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NewYorkPower Authority

Harry P. Salmon, Jr.
Resident Manager

April 30, 1992
JAFP-92-0358

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

Attention: Thomas T. Martin
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 1991 Radiological Environmental Operating Report which covers the operating period of January 1, 1991 through December 31, 1991. 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,

HARRY P. SALMON, JR.

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Enclosures

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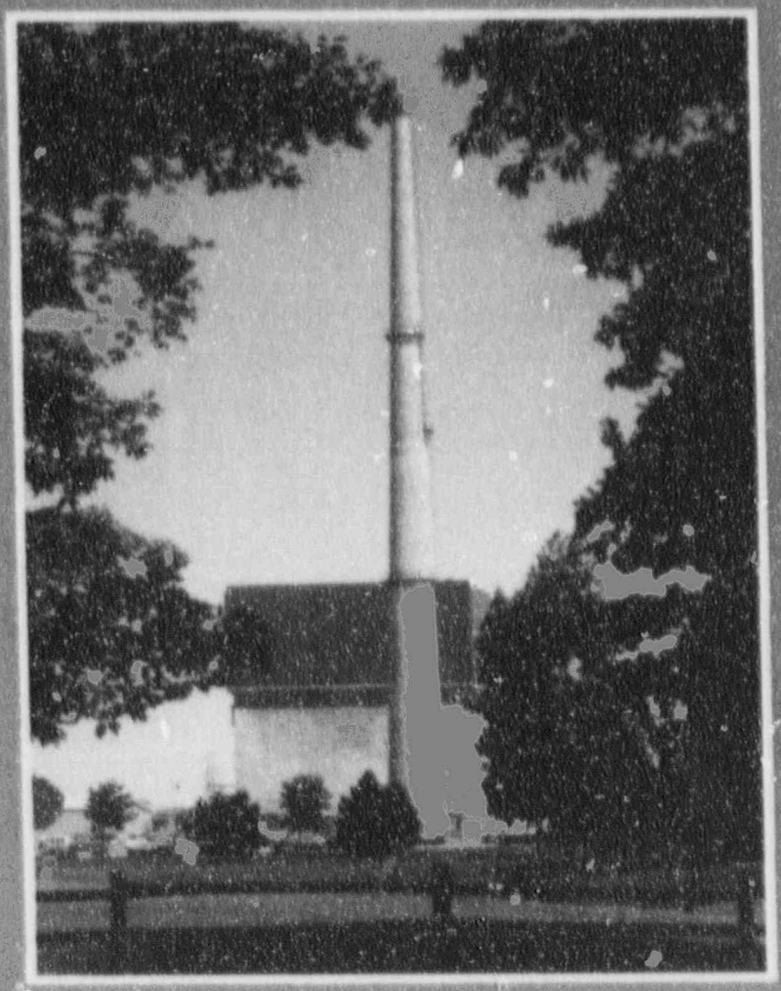
1991 Radiological Environmental Operating Report

James A. FitzPatrick Nuclear Power Plant



New York Power Authority

NEW YORK POWER AUTHORITY

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

JANUARY 1, 1991 - DECEMBER 31, 1991

FOR

JAMES A. FITZPATRICK NUCLEAR POWER PLANT

FACILITY OPERATING LICENSE DPR-59

DOCKET NUMBER 50-333

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1.0 EXECUTIVE SUMMARY

This 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 (NRC). This report contains a description of the program, the presentation of data and an evaluation of the results. In addition to the routine program results, the results and assessment of the environmental samples collected in response to the inadvertent release of radioactive material to the environment on March 18, 1991 has been provided as an appendix to this report.

The analytical results from the 1991 Environmental Monitoring Program showed that the routine operation of the James A. FitzPatrick Nuclear Power Plant had no significant impact on the environment. It is further noted that the 1991 Surveillance Program has demonstrated that there has been no significant short term or chronic long term affect on the environment from the March 18, 1991 release of radioactive material.

The REMP is used to measure radioactivity in the aquatic and the terrestrial pathways. The aquatic pathways include Lake Ontario fish, water, and lake shore sediment. Measurements of the samples representing these pathways showed results consistent with historical levels.

Terrestrial pathways evaluated airborne particulates and radioiodine, milk, food products and direct radiation. Direct radiation includes radiation emitted from buildings and structures of the plant, cosmic radiation, and the naturally occurring radioactive materials found in the soil, air and water. Analysis of all terrestrial radiation pathways demonstrated that there has been no detectable increased radiation levels as a result of plant operation. The radiation levels and concentration of radionuclides in the environment are consistent with historical levels.

This report contains a description and conduct of the REMP as required by Technical Specifications. It also contains the results, data evaluation, dose evaluation, and data trends for each sample media. Also included are the land use census and the results of the Quality Assurance/Quality Control interlaboratory comparisons.

In summary, the measured concentrations of radionuclides in the environment surrounding the JAFNPP are not increasing as a result of plant operation. In many cases, such as fish and airborne particulate activity, this report documents a downward trend in man-made radionuclides in the environment. Ecumenically, the operation of the plant did not result in a measurable significant dose to the population above natural background levels.

2.0 INTRODUCTION

2.1 SITE DESCRIPTION AND BACKGROUND

The New York Power Authority (NYPA) is the owner and licensee of the James A. FitzPatrick Nuclear Power Plant (JAFNPP). JAFNPP is a single unit boiling water reactor (BWR). The plant generates 2436 megawatts (MW) thermal output and 807 megawatts net electrical output. The plant is located on the eastern portion of the Nine Mile Point promontory approximately one-half mile due east of the Niagara Mohawk Power Corporation (NMPC) Nine Mile Point Nuclear Power Stations (NMPNPS). Initial fuel loading of the JAFNPP reactor core was completed in November of 1974. Initial criticality was achieved in late November 1974 and commercial operation began in July 1975. NMPNPS #1, a 620 MWe (net) BWR, has been operating since 1969. NMPNPS #2, a 1,100 Mwe (net) BWR, has been operating since March 1988.

The plant site is on the southeastern shore of Lake Ontario in the Town of Scriba, Oswego County, New York, approximately seven miles northeast of the City of Oswego, New York. The Universal Transverse Mercator System coordinates of JAFNPP are north 4,819,545.012 m, east 386,968.945 m. Syracuse, New York, located 40 miles south , is the largest metropolitan city in the area. The site consists of approximately 700 acres of partially wooded land and shoreline The land adjacent to the site is primarily used for recreation and residential purposes. The country side to the west, east and south is rolling terrain rising gently up from the lake composed mainly of glacial deposits. Approximately 34 percent of the land area in Oswego County is devoted to farming.

NYPA and NMPNC share the responsibility for the JAFNPP Radiological Environmental Monitoring Program (REMP). Technical Specifications for radiological monitoring of the environment for all three plants are similar. This allows the majority of the sampling and analysis to be a joint undertaking. Data generated by the program is shared by the three facilities. Review and publication of the data is done independently by each organization.

This report is submitted in accordance with Section 7.3.d of the Radiological Effluent Technical Specifications (RETS) to DPR-59, Docket 50-333.

2.2 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.

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

3.0 PROGRAM DESCRIPTION

To achieve the objectives listed in Section 2.2, 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 The United States Environmental Protection Agency (USEPA) Environmental Radioactivity Laboratory Intercomparison Program.

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 Science and Technology, Inc. (EA).

TABLE 3.0-1

OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

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

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 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 milch animals in 3 locations within 3.5 miles distant having the highest calculated site average D/Q. If there are none, then 1 sample from milch animals in each of 3 areas 3.5 to 5.0 miles distant having the highest calculated site average D/Q (based on all licensed site reactors)[h]. b. 1 sample from milch animals at a control location (9 to 20 miles distant and in a less prevalent wind direction)[d].	Twice per month, April through December (samples will be collected in January through March if I-131 is detected in November and December of the preceding year).	Gamma isotopic and I-131 analysis twice per month when milch animals are on pasture (April through December); monthly (January through March), if required[c].

TABLE 3.0-1 (CONTINUED)

OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

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 commerically 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 cenus as specified in 6.2, samples of at least 3 different kinds of broad leaf vegetation (such as vegetables) grown nearest each of two different off-site locations of highest predicted site average D/Q (based on all licensed site Reactors).	Once during harvest season.	Gamma isotopic[c] analysis of edible portions. (Isotopic to include I-131).
	One (1) sample of each of the similar broad leaf vegetation grown at least 9.3 miles distant in a least prevalent wind direction sector[d].		

NOTES FOR TABLE 3.0-1

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

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

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

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

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

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

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 a 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 Niagara Mohawk 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. Quarterly composite samples are analyzed for tritium.

In addition to the sample results for the JAFNPP and Oswego Steam Station collection sites, data is presented for the Nine Mile Point Unit 1 and Unit 2 facility inlet canal samples and 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 3.3-2.

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 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 east 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 seven farms during the year. These farms included six 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 1991 there were no milk sample locations within 5.0 miles that were suitable for sampling based on production capabilities. There were however, six optional locations beyond five miles that were sampled as 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 locations 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 maximum of three species per location are used.

b) Samples composed of more than 1 kilogram of single species from the same location are divided into samples of 1 kilogram each. A maximum of three samples per species per location are used. Weight of samples are the edible portions only.

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 for analysis in insulated containers. 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 Teledyne Isotopes of Westwood, New Jersey. Transit and control TLDs accompany each shipment between the site and the vendor's laboratory and accompany the TLDs when they are being placed or collected in the field. TLD data results are corrected using transit and control TLDs data.

Five different regions around the site are evaluated using environmental TLDs.

- On-site areas (areas within the site boundary not required by the RETS)
- Site boundary area in each of the sixteen meteorological sectors
- An outer ring of TLDs (located four to five miles from the site in the eight land based meteorological sectors)
- Special interest TLDs (located at sites of high population density and use)

- Control TLDs located at sites beyond significant influence of the site

Special interest TLDs are located at or near large industrial sites, schools, or nearby towns or communities. Control TLDs are located to the southwest, south and east-northeast of the site at distances of 12.6 to 19.8 miles.

TLDs used for the 1991 program were constructed of rectangular teflon wafers impregnated with 25 percent $CaSO_4$:Dy phosphor. Badges are sealed in a polyethylene package to ensure dosimeter integrity. TLD packages were 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 ANALYSIS PERFORMED

The majority of environmental sample analyses are performed by the James A. FitzPatrick Environmental Laboratory (JAFEL). TLD, tritium and canal I-131 analysis are performed by Teledyne Isotopes (TI). The following samples are analyzed at the JAFEL:

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

Quality assurance samples are analyzed inhouse and by Teledyne Isotopes N.J. and Teledyne Isotopes Midwest.

3.3 SAMPLE LOCATION MAPS

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

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

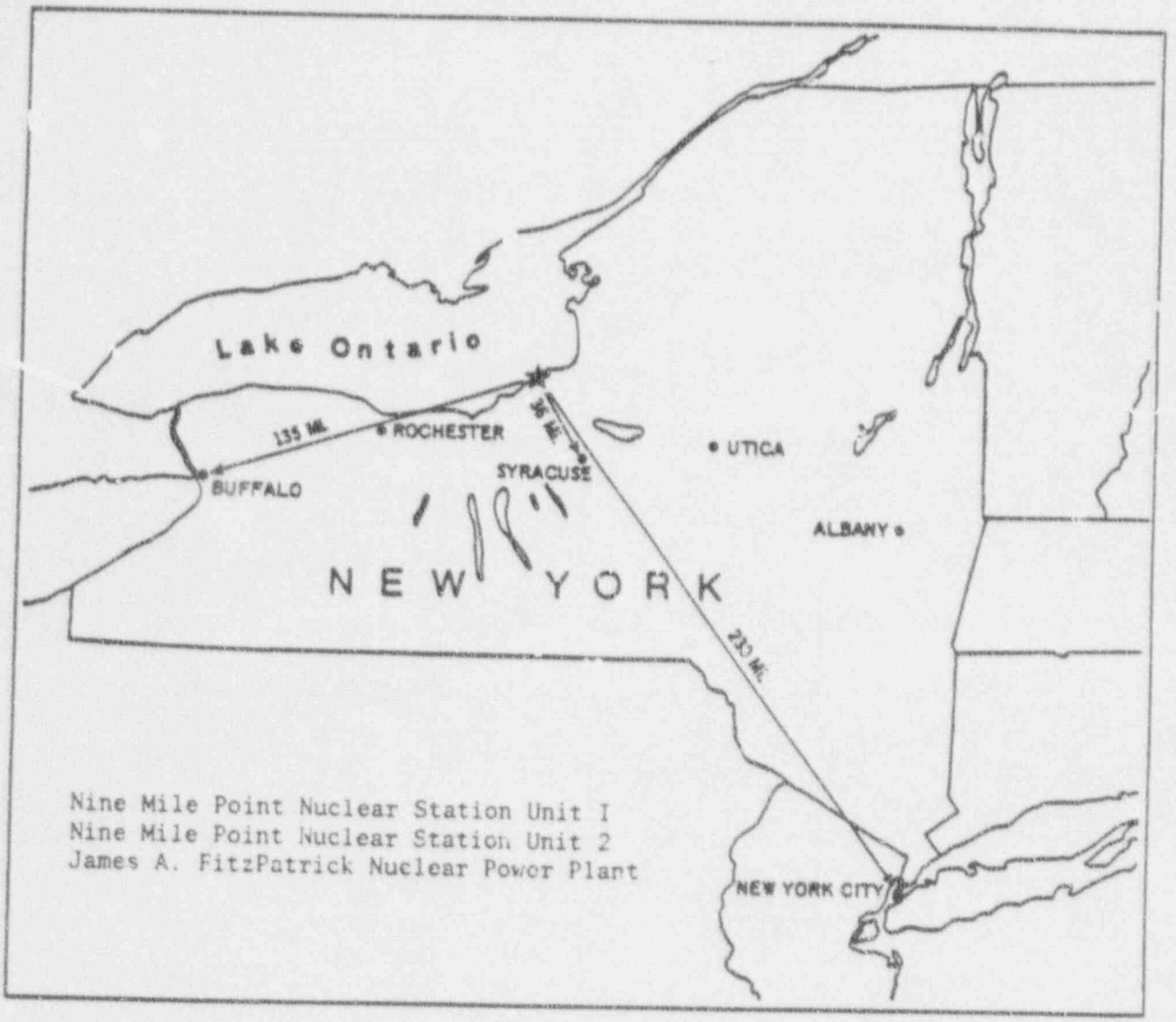
- o Sample Medium
- o Location designation, this column contains the key for the sample location and is consistent with designation on the sample location maps and on the sample results data tables.
- o Location description
- o Degrees and distance of the sample location from the site.

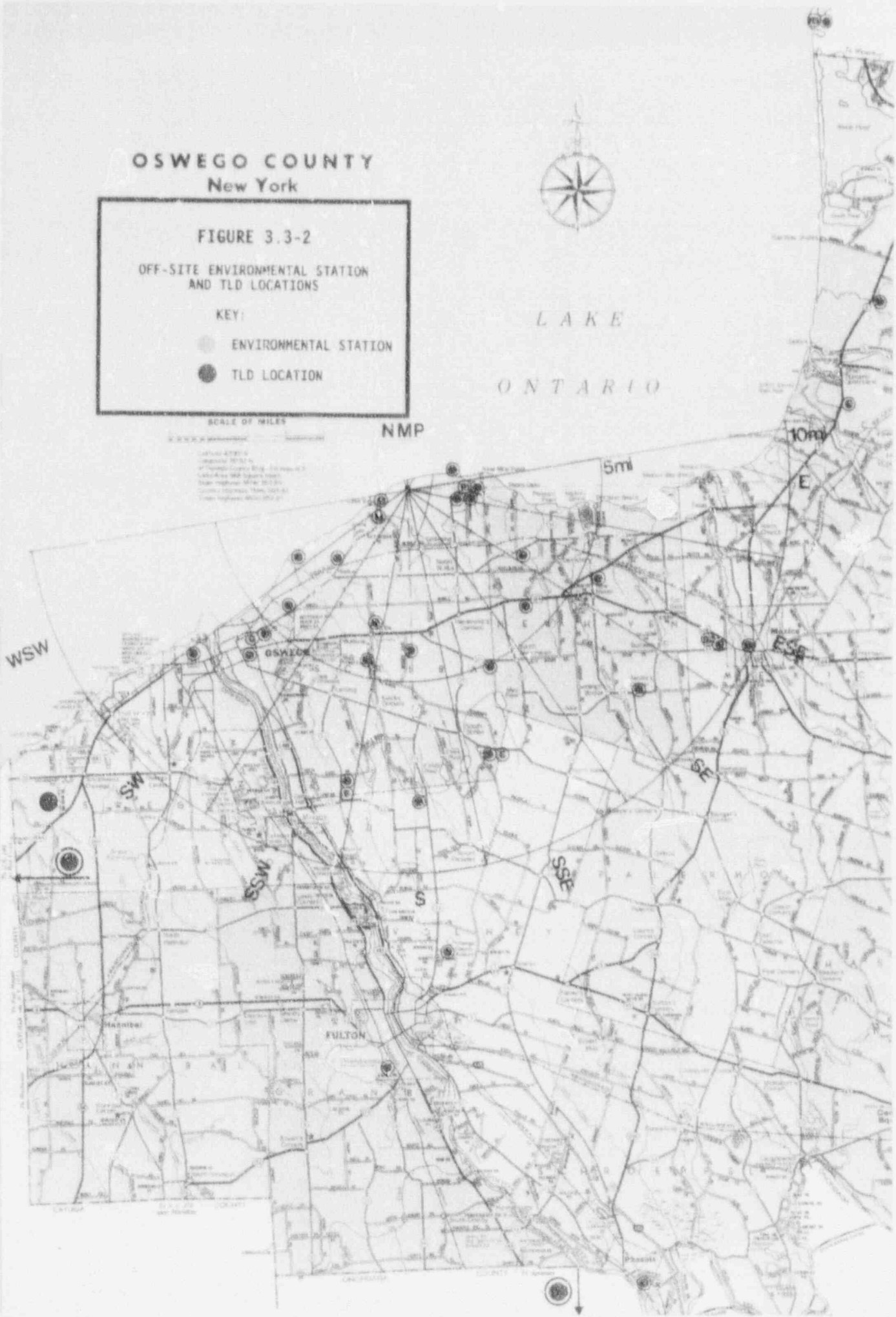
3.3.1 LIST OF FIGURES

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

FIGURE 3.3-1

NEW YORK STATE MAP




OSWEGO COUNTY
New York
FIGURE 3.3-2
OFF-SITE ENVIRONMENTAL STATION AND TLD LOCATIONS
KEY:
ENVIRONMENTAL STATION
TLD LOCATION
SCALE OF MILES
NMP
LAKE
ONTARIO
5mi
10mi
E
ESE
SE
SSE
S
SSW
SW
WSW
OSWEGO
FULTON

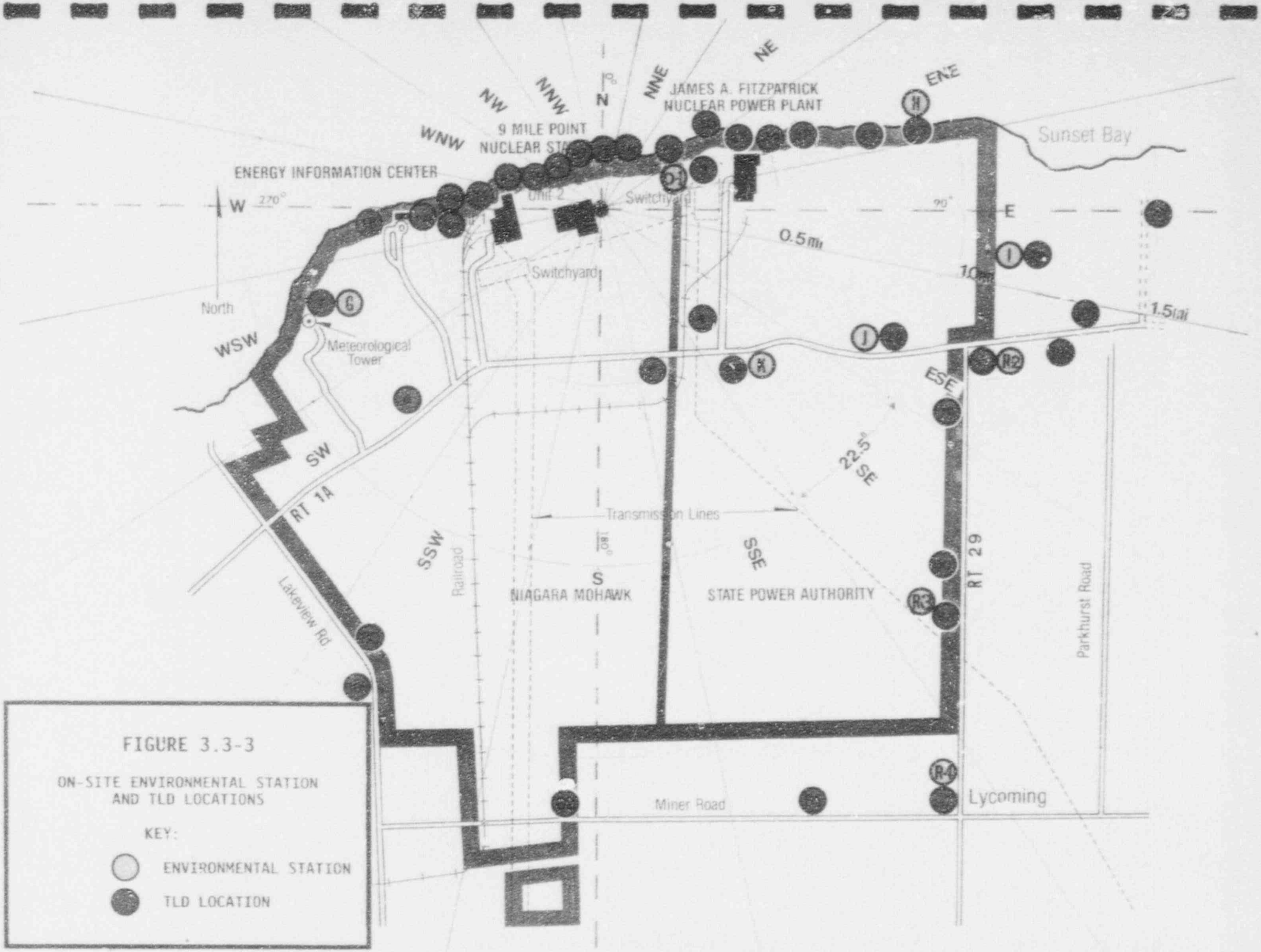


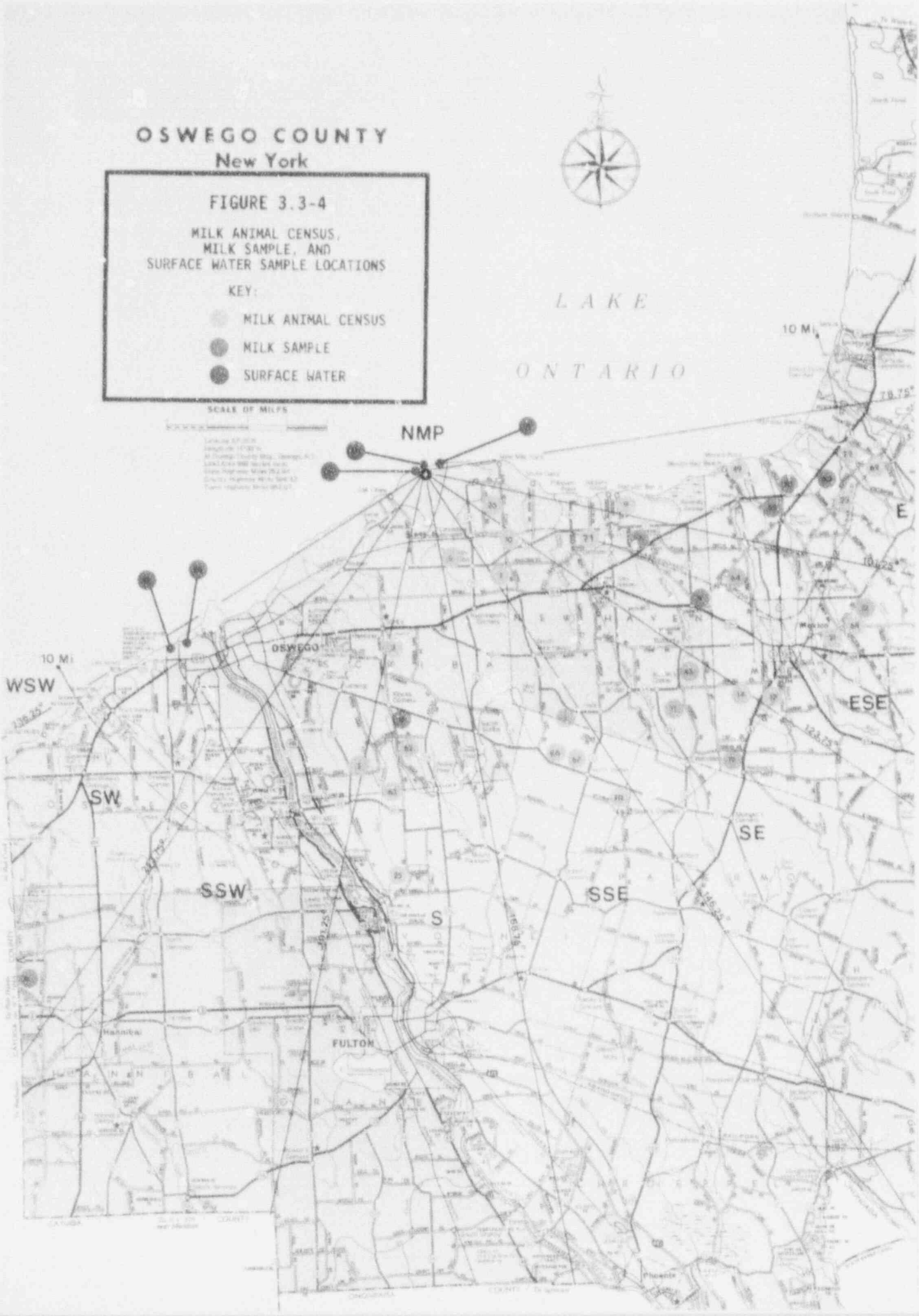
FIGURE 3.3-3

ON-SITE ENVIRONMENTAL STATION
AND TLD LOCATIONS

KEY:

ENVIRONMENTAL STATION

TLD LOCATION


OSWEGO COUNTY
New York
FIGURE 3.3-4
MILK ANIMAL CENSUS,
MILK SAMPLE, AND
SURFACE WATER SAMPLE LOCATIONS
KEY:
MILK ANIMAL CENSUS
MILK SAMPLE
SURFACE WATER
SCALE OF MILES
LAKE
ONTARIO
NMP
10 Mi
E
ESE
SE
SSE
S
SSW
SW
WSW
OSWEGO
FULTON

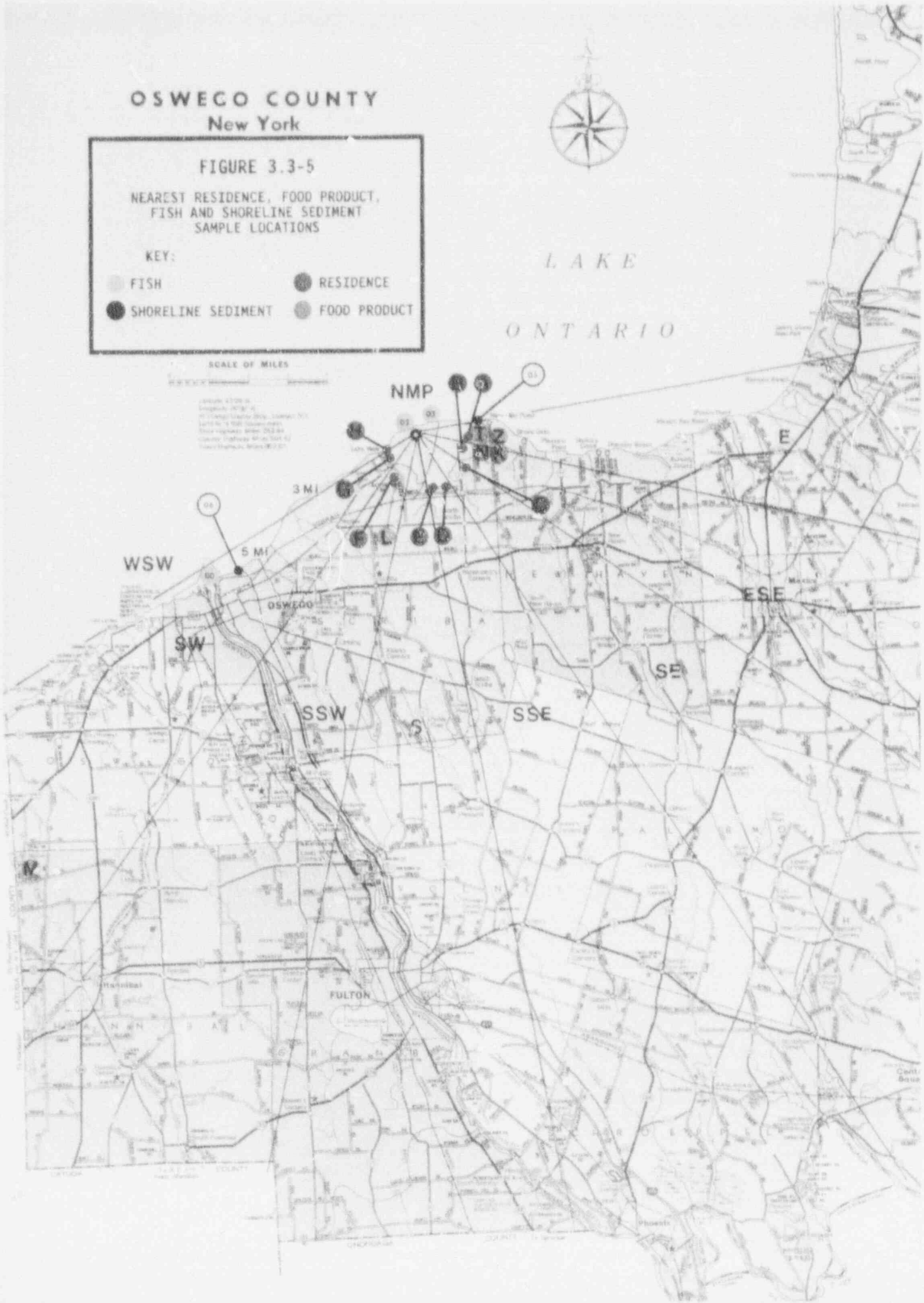

OSWEGO COUNTY
New York
FIGURE 3.3-5
NEAREST RESIDENCE, FOOD PRODUCT, FISH AND SHORELINE SEDIMENT SAMPLE LOCATIONS
KEY:
FISH
RESIDENCE
SHORELINE SEDIMENT
FOOD PRODUCT
SCALE OF MILES
LAKE
ONTARIO
NMP
3 MI
5 MI
WSW
SW
SSW
S
SSE
SE
ESE
E
OSWEGO
FULTON

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	305° at 0.3 miles
	10	Oswego City Water	240° at 7.8 miles
	11	Nine Mile Point Unit 2 Inlet	304° 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	71° 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	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-luminescent Dosimeters (TLDs)	53	Fulton High School	183° at 13.7 miles
	54	Mexico High School	115° at 9.3 miles
	55	Pulaski Gas Substation, Route 5	75° at 13.0 miles
	56*	New Haven Elementary School	123° at 5.3 miles
	58*	County Route 1 and Alcan	220° at 3.[illegible] 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 0.1 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.[illegible] 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 Camp Site	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-luminescent Dosimeters (TLDs)	99	Nine Mile Point Road	88° at 1.8 miles
	100	County Route 29 and Lake Road	104° at 1.1 miles
	101	County Route 29	132° at 1.5 miles
	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
	113	Baldwinsville-Control	170° at 24.7 miles
Cows Milk	7*	Indicator Location	107° at 5.5 miles
	16*	Indicator Location	190° at 5.9 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
	65*	Control Location	220° at 17.0 miles
Food Products	K	Indicator Location	96° at 1.7 miles
	L	Indicator Location	115° at 1.9 miles
	T	Indicator Location	84° at 1.6 miles
	N	Indicator Location	218° at 1.2 miles
	Z	Indicator Location	95° at 1.7 miles
	M	Control Location	225° at 15.6 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.

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 spring. It is conducted by sending questionnaires to previous milk 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 Co-Operative 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 to a distance out to 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 PROGRAM CHANGES

No changes were made to the environmental sample locations required by the Technical Specifications or as specified in the Off-site Dose Calculation Manual. The following additions were made to the optional garden (food product) sample locations:

1. Food product (garden) locations L and N were added to the sample program during 1991. Locations L and N are optional sampling locations.

2. Also during 1991, food product (garden) locations P and O were not utilized by the sampling program because of either sample unavailability or because the location had a low deposition potential as a result of the addition of locations L and N.

3.6 DEVIATION FROM THE PROGRAM

Exceptions to the 1991 sample program concerns those samples or monitoring requirements which are required by the Technical Specifications. This section addresses the reporting requirements of Section 6.1.a of the RETS.

The following are exceptions to the program as specified by the Technical Specifications:

1. The air sampling pump at R-4 off-site environmental sampling station was inoperable from January 14, 1991 (0200 hours) to January 15, 1991 (0800 hours). The inoperability was caused by a vacuum pump mechanical failure.

2. The air sampling pump at R-3 off-site environmental sampling station was inoperable from March 4, 1991 (0105 hours) to March 4, 1991 (1310 hours). The inoperability was caused by the loss of electrical power due to a severe ice storm.

3. The air sampling pump at R-4 off-site environmental sampling station was inoperable from March 4, 1991 (0105 hours) to March 4, 1991 (1310 hours). The inoperability was caused by the loss of electrical power due to a severe ice storm.

4. The air sampling pump at R-2 off-site environmental sampling station was inoperable for 2 hours (0630 to 0830 hours) on December 3, 1991. The inoperability was caused by a mechanical failure. The pump was replaced.

The collective inoperable time period for the air monitoring program was less than 0.15% for the year.

Other occurrences of downtime for the optional air sampling stations were documented for 1991. However, these occurrences are not presented here because optional air sampling stations are not required by the Technical Specifications.

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_m), 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 calculate the mean (X_m) and the standard deviation (s):

A. Mean

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

where,

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

B. Standard Deviation

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

where,

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

s = standard deviation for the sample population.

3.7.2 ESTIMATION OF THE MEAN 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_m) and the associated propagated error.

A. Mean

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

where,

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

B. Error of the Mean (Reference 18)

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

where,

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

* Sigma (σ)

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

3.7.3 LOWER LIMIT OF DETECTION (LLD)

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

The LLDs are specified by the 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 3.1-8). 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 required by the RETS achieved the Lower Limit of Detection (LLD) specified by RETS Table 6.1-3.

TABLE 3.8-1

REQUIRED DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS

LOWER LIMIT OF DETECTION (LLD)

Analysis	Water (pCi/l)	Airborne Particulate or Gases (pCi/m^3)	Fish (pCi/kg, wet)	Milk (pCi/l)	Food Products (pCi/kg, wet)	Sediment (pCi/kg, dry)
gross beta	4	0.01				
H-3	3,000					
Mn-54	15		130			
Fe-59	30		260			
Co-58,59	15		130			
Zn-65	30		260			
Zr/Nb-95	15					
I-131[a]	15	0.07		1	60	
Cs-134	15	0.05	130	15	60	150
Cs-137	18	0.06	150	18	80	180
Ba/La-140	15			15		

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

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 1991

Medium (units)	Type and Number of Analysis	LLD	Indicator Locations: Mean (a) Range	Location (b) of Highest Annual Mean: Locations & Designation	Mean (a) 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	0.13 (2/2) 0.12 - 0.14	No. 5 1.5 @ 80°	0.13 (2/2) 0.12 - 0.14	<LLD	0
Fish (pCi/g-wet)	GSA (36):						
	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	0.029 (13/23) 0.018 - 0.045	No. 03 0.6 @ 55°	0.030 (8/12) 0.018 - 0.044	0.029(5/13) 0.021-0.034	0
Food Products (pCi/g-wet)	GSA (21):						
	I-131	0.06	<LLD		<LLD	<LLD	0
	Cs-134	0.06	<LLD		<LLD	<LLD	0
	Cs-137	0.08	0.039 (1/16) 0.039 - 0.039	No. N 1.2 @ 218°	0.039 (1/2) 0.039 - 0.039	<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 1991

Medium (units)	Type and Number of Analysis	LLD	Indicator Locations: Mean (a) Range	Location (b) of Highest Annual Mean: Locations & Designation	Mean (a) Range	Control Location: Mean (a) Range	Number of Nonroutine Reports
Surface (Lake) Water (pCi/liter)	H-3 (8):	3000	310 (3/4) 290 - 390	No. 3 0.5 @ 70°	310 (3/4) 290 - 390	190 (2/4) 180 - 200	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 1991

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
Milk (f) (pCi/liter)	GSA (126):					
	Cs-134	15	<LLD	<LLD	<LLD	0
	Cs-137	18	<LLD	<LLD	<LLD	0
	Ba/La-140	15	<LLD	<LLD	<LLD	0
	I-131(126):	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 1991

Medium (units)	Type and Number of Analysis	LLD	Indicator Locations: Mean (a) Range	Location (b) of Highest Annual Mean: Locations & Designation	Mean (a) Range	Control Location: Mean (a) Range	Number of Nonroutine Reports
Air Particulate and Radioiodine (d) (pCi/m^3)	G.B. (260):	0.01	0.015 (208/208) 0.006 - 0.033	R-4 0.015 1.8 @ 143°	(52/52) 0.007 - 0.032	0.014 (52/52) 0.007 - 0.028	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
TLD (mrem per standard month)	Gamma Dose (128):	N/A	5.4 (120/120) (c) 2.9 - 16.7	No. 85 0.2 @ 294°	12.2 (4/4) (e) 9.8 - 14.5	4.6 (8/8) 3.8 - 5.3	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.

(c) = Indicator TLD locations are: #7, 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 RESULTS EVALUATION AND DISCUSSION

Each year the results of the Annual Radiological Environmental Monitoring Program are evaluated considering natural processes in the environment and the array of past 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, risk estimates to the general population based on environmental concentrations, effectiveness of plant effluent controls and specific research areas. The report not only presents the data collected during the 1991 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.

There are four separate groups of radionuclides that were detected in the environment as a result of the 1991 sampling program. The first of these groups consists of those radionuclides that are naturally occurring. It is important to realize that the environment contains a broad inventory of naturally occurring radioactive elements. Components of natural background include external cosmic and terrestrial radiation, radionuclides deposited in the body, and radon and its decay products. Naturally occurring radionuclides, such as Th-228, Ra-226, Be-7 and K-40 contribute, along with radon, to the annual per capita background dose which is equal to approximately 300 mrem per year (Reference 17). Comparisons to natural background radiation are made throughout this section to place surveillance program results into perspective and to aid the reader in determining what, if any, significance is associated with the Radiological Environmental Monitoring Report (REMP) results.

The second group of radionuclides that were detected are a result of the detonation of thermonuclear devices in the earth's upper atmosphere. Atmospheric nuclear testing during the early 1950s produced a significant 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 to October 1980. The resulting fallout or deposition from these tests has influenced the background radiation in the vicinity of the site and was evident in many of the sample medias analyzed during the 1981 Environmental Surveillance Program. Cs-137 is currently the major remnant of this testing and is still detected in a number of environmental media.

A third group of radionuclides was detected as a result of the Chernobyl accident which occurred in the Soviet Union in April 1986. The resulting fallout or deposition from this accident influenced the background radiation in the vicinity of the site and was easily detected in many of the sample media analyzed during 1986. Quantities of Nb-95, Ru-103, Ru-106, I-131, La-140, Cs-134, and Cs-137 were detected in air particulate samples during May and June of 1986. Milk samples collected and analyzed after April, 1986 contained measurable concentrations of I-131 and Cs-137. The origin of these radionuclides was a direct result of fallout from the Chernobyl accident. During 1987, Cs-137 was detected in several milk samples collected during the first half of the grazing season. In 1988, Cs-137 was detected in one milk sample. The presence of Cs-137 in the milk samples is attributed to the ubiquitous concentrations of Cs-137 from weapons testing and from the Chernobyl releases.

The fourth group of radionuclides that may be detected in the environment are those that are related to man-made nuclear technology. These radionuclides are a byproduct of nuclear detonations, the Chernobyl accident, and the operation of light water reactors thus making an evaluation of the production source difficult, if not impossible. During 1991, H-3 and Cs-137 were the only potentially plant-related radionuclides detected in the RETS samples. In addition to these radionuclides, Zn-65 was detected in several non-RETS samples.

A number of factors must be considered in performing radiological data evaluation and interpretation. The evaluation and interpretation is made at several levels including trend analysis and dose to man. An attempt has been made not only to report the data collected during 1991, but also to assess the significance of the

radionuclides detected in the environment as compared to natural radiation sources. It is important to note that detected concentrations of radionuclides that resulted from the activities of man are very small and are not of 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 the NCRP Report No. 93 (Reference 17). This average dose includes such exposure sources as natural, occupational, weapons testing, consumer products, medical, etc. The 1987 per capita dose rate due to natural sources was 300 mrem per year. The per capita radiation dose from nuclear power production nation wide is less than one mrem per year (Reference 10).

Background gamma radiation in the environs of the Nine Mile Point Site, resulting from radionuclides in the atmosphere and the ground, accounts for approximately 60 - 65 mrem per year. This dose is a result of radionuclides of cosmic origin (for example, Be-7), of a primordial origin (Ra-226, K-40, and Th-232) and, to a much smaller extent, of a man-made origin from weapons testing. A dose of 60 mrem per year, as a background dose, is significantly greater than any possible doses as a result of operations at the site during 1991.

The results for each sample media is discussed in detail in Section 5.0. This includes a summary of the result, the estimated environmental impact, a detailed review of any relevant detections with a dose to man estimate where appropriate, and an analysis of possible 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 monitor the secondary pathways and to maintain the analytical data base established in 1975 when the plant began commercial operation. These additional samples include; aquatic vegetation (cladophora), bottom sediment, mollusk, milk (Sr-90), meat/poultry and soil samples. In addition to the optional sample media, many additional locations are sampled and analyzed for those pathways required by Technical Specifications. These additional sample locations are obtained to ensure that the important environmental pathways are monitored in a comprehensive manner. Data from additional sample locations common with the Technical Specification required sample media are included in the data presentation and evaluation. When additional locations are included, the use of this data will be specifically noted in Section 5.0.

Section 6.0 contains the analytical results for the sample media addressed in this report. 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, a tool by which trends are discerned. 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 advance 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 1991 sampling period.

5.1.1 SHORELINE SEDIMENT RESULTS

A. Results Summary

A total of four sediment samples were collected for the 1991 sample program. Small concentrations of Cs-137 were detected in the two samples taken at Sunset Beach which is the indicator location. Cs-137 was not detected at the control location. No other plant related radionuclides were detected in the 1991 shoreline sediment samples. 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. Cs-137 was also detected at the indicator location in 1989 and 1990. The level of Cs-137 measured in 1991 shows a significant reduction in mean concentration from 0.29 pCi/g (1989 and 1990) to 0.13 pCi/g in 1991. The calculated potential whole body and skin doses which may result from the measured Cs-137 concentrations are insignificant when compared to natural background doses.

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 at both the indicator and control locations. The second shoreline sample collection was made in October 1991 again, at both the indicator and the control locations. The results of these sample collections are presented in Section 6.0, Table 1. Several radionuclides were detected in sediment samples using gamma spectral analysis.

Three of these radionuclides were naturally occurring. K-40 was detected at both the control location and indicator location. The results ranged from 15.4 pCi/g (dry) to 17.8 pCi/g (dry) at the indicator location, and 10.9 pCi/g (dry) to 13.4 pCi/g (dry) at the control location. Concentrations of AcTh-228 and Ra-226, which are also naturally occurring, were also detected at both indicator and control locations.

Cs-137 was present in the indicator samples collected for the 1991 program. The mean concentration for these two samples was 0.13 pCi/g (dry). Cs-134 was not detected in the indicator or control samples collected for the 1991 program. The principle source of Cs-137 released to the environment has been the atmospheric testing of nuclear weapons. Cs-137 and Cs-134 are both produced in fission reactors and were introduced into the environment from the accident at Chernobyl, but only Cs-137 is found in weapons test debris. Since Cs-134 has a significantly shorter half-life, detected concentrations of Cs-137 attributable to plant operations (e.g., recent releases), should be accompanied by Cs-134. An absence of such corroborating Cs-134 concentrations would indicate that the presence of Cs-137 in these samples is not distinguishable from the existing background and should be attributed primarily to weapons testing and residual concentrations; i.e., not to recent plant operations.

The lack of measurable Cs-137 in the control samples may be attributed to localized concentration factors. Few shoreline regions west of the site contain fine sediment and/or sand. 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 any consistency in shoreline sediment sampling. Soil samples in areas which are likely to be affected by plant operations, as well as soil beyond any influence from the site, all contain levels of Cs-137 equal to or greater than the concentration found in 1991 shoreline sediment. Cs-137 in soil samples is attributed to weapons testing fallout. Therefore, any shoreline sediment sample containing soil would 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 found 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:

- o A teenager spends 67 hours per year at the beach area or on the shoreline.

- o The sediment has a mass of 40 kg/m^2 (dry) to a depth of 15 cm.

- o The shoreline width factor is 0.3.

- o The maximum measured concentration of 0.14 pCi/g (dry) remains constant for the year.

Using these conservative parameters, the potential dose to the maximum exposed individual (teenager) would be 0.0005 mrem/year to the whole body and 0.0005 mrem/year to the skin. This calculated dose is very small and is insignificant when compared to the natural background annual dose of approximately 60 mrem.

D. Data Trends

The average Cs-137 concentrations in the shoreline sediment samples for 1991 was 0.14 pCi/g. The mean values for 1989 and 1990 were 0.29 pCi/g. The mean concentration for 1991 shows a reduction in levels by a factor of two.

