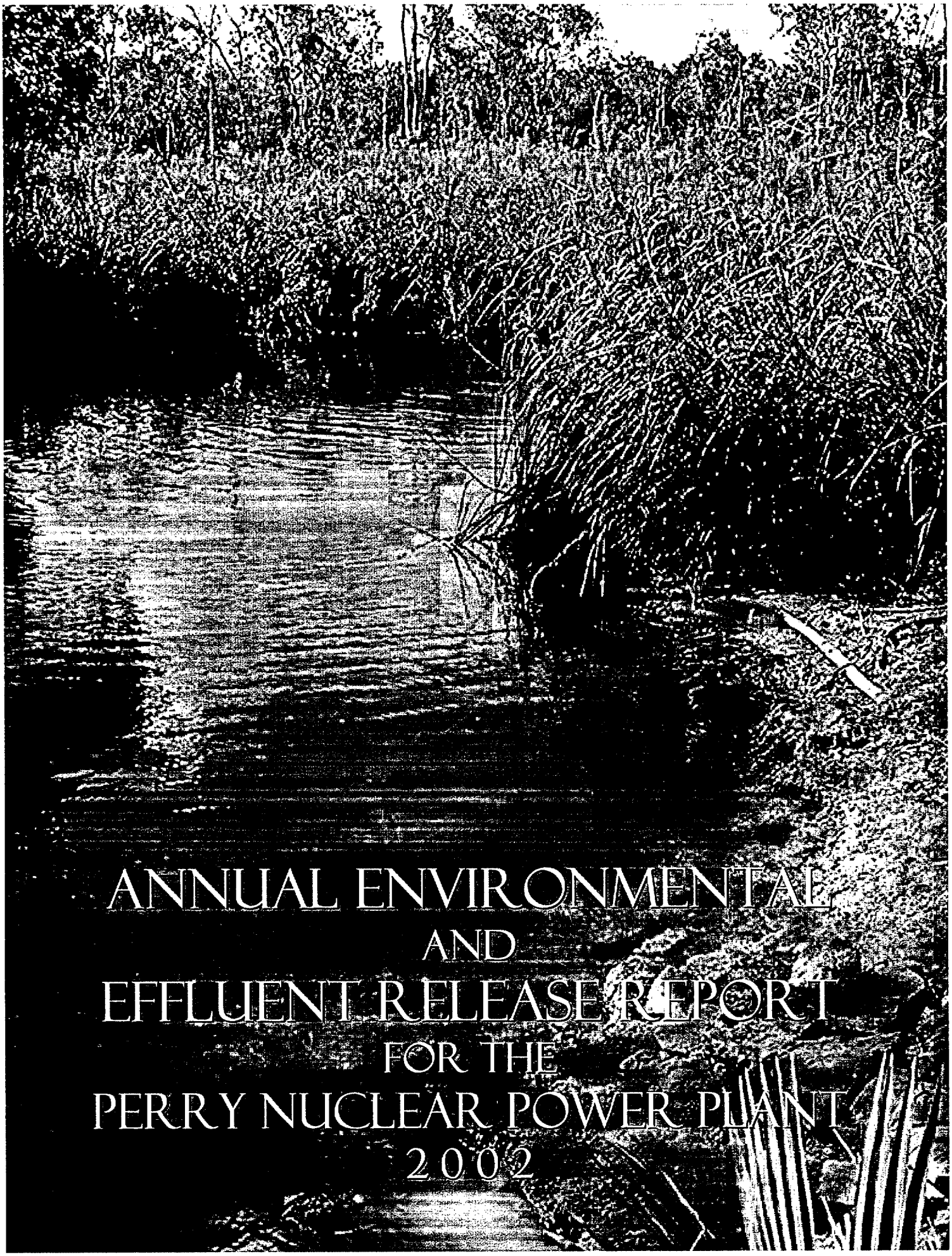

ANNUAL ENVIRONMENTAL AND EFFLUENT RELEASE REPORT FOR THE PERRY NUCLEAR POWER PLANT 2002

2002

ANNUAL ENVIRONMENTAL AND EFFLUENT RELEASE REPORT

for the Perry Nuclear Power Plant

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ANNUAL ENVIRONMENTAL AND EFFLUENT RELEASE REPORT

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, 2002. 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 2002, 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 1.68E-03 mrem (0.056 % of the applicable limit). The calculated hypothetical maximum individual whole body dose potentially received by an individual resulting from PNPP gaseous effluents was 7.46 E-03 mrem (0.15% of the applicable limit). The summation of the hypothetical maximum individual dose from effluents in 2002 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 2002, making shipments of solid radioactive waste to a licensed burial site.

During 2002, there were two (2) Offsite Dose Calculation Manual (ODCM) non-compliance conditions and one (1) abnormal release:

- The Liquid Radwaste to ESW Radiation Monitor, 0D17J0007, was declared inoperable (INOP) at 2110 on 07/14/02 due to a sticking flow meter. ODCM controls were entered. The monitor was not repaired and returned to service within 30 days. The cause in the delay is that the work order was not properly assigned a priority to ensure that it was repaired within 30 days. Work was completed on 09/12/02, and 0D17J0007 was declared OPERABLE on 09/12/02 at 1415. A corrective action was written to ensure these items are worked in a timely manner in the future.
- The radwaste discharge header high flow monitor was declared INOP on 12/2/02 due to a tractor gear on the recorder having a broken tooth. This repair was made within two days; however, the surveillance for the turbine flow meter (which provides the signal for the high flow monitor) became overdue and the parts necessary to perform that surveillance were not available. The monitor then remained INOP until the correct parts could be obtained. An Engineering Change Request was submitted to resolve the obsolete parts issues associated with this monitor.
- Cobalt 60 was detected in the filter set up for monitoring the Waste Abatement and Reclamation Facility (WARF) ventilation effluent. Radioactive materials are handled in the WARF;

therefore, the ventilation system is designed to filter and monitor the effluent to the environment to ensure that the potential for a release is minimized. During this event, the ventilation system was running; however, the installed air sampling radiation monitor was not in service. The ventilation system had been secured to allow for repairs made under a minor maintenance work order. This work order required post maintenance testing to verify that the system operated correctly. An alternate method using a portable goose neck type sampler had been set up to monitor the building atmosphere during this test. This alternate method did not monitor downstream of the ventilation's filtration system and therefore did not accurately analyze the air released to the environment. When the filter and cartridge were removed and analyzed, Cobalt 60 was detected. Conservative dose estimates were then made which assumed all of this activity was released with no credit taken for the filtration system. The hypothetical dose contributions from this event (refer to Table 13) conservatively demonstrated minimal dose consequence to the general public. Refer to Appendix D for meteorological data.

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.

There were over 3000 radioactivity analyses performed on the 1370 radiological environmental samples collected in 2002. 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 2002 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 2002 indicated concentrations of radioactivity similar to that found in previous years. Analyses of other terrestrial samples also detected concentrations of natural radioactivity similar to those observed in previous years, and indicated no build-up of radioactivity attributable to the operation of PNPP.

Aquatic monitoring included the collection and analyses of water, fish, and shoreline sediments. The 2002 analytical results for water and fish samples showed normal background radionuclide concentrations. The results of sediment sample analyses indicated that the annual average cesium radioactivity was similar to previous years for the control location. Cesium-137 activity was detected in seven (7) of the fourteen (14) samples collected and ranged from 151.14 pCi/kg to 3511.30 pCi/kg. The annual average Cesium-137 activity was 1095.92 pCi/kg at the indicator locations and 573.35 pCi/kg at the control location. The indicator value was high in comparison to the control location and values for the indicator in previous years due to a single sample taken at location #64 on 6/10/02. Mandated security measures resulted in the clearing and removal of trees and vegetation along fences and the shoreline. Until these areas had re-stabilized, the occurrence of

heavy rains washed some sediment downstream. On 6/10/02, the shoreline sample collected at location #64 of the northwest drain impoundment had a Cesium activity of 3511.3+/-117.2 pCi/kg. Six (6) follow-up samples were collected on 8/14/02 and resulted in Cs-137 activities ranging from <17.8 to 171 +/- 34 pCi/kg. Additional sampling activities had been performed in this area due to the detection of Cobalt 60 in this area in 1999 (Refer to Table 17, page 34 for results). This was an isolated incident due to the small amount of sediment found for the sample collected on 6/10/02 and the fact that all the confirmatory samples taken were below historical concentrations for indicator locations. The average Cs-137 radioactivity, excluding the 6/10/02 sample at location #64, for all locations was 512.2 pCi/kg and was within the maximum value of 864 pCi/kg established in 1981.

In 1999, a sediment sample of the northwest drain impoundment (sampling location #64) was analyzed to contain 62 pCi/kg of Cobalt-60. During 2002, 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 62.07 mrem/year and control locations averaged 59.81 mrem/year. In 2002, radiation dose in the area of PNPP was similar to the radiation dose measured at locations greater than ten (10) miles away from the Plant.

Based on these results, during 2002, 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. In recent years; however, it has been noted that tracts of land once used for farming are now being developed as mini industrial parks and residential housing tracts. This is reflected in the loss of available milking animals within a five mile radius of PNPP to support the Radiological Environmental Monitoring Program (REMP). For 2002, the predominant land use within the census area continues to be rural/agricultural.

CLAM/MUSSEL MONITORING

Clam and mussel shells can clog plant piping and components that use water from Lake Erie. For this reason, sampling for clams and mussels has been conducted in Lake Erie in the vicinity of PNPP since 1971. The monitoring is specifically for Corbicula (Asiatic clams), since their introduction into the Great Lakes, in 1981, and for Dreissena (zebra mussels), since their discovery in Lake Erie, in 1989. Since no Corbicula have ever been found at PNPP, routine Corbicula monitoring will provide early detection capability, when this pest species arrives at PNPP. The Dreissena program includes both monitoring and control and is directed at minimizing the mussel's impact on plant operation. As in past years, this program has successfully prevented Dreissena from causing any 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 May 8, 2002, the OEPA was notified that construction was necessary for modifications to the plant entrance to meet new NRC requirements. No permit modifications were required; however, the OEPA requested that an updated site map be forwarded when construction is completed.

On October 11, 2002, the OEPA was notified that construction would begin on upgrading the dechlorination system in November 2002. This notification was made in accordance with the site National Pollutant Discharge Elimination System (NPDES) Permit. The construction included changing the dechlorination chemical to sodium bisulfite and increasing the system capacity to meet new effluent limits effective in 2004.

On October 23, 2002, the OEPA was notified that construction was completed on the site entrance. An updated site map was included as requested in May 2002.

INTRODUCTION

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

RADIATION FUNDAMENTALS

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

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

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

RADIATION AND RADIOACTIVITY

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

Alpha Particles

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

Beta Particles

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

Gamma Rays

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

Interaction with Matter

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

UNITS OF MEASURE

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

Activity

Activity is the number of atoms in a material that decay per unit of time. Each time an atom decays, radiation is emitted. The curie (Ci) is the unit used to describe the activity of a material and indicates the rate at which the atoms are decaying. One curie of activity indicates the decay of 37 billion atoms per second. Smaller units of the curie are often used in this report. Two common units are the microcurie (μCi), one millionth of a curie, and the picocurie (pCi), one trillionth of a curie. The mass, or weight, of radioactive material, which would result in one (1) curie of activity, depends on the disintegration rate. For example, one gram of radium-226 is equivalent to one (1) curie of activity. It would require about 1.5 million grams of natural uranium, however, to equal one (1) curie.

Dose

Biological damage due to alpha, beta, and gamma radiation may result from the ionization caused by these types of radiation. Some types of radiation, especially alpha particles, which causes dense local ionization, can result in much more biological damage for the same energy imparted than does

gamma or beta radiation. Therefore, a quality factor must be applied to account for the different ionizing capabilities of various types of ionizing radiation. When the quality factor is multiplied by the absorbed dose, 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.

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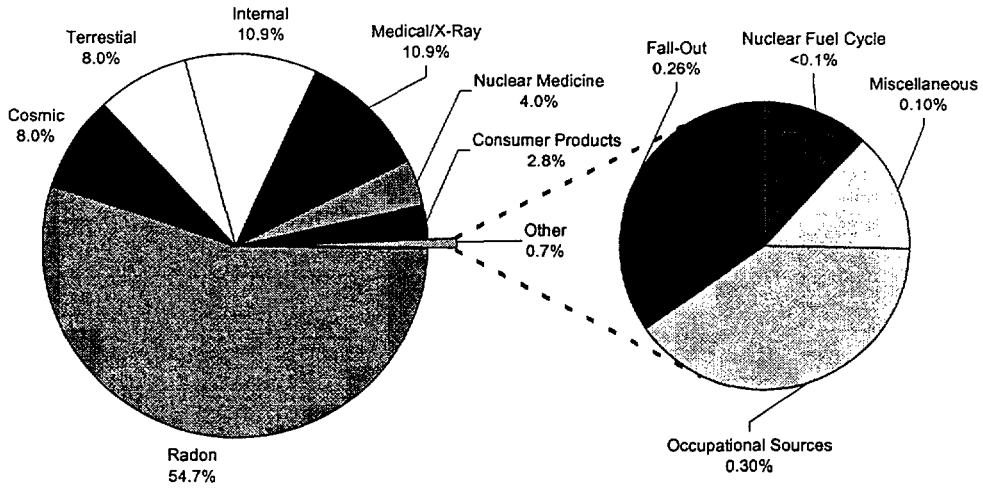
BACKGROUND RADIATION

Background radiation is a natural part of nature. Natural background radioactive decay occurs in the soil, water, air, and space. Common sources of radiation that contribute to the natural background radiation includes: the decay of radioactive elements in the earth's crust, a steady stream of high-energy particles from space (called cosmic radiation), naturally-occurring radioactive isotopes in the human body like Potassium-40, the decay of radioisotopes used in medical procedures, man-made phosphate fertilizers (phosphates and uranium are often found together in nature), fallout from nuclear weapons testing, and even household items like smoke detectors. In the United States, a person's average annual exposure from background radiation is 360 mrem, and is due to the sources shown in Figure 1 [Source: National Council on Radiation Protection and Measurements].

Figure 1: Sources of Background Radiation



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

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

Beryllium-7 and Potassium-40 are especially common in REMP samples. Since they are naturally occurring and are expected to be present, positive results for these radionuclides are not discussed

in the section for the 2002 Sampling Program results. These radionuclides are included; however, in Appendix A, 2002 Inter-Laboratory Cross-Check Comparison Program Results.

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RADIOACTIVE EFFLUENT RELEASES

INTRODUCTION

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

During the normal operation of a nuclear power plant, small amounts of radioactive material are released in the form of solids, liquids, and gases. PNPP was designed, and is operated in such a manner as to control and monitor these effluent releases. Effluents are controlled to ensure any radioactivity released to the environment is minimal and within 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 Radiological Environmental Monitoring Program (REMP) is described in detail in the next section.

Generation of solid waste is carefully monitored to identify opportunities for minimization. Limiting the amount of material taken into the plant, sorting material as radioactive or non-radioactive, 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 prescribes the maximum doses and dose rates due to radioactive effluents resulting from the operation of PNPP. These limits are defined in several ways to limit the over-all impact on persons living near the plant. Since there are

no other fuel sources near the PNPP, the 40CFR190 limits, which are described below, were not exceeded in 2002.

The 40CFR190 limit for total direct-radiation dose is 25 mrem. For 2002, the total whole body dose to a member of the general public, considering all sectors, was 5.4E-01 mrem. This value was determined by summing the annual whole body doses from liquid and gaseous radioactive effluents, the annual gaseous and liquid organ dose (refer to Table 8) and the maximum, direct-radiation dose. Since the direct radiation dose, as determined by TLD, was indistinguishable from natural background (refer to Figure 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.

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 2002.

Table 1: Liquid Batch Releases

	QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4	TOTAL
Number of batch releases	0	7	13	3	23
Total time period for batch releases, min	0	1.61E+03	4.28E+03	8.05E+02	6.70E+03
Maximum time for a batch release, min	0	2.37E+02	1.70E+03	2.90E+02	1.70E+03
Average time period for a batch release, min	0	2.29E+02	3.29E+02	2.68E+02	3.52E+02
Minimum time for a batch release, min	0	2.25E+02	1.01E+02	2.26E+02	1.01E+02
Average stream flow during periods of effluent release into a flowing stream, L/min	0	1.86E+05	2.28E+05	1.83E+05	1.99E+05

In addition to batch releases a continuous release may occur with the release of the Turbine Building Supply Plenum Drains. The moisture from the outside air is condensed and flows into a drain pan. During hot, humid months with low wind speed, the potential exists for some of the gaseous effluent exhaust from the plant to be recycled back into the plant through the Turbine Building Supply Plenums. Since the air from the plant gaseous effluents can contain Tritium, then the water in the exhaust plenums can also contain Tritium. One such continuous release did occur during the year with a duration of 39,374 minutes and a discharge volume of 1.49E6 liters. Tritium concentration for this release was 2.20E-6 μCi/ml.

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 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)	0	3.68E-04	3.79E-04	6.20E-04	1.00E+01
2. Average Diluted Concentration, µCi/mL *	0	1.71E-11	1.25E-11	3.33E-11	
3. Percent of Applicable Limit, %	0	N/A	N/A	N/A	
B. Tritium					
1. Total Released, Ci	0	9.76E+00	1.54E+01	4.85E+00	1.00E+01
2. Average Diluted Concentration, µCi/mL	0	1.76E-06	1.46E-06	1.02E-06	
3. Percent of Applicable Limit, %	0	1.76E-01	1.4E-01	1.02E-01	
C. Dissolved and Entrained Gases					
1. Total Released, Ci	0	<LLD	6.39E-05	<LLD	1.00E+01
2. Average Diluted Concentration, µCi/mL	0	<LLD	5.81E-12	<LLD	
3. Percent of Applicable Limit, %	0	<LLD	2.91E-06	<LLD	
D. Alpha Activity, Ci	0	<LLD	<LLD	<LLD	1.00E+01
E. Waste Volume Released, Liters (prior to dilution)	0	9.16E+05	1.63E+06	3.92E+05	1.00E+00
F. Dilution Water Volume Used, Liters	1.60E+10	2.15E+10	3.04E+10	1.86E+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.

- Average diluted concentrations are based on total volume of water released during quarter.

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

Table 3: Radioactive Liquid Effluent Nuclide Composition

	UNIT	QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4	ANNUAL TOTAL
Tritium	Ci	0	9.76E+00	1.54E+01	4.85E+00	3.00E+01
Chromium-51	Ci	0	<LLD	<LLD	<LLD	<LLD
Manganese-54	Ci	0	9.23E-05	<LLD	8.51E-05	1.77E-04
Iron-55	Ci	0	<LLD	<LLD	<LLD	<LLD
Cobalt-58	Ci	0	1.19E-05	2.01E-05	1.85E-05	5.05E-05
Cobalt-60	Ci	0	8.09E-05	1.76E-04	3.13E-04	5.70E-04
Zinc-65	Ci	0	<LLD	<LLD	2.91E-5	2.91E-5
Strontium-92	Ci	0	<LLD	<LLD	<LLD	<LLD
Zirconium-95	Ci	0	<LLD	<LLD	<LLD	<LLD
Rhuthenium-105	Ci	0	<LLD	<LLD	<LLD	<LLD
Silver-110m	Ci	0	1.35E-05	6.34E-05	7.81E-05	1.55E-04
Antimony-124	Ci	0	<LLD	2.52E-05	<LLD	2.52E-05
Antimony-125	Ci	0	1.08E-04	9.41E-05	<LLD	2.02E-04
Iodine-131	Ci	0	<LLD	<LLD	<LLD	<LLD
Xenon-133	Ci	0	<LLD	<LLD	6.39E-05	6.39E-05
Cesium-134	Ci	0	2.21E-05	<LLD	2.59E-05	4.80E-05
Cesium-137	Ci	0	4.01E-05	<LLD	6.97E-05	1.10E-04
Cesium-138	Ci	0	<LLD	<LLD	<LLD	<LLD
Lanthanum-140	Ci	0	<LLD	<LLD	<LLD	<LLD
Total for Period	**Ci**	0	**9.76E+00**	**1.54E+01**	**4.85E+00**	**3.00E+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	3.53E-01	2.83E+01	1.72E+01	2.22E+00	1.00E+01
2. Average Release Rate, µCi/sec	4.54E-02	3.59E+00	2.16E+00	2.79E-01	
3. Percent of Applicable Limit, %	N/A	N/A	N/A	N/A	
B. Iodine					
1. Total Iodine-131 Released, Ci	1.04E-04	2.54E-05	3.21E-04	1.29E-04	1.00E+01
2. Average Release Rate, µCi/sec	1.34E-05	3.23E-06	4.04E-05	1.62E-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	3.20E-05	5.06E-04	1.19E-04	<LLD	1.00E+01
2. Average Release Rate, µCi/sec	4.12E-06	6.44E-05	1.50E-05	<LLD	
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	1.45E+00	8.10E+00	2.05E-1	1.07E-01	1.00E+01
2. Average Release Rate, µCi/sec	1.86E-01	1.03E+00	2.58E-02	1.34E-02	
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	1.45E+00	8.10E+00	2.05E-01	1.07E-01	9.86E+00
Argon-41	Ci	<LLD	8.19E-03	<LLD	2.92E-03	1.11E-02
Krypton-85m	Ci	<LLD	2.22E-02	4.35E-02	1.40E-02	7.97E-02
Krypton-85	Ci	<LLD	8.84E-01	<LLD	<LLD	8.84E-01
Krypton-87	Ci	<LLD	3.71E-02	<LLD	4.68E-02	8.39E-02
Krypton-88	Ci	<LLD	3.92E-02	8.57E-03	4.04E-02	8.82EE-02
Xenon-131m	Ci	<LLD	6.50E-01	<LLD	2.58E-02	6.76E-01
Xenon-133m	Ci	<LLD	2.25E-01	2.78E-01	1.85E-03	5.05E-01
Xenon-133	Ci	5.28E-02	2.58E+01	1.29E+01	1.36E+00	4.01E+01
Xenon-135m	Ci	4.01E-02	4.20E-02	1.78E-01	3.08E-02	2.91E-01
Xenon-135	Ci	2.60E-01	3.53E-01	3.72E+00	3.65E-01	4.70E+00
Xenon-137	Ci	<LLD	<LLD	<LLD	1.48E-01	1.48E-01
Xenon-138	Ci	<LLD	1.73E-01	<LLD	1.88E-01	3.61E-01
Total for Period	**Ci**	**1.80E+00**	**3.64E+01**	**1.74E+01**	**2.33E+00**	**5.79E+01**
B. IODINE						
Iodine-131	Ci	1.04E-04	2.54E-05	3.21E-04	1.29E-04	5.79E-04
Iodine-132	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Iodine-133	Ci	6.65E-05	1.28E-06	5.90E-04	9.41E-04	1.60E-03
Iodine-134	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Iodine-135	Ci	<LLD	<LLD	9.07E-05	<LLD	9.07E-05
Total for Period	**Ci**	**1.70E-04**	**2.67E-05**	**1.00E-03**	**1.07E-03**	**2.27E-03**
B. PARTICULATE						
Manganese-54	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Cobalt-58	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Cobalt-60	Ci	<LLD	<LLD	2.00E-07	<LLD	2.00E-07
Rubidium-88	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Rubidium-89	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Strontium-89	Ci	2.18E-07	2.62E-06	<LLD	<LLD	2.84E-06
Strontium-90	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
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	<LLD	1.48E-06	<LLD	<LLD	1.48E-06
Cesium-138	Ci	3.18E-05	1.34E-04	<LLD	<LLD	1.66E-04
Barium-139	Ci	<LLD	3.68E-04	1.19E-04	<LLD	4.87E-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**	**3.20E-05**	**5.06E-04**	**1.19E-04**	**0.00**	**6.58E-04**

<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 2002. The solid radioactive waste summary in Table 6 includes 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.	14.5	900.1	+/- 25
Dry compressible waste, contaminated equipment, etc.	37.56	13.6	+/- 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-60 Zn-65 Ag-110m Cs-137 Ce-144	10.2 26.9 52.5 3.5 1.4 1.2 1.1	± 25
Dry Compressible Waste, Contaminated Equipment, etc.	Mn-54 Fe-55 Co-60 Zn-65 Ce-144	4.1 48.4 36.5 2.7 5.7	± 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, milk, vegetation, and fish. Because no one actually meets these criteria, the actual dose received by a real member of the public is significantly less than what is calculated for this hypothetical individual.

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

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

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

TYPE OF DOSE	ORGAN	ESTIMATED DOSE, mrem	LIMIT	% OF LIMIT
Liquid Effluent	Whole body	1.68E-03	3.0E+00	5.6E-02
	Liver	2.18E-03	1.0E+01	2.2E-02
Noble Gas - gamma air	N/A	1.27E-02	1.0E+01	1.3E-01
- beta air	N/A	3.50E-02	2.0E+01	1.8E-01
Noble Gas	Whole body	7.46E-03	5.0E+00	1.5E-01
	Skin	2.29E-02	1.5E+01	1.5E-01
Particulate & Iodine	Thyroid	7.77E-03	1.5E+01	5.2E-02

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	3.1E-01
	Thyroid	2.2E-01
Gaseous Effluent	Whole body	1.7E-03
	Thyroid	3.7E-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	1.68E-03	3.0E+00	5.6E-02
	Liver	2.18E-03	1.0E+01	2.2E-02
Noble Gas - gamma air	N/A	1.62E-03	1.0E+01	1.6E-02
- beta air	N/A	3.09E-03	2.0E+01	1.5E-02
Noble Gas	Whole body	9.41E-04	5.0E+00	1.9E-02
	Skin	2.57E-03	1.5E+01	1.7E-02
Particulate & Iodine	Thyroid	1.44E-03	1.5E+01	9.6E-03

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)	0E+00	0E+00
Second Quarter	6.5E-06	6.8E-06
Third Quarter	9.6E-06	1.1E-05
Fourth Quarter	2.4E-05	2.8E-05
Annual	4.0E-05	4.6E-05

(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	1.2E-04	2.0E-04
Second Quarter	8.0E-04	1.9E-03
Third Quarter	3.7E-04	1.2E-03
Fourth Quarter	7.5E-05	2.9E-04
Annual	1.3E-03	3.3E-03

An average whole body dose to individual members of the public at or beyond the site boundary is then determined by combining the dose from gaseous and liquid radiological effluents. The dose from gaseous radiological effluents is based upon the population that lives within 50 miles of PNPP (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	0.0E+00 (1)	4.5E-11
Second Quarter	3.2E-08	5.4E-10
Third Quarter	5.8E-09	8.3E-11
Fourth Quarter	3.7E-08	7.9E-11
Annual	1.3E-07	7.0E-10

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

ABNORMAL RELEASES

There was one abnormal radioactive release event, during 2002.

Cobalt 60 detected in the effluent of the Waste Abatement and Reclamation Facility

Radioactive materials are handled in the Waste Abatement Reclamation Facility (WARF), and the ventilation system is designed to filter and monitor the effluent to the environment and to ensure that the potential for a release is minimized. During this event, the ventilation system was running, however the installed air sampling radiation monitor was not in service. The ventilation system had been secured to allow for repairs made under a minor maintenance work order. This work order required post maintenance testing to verify that the system operated correctly. An alternate method using a portable goose neck type sampler had been set up to monitor the building atmosphere during this test. This alternate method did not monitor downstream of the ventilation's filtration system and therefore did not accurately analyze the air released to the environment. When the filter and cartridge were removed and analyzed Cobalt 60 was detected. Conservative dose estimates were then made which assumed all of this activity was released with no credit taken for the filtration system. The dose contributions from this event (refer to Table 13) had minimal dose consequence to the general public. Refer to Appendix D for meteorological data.

Table 13: Cobalt 60 detected in the effluent of the Waste Abatement and Reclamation Facility

		ORGAN	ESTIMATED DOSE, mrem	ANNUAL LIMIT	% OF LIMIT
Noble Gas	-air gamma	NA	1.46E-5	1.0E+01	1.5E-04
	-air beta	NA	1.86E-5	2.0E+01	9.3E-05
Noble Gas		Whole body	9.37E-6	5.0E+00	1.9E-04
		Skin	2.47E-5	1.5E+01	1.6E-04
Particulate & Iodine		Thyroid	8.12E-6	1.5E+01	5.4E-05

NON-COMPLIANCES

There were two (2) non-compliance to the ODCM Controls requirements in 2002:

The Liquid Radwaste to Emergency Service Water Radiation Monitor was inoperable greater than 30 days

The Liquid Radwaste to ESW Radiation Monitor, 0D17J0007, was declared inoperable at 2110 on 07/14/02 due to a sticking flow meter. Offsite Dose Calculation Manual (ODCM) controls were entered. The monitor was not repaired and returned to service within 30 days. The cause in the delay is that the work order was not properly assigned a priority to ensure that it was repaired within 30 days. Work was completed on 09/12/02, and 0D17J0007 was declared OPERABLE on 09/12/02 at 1415. A corrective action was written to ensure these items are worked in a timely manner in the future.

The Radwaste Discharge Header High Flow Monitor was inoperable greater than 30 days

This monitor was originally declared inoperable (INOP) on 12/2/02 due to a tractor gear on the recorder having a broken tooth. This repair was made within two days; however, the surveillance for the turbine flow meter (which provides the signal for the high flow monitor) was overdue and the parts necessary to perform that surveillance were not available. The monitor then remained INOP until the correct parts could be obtained. An Engineering Change Request was submitted to resolve the obsolete parts issues associated with this monitor.

OFFSITE DOSE CALCULATION MANUAL CHANGES

During this reporting period, there were three (3) changes and two (2) revisions to the Offsite Dose Calculation Manual:

Change 16

- Added dose factors for Sb-124 and Sb-125.
- Corrected typo for Au on Page 16; 1.0E+00 vs. 1.0E+01.

Change 18

- Revised the sample frequency of fish sampling to be 1 sample in season.
- Revised sampling requirements of fish sampling from one sample of each commercially and/or recreationally important species to 1 sample of 1 commercially and/or recreationally important species.

