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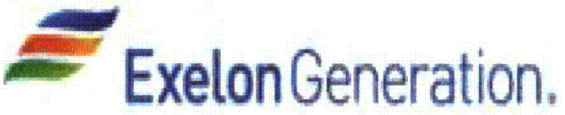
OYSTER CREEK GENERATING STATION
UNIT 1

Annual Radiological
Environmental Operating Report

1 January Through 31 December 2013

Prepared By
Teledyne Brown Engineering
Environmental Services



Oyster Creek Generating Station
Forked River, NJ 08731

April 2014

Table of Contents

Appendices

Figures

I. Summary and Conclusions

This report on the Radiological Environmental Monitoring Program (REMP) conducted for the Oyster Creek Generating Station (OCGS) by Exelon Nuclear covers the period 01 January 2013 through 31 December 2013. During that time period, 1618 analyses were performed on 1223 samples. In assessing all the data gathered for this report and comparing these results with historical data, it was concluded that the operation of OCGS had no adverse radiological impact on the environment.

REMP designated surface water samples were analyzed for concentrations of tritium and gamma emitting nuclides. No tritium, fission or activation products were detected in any of the surface water samples collected as part of the Radiological Environmental Monitoring Program during 2013.

REMP designated drinking water samples were analyzed for concentrations of gross beta, tritium, I-131, and gamma emitting nuclides. The preoperational environmental monitoring program did not include analysis of drinking water for gross beta. No tritium, I-131, or fission or activation products were detected in any of the drinking water samples collected.

REMP designated groundwater samples were analyzed for concentrations of tritium and gamma emitting nuclides. No tritium and no fission or activation products were detected in REMP groundwater samples.

Fish (predator and bottom feeder), clams, crabs, and sediment samples were analyzed for concentrations of gamma emitting nuclides. No OCGS-produced fission or activation products were detected in fish, clams and crabs. Cesium-137 was not detected in any sediment samples.

Air particulate samples were analyzed for concentrations of gross beta, gamma emitting nuclides, Strontium-89, and Strontium-90. Gross beta and cosmogenic Be-7 were detected at levels consistent with those detected in previous years. No fission or activation products were detected. Strontium-89 and Strontium-90 analyses were performed on quarterly composites of air particulate samples. All Strontium-89 and Strontium-90 results were below the minimum detectable activity.

High sensitivity I-131 analyses were performed on weekly air samples. All results were less than the minimum detectable concentration.

Vegetation samples were analyzed for gamma emitting nuclides, Strontium-89, and Strontium-90. Concentrations of naturally occurring K-40 were consistent with those detected in previous years. Cesium-137 was detected at low levels consistent with those detected in previous years. All Strontium-89 results were below the minimum detectable activity. Strontium-90 activity was detected at levels consistent with those detected in previous years at both control and indicator stations, and can be attributed to historical nuclear weapons testing and the Chernobyl accident.

Environmental gamma radiation measurements were performed quarterly using Optically Stimulated Luminescence Dosimeters (OSLD). Exelon changed the dosimetry used for environmental monitoring. Beginning in calendar year 2012, Exelon began using OSLDs and discontinued the use of Thermo Luminescent Dosimetry (TLD). There were two main reasons for this change. First, OSLDs are not subject to "fade". Fade is where the dose on the dosimeter drifts lower over time. Second, OSLDs may be re-read if necessary. TLDs are reset to zero after they are read. Levels detected were consistent with those observed in previous years. The maximum dose to any member of the public attributable to radioactive effluents and direct radiation from the OCGS was less than the 25 mrem/year limit established by the United Stated Environmental Protection Agency (EPA).

II. Introduction

The Oyster Creek Generating Station (OCGS), consisting of one boiling water reactor owned and operated by Exelon, is located on the Atlantic Coastal Plain Physiographic Province in Ocean County, New Jersey, about 60 miles south of Newark, 9 miles south of Toms River, and 35 miles north of Atlantic City. It lies approximately 2 miles inland from Barnegat Bay. The site, covering approximately 781 acres, is situated partly in Lacey Township and, to a lesser extent, in Ocean Township. Access is provided by U.S. Route 9, passing through the site and separating a 637-acre eastern portion from the balance of the property west of the highway. The station is about ¼ mile west of the highway and 1¼ miles east of the Garden State Parkway. The site property extends about 2½ miles inland from the bay; the maximum width in the north-south direction is almost 1 mile. The site location is part of the New Jersey shore area with its relatively flat topography and extensive freshwater and saltwater marshlands. The South Branch of Forked River runs across the northern side of the site and Oyster Creek partly borders the southern side.

A preoperational Radiological Environmental Monitoring Program (REMP) for OCGS was established in 1966, and continued for two years prior to the plant becoming operational in 1969. This report covers those analyses performed by Teledyne Brown Engineering (TBE), Landauer and Environmental Inc. (Midwest Labs) on samples collected during the period 01 January 2013 through 31 December 2013.

A. Objectives of the REMP

The objectives of the REMP are to:

1. Determine whether any significant increase occurs in the concentration of radionuclides in major pathways.

2. Identify and evaluate the buildup, if any, of radionuclides in the local environment, or any changes in normal background radiation levels.

3. Verify the adequacy of the plant's controls for the release of radioactive materials.

4. Fulfill the obligations of the radiological surveillance sections of Oyster Creek's Offsite Dose Calculation Manual (ODCM).

B. Implementation of the Objectives

The implementation of the objectives is accomplished by:

1. Identifying significant exposure pathways.

2. Establishing baseline radiological data for media within those pathways.

3. Continuously monitoring those media before and during Station operation to assess Station radiological effects (if any) on man and the environment.

C. Discussion

1. General Program

The Radiological Environmental Monitoring Program (REMP) was established in 1966, three years before the plant became operational. This preoperational surveillance program was established to describe and quantify the radioactivity, and its variability, in the area prior to the operation of OCGS. After OCGS became operational in 1969, the operational surveillance program continued to measure radiation and radioactivity in the surrounding areas.

A variety of environmental samples are collected as part of the REMP at OCGS. The selection of sample types is based on the established pathways for the transfer of radionuclides through the environment to humans. The selection of sampling locations is based on sample availability, local meteorological and hydrological characteristics, local population characteristics, and land usage in the area of interest. The selection of sampling frequencies for the various environmental media is based on the radionuclides of interest, their respective half-lives, and their behavior in both the biological and physical environment.

2. Preoperational Surveillance Program

The federal government requires nuclear facilities to conduct radiological environmental monitoring prior to constructing the facility. This preoperational surveillance program is aimed at collecting the data needed to identify pathways, including selection of the radioisotope and sample media combinations to be included in the environmental surveillance program conducted after facility

operation begins. Radiochemical analyses performed on the environmental samples should include not only those nuclides expected to be released during facility operation, but should also include typical radionuclides from nuclear weapons testing and natural background radioactivity. All environmental media with a potential to be affected by facility operation as well as those media directly in the major pathways, should be sampled on at least an annual basis during the preoperational phase of the environmental surveillance program.

The preoperational surveillance design, including nuclide/media combinations, sampling frequencies and locations, collection techniques, and radioanalyses performed, should be carefully considered and incorporated in the design of the operational surveillance program. In this manner, data can be compared in a variety of ways (for example, from year to year, location to location, etc.) in order to detect any radiological impact the facility has on the surrounding environment. Data collection during the preoperational phase should be planned to provide a comprehensive database for evaluating any future changes in the environment surrounding the nuclear facility.

OCGS began its preoperational environmental surveillance program three years before the plant began operating in 1969. Data accumulated during those early years provide an extensive database from which environmental monitoring personnel are able to identify trends in the radiological characteristics of the local environment. The environmental surveillance program at OCGS will continue after the plant has reached the end of its economically useful life and decommissioning has begun.

3. Consideration of Plant Effluents

Effluents are strictly monitored to ensure that radioactivity released to the environment is as low as reasonably achievable and does not exceed regulatory limits. Effluent control includes the operation of monitoring systems, in-plant and environmental sampling and analyses programs, quality assurance programs for effluent and environmental programs, and procedures covering all aspects of effluent and environmental monitoring.

Both radiological environmental and effluent monitoring indicate that the operation of OCGS does not result in significant radiation exposure of the people or the environment surrounding OCGS and

is well below the applicable levels set by the Nuclear Regulatory Commission (NRC) and the EPA.

There were liquid radioactive effluent releases during 2013 of concentrations of tritium too low to detect at an LLD of 200 picocuries per liter (pCi/L) at the New Jersey Pollution Discharge Elimination System (NJPDES) permitted main condenser outfall. The releases were part of nearly continuous pumping of groundwater at approximately 70 gpm containing low levels of tritium and no detectable gamma. Exelon and the State of New Jersey Department of Environmental Protection (NJDEP) agreed to this remediation action instead of natural attenuation to address concentrations of tritium in groundwater. Well 73 and supporting equipment and piping were installed to pump groundwater to the intake structure at the inlet of the main circulating water pumps. Provisions were established for both batch and continuous releases of groundwater. Continuous releases occurred approximately 361 days in 2013. The Continuous releases occurred from January 1, 2013 through December 27, 2013 with a total of 3.50E+07 gallons of groundwater pumped resulting in 2.28E-01 Ci of tritium released to the discharge canal. The dose to the most limiting member of the public due to the release of groundwater was 1.37E-06 mrem.

Utilizing gaseous effluent data, the maximum hypothetical dose to any individual during 2013 was calculated using a mathematical model, which is based on the methods defined by the U.S. Nuclear Regulatory Commission. These methods accurately determine the types and quantities of radioactive materials being released to the environment.

The maximum calculated organ dose (Bone) from iodines, tritium, carbon-14 (C-14) and particulates to any individual due to gaseous effluents was 4.93E-01 mrem (0.493mrem) which was approximately 3.29 percent of the annual limit of 15 mrem. The majority of organ dose from gaseous effluents was due to C-14. The maximum hypothetical calculated whole body dose to any individual due to noble gas effluents was 1.42E-03 mrem (0.00142 mrem) which was 2.84E-02 percent of the annual limit of 5 mrem.

The total maximum organ dose (Bone) due to all radiological effluents of 4.97E-01 mrem (0.497 mrem) received by any individual from gaseous effluents from the Oyster Creek Generating Station for the reporting period is more than 603 times lower than the dose the average individual in the Oyster Creek area

received from background radiation, including that from radon, during the same time period. The background radiation dose averages approximately 300 mrem per year in the Central New Jersey area, which includes approximately 200 mrem/year from naturally occurring radon gas.

During 2013, the maximum direct radiation dose to the most likely exposed MEMBER OF THE PUBLIC potentially attributable to the operation of Oyster Creek beyond the site boundary in the west sector, as shown by offsite OSLD readings at station 55 was 5.39 mrem. The nearest member of the public is considered a part-time resident that works 2,000 hours per year at a warehouse located west of the plant.

Environmental sampling of airborne iodine and particulates showed no radioactivity attributable to the operation of OCGS.

III. Program Description

A. Sample Collection

Samples for the OCGS REMP were collected for Exelon by on-site personnel and Normandeau Associates, Incorporated. This section describes the general collection methods used to obtain environmental samples for the OCGS REMP in 2013. Sample locations and descriptions can be found in Tables B–1 and B–2, and Figures B–1, B–2, and B-3, Appendix B. The collection procedures are listed in Table B–3.

Aquatic Environment

The aquatic environment was evaluated by performing radiological analyses on samples of surface water, drinking water, groundwater, fish, clams, crabs, and sediment. One gallon water samples were collected monthly from two surface locations (33 and 94), semiannually at two surface water locations (23 and 24), monthly from six drinking water wells (1N, 1S, 37, 38, 39, and 114) and quarterly from 2 groundwater stations (MW-24-3A and W-3C). Control locations were 94 and 37. All samples were collected in plastic bottles, which were rinsed at least twice with source water prior to collection. Fish samples comprising the flesh of two groups, bottom feeder and predator, were collected semiannually at three locations (33, 93 and 94 (control)). Clams were collected semiannually from three locations (23, 24, and 94 (control)). Two annual crab samples were collected from two locations (33 and 93). Sediment samples were collected at four locations semiannually (23, 24, 33, and 94 (control)).

Atmospheric Environment

The atmospheric environment was evaluated by performing radiological analyses on samples of air particulate and airborne iodine. Airborne iodine and particulate samples were collected and analyzed weekly at eight locations (C, 3, 20, 66, 71, 72, 73, and 111). The control location was C. Airborne iodine and particulate samples were obtained at each location, using a vacuum pump with charcoal and glass fiber filters attached. The pumps were run continuously and sampled air at the rate of approximately one cubic foot per minute. The filters were replaced weekly and sent to the laboratory for analysis.

Terrestrial Environment

The terrestrial environment was evaluated by performing radiological analyses on samples of garden vegetation. No commercial dairy operations and no dairy animals producing milk for human consumption are located within a 5 mile radius of the plant. Therefore, vegetation samples were collected in lieu of milk. Vegetation samples were collected, when available, at four locations (35, 36, 66, and 115). Station 36 was the control location. All samples were collected in 18" x 24" new unused plastic bags and shipped promptly to the laboratory.

Ambient Gamma Radiation

Direct radiation measurements were made using Al_2O_3:C Optically Stimulated Luminescence Dosimetry (OSLD). Exelon changed the dosimetry used for environmental monitoring. Beginning in calendar year 2012, Exelon began using OSLDs and discontinued the use of Thermoluminescent Dosimetry (TLD). There were two main reasons for this change. First, OSLDs are not subject to "fade". Fade is where the dose on the dosimeter drifts lower over time. Second, OSLDs may be re-read if necessary. TLDs are reset to zero after they are read. The OSLDs were placed on and around the OCGS site and were categorized as follows:

A site boundary ring consisting of 19 locations (1, T1, 51, 52, 53, 54, 55, 56, 57, 58, 59, 61, 62, 63, 64, 65, 66, 112, and 113) near the site boundary.

An intermediate distance ring consisting of 31 locations (4, 5, 6, 8, 9, 22, 46, 47, 48, 68, 73, 74, 75, 78, 79, 82, 84, 85, 86, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 109, and 110) extending to approximately 5

miles from the site designed to measure possible exposures to close-in

population.

Special interest stations consisting of 9 locations (3, 11, 71, 72, 81, 88, 89, 90, and 92) representing special interest areas such as population centers, state parks, etc.

Background (Control) stations consisting of two locations (C and 14) greater than 20 miles distant from the site.

Indicator OSLDs were placed systematically, with at least one station in each of 16 meteorological compass sectors in the general area of the site boundary. OSLDs were also placed in each meteorological sector in the 1 to 5 mile range, where reasonable highway access would permit, in areas of public interest and population centers. Background locations were located greater than twenty miles distant from the OCGS and generally in an upwind direction from the OCGS.

Two OSLDs were placed at each location approximately three to eight feet above ground level. The OSLDs were exchanged quarterly and sent to Landauer for analysis.

B. Sample Analysis

This section describes the general analytical methodologies used by TBE and Environmental Inc. (Midwest Labs) to analyze the environmental samples for radioactivity for the OCGS REMP in 2013. The analytical procedures used by the laboratories are listed in Table B–3.

In order to achieve the stated objectives, the current program includes the following analyses:

1. Concentrations of beta emitters in air particulates and drinking water.

2. Concentrations of gamma emitters in surface, drinking water, groundwater, fish, clams, crabs, sediment, air particulates and vegetation.

3. Concentrations of tritium in REMP designated surface, drinking water and groundwater.

4. Concentrations of I-131 in air iodine cartridges and drinking water.

5. Concentrations of strontium in air particulates and vegetation.

6. Ambient gamma radiation levels at various locations around the OCGS.

C. Data Interpretation

For trending purposes, the radiological and direct radiation data collected during 2013 were compared with data from past years. The results of environmental sampling show that radioactivity levels have not increased from the background radioactivity detected prior to the operation of OCGS. The operation of OCGS continues to have no measurable radiological impact upon the environment.

Several factors were important in the interpretation of the data:

1. Lower Limit of Detection and Minimum Detectable Concentration

The lower limit of detection (LLD) is defined as the smallest concentration of radioactive material in a sample that would yield a net count (above background) that would be detected with only a 5% probability of falsely concluding that a blank observation represents a "real" signal. The LLD is intended as a before the fact estimate of a system (including instrumentation, procedure and sample type) and not as an after the fact criterion for the presence of activity. All analyses were designed to achieve the required OCGS detection capabilities for environmental sample analysis.

The minimum detectable concentration (MDC) is defined above with the exception that the measurement is an after the fact estimate of the presence of activity.

2. Net Activity Calculation and Reporting of Results

Net activity for a sample was calculated by subtracting background activity from the sample activity. Since the REMP measures extremely small changes in radioactivity in the environment, background variations may result in sample activity being lower than the background activity, which results in a negative number. An MDC was reported in all cases where positive activity was not detected.

Gamma spectroscopy results for each type of sample were grouped as follows:

For surface, drinking water, and groundwater 12 nuclides: Mn-54, Co-58, Fe-59, Co-60, Zn-65, Zr-95, Nb-95, I-131, Cs-134, Cs-137,

Ba-140, and La-140 were reported.

For fish eight nuclides: K-40, Mn-54, Co-58, Fe-59, Co-60, Zn-65, Cs-134, and Cs-137 were reported.

For clams eight nuclides: K-40, Mn-54, Co-58, Fe-59, Co-60, Zn-65, Cs-134, and Cs-137 were reported.

For crabs eight nuclides: K-40, Mn-54, Co-58, Fe-59, Co-60, Zn-65, Cs-134, and Cs-137 were reported.

For sediment seven nuclides: Be-7, K-40, Mn-54, Co-58, Co-60, Cs-134, and Cs-137 were reported.

For air particulate six nuclides: Be-7, Mn-54, Co-58, Co-60, Cs-134, and Cs-137 were reported.

For air iodine cartridges one nuclide: I-131 was reported.

For vegetation seven nuclides: Be-7, K-40, I-131, Cs-134, Cs-137, Ba-140, and La-140 were reported.

Means and standard deviations of the results were calculated. The standard deviations represent the variability of measured results for different samples rather than single analysis uncertainty.

D. Program Exceptions

For 2013 the OCGS REMP had a sample recovery rate in excess of 99%. Exceptions are listed below:

Drinking Water

1. Station 39 (Lacey Twp., MUA Pump Station) was not collected January 1, 2013 through December 31, 2013. The station was off line for this time period.

2. Station 1N (On-site northern domestic well) Month of February sample is a composite of 2 weeks instead of 4 weeks. No sample for weeks of 2/17/13 and 2/24/13, station out of service. Due to limited volume sample was consumed for the 1-131 (Low Level) analysis, therefore, the gamma, gross beta and H-3 analyses could not be performed.

3. Station 1N (On-site northern domestic well) Month of March sample is a composite of 2 weeks instead of 4 weeks. No sample for weeks of 3/3/13 and 3/24/13, station out of service.

4. Station 1N (On-site northern domestic well) Month of April sample is a composite of 4 weeks instead of 5 weeks. No sample for week of 4/28/13, station out of service.

5. Station 1S (On-site southern domestic well) Month of July sample is a composite of 4 weeks instead of 5 weeks. No sample for week of 7/21/13, station out of service.

6. Station 1N (On-site northern domestic well) Month of August sample is a composite of 3 weeks instead of 4 weeks. No sample for week of 8/4/13, station out of service.

7. Station 1S (On-site southern domestic well) Month of August sample is a composite of 1 week instead of 4 weeks. No sample for weeks of 8/11/13, 8/18/13 and 8/25/13, station out of service. LLD for low level I-131 not met due to time from sample to time of analysis due to only one week being available for composite.

8. Station 1N (On-site northern domestic well) Month of September sample is a composite of 3 weeks instead of 4 weeks. No sample for week of 9/22/13, station out of service.

9. Station 1S (On-site southern domestic well) Month of September sample is a composite of 1 week instead of 4 weeks. No sample for weeks of 9/1/13, 9/8/13 and 9/15/13, station out of service.

10. Station 1N (On-site northern domestic well) Month of October sample is a composite of 2 weeks instead of 5 weeks. No sample for week of 9/29/13, 10/6/13 and 10/13/13, station out of service.

11. Station 1S (On-site southern domestic well) Month of October sample is a composite of 4 week instead of 5 weeks. No sample for weeks of 10/27/13, station out of service.

12. Station 38 (Ocean Township MUA Pumping Station) Month of November sample is a composite of 3 week instead of 4 weeks. No sample for weeks of 11/3/13, station out of service.

13. Station 1S (On-site southern domestic well) No sample for the Months of November and December, station out of service.

Dosimetry

1. Station 106 (Garden State Parkway North) First quarter, the dosimeter rack was found lying on the ground and only one dosimeter was in the rack. Rack was returned to the location with two dosimeters for the second quarter.

2. Station 74 (Orlando Drive and Penguin Court) Second quarter, only one dosimeter was found in the rack.

Air

1. Station 3 – Weeks of 1/6/13 – 1/20/13, No sample due to no access permitted due to hurricane Sandy.

2. Station 73 – Week of 6/30/13 – 7/6/13, No sample due to sample station not running. Fuse and pump were replaced and power was restored.

3. Station 20 – Week of 7/14/13 – 7/20/13, No sample due to no power at station. Breaker reset power was restored.

Vegetation

1. Station 66 (SE of site, east of Route 9 and south of the OCGS Discharge Canal) No samples for the month of July. The garden's growth was slower than the other gardens and there was not enough sample for the month.

2. Station 66 (SE of site, east of Route 9 and south of the OCGS Discharge Canal) No cabbage was available for the month of October.

3. Station 115 (East of Site, on Finninger Farm) No cabbage was available for the month of October.

4. Station 66 (SE of site, east of Route 9 and south of the OCGS Discharge Canal) Kale was not available for the entire growing season.

*NOTE: Per the Oyster Creek ODCM, if garden vegetation samples are unobtainable due to any legitimate reason, the missed sample will be documented in the annual report, with no further actions necessary.

Program exceptions are tracked and investigated to understand the

causes of the program exception. Sampling and maintenance errors are reviewed with the personnel involved to prevent recurrence.

The overall sample recovery rate indicates that the appropriate procedures and equipment are in place to assure reliable program implementation.

E. Program Changes

The Exelon procedure for orientation of REMP air sample stations was revised from "Ensure sampling devices are oriented towards the average prevailing wind" to "Ensure sampling devices are oriented in the centerline toward the power station". This affected air sample stations 3, 66, 71, and 72.

IV. Results and Discussion

A. Aquatic Environment

1. Surface Water

Samples were taken via grab sample methodology at two locations (33 and 94) on a monthly schedule. In addition, grab samples were collected semi-annually at two locations (23 and 24). Of these locations 23, 24, and 33, located downstream, could be affected by Oyster Creek's effluent releases. The following analyses were performed:

Tritium

Samples from all locations were analyzed for tritium activity (Table C–I.1, Appendix C). No tritium activity was detected. Data from this year indicates that surface water tritium concentrations remain very low and not significantly different from recent previous years.

Gamma Spectrometry

Samples from all locations were analyzed for gamma emitting nuclides (Table C–I.2, Appendix C). All nuclides were less than the MDC.

Surface water sampling began in 1966, and the samples were analyzed for tritium as well as other radioactivity. During this preoperational program, tritium was detected at an average

concentration of 1.05E+3 pCi/liter. At that time, counting instrumentation was not as sensitive as it now, and the minimum detectable concentration was 1E+3 pCi/liter versus 2E+2 pCi/liter used today. By comparing the 2013 sampling results to the decay corrected average preoperational concentration reported in the 2007 Annual Radiological Environmental Operating Report (1.11E+2 pCi/liter), it can be seen that the inventory of tritium in the environment is due to fallout from past atmospheric nuclear weapons testing and Chernobyl, and is decreasing with time.