A review of sample results for 1985 - 1988 indicate only naturally occurring radionuclides present in shoreline sediment. The five year results data base shows no increasing or positive trends for the presence of plant related radionuclides and as noted above, 1991 showed a significant reduction in Cs-137 concentrations.

Shoreline sediment sampling commenced in 1985. Prior to 1985, no data was available.

Tables 1 and 2 in Section 7.0 illustrates historical environmental data for shoreline sediment samples.

5.1.2 FISH SAMPLE RESULTS

A. Results Summary

A total of 35 fish samples were collected for the 1991 sample program. Analysis of the 1991 fish samples exhibited detectable concentrations of radionuclides related to past weapons testing and natural origins (naturally occurring). Small concentrations of Cs-137 were detected in approximately 50% of the fish samples collected from both the on-site and off-site locations. This is consistent with the previous year which had a positive detection in 40% of the samples. The ratio of positive detection to total samples collected was higher for the indicator samples than for the control samples. Detectable concentrations of K-40, a naturally occurring radionuclide, were found in all fish samples collected for the 1991 program. No other radionuclides were detected in the 1991 fish samples.

The detectable levels of Cs-137 in the fish samples are small. The control and indicator mean concentration values were equal at 0.29 pCi/g. These low levels of Cs-137 are of no environmental or dose to man significance. As noted above, the measured concentrations of Cs-137 in the fish samples are the result of fallout from past weapons testing. Comparable concentrations of Cs-137 are routinely found in samples of other aquatic media such as shoreline sediment, bottom sediment and aquatic vegetation. The potential whole body and critical organ doses calculated as a result of fish consumption by humans is extremely small. Doses received from both the indicator and control sample groups are equal and considered to be background exposures.

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 1991 results continue to show a long term downward trend in fish Cs-137 concentrations. With the exception of 1986, the mean indicator and control Cs-137 concentration for 1991 were the lowest measured values since the beginning of the surveillance program 17 years ago (1974).

B. Data Evaluation and Discussion

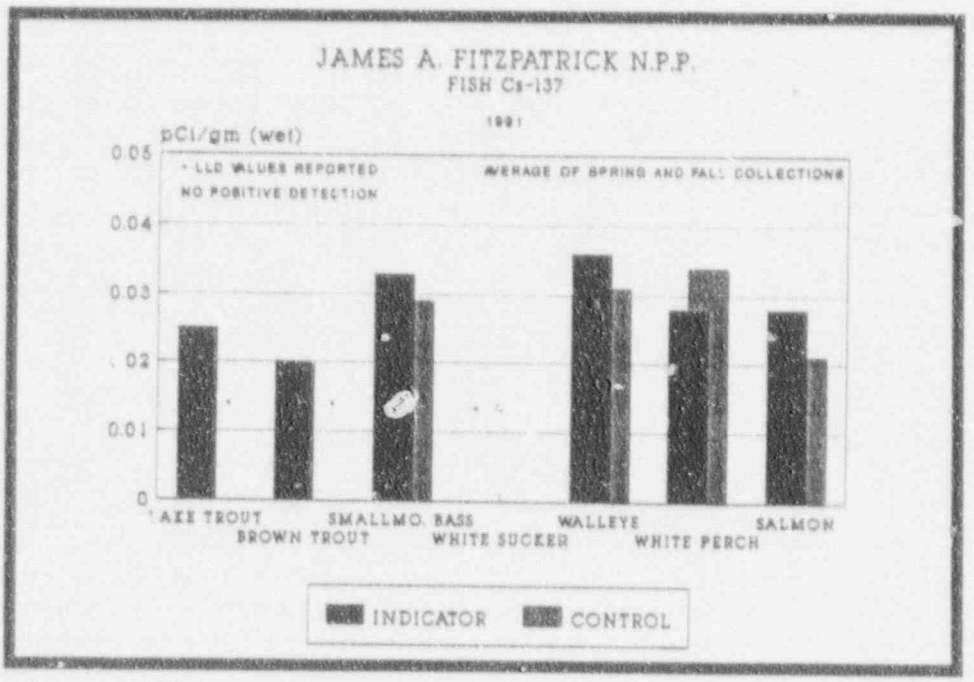
Fish collections were made utilizing gill nets at one location greater than five miles from the site (Oswego Harbor area), and at two locations in the vicinity of the lake discharges for the Nine Mile Point Unit #1 (#02), and the James A. FitzPatrick (#03) generating facilities. The Oswego Harbor samples 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 seventeen samples representing six individual species. Brown trout, lake trout, white sucker, smallmouth bass, walleye and white perch were collected from a combination of the lake sample locations. Brown trout, white sucker, smallmouth bass, white perch and lake trout where collected at all three sample locations. The fall fish collection was comprised of nineteen individual samples representing seven individual species. Lake trout, brown trout, smallmouth bass, white sucker, walleye, salmon and white perch samples were collected at the indicator sampling locations (NMP and JAF). One sample of each of the seven species was collected at the control location (Oswego Harbor).

Cs-137 was detected in five of the eleven indicator samples and in three of the six control samples collected during the spring. Indicator samples showed Cs-137 concentrations which ranged from a minimum of 0.018 pCi/g (wet) to a maximum of 0.044 pCi/g (wet). The control sample Cs-137 concentrations ranged from a minimum of 0.021 pCi/g (wet) to a maximum of 0.034 pCi/g (wet). The average indicator Cs-137 concentration of 0.033 pCi/g (wet) was slightly greater than the average control concentration of 0.032 pCi/g (wet). The indicator results however, are not significantly different from the control results and the concentrations of Cs-137 are considered to be representative of background concentrations. The maximum detected Cs-137 concentration in both the indicator and the control location was measured in samples of walleye.

In the fall collection, Cs-137 was detected in ten of the nineteen samples collected from the control (2 of 7) and indicator (8 of 12) locations. Indicator samples showed a mean Cs-137 concentration that was slightly greater than the control sample mean. The detected concentrations are not significantly different from one another with the indicator mean equal to 0.027 pCi/g (wet) and the control mean equal to 0.025 pCi/g (wet). The Cs-137 concentration in lake trout at the indicator locations ranged from 0.024 to 0.026 pCi/g (wet). The concentration of Cs-137 in the lake trout sample from the control location was <0.039 pCi/g (wet). Cs-137 was detected in perch samples collected at the control and indicator locations with the control mean being higher than the indicator mean. Cs-137 was detected in 1 of 2 brown trout samples from indicator locations at a concentration of 0.032 pCi/g (wet) and was not detected at the control location. White sucker samples collected at the indicator or control locations did not contain any detectable concentrations of Cs-137.

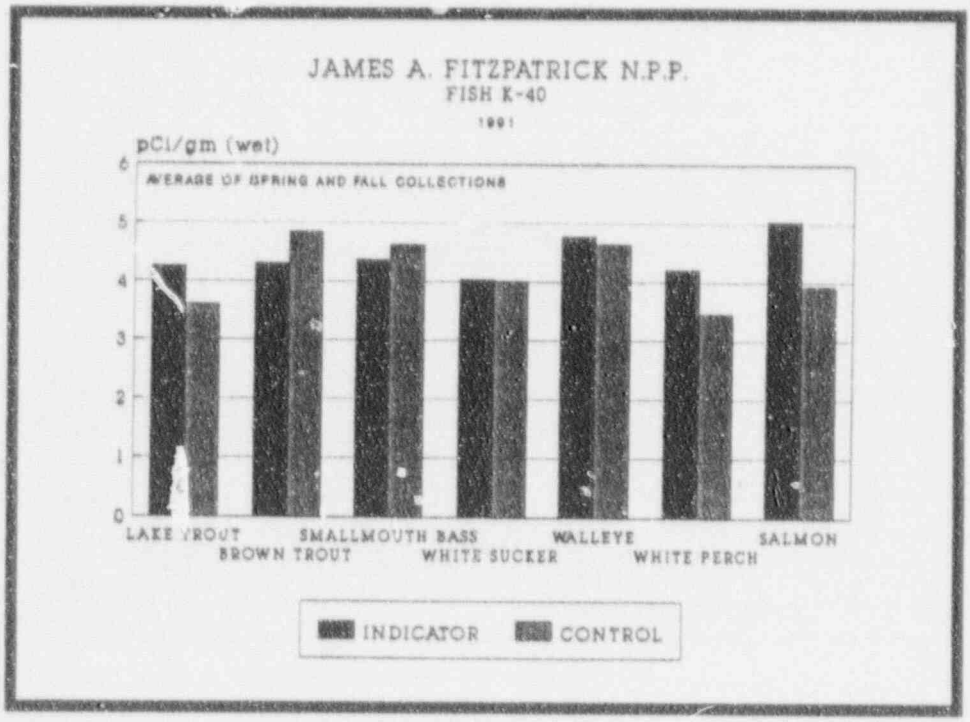
The following graph presents the average Cs-137 concentrations for the fish species analyzed for 1991. Walleye yields the highest average Cs-137 concentration for the indicator locations and white perch yields the highest average Cs-137 for the control location.



K-40 was detected in all of the spring samples collected. K-40 is a naturally occurring radionuclide, and is not related to power plant operations. Detectable concentrations of K-40 in the indicator samples ranged from 2.95 to 5.46 pCi/g (wet) and 2.42 to 5.10 pCi/g (wet) for the control samples. Ra-226, also naturally occurring, was found at varying levels at both the indicator and control locations. No other radionuclides were detected in the spring fish samples.

Naturally occurring K-40 was detected in all of the fall samples collected. Detectable concentrations of K-40 in the indicator samples ranged from 3.79 to 5.04 pCi/g (wet) and 3.57 to 4.75 pCi/g (wet) for the control samples. Ra-226, also naturally occurring, was detected intermittently at varying concentrations at the indicator and control location samples. No other radionuclides were detected in the fall fish samples.

The following graph presents the average K-40 concentrations for the fish species analyzed for 1991. Salmon yields the highest average K-40 concentration for the indicator locations and brown trout yields the highest average K-40 concentration for the control location.



C. Dose Evaluation

Some Lake Ontario fish species may be considered an important food source due to the local sport fishing industry. Therefore, these fish become an integral part of the human food chain. Based on the importance of fish in the local diet a conservative estimate of dose to potential man can be calculated. Assuming that an adult consumes 21.0 kg of fish per year (Regulatory Guide 1.109 maximum exposed age group) and the fish consumed contains an average Cs-137 concentration of 0.029 pCi/g (wet) (annual mean result of indicator samples for 1991), the whole body dose received would be 0.044 mrem per year. The organ of interest in this case is the liver which would receive a calculated dose of 0.065 mrem per year. The Cs-137 whole body and organ doses are conservative potential doses associated with consuming fish species from the Nine Mile Point area which are represented by the indicator samples. Due to the long half life of Cs-137, no radiological decay is assumed for the calculation of doses.

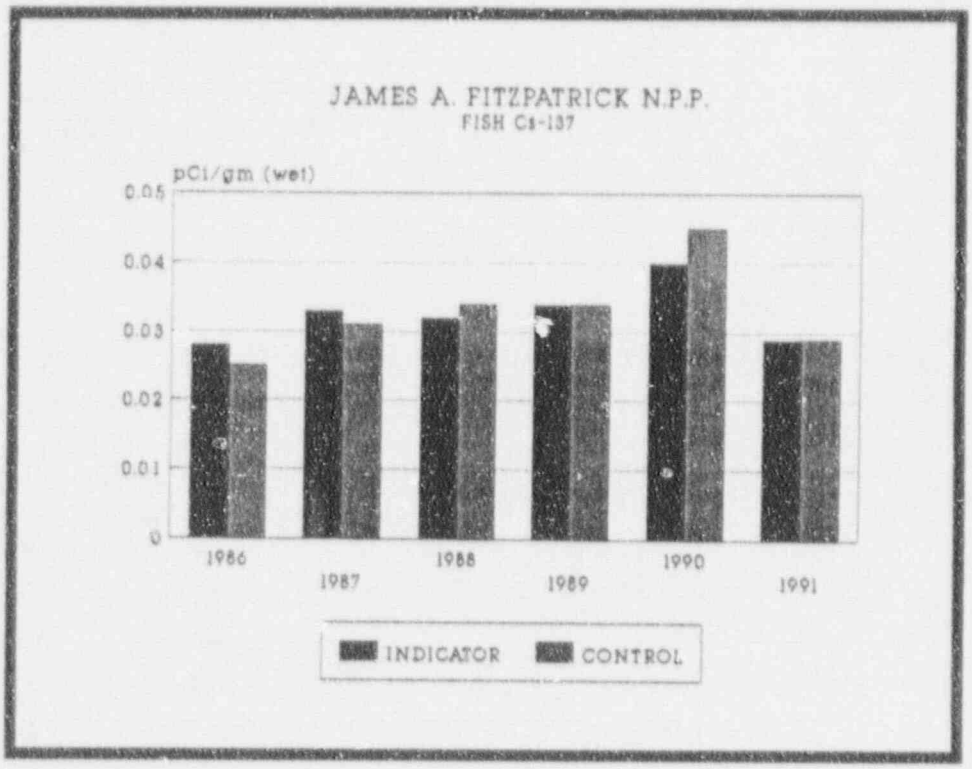
Conservative whole body and organ doses can be calculated for the consumption of fish from the control location as well. In this case the consumption rate is assumed to remain the same (21.0 kg per year) and the average annual Cs-137 concentration for the control samples is 0.029 pCi/g (wet) which is equal to the indicator concentration. The potential calculated Cs-137 whole body dose is 0.044 mrem per year and the associated dose to the liver is 0.065 mrem per year.

In summary, the potential whole body and organ doses observed as a result of consumption of fish is small. Doses received from the consumption of indicator and control sample fish would be the same. The dose to man received from both the indicator and control sample groups are considered to be background exposures.

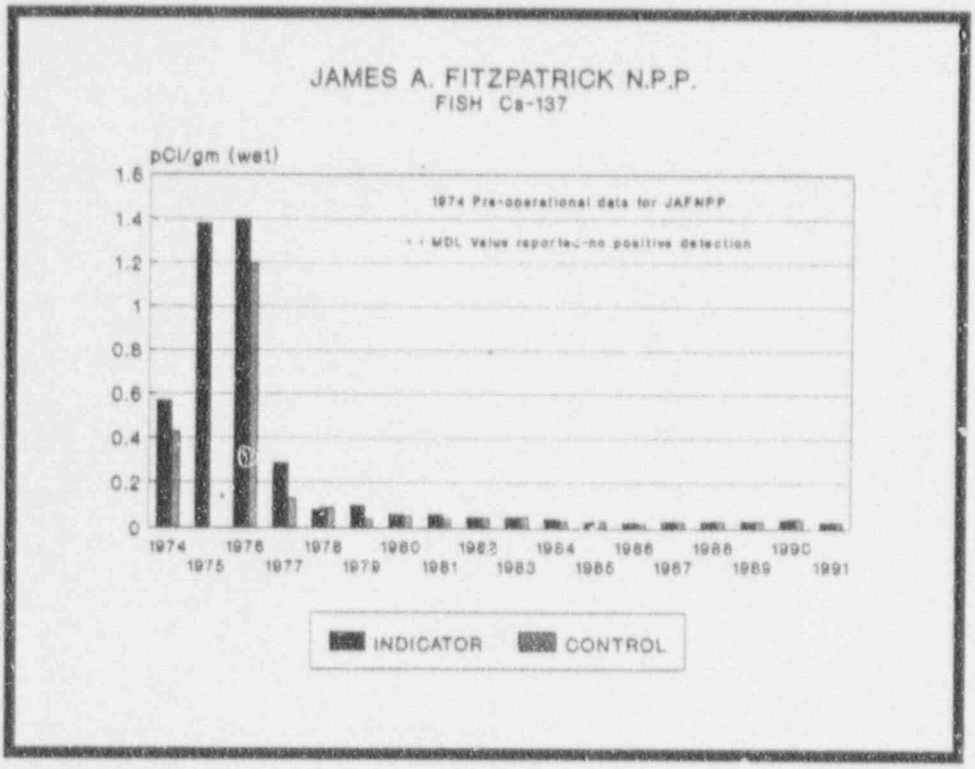
D. Data Trends

Results for the previous five years (1986 through 1991) have shown a fairly consistent stabilizing trend for Cs-137 levels in control and indicator samples. During the period of 1987 through 1990, control and indicator mean results increased slightly when compared to 1986. The

1991 results show a return to the lower 1986 levels. Concentrations for indicator samples has decreased from a maximum concentration of 1.4 pCi/g (wet) in 1976 to a minimum level of 0.028 pCi/g (wet) in 1986. Control sample results have also decreased from a maximum level of 1.2 pCi/g (wet) in 1976 to a minimum level of 0.025 pCi/g (wet) in 1986.



The general decreasing long term 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 since 1976 in fish are a result of weapons testing fallout, and the general downward trend in concentrations will continue as a function of ecological cycling and nuclear decay. There was no apparent effect from the 1986 Chernobyl Nuclear Plant accident during 1986 relative to Cs-137 results in fish samples although an effect may have been detected during the period of 1987 through 1991 since both indicator and control location mean results increased slightly.



The 1991 mean Cs-137 indicator concentration of 0.029 pCi/g (wet) shows a decrease in concentration from 1976 by a factor of approximately 41. Control sample results have decreased from a maximum level of 1.2 pCi/g (wet) in 1976 to a level of 0.029 pCi/g (wet) in 1991. Fish results for the 1991 indicator samples show a decrease in concentration by a factor of 19 when compared to preoperational data (1974) and by a factor of 48 compared to 1976.

Tables 7-2 and 7-3 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 required that monthly surface water samples be taken from the respective inlet canals of the JAFNPP and Niagara Mohawk's Oswego Steam Station. In conjur :tion with the RETS sample, three additional Lake Ontario surface water locations are sampled and analyzed. Gamma spectral analysis was performed on 24 monthly composite samples required by the RETS and on 36 monthly composite samples from the additional locations. The results from gamma spectral analysis indicate that only two radionuclides were detected in samples from the five locations collected for the 1991 Sampling Program. Both of these radionuclides are naturally occurring and are not plant related.

Quarterly composites from the same locations are analyzed for tritium. The 1991 annual average tritium concentration for the Oswego Steam Station Inlet (control location) was 360 pCi/l, which was higher than the annual average JAF inlet concentration of 310 pCi/l. The levels of tritium are routinely variable within the range of 200 - 500 pCi/l. The tritium results for 1991 are consistent with previously measured lake levels and indicate no measurable increase in tritium levels in the lake from operations at the site.

B. Data Evaluation and Discussion

Gamma spectral analysis was performed on monthly composite samples from five Lake Ontario sampling locations. K-40 and Ra-226 were detected in samples from the five locations over the course of the 1991 sampling program. Both of these radionuclides are naturally occurring and are not plant related.

K-40 was detected consistently in both of the Technical Specification required intake canals. The James A. FitzPatrick inlet canal samples showed K-40 was detected in all twelve monthly samples and ranged from 44 to 257 pCi/liter. K-40 in the Oswego Steam Station inlet canal

ranged from 46 to 246 pCi/liter. The additional sample locations at the Nine Mile Point Unit #1 Inlet Canal and the Nine Mile Point Unit #2 Inlet Canal showed K-40 concentrations which ranged 37 to 242 pCi/liter and from 24 to 244 pCi/liter respectively. K-40 in the Oswego City water samples was detected in eleven of the twelve monthly samples and ranged from 26 to 252 pCi/liter. Ra-226 was also detected intermittently in both locations required by Technical Specifications and at the other optional sample locations.

Tritium samples are quarterly samples that are a composite of the appropriate monthly samples. Tritium was detected in five of the eight samples taken at the two locations required by Technical Specifications. Tritium concentrations for the James A. FitzPatrick inlet canal ranged from <160 pCi/liter to 390 pCi/liter and showed a mean concentration of 310 pCi/liter. The Technical Specification control location (Oswego Steam Station inlet canal) showed tritium results which ranged from <100 pCi/liter to 200 pCi/liter. The first and fourth quarter tritium results for the control location were below the sensitivity of the analyses; which is reported as the Lower Limit of Detection (LLD). The result for the fourth quarter indicator sample were also below the sensitivity of the analysis and was reported as a lower limit of detection.

Tritium was also detected in nine of the twelve optional samples taken. The tritium results ranged from <160 pCi/liter to 590 pCi/liter for the optional samples taken. The maximum tritium concentration of 590 pCi/l was measured in the first quarter city water sample.

A summary of tritium results for the 1991 sample program is listed below:

Sample Location	Tritium Concentration pCi/liter Minimum	Maximum	Mean (Annual)
JAF Inlet	<160	390	310
Oswego Steam Inlet	<100	200	190
NMP #1 Inlet	<160	390	293
NMP #2 Inlet	<160	360	310
City Water Intake	<160	590	360

C. Dose Evaluation

The Oswego Steam Station is considered a control location because of its distance from the site and the action of lake current patterns and current patterns from the Oswego River located nearby. The 1991 annual average tritium concentration measured at the Oswego City water intake was higher than the Nine Mile Point Site tritium concentrations for 1991. The current patterns distinguish the Oswego City water intake as an "up-current" sampling point and the JAFNPP inlet canal as a "down-current" sampling point therefore, the operation of the Nine Mile Point Site is located such that it does not have a radiological impact on drinking water. The Oswego City water intake is located in the same general vicinity as the Oswego Steam Station inlet placing it upstream from the Nine Mile Point Site.

The measured H-3 can be evaluated in terms of the potential "maximum exposed individual". It is assumed that a child drinks 510 liters a year of water from the city water intake in Oswego. The tritium concentration in the water is considered to be 360 pCi/liter which is the annual average for the Oswego City water intake for 1991. The child could receive a potential dose of 0.04 mrem to the liver from ingestion of the 510 liters of water. This dose, when compared with the average annual dose from per capita radiation exposure of 300 mrem/year (Reference 17), is insignificant.

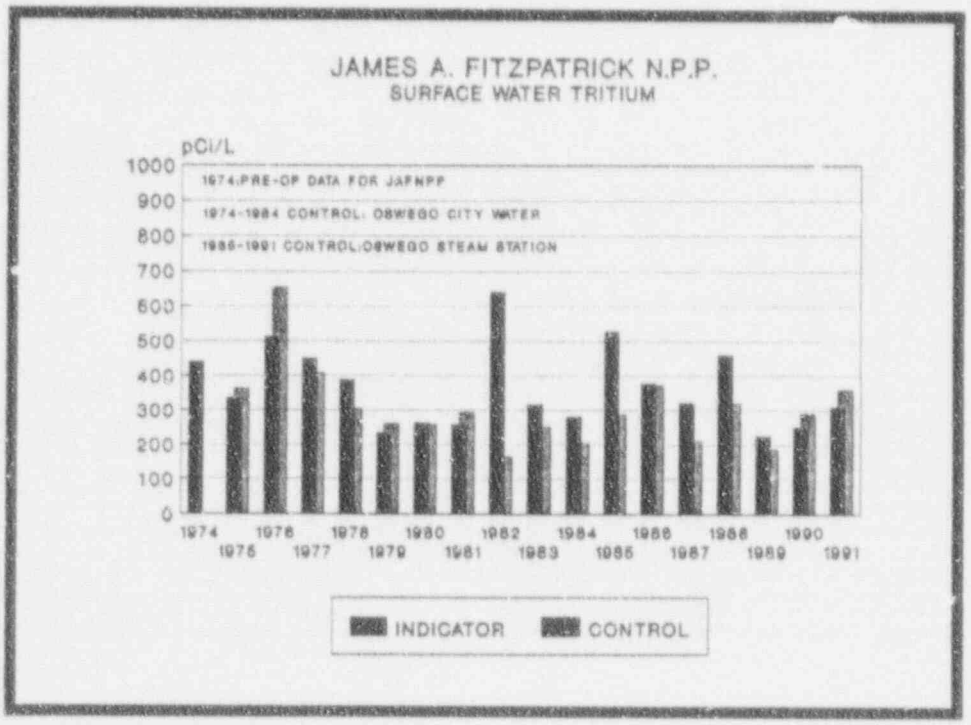
D. Data Trends

Tritium results for the 1991 lake water samples were consistent with results from the previous five years for both the indicator and control locations. The mean tritium concentrations for the period of 1986 -1990 range from 186 pCi/l to 373 pCi/l for the control and 225 pCi/l to 460 pCi/l for the indicator location. The mean 1991 tritium concentrations for the control and indicator locations were 360 pCi/l and 310 pCi/l respectively.

The 1991 indicator results are slightly higher than the previous two years and are lower than the mean concentration for the period of 1986 - 1988. The beginnings of a short term trend may be evident in reviewing the graphical data. This possible trend shows that the control and indicator values are tracking together.

Mean tritium results of the control location (Oswego Steam Station) cannot be evaluated with regard to long term historical data since sampling was only initiated at this location in 1985.

Some idea of the variability of historical control sample data can be obtained by a review of previous data from the City of Oswego drinking water samples. The drinking water samples are likely to be representative of the current control location because of the effects of the distance, predominate lake currents, and the discharge of the Oswego River. The Oswego City water intake is located in the same general vicinity as the Oswego Steam Station inlet. The maximum annual mean concentration of city water was found in 1976 (652 pCi/l) and the minimum in 1982 (165 pCi/l).



Annual mean tritium results from previous city water samples from 1976 to 1991 show that the tritium concentrations have fluctuated over the years. The maximum annual mean concentration was found in 1976 (652 pCi/liter) and the minimum in 1982 (165 pCi/liter). Results for the period of 1982 through 1989 shows that the indicator samples were higher than the control samples. Results for 1990 and 1991 show that the control samples to be higher.

5.2 TERRESTRIAL PROGRAM

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

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

Tables 6-5 through 6-14 represent the analytical results for the terrestrial samples collected for the 1991 reporting period.

5.2.1 AIR PARTICULATE GROSS BETA

A. Results Summary

Weekly, air samples were collected and analyzed for gross beta particulate activity. A total of 52 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 during 1991. These five locations are required by the Technical Specifications. The mean concentration of the control location , R-5, was 0.014 pCi/m^3 for 1991. The mean concentration for the indicator locations was 0.015 pCi/m^3 for 1991. The indicator and control results are essentially equal and show that there are no increased airborne radioactivity levels in the general vicinity of the site. These results, along with those measured in 1990 are the lowest mean gross beta concentration measure to date since the inception of the site Environmental Monitoring Program in 1969. The consistency of these low concentrations may indicate that the natural base line gross beta activity has been reached. It is possible that the manmade radionuclide contribution to the natural background levels can no longer be detected.

B. Data Evaluation and Discussion

Six on-site and nine off-site locations were sampled weekly for gross beta particulate activity. A total of 780 analyses were performed. Five of the nine off-site locations are required by Technical Specifications. These locations are 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 are counted no sooner than 24 hours after collection. This allows for the decay of short half-life naturally occurring radionuclides.

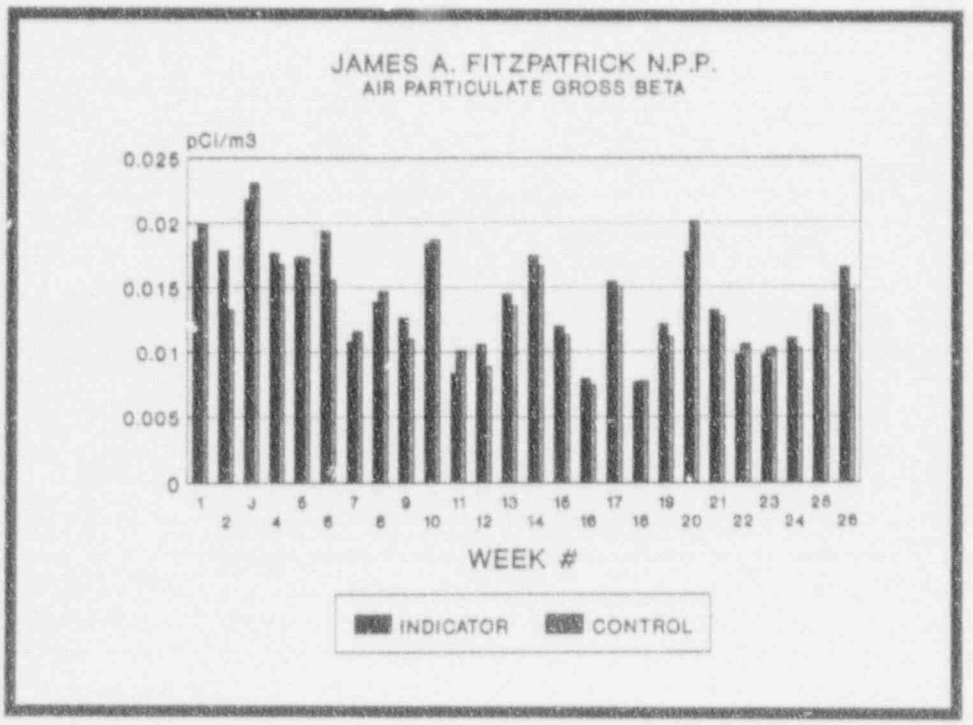
Tables 6-5 and 6-6 in Section 6.0 present the weekly gross beta activity results for the off-site and on-site stations.

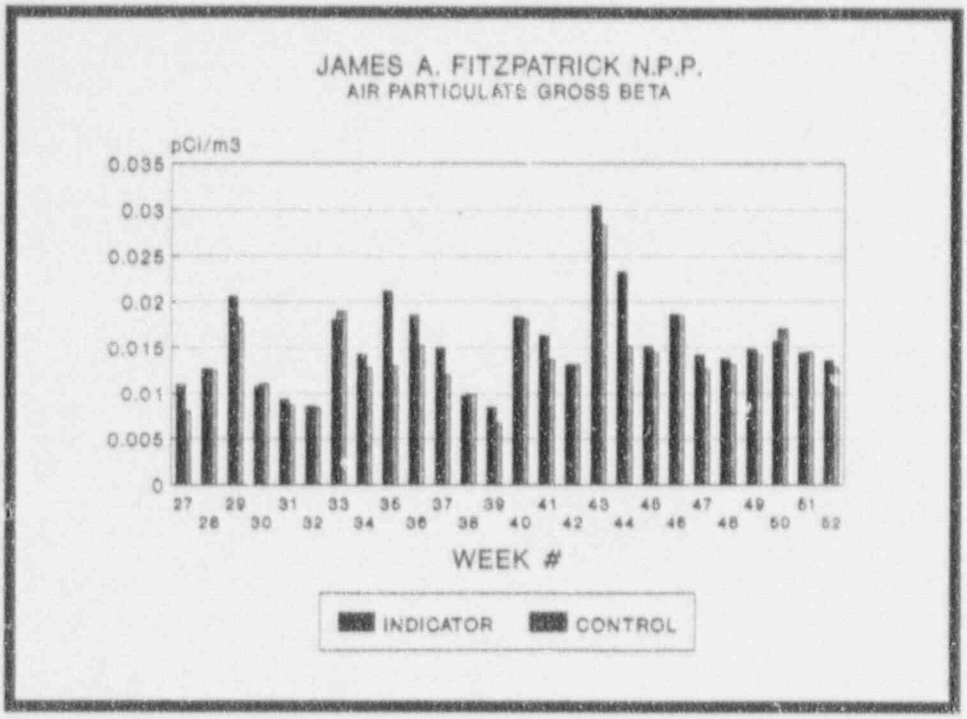
The average yearly gross beta indicator concentration for the indicator stations (R-1, R-2, R-3 and R-4) in 1991 was 0.014 pCi/m^3. The average yearly gross beta control concentration for the off-site station (R-5) was 0.014 pCi/m^3. The minimum, maximum and average gross beta results for sample locations required by Technical Specifications were:

	pCi/m^3		
Location*	Minimum	Maximum	Average
R-1	0.007	0.027	0.014
R-2	0.006	0.033	0.015
R-3	0.007	0.030	0.014
R-4	0.007	0.032	0.015
R-5 (control)	0.007	0.028	0.014

* Locations required by the Technical Specifications

The mean weekly gross beta concentrations measured in 1991 are illustrated in the graphs below.





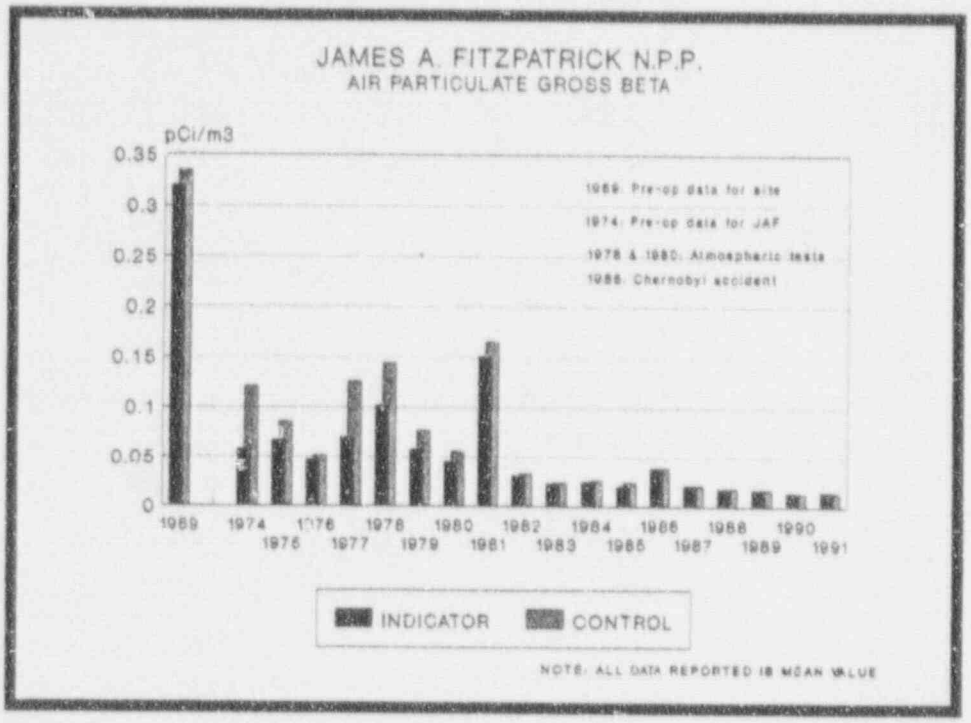
The small fluctuations observed in the gross beta activity over the year can be attributed to changes in the environment, especially seasonal changes. The concentration of naturally occurring radionuclides in the lower levels of the atmosphere directly above land are affected by time related processes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

C. Dose Evaluation

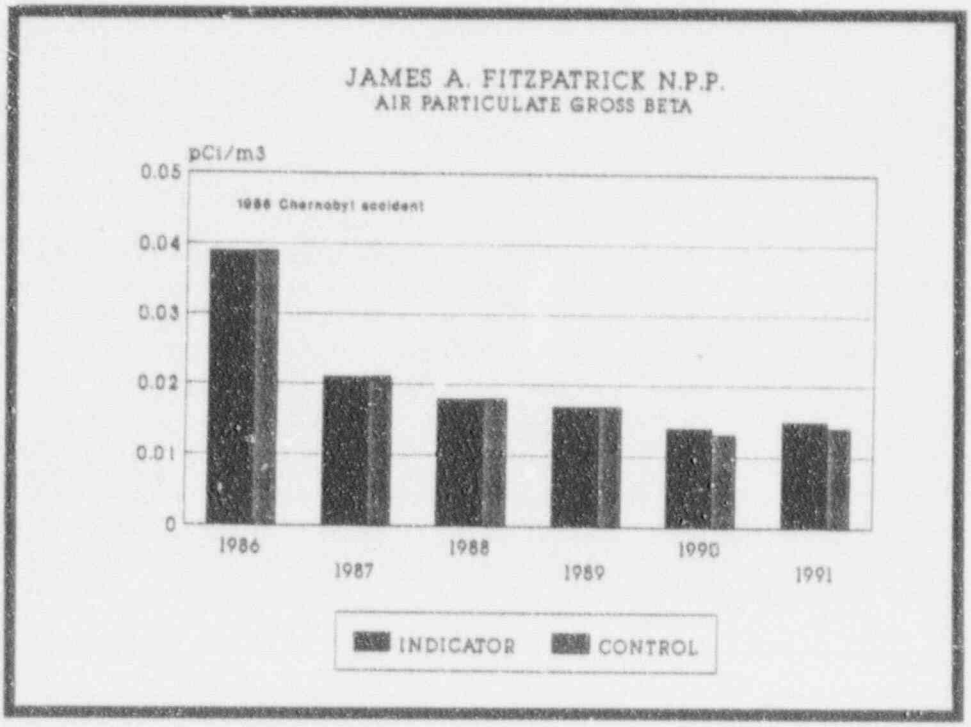
Dose calculations are not performed based on gross beta concentrations. Dose to man as a result of radioactivity in air is calculated using the specific radionuclide and the associated dose factor. See Section 5.2.2 for dose calculations from air concentrations.

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 trend for the previous five years is a sub set of the overall decline in gross beta concentrations, again with the exception of 1986 when a one year increase was measured as a result of the Chernobyl accident. The 1991 results are the second lowest mean concentrations measured when compared to the previous five years for both the indicator and control locations. The change in concentration from the 1990 values is very small. This is illustrated by the following graph.



The air particulate gross beta results for 1991 are a factor of 20 less than the concentrations measured in 1969. 1969 concentrations are considered to be preoperational results for the site. For the operational period of 1975 - 1991 the mean annual gross beta concentration at the control station (R-5) has decreased from a maximum concentration of 0.165 pCi/m^3 in 1981 to 0.014 pCi/m^3 in 1991. The mean annual concentration for the indicator stations for this same time period ranged from a maximum of 0.151 pCi/m^3 in 1981 to a minimum of 0.015 pCi/m^3 in 1991. For both the indicator stations and control stations, the gross beta concentration during 1974 to 1982 fluctuated as a result of fallout from the detonation of thermonuclear weapons. The mean annual results for the years 1983, 1984, 1985, 1987 and 1988 from both the indicator and control locations have been similar and ranged from 0.018 to 0.026 pCi/m^3. This level of activity appears to be at or near baseline range. The 1986 annual mean result was 0.039 pCi/m^3 for both the indicator and control stations. This concentration is slightly higher than 1983-1985 and 1987-1991 levels, and is attributed to fallout from the Chernobyl accident.

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

No plant related radionuclides were detected in any of the air particulate filter samples collected from the Technical Specifications required sampling locations. These stations are located near the site boundary and off-site. A small concentration of Zn-65 was detected at one of the on-site (optional) sample locations. This plant related radionuclide was measured at a relatively low concentration of 0.00566 pCi/m^3 at the H on-site location. No detections of Zn-65 were made off-site during this same sample time period. The impact of the Zn-65 concentration is not considered to be significant due to the on-site location, the low concentration measured and the resulting small dose to man from the short exposure period.

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

Be-7 was detected in all the monthly composites ranging in concentration from 0.0485 to 0.089 pCi/m^3 for the indicator locations required by the Technical Specifications. The control location, required by the Technical Specifications, showed Be-7 concentrations ranging from 0.0209 to 0.0719 pCi/m^3. K-40 was found intermittently in the monthly composite samples from all locations.

B. Data Evaluation Discussion

Weekly air particulate samples were 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 results of all monthly composite samples are presented in Section 6.0, Table 6-9.

No plant related radionuclides were detected at any of the required or optional off-site sampling locations. One plant related activation product radionuclide was detected at an on-site (optional) sample location. Zn-65 was detected in the February composite sample from the H on-site sample location. The measured Zn-65 concentration was 0.00566 pCi/m^3. The presence of Zn-65 was not detected at any of the other air monitoring stations including those at the site boundary.

An evaluation of the presence of Zn-65 in the monthly air composite sample was made. The weekly samples which makeup the monthly composite were analyzed separately. The detected activity in the February composite was determined to originate from two filters which represent the time period 01/28/91 - 02/04/91 (week No. 5) and 02/04/91 - 02/11/91 (week No. 6). The measured concentrations were 0.0242 pCi/m^3 and 0.00742 pCi/m^3 for weeks No. 5 and No. 6 respectively.

Meteorological data was reviewed for two sample periods. A review of effluent records and isotopic measurements showed that Zn-65 was present in plant effluents. Based on the meteorological data and plant effluent records, the presence of Zn-65 in the February 1991 H on-site air particulate filter composite was the result of operations at the FitzPatrick Power Plant.

C. Dose Evaluation

Because of the fact that Zn-65 was not detected at sample locations outside the site boundary, the dose to man is not significant. For the purpose of evaluation, the dose to man can be calculated based on the measured concentrations of Zn-65 at the on-site locations using the methodology found in Regulatory Guide 1.109. This calculated dose is conservative and is not representative of the dose to man beyond the site boundary but can be used to illustrate the significance of the resulting dose relative to background radiation. Using the inhalation rate for the maximum exposed individuals in each age group found in Regulatory Guide 1.109 and the maximum concentrations measured at the H on-site air sampling station, the following dose to man was calculated:

AGE GROUP	DOSE (mrem/yr)	
	WHOLE BODY	LUNG
ADULT	0.00003	0.0006
TEEN	0.00004	0.0008
CHILD	0.00004	0.0006

The conservative whole body and critical organ (lung) doses calculated as a result of the Zn-65 concentration measured on-site are very low when compared to background. Dose to man in the general area of the site is approximately 60 mrem/year. Because no airborne concentrations of Zn-65 were detected off-site, the actual dose to man from this radionuclide is probably zero and in any case much less than that calculated.

D. Data Trends

No plant related radionuclides were detected during 1991 at the required or optional off-site air sampling locations. As noted above, Zn-65 was detected in 1991 at an on-site sampling location.

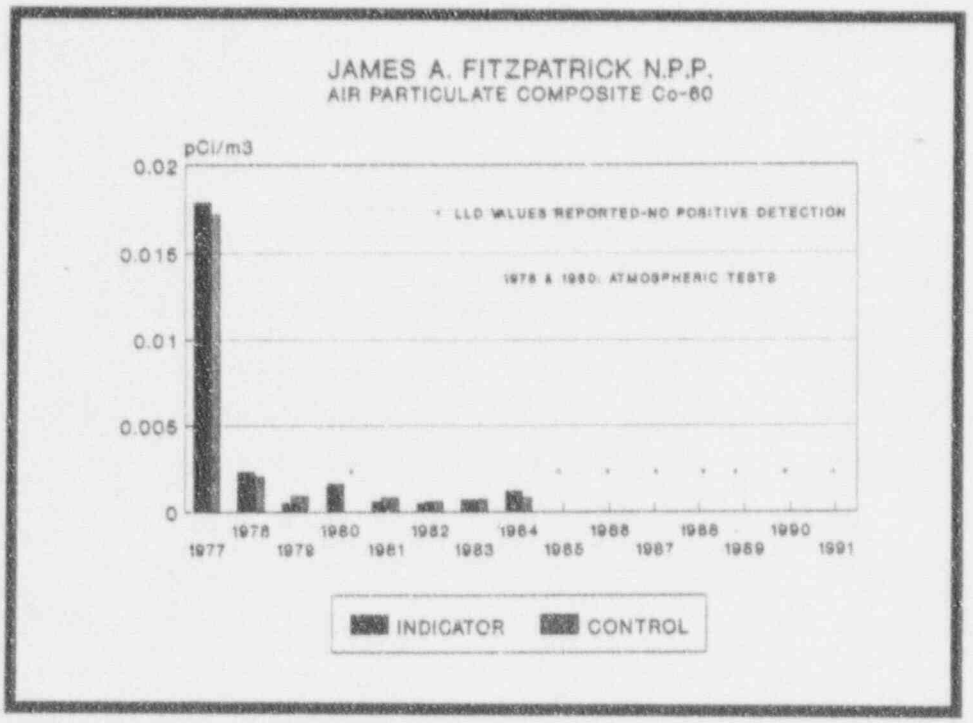
No plant related radionuclides were detected during 1990 at the required or optional air sampling stations. Two plant related activation products were detected at three on-site (optional) air sample locations in 1989. In October 1989 Zinc-65 was detected, and in November 1989 Zn-65 and Co-60 were detected. Zn-65 or Co-60 were not detected in any other air monitoring indicator or control stations during those sample periods.

Based on the evaluation of meteorological and plant effluent data, it was concluded that the presence of Zn-65 and Co-60 in 1989 samples was the results of JAFNPP operations.

A review of historical data shows that Zn-65 was not detected in air samples from 1985 to 1988. Co-60 was not detected during 1985 - 1986 in air particulate samples from either indicator or control locations. During 1987, Co-60 was detected once at a concentration of 0.0017

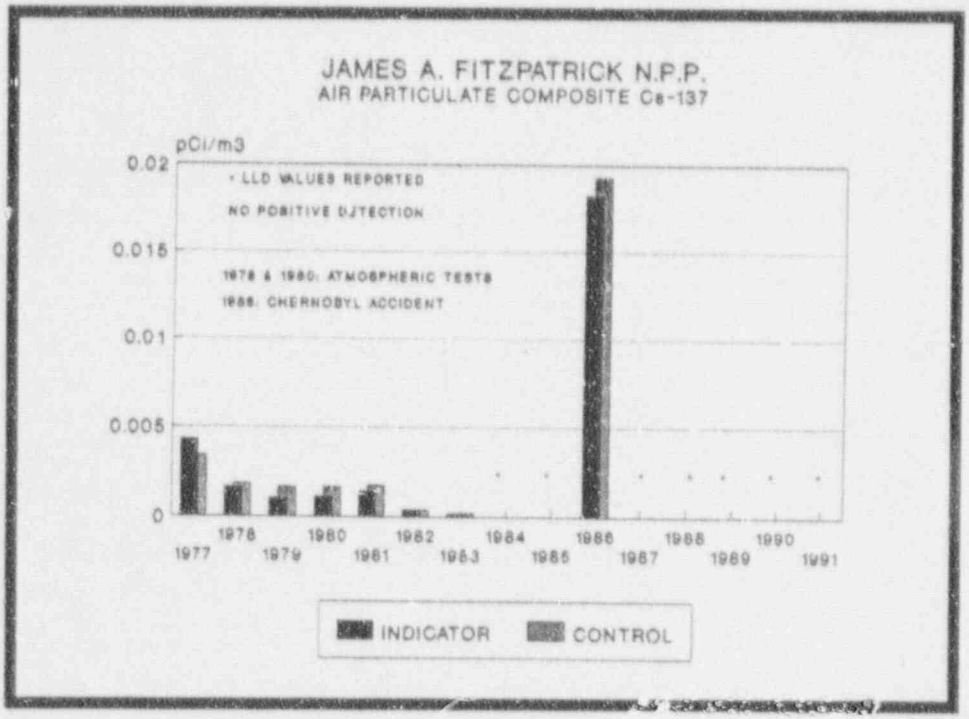
pCi/m^3 at an optional air monitoring station. However, the Co-60 detected during 1987 was the result of contamination from improper handling of the sample, and not as a result of effluents from the site. This evaluation is contained in the 1987 annual report.