- Added reference to Generic Letter 89-01, Supplement No. 1.

Change 19

- Corrected reference to Generic Letter on page 189. Previous change stated Generic Letter, 890, Supplement No. 1 when it is actually Generic Letter 89-01, Supplement No. 1.

Revision 6

- This revision incorporates all applicable changes since the previous revision.
- Changed "total body" to "whole body" to agree with TS Amendment 120.
- Corrected numerous typos throughout the document.
- Changed "maximum permissible concentration" to "limiting effluent concentration" where missed in previous changes.
- Relocated titles for Figures 5.1-1, 5.1-2, and 5.1-3 to top of page.
- Reformatted (style and font) various formulas and tables throughout document for clarity.
- Clarified terms in ESW setpoint calculation to eliminate confusion.
- Revised ODCM Control Tables 3.3.7.9-1 and 4.3.7.9-1 to include the individual heat exchanger (HX) flow monitors and pump curves as acceptable alternate channels.
- Relocated Figure 2.1-1 to Section 2.1 to be closer to its reference.

Revision 7

- Revised to establish the drains from the Turbine Building Supply Plenums as a release point when they are not lined up to radwaste.
- Establish the sampling and analysis criteria for the Turbine Building Supply Plenums.

PROCESS CONTROL PROGRAM CHANGES

During 2002, there was one (1) change to the Process Control Program:

- Corrected numerous administrative deficiencies throughout including renumbering of steps, corrections of typos and removal of the requirement for PORC review.

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.

SAMPLING LOCATIONS

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

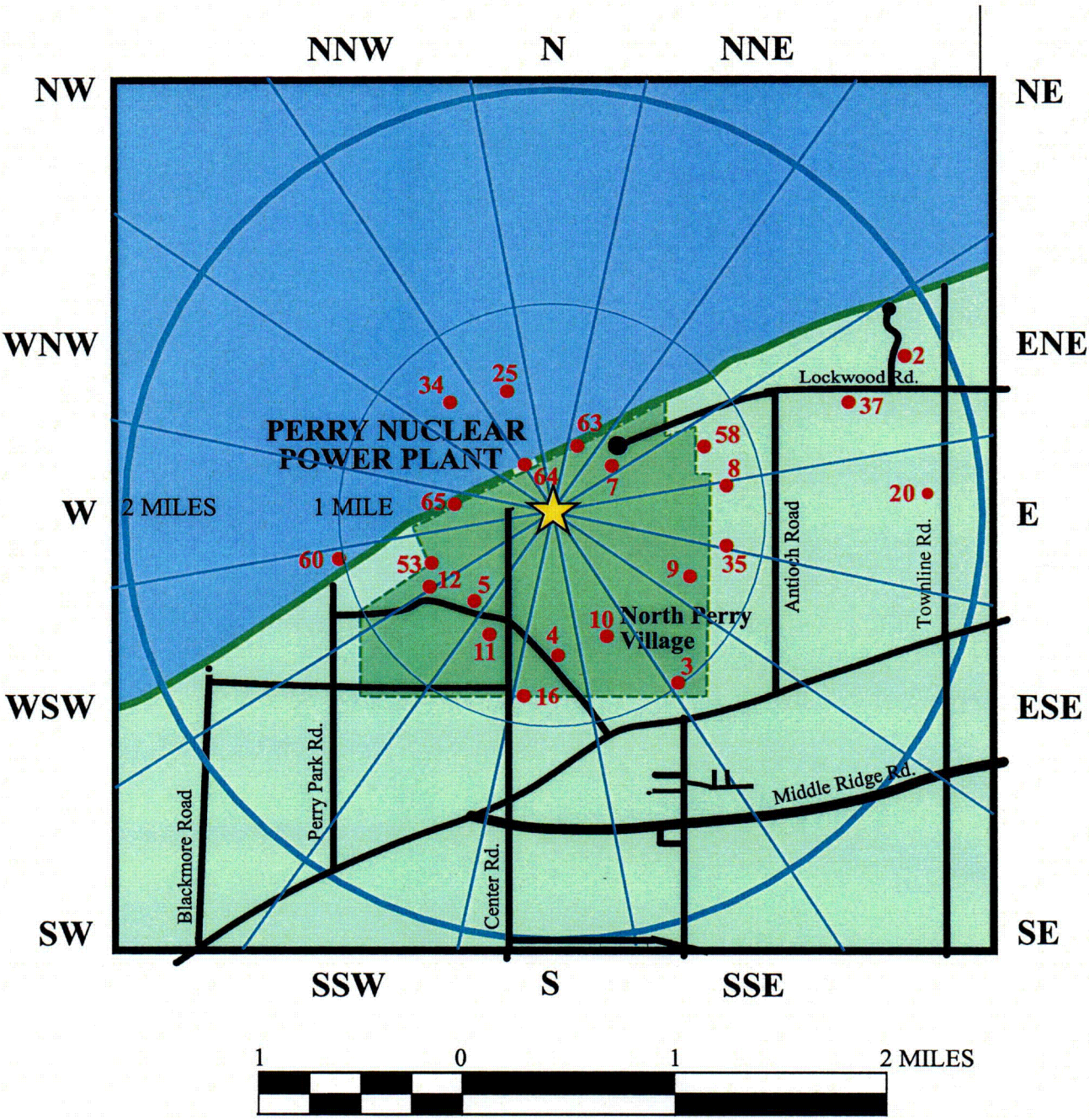
Table 14: REMP Sampling Locations (1)

Location #	Description	Miles	Direction	Media(2)
1	**Chapel Road**	**3.4**	**ENE**	**TLD, AIP**
2	**Kanda Garden**	**1.9**	**ENE**	**Food Products**
3	**Meteorological Tower**	**1.0**	**SE**	**TLD, AIP**
4	**Site Boundary**	**0.7**	**S**	**TLD, AIP**
5	**Quincy Substation**	**0.6**	**SW**	**TLD, 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.

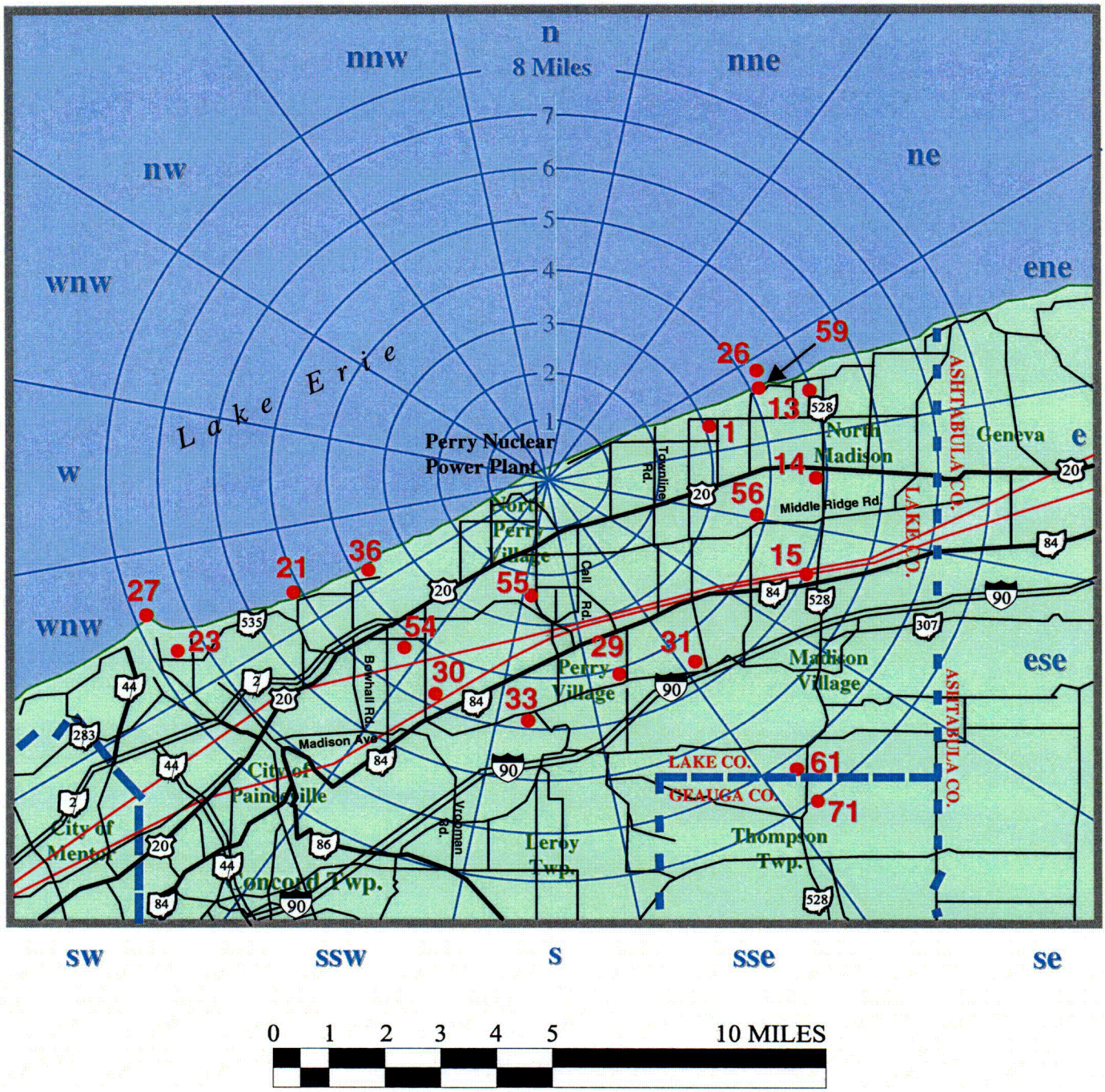
(2) AIP = Air, Iodine and Particulate
Veg = Vegetation
TLD = Thermoluminescent Dosimeter

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



C01

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



C02

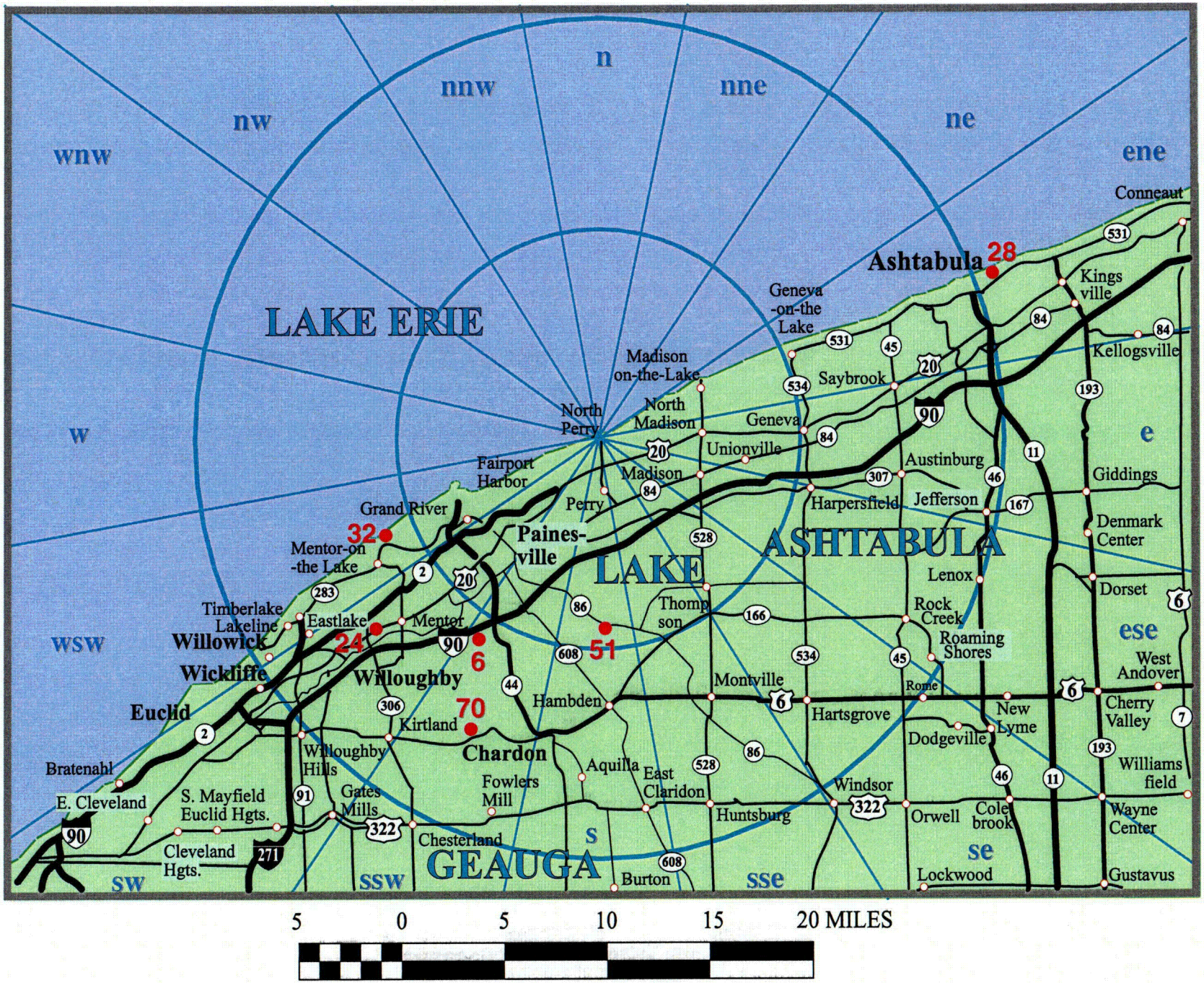


Figure 4: REMP Sampling Locations Greater Than Eight Miles from the Plant Site

C03

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 15 provides a list of the analyses performed on environmental samples collected for the PNPP REMP in 2002.

Sample results are often reported as less than the lower limit of detection (< LLD), which is defined as the smallest amount of radioactive material that will show a positive result for which there can be confidence that radioactivity is present. This statistical parameter is used as a measure of the sensitivity of a sample analysis. When a measurement is reported as < LLD, it means that no radioactivity was detected at a value above, or equal to the appropriate ODCM table value. The NRC has established LLD values for REMP sample analyses. The vendor laboratory for REMP sample analyses complied with those values in 2002.

Table 15: REMP Sample Analyses

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

2002 SAMPLING PROGRAM

The contribution of radionuclides to the environment resulting from PNPP operation is assessed by comparing results from the 2002 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, 2002 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 2002.

Program Changes

In 2002, the Fish Sampling Program was revised. These revisions included changing the collection frequency from biannual to annual and reducing the number of species collected per location, from one (1) of each available commercial/sport species to one (1) commercial/sport species.

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 16 provides information on samples missed during 2002.

Table 16: Missed REMP Samples in 2002

MEDIA	LOCATION	DATE	REASON
Food Products	All	April, May, June 2002	Vegetables not ready for harvest
Lake Water	59	12/26/02	Sample unavailable due to frozen shoreline
Lake Water	60	12/26/02	Sample unavailable due to frozen shoreline
Milk	61	January, February, March, November, December	Drying period for goats
Milk	51	11/4/02	Participant unable to provide sample
TLD (Quarterly)	58	10/2/02	TLD contained too much moisture. Vendor lab was unable to analyze.

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 feet per minute. The air is drawn through glass fiber filters (to collect particulate material) and a charcoal cartridge (to adsorb Iodine). The samples are collected on a weekly basis, 52 weeks a year, from each of 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 January 09, 2002, location # 7 experienced such a power loss, requiring the replacement of a malfunctioning power strip used to provide power to the sample pump. At the time of discovery (during normal weekly collection) it was determined that the sample pump had run 148 out of the normal 168 hour collection period before loosing power. The sample collected was sufficient to provide the required analytical results.

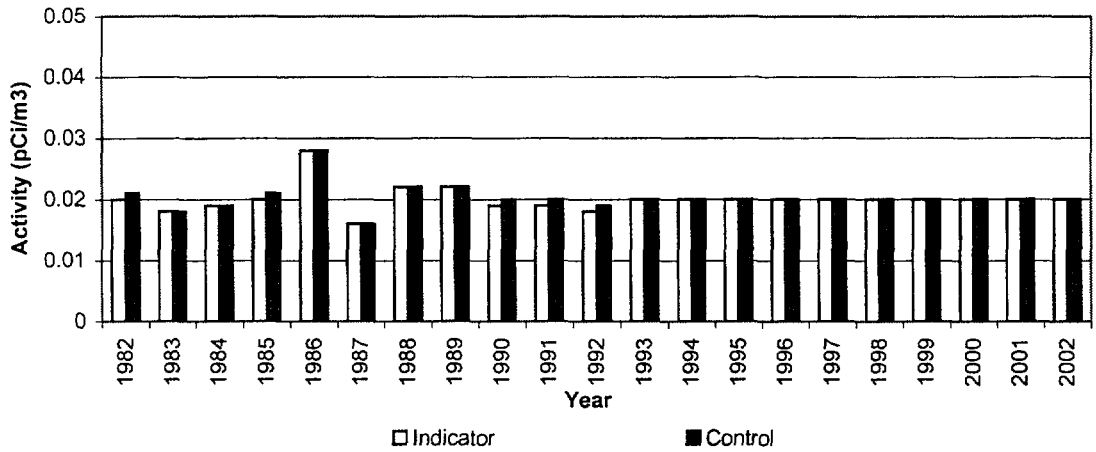
Air samples are analyzed weekly for gross beta activity and radioiodine activity. The air samples are also analyzed by gamma spectral analysis quarterly. A total of 364 for air particulate and 364 air radio-Iodine samples were collected and analyzed in 2002.

Gross beta activity was detected in all air samples and ranged up to 0.04 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 2002 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.

In addition to normal air sampling activities, sample station #3 was used to support the collection of Tritium (H-3) samples in support of the investigation of Tritium activity found in the turbine building supply plenum drains. A dehumidifier was installed and the collected water samples analyzed for H-3. No Tritium activity was detected in any of the samples collected.

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 that are located between 7.4 and 9.6 miles away from the plant. 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 50 milk samples were collected in 2002. 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.

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 sixty six (66) food product samples were collected and analyzed by gamma spectral analysis in 2002. 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 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.

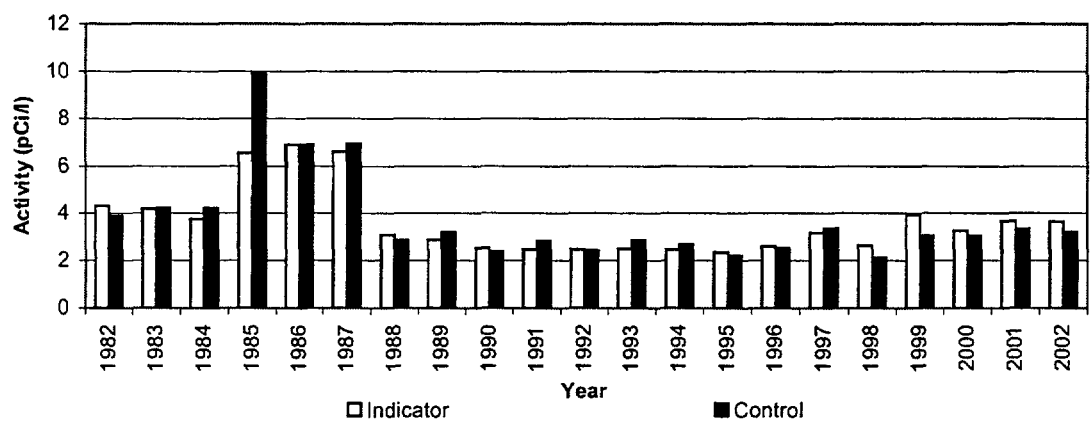
Water

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-eight (58) water samples were collected and analyzed for gross beta activity and gamma spectral analysis in 2002. 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-eight (58) samples collected. The detectable (i.e., above the lab LLD value) gross beta activity ranged from 3.09 pCi/L to 5.24 pCi/L. Referring to Figure 6, the annual average gross beta activity was 3.62 pCi/L at the indicator locations and 3.17 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



There were no radionuclides detected by gamma spectral analysis above the LLD. Tritium was not detected above the LLD value in any of the eighteen (18) samples analyzed. These results are well within the range of those measured in previous years, which have ranged from below the LLD to 2,200 pCi/L.

Sediment

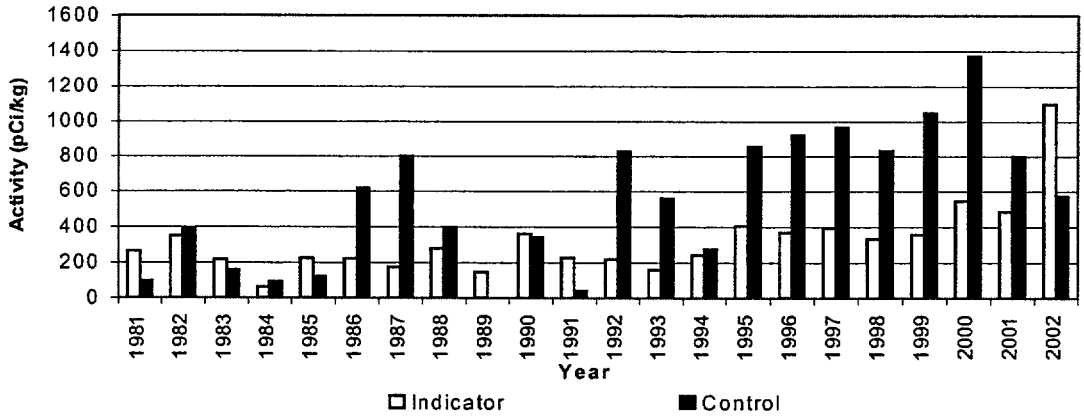
Sampling lake bottom sediments can provide an indication of the accumulation of particulate radionuclides which may lead to internal exposure to humans through the ingestion of fish, the re-suspension into drinking water, or as an external radiation source to fishermen and swimmers from shoreline exposure. 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. Shoreline samples are collected using a scoop. Fourteen (14) sediment samples were collected in 2002 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 seven (7) of the fourteen (14) samples collected and ranged from 151.14 pCi/kg to 3511.30 pCi/kg. The annual average Cesium-137 activity was 1095.92 pCi/kg at the indicator locations and 573.35 pCi/kg at the control location. The indicator value was high in comparison to the control location and values for the indicator in previous years due to a single sample taken at location #64 on 6/10/02. Mandated security measures resulted in the removal clearing and removal of trees and vegetation along fences and the shoreline. Until these areas had re-stabilized, the occurrence of heavy rains washed some sediment downstream. On 6/10/02, the shoreline sample collected at location #64 of the northwest drain impoundment had a Cesium activity of 3511.3+/-117.2 pCi/kg. Six (6) follow-up samples were collected on 8/14/02 and resulted in Cs-137 activities ranging from <17.8 to 171 +/- 34 pCi/kg (Refer to Table 18, page 34 for results). Additional sampling activities had been performed in this area due to the detection of Cobalt 60 in this area in 1999 (Refer to Table 17, page 33 for results). This was an isolated incident due to the small amount of sediment found for the sample collected on 6/10/02 and the fact that all the confirmatory samples taken were below historical concentrations for indicator locations. The average Cs-137 radioactivity, excluding the 6/10/02 sample at location #64, for all locations was 512.2 pCi/kg and was within the maximum value of 864 pCi/kg established in 1981. 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



In 1999, a sediment sample from location #64 (shoreline discharge point of the northwest drain impoundment) was found to contain trace levels of Cobalt-60. Ten (10) additional sample locations were established upstream from location #64 and within the impoundment to identify the boundary of the Cobalt-60 activity and to support supplemental monitoring activities. For 2002, sampling activities were performed and Cobalt-60 activity ranged from <19.5 pCi/kg to 203 +/- 34 pCi/kg. On 6/10/02, Cobalt-60 was detected again at location #64 with a value of 101.16 pCi/kg. The elevated levels can be attributed to the same reasons discussed previously for the elevated Cesium. Backup sampling performed on 8/14/02 did not detect any other Cobalt activity.

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

Location	06/10/02	8/14/02	9/30/02	10/07/02
64	101.16 ± 33.76		< 6.95	
64-A		<17.9		
64-B		<18.1		
64-C		<10.2		
64-D		<17.9		
64-E		<27.1		
64-F		<27.5		
64-1	<23.1			<16.1
64-2	<38.1			<24.9
64-3	63 ± 32			174 ± 38
64-4	*			*
64-5	<19.5			*
64-6	<25.6			<51.9
64-7	137 ± 28			98 ± 21
64-8	73 ± 40			66 ± 12
64-9	187 ± 44			112 ± 17
64-10	203 ± 34			100 ± 15

* *No sample available or insufficient sample for analysis*

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

Location	06/10/02	8/14/02	9/30/02	10/07/02
64	3511.3 ± 117.2		19.7 ± 7.1	
64-A		<23.8		
64-B		<22.6		
64-C		<17.8		
64-D		<18.7		
64-E		171 ± 34		
64-F		<24.7		
64-1	167 ± 16			60 ± 34
64-2	545 ± 56			536 ± 20
64-3	992 ± 61			6294 ± 107
64-4	*			*
64-5	<24.4			*
64-6	1655 ± 51			1546 ± 63
64-7	1279 ± 80			833 ± 50
64-8	500.9 ± 48			1658 ± 38
64-9	1374 ± 73			1226 ± 45
64-10	1329 ± 71			625 ± 24

** No sample available or insufficient sample for analysis*

Fish

Fish are analyzed primarily to quantify the dietary radionuclide intake by humans, and secondarily to serve as indicators of radioactivity in the aquatic ecosystem. Fish are collected from two locations, annually during the fishing season as required by the ODCM. An important sport or commercial species is targeted, and only the fillets are sent to the laboratory for analysis. In 2002, fish sampling was performed for PNPP by a local licensed sport fisherman.

Three (3) fish samples representing both yellow perch and smallmouth bass species were collected and analyzed by gamma spectral analysis in 2002. As expected, naturally occurring Potassium-40 was found in all samples. No other radionuclides were detected above the LLD.

Direct Radiation Monitoring

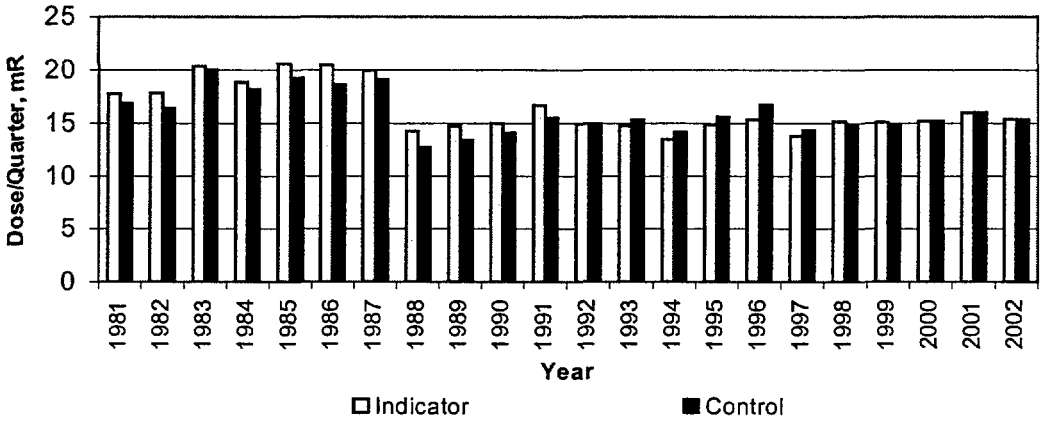
Thermoluminscent Dosimeter (TLD)

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 2002. This includes 223 of 224 collected on a quarterly basis and all twenty-eight (28) collected annually. Annual TLDs are not required per the ODCM and are used for supplemental data only. During the 3rd quarter collection of TLDs on 10/02/02, all quarterly TLDs were collected. However, one (1) of the two (2) TLDs collected at location #58 had become excessively wet between collection periods and could not be analyzed by the vendor laboratory.

In 2002, the annual average dose for all indicator locations was 62.07 mrem, and 59.81 mrem for all control locations. Referring to Figure 8, the average quarterly dose for all indicator locations was 15.33 mrem, and 15.35 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.

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. 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. Elevated Cesium-137 and Cobalt-60 was detected in one sediment sample at location #64 and can be attributed to concentrated levels due to vegetation loss and subsequent soil erosion and is considered to be an isolated incident. The annual concentrations excluding this sample were similar to those measured in previous years.

Finally, direct radiation measurements are consistent with past data.

INTER-LABORATORY CROSS-CHECK COMPARISON PROGRAM

Introduction

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

The EPA's program is 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).

Conclusion

Appendix A, 2002 Inter-Laboratory Cross-Check Comparison Program Results, includes results from both the above referenced programs and the ERA Company cross-check program. Two (2) samples were determined to be outside the ERA program control limits: one (1) sample was analyzed for Tritium (H-3) and one (1) for Cs-134. The Tritium measurement was confirmed by reanalysis. The control limits for the Cs-137 sample could not be met by the Vendor Laboratory and no problems with the analysis were identified. The ERA Company acknowledged that a high percentage of laboratories had failed this particular analysis and questioned its own limits. The Vendor's Laboratory cross-check testing of Thermoluminescent Dosimetry failed to meet the control limits due to its placement (cm) in relationship to the source. Referring to the In-house "blank" samples, one (1) milk sample analyzed for Sr-90 was found to be outside the program control limits. Low levels of Sr-90 remain in the environment and concentrations of (1-5 pCi/l) found in milk is not unusual. For the MAPEP Program, one (1) water sample analyzed for Fe-55 initially failed to meet the LLD due to its initial normal laboratory count time of 55 minutes. To meet the LLD it was re-counted for a longer period. One (1) water sample analyzed for Pu-238 was included as a "false positive" with no activity expected and yielded a confirmed analysis of 1.5 +/- 3.0 pCi/g. In the ERL program, four (4) air samples and three (3) soil samples were identified to be outside their control limits. The four (4) air samples initially failed their analyses due to conversion errors. Recalculations confirmed that the analyses were within the accepted criteria. Initial analysis of two (2) soil samples failed to meet the accepted criteria. After three (3) analyses, the Pu-239/40 soil sample was confirmed with an average result of 14.1 +/- 5.7 Bq/kg. The Uranium soil sample

measurement was confirmed by reanalysis. The remaining soil sample analyzed for Bi-214 was determined to be 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 2002 Land Use Census, which was conducted July 29th and 30th, provided the garden, residence and milk animal locations tabulated in Tables 19, 20 and 21 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. In recent years however, it has been noted that tracts of land once used for farming are now being developed as mini industrial parks and residential housing tracts. This is reflected in the loss of available milking animals within a five mile radius of PNPP to support the Radiological Environmental Monitoring Program (REMP). The 2002 Land Use Survey used the 1999 survey map produced by the Commercial Survey Co. of Cleveland. GPS units are used for more accurate location identification.