2. Drinking water

Monthly samples were composited from monthly grab samples from six drinking water wells (1N, 1S, 37, 38, 39, and 114). Station 1, because it is located on the OCGS site, could potentially be affected by radioactive releases from the plant. Station 1 was split into two separate locations, 1N and 1S. Station 38, the Ocean Township Municipal Utility Authority Well, could potentially be affected by effluent releases from the OCGS. Given its distance from the facility (1.6 miles) and depth (approximately 360 feet), however, the probability of any OCGS related impacts is very small. Stations 37 and 39, Lacey Township Municipal Utility Authority wells, are not likely to be impacted by effluents from the OCGS. These wells are located generally up-gradient of the regional groundwater flow direction (southeast). In addition, because of their depth (> 200 feet) and distance from the site (2.2 and 3.5 miles respectively), they are unlikely to be affected by OCGS operations. The following analyses were performed:

Tritium

Monthly samples from all locations were analyzed for tritium activity (Table C–II.1, Appendix C). No tritium activity was detected. Drinking water was sampled during the preoperational program and throughout the 43 years of the plant's operational program. Tritium sampling results during the preoperational years, yielded results all less than the minimum detectable concentration of 1E+3 pCi/liter. 2013 results are all less than the current MDC of 2E+2 pCi/liter.

Gross Beta

Monthly samples from all locations were analyzed for concentrations of total gross beta activity (Tables C-II.2, Appendix C). Gross beta was detected in 43 of 57 samples, and is expected due to natural sources and fallout residual from previous bomb

testing. The values ranged from 1.5 to 17.7 pCi/l.

The investigation level for gross beta in water is 15 pCi/l. Drinking water sample 1N result for gross beta exceeded the investigation level beginning in January 2012.

The initial result for gross beta was 15.1 pCi/l in 2012. This issue was entered into our Corrective Action Program (CAP) and an investigation initiated. The 1N water sample was analyzed for known beta emitters Sr-89, Sr-90, Fe-55 and Ni-63. These analyses results were all <MDC. It was also identified that the 1N well treatment system was upgraded the previous month and a potassium chloride softener system was added as part of the upgrade. Samples were obtained pre and post treatment. The pre-treatment result for gross beta was 3.6 pCi/l, which is a value that has been seen previously in drinking water samples. The post-treatment sample result for gross beta was 22.2 pCi/l.

Based on the fact that there were no typical plant produced beta emitters detected and that natural potassium is a known beta emitter along with the results of the pre and post sampling, the gross beta values obtained for 1N can be attributed to the addition of the water softener system installed during the system upgrade in December of 2011.

Iodine

Monthly samples from all locations were analyzed for I-131 by the low level method to detect down to 1 pCi/L (Table C-II.3, Appendix C). All results were less than the MDC.

Gamma Spectrometry

Samples from all locations were analyzed for gamma emitting nuclides (Table C–II.4, Appendix C). All nuclides were less than the MDC.

3. Groundwater

The following analyses were performed:

Tritium

Samples from all locations were analyzed for tritium activity (Table C–III.1, Appendix C). No tritium activity was detected.

Gamma Spectrometry

Samples from all locations were analyzed for gamma emitting nuclides (Table C–III.2, Appendix C). All nuclides were less than the MDC.

4. Fish

Fish samples comprised of bottom feeder (black drum, red drum, summer flounder, and tautog) and predator (striped bass, bluefish, weakfish, and white perch) were collected at three locations (33, 93, and 94) semiannually. Locations 93 and 33 could be affected by Oyster Creek's effluent releases. The following analysis was performed:

Gamma Spectrometry

The edible portions of fish samples from three locations were analyzed for gamma emitting nuclides (Table C–IV.1, Appendix C). Naturally occurring potassium-40 was found at all stations and ranged from 3,207 to 5,429 pCi/kg wet and was consistent with levels detected in previous years. No fission or activation products were found.

No fish were sampled during the preoperational sampling program for OCGS.

5. Clams and Crabs

Clams were collected at three locations (23, 24, and 94) semiannually. Crabs were collected at two locations (33 and 93) annually. Locations 23, 24, 33, and 93 could be affected by Oyster Creek's effluent releases. The following analysis was performed:

Gamma Spectrometry

The edible portions of clam samples from all three locations were analyzed for gamma emitting nuclides (Table C–IV.2, Appendix C). Naturally occurring potassium-40 was found at all stations and ranged from 1,356 to 2,199 pCi/kg wet and was consistent with levels detected in previous years. No fission or activation products were found. Historical levels of Co-60 in clams are shown in Figure C–1, Appendix C.

Preoperational clam sample results for potassium-40 ranged from

600 to 9,800 pCi/kg wet, which are consistent with current sample results.

The edible portions of crab samples from two locations were analyzed for gamma emitting nuclides (Table C–IV.2, Appendix C). Naturally occurring potassium-40 was found at both stations and ranged from 1,983 to 2,718 pCi/kg wet and was consistent with levels detected in previous years. No fission or activation products were found.

Crabs were not sampled during the preoperational years of the OCGS environmental monitoring program.

6. Sediment

Aquatic sediment samples were collected at four locations (23, 24, 33, and 94) semiannually. Of these locations, stations 23, 24, and 33 located downstream, could be affected by Oyster Creek's effluent releases. The following analysis was performed:

Gamma Spectrometry

Sediment samples from all four locations were analyzed for gamma emitting nuclides (Table C–V.1, Appendix C). Potassium-40 was found at all stations and ranged from 975 to 19,000 pCi/kg dry. Cesium-137 was not detected in any of the samples. No fission or activation products were found. Figure C-3, Appendix C graphs Cs-137 concentrations in sediment from 1984 through 2013 and figure C–2, Appendix C graphs Co-60 concentrations in sediment from 1984 through 2013.

The requirement for sampling sediment is a requirement of ODCM 3.12.1, Table 3.12.1-1.d. ODCM Table 3.12.1-2, Reporting Levels for Radioactive Concentrations in Environmental samples Reporting Levels does not include requirements for sediment. CY-AA-170-1000, Radiological Environmental Monitoring Program and Meteorological Program Implementation, Attachment 1, Analytical Results Investigation Levels, includes sediment investigation level for Cs-137 of 1000 pCi/kg, dry.

While aquatic sediment sampling was part of the preoperational program, samples were not analyzed for gamma emitting nuclides until 1981.

In conclusion, the 2013 aquatic monitoring results for surface

water, drinking water, fish, clams and crabs showed only naturally occurring radioactivity and were consistent with levels measured prior to the operation of OCGS, and with levels measured in past years. No radioactivity attributable to activities at OCGS was detected in any aquatic samples during 2013 and no adverse long-term trends are shown in the aquatic monitoring data.

B. Atmospheric Environment

1. Airborne

a. Air Particulates

Continuous air particulate samples were collected from eight locations on a weekly basis. The eight locations were separated into three groups: Group I represents locations near the OCGS site boundary (20, 66 and 111), Group II represents the locations at an intermediate distance from the OCGS site (71, 72, and 73), and Group III represents the control and locations at a remote distance from OCGS (C and 3). The following analyses were performed:

Gross Beta

Weekly samples were analyzed for concentrations of beta emitters (Table C–VI.1 and C–VI.2, Appendix C). Detectable gross beta activity was observed at all locations. Comparison of results among the three groups aids in determining the effects, if any, resulting from the operation of OCGS. The results from the Site Boundary locations (Group I) ranged from 7 to 39 E–3 pCi/m^3 with a mean of 15 E–3 pCi/m^3. The results from the Intermediate Distance locations (Group II) ranged from 6 to 34 E–3 pCi/m^3 with a mean of 14 E–3 pCi/m^3. The results from the Distant locations (Group III) ranged from 7 to 32 E–3 pCi/m^3 with a mean of 15 E–3 pCi/m^3. The similarity of the results from the three groups indicates that there is no relationship between gross beta activity and distance from the OCGS. These results are consistent with data from previous years and indicate no effects from the operation of OCGS (Figures C-4 and C–5, Appendix C).

Air sample filters have been analyzed for gross beta activity since the inception of the preoperational environmental monitoring program in 1966. The preoperational data values

ranged from 1.90E-2 to 2.77E-1 pCi/m3. 2013 gross beta activity values ranged from <6E-3 to 39E-3 pCi/m3. The 2013 results are consistent with historical operational data (Figure C-5, Appendix C) and fall within the range of results observed during the preoperational period.

Strontium-89 and Strontium-90

Weekly samples were composited quarterly and analyzed for strontium-89 and strontium-90 (Table C–VI.3, Appendix C). No strontium was detected in any of the samples. These results are consistent with historical operational data. The preoperational environmental monitoring program did not include analysis of air samples for strontium-89 and strontium-90.

Gamma Spectrometry

Weekly samples were composited quarterly and analyzed for gamma emitting nuclides (Table C–VI.4, Appendix C). Naturally occurring Be-7 due to cosmic ray activity was detected in all samples. The values ranged from 30 to 77 E–3 pCi/m^3. All other nuclides were less than the MDC. These results are consistent with historical operational data. The preoperational environmental monitoring program did not include analysis of air samples for gamma emitting nuclides.

b. Airborne Iodine

Continuous air samples were collected from eight (C, 3, 20, 66, 71, 72, 73, 111) locations and analyzed weekly for I-131 (Table C–VII.1, Appendix C). Consistent with historical operational data, all results were less than the MDC for I-131.

The preoperational environmental monitoring program for OCGS did not include analysis of air media for iodine-131.

In conclusion, the atmospheric monitoring data are consistent with preoperational and prior operational data and show no long-term trends in the environment attributable to the operation of OCGS.

2. Terrestrial

a. Vegetation

Samples were collected from four locations (35, 36, 66, and 115) when available. The following analyses were performed:

Strontium-89 and Strontium-90

Vegetation samples from all locations were analyzed for concentrations of strontium-89 and strontium-90 (Table C–VIII.1, Appendix C). All strontium-89 results were less than the MDC. Strontium-90 was detected in 18 of 40 samples. The values ranged from 3.5 to 23.3 pCi/kg wet, which is consistent with historical data.

The following information on Strontium 90 is available on the NRC web page under Backgrounder "Radiation Protection and the "Tooth Fairy" Issue" published in December of 2004.

The largest source of Sr-90 in the environment (~99%) is from weapons testing fallout. Approximately 16.8 million curies of strontium-90 were produced and globally dispersed in atmospheric nuclear weapons testing until 1980. As a result of the Chernobyl accident, approximately 216,000 curies of Sr-90 were released into the atmosphere. With a 28 year half-life, Sr-90 still remains in the environment at nominal levels.

The total annual release of strontium-90 into the atmosphere from all 103 commercial nuclear power plants operating in the United States is typically 1/1000th of a curie. (NUREG/CR-2907 Vol.12). At an individual nuclear power plant, the amount of Sr-90 is so low that it is usually at or below the minimum detectable activity of sensitive detection equipment.

Oyster Creek did not report any Sr-90 released in the Annual Radioactive Effluent Release Report as all analyses for Sr-90 performed were less than the minimum detectable activity.

Gamma Spectrometry

Vegetation samples from locations 35, 36, 66, and 115 were

analyzed for concentrations of gamma emitting nuclides (Table C–VIII.1, Appendix C). Naturally occurring K-40 activity was found in all samples and ranged from 2,124 to 6,601 pCi/kg wet. Naturally occurring Be-7 was detected in 21 of 40 samples and ranged from 131 to 1,265 pCi/kg wet. Cesium-137 was detected in nine of 40 samples and ranged from 37 to 130 pCi/kg wet. These results are consistent with historical operational data. All other nuclides were less than the MDC.

Preoperational vegetation sample analyses did not include strontium analyses or gamma spectroscopy.

Oyster Creek conducted a Cs-137 study in 2006/2007. A report was generated titled "Evaluation of Cesium-137 in Environmental Samples from the Amergen Property East of the Oyster Creek Generating Station". Below is an excerpt from that report:

The levels of Cs-137 observed in the soil and vegetation samples are consistent with environmental concentrations known to be attributable to fallout from historic nuclear weapons testing and the Chernobyl accident. In addition, the variability of Cs-137 concentrations in soil and vegetation on the farm property appears to be driven by a number of environmental factors. Cs-137 concentrations in soil were non-detectable. Vegetation samples exhibited Cs-137 concentrations from non-detectable to 0.130 pCi/g, with a mean concentration of 0.078 pCi/g. For comparison, in the year 2000, as part of the confirmatory release survey for the adjacent Forked River site to the west of OCGS, the NRC reported that the maximum observed soil concentration of 0.53 pCi/g was not distinguishable from the variation in Cs-137 in the environment due to these fallout sources. The NRC also reported background Cs-137 concentrations in New Jersey coastal plain soils as high as 1.5 and 2.8 pCi/g. In addition, decay-corrected historic REMP data from a predominantly upwind location, nearly four miles from the OCGS, yields present-day Cs-137 concentrations ranging from 0.862 to 1.68 pCi/g.

The level of Cs-137 in the REMP samples did not approach any regulatory limits or reporting levels, and is not unusual given the known environmental levels of this radionuclide

attributable to atmospheric nuclear weapons testing and the Chernobyl accident.

In conclusion, terrestrial monitoring results for vegetation samples during 2013 showed only naturally occurring radioactivity and radioactivity associated with fallout from past atmospheric nuclear weapons testing and Chernobyl. The radioactivity levels detected were consistent with levels measured in past years, and no radioactivity attributable to activities at OCGS was detected in any terrestrial samples. The terrestrial monitoring data show no adverse long-term trends in the terrestrial environment.

C. Ambient Gamma Radiation

Ambient gamma radiation levels were measured using Optically Stimulated Luminenscence Dosimeters (OSLD). Sixty-one OSLD locations were monitored around the site. Results of non-background corrected OSLD measurements are summarized in Tables C-IX.1 to C-IX.3 and Figures C-6 and C-7.

The non-background corrected OSLD measurements ranged from 15.9 to 29.4 mR/standard quarter. In order to correct these results for background radiation, the mean of the dose rates measured at the background OSLD stations (C and 14) was subtracted from the dose measured at each indicator station. The maximum annual background corrected dose was 23.6 mR/year at Station 55, located near the site boundary, 0.3 miles west of the OCGS. This OSLD is located in an area where public access is restricted but the nearest member of the public for direct radiation is considered an individual that works in the warehouse west of the site. The individual is assumed to work 2,000 hours per year at this location.

The preoperational environmental monitoring program utilized film badges, the results of which are not comparable with the doses measured using thermoluminescent dosimeters or optically stimulated dosimeters during the operational REMP. In conclusion, the 2013 OSLD results are consistent with past operational measurements of direct radiation, and demonstrate that the OCGS continues to be in compliance with the 40 CFR 190 limit on maximum dose to the public.

D. Land Use Survey

A Land Use Survey, conducted in August 2013 around the Oyster Creek Generating Station (OCGS), was performed by Normandeau Associates, Inc. for Exelon Nuclear. The purpose of the survey is to identify within a

distance of 5 miles the location in each of the 16 meteorological sectors of the nearest milk animal, the nearest residence and the nearest garden of greater than 500 ft^2 producing broad leaf vegetation. The census shall also identify within a distance of 3 miles the location in each of the 16 meteorological sectors all milk animal and all gardens greater than 500 square feet producing broadleaf vegetation. For animals producing milk for human consumption in each of the sixteen meteorological sectors out to a distance of 5 miles from the OCGS, none were observed. The distance and direction of all locations from the OCGS Reactor Building were determined using Global Positioning System (GPS) technology. There were no changes required to the OCGS REMP, as a result of this survey. The results of this survey are summarized below.

Distance in Feet from the OCGS Reactor Building			
Sector		Residence (ft)	Garden* (ft)
1	N	5,655	8,224
2	NNE	3,239	6,015
3	NE	3,245	8,736
4	ENE	5,704	6,445
5	E	6,549	1,756
6	ESE	3,189	2,081
7	SE	3,073	2,321
8	SSE	4,666	8,341
9	S	7,971	9,011
10	SSW	8,344	20,130
11	SW	9,285	9,776
12	WSW	10,713	17,613
13	W	22,191	None
14	WNW	None	None
15	NW	27,985	None
16	NNW	7,506	14,487

*Greater than 500 ft^2 in size producing broad leaf vegetation

E. Summary of Results – Inter-laboratory Comparison Program

The primary and secondary laboratories analyzed Performance Evaluation (PE) samples of air particulate, air iodine, milk, soil, vegetation and water matrices (Appendix F). The PE samples, supplied by Analytics Inc., Environmental Resource Associates (ERA) and DOE's Mixed Analyte Performance Evaluation Program (MAPEP), were evaluated against the following pre-set acceptance criteria:

1. Analytics Evaluation Criteria

   Analytics' evaluation report provides a ratio of TBE's result and Analytics' known value. Since flag values are not assigned by Analytics, TBE-ES evaluates the reported ratios based on internal QC requirements, which are based on the DOE MAPEP criteria.

2. ERA Evaluation Criteria

   ERA's evaluation report provides an acceptance range for control and warning limits with associated flag values. ERA's acceptance limits are established per the USEPA, the National Environmental Laboratory Accreditation Conference (NELAC), state specific performance testing (PT) program requirements or ERA's SOP for the Generation of Performance Acceptance Limits, as applicable. The acceptance limits are either determined by a regression equation specific to each analyte or a fixed percentage limit promulgated under the appropriate regulatory document.

3. DOE Evaluation Criteria

   MAPEP's evaluation report provides an acceptance range with associated flag values.

   The MAPEP defines three levels of performance: Acceptable (flag = "A"), Acceptable with Warning (flag = "W"), and Not Acceptable (flag = "N"). Performance is considered acceptable when a mean result for the specified analyte is ± 20% of the reference value. Performance is acceptable with warning when a mean result falls in the range from ±20% to ±30% of the reference value (i.e., 20% < bias < 30%). If the bias is greater than 30%, the results are deemed not acceptable.

For the TBE laboratory, 178 out of 185 analyses performed met the specified acceptance criteria. Seven analyses (Sr-89 and Sr-90 in milk, Co-57, Zn-65 and Sr-90 in soil, Cs-134 in air particulate and Sr-90 in vegetation [two low warning in a row]) did not meet the specified acceptance criteria or internal QA requirements for the following reason:

1. Teledyne Brown Engineering's Analytics September 2013 Sr-89 in milk result of 63.9 pCi/L was lower than the known value of 96.0 pCi/L. The failure was a result of analyst error and was specific to the Analytics sample. Client samples for the associated time period were evaluated and no client samples were affected by this failure. NCR 13-15

2. Teledyne Brown Engineering's Analytics September 2013 Sr-90 in milk result of 8.88 pCi/L was lower than the known value of 13.2 pCi/L. The failure was a result of analyst error and was specific to the Analytics sample. Client samples for the associated time period were evaluated and no client samples were affected by this failure. NCR 13-15

3. & 4. Teledyne Brown Engineering's MAPEP September 2013 Co-57 and Zn-65 in soil were evaluated as failing the false positive test. While MAPEP evaluated the results as failures, the gamma software listed the results as non identified nuclides. The two nuclides would never have been reported as detected nuclides to a client. MAPEP does not allow laboratories to put in qualifiers for the submitted data nor "less than" results. MAPEP evaluates results based on the relationship between the activity and the uncertainty. MAPEP spiked the soil sample with an extremely large concentration of Eu-152, which was identified by the gamma software as an interfering nuclide, resulting in forced activity results that were evaluated by MAPEP as detected Co-57 and Zn-65. No client samples were affected by these failures. NCR 13-14

5. Teledyne Brown Engineering's MAPEP September 2013 Sr-90 in soil result of 664 Bq/kg was higher than the known value of 460 Bq/kg, exceeding the upper control limit of 598 Bq/kg. An incorrect Sr-90 result was entered into the MAPEP database. The correct Sr-90 activity of 322 Bq/kg would have been evaluated as acceptable with warning. No client samples were affected by this failure. NCR 13-14

6. Teledyne Brown Engineering's MAPEP September 2013 Cs-134 in air particulate activity of -0.570 Bq/sample was evaluated as a failed false positive test, based on MAPEP's evaluation of the result as a significant negative value at 3 standard deviations. A negative number would never have been reported as a detected nuclide to a client, therefore no client samples were affected by this failure. NCR 13-14

7. Teledyne Brown Engineering's MAPEP September 2013 Sr-90 in vegetation result was investigated due to two low warnings in a row. It appears the September sample was double spiked with carrier, resulting in a low activity. With a recovery of around 50% lower, the Sr-90 result would have fallen within the acceptance range. No client samples were affected by this issue. NCR 13-14

For the EIML laboratory, 89 of 92 analyses met the specified acceptance criteria. Three analyses (AP - Gross Alpha, Soil - Sr-90 and Co-57) did not meet the specified acceptance criteria for the following reasons:

1. Environmental Inc., Midwest Laboratory's MAPEP February 2013 air particulate gross alpha result of 0.14 Bq/total sample was lower than the known value of 1.20 Bq/total sample, exceeding the lower control limit of 0.36 Bq/total sample. The filter was recounted overnight. No significant activity could be detected.
2. Environmental Inc., Midwest Laboratory's MAPEP February 2013 soil Co-57 result of 408.40 Bq/kg was lower than the known value of 628.0 Bq/kg, exceeding the lower control limit of 440.0 Bq/kg. The sample was reanalyzed using additional fuming nitric separations. The reanalysis result of 574.4 fell within the control limits.
   Environmental Inc., Midwest Laboratory's MAPEP August 2013 soil Co-57 result of 699.60 Bq/kg was higher than the known value of 0.00 Bq/kg, exceeding the upper control limit of 5.00 Bq/kg. Interference from Eu-152 resulted in misidentification of Co-57.

The Inter-Laboratory Comparison Program provides evidence of "in control" counting systems and methods, and that the laboratories are producing accurate and reliable data.

V. References

1. Exelon Nuclear. Offsite Dose Calculation Manual for Oyster Creek Generating Station, Procedure CY-OC-170-301.

2. United States Nuclear Regulatory Commission Branch Technical Position, An Acceptable Radiological Environmental Monitoring Program, Revision 1, November 1979.

3 Pre-Operational Environmental Radiation Survey, Oyster Creek Nuclear Electric Generating Station, Jersey Central Power and Light Company, March 1968.

VI. Errata

A. Teledyne Brown Engineering (TBE) provides data results [activity, uncertainty and minimum detectable concentration {MDC}]. We are required to calculate the MDC using a multiplier of 4.66.

$$MDA = \frac{4.66\sqrt{\frac{\beta}{\Delta t}}}{2.22\,(v)(y)\,(a)(\varepsilon)}$$

Where:

Δt = counting time for sample (minutes)

β = background rate of instrument blank (cpm)

2.22 = dpm/pCi or : 2.22×10^6 dpm/μCi

v = volume or mass of sample analyzed

y = chemical yield

ε = efficiency of the counter

The formulas for calculating the activity, uncertainty and MDC are contained in the software of the counting equipment. For the gamma system, when the new detector number 08 was added to the system in January 2012, the default value of 3.29 was used to calculated the MDCs on detector 08. The activity and uncertainty were not affected. The multiplier has been changed from 3.29 to the required 4.66.

When the MDCs are recalculated using 4.66, the MDC values will increase by 41.6%. The greatest impact will be on the short-lived nuclides which have an LLD requirement, e.g. I-131, Ba-140 and La-140. Which means there could be some missed LLDs which will be identified in the Errata Data Appendix table of the 2013 annual report. This is not a reportable issue for the NRC. There is also the possibility that naturally produced nuclides that were detected would become a non-detect, e.g Th-228, Th-230, etc.

B. Oyster Creek determines the direct radiation to the public by subtracting the average of the control stations from the measurements from the sample stations (sample station millirem – average of control station millirem = net millirem to the public). The graph (Appendix C, Figure C-7) displays the gross millirem readings from the dosimetry. With the change from TLD to OSLD a high bias in the gross millirem was noted at all locations. This bias was not seen after the net millirem was determined.

C. For the TBE laboratory, 180 out of 186 analyses performed met the specified acceptance criteria in 2012. Six analyses (Co-60, Gross Alpha, Gross Beta, Sr-89, Sr-90 and Zn-65) did not meet the specified acceptance criteria for the following reason:

1. Teledyne Brown Engineering's MAPEP March 2012 Co-60 in soil result of 7.61 Bq/kg was higher than the known value of 1.56 Bq/kg, resulting in a found to known ratio of 4.88 on a sensitivity evaluation. NCR 12-08 was initiated to investigate this failure. Due to massive amount of Cs-134 (22400 pCi/kg), a minor Cs-134 gamma line at 1168 keV caused erroneous counts to show up in the 1173 keV peak of Co-60. The 1332 peak for Co-60 was unaffected by the interference. The potential for this interference was noted for future reference. TBE is monitoring the Co-60 in soil analyses on a case-to-case basis.