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 yea : was the result of atmospheric weapons testing. The maximum yearly mean concentration detected during this period was in 1977 when the mean 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 low mean concentration of 0.0008 Pci/m^3 at the control location. Co-60 has not been detected in any of the required air particulate samples since 1985. This general downward trend and eventual elimination of Co-60 in the air samples is illustrated in the graph below.



Historical data shows that Cs-137 is the fission product radionuclide most frequently detected in the air particulate filter composites. For the five year period, 1986 to 1990, 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.

Cs-137 was detected in each of the years from 1977 through 1983 at both the control and indicator locations. For 1977, the mean Cs-137 concentration for the indicator location was 0.0043 pCi/m^3. The Cs-137 concentration for the control location for 1977 was 0.0034 pCi/m^3. Cs-137 average concentrations at the indicator and control locations decreased during 1978 and 1979 to 0.0017 and 0.0013 pCi/m^3 respectively. Average concentrations during 1980 and 1981 were approximately equal at control and indicator locations. Cs-137 during 1980 was approximately equal to 1979 and increased slightly in 1981 from 1979 levels. The 1980 and 1981 average concentrations were 0.0013 and 0.0015 pCi/m^3 respectively. The mean 1982 concentration for Cs-137 decreased to 0.004 pCi/m^3. The 1983 mean Cs-137 concentration for the indicator and control composite samples were equal at 0.0002 pCi/m^3 which was a reduction from 1982. Cs-137 was not detected during 1984 in any of the indicator or control air particulate composite samples. The reduction in Cs-137 results 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 is clearly illustrated on the graph of historical data.



Prior to 1983, several radionuclides were detected that were associated with atmospheric weapons testing. These radionuclides were not detected during 1984 and 1985 as a result of nuclear decay and natural environmental processes. These include Zr-95, Ce-141, Nb-95, Ce-144, Mn-54, Ru-103, Ru-106 and Ba-140. Ba-140, Nb-95, Ru-103, Ru-106, and I-131 were detected in air particulate composite samples during 1986 as a result of the fallout from the Chernobyl accident. Those radionuclides were not detected after 1986. The five year data for these nuclides indicates no plant related impact on the environment. All positive detections were associated with atmospheric weapons testing.

Current air particulate filter composite results can not 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 size graphic representation 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 I-131 was not detected in any of the 780 samples analyzed for the program. No radioiodine has been detected off-site 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 tne fifteen air sampling stations 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. The analytical data for radioiodine are presented in Section 6.0, Table 6-7 and 6-8.

C. Dose Evaluation

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

D. Data Trends

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

The five year I-131 data shows no detrimental impact or trend due to plant operations during the period from 1986 through 1990. I-131 was detected twice over the last five 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 I-131 (I-131) has been detected in the past at control locations. During 1976, the mean off-site I-131 concentration averaged 0.604 pCi/m^3. 1977 showed an I-131 concentration that decreased to 0.323 pCi/m^3 and for 1978 the 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 0.119 pCi/m^3 in 1986. The maximum value of 0.119 pCi/m^3 was the result of the Chernobyl accident. I-131 was detected in a total of 75 weekly samples collected during the 1986 sample program. The concentrations detected in 1986 ranged from a minimum of 0.011 pCi/m^3 to a maximum of 0.36 pCi/m^3. Each of the positive detections of I-131 in 1986 were a 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 is consistent with the 1969 and 1974 preoperational data.

A graphic presentation of airborne radioiodine is presented in Section 8.0.

5.2.4 DIRECT RADIATION (THERMOLUMINESCENT DOSIMETERS (TLD))

A. Results Summary

71 TLDs were collected and read each quarter in 1991. The 1991 results are consistent with those observed in 1990. On-site readings ranged from 3.2 to 11.6 mrem per standard month. Site boundary measurements ranged from 3.2 to 16.7, with an average of 6.0 mrem per standard month. Direct radiation doses measured 4 to 5 miles from the plant and each land based 22.5 degree compass sector ranged from 3.6 to 5.8 with an average of 4.7 mrem per standard month. Special interest TLDs located at high population density areas, schools, etc. ranged from 2.9 to 6.3, with an average of 4.8 mrem per standard month. The control measurements ranged from 3.8 to 5.8, with an average of 4.6 mrem per standard month.

Overall, environmental direct radiation measurement results for 1991 showed no indication of increased direct radiation at or beyond the site boundary resulting from operations at the site.

B. Data Evaluation and Discussion

Thermoluminescent dosimeters (TLDs) are used to measure direct radiation (gamma dose) in the environment. Badges are obtained from Teledyne Isotopes quarterly and read at the Teledyne Isotopes facility in Westwood, New Jersey.

71 environmental TLDs were collected and read on a quarterly basis during the sample year. The location results are an average of eight independent readings per quarter at each location and are reported in mrem per standard month (See Section 6.0, Table 6-10).

During 1991, collections were made during the weeks of March 24, June 25, September 24, and December 24. Most of the locations required by the Technical Specifications during 1991 were initiated in 1985 as a result of the issuance of new Technical Specifications by the NRC. Therefore, 1991 results can only be compared to 1985 - 1990 results.

Some locations including a numbe quired by the Technical Specifications (i.e., numbers 7, 14, 15, 18, 23, 49, 56, and 58) can be compared to earlier results since these TLDs were established prior to 1985.

On-site TLDs are located at special interest areas within the site boundary. With the exception of location numbers 7 and 23, these locations are not required by the Technical Specifications. Locations 7 and 23 are located near the generating facilities at previous or existing on-site air sampling stations and are used to evaluate sectors that do not extend beyond the site boundary. TLDs located at the air sampling stations include numbers 3, 4, 5, 6, 7, 23, 24, 25 and 26. The results for these locations are very consistent with the previous year results. These results ranged from 3.2 to 11.6 mrem per standard month. TLD #3 is located in the vicinity of NMPNS Unit 2 between Unit 1 and the JAFNPP. The results for TLD #3 were approximately double the results of the other on-site TLDs for the first and fourth quarter in 1991 because of the effects from the NMPNS Unit 2 and the JAF facilities.

Other on-site NMPNS include special interest TLDs located near the north shoreline of the Unit 1, Unit 2 and JAF facilities. They are in close proximity to radwaste facilities and the Unit 1 reactor building. These locations include numbers 27, 28, 29, 30, 31, 39 and 47. Results for these TLDs during 1989 were widely variable and ranged from 5.2 to 31.4 mrem per standard month as a result of activities at the radwaste facilities and the operating modes of the generating facilities. Results for 1991 are consistent with the ranges of variability noted in 1990 for measurements at or near these locations. The maximum result for this group was approximately seven times the mean control result in 1991.

Additional on-site TLD locations are located near the on-site Energy Center and the associated northeast shoreline. These locations include numbers 18, 103, 106 and 107. TLDs 103, 106, and 107 are located east of the Energy Center and west of the Unit 1 facility. TLD number 18 is located on the west side of the Energy Center. Results during 1991 ranged from 4.0 - 6.0 mrem per standard month and were lower than the 1990 results.

The Technical Specification required site boundary TLDs are located in the approximate area of the site boundary, one in each of the sixteen 22 1/2 degree meteorological sectors. These include numbers 75, 76, 77, 23, 78, 79, 80, 81, 82, 83, 84, 7, 18, 85, 86 and 87. Location numbers 78, 79, 80, 81, 82, 83, 84, 7 and 18 showed results that were consistent with control TLD results and ranged from 3.2 to 5.8 mrem per standard month. Site boundary TLDs during 1991 were consistent with 1986-1990 results. TLD numbers 75, 76, 77, 23 85, 86 and 87 showed results that ranged up to three times the 1991 control results. The site boundary results ranged from 4.6 to 16.7 mrem per standard month. This subset of site boundary TLDs are located near the lake shoreline (approximately 100 feet from the shoreline), in close proximity to the reactor building and radwaste facilities of NMPNS Unit 1 and Unit 2 and the radwaste area of the JAF facility.

An estimate of the net site boundary dose can be made using available TLD results. Measured 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) can be compared to control location results. The site boundary locations include numbers 78, 79, 80, 81, 82, 83, 84, 7 and 18. Site boundary TLD numbers 75, 76, 77, 23, 85, 86 and 87 were excluded from the net site boundary dose calculation. These areas are near the north shoreline close to the generating facilities and are not representative of dose rates for members of the public. Control locations include numbers 8, 14, 49, 111 and 113. Net site boundary doses for each quarter in mrem per standard month are as follows:

Quarter	Site Boundary*	Control*	Net Site Boundary Dose*
1	5.8	5.4	+0.4
2	3.9	4.1	-0.2
3	5.0	4.6	+0.4
4	4.5	4.7	-0.2

*Dose in mrem per standard month

The third group of environmental TLDs are located four to five miles from the site in each of the eight land based 22.5 degree meteorological sectors. These locations are required by the Technical Specifications. At this distance, badges are not present in eight of the sixteen meteorological sectors which are located over Lake Ontario.

Results for this group of TLDs during 1991 represented a range of 3.6 to 5.3 mrem per standard month. The range of results is caused by differences in naturally occurring physical conditions and the varying concentrations of naturally occurring radionuclides in the ground at each of the locations. These results are consistent with control TLD results during 1991 and with the 1986 - 1990 results. Results were also congruous with other off-site TLD results during 1990 and previous to 1990. These TLDs were established in 1985 and include numbers 88, 89, 90, 91, 92, 93, 94 and 95.

The fourth group of environmental TLDs are located near the site boundary and at special interest areas. Industrial sites, schools, nearby communities, towns, off-site air sampling stations, the closest residence to the site, and the off-site environmental laboratory are included as special interest locations. Many of these TLDs are required by the Technical Specifications. Others are optional. This group of locations include numbers 9, 10, 11, 12, 13, 15, 19, 51, 52, 53, 54, 55, 56, 58, 96, 97, 98, 99, 100, 101, 102, 108 and 109. TLD numbers 108 and 109 are new locations that were established during 1988 and were added to assist in the evaluation of the residence TLD locations. In 1991 results ranged from 2.9 to 5.6 mrem per standard month. All of the TLD results from this group were below the maximum value of 5.8 mrem per standard month measured at the control locations. Results during 1991 were consistent with results noted for previous years.

The fifth category of TLDs are those used to measure the dose rate at the control locations. These TLDs are required by the Technical Specifications and include numbers 14 and 49. Optional control locations are numbers 8, 111 and 113. Location number 111 was added to the program during 1988 to expand the data base for control measurements. Results for all control locations from 1991 ranged from 3.8 to 5.8 mrem per standard month. Results from 1991 were consistent with previous years results.

C. Dose Evaluation

TLDs located at the site boundary averaged 4.8 mrem per standard month (No. 7, 18, 78, 79, 80, 81, 82 83, 84).

TLDs four to five miles from the site in each land based sector averaged 4.5 mrem per standard month in 1991.

Results for the special interest locations averaged 4.8 mrem per standard month.

The control group results averaged 4.7 mrem per standard month in 1991 (No. 8, 14, 49, 111, 113).

D. Data Trends

A comparison of historical results for TLD results can be made using the separate types of locations. These include site boundary TLDs in each meteorological sector (16 locations), TLDs located off-site in each land based sector at a distance of four to five miles (8 locations), badges located at special interest areas (6 locations) and TLDs located at control locations (4 locations). As noted previously, many of the present TLD locations became effective in 1985 and these results can only be evaluated for 1985 - 1991.

TLDs located at the site boundary averaged 7.0 mrem per standard month during 1986. During 1987, 1988, 1989 and 1990 site boundary dose rates averaged 6.1, 6.4, 5.9 and 6.4 mrem per standard month respectively. As noted previously, this group of TLDs can fluctuate because several of these TLDs are located in close proximity to the generating facilities and influenced by operational modes. An increase was noted during 1986 although such an increase was noted for all TLDs including the control locations. During 1991, site boundary measurements averaged 6.0 mrem per standard month which is consistent with results for the last five years.

TLDs located off-site at a distance of four to five miles from the site in each of the land based meteorological sectors (off-site sectors) averaged 6.0 mrem per standard month during 1986. During 1987, 1988, 1989 and 1990 off-site sector dose rates averaged 5.2, 5.3, 4,9 and 4.7 mrem per standard month, respectively. The 1986 results demonstrated an increase for this group of TLDs relative to the data for the period of 1985 through 1991. 1991 results for the group averaged 4.7 mrem standard month. This dose rate is identical to the 1990 result and is lower than the previous results from 1985 through 1989.

Special interest locations averaged 5.3 mrem per standard month during 1985. During 1986 these same locations averaged 6.1 mrem. The 1987 average results of 5.1 mrem per standard month showed a decrease when compared to the 1985 and 1986 results. 1988, 1989 and 1990 results averaged 5.3, 4.8 and 4.8 mrem per standard month respectively. The 1991 results for these locations averaged 4.8 mrem per standard month and is identical to the 1990 results.

The final group of TLD locations required by the Technical Specifications is the control group. This group utilizes two locations positioned well beyond the site. Results from 1985 for the control group averaged 5.4 mrem per standard month. During 1986, this same group of TLDs averaged 6.3 mrem per standard month. A marked increase was noted in the second quarter of 1986. The increase may have been a result of the Chernobyl accident. Results for 1987, 1988, 1989 and 1990 averaged 5.2, 5.4, 4.1 and 4.8 mrem per standard month respectively. Results for 1991 averaged 4.6 mrem per standard month and showed levels slightly less than previous years. The 1991 TLD program results, when compared to the previous 5 years and preoperational data, shows no significant trends relative to increased dose rates in the environment due to the operation of the FitzPatrick plant.

Tables 7-15 and 7-16 show the historical environmental sample data for environmental TLDs. A graph of historical TLD data is presented in Section 8.0.

5.2.5 MILK

A. Results Summary

There were no plant related radionuclides detected in the indicator or control milk samples collected and analyzed in 1991. Naturally occurring K-40 was detected in both indicator and control samples at levels consistent with past years results.

B. Data Evaluation and Discussion

Milk samples were collected from six indicator and one control location. Technical Specifications require that three locations are 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 1991. Samples were collected from farms located beyond the five mile requirement to ensure the monitoring of this important pathway. The six indicator locations ranged from 5.5 to 9.5 miles from the site. The control samples were collected from a farm 17 miles and up wind from the site. The sample locations are the same as those used in 1989 - 1990 and the geographical location of each location is listed below:

Location No.	Direction From Site	Direction (Miles)
7	ESE	5.5
16	S	5.9
50	E	8.2
55	E	9.0
60	E	9.5
4	ESE	7.8
65 Control	SW	17.0

Samples were collected at each location from April through December, during the first and second half of each month. Since I-131 was not detected in samples collected during November and December of 1991, no additional samples were required for January through March of 1992.

Each sample is analyzed for gamma emitters using a GeLi or HPG detector.

The I-131 analysis is performed using resin extraction followed by gamma spectral analysis for each sample. I-131 analytical results are provided in Section 6.0, Table 6-11. Sample analysis results for gamma emitters are provided in Section 6.0, Table 6-12.

Iodine-131 was not detected in any indicator or control samples analyzed during 1991. All I-131 milk results were reported as lower limits of detection (LLD). The LLD results for all samples ranged from <0.25 to <0.84 pCi/liter.

K-40 was the most abundant radionuclide detected in milk samples collected in 1991. K-40 is a naturally occurring radionuclide and is found in many of the environmental media sampled. K-40 was detected in every indicator and control sample. The K-40 concentration for all samples ranged from 1260 to 1790 pCi/liter.

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 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.

D. Data Trends

1991 showed no man-made radionuclides detected in milk samples analyzed as part of the environmental surveillance program. In the past five years, Cs-137 was detected in 1986 and 1987. The mean Cs-137 activity for those years was 8.6 and 6.8 pCi/liter respectively. I-131 was measured in milk samples in 1986 with a mean concentration of 13.6 pCi/liter. This activity was a result of the Chernobyl accident.

From 1976 to 1985, Cs-137 and I-131 were intermittently detected. Cs-137 was detected in a 1983 milk sample with a concentration of 5.1 pCi/liter. In 1980, I-131 was detected at a control location with a mean concentration of 0.4 pCi/liter. The Cs-137 and I-131 activity is attributed to Chinese atmospheric thermonuclear weapons testing. The comparison of 1991 data to 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

A. Results Summary

There were no plant related radionuclides detected in the food product samples collected and analyzed in 1991. One indicator sample contained a measurable level of Cs-137. The level of Cs-137 is representative of background levels of Cs-137 and is not attributed to operations at the site. Detectable levels of naturally occurring Be-7 and K-40 were measured in each control and indicator sample collected for the 1991 program.

These results are consistent with the levels measured in 1990 and previous years.

B. Data Analysis and Discussion

Food product samples were collected from six 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 least prevalent wind direction.

Food product samples collected during 1991, included cabbage and lettuce. These sample types are considered broadleaf vegetables. Where broadleaf vegetables were not available, non-edible broadleaf vegetation was collected. Non-edible vegetation consisting of bean leaves, squash leaves, corn leaves, and cucumber leaves were collected for the 1991 program. Samples were collected during the late summer/fall harvest season.

Each sample was analyzed for gamma emitters on a GeLi/HPGe detector. A low level of Cs-137 was detected in one indicator sample of squash leaves. The sample contained a Cs-137 concentration of 0.039 pCi/g (wet). Cs-137 was not detected in any of the other indicator or control location food product samples for 1991. The source of the Cs-137 is considered to be the result of past atmospheric weapons testing. The amount of uptake of Cs-137 into plant

tissue is dependent on several factors related to soil composition. Cs-137 will often be substituted by plants for similar elements, such as potassium, which may be lacking in the soil. The wide range in soil composition from location to location can result in varying levels of Cs-137 uptake from location to location. The lack of other plant related radionuclides in the sample further supports the assessment that the Cs-137 in the vegetation samples was the result of background Cs-137. The measured Cs-137 concentration was consistent with levels detected in historical samples.

Naturally occurring Be-7 and K-40 were detected above LLD in food product samples. The concentration of Be-7 in vegetation samples ranged from 0.06 to 0.91 pCi/g (wet). The concentration of K-40 in indicator and control samples ranged from 1.19 pCi/g (wet) and 6.99 pCi/g (wet). These results for naturally occurring radionuclides are consistent with those of prior years.

Analytical results for food products are found in Section 6.0, Table 6-14.

C. Dose Evaluation

The potential dose to man impact of Cs-137 found in a food product can be evaluated by calculating the resulting dose from consumption of the vegetation. Using Regulatory Guide 1.109 Methodology, the maximum organ dose calculated was 0.34 mrem to the child bone. The maximum potential whole body dose was calculated to be 0.18 mrem to the adult. These doses are very small in comparison to radiation exposure received from naturally occurring radionuclides. The annual whole body dose from naturally occurring K-40 is 20 mrem to the critical organ.

D. Data Trends

There was one man-made radionuclide (Cs-137) detected in broadleaf edible and non-edible vegetation samples analyzed in 1991. Food product results for the last five years show no trend other than that plant related radionuclides are not routinely detected in this sample media. This fact is also accurate for the entire time period of plant operation including preoperational results. Cs-137 has been detected in four separate years since operation began at the FitzPatrick Power Plant.

In 1989, Cs-137 was detected in one non-edible broadleaf vegetation sample collected at an indicator location. The concentration was 0.011 pCi/g (wet) which was close to its LLD. LLD values for all other samples ranged from <0.011 to <0.018 pCi/g (wet). Cs-137 was also detected in 1988. Other than naturally occurring levels of Be-7 and K-40, no other radioisotopes were detected from 1986 - 1989.

During the period of 1981 - 1985, Cs-137, Be-7 and K-40 were detected. Cs-137 was found at one indicator location during 1985 at a concentration of 0.047 pCi/g (wet). The levels of Be-7 and K-40 were consistent with natural background levels. There are no discernable trends indicating the presence of plant related radionuclides in food product vegetation samples.

Historical data and graphic presentations of food product results are presented in Section 7.0, Tables 7-19 and 7-20, and in Section 8.0.

5.2.7 LAND USE CENSUS RESULTS

A. Results Summary

No changes were required to milk sampling indicator or control locations in 1991 based on the 1991 milk animal census.

The results of the closest residence census conducted in 1991 required no change to the ODCM closest resident dose calculation reference.

A garden census, not required by Technical Specifications, showed no changes in 1991 to food product (vegetation) sampling locations as required by Technical Specifications. Two gardens planted and sampled in 1990 as optional locations were not planted in 1991. The garden samples were collected from those locations listed in Table H-1 of the ODCM and identified in the census as active for 1991.

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 actually consists of two types of census. A milk animal census is conducted to identify all milk animals within a distance of 10 miles from the site. A census covering areas out to a distance of 10 miles exceeds the 5 mile distance required by the Technical Specifications.

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 estimated by the 1991 census was 1148 cows and 20 goats. This is an increase of 19 cows and a decrease of 9 goats from 1990.

In 1991 one new location, a residence with a milking goat was identified 3.8 miles from the site. This new location did not require a change to the milk sampling program or dose calculation indicator due to its distance and direction from the site and its inability to provide routine milk samples. It did not provide a higher D/Q value than existing locations.

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

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

The second type of census is a residence census. The census is conducted in order to identify the closest residence within 3 miles in each of the 22.5 degree land based meteorological sectors. There are only eight sectors over land where residences are located within 3 miles. These 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 6-15.

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

5.3 CONCLUSION

The REMP is a continuous program implemented to determine the radiological impact of JAFNPP operations on the local environment. The program is designed and implemented to be sensitive to changes in the radiological environment surrounding the site. The sensitivity of this program became extremely important following the inadvertent release of radioactive material to the environment on March 18, 1991 due to operator errors during operation of the radwaste concentrator system. Appendix A contains a detailed discussion of this event and associated environmental samples. The results of the 1991 Radiological Environmental Surveillance Program clearly demonstrates that there was no significant short term or chronic long term detrimental impact on the environment in the vicinity of the Nine Mile Point site. The major radiological impact on the environment remains the result of atmospheric weapons testing in the early 1980s and the 1986 accident at the Chernobyl Nuclear Power Plant. Both of these source terms have increased the ubiquitous inventory of Cs-137.

Samples representing food sources consumed at higher trophic levels, such as fish and milk, were reviewed closely to evaluate any impact to the environment or to man. In addition, the data was reviewed for possible short and long term historical trends.

Doses as a result of naturally occurring radionuclides such as K-40 and Ra-226, contributed the major portion of the total annual dose to members of the general public. The maximum potential individual dose to man, as a result of the March 18, 1991 release was calculated to be 0.0014 mrem whole body (child) and 0.0026 mrem critical organ (infa liver) via the drinking water pathway. The maximum potential dose to man calculated as received from the fish consumption pathway was 0.057 mrem whole body (adult) and 0.12 mrem to the critical organ (teen livers). The long term doses to man as a result of anthropogenic sources can mainly be attributed to the Chernobyl accident and atmospheric weapons testing. Most of the radionuclides detected in 1986 as a result of Chernobyl were not detected in subsequent years. Dose received from man-made sources are very small when compared to the dose from naturally occurring sources of radioactivity.

The contribution to the whole body dose as a result of plant operations is extremely small when compared to the dose contribution from natural background levels and sources other than the plant. Whole body doses in Oswego County due to all natural sources is approximately sixty 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.

5.4 REFERENCE

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

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

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

15. 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.

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

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

18. 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 fc noted with the term "Plant Radionuclides". Plant related radionuclides are radionuclies 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

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)	04/24/91	15.4±0.31	<0.07	<0.10	0.12±0.01	<0.18	<LLD
	10/25/91	17.8±0.34	<0.06	<0.06	0.14±0.01	<0.22	<LLD
Lang's Beach (06, Control)	04/24/91	13.4±0.48	<0.05	<0.06	<0.04	<0.16	<LLD
	10/25/91	10.9±0.47	<0.05	<0.05	<0.04	<0.14	<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

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					
05/29/91	Brown Trout	4.87±0.22	<0.031	<0.036	<0.106	<0.032	<0.075	<0.032	0.018±0.006	<LLD
06/06/91	Lake Trout	4.88±0.23	<0.032	<0.041	<0.115	<0.033	<0.084	<0.034	<0.030	<LLD
06/07/91	White Sucker	5.49±0.26	<0.037	<0.49	<0.124	<0.038	<0.101	<0.036	<0.032	<LLD
06/18/91	Smallmouth Bass	4.23±0.23	<0.028	<0.033	<0.074	<0.037	<0.076	<0.029	0.044±0.012	<LLD
06/18/91	White Perch	3.41±0.24	<0.038	<0.044	<0.107	<0.049	<0.092	<0.038	0.027±0.007	<LLD
06/18/91	Walleye	5.46±0.29	<0.036	<0.042	<0.123	<0.040	<0.101	<0.038	0.045±0.007	<LLD
09/25/91	Smallmouth Bass	4.38±0.23	<0.032	<0.038	<0.127	<0.042	<0.087	<0.029	0.032±0.007	<LLD
10/01/91	White Sucker	3.79±0.21	<0.030	<0.036	<0.101	<0.042	<0.078	<0.027	<0.025	<LLD
10/01/91	Lake Trout	4.30±0.20	<0.027	<0.033	<0.081	<0.030	<0.074	<0.028	0.024±0.006	<LLD
10/01/91	Walleye	4.32±0.20	<0.025	<0.030	<0.072	<0.028	<0.063	<0.024	0.029±0.006	<LLD
10/10/91	White Perch	4.20±0.31	<0.046	<0.050	<0.124	<0.047	<0.114	<0.037	<0.045	<LLD
10/10/91	Brown Trout	3.93±0.25	<0.031	<0.034	<0.078	<0.040	<0.090	<0.030	0.021±0.006	<LLD

* Plant Related Radionuclides

TABLE 6-2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN FISH SAMPLES

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

DATE	TYPE	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137	OTHERS*
					NINE MILE POINT					
06/06/91	Lake Trout	3.91±0.29	<0.045	<0.066	<0.152	<0.056	<0.122	<0.038	<0.033	<LLD
06/06/91	Brown Trout	4.12±0.25	<0.036	<0.045	<0.127	<0.044	<0.093	<0.031	<0.027	<LLD
06/18/91	Smallmouth Bass	4.72±0.25	<0.035	<0.044	<0.111	<0.041	<0.093	<0.037	<0.032	<LLD
06/18/91	White Sucker	2.95±0.19	<0.031	<0.035	<0.082	<0.033	<0.083	<0.028	<0.027	<LLD
06/18/91	White Perch	4.59±2.30	<0.027	<0.037	<0.104	<0.032	<0.082	<0.032	0.029±0.007	<LLD
09/13/91	Salmon	5.04±0.23	<0.0[illegible]	<0.043	<0.128	<0.034	<0.082	<0.032	0.028±0.006	<LLD
09/13/91	Smallmouth Bass	4.17±0.21	<0.028	<0.036	<0.099	<0.033	<0.079	<0.030	0.024±0.006	<LLD
09/25/91	Walleye	4.55±0.25	<0.030	<0.037	<0.102	<0.036	<0.091	<0.029	0.033±0.006	<LLD
09/25/91	White Perch	4.69±0.33	<0.046	<0.059	<0.157	<0.070	<0.126	<0.047	<0.050	<LLD
10/10/91	White Sucker	3.94±0.21	<0.027	<0.035	<0.073	<0.034	<0.077	<0.031	<0.027	<LLD
10/10/91	Lake Trout	3.93±0.25	<0.032	<0.040	<0.091	<0.046	<0.095	<0.038	0.026±0.059	<LLD

* Plant Related Radionuclides

TABLE 6-2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN FISH SAMPLES

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

DATE	TYPE	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137	OTHERS*
					OSWEGO HARBOR (Control)					
05/29/91	White Sucker	4.45±0.30	<0.049	<0.064	<0.197	<0.060	<0.120	<0.037	<0.043	<LLD
05/29/91	Brown Trout	5.10±0.29	<0.036	<0.061	<0.155	<0.045	<0.118	<0.037	<0.040	<LLD
06/06/91	Lake Trout	3.40±0.22	<0.030	<0.040	<0.111	<0.042	<0.092	<0.032	<0.030	<LLD
06/18/91	Walleye	4.54±0.26	<0.038	<0.045	<0.145	<0.045	<0.094	<0.035	0.034±0.007	<LLD
06/19/91	Smallmouth Bass	4.54±0.23	<0.029	<0.030	<0.085	<0.040	<0.083	<0.034	0.029±0.009	<LLD
06/19/91	White Perch	2.42±0.19	<0.033	<0.042	<0.098	<0.035	<0.074	<0.030	0.034±0.007	<LLD
09/13/91	Salmon	3.93±0.20	<0.028	<0.032	<0.096	<0.030	<0.070	<0.024	0.021±0.007	<LLD
09/13/91	Smallmouth Bass	4.72±0.31	<0.043	<0.063	<0.018	<0.063	<0.127	<0.045	<0.042	<LLD
09/13/91	Walleye	4.75±0.30	<0.041	<0.058	<0.144	<0.041	<0.124	<0.033	0.028±0.015	<LLD
09/25/91	Brown Trout	4.58±0.30	<0.045	<0.055	<0.136	<0.057	<0.116	<0.036	<0.038	<LLD
10/02/91	Lake Trout	3.79±0.27	<0.035	<0.042	<0.013	<0.055	<0.118	<0.031	<0.039	<LLD
10/02/91	White Sucker	3.57±0.20	<0.026	<0.028	<0.062	<0.035	<0.071	<0.024	<0.026	<LLD
10/02/91	White Perch	4.48±0.22	<0.030	<0.031	<0.076	<0.034	<0.077	<0.030	<0.028	<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	01/02/91-03/30/91	390±30
	Second Quarter	04/01/91-07/01/91	250±50
OSWEGO STEAM* STATION (08, CONTROL)	First Quarter	12/31/90-04/01/91	<100
	Second Quarter	04/01/91-07/01/91	180±35
NINE MILE POINT UNIT 1** (09, INLET)	First Quarter	12/31/90-04/01/91	390±55
	Second Quarter	04/01/91-07/01/91	220±35
NINE MILE POINT UNIT 2** (11, INLET)	First Quarter	12/31/90-04/01/91	360±50
	Second Quarter	04/01/91-07/01/91	230±35
OSWEGO CITY** WATER (10)	First Quarter	12/31/90-04/01/91	590±35
	Second Quarter	04/01/91-07/01/91	270±50

* Samples required by the Technical Specifications

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

TABLE 6-3 (CONTINUED)

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)	Third Quarter	07/01/91-09/30/91	290±45
	Fourth Quarter	09/30/91-12/30/91	<160
OSWEGO STEAM* STATION (08, CONTROL)	Third Quarter	07/01/91-09/30/91	200±35
	Fourth Quarter	09/30/91-12/31/91	<160
NINE MILE POINT UNIT 1** (09, INLET)	Third Quarter	07/01/91-09/30/91	270±30
	Fourth Quarter	09/30/91-12/31/91	<160
NINE MILE POINT UNIT 2** (11, INLET)	Third Quarter	07/01/91-09/30/91	340±55
	Fourth Quarter	09/30/91-12/31/91	<160
OSWEGO CITY** WATER (10)	Third Quarter	07/01/91-09/30/91	220±35
	Fourth Quarter	09/30/91-12/31/91	<160

* Samples required by the 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 - 1991
Results in Units of pCi/liter ± 1 Sigma

STATION CODE*	NUCLIDE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
OSWEGO STEAM† STATION (08, CONTROL)	I-131	<0.13	<0.13	<0.24	<0.26	<1.0	<0.50
	Cs-134	<2.89	<3.63	<4.32	<3.73	<3.19	<3.15
	Cs-137	<2.95	<3.34	<3.76	<3.58	<3.19	<3.42
	Zr-95	<6.18	<5.60	<8.49	<6.53	<5.38	<5.95
	Nb-95	<3.73	<4.23	<5.01	<4.20	<3.77	<4.03
	Co-58	<3.04	<3.45	<4.77	<4.01	<3.78	<3.59
	Mn-54	<2.85	<2.92	<4.22	<3.51	<2.97	<3.08
	Fe-59	<6.92	<9.11	<11.5	<8.96	<7.50	<8.26
	Zn-65	<5.93	<8.33	<9.05	<8.98	<8.82	<8.35
	Co-60	<3.02	<3.41	<4.82	<3.81	<3.94	<4.07
	K-40	176±29.3	53.2±13.0	71.1±15.0	236±18.1	202±18.2	58.0±12.5
	Ba/La-140	<7.02	<7.55	<8.87	<8.07	<10.9	<8.30
FITZPATRICK† (03, INLET)	I-131	<0.20	<0.19	<0.26	<0.36	<0.70	<0.90
	Cs-134	<3.12	<4.95	<3.83	<3.09	<3.74	<3.94
	Cs-137	<2.49	<4.53	<3.50	<3.38	<3.76	<3.46
	Zr-95	<5.08	<8.96	<7.15	<6.25	<7.05	<7.29
	Nb-95	<2.94	<5.68	<4.32	<4.09	<4.19	<4.86
	Co-58	<3.03	<5.51	<3.60	<3.88	<3.78	<4.21
	Mn-54	<2.84	<4.77	<3.36	<3.11	<3.50	<3.19
	Fe-59	<6.31	<11.4	<8.23	<8.56	<8.67	<9.26
	Zn-65	<5.12	<13.8	<9.38	<8.13	<9.24	<9.58
	Co-60	<2.45	<4.61	<3.20	<3.82	<3.53	<3.91
	K-40	69.4±23	217±23.0	246±18.5	49.7±14.2	185±18.0	240±19.0
	Ba/La-140	<4.79	<11.6	<8.25	<9.87	<10.0	<10.8

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

† Samples required by the Technical Specifications.

TABLE 6-4 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES - 1991

Results in Units of pCi/liter ± 1 Sigma

STATION CODE*	NUCLIDE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
NINE MILE POINT UNIT 1** (09, INLET)	I-131	<6.29	<8.61	<9.94	<9.79	<8.86	<9.69
	Cs-134	<1.39	<4.10	<3.78	<4.02	<3.32	<2.91
	Cs-137	<1.53	<3.33	<3.62	<3.68	<2.99	<3.13
	Zr-95	<3.91	<6.78	<7.05	<6.75	<5.81	<6.59
	Nb-95	<2.85	<4.66	<4.71	<4.29	<3.99	<3.97
	Co-58	<1.68	<4.07	<3.62	<3.69	<3.43	<3.13
	Mn-54	<1.42	<3.42	<3.28	<3.66	<3.13	<3.19
	Fe-59	<3.87	<9.34	<10.1	<8.59	<7.36	<7.30
	Zn-65	<3.26	<9.67	<8.89	<9.20	<8.28	<8.14
	Co-60	<3.36	<3.32	<3.32	<3.60	<3.76	<3.82
	K-40	47.8±12.7	242±19.6	213±18.4	223±19.0	37.4±12.3	40.6±12.8
	Ba/La-140	<3.93	<7.56	<10.4	<9.44	<8.40	<9.85
NINE MILE POINT UNIT 2** (11, INLET)	I-131	<11.8	<12.4	<9.94	<8.97	<12.5	<13.6
	Cs-134	<3.78	<4.75	<5.06	<4.67	<4.71	<5.23
	Cs-137	<3.81	<3.58	<4.36	<3.92	<4.28	<4.52
	Zr-95	<8.04	<9.50	<7.46	<7.63	<9.09	<9.32
	Nb-95	<5.52	<5.61	<4.57	<5.01	<5.95	<6.13
	Co-58	<4.29	<4.90	<4.31	<4.86	<5.23	<5.36
	Mn-54	<3.60	<4.24	<4.42	<4.66	<4.63	<4.60
	Fe-59	<8.89	<10.7	<8.76	<10.1	<11.0	<10.8
	Zn-65	<7.69	<9.33	<10.8	<10.0	<10.9	<11.9
	Co-60	<3.60	<5.77	<4.73	<5.07	<5.69	<5.69
	K-40	207±40.6	81.0±17.2	87.7±14.7	116±16.8	244±24.6	25.1±24.7
	Ba/La-140	<8.34	<14.3	<12.3	<10.4	<9.19	<13.1

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

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

TABLE 6-4 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES - 1991
Results in Units of pCi/liter ± 1 Sigma

STATION CODE*	NUCLIDE	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
OSWEGO CITY WATER** (10)	I-131	<12.4	<12.3	<10.4	<9.07	<10.3	<11.4
	Cs-134	<3.56	<4.09	<3.74	<5.01	<3.90	<3.38
	Cs-137	<3.68	<3.55	<3.25	<4.21	<3.39	<2.95
	Zr-95	<6.72	<7.67	<6.81	<8.63	<6.52	<6.29
	Nb-95	<5.50	<4.94	<4.58	<4.97	<4.57	<4.34
	Co-58	<3.53	<4.42	<4.05	<4.52	<4.02	<3.23
	Mn-54	<3.81	<3.72	<3.61	<4.37	<3.50	<3.00
	Fe-59	<8.50	<10.2	<8.69	<8.75	<9.30	<8.84
	Zn-65	<7.30	<9.77	<9.87	<9.60	<9.13	<9.59
	Co-60	<3.16	<3.67	<4.01	<4.82	<3.35	<3.63
	K-40	182±35.3	26.1±18.9	252±18.7	84.8±14.4	202±18.2	32.3±11.7
	Ba/La-140	<7.95	<10.1	<10.8	<13.3	<10.9	<11.9

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

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

TABLE 6-4 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES - 1991
Results in Units of pCi/liter ± 1 Sigma

STATION CODE*	NUCLIDE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
OSWEGO STEAM† STATION (08, CONTROL)	I-131	<0.60	<0.30	<0.20	<0.90	<0.30	<1.00
	Cs-134	<4.09	<3.25	<3.00	<3.97	<2.88	<3.06
	Cs-137	<3.77	<3.01	<3.17	<3.48	<3.27	<2.94
	Zr-95	<6.85	<5.74	<5.98	<7.47	<6.24	<5.59
	Nb-95	<4.48	<4.06	<4.33	<4.68	<3.96	<3.60
	Co-58	<3.87	<3.64	<3.68	<4.19	<3.60	<3.20
	Mn-54	<3.54	<3.24	<3.31	<3.34	<3.13	<2.97
	Fe-59	<9.65	<8.54	<7.87	<9.24	<8.11	<7.34
	Zn-65	<9.23	<8.53	<8.18	<9.44	<8.41	<7.59
	Co-60	<3.86	<4.07	<4.62	<3.64	<3.88	<3.08
	K-40	202±19.0	63.0±15.5	45.6±14.2	226±17.9	45.4±13.0	246±15.4
	Ba/La-140	<9.19	<9.57	<11.4	<9.66	<7.78	<8.72
FITZPATRICK† (03, INLET)	I-131	<0.60	<0.40	<0.10	<0.90	<0.50	<1.00
	Cs-134	<4.85	<3.57	<4.34	<2.70	<3.67	<5.40
	Cs-137	<4.40	<3.38	<3.77	<2.86	<3.64	<4.31
	Zr-95	<8.29	<7.89	<7.17	<6.16	<6.71	<8.37
	Nb-95	<5.36	<4.77	<4.81	<3.92	<4.26	<4.99
	Co-58	<4.98	<3.88	<3.89	<3.50	<4.10	<4.65
	Mn-54	<4.73	<3.77	<3.54	<3.15	<3.32	<4.30
	Fe-59	<11.8	<8.93	<9.49	<7.68	<8.39	<12.5
	Zn-65	<11.4	<9.92	<9.65	<6.88	<8.91	<11.9
	Co-60	<5.58	<4.93	<3.75	<3.75	<4.12	<6.13
	K-40	232±22.0	59.5±15.3	230±18.7	44.4±13.5	257±19.3	223±22.3
	Ba/La-140	<9.74	<13.0	<9.02	<9.74	<9.02	<14.4

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

† Samples required by the Technical Specifications.

TABLE 6-4 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES - 1991
Results in Units of pCi/liter ± 1 Sigma

STATION CODE*	NUCLIDE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
NINE MILE POINT UNIT 1** (09, INLET)	I-131	<8.23	<10.7	<8.22	<9.09	<9.73	<8.54
	Cs-134	<2.68	<2.67	<3.12	<3.05	<3.55	<2.37
	Cs-137	<3.09	<3.04	<3.42	<3.13	<3.36	<2.73
	Zr-95	<6.35	<5.44	<6.91	<5.75	<6.08	<5.32
	Nb-95	<3.68	<3.72	<4.44	<4.25	<4.21	<3.17
	Co-58	<3.32	<3.49	<3.72	<2.81	<4.10	<2.81
	Mn-54	<2.70	<2.77	<3.58	<3.20	<3.25	<2.44
	Fe-59	<7.06	<7.70	<8.82	<7.61	<8.84	<6.44
	Zn-65	<6.69	<7.59	<9.31	<7.17	<9.20	<6.05
	Co-60	<3.75	<3.19	<5.13	<3.42	<4.41	<3.08
	K-40	61.7±13.2	87.7±12.3	48.0±14.9	47.0±12.6	47.3±14.9	49.2±10.6
	Ba/La-140	<9.39	<12.8	<11.0	<11.1	<11.9	<9.06
NINE MILE POINT UNIT 2** (11, INLET)	I-131	<8.87	<13.0	<9.77	<9.52	<8.30	<11.8
	Cs-134	<3.21	<3.83	<3.11	<2.50	<2.43	<3.66
	Cs-137	<2.95	<3.96	<3.54	<2.12	<2.69	<3.39
	Zr-95	<6.89	<7.96	<6.29	<4.69	<5.29	<7.51
	Nb-95	<4.25	<5.20	<4.01	<3.09	<3.52	<4.85
	Co-58	<3.70	<4.64	<3.98	<2.74	<3.03	<4.32
	Mn-54	<3.29	<4.17	<3.50	<2.26	<2.30	<3.97
	Fe-59	<8.37	<11.0	<9.19	<5.93	<6.83	<9.72
	Zn-65	<7.97	<9.81	<9.05	<5.57	<5.92	<9.50
	Co-60	<3.49	<5.43	<4.05	<2.49	<3.01	<4.63
	K-40	56.6±13.0	187±19.2	65.6±17.8	24.2±12.8	65.9±10.9	214±18.7
	Ba/La-140	<10.9	<12.9	<13.6	<7.12	<9.12	<13.5

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

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

TABLE 6-4 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES - 1991
Results in Units of pCi/liter ± 1 Sigma

STATION CODE*	NUCLIDE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
OSWEGO CITY WATER** (10)	I-131	<8.95	<12.3	<9.14	<11.6	<13.7	<11.0
	Cs-134	<3.76	<4.68	<3.16	<4.16	<4.50	<2.93
	Cs-137	<3.65	<4.61	<3.13	<4.60	<4.47	<2.43
	Zr-95	<7.21	<9.48	<6.27	<9.79	<8.87	<5.40
	Nb-95	<4.44	<6.10	<4.09	<5.67	<5.44	<3.55
	Co-58	<3.69	<5.38	<3.67	<5.14	<5.52	<2.92
	Mn-54	<3.50	<4.55	<3.30	<4.30	<4.71	<2.69
	Fe-59	<9.11	<10.5	<9.17	<10.5	<11.1	<6.53
	Zn-65	<10.2	<10.4	<8.28	<12.7	<11.9	<6.91
	Co-60	<4.63	<6.56	<4.01	<5.75	<5.41	<2.79
	K-40	87.8±17.3	179±22.5	50.5±13.5	158±21.8	229±22.7	77.0±10.8
	Ba/La-140	<13.0	<14.5	<9.48	<12.3	<14.2	<9.86

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

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

TABLE 6-5

NMP/JAF SITE
ENVIRONMENTAL AIRBORNE PARTICULATE SAMPLES - OFF-SITE STATIONS
GROSS BETA ACTIVITY pCi/m^3 ± 2 SIGMA

LOCATION

WEEK END DATE	R-1 OFF*	R-2 OFF*	R-3 OFF*	R-4 OFF*	R-5 OFF*	D-2 OFF	E-OFF	F-OFF	G-OFF
91/01/08	0.018±0.002	0.020±0.002	0.017±0.002	0.020±0.002	0.020±0.002	0.014±0.002	0.017±0.002	0.017±0.002	0.017±0.002
91/01/15	0.018±0.002	0.021±0.002	0.014±0.002	0.019±0.002	0.013±0.002	0.015±0.002	0.018±0.002	0.015±0.002	0.015±0.002
91/01/22	0.023±0.002	0.022±0.002	0.021±0.002	0.021±0.002	0.023±0.002	0.015±0.002	0.016±0.002	0.014±0.002	0.014±0.002
91/01/29	0.017±0.002	0.016±0.002	0.018±0.002	0.020±0.002	0.017±0.002	0.011±0.002	0.013±0.002	0.012±0.002	0.011±0.002
91/02/05	0.017±0.002	0.019±0.002	0.017±0.002	0.017±0.002	0.017±0.002	0.012±0.002	0.012±0.002	0.014±0.002	0.012±0.002
91/02/12	0.018±0.002	0.020±0.002	0.019±0.002	0.021±0.002	0.016±0.002	0.014±0.002	0.017±0.002	0.017±0.002	0.017±0.002
91/02/20	0.010±0.002	0.009±0.002	0.012±0.002	0.012±0.002	0.012±0.002	0.012±0.002	0.013±0.002	0.015±0.002	0.015±0.002
91/02/26	0.013±0.002	0.014±0.002	0.014±0.002	0.015±0.002	0.015±0.002	0.014±0.002	0.015±0.002	0.016±0.002	0.014±0.002
91/03/05	0.011±0.002	0.012±0.002	0.014±0.002	0.014±0.002	0.011±0.002	0.015±0.002	0.018±0.002	0.017±0.002	0.015±0.002
91/03/12	0.018±0.002	0.018±0.002	0.018±0.002	0.019±0.002	0.019±0.002	0.012±0.002	0.014±0.002	0.014±0.002	0.012±0.002
91/03/19	0.009±0.001	0.008±0.001	0.009±0.002	0.008±0.002	0.010±0.002	0.010±0.002	0.010±0.002	0.010±0.002	0.010±0.002
91/03/26	0.010±0.002	0.013±0.002	0.010±0.002	0.010±0.002	0.009±0.002	0.013±0.002	0.014±0.002	0.015±0.002	0.014±0.002
91/04/02	0.015±0.002	0.014±0.002	0.014±0.002	0.016±0.002	0.010±0.001	0.008±0.001	0.009±0.002	0.008±0.002	0.009±0.002
91/04/09	0.016±0.002	0.017±0.002	0.017±0.002	0.020±0.002	0.017±0.002	0.011±0.002	0.012±0.002	0.013±0.002	0.011±0.002
91/04/16	0.011±0.002	0.013±0.002	0.011±0.002	0.014±0.002	0.011±0.002	0.014±0.002	0.014±0.002	0.013±0.002	0.014±0.002
91/04/23	0.008±0.001	0.008±0.002	0.007±0.001	0.006±0.002	0.008±0.002	0.016±0.002	0.017±0.002	0.017±0.002	0.016±0.002
91/05/30	0.014±0.002	0.016±0.002	0.015±0.002	0.017±0.002	0.015±0.002	0.015±0.002	0.018±0.002	0.014±0.002	0.015±0.002
91/05/07	0.008±0.001	0.009±0.002	0.007±0.001	0.007±0.002	0.008±0.001	0.010±0.002	0.010±0.002	0.009±0.002	0.008±0.001
91/05/14	0.014±0.002	0.014±0.002	0.010±0.002	0.011±0.002	0.011±0.002	0.010±0.002	0.012±0.002	0.011±0.002	0.011±0.002
91/05/21	0.008±0.002	0.019±0.002	0.016±0.002	0.018±0.001	0.006±0.001	0.006±0.001	0.006±0.001	0.007±0.001	0.006±0.001
91/05/28	0.013±0.002	0.015±0.002	0.014±0.002	0.013±0.002	0.013±0.002	0.008±0.001	0.011±0.002	0.009±0.002	0.007±0.001
91/06/04	0.017±0.002	0.010±0.002	0.010±0.002	0.010±0.002	0.008±0.001	0.009±0.002	0.011±0.002	0.010±0.002	0.008±0.002
91/06/11	0.011±0.002	0.007±0.002	0.010±0.002	0.011±0.002	0.011±0.002	0.010±0.002	0.011±0.002	0.011±0.002	0.011±0.002
91/06/18	0.009±0.002	0.011±0.002	0.010±0.002	0.012±0.002	0.013±0.002	0.014±0.002	0.016±0.002	0.014±0.002	0.013±0.002
91/06/25	0.011±0.002	0.015±0.002	0.012±0.002	0.013±0.002	0.007±0.001	0.008±0.001	0.009±0.002	0.010±0.002	0.010±0.002

* Sample locations required by Technical Specifications.

