5.0 DATA EVALUATION AND DISCUSSION

Introduction

Each year the results of the annual Radiological Environmental Monitoring Program (REMP) are evaluated considering plant operations at the site, the natural processes in the environment, and the archive of historical environmental radiological data. A number of factors are considered in the course of evaluating and interpreting the annual environmental radiological data. This interpretation can be made using several methods including trend analysis, population dose estimates, risk estimates to the general population based on significance of environmental concentrations, effectiveness of plant effluent controls, and specific research areas. The report not only presents the data collected during the 2007 sample program but also assesses the significance of radionuclides detected in the environment. It is important to note that detection of a radionuclide is not, of itself, an indication of environmental significance. Evaluation of the impact of the radionuclide in terms of potential increased dose to man, in relation to natural background, is necessary to determine the true significance of any detection.

Units of Measure

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

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

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

Dose/Dose to Man

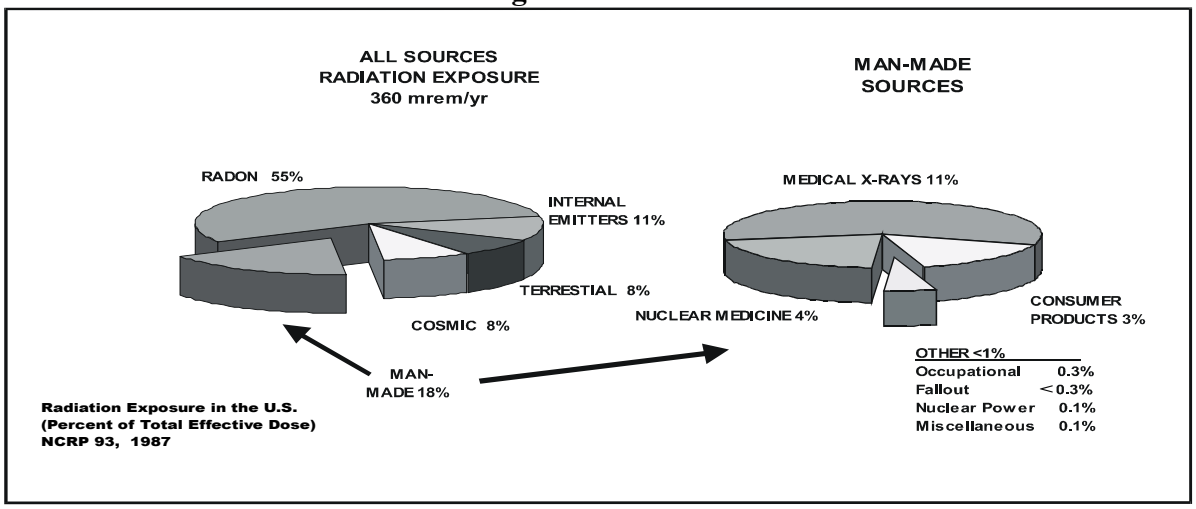
The dose or dose equivalent, simply put, is the amount of ionizing energy deposited or absorbed in living tissue. The amount of energy deposited or ionization caused is dependent on the type of radiation. For example, alpha radiation can cause dense localized ionization that can be up to 20 times the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

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

Discussion

There are three separate groups of radionuclides that were measured in the environment in the media analyzed for the 2007 sampling program. The first of these groups consists of the radionuclides that are naturally occurring. The environment contains a significant inventory of naturally occurring radioactive elements. The components of natural or background radiation include the decay of radioactive elements in the earth's crust, a steady stream of high-energy particles from space called cosmic radiation, naturally-occurring radioactive isotopes in the human body like potassium-40, medical procedures, man-made phosphate fertilizers (phosphates and uranium are often found together in nature), and household items like televisions. In the United States, a person's average annual exposure from background radiation is 360 mrem, as illustrated on the following Background Radiation Chart.

Background Radiation



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

- *Tritium*, present as a result of the interaction of cosmic radiation with the upper atmosphere
- *Beryllium – 7*, present as a result of the interaction of cosmic radiation with the upper atmosphere
- *Potassium –40 and radium-226*, naturally occurring radionuclides found in the human body and throughout the environment
- *Fallout radionuclides* from nuclear weapons testing, including cesium-137, and strontium-90

Beryllium-7 and potassium-40 are especially common in REMP samples. Since they are naturally occurring and are abundant, positive results for these radionuclides are reported in some cases in Section 6.0 of this report. Comparisons of program samples to natural background radiation are made throughout this section to help put program results into perspective and to aid the reader in determining what, if any, significant impact is demonstrated by the REMP results.

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

The third group of radionuclides that may be detected in the environment are those that are related to nuclear power technology. These radionuclides are the byproduct of the operation of light water reactors. These byproduct radionuclides are the same as those produced in atmospheric weapons testing and found in the Chernobyl fallout. This commonality makes a determination of the source of these radionuclides that may be detected in environmental samples difficult to determine. During 2007, Cs-137 was the only potential plant-related radionuclide detected in the REMP samples.

A number of factors must be considered in performing radiological sample data evaluation and interpretation. The evaluation is made using several approaches including trend analysis and dose to man. An attempt has been made not only to report the data collected during 2007, but also to assess the significance of the radionuclides detected in the environment as compared to natural and other man-made radiation sources. It is important to note that detected concentrations of radionuclides in the local environment as a result of man's technology are very small and are of no or little significance from an environmental or dose to man perspective.

The 1987 per capita average dose was determined to be 360 mrem per year from all sources, as noted in NCRP Report No. 93 (Reference 14). This average dose includes such exposure sources as natural radiation, occupational exposure, weapons testing, consumer products and nuclear medicine. The 1987 per capita dose rate due to natural sources was 295 mrem per year. The per capita radiation dose from nuclear power production nationwide is less than one mrem per year.

The natural background gamma radiation in the environs of the Nine Mile Point site, resulting from radionuclides in the atmosphere and in the ground, accounts for approximately 60-65 mrem per year. This dose is a result of radionuclides of cosmic origin (for example, Be-7) and of primordial origin (Ra-226, K-40, and Th-232). A dose of 60 mrem per year, as a background dose, is significantly greater than any possible doses as a result of routine operations at the site during 2007.

The results of each sample medium are discussed in detail in Sections 5.1 and 5.2. This includes a summary of the results, the estimated environmental impact, a detailed review of any relevant detections with a dose to man estimate where appropriate, and an analysis of possible long term and short term trends.

During routine implementation of the REMP, additional or optional environmental pathway media are sampled and analyzed. These samples are obtained to:

- Expand the area covered by the program beyond that required by the ODCM
- Provide more comprehensive monitoring than is currently required
- Monitor the secondary dose to main pathways
- Maintain the analytical data base established when the plants began commercial operation

The optional samples that are collected will vary from year to year. In addition to the optional sample media, additional locations are sampled and analyzed for those pathways required by the ODCM. These additional sample locations are obtained to ensure that a variety of environmental pathways are monitored in a comprehensive manner. Data from additional sample locations that are associated with the required ODCM sample media are included in the data presentation and evaluation. When additional locations are included, the use of this data is specifically noted in Sections 5.1 and 5.2.

Section 6.0 contains the analytical results for the sample media addressed in the report. Tables are provided for each required sample medium analyzed during the 2007 program.

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

5.1 AQUATIC PROGRAM

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

- Shoreline Sediment
- Fish
- Surface Waters

Section 6.0, Tables 6-1 through 6-4 present the analytical results for the aquatic samples collected for the 2007 sampling period.

5.1.1 SHORELINE SEDIMENT RESULTS

A. Results Summary

Shoreline sediment samples were obtained in April and October of 2007 at one offsite control location (Lang's Beach located near Oswego Harbor) and at one indicator location (Sunset Bay) which is an area east of the site considered to have recreational value.

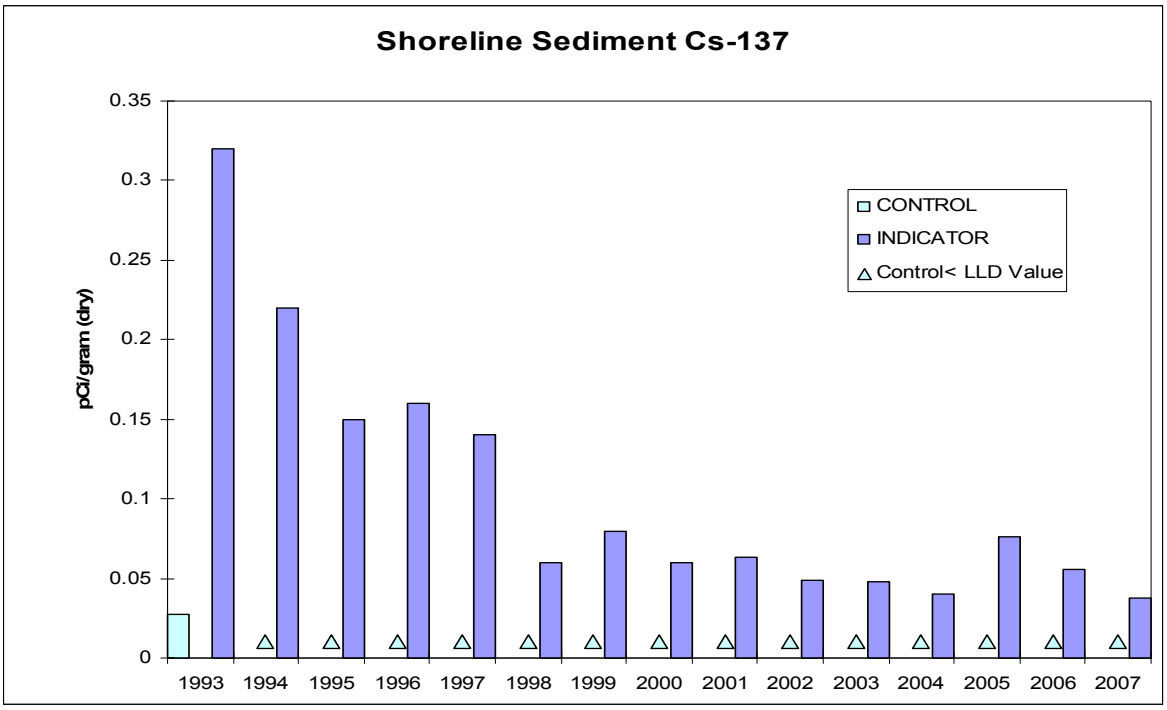
A total of five sediment samples were collected for the 2007 sample program, three indicator and two control. Cs-137 was detected in one of the samples collected from the Sunset Bay indicator location in 2007, measuring 0.038 pCi/g (dry). These results continue to show a downward trend over the last 10 years. Cs-137 was not detected in samples collected from the Lang's Beach control location during 2007; however, Cs-137 was detected in the control samples in 1993 at an average concentration of 0.03 pCi/g.

