NIAGARA MOHAWK

NINE MILE POINT NUCLEAR STATION / P.O. BOX 32 LYCOMING, NEW YORK 13093 / TELEPHONE (315) 343-2110

June 23, 1983

Dr. Thomas E. Murley
Regional Administrator
United States Nuclear Regulatory Commission
Region I
631 Park Avenue
King of Prussia, PA. 19406

RE: Nine Mile Point Nuclear Station Unit #1
Facility Operating License DPR-63
Docket No. 50-220

Dear Dr. Murley:

In accordance with the Environmental Technical Specifications for the Nine Mile Point Nuclear Station Unit #1, the 1982 Annual Environmental Operating Report was submitted with correspondence dated April 25, 1983. Attached [redacted] which reflects corrections for typographical errors in the interpretative section of the report and on Table 7.

If any further clarification is needed, please feel free to contact Hugh Flanagan at Nine Mile Point at (315) 349-2428.

Very truly yours,

Thomas J. Perkins

Thomas J. Perkins
General Superintendent -
Nuclear Generation

mtm
Attachment

NIAGARA MOHAWK

NINE MILE POINT NUCLEAR STATION / P O BOX 32 / LYCOMING, NEW YORK 13093 / TELEPHONE (315) 343 2110

April 25, 1983

Mr. James Allan
Acting Regional Administrator
United States Nuclear Regulatory Commission
Region I
631 Park Avenue
King of Prussia, Pa. 19406

RE: Nine Mile Point Nuclear Station Unit #1
Facility Operating License DPR-63
Docket No. 50-220

Dear Mr. Allan:

In accordance with the Environmental Technical Specifications for Nine Mile Point Unit #1, we are enclosing the Annual Environmental Operating Report for the period January 1, 1982 through December 31, 1982.

The non-radiological Aquatic Ecology Studies Data Report for 1982 was submitted under separate cover.

Very truly yours,

Thomas E. Lempges

Thomas E. Lempges
Vice President -
Nuclear Generation

mtm

Encl. 2 copies

xc: Director, Office of NRR (17 copies)

NIAGARA MOHAWK POWER CORPORATION

ANNUAL ENVIRONMENTAL OPERATING REPORT

PART B - RADIOLOGICAL REPORT

January 1, 1982 - December 31, 1982

for

NINE MILE POINT NUCLEAR STATION UNIT #1

Facility Operating License DPR-63

Docket Number 50-220

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NINE MILE POINT UNIT 1

ANNUAL ENVIRONMENTAL OPERATING REPORT

I. INTRODUCTION

This report is submitted in accordance with Appendix B to DPR-63, Docket No. 50-220.

II. DESCRIPTION

The required sample collection and analysis schedule for NMP #1 is listed in Table 1 and 2.

The sample collections for the radiological program are performed by two groups. Ecological Analysts Incorporated (EAI) performs much of the environmental sampling. EAI is presently performing the Nine Mile Point Aquatic Ecology Study at the site. The staff required by EAI to perform this study is used to perform the terrestrial sampling required for the site Radiological Environmental Monitoring Program (REMP). In-plant and remaining terrestrial sampling is performed jointly by the NMPNS and JAFNPP staffs.

1. Sample Collection Methodology

A. Lake Water

The two indicator stations are the respective inlet canals at NMPNS and JAFNPP. These samples are composited using sampling equipment which discharge into large collection tanks. These tanks are emptied weekly and an aliquot is saved for the monthly composite.

The control station sample is collected from the City of Oswego water intake. Grab samples are drawn from the intake prior to treatment and are composited in a large sample container.

Quarterly composite samples are made up from aliquots of monthly samples.

B. Air Particulate/Iodine

The air sampling stations are located in two rings surrounding the site. The on-site locations ring the area around the plant inside the site boundary. The on-site sampling network is composed of nine stations.

The off-site air monitoring locations range six to seventeen miles from the site and are composed of six stations. Air monitoring locations are shown on Figures 1 and 3.

II. DESCRIPTION (Continued)

1. Sample Collection Methodology (Continued)

B. Air Particulate/Iodine (Continued)

The air particulate glass fiber filters are approximately two inches in diameter and are placed in sample holders in the intake line of a vacuum sampler. Directly down stream from the particulate filter is a 2 x 1 charcoal cartridge used to absorb airborne radioiodine. The samplers run continuously and the charcoal cartridges and particulate filters are changed on a weekly basis.

The particulate filters are composited on a monthly basis by location (two off-site, two on-site) after being counted for gross beta activity.

C. Milk

Milk samples are collected in polyethylene bottles from the bulk storage tank at each sampled farm. Before the sample is drawn, the tank contents are agitated from three to five minutes to assure a homogenous mixture of milk and butterfat. Three gallons are collected during the first half of each month from each of the locations within ten miles of the site and from a control location. The samples are frozen and shipped to the analytical contractor within thirty-six hours of collection in insulated shipping containers. The milk sampling locations are found on Figure 5. (see Table 19 for identification of locations sampled.)

D. Meat, Poultry and Eggs

Semi-annually one kilogram of meat is collected from locations within a ten mile radius of the site. Weekly phone calls are made to the local butcher to determine availability of slaughtered live stock from within the sampling area. Whenever possible, meat samples are collected from locations previously used. (See Figure 4.)

Semi-annually one kilogram of poultry and one kilogram of eggs are collected from each of three locations within a ten mile radius of the site. Attempts are made to collect poultry and eggs at the same time as the meat samples. The samples for poultry and eggs are frozen and shipped in insulated containers. Whenever possible, samples are obtained from previously sampled farms. Control samples are also obtained for meat, eggs, and poultry. (See Figure 4.)

II. DESCRIPTION (Continued)

1. Sample Collection Methodology (Continued)

E. Human Food Crops

Human food crops are collected during the late summer harvest season at locations previously sampled, if available. One kilogram each, of two types of fruits and/or vegetables from each of the three locations within a ten mile radius of the site are collected. The types of fruits and vegetables sampled depends upon what is locally available at the time of collection. Attempts are made to collect at least one broadleaf type vegetable from each location. The fruits and vegetables are chilled prior to shipping and shipped fresh in insulated containers. Control samples are also obtained. (See Figure 4.)

F. Soil Samples

Soil samples were not collected in 1982.

Soil samples are required to be collected every three years at the air monitoring locations and are analyzed for Sr-90 and GSA. Samples were collected in 1980.

G. Fish Samples

Available fish species are removed from the Nine Mile Point Aquatic Ecology Study monitoring collections during the spring and fall collection periods. Samples are collected from two of four possible on-site sample transects and one off-site sample transect (See Figure 1). Available species are selected under the following guidelines:

1. 0.5 to 1 kilogram of edible portion only of a maximum of three species per location.

2. Samples composed of more than one kilogram of a single species from the same location are divided into samples of 1 kilogram each prior to shipping. A maximum of three samples per species per location are used. Only edible portions are sent for analysis.

Selected fish samples are frozen immediately after collection and processing and are segregated by species and location. Samples are shipped frozen within two weeks in insulated containers.

H. Shoreline Sediments

One kilogram of shoreline sediment sample is collected at one on-site location and one off-site location. Sediment samples are collected from shoreline locations that are frequently washed by the surf. Samples are collected semi-annually, placed in plastic bags, sealed and shipped for analysis in insulated containers.

II. DESCRIPTION (Continued)

1. Sample Collection Methodology (Continued)

I. Cladophora

Cladophora samples are collected in the spring and summer season from two on-site locations and one off-site location. Cladophora is collected from natural substrates. Cladorphora is scraped from the substrates into sample containers, labeled, frozen and shipped in insulated containers for off-site analysis.

J. TLD (direct radiation)

Thermoluminescent dosimeters (TLD's) are used to measure direct radiation in the JAF/NMP-1 environment. TLD's are placed in locations using four types of selection criteria. TLD's are classified as either on-site, off-site, special interest areas, or control locations. On-site TLD's are located within the site property boundary and are arranged in a ring around the generating facilities (Figure 3). Off-site TLD's are located outside of the site property boundary and are arranged in a ring approximately 7-11 miles out from the site. Special interest TLD's are located at high population locations such as industrial sites, schools, etc. Control TLD's are located outside of the 10 mile radius of the site. These TLD's are positioned to the east, west, and south of the site up to 20 miles away.

Each TLD is made up of two $CaSO_4$ dosimeters sealed in a polyethylene package to insure dosimeter integrity against the weather. The TLD packages are further protected by placement in plexiglass "birdhouses" or by tape sealing to supporting surfaces. The dosimeters are collected, replaced and evaluated on a quarterly basis.

K. Special Samples

Special radiological environmental samples were also analyzed. An additonal sample media was collected during the 1982 sample period to help in evaluating and interpreting the milk data which was compiled in 1982. Additional samples of pasture grass were collected at all of the milk sampling locations during July, August and September of 1982.

2. Analysis Performed

The Radiological Environmental Monitoring Program (REMP) samples are analyzed by Radiation Management Corporation and by the Site Environmental Laboratory during 1982. The following samples were analyzed by the site:

- Air particulate filter (weekly gross beta analysis)

II. DESCRIPTION (Continued)

2. Analysis Performed (cont.)

- Air particulate filter (monthly gamma spectral analysis)
- Airborne radioiodine cartridge (weekly gamma spectral analysis)
- Lake water (monthly gamma spectral analysis)
- Pasture grass (extra samples collected in July, August and September)

The remainder of the sample analyses, as outlined in Table 1 and 2, were analyzed by Radiation Management Corporation.

3. Changes to the 1982 Sample Program

A. Milk sample location number 45 was added to the milk sampling program in July of 1982. The new sample location was added as a result of the 1982 spring milch animal census which identified this farm as being in a critical downwind sector. The new sampling location is located in a SE direction (125 degrees) at a distance of approximately 8.1 miles from the site. The addition of milk sample location number 45 brings the total number of milk sample locations to seven for the 1982 sampling program.

4. Exceptions to the 1982 Sample Program

A. Environmental radiation monitoring station I on-site was inoperable March 16, 1982 (2100 hours) to March 19, 1982 (1115 hours). Malfunction of the monitor was a result of an electronic failure.

B. Environmental air monitoring station D1 off-site was inoperable March 23, 1982 to April 4, 1982. Malfunction of the air monitoring station was due to a break in the main incoming electrical line.

C. Environmental air monitoring station F on-site was inoperable from April 26, 1982 (2230 hours) to April 30, 1982 (1300 hours). Malfunction of the air monitoring station was a result of a defective vacuum pump.

D. Environmental air monitor station E off-site was inoperable from May 6, 1982 (2106 hours) to May 10, 1982 (0840 hours). Malfunction of the air monitoring station was a result of a defective vacuum pump fuse.

E. Environmental radiation monitor G on-site was inoperable from June 14, 1982 (1330 hours) to June 15, 1982 (1445 hours). Malfunction of the monitor was a result of an electronic failure.

II. DESCRIPTION (Continued)

4. Exceptions to the 1982 Sample Program (cont.)

F. Environmental air monitor station H on-site was inoperable from July 9, 1982 (estimate) to July 14, 1982. Malfunction of the air monitoring station was a result of a defective vacuum pump.

G. Environmental radiation monitor C off-site was inoperable from October 1, 1982 (1200 hours) to October 7, 1982 (0800 hours). Malfunction of the monitor was a result of the detector unit cable being severed (vandalism). This caused an electronic short in the monitor circuitry.

H. Environmental air monitoring station J on-site was inoperable from October 7, 1982 (1000 hours) to October 12, 1982 (1330 hours). Malfunction of the air monitoring station was a result of a defective fuse for the vacuum pump.

I. Environmental radiation monitor and air monitoring station D1 on-site was inoperable from October 20, 1982 (0940 hours) to October 29, 1982 (1500 hours). Malfunction of the equipment was a result of physical damage to the environmental cabinet that contains the radiation and air monitoring equipment. This sampling station was found off its normal mounting structure. The station was de-energized on October 21, 1982 to prevent safety hazards. The radiation monitor sustained damage during the fall and required repair (chart recording unit damaged). The sampling station was reactivated after the installation of a new support structure and repair of the radiation monitor.

J. Environmental air monitoring station J on-site was inoperable from November 12, 1982 (1000 hours) to November 15, 1982 (0945 hours). Malfunction of the air monitoring station was a result of a blown fuse in the vacuum pump circuitry.

K. Environmental air monitoring station I on-site was inoperable from November 22, 1982 (1045 hours) to November 23, 1982 (0818 hours). Malfunction of the air monitoring equipment was a result of a defective vacuum pump.

L. Environmental air monitoring station K on-site was inoperable from December 6, 1982 (estimate) to December 8, 1982 (1107 hours). Malfunction of the air monitoring station was a result of a defective vacuum pump.

M. Environmental radiation monitor C off-site was inoperable from December 14, 1982 (estimate) to December 21, 1982. Malfunction of the monitor was a result of a defective chart recording unit.

III. EVALUATION OF ENVIRONMENTAL DATA

The results of the 1982 Radiological Environmental Monitoring Program (REMP) must be put into perspective considering the natural processes of the environment and the past radiological data. Several factors must be realized in order to effectively evaluate and interpret the data.

There are three separate groups of radionuclides that were detected in the environment during 1982. A few of these radionuclides could possibly fall into two of the three groups. The first of these groups is naturally occurring radionuclides. It must be realized that the environment contains a broad inventory of naturally occurring radioactive elements. Background radiation as a function of primordial radioactive elements and cosmic radiation of solar origin offers a constant exposure to the environment and man. These radionuclides, such as Th-232, Ra-226, Be-7 and especially K-40, account for a majority of the annual per capita background dose.

A second group of radionuclides that were detected are a result of the detonation of thermonuclear devices in the earth's upper atmosphere. The detonation frequency during the early 1950's produced a significant inventory of radionuclides found in the lower atmosphere as well as in ecological systems. A ban was placed on weapons testing in 1963 which greatly reduced the inventory through the decay of short lived radionuclides, deposition, and the removal (by natural processes) of radionuclides from the food chain such as by the process of sedimentation. 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 several months afterwards and then after a peak detection period, diminished to a point where most could not be detected. The last such weapons test was conducted in October of 1980. The resulting fallout or deposition from this test has influenced the background radiation in the vicinity of the site and was very evident in many of the sample medias analyzed during 1981. Calculations of the resulting doses to man from fallout related radionuclides in the environment show that the contribution from such nuclides in some cases (such as Sr-90 or Cs-137) is significant and second in intensity only to natural background radiation. Quantities of Nb-95, Zr-95, Ce-141, Ce-144, Ru-106, Ru-103, La-140, Cs-137, Mn-54 and Co-60 are typical in air particulate samples and have a weapons test origin.

The third group of radionuclides detected in the environment during 1982 were those that could be related to operations at the site. These select radionuclides were detected in a few of the sample medias collected and at very low concentrations. Many of these radionuclides are a by-product of both nuclear detonations and the operation of light water reactors thus making a distinction between the two sources difficult, if not impossible, under the circumstances. Radionuclides falling into this category (as applicable to the 1982 Nine Mile Point Environmental Program) include Cs-137, Mn-54 and Co-60. The dose to man as a result of these radionuclides is small and much less than the radiation exposure from naturally occurring sources of radiation and from fallout.

III. EVALUATION OF ENVIRONMENTAL DATA (cont.)

Thus, a number of factors must be considered in the course of radiological data evaluation and interpretation. The evaluation and interpretation is made at several levels including trend analysis, dose to man, etc. An attempt has been made not only to report the data collected during 1982, 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 are possibly related to operations at the site are very small and are not an indication of environmental significance. In regards to these very small quantities, it will be further noted that at such minute concentrations the assessment of the significance of detected radionuclides is very difficult. Therefore, concentrations in one sample that are two times the concentration of another, for example, are not significant overall. Moreover, concentrations at such low levels may show a particular radionuclide in one sample and yet not in another.

The 1970 per capita dose rate (Eisenbud) was determined to be 209 mrem per year. This average dose includes such exposure sources as natural, occupational, weapons testing, consumer products, medical, etc. The 1970 per capita dose rate due to natural sources was 130 mrem per year. Of this dose, approximately 20 mrem per year is received by the gonads and other soft tissues and an additional 15 mrem per year is received by the bone tissue for a 70 kg (155 lb) man. These doses (ie. 20 mrem and 15 mrem) are the result of just K-40 alone, a naturally occurring relatively high energy beta emitter (1.3 Mev). The 1970 per capita dose rate due to the nuclear fuel cycle is 0.0028 mrem per year.

Background radiation (gamma radiation), as a result of radionuclides in the atmosphere and the ground, accounts for approximately 60 mrem per year. This dose is a result of radionuclides of cosmic origin (as for example Be-7), of a primordial origin (as Ra-226, K-40, and Th-232) and to a 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.

A. Aquatic Program

Tables 3 through 8 demonstrate the analytical results for the aquatic media sampled during the 1982 sampling program. Aquatic samples were collected at four possible indicator locations. The locations (on-site transect designations) used for on-site sampling were NMPW (01), NMPP (02), JAF (03), and NMPE (04) (see Figure 1). Because of the unavailability of various sample media, on-site samples were colected from combinations of the above listed locations, when required. NMPW and NMPP were combined into location NMPP. NMPE and JAF were combined into location JAF. Off-site samples were collected at the Oswego Harbor area or further to the west (or east) and therefore served as control locations.

III. EVALUATION OF ENVIRONMENTAL DATA (cont.)

A. 1. Cladophora - Table 3

The species glomerata is the dominant species of Cladophora in the collections in the vicinity of Nine Mile Point. Cladophora is a long filamentous algae attached by a holdfast to rocks and other submerged substrates. Colonization and propagation of Cladophora extends out to a depth of 20 feet. The long, growing strands of Cladophora in water five feet deep or less are constantly being broken off by wave activity. Maximum growth usually occurs in water approximately ten to fifteen feet deep, but this will vary, depending upon turbidity. Growth of Cladophora begins in late May, reaches a peak in late June or early July, and then declines during the warmer summer months of July and August. As the lake temperature drops after August, a secondary peak in growth may occur during this time. Growth ceases in the fall months as a result of decreasing photoperiod and lake temperature.

Two collections were made for Cladophora samples in 1982. The first collection was made in June followed by a collection in August. The availability of Cladophora is limited in June because of the cool lake temperatures. Whereas, during August, an abundance of Cladophora is available in the near shore zone. Collections were made at an off-site (00) or control location and at two on-site or indicator locations. The indicator locations were in the proximity of the Nine Mile Point (NMPP-02) and the James A. FitzPatrick (JAF-03) facilities. The control location was located just east of the Oswego Harbor area.

Spring collections made in June showed detectable radionuclides that were a result of naturally occurring sources, weapons testing and possibly plant related operations. K-40 and Be-7 are naturally occurring and were noted in both the indicator locations and the control location with the exception of Be-7. Be-7 was not noted at the JAF location. K-40 ranged in concentration from 3.7 pCi/g (wet) to 4.5 pCi/g (wet). Be-7 ranged from 0.12 pCi/g (wet) to 0.21 pCi/g (wet). The concentrations detected for K-40 and Be-7 were significantly less than concentrations noted during 1981.

Cs-137 was detected at all three locations during the June collections. Concentrations at the indicator locations were slightly greater than the control location. Cs-137 at the NMP location showed a concentration of 0.017 pCi/g (wet) and at the JAF location showed a concentration of 0.011 pCi/g (wet). Cs-137 in Cladophora samples is considered to be a result of past weapons testing based on 1982 data and historical data.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

A. 1. Cladophora - Table 3 (cont.)

Although Cs-137 was detected at a greater concentration at the indicator locations it does not necessarily indicate that a portion of the detected Cs-137 is a result of site operations. The 1982 data as well as past data shows that detected radionuclides (man made as well as naturally occurring radionuclides) were noted at greater concentrations at the indicator locations that at the control location. This fact was noted in the 1981 Annual Environmental Operating Report, and may be a result of the Oswego River "plume" in Lake Ontario. In this case, the river water plume may contain a higher concentration of naturally occurring and weapons testing radionuclides as a result of the watershed drainage. Because of a combination of factors, such as the existing longshore current in Lake Ontario, the relative proximity of the indicator locations to the river and the river plume, the Cladophora growth in the Nine Mile Point area may be subject to an environment (river plume) with a greater concentration of radionuclides, than the samples collected at the control location.

Co-60 was detected at the NMP location during June at a concentration of 0.017 pCi/g (wet). Co-60 was not detected at the JAF location or the control location. It is difficult to assess the presence of Co-60 at the NMP location. During 1981 and 1980 Co-60 was not detected at any of the control location samples. During 1979 however, Co-60 was detected in the June control sample at a concentration of 0.010 pCi/g (wet). As noted above, it is difficult to assess whether Co-60 is due to past weapons testing or whether its presence is a result of site operations because of the minute concentration detected. However, Co-60 in this case is most probably a result of operations at the site.

No other radionuclides were detected in the June 1982 samples using gamma spectral analysis.

Samples collected during August also showed detected concentrations of K-40 and Be-7. K-40 was detected at all three sample locations and ranged in concentration from 2.4 pCi/g (wet) to 3.9 pCi/g (wet). Be-7 was detected at the NMP location only at a concentration of 0.16 pCi/g (wet). Historically, Be-7 has been noted as appearing in some samples and not in others because of the minute concentrations detected.

Cs-137 was detected only at the NMP location at a concentration of 0.016 pCi/g (wet). The detected concentration is very small and is just slightly above the lower limit of detection for the other August samples. As noted above for Co-60, it is difficult to assess the presence of Cs-137 at the NMP location and not at the other sample locations because of the minute quantity detected. Cs-137 in Cladophora samples has historically been attributed to past weapons testing.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

A. 1. Cladophora - Table 3 (cont.)

Samples collected during 1981 showed detectable concentrations of many weapons testing radionuclides. These included cerium, zirconium, niobium, ruthenium, and cesium. The presence of the radionuclides was attributed to the 1980 Chinese nuclear weapons test. With the exception of cesium, these radionuclides were not present in the 1982 samples. The half-life of these radionuclides range from 33 days to 365 days with the exception of cesium (Cs-137 has a 30 year half-life). The absence of these radionuclides is attributed to nuclear decay and ecological cycling.

Review of past environmental data shows that the concentrations of naturally occurring K-40 and Be-7 have fluctuated greatly. K-40 at all locations has ranged from 2.3 pCi/g (wet) to 67.8 pCi/g (wet). Be-7 at all locations have ranged from 0.22 pCi/g (wet) to 2.4 pCi/g (wet). Different years showed different peak years for the two radionuclides. Cs-137 since 1979 at the indicator locations has been variable. The annual mean concentration in 1979 (0.15 pCi/g-wet) was higher than 1980 (0.02 pCi/g-wet). 1981 (0.38 pCi/g-wet) was greater than the preceding year. The annual mean for the indicator samples during 1982 was 0.015 pCi/g (wet) which represented a decrease when compared to 1981. Cs-137 at the control location has also been variable. The 1979-1981 annual means for Cs-137 were 0.03 pCi/g, 0.02 pCi/g, and 0.10 pCi/g (wet) respectively. Fluctuation in the Cs-137 concentrations is a result of past weapons testing. An example of this is the October 1980 Chinese weapons test. The 1981 mean concentration increased at both indicator and control locations as a result of this test. The 1982 annual mean decreased as there were no weapons tests since 1980.

The significance of the detected radionuclides in Cladophora samples during 1982 is very small. This sample media has a high bioaccumulation factor for most radionuclides and the results of the analyses can be used, for the most part, in a qualitative sense only. Thus, Cladophora does not reflect the concentrations of radionuclides in the environment in which it grows. As an example, the bioaccumulation factor for Cs-137 is 80-4,000 for this sample media.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

A. 1. Cladophora - Table 3 (cont.)

A dose assessment to man is difficult to make since Cladophora is not a human food source. For the purpose of illustration, a comparison of hypothetical doses can be calculated on the basis of an assumption that Cladophora is an important food source. In this case, Cladophora is assumed to be consumed by an adult at an annual rate equal to green leafy vegetables, i.e. 64 kg/year (Regulatory Guide 1.109). A conservative assumption can also be made that the mean Cs-137 concentration for 1982 at the indicator locations minus the mean control location concentration is a result of operations at the site. Further, it is assumed that the one positive Co-60 concentration is a result of operations at the site (since Co-60 was detected only in June, the calculated dose is based on one-half a year).

Maximum whole body and critical organ doses to an adult are as follows:

Radionuclide	Whole Body Dose*	Critical Organ Dose*
Cs-137	0.036	0.056 (liver)
Co-60	0.002	0.020 (GI tract)

The projected doses are based on maximum consumption rates and radionuclide concentrations. The doses are very small and can be put into perspective by making a comparison to the natural background dose as a result of increases in altitude and cosmic radiation. The combined whole body dose as a result of Cs-137 and Co-60 is 0.038 mrem per year. This is equal to the whole body dose as a result of residing at a location 100 meters (328 feet) higher in altitude for 6.9 days.

A. 2. Dam Shoreline Sediment - Table 4

Shoreline sediment samples were collected twice during 1982. Collections were made in May and November at one off-site or control location and at one indicator location (NMPP-02).

The control sample collected in May was not able to be analyzed for Sr-90 because of the large particle size of this sediment. A gamma spectral analysis was completed, however. A sample was recollected on July 7 once it was known that a Sr-90 analysis could not be performed. This sample was analyzed for Sr-90 and also for gamma emitters using gamma spectral analysis. The results of this extra sample collected at the control location is included on Table 4.

*Dose in mrem per year.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

A. 2. Dam Shoreline Sediment - Table 4 (cont.)

Several radionuclides were detected in sediment samples using gamma spectral analysis. These results ranged from naturally occurring primordial radionuclides to man-made radionuclides. K-40 was detected at both the control location and indicator location for both collection periods during 1982. K-40 ranged in concentration from 12 pCi/g (dry) to 17 pCi/g (dry) at the control location and 16 pCi/g (dry) at the indicator location (results at the indicator location were identical for the spring and fall collections).

Ra-226 and Th-232, in addition to K-40, are also naturally occurring radionuclides. Ra-226 was detected at both indicator and control locations at concentrations that are representative of normal background level fluctuations. Ra-226 ranged in concentration from 0.36 pCi/g (dry) to 0.41 pCi/g (dry) at the indicator location and 0.19 pCi/g (dry) to 1.60 pCi/g (dry) at the control location. Th-232 ranged from 0.42 pCi/g (dry) to 0.56 pCi/g (dry) at the indicator location and 0.18 pCi/g (dry) to 0.48 pCi/g (dry) at the control location.

Cs-137 was detected in three of the four required samples collected during the year. Cs-137 was detected in two of the indicator samples and one of the control samples. The concentrations detected were very small and are for the most part indicative of previous weapons testing. The one positive detection in the control sample location was made in the second half of the year (November) and showed a concentration of 0.05 pCi/g (dry). Cs-137 was detected in both of the indicator samples (i.e., May and November) at concentrations of 0.07 pCi/g (dry) and 0.80 pCi/g (dry) respectively. The one indicator sample (0.80 pCi/g - dry) was statistically greater than the corresponding control location sample. Cs-137 was not detected in the extra control sample collected during July.

Co-60 was detected in one of the indicator samples (November) at a concentration of 0.16 pCi/g (dry). This result was greater than the control sample LLD value. The presence of Co-60 in this sample is most probably a result of operations at the site. Historical data for Co-60 in shoreline sediment samples showed that this radionuclide has not been detected at the control location or the indicator location from 1979 - 1981 (data is not available for this sample media prior to 1979). The concentration detected, however, is very small and the associated impact is minimal. Co-60 was not detected in the extra control sample collected in July.

No other radionuclides were detected in shoreline sediment samples using gamma spectral analysis.

The 1982 samples were analyzed for Sr-90 and showed detectable concentrations in two of the four samples. Sr-90 was detected in the samples at both the indicator and control locations.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

A. 2. Dam Shoreline Sediment - Table 4 (cont.)

The control sample (collected in July) showed a concentration of 0.0043 pCi/g (dry) while the indicator sample (collected in May) showed a concentration of 0.0168 pCi/g (dry). The indicator sample is statistically greater than the control sample. Sr-90 has been detected in the past at the control location.

During 1979, Sr-90 at the control location was detected at a concentration of 0.04 pCi/g (dry) and during 1980 it was detected at concentrations of 0.015 pCi/g (dry) and 0.010 pCi/g (dry). Sr-90 levels detected during these years are approximately the same as or greater than the concentration detected at the indicator location during 1982 (0.0168 pCi/g - dry). Sr-90 is considered to be background and is not considered to be representative of site operations because of historical control sample data and the variability of minute Sr-90 concentrations. Sr-90 was not detected in the indicator or control sample collected in the fall.

Evaluation of historical data (1979-1981) shows that Cs-137 has ranged from 0.22 pCi/g (dry) in 1979 to 0.07 pCi/g (dry) in 1980 at the control location. Cs-137 at the indicator location has ranged from 0.20 pCi/g (dry) in 1980 to 0.11 pCi/g (dry) in 1981. 1982 results ranged from 0.05 pCi/g (dry) to 0.80 pCi/g (dry). Overall, the control location results have decreased since 1979, while the indicator results have also decreased with the exception of the one 1982 sample of 0.80 pCi/g (dry).

The evaluation of past Co-60 data indicates that Co-60 has not been detected in the past at either indicator or control locations since 1979. Sr-90 historical data since 1979 shows that concentrations have generally decreased at the control location from a maximum of 0.015 pCi/g (dry) in 1980 to not detected in 1981 and 0.0043 pCi/g (dry) in 1982. Sr-90 at the indicator location has generally remained the same from 1979-1981 but showed an increase in 1982. The increase, as noted above, is consistent with past control sample data (1980) and may not necessarily demonstrate an increasing trend.

The impact of the 1982 shoreline sediment sample results is minimal and can be evaluated by projecting a dose to man. The critical pathway, in this case, is direct radiation to the whole body. The presence of Co-60 and a portion of the Cs-137 may be as a result of operations at the site. Although the shoreline area is controlled by NMPC personnel, a dose may be calculated assuming that the area in question is utilized as a beach area. Assuming that a teenager spends 67 hours per year at the beach area or shoreline (Regulatory Guide 1.109), and the sediment has a mass of 40 kg/m^2 (dry), then the associated dose to the whole body in mrem per year can be calculated.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

A. 2. Dam Shoreline Sediment - Table 4 (cont.)

Further assumptions must be made and include: no radiological decay of the detected radionuclides, the shore width factor is 0.3 (Regulatory Guide 1.109) and that the Co-60 concentration detected and the Cs-137 concentration detected (minus the background) are constant for one year and are a result of site operations.

The radionuclide values used here are 0.16 pCi/g (dry) for Co-60 and 0.38 pCi/g (dry) for Cs-137. The whole body dose from Co-60 is 0.002 mrem per year and 0.001 mrem per year from Cs-137 or a total whole body dose of 0.003. Sr-90 was not evaluated since the whole body dose from this beta emitter is insignificant.

A whole body dose of 0.003 mrem per year is very small and can be compared to the whole body dose from natural background radiation in the area surrounding the site. The natural background dose as a result of parameters such as cosmic radiation and naturally occurring radionuclides in the atmosphere and the ground, has been demonstrated by environmental dosimeters (TLDs) to be approximately 5 mrem per month or 60 mrem per year. The calculated dose of 0.003 mrem per year as a result of Cs-137 and Co-60 is conservative in the sense that it is a high dose estimate. Even in view of this conservatism, this dose is extremely small and is 0.00005 of the annual natural background dose of 60 mrem per year.

A. 3. Fish - Table 5A, 5B

A total of 18 required fish samples were analyzed as a result of collections in the spring season (June 1982) and in the fall season (October 1982). Collections were made utilizing gill nets at one off-site location greater than five miles from the site (Oswego Harbor area), and at two on-site locations in the vicinity of 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. Samples were analyzed for gamma emitters, Sr-89, and Sr-90.

Analysis of the spring 1982 fish samples indicated detectable concentrations of radionuclides related to past weapons testing and natural origins (naturally occurring). Small detectable concentrations of Cs-137 were found in all fish samples (including control samples). Sr-89 and Sr-90 were also detected in control as well as indication samples. Spring fish collections were comprised of two separate species and nine individual samples. The two species represented one feeding type. Lake trout and brown trout are highly predacious and feed on significant quantities of smaller fish such as smelt, alewife, and other smaller predacious species. Because of the limited availability of species present in the catches, no bottom feeder species were collected in the spring samples.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

A. 3. Fish - Table 5A, 5B (cont.)

Cs-137 was detected in all on-site and off-site samples for both species collected. On-site samples showed Cs-137 concentrations to be slightly greater than control levels for some samples and slightly less than control levels for other samples. The concentrations detected are not significantly different from the control results and are therefore considered to be representative of background concentrations. Cs-137 in lake trout samples ranged from 0.044 to 0.051 pCi/g (wet) and averaged 0.049 pCi/g (wet) for the indicator samples. Cs-137 in the control samples ranged from 0.047 to 0.051 pCi/g (wet), and averaged 0.049 pCi/g (wet) for lake trout. Cs-137 in brown trout samples ranged from 0.048 to 0.064 pCi/g (wet) and averaged 0.056 pCi/g (wet) at the indicator locations. Cs-137 in the control samples was 0.049 pCi/g (wet) (one sample collected).

Sr-89 was detected in four of the nine samples collected. Two of the four samples were control samples. The remaining two samples were collected at the NMP (02) and the JAF (03) locations. Of the positive results, the highest concentration was found in the control sample. This concentration, however, was only slightly above the indicator sample results.