2. Teledyne Brown Engineering's MAPEP March 2012 Zn-65 in AP result of 4.19 Bq/sample was higher than the known value of 2.99 Bq/sample, exceeding the upper control limit of 3.89 Bq/sample. NCR 12-08 was initiated to investigate this failure. Co-60 has a gamma energy at 1172 keV which is very near to the Zn-65 1115 keV line. The Co-60 easily passed with a ratio of 1.20 found/known. No cause could be found for the failure and is considered an anomaly specific to the MAPEP sample. The first and second quarter 2012 Analytics AP Zn-65 analyses were acceptable.

3. Teledyne Brown Engineering's MAPEP September 2012 Sr-90 in water result of 19.6 pCi/L was higher than the known value of 12.2 pCi/L, exceeding the upper control limit of 15.9 pCi/L. NCR 12-11 was initiated to investigate this failure. An incorrect aliquot was entered into LIMS. Using the correct aliquot, the result would have fallen within the acceptance range. Remedial training for the technician including a review of the procedure and discussion of the specific error was performed.

4. Teledyne Brown Engineering's ERA May 2012 Gross Alpha in water result of 82.4 pCi/L was higher than the known value of 62.9 pCi/L, which exceeded the upper control limit of 78.0 pCi/L. NCR 12-05 was initiated to investigate this failure. The G-1 detector is slightly biased high for Th-230 based measurements. All power plant gross alpha measurements are based on an Am-241 efficiency which more accurately represents potential alpha contaminants from a nuclear power plant. Th-230 efficiency is used for gross alpha in EPA potable water measurements. No nuclear power plant data was affected by this failure. The G-1 detector is used only for ERA samples. The detector was recalibrated.

5. Teledyne Brown Engineering's ERA November 2012 Gross Beta in water result of 59.3 pCi/L was higher than the known value of 39.2

pCi/L, which exceeded the upper control limit of 46.7 pCi/L. NCR 12-13 was initiated to investigate this failure. The rerun result of 44.8 fell within the control limits. It appears an incorrect aliquot was entered into LIMS. Remedial training for the technician including a review of the procedure and discussion of the specific error was performed.

6. Teledyne Brown Engineering's ERA November 2012 Sr-89 in water result of 46.5 pCi/L was higher than the known value of 39.1 pCi/L, which exceeded the upper control limit of 46.1 pCi/L. NCR 12-13 was initiated to investigate this failure. The found to known ratio was 1.19, which TBE considers acceptable with warning. TBE's internal QA program, the MAPEP program, and the Analytics program all allow for an acceptance range of 0.70 – 1.30 for radioanalytical cross check samples. The Sr-89 ratio of 1.19 is well within this acceptance range.

D. The following information on Strontium 90 is available on the NRC web page under Backgrounder "Radiation Protection and the "Tooth Fairy" Issue" published in December of 2004.

The largest source of Sr-90 in the environment (~99%) is from weapons testing fallout. Approximately 16.8 million curies of strontium-90 were produced and globally dispersed in atmospheric nuclear weapons testing until 1980. As a result of the Chernobyl accident, approximately 216,000 curies of Sr-90 were released into the atmosphere. With a 28 year half-life, Sr-90 still remains in the environment at nominal levels.

The total annual release of strontium-90 into the atmosphere from all 103 commercial nuclear power plants operating in the United States is typically 1/1000th of a curie. (NUREG/CR-2907 Vol.12). At an individual nuclear power plant, the amount of Sr-90 is so low that it is usually at or below the minimum detectable activity of sensitive detection equipment.

Oyster Creek did not report any Sr-90 released in the Annual Radioactive Effluent Release Report as all analyses for Sr-90 performed were less than the minimum detectable activity.

APPENDIX A

RADIOLOGICAL ENVIRONMENTAL MONITORING REPORT SUMMARY

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE OYSTER CREEK GENERATING STATION, 2013

NAME OF FACILITY:	OYSTER CREEK GENERATING STATION			DOCKET NUMBER:		50-219 2013		
LOCATION OF FACILITY:	OCEAN COUNTY, NJ			REPORTING PERIOD:				
				INDICATOR LOCATIONS	CONTROL LOCATION	LOCATION WITH HIGHEST ANNUAL MEAN (M)		
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
SURFACE WATER (PCI/LITER)	H-3	28	2,000	<LLD	<LLD	-		0
	GAMMA	28						
	MN-54		15	<LLD	<LLD	-		0
	CO-58		15	<LLD	<LLD	-		0
	FE-59		30	<LLD	<LLD	-		0
	CO-60		15	<LLD	<LLD	-		0
	ZN-65		30	<LLD	<LLD	-		0
	NB-95		15	<LLD	<LLD	-		0
	ZR-95		30	<LLD	<LLD	-		0

* THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES
FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F)

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE OYSTER CREEK GENERATING STATION, 2013

NAME OF FACILITY:	OYSTER CREEK GENERATING STATION			DOCKET NUMBER:		50-219 2013		
LOCATION OF FACILITY:	OCEAN COUNTY, NJ			REPORTING PERIOD:				
				INDICATOR LOCATIONS	CONTROL LOCATION	LOCATION WITH HIGHEST ANNUAL MEAN (M)		
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
SURFACE WATER (PCI/LITER)	I-131		15	<LLD	<LLD	-		0
	CS-134		15	<LLD	<LLD	-		0
	CS-137		18	<LLD	<LLD	-		0
	BA-140		60	<LLD	<LLD	-		0
	LA-140		15	<LLD	<LLD	-		0
DRINKING WATER (PCI/LITER)	H-3	57	2,000	<LLD	<LLD	-		0
	GR-B	57	4	6.5 (35/45) (1.5/17.7)	2.2 (8/12) (1.5/4.6)	14.7 (11/11) (10.7/17.7)	1N INDICATOR ON-SITE DOMESTIC WELL AT OCGS 0.2 MILES N OF SITE	0
	I-131	58	1	<LLD	<LLD	-		0

* THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES
FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F)

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE OYSTER CREEK GENERATING STATION, 2013

NAME OF FACILITY:	OYSTER CREEK GENERATING STATION			DOCKET NUMBER:		50-219 2013		
LOCATION OF FACILITY:	OCEAN COUNTY, NJ			REPORTING PERIOD:				
				INDICATOR LOCATIONS	CONTROL LOCATION	LOCATION WITH HIGHEST ANNUAL MEAN (M)		
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
DRINKING WATER (PCI/LITER)	GAMMA	57						
	MN-54		15	<LLD	<LLD	-		0
	CO-58		15	<LLD	<LLD	-		0
	FE-59		30	<LLD	<LLD	-		0
	CO-60		15	<LLD	<LLD	-		0
	ZN-65		30	<LLD	<LLD	-		0
	NB-95		15	<LLD	<LLD	-		0
	ZR-95		30	<LLD	<LLD	-		0
	CS-134		15	<LLD	<LLD	-		0

* THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES
FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F)

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE OYSTER CREEK GENERATING STATION, 2013

NAME OF FACILITY:	OYSTER CREEK GENERATING STATION			DOCKET NUMBER:		50-219 2013		
LOCATION OF FACILITY:	OCEAN COUNTY, NJ			REPORTING PERIOD:				
				INDICATOR LOCATIONS	CONTROL LOCATION	LOCATION WITH HIGHEST ANNUAL MEAN (M)		
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
DRINKING WATER (PCI/LITER)	CS-137		18	<LLD	<LLD	-		0
	BA-140		60	<LLD	<LLD	-		0
	LA-140		15	<LLD	<LLD	-		0
GROUNDWATER (PCI/LITER)	H-3	8	2,000	<LLD	NA	-		0
	GAMMA	8						
	MN-54		15	<LLD	NA	-		0
	CO-58		15	<LLD	NA	-		0
	FE-59		30	<LLD	NA	-		0
	CO-60		15	<LLD	NA	-		0

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FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F)

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE OYSTER CREEK GENERATING STATION, 2013

NAME OF FACILITY:	OYSTER CREEK GENERATING STATION			DOCKET NUMBER:		50-219 2013		
LOCATION OF FACILITY:	OCEAN COUNTY, NJ			REPORTING PERIOD:				
				INDICATOR LOCATIONS	CONTROL LOCATION	LOCATION WITH HIGHEST ANNUAL MEAN (M)		
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROUNDWATER (PCI/LITER)	ZN-65		30	<LLD	NA	-		0
	NB-95		15	<LLD	NA	-		0
	ZR-95		30	<LLD	NA	-		0
	I-131		15	<LLD	NA	-		0
	CS-134		15	<LLD	NA	-		0
	CS-137		18	<LLD	NA	-		0
	BA-140		60	<LLD	NA	-		0
	LA-140		15	<LLD	NA	-		0

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TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE OYSTER CREEK GENERATING STATION, 2013

NAME OF FACILITY:	OYSTER CREEK GENERATING STATION			DOCKET NUMBER:		50-219 2013		
LOCATION OF FACILITY:	OCEAN COUNTY, NJ			REPORTING PERIOD:				
				INDICATOR LOCATIONS	CONTROL LOCATION	LOCATION WITH HIGHEST ANNUAL MEAN (M)		
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
BOTTOM FEEDER (PCI/KG WET)	GAMMA	6						
	K-40		NA	4600 (4/4) (4026/5429)	4775 (2/2) (4450/5100)	4775 (2/2) (4450/5100)	94 CONTROL GREAT BAY/LITTLE EGG HARBOR 20.0 MILES SSW OF SITE	0
	MN-54		130	<LLD	<LLD	-		0
	CO-58		130	<LLD	<LLD	-		0
	FE-59		260	<LLD	<LLD	-		0
	CO-60		130	<LLD	<LLD	-		0
	ZN-65		260	<LLD	<LLD	-		0
	CS-134		130	<LLD	<LLD	-		0
	CS-137		150	<LLD	<LLD	-		0

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NAME OF FACILITY:	OYSTER CREEK GENERATING STATION			DOCKET NUMBER:		50-219 2013		
LOCATION OF FACILITY:	OCEAN COUNTY, NJ			REPORTING PERIOD:				
				INDICATOR LOCATIONS	CONTROL LOCATION	LOCATION WITH HIGHEST ANNUAL MEAN (M)		
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
PREDATOR (PCI/KG WET)	GAMMA	11						
	K-40		NA	4521 (8/8) (3791/5102)	3668 (3/3) (3207/4145)	4640 (4/4) (3791/5102)	33 INDICATOR EAST OF RT 9 BRIDGE IN OCGS DISCHARGE 0.4 MILES ESE OF SITE	0
	MN-54		130	<LLD	<LLD	-		0
	CO-58		130	<LLD	<LLD	-		0
	FE-59		260	<LLD	<LLD	-		0
	CO-60		130	<LLD	<LLD	-		0
	ZN-65		260	<LLD	<LLD	-		0
	CS-134		130	<LLD	<LLD	-		0
	CS-137		150	<LLD	<LLD	-		0

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TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE OYSTER CREEK GENERATING STATION, 2013

NAME OF FACILITY:	OYSTER CREEK GENERATING STATION			DOCKET NUMBER:		50-219 2013		
LOCATION OF FACILITY:	OCEAN COUNTY, NJ			REPORTING PERIOD:				
				INDICATOR LOCATIONS	CONTROL LOCATION	LOCATION WITH HIGHEST ANNUAL MEAN (M)		
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
CLAMS (PCI/KG WET)	GAMMA	6						
	K-40		NA	1709 (4/4) (1356/2199)	1743 (2/2) (1421/2064)	1778 (2/2) (1356/2199)	24 INDICATOR BARNEGAT BAY 2.1 MILES E OF SITE	0
	MN-54		130	<LLD	<LLD	-		0
	CO-58		130	<LLD	<LLD	-		0
	FE-59		260	<LLD	<LLD	-		0
	CO-60		130	<LLD	<LLD	-		0
	ZN-65		260	<LLD	<LLD	-		0
	CS-134		130	<LLD	<LLD	-		0
	CS-137		150	<LLD	<LLD	-		0

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TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE OYSTER CREEK GENERATING STATION, 2013

NAME OF FACILITY:	OYSTER CREEK GENERATING STATION			DOCKET NUMBER:		50-219 2013		
LOCATION OF FACILITY:	OCEAN COUNTY, NJ			REPORTING PERIOD:				
				INDICATOR LOCATIONS	CONTROL LOCATION	LOCATION WITH HIGHEST ANNUAL MEAN (M)		
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
CRABS (PCI/KG WET)	GAMMA	2						
	K-40		NA	2351 (2/2) (1983/2718)	NA	2718 (1/1)	33 INDICATOR EAST OF RT 9 BRIDGE IN OCGS DISCHARGE 0.4 MILES ESE OF SITE	0
	MN-54		130	<LLD	NA	-		0
	CO-58		130	<LLD	NA	-		0
	FE-59		260	<LLD	NA	-		0
	CO-60		130	<LLD	NA	-		0
	ZN-65		260	<LLD	NA	-		0
	CS-134		130	<LLD	NA	-		0
	CS-137		150	<LLD	NA	-		0

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TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE OYSTER CREEK GENERATING STATION, 2013

NAME OF FACILITY:	OYSTER CREEK GENERATING STATION			DOCKET NUMBER:		50-219 2013		
LOCATION OF FACILITY:	OCEAN COUNTY, NJ			REPORTING PERIOD:				
				INDICATOR LOCATIONS	CONTROL LOCATION	LOCATION WITH HIGHEST ANNUAL MEAN (M)		
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
SEDIMENT (PCI/KG DRY)	GAMMA	8						
	BE-7		NA	<LLD	<LLD	-		0
	K-40		NA	6238 (6/6) (975/11820)	17110 (2/2) (15220/19000)	17110 (2/2) (15220/19000)	94 CONTROL GREAT BAY/LITTLE EGG HARBOR 20.0 MILES SSW OF SITE	0
	MN-54		NA	<LLD	<LLD	-		0
	CO-58		NA	<LLD	<LLD	-		0
	CO-60		NA	<LLD	<LLD	-		0
	CS-134		150	<LLD	<LLD	-		0
	CS-137		180	<LLD	<LLD	-		0

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TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE OYSTER CREEK GENERATING STATION, 2013

NAME OF FACILITY:	OYSTER CREEK GENERATING STATION			DOCKET NUMBER:		50-219 2013		
LOCATION OF FACILITY:	OCEAN COUNTY, NJ			REPORTING PERIOD:				
				INDICATOR LOCATIONS	CONTROL LOCATION	LOCATION WITH HIGHEST ANNUAL MEAN (M)		
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
AIR PARTICULATE (E-3 PCI/CU.METER)	GR-B	412	10	14 (294/310) (6/39)	15 (92/102) (7/32)	16 (48/52) (7/32)	C CONTROL JCP&L OFFICE - COOKSTOWN NJ 24.7 MILES NW OF SITE	0
	SR-89	32	NA	<LLD	<LLD	-		0
	SR-90	32	NA	<LLD	<LLD	-		0
	GAMMA	32						
	BE-7		NA	56 (24/24) (30/77)	57 (8/8) (33/71)	63 (4/4) (48/74)	72 INDICATOR LACEY RD AT KNIGHT OF COLUMBUS HALL 1.9 MILES NNE OF SITE	0
	MN-54		NA	<LLD	<LLD	-		0
	CO-58		NA	<LLD	<LLD	-		0
	CO-60		NA	<LLD	<LLD	-		0

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TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE OYSTER CREEK GENERATING STATION, 2013

NAME OF FACILITY:	OYSTER CREEK GENERATING STATION			DOCKET NUMBER:		50-219 2013		
LOCATION OF FACILITY:	OCEAN COUNTY, NJ			REPORTING PERIOD:				
				INDICATOR LOCATIONS	CONTROL LOCATION	LOCATION WITH HIGHEST ANNUAL MEAN (M)		
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
AIR PARTICULATE (E-3 PCI/CU.METER)	CS-134		50	<LLD	<LLD	-		0
	CS-137		60	<LLD	<LLD	-		0
AIR IODINE (E-3 PCI/CU.METER)	GAMMA I-131	412	70	<LLD	<LLD	-		0
VEGETATION (PCI/KG WET)	SR-89	40	NA	<LLD	<LLD	-		0
	SR-90	40	NA	9.4 (13/28) (3.5/23.3)	5.7 (5/12) (4.8/7.5)	10.3 (11/11) (3.9/23.3)	115 INDICATOR EAST OF SITE, ON FINNINGER FARM 0.3 MILES E OF SITE	0
	GAMMA BE-7	40	NA	365 (17/28) (132/1265)	187 (4/12) (131/251)	516 (4/5) (132/1265)	66 INDICATOR EAST OF RT 9 AND SOUTH OF OCGS DISCHG 0.4 MILES SE OF SITE	0

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LOCATION OF FACILITY:	OCEAN COUNTY, NJ			REPORTING PERIOD:				
				INDICATOR LOCATIONS	CONTROL LOCATION	LOCATION WITH HIGHEST ANNUAL MEAN (M)		
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
VEGETATION (PCI/KG WET)	K-40		NA	3592 (28/28) (2124/6601)	4312 (12/12) (2222/6034)	5420 (5/5) (4595/6601)	66 INDICATOR EAST OF RT 9 AND SOUTH OF OCGS DISCHG 0.4 MILES SE OF SITE	0
	I-131		60	<LLD	<LLD	-		0
	CS-134		60	<LLD	<LLD	-		0
	CS-137		80	78 (9/28) (37/130)	<LLD	78 (9/11) (37/130)	115 INDICATOR EAST OF SITE, ON FINNINGER FARM 0.3 MILES E OF SITE	0
	BA-140		NA	<LLD	<LLD	-		0
	LA-140		NA	<LLD	<LLD	-		0
DIRECT RADIATION (MILLIREM/STD.MO.)	OSLD-QUARTERLY	244	NA	21.1 (236/236) (15.9/29.4)	21.6 (8/8) (19.2/24.3)	27.5 (4/4) (25.8/29.4)	55 INDICATOR SOUTHERN AREA STORES SECURITY FENCE 0.3 MILES W	0

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APPENDIX B

LOCATION DESIGNATION, DISTANCE & DIRECTION, AND SAMPLE COLLECTION & ANALYTICAL METHODS

TABLE B-1: Location Designation and Identification System for the Oyster Creek Generating Station

Sample Medium	–	APT = Air Particulate	Clam = Clam
		AIO = Air Iodine	OSLD = Optically Stimulated Dosimetry
		DW = Drinking Water	
		VEG = Vegetation	Fish = Fish
		SWA = Surface Water	Crab = Crab
		AQS = Aquatic Sediment	GW = Ground Water
Station Code	–	Station's Designation	
Distance	–	Distance from the OCGS in miles	
Azimuth	–	Azimuth with respect to the OCGS in degrees	
Description	–	Meteorological sector in which the station is located and a narrative description	

TABLE B-2: Radiological Environmental Monitoring Program – Sampling Locations, Distance and Direction, Oyster Creek Generating Station, 2013

Sample Medium	Station Code	Distance (miles)	Azimuth (degrees)	Description
OSLD	1	0.4	219	SW of site at OCGS Fire Pond, Forked River, NJ
DW	1S	0.1	209	On-site southern domestic well at OCGS, Forked River, NJ
DW	1N	0.2	349	On-site northern domestic well at OCGS, Forked River, NJ
APT, AIO, OSLD	3	6.0	97	East of site, near old Coast Guard Station, Island Beach State Park
OSLD	4	4.6	213	SSW of site, Route 554 and Garden State Parkway, Barnegat, NJ
OSLD	5	4.2	353	North of site, at Garden State Parkway Rest Area, Forked River, NJ
OSLD	6	2.1	13	NNE of site, Lane Place, behind St. Pius Church, Forked River, NJ
OSLD	8	2.3	177	South of site, Route 9 at the Waretown Substation, Waretown, NJ
OSLD	9	2.0	230	SW of site, where Route 532 and the Garden State Parkway meet, Waretown, NJ
APT, AIO, OSLD	C	24.7	313	NW of site, JCP&L office in rear parking lot, Cookstown, NJ
OSLD	11	8.2	152	SSE of site, 80th and Anchor Streets, Harvey Cedars, NJ
OSLD	14	20.8	2	North of site, Larrabee Substation on Randolph Road, Lakewood, NJ
APT, AIO	20	0.7	95	East of site, on Finninger Farm on south side of access road, Forked River, NJ
OSLD	22	1.6	145	SE of site, on Long John Silver Way, Skippers Cove, Waretown, NJ
SWA, CLAM, AQS	23	3.6	64	ENE of site, Barnegat Bay off Stouts Creek, approximately 400 yards SE of "Flashing Light 1"
SWA, CLAM, AQS	24	2.1	101	East of site, Barnegat Bay, approximately 250 yards SE of "Flashing Light 3"
SWA, AQS, FISH, CRAB	33	0.4	123	ESE of site, east of Route 9 Bridge in OCGS Discharge Canal
VEG	35	0.4	111	ESE of site, east of Route 9 and north of the OCGS Discharge Canal, Forked River, NJ
VEG	36	23.1	319	NW of site, at "U-Pick" Farm, New Egypt, NJ

TABLE B-2: Radiological Environmental Monitoring Program – Sampling Locations, Distance and Direction, Oyster Creek Generating Station, 2013

Sample Medium	Station Code	Distance (miles)	Azimuth (degrees)	Description
DW	37	2.2	18	NNE of Site, off Boox Road at Lacey MUA Pumping Station, Forked River, NJ
DW	38	1.6	197	SSW of Site, on Route 532, at Ocean Township MUA Pumping Station, Waretown, NJ
DW	39	3.5	353	North of Site, Trenton Ave. off Lacey Rd, Lacey Twp. MUA Pump Station, Forked River, NJ
OSLD	46	5.6	323	NW of site, on Lacey Road, adjacent to utility pole BT 259 65, Forked River, NJ
OSLD	47	4.6	26	NNE of site, Route 9 and Harbor Inn Road, Bayville, NJ
OSLD	48	4.5	189	South of site, at intersection of Brook and School Streets, Barnegat, NJ
OSLD	51	0.4	358	North of site, on the access road to Forked River site, Forked River, NJ
OSLD	52	0.3	333	NNW of site, on the access road to Forked River site, Forked River, NJ
OSLD	53	0.3	309	NW of site, at sewage lift station on the access road to the Forked River site, Forked River, NJ
OSLD	54	0.3	288	WNW of site, on the access road to Forked River site, Forked River, NJ
OSLD	55	0.3	263	West of site, on Southern Area Stores security fence, west of OCGS Switchyard, Forked River, NJ
OSLD	56	0.3	249	WSW of site, on utility pole east of Southern Area Stores, west of the OCGS Switchyard, Forked River, NJ
OSLD	57	0.2	206	SSW of site, on Southern Area Stores access road, Forked River, NJ
OSLD	58	0.2	188	South of site, on Southern Area Stores access road, Forked River, NJ
OSLD	59	0.3	166	SSE of site, on Southern Area Stores access road, Waretown, NJ
OSLD	61	0.3	104	ESE of site, on Route 9 south of OCGS Main Entrance, Forked River, NJ

TABLE B-2: Radiological Environmental Monitoring Program – Sampling Locations, Distance and Direction, Oyster Creek Generating Station, 2013