The general lack of Cs-137 at the control location is attributed to the differences in the sediment types between the two sample locations (See Data Evaluation and Discussion). The source of the Cs-137 detected in the indicator shoreline sediment is considered to be the result of fallout from atmospheric nuclear weapons testing and not from operations at the site. The mean concentration of Cs-137 measured in the 2007 indicator sample is consistent with measured concentrations since shoreline

sediment sampling began in 1985. Historical mean concentrations measured at the Sunset Bay indicator location ranged from a maximum of 0.33 pCi/g in 1993 to a minimum of 0.038 pCi/g (dry) in 2007. The results for the 2007 control location were less than the detection limit. The one naturally-occurring radionuclide detected was K-40 and was not related to plant operations. No other plant-related radionuclides were detected in the 2007 shoreline sediment samples.

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

The following is a graph of the average Cs-137 concentration in shoreline sediment samples over the previous 14 years. This graph illustrates a general downward trend in the Cs-137 concentrations since 1993.



B. Data Evaluation and Discussion

Shoreline sediment samples are routinely collected twice per year from the shoreline of Lake Ontario. Samples are collected from one indicator location (Sunset Bay), and one control location (Lang's Beach). Samples were collected from both the indicator and control locations in April and October 2007. The results of these sample collections are presented in Section 6.0, Table 6-1, "Concentrations of Gamma Emitters in Shoreline Sediment Samples – 2007". Cesium–137 (Cs-137) and Potassium–40 (K-40) were the significant radionuclides detected in the sediment samples.

Cs-137 was detected in the indicator sample collected in October for the 2007 program. The measured concentration for this sample was 0.038 pCi/g (dry). The presence of Cs-137 in certain environmental sample media such as soil, shoreline sediment and fish is historically common. Cs-137 is a fission product that is produced in nuclear power reactors and during atmospheric weapons testing. In addition to the Cs-137 found in the environment as a result of past weapons testing, a significant inventory of Cs-137 was also introduced globally as a result of the Chernobyl accident in 1986. Because Cs-137 is found in environmental samples as a result of weapons testing and Chernobyl, it is difficult to accurately determine the source of Cs-137 measured in the sediment sample. It is highly probable that the source of the cesium is from sources other than the operation of plants at the Nine Mile Point Site. It is likely that any sediment sample containing Cs-137 which was the result of plant operation would also contain other plant related isotopes such as Co-60 and Cs-134. The absence of corroborating radionuclides would indicate that the source of Cs-137 in sediment samples is from the existing background Cs-137 which is attributed to weapons testing and the Chernobyl accident. This assessment is further substantiated by the fact that Cs-137 was detected in the 1993 sediment control sample. Historically, Cs-137 has been routinely measured in the control samples of other environmental media such as fish and soil.

The general absence of Cs-137 in the control samples is attributed to the differences in the sediment types between the two sample locations. Few shoreline regions west of the site contain fine sediment and/or sand which would be representative of the indicator location. It is difficult to obtain control samples that are comparable in physical and chemical characteristics to the indicator samples. Other factors, which include changing lake level and shoreline erosion, further complicate attempts at consistency in shoreline sediment sampling. Recent soil samples from locations beyond any expected influence from the site have contained levels of Cs-137 equal to or greater than the concentrations found in the 2007 shoreline sediment samples. The Cs-137 is commonly found in soil samples and is attributed to weapons testing fallout. Shoreline samples containing soil or sediment are likely to contain Cs-137.

C. Dose Evaluation

The radiological impact of Cs-137 measured in the shoreline sediment can be evaluated on the basis of dose to man. In the case of shoreline sediments, the critical pathway is direct radiation to the whole body and skin. Using the parameters provided in Regulatory Guide 1.109, the potential dose to man in mrem per year can be calculated. The following regulatory guide values and the maximum 2007 shoreline sediment indicator Cs-137 concentration were used in calculating the dose to man:

- A teenager spends 67 hours per year at the beach area or on the shoreline,
- The sediment has a mass of 40 kg/m2 (dry) to a depth of 2.5 cm,
- The shoreline width factor is 0.3, and
- The maximum measured Cs-137 concentration of 0.038 pCi/g (dry).

Using these conservative parameters, the potential dose to the maximum exposed individual (teenager) would be 0.00013 mrem/year to the whole body and 0.00015 mrem/year to the skin. This calculated dose is very small and is insignificant when compared to the natural background annual exposure of approximately 60 mrem as measured by control TLDs in the vicinity of the site.

D. Data Trends

The mean Cs-137 concentration for the shoreline sediment indicator sample for 2007 was 0.04 pCi/g (dry). This is consistent with mean concentrations measured at the indicator location over the past ten years.

The previous five years of data show a stable mean concentration values measured at the indicator locations. Over the five year period, mean concentrations ranged from a high of 0.08 pCi/g (dry) in 2005 to a low value of 0.04 pCi/g (dry) measured in 2004 and again in 2007. Cesium-137 was not detected in the control location samples over this same five year period.

The previous ten year data trend for indicator shoreline samples showed a overall downward trend in concentration measured at the indicator sample locations. Over the previous ten year period of 1998 through 2007, mean concentrations at the indicator location ranged from a maximum of 0.08 pCi/g (dry) in 1999 to a minimum of 0.04 pCi/g (dry) measured in 2004 and again in 2007. The mean indicator concentration measured in 2007 of 0.04 pCi/g (dry) continues to support the long term decreasing trend in Cs-137 concentration in shoreline sediment samples. Cesium-137 was not detected in the control samples collected over the previous ten years.

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

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

5.1.2 FISH SAMPLE RESULTS

A. Results Summary

A total of 22 fish samples were collected for the 2007 sample program. Species collected were: smallmouth bass, brown trout, lake trout, Chinook salmon, and walleye. The analytical results for the 2007 fish samples showed no detectable concentration of radionuclide that would be attributable to plant operations at the site or past atmospheric weapons testing. Since 2003 no Cs-137 has been measured in fish samples. Over the previous 20 years prior to 2003, Cs-137 has been detected at a combination of both the indicator and/or control locations. (Refer to Tables 7-3 and 7-4). These low levels of Cs-137 represented no significant dose to man or impact on the environment.

The 2007 fish sample results demonstrate that plant operations at the Nine Mile Point Site have no measurable radiological environmental impact on the upper levels of the Lake Ontario food chain. The 2007 results are consistent with previous year's results in that they continue to support the general long-term downward trend in fish Cs-137 concentrations over the last 24 years. Cs-137 was not detected in fish samples collected in 2003 to 2007 from indicator locations. The period of 2000 through 2007 as a group are the lowest results measured since the beginning of the Site Environmental Monitoring Program in 1969.

B. Data Evaluation and Discussion

Fish collections were made utilizing gill nets at one location greater than five miles from the site (Oswego Harbor area) and at two locations in the vicinity of the lake discharges for the NMPNS and the JAFNPP facilities. The Oswego Harbor samples served as control samples while the NMPNS and JAFNPP samples served as indicator samples. All samples were analyzed for gamma emitters. Section 6.0, Table 6-2 shows individual results for all the samples collected in 2007 in units of pCi/g (wet).

The spring fish collection was made up of 11 individual samples representing four separate species. Walleye, smallmouth bass, lake trout and brown trout were collected.

The total fall fish collection was comprised of 11 individual samples representing four individual species. Chinook salmon, walleye, smallmouth bass and brown trout were collected.

