

2006



**New Jersey Department of Environmental Protection
Bureau of Nuclear Engineering**

**ENVIRONMENTAL SURVEILLANCE AND
MONITORING REPORT – For the Environs of
New Jersey’s Nuclear Power Generating Stations**

Jon S. Corzine, Governor

www.state.nj.us/dep/rpp

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TABLE OF CONTENTS

	Page
1.0 Executive Summary	1
2.0 Understanding Sources of Ionizing Radiation and Pathways to Exposure	3
2.1 What is Ionizing Radiation?	3
2.2 Plant Effluents and Release Limits	5
2.3 Pathways of Exposure to Humans	6
3.0 Overview of the Environmental Surveillance and Monitoring Program	7
3.1 Thermoluminescent Dosimetry (TLD) Program	8
3.2 Continuous Radiological Environmental Surveillance Telemetry (CREST)	10
3.3 Radiological Environmental Monitoring Program (REMP)	12
3.3.1 Air Sampling	13
3.3.2 Water Sampling	13
3.3.3 Aquatic Biota (Fish/Shellfish)	14
3.3.4 Vegetation	14
3.3.5 Aquatic Sediment	14
3.3.6 Milk	15
3.4 Bureau of Nuclear Engineering Background REMP Locations	15
4.0 Environmental Surveillance and Monitoring Program – Sampling Results	16
4.1 REMP Background Monitoring Results	16
4.2 Oyster Creek Nuclear Generating Station	16
4.2.1 Oyster Creek Thermoluminescent Dosimetry Results	18
4.2.2 Oyster Creek CREST Data Monitoring	19
4.2.3 Oyster Creek Air Sample Results	19
4.2.4 Oyster Creek Water Sample Results	22
4.2.5 Oyster Creek Aquatic Biota Sample Results	23
4.2.6 Oyster Creek Vegetation Sample Results	24
4.2.7 Oyster Creek Aquatic Sediment Sample Results	26
4.2.8 Oyster Creek Milk Sample Results	26
4.3 Artificial Island – Salem/Hope Creek Generating Stations	26

4.3.1	Salem/Hope Creek Thermoluminescent Dosimetry Results	27
4.3.2	Salem/Hope Creek CREST Data Monitoring	29
4.3.3	Salem/Hope Creek Air Sample Results	29
4.3.4	Salem/Hope Creek Water Sample Results	32
4.3.5	Salem/Hope Creek Aquatic Biota Sample Results	33
4.3.6	Salem/Hope Creek Vegetation Sample Results	33
4.3.7	Salem/Hope Creek Aquatic Sediment Sample Results	33
4.3.8	Salem/Hope Creek Milk Sample Results	34
Appendix A Sampling Locations		36
A-1	Sample Collection Summary for 2006	36
A-2	Background Locations	37
A-3	OCNGS Sample Locations and Descriptions	38
A-4	CREST and Thermoluminescent Dosimetry Network – OCNGS	41
A-5	Salem/Hope Creek Sampling Locations and Descriptions	42
A-6	CREST and Thermoluminescent Dosimetry Network – Salem / Hope Creek	44
Appendix B Sample Results		45
B-1	Background Concentrations of I-131 in Bi-Weekly Air Iodine Samples	45
B-2	Oyster Creek Concentrations of I-131 in Bi-Weekly Air Iodine Samples	47
B-3	Salem/Hope Creek Concentrations of I-131 in Bi-Weekly Air Iodine Samples	52
B-4	Background Concentrations of Gross Beta in Bi-Weekly Air Particulate Samples	55
B-5	Oyster Creek Concentrations of Gross Beta in Bi-Weekly Air Particulate Samples	57
B-6	Salem/Hope Creek Concentrations of Gross Beta in Bi-Weekly Air Particulate Samples	64
B-7	Background Concentrations of Gamma Emitters and Strontium-90 in Quarterly Composite Air Samples	67
B-8	Oyster Creek Concentrations of Gamma Emitters and Strontium-90 in Quarterly Composite Air Samples	68
B-9	Salem/Hope Creek Concentrations of Gamma Emitters and Strontium-90 in Quarterly Composite Air Samples	69
B-10	Oyster Creek Concentrations of Gamma Emitters and Strontium-90 in Shellfish Samples	70
B-11	Salem/Hope Creek Concentrations of Gamma Emitters and Strontium-90 in Fish/Shellfish Samples	71
B-12	Oyster Creek Concentrations of Gamma Emitters in Aquatic Sediment Samples	72

B-13	Salem/Hope Creek Concentrations of Gamma Emitters in Aquatic Sediment Samples	73
B-14	Oyster Creek Concentrations of Gamma Emitters in Vegetable Samples	74
B-15	Salem/Hope Creek Concentrations of Gamma Emitters in Vegetable Samples	76
B-16	Background Concentrations of Gamma Emitters and Strontium-90 in Milk Samples	77
B-17	Salem/Hope Creek Concentrations of Gamma Emitters and Strontium-90 in Milk Samples	78
B-18	Oyster Creek Concentrations of Gamma Emitters and Tritium in Surface Water	80
B-19	Salem/Hope Creek Concentrations of Gamma Emitters and Tritium in Surface Water	81
B-20	Oyster Creek Concentration of Gamma Emitters and Tritium in Well Water	82
B-21	Salem/Hope Creek Concentration of Gamma Emitters and Tritium in Well Water	83
B-22	Background Quarterly Thermoluminescent Dosimetry (TLD) Data	84
B-23	Oyster Creek Quarterly Thermoluminescent Dosimetry (TLD) Data	85
B-24	Salem/Hope Creek Quarterly Thermoluminescent Dosimetry (TLD) Data	87
B-25	Salem/Hope Creek Co-Located Quarterly Thermoluminescent Dosimetry (TLD) Data	88
B-26	Oyster Creek – Continuous Radiological Environmental Surveillance Telemetry (CREST) Data	89
B-27	Salem/Hope Creek – Continuous Radiological Environmental Surveillance Telemetry (CREST) Data	96
Appendix C		101
C-1	Minimum Detectable Concentration Requirements for NJDEP/BNE Radiological Environmental Laboratory Service Contract	101
C-2	Glossary of Terms	102

LIST OF ACRONYMS

ADAMS	Agency-wide Documents Access and Management System
BNE	Bureau of Nuclear Engineering
CREST	Continuous Radiological Environmental Surveillance Telemetry
ELCP	Environmental Laboratory Certification Program
ESMP	Environmental Surveillance Monitoring Program
HCNGS	Hope Creek Nuclear Generating Station
MWt	Megawatts (thermal)
NAREL	National Air and Radiation Environmental Laboratory
NEES	Nuclear Engineering Environmental Section
OCNGS	Oyster Creek Nuclear Generating Station
PIC	Pressurized Ion Chamber
PSEG	Public Service Electric and Gas
REMP	Radiological Environmental Monitoring Program
SNGS	Salem Nuclear Generating Station
TLD	Thermoluminescent Dosimeter
USEPA	United States Environmental Protection Agency
USNRC	United States Nuclear Regulatory Commission

LIST OF FIGURES

		Page
Figure 1	Various Contributions of Radiation to a Member of the Public	4
Figure 2	Radiation Exposure Pathways	7
Figure 3	TLD Used in the Environment	9
Figure 4	CREST Monitoring Station around the Salem/Hope Creek Generating Station	11
Figure 5	Oyster Creek Nuclear Generating Station	17
Figure 6	CREST and Thermoluminescent Dosimeter Locations, Oyster Creek Nuclear Generating Station	18
Figure 7	Air Sampling Locations, Oyster Creek Nuclear Generating Station	20
Figure 8	Average Gross Beta Concentrations in Airborne Particulates – 2006, Oyster Creek Nuclear Generating Station	21
Figure 9	Salem and Hope Creek Nuclear Generating Stations	27
Figure 10	CREST and Thermoluminescent Dosimeter Locations, Salem / Hope Creek	28
Figure 11	Air Sampling Locations, Salem/Hope Creek	30
Figure 12	Average Gross Beta Concentrations in Airborne Particulates, Salem/Hope Creek	31
Figure 13	Average Concentration of Strontium-90 in Milk in the US By EPA Region, 1960 through 2006	35

1.0 EXECUTIVE SUMMARY

For 2006, the New Jersey Department of Environmental Protection's Bureau of Nuclear Engineering (BNE) maintained and operated an independent Environmental Surveillance and Monitoring Program (ESMP) for the environs of the Oyster Creek and Salem/Hope Creek Nuclear Generating Stations. This activity was performed in accordance with the legislative authority of the New Jersey Radiation Accident Response (N.J.S.A. 26:2D-43.g.). Funding for these activities is provided through annual assessments against each owner of a nuclear facility located in New Jersey. By developing and implementing a comprehensive monitoring strategy, the BNE ensures that New Jersey citizens are aware of and if necessary, protected from harmful exposure to radioactive effluent discharges from New Jersey's nuclear power plants during normal or accident operations.

The specific objectives of the ESMP are to monitor pathways for entry of radioactivity into the environment in order to identify potential exposures to the population from routine and accidental releases of radioactive effluent, and to provide a summary and interpretation of this information to members of the public and government agencies. The ESMP is divided into (1) the Radiological Environmental Monitoring Program (REMP); (2) the Thermoluminescent Dosimetry Program (TLD)¹ and (3) the Continuous Radiological Environmental Surveillance Telemetry (CREST). The REMP consists of samples collected by BNE staff of air and potable (drinking) water samples, while other media (aquatic sediment, milk, fish/shellfish, surface water and vegetation) are collected by each nuclear power plant owner and split with the BNE for analysis. The BNE's contract laboratories, Eberline Services and Teledyne Brown Engineering analyzed all REMP samples. The BNE also operates an independent program to assess direct gamma radiation levels by deploying, collecting and analyzing TLD badges. Results obtained through REMP and the TLD programs were compared to background readings, historical results, and to regulatory limits. Any readings significantly above background are investigated by the BNE. Data tables containing results of all REMP and TLD analyses can be found in the appendices attached to this report. The BNE CREST program is a real-time remote network of radiation detectors that monitors the environment for unexpected releases of radiation from nuclear power plants. They are located as close as 0.3 miles to as far away as 8.4 miles from the nuclear power plant.

This report covers sampling conducted during the time period of January 1, 2006 through December 31, 2006. During 2006, the scope of the ESMP included the collection and analysis of 476 TLD badges and the collection and analysis of 789 REMP samples. Overall, the data collected by the BNE's ESMP throughout 2006 indicate that residents living in the area around Oyster Creek and Salem/Hope Creek nuclear power plants have not received measurable exposures above normal background.

In 2006, several improvements were made to the environmental surveillance and monitoring program including the placement of TLDs at additional monitoring locations; the initiation of a

¹ A Thermoluminescent Dosimeter is a small device used to measure direct radiation by measuring the amount of visible light emitted from a crystal in the detector when exposed to ionizing radiation.

TLD intercomparison program; and the start of a contract for the development of a new system (both hardware and software) to replace the BNE's existing Radiation/Air Quality System (RAQS), located at the NJDEP headquarters in Trenton, New Jersey. RAQS is a system that receives minute by minute radiation data from the Bureau's CREST. CREST is a network of highly sensitive radiation detectors that surround New Jersey's four nuclear power plants. Should the set point for acceptable effluent releases be exceeded, RAQS automatically transmits an audio alarm. The new system will take advantage of leading technology including the possibility of moving from dedicated telephone lines to an alternate form of data transmission.

The data collected by the BNE's ESMP throughout 2006 does not indicate any discharges to the environment above the United States Nuclear Regulatory Commission (USNRC) regulatory requirements. There also is no upward trend of radioactivity for those radionuclides of interest (that is, radionuclides of cobalt, cesium, and iodine) reported within this document. There are, however, expected normal fluctuations that are seen historically in environmental radiation data.

Bi-weekly air particulate samples were analyzed for gross beta activity and gamma emitting radionuclides. The concentrations of radionuclides measured in air were not significantly different than ambient background concentrations. These air samples were analyzed quarterly for strontium-90 (Sr-90). The analyses indicated no measurable Sr-90 concentrations in air within 10 miles of either Oyster Creek or Salem/Hope Creek.

Surface water samples were taken monthly and potable (drinking) well water samples were taken quarterly. All water samples were analyzed for gamma emitting radionuclides and tritium². No tritium, fission, or activation products that emit gamma radiation (radionuclides of cobalt, iodine or cesium) were found in any sample analyzed.

Fish (striped bass, white perch, and bluefish) and shellfish (crabs) were sampled at locations surrounding the Salem/Hope Creek facility. Hardshell clams were sampled around the Oyster Creek Nuclear Generating Station (OCNGS). The nuclear power plant operator performed sample collection. Clams from Oyster Creek, fish from Salem/Hope Creek and hard-shell crabs from Salem/Hope Creek were split and analyzed by the BNE. These samples were collected semi-annually and analyzed for gamma emitting radionuclides and Sr-90. No Sr-90, fission, or activation products were found in any sample.

Routine vegetation samples (cabbages, collards, kale, and lettuce) were taken during the harvest season and analyzed for gamma emitting radionuclides. No fission or activation products were found in the routine samples that were collected. However, due to the consumption of edible vegetables by deer at one of the gardens located onsite (on owner controlled property), non-edible broadleaf vegetation samples were taken. These samples included autumn olive, sycamore, apple, cherry, and sassafras leaves, along with prickly pear and ragweed. Slightly elevated cesium-137 ranging from 67 to 855 pCi/kg was found. This is well below the licensee's offsite dose calculation manual threshold of 2000 pCi/kg. The results led to an in-depth investigation by the BNE into the source of the cesium-137. This study included split sampling

² Tritium (H-3) is a radioactive isotope of the element hydrogen. It is produced naturally in the upper atmosphere when cosmic rays strike air molecules. Tritium is also a byproduct of the fission process in commercial nuclear reactors and a result of nuclear weapons testing.

of media with the USNRC and the licensee. Through research efforts and findings by the BNE staff, it was determined that there was no public health risk or exceedance of any USNRC regulatory limits for discharges. As a result of the study, the licensee will incorporate future sampling efforts in these areas of slightly elevated readings as part of their routine environmental monitoring program. All vegetation samples will be split with the BNE. See the section of this report on vegetation samples for Oyster Creek for a discussion of these findings.

Monthly milk samples were taken only in the vicinity of Salem/Hope Creek Nuclear Generating Station and from the BNE's control location outside of Trenton, New Jersey. Since there are no dairy farms within a 10-mile radius of Oyster Creek, no samples were taken. Samples were analyzed for gamma emitting radionuclides and Sr-90. No Sr-90 or fission and activation products were found in any sample analyzed. About 99.9% of strontium in the environment comes from fallout from atmospheric nuclear weapons testing conducted in the 1950's-1960's.

Direct gamma radiation measurements were performed quarterly using TLD badges. CREST provides monthly average gamma radiation levels based on one-minute average radiation readings. All TLD results for the surrounding areas of Oyster Creek and Salem/Hope Creek were less than 20 milliroentgens per standard quarter (mR/Std. Qtr.). These results are consistent with those observed in previous years and are considered normal background levels for those areas of New Jersey. Two TLD badges were missing from the fourth quarter pickup in the vicinity of the Salem / Hope Creek nuclear plant. Losses were due to environmental damage and vandalism. Monthly CREST results in the environment around Oyster Creek and Salem/Hope Creek Nuclear Generating Stations indicated average ambient radiation levels in the range of normal background (0.0050 to 0.0090 mR/hr).

2.0 UNDERSTANDING SOURCES OF IONIZING RADIATION AND PATHWAYS TO EXPOSURE

2.1 WHAT IS IONIZING RADIATION?

People are exposed to radiation every day from naturally occurring background and man-made sources (approximately 360 millirem per year³). Radiation is used beneficially to diagnose and treat disease, but it can also produce harmful effects, such as cancer. There are two basic types of radiation – ionizing and non-ionizing. Ionization occurs when a charged portion of a molecule (usually an electron) is given enough energy to break away from the atom. This disruption of the atom can cause biological harm, such as cancer. Types of ionizing radiation include x-rays, gamma rays, alpha and beta particles, neutrons and certain types of cosmic rays. Examples of non-ionizing radiation include electro-magnetic fields, radio frequency, diathermy (physical therapy), power lines and microwaves.

People living in New Jersey receive an annual ionizing radiation dose of approximately 360 millirem. Of that dose, approximately (82%), or 300 millirem, is from natural background

³ A millirem is a unit of dose, which takes into account the amount of energy absorbed by the body from the radionuclide and its effectiveness in causing harmful biological effects.

sources. The remaining (18%), or 60 millirem, is from man made sources. Radon accounts for the largest portion of natural radiation exposure. Radon is a gas that occurs from the decay of natural uranium and is found in soil, rock, well water, and building materials. Radon can enter buildings through the cracks in floors and walls. Other sources include carbon-14, beryllium-7, and potassium-40, found naturally in food, radium, and drinking water. Building materials contain minerals and rock from the earth's crust that naturally emit radiation and contribute to the annual exposure rate. Annual dose also include radiation received from cosmic sources such as the sun. Individuals who reside in high altitude regions will receive a larger amount of radiation from cosmic sources since there is less atmosphere and ozone that shields humans from harmful radiation. The major contributors from man-made radiation sources include medical x-rays (58%) and nuclear medicine procedures (21%). Use of consumer products contributes approximately (16%) to an individual's exposure from man-made radiation sources. Examples of such products include smoke detectors, lawn fertilizers, ceramics, and some gas lantern mantles.

A small portion of man-made radiation contribution is due to a variety of sources including the commercial nuclear power plant operation and the uranium fuel cycle (1%), fallout from previous years of weapons testing (2%) and occupational sources (2%).

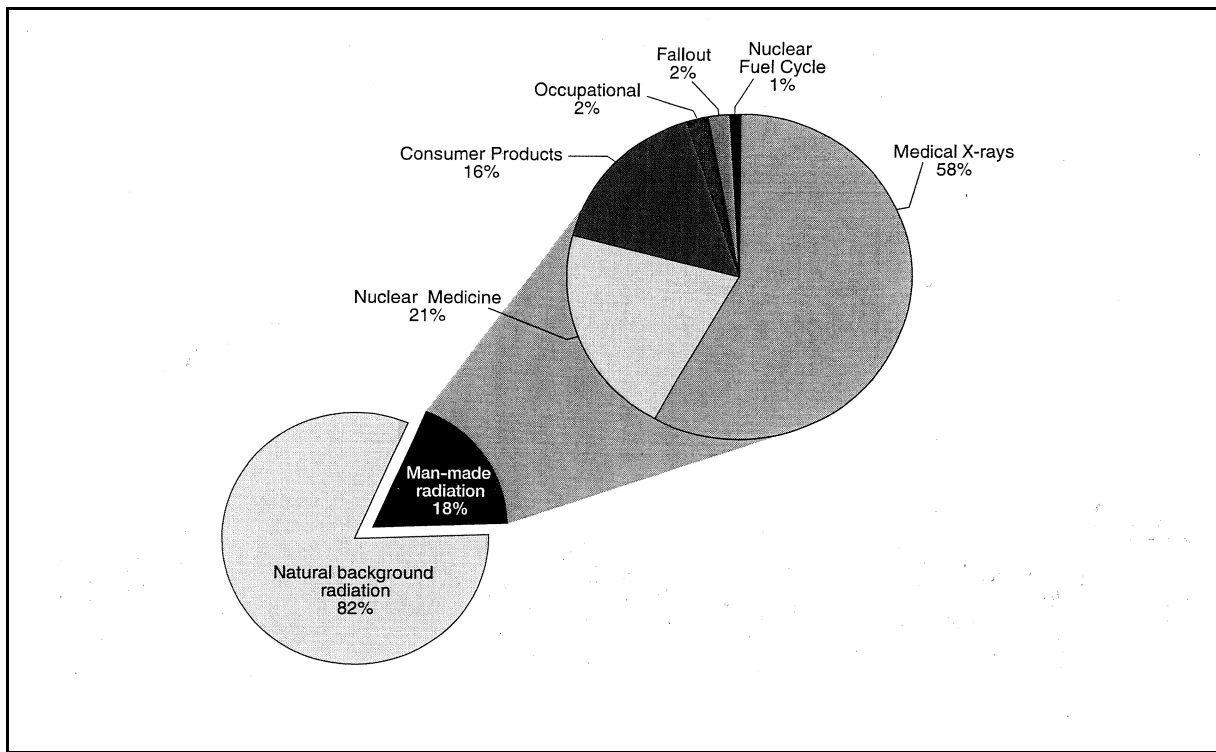


Figure 1 - Various Contributions of Radiation to a Member of the Public⁴

2.2 PLANT EFFLUENTS AND RELEASE LIMITS

⁴ The National Academies, BEIR VII: Health Risks From Exposure to Low Levels of Ionizing Radiation. Figure based on data from Ionizing Radiation Exposure of the Population of the United States, National Council on Radiation Protection and Measurements, 2006.

A nuclear power plant operates on the same principle as a conventional power plant, except that nuclear fission⁵ rather than combustion of fossil fuels (coal, oil and natural gas) provides the heat generation. A byproduct of the fission process is the production of radioactive (fission) gases in the fuel. A typical nuclear reactor may experience a small number of pinhole leaks in the fuel over its operating life. Radioactive gases may escape the fuel rod through these leaks and enter the water coolant. As a result, radioactive fission gases are present to some extent in the coolant water of the reactor at all times. Routine liquid and airborne releases of radionuclides to the environment during normal operation of a nuclear power plant may contribute some radiation exposure to the population. However, regulatory limits are imposed to ensure that the health and safety of the public are protected.

The USNRC requires all nuclear power plant operators to monitor daily radioactive effluent emissions (airborne and liquid discharges) from the plant and to file reports with the USNRC on an annual basis.

The nuclear power plant operator is required to monitor the concentration of radionuclides that are released to the environment in accordance with the USNRC's Appendix B to Title 10 of the Code of Federal Regulations, Part 20, "Standards for Protection Against Radiation" and the nuclear power plant's procedures. There is an additional requirement by the USNRC, through Regulatory Guidance 1.21⁶, that all nuclear power plants report their radionuclide releases in their Annual Radiological Effluent Release Report. Aside from the total radioactivity measurements, the report includes the limits of release set forth in the nuclear power plant's procedures⁷.

The assessment of the radiological impact on members of the public is performed by the nuclear power plant operator in their Annual Radiological Environmental Monitoring Report as well as the aforementioned Effluent Release Report. The calculation of potential radiological impact through the use of a hypothetical offsite dose assessment is performed by the power plant for gaseous and liquid effluents and compared to USNRC dose limits prescribed in Appendix I to 10CFR50⁸. A result of these assessments, along with copies of the nuclear power plant's environmental monitoring and effluent release reports are available on the USNRC's web-based library system, Agency Wide Documents Access and Management System (ADAMS), at <http://www.nrc.gov>.

As part of normal operations, a nuclear power plant will release radionuclides. Radionuclides released as part of the fission process include, but are not limited to the following: gaseous (krypton and xenon), iodine and particulates (iodine, cesium, cobalt, strontium, manganese, zinc,

⁵ The fission process is a nuclear reaction in which an atomic nucleus splits, or fissions, into fragments, with the release of large amounts of energy in the form of heat and radiation.

⁶ Regulatory Guide 1.21; Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power

⁷ Effluent release limits are set forth in the nuclear plant's procedure entitled, "Offsite Dose Calculation Manual"

⁸ 10CFR50, Appendix I, Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion "As Low As Reasonably Achievable" for Radioactive Material in Light-Water Cooled Nuclear Power Reactor Effluents

iron and barium) and tritium. The majority of radioactive effluent released from a commercial power plant to the environment is in the form of gaseous radionuclides. However, iodine-131 is of particular interest because it has an affinity for the thyroid gland, a critical exposure organ.

In assessing the impact of radioactivity on the public or the environment, it is important to consider the amount of radioactivity released to the environment by the nuclear plant, the properties of those radionuclides released and their affect (half-life⁹ of each isotope), the transport method of radioactivity (dispersion in the atmosphere and deposition of particulates in the environment), how the radioactive material enters the body, and the potential biological effect of each radionuclide.

2.3 PATHWAYS OF EXPOSURE TO HUMANS

Human exposure to radionuclides can occur through three different pathways: inhalation, ingestion, and direct exposure (Figure 2).

Airborne releases to the environment are diluted and carried away from the site by the wind, which continuously acts to disperse radioactivity. The source is normally a plant-monitored release point such as a stack or vent. If released, the airborne radionuclides could be breathed into the lung or deposited in the environment and ingested through the consumption of water, fish/shellfish, vegetation, or milk. Direct radiation exposure from airborne releases (standing on contaminated ground or direct exposure to the release plume) could also occur since gamma rays can travel long distances and penetrate entirely through the body.

Liquid releases to the environment are diluted and carried away from the site by groundwater, and surface waters such as streams and rivers. Radioactive elements can deposit on the soil and settle in groundwater. Radioactivity can enter the human body through the consumption of drinking water. Potential sources of liquid releases include plant-monitored discharge points that are permitted by the NJDEP's Bureau of Point Source Permitting program or controlled releases within plant technical specifications, known as batch releases. The exposure pathway to humans through liquid effluents would be through aquatic biota (fish/shellfish), shoreline exposure from sediments and swimming and drinking water.

⁹ The time in which one half of the atoms of a particular radioactive substance disintegrate into another nuclear form. Measured half-lives vary from millionths of a second to billions of years.

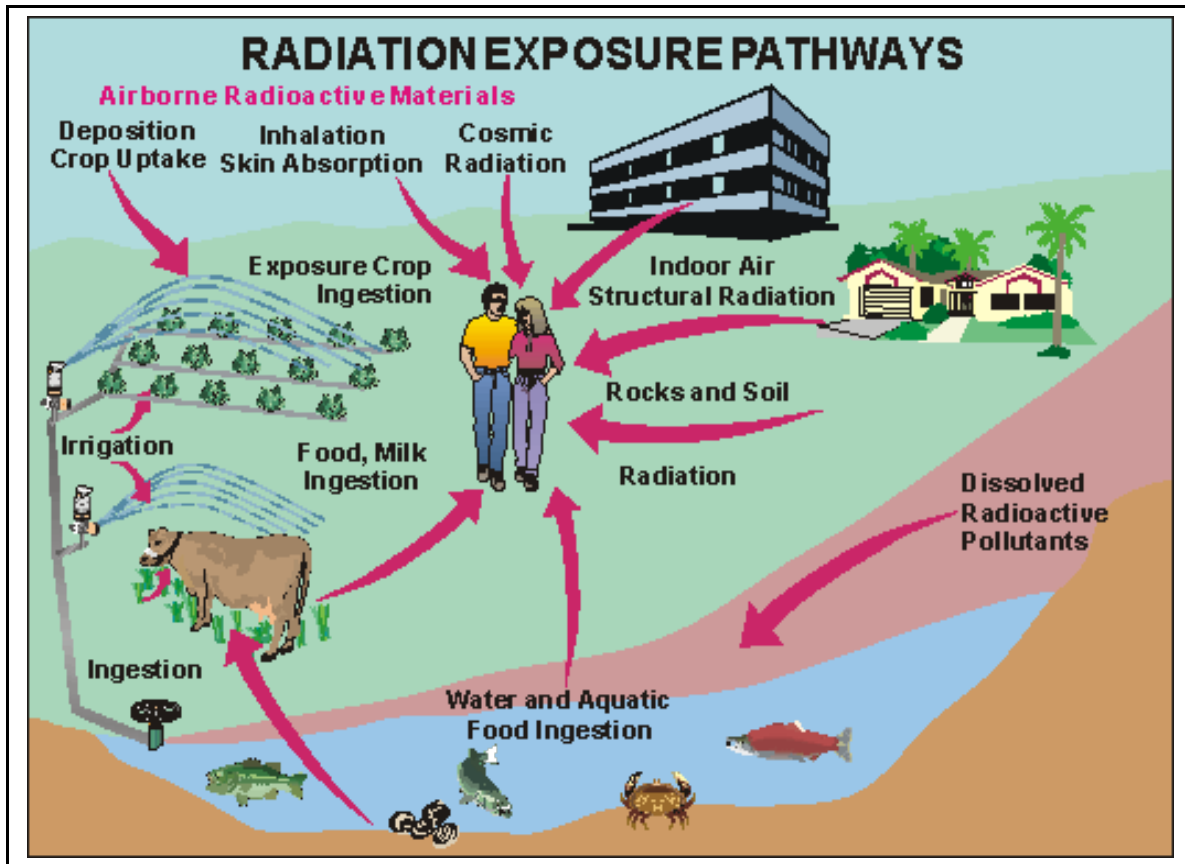


Figure 2 - Radiation Exposure Pathways¹⁰

3.0 OVERVIEW OF THE ENVIRONMENTAL SURVEILLANCE AND MONITORING PROGRAM

The purpose of the ESMP is to monitor the various pathways by which people and the environment could be exposed to radiation. Most ESMP data are collected at and beyond the site boundaries of New Jersey's nuclear power plants. Along with continuous ambient air monitoring, environmental samples are obtained for the determination of radioactivity in air, drinking water, surface water, milk, fish/shellfish, vegetation, aquatic sediment, and occasionally soil. Direct gamma radiation measurements are taken using TLD badges.

The specific objectives of the ESMP are to monitor pathways for entry of radioactive pollutants into the environment in order to identify potential exposures to the population from routine and accidental releases of radioactive effluent by the nuclear reactors; and to provide this information to members of the public and government agencies.

To carry out these objectives, the Bureau of Nuclear Engineering (BNE):

¹⁰ Bobby Scott, Ph.D, The Lovelace Respiratory Research Institute, Radiation Sources and Effects In People, <http://www.radiation-scott/radsources/1-0.htm>

- Deploys TLD badges on a quarterly basis at 30 offsite locations plus 2 background locations. The TLD provides direct gamma radiation measurements in the environs of the Oyster Creek and Salem/Hope Creek nuclear power plants, as well as background locations over 20 miles from either nuclear plant. There are 20 locations around the Oyster Creek nuclear power plant (Table A-4), 10 in the environs of the Salem/Hope Creek nuclear power plant (Table A-6), and 2 background locations (Table A-2).
- Monitors the nearby environment surrounding the nuclear power plants in New Jersey through one of the most advanced remote gamma radiation monitoring systems called the Continuous Radiological Environmental Surveillance Telemetry (CREST) system.
- Performs a comprehensive REMP environmental sampling program that consists of the collection and analysis of approximately 800 samples annually in the environs of the Oyster Creek and Salem/Hope Creek nuclear power plants. In addition, approximately another 50 samples are collected annually to provide comparative background radiation data for air and milk media.

3.1 THERMOLUMINESCENT DOSIMETRY (TLD) PROGRAM

The BNE maintains a TLD program, independent from that of each nuclear power plant operator, in order to determine the ambient gross gamma radiation levels in the vicinity of the Oyster Creek and Salem/Hope Creek nuclear plants. A TLD is a passive radiation detector that requires no power source and is designed to have the same sensitivity to radiation as human tissue. The BNE utilizes Panasonic TLD badges Model No. UD-814. TLD badges are placed at specified locations and exchanged on a quarterly basis by BNE staff. TLD badges collect data from the environment continuously 24 hours a day, 7 days a week, 365 days a year. Once collected, BNE staff use a Panasonic TLD reader (Model # UD-716) to obtain data from the TLD badges. Control and transit TLD badges are read along with each set of field TLD badges to estimate storage and transit exposures.

Site selection follows USNRC's criteria described in NUREG-0837, "NRC TLD Direction Radiation Monitoring Network", and summarized as follows:

- Within five miles of each nuclear plant site, TLD badges are located offsite in each standard wind compass sector (such as North, South, North Northeast, and South-Southwest). TLD badges are not placed in sectors that consist entirely of open water or are unoccupied or inaccessible.
- TLD stations also were selected relative to major population centers and areas of interest such as government buildings, schools and/or hospitals. The population center closest to the Oyster Creek nuclear power plant (OCNGS) is in Forked River, approximately 2 miles from the nuclear plant. There are several TLD badges located in various locations around Forked River. The closest population

center to Salem/Hope Creek is approximately 9.5 miles from the site, in Salem, New Jersey.

During 2006, the BNE expanded its TLD network to include: (1) the placement of TLD badges at background locations (Brendan T. Bryne State Park in New Lisbon, New Jersey and BNE Headquarters in Ewing, New Jersey) starting 3rd quarter of 2006, and (2) the placement of TLD badges at four additional population and recreational areas in the vicinity of the OCNGS. The four locations are: Barnegat Light on Long Beach Island; Barnegat Township; Lanoka Harbor in Lacey Township; and Island Beach State Park (see Figure 6 and Table A-4 for locations and descriptions). All four locations were initiated 4th quarter of 2006. The BNE plans to further expand its TLD monitoring network to include more recreational and population centers in the environs of the Salem/Hope Creek nuclear power plants.

In addition to expansion of the BNE's TLD monitoring network, BNE staff initiated the placement of co-located TLD badges at existing offsite locations in the environs of Salem/Hope Creek to validate BNE's TLD results. TLD badges were obtained from Pennsylvania Power and Light (PP&L) for co-located deployments in the 3rd quarter of 2006. TLD badges from Global Dosimetry Solutions, Inc., (Global) were obtained for deployment starting with 4th quarter 2006 and on into 2007. In 2007, the BNE plans to co-locate TLD badges at offsite locations in the environs of Oyster Creek nuclear generating station.

