Perry Nuclear Power Plant

Annual Environmental & Effluent Release Report 2011

2011

ANNUAL ENVIRONMENTAL AND EFFLUENT RELEASE REPORT

for the Perry Nuclear Power Plant

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TABLE OF CONTENTS

APPENDICES

EXECUTIVE SUMMARY

The Annual Environmental and Effluent Release Report (AEERR) details the results of environmental and effluent monitoring programs conducted at the Perry Nuclear Power Plant (PNPP) from January 01 through December 31, 2011. This report meets all of the requirements in PNPP Technical Specifications, the Environmental Protection Plan (EPP), and Regulatory Guide 1.21. It incorporates the requirements of the Annual Radioactive Effluent Release Report (ARERR), the Annual Radiological Environmental Operating Report (AREOR) and the Annual Environmental Operating Report (AEOR). Report topics include radioactive effluent releases, radiological environmental monitoring, land use census, clam/mussel monitoring, herbicide use, and special reports. The results of the environmental and effluent programs for 2011 indicate that the operations of the Perry Nuclear Power Plant did not result in any significant environmental impact.

RADIOACTIVE EFFLUENT RELEASES

During the normal operation of a nuclear power plant, small quantities of radioactivity may be released to the environment in liquid and gaseous effluents. Radioactive material may also be released as solid waste. PNPP maintains a comprehensive program to control and monitor the release of radioactive materials from the site in accordance with Nuclear Regulatory Commission (NRC) release regulations.

The dose to the general public from the plant's liquid and gaseous effluents was below the applicable regulatory limits. The calculated hypothetical maximum individual whole body dose potentially received by an individual resulting from PNPP liquid effluents was 2.47E-03 mrem (0.082 % of the applicable limit). The calculated hypothetical maximum individual whole body dose potentially received by an individual resulting from PNPP gaseous effluents (excluding C-14) for 2011 was 2.75E-04 mrem (0.0055% of the applicable limit).

In 2011, radioactivity released to the environment in the form of gaseous Carbon-14 (C-14) was estimated based on plant type and power production. This is based on an industry initiative supported by the Nuclear Energy Institute (NEI) and the NRC. The calculated hypothetical maximum individual whole body dose potentially received by an individual resulting from PNPP gaseous effluents for 2011, including C-14 is 0.16 mrem. Refer to page 21 for additional Carbon-14 information.

The summation of the hypothetical maximum individual dose from effluents in 2011 is equivalent to < 0.01 % of the total dose an individual living in the PNPP area receives from all sources of radiation.

Shipments of solid waste consisted of waste generated during water treatment, radioactive material generated during normal daily operations and maintenance, and irradiated components. PNPP complied with applicable regulations governing radioactive shipments in 2011, making shipments of solid radioactive waste to a licensed burial site.

An additional section covers the groundwater monitoring program. It includes a brief history of groundwater tritium issues at the Perry Plant, and results from current sampling and monitoring activities.

RADIOLOGICAL ENVIRONMENTAL MONITORING

The Radiological Environmental Monitoring Program (REMP) was established in 1981 to monitor the radiological conditions in the environment around PNPP. The REMP is conducted in accordance with PNPP Technical Specifications and the Offsite Dose Calculation Manual (ODCM). This program includes the collection and analysis of environmental samples and evaluation of results.

The REMP was established at PNPP six (6) years before the plant became operational. This pre-operational program was designed to provide data on background radiation and radioactivity normally present in the area. PNPP has continued to monitor the environment during plant operation by collecting and analyzing samples of air, precipitation, milk, fish, produce, water and sediment, as well as by measuring radiation directly. The results of the REMP program indicate adequate control of radioactivity released from PNPP plant effluents. These results also demonstrate that PNPP complies with applicable federal regulations. The REMP results are divided into four sections: atmospheric monitoring, terrestrial monitoring, aquatic monitoring, and direct radiation monitoring.

Samples of air were collected to monitor the radioactivity in the atmosphere. Over a four week period in late March to mid-April, radioactive iodine was identified on 25 of the 28 samples taken during that time period – both indicator and control. This radioactivity is attributed to the accident at Fukushima in Japan. Positive results were identified throughout the US. Other than these four weeks, the 2011 results were similar to those observed for the pre-operational and operational programs from prior years.

Terrestrial monitoring included the analysis of milk and produce. The results of three milk samples for mid-April and early May 2011 identified radioactive iodine. This was attributed to Fukushima. Other than these samples, the 2011 results indicated concentrations of radioactivity similar to that found in previous years. Analyses of produce samples detected only natural radioactivity similar to those observed in previous years, and indicated no build-up of radioactivity attributable to the operation of PNPP.

Aquatic monitoring included the collection and analyses of water, fish, and shoreline sediments. The 2011 analytical results for water and fish samples showed normal background radionuclide concentrations. The results of sediment sample analyses indicated that the annual average cesium radioactivity was similar to previous years for the control location. Cesium-137 activity was detected in five (5) of the twelve (12) samples collected. The average cesium-137 radioactivity for all locations was 367.04 pCi/kg and is lower than the highest identified value of 864 pCi/kg established in 1981.

In 1999, a sediment sample of the Northwest Drain Impoundment (sampling location #64) was analyzed to contain 62 pCi/kg of cobalt-60. Enhanced monitoring activities continued within the boundaries of the impoundment for 2011. The cobalt-60 remains centered within the organic material located at the top of the spillway, with little or no activity found farther upstream. Sample analyses continue to identify cobalt-60 levels similar to those found in previous years. Refer to Table 17 for detailed sample results.

Direct radiation measurements showed no change from previous years. The indicator locations averaged 62.44 mrem/year and control locations averaged 60.56 mrem/year. In 2011, radiation dose in the area of PNPP was similar to the radiation dose measured at locations greater than ten (10) miles away from the Plant.

Based on these results, during 2011, the operation of the PNPP resulted in no significant increase in the radionuclide concentrations observed in the environment.

LAND USE CENSUS

In order to estimate radiation dose attributable to the operation of PNPP, the potential pathways through which public exposure can occur must be known. To identify these exposure pathways, an Annual Land Use Census is performed as part of the REMP. During the census, PNPP personnel travel public roads within a five (5) mile radius of the plant to locate key radiological exposure pathways. These key pathways include the nearest resident, garden, and milk animal in each of the ten meteorological land sectors that surround the plant. The information obtained from the census is entered into a computer program, which is used to assess the hypothetical dose to members of the public. In recent years, however, it has been noted that tracts of land once used for farming are now being developed as mini-industrial parks and residential housing tracts. For 2011, the predominant land use within the census area continues to be rural and/or agricultural.

CLAM/MUSSEL MONITORING

Clam and mussel shells can clog plant piping and components that use water from Lake Erie. For this reason, sampling for clams and mussels has been conducted in Lake Erie in the vicinity of PNPP since 1971. The monitoring is specifically for Corbicula (Asiatic clams) since their introduction into the Great Lakes in 1981, and for Dreissena (zebra mussels) since their discovery in Lake Erie in 1989. Since no Corbicula have ever been found at PNPP, routine Corbicula monitoring will provide early detection capability when this pest species arrives at PNPP. The Dreissena program includes both monitoring and control and is directed at minimizing the mussel's impact on plant operation. As in past years, this program has successfully prevented Dreissena from causing any significant operational problems at PNPP.

HERBICIDE USE

The use of herbicides on the PNPP site is monitored to ensure compliance with Ohio Environmental Protection Agency (OEPA) requirements and to protect the site's natural areas. Based on the results of on-site herbicide applications and weekly general site inspections, herbicide use has not had a negative impact on the environment around the plant.

SPECIAL REPORTS

Significant environmental events (for example, spills, releases), noncompliance with environmental regulations [e.g., OEPA discharge limits], and changes in plant design or operation that affect the environment are reported to regulatory agencies as they occur.

One special report was submitted in 2011:

- On October 17, 2011 approximately 1000 gallons of a diesel/gas fuel mixture was spilled into the environment at the Fire Training facility, covering an area of 20 x 60 meters. The release entered a Class III wetlands just west of the Fire Training facility but did not enter Lake Erie. Clean Harbors Incorporated was contracted for the initial clean-up and disposal. The storage tank has been cleaned and emptied and is no longer in service. The associated underground piping has been removed.

All areas affected by the release have been cleaned and will be re-evaluated in the spring of 2012. Periodic sampling of piezometers and sentinel wells has indicated the release has not migrated. All proper notifications to regulatory agencies were made as required.

INTRODUCTION

Nuclear energy provides an alternative energy source, which is readily available and has very limited impact upon the environment. To more fully understand nuclear energy as a source of generating electricity, one must understand basic radiation concepts and its occurrence in nature.

RADIATION FUNDAMENTALS

Atoms are the basic building blocks of all matter. Simply described, atoms are made up of positively and negatively charged particles, and particles which are neutral. These particles are called protons, electrons, and neutrons, respectively. The relatively large protons and neutrons are packed together in the center of the atom called the nucleus. Orbiting around the nucleus are one or more smaller electrons. In an electrically neutral atom, the positively charged protons in the nucleus balance the negatively charged electrons. Due to their dissimilar charges, the protons and electrons have a strong attraction for each other, which helps hold the atom together. Other attractive forces between the protons and neutrons keep the densely packed protons from repelling each other, and preventing the nucleus from breaking apart.

Atoms with the same number of protons in their nuclei make up an element. The number of neutrons in the nuclei of an element may vary. Atoms with the same number of protons but different numbers of neutrons are called isotopes. All isotopes of the same element have the same chemical properties and many are stable or non-radioactive. An unstable or radioactive isotope of an element is called a radioisotope, or radionuclide. Radionuclides contain an excess amount of energy in the nucleus, which is usually due to an excess number of neutrons.

Radioactive atoms attempt to reach a stable, non-radioactive state through a process known as radioactive decay. Radioactive decay is the release of energy from an atom's nucleus through the emission of radiation. Radionuclides vary greatly in the frequency with which their atoms release radiation. The length of time an atom remains radioactive is defined in terms of its half-life. Half-life is defined as the time required for a radioactive substance to lose half its activity through the process of radioactive decay. Half-lives vary from millionths of a second to millions of years.

RADIATION AND RADIOACTIVITY

Radioactive decay is a process in which the nucleus of an unstable atom becomes more stable by spontaneously emitting energy. Radiation refers to the energy that is released when radioactive decay occurs within the nucleus. This section includes a discussion on the three (3) primary forms of radiation produced by radioactive decay.

Alpha Particles

Alpha particles consist of two protons and two neutrons and have a positive charge. Because of their charge and large size, alpha particles do not travel very far when released (less than 4 inches, in air). They are unable to penetrate any solid material, such as paper or skin, to any significant depth. However, if alpha particles are released inside the body, they can damage the soft internal tissues because they deposit all their energy in a small area.

Beta Particles

Beta particles are essentially free electrons, which usually carry a negative electrical charge. They are much smaller than alpha particles and travel at nearly the speed of light. Thus they can travel for longer distances than alpha particles. External beta radiation primarily affects the skin. Because of their electrical charge, paper, plastic or thin metals can stop beta particles.

Gamma Rays

Gamma rays are bundles of electromagnetic energy, called photons, which behave as though they were particles. They are similar to visible light, but of a much higher energy. Gamma rays can travel long distances in air and are often released during radioactive decay, along with alpha and beta particles. Potassium-40 is an example of a naturally occurring radionuclide found in all humans that decays by emitting a gamma ray.

Interaction with Matter

When radiation interacts with other materials, it affects the atoms of those materials principally by knocking the negatively charged electrons out of orbit. This causes an atom to lose its electrical neutrality and become positively charged. An atom that is charged, either positively or negatively, is called an ion and the radiation is called ionizing radiation.

UNITS OF MEASURE

Some of the units of measure used in this report require explanation.

Activity

Activity 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 often used in this report. Two common units are the microcurie (μCi), one millionth of a curie, and the picocurie (pCi), one trillionth of a curie. The mass, or weight, of radioactive material, which would result in one (1) curie of activity, depends on the disintegration rate. For example, one gram of radium-226 is equivalent to one (1) curie of activity. It would require about 1.5 million grams of natural uranium, however, to equal one (1) curie.

Dose

Biological damage due to alpha, beta, and gamma radiation may result from the ionization caused by these types of radiation. Some types of radiation, especially alpha particles, which causes dense local ionization, can result in much more biological damage for the same energy imparted than does gamma or beta radiation. Therefore, a quality factor must be applied to account for the different ionizing capabilities of various types of ionizing radiation. When the quality factor is multiplied by the absorbed dose (as measured in rads), 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 terms of the Roentgen Equivalent Man (rem). When discussing environmental radiation effects, the rem is a large unit. Therefore, a smaller unit, the millirem (mrem) is often used. One mrem is equivalent to 1/1000 of a rem.

LOWER LIMIT OF DETECTION

Sample results are often reported as below the Lower Limit of Detection (LLD). The LLD for an analysis is the smallest amount of radioactive material that will show a positive result for which there can be a 95% confidence that radioactivity is present. This statistical parameter is used as a measure of the sensitivity of a sample analysis. When a measurement is reported as less than the LLD (<LLD), it means that no radioactivity was detected. Had radioactivity been present at (or above) the stated LLD value, it statistically would have been detected. The NRC has established LLD values for environmental and effluent sample analyses.

BACKGROUND RADIATION

Background radiation is a part of nature. Natural background radioactive decay occurs in the soil, water, air, and space. Common sources of radiation that contribute to the natural background radiation includes: 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, the decay of radioisotopes used in medical procedures, man-made phosphate fertilizers (phosphates and uranium are often found together in nature), fallout from nuclear weapons testing, and even household items like smoke detectors. In the United States, a person's average annual exposure from background radiation is 360 mrem, and is due to the sources shown in Figure 1 [Source: National Council on Radiation Protection and Measurements].

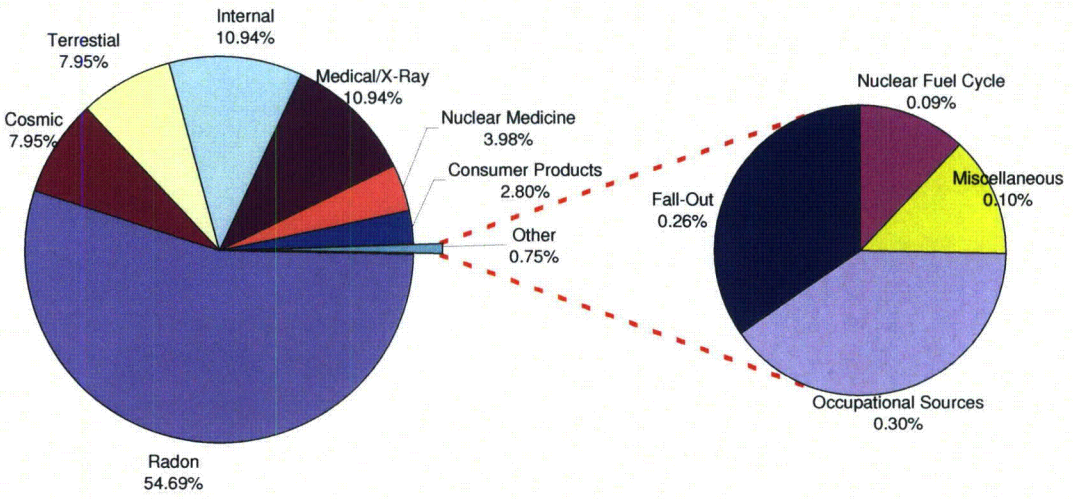


Figure 1: Sources of Background Radiation

Many 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 PNPP. Some of the radionuclides normally present include:

- Beryllium-7, present as a result of the interaction of cosmic radiation with the upper atmosphere,
- Potassium-40, a naturally occurring radionuclide normally found in humans and throughout the environment, and
- Radionuclides from nuclear weapons testing fallout, including tritium and cesium-137. These radionuclides may also be released in minute amounts from nuclear facilities.

Beryllium-7 and potassium-40 are especially common in REMP samples. Since they are naturally occurring and are expected to be present, positive results for these radionuclides

are not discussed in the section for the 2011 Sampling Program results. These radionuclides are included; however, in Appendix A, 2011 Inter-Laboratory Cross Check Comparison Program Results.

RADIOACTIVE EFFLUENT RELEASES

INTRODUCTION

The source of radioactive material in a nuclear power plant is the generation of fission products (e.g., noble gas, iodine, and particulate) or neutron activation of water and corrosion products (e.g., tritium and cobalt). The majority of the fission products generated remain within the nuclear fuel pellet and fuel cladding. Most fission products that escape from the fuel cladding, as well as the majority of the activated corrosion products, are removed by plant processing equipment.

During the normal operation of a nuclear power plant, small amounts of radioactive material are released in the form of solids, liquids, and gases. PNPP was designed, and is operated in such a manner as to control and monitor these effluent releases. Effluents are controlled to ensure any radioactivity released to the environment is minimal and within regulatory limits. Effluent release programs include the operation of monitoring systems, in-plant sampling and analysis, quality assurance, and detailed procedures covering all aspects of effluent monitoring.

The liquid and gaseous radioactive waste treatment systems at PNPP are designed to collect and process these wastes in order to remove most of the radioactivity. Effluent monitoring systems are used to provide continuous indication of the radioactivity present and are sensitive enough to measure several orders of magnitude lower than the applicable release limits. This monitoring equipment is equipped with alarms and indicators in the plant control room. The alarms are set to provide warnings to alert plant operators when radioactivity levels reach a small fraction of actual limits. The waste streams are sampled and analyzed to identify and quantify the radionuclides being released to the environment.

Gaseous effluent release data is coupled with on-site meteorological data in order to calculate the dose to the general public. Devices are maintained at various locations around PNPP to constantly sample the air in the surrounding environment. Frequent samples of other environmental media are also taken to determine if any radioactive material deposition has occurred. The Radiological Environmental Monitoring Program (REMP) is described in detail in the next section.

Generation of solid waste is carefully monitored to identify opportunities for minimization. Limiting the amount of material taken into the plant, sorting material as radioactive or non-radioactive waste, and incinerating waste once it is identified help to lower the volume of radioactive solid waste generated. Solid waste is shipped to a licensed burial site.

REGULATORY LIMITS

The Nuclear Regulatory Commission has established limits for liquid and gaseous effluents that comply with:

- Title 10 of the Code of Federal Regulations, Part 20 (Standards for Protection Against Radiation) [10CFR20], Appendix B;
- Title 10 of the Code of Federal Regulations, Part 50 (Domestic Licensing of Production and Utilization Facilities) [10CFR50], Appendix I; and
- Title 40 of the Code of Federal Regulations, Part 190 (Environmental Radiation Protection Standards for Nuclear Power Plants) [40CFR190].

These limits were incorporated into the PNPP Technical Specifications, and subsequently into the PNPP Offsite Dose Calculation Manual (ODCM). The ODCM prescribes the maximum doses and dose rates due to radioactive effluents resulting from the operation of PNPP. These limits are defined in several ways to limit the overall impact on persons living near the plant. Since there are no other fuel sources near the PNPP, the 40CFR190 limits, which are described below, were not exceeded in 2011.

The 40CFR190 limit for total direct-radiation dose is 25 mrem. For 2011, the total whole body dose to a member of the general public, considering all sectors, was 3.8E-01 person-Rem. This value was determined by summing the annual whole body doses from liquid and gaseous radioactive effluents, the annual gaseous and liquid organ dose (refer to Table 8) and the maximum, direct-radiation dose. Since the direct radiation dose, as determined by TLD, was indistinguishable from natural background (refer to Figure 9), it was not included in the calculation.

Liquid Effluents

The concentration of radioactive material released in liquid effluents to unrestricted areas shall be limited to the concentrations specified in 10CFR20, Appendix B, Table 2, Column 2 for radionuclides other than dissolved or entrained noble gases, as required by the ODCM. For dissolved or entrained noble gases, the concentration shall be limited to 2.0E-04 μCi/ml of total activity. These values are the maximum effluent concentrations.

The dose or dose commitment to a member of the public from radioactive materials in liquid effluents released to unrestricted areas shall be limited to the following:

During any calendar quarter:

Less than or equal to 1.5 mrem to the whole body, and

Less than or equal to 5 mrem to any organ

During any calendar year:

Less than or equal to 3 mrem to the whole body, and

Less than or equal to 10 mrem to any organ

Gaseous Effluents

Dose rate due to radioactive materials released in gaseous effluents from the site to areas at and beyond the site boundary shall be limited to the following:

Noble gases:

Less than or equal to 500 mrem per year to the whole body, and

Less than or equal to 3000 mrem per year to any organ

Iodine-131, Iodine-133, Tritium, and all radionuclides in particulate form with half lives greater than eight days:

Less than or equal to 1500 mrem per year to any organ

Air dose due to noble gases to areas at, and beyond the site boundary, shall be limited to the following:

During any calendar quarter:

Less than or equal to 5 mrad for gamma radiation, and

Less than or equal to 10 mrad for beta radiation

During any calendar year:

Less than or equal to 10 mrad for gamma radiation, and

Less than or equal to 20 mrad for beta radiation

Dose to a member of the public from Iodine-131, Iodine-133, Tritium, and all radionuclides in particulate form with half lives greater than eight days in gaseous effluents released to areas at and beyond the site boundary shall be limited to the following:

Less than or equal to 7.5 mrem to any organ per any calendar quarter, and

Less than or equal to 15 mrem to any organ per any calendar year

The PNPP ODCM does not contain a concentration limit for gaseous effluents. For this reason, effluent concentrations are not used to calculate maximum release rates for gaseous effluents.

RELEASE SUMMARY

Effluents are sampled and analyzed to identify both the type and quantity of radionuclides present. This information is combined with effluent path flow measurements to determine the composition, concentration, and dose contribution of the radioactive effluents.

Liquid Effluents

The PNPP liquid radioactive waste system is designed to collect and treat all radioactive liquid waste produced in the plant. The treatment process used for radioactive liquid waste depends on its physical and chemical properties. It is designed to reduce the concentration of radioactive material in the liquid by filtration to remove suspended solids and demineralization to remove dissolved solids. Normally, the effluent from the liquid radioactive waste system is returned to plant systems. To reduce the volume of water stored in plant systems; however, the processed liquid effluent may be discharged from the plant via a controlled release. In this case, effluent activity and dose calculations are performed prior to, and after discharging this processed water to Lake Erie to ensure regulatory compliance and dose minimization principals are maintained.

Liquid radioactive waste system effluents may be intermittently released, which are considered to be "batch" releases. Table 1 provides information on the number and duration of these releases for 2011.

Table 1: Liquid Batch Releases

	QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4	ANNUAL TOTAL
Number of batch releases	22	72	37	16	147
Total time period for batch releases, min	4.91+E03	1.60E+04	8.26E+03	3.55E+03	3.25E+04
Maximum time for a batch release, min	2.28E+02	3.84E+02	2.30E+02	2.27E+02	3.84E+02
Average time period for a batch release, min	2.23E+02	2.23E+02	2.23E+02	2.22E+02	2.23E+02
Minimum time for a batch release, min	2.02E+02	6.00E+00	2.02E+02	2.05E+02	6.00E+00
Average stream flow during periods of effluent release into a flowing stream, L/min	1.14E+05	2.04E+05	2.33E+05	1.67E+05	1.80E+05

Table 2 provides information on the nuclide composition for the liquid radioactive effluent system releases. If a radionuclide was not present at a level "greater than or equal to the LLD" (≥LLD), then the value is expressed as "less than the LLD" (<LLD). In each case, LLDs were met, or were below the levels required by the ODCM. Table 2a provides information specific to radioactive effluent batch releases while Table 2b provides information specific to continuous radioactive effluent releases.

Table 2: Summation of All Liquid Effluent Releases

	QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4	EST. TOTAL ERROR, (%)
A. Fission and Activation Products					
1. Total Released, Ci (excluding tritium, gases, alpha)	1.43E-03	2.55E-02	5.21E-03	5.27E-03	1.00E+01
2. Average Diluted Concentration, µCi/mL *	8.80E-11	8.68E-10	1.61E-10	2.59E-10	NA
3. Percent of Applicable Limit, %	2.56E-03	2.10E-02	4.75E-03	8.06E-03	NA
B. Tritium					
1. Total Released, Ci	1.08E+01	1.47E+01	6.33E+00	3.33E+00	1.00E+01
2. Average Diluted Concentration, µCi/mL	6.63E-07	4.99E-07	1.96E-07	1.64E-07	
3. Percent of Applicable Limit, %	6.63E-02	4.99E-02	1.96E-02	1.64E-02	
C. Dissolved and Entrained Gases					
1. Total Released, Ci	<LLD	<LLD	<LLD	1.62E-07	1.00E+01
2. Average Diluted Concentration, µCi/mL	<LLD	<LLD	<LLD	7.96E-15	NA
3. Percent of Applicable Limit, %	N/A	N/A	N/A	3.99E-09	NA
D. Gross Alpha Activity, Ci	<LLD	<LLD	<LLD	<LLD	1.00E+01
E. Waste Volume Released, Liters (prior to dilution)	2.86E+06	8.72E+06	6.33E+06	2.74E+06	NA
F. Dilution Water Volume Used, Liters	1.63E+10	2.94E+10	3.23E+10	2.03E+10	NA

<LLD – Less than the lower limit of detection
N/A – Not Applicable, the ODCM does not have a limit for fission and activation products.
**Average diluted concentrations are based on total volume of water released during quarter.*

Table 2a: Summation of Batch Liquid Effluent Releases

	QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4	EST. TOTAL ERROR, (%)
A. Fission and Activation Products					
Total Released, Ci (excluding tritium, gases, alpha)	1.43E-03	2.55E-02	5.21E-03	5.07E-03	1.00E+01
B. Tritium					
Total Released, Ci	1.08E+01	1.47E+01	6.33E+00	3.33E+00	1.00E+01
C. Dissolved and Entrained Gases					
Total Released, Ci	<LLD	<LLD	<LLD	<LLD	1.00E+01
D. Gross Alpha Activity, Ci	<LLD	<LLD	<LLD	<LLD	1.00E+01
E. Waste Volume Released, Liters (prior to dilution)	2.86E+06	8.72E+06	4.80E+06	2.34E+06	NA

<LLD – Less than the lower limit of detection

Table 2b: Summation of Continuous Liquid Effluent Releases

	QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4	EST. TOTAL ERROR, (%)
A. Fission and Activation Products					
Total Released, Ci (excluding tritium, gases, alpha)	<LLD	<LLD	<LLD	1.94E-04	1.00E+01
B. Tritium					
Total Released, Ci	<LLD	<LLD	1.80E-03	3.20E-03	1.00E+01
C. Dissolved and Entrained Gases					
Total Released, Ci	<LLD	<LLD	<LLD	1.62E-07	1.00E+01
D. Gross Alpha Activity, Ci	<LLD	<LLD	<LLD	<LLD	1.00E+01
E. Waste Volume Released, Liters (prior to dilution)	0.00E+00	0.00E+00	1.53E+06	4.01E+05	NA

<LLD – Less than the lower limit of detection

Table 3 lists the total number of curies (Ci) of each radionuclide present in liquid effluent releases for each quarter. If a radionuclide was not present at a level "greater than or equal to the LLD" (≥LLD), then the value is expressed as "less than the LLD" (<LLD). In each case, the LLDs were either met, or were below the levels required by the ODCM.

Table 3: Radioactive Liquid Effluent Nuclide Composition

	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual Total
Tritium	Ci	1.08E+01	1.47E+01	6.33E+00	3.33E+00	3.51E+01
Sodium-24	Ci	<LLD	<LLD	<LLD	9.25E-05	9.25E-05
Chromium-51	Ci	<LLD	2.26E-03	<LLD	<LLD	2.26E-03
Manganese-54	Ci	1.49E-04	2.76E-03	1.18E-04	9.60E-05	3.12E-03
Manganese-56	Ci	<LLD	<LLD	<LLD	1.09E-06	1.09E-06
Iron-55	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Iron-59	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Cobalt-58	Ci	<LLD	7.09E-04	<LLD	3.39E-04	1.05E-03
Cobalt-60	Ci	1.23E-03	1.68E-02	4.25E-03	4.69E-03	2.69E-02
Zinc-65	Ci	<LLD	9.35E-04	2.45E-04	<LLD	1.18E-03
Zinc-69M	Ci	<LLD	<LLD	<LLD	2.38E-07	2.38E-07
Strontium-92	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Zirconium-95	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Niobium-95	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Technetium-99M	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Rhuthenium-105	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Silver-110m	Ci	<LLD	1.38E-04	3.29E-04	<LLD	1.71E-03
Antimony-124	Ci	<LLD	2.09E-04	<LLD	<LLD	2.09E-04
Antimony-125	Ci	5.30E-05	5.03E-04	2.70E-04	<LLD	8.26E-04
Iodine-131	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xenon-135	Ci	<LLD	<LLD	<LLD	1.62E-07	1.62E-07
Cesium-134	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Cesium-137	Ci	<LLD	<LLD	<LLD	5.27E-05	5.27E-05
Cesium-138	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Lanthanum-140	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Gold-199	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Total for Period		**1.08E+01**	**1.47E+01**	**6.34E+00**	**3.34E+00**	**3.52E+01**

<LLD – Less than the lower limit of detection

Gaseous Effluents

Gaseous effluents are made up of fission and activation gases, iodine and particulate releases. The fission and activation gas releases are primarily a result of containment purge operations, small steam leaks, and offgas system operation. The iodine and particulate releases are primarily a result of small steam leaks. Gaseous effluents from PNPP exit the plant via one of four effluent vents. Each of these four effluent vents contains radiation detectors that continuously monitor the air to ensure that the levels of radioactivity released are below regulatory limits. Samples are also collected and analyzed on a periodic basis to ensure regulatory compliance and dose minimization principals are maintained. The majority of gaseous effluents released from PNPP are considered continuous and at ground level.

A summation of all gaseous radioactive effluent releases is given in Table 4. If a radionuclide was not present at a level "greater than or equal to the LLD" (≥LLD), then the value is expressed as "less than the LLD" (<LLD). In each case, the measured LLDs either met or were below the levels required by the PNPP ODCM.

Discussion of Carbon-14 doses is listed on page 20, Carbon-14 supplemental information.

Table 4: Summation of All Gaseous Effluents

	QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4	EST. TOTAL ERROR, %
A. Fission and Activation Products					
1. Total Released, Ci	0.00E+00	1.75E-01	0.00E+00	1.19E-02	1.00E+01
2. Average Release Rate, µCi/sec	0.00E+00	2.23E-02	0.00E+00	1.50E-03	
3. Percent of Applicable Limit, %	N/A	N/A	N/A	N/A	
B. Iodine					
1. Total Iodine-131 Released, Ci	0.00E+00	1.84E-06	1.87E-05	2.11E-05	1.00E+01
2. Average Release Rate, µCi/sec	0.00E+00	2.34E-07	2.35E-06	2.65E-06	
3. Percent of Applicable Limit, %	N/A	N/A	N/A	N/A	
C. Particulates with Half-Lives > 8 days					
1. Total Released, Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+01
2. Average Release Rate, µCi/sec	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
3. Percent of Applicable Limit, %	N/A	N/A	N/A	N/A	
D. Alpha Activity, Ci	4.31E-07	1.16E-07	6.43E-08	6.04E-07	1.00E+01
E. Tritium					
1. Total Released, Ci	3.73E-01	2.17E+00	0.00E+00	0.00E+00	1.00E+01
2. Average Release Rate, µCi/sec	4.80E-02	2.76E-01	0.00E+00	0.00E+00	
3. Percent of Applicable Limit, %	N/A	N/A	N/A	N/A	
F. Carbon-14	4.58	1.84	4.72	3.81	1.00E+01

<LLD – Less than the lower limit of detection N/A – Not Applicable, the ODCM does not have a limit for fission and activation products.

The radionuclide composition of all gaseous radioactive effluents for a continuous-mode, ground-level release is given in Table 5. If a radionuclide was not present at a level "greater than or equal to the LLD" (≥LLD), then the value is expressed as "less than the LLD" (<LLD). In each case, LLDs were met or were below the levels required by the ODCM.

Table 5: Radioactive Gaseous Effluent Nuclide Composition

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual Total
A. Fission and Activation Gases						
Tritium	Ci	3.73E-01	2.17E+00	<LLD	<LLD	2.54E+00
Argon-41	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Krypton-85m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Krypton-85	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Kryton-87	Ci	<LLD	2.21E-02	<LLD	<LLD	2.21E-02
Krypton-88	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xenon-131m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xenon-133m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xenon-133	Ci	<LLD	5.44E-03	<LLD	<LLD	5.44E-03
Xenon-135m	Ci	<LLD	3.21E-02	<LLD	<LLD	3.21E-02
Xenon-135	Ci	<LLD	4.04E-02	<LLD	2.57E-03	4.30E-02
Xenon-137	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xenon-138	Ci	3.73E-01	7.54E-02	<LLD	9.34E-03	8.47E-02
Total for Period		**3.73E-01**	**2.35E+00**	**0.00E+00**	**1.19E-02**	**2.73E+00**
B. Iodine						
Iodine-131	Ci	<LLD	1.84E-06	1.87E-05	2.11E-05	4.16E-05
Iodine-132	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Iodine-133	Ci	<LLD	4.31E-06	2.70E-04	1.60E-04	4.34E-04
Iodine-134	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Iodine-135	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Total for Period		**0.00E+00**	**6.15E-06**	**2.89E-04**	**1.81E-04**	**4.76E-04**
C. Particulate						
Chromium-51	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Manganese-54	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Iron-59	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Cobalt-58	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Cobalt-60	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Zinc-65	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Rubidium-88	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Rubidium-89	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Strontium-89	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Strontium-90	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Yttrium-91m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Strontium-92	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Zirconium-95	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Molybdenum-99	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Cesium-137	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Cesium-138	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Barium-139	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Barium-140	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Lanthanum-140	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Total for Period		**<LLD**	**<LLD**	**<LLD**	**<LLD**	**<LLD**

<LLD – Less than the lower limit of detection

Solid Waste

All solid radioactive waste from PNPP was processed and combined with waste from several other utilities by intermediate vendors (Energy Solutions, Duratek in Oak Ridge, TN and Studsvik, in Erwin, TN). This waste was ultimately sent to Clive, Utah disposal facilities for burial. The solid radioactive waste summary in Table 6 includes all PNPP shipments for 2011.

Table 6: Solid Waste Shipped Offsite for Burial or Disposal

A. Type of Solid Waste Shipped	Volume (m3)	Activity (Ci)	Period	Est. Total Error (%)
Spent resin, filter sludge, evaporator bottoms, etc.	7.36E+01	2.15 E+02	1/1/2011-12/31/2011	+/- 25
Dry compressible waste, contaminated equipment, etc.	1.09E+03	5.88 E+00	1/1/2011-12/31/2011	+/- 25
Irradiated components, control rods, etc.	0	0	1/1/2011-12/31/2011	
Other (Standby Liquid Control Waste Water)	0	0	1/1/2011-12/31/2011	

B. Estimate of Major(1) Nuclide Composition (by type of waste)	Radionuclide	Abundance (%)	Est. Total Error, (%)
Spent Resin, Filter Sludge, Evaporator Bottoms, etc.	Mn-54 Fe-55 Co-60 Zn-65	5.30 29.50 62.02 1.64	+/- 25
Dry Compressible Waste, Contaminated Equipment, etc.	Mn-54 Fe-55 Co-60 Zn-65	8.01 22.80 66.51 1.12	+/- 25
Irradiated Components, Control Rods, etc.	None	0	
Other (Standby Liquid Control Waste Water)	None	0	

C. Disposition	Number of Shipments	Mode of Transportation	Destination
Solid Waste(2)	16	Public Highway	Studsvik, Erwin, TN
Solid Waste(2)	27	Public Highway	Energy Solutions, Bear Creek, TN
Irradiated Fuel Shipments	0	N/A	N/A

N/A -- Not Applicable

(1) -- "Major" is defined as any individual radionuclide identified as >1% of the waste type abundance.

(2) -- This waste was combined with waste from other utilities and disposed of at Clive, Utah.

METEOROLOGICAL DATA

The Meteorological Monitoring System at PNPP consists of a 60-meter tower equipped with two independent systems for measuring wind speed, wind direction, and temperature at both 10-meter and 60-meter heights. The tower also has instrumentation to measure dew point and barometric pressure. Data is logged from the tower through separate data loggers, and transmitted to a common plant computer. This system compiles the data and calculates a variety of atmospheric parameters, communicates with the Meteorological Information Dose Assessment System (MIDAS), and sends data over communication links to the plant Control Room.

A detailed report of the monthly and annual operation of the PNPP Meteorological Monitoring Program is produced under separate cover. For the period of January 1, 2011 through December 31, 2011, the report substantiates the quality and quantity of meteorological data collected in accordance with applicable regulatory guidance.

DOSE ASSESSMENT

The maximum concentration for any radioactive release is controlled by the limits set forth in Title 10 of the Code of Federal Regulations, Part 20 (10CFR20). Sampling, analyzing, processing, and monitoring the effluent stream ensures compliance with these concentration limits. Dose limit compliance is verified through periodic dose assessment calculations. Some dose calculations are conservatively performed for a hypothetical individual who is assumed to reside on the site boundary at the highest potential dose location all year. This person, called the "maximum individual", would incur the maximum potential dose from direct exposure (air plus ground plus water), inhalation, and ingestion of water, milk, vegetation, and fish. Because no one actually meets these criteria, the actual dose received by a real member of the public is significantly less than what is calculated for this hypothetical individual.

Dose calculations for this maximum individual at the site boundary are performed for two cases. First, they are performed using data for a 360° radius around the plant site (land and water based meteorological sectors); even though some of these sectors are over Lake Erie, which has no permanent residents. The second calculation is performed considering only those sectors around the plant in which people reside (land-based meteorological sectors).

The calculated hypothetical, maximum individual dose values at the site boundary are provided in Table 7. This table considers all meteorological sectors around PNPP and provides either the whole body or worst-case, organ dose values. If any radionuclide was not present at a level greater than the LLD, it was not used in the dose calculations.