Sr-89 in lake trout samples ranged from 0.003 to 0.005 pCi/g (wet) and averaged 0.004 pCi/g (wet) in the control samples. Sr-89 was not detected in the indicator samples for lake trout. Brown trout samples showed detectable concentrations of Sr-89 in the indicator samples ranging from 0.003 to 0.004 pCi/g (wet) and a mean of 0.0035 pCi/g (wet). The control brown trout sample showed no detectable Sr-89. All positive Sr-89 results are considered to be representative of normal background Sr-89 concentrations in fish. Background levels are a result of past weapons testing in this case.

Sr-90 was detected in five of the nine samples collected. One of the five samples was a control sample. The remaining samples with positive Sr-90 results were at the NMP (02) and the JAF (03) locations.

Of the five positive results, the control result had the highest concentration. Lake trout samples for the indicator locations showed Sr-90 concentrations ranging from 0.003 to 0.004 pCi/g (wet) and a mean of 0.0035 pCi/g (wet). The lake trout control samples result showed no detectable Sr-90. However, the control sample result for brown trout was 0.013 pCi/g (wet), significantly greater than the indicator sample mean of 0.0035 pCi/g (wet) for the lake trout samples. Sr-90 was not detected in the indicator samples for brown trout. As noted above, the control sample result for brown trout was 0.013 pCi/g (wet).

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

A. 3. Fish - Table 5A, 5B (cont.)

All positive results are considered to be representative of normal background Sr-90 concentrations in fish. This is especially evident when considering the highest Sr-90 concentration in the spring fish collections for the indicator samples (0.004 pCi/g [wet]) and the highest concentration in the control samples (0.013 pCi/g [wet]). These background levels of Sr-90 are a result of past weapons testing.

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 (lake trout and brown trout) ranged from 2.5 to 3.6 pCi/g (wet) and 2.8 to 3.1 pCi/g (wet) for the control samples.. No other radionuclides were detected in the spring fish samples.

Fall sample collections were comprised of two separate species and nine individual samples. Six samples of lake trout and three samples of brown trout were collected at a combination of two on-site sample locations (NMP and JAF) and one off-site sample location (Oswego Harbor area). Samples were collected by gill net in October.

Cs-137 was detected in all nine samples including the three control samples. Control samples showed Cs-137 concentrations to be greater in the indicator samples from the on-site locations. The detected concentrations were not significantly different from one another because of the extremely small quantities detected. Cs-137 in lake trout samples at the indicator locations ranged from 0.034 to 0.045 pCi/g (wet) and averaged 0.042 pCi/g (wet). Brown trout samples from the indicator locations ranged from 0.049 to 0.053 pCi/g (wet) and averaged 0.051 pCi/g (wet). The associated control sample was 0.047 pCi/g (wet).

Sr-89 concentrations for the fall samples were all less than the minimum detectable level. Sr-89 was not detected at any of the on-site or off-site sample locations.

Sr-90 was detected in five of the nine samples collected. Sr-90 was detected at indicator as well as control sample locations. Indicator samples for both lake trout and brown trout showed Sr-90 concentrations approximately equal to control sample locations. Indicator samples ranged from 0.002 to 0.005 pCi/g (wet) and averaged 0.003 pCi/g (wet). Control sample results ranged from 0.002 to 0.004 pCi/g (wet) and averaged 0.003 pCi/g (wet). Sr-90 results at both indicator and control sample locations are indicative of background Sr-90 concentrations and are a result of past weapons testing.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

A. 3. Fish - Table 5A, 5B (cont.)

K-40 was detected in all of the fall samples collected. Detectable concentrations of K-40 in the indicator samples (lake trout and brown trout) ranged from 2.1 to 3.2 pCi/g (wet) and 2.5 to 3.0 pCi/g (wet) for the control samples. No other radionuclides were detected in the fall fish samples.

In addition to the normal fall fish samples, extra samples were collected shortly after the lake trout and brown trout sample collections. White sucker samples were collected at this time. White sucker samples were not available at all locations during the schedule sample collections (i.e., when the lake trout and brown trout samples were collected). White sucker samples were analyzed because they represent a group of "bottom feeders" contrasting the predatory species of lake trout and brown trout.

Samples of white sucker were collected in the vicinity of the NMP and JAF discharges as well as from the inlet canal at the Oswego Steam Station (control sample). Gamma spectral analyses were performed on these three samples. Analyses for Sr-89 and Sr-90 were also performed. These samples are not considered Environmental Technical Specification (ETS) samples.

Cs-137 was detected in all three of the white sucker samples (control and indicator sample locations). Cs-137 in the two indicator samples was 0.06 pCi/g (wet) and 0.039 pCi/g (wet) respectively. Cs-137 in the control sample was 0.027 pCi/g (wet). Although the one indicator sample (NMP) had a detected concentration of 0.06 pCi/g (wet) or approximately two times the control result of 0.027 pCi/g (wet), this difference is not considered significant because of the minute amounts of Cs-137 measured in these two samples. In addition, control sample data in 1981 showed Cs-137 concentrations as high as 0.058 pCi/g (wet).

K-40 was detected in all three extra white sucker samples. Detected concentrations ranged from 3.6 to 4.5 pCi/g (wet). The control sample showed 2.8 pCi/g (wet). It is interesting to note here that the same pattern of concentration in the indicator and control samples for Cs-137 is present for K-40 (in fact the proportions are almost identical). That is, the K-40 and Cs-137 concentrations were approximately 200% of the control result at the JAF location and approximately 130% of the control result at the NMP location.

No other gamma emitting radionuclides were detected in the extra white sucker samples.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

A. 3. Fish - Table 5A, 5B (cont.)

Sr-89 and Sr-90 concentrations for the fall extra white sucker samples were all less than the minimum detectable level. Sr-89 and Sr-90 was not detected in any of the control or indicator samples.

Review of past environmental data indicates that the Sr-89 concentrations have decreased steadily since 1976 for both indicator and control locations. The indicator sample mean results have decreased significantly since 1976. These results range from an annual mean of 0.27 pCi/g (wet) in 1976 to 0.0036 pCi/g (wet) in 1982. Control sample results have also decreased significantly from 0.24 pCi/g (wet) in 1976 to 0.0042 pCi/g (wet) in 1982. Sr-90 annual mean sample results have decreased from 0.28 pCi/g (wet) in 1976 to a low of 0.0035 pCi/g (wet) in 1982. 1981 and 1982 mean sample results are approximately the same. Control sample results have decreased as well, from 0.25 pCi/g (wet) in 1976 to 0.0026 pCi/g (wet) in 1982. Sr-90 was not detected in 1981, however, the LLD level and the 1982 detected level are approximately equal. A general decline in detectable Sr-89 and Sr-90 results is most probably a result of the incorporation of these radionuclides with organic and inorganic substances through ecological cycling. In addition, Sr-89 has a relatively short half-life of 52 days.

The mean 1982 Cs-137 concentrations have decreased slightly from 1981 for the indicator samples and significantly from 1980 to 1976. Concentrations for these samples decreased from a level of 1.4 pCi/g (wet) in 1976 to a level of 0.048 pCi/g (wet) in 1982. Control sample results have also decreased from a level of 0.12 pCi/g (wet) in 1976 to a level of 0.050 pCi/g (wet) in 1982. Results from 1979 to 1982 have remained fairly consistent.

As noted for Sr-89 and Sr-90 above, the general decreasing trend for Cs-137 is most probably a result of ecological cycling. A significant portion of Cs-137 detected since 1976 in fish is a result for weapons testing fallout, and the general downward trend in concentrations will continue as a function of ecological cycling and nuclear decay.

Lake Ontario fish are considered an important food source by many. Therefore, fish is an integral part of the human food chain. Based on the importance of fish in the local diet, a reasonable conservative estimate of dose to man can be calculated. Assuming that the average adult consumes 6.9 kg of fish per year (Regulatory Guide 1.109) and the fish consumed contains an average Cs-137 concentration of 0.048 pCi/g (wet) (annual mean result of indicator samples for 1982), the whole body dose received would be 0.024 mrem per year.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

A. 3. Fish - Table 5A, 5B (cont.)

The critical organ in this case is the liver which would receive a calculated dose of 0.036 mrem per year. Using the same above criteria, the calculated doses associated with Sr-89 are 0.003 mrem per year whole body dose and 0.102 mrem per year bone dose (critical organ). Calculated doses as a result of Sr-90 are 0.616 mrem per year whole body dose and 2.510 mrem per year bone dose (critical organ). These whole body and critical organ doses are conservative calculated doses associated with consuming fish from the Nine Mile Point area (indicator samples).

Conservative whole body and critical 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 (6.9 kg per year) but the average annual Cs-137 mean concentration for the control samples is 0.050 pCi/g (wet). The calculated Cs-137 whole body dose is 0.025 mrem per year and the associated dose to the liver is 0.038 mrem per year. Doses as a result of Sr-89 are 0.003 mrem per year (whole body) and 0.106 mrem per year (bone). Sr-90 doses are 0.642 mrem per year (whole body) and 2.615 mrem per year (bone).

Calculated doses as a result of fish consumption (lake trout and brown trout) at the indicator and control locations are presented below.

	Indicator		Control	
	Whole Body*	Critical Organ*	Whole Body*	Critical Organ*
Cs-137	0.024	0.036 (liver)	0.025	0.038 (liver)
Sr-89	0.003	0.102 (bone)	0.003	0.106 (bone)
Sr-90	0.616	2.510 (bone)	0.642	2.615 (bone)

*Doses in mrem per year. Consumption assumed for all months.

In summary, the whole body and critical organ doses observed as a result of consumption of fish is small. Doses received from the consumption of indicator and control sample fish are approximately the same. The dose from control sample fish are slightly higher. Doses from both sample groups are considered background doses. Doses from the consumption of white sucker samples are not considered here since these fish are rarely consumed.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

A. 4. Lake Water - Tables 6, 7, and 8

1982 lake water samples were analyzed monthly for gross beta and gamma emitters (using gamma spectral analysis). Sr-89, Sr-90, and tritium analyses were performed quarterly. Quarterly samples (i.e., Sr-89, Sr-90, and tritium) were composites of monthly samples.

The analytical results for the 1982 lake water sample program showed no evidence of plant related radionuclide buildup in the lake water in the vicinity of the site. Indicator samples were collected from the inlet canals at the Nine Mile Point Unit #1 and James A. FitzPatrick facilities. The control location samples were collected at the City of Oswego water treatment plant and consisted of raw lake water prior to treatment.

The gross beta annual mean activity for the Nine Mile Point Unit #1 and the James A. FitzPatrick inlet canals (3.00 pCi/liter) was approximately the same as the 1981 mean inlet canal results (3.0 pCi/liter), and was significantly less than the annual mean results for the years prior to 1981. The Nine Mile Point Unit #1 canal samples were greater than the control samples for six of the 12 monthly samples analyzed and ranged from 1.27 pCi/liter 4.72 pCi/liter. The James A. Fitzpatrick canal samples were greater than the control samples for 10 of the 12 monthly samples and ranged from 1.98 pCi/liter to 3.53 pCi/liter. The control sample results ranged from 1.79 pCi/liter to 3.20 pCi/liter. The fluctuation in the gross beta canal sample results is due to the natural variation in the concentration of naturally occurring radionuclides. A slight increase in the gross beta activity was noted in the Nine Mile Point inlet canal samples for September and October. These two results (4.72 pCi/liter and 3.89 pCi/liter respectively) are most probably as a result of liquid waste discharges in September and October and the reverse flow mode of the circulating water system. The discharges and reverse flow mode are covered in more detail below.

A significant reduction in gross beta concentrations is noted when reviewing inlet canal gross beta results since 1974. The reduction in gross beta activity is primarily the result of improved analytical procedures and equipment and not necessarily to changes in plant operations. Although the past elevated gross beta concentration may be due in part to past weapons testing, it is difficult to determine what portion was due to improved instrumentation and what part was due to weapons testing. There were no significant changes or trends in gross beta activity on a monthly basis for 1982.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

A. 4. Lake Water - Tables 6, 7, and 8 (cont.)

Gamma spectral analysis was performed on 36 monthly composite samples required by the Environmental Technical Specifications. Three radionuclides were detected in the inlet canal samples. Two of these radionuclides were plant related and the remaining radionuclide was naturally occurring.

Co-60 was detected in the inlet canal samples for the James A. FitzPatrick facility. Co-60 was detected in the James A. FitzPatrick inlet canal samples in January, March, and August (1.58 pCi/liter, 2.37 pCi/liter, and 1.61 pCi/liter respectively). The detected quantity of Co-60 was most probably the result of intake tempering in January and March or instrument background. On these occasions, a portion of the warm discharge water is circulated into the inlet canal. As a result of normal liquid discharges, a small portion of this discharge enters the inlet canal and may be sampled. The concentration detected is very small and is at the lower limit of detection. The August inlet canal sample, as noted above, also showed Co-60 (1.61 pCi/liter). The concentration detected here was most probably a result of instrument background. Co-60 has been detected in environmental samples on a few occasions as a result of a minute Co-60 background at the on-site counting laboratory. Co-60 was not detected in the Nine Mile Point inlet canal samples during 1982, therefore any detection of Co-60 in the James A. FitzPatrick canal samples was most probably a result of tempering (January and March) or instrument background (August). It should be noted that a quality control sample split, for the FitzPatrick March 1982 inlet canal, was analyzed by an independent contractor. The analysis of the sample split showed no detectable Co-60. The reported lower limit of detection for this sample was 0.57 pCi/liter which is one quarter of the 2.37 pCi/liter reported for the routine or in-house sample analysis. The lack of a positive Co-60 detection in the quality control sample indicates the presence of instrument or environmental background. Efforts are made to keep background levels at a minimum (below detectable levels), but because of the small quantity of material required to increase the background above detectable levels and variability of these small concentrations, background levels of plant radionuclides will at times be present.

Cs-137 was detected once during 1982 in the James A. FitzPatrick inlet canal samples for the month of January. The concentration detected here was 0.43 pCi/liter. The detection of Cs-137 in the January sample was again most probably the result of inlet canal tempering as noted above for the detection of Co-60 during January. This concentration is minute and is at the lower limit of detection for the other monthly samples.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

A. 4. Lake Water - Tables 6, 7, and 8 (cont.)

No other radionuclides were detected in the James A. FitzPatrick inlet canal samples with the exception of naturally occurring K-40. K-40 was detected three times during 1982 for the months of January, September and November. The concentrations detected during these months were 4.5 pCi/liter, 16.5 pCi/liter and 14.2 pCi/liter respectively.

Co-60 was not detected during 1982 in the Nine Mile Point inlet canal samples. The lower limit of detection values for monthly samples ranged from 1.11 pCi/liter to 2.02 pCi/liter which was at the approximate detection levels for Co-60 in the James A. FitzPatrick samples. Two monthly samples did show Cs-137 concentrations for the months of September and October. The concentrations detected here were slightly above the lower limit of detection for Cs-137 in the other monthly samples. The September sample showed a Cs-137 concentration of 3.72 pCi/liter and the October sample showed a Cs-137 concentration of 3.25 pCi/liter.

The presence of Cs-137 in the Nine Mile Point inlet canal samples during September and October is a result of liquid discharges made during those months and the fact that the circulating water flow was in a reverse flow mode. In this case, a portion of the inlet canal becomes the pathway for the discharge flow and a portion of the discharge canal becomes a pathway for the intake flow. The liquid waste discharge pipe is located in the discharge canal vertical shaft which is part of the portion of the discharge canal that is affected by the reverse flow mode (i.e., this part of the canal receives intake water in the reverse flow mode). The intake sample (taken at the discharge canal during reverse flow) is downstream of the liquid waste discharge pipe. It is not practical or possible to acquire an inlet water sample prior to (i.e., upstream) the liquid waste discharge pipe considering the present inlet/discharge canal system design. Therefore, as noted above, the intake water sample contained a portion of the liquid waste discharge. Liquid waste discharges were made in September and October 1982 which were the same months that Cs-137 was detected in the monthly inlet canal samples. Liquid waste discharges were not made in November and December (with the exception of a very minor discharge in November). The corresponding inlet samples showed no detectable radionuclides with the exception of K-40.

No other radionuclides were detected in the Nine Mile Point inlet canal samples other than Cs-137 and K-40. K-40 was detected in the April and December inlet canal samples. The concentrations detected were 16.9 pCi/liter and 16.3 pCi/liter respectively.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

A. 4. Lake Water - Tables 6, 7, and 8 (cont.)

Water samples of the raw water prior to treatment at the City of Oswego water treatment plant showed no detectable concentrations of plant related radionuclides. K-40 was the only detectable radionuclide and was noted in October and November at a concentration of 14.3 pCi/liter and 14.8 pCi/liter respectively.

Quarterly samples for Sr-89 analysis were composites of the monthly samples. The fourth quarter Nine Mile Point inlet canal was the only location during 1982 that showed a detectable concentration of Sr-89. The quantity detected was 0.606 pCi/liter. This small detected concentration is well within the LLD range for the other samples. Sr-89 was detected in this sample as a result of the October liquid waste discharges and the reverse flow mode of the circulating water system during the fourth quarter. Sr-89 was not detected in any of the other water samples taken from the City of Oswego water treatment plant, the Nine Mile Point inlet canal, or the James A. FitzPatrick inlet canal. The lower limit of detection values for the City of Oswego water treatment plant, the Nine Mile Point inlet canal, and the James A. FitzPatrick inlet canal samples ranged from 0.396 pCi/liter to 2.23 pCi/liter.

Quarterly samples for Sr-90 analysis were composites of the monthly samples as noted for the Sr-89 analysis. Sr-90 was detected in all quarterly samples for 1982 at all three locations. At the City of Oswego water treatment plant or control location, Sr-90 ranged from 0.75 pCi/liter to 5.30 pCi/liter with a mean of 2.04 pCi/liter. Sr-90 in the Nine Mile Point inlet canal samples ranged from 0.40 pCi/liter to 3.07 pCi/liter and showed a mean of 1.16 pCi/liter. The James A. FitzPatrick inlet canal samples showed Sr-90 ranging from 0.691 pCi/liter to 1.55 pCi/liter and a mean value of 1.01 pCi/liter. As demonstrated, the control location showed the highest mean result (2.04 pCi/liter) which is a result of natural variation in the distribution of Sr-90. Sr-90, as detected in the 1982 water samples, is considered to be background Sr-90 as a result of past weapons testing.

Tritium samples, as noted above for Sr-89 and Sr-90, are quarterly samples that are a composite of the appropriate monthly samples. Tritium was detected in all samples taken at all three locations. The City of Oswego water treatment plant showed tritium concentrations ranging from 112 pCi/liter to 307 pCi/liter with a mean of 165 pCi/liter. Tritium concentrations for the James A. FitzPatrick inlet canal ranged from 194 pCi/liter to 311 pCi/liter and showed a mean concentration of 266 pCi/liter. Inlet canal samples taken at Nine Mile Point showed tritium concentrations ranging from 202 pCi/liter to 4,620 pCi/liter. The annual mean concentration was 1,478 pCi/liter.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

A. 4. Lake Water - Tables 6, 7, and 8 (cont.)

The maximum concentration (4,620 pCi/liter) and the mean concentration (1,478 pCi/liter) were significantly greater than the control results. As noted above for the detection of Cs-137 in the Nine Mile Point inlet canal samples during September and October, liquid waste discharges were made during those months. These discharges showed concentrations of tritium. As a result of the reverse flow mode and the location of the liquid waste discharge pipe, a portion of this effluent was sampled (the campling equipment is located slightly downstream of the liquid waste pipe). Since monthly samples were composited to quarterly samples, it stands to reason that the third and fourth quarter samples of the inlet canal should show tritium concentrations. Observation of the data shows that the third quarter sample was approximately four times the normal inlet canal concentrations and the fourth quarter result was approximately twenty-three times the normal canal concentrations. Since a significant portion of the September-October discharges were made in October, it is reasonable to expect that the fourth quarter (October - December) inlet canal sample would demonstrate the higher tritium concentration of the two. Although this sample represents intake water from Lake Ontario, the presence of tritium in this sample is indicative of the location of the liquid waste discharge pipe. During the third and fourth quarters, the James A. FitzPatrick inlet canal samples showed tritium concentrations consistent with the first half of the year and within the natural variability of tritium in lake water.

Evaluation of past environmental data shows that gross beta concentrations in water samples have decreased significantly since 1977 at both the indicator sample locations (inlet canals) and at the control location (Oswego City water). As noted previously, however, the decrease is primarily a result of more superior analytical instrumentation. Since 1978, gross beta levels have remained relatively constant at both indicator and control locations. Indicator annual means ranged from 15.8 pCi/liter in 1977 to 41.8 pCi/liter in 1976. For the period of 1978 through 1981, annual means ranged from 2.98 pCi/liter (1981) to 4.53 pCi/liter (1978). The indicator annual mean for 1982 was 3.00 pCi/liter. Control sample annual means were also relatively high during 1975 to 1977. During these years, the concentrations ranged from 45.33 pCi/liter (1975) to 10.9 pCi/liter (1977). Data from 1974 for the control location was deleted from this comparison because of questionable results. For the period 1978 through 1981, annual mean gross beta concentrations ranged from 2.60 pCi/liter (1980) to 3.55 pCi/liter (1978). The control annual mean for 1982 was 2.42 pCi/liter.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

A. 4. Lake Water - Tables 6, 7, and 8 (cont.)

Review of previous data for Sr-89 and Sr-90 demonstrates that results have been variable since 1975. Sr-89 for the indicator samples has ranged from not detected (1976, 1977, and 1979) to 0.78 pCi/liter (1981) and has been relatively consistent when detected. At the control locations, Sr-89 ranged from not detected (1975-1978 and 1981) to 1.4 pCi/liter (1980). During 1982, Sr-89 showed an annual mean of <0.97 pCi/liter (LLD) at the control location and 0.61 pCi/liter at the indicator locations. Sr-90 annual means have remained relatively consistent at both indicator and control sample locations since 1975. Mean results for the indicator samples ranged from not detected (1975 and 1976) to 1.00 pCi/liter (1977 and 1980). Mean results at the control sample location ranged from not detected (1975 - 1978) to 1.10 pCi/liter (1980). The annual mean Sr-90 results during 1982 for the indicator samples and control samples were 1.08 pCi/liter and 2.04 pCi/liter respectively.

Previous annual mean results for tritium at the indicator sample location has decreased slightly since 1976. Sample results were available since 1974 through 1981 and showed a peak value of 513.0 pCi/liter (1976) and a minimum value of 234 pCi/liter (1979). The annual mean tritium result at the indicator locations for 1982 was 740 pCi/liter. This result is higher than the annual mean for any of the previous years but this mean reflects the two elevated results at the Nine Mile Point location in the third and fourth quarters. The two elevated results were a result of the September and October liquid waste discharges and the reverse flow mode at the Nine Mile Point facility, as noted above.

Mean tritium results at the control location have decrease slighly since 1976 as was noted for the indicator samples. Mean annual results were available for 1974 through 1981. These results showed that tritium at the control location ranged from not detected (1974) to 652 pCi/liter (1976). 1979 through 1981 mean results were consistent, as was also noted for the indicator results. The control peak concentration (652 pCi/liter) was greater than the peak concentration in the indicator samples (513 pCi/liter).

The impact, as expressed by a dose to man, is not assessed here since the primary pathway, in this case, is drinking water. The nearest source for drinking water is the City of Oswego water treatment plant which is the control location for the sampling program. The results of the control location are consistent with previous years' results and are representative of normal background radionuclide concentrations in lake water and regional drinking water.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

B. Terrestrial Program

Tables 9 through 21 represent the analytical results for the terrestrial samples collected for the 1982 reporting period.

1. Air Particulate Gross Beta - Tables 9 and 10

Tables 9 and 10 contain the weekly air particulate gross beta results for the six off-site and nine on-site sample locations. The samples were counted at a minimum of twenty-four hours after collection to allow for the decay of naturally occurring radionuclides with short half-lives. A total of 317 off-site and 476 on-site samples were collected and analyzed during 1982. No significant levels of gross beta activity were observed in any of the samples. The off-site or control mean concentration for 1982 was 0.033 pCi/m^3 while the indicator or on-site sample mean was equal to 0.031 pCi/m^3. As noted, the on-site annual mean is about ten percent lower than the off-site mean for the same period. This difference in mean concentration has been exhibited in the past eight years with the exception of 1977 when a higher annual mean gross beta activity was observed for the on-site sampling stations. In these seven years, the control stations' annual mean ranged from a minimum difference of 8.5 percent higher than the indicator observed in 1981 to a maximum difference of 28.6 percent higher, observed in 1978. The difference in off-site and on-site weekly and monthly mean values for gross beta could be the result of a combination of the many natural processes which can affect environmental concentrations. The most significant parameter that could possibly contribute to a depressed or lower concentration for the on-site stations would be location. The close proximity of on-site sampling stations to the lakeshore (Lake Ontario) would account for lower concentrations of naturally occurring radionulcides being collected on the sample media. Surface winds from off the lake would contain less particulate matter and airborne gases than surface winds from adjacent land areas. The major component of gross beta concentrations are potassium-40 and decay or daughter products of uranium and thorium. The concentrations of these nuclides in the ground level atmosphere are dependent upon the local geology and its chemical constituents. Thus, surface wind over land areas have a potential for containing higher concentrations of naturally occurring radionuclides.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

B. 1. Air Particulate Gross Beta - Tables 9 and 10 (cont.)

Review of air particulate gross beta concentrations shows that no significant increases in concentration occurred during 1982. The standard deviation for sample results on an individual sample basis is 0.02 for both the on-site and off-site data base, representing small variation in analytical results for the year. Week #32 (August 2, 1982 through August 10, 1982) showed an on-site mean concentration of 0.51 pCi/m^3 which was 76 percent greater than the concurrent off-site weekly mean concentration. The on-site particulate filters for this week were analyzed for gamma emitter using a gamma spectral analysis. No plant related radionuclides were detected in this sample above the limits of detection.

The observed increases and decreases in general gross beta activity can be attributed to changes in the environment. As discussed above, the concentration of the naturally occurring radionuclides in the lower limits of the atmosphere directly above land areas are affected by time related processes such as wind direction, snow cover, soil temperature and soil moisture content. Little change was noted in gross beta activity which corresponded with seasonal changes as has been observed in past years.

In general, the gross beta activity in air particulate samples has decreased significantly. The mean 1982 concentration for both off-site and on-site is five times lower than the mean concentration detected in 1981. This five-fold reduction in activity is directly attributable to the increased activity detected in 1981 as a result of fallout from an atmospheric nuclear test (i.e., the October 1980 Chinese Weapons Test) and subsequent return to background levels in 1982. The trend of gross beta activity in the environment is that of reduced concentrations. The mean 1982 concentration was the lowest level of gross beta activity observed since 1974. This general decrease is most probably the result of the reduction of atmospheric nuclear testing in recent years in comparison to the 1960's when such testing was conducted on a more frequent basis.

2. Monthly Air Particulate Composites - Table 11

Weekly air particulate samples were composited monthly by location into two on-site composites and two off-site composites. On-site composites include B-1 (stations D1, D2, E, F, and G) and B-2 (H, I, J, and K). Off-site composites include A-1 (stations C, D1 and D2) and A2 (stations E, F, and G).

The results for the composite samples analyzed during the 1982 sample program showed positive results for Ra-226, K-40, Be-7, Ce-144, Nb-95, Cs-137, Ru-106, Mn-54, and Co-60. All nine of these radionuclides were detected in the on-site composites and in the off-site composites with the exception of Ru-106.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

B. 2. Monthly Air Particulate Composites - Table 11 (cont.)

Ra-226, K-40 and Be-7 are naturally occurring. Ce-144, Nb-95, Cs-137 and Ru-106 are a result of weapons testing. Co-60, and Mn-54 are possibly a result of weapons testing or operations at the site or a combination of both. The total number of radionuclides detected in 1982 was significantly less than 1981. This decrease was a result of the decay and deposition of weapons testing radionuclides. Concentrations of Zr-95, Ce-141, Ru-103, La-140 and Ba-140 were not detected in 1982 as they had been in 1981.

Nb-95, Ce-144 and Cs-137 were detected at varying concentrations in both on-site and off-site composites. Nb-95 was detected three times during the year in off-site composite samples and eight times in on-site composite samples. Nb-95 ranged from 0.00045 pCi/m^3 to 0.00058 pCi/m^3 for the off-site samples and from 0.00020 pCi/m^3 to 0.00075 pCi/m^3 for the on-site composites. The mean for the off-site composites (0.00051 pCi/m^3) was slightly greater than the mean for the on-site composites (0.00046 pCi/m^3). Ce-144 was detected in both off-site and on-site composites. Ce-144 ranged from 0.00118 pCi/m^3 to 0.00245 pCi/m^3 in off-site samples and 0.00090 pCi/m^3 to 0.00295 pCi/m^3 in on-site samples. The mean for the off-site composites was greater than the on-site composite mean (0.00176 pCi/m^3 vs. 0.00159 pCi/m^3). Cs-137 was detected at least 33% of the time in both on-site and off-site composites. Off-site composites showed Cs-137 concentrations ranging from 0.00016 pCi/m^3 to 0.00093 pCi/m^3 whereas on-site composites ranged from 0.00012 pCi/m^3 to 0.00067 pCi/m^3. Cs-137 mean concentrations for the off-site composites were greater than the on-site composites (0.00043 pCi/m^3 versus 0.00036 pCi/m^3).

The presence of Nb-95, Ce-144, and Cs-137 in approximately equal concentrations at the off-site and on-site locations is an indication of a weapon testing origin. Nb-95 and Ce-144 were not detected after July for all composite samples with the exception of one detection of Nb-95 in November (on-site B-2 composite). Nb-95 and Ce-144 were noted in 1981 as steadily decreasing in concentration from the October 1980 Chinese weapons test. Concentrations for Nb-95 ranged from 0.1342 pCi/m^3 to 0.00045 pCi/m^3 during 1981 and ranged from 0.00075 pCi/m^3 to not detected in 1982. Ce-144 showed a similar trend in 1981-1982. Cs-137 ranged from 0.00453 pCi/m^3 to 0.00018 pCi/m^3 during 1981 and during 1982 ranged from 0.00093 pCi/m^3 to not detected. Cs-137 during the last four months of 1982 was only detected in four of the sixteen composite samples. Cs-137 would be expected to be detected for a longer time period than Nb-95 and Ce-144 because of its radiological half-life (30 years versus 35 days for Nb-95 and 284 days for Ce-144). It appears, however, that other factors are involved, such as deposition.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

B. 2. Monthly Air Particulate Composites - Table 11 (cont.)

Although Cs-137 is a constituent of site gaseous effluents, its presence in on-site composites is a result of weapons testing. Two observations point to this. First, Cs-137 concentrations in on-site and off-site composite samples are approximately equal. In actuality, the off-site composite sample results are slightly greater. If the Cs-137 detected in the on-site composite samples was a result of site effluents, it would be expected that the on-site composite samples would show a greater Cs-137 concentration than the off-site composite samples when considering release data and gaseous dilution coefficients. Secondly, the presence of Cs-137 as a site gaseous effluent is small for ground level releases when compared to other particulate effluents such as Ba-140, La-140, or Mn-54. If the Cs-137 detected in the on-site particulate composite samples was a result of site gaseous effluents, other radionuclides, such as La-140, or Mn-54 would be detected. La-140 was not detected during 1982 and Mn-54 was detected only once which could very well be a result of the 1980 Chinese weapons test (see below).

Ru-106 was detected once during 1982 in February in an on-site composite sample. Ru-106 is a result of the 1980 Chinese weapons test and was noted during 1981 in both on-site and off-site composite samples. This radionuclide was not detected after September of 1981 with the exception of two composite samples out of a total of sixteen composite samples. The decreasing trend from 1981 to 1982 is a result of the radiological half-life of Ru-106 (367 days) and deposition. Ru-106 was detected at a concentration of 0.00201 pCi/m^3.

Mn-54 and Co-60 were detected in both on-site and off-site composite samples during 1982. Mn-54 was detected once in an off-site composite at a concentration of 0.00023 pCi/m^3 (February A-1 off-site composite) and once in an on-site composite at a concentration of 0.00020 pCi/m^3 (January B-1 on-site composite). The presence of Mn-54 in both on-site and off-site composite samples in the early part of the year indicates that this radionuclide is most probably a result of weapons testing, specifically, the October 1980 Chinese weapons test. Mn-54 was first detected after October 1980 in January 1981 in the A-1 off-site composite sample at a concentration of 0.00028 pCi/m^3, and was detected in all on-site and off-site composites by March of 1981. A maximum concentration of 0.00191 pCi/m^3 was detected in May in an on-site composite sample. The maximum off-site concentration was approximately equal to this result and was noted at a concentration of 0.00158 pCi/m^3. Mn-54 decreased after May 1981 until it was detected sporatically after September and not detected after November.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

B. 2. Monthly Air Particulate Composites - Table 11 (cont.)

The two positive results in January and February of 1982 are most probably a continuation of the downward trend seen in the last four months of 1981 where Mn-54 was only detected sporatically. Historically, Mn-54 has been detected in air particulate composites for a period of up to several years after weapons testing. The downward trend of Mn-54 is a result of the radiological half-life of Mn-54 (303 days) and deposition.

Co-60 was detected in twelve of the forty-eight monthly composite samples. Co-60 was detected in the off-site composites in January, February, and May. On-site composites showed concentrations of Co-60 in January, February, March, May, July, and September. The mean Co-60 concentration for 1982 was 0.00055 pCi/m^3 for the off-site composites and 0.00053 pCi/m^3 for the on-site composites. Co-60 ranged in concentration in the off-site composite samples from 0.00039 pCi/m^3 to 0.00066 pCi/m^3. For the on-site composite samples, Co-60 ranged from 0.00026 pCi/m^3 to 0.00095 pCi/m^3.