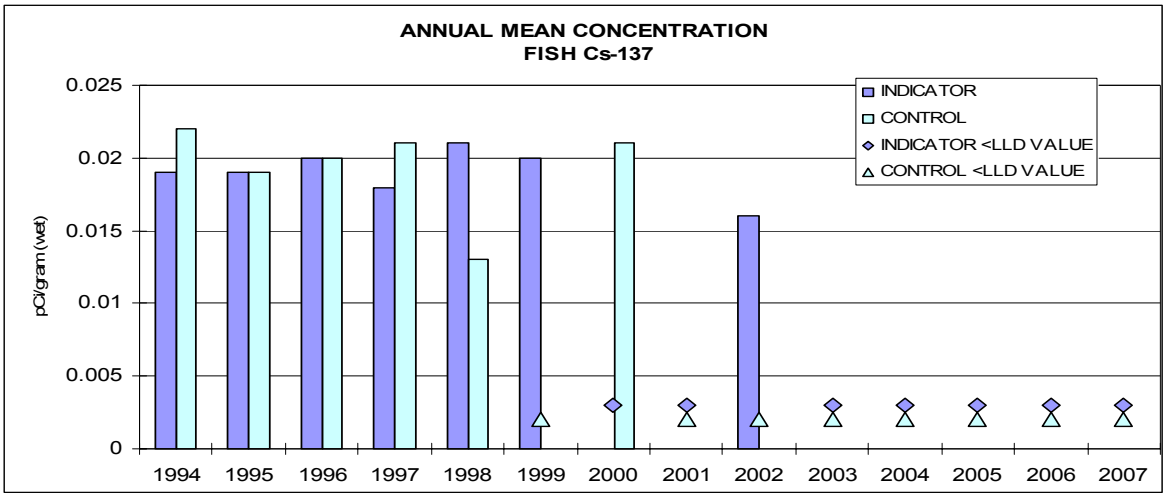
Cs-137 was not detected in any of the fish species collected for the 2007 sample program.

C. Dose Evaluation

Fish represent the highest level in the aquatic food chain and have the potential to be a contributor to the dose to man from the operations at the site. The lack of detectable concentrations of plant-related radionuclides in the 2007 fish samples demonstrates that there is no attributable dose to man from operations at the site through the aquatic pathway. Some Lake Ontario fish species may be considered an important food source due to the local sport fishing industry. Therefore, these fish are an integral part of the human food chain.

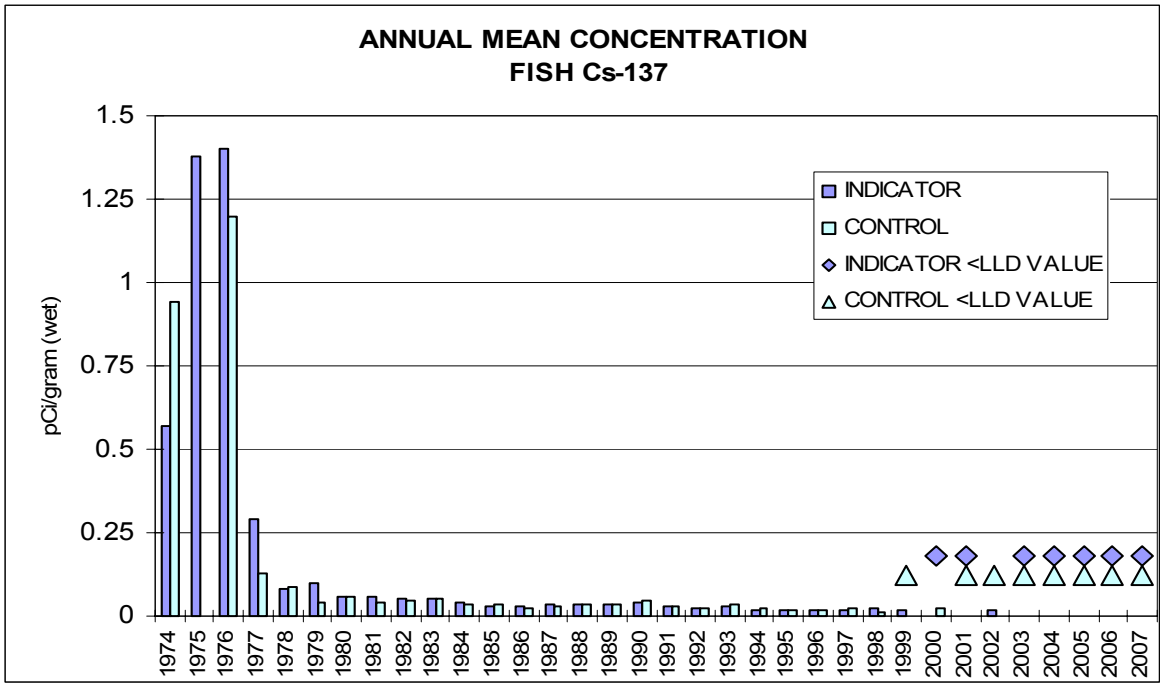
D. Data Trends

The Cs-137 data for fish samples over the previous five years (2003 through 2007) show that the number of positive detections has decreased over this period relative to historical data. There were no positive detections of Cs-137 over the previous five year period at the indicator locations. The graph below illustrates the mean control and indicator Cs-137 concentrations for 2007 and the previous twelve years.



The twelve year data trend shows a consistent level of Cs-137 measured in fish between 1995 and 1998. After 1998, the number of positive detections drops off as noted in the five year trend. The 1995 through 2007 results, as a group, are the lowest Cs-137 concentrations measured over the existence of the sample program.

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



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

5.1.3 SURFACE WATER (LAKE)

A. Results Summary

The ODCM requires that monthly surface water samples be taken from the respective inlet water supplies of the JAFNPP and NRG Energy's Oswego Steam Station. In conjunction with the required samples, three additional Lake Ontario surface water locations are sampled and analyzed. These additional locations are the Oswego City Water Intake, the NMP1 Intake and the NMP2 Intake. Gamma spectral analysis was performed on 24 monthly composite samples from the ODCM locations and on 36 monthly composite samples collected from the additional sample locations. The results of the gamma spectral analyses showed that only naturally-occurring radionuclides were detected in the 60 samples from the five locations collected for the 2007 Sampling Program. The two naturally-occurring radionuclide detected were K-40 and Ra-226 and were not related to plant operations. Monthly composite samples showed no presence of plant-related gamma emitting isotopes in the waters of Lake Ontario as a result of plant operations.

The monthly surface water samples are composited on a quarterly basis and are analyzed for tritium. A total of 20 samples were analyzed for tritium as part of the 2007 REMP program. The results for the 2007 samples showed no positive detections of tritium. All results for 2007 were below the established measurement sensitivity and are reported as less than the lower limit of detection (<LLD). There is no indication of a long-term buildup of tritium concentrations in the surface waters adjacent to the site.

B. Data Evaluation and Discussion

Gamma spectral analysis was performed on monthly composite samples from five Lake Ontario sampling locations. No plant-related radionuclides were detected in 2007 samples. This is consistent with historical data, which has not shown the presence of plant-related radionuclides in surface water samples.

Tritium samples are quarterly samples that are a composite of the applicable monthly samples for a given location. Tritium samples analyzed for the 2007 sample program were analyzed to an instrument detection level of 500 pCi/l.

The tritium results for the JAFNPP inlet canal samples contained no positive detections. The 2007 results had LLD values that ranged from <439 pCi/l to <476 pCi/l. The ODCM Control location (Oswego Steam Station inlet canal) results showed no positive detections and the sample results had LLD values in the range of <439 pCi/l to <476 pCi/l.

Tritium was not detected in any of the twelve optional Lake Ontario samples collected in 2007. The Oswego City Water inlet is sampled to monitor drinking water quality and is representative of a control location due to its distance from the site. The city water inlet is located 7.8 miles west of the site in an "upstream" direction based on the current patterns in the lake.

No positive detections of tritium were identified in 2007. The following is a summary of LLD results for the 2007 sample program:

Sample Location	Tritium Concentration pCi/liter		
	Minimum	Maximum	Mean (Annual)
JAF Inlet (Indicator)*	<439	<476	<452
Oswego Steam Inlet (Control)*	<439	<476	<452
NMP #1 Inlet	<443	<476	<453
NMP #2 Inlet	<439	<476	<452
Oswego City Water Supply	<439	<476	<452

* Sample location required by ODCM

The above LLD values are below the ODCM required LLD value of 3000 pCi/l.

Analytical results for surface water samples are found in Section 6.0, Tables 6-3 through 6-4.

C. Dose Evaluation

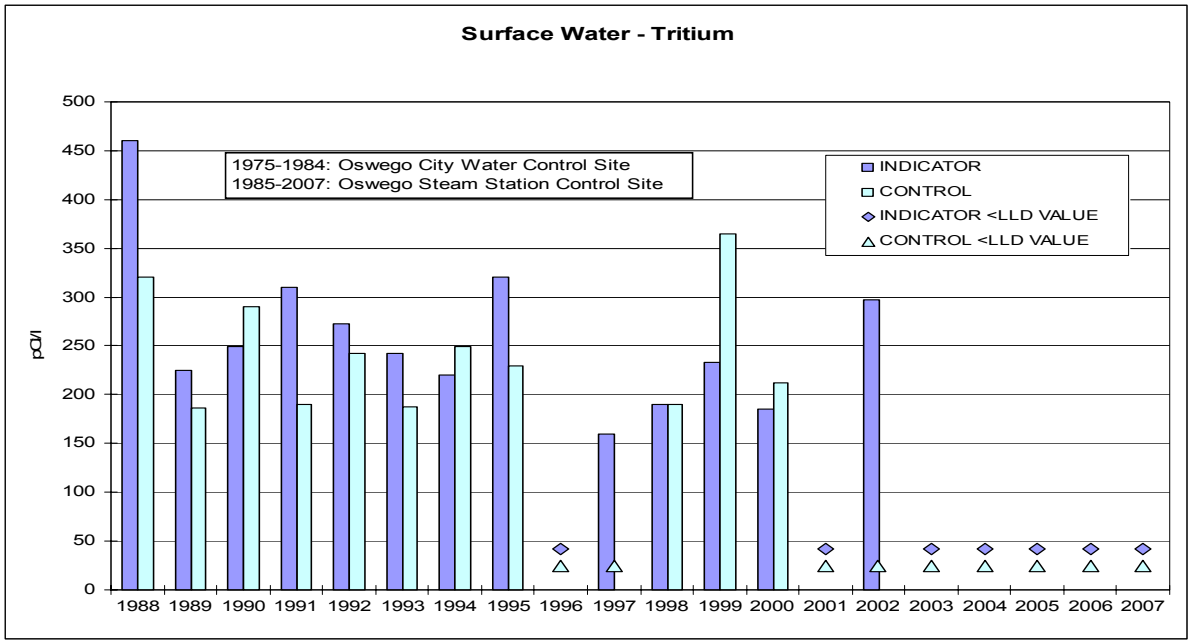
The radiological impact to members of the public from low levels of tritium in water is insignificant. This can be illustrated by calculating a dose to the whole body and maximum organ using the maximum LLD value and Regulatory Guide 1.109 methodology. Based on a water ingestion rate of 510 liters/yr and the maximum 2007 LLD concentration of <476 pCi/l, the calculated dose would be less than 0.049 mrem to the child whole body and less than 0.049 mrem to the child liver (critical age group/organ).