TABLE 6-5 (CONTINUED)

NMP/JAF SITE
ENVIRONMENTAL AIRBORNE PARTICULATE SAMPLES - OFF-SITE STATIONS
GROSS BETA ACTIVITY pCi/m^3 ± 2 SIGMA

LOCATION

WEEK END DATE	R-1 OFF*	R-2 OFF*	R-3 OFF*	R-4 OFF*	R-5 OFF*	D-2 OFF	E-OFF	F-OFF	C-OFF
91/07/02	0.017±0.002	0.017±0.002	0.015±0.002	0.017±0.002	0.015±0.002	0.016±0.002	0.018±0.002	0.018±0.002	0.016±0.002
91/07/09	0.011±0.002	0.012±0.002	0.011±0.002	0.010±0.002	0.008±0.001	0.010±0.002	0.014±0.002	0.011±0.002	0.011±0.002
91/07/16	0.009±0.002	0.014±0.002	0.015±0.002	0.014±0.002	0.013±0.002	0.016±0.002	0.018±0.002	0.013±0.002	0.013±0.002
91/07/23	0.019±0.002	0.022±0.002	0.018±0.002	0.023±0.002	0.018±0.002	0.026±0.003	0.030±0.002	0.020±0.002	0.023±0.002
91/07/30	0.012±0.002	0.011±0.002	0.009±0.002	0.012±0.002	0.011±0.002	0.011±0.002	0.009±0.002	0.011±0.002	0.009±0.002
91/08/06	0.008±0.001	0.010±0.002	0.009±0.002	0.010±0.002	0.009±0.002	0.010±0.002	0.012±0.002	0.010±0.002	0.010±0.002
91/08/13	0.009±0.001	0.010±0.002	0.008±0.001	0.008±0.001	0.008±0.001	0.009±0.002	0.010±0.002	0.010±0.002	0.008±0.002
91/08/20	0.016±0.002	0.020±0.002	0.018±0.002	0.019±0.002	0.019±0.002	0.022±0.002	0.017±0.002	0.017±0.002	0.014±0.002
91/08/27	0.014±0.002	0.015±0.002	0.014±0.002	0.015±0.002	0.013±0.002	0.015±0.002	0.011±0.002	0.015±0.002	0.013±0.002
91/09/03	0.018±0.002	0.021±0.002	0.029±0.003	0.016±0.002	0.013±0.002	0.019±0.002	0.015±0.002	0.016±0.002	0.018±0.002
91/09/10	0.018±0.002	0.020±0.002	0.019±0.002	0.017±0.002	0.015±0.002	0.019±0.002	0.019±0.002	0.015±0.002	0.014±0.002
91/09/17	0.016±0.002	0.015±0.002	0.014±0.002	0.015±0.002	0.012±0.002	0.011±0.002	0.015±0.002	0.012±0.002	0.016±0.002
91/09/24	0.010±0.002	0.009±0.002	0.010±0.002	0.009±0.002	0.010±0.002	0.011±0.002	0.009±0.002	0.011±0.002	0.008±0.002
91/10/01	0.007±0.002	0.009±0.002	0.007±0.001	0.010±0.002	0.007±0.001	0.007±0.001	0.009±0.002	0.008±0.002	0.008±0.001
91/10/08	0.017±0.002	0.019±0.002	0.018±0.002	0.018±0.002	0.018±0.002	0.019±0.002	0.019±0.002	0.018±0.002	0.016±0.002
91/10/15	0.015±0.002	0.017±0.002	0.017±0.002	0.016±0.002	0.014±0.002	0.016±0.002	0.014±0.002	0.014±0.002	0.013±0.002
91/10/22	0.012±0.002	0.013±0.002	0.014±0.002	0.014±0.002	0.013±0.002	0.014±0.002	0.013±0.002	0.014±0.002	0.013±0.002
91/10/29	0.027±0.003	0.033±0.003	0.030±0.003	0.032±0.003	0.028±0.002	0.029±0.002	0.029±0.003	0.030±0.003	0.022±0.002
91/11/05	0.018±0.002	0.020±0.002	0.018±0.002	0.021±0.002	0.015±0.002	0.018±0.002	0.021±0.002	0.016±0.002	0.015±0.002
91/11/12	0.016±0.002	0.014±0.002	0.016±0.002	0.015±0.002	0.015±0.002	0.014±0.002	0.013±0.002	0.015±0.002	0.011±0.002
91/11/19	0.019±0.002	0.018±0.002	0.018±0.002	0.020±0.002	0.019±0.002	0.015±0.002	0.018±0.002	0.018±0.002	0.017±0.002
91/11/26	0.015±0.002	0.014±0.002	0.013±0.002	0.015±0.002	0.013±0.002	0.013±0.002	0.015±0.002	0.013±0.002	0.013±0.002
91/12/03	0.013±0.002	0.013±0.002	0.014±0.002	0.016±0.002	0.013±0.002	0.015±0.002	0.014±0.002	0.010±0.002	0.010±0.002
91/12/10	0.016±0.002	0.013±0.002	0.014±0.002	0.017±0.002	0.014±0.002	0.013±0.002	0.014±0.002	0.015±0.002	0.012±0.002
91/12/17	0.017±0.002	0.013±0.002	0.016±0.002	0.016±0.002	0.017±0.002	0.015±0.002	0.015±0.002	0.016±0.002	0.015±0.002
91/12/23	0.013±0.002	0.014±0.002	0.014±0.002	0.017±0.002	0.015±0.002	0.015±0.002	0.015±0.002	0.015±0.002	0.011±0.002
91/12/30	0.014±0.002	0.014±0.002	0.013±0.002	0.013±0.002	0.013±0.002	0.014±0.002	0.013±0.002	0.013±0.002	0.012±0.002

* Sample locations required by Technical Specifications.

TABLE 6-6

NMP/JAF SITE
ENVIRONMENTAL AIRBORNE PARTICULATE SAMPLES - ON-SITE STATIONS
GROSS BETA ACTIVITY $pCi/m^3 \pm 2$ SIGMA
LOCATION

WEEK END DATE	D1--ON	G--ON	H--ON	I--ON	J--ON	K--ON
91/01/07	0.015±0.002	0.021±0.002	0.013±0.002	0.019±0.002	0.017±0.002	0.018±0.002
91/01/14	0.017±0.002	0.019±0.002	0.014±0.002	0.026±0.003	0.014±0.002	0.017±0.002
91/01/21	0.018±0.002	0.022±0.002	0.021±0.002	0.021±0.002	0.020±0.002	0.021±0.002
91/01/28	0.019±0.002	0.020±0.002	0.018±0.002	0.019±0.002	0.018±0.002	0.020±0.002
91/02/04	0.016±0.002	0.019±0.002	0.023±0.002	0.015±0.002	0.017±0.002	0.016±0.002
91/02/11	0.016±0.002	0.020±0.002	0.020±0.002	0.018±0.002	0.017±0.002	0.020±0.002
91/02/19	0.011±0.002	0.012±0.002	0.012±0.002	0.012±0.002	0.012±0.002	0.011±0.002
91/02/25	0.013±0.002	0.015±0.002	0.013±0.002	0.014±0.002	0.014±0.002	0.013±0.002
91/03/04	0.012±0.002	0.012±0.002	0.018±0.003	0.012±0.002	0.012±0.002	0.013±0.002
91/03/11	0.015±0.002	0.020±0.002	0.017±0.003	0.019±0.002	0.018±0.002	0.016±0.002
91/03/18	0.011±0.002	0.011±0.002	0.011±0.002	0.011±0.002	0.011±0.002	0.011±0.002
91/03/25	0.011±0.002	0.012±0.002	0.019±0.003	0.010±0.002	0.012±0.002	0.010±0.002
91/04/01	0.013±0.002	0.016±0.002	0.016±0.002	0.015±0.002	0.014±0.002	0.014±0.002
91/04/08	0.017±0.002	0.013±0.002	0.019±0.002	0.019±0.002	0.018±0.002	0.018±0.002
91/04/15	0.012±0.002	0.013±0.002	0.013±0.002	0.013±0.002	0.013±0.002	0.013±0.002
91/04/22	0.008±0.002	0.009±0.002	0.010±0.002	0.010±0.002	0.008±0.002	0.009±0.002
91/04/29	0.014±0.002	0.014±0.002	0.016±0.002	0.014±0.002	0.015±0.002	0.014±0.002
91/05/06	0.009±0.002	0.009±0.002	0.011±0.002	0.009±0.002	0.010±0.002	0.010±0.002
91/05/13	0.013±0.002	0.012±0.002	0.014±0.002	0.014±0.002	0.013±0.002	0.010±0.002
91/05/20	0.016±0.002	0.016±0.002	0.018±0.002	0.017±0.002	0.017±0.002	0.015±0.002
91/05/28	0.013±0.002	0.014±0.002	0.014±0.002	0.014±0.002	0.014±0.002	0.014±0.002
91/06/03	0.010±0.002	0.013±0.002	0.014±0.002	0.013±0.002	0.012±0.002	0.010±0.002
91/06/10	0.011±0.002	0.009±0.002	0.009±0.002	0.009±0.002	0.009±0.002	0.010±0.002
91/06/17	0.011±0.002	0.011±0.002	0.011±0.002	0.013±0.002	0.010±0.002	0.015±0.004
91/06/24	0.011±0.002	0.013±0.002	0.010±0.002	0.012±0.002	0.013±0.002	0.002±0.001

TABLE 6-6 (CONTINUED)

NMP/JAF SITE
ENVIRONMENTAL AIRBORNE PARTICULATE [illegible] ON SITE STATIONS
GROSS BETA ACTIVITY pC[illegible] IGH
LOCATION

WEEK END DATE	D1--ON	G--ON	H--ON	[illegible] ON	J--ON	K--ON
91/07/01	0.017±0.002	0.018±0.002	0.015±0.002	0.015±0.002	0.016±0.002	0.015±0.002
91/07/08	0.011±0.002	0.012±0.002	0.013±0.002	0.011±0.002	0.010±0.002	0.012±0.002
91/07/15	0.011±0.002	0.012±0.002	0.014±0.002	0.012±0.002	0.013±0.002	0.012±0.002
91/07/22	0.020±0.002	0.027±0.002	0.029±0.003	0.024±0.002	0.022±0.002	0.019±0.002
91/07/29	0.012±0.002	0.014±0.002	0.015±0.002	0.014±0.002	0.013±0.002	0.011±0.002
91/08/05	0.009±0.002	0.010±0.002	0.010±0.002	0.011±0.002	0.011±0.002	0.006±0.001
91/08/12	0.006±0.001	0.007±0.001	0.006±0.002	0.007±0.001	0.006±0.001	0.004±0.001
91/08/19	0.022±0.003	0.024±0.003	0.026±0.003	0.016±0.002	0.017±0.002	0.016±0.002
91/08/26	0.011±0.002	0.012±0.002	0.011±0.002	0.011±0.002	0.013±0.002	0.004±0.001
91/09/03	0.019±0.002	0.024±0.002	0.023±0.002	0.023±0.002	0.021±0.002	0.005±0.001
91/09/09	0.019±0.002	0.020±0.003	0.021±0.003	0.023±0.003	0.019±0.002	0.012±0.002
91/09/16	0.018±0.002	0.017±0.002	0.016±0.002	0.012±0.002	0.014±0.002	0.012±0.002
91/09/23	0.012±0.002	0.011±0.002	0.015±0.002	0.009±0.002	0.010±0.002	0.010±0.002
91/09/30	0.006±0.001	0.007±0.001	0.007±0.001	0.007±0.001	0.006±0.001	0.006±0.001
91/10/07	0.019±0.002	0.021±0.002	0.023±0.002	0.018±0.002	0.020±0.002	0.016±0.002
91/10/14	0.014±0.002	0.014±0.002	0.014±0.002	0.014±0.002	0.014±0.002	0.015±0.002
91/10/21	0.010±0.002	0.015±0.002	0.012±0.002	0.012±0.002	0.015±0.002	0.010±0.002
91/10/28	0.028±0.003	0.032±0.003	0.029±0.003	0.030±0.003	0.027±0.003	0.028±0.002
91/11/04	0.014±0.002	0.018±0.002	0.020±0.002	0.017±0.002	0.018±0.002	0.014±0.002
91/11/12	0.015±0.002	0.016±0.002	0.016±0.002	0.017±0.002	0.017±0.002	0.016±0.002
91/11/18	0.019±0.002	0.020±0.002	0.022±0.003	0.018±0.002	0.018±0.002	0.017±0.002
91/11/25	0.013±0.002	0.018±0.002	0.020±0.002	0.016±0.002	0.014±0.002	0.015±0.002
91/12/02	0.011±0.002	0.013±0.002	0.012±0.002	0.010±0.002	0.014±0.002	0.013±0.002
91/12/09	0.017±0.002	0.017±0.002	0.012±0.002	0.014±0.002	0.013±0.002	0.013±0.002
91/12/16	0.016±0.002	0.018±0.002	0.013±0.002	0.016±0.002	0.016±0.002	0.014±0.002
91/12/23	0.014±0.002	0.015±0.002	0.010±0.002	0.012±0.002	0.013±0.002	0.014±0.002
91/12/30	0.013±0.002	0.018±0.002	0.013±0.002	0.016±0.002	0.012±0.002	0.010±0.002

TABLE 6-7

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

WEEK END DATE	R-1*	R-2*	R-3*	R-4*	R-5*	D-2	E	F	G
91/01/08	<0.007	<0.012	<0.012	<0.012	<0.009	<0.011	<0.013	<0.008	<0.009
91/01/15	<0.011	<0.009	<0.008	<0.014	<0.012	<0.007	<0.009	<0.008	<0.011
91/01/22	<0.009	<0.010	<0.010	<0.008	<0.008	<0.012	<0.011	<0.008	<0.009
91/01/29	<0.006	<0.009	<0.009	<0.012	<0.013	<0.010	<0.008	<0.009	<0.009
91/02/05	<0.007	<0.008	<0.011	<0.010	<0.011	<0.009	<0.008	<0.007	<0.014
91/02/12	<0.007	<0.009	<0.013	<0.012	<0.009	<0.011	<0.009	<0.006	<0.011
91/02/20	<0.014	<0.013	<0.009	<0.011	<0.008	<0.012	<0.010	<0.016	<0.011
91/02/26	<0.009	<0.009	<0.010	<0.011	<0.013	<0.012	<0.012	<0.012	<0.010
91/03/05	<0.012	<0.014	<0.011	<0.016	<0.012	<0.011	<0.011	<0.013	<0.016
91/03/12	<0.007	<0.014	<0.012	<0.010	<0.011	<0.011	<0.013	<0.015	<0.010
91/03/19	<0.010	<0.010	<0.012	<0.014	<0.009	<0.013	<0.010	<0.009	<0.013
91/03/26	<0.011	<0.012	<0.012	<0.009	<0.009	<0.011	<0.015	<0.014	<0.012
91/04/02	<0.009	<0.013	<0.011	<0.013	<0.016	<0.013	<0.012	<0.015	<0.011
91/04/09	<0.009	<0.015	<0.012	<0.014	<0.008	<0.010	<0.008	<0.016	<0.013
91/04/16	<0.010	<0.013	<0.014	<0.012	<0.010	<0.014	<0.009	<0.011	<0.014
91/04/23	<0.009	<0.015	<0.011	<0.012	<0.009	<0.009	<0.012	<0.011	<0.012
91/05/30	<0.009	<0.012	<0.013	<0.014	<0.010	<0.010	<0.012	<0.013	<0.011
91/05/07	<0.009	<0.013	<0.010	<0.011	<0.010	<0.012	<0.012	<0.012	<0.013
91/05/14	<0.011	<0.012	<0.014	<0.014	<0.010	<0.012	<0.012	<0.013	<0.011
91/05/21	<0.010	<0.010	<0.011	<0.013	<0.012	<0.012	<0.093	<0.011	<0.007
91/05/28	<0.013	<0.011	<0.014	<0.008	<0.012	<0.012	<0.014	<0.012	<0.014
91/06/04	<0.009	<0.014	<0.009	<0.009	<0.011	<0.006	<0.008	<0.010	<0.015
91/06/11	<0.007	<0.013	<0.015	<0.010	<0.012	<0.012	<0.012	<0.010	<0.012
91/06/18	<0.013	<0.011	<0.012	<0.012	<0.008	<0.015	<0.010	<0.013	<0.012
91/06/25	<0.013	<0.009	<0.010	<0.011	<0.010	<0.011	<0.010	<0.015	<0.010

* 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 END DATE	R-1*	R-2*	R-3*	R-4*	R-5*	D-2	E	F	G
91/07/02	<0.012	<0.011	<0.010	<0.015	<0.012	<0.013	<0.014	<0.014	<0.010
91/07/09	<0.009	<0.016	<0.010	<0.011	<0.010	<0.013	<0.009	<0.014	<0.012
91/07/16	<0.010	<0.012	<0.008	<0.012	<0.011	<0.018	<0 012	<0.014	<0.011
91/07/23	<0.015	<0.013	<0.012	<0.013	<0.012	<0.016	<0.011	<0.010	<0.012
91/07/30	<0.011	<0.014	<0.010	<0.012	<0.011	<0.016	<0.012	<0.010	<0.019
91/08/06	<0.009	<0.013	<0.009	<0.013	<0.012	<0.011	<0.012	<0.014	<0.011
91/08/13	<0.011	<0.014	<0.014	<0.009	<0.014	<0.011	<0.014	<0.014	<0.009
91/08/20	<0.011	<0.013	<0.014	<0.011	<0.014	<0.011	<0.011	<0.009	<0.012
91/08/27	<0.013	<0.013	<0.015	<0.010	<0.010	<0.018	<0.013	<0.010	<0.012
91/09/03	<0.011	<0.013	<0.014	<0.014	<0.012	<0.010	<0.015	<0.014	<0.012
91/09/10	<0.010	<0.010	<0.011	<0.008	<0.010	<0.011	<0.009	<0.012	<0.012
91/09/17	<0.010	<0.011	<0.013	<0.014	<0.011	<0.008	<0.015	<0.010	<0.013
91/09/24	<0.011	<0.019	<0.012	<0.013	<0.010	<0.014	<0.013	<0.010	<0.012
91/10/01	<0.009	<0.014	<0.015	<0.012	<0.012	<0.013	<0.011	<0.016	<0.012
91/10/08	<0.010	<0.012	<0.011	<0.013	<0.012	<0.011	<0.011	<0.012	<0.012
91/10/15	<0.018	<0.011	<0.012	<0.014	<0.008	<0.011	<0.014	<0.012	<0.012
91/10/22	<0.010	<0.015	<0.010	<0.014	<0.012	<0.012	<0.009	<0.013	<0.015
91/10/29	<0.010	<0.014	<0.011	<0.012	<0.009	<0.010	<0.009	<0.011	<0.012
91/11/05	<0.014	<0.010	<0.011	<0.011	<0.013	<0.012	<0.010	<0.014	<0.010
91/11/12	<0.013	<0.018	<0.011	<0.013	<0.009	<0.011	<0.013	<0.010	<0.011
91/11/19	<0.013	<0.011	<0.008	<0.011	<0.011	<0.007	<0.010	<0.011	<0.015
91/11/26	<0.012	<0.015	<0.013	<0.013	<0.007	<0.014	<0.011	<0.011	<0.015
91/12/03	<0.012	<0.016	<0.013	<0.013	<0.011	<0.013	<0.010	<0.011	<0.011
91/12/10	<0.010	<0.014	<0.010	<0.015	<0.010	<0.011	<0.010	<0.011	<0.010
91/12/17	<0.013	<0.013	<0.007	<0.015	<0.014	<0.011	<0.010	<0.012	<0.015
91/12/23	<0.014	<0.013	<0.009	<0.021	<0.010	<0.009	<0.018	<0.013	<0.016
91/12/30	<0.010	<0.012	<0.010	<0.014	<0.009	<0.015	<0.011	<0.010	<0.012

* Sample locations required by Technical Specification

** Pump Inoperative

TABLE 6-8

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

LOCATION

WEEK END	D1--ON	G--ON	H--ON	I--ON	J--ON	K--ON
91/01/07	<0.011	<0.010	<0.010	<0.011	<0.011	<0.012
91/01/14	<0.013	<0.009	<0.010	<0.015	<0.015	<0.007
91/01/21	<0.006	<0.008	<0.017	<0.010	<0.010	<0.010
91/01/28	<0.013	<0.011	<0.008	<0.009	<0.011	<0.008
91/02/04	<0.008	<0.010	<0.010	<0.010	<0.011	<0.008
91/02/11	<0.012	<0.008	<0.012	<0.012	<0.007	<0.006
91/02/19	<0.011	<0.013	<0.012	<0.013	<0.011	<0.009
91/02/25	<0.012	<0.011	<0.012	<0.010	<0.011	<0.014
91/03/04	<0.012	<0.012	<0.015	<0.015	<0.009	<0.013
91/03/11	<0.010	<0.015	<0.018	<0.012	<0.013	<0.011
91/03/18	<0.010	<0.013	<0.014	<0.010	<0.016	<0.014
91/03/25	<0.016	<0.016	<0.015	<0.024	<0.009	<0.012
91/04/01	<0.014	<0.011	<0.014	<0.014	<0.017	<0.012
91/04/08	<0.007	<0.014	<0.009	<0.018	<0.012	<0.013
91/04/15	<0.009	<0.010	<0.012	<0.011	<0.012	<0.010
91/04/22	<0.012	<0.011	<0.013	<0.009	<0.011	<0.010
91/04/29	<0.010	<0.011	<0.011	<0.008	<0.011	<0.009
91/05/06	<0.010	<0.011	<0.013	<0.009	<0.010	<0.009
91/05/13	<0.014	<0.009	<0.010	<0.014	<0.012	<0.009
91/05/20	<0.011	<0.013	<0.014	<0.010	<0.015	<0.012
91/05/28	<0.009	<0.014	<0.011	<0.012	<0.010	<0.009
91/06/03	<0.015	<0.012	<0.015	<0.013	<0.014	<0.012
91/06/10	<0.009	<0.014	<0.014	<0.017	<0.011	<0.013
91/06/17	<0.007	<0.010	<0.014	<0.012	<0.012	<0.024
91/06/24	<0.011	<0.016	<0.015	<0.015	<0.010	<0.015

TABLE 6-8 (CONTINUED)

NMP/JAF SITE

ENVIRONMENTAL CHARCOAL CARTRIDGE SAMPLES - ON-SITE STATIONS

I-131 ACTIVITY pCi/m^3 ± 1 SIGMA

LOCATION

WEEK END	D1--ON	G--ON	H--ON	I--ON	J--ON	K--ON
91/07/01	<0.011	<0.011	<0.015	<0.012	<0.014	<0.010
91/07/08	<0.016	<0.010	<0.012	<0.013	<0.015	<0.009
91/07/15	<0.014	<0.010	<0.015	<0.008	<0.013	<0.010
91/07/22	<0.010	<0.016	<0.012	<0.009	<0.010	<0.016
91/07/29	<0.009	<0.012	<0.012	<0.007	<0.015	<0.010
91/08/05	<0.010	<0.014	<0.014	<0.011	<0.012	<0.010
91/08/12	<0.010	<0.011	<0.017	<0.011	<0.019	<0.010
91/08/19	<0.011	<0.009	<0.011	<0.012	<0.011	<0.014
91/08/26	<0.010	<0.010	<0.012	<0.010	<0.012	<0.011
91/09/03	<0.010	<0.012	<0.010	<0.010	<0.009	<0.016
91/09/09	<0.013	<0.022	<0.015	<0.011	<0.014	<0.016
91/09/16	<0.011	<0.012	<0.014	<0.013	<0.010	<0.011
91/09/23	<0.009	<0.012	<0.010	<0.011	<0.016	<0.013
91/09/30	<0.012	<0.014	<0.014	<0.013	<0.011	<0.015
91/10/07	<0.010	<0.012	<0.014	<0.011	<0.014	<0.009
91/10/14	<0.012	<0.009	<0.014	<0.015	<0.010	<0.015
91/10/21	<0.014	<0.011	<0.013	<0.012	<0.011	<0.017
91/10/28	<0.009	<0.014	<0.013	<0.010	<0.011	<0.009
91/11/04	<0.011	<0.012	<0.010	<0.012	<0.010	<0.011
91/11/12	<0.006	<0.009	<0.010	<0.011	<0.008	<0.008
91/11/18	<0.013	<0.013	<0.010	<0.008	<0.016	<0.011
91/11/25	<0.014	<0.010	<0.012	<0.015	<0.010	<0.011
91/12/02	<0.011	<0.013	<0.012	<0.013	<0.010	<0.014
91/12/09	<0.012	<0.017	<0.011	<0.014	<0.011	<0.013
91/12/16	<0.011	<0.010	<0.012	<0.008	<0.011	<0.013
91/12/23	<0.011	<0.016	<0.012	<0.011	<0.009	<0.016
91/12/30	<0.010	<0.017	<0.012	<0.011	<0.010	<0.011

TABLE 6-9

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES
OF JAF/NMP SITE AIR PARTICULATE SAMPLES - 1991
Results in Units of 10^{-3}pCi/m^3 ± 1 Sigma

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
			R1 OFF-SITE COMPOSITE*			
TlCe-144	<3.95	<4.71	<2.98	<3.92	<3.57	<4.35
Ce-141	<1.17	<1.59	<0.98	<1.28	<1.10	<1.46
Be-7	69.2±12.1	69.2±7.8	62.8±5.1	86.8±6.3	73.7±5.8	69.2±6.7
Zn-65	<1.52	<4.37	<3.16	<3.45	<2.63	<3.09
Cs-134	<0.96	<1.70	<0.88	<1.23	<0.97	<1.29
Cs-137	<0.89	<1.50	<0.77	<1.16	<1.01	<1.68
Zr-95	<1.86	<2.68	<1.98	<2.58	<1.89	<2.95
Nb-95	<1.49	<1.63	<1.06	<1.49	<1.38	<1.41
Co-58	<1.09	<1.38	<1.27	<1.00	<1.11	<1.48
Mn-54	<0.99	<1.59	<1.02	<1.14	<0.56	<1.77
Co-60	<1.14	<2.25	<0.68	<1.38	<1.56	<1.81
K-40	<14.2	<20.5	<10.6	38.8±6.9	26.8±6.4	21.5±6.8
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
			R2 OFF-SITE COMPOSITE*			
TlCe-144	<3.24	<4.48	<3.95	<3.93	<4.62	<5.10
Ce-141	<0.66	<1.23	<1.36	<1.45	<1.43	<1.76
Be-7	74.5±63.9	73.8±63.5	65.1±7.0	85.5±7.3	87.7±7.9	75.2±7.8
Zn-65	<1.59	<3.68	<3.83	<2.60	<4.10	<4.21
Cs-134	<0.44	<1.35	<1.51	<1.83	<1.29	<1.60
Cs-137	<0.51	<1.29	<1.52	<1.47	<1.39	<1.48
Zr-95	<0.77	<2.53	<2.80	<2.63	<2.73	<2.95
Nb-95	<0.67	<1.45	<1.77	<2.12	<2.16	<1.96
Co-58	<0.94	<1.43	<1.72	<2.37	<1.32	<1.80
Mn-54	<0.55	<1.23	<1.09	<2.44	<1.34	<1.04
Co-60	<1.18	<2.15	<1.74	<2.96	<2.30	<1.80
K-40	<10.8	<16.2	24.1±7.0	<2.23	16.1±6.3	53.8±8.6
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* Sample Locations 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 - 1991
Results in Units of 10^{-3}pCi/m^3 ± 1 Sigma

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
R3 OFF-SITE COMPOSITE*						
TlCe-144	<2.81	<5.21	<3.42	<4.20	<3.38	<4.18
Ce-141	<0.69	<1.74	<1.27	<1.22	<1.13	<1.39
Be-7	62.8±5.8	61.9±8.4	75.4±6.7	89.5±6.6	74.7±5.5	69.4±6.5
Zn-65	<2.24	<4.05	<3.87	<2.89	<3.28	<3.45
Cs-134	<0.80	<2.23	<1.49	<1.11	<0.97	<1.37
Cs-137	<0.72	<1.34	<1.43	<1.03	<0.97	<1.13
Zr-95	<1.33	<3.83	<1.97	<2.38	<2.15	<1.68
Nb-95	<1.93	<2.07	<1.60	<1.41	<0.80	<1.11
Co-58	<0.68	<1.92	<1.80	<1.22	<0.93	<1.37
Mn-54	<0.72	<1.78	<1.30	<1.31	<0.82	<0.99
Co-60	<0.66	<2.39	<2.33	<1.56	<1.65	<1.60
K-40	<11.8	20.3±9.3	8.96±4.3	<2.59	8.54±4.8	39.9±7.8
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
R4 OFF-SITE COMPOSITE*						
TlCe-144	<5.22	<5.12	<3.42	<3.99	<3.78	<4.64
Ce-141	<1.99	<1.88	<1.08	<1.37	<1.16	<1.62
Be-7	73.0±12.5	94.8±9.2	72.3±5.6	90.6±7.0	77.0±5.6	86.1±7.6
Zn-65	<2.59	<4.54	<3.13	<4.53	<2.96	<3.02
Cs-134	<1.09	<1.76	<0.90	<1.19	<1.11	<1.90
Cs-137	<1.04	<1.46	<1.02	<1.14	<1.09	<1.32
Zr-95	<1.84	<3.39	<1.57	<2.12	<2.21	<2.57
Nb-95	<1.50	<2.65	<0.68	<2.00	<1.59	<1.97
Co-58	<1.18	<2.77	<0.78	<1.37	<1.03	<1.59
Mn-54	<1.06	<1.68	<0.91	<1.18	<1.06	<1.10
Co-60	<0.83	<2.48	<1.15	<1.20	<0.84	<1.94
K-40	42.9±14.4	23.7±8.5	<14.5	12.5±6.1	30.0±5.7	31.5±8.0
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* Sample Locations 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 - 1991
Results in Units of 10^{-3}pCi/m^3 ± 1 Sigma

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
			R5 OFF-SITE COMPOSITE (CONTROL)*			
TlCe-144	<5.10	<4.19	<3.09	<4.35	<3.34	<5.92
Ce-141	<1.61	<1.38	<1.10	<1.56	<1.26	<1.91
Be-7	60.7±13.5	76.9±6.3	66.2±5.0	87.7±7.8	77.4±6.2	72.7±8.0
Zn-65	<2.75	<3.87	<2.27	<5.92	<2.59	<4.65
Cs-134	<1.01	<1.41	<1.13	<2.36	<1.29	<1.65
Cs-137	<1.24	<1.17	<0.88	<1.60	<1.24	<1.69
Zr-95	<1.89	<2.57	<1.91	<3.30	<2.12	<3.30
Nb-95	<1.12	<1.82	<1.35	<2.38	<1.65	<2.20
Co-58	<0.79	<1.50	<1.12	<1.49	<1.05	<2.39
Mn-54	<1.09	<1.20	<0.88	<1.77	<0.92	<1.97
Co-60	<1.63	<1.84	<1.23	<2.11	<1.34	<3.23
K-40	28.9±14.9	47.6±7.2	33.2±5.7	14.2±5.2	35.0±6.3	46.9±8.6
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
			D2 OFF-SITE COMPOSITE**			
TlCe-144	<5.64	<4.49	<3.58	<5.29	<4.84	<4.84
Ce-141	<1.66	<1.48	<1.27	<1.98	<1.46	<1.65
Be-7	68.7±12.7	63.8±6.7	61.8±6.1	76.0±8.8	76.2±7.6	88.6±7.5
Zn-65	<2.58	<3.89	<3.46	<6.62	<4.29	<3.20
Cs-134	<0.72	<1.39	<1.14	<2.38	<1.26	<1.36
Cs-137	<1.05	<1.0	<1.14	<1.92	<1.66	<0.91
Zr-95	<2.19	<2.88	<2.48	<3.45	<3.14	<2.93
Nb-95	<1.36	<1.50	<1.59	<2.24	<2.18	<1.90
Co-58	<1.05	<1.68	<1.51	<2.39	<1.26	<1.37
Mn-54	<1.11	<1.55	<1.14	<1.31	<1.56	<1.45
Co-60	<1.54	<1.48	<1.89	<2.60	<1.65	<1.11
K-40	31.9±12.2	<22.8	20.6±5.2	22.4±8.4	14.8±6.9	47.8±8.5
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* Sample Locations Required by Technical Specifications.
** Optional Sample Location. Not Required By the Technical Specifications.
† Plant Related Radionuclides.

TABLE 6-9 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES
OF JAF/NMP SITE AIR PARTICULATE SAMPLES - 1991
Results in Units of 10^{-3}pCi/m^3 ± 1 Sigma

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
E OFF-SITE COMPOSITE**						
TlCe-144	<4.42	<4.56	<3.88	<4.45	<3.50	<5.05
Ce-141	<1.46	<1.34	<1.23	<1.48	<1.23	<1.74
Be-7	76.9±13.2	83.6±7.0	68.8±6.7	81.1±7.5	84.6±5.8	61.8±6.7
Zn-65	<2.46	<3.09	<3.55	<3.99	<2.43	<4.35
Cs-134	<0.92	<1.16	<1.25	<2.12	<0.92	<1.41
Cs-137	<1.04	<1.10	<1.24	<1.50	<0.83	<1.50
Zr-95	<1.49	<2.46	<2.07	<3.60	<2.31	<2.78
Nb-95	<1.29	<1.51	<1.58	<1.98	<1.07	<1.86
Co-58	<1.17	<1.64	<1.56	<1.70	<1.21	<1.63
Mn-54	<1.05	<1.40	<1.24	<2.11	<0.82	<1.37
Co-60	<0.94	<2.09	<2.13	<1.60	<1.43	<1.89
K-40	<15.2	<18.7	<17.3	<15.3	<11.7	42.9±7.0
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
F OFF-SITE COMPOSITE**						
TlCe-144	<5.20	<4.51	<3.21	<4.42	<3.69	<4.35
Ce-141	<1.65	<1.46	<1.09	<1.49	<1.20	<1.55
Be-7	83.0±12.5	70.5±6.5	67.8±6.4	79.9±6.6	64.3±5.4	55.0±6.5
Zn-65	<2.40	<3.53	<2.49	<3.19	<2.75	<3.37
Cs-134	<1.10	<1.17	<1.49	<1.43	<0.95	<1.79
Cs-137	<0.83	<1.24	<1.14	<1.33	<1.00	<1.39
Zr-95	<1.99	<2.89	<2.49	<2.44	<2.31	<3.59
Nb-95	<1.20	<1.60	<1.46	<1.98	<1.35	<1.95
Co-58	<1.44	<1.39	<1.53	<1.66	<1.27	<1.64
Mn-54	<0.90	<1.73	<0.61	<1.39	<0.96	<1.30
Co-60	<1.03	<1.23	<1.57	<1.38	<1.58	<1.71
K-40	31.6±12.0	42.1±7.91	18.1±4.7	42.8±7.7	<13.8	51.0±8.0
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional Sample Location. Not Required by the Technical Specifications.
† Plant Related Radionuclides.

TABLE 6-9 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES
OF JAF/NMP SITE AIR PARTICULATE SAMPLES - 1991
Results in Units of 10^{-3}pCi/m^3 ± 1 Sigma

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
			G OFF-SITE COMPOSITE**			
TlCe-144	<5.09	<4.73	<3.43	<4.98	<3.93	<4.76
Ce-141	<1.82	<1.72	<1.19	<1.48	<1.43	<1.82
Be-7	68.5±13.5	66.0±6.6	67.8±5.4	65.5±8.3	71.6±6.3	76.3±7.0
Zn-65	<2.93	<3.96	<2.90	<4.03	<2.84	<4.29
Cs-134	<0.83	<1.49	<0.83	<2.29	<1.19	<1.89
Cs-137	<1.21	<1.35	<0.86	<1.75	<1.13	<1.40
Zr-95	<2.73	<2.95	<2.36	<3.41	<2.33	<3.27
Nb-95	<1.92	<2.34	<1.31	<2.57	<1.11	<1.74
Co-58	<1.19	<1.24	<1.05	<1.90	<1.15	<1.92
Mn-54	<1.16	<1.18	<1.02	<1.85	<1.41	<1.74
Co-60	<1.23	<1.95	<1.44	<3.13	<1.97	<2.05
K-40	30.3±15.8	44.7±8.3	8.51±4.5	<2.35	27.2±6.1	43.2±7.8
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional Sample Location. Not Required by the Technical Specifications.
† Plant Related Radionuclides.