Table 7: Maximum Individual Site Boundary Dose, Considering All Sectors

TYPE OF DOSE	ORGAN	ESTIMATED DOSE, (MREM)	LIMIT	% OF LIMIT
Liquid Effluent	Whole body	2.47E-03	3.0E+00	8.2E-02
	Liver	3.34E-03	1.0E+01	3.3E-02
Noble Gas - gamma air	N/A	4.97E-04	1.0E+01	5.0E-03
Noble Gas - beta air	N/A	3.37E-04	2.0E+01	1.7E-03
Noble Gas	Whole body	2.75E-04	5.0E+00	5.5E-03
	Skin	5.74E-04	1.5E+01	3.8E-03
Particulate & Iodine	Thyroid	1.39E-04	1.5E+01	9.3E-04

The calculated hypothetical, maximum population dose values at the site boundary are provided in Table 8. This table considers all meteorological sectors around PNPP and provides either the whole body or worst-case, organ dose values.

Table 8: Population Dose, Considering All Sectors

	ORGAN	ESTIMATED DOSE (PERSON-REM)
Liquid Effluent	Whole body	3.8E-01
	Thyroid	2.5E-01
Gaseous Effluent	Whole body	3.5E-04
	Thyroid	5.8E-04

Table 9 provides the calculated hypothetical maximum site boundary dose values considering only the land-based sectors. If any radionuclide was not present at a level greater than the LLD, it was not used in the dose calculations.

Table 9: Maximum Individual Site Boundary Dose, Considering Sectors on Land

TYPE OF DOSE	ORGAN	ESTIMATED DOSE, (MREM)	LIMIT	% OF LIMIT
Liquid Effluent	Whole Body	2.47E-03	3.0E+00	8.2E-02
	Liver	3.34E-03	1.0E+01	3.3E-02
Noble Gas - gamma air	N/A	3.49E-05	1.0E+01	3.5E-04
- beta air	N/A	2.51E-05	2.0E+01	1.3E-04
Noble Gas	Whole Body	2.85E-06	5.0E+00	5.7E-05
	Skin	5.56E-06	1.5E+01	3.7E-05
Particulate & Iodine	Thyroid	5.11E-05	1.5E+01	3.4E-04
Carbon-14	Whole Body	1.60E-01	1.5E+01	1.1E+00

Other dose calculations are performed for a hypothetical individual who is assumed to be inside the site boundary for some specified amount of time. This person would receive the maximum dose during the time spent inside site boundary. Because no one actually meets the criteria established for these conservative calculations, the actual dose received by a real member of the public is significantly less than what is calculated for this hypothetical

individual. This dose is assessed relative to the offsite dose, and considers dilution, dispersion, and occupancy factors.

The highest hypothetical dose from liquid effluents to a member of the public inside the site boundary is to a person who is fishing on Lake Erie from the shore on PNPP property. The calculations assume that this person will spend 60 hours per year fishing, with a liquid dilution factor of 10. The ratio of the exposure pathway to the doses calculated for offsite locations yields the dose values shown in Table 10.

Table 10: Maximum Site Dose from Liquid Effluents

	WHOLE BODY DOSE, (MREM)	ORGAN DOSE (MREM)
First Quarter	1.1E-04	1.3E-04
Second Quarter	9.3E-04	1.1E-03
Third Quarter	2.0E-04	2.3E-04
Fourth Quarter	3.2E-04	3.8E-04
Annual	1.6E-03	1.8E-03

Although several cases were evaluated to determine the highest hypothetical dose from gaseous effluents to members of the public inside site boundary, the activity inside the site boundary with the highest dose potential is also shoreline fishing. The cases evaluated included traversing a public road within the site boundary, shoreline fishing (assuming fishing 60 hours per year), non-plant related training, car-pooling, and job interviews. The maximum on-site gaseous doses generated are shown in Table 11.

Table 11: Maximum Site Dose from Gaseous Effluents

	WHOLE BODY DOSE, (MREM)	ORGAN DOSE (MREM)
First Quarter	1.4E-05	1.4E-05
Second Quarter	1.3E-04	1.6E-04
Third Quarter	2.2E-07	4.5E-05
Fourth Quarter	1.4E-06	9.5E-06
Annual	1.4E-04	2.1E-04

An average whole body dose to individual members of the public at or beyond the site boundary is then determined by combining the dose from gaseous and liquid radiological effluents. The dose from gaseous radiological effluents is based upon the population that lives within 50 miles of PNPP. The dose from liquid radiological effluents is determined for the population that receives drinking water from intakes within 50 miles of PNPP. The results of this calculation are provided in Table 12.

Table 12: Average Individual Whole Body Dose

	LIQUID EFFLUENTS (MREM)	GASEOUS EFFLUENTS (MREM)
First Quarter	3.8E-05	1.5E-08
Second Quarter	4.2E-05	1.3E-07
Third Quarter	2.0E-05	4.6E-11
Fourth Quarter	2.9E-05	3.1E-10
Annual	1.6E-04	1.5E-07

CARBON-14 SUPPLEMENTAL INFORMATION

Carbon-14 (C-14), with a half-life of 5730 years, is a naturally occurring isotope of carbon produced by cosmic ray interactions in the atmosphere. Nuclear weapons testing in the 1950s and 1960s significantly increased the amount of C-14 in the atmosphere. C-14 is also produced in commercial nuclear reactors, but the amounts produced are much less than those produced naturally or from weapons testing. C-14 is released primarily from BWRs through the off-gas system in the form of carbon dioxide (CO_2). The quantity of gaseous C-14 released to the environment can be estimated using a C-14 source term scaling factor based on power generation.

The U.S. Nuclear Regulatory Commission (NRC) is now requiring assessment of gaseous C-14 dose impact to a member of the public resulting from routine releases in radiological effluents. Prior to 2011, the industry did not estimate the dose impact of C-14 releases. Since the dose contribution had been considered negligible compared to the dose impact from effluent releases of noble gases, tritium, particulates and radioiodines. At Perry, improvements over the years in effluent management practices and fuel performance have resulted in a decrease in the concentration and changes in the distribution of gaseous radionuclides released to the environment.

Perry's 2011 Annual Environmental Effluent Release Report (ARERR) contains estimates of C-14 radioactivity released in 2011, and estimates of public dose resulting from the C-14 effluent. Because the dose contribution of C-14 from liquid radioactive waste is much less than that contributed by gaseous radioactive waste, evaluation of C-14 in liquid radioactive waste at Perry is not required. Refer to Table 4 and Table 9 for C-14 estimated release values.

ON-SITE GROUNDWATER MONITORING PROGRAM

Introduction

History

In March, 2006, a routine sample of the underdrain system at the Perry plant showed detectable tritium concentration. The underdrains are a porous pipe system which drains groundwater from the foundations of the site buildings. As such, it would not be expected to be a contaminated system. A Condition Report, 06-01477, was submitted, and a Root Cause Investigation was conducted. Concurrently, a program of groundwater monitoring was initiated.

It was determined at that time that there was no detectable tritium beyond the boundaries of the underdrain system. Piezometer tubes located both inside and outside of the power block, (area encompassing equipment utilized for the generation of electricity) were sampled and analyzed. In 2007, Perry contracted with Environmental Resource Management (ERM) of Boston, Massachusetts to perform site hydrogeology evaluations, and to facilitate installation of additional groundwater monitoring wells, based on their findings. FirstEnergy fleet chemistry formalized the program with the issuance of fleet procedure NOP-OP-2012, "Groundwater Monitoring."

Cause

The buildings at the Perry site are designed with seismic spaces between building walls. These would serve to drain plant buildings in the event of an earthquake of sufficient strength to break plant piping, minimizing the flooding of vital equipment areas, and facilitate continued safe operation, or safe shutdown, as conditions warrant.

It was surmised that these "rattle spaces" also allow the drainage from some plant systems to reach the outside. Since this discovery, the plant has developed a more rigorous stance towards plant observations, and has minimized process water intrusion into the rattle spaces.

It should be noted that no leakage was identified from either the radwaste system, or from the Spent Fuel Building.

Underdrain System

As mentioned earlier, the underdrain system drains water away from plant foundations. It is separate and distinct from the storm drain system, which is designed purely for rain water control. The underdrain system has a number of installed sump pumps, with the ability to gravity-drain and cascade forward should the pumps fail. There are two major branches of underdrains, one for each of the east and west sides of the power block. These branches ultimately flow into 2 underdrain manholes, designated MH-20 and MH-23, before draining to the suction bay of the Emergency Service Water (ESW) pump house. From there, the water is discharged from the plant. Refer to Figure 2 for locations of Manholes 1 through 23.

Sampling Locations

Prior to the installation of monitoring wells, Manholes 20 and 23 were sampled to assess groundwater tritium in-leakage to the system. This continued through July 2007, and sampling frequency was established at weekly thereafter. Besides tritium, the samples

were also analyzed via gamma spectroscopy to environmental lower limits of detection. No gamma activity was ever detected in any sample.

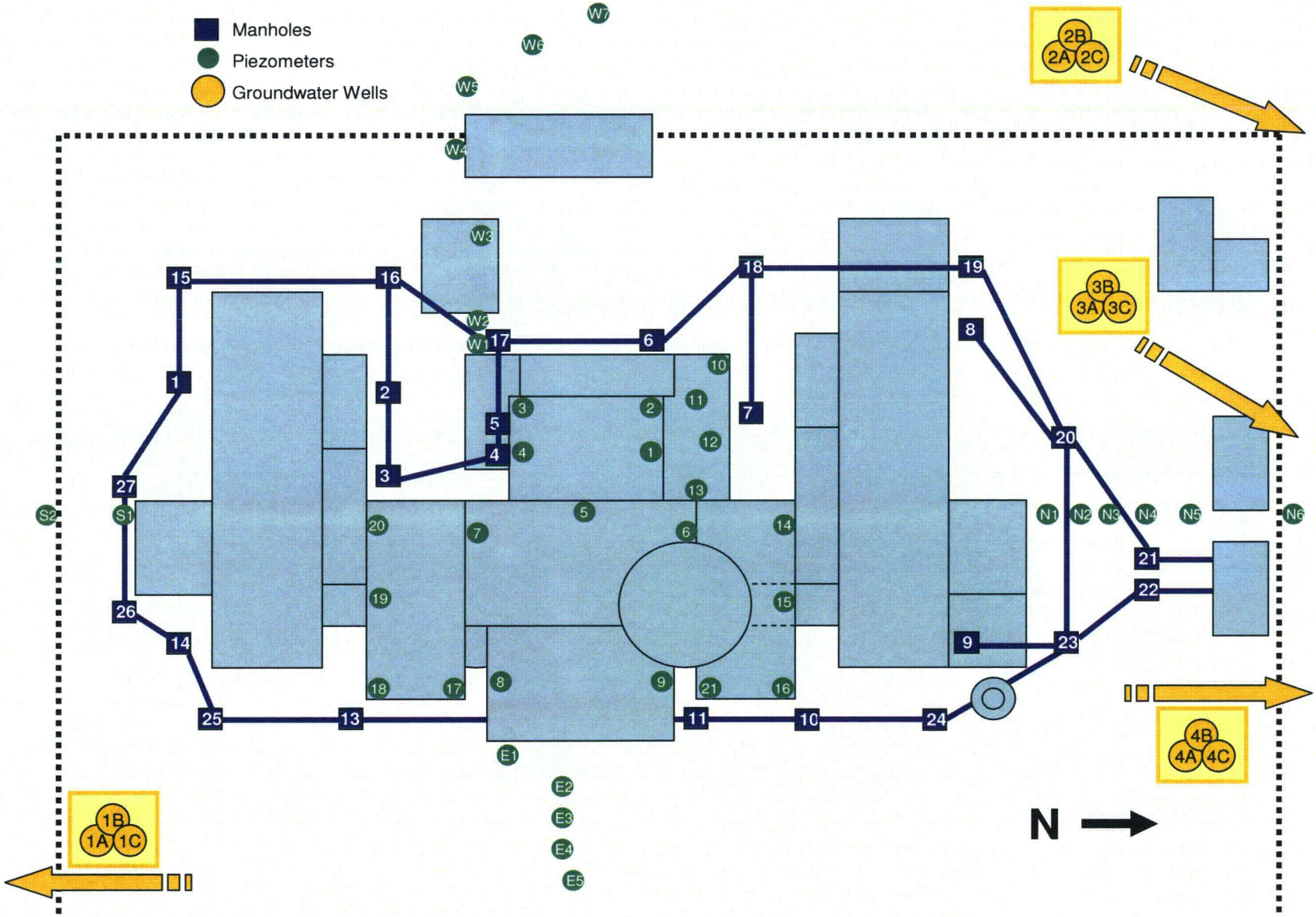
Manholes 20 and 23 were sampled daily through the middle of 2007, and weekly thereafter through the end of the year. Tritium releases from the station were documented as abnormal releases, and the required dose calculations were completed per the Offsite Dose Calculation Manual (ODCM). Overall, the released tritium represented a very small fraction of the limits prescribed in 10CFR20 Appendix B and 10CFR50.

Based on the ERM hydrogeology study, 12 wells were recommended for the site. Since most groundwater flow was anticipated to drain north, towards Lake Erie, the majority of wells are drilled there. A set of control wells was drilled in a more southerly direction, to assess what a typical groundwater profile would be.

There are 4 sets of triplet wells installed at each location. Each triplet has a shallow well (approximately 25 feet), a mid-depth well of approximately 50 feet, and a deep well of approximately 75 feet. These 3 depths are designated A, B and C, from shallowest to deepest, respectively. Refer to Figure 2 for locations of Groundwater wells 1A through 4C.

Besides these wells, there are a number of plant piezometers which date back to early plant construction. Outside of the power block, these are located directionally along the 4 major compass points. There are also piezometers inside the plant buildings in numerous locations. Refer to Figure 2 for locations of Piezometers.

Figure 2: Underdrain System and On-Site Groundwater Wells



State of the Program

Currently, the monitoring wells are sampled twice annually, in spring and fall. The sampling is done under a controlled protocol, and is conducted by personnel from FirstEnergy's BETA Laboratories. Selected plant piezometers are also sampled.

The samples are analyzed for shipping purposes, and are then shipped to Midwest Laboratories in Illinois. Midwest analyzes the sample for gamma isotopic and tritium. On additional samples, Perry has requested analysis of "hard-to-detect" isotopes such as Sr-89/90, Ni-63 and Fe-55.

Table 13: Summary of Onsite Groundwater Samples

Monitoring Well	H-3 MAX. (pCi/L)	TYPICAL H-3 LLD (pCi/L)	REQUIRED H-3 LLD (pCi/L)	PRE-OPERATIONAL (DEVELOPED) MEAN FOR H-3 (pCi/L)	H-3 ANALYSES > PRE-OPERATIONAL MEAN FOR H-3	NEI AND FENOC LEVEL FOR H-3 (pCi/L)	EPA REPORTING LEVEL FOR H-3 (pCi/L)
First Half 2011	277	< 200	< 2000	400	No	2000	20000
Well 1A	<144	< 200	< 2000	400	No	2000	20000
Well 1B	<144	< 200	< 2000	400	No	2000	20000
Well 1C	<144	< 200	< 2000	400	No	2000	20000
Well 2A	<144	< 200	< 2000	400	No	2000	20000
Well 2B	<144	< 200	< 2000	400	No	2000	20000
Well 2C	<144	< 200	< 2000	400	No	2000	20000
Well 3A	277	< 200	< 2000	400	No	2000	20000
Well 3B	<166	< 200	< 2000	400	No	2000	20000
Well 3C	<166	< 200	< 2000	400	No	2000	20000
Well 4A	<144	< 200	< 2000	400	No	2000	20000
Well 4B	<144	< 200	< 2000	400	No	2000	20000
Well 4C	<144	< 200	< 2000	400	No	2000	20000
Second Half 2011	219	< 200	< 2000	400	No	2000	20000
Well 1A	<145	< 200	< 2000	400	No	2000	20000
Well 1B	<145	< 200	< 2000	400	No	2000	20000
Well 1C	<145	< 200	< 2000	400	No	2000	20000
Well 2A	<145	< 200	< 2000	400	No	2000	20000
Well 2B	<145	< 200	< 2000	400	No	2000	20000
Well 2C	<145	< 200	< 2000	400	No	2000	20000
Well 3A	219	< 200	< 2000	400	No	2000	20000
Well 3B	<145	< 200	< 2000	400	No	2000	20000
Well 3C	<145	< 200	< 2000	400	No	2000	20000
Well 4A	164	< 200	< 2000	400	No	2000	20000
Well 4B	<145	< 200	< 2000	400	No	2000	20000
Well 4C	<145	< 200	< 2000	400	No	2000	20000

CORRECTIONS TO PREVIOUS ANNUAL ENVIRONMENTAL AND EFFLUENT RELEASE REPORTS

See Appendix D for description of corrections to previous Annual Environmental and Effluent Release Reports.

ABNORMAL RELEASES

See Appendix E for description of an Abnormal Release from the Nuclear Closed Cooling (NCC) system.

ODCM NON-COMPLIANCES

See Appendix F for description of ODCM Non-Compliances.

OFFSITE DOSE CALCULATION MANUAL CHANGES

During this reporting period, there were no revisions to the Offsite Dose Calculation Manual.

PROCESS CONTROL PROGRAM CHANGES

See Appendix G for description of changes to the Process Control Program

RADIOLOGICAL ENVIRONMENTAL MONITORING

INTRODUCTION

The Radiological Environmental Monitoring Program (REMP) was established at PNPP for several reasons. First, it verifies the adequacy of plant design and operation to control radioactive materials and limit effluent releases. Second, it assesses the radiological impact, if any, that the plant has had on the surrounding environment. Third, it ensures compliance with regulatory guidelines. The REMP is conducted in accordance with the PNPP Operating License, Appendix B, Technical Specifications and the ODCM. The Nuclear Regulatory Commission (NRC) established the REMP requirements.

A variety of samples are collected as part of the PNPP REMP. The selection of sample types, locations, and collection frequency are based on many things. Potential pathways for the transfer of radionuclides through the environment to humans, sample availability, local meteorology, population characteristics, land use and NRC requirements are all factors.

To ensure that the REMP data are meaningful and useful, detailed sampling methods and procedures are followed. This ensures that samples are collected in the same manner and from the same locations each time. All samples are packaged on site, and then shipped to an independent vendor laboratory for analysis. The vendor laboratory analyzes the samples and reports results to the PNPP Chemistry Unit staff, the Lake County General Health District, and the State of Ohio Department of Health. Additionally the Lake County General Health District obtains monthly "split" samples of milk, water and vegetation. This permits an independent verification of Perry's radiological environmental monitoring program.

The REMP began in 1981 with 24 direct radiation monitoring locations, four sediment locations, and two fish sampling locations. In 1982, collections of air, water, milk, food products, and feed/silage were added. Vegetation, precipitation and soil were added in 1985. Although the NRC did not require these last three media, they were incorporated into the program to establish baseline data. In 1993, feed/silage sampling was dropped from the program, based on ten years worth of data. For the same reason, strontium analyses were deleted from the program in 1994, gross beta and tritium were deleted from precipitation analyses in 1995, and precipitation sampling was deleted entirely in 1996. In 1999, grass (vegetation) and soil sampling were dropped from the program.

SAMPLING LOCATIONS

REMP samples are collected at numerous locations, both on site and up to 22 miles away from the plant. Sampling locations are divided into two general categories: indicator and control. Indicator locations are those which would be most likely to display effects caused by plant operation. They are relatively close to the plant. Control locations are those which are considered to be unaffected by plant operation. Typically, they are a greater distance from the plant, in the least prevalent wind directions. Data obtained from the indicator locations are compared with data from the control locations. This comparison allows naturally occurring background radiation to be taken into account when evaluating any radiological impact PNPP may have had on the environment. Table 14, Figure 3, Figure 4 and Figure 5 identify the PNPP REMP sampling locations.

Many REMP samples are collected in addition to those required by the PNPP ODCM. The ODCM requirements for each sample type are discussed in more detail below. Sample types and locations required by the ODCM are shown in **Bold** in Table 14.

FUKUSHIMA DAI-ICHI

During 2011, environmental milk and air particulate samples collected in late March, April and early May identified detectable concentrations of I-131 that could be related to operation of the Perry Nuclear Power Plant. The concentrations detected were above levels historically observed. Concentrations returned to non-detectable levels after May 2. Given the events of March 2011 at the Dai-Ichi plant, Fukushima Japan and the associated airborne releases and subsequent trans-Pacific transportation, the positive results detected for these samples are reasonably attributed to the Dai-Ichi releases. The detected radioactivity levels were below the ODCM reporting criteria.

Table 14: REMP Sampling Locations (1)

LOCATION #	DESCRIPTION	MILES	DIRECTION	MEDIA(2)
1	Chapel Road	3.4	ENE	TLD, AIP
2	Kanda Garden	1.9	ENE	Food Products
3	Meteorological Tower	1.0	SE	TLD, AIP
4	Site Boundary	0.7	S	TLD, AIP
5	Quincy Substation	0.6	SW	TLD, AIP
6	Concord Service Center	11.0	SSW	TLD, AIP
7	Site Boundary	0.6	NE	TLD, AIP
8	Site Boundary	0.8	E	TLD
9	Site Boundary	0.7	ESE	TLD
10	Site Boundary	0.8	SSE	TLD
11	Parmly Rd.	0.6	SSW	TLD
12	Site Boundary	0.6	WSW	TLD
13	Madison-on-the-Lake	4.7	ENE	TLD
14	Hubbard Rd.	4.9	E	TLD
15	Eagle St. Substation	5.1	ESE	TLD
16	Eubank Garden	0.9	S	Food Products
18	Kijauskas Farm (goat)	2.5	E	Food Products, Milk
19	Goodfield Dairy	8.7	S	Milk
20	Rainbow Farms	1.9	E	Food Products
21	Hardy Rd.	5.1	WSW	TLD
23	High St. Substation	7.9	WSW	TLD
24	St. Clair Ave.	15.1	SW	TLD
25	Offshore - PNPP discharge	0.6	NNW	Sediment, Fish
26	Offshore - Redbird	4.2	ENE	Sediment
27	Offshore - Fairport Harbor	7.9	WSW	Sediment
28	CEI Ashtabula Plant Intake	22.0	ENE	Water
29	River Rd.	4.3	SSE	TLD
30	Lane Rd.	4.8	SSW	TLD
31	Wood and River Rd.	4.8	SE	TLD
32	Offshore - Mentor	15.8	WSW	Sediment, Fish
33	River Rd.	4.5	S	TLD
34	PNPP Intake	0.7	NW	Water
35	Site Boundary	0.6	E	TLD, AIP
36	Lake County Water Plant	3.9	WSW	TLD, Water
37	Gerlica Farm	1.5	ENE	Food Products
41	Tuttle Farm (goat)	5.8	SSE	Milk
51	Rettger Milk Farm (cow)	9.6	S	Milk
53	Neff Perkins	0.5	WSW	TLD
54	Hale Rd. School	4.6	SW	TLD
55	Center Rd.	2.5	S	TLD
56	Madison High School	4.0	ESE	TLD
58	Antioch Rd.	0.8	ENE	TLD
59	Lake Shoreline at Green Rd.	4.0	ENE	Water
60	Lake Shoreline at Perry Park	1.0	WSW	Water
61	Keller Milk Farm (goat)	7.4	SE	Milk
64	Northwest Drain Mouth	0.09	NW	Sediment
65	Major Stream Mouth	0.18	W	Sediment
70	H&H Farm Stand	16.2	SSW	Food Products

(1) Missing location numbers denote deleted or retired sampling locations.

(2) AIP = Air, Iodine and Particulate
TLD = Thermoluminescent Dosimeter

Figure 3: REMP Sampling Locations Within Two Miles of Plant Site

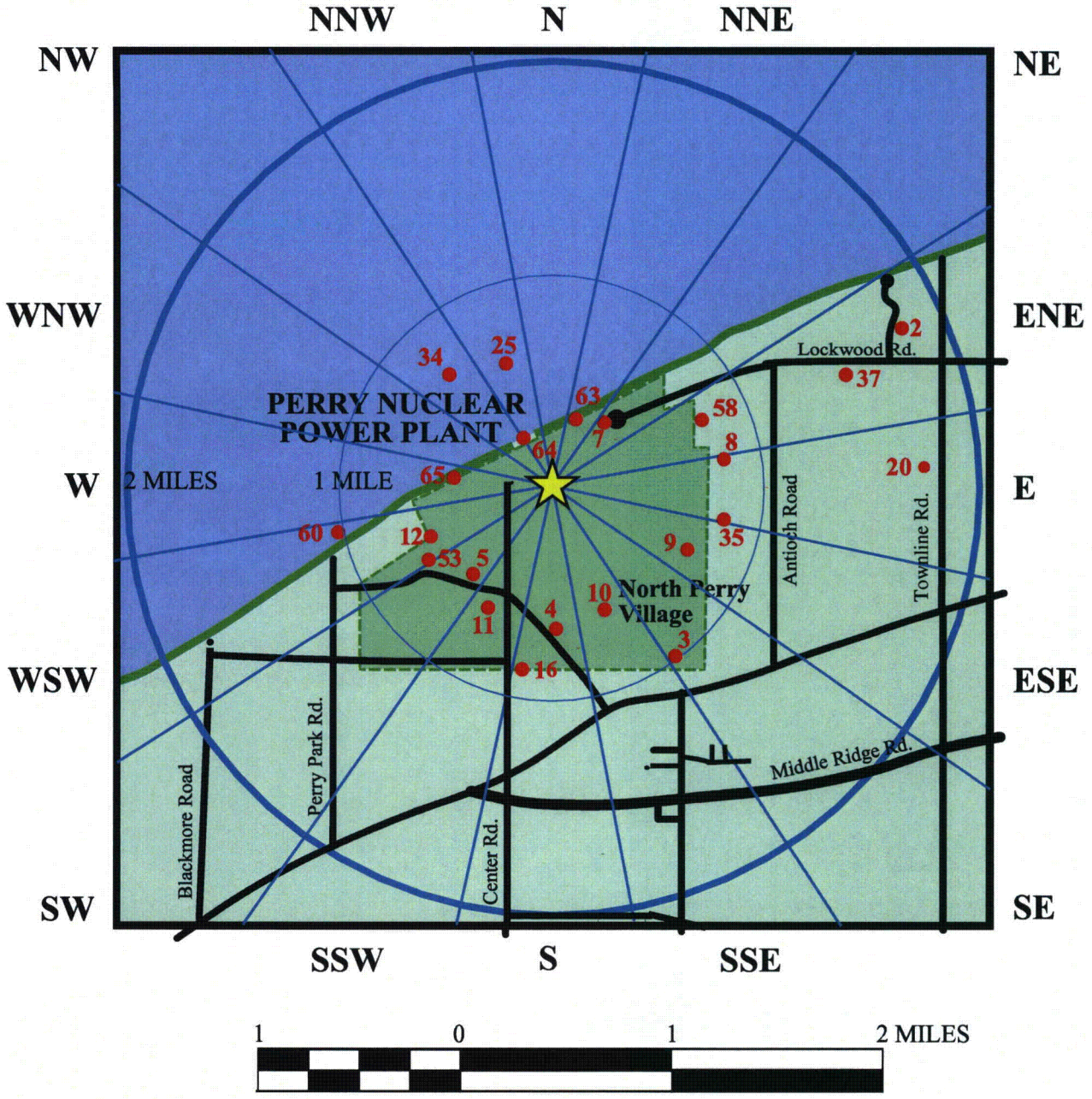


Figure 4: REMP Sampling Locations Between Two and Eight Miles of the Plant Site

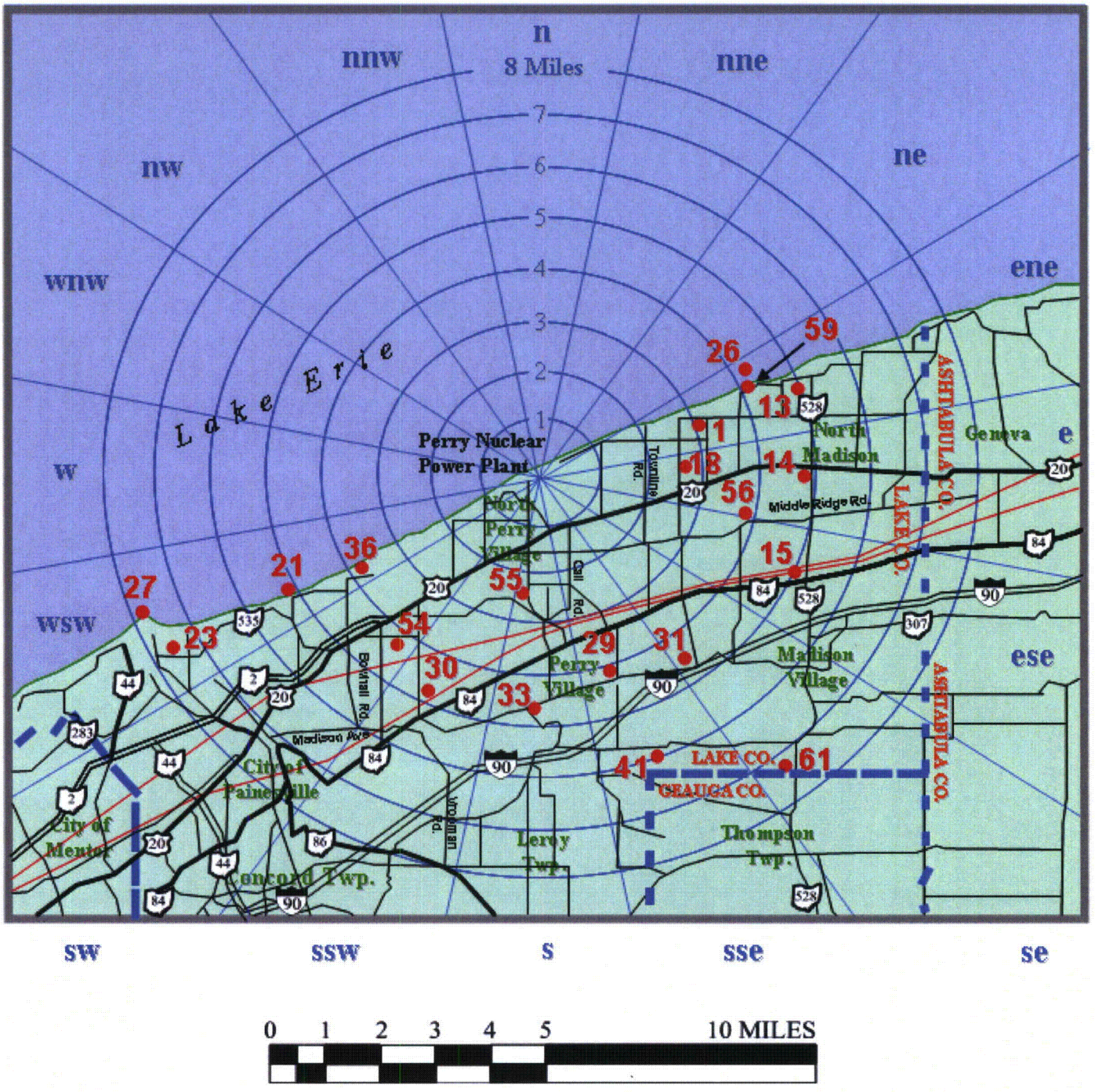
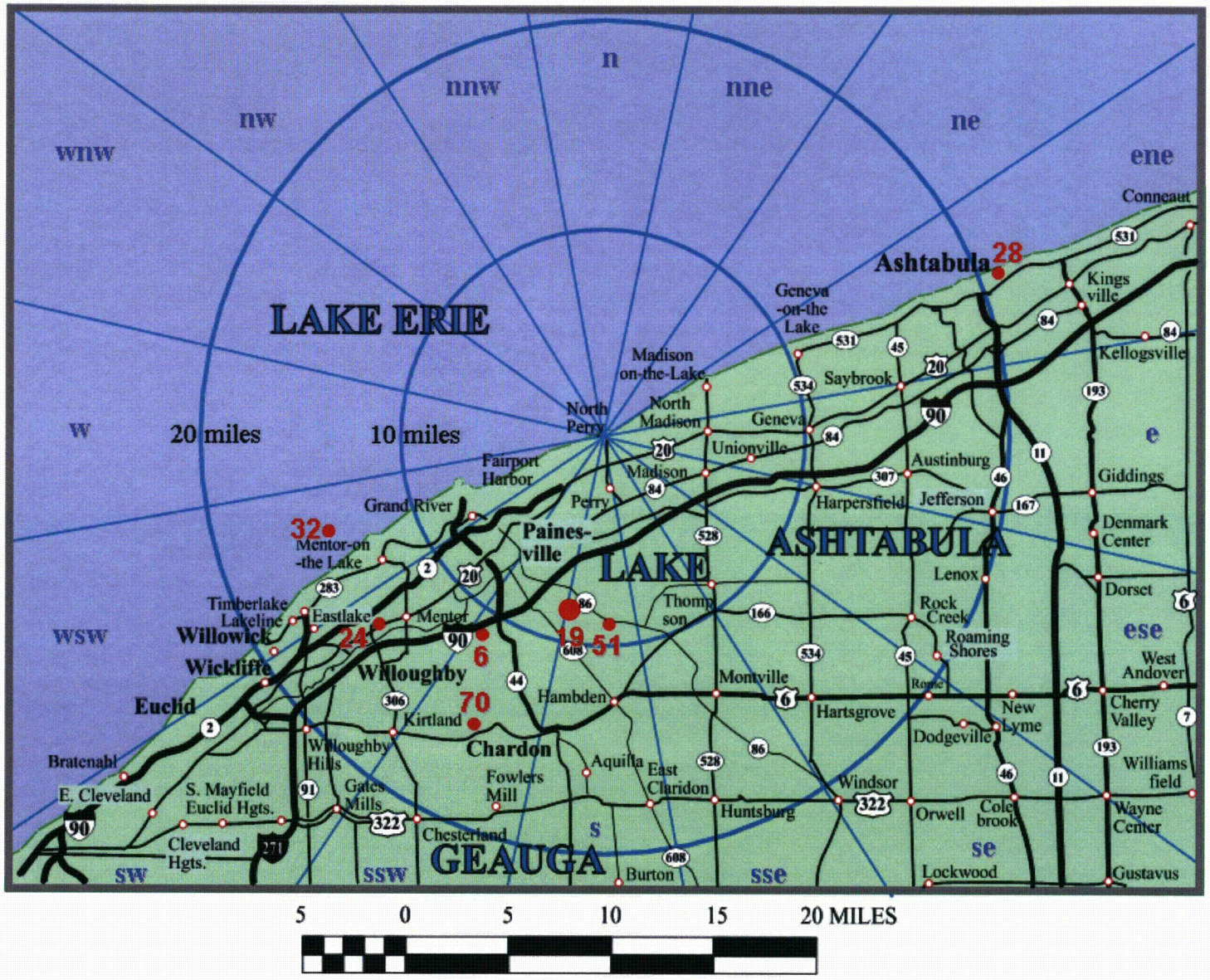


Figure 5: REMP Sampling Locations Greater Than Eight Miles from the Plant Site



SAMPLE ANALYSIS

When environmental samples are analyzed for radioactivity, several types of measurements are performed to provide information about the types of radiation and radionuclides present. The major analyses that are performed are discussed below.

Gross beta activity measures the total amount of beta-emitting radioactivity present in a sample, and acts as a tool to identify samples that may require further analysis. Beta radiation may be released by many different radionuclides. Since beta decay results in a continuous energy spectrum rather than the discrete energy levels, or "peaks", associated with gamma radiation, identification of specific beta-emitting nuclides is more difficult. Therefore, gross beta activity only indicates whether the sample contains normal or abnormal amounts of beta-emitting radioactivity; it does not specifically identify the radionuclides present.

Gamma spectral analysis provides more specific information than does the analysis for gross beta activity. Gamma spectral analysis identifies each radionuclide, and the amount of radioactivity, present in the sample emitting gamma radiation. Each radionuclide has a very specific "fingerprint" that allows for accurate identification and quantification.

Iodine activity analysis measures the amount of radioactive iodine present in a sample. Some media (for example, air sample charcoal cartridges) are analyzed directly by gamma spectral analysis. With other media (for example, milk), the radioiodines are extracted by chemical separation before being analyzed by gamma spectral analysis.

Tritium activity analysis measures the amount of the radionuclide tritium (H-3) present in a sample. Tritium is an isotope of hydrogen that emits low-energy beta particles. Tritium occurs naturally and is also man-made.

Gamma doses received by Thermoluminescent Dosimeters (TLD) while in the field are determined by a special laboratory procedure. Thermoluminescence is a process by which ionizing radiation interacts with the sensitive phosphor material in the TLD. Energy is trapped in the TLD material and can be stored for months or years. This capability provides a method to measure the dose received over long periods of time. The amount of energy that was stored in the TLD as a result of interaction with radiation is released by a controlled heating process and measured in a calibrated reading system. As the TLD is heated, the phosphor releases the stored energy as light. The amount of light is directly proportional to the amount of radiation to which the TLD was exposed. The reading process also zeroes the TLD and prepares it for reuse. Table 15 provides a list of the analyses performed on environmental samples collected for the PNPP REMP in 2011.

Sample results are often reported as less than the lower limit of detection (< LLD), which is defined as the smallest amount of radioactive material that will show a positive result for which there can be confidence that radioactivity is present. This statistical parameter is used as a measure of the sensitivity of a sample analysis. When a measurement is reported as < LLD, it means that no radioactivity was detected at a value above, or equal to the appropriate ODCM table value. The NRC has established LLD values for REMP sample analyses. The vendor laboratory for REMP sample analyses complied with those values in 2011.

Table 15: REMP Sample Analyses

TYPE	SAMPLE	FREQUENCY	ANALYSIS
Atmospheric Monitoring	Airborne Particulates	Weekly & Quarterly	Gross Beta Activity & Gamma Spectral Analysis
	Airborne Radioiodine	Weekly	Iodine-131
Terrestrial Monitoring	Milk	Bi-Monthly	Gamma Spectral Analysis & Iodine-131
	Food Products	Monthly	Gamma Spectral Analysis
Aquatic Monitoring	Water	Monthly	Gross Beta Activity & Gamma Spectral Analysis
		Quarterly	Tritium Activity
	Fish	Annually	Gamma Spectral Analysis
	Sediment	Biannually	Gamma Spectral Analysis
Direct Radiation Monitoring	TLD	Quarterly & Annually	Gamma Dose

2011 SAMPLING PROGRAM

The contribution of radionuclides to the environment resulting from PNPP operation is assessed by comparing results from the 2011 program with pre-operational data (i.e., data from before 1986), operational data from previous years, and control location data. The results for each sample type are discussed below and compared to historical data to determine if there are any observable trends. All results are expressed as concentrations. Refer to Appendix B, 2011 REMP Data Summary Reports for a detailed listing of these results. The NRC requires special reporting whenever sample analysis results exceed set limits. No values exceeded these reporting levels in 2011.