The evaluation of the presence of Co-60, as to whether its origin is weapons testing, site operations or both, is difficult. Co-60 was detected in off-site and on-site composite samples during the first five months of the year at approximately equal concentrations, which tends to indicate a weapons testing origin. Beyond May, however, Co-60 was detected twice in the on-site composite samples. These two positive results were approximately twenty-five percent of the concentrations detected prior to June which tends to indicate that these two results are possibly a result of operations at the site. In conjunction with this, the gaseous effluents from the site for Co-60 generally decreased during the second half of 1982. Overall, as a result of the complicating environmental conditions and the minute Co-60 concentrations detected in these samples, it is very difficult to accurately assess the presence of Co-60.

Three naturally occurring radionuclides were detected during 1982 in both off-site and on-site air particulate composite samples. These included Ra-226, K-40 and Be-7. The annual off-site/on-site means for Ra-226, K-40, and Be-7 in 10^{-3} pCi/m^3 were 5.08/2.58, 3.88/3.32, and 105/98 respectively. The off-site and on-site means were relatively constant except for Ra-226 which demonstrated a higher off-site concentration.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

B. 2. Monthly Air Particulate Composites - Table 11 (cont.)

No other radionuclides were detected in on-site or off-site air particulate composite samples during 1982 using gamma spectral analysis.

The location, concentration range and mean, and frequency of occurrence of each radionuclide detected during 1982 is included below.

Radionuclide	Location	Range*	Mean*	Frequency**
Nb-95	off-site	0.00045-0.00058	0.00051	3
Nb-95	on-site	0.00020-0.00075	0.00046	8
Ce-144	off-site	0.00118-0.00245	0.00176	11
Ce-144	on-site	0.00096-0.00295	0.00159	11
Cs-137	off-site	0.00016-0.00093	0.00043	10
Cs-137	on-site	0.00012-0.00067	0.00036	15
Ru-106	off-site	ND - ND	ND	0
Ru-106	on-site	ND -0.00201	0.00201	1
Mn-54	off-site	0.00023-0.00023	0.00023	1
Mn-54	on-site	0.00020-0.00020	0.00020	1
Co-60	off-site	0.00039-0.00066	0.00055	3
Co-60	on-site	0.00026-0.00095	0.00053	9
Ra-226	off-site	0.00468-0.00546	0.00508	3
Ra-226	on-site	0.00183-0.00414	0.00258	5
K-40	off-site	0.00250-0.00626	0.00388	9
K-40	on-site	0.00168-0.00601	0.00332	15
Be-7	off-site	0.06100-0.14800	0.10500	24
Be-7	on-site	0.05400-0.18000	0.09800	24

ND- not detected
* - results in units of pCi/m^3
**- frequency is number of times detected

Evaluation of the weapons testing radionuclides detected during 1982 indicates that these radionuclides appear after an atmospheric weapons test and then slowly decrease in concentrations through deposition and/or radiological decay. Positive results for Nb-95, Ce-144, Cs-137, and Ru-106 were not only detected in 1982 but also in peak concentrations during 1978 and 1981. The concentration of these radionuclides has fluctuated as a result of the March 1978 and October 1980 atmospheric weapons testing. Cs-137, in particular, has fluctuated as a result of the 1978 and 1980 weapons test. Although this radionuclide is a small constituent of site effluents, the annual mean concentrations have fluctuated in response to the 1978 and 1981 weapons testing.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

B. 2. Monthly Air Particulate Composites - Table 11

Thus, Cs-137 has followed similar trends that parallel the other weapons testing radionuclides such as isotopes of cerium and ruthenium, Zr-95, and Nb-95, etc. Historically, Cs-137 showed a maximum concentration of 0.00305 pCi/m^3 in 1978, decreased to 0.00107 pCi/m^3 in 1980, increased again in 1981 to 0.00453 pCi/m^3 (as a result of the October 1980 weapons test) and finally decreased to 0.00093 pCi/m^3 in 1982.

Co-60 and Mn-54 historically has shown fluctuations that are generally representative of weapons testing. Co-60, at off-site locations showed a maximum concentration of 0.0153 pCi/m^3 in 1978 (as a result of the 1978 weapons test), a decrease in 1979, and was not detected in 1980. An increase was noted during 1980 in the on-site composite sample. This may have been a result of operations at the site. An increase as a result of the 1980 weapons test, was noted in both off-site and on-site composite samples during 1981, (a maximum of 0.00162 pCi/m^3 off-site). This was followed by a decrease in 1982 to 0.00066 pCi/m^3 (off-site). Mn-54 also demonstrated a similar trend since 1978 as was noted for Co-60. During 1978, Mn-54 showed a maximum off-site concentration of 0.00264 pCi/m^3, followed by a decrease to a point where it was not detected off-site during 1979 and 1980. Mn-54 was detected on a few occasions on-site during 1979 and 1980 at very low concentrations. 1981 showed Mn-54 concentrations increasing to 0.00162 pCi/m^3 as a result of the 1980 weapons test. Mn-54 was only detected twice during 1982 at significantly lower concentrations than those detected in 1981.

Assessment of the presence of radionuclides in air particulate composite samples can be depicted by calculating doses to man as a result of inhalation.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

B. 2. Monthly Air Particulate Composites - Table 11 (cont.)

Using the average child inhalation rate of 3,700 m^3 per year or 308.3 m^3 per standard month (Regulatory Guide 1.109) and the mean concentration measured at the on-site sample stations, the following annual doses can be calculated.

Nuclide	Concentration (10^{-3} pCi/m^3)	No. Months Detected	Origin	Dose* (mrem/year)
Nb-95	0.46	6	Fallout	0.00014
Ce-144	1.59	7	Fallout	0.01108
Ru-106	2.01	1	Fallout	0.00240
Cs-137	0.36	10	Fallout/Plant	0.00003
Co-60	0.53	6	Fallout/Plant	0.00187
Mn-54	0.20	1	Fallout/Plant	0.00003

Total Dose - 0.01555
Fallout Dose - 0.01362 (87.6%)
Fallout/Plant Dose- 0.00193 (12.4%)

The table above illustrates that the average dose received by a child from inhalation of air in the vicinity of the site is approximately one-one hundredth of a mrem per year. Of this average yearly dose, the dose received from radionuclides that are possibly a result of operations at the site is approximately twelve percent or 0.002 mrem per year. This dose is actually a significant overestimate because these radionuclides (i.e., possibly site related) where shown to correspond to similar trends in concentrations that were noted for radionuclides that are strictly of fallout origin. Thus, the dose received from radionuclides that are possibly related to operations at the site is minute and insignificant as demonstrated by this pathway (inhalation).

*Dose to the lung.

B. 3. Airborne Radioiodine (I-131) - Tables 12 and 13

During the 1982 sampling program airborne radioiodine was detected in one of the 317 weekly samples collected from the six off-site sampling stations. An I-131 concentration of 0.039 pCi/m^3 was detected at the D-1 off-site sampling station for the sampling period of June 8, 1982 to June 15, 1982. The resulting dose to man can be calculated at this off-site location based on an inhalation rate of 160 m^3 per week (Regulatory Guide 1.109) and the measured concentration. The dose received by man at sampling station D-1 off-site would be 0.00018 mrem to the thyroid and 0.00000031 mrem to the whole body for a one week exposure. The result of I-131 at an off-site sampling location is not routine. In the 1,247 weekly off-site I-131 samples collected in 1979 through 1982 I-131 was only detected once and is noted above. Positive I-131 results were noted in off-site stations during 1977 and 1978.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

B. 3. Airborne Radioiodine (I-131) - Tables 12 and 13 (cont.)

I-131 was detected in twelve of the 476 on-site samples analyzed in 1982. These samples which contained radioiodine covered a total of eight sample weeks or periods. The environmental I-131 concentrations detected in on-site samples during 1982 are outlined below.

Sample End Date	On-site Sample Station	Concentration I-131, pCi/m^3	Dose (mrem) Thyroid/Whole Body
03/22/82	D-2	0.0244±0.004	0.00011/0.00000019
03/29/82	I	0.0250±0.006	0.00012/0.00000010
07/12/82	H	0.0104±0.004	0.00005/0.00000008
07/19/82	H	0.0169±0.005	0.00008/0.00000013
	I	0.0424±0.005	0.00019/0.00000033
07/26/82	D-2	0.0131±0.004	0.00006/0.00000010
	H	0.0146±0.003	0.00007/0.00000012
08/16/82	H	0.0064±0.004	0.00003/0.00000006
	J	0.0105±0.004	0.00005/0.00000008
08/30/82	H	0.0036±0.003	0.00002/0.00000002
	J	0.0024±0.003	0.00001/0.00000002
09/13/82	J	0.0239±0.006	0.00011/0.00000019
		TOTAL	0.00090/0.00000142

The spacial distribution of the I-131 concentrations show that five of the positive results were observed at H and three at J on-site air monitoring stations with two positive results observed at both the D-2 and I on-site air monitoring stations.

The four on-site air monitoring stations showing positive I-131 concentrations in 1982 are located, in reference to the Nine Mile Point Unit 2 reactor centerline, at approximately 0.80 miles @ 71° (H on-site); 0.80 miles @ 98° (I on-site); 0.90 miles @ 110° (J on-site); and 0.40 miles @ 140° (D-2 onsite). A meaningful dose estimate is difficult to make for the I-131 concentrations at the four on-site sampling stations as there are no residencies or individuals in the immediate vicinity of the sample locations. As noted on Figure 2 and 3, the H, I, J and D-2 air monitoring stations are well within the site boundary or controlled area. The above table illustrates the doses that can be calculated using the assumption that a critical individual was present at all the monitoring locations simultaneously for the total period of time for which the I-131 was collected (i.e. 7 days). Such an individual does not exist but the calculated dose can be used for the purpose of illustration. The critical organ for this example is the thyroid gland.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

B. 3. Airborne Radioiodine (I-131) - Tables 12 and 13 (cont.)

The calculated total dose for the above mentioned critical individual would be 0.00090 mrem to the thyroid and 0.00000142 mrem to the whole body assuming a seven day sample period and an inhalation rate of 160 m^3 per sample period (Regulatory Guide 1.109). The resulting calculated dose due to on-site I-131 concentration is extremely small and can be compared to a similar dose from natural or background radiation that an individual could receive as a result of changing elevation. An individual residing one meter (3.28 feet) higher in altitude for a period of 37.3 minutes would receive an additional radiation dose of 0.00000142 mrem which is equal to the total calculated dose to the whole body from environmental I-131 concentrations.

The end result of the 1982 I-131 sampling effort showed no significant impact due to operations at the site. During 1982, I-131 was not detected in any other environmental sample media including milk and green leafy vegetables.

B. 4. TLD (Environmental Dosimeter) - Table 14

TLD's were collected once per quarter during the sample year. The TLD results are an average of four independent readings at each location and are reported in mrem per standard month. Each location has two TLD's with each TLD containing two distinct calcium sulfate dosimeters. In 1982, TLD's for the most part were collected on March 31, 1982, July 1, 1982, September 30, 1982 and December 30, 1982.

TLD results are organized into three groups for reporting purposes. The groups are on-site TLD's (defined as TLD's in the immediate proximity of the individual facilities, at points of interest), environmental station TLD's (a ring of TLD's surrounding the generating facilities as a group), and off-site TLD's (TLD's located off the site property or controlled area and ranging up to 20 miles from the site).

A net dose at the environmental station TLD's can be calculated simply by subtracting the mean standard monthly off-site doses from the mean standard monthly on-site environmental station doses*. Environmental station TLD's are arranged in a concentric circle and range in distance from the individual facilities from 1,500 to 2,000 feet. The net dose per mean standard month for each quarter is as follows:

Quarter	Net Environmental Station Dose**
1	0.21
2	0.88
3	0.94
4	0.61

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

B. 4. TLD (Environmental Dosimeter) - Table 14 (cont.)

The annual site property boundary dose for 1982 cannot be determined from the net environmental station dose since the property boundary extends out to approximately 0.75 miles from the site (i.e., beyond the concentric circle of environmental station TLD's). A general estimate can be made based on two available TLD's located at the site boundary. The net dose per standard month for each quarter can be calculated for these two locations (TLD numbers 19 and 15) east and west of the site. This calculation is conservative since it represents the shortest distance to populated areas.

Quarter	Net Environmental Station Dose**
1	-0.13
2	-0.35
3	-0.32
4	-0.33

As observed, the site boundary dose based on two available TLD locations is less than the average off-site dose. This is probably due to the difference in ground dose rates which are indicative of variable concentrations of naturally occurring radionuclides in soil and rock such as radium, uranium, thorium, and potassium. The difference could also result from statistical variation in the TLD readings, as the site boundary dose is based on a population of only eight individual readings per quarter (two TLD's).

TLD numbers 31 and 39 are located within the Nine Mile Point #1 restricted area near the radwaste facility and are influenced by the close proximity to the building. TLD numbers 27 through 30 and 47 are located within the restricted area of the James A. FitzPatrick radwaste facility and are influenced by the buildings. TLD number 59 is located near the restricted area of the FitzPatrick Plant stack and is influenced by the proximity to this structure. TLD number 3 is located at the construction site of Nine Mile Point #2. This TLD was subject to radiography at the Unit #2 site and to a much lesser extent the FitzPatrick and Nine Mile Point Unit 1 facilities.

TLD results remained fairly consistent for most TLD locations each quarter. A slight increase in natural background radiation levels were noted for off-site TLD's in the third quarter of the year. This is most probably a result of increased emission rates for radon and thoron gases emanating from the ground. The emission rates are related to ground moisture content and other natural parameters.

*Location numbers 5, 6, 7, 23, 24, 25, and 26.
**Dose in mrem per standard month.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

B. 4. TLD (Environmental Dosimeter) - Table 14 (cont.)

On-site TLD results remained fairly consistent except for TLD's located near radwaste facilities which may be affected by the frequency of radwaste processing and shipment. These TLD's include numbers 23, 24, 27, 28, 29, 30, 47, 48 and 61 at the James A. FitzPatrick facility and number 39 at the Nine Mile Point #1 facility. TLD number 3, is located at the Nine Mile Point #2 facility and was affected by the frequency of radiography at the construction site. Radiography is a common practice at construction sites in order to determine the quality of equipment welds such as pipes. TLD's located in areas near radiography work will show fluctuating doses as the amount of radiography performed is not consistent. TLD number 59 results were variable as a result of the operating mode of the James A. FitzPatrick facility. This TLD is located near the James A. FitzPatrick facility exhaust stack.

The results of 1982 showed no detectable impact from direct radiation measured outside the site boundary.

B. 5. Radiation Monitors - Table 15

Environmental radiation monitors are located in 10 of the 15 air monitoring environmental stations. Each of the on-site environmental monitoring stations contains a radiation monitor and, in addition, the C off-site monitoring station contains a similar monitor. The radiation monitors consist of GM detector with an associated power supply, chart recorder, and trip unit. The monitor has an operating and recording range from 0.01 to 100 mrem/hr. Each radiation monitor has a small radioactive source mounted inside the detector casing to produce an on scale reading. The design intent of the monitors is to detect possible dose rates resulting from plume releases from the site. The monitors are not considered to be capable of high sensitivity environmental monitoring and do not detect minute fluctuation in levels of background radiation. Because of the relatively low sensitivity of the monitors (environmentally speaking) no comparisons are made between the radiation monitor readings and the readings from environmental TLD's.

B. 6. Milk - Tables 16, 17, and 18

Milk samples were collected from a combination of seven farms during the 1982 grazing season and the following months of November and December. The grazing season is considered to be May through October.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

B. 6. Milk - Tables 16, 17, and 18 (cont.)

One of the sample locations, number 45, was added to the milk sample locations as a result of the spring milch animal census. This location was added in July. Sample location descriptions are listed below.

Location No.	Direction from Site	Distance from Site (miles)
4	ESE	7.7
40	SW	15.3
14	ESE	9.8
16	SSW	5.2
5	SSE	7.2
7	ESE	5.5
45	SE	8.1

Milk samples were collected from each of the locations in the first half of the month and analyzed for I-131, gamma emitters, and Sr-90. I-131, gamma isotopic, and Sr-90 results are found in the analytical results section.

The gamma spectral analysis of the monthly composite samples showed K-40 to be the most abundant radionuclide detected in the milk samples collected in 1982. K-40 was detected in every sample analyzed and ranged in concentration from 970 pCi/liter to 1,700 pCi/liter at the indicator locations and 1,200 pCi/liter to 1,600 pCi/liter at the control location. K-40 is a naturally occurring radionuclide and is found in many of the environmental medias sampled.

Cs-137 was the only other radionuclide detected in the 1982 milk samples. Cs-137 was measured in ten of the fifty-four monthly samples analyzed. Cs-137 was detected in milk samples at all locations at various times throughout the year except at location number 40 which is designated as the control location. Cesium concentrations ranged from 3.5 pCi/liter to 14.0 pCi/liter for all samples with a mean of 5.7 pCi/liter. Cesium was detected at a higher frequency at locations 5 (three times), location 45 (two times) and location 7 (two times). Overall, Cs-137 was detected at a higher frequency during the months of May (four positive results) and July (three positive results) at the milk sampling locations.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

B. 6. Milk - Tables 16, 17, and 18 (cont.)

A maximum concentration of 14.0 pCi/liter was detected at location number 5 during August. Annual means for the detection of Cs-137 at all locations are presented below.

Location No.	Annual Mean (Cs-137)
4	6.8 pCi/l
40 (control)	< 4.0 pCi/l (LLD)
14	4.6 pCi/l
16	5.2 pCi/l
5	8.1 pCi/l
7	3.8 pCi/l
45	4.2 pCi/l

Annual mean Cs-137 values for each sampling location are variable but quantitatively the values are not significantly different from one another especially when the magnitude of these minute concentrations is considered. Location number 5 had an annual mean slightly higher than the other locations. Location number 40 (control location) showed no detectable Cs-137 during 1982. During 1981, location number 40 showed an annual mean Cs-137 concentration of 3.9 pCi/liter, and in 1980 the control location showed a Cs-137 concentration of 4.5 pCi/liter. Because of the minute quantities of Cs-137 detected, it is difficult to assess whether the concentrations detected were a result of operations at the site or whether part or all of the detected cesium is due to weapons testing fallout. The impact, in any case, is extremely small (see below).

An evaluation of milch animal pasture grass sampled during 1982 showed that Cs-137 was detected once in pasture grass collected from each of the milk sampling locations during 1982. Samples of pasture grass were collected in July, August, and September at each of the milk locations. Of the twenty-one samples collected, one sample showed Cs-137 at a concentration of 0.35 pCi/g (wet). The sample was taken from the control location (number 40) in July. The origin of Cs-137 in this sample was from past weapons testing fallout and probably became incorporated in the pasture grass as a result of plant uptake. As noted above, Cs-137 was not detected in any other pasture grass samples in 1982. Naturally occurring radionuclides, such as K-40, Ra-226, and Be-7, were also detected at varying concentrations in most pasture grass samples.

No other radionuclides were detected in milk samples using gamma spectral analysis.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

B. 6. Milk - Tables 16, 17, and 18 (cont.)

Sr-90 was detected in forty-seven of the fifty-four milk samples collected during 1982. Sr-90 was detected at indicator sample locations for at least ninety-one percent of the time and at the control sample location for sixty-two percent of the time. The mean Sr-90 concentration for the control location was 3.1 pCi/liter. The mean for all indicator locations (within 10 miles of the site) was 4.7 pCi/liter. The control and indicator sample means are similar. Sr-90 results for the indicator locations ranged from 1.0 pCi/liter to 9.9 pCi/liter. Control sample results ranged from 1.6 pCi/liter to 5.0 pCi/liter. The detection of Sr-90 in indicator and control locations at similar concentrations is indicative of background Sr-90 as a result of past weapons testing.

Milk samples were collected and analyzed monthly for I-131. I-131 was not detected during 1982 in any of the indicator or control samples. All 1982 I-131 milk results are reported as lower limits of detection (LLD). The LLD results ranged from < 0.1 pCi/liter to < 0.4 pCi/liter for the 1982 milk samples.

The presence of Cs-137 and Sr-90 in milk samples has been observed in many major urban areas during previous years. During the years when atmospheric weapons testing was common and subsequent to those years (i.e. 1958-1972), Cs-137 and Sr-90 were detected in milk samples at concentrations that were representative of the frequency of testing (NCRP Report No. 45). In the New York area, Cs-137 ranged from 60 pCi/liter in 1958 to a peak of 147 pCi/liter in 1963, to a concentration of 8 pCi/liter in 1972. Sr-90 demonstrated a similar trend. In 1958, Sr-90 was measured at a concentration of 6 pCi/liter and a peak concentration of 28 pCi/liter was measured in 1963., Sr-90 decreased to 8 pCi/liter in 1972.

Evaluation of previous Cs-137 data shows that Cs-137 has been detected in environmental milk samples at both indicator and control locations. Cs-137 concentrations for 1978-1981 have remainder fairly consistent and ranged from 8.6-9.9 pCi/liter at the indicator locations. The 1982 indicator mean was 5.7 pCi/liter which showed a slight decrease when compared to 1978-1981. At the control location, Cs-137 has remained fairly consistent for all years from 1978-1981 except for 1979 and 1982. For these years, this radionuclide was not detected. Cs-137 ranged from 3.9-5.8 pCi/liter during 1978-1982.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

B. 6. Milk - Tables 16, 17, and 18 (cont.)

Historical data for Sr-90 indicates that this radionuclide was detected in most indicator and control samples at approximate equal concentrations. Sr-90 at the indicator locations ranged from 4.0-5.9 pCi/liter during 1978-1981. The 1982 indicator mean was consistent with this range and showed a concentration of 4.8 pCi/liter. At the control location, Sr-90 ranged from 4.2-5.9 pCi/liter during 1978-1981. The 1982 annual mean was 3.1 pCi/liter or slightly less than the 1978-1981 range.

The impact as a result of Cs-137 in 1982 milk samples is very minimal. With respect to Cs-137, the dose to the bone resulting from Sr-90 ingestion is much more significant. As noted above, it is difficult to assess whether Cs-137 in the indicator milk samples is a result of background cesium levels, totally as a result of site operations, or partially as a result of site operations. The difficulty arises because of the minute quantities detected that are at or just above the lower limit of detection.

The impact can be assessed by calculating conservative doses to man as a result of the consumption of milk with detectable quantities of Cs-137. For the purposes of a calculated dose, the mean indicator sample Cs-137 concentration is used (5.7 pCi/liter). Assuming a consumption rate of 330 liters (87.18 gallons) per year for an infant (Regulatory Guide 1.109 maximum exposed individual), the whole body dose would be 0.054 mrem and the critical organ dose would be 0.766 mrem to the liver. The calculated doses are based on eight months of consumption (eight months of milk sample results). Since Cs-137 was not detected at the control location in 1982, a dose calculation cannot be performed. For a limited comparative purpose, the calculated dose to an infant as a result of consuming milk from the control location during 1981 would be 0.008 mrem whole body dose and 0.108 mrem critical organ dose (dose to the liver). The annual mean Cs-137 concentration for the 1981 control location was 4.3 pCi/liter (Cs-137 was only detected in one of the eight monthly samples during 1981).

The calculated dose to an adult can be determined assuming a consumption rate of 110 liters (29.06 gallons) per year (Regulatory Guide 1.109) and a mean Cs-137 concentration of 5.7 pCi/liter for the indicator locations. The resultant doses are 0.030 mrem to the whole body and 0.046 mrem to the liver (critical organ). The calculated doses are based on eight weeks of consumption. As noted above, Cs-137 was not detected at the control location, therefore no whole body or critical organ dose can be calculated. Using the example above, the dose to an adult based on the 1981 control sample results would be 0.004 mrem to the whole body and 0.006 mrem to the liver (critical organ).

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

B. 6. Milk - Tables 16, 17, and 18 (cont.)

For the purpose of illustration, the significance of the above doses can be brought into perspective by comparison to background doses due to cosmic radiation with changes in altitude. Assuming the above calculatd whole body dose, as a result of the consumption of milk, is 0.054 mrem to an infant and is totally a result of plant operations at the site, a comparison can be made to the incremental increase in dose due to cosmic radiation at sea level. A dose of 0.054 mrem whole body is equal to residing at a location 100 meters (328 feet) higher in altitude for 9.9 days.

An additional comparison can be made to naturally occurring K-40. K-40 has been noted in almost all environmental samples at significant levels. A 70 kg adult weights approximately 154 pounds and contains approximately 0.1 microcuries of K-40 as a result of normal life functions (inhalation, consumption, etc.). The dose to the bone tissue is about 20 mrem per year as a result of the internal deposited K-40. For comparison purposes, an adult bone dose can be calculated that results from the consumption of milk from the 1982 indicator locations. The mean Cs-137 concentration of 5.7 pCi/liter is used. The resulting bone dose is 0.050 mrem per year (an average milk Cs-137 concentration of 5.7 pCi/liter is applied over the entire year). This dose is 0.002 of the bone dose as a result of naturally occurring K-40 in a 154 pound adult.

The impact, if any, as a result of Sr-90 in milk, due to plant operation is extremely small since the mean result of the indicator results and the control results are approximately equal considering fluctuations in the background levels. The levels of Sr-90 detected in indicator as well as control samples are considered to be representative of background concentrations. In this regard, the resultant calculated doses would be approximately equal.

Iodine-131 was not detected in the fifty-four monthly milk samples analyzed for the 1982 program. No doses to man have been calculated because of the lack of detectable I-131. The detection of I-131 in milk samples has not been routine in the past. In past sampling programs, I-131 has been detected in milk samples in conjunction with fresh fallout from atmospheric nuclear testing.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

B. 7. Milch Animal Census - Table 19

The milch animal census is an estimation of the number of cows and goats within a ten mile radius of the Nine Mile Point Site. A census is conducted twice per year, once in the spring and once in the summer. The census is conducted by sending questionnaires to previous milch animal owners and also by road surveys to locate any possible new owners. Questionnaires not responded to are followed by telephone calls.

The number of milch animals located within the ten mile radius of the site was estimated to be 1,129 cows and 2 goats for the spring 1982 census. Five new locations were found since the summer 1981 census. The number of cows increased by 143 and the number of goats decreased by 8 with respect to the 1981 summer census. As a result of this census, a new sampling location (number 45) was added.

The 1982 summer census showed a total of 1,141 cows and 3 goats. This represents an increase of 12 cows and an increase of 1 goat with respect to the spring 1982 census. Four milch locations were deleted as a result of this census when compared to the spring 1982 census.

8. Human Food Products - Table 20

Human food product samples were comprised of meat, eggs, poultry, and vegetables. Collections for meat, poultry, and eggs were made in the spring and fall seasons. Samples of produce included vegetables with an attempt to sample at least one green leafy vegetable from each location. The collection of produce was performed in late summer or early fall. Three indicator locations were sampled for each type of media collected, in addition, a control location was sampled during each collection period. Indicator samples were collected within a ten mile radius of the site in areas which would have a high potential for demonstrating possible effects of site operations. The ultimate factor controlling sample locations was the availability of required samples. Attempts were made to maintain prior sample locations were possible.

Spring meat collections were made at one off-site or control location (greater than ten miles from the site) and at three on-site or indicator locations (less than ten miles from the site). Spring meat collections showed detectable concentrations of K-40 in all samples. K-40 concentrations ranged from 2.4 pCi/g (wet) to 6.0 pCi/g (wet). K-40 is a naturally occurring radionuclide. Two of the four spring meat samples showed detectable concentrations of Cs-137. The two positive concentrations were in the indicator samples. Cs-137 in these two samples was 0.02 pCi/g (wet) and 0.08 pCi/g (wet). Cs-137 not detected in the control sample.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

B. 8. Human Food Products - Table 20 (cont.)

Cs-137 was detected in many environmental samples and was most prevalent in meat and fish, with respect to all the sample medias collected. Cs-137 in meat samples is essentially a result of past weapons testing. Cesium is incorporated into meat tissue from feed sources. The results detected in the spring meat samples were very low concentrations and thus can be detected in some samples and not in others. By review of the 1981 spring meat sample data, it is noted that Cs-137 appeared in the control samples (0.017 pCi/g [wet] and 0.024 pCi/g [wet]. Cs-137 was also found in the control sample during 1980 (0.01 pCi/g [wet]).

Of the two meat samples that showed detectable concentrations of Cs-137, one sample (0.02 pCi/g [wet]) was approximately equal to detected concentrations in control sample results during the spring of 1981. The other result was greater than control results over the past several years. Because this result (0.08 pCi/g [wet]) is small, the impact or dose as a result of this concentration is insignificant (see below).

No other radionuclides were detected in the spring meat samples using gamma spectral analysis.

Fall meat collections were made at one control and at three indicator sample locations. The fall samples showed detectable concentrations of K-40 in all samples. K-40 concentrations ranged from 2.5 pCi/g (wet) to 3.5 pCi/g (wet). K-40 is naturally occurring.

Cs-137 was detected in two of the four fall meat samples. The two positive results were two indicator samples (less than ten miles from the site). The two results showed small concentrations of Cs-137 that were approximately at the lower limit of detection (LLD). The results were 0.02 pCi/g (wet) and 0.02 pCi/g (wet) as compared to the control sample result of $<$0.02 pCi/g (wet). These results are very small concentrations and, as noted above for the spring samples, are comparable to concentrations detected at control locations during 1981. These 1981 samples showed control Cs-137 concentrations of 0.017 and 0.024 pCi/g (wet) respectively. The impact of these small concentrations is discussed below.

No other radionuclides were detected in the fall meat samples using gamma spectral analysis.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

B. 8. Human Food Products - Table 20 (cont.)

The detection of Cs-137 in meat samples has been noted for all years since 1978 for indicator samples and since 1980 for control locations (control samples were not collected prior to 1980). The detected concentrations since 1978 at the indicator locations have been fairly consistent. These samples ranged from 0.021 to 0.036 pCi/g (wet). At the control locations, Cs-137 ranged from 0.01 to 0.021 pCi/g (wet). The indicator sample annual mean results have been slightly higher than the control sample annual mean results.

The detection of Cs-137 in meat at control and indicator sample locations is an indication of cesium production from weapons testing. During 1982, Cs-137 was not detected at the control sample locations although Cs-137 has been detected in the past at control sample locations (1981, for example). As noted above, the concentrations detected are very small and the impact or dose to man is insignificant. An average annual dose to man can be calculated as a result of meat consumption from within 10 miles of the site (indicator sample results).

The average Cs-137 concentration in meat during 1982 was 0.035 pCi/g (wet). Assuming an adult consumption rate of 95 kg per year (Regulatory Guide 1.109); the annual dose to the whole body is 0.237 mrem per year. The critical organ dose is 0.362 mrem per year to the liver. This calculated dose is small and can be compared to an annual dose of 20 mrem per year to the critical organ (the gonads in this case) as a result of naturally occurring K-40 in the environment. The calculated whole body dose (0.237 mrem per year) and the calculated critical organ dose (0.362 mrem per year to the liver) can also be compared to the dose received from control sample results during 1981. During 1981, the annual mean concentration for the control meat samples was 0.02 pCi/g (wet). Using the same consumption factor of 95 kg per year, the annual whole body was 0.136 mrem per year and 0.207 mrem per year to the liver (critical organ dose). As noted above, the 1982 control samples did not show any Cs-137 above the lower limits of detection. However, Cs-137 in meat has historically been present. Because of the small concentrations noted here, cesium can be detected in some samples and not in other samples.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

B. 8. Human Food Products - Table 20 (cont.)

Egg samples were collected in the spring (May 5-12, 1982) and in the fall (November 10-11, 1982). Samples were collected at three indicator locations (within ten miles of the site) and at one control location (greater than ten miles from the site). The only radionuclide detected during 1982 in egg samples was K-40. K-40 was detected in the spring samples at concentrations that ranged from 3.2 pCi/g to 3.8 pCi/g (wet). The fall samples showed K-40 concentrations that ranged from 1.2 pCi/g to 2.0 pCi/g (wet). For both the spring and fall samples, the control samples had the highest K-40 concentrations.

Poultry samples were taken during the spring (May 5-12, 1982) and during the fall (November 10-11, 1982) at three indicator locations and one control location. K-40 was detected in all spring and fall samples for both indicator and control results. K-40 in the spring samples ranged from 5.4 pCi/g to 8.4 pCi/g (wet). The control sample had the lower concentration (5.4 pCi/g). K-40 in the fall samples ranged from 3.1 pCi/g to 4.2 pCi/g (wet). The control sample showed a concentration of 4.1 pCi/g (wet).

Cs-137 was detected in one of the indicator poultry samples during 1982. The concentration detected was very small and was approximately at the lower limit of detection (LLD) level for all the 1982 poultry samples. The detected Cs-137 concentration was 0.03 pCi/g (wet). The LLD levels for the other samples ranged from <0.02 pCi/g (wet) to <0.03 pCi/g (wet). Historically, the control samples for poultry have not demonstrated detectable concentrations of Cs-137. Although this sample is an indicator sample (i.e., within ten miles of the site), it is difficult to assess whether the detected cesium is plant related or a minute background cesium concentration. In regards to background Cs-137, poultry can be compared to beef (meat) samples in the sense that Cs-137 can become incorporated in tissue through the ingestion pathway. Thus, poultry have the potential to ingest Cs-137 through the purchased feed they consume (possible weapons testing source) but conversely they also have the potential to incorporate Cs-137 through ingestion of local deposition (plant related source).