TABLE 6-9 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES
OF JAF/NMP SITE AIR PARTICULATE SAMPLES - 1991
Results in Units of 10^{-3}pCi/m^3 ± 1 Sigma

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
			D1 ON-SITE COMPOSITE**			
TlCe-144	<4.52	<4.39	<4.31	<5.26	<3.40	<4.28
Ce-141	<1.50	<1.34	<1.03	<1.64	<1.17	<1.30
Be-7	65.1±11.1	52.6±5.3	62.1±6.6	80.9±8.2	67.6±5.2	66.5±6.1
Zn-65	<2.41	<3.25	<3.27	<4.45	<2.86	<3.00
Cs-134	<0.91	<1.13	<1.46	<1.48	<1.12	<1.40
Cs-137	<0.87	<1.03	<1.38	<1.43	<0.98	<1.45
Zr-95	<2.30	<2.62	<2.76	<3.54	<1.84	<1.81
Nb-95	<1.28	<1.75	<1.91	<2.29	<1.42	<1.33
Co-58	<1.00	<1.45	<0.99	<1.72	<1.42	<1.47
Mn-54	<0.82	<1.27	<1.07	<1.65	<1.07	<1.27
Co-60	<0.74	<1.48	<1.12	<3.11	<1.07	<1.63
K-40	40.4±13.9	32.7±7.0	<14.9	21.1±9.1	44.9±6.4	27.2±6.4
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
			G ON-SITE COMPOSITE**			
TlCe-144	<4.82	<4.10	<3.85	<3.93	<4.47	<3.88
Ce-141	<1.65	<1.46	<1.28	<1.12	<1.42	<1.31
Be-7	83.7±13.0	83.1±6.3	69.0±6.2	72.4±6.6	76.9±7.0	66.2±5.8
Zn-65	<2.07	<3.87	<2.85	<3.62	<3.55	<2.65
Cs-134	<1.02	<1.21	<1.34	<1.07	<1.22	<1.32
Cs-137	<0.78	<1.13	<1.61	<1.03	<1.29	<1.22
Zr-95	<1.75	<2.29	<2.40	<2.12	<2.89	<2.29
Nb-95	<1.30	<1.71	<1.41	<1.68	<1.38	<1.70
Co-58	<0.97	<1.06	<1.68	<1.18	<1.56	<1.29
Mn-54	<1.25	<1.12	<1.25	<1.26	<1.16	<1.25
Co-60	<1.11	<1.50	<1.84	<2.03	<0.32	<1.74
K-40	37.3±13.9	36.6±6.4	21.9±6.2	<15.3	24.4±5.9	40.8±7.2
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional Sample Location. 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 - 1991
Results in Units of 10^{-3}pCi/m^3 ± 1 Sigma

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
			H ON-SITE COMPOSITE**			
TlCe-144	<4.40	<3.90	<5.09	<4.70	<4.91	<4.87
Ce-141	<1.49	<1.32	<1.59	<1.39	<1.59	<1.65
Be-7	62.3±12.0	66.9±5.8	81.7±8.5	78.2±6.7	60.7±7.2	57.7±6.2
Zn-65	<2.92	5.66±0.71	<4.46	<2.17	<4.88	<4.52
Cs-134	<0.91	<1.36	<1.95	<1.49	<1.29	<1.73
Cs-137	<0.85	<1.16	<1.56	<1.38	<1.25	<1.47
Zr-95	<1.58	<2.16	<3.48	<2.93	<3.59	<2.70
Nb-95	<1.25	<1.57	<1.99	<2.16	<2.47	<1.82
Co-58	<0.72	<1.83	<1.53	<1.49	<2.32	<1.63
Mn-54	<0.70	<1.38	<1.65	<1.34	<1.80	<1.46
Co-60	<0.72	<1.83	<2.67	<1.43	<1.99	<1.81
K-40	32.7±11.2	39.1±7.2	21.7±7.6	30.4±6.8	<13.3	43.8±8.3
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
			I SITE COMPOSITE**			
TlCe-144	<5.93	<5.80	<4.42	<4.55	<3.73	<4.82
Ce-141	<1.86	<1.85	<1.54	<1.53	<1.26	<1.66
Be-7	67.5±12.6	59.9±8.2	81.1±7.6	80.4±7.2	77.8±6.0	55.2±6.0
Zn-65	<1.91	<3.62	<4.41	<5.31	<2.36	<3.33
Cs-134	<1.15	<1.74	<1.76	<1.63	<1.07	<1.57
Cs-137	<1.29	<1.76	<1.13	<1.20	<1.07	<1.47
Zr-95	<2.47	<3.70	<3.05	<3.05	<1.87	<2.59
Nb-95	<1.12	<2.80	<1.65	<2.25	<1.55	<1.76
Co-58	<1.50	<2.27	<1.79	<1.80	<1.28	<1.09
Mn-54	<1.06	<1.68	<1.78	<1.44	<1.04	<1.51
Co-60	<0.98	<3.36	<0.35	<1.79	<1.04	<1.80
K-40	22.0±12.8	<20.5	<24.0	27.8±7.9	32.4±6.0	31.4±7.4
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional Sample Location. 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 - 1991
Results in Units of 10^{-3}pCi/m^3 ± 1 Sigma

NUCLIDES	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
			J ON-SITE COMPOSITE**			
TlCe-144	<5.62	<3.70	<3.81	<4.89	<4.88	<4.47
Ce-141	<1.68	<1.17	<1.37	<1.37	<1.51	<1.52
Be-7	61.9±14.5	73.7±6.4	77.4±6.9	89.7±7.0	51.4±6.5	69.0±7.3
Zn-65	<3.09	<1.85	<3.98	<4.16	<3.66	<4.38
Cs-134	<1.07	<1.12	<1.41	<1.18	<1.24	<1.65
Cs-137	<1.48	<1.02	<1.06	<1.09	<1.63	<1.60
Zr-95	<2.84	<1.85	<2.74	<3.11	<2.65	<3.11
Nb-95	<1.91	<1.44	<1.87	<1.78	<1.40	<1.79
Co-58	<1.33	<1.22	<1.50	<1.42	<1.46	<1.53
Mn-54	<1.02	<1.48	<1.11	<1.69	<1.53	<1.22
Co-60	<1.28	<1.38	<1.24	<1.01	<2.37	<1.51
K-40	25.1±14.3	<12.0	38.7±6.6	16.2±6.1	<22.1	24.6±7.1
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
			K ON-SITE COMPOSITE**			
TlCe-144	<4.34	<4.99	<4.09	<4.81	<3.39	<4.79
Ce-141	<1.55	<1.53	<1.33	<1.85	<1.11	<1.69
Be-7	71.6±11.5	67.4±7.6	79.1±6.9	86.6±7.9	65.6±5.4	63.8±7.0
Zn-65	<2.27	<5.09	<3.21	<6.51	<2.02	<4.26
Cs-134	<0.92	<1.74	<1.28	<2.29	<0.90	<1.62
Cs-137	<0.97	<1.68	<1.06	<1.81	<0.96	<2.03
Zr-95	<2.03	<3.15	<2.59	<3.97	<2.14	<2.93
Nb-95	<1.08	<2.41	<2.02	<2.10	<1.07	<2.10
Co-58	<1.03	<1.76	<1.52	<1.99	<1.25	<1.98
Mn-54	<0.90	<1.81	<1.58	<1.93	<0.75	<0.72
Co-60	<1.03	<2.35	<2.55	<2.77	<1.40	<2.03
K-40	36.8±12.5	41.9±9.3	22.3±5.7	<26.3	10.9±4.2	34.5±8.2
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional Sample Location. 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 - 1991
Results in Units of 10^{-3}pCi/m^3 ± 1 Sigma

NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
			R1 OFF-SITE COMPOSITE*			
TlCe-144	<4.11	<3.42	<5.05	<3.84	<6.50	<5.14
Ce-141	<1.33	<1.23	<1.64	<1.18	<1.80	<1.52
Be-7	78.1±6.8	54.2±5.4	50.4±6.8	69.1±6.0	49.0±7.6	62.1±6.4
Zn-65	<2.81	<3.29	<6.64	<3.75	<5.51	<3.23
Cs-134	<1.44	<1.23	<1.38	<2.00	<2.10	<1.48
Cs-137	<1.41	<1.32	<1.97	<1.06	<2.09	<1.31
Zr-95	<3.16	<2.32	<2.46	<2.37	<4.09	<3.21
Nb-95	<1.66	<1.80	<2.12	<1.89	<2.18	<2.23
Co-58	<1.58	<1.14	<1.93	<1.26	<2.32	<1.30
Mn-54	<1.64	<1.03	<1.44	<1.07	<1.91	<1.76
Co-60	<2.17	<1.42	<2.87	<1.63	<3.61	<2.49
K-40	34.7±8.8	18.0±4.7	35.9±9.2	29.8±6.9	15.2±8.0	23.8±7.5
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
			R2 OFF-SITE COMPOSITE*			
TlCe-144	<4.80	<4.47	<5.53	<3.87	<5.65	<5.46
Ce-141	<1.29	<1.68	<1.48	<1.38	<2.12	<1.82
Be-7	75.5±7.2	72.3±7.2	60.2±6.6	77.3±6.0	48.6±7.8	51.8±7.2
Zn-65	<4.06	<4.16	<4.30	<3.71	<7.82	<4.37
Cs-134	<1.69	<1.22	<1.53	<1.79	<2.13	<1.68
Cs-137	<1.18	<1.50	<1.29	<1.36	<2.18	<1.50
Zr-95	<2.65	<2.13	<2.64	<1.79	<4.12	<3.79
Nb-95	<1.22	<2.23	<1.63	<1.70	<2.66	<2.22
Co-58	<1.89	<1.47	<1.15	<1.45	<2.53	<2.12
Mn-54	<1.27	<1.51	<1.61	<1.42	<2.10	<2.10
Co-60	<1.96	<2.11	<1.96	<1.99	<2.64	<3.83
K-40	15.7±7.6	14.3±6.6	<16.1	37.7±6.4	36.7±9.6	29.8±9.0
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* Sample Locations 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 - 1991
Results in Units of 10^{-3}pCi/m^3 ± 1 Sigma

NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
			R3 OFF-SITE COMPOSITE*			
TlCe-144	<4.67	<4.32	<6.01	<3.80	<6.05	<4.35
Ce-141	<1.37	<1.60	<1.77	<1.18	<1.75	<1.35
Be-7	81.6±6.6	47.0±6.4	43.1±6.8	70.0±5.9	51.2±6.8	46.0±5.5
Zn-65	<3.79	<2.53	<5.27	<2.50	<6.57	<3.50
Cs-134	<1.33	<1.19	<1.65	<0.84	<2.43	<1.46
Cs-137	<1.19	<1.30	<1.51	<0.97	<1.78	<1.48
Zr-95	<2.20	<2.75	<3.05	<1.76	<3.87	<2.44
Nb-95	<2.03	<2.03	<2.09	<1.24	<2.60	<1.87
Co-58	<1.59	<2.37	<2.64	<1.47	<2.36	<1.43
Mn-54	<1.33	<1.45	<2.26	<1.25	<1.54	<1.43
Co-60	<1.94	<2.34	<1.49	<1.18	<2.84	<2.03
K-40	<2.70	24.2±6.2	41.9±8.70	<12.0	<20.0	29.7±6.1
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
			R4 OFF-SITE COMPOSITE*			
TlCe-144	<4.42	<3.53	<4.96	<4.06	<6.47	<5.10
Ce-141	<1.23	<1.33	<2.23	<1.46	<1.98	<1.72
Be-7	102±7.5	63.3±5.4	63.6±7.6	81.5±6.8	50.8±8.4	63.7±6.9
Zn-65	<3.14	<2.77	<5.16	<3.17	<7.55	<4.69
Cs-134	<1.31	<1.17	<1.62	<1.09	<2.86	<1.78
Cs-137	<1.08	<0.84	<1.53	<1.36	<2.32	<1.65
Zr-95	<3.00	<2.09	<3.15	<2.72	<3.43	<2.92
Nb-95	<1.82	<1.10	<2.40	<1.80	<2.51	<2.42
Co-58	<1.53	<1.33	<1.88	<1.32	<1.53	<1.52
Mn-54	<0.99	<1.07	<1.32	<1.30	<2.17	<1.84
Co-60	<2.01	<1.43	<1.49	<1.73	<2.32	<1.32
K-40	<15.3	27.5±5.4	42.9±8.33	<15.9	23.4±10.4	14.6±7.5
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* Sample Locations 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 - 1991
Results in Units of 10^{-3}pCi/m^3 ± 1 Sigma

NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
			R5 OFF-SITE COMPOSITE (CONTROL)*			
TiCe-144	<4.41	<3.58	<5.28	<3.53	<4.05	<4.59
Ce-141	<1.33	<1.34	<1.63	<1.26	<1.28	<1.48
Be-7	68.8±6.7	46.1±5.2	51.6±7.3	63.3±5.6	41.5±5.0	56.9±6.0
Zn-65	<3.24	<3.67	<3.35	<3.64	<4.14	<4.12
Cs-134	<1.65	<1.05	<1.51	<2.07	<1.22	<1.59
Cs-137	<1.31	<0.83	<1.69	<0.96	<1.18	<1.32
Zr-95	<2.33	<2.41	<3.68	<2.31	<2.34	<2.91
Nb-95	<1.90	<1.85	<2.20	<1.49	<1.78	<1.99
Co-58	<1.59	<1.48	<1.82	<1.04	<1.28	<1.86
Mn-54	<1.31	<0.94	<1.73	<1.15	<1.07	<1.29
Co-60	<1.11	<1.54	<2.18	<1.55	<1.48	<1.70
K-40	18.8±6.4	12.1±3.5	24.2±8.4	26.0±5.7	31.7±7.2	34.1±7.2
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
			D2 OFF-SITE COMPOSITE**			
TlCe-144	<4.56	<4.29	<4.19	<3.37	<3.94	<4.51
Ce-141	<1.72	<1.62	<1.23	<1.10	<1.42	<1.53
Be-7	86.3±7.6	59.4±6.9	46.7±6.1	61.6±5.3	51.9±5.4	55.0±6.1
Zn-65	<3.79	<4.01	<3.64	<2.78	<3.49	<4.37
Cs-134	<1.30	<1.61	<1.50	<1.12	<1.35	<1.66
Cs-137	<1.26	<1.39	<1.33	<0.85	<1.31	<1.42
Zr-95	<2.68	<2.61	<1.79	<2.08	<2.14	<3.21
Nb-95	<1.73	<1.36	<1.53	<1.30	<1.57	<1.85
Co-58	<1.63	<1.29	<1.93	<0.92	<1.25	<1.63
Mn-54	<1.41	<1.69	<1.33	<0.89	<1.37	<1.37
Co-60	<1.80	<2.17	<2.15	<1.14	<1.14	<1.69
K-40	<18.3	<16.7	<16.2	30.3±5.6	10.6±4.8	21.8±6.1
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* Sample Locations Required by Technical Specifications.
** Optional Sample Location. Not Required By the Technical Specifications.
† Plant Related Radionuclides.

TABLE 6-9 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES
OF JAF/NMP SITE AIR PARTICULATE SAMPLES - 1991
Results in Units of 10^{-3}pCi/m^3 ± 1 Sigma

NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
			E OFF-SITE COMPOSITE**			
TlCe-144	<4.53	<3.60	<4.20	<3.06	<4.28	<4.35
Ce-141	<1.53	<1.31	<1.37	<0.94	<1.35	<1.46
Be-7	54.8±6.4	40.7±5.2	62.0±5.8	81.5±6.0	42.2±5.8	57.2±6.3
Zn-65	<2.96	<2.61	<3.95	<2.86	<3.40	<3.68
Cs-134	<1.46	<1.18	<1.83	<0.98	<1.38	<1.50
Cs-137	<1.16	<1.20	<1.31	<0.99	<1.51	<1.21
Zr-95	<2.47	<2.83	<1.95	<1.88	<2.11	<3.37
Nb-95	<1.97	<1.78	<1.50	<1.19	<1.70	<2.19
Co-58	<1.45	<1.40	<1.64	<1.20	<1.24	<1.86
Mn-54	<1.38	<1.10	<1.16	<0.96	<1.40	<1.48
Co-60	<1.70	<1.80	<1.94	<1.72	<2.05	<2.34
K-40	37.7±6.7	25.0±5.9	<14.7	<11.5	16.0±6.0	<17.6
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
			F OFF-SITE COMPOSITE**			
TlCe-144	<4.48	<3.28	<5.38	<3.84	<5.72	<6.09
Ce-141	<1.52	<1.18	<1.81	<1.32	<1.79	<2.04
Be-7	79.9±6.9	46.6±4.8	35.2±6.0	63.2±59.2	49.4±7.0	47.7±7.4
Zn-65	<3.49	<2.79	<3.92	<3.19	<5.29	<4.45
Cs-134	<1.63	<1.04	<1.39	<1.19	<2.24	<1.52
Cs-137	<1.45	<0.96	<1.76	<1.20	<1.71	<1.91
Zr-95	<3.15	<2.43	<3.69	<1.82	<3.57	<5.34
Nb-95	<1.74	<1.67	<1.85	<1.82	<2.59	<2.75
Co-58	<1.47	<1.38	<2.18	<1.15	<2.36	<2.72
Mn-54	<1.51	<0.97	<1.72	<1.46	<1.98	<1.84
Co-60	<1.44	<1.27	<1.93	<2.39	<1.94	<4.08
K-40	27.4±7.5	33.2±6.2	29.4±8.3	18.7±5.6	24.6±8.21	35.4±9.6
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional Sample Location. Not Required by the Technical Specifications.
† Plant Related Radionuclides.

TABLE 6-9 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES
OF JAF/NMP SITE AIR PARTICULATE SAMPLES - 1991
Results in Units of 10^{-3}pCi/m^3 ± 1 Sigma

NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
			G OFF-SITE COMPOSITE**			
TlCe-144	<4.71	<3.62	<4.98	<4.48	<4.36	<4.48
Ce-141	<1.68	<1.39	<1.54	<1.67	<1.55	<1.68
Be-7	72.4±6.9	51.5±5.2	38.3±5.8	64.1±6.9	39.2±5.5	35.6±5.4
Zn-65	<3.29	<3.45	<5.30	<3.54	<4.83	<4.36
Cs-134	<1.50	<1.10	<1.55	<1.16	<1.50	<1.85
Cs-137	<1.38	<1.00	<1.70	<1.47	<1.42	<1.34
Zr-95	<2.80	<2.84	<3.06	<3.09	<2.20	< 75
Nb-95	<1.86	<1.87	<2.43	<1.93	<1.65	<1.83
Co-58	<1.84	<1.39	<2.25	<1.35	<1.40	<1.81
Mn-54	<1.29	<0.95	<1.92	<1.16	<1.24	<1.67
Co-60	<1.90	<1.26	<1.80	<2.07	<1.52	<1.30
K-40	33.3±8.1	29.7±7.1	<19.9	24.2±7.2	44.0±7.1	48.9±7.5
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional Sample Location. Not Required by the Technical Specifications.
† Plant Related Radionuclides.

TABLE 6-9 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES
OF JAF/NMP SITE AIR PARTICULATE SAMPLES - 1991
Results in Units of 10^{-3}pCi/m^3 ± 1 Sigma

NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
			D1 ON-SITE COMPOSITE**			
TlCe-144	<4.87	<3.91	<4.68	<3.87	<4.16	<4.83
Ce-141	<1.60	<1.50	<1.54	<1.33	<1.60	<1.67
Be-7	80.9±7.6	45.0±6.3	38.7±5.8	68.3±5.3	49.0±6.4	63.6±6.7
Zn-65	<3.78	<4.74	<4.38	<3.17	<4.10	<4.61
Cs-134	<1.44	<1.23	<1.55	<1.40	<1.31	<1.70
Cs-137	<1.58	<1.41	<1.29	<0.96	<1.33	<1.33
Zr-95	<2.85	<2.31	<2.76	<2.35	<2.74	<2.25
Nb-95	<1.42	<1.65	<1.83	<1.15	<1.46	<1.96
Co-58	<1.54	<1.45	<1.52	<1.37	<1.15	<1.61
Mn-54	<1.32	<1.54	<1.33	<1.17	<1.32	<1.28
Co-60	<1.93	<1.99	<1.93	<1.44	<1.95	<2.12
K-40	32.9±7.2	16.1±6.2	50.4±8.6	31.0±5.8	8.6±5.2	23.0±8.2
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
			G ON-SITE COMPOSITE**			
TlCe-144	<4.16	<3.23	<5.12	<4.71	<4.21	<4.32
Ce-141	<1.27	<1.28	<1.58	<1.55	<1.41	<1.35
Be-7	97.6±7.2	63.4±5.3	48.3±6.0	67.5±7.3	54.2±6.0	60.5±6.2
Zn-65	<4.38	<2.61	<3.61	<3.81	<4.10	<3.59
Cs-134	<1.40	<1.04	<1.32	<1.44	<1.71	<1.30
Cs-137	<1.19	<0.86	<1.22	<1.43	<1.20	<0.92
Zr-95	<2.63	<2.31	<3.30	<2.85	<2.66	<2.45
Nb-95	<1.51	<1.45	<2.13	<1.48	<1.77	<1.74
Co-58	<1.18	<1.23	<1.50	<1.68	<1.51	<1.43
Mn-54	<1.12	<1.15	<1.42	<1.61	<1.32	<1.39
Co-60	<1.74	<1.25	<1.38	<2.08	<1.51	<1.88
K-40	<16.1	28.1±5.5	<14.0	17.9±6.9	44.0±7.5	<13.1
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional Sample Location. Not Required by the Technical Specifications.
† Plant Related Radionuclides.

TABLE 6-9 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES
OF JAF/NMP SITE AIR PARTICULATE SAMPLES - 1991
Results in Units of 10^{-3}pCi/m^3 ± 1 Sigma

NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
			H ON-SITE COMPOSITE**			
TlCe-144	<4.95	<3.86	<4.07	<4.91	<4.58	<6.37
Ce-141	<1.74	<1.39	<1.29	<1.47	<1.48	<2.14
Be-7	75.0±6.6	51.8±6.0	33.2±4.6	71.0±6.9	42.5±5.4	29.9±7.1
Zn-65	<4.47	<3.07	<3.51	<3.94	<3.50	<3.89
Cs-134	<1.85	<1.29	<1.36	<3.22	<1.39	<1.68
Cs-137	<1.32	<0.95	<1.07	<1.33	<1.13	<1.59
Zr-95	<2.83	<2.50	<2.21	<3.11	<2.25	<2.97
Nb-95	<1.71	<2.05	<1.52	<2.19	<1.83	<2.36
Co-58	<1.49	<1.46	<1.25	<1.82	<1.72	<2.44
Mn-54	<1.63	<1.26	<1.36	<1.21	<1.26	<1.81
Co-60	<0.89	<1.25	<1.56	<1.84	<1.57	<3.13
K-40	42.8±7.6	26.7±6.7	37.2±6.4	<17.2	10.8±4.3	28.9±7.9
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
			! ON-SITE COMPOSITE**			
TlCe-144	<4.60	<3.28	<5.16	<5.21	<5.02	<4.62
Ce-141	<1.41	<1.17	<1.57	<1.71	<1.75	<1.42
Be-7	60.9±5.9	53.8±4.8	42.0±6.7	66.8±7.0	28.9±6.3	54.0±6.1
Zn-65	<3.14	<2.64	<5.79	<7.30	<4.98	<3.75
Cs-134	<1.35	<0.99	<1.90	<2.23	<1.35	<1.45
Cs-137	<1.44	<0.98	<1.52	<1.65	<1.53	<1.31
Zr-95	<2.84	<2.23	<3.18	<2.37	<. 79	<2.87
Nb-95	<1.90	<1.57	<2.32	<1.83	<2.11	<1.76
Co-58	<1.95	<1.15	<1.77	<0.97	<1.80	<1.40
Mn-54	<1.46	<0.96	<1.83	<1.77	<1.63	<1.14
Co-60	<1.65	<1.44	<2.64	<2.61	<2.74	<1.61
K-40	26.8±6.7	34.1±5.8	<18.4	24.3±7.6	27.0±8.5	51.8±7.8
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional Sample Location. Not Required by the Technical Specifications.
† Plant Related Radionuclides.

TABLE 6-9 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN MONTHLY COMPOSITES
OF JAF/NMP SITE AIR PARTICULATE SAMPLES - 1991
Results in Units of 10^{-3}pCi/m^3 ± 1 Sigma

NUCLIDES	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
			J ON-SITE COMPOSITE**			
TlCe-144	<4.69	<3.72	<6.03	<3.95	<4.81	<4.63
Ce-141	<1.36	<1.35	<2.05	<1.35	<1.51	<1.62
Be-7	63.8±6.4	51.9±5.4	59.2±7.3	56.7±6.0	44.0±5.5	39.0±6.0
Zn-65	<4.83	<2.72	<3.34	<5.30	<4.61	<3.27
Cs-134	<1.31	<1.16	<1.51	<2.34	<1.94	<1.76
Cs-137	<0.87	<1.08	<1.32	<1.27	<1.39	<1.49
Zr-95	<2.58	<2.29	<3.78	<2.98	<2.92	<3.13
Nb-95	<1.81	<1.64	<2.32	<1.76	<1.72	<1.69
Co-58	<1.63	<1.34	<2.43	<1.60	<1.56	<1.32
Mn-54	<1.58	<1.03	<1.92	<1.19	<1.45	<1.72
Co-60	<1.01	<1.58	<2.17	<1.25	<1.74	<2.12
K-40	<19.4	31.3±5.9	15.0±9.2	23.3±7.5	37.6±7.1	36.8±8.1
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
			K ON-SITE COMPOSITE**			
TlCe-144	<3.80	<3.55	<4.77	<4.64	<5.05	<5.06
Ce-141	<1.31	<1.34	<1.44	<1.60	<1.61	<1.75
Be-7	52.7±6.1	26.7±4.2	42.6±6.0	76.7±7.0	34.4±6.2	59.5±7.4
Zn-65	<4.08	<3.17	<3.57	<6.46	<4.07	<5.40
Cs-134	<1.25	<1.06	<1.50	<1.91	<1.42	<1.43
Cs-137	<1.17	<1.09	<1.47	<1.50	<1.35	<1.53
Zr-95	<2.51	<2.46	<2.82	<3.15	<3.88	<3.17
Nb-95	<1.67	<1.35	<1.72	<1.71	<2.67	<2.18
Co-58	<1.64	<1.24	<1.81	<1.97	<2.21	<1.65
Mn-54	<0.98	<1.22	<1.32	<1.51	<1.53	<1.38
Co-60	<1.59	<1.09	<2.46	<2.30	<2.87	<2.74
K-40	45.2±7.2	18.6±4.8	22.6±5.3	19.1±6.6	<29.5	57.5±10.7
Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

** Optional Sample Location. Not Required by the Technical Specifications.
† Plant Related Radionuclides.

TABLE 6-10

DIRECT RADIATION MEASUREMENT RESULTS (1991)

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	10.9±0.9	5.7±0.7	7.5±0.9	11.6±0.8	0.2 miles @ 69°
4	D2 On-site	6.1±0.5	5.1±0.5	5.1±0.8	4.7±0.6	0.4 miles @ 140°
5	E On-site	5.5±0.3	4.7±0.5	6.0±1.5	4.2±0.5	0.4 miles @ 175°
6	F On-site	5.1±0.7	4.0±0.5	4.8±0.8	5.2±0.4	0.5 miles @ 210°
7*	G On-site	5.7±0.5	3.2±0.2	4.2±0.5	4.0±0.4	0.7 miles @ 250°
8	R-5 Off-site Control	5.8±0.3	4.0±0.3	4.7±0.5	4.6±0.3	16.4 miles @ 42°
9	D1 Off-Site	5.4±0.3	3.6±0.3	4.5±2.9	4.8±0.4	11.4 miles @ 80°
10	D2 Off-site	5.6±0.2	3.6±0.3	4.6±0.4	3.6±0.2	9.0 miles @ 117°
11	E Off-site	5.0±0.2	3.7±0.4	4.4±0.3	4.0±0.3	7.2 miles @ 160°
12	F Off-site	4.1±0.2	3.4±0.3	4.8±0.8	3.8±0.4	7.7 miles @ 190°
13	G Off-site	5.5±0.4	5.4±0.5	4.5±0.8	4.5±0.2	5.3 miles @ 225°
14*	DeMass Rd., SW Oswego-Control	5.2±0.2	4.8±0.6	5.3±0.4	4.6±0.2	12.6 miles @ 226°
15*	Pole 66, W. Boundary-Bible Camp	5.0±0.5	2.9±0.3	4.4±0.6	4.4±0.2	0.9 miles @ 237°
18*	Energy Info. Center-Lamp Post, SW	5.9±0.2	4.6±0.5	5.4±0.3	4.8±0.4	0.4 miles @ 265°
19	East Boundary-JAF, Pole 9	5.2±0.2	4.8±0.6	5.3±0.4	4.6±0.2	1.3 miles @ 81°
23*	H On-site	5.4±0.4	5.3±0.7	5.6±0.4	5.4±0.5	0.8 miles @ 70°
24	I On-site	5.7±0.5	3.4±0.4	4.5±0.7	5.4±0.6	0.8 miles @ 98°
25	J On-site	5.6±0.3	4.1±0.6	5.2±1.5	4.0±0.4	0.9 miles @ 110°
26	K On-site	5.0±0.2	4.5±0.9	5.3±1.2	3.9±0.4	0.5 miles @ 132°
27	N. Fence, N. of Switchyard, JAF	15.1±3.0	8.8±1.3	11.7±1.5	15.0±2.4	0.4 miles @ 60°
28	N. Light Pole, N. of Screenhouse, JAF	19.9±4.7	18.1±2.7	22.8±3.4	31.4±6.4	0.5 miles @ 68°
29	N. Fence, N. of W. Side	9.0±4.5	15.0±2.2	16.8±3.6	22.6±5.0	0.5 miles @ 65°
30	N. Fence (NW) JAF	12.5±1.6	8.0±0.7	9.6±1.0	12.6±2.3	0.4 miles @ 57°
31	N. Fence (NW) NMP-1	7.6±0.8	6.3±0.9	7.0±0.9	8.8±2.0	0.2 miles @ 276°
39	N. Fence, Rad. Waste-NMP-1	13.7±2.4	10.4±1.6	12.4±1.5	15.9±2.3	0.2 miles @ 292°
47	N. Fence, (NE) JAF	8.0±1.1	5.2±0.6	6.2±0.8	7.5±1.5	0.6 miles @ 69°
49*	Phoenix, NY-Control	4.9±0.2	4.1±1.1	3.8±0.5	4.2±0.4	19.8 miles @ 170°
51	Liberty & Bronson Sts., E of OSS	4.2±0.3	4.1±0.3	5.0±0.4	5.0±0.7	7.4 miles @ 170°
52	East 12th & Cayuga Sts., Oswego School	5.9±0.2	3.8±0.2	4.3±0.6	4.8±0.4	5.8 miles @ 227°

TABLE 6-10 (CONTINUED)

DIRECT RADIATION MEASUREMENT RESULTS (1991)

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

STATION NUMBER	LOCATION	FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER	LOCATION (DISTANCE AND DIRECTION)**
53	Broadwell & Chestnut Sts. - Fulton H.S.	5.6±0.3	4.6±0.7	5.2±0.5	4.8±0.4	13.7 miles @ 183°
54	Liberty St. & Co. Rt. 16 - Mexico H.S.	5.9±0.5	4.0±0.3	4.0±0.5	4.6±0.3	9.3 miles @ 115°
55	Gas Substation Co. Rt. 5-Pulaski	5.7±0.5	4.4±0.4	4.6±0.4	4.2±0.4	13.0 miles @ 75°
56*	Rt. 104-Hew Haven SCH.(SE Corner)	5.6±0.4	3.8±0.2	4.5±0.6	4.4±0.2	5.3 miles @ 123°
58*	Co. Rt. 1A-Alcan (E. of Entrance Rd.)	6.3±0.3	3.8±0.2	4.9±0.7	4.4±0.4	3.1 miles @ 220°
75*	Unit 2, N. Fence, N. of Reactor Bldg.	7.0±0.7	5.4±0.7	5.8±0.5	6.6±1.0	0.1 miles @ 5°
76*	Unit 2, N. Fence, N. of Change House	6.9±0.4	5.2±0.4	5.6±0.6	5.2±0.4	0.1 miles @ 25°
77*	Unit 2, N. Fence, N. of Pipe Bldg.	7.2±0.8	5.0±0.3	6.3±0.5	6.9±0.9	9.2 miles @ 45°
78*	JAF, E. of E. Old Lay Down Area	6.5±0.4	4.3±0.3	6.3±0.5	4.8±0.4	1.0 miles @ 90°
79*	Co. Rt. 29, Pole #63, 0.2 mi. S. of Lake Rd.	6.1±0.5	3.6±0.2	5.2±0.2	4.6±0.7	1.1 miles @ 115°
80*	Co. Rt. 29, Pole #54, 0.7 mi. S. of Lake Rd.	5.8±0.2	3.8±0.4	4.8±0.8	4.8±0.4	1.4 miles @ 133°
81*	Miner Rd., Pole #16, 0.5 mi. W of Rt. 29	5.4±0.2	4.0±1.4	4.8±0.4	4.7±0.4	1.6 miles @ 159°
82*	Miner Rd., Pole #1 1/2, 1.1 mi. W. of Rt. 29	6.0±0.1	3.6±0.3	5.0±0.7	4.5±0.2	1.6 miles @ 181°
83*	Lakview Rd., Tree 0.45 mi. N. of Miner Rd.	5.7±0.2	4.2±0.3	4.5±0.5	4.4±0.4	1.2 miles @ 200°
84*	Lakeview Rd., N., Pole #6117, 200 ft. N. of Lake Rd.	5.1±0.2	4.2±0.3	5.0±0.6	4.2±0.4	1.1 miles @ 225°
85*	Unit 1, N. Fence, N. of W. Side of Screen House	14.5±1.6	9.8±1.8	11.0±1.4	13.4±1.9	0.2 miles @ 294°
86*	Unit 2, N. Fence, N. of W. Side of Screen House	7.4±0.8	6.0±0.8	8.4±0.9	16.7±2.5	0.1 miles @ 315°

TABLE 6-10 (CONTINUED)

DIRECT RADIATION MEASUREMENT RESULTS (1991)
Results in Units of mrem/std. Month ± 1 Sigma

STATION NUMBER	LOCATION	FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER	LOCATION (DISTANCE AND DIRECTION)**
87*	Unit 2, N. Fence, N. of E. Side of Screen House	7.9±0.7	6.2±1.0	6.0±0.7	8.0±1.7	0.1 miles @ 341°
88*	Hickory Grove Rd., Pole #2. 0.6 mi. N. of Rt. 1	5.6±0.3	4.5±0.4	4.1±0.2	4.6±0.5	4.5 miles @ 97°
89*	Leavitt Rd., Pole #16, 0.4 mi. S. of Rt. 1	5.2±0.4	4.2±0.4	5.5±0.5	4.4±0.3	4.1 miles @ 111°
90*	Rt. 104, Pole #300, 150 Ft. E. of Keefe Rd.	5.6±0.6	4.3±0.4	5.0±0.4	5.2±0.6	4.2 miles @ 135°
91*	Rt. 51A, Pole #59, 0.8 mi. W. of Rt. 51	5.2±0.2	3.6±0.3	4.2±0.3	3.6±0.3	4.8 miles @ 156°
92*	Maiden Lane Rd., Power Pole, 0.6 mi. S. of Rt. 104	5.8±0.4	4.9±0.4	5.6±0.8	5.4±0.4	4.4 miles @ 183°
93*	Rt. 53, Pole 1-1, 120 ft. S. of Rt. 104	5.3±0.3	4.0±0.6	5.0±0.5	4.4±0.5	4.4 miles @ 205°
94*	Rt. 1, Pole #82, 250 ft. E. of Kocher Rd. (Co. Rt. #63)	5.5±0.2	4.1±0.3	4.4±0.5	4.5±0.2	4.7 miles @ 233°
95*	Lakeshore Camp Site, from Alcan W. access Rd. Pole #21, 1.2 mi. N. of Rt. 1	5.1±0.3	3.8±0.2	4.5±0.7	3.8±0.2	4.1 miles @ 237°
96*	Creamery Rd., 0.3 mi. S. of Middle Rd. Pole 1 1/2	5.6±0.8	4.0±0.2	4.0±0.4	4.2±0.5	3.6 miles @ 199°
97*	Rt. 29, Pole #50, 200 ft. N. of Miner Rd.	6.3±0.5	3.8±0.2	5.2±0.9	4.2±0.4	1.8 miles @ 143°
98*	Lake Rd., Pole #145, 0.15 mi. of of Rt. 29	5.9±0.9	4.2±0.2	5.0±0.3	4.4±0.4	1.2 miles @ 101°
99	NMP Rd., 0.3 mi. N. of Lake Rd., Env. Station R1 Off-site	6.1±0.4	4.0±0.2	5.4±0.3	4.4±0.5	1.8 miles @ 88°
100	Rt. 29 and Lake Rd., Env. Station R2 Off-site	5.7±0.3	3.8±0.2	4.6±1.4	4.4±0.2	1.1 miles @ 104°
101	Rt. 29, 0.7 mi. S. of Lake Rd., Env. Station R3	6.2±0.7	3.8±0.2	4.7±0.6	4.0±0.2	1.5 miles @ 132°

TABLE 6-10 (CONTINUED)

DIRECT RADIATION MEASUREMENT RESULTS (1991)
Results in Units of mrem/std. Month ± 1 Sigma

STATION NUMBER	LOCATION	FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER	LOCATION (DISTANCE AND DIRECTION)**
102	EOF/Env. Lab, Oswego Co. Airport (Fulton airport, Rt. 176)	5.9±0.4	4.8±1.0	5.2±0.3	4.2±0.2	11.9 miles @ 175°
103	EIC, East Garage Rd., Lamp Post R3 Off-site	6.0±0.3	4.2±0.2	5.5±0.7	4.4±0.2	0.4 miles @ 267°
104	Parkhurst Road, Pole #148 1/2-A, 0.1 miles South of Lake Rd.	5.5±0.2	5.2±0.6	5.2±0.9	4.0±0.3	1.4 miles @ 102°
105	Lakeview Rd., Pole #6125, 0.6 mi. South of Lake Road	5.8±0.3	4.1±0.5	5.0±1.1	4.2±0.2	1.4 miles @ 198°
106	Shoreline Cove, East of NMP-1, Tree on West Edge	6.6±0.5	4.6±0.5	6.0±0.8	6.0±0.4	0.3 miles @ 274°
107	Shoreline Cove, East of NMP-1	6.1±0.6	4.8±0.4	6.2±1.1	6.0±0.7	0.3 miles @ 272°
108	Pole #143, South of Lake Road, 300 ft. East of Rt. 129	5.6±0.3	4.2±0.3	4.8±0.6	5.0±0.6	1.1 miles @ 104°
109	Tree North of Lake Road, 300 ft. East of Route 29	5.7±0.3	4.3±0.3	4.2±0.2	4.1±0.4	1.1 miles @ 103°
111	Control, Sterling, NY	5.3±0.2	4.0±0.2	5.4±1.3	4.6±0.4	21.8 miles @ 214°
113	Control, Baldwinsville, NY	5.7±0.2	4.4±0.5	4.8±1.0	4.8±1.0	24.7 miles @ 178°

* Technical Specification Location

** Direction and distance based on NMP-2 reactor centerline and sixteen 22.5 degree sectors

*** TLD lost in field

TABLE 6-11

CONCENTRATIONS OF IODINE-131 IN MILK

Results in Units of pCi/liter ± 1 Sigma

STATION*	04/01/91	04/15/91	05/06/91	05/20/91	06/03/91	06/17/91
No. 60	<0.54	<0.62	<0.56	<0.56	<0.57	<0.57
No. 55	<0.50	<0.55	<0.52	<0.54	<0.57	<0.55
No. 50	<0.72	<0.58	<0.49	<0.48	<0.53	<0.52
No. 7	<0.48	[illegible]	<0.53	<0.61	<0.50	<0.59
No. 4	<0.55	<0.55	<0.59	<0.60	<0.66	<0.55
No. 16	<0.57	<0.49	<0.54	<0.55	<0.53	<0.48
No. 65 (Control)	<0.63	<0.64	<0.62	<0.54	<0.55	<0.84

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

TABLE 6-11 (CONTINUED)

CONCENTRATIONS OF IODINE-131 IN MILK

Results in Units of pCi/liter ± 1 Sigma

STATION*	07/01/91	07/15/91	08/05/91	08/19/91	09/03/91	09/16/91
No. 60	<0.39	<0.62	<0.39	<0.50	<0.50	<0.57
No. 55	<0.58	<0.69	<0.39	<0.67	<0.54	<0.36
No. 50	<0.57	<0.44	<0.49	<0.62	<0.57	<0.52
No. [illegible]	<0.64	<0.52	<0.47	<0.57	<0.54	<0.65
No. 4	<0.51	<0.66	<0.56	<0.54	<0.43	<0.54
No. 16	<0.63	<0.58	<0.54	<0.39	<0.39	<0.57
No. 65	<0.56	<0.60	<0.59	<0.53	<0.51	<0.52

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

TABLE 6-11 (CONTINUED)

CONCENTRATIONS OF IODINE-131 IN MILK

Results in Units of pCi/liter ± 1 Sigma

STATION*	10/07/91	10/21/91	11/04/91	11/18/91	12/03/91	12/16/91
No. 60	<0.47	<0.59	<0.36	<0.55	<0.62	<0.44
No. 55	<0.53	<0.49	<0.48	<0.35	<0.52	<0.63
No. 50	<0.53	<0.46	<0.50	<0.53	<0.67	<0.60
No. 7	<0.36	<0.38	<0.54	<0.47	<0.46	<0.58
No. 4	<0.56	<0.54	<0.51	<0.51	<0.52	<0.44
No. 16	<0.51	<0.55	<0.53	<0.48	<0.69	<0.36
No. 65	<0.48	<0.53	<0.56	<0.39	<0.54	<0.25

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

TABLE 6-12

CONCENTRATIONS OF GAMMA EMITTERS IN MILK

Results in Units of pCi/liter ± 1 Sigma

STATION*	NUCLIDES	04/01/91	04/15/91	05/06/91	05/20/91	06/03/91	06/17/91
No. 60	K-40	1670±67	1680±86	1520±66	1430±65	1710±69	1470±64
	Cs-134	<6.46	<8.84	<5.47	<5.56	<7.56	<5.74
	Cs-137	<6.92	<8.32	<7.18	<6.70	<6.69	<6.00
	Ba/La-40	<5.53	<12.9	<8.84	<6.45	<8.45	<8.97
	Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
No. 55	K-40	1540±69	1720±70	1590±68	1550±66	1590±66	1750±71
	Cs-134	<8.59	<7.32	<7.24	<6.26	<5.99	<6.86
	Cs-137	<7.79	<6.40	<6.34	<5.69	<5.69	<6.55
	Ba/La-40	<9.92	<6.22	<8.72	<8.47	<9.35	<7.58
	Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
No. 50	K-40	1620±101	1420±70	1360±69	1580±96	1790±88	1530±67
	Cs-134	<11.9	<7.86	<8.60	<9.26	<10.3	<5.16
	Cs-137	<11.9	<7.70	<6.50	<10.6	<9.47	<6.07
	Ba/La-40	<14.4	<7.17	<7.67	<13.3	<10.9	<7.56
	Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
No. 7	K-40	1610±67	1380±63	1630±69	1540±66	1420±62	1680±87
	Cs-134	<7.28	<5.65	<6.46	<9.53	<5.94	<9.15
	Cs-137	<7.04	<6.43	<7.08	<6.27	<5.77	<8.49
	Ba/La-40	<9.00	<8.42	<8.98	<8.32	<6.23	<10.5
	Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
No. 4	K-40	1550±67	1380±68	1530±83	1520±67	1580±83	1680±102
	Cs-134	<7.49	<7.92	<8.60	<8.01	<10.2	<10.2
	Cs-137	<6.26	<8.27	<9.36	<6.69	<9.15	<11.2
	Ba/La-40	<7.81	<10.0	<11.0	<8.36	<12.3	<9.39
	Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
No. 16	K-40	1540±83	1670±68	1640±85	1640±85	1480±101	1510±64
	Cs-134	<8.50	<7.98	<9.74	<8.17	<8.41	<5.65
	Cs-137	<9.00	<7.68	<9.36	<8.02	<11.2	<6.36
	Ba/La-40	<10.6	<6.00	<10.5	<13.9	<11.2	<8.78
	Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
No. 65 (Control)	K-40	1610±85	1620±83	1690±70	1480±65	1630±99	1550±99
	Cs-134	<9.30	<8.83	<6.82	<5.48	<9.6	<10.6
	Cs-137	<8.78	<9.00	<6.62	<6.50	<9.87	<10.3
	Ba/La-40	<13.3	<11.7	<8.44	<8.86	<11.0	<8.52
	Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* Corresponds to sample locations noted on the maps in Section 3.3.
† Plant related radionuclides.

TABLE 6-12 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN MILK

Results in Units of pCi/liter ± 1 Sigma

STATION*	NUCLIDES	07/01/91	07/15/91	08/05/91	08/19/91	09/03/91	09/16/91
No. 60	K-40	1760±71	1500±64	1700±87	1590±83	1610±86	1650±83
	Cs-134	<6.91	<5.52	<9.00	<8.35	<8.51	<8.98
	Cs-137	<7.21	<6.70	<9.15	<9.57	<8.83	<8.40
	Ba/La-40	<8.38	<6.42	<10.9	<11.5	<8.24	<9.20
	Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
No. 55	K-40	1470±65	1640±101	1740±85	1530±81	1660±68	1460±65
	Cs-134	<6.07	<10.6	<9.45	<9.95	<7.45	<5.98
	Cs-137	<6.50	<9.87	<8.72	<8.37	<6.82	<4.63
	Ba/La-40	<7.05	<8.84	<6.24	<9.14	<7.59	<8.85
	Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
No. 50	K-40	1550±96	1510±99	1620±68	1570±68	1530±72	1580±69
	Cs-134	<9.57	<9.77	<6.81	<6.95	<6.01	<7.54
	Cs-137	<12.1	<12.8	<5.66	<6.89	<7.20	<6.55
	Ba/La-40	<13.9	<13.7	<7.98	<6.86	<8.25	<5.37
	Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
No. 7	K-40	1560±66	1500±65	1630±69	1440±65	1440±62	1620±99
	Cs-134	<6.71	<6.26	<7.19	<6.52	<5.62	<8.95
	Cs-137	<6.96	<6.90	<7.69	<6.64	<5.85	<10.4
	Ba/La-40	<6.81	<7.59	<8.66	<7.69	<6.21	<14.2
	Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
No. 4	K-40	1430±95	1510±65	1490±66	1530±73	1510±65	1440±83
	Cs-134	<10.4	<5.44	<5.20	<7.29	<6.02	<9.53
	Cs-137	<11.8	<5.77	<6.00	<6.60	<6.90	<8.37
	Ba/La-40	<11.8	<5.54	<8.86	<10.4	<6.75	<9.50
	Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
No. 16	K-40	1710±88	1660±101	1480±74	1610±81	1700±104	1530±74
	Cs-134	<10.2	<9.95	<6.37	<7.94	<10.2	<7.15
	Cs-137	<9.57	<12.1	<8.04	<9.78	<12.1	<6.60
	Ba/La-40	<9.06	<12.9	<10.8	<11.0	<9.88	<10.4
	Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
No. 65 (Control)	K-40	1780±88	1470±64	1600±83	1260±62	1320±96	1540±99
	Cs-134	<8.85	<5.71	<9.00	<6.46	<9.46	<10.5
	Cs-137	<8.02	<6.50	<7.24	<6.15	<9.87	<12.9
	Ba/La-40	<11.6	<9.44	<8.51	<7.51	<12.3	<12.9
	Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* Corresponds to sample locations noted on the maps in Section 3.3.
† Plant related radionuclides

TABLE 6-12 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN MILK

Results in Units of pCi/liter ± 1 Sigma

STATION*	NUCLIDES	10/07/91	10/21/91	11/04/91	11/18/91	12/03/91	12/16/91
No. 60	K-40	1650±69	1500±66	1430±64	1550±83	1490±64	1530±67
	Cs-134	<7.05	<6.75	<5.57	<9.23	<5.52	<6.78
	Cs-137	<7.08	<6.43	<6.00	<7.82	<6.36	<7.52
	Ba/La-40	<9.41	<8.43	<10.0	<9.85	<10.6	<8.01
	Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
No. 55	K-40	1670±98	1460±70	1580±83	1620±68	1560±66	1580±84
	Cs-134	<8.86	<7.70	<9.23	<5.29	<6.81	<9.25
	Cs-137	<11.7	<7.51	<8.78	<6.00	<6.29	<8.67
	Ba/La-40	<14.9	<9.88	<13.4	<6.76	<5.68	<9.21
	Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
No. 50	K-40	1610±101	1640±69	1450±68	1600±88	1680±87	1380±83
	Cs-134	<10.4	<6.86	<5.52	<9.32	<8.59	<9.61
	Cs-137	<9.69	<7.21	<6.15	<11.4	<10.0	<10.7
	Ba/La-40	<11.8	<7.59	<8.09	<10.8	<13.3	<13.0
	Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
No. 7	K-40	1420±63	1740±73	1570±100	1450±64	1600±82	1640±85
	Cs-134	<6.22	<7.72	<9.66	<5.61	<7.89	<9.15
	Cs-137	<6.96	<7.02	<12.4	<6.64	<8.07	<9.74
	Ba/La-40	<5.68	<6.85	<14.2	<7.08	<12.1	<12.0
	Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
No. 4	K-40	1460±71	1620±68	1520±82	1730±70	1680±103	1530±80
	Cs-134	<6.52	<8.10	<9.00	<7.19	<9.85	<10.2
	Cs-137	<6.60	<6.41	<7.69	<7.02	<11.5	<9.53
	Ba/La-40	<10.4	<5.95	<9.34	<7.63	<13.4	<11.9
	Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
No. 16	K-40	1620±74	1490±72	1710±70	1690±84	1720±72	1540±81
	Cs-134	<6.22	<6.32	<9.77	<10.3	<6.67	<9.83
	Cs-137	<6.13	<7.36	<6.96	<8.07	<7.21	<8.67
	Ba/La-40	<7.66	<11.3	<6.83	<13.3	<8.33	<12.0
	Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
No. 65 (Control)	K-40	1480±65	1360±62	1610±68	1610±86	1680±70	1620±68
	Cs-134	<6.60	<6.57	<7.64	<12.0	<7.28	<6.56
	Cs-137	<6.00	<6.57	<7.02	<9.53	<6.69	<7.21
	Ba/La-40	<5.94	<9.30	<7.16	<9.43	<6.40	<7.62
	Others†	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* Corresponds to sample locations noted on the maps in Section 3.3.
† Plant related radionuclides

TABLE 6-13

MILCH ANIMAL CENSUS 1991

TOWN OR AREA[a]	NUMBER ON CENSUS MAP[1]	DEGREES[2]	DISTANCE[2]	NUMBER OF MILCH ANIMALS
Scriba	16*	190°	5.9 miles	40C
	2	195°	8.0	NONE
	3	190°	4.5	3C
	6	162°	2.2	1C
	26	114°	1.5	ND
	61	140°	3.0	5G
	62	183°	6.7	7G
	63	185°	8.0	40C
New Haven	9	95°	5.2	45C
	4*	113°	7.8	95C
	45	125°	8.0	ND
	10	130°	2.6	28C
	5	146°	7.2	46C
	11	130°	8.5	NONE
	7*	107°	5.5	62C
	64	107°	7.9	50C
	71†	111°	4.2	3G
Mexico	12	107°	11.5	22C
	14	120°	9.8	62C
	17	115°	10.2	2C
	19	132°	10.5	40C
	60*	90°	9.5	40C
	50*	93°	8.2	150C
	55*	95°	9.2	50C
	21	112°	10.5	75C
	68	108°	11.6	79C
	49	88°	7.9	5G
Richland	22	85°	10.2	43C
Pulaski	23	92°	10.5	NONE
	69	85°	11.6	45C

TABLE 6-13 (CONTINUED)

MILCH ANIMAL CENSUS 1991

TOWN OR AREA[a]	NUMBER ON CENSUS MAP[1]	DEGREES[2]	DISTANCE[2]	NUMBER OF MILCH ANIMALS
Sterling	65**	220°	17.0 miles	45C
Volney	25	182°	9.5	40C
	70	147°	9.4	20C
	66	156°	7.8	70C
	67	152°	8.3	NONE
MILKING ANIMAL TOTALS: (including control locations)				1,193 Cows 20 Goats
MILKING ANIMAL TOTALS: (excluding control locations)				1,148 Cows 20 Goats

C = Cows

G = Goats

* = Milk sample location

** = Milk sample control location

† = New location

ND = Did not wish to participate in the survey

(1) = References Section 3.3

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

NONE = No cows or goats at that location. Location was a previous location with cows and/or goats.