D. Data Trends

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

Tritium results for the 2007 lake water samples were consistent with results from the previous five years for both the indicator and control locations. The mean measured tritium concentrations for the previous five year period of 2002 – 2006 ranged from <LLD pCi/l to 297 pCi/l for the indicator and <LLD pCi/l for the control location. By comparison, the mean 2007 tritium concentrations were <452 pCi/l for the control and indicator locations. The previous five year data indicates no significant trends in either the indicator or the control mean concentrations. This previous five year data set is consistent with long term tritium results measured at the site. The indicator data from the previous ten year period, 1997 through 2006, is representative of natural variations in environmental tritium concentrations with no significant levels of tritium measured. The 1999 mean control value of 365 pCi/l is the highest concentration measured since 1987 and is within the variability of results measured over the life of the program. The ten year historical results are consistent between the control and indicator locations with no large variation in the measured results.

The following graph illustrates the concentrations of tritium measured in Lake Ontario over the past 20 years at both an indicator and control location. Prior to 1985, the Oswego City Water Supply results were used as control location data as this location closely approximates the Oswego Steam Station, the current control location. There is no existing preoperational data for comparison to recent data.



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

5.2 TERRESTRIAL PROGRAM

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

- Airborne particulate and radioiodine,
- Direct Radiation,
- Milk, and
- Food Products

Section 6.0, Tables 6-5 through 6-12 present the analytical results for the terrestrial samples collected for the 2007 reporting period.

5.2.1 AIR PARTICULATE GROSS BETA

A. Results Summary

Weekly air samples were collected and analyzed for particulate gross beta activity. For the 2007 program, a total of 52 samples were collected from control location R-5 and 208 samples were collected from indicator locations R-1, R-2, R-3, and R-4. These five locations are required by the ODCM. Additional air sampling locations are maintained and are discussed in Section 5.2.1.B below. The mean gross beta concentration for samples collected from the control location (R-5) in 2007 was 0.016 pCi/m^3. The mean gross beta concentration for the samples collected from the indicator locations (R-1, R-2, R-3, and R-4) in 2007 was 0.016 pCi/m^3. The mean gross beta results for the

indicator and the control stations were equivalent in 2007. The consistency between the indicator and control mean values, demonstrates that there are no increased airborne radioactivity levels in the general vicinity of the site. The indicator results are consistent with concentrations measured over the last fifteen years. This consistency demonstrates that the natural baseline gross beta activity has been reached. The man-made radionuclide contribution to the natural background from atmospheric weapons testing and Chernobyl can no longer be detected above the background concentrations of naturally occurring beta emitting radionuclides.

B. Data Evaluation and Discussion

The air monitoring system consists of fifteen sample locations, six onsite and nine offsite. Each location is sampled weekly for particulate gross beta activity. A total of 780 samples were collected and analyzed as part of the 2007 program. Five of the nine offsite locations are required by the ODCM. These locations are designated as R-1, R-2, R-3, R-4, and R-5. R-5 is a control location required by the ODCM and is located beyond any local influence from the site. In addition, optional offsite and onsite air sample locations are maintained from which weekly samples are collected. The optional offsite locations are designated as D-2, E, F and G. The optional onsite locations are designated as D-1, G, H, I, J and K.

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

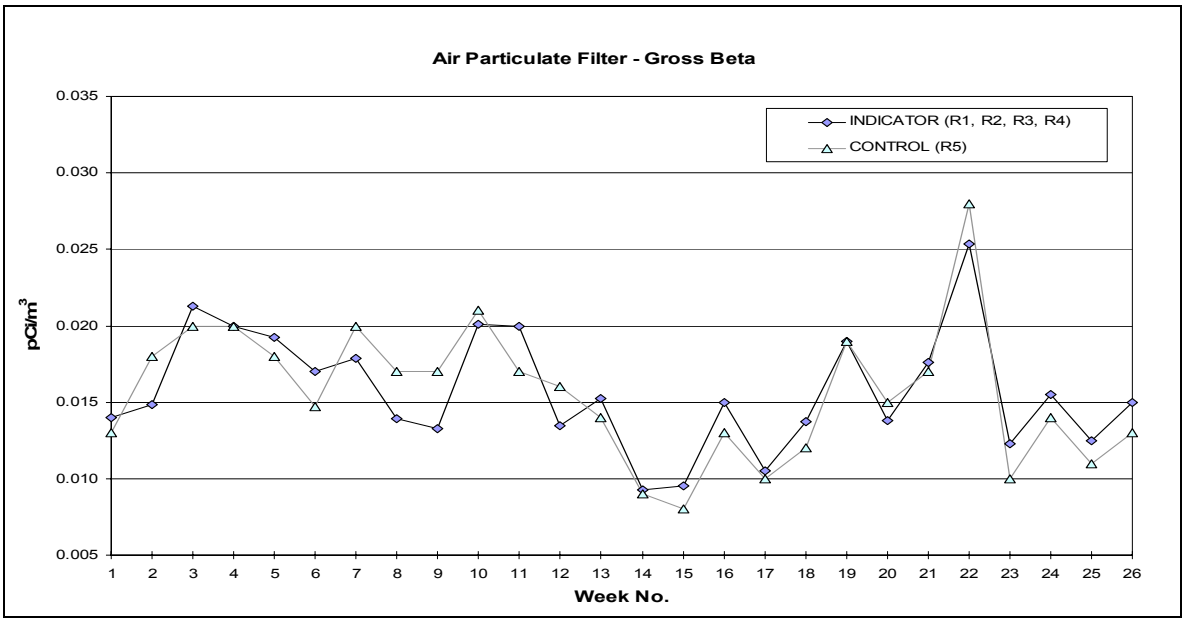
Section 6.0, Tables 6-5 and 6-6 present the weekly gross beta activity results for samples collected from the offsite and onsite locations.

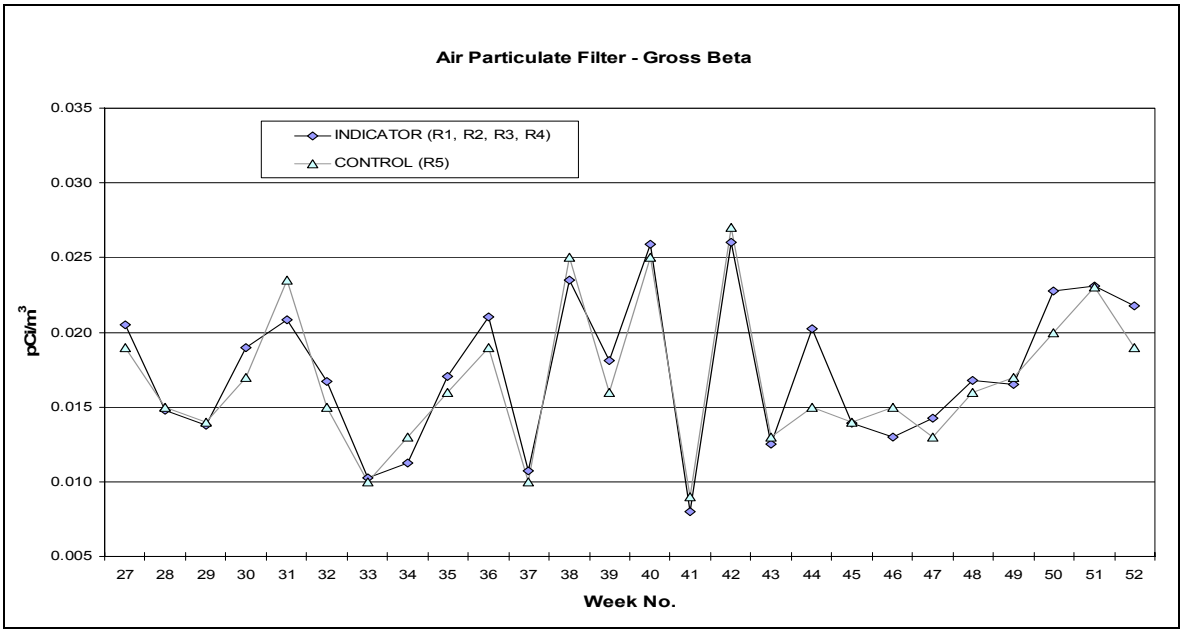
The mean annual gross beta indicator concentrations for the ODCM indicator stations (R-1, R-2, R-3 and R-4) was 0.016 pCi/m3. The offsite ODCM control station (R-5) annual mean gross beta concentration was 0.016 pCi/m3. The minimum, maximum and average gross beta results for sample locations required by the ODCM were as follows:

	Concentration pCi/m^3		
Location	Minimum	Maximum	Mean
R-1	0.007	0.028	0.016
R-2	0.009	0.027	0.016
R-3	0.008	0.028	0.016
R-4	0.007	0.027	0.017
R-5 (control)	0.008	0.028	0.016

R1 – R4 Indicator Stations	Min	0.007
	Max	0.028
	Mean	0.016

The mean weekly gross beta concentrations measured in 2007 are illustrated in the following graphs:





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

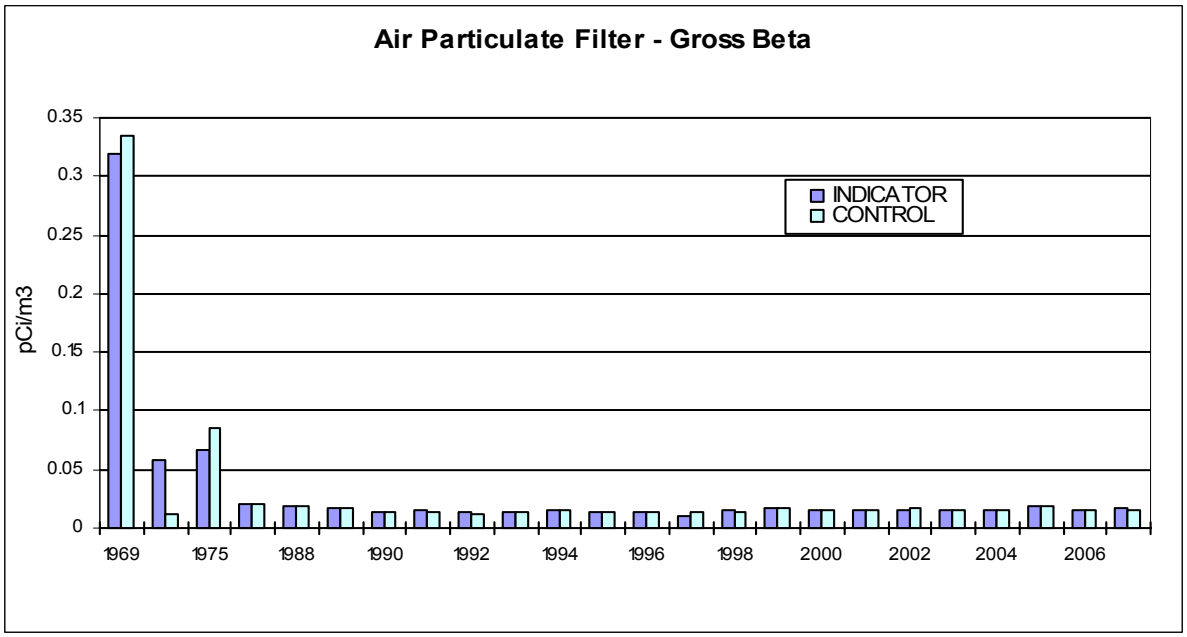
C. Dose Evaluation

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

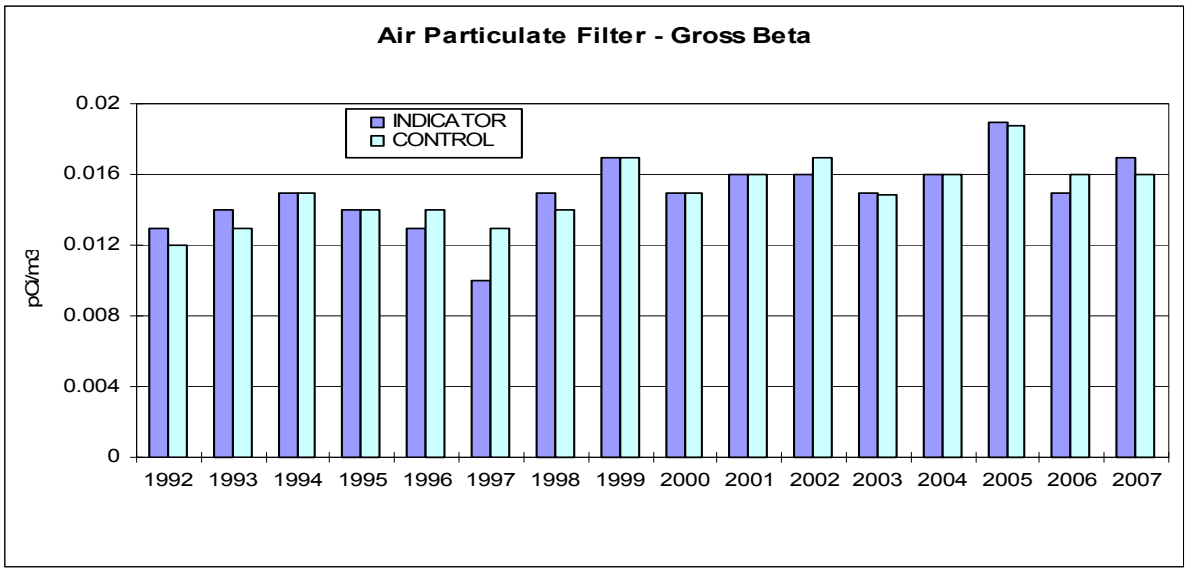
D. Data Trends

With the exception of the 1986 sample data, which was affected by the Chernobyl accident, the general trend in air particulate gross beta activity has been one of decreasing activity since 1981, when the mean control value was 0.165 pCi/m^3. The 1981 samples were affected by fallout from a Chinese atmospheric nuclear test which was carried out in 1980.

The mean gross beta concentration measured in 1987 to 2007 are illustrated in the following graph:



The trend for the previous five years represents a base line concentration or natural background level for gross beta concentrations. This trend is stable with minor fluctuations due to natural variations. The change in concentrations over the period of 1997 through 2007 is very small. This is illustrated by the following graph.



For the operational period of 1997 to 2007, the mean annual gross beta concentration at the control station (R-5) has remained steady with a narrow range of 0.013 pCi/m^3 to 0.019 pCi/m^3. The mean annual concentrations for the indicator stations for this same time period were similar to the control and ranged from a minimum of 0.010 pCi/m3 in 1997 to a maximum mean of 0.019 pCi/m3 in 2005.

Historical data of air particulate gross beta activity are presented in Section 7.0, Tables 7-9 and 7-10.

5.2.2 MONTHLY PARTICULATE COMPOSITES (GAMMA EMITTERS)

A. Results Summary

Fifteen air monitoring stations are maintained around the Nine Mile Point Site. Five of the 15 air monitoring stations are required by the ODCM and are located offsite near the site boundary and offsite as a control location. Ten additional air sampling stations are also maintained as part of the sampling program. Together, these fifteen continuous air sampling stations make up a comprehensive environmental monitoring network for measuring radioactive air particulate concentrations in the environs of the site. Annually, the air monitoring stations provide 780 individual air particulate samples which are assembled by location into 60 quarterly composite samples. The quarterly composites are analyzed using gamma spectroscopy.

No plant-related gamma emitting radionuclides were detected in any of the air particulate filter samples collected during 2007.

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

B. Data Evaluation Discussion

A total of fifteen air sampling stations are in continuous operation and located both onsite and in the offsite sectors surrounding the Nine Mile Point Site. Five of the fifteen monitoring stations are required by the ODCM and the remaining ten are optional to provide an effective monitoring network. Composite air filter samples are assembled for each of the fifteen sampling locations. Each of the weekly air particulate filters collected for the quarter is assembled by location to form quarterly composite samples. The quarterly composite samples required by the ODCM are composite samples assembled for R-1, R-2, R-3, R-4 and R-5. Other sample locations not required by the ODCM, for which analytical results have been provided, include six onsite locations and four offsite locations. The analytical results for the 60 air particulate filter composites in 2007 showed no detectable activity of plant related radionuclides.

The results of the quarterly composite samples are presented in Section 6.0, Table 6-7.

C. Dose Evaluation

The calculated dose as a result of plant effluents is not evaluated due to the fact that no plant related radionuclides were detected in 2007. The monthly air particulate sampling program demonstrated no offsite dose to man from this pathway as a result of operations of the plants located at the Nine Mile Point Site(NMP).

D. Data Trends

No plant related radionuclides were detected during 2007 at the offsite air monitoring locations.

The ten year database of air particulate composite analysis shows that there is no buildup or routine presence of plant related radionuclides in particulate form in the atmosphere around the site. Historically Co-60 was detected in each of the years from 1977 through 1984 at both the indicator and control locations, with the exception of 1980 when Co-60 was not detected at the control location. The presence of Co-60 in the air samples collected during these years was the result of atmospheric weapons testing. Co-60 was again detected in an offsite 2000 indicator sample and was the only positive detection of Co-60 since 1984. The detection of Co-60 in the one 2000 sample was an isolated event associated with effluents from the NMP1 facility. There have been no subsequent measurable concentrations of Co-60 in the environment surrounding the NMP site.

Historical data shows that Cs-137 is the fission product radionuclide most frequently detected in the air particulate filter composites. Cs-137 was detected in each of the years from 1977 through 1983 at both the control and indicator sampling locations. The presence of Cs-137 in the air samples collected during these years was the result of atmospheric weapons testing. Cs-137 was again detected in 1986 as a result of the Chernobyl accident. Since 1986 there have been no detections of Cs-137 in the environment surrounding the NMP site.

After 1986, no plant related or fallout radionuclides were detected in any of the offsite air particulate composite samples with the exception of the isolated detection of Co-60 in 2000 in a single sample. A review of the past five year's data for air particulate filter composites indicates no plant related radiological impact on the environment. All previous historical positive detections of fission product radionuclides were associated with atmospheric weapons testing or the Chernobyl accident, with the exception of the 2000 detection noted above.