The impact, as a result of consumption of poultry, can be assessed by projecting a whole body and critical organ dose to an adult. A maximum and therefore very conservative dose can be calculated based on the one positive detection of Cs-137. Assuming a Cs-137 concentration of 0.03 pCi/g (wet), and a consumption rate of 95 kg per year (Regulatory Guide 1.109), a conservative dose to man can be calculated. The adult whole body dose is 0.10 mrem per year and the adult critical organ dose is 0.16 mrem per year to the liver. These doses were calculated for a six month period since Cs-137 was detected only during the first half of the year.

B. 8. Human Food Products - Table 20 (cont.)

As noted in the assessment of the meat sample data, these doses are small when compared to an annual dose of 20 mrem per year to the critical organ (the gonads in this case) as a result of naturally occurring K-40 in the environment.

An additional comparison can be made to natural background cosmic radiation and the resulting increase in dose with an increase in altitude. Using the incremental increase in dose due to cosmic radiation at sea level, a conservative dose calculation can be made. The dose due to consumption of poultry to the whole body is 0.10 mrem per year, as noted above. This dose is equal to an increase in dose due to cosmic radiation that one would receive by residing at a location 100 meters (328 feet) higher in altitude for 18.2 days. It is assumed that by residing at this location one would remain at this altitude for the full 18.2 days.

Fruits and vegetables were obtained during the harvest season. Collections were made during September at three indicator locations and one control location. A successful attempt was made to collect one broadleaf and one non-broadleaf fruit or vegetable at each location. Broadleaf vegetables of Swiss chard and cabbage and non-broadleaf fruits and vegetables of tomatoes and zucchini were collected.

K-40 was detected in all broadleaf and non-broadleaf vegetables and fruits. Broadleaf vegetables (Swiss chard and cabbage) showed concentrations of K-40 ranging from 1.5 pCi/g to 9.3 pCi/g (wet). The control sample had the highest concentration (9.3 pCi/g [wet]). Non-broadleaf fruits and vegetables (tomatoes and zucchini) showed concentrations of K-40 ranging from 1.8 pCi/g to 2.6 pCi/g (wet). Again the control location had the highest K-40 concentration (2.6 pCi/g [wet]).

In addition to K-40, another naturally occurring radionuclide was detected. Be-7 is a naturally occurring radionuclide of cosmic origin in the upper atmosphere. Be-7 was detected in two of the four broadleaf vegetable samples. Be-7 was not detected in samples of non-broadleaf fruits and vegetables. Concentrations of Be-7 detected were 0.12 pCi/g (wet) and 0.14 pCi/g (wet). One of the positive results (0.12 pCi/g [wet]) was detected in the control sample.

No other radionuclides were detected in the 1982 collection of fruits and vegetables.

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

B. 8. Human Food Products - Table 20 (cont.)

Review of past environmental data indicates that K-40 has been consistently detected in food crop samples. K-40 concentrations have fluctuated from one sample to another but the annual ranges have remained relatively consistent from year to year. Be-7 has been detected occasionally during the past on leafy vegetables (1978 through 1981).

Dose estimates are not performed here for fruits and/or vegetables since no other radionuclides with the exception of naturally occurring K-40 and Be-7 were detected.

Special Studies - Table 21

Since 1974, the detection of Cs-137 in milk samples analyzed for the Radiological Environmental Monitoring Program has been common. The specific source of the Cs-137 is not known as there are several possible source terms for this particular radionuclide. Cs-137 is a small component of plant effluents and is also a major fallout radionuclide from the detonation of thermonuclear devices in the atmosphere. Because Cs-137 has a half-life of 30.2 years it remains a detectable component of environmental sample media for many years. It is estimated that about 34 million curies (34 Megacuries) of Cs-137 have been produced in the atmosphere due to weapons testing. Cs-137 is present in many of the sample media collected for the environmental monitoring program. In the environment, cesium behaves much like potassium with regard to metabolism and elements found in living tissue.

In an attempt to better assess the presence of Cs-137 in milk samples, pasture grass samples were collected during 1982. Pasture grass samples were collected from the routine milk sample locations three times during the grazing season. Collections of pasture grass samples were made in July, August and September which resulted in a total of twenty-one samples. Each sample was analyzed for gamma emmiters. A total of four radionuclides were detected in these pasture grass samples. Three of the four radionuclides detected are naturally occurring and include Ra-226, Be-7 and K-40.

K-40 was detected in each sample and ranged in concentration from 9.3 pCi/g (wet) to 30.4 pCi/g (wet). Ra-226 was detected in eleven samples and Be-7 was detected in six of the twenty-one samples analyzed. The fourth radionuclide detected was Cs-137. Cs-137 was detected once in the August samples at the control location with a measured concentration of 0.347 pCi/g (wet). The indicator locations showed no detectable concentrations of Cs-137. The lower limits of detection (LLD) of Cs-137 for these samples ranged from a minimum of <0.141 pCi/g (wet) to a maximum of <0.329 pCi/g (wet).

III. EVALUATION OF ENVIRONMENTAL DATA (Continued)

B. 8. Special Studies -Table 21 (cont.)

The general lack of Cs-137 above detectable levels in the indicator samples demonstrates that fresh Cs-137 deposition as a result of plant effluents is not indicated in the grass-cow-milk pathway. In addition, the presence of Cs-137 in the control sample (August) indicates that this radionuclide is present in the grass-cow-milk pathway for this particular location. The Cs-137 detected here is a result of weapons testing and its origin may be from recent atmospheric deposition or from plant (pasture grass) uptake. It should be noted however, that Cs-137 was not detected in the control location milk samples during the 1982 grazing season.

9. Canal Water Data - Table 22

Table 22 fulfills the requirements of the NMP-1 Environmental Technical Specifications, Appendix B, section 2.3.2, Table 2.3-2 (Cooling Water Discharge and Cooling Water Intake).

C. Conclusion

The Radiological Environmental Monitoring Program (REMP) was established to detect and assess any possible impact to the environment surrounding the Nine Mile Point area resulting from operations at the site.

Samples representing higher trophic levels, such as fish and meat were reviewed closely to assess any impact to the general environment or to man. In addition, the data was reviewed for any possible historical trophic level bio-accumulation trends. Little or no impact could be determined resulting from radionuclide deposition considering all sources (natural, weapons testing, etc.). In regards to doses as a result of man-made radionuclides, a major portion of the doses received by a member of the public was from past nuclear weapons testing.

Any possible impact as a result of site operations is extremely minimal when compared to background or weapons testing. It has been demonstrated that almost all environmental samples contain traces of radionuclides which are a result of weapons testing or naturally occurring sources (primordial and/or cosmic related). Doses to man because of natural sources (naturally occurring radionuclides in the soil and lower atmosphere in Oswego County) account for approximately 60 mrem per year as demonstrated by control environmental TLD's. Possible doses due to site operations is significantly less than this particular natural exposure.

Therefore, as determined by review of the data presented herein, no impact due to operations at the Nine Mile Point Nuclear Station was detected that would effect the health and safety of the public.

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Sample Summaries

Environmental sample data is summarized by tables. Tables are provided for select sample media and contain data summaries based on quarterly mean values. Mean values are comprised of positive or LLD values where applicable. These tables are entitled "Environmental Sample Summary".

ENVIRONMENTAL SAMPLE SUMMARY (1982)

Medium/Sample	Location	Radionuclide	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Cladophora	Oswego	Be-7	-	0.12	<0.09	-
	6.2 mi. @ 235°	K-40	-	3.7	2.4	-
	(control)	Co-60	-	<0.006	<0.009	-
		Cs-137	-	0.007	<0.008	-
		Others	-	<LLD	<LLD	
Cladophora	NMP	Be-7	-	0.21	0.16	-
	0.3 mi. @ 275°	K-40	-	4.5	3.9	-
		Co-60	-	0.017	<0.012	-
		Cs-137	-	0.017	0.016	-
		Others	-	<LLD	<LLD	-
Cladophora	JAF	Be-7	-	<0.05	<0.12	-
	0.7 mi. @ 68°	K-40	-	4.3	3.7	-
		Co-60	-	<0.004	<0.012	-
		Cs-137	-	0.011	<0.010	-
		Others	-	<LLD	<LLD	

Results in units of pCi/g (wet)

ENVIRONMENTAL SAMPLE SUMMARY (1982)

Medium/Sample	Location	Radionuclide	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Dam Shoreline Sediment	Lang's Beach Control 5.2 mi @ 230°	K-40	–	15	–	17
		Ra-226	–	0.30	–	1.60
		Th-232	–	0.48	–	0.47
		Sr-90	–	*	–	<0.0058
		Co-60	–	<0.0046	–	<0.053
		Cs-137	–	<0.047	–	0.049
		Others	–	<LLD	–	<LLD
Dam Shoreline Sediment	Lang's Beach (extra) 5.2 mi @ 230°	K-40	–	–	12	–
		Ra-226	–	–	0.19	–
		Th-232	–	–	0.18	–
		Sr-90	–	–	0.0043	–
		Co-60	–	–	<0.061	–
		Cs-137	–	–	<0.047	–
		Others	–	–	<LLD	–
Dam Shoreline Sediment	NMP 0.3 mi @ 275°	K-40	–	16	–	16
		Ra-226	–	0.41	–	0.36
		Th-232	–	0.56	–	0.42
		Sr-90	–	<0.016	–	<0.0068
		Co-60	–	<0.044	–	0.160
		Cs-137	–	<0.071	–	0.800
		Others	–	<LLD	–	<LLD

Results in units of pCi/g (dry)

*Sample was not able to be analyzed for Sr-90 because of large sediment particle size. Sample was recollected as Lang's Beach extra in the third quarter.

ENVIRONMENTAL SAMPLE SUMMARY (1982)

Medium/Sample	Location	Radionuclide	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Fish (Brown trout)	Oswego (control) 6.3 mi @ 235°	Sr-89	-	<12.9	-	<12.8
		Sr-90	-	42.9	-	<8.8
		Cs-137	-	161.7	-	159.3
		K-40	-	10,230.	-	10,170.
		Others	-	<LLD	-	<LLD
Fish (Lake Trout #1)	Oswego	Sr-89	-	15.6	-	<11.8
		Sr-90	-	<4.3	-	7.4
		Cs-137	-	136.3	-	158.5
		K-40	-	8,120.	-	7,925.
		Others	-	<LLD	-	<LLD
Fish (Lake Trout #2)	Oswego	Sr-89	-	9.2	-	<16.5
		Sr-90	-	<4.6	-	13.6
		Cs-137	-	142.8	-	181.5
		K-40	-	8,680.	-	8,250.
		Others	-	<LLD	-	<LLD
Fish (Brown Trout	NMP 0.3 mi @ 315°	Sr-89	-	<10.4	-	<17.3
		Sr-90	-	<4.2	-	<10.6
		Cs-137	-	198.4	-	171.5
		K-40	-	9,920.	-	11,200.
		Others	-	<LLD	-	<LLD
Fish (Lake Trout #1	NMP	Sr-89	-	<4.2	-	<11.2
		Sr-90	-	<6.7	-	6.1
		Cs-137	-	98.4	-	126.0
		K-40	-	6,270.	-	7,911.
		Others	-	<LLD	-	<LLD

Results in units of pCi/kg (dry).

ENVIRONMENTAL SAMPLE SUMMARY (1982) (cont.)

Medium/Sample	Location	Radionuclide	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Fish (cont.)	NMP	Sr-89	-	<6.6	-	<16.4
(Lake Trout #2)		Sr-90	-	7.7	-	7.3
		Cs-137	-	153.0	-	141.7
		K-40	-	9,300.	-	8,050.
		Others	-	<LLD	-	<LLD
Fish (cont.)	JAF	Sr-89	-	<10.0	-	<16.2
(Brown Trout)	0.6 mi @ 55°	Sr-90	-	<4.8	-	<8.9
		Cs-137	-	134.4	-	194.5
		K-40	-	8,680.	-	10,643.
		Others	-	<LLD	-	<LLD
Fish (cont.)	JAF	Sr-89	-	<8.1	-	<40.1.
(Lake Trout #1)		Sr-90	-	13.3	-	<21.3
		Cs-137	-	136.4	-	151.6
		K-40	-	7,750.	-	7,077.
		Others	-	<LLD	-	<LLD
Fish (cont.)	JAF	Sr-89	-	<9.5	-	<23.7
(Lake Trout #2)		Sr-90	-	12.1	-	17.4
		Cs-137	-	156.6	-	110.2
		K-40	-	10,440.	-	8,100.
		Others	-	<LLD	-	<LLD

Results in units of pCi/kg (dry).

ENVIRONMENTAL SAMPLE SUMMARY (1982)

Medium/Sample	Location	Radionuclide	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Monthly	Oswego	K-40	<15.7	<18.3	<18.4	<17.3
Water	City Water	Cs-137	<1.27	<1.51	<1.45	<1.20
Composite	(control)	Co-60	<1.56	<1.78	<1.76	<1.55
	7.8 mi @ 240°	Gross Beta	2.91	2.46	2.00	2.29
	NMP	K-40	<15.4	<16.8	<13.7	<13.6
	Inlet	Cs-137	<1.16	<1.43	<2.11	<1.91
	0.3 mi @ 305°	Co-60	<1.69	<1.81	<1.51	<1.48
		Gross Beta	2.75	1.93	3.46	2.64
	JAF	K-40	<11.6	<20.9	<15.5	<15.2
	Inlet	Cs-137	<1.25	<1.53	<1.22	<1.13
	0.5 mi @ 70°	Co-60	<1.66	<2.28	<1.61	<1.26
		Gross Beta	2.96	2.72	2.99	2.36

Results in units of pCi/liter.

ENVIRONMENTAL SAMPLE SUMMARY (1982)

Medium/Sample	Location	Radionuclide	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Quarterly	Raw City Water	Tritium	307	123	112	118
Water	(control)	Sr-89	<2.23	<0.59	<0.63	<0.43
Composite	7.8 mi @ 240°	Sr-90	5.30	1.10	1.01	0.75
	NMP	Tritium	229	202	859	4,620
	Inlet	Sr-89	<1.36	<0.50	<0.59	0.61
	0.3 mi @ 305°	Sr-90	3.07	0.50	0.67	0.40
	JAF	Tritium	311	247	311	194
	Inlet	Sr-89	<0.72	<0.60	<0.58	<0.40
	0.5 mi @ 70°	Sr-90	1.55	1.07	0.72	0.69

Results in units of pCi/liter.

ENVIRONMENTAL SAMPLE SUMMARY (1982)

Medium/Sample	Location No.	Location	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Airborne	D1 on-site	0.2 mi @ 69°	0.037	0.032	0.031	0.027
Particulate	D2	0.4 mi @ 140°	0.038	0.032	0.038	0.028
Filters	E	0.4 mi @ 175°	0.039	0.035	0.035	0.029
(Gross Beta)	F	0.5 mi @ 210°	0.036	0.036	0.032	0.027
	G	0.7 mi @ 250°	0.035	0.033	0.029	0.028
	H	0.8 mi @ 71°	0.032	0.030	0.029	0.027
	I	0.8 mi @ 98°	0.028	0.033	0.032	0.026
	J	0.9 mi @ 110°	0.032	0.031	0.035	0.024
	K	0.5 mi @ 132°	0.034	0.033	0.029	0.026
Airborne	C off-site	16.0 mi @ 42°	0.037	0.033	0.030	0.027
Particulate	D1	11.4 mi @ 80°	0.037	0.037	0.034	0.028
Filters	D2	9.0 mi @ 117°	0.039	0.036	0.033	0.029
(Gross Beta)	E	7.2 mi @ 160°	0.036	0.032	0.034	0.029
	F	7.7 mi @ 190°	0.040	0.036	0.035	0.029
	G	5.3 mi @ 225°	0.039	0.032	0.029	0.028

Results in units of pCi/m^3.

ENVIRONMENTAL SAMPLE SUMMARY (1982)

Medium/Sample	Location	Radionuclide	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Air Particulate Filter Composite Isotopic	A-1[a] (off-site)	Be-7	122	128	100	77
		Ra-226	<5.35	<5.39	<5.04	<4.46
		K-40	<4.11	<5.52	<5.09	<4.32
		Cs-137	<0.37	<0.59	<0.34	<0.27
		Co-60	<0.51	<0.57	<0.43	<0.38
		Mn-54	<0.28	<0.41	<0.33	<0.26
		Ce-144	<2.03	<1.54	<1.33	<1.02
		Nb-95	<0.56	<1.03	<0.48	<0.37
		Ru-106	<2.04	<3.46	<2.76	<2.24
		Others	<LLD	<LLD	<LLD	<LLD
	B-2[b] (on-site)	Be-7	95	115	85	66
		Ra-226	<3.98	<3.90	<2.96	<3.27
		K-40	<3.18	<3.85	3.03	<3.11
		Cs-137	0.33	<0.46	0.31	<0.22
		Co-60	0.55	<0.48	<0.32	<0.32
		Mn-54	<0.27	<0.29	<0.20	<0.21
		Ce-144	1.53	<1.46	<0.86	<0.85
		Nb-95	0.43	<0.49	<0.29	<0.27
		Ru-106	<2.32	<2.47	<1.75	<1.77
		Others	<LLD	<LLD	<LLD	<LLD

Results in units of 10^{-3} pCi/m^3

(a) A-1 monthly composite comprised of stations: C off-site (16.0 mi. @ 42°), D1 off-site (11.4 mi @ 80°) and D2 off-site (9.0 mi. @ 117°).

(b) B-2 monthly composite comprised of stations: H on-site (0.8 mi. @ 71°), I on-site (0.8 mi. @ 98°), J on-site (0.9 mi. @ 110°) and K on-site (0.5 mi. @ 132°).

ENVIRONMENTAL SAMPLE SUMMARY (1982) (cont.)

Medium/Sample	Location	Radionuclide	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Air Particulate Filter Composite Isotopic (cont.)	A-2(c) (off-site)	Be-7	120	119	100	75
		Ra-226	<5.69	<5.37	<4.32	<4.30
		K-40	<5.33	<5.53	<2.91	2.87
		Cs-137	<0.49	<0.37	<0.28	<0.26
		Co-60	<0.49	<0.60	<0.37	<0.35
		Mn-54	<0.35	<0.38	<0.27	<0.22
		Ce-144	1.68	168	<1.13	<1.03
		Nb-95	<0.58	<0.93	<0.40	<0.34
		Ru-106	<2.14	<3.34	<2.52	<2.29
		Others	<LLD	<LLD	<LLD	<LLD
	B-1(d) (on-site)	Be-7	113	133	104	71
		Ra-226	<4.00	<4.23	<3.05	2.60
		K-40	<3.15	3.17	<4.61	<2.84
		Cs-137	0.34	0.39	0.30	<0.18
		Co-60	0.66	<0.40	<0.25	<0.24
		Mn-54	<0.27	<0.29	<0.19	<0.17
		Ce-144	1.45	1.77	<0.81	<0.73
		Nb-95	<0.60	<0.52	<0.23	<0.21
		Ru-106	<2.08	<2.43	<1.61	<1.38
		Others	<LLD	<LLD	<LLD	<LLD

Results in units of 10^{-3} pCi/m^3

(c) A-2 monthly composite comprised of stations: E off-site (7.2 mi. @ 160°), F off-site (7.7 mi @ 190°) and G off-site (5.3 mi. @ 225°).

(d) B-1 monthly composite comprised of stations: D1 on-site (0.2 mi. @ 69°), D2 on-site (0.4 mi. @ 140°), E on-site (0.4 mi @ 175°), F on-site (0.5 mi. @ 210°) and G on-site (0.7 mi. @ 250°).

ENVIRONMENTAL SAMPLE SUMMARY (1982)

Medium/Sample	Location No.	Location	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Airborne	D1 on-site	0.2 mi @ 69°	<0.026	<0.028	<0.022	<0.019
Charcoal	D2	0.4 mi @ 140°	<0.021	<0.028	<0.021	<0.020
Cartridges	E	0.4 mi @ 175°	<0.022	<0.027	<0.024	<0.022
(I-131)	F	0.5 mi @ 210°	<0.029	<0.032	<0.028	<0.023
	G	0.7 mi @ 250°	<0.020	<0.024	<0.030	<0.028
	H	0.8 mi @ 71°	<0.017	<0.023	<0.017	<0.023
	I	0.8 mi @ 98°	<0.024	<0.030	<0.029	<0.019
	J	0.9 mi @ 110°	<0.021	<0.021	<0.016	<0.029
	K	0.5 mi @ 132°	<0.018	<0.023	<0.021	<0.021
Airborne	C off-site	16.0 mi @ 42°	<0.015	<0.025	<0.019	<0.017
Charcoal	D1	11.4 mi @ 80°	<0.020	<0.027	<0.020	<0.020
Cartridges	D2	9.0 mi @ 117°	<0.025	<0.033	<0.025	<0.019
(I-131)	E	7.2 mi @ 160°	<0.026	<0.034	<0.019	<0.015
	F	7.7 mi @ 190°	<0.018	<0.018	<0.020	<0.017
	G	5.3 mi @ 225°	<0.017	<0.023	<0.020	<0.023

Results in units of pCi/m^3.

ENVIRONMENTAL SAMPLE SUMMARY (1982)

Medium/Sample	Location No.	Location	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Direct Radiation	3	0.2 mi @ 69°	16.69	37.14	40.74	33.92
Environmental	4	0.4 mi @ 140°	15.22	20.28	21.97	16.28
TLD	5	0.4 mi @ 175°	13.86	16.90	17.80	16.68
	6	0.5 mi @ 210°	11.58	16.25	18.41	13.38
	7	0.7 mi @ 250°	12.41	16.97	17.74	16.26
	8	16.0 mi @ 42°	13.72	16.60	17.93	17.99
	9	11.4 mi @ 80°	12.14	18.69	17.10	14.96
	10	9.0 mi @ 117°	14.37	16.28	17.04	15.94
	11	7.2 mi @ 160°	12.02	17.75	17.02	14.28
	12	7.7 mi @ 190°	12.14	14.34	15.69	16.47
	13	5.3 mi @ 225°	13.94	16.23	17.81	15.19
	14	12.8 mi @ 225°	13.63	16.31	17.14	15.22
	15	0.9 mi @ 238°	11.52	13.62	13.13	12.55
	18	0.5 mi @ 268°	13.02	17.06	15.87	14.38
	19	1.3 mi @ 81°	13.16	17.06	19.52	15.38
	23	0.8 mi @ 71°	15.05	27.62	27.18	24.31
	24	0.8 mi @ 98°	13.64	19.99	22.50	15.75
	25	0.9 mi @ 110°	13.68	17.79	19.16	16.11
	26	0.5 mi @ 132°	12.94	17.92	19.00	15.36
	27	0.4 mi @ 60°	29.08	70.15	65.55	48.77
	28	0.5 mi @ 68°	87.81	126.47	166.44	134.20
	29	0.5 mi @ 57°	122.70	274.07	237.15	205.72
	30	0.4 mi @ 57°	21.04	51.07	61.01	42.12
	31	0.2 mi @ 290°	30.37	32.22	36.26	*
	39	0.1 mi @ 292°	94.28	133.16	193.46	124.74
	43	9.4 mi @ 88°	12.74	17.71	15.16	14.87
	44	12.6 mi @ 64°	12.32	16.87	17.61	14.67
	45	7.6 mi @ 130°	13.02	17.69	17.43	17.76
	46	7.9 mi @ 178°	12.71	141.85	15.82	14.47
	47	0.6 mi @ 69°	48.39	21.58	159.74	122.58
	48	0.8 mi @ 92°	14.53	15.03	27.48	19.73
	49	20.0 mi @ 165°	10.75	17.51	15.20	15.39
	50	0.7 mi @ 115°	13.45	17.53	*	14.03
	51	7.5 mi @ 233°	12.50	16.44	16.30	15.55

ENVIRONMENTAL SAMPLE SUMMARY (1982) (cont.)

Medium/Sample	Location No.	Location	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Direct Radiation	52	5.8 mi @ 227°	*	*	14.76	15.65
Environmental TLD	53	13.7 mi @ 183°	11.50	16.44	17.69	15.14
(continued)	54	9.3 mi @ 115°	12.30	15.52	16.63	14.84
	55	13.7 mi @ 75°	11.35	14.49	17.21	15.48
	56	5.4 mi @ 120°	12.40	14.67	17.68	14.82
	57	1.9 mi @ 145°	12.82	15.83	16.75	16.41
	58	3.2 mi @ 220°	12.86	16.38	*	16.50
	59	0.5 mi @ 95°	27.70	117.47	105.14	59.65
	60	21.0 mi @ 225°	16.55	18.28	20.91	17.78
	61	0.8 mi @ 83°	16.12	31.79	36.95	28.14
	65	7.8 mi @ 198°	11.40	15.98	17.22	14.79

Results in average mrem per quarter.
*TLD lost (vandalism)

ENVIRONMENTAL SAMPLE SUMMARY (1982)

Medium/Sample	Location	Dose Rate	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Continuous Radiation Monitors	C off-site 0.16 mi @ 42°	MIN	0.010	0.011	0.011	0.010
		MAX.	0.044	0.019	0.026	0.028
		AVE.	0.014	0.015	0.018	0.018
	D1 on-site 0.25 mi @ 69°		0.010	0.012	0.012	0.010
			0.024	0.060	0.078	0.043
			0.014	0.023	0.023	0.022
	D2 on-site 0.40 mi @ 140°		0.011	0.011	0.010	0.010
			0.050	0.063	0.074	0.078
			0.015	0.015	0.015	0.018
	E on-site 0.40 mi @ 175°		0.011	0.012	0.011	0.010
			0.033	0.072	0.121	0.088
			0.015	0.017	0.020	0.016
	F on-site 0.50 mi @ 210°		0.010	0.010	0.010	0.010
			0.020	0.032	0.054	0.048
			0.011	0.015	0.014	0.018
	G on-site. 0.70 mi @ 250°		0.012	0.012	0.014	0.013
			0.031	0.068	0.050	0.047
			0.017	0.018	0.022	0.023
	H on-site 0.80 mi @ 71°		0.015	0.014	0.016	0.014
			0.053	0.076	0.086	0.052
			0.026	0.027	0.028	0.024
	I on-site 0.80 mi @ 98°		0.011	0.014	0.012	0.016
			0.044	0.084	0.095	0.069
			0.018	0.028	0.029	0.027

ENVIRONMENTAL SAMPLE SUMMARY (1982) (cont.)

Medium/Sample	Location	Dose Rate	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
(cont.)						
Continuous	J on-site	MIN.	0.010	0.015	0.011	0.010
Radiation	0.90 mi @ 110°	MAX.	0.046	0.063	0.067	0.039
Monitors		AVE.	0.015	0.022	0.020	0.013
	K on-site		0.010	0.011	0.011	0.010
	0.05 mi @ 132°		0.057	0.056	0.084	0.030
			0.015	0.017	0.015	0.014

Results in units of mrem per hour.

ENVIRONMENTAL SAMPLE SUMMARY (1982)

Medium/Sample	Location	Radionuclide	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Milk	4 7.7 mi @ 115°	I-131	NS	<0.2	<0.2	<0.1
	40 - control 15.3 mi @ 220°	I-131	NS	<0.2	<0.3	<0.2
	14 9.8 mi @ 120°	I-131	NS	<0.2	<0.3	<0.1
	16 5.2 mi @ 190°	I-131	NS	<0.2	<0.3	<0.2
	5 7.2 mi @ 146°	I-131	NS	<0.2	<0.3	<0.2
	7 5.5 mi @ 105°	I-131	NS	<0.2	<0.2	<0.2
	45 8.1 mi @ 125°	I-131	NS	-	<0.2	<0.1

- Sample location not sampled until July 1982
NS Milk samples not collected during the first quarter (not the local grazing season)
Results in units of pCi/liter.

ENVIRONMENTAL SAMPLE SUMMARY (1982)

Medium/Sample	Location	Radionuclide	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Milk	4	Sr-90	NS	3.0	3.7	4.4
	7.7 mi @ 115°	Cs-137		<5.5	<3.4	<3.7
		K-40		1500	1367	1467
		Others		<LLD	<LLD	<LLD
	40	Sr-90	NS	<5.0	3.0	<29.1
	15.3 mi @ 220°	Cs-137		<3.6	<4.1	<4.1
	(control)	K-40		1400	1333	1433
		Others		<LLD	<LLD	<LLD
	14	Sr-90	NS	<1.2	<8.4	4.6
	9.8 mi @ 120°	Cs-137		<4.8	<4.5	<4.2
		K-40		1400	1233	1367
		Others		<LLD	<LLD	<LLD
	16	Sr-90	NS	3.7	5.1	6.4
	5.2 mi @ 190°	Cs-137		<4.5	<4.9	<4.4
		K-40		1235	1400	1200
		Others		<LLD	<LLD	<LLD
	5	Sr-90	NS	4.7	4.9	<26.0
	7.2 mi @ 146°	Cs-137		<4.5	<8.0	<4.4
		K-40		1500	1333	1233
		Others		<LLD	<LLD	<LLD
	7	Sr-90	NS	4.9	6.2	5.5
	5.5 mi @ 105°	Cs-137		<4.0	<4.5	<4.2
		K-40		1550	1400	1333
		Others		<LLD	<LLD	<LLD
	45	Sr-90		-	4.5	6.3
	8.1 mi @ 125°	Cs-137		-	<4.1	<4.4
		K-40		-	1200	1433
		Others		-	<LLD	<LLD

- Sample location not sampled until July 1982
NS Milk samples not collected during the first quarter (not the local grazing season)
Results in units of pCi/liter.

ENVIRONMENTAL SAMPLE SUMMARY (1982)

Medium/Sample	Location	Radionuclide	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Beef	B - control	K-40	-	5.9	-	-
	25 mi @ 221°	Cs-137	-	<0.02	-	-
		Others	-	<LLD	-	-
Beef	A	K-40	-	5.2	-	-
	5.2 mi @ 190°	Cs-137	-	<0.03	-	-
		Others	-	<LLD	-	-
Pork	D	K-40	-	2.4	-	-
	9.5 mi @ 180°	Cs-137	-	0.02	-	-
		Others	-	<LLD	-	-
Beef	C	K-40	-	6.0	-	-
	4.5 mi @ 147°	Cs-137	-	0.08	-	-
		Others	-	<LLD	-	-
Beef	G - control	K-40	-	-	-	2.8
	18.5 mi @ 225°	Cs-137	-	-	-	<0.02
		Others	-	-	-	<LLD
Beef	E	K-40	-	-	-	2.9
	9.7 mi @ 88°	Cs-137	-	-	-	<0.01
		Others	-	-	-	<LLD
Beef	F	K-40	-	-	-	2.5
	8.0 mi @ 145°	Cs-137	-	-	-	0.02
		Others	-	-	-	<LLD
Beef	H	K-40	-	-	-	3.5
	5.0 mi @ 165°	Cs-137	-	-	-	0.02
		Others	-	-	-	<LLD

NOTE: - Sample not collected during that quarter.
Results in units of pCi/g (wet).

ENVIRONMENTAL SAMPLE SUMMARY (1982)

Medium/Sample	Location	Radionuclide	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Eggs	L - control	K-40	-	3.8	-	2.0
	13.0 mi @ 235°	Cs-137	-	<0.02	-	<0.02
		Others	-	<LLD	-	<LLD
Eggs	K	K-40	-	3.2	-	-
	2.0 mi @ 105°	Cs-137	-	<0.02	-	-
		Others	-	<LLD	-	-
Eggs	I	K-40	-	3.5	-	1.2
	3.6 mi @ 195°	Cs-137	-	<0.02	-	<0.01
		Others	-	<LLD	-	<LLD
Eggs	J	K-40	-	3.5	-	1.6
	2.5 mi @ 160°	Cs-137	-	<0.04	-	<0.02
		Others	-	<LLD	-	<LLD
Eggs	M	K-40	-	1.4	-	-
	2.0 mi @ 120°	Cs-137	-	<0.01	-	-
		Others	-	<LLD	-	-

NOTE: - Sample not collected during that quarter.
Results in units of pCi/g (wet).

ENVIRONMENTAL SAMPLE SUMMARY (1982)

Medium/Sample	Location	Radionuclide	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Chicken	L- control	K-40	-	5.4	-	4.1
	13.0 mi @ 235°	Cs-137	-	<0.03	-	<0.02
		Others	-	<LLD	-	<LLD
Chicken	K	K-40	-	8.4	-	-
	2.0 mi @ 105°	Cs-137	-	0.03	-	-
		Others	-	<LLD	-	-
Chicken	J	K-40	-	6.5	-	4.2
	2.5 mi @ 160°	Cs-137	-	<0.03	-	<0.02
		Others	-	<LLD	-	<LLD
Chicken	I	K-40	-	6.8	-	3.1
	3.6 mi @ 195°	Cs-137	-	<0.02	-	<0.02
		Others	-	<LLD	-	<LLD
Chicken	M	K-40	-	-	-	3.6
	2.0 mi @ 120°	Cs-137	-	-	-	<0.02
		Others	-	-	-	<LLD

NOTE: - Sample not collected during that quarter.
Results in units of pCi/g (wet).