Sample Medium	Station Code	Distance (miles)	Azimuth (degrees)	Description
OSLD	62	0.2	83	East of site, on Route 9 at access road to OCGS Main Gate, Forked River, NJ
OSLD	63	0.2	70	ENE of site, on Route 9, between main gate and OCGS North Gate access road, Forked River, NJ
OSLD	64	0.3	42	NE of site, on Route 9 North at entrance to Finninger Farm, Forked River, NJ
OSLD	65	0.4	19	NNE of site, on Route 9 at Intake Canal Bridge, Forked River, NJ
APT, AIO, OSLD, VEG	66	0.4	133	SE of site, east of Route 9 and south of the OCGS Discharge Canal, inside fence, Waretown, NJ
OSLD	68	1.3	266	West of site, on Garden State Parkway North at mile marker 71.7, Lacey Township, NJ
APT, AIO, OSLD	71	1.6	164	SSE of site, on Route 532 at the Waretown Municipal Building, Waretown, NJ
APT, AIO, OSLD	72	1.9	25	NNE of site, on Lacey Road at Knights of Columbus Hall, Forked River, NJ
APT, AIO, OSLD	73	1.8	108	ESE of site, on Bay Parkway, Sands Point Harbor, Waretown, NJ
OSLD	74	1.8	88	East of site, Orlando Drive and Penguin Court, Forked River, NJ
OSLD	75	2.0	71	ENE of site, Beach Blvd. and Maui Drive, Forked River, NJ
OSLD	78	1.8	2	North of site, 1514 Arient Road, Forked River, NJ
OSLD	79	2.9	160	SSE of site, Hightide Drive and Bonita Drive, Waretown, NJ
OSLD	81	3.5	201	SSW of site, on Rose Hill Road at intersection with Barnegat Boulevard, Barnegat, NJ
OSLD	82	4.4	36	NE of site, Bay Way and Clairmore Avenue, Lanoka Harbor, NJ
OSLD	84	4.4	332	NNW of site, on Lacey Road, 1.3 miles west of the Garden State Parkway on siren pole, Lacey Township, NJ
OSLD	85	3.9	250	WSW of site, on Route 532, just east of Wells Mills Park, Waretown, NJ
OSLD	86	5.0	224	SW of site, on Route 554, 1 mile west of the Garden State Parkway, Barnegat, NJ
OSLD	88	6.6	125	SE of site, eastern end of 3rd Street, Barnegat Light, NJ
OSLD	89	6.1	108	ESE of site, Job Francis residence, Island Beach State Park

TABLE B-2: Radiological Environmental Monitoring Program – Sampling Locations, Distance and Direction, Oyster Creek Generating Station, 2013

Sample Medium	Station Code	Distance (miles)	Azimuth (degrees)	Description
OSLD	90	6.3	75	ENE of site, parking lot A-5, Island Beach State Park
OSLD	92	9.0	46	NE of site, at Guard Shack/Toll Booth, Island Beach State Park
FISH, CRAB	93	0.1	242	WSW of site, OCGS Discharge Canal between Pump Discharges and Route 9, Forked River, NJ
SWA, AQS, CLAM, FISH	94	20.0	198	SSW of site, in Great Bay/Little Egg Harbor
OSLD	98	1.6	318	NW of site, on Garden State Parkway North at mile marker 73, Lacey Township, NJ
OSLD	99	1.5	310	NW of site, on Garden State Parkway at mile marker 72.8, Lacey Township, NJ
OSLD	100	1.4	43	NE of site, Yacht Basin Plaza South off Lakeside Dr., Lacey Township, NJ
OSLD	101	1.7	49	NE of site, end of Lacey Rd. East, Lacey Township, NJ
OSLD	102	1.6	344	NNW of site, end of Sheffield Dr., Barnegat Pines, Lacey Township, NJ
OSLD	103	2.4	337	NNW of site, Llewellyn Pkwy., Barnegat Pines, Lacey Township, NJ
OSLD	104	1.8	221	SW of site, Rt. 532 West, before Garden State Parkway, Ocean Township, NJ
OSLD	105	2.8	222	SW of site, Garden State Parkway North beside mile marker 69.6, Ocean Township, NJ
OSLD	106	1.2	288	NW of site, Garden State Parkway North beside mile marker 72.2, Lacey Township, NJ
OSLD	107	1.3	301	NW of site, Garden State Parkway North beside mile marker 72.5, Lacey Township, NJ
OSLD	109	1.2	141	SE of site, Lighthouse Dr., Waretown, Ocean Township, NJ
OSLD	110	1.5	127	SE of site, Tiller Dr. and Admiral Way, Waretown, Ocean Township, NJ
APT, AIO	111	0.3	64	ENE of site, Finninger Farm property along access road, Lacey Township, NJ
OSLD	112	0.2	178	S of site, along southern access road

TABLE B-2: Radiological Environmental Monitoring Program – Sampling Locations, Distance and Direction, Oyster Creek Generating Station, 2013

Sample Medium	Station Code	Distance (miles)	Azimuth (degrees)	Description
OSLD	113	0.3	90	E of site, along Rt. 9, North
DW	114	0.8	267	Well at Bldg 25 on Forked River site
VEG	115	0.3	96	E of Site, on Finninger Farm
OSLD	T1	0.4	219	SW of site, at OCGS Fire Pond, Forked River, NJ
GW	MW-24-3A	0.8	97	ESE of site, Finninger Farm on South side of access road, Lacey Township, NJ
GW	W-3C	0.4	112	ESE of site, Finninger Farm adjacent to Station 35, Lacey Township, NJ

TABLE B-3: Radiological Environmental Monitoring Program – Summary of Sample Collection and Analytical Methods, Oyster Creek Generating Station, 2013

Sample Medium	Analysis	Sampling Method	Collection Procedure Number	Sample Size	Analytical Procedure Number
Drinking Water	Gamma Spectroscopy	Monthly samples	ER-OCGS-06, Collection of water samples for radiological analysis CY-OC-120-1200, REMP sample collection procedure – well water	1 gallon	TBE, TBE-2007 Gamma emitting radioisotopes analysis Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Drinking Water	Tritium	Monthly samples	ER-OCGS-06, Collection of water samples for radiological analysis CY-OC-120-1200, REMP sample collection procedure – well water	1 gallon	TBE, TBE-2010 Tritium and carbon-14 analysis by liquid scintillation Env. Inc., T-02 Determination of tritium in water (direct method)
Drinking water	Iodine	Monthly Samples	ER-OCGS-06, Collection of water samples for radiological analysis CY-OC-120-1200, REMP sample collection procedure – well water	1 gallon	TBE, TBE-2031 Radioiodine in drinking water Env. Inc., I-131-01 Determination of I-131 in water by an ion exchange
Drinking Water	Gross Beta	Monthly Samples	ER-OCGS-06, Collection of water samples for radiological analysis CY-OC-120-1200, REMP sample collection procedure – well water	1 gallon	TBE, TBE-2008 Gross Alpha and/or gross beta activity in various matrices Env. Inc., W(DS)-01 Determination of gross alpha and/or gross beta in water (dissolved solids or total residue) Env. Inc., W(SS)-02 Determination of gross alpha and/or gross beta in water (suspended solids)
Surface Water	Gamma Spectroscopy	Grab Sample	ER-OCGS-06, Collection of water samples for radiological analysis	1 gallon	TBE, TBE-2007 Gamma emitting radioisotopes analysis Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Surface Water	Tritium	Grab Sample	ER-OCGS-06, Collection of water samples for radiological analysis	1 gallon	TBE, TBE-2010 Tritium and carbon-14 analysis by liquid scintillation Env. Inc., T-02 Determination of tritium in water (direct method)
Groundwater	Tritium	Grab Sample	ER-OCGS-06, Collection of water samples for radiological analysis	1 gallon	TBE, TBE-2010 Tritium and carbon-14 analysis by liquid scintillation
Groundwater	Tritium	Grab Sample	ER-OCGS-06, Collection of water samples for radiological analysis	1 gallon	TBE, TBE-2007 Gamma emitting radioisotopes analysis
Fish	Gamma Spectroscopy	Semi-annual samples collected via hook and line technique and traps	ER-OCGS-14, Collection of fish samples for radiological analysis	250 grams (wet)	TBE, TBE-2007 Gamma emitting radioisotopes analysis Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Clams and Crabs	Gamma Spectroscopy	Semi-annual and annual samples collected using clam tongs and traps.	ER-OCGS-16, Collection of clam and crab samples for radiological analysis	300 grams (wet)	TBE, TBE-2007 Gamma emitting radioisotopes analysis Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy

TABLE B-3: Radiological Environmental Monitoring Program – Summary of Sample Collection and Analytical Methods, Oyster Creek Generating Station, 2013

Sample Medium	Analysis	Sampling Method	Collection Procedure Number	Sample Size	Analytical Procedure Number
Sediment	Gamma Spectroscopy	Semi-annual grab samples	ER-OCGS-03, Collection of aquatic sediment samples for radiological analysis	1000 grams (dry)	TBE, TBE-2007 Gamma emitting radioisotopes analysis Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Air Particulates	Gross Beta	One-week composite of continuous air sampling through glass fiber filter paper	ER-OCGS-05, Collection of air iodine and air particulate samples for radiological analysis	1 filter (approximately 300 cubic meters weekly)	TBE, TBE-2008 Gross alpha and/or beta activity in various matrices Env. Inc., AP-02 Determination of gross alpha and/or gross beta in air particulate filters
Air Particulates	Gamma Spectroscopy	Quarterly composite of each station	TBE, TBE-2023 Compositing of samples Env. Inc., AP-03 Procedure for compositing air particulate filters for gamma spectroscopic analysis	13 filters (approximately 4000 cubic meters)	TBE, TBE-2007 Gamma emitting radioisotopes analysis Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Air Particulates	Strontium-89/90	Quarterly composite of each station	ER-OCGS-05, Collection of air iodine and air particulate samples for radiological analysis	13 filters (approximately 4000 cubic meters)	TBE, TBE-2019 Radiostrontium analysis by ion exchange
Air Iodine	Gamma Spectroscopy	One-week composite of continuous air sampling through charcoal filter	ER-OCGS-05, Collection of air iodine and air particulate samples for radiological analysis	1 filter (approximately 300 cubic meters weekly)	TBE, TBE-2007 Gamma emitting radioisotopes analysis Env. Inc., I-131-02 Determination of I-131 in charcoal canisters by gamma spectroscopy (batch method)
Vegetation	Gamma Spectroscopy	Grab sample during growing season	ER-OCGS-04, Collection of food products and broadleaf vegetation samples for radiological analysis	1000 grams	TBE, TBE-2007 Gamma emitting radioisotopes analysis Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Vegetation	Strontium-89/90	Grab sample during growing season	ER-OCGS-04, Collection of food products and broadleaf vegetation samples for radiological analysis	1000 grams	TBE; TBE-2019 Radiostrontium analysis by ion exchange
OSLD	Optically Stimulated Luminescence Dosimetry	Quarterly OSLDs comprised of two Al_2O_3:C Landauer Incorporated elements.	ER OCGS-02, Collection/Exchange of Field Dosimeters for Radiological Analysis	2 dosimeters	Landauer Incorporated

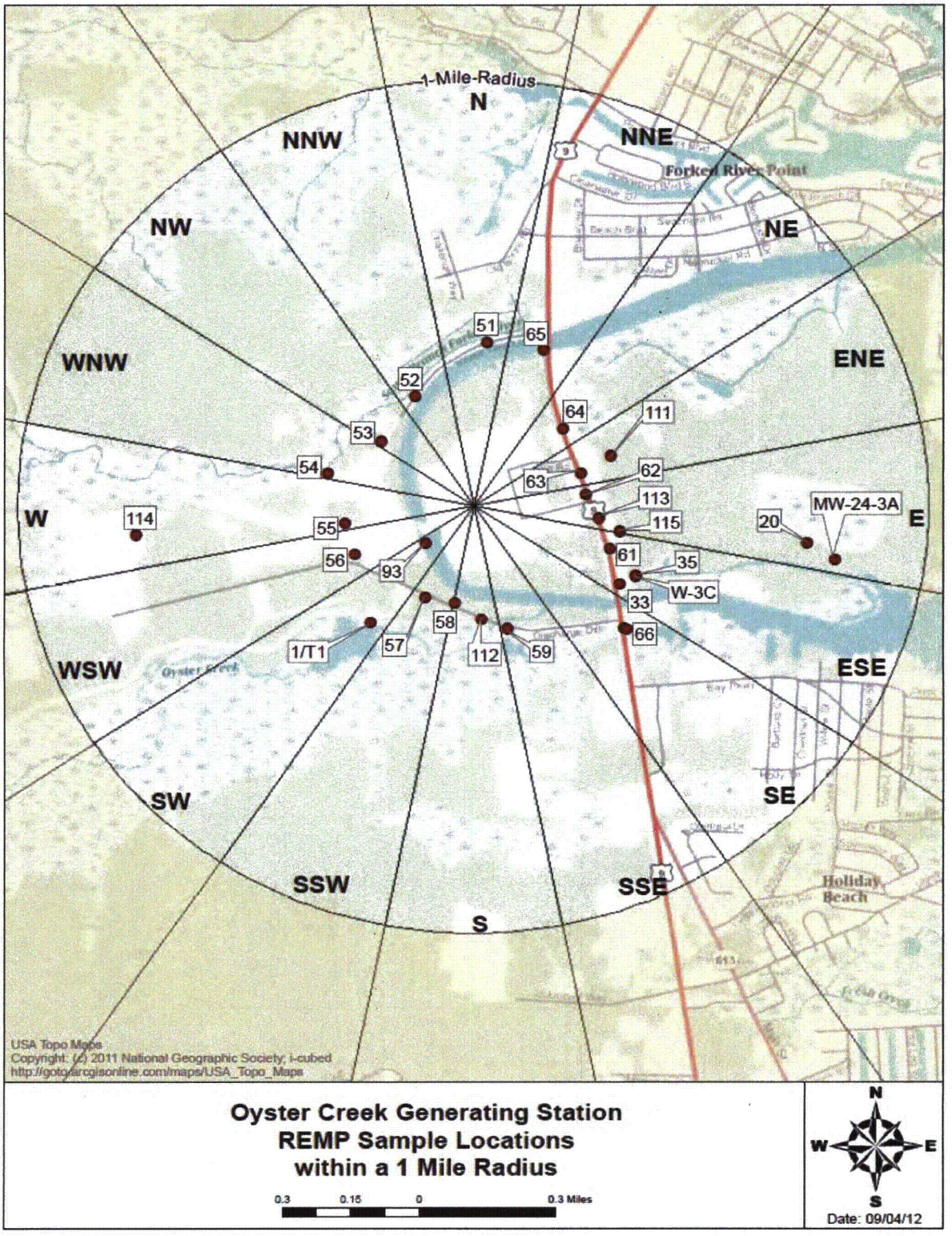


Figure B-1
Locations of REMP Stations within a 1-mile radius
of the Oyster Creek Generating Station

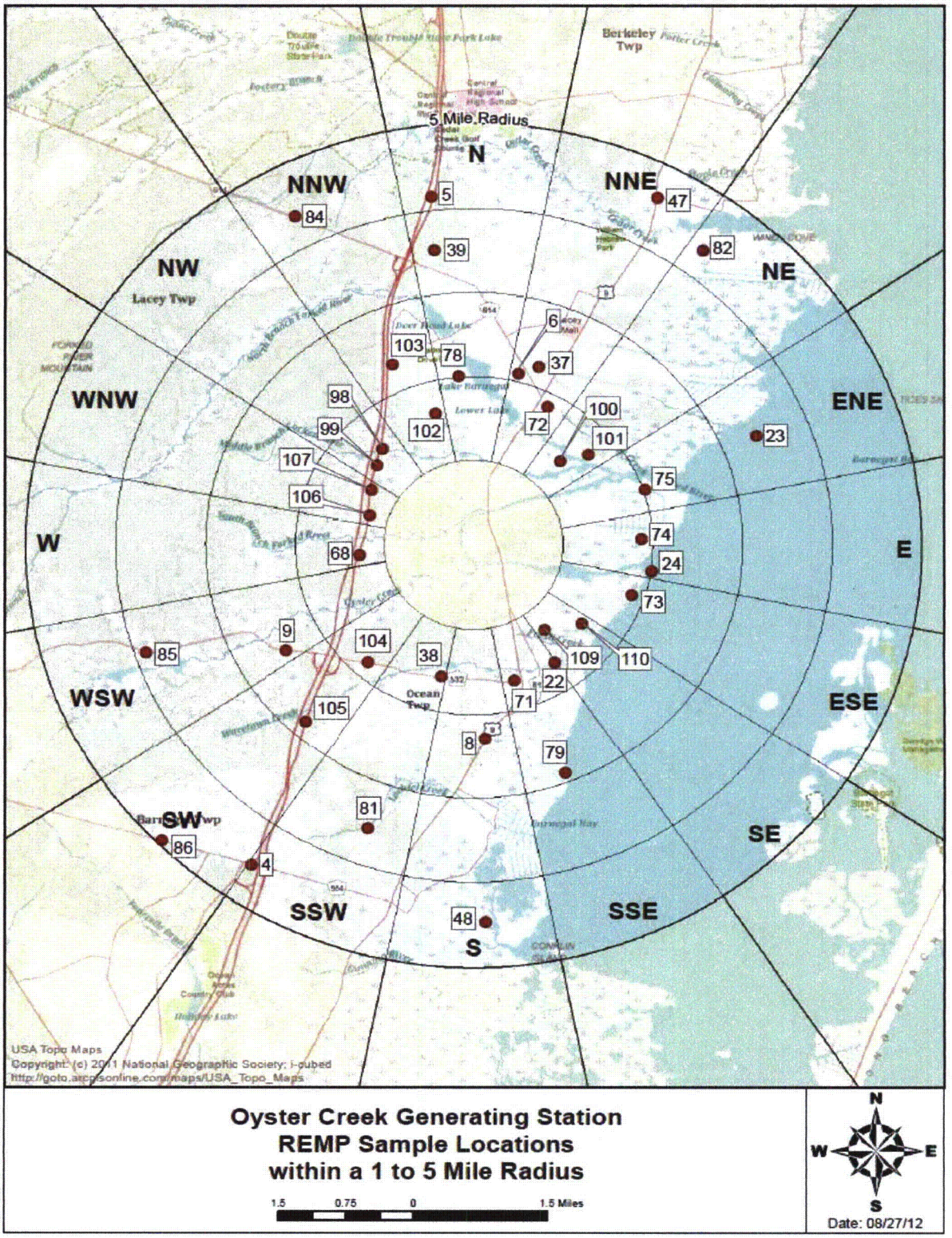


Figure B-2
Locations of REMP Stations within a 1 to 5-mile radius
of the Oyster Creek Generating Station

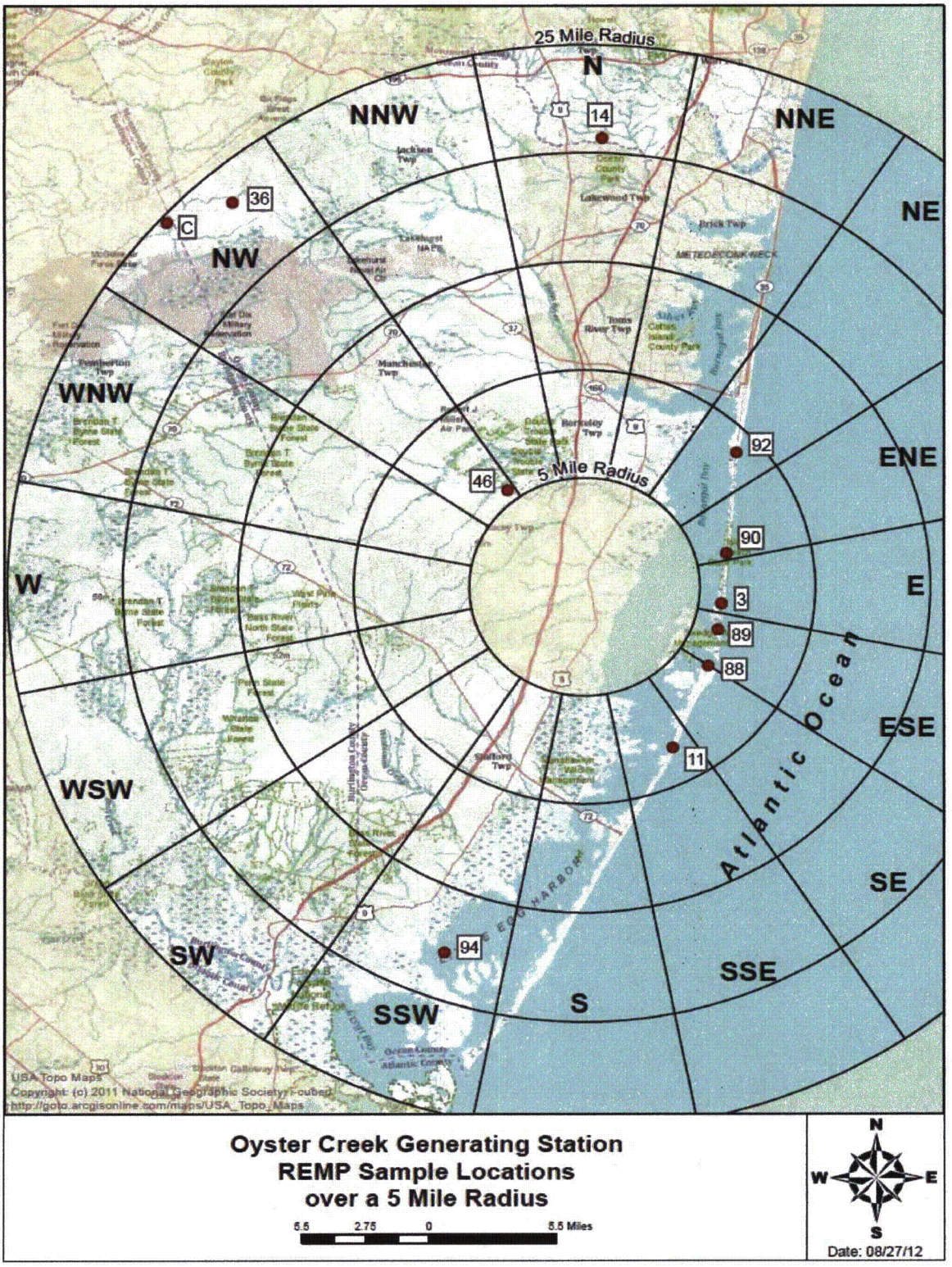


Figure B-3
Locations of REMP Stations greater than 5 miles
from the Oyster Creek Generating Station

APPENDIX C

DATA TABLES AND FIGURES
PRIMARY LABORATORY

Table C-I.1 **CONCENTRATIONS OF TRITIUM IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	23	24	33	94
01/04/13 - 01/31/13			< 172	< 173
02/07/13 - 02/27/13			< 163	< 165
03/05/13 - 03/27/13			< 189	< 192
04/03/13 - 04/25/13	< 195	< 196	< 180	< 177
05/03/13 - 05/30/13			< 169	< 169
06/06/13 - 06/26/13			< 184	< 179
07/02/13 - 08/01/13			< 176	< 177
08/08/13 - 08/29/13			< 188	< 189
09/04/13 - 09/26/13	< 184	< 183	< 177	< 175
10/02/13 - 10/31/13			< 195	< 193
11/08/13 - 11/26/13			< 186	< 188
12/06/13 - 01/02/14			< 175	< 172
MEAN	-	-	-	-