Program Changes

Goodfield Dairy, located 8.7 miles in the South sector was added to the Milk program in August 2011.

Missed Samples

On occasion, samples cannot be collected. This can be due to a variety of events, including equipment malfunction, animal husbandry practices, or lost shipments. Events may also occur which prevent a sample from being collected in the normal way, or prevent a complete sample from being collected. The drying period for goats is an annual occurrence, since unlike cows, goats do not normally produce milk year-round. Food products are weather dependent and are susceptible to excessive spring rains or summer drought that can significantly impact the garden harvest. Shoreline lake water samples are collected by grab sample utilizing a container and scoop. During the winter months the shoreline can become inaccessible due to ice and snow buildup, preventing the safe collection of these samples. Shoreline sediment samples are collected with spoon and container. On occasion, the accessibility of these locations and sample collection may be impacted due to high lake levels, shifting lake bottom sediment, bluff erosion and shoreline collapse. For 2011, there was no impact to the program requirements as a result of any missed samples. Table 16 provides information on samples missed during 2011.

Table 16: Missed REMP Samples in 2011

MEDIA	LOCATION	DATE	REASON
Food Products	All	Jan.-June, Oct.-Dec. 2011	Insufficient growth/temperature. Die-off/Frost damage.
Lake Water	59, 60	Jan., Feb., Mar. 2011	Sample unavailable due to frozen shoreline
Milk	18	Oct. Nov. Dec 2011	Drying period for goats/sample availability
	41	Jan. - May, Oct. Nov., Dec. 2011	Drying period for goats/sample availability
	61	Jan., Feb., Mar., Jun to Dec. 2011	Drying period for goats/sample availability

Atmospheric Monitoring

Air

Air sampling is conducted to detect any increase in the concentration of airborne radionuclides. The PNPP REMP maintains an additional 2 air sampling locations above the five locations (four indicators and one control) required by the ODCM. Six (6) of these locations are within four miles of the plant site; the seventh is used as a control location and is eleven miles from PNPP. Air sampling pumps are used to draw continuous samples at a rate of approximately two cubic feet per minute. The air is drawn through glass fiber filters (to collect particulate material) and a charcoal cartridge (to adsorb iodine). The samples are collected on a weekly basis, 52 weeks a year, from each of the seven air sampling stations.

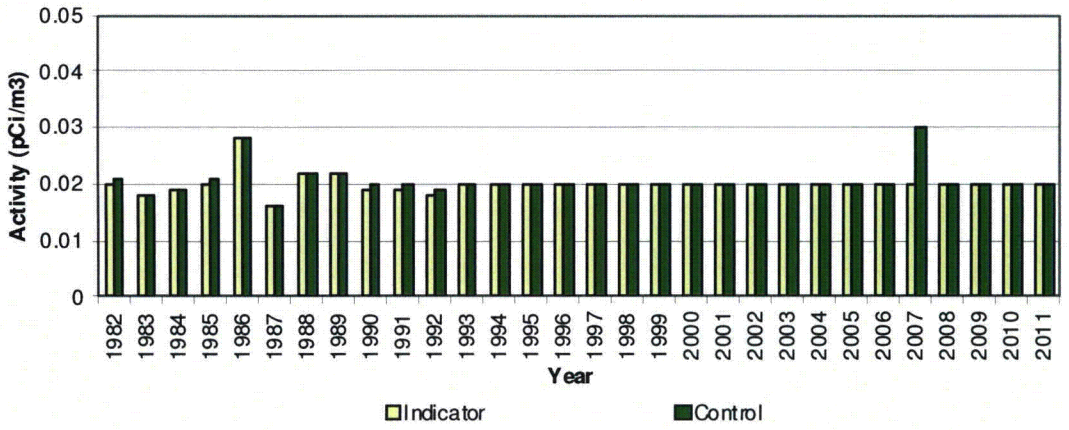
Air samples are analyzed weekly for gross beta activity and radioiodine activity. The air samples are also analyzed by gamma spectral analysis quarterly. A total of 364 air particulate and 364 air radioiodine samples were collected and analyzed in 2011.

Gross beta activity was detected in 364 of 364 air samples and ranged up to 0.06 pCi/m^3. The average gross beta activity at both indicator and control locations was 0.02 pCi/m^3 for 2011. Historically, the concentration of gross beta in air has been essentially identical at indicator and control locations. Figure 6 reflects the average gross beta activity for 2011 and the previous years.

Except for naturally occurring beryllium-7, no radionuclides were identified in the gamma quarterly spectral analysis above the LLD values.

Iodine-131 was detected above the LLD of 0.05 pCi/m^3 on all indicator and control samples obtained from 3/23/11 to 4/13/11. The indicator sample average was 0.07 pCi/m^3 and the control sample average was 0.08 pCi/m^3. These positive results are attributed to the accident at Fukushima Dai-Ichi nuclear plant in Japan.

Figure 6: Annual Average Gross Beta Activity, in Air



Terrestrial Monitoring

Collecting and analyzing samples of milk and food products provides data to assess the build-up of radionuclides that may be ingested by humans. The historical data from soil and vegetation samples provides information on the atmospheric radionuclide deposition. The PNPP ODCM requires neither vegetation nor soil samples.

Milk

Samples of milk are collected once each month from November through March, and twice each month from April through October. Sampling is increased during the summer because animals usually feed outside on pasture and not on stored feed. For 2011, the PNPP REMP included five (5) milk locations located 2.5, 5.8, 7.4, 8.7 and 9.6 miles away from the plant.

Since the milk sampling locations do not meet the requirements of the ODCM (only one milk-producing animal is located within the required distance vs. two required), food product sampling (discussed below) is performed. Milk is collected from the available location to augment food product sampling. If new locations that meet the ODCM requirements are identified in the future, they will be added to the program.

Milk samples are analyzed by gamma spectral analysis for radioiodines and other radionuclides. A total of fifty-four (54) milk samples were collected in 2011. Iodine was detected above the LLD of 0.75 pCi/m^3 in three of the samples collected in April and May with an average value of 1.61 pCi/L. This radioactivity is attributed to the accident at the Fukushima nuclear plant in Japan. The concentrations of all other radionuclides, except naturally occurring potassium-40, were below LLDs in all samples collected. Results for samples taken after May have returned to below LLD levels.

Food Products

Food products can provide a direct pathway to humans by ingestion. They can absorb radionuclides from atmospheric deposition on soil or from irrigation water drawn from a lake or pond receiving airborne or liquid effluents. Also, radionuclides in the soil may be absorbed by the roots of the plants and become incorporated into the edible portions. Because there is not a sufficient number of dependable milk sampling locations, the PNPP REMP is required to include two food product indicator locations and one control location. Food products are

collected monthly during the growing season from six (6) gardens in the vicinity of PNPP. The control location for food products is 16.2 miles SSW from PNPP.

A total of forty-three (43) food product samples were collected and analyzed by gamma spectral analysis in 2011. For the 2011 growing season, record rainfall throughout the year contributed to the missed samples referenced in Table 16.

Four (4) food products were collected which included: beet greens, collard greens, turnip greens and Swiss chard. Beryllium-7 and potassium-40, naturally-occurring radionuclides, were found in several samples, which is expected. No other radionuclides were detected above the required LLDs.

Aquatic Monitoring

Radionuclides may be present in Lake Erie from many sources other than the PNPP. These sources include atmospheric deposition, run-off/soil erosion, and releases of radioactivity in liquid effluents from hospitals, universities or other industrial facilities. These sources provide two forms of potential radiation exposure, external and internal. External exposure can occur from contact with water or shoreline sediments, while internal exposure can occur from either direct ingestion of radionuclides or the transfer of radionuclides through the aquatic food chain. Direct ingestion can occur from drinking the water, while the transfer via the aquatic food chain occurs from the eventual consumption of aquatic organisms, such as fish. To monitor these pathways, PNPP samples water, shoreline sediments, and fish.

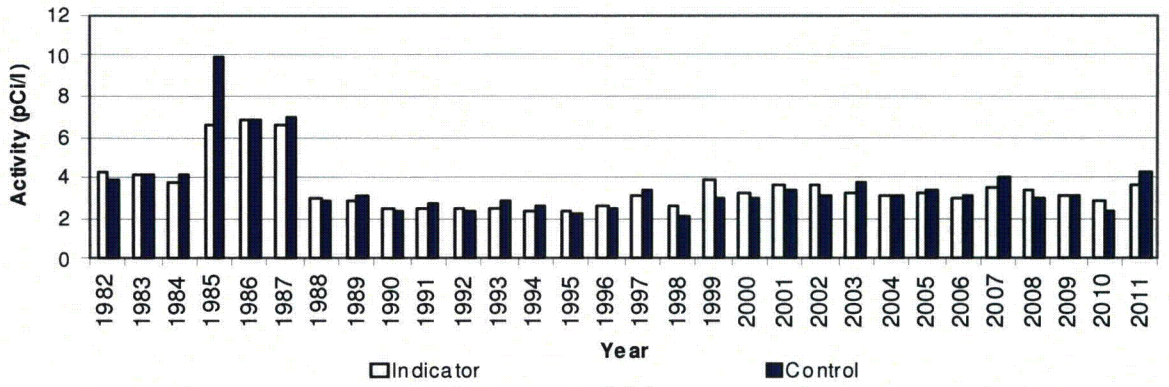
Water

Water is sampled from five locations along Lake Erie in the vicinity of the PNPP as required by the PNPP ODCM. Samples from three locations are collected using composite sample pumps. The pumps are designed to collect water at regular intervals and composite it in a sample container. Samples from the two other locations are manually collected weekly and combined. The containers are emptied monthly and the samples shipped to the vendor laboratory for analysis.

Fifty-four (54) water samples were collected and analyzed for gross beta activity and gamma spectral analysis in 2011. From these monthly samples, eighteen (18) quarterly composite samples were obtained and analyzed for tritium activity.

For 2011, gross beta activity was detected in four (4) of the fifty-four (54) samples collected. The indicator average gross beta activity was 3.59 pCi/L and the control average gross beta activity was 4.25 pCi/L. Refer to Figure 7 for the annual average gross beta activity for both indicator and control locations. The significant difference between the pre-1988 data and post-1988 data has been attributed to a change in vendor laboratories in 1987/1988. A comprehensive explanation for the observed difference is provided in the 1988 Annual Environmental Operating Report.

Figure 7: Annual Average Gross Beta Activity, in Water



There were no radionuclides detected by gamma spectral analysis above the LLD.

Tritium was not detected above the LLD value in any of the eighteen (18) samples analyzed. These results are well within the range of those measured in previous years, which have ranged from below the LLD to 2,200 pCi/L. Refer to Table 16 for an explanation of missed samples.

Sediment

Sampling of lake bottom sediments can provide an indication of the accumulation of particulate radionuclides which may lead to internal exposure to humans through the ingestion of fish, the re-suspension into drinking water, or as an external radiation source to fishermen and swimmers from shoreline exposure. Sediment is sampled twice each year from six (6) locations.

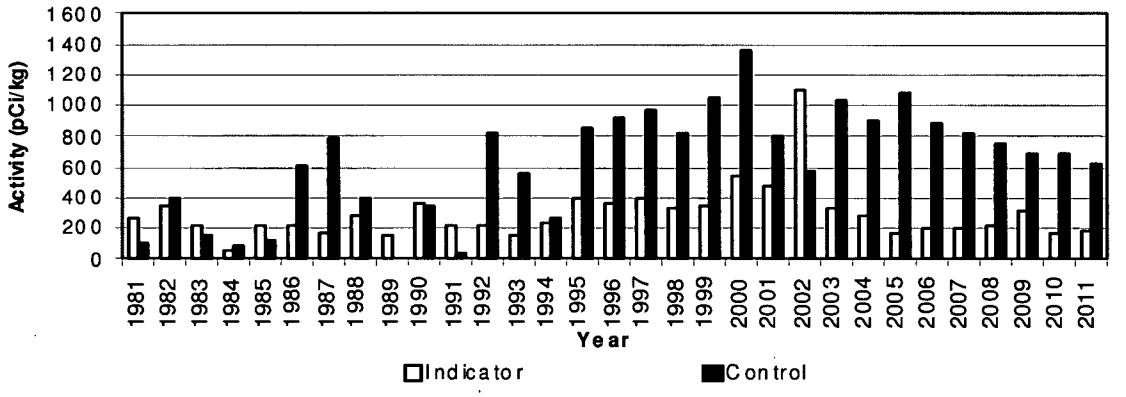
Sediment samples from offshore are collected using a hand dredge. Shoreline samples are collected using a scoop.

Twelve (12) sediment samples were collected in 2011 and analyzed by gamma spectroscopy. The predominant radionuclide detected by gamma spectral analysis was naturally occurring potassium-40.

Cesium-137 activity was detected in five (5) of the twelve (12) samples collected and ranged from 136.1 pCi/kg to 646.6 pCi/kg. The indicator average cesium-137 activity was 188.1 pCi/kg and the average control activity was 635.4 pCi/kg. The average cesium-137 radioactivity for all locations was 367.0 pCi/kg and is lower than the highest identified value of 864 pCi/kg established in 1981. Year-to-year variations in lake bottom sediment sample activity is expected and beyond the control of PNPP. For example, cesium-137 activity variations (refer to Figure 8) in the control locations from year-to-year may be contributed to:

1. The movement of sediment on the lake bottom due to wave action and currents.
2. Difficulty in duplicating exact location and composition of bottom sediment sample from year to year even with assistance of GPS.

Figure 8: Annual Average Cesium-137 Concentration in Sediment



Northwest Drain Impoundment

In 1999, a sediment sample from location #64 (shoreline discharge point of the Northwest Drain Impoundment) was found to contain trace levels of cobalt-60. Since then, ten (10) additional sample locations were established upstream from location #64 and within the Impoundment to identify the boundary of the cobalt-60 activity and to support supplemental monitoring activities.

On 5/26/10, manganese-54 and cobalt-58 (short half-life isotopes) were identified at location 64-9. Additionally, increased levels of cobalt-60 were identified at locations 64-6 and 64-9. Identification of the short half life isotopes was documented and a subsequent investigation and corrective actions occurred. The investigation identified that contaminated runoff water from radioactive material movements and transport vehicles within the protected area probably flowed to the storm drain discharging to the impoundment. Corrective actions directed the addition of sample location 64-11 within the impoundment and catch basins W-24 and W-25 upstream of the impoundment. For 2011, results from the nine (9) active impoundment sample locations shows Mn-54, Co-60 and Cs-137 activity. The shoreline sediment samples showed no activity other than naturally occurring potassium-40 which demonstrates that activity is staying within the site property and no longer migrating to the shoreline. The impoundment activities range from non-detectable to 872 ± 36 pCi/kg (Refer to Table 17).

For informational purposes, cesium-137 activity in sediment within the impoundment is also documented. Refer to Table 18 for these results.

Table 17: Northwest Drain Impoundment Cobalt-60 Activity, pCi/kg (dry)

LOCATION	6/17/11	06/21/11	10/20/11	11/02/11	12/1/11
64	< 8.8	**	< 10.3	< 10.3	**
64-1	**	< 10		< 13	**
64-2	**	< 18		< 18	**
64-3	**	60		< 22	**
64-6	**	271		87	**
64-7	**	59		221	**
64-8	**	29		30	**
64-9	**	< 37		247	**
64-10	**	< 34		872	**
64-11	**	85		< 11	**
W-24	**	< 14		**	49.9
W-25	**	< 9		**	< 36.1

* No sample available or insufficient sample for analysis ** No sample collected on this date

Table 18: Northwest Drain Impoundment Cesium-137 Activity, pCi/kg (dry)

LOCATION	6/17/11	06/21/11	10/20/11	11/02/11	12/1/11
64	< 6.2		< 8.0		**
64-1		< 19		< 15	**
64-2		589		259	**
64-3		385		180	**
64-6		1530		2157	**
64-7		1704		1529	**
64-8		676		563	**
64-9		758		1070	**
64-10		1084		1364	**
64-11		977		220	**
W-24		351		**	2583
W-25		1433		**	3958

* No sample available or insufficient sample for analysis ** No sample collected on this date

Fish

Fish are analyzed primarily to quantify the dietary radionuclide intake by humans, and secondarily to serve as indicators of radioactivity in the aquatic ecosystem. Fish are collected from two locations, annually during the fishing season as required by the ODCM. An important sport or commercial species is targeted, and only the fillets are sent to the laboratory for analysis. In 2011, fish sampling was performed for PNPP by a local licensed sport fisherman.

Six (6) fish samples including (2) Yellow Perch, (2) Catfish and (2) Freshwater Drum were collected and analyzed by gamma spectral analysis in 2011. As expected, naturally occurring potassium-40 was found in all samples. No other radionuclides were detected above the LLD.

Direct Radiation Monitoring

Thermoluminescent Dosimeter (TLD)

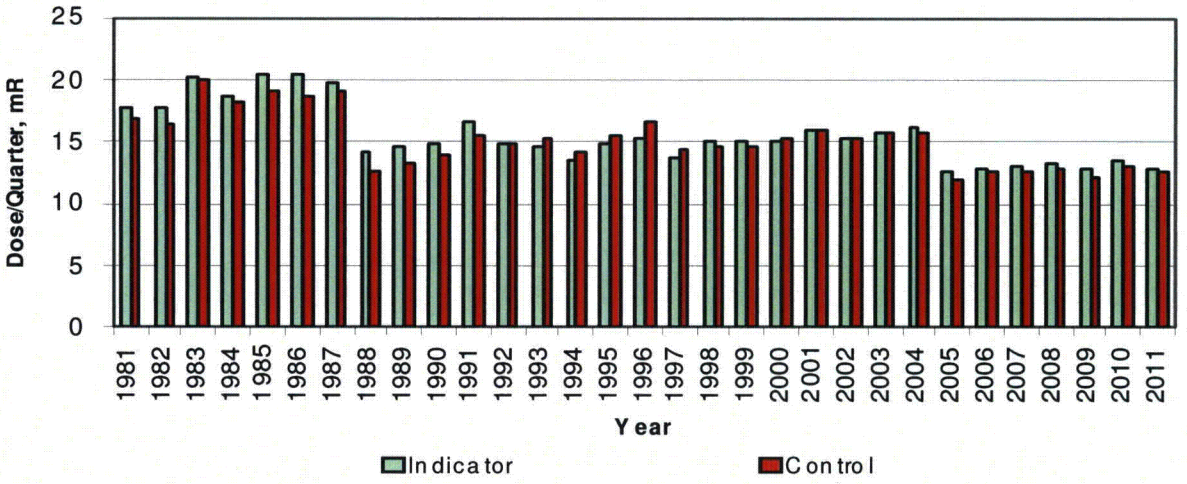
Environmental radiation is measured directly at 28 locations around the PNPP site, two of which are control locations. The locations are positioned in two rings around the plant as well as at the site boundary. The inner ring is within a one-mile radius of the plant site; the outer ring is four miles to five miles from the plant. The control locations are over ten miles from the plant in the two least prevalent wind directions. Each location is equipped with three TLDs, two of which are changed quarterly and one is changed annually.

A total of 252 TLDs were collected and analyzed in 2011. This includes 224 collected on a quarterly basis and 28 collected annually. Annual TLDs are not required per the ODCM and are used for supplemental data only.

For 2011, the annual average dose for all indicator locations was 62.44 mrem, and 60.56 mrem for the control locations.

Referring to Figure 9, the average quarterly dose for all indicator locations was 12.96 mrem, and 12.55 mrem for all control locations. Please refer to Appendix C, 2011 REMP Detailed Data Report for all TLD results. Prior to 1988, the TLD results were higher due to a change in the vendor laboratory services. A comprehensive explanation of this difference was provided in the 1988 Annual Environmental Operating Report.

Figure 9: Average Quarterly TLD Dose



Conclusion

Sediment samples continue to confirm manganese-54 and cobalt-60 in the northwest drain impoundment. (Cobalt-58 was not identified in 2011) Additional monitoring is being performed to monitor this location. An environmental evaluation determined that there would be less impact upon the environment by leaving this material in place.

Other than the activity detected that was attributed to Fukushima, atmospheric monitoring results were consistent with past results. The prevalent radionuclide in air was beryllium-7, which is naturally occurring.

Naturally occurring potassium-40 was detected in all terrestrial samples, as expected.

Finally, direct radiation measurements are consistent with past data.

INTER-LABORATORY CROSS-CHECK COMPARISON PROGRAM

Introduction

The purpose of the Inter-laboratory Cross-Check Comparison Program (ICCCP) is to provide an independent check on the vendor laboratory's analytical procedures. Samples with a known concentration of specific radionuclides are provided to the vendor laboratory. The vendor laboratory measures and reports the concentration of specified radionuclides. The known values are then compared to the vendor results. Results consistently outside established acceptance criteria indicate a need to check instruments or procedures. Regulatory Guide 4.15 specifically required that contractor laboratories that performed environmental measurement participate in the EPA's Environmental Radioactivity Laboratory Inter-Comparison Studies Program, or an equivalent program.

The EPA's program is no longer funded or offered. The reason that the EPA program was referenced in the regulatory guide is that the EPA standards were traceable to National Bureau of Standards (now known as National Institute Standard Technology). In response to this problem, Teledyne (PNPP vendor lab) incorporated a program offered by Environmental Resource Associates (ERA Company), which covered the same analyses in the same matrix at the same frequency as the EPA program. The ERA Company has received NIST accreditation for its program, as an equivalent program. In addition to comparison cross checks performed with the ERA Company, the vendor laboratory routinely monitors the quality of their analyses by:

- Analyzing "spiked" samples (samples with a specific quantity of radioactive material present in them) and
- Participating in the Department of Energy's Mixed Analyte Performance Program (MAPEP).

Through 2004, Teledyne also participated in the Environmental Measurements Laboratory Quality Assessment Program (EML). This program was discontinued in 2005.

Conclusion

Appendix A, 2011 Inter-Laboratory Cross-Check Comparison Program Results, includes results from both the above referenced programs and the ERA Company cross-check program.

1) Table A-1: All sample results obtained through participation in the environmental sample crosscheck program administered by Environmental Resource Associates (ERA) Interlaboratory Comparison Crosscheck Program were found to be within program control limits with one exception. The sample was reanalyzed and the result of the reanalysis was acceptable.
2) Table A-2: The Vendor Laboratory's Cross-Check program results for the testing of Thermoluminescent Dosimetry were acceptable.
3) Table A-3: Laboratory analysis results for In-House "Spike" samples were acceptable.
4) Table A-4: Laboratory analysis results for In-House "Blank" samples were acceptable .

5) Table A-5: Laboratory analysis results for all In-House "Duplicate" Samples were within the Vendor Laboratory's established acceptance criteria with the exception of sample SL-4884. The results of re-analysis of sample SL-4884 was found to be less than the sum of the errors and within the accepted criteria.

6) Table A-6: All sample results obtained through participation in Department of Energy's Mixed Analyte Performance Evaluation Program (MAPEP) were found to be within program control limits with five exceptions. (1) Result of a repeat analysis was still unacceptable. ERA Crosschecks for Am-241 were acceptable but biased low. Matrix samples prepared to verify method; results were acceptable. Am-241 has been added to the internal spike and blank program for 2012. (2) An error in percent recovery was found, result of recalculation was satisfactory. (3) No errors were in calculation or procedure, results of reanalysis were satisfactory. (4) The analyses were repeated through a strontium column, mean result of triplicate analyses were satisfactory. (5) The lab does not currently analyze soil for Tc-99, but is evaluating the procedure.

7) Table A-7: All Vendor Laboratory sample results obtained through participation in Interlaboratory Comparison Crosscheck Program Environmental Resource Associates (ERA) laboratory were found to be acceptable.

LAND USE CENSUS

Introduction

Each year a Land Use Census, which is required by Section 5.2 of the PNPP ODCM, is conducted to identify the locations of the nearest milk animal, garden (of greater than 500 square feet), and residence in each of the meteorological sectors that is over land. Information gathered during the Land Use Census is used for off-site dose assessment and to update sampling locations for the Radiological Environmental Monitoring Program. The census is conducted by traveling all roads within a five-mile radius of the plant site, and recording and mapping the location of the nearest resident, milk animal and vegetable garden. The 2011 Land Use Census, which was conducted August 2nd and 3rd 2011 provided the garden, residence and milk animal locations tabulated in Tables 19, 20 and 21 and depicted in Figure 10. Note that the W, WNW, NW, NNW, N, and NNE sectors extend over Lake Erie, and therefore, are not included in the survey.

Discussions and Results

In general, the predominant land use within the census area continues to be rural/ agricultural. In recent years however, it has been noted that tracts of land once used for farming are now being developed as mini-industrial parks and residential housing tracts. This is reflected in the loss of available milking animals within a five mile radius of PNPP to support the Radiological Environmental Monitoring Program (REMP).

Table 19 identifies the nearest residences, by sector, to the PNPP. For 2011, there were three (3) changes noted for the "nearest residence". The closest residences did not change, however with a more accurate map, the ENE, E and ESE locations were identified as being fractionally closer to the plant.

Table 19: Nearest Residence, By Sector

SECTOR	LOCATION ADDRESS	MILES FROM PNPP	X/Q VALUE, (SEC/M3)	MAP LOCATOR NUMBER
NE	4384 Lockwood	0.7	2.66E-06	1
ENE	4602 Lockwood	1.1	6.710E-07	2
E	2626 Antioch	1.0	1.141E-06	3
ESE	2836 Antioch	1.0	8.571E-07	4
SE	4495 North Ridge	1.2	3.89E-07	5
SSE	3119 Parmly	0.9	1.89E-06	6
S	3121 Center	0.9	2.25E-06	7
SSW	3850 Clark	0.9	1.11E-06	8
SW	2997 Perry Park	1.2	4.98E-07	9
WSW	3460 Parmly	1.1	8.67E-07	10

Table 20 identifies the nearest milking animal by sector, to the PNPP. During the 2011 Land Use Census, no additional new milking animals were identified.

Table 20: Nearest Milk Animal, By Sector

SECTOR	LOCATION ADDRESS	MILES FROM PNPP	MAP LOCATOR NUMBER
E	2591 McMacken Rd.	2.5	21

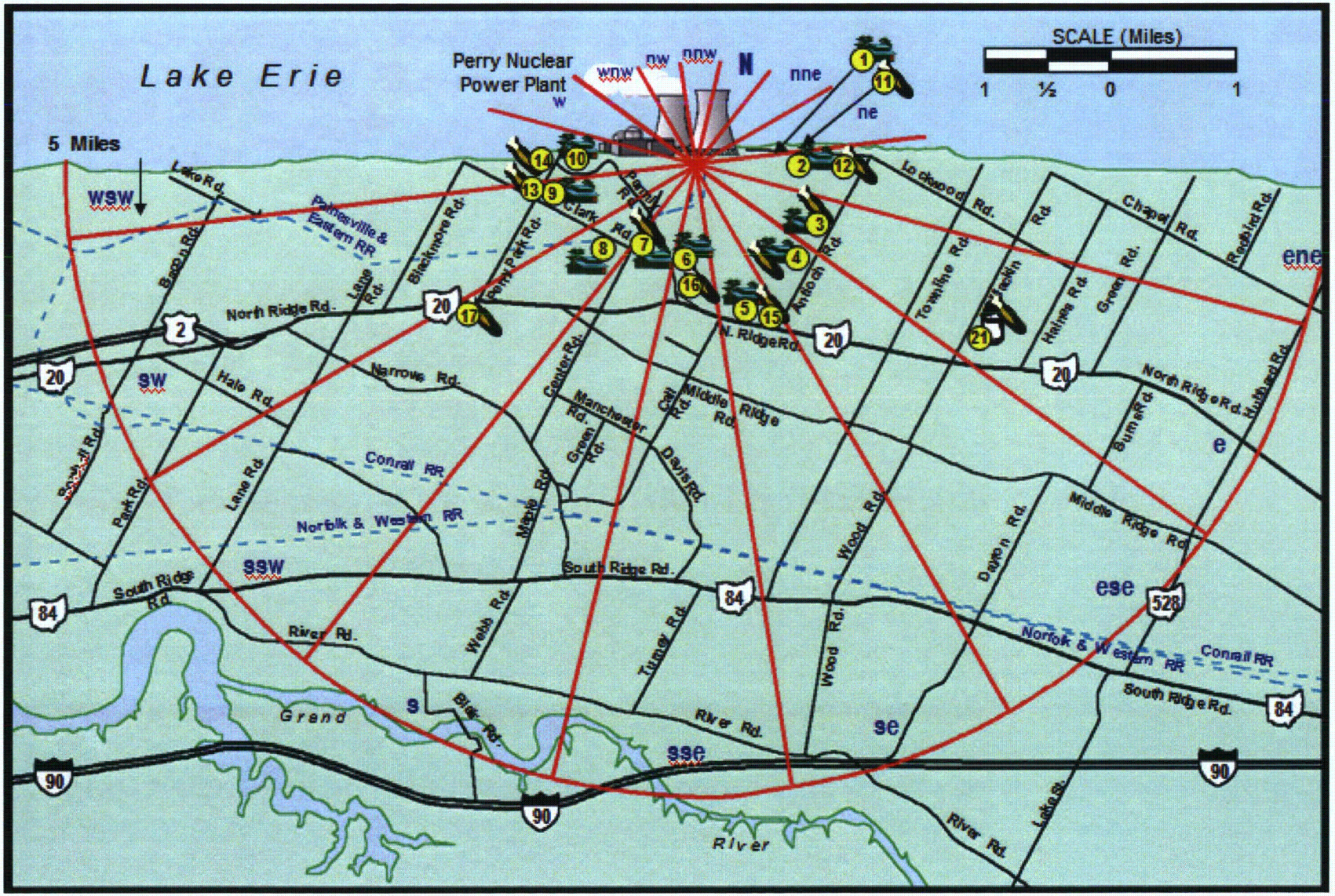
There were two (2) changes for the nearest gardens identified during this year's census.

Table 21 lists the nearest gardens occupying at least 500 square feet identified during the 2011 Land Use Census. The closest gardens did not change, however with a more accurate map, the E and ESE locations were identified as being fractionally closer to the plant.

Table 21: Nearest Garden, By Sector

SECTOR	LOCATION ADDRESS	MILES FROM PNPP	D/Q VALUE, (M^{-2})	MAP LOCATOR NUMBER
NE	2340 Lakehurst	1.0	7.45E-09	11
ENE	4630 Lockwood	1.2	4.11E-09	12
E	2626 Antioch	1.0	9.06E-09	3
ESE	2836 Antioch	1.0	6.78E-09	4
SE	4671 North Ridge	1.3	1.01E-09	15
SSE	4225 Red Mill Valley	1.1	3.48E-09	16
S	3121 Center Rd.	0.9	1.31E-08	7
SSW	3330 Ohio St.	2.3	4.65E-10	17
SW	3032 Perry Park	1.4	1.72E-09	13
WSW	2975 Perry Park	1.3	2.31E-09	14

Figure 10: Land Use Census Map



Garden Residence Milking Animal

CLAM/MUSSEL MONITORING

INTRODUCTION

Sampling for macro-invertebrates (clams and mussels) has been conducted in Lake Erie in the vicinity of PNPP, since 1971. The clam/mussel program currently focuses on two species: *Corbicula fluminea* (Asiatic clam) and *Dreissena polymorpha* (zebra mussel).

CORBICULA PROGRAM

Monitoring specifically for Corbicula was initiated in response to a NRC bulletin and concerns of the Atomic Safety and Licensing Board. The 2011 monitoring was done as part of the Environmental Protection Plan (Operating License, Appendix B). The program consists of visually inspecting the raw water systems, when they are opened for maintenance. The purpose of this program is to detect Corbicula, should it appear at PNPP.

No Corbicula have been found in any sample collected from PNPP. Two Corbicula were found in a sample collected from the Eastlake plant in June, 1987. No Corbicula have been found in any other sample collected since that time. A more detailed program history can be found in the 1986 and 1987 PNPP Annual Environmental Operating Reports.

Monitoring

In 2011, samples were collected from the Service Water (SW) and Emergency Service Water (ESW) pump houses at PNPP and examined for shells and fragments. Samples were either collected by hand scoop or scraper. In addition to sample collections, plant components that use raw water are inspected when opened for maintenance or repair. Sample collection/inspection dates are listed in Table 22.

Table 22: 2011 Corbicula Monitoring

DATE	SAMPLE LOCATION
2/13/2011	Service Water Pump House Intake Traveling Screen "A"
2/13/2011	Service Water Pump House Intake Traveling Screen "B"
3/22/2011	Strainer Fire Protection
4/22/2011	Auxiliary Condenser "A"
4/22/2011	Auxiliary Condenser "A" Waterbox
4/25/2011	LP Condenser Waterbox South
4/25/2011	Intermediate Condenser Waterbox South
4/25/2011	HP Condenser Waterbox South
4/26/2011	HP Condenser Waterbox North
4/26/2011	Intermediate Condenser Waterbox North
8/1/2011	Turbine Lube Oil Cooler "A"
9/2/2011	Turbine Lube Oil Cooler "B"
9/2/2011	ESW Screen Wash Pump

Conclusions

The sample collected in June, 1987, was the only indication of Corbicula in the vicinity of PNPP. Although the presence of Corbicula was detected at the Eastlake Power Plant, it has not been demonstrated that their presence has created any operational problems there, or at PNPP. As in the past, the 2011 monitoring program did not identify Corbicula in any sample collected.

DREISSENA PROGRAM

Dreissena or Zebra mussels were first discovered at PNPP in September, 1988. The initial collection of 19 mussels was made as part of the Corbicula monitoring program. The Dreissena monitoring program began in 1989, with monitoring and testing. The current control program was designed and implemented in 1990.

Monitoring

In addition to visually inspecting the plant's raw water systems when they are opened for maintenance or repair, monitoring methods include the use of commercial divers and side-stream monitors. Commercial divers monitor mussel infestation during the inspection of forebays, basins, and the intake and discharge structures. Divers have also been used to take underwater videotapes of the water basins and intake tunnel. Side-stream monitors are flow-through containers that receive water diverted from plant systems and are set up at two in-plant locations during the mussel season. The side-stream monitors are fitted with slides and inspected for veliger settlement and growth of adult mussels.

Treatment

Chemicals used for mussel control in 2011 included chlorine and a commercial molluscicide. The chlorine is intermittently injected into the plant service water, emergency service water, and circulating water systems by metering sodium hypochlorite into each system's influent. Sodium bisulfite is added at the plant discharge structure for dechlorination prior to return into Lake Erie.

The use of a commercial molluscicide has been approved by the Ohio Environmental Protection Agency (OEPA). The chemical selected for use at the PNPP in 2011 was alkyl-dimethyl-benzyl-ammonium chloride. Treatment was applied once in 2011, on August 31. The active ingredients were detoxified by adsorption using bentonite clay, prior to discharge into Lake Erie.

Results

The effectiveness of the intermittent chlorination treatment has been determined in several ways. First, visual inspections of raw water system components are conducted when systems are open during maintenance or repair. In addition, settlement monitors were inspected for new settlement. No live settlement has been found in any plant component to date.

The effectiveness of the application of the commercial molluscicide was measured by observing mortality of mussels placed in a flow-through container placed in plant service water and subjected to the chemical treatment. The observed mortality rate utilizing the flow-through container for 2011 was 100%.

To date, PNPP has had no significant problems related to zebra mussels.

Conclusions

Perry Nuclear Power Plant has taken the approach that the best method for avoiding problems with zebra mussels is preventive treatment of plant water systems. The current program of monitoring and chemical treatment will be continued to minimize the possibility that PNPP will experience future problems due to zebra mussels.

HERBICIDE APPLICATIONS

Herbicides are used sparingly on the PNPP site. A request must be made to, and approved by the PNPP Chemistry Unit prior to spraying to ensure that only approved chemicals are used, and only in approved areas.

In 2011, four (4) general and three (3) specific herbicide requests were initiated for chemical applications. Each application was in compliance with the Ohio Environmental Protection Agency's rules and regulations. There were no adverse environmental impacts observed during weekly site environmental inspections as a result of these applications. The herbicides approved for use in the Owner-Controlled Area are Round-Up, Round-Up Promax, Accord, Polaris, Kingpin, Tempo Ultra, Oust, Escort, Super Signal Blue Concentrate and Razor. For each application, the type of weed to be treated dictated the herbicide and concentration to be used. Table 23 provides detailed documentation for each application in 2011. The quantity represents the amount of herbicide applied, prior to any dilution.

Table 23: 2011 Herbicide Applications

DATE APPLIED	LOCATION	AMOUNT	CHEMICAL NAME
4/7/11	Transmission Yard	800 gal.	Oust/ Escort
4/13/11	Transmission Yard	100 gal.	Oust/ Escort
5/24/11	Security Towers, Booths, PAF, Perifield Zone	2 oz.	Tempo Ultra
8/3/11	Security Towers, Booths, PAF, Periifeld Zone	10 gal.	Tempo Ultra
7/26/11	Transmission Yard	50 gal.	Razor
7/11 – 8/11	Transmission-Right-of-Ways	1,950 gal.	Accord/ Polaris/ Kingpin

SPECIAL REPORTS

NON-COMPLIANCES

NPDES Permit

The National Pollutant Discharge Elimination System (NPDES) permit is issued by the Ohio Environmental Protection Agency (OEPA). It establishes monitoring requirements and limits for discharges from the PNPP. It also specifies the locations from which the plant is allowed to discharge.

There was no NPDES non-compliance issues identified in 2011.

Environmental Protection Plan

The Environmental Protection Plan (EPP), which is Appendix B of the PNPP Operating License, requires a non-radiological environmental monitoring and reporting program be established at the PNPP.

One special report was submitted in 2011:

- On October 17, 2011 approximately 1000 gallons of a diesel/gas fuel mixture was spilled into the environment at the Fire Training facility, covering an area of 20 x 60 meters. The release entered a Class III wetlands just west of the Fire Training facility but did not enter Lake Erie. Clean Harbors Incorporated was contracted for the initial clean up and disposal. The storage tank has been cleaned and emptied and is no longer in service. The associated underground piping has been removed. All areas affected by the release have been cleaned and will be re-evaluated in the spring. Periodic sampling of piezometers and sentinel wells has indicated the release has not migrated. All proper notifications to regulatory agencies were made as required.