ENVIRONMENTAL SAMPLE SUMMARY (1982)

Medium/Sample	Location	Radionuclide	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Swiss chard (leafy)	T-control 12.5 mi @ 225°	K-40	-	-	9.3	-
		Be-7	-	-	0.12	-
		I-131	-	-	<0.02	-
		Cs-137	-	-	<0.01	-
		Others	-	-	<LLD	-
Cabbage (leafy)	R 3.7 mi @ 160°	K-40	-	-	2.4	-
		Be-7	-	-	<0.07	-
		I-131	-	-	<0.01	-
		Cs-137	-	-	<0.009	-
		Others	-	-	<LLD	-
Swiss Chard (leafy)	Q 2.5 mi @ 150°	K-40	-	-	7.4	-
		Be-7	-	-	0.14	-
		I-131	-	-	<0.02	-
		Cs-137	-	-	<0.01	-
		Others	-	-	<LLD	-
Cabbage (leafy)	N 1.5 mi @ 85°	K-40	-	-	1.5	-
		Be-7	-	-	<0.04	-
		I-131	-	-	<0.008	-
		Cs-137	-	-	<0.005	-
		Others	-	-	<LLD	-
Tomatoes	S - control 15.5 mi @ 220°	K-40	-	-	2.6	-
		Be-7	-	-	<0.04	-
		I-131	-	-	<0.06	-
		Cs-137	-	-	<0.004	-
		Others	-	-	<LLD	-
Tomatoes	R 3.7 mi @ 160°	K-40	-	-	1.8	-
		Be-7	-	-	<0.04	-
		I-131	-	-	<0.06	-
		Cs-137	-	-	<0.004	-
		Others	-	-	<LLD	-

ENVIRONMENTAL SAMPLE SUMMARY (1982) (cont.)

Medium/Sample	Location	Radionuclide	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Tomatoes	P	K-40	-	-	2.1	-
	2.0 mi @ 95°	Be-7	-	-	<0.03	-
		I-131	-	-	<0.04	-
		Cs-137	-	-	<0.003	-
		Others	-	-	<LLD	-
Zucchini	N	K-40	-	-	1.9	-
	1.5 mi @ 85°	Be-7	-	-	<0.04	-
		I-131	-	-	<0.10	-
		Cs-137	-	-	<0.003	-
		Others	-	-	<LLD	-

NOTE: - Sample not collected during that quarter.
Results in units of pCi/g (wet).

TABLE I

SAMPLE COLLECTION AND ANALYSIS

SITE RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

A. AQUATIC PROGRAM

	MEDIA	ANALYSIS	FREQUENCY	LOCATIONS (1)	
1.	Fish	GSA, Sr-89 & Sr-90	2/yr	2 Onsite	1 Offsite
2.	Cladophora	GSA	In Season	2 Onsite	1 Offsite
3.	Lake Water	GSA H-3, Sr-89, Sr-90	M Comp. Qtr. Comp.	3(2)	
4.	Sediment	GSA	Semi-Annual	Dam Shoreline	1 Offsite

NOTES:

(1) Onsite samples collected in the vicinity of discharges, offsite samples collected at a distance of at least five miles from site.

(2) The three lake water samples to include Nine Mile Point Unit 1 intake water, James A. Fitzpatrick intake water, and Oswego City raw water.

TABLE 2

SAMPLE COLLECTION AND ANALYSIS

SITE RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

B. TERRESTRIAL PROGRAM

	MEDIA	ANALYSIS	FREQUENCY	NO. OF LOCATIONS	LOCATIONS
1.	Air Particulates	GB GSA	W M Comp (4)	At least 10	7 Onsite 6 Offsite
2.	Soil	GSA, Sr-90	Every 3 years	13	7 Onsite 6 Offsite
3.	TLD	Gamma Dose	Qtr.	20	14 Onsite 6 Offsite
4.	Radiation Monitors	Gamma Dose	C	At least 7	7 Onsite 1 Offsite
5.	Airborne - I-131	GSA	W	At least 10	7 Onsite 6 Offsite
6.	Milk	I-131 GSA, Sr-90	M(5) M	4(5)	(6)
7.	Human Food Crops	GSA, I-131	A	3	(6)
8.	Meat, Poultry, Eggs	GSA Edible Portions	SA	3	(6)

NOTES: (Cont.)

(4) Onsite samples counted as two composites. Offsite samples counted as two composites. Any high gross beta count samples counted separately (not included in composite).
(5) Frequency applied only during grazing season.
(6) Samples to be collected from locations (where available) witin a 10-mile radius having the highest potential concentrations of radionuclides.

TABLE 3

CONCENTRATIONS OF GAMMA EMITTERS IN CLADOPHORA SAMPLES

Results in units of pCi/g (wet) ± 2 sigma

Collection Site	Nuclides Found	June 1982	August 1982
Nine Mile Point	Be-7	0.21±0.06	0.16±0.08
	K-40	4.5±0.4	3.9±0.4
	Mn-54	<0.008	<0.009
	Co-58	<0.011	<0.011
	Fe-59	<0.033	<0.032
	Co-60	0.017±0.008	<0.012
	Zn-65	<0.022	<0.020
	Zr-95	<0.020	<0.022
	Nb-95	<0.018	<0.019
	Ru-103	<0.014	<0.015
	Cs-134	<0.007	<0.007
	Cs-137	0.017±0.005	0.016±0.007
	Ce-141	<0.022	<0.040
	Ce-144	<0.043	<0.083
	Ra-226	<0.015	<0.019
	Th-232	<0.024	<0.026
	Others	All<LLD	All<LLD
J. A. FitzPatrick	Be-7	<0.05	<0.12
	K-40	4.3±0.4	3.7±0.4
	Mn-54	<0.003	<0.011
	Co-58	<0.004	<0.012
	Fe-59	<0.015	<0.035
	Co-60	<0.004	<0.012
	Zn-65	<0.010	<0.023
	Zr-95	<0.008	<0.023
	Nb-95	<0.008	<0.017
	Ru-103	<0.006	<0.015
	Cs-134	<0.003	<0.008
	Cs-137	0.011±0.003	0.010
	Ce-141	<0.013	<0.020
	Ce-144	<0.025	<0.046
	Ra-226	<0.006	<0.020
	Th-232	<0.009	<0.031
	Others	All<LLD	All<LLD

TABLE 3 (cont.)

CONCENTRATIONS OF GAMMA EMITTERS IN CLADOPHORA SAMPLES

Results in units of pCi/g (wet) ± 2 sigma

Collection Site	Nuclides Found	June 1982	August 1982
Oswego	Be-7	0.12±0.04	<0.09
	K-40	3.7±0.4	2.4±0.2
	Mn-54	<0.005	<0.008
	Co-58	<0.006	<0.010
	Fe-59	<0.020	<0.026
	Co-60	<0.006	<0.009
	Zn-65	<0.014	<0.019
	Zr-95	<0.013	<0.017
	Nb-95	<0.011	<0.014
	Ru-103	<0.008	<0.012
	Cs-134	<0.004	<0.006
	Cs-137	0.007±0.003	0.008
	Ce-141	<0.012	<0.018
	Ce-144	<0.022	<0.036
	Ra-226	<0.011	<0.016
	Th-232	<0.015	<0.025
	Others	All<LLD	All<LLD

TABLE 4

CONCENTRATIONS OF SR-90 AND GAMMA EMITTERS IN SHORELINE SEDIMENT SAMPLES

Results in units of pCi/g (dry) ± 2 sigma

Collection Code	Collection Date	Sr-90	Be-7	K-40	Co-60	Nb-95	Cs-134	Cs-137	Ra-226	Th-232	Others
Nine Mile Point	5-26-82	0.0168 ± 0.0087	<0.47	16 ± 1.6	<0.04	<0.07	<0.04	0.07 ± 0.04	0.41 ± 0.08	0.56 ± 0.10	All<LLD
	11-30-82	<0.0068	<1.00	16 ± 1.6	0.16 ± 0.04	<0.20	<0.05	0.80 ± 0.08	0.36 ± 0.08	0.42 ± 0.18	All<LLD
Langs Beach	5-26-82	*	<0.48	15 ± 1.5	<0.05	<0.07	<0.04	<0.05	0.30 ± 0.10	0.48 ± 0.13	All<LLD
	11-30-82	<0.0058	<0.43	17 ± 1.7	<0.05	<0.07	<0.04	0.05 ± 0.03	1.60 ± 0.70	0.47 ± 0.11	All<LLD
Langs Beach Extra Sample	7-7-82	0.0043 ± 0.0022	<0.44	12 ± 1.2	<0.06	<0.07	<0.05	<0.05	0.19 ± 0.09	0.18 ± 0.09	All<LLD

*Sample was not able to be analyzed for Sr-90 because at large sediment particle size.

TABLE 5A

CONCENTRATIONS OF STRONTIUM-89* AND -90 AND GAMMA EMITTERS IN FISH SAMPLES

Results in Units of pCi/g(wet) ± 2 sigma

SAMPLE DATE	SAMPLE TYPE	Sr-89	Sr-90	K-40	GAMMA EMITTERS Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137	Others
					FITZPATRICK							
June 1982	Brown Trout	0.004±0.002	<0.002	3.1±0.3	<0.01	<0.01	<0.04	<0.02	<0.03	<0.01	0.048±0.008	All<LLD
	Lake Trout #1	<0.003	0.004±0.002	2.5±0.3	<0.007	<0.01	<0.03	<0.008	<0.02	<0.007	0.044±0.009	All<LLD
	Lake Trout #2	<0.003	0.004±0.002	3.6±0.4	<0.009	<0.01	<0.03	<0.01	<0.03	<0.008	0.05±0.01	All<LLD
October 1982	Brown Trout	<0.004	<0.002	2.9±0.3	<0.009	<0.01	<0.04	<0.01	<0.02	<0.008	0.053±0.008	All<LLD
	Lake Trout #1	<0.01	<0.006	2.1±0.2	<0.008	<0.01	<0.03	<0.01	<0.03	<0.008	0.045±0.007	All<LLD
	Lake Trout #2	<0.007	0.005±0.004	2.5±0.3	<0.01	<0.02	<0.09	<0.01	<0.03	<0.008	0.034±0.007	All<LLD
	White Sucker	<0.006	<0.002	3.6±0.4	<0.01	<0.02	<0.08	<0.02	<0.03	<0.01	0.039±0.008	All<LLD
					NINE MILE POINT							
June 1982	Brown Trout	0.003±0.002	<0.001	3.2±0.3	<0.01	<0.01	<0.03	<0.02	<0.03	<0.009	0.064±0.008	All<LLD
	Lake Trout #1	<0.002	0.004±0.001	3.3±0.3	<0.01	<0.01	<0.04	<0.01	<0.03	<0.009	0.05±0.01	All<LLD
	Lake Trout #2	<0.002	0.003±0.001	3.1±0.3	<0.006	<0.008	<0.02	<0.007	<0.02	<0.005	0.051±0.006	All<LLD
October 1982	Brown Trout	<0.005	<0.003	3.2±0.3	<0.01	<0.02	<0.04	<0.02	<0.03	<0.01	0.049±0.009	All<LLD
	Lake Trout #1	<0.004	0.002±0.002	2.7±0.3	<0.009	<0.01	<0.04	<0.01	<0.03	<0.008	0.043±0.007	All<LLD
	Lake Trout #2	<0.004	0.002±0.002	2.5±0.3	<0.009	<0.01	<0.04	<0.01	<0.03	<0.009	0.044±0.008	All<LLD
	White Sucker	<0.006	<0.001	4.5±0.5	<0.02	<0.03	<0.1	<0.02	<0.04	<0.02	0.06±0.01	All<LLD
CONTROL					OSWEGO							
June 1982	Brown Trout	<0.004	0.013±0.002	3.1±0.3	<0.01	<0.02	<0.05	<0.02	<0.03	<0.01	0.049±0.008	All<LLD
	Lake Trout #1	0.005±0.002	<0.001	2.8±0.3	<0.007	<0.01	<0.03	<0.008	<0.02	<0.006	0.047±0.007	All<LLD
	Lake Trout #2	0.003±0.002	<0.002	3.1±0.3	<0.008	<0.01	<0.04	<0.01	<0.02	<0.008	0.051±0.009	All<LLD
October 1982	Brown Trout	<0.004	<0.003	3.0±0.3	<0.009	<0.01	<0.03	<0.01	<0.02	<0.008	0.047±0.008	All<LLD
	Lake Trout #1	<0.004	0.002±0.002	2.5±0.3	<0.008	<0.01	<0.03	<0.01	<0.03	<0.007	0.050±0.007	All<LLD
	Lake Trout #2	<0.005	0.004±0.003	2.5±0.3	<0.009	<0.01	<0.03	<0.01	<0.02	<0.007	0.055±0.008	All<LLD
	White Sucker	<0.01	<0.002	2.8±0.3	<0.02	<0.03	<0.1	<0.02	<0.05	<0.01	0.027±0.009	All<LLD

*Sr-89 results are corrected for decay to sample stop date.

TABLE 5B

CONCENTRATIONS OF STRONTIUM-89 & 90 & GAMMA EMITTERS IN FISH SAMPLES
Results in Units of pCi/kg (dry) ± 2 sigma

Sample Date	Sample Type	Sr-89*	Sr-90	GAMMA EMITTERS K-40	Mn-54	Co-60	Cs-134	Cs-137	Others
				Oswego (control)					
June 1982	Brown Trout	< 12.9	42.9 ± 7.6	10230±1023	< 36.3	< 49.5	< 31.7	161.7±27.1	< LLD
	Lake Trout #1	15.6±5.5	< 4.3	8120±812	< 20.0	< 22.3	< 18.3	136.3±19.4	< LLD
	Lake Trout #2	9.2±5.0	< 4.6	8680±868	< 23.5	< 33.6	< 21.0	142.8±25.2	< LLD
October 1982	Brown Trout	< 12.8	< 8.8	10170±1017	< 29.5	< 33.9	< 25.8	159.3±25.4	< LLD
	Lake Trout #1	< 11.8	7.4±7.3	7925±792	< 25.4	< 34.9	< 23.1	158.5±23.1	< LLD
	Lake Trout #2	< 16.5	13.6±9.9	8250±825	< 29.7	< 39.6	< 23.1	181.5±27.7	< LLD
				NINE MILE POINT (02)					
June 1982	Brown Trout	10.4±5.3	<4.2	9920±992	< 34.1	< 46.5	< 28.8	198.4±25.1	< LLD
	Lake Trout #1	< 4.2	6.7±2.7	6270±627	< 18.6	< 22.8	< 16.9	98.8±18.4	< LLD
	Lake Trout #2	< 6.6	7.7±4.2	9300±930	< 16.5	< 20.4	< 15.0	153.0±18.0	< LLD
October 1982	Brown Trout	< 17.3	< 10.6	11200±1120	< 45.5	< 63.0	< 35.0	171.5±32.6	< LLD
	Lake Trout #1	< 11.2	6.1±5.9	7911±791	< 26.4	< 27.8	< 24.3	126.0±20.2	< LLD
	Lake Trout #2	< 16.4	7.3±7.1	8050±805	< 28.0	< 38.6	< 27.7	141.7±24.8	< LLD

*Sr-89 results are corrected for decay to sample stop date.

TABLE 5B (Continued)

CONCENTRATIONS OF STRONTIUM-89 & 90 & GAMMA EMITTERS IN FISH SAMPLES
Results in Units of pCi/kg (dry) ± 2 sigma

Sample Date	Sample Type	Sr-89*	Sr-90	GAMMA EMITTERS K-40	Mn-54	Co-60	Cs-134	Cs-137	Others
				J. A. FITZPATRICK (03)					
June 1982	Brown Trout	10.0±5.6	< 4.8	8680±868	< 30.8	< 47.6	< 28.0	134.4±23.5	< LLD
	Lake Trout #1	< 8.1	13.3±5.3	7750±775	< 21.7	< 23.2	< 20.5	130.4±27.0	< LLD
	Lake Trout #2	< 9.5	12.1±6.7	10440±1044	< 27.3	< 29.0	< 22.9	156.6±27.6	< LLD
October 1982	Brown Trout	< 16.2	< 8.9	10643±1064	< 31.2	< 40.4	< 29.7	194.5±28.3	< LLD
	Lake Trout #1	< 40.1	< 21.3	7077±708	< 25.3	< 37.1	< 25.6	151.6±22.9	< LLD
	Lake Trout #2	< 23.7	17.4±13.3	8100±810	< 32.1	< 35.6	< 25.0	110.2±22.4	< LLD

*Sr-89 results are corrected for decay to sample stop date.

TABLE 6

CONCENTRATIONS OF BETA EMITTERS IN LAKE WATER SAMPLES

Results in Units of pCi/l ± 2 sigma

Station code	January	February	March	April	May	June
JAF Inlet	2.78±0.61(a)	3.47±0.63(b)	2.62±0.69(c)	3.00±0.65	2.85±0.70	2.31±0.67
NMP Inlet	2.32±0.58	2.78±0.59	3.16±0.72	2.77±0.63	1.27±0.59	1.74±0.63
Raw City Water (control)	2.54±0.59	3.20±0.61	2.99±0.71	2.68±0.62	2.66±0.69	2.04±0.65

Station code	July	August	September	October	November	December
JAF Inlet	2.74±0.69	3.53±0.74	2.69±0.68	2.71±0.70	2.40±0.68	1.98±0.40(d)
NMP Inlet	2.43±0.67	3.22±0.72	4.72±0.79	3.89±0.77	1.79±0.69	2.23±0.41
Raw City Water (control)	2.06±0.65	2.16±0.66	1.79±0.63	2.47±0.68	2.00±0.71	2.39±0.42

(a) Sample collection dates were 12/31/81 to 1/31/82
(b) Sample collection dates were 1/31/82 to 2/27/83
(c) Sample collection dates were 2/27/82 to 3/31/82
(d) Sample collection dates were 11/30/82 to 1/3/83

TABLE 7

CONCENTRATIONS OF TRITIUM AND STRONTIUM-89 AND STRONTIUM-90 IN LAKE WATER
(QUARTER COMPOSITE SAMPLES)

Results in Units of pCi/l ± 2 sigma

STATION CODE	PERIOD	DATE	TRITIUM	Sr-89	Sr-90
JAF INLET	First Quarter	12/31/81 to 03/31/82	311 ± 140	<0.722	1.55 ± 0.42
	Second Quarter	03/31/82 to 07/02/82	247 ± 120	<0.603	1.07 ± 0.38
	Third Quarter	07/02/82 to 10/01/82	311 ± 110	<0.580	0.718± 0.31
	Fourth Quarter	10/01/82 to 01/03/83	194 ± 98	<0.396	0.691± 0.31
NMP INLET	First Quarter	12/31/81 to 03/31/82	229 ± 130	<1.36	3.07 ± 0.77
	Second Quarter	03/31/82 to 07/02/82	202 ± 120	<0.502	0.501± 0.34
	Third Quarter	07/02/82 to 10/01/82	859 ± 120	<0.592	0.67 ± 0.34
	Fourth Quarter	10/01/82 to 01/03/83	4620 ± 460	0.606 ± 0.38	0.40 ± 0.30
RAW CITY WATER (Control)	First Quarter	12/31/81 to 03/31/82	307 ± 140	<2.23	5.30 ± 1.3
	Second Quarter	03/31/82 to 07/02/82	123 ± 120	<0.586	1.10 ± 0.37
	Third Quarter	07/02/82 to 10/01/82	112 ± 110	<0.628	1.01 ± 0.32
	Fourth Quarter	10/01/82 to 01/03/83	118 ± 97	<0.433	0.75 ± 0.32

TABLE 8
CONCENTRATIONS OF GAMMA EMITTERS IN LAKE WATER SAMPLES
Results in Units of pCi/l ± 2 sigma

Station Code	Nuclide	January	February	March	April	May	June
OSWEGO CITY WATER (00, CONTROL)	Ce-144	< 5.04	< 4.83	< 7.18	< 6.23	< 5.64	< 6.73
	Cs-134	< 0.95	< 1.04	< 1.29	< 1.43	< 1.14	< 1.17
	Cs-137	< 1.15	< 1.06	< 1.59	< 1.59	< 1.41	< 1.53
	Zr-95	< 3.43	< 2.85	< 5.47	< 5.02	< 3.60	< 5.51
	Nb-95	< 1.67	< 1.40	< 3.42	< 2.62	< 2.48	< 3.59
	Co-58	< 1.48	< 1.19	< 2.05	< 1.92	< 1.72	< 2.18
	Mn-54	< 1.17	< 1.26	< 1.7	< 1.58	< 1.30	< 1.59
	Fe-59	< 1.38	< 1.56	< 3.03	< 3.46	< 2.57	< 3.32
	Co-60	< 1.15	< 1.20	< 2.33	< 1.78	< 1.66	< 1.89
	K-40	<12.4	<15.0	<19.6	<20.3	<17.30	<17.40
NINE MILE POINT (02, INLET)	Ce-144	< 5.10	< 4.90	< 6.85	< 6.35	< 6.43	< 6.18
	Cs-134	< 0.95	< 1.17	< 1.27	< 1.41	< 1.24	< 1.55
	Cs-137	< 1.10	< 0.98	< 1.4	< 1.37	< 1.38	< 1.53
	Zr-95	< 3.92	< 3.11	< 5.17	< 4.77	< 4.61	< 5.09
	Nb-95	< 2.14	< 1.63	< 3.25	< 2.96	< 2.65	< 3.16
	Co-58	< 1.48	< 1.21	< 2.41	< 2.00	< 1.65	< 2.51
	Mn-54	< 1.14	< 0.99	< 1.59	< 1.72	< 1.45	< 1.49
	Fe-59	< 1.38	< 1.96	< 3.37	< 3.18	< 3.16	< 3.27
	Co-60	< 1.41	< 1.64	< 2.02	< 1.85	< 1.66	< 1.91
	K-40	<14.7	< 9.7	<21.7	16.9±9.6	<15.9	<17.6
FITZPATRICK (03, INLET)	Ce-144	< 3.18	< 4.62	< 6.88	< 6.91	< 6.19	< 5.82
	Cs-134	< 0.72	< 1.07	< 1.42	< 1.42	< 1.35	< 1.30
	Cs-137	0.43±0.29	< 1.52	< 1.79	< 1.69	< 1.41	< 1.50
	Zr-95	< 2.13	< 3.66	< 4.98	< 5.16	< 4.38	< 4.59
	Nb-95	< 1.45	< 1.55	< 3.45	< 3.83	< 2.50	< 3.33
	Co-58	< 0.99	< 1.29	< 2.19	< 2.13	< 2.02	< 2.02
	Mn-54	< 0.74	< 1.46	< 1.94	< 1.66	< 1.83	< 1.49
	Fe-59	< 1.35	< 1.92	< 3.21	< 3.66	< 3.07	< 2.85
	Co-60	1.58±0.56	< 1.03	2.37±1.13	< 2.30	< 2.26	< 2.27
	K-40	4.5 ±3.3	<11.5	<18.7	<23.3	<21.60	<17.9

TABLE 8 (cont.)
CONCENTRATIONS OF GAMMA EMITTERS IN LAKE WATER SAMPLES
Results in Units of pCi/l ± 2 sigma

Station Code	Nuclide	July	August	September	October	November	December
OSWEGO CITY	Ce-144	< 5.97	< 6.47	< 6.76	< 5.79	< 5.29	< 6.96
WATER	Cs-134	< 1.07	< 1.26	< 1.37	< 0.917	< 1.07	< 1.47
(00, CONTROL)	Cs-137	< 1.47	< 1.41	< 1.46	< 0.996	< 0.98	< 1.62
	Zr-95	< 3.92	< 3.97	< 4.64	< 4.31	< 3.22	< 5.67
	Nb-95	< 2.64	< 2.32	< 3.24	< 2.43	< 1.55	< 3.29
	Co-58	< 1.84	< 1.96	< 2.24	< 1.32	< 1.10	< 2.33
	Mn-54	< 1.13	< 1.58	< 1.70	< 1.07	< 1.67	< 1.81
	Fe-59	< 2.15	< 2.83	< 3.05	< 2.28	< 1.76	< 3.40
	Co-60	< 1.50	< 1.78	< 2.01	< 1.26	< 1.18	< 2.20
	K-40	<18.4	<16.3	<20.5	14.3±8.9	14.8±7.9	<22.9
NINE MILE	Ce-144	< 5.02	< 6.24	< 5.63	< 5.83	< 4.79	< 6.05
POINT	Cs-134	< 0.946	< 1.13	< 1.14	< 1.11	< 1.03	< 1.28
(02, INLET)	Cs-137	< 0.989	< 1.62	3.72±1.13	3.25±0.10	< 1.10	< 1.39
	Zr-95	< 3.47	< 3.97	< 3.72	< 4.20	< 3.11	< 4.18
	Nb-95	< 2.09	< 2.08	< 2.82	< 2.42	< 1.71	< 2.52
	Co-58	< 1.36	< 1.63	< 1.69	< 1.34	< 1.11	< 1.89
	Mn-54	< 1.16	< 1.22	< 1.40	< 1.02	< 1.18	< 1.39
	Fe-59	< 1.98	< 2.97	< 2.56	< 2.27	< 2.01	< 2.29
	Co-60	< 1.20	< 1.70	< 1.62	< 1.70	< 1.11	< 1.62
	K-40	<14.2	<14.4	<12.4	<11.5	<13.1	16.3±8.7
FITZPATRICK	Ce-144	< 5.35	< 5.97	< 5.71	< 5.70	< 4.97	< 5.97
(03, INLET)	Cs-134	< 1.07	< 1.10	< 1.16	< 1.19	< 0.96	< 1.13
	Cs-137	< 1.26	< 1.21	< 1.18	< 1.27	< 1.04	< 1.09
	Zr-95	< 4.12	< 4.26	< 4.47	< 4.43	< 2.90	< 3.54
	Nb-95	< 2.11	< 2.30	< 2.93	< 3.07	< 1.87	< 2.11
	Co-58	< 1.46	< 1.84	< 1.70	< 1.53	< 1.16	< 1.69
	Mn-54	< 1.25	< 1.38	< 1.31	< 1.28	< 0.93	< 1.22
	Fe-59	< 2.47	< 2.19	< 2.62	< 2.60	< 1.49	< 2.06
	Co-60	< 1.67	1.61±0.78	< 1.54	< 1.46	< 1.14	< 1.18
	K-40	<14.9	<15.0	16.5±7.8	<15.2	14.2±7.9	<16.2

TABLE 9

NMP/JAF SITE

ENVIRONMENTAL AIRBORNE PARTICULATE SAMPLES - OFF SITE STATIONS

GROSS BETA ACTIVITY pCi/m^3 ± 2 Sigma

WEEK END DATE	LOCATION C--OFF	D1-OFF	D2-OFF	E--OFF	F--OFF	G--OFF
82/01/05	0.032±0.004	0.036±0.004	0.034±0.005	0.031±0.005	0.033±0.004	0.035±0.005
82/01/13	0.038±0.004	0.042±0.004	0.041±0.005	0.034±0.005	0.042±0.004	0.033±0.004
82/01/19	0.034±0.004	0.036±0.005	0.036±0.005	0.036±0.006	0.043±0.005	0.047±0.006
82/01/26	0.042±0.004	0.041±0.005	0.040±0.005	0.037±0.005	0.043±0.005	0.045±0.005
82/02/03	0.039±0.004	0.040±0.004	0.045±0.005	0.043±0.005	0.041±0.004	0.047±0.005
82/02/09	0.039±0.005	0.040±0.005	0.044±0.006	0.030±0.006	0.041±0.005	0.030±0.006
82/02/17	0.050±0.005	0.054±0.005	0.051±0.005	0.048±0.006	0.059±0.005	0.047±0.005
82/02/23	0.030±0.004	0.027±0.004	0.029±0.005	0.025±0.005	0.029±0.004	0.027±0.005
82/03/02	0.037±0.004	0.035±0.004	0.034±0.005	0.037±0.005	0.036±0.004	0.041±0.005
82/03/09	0.043±0.005	0.041±0.005	0.045±0.005	0.041±0.006	0.051±0.005	0.039±0.005
82/03/16	0.037±0.004	0.036±0.004	0.036±0.005	0.034±0.005	0.031±0.004	0.035±0.005
82/03/24	0.015±0.003	0.018±0.003	0.024±0.004	0.020±0.004	0.022±0.003	0.022±0.004
82/03/30	0.049±0.005	0.032±0.007	0.046±0.006	0.044±0.007	0.053±0.005	0.053±0.006
82/04/06	0.034±0.004	*	0.034±0.005	0.022±0.005	0.035±0.004	0.031±0.006
82/04/13	0.055±0.005	0.057±0.006	0.057±0.006	0.058±0.007	0.059±0.005	0.057±0.005
82/04/20	0.032±0.004	0.038±0.005	0.034±0.005	0.035±0.006	0.040±0.005	0.040±0.005
82/04/27	0.047±0.005	0.053±0.006	0.050±0.006	0.035±0.023	0.052±0.005	0.044±0.006
82/05/04	0.063±0.006	0.071±0.006	0.063±0.007	0.054±0.006	0.054±0.005	0.052±0.005
82/05/12	0.036±0.005	0.043±0.005	0.044±0.006	0.045±0.008	0.047±0.005	0.030±0.004
82/05/18	0.029±0.005	0.026±0.005	0.048±0.007	0.024±0.006	0.025±0.004	0.023±0.004
82/05/25	0.027±0.004	0.030±0.004	0.026±0.006	0.027±0.006	0.028±0.004	0.027±0.004
82/06/02	0.023±0.003	0.022±0.004	0.021±0.004	0.025±0.005	0.022±0.003	0.021±0.003
82/06/08	0.024±0.004	0.023±0.004	0.016±0.005	0.010±0.005	0.021±0.004	0.020±0.004
82/06/15	0.022±0.004	0.032±0.005	0.027±0.005	0.030±0.006	0.029±0.004	0.022±0.004
82/06/22	0.024±0.004	0.030±0.004	0.024±0.005	0.022±0.004	0.028±0.004	0.010±0.005
82/06/29	0.019±0.003	0.023±0.004	0.020±0.005	0.018±0.004	0.027±0.004	0.019±0.004
82/07/07	0.031±0.004	0.042±0.004	0.033±0.005	0.037±0.005	0.034±0.004	0.025±0.004
82/07/13	0.032±0.005	0.029±0.005	0.036±0.006	0.029±0.005	0.020±0.004	0.011±0.003
82/07/20	0.029±0.004	0.040±0.005	0.031±0.005	0.032±0.005	0.034±0.004	0.021±0.004
82/07/27	0.025±0.004	0.036±0.005	0.037±0.006	0.032±0.005	0.035±0.004	0.025±0.004
82/08/03	0.027±0.004	0.025±0.004	0.024±0.005	0.030±0.004	0.030±0.004	0.023±0.004
82/08/10	0.029±0.004	0.025±0.006	0.031±0.006	0.029±0.004	0.032±0.004	0.027±0.004
82/08/17	0.027±0.005	0.033±0.006	0.030±0.006	0.035±0.005	0.030±0.004	0.026±0.004
82/08/24	0.020±0.004	0.020±0.004	0.050±0.006	0.030±0.004	0.027±0.004	0.022±0.004
82/08/31	0.022±0.003	0.028±0.004	0.019±0.004	0.022±0.004	0.023±0.003	0.020±0.004
82/09/8	0.040±0.004	0.060±0.005	0.052±0.005	0.063±0.005	0.070±0.005	0.053±0.006
82/09/14	0.055±0.006	0.050±0.005	0.050±0.005	0.052±0.006	0.049±0.005	0.059±0.008
82/09/21	0.019±0.003	0.022±0.004	0.020±0.003	0.025±0.004	0.024±0.004	0.026±0.005
82/09/28	0.024±0.004	0.029±0.004	0.029±0.004	0.020±0.004	0.031±0.004	0.032±0.006
82/10/5	0.024±0.003	0.025±0.004	0.027±0.004	0.030±0.004	0.034±0.004	0.027±0.005
82/10/5	0.040±0.004	0.050±0.005	0.054±0.005	0.054±0.005	0.054±0.005	0.046±0.006
82/10/19	0.017±0.004	0.014±0.004	0.015±0.004	0.015±0.004	0.017±0.004	0.015±0.005
82/10/26	0.025±0.004	0.029±0.004	0.034±0.004	0.032±0.005	0.033±0.004	0.024±0.005
82/11/2	0.042±0.005	0.039±0.004	0.043±0.005	0.042±0.005	0.042±0.005	0.043±0.006
82/11/9	0.026±0.004	0.026±0.004	0.025±0.004	0.024±0.004	0.025±0.004	0.022±0.005
82/11/16	0.015±0.003	0.016±0.003	0.017±0.003	0.018±0.004	0.018±0.003	0.019±0.005
82/11/23	0.034±0.004	0.035±0.004	0.039±0.004	0.035±0.004	0.036±0.004	0.037±0.006
82/11/30	0.023±0.003	0.022±0.003	0.021±0.003	0.022±0.003	0.027±0.003	0.024±0.003
82/12/7	0.027±0.004	0.031±0.004	0.020±0.004	0.030±0.004	0.026±0.004	0.020±0.004
82/12/15	0.032±0.004	0.033±0.004	0.031±0.004	0.030±0.004	0.028±0.003	0.030±0.004
82/12/21	0.019±0.004	0.023±0.004	0.019±0.004	0.020±0.004	0.010±0.004	0.010±0.004
82/12/28	0.026±0.004	0.022±0.003	0.024±0.003	0.023±0.003	0.024±0.003	0.020±0.004
83/01/04	0.023±0.004	0.019±0.003	0.020±0.003	0.020±0.004	0.023±0.004	0.022±0.003

