FENOC
FirstEnergy Nuclear Operating Company

Perry Nuclear Power Plant
10 Center Road
Perry, Ohio 44081

Guy G. Campbell
Vice President - Nuclear

440-280-5224
Fax: 440-280-8029

April 16, 2002
PY-CEI/NRR-2630L

United States Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Perry Nuclear Power Plant
Docket No. 50-440
Annual Environmental and Effluent Release Report

Ladies and Gentlemen:

Enclosed is the Annual Environmental and Effluent Release Report for the Perry Nuclear Power Plant, Unit 1, for the period of January 1, 2001 through December 31, 2001. This document includes the radiological environmental operating report, radioactive effluent release report, and the non-radiological environmental operating report which satisfies the requirements of the PNPP Technical Specifications, the Offsite Dose Calculation Manual, and the Environmental Protection Plan, Appendix B of the PNPP Operating License.

Also enclosed are the current Offsite Dose Calculation Manual and the Process Control Program which refelect the changes that were described within the Annual Environmental and Effluent Release Report.

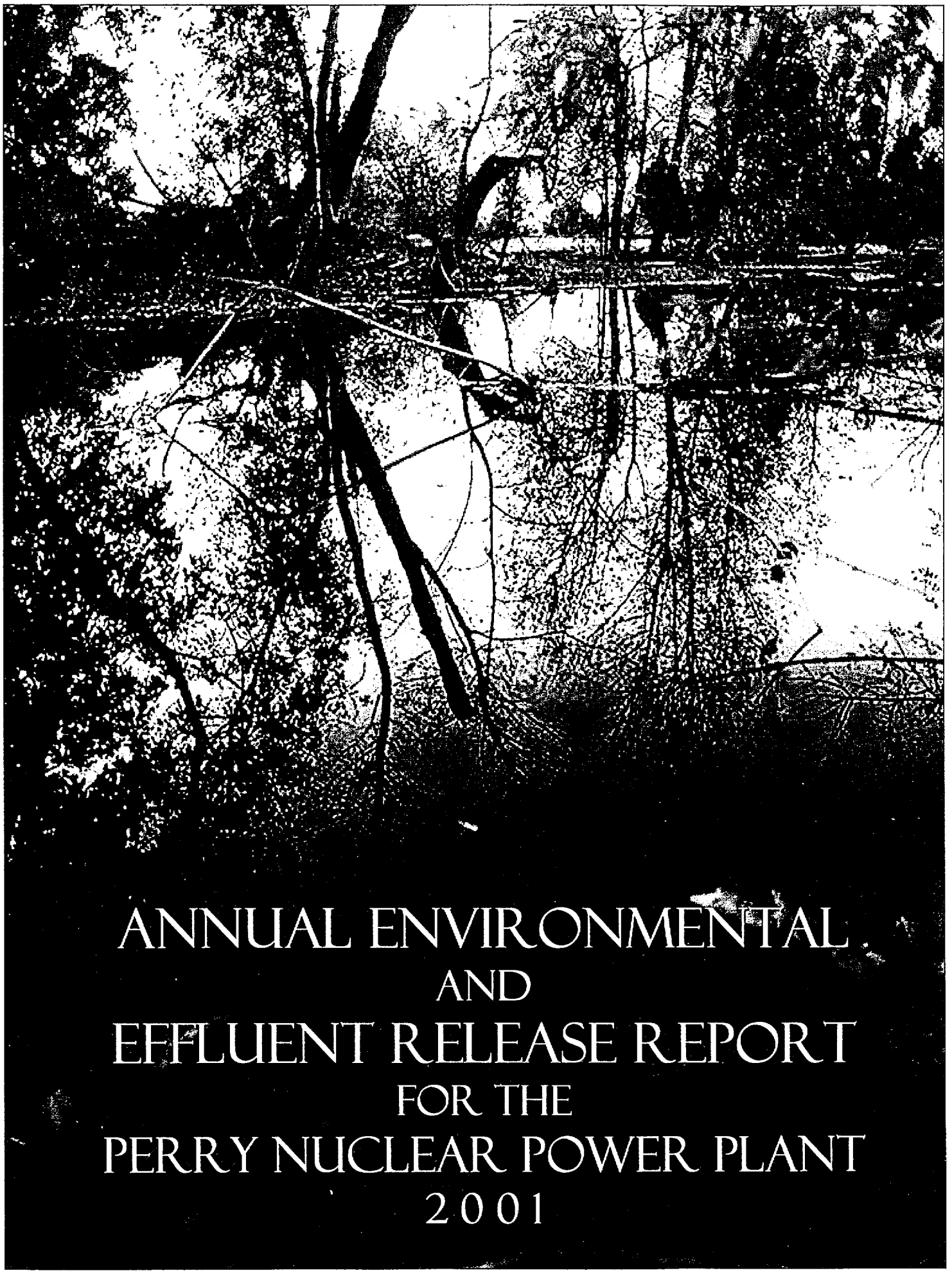
If you have any questions or require additional information, please contact Michael E. Doty at (440) 280-5599.

Very truly yours,

Enclosures:
1. Annual Environmental and Effluent Release Report
2. Offsite Dose Calculation Manual
3. Process Control Program

cc: NRC Project Manager
NRC Region III
NRC Resident Inspectors Office

IE48
IE25



ANNUAL ENVIRONMENTAL AND EFFLUENT RELEASE REPORT FOR THE PERRY NUCLEAR POWER PLANT 2001

2001

ANNUAL ENVIRONMENTAL AND EFFLUENT RELEASE REPORT

for the Perry Nuclear Power Plant

PREPARED BY:
RADWASTE, ENVIRONMENTAL, AND CHEMISTRY SECTION
PERRY NUCLEAR POWER PLANT
FIRSTENERGY NUCLEAR OPERATING COMPANY
PERRY, OHIO
MARCH, 2002

TABLE OF CONTENTS

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, 2001. 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 2001, 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 all radioactive materials from the site in accordance with all 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 2.31E-03 mrem (0.077 % of the applicable limit). The calculated hypothetical maximum individual whole body dose potentially received by an individual resulting from PNPP gaseous effluents was 6.16E-03 mrem (0.12% of the applicable limit). The summation of the hypothetical maximum individual dose from effluents in 2001 is equivalent to < 0.1 % 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 all regulations governing radioactive shipments in 2001, making shipments of solid radioactive waste to a licensed burial site.

During 2001, there were two (2) ODCM Controls non-compliance conditions and two (2) abnormal releases:

- On March 15, 2001, the liquid radwaste discharge high flow monitor was inoperable for greater than 30 days as a result of a bad micrometer switch connector. Since this connector was not expected to fail, it was not maintained as a spare part. The monitor was out of service for 34 days. Compensatory measures, as required by ODCM Table 3.3.7.9-1, Action 112, were implemented, until the flow monitor was returned to service on March 22, 2001.
- On June 02, 2001, the Emergency Service Water total flow monitor, 1P45-N0271, was out of service for greater than 30 days. Erratic flow indications resulted in the monitor being out of service for 48 days. Compensatory measures, as required by ODCM Table 3.3.7.9-1, Action 113, were implemented, until the flow monitor was returned to service on June 19, 2001.
- On August 20, 2001, tritium was detected in the Turbine Building HVAC (M35) condensate drains system effluent. The most probable cause for this abnormal release was the recycling of radioactive gaseous treatment system effluent vent discharges back into the M35 system via the air intake. There was minimal dose consequence to the any member of the general public.

- On December 03, 2001, a Unit 1 containment vacuum breaker was inadvertently opened during the performance of a surveillance. The inadvertent opening of the vacuum breaker resulted in a potential airborne radioactive effluent release to the environment. The dose contribution as a result of this abnormal release had minimal consequence to any member of the general public.

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.

Of the 1376 radiological environmental samples collected in 2001, there were approximately 3300 radioactivity analyses performed. The results of the REMP indicate the adequacy of the control of the release of radioactivity in the effluents from PNPP. These results also demonstrate that PNPP complies with all 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. The 2001 results were similar to those observed for the pre-operational and operational programs from prior years. Only natural background environmental radioactivity was detected.
- Terrestrial monitoring included the analysis of milk, produce, and vegetation. The PNPP ODCM does not require vegetation or soil samples to be included in the monitoring program. The results of the sample analyses in 2001 indicated concentrations of radioactivity similar to that found in previous years. Analyses of other terrestrial samples also detected concentrations of 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 2001 analytical results for water and fish sample showed normal background radionuclide concentrations. The results of sediment sample analyses indicated that the cesium radioactivity was similar to previous years. The average concentration of cesium-137 in the sediment was 611.91 pCi/kg, which is within the maximum value of 864 pCi/kg established since 1981. In 1999, a sediment sample of the northwest drain impoundment (sampling location #64) was analyzed to contain 62 pCi/kg of cobalt-60. During 2001, enhanced monitoring activities continued within the boundaries of the impoundment. The cobalt-60 remained centered within the organic material located at the top of the spillway, with little or no activity found farther upstream.
- Direct radiation measurements showed no change from previous years. The indicator locations averaged 56.26 mrem/year and control locations averaged 54.92 mrem/year. In 2001, radiation dose in the area of PNPP was statistically similar to the radiation dose measured at locations greater than ten (10) miles away from the Plant.

Based on these results, during 2001, 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 every public road 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 sixteen meteorological sectors. 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.

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 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., Ohio Environmental Protection Agency (OEPA) discharge limits], and changes in plant design or operation that affect the environment are reported to regulatory agencies as they occur. These special reports are also summarized annually in this report.

On February 19, 2001, the OEPA was notified of a leak from the Circulating Water (CW) system. This leak was in an underground pipe, which released approximately 15,000 gallons to the environment. This water contained Ferroquest LP7202 at concentrations greater than the discharge limits. The CW system was shut down for repairs and the Ferroquest LP7202 was neutralized to meet Permit limits.

On October 02, 2001, the OEPA was notified that the permitted discharge limit for Clam-Trol was exceeded during a planned zebra mussel chemical treatment. The chemical injection rate was reduced and detoxification was increased to return the Clam-Trol to within the Permit limit. The zebra mussel chemical treatment test procedure was revised to improve the detoxification method and to require more detoxification chemical during future treatments.

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. The typical half-life for radionuclides released from the plant is approximately five 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, 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.

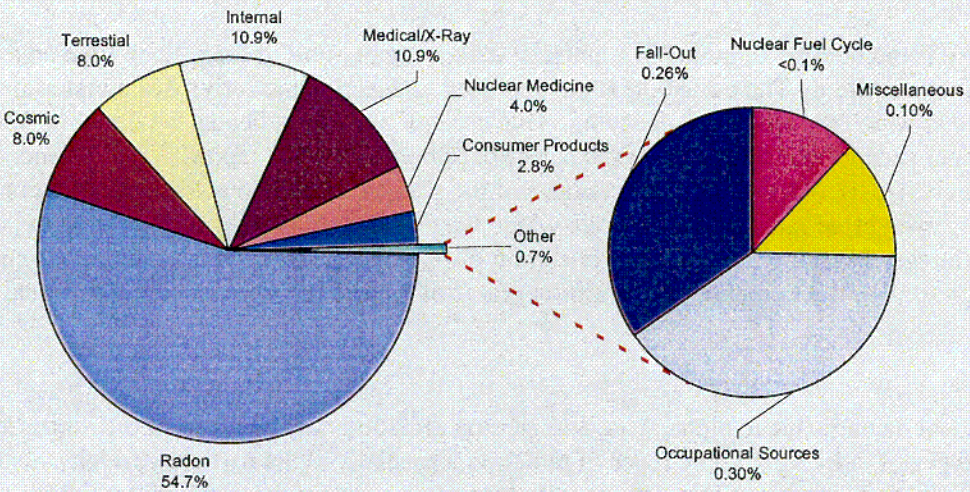
LOWER LIMIT OF DETECTION

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 natural part of nature. Natural radioactive decay also 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 on the 2001 Sampling Program results. These radionuclides are included, however, in Appendix A, 2001 Inter-Laboratory Cross-Check Comparison Program Results.

C01

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. 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 all 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 REMP program 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, shredding and compacting, or 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 prescribe 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 over-all impact on persons living near the plant. Since there are

no other fuel cycle sources near the PNPP the 40CFR190 limits, which are described below, were not exceeded in 2001.

The 40CFR190 limit for total direct-radiation dose is 25 mrem. For 2001, the total whole body dose to a member of the general public, considering all sectors, was 4.3E-01 mrem. This value was determined by summing the annual whole body doses from liquid and gaseous radioactive effluents, the annual gaseous 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 8), 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 reference 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 discharge 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. This section does not include information on the abnormal tritium release related to the Turbine Building HVAC Condensate Drains (M35) System. The abnormal release is fully discussed under the "Special Reports" section.

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 2001.

Table 1: Liquid Batch Releases

	QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4	TOTAL
Number of batch releases	13	21	23	2	59
Total time period for batch releases, min	3.08E+03	4.77E+03	1.54E+04	4.48E+02	2.37E+04
Maximum time for a batch release, min	2.74E+02	2.45E+02	1.04E+04	2.25E+02	1.04E+04
Average time period for a batch release, min	2.37E+02	2.27E+02	6.71E+02	2.24E+02	4.02E+02
Minimum time for a batch release, min	2.19E+02	2.19E+02	2.07E+02	2.23E+02	2.07E+02
Average stream flow during periods of effluent release into a flowing stream, L/min	2.08E+05	2.33E+05	8.02E+04	1.12E+05	1.58E+05

Table 2 provides information on the nuclide composition for the liquid radioactive waste system effluent 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 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 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)	1.06E-02	1.72E-03	3.56E-03	2.74E-05	1.00E+01
2. Average Diluted Concentration, µCi/mL	3.43E-10	4.99E-11	8.90E-11	1.00E-12	
3. Percent of Applicable Limit, %	N/A	N/A	N/A	N/A	
B. Tritium					
1. Total Released, Ci	8.49E+00	1.29E+01	1.29E+01	1.65E+00	1.00E+01
2. Average Diluted Concentration, µCi/mL	2.75E-07	3.74E-07	3.23E-07	6.04E-08	
3. Percent of Applicable Limit, %	2.8E-02	3.7E-02	3.2E-02	6.0E-03	
C. Dissolved and Entrained Gases					
1. Total Released, Ci	4.44E-04	6.63E-04	9.80E-05	<LLD	1.00E+01
2. Average Diluted Concentration, µCi/mL	1.44E-11	1.92E-11	2.45E-12	<LLD	
3. Percent of Applicable Limit, %	7.2E-06	9.6E-06	1.2E-06	<LLD	
D. Alpha Activity, Ci	<LLD	<LLD	<LLD	<LLD	1.00E+01
E. Waste Volume Released, Liters (prior to dilution)	1.68E+06	2.73E+06	2.81E+06	2.58E+05	1.00E+00
F. Dilution Water Volume Used, Liters	3.09E+10	3.45E+10	4.00E+10	2.73E+10	2.8E+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.

Table 3: Radioactive Liquid Effluent Nuclide Composition

	UNIT	QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4	ANNUAL TOTAL
Tritium	Ci	8.49E+00	1.29E+01	1.29E+01	1.65E+00	3.59E+01
Chromium-51	Ci	<LLD	5.39E-05	<LLD	<LLD	5.39E-05
Manganese-54	Ci	1.65E-04	1.19E-04	1.59E-04	<LLD	4.43E-04
Iron-55	Ci	6.73E-03	<LLD	<LLD	<LLD	6.73E-03
Cobalt-58	Ci	3.18E-04	1.07E-04	5.93E-05	<LLD	4.84E-04
Cobalt-60	Ci	2.29E-03	8.68E-04	6.98E-04	2.74E-05	3.88E-03
Zinc-65	Ci	3.02E-04	1.60E-04	<LLD	<LLD	3.62E-04
Strontium-92	Ci	<LLD	3.38E-05	1.77E-04	<LLD	2.10E-04
Zirconium-95	cI	<LLD	<LLD	6.33E-05	<LLD	6.33E-05
Rhuthenium-105	Ci	<LLD	<LLD	5.88E-05	<LLD	5.88E-05
Silver-110m	Ci	<LLD	2.15E-04	7.15E-04	<LLD	9.30E-04
Antimony-124	Ci	<LLD	<LLD	6.91E-04	<LLD	6.91E-04
Antimony-125	Ci	3.91E-04	<LLD	8.66E-04	<LLD	1.26E-03
Iodine-131	Ci	1.40E-05	<LLD	<LLD	<LLD	1.40E-05
Xenon-133	Ci	4.44E-05	6.63E-05	9.80E-05	<LLD	2.09E-04
Cesium-134	Ci	8.52E-05	6.86E-05	<LLD	<LLD	1.54E-04
Cesium-137	Ci	1.20E-04	9.55E-05	7.25E-05	<LLD	2.88E-04
Cesium-138	Ci	6.09E-05	<LLD	<LLD	<LLD	6.09E-05
Lanthanum-140	Ci	8.89E-05	<LLD	<LLD	<LLD	8.89E-05
Total for Period	**Ci**	**8.50E+00**	**1.29E+01**	**1.29E+01**	**1.65E+00**	**3.60E+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 off-gassing during plant start up and shut down operations. 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 well below regulatory limits. Samples are also collected and analyzed on a routine 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.

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	5.12E+01	2.13E+00	1.40E+00	1.83E+00	1.00E+01
2. Average Release Rate, µCi/sec	6.59E+00	2.71E-01	1.76E-01	2.30E-01	
3. Percent of Applicable Limit, %	N/A	N/A	N/A	N/A	
B. Iodine					
1. Total Iodine-131 Released, Ci	1.69E-03	1.78E-04	3.91E-04	2.21E-04	1.00E+01
2. Average Release Rate, µCi/sec	2.18E-04	2.26E-05	4.92E-05	2.77E-05	
3. Percent of Applicable Limit, %	N/A	N/A	N/A	N/A	
C. Particulates with Half-Lives > 8 days					
1. Total Released, Ci	1.05E-03	4.42E-04	4.21E-05	2.99E-04	1.00E+01
2. Average Release Rate, µCi/sec	1.36E-04	5.62E-05	5.30E-06	3.76E-05	
3. Percent of Applicable Limit, %	N/A	N/A	N/A	N/A	
D. Alpha Activity, Ci	<LLD	<LLD	<LLD	<LLD	
E. Tritium					
1. Total Released, Ci	7.90E-03	4.21E-02	<LLD	2.54E-02	1.00E+01
2. Average Release Rate, µCi/sec	1.02E-03	5.36E-03	<LLD	3.19E-03	
3. Percent of ODCM Limit, %	N/A	N/A	N/A	N/A	

<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	7.90E-03	4.21E-02	<LLD	2.54E-02	7.54E-02
Argon-14	Ci	4.61E-02	1.58E-03	4.07E-03	<LLD	5.18E-03
Krypton-85	Ci	8.15E-02	<LLD	<LLD	<LLD	8.15E-02
Krypton-85m	Ci	1.08E-01	1.28E-02	9.49E-03	<LLD	1.30E-01
Krypton-87	Ci	4.44E-01	5.71E-02	3.18E-02	<LLD	5.33E-01
Krypton-88	Ci	2.72E-01	5.31E-02	2.93E-02	<LLD	3.54E-01
Xenon-131m	Ci	2.48E-01	<LLD	<LLD	<LLD	2.48E-01
Xenon-133	Ci	3.93E+01	4.78E-01	3.33E-01	6.76E-01	4.08E+01
Xenon-133m	Ci	6.04E-01	<LLD	1.53E-03	2.75E-02	6.33E-01
Xenon-135	Ci	3.00E+00	1.09E+00	6.50E-01	7.52E-01	5.49E+00
Xenon-135m	Ci	6.66E-01	8.69E-02	1.33E-01	1.57E-01	1.04E+00
Xenon-137	Ci	3.30E+00	1.08E-01	6.97E-02	<LLD	3.48E+00
Xenon-138	Ci	3.16E+00	2.48E-01	1.37E-01	2.15E-01	3.76E+00
Total for Period	**Ci**	**5.12E+01**	**2.17E+00**	**1.40E+00**	**1.85E+00**	**5.66E+01**
B. Iodine						
Iodine-131	Ci	1.69E-03	1.78E-04	3.91E-04	2.21E-04	2.48E-03
Iodine-132	Ci	4.54E-05	<LLD	2.37E-06	<LLD	2.82E-04
Iodine-133	Ci	1.08E-03	2.88E-04	5.60E-04	2.05E-04	2.13E-03
Iodine-134	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Iodine-135	Ci	2.90E-04	4.34E-05	7.70E-05	6.31E-06	4.17E-04
Total for Period	**Ci**	**3.11E-03**	**5.09E-04**	**1.03E-03**	**4.32E-04**	**5.08E+03**
B. Particulate						
Manganese-54	Ci	4.77E-07	1.24E-05	1.39E-06	<LLD	1.43E-05
Cobalt-58	Ci	<LLD	1.10E-06	2.48E-06	<LLD	3.58E-06
Cobalt-60	Ci	6.96E-09	2.01E-05	4.04E-06	<LLD	2.42E-05
Rubidium-88	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Rubidium-89	Ci	6.02E-05	<LLD	<LLD	<LLD	6.02E-05
Strontium-89	Ci	2.79E-08	3.97E-07	<LLD	<LLD	4.25E-07
Strontium-90	Ci	2.86E-09	4.08E-08	<LLD	<LLD	4.37E-08
Strontium-91	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Yttrium-91m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Strontium-92	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Molybdenum-99	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Technetium-99m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Cesium-137	Ci	6.21E-05	3.17E-06	<LLD	<LLD	6.53E-05
Cesium-138	Ci	6.59E-04	3.61E-04	<LLD	2.53E-04	1.27E-03
Barium-139	Ci	2.72E-04	4.41E-05	3.42E-05	4.62E-05	3.97E-04
Barium-140	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Lanthanum-140	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Lanthanum-142	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Total for Period	**Ci**	**1.05E-03**	**4.42E-04**	**4.21E-05**	**2.99E-04**	**1.83E-03**

<LLD – Less than the lower limit of detection

Solid Waste

Two (2) shipments of PNPP solid radioactive waste were transported, by truck, directly to the Barnwell, South Carolina, disposal facility for burial. Solid radioactive waste from PNPP was processed and combined with waste from several other utilities by intermediate vendors (Duratek in Oak Ridge, TN; ATG in Oak Ridge TN and Richland, WA; and Studsvik in Erwin, TN). This waste was ultimately sent to the Barnwell, South Carolina, or Clive, Utah, disposal facilities for burial. No irradiated fuel or components were transported from PNPP in 2001. The solid radioactive waste summary in Table 6 include all PNPP shipments.

Table 6: Solid Waste Shipped Offsite for Burial or Disposal

A. Type of Solid Waste Shipped	VOLUME, m^3	ACTIVITY, Ci	EST. TOTAL ERROR, %
Spent resin, filter sludge, evaporator bottoms, etc.	25.0	77.7	+/- 25
Dry compressible waste, contaminated equipment, etc.	44.5	18.2	+/- 25
Irradiated components, control rods, etc.	0	0	+/- 25
Other (describe)	0	0	+/- 25

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-58 Co-60 Ni-63 Zn-65 Ag-110m Cs-137 Ce-144	12.2 22.7 2.4 48.7 1.1 7.1 1.6 1.6 1.1	± 25
Dry Compressible Waste, Contaminated Equipment, etc.	Mn-54 Fe-55 Co-60 Ni-63 Zn-65 Sb-125 Ce-144	1.3 36.3 47.8 1.4 4.8 1.3 5.3	± 25
Irradiated Components, Control Rods, etc.	None	N/A	N/A
Other (describe)	None	N/A	N/A

C. Disposition	Number of Shipments	Mode of Transportation	Destination
Solid Waste	2(2)	Truck	Barnwell, SC
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) -- Additional shipments were made to Studsvik, in Erwin, TN; Durateck, AERC and ATG in Oak Ridge, TN; and ATG in Richland, WA. This waste was combined with waste from other utilities disposed of at Barnwell, SC or Envirocare of 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.

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. . vegetation, and fish. Because no one actually meets these criteria, the actual dose receiv a real member of the public is significantly less than what is calculated for this hypothetical in dual.

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	2.31E-03	3.0E+00	7.7E-02
	GI-Tract	2.99E-03	1.0E+01	3.0E-02
Noble Gas - gamma air	N/A	2.59E-02	1.0E+01	2.6E-01
- beta air	N/A	4.62E-02	2.0E+01	2.3E-01
Noble Gas	Whole body	6.16E-03	5.0E+00	1.2E-01
	Skin	1.65E-02	1.5E+01	1.1E-01
Particulate & Iodine	Thyroid	2.02E-02	1.5E+01	1.3E-01

N/A -- Not Applicable

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	4.2E-01
	Thyroid	1.7E-01
Gaseous Effluent	Whole body	6.7E-04
	Thyroid	4.2E-03

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	2.31E-03	3.0E+00	7.7E-02
	GI-Tract	2.99E-03	1.0E+01	3.0E-02
Noble Gas - gamma air	N/A	2.76E-03	1.0E+01	2.8E-02
- beta air	N/A	4.13E-03	2.0E+01	2.1E-02
Noble Gas	Whole body	5.16E-04	5.0E+00	1.0E-02
	Skin	1.30E-03	1.5E+01	8.7E-03
Particulate & Iodine	Thyroid	2.09E-03	1.5E+01	1.4E-02

N/A -- Not Applicable

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	1.2E-04	1.3E-04
Second Quarter	4.4E-04	5.2E-05
Third Quarter	3.6E-05	4.2E-05
Fourth Quarter	3.3E-06	3.9E-06
Annual	2.0E-04	2.3E-04

(1) -- No liquid radioactive effluent releases during this period

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	7.3E-04	2.9E-03
Second Quarter	3.0E-04	6.1E-04
Third Quarter	1.3E-04	8.7E-04
Fourth Quarter	9.3E-05	5.1E-04
Annual	9.1E-04	3.9E-03

An average whole body dose to individual members of the public 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 (2,420,000 people). The dose from liquid radiological effluents is determined for the population that receives drinking water from intakes within 50 miles of PNPP (1,820,000 people). 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	4.0E-10	2.4E-09
Second Quarter	3.3E-10	5.8E-10
Third Quarter	1.9E-10	4.1E-10
Fourth Quarter	3.8E-11	3.4E-10
Annual	9.5E-10	2.5E-09

(1) -- No liquid radioactive effluent releases during this period

ABNORMAL RELEASES

There were two abnormal radioactive release events, during 2001.

Turbine Bldg. HVAC (M35) System Condensate Drains Effluent Tritium Release

During routine monitoring of the Turbine Building HVAC (M35) system condensate drains on August 20, 2001, tritium was detected in the effluent. This system was not expected to contain radioactivity, nor was the discharge from this system a radioactive liquid effluent discharge point.

The condensate drains collected condensed moisture entrained in the intake air to the M35 system. By plant design, the condensed moisture from the outside air was discharged to the plant's storm drains as radiologically-clean effluent. The routing of the M35 system condensate drains to the plant's storm drains was implemented to remove a "radioactively clean" source of water from the radioactive liquid treatment system.

In accordance with the PNPP ODCM, this incident was considered an abnormal release. Although believed to be only a few days, the exact duration for the release could not be determined. The release was estimated to have started after August 13, 2001, which was the last time the M35 system was sampled and analyzed to have no detectable radioactivity. The immediate corrective action was to route the M35 drains to the radioactive liquid treatment system for processing.

The measured tritium activity of 9.73E-07 μCi/mL was 9.7E-02 % of the 10CFR20, Appendix B, Table 2, Column 2, limiting effluent concentration limit. The amount of tritium released over seven (7) days was calculated to be 3.1E-04 Ci. Since these dose values are well below any regulatory limits, this abnormal release (refer to Table 13) had minimal dose consequence to the general public.

Table 13: Turbine Bldg. HVAC Condensate Drain System Abnormal Release

	ORGAN	ESTIMATED DOSE, mrem	ANNUAL LIMIT	% OF LIMIT
Liquid Effluent	Whole body	6.30E-05	3.0E+00	2.1E-03
	Liver	6.30E-05	1.0E+01	6.3E-04

The most probable cause for this event was the recycling of the radioactive gaseous treatment system effluent vent discharges back into the plant as part of the air intake. Four factors combined to contribute to the apparent causes associated with this event: 1) the gaseous treatment system effluent vents are considered ground-level release points; 2) the atmospheric high humidity and stability (very little wind); 3) tritium build-up in the plant; and 4) the near "zero discharge" policy for radioactive liquid discharges. It is postulated that the low levels of tritium in the effluent vents being short-cycled back into the M35 system intakes, combined with the contributing factors, resulted in the tritium being concentrated in the M35 drains.

The routing of the M35 drains to the storm drains system was to remove a "radioactively clean" source of water from the radioactive liquid treatment system. By reducing the input of "radioactively clean" water into the radioactive liquid treatment system, the need for discharges is significantly reduced, thus reducing the dose impact on the general public. At the time, engineering recognized the potential for radioactive material to enter the storm drains via this path. Monitoring was implemented, and corrective actions put in place should radioactivity be detected.

Unit 1 Containment Vacuum Breaker Inadvertent Opening

On December 03, 2001, at 06:58, the Unit 1 containment vacuum breaker 1M17-F0010 was inadvertently opened, which resulted in a potential airborne radioactive effluent release to the environment. The duration of the release was estimated to be 15 seconds, but for calculational purposes, a release duration of 60 seconds was used. This incident was considered an abnormal release in accordance with the PNPP ODCM. As required by the PNPP ODCM, a grab sample was obtained of the Unit 1 Containment Building atmosphere and analyzed for principal gamma emitters. Based on the analytical results and an estimated volume released of 4263 cu ft, compliance with the limits for Derived Air Concentration (0.0148 μCi/cc) and 10CFR50 (1.19E-04 μCi/cc) was verified. The dose contributions from this event (refer to Table 14) had minimal dose consequence to the general public. Refer to Appendix D, 2001 Abnormal Gaseous Release Dose Summary and Meteorological Data for compliance data, dose summaries and meteorological data.

Table 14: Vacuum Breaker Abnormal Event Dose Contribution

	ORGAN	ESTIMATED DOSE, mrem	ANNUAL LIMIT	% OF LIMIT
Noble Gas -air gamma	NA	1.58E-07	1.0E+01	1.6E-06
-air beta	NA	2.92E-07	2.0E+01	1.5E-06
Noble Gas	Whole body	9.84E-08	5.0E+00	2.0E-06
	Skin	2.65E-07	1.5E+01	1.8E-06
Particulate & Iodine	Thyroid	3.70E-07	1.5E+01	2.5E-03

During the performance of surveillance SVI-M17-T2002, Step 5.1.4.5, a plant operator in the field inadvertently operated the control switch for containment vacuum breaker 1M17-F0010 instead of

the switch for containment vacuum breaker 1M17-F0040. Opening valve 1M17-F0010 resulted in an unmonitored release path to the environment. The apparent cause of this event was the result of a human performance error related to attention to detail. The plant operator was not focused on the required switch manipulations prior to actually performing the evolution.

NON-COMPLIANCES

There were two (2) non-compliance to the ODCM Controls requirements in 2001:

Radwaste Discharge Header High Flow Monitor Inoperable Greater Than 30 Days

The liquid radwaste discharge to ESW header high flow monitor was inoperable for greater than 30 days as a result of a hardware failure. The flow monitor failed on 02/16/2001 due to a bad micrometer switch connector. This connector was not expected to fail, therefore, it was not considered a "critical" spare part or maintained in stock. The replacement connector arrived on-site on 03/17/01, with the monitor being returned to service on 03/22/01. The monitor was inoperable for 34 days. In accordance with Control 3.3.7.9, Action b, the flow monitor was declared inoperable and the compensatory requirements of Table 3.3.7.9-1, Action 113, were implemented.

ESW Total Flow Monitor Inoperable Greater Than 30 Days

The Emergency Service Water flow monitor 1P45-N0271 was out-of-service for greater than 30 days as a result of excessive turbulence in the monitor's stillwell, when two ESW pumps are operating. On 5/02/01, the flow monitor was declared inoperable, when a satisfactory channel check could not be obtained. At that time, the monitor was declared inoperable and Control 3.3.7.9, Action b, was implemented. On 06/19/01, the total flow monitor was declared operable, which meant the flow monitor was inoperable for 48 days.

OFFSITE DOSE CALCULATION MANUAL CHANGES

During this reporting period, there was two (2) changes to the Offsite Dose Calculation Manual:

- ODCM Table 4.11.2.1.2-1, Table Notation c. was revised to permit the use of grab samples to demonstrate that the effluent point activity did not increase by greater than three times, when the noble gas monitor is inoperable.
- Dose factors were added for Au-199.

PROCESS CONTROL PROGRAM CHANGES

During 2001, there were two (2) changes to the Process Control Program:

- References for the vendors used to document compliance to the PCP was updated. Additionally, references to Tech Specifications 1.34 was replaced by PCP Section 1.34.
- References to the PNPP Quality Assurance Plan was revised to reference the FENOC Quality Assurance Program Manual.

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 wide variety of samples are collected as part of the PNPP REMP. The selection of sample types, sampling locations, and sample 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 considered.

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, 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.

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 and soil sampling were dropped from the program. Although not required, the grass, soil and precipitation sampling sites remain available, if future sampling is desired.

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 15, Figure 2, Figure 3 and Figure 4 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 15.