(a) = Census performed out to a distance of approximately ten miles.

TABLE 6-14

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
T*	08/26/91	Cucumber Leaves	0.91±0.08	3.18±0.17	<0.020	<0.020	<0.024	<0.066
	08/26/91	Bean Leaves	0.48±0.04	4.37±0.13	<0.012	<0.014	<0.013	<0.038
	08/26/91	Cabbage	0.06±0.03	3.55±0.12	<0.011	<0.012	<0.012	<0.032
	08/26/91	Squash Leaves	0.45±0.04	3.36±0.13	<0.012	<0.013	<0.012	<0.039
K*	08/26/91	Squash Leaves	<0.93	4.46±0.12	<0.011	<0.012	<0.012	<0.031
	08/26/91	Corn Leaves	0.65±0.08	5.36±0.24	<0.027	<0.024	<0.028	<0.081
	08/26/91	Bean Leaves	0.42±0.04	3.79±0.12	<0.012	<0.013	<0.012	<0.035
L	08/26/91	Pepper Leaves	0.24±0.03	5.35±0.12	<0.012	<0.012	<0.011	<0.033
	08/26/91	Cucumber Leaves	0.75±0.03	1.19±0.53	<0.008	<0.006	<0.007	<0.018
	08/26/91	Bean Leaves	0.37±0.03	1.39±0.73	<0.012	<0.008	<0.011	<0.029
N	08/26/91	Grape Leaves	0.35±0.03	3.20±0.09	<0.009	<0.010	<0.009	<0.026
	08/26/91	Squash Leaves	0.50±0.04	3.49±0.11	<0.012	<0.012	0.039±0.003	<0.033
Z	08/26/91	Pepper Leaves	0.09±0.02	6.99±0.11	<0.007	<0.006	<0.007	<0.026
	08/26/91	Bean Leaves	0.30±0.04	4.35±0.13	<0.012	<0.013	<0.012	<0.039
	08/26/91	Grape Leaves	0.38±0.05	3.11±0.14	<0.017	<0.014	<0.015	<0.049
	08/26/91	Lettuce	0.04±0.02	3.64±0.09	<0.007	<0.007	<0.007	<0.024
M* (Control)	08/26/91	Bean Leaves	0.48±0.04	4.60±0.14	<0.014	<0.016	<0.015	<0.042
	08/26/91	Squash Leaves	0.25±0.04	5.09±0.14	<0.015	<0.017	<0.014	<0.042
	08/26/91	Grape Leaves	0.66±0.06	2.92±0.14	<0.017	<0.014	<0.018	<0.049
	08/26/91	Cucumber Leaves	0.36±0.03	2.41±0.08	<0.008	<0.008	<0.008	<0.024
	08/26/91	Pepper Leaves	0.42±0.02	6.65±0.11	<0.021	<0.006	<0.007	<0.024

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

TABLE 6-15

1991 RESIDENCE CENSUS

LOCATION	MAP DESIGNATION[b]	METEROLOGICAL SECTOR	DEGREES[a]	DISTANCE[a]
w		N	-	-
w		NNE	-	-
w		NE	-	-
w		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		W	-	-
w		WNW	-	-
w		NW	-	-
w		NNW	-	-

w This meteorological sector is over Lake Ontario. There are no residences within three miles.

[a] Based on J. A. FitzPatrick Nuclear Power Plant Reactor Centerline.

[b] See the maps in Section 3.3.

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, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988 and 1989 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

HISTORICA' 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	**	**	**	**	**	**	**	**	**
1976	**	**	**	**	**	**	**	**	**
1977	**	**	**	**	**	**	**	**	**
1978	**	**	**	**	**	**	**	**	**
1979	**	**	**	**	**	**	**	**	**
1980	**	**	**	**	**	**	**	**	**
1981	**	**	**	**	**	**	**	**	**
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

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

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

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	**	**	**	**	**	**	**	**	**
1976	**	**	**	**	**	**	**	**	**
1977	**	**	**	**	**	**	**	**	**
1978	**	**	**	**	**	**	**	**	**
1979	**	**	**	**	**	**	**	**	**
1980	**	**	**	**	**	**	**	**	**
1981	**	**	**	**	**	**	**	**	**
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

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

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

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†	0.99	0.94	0.43
1975	<MDL	<MDL	<MDL
1976	1.2	1.2	1.2
1977	0.13	0.13	0.13
1978	0.04	0.20	0.09
1979	0.03	0.06	0.04
1980	0.029	0.110	0.059
1981	0.028	0.062	0.043
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	0.03
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

* 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 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
1977	0.13	0.79	0.29
1978	0.03	0.10	0.08
1979	0.02	0.55	0.10
1980	0.030	0.100	0.061
1981	0.027	0.10	0.061
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

* 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 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	*	*	*	*	*	*
1976	*	*	*	*	*	*
1977	**	**	**	**	**	**
1978	<MDL	<MDL	<MDL	**	**	**
1979	2.5	2.5	2.5	<LLD	<LLD	<LLD
1980	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1981	<LLD	<LLD	<LLD	1.4	1.4	1.4
1982	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1983	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1984	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1985	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1986	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1987	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* No gamma analysis performed (not required).

** Data showed instrument background results.

† Location was the City of Oswego Water Supply for 1969 - 1984 and the Oswego Steam Station inlet canal for 1985 - 1991.

†† 1969 data is considered to be pre-operational for the site. 1974 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	*	*	*	*	*	*
1976	*	*	*	*	*	*
1977	**	**	**	**	**	**
1978	<MDL	<MDL	<MDL	**	**	**
1979	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1980	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1981	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1982	0.43	0.43	0.43	1.6	2.4	1.9
1983	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1984	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1985	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1986	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1987	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* No gamma analysis performed (not required).

** Data showed instrument background results.

† Indicator location was the NMP 1 Inlet Canal for the period 1969 - 1973, and the JAF Inlet Canal for 1974 - 1991.

†† 1969 data is considered to be pre-operational for the site. 1974 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
1976	440	929	652
1977	300	530	408
1978	215	490	304
1979	174	308	259
1980	211	290	257
1981	211	357	293
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	220	590	360

* Control location is the City of Oswego, drinking water for 1969 - 1984 and the Oswego Steam Station inlet canal for 1985 1991.

† 1969 data is considered to be pre-operational for the site. 1974 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
1976	297	889	513
1977	380	530	450
1978	253	560	389
1979	176	286	234
1980	150	457	263
1981	183	388	258
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

* Indicator location was the NMP-1 Inlet Canal during the period 1969-1973, and the JAF Inlet Canal for 1974-1991.

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

† 1969 data is considered to be pre-operational for the site. 1974 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
1976	0.004	0.240	0.051
1977	0.001	0.484	0.126
1978	0.010	0.650	0.144
1979	0.010	0.703	0.077
1980	0.009	0.291	0.056
1981	0.016	0.549	0.165
1982	0.011	0.078	0.033
1983	0.007	0.085	0.024
1984	0.013	0.051	0.026
1985	0.013	0.043	0.024
1986	0.008	0.272	0.039
1987	0.009	0.037	0.021
1988	0.008	0.039	0.018
1989	0.007	0.039	0.017
1990	0.003	0.027	0.013
1991	0.007	0.028	0.014

* 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 - 1991 (formerly C off-site location).

† 1969 data is considered to be pre-operational for the site. 1974 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
1976	0.002	0.191	0.047
1977	0.016	0.140	0.070
1978	0.006	0.340	0.102
1979	0.001	0.271	0.058
1980	0.002	0.207	0.045
1981	0.004	0.528	0.151
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

* 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 - 1991 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 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	*	*	*	*	*	*
1976	*	*	*	*	*	*
1977	0.0002	0.0112	0.0034	0.0034	0.0347	0.0172
1978	0.0008	0.0042	0.0018	0.0003	0.0056	0.0020
1979	0.0008	0.0047	0.0016	0.0005	0.0014	0.0009
1980	0.0015	0.0018	0.0016	<LLD	<LLD	<LLD
1981	0.0003	0.0042	0.0017	0.0003	0.0012	0.0008
1982	0.0002	0.0009	0.0004	0.0004	0.0007	0.0006
1983	0.0002	0.0002	0.0002	0.0007	0.0007	0.0007
1984	<LLD	<LLD	<LLD	0.0004	0.0012	0.0008
1985	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1986	0.0075	0.0311	0.0193	<LLD	<LLD	<LLD
1987	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* 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 - 1991.

† 1969 data is considered to be pre-operational for the site. 1974 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	*	*	*	*	*	*
1976	*	*	*	*	*	*
1977	0.0001	0.0105	0.0043	0.0003	0.0711	0.0179
1978	0.0003	0.0026	0.0016	0.0003	0.0153	0.0023
1979	0.0003	0.0020	0.0010	0.0003	0.0007	0.0005
1980	0.0005	0.0019	0.0011	0.0016	0.0016	0.0016
1981	0.0002	0.0045	0.0014	0.0002	0.0017	0.0006
1982	0.0001	0.0006	0.0004	0.0003	0.0010	0.0005
1983	0.0002	0.0003	0.0002	0.0003	0.0017	0.0007
1984	<LLD	<LLD	<LLD	0.0007	0.0017	0.0012
1985	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1986	0.0069	0.0364	0.0183	<LLD	<LLD	<LLD
1987	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* 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 - 1991.

† 1969 data is consied to be pre-operational for the site. 1974 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
1976	0.01	5.88	0.60
1977	0.02	0.82	0.32
1978	0.03	0.04	0.03
1979	<LLD	<LLD	<LLD
1980	<LLD	<LLD	<LLD
1981	<LLD	<LLD	<LLD
1982	0.039	0.039	0.039
1983	<LLD	<LLD	<LLD
1984	<LLD	<LLD	<LLD
1985	<LLD	<LLD	<LLD
1986	0.041	0.332	0.151
1987	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD

* 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 - 1991.

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

† 1969 data is considered to be pre-operational for the site. 1974 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
1976	0.01	2.09	0.33
1977	0.02	0.73	0.31
1978	0.02	0.07	0.04
1979	<LLD	<LLD	<LLD
1980	0.013	0.013	0.013
1981	0.016	0.042	0.029
1982	0.002	0.042	0.016
1983	0.022	0.035	0.028
1984	<LLD	<LLD	<LLD
1985	<LLD	<LLD	<LLD
1986	0.023	0.360	0.119
1987	0.011	0.018	0.014
1988	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD

* 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 - 1991 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 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†	*	*	*
1970	6.0	7.3	6.7
1971	2.0	6.7	4.3
1972	2.2	6.2	4.4
1973	2.2	6.9	4.7
1974†	2.7	8.9	5.6
1975	4.6	6.0	5.5
1976	3.2	7.2	5.4
1977	4.0	8.0	5.3
1978	3.3	4.7	4.3
1979	3.3	5.7	4.7
1980	3.8	5.8	4.9
1981	3.5	5.9	4.8
1982	3.8	6.1	5.1
1983	4.9	7.2	5.8
1984	4.7	8.2	6.2
1985	4.5	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

* Data not available.

** TLD #8, 14, 49, 111 (1985 - 1990) and 113 (1991).

† 1969 data is considered to be pre-operational for the site. 1974 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†	*	*	*
1970	6.0	7.3	6.7
1971	2.0	6.7	4.3
1972	2.2	6.2	4.4
1973	2.2	6.9	4.7
1974†	2.7	8.9	5.6
1975	4.8	6.0	5.5
1976	3.2	7.2	5.4
1977	4.0	8.0	5.3
1978	3.3	4.7	4.3
1979	3.3	5.7	4.7
1980	3.8	5.8	4.9
1981	3.5	5.9	4.8
1982	3.8	6.1	5.1
1983	4.9	7.2	5.8
1984	4.7	8.2	6.2
1985	4.4	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

* Data not available.

** TLD #14 and 49 (RETS Control Locations).

† 1969 data is considered to be pre-operational for the site. 1974 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†	*	*	*
1970	*	*	*
1971	*	*	*
1972	*	*	*
1973	*	*	*
1974†	*	*	*
1975	*	*	*
1976	*	*	*
1977	*	*	*
1978	*	*	*
1979	*	*	*
1980	*	*	*
1981	*	*	*
1982	*	*	*
1983	*	*	*
1984	*	*	*
1985	4.1	12.6	6.2
1986	4.4	18.7	7.0
1987	4.4	14.3	6.1
1988	3.4	17.9	6.4
1989	2.8	15.4	5.9
1990	3.6	14.9	6.4
1991	3.2	16.7	6.0

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

** TLD locations initiated in 1985 as required by the New Technical Specifications. Includes TLD numbers 7, 18, 23 and 75 - 87. Several of these are in close proximity to site operational buildings not generally accessible to the public, and are not representative of the site boundary dose.

† 1969 data is considered to be pre-operational for the site. 1974 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†	*	*	*
1970	*	*	*
19[illegible]	*	*	*
[illegible]	*	*	*
1973	*	*	*
1974†	*	*	*
1975	*	*	*
1976	*	*	*
1977	*	*	*
1978	*	*	*
1979	*	*	*
1980	*	*	*
1981	*	*	*
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

* 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 data is considered to be pre-operational for the JAFNPP.

TABLE 7-16C

HISTORICAL ENVIRONMENTAL SAMPLE DATA

ENVIRONMENTAL TLD

Results in mrem per standard month

LOCATION: SPECIAL INTEREST **			
Year	Min.	Max.	Mean
Preop†	*	*	*
1970	*	*	*
1971	*	*	*
1972	*	*	*
1973	*	*	*
1974†	*	*	*
1975	*	*	*
1976	*	*	*
1977	*	*	*
1978	*	*	*
1979	*	*	*
1980	*	*	*
1981	*	*	*
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	6.3	4.8

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

** TLD locations initiated in 1985 as required by the New Technical Specifications. Includes TLD numbers 15, 56, 58, 96-105, 108 and 109, which are located near critical residences and populated areas near the site.

† 1969 data is considered to be pre-operational for the site. 1974 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†	*	*	*
1970	4.7	9.0	6.0
1971	1.5	7.7	4.7
1972	2.3	8.2	4.9
1973	3.0	24.4	6.6
1974†	3.1	10.0	5.7
1975	4.6	16.0	7.3
1976	3.7	18.8	6.9
1977	3.0	15.3	5.7
1978	3.0	9.0	4.3
1979	2.7	8.3	4.3
1980	3.9	12.0	5.3
1981	4.1	11.8	5.8
1982	3.9	13.0	6.3
1983	5.0	16.5	6.9
1984	4.6	13.2	7.0
1985	4.7	15.9	6.3
1986	4.7	16.1	7.0
1987	4.0	11.4	5.8
1988	4.4	11.9	6.0
1989	3.7	13.1	6.0
1990	3.6	12.9	5.5
1991	3.2	11.6	5.4

* No data available.

** Includes TLD numbers 3, 4, 5, 6 and 7 (1970 - 1973). Includes TLD numbers 3, 4, 5, 6, 7, 23, 24, 25 and 26 (1974 - 1991). Locations are existing or previous on-site environmental air monitoring locations.

† 1969 data is considered to be pre-operational for the site. 1974 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†	*	*	*
1970	5.0	8.0	6.7
1971	1.1	7.7	4.5
1972	1.8	6.6	4.4
1973	2.2	6.9	4.1
1974†	2.4	8.9	5.3
1975	4.5	7.1	5.5
1976	3.4	7.2	5.2
1977	3.7	8.0	5.3
1978	2.7	4.7	3.7
1979	3.0	5.7	4.0
1980	3.1	5.8	4.6
1981	3.6	5.9	4.7
1982	4.0	6.2	5.2
1983	4.6	7.2	5.6
1984	4.6	8.2	6.1
1985	4.6	7.7	5.5
1986	5.0	7.6	6.1
1987	4.4	6.6	5.2
1988	4.2	6.6	5.4
1989	2.8	6.4	4.6
1990	3.8	6.1	4.8
1991	3.4	5.8	4.5

* No data available.

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

† 1969 data is considered to be pre-operational for the site. 1974 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	*	*	*	*	*	*
1976	*	*	*	*	*	*
1977	*	*	*	*	*	*
1978	2.4	7.8	5.8	<LLD	<LLD	<LLD
1979	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1980	<LLD	<LLD	<LLD	1.4	1.4	1.4
1981	7.0	7.0	7.0	<LLD	<LLD	<LLD
1982	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1983	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1984	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1985	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1986	5.3	12.4	8.4	0.8	29.0	13.6
1987	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1988	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1989	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1990	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
1991	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

* 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 consied to be pre-operational for the site. 1974 data is considered to be pre-operational for the JAFNPP.

TABLE 7-18

HISTORICAL ENVIRONMENTAL SAMPLE

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
1976	4.0	15.0	9.3	0.02	45.00	3.20
1977	11.0	22.0	17.1	0.40	0.22	0.02
1978	3.4	33.0	9.9	0.19	0.19	0.19
1979	2.7	40.0	9.4	<LLD	<LLD	<LLD
1980	4.0	21.0	9.7	0.4	8.8	4.9
1981	4.3	29.0	7.6	<LLD	<LLD	<LLD
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

* Locations sampled were available downwind locations within ten miles with high deposition potential.

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

† 1969 data is consied to be pre-operational for the site. 1974 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	**	**	**
1976	**	**	**
1977	**	**	**
1978	**	**	**
1979	**	**	**
1980	<LLD	<LLD	<LLD
1981	<LLD	<LLD	<LLD
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

* Locations was an available food product sample location in a least prevalent wi.. 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 data is considered to be pre-operational for the JAFNPP.

†† Data comprised of broadleaf and non-broadleaf vegetaion (1980-1984). Data comprised of broadleaf vegetation only (1985-1991).

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
1976	<MDL	<MDL	<MDL
1977	<MDL	<MDL	<MDL
1978	0.01	0.01	0.01
1979	<LLD	<LLD	<LLD
1980	0.004	0.060	0.033
1981	<LLD	<LLD	<LLD
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

* 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 data is considered to be pre-operational for the JAFNPP.

†† Data comprised of broadleaf and non-broadleaf vegetaion (1976-1984). Data comprised of broadleaf vegetation only (1985-1991).

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.

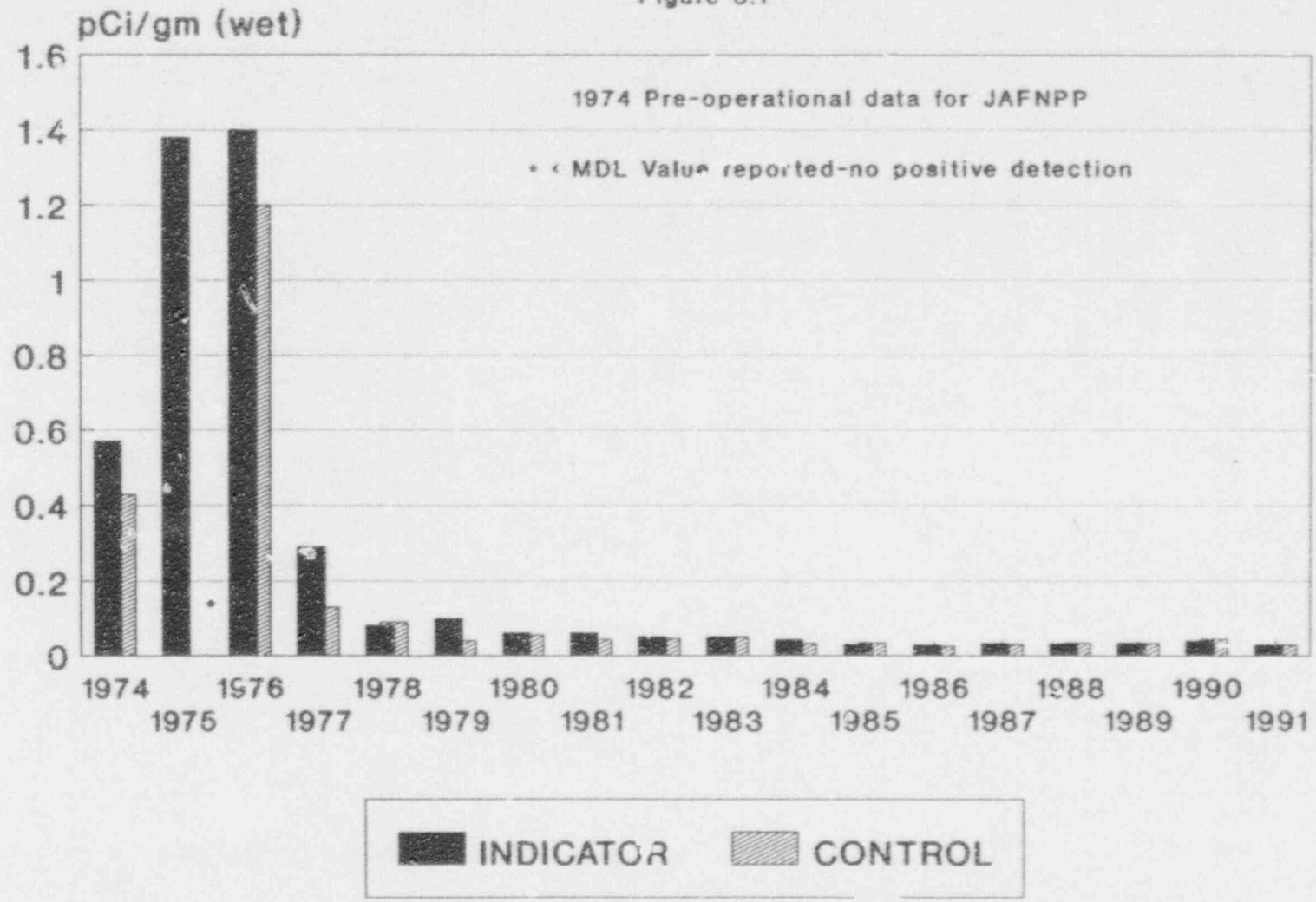
2. SAMPLE LOCATIONS

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.

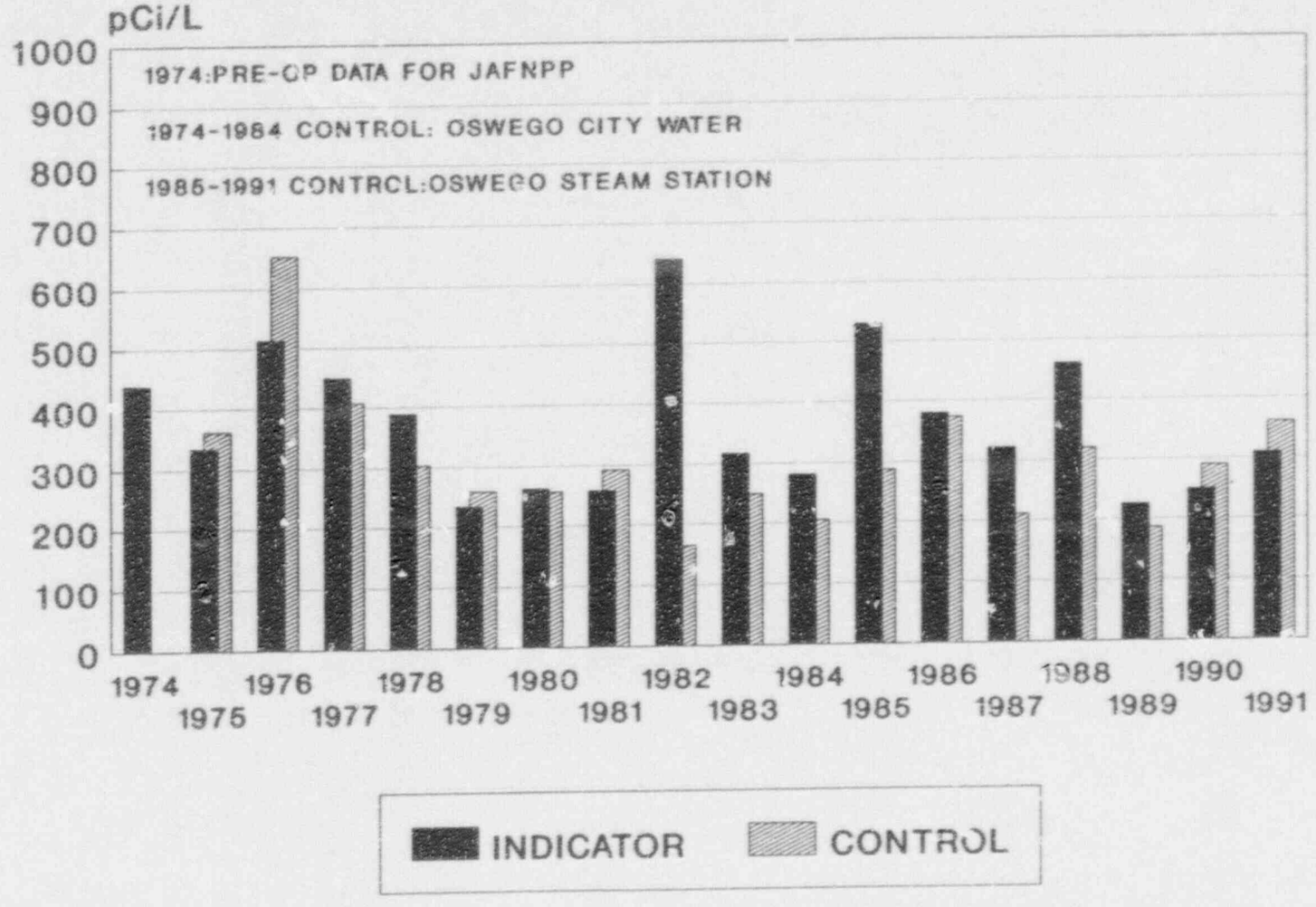
FISH Cs-137

Figure 8.1



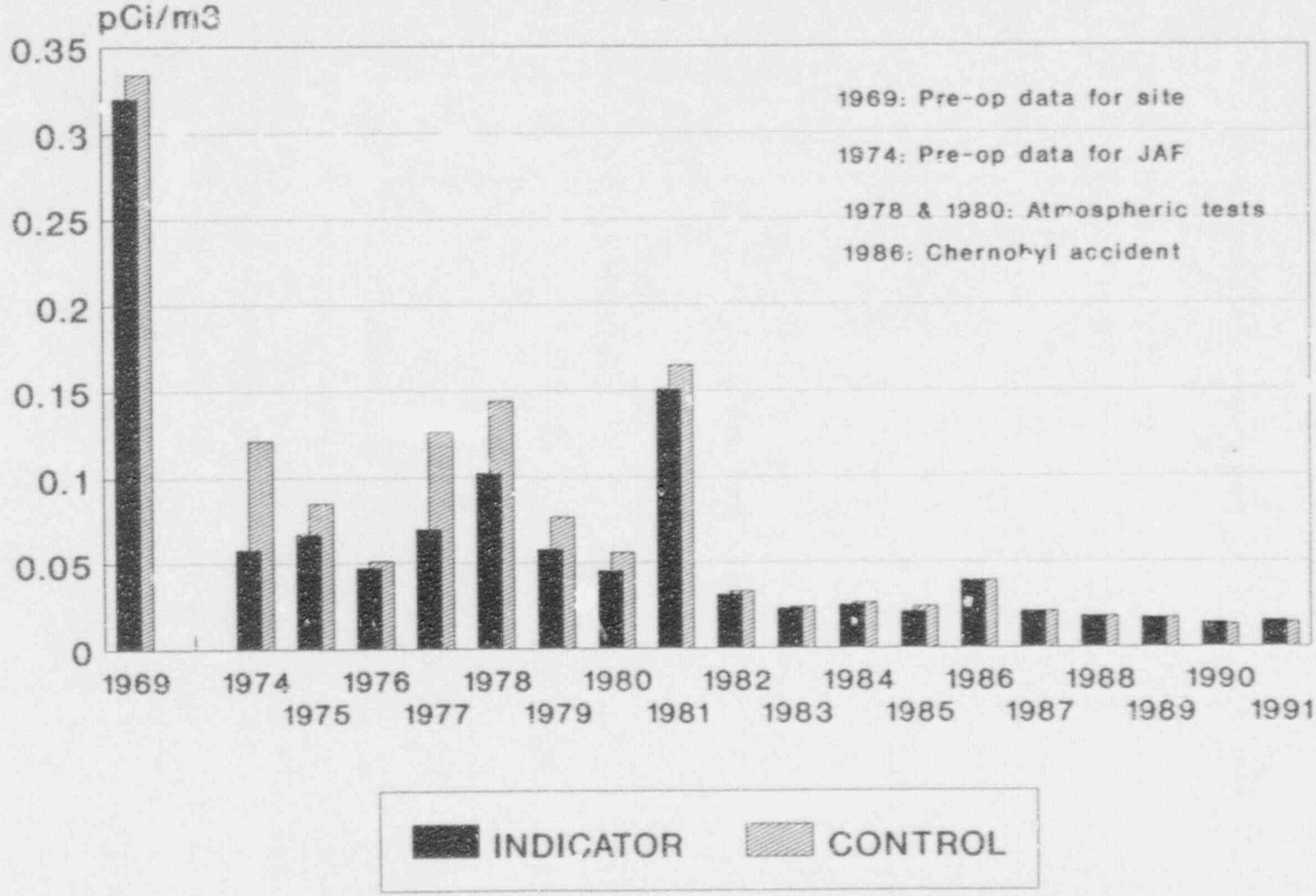
JAMES A. FITZPATRICK N.P.P.
SURFACE WATER TRITIUM

Figure 8.2



JAMES A. FITZPATRICK N.P.P.
AIR PARTICULATE GROSS BETA

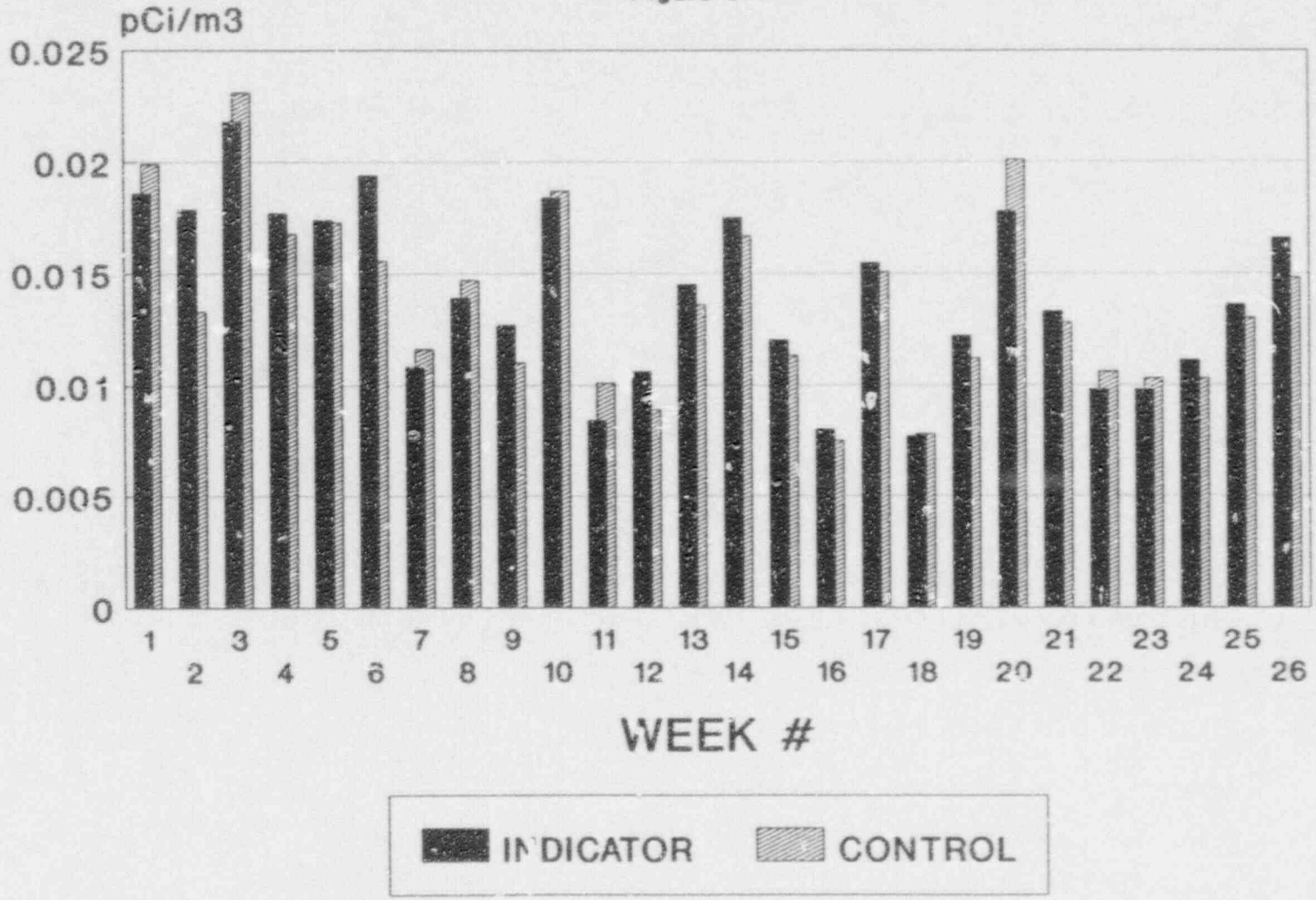
Figure 8.3



NOTE: ALL DATA REPORTED IS MEAN VALUE

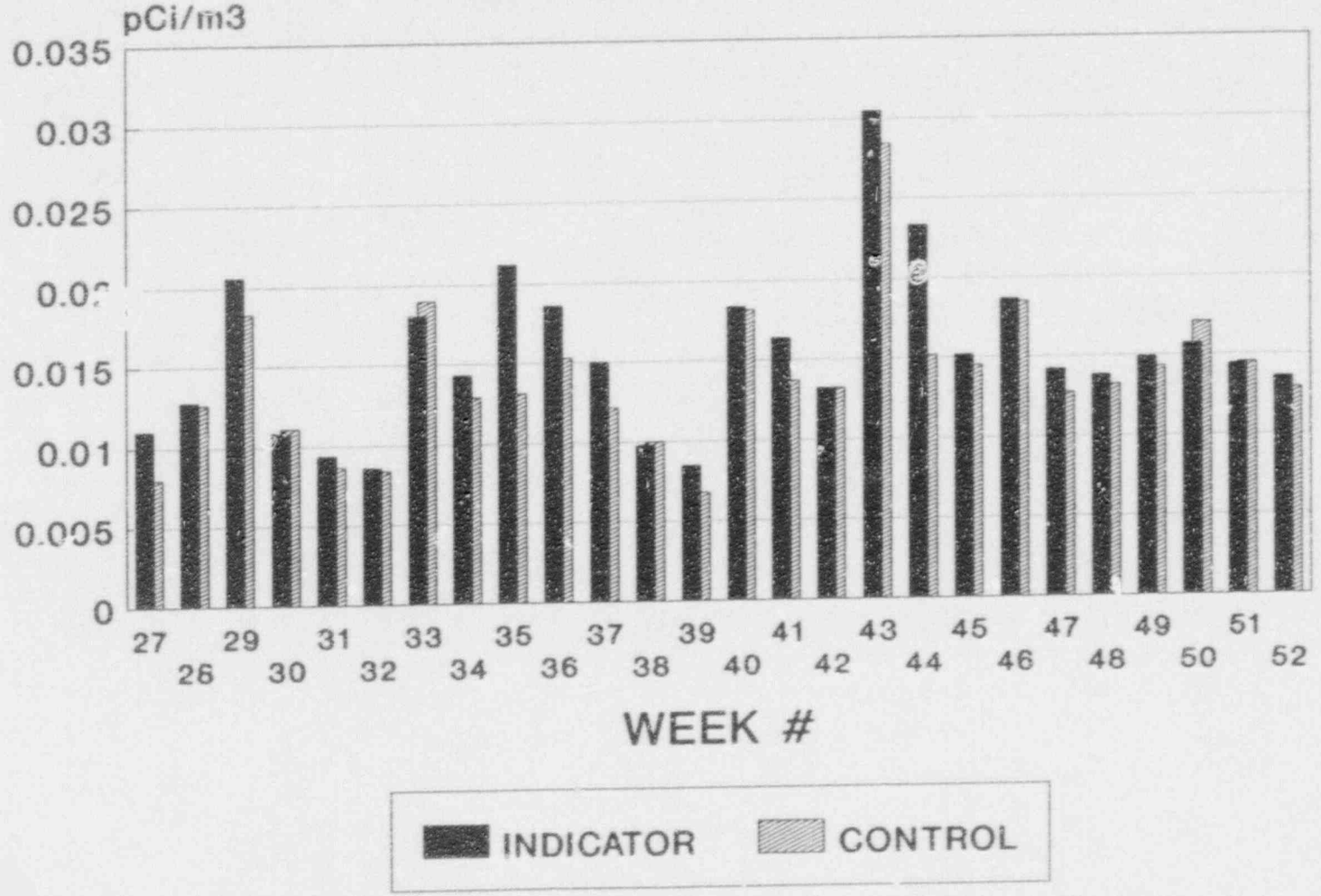
JAMES A. FITZPATRICK N.P.P.
AIR PARTICULATE GROSS BETA

Figure 8.4



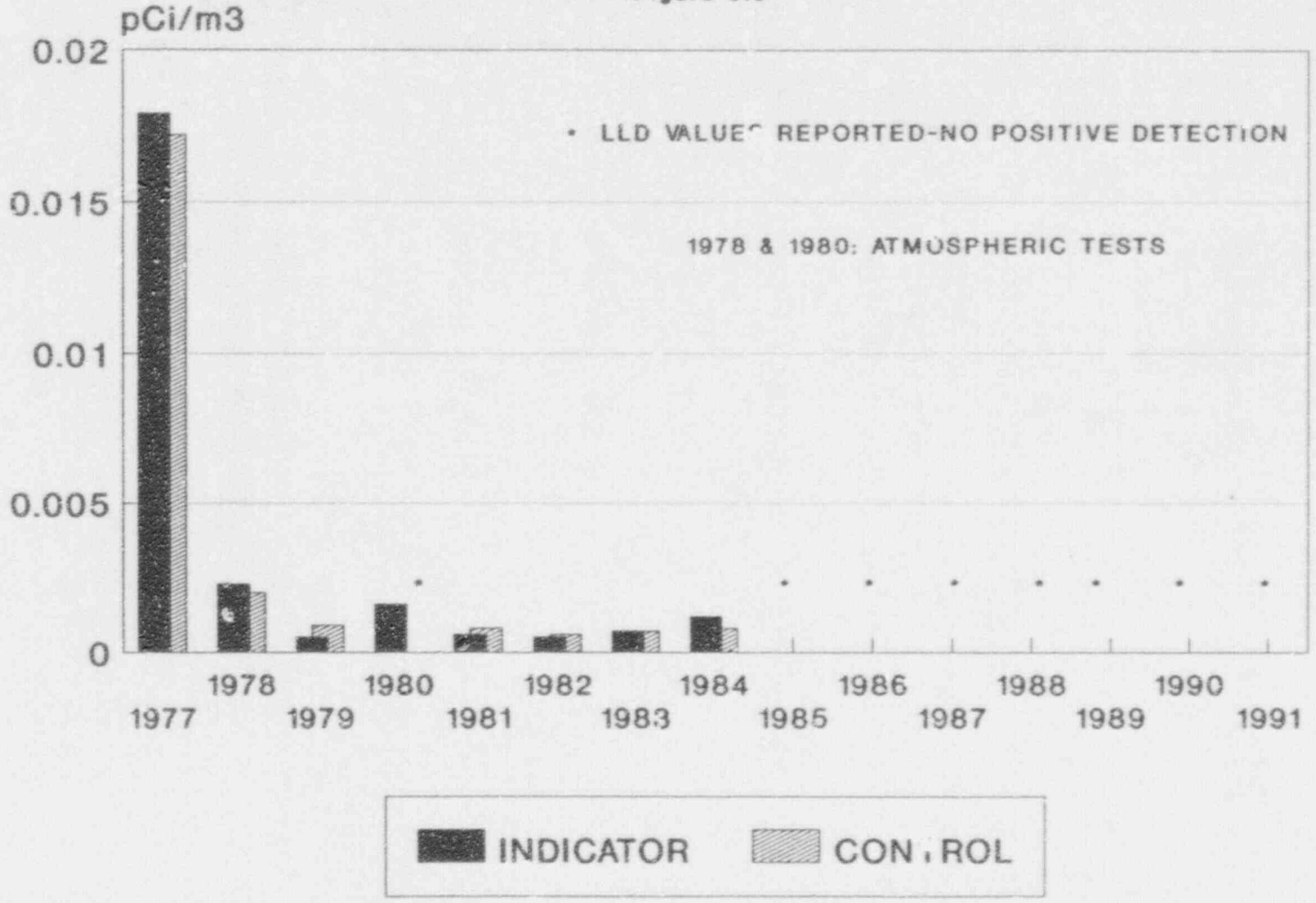
JAMES A. FITZPATRICK N.P.P.
AIR PARTICULATE GROSS BETA

Figure 8.5



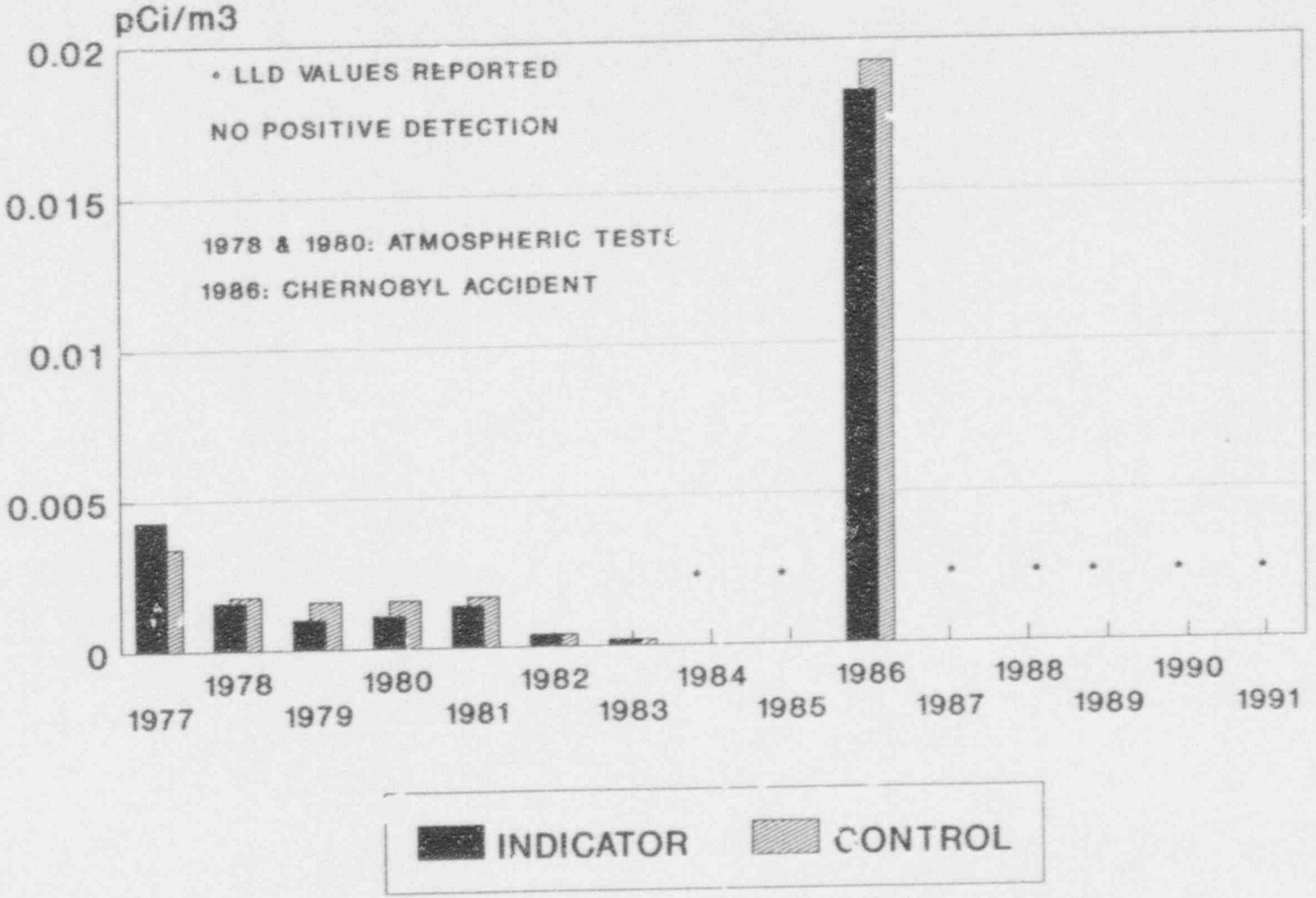
JAMES A. FITZPATRICK N.P.P.
AIR PARTICULATE COMPOSITE Co-60

Figure 8.6



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

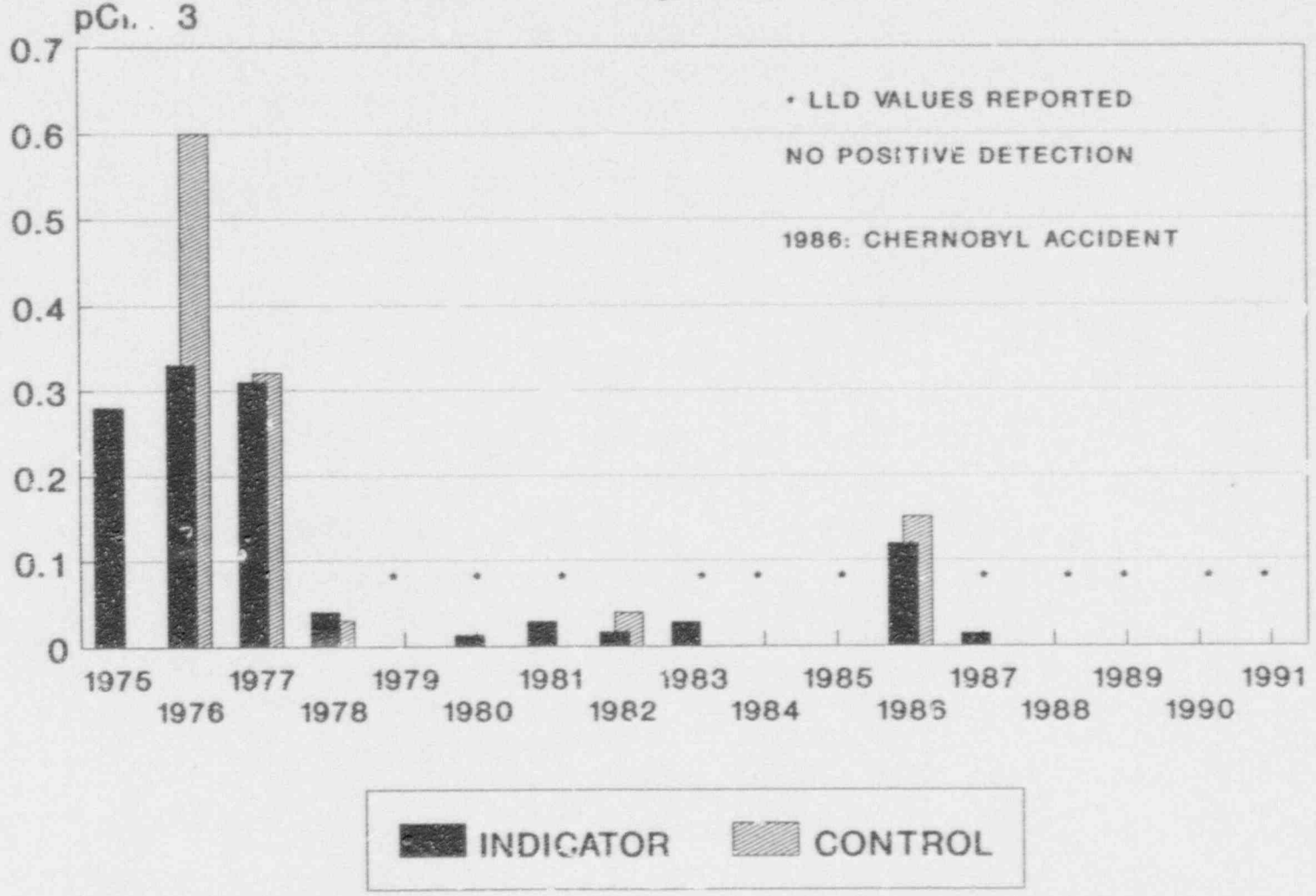
Figure 8.7



JAMES A. FITZPATRICK N.P.P.