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 2002, there are two (2) changes noted for the "nearest residence". In the NE sector, the first change identifies the construction of a new home that replaces an existing one damaged by fire, and in the SSE where a new home has been built on a vacant lot.

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	4247 Parmly	1.1	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	1.3	4.98E-07	9
WSW	3462 Parmly	1.1	8.67E-07	10

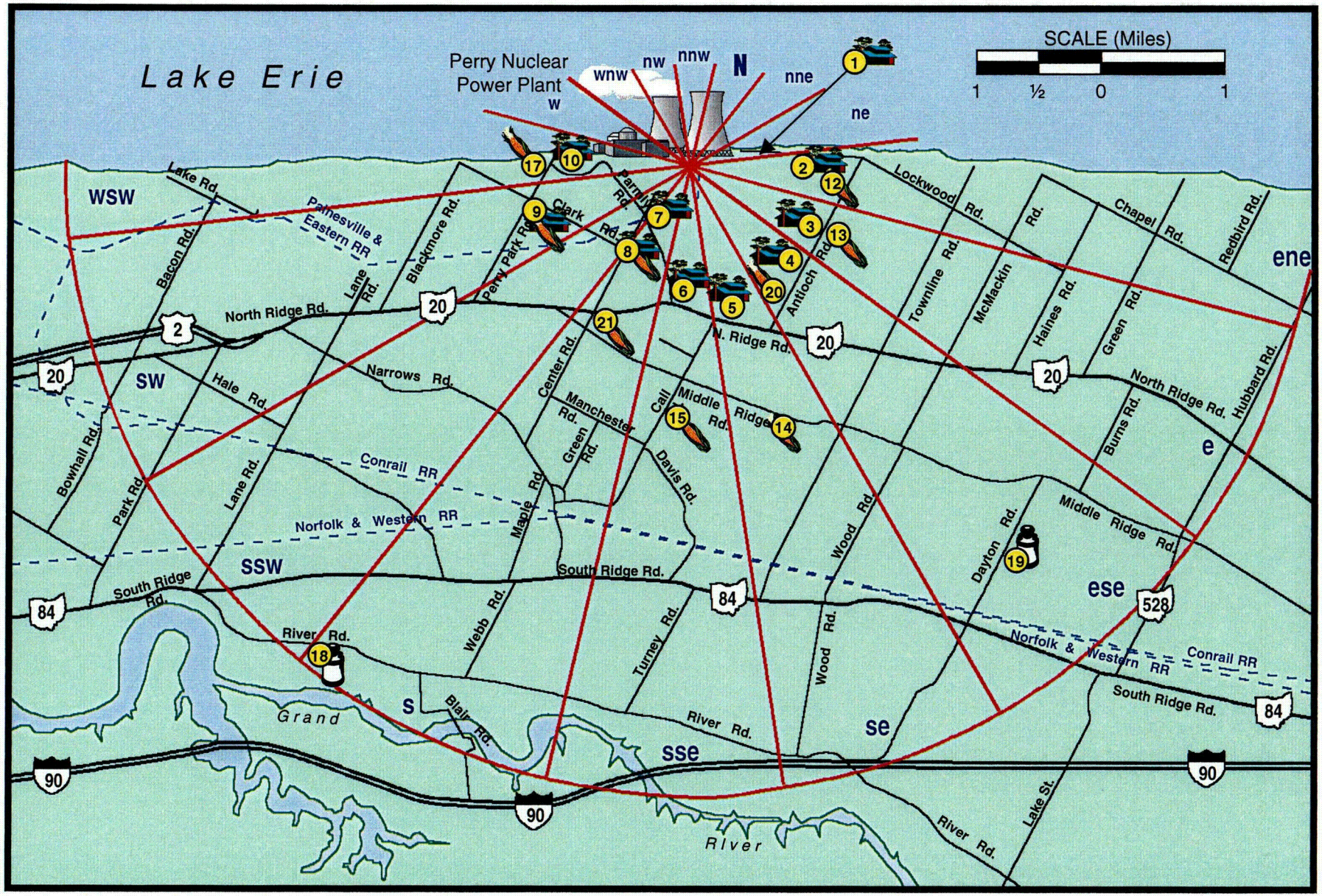


Figure 9: Land Use Census Map

C04

During the 2002 Land Use Census, no changes were identified regarding the nearest milk animal. However, the new goat identified to exist in the ESE sector in October 2001and thought be ready for milking in the Spring 2002, was not. These locations 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 four (4) changes in the nearest gardens recorded during this year's census. One of these changes includes the loss of the "long standing" garden in the NE sector. This change coincides with the fire and new home construction at the same address. 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	No gardens available	N/A	1.76E-08	N/A
ENE	2382 Antioch	1.1	2.08E-09	12
E	2601 Antioch	1.1	1.32E-08	13
ESE	2864 Antioch	1.1	3.96E-09	20
SE	5021 Middle Ridge	2.2	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	1.3	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 2002 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 2002, 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: 2002 Corbicula Monitoring

DATE	SAMPLE LOCATION	DATE	SAMPLE LOCATION
01/19/02	Condenser Manways	06/01/02	Low Pressure Condenser
01/21/02	Nuclear Closed Cooling Heat Exchanger (HX) B	06/14/02	Fire Water 0P54-C0003 Pump Discharge
01/21/02	Nuclear Closed Cooling HX B	08/12/02	Service Water Valve 0P41-F0010A
01/29/02	Fire Water Valve 1P54-F0869	08/15/02	Service Water Valve 0P41-F0010B
02/27/02	Nuclear Closed Cooling HX A	08/19/02	Service Water Valve 0P41-F0010C
05/01/02	Makeup Water Pretreat Valve 0P20-F0105C	08/19/02	Turbine Building Closed Cooling HX A
05/07/02	Emergency Service Water Bays	08/21/02	Piping Downstream of 0P41-F0010D
05/21/02	Emergency Service Water Intake	09/15/02	Auxiliary Condenser 1N61B0001A
05/28/02	Service Water Bays		

Conclusions

The sample collected in June, 1987, was the only indication of Corbicula in the vicinity of PNPP. Although the presence of Corbicula was detected at the Eastlake Power Plant, it has not been demonstrated that their presence has created any operational problems there, or at PNPP. As in the past, the 2002 monitoring program did not identify Corbicula in any sample collected.

DREISSENA PROGRAM

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

Monitoring

In addition to visually inspecting the plant's raw water systems when they are opened for maintenance or repair, monitoring methods include the use of commercial divers, 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. Side-stream 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 side-stream monitors are fitted with slides and inspected for veliger settlement. In 2002, a plankton net was used on a limited basis to help trend veligers during the spawning season and samples from the side-stream monitors were filtered and evaluated.

Treatment

Chemicals used for mussel control in 2002 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 or sodium bisulfite is added at the plant discharge structure for dechlorination prior to return 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 2002 was alkyl-dimethyl-benzyl-ammonium chloride. One treatment was applied in September, 2002. 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 >97%. 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 2002, five (5) general herbicide requests were initiated for chemical applications. Each application was in compliance with the Ohio Environmental Protection Agency's rules and regulations. There were no adverse environmental impacts observed during weekly site environmental inspections as a result of these applications. The herbicides approved for use in the Owner-Controlled Area are Round-Up, Snapshot, Oust, Karmex, Garlon 4 and Glypro Plus. For each application, the type of weed to be treated dictated the herbicide and concentration to be used. Table 23 provides detailed documentation for each application in 2002. The volume represents the quantity of herbicide applied, after any dilution.

Table 23: 2002 Herbicide Applications

Application Date	Location	Area sq ft	Volume gals/lb	Chemical Conc.	Chemical Name
04/06/02	Graveled areas/landscape beds located within the Owner Controlled Area	65,000	40 lb	100%	Snapshot
04/10/02	Graveled areas/landscape beds located within the Owner Controlled Area	78,000	15 lb	100%	Snapshot
04/11/02	Graveled areas/landscape beds located within the Owner Controlled Area	50,000	10 lb	100%	Snapshot
04/15/02	Graveled areas/landscape beds located within the Owner Controlled Area	60,000	5 gal	1.6%	Roundup
04/15/02	Graveled areas/landscape beds located within the Owner Controlled Area	10,000	5 lb	100%	Snapshot
04/16/02	Graveled areas/landscape beds located within the Owner Controlled Area	14,000	1 lb	100%	Snapshot
04/16/02	Graveled areas/landscape beds located within the Owner Controlled Area	35,000	3 gal	2.3%	Roundup
04/16/02	Graveled areas/landscape beds located within the Protected Area	42,000	5 lb	100%	Snapshot
04/18/02	Graveled areas/landscape beds located within the Owner Controlled Area	17,000	1 lb	100%	Snapshot
04/22/02	Graveled areas/landscape beds located within the Owner Controlled Area	17,000	2 lb	100%	Snapshot
04/29/02	Graveled areas/landscape beds located within the Owner Controlled Area	124,000	2 lb	100%	Snapshot
05/06/02	Graveled areas/landscape beds located within the Protected Area	5,000	25 gal	2.3%	Roundup
05/15/02	Graveled areas/landscape beds located within the Owner Controlled Area	175,000	4 gal	2.3%	Roundup
05/15/02	Graveled areas/landscape beds located within the Protected Area	205,000	20 gal	2.3%	Roundup
05/19/02	Graveled area within the Security Perimeter Fence	58,500	200 gal	2.3%	Roundup
05/20/02	Graveled areas/landscape beds located within the Protected Area	110,000	3 gal	2.3%	Roundup
05/21/02	Graveled areas/landscape beds located within the Owner Controlled Area	270,000	37 gal	2.3%	Roundup
05/28/02	Graveled areas/landscape beds located within the Protected Area	175,000	75 gal	2.3%	Roundup
06/03/02	Graveled areas/landscape beds located within the Owner Controlled Area	176,000	50 gal	2.3%	Roundup
06/04/02	Perry Transmission Yard	618,840	905 gal	0.9%	Karmex & Oust
06/05/02	Graveled areas/landscape beds located within the Owner Controlled Area	210,000	50 gal	2.3%	Roundup
06/10/02	Graveled areas/landscape beds located within the Protected Area	185,000	25 gal	2.3%	Roundup
06/12/02	Graveled areas/landscape beds located within the Owner Controlled Area	227,000	25 gal	2.3%	Roundup
06/17/02	Graveled areas/landscape beds located within the Owner Controlled Area	217,000	50 gal	2.3%	Roundup
06/24/02	Graveled areas/landscape beds located within the Protected Area	215,000	50 gal	2.3%	Roundup
07/01/02	Graveled areas/landscape beds located within the Owner Controlled Area	287,000	50 gal	2.3%	Roundup
07/03/02	Graveled areas/landscape beds located within the Owner Controlled Area	210,000	15 gal	2.3%	Roundup
07/09/02	Graveled areas/landscape beds located within the Owner Controlled Area	950	1 gal	2.3%	Roundup

Application Date	Location	Area sq ft	Volume gals/lb	Chemical Conc.	Chemical Name
07/15/02	Graveled areas/landscape beds located within the Owner Controlled Area	1,500	9 gal	2.3%	Roundup
07/15/02	Graveled areas/landscape beds located within the Protected Area	2,500	25 gal	2.3%	Roundup
07/22/02	Graveled areas/landscape beds located within the Protected Area	185,000	50 gal	2.3%	Roundup
07/29/02	Graveled areas/landscape beds located within the Owner Controlled Area	205,000	50 gal	2.3%	Roundup
07/29/02	Fence perimeter, inspection trails, FTG dikes, and barrel storage areas	100	0.5 gal	20%	Garlon
07/29/02	Fence perimeter, inspection trails, FTG dikes, and barrel storage areas	1,500	12 gal	5%	Accord
07/29/02	Fence perimeter, inspection trails, FTG dikes, and barrel storage areas	100	0.5 gal	50%	Accord
07/30/02	Fence perimeter, inspection trails, FTG dikes, and barrel storage areas	100	0.5 gal	20%	Garlon
08/05/02	Graveled areas/landscape beds located within the Protected Area	320,000	75 gal	2.3%	Roundup
08/05/02	Fence perimeter, inspection trails, FTG dikes, and barrel storage areas	100	0.25 gal	50%	Accord
08/07/02	Graveled areas/landscape beds located within the Owner Controlled Area	25,000	1 gal	2.3%	Roundup
08/07/02	Fence perimeter, inspection trails, FTG dikes, and barrel storage areas	100	0.25 gal	50%	Accord
08/08/02	Fence perimeter, inspection trails, FTG dikes, and barrel storage areas	100	0.25 gal	50%	Accord
08/12/02	Graveled areas/landscape beds located within the Protected Area	205,000	50 gal	2.3%	Roundup
08/12/02	Fence perimeter, inspection trails, FTG dikes, and barrel storage areas	18,225	15 gal	8%	Glypro
08/12/02	Fence perimeter, inspection trails, FTG dikes, and barrel storage areas	250	0.25 gal	50%	Accord
08/13/02	Fence perimeter, inspection trails, FTG dikes, and barrel storage areas	250	0.25 gal	50%	Accord
08/14/02	Fence perimeter, inspection trails, FTG dikes, and barrel storage areas	250	0.25 gal	50%	Accord
08/15/02	Graveled areas/landscape beds located within the Owner Controlled Area	197,000	50 gal	2.3%	Roundup
08/15/02	Fence perimeter, inspection trails, FTG dikes, and barrel storage areas	300	0.5 gal	50%	Accord
08/19/02	Graveled areas/landscape beds located within the Protected Area	197,000	50 gal	2.3%	Roundup
08/20/02	Fence perimeter, inspection trails, FTG dikes, and barrel storage areas	32,683	27 gal	5%	Karmex
08/26/02	Graveled areas/landscape beds located within the Owner Controlled Area	45,000	2 gal	2.3%	Roundup
08/26/02	Graveled areas/landscape beds located within the Protected Area	192,000	50 gal	2.3%	Roundup
08/29/02	Graveled areas/landscape beds located within the Owner Controlled Area	110,000	6 gal	2.3%	Roundup
09/03/02	Graveled areas/landscape beds located within the Owner Controlled Area	202,000	50 gal	2.3%	Roundup
09/09/02	Graveled areas/landscape beds located within the Owner Controlled Area	135,000	4 gal	2.3%	Roundup
09/09/02	Graveled areas/landscape beds located within the Protected Area	204,000	50 gal	2.3%	Roundup
10/01/02	Graveled areas/landscape beds located within the Owner Controlled Area	242,000	50 gal	2.3%	Roundup
10/02/02	Graveled areas/landscape beds located within the Protected Area	187,000	25 gal	2.3%	Roundup
10/06/02	Graveled areas/landscape beds located within the Owner Controlled Area	9,100	100 gal	2.3%	Roundup
10/28/02	Graveled areas/landscape beds located within the Owner Controlled Area	100,000	25 gal	2.3%	Roundup

SPECIAL REPORTS

NON-COMPLIANCES

NPDES Permit

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

There were no instances of NPDES non-compliance issues identified in 2002.

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 2002.

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 2002, 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 three (3) non-routine reports submitted in 2002.

On May 8, 2002, the OEPA was notified that construction was necessary for modifications to the plant entrance to meet new NRC requirements. No permit modifications were required; however, the OEPA requested that an updated site map is forwarded when construction is completed.

On October 11, 2002, the OEPA was notified that construction would begin on the new dechlorination system in November 2002. This notification was made in accordance with the site National Pollutant Discharge Elimination System (NPDES) Permit. The construction included changing the dechlorination chemical to sodium bisulfite and increasing the system capacity to meet new effluent limits effective in 2004.

On October 23, 2002, the OEPA was notified that construction was completed on the site entrance. An updated site map was included as requested in May 2002.

APPENDIX A, 2002 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 their 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.

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

Lab Code	Date	Analysis	Concentration (pCi/L) Laboratory Result[b]	ERA Result[c]	Control Limits
STW-940	02/20/02	Sr-89	53.0 ± 2.5	55.3 ± 5.0	46.6 - 64.0
STW-940	02/20/02	Sr-90	16.6 ± 0.5	15.9 ± 5.0	7.2 - 24.6
STW-942	02/20/02	Gr. Alpha	6.5 ± 0.6	8.0 ± 5.0	0.0 - 16.7
STW-942	02/20/02	Gr. Beta	45.7 ± 3.1	48.3 ± 5.0	39.6 - 57.0
STW-944	02/20/02	Ba-133	25.8 ± 1.5	28.9 ± 5.0	20.2 - 37.6
STW-944	02/20/02	Co-60	76.9 ± 2.7	73.4 ± 5.0	64.7 - 82.1
STW-944	02/20/02	Cs-134	38.7 ± 1.6	42.1 ± 5.0	33.4 - 50.8
STW-944	02/20/02	Cs-137	92.9 ± 2.7	88.8 ± 5.0	80.1 - 97.5
STW-944	02/20/02	Ra-226	15.3 ± 0.7	14.3 ± 2.2	10.6 - 18.0
STW-944	02/20/02	Ra-228	17.5 ± 0.4	16.9 ± 4.2	9.6 - 24.2
STW-944	02/20/02	Uranium	23.8 ± 1.1	28.3 ± 3.0	23.1 - 33.5
STW-944	02/20/02	Zn-65	361.0 ± 9.2	359.0 ± 35.9	298.0 - 420.0
STW-951	05/22/02	Gr. Alpha	23.9 ± 2.5	22.8 ± 5.7	13.0 - 32.6
STW-951	05/22/02	Ra-226	5.9 ± 0.5	6.1 ± 0.9	4.5 - 7.7
STW-951	05/22/02	Ra-228	5.6 ± 0.9	4.5 ± 1.1	2.6 - 6.5
STW-951	05/22/02	Uranium	7.6 ± 0.2	9.3 ± 3.0	4.1 - 14.5
STW-952	05/22/02	Co-60	37.9 ± 0.7	39.1 ± 5.0	30.4 - 47.8
STW-952	05/22/02	Cs-134	14.5 ± 0.8	17.1 ± 5.0	8.4 - 25.8
STW-952	05/22/02	Cs-137	50.0 ± 2.0	52.1 ± 5.0	43.4 - 60.8
STW-952	05/22/02	Gr. Beta	171.0 ± 2.5	189.0 ± 28.4	140.0 - 238.0
STW-952	05/22/02	Sr-89	28.4 ± 4.8	31.7 ± 5.0	23.0 - 40.4
STW-952	05/22/02	Sr-90	32.4 ± 3.1	28.3 ± 5.0	19.6 - 37.0
STW-953 [d]	05/22/02	H-3	13900.0 ± 100.0	17400.0 ± 1740.0	14400.0 - 20400.0
STW-954	05/22/02	I-131	14.6 ± 0.3	14.7 ± 2.0	11.2 - 18.2
STW-965	08/21/02	Ba-133	71.9 ± 2.1	80.0 ± 8.0	66.4 - 93.6
STW-965	08/21/02	Co-60	23.8 ± 1.0	23.3 ± 5.0	14.6 - 32.0
STW-965	08/21/02	Cs-134[e]	62.9 ± 1.2	71.7 ± 5.0	63.0 - 80.4
STW-965	08/21/02	Cs-137	219.3 ± 10.7	214.0 ± 10.7	195.0 - 233.0
STW-965	08/21/02	Gr. Alpha	74.4 ± 0.6	58.8 ± 14.7	33.5 - 84.1
STW-965	08/21/02	Gr. Beta	26.7 ± 0.4	21.9 ± 2.2	13.2 - 30.6
STW-965	08/21/02	Ra-226	5.0 ± 0.5	5.0 ± 0.8	3.7 - 6.3
STW-965	08/21/02	Ra-228	6.0 ± 0.7	4.7 ± 1.2	2.7 - 6.7
STW-965	08/21/02	Sr-89	28.4 ± 1.5	29.0 ± 5.0	20.3 - 37.7
STW-965	08/21/02	Sr-90	36.5 ± 1.1	36.4 ± 5.0	27.7 - 45.1
STW-965	08/21/02	Uranium	4.1 ± 0.1	5.0 ± 3.0	0.0 - 10.2
STW-965	08/21/02	Zn-65	92.4 ± 2.2	95.7 ± 9.6	79.4 - 112.0
STW-966	11/20/02	Gr. Alpha	9.3 ± 0.4	12.2 ± 5.0	3.5 - 20.9
STW-966	11/20/02	Gr. Beta	44.7 ± 1.0	47.0 ± 5.0	38.3 - 55.7
STW-967	11/20/02	H-3	10100.0 ± 38.7	10200.0 ± 1020.0	8440.0 - 12000.0
STW-968	11/20/02	Ra-226	11.6 ± 0.1	12.1 ± 1.8	9.0 - 15.2
STW-968	11/20/02	Ra-228	16.0 ± 1.4	15.1 ± 3.8	8.6 - 21.6
STW-968	11/20/02	Uranium	15.5 ± 0.5	19.2 ± 3.0	14.0 - 24.4
STW-969	11/20/02	I-131	6.0 ± 0.4	6.8 ± 2.0	3.3 - 10.2

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

Lab Code	Date	Analysis	Concentration (pCi/L) Laboratory Result[b]	ERA Result[c]	Control Limits
STW-970	11/20/02	Co-60	104.0 ± 7.1	104.0 ± 5.2	95.0 - 113.0
STW-970	11/20/02	Cs-134	48.2 ± 2.3	55.5 ± 5.0	46.8 - 64.2
STW-970	11/20/02	Cs-137	109.0 ± 12.6	117.0 ± 5.9	107.0 - 127.0
STW-970	11/20/02	Gr. Beta	252.0 ± 26.8	288.0 ± 49.5	244.0 - 416.0
STW-970	11/20/02	Sr-89	43.2 ± 0.7	47.6 ± 5.0	38.9 - 56.3
STW-970	11/20/02	Sr-90	7.5 ± 0.2	7.6 ± 5.0	0.0 - 16.2
STW-971	11/20/02	Gr. Alpha	74.9 ± 1.5	103.0 ± 25.8	58.4 - 148.0
STW-971	11/20/02	Ra-226	8.9 ± 0.0	9.1 ± 1.4	6.7 - 11.5
STW-971	11/20/02	Ra-228	15.3 ± 0.1	17.8 ± 4.5	10.1 - 25.5
STW-971	11/20/02	Uranium	51.7 ± 1.6	61.7 ± 6.2	51.0 - 72.4

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

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

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

[d] Analysis was repeated; result of reanalysis: 16114±487 pCi/L.

[e] ERA acknowledged an unacceptably high percentage of failure for Cs-134 and questioned its own control limits. No problems were identified in the analysis.

TABLE A-2. Crosscheck program results; Thermoluminescent Dosimetry, (TLDs).

Lab Code	TLD Type	Date	Measurement	mR Known Value	mR Lab Result ± 2 sigma	mR Control Limits
Environmental, Inc.						
2001-1	CaSO4: Dy Cards	12/24/2001	Reader 1, #1	3.98	3.71 ± 0.12	2.79 - 5.17
2001-1	CaSO4: Dy Cards	12/24/2001	Reader 1, #1	3.98	3.38 ± 0.09	2.79 - 5.17
2001-1	CaSO4: Dy Cards	12/24/2001	Reader 1, #2	7.07	7.89 ± 0.18	4.95 - 9.19
2001-1	CaSO4: Dy Cards	12/24/2001	Reader 1, #2	7.07	7.64 ± 0.25	4.95 - 9.19
2001-1	CaSO4: Dy Cards	12/24/2001	Reader 1, #3	15.9	18.62 ± 0.40	11.13 - 20.67
2001-1	CaSO4: Dy Cards	12/24/2001	Reader 1, #3	15.9	19.58 ± 0.12	11.13 - 20.67
2001-1	CaSO4: Dy Cards	12/24/2001	Reader 1, #4	63.61	78.24 ± 1.23	44.53 - 82.69
2001-1	CaSO4: Dy Cards	12/24/2001	Reader 1, #4	63.61	79.89 ± 2.47	44.53 - 82.69
Environmental, Inc.						
2002-1	CaSO4: Dy Cards	5/28/2002	Reader 1, #1	4.84	4.44 ± 0.16	3.39 - 6.29
2002-1	CaSO4: Dy Cards	5/28/2002	Reader 1, #1	4.84	4.37 ± 0.20	3.39 - 6.29
2002-1	CaSO4: Dy Cards	5/28/2002	Reader 1, #2	8.60	9.08 ± 0.14	6.02 - 11.18
2002-1	CaSO4: Dy Cards	5/28/2002	Reader 1, #2	8.60	8.76 ± 0.16	6.02 - 11.18
2002-1	CaSO4: Dy Cards	5/28/2002	Reader 1, #3	19.34	22.14 ± 0.27	13.54 - 25.14
2002-1	CaSO4: Dy Cards	5/28/2002	Reader 1, #3	19.34	24.03 ± 0.30	13.54 - 25.14
2002-1	CaSO4: Dy Cards	5/28/2002	Reader 1, #4	77.36	92.77 ± 0.58	54.15 - 100.57
2002-1	CaSO4: Dy Cards	5/28/2002	Reader 1, #4	77.36	85.25 ± 0.37	54.15 - 100.57
Environmental, Inc.						
2002-2	CaSO4: Dy Cards	12/13/2002	Reader 1, 30	56.73	71.61 ± 1.79	39.71 - 73.75
2002-2	CaSO4: Dy Cards	12/13/2002	Reader 1, 45[a]	25.21	33.49 ± 1.38	17.65 - 32.77
[a] Precision of the distance (cm) measurement can significantly increase the error. The placement of the card holder on the table could account for the higher error.						
2002-2	CaSO4: Dy Cards	12/13/2002	Reader 1, 60	14.18	17.37 ± 1.24	9.93 - 18.43
2002-2	CaSO4: Dy Cards	12/13/2002	Reader 1, 75	9.08	10.65 ± 1.02	6.36 - 11.80
2002-2	CaSO4: Dy Cards	12/13/2002	Reader 1, 90	6.30	6.37 ± 0.54	4.41 - 8.19
2002-2	CaSO4: Dy Cards	12/13/2002	Reader 1, 120	3.55	4.60 ± 0.41	2.49 - 4.62
2002-2	CaSO4: Dy Cards	12/13/2002	Reader 1, 135	2.80	2.51 ± 0.23	1.96 - 3.64
2002-2	CaSO4: Dy Cards	12/13/2002	Reader 1, 150	2.28	2.22 ± 0.28	1.60 - 2.96

[c] Control limits are based on Attachment A, Page A2 of this report.