Table C-I.2 **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
23	04/08/13 - 04/08/13	< 4	< 4	< 8	< 5	< 9	< 4	< 7	< 7	< 4	< 4	< 20	< 7
	09/30/13 - 09/30/13	< 4	< 4	< 8	< 4	< 8	< 4	< 7	< 15	< 4	< 4	< 30	< 9
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
24	04/08/13 - 04/08/13	< 4	< 4	< 8	< 5	< 9	< 5	< 9	< 8	< 4	< 5	< 19	< 7
	09/30/13 - 09/30/13	< 5	< 5	< 10	< 5	< 9	< 5	< 8	< 12	< 4	< 5	< 36	< 8
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
33	01/04/13 - 01/30/13	< 6	< 6	< 17	< 6	< 13	< 7	< 11	< 11	< 6	< 6	< 27	< 9
	02/07/13 - 02/27/13	< 4	< 5	< 10	< 5	< 10	< 5	< 8	< 12	< 4	< 4	< 29	< 10
	03/05/13 - 03/27/13	< 4	< 5	< 10	< 5	< 10	< 5	< 9	< 8	< 4	< 5	< 24	< 7
	04/03/13 - 04/24/13	< 3	< 4	< 9	< 3	< 7	< 4	< 6	< 11	< 3	< 3	< 24	< 8
	05/03/13 - 05/30/13	< 4	< 6	< 12	< 7	< 11	< 6	< 9	< 14	< 5	< 5	< 31	< 11
	06/06/13 - 06/26/13	< 1	< 1	< 3	< 1	< 3	< 1	< 3	< 4	< 1	< 1	< 9	< 3
	07/02/13 - 08/01/13	< 1	< 2	< 3	< 2	< 3	< 2	< 3	< 4	< 1	< 1	< 9	< 3
	08/08/13 - 08/28/13	< 3	< 3	< 7	< 3	< 6	< 4	< 6	< 10	< 3	< 3	< 22	< 7
	09/04/13 - 09/26/13	< 4	< 5	< 12	< 5	< 10	< 5	< 8	< 15	< 4	< 5	< 32	< 9
	09/30/13 - 10/31/13	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 6	< 2	< 2	< 13	< 4
	11/08/13 - 11/26/13	< 5	< 6	< 15	< 7	< 11	< 6	< 12	< 11	< 6	< 7	< 30	< 8
	12/06/13 - 01/02/14	< 5	< 6	< 11	< 5	< 12	< 6	< 10	< 13	< 5	< 6	< 33	< 9
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
94	01/04/13 - 01/31/13	< 5	< 6	< 13	< 7	< 12	< 5	< 10	< 11	< 6	< 6	< 30	< 8
	02/07/13 - 02/27/13	< 6	< 6	< 15	< 6	< 12	< 6	< 10	< 15	< 5	< 6	< 35	< 11
	03/05/13 - 03/27/13	< 5	< 5	< 10	< 6	< 9	< 5	< 10	< 8	< 4	< 6	< 23	< 6
	04/05/13 - 04/25/13	< 3	< 4	< 9	< 4	< 6	< 4	< 8	< 14	< 4	< 4	< 27	< 9
	05/03/13 - 05/30/13	< 5	< 5	< 12	< 5	< 9	< 5	< 9	< 14	< 5	< 5	< 34	< 6
	06/06/13 - 06/26/13	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 6	< 2	< 2	< 12	< 4
	07/02/13 - 08/01/13	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 5	< 2	< 2	< 11	< 4
	08/08/13 - 08/29/13	< 4	< 5	< 10	< 4	< 9	< 5	< 8	< 12	< 4	< 5	< 29	< 9
	09/06/13 - 09/26/13	< 4	< 5	< 12	< 4	< 10	< 5	< 8	< 13	< 4	< 4	< 30	< 8
	10/02/13 - 10/31/13	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 6	< 2	< 2	< 15	< 5
	11/08/13 - 11/26/13	< 5	< 5	< 11	< 6	< 13	< 6	< 10	< 9	< 5	< 6	< 26	< 6
	12/06/13 - 01/02/14	< 6	< 7	< 14	< 8	< 12	< 6	< 10	< 14	< 6	< 6	< 40	< 11
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

Table C-II.1 **CONCENTRATIONS OF TRITIUM IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	114	1N	1S	37	38	39
01/04/13 - 01/31/13	< 157	< 174	< 173	< 158	< 156	(1)
02/07/13 - 02/28/13	< 164	(1)	< 165	< 164	< 161	-
03/07/13 - 03/19/13	< 186	< 190 (1)	< 189	< 191	< 189	-
04/05/13 - 04/25/13	< 174	< 180 (1)	< 180	< 177	< 178	-
05/07/13 - 05/28/13	< 167	< 166	< 165	< 165	< 168	-
06/06/13 - 06/26/13	< 183	< 181	< 182	< 179	< 183	-
07/02/13 - 08/01/13	< 180	< 183	< 182 (1)	< 179	< 179	-
08/13/13 - 08/27/13	< 190	< 186 (1)	< 187 (1)	< 187	< 189	-
09/24/13 - 09/24/13	< 178	< 177 (1)	< 177 (1)	< 176	< 175	-
10/23/13 - 10/29/13	< 173	< 198 (1)	< 195 (1)	< 176	< 173	-
11/15/13 - 11/26/13	< 188	< 188	(1)	< 188	< 188 (1)	-
12/06/13 - 01/02/14	< 180	< 176	(1)	< 177	< 163	-
MEAN	-	-	-	-	-	-

Table C-II.2 **CONCENTRATIONS OF GROSS BETA IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	114	1N	1S	37	38	39
01/04/13 - 01/31/13	2.9 ± 1.1	16.9 ± 1.7	6.3 ± 2.0	2.0 ± 1.0	< 1.5	(1)
02/07/13 - 02/28/13	3.8 ± 2.5	(1)	< 3.8	< 3.3	< 3.4	-
03/07/13 - 03/19/13	4.0 ± 1.4	14.9 ± 1.9 (1)	2.8 ± 1.2	1.7 ± 1.0	2.7 ± 1.3	-
04/05/13 - 04/25/13	4.3 ± 1.4	10.8 ± 1.8 (1)	< 1.7	1.9 ± 1.2	2.0 ± 1.2	-
05/07/13 - 05/28/13	3.4 ± 1.0	17.7 ± 1.5	4.8 ± 1.0	1.5 ± 0.8	1.5 ± 0.8	-
06/06/13 - 06/26/13	3.0 ± 1.7	14.4 ± 2.2	< 2.3	< 2.2	< 2.2	-
07/02/13 - 08/01/13	2.1 ± 1.3	17.2 ± 2.2	< 1.8 (1)	< 1.7	< 1.8	-
08/13/13 - 08/27/13	3.2 ± 1.3	14.3 ± 1.9 (1)	2.4 ± 1.2 (1)	1.5 ± 1.1	3.1 ± 1.2	-
09/24/13 - 09/24/13	2.3 ± 1.3	14.2 ± 1.9 (1)	< 1.9 (1)	4.6 ± 1.3	2.6 ± 1.2	-
10/23/13 - 10/29/13	3.0 ± 1.4	13.7 ± 2.0 (1)	2.2 ± 1.2 (1)	2.0 ± 1.2	1.7 ± 1.1	-
11/15/13 - 11/26/13	4.8 ± 1.7	17.3 ± 2.4	(1)	2.2 ± 1.4	< 2.1 (1)	-
12/06/13 - 01/02/14	3.5 ± 1.6	10.7 ± 1.9	(1)	< 1.9	3.2 ± 1.4	-
MEAN	3.4 ± 1.6	14.7 ± 4.9	3.7 ± 3.5	2.2 ± 2.0	2.4 ± 1.3	-

Table C-II.3 **CONCENTRATIONS OF I-131 IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	114	1N	1S	37	38	39
01/04/13 - 01/31/13	< 0.7	< 0.7	< 0.7	< 0.6	< 0.6	(1)
02/07/13 - 02/28/13	< 0.6	< 0.9	< 0.5	< 0.5	< 0.5	-
03/07/13 - 03/19/13	< 0.6	< 0.6 (1)	< 0.3	< 0.3	< 0.6	-
04/05/13 - 04/25/13	< 0.8	< 0.5 (1)	< 0.6	< 0.8	< 0.8	-
05/07/13 - 05/28/13	< 0.6	< 0.7	< 0.6	< 0.6	< 0.6	-
06/06/13 - 06/26/13	< 0.5	< 0.7	< 0.7	< 0.6	< 0.7	-
07/02/13 - 08/01/13	< 0.5	< 0.7	< 0.7 (1)	< 0.5	< 0.5	-
08/13/13 - 08/27/13	< 0.7	< 0.8 (1)	< 1.9 (1)	< 0.8	< 0.6	-
09/24/13 - 09/24/13	< 0.9	< 0.7 (1)	< 0.6 (1)	< 0.6	< 0.8	-
10/23/13 - 10/29/13	< 0.7	< 0.7 (1)	< 0.7 (1)	< 0.6	< 0.6	-
11/15/13 - 11/26/13	< 0.8	< 0.8	(1)	< 0.8	< 0.9	-
12/06/13 - 01/02/14	< 0.6	< 0.6	(1)	< 0.8	< 0.6	-
MEAN	-	-	-	-	-	-

THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES
(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-II.4 **CONCENTRATIONS OF GAMMA EMITTERS IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
114	01/04/13 - 01/31/13	< 5	< 5	< 11	< 5	< 11	< 5	< 8	< 4	< 7	< 26	< 8
	02/07/13 - 02/28/13	< 5	< 4	< 11	< 4	< 11	< 4	< 8	< 4	< 5	< 27	< 10
	03/05/13 - 03/27/13	< 4	< 5	< 9	< 5	< 10	< 4	< 8	< 4	< 5	< 20	< 8
	04/05/13 - 04/25/13	< 4	< 4	< 8	< 3	< 7	< 4	< 6	< 4	< 4	< 27	< 9
	05/03/13 - 05/30/13	< 5	< 6	< 12	< 5	< 12	< 6	< 10	< 5	< 6	< 33	< 9
	06/06/13 - 06/26/13	< 1	< 2	< 3	< 1	< 3	< 1	< 3	< 1	< 1	< 10	< 3
	07/02/13 - 08/01/13	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 2	< 2	< 10	< 3
	08/07/13 - 08/29/13	< 2	< 2	< 5	< 2	< 4	< 3	< 4	< 2	< 2	< 16	< 5
	09/06/13 - 09/26/13	< 3	< 4	< 12	< 3	< 8	< 5	< 8	< 4	< 5	< 28	< 12
	10/02/13 - 10/31/13	< 1	< 2	< 3	< 1	< 3	< 2	< 3	< 1	< 1	< 11	< 4
	11/08/13 - 11/26/13	< 6	< 6	< 12	< 6	< 10	< 6	< 11	< 5	< 7	< 27	< 9
	12/06/13 - 01/02/14	< 6	< 6	< 12	< 6	< 11	< 7	< 12	< 5	< 7	< 38	< 11
	MEAN	-	-	-	-	-	-	-	-	-	-	-
1N	01/02/13 - 01/29/13	< 5	< 5	< 13	< 7	< 15	< 6	< 9	< 5	< 6	< 29	< 8
	02/05/13 - 02/12/13 (1)	-	-	-	-	-	-	-	-	-	-	-
	03/07/13 - 03/19/13 (1)	< 3	< 3	< 8	< 3	< 7	< 4	< 5	< 3	< 3	< 21	< 6
	04/03/13 - 04/23/13 (1)	< 3	< 3	< 7	< 3	< 6	< 3	< 6	< 3	< 3	< 26	< 9
	05/07/13 - 05/28/13	< 4	< 5	< 8	< 4	< 8	< 5	< 8	< 5	< 5	< 28	< 11
	06/04/13 - 06/25/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 2	< 2	< 15	< 5
	07/02/13 - 07/30/13	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 2	< 2	< 13	< 4
	08/13/13 - 08/27/13 (1)	< 3	< 3	< 7	< 3	< 6	< 3	< 6	< 3	< 3	< 23	< 6
	09/03/13 - 09/17/13 (1)	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 2	< 2	< 21	< 6
	10/23/13 - 10/29/13 (1)	< 1	< 2	< 3	< 2	< 3	< 2	< 3	< 1	< 1	< 12	< 4
	11/05/13 - 11/25/13	< 8	< 8	< 16	< 6	< 15	< 7	< 14	< 6	< 8	< 39	< 11
	12/02/13 - 12/30/13	< 4	< 6	< 10	< 5	< 8	< 5	< 9	< 4	< 5	< 32	< 11
	MEAN	-	-	-	-	-	-	-	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-II.4 **CONCENTRATIONS OF GAMMA EMITTERS IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
1S	01/02/13 - 01/29/13	< 5	< 5	< 11	< 5	< 11	< 6	< 10	< 5	< 6	< 28	< 8
	02/05/13 - 02/26/13	< 3	< 3	< 7	< 3	< 6	< 4	< 6	< 3	< 3	< 25	< 8
	03/05/13 - 03/26/13	< 4	< 4	< 9	< 4	< 10	< 4	< 8	< 4	< 5	< 19	< 7
	04/02/13 - 04/23/13	< 2	< 3	< 6	< 3	< 5	< 3	< 5	< 3	< 3	< 23	< 7
	04/30/13 - 05/28/13	< 5	< 7	< 13	< 5	< 10	< 7	< 9	< 6	< 6	< 32	< 12
	06/04/13 - 06/25/13	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 1	< 2	< 11	< 4
	07/02/13 - 07/30/13 (1)	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 2	< 2	< 11	< 4
	08/06/13 - 08/06/13 (1)	< 1	< 1	< 3	< 1	< 2	< 1	< 3	< 1	< 1	< 19	< 6
	09/24/13 - 09/24/13 (1)	< 4	< 4	< 9	< 4	< 9	< 4	< 7	< 4	< 4	< 29	< 9
	10/01/13 - 10/22/13 (1)	< 1	< 2	< 4	< 1	< 3	< 2	< 3	< 1	< 1	< 17	< 5
	11/05/13 - 11/25/13 (1)	-	-	-	-	-	-	-	-	-	-	-
	12/02/13 - 12/30/13 (1)	-	-	-	-	-	-	-	-	-	-	-
	MEAN	-	-	-	-	-	-	-	-	-	-	-
37	01/04/13 - 01/30/13	< 4	< 5	< 9	< 5	< 10	< 5	< 8	< 4	< 5	< 22	< 8
	02/06/13 - 02/27/13	< 5	< 6	< 10	< 5	< 11	< 6	< 9	< 5	< 6	< 33	< 9
	03/05/13 - 03/27/13	< 5	< 6	< 9	< 4	< 9	< 5	< 11	< 5	< 5	< 29	< 7
	04/05/13 - 04/25/13	< 5	< 5	< 8	< 4	< 9	< 4	< 7	< 4	< 4	< 27	< 11
	05/03/13 - 05/30/13	< 5	< 6	< 13	< 7	< 12	< 7	< 8	< 5	< 6	< 31	< 11
	06/06/13 - 06/26/13	< 2	< 2	< 4	< 1	< 3	< 2	< 3	< 1	< 2	< 10	< 3
	07/02/13 - 07/31/13	< 2	< 3	< 5	< 2	< 5	< 2	< 5	< 2	< 2	< 15	< 5
	08/07/13 - 08/28/13	< 3	< 3	< 6	< 3	< 6	< 3	< 5	< 3	< 3	< 20	< 7
	09/04/13 - 09/25/13	< 4	< 4	< 11	< 4	< 10	< 6	< 9	< 4	< 5	< 29	< 13
	10/02/13 - 10/30/13	< 1	< 1	< 3	< 1	< 3	< 1	< 2	< 1	< 1	< 11	< 3
	11/08/13 - 11/26/13	< 5	< 6	< 10	< 6	< 12	< 6	< 9	< 6	< 6	< 24	< 11
	12/06/13 - 01/02/14	< 4	< 6	< 9	< 5	< 9	< 5	< 9	< 4	< 5	< 30	< 8
	MEAN	-	-	-	-	-	-	-	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-II.4 **CONCENTRATIONS OF GAMMA EMITTERS IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
38	01/04/13 - 01/31/13	< 5	< 5	< 11	< 6	< 9	< 5	< 11	< 5	< 5	< 27	< 9
	02/07/13 - 02/28/13	< 4	< 5	< 10	< 5	< 10	< 5	< 10	< 4	< 6	< 28	< 11
	03/05/13 - 03/27/13	< 4	< 4	< 7	< 4	< 8	< 4	< 6	< 4	< 4	< 20	< 7
	04/05/13 - 04/25/13	< 4	< 4	< 8	< 4	< 8	< 4	< 7	< 3	< 4	< 29	< 9
	05/03/13 - 05/30/13	< 5	< 5	< 10	< 5	< 10	< 6	< 10	< 4	< 4	< 28	< 10
	06/06/13 - 06/26/13	< 2	< 2	< 6	< 2	< 5	< 3	< 5	< 2	< 2	< 16	< 5
	07/02/13 - 08/01/13	< 2	< 2	< 3	< 2	< 3	< 2	< 3	< 1	< 2	< 9	< 3
	08/08/13 - 08/29/13	< 2	< 3	< 6	< 3	< 5	< 3	< 5	< 2	< 3	< 17	< 6
	09/06/13 - 09/26/13	< 5	< 5	< 9	< 4	< 11	< 5	< 9	< 4	< 5	< 33	< 9
	10/02/13 - 10/30/13	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 1	< 2	< 13	< 4
	11/15/13 - 11/26/13 (1)	< 5	< 5	< 8	< 6	< 11	< 6	< 9	< 5	< 5	< 23	< 7
	12/06/13 - 01/02/14	< 6	< 7	< 15	< 6	< 13	< 6	< 9	< 5	< 5	< 40	< 14
	MEAN	-	-	-	-	-	-	-	-	-	-	-
39	01/04/13 - 01/31/13 (1)	-	-	-	-	-	-	-	-	-	-	-
	02/07/13 - 02/28/13	-	-	-	-	-	-	-	-	-	-	-
	03/05/13 - 03/27/13	-	-	-	-	-	-	-	-	-	-	-
	04/05/13 - 04/25/13	-	-	-	-	-	-	-	-	-	-	-
	05/03/13 - 05/30/13	-	-	-	-	-	-	-	-	-	-	-
	06/06/13 - 06/26/13	-	-	-	-	-	-	-	-	-	-	-
	07/02/13 - 08/01/13	-	-	-	-	-	-	-	-	-	-	-
	08/08/13 - 08/29/13	-	-	-	-	-	-	-	-	-	-	-
	09/06/13 - 09/26/13	-	-	-	-	-	-	-	-	-	-	-
	10/02/13 - 10/30/13	-	-	-	-	-	-	-	-	-	-	-
	11/15/13 - 11/26/13	-	-	-	-	-	-	-	-	-	-	-
	12/06/13 - 01/02/14	-	-	-	-	-	-	-	-	-	-	-
	MEAN	-	-	-	-	-	-	-	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-III.1 **CONCENTRATIONS OF TRITIUM IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	MW-24-3A	W-3C
01/09/13 - 01/09/13	< 171	< 168
04/11/13 - 04/11/13	< 195	< 192
07/16/13 - 07/16/13	< 188	< 184
11/21/13 - 11/21/13	< 190	< 161
MEAN	-	-

Table C-III.2 **CONCENTRATIONS OF GAMMA EMITTERS IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
MW-24-3A	01/09/13 - 01/09/13	< 3	< 3	< 9	< 3	< 6	< 4	< 7	< 10	< 4	< 4	< 24	< 8
	04/11/13 - 04/11/13	< 5	< 4	< 12	< 5	< 9	< 4	< 9	< 13	< 4	< 5	< 32	< 9
	07/16/13 - 07/16/13	< 4	< 5	< 11	< 5	< 10	< 5	< 8	< 13	< 4	< 4	< 30	< 10
	11/21/13 - 11/21/13	< 4	< 4	< 8	< 4	< 9	< 5	< 7	< 11	< 3	< 4	< 26	< 8
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
W-3C	01/09/13 - 01/09/13	< 7	< 7	< 15	< 6	< 13	< 6	< 10	< 15	< 5	< 6	< 45	< 13
	04/11/13 - 04/11/13	< 5	< 4	< 10	< 5	< 9	< 5	< 7	< 12	< 4	< 4	< 27	< 8
	07/16/13 - 07/16/13	< 4	< 4	< 8	< 4	< 7	< 4	< 8	< 13	< 4	< 4	< 28	< 6
	11/21/13 - 11/21/13	< 5	< 5	< 14	< 5	< 12	< 6	< 7	< 14	< 5	< 5	< 24	< 9
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

Table C-IV.1 **CONCENTRATIONS OF GAMMA EMITTERS IN PREDATOR AND BOTTOM FEEDER (FISH) SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013**

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137
33	PREDATOR								
	04/08/13	4566 ± 969	< 68	< 62	< 159	< 62	< 129	< 58	< 70
	04/09/13	5102 ± 1149	< 60	< 81	< 203	< 76	< 136	< 63	< 65
	09/30/13	3791 ± 953	< 69	< 70	< 169	< 70	< 127	< 52	< 59
	09/30/13	5100 ± 1126	< 72	< 92	< 208	< 67	< 163	< 71	< 77
	MEAN	4640 ± 1239	-	-	-	-	-	-	-
33	BOTTOM FEEDER								
	09/30/13	4122 ± 820	< 36	< 44	< 127	< 38	< 99	< 39	< 42
	MEAN	-	-	-	-	-	-	-	-
93	PREDATOR								
	04/09/13	4533 ± 871	< 45	< 57	< 131	< 57	< 94	< 56	< 54
	10/01/13	4097 ± 926	< 48	< 58	< 164	< 66	< 141	< 45	< 56
	10/01/13	3949 ± 873	< 55	< 76	< 161	< 66	< 117	< 53	< 59
	10/01/13	5027 ± 847	< 47	< 64	< 120	< 71	< 138	< 37	< 46
	MEAN	4402 ± 970	-	-	-	-	-	-	-
93	BOTTOM FEEDER								
	04/10/13	5429 ± 1343	< 63	< 74	< 136	< 69	< 146	< 62	< 61
	04/10/13	4824 ± 1006	< 64	< 74	< 125	< 60	< 136	< 72	< 79
	10/01/13	4026 ± 1002	< 72	< 82	< 177	< 53	< 143	< 78	< 72
	MEAN	4760 ± 1407	-	-	-	-	-	-	-
94	PREDATOR								
	04/09/13	3651 ± 1291	< 93	< 95	< 214	< 64	< 204	< 89	< 83
	04/09/13	3207 ± 795	< 51	< 47	< 123	< 59	< 99	< 48	< 42
	10/02/13	4145 ± 864	< 40	< 57	< 115	< 55	< 125	< 37	< 41
	MEAN	3668 ± 938	-	-	-	-	-	-	-
94	BOTTOM FEEDER								
	10/02/13	4450 ± 905	< 50	< 59	< 142	< 61	< 107	< 48	< 56
	10/02/13	5100 ± 1471	< 77	< 85	< 177	< 83	< 127	< 70	< 87
	MEAN	4775 ± 919	-	-	-	-	-	-	-

Table C-IV.2 CONCENTRATIONS OF GAMMA EMITTERS IN CLAM AND CRAB SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137
23	CLAMS								
	04/08/13	1370 ± 410	< 30	< 32	< 80	< 32	< 68	< 36	< 43
	09/30/13	1911 ± 610	< 37	< 64	< 169	< 45	< 109	< 41	< 39
	MEAN	1641 ± 765	-	-	-	-	-	-	-
24	CLAMS								
	04/08/13	2199 ± 445	< 30	< 26	< 55	< 31	< 51	< 24	< 25
	09/30/13	1356 ± 623	< 46	< 53	< 134	< 46	< 100	< 42	< 36
	MEAN	1778 ± 1192	-	-	-	-	-	-	-
33	CRABS								
	09/27/13	2718 ± 785	< 39	< 51	< 147	< 50	< 85	< 45	< 42
	MEAN	-	-	-	-	-	-	-	-
93	CRABS								
	09/27/13	1983 ± 774	< 40	< 56	< 124	< 41	< 92	< 47	< 40
	MEAN	-	-	-	-	-	-	-	-
94	CLAMS								
	04/09/13	2064 ± 614	< 33	< 38	< 72	< 39	< 72	< 36	< 40
	10/02/13	1421 ± 631	< 37	< 37	< 109	< 44	< 71	< 30	< 35
	MEAN	1743 ± 909	-	-	-	-	-	-	-

Table C-V.1 CONCENTRATIONS OF GAMMA EMITTERS IN SEDIMENT SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013

RESULTS IN UNITS OF PCI/KG DRY ± 2 SIGMA

SITE	COLLECTION PERIOD	Be-7	K-40	Mn-54	Co-58	Co-60	Cs-134	Cs-137
23	04/08/13	< 270	3191 ± 560	< 27	< 32	< 34	< 26	< 31
	09/30/13	< 541	8800 ± 926	< 53	< 53	< 62	< 40	< 55
	MEAN	-	5996 ± 7932	-	-	-	-	-
24	04/08/13	< 436	11820 ± 1066	< 45	< 42	< 51	< 45	< 47
	09/30/13	< 502	975 ± 501	< 41	< 47	< 42	< 36	< 37
	MEAN	-	6398 ± 15337	-	-	-	-	-
33	04/08/13	< 413	11270 ± 1130	< 56	< 49	< 56	< 47	< 63
	09/30/13	< 403	1371 ± 549	< 35	< 35	< 35	< 34	< 35
	MEAN	-	6321 ± 13999	-	-	-	-	-
94	04/09/13	< 629	15220 ± 1369	< 68	< 59	< 75	< 65	< 84
	10/02/13	< 700	19000 ± 1292	< 60	< 65	< 67	< 66	< 62
	MEAN	-	17110 ± 5346	-	-	-	-	-