UN-REVIEWED ENVIRONMENTAL QUESTIONS

All proposed changes to the PNPP design or operation, as well as tests or experiments, must be evaluated for potential environmental impacts in accordance with the EPP and administrative quality assurance procedures. In 2011 there were no proposed changes to the facility or programs that if performed could have resulted in an adverse environmental impact. Therefore, there were no un-reviewed environmental questions identified.

APPENDIX A

2011 INTER-LABORATORY CROSS CHECK COMPARISON PROGRAM RESULTS

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APPENDIX A

INTERLABORATORY COMPARISON PROGRAM RESULTS

NOTE: Environmental Inc., Midwest Laboratory participates in intercomparison studies administered by Environmental Resources Associates, and serves as a replacement for studies conducted previously by the U.S. EPA Environmental Monitoring Systems Laboratory, Las Vegas, Nevada. Results are reported in Appendix A. TLD Intercomparison results, in-house spikes, blanks, duplicates and mixed analyte performance evaluation program results are also reported. Appendix A is updated four times a year; the complete Appendix is included in March, June, September and December monthly progress reports only.

January through December, 2011

Appendix A

Interlaboratory Comparison Program Results

Environmental, Inc., Midwest Laboratory has participated in interlaboratory comparison (crosscheck) programs since the formulation of it's quality control program in December 1971. These programs are operated by agencies which supply environmental type samples containing concentrations of radionuclides known to the issuing agency but not to participant laboratories. The purpose of such a program is to provide an independent check on a laboratory's analytical procedures and to alert it of any possible problems.

Participant laboratories measure the concentration of specified radionuclides and report them to the issuing agency. Several months later, the agency reports the known values to the participant laboratories and specifies control limits. Results consistently higher or lower than the known values or outside the control limits indicate a need to check the instruments or procedures used.

Results in Table A-1 were obtained through participation in the environmental sample crosscheck program administered by Environmental Resources Associates, serving as a replacement for studies conducted previously by the U.S. EPA Environmental Monitoring Systems Laboratory, Las Vegas, Nevada.

Table A-2 lists results for thermoluminescent dosimeters (TLDs), via International Intercomparison of Environmental Dosimeters, when available, and internal laboratory testing.

Table A-3 lists results of the analyses on in-house "spiked" samples for the past twelve months. All samples are prepared using NIST traceable sources. Data for previous years available upon request.

Table A-4 lists results of the analyses on in-house "blank" samples for the past twelve months. Data for previous years available upon request.

Table A-5 lists REMP specific analytical results from the in-house "duplicate" program for the past twelve months. Acceptance is based on the difference of the results being less than the sum of the errors. Complete analytical data for duplicate analyses is available upon request.

The results in Table A-6 were obtained through participation in the Mixed Analyte Performance Evaluation Program.

Results in Table A-7 were obtained through participation in the environmental sample crosscheck program administered by Environmental Resources Associates, serving as a replacement for studies conducted previously by the Environmental Measurement Laboratory Quality Assessment Program (EML).

Attachment A lists the laboratory precision at the 1 sigma level for various analyses. The acceptance criteria in Table A-3 is set at ± 2 sigma.

Out-of-limit results are explained directly below the result.

Attachment A

ACCEPTANCE CRITERIA FOR "SPIKED" SAMPLES

LABORATORY PRECISION: ONE STANDARD DEVIATION VALUES FOR VARIOUS ANALYSES[a]

Analysis	Level	One standard deviation for single determination
Gamma Emitters	5 to 100 pCi/liter or kg > 100 pCi/liter or kg	5.0 pCi/liter 5% of known value
Strontium-89[b]	5 to 50 pCi/liter or kg > 50 pCi/liter or kg	5.0 pCi/liter 10% of known value
Strontium-90[b]	2 to 30 pCi/liter or kg > 30 pCi/liter or kg	5.0 pCi/liter 10% of known value
Potassium-40	≥ 0.1 g/liter or kg	5% of known value
Gross alpha	≤ 20 pCi/liter > 20 pCi/liter	5.0 pCi/liter 25% of known value
Gross beta	≤ 100 pCi/liter > 100 pCi/liter	5.0 pCi/liter 5% of known value
Tritium	≤ 4,000 pCi/liter > 4,000 pCi/liter	$\pm 1\sigma$ = $169.85 \times (\text{known})^{0.0933}$ 10% of known value
Radium-226,-228	≥ 0.1 pCi/liter	15% of known value
Plutonium	≥ 0.1 pCi/liter, gram, or sample	10% of known value
Iodine-131, Iodine-129[b]	≤ 55 pCi/liter > 55 pCi/liter	6 pCi/liter 10% of known value
Uranium-238, Nickel-63[b] Technetium-99[b]	≤ 35 pCi/liter > 35 pCi/liter	6 pCi/liter 15% of known value
Iron-55[b]	50 to 100 pCi/liter > 100 pCi/liter	10 pCi/liter 10% of known value
Other Analyses [b]	---	20% of known value

[a] From EPA publication, "Environmental Radioactivity Laboratory Intercomparison Studies Program, Fiscal Year, 1981-1982, EPA-600/4-81-004.

[b] Laboratory limit.

TABLE A-1. Interlaboratory Comparison Crosscheck program, Environmental Resource Associates (ERA)[a].

Lab Code	Date	Analysis	Concentration (pCi/L) Laboratory Result [b]	ERA Result [c]	Control Limits	Acceptance
STW-1243	04/04/11	Sr-89	68.2 ± 5.8	63.2	51.1 - 71.2	Pass
STW-1243	04/04/11	Sr-90	44.3 ± 2.4	42.5	31.3 - 48.8	Pass
STW-1244	04/04/11	Ba-133	69.8 ± 3.9	75.3	63.0 - 82.8	Pass
STW-1244	04/04/11	Co-60	87.9 ± 3.8	88.8	79.9 - 100.0	Pass
STW-1244	04/04/11	Cs-134	69.5 ± 3.7	72.9	59.5 - 80.2	Pass
STW-1244	04/04/11	Cs-137	77.9 ± 5.3	77.0	69.3 - 87.4	Pass
STW-1244	04/04/11	Zn-65	105.2 ± 8.4	98.9	89.0 - 118.0	Pass
STW-1245	04/04/11	Gr. Alpha	41.5 ± 2.3	50.1	26.1 - 62.9	Pass
STW-1245	04/04/11	Gr. Beta	48.9 ± 1.8	49.8	33.8 - 56.9	Pass
STW-1246	04/04/11	I-131	26.6 ± 1.7	27.5	22.9 - 32.3	Pass
STW-1247	04/04/11	Ra-226	13.2 ± 0.6	12.1	9.0 - 14.0	Pass
STW-1247	04/04/11	Ra-228	11.2 ± 0.6	11.6	7.6 - 14.3	Pass
STW-1247	04/04/11	Uranium	36.4 ± 0.6	39.8	32.2 - 44.4	Pass
STW-1248	04/04/11	H-3	10322 ± 285	10200.0	8870 - 11200	Pass
STW-1256	10/07/11	Sr-89	68.7 ± 6.0	69.7	56.9 - 77.9	Pass
STW-1256	10/07/11	Sr-90	36.9 ± 2.4	41.1	30.2 - 47.2	Pass
STW-1257	10/07/11	Ba-133	88.2 ± 7.8	96.9	81.8 - 106.0	Pass
STW-1257	10/07/11	Co-60	116.5 ± 7.1	119.0	107.0 - 133.0	Pass
STW-1257 [d]	10/07/11	Cs-134	38.8 ± 8.0	33.4	26.3 - 36.7	Fail
STW-1257	10/07/11	Cs-137	45.6 ± 7.3	44.3	39.4 - 51.7	Pass
STW-1257	10/07/11	Zn-65	84.9 ± 15.4	76.8	68.9 - 92.5	Pass
STW-1258	10/07/11	Gr. Alpha	35.7 ± 3.8	53.2	27.8 - 66.6	Pass
STW-1258	10/07/11	Gr. Beta	36.1 ± 3.3	45.9	30.9 - 53.1	Pass
STW-1259	10/07/11	I-131	25.0 ± 1.1	27.5	22.9 - 32.3	Pass
STW-1260	10/07/11	Ra-226	12.2 ± 0.6	11.6	8.7 - 13.4	Pass
STW-1260	10/07/11	Ra-228	11.5 ± 1.7	10.3	6.7 - 12.8	Pass
STW-1260	10/07/11	Uranium	46.6 ± 0.5	48.6	39.4 - 54.0	Pass
STW-1261	10/07/11	H-3	17435 ± 382	17400	15200 - 19100	Pass

[a] Results obtained by Environmental, Inc., Midwest Laboratory as a participant in the crosscheck program for proficiency testing in drinking water conducted by Environmental Resources Associates (ERA).

[b] Unless otherwise indicated, the laboratory result is given as the mean ± standard deviation for three determinations.

[c] Results are presented as the known values, expected laboratory precision (1 sigma, 1 determination) and control limits as provided by ERA.

[d] The sample was reanalyzed. Result of reanalysis was acceptable, 32.9 ± 7.4 pCi/L.

TABLE A-2. Thermoluminescent Dosimetry, (TLD, $CaSO_4$: Dy Cards).

Lab Code	Date	Description	mR Known Value	mR Lab Result ± 2 sigma	Control Limits	Acceptance
Environmental, Inc.						
2010-2	12/13/2010	100 cm.	4.94	4.65 ± 0.57	3.46 - 6.42	Pass
2010-2	12/13/2010	110 cm.	4.09	3.50 ± 0.74	2.86 - 5.32	Pass
2010-2	12/13/2010	120 cm.	3.43	2.68 ± 0.36	2.40 - 4.46	Pass
2010-2	12/13/2010	150 cm.	2.2	1.75 ± 0.42	1.54 - 2.86	Pass
2010-2	12/13/2010	180 cm.	1.53	1.32 ± 0.52	1.07 - 1.99	Pass
2010-2	12/13/2010	40 cm.	30.89	38.56 ± 2.11	21.62 - 40.16	Pass
2010-2	12/13/2010	50 cm.	19.77	23.35 ± 1.82	13.84 - 25.70	Pass
2010-2	12/13/2010	60 cm.	13.73	14.53 ± 1.24	9.61 - 17.85	Pass
2010-2	12/13/2010	60 cm.	13.73	15.84 ± 1.53	9.61 - 17.85	Pass
2010-2	12/13/2010	80 cm.	7.72	8.33 ± 0.74	5.40 - 10.04	Pass
2010-2	12/13/2010	90 cm.	6.1	5.93 ± 0.73	4.27 - 7.93	Pass
Environmental, Inc.						
2011-1	7/6/2011	100 cm.	6.71	5.64 ± 0.30	4.70 - 8.72	Pass
2011-1	7/6/2011	110 cm.	5.54	4.60 ± 0.46	3.88 - 7.20	Pass
2011-1	7/6/2011	120 cm.	4.66	4.68 ± 0.29	3.26 - 6.06	Pass
2011-1	7/6/2011	150 cm.	2.98	2.93 ± 0.66	2.09 - 3.87	Pass
2011-1	7/6/2011	180 cm.	2.07	2.05 ± 0.18	1.45 - 2.69	Pass
2011-1	7/6/2011	40 cm.	41.92	52.36 ± 3.08	29.34 - 54.50	Pass
2011-1	7/6/2011	45 cm.	33.12	41.83 ± 3.46	23.18 - 43.06	Pass
2011-1	7/6/2011	50 cm.	26.83	28.61 ± 2.63	18.78 - 34.88	Pass
2011-1	7/6/2011	60 cm.	18.63	21.00 ± 1.15	13.04 - 24.22	Pass
2011-1	7/6/2011	70 cm.	13.69	13.24 ± 1.76	9.58 - 17.80	Pass
2011-1	7/6/2011	80 cm.	10.48	12.18 ± 0.65	7.34 - 13.62	Pass
2011-1	7/6/2011	90 cm.	8.28	7.95 ± 0.82	5.80 - 10.76	Pass

TABLE A-3. In-House "Spike" Samples

Lab Code [b]	Date	Analysis	Concentration (pCi/L)[a] Laboratory results 2s, n=1 [c]	Known Activity	Control Limits [d]	Acceptance
SPW-202	1/17/2011	U-238	4.19 ± 0.19	4.17	0.00 - 16.17	Pass
W-20111	2/1/2011	Ra-226	16.32 ± 0.47	16.77	11.74 - 21.80	Pass
W-20711	2/7/2011	Gr. Alpha	23.02 ± 0.45	20.00	10.00 - 30.00	Pass
W-20711	2/7/2011	Gr. Beta	46.59 ± 0.41	45.20	35.20 - 55.20	Pass
XWW-331	2/11/2011	Ba-133	144.30 ± 8.50	144.40	129.96 - 158.84	Pass
XWW-331	2/11/2011	Cs-134	22.20 ± 3.70	21.50	11.50 - 31.50	Pass
XWW-331	2/11/2011	Cs-137	64.70 ± 7.40	61.00	51.00 - 71.00	Pass
XWW-331	2/11/2011	H-3	13399 ± 334	12538	10030 - 15046	Pass
SPAP-567	2/14/2011	Gr. Beta	46.90 ± 0.11	48.10	28.86 - 67.34	Pass
SPAP-569	2/14/2011	Cs-134	7.70 ± 1.70	7.49	0.00 - 17.49	Pass
SPAP-569	2/14/2011	Cs-137	102.47 ± 3.20	106.79	96.11 - 117.47	Pass
SPAP-571	2/14/2011	H-3	75815 ± 542	73230	58584 - 87876	Pass
SPW-581	2/15/2011	Cs-134	39.91 ± 1.38	37.45	27.45 - 47.45	Pass
SPW-581	2/15/2011	Cs-137	56.28 ± 2.28	53.39	43.39 - 63.39	Pass
SPW-581	2/15/2011	Sr-89	112.92 ± 5.61	121.42	97.14 - 145.70	Pass
SPW-581	2/15/2011	Sr-90	47.80 ± 2.02	42.07	33.66 - 50.48	Pass
SPMI-583	2/15/2011	Cs-137	57.04 ± 2.76	53.39	43.39 - 63.39	Pass
SPMI-583	2/15/2011	Sr-90	36.27 ± 1.47	42.07	33.66 - 50.48	Pass
SPW-602	2/17/2011	U-238	3.98 ± 0.19	4.17	0.00 - 16.17	Pass
SPW-686	2/25/2011	Ni-63	167.41 ± 3.05	208.11	145.68 - 270.54	Pass
SPF-1113	3/17/2011	Cs-137	2369 ± 22	2170	1953 - 2387	Pass
XWW-1602	3/21/2011	Ba-133	26.83 ± 6.35	28.58	18.58 - 38.58	Pass
XWW-1602	3/21/2011	Cs-134	18.90 ± 4.06	16.30	6.30 - 26.30	Pass
XWW-1602	3/21/2011	Cs-137	33.98 ± 5.88	30.50	20.50 - 40.50	Pass
XWW-1602	3/21/2011	H-3	7348 ± 248	7617	6094 - 9140	Pass
XWW-2537	4/4/2011	Ba-133	43.40 ± 4.26	42.70	32.70 - 52.70	Pass
XWW-2537	4/4/2011	Cs-134	13.50 ± 2.40	11.90	1.90 - 21.90	Pass
XWW-2537	4/4/2011	Cs-137	68.30 ± 5.90	60.70	50.70 - 70.70	Pass
XWW-2537	4/4/2011	H-3	7134 ± 257	7234	5787 - 8681	Pass
SPW-2877	5/3/2011	Ra-228	25.23 ± 2.48	31.62	22.13 - 41.11	Pass
SPMI-3167	5/24/2011	Cs-134	33.04 ± 8.25	34.19	24.19 - 44.19	Pass
SPMI-3167	5/24/2011	Cs-137	51.53 ± 8.63	53.06	43.06 - 63.06	Pass
SPMI-3167	5/24/2011	Sr-89	90.89 ± 4.30	93.47	74.78 - 112.16	Pass
SPMI-3167	5/24/2011	Sr-90	41.17 ± 1.53	41.80	33.44 - 50.16	Pass
W-52411	5/24/2011	Ra-226	17.90 ± 0.42	16.80	11.76 - 21.84	Pass
W-60711	6/7/2011	Gr. Alpha	23.00 ± 0.49	20.00	10.00 - 30.00	Pass
W-60711	6/7/2011	Gr. Beta	43.27 ± 0.42	45.20	35.20 - 55.20	Pass
SPAP-4167	7/7/2011	Cs-134	6.92 ± 1.45	6.57	0.00 - 16.57	Pass
SPAP-4167	7/7/2011	Cs-137	108.02 ± 2.84	105.80	95.22 - 116.38	Pass
SPW-4169	7/7/2011	Cs-134	34.52 ± 4.79	32.84	22.84 - 42.84	Pass
SPW-4169	7/7/2011	Cs-137	58.29 ± 6.19	52.92	42.92 - 62.92	Pass

TABLE A-3. In-House "Spike" Samples

Lab Code [b]	Date	Concentration (pCi/L)[a] Analysis	Laboratory results 2s, n=1 [c]	Known Activity	Control Limits [d]	Acceptance
SPW-4169	7/7/2011	Sr-89	66.12 ± 4.18	69.64	55.71 - 83.57	Pass
SPW-4169	7/7/2011	Sr-90	41.72 ± 1.79	41.68	33.34 - 50.02	Pass
SPW-4171	7/7/2011	H-3	70582 ± 767	71646	57317 - 85975	Pass
SPW-4180	7/7/2011	Tc-99	95.69 ± 1.65	97.02	67.91 - 126.13	Pass
SPW-41821	7/7/2011	Ra-228	32.57 ± 2.63	30.63	21.44 - 39.82	Pass
SPW-4241	7/7/2011	Ni-63	403.01 ± 4.66	415.20	290.64 - 539.76	Pass
SPW-4180	7/8/2011	Tc-99	100.30 ± 1.75	97.02	67.91 - 126.13	Pass
SPW-5029	7/29/2011	C-14	3991 ± 17	4739	2843 - 6634	Pass
SPW-5031	7/29/2011	Fe-55	13801 ± 331	14895	11916 - 17874	Pass
W-91411	9/14/2011	Gr. Alpha	21.58 ± 0.44	20.00	10.00 - 30.00	Pass
W-91411	9/14/2011	Gr. Beta	43.02 ± 0.40	45.20	35.20 - 55.20	Pass
SPW-91511	9/15/2011	Tc-99	29.92 ± 1.07	32.34	20.34 - 44.34	Pass
W-91911	9/19/2011	Ra-226	17.06 ± 0.42	16.80	11.76 - 21.84	Pass
W-100711	10/7/2011	Gr. Alpha	22.05 ± 0.45	20.00	10.00 - 30.00	Pass
W-100711	10/7/2011	Gr. Beta	45.51 ± 0.41	45.20	35.20 - 55.20	Pass
W-101111	10/11/2011	Ra-226	16.02 ± 0.40	16.80	11.76 - 21.84	Pass
XWW-7220	11/17/2011	Ba-133	25.11 ± 4.36	27.47	17.47 - 37.47	Pass
XWW-7220	11/17/2011	Cs-134	14.09 ± 3.11	16.60	6.60 - 26.60	Pass
XWW-7220	11/17/2011	Cs-137	35.59 ± 4.28	29.98	19.98 - 39.98	Pass
W-113011	11/30/2011	Ra-226	16.12 ± 0.39	16.80	11.76 - 21.84	Pass
W-120111	12/1/2011	Gr. Alpha	21.34 ± 0.43	20.00	10.00 - 30.00	Pass
W-120111	12/1/2011	Gr. Beta	45.55 ± 0.41	45.20	35.20 - 55.20	Pass
SPW-41823	12/9/2011	Ra-228	26.98 ± 2.38	29.40	20.58 - 38.22	Pass
SPMI-8906	12/22/2011	Cs-134	29.11 ± 3.52	28.14	18.14 - 38.14	Pass
SPMI-8906	12/22/2011	Cs-137	58.27 ± 7.62	52.36	42.36 - 62.36	Pass
SPW-8916	12/22/2011	Cs-134	31.74 ± 3.63	28.14	18.14 - 38.14	Pass
SPW-8916	12/22/2011	Cs-137	56.48 ± 6.12	52.36	42.36 - 62.36	Pass
SPAP-8902	12/23/2011	Gr. Beta	45.72 ± 0.11	47.11	28.27 - 65.95	Pass
SPAP-8904	12/23/2011	Cs-134	5.19 ± 0.63	5.63	0.00 - 15.63	Pass
SPAP-8904	12/23/2011	Cs-137	101.21 ± 2.55	104.71	94.24 - 115.18	Pass
SPW-8918	12/23/2011	H-3	136759 ± 1056	137638	110110 - 165166	Pass
SPW-8922	12/23/2011	Ni-63	202.21 ± 3.75	206.88	144.82 - 268.94	Pass
SPW-8924	12/23/2011	Tc-99	126.10 ± 1.86	129.36	90.55 - 168.17	Pass
SPF-8926	12/23/2011	Cs-134	0.34 ± 0.01	0.33	0.20 - 0.47	Pass
SPF-8926	12/23/2011	Cs-137	2.34 ± 0.02	2.09	1.25 - 2.93	Pass

[a] Liquid sample results are reported in pCi/Liter, air filters(pCi/filter), charcoal (pCi/m^3), and solid samples (pCi/g).

[b] Laboratory codes as follows: W (water), MI (milk), AP (air filter), SO (soil), VE (vegetation), CH (charcoal canister), F (fish), U (urine).

[c] Results are based on single determinations.

[d] Control limits are established from the precision values listed in Attachment A of this report, adjusted to ± 2 σ.

NOTE: For fish, Jello is used for the Spike matrix. For Vegetation, cabbage is used for the Spike matrix.

TABLE A-4. In-House "Blank" Samples

Lab Code	Sample Type	Date	Analysis[b]	Concentration (pCi/L)[a]		
				Laboratory results (4.66σ)		Acceptance
				LLD	Activity[c]	Criteria (4.66 σ)
SPW-202	Water	1/17/2011	U-238	0.10	0.12 ± 0.12	1
W-20111	Water	2/1/2011	Ra-226	0.04	0.05 ± 0.03	1
W-20711	Water	2/7/2011	Gr. Alpha	0.44	-0.02 ± 0.29	1
W-20711	Water	2/7/2011	Gr. Beta	0.75	-0.03 ± 0.53	3.2
SPAP-566	Air Filter	2/14/2011	Gr. Beta	0.64	2.24 ± 0.61	3.2
SPAP-568	Air Filter	2/14/2011	Cs-134	2.34	-	100
SPAP-568	Air Filter	2/14/2011	Cs-137	1.56	-	100
SPAP-570	Air Filter	2/14/2011	H-3	103.20	-49.40 ± 52.50	200
SPW-580	Water	2/15/2011	Cs-134	2.68	-	10
SPW-580	Water	2/15/2011	Cs-137	2.84	-	10
SPW-580	Water	2/15/2011	Sr-89	0.73	0.24 ± 0.57	5
SPW-580	Water	2/15/2011	Sr-90	0.57	0.02 ± 0.27	1
SPMI-582	Milk	2/15/2011	Cs-134	3.49	-	10
SPMI-582	Milk	2/15/2011	Cs-137	3.54	-	10
SPMI-582	Milk	2/15/2011	I-131(G)	4.14	-	20
SPMI-582	Milk	2/15/2011	Sr-89	0.71	0.16 ± 0.67	5
SPMI-582	Milk	2/15/2011	Sr-90	0.55	0.59 ± 0.32	1
SPW-601	Water	2/17/2011	U-238	0.20	0.09 ± 0.17	1
SPW-685	Water	2/25/2011	Ni-63	1.61	0.05 ± 0.98	20
SPF-1112	Fish	3/17/2011	Cs-134	6.74	-	100
SPF-1112	Fish	3/17/2011	Cs-137	5.45	-	100
BKW-40111	Water	4/1/2011	I-131	4.16	-	10
BKW-40111	Water	4/1/2011	Co-60	3.11	-	10
BKW-40111	Water	4/1/2011	Cs-134	4.73	-	10
BKW-40111	Water	4/1/2011	Cs-137	5.04	-	10
SPW-2887	Water	5/3/2011	Ra-228	0.72	0.46 ± 0.39	2
W-52411	Water	5/24/2011	Ra-226	0.04	0.05 ± 0.03	1
W-60711	Water	6/7/2011	Gr. Alpha	0.51	0.00 ± 0.36	1
W-60711	Water	6/7/2011	Gr. Beta	1.58	0.38 ± 1.12	3.2
SPAP-4164	Air Filter	7/7/2011	Gr. Beta	0.72	1.04 ± 0.48	3.2
SPW-4168	Water	7/7/2011	Cs-134	3.41	-	10
SPW-4168	Water	7/7/2011	Cs-137	2.45	-	10
SPW-4168	Water	7/7/2011	Sr-89	0.72	0.40 ± 0.50	5
SPW-4168	Water	7/7/2011	Sr-90	0.51	-0.19 ± 0.21	1
SPW-4171	Water	7/7/2011	H-3	152.00	37.10 ± 81.80	200
SPW-41811	Water	7/7/2011	Ra-228	0.77	0.51 ± 0.42	2

TABLE A-4. In-House "Blank" Samples

Lab Code	Sample Type	Date	Analysis[b]	Concentration (pCi/L)[a]		
				Laboratory results (4.66σ)		Acceptance
				LLD	Activity[c]	Criteria (4.66 σ)
SPW-4241	Water	7/7/2011	Ni-63	1.70	0.09 ± 1.03	20
SPW-4179	Water	7/8/2011	Tc-99	1.20	-0.96 ± 0.71	10
SPW-5028	Water	7/29/2011	C-14	109.80	61.90 ± 59.20	200
SPW-5031	Water	7/29/2011	Fe-55	140.60	0.00 ± 85.30	1000
W-91411	Water	9/14/2011	Gr. Alpha	0.48	-0.06 ± 0.33	1
W-91411	Water	9/14/2011	Gr. Beta	0.78	-0.43 ± 0.53	3.2
SPW-91511	Water	9/15/2011	Tc-99	1.11	-0.62 ± 0.66	10
W-91911	Water	9/19/2011	Ra-226	0.03	0.04 ± 0.02	1
W-100711	Water	10/7/2011	Gr. Alpha	0.44	-0.26 ± 0.28	1
W-100711	Water	10/7/2011	Gr. Beta	0.76	-0.43 ± 0.52	3.2
W-101111	Water	10/11/2011	Ra-226	0.04	0.05 ± 0.03	1
W-113011	Water	11/30/2011	Ra-226	0.03	0.04 ± 0.02	1
W-120111	Water	12/1/2011	Gr. Alpha	0.41	-0.20 ± 0.27	1
W-120111	Water	12/1/2011	Gr. Beta	0.75	-0.10 ± 0.53	3.2
SPW-41813	Water	12/9/2011	Ra-228	0.71	0.17 ± 0.35	2
SPMI-8905	Milk	12/22/2011	Cs-134	3.27	-	10
SPMI-8905	Milk	12/22/2011	Cs-137	3.38	-	10
SPMI-8905	Milk	12/22/2011	I-131(G)	2.17	-	20
SPW-8915	Water	12/22/2011	Cs-134	3.37	-	10
SPW-8915	Water	12/22/2011	Cs-137	3.45	-	10
SPW-8915	Water	12/22/2011	I-131(G)	3.38	-	20
SPAP-8901	Air Filter	12/23/2011	Gr. Beta	0.78	0.50 ± 0.46	3.2
SPAP-8903	Air Filter	12/23/2011	Cs-134	1.65	-	100
SPAP-8903	Air Filter	12/23/2011	Cs-137	2.41	-	100
SPW-8917	Water	12/23/2011	H-3	150.20	-3.04 ± 78.80	200
SPW-8921	Water	12/23/2011	Ni-63	16.92	-4.60 ± 10.16	20
SPW-8923	Water	12/23/2011	Tc-99	5.66	-5.45 ± 3.34	10
SPF-8925	Fish	12/23/2011	Cs-134	7.15	-	100
SPF-8925	Fish	12/23/2011	Cs-137	9.73	-	100

[a] Liquid sample results are reported in pCi/Liter, air filters(pCi/filter), charcoal (pCi/charcoal canister), and solid samples (pCi/kg).

[b] I-131(G); iodine-131 as analyzed by gamma spectroscopy.

[c] Activity reported is a net activity result. For gamma spectroscopic analysis, activity detected below the LLD value is not reported.

TABLE A-5. In-House "Duplicate" Samples

Lab Code	Date	Analysis	Concentration (pCi/L)[a] First Result	Second Result	Averaged Result	Acceptance
CF-20, 21	1/3/2011	Be-7	0.24 ± 0.14	0.34 ± 0.17	0.29 ± 0.11	Pass
CF-20, 21	1/3/2011	K-40	10.37 ± 0.43	9.76 ± 0.68	10.07 ± 0.40	Pass
CF-20, 21	1/3/2011	Sr-90	0.01 ± 0.01	0.01 ± 0.01	0.01 ± 0.00	Pass
WW-65, 66	1/6/2011	H-3	321.91 ± 97.19	345.76 ± 98.16	333.83 ± 69.06	Pass
BS-165, 166	1/11/2011	Cs-137	0.13 ± 0.02	0.15 ± 0.02	0.14 ± 0.01	Pass
BS-165, 166	1/11/2011	H-3	286.00 ± 80.00	284.00 ± 80.00	285.00 ± 56.57	Pass
BS-165, 166	1/11/2011	K-40	14.11 ± 0.52	13.79 ± 0.60	13.95 ± 0.40	Pass
BS-176, 177	1/11/2011	H-3	391.00 ± 92.00	332.00 ± 89.00	361.50 ± 64.00	Pass
BS-176, 177	1/11/2011	K-40	9.06 ± 0.44	8.28 ± 0.81	8.67 ± 0.46	Pass
BS-197, 198	1/11/2011	Cs-137	0.14 ± 0.03	0.15 ± 0.04	0.15 ± 0.03	Pass
BS-197, 198	1/11/2011	H-3	459.00 ± 103.00	283.00 ± 95.00	371.00 ± 70.06	Pass
BS-197, 198	1/11/2011	K-40	14.40 ± 0.77	14.16 ± 1.23	14.28 ± 0.73	Pass
WW-358, 359	1/17/2011	H-3	331.44 ± 93.05	407.65 ± 95.91	369.55 ± 66.81	Pass
DW-20009, 20010	1/19/2011	Ra-226	3.66 ± 0.57	2.74 ± 0.43	3.20 ± 0.36	Pass
DW-20009, 20010	1/19/2011	Ra-228	1.51 ± 0.64	1.36 ± 0.60	1.44 ± 0.44	Pass
WW-337, 338	1/25/2011	H-3	21986 ± 402	21896 ± 401	21941 ± 284	Pass
W-491, 492	1/27/2011	Ra-226	6.70 ± 0.50	6.10 ± 0.50	6.40 ± 0.35	Pass
W-491, 492	1/27/2011	Ra-228	6.60 ± 1.30	8.40 ± 1.40	7.50 ± 0.96	Pass
DW-20014, 20015	1/28/2011	Gr. Alpha	1.91 ± 0.71	2.34 ± 0.80	2.13 ± 0.53	Pass
SWU-447, 448	1/31/2011	Gr. Beta	7.42 ± 1.17	6.85 ± 1.11	7.14 ± 0.81	Pass
W-694, 695	2/7/2011	H-3	628.26 ± 104.30	692.37 ± 106.89	660.32 ± 74.67	Pass
DW-20022, 20023	2/9/2011	Ra-228	0.71 ± 0.47	1.13 ± 0.54	0.92 ± 0.36	Pass
SW-626, 627	2/16/2011	H-3	1268.17 ± 129.52	1144.65 ± 125.39	1206.41 ± 90.14	Pass
LW-825, 826	2/24/2011	Gr. Beta	2.65 ± 0.82	2.45 ± 0.74	2.55 ± 0.55	Pass
SWT-845, 846	3/1/2011	Gr. Beta	1.11 ± 0.39	0.80 ± 0.37	0.96 ± 0.27	Pass
MI-998, 999	3/7/2011	K-40	1760.10 ± 127.50	1708.50 ± 131.60	1734.30 ± 91.62	Pass
W-1024, 1025	3/7/2011	H-3	489.83 ± 101.09	581.39 ± 105.06	535.61 ± 72.90	Pass
WW-1156, 1157	3/16/2011	Gr. Beta	1.79 ± 0.78	0.47 ± 0.66	1.13 ± 0.51	Pass
P-1198, 1199	3/17/2011	H-3	504.00 ± 133.00	597.00 ± 136.00	550.50 ± 95.11	Pass
SW-1434, 1435	3/28/2011	H-3	15523 ± 359	15968 ± 364	15746 ± 256	Pass
WW-1588, 1589	3/28/2011	Gr. Beta	1.81 ± 1.23	2.81 ± 1.38	2.31 ± 0.92	Pass
SG-1714, 1715	3/28/2011	Gr. Alpha	8.82 ± 0.81	8.58 ± 0.74	8.70 ± 0.55	Pass
SG-1714, 1715	3/28/2011	Gr. Beta	13.78 ± 0.65	12.76 ± 0.58	13.27 ± 0.44	Pass
AP-1862, 1863	3/28/2011	Be-7	0.09 ± 0.02	0.08 ± 0.02	0.08 ± 0.01	Pass
W-2143, 2144	3/28/2011	H-3	536.40 ± 99.37	466.79 ± 96.46	501.59 ± 69.25	Pass
AP-2269, 2270	3/28/2011	Be-7	0.07 ± 0.01	0.08 ± 0.01	0.07 ± 0.01	Pass
DW-20061, 20062	3/28/2011	Gr. Alpha	2.82 ± 1.33	3.89 ± 1.26	3.36 ± 0.92	Pass
SWU-1455, 1456	3/29/2011	Gr. Beta	2.50 ± 0.75	2.75 ± 0.83	2.62 ± 0.56	Pass
SWU-1522, 1523	3/29/2011	Gr. Beta	1.36 ± 0.87	2.14 ± 0.96	1.75 ± 0.65	Pass
PM-1543, 1544	3/29/2011	Gr. Beta	13.81 ± 0.26	13.67 ± 0.27	13.74 ± 0.19	Pass
PM-1543, 1544	3/29/2011	Sr-90	8.12 ± 3.20	7.71 ± 3.25	7.91 ± 2.28	Pass

TABLE A-5. In-House "Duplicate" Samples

Lab Code	Date	Analysis	Concentration (pCi/L)[a] First Result	Second Result	Averaged Result	Acceptance
SWT-5885, 5886	3/29/2011	Gr. Beta	1.21 ± 0.54	0.77 ± 0.54	0.99 ± 0.38	Pass
AP-1883, 1884	3/30/2011	Be-7	0.07 ± 0.01	0.09 ± 0.02	0.08 ± 0.01	Pass
AP-2248, 2249	3/30/2011	Be-7	0.06 ± 0.01	0.06 ± 0.01	0.06 ± 0.01	Pass
DW-20066, 20067	3/30/2011	Ra-226	2.14 ± 0.16	2.10 ± 0.16	2.12 ± 0.11	Pass
DW-20066, 20067	3/30/2011	Ra-228	2.55 ± 0.65	1.78 ± 0.62	2.17 ± 0.45	Pass
P-1567, 1568	4/1/2011	H-3	289.00 ± 103.00	296.00 ± 103.00	292.50 ± 72.83	Pass
MI-1609, 1610	4/4/2011	I-131	0.85 ± 0.17	0.91 ± 0.18	0.88 ± 0.13	Pass
MI-1609, 1610	4/4/2011	K-40	1323.80 ± 112.00	1323.20 ± 96.22	1323.50 ± 73.83	Pass
MI-1609, 1610	4/4/2011	Sr-90	0.85 ± 0.33	0.97 ± 0.34	0.91 ± 0.24	Pass
S-1651, 1652	4/4/2011	Ac-228	0.88 ± 0.08	1.03 ± 0.22	0.96 ± 0.12	Pass
S-1651, 1652	4/4/2011	Pb-214	1.09 ± 0.12	0.84 ± 0.16	0.97 ± 0.10	Pass
AP-1841, 1842	4/7/2011	Be-7	0.12 ± 0.02	0.12 ± 0.01	0.12 ± 0.01	Pass
AP-1841, 1842	4/7/2011	Cs-137	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	Pass
AP-1841, 1842	4/7/2011	I-131(G)	0.02 ± 0.00	0.03 ± 0.00	0.03 ± 0.00	Pass
S-1990, 1991	4/7/2011	Ac-228	15.83 ± 0.39	16.12 ± 0.64	15.98 ± 0.37	Pass
S-1990, 1991	4/7/2011	Pb-214	11.21 ± 0.23	11.81 ± 1.22	11.51 ± 0.62	Pass
WW-2552, 2553	4/7/2011	H-3	761.09 ± 116.48	759.04 ± 116.41	760.07 ± 82.34	Pass
PM-1904, 1905	4/11/2011	K-40	13585 ± 611	14278 ± 648	13932 ± 445	Pass
PM-1904, 1905	4/11/2011	Sr-90	9.94 ± 3.05	5.62 ± 2.52	7.78 ± 1.98	Pass
P-2011, 2012	4/11/2011	H-3	670.00 ± 108.00	619.00 ± 106.00	644.50 ± 75.66	Pass
WW-2053, 2054	4/13/2011	H-3	220.20 ± 86.50	246.80 ± 87.80	233.50 ± 61.63	Pass
BS-2095, 2096	4/13/2011	K-40	12.88 ± 0.72	13.56 ± 1.08	13.22 ± 0.65	Pass
DW-20099, 20100	4/13/2011	U-233/4	1.64 ± 0.40	1.31 ± 0.34	1.48 ± 0.26	Pass
DW-20099, 20100	4/13/2011	U-238	1.49 ± 0.39	1.28 ± 0.33	1.39 ± 0.26	Pass
WW-2416, 2417	4/19/2011	H-3	217.10 ± 97.00	184.90 ± 95.60	201.00 ± 68.10	Pass
P-2185, 2186	4/20/2011	H-3	405.00 ± 93.00	504.00 ± 98.00	454.50 ± 67.55	Pass
WW-2353, 2354	4/20/2011	H-3	525.54 ± 119.74	399.41 ± 115.99	462.48 ± 83.35	Pass
DW-20115, 20116	4/26/2011	U-233/4	11.94 ± 2.34	10.71 ± 1.19	11.33 ± 1.31	Pass
DW-20115, 20116	4/26/2011	U-238	2.70 ± 1.15	3.89 ± 0.72	3.30 ± 0.68	Pass
SO-2960, 2961	4/27/2011	K-40	22.63 ± 1.36	22.90 ± 0.03	22.77 ± 0.68	Pass
MI-2657, 2658	5/2/2011	K-40	1319.30 ± 101.30	1403.20 ± 131.60	1361.25 ± 83.04	Pass
DW-20130, 20131	5/2/2011	U-233/4	7.59 ± 0.90	7.62 ± 0.83	7.61 ± 0.61	Pass
DW-20130, 20131	5/2/2011	U-238	4.67 ± 0.72	4.84 ± 0.66	4.76 ± 0.49	Pass
DW-20148, 20149	5/3/2011	U-233/4	6.64 ± 0.83	6.35 ± 0.81	6.50 ± 0.58	Pass
DW-20148, 20149	5/3/2011	U-238	6.11 ± 0.83	5.18 ± 0.73	5.65 ± 0.55	Pass
PM-2810, 2811	5/4/2011	Cs-134	18.64 ± 12.16	33.33 ± 11.86	25.99 ± 8.49	Pass
PM-2810, 2811	5/4/2011	Cs-137	28.99 ± 14.92	21.17 ± 12.16	25.08 ± 9.62	Pass
PM-2810, 2811	5/4/2011	K-40	14368 ± 720	14309 ± 638	14339 ± 481	Pass
WW-3065, 3066	5/16/2011	H-3	280.51 ± 86.98	179.46 ± 82.83	229.98 ± 60.05	Pass
WW-3086, 3087	5/16/2011	H-3	341.14 ± 85.94	377.97 ± 87.43	359.56 ± 61.30	Pass