AIR I-131

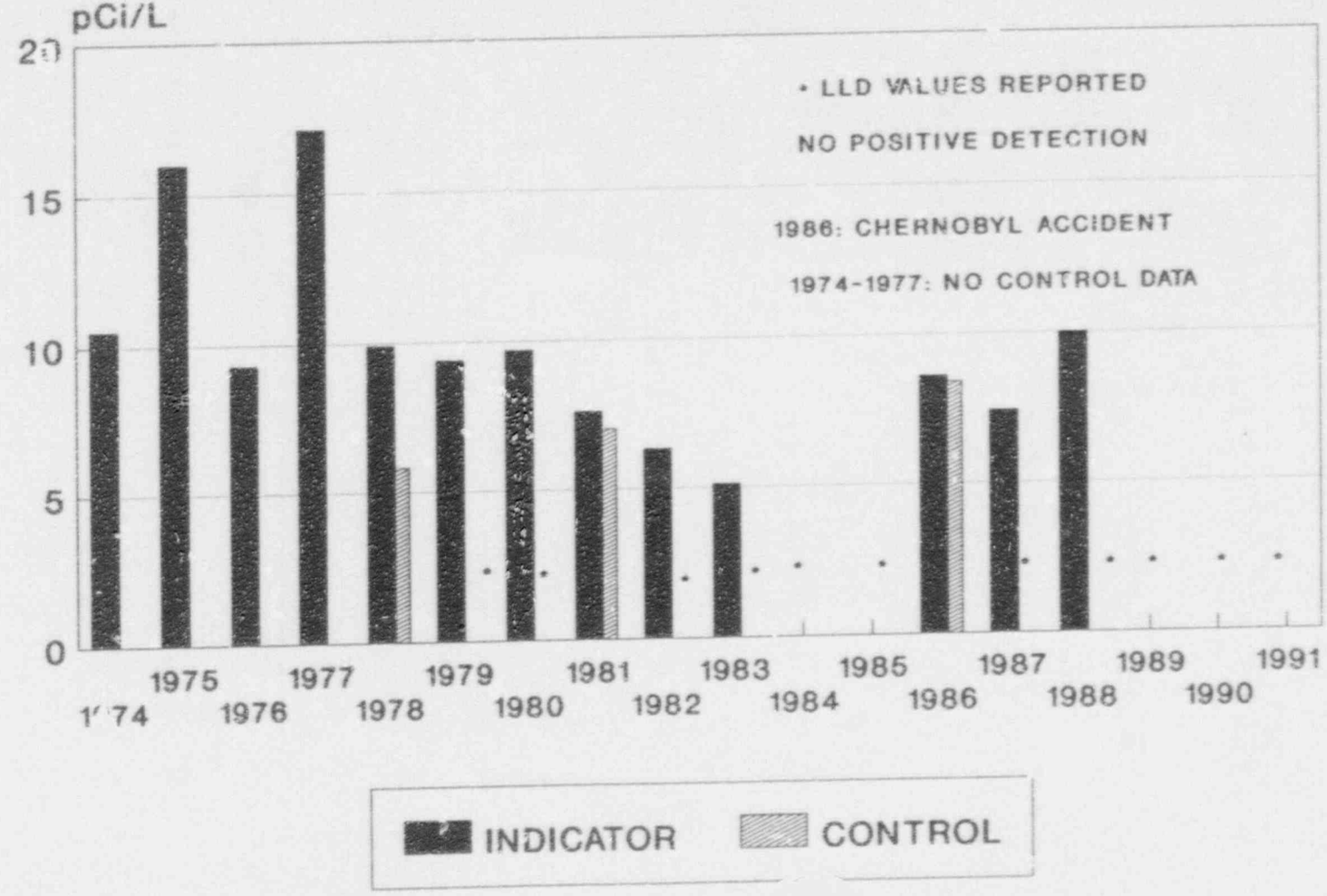
Figure 8.8



JAMES A. FITZPATRICK N.P.P.

MILK Cs-137

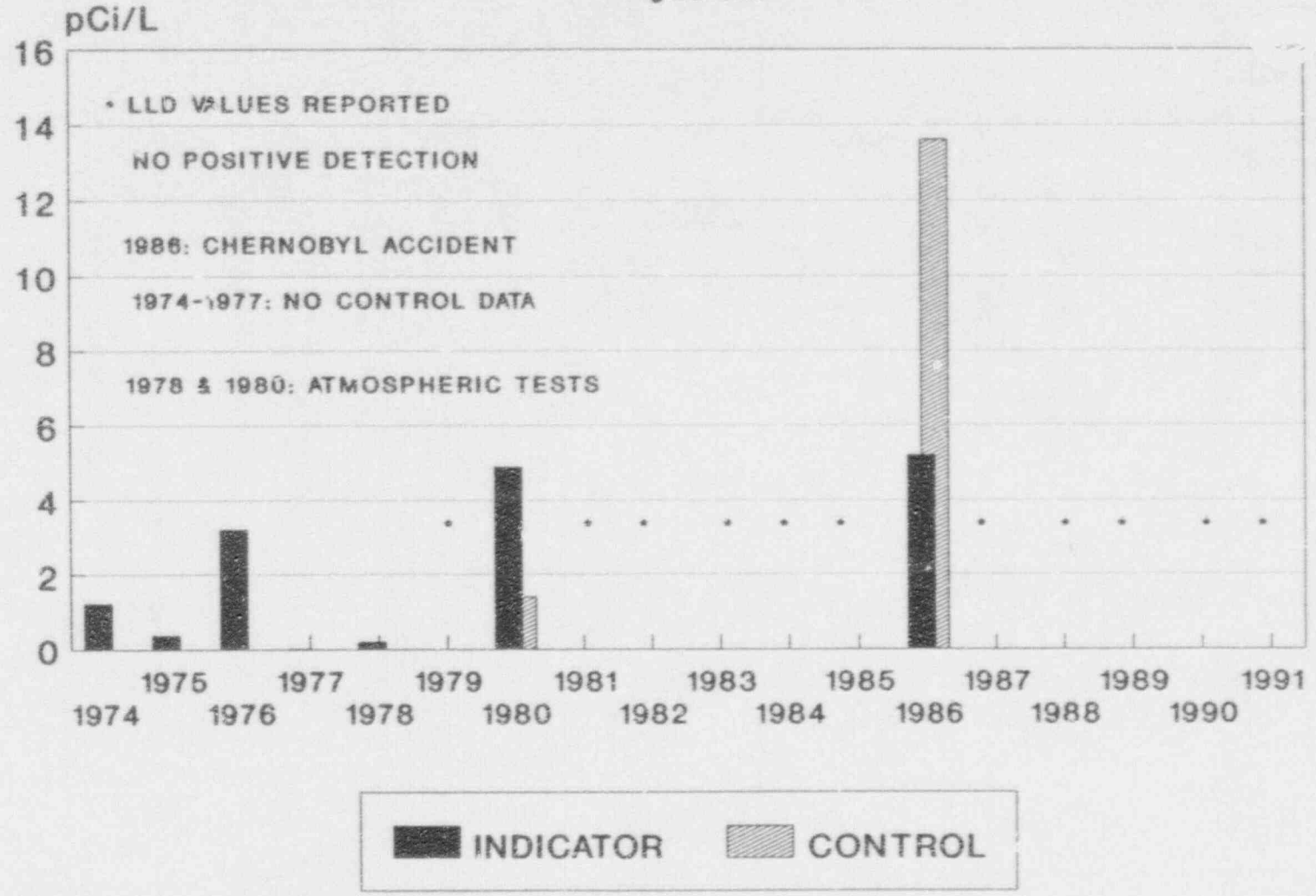
Figure 8.9



JAMES A. FITZPATRICK N.P.P.

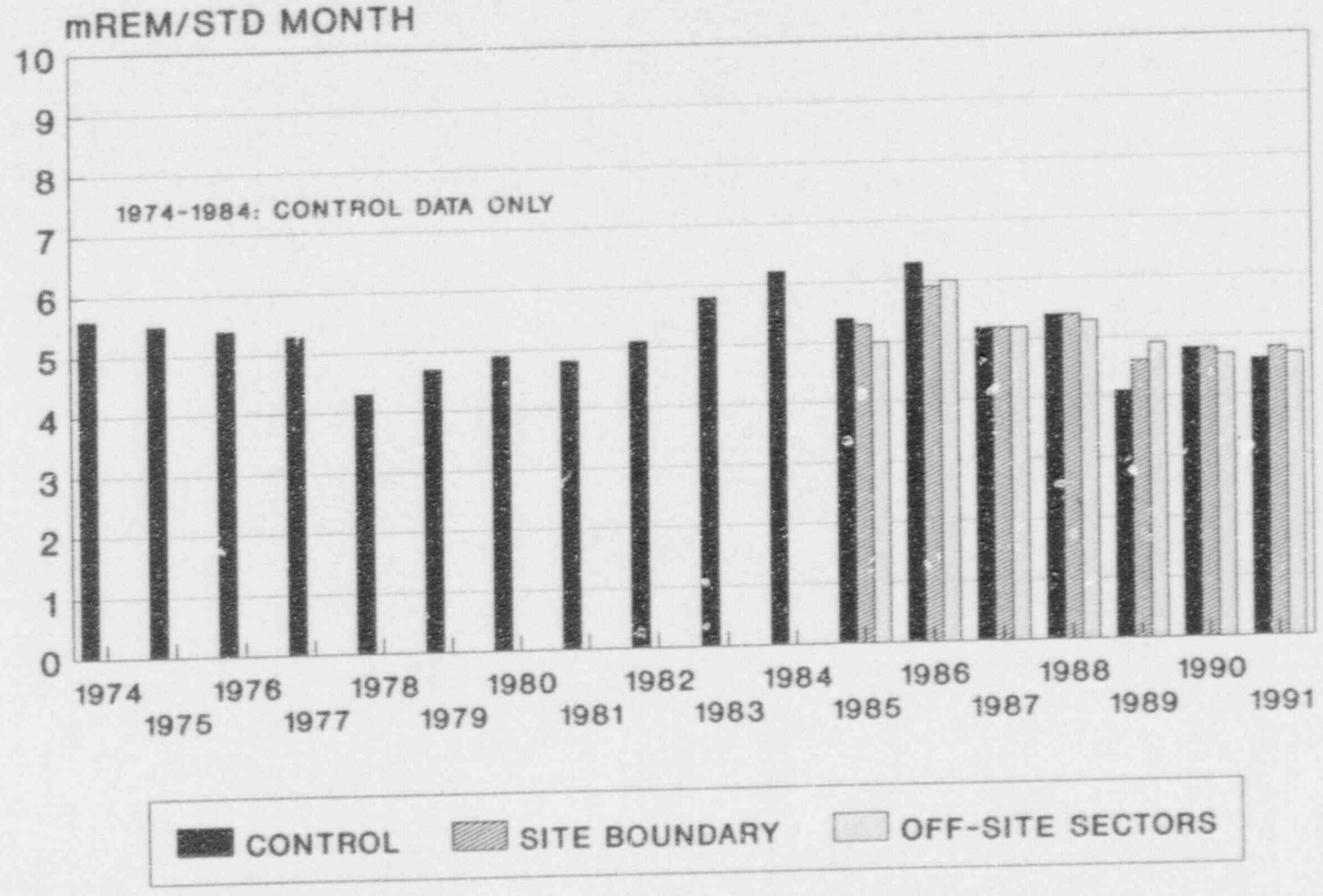
MILK I-131

Figure 8.10



JAMES A. FITZPATRICK N.P.
TLD DATA

Figure 8.11



9.0 QA/QC PROGRAM

9.1 PROGRAM DESCRIPTION

The JAFNPP Radiological Effluent Technical Specifications require that a summary of the results for participation in the Interlaboratory Comparison Program be included in the Annual Radiological Environmental Operating Report. Reference samples obtained from the US Environmental Protection Agency (USEPA) Cross Check Program are analyzed by JAFNPP Environmental Laboratory. Sample media analyzed for the intercomparison program includes those which are routinely obtained as part of the site radiological environmental monitoring program.

Sample results are compared to the USEPA reference results for accuracy and precision. The USEPA reports results in terms of normalized deviations from a known value (NDKV). Interlaboratory results are acceptable by the USEPA if the laboratories NDKV is between plus three or minus three for each sample.

9.2 PROGRAM RESULTS

The performance of the laboratory was acceptable in 1991. 40 out of 41 USEPA Cross Check Program samples analyzed at the site Environmental Laboratory were within three normalized deviations. All eight samples analyzed by the program vendor laboratory were acceptable. Specific results for the USEPA Cross Check Program are presented in Tables 9-1 through 9-4 in this section.

9.3 NONCONFORMITIES

9.3.1 One USEPA Cross Check sample analyzed by the site Environmental Laboratory was outside three normalized deviations. The sample, QA-91-103, was a gamma in water sample analyzed for Co-60, Zn-65, Ru-106, Cs-134, Cs-137 and Ba-133. Five isotope activities reported were within two normalized deviations, while the Ru-106 activity was -4.04 normalized deviations.

The USEPA known activity for Ru-106 was 199±20 pCi/l. JAF reported activities were 166±36, 161±15, 130±22 pCi/l for an average of 152 pCi/l.

The reason for the nonconformity was including an outlier (130 pCi/l) from the data in the final average. The sample was counted two times each on four different detectors with the following results:

#1	#3	#4	#5
161 ± 22	161 ± 15	179 ± 32	166 ± 36
130 ± 22	177 ± 21	174 ± 24	194 ± 37

The population average is 169 pCi/l.

A Q-test of the 130 data point shows that is an outlier.

$$Q = \frac{130 - 161}{130 - 179} = \frac{-31}{-49} = 0.63$$

This result is >0.554 for a 95% significance level.

Deleting the 130 pCi/l and recalculating an overall average gives a result of 173 pCi/l.

Reporting an average of 173 pCi/l would have resulted in an normal deviation of -2.22, which is within the -3 to +3 NDKV, which is acceptable.

TABLE 9-1

USEPA ENVIRONMENTAL RADIOACTIVITY LABORATORY

INTERCOMPARISON STUDY PROGRAM

GROSS BETA ANALYSIS OF AIR PARTICULATE FILTERS (pCi/FILTER)
GROSS BETA ANALYSIS OF WATER (pCi/LITER)

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	EPA RESULT (2)	NDKV (5)
01/91	QA 91-016	WATER	GB	6±0.5(3) 6±0.5 7±0.5	5±5	0.46
03/91	QA 91-025	FILTER	GB	130±1(3) 129±1 131±1	124±6	1.73
04/91	QA 91-033	WATER	GB	105±1(3) 103±1 113±1	115±17	-0.82
05/91	QA 91-035	WATER	GB	46±0.5(3) 50±0.5 52±0.5	46±5	1.15
08/91	QA 91-086	FILTER	GB	96±1.5(3) 95±1.5 95±1.5	92±10	0.58
09/91	QA 91-099	WATER	GB	20±0.5(3) 22±0.5 19±0.5	20±5	0.12
10/91	QA 91-112	WATER	GB	53±0.5(3) 53±0.5 54±0.5	65±10	-2.02

TABLE 9-2

USEPA ENVIRONMENTAL RADIOACTIVITY LABORATORY

INTERCOMPARISON STUDY PROGRAM

TRITIUM ANALYSIS OF WATER (PCI/LITER)

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	EPA RESULT (2)	NDKV (5)
02/91	QA 91-019	WATER	H-3	4264±121(3) 4245±120 4282±121	4418±442	-0.60
				4400±50(4) 4500±50 4700±50	4418±442	0.45
06/91	QA 91-063	WATER	H-3	11200±160(3) 10900±159 10800±159	12480±1248	-2.10
				13000±500(4) 13000±500 13000±500	12480±1248	0.72
10/91	QA 91-111	WATER	H-3	2400±106(3) 2300±105 2300±105	2454±352	-0.59
				2400±100(4) 2600±100 2500±100	2454±352	0.23

TABLE 9-3

USEPA ENVIRONMENTAL RADIOACTIVITY LABORATORY

INTERCOMPARISON STUDY PROGRAM

IODINE ANALYSIS OF WATER (pCi/LITER) AND MILK (pCi/LITER)

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	EPA RESULT (2)	NDKV (5)
02/91	QA 91-018	WATER	I-131	85±3(3) 83±2 87±3	75±8	2.17
04/91	QA 91-034	MILK	I-131	61±4(3) 58±20(4)	60±6 60±6	0.19 -0.58
08/91	QA 91-084	WATER	I-131	20±1(3) 21±1 21±1 20±1(4) 19±1 19±1	20±6 20±6	0.19 -0.19
09/91	QA 91-100	MILK	I-131	111±3(3) 116±3 94±2 102±11(4) 106±16 121±12	108±11 108±11	-0.16 0.26

TABLE 9-4

USEPA ENVIRONMENTAL RADIOACTIVITY LABORATORY

INTERCOMPARISON STUDY PROGRAM

GAMMA ANALYSIS OF MILK, WATER (pCi/LITER)
AND AIR PARTICULATE FILTERS (pCi/FILTER)

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	EPA RESULT (2)	NDKV (5)
02/91	QA 91-017	WATER	Co-60	39±2(3) 37±3 39±2	40±5	-0.58
			Zn-65	151±7(3) 139±10 153±7	149±15	-0.15
			Ru-106	169±20(3) 165±32 158±18	186±19	-2.01
			Cs-134	6±1(3) 6±1 6±2	8±5	-0.69
			Cs-137	11±2(3) 8±2 7±2	8±5	0.23
			Ba-133	73±3(3) 78±5 68±3	75±8	-0.43
03/91	QA 91-025	FILTER	Cs-137	38±3(3) 37±3 37±3	40±5	-0.92
04/91	QA 91-033	WATER	Cs-134	19±1(3) 20±1 21±2	24±5	-1.39
			Cs-137	23±2(3) 19±2 26±3	25±5	-0.81

TABLE 9-4 (CONTINUED)

USEPA ENVIRONMENTAL RADIOACTIVITY LABORATORY

INTERCOMPARISON STUDY PROGRAM

GAMMA ANALYSIS OF MILK, WATER (pCi/LITER)
AND AIR PARTICULATE FILTERS (pCi/FILTER)

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	EPA RESULT (2)	NDKV (5)
04/91	QA 91-034	MILK	Cs-137	54±4(3)	49±5	1.73
				47±6(4)	49±5	-0.58
06/91	QA 91-062	WATER	Co-60	10±2(3) 9±1 10±1	10±5	-0.12
			Zn-65	114±6(3) 117±7 110±5	108±11	0.58
			Ru-106	123±27(3) 143±20 162±17	149±15	-0.73
			Cs-134	10±1(3) 11±2 10±1	15±5	-1.62
			Cs-137	12±2(3) 13±2 15±2	14±5	-0.23
			Ba-133	59±3(3) 59±3 54±3	62±6	-1.35
08/91	QA 91-086	FILTER	Cs-137	26±3(3) 28±3 32±3	30±5	-0.46

TABLE 9-4 (CONTINUED)

USEPA ENVIRONMENTAL RADIOACTIVITY LABORATORY

INTERCOMPARISON STUDY PROGRAM

GAMMA ANALYSIS OF MILK, WATER (pCi/LITER)
AND AIR PARTICULATE FILTERS (pCi/FILTER)

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	EPA RESULT (2)	NDKV (5)
09/91	QA 91-100	MILK	Cs-137	28±3(3) 26±3 26±5	30±5	-1.15
				31±4(4) 29±5 33±3	30±5	0.29
10/91	QA 91-103	WATER	Co-60	28±2(3) 28±3 27±2	29±5	-0.46
			Zn-65	67±9(3) 69±6 64±6	73±7	-1.57
			Ru-106	166±36(3) 161±15 130±22	199±20	-4.04
			Cs-134	9±4(3) 7±2 8±2	10±5	-0.69
			Cs-137	8±3(3) 6±2 9±2	10±5	-0.81
			Ba-133	95±6(3) 91±4 90±4	98±10	-1.04

TABLE 9-4 (CONTINUED)

USEPA ENVIRONMENTAL RADIOACTIVITY LABORATORY

INTERCOMPARISON STUDY PROGRAM

GAMMA ANALYSIS OF MILK, WATER (pCi/LITER)
AND AIR PARTICULATE FILTERS (pCi/FILTER)

DATE	JAF ENV ID NUMBER	MEDIUM	ANALYSIS	JAF RESULT (1)	EPA RESULT (2)	NDKV (5)
10/91	QA 91-112	WATER	Co-60	19±2(3) 18±3 19±2	20±5	-0.46
			Cs-134	8±2(3) 7±3 9±1	10±5	-0.69
			Cs-137	12±2(3) 17±3 12±2	11±5	0.92

(1) Results reported as activity ± the error (1 sigma).

(2) Results reported as activity ± the standard deviation of the error.

(3) Analyzed at the site Environmental Laboratory.

(4) Analyzed at a vendor laboratory.

(5) NDKV is the Normalized Deviation from Known Value as determined by the EPA. Values within the range of +3 and -3 indicate acceptable results.

APPENDIX A

ENVIRONMENTAL RADIOLOGICAL ASSESSMENT OF THE MARCH 18, 1991 RELEASE OF RADIOACTIVE MATERIAL

1.0 INTRODUCTION

Appendix A has been added to the 1991 Radiological Environmental Operating Report to provide data and an environmental assessment relative to the March 18, 1991 accidental release of radioactive material to the environment. This appendix contains a description of the Radiological Environmental Assessment Plan implemented, summary tables of sample results for important environmental sample media, an evaluation of the sample results and the dose to man assessment. Analytical results are provided for samples collected beyond the protected (security) areas of the site between March 18, 1991 and May 15, 1991. A number of the sample media were collected as part of the routine Environmental Surveillance Program. These routine sample results can be found in Section 6.0 of the Radiological Environmental Operating Report.

2.0 0VERVIEW

Following the radiological events of March 18, 1991, a Radiological Environmental Assessment Plan (REAP) was implemented. The Radiological Environmental Assessment Plan was implemented to provide a systematic approach for determining the radiological conditions at the FitzPatrick site and the radiological impact off-site. The specific objectives of the plan were to:

- Determine the amount of radioactive material that was released off-site.
- Determine the extent and levels of radiological contamination on-site and off-site.

- o Evaluate the radiological impact off-site to the general public in terms of dose to man from environmental pathways

- o Provide environmental data and assessment for the restoration of contaminated areas of the site specifically the grounds and plant storm drainage system.

To meet the objectives of the REAP an Environmental Sampling and Analysis Program was conducted. This program was comprised of collecting appropriate environmental samples, analyzing the samples to environmental levels and evaluating the analytical results.

3.0 METHODOLOGY

Due to the nature of the release, the REAP focused on three specific areas:

1. Aquatic pathways (off-site)

   - o Drinking water
   - o Lake water
   - o Fish
   - o Shoreline sediment
   - o Bottom sediment

2. Terrestrial Pathways (off-site)

   - o Airborne radioactivity
   - o Direct radiation
   - o soil

3. JAF Site Environs (on-site)

   - o Soil
   - o Radiation instrumentation surveys
   - o Airborne radioactivity

4.0 SAMPLES COLLECTED AND ANALYTICAL RESULTS

The samples that were collected and analyzed to assess the levels of radioactivity that was potentially present in the environment are described below. The number and types of samples collected are summarized in Table 1. The specific analytical results are provided in Table 2 and in the 1991 Radiological Environmental Operating Report. Sample locations are keyed to the map provided as Figure 1.

4.1 Aquatic Pathways (off-site)

a. Drinking Water

The Oswego City water supply was sampled and analyzed to determine if radioactive material was present in the water supply. Samples were collected from the water filtration plant on a routine basis from 03/20/91 to 04/24/91. Samples were taken from both the treated and untreated process streams at the treatment plant. In addition, samples were collected from supply points within the distribution system including the JAF city water supply.

The analytical results for all of the drinking water samples collected showed no presence of radioactive material above natural background.

b. Raw Lake Water

Raw lake water samples were collected from a number of sample locations which included:

- o JAF Inlet Canal
- o JAF Discharge Canal
- o 9 Mile Point Unit No. 1 Inlet Canal
- o Lake Shore Grab Samples

These samples were collected to measure the possible levels of radioactive material in lake water in the vicinity of the site. Because the respective inlet canals for the power plants draw a significant amount of cooling water from Lake Ontario, samples from these locations are considered to be representative of raw lake water. Shoreline grab samples are considered to be more representative of the near shore water column.

The analytical results for all of the raw lake water samples collected showed no presence of radioactive material above natural background.

c. Lake Ontario Fish

To evaluate impact of the release on the fish pathway, a number of fish samples were collected and analyzed. Gill nets were used to collect game fish specimens. The nets were set weekly, weather permitting, in the off shore vicinity of the plant and near the Oswego Harbor. Game fish samples were also collected daily, when available, from the JAF and 9 Mile Point Unit #1 intake traveling screen fish collection baskets.

The analytical results for all the fish samples collected and analyzed as part of the REAP showed no presence of radioactive material associated with the release. A number of the fish samples did show the presence of Cs-137. The presence of Cs-137 in the fish is the result of cesium deposited in the environment from past atmospheric nuclear weapons testing. The levels of Cs-137 measured in the fish samples is consistent with concentrations measured in fish samples collected in previous years as part of the routine Radiological Environmental Operating Report.

d. Lake Ontario, Shoreline Sediment Samples

Shoreline sediment samples were collected once per week for four weeks. Samples were collected at a total of nine locations east and west of the site. Sample locations were selected based on the availability of sediment for sampling.

The analytical results for the shoreline sediment samples showed no detectable quantities of radioactive material above background with the exception of Cs-137. As noted for the fish samples, the presence of Cs-137 in these samples is the result of fallout from past atmospheric nuclear weapons testing and is documented in the annual Radiological Environmental Operating Report for the plant.

e. Bottom Sediment

One series of four bottom sediment samples was collected. The samples were collected approximately 50 to 100 ft. offshore from the FitzPatrick Plant. The samples were taken to determine if there was a build up of radioactive material in the near shore area.

The analytical results showed no detectable quantities of radioactive material above background with the exception of Cs-137 and Co-60. The levels of Cs-137 and Co-60 are within the range of documented historical results and are not attributed to the release.

4.2 Terrestrial Pathways

a. Soil

Approximately 77 soil samples were collected around the site to determine to what extent the radioactive material released was deposited. Samples were taken in areas of known deposition and at the site perimeter areas along roadways and other areas of potential contamination.

The soil sample results showed that no radioactive material associated with the release was deposited on soil beyond the protected (security) area, and are not included in the tables in this report.

b. Airborne Radioactivity

As part of the routine Environmental Monitoring Program, the site maintains a network of environmental air monitoring stations. These stations are equipped to collect representative samples of airborne radioiodine and airborne particulates. Samples from these monitoring stations are collected on a weekly basis as part of normal surveillance schedule. Samples from the off-site environmental air monitoring stations were collected on March 19th and the on-site air monitoring samples were collected on March 20th. Collections continued as routinely scheduled.

None of the air monitoring samples showed detectable concentrations of radioactive material associated with the release. The results for the air sampling program are presented on Table 6-5 through 6-9 of the 1991 Radiological Environmental Operating Report.

c. Direct Radiation

Thermoluminescent Dosimeters (TLDs) are used to measure direct radiation (gamma dose) in the environment. TLDs are located on-site and at the site boundary. Additional TLDs are located off-site. The badges were collected during the last week of March and sent to a contractor lab for processing. The results for the first quarter TLD badges showed no significant increase in radiation exposure beyond the site boundary. The TLD results for 1991 in general are consistent with previous years. A detailed description of TLD monitoring programs can be found in Section 3.0 of the 1991 Radiological Environmental Operating Report. Specific results for the 1991 TLD program can be found in Table 6-10 also in the same report.

4.3 JAF Site Environs

a. Parking Lot/Site Drainage

Samples were taken from the site outfall of the two main drainage ditches. These drainage ditches receive most of the storm run-off at the site. These samples were collected to evaluate the presence of radioactive material in the storm water run-off from the site.

The analytical results for the samples collected from the site drainage ditches verified that radioactive material was not contained in the run-off from the site. Results for these samples are included in this report in Table 2.

b. Radiation Instrument Surveys

Radiation instrument surveys were performed within the exclusion area of the site. The exclusion areas of the site are outside the protected (security) area and are accessible to the general public on a limited basis. The portion of the FitzPatrick site included in the assessment was encompassed by the Lake

Ontario shore line on the north, Lake Road on the south, the Niagara Mohawk/NYPA property line on the west and the Training Building access road on the east. Surveys were made along every 200 ft. of road frontage. Surveys were also taken within each 200 ft. x 200 ft. section of paved parking lot area.

The survey results for the exclusion area showed that no measurable levels of radiation above background were detected outside the protected (security) area of the site. Results for these surveys are not included in this report.

5.0 DOSE EVALUATION

Dose calculations were performed using the estimated release activity of 5.15 E-2 Ci. A computer dispersion model was used to determine the dilution factors for the exposure pathways of interest. The calculations included spacial and temporal averages representing continuous exposure over a three month period and the corresponding mean water concentrations. The primary dose analysis was based on the plants Off-Site Dose Calculation Manual (ODCM) methodology. The environmental pathways of interest were the drinking water pathway and the fish consumption pathway. The potential exposure to the maximally-exposed individual as a result of the release of material to the lake, was calculated to be as follows:

Pathway	Age Group	Organ	Radiation Exposure (mrem)
Drinking Water	Child Infant	Total Body Liver	0.0014 0.0026
Fish Consumption	Adult Teen	Total Body Liver	0.057 0.12

TABLE REFERENCE: MEMORANDUM, RCC-91-007, GCR-91-044, ASSESSMENT OF THE RADIOLOGICAL CONSEQUENCES OF THE MARCH 18, 1991 RELEASE OF RADIOACTIVE LIQUID TO LAKE ONTARIO, DATED JUNE 27, 1991

It is obvious by the magnitude of the dose to man that the radiological impact of the release to the lake is insignificant. The sampling and analysis of environmental samples of lake water, drinking water supply and fish population further demonstrates the lack of dose to man from the release and support the validity of the calculations. It can be seen from the calculation and supporting environmental pathway sample results that the doses are well below the regulatory guidelines and limits and are only a small fraction of the annual dose to man resulting from natural background radiation.

6.0 CONCLUSION

The environmental assessment of the radiological release on March 18, 1991, was implemented to determine the impact of the event on the environment and the resulting dose to man. An evaluation of the results indicates that there was no significant impact to the off-site environment. The radiological surveys show that there was no wide spread contamination. The majority of the radioactive material which was released from the plant was confined to the area adjacent to the building structures. The release of radioactive material to Lake Ontario was the major impact to the local environment. The resulting dose to man from this release is calculated to be 0.057 mrem to the whole body (adult) and 0.12 mrem to the liver (teen). These calculated doses are very small and of little significance when compared to the annual whole body dose rate of approximately 60 mrem per year from natural background radiation.

7.0 FIGURES AND TABLES

7.1 Table 1 - Sample Collection Summary Table

This Table lists the types of samples that were collected as part of the Environmental Assessment Plan. Also listed are the number of samples collected and the map location number as illustrated on Figure 1.

7.2 Table 2

Table 2 contains the analytical results for the off-site samples collected as part of the REAP implementation.

7.3 Figure 1 - Sample Location Map

This map illustrates the locations of the off-site samples including; bottom sediment, water, shoreline sediment and air monitoring stations. Samples collected within the site boundary are not noted on the map due to the scale. Maps illustrating the locations of the on-site air monitoring stations and the TLD locations can be found in Section 3.3 of the Radiological Environmental Operating Report.

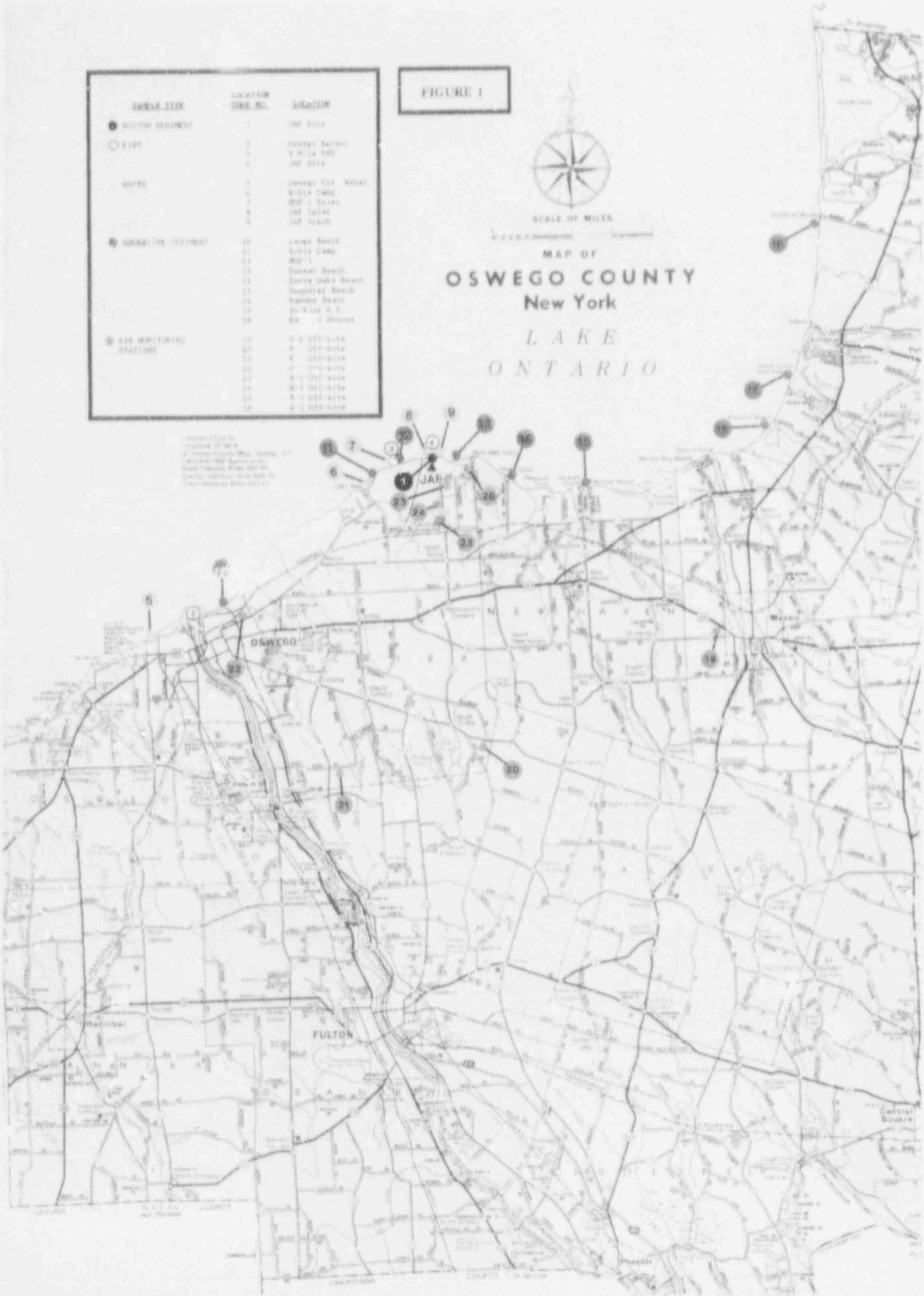


FIGURE 1
SAMPLE TYPE
LOCATION CODE NO.
LOCATION
SCALE OF MILES
MAP OF
OSWEGO COUNTY
New York
LAKE
ONTARIO
JAF
OSWEGO
FULTON

TABLE 1

ENVIRONMENTAL SAMPLE SUMMARY

FROM: March 18, 1991 TO: May 15, 1991

SAMPLE TYPE	SAMPLE DESCRIPTION	MAP NUMBER*	NUMBER OF SAMPLES
Water (Off-site)	JAF Inlet Canal Samples	8	16
	JAF Discharge Canal Daily Composite	8	15
	City Water Samples	5	37
	NMP 1 Inlet Canal Samples	7	16
	Shoreline Grab Samples	6	4
	Site Drainage Samples	NS	24
			TOTAL: 112
Fish (Off-site)	JAF Quadrant	4	25
	NMP Quadrant	3	18
	Oswego Harbor Quadrant	2	2
			TOTAL: 45
Shoreline Sediment	Langs Beach	10	4
	Bible Camp	11	4
	NMP-1 Shoreline	12	4
	Sunset Beach	13	3
	Shore Oaks Drive Beach	14	4
	Dempster Beach	15	4
	Ramona Beach	16	4
	Slekirk Shores Beach	17	4
	Rainbow Shores Beach	18	4
			TOTAL: 35
Bottom Sediment	JAF Quadrant	1	TOTAL: 4
Air Samples	JAF Air Monitoring Stations: On-site	NS	TOTAL: 36
	Off-site	19-26	TOTAL: 54

NS - Not Specified
* - Figure 1

TABLE 2

CONCENTRATIONS OF GAMMA EMITTERS IN JAF INLET CANAL WATER SAMPLES

RESULTS IN UNITS OF µCi/ML ± 1 SIGMA

ISOTOPE	DATE: 03/20/91 LOCATION: JAF Inlet Canal (04k)	DATE: 03/21/91 LOCATION: JAF Inlet Canal (04k)	DATE: 03/22/91 LOCATION: JAF Inlet Canal (04k)	DATE: 03/23/91 LOCATION: JAF Inlet Canal (04k)	DATE: 03/24/91 LOCATION: JAF Inlet Canal (04k)
Cr-51	<6.62E-8	<8.73E-8	<7.65E-8	<6.07E-8	<5.41E-8
Cs-134	<9.08E-9	<1.64E-8	<1.17E-8	<1.07E-8	<1.43E-8
Cs-137	<7.10E-9	<1.12E-8	<1.03E-8	<1.01E-8	<1.01E-8
Co-58	<9.21E-9	<1.15E-8	<8.24E-9	<9.12E-9	<9.11E-9
Mn-54	<7.87E-9	<1.02E-8	<1.07E-8	<1.08E-8	<1.12E-8
Fe-59	<1.49E-8	<2.82E-8	<1.90E-8	<1.42E-8	<1.76E-8
Zn-65	<1.65E-8	<3.34E-8	<3.80E-8	<3.00E-8	<3.00E-8
Co-60	<6.69E-9	<1.76E-8	<1.76E-8	<1.26E-8	<1.15E-8

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN JAF INLET CANAL WATER SAMPLES

RESULTS IN UNITS OF µCi/ML ± 1 SIGMA

ISOTOPE	DATE: 03/25/91 LOCATION: JAF Inlet Canal (04k)	DATE: 03/26/91 LOCATION: JAF Inlet Canal (04k)	DATE: 03/27/91 LOCATION: JAF Inlet Canal (04k)	DATE: 03/28/91 LOCATION: JAF Inlet Canal (04k)	DATE: 03/29/91 LOCATION: JAF Inlet Canal (04k)
Cr-51	<9.81E-8	<6.89E-8	<7.97E-8	<6.43E-8	<1.07E-7
Cs-134	<1.56E-8	<7.57E-9	<1.37E-8	<8.16E-9	<1.73E-8
Cs-137	<1.51E-8	<8.23E-9	<1.19E-8	<9.20E-9	<1.40E-8
Co-58	<1.58E-8	<7.76E-9	<1.10E-8	<7.45E-9	<1.39E-8
Mn-54	<1.11E-8	<6.86E-9	<1.02E-8	<6.86E-9	<1.35E-8
Fe-59	<3.40E-8	<1.57E-8	<2.25E-8	<1.36E-8	<3.58E-8
Zn-65	<4.21E-8	<1.53E-8	<3.17E-8	<1.76E-8	<3.61E-8
Co-60	<2.37E-8	<1.32E-8	<1.23E-8	<8.87E-8	<1.86E-8

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN JAF INLET CANAL WATER SAMPLES

RESULTS IN UNITS OF µCi/ML ± 1 SIGMA

ISOTOPE	DATE: 03/30/91 LOCATION: JAF Inlet Canal (04k)	DATE: 03/31/91 LOCATION: JAF Inlet Canal (04k)	DATE: 04/03/91 LOCATION: JAF Inlet Canal (04k)	DATE: 04/10/91 LOCATION: JAF Inlet Canal (04k)	DATE: 04/17/91 LOCATION: JAF Inlet Canal (04k)
Cr-51	<1.09E-7	<6.81E-8	<[illegible]3E-8	<9.37E-8	<6.55E-8
Cs-134	<1.73E-8	<1.06E-8	<9.68E-9	<1.14E-8	<1.03E-8
Cs-137	<1.40E-8	<8.64E-9	<7.95E-9	<1.30E-8	<7.40E-9
Co-58	<1.39E-8	<9.36E-9	<7.75E-9	<1.00E-8	<9.84E-9
Mn-54	<1.19E-8	<9.59E-9	<7.86E-9	<1.21E-8	<6.33E-9
Fe-59	<3.40E-8	<1.61E-8	<1.83E-8	<1.90E-8	<1.97E-8
Zn-65	<3.82E-8	<2.23E-8	<2.06E-8	<3.50E-8	<2.66E-8
Co-60	<1.08E-8	<1.02E-8	<8.86E-9	<1.52E-8	<7.18E-9

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN JAF INLET CANAL WATER SAMPLES

RESULTS IN UNITS OF µCi/ML ± 1 SIGMA

ISOTOPE	DATE: 04/25/91 LOCATION: JAF Inlet Canal (04k)	(BLANK)	(BLANK)	(BLANK)	(BLANK)
Cr-51	<6.67E-8				
Cs-134	<9.62E-9				
Cs-137	<9.08E-9				
Co-58	<8.65E-9				
Mn-54	<5.93E-9				
Fe-59	<1.73E-8				
Zn-65	<1.75E-8				
Co-60	<1.02E-8				

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN JAF DISCHARGE CANAL DAILY COMPOSITE WATER SAMPLES

RESULTS IN UNITS OF µCi/ML ± 1 SIGMA

ISOTOPE	DATE: 03/21/91 LOCATION: JAF Disch. Canal Comp. (05g)	DATE: 03/22/91 LOCATION: JAF Disch. Canal Comp.(05g)	DATE: 03/24/91 LOCATION: JAF Disch. Canal Comp.(05g)	DATE: 03/27/91 LOCATION: JAF Disch. Canal Comp.(05g)	DATE: 03/27/91 LOCATION: JAF Disch. Canal Comp.(05g)
Cr-51	<5.85E-8	<1.11E-7	<6.36E-8	<6.87E-8	<6.52E-8
Cs-134	<1.13E-8	<1.37E-8	<1.07E-8	<1.11E-8	<1.30E-8
Cs-137	<8.41E-9	<1.35E-8	<8.56E-9	<8.41E-9	<7.68E-9
Co-58	<7.88E-9	<1.70E-8	<9.19E-9	<8.93E-9	<6.51E-9
Mn-54	<9.06E-9	<1.20E-8	<8.62E-9	<8.55E-9	<1.09E-8
Fe-59	<1.57E-8	<3.05E-8	<1.44E-8	<1.92E-8	<2.18E-8
Zn-65	<2.30E-8	<3.83E-8	<1.60E-8	<1.95E-8	<2.42E-8
Co-60	<1.02E-8	<2.05E-8	<1.02E-8	<1.02E-8	<1.15E-8