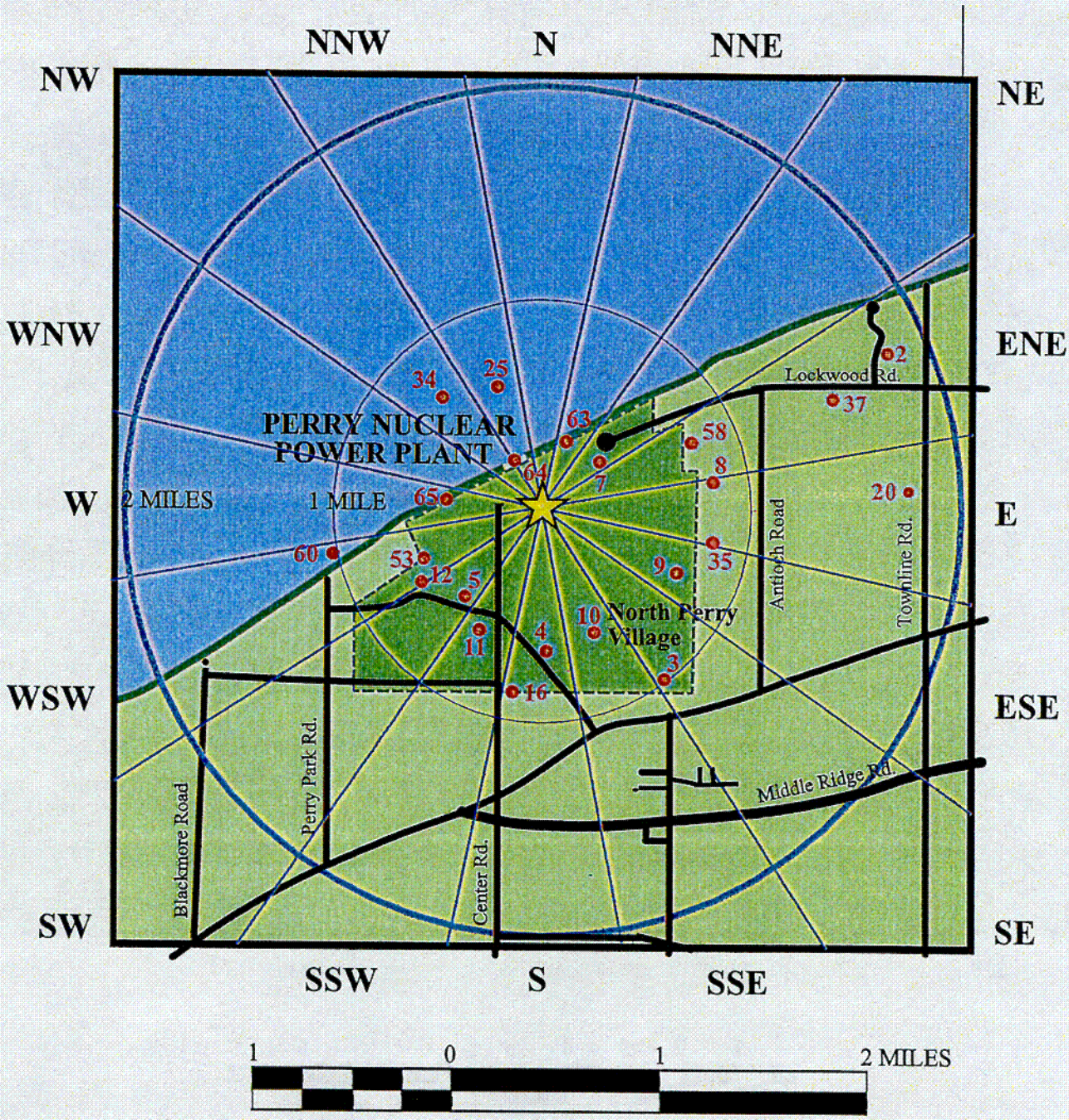
Table 15: REMP Sampling Locations (1)

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, Air
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.	0.8	S	Food Products
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
51	Rettger Milk Farm	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	7.4	SE	Milk
63	Minor Stream Mouth	0.08	NNE	Sediment
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
71	Mosley Farm	7.9	SE	Milk

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

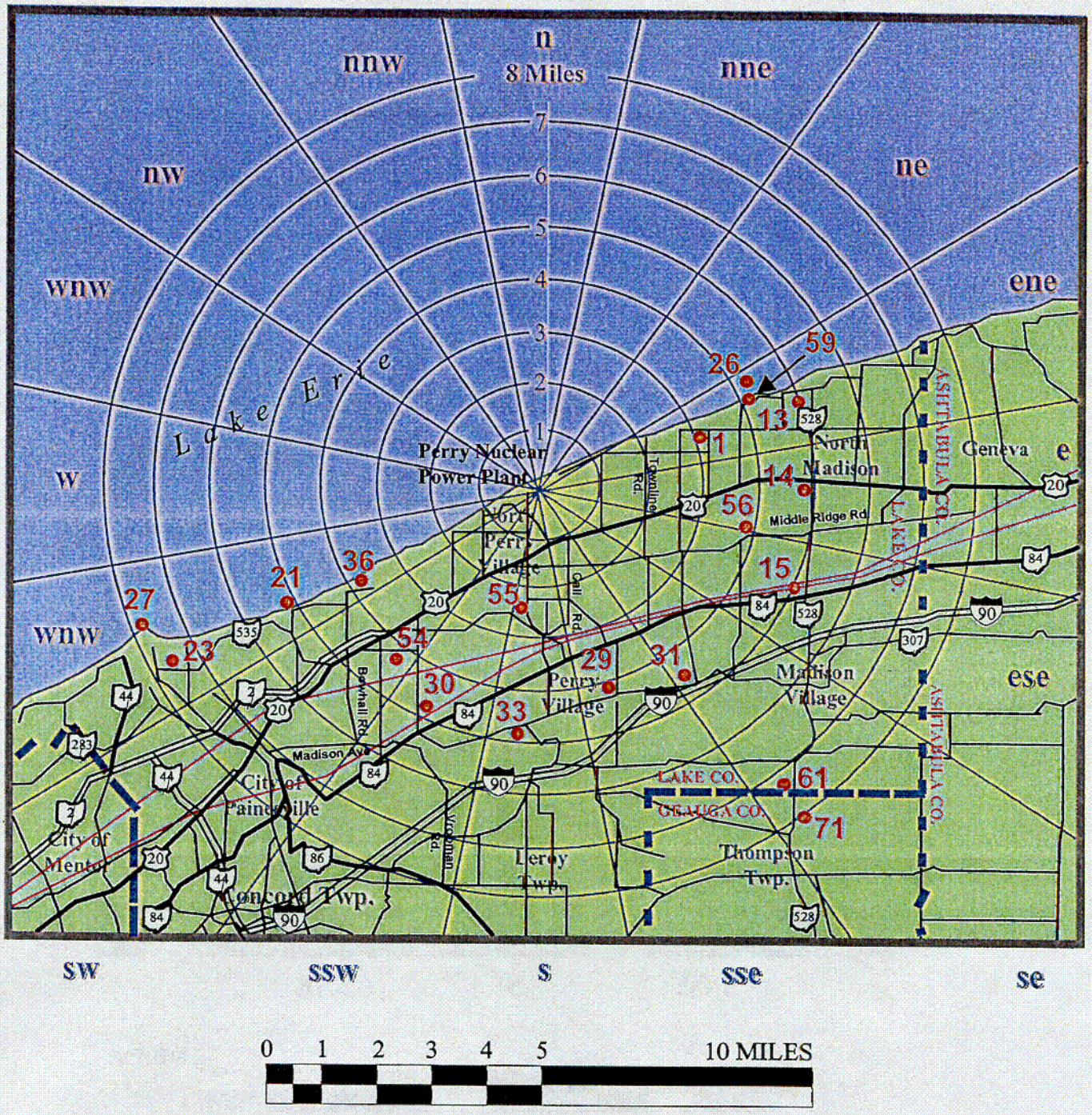
(2) AIP = Air, Iodine and Particulate
Veg = Vegetation
TLD = Thermoluminescent Dosimeter

Figure 2: REMP Sampling Locations Within Two Miles of Plant Site



C02

Figure 3: REMP Sampling Locations Between Two and Eight Miles of Plant Site



C03

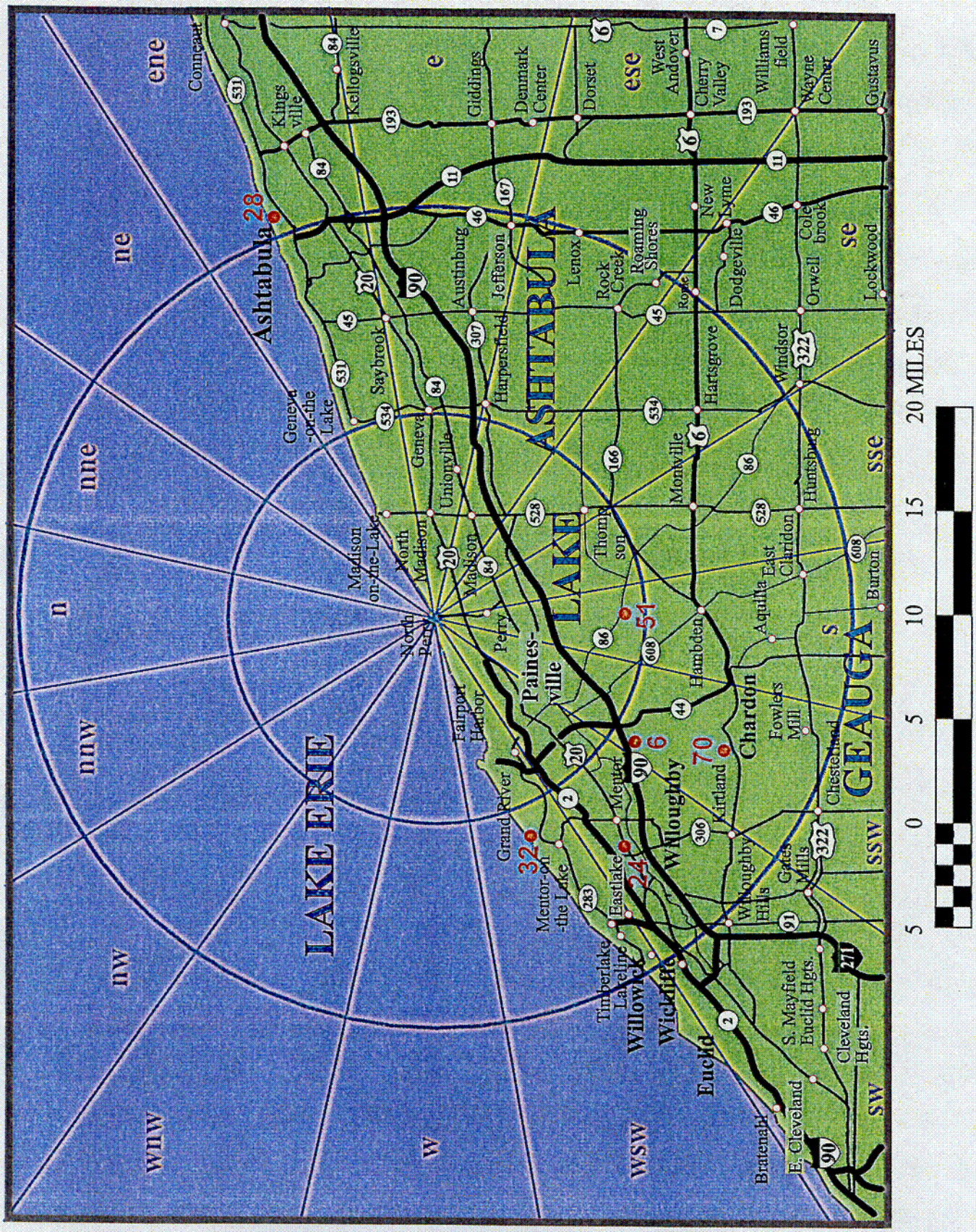


Figure 4: REMP Sampling Locations Greater Than Eight Miles from the Plant Site

C04

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 much 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 an excellent 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 16 provides a list of the analyses performed on environmental samples collected for the PNPP REMP in 2001.

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 was able to comply with those values in 2001.

Table 16: 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
	Vegetation	As Required	Gamma Spectral Analysis
	Soil	As Required	Gamma Spectral Analysis
Aquatic Monitoring	Water	Monthly Quarterly	Gross Beta Activity, Gamma Spectral Analysis Tritium Activity
	Fish	Biannually	Gamma Spectral Analysis
	Sediment	Biannually	Gamma Spectral Analysis
Direct Radiation Monitoring	TLD	Quarterly	Gamma Dose
		Annually	Gamma Dose

2001 SAMPLING PROGRAM

The contribution of radionuclides to the environment resulting from PNPP operation is assessed by comparing results from the 2001 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, 2001 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 2001.

Program Changes

There were no changes to the REMP Program during 2001.

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 cannot produce milk year-round. Missing TLDs may be the result of vandalism. When vandalism has been identified as a recurring problem, the TLD is relocated. If the loss of a TLD is determined to be a single or unusual event, it is not normally relocated. Table 17 provides information on samples missed during 2001.

Table 17: Missed REMP Samples in 2001

MEDIA	LOCATION	DATE	REASON
Food Products	All	April, 2001	Vegetables not ready for harvest
Food Products	All	May, 2001	Vegetables not ready for harvest
Food Products	2	June, 2001	Vegetables not ready for harvest
Food Products	16	June, 2001	Vegetables not ready for harvest
Food Products	20	June, 2001	Vegetables not ready for harvest
Lake Water	59	01/25/2001	Sample unavailable due to frozen shoreline
Lake Water	60	01/25/2001	Sample unavailable due to frozen shoreline
Lake Water	59	02/22/2001	Sample unavailable due to frozen shoreline
Lake Water	60	02/22/2001	Sample unavailable due to frozen shoreline
Milk	61	January, February, March, November, December	Drying period for goats
Milk	51	08/06/2001	Sample lost in transit to vendor lab
TLD (Annual)	55	01/03/2002	Missing at time of collection; deep snow hampered search

Atmospheric Monitoring

Air

Air sampling is conducted to detect any increase in the concentration of airborne radionuclides. The PNPP ODCM requires five locations (four indicator and one control). Air sampling pumps are used to draw continuous samples at a rate of approximately two cubic foot 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 seven air sampling stations. 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.

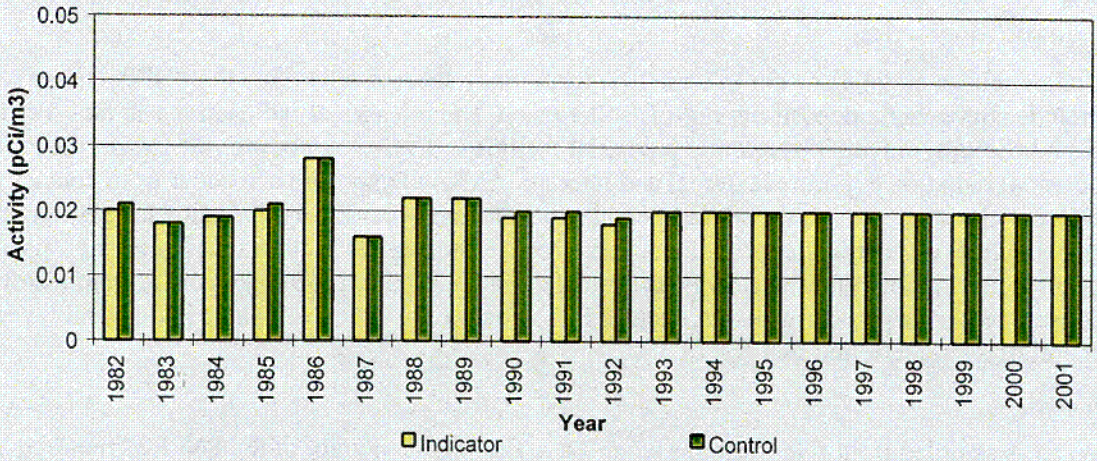
On occasion, air sample locations can experience power losses associated with storms and/or malfunctioning equipment. On September 08, 2001, location # 35 experienced such a power loss, which required the complete replacement of the underground transformer that powered the sample station. Although the sample station was without power for 4 days, the sample collected was sufficient to provide the required analytical results.

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 for air particulate and 364 air radio-iodine samples were collected and analyzed in 2001.

Gross beta activity was detected in all air samples and ranged up to 0.06 pCi/m^3. The annual average gross beta activity at both indicator and control locations was 0.02 pCi/m^3. Historically, the concentration of gross beta in air has been essentially identical at indicator and control locations. Figure 5 reflects the average gross beta activity for 2001 and the previous years.

Except for naturally occurring beryllium-7, no radionuclides were identified in the gamma spectral analysis above the LLD values. Iodine-131 was not detected in any sample above the LLD of 0.05 pCi/m^3.

Figure 5: Annual Average Gross Beta Activity, in Air



Terrestrial Monitoring

Collecting and analyzing samples of milk, food products and vegetation 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. The PNPP REMP includes three (3) milk locations (two within five miles of the plant, and one control). Since the milk sampling locations did not meet the requirements of the ODCM (no milk-producing animals located within the required areas), food product sampling (discussed below) was performed. Milk was collected from the available locations, even though they did not meet the ODCM requirements. 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 51 milk samples were collected in 2001. Iodine was not detected above the LLD of 0.75 pCi/L in any of the samples. The concentrations of all radionuclides, except naturally occurring potassium-40, were below LLDs in all samples collected. The results for potassium-40 were similar at indicator and control locations, as expected.

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 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 five farms in the vicinity of PNPP. The control location for food products is 16.2 miles from PNPP.

A total of seventy-seven (77) food product samples were collected and analyzed by gamma spectral analysis in 2001. Five (5) food products were collected which included: beet greens, turnip greens, chinese cabbage, swiss chard and kale. Beryllium-7 and potassium-40, naturally-occurring

C05

radionuclides, were found in several samples, as 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.

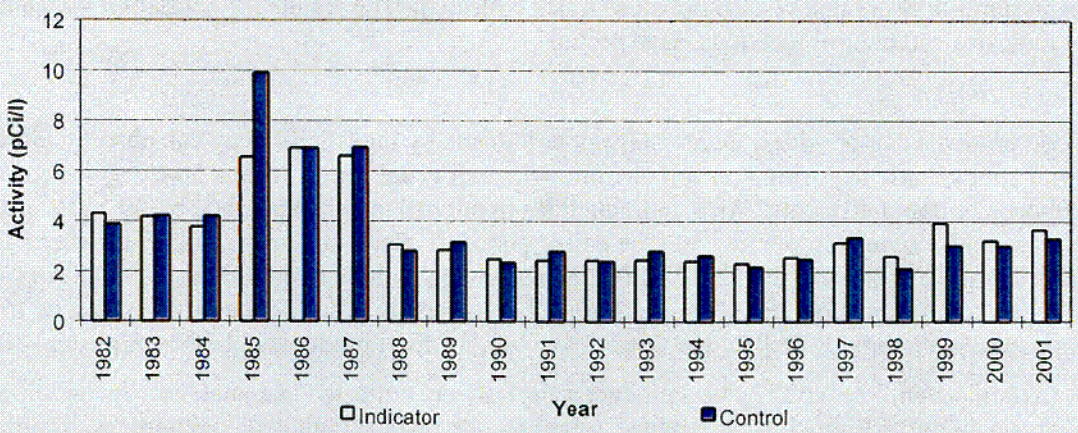
Water

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. The containers are emptied monthly and the samples shipped to the laboratory for analysis. Samples from two locations are collected weekly and combined. Each month the combined sample is shipped for analysis.

Fifty six (56) water samples were collected and analyzed for gross beta activity and gamma spectral analysis in 2001. From these monthly samples, a quarterly composite sample was obtained and analyzed for tritium activity.

Gross beta activity was detected in nine (9) of the fifty-six (56) samples collected. None (0) of the twelve (12) control samples, however, were above the LLD values listed in the ODCM. The detectable (i.e., above the lab LLD value) gross beta activity ranged from 3.06 pCi/L to 4.15 pCi/L. Referring to Figure 6, the annual average gross beta activity was 3.67 pCi/L at the indicator locations and 3.32 pCi/L at the control location, using the mean of values >LLD. 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 6: Annual Average Gross Beta Activity, in Water



COC

There were no radionuclides detected by gamma spectral analysis above the LLD. Tritium was not detected above the LLD value in any of the twenty (20) 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.

Sampling 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. Although the PNPP ODCM requires only one location, sediment is sampled twice each year from seven (7) locations. Two (2) of the sampling locations are also fish sampling locations. Sediment samples from offshore are collected using a hand dredge. Near shore samples are collected using a scoop. Fourteen (14) sediment samples were collected in 2001 and analyzed by gamma spectrometry.

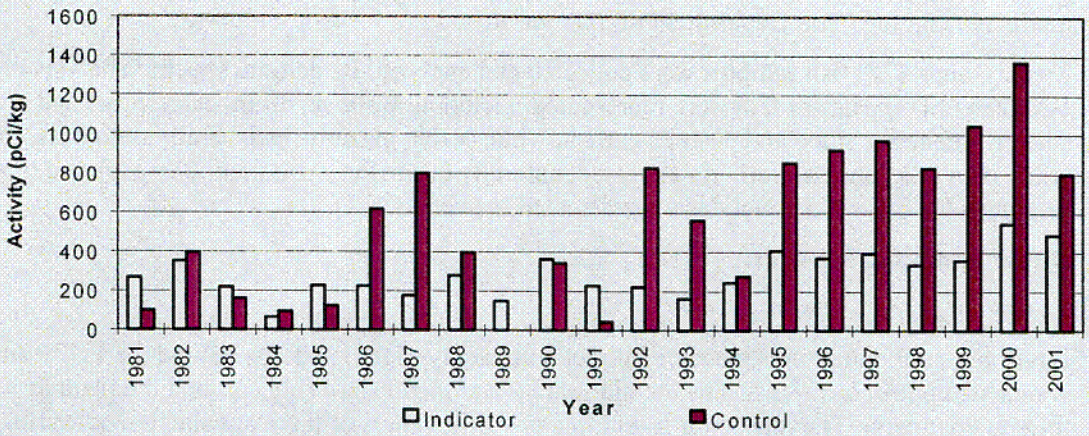
The predominant radionuclide detected by gamma spectral analysis was naturally-occurring potassium-40. Potassium-40 has been detected in all samples, since the program began in 1981.

Cesium-137 activity was detected in five (5) of the fourteen (14) samples collected and ranged from 210.75 pCi/kg to 1388.10 pCi/kg. The annual average cesium-137 activity was 486.90 pCi/kg at the indicator locations and 799.43 pCi/kg at the control location.

Year-to-year variations in the lake bottom sediment sample activities is expected and beyond the control of PNPP. For example, cesium-137 activity variations (refer to Figure 7) 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, and
2. Sampling in nearly the same location approximately 4½ miles off-shore, even with GPS, is extremely difficult.

Figure 7: Annual Average Cesium-137 Concentration in Sediment



For these reasons, it is unlikely the same bed of sediment is sampled at each collection. The average Cs-137 radioactivity of 611.91 pCi/kg for all locations is within the maximum value of 864 pCi/kg established in 1981.

In 1999, a sediment sample from sample location #64 (northwest drain impoundment) was analyzed to contain 62.00 pCi/kg of cobalt-60. This activity was just above the detection limit. In 2000, ten (10) additional sample locations were established within the impoundment to identify the boundary of the cobalt-60 activity and to support supplemental monitoring activities. For 2001, sampling activities were performed on May 30th, June 6th, October 8th and October 15th. Referring to

C07

Table 18, the cobalt activity for sampling location #64 for the months of May and October, was <8.9 pCi/kg dry and <6.7 pCi/kg dry, respectively.

Table 18: Northwest Drain Impoundment Cobalt-60 Activity, pCi/kg (dry)

Location	05/30/01	06/06/01	10/08/01	10/15/01
64	< 8.9		< 6.7	
64-1		< 19.9		< 24.0
64-2		< 16.3		56 ± 30
64-3		138.7 ± 19.2		148 ± 40
64-4		78.1 ± 29.1		111 ± 23
64-5		*		< 10.0
64-6		< 43.5		< 39.3
64-7		142.6 ± 32.2		173 ± 25
64-8		112.0 ± 24.3		119 ± 29
64-9		128.4 ± 31.7		267 ± 35
64-10		206.0 ± 30.9		191 ± 29

** Insufficient sample for analysis*

For the additional ten (10) sampling locations, in the month of June, the cobalt-60 activity ranged from <16.3 pCi/kg to 206.0 pCi/kg, while for October, the cobalt-60 activity range from <10.0 pCi/kg to 267.0 pCi/kg. The cobalt-60 activity at sampling location #64 continues to be centered within the organic material at the top of the spillway, with little or no activity found farther upstream.

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, twice each year as required by the ODCM. Important sport and commercial species are targeted, and only the fillets are sent to the laboratory for analysis. A scientific collecting permit is obtained annually from the Ohio Department of Natural Resources for fish sampling.

Twenty-eight (28) fish samples were collected and analyzed by gamma spectral analysis in 2001. Fourteen (14) species of fish were represented, including walleye, drum, carp, white and redhorse sucker, steelhead, stone and channel catfish, white perch, gizzard shad, smallmouth bass, rock bass, white bass and coho salmon. As expected, naturally occurring potassium-40 was found in all samples. No other radionuclides were detected above the LLD.

Direct Radiation Monitoring

Thermoluminscent Dosimeter (TLD)

Environmental radiation is measured directly at twenty-eight 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 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.

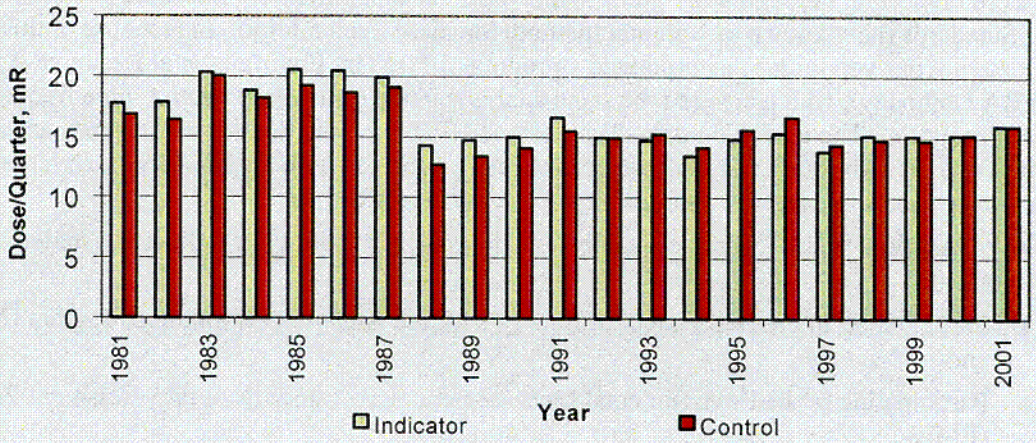
A total of 251 TLDs were collected and analyzed in 2001. This includes all 224 collected on a quarterly basis and twenty seven (27) of (28) collected annually. During the 4th quarter collection of TLDs on 1/3/02, all TLDs (quarterly and annual) were collected with the exception of the annual TLD for location #55. A search of the immediate area was performed but possible recovery was hampered by deep snow. It was determined that the location had not been vandalized, but that strong

winds had dislodged the TLD from its mounting point. Annual TLDs are not required per the ODCM and are used for supplemental data only.

In 2001, the annual average dose for all indicator locations was 56.26 mrem, and 54.92 mrem for all control locations. Referring to Figure 8, the average quarterly dose for all indicator locations was 15.95 mrem, and 15.97 mrem for all control locations. 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.

A typographical error was discovered in the 2000 report between Figure 8 and its respective text (refer to Appendix E, 2000 AEERR Corrections). Figure 8 reflected that the 2000 average quarterly TLD control dose was 15.2 mrem vs. the text reference of 9.1 mrem. The correct value was 15.2 mrem, as reflected in the graph.

Figure 8: Average Quarterly TLD Dose



Conclusion

Sediment samples continue to confirm cobalt-60 in the northwest drain impoundment. The activity level was just above the detection limits. Samples taken upstream did not find any additional activity or the source. 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. 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. Cesium-137 was detected in sediment samples and is the result of fallout from weapons testing. The concentrations were similar to those measured in previous years and are not related to plant operation.

Finally, direct radiation measurements are consistent with past data.

C08

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 not longer funded and no longer 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 (our 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),
- Participating in the Department of Energy's Mixed Analyte Performance Program (MAPEP), and
- Participating in the Environmental Measurements Laboratory Quality Assessment Program (EML).

In the 2000 Annual Report, Table A-1 (refer to Appendix E, 2000 AEERR Corrections), the "spiked" water sample STW-868 referenced the vendor laboratory results for Ra-228 as 5.6+/-1.0 pCi/L vs. the control limit of 1.3-3.2 pCi/L. Although re-analysis results were identified, no explanation was given for the reason the control limit was not met. Per the vendor lab (Environmental Inc.), the chemistry reanalysis results and the gamma spectroscopy results confirmed that their detectors were functioning properly. The vendor's investigation determined that the probable cause was a possible error in dilution. Sufficient spiked sample was not available to have the dilution steps re-performed.

Conclusion

Appendix A, 2001 Inter-Laboratory Cross-Check Comparison Program Results, includes results from both the above referenced programs and the ERA Company cross-check program. One (1) water sample analyzed for Sr-89 was determined to be outside the ERA program control limits. Delay in processing possibly caused the resulting analysis. Reanalysis determined that the Sr-89 sample was within program control limits. Referring to the In-house "spike" sample results, one (1) water sample analyzed for Ra-228 was lost during the analysis, causing the results to be outside the control limits on the low side. Insufficient sample remained to perform a re-analysis. One other "spiked" sample, Cs-137 in milk, was suspect due to its results being outside the control limits on the high side. A new Cs-137 spike was prepared and analyzed the following month. This value was within the accepted criteria. Two (2) In-house "blank" milk samples analyzed for Sr-90 were found to be outside the program control limits of <1.0 pCi/L liquid. Low levels of Sr-90 remain in the environment and concentrations of (1-5 pCi/l) found in milk is not unusual. The sample's results of

1.18+/- 0.35 pCi/l and 1.09+/- 0.36 pCi/l respectively, fall within these parameters. For the MAPEP Program, one (1) soil sample analyzed for Am-241 was included as a "false positive" with no activity expected. The resulting analysis was <0.8 Bq/l. In the ERL program, a soil sample analyzed for Bi-212 was found outside the control limits on the high side. The Vendor Laboratory determined that naturally occurring radium and thorium daughters contained in the shield background contributed to the slightly elevated results. To adjust for these occurrences, the vendor lab performs quarterly background readings and calibrates its equipment accordingly. All other analysis results performed under these programs were within the control limits established.

LAND USE CENSUS

Introduction

Each year a land use census, which is required by Section 3/4.12.2 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 2001 Land Use Census, which was conducted August 8th and 9th, provided the garden, residence and milk animal locations tabulated in Table 19 and depicted in Figure 9. Note that the W, WNW, NNW, NW, 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. The 2001 Land Use Survey used the 1999 survey map produced by the Commercial Survey Co. of Cleveland. GPS units were used for a more accurate and detailed identification of media locations.

Table 19 identifies the nearest residences, by sector, to the PNPP. The table is updated annually to reflect any changes identified during the annual Land Use Census. For 2001, there was only one change required. This change identified the construction of a new home, which resulted in a new "nearest residence" in the ESE sector.