Table C-VI.1 **CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013**

RESULTS IN UNITS OF E-3 PCI/CU METER ± 2 SIGMA

COLLECTION	GROUP I			GROUP II			GROUP III	
PERIOD	20	66	111	71	72	73	3	C
01/02/13 - 01/09/13	39 ± 6	32 ± 6	28 ± 6	27 ± 6	34 ± 6	29 ± 6	(1)	32 ± 6
01/09/13 - 01/16/13	16 ± 5	14 ± 5	11 ± 5	15 ± 5	18 ± 6	18 ± 6	(1)	18 ± 5
01/16/13 - 01/23/13	19 ± 5	16 ± 5	28 ± 6	18 ± 5	17 ± 6	21 ± 5	20 ± 5	11 ± 5
01/23/13 - 01/30/13	19 ± 6	13 ± 5	19 ± 6	18 ± 6	26 ± 7	18 ± 6	24 ± 6	19 ± 6
01/30/13 - 02/06/13	20 ± 5	16 ± 5	22 ± 6	17 ± 5	19 ± 6	18 ± 5	23 ± 6	26 ± 6
02/06/13 - 02/13/13	16 ± 4	16 ± 4	17 ± 4	13 ± 4	16 ± 4	13 ± 4	10 ± 3	15 ± 4
02/13/13 - 02/20/13	18 ± 6	10 ± 5	16 ± 5	20 ± 6	22 ± 6	16 ± 6	18 ± 6	20 ± 6
02/20/13 - 02/27/13	10 ± 5	9 ± 5	8 ± 5	9 ± 5	11 ± 5	9 ± 5	9 ± 5	10 ± 5
02/27/13 - 03/05/13	< 8	11 ± 6	9 ± 5	10 ± 6	11 ± 5	9 ± 5	11 ± 5	< 8
03/05/13 - 03/12/13	< 7	8 ± 5	< 7	< 7	< 7	< 7	< 7	< 7
03/12/13 - 03/20/13	13 ± 4	13 ± 5	14 ± 4	17 ± 5	18 ± 5	10 ± 4	13 ± 4	15 ± 5
03/20/13 - 03/27/13	10 ± 4	8 ± 4	9 ± 4	10 ± 4	10 ± 4	10 ± 4	16 ± 7	12 ± 4
03/27/13 - 04/03/13	< 6	7 ± 4	7 ± 4	10 ± 4	6 ± 4	7 ± 4	9 ± 4	< 6
04/03/13 - 04/10/13	15 ± 5	18 ± 5	20 ± 5	19 ± 5	15 ± 5	16 ± 5	15 ± 5	17 ± 5
04/10/13 - 04/17/13	8 ± 5	9 ± 5	9 ± 4	9 ± 4	9 ± 5	10 ± 5	< 7	10 ± 5
04/17/13 - 04/24/13	13 ± 4	14 ± 4	9 ± 4	9 ± 4	8 ± 4	11 ± 4	9 ± 4	14 ± 4
04/24/13 - 05/01/13	16 ± 5	18 ± 5	20 ± 5	15 ± 5	16 ± 5	15 ± 5	12 ± 4	17 ± 5
05/01/13 - 05/08/13	9 ± 4	< 6	< 6	7 ± 4	9 ± 4	< 6	< 6	< 6
05/08/13 - 05/15/13	14 ± 4	17 ± 4	15 ± 4	20 ± 4	17 ± 4	16 ± 4	17 ± 4	16 ± 4
05/15/13 - 05/21/13	15 ± 5	12 ± 5	17 ± 5	17 ± 5	13 ± 5	13 ± 5	13 ± 5	15 ± 5
05/21/13 - 05/29/13	14 ± 4	11 ± 4	16 ± 4	14 ± 4	11 ± 4	12 ± 4	12 ± 4	13 ± 4
05/29/13 - 06/05/13	8 ± 5	13 ± 5	10 ± 5	12 ± 5	11 ± 5	8 ± 5	11 ± 5	12 ± 5
06/05/13 - 06/12/13	8 ± 4	8 ± 4	7 ± 4	10 ± 4	8 ± 4	8 ± 4	7 ± 4	8 ± 4
06/12/13 - 06/19/13	14 ± 5	10 ± 4	11 ± 4	15 ± 5	12 ± 4	13 ± 4	9 ± 4	11 ± 4
06/19/13 - 06/26/13	13 ± 5	11 ± 4	15 ± 4	10 ± 4	11 ± 4	9 ± 6	8 ± 5	13 ± 4
06/26/13 - 07/02/13	11 ± 5	12 ± 6	8 ± 5	12 ± 6	11 ± 5	(1)	9 ± 5	10 ± 5
07/02/13 - 07/10/13	< 7	8 ± 4	11 ± 4	6 ± 4	9 ± 4	7 ± 4	< 6	7 ± 4
07/10/13 - 07/17/13	(1)	12 ± 4	11 ± 4	14 ± 4	14 ± 4	10 ± 4	9 ± 4	17 ± 4
07/17/13 - 07/25/13	11 ± 4	16 ± 5	14 ± 4	12 ± 4	16 ± 4	15 ± 4	9 ± 4	11 ± 4
07/25/13 - 07/31/13	< 7	9 ± 5	13 ± 5	9 ± 5	9 ± 5	8 ± 5	< 7	11 ± 5
07/31/13 - 08/07/13	15 ± 4	15 ± 4	17 ± 4	16 ± 4	18 ± 5	19 ± 5	19 ± 5	19 ± 5
08/07/13 - 08/14/13	15 ± 5	10 ± 5	10 ± 5	8 ± 5	11 ± 5	9 ± 5	15 ± 5	9 ± 5
08/14/13 - 08/21/13	8 ± 4	12 ± 5	12 ± 4	9 ± 4	10 ± 4	11 ± 5	10 ± 4	18 ± 5
08/21/13 - 08/28/13	11 ± 4	< 6	13 ± 4	13 ± 5	13 ± 5	15 ± 5	13 ± 5	16 ± 5
08/28/13 - 09/04/13	38 ± 6	24 ± 5	19 ± 5	20 ± 5	21 ± 5	14 ± 5	24 ± 5	18 ± 5
09/04/13 - 09/11/13	17 ± 5	16 ± 5	14 ± 5	17 ± 5	17 ± 5	14 ± 5	17 ± 5	16 ± 5
09/11/13 - 09/18/13	20 ± 5	16 ± 5	19 ± 5	19 ± 5	16 ± 5	18 ± 5	14 ± 5	21 ± 5
09/18/13 - 09/25/13	8 ± 4	10 ± 4	9 ± 4	11 ± 4	13 ± 5	10 ± 4	8 ± 4	9 ± 4
09/25/13 - 10/02/13	14 ± 5	11 ± 4	14 ± 4	13 ± 5	14 ± 5	14 ± 5	10 ± 4	12 ± 4
10/02/13 - 10/09/13	26 ± 6	29 ± 6	23 ± 5	26 ± 6	23 ± 5	28 ± 6	25 ± 6	24 ± 5
10/09/13 - 10/16/13	11 ± 4	13 ± 5	11 ± 4	11 ± 4	13 ± 4	11 ± 4	11 ± 4	13 ± 4
10/16/13 - 10/23/13	18 ± 5	13 ± 5	16 ± 5	15 ± 5	13 ± 5	13 ± 5	16 ± 5	17 ± 5
10/23/13 - 10/30/13	13 ± 5	15 ± 5	16 ± 5	11 ± 4	18 ± 5	13 ± 5	13 ± 5	17 ± 5
10/30/13 - 11/06/13	17 ± 5	24 ± 5	16 ± 5	21 ± 5	20 ± 5	16 ± 5	19 ± 5	22 ± 5
11/06/13 - 11/13/13	8 ± 4	10 ± 4	10 ± 4	15 ± 5	8 ± 4	14 ± 5	11 ± 4	10 ± 4
11/13/13 - 11/20/13	13 ± 5	15 ± 5	14 ± 4	15 ± 5	11 ± 4	12 ± 5	14 ± 5	14 ± 5
11/20/13 - 11/26/13	< 8	11 ± 5	14 ± 5	< 8	10 ± 5	< 8	< 8	9 ± 5
11/26/13 - 12/04/13	17 ± 4	20 ± 5	21 ± 4	20 ± 4	16 ± 4	15 ± 4	14 ± 4	21 ± 4
12/04/13 - 12/12/13	19 ± 5	17 ± 4	18 ± 4	18 ± 5	22 ± 5	16 ± 4	15 ± 4	24 ± 5
12/12/13 - 12/18/13	19 ± 6	16 ± 6	23 ± 6	24 ± 6	20 ± 6	22 ± 6	18 ± 6	24 ± 6
12/18/13 - 12/26/13	15 ± 4	11 ± 4	15 ± 4	13 ± 4	15 ± 4	15 ± 4	13 ± 4	16 ± 4
12/26/13 - 01/02/14	18 ± 5	16 ± 5	20 ± 5	18 ± 5	20 ± 5	17 ± 5	16 ± 5	18 ± 5
MEAN	15 ± 13	14 ± 10	15 ± 10	15 ± 10	15 ± 11	14 ± 10	14 ± 9	16 ± 10

THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES
(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-VI.2 **MONTHLY AND YEARLY MEAN VALUES OF GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013**

RESULTS IN UNITS OF E-3 PCI/CU METER ± 2 SIGMA

GROUP I - ON-SITE LOCATIONS				GROUP II - INTERMEDIATE DISTANCE LOCATIONS				GROUP III - CONTROL LOCATIONS			
COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD	COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD	COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD
01/02/13 - 01/30/13	11	39	21 ± 17	01/02/13 - 01/30/13	15	34	21 ± 12	01/02/13 - 01/30/13	11	32	20 ± 14
01/30/13 - 02/27/13	8	22	15 ± 9	01/30/13 - 02/27/13	9	22	15 ± 8	01/30/13 - 02/27/13	9	26	16 ± 13
02/27/13 - 04/03/13	7	14	10 ± 5	02/27/13 - 04/03/13	6	18	11 ± 7	02/27/13 - 04/03/13	9	16	13 ± 5
04/03/13 - 05/01/13	8	20	14 ± 9	04/03/13 - 05/01/13	8	19	13 ± 8	04/03/13 - 05/01/13	9	17	13 ± 7
05/01/13 - 05/29/13	9	17	14 ± 5	05/01/13 - 05/29/13	7	20	14 ± 8	05/08/13 - 05/29/13	12	17	15 ± 4
05/29/13 - 07/02/13	7	15	11 ± 5	05/29/13 - 07/02/13	8	15	11 ± 4	05/29/13 - 07/02/13	7	13	10 ± 3
07/02/13 - 07/31/13	8	16	12 ± 5	07/02/13 - 07/31/13	6	16	11 ± 6	07/02/13 - 07/31/13	7	17	11 ± 7
07/31/13 - 09/04/13	8	38	16 ± 16	07/31/13 - 09/04/13	8	21	14 ± 8	07/31/13 - 09/04/13	9	24	16 ± 9
09/04/13 - 10/02/13	8	20	14 ± 8	09/04/13 - 10/02/13	10	19	15 ± 6	09/04/13 - 10/02/13	8	21	13 ± 9
10/02/13 - 10/30/13	11	29	17 ± 12	10/02/13 - 10/30/13	11	28	16 ± 12	10/02/13 - 10/30/13	11	25	17 ± 10
10/30/13 - 12/04/13	8	24	15 ± 9	10/30/13 - 12/04/13	8	21	15 ± 8	10/30/13 - 12/04/13	9	22	15 ± 9
12/04/13 - 01/02/14	11	23	17 ± 6	12/04/13 - 01/02/14	13	24	18 ± 7	12/04/13 - 01/02/14	13	24	18 ± 8
01/02/13 - 01/02/14	7	39	15 ± 11	01/02/13 - 01/02/14	6	34	14 ± 10	01/02/13 - 01/02/14	7	32	15 ± 10

Table C-VI.3 **CONCENTRATIONS OF STRONTIUM IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013**

RESULTS IN UNITS OF E-3 PCI/CU METER ± 2 SIGMA

SITE	COLLECTION PERIOD	SR-89	SR-90
3	01/02/13 - 04/03/13	< 6	< 6
	04/03/13 - 07/02/13	< 4	< 5
	07/02/13 - 10/02/13	< 9	< 2
	10/02/13 - 01/02/14	< 6	< 3
	MEAN	-	-
20	01/02/13 - 04/03/13	< 5	< 5
	04/03/13 - 07/02/13	< 4	< 2
	07/02/13 - 10/02/13	< 8	< 3
	10/02/13 - 01/02/14	< 6	< 3
	MEAN	-	-
66	01/02/13 - 04/03/13	< 5	< 5
	04/03/13 - 07/02/13	< 4	< 2
	07/02/13 - 10/02/13	< 10	< 2
	10/02/13 - 01/02/14	< 9	< 3
	MEAN	-	-
71	01/02/13 - 04/03/13	< 5	< 6
	04/03/13 - 07/02/13	< 4	< 2
	07/02/13 - 10/02/13	< 7	< 2
	10/02/13 - 01/02/14	< 8	< 4
	MEAN	-	-

SITE	COLLECTION PERIOD	SR-89	SR-90
72	01/02/13 - 04/03/13	< 6	< 5
	04/03/13 - 07/02/13	< 4	< 2
	07/02/13 - 10/02/13	< 10	< 2
	10/02/13 - 01/02/14	< 6	< 3
	MEAN	-	-
73	01/02/13 - 04/03/13	< 5	< 4
	04/03/13 - 06/26/13	< 4	< 2
	07/02/13 - 10/02/13	< 9	< 3
	10/02/13 - 01/02/14	< 9	< 2
	MEAN	-	-
111	01/02/13 - 04/03/13	< 5	< 5
	04/03/13 - 07/02/13	< 3	< 2
	07/02/13 - 10/02/13	< 9	< 2
	10/02/13 - 01/02/14	< 9	< 2
	MEAN	-	-
C	01/02/13 - 04/03/13	< 5	< 4
	04/03/13 - 07/02/13	< 4	< 2
	07/02/13 - 10/02/13	< 10	< 2
	10/02/13 - 01/02/14	< 10	< 4
	MEAN	-	-

Table C-VI.4 **CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013**

RESULTS IN UNITS OF E-3 PCI/CU METER ± 2 SIGMA

SITE	COLLECTION PERIOD	Be-7	Mn-54	Co-58	Co-60	Cs-134	Cs-137
3	01/02/13 - 04/03/13	66 ± 23	< 4	< 5	< 3	< 4	< 2
	04/03/13 - 07/02/13	58 ± 30	< 2	< 3	< 2	< 2	< 2
	07/02/13 - 10/02/13	33 ± 26	< 3	< 3	< 3	< 3	< 3
	10/02/13 - 01/02/14	60 ± 18	< 2	< 2	< 3	< 2	< 3
	MEAN	54 ± 29	-	-	-	-	-
20	01/02/13 - 04/03/13	56 ± 31	< 3	< 4	< 3	< 3	< 3
	04/03/13 - 07/02/13	65 ± 21	< 1	< 2	< 1	< 1	< 2
	07/02/13 - 10/02/13	61 ± 20	< 2	< 3	< 2	< 3	< 2
	10/02/13 - 01/02/14	56 ± 19	< 3	< 2	< 2	< 2	< 3
	MEAN	59 ± 9	-	-	-	-	-
66	01/02/13 - 04/03/13	50 ± 17	< 2	< 3	< 2	< 2	< 2
	04/03/13 - 07/02/13	68 ± 21	< 1	< 2	< 2	< 2	< 2
	07/02/13 - 10/02/13	51 ± 16	< 2	< 2	< 2	< 2	< 2
	10/02/13 - 01/02/14	59 ± 14	< 2	< 3	< 3	< 2	< 3
	MEAN	57 ± 16	-	-	-	-	-
71	01/02/13 - 04/03/13	77 ± 22	< 3	< 3	< 3	< 2	< 2
	04/03/13 - 07/02/13	59 ± 20	< 2	< 2	< 2	< 1	< 2
	07/02/13 - 10/02/13	52 ± 22	< 2	< 2	< 2	< 2	< 2
	10/02/13 - 01/02/14	54 ± 21	< 2	< 2	< 3	< 2	< 2
	MEAN	60 ± 23	-	-	-	-	-
72	01/02/13 - 04/03/13	64 ± 23	< 4	< 4	< 3	< 3	< 3
	04/03/13 - 07/02/13	74 ± 19	< 2	< 2	< 1	< 2	< 1
	07/02/13 - 10/02/13	65 ± 18	< 2	< 2	< 1	< 1	< 1
	10/02/13 - 01/02/14	48 ± 23	< 3	< 3	< 3	< 3	< 3
	MEAN	63 ± 21	-	-	-	-	-
73	01/02/13 - 04/03/13	43 ± 22	< 3	< 4	< 3	< 3	< 2
	04/03/13 - 06/26/13	47 ± 25	< 2	< 1	< 1	< 1	< 2
	07/02/13 - 10/02/13	30 ± 15	< 2	< 2	< 2	< 2	< 2
	10/02/13 - 01/02/14	58 ± 17	< 3	< 2	< 3	< 2	< 3
	MEAN	44 ± 23	-	-	-	-	-
111	01/02/13 - 04/03/13	48 ± 21	< 3	< 3	< 4	< 3	< 3
	04/03/13 - 07/02/13	54 ± 24	< 2	< 3	< 3	< 2	< 3
	07/02/13 - 10/02/13	52 ± 25	< 3	< 4	< 4	< 3	< 3
	10/02/13 - 01/02/14	43 ± 19	< 3	< 4	< 4	< 3	< 3
	MEAN	50 ± 10	-	-	-	-	-
C	01/02/13 - 04/03/13	49 ± 19	< 2	< 3	< 2	< 2	< 2
	04/03/13 - 07/02/13	71 ± 18	< 2	< 2	< 2	< 1	< 1
	07/02/13 - 10/02/13	62 ± 19	< 1	< 2	< 1	< 1	< 1
	10/02/13 - 01/02/14	59 ± 16	< 3	< 2	< 3	< 2	< 2
	MEAN	60 ± 18	-	-	-	-	-

Table C-VII.1 **CONCENTRATIONS OF I-131 IN AIR IODINE SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013**

RESULTS IN UNITS OF E-3 PCI/CU METER ± 2 SIGMA

COLLECTION	GROUP I			GROUP II			GROUP III	
PERIOD	20	66	111	71	72	73	3	C
01/02/13 - 01/09/13	< 23	< 56	< 54	< 55	< 28	< 56	(1)	< 65
01/09/13 - 01/16/13	< 58	< 59	< 57	< 25	< 58	< 59	(1)	< 68
01/16/13 - 01/23/13	< 52	< 56	< 54	< 56	< 66	< 56	< 22	< 56
01/23/13 - 01/30/13	< 48	< 40	< 38	< 40	< 53	< 40	< 48	< 49
01/30/13 - 02/06/13	< 35	< 31	< 30	< 45	< 36	< 31	< 34	< 15
02/06/13 - 02/13/13	< 51	< 67	< 68	< 67	< 53	< 67	< 51	< 53
02/13/13 - 02/20/13	< 52	< 55	< 53	< 55	< 58	< 24	< 52	< 63
02/20/13 - 02/27/13	< 52	< 42	< 41	< 42	< 54	< 41	< 52	< 54
02/27/13 - 03/05/13	< 30	< 40	< 38	< 40	< 30	< 41	< 30	< 39
03/05/13 - 03/12/13	< 27	< 21	< 20	< 21	< 27	< 21	< 27	< 27
03/12/13 - 03/20/13	< 26	< 26	< 25	< 11	< 27	< 26	< 27	< 27
03/20/13 - 03/27/13	< 22	< 22	< 21	< 22	< 21	< 23	< 36	< 21
03/27/13 - 04/03/13	< 51	< 42	< 41	< 42	< 50	< 16	< 50	< 50
04/03/13 - 04/10/13	< 51	< 44	< 42	< 44	< 49	< 45	< 49	< 47
04/10/13 - 04/17/13	< 52	< 18	< 44	< 45	< 51	< 46	< 53	< 54
04/17/13 - 04/24/13	< 39	< 34	< 32	< 33	< 38	< 34	< 38	< 38
04/24/13 - 05/01/13	< 38	< 33	< 12	< 33	< 37	< 33	< 38	< 37
05/01/13 - 05/08/13	< 66	< 56	< 53	< 55	< 64	< 56	< 64	< 68
05/08/13 - 05/15/13	< 15	< 25	< 32	< 25	< 34	< 25	< 35	< 30
05/15/13 - 05/21/13	< 29	< 39	< 37	< 38	< 29	< 39	< 29	< 29
05/21/13 - 05/29/13	< 56	< 40	< 38	< 39	< 18	< 40	< 55	< 55
05/29/13 - 06/05/13	< 42	< 49	< 47	< 48	< 41	< 49	< 42	< 42
06/05/13 - 06/12/13	< 41	< 36	< 34	< 36	< 39	< 37	< 17	< 41
06/12/13 - 06/19/13	< 47	< 58	< 56	< 58	< 47	< 58	< 47	< 46
06/19/13 - 06/26/13	< 29	< 22	< 21	< 22	< 28	< 30	< 38	< 15
06/26/13 - 07/02/13	< 48	< 48	< 46	< 19	< 46	(1)	< 51	< 50
07/02/13 - 07/10/13	< 46	< 37	< 35	< 14	< 35	< 37	< 35	< 35
07/10/13 - 07/17/13	(1)	< 44	< 41	< 17	< 43	< 44	< 41	< 40
07/17/13 - 07/25/13	< 42	< 41	< 39	< 41	< 12	< 17	< 28	< 27
07/25/13 - 07/31/13	< 65	< 65	< 62	< 35	< 21	< 65	< 57	< 58
07/31/13 - 08/07/13	< 65	< 25	< 62	< 64	< 16	< 65	< 39	< 38
08/07/13 - 08/14/13	< 52	< 52	< 49	< 20	< 18	< 52	< 44	< 43
08/14/13 - 08/21/13	< 64	< 64	< 24	< 63	< 18	< 64	< 43	< 42
08/21/13 - 08/28/13	< 10	< 27	< 25	< 26	< 21	< 27	< 21	< 21
08/28/13 - 09/04/13	< 23	< 54	< 52	< 53	< 32	< 54	< 60	< 59
09/04/13 - 09/11/13	< 39	< 38	< 37	< 15	< 18	< 39	< 44	< 44
09/11/13 - 09/18/13	< 20	< 20	< 19	< 7	< 8	< 20	< 18	< 18
09/18/13 - 09/25/13	< 29	< 29	< 27	< 15	< 13	< 29	< 32	< 32
09/25/13 - 10/02/13	< 17	< 40	< 38	< 40	< 53	< 40	< 54	< 54
10/02/13 - 10/09/13	< 63	< 63	< 60	< 26	< 32	< 63	< 59	< 59
10/09/13 - 10/16/13	< 63	< 62	< 60	< 33	< 64	< 63	< 65	< 27
10/16/13 - 10/23/13	< 54	< 53	< 51	< 29	< 16	< 29	< 37	< 36
10/23/13 - 10/30/13	< 50	< 50	< 47	< 19	< 45	< 49	< 47	< 47
10/30/13 - 11/06/13	< 46	< 43	< 42	< 43	< 45	< 44	< 46	< 46
11/06/13 - 11/13/13	< 49	< 49	< 47	< 19	< 59	< 49	< 60	< 59
11/13/13 - 11/20/13	< 68	< 53	< 51	< 53	< 67	< 54	< 68	< 67
11/20/13 - 11/26/13	< 50	< 49	< 47	< 49	< 53	< 19	< 53	< 53
11/26/13 - 12/04/13	< 45	< 52	< 50	< 52	< 45	< 52	< 45	< 45
12/04/13 - 12/12/13	< 45	< 18	< 43	< 45	< 42	< 45	< 42	< 42
12/12/13 - 12/18/13	< 68	< 67	< 64	< 66	< 66	< 67	< 67	< 67
12/18/13 - 12/26/13	< 30	< 66	< 67	< 66	< 70	< 67	< 68	< 70
12/26/13 - 01/02/14	< 67	< 58	< 55	< 57	< 65	< 58	< 66	< 65
MEAN	-	-	-	-	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-VIII.1 **CONCENTRATIONS OF STRONTIUM AND GAMMA EMITTERS IN VEGETATION SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013**