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

Lab Code	Sample Type	Date	Analysis	Concentration (pCi/L)[a] Laboratory results 2s, n=1[b]	Known Activity	Control Limits[c]
SPW-11552	Water	1/7/2002	Gr. Alpha	35.33 ± 1.83	34.57	17.29 - 51.86
SPW-11552	Water	1/7/2002	Gr. Beta	112.62 ± 2.44	107.70	96.93 - 118.47
SPMI-595	Milk	1/31/2002	Cs-134	29.63 ± 4.98	27.10	17.10 - 37.10
SPMI-595	Milk	1/31/2002	Cs-137	51.31 ± 7.55	50.89	40.89 - 60.89
SPMI-597	Milk	1/31/2002	Co-60	44.18 ± 7.76	41.36	31.36 - 51.36
SPMI-597	Milk	1/31/2002	Cs-134	20.15 ± 5.08	22.59	12.59 - 32.59
SPMI-597	Milk	1/31/2002	Cs-137	54.88 ± 8.32	50.89	40.89 - 60.89
SPAP-594	Air Filter	2/6/2002	Gr. Beta	1.58 ± 0.02	1.55	0.00 - 11.55
SPW-599	Water	2/19/2002	H-3	47607 ± 595	50189	40151 ± 60227
SPMI-1446	Milk	3/8/2002	I-131(G)	87.84 ± 11.47	85.20	75.20 - 95.20
SPW-1446	Water	3/8/2002	I-131	82.98 ± 1.20	85.20	68.16 - 102.24
SPW-1446	Water	3/8/2002	I-131(G)	92.75 ± 12.87	85.20	75.20 - 95.20
SPMI-1448	Milk	3/8/2002	I-131	88.00 ± 1.13	85.20	68.16 - 102.24
SPVE-1444	Vegetation	3/11/2002	I-131(G)	0.39 ± 0.04	0.42	0.25 - 0.58
SPAP-2078	Air Filter	4/8/2002	Gr. Beta	1.43 ± 0.01	1.55	0.00 - 11.55
SPW-2080	Water	4/5/2002	H-3	49121 ± 608	46912	37530 ± 56294
SPF-2082	Fish	4/5/2002	Cs-134	0.83 ± 0.04	0.83	0.50 - 1.16
SPF-2082	Fish	4/5/2002	Cs-137	1.29 ± 0.07	1.35	0.81 - 1.89
SPMI-2084	Milk	4/8/2002	Cs-134	20.93 ± 5.82	24.69	14.69 - 34.69
SPMI-2084	Milk	4/8/2002	Cs-137	51.83 ± 10.23	50.56	40.56 - 60.56
SPMI-2084	Milk	4/8/2002	I-131	87.72 ± 1.28	88.37	70.70 - 106.04
SPMI-2084	Milk	4/8/2002	I-131(G)	84.08 ± 10.75	88.37	78.37 - 98.37
SPMI-2084	Milk	4/8/2002	Sr-90	62.81 ± 1.99	66.85	53.48 - 80.22
SPW-2115	Water	4/8/2002	I-131	82.42 ± 1.27	88.37	70.70 - 106.04
SPW-2116	Water	4/8/2002	Co-60	32.47 ± 5.78	33.09	23.09 - 43.09
SPW-2116	Water	4/8/2002	Cs-134	30.80 ± 3.60	28.80	18.80 - 38.80
SPW-2116	Water	4/8/2002	Cs-137	53.85 ± 7.07	50.56	40.56 - 60.56
SPW-2116	Water	4/8/2002	I-131(G)	79.09 ± 7.58	88.37	78.37 - 98.37
SPW-2116	Water	4/8/2002	Sr-90	70.35 ± 2.32	66.85	53.48 - 80.22
SPW-2019	Water	5/3/2002	Gr. Alpha	25.89 ± 1.71	34.57	17.29 - 51.86
SPW-2019	Water	5/3/2002	Gr. Beta	101.19 ± 2.37	107.70	96.93 - 118.47
SPCH-3064	Charcoal	5/11/2002	I-131(G)	0.74 ± 0.04	0.85	0.51 - 1.18
SPW-4682	Water	7/17/2002	H-3	40856 ± 548	46179	36943 ± 55415
SPAP-4685	Air Filter	7/17/2002	Gr. Beta	1.58 ± 0.02	1.55	0.00 - 11.55
W-71702S	Water	7/17/2002	Fe-55	10463.00 ± 126.00	12200.60	9760.48 - 14640.72
W-71702S	Water	07/17/02	H-3	45779 ± 583	46179	36943 ± 55415
W-71702S	Water	07/17/02	Ni-63	17.02 ± 1.50	17.10	10.26 - 23.94
SPVE-4910	Vegetation	07/22/02	Sr-90	10.22 ± 0.80	9.04	0.00 - 19.04
W-72302S	Water	07/23/02	Sr-90	21.43 ± 0.97	26.55	16.55 - 36.55
W-80102S	Water	08/01/02	Gr. Alpha	41.25 ± 4.58	34.45	17.23 - 51.68
W-80102S	Water	08/01/02	Gr. Beta	113.66 ± 5.30	107.70	96.93 - 118.47
W-80202S	Water	08/02/02	Tc-99	16.39 ± 0.72	14.13	2.13 - 26.13
SPW-7188	Water	10/25/02	Fe-55	20396 ± 265	22778	18222 - 27334
SPW-7190	Water	10/25/02	Ni-63	227.18 ± 11.60	170.80	102.48 - 239.12

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

Lab Code	Sample Type	Date	Analysis	Concentration (pCi/L) Laboratory results 2s, n=1[b]	Known Activity	Control Limits[c]
SPW-7192	Water	10/25/02	H-3	96310 ± 871	90963	72770 - 109156
SPW-7194	Water	10/25/02	C-14	42938 ± 167	49661	29796 - 69525
SPAP-7198	Air Filter	10/25/02	Gr. Beta	1.65 ± 0.02	1.53	0.00 - 11.53
SPW-7335	Water	10/30/02	Co-60	39.67 ± 7.38	37.05	27.05 - 47.05
SPW-7335	Water	10/30/02	Cs-134	33.09 ± 5.96	34.11	24.11 - 44.11
SPW-7335	Water	10/30/02	Cs-137	46.80 ± 10.39	49.90	39.90 - 59.90
SPMI-7336	Milk	10/30/02	Cs-134	34.40 ± 4.99	34.11	24.11 - 44.11
SPMI-7336	Milk	10/30/02	Cs-137	46.52 ± 8.52	49.91	39.91 - 59.91
SPF-7340	Fish	10/30/02	Cs-134	0.66 ± 0.03	0.68	0.41 - 0.95
SPF-7340	Fish	10/30/02	Cs-137	1.35 ± 0.05	1.33	0.80 - 1.86
SPS-8102	Sediment	11/01/02	Sr-90	14.69 ± 0.67	13.45	3.45 - 23.45

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

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

Lab Code	Sample Type	Date	Analysis	Concentration (pCi/L)[a] Laboratory results (4.66σ) LLD	Activity[b]	Acceptance Criteria (4.66 σ)
SPW-11551	water	1/7/2002	Gr. Alpha	0.47	0.45 ± 0.39	1
SPW-11551	water	1/7/2002	Gr. Beta	1.37	0.55 ± 1.03	3.2
SPAP-590	Air Filter	1/31/2002	Co-60	1.78		100
SPAP-590	Air Filter	1/31/2002	Cs-134	3.42		100
SPAP-590	Air Filter	1/31/2002	Cs-137	2.33		100
SPAP-590	Air Filter	1/31/2002	Gr. Beta	0.74	-0.096 ± 0.38	3.2
SPMI-596	Milk	1/31/2002	Co-60	3.54		10
SPMI-596	Milk	1/31/2002	Cs-134	3.24		10
SPMI-596	Milk	1/31/2002	Cs-137	3.89		10
SPMI-596	Milk	1/31/2002	K-40		1472.1 ± 101.50	0
SPW-598	water	1/31/2002	Co-60	2.30		10
SPW-598	water	1/31/2002	Cs-134	3.74		10
SPW-598	water	1/31/2002	Cs-137	3.23		10
SPW-600	water	1/31/2002	H-3	138.80	-96.5 ± 63.40	200
SPMI-1447	Milk	3/7/2002	I-131(G)	7.63		20
SPVE-1443	Vegetation	3/8/2002	I-131(G)	0.02		20
SPW-1445	water	3/8/2002	Co-60	2.76		10
SPW-1445	water	3/8/2002	Cs-134	2.87		10
SPW-1445	water	3/8/2002	Cs-137	4.34		10
SPW-1445	water	3/8/2002	I-131	0.45	0.17 ± 0.31	0.5
SPW-1445	water	3/8/2002	I-131(G)	6.50		20
SPMI-1447	Milk	3/8/2002	I-131	0.31	0.15 ± 0.22	0.5
SPAP-2077	Air Filter	4/8/2002	Gr. Beta	0.32	-0.055 ± 0.19	3.2
SPW-2079	water	4/5/2002	H-3	134.17	16.13 ± 67.39	200
SPF-2081	Fish	4/5/2002	Cs-134	7.67		100
SPF-2081	Fish	4/5/2002	Cs-137	9.54		100
SPMI-2083	Milk	4/8/2002	Cs-134	2.90		10
SPMI-2083	Milk	4/8/2002	Cs-137	3.03		10
SPMI-2083	Milk	4/8/2002	I-131	0.52	-0.38 ± 0.34	0.5
SPMI-2083	Milk[c]	4/8/2002	Sr-90	0.48	1.29 ± 0.36	1
SPW-2115	water	4/8/2002	Co-60	1.49		10
SPW-2115	water	4/8/2002	Cs-134	2.09		10
SPW-2115	water	4/8/2002	Cs-137	3.78		10
SPW-2115	water	4/8/2002	I-131	0.50	-0.16 ± 0.33	0.5
SPW-2115	water	4/8/2002	I-131(G)	3.30		20
SPW-2115	water	4/8/2002	Sr-90	0.66	0.10 ± 0.32	1
SPW-2018	water	4/22/2002	Gr. Alpha	0.56	-0.24 ± 0.38	1
SPW-2018	water	4/22/2002	Gr. Beta	1.38	3.19 ± 1.03	3.2
SPch-3063	Charcoal	5/11/2002	I-131(G)	8.27		9.6
SPW-4683	water	7/17/2002	H-3	129.00	-62.8 ± 60.30	200
W-71702	water	7/17/2002	Fe-55	33.61	-1.72 ± 15.63	1000
W-71702	water	7/17/2002	Ni-63	2.56	0.71 ± 1.37	20
W-71802B	water	7/18/2002	Gr. Alpha	0.48	0.31 ± 0.36	1
W-71802B	water	7/18/2002	Gr. Beta	1.33	0.9 ± 0.95	3.2

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

Lab Code	Sample Type	Date	Analysis	Concentration (pCi/L)[a] Laboratory results (4.66σ) LLD	Activity[b]	Acceptance Criteria (4.66 σ)
W-72302	water	7/23/2002	Sr-90	0.27	0.027 ± 0.13	1
W-80202	water	8/2/2002	Tc-99	0.34	-0.051 ± 0.16	10
SPW-7189	water	10/25/2002	Fe-55	978.21	21.77 ± 595.33	1000
SPW-7191	water	10/25/2002	Ni-63	11.74	4.47 ± 7.24	20
SPW-7193	water	10/25/2002	H-3	146.00	-92 ± 65.00	200
SPAP-7199	Air Filter	10/25/2002	Gr. Beta	0.00	-0.0024 ± 0.00	3.2
SPMI-7333	Milk	10/30/2002	Cs-134	5.30		10
SPMI-7333	Milk	10/30/2002	Cs-137	4.80		10
SPW-7334	water	10/30/2002	Co-60	3.69		10
SPW-7334	water	10/30/2002	Cs-134	5.37		10
SPW-7334	water	10/30/2002	Cs-137	3.90		10
SPF-7339	Fish	10/30/2002	Cs-134	4.69		100
SPF-7339	Fish	10/30/2002	Cs-137	11.18		100

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

[b] The activity reported is the net activity result.

[c] Low levels of Sr-90 are still detected in the environment. A concentration of (1-5 pCi/L) in milk is not unusual.

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

Lab Code	Date	Analysis	Concentration (pCi/L)[a] First Result	Second Result	Averaged Result
CF-20, 21	1/2/2002	Be-7	0.47 ± 0.25	0.37 ± 0.12	0.42 ± 0.14
CF-20, 21	1/2/2002	Gr. Beta	7.82 ± 0.20	7.95 ± 0.21	7.89 ± 0.14
CF-20, 21	1/2/2002	K-40	6.65 ± 0.55	6.53 ± 0.36	6.59 ± 0.33
CF-20, 21	1/2/2002	Sr-90	0.01 ± 0.01	0.01 ± 0.01	0.01 ± 0.00
AP-11804, 11805	1/2/2002	Be-7	0.054 ± 0.011	0.049 ± 0.019	0.052 ± 0.011
AP-11825, 11826	1/2/2002	Be-7	0.053 ± 0.013	0.043 ± 0.013	0.048 ± 0.009
AP-11846, 11847	1/2/2002	Be-7	0.054 ± 0.018	0.048 ± 0.016	0.051 ± 0.012
WW-150, 151	1/7/2002	Gr. Beta	1.26 ± 0.50	1.04 ± 0.46	1.15 ± 0.34
MI-124, 125	1/8/2002	K-40	1332.30 ± 158.90	1271.70 ± 151.50	1302.00 ± 109.77
W-172, 173	1/8/2002	H-3	153.00 ± 68.00	148.00 ± 68.00	150.50 ± 48.08
SW-11698, 11699	1/8/2002	Gr. Alpha	2.51 ± 1.36	3.71 ± 1.80	3.11 ± 1.13
SW-11698, 11699	1/8/2002	Gr. Beta	7.68 ± 1.33	8.49 ± 1.43	8.09 ± 0.98
U-275, 276	1/10/2002	Gr. Alpha	1.40 ± 1.00	1.10 ± 1.20	1.25 ± 0.78
LW-356, 357	1/16/2002	Gr. Beta	3.47 ± 0.65	2.94 ± 0.61	3.21 ± 0.45
LW-377, 378	1/16/2002	Gr. Beta	2.75 ± 0.68	2.84 ± 0.61	2.79 ± 0.46
SW-525, 526	1/30/2002	Gr. Alpha	0.56 ± 0.35	0.24 ± 0.35	0.40 ± 0.25
SW-525, 526	1/30/2002	Gr. Beta	2.29 ± 0.41	2.58 ± 0.39	2.43 ± 0.28
DW-504, 505	1/31/2002	Gr. Alpha	2.30 ± 1.70	3.90 ± 1.40	3.10 ± 1.10
MI-649, 650	2/5/2002	K-40	1319.40 ± 176.70	1210.80 ± 118.20	1265.10 ± 106.29
DW-697, 698	2/6/2002	Gr. Beta	5.10 ± 1.20	4.70 ± 1.20	4.90 ± 0.85
DW-927, 928	2/8/2002	Sr-90	0.69 ± 0.29	0.71 ± 0.29	0.70 ± 0.21
W-973, 974	2/18/2002	Fe-55	7.29 ± 0.97	6.86 ± 0.94	7.08 ± 0.68
W-1673, 1674	2/25/2002	H-3	2640.00 ± 155.00	2908.00 ± 161.00	2774.00 ± 111.74
SWT-1395, 1396	2/26/2002	Gr. Beta	2.96 ± 0.59	2.29 ± 0.53	2.63 ± 0.40
MI-1268, 1269	2/27/2002	K-40	1460.50 ± 162.50	1573.00 ± 168.00	1516.75 ± 116.87
MI-1268, 1269	2/27/2002	Sr-90	0.77 ± 0.36	0.95 ± 0.40	0.86 ± 0.27
MI-1332, 1333	3/5/2002	K-40	1503.00 ± 164.00	1305.00 ± 168.00	1404.00 ± 117.39
MI-1332, 1333	3/5/2002	Sr-90	1.35 ± 0.38	1.07 ± 0.40	1.21 ± 0.28
MI-1458, 1459	3/6/2002	K-40	1411.70 ± 166.70	1390.00 ± 172.30	1400.85 ± 119.87
DW-10100, 10101	3/9/2002	Gr. Alpha	4.10 ± 1.70	1.80 ± 1.60	2.95 ± 1.17
DW-10111, 10112	3/9/2002	Gr. Alpha	7.10 ± 2.00	8.30 ± 2.30	7.70 ± 1.52
MI-1521, 1522	3/11/2002	K-40	1270.80 ± 103.30	1369.10 ± 121.60	1319.95 ± 79.78
MI-1521, 1522	3/11/2002	Sr-90	1.69 ± 0.46	2.46 ± 0.49	2.07 ± 0.34
MI-1541, 1542	3/11/2002	K-40	1562.20 ± 122.80	1529.30 ± 126.10	1545.75 ± 88.01
MI-1541, 1542	3/11/2002	Sr-90	0.85 ± 0.57	1.48 ± 0.43	1.16 ± 0.36
LW-1651, 1652	3/14/2002	Gr. Beta	2.90 ± 0.57	2.57 ± 0.56	2.74 ± 0.40
DW-10134, 10135	3/16/2002	Gr. Alpha	5.60 ± 1.90	5.40 ± 1.60	5.50 ± 1.24
WW-1694, 1695	3/18/2002	Gr. Beta	1.79 ± 0.59	1.53 ± 0.50	1.66 ± 0.39
SO-1715, 1716	3/19/2002	Cs-137	0.03 ± 0.01	0.02 ± 0.01	0.03 ± 0.01
SO-1715, 1716	3/19/2002	Gr. Beta	18.50 ± 1.70	19.10 ± 1.70	18.80 ± 1.20
DW-10302, 10303	3/20/2002	Gr. Alpha	2.30 ± 1.40	3.30 ± 1.60	2.80 ± 1.06
W-1758, 1759	3/25/2002	Gr. Alpha	2.50 ± 0.70	2.30 ± 0.60	2.40 ± 0.46
W-1758, 1759	3/25/2002	Gr. Beta	4.10 ± 1.20	2.50 ± 1.10	3.30 ± 0.81

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

Lab Code	Date	Analysis	Concentration (pCi/L)[a] First Result	Second Result	Averaged Result
MI-1926, 1927	3/26/2002	K-40	1414.00 ± 115.00	1316.00 ± 128.00	1365.00 ± 86.04
MI-1926, 1927	3/26/2002	Sr-90	2.30 ± 0.70	2.40 ± 0.70	2.35 ± 0.49
SWU-2010, 2011	3/26/2002	Gr. Beta	2.90 ± 0.60	2.20 ± 0.50	2.55 ± 0.39
DW-10376, 10377	3/27/2002	Gr. Beta	10.50 ± 1.30	10.10 ± 1.50	10.30 ± 0.99
AP-2479, 2480	3/28/2002	Be-7	0.064 ± 0.023	0.068 ± 0.014	0.066 ± 0.013
DW-10395, 10396	3/29/2002	Gr. Alpha	10.20 ± 2.10	14.60 ± 2.40	12.40 ± 1.59
LW-2181, 2182	3/31/2002	Gr. Beta	2.98 ± 0.68	1.99 ± 0.70	2.48 ± 0.49
LW-2181, 2182	3/31/2002	H-3	2694.43 ± 156.53	2688.84 ± 156.40	2691.64 ± 110.64
CW-2437, 2438	3/31/2002	Gr. Beta	1.09 ± 0.61	1.14 ± 0.58	1.11 ± 0.42
CW-2437, 2438	3/31/2002	H-3	6456.70 ± 229.20	6292.80 ± 226.52	6374.75 ± 161.12
MI-1947, 1948	4/1/2002	K-40	1421.40 ± 130.90	1256.80 ± 104.20	1339.10 ± 83.65
AP-2458, 2459	4/1/2002	Be-7	0.077 ± 0.011	0.081 ± 0.010	0.079 ± 0.008
DW-10409, 10410	4/1/2002	Gr. Alpha	39.30 ± 4.00	35.30 ± 3.60	37.30 ± 2.69
MI-2052, 2053	4/3/2002	K-40	1283.70 ± 103.20	1434.80 ± 147.90	1359.25 ± 90.17
MI-2052, 2053	4/3/2002	Sr-90	0.81 ± 0.36	0.75 ± 0.35	0.78 ± 0.25
AP-2711, 2712	4/3/2002	Be-7	0.071 ± 0.01	0.07 ± 0.01	0.07 ± 0.01
W-938, 939	4/9/2002	Ni-63	1.73 ± 0.10	1.82 ± 0.10	1.78 ± 0.07
SS-2202, 2203	4/9/2002	Gr. Beta	5.83 ± 1.16	5.52 ± 1.19	5.67 ± 0.83
SS-2202, 2203	4/9/2002	K-40	5.75 ± 0.48	6.11 ± 0.51	5.93 ± 0.35
F-2307, 2308	4/10/2002	K-40	2.75 ± 0.27	2.49 ± 0.32	2.62 ± 0.21
DW-10476, 10477	4/12/2002	Gr. Alpha	5.10 ± 1.30	3.90 ± 1.60	4.50 ± 1.03
W-2244, 2245	4/15/2002	Gr. Beta	1.70 ± 1.10	1.60 ± 1.00	1.65 ± 0.74
DW-10509, 10510	4/17/2002	Gr. Alpha	6.00 ± 2.00	7.30 ± 1.80	6.65 ± 1.35
SW-2690, 2691	4/24/2002	Gr. Beta	2.25 ± 0.68	2.15 ± 0.59	2.20 ± 0.45
SO-2903, 2904	4/24/2002	Be-7	1.22 ± 0.57	0.78 ± 0.43	1.00 ± 0.36
SO-2903, 2904	4/24/2002	Cs-137	0.13 ± 0.05	0.09 ± 0.05	0.11 ± 0.04
SO-2903, 2904	4/24/2002	K-40	21.06 ± 1.48	19.91 ± 1.16	20.48 ± 0.94
DW-10562, 10563	4/24/2002	Gr. Alpha	2.17 ± 1.13	3.25 ± 1.54	2.71 ± 0.96
DW-10578, 10579	4/29/2002	Gr. Alpha	8.20 ± 2.20	7.40 ± 2.00	7.80 ± 1.49
SO-2861, 2862	4/30/2002	Cs-137	236.40 ± 46.00	200.70 ± 52.60	218.55 ± 34.94
SO-2861, 2862	4/30/2002	K-40	10191.00 ± 784.60	11025.00 ± 941.30	10608.00 ± 612.71
SL-2819, 2820	5/1/2002	Be-7	805.70 ± 301.50	860.73 ± 164.80	833.22 ± 171.80
SL-2819, 2820	5/1/2002	Gr. Beta	5566.00 ± 124.00	5359.00 ± 122.00	5462.50 ± 86.98
SL-2819, 2820	5/1/2002	K-40	5524.00 ± 632.90	5277.50 ± 431.40	5400.75 ± 382.97
SL-2840, 2841	5/1/2002	Be-7	1010.00 ± 352.10	872.95 ± 181.70	941.48 ± 198.11
SL-2840, 2841	5/1/2002	Gr. Beta	4399.00 ± 221.80	4593.00 ± 276.00	4496.00 ± 177.04
SL-2840, 2841	5/1/2002	K-40	2422.80 ± 352.10	2254.10 ± 371.40	2338.45 ± 255.89
MI-2971, 2972	5/5/2002	K-40	1338.90 ± 83.44	1345.80 ± 100.90	1342.35 ± 65.47
MI-2971, 2972	5/5/2002	Sr-90	0.83 ± 0.47	1.65 ± 0.46	1.24 ± 0.33
DW-10603, 10604	5/6/2002	Gr. Alpha	6.30 ± 1.70	5.50 ± 1.60	5.90 ± 1.17
SS-3037, 3038	5/9/2002	K-40	11585.00 ± 749.00	11612.00 ± 787.00	11598.50 ± 543.22
MI-3124, 3125	5/13/2002	K-40	1329.50 ± 103.80	1373.00 ± 107.40	1351.25 ± 74.68
MI-3208, 3209	5/14/2002	K-40	1494.60 ± 158.40	1462.60 ± 182.50	1478.60 ± 120.83
LW-3250, 3251	5/15/2002	Gr. Beta	3.14 ± 0.55	3.28 ± 0.63	3.21 ± 0.42

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

Lab Code	Date	Analysis	Concentration (pCi/L)[a] First Result	Second Result	Averaged Result
CF-3292, 3293	5/20/2002	K-40	1.33 ± 0.99	1.14 ± 0.91	1.23 ± 0.67
MI-3376, 3377	5/26/2002	K-40	1333.30 ± 159.40	1090.70 ± 143.40	1212.00 ± 107.21
MI-3418, 3419	5/28/2002	K-40	1423.70 ± 121.30	1443.30 ± 164.30	1433.50 ± 102.11
SWT-3461, 3462	5/28/2002	Gr. Beta	2.65 ± 0.54	3.28 ± 0.60	2.97 ± 0.40
SO-3503, 3504	5/29/2002	Cs-137	0.17 ± 0.04	0.18 ± 0.05	0.18 ± 0.03
SO-3503, 3504	5/29/2002	Gr. Beta	27.72 ± 2.26	25.45 ± 2.03	26.58 ± 1.52
SO-3503, 3504	5/29/2002	K-40	20.24 ± 1.19	20.54 ± 1.24	20.39 ± 0.86
SL-3545, 3546	6/3/2002	Gr. Beta	4436.00 ± 90.00	4281.00 ± 89.00	4358.50 ± 63.29
SL-3545, 3546	6/3/2002	K-40	4684.20 ± 734.40	5242.50 ± 884.50	4963.35 ± 574.82
DW-10754, 10755	6/6/2002	Sr-90	0.50 ± 0.30	0.60 ± 0.30	0.55 ± 0.21
SW-3777, 3778	6/11/2002	Gr. Alpha	4.42 ± 1.50	2.97 ± 1.40	3.70 ± 1.02
SW-3777, 3778	6/11/2002	Gr. Beta	7.57 ± 1.22	6.83 ± 1.16	7.20 ± 0.84
MI-3798, 3799	6/11/2002	K-40	1433.40 ± 124.20	1401.20 ± 96.96	1417.30 ± 78.78
LW-3924, 3925	6/13/2002	Gr. Beta	3.05 ± 0.59	3.38 ± 0.72	3.21 ± 0.46
MI-3966, 3967	6/18/2002	K-40	1245.20 ± 109.20	1340.20 ± 121.90	1292.70 ± 81.83
MI-3966, 3967	6/18/2002	Sr-90	2.38 ± 0.51	2.63 ± 0.52	2.51 ± 0.36
MI-3987, 3988	6/19/2002	Sr-90	0.98 ± 0.35	0.97 ± 0.35	0.98 ± 0.25
MI-4095, 4096	6/25/2002	K-40	1256.10 ± 138.20	1199.00 ± 128.30	1227.55 ± 94.29
SWU-4221, 4222	6/25/2002	Gr. Beta	6.89 ± 1.97	5.38 ± 1.93	6.13 ± 1.38
LW-4179, 4180	6/27/2002	Gr. Beta	2.37 ± 0.58	2.00 ± 0.62	2.19 ± 0.42
G-4329, 4330	7/1/2002	Be-7	1394.80 ± 538.40	1098.10 ± 437.40	1246.45 ± 346.84
G-4329, 4330	7/1/2002	Gr. Beta	8.10 ± 0.27	8.00 ± 0.25	8.05 ± 0.18
G-4329, 4330	7/1/2002	K-40	7758.20 ± 1100.00	8399.80 ± 929.30	8079.00 ± 720.00
SL-4337, 4338	7/1/2002	Be-7	1480.90 ± 223.80	1726.40 ± 552.60	1603.65 ± 298.10
SL-4337, 4338	7/1/2002	Cs-137	32.30 ± 14.70	50.97 ± 27.10	41.64 ± 15.42
SL-4337, 4338	7/1/2002	Gr. Beta	5262.40 ± 522.10	5432.40 ± 540.00	5347.40 ± 375.56
SL-4337, 4338	7/1/2002	K-40	2249.00 ± 381.90	2989.90 ± 509.60	2619.45 ± 318.41
AP-4864, 4865	7/1/2002	Be-7	0.085 ± 0.009	0.085 ± 0.006	0.085 ± 0.006
MI-4359, 4360	7/2/2002	K-40	1390.10 ± 168.30	1567.40 ± 194.30	1478.75 ± 128.53
AP-4569, 4570	7/2/2002	Be-7	0.068 ± 0.016	0.086 ± 0.018	0.077 ± 0.012
AP-4843, 4844	7/2/2002	Be-7	0.077 ± 0.016	0.090 ± 0.020	0.084 ± 0.013
AP-4789, 4790	7/3/2002	Be-7	0.080 ± 0.013	0.078 ± 0.015	0.079 ± 0.010
SWU-4810, 4811	7/3/2002	Gr. Beta	2.40 ± 0.84	2.47 ± 0.88	2.43 ± 0.61
MI-4548, 4549	7/9/2002	K-40	1511.80 ± 127.00	1446.80 ± 101.80	1479.30 ± 81.38
DW-4737, 4738	7/12/2002	I-131	0.52 ± 0.20	0.49 ± 0.29	0.51 ± 0.18
MI-4632, 4633	7/15/2002	K-40	1198.40 ± 114.10	1371.30 ± 146.90	1284.85 ± 93.00
MI-5054, 5055	7/30/2002	K-40	1428.80 ± 105.60	1344.30 ± 106.40	1386.55 ± 74.95
G-5075, 5076	7/30/2002	Gr. Beta	7.11 ± 0.07	6.99 ± 0.07	7.05 ± 0.05
SWU-5124, 5125	7/30/2002	Gr. Beta	1.75 ± 0.84	1.90 ± 0.78	1.82 ± 0.57
G-5151, 5152	7/31/2002	Be-7	1.82 ± 0.30	2.05 ± 0.32	1.93 ± 0.22
G-5151, 5152	7/31/2002	K-40	5.13 ± 0.66	5.72 ± 0.70	5.42 ± 0.48
MI-5103, 5104	8/2/2002	K-40	1415.90 ± 70.57	1423.80 ± 129.20	1419.85 ± 73.61
LW-5434, 5435	8/5/2002	Gr. Beta	2.77 ± 0.35	2.26 ± 0.35	2.52 ± 0.25
MI-5215, 5216	8/7/2002	K-40	1361.10 ± 111.90	1358.30 ± 115.80	1359.70 ± 80.52