The locations, site descriptions, and distances from the plant of the BNE's TLD sites for the program's background locations, Oyster Creek, and Salem/Hope Creek are given in Appendix A, Tables A-2, A-4 and A-6 respectively. Figure 3 shows an actual BNE field TLD located on the licensee's property fence-line at Oyster Creek.



Figure 3– TLD Used in the Environment

3.2 CONTINUOUS RADIOLOGICAL ENVIRONMENTAL SURVEILLANCE TELEMETRY (CREST)

The Continuous Radiological Environmental Surveillance Telemetry System (CREST) is a near real-time remote network of highly sensitive radiation detectors surrounding New Jersey's four nuclear power plants. It serves to monitor the environment for any unexpected releases of radiation from the Salem/Hope Creek Generating Station and the Oyster Creek Generating Station. Ten CREST stations are located around the Salem/Hope Creek Generating Stations, and sixteen station locations around the Oyster Creek Generating Station. The stations are located in every available compass sector, from outside the fence-line up to eight miles from the Salem/Hope Creek Generating Station, and 2.7 miles away from the Oyster Creek Generating Station.

Each CREST site includes a GE Reuter Stokes RSS-131 pressurized ion chamber (PIC) filled with argon gas. The PIC is able to accurately detect changes in ambient gamma radiation levels, from naturally occurring background radiation to what might be encountered during an emergency event at one of the nuclear power plants. In addition to measuring radiation, the CREST sites are equipped with Climatronics meteorological sensors that measure wind speed and wind direction at every station. These data would be used in conjunction with measured radiation levels during a nuclear event to determine what areas might be impacted and how quickly.



Figure 4: Servicing a CREST Monitoring Station near the Salem / Hope Creek Nuclear Generating Station

The CREST system is part of the DEP's Radiation/Air Quality System (RAQS). It is supported by BNE staff utilizing a bucket truck dedicated to its operation and maintenance. The CREST radiation and meteorological data are transmitted on a minute-by-minute basis to a central RAQS computer in Trenton. If radiation levels exceed a predetermined threshold, an alarm is triggered and the BNE staff is notified to investigate. The threshold is set above normal background levels, but well below what would pose a health risk. In addition to providing continuous monitoring of ambient radiation levels, CREST also serves as an emergency response system should a radioactive release occur at any of the nuclear plant sites.

Over the last several years, the CREST team has been working to upgrade all of its radiation monitoring sites to the newest generation of radiation detectors, Reuter-Stokes' RS-131s. The upgrade of the Salem / Hope Creek nuclear plant sites has been completed, including the three new monitoring sites around Hope Creek's Independent Spent Fuel Storage Installation. All of the monitoring sites around the Oyster Creek nuclear plant also have been upgraded to RS-131s, with the exception of one of the three Independent Spent Fuel Storage Installation sites that still must be completed.

A contract to replace the central computer system shared by CREST and NJDEP's Bureau of Air Monitoring was awarded to Envitech, Ltd. in February 2006. New hardware will support Envitech's off-the-shelf software modified to meet New Jersey's air quality and radiation monitoring needs. The new system replaces the Radiation/Air Quality System running on Digital Equipment Corporation's MicroVAX's since the late 1980's. Software support and replacement hardware parts had become nearly non-existent and the system suffered several significant failures. Because of the risk of failure, Envitech provided an interim system mid-year while developing the new Air Pollution/Radiation Data Acquisition and Early Warning System. The new system will be supported by an Oracle database and take advantage of leading technology, including the possibility of moving from leased lines to an alternate form of data transmission.

Locations and descriptions of the BNE CREST stations can be found in Appendix A, Table A-4 (OCNGS) and Table A-6 (Salem/Hope Creek).

3.3 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM (REMP)

Through its REMP, the BNE independently monitors radiation in environmental media located in the areas surrounding New Jersey's nuclear generating stations. During 2006, the BNE's REMP program included the collection and analysis of 342 air particulate samples, 253 air iodine samples, 76 water samples (surface and drinking well water), 40 milk samples, 15 aquatic sediment samples, 12 fish/shellfish samples, and 47 vegetable samples from both nuclear generating stations (Oyster Creek and Salem/Hope Creek) combined. Of the 785 total samples collected, 112 were background air (Tables B-1, B-4, and B-7) and/or milk samples collected from areas distant from the nuclear power plants (Table B-16). See Appendix A, Table A-1 for a description of the sampling media, frequency and type of analysis.

All REMP samples were analyzed for the BNE by independent contract laboratories. Each contract cycle, the BNE awards a two-year laboratory sampling analysis contract with the option to extend to a third year. At the end of every three years, the BNE must re-bid its laboratory services contract. On July 1, 2005, the BNE laboratory contract was awarded to Eberline Services for water sample analyses and Teledyne Brown Engineering for all other sampling media.

The BNE's Radiological Environmental Laboratory Monitoring contract specifies minimum detection limits for the analysis of radionuclides in the various media (air, water, soil, milk, fish/shellfish, vegetables) collected through the BNE's radiological environmental monitoring program (See Table C-1 in Appendix C). The Bureau's contract labs must achieve detection limits that are equal to or lower than the limits cited in this table. The detection limits are determined in accordance with the procedures specified in Appendix B of the U.S. EPA's Code of Federal Regulations (CFR) 40 CFR 136 (Guidelines Establishing Test Procedures for the Analysis of Pollutants) and are based on the regulatory requirements in 40 CFR 141 (National Primary Drinking Water Regulations) and the U.S. NRC Branch Technical Position, Revision 1, November 1979. The U.S. EPA Safe Drinking Water Standards for radionuclides are the same as New Jersey's Groundwater Quality Standards, which are the same as the New Jersey Surface Water Quality Standards.

Furthermore, for the analysis of water samples throughout the duration of the laboratory contract, the contractor must be in compliance with the New Jersey Administrative Code (N.J.A.C.) 7:18 (Regulations Governing the Certification of Laboratories and Environmental Measurements). This program is administered by the NJDEP's Office of Quality Assurance through its Environmental Laboratory Certification Program (ELCP). Additional information on the ELCP can be found at <http://www.nj.gov/dep/oqa/>

3.3.1 Air Sampling

BNE staff maintains a network of air sampling locations around Oyster Creek and Salem/Hope Creek Nuclear Generating Stations. Air samples are collected biweekly (once every two weeks) using low-volume samplers (Hi-Q VS23-052CCV) and are comprised of two parts. The first part is an air filter, designed to capture radioactive particulates, which is counted for gross beta radioactivity. This filter is then stored with other air filters collected from each individual sampling site until the end of each quarter. At that time, all of the filters from each individual sampling site are composited and analyzed for gamma emitting radionuclides and for strontium-89/90. This is called an, "air particulate quarterly composite" sample. The second part of the biweekly air sample is a charcoal canister, which is analyzed at the end of each biweekly period for gaseous Iodine-131.

Air sampling locations have been chosen with respect to (1) atmospheric stability data; (2) the prevailing wind direction; and (3) the height of the airborne release point from each nuclear plant site. A complete list of air sampling locations for both Oyster Creek and Salem/Hope Creek can be found in Appendix A, Table A-3 for Oyster Creek and Table A-5 for Salem/Hope Creek. Background locations are found in Appendix A, Table A-2.

The air sampling location on Finninger Farm¹¹ is maintained by the nuclear power plant operator and its sample is split with the BNE for analysis.

During 2006, BNE staff replaced all of the steel enclosures that house the air sampling equipment (air sampler and gas meter) with weather-resistant aluminum enclosures.

3.3.2 Water Sampling

Drinking water samples are taken quarterly by BNE staff from around each nuclear facility as a way to evaluate potential ingestion of radionuclides by humans. Sources of this water are commercial well water systems. Samples are obtained directly from tap water at each location (such as a school, administration building or state park). Sample locations are chosen in aquifers downstream and upstream of each commercial nuclear facility. Each sample obtained is analyzed for gamma emitters, such as cesium-134/137 and cobalt-58/60, as well as for tritium.

¹¹ Finninger Farm, located east of U.S. Route 9, is owned by Exelon Corporation. This land (approximately 650 acres) was formerly privately-owned farmland prior to the operation of the Oyster Creek nuclear plant.

Surface water samples are taken monthly by the nuclear power plant operator and split with the Bureau as a way to evaluate potential direct exposure to radionuclides. Samples are collected in locations in the direct liquid effluent pathway of release from each commercial nuclear facility (such as the discharge canal at Oyster Creek) and in locations that are outside the influence of the discharge point or any effects of re-circulation of liquid plant effluent (for example, effects of recirculation in the river or bay). Analyses for gamma emitters and tritium are performed on all surface water samples.

3.3.3 Aquatic Biota (Fish/Shellfish)

Fish and shellfish samples are collected and analyzed quarterly as an indicator of any radionuclides that may have entered the food chain and therefore could be consumed by humans. Edible portions and body fluids are analyzed to evaluate radionuclide concentrations in fish/shellfish. Biological samples of clams (*Mercenaria mercenaria*) are taken to monitor radionuclide concentrations in shellfish. Fish sampling is divided into two types. First, bottom feeders (such as crabs, clams or eel) ingest radioactive materials that settle to the bottom of the bays and canals. Second, predator fish (such as bluefish, bass, and white perch) that feed upon other species of fish are collected.

All fish/shellfish samples are split with the nuclear power plant operator and analyzed for gamma emitting isotopes such as cobalt-60 and cesium-137 and for beta-emitting strontium-89/90.

3.3.4 Vegetation

The nuclear power plant operators collect samples of locally grown vegetables from a combination of seven farms during the growing season (April through October) and split these samples with the BNE for analysis. Edible portions of vegetables such as cabbage, collards, kale, corn and lettuce are analyzed for gamma emitting radionuclides in order to evaluate possible radionuclide uptake by crops.

3.3.5 Aquatic Sediment

Aquatic sediment samples are collected quarterly from the bottom of water passages that carry effluents from the nuclear generating stations to evaluate the concentrations of radionuclides. Sediments are fine solid materials that have settled out of a liquid stream or standing body of water. Accumulation of radionuclides in sediment can lead to exposure of humans through the ingestion of aquatic species or through direct shoreline exposure.

Around Oyster Creek, sediment samples are taken from Barnegat Bay, and Great Bay/Little Egg Harbor as well as the plant's discharge canal. Locations range from 0.4 to 20 miles from Oyster Creek. Around Salem/Hope Creek, sediment samples are taken from four locations along the Delaware River. Locations range from approximately 0.2 to 0.7 miles downstream of the release point from Salem Units 1 and 2.

All aquatic sediment samples are obtained by the nuclear power plant operator, and the sample is split with the BNE. Samples are analyzed for gamma emitting isotopes such as cesium-134/137 and cobalt-58/60.

3.3.6 Milk

Milk samples are collected quarterly from a combination of three farms located within 20 miles of the Salem/Hope Creek. All samples are split with the nuclear power plant operator and analyzed for gamma emitting radionuclides and for strontium-89/90. There are no dairy farms within a 10-mile radius of the OCNGS. Therefore no milk samples are collected from the environs of Oyster Creek for analysis.

Milk is sampled because it is a readily available food source consumed by a large portion of the population and is a good indicator of radionuclides present in the environment. Radionuclides such as iodine-131, strontium-90 and cesium-137 are products of nuclear power plant operation. If released, the radionuclides can settle on pastures, and ultimately be consumed by milk-producing cows.

3.4 BUREAU OF NUCLEAR ENGINEERING BACKGROUND REMP LOCATIONS

In order to assess the contribution of radioactivity in the environment from the commercial nuclear plants in New Jersey, the BNE has established background stations for air and milk media. A background sample location is one that is considered beyond the influence of either the OCNGS or Salem/Hope Creek nuclear power plant and is used to evaluate normal levels of radionuclides in the environment from natural sources and fallout from previous years' weapons testing (weapons tests conducted in the 1950's, 1960's and Chinese weapons tests during the late 1970's through October of 1980). Background data are used to track and trend radioactivity over time and are compared to the BNE's samples taken near each nuclear plant site.

For air sampling, the BNE maintains a background monitor at Brendan T. Byrne State Park in New Lisbon, New Jersey and at the BNE Offices in Ewing, New Jersey. The air sampler at Brendan T. Byrne State Park is approximately 20 miles from the OCNGS and approximately 60 miles from Salem/Hope Creek. The air sampler at the BNE Offices is approximately 50 miles from OCNGS and 80 miles from Salem/Hope Creek. The BNE collects background air samples biweekly (once every two weeks).

A background location for milk was established in August of 2004 at a dairy farm located in suburban Trenton, New Jersey. This dairy farm is approximately 50 miles from the OCNGS and 80 miles from Salem / Hope Creek, well beyond the influence of either of New Jersey's nuclear generating stations. The nearest nuclear power plant in Pennsylvania (Limerick Nuclear Power Plant) is located approximately 50 miles west of the background dairy farm¹². The BNE staff collects background milk samples once each quarter.

¹² Limerick Nuclear Power Plant is a two-unit nuclear power plant owned and operated by the Exelon Corporation.

TLD badges at both background locations were established during the second quarter of 2006.

Locations and descriptions of the BNE's background sampling sites can be found in Appendix A, Table A-2.

4.0 ENVIRONMENTAL SURVEILLANCE AND MONITORING PROGRAM – SAMPLING RESULTS

4.1 REMP BACKGROUND MONITORING RESULTS

Results for background air particulate samples were consistent in magnitude with results found at sample locations in close proximity (Appendix A, Tables A-3 and A-5) to each commercial nuclear power plant.

There were no fission or activation products (cobalt-60, cesium-134, or cesium-137) in air particulate samples at either background location. Beryllium-7, found naturally in the environment, was present at both background stations.

No activity was detected in milk samples collected from the background farm located in the Trenton area (cesium, iodine or strontium).

All TLD results for both background locations were less than 20 milliroentgens (mR) per standard quarter (std. Qtr) with a range of 10.2 to 14.4 mR/Std. Qtr. These results are consistent with those observed in the environs around both nuclear power plants.

A complete summary of sample results from the background locations can be found in Appendix B, Table B-1 for air iodine, and Table B-4 for air particulate gross beta, Table B-16 for milk and Table B-22 for TLD.

4.2 OYSTER CREEK NUCLEAR GENERATING STATION

The Oyster Creek Nuclear Generating Station (OCNGS) is a boiling water reactor rated at 650-megawatts electric (see Figure 5). The facility is located in Lacey Township, Ocean County, New Jersey, near Barnegat Bay. It has been in commercial operation since December of 1969. The plant is owned and operated by Amergen Energy Company, a subsidiary of the Exelon Corporation, headquartered in Illinois and Pennsylvania.

The OCNGS site is comprised of 1,316 acres located in the coastal pine barrens of New Jersey and is traversed by U.S. Highway Route 9. Geographically, the plant is situated in the Outer Coastal Plain near the Pinelands National Reserve. The area contains extensive freshwater and saltwater marshes. Barnegat Bay Inlet and the Atlantic Ocean are within 10 miles of the plant. Land use near the plant consists of commercial, residential, and

recreational properties. Island Beach State Park and adjacent shore areas contribute to a large seasonal increase to the local population.

The largest concentrations of residents are to the north and the northeast. The closest residents are 0.5 miles northeast of the plant. The nearest population center is Ocean Township, which lies less than two miles south-southeast of the site. Other population centers within the 10-mile radius of the plant include Lacey Township and Toms River (Dover Township). There are a number of retirement communities in the area, including Lacey, Whiting (northwest) and Ocean Township.



Figure 5 – Oyster Creek Nuclear Generating Station

The OCN GS uses a man-made intake and discharge canal to provide cooling. Water enters the intake canal, located north and east of the site, from the Barnegat Bay, and is pumped through the station as a source of cooling water. Water returns from the plant into the discharge canal, along with existing water that is diverted from the intake canal through pumps, directly into the discharge canal, in order to maintain an acceptable temperature limit for aquatic biota. The water is then discharged from the canal south and east of the plant, and is returned to the Barnegat Bay. The Oyster Creek flows from the west and south of the plant into the discharge canal south of the plant. The branches of the Forked River flow into the intake canal, mixing with waters entering the canal from Barnegat Bay.

4.2.1 OYSTER CREEK THERMOLUMINESCENT DOSIMETRY RESULTS

The BNE maintains twenty (20) TLD sites in the offsite surrounding area of the OCNCS. Each location has two TLD badges that are exchanged at the end of each calendar quarter. Appendix A, Table A-4 provides details on TLD locations, site descriptions, and distances from the OCNCS. Figure 6 depicts locations of TLD sites near Oyster Creek. A complete summary of TLD results can be found in Appendix B, Table B-23 for TLD badges surrounding the OCNCS.-

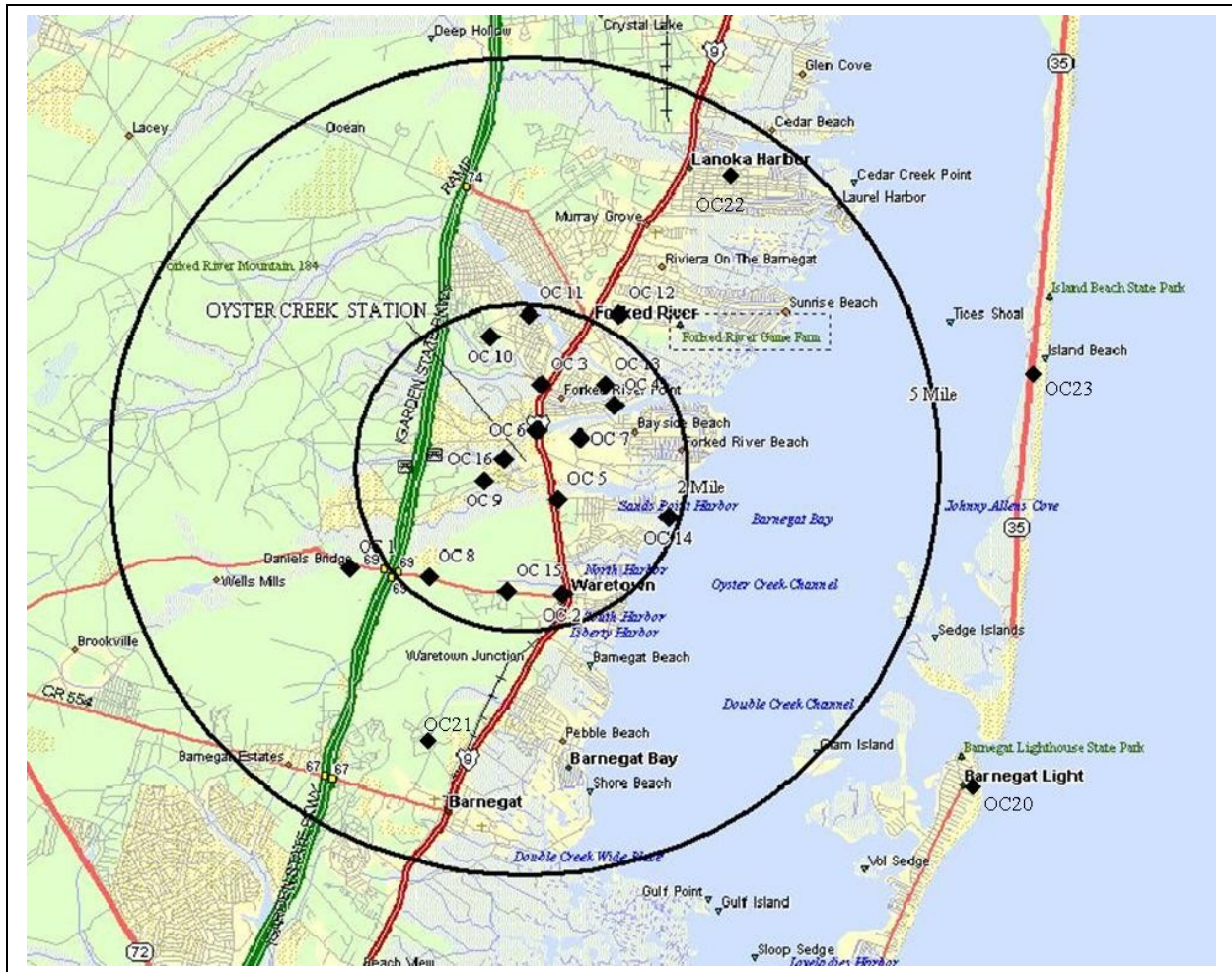


Figure 6 – CREST and Thermoluminescent Dosimeter Locations, Oyster Creek Nuclear Generating Station
Note: Stations OC20 through OC23 have TLD Badges ONLY

All TLDs are deployed, exchanged and analyzed by BNE staff. The overall collection efficiency for the OCNCS TLD network in 2006 was 100%.

Appendix B, Table B-23 represents ambient radiation levels obtained from the OCNGS TLDs during 2006. All TLD results for the environs of Oyster Creek were less than 20 milliroentgens (mR) per standard quarter (std. Qtr) with a range of 7.9 to 13.5 mR/Std. Qtr. These results are consistent with those observed in previous years.

4.2.2 OYSTER CREEK CREST DATA MONITORING

Figure 6 above identifies the locations of CREST stations around the Oyster Creek Nuclear Generating Station. Table B-26, in Appendix B, provides graphical summaries of ambient radiation results for each CREST site. The monthly average ambient radiation level recorded at each station is graphed in milliroentgens per hour (mR/hr). Several sites (OC9, OC12 and OC13) were not in operation during 2006 due to inoperable phone lines, and therefore, do not have graphs reflecting average radiation levels.

Normal background radiation levels range from 0.0050 to 0.0090 mR/hr in the vicinity of the Oyster Creek nuclear power plant. The monthly average ambient radiation levels at all CREST stations located in the environment around the nuclear power plant sites fell within this range during 2006.

4.2.3 OYSTER CREEK AIR SAMPLE RESULTS

In 2006, air sampling around the OCNGS was done at six locations. Figure 7 below displays and Appendix A, Table A-3 describes a detailed list of air sampling sites.

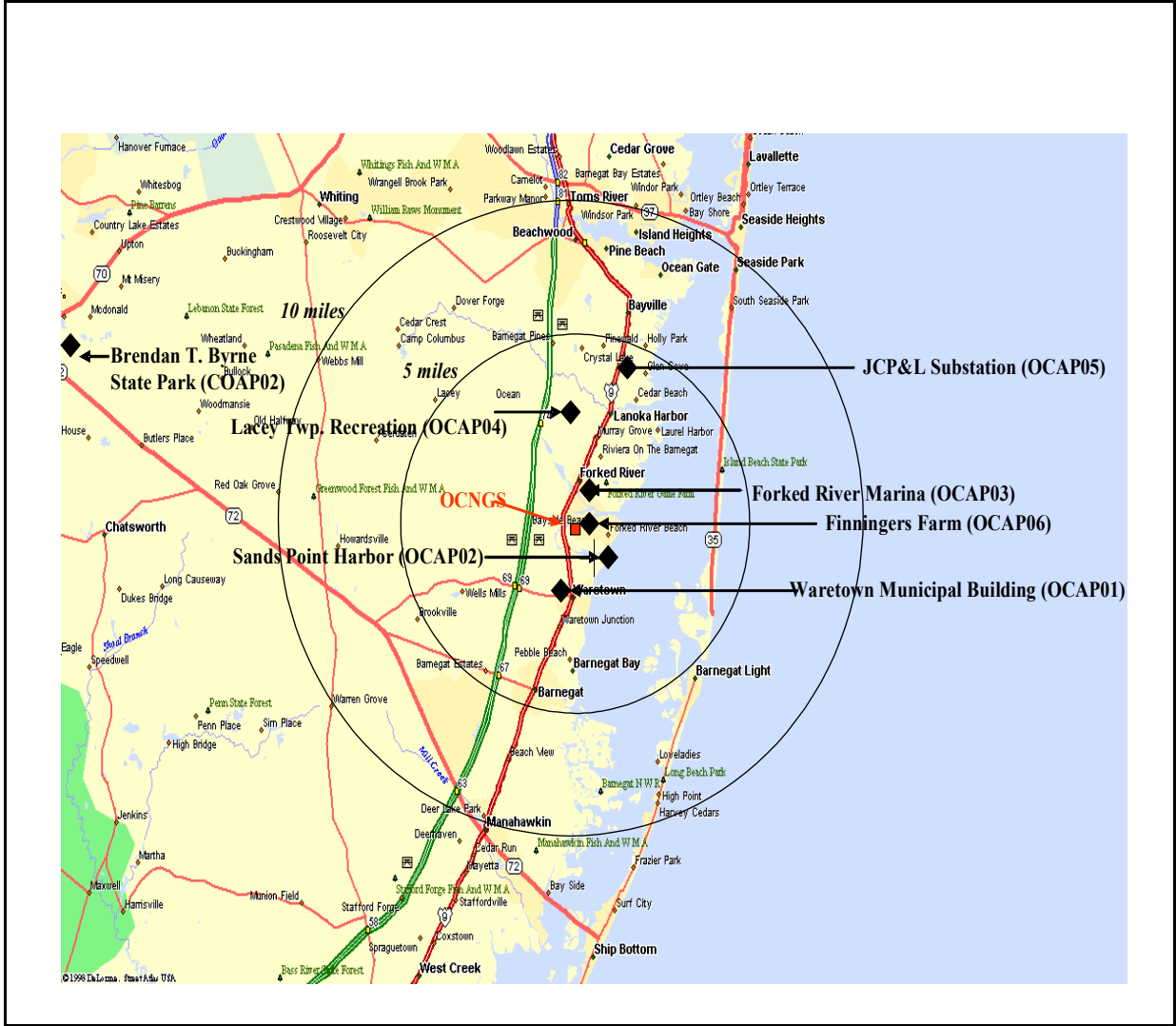


Figure 7 – Air Sampling Locations, Oyster Creek Nuclear Generating Station

Air Particulate Gross Beta Results

Gross beta activity is a measurement of all beta activity present, regardless of specific radionuclide source. Gross measurements are used as a method to screen samples for relative levels of radioactivity. Specific analyses of beta-emitting isotopes are done at the end of each quarter-annual period of time, when samples are composited by location.

Figure 8 depicts the average gross beta concentration in air for each of the BNE’s sampling locations around the OCNGS, as well as the background location at Brendan T. Byrne Forest in New Lisbon, New Jersey. All air sites measured were not significantly different than the ambient background concentrations at Brendan T. Byrne State Forest.

The highest gross beta concentration was 0.036 pCi/m³, well below the EPA’s RadNet screening criteria of 1.0 pCi/m³ but greater than the minimum detectable concentration requirement

(Appendix C, Table C-1) of 0.0100 pCi/m^3 . RadNet is a national network of monitoring stations that regularly collect air, precipitation, drinking water, and milk samples for analysis of radioactivity. RadNet, which has stations in each state, has been used to track environmental releases of radioactivity from nuclear weapons tests and nuclear accidents. Sample results are compared against EPA screening levels for the various media. A screening level is a guideline used by the EPA to decide whether or not to determine the identity and activity of radionuclides in the sample, and does not correspond to any regulatory dose limit. RadNet documents background levels of radioactivity and publishes this information in “Environmental Radiation Data” reports that are available on the EPA’s internet website at <http://epa.gov/narel/erams/erdononline.html>.

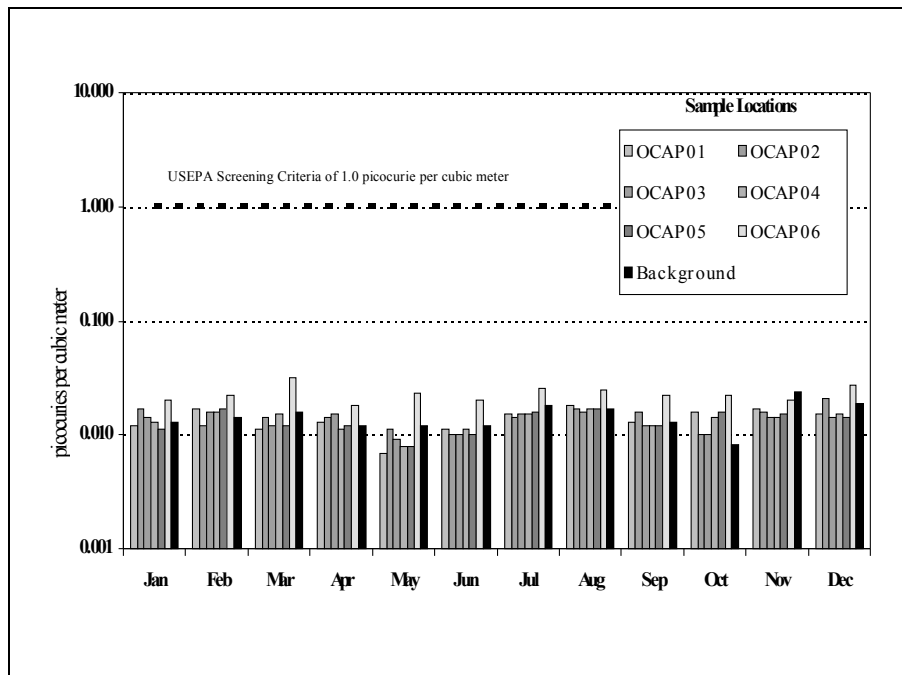


Figure 8 – Average Gross Beta Concentrations in Airborne Particulates – 2006, Oyster Creek Nuclear Generating Station

Air Particulate Quarterly Composites (Sr-90)

Sr-90 is a beta emitting fission product present in radioactive fallout¹³ and in the fission process of commercial nuclear power plants. It remains in the environment for an extended period of time due to its 28.1 year half-life and is known to increase the risk of bone cancer and leukemia in animals and is presumed to do so in humans.¹⁴ For most radionuclides, the amount of radioactive material collected on a filter during the biweekly period was too small to be readily measured. The sensitivity and accuracy of sample analysis was increased by combining biweekly samples into quarterly composite samples.

¹³ See section 3.4, page 15, for sources of fallout.

¹⁴ USEPA, Radiation Information, Strontium, <http://www.epa.gov/radiation/radionuclides/strontium.htm>

Due to concerns expressed by the public, the DEP instituted quarterly analysis of Sr-90 in air samples in 1999. The predominance of environmental data shows no increase of Sr-90 in the environment.¹⁵

Quarterly analysis of samples collected and analyzed in 2006 by the BNE's contract laboratory also indicated no measurable Sr-90 concentrations in air. This was similar to what was found at both background locations.

Air Particulate Quarterly Composites (Gamma Emitters)

Gamma isotopic analysis of the air particulate portion of the biweekly air samples did not detect any radionuclides of interest (cobalt or cesium). Beryllium-7, which is produced naturally by cosmic ray interactions with atmospheric constituents, was detected¹⁶. This was similar to what was found at both background locations (Trenton and Brendan T. Byrne State Park).

Air Iodine Results

Iodine-131 was not detected (all results below the minimum detectable concentration requirement of 0.07 pCi/m³, per Appendix C, Table C-1) in any of the air charcoal samples collected biweekly from the six continuous air-monitoring locations around the OCNCS.

A complete summary of all air sample results can be found in Appendix B: Table B-2 for air iodine; Table B-5 for air particulate gross beta; and Table B-8 for air particulate quarterly composites.

4.2.4 OYSTER CREEK WATER SAMPLE RESULTS

The OCNCS utilizes an intake/discharge canal, along with the Barnegat Bay for the discharge of cooling water and potential effluent discharges. The facility adheres to a 'zero discharge' policy and does not release liquid effluent to the environment through this pathway.

Surface water samples are collected from four locations in the environment. These locations range from 0.4 miles in the plant's discharge canal to 20 miles away in the Great Bay/Little Egg Harbor. Surface water samples are also collected in the Barnegat Bay, located east of the discharge canal (2.1 miles from the plant) and in Stouts Creek, a tributary of the Barnegat Bay, located approximately 3.6 miles north of the plant discharge canal.

Well water samples were collected from two sources. Samples are taken from the OCNCS Administration Building and offsite from the New Jersey State Forked River Marina. The latter site is located approximately 1.7 miles north-northeast of the facility

¹⁵ A Review of Understanding Patterns and Trends of Radioactive Strontium-90 in Baby Teeth of New Jersey Children and Cancer: A Report To the NJ State Department of Health and Senior Services New, January 2006, <http://www.nj.gov/dep/rpp/index.htm>.

¹⁶ Parker, R.P., Beryllium-7 and Fission Products in Surface Air, *Nature* 193, 967 - 968 (10 March 1962)

and considered upstream of the plant with regard to the aquifer that supplies water to the community.

Surface water and well water samples were analyzed for gamma emitting isotopes (such as radionuclides of cobalt, cesium, and iodine) and for tritium (see Table B-18 and B-20, Appendix B). No gamma emitting isotopes or tritium were found in any routine surface water and well water samples collected during 2006. For the analysis of iodine-131 in both routine surface water and well water samples, the BNE requires its contract laboratory to achieve the U.S. EPA drinking water detection limit of 1.0 pCi/L. However, for the months of January through April 2006, the BNE's contract laboratory analyzed surface water samples using gamma isotopic analysis, but did not achieve the 1.0 pCi/L detection limit for iodine-131. Corrective action has been implemented to address this deficiency. Surface water sample results not meeting the data quality assurance requirement of 1.0 pCi/L for iodine-131 have been included in the report, but are not considered in the evaluation process.