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS
IN JAF DISCHARGE CANAL DAILY COMPOSITE WATER SAMPLES

RESULTS IN UNITS OF µCi/ML ± 1 SIGMA

ISOTOPE	DATE: 03/29/91 LOCATION: JAF Disch. Canal Comp. (05g)	DATE: 03/31/91 LOCATION: JAF Disch. Canal Comp.(05g)	DATE: 04/02/91 LOCATION: JAF Disch. Canal Comp.(05g)	DATE: 04/08/91 LOCATION: JAF Disch. Canal Comp.(05g)	DATE: 04/09/91 LOCATION: JAF Disch. Canal Comp.(05g)
Cr-51	<5.88E-8	<8.28E-8	<1.37E-7	<6.74E-8	<9.36E-8
Cs-134	<8.44E-9	<1.44E-8	<1.54E-8	<9.30E-9	<1.46E-8
Cs-137	<8.73E-9	<1.07E-8	<1.66E-8	<1.05E-8	<1.07E-8
Co-58	<6.05E-9	<8.97E-9	<1.58E-8	<8.98E-9	<1.29E-8
Mn-54	<8.19E-9	<1.22E-82	<1.46E-8	<7.99E-9	<1.26E-8
Fe-59	<1.69E-8	<2.44E-8	<2.76E-8	<1.76E-8	<3.09E-8
Zn-65	<1.87E-8	<2.36E-8	<4.37E-8	<1.95E-8	<3.35E-8
Co-60	<1.13E-8	<1.97E-8	<2.22E-8	<1.24E-8	<8.06E-9

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN CITY WATER SAMPLES

RESULTS IN UNITS OF μCi/ML ± 1 SIGMA

ISOTOPE	DATE: 03/22/91 LOCATION: Oswego City Water Treated (Z1c)	DATE: 03/22/91 LOCATION: Oswego City Water Raw (Z1b)	DATE: 03/23/91 LOCATION: JAF STP City Water Tap (Q7m)	DATE: 03/23/91 LOCATION: Oswego City Water Raw (Z1b)	DATE: 03/23/91 LOCATION: Oswego City Water Treated (Z1C)
Cr-51	<6.32E-8	<9.31E-8	<6.74E-8	<1.08E-7	<6.47E-8
Cs-134	<7.80E-9	<1.39E-8	<1.24E-8	<1.56E-8	<9.45E-9
Cs-137	<7.92E-9	<9.36E-9	<1.07E-8	<1.23E-8	<9.19E-9
Co-58	<6.59E-9	<1.46E-8	<8.68E-9	<1.74E-8	<7.13E-9
Mn-54	<6.33E-9	<1.02E-8	<1.29E-8	<1.55E-8	<8.17E-9
Fe-59	<1.62E-8	<2.09E-8	<1.91E-8	<2.27E-8	<1.76E-8
Zn-65	<1.75E-8	<3.65E-8	<2.55E-8	<3.61E-8	<1.39E-8
Co-60	<1.02E-8	<1.23E-8	<1.37E-8	<2.77E-8	<1.13E-8

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN CITY WATER SAMPLES

RESULTS IN UNITS OF µCi/ML ± 1 SIGMA

ISOTOPE	DATE: 03/24/91 LOCATION: JAF STP City Water Tap (Q7m)	DATE: 03/24/91 LOCATION: Oswego City Water Raw (Z1b)	DATE: 03/24/91 LOCATION: Oswego City Water Treated (Z1c)	DATE: 03/25/91 LOCATION: JAF STP City Water Tap (Q7m)	DATE: 03/25/91 LOCATION: Oswego City Water Treated (Z1c)
Cr-51	<6.90E-8	<8.41E-8	<6.81E-8	<6.14E-8	<6.42E-8
Cs-134	<8.99E-9	<1.52E-8	<1.13E-8	<9.45E-9	<8.99E-9
Cs-137	<9.89E-9	<1.19E-8	<9.08E-9	<8.17E-9	<7.40E-9
Co-58	<6.93E-9	<1.11E-8	<8.14E-9	<9.40E-9	<7.27E-9
Mn-54	<8.80E-9	<9.64E-9	<9.05E-9	<7.37E-9	<8.80E-9
Fe-59	<1.65E-8	<1.91E-8	<1.35E-8	<1.90E-8	<1.56E-8
Zn-65	<2.13E-8	<2.09E-8	<2.37E-8	<2.04E-8	<2.30E-8
Co-60	<9.56E-9	<1.05E-8	<7.18E-9	<9.56E-9	<7.18E-9

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN CITY WATER SAMPLES

RESULTS IN UNITS OF µCi/ML ± 1 SIGMA

ISOTOPE	DATE: 03/25/91 LOCATION: Oswego City Water Raw (Z1b)	DATE: 03/26/91 LOCATION: Oswego City Water Raw (Z1b)	DATE: 03/26/91 LOCATION: JAF STP City Water Tap (Q7m)	DATE: 03/26/91 LOCATION: Oswego City Water Treated (Z1c)	DATE: 03/27/91 LOCATION: JAF STP City Water Tap (Q7m)
Cr-51	<7.70E-8	<9.06E-8	<5.87E-8	<6.46E-8	<7.07E-8
Cs-134	<1.25E-8	<1.08E-8	<1.02E-8	<1.04E-8	<1.07E-8
Cs-137	<1.19E-8	<1.23E-8	<1.07E-8	<9.08E-9	<1.14E-8
Co-58	<1.11E-8	<1.15E-8	<9.11E-9	<9.17E-9	<9.95E-9
Mn-54	<1.17E-8	<1.30E-8	<7.24E-9	<9.30E-9	<9.75E-9
Fe-59	<1.91E-8	<2.26E-8	<1.76E-8	<1.74E-8	<1.60E-8
Zn-65	<3.17E-8	<3.17E-8	<2.79E-8	<2.04E-8	<1.80E-8
Co-60	<1.23E-8	<1.23E-8	<1.55E-8	<1.02E-8	<1.37E-8

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN CITY WATER SAMPLES

RESULTS IN UNITS OF μCi/ML ± 1 SIGMA

ISOTOPE	DATE: 03/27/91 LOCATION: Oswego City Water Treated (Z1c)	DATE: 03/27/91 LOCATION: Oswego City Water Raw (Z1b)	DATE: 03/27/91 LOCATION: JAF STP City Water Tap (Q7m)	DATE: 03/28/91 LOCATION: Oswego City Water Treated (Z1c)	DATE: 03/28/91 LOCATION: Oswego City Water Raw (Z1b)
Cr-51	<1.01E-7	<6.90E-8	<1.16E-7	<8.35E-8	<6.92E-8
Cs-134	<2.92E-8	<1.28E-8	<1.63E-8	<1.42E-8	<1.03E-8
Cs-137	<1.58E-8	<9.70E-8	<1.61E-8	<1.12E-8	<7.40E-9
Co-58	<1.55E-8	<1.04E-8	<1.40E-8	<1.24E-8	<9.66E-9
Mn-54	<1.26E-8	<8.56E-9	<1.35E-8	<1.12E-8	<7.68E-9
Fe-59	<3.10E-8	<1.94E-8	<3.05E-8	<2.10E-8	<1.57E-8
Zn-65	<5.43E-8	<3.15E-8	<3.39E-8	<2.59E-8	<2.37E-8
Co-60	<1.52E-8	<8.85E-9	<2.37E-8	<1.23E-8	<8.85E-9

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN CITY WATER SAMPLES

RESULTS IN UNITS OF μCi/ML ± 1 SIGMA

ISOTOPE	DATE: 03/29/91 LOCATION: JAF STP City Water Tap (Q7m)	DATE: 03/29/91 LOCATION: Oswego City Water Raw (Z1b)	DATE: 03/29/91 LOCATION: Oswego City Water Treated (Z1c)	DATE: 03/30/91 LOCATION: JAF STP City Water Tap (Q7m)	DATE: 04/03/91 LOCATION: Oswego City Water Raw (Z1b)
Cr-51	<6.13E-8	<9.57E-7	<5.45E-8	<5.88E-8	<9.21E-8
Cs-134	<1.05E-8	<1.12E-8	<8.16E-9	<9.21E-9	<1.29E-8
Cs-137	<9.72E-9	<1.04E-8	<6.79E-9	<8.96E-9	<1.51E-8
Co-58	<9.54E-9	<8.67E-9	<7.13E-9	<1.18E-8	<1.53E-8
Mn-54	<1.08E-8	<1.03E-8	<1.09E-8	<1.33E-8	<1.28E-8
Fe-59	<1.75E-8	<2.04E-8	<1.76E-8	<1.21E-8	<2.30E-8
Zn-65	<2.67E-8	<1.59E-8	<1.87E-8	<2.55E-8	<3.14E-8
Co-60	<1.26E-8	<1.26E-8	<1.05E-8	<1.37E-8	<2.21E-8

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN CITY WATER SAMPLES

RESULTS IN UNITS OF µCi/ML ± 1 SIGMA

ISOTOPE	DATE: 04/03/91 LOCATION: Oswego City Water Treated (Z1c)	DATE: 04/11/91 LOCATION: Oswego City Water Raw (Z1b)	DATE: 04/11/91 LOCATION: Oswego City Water Treated (Z1c)	DATE: 04/17/91 LOCATION: Oswego City Water Treated (Z1c)	DATE: 04/17/91 LOCATION: Oswego City Water Raw (Z1b)
Cr-51	<6.31E-8	<6.18E-8	<1.00E-7	<6.08E-8	<8.37E-8
Cs-134	<1.16E-8	<9.49E-9	<1.60E-8	<9.31E-9	<1.48E-8
Cs-137	<9.72E-9	<1.07E-8	<1.70E-8	<8.17E-9	<8.30E-9
Co-58	<9.65E-9	<4.95E-9	<1.53E-8	<9.94E-9	<1.06E-8
Mn-54	<1.13E-8	<1.13E-8	<1.72E-8	<7.38E-9	<1.12E-8
Fe-59	<2.07E-8	<1.62E-8	<3.04E-8	<1.67E-8	<2.58E-8
Zn-65	<2.43E-8	<1.98E-8	<2.17E-8	<2.22E-8	<3.81E-8
Co-60	<1.37E-8	<1.15E-8	<1.65E-8	<1.02E-8	<1.76E-8

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN CITY WATER SAMPLES

RESULTS IN UNITS OF µCi/ml ± 1 SIGMA

ISOTOPE	DATE: 04/24/91 LOCATION: Oswego City Water Raw (Z1b)	DATE: 04/24/91 LOCATION: Oswego City Water Treated (Z1c)	(BLANK)	(BLANK)	(BLANK)
Cr-51	<5.82E-8	<1.12E-7			
Cs-134	<8.01E-9	<1.41E-8			
Cs-137	<7.95E-9	<1.46E-8			
Co-58	<8.34E-9	<1.57E-8			
Mn-54	<6.07E-9	<1.66E-8			
Fe-59	<1.10E-8	<3.00E-8			
Zn-65	<1.76E-8	<3.82E-8			
Co-60	<7.87E-9	<2.05E-8			

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN NMP-1 INLET CANAL WATER SAMPLES

RESULTS IN UNITS OF µCi/ML ± 1 SIGMA

ISOTOPE	DATE: 03/20/91 LOCATION: NMP1 Inlet Canal (Z1a)	DATE: 03/21/91 LOCATION: NMP1 Inlet Canal (Z1a)	DATE: 03/22/91 LOCATION: NMP1 Inlet Canal (Z1a)	DATE: 03/23/91 LOCATION: NMP1 Inlet Canal (Z1a)	DATE: 03/24/91 LOCATION: NMP1 Inlet Canal (Z1a)
Cr-51	<6.14E-8	<1.11E-7	<6.48E-8	<9.68E-8	<9.43E-8
Cs-134	<1.26E-8	<1.63E-8	<1.03E-8	<1.42E-8	<1.02E-8
Cs-137	<1.19E-8	<1.56E-8	<9.35E-9	<1.07E-8	<1.16E-8
Co-58	<1.08E-8	<1.18E-8	<1.01E-8	<1.16E-8	<1.11E-8
Mn-54	<9.22E-9	<1.48E-8	<1.21E-8	<1.17E-8	<1.22E-8
Fe-59	<2.07E-8	<2.28E-8	<1.79E-8	<2.58E-8	<2.28E-8
Zn-65	<1.98E-8	<4.03E-8	<2.56E-8	<2.80E-8	<3.51E-8
Co-60	<1.15E-8	<2.51E-8	<1.15E-8	<1.52E-8	<1.65E-8

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN NMP-1 INLET CANAL WATER SAMPLES

RESULTS IN UNITS OF µCi/ML ± 1 SIGMA

ISOTOPE	DATE: 03/25/91 LOCATION: NMP1 Inlet Canal (Z1a)	DATE: 03/26/91 LOCATION: NMP1 Inlet Canal (Z1a)	DATE: 03/28/91 LOCATION: NMP1 Inlet Canal (Z1a)	DATE: 03/29/91 LOCATION: NMP1 Inlet Canal (Z1a)	DATE: 03/29/91 LOCATION: NMP1 Inlet Canal (Z1a)
Cr-51	<8.91E-8	<6.63E-8	<8.05E-8	<9.72E-8	<1.17E-7
Cs-134	<1.28E-8	<1.03E-8	<1.28E-8	<1.30E-8	<1.76E-8
Cs-137	<1.03E-8	<9.29E-9	<1.16E-8	<1.16E-8	<1.16E-8
Co-58	<1.36E-8	<9.63E-9	<1.11E-8	<1.16E-8	<1.12E-8
Mn-54	<6.84E-9	<8.53E-9	<9.05E-9	<1.22E-8	<1.49E-8
Fe-59	<2.94E-8	<1.65E-8	<1.91E-8	<1.93E-8	<2.01E-8
Zn-65	<2.36E-8	<1.85E-8	<3.00E-8	<2.60E-8	<2.56E-8
Co-60	<1.65E-8	<1.34E-8	<1.39E-8	<1.76E-8	<1.86E-8

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN NMP-1 INLET CANAL WATER SAMPLES

RESULTS IN UNITS OF μCi/ML ± 1 S

ISOTOPE	DATE: 03/30/91 LOCATION: NMP1 Inlet Canal (Z1a)	DATE: 03/31/91 LOCATION: NMP1 Inlet Canal (Z1c)	DATE: 04/01/91 LOCATION: NMP1 Inlet Canal (Z1a)	DATE: 04/08/91 LOCATION: NMP1 Inlet Canal (Z1a)	DATE: 04/15/91 LOCATION: NMP1 Inlet Canal (Z1a)
Cr-51	<6.11E-8	<6.20E-8	<6.75E-8	<1.08E-7	<6.51E-8
Cs-134	<1.45E-8	<1.00E-8	<1.28E-8	<1.52E-8	<9.33E-9
Cs-137	<1.11E-8	<9.29E-9	<9.72E-9	<1.40E-8	<8.23E-9
Co-58	<9.[illegible]E-9	<9.24E-9	<7.11E-9	<1.79E-8	<7.77E-9
Mn-54	<9.24E-9	<9.32E-9	<1.25E-8	<1.48E-8	<9.78E-9
Fe-59	<1.96E-8	<1.76E-8	<1.61E-8	<1.50E-8	<1.67E-8
Zn-65	<3.22E-8	<1.86E-8	<2.28E-8	<3.61E-8	<1.97E-8
Co-60	<1.47E-8	<8.07E-9	<1.26E-8	<2.05E-8	<1.19E-8

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN NMP-1 INLET CANAL WATER SAMPLES

RESULTS IN UNITS OF µCi/ML ± 1 SIGMA

ISOTOPE	DATE: 04/22/91 LOCATION: NMP1 Inlet Canal (Zla)	(BLANK)	(BLANK)	(BLANK)	(BLANK)
Cr-51	<7.14E-8				
Cs-134	<1.03E-8				
Cs-137	<1.05E-8				
Co-58	<9.16E-9				
Mn-54	<7.37E-9				
Fe-59	<1.35E-8				
Zn-65	<2.21E-8				
Co-60	<8.85E-9				

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN SHORELINE LAKE WATER SAMPLES

RESULTS IN UNITS OF µCi/ML ± 1 SIGMA

ISOTOPE	DATE: 03/19/91 LOCATION: Lake Water Sunset Bay (Z1m)	DATE: 03/19/91 LOCATION: Lake Water Bible Camp (Z1f)	DATE: 03/20/91 LOCATION: Lake Water SUNY Oswego (Z1o)	DATE: 03/21/91 LOCATION: Lake Water SUNY Oswego (Z1o)	(BLANK)
Cr-51	<5.89E-8	<8.51E-8	[illegible]20E-8	<6.32E-8	
Cs-134	<8.70E-9	<1.57E-8	<1.16E-8	<1.20E-8	
Cs-137	<7.95E-9	<1.33E-8	<1.07E-8	<9.72E-9	
Co-[illegible]	<6.02E-8	<1.16E-8	<8.74E-9	<1.07E-8	
Mn-54	<7.87E-9	<1.22E-8	<1.03E-9	<1.17E-8	
Fe-59	<1.67E-8	<2.71E-8	<2.18E-8	<2.38E-8	
Zn-65	<1.76E-8	<3.18E-8	<2.90E-8	<2.90E-8	
Co-60	<1.05E-8	<1.65E-8	<1.37E-8	<1.02E-8	

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN SITE DRAINAGE WATER SAMPLES

RESULTS IN UNITS OF µCi/ML ± 1 SIGMA

ISOTOPE	DATE: 03/24/91 LOCATION: JAF West Boundary Drain (H1m)	DATE: 03/24/91 LOCATION: JAF East Drainage Ditch (K8p)	DATE: 03/24/91 LOCATION: JAF East Drainage Ditch (Q8n)	DATE: 03/25/91 LOCATION: JAF East Drainage Ditch (Q8n)	DATE: 03/25/91 LOCATION: JAF West Boundary Drain (H1m)
Cr-51	<5.85E-8	<6.79E-8	<7.25E-8	<6.98E-8	<8.59E-8
Cs-134	<1.09E-8	<2.02E-8	<1.59E-8	<1.50E-8	<1.64E-8
Cs-137	<8.73E-9	<1.01E-8	<8.41E-9	<7.67E-9	<1.19E-8
Co-58	<9.16E-9	<9.96E-9	<9.63E-9	<7.86E-9	<1.28E-8
Mn-54	<9.53E-9	<9.20E-9	<7.37E-9	<8.26E-9	<1.26E-8
Fe-59	<1.84E-8	<1.90E-8	<1.65E-8	<1.82E-8	<2.41E-8
Zn-65	<2.87E-8	<2.90E-8	<3.25E-8	<3.25E-8	<4.33E-8
Co-60	<7.87E-9	<1.37E-8	<1.02E-8	<1.14E-8	<1.65E-8

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN SITE DRAINAGE WATER SAMPLES

RESULTS IN UNITS OF µCi/ML ± 1 SIGMA

ISOTOPE	DATE: 03/25/91 LOCATION: JAF East Drainage Ditch (K8p)	DATE: 03/29/91 LOCATION: JAF West Boundary Drain (H1m)	DATE: 03/29/91 LOCATION: JAF East Drainage Ditch (K8p)	DATE: 03/29/91 LOCATION: JAF East Drainage Ditch (Q8n)	DATE: 03/30/91 LOCATION: JAF East Drainage Ditch (Q8n)
Cr-51	<7.16E-8	<5.96E-8	<6.35E-8	<1.19E-7	<7.64E-8
Cs-134	<1.42E-8	<1.83E-8	<1.41E-8	<2.50E-8	<1.17E-8
Cs-137	<8.73E-9	<1.04E-8	<8.48E-9	<1.40E-8	<1.01E-8
Co-58	<8.06E-9	<1.18E-8	<1.01E-8	<1.46E-8	<9.65E-9
Mn-54	<6.49E-9	<1.12E-8	<9.53E-9	<1.42E-8	<6.86E-9
Fe-59	<1.91E-8	<2.48E-8	<1.99E-8	<3.00E-8	<1.84E-8
Zn-65	<3.33E-8	<3.39E-8	<3.33E-8	<4.21E-8	<3.22E-8
Co-60	<1.13E-8	<1.46E-8	<1.32E-8	<2.50E-8	<1.19E-8

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN SITE DRAINAGE WATER SAMPLES

RESULTS IN UNITS OF µCi/ML ± 1 SIGMA

ISOTOPE	DATE: 03/30/91 LOCATION: JAF West Boundary Ditch (H1m)	DATE: 03/30/91 LOCATION: JAF East Drainage Ditch (K8p)	DATE: 04/01/91 LOCATION: JAF East Drainage Ditch (K8p)	DATE: 04/01/91 LOCATION: JAF East Drainage Ditch (Q8n)	DATE: 04/01/91 LOCATION: JAF West Boundary Drain (H1m)
Cr-51	<6.07E-8	<8.95E-8	<7.37E-8	<9.73E-8	<8.13E-8
Cs-134	<1.32E-8	<2.44E-8	<1.55E-8	<2.51E-8	<1.79E-8
Cs-137	<7.92E-9	<1.03E-8	<1.10E-8	<1.35E-8	<1.49E-8
Co-58	<7.85E-9	<1.43E-8	<9.66E-9	<1.46E-8	<1.32E-8
Mn-54	<8.26E-9	<1.26E-8	<8.17E-9	<1.27E-8	<9.65E-9
Fe-59	<1.65E-8	<2.25E-8	<1.92E-8	<3.22E-8	<2.82E-8
Zn-65	<2.29E-8	<5.11E-8	<3.82E-8	<4.40E-8	<3.80E-8
Co-60	<1.02E-8	<1.05E-8	<1.26E-8	<2.37E-8	<1.39E-8

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN SITE DRAINAGE WATER SAMPLES

RESULTS IN UNITS OF µCi/ML ± 1 SIGMA

ISOTOPE	DATE: 04/08/91 LOCATION: JAF East Drainage Ditch (K8p)	DATE: 04/08/91 LOCATION: JAF East Drainage Ditch (Q8n)	DATE: 04/08/91 LOCATION: JAF East Boundary Drain (H1m)	DATE: 04/15/91 LOCATION: JAF East Drainage Ditch (K8p)	DATE: 04/15/91 LOCATION: JAF East Drainage Ditch (Q8n)
Cr-51	<9.47E-8	<6.55E-8	<6.38E-8	<1.09E-7	<1.10E-7
Cs-134	<2.77E-8	<1.63E-8	<1.89E-8	<3.61E-8	<2.57E-8
Cs-137	<1.16E-8	<1.03E-8	<1.28E-8	<1.91E-8	<1.70E-8
Co-58	<1.43E-8	<8.40E-9	<1.03E-8	<1.32E-8	<1.33E-8
Mn-54	<1.42E-8	<9.30E-9	<9.75E-9	<1.82E-9	<1.35E-8
Fe-59	<2.81E-8	<1.74E-8	<2.27E-8	<3.58E-8	<2.82E-8
Zn-65	<4.20E-8	<3.41E-8	<2.90E-8	<6.13E-8	<5.35E-8
Co-60	<1.87E-8	<1.08E-8	<1.37E-8	<2.37E-8	<2.37E-8

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN SITE DRAINAGE DITCH SAMPLES

RESULTS IN UNITS OF µCi/ML ± 1 SIGMA

ISOTOPE	DATE: 04/15/91 LOCATION: JAF West Boundary Drain (H1m)	DATE: 05/15/91 LOCATION: JAF East Drainage Ditch (K8p)	DATE: 05/15/91 LOCATION: JAF East Drainage Ditch (Q8n)	DATE: 05/15/91 LOCATION: JAF West Boundary Drain (H1m)	(BLANK)
Cr-51	<6.60E-8	<6.57E-8	<1.07E-7	<9.34E-8	
Cs-134	<1.54E-8	<2.51E-8	<1.55E-8	<1.50E-8	
Cs-137	<1.28E-8	<1.24E-8	<1.31E-8	<1.59E-8	
Co-58	<1.00E-8	<1.22E-8	<1.47E-8	<1.41E-8	
Mn-54	<1.13E-8	<1.13E-8	<1.85E-8	<1.50E-8	
Fe-59	<2.06E-8	<2.07E-8	<2.28E-8	<3.04E-8	
Zn-65	<2.68E-8	<4.61E-8	<3.65E-8	<4.79E-8	
Co-60	<1.15E-8	<1.17E-8	<1.67E-8	<1.42E-8	

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN FISH

RESULTS IN UNITS OF pCi/GM ± 1 SIGMA

ISOTOPE	DATE: 03/20/91 LOCATION: JAF (04k) SPECIES: Lake Trout	DATE: 03/21/91 LOCATION: NMP1 (Z1a) SPECIES: Lake Trout	DATE: 03/21/91 LOCATION: Oswego Harbor (Z1[illegible]) SEPCIES: Alewives	DATE: 03/21/91 LOCATION: Oswego Harbor (Z1q) SPECIES: Lake Chubs	DATE: 03/21/91 LOCATION: JAF (Z1d) SPECIES: Alewives
Cr-51	<2.03E-1	<2.14E-1	<3.03E-1	<3.32E-1	<2.55E-1
Cs-134	<3.22E-2	<3.65E-2	<4.96E-2	<4.45E-2	<5.16E-2
Cs-137	3.03E-2±1.06E-2	<3.67E-2	<4.80E-2	<4.79E-2	<4.46E-2
Co-58	<3.09E-2	<3.93E-2	<4.55E-2	<4.13E-2	<4.06E-2
Mn-54	<3.14E-2	<3.44E-2	<4.64E-2	<4.86E-2	<4.43E-2
Fe-59	<7.05E-2	<6.17E-2	<1.18E-1	<9.70E-2	<7.59E-2
Zn-65	<7.59E-2	<8.33E-2	<1.24E-1	<1.20E-1	<1.36E-1
Co-60	<3.09E-2	<4.84E-2	<5.51E-2	<6.36E-2	<4.70E-2

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN FISH

RESULTS IN UNITS OF pCi/GM ± 1 SIGMA

ISOTOPE	DATE: 03/22/91 LOCATION: NMP1 (Zla) SPECIES: Smallmouth Bass	DATE: 03/23/91 LOCATION: NMP1 (Zla) SPECIES: White Perch	DATE: 03/24/91 LOCATION: NMP1 (Zla) SEPCIES:Yellow Perch	DATE: 03/24/91 LOCATION: NMP1 (Zla) SPECIES: Walleye	DATE: 03/25/91 LOCATION: NMP1 (Zla) SPECIES: Smallmouth Bass
Cr-51	<2.30E-1	<6.69E-1	<9.42E-1	<3.00E-1	<1.94E-1
Cs-134	<3.80E-2	<8.60E-2	<1.78E-1	<4.68E-2	<2.92E-2
Cs-137	3.17E-2±1.05E-2	<1.01E-1	<1.72E-1	<5.00E-2	2.29E-2±1.04E-2
Co-58	<3.35E-2	<9.89E-2	<1.60E-1	<5.16E-2	<2.47E-2
Mn-54	<3.31E-2	<1.04E-1	<1.66E-1	<3.95E-2	<3.18E-2
Fe-59	<6.87E-2	<1.86E-1	<2.58E-1	<1.07E-1	<6.02E-2
Zn-65	<9.13E-2	<2.80E-1	3.49E-1	<1.29E-1	<8.20E-2
Co-60	<3.57E-2	<1.52E-1	<1.92E-1	<6.26E-2	<3.83E-2

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN FISH

RESULTS IN UNITS OF pCi/GM ± 1 SIGMA

ISOTOPE	DATE: 03/26/91 LOCATION: JAF (Z1d) SPECIES: Lake Trout	DATE: 03/26/91 LOCATION: JAF (Z1d) SPECIES: Brown Trout	DATE: 03/26/91 LOCATION: NMP1 (Z1a) SEPCIES: Smallmouth Bass	DATE: 03/26/91 LOCATION: NMP2 (Z1p) SPECIES: Brown Trout	DATE: 03/27/91 LOCATION: JAF (Z1d) SPECIES: Brown Trout
Cr-51	<3.09E-1	<2.14E-1	<2.71E-1	<1.65E-1	<1.90E-1
Cs-134	<4.73E-2	<4.27E-2	<4.45E-2	<2.36E-2	<3.65E-2
Cs-137	<4.37E-2	3.11E-2±1.07E-2	<4.34E-2	1.63E-2±7.81E-3	2.25E-2±1.02E-2
Co-58	<5.05E-2	<3.90E-2	<3.80E-2	<2.50E-2	<3.15E-2
Mn-54	<5.19E-2	<4.20E-2	<3.50E-2	<2.41E-2	<3.70E-2
Fe-59	<1.03E-1	<8.15E-2	<9.56E-2	<6.05E-2	<6.97E-2
Zn-65	<1.36E-1	<9.00E-2	<1.02E-1	<5.03E-2	<8.76E-2
Co-60	<6.18E-2	<4.97E-2	<4.73E-2	<2.93E-2	<3.50E-2

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN FISH

RESULTS IN UNITS OF pCi/GM ± 1 SIGMA

ISOTOPE	DATE: 03/28/91 LOCATION: JAF (04k) SPECIES: Smallmouth Bass	DATE: 03/30/91 LOCATION: NMP1 (Z1a) SPECIES: Perch	DATE: 04/01/91 LOCATION: JAF (04k) SEPCIES: Lake Trout	DATE: 04/02/91 LOCATION: NMP1 (Z1a) SPECIES: White Perch	DATE: 04/02/91 LOCATION: NMP1 (Z1a) SPECIES: Smallmouth Bass
Cr-51	<3.46E-1	<4.89E-1	<1.97E-1	<7.35E-1	<3.77E-1
Cs-134	<5.45E-2	<9.97E-2	<2.58E-2	<1.24E-1	<5.72E-2
Cs-137	6.85E-2±1.86E-2	<8.73E-2	<2.64E-2	<1.12E-1	5.77E-2±2.24E-2
Co-58	<5.77E-2	<8.56E-2	<2.74E-2	<1.15E-1	<5.23E-2
Mn-54	<5.54E-2	<9.33E-2	<2.70E-2	<9.09E-2	<5.14E-2
Fe-59	<1.23E-1	<1.55E-1	<6.92E-2	<2.35E-1	<1.19E-1
Zn-65	<1.46E-1	<2.10E-1	<7.05E-2	<3.28E-1	<1.53E-1
Co-60	<6.29E-2	<9.31E-2	<4.12E-2	<1.38E-1	<6.46E-2

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN FISH

RESULTS IN UNITS OF pCi/GM ± 1 SIGMA

ISOTOPE	DATE: 04/04/91 LOCATION: JAF (04k) SPECIES: Lake Trout	DATE: 04/04/91 LOCATION: JAF (Z1d) SPECIES: Brown Trout	DATE: 04/04/91 LOCATION: JAF (Z1d) SEPCIES: Rainbow Trout	DATE: 04/05/91 LOCATION: JAF (Z1d) SPECIES: Chinook Salmon	DATE: 04/09/91 LOCATION: JAF (Z1d) SPECIES: Brown Trout
Cr-51	<1.93E-1	<2.02E-1	<2.48E-1	<2.23E-1	<2.49E-1
Cs-134	<3.09E-2	<4.19E-2	<4.07E-2	<3.22E-2	<3.82E-2
Cs-137	2.05E-2±8.35E-3	<3.39E-2	<4.21E-2	<3.14E-2	<3.44E-2
Co-58	<2.63E-2	<3.34E-2	<3.80E-2	<3.02E-2	<3.73E-2
Mn-54	<2.84E-2	<3.65E-2	<3.92E-2	<3.13E-2	<3.57E-2
Fe-59	<6.04E-2	<7.62E-2	<9.32E-2	<6.87E-2	<8.71E-2
Zn-65	<7.48E-2	<9.00E-2	<1.18E-1	<8.35E-2	<1.03E-1
Co-60	<3.40E-2	<4.27E-2	<5.27E-2	<3.78E-2	<4.83E-2

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN FISH

RESULTS IN UNITS OF pCi/GM ± 1 SIGMA

ISOTOPE	DATE: 04/09/91 LOCATION: JAF (Z1d) SPECIES: Lake Trout	DATE: 04/09/91 LOCATION: NMP1 (Z1a) SPECIES: White Perch	DATE: 04/10/91 LOCATION: NMP1 (Z1a) SEPCIES: White Perch	DATE: 04/10/91 LOCATION: NMP1 (Z1a) SPECIES: Rainbown Trout	DATE: 04/11/91 LOCATION: JAF (Z1d) SPECIES: White & Yellow Perch
Cr-51	<1.95E-1	<8.64E-1	<1.05E+0	<2.06E-1	<6.92E-7
Cs-134	<2.93E-2	<1.30E-1	<1.64E-1	<4.21E-2	<1.02E-7
Cs-137	2.61E-2±9.91E-3	<1.24E-1	7.49E-2±2.83E-2	<3.33E-2	<8.64E-8
Co-58	<2.80E-2	<1.09E-1	<1.73E-1	<3.46E-2	<8.60E-8
Mn-54	<2.30E-2	<1.10E-1	<1.54E-1	<3.29E-2	<9.13E-8
Fe-59	<6.60E-2	<2.80E-1	<3.18E-1	<8.26E-2	<1.74E-7
Zn-65	<8.38E-2	<3.05E-1	<4.31E-1	<8.58E-2	<2.58E-7
Co-60	<3.38E-2	<1.37E-1	<1.77E-1	<4.63E-2	<1.11E-7

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN FISH

RESULTS IN UNITS OF pCi/GM ± 1 SIGMA

ISOTOPE	DATE: 04/11/91 LOCATION: JAF (Z1d) SPECIES: White & Yellow Perch	DATE: 04/12/91 LOCATION: JAF (Z1d) SPECIES: Lake Trout	DATE: 04/12/91 LOCATION: JAF (Z1d) SEPCIES: Smallmouth Bass	DATE: 04/12/91 LOCATION: JAF (Z1d) SPECIES: White Perch	DATE: 04/12/91 LOCATION: JAF (Z1d) SPECIES: Yellow Perch
Cr-51	<3.36E-1	<1.67E-1	<3.82E-1	<3.20E-1	<7.57E-1
Cs-134	<6.66E-2	<2.45E-2	<5.01E-2	<4.65E-2	<1.25E-1
Cs-137	<6.06E-2	2.20E-2±8.47E-3	<5.44E-2	3.65E-2±1.41E-2	<1.13E-1
Co-58	<5.69E-2	<2.56E-2	<4.34E-2	<5.11E-2	<1.13E-1
Mn-54	<6.57E-2	<2.39E-2	<4.64E-2	<4.96E-2	<1.17E-1
Fe-59	<1.17E-1	<5.44E-2	<9.94E-2	<9.17E-2	<2.76E-1
Zn-65	<1.49E-1	<7.53E-2	<1.41E-1	<1.11E-1	<2.57E-1
Co-60	<7.75E-2	<3.42E-2	<6.17E-2	<5.69E-2	<1.75E-1

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN FISH

RESULTS IN UNITS OF pCi/GM ± 1 SIGMA

ISOTOPE	DATE: 04/12/91 LOCATION: NMP1 (Z1a) SPECIES: Cisco	DATE: 04/12/91 LOCATION: NMP1 (Z1a) SPECIES: Yellow Perch	DATE: 04/15/91 LOCATION: NMP1 (Z1a) SPECIES: Rainbow Trout	DATE: 04/16/91 LOCATION: NMP1 (Z1a) SPECIES: Brown Trout	DATE: 04/17/91 LOCATION: JAF (04k) SPECIES: Yellow Perch
Cr-51	<2.67E-1	<1.39E+0	<3.70E-1	<2.02E-1	<6.66E-1
Cs-134	<3.84E-2	<2.01E-1	<5.80E-2	<3.30E-2	<1.06E-2
Cs-137	<3.50E-2	<1.93E-1	<5.15E-2	<2.83E-2	9.60E-2±3.50E-2
Co-58	<3.37E-2	<2.06E-1	<5.61E-2	<3.17E-2	<8.92E-2
Mn-54	<3.65E-2	<1.99E-1	<5.65E-2	<2.90E-2	<9.86E-2
Fe-59	<8.60E-2	<4.91E-1	<1.19E-1	<5.88E-2	<2.25E-1
Zn-65	<9.32E-2	<5.02E-1	<1.40E-1	<7.76E-2	<2.70E-1
Co-60	<4.29E-2	<2.41E-1	<7.06E-2	<3.42E-2	<1.27E-1

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN FISH

RESULTS IN UNITS OF pCi/GM ± 1 SIGMA

ISOTOPE	DATE: 04/18/91 LOCATION: JAF (Z1d) SPECIES: Lake Trout	DATE: 04/18/91 LOCATION: JAF (Z1d) SPECIES: White Perch	DATE: 04/18/91 LOCATION: JAF (Z1d) SEPCIES: Brown Trout	DATE: 04/19/91 LOCATION: JAF (Z1d) SPECIES: Smallmouth Bass	DATE: 04/19/91 LOCATION: JAF (Z1d) SPECIES: Lake Trout
Cr-51	<2.10E-1	<5.35E-1	<2.19E-1	<6.20E-1	<2.29E-1
Cs-134	<3.51E-2	<8.24E-2	<3.74E-2	<1.03E-1	<4.16E-2
Cs-137	<3.13E-2	<7.58E-2	2.87E-2±1.24E-2	1.15E-1±3.24E-2	2.69E-2±1.04E-2
Co-58	<3.15E-2	<7.44E-2	<3.91E-2	<8.95E-2	<4.05E-2
Mn-54	<3.26E-2	<7.09E-2	<4.37E-2	<1.05E-1	<3.96E-2
Fe-59	<6.46E-2	<1.47E-2	<8.36E-2	<2.26E-1	<6.74E-2
Zn-65	<7.96E-2	<2.28E-1	<9.53E-2	<2.22E-1	<8.54E-2
Co-60	<3.78E-2	<8.91E-2	<3.97E-2	<1.51E-1	<4.68E-2

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN SHORELINE SEDIMENT

RESULTS IN UNITS OF pCi/GM (WET) ± 1 SIGMA

ISOTOPE	DATE: 03/27/91 LOCATION: Romona Beach (Z1i)	DATE: 03/27/91 LOCATION: Dempster Beach (Z1h)	DATE: 03/27/91 LOCATION: Bible Camp (Z1f)	DATE: 03/27/91 LOCATION: Shore Oaks (Z1g)	DATE: 03/27/91 LOCATION: Selkirk Shores (Z1j)
Cr-51	<2.61E-1	<2.86E-1	<2.80E-1	<3.95E-1	<2.72E-1
Cs-134	<4.49E-2	<7.04E-2	<5.23E-2	<1.07E-1	<8.36E-2
Cs-137	6.76E-2±1.52E-2	1.07E-1±1.62E-2	1.18E-1±1.86E-2	1.46E-7±2.72E-2	3.71E-2±1.73E-2
Co-58	<3.38E-2	<4.39E-2	<4.25E-2	<6.53E-2	<4.89E-2
Mn-54	<3.35E-2	<2.26E-2	<3.60E-2	<6.83E-2	<5.79E-2
Fe-59	<7.71E-2	<1.02E-1	<9.05E-2	<1.69E-1	<1.28E-1
Zn-65	<1.18E-1	<1.43E-1	<1.52E-1	<2.83E-1	<1.76E-1
Co-60	<3.32E-2	<4.88E-2	<5.84E-2	<8.25E-2	<7.14E-2

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN SHORELINE SEDIMENT

RESULTS IN UNITS OF pCi/GM (WET) ± 1 SIGMA

ISOTOPE	DATE: 03/27/91 LOCATION: Rainbow Shores (Z1k)	DATE: 03/27/91 LOCATION: NMP1 (Z11)	DATE: 04/02/91 LOCATION: Langs Beach (Z1e)	DATE: 04/02/91 LOCATION: Bible Camp (Z1f)	DATE: 04/02/91 LOCATION: NMP1 (Z11)
Cr-51	<4.17E-1	<2.64E-1	<3.05E-1	<3.84E-1	<4.99E-1
Cs-134	<1.01E-1	<6.05E-2	<7.60E-2	<1.02E-1	<1.25E-1
Cs-137	4.47E-2±1.82E-2	2.68E-1±2.07E-2	<5.22E-2	1.23E-1±2.26E-2	3.68E-1±3.76E-2
Co-58	<6.54E-2	<3.32E-2	<4.15E-2	<6.46E-2	<8.06E-2
Mn-54	<6.70E-2	<3.43E-2	<4.59E-2	<6.19E-2	<7.31E-2
Fe-59	<1.51E-1	<8.42E-2	<1.27E-1	<1.63E-1	<1.93E-1
Zn-65	<2.17E-1	<1.31E-1	<1.96E-1	<2.51E-1	<2.63E-1
Co-60	<9.30E-2	2.66E-2±1.48E-2	<6.12E-2	<7.52E-2	<1.08E-1

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN SHORELINE SEDIMENT

RESULTS IN UNITS OF pCi/gm (wet) ± 1 SIGMA

ISOTOPE	DATE: 04/02/91 LOCATION: Sunset Beach (Z1m)	DATE: 04/02/91 LOCATION: Shore Oaks (Z1g)	DATE: 04/02/91 LOCATION: Dempster Beach (Z1h)	DATE: 04/02/91 LOCATION: Ramona Beach (Z1i)	DATE: 04/02/91 LOCATION: Selkirk Shores (Z1j)
Cr-51	<4.36E-1	<4.59E-1	<3.04E-1	<3.18E-1	<3.20E-1
Cs-134	<1.29E-1	<1.18E-1	<5.45E-2	<5.97E-2	<8.77E-2
Cs-137	7.64E-2±2.41E-2	1.34E-1±2.68E-2	<5.33E-2	8.09E-2±1.70E-2	6.20E-2±1.78E-2
Co-58	<7.54E-2	<7.07E-2	<4.39E-2	<4.26E-2	<4.85E-2
Mn-54	<7.05E-2	<7.48E-2	<5.80E-2	<4.35E-2	<6.19E-2
Fe-59	<1.76E-1	<1.60E-1	<1.19E-1	<1.13E-1	<1.54E-1
Zn-65	<2.63E-1	<2.40E-1	<1.89E-1	<1.69E-1	<2.13E-1
Co-60	<1.00E-1	<9.07E-2	<6.06E-2	<5.24E-2	<7.59E-2

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN SHORELINE SEDIMENT

RESULTS IN UNITS OF pCi/gm (wet) ± 1 SIGMA

ISOTOPE	DATE: 04/02/91 LOCATION: Rainbow Shores (Z1k)	DATE: 04/10/91 LOCATION: Selkirk Shores (Z1j)	DATE: 04/10/91 LOCATION: Rainbow Shores (Z1k)	DATE: 04/10/91 LOCATION: NMP1 (Z11)	DATE: 04/10/91 LOCATION: Sunset Beach (Z1m)
Cr-51	<2.74E-1	<2.93E-1	<3.83E-1	<3.81E-1	<4.01E-1
Cs-134	<5.61E-2	<6.33E-2	<1.19E-1	<9.69E-2	<1.07E-1
Cs-137	2.27E-2±1.32E-2	6.36E-2±1.52E-2	8.93E-2±1.94E-2	4.04E-2±2.70E-2	6.47E-2±2.36E-2
Co-58	<4.00E-2	<4.27E-2	<5.98E-2	<5.21E-2	<6.28E-2
Mn-54	<4.32E-2	<4.66E-2	<7.87E-2	<5.69E-2	<6.20E-2
Fe-59	<8.49E-2	<1.07E-1	<1.69E-1	<1.32E-1	<1.57E-1
Zn-65	<1.39E-1	<1.64E-1	<2.23E-1	<2.09E-1	<2.44E-1
Co-60	<4.16E-2	<5.01E-2	<8.43E-2	<5.98E-2	<7.75E-2

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN SHORELINE SEDIMENT

RESULTS IN UNITS OF pCi/GM (WET) ± 1 SIGMA

ISOTOPE	DATE: 04/10/91 LOCATION: Langs Beach (Z1e)	DATE: 04/10/91 LOCATION: Bible Camp (Z1f)	DATE: 04/10/91 LOCATION: Shore Oaks (Z1g)	DATE: 04/10/91 LOCATION: Dempster Beach (Z1h)	DATE: 04/10/91 LOCATION: Ramona Beach (Z1i)
Cr-51	<3.47E-1	<3.89E-1	<3.61E-1	<3.79E-1	<4.18E-1
Cs-134	<8.40E-2	<9.70E-2	<9.28E-2	<1.03E-1	<9.98E-2
Cs-137	<4.85E-2	1.31E-1±2.53E-2	1.32E-1±2.24E-2	<5.82E-2	8.86E-2±2.25E-2
Co-58	<4.28E-2	<5.78E-2	<5.59E-2	<5.62E-2	<5.15E-2
Mn-54	<4.44E-2	<6.08E-2	<5.48E-2	<5.39E-2	<5.59E-2
Fe-59	<1.09E-1	<1.29E-1	<1.53E-1	<1.25E-1	<1.17E-1
Zn-65	<1.79E-1	<2.18E-1	<2.46E-1	<2.07E-1	<2.15E-1
Co-60	<5.36E-2	<5.94E-2	<7.23E-2	<6.67E-2	<7.37E-2

TABLE 2 (CONTINUED)

CONCENTRATIONS OF GAMMA EMITTERS IN BOTTOM SEDIMENT

RESULTS IN UNITS OF pCi/gm (wet) ± 1 SIGMA

ISOTOPE	DATE: 03/20/91 LOCATION:* JAF West	DATE: 03/20/91 LOCATION:* JAF Center West	DATE: 03/20/91 LOCATION:* JAF Center East	DATE: 03/20/91 LOCATION:* JAF East	(BLANK)
Cr-51	<2.51E-1	<3.61E-1	<3.21E-1	<2.73E-1	
Cs-134	<4.70E-2	<8.63E-2	<5.69E-2	<7.26E-2	
Cs-137	2.82E-1±1.79E-2	4.09E-1±2.81E-2	4.91E-1±2.86E-2	3.80E-1±2.30E-2	
Co-58	<3.84E-2	<5.79E-2	<5.08E-2	<4.23E-2	
Mn-54	<3.59E-2	<4.76E-2	<5.81E-2	<3.64E-2	
Fe-59	<7.42E-2	<1.19E-2	<1.[illegible]E-1	<1.08E-1	
Zn-65	<1.24E-1	<2.00E-2	<1.87E-1	<1.51E-1	
Co-60	6.26E-2±1.12E-2	8.58E-2±1.83E-2	9.02E-2±1.71E-2	5.69E-2±1.25E-2	

* Collected at the JAF East and West out falls and equal distance between each out fall.