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

Lab Code	Date	Analysis	Concentration (pCi/L)[a] First Result	Second Result	Averaged Result
MI-5355, 5356	8/13/2002	K-40	1405.00 ± 165.80	1549.30 ± 114.40	1477.15 ± 100.72
F-5413, 5414	8/15/2002	Gr. Beta	2.37 ± 0.10	2.55 ± 0.10	2.46 ± 0.07
F-5413, 5414	8/15/2002	K-40	1.47 ± 0.32	1.73 ± 0.43	1.60 ± 0.27
MI-5603, 5604	8/26/2002	I-131	0.64 ± 0.34	0.52 ± 0.36	0.58 ± 0.25
MI-5603, 5604	8/26/2002	K-40	1353.60 ± 83.13	1261.40 ± 117.80	1307.50 ± 72.09
MI-5578, 5579	8/27/2002	K-40	1301.50 ± 161.70	1381.60 ± 111.20	1341.55 ± 98.12
VE-5682, 5683	8/28/2002	Be-7	0.29 ± 0.10	0.25 ± 0.11	0.27 ± 0.08
VE-5682, 5683	8/28/2002	Gr. Beta	3.79 ± 0.08	3.80 ± 0.08	3.79 ± 0.06
VE-5682, 5683	8/28/2002	K-40	3.06 ± 0.29	3.31 ± 0.42	3.18 ± 0.25
WW-6188, 6189	8/31/2002	Gr. Beta	2.70 ± 0.57	2.30 ± 0.57	2.50 ± 0.41
SL-5724, 5725	9/3/2002	Be-7	0.92 ± 0.19	1.04 ± 0.23	0.98 ± 0.15
SL-5724, 5725	9/3/2002	Cs-137	0.05 ± 0.02	0.05 ± 0.02	0.05 ± 0.01
SL-5724, 5725	9/3/2002	K-40	2.09 ± 0.31	2.28 ± 0.48	2.19 ± 0.29
MI-5877, 5878	9/9/2002	K-40	1340.70 ± 165.00	1168.50 ± 172.50	1254.60 ± 119.35
MI-6157, 6158	9/19/2002	K-40	1372.10 ± 115.10	1136.50 ± 222.70	1254.30 ± 125.34
MI-6258, 6259	9/24/2002	K-40	1328.60 ± 201.00	1312.60 ± 118.60	1320.60 ± 116.69
LW-6278, 6279	9/30/2002	Gr. Beta	2.15 ± 0.51	1.70 ± 0.50	1.93 ± 0.36
MI-6385, 6386	10/1/2002	K-40	1297.10 ± 168.90	1310.10 ± 128.30	1303.60 ± 106.05
BS-6453, 6454	10/1/2002	Cs-137	0.43 ± 0.03	0.44 ± 0.03	0.44 ± 0.02
BS-6453, 6454	10/1/2002	K-40	16.50 ± 0.51	16.80 ± 0.61	16.65 ± 0.40
SO-6478, 6479	10/1/2002	Cs-137	0.074 ± 0.016	0.070 ± 0.016	0.072 ± 0.011
SO-6478, 6479	10/1/2002	Gr. Alpha	8.01 ± 4.36	7.55 ± 4.57	7.78 ± 3.16
SO-6478, 6479	10/1/2002	Gr. Beta	30.41 ± 4.07	33.04 ± 4.28	31.73 ± 2.95
SO-6478, 6479	10/1/2002	K-40	19.82 ± 0.53	20.39 ± 0.58	20.10 ± 0.39
SO-6478, 6479	10/1/2002	Sr-90	0.087 ± 0.017	0.094 ± 0.020	0.091 ± 0.013
AP-6641, 6642	10/1/2002	Be-7	0.070 ± 0.016	0.080 ± 0.015	0.075 ± 0.011
MI-6544, 6545	10/2/2002	K-40	1331.60 ± 125.20	1326.50 ± 171.60	1329.05 ± 106.21
AP-6857, 6858	10/3/2002	Be-7	0.062 ± 0.015	0.071 ± 0.015	0.066 ± 0.010
AP-6857, 6858	10/3/2002	Be-7	0.062 ± 0.015	0.071 ± 0.015	0.066 ± 0.010
AP-6857, 6858	10/3/2002	Be-7	0.062 ± 0.015	0.071 ± 0.015	0.066 ± 0.010
BS-6620, 6621	10/7/2002	Co-60	0.090 ± 0.020	0.11 ± 0.02	0.10 ± 0.01
BS-6620, 6621	10/7/2002	Cs-137	0.62 ± 0.04	0.63 ± 0.03	0.62 ± 0.02
BS-6620, 6621	10/7/2002	K-40	11.38 ± 0.48	10.78 ± 0.52	11.08 ± 0.35
MI-6651, 6652	10/8/2002	K-40	1565.50 ± 141.00	1640.60 ± 189.20	1603.05 ± 117.98
G-6760, 6761	10/9/2002	Be-7	2.17 ± 0.49	2.31 ± 0.34	2.24 ± 0.30
G-6760, 6761	10/9/2002	K-40	6.24 ± 1.00	6.61 ± 0.60	6.42 ± 0.58
SWU-7054, 7055	10/10/2002	Gr. Beta	3.09 ± 0.57	2.06 ± 0.52	2.57 ± 0.39
U-7126, 7127	10/11/2002	Gr. Beta	2.61 ± 1.24	2.61 ± 1.08	2.61 ± 0.82
XW-7768, 7769	10/14/2002	Cs-137	2.25 ± 0.25	2.09 ± 0.18	2.17 ± 0.15
XW-7768, 7769	10/14/2002	H-3	2.63 ± 0.10	2.64 ± 0.10	2.64 ± 0.07
F-7148, 7149	10/15/2002	K-40	2.57 ± 0.28	2.98 ± 0.44	2.77 ± 0.26
BS-7337, 7338	10/23/2002	Co-60	0.083 ± 0.025	0.073 ± 0.031	0.078 ± 0.020
BS-7337, 7338	10/23/2002	Cs-137	0.082 ± 0.019	0.11 ± 0.04	0.10 ± 0.02
BS-7337, 7338	10/23/2002	Gr. Beta	12.54 ± 2.34	12.99 ± 2.22	12.77 ± 1.61
SO-7407, 7408	10/29/2002	Cs-137	0.14 ± 0.03	0.15 ± 0.03	0.15 ± 0.02
SO-7407, 7408	10/29/2002	Gr. Beta	16.73 ± 2.21	16.62 ± 2.27	16.67 ± 1.58
SO-7407, 7408	10/29/2002	K-40	12.05 ± 0.61	12.27 ± 0.81	12.16 ± 0.51

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

Lab Code	Date	Analysis	Concentration (pCi/L)[a] First Result	Second Result	Averaged Result
MI-7428, 7429	10/29/2002	K-40	1542.60 ± 213.00	1355.80 ± 185.70	1449.20 ± 141.29
pw-7621, 7622	10/30/2002	Gr. Beta	2.22 ± 0.92	2.08 ± 0.83	2.15 ± 0.62
TD-7653, 7654	10/31/2002	H-3	11122.00 ± 387.00	11259.00 ± 390.00	11190.50 ± 274.71
SW-7569, 7570	11/5/2002	Gr. Beta	15.90 ± 1.25	16.24 ± 1.27	16.07 ± 0.89
SW-7569, 7570	11/5/2002	K-40	14.79 ± 1.48	14.79 ± 1.48	14.79 ± 1.05
SO-8010, 8011	11/7/2002	Cs-137	0.11 ± 0.02	0.11 ± 0.03	0.11 ± 0.02
SO-8010, 8011	11/7/2002	K-40	6.91 ± 0.54	7.21 ± 0.54	7.06 ± 0.38
VE-7747, 7748	11/11/2002	Gr. Beta	3.59 ± 0.05	3.25 ± 0.05	3.42 ± 0.03
VE-7747, 7748	11/11/2002	K-40	3.17 ± 0.36	3.26 ± 0.46	3.22 ± 0.29
MI-7789, 7790	11/13/2002	K-40	1319.30 ± 167.60	1301.20 ± 140.70	1310.25 ± 109.41
DW-8082, 8083	11/29/2002	I-131	0.83 ± 0.24	0.98 ± 0.22	0.90 ± 0.16
SW-8054, 8055	12/2/2002	Gr. Beta	2.60 ± 0.46	2.21 ± 0.39	2.41 ± 0.30
SW-8054, 8055	12/2/2002	K-40	1.44 ± 0.14	1.43 ± 0.14	1.44 ± 0.10
MI-8105, 8106	12/4/2002	K-40	1300.60 ± 111.30	1315.40 ± 108.90	1308.00 ± 77.86
TD-8298, 8299	12/5/2002	H-3	355.00 ± 94.00	469.00 ± 99.00	412.00 ± 68.26
MI-8396, 8397	12/17/2002	K-40	1409.20 ± 117.30	1449.60 ± 108.60	1429.40 ± 79.93
SWT-8654, 8655	12/30/2002	Gr. Beta	1.63 ± 0.50	1.40 ± 0.47	1.51 ± 0.34
AP-8783, 8784	12/31/2002	Be-7	0.044 ± 0.009	0.042 ± 0.008	0.043 ± 0.006

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

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

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

			Concentration[b]			
Lab Code	Type	Date	Analysis	Laboratory result	Known Activity	Control Limits[c]
STW-939	water	12/01/01	Am-241	1.25 ± 0.0	1.19 ± 0.0	0.83 - 1.6
STW-939	water	12/01/01	Co-57	138.9 ± 0.5	143 ± 14.3	100.1 - 185.9
STW-939	water	12/01/01	Co-60	139.1 ± 0.5	141 ± 14.1	98.7 - 183.3
STW-939	water	12/01/01	Cs-134	25.16 ± 0.2	28.5 ± 0.3	19.95 - 37.1
STW-939	water	12/01/01	Cs-137	279.96 ± 0.9	286 ± 28.6	200.2 - 371.8
STW-939[d]	water	12/01/01	Fe-55	19.68 ± 23.2	9.2 ± 0.9	6.44 - 12.0
STW-939	water	12/01/01	Mn-54	253.64 ± 0.9	246 ± 0.2	172.2 - 319.8
STW-939	water	12/01/01	Ni-63	65.88 ± 1.9	88.3 ± 8.8	61.81 - 114.8
STW-939[e]	water	12/01/01	Pu-238	0.060 ± 0.01	0.0 ± 0.0	-
STW-939	water	12/01/01	Pu-239/40	2.79 ± 0.0	2.99 ± 0.3	2.09 - 3.9
STW-939	water	12/01/01	Sr-90	4.88 ± 0.3	4.8 ± 0.5	3.36 - 6.2
STW-939	water	12/01/01	U-233/4	0.89 ± 0.0	0.98 ± 0.1	0.69 - 1.3
STW-939	water	12/01/01	U-238	6.75 ± 0.0	7.8 ± 0.8	5.46 - 10.1
STW-939	water	12/01/01	Zn-65	70.6 ± 1.1	67.3 ± 6.7	47.11 - 87.5
STSO-955	soil	10/16/02	Am-241	40.54 ± 2.7	43.5 ± 4.4	30.45 - 56.6
STSO-955	soil	10/16/02	Co-57	210.58 ± 2.0	246 ± 24.6	172.2 - 319.8
STSO-955	soil	10/16/02	Co-60	84.38 ± 0.9	87.5 ± 8.8	61.25 - 113.8
STSO-955	soil	10/16/02	Cs-134	692.6 ± 2.1	862 ± 86.0	603.4 - 1120.6
STSO-955	soil	10/16/02	Cs-137	96.98 ± 1.7	111 ± 11.1	77.7 - 144.3
STSO-955	soil	10/16/02	Fe-55	1714.6 ± 299.6	1870 ± 187.0	1309 - 2431.0
STSO-955	soil	10/16/02	Mn-54	509.74 ± 3.4	546 ± 54.6	382.2 - 709.8
STSO-955	soil	10/16/02	Ni-63	890.6 ± 22.4	1180 ± 118.0	826 - 1534.0
STSO-955	soil	10/16/02	Pu-238	34.04 ± 6.0	33.3 ± 3.3	23.31 - 43.3
STSO-955	soil	10/16/02	Pu-239/40	68.7 ± 3.7	72.9 ± 7.3	51.03 - 94.8
STSO-955[e]	soil	10/16/02	Sr-90	1.5 ± 3.0	0.0 ± 0.0	-
STSO-955	soil	10/16/02	U-233/4	166.33 ± 3.8	229 ± 22.9	160.3 - 297.7
STSO-955	soil	10/16/02	U-238	169.76 ± 3.8	220 ± 22.0	154 - 286.0
STSO-955	soil	10/16/02	Zn-65	783.59 ± 6.4	809 ± 80.9	566.3 - 1051.7

[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.

[d] Known activity below the laboratory LLD. The sample was recounted for 2000 minutes; result : 11.52 ± 5.55 Bq /L

[e] Included in the testing series as a "false positive". No activity expected.

TABLE A-7. Environmental Measurements Laboratory Quality Assessment Program (EML)

Lab Code	Type	Date	Analysis	Concentration[a] Laboratory results	EML Result[b]	Control Limits[c]
STW-945	Water	03/01/02	Am-241	1.68 ± 0.14	1.47	0.79 - 1.41
STW-945	Water	03/01/02	Co-60	349.20 ± 2.60	347.33	0.80 - 1.20
STW-945	Water	03/01/02	Cs-134	3.40 ± 0.60	3.36	0.80 - 1.30
STW-945	Water	03/01/02	Cs-137	57.20 ± 1.70	56.07	0.80 - 1.22
STW-945	Water	03/01/02	Pu-238	0.45 ± 0.11	0.49	0.74 - 1.20
STW-945	Water	03/01/02	Pu-239/40	4.47 ± 0.28	4.22	0.79 - 1.20
STW-945	Water	03/01/02	Sr-90	7.40 ± 1.30	7.58	0.69 - 1.34
STW-945	Water	03/01/02	Uranium	3.27 ± 0.43	2.84	0.75 - 1.33
STW-946	Water	03/01/02	Gr. Alpha	265.40 ± 7.70	375.00	0.58 - 1.29
STW-946	Water	03/01/02	Gr. Beta	930.60 ± 12.00	1030.00	0.61 - 1.43
STW-946	Water	03/01/02	H-3	226.30 ± 32.70	283.70	0.78 - 2.45
STSO-947	Soil	03/01/02	Ac-228	55.00 ± 5.50	51.17	0.80 - 1.38
STSO-947	Soil	03/01/02	Am-241	8.30 ± 3.30	10.93	0.65 - 2.28
STSO-947	Soil	03/01/02	Bi-212	49.20 ± 12.40	53.43	0.50 - 1.34
STSO-947	Soil	03/01/02	Bi-214	46.60 ± 3.10	53.93	0.78 - 1.42
STSO-947	Soil	03/01/02	Cs-137	1401.60 ± 9.10	1326.67	0.80 - 1.25
STSO-947	Soil	03/01/02	K-40	613.10 ± 28.10	621.67	0.80 - 1.32
STSO-947	Soil	03/01/02	Pb-212	51.60 ± 2.60	51.10	0.78 - 1.32
STSO-947	Soil	03/01/02	Pb-214	52.00 ± 3.60	54.37	0.76 - 1.46
STSO-947	Soil	03/01/02	Pu-239/40	14.70 ± 3.50	19.10	0.71 - 1.30
STSO-947	Soil	03/01/02	Sr-90	52.10 ± 6.30	53.76	0.67 - 2.90
STSO-947	Soil	03/01/02	Th-234	122.40 ± 6.30	89.30	0.63 - 2.35
STSO-947	Soil	03/01/02	Uranium	143.40 ± 9.40	194.77	0.71 - 1.32
STVE-948	Vegetation	03/01/02	Am-241	3.10 ± 2.20	2.23	0.73 - 2.02
STVE-948	Vegetation	03/01/02	Cm-244	0.90 ± 0.80	1.32	0.61 - 1.59
STVE-948	Vegetation	03/01/02	Co-60	13.50 ± 2.10	11.23	0.80 - 1.44
STVE-948	Vegetation	03/01/02	Cs-137	350.40 ± 6.30	313.67	0.80 - 1.31
STVE-948	Vegetation	03/01/02	K-40	940.80 ± 45.60	864.33	0.79 - 1.39
STVE-948[d]	Vegetation	03/01/02	Pu-239/40	16.90 ± 0.70	3.54	0.69 - 1.31
STVE-948	Vegetation	03/01/02	Sr-90	543.40 ± 24.90	586.28	0.55 - 1.21
STAP-949	Air Filter	03/01/02	Am-241	0.09 ± 0.05	0.09	0.70 - 2.34
STAP-949	Air Filter	03/01/02	Co-60	30.10 ± 0.30	30.52	0.80 - 1.26
STAP-949	Air Filter	03/01/02	Cs-137	29.90 ± 0.30	28.23	0.80 - 1.32
STAP-949	Air Filter	03/01/02	Mn-54	40.40 ± 0.40	38.53	0.80 - 1.35
STAP-949	Air Filter	03/01/02	Pu-238	0.05 ± 0.02	0.06	0.67 - 1.33
STAP-949	Air Filter	03/01/02	Pu-239/40	0.15 ± 0.02	0.19	0.73 - 1.26
STAP-949	Air Filter	03/01/02	Sr-90	3.40 ± 0.40	4.83	0.53 - 1.84
STAP-949	Air Filter	03/01/02	Uranium	0.80 ± 0.20	0.61	0.79 - 2.10
STAP-950	Air Filter	03/01/02	Gr. Alpha	0.43 ± 0.04	0.53	0.73 - 1.43
STAP-950	Air Filter	03/01/02	Gr. Beta	1.34 ± 0.05	1.30	0.76 - 1.36
STW-959	Water	09/01/02	Am-241	3.00 ± 0.10	3.04	0.79 - 1.41
STW-959	Water	09/01/02	Co-60	258.40 ± 2.30	268.67	0.80 - 1.20
STW-959	Water	09/01/02	Cs-134	50.80 ± 3.30	60.20	0.80 - 1.30
STW-959	Water	09/01/02	Cs-137	80.10 ± 0.30	81.43	0.80 - 1.22
STW-959	Water	09/01/02	Cs-137	80.10 ± 0.30	81.43	0.80 - 1.22
STW-959	Water	09/01/02	Am-241	3.00 ± 0.10	3.04	0.79 - 1.41

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

Lab Code	Type	Date	Analysis	Concentration[b] Laboratory results	EML Result[c]	Control Limits[d]
STW-959	Water	09/01/02	Am-241	3.00 ± 0.10	3.04	0.79 - 1.41
STW-959	Water	09/01/02	Co-60	258.40 ± 2.30	268.67	0.80 - 1.20
STW-959	Water	09/01/02	Cs-134	50.80 ± 3.30	60.20	0.80 - 1.30
STW-959	Water	09/01/02	Cs-137	80.10 ± 0.30	81.43	0.80 - 1.22
STW-959	Water	09/01/02	H-3	271.90 ± 20.90	227.30	0.78 - 2.45
STW-959	Water	09/01/02	Pu-238	4.40 ± 0.20	4.33	0.74 - 1.20
STW-959	Water	09/01/02	Pu-239/40	2.10 ± 0.10	2.07	0.79 - 1.20
STW-959	Water	09/01/02	Sr-90	9.70 ± 0.20	8.69	0.69 - 1.34
STW-959	Water	09/01/02	Uranium	5.60 ± 0.10	6.84	0.75 - 1.33
STW-960	Water	09/01/02	Gr. Alpha	204.90 ± 3.20	210.00	0.58 - 1.29
STW-960	Water	09/01/02	Gr. Beta	852.00 ± 26.50	900.00	0.61 - 1.43
STSO-961	Soil	09/01/02	Ac-228	47.60 ± 1.90	42.30	0.80 - 1.38
STSO-961	Soil	09/01/02	Am-241	7.80 ± 1.40	6.77	0.65 - 2.28
STSO-961	Soil	09/01/02	Bi-212	45.60 ± 1.70	45.93	0.50 - 1.34
STSO-961[e]	Soil	09/01/02	Bi-214	48.80 ± 4.90	33.63	0.78 - 1.42
STSO-961	Soil	09/01/02	Cs-137	819.60 ± 16.60	829.33	0.80 - 1.25
STSO-961	Soil	09/01/02	K-40	705.30 ± 31.40	637.67	0.80 - 1.32
STSO-961	Soil	09/01/02	Pb-212	48.60 ± 3.40	43.43	0.78 - 1.32
STSO-961	Soil	09/01/02	Pb-214	51.10 ± 5.10	35.20	0.76 - 1.46
STSO-961[f]	Soil	09/01/02	Pu-239/40	20.20 ± 0.80	12.90	0.71 - 1.30
STSO-961	Soil	09/01/02	Sr-90	38.50 ± 0.10	41.16	0.67 - 2.90
STSO-961[g]	Soil	09/01/02	Uranium	58.90 ± 0.70	87.21	0.71 - 1.32
STVE-962	Vegetation	09/01/02	Am-241	2.10 ± 0.30	2.25	0.73 - 2.02
STVE-962	Vegetation	09/01/02	Cm-244	1.00 ± 0.30	1.25	0.61 - 1.59
STVE-962	Vegetation	09/01/02	Co-60	11.80 ± 1.50	9.66	0.80 - 1.44
STVE-962	Vegetation	09/01/02	Cs-137	340.30 ± 16.80	300.67	0.80 - 1.31
STVE-962	Vegetation	09/01/02	K-40	1646.00 ± 74.40	1480.00	0.79 - 1.39
STVE-962	Vegetation	09/01/02	Pu-239/40	3.00 ± 0.30	3.43	0.69 - 1.31
STVE-962	Vegetation	09/01/02	Sr-90	345.60 ± 97.80	476.26	0.55 - 1.21
STAP-963[h]	Air Filter	09/01/02	Am-241	0.20 ± 0.01	0.19	0.70 - 2.34
STAP-963	Air Filter	09/01/02	Co-60	24.90 ± 0.60	23.00	0.80 - 1.26
STAP-963	Air Filter	09/01/02	Cs-137	38.00 ± 1.30	32.50	0.80 - 1.32
STAP-963	Air Filter	09/01/02	Mn-54	60.80 ± 1.90	52.20	0.80 - 1.35
STAP-963[h]	Air Filter	09/01/02	Pu-238	0.11 ± 0.02	0.12	0.67 - 1.33
STAP-963[h]	Air Filter	09/01/02	Pu-239/40	0.21 ± 0.01	0.21	0.73 - 1.26
STAP-963	Air Filter	09/01/02	Sr-90	5.20 ± 0.20	5.56	0.53 - 1.84
STAP-963[h]	Air Filter	09/01/02	Uranium	0.41 ± 0.04	0.47	0.79 - 2.10
STAP-964	Air Filter	09/01/02	Gr. Alpha	0.40 ± 0.10	0.29	0.73 - 1.43
STAP-964	Air Filter	09/01/02	Gr. Beta	0.80 ± 0.10	0.87	0.76 - 1.36

[a] Results are reported in Bq/L with the following exceptions: Air Filters (Bq/Filter), Soil and Vegetation (Bq/kg).

[b] The EML result listed is the mean of replicate determinations for each nuclide ± the standard error of the mean.

[c] Control limits are reported by EML as the ratio of Reported Value / EML value.

[d] An error was found in the conversion from pCi/g to Bq/kg. Corrected result : 2.84 ± 0.59 Bq/kg.

[e] Naturally-occurring radium daughters are present in the shield background, and a probable cause of the higher bias seen for isotopes of lead and bismuth.

[f] Reporting error.The average result of the triplicate analyses was 14.1± 5.7 Bq/kg.

[g] The analysis was repeated in duplicate; result of reanalysis, 87.05 ± 7.64 Bq/kg.

[h] STAP-963, Calculations for the transuranics analyses (Am-241, Uranium, Pu-238, -239/40) were not converted to Bq/total filter. The data listed is the result of recalculation.

APPENDIX B, 2002 REMP DATA SUMMARY REPORTS

Air Gamma Spectral Summary Report 2002
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 Collecte and Range
Air pCi/m3	Be-7 28	N/A	0.06 28 / 28 0.04 - 0.07	0.06 24 / 24 0.04 - 0.07	5 0.60 SW	0.07 4 / 20 0.06 - 0.07	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 2002
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 Collecte and Range
Air pCi/m3	Gross Beta 364	0.01	0.02 364 / 364 0.01 - 0.04	0.02 312 / 312 0.01 - 0.04	5 0.60 SW	0.02 52 / 52 0.01 - 0.04	0.02 52 / 52 0.01 - 0.04

Air Iodine Summary Report 2002
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	Mean and Number Detected/Number Collected and Range	Mean of Results from All Control Locations and Number Detected/Number Collecte and Range
Air pCi/m3	I-131 364	0.05	LLD	-	-	-	-

Fish Gamma Spectral Summary Report 2002
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 Collecte and Range
Fish pCi/kg wet	Co-58 3	97.00	LLD	-	-	-	-
Fish pCi/kg wet	Co-60 3	97.00	LLD	-	-	-	-
Fish pCi/kg wet	Cs-134 3	97.00	LLD	-	-	-	-
Fish pCi/kg wet	Cs-137 3	112.00	LLD	-	-	-	-
Fish pCi/kg wet	Fe-59 3	195.00	LLD	-	-	-	-
Fish pCi/kg wet	K-40 3	N/A	1,691.40 3 / 3 1,585.40 - 1,840.60	1,616.80 2 / 2 1,585.40 - 1,648.20	32 15.80 WSW	1,840.60 1 / 8 1,840.60 - 1,840.60	1,840.60 1 / 1 1,840.60 - 1,840.60
Fish pCi/kg wet	Mn-54 3	97.00	LLD	-	-	-	-
Fish pCi/kg wet	Zn-65 3	195.00	LLD	-	-	-	-

Food Products Gamma Spectral Summary Report 2002
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	Mean and Number Detected/Number Collected and Range	Mean of Results from All Control Locations and Number Detected/Number Collecte and Range
Food Products pCi/kg wet	Be-7 66	N/A	272.68 13 / 66 192.39 - 432.76	256.27 9 / 51 192.39 - 306.82	70 16.20 SSW	309.60 4 / 105 199.24 - 432.76	309.60 4 / 15 199.24 - 432.76
Food Products pCi/kg wet	Co-58 66	N/A	LLD	-	-	-	-
Food Products pCi/kg wet	Co-60 66	N/A	LLD	-	-	-	-
Food Products pCi/kg wet	Cs-134 66	45.00	LLD	-	-	-	-
Food Products pCi/kg wet	Cs-137 66	60.00	LLD	-	-	-	-
Food Products pCi/kg wet	I-131 66	45.00	LLD	-	-	-	-
Food Products pCi/kg wet	K-40 66	N/A	5,275.50 66 / 66 2,359.90 - 11,011.00	5,207.55 51 / 51 2,359.90 - 11,011.00	16 0.80 S	6,652.98 11 / 77 3,451.40 - 11,011.00	5,506.53 15 / 15 2,433.00 - 10,081.00

Milk Gamma Spectral Summary Report 2002
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 Collecte and Range
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 pCi/L	K-40 50	N/A	1,406.85 49 / 50 736.00 - 1,968.00	1,482.06 31 / 31 1,147.90 - 1,968.00	61 7.40 SE	1,740.04 14 / 70 1,608.90 - 1,968.00	1,277.32 18 / 19 736.00 - 1,524.00
Milk pCi/L	La-140 50	11.00	LLD	-	-	-	-

Milk Iodine Summary Report 2002
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 Collecte and Range
Milk pCi/L	I-131 50	0.75	LLD	-	-	-	-

Sediment Gamma Spectral Summary Report 2002
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	Mean and Number Detected/Number Collected and Range	Mean of Results from All Control Locations and Number Detected/Number Collecte and Range
Sediment pCi/kg dry	Co-58 14	50.00	LLD	-	-	-	-
Sediment pCi/kg dry	Co-60 14	40.00	101.16 1 / 14 101.16 - 101.16	101.16 1 / 12 101.16 - 101.16	64 0.09 NW	101.16 1 / 10 101.16 - 101.16	LLD 0 / 2
Sediment pCi/kg dry	Cs-134 14	112.00	LLD	-	-	-	-
Sediment pCi/kg dry	Cs-137 14	135.00	946.61 7 / 14 151.14 - 3,511.30	1,095.92 5 / 12 151.14 - 3,511.30	64 0.09 NW	3,511.30 1 / 10 3,511.30 - 3,511.30	573.35 2 / 2 161.60 - 985.10
Sediment pCi/kg dry	K-40 14	N/A	13,193.17 14 / 14 8,315.20 - 25,517.00	11,764.20 12 / 12 8,315.20 - 18,360.00	32 15.80 WSW	21,767.00 2 / 10 18,017.00 - 25,517.00	21,767.00 2 / 2 18,017.00 - 25,517.00

TLD Gamma Dose Summary Report 2002
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 Analysis Performed	Lower Limit (LLD)	Mean of Results from All Location 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:		Mean of Results from All Control Locations and Number Detected/Number Collected and Range
					Location # and Distance and Direction	Mean and Number Detected/Number Collected and Range	
TLD	Direct 112	1.00	15.59 112 / 112 10.72 – 21.61	15.57 104 / 104 10.72 – 21.61	29 4.30 SSE	20.20 4 / 4 18.27 – 21.61	15.86 8 / 8 13.89 – 17.58
TLD	Direct 111	1.0	15.07 111 / 111 8.20 – 21.76	15.09 103 / 103 8.20 – 21.76	33 4.50 S	20.03 4 / 4 18.01 – 21.76	14.83 8 / 8 12.03 – 16.90
TLD	Direct 28	1.00	61.91 28 / 28 50.24 – 78.93	62.07 26 / 26 50.24 – 78.93	36 3.90 WSW	78.93 1 / 1 78.93 – 78.93	59.81 2 / 2 54.51 – 65.10

Water Gamma Spectral Summary Report 2002
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	Mean and Number Detected/Number Collected and Range	Mean of Results from All Control Locations and Number Detected/Number Collecte and Range
Water pCi/L	Ba-140 58	45.00	LLD	-	-	-	-
Water pCi/L	Co-58 58	11.00	LLD	-	-	-	-
Water pCi/L	Co-60 58	11.00	LLD	-	-	-	-
Water pCi/L	Cs-134 58	11.00	LLD	-	-	-	-
Water pCi/L	Cs-137 58	13.00	LLD	-	-	-	-
Water pCi/L	Fe-59 58	22.00	LLD	-	-	-	-
Water pCi/L	La-140 58	11.00	LLD	-	-	-	-
Water pCi/L	Mn-54 58	11.00	LLD	-	-	-	-
Water pCi/L	Nb-95 58	11.00	LLD	-	-	-	-
Water pCi/L	Zn-65 58	22.00	LLD	-	-	-	-
Water pCi/L	Zr-95 58	22.00	LLD	-	-	-	-

Water Gross Beta Summary Report 2002
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	Mean and Number Detected/Number Collected and Range	Mean of Results from All Control Locations and Number Detected/Number Collecte and Range
Water pCi/L	Gross Beta 58	3.00	3.57 9 / 58 3.09 - 5.24	3.62 8 / 46 3.09 - 5.24	59 4.00 ENE	3.92 4 / 11 3.14 - 5.24	3.17 1 / 12 3.17 - 3.17

Water Tritium Summary Report 2002
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	Mean and Number Detected/Number Collected and Range	Mean of Results from All Control Locations and Number Detected/Number Collecte and Range
Water pCi/L	H-3 18	1,500.00	LLD	-	-	-	-

APPENDIX C, 2002 REMP DETAILED DATA REPORTS

Air Gamma Spectral Detail Report 2002

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	4/3/02	0.063 +/- 0.012	< 0.000	< 0.000	< 0.000	< 0.000
1	Air	7/3/02	0.066 +/- 0.011	< 0.000	< 0.001	< 0.000	< 0.000
1	Air	10/2/02	0.058 +/- 0.008	< 0.000	< 0.000	< 0.000	< 0.000
1	Air	12/31/02	0.057 +/- 0.010	< 0.000	< 0.000	< 0.000	< 0.000
3	Air	4/3/02	0.061 +/- 0.010	< 0.000	< 0.000	< 0.000	< 0.000
3	Air	7/3/02	0.062 +/- 0.010	< 0.000	< 0.001	< 0.000	< 0.000
3	Air	10/2/02	0.060 +/- 0.008	< 0.000	< 0.000	< 0.000	< 0.000
3	Air	12/31/02	0.052 +/- 0.009	< 0.000	< 0.000	< 0.000	< 0.000
4	Air	4/3/02	0.057 +/- 0.010	< 0.000	< 0.001	< 0.000	< 0.000
4	Air	7/3/02	0.075 +/- 0.012	< 0.000	< 0.001	< 0.000	< 0.000
4	Air	10/2/02	0.072 +/- 0.011	< 0.000	< 0.000	< 0.000	< 0.000