Table 19: Nearest Residence, By Sector

SECTOR	LOCATION ADDRESS	MILES FROM PNPP	X/Q VALUE, sec/m^3	MAP LOCATOR NUMBER
NE	4384 Lockwood	0.7	2.66E-06	1
ENE	4460 Lockwood	0.8	1.59E-06	2
E	2626 Antioch	1.1	6.77E-07	3
ESE	2750 Antioch	1.0	5.08E-07	4
SE	4537 North Ridge	1.3	3.44E-07	5
SSE	4243 Parmly	1.2	4.83E-06	6
S	3119 Parmly	0.9	2.25E-06	7
SSW	3121 Center	0.9	1.11E-06	8
SW	3440 Clark	1.2	4.98E-07	9
WSW	3462 Parmly	1.1	8.67E-07	10

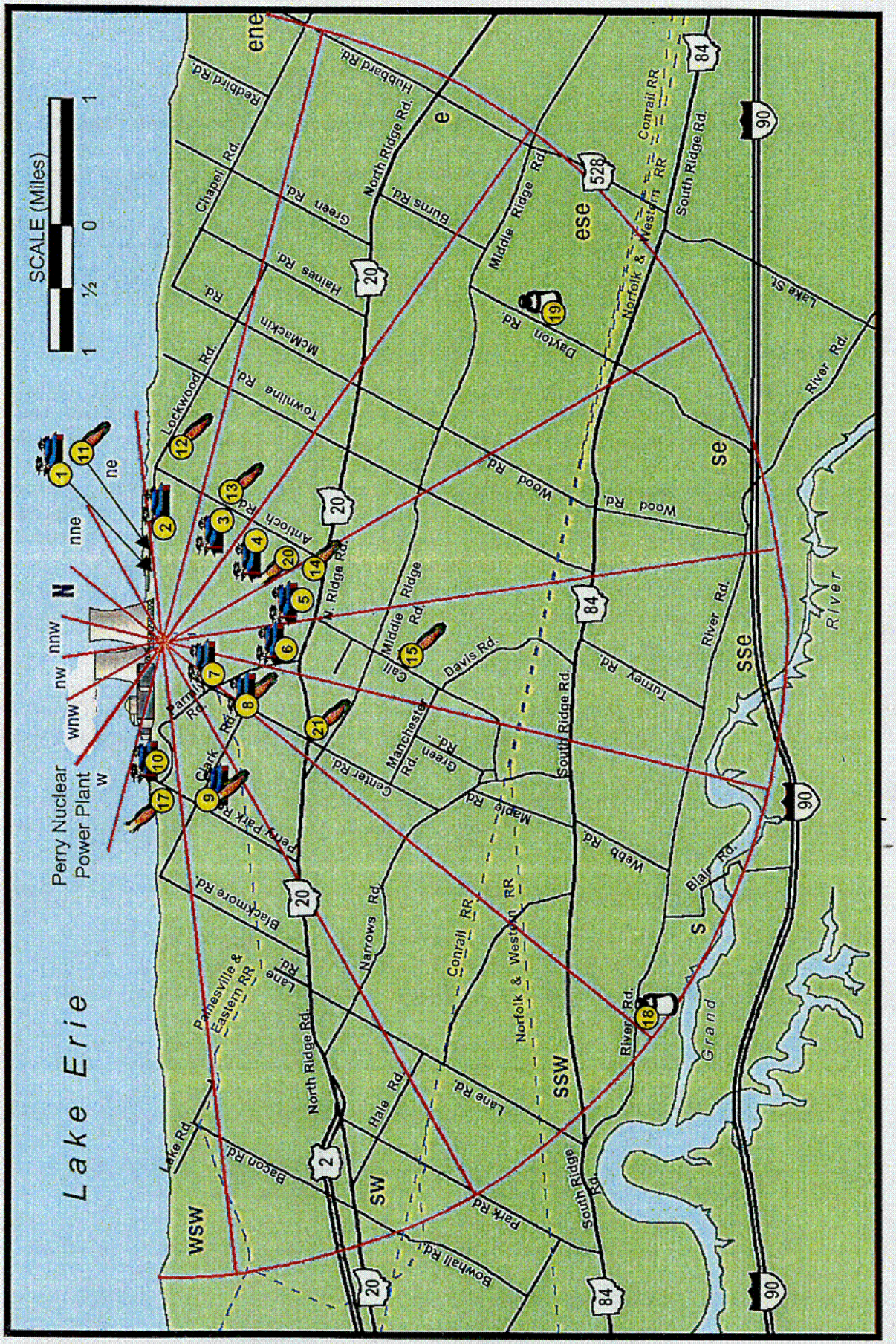


Figure 9: Land Use Census Map

C09

During the 2001 Land Use Census, two (2) changes were identified regarding the nearest milk animal. Although no new milk animals were found, the goat previously identified in the S sector was found to be no longer present. In October, 2001, however, a new goat was identified to exist in the ESE sector and would be ready for milking in the Spring, 2002. These changes are reflected in Table 20.

Table 20: Nearest Milk Animal, By Sector

SECTOR	LOCATION ADDRESS	MILES FROM PNPP	MAP LOCATOR NUMBER
ESE	3485 Dayton	4.0	19
S	3588 River	4.8	18

There were six (6) changes in the nearest gardens recorded during this year's census. These changes are identified in Table 21, which lists nearest gardens occupying at least 500 square feet.

Table 21: Nearest Garden, By Sector

SECTOR	LOCATION ADDRESS	MILES FROM PNPP	D/Q VALUE, m^{-2}	MAP LOCATOR NUMBER
NE	4384 Lockwood	0.6	1.76E-08	11
ENE	4762 Lockwood	1.6	2.08E-09	12
E	2610 Antioch	0.8	1.32E-08	13
ESE	2864 Antioch	1.1	3.96E-09	20
SE	4771 North Ridge	1.5	1.97E-09	14
SSE	3323 Call	1.5	2.04E-09	15
S	4176 North Ridge	1.2	00.0E-08	21
SSW	3121 Center	0.9	5.58E-09	8
SW	3440 Clark	1.2	2.24E-09	9
WSW	2975 Perry Park	1.3	2.01E-09	17

CLAM/MUSSEL MONITORING

INTRODUCTION

Sampling for benthic 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 2001 monitoring was done as part of the Environmental Protection Plan (Operating License, Appendix B). The program consists of visually inspecting the raw water systems, whenever they are opened for maintenance. The purpose of this program is to detect Corbicula, should it appear at PNPP.

No Corbicula have ever been found in any sample collected from PNPP or from Lake Erie in the vicinity of 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 2001, samples were collected from the Service Water (SW), Emergency Service Water (ESW) and Circulating Water (CW) systems at PNPP. All samples were collected by Ponar hand dredge, hand scoop, or scraper. They were examined for asiatic clam shells and fragments. In addition to sample collections, plant components that use raw water are inspected whenever opened for maintenance or repair. Sample collection/inspection dates are listed in Table 22.

Table 22: 2001 Corbicula Monitoring

DATE	SAMPLE LOCATION	DATE	SAMPLE LOCATION
02/04/01	SW Traveling Screens	03/10/01	Condenser 1A
02/24/01	ESW "A" Pump Discharge Strainer	03/10/01	Condenser 1B
02/26/01	CW Cooling Tower	03/10/01	Condenser 1C
02/26/01	ESW Valve 1P45-F0040A	03/10/01	Condenser 1D
02/22/01	SW Main Lube Oil Cooler B	03/10/01	Condenser 2A
03/05/01	CW Strainer D0001	03/10/01	Condenser 2B
03/08/01	Condenser 2A	03/10/01	Condenser 2C
03/09/01	Condenser 2B	03/10/01	Condenser 2D
03/09/01	Condenser 3A	03/10/01	Condenser 5A
03/09/01	Condenser 3B	03/10/01	Condenser 5B
03/09/01	Condenser 3C	03/10/01	Condenser 5C
03/09/01	Condenser 3D	03/10/01	Condenser 5D
03/09/01	Condenser 4A	03/10/01	Condenser 6A
03/09/01	Condenser 4B	03/10/01	Condenser 6B
03/09/01	Condenser 4C	03/10/01	Condenser 6C
03/09/01	Condenser 4D	03/10/01	Condenser 6D
03/09/01	ESW Valve 1P45-F0520	04/30/01	ESW Traveling Screen "B"

Results

As in the past, the 2001 monitoring program did not identify Corbicula in any sample collected.

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.

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, side-stream monitors, and plankton nets. 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. Sidestream monitors are flow-through containers that receive water diverted from plant systems, and are normally used in three in-plant locations during the mussel season. The sidestream monitors are fitted with slides and inspected for veliger settlement. A plankton net was used on a limited basis in 2001 to help trend veligers during the spawning season.

Treatment

Chemicals used for mussel control in 2001 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 sulfite is added at the plant discharge structure for dechlorination prior to entry into Lake Erie.

The use of a commercial molluscicide requires approval by the Ohio Environmental Protection Agency (OEPA). The chemical selected for use at the PNPP in 2001 was alkyl-dimethyl-benzyl-ammonium chloride. One treatment was applied in October, 2001. The active ingredients were detoxified by adsorption onto 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 in the flow-through container was >99%. To date, PNPP has had no 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 2001, three (3) general herbicide requests were initiated for spraying 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 only herbicide approved for use in the Owner-Controlled Area was Round-Up. For each application, the type of weed to be treated dictated the herbicide concentration to be used. Table 23 provides detailed documentation for each application in 2001. The volume represents the quantity of herbicide applied, after dilution.

Table 23: 2001 Herbicide Applications

Application Date	Location	Area sq ft	Conc. %	Volume gal
06/08/01	Gravel areas within the perimeter fence	36,000	105	3.8
07/07/01	Gravel areas within the perimeter fence	79,200	800	3.8
07/16/01	Gravel areas within the perimeter fence	4,000	105	3.8
06/08/01	Gravel areas inside protected area	160,000	205	3.8
06/10/01	Gravel areas inside protected area	397,000	200	3.8
07/02/01	Gravel areas inside protected area	14,000	24	3.8
07/09/01	Gravel areas inside protected area	48,000	75	3.8
07/16/01	Gravel areas inside protected area	122,000	250	3.8
07/23/01	Gravel areas inside protected area	128,000	210	3.8
07/30/01	Gravel areas inside protected area	162,000	200	3.8
08/06/01	Gravel areas inside protected area	150,000	28	3.8
08/13/01	Gravel areas inside protected area	150,000	50	3.8
08/21/01	Gravel areas inside protected area	120,000	25	3.8
08/27/01	Gravel areas inside protected area	129,000	29	3.8
06/04/01	Gravel areas/Landscaped beds inside owner controlled area	8,920	2	2.8
06/07/01	Gravel areas/Landscaped beds inside owner controlled area	118,000	48	3.8
06/08/01	Gravel areas/Landscaped beds inside owner controlled area	33,000	102	2.8
07/02/01	Gravel areas/Landscaped beds inside owner controlled area	17,000	12	3.8
07/07/01	Gravel areas/Landscaped beds inside owner controlled area	147,000	60	3.8
07/09/01	Gravel areas/Landscaped beds inside owner controlled area	15,000	10	3.8
07/16/01	Gravel areas/Landscaped beds inside owner controlled area	19,000	26	2.8
07/17/01	Gravel areas/Landscaped beds inside owner controlled area	24,500	100	3.8
07/24/01	Gravel areas/Landscaped beds inside owner controlled area	194,000	200	3.8
07/31/01	Gravel areas/Landscaped beds inside owner controlled area	62,000	20	2.8
08/06/01	Gravel areas/Landscaped beds inside owner controlled area	6,700	9	2.8
08/14/01	Gravel areas/Landscaped beds inside owner controlled area	198,000	50	3.8
08/21/01	Gravel areas/Landscaped beds inside owner controlled area	167,000	50	3.8
08/27/01	Gravel areas/Landscaped beds inside owner controlled area	249,000	80	3.8
08/28/01	Gravel areas/Landscaped beds inside owner controlled area	147,000	58	3.8
09/05/01	Gravel areas/Landscaped beds inside owner controlled area	157,000	28	3.8
09/17/01	Gravel areas/Landscaped beds inside owner controlled area	156,000	26	3.8

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.

On February 19, 2001, the OEPA was notified of a leak from the Circulating Water (CW) system. This leak was in an underground pipe, which released approximately 15,000 gallons to the environment. This water contained Ferroquest LP7202 at concentrations greater than the discharge limits. The CW system was shut down for repairs and the Ferroquest LP7202 was neutralized to meet Permit limits.

On October 02, 2001, the OEPA was notified that the permitted discharge limit for Clam-Trol was exceeded, during a zebra mussel chemical treatment evolution. The chemical injection rate was reduced and detoxification was increased to return the Clam-Trol to within the Permit limit. The zebra mussel chemical treatment test procedure was revised to improve the detoxification method and to require more detoxification chemical during future treatments.

Environmental Protection Plan

The Environmental Protection Plan (EPP), which is a part of the PNPP Operating License, requires a non-radiological environmental monitoring and reporting program be established at the PNPP. There were no instances of an EPP non-compliance identified in 2001.

UNREVIEWED 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 2001, these reviews ensured that no changes to the facility or programs were performed, which could have resulted in an adverse environmental impact. Therefore, there were no potentially significant unreviewed environmental questions identified.

NON-ROUTINE REPORTS

There were two (2) non-routine reports submitted in 2001.

On March 13, 2001, the OEPA was contacted to request permission to bypass Circulating Water in accordance with NPDES permit requirements.

On June 14, 2001, the OEPA was notified that a bypass had occurred during routine maintenance of the Emergency Service Water System. This caused untreated Lake Water to flow to the ground. Authorization was given by the OEPA to continue the bypass for maintenance.

APPENDIX A, 2001 INTER-LABORATORY CROSS-CHECK COMPARISON PROGRAM RESULTS

Environmental, Inc., Midwest Laboratory, formerly Teledyne Brown Engineering Environmental Services, Midwest Laboratory has participated in inter-laboratory cross-check comparison programs since the formulation of it's quality control program in December, 1971. These programs are operated by agencies which supply environmental type samples (e.g., milk or water) 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.

The results in Table A-1 were obtained through participation in the environmental sample crosscheck program for milk, water and air filters during the past twelve months. Data for previous years is available upon request. The U.S. Environmental Protection Agency, Office of Research and Development, National Exposure Research Laboratory, Characterization Research Division-Las Vegas, Nevada, conducted this program.

The results in Table A-2 were obtained for Thermoluminescent Dosimeters (TLDs), via various International Intercomparisons of Environmental Dosimeters under the sponsorships listed in Table A-2. Results of cross-check testing with Teledyne Brown Engineering are also listed.

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 is 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 is available upon request.

Table A-5 lists results of 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. Data for previous years is available upon request.

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

The results in Table A-7 were obtained through the participation in the Environmental Measurement Laboratory Quality Assessment Program.

Attachment A lists acceptance criteria for "spiked" samples.

ATTACHMENT A

ACCEPTANCE CRITERIA FOR "SPIKED" SAMPLES

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

Analysis	Level	One Standard Deviation for single determinations
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	1s = (pCi/liter) = 169.85 x (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	6.0 pCi/liter 10% of known value
Uranium-238, Nickel-63[b] Technetium-99[b]	35 pCi/liter > 35 pCi/liter	6.0 pCi/liter 15% of known value
Iron-55[b]	50 to 100 pCi/liter > 100 pCi/liter	10 pCi/liter 10% of known value
Others[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	Sample Type	Date Collected	Analysis	Concentration in pCi/L[b] Laboratory result[c]	ERA Result[d]	Control Limits
STW-897	WATER	Jan, 2001	Gr. Alpha	31.9 ± 2.1	45.7 ± 11.4	25.9 - 65.5
STW-897	WATER	Jan, 2001	Gr. Beta	25.3 ± 2.7	16.7 ± 5.0	8.0 - 25.4
STW-900	WATER	Feb, 2001	I-131	27.2 ± 0.8	28.3 ± 3.0	23.1 - 33.5
STW-902	WATER	Feb, 2001	Ra-226	4.0 ± 0.1	4.7 ± 0.7	3.4 - 5.9
STW-902	WATER	Feb, 2001	Ra-228	13.8 ± 0.4	14.4 ± 3.6	8.2 - 20.6
STW-902	WATER	Feb, 2001	Uranium	17.0 ± 0.3	20.4 ± 3.0	15.2 - 25.6
STW-903	WATER	Mar, 2001	H-3	17,400.0 ± 69.7	17,800.0 ± 1,780.0	14,700. - 20,900.0
STW-917	WATER	Apr, 2001	Gr. Alpha	57.4 ± 3.5	56.0 ± 14.0	31.8 - 80.2
STW-917	WATER	Apr, 2001	Ra-226	13.5 ± 0.4	17.7 ± 2.7	13.1 - 22.3
STW-917	WATER	Apr, 2001	Ra-228	10.1 ± 0.6	8.1 ± 2.0	4.6 - 11.6
STW-917	WATER	Apr, 2001	Uranium	14.2 ± 0.2	15.6 ± 3.0	10.4 - 20.8
STW-918	WATER	Apr, 2001	Co-60	27.9 ± 1.4	26.4 ± 5.0	17.7 - 35.1
STW-918	WATER	Apr, 2001	Cs-134	16.0 ± 0.4	16.9 ± 5.0	8.2 - 25.6
STW-918	WATER	Apr, 2001	Cs-137	195.4 ± 1.5	186.0 ± 9.3	170.0 - 202.0
STW-918	WATER	Apr, 2001	Gr. Beta	340.0 ± 51.0	343.0 ± 1.7	252.0 - 428.0
STW-918	WATER	Apr, 2001	Sr-89	62.8 ± 5.7	64.1 ± 5.0	55.5 - 72.8
STW-918	WATER	Apr, 2001	Sr-90	34.2 ± 1.6	33.8 ± 5.0	25.1 - 42.5
STW-919	WATER	Jun, 2001	Ba-133	37.8 ± 1.2	36.0 ± 5.0	27.3 - 44.7
STW-919	WATER	Jun, 2001	Co-60	49.9 ± 0.7	46.8 ± 5.0	38.1 - 55.5
STW-919	WATER	Jun, 2001	Cs-134	16.0 ± 1.4	15.9 ± 5.0	7.2 - 24.6
STW-919	WATER	Jun, 2001	Cs-137	208.0 ± 1.7	197.0 ± 9.9	180.0 - 214.0
STW-919	WATER	Jun, 2001	Zn-65	37.8 ± 0.7	36.2 ± 5.0	27.5 - 44.9
STW-920	WATER	Jun, 2001	Ra-226	14.6 ± 0.4	15.4 ± 2.3	11.4 - 19.4
STW-920	WATER	Jun, 2001	Ra-228	6.2 ± 0.2	4.5 ± 1.1	2.6 - 6.5
STW-920	WATER	Jun, 2001	Uranium	49.0 ± 1.0	55.7 ± 5.6	46.1 - 65.3
STW-921	WATER	Jul, 2001	Sr-89	19.8 ± 1.5	31.2 ± 5.0	22.5 - 39.9
Delay in processing may have attributed to deviation. Result of reanalysis; Sr-89, 35.3 ± 4.4 pCi/L. Sr-90, 25.0 ± 2.8 pCi/L.						
STW-921	WATER	Jul, 2001	Sr-90	26.3 ± 1.1	25.9 ± 5.0	17.2 - 34.6
STW-922	WATER	Jul, 2001	Gr. Alpha	23.3 ± 1.9	17.8 ± 5.0	9.1 - 26.5
STW-922	WATER	Jul, 2001	Gr. Beta	48.5 ± 4.6	53.0 ± 10.0	35.7 - 70.3
STW-924	WATER	Aug, 2001	H-3	2,680.0 ± 41.9	2,730.0 ± 356.0	2,110.0 - 3,350.0
STW-931	WATER	Sep, 2001	Ra-226	10.9 ± 0.2	10.8 ± 1.6	8.0 - 13.6
STW-931	WATER	Sep, 2001	Ra-228	9.7 ± 1.1	9.0 ± 2.2	5.1 - 12.8
STW-931	WATER	Sep, 2001	Uranium	11.2 ± 0.1	13.1 ± 3.0	7.9 - 18.3
STW-932	WATER	Oct, 2001	I-131	7.7 ± 0.3	7.7 ± 2.0	4.2 - 11.2
STW-933	WATER	Oct, 2001	Gr. Alpha	82.2 ± 4.0	97.5 ± 24.4	55.3 - 140.0
STW-933	WATER	Oct, 2001	Ra-226	9.5 ± 1.2	10.8 ± 1.6	8.0 - 13.6

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

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L[b]		
				Laboratory result[c]	ERA Result[d]	Control Limits
STW-933	WATER	Oct, 2001	Ra-228	17.0 ± 0.8	15.6 ± 3.9	8.9 - 22.4
STW-933	WATER	Oct, 2001	Uranium	32.2 ± 1.4	37.2 ± 3.7	30.7 - 43.6
STW-934	WATER	Oct, 2001	Co-60	82.4 ± 0.9	78.4 ± 5.0	69.7 - 87.1
STW-934	WATER	Oct, 2001	Cs-134	52.2 ± 1.3	54.1 ± 5.0	45.4 - 62.8
STW-934	WATER	Oct, 2001	Cs-137	39.4 ± 0.6	37.9 ± 5.0	26.3 - 43.7
STW-934	WATER	Oct, 2001	Gr. Beta	166.0 ± 7.1	192.0 ± 28.8	142.0 - 242.0
STW-934	WATER	Oct, 2001	Sr-89	12.8 ± 0.8	16.7 ± 5.0	8.0 - 25.4
STW-934	WATER	Oct, 2001	Sr-90	6.8 ± 0.7	7.7 ± 5.0	-1.0 - 16.4
STW-935	WATER	Oct, 2001	Gr. Alpha	63.5 ± 2.5	64.0 ± 16.0	36.5 - 91.5
STW-935	WATER	Oct, 2001	Gr. Beta	26.0 ± 1.2	21.5 ± 5.0	12.8 - 30.2
STW-938	WATER	Nov, 2001	Ba-133	66.7 ± 1.2	69.3 ± 6.9	57.5 - 81.1
STW-938	WATER	Nov, 2001	Co-60	59.3 ± 0.6	59.7 ± 5.0	51.0 - 68.4
STW-938	WATER	Nov, 2001	Cs-134	86.7 ± 1.5	93.9 ± 5.0	85.2 - 103.0
STW-938	WATER	Nov, 2001	Cs-137	45.0 ± 1.0	42.0 ± 5.0	33.3 - 50.7
STW-938	WATER	Nov, 2001	Zn-65	80.7 ± 0.6	77.3 ± 7.7	63.9 - 90.7

[a] Results obtained by Environmental, Inc., Midwest Laboratory as a participant in the environmental samples crosscheck program operated by Environmental Resources Associates (ERA).

[b] All results are in pCi/L, except for elemental potassium (K) data in milk, which are in mg/L; air filter samples, which are in pCi/Filter.

[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.

Table A-2. Crosscheck program results; Thermoluminescent Dosimeters. (TLDs).

Lab Code	TLD Type	Date	Measurement	mR Known Value	mR Lab result ± 2 Sigma	mR Control Limits
Teledyne Brown Engineering						
2000-1	LiF-100 Chips	Mar, 2000	Reader 1, #1	17.8	14.4 ± 0.2	12.46 - 23.14
2000-1	LiF-100 Chips	Mar, 2000	Reader 1, #2	35.5	32.4 ± 0.1	24.85 - 46.15
2000-1	LiF-100 Chips	Mar, 2000	Reader 1, #3	62.2	61.8 ± 0.9	43.54 - 80.86
Teledyne Brown Engineering						
2000-2	$CaSO_4$: Dy Cards	Mar, 2000	Reader 1, #1	17.8	21.3 ± 0.3	12.46 - 23.14
2000-2	$CaSO_4$: Dy Cards	Mar, 2000	Reader 1, #2	35.5	40.1 ± 1.9	24.85 - 46.15
2000-2	$CaSO_4$: Dy Cards	Mar, 2000	Reader 1, #3	62.2	69.9 ± 3.5	43.54 - 80.86
Chips and cards irradiated by Teledyne Brown Engineering, Westwood, New Jersey, in March of 2000.						
12th International Intercomparison						
022-1	$CaSO_4$: Dy Cards	Jun, 2000	Field	161.0	184.9 ± 1.9	112.70 - 209.30
022-1	$CaSO_4$: Dy Cards	Jun, 2000	Field 1	548.0	502.2 ± 1.7	383.60 - 712.40
022-1	$CaSO_4$: Dy Cards	Jun, 2000	Field 2	391.0	412.0 ± 2.9	273.70 - 508.30
022-1	$CaSO_4$: Dy Cards	Jun, 2000	Field 3	623.0	643.2 ± 2.9	436.10 - 809.90
022-1	$CaSO_4$: Dy Cards	Jun, 2000	Lab, 1	391.0	442.8 ± 2.5	273.70 - 508.30
Environmental, Inc.						
2001-1	$CaSO_4$: Dy Cards	Dec, 2001	Reader 1, #1	4.0	3.7 ± 0.1	2.79 - 5.17
2001-1	$CaSO_4$: Dy Cards	Dec, 2001	Reader 1, #1	4.0	3.4 ± 0.1	2.79 - 5.17
2001-1	$CaSO_4$: Dy Cards	Dec, 2001	Reader 1, #2	7.1	7.9 ± 0.2	4.95 - 9.19
2001-1	$CaSO_4$: Dy Cards	Dec, 2001	Reader 1, #2	7.1	7.6 ± 0.3	4.95 - 9.19
2001-1	$CaSO_4$: Dy Cards	Dec, 2001	Reader 1, #3	15.9	18.6 ± 0.4	11.13 - 20.67
2001-1	$CaSO_4$: Dy Cards	Dec, 2001	Reader 1, #3	15.9	19.6 ± 0.1	11.13 - 20.67
2001-1	$CaSO_4$: Dy Cards	Dec, 2001	Reader 1, #4	63.6	78.2 ± 1.2	44.53 - 82.69
2001-1	$CaSO_4$: Dy Cards	Dec, 2001	Reader 1, #4	63.6	79.9 ± 2.5	44.53 - 82.69

Table A-3. In-house "spike" samples.

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L[a] Laboratory results 2s, n=1[b]	Known Activity	Control[c] Limits
SPAP-477	Air Filter	Jan, 2001	Cs-137	1.76 ± 0.02	1.68	1.01 - 2.35
SPW-479	Water	Jan, 2001	H-3	54702.00 ± 644.00	54549.00	43639.20 - 65458.80
SPW-481	Water	Jan, 2001	Gr. Alpha	58.08 ± 2.79	69.14	34.57 - 103.71
SPW-481	Water	Jan, 2001	Gr. Beta	213.83 ± 3.07	220.26	198.23 - 242.29
SPW-482	Water	Jan, 2001	Gr. Alpha	51.77 ± 2.18	69.14	34.57 - 103.71
SPW-482	Water	Jan, 2001	Gr. Beta	202.48 ± 2.98	220.26	198.23 - 242.29
SPW-483	Water	Jan, 2001	Ra-226	20.11 ± 0.34	20.86	14.60 - 27.12
SPW-483	Water	Jan, 2001	Ra-228	10.55 ± 2.02	19.43	13.60 - 25.26
Sample was lost during analysis. Insufficient sample available to perform reanalysis.						
SPW-485	Water	Jan, 2001	Co-60	33.53 ± 3.40	31.13	21.13 - 41.13
SPW-485	Water	Jan, 2001	Cs-134	32.80 ± 2.54	30.81	20.81 - 40.81
SPW-485	Water	Jan, 2001	Cs-137	42.10 ± 5.60	36.00	26.00 - 46.00
SPW-485	Water	Jan, 2001	Sr-90	154.34 ± 3.49	137.66	110.13 - 165.19
SPAP-754	Air Filter	Jan, 2001	Gr. Beta	8.53 ± 0.02	7.88	-2.12 - 17.88
SPW-1037	Water	Feb, 2001	U-233/4	3.74 ± 0.10	4.17	2.50 - 5.84
SPW-1037	Water	Feb, 2001	U-238	3.81 ± 0.10	4.17	-7.83 - 16.17
SPW-1224	Water	Feb, 2001	Ra-226	21.25 ± 0.50	20.68	14.48 - 26.88
SPW-1224	Water	Feb, 2001	Ra-228	21.76 ± 2.65	19.27	13.49 - 25.05
SPW-1225	Water	Feb, 2001	Gr. Alpha	71.87 ± 3.07	69.14	34.57 - 103.71
SPW-1225	Water	Feb, 2001	Gr. Beta	36.30 ± 1.47	28.75	18.75 - 38.75
SPW-1272	Water	Feb, 2001	I-131	56.82 ± 0.71	63.05	50.44 - 75.66
SPW-1272	Water	Feb, 2001	I-131(g)	65.69 ± 10.21	63.05	53.05 - 73.05
SPVE-1274	Vegetation	Feb, 2001	I-131(g)	0.78 ± 0.05	0.76	0.45 - 1.06
SPCH-1276	Charcoal	Feb, 2001	I-131(g)	1.57 ± 0.05	1.58	0.95 - 2.21
SPMI-1270	Milk	Mar, 2001	Cs-134	31.89 ± 4.71	29.77	19.77 - 39.77
SPMI-1270	Milk	Mar, 2001	Cs-137	46.61 ± 8.81	35.90	25.90 - 45.90
The Cs-137 spike is suspect; A new cesium spike has been prepared. Reference to SPMI-3232.						
SPMI-1270	Milk	Mar, 2001	I-131(g)	81.92 ± 10.80	81.95	71.95 - 91.95
SPU-2901	Urine	Mar, 2001	H-3	51512.00 ± 1369.00	50189.00	40151.20 - 60226.80
SPW-2161	Water	Mar, 2001	Ra-228	29.92 ± 5.13	31.75	22.23 - 41.28
SPU-3128	Urine	Apr, 2001	H-3	2065.00 ± 408.00	2008.00	1317.37 - 2698.63
SPW-3129	Water	Apr, 2001	Gr. Alpha	37.94 ± 2.42	34.57	17.29 - 51.86

Table A-3. In-house "spike" samples.

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L[a]		
				Laboratory results 2s, n=1[b]	Known Activity	Control[c] Limits
SPW-3129	Water	Apr, 2001	Gr. Beta	117.83 ± 2.37	109.46	98.51 - 120.41
SPAP-3508	Air Filter	Apr, 2001	Gr. Beta	0.80 ± 0.01	0.78	-9.22 - 10.78
SPMI-3232	Milk	Apr, 2001	Cs-134	32.69 ± 6.50	33.96	23.96 - 43.96
SPMI-3232	Milk	Apr, 2001	Cs-137	44.20 ± 9.08	35.79	25.79 - 45.79
SPMI-3232	Milk	Apr, 2001	I-131	48.05 ± 0.90	56.68	45.34 - 68.02
SPMI-3232	Milk	Apr, 2001	I-131(g)	55.64 ± 11.39	56.68	46.68 - 66.68
SPMI-3232	Milk	Apr, 2001	Sr-90	143.77 ± 3.04	136.82	109.46 - 164.18
SPSO-3356	Soil	Apr, 2001	Co-60	18.49 ± 0.21	19.57	9.57 - 29.57
SPSO-3356	Soil	Apr, 2001	Cs-137	18.71 ± 0.24	16.61	6.61 - 26.61
SPAP-3359	Air Filter	Apr, 2001	Cs-137	1.80 ± 0.01	1.67	1.00 - 2.34
SPW-3376	Water	Apr, 2001	Co-60	48.17 ± 4.85	45.19	35.19 - 55.19
SPW-3376	Water	Apr, 2001	Cs-134	37.14 ± 3.90	33.96	23.96 - 43.96
SPW-3376	Water	Apr, 2001	Sr-90	159.84 ± 3.42	136.82	109.46 - 164.18
SPW-3377	Water	Apr, 2001	I-131	68.60 ± 2.63	85.02	68.02 - 102.02
SPW-3129/1	Water	May, 2001	Gr. Alpha	37.94 ± 2.42	34.57	17.29 - 51.86
SPW-3129/1	Water	May, 2001	Gr. Beta	117.83 ± 2.37	109.46	98.51 - 120.41
SPW-3129/2	Water	Jun, 2001	Gr. Alpha	34.42 ± 2.14	34.57	17.29 - 51.86
SPW-3129/2	Water	Jun, 2001	Gr. Beta	119.99 ± 2.45	109.46	98.51 - 120.41
SPVE-3303	Vegetation	Jun, 2001	I-131(g)	0.81 ± 0.03	0.86	0.51 - 1.20
SPSO-5701	Soil	Jul, 2001	Co-60	17.42 ± 0.19	19.05	9.05 - 29.05
SPSO-5701	Soil	Jul, 2001	Cs-137	16.03 ± 0.22	16.52	6.52 - 26.52
SPW-5779	Water	Jul, 2001	Co-60	250.05 ± 18.63	233.26	209.93 - 256.59
SPW-5779	Water	Jul, 2001	Cs-137	178.68 ± 19.89	175.91	158.32 - 193.50
SPW-5779	Water	Jul, 2001	Sr-90	72.12 ± 2.24	68.12	54.50 - 81.74
SPF-5781	Fish	Jul, 2001	Co-60	1.87 ± 0.08	1.79	1.07 - 2.51
SPF-5781	Fish	Jul, 2001	Cs-137	1.43 ± 0.07	1.39	0.83 - 1.95
SPW-5937	Water	Jul, 2001	H-3	51177.00 ± 631.00	50189.00	40151.20 - 60226.80
SPW-59441	Water	Jul, 2001	Ra-226	36.62 ± 1.74	34.46	24.12 - 44.80
SPW-59441	Water	Jul, 2001	Ra-228	41.46 ± 6.44	36.06	25.24 - 46.88
SPAP-5703	Air Filter	Jul, 2001	Cs-137	1.81 ± 0.02	1.67	1.00 - 2.34
SPW-3129/3	Water	Jul, 2001	Gr. Alpha	35.31 ± 3.04	34.75	17.38 - 52.13

Table A-3. In-house "spike" samples.

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L[a]		
				Laboratory results 2s, n=1[b]	Known Activity	Control[c] Limits
SPW-3129/3	Water	Jul, 2001	Gr. Beta	113.28 ± 3.65	109.46	98.51 - 120.41
SPMI-6145	Milk	Jul, 2001	Cs-137	188.45 ± 19.10	175.91	158.32 - 193.50
SPW-6604	Water	Jul, 2001	Gr. Alpha	35.36 ± 1.94	34.57	17.29 - 51.86
SPW-6604	Water	Jul, 2001	Gr. Beta	112.56 ± 2.46	108.82	97.94 - 119.70
SPW-9008	Water	Oct, 2001	H-3	48285.00 ± 606.10	50189.00	40151.20 - 60226.80
SPAP-9010	Air Filter	Oct, 2001	Cs-137	1.91 ± 0.01	1.67	1.00 - 2.34
SPW-10723	Water	Dec, 2001	U-233/4	40.12 ± 1.09	41.73	25.04 - 58.42
SPW-10723	Water	Dec, 2001	U-238	40.16 ± 1.09	41.73	29.21 - 54.25
SPAP-11550	Air Filter	Dec, 2001	Gr. Beta	1.58 ± 0.02	1.56	-8.44 - 11.56
SPW-11757	Water	Dec, 2001	Co-60	43.82 ± 3.14	41.36	31.36 - 51.36
SPW-11757	Water	Dec, 2001	Cs-134	24.11 ± 2.42	22.59	12.59 - 32.59
SPW-11757	Water	Dec, 2001	Cs-137	52.11 ± 4.40	50.89	40.89 - 60.89
SPMI-11759	Milk	Dec, 2001	Cs-134	28.03 ± 2.64	27.10	17.10 - 37.10
SPMI-11759	Milk	Dec, 2001	Cs-137	54.59 ± 5.08	50.89	40.89 - 60.89
SPF-11761	Fish	Dec, 2001	Cs-134	0.94 ± 0.02	0.90	0.54 - 1.26
SPF-11761	Fish	Dec, 2001	Cs-137	1.43 ± 0.04	1.43	0.86 - 2.00

[a] All results are in pCi/L, except for elemental potassium (K) in milk, which are in mg/L.; air filter samples, which are in pCi/Filter; and food products, which are in pCi/kg.
[b] Results are based on single determinations.
[c] Control limits are based on Attachment A, Page A2 of this report.