Historical data for air particulate results are presented in Section 7.0, Tables 7-11 and 7-12.

5.2.3 AIRBORNE RADIOIODINE (I-131)

A. Results Summary

Iodine-131 (I-131) was not detected in any of the 780 samples analyzed for the 2007 program. No radioiodine (I-131) has been measured offsite at the constant air monitoring stations since 1987.

B. Data Evaluation and Discussion

Airborne radioiodine (I-131) is monitored at the fifteen air sampling stations also used to collect air particulate samples. There are nine offsite locations, five of which are required by the ODCM. The offsite locations required by the ODCM are designated as R-1, R-2, R-3, R-4 and R-5. R-5 is a control station located beyond any local influence from the plant. Ten air sampling locations are also maintained in addition to those required by the ODCM. Six of these stations D-1, G, H, I, J and K are located onsite. D-2, E, F and G are the optional stations located offsite. Samples are collected using activated charcoal cartridges. They are analyzed weekly for I-131.

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

C. Dose Evaluation

The calculated dose as a result of I-131 was not evaluated due to the fact I-131 was not detected during 2007. The I-131 sampling program demonstrated no offsite dose to man from this pathway as a result of operation of the plants located at Nine Mile Point.

D. Data Trends

No radioiodine has been detected in samples collected from the air sampling locations required by the ODCM since 1987.

There has been no positive detection of I-131 in air samples collected over the last ten years. This demonstrates that there is no measurable environmental impact or positive trend for iodine buildup due to plant operations during the period from 1997 through 2007. I-131 has previously been detected in samples collected in 1986 and 1987. The 1986 detection of I-131 was the result of the Chernobyl accident and the 1987 detection was the result of plant operations.

I-131 has been detected in the past at control locations. Control samples collected during 1976 had a mean I-131 concentration of 0.60 pCi/m^3. During 1977 this mean decreased to 0.32 pCi/m^3, and further decreased by a factor of ten to 0.03 pCi/m^3 in 1978. I-131 was not detected in samples collected from the control location during 1979 – 1981 and 1983 to 1985. I-131 was detected once at the control location during 1982 at a concentration of 0.039 pCi/m^3.

Iodine-131 has been detected in samples collected from the onsite indicator locations during 1980 to 1983 and 1986 to 1987. The mean concentrations ranged from 0.013 pCi/m^3 in 1980 to a maximum of 0.119 pCi/m^3 in 1986. The maximum mean indicator I-131 concentration of 0.119 pCi/m^3 was the result of the Chernobyl accident. I-131 was detected in a total of 75 weekly samples collected during the 1986 sample program. The 1986 measured concentrations ranged from a minimum of 0.023 pCi/m^3 to a maximum of 0.36 pCi/m^3. Each positive detection of I-131 in samples collected in 1986 was the direct result of the Chernobyl Nuclear accident.

Historical data for I-131 are presented in Section 7.0, Tables 7-13 and 7-14.

5.2.4 DIRECT RADIATION THERMOLUMINESCENT DOSIMETERS (TLD)

A. Results Summary

Thermoluminescent dosimeters (TLDs) are used to measure direct radiation (gamma dose) in the environment. As part of the 2007 environmental monitoring program, TLDs were placed at a total of 72 different environmental TLD locations (32 required by the ODCM and 40 optional locations). These TLDs were placed, collected and read each quarter of 2007. As a result of placing two TLDs at each location, the results presented in this report are the average of two TLD readings obtained for a given location.

The TLDs were placed in the following five geographical locations around the site boundary:

- Onsite (areas within the site boundary, includes TLD #s 3, 4, 5, 6, 7, 23, 24, 25, 26; TLD #s 18, 27, 28, 29, 30, 31, 39, 47, 103, 106, 107 are excluded)
- Site Boundary (area of the site boundary in each of the 16 meteorological sectors: Only includes TLD results that are not affected by radwaste direct shine, includes TLD #s 7, 18, 78, 79, 80, 81, 82, 83, 84; TLD #s: 23, 75, 76, 77, 85, 86, 87 are excluded)
- Offsite Sector (area four to five miles from the site in each of the eight land based meteorological sectors, includes TLD #s: 88, 89, 90, 91, 92, 93, 94, 95)
- Special Interest (areas of high population density, includes TLD #s 15, 56, 58, 96, 97, 98)
- Control (areas beyond significant influence of the site, includes TLD #s 8, 14, 49)

All geographical locations are required by the ODCM with the exception of the Onsite area which was optional. Description of the five geograpical categories and the designation of specific TLD locations that make up each category is presented in Section 3.1.5, TLD (Direct Radiation) of this report.

A summary of the 2007 dose rates for each of the five geographical locations is as follows:

	Dose in mrem per standard month		
Geographic Category	Min	Max	Mean
Onsite (Optional)	3.2	14.8	5.6
Site Boundary (Inner Ring) *	3.2	5.4	4.3
Offsite Sectors (Outer Ring) *	3.1	5.1	4.2
Special Interest *	3.0	5.1	4.2
Control *	3.2	5.8	4.6

* Geographical locations required by the ODCM

Comparison of annual mean dose rates associated with each geographical location indicate that there is no statistical difference in annual dose as a function of distance from the site boundary. The measured annual dose rate at the nearest resident to the site was consistent with the dose rates measured at the site boundary and control locations. The results for the Site Boundary, Offsite Sectors and Special Interest (Offsite) were well within expected normal variation when compared to the Control TLD results.

The results for the 2007 environmental TLD monitoring program indicate that there was no significant increase in dose rates as a result of operations at the site. The Hydrogen Water Chemistry system and the Independent Spent Fuel Storage Installation (ISFSI) in use at the Fitzpatrick plant did not measurably increase the ambient radiation exposure rate beyond the site boundary.

B. Data Evaluation and Discussion

Direct Radiation (Gamma Dose) measurements were taken at 72 different environmental locations during 2007, 32 of which are required by the ODCM. These locations are grouped into five geographical location categories for evaluation of results. The five categories include: Onsite, Site Boundary, Offsite Sector, Special Interest and Control locations. All categories are required by the ODCM with the exception of the Onsite TLDs. Onsite TLDs are placed at various locations within the site boundary to provide additional information on direct radiation levels at and around the NMP1, NMP2 and JAFNPP facilities.

Onsite TLD results ranged from 3.2 to 14.8 mrem per standard month in 2007. This range includes TLDs that are located near NMP1, NMP2 and JAFNPP generating facilities including those in close proximity to the Radwaste buildings of NMP1, NMP2 and JAFNPP.

Site Boundary TLD results ranged from 3.2 to 9.0 mrem per standard month in 2007. This range included all TLDs placed in each of the 16 meteorological sectors in the general area of the site boundary. The highest dose rate measured at a location required by the ODCM was 9.0 mrem per standard month. This TLD, (TLD 87) represents the site boundary maximum dose and is located in the NNW sector along the lake shore in close proximity to the NMP 2 plant. The TLD locations along the lakeshore close to the plants (TLD #s 75, 76, 77, 85, 86 and 87) are influenced by radwaste buildings and radwaste shipping activities. These locations and are not accessible to members of the public and the TLD results for these areas are not representative of dose rates measured at the remaining site boundary locations. The remaining Site Boundary TLD locations, which are located away from the plant ranged from 3.2 to 5.4 mrem per standard month resulting in an average dose rate of 4.3 mrem per standard month.

Offsite Sector TLDs, required by the ODCM, located 4 to 5 miles from the site in each of the 8 land based meteorological sectors ranged from 3.1 to 5.1 mrem per standard month with an average dose rate of 4.2 mrem per standard month.

Special Interest TLDs from all locations ranged from 3.0 to 5.1 mrem per standard month with a 2007 annual average dose rate of 4.1 mrem per standard month.

The Control TLD group required by the ODCM utilizes locations positioned well beyond the site. 2007 Control TLD results ranged from 3.2 to 5.8 mrem per standard month with an annual average dose rate of 4.6 mrem per standard month. These results include both the ODCM required control TLDs and the additional control TLDs.

TLD analysis results are presented in Section 6.0, Table 6-10.