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD		SR-89	SR-90	Be-7	K-40	I-131	Cs-134	Cs-137	Ba-140	La-140
115	07/24/13	Cabbage	< 15	10.4 ± 3.5	309 ± 182	2813 ± 437	< 52	< 26	37 ± 21	< 145	< 35
	07/24/13	Collards	< 13	10.7 ± 3.4	< 213	2724 ± 433	< 49	< 22	74 ± 30	< 132	< 45
	07/24/13	Kale	< 14	23.3 ± 4.1	212 ± 190	2301 ± 314	< 39	< 20	130 ± 28	< 105	< 32
	08/27/13	Cabbage	< 19	6.6 ± 3.7	< 242	2666 ± 432	< 46	< 24	92 ± 32	< 121	< 35
	08/27/13	Collards	< 18	6.8 ± 3.8	< 176	3287 ± 461	< 33	< 15	< 30	< 94	< 22
	08/27/13	Kale	< 18	13.0 ± 4.6	< 115	3169 ± 515	< 23	< 10	< 22	< 62	< 24
	09/24/13	Cabbage	< 22	5.4 ± 1.4	202 ± 90	3114 ± 216	< 52	< 11	74 ± 12	< 95	< 24
	09/24/13	Collards	< 20	8.5 ± 1.7	< 156	2606 ± 302	< 59	< 13	90 ± 20	< 111	< 29
	09/24/13	Kale	< 16	3.9 ± 1.2	147 ± 87	2996 ± 226	< 44	< 10	67 ± 11	< 92	< 26
	10/16/13	Collards	< 22	17.5 ± 3.5	374 ± 83	3432 ± 181	< 60	< 8	80 ± 10	< 104	< 27
	10/16/13	Kale	< 18	7.0 ± 3.5	526 ± 108	4616 ± 233	< 41	< 5	54 ± 12	< 73	< 17
	10/16/13	Cabbage (1)	-	-	-	-	-	-	-	-	-
	MEAN		-	10.3 ± 11.6	295 ± 279	3066 ± 1223	-	-	78 ± 52	-	-
35	07/24/13	Cabbage	< 12	< 4.4	288 ± 105	4148 ± 300	< 31	< 15	< 18	< 86	< 23
	07/24/13	Collards	< 12	< 4.2	283 ± 247	4058 ± 575	< 50	< 25	< 27	< 135	< 29
	07/24/13	Kale	< 13	< 4.3	152 ± 112	3344 ± 310	< 31	< 15	< 17	< 82	< 27
	08/27/13	Cabbage	< 16	< 4.9	< 158	2124 ± 313	< 35	< 16	< 19	< 97	< 28
	08/27/13	Collards	< 18	< 4.4	< 235	3229 ± 455	< 42	< 20	< 22	< 85	< 31
	08/27/13	Kale	< 19	< 4.9	< 209	3475 ± 424	< 45	< 21	< 25	< 134	< 33
	09/24/13	Cabbage	< 23	< 2.5	194 ± 144	3382 ± 303	< 47	< 11	< 15	< 101	< 21
	09/24/13	Collards	< 19	< 1.8	< 163	3847 ± 340	< 60	< 13	< 18	< 132	< 33
	09/24/13	Kale	< 21	3.5 ± 1.3	< 138	3235 ± 267	< 52	< 14	< 14	< 112	< 28
	10/16/13	Cabbage	< 24	< 4.8	237 ± 68	2310 ± 133	< 44	< 6	< 7	< 71	< 20
	10/16/13	Collards	< 19	< 4.8	847 ± 78	3148 ± 133	< 43	< 6	< 7	< 71	< 20
	10/16/13	Kale	< 22	< 3.8	377 ± 86	3452 ± 179	< 23	< 3	< 5	< 41	< 12
	MEAN		-	-	340 ± 470	3313 ± 1213	-	-	-	-	-

THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES
(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-VIII.1 **CONCENTRATIONS OF STRONTIUM AND GAMMA EMITTERS IN VEGETATION SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013**

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD		SR-89	SR-90	Be-7	K-40	I-131	Cs-134	Cs-137	Ba-140	La-140
36	07/24/13	Cabbage	< 12	< 3.7	< 131	2222 ± 308	< 30	< 13	< 13	< 67	< 25
	07/24/13	Collards	< 16	< 4.7	< 166	4865 ± 409	< 32	< 15	< 20	< 99	< 26
	07/24/13	Kale	< 13	< 4.0	189 ± 124	4680 ± 403	< 23	< 11	< 12	< 60	< 10
	08/27/13	Cabbage	< 15	5.0 ± 3.5	177 ± 112	3097 ± 435	< 31	< 15	< 20	< 97	< 33
	08/27/13	Collards	< 17	4.8 ± 1.9	< 215	5324 ± 540	< 38	< 17	< 21	< 104	< 34
	08/27/13	Kale	< 16	7.5 ± 3.9	< 169	5740 ± 458	< 33	< 16	< 17	< 86	< 25
	09/24/13	Cabbage	< 23	< 3.1	< 114	2355 ± 233	< 50	< 12	< 13	< 104	< 33
	09/24/13	Collards	< 24	5.5 ± 2.0	< 110	6034 ± 344	< 49	< 10	< 10	< 88	< 21
	09/24/13	Kale	< 18	5.9 ± 1.7	< 171	5729 ± 451	< 58	< 15	< 15	< 124	< 44
	10/16/13	Cabbage	< 23	< 4.4	< 64	2739 ± 142	< 42	< 6	< 6	< 69	< 22
	10/16/13	Collards	< 24	< 4.0	251 ± 72	4770 ± 178	< 52	< 6	< 7	< 78	< 25
	10/16/13	Kale	< 24	< 4.1	131 ± 62	4189 ± 167	< 48	< 6	< 6	< 78	< 19
	MEAN		-	5.7 ± 2.1	187 ± 99	4312 ± 2754	-	-	-	-	-
66	07/24/13	Cabbage (1)	-	-	-	-	-	-	-	-	-
	07/24/13	Collards (1)	-	-	-	-	-	-	-	-	-
	07/24/13	Kale (1)	-	-	-	-	-	-	-	-	-
	08/27/13	Cabbage	< 16	< 4.9	392 ± 174	4595 ± 491	< 36	< 16	< 21	< 98	< 33
	08/27/13	Collards	< 18	< 4.2	< 232	5833 ± 516	< 48	< 24	< 28	< 126	< 36
	08/27/13	Kale (1)	-	-	-	-	-	-	-	-	-
	09/24/13	Cabbage	< 19	< 4.0	276 ± 92	4972 ± 225	< 40	< 9	< 11	< 84	< 22
	09/24/13	Collards	< 19	< 3.1	132 ± 96	6601 ± 248	< 47	< 10	< 11	< 89	< 23
	09/24/13	Kale (1)	-	-	-	-	-	-	-	-	-
	10/16/13	Collards	< 20	6.0 ± 2.9	1265 ± 107	5097 ± 209	< 60	< 8	< 8	< 97	< 29
	10/16/13	Cabbage (1)	-	-	-	-	-	-	-	-	-
	10/16/13	Kale (1)	-	-	-	-	-	-	-	-	-
	MEAN		-	-	516 ± 1020	5420 ± 1597	-	-	-	-	-

THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-IX.1 QUARTERLY OSLD RESULTS FOR OYSTER CREEK GENERATING STATION, 2013

RESULTS IN UNITS OF MILLIREM/STD. MONTH ± 2 STANDARD DEVIATION

STATION CODE	MEAN ± 2 S.D.	JAN - MAR	APR - JUN	JUL - SEP	OCT - DEC
1	22.4 ± 3.7	22.2 ± 1.2	20.1 ± 0.6	24.6 ± 1.2	22.8 ± 0.3
3	19.7 ± 3.5	19.2 ± 0.3	17.7 ± 0.9	21.9 ± 0.0	20.1 ± 0.6
4	21.1 ± 5.2	20.7 ± 0.6	18.3 ± 1.2	24.6 ± 0.9	20.7 ± 0.0
5	26.7 ± 2.9	25.8 ± 4.2	25.2 ± 4.2	28.2 ± 2.7	27.6 ± 1.2
6	20.9 ± 4.1	21.3 ± 0.9	18.6 ± 0.9	23.4 ± 1.8	20.1 ± 1.8
8	20.1 ± 4.2	19.8 ± 0.0	17.7 ± 3.6	22.8 ± 0.6	20.1 ± 1.5
9	19.4 ± 2.7	19.2 ± 0.9	18.0 ± 4.2	21.3 ± 0.6	19.2 ± 0.3
C	21.0 ± 3.2	21.0 ± 0.6	19.2 ± 1.5	23.1 ± 1.5	20.7 ± 2.4
11	20.8 ± 4.2	21.3 ± 0.0	18.0 ± 0.9	23.1 ± 0.3	20.7 ± 1.2
14	22.3 ± 4.1	23.1 ± 0.6	19.5 ± 3.3	24.3 ± 1.5	22.2 ± 0.3
22	20.3 ± 2.7	20.4 ± 0.9	18.6 ± 3.6	21.9 ± 2.4	20.1 ± 1.5
46	18.8 ± 4.7	18.3 ± 0.0	15.9 ± 3.9	21.6 ± 2.4	19.2 ± 0.0
47	21.1 ± 4.3	20.4 ± 0.0	18.9 ± 1.2	24.0 ± 1.2	21.0 ± 0.9
48	20.9 ± 3.9	21.0 ± 1.2	18.6 ± 1.2	23.4 ± 0.3	20.7 ± 0.3
51	23.5 ± 4.1	24.3 ± 0.0	20.7 ± 1.5	25.5 ± 1.2	23.4 ± 0.6
52	25.1 ± 3.0	25.2 ± 0.9	23.4 ± 0.6	27.0 ± 1.2	24.6 ± 0.3
53	23.3 ± 2.7	23.4 ± 1.5	21.6 ± 3.6	24.9 ± 0.0	23.4 ± 0.0
54	20.6 ± 4.2	20.1 ± 0.6	18.3 ± 0.6	23.4 ± 1.8	20.4 ± 1.5
55	27.5 ± 3.0	27.6 ± 1.2	25.8 ± 0.3	29.4 ± 2.1	27.3 ± 0.9
56	25.4 ± 3.2	25.5 ± 1.5	23.4 ± 1.5	27.3 ± 2.4	25.5 ± 3.0
57	22.6 ± 2.0	22.5 ± 1.5	21.6 ± 0.3	24.0 ± 0.3	22.2 ± 1.8
58	22.0 ± 2.7	21.3 ± 0.3	21.6 ± 2.4	24.0 ± 1.8	21.0 ± 1.8
59	22.6 ± 6.2	21.6 ± 0.0	19.8 ± 0.3	27.0 ± 1.8	21.9 ± 1.8
61	20.6 ± 3.7	20.4 ± 1.5	18.3 ± 2.4	22.8 ± 1.8	20.7 ± 0.9
62	21.2 ± 3.7	21.0 ± 0.3	19.2 ± 1.5	23.7 ± 3.3	21.0 ± 1.5
63	21.5 ± 3.7	21.0 ± 1.2	19.5 ± 2.1	24.0 ± 2.1	21.3 ± 0.3
64	20.3 ± 3.5	20.7 ± 1.5	18.0 ± 0.9	22.2 ± 0.0	20.1 ± 0.0
65	20.9 ± 3.5	20.7 ± 0.3	18.6 ± 2.1	22.8 ± 0.6	21.6 ± 0.0
66	20.3 ± 3.5	19.8 ± 0.6	18.3 ± 2.1	22.5 ± 2.4	20.7 ± 2.4
68	19.3 ± 4.0	18.9 ± 0.3	17.1 ± 1.5	21.9 ± 2.7	19.2 ± 0.0
71	21.5 ± 3.0	21.6 ± 0.9	19.5 ± 2.4	23.1 ± 0.0	21.9 ± 0.0
72	20.9 ± 3.1	20.4 ± 1.2	19.5 ± 0.9	23.1 ± 3.3	20.4 ± 0.6
73	19.2 ± 5.0	19.2 ± 0.0	15.9 ± 2.4	21.9 ± 0.6	19.8 ± 0.9
74	20.4 ± 3.2	19.5 ± 0.0 (1)	18.9 ± 0.0	22.5 ± 0.3	20.7 ± 0.9
75	21.7 ± 3.5	22.5 ± 0.9	19.8 ± 0.3	23.7 ± 0.6	20.7 ± 0.3
78	20.9 ± 3.7	20.7 ± 0.6	18.6 ± 1.8	23.1 ± 0.3	21.0 ± 0.9
79	21.5 ± 3.2	21.3 ± 1.2	19.5 ± 1.2	23.4 ± 0.9	21.6 ± 0.9
81	20.4 ± 2.8	19.8 ± 0.3	19.8 ± 2.4	22.5 ± 1.5	19.5 ± 0.3
82	21.0 ± 3.9	20.7 ± 0.6	18.6 ± 0.9	23.4 ± 0.0	21.3 ± 0.9
84	21.0 ± 4.7	21.0 ± 0.3	18.0 ± 0.9	23.7 ± 0.3	21.3 ± 0.0
85	19.7 ± 3.0	19.8 ± 0.6	17.7 ± 0.3	21.3 ± 1.2	19.8 ± 0.0
86	21.1 ± 2.5	20.7 ± 0.9	19.8 ± 1.5	22.8 ± 0.6	21.0 ± 0.3
88	19.0 ± 2.7	18.9 ± 0.6	17.4 ± 0.9	20.7 ± 0.3	18.9 ± 1.5
89	18.8 ± 3.0	18.6 ± 0.3	17.1 ± 1.5	20.7 ± 1.8	18.6 ± 1.2
90	19.1 ± 3.7	18.6 ± 0.0	17.1 ± 0.0	21.6 ± 0.0	18.9 ± 0.3
92	21.2 ± 4.0	20.7 ± 0.3	18.9 ± 1.5	23.7 ± 0.3	21.3 ± 1.5
98	20.0 ± 3.2	19.8 ± 0.3	18.0 ± 2.4	21.9 ± 1.2	20.4 ± 1.2
99	19.7 ± 3.5	19.8 ± 0.6	18.6 ± 1.5	22.2 ± 0.3	18.3 ± 4.8

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-IX.1 QUARTERLY OSLD RESULTS FOR OYSTER CREEK GENERATING STATION, 2013

RESULTS IN UNITS OF MILLIREM/STD. MONTH ± 2 STANDARD DEVIATION

STATION CODE	MEAN ± 2 S.D.	JAN - MAR	APR - JUN	JUL - SEP	OCT - DEC
T1	22.0 ± 3.9	21.0 ± 0.3	20.1 ± 2.4	24.6 ± 2.4	22.2 ± 0.0
100	20.2 ± 3.7	20.1 ± 1.5	18.0 ± 0.0	22.5 ± 0.0	20.1 ± 2.7
101	20.0 ± 3.2	20.1 ± 1.2	18.0 ± 2.1	21.9 ± 0.3	19.8 ± 0.0
102	21.2 ± 3.6	20.4 ± 0.6	19.5 ± 3.3	23.7 ± 1.5	21.3 ± 0.6
103	20.8 ± 2.7	20.7 ± 1.5	19.2 ± 3.6	22.5 ± 0.0	20.7 ± 1.8
104	21.1 ± 2.3	21.3 ± 0.3	19.8 ± 0.9	22.5 ± 1.5	20.7 ± 0.6
105	18.4 ± 3.7	18.9 ± 0.3	15.9 ± 0.3	20.4 ± 0.9	18.3 ± 0.9
106	19.4 ± 4.0	19.8 ± 0.0 (1)	17.1 ± 0.9	21.9 ± 1.5	18.9 ± 0.9
107	19.7 ± 3.6	20.1 ± 0.6	17.1 ± 3.0	21.3 ± 0.9	20.4 ± 0.6
109	21.2 ± 2.8	20.7 ± 0.0	19.8 ± 4.2	23.1 ± 0.9	21.3 ± 0.9
110	20.5 ± 3.7	20.4 ± 0.3	18.3 ± 2.4	22.8 ± 1.8	20.4 ± 0.9
112	23.7 ± 3.6	24.0 ± 0.0	21.9 ± 0.9	26.1 ± 2.4	22.8 ± 2.1
113	20.4 ± 3.3	20.1 ± 1.5	18.3 ± 0.3	22.2 ± 2.7	21.0 ± 1.5

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-IX.2 MEAN QUARTERLY OSLD RESULTS FOR THE SITE BOUNDARY, INTERMEDIATE, SPECIAL INTEREST AND CONTROL LOCATIONS FOR OYSTER CREEK GENERATING STATION, 2013

RESULTS IN UNITS OF MILLIREM PER STD. MONTH ± 2 STANDARD DEVIATION OF THE STATION DATA

COLLECTION PERIOD	SITE BOUNDARY ± 2 S.D.	INTERMEDIATE	SPECIAL INTEREST	CONTROL
JAN-MAR	22.2 ± 4.4	20.4 ± 2.6	19.9 ± 2.3	22.1 ± 3.0
APR-JUN	20.4 ± 4.3	18.5 ± 3.3	18.3 ± 2.2	19.4 ± 0.4
JUL-SEP	24.6 ± 4.0	22.8 ± 2.8	22.3 ± 2.2	23.7 ± 1.7
OCT-DEC	22.3 ± 3.8	20.5 ± 3.2	20.0 ± 2.3	21.5 ± 2.1

TABLE C-IX.3 SUMMARY OF THE AMBIENT DOSIMETRY PROGRAM FOR OYSTER CREEK GENERATING STATION, 2013

RESULTS IN UNITS OF MILLIREM/STD. MONTH

LOCATION	SAMPLES ANALYZED	PERIOD MINIMUM	PERIOD MAXIMUM	PERIOD MEAN ± 2 S.D.
SITE BOUNDARY	76	18.0	29.4	22.4 ± 5.0
INTERMEDIATE	124	15.9	28.2	20.5 ± 4.2
SPECIAL INTEREST	36	17.1	23.7	20.1 ± 3.6
CONTROL	8	19.2	24.3	21.6 ± 3.7

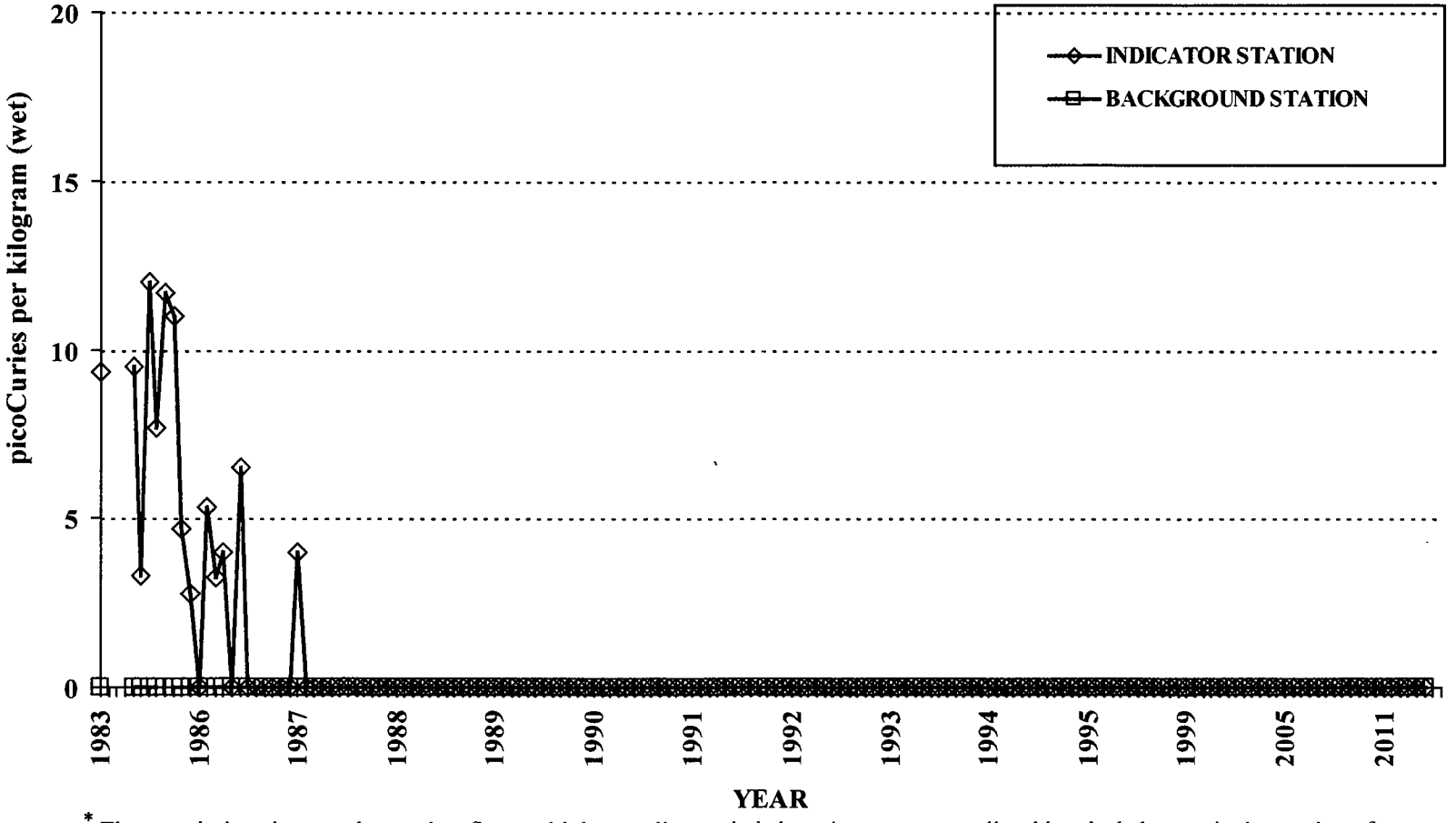
SITE BOUNDARY STATIONS - 1, 112, 113, 51, 52, 53, 54, 55, 56, 57, 58, 59, 61, 62, 63, 64, 65, 66, T1

INTERMEDIATE STATIONS - 100, 101, 102, 103, 104, 105, 106, 107, 109, 110, 22, 4, 46, 47, 48, 5, 6, 68, 73, 74, 75, 78, 79, 8, 82, 84, 85, 86, 9, 98, 99