NOTE: For fish, Jello is used for the spike matrix. For vegetation, coleslaw is used for the spike matrix.

Table A-4. In-house "blank" samples.

Lab Code	Sample Type	Sample Date	Analysis	Concentration pCi/L[a]. Laboratory results (4.66 Sigma) LLD	Laboratory results (4.66 Sigma) Activity[b]	Acceptance Criteria (4.66 Sigma)
SPAP-478	AIR FILTER	Jan 2001	Co-60	< 1.12		<100.0
SPAP-478	AIR FILTER	Jan 2001	Cs-134	< 1.66		<100.0
SPAP-478	AIR FILTER	Jan 2001	Cs-137	< 2.46		<100.0
SPW-480	WATER	Jan 2001	H-3	< 162.00	-1.86 ± 80.40	<200.0
SPW-484	WATER	Jan 2001	Gr. Alpha	< 0.68		<1.0
SPW-484	WATER	Jan 2001	Gr. Beta	< 1.35		<3.2
SPW-484	WATER	Jan 2001	Ra-226	< 0.02	0.03 ± 0.01	<1.0
SPW-484	WATER	Jan 2001	Ra-228	< 0.97	0.43 ± 0.50	<2.0
SPW-486	WATER	Jan 2001	Co-60	< 2.68		<10.0
SPW-486	WATER	Jan 2001	Cs-134	< 3.46		<10.0
SPW-486	WATER	Jan 2001	Cs-137	< 5.43		<10.0
SPW-486	WATER	Jan 2001	Sr-90	< 0.65	0.06 ± 0.31	<1.0
SPAP-755	AIR FILTER	Jan 2001	Gr. Beta	< 1.60	0.16 ± 0.90	<3.2
SPW-1038	WATER	Feb 2001	U-238	< 0.03		<1.0
SPW-1038	WATER	Feb 2001	U-238	< 0.00		<1.0
SPW-1223	WATER	Feb 2001	Gr. Alpha	< 0.46		<1.0
SPW-1223	WATER	Feb 2001	Gr. Beta	< 1.50		<3.2
SPW-1223	WATER	Feb 2001	Ra-226	< 0.02	0.03 ± 0.01	<1.0
SPW-1223	WATER	Feb 2001	Ra-228	< 0.95	0.45 ± 0.49	<2.0
SPMI-1268	MILK	Feb 2001	Cs-134	< 5.86		<10.0
SPMI-1268	MILK	Feb 2001	Cs-137	< 3.02		<10.0
SPMI-1268	MILK	Feb 2001	I-131(g)	< 7.46		<20.0
SPW-1271	WATER	Feb 2001	Co-60	< 1.06		<10.0
SPW-1271	WATER	Feb 2001	Cs-134	< 2.61		<10.0
SPW-1271	WATER	Feb 2001	Cs-137	< 2.37		<10.0
SPVE-1273	VEGETATION	Feb 2001	Cs-134	< 10.04		<100.0
SPVE-1273	VEGETATION	Feb 2001	Cs-137	< 6.00		<100.0
SPCH-1275	CHARCOAL CANISTER	Feb 2001	I-131(g)	< 0.01		<9.6
SPW-2164	WATER	Mar 2001	Ra-226	< 0.02	0.05 ± 0.01	<1.0
SPU-3126	URINE	Apr 2001	H-3	< 642.00	-66.00 ± 335.00	<200.0

2.0 ml. sample volume.

Table A-4. In-house "blank" samples.

Lab Code	Sample Type	Sample Date	Analysis	Concentration pCi/L[a]. Laboratory results (4.66 Sigma) LLD	Laboratory results (4.66 Sigma) Activity[b]	Acceptance Criteria (4.66 Sigma)
SPDW-3130	WATER	Apr 2001	Gr. Alpha	< 0.54	0.04 ± 0.38	<1.0
SPDW-3130	WATER	Apr 2001	Gr. Beta	< 1.46	0.67 ± 1.04	<3.2
SPMI-3233	MILK	Apr 2001	Cs-137	< 2.66		<10.0
SPMI-3233	MILK	Apr 2001	I-131	< 0.26	-0.06 ± 0.14	<0.5
SPMI-3233	MILK	Apr 2001	I-131(g)	< 3.91		<20.0
SPMI-3233	MILK	Apr 2001	Sr-89	< 0.79	-0.32 ± 0.79	<5.0
SPMI-3233	MILK	Apr 2001	Sr-90		1.18 ± 0.35	<1.0
Low levels of Sr-90 are still detected in the environment. A concentration of (1-5 pCi/L) in milk is not unusual.						
SPSO-3357	SOIL	Apr 2001	Cs-134	< 14.77		<100.0
SPSO-3357	SOIL	Apr 2001	Cs-137	< 11.72		<100.0
SPAP-3358	AIR FILTER	Apr 2001	Cs-137	< 0.55		<100.0
SPW-3375	WATER	Apr 2001	Co-60	< 2.90		<10.0
SPW-3375	WATER	Apr 2001	Cs-134	< 3.71		<10.0
SPW-3375	WATER	Apr 2001	I-131(g)	< 0.39	0.02 ± 0.22	<20.0
SPW-3375	WATER	Apr 2001	Sr-90	< 0.56	0.05 ± 0.27	<1.0
SPDW-3130	WATER	May 2001	Gr. Alpha	< 0.45	0.15 ± 0.34	<1.0
SPDW-3130	WATER	May 2001	Gr. Beta	< 1.26	0.34 ± 0.95	<3.2
SPDW-3130	WATER	Jun 2001	Gr. Alpha	< 0.44	0.09 ± 0.32	<1.0
SPDW-3130	WATER	Jun 2001	Gr. Beta	< 1.46	0.66 ± 1.04	<3.2
SPVE-3304	VEGETATION	Jun 2001	Co-60	< 7.06		<100.0
SPVE-3304	VEGETATION	Jun 2001	Cs-134	< 11.56		<100.0
SPVE-3304	VEGETATION	Jun 2001	Cs-137	< 8.30		<100.0
SPSO-5702	SOIL	Jul 2001	Co-60	< 12.80		<100.0
SPSO-5702	SOIL	Jul 2001	Cs-134	< 13.96		<100.0
SPSO-5702	SOIL	Jul 2001	Cs-137	< 8.10		<100.0
SPAP-5704	AIR FILTER	Jul 2001	Co-60	< 0.79		<100.0
SPAP-5704	AIR FILTER	Jul 2001	Cs-134	< 0.84		<100.0
SPAP-5704	AIR FILTER	Jul 2001	Cs-137	< 0.60		<100.0
SPW-5780	WATER	Jul 2001	Co-60	< 1.86		<10.0
SPW-5780	WATER	Jul 2001	Cs-134	< 2.46		<10.0
SPW-5780	WATER	Jul 2001	Cs-137	< 3.77		<10.0

Table A-4. In-house "blank" samples.

Lab Code	Sample Type	Sample Date	Analysis	Concentration pCi/L[a]. Laboratory results (4.66 Sigma) LLD	Activity[b]	Acceptance Criteria (4.66 Sigma)
SPF-5782	FISH	Jul 2001	Co-60	< 5.64		<100.0
SPF-5782	FISH	Jul 2001	Cs-134	< 7.51		<100.0
SPW-5938	WATER	Jul 2001	H-3	< 163.22	-16.21 ± 85.07	<200.0
SPW-59451	WATER	Jul 2001	Ra-226	< 0.01	0.04 ± 0.01	<1.0
SPW-59451	WATER	Jul 2001	Ra-228	< 0.77	0.70 ± 0.44	<2.0
SPDW-3130	WATER	Jul 2001	Gr. Alpha	< 0.54	0.36 ± 0.40	<1.0
SPDW-3130	WATER	Jul 2001	Gr. Beta	< 2.27	-0.78 ± 1.35	<3.2
SPMI-6146	MILK	Jul 2001	Sr-90	< 0.50	1.09 ± 0.36	<1.0
Low levels of Sr-90 are still detected in the environment. A concentration of (1-5 pCi/L) in milk is not unusual.						
SPW-6605	WATER	Jul 2001	Gr. Beta	< 1.34	0.55 ± 1.01	<3.2
SPW-9009	WATER	Oct 2001	H-3	< 160.00	-56.70 ± 76.50	<200.0
SPAP-9011	AIR FILTER	Oct 2001	Co-60	< 0.76		<100.0
SPAP-9011	AIR FILTER	Oct 2001	Cs-137	< 0.58		<100.0
SPW-5780	WATER	Oct 2001	Sr-90	< 0.54	0.36 ± 0.30	<1.0
SPW-10724	WATER	Dec 2001	U-238	< 0.13	0.04 ± 0.10	<1.0
SPAP-11549	AIR FILTER	Dec 2001	Gr. Beta	< 0.00	0.01 ± 0.00	<3.2
SPW-11756	WATER	Dec 2001	Cs-137	< 2.62		<10.0
SPMI-11758	MILK	Dec 2001	Cs-137	< 4.00		<10.0
SPMI-11758	MILK	Dec 2001	I-131(g)	< 16.57		<20.0
SPF-11760	FISH	Dec 2001	Cs-137	< 7.96		<100.0

[a] Liquid sample results are reported in pCi/Liter, air filter sample results are in pCi/filter, charcoal sample results are in pCi/charcoal, and solid sample results are in pCi/kilogram.
[b] The activity reported is the net activity result.

Table A-5. In-house "duplicate" samples.

Lab Codes	Sample Date	Analysis	Concentration in pCi/L[a] First Result	Second Result	Averaged Result
AP-10675, 10676	Jan, 2001	Be-7	0.06 ± 0.02	0.06 ± 0.02	0.06 ± 0.01
AP-10803, 10804	Jan, 2001	Be-7	0.04 ± 0.01	0.04 ± 0.01	0.04 ± 0.01
AP-10833, 10834	Jan, 2001	Be-7	0.04 ± 0.01	0.04 ± 0.01	0.04 ± 0.01
WW-51, 52	Jan, 2001	H-3	362.60 ± 94.70	417.20 ± 96.80	389.90 ± 67.71
MI-72, 73	Jan, 2001	K-40	1,566.90 ± 196.80	1,372.40 ± 152.50	1,469.65 ± 124.49
MI-96, 97	Jan, 2001	K-40	1,418.30 ± 117.80	1,545.70 ± 162.50	1,482.00 ± 100.35
U-858, 859	Jan, 2001	Gr. Beta	2.17 ± 2.47	4.23 ± 2.74	3.20 ± 1.84
MI-389, 390	Jan, 2001	K-40	1,489.20 ± 141.10	1,463.30 ± 168.20	1,476.25 ± 109.77
DW-879, 880	Jan, 2001	Gr. Beta	2.63 ± 0.52	2.37 ± 0.50	2.50 ± 0.36
SWU-813, 814	Jan, 2001	Gr. Beta	2.48 ± 0.58	2.46 ± 0.63	2.47 ± 0.43
MI-708, 709	Feb, 2001	K-40	1,179.40 ± 103.00	1,280.40 ± 90.26	1,229.90 ± 68.48
MI-740, 741	Feb, 2001	I-131	0.01 ± 0.26	-0.12 ± 0.26	-0.05 ± 0.18
MI-740, 741	Feb, 2001	K-40	1,434.00 ± 156.50	1,435.00 ± 126.10	1,434.50 ± 100.49
MI-789, 790	Feb, 2001	K-40	1,584.30 ± 158.80	1,390.70 ± 136.50	1,487.50 ± 104.70
DW-901, 902	Feb, 2001	Gr. Beta	4.67 ± 1.08	5.54 ± 1.13	5.11 ± 0.78
SWU-1544, 1545	Feb, 2001	Gr. Beta	3.13 ± 0.63	2.33 ± 0.52	2.73 ± 0.41
DW-1426, 1427	Feb, 2001	Gr. Beta	2.05 ± 0.92	2.34 ± 0.93	2.20 ± 0.65
DW-1426, 1427	Feb, 2001	H-3	42.60 ± 94.23	131.31 ± 95.34	86.96 ± 67.02
WW-1476, 1477	Feb, 2001	H-3	53.06 ± 65.79	53.06 ± 93.03	53.06 ± 56.97
MI-1523, 1524	Mar, 2001	I-131	-0.01 ± 0.20	-0.10 ± 0.37	-0.06 ± 0.21
MI-1523, 1524	Mar, 2001	K-40	1,396.00 ± 184.80	1,576.00 ± 184.90	1,486.00 ± 130.71
MI-1572, 1573	Mar, 2001	K-40	1,499.20 ± 113.30	1,326.00 ± 118.80	1,412.60 ± 82.08
MI-1572, 1573	Mar, 2001	Sr-90	1.65 ± 0.44	1.51 ± 0.52	1.58 ± 0.34
SW-1648, 1649	Mar, 2001	K-40	297.80 ± 67.20	344.80 ± 82.30	321.30 ± 53.13
MI-1800, 1801	Mar, 2001	K-40	1,425.80 ± 183.30	1,372.20 ± 119.70	1,399.00 ± 109.46
SW-1779, 1780	Mar, 2001	Gr. Alpha	2.22 ± 0.73	2.14 ± 0.69	2.18 ± 0.50
SW-1779, 1780	Mar, 2001	Gr. Beta	6.28 ± 0.74	6.62 ± 0.70	6.45 ± 0.51
MI-1447, 1448	Mar, 2001	I-131	-0.65 ± 0.27	0.13 ± 0.55	-0.26 ± 0.31
MI-1447, 1448	Mar, 2001	K-40	1,496.20 ± 155.40	1,413.40 ± 169.60	1,454.80 ± 115.01
WW-2115, 2116	Mar, 2001	H-3	540.04 ± 111.84	500.85 ± 110.46	520.44 ± 78.59
SW-1698, 1699	Mar, 2001	Gr. Beta	6.07 ± 1.75	5.57 ± 1.85	5.82 ± 1.27
DW-2272, 2273	Mar, 2001	Gr. Beta	2.10 ± 0.86	1.63 ± 0.83	1.87 ± 0.60
WW-2356, 2357	Mar, 2001	Gr. Beta	1.22 ± 0.50	1.32 ± 0.47	1.27 ± 0.35
AP-2812, 2813	Mar, 2001	Be-7	0.07 ± 0.02	0.05 ± 0.01	0.06 ± 0.01
AP-2812, 2813	Mar, 2001	Be-7	0.07 ± 0.02	0.05 ± 0.01	0.06 ± 0.01
LW-2217, 2218	Mar, 2001	Gr. Beta	1.85 ± 0.51	2.23 ± 0.55	2.04 ± 0.37

Table A-5. In-house "duplicate" samples.

Lab Codes	Sample Date	Analysis	Concentration in pCi/L[a] First Result	Second Result	Averaged Result
AP-2833, 2834	Mar, 2001	Be-7	0.04 ± 0.01	0.06 ± 0.02	0.05 ± 0.01
AP-3038, 3039	Mar, 2001	Be-7	0.07 ± 0.02	0.07 ± 0.02	0.07 ± 0.01
AP-3038, 3039	Mar, 2001	Be-7	0.06 ± 0.02	0.07 ± 0.01	0.07 ± 0.01
DW-2398, 2399	Mar, 2001	Gr. Beta	1.58 ± 0.89	1.81 ± 0.88	1.69 ± 0.63
LW-2467, 2468	Mar, 2001	Gr. Beta	2.52 ± 0.53	2.42 ± 0.53	2.47 ± 0.37
MI-2446, 2447	Apr, 2001	K-40	1,285.40 ± 177.10	1,376.00 ± 175.90	1,330.70 ± 124.81
AP-3017, 3018	Apr, 2001	Be-7	0.05 ± 0.01	0.05 ± 0.01	0.05 ± 0.00
SW-2423, 2424	Apr, 2001	K-40	255.60 ± 59.80	268.40 ± 65.40	262.00 ± 44.31
BS-3103, 3104	Apr, 2001	Gr. Beta	7.99 ± 1.80	8.17 ± 1.73	8.08 ± 1.25
SWU-3239, 3240	Apr, 2001	Gr. Beta	3.30 ± 0.60	4.30 ± 0.74	3.80 ± 0.48
SS-3322, 3323	Apr, 2001	K-40	15.99 ± 1.08	15.59 ± 1.01	15.79 ± 0.74
W-3990, 3991	Apr, 2001	Sr-89	91.35 ± 18.94	85.29 ± 23.99	88.32 ± 15.28
BS-4347, 4348	Apr, 2001	K-40	3,982.40 ± 489.60	3,255.80 ± 450.10	3,619.10 ± 332.53
BS-4347, 4348	Apr, 2001	K-40	3.26 ± 0.45	3.98 ± 0.49	3.62 ± 0.33
MI-3364, 3365	May, 2001	K-40	1,325.90 ± 160.20	1,453.20 ± 163.00	1,389.55 ± 114.27
SO-3385, 3386	May, 2001	Gr. Alpha	6.51 ± 3.09	9.01 ± 3.44	7.76 ± 2.31
SO-3385, 3386	May, 2001	Gr. Beta	24.63 ± 3.15	28.17 ± 3.12	26.40 ± 2.22
SO-3385, 3386	May, 2001	K-40	19.17 ± 1.08	17.94 ± 0.76	18.56 ± 0.66
CL-4068, 4069	May, 2001	K-40	1.09 ± 0.27	1.13 ± 0.23	1.11 ± 0.18
MI-3475, 3476	May, 2001	Gr. Beta	1,297.10 ± 114.60	1,433.60 ± 156.60	1,365.35 ± 97.03
WW-3545, 3546	May, 2001	Gr. Beta	1.57 ± 0.55	1.36 ± 0.53	1.47 ± 0.38
MI-3681, 3682	May, 2001	K-40	1,417.20 ± 125.70	1,496.20 ± 124.50	1,456.70 ± 88.46
SW-3702, 3703	May, 2001	Gr. Alpha	4.51 ± 1.66	3.22 ± 1.55	3.87 ± 1.13
SW-3702, 3703	May, 2001	Gr. Beta	8.74 ± 1.36	7.11 ± 1.38	7.93 ± 0.97
BS-4021, 4022	May, 2001	Cs-137	224.30 ± 30.20	205.90 ± 43.00	215.10 ± 26.27
BS-4021, 4022	May, 2001	H-3	842.00 ± 47.00	860.00 ± 48.00	851.00 ± 33.59
BS-4021, 4022	May, 2001	K-40	21,117.00 ± 953.00	21,629.00 ± 1,357.00	21,373.00 ± 829.10
BS-4021, 4022	May, 2001	Pu-238	80.30 ± 36.50	59.50 ± 22.00	69.90 ± 21.31
BS-4021, 4022	May, 2001	Pu-239/40	49.40 ± 31.80	41.10 ± 19.60	45.25 ± 18.68
BS-4021, 4022	May, 2001	Ra-226	7,436.00 ± 577.90	9,126.00 ± 751.90	8,281.00 ± 474.16
BS-4021, 4022	May, 2001	Sr-90	10.60 ± 2.71	16.80 ± 3.22	13.70 ± 2.10
F-3813, 3814	May, 2001	K-40	2.10 ± 0.17	2.30 ± 0.26	2.20 ± 0.16
G-4158, 4159	May, 2001	Be-7	0.37 ± 0.13	0.41 ± 0.14	0.39 ± 0.10
SO-4179, 4180	May, 2001	Ac-228	0.45 ± 0.13	0.52 ± 0.14	0.49 ± 0.10
SO-4179, 4180	May, 2001	Bi-214	0.31 ± 0.06	0.41 ± 0.06	0.36 ± 0.04
SO-4179, 4180	May, 2001	Cs-137	0.46 ± 0.05	0.47 ± 0.04	0.47 ± 0.03

Table A-5. In-house "duplicate" samples.

Lab Codes	Sample Date	Analysis	Concentration in pCi/L[a]		
			First Result	Second Result	Averaged Result
SO-4179, 4180	May, 2001	Gr. Beta	26.65 ± 2.63	24.68 ± 2.52	25.67 ± 1.82
SO-4179, 4180	May, 2001	K-40	16.35 ± 0.86	16.05 ± 0.82	16.20 ± 0.59
SO-4179, 4180	May, 2001	Pb-212	0.35 ± 0.04	0.43 ± 0.05	0.39 ± 0.03
SO-4179, 4180	May, 2001	Ra-226	0.56 ± 0.98	1.03 ± 0.31	0.79 ± 0.51
SO-4179, 4180	May, 2001	Tl-208	0.14 ± 0.03	0.17 ± 0.03	0.15 ± 0.02
BS-4233, 4234	May, 2001	Cs-137	0.03 ± 0.01	0.03 ± 0.02	0.03 ± 0.01
BS-4233, 4234	May, 2001	K-40	8.18 ± 0.48	7.80 ± 0.58	7.99 ± 0.38
SWU-4376, 4377	May, 2001	Gr. Beta	2.58 ± 0.55	2.94 ± 0.58	2.76 ± 0.40
DW-4449, 4450	May, 2001	Gr. Beta	2.83 ± 0.55	3.74 ± 0.65	3.29 ± 0.43
DW-4397, 4398	May, 2001	Gr. Beta	9.13 ± 1.26	10.20 ± 1.34	9.66 ± 0.92
MI-4114, 4115	May, 2001	K-40	1,325.90 ± 118.80	1,394.70 ± 133.10	1,360.30 ± 89.20
F-4284, 4285	May, 2001	K-40	2.23 ± 0.32	2.12 ± 0.35	2.18 ± 0.24
DW-4326, 4327	Jun, 2001	Gr. Beta	2.60 ± 0.97	1.47 ± 0.83	2.04 ± 0.64
MI-4470, 4471	Jun, 2001	K-40	1,514.50 ± 116.60	1,456.80 ± 130.90	1,485.65 ± 87.65
SW-4493, 4494	Jun, 2001	Gr. Beta	4.05 ± 1.23	4.64 ± 1.32	4.35 ± 0.90
BS-4725, 4726	Jun, 2001	Co-60	112.00 ± 24.30	84.50 ± 8.70	98.25 ± 12.91
BS-4725, 4726	Jun, 2001	Cs-137	3,083.10 ± 100.10	3,094.80 ± 35.30	3,088.95 ± 53.07
BS-4725, 4726	Jun, 2001	K-40	8,143.70 ± 640.40	8,083.80 ± 225.10	8,113.75 ± 339.40
MI-4775, 4776	Jun, 2001	K-40	1,362.20 ± 71.80	1,363.90 ± 73.40	1,363.05 ± 51.34
WW-5110, 5111	Jun, 2001	H-3	1,173.50 ± 129.10	1,046.80 ± 125.20	1,110.15 ± 89.92
G-5085, 5086	Jun, 2001	Be-7	0.89 ± 0.17	1.14 ± 0.39	1.02 ± 0.21
G-5085, 5086	Jun, 2001	K-40	5.13 ± 0.39	5.22 ± 0.70	5.17 ± 0.40
MI-5259, 5260	Jun, 2001	K-40	1,529.70 ± 122.70	1,406.20 ± 123.80	1,467.95 ± 87.15
MI-5259, 5260	Jun, 2001	Sr-90	1.69 ± 0.42	1.71 ± 0.44	1.70 ± 0.30
SWU-5422, 5423	Jun, 2001	Gr. Beta	2.59 ± 0.54	1.91 ± 0.52	2.25 ± 0.37
VE-5401, 5402	Jun, 2001	Gr. Beta	8.12 ± 0.24	8.88 ± 0.26	8.50 ± 0.18
VE-5401, 5402	Jun, 2001	K-40	6.55 ± 0.52	6.26 ± 0.65	6.40 ± 0.42
AP-5830, 5831	Jun, 2001	Be-7	0.08 ± 0.01	0.08 ± 0.01	0.08 ± 0.01
SW-5557, 5558	Jun, 2001	Gr. Beta	5.43 ± 1.70	5.96 ± 1.56	5.70 ± 1.15
[illegible]-5851, 5852	Jun, 2001	Be-7	0.07 ± 0.02	0.07 ± 0.02	0.07 ± 0.01
SW-5636, 5637	Jun, 2001	Gr. Beta	4.75 ± 1.38	4.18 ± 1.34	4.47 ± 0.96
LW-5681, 5682	Jun, 2001	Gr. Beta	2.42 ± 0.37	2.18 ± 0.34	2.30 ± 0.25
G-5535, 5536	Jul, 2001	Be-7	0.99 ± 0.29	0.97 ± 0.54	0.98 ± 0.31
G-5535, 5536	Jul, 2001	Gr. Beta	7.62 ± 0.12	7.72 ± 0.12	7.67 ± 0.08
G-5535, 5536	Jul, 2001	K-40	7.26 ± 1.03	7.64 ± 0.93	7.45 ± 0.69
AP-5788, 5789	Jul, 2001	Be-7	0.08 ± 0.02	0.07 ± 0.02	0.08 ± 0.01

Table A-5. In-house "duplicate" samples.

Lab Codes	Sample Date	Analysis	Concentration in pCi/L[a] First Result	Second Result	Averaged Result
AP-5872, 5873	Jul, 2001	Be-7	0.07 ± 0.02	0.08 ± 0.02	0.07 ± 0.01
AP-5893, 5894	Jul, 2001	Be-7	0.08 ± 0.02	0.08 ± 0.01	0.08 ± 0.01
AP-5809, 5810	Jul, 2001	Be-7	0.07 ± 0.02	0.06 ± 0.01	0.06 ± 0.01
SW-5724, 5725	Jul, 2001	Gr. Alpha	2.95 ± 0.70	2.89 ± 0.60	2.92 ± 0.46
SW-5724, 5725	Jul, 2001	Gr. Beta	8.79 ± 0.71	8.21 ± 0.65	8.50 ± 0.48
SW-5767, 5768	Jul, 2001	I-131	0.79 ± 0.31	0.61 ± 0.26	0.70 ± 0.20
LW-5920, 5921	Jul, 2001	Gr. Beta	3.06 ± 0.64	3.15 ± 0.58	3.11 ± 0.43
SO-6172, 6173	Jul, 2001	Cs-137	0.30 ± 0.05	0.32 ± 0.04	0.31 ± 0.03
SO-6172, 6173	Jul, 2001	K-40	18.20 ± 1.08	17.55 ± 0.82	17.88 ± 0.68
SO-6172, 6173	Jul, 2001	Sr-90	0.03 ± 0.01	0.05 ± 0.02	0.04 ± 0.01
MI-6353, 6354	Jul, 2001	K-40	966.35 ± 82.28	986.31 ± 91.91	976.33 ± 61.68
SW-6376, 6377	Jul, 2001	I-131	0.58 ± 0.16	0.81 ± 0.17	0.70 ± 0.12
VE-6424, 6425	Jul, 2001	Gr. Beta	2.52 ± 0.05	2.49 ± 0.05	2.51 ± 0.03
VE-6424, 6425	Jul, 2001	K-40	3.04 ± 0.26	3.12 ± 0.37	3.08 ± 0.23
MI-6445, 6446	Jul, 2001	K-40	1,407.40 ± 97.10	1,442.20 ± 189.60	1,424.80 ± 106.51
LW-6489, 6490	Jul, 2001	Gr. Beta	2.61 ± 0.57	2.79 ± 0.54	2.70 ± 0.39
MI-6533, 6534	Jul, 2001	K-40	1,498.60 ± 113.90	1,375.50 ± 129.60	1,437.05 ± 86.27
DW-6835, 6836	Jul, 2001	Gr. Beta	2.01 ± 0.59	2.36 ± 0.63	2.19 ± 0.43
MI-6693, 6694	Aug, 2001	K-40	1,294.30 ± 118.70	1,417.30 ± 176.50	1,355.80 ± 106.35
MI-6693, 6694	Aug, 2001	Sr-90	1.47 ± 0.42	1.23 ± 0.41	1.35 ± 0.29
WW-6952, 6953	Aug, 2001	Gr. Beta	5.49 ± 0.69	5.80 ± 0.69	5.64 ± 0.49
MI-6906, 6907	Aug, 2001	K-40	1,613.80 ± 218.50	1,532.70 ± 135.80	1,573.25 ± 128.63
VE-6973, 6974	Aug, 2001	K-40	4.21 ± 0.24	4.29 ± 0.64	4.25 ± 0.34
LW-7851, 7852	Aug, 2001	Gr. Beta	2.20 ± 0.48	2.12 ± 0.42	2.16 ± 0.32
MI-7001, 7002	Aug, 2001	K-40	1,453.80 ± 148.10	1,285.30 ± 190.50	1,369.55 ± 120.65
MI-7073, 7074	Aug, 2001	K-40	1,217.30 ± 80.83	1,218.30 ± 99.13	1,217.80 ± 63.95
LW-7145, 7146	Aug, 2001	Gr. Beta	2.77 ± 0.53	3.60 ± 0.59	3.19 ± 0.39
MI-7221, 7222	Aug, 2001	K-40	1,192.90 ± 95.40	1,388.90 ± 132.70	1,290.90 ± 81.72
MI-7221, 7222	Aug, 2001	Sr-90	2.10 ± 0.48	1.72 ± 0.47	1.91 ± 0.34
SWU-7527, 7528	Aug, 2001	Gr. Beta	17.51 ± 3.06	20.36 ± 3.31	18.93 ± 2.25
VE-7485, 7486	Aug, 2001	K-40	2.12 ± 0.47	2.47 ± 0.34	2.30 ± 0.29
DW-7506, 7507	Aug, 2001	Gr. Beta	4.25 ± 1.18	4.13 ± 1.12	4.19 ± 0.81
MI-7622, 7623	Sep, 2001	K-40	1,340.10 ± 111.10	1,290.80 ± 116.50	1,315.45 ± 80.49
MI-7664, 7665	Sep, 2001	K-40	1,408.10 ± 102.70	1,396.90 ± 114.30	1,402.50 ± 76.83
MI-7876, 7877	Sep, 2001	K-40	1,416.40 ± 192.30	1,318.00 ± 155.50	1,367.20 ± 123.65
G-7960, 7961	Sep, 2001	Be-7	1.27 ± 0.21	1.25 ± 0.25	1.26 ± 0.16

Table A-5. In-house "duplicate" samples.

Lab Codes	Sample Date	Analysis	Concentration in pCi/L[a] First Result	Second Result	Averaged Result
G-7960, 7961	Sep, 2001	K-40	5.21 ± 0.57	5.70 ± 0.63	5.45 ± 0.43
F-8011, 8012	Sep, 2001	Cs-137	0.06 ± 0.02	0.04 ± 0.02	0.05 ± 0.01
F-8011, 8012	Sep, 2001	Gr. Beta	3.68 ± 0.12	3.50 ± 0.11	3.59 ± 0.08
F-8011, 8012	Sep, 2001	K-40	3.47 ± 0.49	3.38 ± 0.47	3.43 ± 0.34
MI-8149, 8150	Sep, 2001	K-40	1,551.70 ± 118.00	1,489.90 ± 123.60	1,520.80 ± 85.44
MI-8343, 8344	Sep, 2001	K-40	1,550.30 ± 170.60	1,368.10 ± 126.70	1,459.20 ± 106.25
VE-8319, 8320	Sep, 2001	Gr. Beta	3.37 ± 0.10	3.42 ± 0.11	3.39 ± 0.07
VE-8319, 8320	Sep, 2001	K-40	2.14 ± 0.46	2.24 ± 0.37	2.19 ± 0.29
AP-9069, 9070	Sep, 2001	Be-7	0.07 ± 0.02	0.07 ± 0.01	0.07 ± 0.01
AP-9566, 9567	Sep, 2001	Be-7	0.08 ± 0.02	0.09 ± 0.03	0.09 ± 0.02
VE-8700, 8701	Oct, 2001	Be-7	0.24 ± 0.10	0.19 ± 0.10	0.22 ± 0.07
VE-8700, 8701	Oct, 2001	K-40	2.03 ± 0.24	2.03 ± 0.21	2.03 ± 0.16
VE-8700, 8701	Oct, 2001	Sr-90	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.00
AP-9048, 9049	Oct, 2001	Be-7	0.07 ± 0.01	0.07 ± 0.00	0.07 ± 0.01
DW-8636, 8637	Oct, 2001	Gr. Beta	4.74 ± 1.06	5.08 ± 1.21	4.91 ± 0.80
DW-8615, 8616	Oct, 2001	Gr. Beta	4.65 ± 0.58	4.28 ± 0.54	4.47 ± 0.40
AP-9090, 9091	Oct, 2001	Be-7	0.07 ± 0.01	0.07 ± 0.01	0.07 ± 0.01
AP-9166, 9167	Oct, 2001	Be-7	0.08 ± 0.02	0.08 ± 0.02	0.08 ± 0.01
AP-9187, 9188	Oct, 2001	Be-7	0.07 ± 0.01	0.05 ± 0.01	0.06 ± 0.01
VE-10562, 10563	Oct, 2001	Be-7	309.90 ± 158.80	348.30 ± 168.10	329.10 ± 115.62
VE-10562, 10563	Oct, 2001	K-40	6,407.10 ± 620.70	6,057.50 ± 660.40	6,232.30 ± 453.15
WW-8636, 8637	Oct, 2001	Gr. Beta	5.08 ± 1.20	4.74 ± 1.06	4.91 ± 0.80
DW-8894, 8895	Oct, 2001	Gr. Beta	4.28 ± 0.89	3.40 ± 0.90	3.84 ± 0.63
MI-9232, 9233	Oct, 2001	K-40	1,440.70 ± 46.60	1,424.80 ± 76.40	1,432.75 ± 44.75
VE-9518, 9519	Oct, 2001	K-40	1.91 ± 0.22	1.97 ± 0.39	1.94 ± 0.22
WW-10257, 10258	Nov, 2001	H-3	755.90 ± 102.50	684.70 ± 99.90	720.30 ± 71.57
VE-10333, 10334	Nov, 2001	Be-7	0.68 ± 0.26	0.99 ± 0.26	0.84 ± 0.18
VE-10333, 10334	Nov, 2001	K-40	6.10 ± 0.72	5.83 ± 0.72	5.97 ± 0.51
MI-10588, 10589	Nov, 2001	K-40	1,428.40 ± 114.70	1,445.50 ± 129.40	1,436.95 ± 86.46
DW-10688, 10689	Nov, 2001	Gr. Beta	3.49 ± 0.91	2.36 ± 0.76	2.93 ± 0.60
WW-10905, 10906	Dec, 2001	H-3	233.90 ± 90.60	226.30 ± 90.20	230.10 ± 63.92
SS-10953, 10954	Dec, 2001	Ac-228	1.10 ± 0.25	0.91 ± 0.16	1.00 ± 0.15
SS-10953, 10954	Dec, 2001	Bi-214	0.69 ± 0.08	0.75 ± 0.08	0.72 ± 0.06
SS-10953, 10954	Dec, 2001	Co-58	0.21 ± 0.05	0.18 ± 0.04	0.19 ± 0.03
SS-10953, 10954	Dec, 2001	Co-60	0.93 ± 0.06	0.94 ± 0.06	0.93 ± 0.04
SS-10953, 10954	Dec, 2001	Cs-137	0.13 ± 0.03	0.16 ± 0.03	0.14 ± 0.02

Table A-5. In-house "duplicate" samples.