A complete summary of surface water and well water results can be found in Table B-18 and B-20, Appendix B.

In recent years events at several nuclear power plants have led to the discovery of tritium contamination of groundwater. The tritium was the result of unplanned releases, such as those due to equipment degradation. As part of a fleetwide initiative, Exelon Corporation, the owners of the Oyster Creek Nuclear Generating Station have initiated the collection and analysis of groundwater samples from 36 onsite wells. Samples were taken from wells located on company property surrounding the nuclear plant, split between Exelon and the BNE, and analyzed for tritium and gamma emitting radionuclides. All of the initial sampling results from these wells were less than the minimum detectable concentration of 300 picoCuries per Liter. Results of the BNE's split samples, analyzed by the Department's independent contract laboratory, are available on the BNE website at <http://www.nj.gov/dep/rpp/bne/welltab.htm>. Additional information regarding tritium can be found on the USNRC's website at <http://www.nrc.gov/>.

4.2.5 OYSTER CREEK AQUATIC BIOTA SAMPLE RESULTS

During 2006, the nuclear power plant operator collected and split shellfish samples (hardshell clams) with the BNE. Six shellfish samples were collected from three locations in the environs of Oyster Creek. Samples were collected from the Barnegat Bay, approximately 2.1 miles east of the discharge canal, Stouts Creek, located 3.6 miles north and east of the discharge canal, and Great Bay/Little Egg Harbor, some 20 miles south and east of the discharge canal.

No fission or activation products (cobalt or cesium) were detected in any shellfish samples collected and analyzed during 2006 (results were less than the minimum detectable concentration for cobalt and cesium, Appendix C, Table C-1). In addition, no strontium was found in any sample. Potassium-40, a naturally occurring radionuclide, was found in all samples.

A summary of sample results can be found in Appendix B, Table B-10.

4.2.6 OYSTER CREEK VEGETATION SAMPLE RESULTS

Edible vegetation samples are routinely collected from three sampling locations (OCVE01, OCVE02, and OCVE03) each year and split with the BNE for analysis. These locations include two onsite vegetable gardens and one background garden located over 20-miles upwind of the nuclear plant. In 2006, three additional sampling locations were added (OCVE04, OCVE05, and OCVE06) as a result of the limited availability of vegetables at one of the routine locations (OCVE01). Vegetables in this onsite garden were consumed by the deer population in August. Due to the lack of edible samples in the OCVE01 location, samples of non-edible broadleaf vegetation were collected within 1/4 mile of the nuclear plant in the east-northeast (OCVE06), east (OCVE05), and east-southeast (OCVE04) wind compass sectors. These wind sectors are considered high deposition areas in the event of an accidental release of radioactivity from the nuclear plant. The non-edible broadleaf vegetation collected included autumn olive, sycamore, apple, cherry and sassafras leaves, along with prickly pear and ragweed.

During 2006, naturally occurring potassium-40 was found in all edible vegetables and non-edible broadleaf vegetation. Sample analysis results from the edible vegetation were below minimum detectable levels (Appendix C, Table C-1) for fission and activation products (cobalt-58, cobalt-60, cesium-134, and cesium-137) for all locations. However, in September of 2006, slightly elevated cesium-137 was detected in the non-edible sycamore, apple, autumn olive and sassafras leaf samples located just to the east-northeast (OCVE06) of the plant on Finninger Farm. This location is on owner-controlled property. The cesium-137 detected in these samples ranged from 67 to 866 pCi/kg. Overall, the cesium-137 found in non-edible broadleaf vegetation was well below the licensee's offsite dose calculation manual threshold of 2000 pCi/kg. There is no public health risk or exceedance of any USNRC regulatory limits for discharges.

Federal regulations require notification by the licensee to the USNRC when cesium-137 levels in vegetables exceed 2000 pCi/kg. To determine dose, NUREG-1957¹⁷ provides a reference value of 11,000 pCi/kg for cesium-137 in leaves that corresponds to the USNRC's regulatory limit of 25 millirem per year. It is estimated that the cesium-137 detected in the sassafras leaves obtained from Finninger Farm would equate to an additional 2 millirem per year.

The detection of cesium-137 in excess of what is normally seen in vegetation samples as part of the BNE's routine REMP program, led to a further evaluation including the collection of soil samples split between AmerGen and the BNE for analysis. Evaluation of sampling results indicated a correlation between the cesium-137 in the sassafras leaves and the soil directly underneath the tree. It is believed that the cesium-137 is not from any recent release of fission products from Oyster Creek. The way to determine this is through the analysis of samples for radioactive iodine-131 which has a half-life of only eight days. The DEP analyzed the

¹⁷ US Nuclear Regulatory Commission; Consolidated Decommissioning Guidance, NUREG-1757, Decommissioning Process for Materials Licensees, September 2006.

vegetation and soil samples split with the utility in the immediate vicinity of the sassafras tree for iodine-131. None was detected.

Literature searches have indicated that sassafras trees uptake potassium readily. Potassium and cesium share similar chemical characteristics. Sassafras trees have shallow root systems which can more easily uptake radionuclides. In sandy soils, such as that on Finninger Farm, cesium is more easily taken up by the tree's shallow root system. Analyses of leaf and twig samples from the sassafras tree on Finninger Farm indicated some cesium activity. It is probable that the elevated cesium-137 detected in the soil underneath of the tree was taken up by the tree and concentrated in the leaves or twigs, with recharging of the soil occurring as fallen leaves from the tree become part of the surrounding organic material.

Background cesium-137 concentrations in the area of the OCNGS for soil and vegetation have been documented through the plant's radiological environmental monitoring program (REMP). Historically, trace amounts of cesium-137 have been detected in vegetation samples. According to historic measurements in the area, cesium-137 was detected in soil samples (up to 3000 pCi/kg¹⁸) at a routine sampling location approximately 3.8 miles to the north-northwest of the Oyster Creek nuclear plant. Prevailing winds in the area are such that this sample location is upwind of the nuclear plant.

Cesium-137 is present in radioactive fallout (atmospheric weapons testing conducted in the 1950's and 1960's) and in the fission process of commercial nuclear power plants. It remains in the environment for an extended period of time due to its 30-year half-life. About 25.6 million curies (85.9%) of cesium in the environment comes from fallout from atmospheric weapons testing conducted mainly in the 1950's and 1960's, although the last above ground test took place in early 1980. The second largest source (8.7%) of cesium in the environment is from the April 1986 Chernobyl accident in the Ukraine. Approximately 2.5 million curies of cesium were released as a result of Chernobyl.¹⁹ In comparison, on average, the total annual release of cesium-137 into the environment by Oyster Creek, from 1985 to 2005 was typically 0.03 curies. This is documented in annual effluent release reports submitted by the licensee to the USNRC each year. A discussion of cesium-137 results in soil and vegetation samples collected from Finninger Farm can be found in the licensee's report entitled "Evaluation of Cs-137 in Environmental Samples from the AmerGen Property East of the Oyster Creek Generating Station, Final Report, January 2007". Details of the extensive testing done at Finninger Farm can also be found in the USNRC Resident Inspector's report at http://www.nrc.gov/NRR/OVERSIGHT/ASSESS/listofrpts_body.html. The ADAMS accession number for this inspection report is 2007002 under the heading of "OYSTER CREEK".

A complete summary of vegetation sample results can be found Appendix B, Table B-14. The collection and analysis of soil samples are not part of a routine REMP program since soil is not a

¹⁸ GPU Nuclear Corporation, Annual Radiological Environmental Monitoring Reports, 1977 through 1985, Oyster Creek Nuclear Generating Station.

¹⁹ Hyperphysics Nuclear, A retrospective view of the Chernobyl accident of Apr 26, 1986, <http://hyperphysics.phy-astr.gsu.edu/hbase/nucene/chno2.html>

direct pathway to humans. Results of the BNE's split sample analyses for soil samples can be viewed on the BNE's website address at <http://www.nj.gov/dep/rpp/bne/index.htm>

4.2.7 OYSTER CREEK AQUATIC SEDIMENT SAMPLES

Aquatic sediment samples were collected from four locations. Sample locations include the plant Discharge Canal, Barnegat Bay (East of the site), Stouts Creek and Great Bay/Little Egg Harbor.

Sample analysis results from aquatic sediment samples were below minimum detectable levels (Appendix C, Table C-1) for fission and activation products (radionuclides of cobalt and cesium) for all locations. Naturally occurring beryllium-7 and potassium-40 were found at all sample locations.

A complete summary of sample results can be found Appendix B, Table B-12.

4.2.8 OYSTER CREEK MILK SAMPLE RESULTS

No milk samples are collected. There are no dairy farms within a 10-mile radius of the OCNGS. The closest dairy farm is about 30 miles away (Burlington County, New Jersey), as per the OCNGS Year 2000 Land Use Survey. Radiological data from milk taken at the closest dairy farm would not be statistically representative of the milk pathway to humans living near the OCNGS. Therefore, the REMP monitors air, water, soil and vegetation to determine radiological exposure to people living near the OCNGS.

4.3 ARTIFICIAL ISLAND - SALEM/HOPE CREEK GENERATING STATIONS

Artificial Island is the site of the Salem and Hope Creek Nuclear Generating Stations (Salem/Hope Creek). The Salem Generating Station consists of two pressurized water reactors. Salem Unit 1, rated at 1090 megawatts electric has been in commercial operation since June of 1977. Salem Unit 2, rated at 1115 megawatts electric has been in commercial operation since October of 1981. The Hope Creek Nuclear Generating Station (HCNGS) is a boiling water reactor rated at 1067 megawatts electric. It has been in commercial operation since February of 1987. All three plants are owned and operated by Public Service Electric and Gas (PSEG). Salem Units 1 and 2 also are partly owned by Exelon Corporation. Salem Units 1 and 2 are located on the southern half of Artificial Island, in Lower Alloways Creek Township in Salem County.



Figure 9 – Salem and Hope Creek Nuclear Generating Stations

Artificial Island is a 700-acre man-made site created by the deposition of fill from dredging operations. Land use in the areas adjacent to the site consists of commercial, government, agricultural, and residential properties. To the north and east are extensive tidal marshlands and low-lying areas. Mad Horse Creek Wildlife Management Area, located to the north and east of the site supports trapping and fishing. This wildlife area is also important for migratory birds. Within 10 miles of the site is some of South Jersey's prime agricultural land. The nearest New Jersey resident to the site is approximately four miles away.

4.3.1 SALEM/HOPE CREEK THERMOLUMINESCENT DOSIMETRY RESULTS

The Bureau of Nuclear Engineering's TLD program for Salem/Hope Creek consists of ten (10) offsite locations. Each location has two TLD badges that are exchanged at the end of each calendar quarter. Appendix A, Table A-6 provides details on TLD locations, site descriptions, and distances from the Salem/Hope Creek Nuclear Generating Stations. Figure 10 depicts locations of the TLD badges.

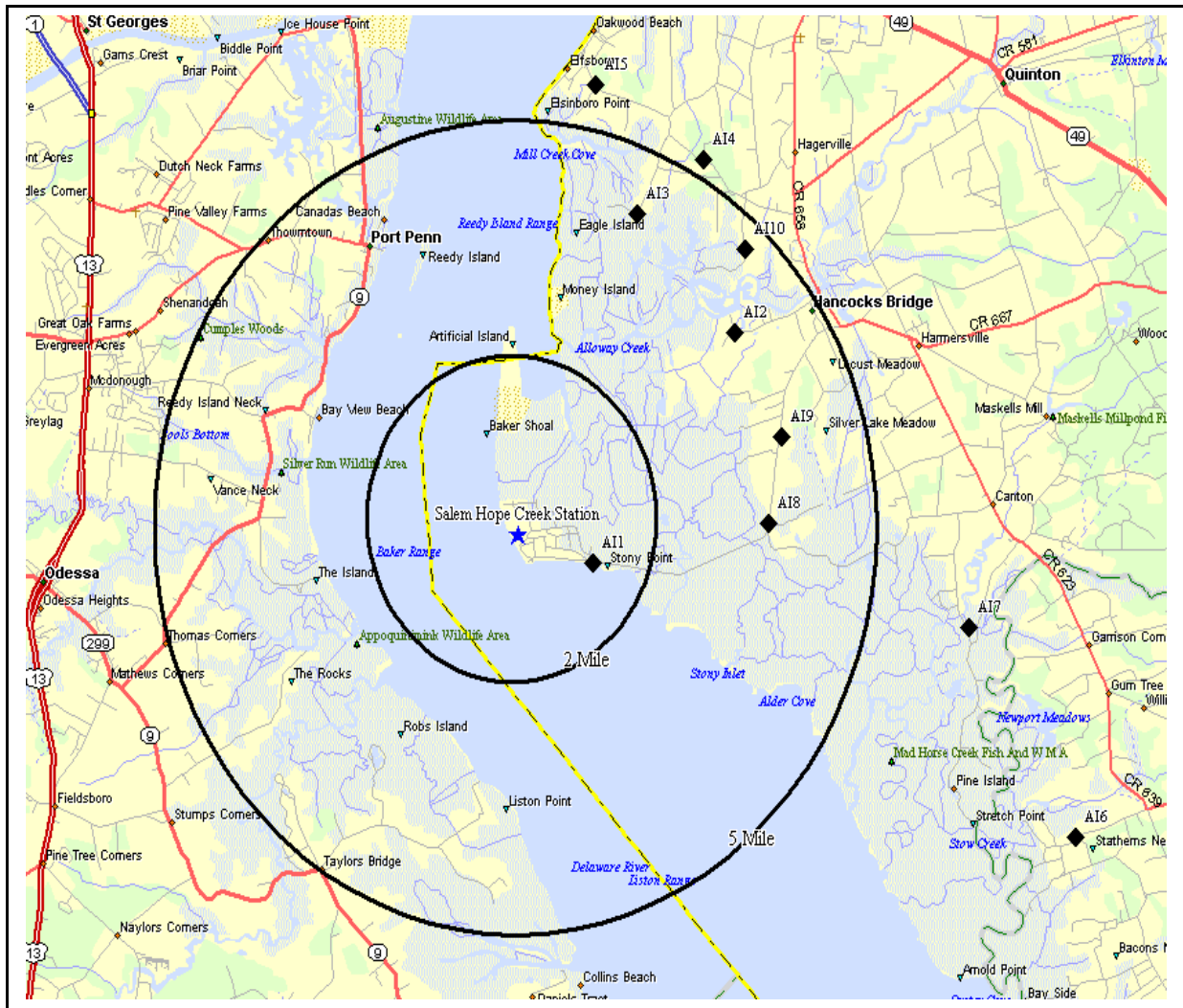


Figure 10 – CREST and Thermoluminescent Dosimeter Locations, Salem / Hope Creek

All TLD badges are deployed, exchanged and analyzed by BNE staff. Collection efficiency for Salem/Hope Creek TLD badges was 98% in 2006. Two TLD badges were missing from the 4th quarter pickup. Losses were due to environmental damage and vandalism.

Appendix B, Table B-24 represents ambient radiation levels obtained from TLD badges in the surrounding area of Salem/Hope Creek Nuclear Generating Stations during 2006. All TLD results were less than 20 milliroentgens (mR) per standard quarter (Std. Qtr.) with a range from 9.5 to 17.1 mR/std Qtr. These results are consistent with those observed in previous years.

As previously mentioned, the BNE installed co-located TLD badges in the third quarter of 2006 with the Pennsylvania Power and Light (PP&L) utility and the fourth quarter of 2006 from an independent vendor (Global) at existing locations in the environs of the Salem / Hope Creek. Results indicate that the BNE TLD data are in good agreement with the PP&L and Global TLD data (Appendix B, Table B-25).

4.3.2 SALEM/HOPE CREEK CREST DATA MONITORING

Figure 10, located on the previous page identifies the locations of CREST stations around the Salem/Hope Creek Nuclear Generating Station. Table B-26, in Appendix B, provides graphical summaries of ambient radiation results for each CREST site. The monthly average ambient radiation level recorded at each station is graphed in milliroentgens per hour (mR/hr).

Normal background radiation levels range from 0.0050 to 0.0090 mR/hr around the Salem/Hope Creek Nuclear Generating Station. The monthly average ambient radiation levels at all CREST stations located in the environment around the nuclear power plant sites fell within this range during 2006.

4.3.3 SALEM / HOPE CREEK AIR SAMPLE RESULTS

In 2006, air sampling was done at three locations. Figure 11, located on the next page, and Table A-5 describe a detailed list of air sampling sites.

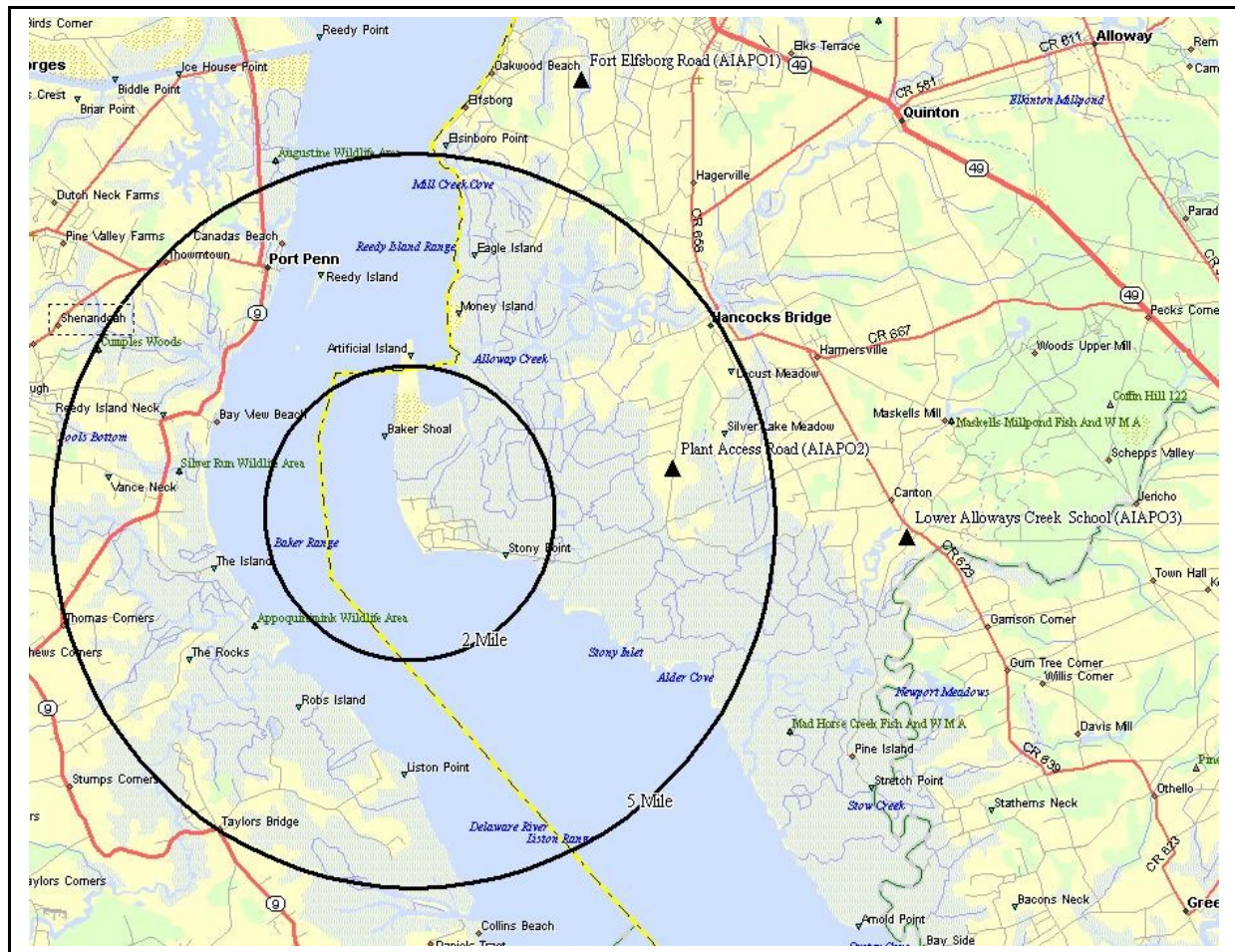


Figure 11 – Air Sample Locations, Salem/Hope Creek

Air Particulate Gross Beta Results

Gross beta activity is a measurement of all beta activity present, regardless of specific radionuclide source. Gross measurements are used as a method to screen samples for relative levels of radioactivity. Specific analyses of beta-emitting isotopes are done at the end of each quarter-annual period of time, when samples are composited by location. Figure 12 depicts the average gross beta concentration in air for each of the BNE’s sampling locations around the Salem/Hope Creek, including the background location at Brendan T. Byrne Forest, in New Lisbon, New Jersey. Results were not significantly different than the ambient background concentrations at Brendan T. Byrne State Forest.

The highest gross beta concentration was 0.022 pCi/m³, well below the USEPA’s RadNet screening criteria of 1.0 pCi/m³, but greater than the minimum detectable concentration of 0.0100 pCi/m³ (Appendix C, Table C-1).

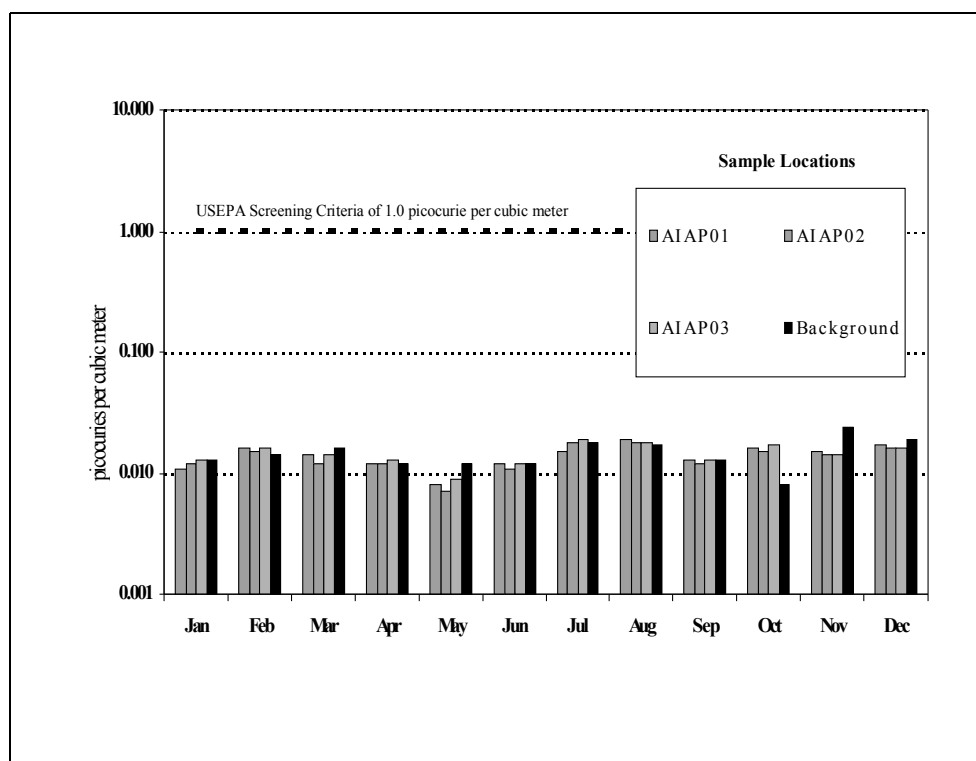


Figure 12 – Average Gross Beta Concentrations in Airborne Particulates, 2006 Salem/Hope Creek

Air Particulate Quarterly Composites (Sr-90)

Quarterly analysis of samples collected and analyzed in 2006 by the BNE’s contract laboratory also indicated no measurable Sr-90 concentrations in air. This was similar to what was found at

both background locations. Sr-90 is a beta emitting fission product present in radioactive fallout.²⁰

Air Particulate Quarterly Composites (Gamma Emitters)

No gamma emitting radionuclides of interest (radionuclides of cobalt or cesium) were detected in the air particulate portion of the bi-weekly air samples greater than the minimum detectable concentration (Appendix C, Table C-1). Beryllium-7, which is found naturally in the environment, was detected. This was similar to what was found at both background locations (Trenton and Brendan T. Byrne State Park).-

Air Iodine Results

Iodine-131 was not detected in any of the air charcoal samples collected biweekly from the three continuous air-monitoring locations around the Salem/Hope Creek Nuclear Generating Stations.

—
A complete summary of all air sample results can be found in Appendix B: Table B-3 for air iodine; Table B-6 for air particulate gross beta; and Table B-9 for air particulate quarterly composites.

4.3.4 SALEM/HOPE CREEK WATER SAMPLE RESULTS

The stations utilize two separate methods for cooling. The Hope Creek facility utilizes a cooling tower. The two units at Salem utilize water drawn from the Delaware River for cooling purposes.

Surface water samples are collected from two locations in the environment. These locations range from 0.2 miles at the Onsite Surface Water Inlet Building Discharge to approximately 2.5 miles from the nuclear facility, in a location along the west bank of the Delaware River upstream from the liquid discharge point of Salem Nuclear power plant.

Well water samples are taken from the site's Administration Building. In addition, samples are drawn from the following locations: the Elsinboro School (5.8 miles from the plant), Lower Alloways Creek School in Canton, New Jersey (5.1 miles from the plant) and the Lower Alloways Creek Police Station (6.5 miles from the plant). Sample locations are chosen in potential drinking water aquifers downstream and upstream of the site.

Surface and well water samples were analyzed for gamma emitting isotopes (such as radionuclides of cobalt, cesium and iodine) and for tritium (See Table B-19 and Table B-21, Appendix B). No gamma emitting isotopes or tritium were found in any routine surface water and well water samples collected during 2006. . For the analysis of iodine-131 in both routine surface water and well water samples, the BNE requires its contract laboratory to achieve the U.S. EPA drinking water detection limit of 1.0 pCi/L. However, for the months of January, February and April 2006, the BNE's contract laboratory did not achieve the 1.0 pCi/L detection limit for iodine-131. Corrective action has been implemented to address this deficiency. Surface water sample results not

²⁰ See section 3.4, page 15, for sources of fallout.

meeting the data quality objective of 1.0 pCi/L for iodine-131 have been included in the report, but are not considered in the evaluation process.

A complete summary of surface water and well water results can be found in Table B-19 and Table B-21 in Appendix B.

While not part of the Department's routine REMP program, the BNE has been monitoring for tritium and gamma emitting radionuclides in groundwater onsite at Artificial Island. This is in response to the discovery of tritium in shallow groundwater adjacent to and south of Salem Unit 1. The source of the tritium was the Salem Unit 1 spent fuel pool. The tritium has been contained on site. No onsite or offsite dose consequences to workers or members of the public, associated with the tritium in groundwater contamination, were identified. Remediation activities are being conducted by PSEG and monitored by the BNE. This project has been extended to include the collection and analysis of groundwater samples for Salem Unit 2 and Hope Creek. Groundwater samples are taken from wells located on company property that surrounds each reactor. The samples are split between PSEG and the BNE. Results of the BNE's split samples, analyzed by the Department's independent contract laboratory, are available on the BNE website at <http://www.nj.gov/dep/rpp/bne/welltab.htm>.

4.3.5 SALEM/HOPE CREEK AQUATIC BIOTA SAMPLE RESULTS

Samples of aquatic biota (fish/shellfish) are collected by the nuclear power plant operator, and split with the BNE. Samples are analyzed for gamma emitting radionuclides and strontium-89/90. Samples of fish (striped bass, white perch, bluefish, and weakfish) as well as hardshell crabs were collected from two locations, the Onsite Surface Water Inlet Building (within 0.2 miles of the plant) and along the western bank of the Delaware River (approximately 2.5 miles upstream from the plant).

No fission or activation products (cobalt or cesium) were detected in any shellfish samples (Appendix B, Table B-11) collected and analyzed during 2006 (results were less than the minimum detectable concentration for cobalt and cesium, Appendix C, Table C-1). Potassium-40 is a naturally occurring radionuclide found in the environment.

A summary of fish/shellfish sample results can be found in Appendix B, Table B-11.

4.3.6 SALEM/HOPE CREEK VEGETATION SAMPLE RESULTS

In 2006, during the harvest season, vegetation samples were collected from five farms ranging in distance from 6.3 to 25 miles of Salem / Hope Creek. Vegetation samples included cabbage, corn, tomatoes and peppers.

Sample analysis results from the edible vegetation were below minimum detectable levels (Appendix C, Table C-1) for fission and activation products (cobalt-58, cobalt-60, cesium-134, and cesium-137) for all locations. All samples contained, potassium-40, which is a naturally occurring radionuclide found in the environment.

A complete summary of vegetation sample results can be found Appendix B, Table B-15.

4.3.7 SALEM/HOPE CREEK AQUATIC SEDIMENT SAMPLE RESULTS

Aquatic sediment samples were collected from the following four locations, the Onsite Observation Building, Onsite Surface Water Inlet Building, the Cooling Tower Blowdown Discharge Line (Onsite) and the Onsite South Storm Drain Discharge Line.

Sample analysis results from aquatic sediment samples were below minimum detectable levels (Appendix C, Table C-1) for fission and activation products (cobalt-58, cobalt-60, cesium-134, and cesium-137) for all locations. Naturally occurring potassium-40 was detected in all samples.

A complete summary of aquatic sediment sample results can be found Appendix B, Table B-13.

4.3.8 SALEM/HOPE CREEK MILK SAMPLE RESULTS

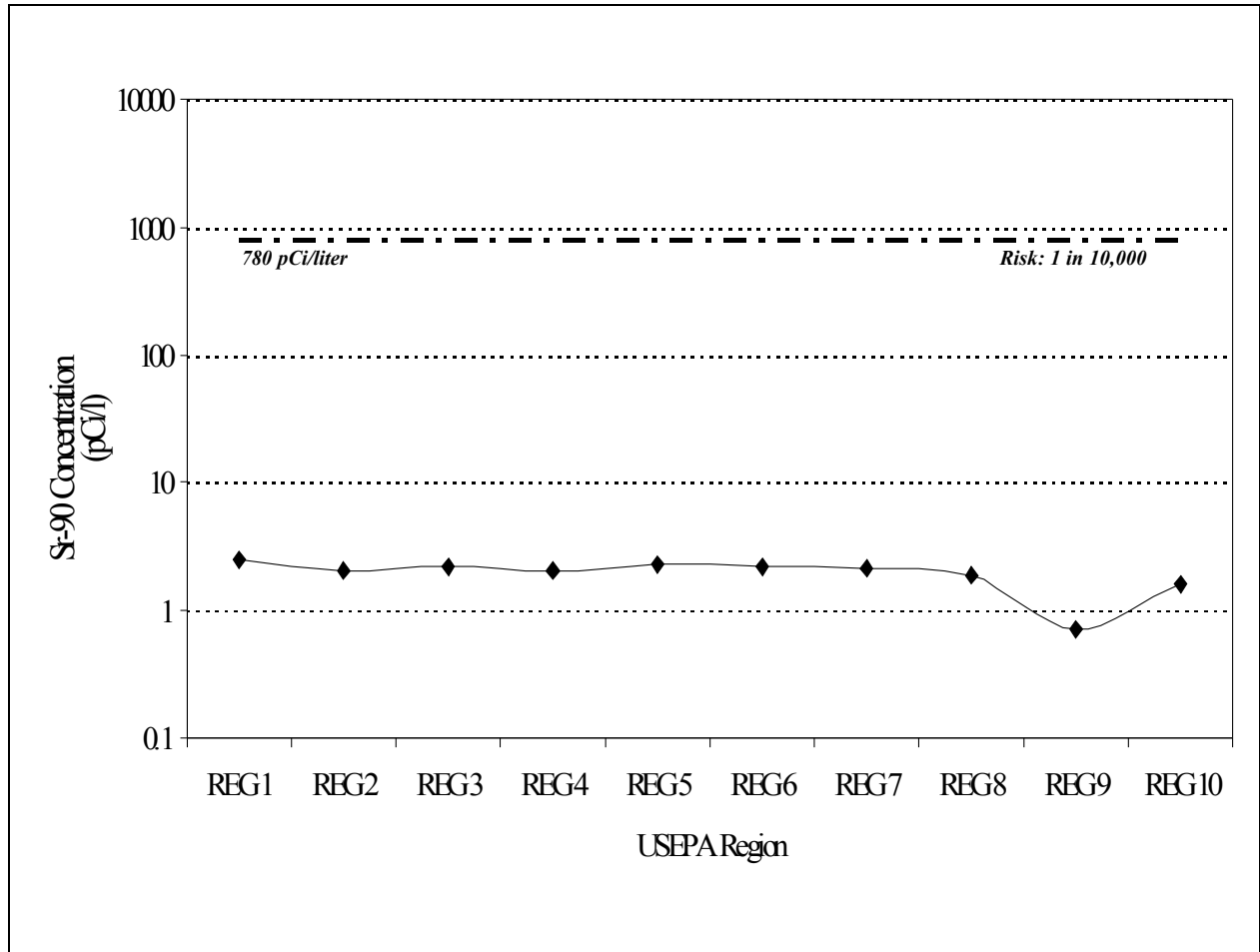
Milk samples were collected monthly from three farms, ranging from 7.6 to 17 miles from the plant.