* PUMP NOT OPERATIONAL

TABLE 10

HMP/JAF SITE
ENVIRONMENTAL AIRBORNE PARTICULATE SAMPLES - ON SITE STATIONS
GROSS BETA ACTIVITY pCi/m^3 ± 2 Sigma

LOCATION

WEEK END DATE	D1-ON	D2-ON	E--ON	F--ON	G--ON	H--ON	I--ON	J--ON	K--ON
82/01/04	0.033±0.006	0.036±0.005	0.036±0.005	0.033±0.006	0.025±0.004	0.036±0.004	0.029±0.006	0.036±0.005	0.032±0.004
82/01/12	0.040±0.005	0.034±0.005	0.039±0.004	0.037±0.005	0.032±0.004	0.034±0.004	0.029±0.005	0.028±0.003	0.037±0.004
82/01/18	0.036±0.007	0.033±0.006	0.038±0.005	0.033±0.006	0.026±0.004	0.037±0.005	0.025±0.006	0.019±0.004	0.033±0.005
82/01/25	0.043±0.006	0.049±0.006	0.051±0.005	0.044±0.006	0.044±0.005	0.006±0.002	0.019±0.004	0.042±0.004	0.041±0.005
82/02/02	0.042±0.005	0.045±0.005	0.038±0.004	0.047±0.006	0.048±0.004	0.017±0.003	0.003±0.003	0.025±0.003	0.033±0.004
82/02/08	0.045±0.007	0.039±0.006	0.045±0.006	0.038±0.007	0.041±0.006	0.043±0.005	0.006±0.004	0.041±0.005	0.042±0.006
82/02/16	0.045±0.006	0.047±0.005	0.040±0.005	0.049±0.006	0.046±0.005	0.050±0.004	0.052±0.006	0.049±0.005	0.037±0.005
82/02/22	0.027±0.006	0.041±0.006	0.033±0.005	0.023±0.006	0.031±0.005	0.031±0.004	0.023±0.005	0.026±0.004	0.020±0.004
82/03/01	0.044±0.006	0.041±0.005	0.045±0.005	0.042±0.006	0.038±0.005	0.038±0.004	0.036±0.005	0.014±0.003	0.042±0.005
82/03/08	0.040±0.006	0.035±0.005	0.040±0.005	0.038±0.006	0.041±0.005	0.042±0.004	0.038±0.006	0.044±0.005	0.036±0.004
82/03/15	0.034±0.006	0.038±0.005	0.039±0.005	0.037±0.006	0.041±0.005	0.037±0.004	0.030±0.005	0.034±0.004	0.028±0.004
82/03/22	0.014±0.005	0.016±0.004	0.016±0.004	0.012±0.005	0.017±0.004	0.018±0.003	0.018±0.004	0.014±0.003	0.014±0.004
82/03/29	0.040±0.006	0.037±0.005	0.042±0.005	0.041±0.008	0.040±0.005	0.034±0.004	0.040±0.006	0.047±0.005	0.043±0.005
82/04/05	0.031±0.006	0.028±0.004	0.030±0.004	0.030±0.005	0.031±0.005	0.030±0.004	0.031±0.005	0.030±0.004	0.030±0.005
82/04/12	*	0.057±0.005	0.053±0.006	0.057±0.005	0.049±0.005	0.050±0.005	0.058±0.007	0.051±0.005	0.054±0.005
82/04/19	0.043±0.005	0.043±0.005	0.045±0.005	0.046±0.005	0.043±0.005	0.041±0.004	0.043±0.006	0.042±0.005	0.045±0.005
82/04/26	0.060±0.006	0.052±0.006	0.070±0.007	0.063±0.007	0.061±0.006	0.047±0.005	0.062±0.006	0.058±0.005	0.052±0.005
82/05/03	0.052±0.005	0.051±0.006	0.054±0.006	0.064±0.010	0.052±0.006	0.045±0.005	0.052±0.006	0.047±0.005	0.045±0.005
82/05/11	0.046±0.005	0.025±0.003	0.046±0.005	0.042±0.005	0.051±0.005	0.046±0.004	0.044±0.005	0.047±0.005	0.048±0.005
82/05/17	0.022±0.004	0.027±0.005	0.028±0.005	0.024±0.006	0.019±0.004	0.023±0.004	0.024±0.005	0.025±0.004	0.025±0.005
82/05/24	0.030±0.005	0.030±0.005	0.038±0.005	0.030±0.006	0.025±0.005	0.025±0.004	0.028±0.005	0.026±0.004	0.034±0.005
82/06/01	0.016±0.003	0.020±0.004	0.019±0.004	0.026±0.005	0.017±0.004	0.016±0.003	0.016±0.004	0.017±0.003	0.016±0.003
82/06/07	0.016±0.004	0.016±0.004	0.014±0.004	0.015±0.005	0.017±0.004	0.014±0.003	0.010±0.004	0.016±0.004	0.018±0.004
82/06/14	0.022±0.004	0.024±0.004	0.020±0.004	0.027±0.005	0.022±0.004	0.019±0.003	0.021±0.005	0.019±0.003	0.021±0.004
82/06/21	0.024±0.004	0.023±0.004	0.023±0.004	0.027±0.005	0.019±0.004	0.021±0.003	0.023±0.005	0.015±0.003	0.020±0.004
82/06/28	0.019±0.004	0.020±0.004	0.021±0.004	0.019±0.004	0.019±0.005	0.019±0.003	0.023±0.004	0.015±0.003	0.015±0.003
82/07/06	0.032±0.004	0.032±0.004	0.033±0.004	0.033±0.005	0.030±0.005	0.039±0.004	0.035±0.005	0.035±0.003	0.034±0.004
82/07/12	0.027±0.005	0.031±0.005	0.031±0.005	0.031±0.006	0.031±0.007	0.027±0.004	0.033±0.006	0.030±0.004	0.027±0.004
82/07/19	0.035±0.005	0.027±0.005	0.032±0.005	0.035±0.006	0.027±0.006	0.037±0.005	0.031±0.005	0.027±0.004	0.031±0.005
82/07/26	0.024±0.004	0.024±0.004	0.020±0.005	0.023±0.005	0.021±0.005	0.020±0.003	0.021±0.004	0.019±0.003	0.019±0.004
82/08/02	0.027±0.004	0.028±0.005	0.028±0.004	0.030±0.005	0.032±0.006	0.024±0.003	0.029±0.005	0.026±0.003	0.029±0.004
82/08/09	0.031±0.004	0.113±0.008	0.058±0.006	0.035±0.005	0.020±0.005	0.030±0.003	0.070±0.007	0.077±0.005	0.045±0.005
82/08/16	0.030±0.004	0.034±0.005	0.033±0.004	0.035±0.005	0.030±0.006	0.031±0.004	0.022±0.005	0.037±0.004	0.028±0.004
82/08/23	0.026±0.004	0.029±0.004	0.026±0.004	0.032±0.005	0.028±0.005	0.031±0.003	0.027±0.006	0.035±0.004	0.026±0.004
82/08/30	0.022±0.003	0.025±0.004	0.023±0.004	0.023±0.004	0.024±0.004	0.025±0.003	0.034±0.005	0.027±0.003	0.022±0.003
82/09/07	0.037±0.003	0.032±0.004	0.033±0.004	0.020±0.004	0.026±0.005	0.034±0.004	0.042±0.004	0.023±0.003	0.040±0.004
82/09/13	0.050±0.008	0.057±0.008	0.047±0.006	0.041±0.006	0.050±0.007	0.040±0.006	0.015±0.004	0.053±0.006	0.037±0.005
82/09/20	0.031±0.004	0.029±0.004	0.030±0.004	0.028±0.005	0.026±0.005	0.025±0.005	0.027±0.004	0.036±0.005	0.027±0.004
82/09/27	0.033±0.004	0.037±0.005	0.054±0.005	0.035±0.005	0.029±0.005	0.001±0.003	0.030±0.004	0.032±0.005	0.015±0.004
82/10/4	0.021±0.003	0.030±0.004	0.026±0.004	0.021±0.004	0.026±0.005	0.021±0.004	0.019±0.003	0.021±0.005	0.025±0.005
82/10/12	0.036±0.004	0.034±0.004	0.036±0.005	0.031±0.005	0.033±0.005	0.034±0.005	0.037±0.004	0.026±0.008	0.039±0.006
82/10/18	0.017±0.003	0.019±0.004	0.020±0.005	0.020±0.005	0.017±0.005	0.017±0.005	0.016±0.003	0.014±0.004	0.012±0.004
82/10/25	0.017±0.005	0.019±0.004	0.033±0.004	0.024±0.005	0.026±0.005	0.024±0.005	0.030±0.004	0.021±0.005	0.018±0.003
82/11/1	0.045±0.005	0.046±0.005	0.050±0.006	0.050±0.006	0.040±0.006	0.044±0.006	0.041±0.005	0.030±0.005	0.037±0.004
82/11/8	0.024±0.004	0.024±0.004	0.025±0.004	0.024±0.005	0.021±0.005	0.022±0.005	0.024±0.004	0.019±0.004	0.021±0.004
82/11/15	0.025±0.003	0.021±0.003	0.024±0.004	0.010±0.004	0.020±0.004	0.024±0.005	0.020±0.003	0.017±0.004	0.020±0.003
82/11/22	0.032±0.004	0.030±0.004	0.035±0.004	0.034±0.005	0.031±0.005	0.037±0.005	0.034±0.004	0.031±0.005	0.029±0.004
82/11/29	0.035±0.004	0.035±0.004	0.036±0.004	0.035±0.005	0.043±0.006	0.036±0.004	0.032±0.004	0.038±0.004	0.036±0.004
82/12/6	0.027±0.003	0.025±0.004	0.033±0.004	0.024±0.005	0.026±0.005	0.020±0.004	0.025±0.004	0.024±0.003	0.025±0.004
82/12/14	0.026±0.003	0.026±0.004	0.023±0.004	0.027±0.005	0.025±0.004	0.025±0.004	0.020±0.003	0.025±0.003	0.032±0.004
82/12/20	0.028±0.004	0.024±0.004	0.025±0.005	0.020±0.005	0.024±0.006	0.020±0.004	0.016±0.004	0.023±0.004	0.025±0.004
82/12/27	0.020±0.003	0.021±0.003	0.017±0.004	0.019±0.004	0.010±0.004	0.020±0.004	0.020±0.003	0.020±0.003	0.020±0.003
83/01/03	0.010±0.003	0.017±0.003	0.015±0.003	0.016±0.004	0.020±0.005	0.022±0.004	0.010±0.003	0.021±0.004	0.015±0.003

* PUMP NOT OPERATIONAL

TABLE 11

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

Results in units of 10^{-3} pCi/m^3 ± 2 sigma

Nuclides	January	February	March	April	May	June
			OFF-SITE COMPSITE: A-1			
Co-60	<0.24	0.66 ± 0.29	<0.63	<0.77	<0.45	<0.50
Mn-54	<0.19	0.23 ± 0.15	<0.42	<0.65	<0.33	<0.24
Cs-134	<0.16	<0.28	<0.40	<0.48	<0.24	<0.27
Cs-137	<0.26	0.38 ± 0.20	<0.46	0.93 ± 0.48	0.52 ± 0.21	<0.32
Nb-95	0.50 ± 0.25	<0.56	<0.61	<2.04	<0.54	<0.51
Zr-95	<0.59	<1.04	<1.09	<2.11	<0.79	<0.71
Ce-141	<0.39	<0.44	<0.54	<1.92	<0.41	<0.49
Ce-144	1.78 ± 0.59	2.30 ± 0.83	2.00 ± 1.12	1.69 ± 0.97	1.54 ± 0.72	<1.40
Ru-106	<2.23	<3.49	<0.40	<5.17	<2.61	<2.61
Ru-103	<0.33	<0.37	<0.53	<1.42	<0.34	<0.38
Be-7	115 ± 6	139 ± 7	111 ± 7	148 ± 12	121± 6	114 ± 7
K-40	2.67 ± 1.86	<3.78	<5.89	<6.35	6.26 ± 2.71	<3.96
La-140	<0.88	<0.92	<1.41	<30.2	<0.78	<1.59
Ra-226	<3.66	<6.08	<6.32	<6.78	<4.73	<4.66
			ON-SITE COMPSITE: B-2			
Co-60	0.44 ± 0.17	0.77 ± 0.25	0.44 ± 0.22	<0.45	0.60 ± 0.24	<0.39
Mn-54	<0.19	<0.25	<0.37	<0.35	<0.24	<0.28
Cs-134	<0.14	<0.20	<0.31	<0.25	<0.18	<0.25
Cs-137	0.29 ± 0.15	0.39 ± 0.15	0.30 ± 0.19	0.67 ± 0.29	0.44 ± 0.18	<0.28
Nb-95	0.47 ± 0.21	0.47 ± 0.23	0.36 ± 0.27	<0.68	<0.40	<0.40
Zr-95	<0.50	<0.66	<0.83	<0.97	<0.62	<0.75
Ce-141	<0.30	<0.32	<0.43	<0.61	<0.34	<0.35
Ce-144	1.63 ± 0.65	1.45 ± 0.49	1.51 ± 0.61	2.34 ± 0.73	0.96 ± 0.47	<1.09
Ru-106	<1.50	<2.73	<2.72	<3.06	<1.95	<2.40
Ru-103	<0.27	<0.28	<0.39	<0.50	<0.29	<0.32
Be-7	68 ± 4	119 ± 6	97 ± 5	155 ± 8	98 ± 5	92 ± 5
K-40	2.12 ±1.50	<2.81	<4.61	<4.29	<3.82	<3.44
La-140	<0.78	<0.61	<1.32	<3.73	<0.84	<1.30
Ra-226	<2.84	<4.17	<4.94	<4.26	<3.52	<3.93

TABLE 11 (Cont.)

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

Results in units of 10^{-3} pCi/m^3 ± 2 sigma

Nuclides	July	August	September	October	November	December
			OFF-SITE COMPSITE: A-2			
Co-60	<0.47	<0.36	<0.28	<0.43	<0.37	<0.26
Mn-54	<0.37	<0.24	<0.21	<0.34	<0.18	<0.14
Cs-134	<0.25	<0.27	<0.20	<0.28	<0.26	<0.18
Cs-137	<0.35	0.23 ± 0.13	<0.26	<0.36	<0.27	0.16 ± 0.10
Nb-95	<0.50	<0.34	<0.37	<0.46	<0.32	<0.23
Zr-95	<0.96	<0.62	<0.60	<0.89	<0.69	<0.57
Ce-141	<0.48	<0.37	<0.36	<0.41	<0.40	<0.36
Ce-144	<1.23	<1.15	<1.01	<1.12	<1.04	<0.94
Ru-106	<2.82	<2.56	<2.19	<2.55	<2.12	<2.20
Ru-103	<0.38	<0.30	<0.30	<0.36	<0.30	<0.23
Be-7	115 ± 6	108 ± 6	78 ± 5	61 ± 5	76 ± 5	89 ± 5
K-40	<4.74	<0.42	<3.58	2.50 ± 2.05	2.60 ± 1.76	3.52 ± 1.89
La-140	<1.82	<0.75	<0.82	<1.10	<0.92	<0.69
Ra-226	<4.33	<4.59	<4.05	<4.62	<4.62	<3.67
			ON-SITE COMPSITE: B-1			
Co-60	0.26 ± 0.14	<0.20	0.28 ± 0.11	<0.25	<0.28	<0.18
Mn-54	<0.22	<0.18	<0.16	<0.20	<0.18	<0.14
Cs-134	<0.16	<0.17	<0.14	<0.17	<0.16	<0.14
Cs-137	0.36 ± 0.12	0.41 ± 0.15	0.12 ± 0.08	<0.18	<0.18	0.18 ± 0.11
Nb-95	<0.24	<0.23	<0.22	<0.23	<0.23	<0.18
Zr-95	<0.39	<0.50	<0.32	<0.44	<0.47	<0.38
Ce-141	<0.26	<0.28	<0.25	<0.27	<0.25	<0.27
Ce-144	0.90 ± 0.37	<0.85	<0.68	<0.77	<0.75	<0.68
Ru-106	<1.81	<1.82	<1.21	<1.40	<1.51	<1.24
Ru-103	<0.22	<0.20	<0.15	<0.22	<0.22	<0.19
Be-7	128 ± 5	109 ± 5	76 ± 4	58 ± 3	76 ± 4	80 ± 4
K-40	4.57 ± 1.68	<3.24	6.01 ± 1.90	3.10 ± 1.58	<2.61	2.82 ± 1.57
La-140	<0.70	<0.56	<0.62	<0.58	<0.48	<0.72
Ra-226	<3.13	<3.34	<2.69	4.14 ± 1.94	1.83 ± 1.21	1.84 ± 1.19

TABLE 11 (Cont.)

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

Results in units of 10^{-3} pCi/m^3 ± 2 sigma

Nuclides	January	February	March	April	May	June
OFF-SITE COMPSITE: A-2						
Co-60	0.39 ± 0.20	<0.45	<0.63	<0.71	0.59 ± 0.25	<0.49
Mn-54	<0.25	<0.31	<0.50	<0.49	<0.34	<0.31
Cs-134	<0.26	<0.37	<0.39	<0.38	<0.26	<0.28
Cs-137	0.37 ± 0.16	0.48 ± 0.26	<0.61	0.37 ± 0.22	0.46 0.21	<0.28
Nb-95	0.45 ± 0.25	0.58 ± 0.31	<0.71	<1.84	<0.48	<0.47
Zr-95	<0.74	<0.80	<1.22	<2.20	<0.86	<0.79
Ce-141	<0.43	<0.46	<0.60	<1.74	<0.44	<0.49
Ce-144	1.18 ± 0.49	2.45 ± 0.99	1.42 ± 0.72	2.04 ± 0.78	1.33 ± 0.56	1.67 ± 0.92
Ru-106	<2.32	<3.69	<0.40	<4.76	<2.74	<2.53
Ru-103	<0.38	<0.38	<0.55	<1.28	<0.42	<0.43
Be-7	113 ± 6	135 ± 7	111 ± 7	124 ±11	126 ± 7	106 ± 7
K-40	<4.06	<5.26	<6.66	<6.46	3.96 ± 2.46	6.17 ± 2.46
La-140	<1.32	<0.77	<1.48	<23.00	<1.22	<1.25
Ra-226	<3.98	<5.98	<7.12	<6.28	<4.72	5.10 ± 2.35
ON-SITE COMPSITE: B-1						
Co-60	0.34 ± 0.13	0.68 ± 0.23	0.95 ± 0.34	<0.42	<0.35	<0.42
Mn-54	0.20 ± 0.11	<0.25	<0.37	<0.32	<0.25	<0.30
Cs-134	<0.16	<0.18	<0.27	<0.27	<0.21	<0.27
Cs-137	0.16 ± 0.09	0.38 ± 0.14	0.48 ± 0.23	0.65 ± 0.23	0.26 ± 0.13	0.27 ± 0.18
Nb-95	0.68 ± 0.24	0.53 ± 0.21	<0.58	0.75 ± 0.37	0.20 ± 0.14	<0.60
Zr-95	<0.49	<0.63	<0.90	<0.98	<0.54	<0.71
Ce-141	<0.33	<0.34	<0.45	<0.60	<0.30	<0.37
Ce-144	1.40 ± 0.50	1.91 ± 0.58	1.03 ± 0.51	2.95 ± 0.80	1.22 ± 0.46	1.14 ± 0.45
Ru-106	<1.44	2.01 ± 1.01	<2.78	<2.89	<2.18	<2.22
Ru-103	<0.25	<0.24	<0.36	<0.39	<0.26	<0.30
Be-7	92 ± 5	139 ± 6	107 ± 6	180 ± 8	108 ± 5	111 ± 5
K-40	1.68 ± 0.13	<2.84	4.94 ± 2.76	3.91 ± 2.57	2.99 ± 1.63	2.62 ± 1.83
La-140	<1.20	<0.22	<1.15	<2.32	<0.75	<1.18
Ra-226	<3.00	<4.34	<4.65	<4.44	<3.72	<4.52

TABLE 11 (Cont.)

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

Results in units of 10^{-3} pCi/m^3 ± 2 sigma

Nuclides	July	August	September	October	November	December
			OFF-SITE COMPSITE: A-1			
Co-60	<0.57	<0.48	<0.25	<0.36	<0.47	<0.32
Mn-54	<0.42	<0.40	<0.16	<0.31	<0.31	<0.17
Cs-134	<0.35	<0.33	<0.16	<0.25	<0.29	<0.17
Cs-137	<0.44	0.36 ± 0.21	<0.22	<0.28	<0.32	<0.21
Nb-95	<0.58	<0.54	<0.33	<0.42	<0.42	<0.26
Zr-95	<1.03	<0.85	<0.51	<0.75	<0.74	<0.49
Ce-141	<0.52	<0.49	<0.34	<0.36	<0.42	<0.32
Ce-144	<1.48	<1.60	<0.90	<1.13	<1.14	<0.79
Ru-106	<3.39	<2.90	<1.99	<2.57	<2.58	<1.57
Ru-103	<0.48	<0.45	<0.22	<0.35	<0.33	<0.24
Be-7	123 ± 6	109 ± 6	69 ± 4	61 ± 4	80 ± 5	89 ± 5
K-40	<6.43	<4.91	3.93 ± 1.68	<4.24	<5.42	3.30 ± 1.85
La-140	<1.65	<1.10	<0.88	<1.21	<1.03	<0.62
Ra-226	5.46 ± 2.52	<6.03	<3.62	<4.17	<4.52	4.68 ± 2.48
			ON-SITE COMPSITE: B-2			
Co-60	<0.37	<0.28	<0.30	<0.39	<0.29	<0.27
Mn-54	<0.23	<0.19	<0.18	<0.25	<0.21	<0.18
Cs-134	<0.20	<0.18	<0.17	<0.23	<0.18	<0.16
Cs-137	0.35 ± 0.12	0.38 ± 0.13	0.20 ± 0.11	<0.24	<0.22	<0.21
Nb-95	<0.36	<0.24	<0.28	<0.34	0.22 ± 0.19	<0.25
Zr-95	<0.60	<0.42	<0.58	<0.56	<0.42	<0.49
Ce-141	<0.33	<0.27	<0.29	<0.34	<0.32	<0.28
Ce-144	<0.96	<0.85	<0.78	<0.93	<0.86	<0.77
Ru-106	<2.20	<1.53	<1.51	<2.01	<1.78	<1.53
Ru-103	<0.28	<0.23	<0.25	<0.26	<0.26	<0.24
Be-7	116 ± 5	86 ± 4	54 ± 4	56 ± 4	66 ± 4	76 ± 4
K-40	4.04 ± 1.89	2.09 ± 1.20	2.95 ± 1.59	<3.46	3.51 ± 1.85	2.35 ± 1.81
La-140	<1.02	<0.62	<0.70	<1.09	<0.71	<0.79
Ra-226	<3.49	<3.27	2.11 ± 1.23	<3.67	2.97 ± 1.63	<3.18

TABLE 12

NMP/JAF SITE
ENVIRONMENTAL CHARCOAL CARTRIDGE SAMPLES - OFF SITE STATIONS
I-131 ACTIVITY pCi/m^3 ± 2 sigma

LOCATION

WEEK END DATE	C--OFF	D1-OFF	D2-OFF	E--OFF	F--OFF	G--OFF
82/01/05	<0.028	<0.018	<0.019	<0.022	<0.010	<0.016
82/01/13	<0.013	<0.012	<0.021	<0.017	<0.016	<0.016
82/01/19	<0.028	<0.021	<0.021	<0.018	<0.023	<0.026
82/01/26	<0.012	<0.011	<0.021	<0.025	<0.017	<0.018
82/02/03	<0.009	<0.014	<0.018	<0.032	<0.012	<0.014
82/02/09	<0.019	<0.039	<0.059	<0.048	<0.017	<0.015
82/02/17	<0.014	<0.016	<0.023	<0.021	<0.017	<0.014
82/02/23	<0.014	<0.028	<0.021	<0.015	<0.028	<0.025
82/03/02	<0.019	<0.018	<0.020	<0.026	<0.015	<0.016
82/03/09	<0.011	<0.015	<0.025	<0.022	<0.019	<0.013
82/03/16	<0.017	<0.020	<0.029	<0.033	<0.017	<0.026
82/03/24	<0.016	<0.019	<0.029	<0.026	<0.019	<0.023
82/03/30	<0.022	<0.036	<0.027	<0.030	<0.018	<0.005
82/04/06	<0.017	*	<0.026	<0.021	<0.010	<0.026
82/04/13	<0.027	<0.028	<0.020	<0.036	<0.019	<0.021
82/04/20	<0.020	<0.031	<0.031	<0.025	<0.022	<0.029
82/04/27	<0.019	<0.028	<0.028	<0.080	<0.017	<0.031
82/05/04	<0.018	<0.016	<0.029	<0.023	<0.017	<0.020
82/05/12	<0.064	<0.052	<0.060	<0.042	<0.017	<0.019
82/05/18	<0.057	<0.043	<0.059	<0.035	<0.021	<0.018
82/05/25	<0.016	<0.022	<0.033	<0.030	<0.020	<0.019
82/06/02	<0.020	<0.019	<0.024	<0.031	<0.016	<0.020
82/06/08	<0.017	<0.026	<0.023	<0.034	<0.010	<0.007
82/06/15	<0.022	0.039±0.005	<0.034	<0.038	<0.018	<0.023
82/06/22	<0.024	<0.021	<0.029	<0.025	<0.018	<0.039
82/06/29	<0.011	<0.009	<0.030	<0.028	<0.021	<0.022
82/07/07	<0.018	<0.018	<0.026	<0.018	<0.017	<0.021
82/07/13	<0.017	<0.020	<0.028	<0.023	<0.016	<0.007
82/07/20	<0.022	<0.016	<0.041	<0.026	<0.024	<0.021
82/07/27	<0.018	<0.018	<0.024	<0.024	<0.020	<0.026
82/08/03	<0.023	<0.024	<0.028	<0.021	<0.017	<0.017
82/08/10	<0.017	<0.031	<0.038	<0.022	<0.019	<0.020
82/08/17	<0.021	<0.020	<0.034	<0.020	<0.016	<0.025
82/08/24	<0.020	<0.027	<0.010	<0.025	<0.026	<0.015
82/08/31	<0.020	<0.016	<0.019	<0.009	<0.017	<0.003
82/09/8	<0.014	<0.014	<0.020	<0.009	<0.021	<0.018
82/09/14	<0.017	<0.017	<0.023	<0.023	<0.023	<0.022
82/09/21	<0.019	<0.018	<0.019	<0.017	<0.018	<0.022
82/09/28	<0.017	<0.016	<0.016	<0.010	<0.023	<0.037
82/10/5	<0.014	<0.022	<0.023	<0.016	<0.012	<0.021
82/10/5	<0.015	<0.017	<0.015	<0.014	<0.017	<0.023
82/10/19	<0.017	<0.020	<0.020	<0.011	<0.019	<0.027
82/10/26	<0.020	<0.025	<0.021	<0.023	<0.022	<0.020
82/11/2	<0.028	<0.028	<0.019	<0.013	<0.021	<0.036
82/11/9	<0.015	<0.015	<0.015	<0.013	<0.010	<0.033
82/11/16	<0.020	<0.021	<0.016	<0.015	<0.017	<0.031
82/11/23	<0.014	<0.016	<0.010	<0.010	<0.013	<0.020
82/11/30	<0.015	<0.016	<0.021	<0.016	<0.011	<0.017
82/12/7	<0.018	<0.015	<0.028	<0.021	<0.013	<0.014
82/12/15	<0.014	<0.021	<0.022	<0.013	<0.012	<0.011
82/12/21	<0.021	<0.023	<0.010	<0.013	<0.010	<0.016
82/12/30	<0.024	<0.018	<0.023	<0.017	<0.025	<0.015
83/01/04	<0.015	<0.014	<0.022	<0.021	<0.013	<0.010

* PUMP NOT OPERATIONAL

TABLE 13

NMP/JAF SITE
ENVIRONMENTAL CHARCOAL CARTRIDGE SAMPLES - ON SITE STATIONS
I-131 ACTIVITY pCi/m^3 ± 2 sigma

WEEK END DATE	LOCATION								
	D1-ON	D2-ON	E--ON	F--ON	G--ON	H--ON	I--ON	J--ON	K--ON
82/01/04	<0.022	<0.023	<0.014	<0.030	<0.021	<0.016	<0.021	<0.020	<0.016
82/01/12	<0.021	<0.023	<0.016	<0.024	<0.014	<0.009	<0.019	<0.016	<0.017
82/01/18	<0.032	<0.016	<0.018	<0.028	<0.022	<0.012	<0.033	<0.019	<0.020
82/01/25	<0.031	<0.019	<0.022	<0.022	<0.021	<0.021	<0.027	<0.014	<0.017
82/02/02	<0.019	<0.025	<0.019	<0.024	<0.013	<0.000	<0.016	<0.017	<0.014
82/02/00	<0.026	<0.024	<0.062	<0.024	<0.025	<0.034	<0.032	<0.057	<0.020
82/02/16	<0.019	<0.018	<0.012	<0.023	<0.017	<0.014	<0.012	<0.014	<0.016
02/02/22	<0.026	<0.019	<0.027	<0.029	<0.018	<0.013	<0.024	<0.015	<0.018
82/03/01	<0.026	<0.014	<0.016	<0.031	<0.023	<0.015	<0.029	<0.023	<0.018
82/03/08	<0.023	<0.023	<0.017	<0.027	<0.015	<0.020	<0.027	<0.011	<0.020
82/03/15	<0.030	<0.027	<0.017	<0.022	<0.018	<0.019	<0.013	<0.018	<0.025
82/03/22	<0.037	0.024±0.004	<0.029	<0.043	<0.030	<0.019	<0.030	<0.027	<0.023
82/03/29	<0.025	<0.021	<0.024	<0.047	<0.021	<0.022	0.025±0.006	<0.025	<0.007
82/04/05	<0.033	<0.024	<0.022	<0.027	<0.033	<0.024	<0.031	<0.028	<0.035
82/04/12	*	<0.017	<0.020	<0.025	<0.020	<0.020	<0.032	<0.017	<0.020
82/04/19	<0.023	<0.021	<0.022	<0.031	<0.020	<0.026	<0.043	<0.020	<0.021
82/04/26	<0.029	<0.025	<0.024	<0.027	<0.026	<0.020	<0.030	<0.025	<0.022
82/05/03	<0.026	<0.026	<0.020	<0.038	<0.020	<0.026	<0.021	<0.026	<0.020
82/05/11	<0.046	<0.046	<0.017	<0.024	<0.010	<0.057	<0.066	<0.021	<0.014
82/05/17	<0.048	<0.065	<0.069	<0.063	<0.023	<0.016	<0.026	<0.010	<0.027
82/05/24	<0.020	<0.019	<0.027	<0.035	<0.024	<0.020	<0.024	<0.022	<0.023
82/06/01	<0.019	<0.035	<0.023	<0.031	<0.022	<0.019	<0.010	<0.021	<0.024
82/06/07	<0.019	<0.020	<0.025	<0.026	<0.024	<0.016	<0.021	<0.018	<0.020
82/06/14	<0.020	<0.023	<0.025	<0.029	<0.021	<0.016	<0.032	<0.018	<0.025
82/06/21	<0.032	<0.017	<0.024	<0.031	<0.026	<0.019	<0.018	<0.018	<0.016
82/06/28	<0.019	<0.021	<0.022	<0.032	<0.024	<0.018	<0.029	<0.016	<0.028
82/07/06	<0.024	<0.020	<0.023	<0.022	<0.030	<0.025	<0.020	<0.018	<0.024
82/07/12	<0.016	<0.008	<0.020	<0.018	<0.032	0.010±0.004	<0.035	<0.017	<0.020
82/07/19	<0.024	<0.022	<0.019	<0.027	<0.034	0.017±0.005	0.042±0.005	<0.021	<0.018
82/07/26	<0.026	0.013±0.004	<0.037	<0.037	<0.030	0.015±0.003	<0.033	<0.019	<0.026
82/08/02	<0.021	<0.022	<0.024	<0.036	<0.025	<0.009	<0.027	<0.013	<0.021
82/08/09	<0.022	<0.020	<0.030	<0.036	<0.031	<0.022	<0.033	<0.016	<0.023
82/08/16	<0.020	<0.025	<0.020	<0.029	<0.034	0.006±0.004	<0.031	0.011±0.004	<0.022
82/08/23	<0.018	<0.020	<0.020	<0.023	<0.024	<0.013	<0.036	<0.012	<0.019
82/08/30	<0.015	<0.019	<0.017	<0.026	<0.021	0.004±0.003	<0.023	0.002±0.003	<0.017
82/09/07	<0.013	<0.009	<0.014	<0.020	<0.024	<0.022	<0.018	<0.018	<0.013
82/09/13	<0.045	<0.037	<0.033	<0.037	<0.033	<0.025	<0.031	0.024±0.006	<0.025
82/09/20	<0.020	<0.025	<0.027	<0.026	<0.027	<0.024	<0.025	<0.026	<0.024
82/09/27	<0.021	<0.020	<0.027	<0.029	<0.027	<0.027	<0.018	<0.022	<0.024
82/10/4	<0.013	<0.022	<0.014	<0.022	<0.028	<0.028	<0.017	<0.032	<0.030
82/10/12	<0.017	<0.019	<0.027	<0.010	<0.022	<0.025	<0.019	<0.069	<0.010
82/10/18	<0.017	<0.013	<0.034	<0.024	<0.033	<0.021	<0.023	<0.026	<0.022
82/10/25	<0.041	<0.023	<0.019	<0.028	<0.033	<0.033	<0.021	<0.036	<0.023
82/11/1	<0.026	<0.029	<0.020	<0.027	<0.023	<0.036	<0.024	<0.030	<0.025
82/11/8	<0.013	<0.019	<0.017	<0.018	<0.031	<0.033	<0.010	<0.018	<0.019
82/11/15	<0.015	<0.018	<0.023	<0.012	<0.013	<0.020	<0.017	<0.020	<0.011
82/11/22	<0.021	<0.018	<0.015	<0.032	<0.030	<0.022	<0.014	<0.035	<0.016
02/11/29	<0.016	<0.022	<0.026	<0.025	<0.027	<0.017	<0.021	<0.019	<0.010
82/12/6	<0.017	<0.018	<0.026	<0.021	<0.010	<0.016	<0.019	<0.019	<0.021
82/12/14	<0.015	<0.016	<0.019	<0.024	<0.032	<0.016	<0.013	<0.023	<0.022
82/12/20	<0.015	<0.021	<0.025	<0.019	<0.033	<0.020	<0.020	<0.022	<0.021
82/12/27	<0.022	<0.018	<0.023	<0.024	<0.035	<0.019	<0.018	<0.022	<0.023
83/01/03	<0.012	<0.014	<0.007	<0.025	<0.030	<0.010	<0.021	<0.018	<0.023