Air Gamma Spectral Detail Report 2002

Radiological Environmental Monitoring Program Detail Data

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

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

Location	Sample Type	Collection Date	Be-7	Co-58	Co-60	Cs-134	Cs-137
4	Air	12/31/02	0.043 +/- 0.006	< 0.000	< 0.000	< 0.000	< 0.000
5	Air	4/3/02	0.070 +/- 0.014	< 0.000	< 0.000	< 0.000	< 0.000
5	Air	7/3/02	0.068 +/- 0.012	< 0.000	< 0.001	< 0.000	< 0.000
5	Air	10/2/02	0.071 +/- 0.011	< 0.000	< 0.000	< 0.000	< 0.000
5	Air	12/31/02	0.056 +/- 0.010	< 0.000	< 0.000	< 0.000	< 0.000
6	Air	4/3/02	0.054 +/- 0.012	< 0.000	< 0.000	< 0.000	< 0.000
6	Air	7/3/02	0.070 +/- 0.010	< 0.000	< 0.001	< 0.000	< 0.000
6	Air	10/2/02	0.069 +/- 0.011	< 0.000	< 0.000	< 0.000	< 0.000
6	Air	12/31/02	0.052 +/- 0.011	< 0.000	< 0.000	< 0.000	< 0.000
7	Air	4/3/02	0.049 +/- 0.010	< 0.000	< 0.000	< 0.000	< 0.000
7	Air	7/3/02	0.064 +/- 0.012	< 0.000	< 0.001	< 0.000	< 0.000

Air Gamma Spectral Detail Report 2002

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	10/2/02	0.066 +/- 0.011	< 0.000	< 0.000	< 0.000	< 0.000
7	Air	12/31/02	0.055 +/- 0.009	< 0.000	< 0.000	< 0.000	< 0.000
35	Air	4/3/02	0.067 +/- 0.012	< 0.000	< 0.000	< 0.000	< 0.001
35	Air	7/3/02	0.072 +/- 0.011	< 0.000	< 0.001	< 0.000	< 0.000
35	Air	10/2/02	0.067 +/- 0.009	< 0.000	< 0.000	< 0.000	< 0.000
35	Air	12/31/02	0.045 +/- 0.009	< 0.000	< 0.000	< 0.000	< 0.001

Air Gross Beta Detail Report 2002

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			
1/9/02	Air	0.033 +/- 0.003 0.038 +/- 0.004	0.031 +/- 0.003 0.030 +/- 0.003	0.030 +/- 0.003	0.033 +/- 0.003	0.032 +/- 0.003
1/16/02	Air	0.021 +/- 0.003 0.021 +/- 0.003	0.022 +/- 0.003 0.023 +/- 0.003	0.023 +/- 0.003	0.022 +/- 0.003	0.020 +/- 0.003
1/23/02	Air	0.029 +/- 0.003 0.031 +/- 0.003	0.029 +/- 0.003 0.030 +/- 0.003	0.029 +/- 0.003	0.038 +/- 0.003	0.032 +/- 0.003
1/30/02	Air	0.029 +/- 0.003 0.027 +/- 0.003	0.029 +/- 0.003 0.028 +/- 0.003	0.027 +/- 0.003	0.032 +/- 0.003	0.028 +/- 0.003
2/6/02	Air	0.021 +/- 0.003 0.021 +/- 0.003	0.020 +/- 0.002 0.024 +/- 0.003	0.020 +/- 0.002	0.025 +/- 0.003	0.016 +/- 0.002
2/13/02	Air	0.031 +/- 0.003 0.032 +/- 0.003	0.029 +/- 0.003 0.034 +/- 0.003	0.031 +/- 0.003	0.033 +/- 0.003	0.030 +/- 0.003
2/20/02	Air	0.018 +/- 0.003 0.019 +/- 0.003	0.019 +/- 0.003 0.021 +/- 0.003	0.018 +/- 0.003	0.025 +/- 0.003	0.019 +/- 0.003
2/27/02	Air	0.017 +/- 0.002 0.018 +/- 0.002	0.018 +/- 0.002 0.020 +/- 0.003	0.015 +/- 0.002	0.017 +/- 0.002	0.019 +/- 0.002
3/6/02	Air	0.026 +/- 0.003 0.026 +/- 0.003	0.027 +/- 0.003 0.028 +/- 0.003	0.024 +/- 0.003	0.035 +/- 0.003	0.026 +/- 0.003
3/13/02	Air	0.032 +/- 0.003 0.032 +/- 0.003	0.029 +/- 0.003 0.034 +/- 0.003	0.032 +/- 0.003	0.033 +/- 0.003	0.032 +/- 0.003
3/20/02	Air	0.024 +/- 0.003 0.021 +/- 0.003	0.022 +/- 0.003 0.024 +/- 0.003	0.022 +/- 0.003	0.025 +/- 0.003	0.022 +/- 0.003
3/27/02	Air	0.024 +/- 0.003 0.024 +/- 0.003	0.022 +/- 0.002 0.023 +/- 0.003	0.020 +/- 0.002	0.024 +/- 0.003	0.022 +/- 0.002
4/3/02	Air	0.022 +/- 0.003 0.022 +/- 0.003	0.021 +/- 0.002 0.024 +/- 0.003	0.021 +/- 0.003	0.022 +/- 0.003	0.021 +/- 0.003
4/10/02	Air	0.020 +/- 0.003 0.019 +/- 0.002	0.016 +/- 0.002 0.019 +/- 0.003	0.017 +/- 0.002	0.023 +/- 0.003	0.018 +/- 0.002
4/16/02	Air	0.021 +/- 0.003 0.018 +/- 0.003	0.018 +/- 0.003 0.019 +/- 0.003	0.018 +/- 0.003	0.023 +/- 0.003	0.020 +/- 0.003

Air Gross Beta Detail Report 2002

Radiological Environmental Monitoring Program Data Summary

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

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

		Location				
		1	3	4	5	6
Collection Date	Sample Type	7	35			
4/24/02	Air	0.019 +/- 0.002 0.021 +/- 0.002	0.020 +/- 0.002 0.020 +/- 0.002	0.024 +/- 0.002	0.021 +/- 0.002	0.021 +/- 0.002
5/1/02	Air	0.017 +/- 0.002 0.018 +/- 0.002	0.018 +/- 0.002 0.016 +/- 0.002	0.020 +/- 0.002	0.018 +/- 0.002	0.018 +/- 0.002
5/8/02	Air	0.017 +/- 0.002 0.017 +/- 0.003	0.018 +/- 0.002 0.016 +/- 0.002	0.018 +/- 0.003	0.019 +/- 0.003	0.018 +/- 0.003
5/15/02	Air	0.016 +/- 0.002 0.017 +/- 0.003	0.019 +/- 0.003 0.017 +/- 0.002	0.018 +/- 0.003	0.017 +/- 0.003	0.019 +/- 0.003
5/22/02	Air	0.010 +/- 0.002 0.010 +/- 0.002	0.010 +/- 0.002 0.010 +/- 0.002	0.010 +/- 0.002	0.013 +/- 0.002	0.011 +/- 0.002
5/29/02	Air	0.015 +/- 0.002 0.015 +/- 0.002	0.014 +/- 0.002 0.014 +/- 0.002	0.015 +/- 0.002	0.015 +/- 0.002	0.015 +/- 0.002
6/5/02	Air	0.015 +/- 0.002 0.016 +/- 0.002	0.018 +/- 0.002 0.015 +/- 0.002	0.018 +/- 0.002	0.016 +/- 0.002	0.018 +/- 0.002
6/12/02	Air	0.019 +/- 0.002 0.022 +/- 0.003	0.019 +/- 0.002 0.019 +/- 0.002	0.022 +/- 0.002	0.020 +/- 0.002	0.022 +/- 0.003
6/19/02	Air	0.013 +/- 0.002 0.011 +/- 0.003	0.010 +/- 0.002 0.011 +/- 0.002	0.012 +/- 0.002	0.015 +/- 0.003	0.016 +/- 0.003
6/26/02	Air	0.028 +/- 0.003 0.029 +/- 0.003	0.028 +/- 0.002 0.028 +/- 0.003	0.028 +/- 0.003	0.029 +/- 0.003	0.028 +/- 0.003
7/3/02	Air	0.022 +/- 0.002 0.022 +/- 0.003	0.021 +/- 0.002 0.021 +/- 0.002	0.025 +/- 0.003	0.021 +/- 0.003	0.024 +/- 0.003
7/10/02	Air	0.020 +/- 0.003 0.019 +/- 0.003	0.019 +/- 0.003 0.019 +/- 0.003	0.023 +/- 0.003	0.021 +/- 0.003	0.021 +/- 0.003
7/17/02	Air	0.020 +/- 0.003 0.021 +/- 0.003	0.019 +/- 0.002 0.019 +/- 0.002	0.023 +/- 0.003	0.023 +/- 0.003	0.019 +/- 0.003
7/24/02	Air	0.024 +/- 0.002 0.029 +/- 0.003	0.026 +/- 0.003 0.025 +/- 0.003	0.031 +/- 0.003	0.027 +/- 0.003	0.028 +/- 0.003
7/31/02	Air	0.020 +/- 0.002 0.019 +/- 0.003	0.020 +/- 0.002 0.020 +/- 0.002	0.021 +/- 0.003	0.021 +/- 0.002	0.019 +/- 0.002

Air Gross Beta Detail Report 2002

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			
8/7/02	Air	0.022 +/- 0.003 0.027 +/- 0.003	0.024 +/- 0.003 0.025 +/- 0.003	0.025 +/- 0.003	0.026 +/- 0.003	0.025 +/- 0.003
8/14/02	Air	0.027 +/- 0.003 0.025 +/- 0.003	0.027 +/- 0.003 0.024 +/- 0.003	0.027 +/- 0.003	0.028 +/- 0.003	0.024 +/- 0.003
8/21/02	Air	0.017 +/- 0.002 0.017 +/- 0.002	0.018 +/- 0.002 0.015 +/- 0.002	0.020 +/- 0.002	0.019 +/- 0.002	0.021 +/- 0.003
8/28/02	Air	0.025 +/- 0.002 0.028 +/- 0.003	0.024 +/- 0.002 0.025 +/- 0.002	0.027 +/- 0.003	0.028 +/- 0.003	0.028 +/- 0.003
9/4/02	Air	0.018 +/- 0.003 0.019 +/- 0.003	0.019 +/- 0.003 0.018 +/- 0.003	0.019 +/- 0.003	0.019 +/- 0.003	0.022 +/- 0.003
9/11/02	Air	0.026 +/- 0.003 0.029 +/- 0.003	0.026 +/- 0.003 0.029 +/- 0.003	0.029 +/- 0.003	0.029 +/- 0.003	0.029 +/- 0.003
9/18/02	Air	0.027 +/- 0.003 0.026 +/- 0.003	0.024 +/- 0.002 0.025 +/- 0.002	0.026 +/- 0.003	0.026 +/- 0.003	0.026 +/- 0.003
9/25/02	Air	0.024 +/- 0.002 0.023 +/- 0.003	0.021 +/- 0.002 0.022 +/- 0.002	0.029 +/- 0.003	0.025 +/- 0.003	0.026 +/- 0.003
10/2/02	Air	0.030 +/- 0.003 0.031 +/- 0.003	0.028 +/- 0.003 0.031 +/- 0.003	0.030 +/- 0.003	0.030 +/- 0.003	0.031 +/- 0.003
10/9/02	Air	0.025 +/- 0.003 0.024 +/- 0.003	0.021 +/- 0.002 0.022 +/- 0.002	0.025 +/- 0.003	0.022 +/- 0.003	0.021 +/- 0.003
10/16/02	Air	0.029 +/- 0.003 0.030 +/- 0.003	0.030 +/- 0.003 0.033 +/- 0.003	0.032 +/- 0.003	0.032 +/- 0.003	0.027 +/- 0.003
10/23/02	Air	0.022 +/- 0.003 0.021 +/- 0.002	0.021 +/- 0.002 0.021 +/- 0.003	0.024 +/- 0.003	0.021 +/- 0.003	0.020 +/- 0.003
10/30/02	Air	0.017 +/- 0.003 0.020 +/- 0.003	0.017 +/- 0.003 0.018 +/- 0.003	0.021 +/- 0.003	0.017 +/- 0.003	0.017 +/- 0.003
11/6/02	Air	0.035 +/- 0.003 0.037 +/- 0.003	0.038 +/- 0.003 0.035 +/- 0.003	0.042 +/- 0.003	0.036 +/- 0.003	0.041 +/- 0.003
11/13/02	Air	0.041 +/- 0.003 0.038 +/- 0.003	0.035 +/- 0.003 0.038 +/- 0.002	0.035 +/- 0.003	0.038 +/- 0.003	0.042 +/- 0.003

Air Gross Beta Detail Report 2002

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			
11/20/02	Air	0.022 +/- 0.003 0.019 +/- 0.003	0.019 +/- 0.003 0.015 +/- 0.003	0.017 +/- 0.003	0.020 +/- 0.003	0.020 +/- 0.003
11/27/02	Air	0.024 +/- 0.003 0.023 +/- 0.003	0.022 +/- 0.002 0.023 +/- 0.003	0.020 +/- 0.002	0.025 +/- 0.003	0.022 +/- 0.003
12/4/02	Air	0.022 +/- 0.003 0.023 +/- 0.003	0.021 +/- 0.002 0.020 +/- 0.002	0.018 +/- 0.002	0.022 +/- 0.002	0.021 +/- 0.003
12/11/02	Air	0.040 +/- 0.003 0.034 +/- 0.003	0.033 +/- 0.003 0.029 +/- 0.003	0.029 +/- 0.003	0.033 +/- 0.003	0.034 +/- 0.003
12/18/02	Air	0.042 +/- 0.003 0.039 +/- 0.003	0.040 +/- 0.003 0.039 +/- 0.003	0.034 +/- 0.003	0.040 +/- 0.003	0.040 +/- 0.003
12/24/02	Air	0.027 +/- 0.003 0.025 +/- 0.003	0.027 +/- 0.003 0.025 +/- 0.003	0.025 +/- 0.003	0.028 +/- 0.003	0.029 +/- 0.003
12/31/02	Air	0.032 +/- 0.003 0.031 +/- 0.003	0.027 +/- 0.003 0.028 +/- 0.003	0.029 +/- 0.003	0.027 +/- 0.003	0.030 +/- 0.003

Air Iodine Detail Report 2002
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	1/9/02	< 0.004
1	Air	1/16/02	< 0.005
1	Air	1/23/02	< 0.005
1	Air	1/30/02	< 0.005
1	Air	2/6/02	< 0.004
1	Air	2/13/02	< 0.004
1	Air	2/20/02	< 0.005
1	Air	2/27/02	< 0.005
1	Air	3/6/02	< 0.005
1	Air	3/13/02	< 0.005
1	Air	3/20/02	< 0.005
1	Air	3/27/02	< 0.003
1	Air	4/3/02	< 0.005
1	Air	4/10/02	< 0.005
1	Air	4/16/02	< 0.008
1	Air	4/24/02	< 0.003
1	Air	5/1/02	< 0.004
1	Air	5/8/02	< 0.004
1	Air	5/15/02	< 0.003
1	Air	5/22/02	< 0.003
1	Air	5/29/02	< 0.003
1	Air	6/5/02	< 0.004
1	Air	6/12/02	< 0.003
1	Air	6/19/02	< 0.005
1	Air	6/26/02	< 0.004
1	Air	7/3/02	< 0.007
1	Air	7/10/02	< 0.003
1	Air	7/17/02	< 0.004
1	Air	7/24/02	< 0.005
1	Air	7/31/02	< 0.003
1	Air	8/7/02	< 0.005
1	Air	8/14/02	< 0.005
1	Air	8/21/02	< 0.004
1	Air	8/28/02	< 0.003
1	Air	9/4/02	< 0.003
1	Air	9/11/02	< 0.004
1	Air	9/18/02	< 0.006
1	Air	9/25/02	< 0.005
1	Air	10/2/02	< 0.004
1	Air	10/9/02	< 0.005
1	Air	10/16/02	< 0.003
1	Air	10/23/02	< 0.003

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	10/30/02	< 0.004
1	Air	11/6/02	< 0.005
1	Air	11/13/02	< 0.003
1	Air	11/20/02	< 0.003
1	Air	11/27/02	< 0.004
1	Air	12/4/02	< 0.003
1	Air	12/11/02	< 0.005
1	Air	12/18/02	< 0.006
1	Air	12/24/02	< 0.004
1	Air	12/31/02	< 0.007
3	Air	1/9/02	< 0.004
3	Air	1/16/02	< 0.004
3	Air	1/23/02	< 0.004
3	Air	1/30/02	< 0.005
3	Air	2/6/02	< 0.004
3	Air	2/13/02	< 0.003
3	Air	2/20/02	< 0.004
3	Air	2/27/02	< 0.005
3	Air	3/6/02	< 0.005
3	Air	3/13/02	< 0.005
3	Air	3/20/02	< 0.004
3	Air	3/27/02	< 0.003
3	Air	4/3/02	< 0.004
3	Air	4/10/02	< 0.004
3	Air	4/16/02	< 0.008
3	Air	4/24/02	< 0.003
3	Air	5/1/02	< 0.004
3	Air	5/8/02	< 0.004
3	Air	5/15/02	< 0.003
3	Air	5/22/02	< 0.003
3	Air	5/29/02	< 0.003
3	Air	6/5/02	< 0.004
3	Air	6/12/02	< 0.003
3	Air	6/19/02	< 0.005
3	Air	6/26/02	< 0.004
3	Air	7/3/02	< 0.007
3	Air	7/10/02	< 0.003
3	Air	7/17/02	< 0.004
3	Air	7/24/02	< 0.005
3	Air	7/31/02	< 0.003
3	Air	8/7/02	< 0.005
3	Air	8/14/02	< 0.005

Air Iodine Detail Report 2002

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	8/21/02	< 0.004
3	Air	8/28/02	< 0.003
3	Air	9/4/02	< 0.003
3	Air	9/11/02	< 0.003
3	Air	9/18/02	< 0.006
3	Air	9/25/02	< 0.005
3	Air	10/2/02	< 0.003
3	Air	10/9/02	< 0.005
3	Air	10/16/02	< 0.003
3	Air	10/23/02	< 0.003
3	Air	10/30/02	< 0.004
3	Air	11/6/02	< 0.005
3	Air	11/13/02	< 0.003
3	Air	11/20/02	< 0.003
3	Air	11/27/02	< 0.003
3	Air	12/4/02	< 0.002
3	Air	12/11/02	< 0.005
3	Air	12/18/02	< 0.006
3	Air	12/24/02	< 0.004
3	Air	12/31/02	< 0.007
4	Air	1/9/02	< 0.004
4	Air	1/16/02	< 0.004
4	Air	1/23/02	< 0.004
4	Air	1/30/02	< 0.005
4	Air	2/6/02	< 0.004
4	Air	2/13/02	< 0.004
4	Air	2/20/02	< 0.004
4	Air	2/27/02	< 0.005
4	Air	3/6/02	< 0.005
4	Air	3/13/02	< 0.005
4	Air	3/20/02	< 0.004
4	Air	3/27/02	< 0.003
4	Air	4/3/02	< 0.004
4	Air	4/10/02	< 0.005
4	Air	4/16/02	< 0.008
4	Air	4/24/02	< 0.004
4	Air	5/1/02	< 0.004
4	Air	5/8/02	< 0.004
4	Air	5/15/02	< 0.003
4	Air	5/22/02	< 0.003
4	Air	5/29/02	< 0.004
4	Air	6/5/02	< 0.004

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

Air Iodine Detail Report 2002
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	4/3/02	< 0.005
5	Air	4/10/02	< 0.005
5	Air	4/16/02	< 0.009
5	Air	4/24/02	< 0.004
5	Air	5/1/02	< 0.004
5	Air	5/8/02	< 0.004
5	Air	5/15/02	< 0.003
5	Air	5/22/02	< 0.003
5	Air	5/29/02	< 0.004
5	Air	6/5/02	< 0.004
5	Air	6/12/02	< 0.003
5	Air	6/19/02	< 0.006
5	Air	6/26/02	< 0.004
5	Air	7/3/02	< 0.008
5	Air	7/10/02	< 0.003
5	Air	7/17/02	< 0.005
5	Air	7/24/02	< 0.005
5	Air	7/31/02	< 0.003
5	Air	8/7/02	< 0.005
5	Air	8/14/02	< 0.005
5	Air	8/21/02	< 0.004
5	Air	8/28/02	< 0.003
5	Air	9/4/02	< 0.003
5	Air	9/11/02	< 0.004
5	Air	9/18/02	< 0.007
5	Air	9/25/02	< 0.006
5	Air	10/2/02	< 0.004
5	Air	10/9/02	< 0.006
5	Air	10/16/02	< 0.003
5	Air	10/23/02	< 0.003
5	Air	10/30/02	< 0.004
5	Air	11/6/02	< 0.005
5	Air	11/13/02	< 0.003
5	Air	11/20/02	< 0.003
5	Air	11/27/02	< 0.003
5	Air	12/4/02	< 0.003
5	Air	12/11/02	< 0.005
5	Air	12/18/02	< 0.006
5	Air	12/24/02	< 0.004
5	Air	12/31/02	< 0.007
6	Air	1/9/02	< 0.004
6	Air	1/16/02	< 0.004

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	1/23/02	< 0.004
6	Air	1/30/02	< 0.005
6	Air	2/6/02	< 0.004
6	Air	2/13/02	< 0.003
6	Air	2/20/02	< 0.004
6	Air	2/27/02	< 0.005
6	Air	3/6/02	< 0.005
6	Air	3/13/02	< 0.005
6	Air	3/20/02	< 0.005
6	Air	3/27/02	< 0.003
6	Air	4/3/02	< 0.004
6	Air	4/10/02	< 0.005
6	Air	4/16/02	< 0.008
6	Air	4/24/02	< 0.004
6	Air	5/1/02	< 0.004
6	Air	5/8/02	< 0.004
6	Air	5/15/02	< 0.003
6	Air	5/22/02	< 0.003
6	Air	5/29/02	< 0.004
6	Air	6/5/02	< 0.004
6	Air	6/12/02	< 0.003
6	Air	6/19/02	< 0.006
6	Air	6/26/02	< 0.005
6	Air	7/3/02	< 0.008
6	Air	7/10/02	< 0.003
6	Air	7/17/02	< 0.005
6	Air	7/24/02	< 0.005
6	Air	7/31/02	< 0.003
6	Air	8/7/02	< 0.005
6	Air	8/14/02	< 0.005
6	Air	8/21/02	< 0.005
6	Air	8/28/02	< 0.003
6	Air	9/4/02	< 0.003
6	Air	9/11/02	< 0.004
6	Air	9/18/02	< 0.008
6	Air	9/25/02	< 0.006
6	Air	10/2/02	< 0.004
6	Air	10/9/02	< 0.006
6	Air	10/16/02	< 0.003
6	Air	10/23/02	< 0.004
6	Air	10/30/02	< 0.004
6	Air	11/6/02	< 0.006
6	Air	11/13/02	< 0.003

Air Iodine Detail Report 2002
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	11/20/02	< 0.003
6	Air	11/27/02	< 0.004
6	Air	12/4/02	< 0.003
6	Air	12/11/02	< 0.005
6	Air	12/18/02	< 0.006
6	Air	12/24/02	< 0.004
6	Air	12/31/02	< 0.007
7	Air	1/9/02	< 0.004
7	Air	1/16/02	< 0.006
7	Air	1/23/02	< 0.005
7	Air	1/30/02	< 0.005
7	Air	2/6/02	< 0.004
7	Air	2/13/02	< 0.004
7	Air	2/20/02	< 0.004
7	Air	2/27/02	< 0.005
7	Air	3/6/02	< 0.005
7	Air	3/13/02	< 0.005
7	Air	3/20/02	< 0.005
7	Air	3/27/02	< 0.003
7	Air	4/3/02	< 0.004
7	Air	4/10/02	< 0.005
7	Air	4/16/02	< 0.008
7	Air	4/24/02	< 0.004
7	Air	5/1/02	< 0.004
7	Air	5/8/02	< 0.004
7	Air	5/15/02	< 0.003
7	Air	5/22/02	< 0.003
7	Air	5/29/02	< 0.004
7	Air	6/5/02	< 0.004
7	Air	6/12/02	< 0.003
7	Air	6/19/02	< 0.006
7	Air	6/26/02	< 0.005
7	Air	7/3/02	< 0.008
7	Air	7/10/02	< 0.003
7	Air	7/17/02	< 0.005
7	Air	7/24/02	< 0.005
7	Air	7/31/02	< 0.004
7	Air	8/7/02	< 0.006
7	Air	8/14/02	< 0.005
7	Air	8/21/02	< 0.005
7	Air	8/28/02	< 0.003
7	Air	9/4/02	< 0.003

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	9/11/02	< 0.004
7	Air	9/18/02	< 0.007
7	Air	9/25/02	< 0.006
7	Air	10/2/02	< 0.004
7	Air	10/9/02	< 0.005
7	Air	10/16/02	< 0.003
7	Air	10/23/02	< 0.003
7	Air	10/30/02	< 0.004
7	Air	11/6/02	< 0.005
7	Air	11/13/02	< 0.003
7	Air	11/20/02	< 0.003
7	Air	11/27/02	< 0.003
7	Air	12/4/02	< 0.003
7	Air	12/11/02	< 0.005
7	Air	12/18/02	< 0.006
7	Air	12/24/02	< 0.004
7	Air	12/31/02	< 0.007
35	Air	1/9/02	< 0.003
35	Air	1/16/02	< 0.003
35	Air	1/23/02	< 0.002
35	Air	1/30/02	< 0.005
35	Air	2/6/02	< 0.005
35	Air	2/13/02	< 0.005
35	Air	2/20/02	< 0.006
35	Air	2/27/02	< 0.002
35	Air	3/6/02	< 0.002
35	Air	3/13/02	< 0.004
35	Air	3/20/02	< 0.002
35	Air	3/27/02	< 0.003
35	Air	4/3/02	< 0.002
35	Air	4/10/02	< 0.002
35	Air	4/16/02	< 0.004
35	Air	4/24/02	< 0.002
35	Air	5/1/02	< 0.003
35	Air	5/8/02	< 0.002
35	Air	5/15/02	< 0.003
35	Air	5/22/02	< 0.002
35	Air	5/29/02	< 0.003
35	Air	6/5/02	< 0.002
35	Air	6/12/02	< 0.002
35	Air	6/19/02	< 0.002
35	Air	6/26/02	< 0.003

Air Iodine Detail Report 2002

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	7/3/02	< 0.004
35	Air	7/10/02	< 0.003
35	Air	7/17/02	< 0.003
35	Air	7/24/02	< 0.002
35	Air	7/31/02	< 0.003
35	Air	8/7/02	< 0.003
35	Air	8/14/02	< 0.004
35	Air	8/21/02	< 0.002
35	Air	8/28/02	< 0.005
35	Air	9/4/02	< 0.008
35	Air	9/11/02	< 0.006
35	Air	9/18/02	< 0.005
35	Air	9/25/02	< 0.005
35	Air	10/2/02	< 0.004
35	Air	10/9/02	< 0.006
35	Air	10/16/02	< 0.004
35	Air	10/23/02	< 0.007
35	Air	10/30/02	< 0.006
35	Air	11/6/02	< 0.007
35	Air	11/13/02	< 0.006
35	Air	11/20/02	< 0.006
35	Air	11/27/02	< 0.009
35	Air	12/4/02	< 0.005
35	Air	12/11/02	< 0.007
35	Air	12/18/02	< 0.004
35	Air	12/24/02	< 0.010
35	Air	12/31/02	< 0.005

Food Products Gamma Spectral Detail Report 2002

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	beet greens	7/15/02	< 144.83 < 25.77	< 17.60 5,052.90 +/- 551.20	< 16.37	< 17.12	< 14.80
2	chinese cabbage	7/15/02	< 137.10 < 20.81	< 8.57 5,021.40 +/- 389.60	< 7.37	< 14.76	< 15.18
2	swiss chard	7/15/02	< 83.07 < 14.97	< 11.70 5,864.50 +/- 467.00	< 12.09	< 12.42	< 15.04
2	beet greens	8/12/02	< 191.81 < 29.20	< 22.62 5,384.70 +/- 634.60	< 16.62	< 16.10	< 17.90
2	chinese cabbage	8/12/02	< 175.80 < 12.08	< 10.11 6,556.90 +/- 584.50	< 10.89	< 17.30	< 16.70
2	swiss chard	8/12/02	< 150.28 < 14.22	< 14.69 4,960.60 +/- 510.80	< 19.30	< 20.29	< 15.58
2	beet greens	9/10/02	196.37 +/- 111.70 < 12.23	< 11.88 8,038.00 +/- 466.20	< 13.31	< 11.36	< 11.12
2	kale	9/10/02	< 119.32 < 15.88	< 8.73 4,095.10 +/- 487.20	< 13.13	< 7.90	< 17.37
2	swiss chard	9/10/02	< 100.86 < 14.30	< 8.65 6,144.90 +/- 345.30	< 7.45	< 6.49	< 10.30
2	beet greens	10/17/02	< 127.36 < 7.73	< 7.76 3,821.00 +/- 421.30	< 13.48	< 13.45	< 17.60
2	kale	10/17/02	< 170.82 < 17.89	< 8.14 3,922.20 +/- 473.40	< 16.49	< 12.60	< 16.79
2	swiss chard	10/17/02	< 90.65 < 15.04	< 7.76 3,493.60 +/- 281.80	< 9.20	< 7.99	< 10.13