No strontium-90 (Sr-90) was found at any farm in the Salem/Hope Creek vicinity (7.6 and 12 miles from Salem/Hope Creek). In addition, the background station farm also found no reportable Sr-90. Sr-90 is a beta emitting fission product present in radioactive fallout (atmospheric nuclear weapons tests conducted in the 1950's and 1960's) and in the fission process of commercial nuclear power plants. It remains available in the environment for an extended period because of its 28.1-year half-life. About 99.9% of strontium in the environment comes from fallout from atmospheric nuclear weapons testing. Although Sr-90 levels have decreased since atmospheric weapons testing were halted, Sr-90 is still being detected.

To put this into perspective, Figure 13 below shows trends for Sr-90 concentrations in milk for all regions across the nation. The average historical Sr-90 in milk (1960-2006) for all EPA regions was 1.9 pCi/L. The average Sr-90 in milk for Region 2, which includes New Jersey, was 2.0 pCi/L and well below EPA's acceptable risk level of 1 in 10,000 (780 pCi/L).

No fission or activation products (cesium-134, cesium-137 or iodine-131) above the minimum detectable concentration (Appendix C, Table C-1) were found in any milk samples collected and analyzed during 2006. A summary of results for milk samples can be found in Appendix B, Table B-17.

Figure 13 – Average Concentration of Strontium-90 in Milk in the US by EPA Region, 1960 through 2006



Appendix A

Table A-1
NJDEP / BNE
Radiological Environmental Monitoring Program

Sample Collection Summary for 2006

<i>Description</i>	<i>Parameters Analyzed For</i>	<i>Frequency</i>	<i>Number of Samples</i>
Milk	Gamma Emitters, Strontium-89/90 *	Monthly	40
Air Particulate Filter	Gross Beta	Bi-Weekly	298
Air Particulate Composite	Gamma Emitters, Strontium-89/90	Quarterly	44
Air Charcoal	Iodine-131	Bi-Weekly	253
Aquatic Sediment	Gamma Emitters	Semi-Annually	15
Fish & Shellfish	Gamma Emitters Strontium-89/90 *	Semi-Annually	12
Vegetables	Gamma Emitters	Harvest Season Only	47
Surface Water	Gamma Emitters** Tritium	Monthly	52
Potable Well Water	Gamma Emitters** Tritium	Quarterly	24
Total Samples Collected			785

* Radiochemical analysis performed for Strontium-89/90, USEPA Analytical Method 905.0.

** Radiochemical analysis performed for Iodine-131, USEPA Analytical Method 902.0

Table A-2
NJDEP/BNE
Radiological Environmental Monitoring Program

Background Locations

<i>Sample Media</i>	<i>Station Code</i>	<i>Description of Site</i>
Milk	COMI01	Farm T
Air Particulate Filter	COAP01	BNE Office, Arctic Parkway, Ewing, NJ
	COAP02	Brendan T. Byrne State Forest, New Lisbon, NJ
Air Particulate Composite	COAP01	BNE Office, Arctic Parkway, Ewing, NJ
	COAP02	Brendan T. Byrne State Forest, New Lisbon, NJ
Air Charcoal	COAI01	BNE Office, Arctic Parkway, Ewing, NJ
	COAI02	Brendan T. Byrne State Forest, New Lisbon, NJ
TLD	CO01	BNE Office, Arctic Parkway, Ewing, NJ
	CO02	Brendan T. Byrne State Forest, New Lisbon, NJ

Table A-3
NJDEP / BNE
Radiological Environmental Monitoring Program

Oyster Creek Nuclear Generating Station
Sample Locations and Descriptions

<i>Sample Medium</i>	<i>Station Code</i>	<i>Distance From Plant (miles)</i>	<i>Description of Site</i>
Milk	Not sampled	Not sampled	No milk-producing animals within 50-mile radius as per OCNGS Land Use Survey for 2000
Air Particulate Filter	OCAP01	1.7	Waretown Municipal Building, SSE of site, on County Route 532, Waretown, NJ
	OCAP02	1.8	Sands Point Harbor, ESE of site on Bay Parkway, Waretown, NJ
	OCAP03	1.7	Forked River Marina, Forked River, NJ
	OCAP04	3.2	Lacey Township Recreation Bldg., Forked River, NJ
	OCAP05	5.6	JCP&L Substation, US Route 9, Bayville, NJ
	OCAP06	0.7	Finningers Farm, OC Dredge Site, Forked River, NJ*
Air Particulate Composite	OCAP01	1.7	Waretown Municipal Building, SSE of site, on County Route 532, Waretown, NJ
	OCAP02	1.8	Sands Point Harbor, ESE of site on Bay Parkway, Waretown, NJ
	OCAP03	1.7	Forked River Marina, Forked River, NJ
	OCAP04	3.2	Lacey Township Recreation Bldg., Forked River, NJ
	OCAP05	5.6	JCP&L Substation, US Route 9, Bayville, NJ
	OCAP06	0.7	Finningers Farm, OC Dredge Site, Forked River, NJ*
Air Charcoal	OCAI01	1.7	Waretown Municipal Building, SSE of site, on County Route 532, Waretown, NJ
	OCAI02	1.8	Sands Point Harbor, ESE of site on Bay Parkway, Waretown, NJ
	OCAI03	1.7	Forked River Marina, Forked River, NJ
	OCAI04	3.2	Lacey Township Recreation Bldg., Forked River, NJ
	OCAI05	5.6	JCP&L Substation, US Route 9, Bayville, NJ

* Oyster Creek Filter ONLY – sample split with nuclear power plant operator

Table A-3 (continued)
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Oyster Creek Nuclear Generating Station Locations
 Sampling Locations and Descriptions

<i>Sample Medium</i>	<i>Station Code</i>	<i>Distance From Plant (miles)</i>	<i>Description of Site</i>
Vegetables*	OCVE01	0.4	OCNGS Onsite Garden, east of US Route 9 and NORTH of the OCNGS Discharge Canal, Forked River, NJ
	OCVE02	23.1	Farm J
	OCVE03	0.4	OCNGS Onsite Garden, Discharge Canal, SE of site, east of US Route 9 and south of the inside fence, Waretown, NJ
	OCVE04	0.3	OCNGS Owner Controlled Area on Finninger Farm – ESE Sector – Non-edible broadleaf
	OCVE05	0.3	OCNGS Owner Controlled Area on Finninger Farm – E Sector– Non-edible broadleaf
	OCVE06	0.3	OCNGS Owner Controlled Area on Finninger Farm – ENE Sector– Non-edible broadleaf
Surface Water*	OCSW01	2.1	Barnegat Bay, east of site
	OCSW02	20	Great Bay / Little Egg Harbor, SSW of site
	OCSW03	3.6	Stouts Creek, ENE of site, Barnegat Bay
	OCSW04	0.4	OCNGS Discharge Canal, ESE of site, East of U.S. Route 9 Bridge
Well Water	OCWW01	0.1	Oyster Creek Administration Building (On-site)
	OCWW02	1.7	Forked River Marina, Forked River, NJ

* Sample split with nuclear power plant operator

Table A-3 (continued)
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Oyster Creek Nuclear Generating Station Locations
 Sampling Locations and Descriptions

<i>Sample Medium</i>	<i>Station Code</i>	<i>Distance From Plant (miles)</i>	<i>Description of Site</i>
Aquatic Sediment*	OCAQ01	2.1	Barnegat Bay, East of site
	OCAQ02	0.4	OCNGS Discharge Canal, ESE of site, East of U.S. Route 9 Bridge
	OCAQ03	20	Great Bay / Little Egg Harbor, SSW of site
	OCAQ04	3.6	Stouts Creek, ENE of site, Barnegat Bay
Shellfish*	OCFS01	3.6	Stouts Creek, ENE of site, Barnegat Bay
	OCFS02	2.1	Barnegat Bay, east of site
	OCFS03	20	Great Bay / Little Egg Harbor, SSW of site

* Sample split with nuclear power plant operator

Table A-4
NJDEP / BNE
Radiological Environmental Monitoring Program

CREST and Thermoluminescent Dosimetry Network
Oyster Creek Nuclear Generating Station

<i>ID</i>	<i>Distance From Plant (miles)</i>	<i>Description of Site</i>
OC-1	2.7	Ocean County Vocational School, Waretown, NJ
OC-2	1.8	Ocean Township (Waretown) Municipal Building, Waretown, NJ
OC-3	0.9	Sewage Pump Station on U.S. Route 9, Forked River, NJ
OC-4	1.3	Twin River Station, Forked River, NJ
OC-5	0.5	Sewage Pump Station, U.S. Route 9, Ocean Township, NJ
OC-6	0.5	Oyster Creek Generating Station Gate #2, North Access Road, Forked River, NJ
OC-7	0.7	Finnigers Farm, Forked River, NJ
OC-8	1.8	Ocean County Memorial Park Cemetery, Waretown, NJ
OC-9	0.3	OCNGS Amergen Building #17, Forked River, NJ
OC-10	2.3	Sheffield and Derby Roads, Forked River, NJ
OC-11	1.9	Lakeside Drive, Forked River, NJ
OC-12	2.2	Forked River Game Farm, Forked River, NJ
OC-13	1.4	Lacey Township Restrooms, Lakeside Drive, Forked River, NJ
OC-14	1.1	Sands Point Park, Dock Avenue, Waretown, NJ
OC-15	1.5	Recreational Center, Waretown, NJ
OC-16	0.3	North Access Road, Forked River Site, Forked River, NJ
OC-20	6.6	Third Avenue, Barnegat Light, NJ
OC-21	3.5	Rose Hill Road & Barnegat Blvd., Barnegat Twp., NJ
OC-22	4.4	Bay Way & Claimore Avenue, Lanoka Harbor, NJ
OC-23	6.3	Island Beach State Park, Parking Lot A5

Note: Each sample location above contains a CREST monitor and TLD

Note: Stations OC-20, OC-21, OC-22 and OC-23 contain TLD badges only

Table A-5
NJDEP / BNE
Radiological Environmental Monitoring Program

Salem / Hope Creek Nuclear Generating Station
Sample Locations and Descriptions

<i>Sample Medium</i>	<i>Station Code</i>	<i>Distance From Plant (miles)</i>	<i>Description of Site</i>
Milk	AIMI01	12	Farm A
	AIMI02	17	Farm B
	AIMI03	7.6	Farm C
Air Particulate Filter	AIAP01	5.6	Fort Elfsborg Rd., Elsinboro Township, NJ
	AIAP02	4.0	Plant Access Road
	AIAP03	5.1	Lower Alloways Creek School, Canton, NJ
Air Particulate Composite	AIAP01	5.6	Fort Elfsborg Rd., Elsinboro Township, NJ
	AIAP02	4.0	Plant Access Road
	AIAP03	5.1	Lower Alloways Creek School, Canton, NJ
Air Charcoal	AIAI01	5.6	Fort Elfsborg Rd., Elsinboro Township, NJ
	AIAI02	4.0	Plant Access Road
	AIAI03	5.1	Lower Alloways Creek School, Canton, NJ
Vegetable *	AIVE01	25	Farm D
	AIVE02	9.4	Farm E
	AIVE03	6.3	Farm F
	AIVE04	13.5	Farm G
	AIVE05	7.5	Farm H
	AIVE06	8.5	Farm I
	AIVE07	9.2	Farm K
	AIVE08	6.5	Farm L
Surface Water *	AISW01	0.2	Onsite, Surface Water Inlet Building Discharge
	AISW02	2.5	Delaware River, West Bank Upstream

* Sample split with nuclear power plant operator

Table A-5 (continued)
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Salem / Hope Creek Nuclear Generating Station
 Sampling Locations and Descriptions Locations (*continued*)

<i>Sample Medium</i>	<i>Station Code</i>	<i>Distance From Plant (miles)</i>	<i>Description of Site</i>
Well Water *	AIWW01	5.8	Elsinboro School, Ft. Elfsborg Road, Elsinboro Township, NJ
	AIWW02	6.5	Lower Alloways Creek Police Station, 501 Locust Island Road, Hancocks Bridge, NJ
	AIWW03	Onsite	Salem Nuclear Generating Station, Admin Building
	AIWW04	5.1	Lower Alloways Creek School, Canton, NJ
Aquatic Sediment *	AIAQ01	0.2	Onsite, Observation Building
	AIAQ02	0.2	Onsite, Surface Water Inlet Building
	AIAQ03	0.3	Onsite, Cooling Tower Blowdown Discharge Line
	AIAQ04	0.7	Onsite, South Storm Drain Discharge Line
Fish & Shellfish*	AIFS01	0.2	Onsite, Surface Water Inlet Building
	AIFS02	2.5	Delaware River, West Bank Upstream

* Sample split with nuclear power plant operator

Table A-6
NJDEP / BNE
Radiological Environmental Monitoring Program

CREST and Thermoluminescent Dosimetry Network
Salem / Hope Creek Nuclear Generating Station

<i>ID</i>	<i>Distance From Plant (miles)</i>	<i>Description of Site</i>
AI-1*	1.0	Access Road, Security Checkpoint
AI-2*	4.1	Poplar Road, Lower Alloways Creek Twp., NJ
AI-3	4.1	Money and Eagle Island Roads, Elsinboro Twp., NJ
AI-4	5.4	Fort Elfsborg Road and Hancocks Bridge Road – East, Elsinboro Twp., NJ
AI-5*	5.6	Fort Elfsborg Road and Hancocks Bridge Road – West, Elsinboro Twp., NJ
AI-6	8.4	Stathems Neck Road, Greenwich Twp., NJ
AI-7	6.2	Stow Neck Road, Lower Alloways Creek Twp., NJ
AI-8	3.3	Alloways Creek Neck Road, Lower Alloways Creek Twp., NJ
AI-9*	3.8	Alloways Creek Neck Road, Lower Alloways Creek Twp., NJ
AI-10	4.8	Abbots Farm Road, Elsinboro Twp., NJ

Note: Each sample location above contains a CREST monitor and TLD

* Stations that have co-located TLDs, as part of the BNE inter-comparison program

Appendix B

Table B-1

NJDEP / BNE

Radiological Environmental Monitoring Program

Background

Concentrations of I-131 in Bi-Weekly Air Iodine Samples 2006

<u>BNE Office (COAI01)</u>		
<u>Collection Period</u>		<u>I-131 (pCi/m3)</u>
01/03/06	- 01/18/06	< 0.005
01/18/06	- 01/31/06	< 0.004
01/31/06	- 02/14/06	< 0.006
02/14/06	- 02/28/06	< 0.009
02/28/06	- 03/13/06	< 0.009
03/13/06	- 03/28/06	< 0.010
03/28/06	- 04/10/06	No Data
04/10/06	- 04/25/06	No Data
04/25/06	- 05/09/06	No Data
05/09/06	- 05/22/06	< 0.013
05/22/06	- 06/05/06	< 0.012
06/05/06	- 06/19/06	< 0.015
06/19/06	- 07/10/06	< 0.011
07/10/06	- 07/19/06	< 0.019
07/19/06	- 08/01/06	< 0.011
08/01/06	- 08/17/06	< 0.007
08/17/06	- 08/29/06	< 0.012
08/29/06	- 09/11/06	< 0.013
09/11/06	- 09/25/06	< 0.008
09/25/06	- 10/11/06	< 0.009
10/11/06	- 10/23/06	< 0.007
10/23/06	- 11/06/06	< 0.005
11/06/06	- 11/20/06	< 0.008
11/20/06	- 12/04/06	< 0.003
12/04/06	- 12/18/06	< 0.007
12/18/06	- 01/02/07	No Data

Results in picoCuries per cubic meter (pCi/m³) +/- 2 Standard Deviations

'No Data' indicates no sample results due to maintenance issues with equipment

Table B-1 (continued)
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Background
Concentrations of I-131 in Bi-Weekly Air Iodine Samples
2006

<u>Brendan T. Byrne State Forest (COAI02)</u>			
<u>Collection Period</u>		<u>I-131 (pCi/m3)</u>	
01/04/06	- 01/19/06	<	0.011
01/19/06	- 02/01/06	<	0.004
02/01/06	- 02/14/06	<	0.009
02/14/06	- 03/02/06	<	0.005
03/02/06	- 03/14/06	<	0.012
03/14/06	- 03/28/06	<	0.008
03/28/06	- 04/11/06	<	0.012
04/11/06	- 04/25/06	<	0.015
04/25/06	- 05/08/06	<	0.054
05/08/06	- 05/22/06	<	0.016
05/22/06	- 06/05/06	<	0.015
06/05/06	- 06/20/06	<	0.013
06/20/06	- 07/10/06	<	0.011
07/10/06	- 07/17/06	<	0.048
07/17/06	- 07/31/06	<	0.010
07/31/06	- 08/14/06	<	0.011
08/14/06	- 08/28/06	<	0.011
08/28/06	- 09/12/06	<	0.007
09/12/06	- 09/26/06	<	0.006
09/26/06	- 10/10/06	<	0.024
10/10/06	- 10/24/06	<	0.010
10/24/06	- 11/06/06	<	0.010
11/06/06	- 11/21/06	<	0.009
11/21/06	- 12/05/06	<	0.008
12/05/06	- 12/19/06	No	Data
12/19/06	- 01/03/07	No	Data

Results in picoCuries per cubic meter (pCi/m³) +/- 2 Standard Deviations

'No Data' indicates no sample results due to maintenance issues with equipment

Table B-2
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Oyster Creek
Concentrations of I-131 in Bi-Weekly Air Iodine Samples
2006

Waretown Municipal Building (OCAI01)		
<u>Collection Period</u>		<u>I-131 (pCi/m3)</u>
01/04/06	- 01/17/06	< 0.012
01/17/06	- 02/01/06	< 0.006
02/01/06	- 02/14/06	< 0.012
02/14/06	- 02/27/06	< 0.014
02/27/06	- 03/14/06	< 0.009
03/14/06	- 03/28/06	< 0.011
03/28/06	- 04/11/06	< 0.011
04/11/06	- 04/25/06	< 0.011
04/25/06	- 05/08/06	< 0.057
05/08/06	- 05/22/06	< 0.016
05/22/06	- 06/05/06	< 0.014
06/06/06	- 06/20/06	< 0.025
06/20/06	- 07/10/06	< 0.020
07/10/06	- 07/17/06	< 0.034
07/17/06	- 07/31/06	< 0.006
07/31/06	- 08/14/06	< 0.010
08/14/06	- 08/28/06	< 0.014
08/28/06	- 09/12/06	< 0.032
09/12/06	- 09/26/06	< 0.019
09/26/06	- 10/10/06	< 0.027
10/10/06	- 10/24/06	< 0.008
10/24/06	- 11/06/06	< 0.005
11/06/06	- 11/21/06	< 0.017
11/21/06	- 12/05/06	< 0.009
12/05/06	- 12/19/06	< 0.007
12/19/06	- 01/03/07	< 0.003

Results in picoCuries per cubic meter (pCi/m³) +/- 2 Standard Deviations

Table B-2 (continued)
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Oyster Creek
Concentrations of I-131 in Bi-Weekly Air Iodine Samples
2006

Sands Point Harbor (OCAI02)		
Collection Period		I-131 (pCi/m³)
01/04/06	- 01/17/06	< 0.011
01/17/06	- 02/01/06	< 0.006
02/01/06	- 02/14/06	< 0.013
02/14/06	- 02/27/06	< 0.006
02/27/06	- 03/14/06	< 0.009
03/14/06	- 03/28/06	< 0.010
03/28/06	- 04/11/06	< 0.011
04/11/06	- 04/25/06	< 0.010
04/25/06	- 05/08/06	< 0.054
05/08/06	- 05/22/06	< 0.016
05/22/06	- 06/05/06	< 0.014
06/06/06	- 06/20/06	< 0.025
06/20/06	- 07/10/06	< 0.018
07/10/06	- 07/17/06	< 0.024
07/17/06	- 07/31/06	< 0.006
07/31/06	- 08/14/06	< 0.016
08/14/06	- 08/28/06	< 0.016
08/28/06	- 09/12/06	< 0.013
09/12/06	- 09/26/06	< 0.025
09/26/06	- 10/10/06	< 0.015
10/10/06	- 10/24/06	< 0.008
10/24/06	- 11/06/06	< 0.005
11/06/06	- 11/21/06	< 0.008
11/21/06	- 12/05/06	< 0.005
12/05/06	- 12/19/06	< 0.007
12/19/06	- 01/03/07	< 0.003

Results in picoCuries per cubic meter (pCi/m³) +/- 2 Standard Deviations

Table B-2 (continued)
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Oyster Creek
Concentrations of I-131 in Bi-Weekly Air Iodine Samples
2006

Forked River Marina (OCAI03)		
Collection Period		I-131 (pCi/m³)
01/04/06	- 01/17/06	< 0.010
01/17/06	- 02/01/06	< 0.005
02/01/06	- 02/14/06	< 0.012
02/14/06	- 02/27/06	< 0.015
02/27/06	- 03/14/06	< 0.021
03/14/06	- 03/28/06	< 0.011
03/28/06	- 04/11/06	< 0.011
04/11/06	- 04/25/06	No Data
04/25/06	- 05/08/06	< 0.020
05/08/06	- 05/22/06	< 0.012
05/22/06	- 06/05/06	< 0.015
06/06/06	- 06/20/06	< 0.014
06/20/06	- 07/10/06	< 0.024
07/10/06	- 07/17/06	< 0.004
07/17/06	- 07/31/06	< 0.010
07/31/06	- 08/14/06	< 0.009
08/14/06	- 08/28/06	< 0.007
08/28/06	- 09/12/06	< 0.014
09/12/06	- 09/26/06	< 0.016
09/26/06	- 10/10/06	< 0.003
10/10/06	- 10/24/06	< 0.003
10/24/06	- 11/06/06	< 0.005
11/06/06	- 11/21/06	< 0.002
11/21/06	- 12/05/06	< 0.005
12/05/06	- 12/19/06	< 0.002

Results in picoCuries per cubic meter (pCi/m³) +/- 2 Standard Deviations

'No Data' indicates no sample results due to maintenance issues with equipment

Table B-2 (continued)
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Oyster Creek
Concentrations of I-131 in Bi-Weekly Air Iodine Samples
2006

<u>Lacey Township Recreation Building (OCAI04)</u>		
<u>Collection Period</u>		<u>I-131 (pCi/m3)</u>
01/04/06	- 01/17/06	< 0.008
01/17/06	- 02/01/06	< 0.005
02/01/06	- 02/14/06	< 0.010
02/14/06	- 02/27/06	< 0.007
02/27/06	- 03/14/06	< 0.044
03/14/06	- 03/28/06	< 0.012
03/28/06	- 04/11/06	< 0.007
04/11/06	- 04/25/06	< 0.010
04/25/06	- 05/08/06	< 0.053
05/08/06	- 05/22/06	< 0.016
05/22/06	- 06/05/06	< 0.014
06/06/06	- 06/20/06	< 0.024
06/20/06	- 07/10/06	< 0.022
07/10/06	- 07/17/06	< 0.039
07/17/06	- 07/31/06	< 0.007
07/31/06	- 08/14/06	< 0.017
08/14/06	- 08/28/06	< 0.016
08/28/06	- 09/12/06	< 0.014
09/12/06	- 09/26/06	< 0.026
09/26/06	- 10/10/06	< 0.029
10/10/06	- 10/24/06	< 0.008
10/24/06	- 11/06/06	< 0.003
11/06/06	- 11/21/06	< 0.009
11/21/06	- 12/05/06	< 0.005
12/05/06	- 12/19/06	< 0.008
12/19/06	- 01/03/07	< 0.003

Results in picoCuries per cubic meter (pCi/m³) +/- 2 Standard Deviations

Table B-2 (continued)
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Oyster Creek
Concentrations of I-131 in Bi-Weekly Air Iodine Samples
2006

JCP&L Substation (OCAI05)		
Collection Period		I-131 (pCi/m3)
01/04/06	- 01/17/06	< 0.010
01/17/06	- 02/01/06	< 0.003
02/01/06	- 02/14/06	< 0.010
02/14/06	- 02/27/06	< 0.009
02/27/06	- 03/14/06	< 0.004
03/14/06	- 03/28/06	< 0.010
03/28/06	- 04/11/06	< 0.012
04/11/06	- 04/25/06	< 0.011
04/25/06	- 05/08/06	< 0.040
05/08/06	- 05/22/06	< 0.010
05/22/06	- 06/05/06	< 0.009
06/06/06	- 06/20/06	< 0.013
06/20/06	- 07/10/06	< 0.010
07/10/06	- 07/17/06	< 0.031
07/17/06	- 07/31/06	< 0.005
07/31/06	- 08/14/06	< 0.011
08/14/06	- 08/28/06	< 0.010
08/28/06	- 09/12/06	< 0.011
09/12/06	- 09/26/06	< 0.021
09/26/06	- 10/10/06	< 0.024
10/10/06	- 10/24/06	< 0.007
10/24/06	- 11/06/06	< 0.005
11/06/06	- 11/21/06	< 0.004
11/21/06	- 12/05/06	< 0.004
12/05/06	- 12/19/06	< 0.004
12/19/06	- 01/03/07	< 0.002

Results in picoCuries per cubic meter (pCi/m³) +/- 2 Standard Deviations

Table B-3
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Salem / Hope Creek
Concentrations of I-131 in Bi-Weekly Air Iodine Samples
2006

<u>Fort Elfsborg Road (AIAI01)</u>		
<u>Collection Period</u>		<u>I-131 (pCi/m3)</u>
01/03/06	- 01/18/06	< 0.009
01/18/06	- 01/31/06	< 0.008
01/31/06	- 02/14/06	< 0.009
02/14/06	- 02/28/06	< 0.009
02/28/06	- 03/13/06	< 0.014
03/13/06	- 03/27/06	< 0.011
03/27/06	- 04/10/06	< 0.009
04/10/06	- 04/25/06	< 0.016
04/25/06	- 05/09/06	< 0.025
05/09/06	- 05/22/06	< 0.016
05/22/06	- 06/05/06	< 0.015
06/05/06	- 06/19/06	< 0.016
06/19/06	- 07/10/06	< 0.012
07/10/06	- 07/19/06	< 0.028
07/19/06	- 08/01/06	< 0.011
08/01/06	- 08/17/06	< 0.008
08/17/06	- 08/29/06	< 0.013
08/29/06	- 09/11/06	< 0.014
09/11/06	- 09/25/06	< 0.009
09/25/06	- 10/11/06	< 0.019
10/11/06	- 10/23/06	< 0.005
10/23/06	- 11/06/06	< 0.005
11/06/06	- 11/20/06	< 0.009
11/20/06	- 12/04/06	< 0.005
12/04/06	- 12/18/06	< 0.015
12/18/06	- 01/02/07	< 0.003

Results in picoCuries per cubic meter (pCi/m³) +/- 2 Standard Deviations

Table B-3 (continued)
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Salem / Hope Creek
Concentrations of I-131 in Bi-Weekly Air Iodine Samples
2006

<u>Plant Access Road (AIAI02)</u>		
<u>Collection Period</u>		<u>I-131 (pCi/m³)</u>
01/03/06	- 01/18/06	< 0.008
01/18/06	- 01/31/06	< 0.007
01/31/06	- 02/14/06	< 0.008
02/14/06	- 02/28/06	< 0.008
02/28/06	- 03/13/06	< 0.012
03/13/06	- 03/27/06	< 0.010
03/27/06	- 04/10/06	< 0.008
04/10/06	- 04/25/06	< 0.014
04/25/06	- 05/09/06	< 0.038
05/09/06	- 05/22/06	< 0.008
05/22/06	- 06/05/06	< 0.013
06/05/06	- 06/19/06	< 0.014
06/19/06	- 07/10/06	< 0.010
07/10/06	- 07/19/06	< 0.025
07/19/06	- 08/01/06	< 0.010
08/01/06	- 08/17/06	< 0.007
08/17/06	- 08/29/06	< 0.011
08/29/06	- 09/11/06	< 0.012
09/11/06	- 09/25/06	< 0.008
09/25/06	- 10/11/06	< 0.016
10/11/06	- 10/23/06	< 0.007
10/23/06	- 11/06/06	< 0.005
11/06/06	- 11/20/06	< 0.008
11/20/06	- 12/04/06	< 0.004
12/04/06	- 12/18/06	< 0.010
12/18/06	- 01/02/07	< 0.003

Results in picoCuries per cubic meter (pCi/m³) +/- 2 Standard Deviations

Table B-3 (continued)
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Salem / Hope Creek
Concentrations of I-131 in Bi-Weekly Air Iodine Samples
2006

<u>Lower Alloways Creek School (AIAI03)</u>		
<u>Collection Period</u>		<u>I-131 (pCi/m³)</u>
01/03/06	- 01/18/06	< 0.010
01/18/06	- 01/31/06	< 0.008
01/31/06	- 02/14/06	< 0.010
02/14/06	- 02/28/06	< 0.009
02/28/06	- 03/13/06	< 0.009
03/13/06	- 03/27/06	< 0.006
03/27/06	- 04/10/06	< 0.010
04/10/06	- 04/25/06	< 0.009
04/25/06	- 05/09/06	< 0.015
05/09/06	- 05/22/06	< 0.044
05/22/06	- 06/05/06	< 0.016
06/05/06	- 06/19/06	< 0.012
06/19/06	- 07/10/06	< 0.019
07/10/06	- 07/19/06	< 0.012
07/19/06	- 08/01/06	< 0.030
08/01/06	- 08/17/06	< 0.012
08/17/06	- 08/29/06	< 0.009
08/29/06	- 09/11/06	< 0.014
09/11/06	- 09/25/06	< 0.015
09/25/06	- 10/11/06	< 0.010
10/11/06	- 10/23/06	< 0.069
10/23/06	- 11/06/06	< 0.011
11/06/06	- 11/20/06	< 0.006
11/20/06	- 12/04/06	< 0.010
12/04/06	- 12/18/06	< 0.005
12/18/06	- 01/02/07	< 0.013

Results in picoCuries per cubic meter (pCi/m³) +/- 2 Standard Deviations

Table B-4
NJDEP / BNE
Radiological Environmental Monitoring Program

Background
Concentrations of Gross Beta in Bi-Weekly Air Particulate Samples
2006

<u>BNE Office (COAP01)</u>					
<u>Collection Period</u>		<u>Particulate Gross Beta</u> <u>(pCi/m³)</u>			
01/03/06	- 01/18/06	0.013	+/-	0.0013	
01/18/06	- 01/31/06	0.011	+/-	0.0013	
01/31/06	- 02/14/06	0.014	+/-	0.0015	
02/14/06	- 02/28/06	0.021	+/-	0.0018	
02/28/06	- 03/13/06	0.010	+/-	0.0011	
03/13/06	- 03/28/06	0.011	+/-	0.0013	
03/28/06	- 04/10/06			No Data	
04/10/06	- 04/25/06			No Data	
04/25/06	- 05/09/06			No Data	
05/09/06	- 05/22/06	0.008	+/-	0.0010	
05/22/06	- 06/05/06	0.006	+/-	0.0006	
06/05/06	- 06/19/06	0.009	+/-	0.0011	
06/19/06	- 07/10/06	0.014	+/-	0.0011	
07/10/06	- 07/19/06	0.014	+/-	0.0016	
07/19/06	- 08/01/06	0.017	+/-	0.0016	
08/01/06	- 08/17/06	0.016	+/-	0.0013	
08/17/06	- 08/29/06	0.016	+/-	0.0016	
08/29/06	- 09/11/06	0.014	+/-	0.0013	
09/11/06	- 09/25/06	0.013	+/-	0.0013	
09/25/06	- 10/11/06	0.015	+/-	0.0013	
10/11/06	- 10/23/06	0.015	+/-	0.0015	
10/23/06	- 11/06/06	0.015	+/-	0.0014	
11/06/06	- 11/20/06	0.014	+/-	0.0014	
11/20/06	- 12/04/06	0.016	+/-	0.0014	
12/04/06	- 12/18/06	0.019	+/-	0.0016	
12/18/06	- 01/02/07			No Data	

Results in picoCuries per cubic meter (pCi/m³) +/- 2 Standard Deviations

'No Data' indicates no sample results due to maintenance issues with equipment

Table B-4 (continued)
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Background
Concentrations of Gross Beta in Bi-Weekly Air Particulate Samples
2006

Brendan T. Byrne State Forest (COAP02)					
<u>Collection Period</u>			<u>Particulate Gross Beta</u>		
			<u>(pCi/m3)</u>		
01/04/06	-	01/19/06	0.014	+/-	0.0018
01/19/06	-	02/01/06	0.013	+/-	0.0013
02/01/06	-	02/14/06	0.014	+/-	0.0018
02/14/06	-	03/02/06	0.003	+/-	0.0009
03/02/06	-	03/14/06	0.032	+/-	0.0022
03/14/06	-	03/28/06	0.010	+/-	0.0013
03/28/06	-	04/11/06	0.015	+/-	0.0017
04/11/06	-	04/25/06	0.010	+/-	0.0013
04/25/06	-	05/08/06	0.012	+/-	0.0014
05/08/06	-	05/22/06	0.008	+/-	0.0012
05/22/06	-	06/05/06	0.006	+/-	0.0007
06/05/06	-	06/20/06	0.010	+/-	0.0013
06/20/06	-	07/10/06	0.014	+/-	0.0012
07/10/06	-	07/17/06	0.023	+/-	0.0027
07/17/06	-	07/31/06	0.016	+/-	0.0016
07/31/06	-	08/14/06	0.018	+/-	0.0017
08/14/06	-	08/28/06	0.017	+/-	0.0016
08/28/06	-	09/12/06	0.012	+/-	0.0013
09/12/06	-	09/26/06	0.012	+/-	0.0014
09/26/06	-	10/10/06	0.012	+/-	0.0014
10/10/06	-	10/24/06	0.038	+/-	0.0028
10/24/06	-	11/06/06	0.041	+/-	0.0041
11/06/06	-	11/21/06	0.031	+/-	0.0031
11/21/06	-	12/05/06	0.028	+/-	0.0026
12/05/06	-	12/19/06			No Data
12/19/06	-	01/03/07			No Data