* PUMP NOT OPERATIONAL

TABLE 14

DIRECT RADIATION MEASUREMENTS - QUARTERLY RESULTS (1982)

STATION NUMBER	LOCATION	JANUARY TO APRIL	APRIL TO JULY	JULY TO OCTOBER	OCTOBER TO DECEMBER	LOCATION (DIRECTION AND DISTANCE)
3	D1 on Site	5.58±0.25	12.27±0.46	13.04±0.21	10.81±1.54	0.25 miles @ 69°
4	D2 on Site	5.08±0.61	6.70±0.30	7.03±0.40	5.69±0.61	0.40 miles @ 140°
5	E on Site	4.63±0.50	5.59±0.12	5.70±0.41	5.83±0.50	0.40 miles @ 175°
6	F on Site	3.87±0.08	5.37±0.13	5.89±0.58	4.67±1.89	0.50 miles @ 210°
7	G on Site	4.15±0.48	5.61±0.08	5.60±0.63	5.68±0.63	0.70 miles @ 250°
8	C off Site	4.53±0.36	5.61±0.10	5.99±0.57	6.08±0.69	16.00 miles @ 42°
9	D1 off Site	4.06±0.64	6.24±0.17	5.71±0.47	5.05±0.22	11.40 miles @ 80°
10	D2 off Site	4.80±0.13	5.44±0.22	5.69±0.28	5.38±0.74	9.00 miles @ 117°
11	E off Site	4.02±0.56	5.93±0.11	5.68±0.58	4.83±0.08	7.20 miles @ 160°
12	F off Site	4.05±0.15	4.79±0.22	5.24±0.33	5.56±1.01	7.70 miles @ 190°
13	G off Site	4.66±0.23	5.42±0.19	5.95±0.28	5.13±0.34	5.30 miles @ 225°
14	DeMass Rd, SW Oswego-Control	4.55±0.29	5.17±0.06	5.66±0.18	5.20±0.42	12.80 miles @ 225°
15	Pole 66, W. Boundary-Bible Camp	3.85±0.45	4.50±0.18	4.20±0.27	4.44±0.56	0.90 miles @ 238°
18	Progress Center-Picnic Area	4.35±0.39	5.64±0.15	5.08±0.32	5.08±0.76	0.50 miles @ 268°
19	East Boundary-JAF, Pole 9	4.40±0.53	5.64±0.29	6.25±0.34	5.44±0.63	1.30 miles @ 81°
23	H on Site	5.03±0.34	9.13±0.14	8.70±0.54	8.50±0.98	0.80 miles @ 71°
24	I on Site	4.55±0.16	6.60±0.12	7.20±0.11	5.50±0.45	0.80 miles @ 98°
25	J on Site	4.57±0.39	5.88±0.08	6.13±0.45	5.63±0.88	0.90 miles @ 110°
26	K on Site	4.32±0.49	5.92±0.05	6.08±0.75	5.37±0.83	0.50 miles @ 132°
27	Nor. Fence-NNW Sector, JAF	9.71±0.77	23.18±0.28	20.98±0.98	17.24±2.15	0.40 miles @ 60°
28	Light Pole (E) JAF	29.33±2.91	41.79±0.16	53.26±3.11	47.44±6.42	0.50 miles @ 68°
29	Nor. Fence (E) JAF	40.99±2.24	90.56±1.73	75.89±4.93	72.72±8.84	0.50 miles @ 65°
30	Nor. Fence (NW) JAF	7.03±0.91	16.88±0.13	19.52±1.55	14.89±1.07	0.40 miles @ 57°
31	Nor. Fence (NW) NMP-1	10.15±1.16	10.76±0.11	11.60±0.62	(1)	0.20 miles @ 290°
39	East Fence, Rad. Waste-NMP-1	31.49±0.94	44.40±1.09	61.91±4.46	43.59±16.11	0.10 miles @ 292°
43	.9 mi Rt. 3 from Rt. 104B	4.26±0.30	5.92±0.07	5.01±0.52	5.02±0.34	9.40 miles @ 88°
44	Cor. Rt 3 and Kelly Drive	4.12±0.30	5.63±0.31	5.82±0.42	4.95±0.50	12.60 miles @ 64°
45	Cor. Rt 64 and Rt. 35	4.35±0.25	5.91±0.06	5.76±0.14	6.00±0.40	7.60 miles @ 130°
46	Cor. Rt. 176 and Black Creek Rd.	4.25±0.37	(1)	5.23±0.29	4.89±0.49	7.90 miles @ 178°
47	NE Shoreline (JAF)	16.16±3.36	46.87±0.08	51.12±0.30	43.33±3.41	0.60 miles @ 69°
48	.36 mi (N) on Access Rd. (JAF)	4.85±0.52	7.13±0.16	8.79±0.58	6.90±0.78	0.80 miles @ 92°
49	Phoenix, NY-Control	3.80±0.23	4.97±0.03	5.02±0.57	4.87±0.42	20.00 miles @ 165°
50	Lake Rd. West of J On-Site	4.49±0.49	5.78±0.22	(1)	4.90±0.44	0.70 miles @ 115°
51	Oswego Steam Sta. N End of W Fence	4.18±0.36	5.86±0.13	5.39±0.58	5.25±0.37	7.50 miles @ 233°
52	East 11th St. Fitzhugh Park Sch.	(1)	(1)	4.88±0.15	5.29±1.11	5.80 miles @ 227°
53	Broadwell & Chestnut Sts. - Fulton H.S.	3.84±0.25	5.49±0.21	5.85±0.17	5.11±0.45	13.70 miles @ 183°
54	Liberty St. & Co. Rt. 16 - Mexico H.S.	4.11±0.45	5.10±0.13	5.50±0.46	5.01±0.81	9.30 miles @ 115°

TABLE 14 (cont.)

DIRECT RADIATION MEASUREMENTS - QUARTERLY RESULTS (1982)

STATION NUMBER	LOCATION	JANUARY TO APRIL	APRIL TO JULY	JULY TO OCTOBER	OCTOBER TO DECEMBER	LOCATION (DIRECTION AND DISTANCE)
55	Hinnmann Rd. & Co. Rt. 5 - Pulaski N.S.	3.79±0.47	4.84±0.16	5.69±0.36	5.23±0.45	13.70 miles @ 75°
56	Rt. 104 - New Haven N.S. (SE Corner)	4.10±0.37	4.95±0.24	5.84±0.30	5.00±0.65	5.40 miles @ 120°
57	Co. Rt. 29 & Hiner Rd. (SE) - Lycoming, NY	4.24±0.41	5.35±0.26	5.53±0.35	5.54±0.69	1.90 miles @ 145°
58	Co. Rt. 1 - ALCAN (S of Entrance Rd.)	4.30±0.38	5.47±0.19	(1)	5.57±0.14	3.20 miles @ 220°
59	Environmental Lab - JAF	9.25±1.15	38.40±0.98	34.00±3.56	21.09±2.52	0.50 miles @ 95°
60	S. Shore (Fish Point) Little Sodus Bay, NY	5.53±0.51	5.73±0.07	6.95±0.43	6.51±0.75	21.00 miles @ 225°
61	700' N of #48 (On Access Rd.) - JAF	5.39±0.38	10.50±0.18	11.83±0.61	9.83±1.55	0.80 miles @ 83°
65	Dutch Ridge Rd. & Kerflen Rd. (SE)	3.81±0.32	5.34±0.06	5.40±0.58	5.29±1.13	7.80 miles @ 198°

(1) TLDs lost.

Results in units of mrem/standard month.

TABLE 15

CONTINUOUS RADIATION MONITORS* (GM)

mR/hr

FIRST HALF

LOCATION	PERIOD 1982	mR/hr MIN.	mR/hr MAX.	mR/hr AVG.
C Offsite	01/05 to 02/04	0.010	0.032	0.012
	02/04 to 03/02	0.010	0.019	0.012
	03/02 to 04/01	0.010	0.080	0.019
	04/01 to 04/30	0.011	0.020	0.017
	04/30 to 05/29	0.011	0.018	0.015
	05/29 to 06/29	0.010	0.020	0.014
D_1 Onsite	01/04 to 02/03	0.010	0.015	0.011
	02/03 to 03/01	0.010	0.017	0.011
	03/01 to 03/30	0.010	0.040	0.019
	03/30 to 04/30	0.015	0.060	0.023
	04/30 to 05/28	0.011	0.063	0.024
	05/28 to 06/28	0.010	0.058	0.022
D_2 Onsite	01/04 to 02/03	0.011	0.021	0.015
	02/03 to 03/01	0.011	0.031	0.015
	03/01 to 03/30	0.011	0.099	0.014
	03/30 to 04/30	0.011	0.050	0.016
	04/30 to 05/28	0.012	0.047	0.015
	05/28 to 06/28	0.011	0.091	0.014
E Onsite	01/04 to 02/03	0.011	0.022	0.014
	02/03 to 03/01	0.011	0.026	0.016
	03/01 to 03/30	0.010	0.051	0.014
	03/30 to 04/30	0.011	0.077	0.017
	04/30 to 05/28	0.013	0.053	0.019
	05/28 to 06/28	0.011	0.085	0.015
F Onsite	01/04 to 02/03	0.010	0.017	0.011
	02/03 to 03/01	0.010	0.022	0.012
	03/01 to 03/30	0.010	0.022	0.011
	03/30 to 04/30	0.010	0.025	0.016
	04/30 to 05/28	0.010	0.032	0.016
	05/28 to 06/28	0.010	0.040	0.012

*Detectors are "bugged" to insure on scale readings.

TABLE 15 (cont.)

CONTINUOUS RADIATION MONITORS* (GM)

mR/hr

FIRST HALF

LOCATION	PERIOD 1982	mR/hr MIN.	mR/hr MAX.	mR/hr AVG.
G Onsite	01/04 to 02/03	0.012	0.028	0.014
	02/03 to 03/01	0.011	0.029	0.024
	03/01 to 03/30	0.012	0.036	0.014
	03/30 to 04/30	0.015	0.067	0.018
	04/30 to 05/28	0.010	0.053	0.019
	05/28 to 06/28	0.011	0.085	0.018
H Onsite	01/04 to 02/03	0.018	0.040	0.022
	02/03 to 03/01	0.010	0.048	0.030
	03/01 to 03/30	0.017	0.071	0.027
	03/30 to 04/30	0.010	0.080	0.030
	04/30 to 05/28	0.018	0.060	0.024
	05/28 to 06/28	0.015	0.088	0.027
I Onsite	01/04 to 02/03	0.010	0.013	0.011
	02/03 to 03/01	0.011	0.021	0.015
	03/01 to 03/30	0.012	0.099	0.028
	03/30 to 04/30	0.021	0.099	0.028
	04/30 to 05/28	0.011	0.062	0.029
	05/28 to 06/28	0.010	0.090	0.026
J Onsite	01/04 to 02/03	0.011	0.025	0.014
	02/03 to 03/01	0.010	0.034	0.015
	03/01 to 03/30	0.010	0.080	0.015
	03/30 to 04/30	0.017	0.072	0.025
	04/30 to 05/28	0.015	0.028	0.020
	05/28 to 06/28	0.013	0.089	0.022
K Onsite	01/04 to 02/03	0.010	0.023	0.012
	02/03 to 03/01	0.010	0.099	0.015
	03/01 to 03/30	0.010	0.050	0.018
	03/30 to 04/30	0.011	0.051	0.019
	04/30 to 05/28	0.011	0.049	0.014
	05/28 to 06/28	0.011	0.069	0.019

*Detectors are "bugged" to insure on scale readings.

TABLE 15 (cont.)

CONTINUOUS RADIATION MONITORS* (GM)

mR/hr

SECOND HALF

LOCATION	PERIOD 1982	mR/hr MIN.	mR/hr MAX.	mR/hr AVG.
C Offsite	06/29 to 07/23	0.010	0.028	0.018
	07/23 to 08/20	0.013	0.021	0.018
	08/20 to 09/17	0.012	0.030	0.018
	09/17 to 10/19	0.010	0.023	0.018
	10/19 to 11/16	0.010	0.035	0.020
	11/16 to 12/15	0.010	0.025	0.018
	12/15 to 02/01/83	0.010	0.023	0.015
D_1 Onsite	06/28 to 07/22	0.010	0.060	0.021
	07/22 to 08/19	0.014	0.082	0.023
	08/19 to 09/17	0.013	0.600	0.022
	09/17 to 10/15	0.010	0.110	0.025
	10/15 to 11/12	0.010	0.063	0.022
	11/12 to 12/08	0.010	0.032	0.022
	12/08 to 01/06/83	0.010	0.033	0.022
D_2 Onsite	06/28 to 07/22	0.011	0.097	0.017
	07/22 to 08/19	0.011	0.094	0.013
	08/19 to 09/17	0.010	0.060	0.015
	09/17 to 10/15	0.010	0.047	0.015
	10/15 to 11/12	0.010	0.130	0.025
	11/12 to 12/08	0.010	0.030	0.013
	12/08 to 01/06/83	0.010	0.075	0.015
E Onsite	06/28 to 07/22	0.012	0.190	0.018
	07/22 to 08/19	0.013	0.121	0.019
	08/19 to 09/17	0.010	0.100	0.022
	09/17 to 10/15	0.010	0.075	0.020
	10/15 to 11/12	0.010	0.150	0.013
	11/12 to 12/08	0.010	0.032	0.018
	12/08 to 01/06/83	0.010	0.081	0.018
F Onsite	06/28 to 07/22	0.010	0.040	0.013
	07/22 to 08/19	0.010	0.071	0.014
	08/19 to 09/17	0.010	0.033	0.014
	09/17 to 10/15	0.010	0.070	0.016
	10/15 to 11/12	0.011	0.072	0.018
	11/12 to 12/08	0.010	0.041	0.018
	12/08 to 01/06/83	0.010	0.030	0.018

*Detectors are "bugged" to insure on scale readings.

TABLE 15 (cont.)

CONTINUOUS RADIATION MONITORS* (GM)

mR/hr

SECOND HALF

LOCATION	PERIOD 1982	mR/hr MIN.	mR/hr MAX.	mR/hr AVG.
G Onsite	06/28 to 07/22	0.013	0.051	0.020
	07/22 to 08/19	0.019	0.052	0.024
	08/19 to 09/17	0.013	0.058	0.023
	09/17 to 10/15	0.013	0.041	0.023
	10/15 to 11/12	0.013	0.075	0.025
	11/12 to 12/08	0.013	0.032	0.022
	12/08 to 01/06/83	0.012	0.033	0.021
H Onsite	06/28 to 07/22	0.018	0.070	0.028
	07/22 to 08/19	0.014	0.092	0.033
	08/19 to 09/17	0.017	0.100	0.028
	09/17 to 10/15	0.015	0.080	0.022
	10/15 to 11/12	0.013	0.082	0.026
	11/12 to 12/08	0.013	0.037	0.025
	12/08 to 01/06/83	0.015	0.038	0.020
I Onsite	06/28 to 07/22	0.012	0.090	0.028
	07/22 to 08/19	0.014	0.110	0.033
	08/19 to 09/17	0.011	0.120	0.025
	09/17 to 10/15	0.012	0.060	0.028
	10/15 to 11/12	0.020	0.092	0.030
	11/12 to 12/08	0.015	0.035	0.025
	12/08 to 01/06/83	0.012	0.080	0.025
J Onsite	06/28 to 07/22	0.011	0.090	0.013
	07/22 to 08/19	0.010	0.080	0.013
	08/19 to 09/17	0.010	0.047	0.025
	09/17 to 10/15	0.012	0.051	0.028
	10/15 to 11/12	0.010	0.062	0.013
	11/12 to 12/08	0.010	0.028	0.013
	12/08 to 01/06/83	0.010	0.027	0.013
K Onsite	06/28 to 07/22	0.011	0.130	0.014
	07/22 to 08/19	0.012	0.081	0.014
	08/19 to 09/17	0.010	0.060	0.013
	09/17 to 10/15	0.010	0.065	0.018
	10/15 to 11/12	0.010	0.044	0.018
	11/12 to 12/08	0.010	0.022	0.013
	12/08 to 01/06/83	0.010	0.024	0.012

*Detectors are "bugged" to insure on scale readings.

TABLE 16

CONCENTRATIONS OF IODINE - 131* IN MILK
Results in units of pCi/l ± 2 sigma

Station	5-3-82	6-7-82	7-12-82	8-9-82	9-13-82	10-4-82	11-8-82	12-6-82
40	<0.1	<0.2	<0.3	<0.3	<0.2	<0.4	<0.1	<0.2
4	<0.2	<0.2	<0.3	<0.2	<0.2	<0.1	<0.1	<0.1
14	<0.2	<0.2	<0.3	<0.3	<0.2	<0.1	<0.1	<0.2
5	<0.2	<0.2	<0.3	<0.3	<0.2	<0.3	<0.1	<0.1
16	<0.2	<0.2	<0.3	<0.3	<0.2	<0.3	<0.1	<0.2
7	<0.1	<0.2	<0.2	<0.2	<0.2	<0.1	<0.4	<0.2
45	-	-	<0.3	<0.2	<0.1	<0.1	<0.1	<0.2

*Iodine-131 results are corrected for decay to the sampling stop date.
-No result because the sampling station was not in operation.

TABLE 17

CONCENTRATIONS OF GAMMA EMITTERS IN MILK (MONTHLY SAMPLES)
Results in units of pCi/liter ± 2 sigma

Station	Nuclides	5-3-82	6-7-82	7-12-82	8-9-82	9-13-82	10-4-82	11-8-82	12-6-82
40	K-40	1500 ± 150	1300 ± 130	1600 ± 160	1200 ±120	1200 ± 120	1400 ± 140	1600 ± 160	1300 ± 130
	Cs-134	<2.4	<2.7	<2.9	<3.3	<3.0	<3.1	<3.0	<3.6
	Cs-137	<3.0	4.2	<3.4	4.4	4.6	4.0	<3.8	4.6
	Ba-140	<26	<27	<51	<54	<48	<55	<63	<27
	La-140	4.4	<6.6	<5.7	<7.4	<16	<14	<16	4.2
	Others	LLD	LLD	LLD	LLD	LLD	LLD	LLD	LLD
4	K-40	1500 ± 150	1500 ± 150	1600 ± 160	1400 ± 140	1100 ± 110	1600 ± 160	1300 ± 130	1500 ± 150
	Cs-134	<2.8	<2.5	<3.0	<2.0	<3.0	<3.4	<3.6	<3.2
	Cs-137	6.8 ± 2.7	4.2	<3.3	<3.7	<3.1	<3.5	4.0	<3.7
	Ba-140	<29	<35	<39	<46	<34	<49	<36	<28
	La-140	<3.2	<8.1	4.1	4.5	4.5	<15	<8.0	<3.9
	Others	LLD	LLD	LLD	LLD	LLD	LLD	LLD	LLD
14	K-40	1400 ± 140	1400 ± 140	1500 ± 150	1100 ± 110	1100 ± 110	1400 ± 140	1300 ± 130	1400 ± 140
	Cs-134	<3.3	<2.6	<3.6	<3.7	<2.7	<3.5	<3.2	<3.3
	Cs-137	4.9	4.6 ± 3.1	<6.2	4.0	<3.2	4.3	4.5	<3.7
	Ba-140	<32	<42	<72	<53	<29	<26	<58	<32
	La-140	<7.7	4.9	<13	<18	<7.5	<7.8	<6.7	<9.5
	Others	LLD	LLD	LLD	LLD	LLD	LLD	LLD	LLD

TABLE 17 (Cont.)

CONCENTRATIONS OF GAMMA EMITTERS IN MILK (MONTHLY SAMPLES)
Results in units of pCi/liter ± 2 sigma

Station	Nuclides	5-3-82	6-7-82	7-12-82	8-9-82	9-13-82	10-4-82	11-8-82	12-6-82
5	K-40	1500 ± 150	1500 ± 150	1500 ± 150	1200 ± 120	1300 ± 130	1300 ± 130	1100 ± 110	1300 ± 130
	Cs-134	<2.9	<3.7	<2.8	<2.2	<3.0	<3.1	<2.8	<2.7
	Cs-137	4.3 ± 2.8	<4.7	6.1 ± 2.9	14 ± 3.3	<3.8	<4.5	<4.2	<4.5
	Ba-140	<30	<52	<48	<41	<37	<49	<46	<42
	La-140	<3.6	<10	<11	<7.8	<6.3	<7.3	<15	<3.0
	Others	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
16	K-40	1500 ± 150	970 ± 97	1500 ± 150	1300 ± 130	1400 ± 140	1300 ± 130	1300 ± 130	1000 ± 100
	Cs-134	<2.9	<2.4	<3.0	<3.0	<2.7	<3.1	<2.4	<2.9
	Cs-137	5.2 ± 2.9	<3.8	<4.5	<6.2	<4.1	<4.7	<3.6	<4.9
	Ba-140	<34	<16	<79	<57	<39	<60	<58	<33
	La-140	<6.7	<2.5	<13	<12	<7.1	<14	<5.6	<12
	Others	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
7	K-40	1600 ± 160	1500 ± 150	1500 ± 150	1500 ± 150	1200 ± 120	1300 ± 130	1200 ± 120	1500 ± 150
	Cs-134	<2.7	<2.7	<2.9	<2.6	<2.6	<3.2	<3.2	<3.0
	Cs-137	4.2 ± 2.8	<3.7	3.5 ± 2.3	<5.5	<4.5	<3.6	<4.2	<4.7
	Ba-140	<30	<25	<44	<36	<27	<27	<32	<37
	La-140	<4.3	<2.5	<4.1	<7.1	<8.4	<5.7	<4.5	<8.4
	Others	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
45	K-40	-	-	1400 ± 140(1)	1200 ± 120	1000 ± 100	1300 ± 130	1700 ± 170	1300 ± 130
	Cs-134	-	-	<3.4	<2.9	<2.8	<3.2	<3.2	<3.1
	Cs-137	-	-	4.1 ± 2.7	<4.0	4.3 ± 2.7	<4.2	<4.9	<4.1
	Ba-140	-	-	<74	<62	<32	<48	<47	<44
	La-140	-	-	<17.0	<12.0	<6.1	<12.0	<9.0	<12.0
	Others	-	-	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD

NOTES: - No results because the sampling station was not a milk sampling location until July.
(1) Sampling began at location #45 on 7-12-82

TABLE 18

CONCENTRATIONS OF STRONTIUM - 90 IN MILK (MONTHLY SAMPLES)

Results in units of pCi/liter ± 2 sigma

Station	5-3-82	6-7-82	7-12-82	8-9-82
40	< 7.8	< 2.1	2.5±1.1	5.0±2.1
4	5.1±3.4	1.0±0.4	3.0±1.1	3.0±1.1
14	1.8±1.3	< 0.6	< 0.2	2.2±1.0
5	3.8±1.0	5.6±1.2	5.2±1.1	4.5±1.5
16	3.8±1.0	3.6±1.7	7.7±1.2	4.0±1.6
7	5.7±1.4	4.1±1.7	6.0±1.9	8.5±2.1
45	-	-	4.3±2.1	5.2±3.0

Station	9-13-82	10-4-82	11-8-82	12-6-82
40	1.6±1.1	3.6±0.7	<0.6(1)	3.0±0.8
4	5.1±1.5	4.4±1.2	3.1±0.9	5.6±1.0
14	<2.9	6.1±1.1	4.3±1.2	3.5±0.8
5	4.8±1.1	1.4±1.3	5.7±2.5	<1.0
16	3.6±1.0	5.8±1.0	9.9±4.3	3.6±1.0
7	4.2±1.0	7.0±3.3	5.8±1.3	3.8±0.8
45	4.1±1.5	5.8±0.9	7.8±1.1	5.3±0.8

(1) High LLD result because of low chemical yield. Insufficient sample for reanalysis.
-No results because the sampling station was not in operation.

TABLE 19

MILCH ANIMAL CENSUS

SPRING 1982

TOWN	NUMBER ON CENSUS MAP	NUMBER OF MILCH ANIMALS
Scriba	1	2 G
	16*	39 C
	2	20 C
	3	1 C
	6	2 C
New Haven	8	35 C
	9	45 C
	4*	55 C
	45*	18 C
	10	24 C
	5*	40 C
	11	34 C
	7*	51 C
Mexico	12	62 C
	13	2 C
	14*	65 C
	17	38 C
	18	46 C
	19	43 C
	20	37 C
	21	5 C
	22	35 C
	23	150 C
	24	35 C
	25	82 C
Richland	26	42 C
	27	58 C
Oswego	28	30 C
Hannibal	40**	33 C
Volney	29	2 C
	TOTALS	1,129 Cows
		2 Goats

C = Cows
G = Goats
* = Milk Sample Locations
** = Milk Sample Control Location

TABLE 19 (cont.)

MILCH ANIMAL CENSUS

SUMMER 1982

TOWN	NUMBER ON CENSUS MAP	NUMBER OF MILCH ANIMALS
Scriba	1	2 G
	16*	39 C
	2	20 C
	3	1 C
	6	1 C
New Haven	8	30 C
	9	40 C
	4*	70 C
	45*	20 C, 1 G
	10	26 C
	5*	45 C
	11	40 C
	7*	52 C
Mexico	12	70 C
	13	2 C
	14*	60 C
	17	34 C
	18	42 C
	19	45 C
	20	40 C
	21	8 C
	22	40 C
	23	114 C
	24	37 C
	25	75 C
Richland	26	37 C
	27	60 C
Oswego	28	29 C
Hannibal	40**	34 C
Volney	29	30 C
	TOTALS	1,141 Cows
		3 Goats

C = Cows
G = Goats
* = Milk Sample Locations
** = Milk Sample Control Location

TABLE 20

CONCENTRATIONS OF GAMMA EMITTERS IN VARIOUS FOOD PRODUCTS

Results in Units of pCi/g(wet) ± 2 sigma

COLLECTION * SITE	SAMPLE DATE	DESCRIPTION	Be-7	K-40	I-131	Cs-134	Cs-137	Others
A	4-23-82	Beef	<0.5	5.2±0.5	<3.7	<0.03	<0.03	All<LLD
B (Control)	5-03-82	Beef	<0.2	5.9±0.6	<0.9	<0.02	<0.02	All<LLD
I	5-05-82	Chicken	<0.3	6.0±0.7	<0.8	<0.02	<0.02	All<LLD
I	5-05-82	Eggs	<0.3	3.5±0.4	<0.7	<0.02	<0.02	All<LLD
K	5-06-82	Eggs	<0.3	3.2±0.4	<0.8	<0.02	<0.02	All<LLD
J	5-06-82	Chicken	<0.3	6.5±0.7	<0.8	<0.02	<0.03	All<LLD
J	5-06-82	Eggs	<0.5	3.5±0.5	<1.0	<0.04	<0.04	All<LLD
K	5-07-82	Chicken	<0.3	8.4±0.8	<0.9	<0.02	0.03±0.02	All<LLD
D	5-10-82	Pork	<0.2	2.4±0.3	<0.4	<0.01	0.02±0.01	All<LLD
C	5-10-82	Beef	<0.3	6.0±0.6	<0.8	<0.02	0.08±0.02	All<LLD
L (Control)	5-12-82	Chicken	<0.3	5.4±0.5	<0.5	<0.02	<0.03	All<LLD
L (Control)	5-12-82	Eggs	<0.3	3.0±0.5	<0.4	<0.02	<0.02	All<LLD
Q	9-07-82	Swiss Chard	0.14±0.07	7.4±0.7	<0.02	<0.01	<0.01	All<LLD
T (Control)	9-07-82	Swiss Chard	0.12±0.07	9.3±0.9	<0.02	<0.01	<0.01	All<LLD
P	9-07-82	Tomatoes	<0.03	2.1±0.2	<0.04	<0.003	<0.003	All<LLD
R	9-07-82	Cabbage	<0.07	2.4±0.2	<0.01	<0.008	<0.009	All<LLD
R	9-07-82	Tomatoes	<0.04	1.8±0.2	<0.06	<0.003	<0.004	All<LLD
S (Control)	9-07-82	Tomatoes	<0.04	2.6±0.3	<0.06	<0.003	<0.004	All<LLD
N	9-07-82	Cabbage	<0.04	1.5±0.2	<0.000	<0.004	<0.005	All<LLD
N	9-07-82	Zucchini	<0.04	1.9±0.2	<0.1	<0.002	<0.003	All<LLD
E	11-05-82	Beef	<0.2	2.9±0.3	<0.4	<0.01	<0.01	All<LLD
F	11-10-82	Beef	<0.2	2.5±0.3	<0.4	<0.02	0.02±0.01	All<LLD

TABLE 20 (cont.)

CONCENTRATIONS OF GAMMA EMITTERS IN VARIOUS FOOD PRODUCTS

Results in Units of pCi/g(wet) ± 2 sigma

COLLECTION SITE	SAMPLE DATE	DESCRIPTION	Be-7	K-40	I-131	Cs-134	Cs-137	Others
L (Control)	11-10-82	Chicken	<0.2	4.1±0.4	<0.4	<0.01	<0.02	All<LLD
L (Control)	11-10-82	Eggs	<0.2	2.0±0.2	<0.2	<0.01	<0.02	All<LLD
H	11-10-82	Chicken	<0.3	3.6±0.4	<0.5	<0.02	<0.02	All<LLD
H	11-10-82	Eggs	<0.2	1.4±0.2	<0.3	<0.01	<0.01	All<LLD
G (Control)	11-10-82	Beef	<0.2	2.8±0.3	<0.4	<0.02	<0.02	All<LLD
H	11-11-82	Beef	<0.2	3.5±0.4	<0.4	<0.01	0.02±0.01	All<LLD
I	11-11-82	Chicken	<0.2	3.1±0.3	<0.3	<0.01	<0.02	All<LLD
I	11-11-82	Eggs	<0.1	1.2±0.2	<0.2	<0.01	<0.01	All<LLD
J	11-11-82	Chicken	<0.2	4.2±0.4	<0.4	<0.01	<0.02	All<LLD
J	11-11-82	Eggs	<0.2	1.6±0.2	<0.3	<0.01	<0.02	All<LLD

TABLE 21

CONCENTRATION OF GAMMA EMITTERS IN PASTURE GRASS

Results in Units of pCi/g (wet)

Station Code	Sample Type	Sample Date	Ra-226	Be-7	Cs-134	Ru-106	Cs-137	Nb-95	Co-58	Mn-54	Co-60	K-40	Ce-144
40	Pasture Grass	07/26/82	2.61±1.70	< 8.86	<0.255	<3.13	<0.273	<2.36	<0.586	<0.341	<0.363	12.9 ±3.40	<1.41
4	Pasture Grass	07/26/82	<3.98	< 7.80	<0.259	<2.43	<0.236	<2.01	<0.545	<0.297	<0.294	17.0 ±3.47	<1.30
14	Pasture Grass	07/26/82	2.87±1.40	4.28±2.57	<0.159	<1.82	<0.159	<1.57	<0.447	<0.211	<0.197	17.7 ±2.39	<0.896
12	Pasture Grass	07/26/82	3.07±3.97	< 8.00	<0.22	<2.46	<0.224	<1.92	<0.775	<0.288	<0.322	18.1 ±4.03	<1.50
16	Pasture Grass	07/26/82	<2.91	< 5.95	<0.146	<1.87	<0.160	<1.43	<0.455	<0.204	<0.234	15.1 ±2.95	<0.944
7	Pasture Grass	07/26/82	<4.38	< 7.85	<0.291	<3.03	<0.280	<2.07	<0.740	<0.362	<0.358	21.3 ±4.20	<1.39
45	Pasture Grass	07/26/82	4.50±3.06	< 9.84	<0.291	<2.75	<0.329	<2.24	<0.824	<0.390	<0.376	30.4 ±4.93	<1.56
40	Pasture Grass	08/23/82	<3.21	9.22±7.09	<0.175	<2.02	0.347±0.133	<2.36	<0.733	<0.232	<0.168	23.4 ±3.16	<1.32
4	Pasture Grass	08/23/82	<3.72	<11.2	<0.233	<2.45	<0.206	<2.79	<0.744	<0.282	<0.248	22.2 ±3.44	<1.38
14	Pasture Grass	08/23/82	2.28±1.53	< 9.43	<0.179	<1.78	<0.198	<2.93	<0.641	<0.215	<0.119	27.1 ±3.61	<0.949
12	Pasture Grass	08/23/82	<2.85	6.91±5.07	<0.177	<2.11	<0.160	<3.07	<0.733	<0.260	<0.187	27.4 ±3.48	<1.20
16	Pasture Grass	08/23/82	<2.60	< 8.58	<0.141	<1.76	<0.167	<2.54	<0.627	<0.208	<0.200	9.31±2.18	<0.936
7	Pasture Grass	08/23/82	4.76±1.86	10.9 ±6.27	<0.192	<2.00	<0.238	<2.62	<0.699	<0.258	<0.314	19.7 ±3.45	<1.23
45	Pasture Grass	08/23/82	<3.12	6.28±5.26	<0.201	<1.98	<0.182	<3.36	<0.639	<0.206	<0.244	23.7 ±3.31	<1.26
40	Pasture Grass	09/20/82	<3.70	< 8.89	<0.219	<2.16	<0.236	<2.26	<0.722	<0.279	<0.305	19.8 ±3.43	<1.13
4	Pasture Grass	09/20/82	<2.52	< 6.83	<0.162	<1.84	<0.146	<1.87	<0.522	<0.180	<0.167	20.4 ±3.31	<0.910
14	Pasture Grass	09/20/82	2.11±1.54	<10.00	<0.235	<2.41	<0.239	<2.07	<0.780	<0.317	<0.246	22.4 ±3.65	<1.42
12	Pasture Grass	09/20/82	2.64±1.71	< 8.01	<0.211	<1.84	<0.180	<1.80	<0.617	<0.188	<0.185	12.2 ±2.06	<1.29
16	Pasture Grass	09/20/82	2.36±1.47	< 8.05	<0.208	<1.82	<0.184	<2.11	<0.479	<0.261	<0.230	17.3 ±3.08	<1.04
7	Pasture Grass	09/20/82	1.73±0.847	< 5.26	<0.127	<1.29	<0.141	<1.32	<0.337	<0.158	<0.183	29.9 ±2.87	<0.775
45	Pasture Grass	09/20/82	3.73±1.70	8.86±5.18	<0.229	<2.09	<0.181	<1.77	<0.527	<0.240	<0.261	12.9 ±3.01	<1.13

Error expressed as 2 sigma .