TABLE A-5. In-House "Duplicate" Samples

Lab Code	Date	Analysis	Concentration (pCi/L)[a] First Result	Second Result	Averaged Result	Acceptance
SG-3134, 3135	5/16/2011	Ac-228	11.19 ± 0.82	12.50 ± 0.84	11.85 ± 0.59	Pass
SG-3134, 3135	5/16/2011	Pb-214	9.12 ± 0.17	9.37 ± 0.42	9.25 ± 0.23	Pass
F-3221, 3222	5/23/2011	K-40	2.73 ± 0.39	2.81 ± 0.42	2.77 ± 0.29	Pass
SS-3434, 3435	5/25/2011	K-40	11533.00 ± 563.70	11236.00 ± 566.10	11384.50 ± 399.45	Pass
AP-3329, 3330	5/26/2011	Be-7	0.24 ± 0.11	0.23 ± 0.13	0.24 ± 0.08	Pass
WW-3350, 3351	6/1/2011	H-3	235.37 ± 83.98	173.12 ± 81.05	204.25 ± 58.36	Pass
G-3413, 3414	6/1/2011	Be-7	0.28 ± 0.10	0.25 ± 0.09	0.27 ± 0.07	Pass
G-3413, 3414	6/1/2011	Gr. Beta	11.04 ± 0.31	10.85 ± 0.31	10.95 ± 0.22	Pass
G-3413, 3414	6/1/2011	K-40	6.80 ± 0.33	6.71 ± 0.38	6.76 ± 0.25	Pass
AP-3602, 3603	6/3/2011	Be-7	0.20 ± 0.08	0.25 ± 0.10	0.22 ± 0.07	Pass
SO-3797, 3798	6/8/2011	Ac-228	0.99 ± 0.05	1.00 ± 0.06	1.00 ± 0.04	Pass
SO-3797, 3798	6/8/2011	Bi-212	1.10 ± 0.12	1.08 ± 0.17	1.09 ± 0.10	Pass
SO-3797, 3798	6/8/2011	Bi-214	0.87 ± 0.02	0.86 ± 0.02	0.87 ± 0.01	Pass
SO-3797, 3798	6/8/2011	Cs-137	0.41 ± 0.01	0.39 ± 0.01	0.40 ± 0.01	Pass
SO-3797, 3798	6/8/2011	K-40	16.08 ± 0.26	16.27 ± 0.29	16.18 ± 0.19	Pass
SO-3797, 3798	6/8/2011	Pb-212	0.98 ± 0.10	0.93 ± 0.02	0.96 ± 0.05	Pass
SO-3797, 3798	6/8/2011	Pb-214	0.95 ± 0.02	0.91 ± 0.02	0.93 ± 0.01	Pass
SO-3797, 3798	6/8/2011	Th-232	0.47 ± 0.05	0.49 ± 0.04	0.48 ± 0.03	Pass
SO-3797, 3798	6/8/2011	U-233/4	0.16 ± 0.02	0.15 ± 0.02	0.16 ± 0.01	Pass
SO-3797, 3798	6/8/2011	U-238	0.16 ± 0.02	0.13 ± 0.02	0.15 ± 0.01	Pass
MI-3935, 3936	6/20/2011	K-40	1764.60 ± 119.40	1843.10 ± 136.50	1803.85 ± 90.68	Pass
BS-4172, 4173	6/21/2011	Cs-137	51.50 ± 23.78	48.57 ± 17.06	50.04 ± 14.63	Pass
BS-4172, 4173	6/21/2011	K-40	11730.00 ± 679.60	11120.00 ± 512.30	11425.00 ± 425.53	Pass
DW-20183, 20184	6/21/2011	U-233/4	10.00 ± 1.00	8.40 ± 0.90	9.20 ± 0.67	Pass
DW-20183, 20184	6/21/2011	U-238	6.70 ± 0.80	6.10 ± 0.80	6.40 ± 0.57	Pass
WW-4019, 4020	6/24/2011	Gr. Beta	3.56 ± 1.20	3.16 ± 1.21	3.36 ± 0.85	Pass
PM-4193, 4194	6/30/2011	K-40	14795.00 ± 759.00	14660.00 ± 750.00	14727.50 ± 533.52	Pass
LW-4235, 4236	6/30/2011	Gr. Beta	2.70 ± 0.72	2.11 ± 0.78	2.41 ± 0.53	Pass
AP-4367, 4368	7/7/2011	Be-7	0.17 ± 0.10	0.19 ± 0.11	0.18 ± 0.07	Pass
MI-4416, 4417	7/11/2011	K-40	1342.40 ± 91.49	1447.00 ± 114.80	1394.70 ± 73.40	Pass
W-4914, 4915	7/11/2011	H-3	576.36 ± 110.35	584.67 ± 110.67	580.52 ± 78.14	Pass
MI-4438, 4439	7/12/2011	K-40	1280.60 ± 107.50	1381.20 ± 112.70	1330.90 ± 77.87	Pass
VE-4481, 4482	7/13/2011	K-40	4452.60 ± 332.40	4767.90 ± 349.70	4610.25 ± 241.24	Pass
AP-4677, 4678	7/15/2011	Be-7	0.18 ± 0.08	0.23 ± 0.09	0.20 ± 0.06	Pass
W-5537, 5538	7/18/2011	H-3	650.13 ± 105.19	695.39 ± 106.94	672.76 ± 75.00	Pass
P-4764, 4765	7/19/2011	H-3	179.82 ± 84.81	138.72 ± 82.79	159.27 ± 59.26	Pass
WW-5211, 5212	7/24/2011	H-3	191.94 ± 85.50	136.22 ± 82.76	164.08 ± 59.50	Pass

TABLE A-5. In-House "Duplicate" Samples

Lab Code	Date	Analysis	Concentration (pCi/L)[a] First Result	Second Result	Averaged Result	Acceptance
VE-4998, 4999	7/25/2011	Be-7	543.90 ± 158.20	488.30 ± 163.80	516.10 ± 113.86	Pass
VE-4998, 4999	7/25/2011	K-40	2562.20 ± 319.80	2414.00 ± 350.00	2488.10 ± 237.05	Pass
DW-20258, 20259	7/25/2011	U-233/4	21.34 ± 1.52	24.93 ± 2.93	23.14 ± 1.65	Pass
DW-20258, 20259	7/25/2011	U-235	0.57 ± 0.26	0.69 ± 0.26	0.63 ± 0.18	Pass
DW-20258, 20259	7/25/2011	U-238	14.11 ± 1.24	15.81 ± 1.23	14.96 ± 0.87	Pass
DW-20269, 20270	7/25/2011	U-233/4	4.93 ± 0.73	4.65 ± 0.68	4.79 ± 0.50	Pass
DW-20269, 20270	7/25/2011	U-238	3.26 ± 0.60	2.53 ± 0.50	2.90 ± 0.39	Pass
DW-20280, 20281	7/25/2011	U-233/4	3.58 ± 0.58	3.33 ± 0.56	3.46 ± 0.40	Pass
DW-20280, 20281	7/25/2011	U-238	1.64 ± 0.40	2.11 ± 0.45	1.88 ± 0.30	Pass
MI-5019, 5020	7/26/2011	K-40	1348.50 ± 101.00	1347.40 ± 109.70	1347.95 ± 74.56	Pass
W-5447, 5448	7/26/2011	H-3	246.31 ± 99.19	241.99 ± 99.02	244.15 ± 70.08	Pass
G-5124, 5125	7/28/2011	Gr. Beta	7.48 ± 0.20	7.17 ± 0.19	7.33 ± 0.14	Pass
AP-5232, 5233	7/28/2011	Be-7	0.15 ± 0.08	0.22 ± 0.13	0.19 ± 0.08	Pass
SL-5169, 5170	8/1/2011	Be-7	2.37 ± 0.16	2.17 ± 0.17	2.27 ± 0.12	Pass
SL-5169, 5170	8/1/2011	Gr. Beta	4.74 ± 0.45	3.94 ± 0.39	4.34 ± 0.30	Pass
SL-5169, 5170	8/1/2011	K-40	3.12 ± 0.16	2.96 ± 0.21	3.04 ± 0.13	Pass
G-5190, 5191	8/1/2011	Be-7	3.14 ± 0.30	3.44 ± 0.27	3.29 ± 0.20	Pass
G-5190, 5191	8/1/2011	Gr. Beta	8.07 ± 0.28	7.86 ± 0.27	7.97 ± 0.19	Pass
G-5190, 5191	8/1/2011	K-40	5.51 ± 0.46	5.57 ± 0.44	5.54 ± 0.32	Pass
DW-20291, 20292	8/2/2011	U-233/4	3.24 ± 0.54	2.60 ± 0.50	2.92 ± 0.37	Pass
DW-20291, 20292	8/2/2011	U-238	1.59 ± 0.38	2.00 ± 0.43	1.80 ± 0.29	Pass
SG-5342, 5343	8/5/2011	Ac-228	14.41 ± 0.36	14.13 ± 0.48	14.27 ± 0.30	Pass
SG-5342, 5343	8/5/2011	Bi-212	4.14 ± 0.65	4.73 ± 1.21	4.44 ± 0.69	Pass
SG-5342, 5343	8/5/2011	K-40	7.67 ± 0.92	7.95 ± 1.21	7.81 ± 0.76	Pass
SG-5342, 5343	8/5/2011	Pb-214	10.72 ± 0.21	10.67 ± 0.28	10.70 ± 0.18	Pass
SG-5342, 5343	8/5/2011	Tl-208	0.96 ± 0.06	1.00 ± 0.06	0.98 ± 0.04	Pass
MI-5405, 5406	8/8/2011	K-40	1545.30 ± 116.00	1388.00 ± 98.20	1466.65 ± 75.99	Pass
DW-20301, 20302	8/9/2011	Gr. Alpha	6.36 ± 1.09	5.30 ± 1.08	5.83 ± 0.77	Pass
DW-20301, 20302	8/9/2011	Gr. Beta	14.36 ± 0.92	13.51 ± 0.89	13.94 ± 0.64	Pass
DW-5603, 5604	8/16/2011	Ra-228	1.68 ± 0.88	2.26 ± 0.91	1.97 ± 0.63	Pass
VE-5753, 5754	8/22/2011	Be-7	0.78 ± 0.20	0.75 ± 0.23	0.77 ± 0.15	Pass
VE-5753, 5754	8/22/2011	K-40	6.16 ± 0.51	6.63 ± 0.57	6.40 ± 0.38	Pass
S-5801, 5802	8/29/2011	Ac-228	0.43 ± 0.09	0.38 ± 0.07	0.41 ± 0.06	Pass
S-5801, 5802	8/29/2011	K-40	6.54 ± 0.51	5.96 ± 0.49	6.25 ± 0.35	Pass
S-5801, 5802	8/29/2011	Pb-212	0.31 ± 0.03	0.36 ± 0.03	0.34 ± 0.02	Pass
S-5801, 5802	8/29/2011	Pb-214	0.28 ± 0.04	0.25 ± 0.04	0.27 ± 0.03	Pass
S-5801, 5802	8/29/2011	Tl-208	0.14 ± 0.02	0.12 ± 0.02	0.13 ± 0.01	Pass
S-5801, 5802	8/29/2011	U-235	0.05 ± 0.02	0.04 ± 0.01	0.05 ± 0.01	Pass
ME-5996, 5997	9/1/2011	Gr. Alpha	0.03 ± 0.02	0.03 ± 0.02	0.03 ± 0.01	Pass
ME-5996, 5997	9/1/2011	Gr. Beta	2.55 ± 0.07	2.62 ± 0.07	2.58 ± 0.05	Pass
ME-5996, 5997	9/1/2011	K-40	2.66 ± 0.35	2.24 ± 0.58	2.45 ± 0.34	Pass

TABLE A-5. In-House "Duplicate" Samples

Lab Code	Date	Analysis	Concentration (pCi/L)[a] First Result	Second Result	Averaged Result	Acceptance
SL-6017, 6018	9/6/2011	Be-7	0.47 ± 0.17	0.51 ± 0.19	0.49 ± 0.13	Pass
SL-6017, 6018	9/6/2011	Gr. Beta	4.23 ± 0.16	3.94 ± 0.15	4.09 ± 0.11	Pass
SL-6017, 6018	9/6/2011	K-40	4.43 ± 0.55	4.24 ± 0.53	4.34 ± 0.38	Pass
VE-6038, 6039	9/7/2011	Sr-90	1.86 ± 0.98	2.30 ± 0.92	2.08 ± 0.67	Pass
SW-6059, 6060	9/8/2011	H-3	219.75 ± 97.52	177.41 ± 95.76	198.58 ± 68.34	Pass
VE-6302, 6303	9/13/2011	Be-7	0.76 ± 0.24	0.85 ± 0.20	0.81 ± 0.16	Pass
VE-6302, 6303	9/13/2011	Gr. Beta	27.00 ± 1.02	25.50 ± 0.95	26.25 ± 0.70	Pass
VE-6302, 6303	9/13/2011	H-3	6966.00 ± 249.00	6947.00 ± 249.00	6956.50 ± 176.07	Pass
VE-6302, 6303	9/13/2011	K-40	20.62 ± 0.68	20.63 ± 0.64	20.63 ± 0.47	Pass
W-7098, 7099	9/19/2011	H-3	586.61 ± 103.06	525.71 ± 100.63	556.16 ± 72.02	Pass
W-6407, 6408	9/20/2011	Ra-228	1.61 ± 0.94	0.79 ± 0.81	1.20 ± 0.62	Pass
MI-6479, 6480	9/27/2011	K-40	1384.10 ± 111.10	1411.40 ± 105.00	1397.75 ± 76.43	Pass
W-6579, 6580	9/27/2011	H-3	287.97 ± 99.68	285.95 ± 99.60	286.96 ± 70.45	Pass
AP-7015, 7016	9/27/2011	Be-7	0.08 ± 0.02	0.09 ± 0.02	0.08 ± 0.01	Pass
AP-6105, 6106	9/28/2011	Be-7	0.11 ± 0.02	0.09 ± 0.02	0.10 ± 0.01	Pass
LW-6603, 6604	9/28/2011	Gr. Beta	2.15 ± 1.04	1.65 ± 0.90	1.90 ± 0.69	Pass
AP-7056, 7057	9/29/2011	Be-7	0.08 ± 0.02	0.06 ± 0.01	0.07 ± 0.01	Pass
G-6730, 6731	10/3/2011	Be-7	4.24 ± 0.36	4.47 ± 0.37	4.36 ± 0.26	Pass
G-6730, 6731	10/3/2011	Gr. Beta	8.27 ± 0.33	7.93 ± 0.31	8.10 ± 0.23	Pass
G-6730, 6731	10/3/2011	K-40	6.46 ± 0.56	5.41 ± 0.50	5.94 ± 0.38	Pass
AP-7077, 7078	10/3/2011	Be-7	0.08 ± 0.01	0.07 ± 0.01	0.07 ± 0.01	Pass
AP-7077, 7078	10/3/2011	Be-7	0.08 ± 0.01	0.07 ± 0.01	0.07 ± 0.01	Pass
VE-6798, 6799	10/4/2011	K-40	11.76 ± 0.65	11.91 ± 0.62	11.84 ± 0.45	Pass
AP-6820, 6821	10/6/2011	Be-7	0.22 ± 0.08	0.18 ± 0.10	0.20 ± 0.06	Pass
W-7755, 7756	10/9/2011	H-3	261.92 ± 96.52	221.92 ± 94.80	241.92 ± 67.65	Pass
BS-7944, 7945	10/10/2011	Cs-137	291.17 ± 34.00	330.68 ± 36.40	310.93 ± 24.90	Pass
BS-7944, 7945	10/10/2011	K-40	14237.00 ± 686.40	15359.00 ± 703.80	14798.00 ± 491.55	Pass
BS-7140, 7141	10/13/2011	K-40	2.59 ± 0.35	2.58 ± 0.52	2.59 ± 0.31	Pass
AP-7168, 7169	10/13/2011	Be-7	0.25 ± 0.09	0.25 ± 0.11	0.25 ± 0.07	Pass
DW-20349, 20350	10/13/2011	U-233/4	1.77 ± 0.41	2.25 ± 0.77	2.01 ± 0.44	Pass
DW-20349, 20350	10/13/2011	U-238	0.28 ± 0.19	0.31 ± 0.33	0.30 ± 0.19	Pass
WW-7667, 7668	10/19/2011	H-3	1049.11 ± 116.32	1071.39 ± 117.10	1060.25 ± 82.53	Pass
WW-7381, 7382	10/21/2011	H-3	1904.40 ± 145.45	1813.62 ± 142.91	1859.01 ± 101.95	Pass
SS-7495, 7496	10/26/2011	K-40	10.16 ± 0.55	9.56 ± 0.49	9.86 ± 0.37	Pass
W-7516, 7517	10/27/2011	H-3	191.46 ± 84.47	224.05 ± 86.03	207.76 ± 60.28	Pass
VE-7537, 7538	10/28/2011	K-40	2.08 ± 0.23	2.41 ± 0.21	2.24 ± 0.16	Pass
MI-7622, 7623	10/31/2011	K-40	1386.20 ± 116.80	1407.90 ± 116.50	1397.05 ± 82.48	Pass
DW-20399, 20400	10/31/2011	U-233/4	5.70 ± 0.70	5.70 ± 0.70	5.70 ± 0.49	Pass
DW-20399, 20400	10/31/2011	U-238	3.10 ± 0.50	3.70 ± 0.70	3.40 ± 0.43	Pass
BS-7600, 7601	11/1/2011	Gr. Beta	6.83 ± 1.44	5.31 ± 1.35	6.07 ± 0.98	Pass

TABLE A-5. In-House "Duplicate" Samples

Lab Code	Date	Analysis	Concentration (pCi/L)[a] First Result	Second Result	Averaged Result	Acceptance
SG-8471, 8472	11/1/2011	Gr. Alpha	13.63 ± 2.32	11.13 ± 2.00	12.38 ± 1.53	Pass
SG-8471, 8472	11/1/2011	Gr. Beta	20.30 ± 1.43	17.65 ± 1.42	18.98 ± 1.01	Pass
DW-20424, 20425	11/7/2011	U-233/4	5.90 ± 0.80	6.10 ± 0.80	6.00 ± 0.57	Pass
DW-20424, 20425	11/7/2011	U-235	0.10 ± 0.10	0.30 ± 0.20	0.20 ± 0.11	Pass
DW-20424, 20425	11/7/2011	U-238	4.30 ± 0.70	3.70 ± 0.60	4.00 ± 0.46	Pass
DW-20424, 20425	11/7/2011	U-238	10.30 ± 1.00	10.10 ± 1.00	10.20 ± 0.71	Pass
DW-20435, 20436	11/8/2011	U-233/4	11.00 ± 1.10	10.60 ± 0.80	10.80 ± 0.68	Pass
DW-20435, 20436	11/8/2011	U-238	5.90 ± 0.80	4.90 ± 0.60	5.40 ± 0.50	Pass
SG-7902, 7903	11/10/2011	Ac-228	21.38 ± 0.47	20.48 ± 0.52	20.93 ± 0.35	Pass
SG-7902, 7903	11/10/2011	K-40	9.72 ± 1.04	9.53 ± 0.92	9.63 ± 0.69	Pass
SG-7902, 7903	11/10/2011	Pb-212	3.99 ± 0.10	3.99 ± 0.10	3.99 ± 0.07	Pass
SG-7902, 7903	11/10/2011	Pb-214	9.15 ± 0.23	9.14 ± 0.21	9.15 ± 0.16	Pass
BS-8033, 8034	11/11/2011	Cs-137	0.03 ± 0.02	0.03 ± 0.02	0.03 ± 0.01	Pass
LW-8075, 8076	11/16/2011	Gr. Beta	1.93 ± 0.62	2.55 ± 0.64	2.24 ± 0.44	Pass
AP-8193, 8194	11/17/2011	Be-7	0.21 ± 0.11	0.26 ± 0.13	0.24 ± 0.08	Pass
F-8663, 8664	11/19/2011	Cs-137	0.03 ± 0.02	0.03 ± 0.02	0.03 ± 0.01	Pass
F-8663, 8664	11/19/2011	Gr. Beta	3.55 ± 0.10	3.71 ± 0.10	3.63 ± 0.07	Pass
F-8663, 8664	11/19/2011	K-40	3.04 ± 0.42	3.05 ± 0.35	3.05 ± 0.27	Pass
DW-20449, 20450	11/28/2011	U-233/4	0.70 ± 0.20	0.80 ± 0.20	0.75 ± 0.14	Pass
DW-20449, 20450	11/28/2011	U-238	0.60 ± 0.20	0.60 ± 0.20	0.60 ± 0.14	Pass
SWU-8388, 8389	11/29/2011	Gr. Beta	1.66 ± 0.57	1.65 ± 0.59	1.66 ± 0.41	Pass
AP-8841, 8842	12/15/2011	Be-7	0.23 ± 0.12	0.19 ± 0.09	0.21 ± 0.07	Pass
W-8886, 8887	12/15/2011	Gr. Alpha	0.83 ± 0.81	1.58 ± 0.99	1.21 ± 0.64	Pass
W-8886, 8887	12/15/2011	Gr. Beta	6.80 ± 1.25	5.94 ± 1.22	6.37 ± 0.87	Pass
W-8886, 8887	12/15/2011	Ra-226	0.23 ± 0.15	0.41 ± 0.16	0.32 ± 0.11	Pass
SO-8958, 8959	12/21/2011	K-40	14.58 ± 0.86	15.07 ± 0.87	14.83 ± 0.61	Pass
AP-8907, 8908	12/22/2011	Be-7	0.15 ± 0.06	0.11 ± 0.07	0.13 ± 0.05	Pass
AP-9196, 9197	12/28/2011	Be-7	0.06 ± 0.01	0.07 ± 0.01	0.06 ± 0.01	Pass
LW-9091, 9092	12/29/2011	Gr. Beta	1.97 ± 0.63	1.74 ± 0.60	1.86 ± 0.44	Pass

Note: Duplicate analyses are performed on every twentieth sample received in-house. Results are not listed for those analyses with activities that measure below the LLD.

[a] Results are reported in units of pCi/L, except for air filters (pCi/Filter), food products, vegetation, soil, sediment (pCi/g).

TABLE A-6. Department of Energy's Mixed Analyte Performance Evaluation Program (MAPEP)[a].

			Concentration [b]			
Lab Code [c]	Date	Analysis	Laboratory result	Known Activity	Control Limits [d]	Acceptance
STW-1237 [e]	02/01/11	Am-241	0.35 ± 0.10	0.53	0.37 - 0.69	Fail
STW-1237	02/01/11	Co-57	< 0.2	0.00	-	Pass
STW-1237	02/01/11	Co-60	24.10 ± 0.40	24.60	17.20 - 32.00	Pass
STW-1237	02/01/11	Cs-134	19.80 ± 0.40	21.50	15.10 - 28.00	Pass
STW-1237	02/01/11	Cs-137	29.40 ± 0.50	29.40	20.60 - 38.20	Pass
STW-1237	02/01/11	H-3	238.90 ± 8.80	243.00	170.00 - 316.00	Pass
STW-1237	02/01/11	K-40	95.40 ± 3.10	91.00	64.00 - 118.00	Pass
STW-1237	02/01/11	Mn-54	32.50 ± 0.60	31.60	22.10 - 41.10	Pass
STW-1237	02/01/11	Ni-63	16.30 ± 0.60	18.60	13.00 - 24.20	Pass
STW-1237	02/01/11	Pu-238	1.11 ± 0.12	1.06	0.75 - 1.38	Pass
STW-1237	02/01/11	Pu-239/40	0.88 ± 0.12	0.81	0.57 - 1.05	Pass
STW-1237	02/01/11	Sr-90	8.70 ± 0.70	8.72	6.10 - 11.34	Pass
STW-1237	02/01/11	Tc-99	7.60 ± 0.60	8.99	6.29 - 11.69	Pass
STW-1237	02/01/11	Zn-65	< 0.5	0.00	-	Pass
STW-1238	02/01/11	Gr. Alpha	0.82 ± 0.07	1.14	0.34 - 1.93	Pass
STW-1238	02/01/11	Gr. Beta	2.82 ± 0.07	2.96	1.48 - 4.44	Pass
STVE-1239	02/01/11	Co-57	11.27 ± 0.21	9.94	6.96 - 12.92	Pass
STVE-1239	02/01/11	Co-60	4.95 ± 0.16	4.91	3.44 - 6.38	Pass
STVE-1239	02/01/11	Cs-134	5.18 ± 0.19	5.50	3.85 - 7.15	Pass
STVE-1239	02/01/11	Cs-137	< 0.09	0.00	-	Pass
STVE-1239	02/01/11	Mn-54	6.91 ± 0.25	6.40	4.48 - 8.32	Pass
STVE-1239	02/01/11	Zn-65	3.10 ± 0.32	2.99	2.09 - 3.89	Pass
STSO-1240	02/01/11	Co-57	984.10 ± 4.10	927.00	649.00 - 1205.00	Pass
STSO-1240	02/01/11	Co-60	540.70 ± 3.00	482.00	337.00 - 627.00	Pass
STSO-1240	02/01/11	Cs-134	726.70 ± 5.92	680.00	476.00 - 884.00	Pass
STSO-1240	02/01/11	Cs-137	883.10 ± 4.70	758.00	531.00 - 985.00	Pass
STSO-1240	02/01/11	K-40	622.70 ± 16.70	540.00	378.00 - 702.00	Pass
STSO-1240	02/01/11	Mn-54	-0.30 ± 1.00	0.00	-	Pass
STSO-1240 [f]	02/01/11	Ni-63	384.00 ± 16.90	582.00	407.00 - 757.00	Fail
STSO-1240	02/01/11	U-233/4	166.60 ± 7.30	176.00	123.00 - 229.00	Pass
STSO-1240	02/01/11	U-238	172.00 ± 7.40	184.00	129.00 - 239.00	Pass
STSO-1240	02/01/11	Zn-65	1671.00 ± 13.10	1359.00	951.00 - 1767.00	Pass
STAP-1241	02/01/11	Am-241	0.00 ± 0.01	0.00	-0.10 - 0.10	Pass
STAP-1241	02/01/11	Co-57	3.48 ± 0.06	3.33	2.33 - 4.33	Pass
STAP-1241	02/01/11	Co-60	0.00 ± 0.02	0.00	-0.10 - 0.10	Pass
STAP-1241	02/01/11	Cs-134	3.44 ± 0.27	3.49	2.44 - 4.54	Pass
STAP-1241	02/01/11	Cs-137	2.46 ± 0.27	2.28	1.60 - 2.96	Pass

TABLE A-6. Department of Energy's Mixed Analyte Performance Evaluation Program (MAPEP)[a].

			Concentration [b]			
Lab Code [c]	Date	Analysis	Laboratory result	Known Activity	Control Limits [d]	Acceptance
STAP-1241	02/01/11	Gr. Alpha	0.39 ± 0.05	0.66	0.20 - 1.12	Pass
STAP-1241	02/01/11	Gr. Beta	1.54 ± 0.07	1.32	0.66 - 1.99	Pass
STAP-1241	02/01/11	Mn-54	2.90 ± 0.10	2.64	1.85 - 3.43	Pass
STAP-1241	02/01/11	Pu-238	0.07 ± 0.02	0.10	0.07 - 0.13	Pass
STAP-1241	02/01/11	Pu-239/40	0.06 ± 0.02	0.08	0.05 - 0.10	Pass
STAP-1241 [g]	02/01/11	Sr-90	1.89 ± 0.15	1.36	0.95 - 1.77	Fail
STAP-1241	02/01/11	U-233/4	0.13 ± 0.02	0.18	0.13 - 0.23	Pass
STAP-1241	02/01/11	U-238	0.14 ± 0.02	0.19	0.13 - 0.24	Pass
STAP-1241	02/01/11	Zn-65	3.80 ± 0.18	3.18	2.23 - 4.13	Pass
STW-1249	08/01/11	I-129	7.32 ± 0.30	9.50	6.70 - 12.40	Pass
STVE-1250	08/01/11	Co-57	0.01 ± 0.02	0.00	-	Pass
STVE-1250	08/01/11	Co-60	3.57 ± 0.13	3.38	2.37 - 4.39	Pass
STVE-1250	08/01/11	Cs-134	-0.02 ± 0.04	0.00	-0.10 - 0.10	Pass
STVE-1250	08/01/11	Cs-137	5.28 ± 0.20	4.71	3.30 - 6.12	Pass
STVE-1250	08/01/11	Mn-54	6.48 ± 0.22	5.71	4.00 - 7.42	Pass
STVE-1250	08/01/11	Zn-65	7.35 ± 0.34	6.39	4.47 - 8.31	Pass
STSO-1251	08/01/11	Co-57	1333.90 ± 4.20	1180.00	826.00 - 1534.00	Pass
STSO-1251	08/01/11	Co-60	701.30 ± 3.40	644.00	451.00 - 837.00	Pass
STSO-1251	08/01/11	Cs-134	0.71 ± 1.05	0.00	-	Pass
STSO-1251	08/01/11	Cs-137	1106.00 ± 5.60	979.00	685.00 - 1273.00	Pass
STSO-1251	08/01/11	K-40	749.20 ± 19.00	625.00	438.00 - 813.00	Pass
STSO-1251	08/01/11	Mn-54	984.30 ± 5.40	848.00	594.00 - 1102.00	Pass
STSO-1251	08/01/11	Ni-63	0.11 ± 1.21	0.00	-	Pass
STSO-1251	08/01/11	Pu-238	97.90 ± 7.40	93.60	65.50 - 121.70	Pass
STSO-1251	08/01/11	Pu-239/40	78.80 ± 6.40	77.40	54.20 - 100.60	Pass
STSO-1251 [h]	08/01/11	Sr-90	219.40 ± 16.70	320.00	224.00 - 416.00	Fail
STSO-1251 [i]	08/01/11	Tc-99	110.00 ± 8.00	182.00	127.00 - 237.00	Fail
STSO-1251	08/01/11	U-233/4	267.00 ± 10.20	263.00	184.00 - 342.00	Pass
STSO-1251	08/01/11	U-238	280.30 ± 10.40	274.00	192.00 - 356.00	Pass
STSO-1251	08/01/11	Zn-65	1639.90 ± 11.40	1560.00	1092.00 - 2028.00	Pass
STAP-1252	08/01/11	Co-57	5.06 ± 0.08	5.09	3.56 - 6.62	Pass
STAP-1252	08/01/11	Co-60	3.13 ± 0.09	3.20	2.24 - 4.16	Pass
STAP-1252	08/01/11	Cs-134	0.01 ± 0.03	0.00	-0.10 - 0.10	Pass
STAP-1252	08/01/11	Cs-137	2.61 ± 0.09	2.60	1.82 - 3.38	Pass
STAP-1252	08/01/11	Mn-54	0.01 ± 0.03	0.00	-0.10 - 0.10	Pass
STAP-1252	08/01/11	Pu-238	0.13 ± 0.02	0.12	0.08 - 0.15	Pass
STAP-1252	08/01/11	Pu-239/40	0.15 ± 0.02	0.14	0.10 - 0.18	Pass
STAP-1252	08/01/11	Sr-90	1.65 ± 0.16	1.67	1.17 - 2.17	Pass

TABLE A-6. Department of Energy's Mixed Analyte Performance Evaluation Program (MAPEP)[a].

			Concentration [b]			
Lab Code [c]	Date	Analysis	Laboratory result	Known Activity	Control Limits [d]	Acceptance
STAP-1252	08/01/11	U-233/4	0.17 ± 0.02	0.16	0.11 - 0.21	Pass
STAP-1252	08/01/11	U-238	0.17 ± 0.02	0.17	0.12 - 0.22	Pass
STAP-1252	08/01/11	Zn-65	4.46 ± 0.23	4.11	2.88 - 5.34	Pass
STW-1254	08/01/11	Co-57	37.20 ± 0.50	36.60	25.60 - 47.60	Pass
STW-1254	08/01/11	Co-60	28.80 ± 0.40	29.30	20.50 - 38.10	Pass
STW-1254	08/01/11	Cs-134	18.00 ± 0.60	19.10	13.40 - 24.80	Pass
STW-1254	08/01/11	Cs-137	0.06 ± 0.13	0.00	-	Pass
STW-1254	08/01/11	H-3	1039.90 ± 17.90	1014.00	710.00 - 1318.00	Pass
STW-1254	08/01/11	K-40	161.40 ± 4.10	156.00	109.00 - 203.00	Pass
STW-1254	08/01/11	Mn-54	25.70 ± 0.50	25.00	17.50 - 32.50	Pass
STW-1254	08/01/11	Ni-63	0.60 ± 2.00	0.00	-	Pass
STW-1254	08/01/11	Pu-238	0.04 ± 0.02	0.02	0.00 - 1.00	Pass
STW-1254	08/01/11	Pu-239/40	2.27 ± 0.14	2.40	1.68 - 3.12	Pass
STW-1254	08/01/11	Sr-90	15.60 ± 1.80	14.20	9.90 - 18.50	Pass
STW-1254	08/01/11	Tc-99	-0.30 ± 0.50	0.00	-	Pass
STW-1254	08/01/11	U-233/4	2.78 ± 0.20	2.78	1.95 - 3.61	Pass
STW-1254	08/01/11	U-238	2.86 ± 0.21	2.89	2.02 - 3.76	Pass
STW-1254	08/01/11	Zn-65	30.20 ± 0.90	28.50	20.00 - 37.10	Pass
STW-1255	08/01/11	Gr. Alpha	0.72 ± 0.12	0.87	0.26 - 1.47	Pass
STW-1255	08/01/11	Gr. Beta	4.71 ± 0.15	4.81	2.41 - 7.22	Pass

[a] Results obtained by Environmental, Inc., Midwest Laboratory as a participant in the Department of Energy's Mixed Analyte Performance Evaluation Program, Idaho Operations office, Idaho Falls, Idaho

[b] Results are reported in units of Bq/kg (soil), Bq/L (water) or Bq/total sample (filters, vegetation).

[c] Laboratory codes as follows: STW (water), STAP (air filter), STSO (soil), STVE (vegetation).

[d] MAPEP results are presented as the known values and expected laboratory precision (1 sigma, 1 determination) and control limits as defined by the MAPEP. A known value of "zero" indicates an analysis was included in the testing series as a "false positive". MAPEP does not provide control limits.

[e] Result of a repeat analysis was still unacceptable. ERA crosschecks for Am-241 were acceptable, but biased low. Matrix spikes were prepared, (5.17 and 51.7 pCi/L), to verify method; results were acceptable, 4.4 and 47.5 pCi/L. Am-241 has been added to the internal spike and blank program for 2012.

[f] An error in percent recovery was found, result of recalculation, 427.3 ± 18.8 Bq/kg dry.

[g] No errors found in calculation or procedure, results of reanalysis; 1.73 Bq/filter.

[h] The analyses were repeated through a strontium column; mean result of triplicate analyses, 304.2 Bq/kg.

[i] The lab does not currently analyze soil for Tc-99, but is evaluating the procedure. After consultation with Eichrom, the analysis was repeated using a matrix spike correction. Mean result of triplicate reanalyses; 183.3 Bq/kg.

TABLE A-7. Interlaboratory Comparison Crosscheck program, Environmental Resource Associates (ERA)[a].