Results in picoCuries per cubic meter (pCi/m³) +/- 2 Standard Deviations

'No Data' indicates no sample results due to maintenance issues with equipment

Table B-5
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Oyster Creek
Concentrations of Gross Beta in Bi-Weekly Air Particulate Samples
2006

<u>Waretown Municipal Building (OCAP01)</u>				
<u>Collection Period</u>		<u>Particulate Gross Beta</u> <u>(pCi/m³)</u>		
01/04/06	- 01/17/06	0.012	+/-	0.0015
01/17/06	- 02/01/06	0.012	+/-	0.0013
02/01/06	- 02/14/06	0.014	+/-	0.0018
02/14/06	- 02/27/06	0.019	+/-	0.0024
02/27/06	- 03/14/06	0.013	+/-	0.0013
03/14/06	- 03/28/06	0.009	+/-	0.0013
03/28/06	- 04/11/06	0.016	+/-	0.0016
04/11/06	- 04/25/06	0.010	+/-	0.0012
04/25/06	- 05/08/06	0.013	+/-	0.0015
05/08/06	- 05/22/06	0.009	+/-	0.0013
05/22/06	- 06/05/06	0.005	+/-	0.0007
06/06/06	- 06/20/06	0.010	+/-	0.0013
06/20/06	- 07/10/06	0.012	+/-	0.0011
07/10/06	- 07/17/06	0.013	+/-	0.0020
07/17/06	- 07/31/06	0.017	+/-	0.0015
07/31/06	- 08/14/06	0.019	+/-	0.0016
08/14/06	- 08/28/06	0.017	+/-	0.0015
08/28/06	- 09/12/06	0.012	+/-	0.0025
09/12/06	- 09/26/06	0.013	+/-	0.0014
09/26/06	- 10/10/06	0.015	+/-	0.0015
10/10/06	- 10/24/06	0.017	+/-	0.0016
10/24/06	- 11/06/06	0.014	+/-	0.0015
11/06/06	- 11/21/06	0.019	+/-	0.0025
11/21/06	- 12/05/06	0.018	+/-	0.0023
12/05/06	- 12/19/06	0.020	+/-	0.0017
12/19/06	- 01/03/07	0.010	+/-	0.0012

Results in picoCuries per cubic meter (pCi/m³) +/- 2 Standard Deviations

Table B-5 (continued)
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Oyster Creek
Concentrations of Gross Beta in Bi-Weekly Air Particulate Samples
2006

<u>Sands Point Harbor (OCAP02)</u>					
<u>Collection Period</u>		<u>Particulate Gross Beta</u>			
		<u>(pCi/m³)</u>			
01/04/06	- 01/17/06	0.016	+/-	0.0010	
01/17/06	- 02/01/06	0.018	+/-	0.0009	
02/01/06	- 02/14/06	0.020	+/-	0.0013	
02/14/06	- 02/27/06	0.004	+/-	0.0004	
02/27/06	- 03/14/06	0.014	+/-	0.0010	
03/14/06	- 03/28/06	0.014	+/-	0.0009	
03/28/06	- 04/11/06	0.012	+/-	0.0008	
04/11/06	- 04/25/06	0.016	+/-	0.0009	
04/25/06	- 05/08/06	0.013	+/-	0.0009	
05/08/06	- 05/22/06	0.011	+/-	0.0007	
05/22/06	- 06/05/06	0.011	+/-	0.0009	
06/06/06	- 06/20/06	0.008	+/-	0.0006	
06/20/06	- 07/10/06	0.011	+/-	0.0013	
07/10/06	- 07/17/06	0.010	+/-	0.0013	
07/17/06	- 07/31/06	0.018	+/-	0.0016	
07/31/06	- 08/14/06	0.019	+/-	0.0016	
08/14/06	- 08/28/06	0.014	+/-	0.0014	
08/28/06	- 09/12/06	0.015	+/-	0.0015	
09/12/06	- 09/26/06	0.016	+/-	0.0015	
09/26/06	- 10/10/06	0.009	+/-	0.0011	
10/10/06	- 10/24/06	0.010	+/-	0.0013	
10/24/06	- 11/06/06	0.018	+/-	0.0016	
11/06/06	- 11/21/06	0.018	+/-	0.0018	
11/21/06	- 12/05/06	0.014	+/-	0.0014	
12/05/06	- 12/19/06	0.020	+/-	0.0018	
12/19/06	- 01/03/07	0.021	+/-	0.0016	

Results in picoCuries per cubic meter (pCi/m³) +/- 2 Standard Deviations

Table B-5 (continued)
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Oyster Creek
Concentrations of Gross Beta in Bi-Weekly Air Particulate Samples
2006

<u>Forked River Marina (OCAP03)</u>					
<u>Collection Period</u>		<u>Particulate Gross Beta (pCi/m³)</u>			
01/04/06	- 01/17/06	0.013	+/-	0.0014	
01/17/06	- 02/01/06	0.014	+/-	0.0014	
02/01/06	- 02/14/06	0.014	+/-	0.0015	
02/14/06	- 02/27/06	0.018	+/-	0.0024	
02/27/06	- 03/14/06	0.013	+/-	0.0021	
03/14/06	- 03/28/06	0.011	+/-	0.0014	
03/28/06	- 04/11/06	0.016	+/-	0.0017	
04/11/06	- 04/25/06	0.011	+/-	0.0014	
04/25/06	- 05/08/06	0.019	+/-	0.0048	
05/08/06	- 05/22/06	0.010	+/-	0.0016	
05/22/06	- 06/05/06	0.008	+/-	0.0007	
06/06/06	- 06/20/06	0.008	+/-	0.0009	
06/20/06	- 07/10/06	0.012	+/-	0.0009	
07/10/06	- 07/17/06	0.015	+/-	0.0017	
07/17/06	- 07/31/06	0.015	+/-	0.0012	
07/31/06	- 08/14/06	0.017	+/-	0.0013	
08/14/06	- 08/28/06	0.015	+/-	0.0011	
08/28/06	- 09/12/06	0.011	+/-	0.0009	
09/12/06	- 09/26/06	0.012	+/-	0.0010	
09/26/06	- 10/10/06	0.013	+/-	0.0010	
10/10/06	- 10/24/06	0.006	+/-	0.0007	
10/24/06	- 11/06/06	0.014	+/-	0.0011	
11/06/06	- 11/21/06	0.012	+/-	0.0010	
11/21/06	- 12/05/06	0.016	+/-	0.0012	
12/05/06	- 12/19/06	0.015	+/-	0.0012	
12/19/06	- 01/03/07	0.012	+/-	0.0010	

Results in picoCuries per cubic meter (pCi/m³) +/- 2 Standard Deviations

Table B-5 (continued)
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Oyster Creek
Concentrations of Gross Beta in Bi-Weekly Air Particulate Samples
2006

<u>Lacey Twp. Recreation Building (OCAP04)</u>					
<u>Collection Period</u>			<u>Particulate Gross Beta</u>		
			<u>(pCi/m³)</u>		
01/04/06	-	01/17/06	0.012	+/-	0.0013
01/17/06	-	02/01/06	0.014	+/-	0.0013
02/01/06	-	02/14/06	0.013	+/-	0.0013
02/14/06	-	02/27/06	0.019	+/-	0.0016
02/27/06	-	03/14/06	0.019	+/-	0.0038
03/14/06	-	03/28/06	0.010	+/-	0.0014
03/28/06	-	04/11/06	0.014	+/-	0.0015
04/11/06	-	04/25/06	0.008	+/-	0.0011
04/25/06	-	05/08/06	0.012	+/-	0.0014
05/08/06	-	05/22/06	0.009	+/-	0.0012
05/22/06	-	06/05/06	0.006	+/-	0.0007
06/06/06	-	06/20/06	0.009	+/-	0.0013
06/20/06	-	07/10/06	0.013	+/-	0.0012
07/10/06	-	07/17/06	0.015	+/-	0.0022
07/17/06	-	07/31/06	0.015	+/-	0.0016
07/31/06	-	08/14/06	0.018	+/-	0.0017
08/14/06	-	08/28/06	0.016	+/-	0.0016
08/28/06	-	09/12/06	0.011	+/-	0.0012
09/12/06	-	09/26/06	0.012	+/-	0.0015
09/26/06	-	10/10/06	0.013	+/-	0.0015
10/10/06	-	10/24/06	0.015	+/-	0.0016
10/24/06	-	11/06/06	0.015	+/-	0.0017
11/06/06	-	11/21/06	0.013	+/-	0.0014
11/21/06	-	12/05/06	0.015	+/-	0.0015
12/05/06	-	12/19/06	0.018	+/-	0.0018
12/19/06	-	01/03/07	0.012	+/-	0.0014

Results in picoCuries per cubic meter (pCi/m³) +/- 2 Standard Deviations

Table B-5 (continued)
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Oyster Creek
Concentrations of Gross Beta in Bi-Weekly Air Particulate Samples
2006

JCP&L Substation (OCAP05)					
<u>Collection Period</u>			<u>Particulate Gross Beta</u>		
			<u>(pCi/m3)</u>		
01/04/06	-	01/17/06	0.012	+/-	0.0014
01/17/06	-	02/01/06	0.009	+/-	0.0010
02/01/06	-	02/14/06	0.015	+/-	0.0014
02/14/06	-	02/27/06	0.018	+/-	0.0018
02/27/06	-	03/14/06	0.014	+/-	0.0013
03/14/06	-	03/28/06	0.010	+/-	0.0013
03/28/06	-	04/11/06	0.015	+/-	0.0017
04/11/06	-	04/25/06	0.013	+/-	0.0016
04/25/06	-	05/08/06	0.009	+/-	0.0011
05/08/06	-	05/22/06	0.009	+/-	0.0012
05/22/06	-	06/05/06	0.006	+/-	0.0007
06/06/06	-	06/20/06	0.009	+/-	0.0012
06/20/06	-	07/10/06	0.013	+/-	0.0011
07/10/06	-	07/17/06	0.015	+/-	0.0020
07/17/06	-	07/31/06	0.017	+/-	0.0014
07/31/06	-	08/14/06	0.018	+/-	0.0015
08/14/06	-	08/28/06	0.016	+/-	0.0014
08/28/06	-	09/12/06	0.012	+/-	0.0012
09/12/06	-	09/26/06	0.012	+/-	0.0013
09/26/06	-	10/10/06	0.016	+/-	0.0014
10/10/06	-	10/24/06	0.015	+/-	0.0014
10/24/06	-	11/06/06	0.013	+/-	0.0014
11/06/06	-	11/21/06	0.014	+/-	0.0013
11/21/06	-	12/05/06	0.017	+/-	0.0014
12/05/06	-	12/19/06	0.017	+/-	0.0015
12/19/06	-	01/03/07	0.010	+/-	0.0011

Results in picoCuries per cubic meter (pCi/m³) +/- 2 Standard Deviations

Table B-5 (continued)
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Oyster Creek
Concentrations of Gross Beta in Weekly Air Particulate Samples
2006

<u>Finninger Farm, OC Dredge Site (OCAP06)</u>					
<u>Collection Period</u>			<u>Particulate Gross Beta</u>		
			<u>(pCi/m³)</u>		
01/04/06	-	01/11/06	0.023	+/-	0.0045
01/11/06	-	01/18/06	0.017	+/-	0.0042
01/18/06	-	01/25/06	0.020	+/-	0.0040
01/25/06	-	02/02/06	0.019	+/-	0.0040
02/01/06	-	02/08/06	0.021	+/-	0.0044
02/08/06	-	02/15/06	0.020	+/-	0.0043
02/15/06	-	02/22/06	0.024	+/-	0.0047
02/22/06	-	03/01/06		No Data	
03/07/06		03/14/06	0.036	+/-	0.0089
03/15/06	-	03/21/06		No Data	
03/21/06	-	03/28/06	0.025	+/-	0.0069
03/28/06	-	04/04/06		No Data	
04/04/06	-	04/11/06	0.020	+/-	0.0042
04/11/06	-	04/19/06	0.018	+/-	0.0037
04/19/06	-	04/25/06	0.017	+/-	0.0044
04/25/06	-	05/03/06	0.018	+/-	0.0041
05/03/06	-	05/10/06	0.021	+/-	0.0041
05/10/06	-	05/17/06		No Data	
05/17/06	-	05/23/06		No Data	
05/23/06	-	05/31/06	0.024	+/-	0.0042
05/31/06	-	06/06/06	0.021	+/-	0.0051
06/06/06	-	06/14/06	0.011	+/-	0.0032
06/14/06	-	06/20/06	0.026	+/-	0.0049
06/20/06	-	06/28/06	0.020	+/-	0.0039
06/28/06	-	07/05/06	0.027	+/-	0.0048
07/05/06	-	07/12/06	0.019	+/-	0.0040

Results in picoCuries per cubic meter (pCi/m³) +/- 2 Standard Deviations

'No Data' indicates no sample results due to maintenance issues with equipment

Table B-5 (continued)
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Oyster Creek
Concentrations of Gross Beta in Weekly Air Particulate Samples
2006

<u>Finnigers Farm, OC Dredge Site (OCAP06)</u>					
<i>(continued)</i>					
<u>Collection Period</u>			<u>Particulate Gross Beta</u>		
			<u>(pCi/m³)</u>		
07/12/06	-	07/18/06	0.027	+/-	0.0051
07/18/06	-	07/26/06	0.025	+/-	0.0040
07/26/06	-	08/02/06	0.034	+/-	0.0050
07/31/06	-	08/09/06	0.025	+/-	0.0045
08/09/06	-	08/15/06	0.023	+/-	0.0047
08/15/06	-	08/23/06	0.023	+/-	0.0039
08/23/06	-	08/30/06	0.028	+/-	0.0046
08/30/06	-	09/06/06	0.018	+/-	0.0039
09/06/06	-	09/13/06	0.026	+/-	0.0043
09/13/06	-	09/20/06	0.023	+/-	0.0044
09/20/06	-	09/26/06	0.021	+/-	0.0048
09/26/06	-	10/04/06	0.021	+/-	0.0039
10/04/06	-	10/11/06	0.023	+/-	0.0044
10/11/06	-	10/18/06	0.023	+/-	0.0041
10/18/06	-	10/24/06	0.021	+/-	0.0045
10/24/06	-	11/01/06	0.021	+/-	0.0039
11/01/06	-	11/08/06	0.029	+/-	0.0048
11/08/06	-	11/15/06	0.017	+/-	0.0039
11/15/06	-	11/29/06	0.025	+/-	0.0040
11/29/06	-	12/05/06	0.029	+/-	0.0051
12/05/06	-	12/12/06	0.034	+/-	0.0050
12/12/06	-	12/19/06	0.029	+/-	0.0051
12/19/06	-	12/27/06	0.023	+/-	0.0042
12/27/06	-	01/03/07	0.022	+/-	0.0042

Results in picoCuries per cubic meter (pCi/m³) +/- 2 Standard Deviations

Table B-6
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Salem / Hope Creek
Concentrations of Gross Beta in Bi-Weekly Air Particulate Samples
2006

<u>Fort Elfsborg Road (AIAP01)</u>					
<u>Collection Period</u>			<u>Particulate Gross Beta</u>		
			<u>(pCi/m3)</u>		
01/03/06	-	01/18/06	0.009	+/-	0.0012
01/18/06	-	01/31/06	0.013	+/-	0.0015
01/31/06	-	02/14/06	0.014	+/-	0.0015
02/14/06	-	02/28/06	0.017	+/-	0.0016
02/28/06	-	03/13/06	0.016	+/-	0.0017
03/13/06	-	03/27/06	0.011	+/-	0.0014
03/27/06	-	04/10/06	0.014	+/-	0.0014
04/10/06	-	04/25/06	0.010	+/-	0.0013
04/25/06	-	05/09/06	0.012	+/-	0.0013
05/09/06	-	05/22/06	0.009	+/-	0.0013
05/22/06	-	06/05/06	0.007	+/-	0.0007
06/05/06	-	06/19/06	0.010	+/-	0.0013
06/19/06	-	07/10/06	0.013	+/-	0.0011
07/10/06	-	07/19/06	0.011	+/-	0.0016
07/19/06	-	08/01/06	0.018	+/-	0.0016
08/01/06	-	08/17/06	0.019	+/-	0.0015
08/17/06	-	08/29/06	0.019	+/-	0.0018
08/29/06	-	09/11/06	0.013	+/-	0.0014
09/11/06	-	09/25/06	0.013	+/-	0.0014
09/25/06	-	10/11/06	0.015	+/-	0.0013
10/11/06	-	10/23/06	0.016	+/-	0.0016
10/23/06	-	11/06/06	0.016	+/-	0.0015
11/06/06	-	11/20/06	0.014	+/-	0.0014
11/20/06	-	12/04/06	0.014	+/-	0.0014
12/04/06	-	12/18/06	0.022	+/-	0.0020
12/18/06	-	01/02/07	0.012	+/-	0.0013

Results in picoCuries per cubic meter (pCi/m³) +/- 2 Standard Deviations

Table B-6 (continued)
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Salem / Hope Creek
Concentrations of Gross Beta in Bi-Weekly Air Particulate Samples
2006

<u>Plant Access Road (AIAP02)</u>					
<u>Collection Period</u>			<u>Particulate Gross Beta</u> <u>(pCi/m³)</u>		
01/03/06	- 01/18/06	0.012	+/-	0.0013	
01/18/06	- 01/31/06	0.011	+/-	0.0013	
01/31/06	- 02/14/06	0.013	+/-	0.0014	
02/14/06	- 02/28/06	0.016	+/-	0.0015	
02/28/06	- 03/13/06	0.012	+/-	0.0014	
03/13/06	- 03/27/06	0.012	+/-	0.0013	
03/27/06	- 04/10/06	0.012	+/-	0.0012	
04/10/06	- 04/25/06	0.010	+/-	0.0012	
04/25/06	- 05/09/06	0.013	+/-	0.0013	
05/09/06	- 05/22/06	0.009	+/-	0.0012	
05/22/06	- 06/05/06	0.005	+/-	0.0006	
06/05/06	- 06/19/06	0.011	+/-	0.0012	
06/19/06	- 07/10/06	0.011	+/-	0.0010	
07/10/06	- 07/19/06	0.019	+/-	0.0019	
07/19/06	- 08/01/06	0.016	+/-	0.0014	
08/01/06	- 08/17/06	0.019	+/-	0.0014	
08/17/06	- 08/29/06	0.016	+/-	0.0015	
08/29/06	- 09/11/06	0.012	+/-	0.0012	
09/11/06	- 09/25/06	0.012	+/-	0.0012	
09/25/06	- 10/11/06	0.015	+/-	0.0013	
10/11/06	- 10/23/06	0.015	+/-	0.0015	
10/23/06	- 11/06/06	0.014	+/-	0.0013	
11/06/06	- 11/20/06	0.014	+/-	0.0013	
11/20/06	- 12/04/06	0.015	+/-	0.0013	
12/04/06	- 12/18/06	0.018	+/-	0.0015	
12/18/06	- 01/02/07	0.013	+/-	0.0012	

Results in picoCuries per cubic meter (pCi/m³) +/- 2 Standard Deviations

Table B-6 (continued)
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Salem / Hope Creek
Concentrations of Gross Beta in Bi-Weekly Air Particulate Samples
2006

<u>Lower Alloways Creek School (AIAP03)</u>					
<u>Collection Period</u>			<u>Particulate Gross Beta (pCi/m³)</u>		
01/03/06	-	01/18/06	0.012	+/-	0.0014
01/18/06	-	01/31/06	0.013	+/-	0.0015
01/31/06	-	02/14/06	0.014	+/-	0.0016
02/14/06	-	02/28/06	0.017	+/-	0.0016
02/28/06	-	03/13/06	0.015	+/-	0.0016
03/13/06	-	03/27/06	0.012	+/-	0.0014
03/27/06	-	04/10/06	0.014	+/-	0.0014
04/10/06	-	04/25/06	0.011	+/-	0.0013
04/25/06	-	05/09/06	0.013	+/-	0.0013
05/09/06	-	05/22/06	0.010	+/-	0.0013
05/22/06	-	06/05/06	0.007	+/-	0.0008
06/05/06	-	06/19/06	0.011	+/-	0.0014
06/19/06	-	07/10/06	0.012	+/-	0.0011
07/10/06	-	07/19/06	0.021	+/-	0.0022
07/19/06	-	08/01/06	0.017	+/-	0.0016
08/01/06	-	08/17/06	0.018	+/-	0.0015
08/17/06	-	08/29/06	0.018	+/-	0.0018
08/29/06	-	09/11/06	0.013	+/-	0.0014
09/11/06	-	09/25/06	0.012	+/-	0.0014
09/25/06	-	10/11/06	No Data		
10/11/06	-	10/23/06	0.017	+/-	0.0019
10/23/06	-	11/06/06	0.014	+/-	0.0015
11/06/06	-	11/20/06	0.012	+/-	0.0014
11/20/06	-	12/04/06	0.015	+/-	0.0015
12/04/06	-	12/18/06	0.017	+/-	0.0017
12/18/06	-	01/02/07	0.014	+/-	0.0014

Results in picoCuries per cubic meter (pCi/m³) +/- 2 Standard Deviations

'No Data' indicates no sample results due to maintenance issues with equipment

Table B-7
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Background
Concentrations of Gamma Emitters and Strontium-90 in
Quarterly Composite Air Samples
2006

BNE Office (COAP01)						
<u>Collection Period</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Be-7</u>	<u>Sr-90</u>	
12/20/05 - 03/28/06	< 2.10	< 1.32	< 1.63	50+/-27	< 1.01	
05/09/06 - 06/19/06	< 1.90	< 1.71	< 0.85	< 61	< 0.22	
06/19/06 - 09/25/06	< 0.59	< 0.57	< 0.71	70+/-16	< 0.08	
09/25/06 - 01/02/07	< 0.59	< 0.79	< 0.80	55+/-15	< 2.81	

Brendan T. Byrne State Forest (COAP02)						
<u>Collection Period</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Be-7</u>	<u>Sr-90</u>	
12/19/05 - 03/28/06	< 2.49	< 1.31	< 1.71	50+/-18	< 1.06	
03/28/06 - 06/20/06	< 1.17	< 0.92	< 1.23	86+/-33	< 0.07	
06/22/05 - 09/28/05	< 1.38	< 0.85	< 0.85	61+/-14	< 0.13	
09/26/06 - 01/03/07	< 1.76	< 1.90	< 1.49	129+/-29	< 11.40	

Results in 10⁻³ picoCuries per cubic meter (pCi/m³) +/- 2 Standard Deviations

Beryllium-7 (Be-7) is a naturally occurring radionuclide found in the environment.

Table B-8
NJDEP / BNE
Radiological Environmental Monitoring Program

Oyster Creek
Concentrations of Gamma Emitters and Strontium-90 in
Quarterly Composite Air Samples 2006

Waretown Municipal Building (OCAP01)						
<u>Collection Period</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Be-7</u>	<u>Sr-90</u>	
12/19/05 - 03/28/06	< 1.88	< 1.70	< 1.22	59+/-25	< 1.05	
03/28/06 - 06/20/06	< 1.18	< 1.09	< 0.96	78+/-27	< 0.08	
06/20/06 - 09/26/06	< 1.28	< 0.78	< 0.79	74+/-16	< 0.13	
09/26/06 - 01/03/07	< 0.59	< 0.81	< 1.42	53+/-19	< 2.48	

Sands Point Harbor (OCAP02)						
<u>Collection Period</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Be-7</u>	<u>Sr-90</u>	
12/19/05 - 03/28/06	< 1.70	< 1.17	< 1.16	74+/-25	< 1.10	
03/28/06 - 06/20/06	< 1.37	< 1.29	< 1.21	79+/-25	< 0.11	
06/20/06 - 09/26/06	< 1.03	< 0.59	< 1.03	50+/-17	< 0.11	
09/26/06 - 01/03/07	< 0.57	< 0.90	< 0.89	62+/-18	< 3.29	

Forked River Marina (OCAP03)						
<u>Collection Period</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Be-7</u>	<u>Sr-90</u>	
12/19/05 - 03/28/06	< 1.66	< 1.38	< 1.51	41+/-20	< 1.33	
03/28/06 - 06/20/06	< 1.69	< 1.06	< 1.03	75+/-35	< 0.09	
06/20/06 - 09/26/06	< 0.38	< 0.26	< 0.33	60+/-9	< 0.07	
09/26/06 - 01/03/07	< 0.69	< 0.51	< 0.54	60+/-11	< 1.90	

Lacey Twp. Recreation Building (OCAP04)						
<u>Collection Period</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Be-7</u>	<u>Sr-90</u>	
12/19/05 - 03/28/06	< 1.81	< 1.23	< 1.49	41+/-21	< 1.20	
03/28/06 - 06/20/06	< 1.47	< 1.45	< 1.38	71+/-37	< 0.13	
06/20/06 - 09/26/06	< 1.48	< 0.93	< 1.00	63+/-17	< 0.10	
09/26/06 - 01/03/07	< 1.64	< 0.67	< 1.05	45+/-19	< 2.99	

Jersey Central Power & Light Substation (OCAP05)						
<u>Collection Period</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Be-7</u>	<u>Sr-90</u>	
12/19/05 - 03/28/06	< 1.35	< 1.18	< 1.13	60+/-18	< 1.18	
03/28/06 - 06/20/06	< 0.87	< 1.20	< 0.84	67+/-36	< 0.10	
06/20/06 - 09/26/06	< 0.88	< 0.45	< 0.67	64+/-14	< 0.06	
09/26/06 - 01/03/07	< 0.51	< 0.58	< 0.40	49+/-12	< 2.10	

Finnings Farm, OC Dredge Site (OCAP06)						
<u>Collection Period</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Be-7</u>	<u>Sr-90</u>	
12/19/05 - 03/28/06	< 5.68	< 5.19	< 4.94	< 84	< 4.99	
03/28/06 - 06/20/06	< 2.76	< 2.45	< 2.29	< 69	< 0.30	
06/20/06 - 09/26/06	< 3.11	< 2.00	< 2.08	< 30	< 0.20	
09/26/06 - 01/03/07	< 2.38	< 2.16	< 2.45	65+/-25	< 7.02	

Results in 10⁻³ picoCuries per cubic meter (pCi/m³) +/- 2 Standard Deviations
 Beryllium-7 (Be-7) is a naturally occurring radionuclide found in the environment.

Table B-9
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Salem / Hope Creek
Concentrations of Gamma Emitters and Strontium-90 in
Quarterly Composite Air Samples 2006

Fort Elfsborg Road (AIAP01)						
Collection Period	Co-60	Cs-134	Cs-137	Be-7	Sr-90	
12/20/05 - 03/27/06	< 0.89	< 0.96	< 0.80	48+/-13	< 1.41	
03/27/06 - 06/19/06	< 0.59	< 0.60	< 0.89	66+/-28	< 0.07	
06/19/06 - 09/25/06	< 1.03	< 0.63	< 0.73	60+/-15	< 0.08	
09/25/06 - 01/27/07	< 1.67	< 0.81	< 1.05	63+/-17	< 2.62	

Plant Access Road (AIAP02)						
Collection Period	Co-60	Cs-134	Cs-137	Be-7	Sr-90	
12/20/05 - 03/27/06	< 1.29	< 1.79	< 1.46	59+/-21	< 1.47	
03/27/06 - 06/19/06	< 0.72	< 1.18	< 0.80	< 33	< 0.08	
06/19/06 - 09/25/06	< 0.47	< 0.62	< 0.44	59+/-13	< 0.07	
09/25/06 - 01/27/07	< 0.89	< 0.63	< 0.34	66+/-13	< 2.28	

Lower Alloways Creek School (AIAP03)						
Collection Period	Co-60	Cs-134	Cs-137	Be-7	Sr-90	
12/20/05 - 03/27/06	< 0.89	< 2.02	< 1.59	48+/-27	< 1.26	
03/27/06 - 06/19/06	< 0.96	< 0.96	< 0.89	57+/-31	< 0.12	
06/19/06 - 09/25/06	< 1.27	< 0.65	< 0.85	71+/-15	< 0.11	
09/25/06 - 01/27/07	< 0.88	< 1.16	< 1.20	46+/-22	< 3.25	

Results in 10⁻³ picoCuries per cubic meter (pCi/m³) +/- 2 Standard Deviations

Beryllium-7 (Be-7) is a naturally occurring radionuclide found in the environment.

Table B-10
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Oyster Creek
Concentrations of Gamma Emitters and Strontium-90 in Shellfish Samples
2006

Stouts Creek (OCFS01)						
<u>Collection Date</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>K-40</u>	<u>Sr-90</u>
04/18/06 – Clams	< 31	< 29	< 30	< 29	899 +/- 310	< 11
10/09/06 – Clams	< 28	< 23	< 23	< 24	1527 +/- 386	< 31

East of Site – Barnegat Bay (OCFS02)						
<u>Collection Date</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>K-40</u>	<u>Sr-90</u>
04/18/06 – Clams	< 24	< 23	< 24	< 21	1336 +/- 246	< 14
10/09/06 – Clams	< 14	< 12	< 11	< 13	1615 +/- 259	< 36

Great Bay / Little Egg Harbor (OCFS03)						
<u>Collection Date</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>K-40</u>	<u>Sr-90</u>
04/18/06 - Clams	< 25	< 24	< 24	< 24	1582 +/- 268	< 15
10/11/06 - Clams	< 10	< 11	< 11	< 11	945 +/- 286	< 161*

Results in picoCuries per kilogram – WET (pCi/kg) +/- 2 Standard Deviations

Potassium-40 (K-40) is a naturally occurring radionuclide found in the environment.

* Sample minimum detectable value is higher because the aliquot was smaller (10g versus 20g). An aliquot is usually a portion of a total amount of a sample.

Table B-11
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Salem / Hope Creek
Concentrations of Gamma Emitters and Strontium-90 in Fish/Shellfish Samples
2006

Onsite Surface Water Inlet Building (AIFS01)						
<u>Collection Date</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>K-40</u>	<u>Sr-90</u>
05/04/06 – Fish*	< 50	< 45	< 46	< 44	3337 +/- 599	< 4
07/18/06 - Crab	< 19	< 16	< 15	< 15	2891 +/- 307	< 38
08/15/06 - Crab	< 68	< 52	< 52	< 57	2531 +/- 817	< 51

Delaware River – West Bank Upstream (AIFS02)						
<u>Collection Date</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>K-40</u>	<u>Sr-90</u>
05/04/06 – Fish*	< 48	< 42	< 47	< 46	3449 +/- 608	< 3
07/18/06 – Crab	< 70	< 48	< 40	< 44	3428 +/- 745	< 32
08/15/06 – Crab	< 70	< 53	< 42	< 52	3969 +/- 756	< 29

Results in picoCuries per kilogram – WET (pCi/kg) +/- 2 Standard Deviations

Potassium-40 (K-40) is a naturally occurring radionuclide found in the environment.

*Fish consist of various species including striped bass, white perch, bluefish, and weakfish

Table B-12
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Oyster Creek
Concentrations of Gamma Emitters in Aquatic Sediment Samples
2006

Barnegat Bay (OCAQ01)						
<u>Collection Date</u>	<u>Be-7</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>K-40</u>
04/17/06	190 +/- 82	< 12	< 10	< 11	< 10	2816 +/- 121
10/09/06	573 +/- 85	< 10	< 9	< 8	< 9	4295 +/- 192

OCNGS Discharge Canal (OCAQ02)						
<u>Collection Date</u>	<u>Be-7</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>K-40</u>
04/17/06	< 89	< 9	< 7	< 10	< 8	1053 +/- 103
10/09/06	378 +/- 155	< 13	< 12	< 12	< 14	7803 +/- 419

Great Bay / Little Egg Harbor (OCAQ03)						
<u>Collection Date</u>	<u>Be-7</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>K-40</u>
04/19/06	< 257	< 27	< 21	< 25	< 23	15600 +/- 397
10/09/06	99 +/- 59	< 6	< 5	< 5	< 5	1340 +/- 160

Stouts Creek (OCAQ04)						
<u>Collection Date</u>	<u>Be-7</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>K-40</u>
04/18/06	< 138	< 15	< 13	< 18	< 12	7177 +/- 203
10/11/06	< 132	< 15	< 13	< 12	< 15	13380 +/- 342

Results in picoCuries per kilogram – DRY (pCi/kg) +/- 2 Standard Deviations

Potassium-40 (K-40) and Beryllium-7 (Be-7) are naturally occurring radionuclides found in the environment.