TABLE 22

CANAL WATER DATA
MONTHLY COMPOSITE ANALYSIS
(1982)

	Inlet Canal			Discharge Canal		
Month (1982)	pH	Dissolved Solids PPM	Suspended Solids PPM	pH	Dissolved Solids PPM	Suspended Solids PPM
January	7.90	235.00	2.67	7.70	251.00	0.67
February	8.00	226.40	3.40	8.10	239.00	3.60
March	7.80	229.20	2.00	7.60	231.00	4.90
April	7.71	234.20	6.80	7.73	232.00	4.00
May	8.33	202.60	0.60	8.03	182.20	0.80
June	8.46	169.00	0.90	8.15	205.00	1.20
July	7.98	186.00	4.00	7.94	163.40	3.10
August	7.91	206.60	5.90	7.95	211.80	5.20
September	8.00	196.80	1.60	8.07	168.20	1.50
October	7.91	180.80	1.60	7.85	213.20	1.80
November	7.96	188.60	1.20	7.95	216.80	1.30
December	7.74	243.40	0.90	7.77	249.00	1.00

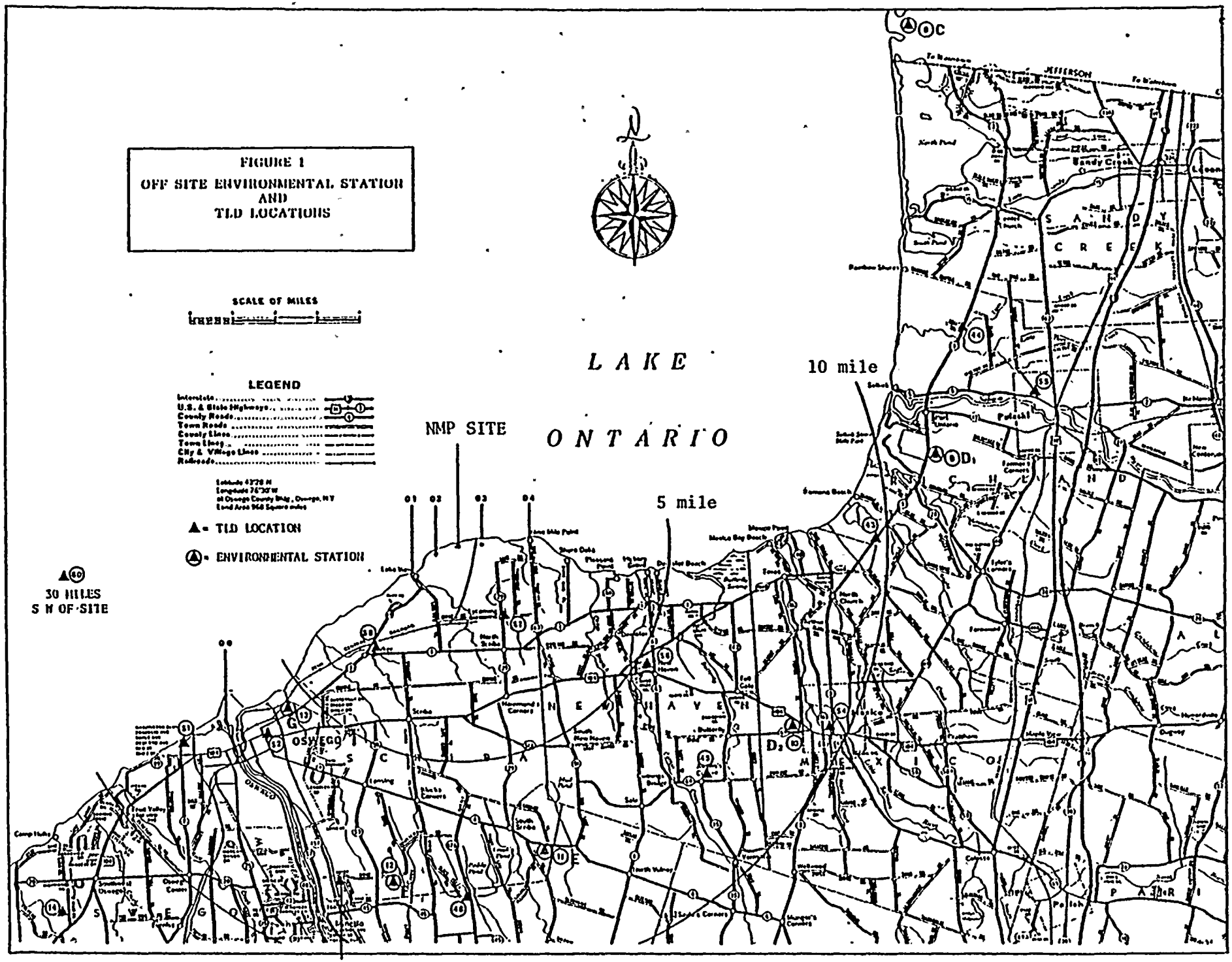


FIGURE 1
OFF SITE ENVIRONMENTAL STATION
AND
TLD LOCATIONS
SCALE OF MILES
LEGEND
Interstate
U.S. & State Highways
County Roads
Town Roads
County Lines
Town Lines
City & Village Lines
Railroads
▲- TLD LOCATION
- ENVIRONMENTAL STATION
30 MILES
S W OF SITE
NMP SITE
LAKE
ONTARIO
10 mile
5 mile
OSWEGO
SANDY CREEK
JEFFERSON

FIGURE 1-A

OFF SITE ENVIRONMENTAL STATION
AND
TLD LOCATIONS
(SOUTHERN)

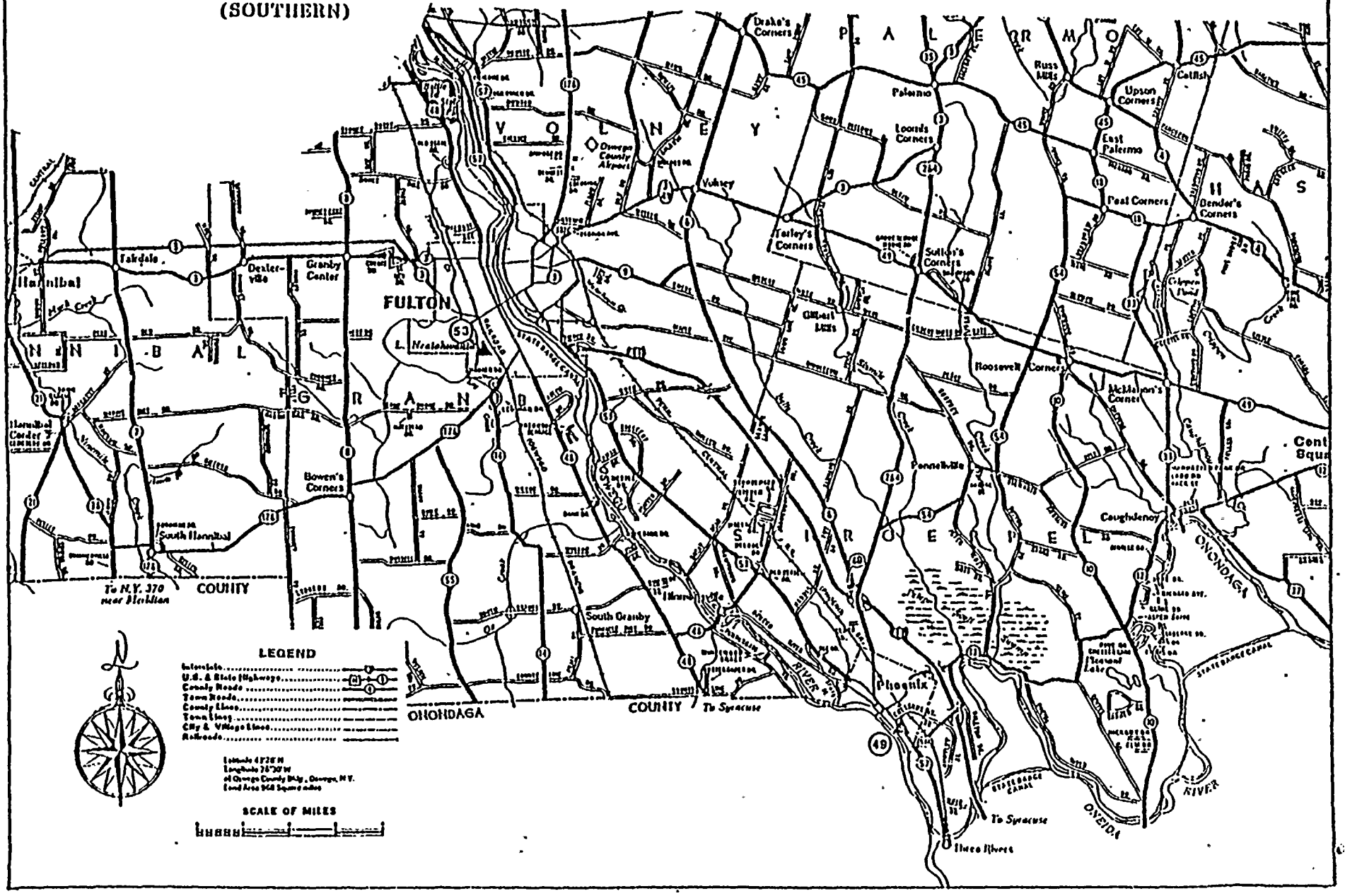
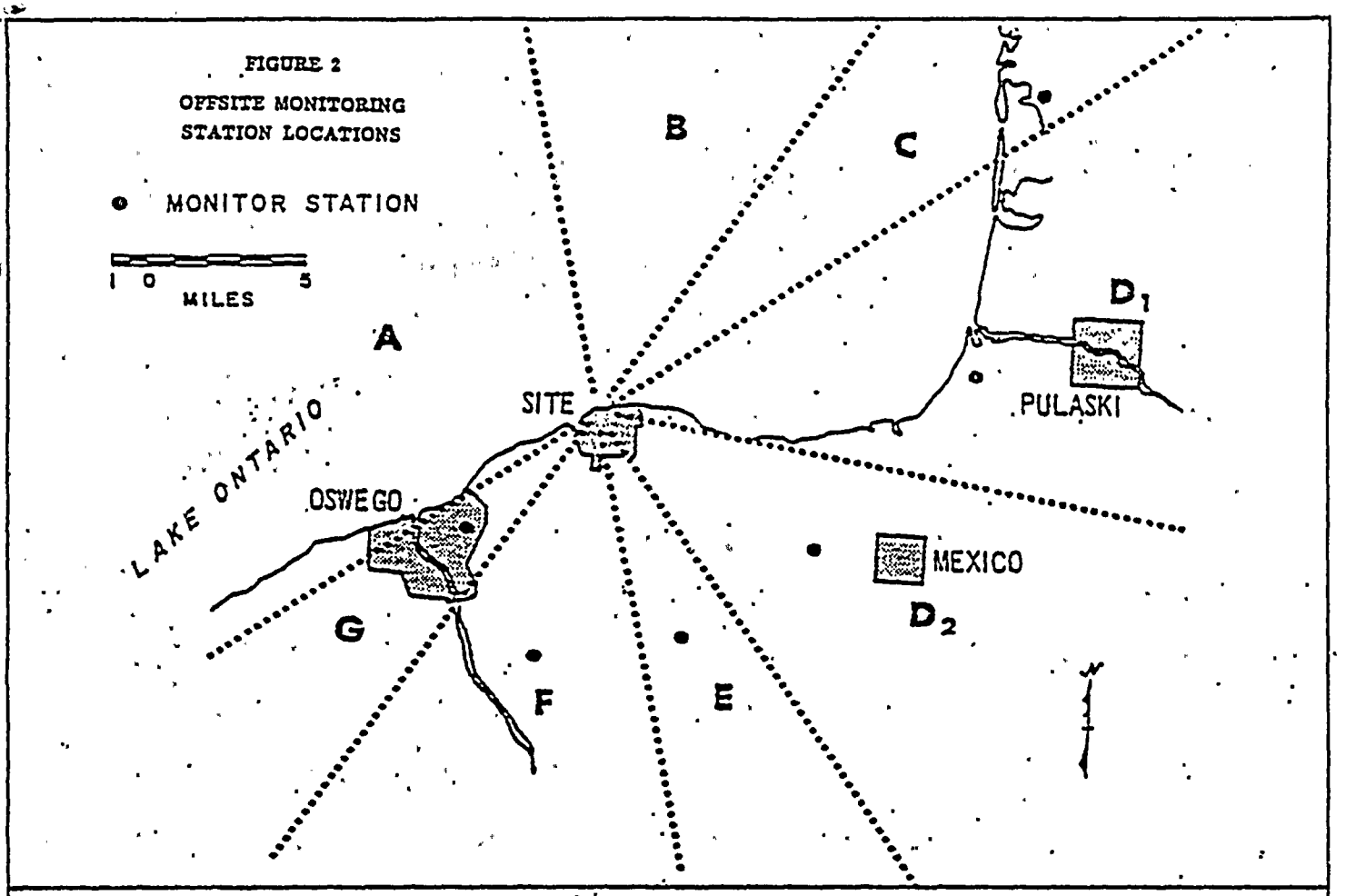
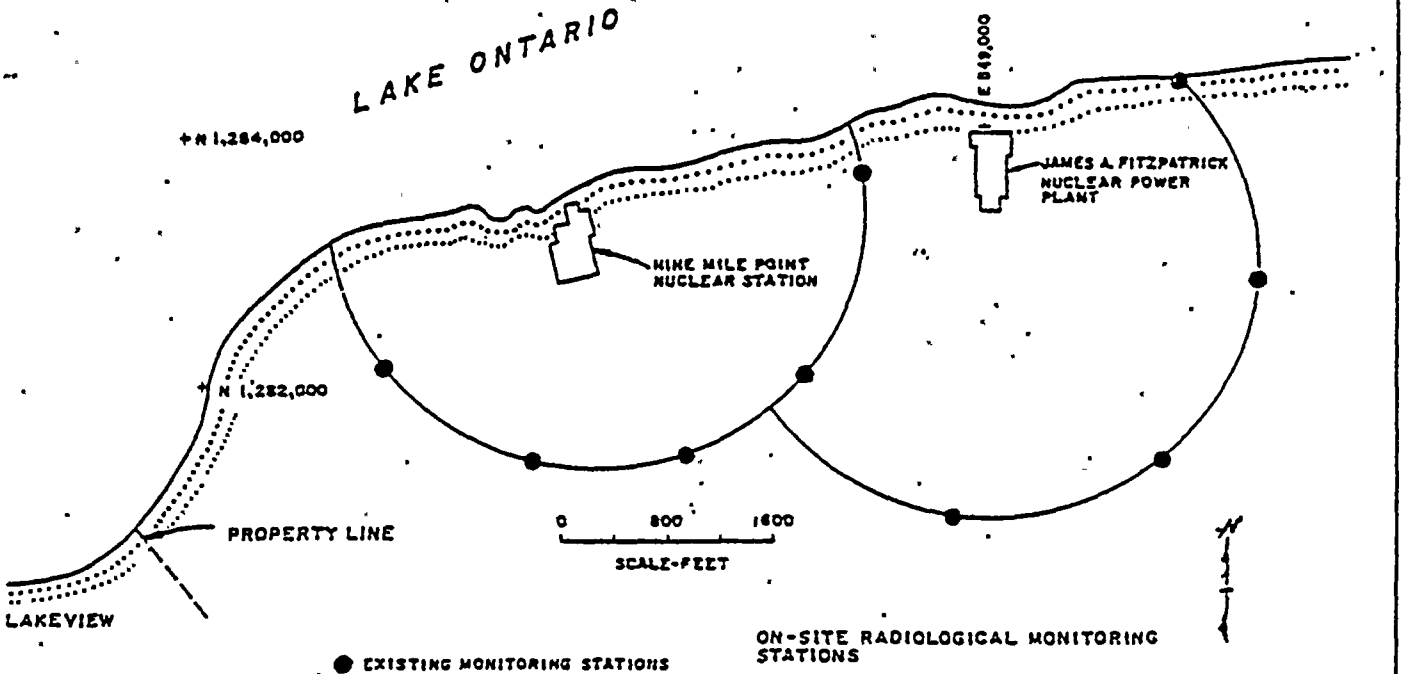


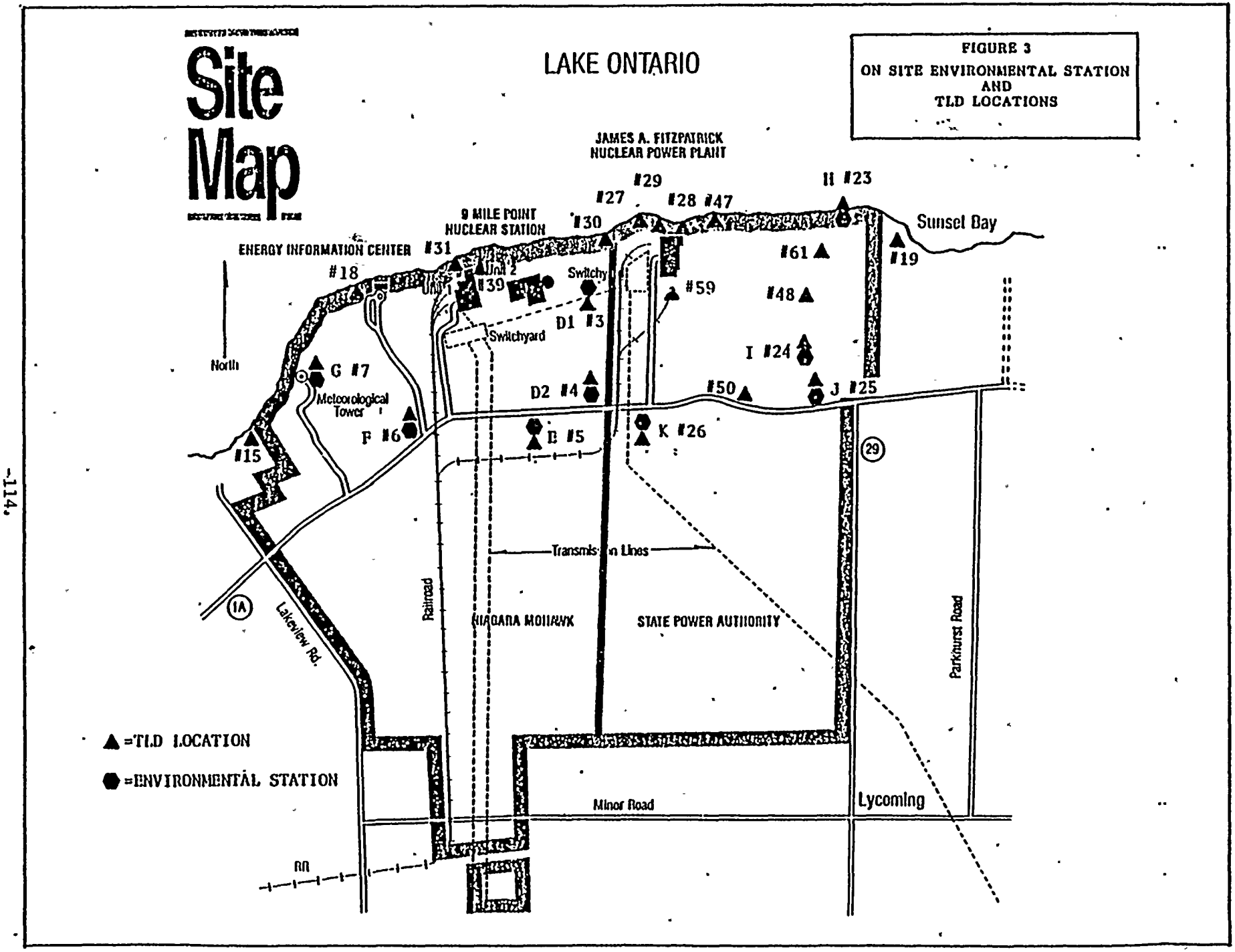
FIGURE 2

OFFSITE MONITORING STATION LOCATIONS





MONITORING STATIONS LOCATED AT 2,000 FT. RADII FROM STACKS


Site Map
LAKE ONTARIO
FIGURE 3
ON SITE ENVIRONMENTAL STATION
AND
TLD LOCATIONS
JAMES A. FITZPATRICK
NUCLEAR POWER PLANT
9 MILE POINT
NUCLEAR STATION
ENERGY INFORMATION CENTER
Sunset Bay
#18
#31
#29
#27
#28
#47
#30
#23
#61
#19
#39
Unit 1
Unit 2
Switchyard
#59
#48
D1 #3
Switchyard
I #24
North
G #7
Meteorological
Tower
D2 #4
#50
J #25
F #6
E #5
K #26
#15
29
Transmission Lines
1A
Lakeview Rd.
Railroad
NIAGARA MOHAWK
STATE POWER AUTHORITY
Parkhurst Road
▲=TLD LOCATION
⬢=ENVIRONMENTAL STATION
Minor Road
Lycoming
RR

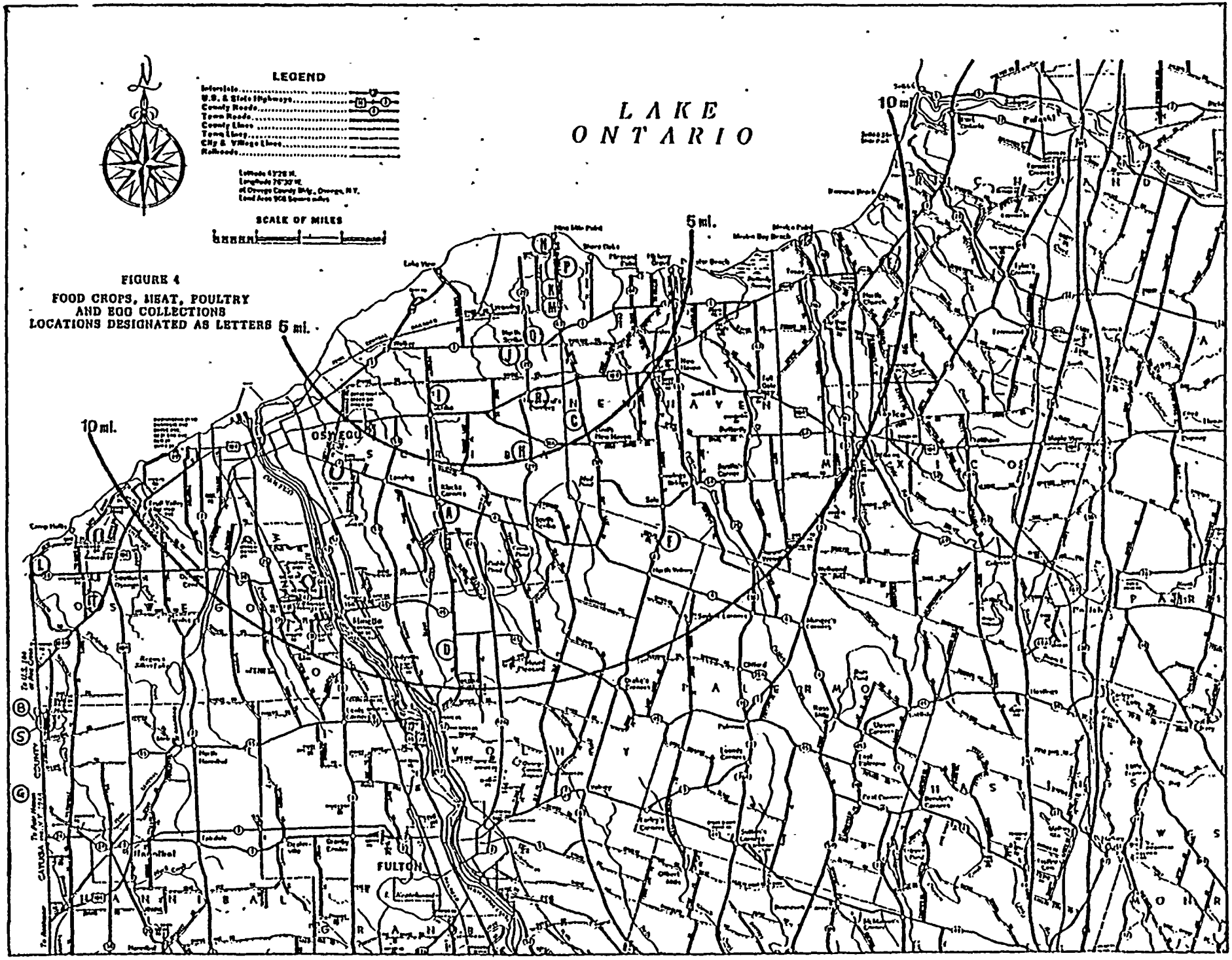


FIGURE 4

FOOD CROPS, MEAT, POULTRY
AND EGG COLLECTIONS
LOCATIONS DESIGNATED AS LETTERS

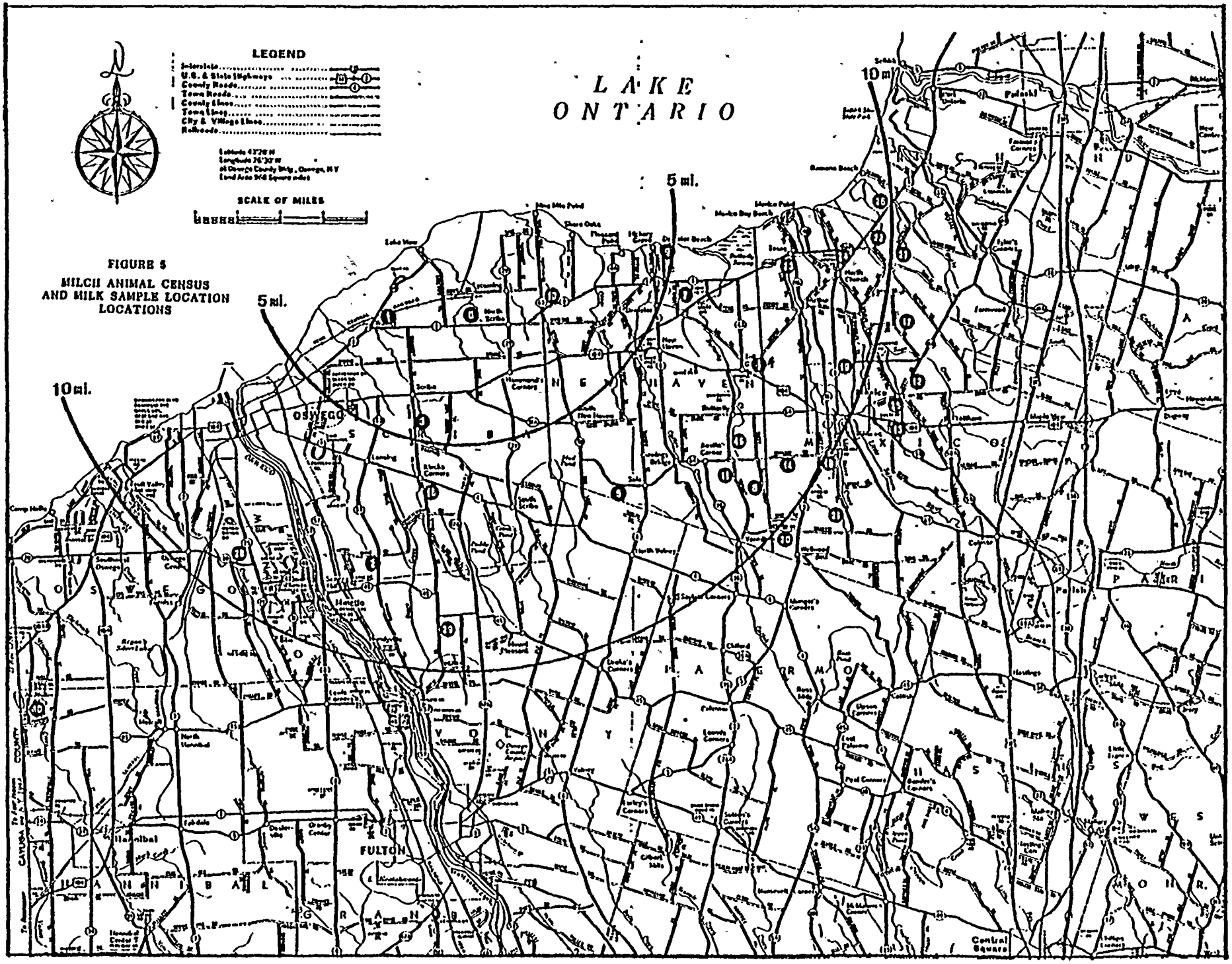
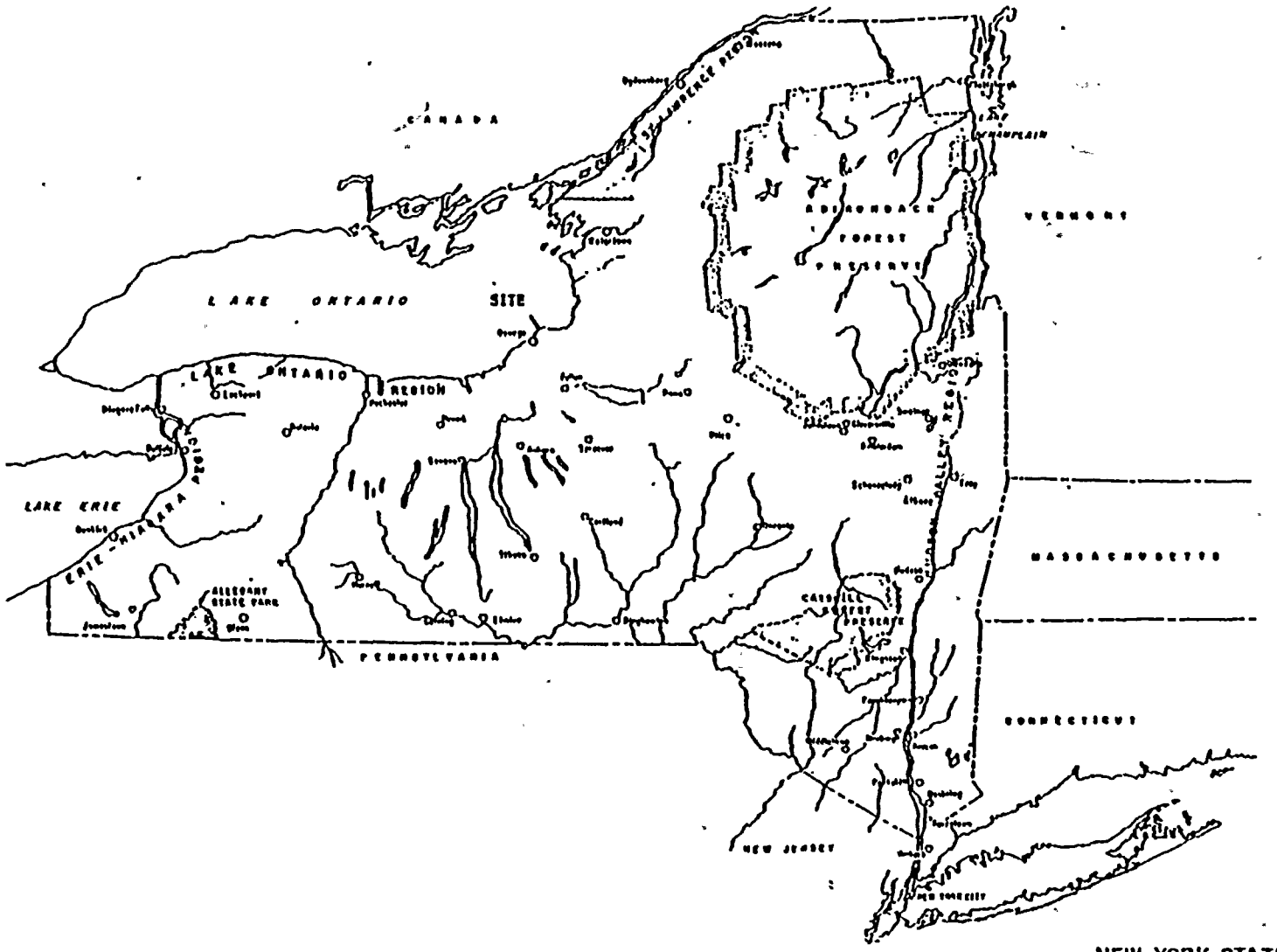


FIGURE 5

MILCH ANIMAL CENSUS
AND MILK SAMPLE LOCATION
LOCATIONS

FI RE 6



NEW YORK STATE MAP WITH REGIONS