Lab Code [b]	Date	Analysis	Concentration (pCi/L) [b] Laboratory Result [c]	ERA Result [d]	Control Limits	Acceptance
STAP-1230	03/21/11	Am-241	46.0 ± 1.8	62.5	36.6 - 85.7	Pass
STAP-1230	03/21/11	Co-60	401.2 ± 12.1	390.0	302.0 - 487.0	Pass
STAP-1230	03/21/11	Cs-134	268.2 ± 24.8	279.0	182.0 - 345.0	Pass
STAP-1230	03/21/11	Cs-137	345.3 ± 24.9	312.0	234.0 - 410.0	Pass
STAP-1230	03/21/11	Mn-54	< 1.9	0.0	-	Pass
STAP-1230	03/21/11	Pu-238	76.1 ± 3.2	69.0	47.4 - 90.7	Pass
STAP-1230	03/21/11	Pu-239/40	70.50 ± 3.10	65.5	47.5 - 85	Pass
STAP-1230	03/21/11	Sr-90	208.40 ± 18.70	185.0	81.4 - 288	Pass
STAP-1230	03/21/11	U-233/4	56.10 ± 2.10	61.5	38.7 - 91	Pass
STAP-1230	03/21/11	U-238	58.90 ± 2.60	61.0	39.0 - 87	Pass
STAP-1230	03/21/11	Uranium	118.50 ± 5.52	125.0	63.9 - 199	Pass
STAP-1230	03/21/11	Zn-65	312.60 ± 23.40	279.0	193.0 - 386	Pass
STAP-1231	03/21/11	Gr. Alpha	88.40 ± 3.70	74.3	38.5 - 112	Pass
STAP-1231	03/21/11	Gr. Beta	85.10 ± 2.80	69.5	42.8 - 102	Pass
STSO-1232	03/21/11	Ac-228	1327.8 ± 97.5	1490.0	958.0 - 2100.0	Pass
STSO-1232	03/21/11	Am-241	662.8 ± 88.1	914.0	546.0 - 1170.0	Pass
STSO-1232	03/21/11	Bi-212	1396.2 ± 185.3	1400.0	368.0 - 2090.0	Pass
STSO-1232	03/21/11	Bi-214	841.1 ± 33.2	725.0	445.0 - 1040.0	Pass
STSO-1232	03/21/11	Co-60	2423.7 ± 27.1	2220.0	1620.0 - 2980.0	Pass
STSO-1232	03/21/11	Cs-134	2481.3 ± 42.2	2450.0	1580.0 - 2950.0	Pass
STSO-1232	03/21/11	Cs-137	2108.2 ± 30.2	1920.0	1470.0 - 2490.0	Pass
STSO-1232	03/21/11	K-40	11497.3 ± 276.6	11500.0	8320.0 - 15600.0	Pass
STSO-1232	03/21/11	Mn-54	< 17.4	0.0	-	Pass
STSO-1232	03/21/11	Pb-212	994.7 ± 30.0	1440.0	931.0 - 2030.0	Pass
STSO-1232	03/21/11	Pb-214	918.3 ± 42.6	805.0	482.0 - 1200.0	Pass
STSO-1232	03/21/11	Pu-238	1593.6 ± 156.7	1420.0	813.0 - 2000.0	Pass
STSO-1232	03/21/11	Pu-239/40	1428.9 ± 143.4	1400.0	956.0 - 1860.0	Pass
STSO-1232	03/21/11	Sr-90	8638.0 ± 442.8	7590.0	2740.0 - 12400.0	Pass
STSO-1232	03/21/11	Th-234	1350.1 ± 180.0	962.0	305.0 - 1830.0	Pass
STSO-1232	03/21/11	U-233/4	748.0 ± 94.4	972.0	616.0 - 1210.0	Pass
STSO-1232	03/21/11	U-238	909.0 ± 104.9	962.0	588.0 - 1220.0	Pass
STSO-1232	03/21/11	Uranium	1690.8 ± 104.9	1980.0	1130.0 - 2670.0	Pass
STSO-1232	03/21/11	Zn-65	2356.2 ± 57.1	1990.0	1580.0 - 2670.0	Pass

TABLE A-7. Interlaboratory Comparison Crosscheck program, Environmental Resource Associates (ERA)[a].

Lab Code [b]	Date	Analysis	Concentration (pCi/L) [b] Laboratory Result [c]	ERA Result [d]	Control Limits	Acceptance
STVE-1233	03/21/11	Am-241	2377.5 ± 83.2	3200.0	1820.0 - 4400.0	Pass
STVE-1233	03/21/11	Cm-244	602.9 ± 38.4	812.0	400.0 - 1260.0	Pass
STVE-1233	03/21/11	Co-60	810.2 ± 32.4	733.0	496.0 - 1050.0	Pass
STVE-1233	03/21/11	Cs-134	849.4 ± 54.5	770.0	441.0 - 1070.0	Pass
STVE-1233	03/21/11	Cs-137	889.9 ± 36.3	829.0	608.0 - 1150.0	Pass
STVE-1233	03/21/11	K-40	28146.70 ± 698.80	25800.0	18500.0 - 36500	Pass
STVE-1233	03/21/11	Mn-54	< 19.3	0.0	-	Pass
STVE-1233	03/21/11	Pu-238	3068.10 ± 170.70	2990.0	1610.0 - 4380	Pass
STVE-1233	03/21/11	Pu-239/40	3180.00 ± 88.90	3100.0	1920.0 - 4230	Pass
STVE-1233	03/21/11	Sr-90	8549.20 ± 675.00	7890.0	4410.0 - 10500	Pass
STVE-1233	03/21/11	U-233/4	2418.60 ± 142.50	2610.0	1790.0 - 3460	Pass
STVE-1233	03/21/11	U-238	2417.00 ± 142.50	2590.0	1820.0 - 3270	Pass
STVE-1233	03/21/11	Uranium	4929.80 ± 142.50	5320.0	3660.0 - 6860	Pass
STVE-1233	03/21/11	Zn-65	962.40 ± 62.50	799.0	577.0 - 1090	Pass
STW-1234	03/21/11	Am-241	100.0 ± 6.4	135.0	92.5 - 182.0	Pass
STW-1234	03/21/11	Co-60	401.6 ± 7.2	411.0	358.0 - 486.0	Pass
STW-1234	03/21/11	Cs-134	222.7 ± 12.3	231.0	171.0 - 265.0	Pass
STW-1234	03/21/11	Cs-137	410.3 ± 9.5	417.0	354.0 - 500.0	Pass
STW-1234	03/21/11	Mn-54	< 3.0	0.0	-	Pass
STW-1234	03/21/11	Pu-238	130.9 ± 5.5	131.0	99.1 - 162.0	Pass
STW-1234	03/21/11	Pu-239/40	113.0 ± 5.0	119.0	92.1 - 147.0	Pass
STW-1234	03/21/11	Sr-90	739.6 ± 13.0	773.0	491.0 - 1030.0	Pass
STW-1234	03/21/11	U-233/4	83.4 ± 3.8	94.3	71.1 - 122.0	Pass
STW-1234	03/21/11	U-238	85.5 ± 3.9	93.5	71.4 - 116.0	Pass
STW-1234	03/21/11	Uranium	172.0 ± 8.5	192.0	138.0 - 256.0	Pass
STW-1234	03/21/11	Zn-65	114.5 ± 10.8	111.0	94.1 - 138.0	Pass
STW-1235	03/21/11	Gr. Alpha	97.6 ± 2.9	112.0	49.7 - 166.0	Pass
STW-1235	03/21/11	Gr. Beta	99.6 ± 2.0	99.8	58.4 - 146.0	Pass
STW-1236	03/21/11	H-3	16307.0 ± 377.0	15200.0	9900.0 - 22500.0	Pass

[a] Results obtained by Environmental, Inc., Midwest Laboratory as a participant in the crosscheck program for proficiency testing administered by Environmental Resources Associates, serving as a replacement for studies conducted previously by the Environmental Measurements Laboratory Quality Assessment Program (EML).

[b] Laboratory codes as follows: STW (water), STAP (air filter), STSO (soil), STVE (vegetation). Results are reported in units of pCi/L, except for air filters (pCi/Filter), vegetation and soil (pCi/kg).

[c] Unless otherwise indicated, the laboratory result is given as the mean ± standard deviation for three determinations.

[d] Results are presented as the known values, expected laboratory precision (1 sigma, 1 determination) and control limits as provided by ERA. A known value of "zero" indicates an analysis was included in the testing series as a "false positive". Control limits are not provided.

APPENDIX B
2011 REMP DATA SUMMARY REPORTS

Air Gamma Spectral Summary Report 2011

Radiological Environmental Monitoring Program Data Summary

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Type and Units	Type and Number of Analyses Performed	Lower Limit (LLD)	Mean of Results from All Locations and Number Detected/Number Collected and Range	Mean of Results from All Indicator Locations and Number Detected/Number Collected and Range	Location with Highest Annual Mean: Location # and Distance and Direction	Location with Highest Annual Mean: Mean and Number Detected/Number Collected and Range	Mean of Results from All Control Locations and Number Detected/Number Collected and Range
Air pCi/m3	Be-7 28	N/A	0.06 28 / 28 0.05 - 0.08	0.06 24 / 24 0.06 - 0.07	5 0.60 SW	0.06 4 / 20 0.06 - 0.07	0.06 4 / 4 0.05 - 0.08
Air pCi/m3	Co-58 28	N/A	LLD	-	-	-	-
Air pCi/m3	Co-60 28	N/A	LLD	-	-	-	-
Air pCi/m3	Cs-134 28	0.04	LLD	-	-	-	-
Air pCi/m3	Cs-137 28	0.05	LLD	-	-	-	-

Air Gross Beta Summary Report 2011

Radiological Environmental Monitoring Program Data Summary

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Type and Units	Type and Number of Analyses Performed	Lower Limit (LLD)	Mean of Results from All Locations and Number Detected/Number Collected and Range	Mean of Results from All Indicator Locations and Number Detected/Number Collected and Range	Location with Highest Annual Mean: Location # and Distance and Direction	Location with Highest Annual Mean: Mean and Number Detected/Number Collected and Range	Mean of Results from All Control Locations and Number Detected/Number Collected and Range
Air pCi/m3	Gross Beta 364	0.01	0.02 364 / 364 0.01 - 0.06	0.02 312 / 312 0.01 - 0.06	6 11.00 SSW	0.03 52 / 52 0.01 - 0.06	0.03 52 / 52 0.01 - 0.06

Air Iodine Summary Report 2011

Radiological Environmental Monitoring Program Data Summary

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Type and Units	Type and Number of Analyses Performed	Lower Limit (LLD)	Mean of Results from All Locations and Number Detected/Number Collected and Range	Mean of Results from All Indicator Locations and Number Detected/Number Collected and Range	Location with Highest Annual Mean: Location # and Distance and Direction	Location with Highest Annual Mean: Mean and Number Detected/Number Collected and Range	Mean of Results from All Control Locations and Number Detected/Number Collected and Range
Air pCi/m3	I-131 364	0.05	0.07 21 / 364 0.02 - 0.13	0.07 18 / 312 0.02 - 0.11	6 11.00 SSW	0.08 3 / 52 0.04 - 0.13	0.08 3 / 52 0.04 - 0.13

Fish Gamma Spectral Summary Report 2011
Radiological Environmental Monitoring Program Data Summary
Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Type and Units	Type and Number of Analyses Performed	Lower Limit (LLD)	Mean of Results from All Locations and Number Detected/Number Collected and Range	Mean of Results from All Indicator Locations and Number Detected/Number Collected and Range	Location with Highest Annual Mean: Location # and Distance and Direction	Location with Highest Annual Mean: Mean and Number Detected/Number Collected and Range	Mean of Results from All Control Locations and Number Detected/Number Collected and Range
Fish pCi/kg wet	Co-58 6	97.00	LLD	-	-	-	-
Fish pCi/kg wet	Co-60 6	97.00	LLD	-	-	-	-
Fish pCi/kg wet	Cs-134 6	97.00	LLD	-	-	-	-
Fish pCi/kg wet	Cs-137 6	112.00	LLD	-	-	-	-
Fish pCi/kg wet	Fe-59 6	195.00	LLD	-	-	-	-
Fish pCi/kg wet	K-40 6	N/A	1,353.80 6 / 6 1,132.70 - 1,823.20	1,315.43 3 / 3 1,276.60 - 1,342.40	32 15.80 WSW	1,392.17 3 / 24 1,132.70 - 1,823.20	1,392.17 3 / 3 1,132.70 - 1,823.20
Fish pCi/kg wet	Mn-54 6	97.00	LLD	-	-	-	-
Fish pCi/kg wet	Zn-65 6	195.00	LLD	-	-	-	-

Food Products Gamma Spectral Summary Report 2011
Radiological Environmental Monitoring Program Data Summary
Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Type and Units	Type and Number of Analyses Performed	Lower Limit (LLD)	Mean of Results from All Locations and Number Detected/Number Collected and Range	Mean of Results from All Indicator Locations and Number Detected/Number Collected and Range	Location with Highest Annual Mean: Location # and Distance and Direction	Location with Highest Annual Mean: Mean and Number Detected/Number Collected and Range	Mean of Results from All Control Locations and Number Detected/Number Collected and Range
Food Products pCi/kg wet	Be-7 43	N/A	651.54 28 / 43 181.11 - 1,736.70	651.58 25 / 36 181.11 - 1,736.70	2 1.90 ENE	909.23 6 / 63 181.11 - 1,736.70	651.17 3 / 7 291.40 - 873.62
Food Products pCi/kg wet	Co-58 43	N/A	LLD	-	-	-	-
Food Products pCi/kg wet	Co-60 43	N/A	LLD	-	-	-	-
Food Products pCi/kg wet	Cs-134 43	45.00	LLD	-	-	-	-
Food Products pCi/kg wet	Cs-137 43	60.00	LLD	-	-	-	-
Food Products pCi/kg wet	I-131 43	45.00	LLD	-	-	-	-
Food Products pCi/kg wet	K-40 43	N/A	4,825.36 43 / 43 2,654.10 - 7,399.40	4,939.90 36 / 36 2,654.10 - 7,399.40	18 2.50 E	5,577.61 8 / 56 4,898.60 - 6,791.10	4,236.29 7 / 7 3,148.30 - 5,771.20

Milk Gamma Spectral Summary Report 2011
Radiological Environmental Monitoring Program Data Summary
Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Type and Units	Type and Number of Analyses Performed	Lower Limit (LLD)	Mean of Results from All Locations and Number Detected/Number Collected and Range	Mean of Results from All Indicator Locations and Number Detected/Number Collected and Range	Location with Highest Annual Mean: Location # and Distance and Direction	Location with Highest Annual Mean: Mean and Number Detected/Number Collected and Range	Mean of Results from All Control Locations and Number Detected/Number Collected and Range
Milk pCi/L	Cs-137 54	13.00	LLD	-	-	-	-
Milk pCi/L	K-40 54	N/A	1,420.59 54 / 54 717.02 - 1,902.00	1,596.51 35 / 35 1,113.70 - 1,902.00	41 5.80 SSE	1,703.85 8 / 40 1,152.90 - 1,868.00	1,096.52 19 / 19 717.02 - 1,844.70
Milk pCi/L	La-140 54	11.00	LLD	-	-	-	-
Milk pCi/L	Ba-140 54	45.00	LLD	-	-	-	-
Milk pCi/L	Cs-134 54	11.00	LLD	-	-	-	-

Milk Iodine Summary Report 2011

Radiological Environmental Monitoring Program Data Summary

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Type and Units	Type and Number of Analyses Performed	Lower Limit (LLD)	Mean of Results from All Locations and Number Detected/Number Collected and Range	Mean of Results from All Indicator Locations and Number Detected/Number Collected and Range	Location with Highest Annual Mean: Location # and Distance and Direction	Location with Highest Annual Mean: Mean and Number Detected/Number Collected and Range	Mean of Results from All Control Locations and Number Detected/Number Collected and Range
Milk pCi/L	I-131 54	0.75	1.61 3 / 54 1.25 - 2.23	1.61 3 / 35 1.25 - 2.23	18 2.50 E	1.80 2 / 15 1.36 - 2.23	LLD 0 / 19

Sediment Gamma Spectral Summary Report 2011
Radiological Environmental Monitoring Program Data Summary
Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Type and Units	Type and Number of Analyses Performed	Lower Limit (LLD)	Mean of Results from All Locations and Number Detected/Number Collected and Range	Mean of Results from All Indicator Locations and Number Detected/Number Collected and Range	Location with Highest Annual Mean: Location # and Distance and Direction	Location with Highest Annual Mean: Mean and Number Detected/Number Collected and Range	Mean of Results from All Control Locations and Number Detected/Number Collected and Range
Sediment pCi/kg dry	Co-58 12	50.00	LLD	-	-	-	-
Sediment pCi/kg dry	Co-60 12	40.00	LLD	-	-	-	-
Sediment pCi/kg dry	Cs-134 12	112.00	LLD	-	-	-	-
Sediment pCi/kg dry	Cs-137 12	135.00	367.04 5 / 12 136.09 - 646.60	188.12 3 / 10 136.09 - 291.17	32 15.80 WSW	635.43 2 / 10 624.25 - 646.60	635.43 2 / 2 624.25 - 646.60
Sediment pCi/kg dry	K-40 12	N/A	13,406.15 12 / 12 7,531.30 - 23,261.00	11,491.08 10 / 10 7,531.30 - 15,973.00	32 15.80 WSW	22,981.50 2 / 10 22,702.00 - 23,261.00	22,981.50 2 / 2 22,702.00 - 23,261.00

TLD Gamma Dose Summary Report 2011

Radiological Environmental Monitoring Program Data Summary

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Type and Units	Type and Number of Analyses Performed	Lower Limit (LLD)	Mean of Results from All Locations and Number Detected/Number Collected and Range	Mean of Results from All Indicator Locations and Number Detected/Number Collected and Range	Location with Highest Annual Mean: Location # and Distance and Direction	Location with Highest Annual Mean: Mean and Number Detected/Number Collected and Range	Mean of Results from All Control Locations and Number Detected/Number Collected and Range
TLD mR/91 days	Direct 112	1.00	12.47 112 / 112 7.11 - 17.35	12.48 104 / 104 7.11 - 17.35	33 4.50 S	16.79 4 / 4 16.25 - 17.35	12.29 8 / 8 11.62 - 12.82
TLD mR/91 days	Direct 112	1.00	13.40 112 / 112 8.75 - 18.47	13.44 104 / 104 8.75 - 18.47	33 4.50 S	17.39 4 / 4 16.61 - 18.47	12.81 8 / 8 11.23 - 14.32
TLD mR/365 days	Direct 28	1.00	62.31 28 / 28 49.07 - 80.26	62.44 26 / 26 49.07 - 80.26	33 4.50 S	80.26 1 / 1 80.26 - 80.26	60.56 2 / 2 56.45 - 64.68

Water Gamma Spectral Summary Report 2011
Radiological Environmental Monitoring Program Data Summary
Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Type and Units	Type and Number of Analyses Performed	Lower Limit (LLD)	Mean of Results from All Locations and Number Detected/Number Collected and Range	Mean of Results from All Indicator Locations and Number Detected/Number Collected and Range	Location with Highest Annual Mean: Location # and Distance and Direction	Location with Highest Annual Mean: Mean and Number Detected/Number Collected and Range	Mean of Results from All Control Locations and Number Detected/Number Collected and Range
Water pCi/L	Ba-140 54	45.00	LLD	-	-	-	-
Water pCi/L	Co-58 54	11.00	LLD	-	-	-	-
Water pCi/L	Co-60 54	11.00	LLD	-	-	-	-
Water pCi/L	Cs-134 54	11.00	LLD	-	-	-	-
Water pCi/L	Cs-137 54	13.00	LLD	-	-	-	-
Water pCi/L	Fe-59 54	22.00	LLD	-	-	-	-
Water pCi/L	La-140 54	11.00	LLD	-	-	-	-
Water pCi/L	Mn-54 54	11.00	LLD	-	-	-	-
Water pCi/L	Nb-95 54	11.00	LLD	-	-	-	-
Water pCi/L	Zn-65 54	22.00	LLD	-	-	-	-
Water pCi/L	Zr-95 54	22.00	LLD	-	-	-	-

Water Gross Beta Summary Report 2011

Radiological Environmental Monitoring Program Data Summary

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Type and Units	Type and Number of Analyses Performed	Lower Limit (LLD)	Mean of Results from All Locations and Number Detected/Number Collected and Range	Mean of Results from All Indicator Locations and Number Detected/Number Collected and Range	Location with Highest Annual Mean: Location # and Distance and Direction	Location with Highest Annual Mean: Mean and Number Detected/Number Collected and Range	Mean of Results from All Control Locations and Number Detected/Number Collected and Range
Water pCi/L	Gross Beta 54	3.00	3.76 4 / 54 3.06 - 4.25	3.59 3 / 42 3.06 - 4.11	28 22.00 ENE	4.25 1 / 12 4.25 - 4.25	4.25 1 / 12 4.25 - 4.25

Water Tritium Summary Report 2011
Radiological Environmental Monitoring Program Data Summary
Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Type and Units	Type and Number of Analyses Performed	Lower Limit (LLD)	Mean of Results from All Locations and Number Detected/Number Collected and Range	Mean of Results from All Indicator Locations and Number Detected/Number Collected and Range	Location with Highest Annual Mean: Location # and Distance and Direction	Location with Highest Annual Mean: Mean and Number Detected/Number Collected and Range	Mean of Results from All Control Locations and Number Detected/Number Collected and Range
Water pCi/L	H-3 18	1,500.00	LLD	-	-	-	-

APPENDIX C
2011 REMP DETAILED DATA REPORT

Air Gamma Spectral Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Quarterly Results in pCi/m3 +/- 2 Sigma

Location	Sample Type	Collection Date	Be-7	Co-58	Co-60	Cs-134	Cs-137
1	Air	3/30/2011	0.057 +/- 0.009	< 0.000	< 0.000	< 0.000	< 0.001
1	Air	6/29/2011	0.065 +/- 0.009	< 0.000	< 0.000	< 0.001	< 0.001
1	Air	9/29/2011	0.062 +/- 0.011	< 0.000	< 0.000	< 0.000	< 0.000
1	Air	12/28/2011	0.061 +/- 0.009	< 0.001	< 0.000	< 0.000	< 0.000
3	Air	3/30/2011	0.057 +/- 0.010	< 0.000	< 0.000	< 0.000	< 0.001
3	Air	6/29/2011	0.062 +/- 0.010	< 0.000	< 0.001	< 0.000	< 0.001
3	Air	9/29/2011	0.059 +/- 0.009	< 0.000	< 0.000	< 0.000	< 0.000
3	Air	12/28/2011	0.059 +/- 0.009	< 0.000	< 0.000	< 0.000	< 0.000
4	Air	3/30/2011	0.063 +/- 0.010	< 0.000	< 0.000	< 0.000	< 0.000
4	Air	6/29/2011	0.062 +/- 0.009	< 0.000	< 0.000	< 0.001	< 0.001
4	Air	9/29/2011	0.063 +/- 0.008	< 0.001	< 0.000	< 0.000	< 0.000

Air Gamma Spectral Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Quarterly Results in pCi/m3 +/- 2 Sigma

Location	Sample Type	Collection Date	Be-7	Co-58	Co-60	Cs-134	Cs-137
4	Air	12/28/2011	0.064 +/- 0.012	< 0.000	< 0.000	< 0.000	< 0.000
5	Air	3/30/2011	0.060 +/- 0.006	< 0.000	< 0.000	< 0.000	< 0.000
5	Air	6/29/2011	0.057 +/- 0.008	< 0.000	< 0.000	< 0.000	< 0.000
5	Air	9/29/2011	0.071 +/- 0.009	< 0.000	< 0.000	< 0.000	< 0.000
5	Air	12/28/2011	0.065 +/- 0.011	< 0.001	< 0.000	< 0.000	< 0.000
6	Air	3/30/2011	0.054 +/- 0.009	< 0.000	< 0.000	< 0.000	< 0.000
6	Air	6/29/2011	0.077 +/- 0.009	< 0.000	< 0.000	< 0.000	< 0.000
6	Air	9/29/2011	0.065 +/- 0.009	< 0.000	< 0.000	< 0.000	< 0.000
6	Air	12/28/2011	0.056 +/- 0.007	< 0.000	< 0.000	< 0.000	< 0.000
7	Air	3/30/2011	0.055 +/- 0.008	< 0.000	< 0.000	< 0.000	< 0.001
7	Air	6/29/2011	0.059 +/- 0.009	< 0.000	< 0.000	< 0.001	< 0.000

Air Gamma Spectral Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Quarterly Results in pCi/m3 +/- 2 Sigma

Location	Sample Type	Collection Date	Be-7	Co-58	Co-60	Cs-134	Cs-137
7	Air	9/29/2011	0.059 +/- 0.008	< 0.000	< 0.000	< 0.000	< 0.000
7	Air	12/28/2011	0.062 +/- 0.010	< 0.001	< 0.000	< 0.000	< 0.001
35	Air	3/30/2011	0.058 +/- 0.010	< 0.000	< 0.000	< 0.001	< 0.000
35	Air	6/29/2011	0.064 +/- 0.011	< 0.001	< 0.000	< 0.000	< 0.000
35	Air	9/29/2011	0.062 +/- 0.009	< 0.000	< 0.000	< 0.000	< 0.000
35	Air	12/28/2011	0.064 +/- 0.010	< 0.000	< 0.000	< 0.000	< 0.000

Air Gross Beta Detail Report 2011

Radiological Environmental Monitoring Program Data Summary

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Weekly Results in pCi/m3 +/- 2 Sigma

		Location				
		1	3	4	5	6
Collection Date	Sample Type	7	35			
1/5/2011	Air	0.036 +/- 0.003 0.039 +/- 0.003	0.035 +/- 0.003 0.038 +/- 0.003	0.037 +/- 0.003	0.039 +/- 0.003	0.038 +/- 0.003
1/12/2011	Air	0.029 +/- 0.003 0.035 +/- 0.003	0.029 +/- 0.003 0.030 +/- 0.003	0.030 +/- 0.003	0.032 +/- 0.003	0.038 +/- 0.003
1/19/2011	Air	0.027 +/- 0.003 0.027 +/- 0.003	0.023 +/- 0.003 0.027 +/- 0.003	0.025 +/- 0.003	0.024 +/- 0.003	0.026 +/- 0.003
1/26/2011	Air	0.032 +/- 0.003 0.037 +/- 0.003	0.027 +/- 0.003 0.033 +/- 0.003	0.034 +/- 0.003	0.036 +/- 0.003	0.035 +/- 0.003
2/2/2011	Air	0.029 +/- 0.003 0.028 +/- 0.003	0.026 +/- 0.003	0.028 +/- 0.003	0.027 +/- 0.003	0.027 +/- 0.003
2/3/2011	Air		0.025 +/- 0.002			
2/9/2011	Air	0.025 +/- 0.003 0.024 +/- 0.003	0.020 +/- 0.003 0.022 +/- 0.003	0.022 +/- 0.003	0.023 +/- 0.003	0.024 +/- 0.003
2/16/2011	Air	0.027 +/- 0.003 0.025 +/- 0.003	0.022 +/- 0.003 0.027 +/- 0.003	0.024 +/- 0.003	0.024 +/- 0.003	0.022 +/- 0.003
2/24/2011	Air	0.021 +/- 0.002 0.021 +/- 0.002	0.020 +/- 0.002 0.021 +/- 0.002	0.025 +/- 0.003	0.024 +/- 0.003	0.023 +/- 0.003
3/2/2011	Air	0.031 +/- 0.003 0.031 +/- 0.003	0.027 +/- 0.003 0.032 +/- 0.003	0.031 +/- 0.003	0.030 +/- 0.003	0.031 +/- 0.003
3/9/2011	Air	0.020 +/- 0.003 0.020 +/- 0.003	0.016 +/- 0.002 0.021 +/- 0.003	0.021 +/- 0.003	0.018 +/- 0.002	0.018 +/- 0.003
3/16/2011	Air	0.020 +/- 0.003 0.018 +/- 0.003	0.016 +/- 0.002 0.017 +/- 0.003	0.019 +/- 0.003	0.018 +/- 0.002	0.019 +/- 0.003
3/23/2011	Air	0.030 +/- 0.003 0.031 +/- 0.003	0.029 +/- 0.003 0.032 +/- 0.003	0.031 +/- 0.003	0.028 +/- 0.003	0.027 +/- 0.003
3/30/2011	Air	0.030 +/- 0.003 0.029 +/- 0.003	0.030 +/- 0.003 0.029 +/- 0.003	0.029 +/- 0.003	0.027 +/- 0.003	0.029 +/- 0.003
4/6/2011	Air	0.030 +/- 0.003 0.041 +/- 0.003	0.036 +/- 0.003 0.046 +/- 0.003	0.045 +/- 0.003	0.030 +/- 0.003	0.039 +/- 0.003

Air Gross Beta Detail Report 2011

Radiological Environmental Monitoring Program Data Summary

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Weekly Results in pCi/m3 +/- 2 Sigma

		Location				
		1	3	4	5	6
Collection Date	Sample Type	7	35			
4/13/2011	Air	0.017 +/- 0.003 0.018 +/- 0.003	0.019 +/- 0.003 0.019 +/- 0.003	0.016 +/- 0.003	0.015 +/- 0.002	0.018 +/- 0.003
4/20/2011	Air	0.024 +/- 0.003 0.025 +/- 0.003	0.022 +/- 0.003 0.024 +/- 0.003	0.027 +/- 0.003	0.023 +/- 0.002	0.023 +/- 0.003
4/27/2011	Air	0.015 +/- 0.003 0.009 +/- 0.002	0.013 +/- 0.002 0.015 +/- 0.003	0.017 +/- 0.003	0.012 +/- 0.002	0.014 +/- 0.003
5/4/2011	Air	0.016 +/- 0.002 0.018 +/- 0.002	0.015 +/- 0.002 0.017 +/- 0.002	0.014 +/- 0.002	0.014 +/- 0.002	0.015 +/- 0.002
5/11/2011	Air	0.014 +/- 0.003 0.013 +/- 0.003	0.013 +/- 0.003 0.014 +/- 0.003	0.015 +/- 0.003	0.012 +/- 0.002	0.016 +/- 0.003
5/18/2011	Air	0.011 +/- 0.002 0.012 +/- 0.002	0.014 +/- 0.002 0.012 +/- 0.002	0.015 +/- 0.002	0.015 +/- 0.002	0.013 +/- 0.002
5/26/2011	Air	0.013 +/- 0.002 0.012 +/- 0.002	0.012 +/- 0.002 0.014 +/- 0.002	0.013 +/- 0.002	0.012 +/- 0.002	0.014 +/- 0.002
6/1/2011	Air	0.016 +/- 0.003 0.020 +/- 0.003	0.019 +/- 0.003 0.020 +/- 0.003	0.020 +/- 0.003	0.020 +/- 0.003	0.020 +/- 0.003
6/8/2011	Air	0.021 +/- 0.003 0.018 +/- 0.003	0.021 +/- 0.003 0.022 +/- 0.003	0.025 +/- 0.003	0.021 +/- 0.003	0.019 +/- 0.003
6/15/2011	Air	0.015 +/- 0.002 0.015 +/- 0.002	0.015 +/- 0.002 0.015 +/- 0.002	0.013 +/- 0.002	0.015 +/- 0.002	0.015 +/- 0.002
6/22/2011	Air	0.012 +/- 0.003 0.011 +/- 0.003	0.012 +/- 0.003 0.012 +/- 0.003	0.013 +/- 0.003	0.012 +/- 0.003	0.011 +/- 0.003
6/29/2011	Air	0.014 +/- 0.002 0.013 +/- 0.002	0.012 +/- 0.002 0.012 +/- 0.002	0.012 +/- 0.002	0.013 +/- 0.002	0.014 +/- 0.002
7/6/2011	Air	0.017 +/- 0.003 0.020 +/- 0.003	0.013 +/- 0.002 0.016 +/- 0.003	0.017 +/- 0.003	0.029 +/- 0.003	0.035 +/- 0.003
7/13/2011	Air	0.025 +/- 0.003 0.027 +/- 0.003	0.024 +/- 0.003 0.025 +/- 0.003	0.026 +/- 0.003	0.026 +/- 0.003	0.028 +/- 0.003
7/20/2011	Air	0.025 +/- 0.003 0.024 +/- 0.003	0.024 +/- 0.003 0.024 +/- 0.003	0.024 +/- 0.003	0.025 +/- 0.003	0.029 +/- 0.003

Air Gross Beta Detail Report 2011

Radiological Environmental Monitoring Program Data Summary

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Weekly Results in pCi/m3 +/- 2 Sigma

		Location				
		1	3	4	5	6
Collection Date	Sample Type	7	35			
7/27/2011	Air	0.040 +/- 0.003 0.030 +/- 0.003	0.033 +/- 0.003 0.030 +/- 0.003	0.028 +/- 0.003	0.031 +/- 0.003	0.039 +/- 0.003
8/3/2011	Air	0.028 +/- 0.003 0.030 +/- 0.003	0.030 +/- 0.003 0.030 +/- 0.003	0.028 +/- 0.003	0.028 +/- 0.003	0.037 +/- 0.003
8/10/2011	Air	0.022 +/- 0.003 0.027 +/- 0.003	0.024 +/- 0.003 0.024 +/- 0.003	0.025 +/- 0.003	0.027 +/- 0.003	0.026 +/- 0.003
8/17/2011	Air	0.021 +/- 0.002 0.017 +/- 0.003	0.020 +/- 0.002 0.020 +/- 0.003	0.019 +/- 0.002	0.024 +/- 0.003	0.019 +/- 0.003
8/24/2011	Air	0.031 +/- 0.003 0.031 +/- 0.003	0.028 +/- 0.003 0.032 +/- 0.003	0.029 +/- 0.003	0.030 +/- 0.003	0.031 +/- 0.003
8/31/2011	Air	0.017 +/- 0.002 0.015 +/- 0.002	0.015 +/- 0.002 0.018 +/- 0.003	0.017 +/- 0.002	0.018 +/- 0.003	0.018 +/- 0.003
9/7/2011	Air	0.040 +/- 0.003 0.043 +/- 0.003	0.039 +/- 0.003 0.043 +/- 0.003	0.037 +/- 0.003	0.045 +/- 0.003	0.043 +/- 0.003
9/14/2011	Air	0.020 +/- 0.003 0.020 +/- 0.003	0.021 +/- 0.003 0.022 +/- 0.003	0.023 +/- 0.003	0.024 +/- 0.003	0.021 +/- 0.003
9/21/2011	Air	0.017 +/- 0.002 0.016 +/- 0.003	0.014 +/- 0.002 0.016 +/- 0.003	0.016 +/- 0.002	0.015 +/- 0.003	0.016 +/- 0.003
9/29/2011	Air	0.024 +/- 0.002 0.020 +/- 0.002	0.022 +/- 0.002 0.021 +/- 0.002	0.021 +/- 0.002	0.025 +/- 0.003	0.025 +/- 0.003
10/5/2011	Air	0.014 +/- 0.003 0.012 +/- 0.003	0.011 +/- 0.003 0.012 +/- 0.003	0.013 +/- 0.003	0.015 +/- 0.003	0.014 +/- 0.003
10/12/2011	Air	0.052 +/- 0.003 0.053 +/- 0.004	0.049 +/- 0.003 0.054 +/- 0.003	0.056 +/- 0.003	0.060 +/- 0.004	0.057 +/- 0.004
10/19/2011	Air	0.020 +/- 0.003 0.020 +/- 0.003	0.022 +/- 0.003 0.026 +/- 0.003	0.022 +/- 0.003	0.022 +/- 0.003	0.024 +/- 0.003
10/26/2011	Air	0.021 +/- 0.003 0.020 +/- 0.003	0.019 +/- 0.003 0.024 +/- 0.003	0.020 +/- 0.003	0.022 +/- 0.003	0.018 +/- 0.003
11/2/2011	Air	0.025 +/- 0.003 0.022 +/- 0.003	0.022 +/- 0.003 0.023 +/- 0.003	0.025 +/- 0.003	0.026 +/- 0.003	0.025 +/- 0.003

Air Gross Beta Detail Report 2011

Radiological Environmental Monitoring Program Data Summary

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Weekly Results in pCi/m3 +/- 2 Sigma

		Location				
		1	3	4	5	6
Collection Date	Sample Type	7	35			
11/8/2011	Air	0.028 +/- 0.003 0.031 +/- 0.003	0.031 +/- 0.003 0.029 +/- 0.003	0.033 +/- 0.003	0.032 +/- 0.003	0.035 +/- 0.003
11/16/2011	Air	0.030 +/- 0.003 0.028 +/- 0.002	0.026 +/- 0.002 0.026 +/- 0.002	0.029 +/- 0.003	0.030 +/- 0.003	0.029 +/- 0.003
11/23/2011	Air	0.021 +/- 0.003 0.021 +/- 0.002	0.019 +/- 0.002 0.024 +/- 0.003	0.022 +/- 0.003	0.019 +/- 0.003	0.021 +/- 0.003
11/30/2011	Air	0.018 +/- 0.003 0.020 +/- 0.003	0.018 +/- 0.003 0.020 +/- 0.003	0.020 +/- 0.003	0.028 +/- 0.005	0.020 +/- 0.003
12/7/2011	Air	0.022 +/- 0.003 0.017 +/- 0.002	0.021 +/- 0.003 0.019 +/- 0.003	0.020 +/- 0.003	0.022 +/- 0.003	0.021 +/- 0.003
12/14/2011	Air	0.040 +/- 0.003 0.040 +/- 0.003	0.040 +/- 0.003 0.040 +/- 0.003	0.040 +/- 0.003	0.046 +/- 0.003	0.044 +/- 0.003
12/21/2011	Air	0.038 +/- 0.003 0.036 +/- 0.003	0.037 +/- 0.003 0.034 +/- 0.003	0.035 +/- 0.003	0.042 +/- 0.003	0.039 +/- 0.003
12/28/2011	Air	0.020 +/- 0.002 0.019 +/- 0.002	0.017 +/- 0.002 0.019 +/- 0.002	0.018 +/- 0.002	0.020 +/- 0.003	0.023 +/- 0.003

Air Iodine Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Weekly Results in pCi/m3 +/- 2 Sigma

Location	Sample Type	Collection Date	I-131
1	Air	1/5/2011	< 0.006
1	Air	1/12/2011	< 0.011
1	Air	1/19/2011	< 0.010
1	Air	1/26/2011	< 0.006
1	Air	2/2/2011	< 0.005
1	Air	2/9/2011	< 0.006
1	Air	2/16/2011	< 0.004
1	Air	2/24/2011	< 0.011
1	Air	3/2/2011	< 0.014
1	Air	3/9/2011	< 0.009
1	Air	3/16/2011	< 0.012
1	Air	3/23/2011	0.063 +/- 0.012
1	Air	3/30/2011	LLD
1	Air	4/6/2011	0.107 +/- 0.017
1	Air	4/13/2011	< 0.015
1	Air	4/20/2011	< 0.013
1	Air	4/27/2011	< 0.013
1	Air	5/4/2011	< 0.010
1	Air	5/11/2011	< 0.012
1	Air	5/18/2011	< 0.011
1	Air	5/26/2011	< 0.005
1	Air	6/1/2011	< 0.008
1	Air	6/8/2011	< 0.007
1	Air	6/15/2011	< 0.011
1	Air	6/22/2011	< 0.006
1	Air	6/29/2011	< 0.007
1	Air	7/6/2011	< 0.013
1	Air	7/13/2011	< 0.009
1	Air	7/20/2011	< 0.010
1	Air	7/27/2011	< 0.010
1	Air	8/3/2011	< 0.012
1	Air	8/10/2011	< 0.005
1	Air	8/17/2011	< 0.006
1	Air	8/24/2011	< 0.007
1	Air	8/31/2011	< 0.007
1	Air	9/7/2011	< 0.008
1	Air	9/14/2011	< 0.007
1	Air	9/21/2011	< 0.008
1	Air	9/29/2011	< 0.008
1	Air	10/5/2011	< 0.007
1	Air	10/12/2011	< 0.008