C. Dose Evaluation

2007 annual mean dose rates for each geographic location required by the ODCM (excluding TLD #s 23, 75, 76, 77, 85, 86, 87) are as follows:

Site Boundary: 4.3 mrem per standard month (TLD #s: 7,18, 78, 79, 80, 81, 82, 83, 84)

Offsite Sectors: 4.2 mrem per standard month (TLD #s: 88, 89, 90, 91, 92, 93, 94, 95)

Special Interest: 4.2 mrem per standard month (TLD #s: 15, 56, 58, 96, 97)

Control: 4.6 mrem per standard month (TLD #s 8, 14, 49)

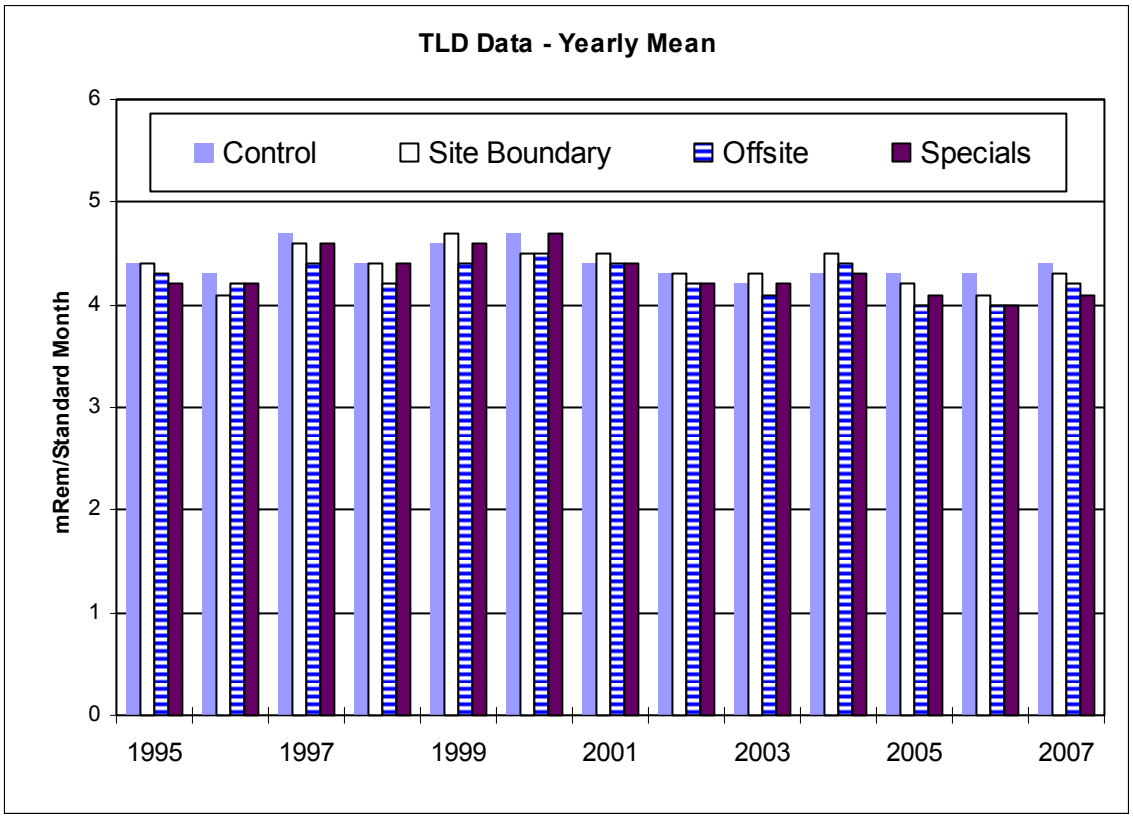
The measured mean dose rate in the proximity of the closest resident was 4.5 mrem per standard month (TLD #s: 108, 109) which is consistent with the control measurements of 4.6 mrem per standard month.

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

D. Data Trends

A comparison of historical TLD results can be made using the different geographical categories of measurement locations. These include Site Boundary TLDs located in each of the 16 meteorological sectors, TLDs located offsite in each land based sector at a distance of 4 to 5 miles from the site, TLDs located at special interest areas and TLDs located at control locations. Site Boundary, Offsite Sector and Special Interest TLD locations became effective in 1985; therefore, trends for these results can only be evaluated from 1985 to the present.

The following graph illustrates TLD results for the Control, Site Boundary, Offsite Sectors and Special Interest groups from 1995 through 2007:



TLDs located at the site boundary averaged 4.3 mrem per standard month during 2007 (Site Boundary average results do not include TLDs influenced by radwaste buildings and radwaste shipping activities: TLDs 75, 76, 77, 85, 86, 87). This result is consistent with the previous five year average of 4.3 mrem per standard month.

Offsite Sector TLDs averaged 4.2 mrem per standard month during 2007. This result is also consistent with the previous five year average of 4.1 mrem per standard month for offsite sectors.

Special Interest TLD locations averaged 4.1 mrem per standard month during 2007 which is consistent with the previous five year average of 4.2 mrem per standard month.

The last group of TLD locations required by the ODCM is the Control Group. This group utilized TLD locations positioned well beyond the site. 2007 control results from all Control TLDs averaged 4.6 mrem per standard month, consistent with the previous five year average of 4.2 mrem per standard month. The 2007 TLD program results, when compared to the previous ten years, showed no significant trends relative to increased dose rates in the environment.

5.2.5 MILK

A. Results Summary

A total of 58 milk samples were collected during the 2007 program and analyzed for gamma emitting radionuclides using gamma spectroscopy. In addition, each sample undergoes an iodine extraction procedure to determine the presence of Iodine-131 (I-131).

I–131, a possible plant related radionuclide, is measured to evaluate the cow/milk dose pathway to man. I-131 was not detected in any of the 58 milk samples collected in 2007 from the four milk sample locations.

Gamma spectral analyses of the milk samples showed only naturally occurring radionuclides, such as K-40, were detected in milk samples collected during 2007. K-40 was detected in all indicator and control samples. K-40 is a naturally occurring radionuclide and is found in many environmental sample media.

The 2007 results demonstrate that routine operations of the Nine Mile Point Site resulted in no measurable contribution to the "dose to the public" from the cow/milk pathway.

B. Sampling Overview

Milk samples were collected from three indicator locations and one control location. The ODCM requires that three sample locations be within five miles of the site. Based on the milk animal census, there were no adequate milk sample locations within five miles of the site in 2007. Sample location #4 ceased operation in May of 2007 and therefore was sampled only during the months of April and May. Samples were collected from three farms located beyond the five-mile requirement to ensure the continued monitoring of this important pathway. The two indicator locations ranged from 6.3 to 8.7 miles from the site. The control samples were collected from a farm located 16.0 miles from the site and in a low frequency wind sector (upwind). The geographic location of each sample location is listed below:

Location No.	Direction From Site	Distance (Miles)
76	SE	6.3
55	E	8.7
4 *	ESE	7.6
77 (Control)	SSW	16.0

* Ceased operation in May 2007. Samples only collected from April to May 2007

Samples were collected from Indicator location #4 during April and May, while Indicator locations #55, #76 and Control location #77 were sampled from April through December. Sampling occurs during the first and second half of each month. Samples were not required to be collected during January through March of 2007 as a result of I-131 not having been detected in samples collected during November and December of 2006, as stipulated in the ODCM.

C. Data Evaluation and Discussion

Each milk sample is analyzed for gamma emitters using gamma spectral analysis. The I-131 analysis is performed using resin extraction followed by spectral analysis for each sample. I-131 and gamma analysis results for milk samples collected during 2007 are provided in Section 6.0, Table 6-11.

Iodine–131 was not detected in any indicator or control milk samples analyzed during 2007. All I-131 milk results were reported as Lower Limits of Detection (LLD). No plant-related radionuclides were detected in any milk sample collected in 2007. K-40 was the most abundant radionuclide detected, and found in every indicator and control sample collected. K-40 is a naturally-occurring radionuclide and is found in many of the environmental media samples. Cs-137 was not detected in any indicator or control milk sample collected in 2007.

D. Dose Evaluation

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

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

E. Data Trends

Manmade radionuclides are not routinely detected in milk samples. In the past twenty years, Cs-137 was only detected in 1986, 1987, and 1988. The mean Cs-137 indicator activities for those years were 8.6, 6.8 and 10.0 pCi/liter, respectively. I-131 was measured in two milk samples collected in 1997 from a single sample location, having a mean concentration of 0.50 pCi/liter and was of undetermined origin. The previous detection was in 1986 with a mean concentration of 13.6 pCi/liter. The 1986 activity was a result of the Chernobyl accident.

The comparison of 2007 data to historical results over the operating life of the plants shows that Cs-137 and I-131 levels have decreased significantly since 1988.

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

5.2.6 FOOD PRODUCTS (VEGETATION)

A. Results Summary

There were no plant-related radionuclides detected in the 25 food product samples collected and analyzed for the 2007 program.

Detectable levels of naturally occurring K–40 were measured in all control and indicator samples collected for the 2007 program. Be-7 a naturally-occurring radionuclide, was also detected intermittently in samples collected in 2007. These results are consistent with the levels measured in 2006 and previous years.

The results of the 2007 sampling program demonstrate that there is no measurable impact on the dose to the public from the garden pathway as a result of plant operations.

B. Data Analysis and Discussion

Food product samples were collected from five indicator locations and one control location. The indicator locations are represented by nearby gardens in areas of highest D/Q (deposition factor) values based on historical meteorology and an annual garden census. The control location was a garden 15 miles away in a predominately upwind direction.

Food product samples collected during 2007 included one variety considered to be an edible broadleaf vegetable. Collards, an edible broadleaf vegetable, was collected from one indicator location. Collards was not available from the control location. The general lack of edible broadleaf vegetation samples was the result of grower preference and such varieties were not available in local gardens. Where broadleaf vegetables were not available, non-edible broadleaf vegetation was collected. Non-edible vegetation consisting of squash leaves, zuccini leaves, rhubarb, grape leaves, pumpkin leaves, corn leaves, horseradish leaves, green bean leaves and pepper leaves were collected for the 2007 program. The leaves of these plants were sampled as representative of broadleaf vegetation which is a measurement of radionuclide deposition. In addition to the broadleaf vegetation, tomato samples were collected from all locations except #48. Samples were collected during the late summer/fall harvest season. Each sample was analyzed for gamma emitters using gamma spectroscopy.

The analysis of food product samples collected during 2007 did not detect any plant-related radionuclides. Results for the past five years also demonstrate that there is no buildup of plant-related radionuclides in the garden food products grown in areas close to the site.

Naturally-occurring Be-7, K-40, Ra-226 and AcTh-228 were detected in food product samples. The results for naturally-occurring radionuclides are consistent with the data of prior years.

Analytical results for food products are found in Section 6.0, Table 6-12.