Table B-13
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Salem / Hope Creek
Concentrations of Gamma Emitters in Aquatic Sediment Samples
2006

Surface Water Inlet Building (AIAQ02)						
<u>Collection Date</u>	<u>Be-7</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>K-40</u>
07/07/06	< 156	< 17	< 17	< 16	< 14	8400 +/- 292
10/27/06	< 223	< 24	< 16	< 19	< 18	8739 +/- 538

Onsite – Cooling Tower Blowdown Discharge Line (AIAQ03)						
<u>Collection Date</u>	<u>Be-7</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>K-40</u>
07/07/06	< 154	< 16	< 15	< 14	< 15	4905 +/- 255
10/27/06	< 236	< 21	< 16	< 16	< 17	8002 +/- 608

Onsite – South Storm Drain Discharge Line (AIAQ04)						
<u>Collection Date</u>	<u>Be-7</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>K-40</u>
07/07/06	< 240	< 27	< 23	< 32	< 23	11110 +/- 373
10/27/06	< 257	< 25	< 19	< 19	< 21	5101 +/- 459

West Bank of Delaware River - Upstream (AIAQ05)						
<u>Collection Date</u>	<u>Be-7</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>K-40</u>
10/27/06	< 297	< 30	< 23	< 20	< 23	16630 +/- 554

Results in picoCuries per kilogram – DRY (pCi/kg) +/- 2 Standard Deviations

Potassium-40 (K-40) and Beryllium-7 (Be-7) are naturally occurring radionuclides found in the environment.

Table B-14
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Oyster Creek
Concentrations of Gamma Emitters in Vegetable Samples
2006

OCNGS Onsite Garden (OCVE01) *						
Sample	Collection Date	Co-58	Co-60	Cs-134	Cs-137	K-40
Cabbage	07/19/06	< 5	< 6	< 4	< 4	2574 +/- 110
Collards	07/19/06	< 4	< 4	< 4	< 4	3343 +/- 105
Lettuce	07/19/06	< 5	< 4	< 4	< 4	4214 +/- 124

Farm J (OCVE02)						
Sample	Collection Date	Co-58	Co-60	Cs-134	Cs-137	K-40
Cabbage	07/19/06	< 6	< 5	< 5	< 5	2779 +/- 148
Collards	07/19/06	< 6	< 5	< 5	< 5	5186 +/- 152
Kale	07/19/06	< 5	< 4	< 4	< 4	5373 +/- 129
Cabbage	08/17/06	< 7	< 7	< 6	< 7	4268 +/- 189
Collards	08/17/06	< 7	< 6	< 5	< 6	5572 +/- 198
Kale	08/17/06	< 7	< 6	< 6	< 7	5958 +/- 207
Cabbage	09/21/06	< 6	< 5	< 5	< 6	2102 +/- 121
Maple Leaf	09/21/06	< 11	< 10	< 10	< 11	2410 +/- 202
Autumn Olive	09/21/06	< 11	< 10	< 9	< 10	1978 +/- 167
Collards	09/21/06	< 3	< 5	< 3	< 3	4255 +/- 197
Cherry Leaf	09/21/06	< 13	< 11	< 10	< 12	4672 +/- 257

OCNGS Onsite Garden (OCVE03)						
Sample	Collection Date	Co-58	Co-60	Cs-134	Cs-137	K-40
Cabbage	07/19/06	< 6	< 5	< 5	< 5	3478 +/- 124
Collards	07/19/06	< 8	< 9	< 6	< 7	3072 +/- 159
Lettuce	07/19/06	< 6	< 6	< 5	< 5	6979 +/- 170
Cabbage	08/16/06	< 5	< 4	< 4	< 4	4338 +/- 114
Collards	08/16/06	< 5	< 6	< 4	< 4	6554 +/- 155
Lettuce	08/16/06	< 66**	< 54**	< 46**	< 62**	7794 +/- 1019**
Cabbage	09/21/06	< 5	< 5	< 5	< 6	4980 +/- 264
Collards	09/21/06	< 6	< 6	< 5	< 6	3866 +/- 164
Kale	09/21/06	< 8	< 7	< 6	< 8	4491 +/- 182

Results in picoCuries per kilogram – WET (pCi/kg) +/- 2 Standard Deviations

Potassium-40 (K-40) is a naturally occurring radionuclide found in the environment.

* Vegetable garden unavailable in August and September due to consumption by deer

** Sample minimum detectable value is higher because the medium/sample was smaller (.32 kg versus 1 kg normal amount) and the yield was lower. This was likely due to sample spoilage.

Table B-14 (continued)
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Oyster Creek
Concentrations of Gamma Emitters in Vegetable Samples
2006

OCNGS Owner Controlled Area on Finningers Farm – ESE Sector (OCVE04)						
Sample	Collection Date	Co-58	Co-60	Cs-134	Cs-137	K-40
Apple Leaf	08/16/06	< 5	< 5	< 5	< 5	3867 +/- 143
Ragweed	08/16/06	< 30	< 19	< 21	< 23	2147 +/- 394
Maple Leaf	08/16/06	< 32	< 27	< 27	< 28	2183 +/- 436
Apple Leaf	09/21/06	< 7	< 6	< 6	< 7	4495 +/- 322
Maple Leaf	09/21/06	< 6	< 7	< 6	< 6	2810 +/- 263

OCNGS Owner Controlled Area on Finningers Farm – E Sector (OCVE05)						
Sample	Collection Date	Co-58	Co-60	Cs-134	Cs-137	K-40
Ragweed	08/16/06	< 23	< 15	< 18	< 29	1890 +/- 306
Autumn Olive	08/16/06	< 53	< 45	< 48	< 44	1845 +/- 666
Apple Leaf	08/16/06	< 71	< 41	< 39	< 42	3705 +/- 752
Autumn Olive	09/21/06	< 5	< 5	< 5	< 6	1302 +/- 198
Apple Leaf	09/21/06	< 9	< 7	< 8	< 8	1630 +/- 132
Prickly Pear	09/21/06	< 7	< 6	< 5	< 6	1103 +/- 110

OCNGS Owner Controlled Area on Finningers Farm – ENE Sector (OCVE06)						
Sample	Collection Date	Co-58	Co-60	Cs-134	Cs-137	K-40
Sycamore	08/16/06	< 6	< 5	< 5	160 +/- 9	3655 +/- 187
Apple Leaf	08/16/06	< 4	< 3	< 3	67 +/- 6	2918 +/- 136
Autumn Olive	08/16/06	< 4	< 3	< 4	74 +/- 7	1361 +/- 143
Sycamore	09/21/06	< 8	< 7	< 7	< 8	1160 +/- 216
Sassafras Leaf	09/21/06	< 7	< 7	< 6	866 +/- 153	1895 +/- 183
Autumn Olive	09/21/06	< 8	< 7	< 6	< 7	1095 +/- 199

Results in picoCuries per kilogram – WET (pCi/kg) +/- 2 Standard Deviations

Potassium-40 (K-40) is a naturally occurring radionuclide found in the environment.

Regulatory reporting level for cesium-137 in vegetation is 2000 picoCuries per kilogram – WET (pCi/kg) (Source: Oyster Creek NGS Offsite Dose Calculation Manual).

Table B-15
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Salem / Hope Creek
Concentrations of Gamma Emitters in Vegetable Samples
2006

Farm D (AIVE01)						
Sample	Collection Date	Co-58	Co-60	Cs-134	Cs-137	K-40
Cabbage	07/18/06	< 5	< 5	< 4	< 5	2923 +/- 119

Farm F (AIVE03)						
Sample	Collection Date	Co-58	Co-60	Cs-134	Cs-137	K-40
Tomatoes	07/18/06	< 5	< 5	< 5	< 5	1609 +/- 99

Farm G (AIVE04)						
Sample	Collection Date	Co-58	Co-60	Cs-134	Cs-137	K-40
Peppers	07/18/06	< 5	< 4	< 3	< 4	1284 +/- 77

Farm H (AIVE05)						
Sample	Collection Date	Co-58	Co-60	Cs-134	Cs-137	K-40
Cabbage	07/18/06	< 5	< 4	< 4	< 4	2630 +/- 107
Corn	07/18/06	< 5	< 4	< 4	< 5	3205 +/- 122

Farm K (AIVE07)						
Sample	Collection Date	Co-58	Co-60	Cs-134	Cs-137	K-40
Cabbage	07/18/06	< 4	< 4	< 3	< 4	2715 +/- 94

Farm L (AIVE08)						
Sample	Collection Date	Co-58	Co-60	Cs-134	Cs-137	K-40
Cabbage	07/18/06	< 6	< 5	< 4	< 5	2974 +/- 119

Results in picoCuries per kilogram – WET (pCi/kg) +/- 2 Standard Deviations

Potassium-40 (K-40) is a naturally occurring radionuclide found in the environment.

Table B-16
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Background*
Concentrations of Gamma Emitters and Strontium-90 in Milk Samples
2006

Farm T (COMI01)				
<u>Collection Date</u>	<u>Cs-137</u>	<u>I-131</u>	<u>K-40</u>	<u>Sr-90</u>
02/17/06	< 2.62	< 0.38	1435 +/- 37	< 0.41
05/17/06	< 2.80	< 0.53	1411 +/- 52	< 0.46
08/07/06	< 8.39	< 0.66	1318 +/- 218	< 0.44
11/15/06	< 3.23	< 0.68	1382 +/- 122	< 0.73

Results in picoCuries per Liter (pCi/L) +/- 2 Standard Deviations

Potassium-40 (K-40) is a naturally occurring radionuclide found in the environment.

* Background milk location was established in August 2004

Table B-17
NJDEP / BNE
Radiological Environmental Monitoring Program

Salem / Hope Creek
Concentrations of Gamma Emitters and Strontium-90 in Milk Samples
2006

Farm A (AIMI01)				
<u>Collection Date</u>	<u>Cs-137</u>	<u>I-131</u>	<u>K-40</u>	<u>Sr-90</u>
01/04/06	< 2.97	< 0.35	1374 +/- 78	< 0.14
02/06/06	< 2.09	< 0.47	1429 +/- 41	< 0.46
04/03/06	< 1.93	< 1.00	1426 +/- 40	< 0.27
05/02/06	< 2.29	< 0.48	1338 +/- 41	< 0.31
08/08/06	< 11.24	< 0.39	1261 +/- 193	< 0.61
09/06/06	< 7.22	< 0.49	1046 +/- 147	< 0.47
10/02/06	< 6.51	< 0.65	1214 +/- 157	< 0.94
11/06/06	< 3.10	< 0.62	1362 +/- 82	< 0.36
12/05/06	< 6.80	< 0.65	1203 +/- 151	< 0.47

Farm B (AIMI02)				
<u>Collection Date</u>	<u>Cs-137</u>	<u>I-131</u>	<u>K-40</u>	<u>Sr-90</u>
01/03/06	< 3.12	< 0.83	1226 +/- 101	< 0.24
02/06/06	< 2.30	< 0.48	1452 +/- 45	< 0.35
03/06/06	< 2.93	< 0.25	1209 +/- 53	< 0.72
04/03/06	< 1.80	< 0.68	1360 +/- 33	< 0.20
05/02/06	< 2.28	< 0.94	1331 +/- 41	< 0.35
06/04/06	< 3.84	< 2.16 *	1356 +/- 70	< 0.25
07/10/06	< 7.36	< 0.60	1283 +/- 132	< 0.47
08/08/06	< 7.39	< 0.77	1410 +/- 217	< 0.49
09/06/06	< 6.80	< 0.87	1331 +/- 174	< 0.44
10/02/06	< 7.80	< 0.60	1305 +/- 196	< 0.58
11/06/06	< 3.70	< 0.64	1226 +/- 90	< 0.56
12/05/06	< 6.81	< 0.31	1160 +/- 132	< 0.50

Results in picoCuries per Liter (pCi/L) +/- 2 Standard Deviations

Potassium-40 (K-40) is a naturally occurring radionuclide found in the environment.

* Lab performance issue with replacement filter for I-131 analysis. During 2006, the existing filter utilized in the analysis was discontinued. The recommended replacement filter did not perform to standards due to a difference in porosity of the filter. The vendor is now requesting specific filters with similar porosity characteristics. An internal laboratory non-conformance report was issued.

Table B-17 (continued)
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Salem / Hope Creek
Concentrations of Gamma Emitters and Strontium-90 in Milk Samples
2006

Farm C (AIMI03)				
<u>Collection Date</u>	<u>Cs-137</u>	<u>I-131</u>	<u>K-40</u>	<u>Sr-90</u>
01/03/06	< 1.94	< 0.37	1378 +/- 51	< 0.20
02/06/06	< 2.07	< 0.92	1287 +/- 37	< 0.39
03/06/06	< 2.67	< 0.31	1454 +/- 47	< 0.57
04/04/06	< 1.98	< 0.48	1455 +/- 38	< 0.22
05/02/06	< 2.18	< 0.56	1311 +/- 41	< 0.43
06/04/06	< 3.63	< 17.80 *	1447 +/- 67	< 0.28
07/10/06	< 8.12	< 0.29	1364 +/- 130	< 0.37
08/07/06	< 9.41	< 0.39	1333 +/- 195	< 0.60
09/05/06	< 7.98	< 0.49	1258 +/- 185	< 0.69
10/02/06	< 8.70	< 0.71	1089 +/- 183	< 0.53
11/06/06	< 3.32	< 0.94	1317 +/- 82	< 0.40
12/04/06	< 6.23	< 0.31	1353 +/- 143	< 0.42

Farm D (AIMI04)				
<u>Collection Date</u>	<u>Cs-137</u>	<u>I-131</u>	<u>K-40</u>	<u>Sr-90</u>
03/06/06	< 2.81	< 0.62	1227 +/- 49	< 0.74
06/04/06	< 3.98	< 1.52	1337 +/- 60	< 0.33
07/10/06	< 7.88	< 0.91	1361 +/- 133	< 0.43

Results in picoCuries per Liter (pCi/L) +/- 2 Standard Deviations

Potassium-40 (K-40) is a naturally occurring radionuclide found in the environment.

* Lab performance issue with replacement filter for I-131 analysis. During 2006, the existing filter utilized in the analysis was discontinued. The recommended replacement filter did not perform to standards due to a difference in porosity of the filter. The vendor is now requesting specific filters with similar porosity characteristics. An internal laboratory non-conformance report was issued.

Table B-18
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Oyster Creek
Concentrations of Gamma Emitters and Tritium in Surface Water
2006

<u>Barnegat Bay (OCSW01)</u>						
<u>Collection Date</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>H-3</u>	<u>I-131</u>
04/17/06	< 7.68	< 7.88	< 6.38	< 7.67	< 374	< 0.97
10/09/06	< 6.03	< 6.55	< 5.88	< 5.46	< 303	< 0.89

<u>Great Bay / Little Egg Harbor (OCSW02)</u>						
<u>Collection Date</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>H-3</u>	<u>I-131</u>
01/04/06	< 6.92	< 7.04	< 6.59	< 6.26	< 265	< 23.37*
02/08/06	< 6.02	< 5.81	< 4.80	< 4.82	< 254	< 8.73*
03/01/06	< 3.91	< 4.47	< 4.30	< 4.46	< 262	< 7.95*
04/04/06	< 9.01	< 11.57	< 8.24	< 8.15	< 371	< 28.27*
05/03/06	< 7.54	< 8.78	< 7.04	< 7.09	< 263	< 0.97
06/06/06	< 9.22	< 9.78	< 7.24	< 9.14	< 249	< 0.86
07/05/06	< 7.96	< 8.05	< 7.36	< 7.14	< 272	< 0.84
08/02/06	< 6.42	< 7.61	< 5.91	< 6.81	< 296	< 0.76
09/06/06	< 9.01	< 9.45	< 7.88	< 8.87	< 302	< 0.84
10/04/06	< 6.15	< 5.43	< 5.73	< 6.18	< 304	< 0.94
11/08/06	< 8.67	< 9.83	< 8.48	< 10.74	< 279	< 1.41
12/05/06	< 10.57	< 11.56	< 10.96	< 11.57	< 226	< 0.94

<u>Stouts Creek (OCSW03)</u>						
<u>Collection Date</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>H-3</u>	<u>I-131</u>
04/18/06	< 10.34	< 9.82	< 8.34	< 10.57	< 377	< 0.93
10/09/06	< 9.32	< 9.38	< 7.14	< 9.69	< 300	< 0.75

<u>OCNGS Discharge Canal (OCSW04)</u>						
<u>Collection Date</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>H-3</u>	<u>I-131</u>
01/04/06	< 8.69	< 8.53	< 7.05	< 8.86	< 264	< 26.60*
02/08/06	< 10.04	< 12.12	< 9.22	< 12.13	< 255	< 14.03*
03/01/06	< 5.01	< 6.61	< 5.51	< 6.30	< 257	< 9.93*
04/04/06	< 8.63	< 10.42	< 7.20	< 9.94	< 362	< 30.98*
05/03/06	< 10.29	< 11.50	< 8.99	< 12.19	< 265	< 0.92
06/06/06	< 7.41	< 7.73	< 6.64	< 6.78	< 247	< 0.87
07/05/06	< 7.17	< 7.79	< 6.59	< 7.12	< 277	< 0.81
08/02/06	< 5.24	< 5.84	< 4.74	< 5.28	< 300	< 1.18
09/06/06	< 10.19	< 11.47	< 9.35	< 11.41	< 302	< 0.84
10/09/06	< 6.35	< 6.71	< 5.31	< 6.01	< 298	< 0.80
11/08/06	< 12.97	< 13.47	< 11.26	< 14.63	< 277	< 1.13
12/05/06	< 11.67	< 12.25	< 9.59	< 10.78	< 218	< 0.97

Results in picoCuries per Liter (pCi/L) +/- 2 Standard Deviations

* Samples analyzed for iodine-131 did not meet the U.S. EPA drinking water detection limit of 1.0 pCi/L. Towards the end of April 2006, the corrective action was implemented.

Table B-19
NJDEP / BNE
Radiological Environmental Monitoring Program

Salem / Hope Creek
Concentrations of Gamma Emitters and Tritium in Surface Water
2006

Surface Water Inlet Building Discharge (AISW01)						
<u>Collection Date</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>H-3</u>	<u>I-131</u>
01/06/06	< 7.39	< 8.53	< 6.99	< 9.29	< 262	< 23.03*
02/07/06	< 6.75	< 7.52	< 5.63	< 6.96	< 267	< 23.65*
03/06/06	< 6.86	< 7.28	< 6.10	< 7.06	< 265	< 1.04
04/05/06	< 10.10	< 11.02	< 9.26	< 11.49	< 361	< 40.28*
05/04/06	< 4.61	< 5.66	< 4.06	< 4.80	< 288	< 0.82
06/05/06	< 8.67	< 8.26	< 7.91	< 7.38	< 246	< 0.82
07/07/06	< 5.63	< 6.48	< 4.86	< 6.04	< 279	< 0.90
08/09/06	< 10.10	< 11.23	< 7.62	< 8.78	< 280	< 1.19
09/06/06	< 7.50	< 8.37	< 6.15	< 7.63	< 300	< 0.87
10/02/06	< 9.13	< 9.72	< 8.73	< 9.47	< 303	< 0.88
11/06/06	< 6.50	< 7.19	< 5.07	< 5.90	< 288	< 0.85
12/05/06	< 6.73	< 6.23	< 5.68	< 5.37	< 275	< 2.03

West Bank – Delaware River (AISW02)						
<u>Collection Date</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>H-3</u>	<u>I-131</u>
01/06/06	< 7.24	< 6.09	< 7.35	< 6.62	< 266	< 19.48*
02/07/06	< 5.58	< 7.05	< 5.77	< 5.47	< 270	< 32.96*
03/06/06	< 9.51	< 10.66	< 7.66	< 10.76	< 265	< 0.89
04/05/06	< 10.88	< 11.23	< 9.00	< 10.77	< 363	< 31.79*
05/04/06	< 5.63	< 5.67	< 4.69	< 5.34	< 266	< 0.81
06/05/06	< 7.03	< 8.47	< 6.40	< 7.97	< 249	< 0.80
07/07/06	< 5.19	< 6.08	< 4.99	< 5.92	< 273	< 0.87
08/09/06	< 6.64	< 6.57	< 5.29	< 5.68	< 278	< 1.20
09/06/06	< 13.74	< 12.68	< 10.73	< 12.20	< 310	< 0.87
10/02/06	< 6.51	< 4.58	< 5.47	< 5.29	< 306	< 0.94
11/06/06	< 7.78	< 7.22	< 5.86	< 7.31	< 285	< 0.94
12/05/06	< 6.84	< 6.84	< 6.88	< 8.19	< 294	< 1.35

Results in picoCuries per Liter (pCi/L) +/- 2 Standard Deviations

* Samples analyzed for iodine-131 did not meet the U.S. EPA drinking water detection limit of 1.0 pCi/L. Towards the end of April 2006, corrective action was implemented.

Table B-20
NJDEP / BNE
Radiological Environmental Monitoring Program

Oyster Creek
Concentrations of Gamma Emitters and Tritium in Well Water
2006

Oyster Creek Administration Building Onsite (OCWW01)						
<u>Collection Date</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>H-3</u>	<u>I-131</u>
02/14/06	< 6.80	< 6.58	< 6.20	< 5.74	< 280	< 1.06
05/10/06	< 6.79	< 6.02	< 6.15	< 6.86	< 264	< 0.84
07/31/06	< 5.11	< 6.19	< 5.32	< 6.36	< 267	< 0.89
10/24/06	< 4.43	< 4.31	< 3.94	< 5.36	< 294	< 1.09

Forked River Marina (OCWW02)						
<u>Collection Date</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>H-3</u>	<u>I-131</u>
02/14/06	< 8.56	< 9.76	< 7.23	< 9.53	< 272	< 1.00
05/10/06	< 3.53	< 5.23	< 3.42	< 4.07	< 265	< 0.80
07/31/06	< 5.11	< 5.15	< 5.07	< 5.48	< 266	< 1.26
10/24/06	< 4.52	< 3.73	< 4.07	< 3.85	< 309	< 0.93

Results in picoCuries per Liter (pCi/L) +/- 2 Standard Deviations

Table B-21
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Salem / Hope Creek
Concentrations of Gamma Emitters and Tritium in Well Water
2006

<u>Elsinboro School (AIWW01)</u>						
<u>Collection Date</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>H-3</u>	<u>I-131</u>
02/14/06	< 8.77	< 7.95	< 8.14	< 8.34	< 269	< 0.91
05/09/06	< 4.08	< 3.74	< 3.64	< 3.85	< 268	< 0.82
08/01/06	< 5.01	< 5.41	< 4.95	< 5.89	< 273	< 0.78
10/23/06	< 4.29	< 4.48	< 3.78	< 4.23	< 320	< 1.07

<u>Lower Alloways Creek Police Station (AIWW02)</u>						
<u>Collection Date</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>H-3</u>	<u>I-131</u>
02/14/06	< 10.22	< 11.98	< 8.71	< 11.82	< 264	< 0.98
05/09/06	< 5.83	< 6.97	< 4.79	< 6.49	< 264	< 0.81
08/01/06	< 5.23	< 5.89	< 5.52	< 5.38	< 270	< 0.96
10/23/06	< 4.48	< 4.34	< 4.10	< 3.66	< 280	< 0.89

<u>Salem Administration Building (AIWW03)</u>						
<u>Collection Date</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>H-3</u>	<u>I-131</u>
02/14/06	< 6.56	< 6.05	< 5.92	< 6.61	< 271	< 1.04
05/09/06	< 3.93	< 4.52	< 3.99	< 4.26	< 263	< 0.75
08/01/06	< 6.68	< 6.85	< 5.60	< 6.11	< 291	< 1.13
10/23/06	< 6.50	< 8.55	< 5.08	< 6.59	< 298	< 0.78

<u>Lower Alloways Creek School (AIWW04)</u>						
<u>Collection Date</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>H-3</u>	<u>I-131</u>
02/14/06	< 6.17	< 7.75	< 5.74	< 6.13	< 265	< 0.98
05/09/06	< 5.44	< 5.66	< 5.27	< 5.56	< 273	< 0.79
08/01/06	< 8.35	< 9.04	< 7.39	< 7.93	< 273	< 0.80
10/23/06	< 3.97	< 4.36	< 3.94	< 4.40	< 295	< 0.87

Results in picoCuries per Liter (pCi/L) +/- 2 Standard Deviations

Table B-22
NJDEP / BNE
Radiological Environmental Monitoring Program

Background*
Quarterly Thermoluminescent Dosimetry (TLD) Data
2006

Station	Location	<u>1st</u> <u>Qtr</u>	<u>C.V.</u>	<u>2nd</u> <u>Qtr</u>	<u>C.V.</u>	<u>3rd</u> <u>Qtr</u>	<u>C.V.</u>	<u>4th</u> <u>Qtr</u>	<u>C.V.</u>
CO01	BNE Office, Arctic Parkway, Ewing, NJ	*	*	12.4	2.1	14.4	4.2	11.1	5.4
CO02	Brendan T. Byrne State Forest, New Lisbon, NJ	*	*	10.6	3.3	10.2	4.7	15.5	4.9

* *Deployment of TLD at Background locations began in 2nd Quarter of 2006*

C.V. is the Coefficient of Variation, the ratio of the standard deviation to the mean.

Table B-23
NJDEP / BNE
Radiological Environmental Monitoring Program

Oyster Creek
Quarterly Thermoluminescent Dosimetry (TLD) Data
2006

<u>Station</u>	<u>Location</u>	<u>1st Qtr</u>	<u>C.V.</u>	<u>2nd Qtr</u>	<u>C.V.</u>	<u>3rd Qtr</u>	<u>C.V.</u>	<u>4th Qtr</u>	<u>C.V.</u>
1	Ocean County Vocational School	12.0	3.7	8.6	3.2	10.2	1.5	8.3	3.2
2	Ocean Twp. Municipal Building	12.9	4.1	10.1	8.3	11.0	5.3	10.3	7.5
3	Sewage Pumping Station, Forked River	13.1	2.9	10.7	3.8	11.4	2.5	9.7	3.2
4	Twin River Station, Forked River	12.7	2.9	9.4	2.8	10.8	3.6	8.5	3.8
5	Sewage Pumping Station, Ocean Twp.	12.8	6.2	10.1	2.9	10.9	3.7	9.7	5.8
6	OCNGS, Gate #2, Forked River	13.3	5.0	10.3	5.3	11.5	3.1	9.1	6.6
7	Finninger Farm, Forked River	10.8	7.1	8.8	2.4	10.1	4.1	7.9	2.5
8	Ocean Co. Memorial Cemetery, Waretown	11.7	5.0	8.9	3.1	9.6	6.4	8.3	4.6
9	OCNGS Building 17, Forked River	12.8	3.8	9.8	4.7	11.6	4.2	9.7	2.3
10	Sheffield & Derby Rd, Forked River	12.8	3.3	9.8	3.5	10.5	3.9	8.9	2.2
11	Lakeside Drive, Forked River	12.9	3.3	9.7	2.6	11.1	2.3	9.5	2.1
12	Forked River Game Farm, Forked River	13.2	5.7	9.8	1.3	11.2	5.7	10.3	2.7
13	Restrooms, Lakeside Dr., Forked River	12.5	2.1	9.2	3.5	10.6	5.3	9.9	1.7
14	Sands Pt. Park, Dock Ave., Waretown	13.0	2.3	10.4	3.8	11.4	3.2	10.0	3.8
15	Recreation Center, Waretown	13.3	7.4	8.9	3.5	9.7	4.7	8.5	7.1
16	North Access Rd., Forked River	13.5	3.2	10.7	4.1	11.7	3.6	9.5	2.7

All exposures were normalized to 91 days (a standard quarter) and are reported in units of milliroentgen (mR)

C.V. is the Coefficient of Variation, the ratio of the standard deviation to the mean.

Table B-23 (continued)
 NJDEP / BNE
 Radiological Environmental Monitoring Program

Oyster Creek*
Quarterly Thermoluminescent Dosimetry (TLD) Data
2006

Station	Location	1st Qtr	C.V.	2nd Qtr	C.V.	3rd Qtr	C.V.	4th Qtr	C.V.
20	Third Avenue, Barnegat Light	*	*	*	*	*	*	8.2	7.4
21	Rose Hill Road & Barnegat Blvd	*	*	*	*	*	*	9.7	4.1
22	Bay Way & Claimore Avenue	*	*	*	*	*	*	10.4	5.3
23	Island Beach State Park, Parking Lot A5	*	*	*	*	*	*	8.0	3.4

All exposures were normalized to 91 days (a standard quarter) and are reported in units of milliroentgen (mR)

C.V. is the Coefficient of Variation, the ratio of the standard deviation to the mean.

* Deployment of TLD badges at Stations OC-20 through OC-23 began during Fourth Quarter 2006

Table B-24
NJDEP / BNE
Radiological Environmental Monitoring Program

Salem / Hope Creek
Quarterly Thermoluminescent Dosimetry (TLD) Data
2006

Station	Location	1st Qtr	C.V.	2nd Qtr	C.V.	3rd Qtr	C.V.	4th Qtr	C.V.
1	Access Road – Security Checkpoint	14.5	2.9	12.7	9.3	11.1	2.9	10.6	6.2
2	Poplar Road, Lower Alloways	13.6	1.4	12.4	3.7	11.9	3.2	*	*
3	Money and Eagle Island Road	14.3	3.5	13.3	2.4	12.7	2.1	12.0	4.4
4	Ft. Elfsborg / Hancocks – East	14.9	3.8	14.0	7.5	13.6	5.2	12.9	5.0
5	Ft. Elfsborg / Hancocks – West	13.6	3.8	11.9	4.1	17.1	5.0	16.3	4.2
6	Stathems Neck Road	13.3	5.1	12.2	5.7	11.7	3.2	11.1	4.7
7	Stow Neck Road Lower Alloways	11.4	4.3	10.5	5.3	9.8	3.4	9.5	2.1
8	Alloways Creek Neck Road - Middle	11.2	3.5	10.4	1.9	10.1	6.2	9.7	4.3
9	Alloways Creek Neck Road - North	14.7	2.3	13.5	4.5	13.5	4.1	11.7	4.1
10	Abbotts Farm Road	11.5	2.5	10.6	3.7	9.8	3.1	9.9	1.4

All exposures were normalized to 91 days (a standard quarter) and are reported in units of milliroentgen (mR)

C.V. is the Coefficient of Variation, the ratio of the standard deviation to the mean.

** Data lost due to environmental damage, or vandalism*

Table B-25
NJDEP / BNE
Radiological Environmental Monitoring Program

Salem / Hope Creek
Co-Located Quarterly Thermoluminescent Dosimetry (TLD) Data
2006

Station	Location	<u>NJBNE</u> <u>Network</u>		<u>PP&L</u> <u>Network</u>		<u>NJBNE</u> <u>Network</u>		<u>Global</u> <u>Network</u>	
		<u>3^{rd.}</u> <u>Qtr</u>	<u>C.V</u>	<u>3^{rd.}</u> <u>Qtr</u>	<u>C.V.</u>	<u>4^{th.}</u> <u>Qtr</u>	<u>C.V</u>	<u>4^{th.}</u> <u>Qtr</u>	<u>C.V</u>
1	Access Road – Security Checkpoint	11.1	2.9	12.4	3.2	10.6	6.2	11.5	3.0
2	Poplar Road, Lower Alloways	11.9	3.2	12.5	8.0	*	*	*	*
5	Ft. Elfsborg / Hancocks – West	17.1	5.0	18.7	2.6	16.3	4.2	16.6	3.3
9	Alloways Creek Neck Road - North	13.5	4.1	14.1	2.6	11.7	4.1	13.1	5.3

** Data lost due to environmental damage, or vandalism*

C.V. is the Coefficient of Variation, the ratio of the standard deviation to the mean.