Air Iodine Detail Report 2011

Radiological Environmental Monitoring Program Detail Data
Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441
Sample Frequency is: Weekly Results in pCi/m3 +/- 2 Sigma

Location	Sample Type	Collection Date	I-131
1	Air	10/19/2011	< 0.006
1	Air	10/26/2011	< 0.007
1	Air	11/2/2011	< 0.008
1	Air	11/8/2011	< 0.007
1	Air	11/16/2011	< 0.011
1	Air	11/23/2011	< 0.007
1	Air	11/30/2011	< 0.005
1	Air	12/7/2011	< 0.005
1	Air	12/14/2011	< 0.012
1	Air	12/21/2011	< 0.013
1	Air	12/28/2011	< 0.005
3	Air	1/5/2011	< 0.005
3	Air	1/12/2011	< 0.010
3	Air	1/19/2011	< 0.010
3	Air	1/26/2011	< 0.006
3	Air	2/3/2011	< 0.004
3	Air	2/9/2011	< 0.006
3	Air	2/16/2011	< 0.004
3	Air	2/24/2011	< 0.010
3	Air	3/2/2011	< 0.013
3	Air	3/9/2011	< 0.008
3	Air	3/16/2011	< 0.011
3	Air	3/23/2011	0.056 +/- 0.012
3	Air	3/30/2011	LLD
3	Air	4/6/2011	0.107 +/- 0.018
3	Air	4/13/2011	< 0.013
3	Air	4/20/2011	< 0.009
3	Air	4/27/2011	< 0.012
3	Air	5/4/2011	< 0.009
3	Air	5/11/2011	< 0.011
3	Air	5/18/2011	< 0.011
3	Air	5/26/2011	< 0.005
3	Air	6/1/2011	< 0.008
3	Air	6/8/2011	< 0.007
3	Air	6/15/2011	< 0.016
3	Air	6/22/2011	< 0.006
3	Air	6/29/2011	< 0.007
3	Air	7/6/2011	< 0.012
3	Air	7/13/2011	< 0.009
3	Air	7/20/2011	< 0.010
3	Air	7/27/2011	< 0.010

Air Iodine Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Weekly Results in pCi/m3 +/- 2 Sigma

Location	Sample Type	Collection Date	I-131
3	Air	8/3/2011	< 0.012
3	Air	8/10/2011	< 0.005
3	Air	8/17/2011	< 0.006
3	Air	8/24/2011	< 0.007
3	Air	8/31/2011	< 0.007
3	Air	9/7/2011	< 0.008
3	Air	9/14/2011	< 0.007
3	Air	9/21/2011	< 0.008
3	Air	9/29/2011	< 0.008
3	Air	10/5/2011	< 0.007
3	Air	10/12/2011	< 0.008
3	Air	10/19/2011	< 0.007
3	Air	10/26/2011	< 0.007
3	Air	11/2/2011	< 0.008
3	Air	11/8/2011	< 0.007
3	Air	11/16/2011	< 0.010
3	Air	11/23/2011	< 0.010
3	Air	11/30/2011	< 0.005
3	Air	12/7/2011	< 0.005
3	Air	12/14/2011	< 0.012
3	Air	12/21/2011	< 0.013
3	Air	12/28/2011	< 0.005
4	Air	1/5/2011	< 0.006
4	Air	1/12/2011	< 0.011
4	Air	1/19/2011	< 0.010
4	Air	1/26/2011	< 0.006
4	Air	2/2/2011	< 0.005
4	Air	2/9/2011	< 0.006
4	Air	2/16/2011	< 0.004
4	Air	2/24/2011	< 0.011
4	Air	3/2/2011	< 0.013
4	Air	3/9/2011	< 0.009
4	Air	3/16/2011	< 0.012
4	Air	3/23/2011	0.082 +/- 0.017
4	Air	3/30/2011	LLD
4	Air	4/6/2011	0.113 +/- 0.016
4	Air	4/13/2011	LLD
4	Air	4/20/2011	< 0.010
4	Air	4/27/2011	< 0.013
4	Air	5/4/2011	< 0.010
4	Air	5/11/2011	< 0.011

Air Iodine Detail Report 2011

Radiological Environmental Monitoring Program Detail Data
Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441
Sample Frequency is: Weekly Results in pCi/m3 +/- 2 Sigma

Location	Sample Type	Collection Date	I-131
4	Air	5/18/2011	< 0.011
4	Air	5/26/2011	< 0.005
4	Air	6/1/2011	< 0.008
4	Air	6/8/2011	< 0.007
4	Air	6/15/2011	< 0.008
4	Air	6/22/2011	< 0.007
4	Air	6/29/2011	< 0.007
4	Air	7/6/2011	< 0.013
4	Air	7/13/2011	< 0.009
4	Air	7/20/2011	< 0.010
4	Air	7/27/2011	< 0.010
4	Air	8/3/2011	< 0.012
4	Air	8/10/2011	< 0.005
4	Air	8/17/2011	< 0.006
4	Air	8/24/2011	< 0.007
4	Air	8/31/2011	< 0.007
4	Air	9/7/2011	< 0.008
4	Air	9/14/2011	< 0.007
4	Air	9/21/2011	< 0.008
4	Air	9/29/2011	< 0.008
4	Air	10/5/2011	< 0.007
4	Air	10/12/2011	< 0.008
4	Air	10/19/2011	< 0.007
4	Air	10/26/2011	< 0.007
4	Air	11/2/2011	< 0.008
4	Air	11/8/2011	< 0.007
4	Air	11/16/2011	< 0.011
4	Air	11/23/2011	< 0.013
4	Air	11/30/2011	< 0.005
4	Air	12/7/2011	< 0.005
4	Air	12/14/2011	< 0.013
4	Air	12/21/2011	< 0.013
4	Air	12/28/2011	< 0.005
5	Air	1/5/2011	< 0.006
5	Air	1/12/2011	< 0.011
5	Air	1/19/2011	< 0.010
5	Air	1/26/2011	< 0.006
5	Air	2/2/2011	< 0.005
5	Air	2/9/2011	< 0.006
5	Air	2/16/2011	< 0.004
5	Air	2/24/2011	< 0.011

Air Iodine Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Weekly Results in pCi/m3 +/- 2 Sigma

Location	Sample Type	Collection Date	I-131
5	Air	3/2/2011	< 0.014
5	Air	3/9/2011	< 0.008
5	Air	3/16/2011	< 0.010
5	Air	3/23/2011	0.064 +/- 0.013
5	Air	3/30/2011	LLD
5	Air	4/6/2011	0.091 +/- 0.017
5	Air	4/13/2011	< 0.017
5	Air	4/20/2011	< 0.011
5	Air	4/27/2011	< 0.011
5	Air	5/4/2011	< 0.009
5	Air	5/11/2011	< 0.010
5	Air	5/18/2011	< 0.011
5	Air	5/26/2011	< 0.005
5	Air	6/1/2011	< 0.008
5	Air	6/8/2011	< 0.007
5	Air	6/15/2011	< 0.017
5	Air	6/22/2011	< 0.006
5	Air	6/29/2011	< 0.007
5	Air	7/6/2011	< 0.013
5	Air	7/13/2011	< 0.010
5	Air	7/20/2011	< 0.010
5	Air	7/27/2011	< 0.010
5	Air	8/3/2011	< 0.012
5	Air	8/10/2011	< 0.005
5	Air	8/17/2011	< 0.006
5	Air	8/24/2011	< 0.007
5	Air	8/31/2011	< 0.007
5	Air	9/7/2011	< 0.008
5	Air	9/14/2011	< 0.008
5	Air	9/21/2011	< 0.009
5	Air	9/29/2011	< 0.008
5	Air	10/5/2011	< 0.008
5	Air	10/12/2011	< 0.008
5	Air	10/19/2011	< 0.007
5	Air	10/26/2011	< 0.007
5	Air	11/2/2011	< 0.009
5	Air	11/8/2011	< 0.007
5	Air	11/16/2011	< 0.011
5	Air	11/23/2011	< 0.012
5	Air	11/30/2011	< 0.011
5	Air	12/7/2011	< 0.006
5	Air	12/14/2011	< 0.013
5	Air	12/21/2011	< 0.014

Air Iodine Detail Report 2011

Radiological Environmental Monitoring Program Detail Data
Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441
Sample Frequency is: Weekly Results in pCi/m3 +/- 2 Sigma

Location	Sample Type	Collection Date	I-131
5	Air	12/28/2011	< 0.005
6	Air	1/5/2011	< 0.006
6	Air	1/12/2011	< 0.011
6	Air	1/19/2011	< 0.011
6	Air	1/26/2011	< 0.006
6	Air	2/2/2011	< 0.005
6	Air	2/9/2011	< 0.006
6	Air	2/16/2011	< 0.004
6	Air	2/24/2011	< 0.011
6	Air	3/2/2011	< 0.014
6	Air	3/9/2011	< 0.009
6	Air	3/16/2011	< 0.012
6	Air	3/23/2011	0.069 +/- 0.016
6	Air	3/30/2011	LLD
6	Air	4/6/2011	0.127 +/- 0.021
6	Air	4/13/2011	LLD
6	Air	4/20/2011	< 0.010
6	Air	4/27/2011	< 0.013
6	Air	5/4/2011	< 0.010
6	Air	5/11/2011	< 0.012
6	Air	5/18/2011	< 0.011
6	Air	5/26/2011	< 0.005
6	Air	6/1/2011	< 0.008
6	Air	6/8/2011	< 0.007
6	Air	6/15/2011	< 0.017
6	Air	6/22/2011	< 0.006
6	Air	6/29/2011	< 0.007
6	Air	7/6/2011	< 0.014
6	Air	7/13/2011	< 0.011
6	Air	7/20/2011	< 0.012
6	Air	7/27/2011	< 0.011
6	Air	8/3/2011	< 0.013
6	Air	8/10/2011	< 0.005
6	Air	8/17/2011	< 0.006
6	Air	8/24/2011	< 0.008
6	Air	8/31/2011	< 0.007
6	Air	9/7/2011	< 0.008
6	Air	9/14/2011	< 0.007
6	Air	9/21/2011	< 0.009
6	Air	9/29/2011	< 0.008
6	Air	10/5/2011	< 0.008

Air Iodine Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Weekly Results in pCi/m3 +/- 2 Sigma

Location	Sample Type	Collection Date	I-131
6	Air	10/12/2011	< 0.008
6	Air	10/19/2011	< 0.007
6	Air	10/26/2011	< 0.007
6	Air	11/2/2011	< 0.009
6	Air	11/8/2011	< 0.007
6	Air	11/16/2011	< 0.011
6	Air	11/23/2011	< 0.010
6	Air	11/30/2011	< 0.005
6	Air	12/7/2011	< 0.005
6	Air	12/14/2011	< 0.013
6	Air	12/21/2011	< 0.013
6	Air	12/28/2011	< 0.005
7	Air	1/5/2011	< 0.006
7	Air	1/12/2011	< 0.011
7	Air	1/19/2011	< 0.011
7	Air	1/26/2011	< 0.006
7	Air	2/2/2011	< 0.005
7	Air	2/9/2011	< 0.006
7	Air	2/16/2011	< 0.004
7	Air	2/24/2011	< 0.011
7	Air	3/2/2011	< 0.014
7	Air	3/9/2011	< 0.009
7	Air	3/16/2011	< 0.012
7	Air	3/23/2011	0.065 +/- 0.013
7	Air	3/30/2011	LLD
7	Air	4/6/2011	0.098 +/- 0.013
7	Air	4/13/2011	LLD
7	Air	4/20/2011	< 0.012
7	Air	4/27/2011	< 0.014
7	Air	5/4/2011	< 0.010
7	Air	5/11/2011	< 0.012
7	Air	5/18/2011	< 0.011
7	Air	5/26/2011	< 0.005
7	Air	6/1/2011	< 0.008
7	Air	6/8/2011	< 0.008
7	Air	6/15/2011	< 0.007
7	Air	6/22/2011	< 0.007
7	Air	6/29/2011	< 0.007
7	Air	7/6/2011	< 0.013
7	Air	7/13/2011	< 0.010
7	Air	7/20/2011	< 0.011

Air Iodine Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Weekly Results in pCi/m3 +/- 2 Sigma

Location	Sample Type	Collection Date	I-131
7	Air	7/27/2011	< 0.010
7	Air	8/3/2011	< 0.013
7	Air	8/10/2011	< 0.005
7	Air	8/17/2011	< 0.006
7	Air	8/24/2011	< 0.007
7	Air	8/31/2011	< 0.007
7	Air	9/7/2011	< 0.008
7	Air	9/14/2011	< 0.008
7	Air	9/21/2011	< 0.009
7	Air	9/29/2011	< 0.008
7	Air	10/5/2011	< 0.008
7	Air	10/12/2011	< 0.008
7	Air	10/19/2011	< 0.007
7	Air	10/26/2011	< 0.007
7	Air	11/2/2011	< 0.009
7	Air	11/8/2011	< 0.007
7	Air	11/16/2011	< 0.011
7	Air	11/23/2011	< 0.016
7	Air	11/30/2011	< 0.005
7	Air	12/7/2011	< 0.005
7	Air	12/14/2011	< 0.012
7	Air	12/21/2011	< 0.013
7	Air	12/28/2011	< 0.005
35	Air	1/5/2011	< 0.008
35	Air	1/12/2011	< 0.014
35	Air	1/19/2011	< 0.010
35	Air	1/26/2011	< 0.010
35	Air	2/2/2011	< 0.008
35	Air	2/9/2011	< 0.013
35	Air	2/16/2011	< 0.008
35	Air	2/24/2011	< 0.008
35	Air	3/2/2011	< 0.013
35	Air	3/9/2011	< 0.010
35	Air	3/16/2011	< 0.014
35	Air	3/23/2011	0.076 +/- 0.015
35	Air	3/30/2011	LLD
35	Air	4/6/2011	0.111 +/- 0.017
35	Air	4/13/2011	LLD
35	Air	4/20/2011	< 0.012
35	Air	4/27/2011	< 0.011
35	Air	5/4/2011	< 0.011

Air Iodine Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Weekly Results in pCi/m3 +/- 2 Sigma

Location	Sample Type	Collection Date	I-131
35	Air	5/11/2011	< 0.009
35	Air	5/18/2011	< 0.006
35	Air	5/26/2011	< 0.009
35	Air	6/1/2011	< 0.007
35	Air	6/8/2011	< 0.011
35	Air	6/15/2011	< 0.010
35	Air	6/22/2011	< 0.015
35	Air	6/29/2011	< 0.010
35	Air	7/6/2011	< 0.012
35	Air	7/13/2011	< 0.012
35	Air	7/20/2011	< 0.013
35	Air	7/27/2011	< 0.008
35	Air	8/3/2011	< 0.008
35	Air	8/10/2011	< 0.010
35	Air	8/17/2011	< 0.013
35	Air	8/24/2011	< 0.008
35	Air	8/31/2011	< 0.007
35	Air	9/7/2011	< 0.011
35	Air	9/14/2011	< 0.011
35	Air	9/21/2011	< 0.009
35	Air	9/29/2011	< 0.006
35	Air	10/5/2011	< 0.007
35	Air	10/12/2011	< 0.012
35	Air	10/19/2011	< 0.007
35	Air	10/26/2011	< 0.007
35	Air	11/2/2011	< 0.010
35	Air	11/8/2011	< 0.007
35	Air	11/16/2011	< 0.008
35	Air	11/23/2011	< 0.010
35	Air	11/30/2011	< 0.014
35	Air	12/7/2011	< 0.014
35	Air	12/14/2011	< 0.011
35	Air	12/21/2011	< 0.006
35	Air	12/28/2011	< 0.006

Fish Gamma Spectral Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Bi-Annually Results in pCi/kg wet +/- 2 Sigma

Location	Sample Type	Collection Date	Co-58 K-40	Co-60 Mn-54	Cs-134 Zn-65	Cs-137	Fe-59
25	catfish	8/5/2011	< 11.05 1,342.40 +/- 267.90	< 10.66 < 16.52	< 11.60 < 11.81	< 11.76	< 29.87
25	freshwater drum	8/5/2011	< 13.77 1,327.30 +/- 271.20	< 8.60 < 9.54	< 4.78 < 18.46	< 13.78	< 30.21
25	yellow perch	8/5/2011	< 11.74 1,276.60 +/- 265.90	< 13.49 < 10.61	< 12.62 < 11.84	< 9.44	< 28.17
32	catfish	8/5/2011	< 9.35 1,220.60 +/- 267.40	< 11.09 < 13.61	< 9.35 < 9.99	< 11.05	< 28.67
32	freshwater drum	8/5/2011	< 11.62 1,132.70 +/- 260.00	< 9.93 < 11.24	< 9.72 < 18.08	< 8.74	< 44.63
32	yellow perch	8/5/2011	< 10.99 1,823.20 +/- 400.70	< 11.01 < 9.48	< 10.88 < 12.39	< 13.60	< 32.21

Food Products Gamma Spectral Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Monthly Results in pCi/kg wet +/- 2 Sigma

Location	Sample Type	Collection Date	Be-7 I-131	Co-58 K-40	Co-60	Cs-134	Cs-137
2	collard greens	7/13/2011	< 132.21 < 21.35	< 6.66 3,979.40 +/- 349.90	< 7.77	< 10.44	< 11.43
2	swiss chard	7/13/2011	181.11 +/- 101.20 < 21.05	< 8.46 4,762.60 +/- 374.70	< 11.45	< 12.26	< 9.27
2	turnip greens	7/13/2011	< 132.21 < 21.35	< 6.66 3,979.40 +/- 349.90	< 7.77	< 10.44	< 11.43
2	beet greens	8/9/2011	679.62 +/- 128.80 < 18.07	< 7.27 6,306.70 +/- 405.20	< 9.64	< 8.68	< 12.95
2	collard greens	8/9/2011	< 119.58 < 22.03	< 9.91 3,873.00 +/- 342.80	< 9.65	< 9.94	< 13.31
2	turnip greens	8/9/2011	679.62 +/- 128.80 < 18.07	< 7.27 6,306.70 +/- 405.20	< 9.64	< 8.68	< 12.95
2	collard greens	9/13/2011	749.85 +/- 136.70 < 16.29	< 5.68 4,645.90 +/- 333.60	< 7.39	< 10.67	< 8.11
2	swiss chard	9/13/2011	1,736.70 +/- 157.30 < 16.14	< 6.90 7,399.40 +/- 405.90	< 6.30	< 10.07	< 12.88
2	turnip greens	9/13/2011	1,428.50 +/- 155.50 < 21.65	< 5.80 5,660.50 +/- 359.30	< 5.90	< 7.22	< 11.79
16	beet greens	7/13/2011	< 155.01 < 13.23	< 7.48 6,671.60 +/- 449.80	< 6.34	< 10.67	< 11.59
16	turnip greens	7/13/2011	< 155.01 < 13.23	< 7.48 6,671.60 +/- 449.80	< 6.34	< 10.67	< 11.59

Food Products Gamma Spectral Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Monthly Results in pCi/kg wet +/- 2 Sigma

Location	Sample Type	Collection Date	Be-7 I-131	Co-58 K-40	Co-60	Cs-134	Cs-137
16	beet greens	8/9/2011	420.71 +/- 173.40 < 20.54	< 14.45 5,730.30 +/- 436.50	< 5.94	< 13.00	< 13.17
16	swiss chard	8/9/2011	276.92 +/- 92.77 < 11.73	< 12.09 4,861.30 +/- 337.50	< 10.11	< 9.37	< 6.97
16	turnip greens	8/9/2011	420.71 +/- 173.40 < 20.54	< 14.45 5,730.30 +/- 436.50	< 5.94	< 13.00	< 13.17
16	collard greens	9/13/2011	578.34 +/- 163.60 < 19.33	< 8.95 3,846.60 +/- 333.20	< 6.52	< 8.20	< 6.90
16	swiss chard	9/13/2011	726.96 +/- 157.20 < 19.49	< 10.77 4,485.80 +/- 349.70	< 9.22	< 7.69	< 8.80
16	turnip greens	9/13/2011	746.31 +/- 122.40 < 18.60	< 10.45 4,714.30 +/- 341.30	< 6.38	< 9.23	< 10.19
18	collard greens	7/13/2011	< 124.75 < 23.55	< 14.54 5,515.40 +/- 433.90	< 10.97	< 7.95	< 16.16
18	turnip greens	7/13/2011	< 124.75 < 23.55	< 14.54 5,515.40 +/- 433.90	< 10.97	< 7.95	< 16.16
18	collard greens	8/9/2011	< 131.00 < 15.96	< 11.15 5,200.80 +/- 409.90	< 5.16	< 8.95	< 8.91
18	swiss chard	8/9/2011	427.24 +/- 138.20 < 16.40	< 11.09 6,791.10 +/- 419.40	< 7.88	< 10.54	< 9.51
18	turnip greens	8/9/2011	< 131.00 < 15.96	< 11.15 5,200.80 +/- 409.90	< 5.16	< 8.95	< 8.91

Food Products Gamma Spectral Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Monthly Results in pCi/kg wet +/- 2 Sigma

Location	Sample Type	Collection Date	Be-7 I-131	Co-58 K-40	Co-60	Cs-134	Cs-137
18	collard greens	9/13/2011	658.25 +/- 121.20 < 20.45	< 5.74 4,898.60 +/- 346.90	< 6.37	< 8.13	< 9.77
18	swiss chard	9/13/2011	976.78 +/- 145.50 < 14.21	< 8.96 6,218.70 +/- 377.40	< 8.84	< 8.41	< 10.90
18	turnip greens	9/13/2011	764.54 +/- 121.20 < 18.63	< 4.44 5,280.10 +/- 387.20	< 9.81	< 11.40	< 12.48
20	collard greens	7/13/2011	334.51 +/- 116.70 < 19.40	< 7.27 6,288.60 +/- 466.20	< 9.06	< 12.93	< 17.89
20	turnip greens	8/9/2011	350.64 +/- 131.50 < 16.84	< 8.55 3,401.40 +/- 304.30	< 6.77	< 8.39	< 9.60
20	turnip greens	9/13/2011	920.41 +/- 137.20 < 14.85	< 9.75 4,043.30 +/- 324.50	< 5.51	< 8.95	< 13.75
37	beet greens	7/13/2011	227.86 +/- 109.80 < 19.69	< 10.64 4,854.50 +/- 379.60	< 9.31	< 10.29	< 14.58
37	turnip greens	7/13/2011	227.86 +/- 109.80 < 19.69	< 10.64 4,854.50 +/- 379.60	< 9.31	< 10.29	< 14.58
37	collard greens	8/9/2011	< 96.60 < 13.10	< 6.17 3,277.40 +/- 273.20	< 5.02	< 6.48	< 9.80
37	swiss chard	8/9/2011	380.89 +/- 98.69 < 11.64	< 8.61 2,799.80 +/- 273.80	< 6.60	< 7.40	< 10.63
37	turnip greens	8/9/2011	< 96.60 < 13.10	< 6.17 3,277.40 +/- 273.20	< 5.02	< 6.48	< 9.80

Food Products Gamma Spectral Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Monthly Results in pCi/kg wet +/- 2 Sigma

Location	Sample Type	Collection Date	Be-7 I-131	Co-58 K-40	Co-60	Cs-134	Cs-137
37	collard greens	9/13/2011	418.19 +/- 96.20 < 14.28	< 6.24 2,744.40 +/- 246.90	< 6.77	< 6.49	< 8.21
37	swiss chard	9/13/2011	752.41 +/- 113.10 < 13.89	< 3.53 2,654.10 +/- 238.20	< 5.49	< 6.35	< 9.10
37	turnip greens	9/13/2011	1,224.60 +/- 152.30 < 14.22	< 8.64 5,394.60 +/- 380.00	< 7.81	< 8.31	< 6.92
70	collard greens	7/13/2011	< 99.52 < 14.58	< 7.70 4,452.60 +/- 332.40	< 5.53	< 9.01	< 11.70
70	turnip greens	7/13/2011	< 99.52 < 14.58	< 7.70 4,452.60 +/- 332.40	< 5.53	< 9.01	< 11.70
70	collard greens	8/9/2011	< 125.32 < 18.97	< 11.36 3,148.30 +/- 402.20	< 8.85	< 9.72	< 13.96
70	swiss chard	8/9/2011	291.40 +/- 95.27 < 18.87	< 8.37 4,643.30 +/- 340.80	< 6.61	< 9.89	< 13.30
70	turnip greens	8/9/2011	< 125.32 < 18.97	< 11.36 3,148.30 +/- 402.20	< 8.85	< 9.72	< 13.96
70	swiss chard	9/13/2011	873.62 +/- 156.60 < 23.09	< 10.12 5,771.20 +/- 370.00	< 3.80	< 9.59	< 5.47
70	turnip greens	9/13/2011	788.49 +/- 134.10 < 10.94	< 9.15 4,037.70 +/- 329.60	< 8.45	< 7.50	< 10.17

Milk Gamma Spectral Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Bi-Monthly Results in pCi/L +/- 2 Sigma

Location	Sample Type	Collection Date	Ba-140	Cs-134	Cs-137	K-40	La-140
18	Milk	1/4/2011	< 12	< 2	< 3	1,777 +/- 107	< 2
18	Milk	2/7/2011	< 19	< 3	< 4	1,553 +/- 106	< 3
18	Milk	3/7/2011	< 15	< 3	< 4	1,734 +/- 92	< 2
18	Milk	4/4/2011	< 27	< 4	< 4	1,871 +/- 141	< 6
18	Milk	4/18/2011	< 19	< 4	< 4	1,753 +/- 133	< 4
18	Milk	5/2/2011	< 12	< 3	< 5	1,620 +/- 115	< 2
18	Milk	5/16/2011	< 24	< 3	< 4	1,609 +/- 119	< 2
18	Milk	6/6/2011	< 22	< 3	< 3	1,762 +/- 121	< 3
18	Milk	6/20/2011	< 14	< 3	< 5	1,760 +/- 113	< 3
18	Milk	7/5/2011	< 22	< 4	< 4	1,607 +/- 125	< 5
18	Milk	7/18/2011	< 20	< 3	< 5	1,620 +/- 130	< 2
18	Milk	8/1/2011	< 41	< 4	< 5	1,683 +/- 112	< 6

Milk Gamma Spectral Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Bi-Monthly Results in pCi/L +/- 2 Sigma

Location	Sample Type	Collection Date	Ba-140	Cs-134	Cs-137	K-40	La-140
18	Milk	8/15/2011	< 23	< 3	< 4	1,674 +/- 110	< 4
18	Milk	9/6/2011	< 27	< 4	< 4	1,902 +/- 140	< 2
18	Milk	9/19/2011	< 23	< 5	< 6	1,290 +/- 141	< 3
19	Milk	8/1/2011	< 28	< 2	< 3	1,393 +/- 106	< 6
19	Milk	8/15/2011	< 17	< 3	< 3	1,436 +/- 97	< 3
19	Milk	9/6/2011	< 19	< 3	< 3	1,274 +/- 95	< 3
19	Milk	9/20/2011	< 21	< 3	< 4	1,114 +/- 111	< 4
19	Milk	10/3/2011	< 25	< 3	< 4	1,321 +/- 113	< 3
19	Milk	10/18/2011	< 23	< 4	< 4	1,293 +/- 140	< 3
19	Milk	11/7/2011	< 28	< 3	< 3	1,436 +/- 131	< 3
19	Milk	12/5/2011	< 14	< 3	< 2	1,244 +/- 87	< 2

Milk Gamma Spectral Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Bi-Monthly Results in pCi/L +/- 2 Sigma

Location	Sample Type	Collection Date	Ba-140	Cs-134	Cs-137	K-40	La-140
41	Milk	6/6/2011	< 22	< 3	< 4	1,735 +/- 117	< 2
41	Milk	6/20/2011	< 11	< 3	< 4	1,765 +/- 119	< 4
41	Milk	7/5/2011	< 18	< 3	< 3	1,868 +/- 131	< 3
41	Milk	7/18/2011	< 19	< 3	< 4	1,791 +/- 115	< 4
41	Milk	8/1/2011	< 25	< 3	< 4	1,861 +/- 130	< 5
41	Milk	8/15/2011	< 29	< 3	< 3	1,153 +/- 97	< 3
41	Milk	9/6/2011	< 20	< 2	< 4	1,748 +/- 120	< 3
41	Milk	9/19/2011	< 15	< 2	< 4	1,711 +/- 110	< 5
51	Milk	1/4/2011	< 17	< 3	< 4	942 +/- 84	< 3
51	Milk	2/7/2011	< 14	< 3	< 4	981 +/- 90	< 2
51	Milk	3/7/2011	< 11	< 2	< 3	1,330 +/- 88	< 2

Milk Gamma Spectral Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Bi-Monthly Results in pCi/L +/- 2 Sigma

Location	Sample Type	Collection Date	Ba-140	Cs-134	Cs-137	K-40	La-140
51	Milk	4/4/2011	< 32	< 3	< 3	1,231 +/- 110	< 4
51	Milk	4/18/2011	< 19	< 3	< 4	756 +/- 75	< 3
51	Milk	5/2/2011	< 10	< 3	< 4	1,231 +/- 102	< 2
51	Milk	5/16/2011	< 19	< 3	< 3	1,106 +/- 111	< 3
51	Milk	6/6/2011	< 15	< 3	< 2	966 +/- 84	< 3
51	Milk	6/20/2011	< 22	< 3	< 4	1,334 +/- 118	< 3
51	Milk	7/5/2011	< 21	< 3	< 4	1,046 +/- 100	< 5
51	Milk	7/18/2011	< 13	< 3	< 4	1,301 +/- 117	< 4
51	Milk	8/1/2011	< 26	< 3	< 3	970 +/- 96	< 4
51	Milk	8/15/2011	< 19	< 2	< 3	1,845 +/- 116	< 4
51	Milk	9/6/2011	< 17	< 4	< 4	1,210 +/- 96	< 4
51	Milk	9/19/2011	< 20	< 2	< 3	1,027 +/- 82	< 3

Milk Gamma Spectral Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Bi-Monthly Results in pCi/L +/- 2 Sigma

Location	Sample Type	Collection Date	Ba-140	Cs-134	Cs-137	K-40	La-140
51	Milk	10/3/2011	< 18	< 3	< 3	1,021 +/- 101	< 2
51	Milk	10/18/2011	< 22	< 4	< 4	717 +/- 85	< 5
51	Milk	11/7/2011	< 15	< 3	< 3	888 +/- 91	< 2
51	Milk	12/5/2011	< 14	< 2	< 2	932 +/- 98	< 2
61	Milk	4/4/2011	< 28	< 3	< 4	1,535 +/- 119	< 2
61	Milk	4/18/2011	< 26	< 2	< 4	1,723 +/- 120	< 5
61	Milk	5/2/2011	< 9	< 3	< 4	1,579 +/- 120	< 1
61	Milk	5/16/2011	< 22	< 2	< 4	1,687 +/- 130	< 4

Milk Iodine Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Bi-Monthly Results in pCi/L +/- 2 Sigma

Location	Sample Type	Collection Date	I-131
18	Milk	1/4/2011	< 0.32
18	Milk	2/7/2011	< 0.32
18	Milk	3/7/2011	< 0.37
18	Milk	4/4/2011	< 0.43
18	Milk	4/18/2011	2.23 +/- 0.27
18	Milk	5/2/2011	1.36 +/- 0.19
18	Milk	5/16/2011	< 0.38
18	Milk	6/6/2011	< 0.31
18	Milk	6/20/2011	< 0.29
18	Milk	7/5/2011	< 0.37
18	Milk	7/18/2011	< 0.23
18	Milk	8/1/2011	< 0.25
18	Milk	8/15/2011	< 0.32
18	Milk	9/6/2011	< 0.42
18	Milk	9/19/2011	< 0.42
19	Milk	8/1/2011	< 0.22
19	Milk	8/15/2011	< 0.47
19	Milk	9/6/2011	< 0.33
19	Milk	9/20/2011	< 0.27
19	Milk	10/3/2011	< 0.37
19	Milk	10/18/2011	< 0.37
19	Milk	11/7/2011	< 0.40
19	Milk	12/5/2011	< 0.31
41	Milk	6/6/2011	< 0.21
41	Milk	6/20/2011	< 0.46
41	Milk	7/5/2011	< 0.34
41	Milk	7/18/2011	< 0.22
41	Milk	8/1/2011	< 0.41
41	Milk	8/15/2011	< 0.26
41	Milk	9/6/2011	< 0.32
41	Milk	9/19/2011	< 0.42
51	Milk	1/4/2011	< 0.34
51	Milk	2/7/2011	< 0.33
51	Milk	3/7/2011	< 0.31
51	Milk	4/4/2011	< 0.47
51	Milk	4/18/2011	< 0.25
51	Milk	5/2/2011	< 0.32
51	Milk	5/16/2011	< 0.50

Milk Iodine Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Bi-Monthly Results in pCi/L +/- 2 Sigma

Location	Sample Type	Collection Date	I-131
51	Milk	6/6/2011	< 0.28
51	Milk	6/20/2011	< 0.32
51	Milk	7/5/2011	< 0.32
51	Milk	7/18/2011	< 0.22
51	Milk	8/1/2011	< 0.42
51	Milk	8/15/2011	< 0.35
51	Milk	9/6/2011	< 0.35
51	Milk	9/19/2011	< 0.38
51	Milk	10/3/2011	< 0.43
51	Milk	10/18/2011	< 0.47
51	Milk	11/7/2011	< 0.36
51	Milk	12/5/2011	< 0.29
61	Milk	4/4/2011	< 0.42
61	Milk	4/18/2011	1.25 +/- 0.23
61	Milk	5/2/2011	< 0.38
61	Milk	5/16/2011	< 0.48

TLD Gamma Dose Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Quarterly Results in mR/91 days +/- 2 Sigma

Location	Sample Type	Collection Period	Exposure
1	TLD	1/5/2011 to 4/26/2011	10.79 +/- 0.58
1	TLD	4/26/2011 to 7/12/2011	8.53 +/- 1.02
1	TLD	7/12/2011 to 0/17/2011	10.20 +/- 0.66
1	TLD	10/17/2011 to 1/6/2012	8.94 +/- 1.06
3	TLD	1/5/2011 to 4/26/2011	11.24 +/- 0.67
3	TLD	4/26/2011 to 7/12/2011	11.04 +/- 1.12
3	TLD	7/12/2011 to 0/17/2011	10.76 +/- 0.70
3	TLD	10/17/2011 to 1/6/2012	10.98 +/- 0.98
4	TLD	1/5/2011 to 4/26/2011	12.14 +/- 0.62
4	TLD	4/26/2011 to 7/12/2011	11.47 +/- 0.68
4	TLD	7/12/2011 to 0/17/2011	11.66 +/- 0.69
4	TLD	10/17/2011 to 1/6/2012	12.06 +/- 1.11
5	TLD	1/5/2011 to 4/26/2011	11.13 +/- 0.53
5	TLD	4/26/2011 to 7/12/2011	11.17 +/- 0.63
5	TLD	7/12/2011 to 0/17/2011	10.88 +/- 0.79
5	TLD	10/17/2011 to 1/6/2012	11.71 +/- 0.87
6	TLD	1/5/2011 to 4/26/2011	12.73 +/- 0.63
6	TLD	4/26/2011 to 7/12/2011	12.14 +/- 0.74
6	TLD	7/12/2011 to 0/17/2011	12.43 +/- 1.13
6	TLD	10/18/2011 to 1/6/2012	12.82 +/- 0.91
7	TLD	1/5/2011 to 4/26/2011	11.90 +/- 0.48
7	TLD	4/26/2011 to 7/12/2011	11.86 +/- 0.85
7	TLD	7/12/2011 to 0/17/2011	11.99 +/- 0.54
7	TLD	10/17/2011 to 1/6/2012	12.83 +/- 0.96
8	TLD	1/5/2011 to 4/26/2011	10.82 +/- 0.47
8	TLD	4/26/2011 to 7/12/2011	10.36 +/- 0.60
8	TLD	7/12/2011 to 0/17/2011	10.51 +/- 0.72
8	TLD	10/17/2011 to 1/6/2012	10.78 +/- 0.86
9	TLD	1/5/2011 to 4/26/2011	10.91 +/- 0.47
9	TLD	4/26/2011 to 7/12/2011	10.31 +/- 0.78
9	TLD	7/12/2011 to 0/17/2011	10.58 +/- 0.63
9	TLD	10/17/2011 to 1/6/2012	10.86 +/- 0.97
10	TLD	1/5/2011 to 4/26/2011	13.29 +/- 0.61
10	TLD	4/26/2011 to 7/12/2011	13.57 +/- 1.08

TLD Gamma Dose Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Quarterly Results in mR/91 days +/- 2 Sigma

Location	Sample Type	Collection Period	Exposure
10	TLD	7/12/2011 to 0/17/2011	13.24 +/- 0.58
10	TLD	10/17/2011 to 1/6/2012	14.79 +/- 1.26
11	TLD	1/5/2011 to 4/26/2011	12.93 +/- 0.67
11	TLD	4/26/2011 to 7/12/2011	11.80 +/- 0.65
11	TLD	7/12/2011 to 0/17/2011	13.13 +/- 0.98
11	TLD	10/17/2011 to 1/6/2012	12.33 +/- 0.82
12	TLD	1/5/2011 to 4/26/2011	11.93 +/- 0.67
12	TLD	4/26/2011 to 7/12/2011	11.23 +/- 1.08
12	TLD	7/12/2011 to 0/17/2011	12.32 +/- 0.77
12	TLD	10/17/2011 to 1/6/2012	11.19 +/- 1.16
13	TLD	1/5/2011 to 4/26/2011	12.74 +/- 0.52
13	TLD	4/26/2011 to 7/12/2011	10.94 +/- 0.92
13	TLD	7/12/2011 to 0/17/2011	12.21 +/- 0.62
13	TLD	10/17/2011 to 1/6/2012	11.64 +/- 1.08
14	TLD	1/5/2011 to 4/26/2011	11.17 +/- 0.61
14	TLD	4/26/2011 to 7/12/2011	10.69 +/- 0.83
14	TLD	7/12/2011 to 0/17/2011	10.77 +/- 0.62
14	TLD	10/17/2011 to 1/6/2012	10.41 +/- 0.91
15	TLD	1/5/2011 to 4/26/2011	10.80 +/- 0.75
15	TLD	4/26/2011 to 7/12/2011	7.63 +/- 0.81
15	TLD	7/12/2011 to 0/17/2011	11.15 +/- 0.72
15	TLD	10/17/2011 to 1/6/2012	7.11 +/- 0.85
21	TLD	1/5/2011 to 4/26/2011	13.10 +/- 0.59
21	TLD	4/26/2011 to 7/12/2011	12.37 +/- 1.06
21	TLD	7/12/2011 to 0/18/2011	14.00 +/- 0.78
21	TLD	10/18/2011 to 1/6/2012	11.94 +/- 0.88
23	TLD	1/5/2011 to 4/26/2011	14.05 +/- 0.51
23	TLD	4/26/2011 to 7/12/2011	12.50 +/- 0.70
23	TLD	7/12/2011 to 0/18/2011	15.12 +/- 0.60
23	TLD	10/18/2011 to 1/6/2012	12.46 +/- 0.80
24	TLD	1/5/2011 to 4/26/2011	12.28 +/- 0.53
24	TLD	4/26/2011 to 7/12/2011	11.62 +/- 0.75
24	TLD	7/12/2011 to 0/18/2011	12.68 +/- 0.75
24	TLD	10/18/2011 to 1/6/2012	11.65 +/- 1.21