C. Dose Evaluation

The calculated dose as a result of plant effluents is not evaluated due to the fact that no plant-related radionuclides were detected. The food product sampling program demonstrated no measurable offsite dose to man from this pathway as a result of operations of the plants located at Nine Mile Point.

D. Data Trends

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

The last positive indication was for Cs-137 which was detected at one indicator location in 1999 with a concentration of 0.007 pCi/g (wet).

Historically, Cs-137 had been detected in ten separate years since 1976 ranging from a maximum mean concentration of 0.047 pCi/g (wet) in 1985 to a minimum of 0.006 pCi/g (wet) in 1994. The trend for Cs-137 is a general reduction in concentration to non detectable levels in samples collected during the 2000 through 2007 sample programs.

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

5.2.7 LAND USE CENSUS RESULTS

A. Results Summary

The ODCM requires that an annual land use census be performed to identify potential new locations for milk sampling and for calculating the dose to man from plant effluents. In 2007, a milk animal census, a nearest resident census and a garden survey were performed.

The results of the closest residence census conducted in 2006 required no change to Fitzpatrick ODCMs' closest resident location.

A garden census, not required by the ODCM, is performed to identify appropriate garden sampling locations and dose calculation receptors. Garden samples were collected from a number of locations identified in the census as active for 2007. See Table 3.3-1 for 2007 sampling locations.

B. Data Evaluation and Discussion

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

The milk animal census is an estimation of the number of cows and goats within an approximate 10 mile radius of the Nine Mile Point Site. The annual census is conducted during the first half of the grazing season by sending questionnaires to previous milk animal owners and also by road surveys to locate any possible new locations. In the event the questionnaires are not answered, the owners are contacted by telephone or in person. The local county agricultural extension service is also contacted as an additional source of information concerning new milk animal locations in the vicinity of the site.

The number of milk animals located within an approximate 10 mile radius of the site was estimated to be 381 cows and 6 goats based on the 2007 land use census. The number of cows has decreased by 92 when compared to the 2006 census. The census determined that the milk from the goats identified was not shipped in 2007 . The results of the milk animal census are found in Section 6.0, Table 6-13.

The second type of census conducted is a residence census. The census is conducted in order to identify the closest residence within 5 miles in each of the 22.5 degree land-based meteorological sectors. There are only eight sectors over land where residences are located within 5 miles. The water sectors include: N, NNE, NE, ENE, W, WNW, NW and NNW. The results of the residence census, showing the applicable sectors and degrees and distance of each of the nearest residence, are found in Section 6.0, Table 6-14. There were no changes identified in the 2007 census for the closest resident in the land based meteorological sectors. The nearest resident locations are illustrated in Section 3.3, Figure 3.3-5.

5.2.8 DIRECT RADIATION, THERMOLUMINESCENT DOSIMETERS (TLD)

Independent Spent Fuel Storage Installation (ISFSI)

A. Results Summary

Thermoluminescent Dosimeters (TLDs) are used to measure direct radiation (gamma dose) in the localized environment of the ISFSI pad. Eighteen TLD locations are in place around the perimeter of the ISFSI pad. TLDs were placed at these locations prior to loading the first storage casks for baseline dose rate determination in the general area of the pad.

On April 25, 2002, the ISFSI facility was placed in service with the installation of the first storage cask on the pad. Two subsequent storage casks were moved to the storage facility on May 8, 2002 and May 21, 2002. A second series of six storage casks were added to the storage facility starting on September 6, 2005. The sixth and last cask in this series was placed in the storage facility on November 12, 2005 bringing the total number of casks in storage to nine. The nine casks are located on the northern end of the pad are in close proximity to the north ISFSI perimeter fence. In addition, the radiation exposure from hydrogen water chemistry also contribute to the higher dose rates measured at the north fenceline of the ISFSI storage facility.

The increase in dose rate is limited to the general area of the storage facility. The implementation and loading of the ISFSI project has resulted in no increase in dose at the site boundary or to the public. The analysis of offsite doses from direct radiation measurements, presented in Section 5.2.4 of this report, concludes that there is no significant difference in annual dose to the public at or beyond the site boundary. The measured annual dose rate at the nearest residence to the site was consistent with the dose rates measured at the site boundary and the offsite control locations. The results for the Site Boundary, Offsite Sectors, and Special Interest (offsite) were well within expected normal variation when compared to the Control TLD results. The results for the 2007 environmental TLD monitoring program indicate that there is no significant increase in dose rates as a result of operations at the site. The use of hydrogen injection and the implementation of the Independent Spent Fuel Storate Installation (ISFSI) at the FitzPatrick plant did not measurably increase the ambient radiation exposure rate at or beyond the site boundary. The lack of a dose rate increase at or beyond the site boundary is consistent with design calculations performed to evaluate compliance with 10 CFR72.104(a).

The measured results of the 2007 TLD monitoring program demonstrate compliance with the offsite dose limits to members of the public specified in 40CFR190 and 10CFR72.104(a).

B. Program Design

An array of eight TLD locations was established around the perimeter of the ISFSI pad 18 months prior to facility usage. Six months prior to the facility becoming operational, an additional 10 TLD locations were established at areas of interest on the facility perimeter. These preoperational TLDs were used for baseline dose rate determination. The TLDs are placed, collected and read each quarter. Two dosimeters are placed at each location and the average of the two dosimeters is reported. The quarterly results are compared to baseline data to assess the contribution to ambient dose rates in the vicinity of the storage facility from casks as they are placed on the storage pad.

C. Dose Evaluation

A maximum dose rate of 17.9 mrem per standard month above the baseline dose rate was measured at the north perimeter fence. The lowest measured dose rate of 2007 was 3.9 mrem per standard month above the baseline dose rate and was measured at the southern perimeter fence.

An evaluation of Site Boundary TLDs and Control TLDs results for 2007 shows that there is no increase in dose rate at or beyond the site boundary. A detailed discussion of this evaluation is found in Section 5.2.4. The Environmental TLD results for this period show no significant difference in control and site boundary dose rates for 2006.

2007 DOSE IN MREM PER STANDARD MONTH

	Minimum	Maximum	Mean
Site Boundary	3.2	5.4	4.3
Control	3.2	5.8	4.6

5.3 CONCLUSION

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

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

The results of the 2007 REMP continue to clearly demonstrate that there is no significant short term or chronic long term radiological impact on the environment in the vicinity of the Nine Mile Point site. No unusual radiological characteristics were measured or observed in the local environment. The REMP continues to demonstrate that the effluents from the site to the environment contribute no significant or even measurable radiation exposures to the general public as confirmed by the sampling and analysis of environmental media from recognized environmental pathways. Based on TLD results there was no measurable increase in radiation levels beyond the site boundary as a result of the hydrogen water chemistry programs. Environmental radiation levels measured at the nearest residence are at the background level based on control station TLD results. The only measurable radiological impact on the environment continues to be the result of atmospheric weapons testing conducted in the early 1980s and the 1986 accident at the Chernobyl Nuclear Power Plant. Both of these source terms have contributed to a measurable inventory of Cs-137 in the environment. The results for the 2007 sample program demonstrate that the concentrations of man-made radionuclides continue to decline. This reduction in environmental background concentrations will allow for the site environmental program to become more sensitive to the measurable impact of plant operations on the environment as time goes on.

The environmental monitoring program detected one potential plant-related radionuclide in the sample media collected during 2007. Cs-137 was detected in one shoreline sediment sample. The source of the Cs-137 measured in this sample is considered to be fallout from past atmospheric

nuclear weapons testing. The measured concentration of Cs-137 in the sample was small and consistent with historical results for shoreline sediment. The impact of these Cs-137 concentrations are minimal in terms of dose to man. Dose from man-made sources in the environment is very small when compared to the dose originating from naturally-occurring sources of radioactivity.

Radiation from naturally-occurring radionuclides such as K-40 and Ra-226 contributed the vast majority of the total annual dose to members of the general public. The dose to members of the public, resulting from plant operations, is extremely small in comparison to the dose contribution from natural background levels and sources other than the plants. The whole body dose in Oswego County due to natural sources is approximately 50 – 60 mrem per individual per year as demonstrated by control environmental TLDs. The fraction of the annual dose to man, attributable to site operation, remains insignificant.

Based upon the overall results of the 2007 Radiological Environmental Monitoring Program, it can be concluded that the levels and variation of radioactivity in the environment samples were consistent with background levels that would be expected for the lakeshore environment of the site.

5.4 REFERENCES

1. U.S. Nuclear Regulatory Commission Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I", March 1976.

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

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

4. U.S. Nuclear Regulatory Commission Branch Technical Position to Regulatory Guide 4.8, "An Acceptable Radiological Environmental Monitoring Program", Revision 1, November 1979.

5. National Council on Radiation Protection and Measurements (NCRP), Environmental Radiation Measurements, NCRP Report No. 50, 1975.

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

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

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

9. International Commission on Radiological Protection (ICRP), Radionuclide Release into the Environment: Assessment of Doses to Man, ICRP Publication 29, 1979.

10. Glasstone, Samuel and Jordan, Walter H., Nuclear Power and Its Environmental Effects, First Edition, American Nuclear Society, La Grange Park, Ill., 1980.

11. Schleien, Bernard. The Health Physics and Radiological Health Handbook. Scinta, Inc., Silver Spring, Maryland, 1992.

12. U.S. Department of Health and Human Services. Preparedness and Response in Radiation Accidents, National Center for Devices and Radiological Health, Rackville, Maryland 20857, August 1983.

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

14. National Council on Radiation Protection and Measurements (NCRP), Exposure of the Population in the United States and Canada from National Background Radiation, NCRP Report No. 94, 1987