Lab Codes	Sample Date	Analysis	Concentration in pCi/L[a] First Result	Second Result	Averaged Result
SS-10953, 10954	Dec, 2001	K-40	9.91 ± 0.83	8.36 ± 0.80	9.13 ± 0.57
SS-10953, 10954	Dec, 2001	Pb-212	0.94 ± 0.05	0.91 ± 0.06	0.92 ± 0.04
SS-10953, 10954	Dec, 2001	Pb-214	0.83 ± 0.08	0.82 ± 0.07	0.83 ± 0.05
SS-10953, 10954	Dec, 2001	Ra-226	1.76 ± 0.37	1.67 ± 0.37	1.72 ± 0.26
SS-10953, 10954	Dec, 2001	Tl-208	0.34 ± 0.05	0.31 ± 0.05	0.32 ± 0.04
MI-11033, 11034	Dec, 2001	K-40	1,339.80 ± 128.70	1,435.80 ± 117.30	1,387.80 ± 87.07
MI-11033, 11034	Dec, 2001	Sr-90	1.31 ± 0.41	1.38 ± 0.37	1.35 ± 0.28
AP-11888, 11889	Dec, 2001	Be-7	0.06 ± 0.02	0.06 ± 0.02	0.06 ± 0.01

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 elemental potassium (K) in milk (mg/L), air filters (pCi/Filter), food products and vegetation (pCi/g), soil and sediments (pCi/kg).

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

Lab Code	Sample Type	Date Collected	Analysis	Concentration[b] Laboratory result[c]	MAPEP Result[d] 1s, N=1	Control Limits
STSO-923	SOIL	Jan, 2001	Am-241			0.0 - 2.6
Included in the testing series as a "false positive". No activity expected. Result of analysis; < 0.8 Bq/L.						
STSO-923	SOIL	Jan, 2001	Co-57	100.2 ± 3.5	103.0 ± 10.3	72.1 - 133.9
STSO-923	SOIL	Jan, 2001	Co-60	1,285.1 ± 5.3	1,270.0 ± 127.0	889.0 - 1,651.0
STSO-923	SOIL	Jan, 2001	Cs-134	81.1 ± 1.8	91.1 ± 9.1	63.8 - 118.4
STSO-923	SOIL	Jan, 2001	Cs-137	1,210.6 ± 6.6	1,240.0 ± 124.0	868.0 - 1,612.0
STSO-923	SOIL	Jan, 2001	K-40	732.6 ± 21.2	652.0 ± 65.2	456.4 - 847.6
STSO-923	SOIL	Jan, 2001	Mn-54	212.6 ± 6.7	203.0 ± 20.3	142.1 - 263.9
STSO-923	SOIL	Jan, 2001	Pu-238	110.7 ± 7.2	115.0 ± 11.5	80.5 - 149.5
STSO-923	SOIL	Jan, 2001	Pu-239/40	79.6 ± 5.9	83.4 ± 8.3	58.4 - 108.4
STSO-923	SOIL	Jan, 2001	Sr-90	159.8 ± 9.5	209.0 ± 20.9	146.3 - 271.7
STSO-923	SOIL	Jan, 2001	U-233/4	45.0 ± 3.9	60.0 ± 6.0	42.0 - 78.0
STSO-923	SOIL	Jan, 2001	U-238	165.6 ± 7.4	191.0 ± 19.1	133.7 - 248.3
STSO-923	SOIL	Jan,.2001	Zn-65	428.5 ± 10.9	382.0 ± 38.2	267.4 - 496.6

[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] All results are in Bq/kg or Bq/L as requested by the Department of Energy.

[c] MAPEP results are presented as the known values and expected laboratory precision (1 sigma, 1 determination) and control limits as defined by the MAPEP.

Table A-7. Environmental Measurements Laboratory Quality Assessment Program (EML)[a].

Lab Code	Sample Type	Date Collected	Analysis	Concentration [b] Laboratory result	EML Result[c]	Control Limits[d]
STSO-904	SOIL	Mar, 2001	Ac-228	45.60 ± 4.0	42.70	0.80 - 1.50
STSO-904	SOIL	Mar, 2001	Am-241	14.40 ± 0.5	14.80	0.63 - 2.64
STSO-904	SOIL	Mar, 2001	Bi-212	53.20 ± 3.1	42.00	0.45 - 1.23
	Naturally-occurring radium and thorium daughters are present in the shield background, and a probable cause of the higher bias seen for isotopes of lead and bismuth.					
STSO-904	SOIL	Mar, 2001	Bi-214	42.10 ± 7.7	32.60	0.78 - 1.50
STSO-904	SOIL	Mar, 2001	Cs-137	1,772.60 ± 79.8	1,740.00	0.80 - 1.29
STSO-904	SOIL	Mar, 2001	K-40	583.80 ± 52.6	468.00	0.80 - 1.37
STSO-904	SOIL	Mar, 2001	Pb-212	46.60 ± 8.5	41.50	0.74 - 1.36
STSO-904	SOIL	Mar, 2001	Pb-214	45.30 ± 8.6	34.30	0.76 - 1.53
STSO-904	SOIL	Mar, 2001	Pu-239/40	26.00 ± 0.8	25.60	0.71 - 1.33
STSO-904	SOIL	Mar, 2001	Sr-90	55.60 ± 2.2	69.00	0.61 - 3.91
STW-905	WATER	Mar, 2001	Am-241	2.15 ± 0.1	1.67	0.76 - 1.48
STW-905	WATER	Mar, 2001	Co-60	97.00 ± 0.8	98.20	0.80 - 1.20
STW-905	WATER	Mar, 2001	Cs-137	70.10 ± 4.0	73.00	0.80 - 1.20
STW-905	WATER	Mar, 2001	H-3	76.50 ± 5.5	79.30	0.74 - 2.29
STW-905	WATER	Mar, 2001	Pu-238	1.69 ± 0.1	1.58	0.74 - 1.22
STW-905	WATER	Mar, 2001	Pu-239/40	1.69 ± 0.1	1.64	0.75 - 1.26
STW-905	WATER	Mar, 2001	Sr-90	3.85 ± 0.1	4.40	0.64 - 1.50
STW-905	WATER	Mar, 2001	U-233/4	0.90 ± 0.1	1.04	0.80 - 1.40
STW-905	WATER	Mar, 2001	U-238	0.88 ± 0.1	1.04	0.80 - 1.29
STW-906	WATER	Mar, 2001	Gr. Alpha	1,724.60 ± 141.7	1,900.00	0.58 - 1.26
STW-906	WATER	Mar, 2001	Gr. Beta	1,246.40 ± 31.1	1,297.00	0.56 - 1.50
STAP-907	AIR FILTER	Mar, 2001	Am-241	0.47 ± 0.0	0.49	0.69 - 2.40
STAP-907	AIR FILTER	Mar, 2001	Co-60	20.11 ± 0.2	19.44	0.79 - 1.30
STAP-907	AIR FILTER	Mar, 2001	Cs-134	2.71 ± 0.2	2.83	0.74 - 1.21
STAP-907	AIR FILTER	Mar, 2001	Cs-137	9.86 ± 0.2	8.76	0.78 - 1.35
STAP-907	AIR FILTER	Mar, 2001	Mn-54	7.25 ± 0.2	6.52	0.80 - 1.36
STAP-907	AIR FILTER	Mar, 2001	Pu-238	0.23 ± 0.0	0.22	0.66 - 1.35
STAP-907	AIR FILTER	Mar, 2001	Pu-239/40	0.12 ± 0.0	0.14	0.69 - 1.29

Table A-7. Environmental Measurements Laboratory Quality Assessment Program (EML)[a].

Lab Code	Sample Type	Date Collected	Analysis	Concentration [b]		
				Laboratory result	EML Result[c]	Control Limits[d]
STAP-907	AIR FILTER	Mar, 2001	Sr-90	7.41 ± 0.2	7.10	0.55 - 2.05
STAP-907	AIR FILTER	Mar, 2001	U-233/4	0.05 ± 0.0	0.05	0.80 - 1.92
STAP-907	AIR FILTER	Mar, 2001	U-238	0.05 ± 0.0	0.05	0.80 - 1.59
STAP-908	AIR FILTER	Mar, 2001	Gr. Alpha	2.66 ± 0.0	3.97	0.57 - 1.47
STAP-908	AIR FILTER	Mar, 2001	Gr. Beta	2.30 ± 0.0	2.58	0.76 - 1.52
STVE-909	VEGETATION	Mar, 2001	Am-241	6.10 ± 0.2	6.17	0.72 - 2.34
STVE-909	VEGETATION	Mar, 2001	Cm-244	3.50 ± 0.5	3.69	0.61 - 1.61
STVE-909	VEGETATION	Mar, 2001	Co-60	28.50 ± 2.1	30.40	0.75 - 1.51
STVE-909	VEGETATION	Mar, 2001	Cs-137	795.50 ± 76.4	842.00	0.80 - 1.37
STVE-909	VEGETATION	Mar, 2001	K-40	592.60 ± 42.5	603.00	0.78 - 1.43
STVE-909	VEGETATION	Mar, 2001	Pu-239/40	8.50 ± 0.6	9.58	0.67 - 1.49
STVE-909	VEGETATION	Mar, 2001	Sr-90	1,239.60 ± 130.0	1,330.00	0.52 - 1.23
STW-925	WATER	Sep, 2001	Am-241	0.70 ± 0.1	0.76	0.76 - 1.48
STW-925	WATER	Sep, 2001	Co-60	206.70 ± 4.7	209.00	0.80 - 1.20
STW-925	WATER	Sep, 2001	Cs-137	46.60 ± 0.8	45.13	0.80 - 1.24
STW-925	WATER	Sep, 2001	H-3	254.10 ± 3.6	207.00	0.74 - 2.29
STW-925	WATER	Sep, 2001	Ni-63	50.90 ± 3.0	45.25	0.70 - 1.30
STW-925	WATER	Sep, 2001	Pu-238	1.10 ± 0.1	1.09	0.74 - 1.22
STW-925	WATER	Sep, 2001	Pu-239/40	1.60 ± 0.1	1.63	0.75 - 1.26
STW-925	WATER	Sep, 2001	Sr-90	4.10 ± 0.3	3.73	0.64 - 1.50
STW-925	WATER	Sep, 2001	Uranium	2.20 ± 0.2	2.37	0.73 - 1.37
STW-926	WATER	Sep, 2001	Gr. Alpha	1,220.00 ± 32.0	1,150.00	0.58 - 1.26
STW-926	WATER	Sep, 2001	Gr. Beta	8,461.00 ± 206.0	7,970.00	0.56 - 1.50
STSO-927	SOIL	Sep, 2001	Ac-228	68.10 ± 1.4	59.57	0.80 - 1.50
STSO-927	SOIL	Sep, 2001	Am-241	5.20 ± 1.3	4.43	0.63 - 2.64
STSO-927	SOIL	Sep, 2001	Bi-212	65.10 ± 1.6	62.07	0.45 - 1.23
STSO-927	SOIL	Sep, 2001	Bi-214	47.30 ± 4.7	36.90	0.78 - 1.50
STSO-927	SOIL	Sep, 2001	Cs-137	659.20 ± 10.8	612.33	0.80 - 1.29
STSO-927	SOIL	Sep, 2001	K-40	737.70 ± 16.6	623.33	0.80 - 1.37

Table A-7. Environmental Measurements Laboratory Quality Assessment Program (EML)[a].

Lab Code	Sample Type	Date Collected	Analysis	Concentration [b]		
				Laboratory result	EML Result[c]	Control Limits[d]
STSO-927	SOIL	Sep, 2001	Pb-212	64.70 ± 3.8	58.33	0.74 - 1.36
STSO-927	SOIL	Sep, 2001	Pb-214	53.70 ± 7.7	39.67	0.76 - 1.53
STSO-927	SOIL	Sep, 2001	Pu-239/40	9.30 ± 2.9	8.95	0.71 - 1.33
STSO-927	SOIL	Sep, 2001	Sr-90	27.40 ± 6.3	30.60	0.61 - 3.91
STSO-927	SOIL	Sep, 2001	Uranium	155.60 ± 7.8	194.23	0.62 - 1.35
STVE-928	VEGETATION	Sep, 2001	Am-241	7.00 ± 0.3	6.92	0.72 - 2.34
STVE-928	VEGETATION	Sep, 2001	Cm-244	4.30 ± 0.8	4.31	0.61 - 1.61
STVE-928	VEGETATION	Sep, 2001	Co-60	40.20 ± 0.9	35.30	0.75 - 1.51
STVE-928	VEGETATION	Sep, 2001	Cs-137	1,184.00 ± 2.8	1,030.00	0.80 - 1.37
STVE-928	VEGETATION	Sep, 2001	K-40	1,023.00 ± 44.1	898.67	0.78 - 1.43
STVE-928	VEGETATION	Sep, 2001	Pu-239/40	8.90 ± 1.4	11.02	0.67 - 1.49
STVE-928	VEGETATION	Sep, 2001	Sr-90	1,364.00 ± 18.4	1,612.80	0.52 - 1.23
STAP-929	AIR FILTER	Sep, 2001	Am-241	0.09 ± 30.0	0.09	0.69 - 2.40
STAP-929	AIR FILTER	Sep, 2001	Co-60	16.90 ± 0.3	17.50	0.79 - 1.30
STAP-929	AIR FILTER	Sep, 2001	Cs-134	11.80 ± 0.2	12.95	0.74 - 1.21
STAP-929	AIR FILTER	Sep, 2001	Cs-137	18.30 ± 0.3	17.10	0.78 - 1.35
STAP-929	AIR FILTER	Sep, 2001	Mn-54	85.40 ± 1.3	81.15	0.80 - 1.36
STAP-929	AIR FILTER	Sep, 2001	Pu-238	0.05 ± 0.0	0.07	0.66 - 1.35
STAP-929	AIR FILTER	Sep, 2001	Pu-239/40	0.22 ± 0.0	0.23	0.69 - 1.29
STAP-929	AIR FILTER	Sep, 2001	Sr-90	3.11 ± 0.1	3.48	0.55 - 2.05
STAP-929	AIR FILTER	Sep, 2001	Uranium	0.24 ± 0.1	0.22	0.80 - 2.54
STAP-930	AIR FILTER	Sep, 2001	Gr. Alpha	6.30 ± 0.1	5.36	0.57 - 1.47
STAP-930	AIR FILTER	Sep, 2001	Gr. Beta	13.80 ± 0.1	12.77	0.76 - 1.52

[a] The Environmental Measurements Laboratory provides the following nuclear species : Air Filters, Soil, Vegetation and Water.
[b] Results are reported in Bq/L with the following exceptions: Air Filter results are reported in Bq/Filter, Soil results are reported in Bq/Kg, Vegetation results are reported in Bq/Kg.
[c] The EML result listed is the mean of replicate determinations for each nuclide±the standard error of the mean.
[d] Control limits are reported by EML as the ratio of Reported Value / EML value.

APPENDIX B, 2001 REMP DATA SUMMARY REPORTS

Air Gamma Spectral Summary Report 2001
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 0.05 - 0.08	1 3.40 ENE	0.06 4 / 20 0.05 - 0.08	0.06 4 / 4 0.05 - 0.07
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 2001
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	5 0.60 SW	0.02 52 / 52 0.01 - 0.06	0.02 52 / 52 0.01 - 0.05

Air Iodine Summary Report 2001
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	LLD	-	-	-	-

Fish Gamma Spectral Summary Report 2001
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 28	97.00	LLD	-	-	-	-
Fish pCi/kg wet	Co-60 28	97.00	LLD	-	-	-	-
Fish pCi/kg wet	Cs-134 28	97.00	LLD	-	-	-	-
Fish pCi/kg wet	Cs-137 28	112.00	LLD	-	-	-	-
Fish pCi/kg wet	Fe-59 28	195.00	LLD	-	-	-	-
Fish pCi/kg wet	K-40 28	N/A	1,615.38 28 / 28 796.52 - 2,219.20	1,671.33 14 / 14 972.88 - 2,219.20	25 0.60 NNW	1,671.33 14 / 112 972.88 - 2,219.20	1,559.44 14 / 14 796.52 - 2,178.20
Fish pCi/kg wet	Mn-54 28	97.00	LLD	-	-	-	-
Fish pCi/kg wet	Zn-65 28	195.00	LLD	-	-	-	-

Food Products Gamma Spectral Summary Report 2001
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 75	N/A	533.19 23 / 75 145.90 - 1,016.60	518.48 18 / 57 145.90 - 1,016.60	37 1.50 ENE	715.41 2 / 119 584.86 - 845.95	586.14 5 / 18 288.07 - 834.16
Food Products pCi/kg wet	Co-58 75	N/A	LLD	-	-	-	-
Food Products pCi/kg wet	Co-60 75	N/A	LLD	-	-	-	-
Food Products pCi/kg wet	Cs-134 75	45.00	LLD	-	-	-	-
Food Products pCi/kg wet	Cs-137 75	60.00	LLD	-	-	-	-
Food Products pCi/kg wet	I-131 75	45.00	LLD	-	-	-	-
Food Products pCi/kg wet	K-40 75	N/A	4,986.25 75 / 75 2,475.60 - 11,972.00	4,719.38 57 / 57 2,475.60 - 7,163.80	70 16.20 SSW	5,831.36 18 / 126 3,106.20 - 11,972.00	5,831.36 18 / 18 3,106.20 - 11,972.00

Milk Gamma Spectral Summary Report 2001
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	K-40 50	N/A	1,409.80 50 / 50 704.00 - 1,865.60	1,454.37 32 / 32 1,134.80 - 1,865.60	61 7.40 SE	1,702.49 13 / 65 1,401.40 - 1,865.60	1,330.56 18 / 18 704.00 - 1,545.70
Milk pCi/L	La-140 50	11.00	LLD	-	-	-	-
Milk pCi/L	Ba-140 50	45.00	LLD	-	-	-	-
Milk pCi/L	Cs-134 50	11.00	LLD	-	-	-	-
Milk pCi/L	Cs-137 50	13.00	LLD	-	-	-	-

Milk Iodine Summary Report 2001
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 50	0.75	LLD	-	-	-	-

Sediment Gamma Spectral Summary Report 2001
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 14	50.00	LLD	-	-	-	-
Sediment pCi/kg dry	Co-60 14	40.00	LLD	-	-	-	-
Sediment pCi/kg dry	Cs-134 14	112.00	LLD	-	-	-	-
Sediment pCi/kg dry	Cs-137 14	135.00	611.91 5 / 14 210.75 - 1,388.10	486.90 3 / 12 292.05 - 775.19	32 15.80 WSW	799.43 2 / 10 210.75 - 1,388.10	799.43 2 / 2 210.75 - 1,388.10
Sediment pCi/kg dry	K-40 14	N/A	13,477.90 14 / 14 6,494.20 - 28,881.00	12,347.55 12 / 12 6,494.20 - 23,983.00	32 15.80 WSW	20,260.00 2 / 10 11,639.00 - 28,881.00	20,260.00 2 / 2 11,639.00 - 28,881.00

TLD Gamma Dose Summary Report 2001
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	Direct 112	1.00	16.00 112 / 112 11.26 - 21.51	15.97 104 / 104 11.26 - 21.51	29 4.30 SSE	20.28 4 / 4 19.43 - 21.51	16.34 8 / 8 14.76 - 17.95
TLD	Direct 112	1.00	15.90 112 / 112 10.64 - 21.67	15.93 104 / 104 10.64 - 21.67	33 4.50 S	21.01 4 / 4 19.99 - 21.67	15.59 8 / 8 13.51 - 17.83
TLD	Direct 27	1.00	56.16 27 / 27 47.85 - 75.22	56.26 25 / 25 47.85 - 75.22	36 3.90 WSW	75.22 1 / 1 75.22 - 75.22	54.92 2 / 2 51.49 - 58.34

Water Gamma Spectral Summary Report 2001
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 56	45.00	LLD	-	-	-	-
Water pCi/L	Co-58 56	11.00	LLD	-	-	-	-
Water pCi/L	Co-60 56	11.00	LLD	-	-	-	-
Water pCi/L	Cs-134 56	11.00	LLD	-	-	-	-
Water pCi/L	Cs-137 56	13.00	LLD	-	-	-	-
Water pCi/L	Fe-59 56	22.00	LLD	-	-	-	-
Water pCi/L	La-140 56	11.00	LLD	-	-	-	-
Water pCi/L	Mn-54 56	11.00	LLD	-	-	-	-
Water pCi/L	Nb-95 56	11.00	LLD	-	-	-	-
Water pCi/L	Zn-65 56	22.00	LLD	-	-	-	-
Water pCi/L	Zr-95 56	22.00	LLD	-	-	-	-

Water Gross Beta Summary Report 2001
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 56	3.00	3.55 9 / 56 3.06 - 4.15	3.67 6 / 44 3.21 - 4.15	60 1.00 WSW	3.85 4 / 10 3.62 - 4.15	3.32 3 / 12 3.06 - 3.48

Water Tritium Summary Report 2001
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 20	1,500.00	LLD	-	-	-	-

APPENDIX C, 2001 REMP DETAILED DATA REPORTS

Air Gamma Spectral Detail Report 2001

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	3/27/01	0.059 +/- 0.012	< 0.001	< 0.000	< 0.000	< 0.000
1	Air	7/3/01	0.079 +/- 0.011	< 0.000	< 0.000	< 0.001	< 0.000
1	Air	10/3/01	0.073 +/- 0.010	< 0.000	< 0.000	< 0.001	< 0.000
1	Air	1/2/02	0.048 +/- 0.009	< 0.000	< 0.001	< 0.000	< 0.000
3	Air	3/27/01	0.050 +/- 0.010	< 0.000	< 0.000	< 0.000	< 0.000
3	Air	7/3/01	0.071 +/- 0.009	< 0.000	< 0.000	< 0.001	< 0.000
3	Air	10/3/01	0.062 +/- 0.011	< 0.000	< 0.000	< 0.001	< 0.000
3	Air	1/2/02	0.045 +/- 0.009	< 0.000	< 0.001	< 0.000	< 0.000
4	Air	3/27/01	0.059 +/- 0.009	< 0.000	< 0.000	< 0.000	< 0.000
4	Air	7/3/01	0.067 +/- 0.012	< 0.000	< 0.000	< 0.001	< 0.000
4	Air	10/3/01	0.064 +/- 0.012	< 0.000	< 0.000	< 0.001	< 0.000

Air Gamma Spectral Detail Report 2001

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	1/2/02	0.049 +/- 0.009	< 0.000	< 0.001	< 0.000	< 0.000
5	Air	3/27/01	0.052 +/- 0.010	< 0.000	< 0.000	< 0.000	< 0.000
5	Air	7/3/01	0.062 +/- 0.009	< 0.000	< 0.000	< 0.000	< 0.000
5	Air	10/3/01	0.058 +/- 0.010	< 0.000	< 0.000	< 0.000	< 0.000
5	Air	1/2/02	0.064 +/- 0.010	< 0.000	< 0.001	< 0.000	< 0.000
6	Air	3/27/01	0.054 +/- 0.011	< 0.001	< 0.001	< 0.000	< 0.000
6	Air	7/3/01	0.070 +/- 0.010	< 0.000	< 0.000	< 0.000	< 0.000
6	Air	10/3/01	0.054 +/- 0.011	< 0.000	< 0.000	< 0.001	< 0.000
6	Air	1/2/02	0.049 +/- 0.008	< 0.000	< 0.001	< 0.000	< 0.000
7	Air	3/27/01	0.060 +/- 0.011	< 0.001	< 0.000	< 0.000	< 0.000
7	Air	7/3/01	0.064 +/- 0.012	< 0.000	< 0.000	< 0.000	< 0.000

Air Gamma Spectral Detail Report 2001

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	10/3/01	0.057 +/- 0.010	< 0.000	< 0.000	< 0.000	< 0.000
7	Air	1/2/02	0.048 +/- 0.010	< 0.000	< 0.001	< 0.000	< 0.000
35	Air	3/27/01	0.055 +/- 0.011	< 0.000	< 0.000	< 0.000	< 0.000
35	Air	7/3/01	0.064 +/- 0.010	< 0.000	< 0.000	< 0.001	< 0.000
35	Air	10/3/01	0.065 +/- 0.013	< 0.001	< 0.000	< 0.001	< 0.000
35	Air	1/2/02	0.045 +/- 0.006	< 0.000	< 0.001	< 0.000	< 0.000

Air Gross Beta Detail Report 2001

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			
1/10/01	Air	0.031 +/- 0.003 0.028 +/- 0.003	0.031 +/- 0.003 0.031 +/- 0.003	0.030 +/- 0.003	0.031 +/- 0.003	0.028 +/- 0.003
1/17/01	Air	0.032 +/- 0.003 0.028 +/- 0.003	0.031 +/- 0.003 0.032 +/- 0.003	0.029 +/- 0.003	0.031 +/- 0.003	0.031 +/- 0.003
1/24/01	Air	0.038 +/- 0.003 0.034 +/- 0.003	0.040 +/- 0.003 0.035 +/- 0.003	0.036 +/- 0.003	0.035 +/- 0.003	0.033 +/- 0.003
1/31/01	Air	0.029 +/- 0.003 0.025 +/- 0.002	0.026 +/- 0.003 0.028 +/- 0.003	0.028 +/- 0.003	0.028 +/- 0.003	0.027 +/- 0.003
2/7/01	Air	0.036 +/- 0.003 0.030 +/- 0.003	0.030 +/- 0.003 0.032 +/- 0.003	0.031 +/- 0.003	0.034 +/- 0.003	0.031 +/- 0.003
2/14/01	Air	0.026 +/- 0.003 0.021 +/- 0.002	0.022 +/- 0.002 0.024 +/- 0.003	0.025 +/- 0.003	0.022 +/- 0.003	0.022 +/- 0.003
2/21/01	Air	0.038 +/- 0.003 0.033 +/- 0.003	0.031 +/- 0.003 0.032 +/- 0.003	0.031 +/- 0.003	0.032 +/- 0.003	0.029 +/- 0.003
2/28/01	Air	0.028 +/- 0.003 0.024 +/- 0.003	0.025 +/- 0.003 0.025 +/- 0.003	0.024 +/- 0.003	0.024 +/- 0.003	0.026 +/- 0.003
3/7/01	Air	0.026 +/- 0.003 0.023 +/- 0.003	0.022 +/- 0.003 0.024 +/- 0.003	0.025 +/- 0.003	0.023 +/- 0.003	0.025 +/- 0.003
3/14/01	Air	0.020 +/- 0.002 0.015 +/- 0.002	0.015 +/- 0.002 0.018 +/- 0.002	0.018 +/- 0.002	0.016 +/- 0.002	0.016 +/- 0.002
3/21/01	Air	0.019 +/- 0.003 0.020 +/- 0.003	0.017 +/- 0.002 0.019 +/- 0.003	0.019 +/- 0.003	0.019 +/- 0.003	0.018 +/- 0.003
3/27/01	Air	0.016 +/- 0.003 0.017 +/- 0.003	0.015 +/- 0.003 0.016 +/- 0.003	0.018 +/- 0.003	0.017 +/- 0.003	0.017 +/- 0.003
4/4/01	Air	0.017 +/- 0.002 0.017 +/- 0.002	0.017 +/- 0.002 0.018 +/- 0.002	0.017 +/- 0.002	0.017 +/- 0.002	0.017 +/- 0.002
4/11/01	Air	0.017 +/- 0.003 0.018 +/- 0.002	0.017 +/- 0.002 0.016 +/- 0.002	0.015 +/- 0.002	0.017 +/- 0.003	0.018 +/- 0.003
4/18/01	Air	0.018 +/- 0.003 0.016 +/- 0.002	0.017 +/- 0.002 0.017 +/- 0.002	0.019 +/- 0.002	0.016 +/- 0.002	0.018 +/- 0.002

Air Gross Beta Detail Report 2001

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				
Collection Date	Sample Type	1 7	3 35	4	5	6
4/25/01	Air	0.022 +/- 0.003 0.020 +/- 0.002	0.023 +/- 0.003 0.024 +/- 0.003	0.022 +/- 0.002	0.023 +/- 0.003	0.020 +/- 0.003
5/2/01	Air	0.027 +/- 0.003 0.025 +/- 0.003	0.025 +/- 0.003 0.025 +/- 0.003	0.021 +/- 0.003	0.026 +/- 0.003	0.024 +/- 0.003
5/9/01	Air	0.022 +/- 0.003 0.021 +/- 0.003	0.023 +/- 0.003 0.025 +/- 0.003	0.024 +/- 0.003	0.024 +/- 0.003	0.019 +/- 0.003
5/16/01	Air	0.020 +/- 0.003 0.019 +/- 0.003	0.022 +/- 0.003 0.020 +/- 0.003	0.020 +/- 0.003	0.021 +/- 0.003	0.022 +/- 0.003
5/23/01	Air	0.016 +/- 0.003 0.013 +/- 0.003	0.016 +/- 0.003 0.014 +/- 0.003	0.017 +/- 0.003	0.015 +/- 0.003	0.015 +/- 0.003
5/30/01	Air	0.012 +/- 0.002 0.010 +/- 0.002	0.011 +/- 0.002 0.012 +/- 0.002	0.011 +/- 0.002	0.011 +/- 0.002	0.012 +/- 0.002
6/6/01	Air	0.010 +/- 0.002 0.008 +/- 0.002	0.009 +/- 0.002 0.010 +/- 0.002	0.008 +/- 0.002	0.008 +/- 0.002	0.009 +/- 0.002
6/13/01	Air	0.020 +/- 0.002 0.018 +/- 0.002	0.019 +/- 0.002 0.021 +/- 0.002	0.020 +/- 0.002	0.020 +/- 0.002	0.020 +/- 0.002
6/20/01	Air	0.023 +/- 0.003 0.021 +/- 0.002	0.024 +/- 0.003 0.023 +/- 0.003	0.023 +/- 0.003	0.021 +/- 0.002	0.025 +/- 0.003
6/27/01	Air	0.017 +/- 0.002 0.015 +/- 0.002	0.016 +/- 0.002 0.015 +/- 0.002	0.016 +/- 0.002	0.016 +/- 0.002	0.016 +/- 0.002
7/3/01	Air	0.025 +/- 0.003 0.021 +/- 0.003	0.022 +/- 0.003 0.022 +/- 0.003	0.021 +/- 0.003	0.020 +/- 0.003	0.022 +/- 0.003
7/11/01	Air	0.019 +/- 0.002 0.018 +/- 0.002	0.019 +/- 0.002 0.018 +/- 0.002	0.019 +/- 0.002	0.019 +/- 0.002	0.018 +/- 0.002
7/18/01	Air	0.017 +/- 0.003 0.015 +/- 0.003	0.018 +/- 0.003 0.018 +/- 0.003	0.015 +/- 0.003	0.018 +/- 0.003	0.017 +/- 0.003
7/25/01	Air	0.028 +/- 0.003 0.031 +/- 0.003	0.033 +/- 0.003 0.031 +/- 0.003	0.030 +/- 0.003	0.033 +/- 0.003	0.033 +/- 0.003
8/1/01	Air	0.016 +/- 0.003 0.014 +/- 0.003	0.015 +/- 0.003 0.015 +/- 0.003	0.016 +/- 0.003	0.015 +/- 0.003	0.015 +/- 0.003