TLD Gamma Dose Detail Report 2011

Radiological Environmental Monitoring Program Detail Data
Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441
Sample Frequency is: Quarterly Results in mR/91 days +/- 2 Sigma

Location	Sample Type	Collection Period		Exposure		
29	TLD	1/5/2011	to 4/26/2011	15.99	+/-	0.60
29	TLD	4/26/2011	to 7/12/2011	14.78	+/-	0.82
29	TLD	7/12/2011	to 0/17/2011	16.86	+/-	0.74
29	TLD	10/17/2011	to 1/6/2012	15.24	+/-	0.99
30	TLD	1/5/2011	to 4/26/2011	14.30	+/-	0.67
30	TLD	4/26/2011	to 7/12/2011	13.70	+/-	0.64
30	TLD	7/12/2011	to 0/17/2011	15.75	+/-	0.85
30	TLD	10/17/2011	to 1/6/2012	13.99	+/-	0.92
31	TLD	1/5/2011	to 4/26/2011	14.98	+/-	0.77
31	TLD	4/26/2011	to 7/12/2011	15.89	+/-	0.80
31	TLD	7/12/2011	to 0/17/2011	16.11	+/-	0.80
31	TLD	10/17/2011	to 1/6/2012	16.68	+/-	1.02
33	TLD	1/5/2011	to 4/26/2011	16.25	+/-	0.81
33	TLD	4/26/2011	to 7/12/2011	16.39	+/-	0.70
33	TLD	7/12/2011	to 0/17/2011	17.19	+/-	1.03
33	TLD	10/17/2011	to 1/6/2012	17.35	+/-	1.06
35	TLD	1/5/2011	to 4/26/2011	11.50	+/-	0.70
35	TLD	4/26/2011	to 7/12/2011	11.26	+/-	0.69
35	TLD	7/12/2011	to 0/17/2011	12.65	+/-	0.84
35	TLD	10/17/2011	to 1/6/2012	11.97	+/-	0.87
36	TLD	1/5/2011	to 4/26/2011	14.68	+/-	0.38
36	TLD	4/26/2011	to 7/12/2011	15.33	+/-	1.08
36	TLD	7/12/2011	to 0/18/2011	15.97	+/-	0.53
36	TLD	10/18/2011	to 1/6/2012	15.98	+/-	0.86
53	TLD	1/5/2011	to 4/26/2011	12.46	+/-	0.71
53	TLD	4/26/2011	to 7/12/2011	12.20	+/-	1.17
53	TLD	7/12/2011	to 0/18/2011	13.90	+/-	0.69
53	TLD	10/17/2011	to 1/6/2012	13.45	+/-	1.19
54	TLD	1/5/2011	to 4/26/2011	12.01	+/-	0.77
54	TLD	4/26/2011	to 7/12/2011	11.76	+/-	0.54
54	TLD	7/12/2011	to 0/17/2011	12.89	+/-	0.88
54	TLD	10/17/2011	to 1/6/2012	12.24	+/-	0.76
55	TLD	1/5/2011	to 4/26/2011	12.60	+/-	1.40
55	TLD	4/26/2011	to 7/12/2011	12.52	+/-	0.69
55	TLD	7/12/2011	to 0/18/2011	13.68	+/-	1.51

TLD Gamma Dose Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Quarterly Results in mR/91 days +/- 2 Sigma

Location	Sample Type	Collection Period	Exposure
55	TLD	10/18/2011 to 1/6/2012	13.16 +/- 0.88
56	TLD	1/5/2011 to 4/26/2011	12.05 +/- 0.57
56	TLD	4/26/2011 to 7/12/2011	12.71 +/- 1.09
56	TLD	7/12/2011 to 0/17/2011	12.83 +/- 0.61
56	TLD	10/17/2011 to 1/6/2012	13.38 +/- 1.25
58	TLD	1/5/2011 to 4/26/2011	9.94 +/- 0.48
58	TLD	4/26/2011 to 7/12/2011	9.97 +/- 0.65
58	TLD	7/12/2011 to 0/17/2011	10.70 +/- 0.63
58	TLD	10/17/2011 to 1/6/2012	10.18 +/- 0.78

TLD Gamma Dose Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Quarterly Results in mR/91 days +/- 2 Sigma

Location	Sample Type	Collection Period	Exposure
1	TLB	1/5/2011 to 4/26/2011	11.23 +/- 0.99
1	TLB	4/26/2011 to 7/12/2011	8.75 +/- 1.42
1	TLB	7/12/2011 to 0/17/2011	9.94 +/- 1.12
1	TLB	10/17/2011 to 1/6/2012	10.89 +/- 1.40
3	TLB	1/5/2011 to 4/26/2011	12.10 +/- 0.63
3	TLB	4/26/2011 to 7/12/2011	9.62 +/- 1.30
3	TLB	7/12/2011 to 0/17/2011	11.88 +/- 0.48
3	TLB	10/17/2011 to 1/6/2012	11.35 +/- 1.13
4	TLB	1/5/2011 to 4/26/2011	12.15 +/- 0.33
4	TLB	4/26/2011 to 7/12/2011	12.67 +/- 0.97
4	TLB	7/12/2011 to 0/17/2011	12.32 +/- 0.61
4	TLB	10/17/2011 to 1/6/2012	14.62 +/- 1.05
5	TLB	1/5/2011 to 4/26/2011	12.87 +/- 0.36
5	TLB	4/26/2011 to 7/12/2011	11.42 +/- 1.01
5	TLB	7/12/2011 to 0/17/2011	12.70 +/- 0.48
5	TLB	10/17/2011 to 1/6/2012	13.84 +/- 1.13
6	TLB	1/5/2011 to 4/26/2011	13.23 +/- 0.96
6	TLB	4/26/2011 to 7/12/2011	12.28 +/- 0.93
6	TLB	7/12/2011 to 0/18/2011	12.86 +/- 0.57
6	TLB	10/18/2011 to 1/6/2012	14.32 +/- 0.96
7	TLB	1/5/2011 to 4/26/2011	13.89 +/- 0.27
7	TLB	4/26/2011 to 7/12/2011	13.85 +/- 1.05
7	TLB	7/12/2011 to 0/17/2011	13.88 +/- 0.48
7	TLB	10/17/2011 to 1/6/2012	16.09 +/- 1.03
8	TLB	1/5/2011 to 4/26/2011	12.56 +/- 1.44
8	TLB	4/26/2011 to 7/12/2011	11.93 +/- 0.96
8	TLB	7/12/2011 to 0/17/2011	11.70 +/- 0.56
8	TLB	10/17/2011 to 1/6/2012	13.65 +/- 0.85
9	TLB	1/5/2011 to 4/26/2011	11.76 +/- 0.61
9	TLB	4/26/2011 to 7/12/2011	11.22 +/- 1.19
9	TLB	7/12/2011 to 0/17/2011	11.81 +/- 0.60
9	TLB	10/17/2011 to 1/6/2012	12.83 +/- 1.07
10	TLB	1/5/2011 to 4/26/2011	14.25 +/- 0.65
10	TLB	4/26/2011 to 7/12/2011	14.82 +/- 0.92
10	TLB	7/12/2011 to 0/17/2011	14.27 +/- 0.58

TLD Gamma Dose Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Quarterly Results in mR/91 days +/- 2 Sigma

Location	Sample Type	Collection Period	Exposure
10	TLB	10/17/2011 to 1/6/2012	16.13 +/- 0.89
11	TLB	1/5/2011 to 4/26/2011	13.24 +/- 1.21
11	TLB	4/26/2011 to 7/12/2011	13.00 +/- 1.22
11	TLB	7/12/2011 to 0/17/2011	12.88 +/- 0.68
11	TLB	10/17/2011 to 1/6/2012	14.59 +/- 1.05
12	TLB	1/5/2011 to 4/26/2011	12.89 +/- 0.31
12	TLB	4/26/2011 to 7/12/2011	12.62 +/- 1.22
12	TLB	7/12/2011 to 0/17/2011	13.02 +/- 0.48
12	TLB	10/17/2011 to 1/6/2012	13.98 +/- 1.29
13	TLB	1/5/2011 to 4/26/2011	12.50 +/- 0.33
13	TLB	4/26/2011 to 7/12/2011	11.83 +/- 1.37
13	TLB	7/12/2011 to 0/17/2011	12.54 +/- 0.47
13	TLB	10/17/2011 to 1/6/2012	13.40 +/- 1.66
14	TLB	1/5/2011 to 4/26/2011	11.71 +/- 1.02
14	TLB	4/26/2011 to 7/12/2011	11.39 +/- 0.96
14	TLB	7/12/2011 to 0/17/2011	10.96 +/- 0.64
14	TLB	10/17/2011 to 1/6/2012	12.54 +/- 0.93
15	TLB	1/5/2011 to 4/26/2011	10.61 +/- 0.78
15	TLB	4/26/2011 to 7/12/2011	9.90 +/- 1.09
15	TLB	7/12/2011 to 0/17/2011	10.54 +/- 0.61
15	TLB	10/17/2011 to 1/6/2012	11.61 +/- 0.97
21	TLB	1/5/2011 to 4/26/2011	14.15 +/- 0.28
21	TLB	4/26/2011 to 7/12/2011	12.76 +/- 1.15
21	TLB	7/12/2011 to 0/18/2011	13.63 +/- 0.57
21	TLB	10/18/2011 to 1/6/2012	13.59 +/- 1.02
23	TLB	1/5/2011 to 4/26/2011	13.48 +/- 0.70
23	TLB	4/26/2011 to 7/12/2011	12.96 +/- 0.93
23	TLB	7/12/2011 to 0/18/2011	14.08 +/- 1.02
23	TLB	10/18/2011 to 1/6/2012	13.97 +/- 1.28
24	TLB	1/5/2011 to 4/26/2011	13.24 +/- 1.51
24	TLB	4/26/2011 to 7/12/2011	11.23 +/- 0.78
24	TLB	7/12/2011 to 0/18/2011	12.93 +/- 1.28
24	TLB	10/18/2011 to 1/6/2012	12.36 +/- 0.83
29	TLB	1/5/2011 to 4/26/2011	16.28 +/- 0.48

TLD Gamma Dose Detail Report 2011

Radiological Environmental Monitoring Program Detail Data
Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441
Sample Frequency is: Quarterly Results in mR/91 days +/- 2 Sigma

Location	Sample Type	Collection Period	Exposure
29	TLB	4/26/2011 to 7/12/2011	16.16 +/- 1.34
29	TLB	7/12/2011 to 0/17/2011	16.48 +/- 0.56
29	TLB	10/17/2011 to 1/6/2012	16.86 +/- 1.33
30	TLB	1/5/2011 to 4/26/2011	14.92 +/- 0.43
30	TLB	4/26/2011 to 7/12/2011	13.64 +/- 0.84
30	TLB	7/12/2011 to 0/17/2011	15.58 +/- 0.60
30	TLB	10/17/2011 to 1/6/2012	15.03 +/- 0.76
31	TLB	1/5/2011 to 4/26/2011	15.72 +/- 0.97
31	TLB	4/26/2011 to 7/12/2011	15.49 +/- 0.98
31	TLB	7/12/2011 to 0/17/2011	16.59 +/- 0.79
31	TLB	10/17/2011 to 1/6/2012	16.64 +/- 1.16
33	TLB	1/5/2011 to 4/26/2011	16.61 +/- 0.60
33	TLB	4/26/2011 to 7/12/2011	17.07 +/- 1.09
33	TLB	7/12/2011 to 0/17/2011	17.40 +/- 0.61
33	TLB	10/17/2011 to 1/6/2012	18.47 +/- 1.40
35	TLB	1/5/2011 to 4/26/2011	12.26 +/- 0.40
35	TLB	4/26/2011 to 7/12/2011	12.08 +/- 0.77
35	TLB	7/12/2011 to 0/17/2011	12.85 +/- 0.52
35	TLB	10/17/2011 to 1/6/2012	13.70 +/- 0.74
36	TLB	1/5/2011 to 4/26/2011	15.92 +/- 0.27
36	TLB	4/26/2011 to 7/12/2011	16.41 +/- 0.95
36	TLB	7/12/2011 to 0/18/2011	16.29 +/- 0.45
36	TLB	10/18/2011 to 1/6/2012	16.62 +/- 1.15
53	TLB	1/5/2011 to 4/26/2011	13.30 +/- 0.43
53	TLB	4/26/2011 to 7/12/2011	14.11 +/- 0.72
53	TLB	7/12/2011 to 0/18/2011	14.19 +/- 0.53
53	TLB	10/17/2011 to 1/6/2012	14.25 +/- 1.15
54	TLB	1/5/2011 to 4/26/2011	12.97 +/- 0.51
54	TLB	4/26/2011 to 7/12/2011	13.54 +/- 0.78
54	TLB	7/12/2011 to 0/17/2011	13.73 +/- 0.59
54	TLB	10/17/2011 to 1/6/2012	14.24 +/- 0.77
55	TLB	1/5/2011 to 4/26/2011	13.85 +/- 1.01
55	TLB	4/26/2011 to 7/12/2011	14.61 +/- 0.84
55	TLB	7/12/2011 to 0/18/2011	14.01 +/- 0.70
55	TLB	10/18/2011 to 1/6/2012	15.05 +/- 1.18

TLD Gamma Dose Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Quarterly Results in mR/91 days +/- 2 Sigma

Location	Sample Type	Collection Period	Exposure
56	TLB	1/5/2011 to 4/26/2011	12.88 +/- 0.63
56	TLB	4/26/2011 to 7/12/2011	13.73 +/- 1.34
56	TLB	7/12/2011 to 0/17/2011	13.49 +/- 0.75
56	TLB	10/17/2011 to 1/6/2012	14.16 +/- 1.26
58	TLB	1/5/2011 to 4/26/2011	10.24 +/- 0.47
58	TLB	4/26/2011 to 7/12/2011	10.90 +/- 0.81
58	TLB	7/12/2011 to 0/17/2011	11.00 +/- 0.79
58	TLB	10/17/2011 to 1/6/2012	11.45 +/- 0.79

TLD Gamma Dose Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Annual Results in mR/365 days +/- 2 Sigma

Location	Sample Type	Collection Period	Exposure
1	TLA	1/5/2011 to 1/6/2012	52.01 +/- 2.40
3	TLA	1/5/2011 to 1/6/2012	50.47 +/- 1.27
4	TLA	1/5/2011 to 1/6/2012	67.14 +/- 1.41
5	TLA	1/5/2011 to 1/6/2012	54.60 +/- 1.66
6	TLA	1/5/2011 to 1/6/2012	64.68 +/- 1.22
7	TLA	1/5/2011 to 1/6/2012	53.05 +/- 1.90
8	TLA	1/5/2011 to 1/6/2012	58.35 +/- 1.93
9	TLA	1/5/2011 to 1/6/2012	52.67 +/- 3.22
10	TLA	1/5/2011 to 1/6/2012	71.70 +/- 2.45
11	TLA	1/5/2011 to 1/6/2012	66.28 +/- 4.82
12	TLA	1/5/2011 to 1/6/2012	60.77 +/- 1.97
13	TLA	1/5/2011 to 1/6/2012	60.13 +/- 2.60
14	TLA	1/5/2011 to 1/6/2012	49.07 +/- 3.21
15	TLA	1/5/2011 to 1/6/2012	51.48 +/- 2.09
21	TLA	1/5/2011 to 1/6/2012	68.33 +/- 4.52
23	TLA	1/5/2011 to 1/6/2012	61.22 +/- 2.01
24	TLA	1/5/2011 to 1/6/2012	56.45 +/- 2.88
29	TLA	1/5/2011 to 1/6/2012	72.05 +/- 1.70
30	TLA	1/5/2011 to 1/6/2012	70.42 +/- 2.10
31	TLA	1/5/2011 to 1/6/2012	77.42 +/- 2.32
33	TLA	1/5/2011 to 1/6/2012	80.26 +/- 4.82

TLD Gamma Dose Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Annual Results in mR/365 days +/- 2 Sigma

Location	Sample Type	Collection Period	Exposure
35	TLA	1/5/2011 to 1/6/2012	59.49 +/- 2.18
36	TLA	1/5/2011 to 1/6/2012	77.91 +/- 4.02
53	TLA	1/5/2011 to 1/6/2012	63.73 +/- 2.32
54	TLA	1/5/2011 to 1/6/2012	62.64 +/- 4.92
55	TLA	1/5/2011 to 1/6/2012	64.85 +/- 4.67
56	TLA	1/5/2011 to 1/6/2012	66.25 +/- 2.64
58	TLA	1/5/2011 to 1/6/2012	51.22 +/- 1.88

TLD Gamma Dose Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Annual Results in mR/365 days +/- 2 Sigma

Location	Sample Type	Collection Period	Exposure

Water Gamma Spectral Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Monthly Results in pCi/L +/- 2 Sigma

Location	Sample Type	Collection Period	Ba-140 Fe-59 Zr-95	Co-58 La-140	Co-60 Mn-54	Cs-134 Nb-95	Cs-137 Zn-65
28	Water	1/27/2011 to 1/27/2011	< 19.89 < 9.47 < 10.10	< 4.23 < 7.31	< 4.52 < 5.10	< 4.94 < 8.42	< 6.69 < 12.49
28	Water	1/27/2011 to 2/24/2011	< 14.02 < 4.65 < 3.60	< 2.70 < 1.79	< 2.29 < 3.05	< 3.21 < 3.02	< 2.33 < 2.50
28	Water	2/24/2011 to 3/31/2011	< 26.87 < 4.43 < 3.38	< 2.49 < 4.14	< 3.16 < 2.16	< 3.12 < 4.28	< 3.90 < 3.13
28	Water	4/28/2011 to 4/28/2011	< 17.91 < 6.15 < 4.40	< 2.49 < 6.17	< 2.58 < 3.03	< 2.45 < 4.93	< 2.91 < 3.26
28	Water	4/28/2011 to 5/26/2011	< 25.99 < 2.90 < 3.39	< 3.61 < 8.69	< 3.14 < 3.28	< 2.96 < 5.58	< 5.78 < 5.30
28	Water	5/26/2011 to 6/30/2011	< 25.94 < 7.28 < 5.19	< 3.93 < 6.73	< 1.70 < 3.18	< 3.12 < 2.95	< 2.14 < 4.05
28	Water	6/30/2011 to 7/29/2011	< 22.82 < 5.08 < 4.37	< 3.12 < 7.15	< 1.46 < 2.44	< 2.21 < 2.13	< 2.53 < 4.09
28	Water	7/29/2011 to 8/25/2011	< 21.00 < 6.38 < 4.13	< 2.44 < 2.27	< 1.39 < 2.58	< 2.56 < 4.24	< 2.26 < 3.53
28	Water	8/25/2011 to 9/28/2011	< 16.20 < 6.30 < 6.53	< 2.82 < 3.93	< 2.02 < 2.35	< 3.32 < 3.87	< 3.60 < 3.50
28	Water	9/28/2011 to 0/27/2011	< 12.49 < 3.61 < 5.23	< 1.88 < 2.01	< 1.90 < 2.91	< 2.95 < 3.94	< 2.39 < 3.40
28	Water	0/27/2011 to 1/30/2011	< 19.86 < 3.74 < 4.04	< 1.03 < 4.95	< 1.35 < 2.10	< 1.92 < 2.61	< 2.07 < 2.65
28	Water	1/24/2011 to 2/29/2011	< 20.29 < 3.54 < 4.32	< 2.12 < 6.07	< 1.09 < 2.23	< 2.88 < 2.59	< 2.67 < 5.74

Water Gamma Spectral Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Monthly Results in pCi/L +/- 2 Sigma

Location	Sample Type	Collection Period	Ba-140 Fe-59 Zr-95	Co-58 La-140	Co-60 Mn-54	Cs-134 Nb-95	Cs-137 Zn-65
34	Water	2/30/2010 to 1/27/2011	< 22.14 < 4.87 < 4.60	< 1.61 < 6.03	< 3.87 < 3.52	< 4.57 < 3.38	< 4.64 < 6.72
34	Water	1/27/2011 to 2/24/2011	< 17.29 < 5.73 < 7.27	< 2.94 < 4.11	< 2.19 < 1.79	< 2.37 < 2.93	< 2.91 < 5.49
34	Water	2/24/2011 to 3/31/2011	< 22.64 < 5.38 < 3.80	< 3.27 < 6.52	< 2.98 < 3.75	< 2.80 < 3.94	< 3.84 < 3.87
34	Water	3/31/2011 to 4/28/2011	< 21.12 < 5.40 < 3.96	< 1.89 < 4.47	< 1.79 < 2.80	< 2.09 < 2.22	< 2.67 < 1.90
34	Water	4/28/2011 to 5/26/2011	< 12.92 < 3.82 < 5.17	< 2.82 < 2.29	< 2.01 < 2.55	< 2.85 < 2.16	< 3.06 < 2.38
34	Water	5/26/2011 to 6/30/2011	< 18.38 < 8.56 < 8.49	< 2.99 < 5.90	< 3.47 < 4.05	< 2.82 < 4.73	< 3.80 < 7.29
34	Water	6/30/2011 to 7/29/2011	< 22.16 < 5.93 < 5.22	< 2.57 < 7.95	< 2.65 < 2.55	< 2.41 < 3.07	< 2.08 < 3.77
34	Water	8/25/2011 to 8/25/2011	< 20.01 < 3.95 < 4.79	< 1.65 < 2.17	< 1.39 < 2.10	< 2.44 < 3.67	< 2.30 < 5.20
34	Water	8/25/2011 to 9/28/2011	< 15.63 < 4.06 < 5.58	< 2.40 < 2.24	< 1.22 < 1.94	< 3.17 < 3.31	< 3.85 < 3.08
34	Water	9/28/2011 to 0/27/2011	< 25.46 < 6.18 < 5.58	< 2.82 < 5.62	< 2.04 < 4.30	< 3.34 < 3.62	< 4.76 < 5.02
34	Water	0/27/2011 to 1/30/2011	< 9.07 < 6.27 < 3.87	< 2.19 < 2.91	< 1.55 < 2.07	< 2.57 < 3.60	< 2.15 < 6.00
34	Water	1/24/2011 to 2/29/2011	< 16.90 < 5.14 < 6.21	< 2.10 < 4.41	< 1.62 < 2.95	< 2.60 < 3.09	< 3.03 < 3.34

Water Gamma Spectral Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Monthly Results in pCi/L +/- 2 Sigma

Location	Sample Type	Collection Period	Ba-140 Fe-59 Zr-95	Co-58 La-140	Co-60 Mn-54	Cs-134 Nb-95	Cs-137 Zn-65
36	Water	12/30/2010 to 1/27/2011	< 15.40 < 4.48 < 6.72	< 2.77 < 2.89	< 3.27 < 3.23	< 4.47 < 3.02	< 4.13 < 3.19
36	Water	1/27/2011 to 2/24/2011	< 16.36 < 5.72 < 3.60	< 1.84 < 2.46	< 3.34 < 2.71	< 2.19 < 2.76	< 2.35 < 3.08
36	Water	2/24/2011 to 3/31/2011	< 28.25 < 8.21 < 3.69	< 3.04 < 5.09	< 2.91 < 2.45	< 3.36 < 4.62	< 3.00 < 2.90
36	Water	3/31/2011 to 4/28/2011	< 28.33 < 5.80 < 4.52	< 2.34 < 4.09	< 1.76 < 1.83	< 2.56 < 3.97	< 3.66 < 4.19
36	Water	4/28/2011 to 5/26/2011	< 20.51 < 5.26 < 4.40	< 2.66 < 3.55	< 2.51 < 3.15	< 2.84 < 3.04	< 3.50 < 3.04
36	Water	5/26/2011 to 6/30/2011	< 13.91 < 3.40 < 3.27	< 3.12 < 4.83	< 1.91 < 3.30	< 2.47 < 3.27	< 2.82 < 3.10
36	Water	6/30/2011 to 7/29/2011	< 32.22 < 6.56 < 4.51	< 2.55 < 3.69	< 2.50 < 2.49	< 2.85 < 3.44	< 2.38 < 2.81
36	Water	7/29/2011 to 8/25/2011	< 21.53 < 6.41 < 4.79	< 1.45 < 3.60	< 1.65 < 1.84	< 2.30 < 2.03	< 2.58 < 3.76
36	Water	8/25/2011 to 9/28/2011	< 23.82 < 5.48 < 6.27	< 2.48 < 6.17	< 2.15 < 3.36	< 3.21 < 3.20	< 3.12 < 2.50
36	Water	9/28/2011 to 10/27/2011	< 11.46 < 4.49 < 5.94	< 1.45 < 2.85	< 1.34 < 2.62	< 2.19 < 2.24	< 2.15 < 4.64
36	Water	10/27/2011 to 11/30/2011	< 16.13 < 4.01 < 6.47	< 2.23 < 2.89	< 2.31 < 2.50	< 3.30 < 3.53	< 2.01 < 5.23
36	Water	11/24/2011 to 12/29/2011	< 15.60 < 2.95 < 2.93	< 1.51 < 2.50	< 1.87 < 2.36	< 2.22 < 3.14	< 3.34 < 2.93

Water Gamma Spectral Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Monthly Results in pCi/L +/- 2 Sigma

Location	Sample Type	Collection Period	Ba-140 Fe-59 Zr-95	Co-58 La-140	Co-60 Mn-54	Cs-134 Nb-95	Cs-137 Zn-65
59	Water	4/6/2011 to 4/28/2011	< 27.69 < 4.40 < 6.90	< 3.18 < 5.90	< 1.77 < 3.22	< 2.24 < 4.34	< 2.60 < 4.63
59	Water	4/28/2011 to 5/26/2011	< 19.68 < 5.08 < 5.21	< 3.09 < 5.25	< 1.66 < 2.59	< 1.77 < 2.37	< 3.09 < 3.73
59	Water	5/26/2011 to 6/30/2011	< 21.00 < 4.61 < 4.04	< 2.00 < 4.41	< 3.09 < 2.79	< 3.98 < 3.58	< 3.87 < 4.44
59	Water	6/30/2011 to 7/29/2011	< 18.44 < 3.42 < 3.06	< 1.78 < 7.95	< 1.73 < 2.11	< 2.19 < 3.18	< 3.07 < 3.58
59	Water	7/29/2011 to 8/25/2011	< 22.68 < 4.99 < 5.83	< 2.41 < 4.66	< 2.73 < 2.62	< 2.84 < 2.60	< 3.55 < 4.24
59	Water	8/25/2011 to 9/28/2011	< 19.33 < 3.00 < 4.73	< 3.49 < 2.76	< 1.91 < 2.39	< 3.76 < 3.82	< 3.18 < 4.22
59	Water	9/28/2011 to 0/27/2011	< 23.23 < 8.07 < 3.75	< 2.91 < 5.01	< 3.02 < 3.62	< 3.06 < 3.33	< 2.85 < 6.48
59	Water	0/27/2011 to 1/30/2011	< 20.21 < 2.74 < 4.27	< 1.74 < 3.56	< 2.18 < 2.77	< 2.73 < 4.05	< 2.73 < 4.58
59	Water	1/30/2011 to 2/29/2011	< 12.00 < 4.43 < 5.18	< 2.29 < 5.84	< 1.74 < 2.59	< 3.06 < 3.46	< 3.76 < 5.31
60	Water	4/6/2011 to 4/28/2011	< 26.39 < 3.36 < 3.27	< 1.81 < 3.60	< 1.72 < 2.66	< 2.40 < 4.08	< 2.03 < 2.59
60	Water	4/28/2011 to 5/26/2011	< 17.95 < 3.12 < 3.97	< 2.41 < 3.67	< 1.58 < 1.48	< 2.66 < 2.82	< 3.53 < 3.43

Water Gamma Spectral Detail Report 2011

Radiological Environmental Monitoring Program Detail Data

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Monthly Results in pCi/L +/- 2 Sigma

Location	Sample Type	Collection Period	Ba-140 Fe-59 Zr-95	Co-58 La-140	Co-60 Mn-54	Cs-134 Nb-95	Cs-137 Zn-65
60	Water	5/26/2011 to 6/30/2011	< 14.59 < 4.70 < 3.88	< 2.86 < 4.52	< 1.44 < 3.31	< 2.45 < 2.93	< 3.34 < 2.09
60	Water	6/30/2011 to 7/29/2011	< 28.06 < 3.68 < 4.64	< 2.57 < 8.31	< 1.96 < 1.53	< 2.06 < 4.06	< 2.55 < 4.21
60	Water	7/29/2011 to 8/25/2011	< 22.68 < 6.97 < 3.11	< 3.51 < 6.50	< 2.59 < 2.15	< 2.45 < 3.17	< 2.72 < 3.55
60	Water	8/25/2011 to 9/28/2011	< 16.34 < 4.61 < 5.35	< 3.19 < 4.30	< 1.19 < 1.69	< 2.65 < 3.21	< 3.39 < 3.55
60	Water	9/28/2011 to 0/27/2011	< 17.81 < 4.77 < 4.44	< 2.14 < 6.79	< 1.54 < 1.81	< 1.91 < 3.46	< 2.53 < 3.44
60	Water	0/27/2011 to 1/30/2011	< 17.83 < 5.86 < 3.19	< 1.83 < 2.59	< 1.73 < 1.18	< 1.86 < 1.73	< 2.42 < 2.91
60	Water	1/30/2011 to 2/29/2011	< 19.71 < 5.73 < 3.71	< 1.68 < 5.43	< 1.37 < 1.79	< 2.10 < 3.12	< 2.98 < 4.89

Water Gross Beta Detail Report 2011

Radiological Environmental Monitoring Program Data Summary

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Monthly Results in pCi/L +/- 2 Sigma

		Location				
Collection Period	Sample Type	28	34	36	59	60
12/30/2010 to 1/27/2011	Water		LLD	LLD		
1/27/2011 to 1/27/2011	Water	LLD				
1/27/2011 to 2/24/2011	Water	LLD	LLD	LLD		
2/24/2011 to 3/31/2011	Water	LLD	LLD	LLD		
3/31/2011 to 4/28/2011	Water		3.06 +/- 1.41	4.11 +/- 1.53		
4/6/2011 to 4/28/2011	Water				< 2.16	3.61 +/- 1.49
4/28/2011 to 4/28/2011	Water	4.25 +/- 1.59				
4/28/2011 to 5/26/2011	Water	< 1.88	LLD	LLD	< 1.61	LLD
5/26/2011 to 6/30/2011	Water	LLD	LLD	< 1.65	LLD	< 1.82
6/30/2011 to 7/29/2011	Water	LLD	< 0.86	< 0.88	< 0.87	LLD
7/29/2011 to 8/25/2011	Water	LLD		LLD	LLD	LLD
8/25/2011 to 8/25/2011	Water		< 0.87			

Water Gross Beta Detail Report 2011

Radiological Environmental Monitoring Program Data Summary

Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441

Sample Frequency is: Monthly Results in pCi/L +/- 2 Sigma

Collection Period	Sample Type	Location				
		28	34	36	59	60
8/25/2011 to 9/28/2011	Water	LLD	< 0.87	LLD	LLD	LLD
9/28/2011 to 10/27/2011	Water	LLD	LLD	LLD	LLD	LLD
10/27/2011 to 11/30/2011	Water	LLD	LLD	LLD	LLD	LLD
11/24/2011 to 12/29/2011	Water	LLD	LLD	LLD		
11/30/2011 to 12/29/2011	Water				LLD	LLD

Water Tritium Detail Report 2011
Radiological Environmental Monitoring Program Detail Data
Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441
Sample Frequency is: Quarterly Results in pCi/L +/- 2 Sigma

Location	Sample Type	Collection Date	H-3
28	Water	3/31/2011	< 141.23
28	Water	6/30/2011	< 147.99
28	Water	9/28/2011	< 143.11
28	Water	12/29/2011	< 144.36
34	Water	3/31/2011	< 141.23
34	Water	6/30/2011	< 147.99
34	Water	9/28/2011	< 143.11
34	Water	12/29/2011	< 144.36
36	Water	3/31/2011	< 141.23
36	Water	6/30/2011	< 147.99
36	Water	9/28/2011	< 143.11
36	Water	12/29/2011	< 144.36
59	Water	6/30/2011	< 147.99
59	Water	9/28/2011	< 143.11
59	Water	12/29/2011	< 144.36
60	Water	6/30/2011	< 147.99
60	Water	9/28/2011	< 143.11
60	Water	12/29/2011	< 144.36

APPENDIX D

CORRECTIONS TO PREVIOUS ANNUAL ENVIRONMENTAL AND EFFLUENT RELEASE REPORTS

APPENDIX D

CORRECTIONS TO PREVIOUS ANUUAL ENVIRONMENTAL AND EFFLUENT RELEASE REPORTS:

2010 ANNUAL ENVIRONMENTAL AND EFFLUENT RELEASE REPORT

Page 12 of 2010 annual report

Table 2b, Summation of Continuous Liquid Effluent Releases The value for line E, Waste Volume Released, Liters (prior to dilution) 4th quarter was incorrect. The correct value is 4.32E+05.

Page 38 of 2010 annual report

Northwest Drain Impoundment sediment samples collected on 5/26/10 identified Co-58 at location 64-9. Mn-54 was also identified in the sample but not reported. The value for Mn-54 in the 5/26/10 sample was 248 +/- pCi/kg dry.

APPENDIX E
ABNORMAL RELEASES

APPENDIX E

ABNORMAL RELEASES

In November 2011, radioactivity was detected in the Nuclear Closed Cooling (NCC) system. The source of this activity has not been identified. There is some leakage from the NCC system to Service Water and from there to the environment. Conservatively, activity calculations are done assuming that all leakage from the NCC system is going to Service Water. Daily NCC samples are being analyzed and system leakage is being tracked. The calculated activity released from NCC has been included in the total radioactivity released.

	QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4	ANNUAL TOTAL
A. Fission and Activation Products (Ci)					
Na-24	<LLD	<LLD	<LLD	9.25E-05	9.25E-05
Mn-54	<LLD	<LLD	<LLD	1.17E-05	1.17E-05
Mn-56	<LLD	<LLD	<LLD	1.09E-06	1.09E-06
Co-58	<LLD	<LLD	<LLD	3.50E-05	3.50E-05
Co-60	<LLD	<LLD	<LLD	2.38E-07	2.38E-07
Zn-69m	<LLD	<LLD	<LLD	1.62E-07	1.62E-07
Cs-137	<LLD	<LLD	<LLD	5.27E-05	5.27E-05
B. Tritium	<LLD	<LLD	<LLD	3.20E-03	3.20E-03
C. Dissolved and Entrained Gases (Ci)					
Xe-135	<LLD	<LLD	<LLD	1.62E-07	1.62E-07
D. Gross Alpha Activity, (Ci)	<LLD	<LLD	<LLD	<LLD	<LLD

APPENDIX F
ODCM NON-COMPLIANCES

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ODCM NON-COMPLIANCES

An Emergency Service Water sample was missed on 8/30/11 due to short duration of pump run. CR-2011-01331

The Unit 1 Plant Vent Gaseous Effluent Monitor was out of service for greater than 30 days. The > 30 day duration was due to being unable to obtain the needed part. Monitor was out of service from 5/6/11 to 6/14/11. CR-G202-2011-95984

The Liquid Radwaste to Emergency Service Water Liquid Effluent Monitor was out of service for greater than 30 days. The > 30 day duration was due to parts availability issues. The monitor was out of service from 5/31/11 to 1/7/12. CR-2011-00211

The Emergency Service Water B Liquid Effluent Monitor was out of service for greater than 30 days. The > 30 day duration was due the time it took to obtain a new pump for the effluent monitor. The monitor was out of service from 7/5/11 to 8/5/11. CR-2011-00227

Environmental air sampler at location #5 was found not running on 11/30/201. Sample volume collect prior to sampler stopping was sufficient to meet ODCM LLD requirements. Sample pump was replaced. CR-2011-06114

APPENDIX G
CHANGES TO PROCESS CONTROL PROGRAM

APPENDIX G

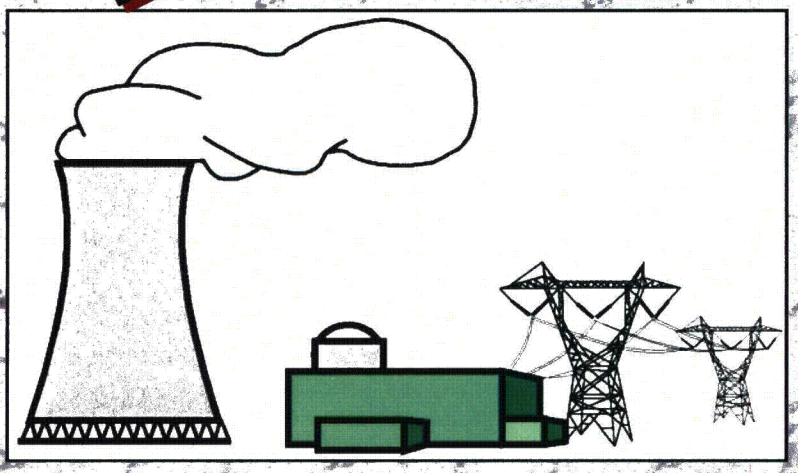
CHANGES TO THE PROCESS CONTROL PROGRAM

During this reporting period, there was one (1) revision to the Process Control Program.

Rev. 12 SCOPE OF REVISION:

Changed section 3.1.1 to permit the use of uniquely numbered seals as a replacement for the clearance program for isolating tanks for processing.

PNPPD



Generating Success!

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