Sediment Gamma Spectral Detail Report 2002

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	6/11/02	< 29.38	< 23.54	< 38.28	503.65 +/- 40.56	18,360.00 +/- 830.10
25	Sediment	10/1/02	< 19.81	< 15.35	< 12.13	435.51 +/- 20.98	16,646.00 +/- 396.21
26	Sediment	6/11/02	< 32.61	< 24.80	< 42.30	LLD	13,234.00 +/- 808.80
26	Sediment	10/1/02	< 20.92	< 16.92	< 27.25	LLD	11,473.00 +/- 561.90
27	Sediment	6/11/02	< 29.56	< 39.09	< 41.28	878.00 +/- 53.82	16,268.00 +/- 740.30
27	Sediment	10/1/02	< 10.18	< 11.46	< 15.78	151.14 +/- 18.73	13,699.00 +/- 345.90
32	Sediment	6/11/02	< 33.25	< 13.83	< 39.91	985.10 +/- 59.88	25,517.00 +/- 760.70
32	Sediment	10/1/02	< 17.45	< 13.97	< 18.49	161.60 +/- 14.83	18,017.00 +/- 481.20
63	Sediment	6/10/02	< 20.52	< 14.88	< 29.54	< 19.63	9,187.80 +/- 599.60
63	Sediment	9/30/02	< 7.96	< 6.00	< 8.02	< 6.99	8,363.20 +/- 193.50

Milk Iodine Detail Report 2002

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	6/3/02	< 0.33
71	Milk	6/17/02	< 0.26
71	Milk	7/1/02	< 0.36
71	Milk	7/15/02	< 0.23
71	Milk	8/5/02	< 0.27
71	Milk	8/19/02	< 0.33
71	Milk	9/16/02	< 0.28
71	Milk	10/7/02	< 0.26
71	Milk	10/21/02	< 0.36
71	Milk	12/2/02	< 0.34

Milk Iodine Detail Report 2002

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	1/8/02	< 0.33
51	Milk	2/4/02	< 0.26
51	Milk	3/4/02	< 0.28
51	Milk	4/1/02	< 0.24
51	Milk	4/15/02	< 0.34
51	Milk	5/6/02	< 0.22
51	Milk	5/21/02	< 0.24
51	Milk	6/3/02	< 0.27
51	Milk	6/17/02	< 0.28
51	Milk	7/2/02	< 0.41
51	Milk	7/15/02	< 0.30
51	Milk	8/5/02	< 0.39
51	Milk	8/20/02	< 0.25
51	Milk	9/3/02	< 0.30
51	Milk	9/16/02	< 0.31
51	Milk	10/7/02	< 0.30
51	Milk	10/21/02	< 0.30
51	Milk	11/4/02	< 0.25
51	Milk	12/2/02	< 0.26
61	Milk	4/1/02	< 0.26
61	Milk	4/15/02	< 0.34
61	Milk	5/6/02	< 0.24
61	Milk	5/20/02	< 0.30
61	Milk	6/3/02	< 0.29
61	Milk	6/17/02	< 0.35
61	Milk	7/1/02	< 0.37
61	Milk	7/15/02	< 0.21
61	Milk	8/5/02	< 0.28
61	Milk	8/19/02	< 0.30
61	Milk	9/3/02	< 0.30
61	Milk	9/16/02	< 0.29
61	Milk	10/7/02	< 0.26
61	Milk	10/21/02	< 0.32
71	Milk	1/7/02	< 0.35
71	Milk	2/4/02	< 0.30
71	Milk	3/5/02	< 0.31
71	Milk	4/1/02	< 0.32
71	Milk	4/15/02	< 0.33
71	Milk	5/6/02	< 0.24
71	Milk	5/20/02	< 0.30

Milk Gamma Spectral Detail Report 2002

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	10/21/02	< 35	< 5	< 7	1,148 +/- 169	< 4
71	Milk	12/2/02	< 13	< 3	< 2	1,339 +/- 114	< 2

Milk Gamma Spectral Detail Report 2002

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	4/1/02	< 12	< 7	< 7	1,232 +/- 166	< 4
71	Milk	4/15/02	< 13	< 3	< 3	1,296 +/- 100	< 2
71	Milk	5/6/02	< 16	< 4	< 4	1,244 +/- 117	< 3
71	Milk	5/20/02	< 26	< 3	< 3	1,301 +/- 95	< 4
71	Milk	6/3/02	< 43	< 6	< 5	1,227 +/- 132	< 11
71	Milk	6/17/02	< 44	< 4	< 4	1,221 +/- 115	< 4
71	Milk	7/1/02	< 24	< 2	< 3	1,195 +/- 71	< 2
71	Milk	7/15/02	< 29	< 4	< 4	1,292 +/- 116	< 8
71	Milk	8/5/02	< 14	< 3	< 3	1,250 +/- 106	< 3
71	Milk	8/19/02	< 20	< 4	< 3	1,192 +/- 111	< 3
71	Milk	9/16/02	< 28	< 5	< 7	1,273 +/- 180	< 10
71	Milk	10/7/02	< 14	< 8	< 6	1,336 +/- 182	< 5

Milk Gamma Spectral Detail Report 2002

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	6/17/02	< 25	< 3	< 4	1,721 +/- 88	< 3
61	Milk	7/1/02	< 20	< 2	< 2	1,684 +/- 72	< 4
61	Milk	7/15/02	< 31	< 4	< 4	1,968 +/- 132	< 5
61	Milk	8/5/02	< 15	< 3	< 3	1,730 +/- 72	< 5
61	Milk	8/19/02	< 20	< 3	< 3	1,902 +/- 138	< 4
61	Milk	9/3/02	< 22	< 6	< 7	1,797 +/- 189	< 5
61	Milk	9/16/02	< 16	< 7	< 6	1,761 +/- 184	< 3
61	Milk	10/7/02	< 19	< 7	< 7	1,782 +/- 220	< 5
61	Milk	10/21/02	< 30	< 7	< 6	1,609 +/- 197	< 6
71	Milk	1/7/02	< 9	< 4	< 3	1,395 +/- 100	< 3
71	Milk	2/4/02	< 8	< 2	< 3	1,296 +/- 71	< 2
71	Milk	3/5/02	< 0	< 0	< 0	1,348 +/- 115	< 0

Milk Gamma Spectral Detail Report 2002

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	8/20/02	< 11	< 4	< 4	< 253	< 2
51	Milk	9/3/02	< 13	< 4	< 3	1,235 +/- 115	< 2
51	Milk	9/16/02	< 18	< 4	< 4	763 +/- 96	< 4
51	Milk	10/7/02	< 16	< 4	< 3	1,314 +/- 139	< 3
51	Milk	10/21/02	< 22	< 3	< 2	1,395 +/- 119	< 4
51	Milk	11/4/02	< 20	< 6	< 5	736 +/- 203	< 5
51	Milk	12/2/02	< 8	< 4	< 3	1,275 +/- 118	< 2
61	Milk	4/1/02	< 23	< 7	< 6	1,643 +/- 162	< 5
61	Milk	4/15/02	< 14	< 3	< 4	1,734 +/- 111	< 2
61	Milk	5/6/02	< 19	< 4	< 4	1,662 +/- 124	< 5
61	Milk	5/20/02	< 28	< 3	< 4	1,690 +/- 127	< 4
61	Milk	6/3/02	< 31	< 2	< 3	1,678 +/- 94	< 6

Milk Gamma Spectral Detail Report 2002

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	1/8/02	< 13	< 4	< 4	1,350 +/- 114	< 2
51	Milk	2/4/02	< 12	< 4	< 4	1,405 +/- 102	< 1
51	Milk	3/4/02	< 0	< 0	< 0	1,351 +/- 108	< 0
51	Milk	4/1/02	< 8	< 3	< 4	1,417 +/- 106	< 2
51	Milk	4/15/02	< 11	< 3	< 3	1,406 +/- 109	< 1
51	Milk	5/6/02	< 20	< 4	< 3	1,524 +/- 121	< 4
51	Milk	5/21/02	< 29	< 2	< 4	1,386 +/- 116	< 4
51	Milk	6/3/02	< 36	< 3	< 4	1,212 +/- 101	< 5
51	Milk	6/17/02	< 35	< 2	< 2	1,273 +/- 89	< 7
51	Milk	7/2/02	< 25	< 2	< 3	1,315 +/- 69	< 4
51	Milk	7/15/02	< 24	< 3	< 2	1,285 +/- 93	< 3
51	Milk	8/5/02	< 28	< 4	< 3	1,351 +/- 81	< 5

Fish Gamma Spectral Detail Report 2002

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	smallmouth bass	7/7/02	< 22.36 1,585.40 +/- 392.90	< 10.27 < 10.52	< 12.04 < 23.84	< 20.62	< 69.09
25	yellow perch	9/17/02	< 15.28 1,648.20 +/- 302.10	< 5.88 < 10.36	< 12.00 < 29.66	< 12.36	< 29.89
32	yellow perch	7/11/02	< 10.80 1,840.60 +/- 329.10	< 14.38 < 10.45	< 12.03 < 18.20	< 8.12	< 21.17

Food Products Gamma Spectral Detail Report 2002

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	beet greens	10/17/02	< 189.79 < 18.59	< 19.36 4,965.25 +/- 416.36	< 14.73	< 18.92	< 17.56
70	chinese cabbage	10/17/02	< 137.10 < 22.81	< 8.89 2,433.00 +/- 363.40	< 11.19	< 17.22	< 13.73
70	swiss chard	10/17/02	< 130.08 < 9.90	< 9.34 4,682.90 +/- 371.00	< 13.80	< 15.43	< 9.75
70	beet greens	11/12/02	386.64 +/- 194.10 < 27.69	< 21.59 5,628.00 +/- 632.50	< 17.84	< 14.33	< 16.99
70	chinese cabbage	11/12/02	< 146.71 < 16.55	< 13.66 3,015.60 +/- 371.60	< 12.14	< 12.10	< 13.06
70	swiss chard	11/12/02	432.76 +/- 193.10 < 23.14	< 17.01 3,639.60 +/- 442.20	< 8.95	< 11.71	< 14.23

Food Products Gamma Spectral Detail Report 2002

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	beet greens	11/12/02	< 218.42 < 27.96	< 10.26 5,345.20 +/- 652.70	< 20.55	< 23.87	< 20.34
37	chinese cabbage	11/12/02	< 102.83 < 13.01	< 8.79 2,465.20 +/- 257.20	< 7.10	< 9.35	< 9.32
37	swiss chard	11/12/02	291.90 +/- 104.50 < 14.30	< 4.47 3,063.90 +/- 300.50	< 11.45	< 9.74	< 8.20
70	beet greens	7/15/02	< 111.58 < 22.13	< 17.34 10,081.00 +/- 789.70	< 11.39	< 17.70	< 14.67
70	chinese cabbage	7/15/02	< 134.17 < 22.77	< 12.77 4,569.40 +/- 501.20	< 12.08	< 14.44	< 12.76
70	swiss chard	7/15/02	< 154.75 < 15.09	< 16.37 7,028.50 +/- 668.80	< 13.92	< 13.29	< 23.32
70	beet greens	8/12/02	199.24 +/- 114.80 < 16.82	< 7.10 9,313.30 +/- 526.90	< 13.89	< 15.24	< 14.65
70	chinese cabbage	8/12/02	< 122.89 < 14.17	< 13.04 2,668.40 +/- 419.70	< 14.98	< 13.06	< 13.32
70	swiss chard	8/12/02	< 118.67 < 13.72	< 12.88 6,417.50 +/- 505.90	< 13.11	< 12.76	< 16.19
70	beet greens	9/10/02	219.77 +/- 109.90 < 11.49	< 7.99 8,949.40 +/- 423.40	< 10.13	< 10.29	< 10.06
70	chinese cabbage	9/10/02	< 82.70 < 17.31	< 9.02 4,938.90 +/- 387.90	< 8.72	< 11.62	< 8.47
70	swiss chard	9/10/02	< 124.77 < 9.69	< 10.54 4,267.20 +/- 422.00	< 12.01	< 11.96	< 16.09

Food Products Gamma Spectral Detail Report 2002

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	beet greens	7/15/02	< 157.68 < 14.85	< 10.33 6,175.80 +/- 447.86	< 14.21	< 14.67	< 15.92
37	chinese cabbage	7/15/02	< 154.75 < 20.09	< 13.69 3,653.80 +/- 548.90	< 19.61	< 16.56	< 16.32
37	swiss chard	7/15/02	< 186.01 < 24.26	< 16.38 4,632.80 +/- 571.60	< 7.96	< 24.15	< 19.18
37	beet greens	8/12/02	286.75 +/- 142.00 < 25.44	< 19.54 7,943.50 +/- 710.60	< 19.17	< 22.29	< 14.69
37	chinese cabbage	8/12/02	< 91.64 < 12.37	< 7.84 2,940.40 +/- 288.80	< 6.42	< 7.58	< 10.21
37	swiss chard	8/12/02	258.32 +/- 115.80 < 16.24	< 6.49 4,298.60 +/- 388.80	< 11.80	< 11.44	< 11.45
37	beet greens	9/10/02	< 111.98 < 11.35	< 12.00 6,125.90 +/- 396.90	< 11.02	< 12.53	< 11.03
37	chinese cabbage	9/10/02	< 115.30 < 12.24	< 8.75 2,647.20 +/- 289.10	< 6.56	< 7.51	< 10.01
37	swiss chard	9/10/02	< 108.85 < 11.62	< 11.33 3,248.00 +/- 283.48	< 9.80	< 10.58	< 15.32
37	beet greens	10/17/02	< 157.84 < 16.68	< 13.08 4,808.40 +/- 522.90	< 14.25	< 15.71	< 15.56
37	chinese cabbage	10/17/02	< 108.06 < 17.87	< 11.01 2,359.90 +/- 380.80	< 8.86	< 13.83	< 10.50
37	swiss chard	10/17/02	< 194.38 < 17.91	< 20.65 3,175.30 +/- 536.60	< 10.88	< 23.91	< 15.56

Food Products Gamma Spectral Detail Report 2002
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	swiss chard	10/17/02	< 111.97 < 12.58	< 8.57 4,979.30 +/- 361.80	< 8.07	< 9.27	< 11.24
20	beet greens	7/15/02	< 138.01 < 17.42	< 7.13 7,333.10 +/- 526.50	< 12.29	< 15.65	< 17.07
20	chinese cabbage	7/15/02	< 135.88 < 22.31	< 7.59 4,549.10 +/- 423.30	< 16.20	< 13.90	< 15.46
20	swiss chard	7/15/02	< 151.86 < 27.27	< 13.20 5,139.30 +/- 569.50	< 16.31	< 11.55	< 19.87
20	beet greens	8/12/02	< 176.57 < 15.20	< 14.07 8,869.90 +/- 777.30	< 7.52	< 20.96	< 21.05
20	chinese cabbage	8/12/02	< 138.30 < 17.23	< 8.93 4,086.60 +/- 360.30	< 13.02	< 18.87	< 17.07
20	swiss chard	8/12/02	265.48 +/- 135.80 < 20.40	< 13.95 8,302.90 +/- 483.40	< 9.62	< 9.67	< 10.61
20	chinese cabbage	9/10/02	< 94.58 < 10.50	< 7.79 2,519.10 +/- 247.60	< 6.85	< 5.86	< 9.37
20	swiss chard	9/10/02	< 159.22 < 15.31	< 9.81 6,307.70 +/- 417.00	< 10.33	< 13.13	< 13.95
20	chinese cabbage	10/17/02	< 96.13 < 11.69	< 6.16 3,679.70 +/- 363.00	< 10.88	< 10.34	< 11.37
20	swiss chard	10/17/02	244.96 +/- 111.20 < 21.27	< 8.24 4,168.60 +/- 353.10	< 8.55	< 12.12	< 10.79
20	turnip greens	10/17/02	263.45 +/- 112.80 < 13.18	< 7.87 4,132.80 +/- 346.70	< 10.22	< 8.65	< 8.55

Food Products Gamma Spectral Detail Report 2002

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	beet greens	11/12/02	306.82 +/- 149.80 < 18.21	< 13.74 3,858.10 +/- 514.50	< 11.89	< 10.38	< 20.87
2	swiss chard	11/12/02	< 157.58 < 19.52	< 15.20 4,215.60 +/- 575.60	< 13.10	< 15.25	< 19.32
16	beet greens	7/15/02	< 138.95 < 16.21	< 7.87 11,011.00 +/- 578.20	< 9.05	< 12.81	< 14.65
16	chinese cabbage	7/15/02	< 161.37 < 29.70	< 16.26 4,493.10 +/- 492.60	< 16.51	< 14.54	< 11.00
16	swiss chard	7/15/02	< 126.71 < 18.53	< 11.50 10,621.00 +/- 613.30	< 14.10	< 15.88	< 13.51
16	beet greens	8/12/02	< 154.80 < 24.85	< 16.55 6,301.85 +/- 455.50	< 9.73	< 20.11	< 12.92
16	chinese cabbage	8/12/02	< 122.46 < 15.93	< 8.68 3,451.40 +/- 462.90	< 12.93	< 11.56	< 17.35
16	swiss chard	8/12/02	< 112.91 < 11.86	< 10.34 5,943.90 +/- 453.50	< 9.85	< 14.39	< 17.99
16	beet greens	9/10/02	< 139.53 < 14.78	< 8.67 8,636.10 +/- 564.20	< 11.94	< 12.23	< 13.65
16	chinese cabbage	9/10/02	< 177.84 < 19.34	< 21.22 6,108.00 +/- 664.60	< 17.50	< 21.79	< 10.88
16	swiss chard	9/10/02	< 137.29 < 14.93	< 12.44 6,624.50 +/- 581.60	< 14.67	< 20.10	< 16.15
16	beet greens	10/17/02	192.39 +/- 97.08 < 15.75	< 3.91 5,012.60 +/- 355.60	< 10.46	< 9.39	< 7.94

Water Gamma Spectral Detail Report 2002

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	12/27/01 to 1/31/02	< 12.94 < 4.66 < 2.97	< 2.72 < 1.95	< 3.26 < 2.90	< 2.55 < 2.75	< 2.72 < 3.35
28	Water	1/31/02 to 2/25/02	< 17.23 < 4.18 < 9.15	< 2.60 < 3.59	< 3.88 < 4.68	< 1.78 < 4.02	< 3.73 < 4.71
28	Water	2/25/02 to 3/28/02	< 16.16 < 5.78 < 7.99	< 2.74 < 3.45	< 3.80 < 4.56	< 2.32 < 4.11	< 4.20 < 5.11
28	Water	3/28/02 to 4/25/02	< 10.93 < 4.23 < 4.92	< 1.97 < 2.77	< 1.97 < 1.40	< 2.33 < 2.04	< 3.01 < 3.03
28	Water	4/25/02 to 5/30/02	< 13.88 < 4.18 < 7.47	< 3.12 < 6.95	< 2.41 < 1.59	< 3.14 < 3.89	< 3.59 < 5.77
28	Water	5/30/02 to 6/27/02	< 27.90 < 6.72 < 7.34	< 2.92 < 4.00	< 2.27 < 1.81	< 2.68 < 2.61	< 3.13 < 3.76
28	Water	6/27/02 to 7/24/02	< 20.75 < 3.71 < 3.04	< 1.20 < 4.98	< 1.97 < 1.63	< 1.48 < 3.31	< 1.19 < 3.94
28	Water	7/24/02 to 8/28/02	< 6.99 < 3.37 < 2.21	< 1.45 < 1.15	< 1.30 < 1.44	< 2.00 < 1.27	< 1.84 < 2.91
28	Water	9/26/02 to 9/26/02	< 10.69 < 3.36 < 5.26	< 2.45 < 2.30	< 2.93 < 1.25	< 2.83 < 2.09	< 2.71 < 2.05
28	Water	9/26/02 to 10/31/02	< 12.97 < 6.91 < 5.03	< 3.92 < 4.50	< 1.68 < 2.34	< 2.83 < 3.46	< 1.96 < 3.76
28	Water	10/31/02 to 11/26/02	< 17.05 < 8.02 < 8.06	< 3.44 < 5.52	< 3.37 < 3.18	< 5.69 < 4.81	< 6.19 < 3.94
28	Water	12/26/02 to 12/26/02	< 25.00 < 7.86 < 13.59	< 3.99 < 3.17	< 5.30 < 2.90	< 3.89 < 6.12	< 4.44 < 3.45

TLD Gamma Dose Detail Report 2002

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	4/2/02	to	7/2/02	14.64	+/-	0.55
56	TLD	7/2/02	to	10/2/02	15.23	+/-	0.90
56	TLD	10/2/02	to	1/9/03	11.89	+/-	0.66
58	TLD	1/3/02	to	4/2/02	14.28	+/-	0.45
58	TLD	4/2/02	to	7/2/02	14.97	+/-	0.61
58	TLD	7/2/02	to	10/2/02	15.43	+/-	0.94
58	TLD	10/2/02	to	1/9/03	12.37	+/-	0.65

TLD Gamma Dose Detail Report 2002

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	7/2/02	to	10/2/02	21.61	+/-	1.12
29	TLD	10/2/02	to	1/9/03	18.27	+/-	0.59
30	TLD	1/3/02	to	4/2/02	17.81	+/-	0.47
30	TLD	4/2/02	to	7/2/02	18.17	+/-	0.65
30	TLD	7/2/02	to	10/2/02	18.96	+/-	1.27
30	TLD	10/2/02	to	1/9/03	15.63	+/-	0.77
31	TLD	1/3/02	to	4/2/02	17.39	+/-	0.36
31	TLD	4/2/02	to	7/2/02	20.21	+/-	1.52
31	TLD	7/2/02	to	10/2/02	19.15	+/-	1.08
31	TLD	10/2/02	to	1/9/03	16.98	+/-	0.55
33	TLD	1/3/02	to	4/2/02	17.95	+/-	0.69
33	TLD	4/2/02	to	7/2/02	20.44	+/-	0.65
33	TLD	7/2/02	to	10/2/02	19.78	+/-	1.19
33	TLD	10/2/02	to	1/9/03	17.31	+/-	0.54
35	TLD	1/3/02	to	4/2/02	13.53	+/-	0.37
35	TLD	4/2/02	to	7/2/02	14.64	+/-	0.43
35	TLD	7/2/02	to	10/2/02	14.41	+/-	0.92
35	TLD	10/2/02	to	1/9/03	12.04	+/-	0.51
36	TLD	1/3/02	to	4/2/02	17.31	+/-	0.41
36	TLD	4/2/02	to	7/2/02	18.11	+/-	0.51
36	TLD	7/2/02	to	10/2/02	19.67	+/-	1.08
36	TLD	10/2/02	to	1/9/03	16.12	+/-	0.89
53	TLD	1/3/02	to	4/2/02	13.92	+/-	0.49
53	TLD	4/2/02	to	7/2/02	15.94	+/-	0.69
53	TLD	7/2/02	to	10/2/02	16.63	+/-	1.05
53	TLD	10/2/02	to	1/9/03	13.87	+/-	0.54
54	TLD	1/3/02	to	4/2/02	13.88	+/-	0.42
54	TLD	4/2/02	to	7/2/02	15.45	+/-	0.46
54	TLD	7/2/02	to	10/2/02	15.26	+/-	1.51
54	TLD	10/2/02	to	1/9/03	12.96	+/-	0.44
55	TLD	1/3/02	to	4/2/02	16.18	+/-	0.30
55	TLD	4/2/02	to	7/2/02	16.94	+/-	0.55
55	TLD	7/2/02	to	10/2/02	17.70	+/-	1.47
55	TLD	10/2/02	to	1/9/03	14.70	+/-	0.56
56	TLD	1/3/02	to	4/2/02	14.07	+/-	0.48

TLD Gamma Dose Detail Report 2002

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	10/2/02	to	1/9/03	15.17	+/-	0.86
11	TLD	1/3/02	to	4/2/02	15.46	+/-	0.30
11	TLD	4/2/02	to	7/2/02	14.93	+/-	0.51
11	TLD	7/2/02	to	10/2/02	17.15	+/-	1.19
11	TLD	10/2/02	to	1/9/03	13.13	+/-	0.41
12	TLD	1/3/02	to	4/2/02	15.64	+/-	0.35
12	TLD	4/2/02	to	7/2/02	15.91	+/-	0.69
12	TLD	7/2/02	to	10/2/02	17.34	+/-	1.05
12	TLD	10/2/02	to	1/9/03	13.58	+/-	0.61
13	TLD	1/3/02	to	4/2/02	15.30	+/-	0.33
13	TLD	4/2/02	to	7/2/02	16.26	+/-	0.79
13	TLD	7/2/02	to	10/2/02	17.50	+/-	1.11
13	TLD	10/2/02	to	1/9/03	13.55	+/-	0.68
14	TLD	1/3/02	to	4/2/02	14.00	+/-	0.60
14	TLD	4/2/02	to	7/2/02	15.32	+/-	0.63
14	TLD	7/2/02	to	10/2/02	14.81	+/-	1.00
14	TLD	10/2/02	to	1/9/03	12.95	+/-	0.48
15	TLD	1/3/02	to	4/2/02	14.08	+/-	0.51
15	TLD	4/2/02	to	7/2/02	14.91	+/-	0.63
15	TLD	7/2/02	to	10/2/02	14.52	+/-	1.09
15	TLD	10/2/02	to	1/9/03	12.40	+/-	0.65
21	TLD	1/3/02	to	4/2/02	18.31	+/-	0.54
21	TLD	4/2/02	to	7/2/02	18.57	+/-	0.56
21	TLD	7/2/02	to	10/2/02	19.86	+/-	1.06
21	TLD	10/2/02	to	1/9/03	15.90	+/-	0.51
23	TLD	1/3/02	to	4/2/02	17.38	+/-	0.35
23	TLD	4/2/02	to	7/2/02	18.50	+/-	0.53
23	TLD	7/2/02	to	10/2/02	19.46	+/-	0.95
23	TLD	10/2/02	to	1/9/03	15.65	+/-	0.62
24	TLD	1/3/02	to	4/2/02	15.90	+/-	0.36
24	TLD	4/2/02	to	7/2/02	16.41	+/-	0.72
24	TLD	7/2/02	to	10/2/02	15.74	+/-	0.96
24	TLD	10/2/02	to	1/9/03	13.89	+/-	0.82
29	TLD	1/3/02	to	4/2/02	19.37	+/-	0.31
29	TLD	4/2/02	to	7/2/02	21.53	+/-	0.55

TLD Gamma Dose Detail Report 2002

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	1/3/02	to	4/2/02	14.06	+/-	0.46
1	TLD	4/2/02	to	7/2/02	16.72	+/-	1.49
1	TLD	7/2/02	to	10/2/02	16.68	+/-	0.94
1	TLD	10/2/02	to	1/9/03	12.74	+/-	0.79
3	TLD	1/3/02	to	4/2/02	15.38	+/-	0.31
3	TLD	4/2/02	to	7/2/02	16.36	+/-	1.60
3	TLD	7/2/02	to	10/2/02	16.18	+/-	0.90
3	TLD	10/2/02	to	1/9/03	12.90	+/-	0.66
4	TLD	1/3/02	to	4/2/02	14.16	+/-	0.46
4	TLD	4/2/02	to	7/2/02	14.78	+/-	0.62
4	TLD	7/2/02	to	10/2/02	16.11	+/-	1.02
4	TLD	10/2/02	to	1/9/03	12.27	+/-	0.64
5	TLD	1/3/02	to	4/2/02	12.76	+/-	0.39
5	TLD	4/2/02	to	7/2/02	15.29	+/-	0.60
5	TLD	7/2/02	to	10/2/02	14.06	+/-	0.87
5	TLD	10/2/02	to	1/9/03	12.68	+/-	0.40
6	TLD	1/3/02	to	4/2/02	15.47	+/-	0.29
6	TLD	4/2/02	to	7/2/02	17.58	+/-	0.94
6	TLD	7/2/02	to	10/2/02	17.40	+/-	1.08
6	TLD	10/2/02	to	1/9/03	14.49	+/-	0.57
7	TLD	1/3/02	to	4/2/02	12.58	+/-	0.55
7	TLD	4/2/02	to	7/2/02	15.32	+/-	0.49
7	TLD	7/2/02	to	10/2/02	14.22	+/-	0.99
7	TLD	10/2/02	to	1/9/03	12.23	+/-	0.38
8	TLD	1/3/02	to	4/2/02	11.59	+/-	0.35
8	TLD	4/2/02	to	7/2/02	13.66	+/-	0.64
8	TLD	7/2/02	to	10/2/02	13.14	+/-	0.87
8	TLD	10/2/02	to	1/9/03	10.72	+/-	0.50
9	TLD	1/3/02	to	4/2/02	11.14	+/-	0.29
9	TLD	4/2/02	to	7/2/02	13.99	+/-	0.52
9	TLD	7/2/02	to	10/2/02	12.71	+/-	0.97
9	TLD	10/2/02	to	1/9/03	11.80	+/-	0.68
10	TLD	1/3/02	to	4/2/02	16.25	+/-	0.48
10	TLD	4/2/02	to	7/2/02	17.98	+/-	0.70
10	TLD	7/2/02	to	10/2/02	18.25	+/-	1.08

TLD Gamma Dose Detail Report 2002
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	1/3/02	to	1/9/03	78.93	+/-	1.33
53	TLA	1/3/02	to	1/9/03	66.63	+/-	3.29
54	TLA	1/3/02	to	1/9/03	60.30	+/-	1.42
55	TLA	1/3/02	to	1/9/03	70.42	+/-	2.00
56	TLA	1/3/02	to	1/9/03	57.05	+/-	1.04
58	TLA	1/3/02	to	1/9/03	54.80	+/-	1.64