Table B-26
 Oyster Creek – Continuous Radiological Environmental Surveillance Telemetry (CREST) Data

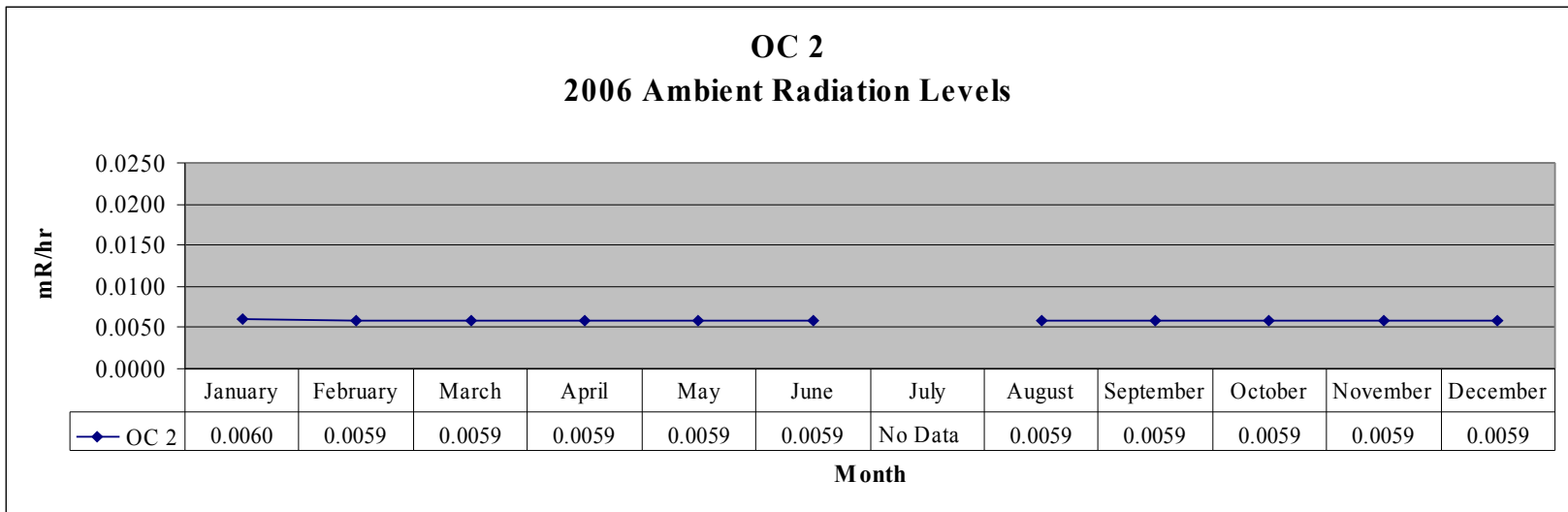
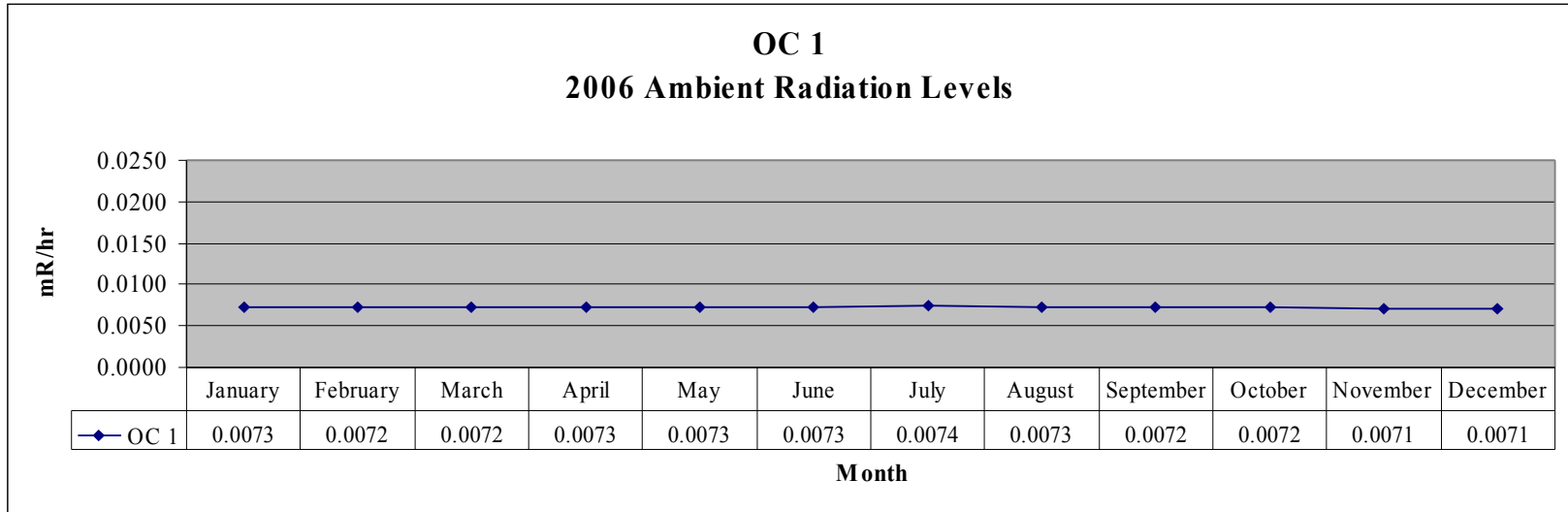


Table B-26 (continued)
Oyster Creek – Continuous Radiological Environmental Surveillance Telemetry (CREST) Data

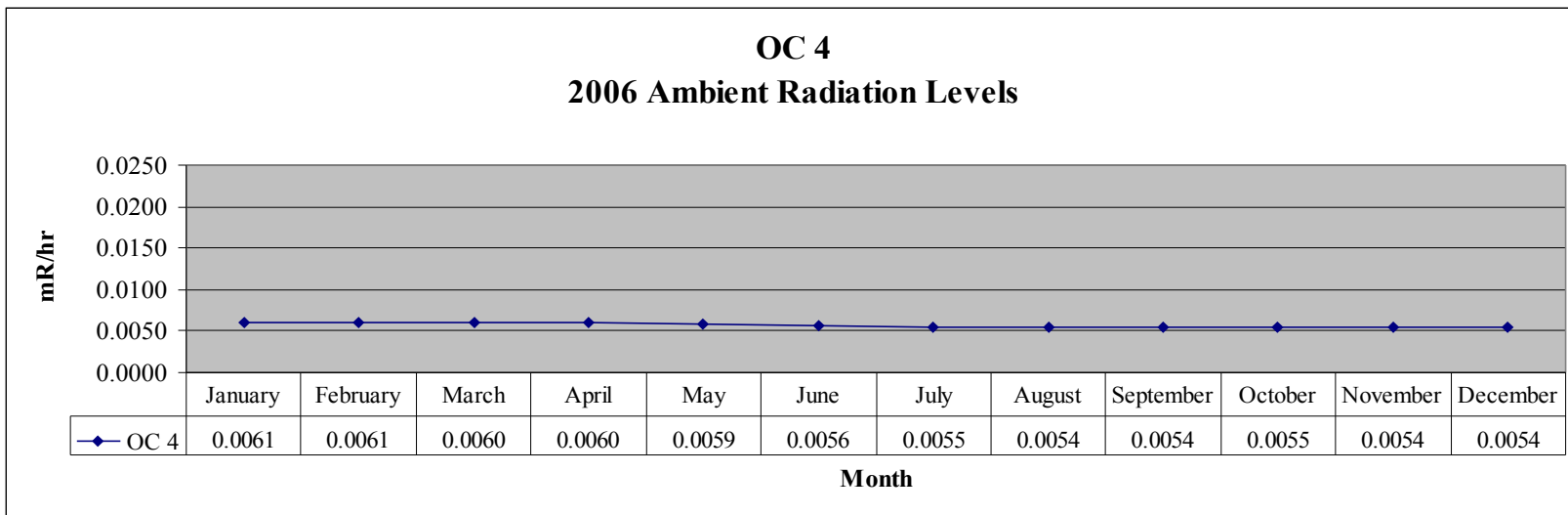
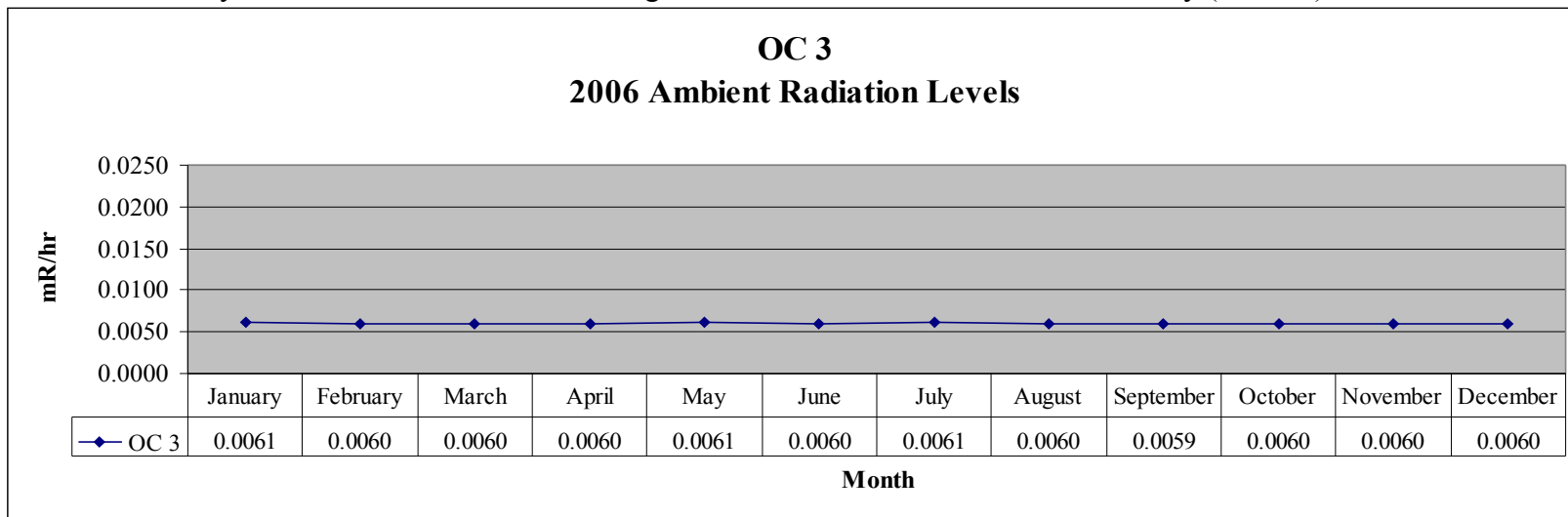


Table B-26 (continued)
 Oyster Creek – Continuous Radiological Environmental Surveillance Telemetry (CREST) Data

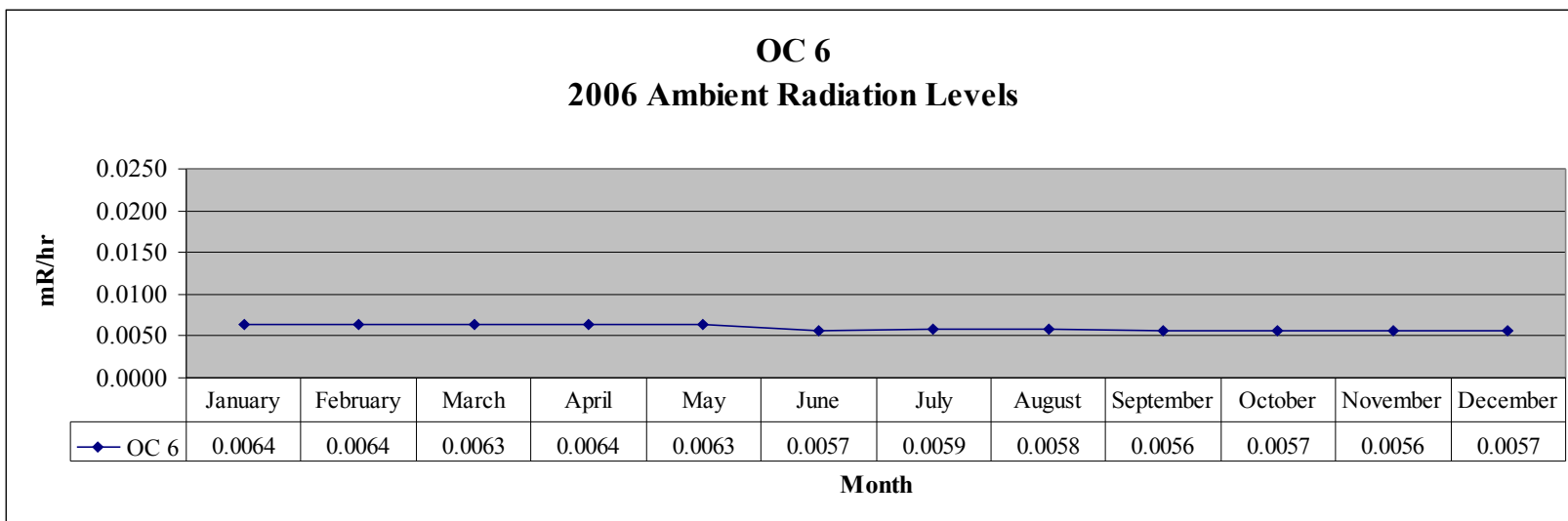
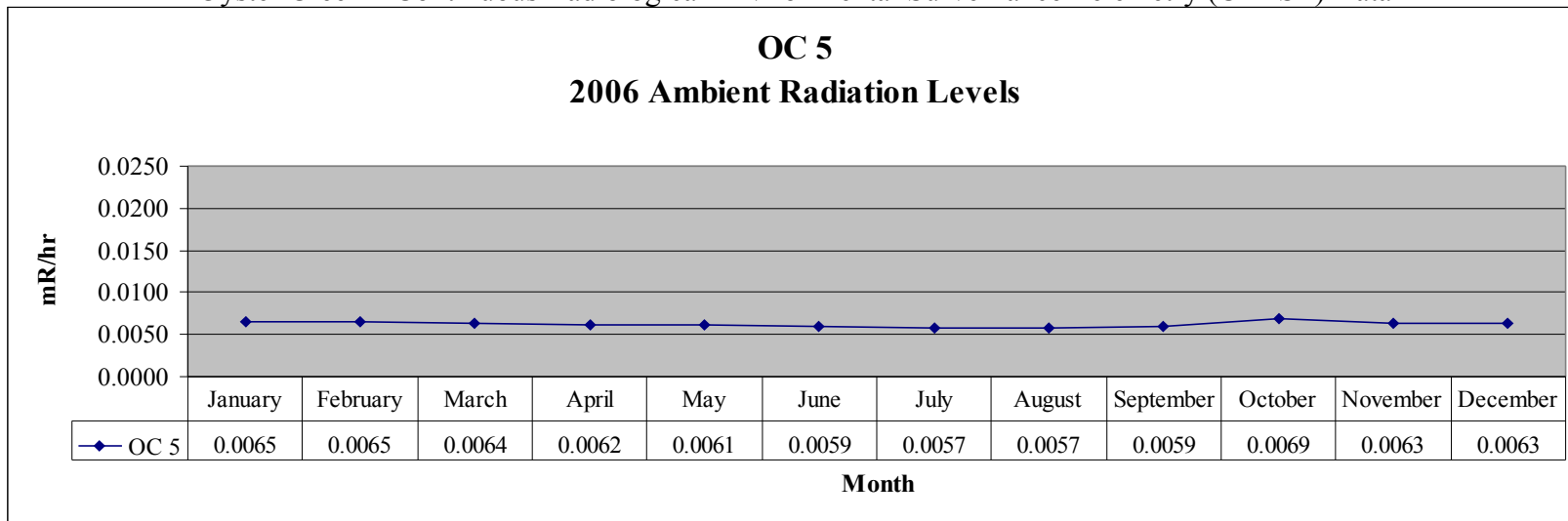


Table B-26 (continued)
Oyster Creek – Continuous Radiological Environmental Surveillance Telemetry (CREST) Data

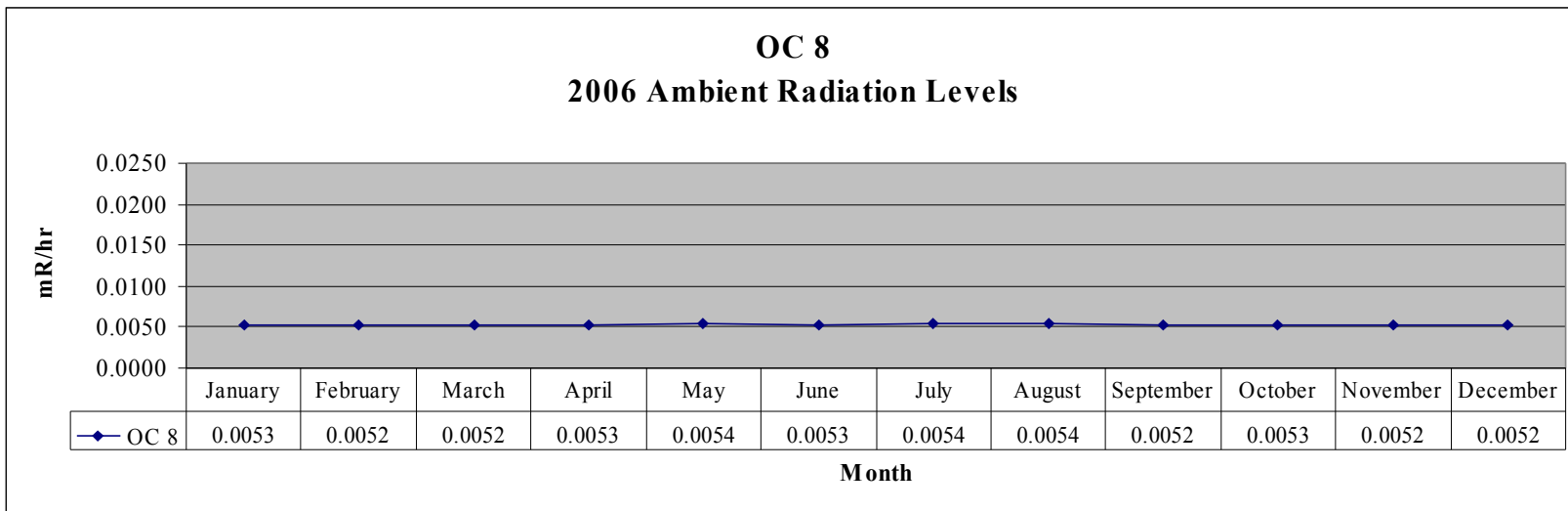
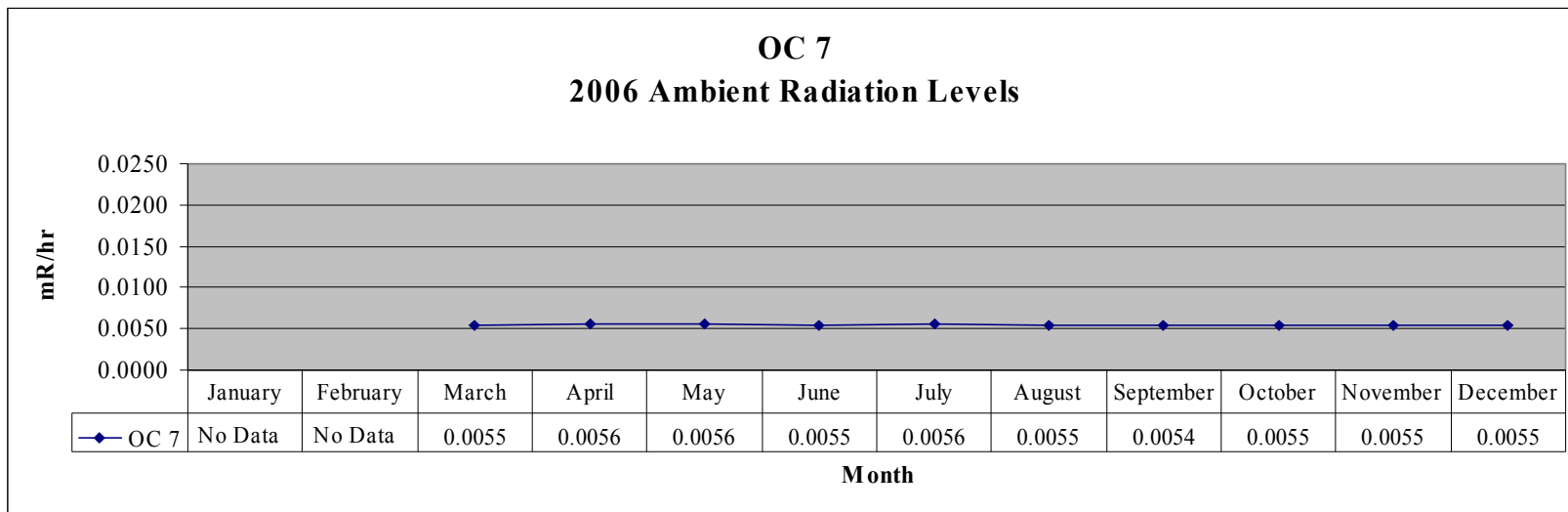


Table B-26 (continued)
 Oyster Creek – Continuous Radiological Environmental Surveillance Telemetry (CREST) Data

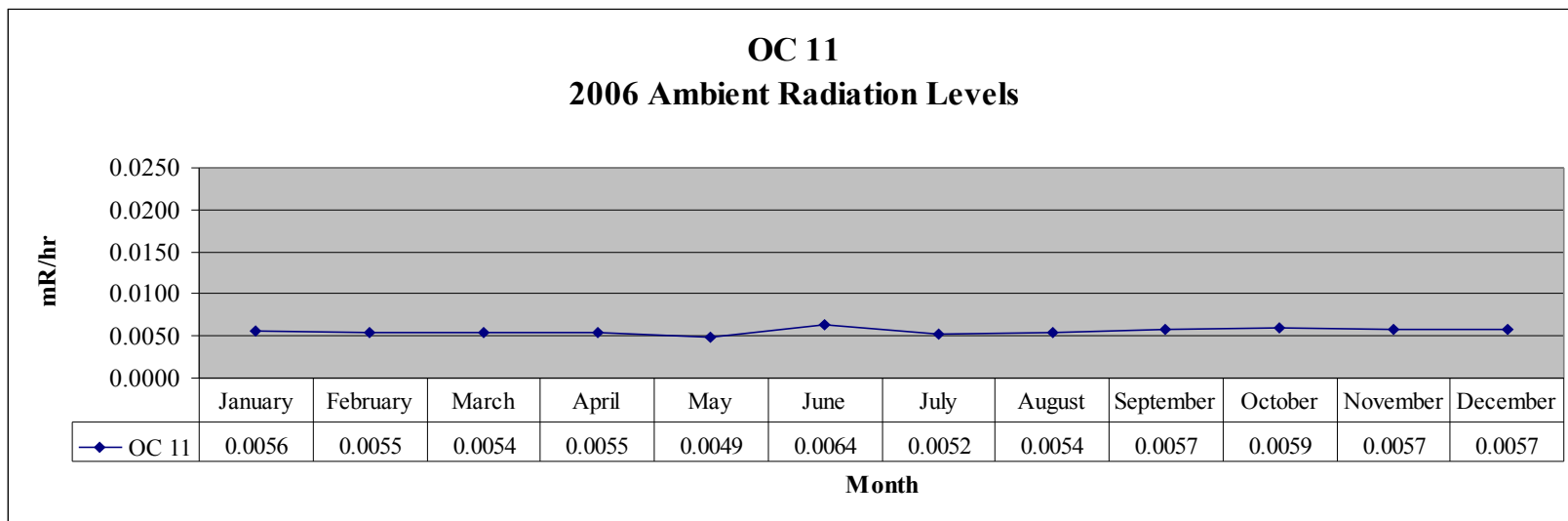
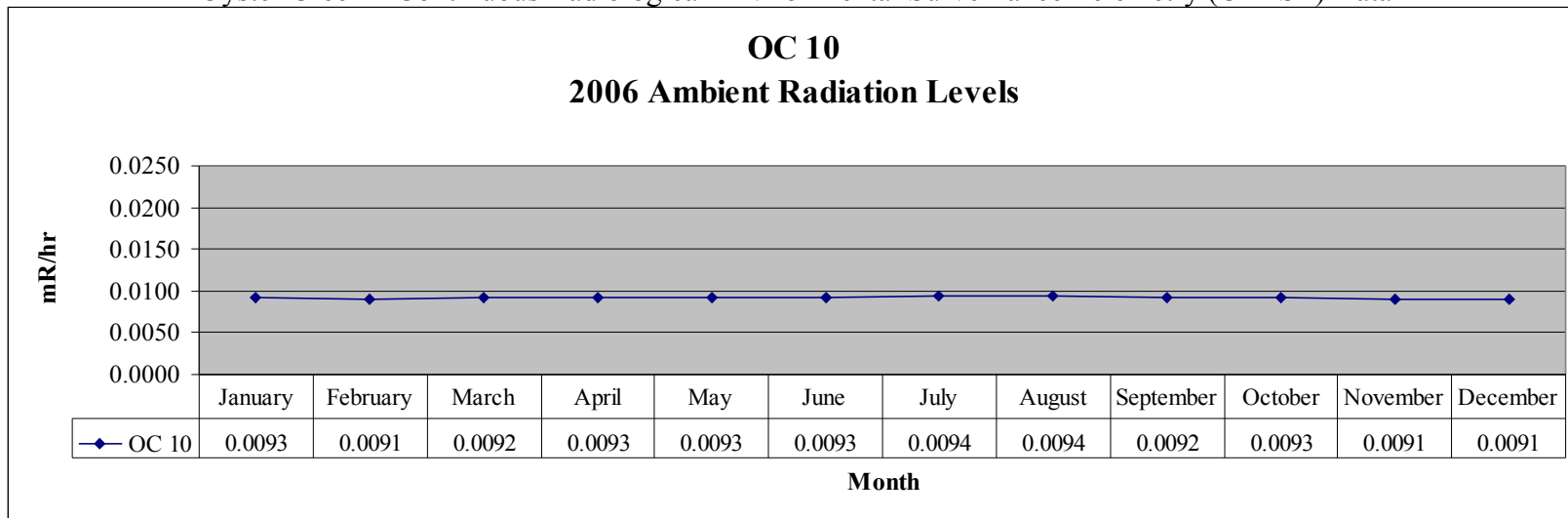


Table B-26 (continued)
 Oyster Creek – Continuous Radiological Environmental Surveillance Telemetry (CREST) Data

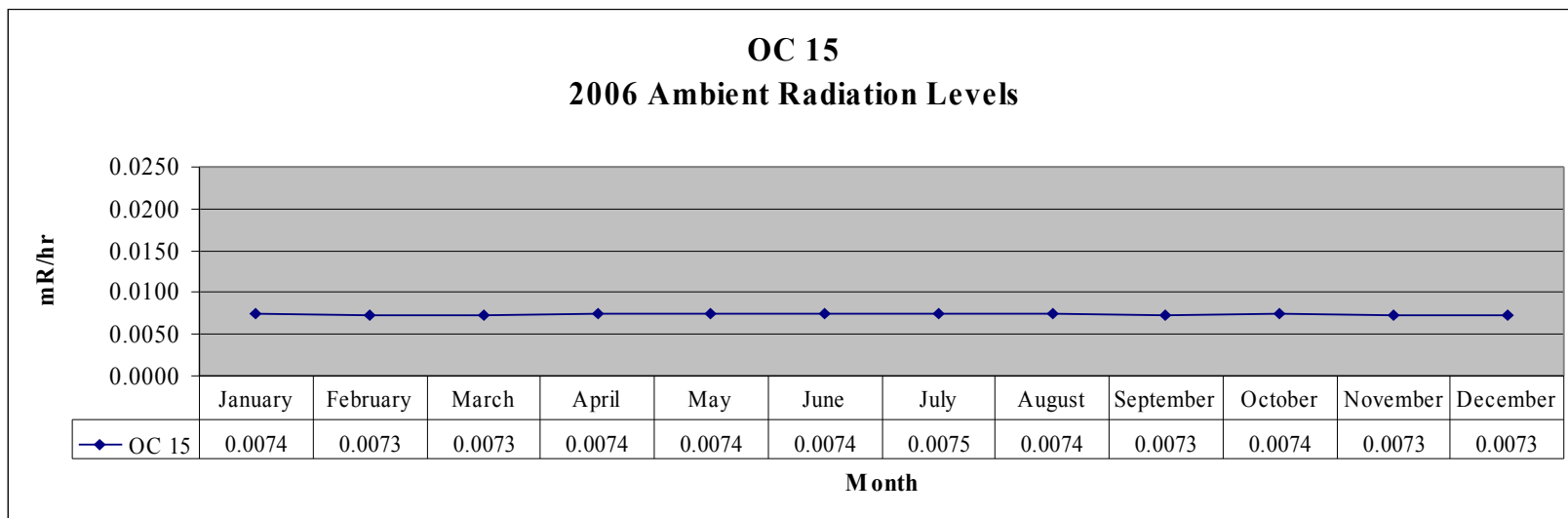
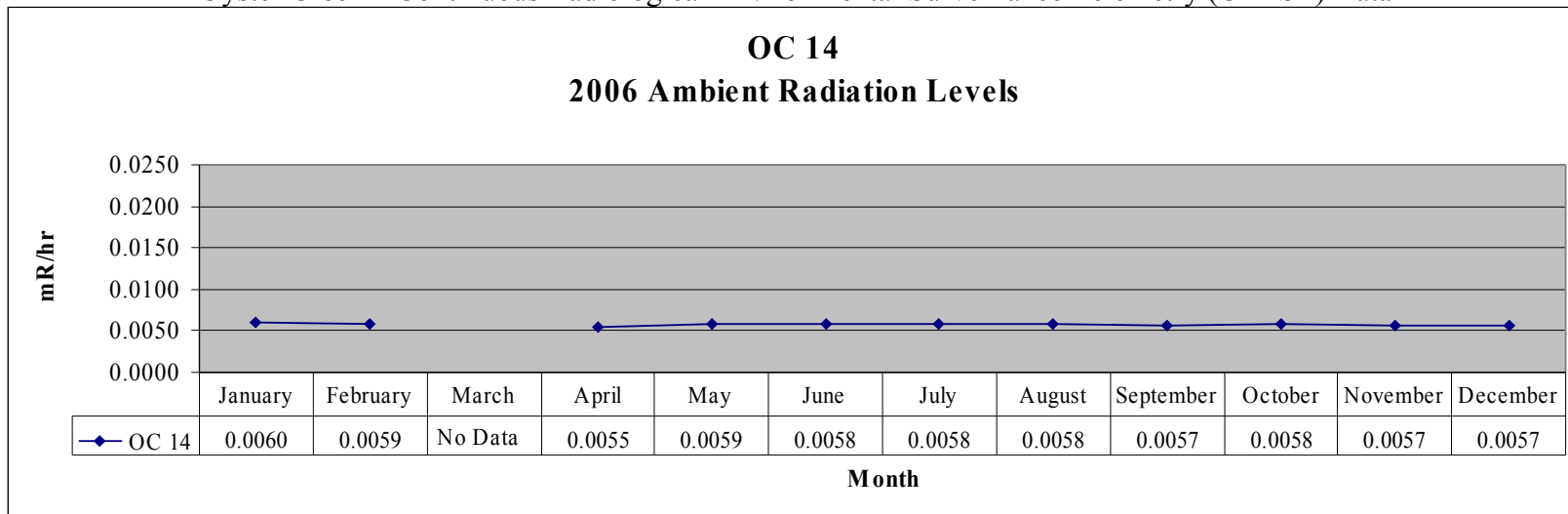


Table B-26 (continued)
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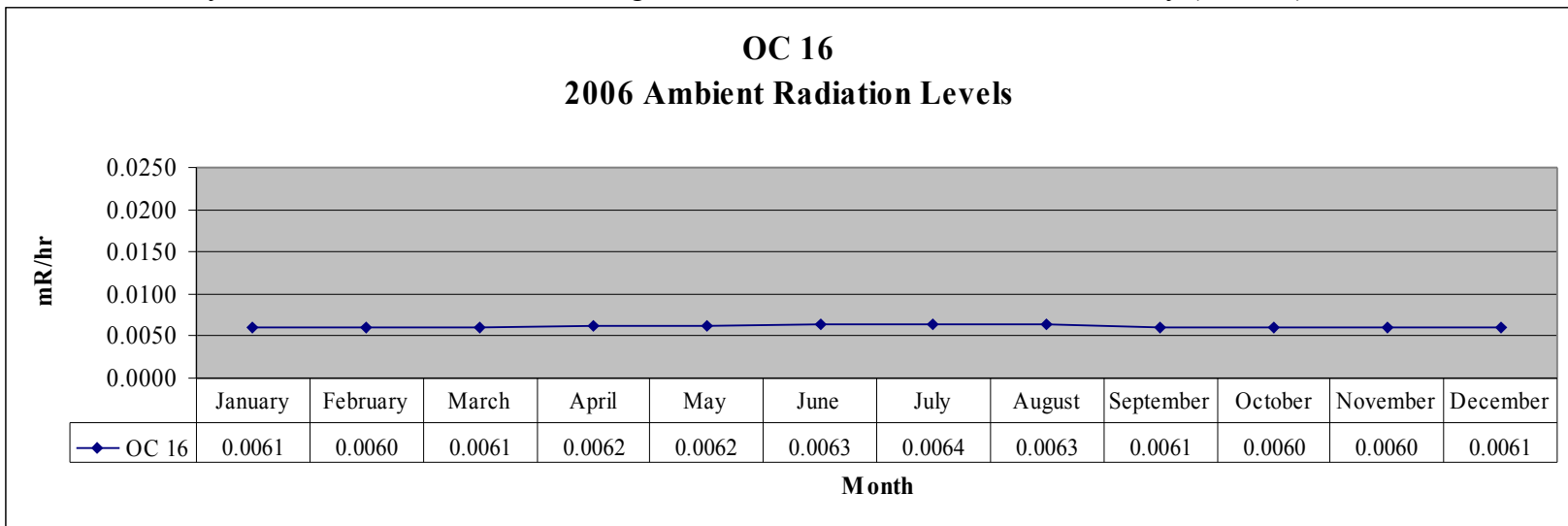


Table B-27

Salem / Hope Creek – Continuous Radiological Environmental Surveillance Telemetry (CREST) Data

