytics (See Section 9.3).
(*) Sample provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.

TABLE 9-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis of Air Particulate Filters (pCi/filter)

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

(1) Results reported as activity ± 1 sigma.
(2) Ratio = Reported/Analytics (See Section 9.3).
(*) Sample provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.

TABLE 9-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis of Air Particulate Filters (pCi/filter)

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

(1) Results reported as activity ± 1 sigma.
(2) Ratio = Reported/Analytics (See Section 9.3).
(*) Sample provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.

TABLE 9-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis Milk (pCi/liter)

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

(1) Results reported as activity ± 1 sigma.
(2) Ratio = Reported/Analytics (See Section 9.3).
(*) Sample provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.

TABLE 9-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis Milk (pCi/liter)

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

(1) Results reported as activity ± 1 sigma.
(2) Ratio = Reported/Analytics (See Section 9.3).
(*) Sample provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.

TABLE 9-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis Soil (pCi/gram)

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

(1) Results reported as activity ± 1 sigma.
(2) Ratio = Reported/Analytics (See Section 9.3).
(*) Sample provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.
(D) Evaluation Results, Disagreement.
(NC) Nonconformity report number.

TABLE 9-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis Vegetation (pCi/gram)

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	REFERENCE LABORATORY* (1)	RATIO (2)
06/14/01	E-2679-05	VEGETATION pCi/gram	Ce-141	0.274±0.022 0.304±0.023 0.288±0.022 Mean = 0.289±0.014	0.271±0.005	1.07, A
			Cr-51	0.283±0.119 0.344±0.123 0.327±0.104 Mean = 0.318±0.073	0.373±0.006	0.85, A
			Cs-134	0.176±0.021 0.241±0.020 0.264±0.017 Mean = 0.227±0.012	0.224±0.004	1.01, A
			Cs-137	0.202±0.020 0.197±0.019 0.225±0.017 Mean = 0.208±0.011	0.202±0.003	1.03, A
			Mn-54	0.276±0.021 0.269±0.022 0.266±0.019 Mean = 0.270±0.013	0.250±0.004	1.08, A
			Fe-59	0.174±0.037 0.153±0.038 0.180±0.030 Mean = 0.169±0.021	0.146±0.003	1.16, A
			Zn-65	0.305±0.040 0.219±0.042 0.327±0.035 Mean = 0.284±0.024	0.302±0.005	0.94, A
			Co-60	0.231±0.016 0.262±0.017 0.244±0.013 Mean = 0.246±0.009	0.225±0.004	1.09, A
			Co-58	0.184±0.019 0.177±0.019 0.157±0.016 Mean = 0.173±0.011	0.160±0.003	1.08, A

(1) Results reported as activity ± 1 sigma.
(2) Ratio = Reported/Analytics (See Section 9.3).
(*) Sample provided by Analytics, Inc.
(A) Evaluation Results, Acceptable.

TABLE 9-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis Water (Bq/liter)

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

(1) Results reported as activity ± 1 sigma.
(2) Ratio = Reported/EML(See Section 9.3).
(*) Sample provided by Environmental Measurements Lab., Dept. of Energy.
(A) Evaluation Results, Acceptable.

TABLE 9-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gamma Analysis Air Particulate Filters (Bq/filter)

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

(1) Results reported as activity ± 1 sigma.
(2) Ratio = Reported/EML(See Section 9.3).
(*) Sample provided by Environmental Measurements Lab., Dept. of Energy.
(A) Evaluation Results, Acceptable.

TABLE 9-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gross Beta Analysis of Water (Bq/liter)

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

(1) Results reported as activity ± 1 sigma.
(2) Ratio = Reported/EML (See Section 9.3).
(*) Sample provided by Environmental Measurements Lab., Dept. of Energy.
(A) Evaluation Results, Acceptable.
(N) Evaluation Results, Not Acceptable.

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

TABLE 9-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Tritium Analysis of Water (Bq/liter)

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

(1) Results reported as activity ± 1 sigma.
(2) Ratio = Reported/EML (See Section 9.3).
(*) Sample provided by Environmental Measurements Lab., Dept. of Energy.
(A) Evaluation Results, Acceptable.
(B) Analysis performed by vendor laboratory: Environmental Inc., Midwest Laboratory
(C) Analysis performed by vendor laboratory: Duke Engineering and Services, Environmental Laboratory, Marlborough MA.

TABLE 9-1 (Continued)
INTERLABORATORY INTERCOMPARISON PROGRAM
Gross Beta Analysis of Air (Bq/filter)

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

(1) Results reported as activity ± 1 sigma.
(2) Ratio = Reported/EML (See Section 9.3).
(*) Sample provided by Environmental Measurements Lab., Dept. of Energy.
(A) Evaluation Results, Acceptable.

9.5 REFERENCES

9.5.1 Semi-Annual Report of the Department of Energy, Office of Environmental Management, Quality Assessment Program, EML 613, June 2001.

9.5.2 Semi-Annual Report of the Department of Energy, Office of Environmental Management, Quality Assessment Program, EML 615, December 2001.

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