Air Gross Beta Detail Report 2001

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			
8/8/01	Air	0.036 +/- 0.003 0.031 +/- 0.003	0.032 +/- 0.003 0.032 +/- 0.003	0.031 +/- 0.003	0.033 +/- 0.003	0.033 +/- 0.003
8/15/01	Air	0.023 +/- 0.003 0.022 +/- 0.003	0.020 +/- 0.003 0.020 +/- 0.003	0.023 +/- 0.003	0.025 +/- 0.003	0.023 +/- 0.003
8/21/01	Air	0.024 +/- 0.003 0.023 +/- 0.003	0.025 +/- 0.003 0.026 +/- 0.003	0.026 +/- 0.003	0.023 +/- 0.003	0.023 +/- 0.003
8/29/01	Air	0.024 +/- 0.003 0.022 +/- 0.003	0.026 +/- 0.003 0.024 +/- 0.003	0.027 +/- 0.003	0.026 +/- 0.003	0.030 +/- 0.003
9/5/01	Air	0.020 +/- 0.003 0.019 +/- 0.003	0.020 +/- 0.003 0.020 +/- 0.003	0.019 +/- 0.003	0.019 +/- 0.003	0.021 +/- 0.003
9/12/01	Air	0.033 +/- 0.003 0.026 +/- 0.003	0.030 +/- 0.003 0.020 +/- 0.007	0.029 +/- 0.003	0.028 +/- 0.003	0.029 +/- 0.003
9/19/01	Air	0.026 +/- 0.003 0.024 +/- 0.003	0.025 +/- 0.003 0.027 +/- 0.004	0.026 +/- 0.003	0.024 +/- 0.003	0.028 +/- 0.003
9/26/01	Air	0.024 +/- 0.003 0.024 +/- 0.003	0.025 +/- 0.003 0.024 +/- 0.003	0.025 +/- 0.003	0.024 +/- 0.003	0.024 +/- 0.003
10/3/01	Air	0.022 +/- 0.002 0.021 +/- 0.002	0.021 +/- 0.002 0.022 +/- 0.002	0.022 +/- 0.003	0.020 +/- 0.002	0.021 +/- 0.002
10/10/01	Air	0.026 +/- 0.003 0.026 +/- 0.003	0.026 +/- 0.002 0.027 +/- 0.003	0.025 +/- 0.003	0.044 +/- 0.006	0.024 +/- 0.003
10/17/01	Air	0.017 +/- 0.002 0.016 +/- 0.002	0.016 +/- 0.002 0.018 +/- 0.002	0.016 +/- 0.002	0.017 +/- 0.002	0.018 +/- 0.002
10/24/01	Air	0.027 +/- 0.003 0.029 +/- 0.003	0.027 +/- 0.003 0.026 +/- 0.003	0.027 +/- 0.003	0.026 +/- 0.003	0.027 +/- 0.003
10/31/01	Air	0.015 +/- 0.002 0.018 +/- 0.003	0.016 +/- 0.002 0.017 +/- 0.003	0.017 +/- 0.003	0.015 +/- 0.002	0.017 +/- 0.003
11/7/01	Air	0.022 +/- 0.003 0.022 +/- 0.003	0.023 +/- 0.003 0.021 +/- 0.003	0.023 +/- 0.003	0.024 +/- 0.003	0.022 +/- 0.003
11/14/01	Air	0.021 +/- 0.003 0.024 +/- 0.003	0.022 +/- 0.003 0.023 +/- 0.003	0.024 +/- 0.003	0.022 +/- 0.003	0.023 +/- 0.003

Air Gross Beta Detail Report 2001

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			
11/21/01	Air	0.048 +/- 0.004 0.046 +/- 0.004	0.048 +/- 0.003 0.048 +/- 0.004	0.053 +/- 0.004	0.056 +/- 0.004	0.048 +/- 0.003
11/28/01	Air	0.028 +/- 0.003 0.030 +/- 0.003	0.028 +/- 0.003 0.030 +/- 0.003	0.024 +/- 0.003	0.030 +/- 0.003	0.027 +/- 0.003
12/5/01	Air	0.027 +/- 0.003 0.028 +/- 0.003	0.027 +/- 0.003 0.031 +/- 0.003	0.027 +/- 0.003	0.033 +/- 0.003	0.029 +/- 0.003
12/12/01	Air	0.030 +/- 0.003 0.032 +/- 0.003	0.033 +/- 0.003 0.032 +/- 0.003	0.033 +/- 0.003	0.032 +/- 0.003	0.031 +/- 0.003
12/19/01	Air	0.018 +/- 0.002 0.019 +/- 0.002	0.021 +/- 0.002 0.021 +/- 0.003	0.019 +/- 0.002	0.024 +/- 0.003	0.021 +/- 0.002
12/26/01	Air	0.027 +/- 0.003 0.023 +/- 0.003	0.027 +/- 0.003 0.026 +/- 0.003	0.025 +/- 0.003	0.027 +/- 0.003	0.024 +/- 0.003
1/2/02	Air	0.025 +/- 0.003 0.026 +/- 0.003	0.024 +/- 0.003 0.024 +/- 0.003	0.023 +/- 0.003	0.028 +/- 0.003	0.022 +/- 0.003

Air Iodine Detail Report 2001

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 Dat	I-131
1	Air	1/10/01	< 0.007
1	Air	1/17/01	< 0.003
1	Air	1/24/01	< 0.004
1	Air	1/31/01	< 0.005
1	Air	2/7/01	< 0.005
1	Air	2/14/01	< 0.004
1	Air	2/21/01	< 0.005
1	Air	2/28/01	< 0.007
1	Air	3/7/01	< 0.007
1	Air	3/14/01	< 0.007
1	Air	3/21/01	< 0.005
1	Air	3/27/01	< 0.004
1	Air	4/4/01	< 0.004
1	Air	4/11/01	< 0.004
1	Air	4/18/01	< 0.007
1	Air	4/25/01	< 0.004
1	Air	5/2/01	< 0.004
1	Air	5/9/01	< 0.005
1	Air	5/16/01	< 0.006
1	Air	5/23/01	< 0.004
1	Air	5/30/01	< 0.004
1	Air	6/6/01	< 0.003
1	Air	6/13/01	< 0.005
1	Air	6/20/01	< 0.004
1	Air	6/27/01	< 0.005
1	Air	7/3/01	< 0.008
1	Air	7/11/01	< 0.003
1	Air	7/18/01	< 0.003
1	Air	7/25/01	< 0.004
1	Air	8/1/01	< 0.006
1	Air	8/8/01	< 0.007
1	Air	8/15/01	< 0.003
1	Air	8/21/01	< 0.005
1	Air	8/29/01	< 0.004
1	Air	9/5/01	< 0.003
1	Air	9/12/01	< 0.003
1	Air	9/19/01	< 0.003
1	Air	9/26/01	< 0.002
1	Air	10/3/01	< 0.005
1	Air	10/10/01	< 0.003
1	Air	10/17/01	< 0.004
1	Air	10/24/01	< 0.006

Air Iodine Detail Report 2001
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 Dat	I-131
1	Air	10/31/01	< 0.005
1	Air	11/7/01	< 0.003
1	Air	11/14/01	< 0.004
1	Air	11/21/01	< 0.010
1	Air	11/28/01	< 0.003
1	Air	12/5/01	< 0.006
1	Air	12/12/01	< 0.005
1	Air	12/19/01	< 0.006
1	Air	12/26/01	< 0.007
1	Air	1/2/02	< 0.005
3	Air	1/10/01	< 0.006
3	Air	1/17/01	< 0.003
3	Air	1/24/01	< 0.003
3	Air	1/31/01	< 0.005
3	Air	2/7/01	< 0.004
3	Air	2/14/01	< 0.003
3	Air	2/21/01	< 0.004
3	Air	2/28/01	< 0.006
3	Air	3/7/01	< 0.007
3	Air	3/14/01	< 0.006
3	Air	3/21/01	< 0.005
3	Air	3/27/01	< 0.004
3	Air	4/4/01	< 0.004
3	Air	4/11/01	< 0.004
3	Air	4/18/01	< 0.006
3	Air	4/25/01	< 0.003
3	Air	5/2/01	< 0.004
3	Air	5/9/01	< 0.005
3	Air	5/16/01	< 0.006
3	Air	5/23/01	< 0.004
3	Air	5/30/01	< 0.004
3	Air	6/6/01	< 0.003
3	Air	6/13/01	< 0.005
3	Air	6/20/01	< 0.004
3	Air	6/27/01	< 0.005
3	Air	7/3/01	< 0.008
3	Air	7/11/01	< 0.003
3	Air	7/18/01	< 0.003
3	Air	7/25/01	< 0.004
3	Air	8/1/01	< 0.006
3	Air	8/8/01	< 0.007
3	Air	8/15/01	< 0.003

Air Iodine Detail Report 2001

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 Dat	I-131
3	Air	8/21/01	< 0.005
3	Air	8/29/01	< 0.004
3	Air	9/5/01	< 0.003
3	Air	9/12/01	< 0.003
3	Air	9/19/01	< 0.003
3	Air	9/26/01	< 0.002
3	Air	10/3/01	< 0.005
3	Air	10/10/01	< 0.003
3	Air	10/17/01	< 0.005
3	Air	10/24/01	< 0.006
3	Air	10/31/01	< 0.005
3	Air	11/7/01	< 0.004
3	Air	11/14/01	< 0.004
3	Air	11/21/01	< 0.010
3	Air	11/28/01	< 0.003
3	Air	12/5/01	< 0.006
3	Air	12/12/01	< 0.005
3	Air	12/19/01	< 0.006
3	Air	12/26/01	< 0.006
3	Air	1/2/02	< 0.004
4	Air	1/10/01	< 0.006
4	Air	1/17/01	< 0.003
4	Air	1/24/01	< 0.003
4	Air	1/31/01	< 0.005
4	Air	2/7/01	< 0.004
4	Air	2/14/01	< 0.004
4	Air	2/21/01	< 0.004
4	Air	2/28/01	< 0.006
4	Air	3/7/01	< 0.007
4	Air	3/14/01	< 0.006
4	Air	3/21/01	< 0.005
4	Air	3/27/01	< 0.004
4	Air	4/4/01	< 0.004
4	Air	4/11/01	< 0.004
4	Air	4/18/01	< 0.006
4	Air	4/25/01	< 0.003
4	Air	5/2/01	< 0.004
4	Air	5/9/01	< 0.005
4	Air	5/16/01	< 0.006
4	Air	5/23/01	< 0.004
4	Air	5/30/01	< 0.004
4	Air	6/6/01	< 0.003

Air Iodine Detail Report 2001
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 Dat	I-131
4	Air	6/13/01	< 0.005
4	Air	6/20/01	< 0.004
4	Air	6/27/01	< 0.005
4	Air	7/3/01	< 0.008
4	Air	7/11/01	< 0.003
4	Air	7/18/01	< 0.003
4	Air	7/25/01	< 0.004
4	Air	8/1/01	< 0.006
4	Air	8/8/01	< 0.007
4	Air	8/15/01	< 0.003
4	Air	8/21/01	< 0.005
4	Air	8/29/01	< 0.004
4	Air	9/5/01	< 0.003
4	Air	9/12/01	< 0.003
4	Air	9/19/01	< 0.004
4	Air	9/26/01	< 0.002
4	Air	10/3/01	< 0.005
4	Air	10/10/01	< 0.004
4	Air	10/17/01	< 0.005
4	Air	10/24/01	< 0.007
4	Air	10/31/01	< 0.005
4	Air	11/7/01	< 0.004
4	Air	11/14/01	< 0.005
4	Air	11/21/01	< 0.011
4	Air	11/28/01	< 0.003
4	Air	12/5/01	< 0.007
4	Air	12/12/01	< 0.005
4	Air	12/19/01	< 0.006
4	Air	12/26/01	< 0.006
4	Air	1/2/02	< 0.004
5	Air	1/10/01	< 0.007
5	Air	1/17/01	< 0.003
5	Air	1/24/01	< 0.004
5	Air	1/31/01	< 0.005
5	Air	2/7/01	< 0.005
5	Air	2/14/01	< 0.004
5	Air	2/21/01	< 0.005
5	Air	2/28/01	< 0.007
5	Air	3/7/01	< 0.007
5	Air	3/14/01	< 0.007
5	Air	3/21/01	< 0.005
5	Air	3/27/01	< 0.004

Air Iodine Detail Report 2001

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 Dat	I-131
5	Air	4/4/01	< 0.004
5	Air	4/11/01	< 0.004
5	Air	4/18/01	< 0.006
5	Air	4/25/01	< 0.003
5	Air	5/2/01	< 0.004
5	Air	5/9/01	< 0.004
5	Air	5/16/01	< 0.006
5	Air	5/23/01	< 0.004
5	Air	5/30/01	< 0.004
5	Air	6/6/01	< 0.003
5	Air	6/13/01	< 0.005
5	Air	6/20/01	< 0.004
5	Air	6/27/01	< 0.005
5	Air	7/3/01	< 0.008
5	Air	7/11/01	< 0.003
5	Air	7/18/01	< 0.003
5	Air	7/25/01	< 0.004
5	Air	8/1/01	< 0.006
5	Air	8/8/01	< 0.007
5	Air	8/15/01	< 0.003
5	Air	8/21/01	< 0.005
5	Air	8/29/01	< 0.004
5	Air	9/5/01	< 0.003
5	Air	9/12/01	< 0.003
5	Air	9/19/01	< 0.004
5	Air	9/26/01	< 0.002
5	Air	10/3/01	< 0.005
5	Air	10/10/01	< 0.009
5	Air	10/17/01	< 0.005
5	Air	10/24/01	< 0.006
5	Air	10/31/01	< 0.005
5	Air	11/7/01	< 0.004
5	Air	11/14/01	< 0.005
5	Air	11/21/01	< 0.011
5	Air	11/28/01	< 0.003
5	Air	12/5/01	< 0.007
5	Air	12/12/01	< 0.005
5	Air	12/19/01	< 0.007
5	Air	12/26/01	< 0.007
5	Air	1/2/02	< 0.005
6	Air	1/10/01	< 0.007
6	Air	1/17/01	< 0.003

Air Iodine Detail Report 2001

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 Dat	I-131
6	Air	1/24/01	< 0.004
6	Air	1/31/01	< 0.005
6	Air	2/7/01	< 0.005
6	Air	2/14/01	< 0.004
6	Air	2/21/01	< 0.005
6	Air	2/28/01	< 0.007
6	Air	3/7/01	< 0.007
6	Air	3/14/01	< 0.007
6	Air	3/21/01	< 0.005
6	Air	3/27/01	< 0.004
6	Air	4/4/01	< 0.004
6	Air	4/11/01	< 0.004
6	Air	4/18/01	< 0.006
6	Air	4/25/01	< 0.004
6	Air	5/2/01	< 0.004
6	Air	5/9/01	< 0.005
6	Air	5/16/01	< 0.006
6	Air	5/23/01	< 0.004
6	Air	5/30/01	< 0.004
6	Air	6/6/01	< 0.003
6	Air	6/13/01	< 0.005
6	Air	6/20/01	< 0.005
6	Air	6/27/01	< 0.005
6	Air	7/3/01	< 0.008
6	Air	7/11/01	< 0.003
6	Air	7/18/01	< 0.003
6	Air	7/25/01	< 0.004
6	Air	8/1/01	< 0.006
6	Air	8/8/01	< 0.007
6	Air	8/15/01	< 0.003
6	Air	8/21/01	< 0.005
6	Air	8/29/01	< 0.004
6	Air	9/5/01	< 0.003
6	Air	9/12/01	< 0.003
6	Air	9/19/01	< 0.003
6	Air	9/26/01	< 0.002
6	Air	10/3/01	< 0.005
6	Air	10/10/01	< 0.004
6	Air	10/17/01	< 0.005
6	Air	10/24/01	< 0.006
6	Air	10/31/01	< 0.005
6	Air	11/7/01	< 0.004
6	Air	11/14/01	< 0.005

Air Iodine Detail Report 2001

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 Dat	I-131
6	Air	11/21/01	< 0.011
6	Air	11/28/01	< 0.003
6	Air	12/5/01	< 0.007
6	Air	12/12/01	< 0.005
6	Air	12/19/01	< 0.006
6	Air	12/26/01	< 0.006
6	Air	1/2/02	< 0.004
7	Air	1/10/01	< 0.007
7	Air	1/17/01	< 0.003
7	Air	1/24/01	< 0.003
7	Air	1/31/01	< 0.005
7	Air	2/7/01	< 0.005
7	Air	2/14/01	< 0.004
7	Air	2/21/01	< 0.004
7	Air	2/28/01	< 0.007
7	Air	3/7/01	< 0.007
7	Air	3/14/01	< 0.007
7	Air	3/21/01	< 0.005
7	Air	3/27/01	< 0.004
7	Air	4/4/01	< 0.004
7	Air	4/11/01	< 0.004
7	Air	4/18/01	< 0.006
7	Air	4/25/01	< 0.003
7	Air	5/2/01	< 0.004
7	Air	5/9/01	< 0.005
7	Air	5/16/01	< 0.006
7	Air	5/23/01	< 0.004
7	Air	5/30/01	< 0.004
7	Air	6/6/01	< 0.003
7	Air	6/13/01	< 0.005
7	Air	6/20/01	< 0.004
7	Air	6/27/01	< 0.005
7	Air	7/3/01	< 0.008
7	Air	7/11/01	< 0.003
7	Air	7/18/01	< 0.003
7	Air	7/25/01	< 0.004
7	Air	8/1/01	< 0.006
7	Air	8/8/01	< 0.007
7	Air	8/15/01	< 0.003
7	Air	8/21/01	< 0.005
7	Air	8/29/01	< 0.004
7	Air	9/5/01	< 0.003

Air Iodine Detail Report 2001

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 Dat	I-131
7	Air	9/12/01	< 0.003
7	Air	9/19/01	< 0.003
7	Air	9/26/01	< 0.002
7	Air	10/3/01	< 0.005
7	Air	10/10/01	< 0.004
7	Air	10/17/01	< 0.005
7	Air	10/24/01	< 0.007
7	Air	10/31/01	< 0.005
7	Air	11/7/01	< 0.004
7	Air	11/14/01	< 0.005
7	Air	11/21/01	< 0.011
7	Air	11/28/01	< 0.003
7	Air	12/5/01	< 0.007
7	Air	12/12/01	< 0.005
7	Air	12/19/01	< 0.006
7	Air	12/26/01	< 0.007
7	Air	1/2/02	< 0.005
35	Air	1/10/01	< 0.002
35	Air	1/17/01	< 0.003
35	Air	1/24/01	< 0.002
35	Air	1/31/01	< 0.001
35	Air	2/7/01	< 0.002
35	Air	2/14/01	< 0.001
35	Air	2/21/01	< 0.003
35	Air	2/28/01	< 0.004
35	Air	3/7/01	< 0.003
35	Air	3/14/01	< 0.002
35	Air	3/21/01	< 0.003
35	Air	3/27/01	< 0.003
35	Air	4/4/01	< 0.003
35	Air	4/11/01	< 0.006
35	Air	4/18/01	< 0.003
35	Air	4/25/01	< 0.004
35	Air	5/2/01	< 0.002
35	Air	5/9/01	< 0.003
35	Air	5/16/01	< 0.003
35	Air	5/23/01	< 0.003
35	Air	5/30/01	< 0.002
35	Air	6/6/01	< 0.002
35	Air	6/13/01	< 0.002
35	Air	6/20/01	< 0.004
35	Air	6/27/01	< 0.004

Air Iodine Detail Report 2001

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 Dat	I-131
35	Air	7/3/01	< 0.005
35	Air	7/11/01	< 0.003
35	Air	7/18/01	< 0.003
35	Air	7/25/01	< 0.002
35	Air	8/1/01	< 0.006
35	Air	8/8/01	< 0.007
35	Air	8/15/01	< 0.005
35	Air	8/21/01	< 0.005
35	Air	8/29/01	< 0.003
35	Air	9/5/01	< 0.004
35	Air	9/12/01	< 0.012
35	Air	9/19/01	< 0.008
35	Air	9/26/01	< 0.002
35	Air	10/3/01	< 0.005
35	Air	10/10/01	< 0.005
35	Air	10/17/01	< 0.003
35	Air	10/24/01	< 0.003
35	Air	10/31/01	< 0.004
35	Air	11/7/01	< 0.003
35	Air	11/14/01	< 0.002
35	Air	11/21/01	< 0.008
35	Air	11/28/01	< 0.007
35	Air	12/5/01	< 0.004
35	Air	12/12/01	< 0.003
35	Air	12/19/01	< 0.006
35	Air	12/26/01	< 0.005
35	Air	1/2/02	< 0.003

Fish Gamma Spectral Detail Report 2001

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	carp	5/31/01	< 9.98 2,173.35 +/- 235.93	< 7.92 < 9.52	< 7.25 < 17.42	< 9.43	< 12.76
25	channel catfish	5/31/01	< 14.45 1,718.70 +/- 376.20	< 9.82 < 15.82	< 16.48 < 40.47	< 16.32	< 29.68
25	freshwater drum	5/31/01	< 10.94 1,424.00 +/- 388.80	< 14.12 < 16.91	< 15.43 < 24.07	< 13.83	< 38.50
25	gizzard shad	5/31/01	< 24.23 1,293.30 +/- 399.80	< 13.46 < 13.98	< 14.89 < 53.43	< 5.53	< 45.64
25	redhorse sucker	5/31/01	< 14.35 1,848.40 +/- 374.10	< 12.34 < 16.15	< 13.57 < 23.13	< 13.09	< 22.55
25	smallmouth bass	5/31/01	< 11.17 1,971.00 +/- 330.60	< 5.98 < 9.55	< 7.09 < 10.64	< 14.60	< 26.14
25	walleye	5/31/01	< 19.25 2,219.20 +/- 411.00	< 18.32 < 14.69	< 17.88 < 41.60	< 17.56	< 33.28
25	white bass	5/31/01	< 9.06 1,343.70 +/- 293.40	< 14.67 < 10.79	< 13.98 < 21.54	< 14.69	< 22.16
25	white perch	5/31/01	< 12.68 1,387.80 +/- 330.40	< 12.58 < 19.20	< 19.36 < 30.87	< 19.52	< 24.88
25	white sucker	5/31/01	< 10.29 972.88 +/- 320.40	< 13.59 < 15.94	< 15.18 < 9.56	< 17.29	< 14.26
25	coho salmon	10/9/01	< 29.33 1,389.20 +/- 441.30	< 27.31 < 15.71	< 26.98 < 29.41	< 18.35	< 100.92
25	redhorse sucker	10/9/01	< 18.88 2,102.70 +/- 339.70	< 9.02 < 8.73	< 9.52 < 19.60	< 10.62	< 53.37

Fish Gamma Spectral Detail Report 2001

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	steelhead	10/9/01	< 16.64 1,764.40 +/- 284.30	< 8.22 < 8.33	< 11.34 < 15.56	< 11.96	< 36.19
25	walleye	10/9/01	< 10.13 1,790.00 +/- 310.40	< 10.03 < 11.07	< 6.72 < 16.13	< 11.48	< 16.07
32	freshwater drum	5/31/01	< 11.50 1,504.80 +/- 239.50	< 6.87 < 4.67	< 7.91 < 15.41	< 8.51	< 23.75
32	redhorse sucker	5/31/01	< 8.78 1,494.60 +/- 282.50	< 8.91 < 15.09	< 13.82 < 8.20	< 10.42	< 30.15
32	smallmouth bass	5/31/01	< 17.41 1,476.50 +/- 308.50	< 16.73 < 16.05	< 15.80 < 37.98	< 16.05	< 20.80
32	walleye	5/31/01	< 7.04 1,782.80 +/- 373.90	< 9.48 < 18.15	< 16.05 < 26.68	< 17.05	< 13.53
32	white bass	5/31/01	< 11.59 1,568.50 +/- 336.90	< 10.01 < 8.72	< 8.76 < 33.80	< 8.34	< 32.17
32	white perch	5/31/01	< 14.15 1,221.60 +/- 378.50	< 8.80 < 16.97	< 17.07 < 24.06	< 23.02	< 41.21
32	white sucker	5/31/01	< 18.08 1,903.10 +/- 373.00	< 8.04 < 7.90	< 13.06 < 36.49	< 6.55	< 28.05
32	channel catfish	10/9/01	< 16.67 1,452.80 +/- 261.00	< 9.27 < 10.43	< 11.12 < 18.40	< 10.68	< 33.72
32	coho salmon	10/9/01	< 14.27 1,795.10 +/- 356.40	< 15.76 < 15.61	< 23.44 < 42.31	< 16.35	< 71.88
32	gizzard shad	10/9/01	< 26.24 796.52 +/- 366.70	< 19.85 < 13.78	< 21.07 < 43.11	< 19.38	< 30.64

Fish Gamma Spectral Detail Report 2001

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
32	redhorse sucker	10/9/01	< 15.79 1,669.20 +/- 344.20	< 8.01 < 20.02	< 17.33 < 35.87	< 16.30	< 36.51
32	small mouth bass	10/9/01	< 20.12 1,097.90 +/- 383.40	< 15.51 < 13.99	< 17.13 < 47.47	< 22.30	< 32.05
32	steelhead	10/9/01	< 13.22 2,178.20 +/- 362.80	< 15.46 < 13.91	< 18.54 < 29.30	< 19.48	< 57.68
32	white sucker	10/9/01	< 14.59 1,890.50 +/- 270.20	< 11.06 < 7.92	< 14.26 < 21.21	< 9.98	< 60.71

Food Products Gamma Spectral Detail Report 2001

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	swiss chard	7/16/01	< 126.27 < 13.32	< 7.14 5,979.30 +/- 452.90	< 9.82	< 15.42	< 9.78
2	turnip greens	7/16/01	< 128.63 < 9.28	< 12.09 3,741.50 +/- 462.90	< 8.05	< 13.89	< 10.54
2	kale	8/13/01	< 112.08 < 18.29	< 8.61 3,945.10 +/- 363.00	< 10.67	< 7.79	< 11.00
2	swiss chard	8/13/01	< 191.25 < 25.79	< 21.19 3,646.50 +/- 552.10	< 16.99	< 21.50	< 21.36
2	beet greens	9/10/01	< 166.74 < 19.84	< 13.72 5,024.30 +/- 604.20	< 11.94	< 10.39	< 11.36
2	kale	9/10/01	< 115.40 < 14.96	< 8.79 4,210.80 +/- 366.80	< 9.90	< 11.45	< 11.89
2	swiss chard	9/10/01	< 96.44 < 13.74	< 5.94 4,726.20 +/- 319.50	< 5.48	< 12.00	< 9.66
2	beet greens	10/4/01	412.36 +/- 100.71 < 16.59	< 9.50 6,310.45 +/- 312.15	< 8.03	< 7.74	< 11.48
2	kale	10/4/01	< 141.52 < 16.14	< 9.22 4,607.10 +/- 399.20	< 10.42	< 10.97	< 11.15
2	swiss chard	10/4/01	< 171.57 < 19.34	< 9.02 4,526.10 +/- 525.00	< 19.80	< 23.69	< 19.16
2	kale	11/12/01	< 270.41 < 25.36	< 20.82 4,994.70 +/- 640.40	< 17.31	< 15.97	< 25.13
2	swiss chard	11/12/01	< 199.10 < 26.26	< 19.12 5,517.60 +/- 612.40	< 16.80	< 24.30	< 21.06

Food Products Gamma Spectral Detail Report 2001
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	chinese cabbage	7/16/01	< 158.26 < 18.29	< 13.07 6,059.80 +/- 631.30	< 19.15	< 16.67	< 21.51
16	swiss chard	7/16/01	< 140.80 < 13.15	< 10.91 2,805.90 +/- 347.80	< 12.29	< 16.87	< 16.61
16	turnip greens	7/16/01	< 142.44 < 20.35	< 10.85 6,510.80 +/- 599.70	< 13.49	< 22.85	< 14.41
16	chinese cabbage	8/13/01	250.77 +/- 145.60 < 15.57	< 22.08 4,566.20 +/- 576.40	< 23.45	< 12.27	< 9.90
16	swiss chard	8/13/01	385.43 +/-.183.40 < 14.82	< 24.79 6,912.80 +/- 736.10	< 13.02	< 24.77	< 19.44
16	turnip greens	8/13/01	327.44 +/- 154.00 < 27.38	< 19.85 5,005.30 +/- 583.00	< 18.90	< 15.14	< 24.69
16	chinese cabbage	9/10/01	479.93 +/- 248.00 < 27.18	< 15.66 4,834.40 +/- 677.20	< 13.55	< 20.35	< 23.00
16	swiss chard	9/10/01	< 177.91 < 20.02	< 12.56 6,724.10 +/- 591.90	< 10.41	< 22.40	< 21.66
16	turnip greens	9/10/01	325.23 +/- 144.50 < 24.08	< 22.68 6,480.40 +/- 643.90	< 17.30	< 15.58	< 18.74
16	swiss chard	10/4/01	< 151.35 < 15.52	< 9.07 4,897.40 +/- 497.90	< 16.42	< 14.56	< 13.88
16	turnip greens	10/4/01	904.68 +/- 136.00 < 17.11	< 4.94 6,756.70 +/- 424.20	< 8.30	< 8.13	< 11.01
16	swiss chard	11/12/01	389.90 +/- 219.90 < 30.93	< 19.05 7,163.80 +/- 705.60	< 28.82	< 19.39	< 17.52

Food Products Gamma Spectral Detail Report 2001
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	turnip greens	11/12/01	772.41 +/- 314.10 < 36.04	< 27.39 4,929.30 +/- 708.90	< 14.20	< 25.52	< 22.57
20	chinese cabbage	7/16/01	< 185.00 < 20.63	< 20.15 3,560.20 +/- 446.20	< 14.29	< 22.10	< 22.58
20	swiss chard	7/16/01	< 147.75 < 19.24	< 13.43 3,878.10 +/- 376.70	< 14.90	< 11.73	< 18.79
20	turnip greens	7/16/01	< 175.87 < 19.91	< 9.57 4,747.80 +/- 547.80	< 10.28	< 24.37	< 18.32
20	chinese cabbage	8/13/01	< 96.45 < 10.61	< 5.47 3,261.10 +/- 262.10	< 5.81	< 8.84	LLD
20	swiss chard	8/13/01	< 188.89 < 26.18	< 14.50 3,866.10 +/- 486.30	< 8.98	< 18.74	< 18.64
20	turnip greens	8/13/01	311.55 +/- 174.70 < 30.65	< 10.37 4,092.60 +/- 481.70	< 11.91	< 16.82	< 23.63
20	chinese cabbage	9/10/01	< 139.10 < 16.97	< 8.16 2,475.60 +/- 321.10	< 9.32	< 15.22	< 18.12
20	swiss chard	9/10/01	< 177.57 < 23.66	< 15.37 4,552.30 +/- 544.20	< 21.53	< 13.02	< 19.34
20	turnip greens	9/10/01	519.00 +/- 36.14 < 5.62	< 3.48 5,830.90 +/- 119.30	< 4.07	< 3.92	LLD
20	chinese cabbage	10/4/01	< 152.79 < 31.80	< 13.34 4,146.30 +/- 493.60	< 10.62	< 19.87	< 19.19
20	swiss chard	10/4/01	145.90 +/- 84.76 < 9.12	< 7.28 3,207.10 +/- 272.80	< 10.30	< 9.34	< 8.86

Food Products Gamma Spectral Detail Report 2001
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
20	turnip greens	10/4/01	1,016.60 +/- 277.10 < 22.81	< 17.10 6,102.00 +/- 734.90	< 18.11	< 24.74	< 21.10
20	chinese cabbage	11/12/01	431.83 +/- 200.40 < 19.37	< 19.16 4,806.00 +/- 603.30	< 13.71	< 20.65	< 23.83
20	swiss chard	11/12/01	396.05 +/- 174.30 < 26.48	< 14.63 4,572.60 +/- 549.00	< 22.62	< 19.72	< 24.50
20	turnip greens	11/12/01	832.73 +/- 184.04 < 21.02	< 20.57 5,963.75 +/- 507.31	< 13.63	< 18.53	< 22.04
37	chinese cabbage	6/25/01	< 137.77 < 17.59	< 11.36 5,178.30 +/- 416.40	< 12.62	< 9.16	< 10.61
37	swiss chard	6/25/01	< 134.54 < 14.52	< 15.92 6,966.30 +/- 444.30	< 13.45	< 10.50	< 11.33
37	turnip greens	6/25/01	< 93.87 < 12.03	< 5.70 5,268.30 +/- 340.70	< 9.54	< 8.54	< 8.14
37	chinese cabbage	7/16/01	< 181.41 < 26.75	< 15.55 4,084.00 +/- 513.40	< 15.89	< 22.68	< 25.23
37	swiss chard	7/16/01	< 152.17 < 19.69	< 13.42 4,553.10 +/- 489.40	< 18.19	< 15.42	< 20.38
37	turnip greens	7/16/01	< 183.36 < 11.18	< 9.67 4,809.50 +/- 537.20	< 12.61	< 15.06	< 17.80
37	swiss chard	8/13/01	< 144.77 < 19.52	< 10.74 3,411.30 +/- 503.30	< 17.57	< 16.69	< 15.76
37	turnip greens	8/13/01	< 138.99 < 11.90	< 8.81 3,935.20 +/- 459.50	< 16.35	< 13.39	< 15.89