TLD Gamma Dose Detail Report 2002

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	1/3/02	to	1/9/03	56.06	+/-	1.71
3	TLA	1/3/02	to	1/9/03	53.40	+/-	1.80
4	TLA	1/3/02	to	1/9/03	60.34	+/-	2.09
5	TLA	1/3/02	to	1/9/03	55.22	+/-	2.15
6	TLA	1/3/02	to	1/9/03	65.10	+/-	2.99
7	TLA	1/3/02	to	1/9/03	60.46	+/-	0.91
8	TLA	1/3/02	to	1/9/03	54.71	+/-	1.69
9	TLA	1/3/02	to	1/9/03	52.53	+/-	1.43
10	TLA	1/3/02	to	1/9/03	75.71	+/-	2.53
11	TLA	1/3/02	to	1/9/03	57.21	+/-	0.85
12	TLA	1/3/02	to	1/9/03	61.16	+/-	1.37
13	TLA	1/3/02	to	1/9/03	60.21	+/-	2.21
14	TLA	1/3/02	to	1/9/03	56.13	+/-	2.94
15	TLA	1/3/02	to	1/9/03	50.24	+/-	1.12
21	TLA	1/3/02	to	1/9/03	64.67	+/-	4.11
23	TLA	1/3/02	to	1/9/03	60.75	+/-	1.21
24	TLA	1/3/02	to	1/9/03	54.51	+/-	3.30
29	TLA	1/3/02	to	1/9/03	75.86	+/-	2.04
30	TLA	1/3/02	to	1/9/03	64.61	+/-	1.65
31	TLA	1/3/02	to	1/9/03	71.75	+/-	3.57
33	TLA	1/3/02	to	1/9/03	75.22	+/-	1.75
35	TLA	1/3/02	to	1/9/03	59.42	+/-	1.35

TLD Gamma Dose Detail Report 2002

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 +/- 2 Sigma

Location	Sample Type	Collection Period			Exposure		
56	TLB	7/2/02	to	10/2/02	14.74	+/-	1.18
56	TLB	10/2/02	to	1/9/03	11.35	+/-	0.79
58	TLB	1/3/02	to	4/2/02	13.49	+/-	0.22
58	TLB	4/2/02	to	7/2/02	13.61	+/-	0.69
58	TLB	7/2/02	to	10/2/02			
58	TLB	10/2/02	to	1/9/03	11.99	+/-	0.83

TLD Gamma Dose Detail Report 2002

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	10/2/02	to	1/9/03	17.45	+/-	0.78
30	TLB	1/3/02	to	4/2/02	17.91	+/-	0.26
30	TLB	4/2/02	to	7/2/02	16.30	+/-	0.70
30	TLB	7/2/02	to	10/2/02	18.39	+/-	1.22
30	TLB	10/2/02	to	1/9/03	15.26	+/-	0.88
31	TLB	1/3/02	to	4/2/02	19.22	+/-	0.36
31	TLB	4/2/02	to	7/2/02	17.58	+/-	0.59
31	TLB	7/2/02	to	10/2/02	20.42	+/-	1.27
31	TLB	10/2/02	to	1/9/03	16.44	+/-	0.43
33	TLB	1/3/02	to	4/2/02	21.02	+/-	0.21
33	TLB	4/2/02	to	7/2/02	19.33	+/-	0.58
33	TLB	7/2/02	to	10/2/02	21.76	+/-	1.11
33	TLB	10/2/02	to	1/9/03	18.01	+/-	0.59
35	TLB	1/3/02	to	4/2/02	15.11	+/-	0.40
35	TLB	4/2/02	to	7/2/02	15.06	+/-	1.25
35	TLB	7/2/02	to	10/2/02	15.23	+/-	1.10
35	TLB	10/2/02	to	1/9/03	12.44	+/-	0.50
36	TLB	1/3/02	to	4/2/02	19.43	+/-	0.28
36	TLB	4/2/02	to	7/2/02	18.58	+/-	0.63
36	TLB	7/2/02	to	10/2/02	20.70	+/-	1.10
36	TLB	10/2/02	to	1/9/03	17.52	+/-	0.70
53	TLB	1/3/02	to	4/2/02	16.15	+/-	0.21
53	TLB	4/2/02	to	7/2/02	15.18	+/-	0.73
53	TLB	7/2/02	to	10/2/02	17.97	+/-	1.12
53	TLB	10/2/02	to	1/9/03	14.60	+/-	0.59
54	TLB	1/3/02	to	4/2/02	16.85	+/-	0.19
54	TLB	4/2/02	to	7/2/02	15.50	+/-	0.77
54	TLB	7/2/02	to	10/2/02	16.84	+/-	1.32
54	TLB	10/2/02	to	1/9/03	14.04	+/-	0.76
55	TLB	1/3/02	to	4/2/02	16.08	+/-	0.19
55	TLB	4/2/02	to	7/2/02	15.62	+/-	0.79
55	TLB	7/2/02	to	10/2/02	17.54	+/-	1.27
55	TLB	10/2/02	to	1/9/03	14.53	+/-	0.52
56	TLB	1/3/02	to	4/2/02	14.07	+/-	0.27
56	TLB	4/2/02	to	7/2/02	13.16	+/-	0.63

TLD Gamma Dose Detail Report 2002

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	1/3/02	to	4/2/02	11.35	+/-	0.19
11	TLB	4/2/02	to	7/2/02	14.48	+/-	0.79
11	TLB	7/2/02	to	10/2/02	14.24	+/-	1.09
11	TLB	10/2/02	to	1/9/03	12.63	+/-	0.58
12	TLB	1/3/02	to	4/2/02	14.99	+/-	0.41
12	TLB	4/2/02	to	7/2/02	14.63	+/-	0.57
12	TLB	7/2/02	to	10/2/02	16.34	+/-	1.10
12	TLB	10/2/02	to	1/9/03	13.94	+/-	0.51
13	TLB	1/3/02	to	4/2/02	14.34	+/-	0.30
13	TLB	4/2/02	to	7/2/02	14.06	+/-	0.91
13	TLB	7/2/02	to	10/2/02	14.57	+/-	1.12
13	TLB	10/2/02	to	1/9/03	12.72	+/-	0.57
14	TLB	1/3/02	to	4/2/02	12.75	+/-	0.22
14	TLB	4/2/02	to	7/2/02	13.05	+/-	0.69
14	TLB	7/2/02	to	10/2/02	12.37	+/-	1.10
14	TLB	10/2/02	to	1/9/03	11.96	+/-	0.67
15	TLB	1/3/02	to	4/2/02	10.94	+/-	0.35
15	TLB	4/2/02	to	7/2/02	12.23	+/-	0.61
15	TLB	7/2/02	to	10/2/02	11.31	+/-	1.14
15	TLB	10/2/02	to	1/9/03	10.57	+/-	0.77
21	TLB	1/3/02	to	4/2/02	16.87	+/-	0.21
21	TLB	4/2/02	to	7/2/02	15.53	+/-	0.81
21	TLB	7/2/02	to	10/2/02	17.10	+/-	1.16
21	TLB	10/2/02	to	1/9/03	14.29	+/-	0.78
23	TLB	1/3/02	to	4/2/02	13.68	+/-	0.33
23	TLB	4/2/02	to	7/2/02	14.98	+/-	0.63
23	TLB	7/2/02	to	10/2/02	14.33	+/-	1.32
23	TLB	10/2/02	to	1/9/03	13.76	+/-	0.61
24	TLB	1/3/02	to	4/2/02	14.78	+/-	0.58
24	TLB	4/2/02	to	7/2/02	13.29	+/-	0.68
24	TLB	7/2/02	to	10/2/02	14.70	+/-	1.41
24	TLB	10/2/02	to	1/9/03	12.03	+/-	1.06
29	TLB	1/3/02	to	4/2/02	19.40	+/-	0.56
29	TLB	4/2/02	to	7/2/02	18.71	+/-	0.85
29	TLB	7/2/02	to	10/2/02	20.77	+/-	1.27

LD ma Detail Report

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	1/3/02	to	4/2/02	14.08	+/-	0.20
1	TLB	4/2/02	to	7/2/02	14.72	+/-	0.92
1	TLB	7/2/02	to	10/2/02	14.01	+/-	1.71
1	TLB	10/2/02	to	1/9/03	11.87	+/-	0.71
3	TLB	1/3/02	to	4/2/02	14.80	+/-	0.48
3	TLB	4/2/02	to	7/2/02	15.11	+/-	0.89
3	TLB	7/2/02	to	10/2/02	14.93	+/-	1.26
3	TLB	10/2/02	to	1/9/03	8.20	+/-	0.48
4	TLB	1/3/02	to	4/2/02	15.35	+/-	0.37
4	TLB	4/2/02	to	7/2/02	14.99	+/-	0.59
4	TLB	7/2/02	to	10/2/02	15.34	+/-	1.40
4	TLB	10/2/02	to	1/9/03	12.55	+/-	0.55
5	TLB	1/3/02	to	4/2/02	15.17	+/-	0.23
5	TLB	4/2/02	to	7/2/02	14.12	+/-	0.58
5	TLB	7/2/02	to	10/2/02	15.00	+/-	1.11
5	TLB	10/2/02	to	1/9/03	12.20	+/-	0.68
6	TLB	1/3/02	to	4/2/02	16.81	+/-	0.21
6	TLB	4/2/02	to	7/2/02	16.06	+/-	0.64
6	TLB	7/2/02	to	10/2/02	16.90	+/-	1.16
6	TLB	10/2/02	to	1/9/03	14.04	+/-	0.50
7	TLB	1/3/02	to	4/2/02	15.07	+/-	0.42
7	TLB	4/2/02	to	7/2/02	14.81	+/-	0.99
7	TLB	7/2/02	to	10/2/02	15.51	+/-	1.11
7	TLB	10/2/02	to	1/9/03	12.56	+/-	0.61
8	TLB	1/3/02	to	4/2/02	13.80	+/-	0.28
8	TLB	4/2/02	to	7/2/02	13.42	+/-	0.68
8	TLB	7/2/02	to	10/2/02	14.36	+/-	1.11
8	TLB	10/2/02	to	1/9/03	11.38	+/-	0.55
9	TLB	1/3/02	to	4/2/02	13.57	+/-	0.19
9	TLB	4/2/02	to	7/2/02	12.94	+/-	0.60
9	TLB	7/2/02	to	10/2/02	14.84	+/-	1.08
9	TLB	10/2/02	to	1/9/03	11.64	+/-	0.59
10	TLB	1/3/02	to	4/2/02	17.23	+/-	0.20
10	TLB	4/2/02	to	7/2/02	17.00	+/-	0.58
10	TLB	7/2/02	to	10/2/02	18.23	+/-	1.17
10	TLB	10/2/02	to	1/9/03	15.64	+/-	0.57

Sediment Gamma Spectral Detail Report 2002

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	6/10/02	< 38.60	101.16 +/- 33.76	< 32.25	3,511.30 +/- 117.20	8,315.20 +/- 740.80
64	Sediment	9/30/02	< 7.33	< 6.95	< 8.70	LLD	8,478.40 +/- 216.80
65	Sediment	6/10/02	< 23.30	< 13.31	< 22.82	< 19.94	8,602.25 +/- 448.72
65	Sediment	9/30/02	< 7.77	< 3.49	< 9.46	< 7.23	8,543.50 +/- 208.30

Water Gamma Spectral Detail Report 2002
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	12/27/01 to 1/31/02	< 10.24 < 4.67 < 4.03	< 2.73 < 6.29	< 1.50 < 2.85	< 3.97 < 2.76	< 2.33 < 3.93
34	Water	1/31/02 to 2/25/02	< 13.79 < 4.58 < 4.65	< 3.43 < 1.37	< 0.96 < 2.33	< 1.52 < 2.19	< 2.48 < 3.76
34	Water	2/25/02 to 3/28/02	< 14.00 < 4.87 < 2.86	< 2.24 < 2.90	< 3.01 < 2.24	< 1.20 < 3.64	< 3.68 < 5.43
34	Water	3/28/02 to 4/25/02	< 14.67 < 7.36 < 5.44	< 2.85 < 3.24	< 3.24 < 3.50	< 3.97 < 3.14	< 4.07 < 4.31
34	Water	4/25/02 to 5/30/02	< 17.75 < 1.97 < 5.30	< 2.62 < 3.78	< 1.90 < 2.42	< 2.91 < 1.02	< 3.25 < 3.47
34	Water	5/30/02 to 6/27/02	< 31.14 < 4.89 < 4.05	< 2.09 < 5.28	< 1.62 < 2.31	< 1.67 < 2.22	< 3.66 < 5.05
34	Water	6/27/02 to 7/24/02	< 33.62 < 6.30 < 4.86	< 2.60 < 10.62	< 2.83 < 3.23	< 3.39 < 4.64	< 2.76 < 4.14
34	Water	7/24/02 to 8/28/02	< 16.00 < 3.89 < 5.49	< 3.20 < 1.68	< 2.76 < 2.65	< 4.33 < 2.38	< 3.98 < 5.32
34	Water	8/28/02 to 9/26/02	< 14.12 < 6.44 < 4.69	< 2.81 < 2.30	< 2.59 < 1.78	< 3.12 < 3.54	< 3.61 < 4.20
34	Water	9/26/02 to 10/31/02	< 14.22 < 5.09 < 4.59	< 2.12 < 2.52	< 2.69 < 3.31	< 3.36 < 3.59	< 4.20 < 2.16
34	Water	10/31/02 to 11/26/02	< 12.84 < 4.42 < 8.44	< 2.30 < 3.28	< 2.90 < 3.64	< 4.00 < 2.35	< 3.85 < 8.15
34	Water	12/26/02 to 12/26/02	< 15.99 < 4.64 < 10.39	< 5.43 < 3.84	< 3.65 < 3.21	< 5.49 < 5.18	< 5.22 < 7.02

Water Gamma Spectral Detail Report 2002

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	12/27/01 to 1/31/02	< 13.55 < 3.43 < 6.67	< 3.33 < 1.37	< 3.41 < 2.00	< 3.89 < 2.88	< 2.89 < 1.53
36	Water	1/31/02 to 2/25/02	< 11.25 < 4.33 < 4.83	< 2.34 < 2.20	< 2.39 < 4.00	< 2.66 < 3.55	< 3.23 < 4.44
36	Water	2/25/02 to 3/28/02	< 11.06 < 3.07 < 3.85	< 1.52 < 2.24	< 1.67 < 1.59	< 2.46 < 2.35	< 1.43 < 2.79
36	Water	3/28/02 to 4/25/02	< 15.80 < 5.65 < 6.86	< 2.24 < 3.62	< 2.74 < 2.83	< 1.72 < 1.63	< 2.68 < 2.63
36	Water	4/25/02 to 5/30/02	< 20.71 < 2.83 < 1.91	< 1.98 < 3.84	< 2.32 < 1.55	< 2.80 < 3.20	< 2.23 < 1.82
36	Water	5/30/02 to 6/27/02	< 33.35 < 4.58 < 3.14	< 3.50 < 8.69	< 3.47 < 3.64	< 2.53 < 4.11	< 4.44 < 3.42
36	Water	6/27/02 to 7/24/02	< 25.60 < 3.96 < 4.49	< 1.85 < 5.73	< 2.10 < 1.39	< 1.40 < 2.59	< 1.81 < 2.85
36	Water	7/24/02 to 8/28/02	< 20.14 < 4.96 < 7.63	< 4.69 < 6.18	< 3.74 < 4.64	< 3.40 < 3.68	< 6.49 < 10.27
36	Water	8/28/02 to 9/26/02	< 18.01 < 4.71 < 6.26	< 3.93 < 5.42	< 3.76 < 3.69	< 2.82 < 2.38	< 4.56 < 4.59
36	Water	9/26/02 to 10/31/02	< 14.64 < 4.22 < 7.67	< 2.76 < 2.87	< 3.35 < 2.35	< 3.26 < 2.89	< 3.36 < 4.30
36	Water	10/31/02 to 11/26/02	< 9.91 < 2.71 < 6.59	< 2.00 < 1.20	< 3.67 < 2.53	< 2.69 < 1.40	< 1.39 < 3.49
36	Water	11/26/02 to 12/26/02	< 12.92 < 4.00 < 4.22	< 2.23 < 3.74	< 5.01 < 2.44	< 6.28 < 3.13	< 4.72 < 7.95

Water Gamma Spectral Detail Report 2002

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	1/31/02 to 1/31/02	< 10.83 < 4.75 < 5.73	< 2.36 < 2.59	< 1.24 < 2.42	< 2.61 < 2.10	< 4.03 < 3.44
59	Water	2/13/02 to 2/25/02	< 9.78 < 4.14 < 3.34	< 2.44 < 2.21	< 2.94 < 1.97	< 2.85 < 3.03	< 3.46 < 3.68
59	Water	2/25/02 to 3/28/02	< 12.60 < 2.87 < 5.16	< 2.40 < 2.16	< 2.13 < 2.58	< 3.35 < 1.49	< 1.87 < 1.74
59	Water	3/28/02 to 4/25/02	< 9.14 < 4.14 < 6.02	< 1.47 < 2.06	< 3.13 < 2.39	< 2.24 < 2.56	< 2.25 < 3.63
59	Water	4/25/02 to 5/30/02	< 23.82 < 6.24 < 5.43	< 3.55 < 2.21	< 1.71 < 1.13	< 2.87 < 2.48	< 3.00 < 4.95
59	Water	5/30/02 to 6/27/02	< 22.14 < 1.67 < 3.91	< 2.15 < 3.70	< 1.55 < 2.27	< 2.05 < 3.02	< 2.49 < 1.72
59	Water	6/27/02 to 7/24/02	< 30.94 < 5.32 < 5.12	< 1.48 < 6.27	< 2.42 < 2.50	< 2.66 < 3.93	< 2.06 < 3.66
59	Water	7/24/02 to 8/28/02	< 13.24 < 5.12 < 6.17	< 3.97 < 4.30	< 5.45 < 3.98	< 3.07 < 4.47	< 6.77 < 5.64
59	Water	8/28/02 to 9/26/02	< 21.47 < 6.72 < 4.11	< 4.37 < 8.99	< 3.81 < 3.99	< 4.10 < 5.57	< 5.67 < 3.51
59	Water	9/26/02 to 10/31/02	< 19.04 < 4.81 < 6.60	< 1.67 < 3.16	< 2.09 < 1.45	< 2.34 < 2.53	< 2.62 < 4.63
59	Water	10/31/02 to 11/26/02	< 26.88 < 11.65 < 15.76	< 9.05 < 8.82	< 3.86 < 6.01	< 6.19 < 10.96	< 7.28 < 13.97
60	Water	1/31/02 to 1/31/02	< 14.06 < 3.68 < 7.33	< 1.63 < 3.79	< 1.82 < 2.54	< 3.25 < 3.36	< 3.20 < 2.79

Water Gamma Spectral Detail Report 2002

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	2/13/02 to 2/25/02	< 9.71 < 3.12 < 3.83	< 3.23 < 2.35	< 3.37 < 1.70	< 2.77 < 2.31	< 2.83 < 2.33
60	Water	2/25/02 to 3/28/02	< 11.69 < 4.83 < 2.91	< 2.43 < 1.47	< 2.05 < 2.13	< 2.73 < 2.53	< 1.80 < 4.30
60	Water	3/28/02 to 4/25/02	< 9.29 < 3.95 < 3.99	< 2.32 < 2.39	< 2.49 < 1.88	< 1.82 < 2.32	< 1.85 < 3.80
60	Water	4/25/02 to 5/30/02	< 25.01 < 2.98 < 5.02	< 2.27 < 5.04	< 2.93 < 2.68	< 2.81 < 1.78	< 3.25 < 2.87
60	Water	5/30/02 to 6/27/02	< 32.26 < 7.40 < 6.33	< 2.67 < 4.78	< 2.36 < 3.21	< 3.40 < 4.07	< 3.41 < 4.21
60	Water	6/27/02 to 7/24/02	< 39.84 < 7.29 < 6.03	< 2.03 < 7.00	< 2.54 < 3.28	< 1.88 < 3.92	< 3.05 < 6.46
60	Water	7/24/02 to 8/28/02	< 18.51 < 8.23 < 2.53	< 3.34 < 2.63	< 5.08 < 5.11	< 5.10 < 7.07	< 3.53 < 3.91
60	Water	8/28/02 to 9/26/02	< 16.74 < 7.79 < 10.17	< 4.05 < 3.19	< 4.23 < 4.81	< 5.69 < 4.34	< 6.22 < 5.64
60	Water	9/26/02 to 10/31/02	< 14.72 < 4.89 < 3.13	< 3.11 < 3.16	< 2.33 < 3.02	< 3.23 < 3.36	< 2.92 < 3.34
60	Water	10/31/02 to 11/26/02	< 32.73 < 8.47 < 7.05	< 4.01 < 5.67	< 4.43 < 6.01	< 4.44 < 7.86	< 5.42 < 12.59

Water Gross Beta Detail Report 2002

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
12/27/01 to 1/31/02	Water	LLD	LLD	LLD		
1/31/02 to 1/31/02	Water				4.04 +/- 0.72	3.39 +/- 0.70
1/31/02 to 2/25/02	Water	3.17 +/- 0.61	LLD	LLD		
2/13/02 to 2/25/02	Water				LLD	LLD
2/25/02 to 3/28/02	Water	LLD	LLD	LLD	LLD	3.65 +/- 0.65
3/28/02 to 4/25/02	Water	LLD	LLD	LLD	3.14 +/- 0.56	3.09 +/- 0.59
4/25/02 to 5/30/02	Water	LLD	LLD	LLD	3.27 +/- 0.63	LLD
5/30/02 to 6/27/02	Water	LLD	LLD	LLD	LLD	LLD
6/27/02 to 7/24/02	Water	LLD	LLD	LLD	5.24 +/- 0.75	LLD
7/24/02 to 8/28/02	Water	LLD	LLD	LLD	LLD	LLD
8/28/02 to 9/26/02	Water		LLD	LLD	LLD	LLD
9/26/02 to 9/26/02	Water	LLD				

Water Gross Beta Detail Report 2002

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
9/26/02 to 10/31/02	Water	LLD	LLD	LLD	LLD	LLD
10/31/02 to 11/26/02	Water	LLD	LLD	LLD	LLD	3.14 +/- 0.55
11/26/02 to 12/26/02	Water			LLD		
12/26/02 to 12/26/02	Water	LLD	LLD			

Water Tritium Detail Report 2002
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	3/28/02	< 138.21
28	Water	6/27/02	< 131.41
28	Water	9/26/02	< 146.35
28	Water	12/26/02	< 131.45
34	Water	3/28/02	< 138.21
34	Water	6/27/02	< 131.41
34	Water	9/26/02	< 146.35
34	Water	12/26/02	< 131.45
36	Water	3/28/02	< 138.21
36	Water	6/27/02	< 131.41
36	Water	9/26/02	< 146.35
36	Water	12/26/02	< 131.45
59	Water	3/28/02	< 138.21
59	Water	6/27/02	< 131.41
59	Water	9/26/02	< 146.35
60	Water	3/28/02	< 138.21
60	Water	6/27/02	< 131.41
60	Water	9/26/02	< 146.35

APPENDIX D, 2002 ABNORMAL GASEOUS RELEASE METEOROLOGICAL DATA

ANNUAL ENVIRONMENTAL AND EFFLUENT RELEASE REPORT

SITE: PERRY UNIT: UNIT 1 7/29/02 14:34

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD = 02070808-02071508

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	1	0	0	0	1
NNE	0	1	8	0	0	0	9
NE	0	1	5	5	0	0	11
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	1	0	0	0	0	1
WNW	0	1	0	0	0	0	1
NW	0	0	0	0	0	0	0
NNW	0	6	0	0	0	0	6
TOTAL	0	10	14	5	0	0	29

PERIODS OF CALM (HOURS): 0

VARIABLE DIRECTION 0

HOURS OF MISSING DATA: 0

ANNUAL ENVIRONMENTAL AND EFFLUENT RELEASE REPORT

SITE: PERRY UNIT: UNIT 1 7/29/02 14:34

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD = 02070808-02071508

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	1	1	0	0	0	2
NE	0	0	1	1	0	0	2
ENE	0	1	0	1	0	0	2
E	0	0	1	0	0	0	1
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	1	0	0	0	1
NW	0	0	2	0	0	0	2
NNW	0	1	0	0	0	0	1
TOTAL	0	3	6	2	0	0	11

PERIODS OF CALM (HOURS): 0

VARIABLE DIRECTION 0

HOURS OF MISSING DATA: 0

ANNUAL ENVIRONMENTAL AND EFFLUENT RELEASE REPORT

SITE: PERRY UNIT: UNIT 1 7/29/02 14:34

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD = 02070808-02071508

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	1	0	0	0	0	0	1
NNE	0	0	0	0	0	0	0
NE	0	2	2	0	0	0	4
ENE	0	0	0	0	0	0	0
E	0	0	1	0	0	0	1
ESE	0	1	0	0	0	0	1
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	1	0	0	0	0	1
WNW	0	2	1	0	0	0	3
NW	0	0	0	0	0	0	0
NNW	0	2	0	0	0	0	2
TOTAL	1	8	4	0	0	0	13

PERIODS OF CALM (HOURS): 0

VARIABLE DIRECTION 0

HOURS OF MISSING DATA: 0

ANNUAL ENVIRONMENTAL AND EFFLUENT RELEASE REPORT

SITE: PERRY UNIT: UNIT 1 7/29/02 14:34

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD = 02070808-02071508

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	1	4	0	1	0	0	6
ENE	0	2	1	2	0	0	5
E	0	1	0	0	0	0	1
ESE	0	1	0	0	0	0	1
SE	0	1	0	0	0	0	1
SSE	1	0	0	0	0	0	1
S	0	0	0	0	0	0	0
SSW	0	1	0	0	0	0	1
SW	0	1	0	0	0	0	1
WSW	1	0	0	0	0	0	1
W	0	4	0	0	0	0	4
WNW	0	4	0	0	0	0	4
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
TOTAL	3	19	1	3	0	0	26

PERIODS OF CALM (HOURS): 0

VARIABLE DIRECTION 0

HOURS OF MISSING DATA: 0

ANNUAL ENVIRONMENTAL AND EFFLUENT RELEASE REPORT

SITE: PERRY UNIT: UNIT 1 7/29/02 14:34

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD = 02070808-02071508

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	2	0	0	0	0	2
NNE	1	0	0	0	0	0	1
NE	0	1	3	0	0	0	4
ENE	1	1	2	0	0	0	4
E	1	1	0	0	0	0	2
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	2	1	0	0	0	3
SSW	0	3	1	0	0	0	4
SW	1	3	2	0	0	0	6
WSW	1	0	1	0	0	0	2
W	0	3	0	0	0	0	3
WNW	0	0	0	0	0	0	0
NW	1	0	0	0	0	0	1
NNW	1	0	0	0	0	0	1
TOTAL	7	16	10	0	0	0	33

PERIODS OF CALM (HOURS): 0

VARIABLE DIRECTION 0

HOURS OF MISSING DATA: 0

ANNUAL ENVIRONMENTAL AND EFFLUENT RELEASE REPORT

SITE: PERRY UNIT: UNIT 1 7/29/02 14:34

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD = 02070808-02071508

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	1	0	0	0	0	0	1
E	1	0	0	0	0	0	1
ESE	2	0	0	0	0	0	2
SE	0	0	0	0	0	0	0
SSE	0	3	0	0	0	0	3
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	4	3	0	0	0	0	7

PERIODS OF CALM (HOURS): 0

VARIABLE DIRECTION 0

HOURS OF MISSING DATA: 0

ANNUAL ENVIRONMENTAL AND EFFLUENT RELEASE REPORT

SITE: PERRY UNIT: UNIT 1 7/29/02 14:34

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD = 02070808-02071508

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	3	0	0	0	0	0	3
E	11	0	0	0	0	0	11
ESE	16	0	0	0	0	0	16
SE	6	0	0	0	0	0	6
SSE	5	0	0	0	0	0	5
S	2	0	0	0	0	0	2
SSW	3	2	0	0	0	0	5
SW	1	0	0	0	0	0	1
WSW	1	0	0	0	0	0	1
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	48	2	0	0	0	0	50

PERIODS OF CALM (HOURS): 0

VARIABLE DIRECTION 0

HOURS OF MISSING DATA: 0

ANNUAL ENVIRONMENTAL AND EFFLUENT RELEASE REPORT

SITE: PERRY UNIT: UNIT 1 7/29/02 14:34

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD = 02070808-02071508

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	1	2	1	0	0	0	4
NNE	1	2	9	0	0	0	12
NE	1	8	11	7	0	0	27
ENE	5	4	3	3	0	0	15
E	13	2	2	0	0	0	17
ESE	18	2	0	0	0	0	20
SE	6	1	0	0	0	0	7
SSE	6	3	0	0	0	0	9
S	2	2	1	0	0	0	5
SSW	3	6	1	0	0	0	10
SW	2	4	2	0	0	0	8
WSW	3	0	1	0	0	0	4
W	0	9	0	0	0	0	9
WNW	0	7	2	0	0	0	9
NW	1	0	2	0	0	0	3
NNW	1	9	0	0	0	0	10
TOTAL	63	61	35	10	0	0	169

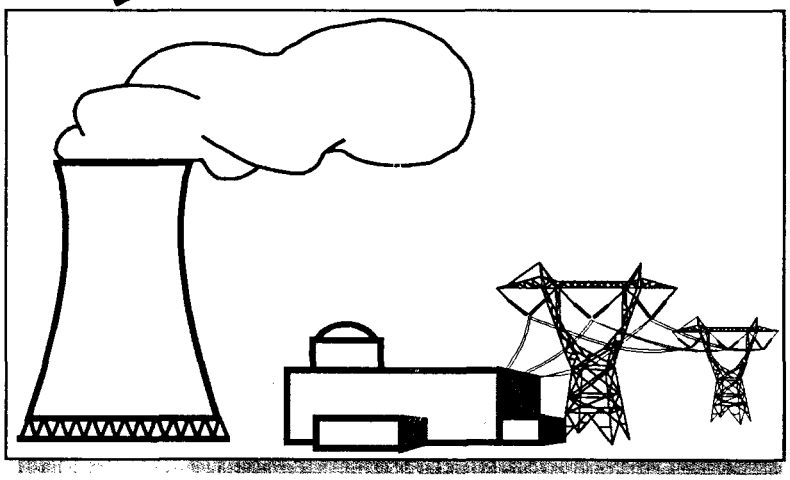
PERIODS OF CALM (HOURS): 0

VARIABLE DIRECTION 0

HOURS OF MISSING DATA: 0

ANNUAL ENVIRONMENTAL AND EFFLUENT RELEASE REPORT

PNPPD



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For more information, write :

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