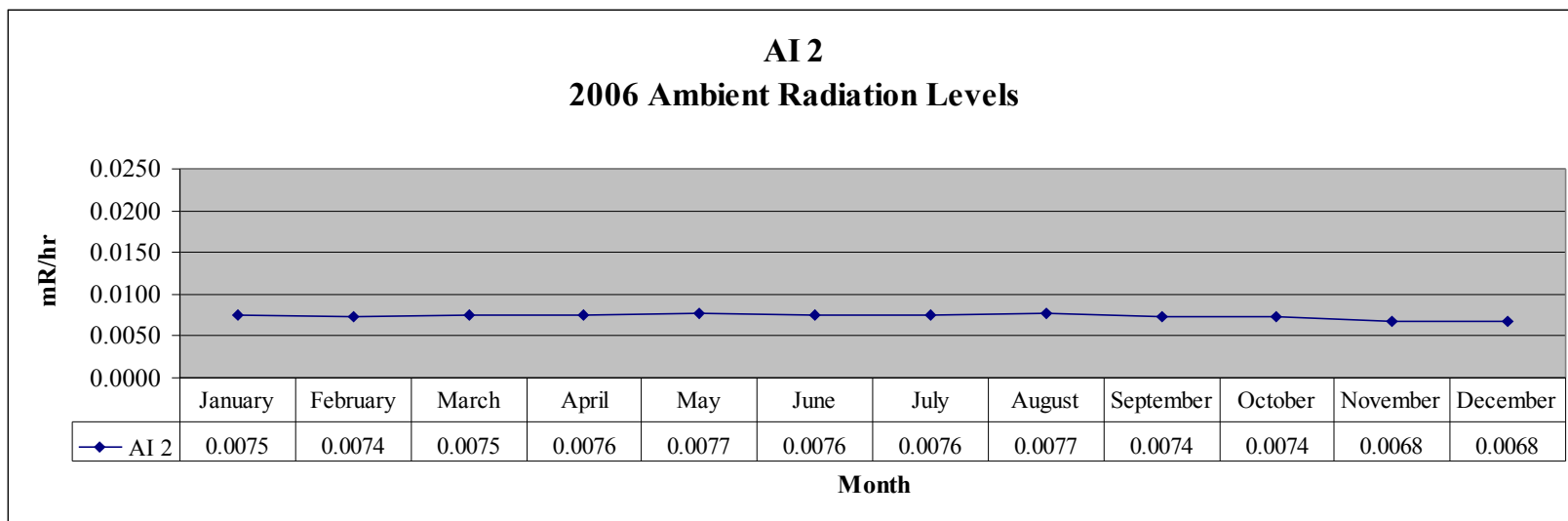
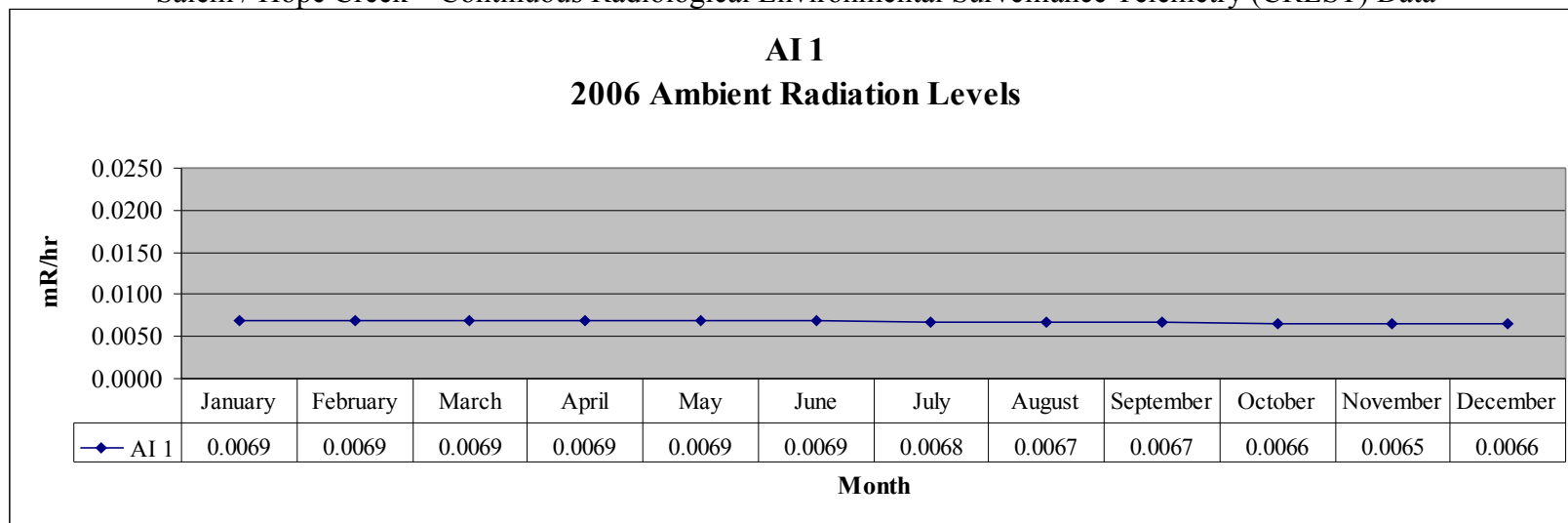


Table B-27 (continued)

Salem / Hope Creek – Continuous Radiological Environmental Surveillance Telemetry (CREST) Data

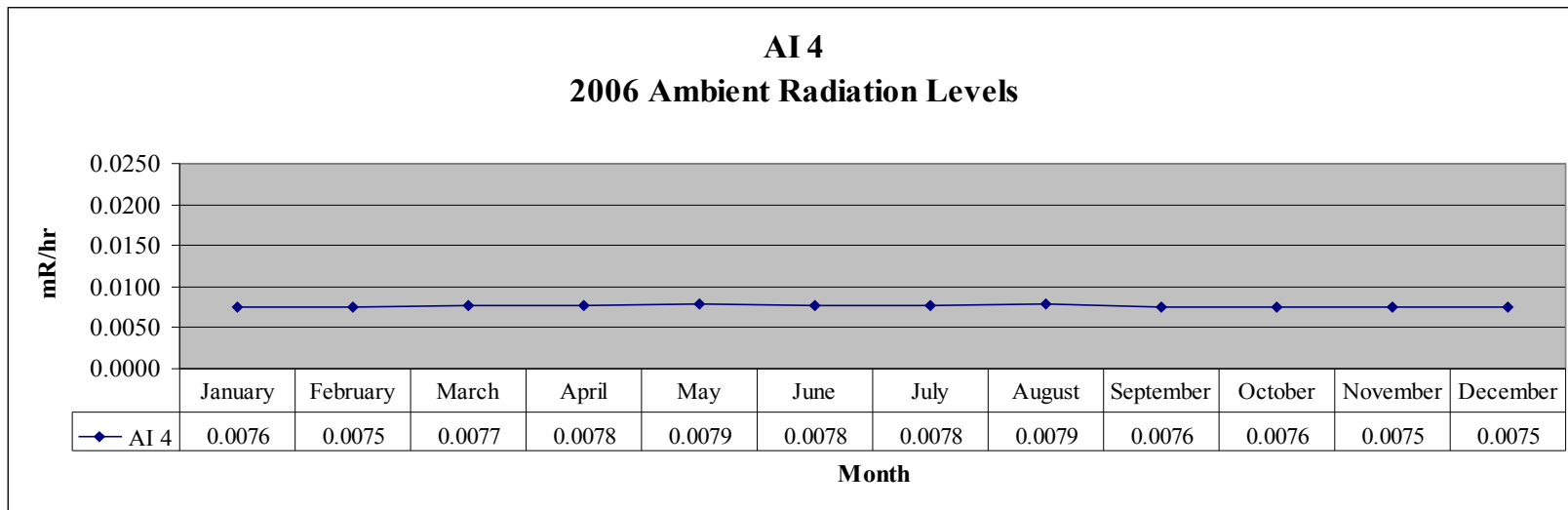
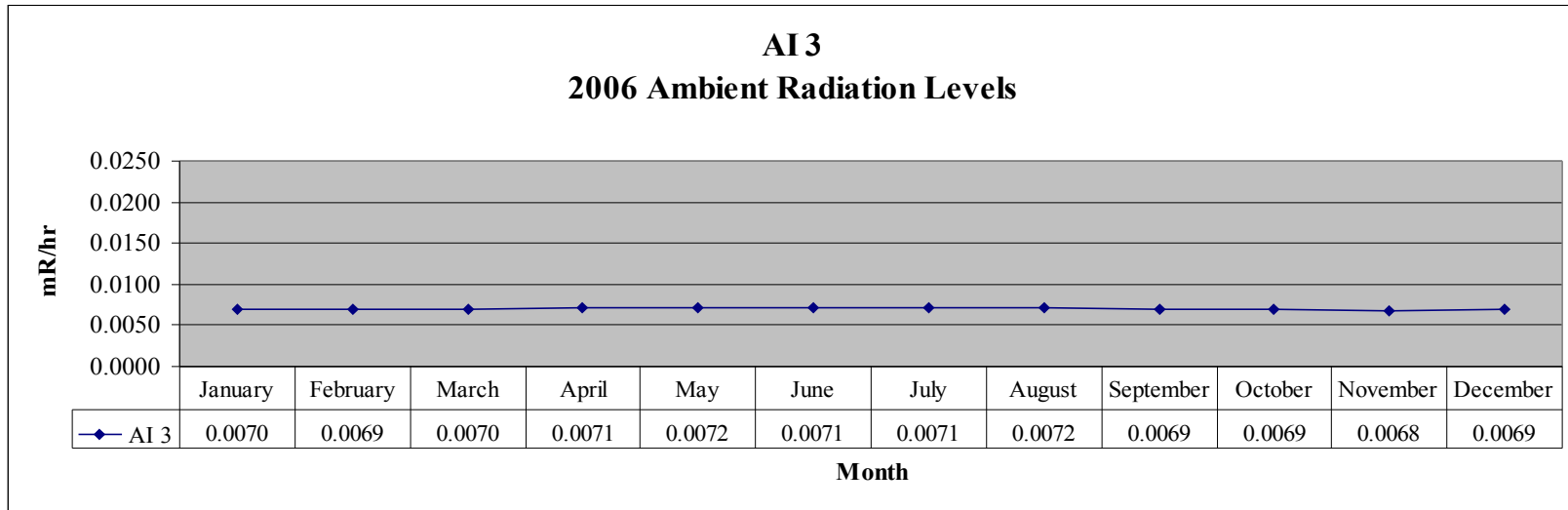


Table B-27 (continued)
 Salem / Hope Creek – Continuous Radiological Environmental Surveillance Telemetry (CREST) Data

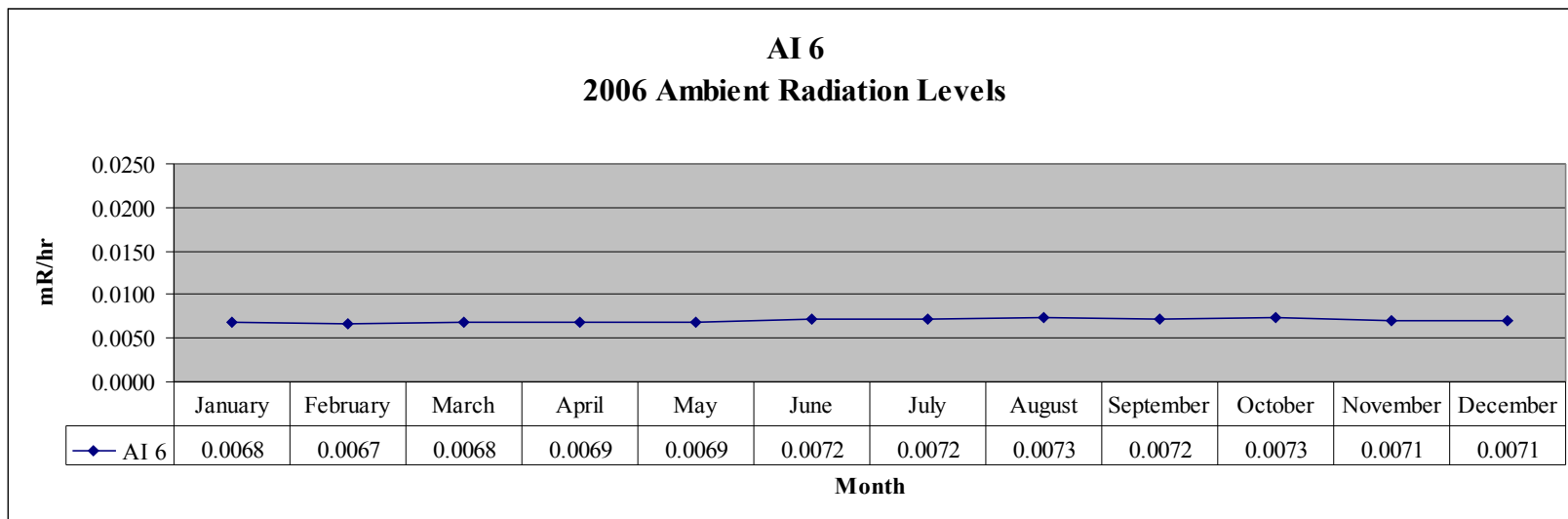
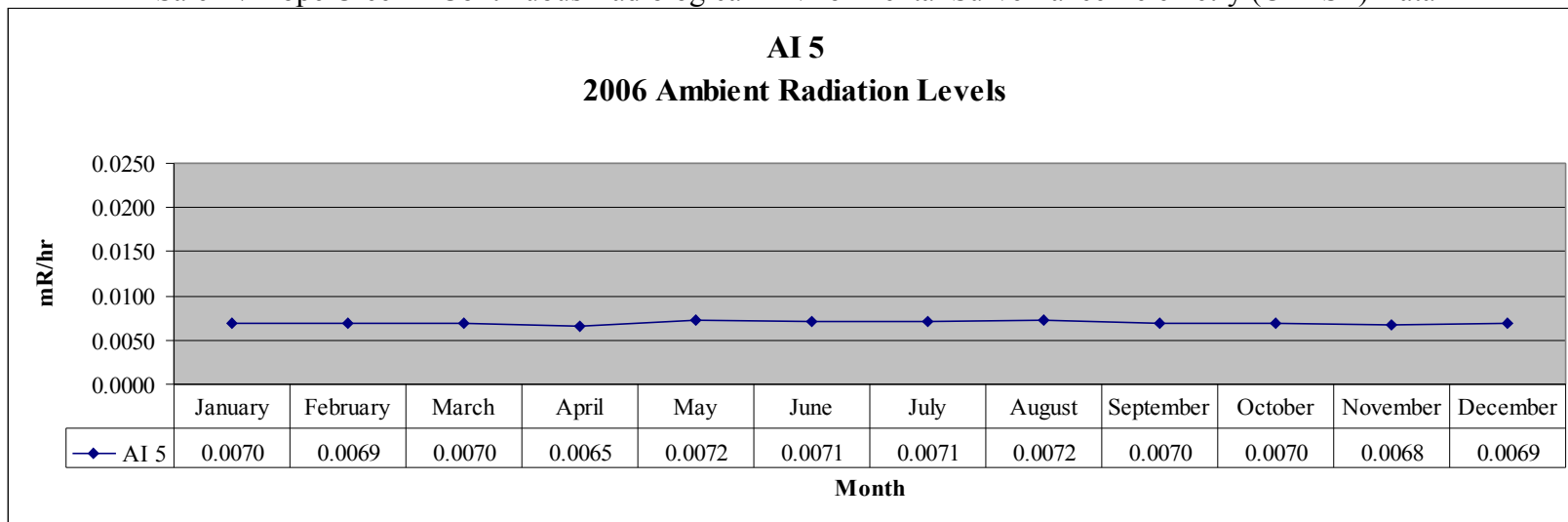


Table B-27 (continued)
 Salem / Hope Creek – Continuous Radiological Environmental Surveillance Telemetry (CREST) Data

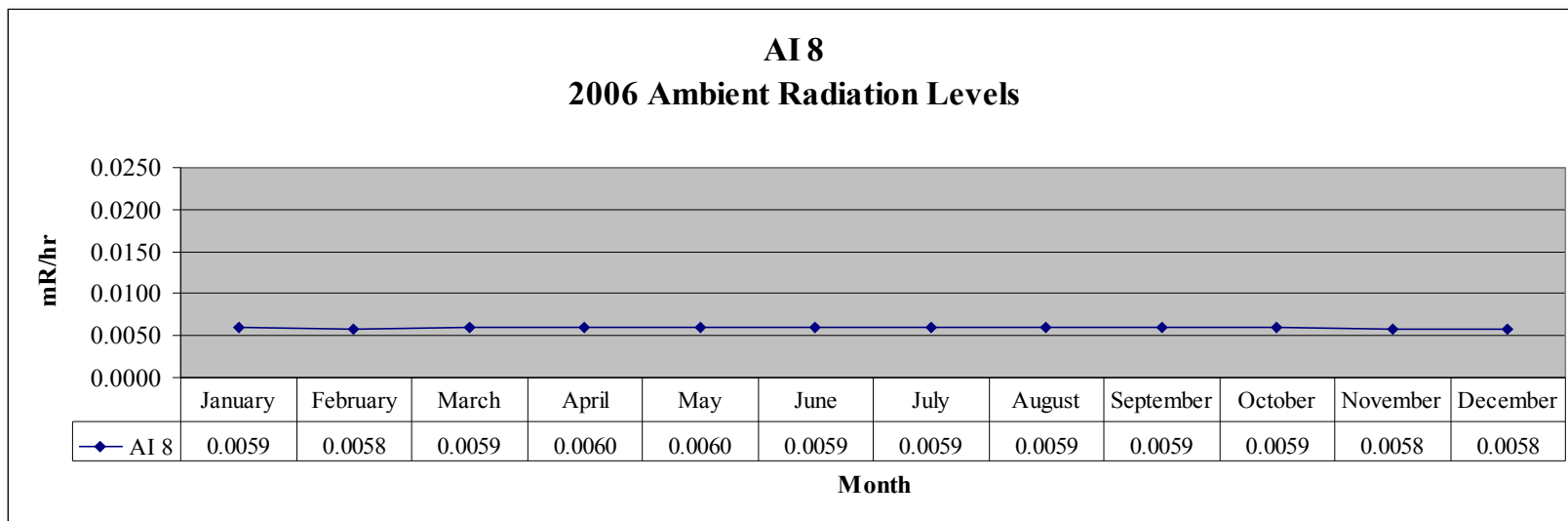
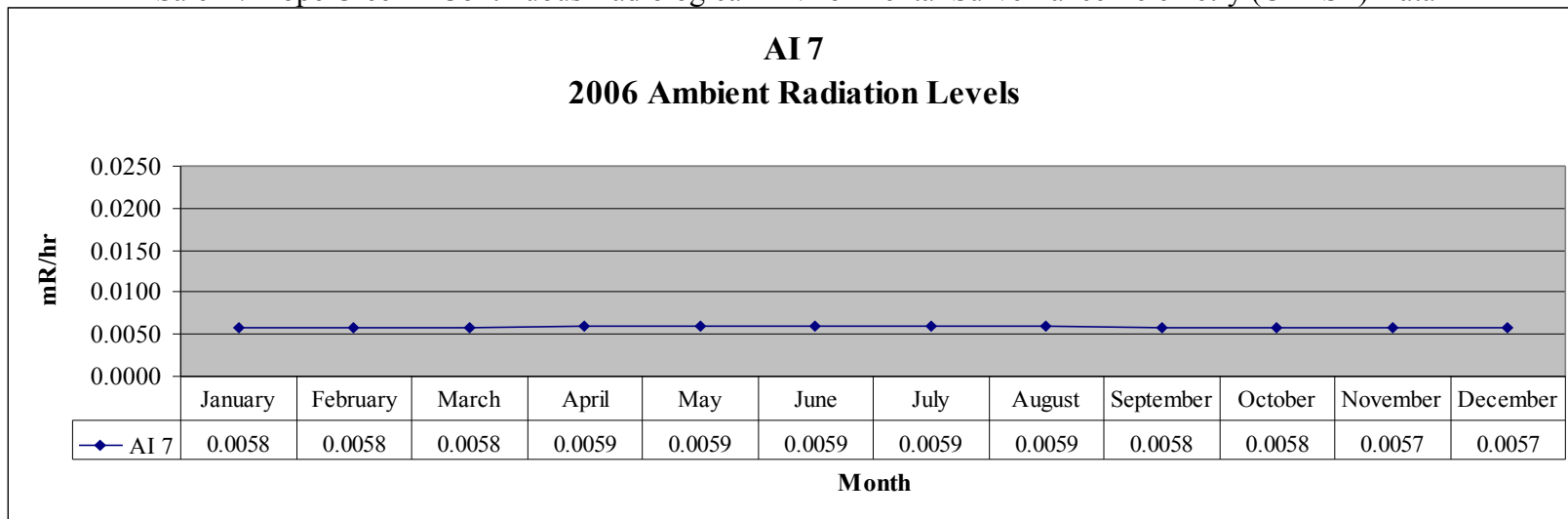
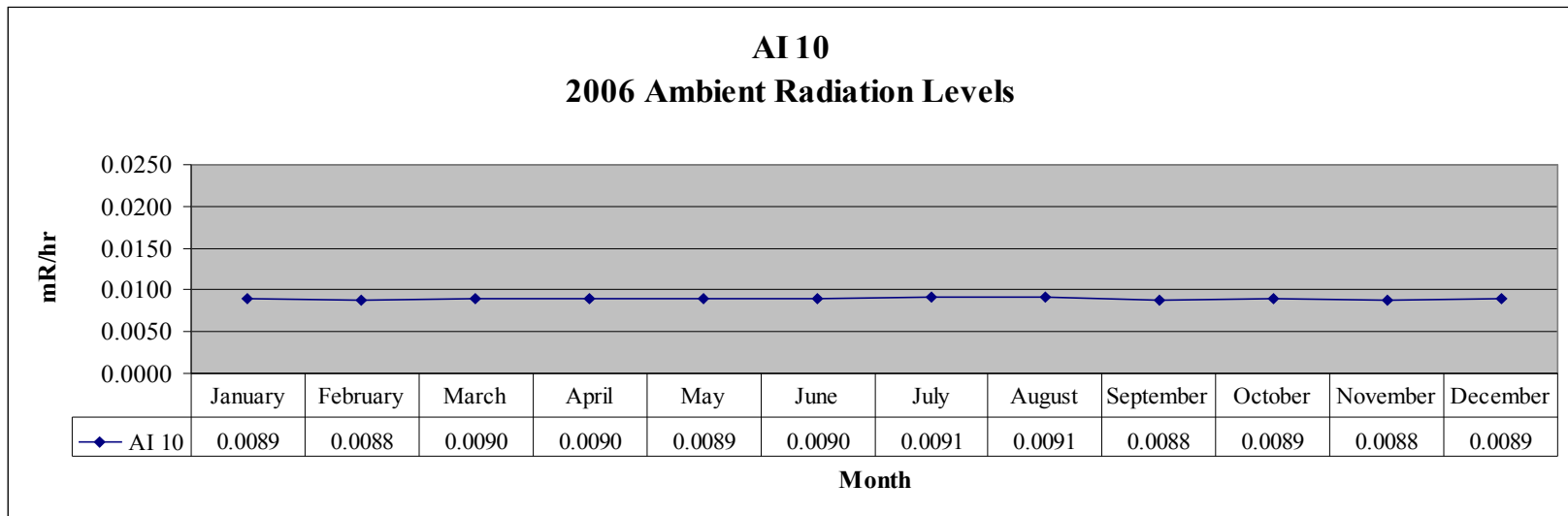
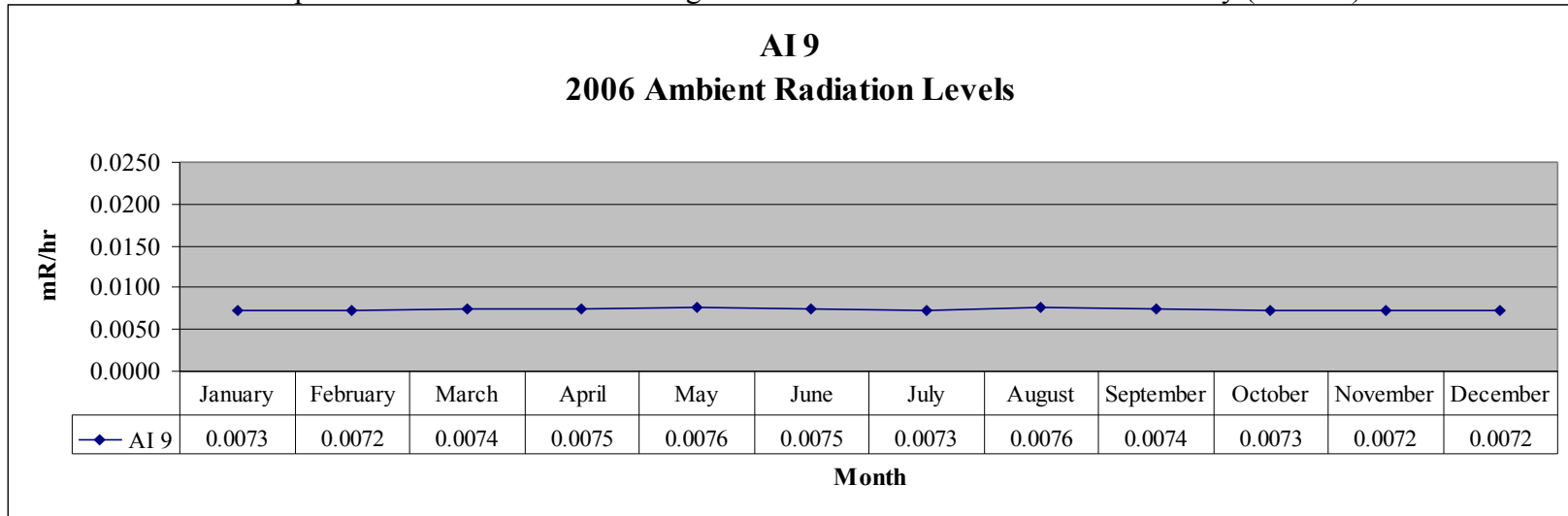


Table B-27 (continued)

Salem / Hope Creek – Continuous Radiological Environmental Surveillance Telemetry (CREST) Data



Appendix C

Table C-1
NJDEP/BNE

Radiological Environmental Monitoring Program

Minimum Detectable Concentration Requirements For NJDEP/BNE Radiological Environmental Lab Services Contract						
NUCLIDE	AIR pCi/M ³	WATER* pCi/L	SOILS/ SEDIMENT pCi/Kg (dry)	MILK pCi/L	FISH/ INVERTIBRATE pCi/Kg (wet)	VEGETABLE pCi/Kg
Gross Beta	0.01 @	4 *				
Tritium		1000 *				
Mn-54		15 @			130 @	
Fe-59		30 @			260 @	
Co-58		15 @	30		130 @	
Co-60		15 @	30		130 @	
Zn-65		30 @			260 @	
Sr-89		10 *		1	1000	
Sr-90		2 *		1	1000	
Zr-95		15 @				
Nb-95		15 @				
I-131	0.07 @	1 * %	100	1 %	10	60 @
Cs-134	0.01	10 *	150 @	15 @	130 @	60 @
Cs-137	0.01	18 @	180 @	18 @	150 @	80 @
Ba-140		15 @		15 @		
La-140		15 @		15 @		
Ra-226		0.5	500			
Ra-228		0.5				

* USEPA Safe Drinking Water Regulation 141.25, Implementation Guidance for Radionuclides, Table I-6.

% Radiochemical analysis performed for Iodine-131, USEPA Analytical Method 902.0

@ Detection Capabilities for Environmental Sample Analysis, Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Boiling Water Reactors, NUREG-1302, United States Nuclear Regulatory Commission, Generic Letter 89-01, Supplement No. 1, April 1991.

Table C-2
GLOSSARY OF TERMS

ADAMS:	Agency-wide Documents Access and Management System. The USNRC's web-based access tool that enables an individual to search for USNRC public documents. Access to ADAMS is through the USNRC website at http://www.nrc.gov/reading-rm/adams/web-based.html .
Background Location:	Removed from the influence of a source. A background station is a sampling location that is away from the influence of a potential source (of man-made radioactivity in this case).
Background Radiation:	The amount of radiation to which a member of the population is exposed from natural sources, such as terrestrial radiation due to naturally occurring radionuclides in the soil, cosmic radiation originating in outer space, radioactive substances found in building materials, and naturally occurring radionuclides deposited in the human body.
Bottom Feeder:	A fish, such as a catfish, carp, or flounder, that exists on or near the bottom of a body of water. Shellfish are also bottom feeders.
Composite:	A collection of more than one sample of the same medium (e.g. milk, air particulate or water) such that multiple samples can be analyzed as a single sample.
Coefficient of Variation	The coefficient of variation represents the ratio of the standard deviation to the mean, and it is a useful statistic for comparing the degree of variation from one data series to another, even if the means are drastically different from each other.
Curie (Ci):	The quantity of any radionuclide in which the number of disintegrations per second is 37 billion. It is a measure of radioactivity.
Dose:	The mean energy imparted by ionizing radiation to an irradiated medium per unit mass. Dose is measured in rads.

Table C-2 (continued)
GLOSSARY OF TERMS

Effluent:	Material that is released from a source. For the purpose of this report, radioactive effluent is the radioactivity released from each commercial nuclear power plant.
femtoCurie (fCi):	One millionth of a billionth of a curie (10E-15).
Gamma Emitters:	Gamma emitting radionuclides are isotopes that emit gamma radiation. Examples of gamma emitting radionuclides are Cesium-137, Cesium-134 and Cobalt-60.
Gamma Ray:	Short-wavelength electromagnetic radiation of nuclear origin.
Gross Beta:	A measurement of all beta activity present, regardless of specific radionuclide source. Gross measurements are used as a method to screen samples for relative levels of radioactivity.
Isotopes:	Nuclides that have the same number of protons in their nuclei, and hence the same atomic number, but that differ in the number of neutrons, and therefore in mass number. The chemical properties of isotopes of a particular element are almost identical. An example of isotopes are Iodine-131 and Iodine-133.
MegaWatt Thermal:	Refers to thermal power produced (MWt). A nuclear power plant utilizes a reactor to generate heat (thermal output) which creates steam to drive a turbine to generate electricity.
MicroRem (μ R):	A submultiple of a Rem equal to one one-hundred thousand of a Rem.
MilliRem (mR):	A submultiple of a Rem equal to one one-thousand of a Rem.
Milliroentgen (mR):	A submultiple of the roentgen equal to one one-thousand of a roentgen.

Table C-2 (continued)
GLOSSARY OF TERMS

Minimum Detectable Concentration (MDC):	The Minimum Detectable Concentration (MDC) is the smallest concentration of radioactivity in a sample that can be detected with a 5% probability of erroneously detecting radioactivity, when in fact none was present (Type I error) and also, a 5% probability of not detecting radioactivity, when in fact it is present (Type II error). Often used interchangeably with Minimum Detectable Activity, since the difference between the two terms is only one of units conversion.
NAREL:	National Air and Radiation Environmental Laboratory. Samples from the USEPA's RadNet program are analyzed at this facility. See http://www.epa.gov/narel/
NJDEP/BNE	New Jersey Department of Environmental Protection, Bureau of Nuclear Engineering. This group independently monitors radiation in the environment outside the site boundaries of New Jersey's nuclear power generating stations (Artificial Island and Oyster Creek).
Nuclide:	A species of atom characterized by the constitution of its nucleus, which is specified by its atomic mass and atomic number (Z). The atomic number is its number of protons while the atomic mass is its number of protons plus neutrons.
Picocurie:	The measurement of radioactivity in the environment is expressed in picocuries. A picocurie is one trillionth (10^{-12}) of a curie.
Predator:	An organism that lives by preying on other organisms.
Pressurized Ion Chamber:	An integrating instrument that measures the total dose over a given timeframe. It is referred to as a PIC.
Rad:	A unit of radiation absorbed dose.
Radioactivity:	The property of some nuclides of spontaneously emitting particles or radiation.
Radioisotope:	A radioactive atomic species of an element with the same atomic number usually identical chemical properties (eg., stable and the radioisotope [Tritium]).

Table C-2 (continued)
GLOSSARY OF TERMS

Radionuclide:	A radioactive species of an atom characterized by the constitution of its nucleus.
RadNet:	Formerly known as ERAMS, RadNet is a national network of monitoring stations that regularly collect air, precipitation, drinking water, and milk samples for analysis of radioactivity. RadNet also documents the status and trends of environmental radioactivity. These data are published by NAREL in a quarterly report entitled <i>Environmental Radiation Data</i> . RadNet information can also be found be at: <u>http://www.epa.gov/narel/radnet/</u> .
Rem:	A unit of radiation dose equivalent. Different types of ionizing radiation produce varying amounts of injury based on how and where the energy is imparted to a system. To account for these differences, quality and modifying factors have been developed. The dose equivalent is designed to normalize all ionizing radiation to a common scale so that radiation protection standards can be developed.
Roentgen (R):	The special unit of radiation exposure to X or gamma radiation. One roentgen creates 2.58E-4 coulomb of electric charge per kilogram of air. The roentgen expresses the amount of energy imparted by X or gamma radiation in a given volume of air.
Sigma	Referred to as ‘the standard deviation’, sigma is the most common measure of statistical dispersion, measuring how ‘spread out’ the values in the dataset are. If the data points are all close to the mean, then the standard deviation is close to zero. If all data values are equal, the standard deviation is zero.