Food Products Gamma Spectral Detail Report 2001
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	chinese cabbage	9/10/01	< 132.88 < 18.33	< 14.88 3,240.10 +/- 401.30	< 7.92	< 17.93	< 10.08
37	swiss chard	9/10/01	< 149.37 < 23.69	< 11.98 4,758.60 +/- 409.20	< 13.71	< 7.09	< 10.47
37	turnip greens	9/10/01	< 156.47 < 19.19	< 10.73 3,763.60 +/- 466.10	< 10.50	< 18.42	< 18.26
37	chinese cabbage	10/4/01	< 137.45 < 12.11	< 12.60 2,624.60 +/- 461.60	< 16.34	< 15.87	< 20.02
37	swiss chard	10/4/01	< 121.84 < 17.82	< 14.74 3,312.50 +/- 425.10	< 16.25	< 15.81	< 14.66
37	turnip greens	10/4/01	584.86 +/- 192.10 < 26.45	< 18.93 5,785.90 +/- 536.90	< 14.91	< 17.66	< 17.89
37	chinese cabbage	11/12/01	< 131.80 < 21.54	< 9.32 2,481.30 +/- 353.20	< 8.35	< 14.68	< 15.17
37	swiss chard	11/12/01	< 150.76 < 9.48	< 11.11 3,932.10 +/- 465.70	< 12.12	< 16.65	< 16.78
37	turnip greens	11/12/01	845.95 +/- 166.30 < 19.83	< 6.47 4,960.90 +/- 436.30	< 9.01	< 12.63	< 18.51
70	chinese cabbage	6/25/01	< 134.25 < 16.74	< 13.95 4,381.90 +/- 460.80	< 11.70	< 15.83	< 10.87
70	swiss chard	6/25/01	< 127.97 < 17.27	< 13.27 4,758.60 +/- 468.60	< 11.41	< 15.31	< 19.71
70	turnip greens	6/25/01	< 192.65 < 26.54	< 11.44 4,632.70 +/- 542.40	< 17.88	< 14.11	< 20.78

Food Products Gamma Spectral Detail Report 2001
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
70	chinese cabbage	7/16/01	< 75.74 < 11.17	< 3.92 3,656.70 +/- 284.00	< 4.99	< 7.95	< 8.14
70	swiss chard	7/16/01	< 115.46 < 19.27	< 13.04 7,167.00 +/- 453.40	< 7.11	< 14.35	< 10.73
70	turnip greens	7/16/01	< 197.48 < 16.93	< 17.75 6,772.90 +/- 640.60	< 19.22	< 18.46	< 22.94
70	chinese cabbage	8/13/01	343.56 +/- 119.70 < 16.90	< 13.40 7,102.00 +/- 417.80	< 14.82	< 13.09	< 7.00
70	swiss chard	8/13/01	< 190.07 < 15.05	< 18.22 11,972.00 +/- 903.20	< 16.91	< 19.34	< 18.06
70	turnip greens	8/13/01	819.30 +/- 233.50 < 24.18	< 19.20 8,667.40 +/- 631.60	< 15.65	< 15.73	< 18.55
70	chinese cabbage	9/10/01	< 141.66 < 14.19	< 9.43 4,233.60 +/- 409.70	< 11.20	< 10.71	< 11.52
70	swiss chard	9/10/01	< 154.22 < 25.16	< 18.62 5,419.90 +/- 571.60	< 15.28	< 10.75	< 10.88
70	turnip greens	9/10/01	< 176.79 < 27.08	< 21.03 5,122.80 +/- 563.10	< 18.37	< 15.26	< 22.62
70	chinese cabbage	10/4/01	< 140.41 < 21.20	< 11.13 3,106.20 +/- 465.40	< 19.78	< 22.77	< 10.10
70	swiss chard	10/4/01	< 202.21 < 26.80	< 15.19 6,087.90 +/- 541.00	< 7.62	< 20.04	< 15.70
70	turnip greens	10/4/01	645.61 +/- 142.40 < 16.62	< 10.04 5,698.30 +/- 359.10	< 6.99	< 12.04	< 10.94

Food Products Gamma Spectral Detail Report 2001

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
70	chinese cabbage	11/12/01	< 128.11 < 10.45	< 10.09 3,340.50 +/- 479.20	< 12.88	< 12.38	< 17.77
70	swiss chard	11/12/01	288.07 +/- 174.60 < 13.16	< 16.46 6,378.70 +/- 641.80	< 16.42	< 21.18	< 18.68
70	turnip greens	11/12/01	834.16 +/- 258.00 < 26.38	< 18.41 6,465.30 +/- 646.90	< 23.45	< 24.20	< 20.34

Milk Gamma Spectral Detail Report 2001

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	1/8/01	< 19	< 7	< 6	1,546 +/- 177	< 2
51	Milk	2/5/01	< 17	< 3	< 4	1,488 +/- 105	< 3
51	Milk	3/5/01	< 15	< 4	< 5	1,479 +/- 140	< 5
51	Milk	4/10/01	< 34	< 4	< 4	1,336 +/- 149	< 6
51	Milk	4/23/01	< 17	< 4	< 3	1,262 +/- 117	< 2
51	Milk	5/7/01	< 19	< 3	< 3	1,314 +/- 104	< 2
51	Milk	5/21/01	< 15	< 3	< 4	1,360 +/- 89	< 2
51	Milk	6/4/01	< 24	< 4	< 6	1,269 +/- 149	< 4
51	Milk	6/18/01	< 33	< 4	< 4	1,407 +/- 130	< 5
51	Milk	7/9/01	< 37	< 3	< 3	1,327 +/- 69	< 8
51	Milk	7/23/01	< 40	< 3	< 3	1,409 +/- 80	< 8
51	Milk	8/20/01	< 13	< 4	< 3	1,239 +/- 98	< 4

Milk Gamma Spectral Detail Report 2001

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	9/5/01	< 31	< 5	< 7	1,401 +/- 187	< 3
51	Milk	9/17/01	< 21	< 3	< 3	1,333 +/- 119	< 4
51	Milk	10/8/01	< 36	< 2	< 3	1,368 +/- 94	< 11
51	Milk	10/22/01	< 29	< 1	< 1	1,402 +/- 42	< 6
51	Milk	11/5/01	< 44	< 3	< 3	704 +/- 82	< 4
51	Milk	12/3/01	< 13	< 6	< 5	1,307 +/- 143	< 2
61	Milk	4/9/01	< 41	< 4	< 5	1,401 +/- 134	< 6
61	Milk	4/23/01	< 17	< 3	< 3	1,648 +/- 146	< 3
61	Milk	5/7/01	< 37	< 5	< 7	1,680 +/- 177	< 6
61	Milk	5/23/01	< 18	< 4	< 4	1,705 +/- 134	< 3
61	Milk	6/4/01	< 14	< 4	< 5	1,730 +/- 136	< 2
61	Milk	6/18/01	< 19	< 4	< 4	1,844 +/- 90	< 2

Milk Gamma Spectral Detail Report 2001

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
61	Milk	7/9/01	< 45	< 4	< 5	1,757 +/- 152	< 7
61	Milk	7/23/01	< 33	< 5	< 4	1,866 +/- 125	< 11
61	Milk	8/6/01	< 16	< 6	< 6	1,835 +/- 193	< 5
61	Milk	8/20/01	< 15	< 4	< 4	1,652 +/- 123	< 3
61	Milk	9/4/01	< 14	< 4	< 4	1,751 +/- 122	< 1
61	Milk	9/17/01	< 10	< 2	< 4	1,678 +/- 91	< 3
61	Milk	10/8/01	< 33	< 2	< 4	1,585 +/- 119	< 6
71	Milk	1/8/01	< 16	< 4	< 5	1,470 +/- 124	< 3
71	Milk	2/5/01	< 25	< 5	< 4	1,238 +/- 120	< 3
71	Milk	3/5/01	< 21	< 4	< 4	1,285 +/- 135	< 3
71	Milk	4/9/01	< 32	< 3	< 4	1,291 +/- 122	< 9
71	Milk	4/23/01	< 11	< 3	< 3	1,455 +/- 129	< 3

Milk Gamma Spectral Detail Report 2001

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
71	Milk	5/7/01	< 35	< 6	< 6	1,290 +/- 157	< 7
71	Milk	5/21/01	< 21	< 3	< 4	1,274 +/- 111	< 4
71	Milk	6/4/01	< 28	< 3	< 5	1,238 +/- 164	< 4
71	Milk	6/18/01	< 28	< 2	< 3	1,223 +/- 90	< 2
71	Milk	7/9/01	< 41	< 2	< 1	1,170 +/- 44	< 6
71	Milk	7/23/01	< 33	< 3	< 3	1,298 +/- 79	< 7
71	Milk	8/6/01	< 22	< 3	< 3	1,135 +/- 122	< 4
71	Milk	8/20/01	< 15	< 4	< 7	1,237 +/- 165	< 4
71	Milk	9/4/01	< 11	< 4	< 4	1,312 +/- 115	< 4
71	Milk	9/17/01	< 28	< 2	< 4	1,331 +/- 110	< 4
71	Milk	10/8/01	< 32	< 2	< 5	1,260 +/- 105	< 10
71	Milk	10/22/01	< 35	< 4	< 4	1,335 +/- 99	< 11

Milk Gamma Spectral Detail Report 2001

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
71	Milk	11/5/01	< 22	< 2	< 2	1,275 +/- 41	< 4
71	Milk	12/3/01	< 26	< 6	< 5	1,290 +/- 155	< 3

Milk Iodine Detail Report 2001

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 Dat	I-131
51	Milk	1/8/01	< 0.28
51	Milk	2/5/01	< 0.36
51	Milk	3/5/01	< 0.22
51	Milk	4/10/01	< 0.26
51	Milk	4/23/01	< 0.29
51	Milk	5/7/01	< 0.34
51	Milk	5/21/01	< 0.44
51	Milk	6/4/01	< 0.26
51	Milk	6/18/01	< 0.25
51	Milk	7/9/01	< 0.35
51	Milk	7/23/01	< 0.24
51	Milk	8/6/01	
51	Milk	8/20/01	< 0.26
51	Milk	9/5/01	< 0.36
51	Milk	9/17/01	< 0.28
51	Milk	10/8/01	< 0.25
51	Milk	10/22/01	< 0.25
51	Milk	11/5/01	< 0.29
51	Milk	12/3/01	< 0.30
61	Milk	4/9/01	< 0.30
61	Milk	4/23/01	< 0.26
61	Milk	5/7/01	< 0.43
61	Milk	5/23/01	< 0.32
61	Milk	6/4/01	< 0.26
61	Milk	6/18/01	< 0.36
61	Milk	7/9/01	< 0.27
61	Milk	7/23/01	< 0.24
61	Milk	8/6/01	< 0.23
61	Milk	8/20/01	< 0.18
61	Milk	9/4/01	< 0.42
61	Milk	9/17/01	< 0.34
61	Milk	10/8/01	< 0.25
61	Milk	10/22/01	
71	Milk	1/8/01	< 0.37
71	Milk	2/5/01	< 0.33
71	Milk	3/5/01	< 0.43
71	Milk	4/9/01	< 0.33
71	Milk	4/23/01	< 0.24
71	Milk	5/7/01	< 0.44
71	Milk	5/21/01	< 0.35

Milk Iodine Detail Report 2001
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 Dat	I-131
71	Milk	6/4/01	< 0.24
71	Milk	6/18/01	< 0.29
71	Milk	7/9/01	< 0.27
71	Milk	7/23/01	< 0.45
71	Milk	8/6/01	< 0.24
71	Milk	8/20/01	< 0.21
71	Milk	9/4/01	< 0.48
71	Milk	9/17/01	< 0.27
71	Milk	10/8/01	< 0.29
71	Milk	10/22/01	< 0.27
71	Milk	11/5/01	< 0.20
71	Milk	12/3/01	< 0.33

Sediment Gamma Spectral Detail Report 2001

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 dry +/- 2 Sigma

Location	Sample Type	Collection Date	Co-58	Co-60	Cs-134	Cs-137	K-40
25	Sediment	5/30/01	< 26.13	< 17.25	< 25.62	292.05 +/- 36.41	16,790.00 +/- 763.70
25	Sediment	10/8/01	< 12.74	< 9.24	< 16.85	LLD	11,865.00 +/- 331.50
26	Sediment	5/30/01	< 18.55	< 8.76	< 10.42	LLD	12,569.00 +/- 573.80
26	Sediment	10/8/01	< 36.52	< 28.13	< 41.89	< 35.04	11,939.00 +/- 793.50
27	Sediment	5/30/01	< 20.72	< 13.65	< 18.49	393.47 +/- 36.97	14,214.00 +/- 658.90
27	Sediment	10/8/01	< 13.52	< 26.79	< 39.84	775.19 +/- 47.12	23,983.00 +/- 845.90
32	Sediment	5/30/01	< 14.27	< 6.76	< 15.21	210.75 +/- 27.30	11,639.00 +/- 519.00
32	Sediment	10/8/01	< 33.88	< 20.06	< 19.98	1,388.10 +/- 64.71	28,881.00 +/- 1,048.00
63	Sediment	5/30/01	< 14.65	< 11.22	< 10.56	< 7.73	8,557.30 +/- 417.90
63	Sediment	10/8/01	< 34.01	< 10.18	< 30.51	< 15.50	10,127.00 +/- 646.80

Sediment Gamma Spectral Detail Report 2001

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 dry +/- 2 Sigma

Location	Sample Type	Collection Date	Co-58	Co-60	Cs-134	Cs-137	K-40
64	Sediment	5/30/01	< 12.65	< 8.87	< 8.36	LLD	8,663.50 +/- 417.20
64	Sediment	10/8/01	< 12.31	< 6.66	< 11.41	< 8.15	6,494.20 +/- 331.35
65	Sediment	5/30/01	< 17.38	< 12.62	< 17.28	LLD	15,554.00 +/- 666.50
65	Sediment	10/8/01	< 16.81	< 9.73	< 12.37	< 11.13	7,414.65 +/- 380.37

TLD Gamma Dose Detail Report 2001

Radiological Environmental Monitoring Program Detail Data
Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441
Sample Frequency is: Quarterly

Location	Sample Type	Collection Period	Exposure
1	TLD	1/4/01 to 4/5/01	12.63 +/- 0.40
1	TLD	4/5/01 to 7/9/01	14.67 +/- 0.23
1	TLD	7/9/01 to 10/2/01	15.62 +/- 0.66
1	TLD	10/2/01 to 1/3/02	15.48 +/- 0.48
3	TLD	1/4/01 to 4/5/01	16.27 +/- 0.23
3	TLD	4/5/01 to 7/9/01	15.04 +/- 0.23
3	TLD	7/9/01 to 10/2/01	15.79 +/- 0.38
3	TLD	10/2/01 to 1/3/02	15.26 +/- 0.45
4	TLD	1/4/01 to 4/5/01	15.75 +/- 0.22
4	TLD	4/5/01 to 7/9/01	15.71 +/- 0.27
4	TLD	7/9/01 to 10/2/01	15.73 +/- 0.36
4	TLD	10/2/01 to 1/3/02	13.45 +/- 0.23
5	TLD	1/4/01 to 4/5/01	13.95 +/- 0.23
5	TLD	4/5/01 to 7/9/01	13.50 +/- 0.38
5	TLD	7/9/01 to 10/2/01	12.94 +/- 0.36
5	TLD	10/2/01 to 1/3/02	13.98 +/- 0.35
6	TLD	1/4/01 to 4/5/01	17.19 +/- 0.35
6	TLD	4/5/01 to 7/9/01	16.65 +/- 0.25
6	TLD	7/9/01 to 10/2/01	17.95 +/- 0.34
6	TLD	10/2/01 to 1/3/02	17.00 +/- 0.22
7	TLD	1/4/01 to 4/5/01	15.04 +/- 0.28
7	TLD	4/5/01 to 7/9/01	14.72 +/- 0.23
7	TLD	7/9/01 to 10/2/01	15.36 +/- 0.61
7	TLD	10/2/01 to 1/3/02	14.75 +/- 0.33
8	TLD	1/4/01 to 4/5/01	12.36 +/- 0.30
8	TLD	4/5/01 to 7/9/01	12.33 +/- 0.21
8	TLD	7/9/01 to 10/2/01	12.99 +/- 0.37
8	TLD	10/2/01 to 1/3/02	13.01 +/- 0.20
9	TLD	1/4/01 to 4/5/01	11.26 +/- 0.23
9	TLD	4/5/01 to 7/9/01	13.46 +/- 0.36
9	TLD	7/9/01 to 10/2/01	12.21 +/- 0.33
9	TLD	10/2/01 to 1/3/02	14.09 +/- 0.21
10	TLD	1/4/01 to 4/5/01	17.20 +/- 0.26
10	TLD	4/5/01 to 7/9/01	17.36 +/- 0.35
10	TLD	7/9/01 to 10/2/01	18.07 +/- 0.42

TLD Gamma Dose Detail Report 2001

Radiological Environmental Monitoring Program Detail Data
Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441
Sample Frequency is: Quarterly

Location	Sample Type	Collection Period			Exposure		
10	TLD	10/2/01	to	1/3/02	18.05	+/-	0.28
11	TLD	1/4/01	to	4/5/01	16.27	+/-	0.23
11	TLD	4/5/01	to	7/9/01	15.42	+/-	0.22
11	TLD	7/9/01	to	10/2/01	17.60	+/-	0.38
11	TLD	10/2/01	to	1/3/02	14.13	+/-	0.26
12	TLD	1/4/01	to	4/5/01	15.88	+/-	0.33
12	TLD	4/5/01	to	7/9/01	15.44	+/-	0.32
12	TLD	7/9/01	to	10/2/01	17.24	+/-	0.29
12	TLD	10/2/01	to	1/3/02	15.44	+/-	0.45
13	TLD	1/4/01	to	4/5/01	16.98	+/-	0.39
13	TLD	4/5/01	to	7/9/01	14.83	+/-	0.21
13	TLD	7/9/01	to	10/2/01	17.72	+/-	0.30
13	TLD	10/2/01	to	1/3/02	15.74	+/-	0.43
14	TLD	1/4/01	to	4/5/01	13.59	+/-	0.20
14	TLD	4/5/01	to	7/9/01	14.31	+/-	0.21
14	TLD	7/9/01	to	10/2/01	13.79	+/-	0.31
14	TLD	10/2/01	to	1/3/02	15.65	+/-	0.40
15	TLD	1/4/01	to	4/5/01	14.82	+/-	0.26
15	TLD	4/5/01	to	7/9/01	13.47	+/-	0.41
15	TLD	7/9/01	to	10/2/01	14.35	+/-	0.42
15	TLD	10/2/01	to	1/3/02	15.43	+/-	0.49
21	TLD	1/4/01	to	4/5/01	19.47	+/-	0.23
21	TLD	4/5/01	to	7/9/01	17.74	+/-	0.33
21	TLD	7/9/01	to	10/2/01	20.05	+/-	0.48
21	TLD	10/2/01	to	1/3/02	18.81	+/-	0.26
23	TLD	1/4/01	to	4/5/01	17.70	+/-	0.47
23	TLD	4/5/01	to	7/9/01	17.40	+/-	0.26
23	TLD	7/9/01	to	10/2/01	18.95	+/-	0.37
23	TLD	10/2/01	to	1/3/02	17.78	+/-	0.20
24	TLD	1/4/01	to	4/5/01	15.85	+/-	0.23
24	TLD	4/5/01	to	7/9/01	14.76	+/-	0.27
24	TLD	7/9/01	to	10/2/01	15.87	+/-	0.43
24	TLD	10/2/01	to	1/3/02	15.48	+/-	0.46
29	TLD	1/4/01	to	4/5/01	21.51	+/-	0.44
29	TLD	4/5/01	to	7/9/01	19.43	+/-	0.24

TLD Gamma Dose Detail Report 2001

Radiological Environmental Monitoring Program Detail Data
Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441
Sample Frequency is: Quarterly

Location	Sample Type	Collection Period			Exposure		
29	TLD	7/9/01	to	10/2/01	20.35	+/-	0.36
29	TLD	10/2/01	to	1/3/02	19.83	+/-	0.37
30	TLD	1/4/01	to	4/5/01	15.35	+/-	0.24
30	TLD	4/5/01	to	7/9/01	15.43	+/-	0.23
30	TLD	7/9/01	to	10/2/01	17.55	+/-	0.33
30	TLD	10/2/01	to	1/3/02	17.94	+/-	0.22
31	TLD	1/4/01	to	4/5/01	17.34	+/-	0.27
31	TLD	4/5/01	to	7/9/01	19.03	+/-	0.26
31	TLD	7/9/01	to	10/2/01	18.65	+/-	0.38
31	TLD	10/2/01	to	1/3/02	19.57	+/-	0.31
33	TLD	1/4/01	to	4/5/01	18.20	+/-	0.20
33	TLD	4/5/01	to	7/9/01	19.83	+/-	0.22
33	TLD	7/9/01	to	10/2/01	18.56	+/-	0.33
33	TLD	10/2/01	to	1/3/02	19.88	+/-	0.33
35	TLD	1/4/01	to	4/5/01	12.99	+/-	0.43
35	TLD	4/5/01	to	7/9/01	15.23	+/-	0.25
35	TLD	7/9/01	to	10/2/01	13.65	+/-	0.33
35	TLD	10/2/01	to	1/3/02	14.86	+/-	0.30
36	TLD	1/4/01	to	4/5/01	17.91	+/-	0.20
36	TLD	4/5/01	to	7/9/01	18.77	+/-	0.23
36	TLD	7/9/01	to	10/2/01	20.32	+/-	0.49
36	TLD	10/2/01	to	1/3/02	18.63	+/-	0.21
53	TLD	1/4/01	to	4/5/01	14.03	+/-	0.25
53	TLD	4/5/01	to	7/9/01	16.27	+/-	0.22
53	TLD	7/9/01	to	10/2/01	15.26	+/-	0.45
53	TLD	10/2/01	to	1/3/02	15.87	+/-	0.33
54	TLD	1/4/01	to	4/5/01	13.07	+/-	0.42
54	TLD	4/5/01	to	7/9/01	15.47	+/-	0.21
54	TLD	7/9/01	to	10/2/01	16.59	+/-	2.20
54	TLD	10/2/01	to	1/3/02	15.70	+/-	0.31
55	TLD	1/4/01	to	4/5/01	14.43	+/-	0.24
55	TLD	4/5/01	to	7/9/01	17.24	+/-	0.27
55	TLD	7/9/01	to	10/2/01	15.58	+/-	0.52
55	TLD	10/2/01	to	1/3/02	17.27	+/-	0.27
56	TLD	1/4/01	to	4/5/01	14.37	+/-	0.24

TLD Gamma Dose Detail Report 2001

Radiological Environmental Monitoring Program Detail Data
Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441
Sample Frequency is: Quarterly

Location	Sample Type	Collection Period			Exposure		
56	TLD	4/5/01	to	7/9/01	14.55	+/-	0.22
56	TLD	7/9/01	to	10/2/01	15.43	+/-	0.60
56	TLD	10/2/01	to	1/3/02	14.88	+/-	0.33
58	TLD	1/4/01	to	4/5/01	14.89	+/-	0.28
58	TLD	4/5/01	to	7/9/01	14.42	+/-	0.22
58	TLD	7/9/01	to	10/2/01	15.39	+/-	0.37
58	TLD	10/2/01	to	1/3/02	15.18	+/-	0.49

TLD Gamma Dose Detail Report 2001

Radiological Environmental Monitoring Program Detail Data
Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441
Sample Frequency is: Quarterly

Location	Sample Type	Collection Period			Exposure		
1	TLB	1/4/01	to	4/5/01	11.74	+/-	0.28
1	TLB	4/5/01	to	7/9/01	14.58	+/-	0.23
1	TLB	7/9/01	to	10/2/01	14.89	+/-	0.31
1	TLB	10/2/01	to	1/3/02	15.74	+/-	0.60
3	TLB	1/4/01	to	4/5/01	13.91	+/-	0.21
3	TLB	4/5/01	to	7/9/01	15.28	+/-	0.25
3	TLB	7/9/01	to	10/2/01	16.60	+/-	2.05
3	TLB	10/2/01	to	1/3/02	15.57	+/-	0.52
4	TLB	1/4/01	to	4/5/01	14.62	+/-	0.25
4	TLB	4/5/01	to	7/9/01	15.78	+/-	0.24
4	TLB	7/9/01	to	10/2/01	16.85	+/-	0.24
4	TLB	10/2/01	to	1/3/02	15.55	+/-	0.55
5	TLB	1/4/01	to	4/5/01	15.18	+/-	0.22
5	TLB	4/5/01	to	7/9/01	14.94	+/-	0.25
5	TLB	7/9/01	to	10/2/01	15.59	+/-	0.27
5	TLB	10/2/01	to	1/3/02	15.17	+/-	0.35
6	TLB	1/4/01	to	4/5/01	15.28	+/-	0.98
6	TLB	4/5/01	to	7/9/01	17.58	+/-	0.38
6	TLB	7/9/01	to	10/2/01	17.83	+/-	0.22
6	TLB	10/2/01	to	1/3/02	16.87	+/-	0.19
7	TLB	1/4/01	to	4/5/01	14.67	+/-	0.20
7	TLB	4/5/01	to	7/9/01	18.46	+/-	0.23
7	TLB	7/9/01	to	10/2/01	15.42	+/-	0.48
7	TLB	10/2/01	to	1/3/02	15.69	+/-	0.51
8	TLB	1/4/01	to	4/5/01	13.64	+/-	0.23
8	TLB	4/5/01	to	7/9/01	13.42	+/-	0.23
8	TLB	7/9/01	to	10/2/01	15.04	+/-	0.59
8	TLB	10/2/01	to	1/3/02	13.71	+/-	0.20
9	TLB	1/4/01	to	4/5/01	13.48	+/-	0.19
9	TLB	4/5/01	to	7/9/01	13.84	+/-	0.24
9	TLB	7/9/01	to	10/2/01	14.97	+/-	0.49
9	TLB	10/2/01	to	1/3/02	14.03	+/-	0.38
10	TLB	1/4/01	to	4/5/01	15.88	+/-	0.42
10	TLB	4/5/01	to	7/9/01	17.62	+/-	0.37
10	TLB	7/9/01	to	10/2/01	18.24	+/-	0.24
10	TLB	10/2/01	to	1/3/02	18.24	+/-	0.28

TLD Gamma Dose Detail Report 2001

Radiological Environmental Monitoring Program Detail Data
Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441
Sample Frequency is: Quarterly

Location	Sample Type	Collection Period			Exposure		
11	TLB	1/4/01	to	4/5/01	13.88	+/-	0.20
11	TLB	4/5/01	to	7/9/01	15.68	+/-	0.25
11	TLB	7/9/01	to	10/2/01	15.41	+/-	0.51
11	TLB	10/2/01	to	1/3/02	15.33	+/-	0.64
12	TLB	1/4/01	to	4/5/01	14.23	+/-	0.21
12	TLB	4/5/01	to	7/9/01	15.63	+/-	0.25
12	TLB	7/9/01	to	10/2/01	15.82	+/-	0.40
12	TLB	10/2/01	to	1/3/02	15.93	+/-	0.34
13	TLB	1/4/01	to	4/5/01	13.13	+/-	0.27
13	TLB	4/5/01	to	7/9/01	14.82	+/-	0.22
13	TLB	7/9/01	to	10/2/01	14.67	+/-	0.38
13	TLB	10/2/01	to	1/3/02	15.08	+/-	0.25
14	TLB	1/4/01	to	4/5/01	11.80	+/-	0.31
14	TLB	4/5/01	to	7/9/01	14.60	+/-	0.23
14	TLB	7/9/01	to	10/2/01	12.49	+/-	0.28
14	TLB	10/2/01	to	1/3/02	13.86	+/-	0.29
15	TLB	1/4/01	to	4/5/01	10.64	+/-	0.23
15	TLB	4/5/01	to	7/9/01	13.28	+/-	0.28
15	TLB	7/9/01	to	10/2/01	11.09	+/-	0.21
15	TLB	10/2/01	to	1/3/02	13.11	+/-	0.24
21	TLB	1/4/01	to	4/5/01	15.94	+/-	0.45
21	TLB	4/5/01	to	7/9/01	17.61	+/-	0.42
21	TLB	7/9/01	to	10/2/01	17.53	+/-	0.23
21	TLB	10/2/01	to	1/3/02	17.21	+/-	0.22
23	TLB	1/4/01	to	4/5/01	13.27	+/-	0.27
23	TLB	4/5/01	to	7/9/01	16.52	+/-	0.24
23	TLB	7/9/01	to	10/2/01	14.75	+/-	0.39
23	TLB	10/2/01	to	1/3/02	16.86	+/-	0.21
24	TLB	1/4/01	to	4/5/01	13.51	+/-	0.23
24	TLB	4/5/01	to	7/9/01	14.87	+/-	0.24
24	TLB	7/9/01	to	10/2/01	14.28	+/-	0.32
24	TLB	10/2/01	to	1/3/02	14.45	+/-	0.39
29	TLB	1/4/01	to	4/5/01	18.10	+/-	0.23
29	TLB	4/5/01	to	7/9/01	20.08	+/-	0.25
29	TLB	7/9/01	to	10/2/01	19.97	+/-	0.33

TLD Gamma Dose Detail Report 2001

Radiological Environmental Monitoring Program Detail Data
Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441
Sample Frequency is: Quarterly

Location	Sample Type	Collection Period			Exposure		
29	TLB	10/2/01	to	1/3/02	20.01	+/-	0.42
30	TLB	1/4/01	to	4/5/01	15.16	+/-	0.23
30	TLB	4/5/01	to	7/9/01	16.08	+/-	0.25
30	TLB	7/9/01	to	10/2/01	17.10	+/-	0.25
30	TLB	10/2/01	to	1/3/02	17.99	+/-	0.26
31	TLB	1/4/01	to	4/5/01	18.15	+/-	0.22
31	TLB	4/5/01	to	7/9/01	19.81	+/-	0.25
31	TLB	7/9/01	to	10/2/01	19.80	+/-	0.39
31	TLB	10/2/01	to	1/3/02	19.74	+/-	0.53
33	TLB	1/4/01	to	4/5/01	19.99	+/-	0.43
33	TLB	4/5/01	to	7/9/01	21.56	+/-	0.37
33	TLB	7/9/01	to	10/2/01	21.67	+/-	0.21
33	TLB	10/2/01	to	1/3/02	20.82	+/-	0.20
35	TLB	1/4/01	to	4/5/01	14.70	+/-	0.22
35	TLB	4/5/01	to	7/9/01	16.04	+/-	0.25
35	TLB	7/9/01	to	10/2/01	15.80	+/-	0.34
35	TLB	10/2/01	to	1/3/02	15.56	+/-	0.46
36	TLB	1/4/01	to	4/5/01	19.78	+/-	0.35
36	TLB	4/5/01	to	7/9/01	19.37	+/-	0.24
36	TLB	7/9/01	to	10/2/01	21.29	+/-	0.24
36	TLB	10/2/01	to	1/3/02	19.74	+/-	0.35
53	TLB	1/4/01	to	4/5/01	15.86	+/-	0.27
53	TLB	4/5/01	to	7/9/01	16.55	+/-	0.25
53	TLB	7/9/01	to	10/2/01	17.31	+/-	0.26
53	TLB	10/2/01	to	1/3/02	16.94	+/-	0.22
54	TLB	1/4/01	to	4/5/01	15.13	+/-	0.26
54	TLB	4/5/01	to	7/9/01	16.08	+/-	0.24
54	TLB	7/9/01	to	10/2/01	15.63	+/-	0.61
54	TLB	10/2/01	to	1/3/02	17.17	+/-	0.23
55	TLB	1/4/01	to	4/5/01	14.69	+/-	0.21
55	TLB	4/5/01	to	7/9/01	16.85	+/-	0.28
55	TLB	7/9/01	to	10/2/01	17.36	+/-	0.34
55	TLB	10/2/01	to	1/3/02	16.13	+/-	0.25
56	TLB	1/4/01	to	4/5/01	13.92	+/-	0.22
56	TLB	4/5/01	to	7/9/01	13.53	+/-	0.32

TLD Gamma Dose Detail Report 2001
Radiological Environmental Monitoring Program Detail Data
Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441
Sample Frequency is: Quarterly

Location	Sample Type	Collection Period			Exposure		
56	TLB	7/9/01	to	10/2/01	15.18	+/-	0.47
56	TLB	10/2/01	to	1/3/02	13.70	+/-	0.41
58	TLB	1/4/01	to	4/5/01	13.91	+/-	0.21
58	TLB	4/5/01	to	7/9/01	14.93	+/-	0.24
58	TLB	7/9/01	to	10/2/01	14.54	+/-	0.24
58	TLB	10/2/01	to	1/3/02	14.31	+/-	0.30

TLD Gamma Dose Detail Report 2001

Radiological Environmental Monitoring Program Detail Data
Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441
Sample Frequency is: Annual

Location	Sample Type	Collection Period			Exposure		
1	TLA	1/4/01	to	1/3/02	48.31	+/-	0.63
3	TLA	1/4/01	to	1/3/02	47.85	+/-	0.79
4	TLA	1/4/01	to	1/3/02	54.94	+/-	1.09
5	TLA	1/4/01	to	1/3/02	48.98	+/-	0.66
6	TLA	1/4/01	to	1/3/02	58.34	+/-	0.63
7	TLA	1/4/01	to	1/3/02	54.60	+/-	1.99
8	TLA	1/4/01	to	1/3/02	47.87	+/-	0.78
9	TLA	1/4/01	to	1/3/02	48.82	+/-	1.06
10	TLA	1/4/01	to	1/3/02	70.48	+/-	1.58
11	TLA	1/4/01	to	1/3/02	50.54	+/-	0.66
12	TLA	1/4/01	to	1/3/02	57.11	+/-	0.98
13	TLA	1/4/01	to	1/3/02	52.17	+/-	0.70
14	TLA	1/4/01	to	1/3/02	51.76	+/-	1.02
15	TLA	1/4/01	to	1/3/02	51.52	+/-	1.15
21	TLA	1/4/01	to	1/3/02	65.31	+/-	0.65
23	TLA	1/4/01	to	1/3/02	62.31	+/-	0.77
24	TLA	1/4/01	to	1/3/02	51.49	+/-	1.03
29	TLA	1/4/01	to	1/3/02	62.47	+/-	0.64
30	TLA	1/4/01	to	1/3/02	53.98	+/-	0.62
31	TLA	1/4/01	to	1/3/02	65.03	+/-	0.84
33	TLA	1/4/01	to	1/3/02	67.02	+/-	0.67
35	TLA	1/4/01	to	1/3/02	55.82	+/-	0.68

TLD Gamma Dose Detail Report 2001

Radiological Environmental Monitoring Program Detail Data
Perry Nuclear Power Plant, Lake County Ohio Docket no. : 50-440/50-441
Sample Frequency is: Annual

Location	Sample Type	Collection Period	Exposure
36	TLA	1/4/01 to 1/3/02	75.22 +/- 1.51
53	TLA	1/4/01 to 1/3/02	58.96 +/- 0.62
54	TLA	1/4/01 to 1/3/02	55.79 +/- 0.78
55	TLA	1/4/01 to 1/3/02	
56	TLA	1/4/01 to 1/3/02	51.12 +/- 1.09
58	TLA	1/4/01 to 1/3/02	48.54 +/- 0.82

Water Gamma Spectral Detail Report 2001

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	12/28/00 to 1/25/01	< 14.91 < 4.80 < 11.42	< 2.63 < 4.71	< 4.66 < 3.07	< 3.05 < 6.45	< 3.83 < 9.50
28	Water	2/22/01 to 2/22/01	< 6.97 < 4.27 < 5.42	< 1.59 < 1.27	< 2.02 < 1.26	< 2.28 < 2.46	< 1.28 < 3.36
28	Water	3/29/01 to 3/29/01	< 21.74 < 3.54 < 4.13	< 3.28 < 4.88	< 1.65 < 2.64	< 4.02 < 3.64	< 2.75 < 3.96
28	Water	3/29/01 to 4/26/01	< 22.88 < 1.75 < 4.21	< 3.09 < 4.00	< 1.37 < 3.04	< 2.82 < 3.49	< 2.89 < 4.39
28	Water	4/26/01 to 5/29/01	< 44.85 < 6.07 < 3.60	< 2.71 < 5.32	< 1.53 < 2.26	< 2.95 < 3.93	< 2.01 < 3.40
28	Water	5/29/01 to 6/28/01	< 42.83 < 8.43 < 8.23	< 2.91 < 10.06	< 1.64 < 2.83	< 3.02 < 3.95	< 1.86 < 5.96
28	Water	7/26/01 to 7/26/01	< 40.70 < 6.83 < 6.03	< 2.40 < 10.27	< 2.30 < 1.79	< 3.64 < 5.47	< 3.31 < 5.43
28	Water	7/26/01 to 8/30/01	< 16.26 < 3.93 < 4.73	< 2.43 < 2.11	< 2.75 < 2.63	< 3.27 < 3.14	< 2.13 < 3.43
28	Water	8/30/01 to 9/27/01	< 20.31 < 6.09 < 7.14	< 2.15 < 2.59	< 3.13 < 3.01	< 1.41 < 3.28	< 2.87 < 4.07
28	Water	10/25/01 to 10/25/01	< 28.87 < 12.06 < 4.54	< 4.97 < 8.77	< 5.01 < 2.32	< 5.54 < 5.61	< 4.45 < 4.82
28	Water	10/25/01 to 11/29/01	< 16.56 < 8.13 < 6.51	< 2.21 < 5.09	< 4.62 < 3.31	< 3.33 < 2.82	< 5.24 < 6.19
28	Water	11/29/01 to 12/27/01	< 16.79 < 6.75 < 3.37	< 2.20 < 2.45	< 2.99 < 2.69	< 2.63 < 1.93	< 2.42 < 2.52

Water Gamma Spectral Detail Report 2001

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	12/28/00 to 1/25/01	< 18.77 < 6.32 < 8.71	< 5.37 < 2.66	< 4.33 < 5.51	< 4.86 < 4.45	< 3.24 < 3.86
34	Water	1/25/01 to 2/22/01	< 10.18 < 5.75 < 5.88	< 2.41 < 4.62	< 1.16 < 2.14	< 2.87 < 1.89	< 2.62 < 2.49
34	Water	2/22/01 to 3/29/01	< 17.14 < 4.06 < 4.13	< 4.14 < 2.52	< 1.30 < 1.83	< 3.69 < 4.19	< 2.67 < 3.45
34	Water	3/29/01 to 4/26/01	< 31.71 < 4.18 < 7.94	< 2.35 < 4.29	< 2.24 < 1.96	< 2.96 < 2.03	< 3.02 < 5.27
34	Water	4/26/01 to 5/29/01	< 37.29 < 4.15 < 4.70	< 3.79 < 5.40	< 3.59 < 2.20	< 2.65 < 2.92	< 2.88 < 3.70
34	Water	5/29/01 to 6/28/01	< 36.33 < 5.98 < 5.11	< 2.66 < 6.22	< 1.22 < 2.48	< 2.99 < 4.11	< 3.62 < 5.94
34	Water	6/28/01 to 7/26/01	< 36.00 < 4.25 < 4.81	< 2.26 < 4.48	< 1.64 < 2.08	< 2.17 < 4.24	< 2.29 < 5.77
34	Water	7/26/01 to 8/30/01	< 20.41 < 6.39 < 5.29	< 2.29 < 5.10	< 2.63 < 3.64	< 3.35 < 3.02	< 1.26 < 2.77
34	Water	8/30/01 to 9/27/01	< 12.29 < 3.85 < 4.36	< 2.56 < 1.91	< 2.53 < 3.03	< 3.00 < 1.39	< 2.48 < 3.09
34	Water	9/27/01 to 10/25/01	< 21.52 < 6.41 < 4.70	< 3.91 < 2.37	< 3.98 < 5.08	< 4.17 < 4.98	< 4.03 < 5.37
34	Water	10/25/01 to 11/29/01	< 17.56 < 3.93 < 5.45	< 2.73 < 2.95	< 3.47 < 3.04	< 2.60 < 3.66	< 4.36 < 2.63
34	Water	11/29/01 to 12/27/01	< 22.49 < 7.63 < 11.90	< 2.35 < 8.47	< 7.78 < 3.99	< 4.36 < 4.49	< 4.79 < 11.24

Water Gamma Spectral Detail Report 2001

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	12/28/00 to 1/25/01	< 9.86 < 3.92 < 4.87	< 2.72 < 3.64	< 1.77 < 2.33	< 2.55 < 2.12	< 1.63 < 1.54
36	Water	1/25/01 to 2/22/01	< 10.25 < 2.25 < 6.16	< 2.85 < 2.11	< 1.85 < 2.36	< 1.35 < 3.87	< 3.41 < 4.27
36	Water	2/22/01 to 3/29/01	< 16.72 < 3.24 < 5.89	< 2.37 < 3.00	< 1.23 < 2.83	< 3.05 < 3.14	< 2.24 < 2.89
36	Water	3/29/01 to 4/26/01	< 28.95 < 3.48 < 6.48	< 2.29 < 10.26	< 1.85 < 2.34	< 4.15 < 3.92	< 3.53 < 5.75
36	Water	4/26/01 to 5/29/01	< 30.28 < 5.77 < 1.68	< 2.64 < 3.74	< 1.29 < 2.38	< 2.31 < 2.69	< 2.51 < 4.85
36	Water	5/29/01 to 6/28/01	< 43.92 < 5.24 < 5.90	< 3.00 < 8.68	< 1.52 < 2.39	< 2.18 < 5.12	< 2.53 < 3.37
36	Water	6/28/01 to 7/26/01	< 38.28 < 4.43 < 6.41	< 2.86 < 8.75	< 2.26 < 2.67	< 3.12 < 4.14	< 3.23 < 3.46
36	Water	7/26/01 to 8/30/01	< 35.02 < 5.59 < 8.08	< 4.80 < 8.79	< 2.48 < 5.50	< 4.57 < 4.55	< 4.93 < 3.72
36	Water	8/30/01 to 9/27/01	< 13.16 < 4.10 < 8.77	< 2.21 < 4.36	< 2.84 < 2.72	< 2.55 < 2.07	< 3.30 < 4.91
36	Water	9/27/01 to 10/25/01	< 43.84 < 5.84 < 10.21	< 5.37 < 3.97	< 2.63 < 5.00	< 5.67 < 2.78	< 5.66 < 7.11
36	Water	10/25/01 to 11/29/01	< 23.87 < 4.40 < 9.68	< 4.04 < 2.56	< 1.87 < 5.46	< 4.84 < 3.95	< 3.88 < 2.79
36	Water	11/29/01 to 12/27/01	< 26.20 < 7.44 < 10.40	< 4.00 < 4.42	< 2.75 < 6.28	< 4.92 < 3.92	< 4.02 < 4.87

Water Gamma Spectral Detail Report 2001

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	3/7/01 to 3/29/01	< 15.38 < 2.98 < 5.57	< 3.76 < 3.88	< 1.20 < 1.72	< 3.98 < 2.22	< 2.26 < 4.07
59	Water	3/29/01 to 4/26/01	< 33.18 < 2.94 < 6.32	< 3.72 < 6.75	< 2.95 < 2.92	< 2.40 < 3.65	< 2.77 < 2.93
59	Water	4/26/01 to 5/29/01	< 25.90 < 5.61 < 3.53	< 3.33 < 4.07	< 2.08 < 2.77	< 1.96 < 3.12	< 3.33 < 3.38
59	Water	5/29/01 to 6/28/01	< 23.59 < 5.26 < 2.90	< 1.51 < 3.65	< 2.63 < 2.40	< 2.32 < 3.67	< 2.33 < 2.37
59	Water	6/28/01 to 7/26/01	< 39.10 < 4.15 < 3.60	< 3.04 < 7.83	< 2.58 < 2.70	< 1.72 < 3.60	< 2.90 < 4.33
59	Water	7/26/01 to 8/30/01	< 18.79 < 9.60 < 4.82	< 4.23 < 4.09	< 4.12 < 4.15	< 2.81 < 3.67	< 3.76 < 4.07
59	Water	8/30/01 to 9/27/01	< 14.28 < 3.41 < 3.18	< 2.47 < 3.23	< 1.86 < 2.83	< 2.39 < 3.36	< 2.13 < 3.44
59	Water	9/27/01 to 10/25/01	< 27.09 < 6.69 < 5.77	< 5.29 < 3.13	< 2.33 < 3.21	< 3.65 < 4.92	< 4.98 < 8.18
59	Water	10/25/01 to 11/29/01	< 21.47 < 4.86 < 7.71	< 4.07 < 3.37	< 1.77 < 3.07	< 4.98 < 3.68	< 3.65 < 4.27
59	Water	11/29/01 to 12/27/01	< 17.26 < 3.93 < 4.72	< 1.92 < 2.97	< 2.48 < 3.33	< 3.58 < 2.36	< 2.49 < 4.82
60	Water	3/7/01 to 3/29/01	< 15.28 < 3.34 < 6.38	< 1.83 < 4.06	< 1.68 < 2.45	< 3.51 < 2.13	< 2.52 < 1.97
60	Water	3/29/01 to 4/26/01	< 18.97 < 4.32 < 4.86	< 2.42 < 4.38	< 2.29 < 3.73	< 3.49 < 5.86	< 2.74 < 3.36

Water Gamma Spectral Detail Report 2001

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	4/26/01 to 5/29/01	< 25.18 < 7.94 < 6.66	< 2.90 < 6.98	< 1.88 < 3.89	< 2.77 < 5.28	< 3.11 < 6.03
60	Water	5/29/01 to 6/28/01	< 35.71 < 4.06 < 7.78	< 2.90 < 9.26	< 2.08 < 2.45	< 3.11 < 3.85	< 2.72 < 4.05
60	Water	6/28/01 to 7/26/01	< 34.39 < 3.93 < 3.29	< 2.58 < 3.94	< 1.70 < 1.61	< 1.84 < 2.92	< 1.69 < 2.17
60	Water	7/26/01 to 8/30/01	< 18.19 < 3.91 < 4.68	< 3.35 < 1.61	< 2.45 < 2.27	< 2.80 < 4.10	< 3.79 < 3.28
60	Water	8/30/01 to 9/27/01	< 15.92 < 3.41 < 1.61	< 2.43 < 2.58	< 2.30 < 2.45	< 2.78 < 2.42	< 2.59 < 3.79
60	Water	9/27/01 to 10/25/01	< 36.97 < 5.71 < 8.06	< 3.26 < 4.28	< 3.91 < 4.23	< 6.16 < 3.72	< 6.60 < 2.93
60	Water	10/25/01 to 11/29/01	< 20.26 < 4.99 < 2.89	< 2.91 < 3.26	< 4.10 < 3.33	< 4.27 < 3.22	< 3.74 < 7.46
60	Water	11/29/01 to 12/27/01	< 19.75 < 4.87 < 5.50	< 1.47 < 2.45	< 2.23 < 1.86	< 3.57 < 3.21	< 2.67 < 2.78

Water Gross Beta Detail Report 2001

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
12/28/00 to 1/25/01	Water	LLD	LLD	LLD		
1/25/01 to 2/22/01	Water		LLD	LLD		
2/22/01 to 2/22/01	Water	LLD				
2/22/01 to 3/29/01	Water		LLD	LLD		
3/7/01 to 3/29/01	Water				LLD	LLD
3/29/01 to 3/29/01	Water	3.06 +/- 0.59				
3/29/01 to 4/26/01	Water	LLD	LLD	LLD	3.21 +/- 0.63	3.62 +/- 0.65
4/26/01 to 5/29/01	Water	LLD	LLD	LLD	LLD	LLD
5/29/01 to 6/28/01	Water	LLD	LLD	LLD	LLD	LLD
6/28/01 to 7/26/01	Water		LLD	LLD	LLD	LLD
7/26/01 to 7/26/01	Water	3.42 +/- 0.59				
7/26/01 to 8/30/01	Water	LLD	LLD	LLD	LLD	LLD
8/30/01 to 9/27/01	Water	LLD	LLD	LLD	LLD	3.78 +/- 0.72

Water Gross Beta Detail Report 2001

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
9/27/01 to 10/25/01	Water		LLD	LLD	LLD	LLD
10/25/01 to 10/25/01	Water	LLD				
10/25/01 to 11/29/01	Water	3.48 +/- 0.71	LLD	LLD	LLD	3.86 +/- 0.66
11/29/01 to 12/27/01	Water	LLD	LLD	LLD	3.40 +/- 0.59	4.15 +/- 0.59

Water Tritium Detail Report 2001
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	3/29/01	< 186.37
28	Water	6/28/01	< 152.63
28	Water	9/27/01	< 156.26
28	Water	12/27/01	< 156.66
34	Water	3/29/01	< 186.37
34	Water	6/28/01	< 152.63
34	Water	9/27/01	< 156.26
34	Water	12/27/01	LLD
36	Water	3/29/01	< 183.50
36	Water	6/28/01	< 152.63
36	Water	9/27/01	< 156.26
36	Water	12/27/01	< 156.66
59	Water	3/29/01	< 186.37
59	Water	6/28/01	< 152.63
59	Water	9/27/01	< 156.26
59	Water	12/27/01	< 156.66
60	Water	3/29/01	< 186.37
60	Water	6/28/01	< 152.63
60	Water	9/27/01	< 156.26
60	Water	12/27/01	< 156.66

APPENDIX D, 2001 ABNORMAL GASEOUS RELEASE DOSE SUMMARY AND METEOROLOGICAL DATA

ANNUAL ENVIRONMENTAL AND EFFLUENT RELEASE REPORT

SITE: PERRY UNIT: UNIT 1 0112101101

USER: CLN SUMMARY OF MAXIMUM INDIVIDUAL DOSES

LAST ACCUMULATIONS FOR PERIODS:

LIQUID 01010101-01112524

GASEOUS 01120307-01120308

AIR 01120307-01120308

EFFLUENT	APPLICABLE ORGAN	ESTIMATED DOSE (MREM)	AGE GROUP	LOCATION DIST (M)	DIR (TOWARD)	% OF APPLICABLE LIMIT	LIMIT MREM)
LIQUID	TOTAL BODY	2.27E-03	ADULT	RECEPTOR 1		7.6E-02	3.0E+00
LIQUID	LIVER	2.95E-03	CHILD	RECEPTOR 1		2.9E-02	1.0E+01
NOBLE GAS	AIR DOSE (GAMMA-MRAD)	1.58E-07		294	N	1.6E-06	1.0E+01
NOBLE GAS	AIR DOSE (BETA-MRAD)	2.92E-07		294	N	1.5E-06	2.0E+01
NOBLE GAS	T.BODY	9.84E-08	ALL	294	N	2.0E-06	5.0E+00
NOBLE GAS	SKIN	2.65E-07	ALL	294	N	1.8E-06	1.5E+01
IODINE&THYROID PARTICULATES		3.70E-07	CHILD	294	N	2.5E-06	1.5E+01

ANNUAL ENVIRONMENTAL AND EFFLUENT RELEASE REPORT

SITE: PERRY UNIT: UNIT 1 0112050753

USER: CLN SUMMARY OF MAXIMUM INDIVIDUAL DOSES

LAST ACCUMULATIONS FOR PERIODS:

LIQUID 01010101-01112524

GASEOUS 01100101-01120308

AIR 01100101-01120308

EFFLUENT	APPLICABLE ORGAN	ESTIMATED DOSE (MREM)	AGE GROUP	LOCATION DIST (M)	DIR (TOWARD)	% OF APPLICABLE LIMIT	LIMIT MREM)
LIQUID	TOTAL BODY	2.27E-03	ADULT	RECEPTOR 1		7.6E-02	3.0E+00
LIQUID	LIVER	2.95E-03	CHILD	RECEPTOR 1		2.9E-02	1.0E+01
NOBLE GAS	AIR DOSE (GAMMA-MRAD)	2.66E-04		402	NNE	2.7E-03	1.0E+01
NOBLE GAS	AIR DOSE (BETA-MRAD)	2.16E-04		273	NW	1.1E-03	2.0E+01
NOBLE GAS	T.BODY	1.03E-04	ALL	294	N	2.1E-03	5.0E+00
NOBLE GAS	SKIN	2.32E-04	ALL	294	N	1.5E-03	1.5E+01
IODINE&THYROID PARTICULATES		1.00E-04	CHILD	294	N	6.7E-04	1.5E+01

ANNUAL ENVIRONMENTAL AND EFFLUENT RELEASE REPORT

SITE: PERRY UNIT: UNIT 1 0112050753

USER: CLN SUMMARY OF MAXIMUM INDIVIDUAL DOSES

LAST ACCUMULATIONS FOR PERIODS:

LIQUID 01010101-01112524

GASEOUS 01100101-01120308

AIR 01100101-01120308

EFFLUENT	APPLICABLE ORGAN	ESTIMATED DOSE (MREM)	AGE GROUP	LOCATION DIST (M)	DIR (TOWARD)	% OF APPLICABLE LIMIT	LIMIT MREM)
LIQUID	TOTAL BODY	2.27E-03	ADULT	RECEPTOR 1		7.6E-02	3.0E+00
LIQUID	LIVER	2.95E-03	CHILD	RECEPTOR 1		2.9E-02	1.0E+01
NOBLE GAS (GAMMA-MRAD)	AIR DOSE	3.02E-02		294	N	3.0E-01	1.0E+01
NOBLE GAS (BETA-MRAD)	AIR DOSE	4.33E-02		294	N	2.2E-01	2.0E+01
NOBLE GAS	T.BODY	6.14E-03	ALL	283	WNW	1.2E-01	5.0E+00
NOBLE GAS	SKIN	1.64E-02	ALL	283	WNW	1.1E-01	1.5E+01
IODINE&THYROID PARTICULATES		1.94E-02	CHILD	294	N	1.3E-01	1.5E+01

SITE: PERRY UNIT: UNIT 1 0112050753

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD = 01120301-01120324

STABILITY CLASS A DT/DZ

ELEVATION: SPEED: SPD10P DIRECTION: DIR10P LAPSE: DT50M

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0

PERIODS OF CALM (HOURS): 0

VARIABLE DIRECTION 0

HOURS OF MISSING DATA: 0

SITE: PERRY UNIT: UNIT 1 0112050753

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD = 01120301-01120324

STABILITY CLASS B DT/DZ

ELEVATION: SPEED: SPD10P DIRECTION: DIR10P LAPSE: DT50M

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0

PERIODS OF CALM (HOURS): 0

VARIABLE DIRECTION 0

HOURS OF MISSING DATA: 0

SITE: PERRY UNIT: UNIT 1 0112050753

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD = 01120301-01120324

STABILITY CLASS C DT/DZ

ELEVATION: SPEED: SPD10P DIRECTION: DIR10P LAPSE: DT50M

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0

PERIODS OF CALM (HOURS): 0

VARIABLE DIRECTION 0

HOURS OF MISSING DATA: 0

SITE: PERRY UNIT: UNIT 1 0112050753

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD = 01120301-01120324

STABILITY CLASS D DT/DZ

ELEVATION: SPEED: SPD10P DIRECTION: DIR10P LAPSE: DT50M

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	2	0	0	0	2
WSW	0	1	0	1	0	0	2
W	0	0	2	0	0	0	2
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
TOTAL	0	1	4	1	0	0	6

PERIODS OF CALM (HOURS): 0

VARIABLE DIRECTION 0

HOURS OF MISSING DATA: 0

SITE: PERRY UNIT: UNIT 1 0112050753

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD = 01120301-01120324

STABILITY CLASS E DT/DZ

ELEVATION: SPEED: SPD10P DIRECTION: DIR10P LAPSE: DT50M

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	0	1	5	0	0	0	6
SSW	0	1	3	0	0	0	4
SW	0	0	0	0	0	0	0
WSW	1	1	0	0	0	0	2
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
TOTAL	1	3	8	0	0	0	12

PERIODS OF CALM (HOURS): 0

VARIABLE DIRECTION 0

HOURS OF MISSING DATA: 0

SITE: PERRY UNIT: UNIT 1 0112050753

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD = 01120301-01120324

STABILITY CLASS F DT/DZ

ELEVATION: SPEED: SPD10P DIRECTION: DIR10P LAPSE: DT50M

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
SE	1	0	0	0	0	0	1
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
TOTAL	1	0	0	0	0	0	1

PERIODS OF CALM (HOURS): 0

VARIABLE DIRECTION 0

HOURS OF MISSING DATA: 0

SITE: PERRY UNIT: UNIT 1 0112050753

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD = 01120301-01120324

STABILITY CLASS G DT/DZ

ELEVATION: SPEED: SPD10P DIRECTION: DIR10P LAPSE: DT50M

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
SE	1	0	0	0	0	0	1
SSE	1	0	0	0	0	0	1
S	2	0	0	0	0	0	2
SSW	1	0	0	0	0	0	1
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
TOTAL	5	0	0	0	0	0	5

PERIODS OF CALM (HOURS): 0

VARIABLE DIRECTION 0

HOURS OF MISSING DATA: 0

SITE: PERRY UNIT: UNIT 1 0112050753

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD = 01120301-01120324

STABILITY CLASS ALL DT/DZ

ELEVATION: SPEED: SPD10P DIRECTION: DIR10P LAPSE: DT50M

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
SE	2	0	0	0	0	0	2
SSE	1	0	0	0	0	0	1
S	2	1	5	0	0	0	8
SSW	1	1	3	0	0	0	5
SW	0	0	2	0	0	0	2
WSW	1	2	0	1	0	0	4
W	0	0	2	0	0	0	2
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
TOTAL	7	4	12	1	0	0	24

PERIODS OF CALM (HOURS): 0

VARIABLE DIRECTION 0

HOURS OF MISSING DATA: 0

APPENDIX E, 2000 AEERR CORRECTIONS

Twenty-seven (27) fish samples were collected and analyzed by gamma spectral analysis in 2000. Sixteen (16) species of fish were represented, including walleye, drum, carp, quilback sucker, spotted sucker, white sucker, redhorse sucker, round gobi, steelhead, catfish, yellow perch, white perch, gizzard shad, smallmouth bass, rock bass and white bass. As expected, naturally occurring potassium-40 was found in all samples. No other radionuclides were detected above the LLD.

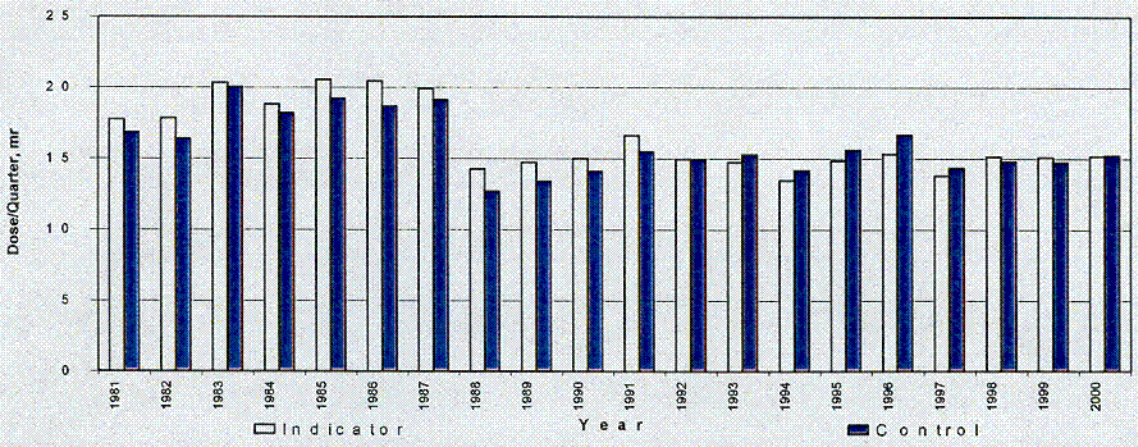
Direct Radiation Monitoring

Thermoluminscent Dosimeter (TLD)

Environmental radiation is measured directly at twenty-eight 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 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 2000. This included 224 collected on a quarterly basis, and twenty-eight (28) collected annually. In 2000, the annual average dose for all indicator locations was 59.59 mrem, and 56.97 mrem for all control locations. Referring to Figure 8, the average quarterly dose for all indicator locations was 15.2 mrem, and 9.1 15.2 mrem for the control locations. Prior to 1988, the TLD results were higher due to a change in vendor laboratory services. A comprehensive explanation of this difference was provided in the 1988 Annual Environmental Operating Report.

Figure 10: Average Quarterly TLD Dose



Conclusion

Sediment samples continue to confirm cobalt-60 in the northwest drain impoundment. The activity level was just above the detection limits. Samples taken upstream did not find any additional activity or the source. 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. 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. Cesium-137 was detected in sediment samples and is the result of fallout from weapons testing. The concentrations were similar to those measured in previous years and are not related to plant operation.

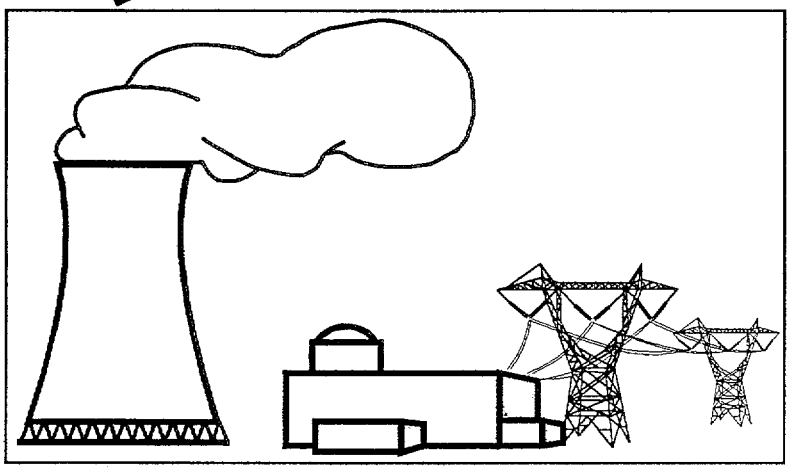
Finally, direct radiation measurements are consistent with past data.

C10

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

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L[b] Laboratory results ±2 Sigma[c]	ERA Result[d] 1s, N=1	Control Limits
STW-863	WATER	Jan, 2000	Gr. Alpha	39.3 ± 5.2	25.4 ± 6.4	14.5 - 36.3
The analysis was repeated and recalculated with Am-241 efficiency; result of reanalysis 29.32 ± 5.79 pCi/I Internal spike program results do not indicate a problem.						
STW-863	WATER	Jan, 2000	Gr. Beta	40.7 ± 1.2	42.1 ± 4.2	33.4 - 50.8
STW-866	WATER	Jan, 2000	Sr-89	17.1 ± 2.2	22.5 ± 5.0	13.8 - 31.2
STW-866	WATER	Jan, 2000	Sr-90	8.1 ± 0.6	9.6 ± 5.0	0.9 - 18.3
STW-868	WATER	Feb, 2000	Ra-226	7.6 ± 0.5	8.3 ± 1.2	6.1 - 10.4
STW-868	WATER	Feb, 2000	Ra-228	5.6 ± 1.0	2.3 ± 0.6	1.3 - 3.2
Result of reanalysis: 6.34 ± 0.94. Activity confirmed by gamma spectroscopy (6.00 ± 1.42 pCi/L). The probable cause was a possible error in dilution. Sufficient spiked sample was not available to have the dilution steps re-performed.						
STW-868	WATER	Feb, 2000	Uranium	5.4 ± 0.2	6.1 ± 3.0	0.9 - 11.3
STW-869	WATER	Mar, 2000	H-3	23,500.0 ± 306.0	23,800.0 ± 2,380.0	19,800.0 - 27,800.0
STW-867	WATER	Mar, 2000	Gr. Alpha	83.6 ± 5.8	58.4 ± 5.8	33.3 - 83.5
Results were recalculated with Am-241 efficiency; 57.80 ± 5.73 pCi/L. Refer to STW-863.						
STW-867	WATER	Mar, 2000	Gr. Beta	15.4 ± 0.9	16.8 ± 1.7	8.1 - 25.5
STW-876	WATER	Mar, 2000	I-131	18.7 ± 0.6	19.9 ± 2.0	18.1 - 28.5
STW-877	WATER	Apr, 2000	Gr. Alpha	52.3 ± 2.3	54.0 ± 13.5	30.8 - 77.2
STW-877	WATER	Apr, 2000	Ra-226	17.5 ± 1.1	18.6 ± 2.8	13.8 - 23.4
STW-877	WATER	Apr, 2000	Ra-228	3.7 ± 0.4	3.6 ± 0.9	2.0 - 5.1
STW-878	WATER	Apr, 2000	Co-60	19.2 ± 0.6	16.9 ± 5.0	8.2 - 25.6
STW-878	WATER	Apr, 2000	Cs-134	81.0 ± 1.3	86.4 ± 5.0	77.7 - 95.1
STW-878	WATER	Apr, 2000	Cs-137	119.0 ± 2.6	123.0 ± 6.2	112.0 - 134.0
STW-878	WATER	Apr, 2000	Gr. Beta	276.0 ± 9.6	289.0 ± 43.4	214.0 - 364.0
STW-878	WATER	Apr, 2000	Sr-89	32.3 ± 3.3	50.7 ± 5.0	42.0 - 59.4
STW-878	WATER	Apr, 2000	Sr-90	11.3 ± 1.0	32.8 ± 5.0	24.1 - 41.5
An error was found in calculation. Result of recalculation: Sr-89, 55.5± 7.2 pCi/L / Sr-90, 30.7 ± 3.0 pCi/L. Results of reanalysis: Sr-89, 47.4 ± 14.5 pCi/L / Sr-90, 33.0 ± 1.35 pCi/L. Both results are within limits.						
STW-879	WATER	Jun, 2000	Ba-133	22.4 ± 2.1	25.5 ± 5.0	16.8 - 34.2
STW-879	WATER	Jun, 2000	Co-60	69.9 ± 3.7	65.6 ± 5.0	56.9 - 74.3
STW-879	WATER	Jun, 2000	Cs-134	13.5 ± 0.8	13.8 ± 5.0	5.1 - 22.5
STW-879	WATER	Jun, 2000	Cs-137	232.0 ± 7.8	238.0 ± 11.9	217.0 - 259.0
STW-879	WATER	Jun, 2000	Zn-65	50.9 ± 3.8	54.6 ± 5.5	45.3 - 63.9
STW-880	WATER	Jun, 2000	Ra-226	2.8 ± 0.2	3.0 ± 0.5	2.2 - 3.8
STW-880	WATER	Jun, 2000	Ra-228	10.0 ± 0.9	13.0 ± 3.3	7.4 - 18.6
STW-880	WATER	Jun, 2000	Uranium	57.0 ± 4.4	63.4 ± 6.3	52.6 - 74.2
STW-883	WATER	Jul, 2000	Gr. Alpha	6.9 ± 1.1	7.2 ± 5.0	0.0 - 15.9
STW-883	WATER	Jul, 2000	Gr. Beta	88.8 ± 9.8	87.5 ± 10.0	70.2 - 105.0
STW-884	WATER	Aug, 2000	H-3	8,740.0 ± 174.0	8,320.0 ± 832.0	6,910.0 - 9,730.0
STW-891	WATER	Sep, 2000	Ra-226	17.9 ± 1.3	18.9 ± 2.8	14.0 - 23.8
STW-891	WATER	Sep, 2000	Ra-228	5.7 ± 0.5	6.2 ± 1.6	3.5 - 8.8

PNPPD



Generating Success!

For more information, write :

Perry Nuclear Power Plant
10 Center Road
P.O. Box 97
Perry OH 44081-0097