SPECIAL INTEREST STATIONS - 11, 3, 71, 72, 81, 88, 89, 90, 92

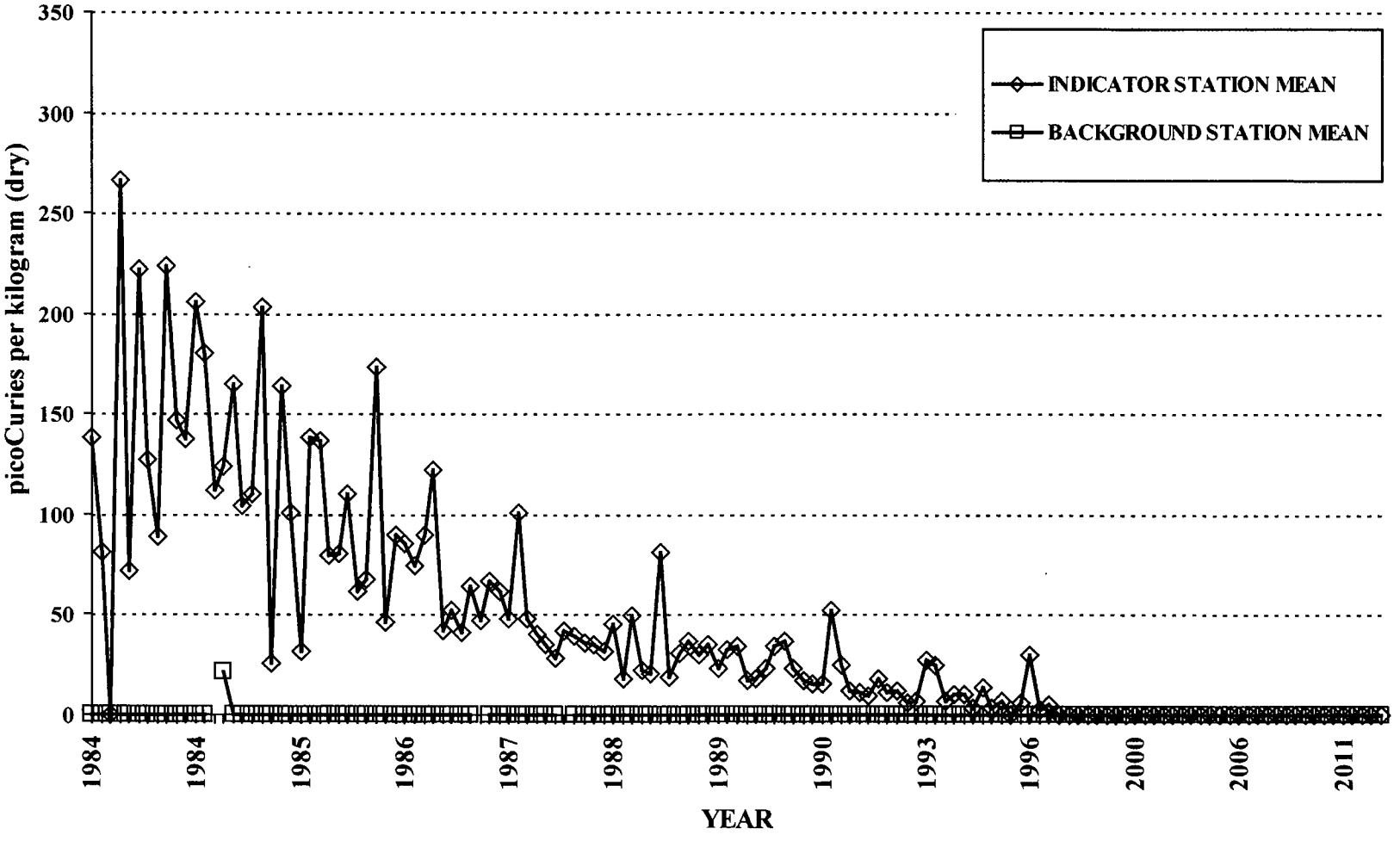
CONTROL STATIONS - 14, C

FIGURE C-1
MEAN COBALT-60 CONCENTRATION IN CLAMS
OYSTER CREEK GENERATING STATION, 1983 - 2013



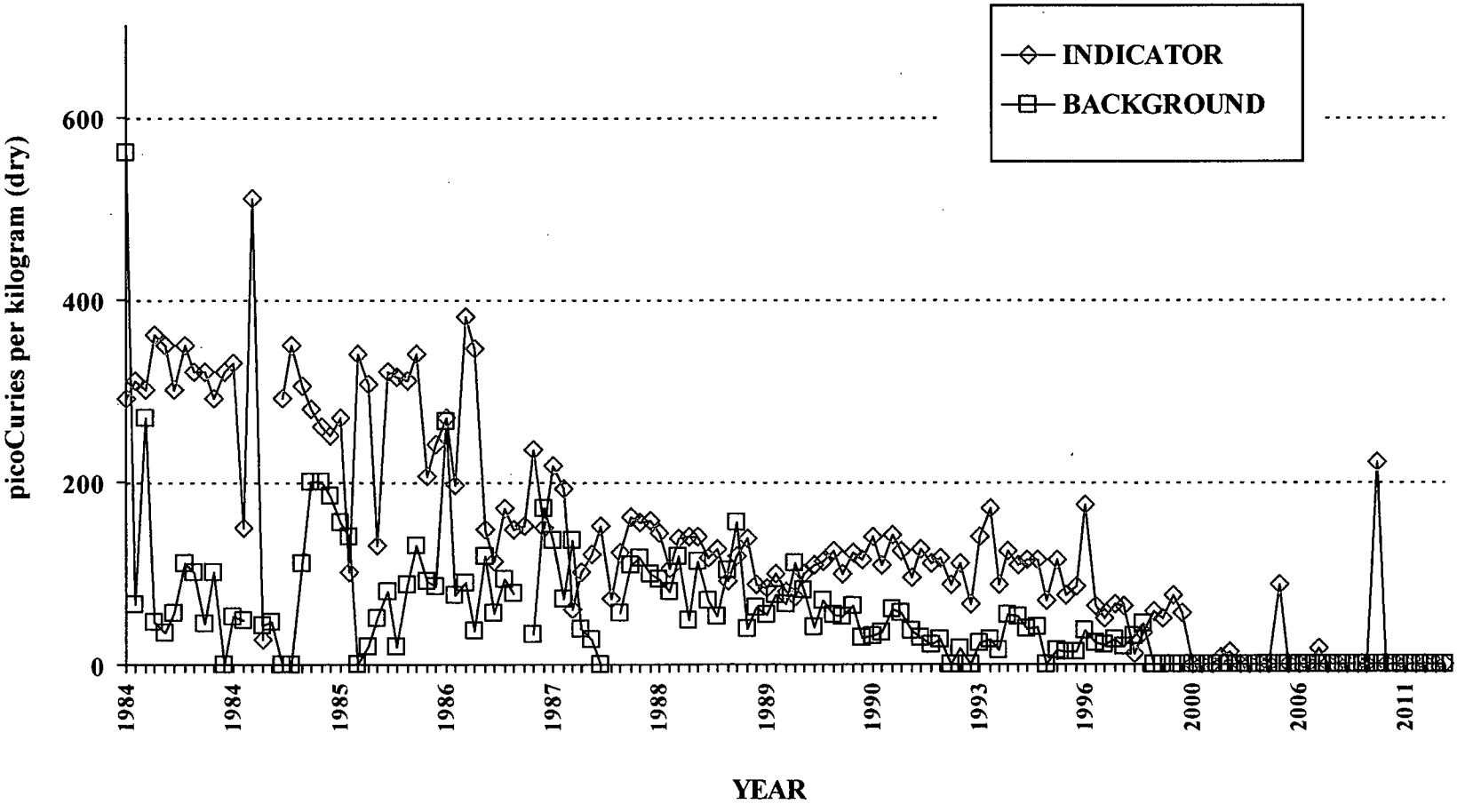
* The year designations on the x-axis reflect multiple sampling periods in a given year, as well as historical changes in the number of sampling periods per year.

FIGURE C-2
MEAN COBALT-60 CONCENTRATION IN AQUATIC SEDIMENT
OYSTER CREEK GENERATING STATION, 1984 - 2013



* The year designations on the x-axis reflect multiple sampling periods in a given year, as well as historical changes in the number of sampling periods per year.

FIGURE C-3
MEAN CESIUM-137 CONCENTRATION IN AQUATIC SEDIMENT
OYSTER CREEK GENERATING STATION, 1984 - 2013



* The year designations on the x-axis reflect multiple sampling periods in a given year, as well as historical changes in the number of sampling periods per year.

FIGURE C-4
MEAN WEEKLY GROSS BETA CONCENTRATIONS IN AIR PARTICULATES OYSTER CREEK GENERATING STATION, 2008 - 2013

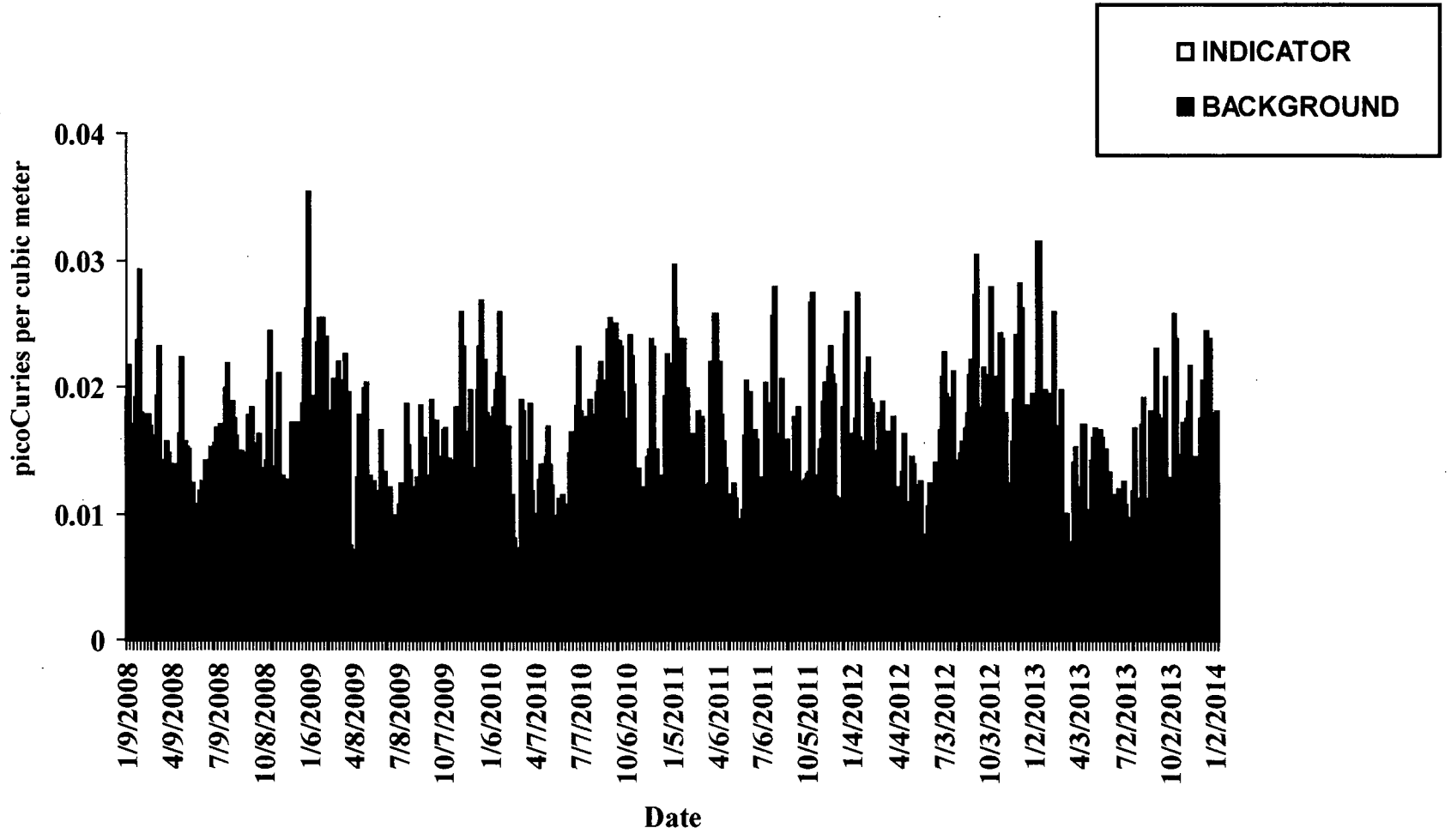
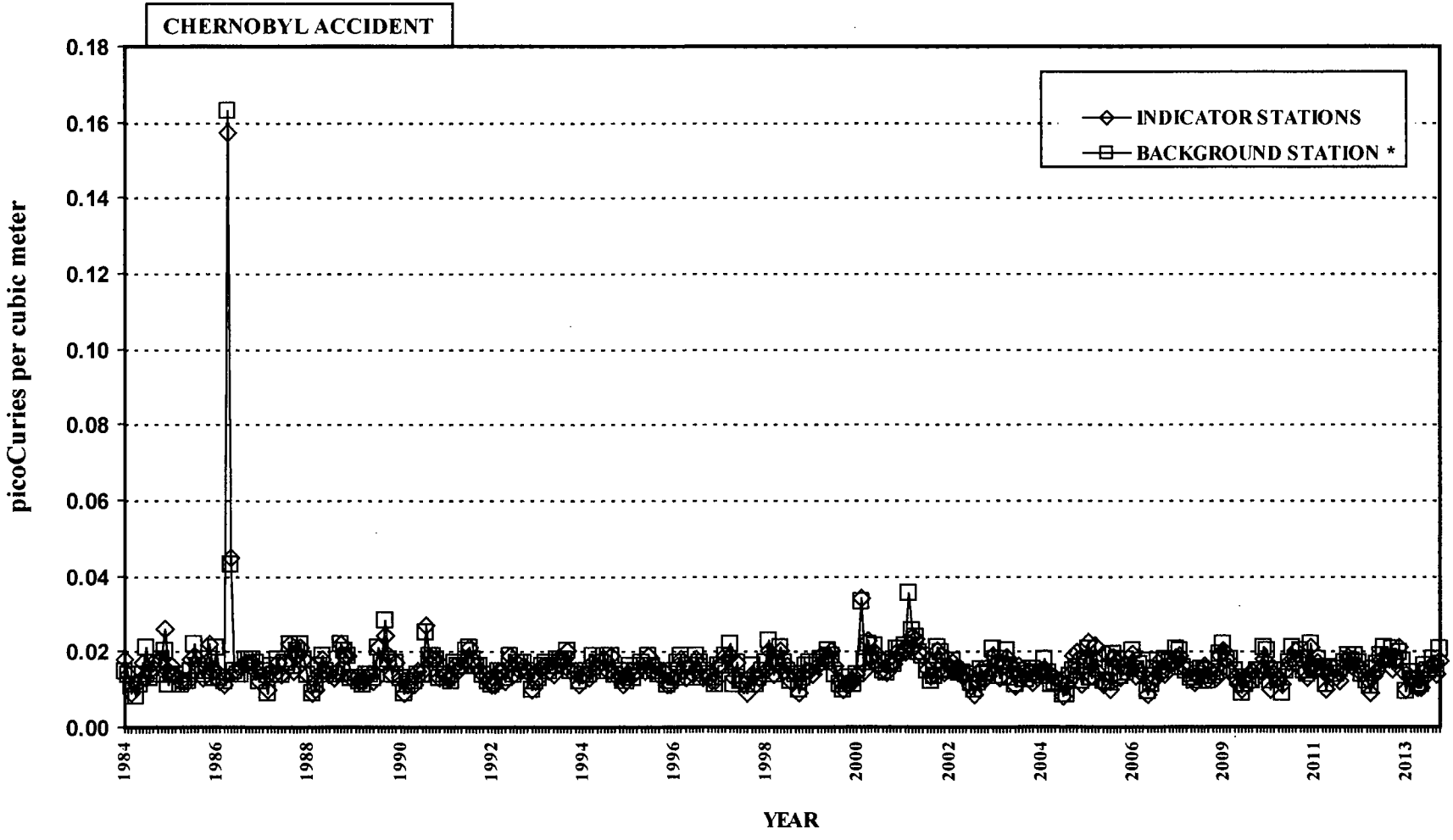
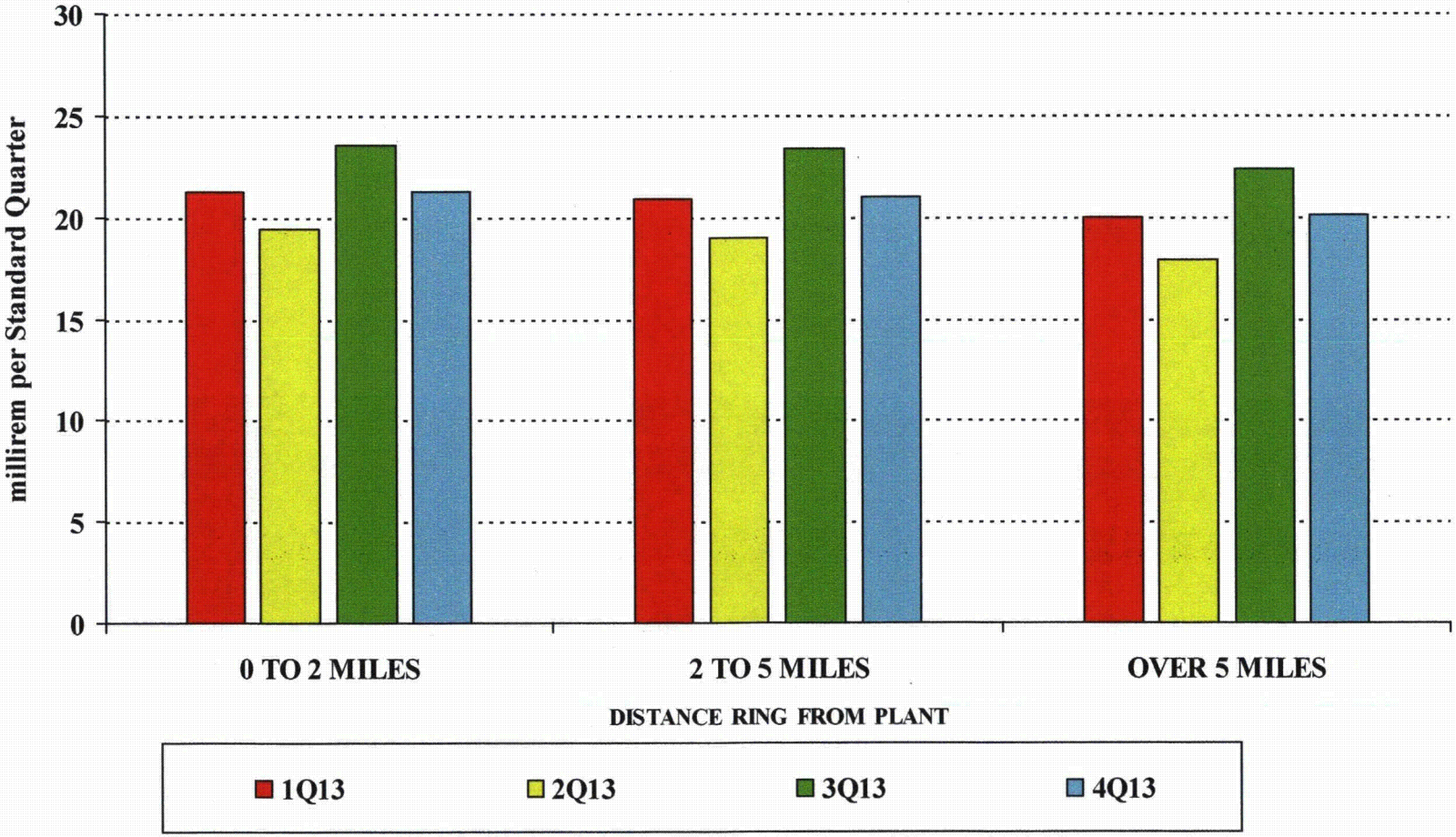


FIGURE C-5
MEAN MONTHLY GROSS BETA CONCENTRATIONS IN AIR PARTICULATES OYSTER CREEK GENERATING STATION, 1984 - 2013



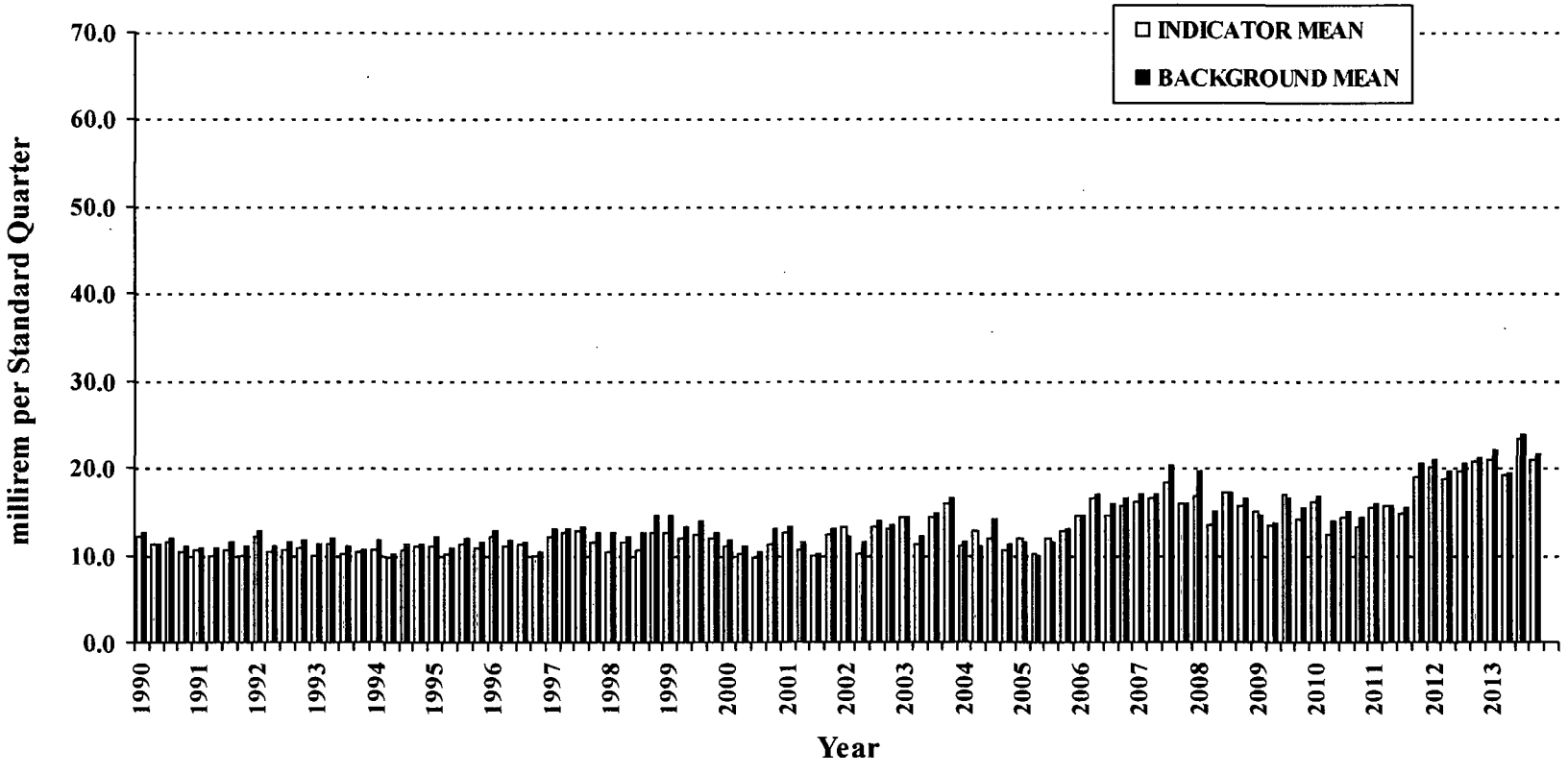
* Data from Cookstown station ONLY after December 1996

FIGURE C-6
MEAN QUARTERLY OSLD GAMMA DOSE
OYSTER CREEK GENERATING STATION, 2013



Oyster Creek's dosimetry changed from TLD to OSLD in 2012.

FIGURE C-7
MEAN QUARTERLY TLD/OSLD GAMMA DOSE
OYSTER CREEK GENERATING STATION, 1990 – 2013*



•Harshaw Model 110 TLDs were used during the first quarter of 2001. Panasonic Model 814 TLDs were used in the second, third, and fourth quarters of 2001.

•Oyster Creek's dosimetry changed from TLD to OSLD in 2012. Due to the dosimeter change, OSLD values appear higher.

Oyster Creek determines the direct radiation to the public by subtracting the average of the control stations from the measurements from the sample stations (sample station millirem – average of control station millirem = net millirem to the public). The graph (Appendix C, Figure C-7) displays the gross millirem readings from the dosimetry. With the change from TLD to OSLD a high bias in the gross millirem was noted at all locations. This bias was not seen after the net millirem was determined.

Station	Gross TLD Average 2010/2011 millirem	Gross OSLD Average 2012/2013 millirem	Difference (OSLD - TLD) millirem
C	14.7	20.2	5.5
14	15.9	22.0	6.0
1	15.6	21.9	6.3
T1	16.1	21.5	5.5
3	13.8	19.2	5.4
4	13.7	20.5	6.8
5	18.4	25.5	7.1
6	14.5	20.4	5.8
8	14.0	19.4	5.5
9	13.3	18.6	5.3
11	14.4	20.1	5.6
22	14.0	19.5	5.4
46	12.9	18.2	5.3
47	14.1	20.3	6.1
48	14.5	20.2	5.7
51	16.4	22.8	6.4
52	17.4	24.2	6.7
53	16.3	22.9	6.6
54	14.4	19.8	5.4
55	19.5	27.1	7.6
56	18.0	24.9	6.9
57	15.3	21.8	6.6
58	15.4	21.5	6.1
59	15.2	21.5	6.3
61	14.3	19.8	5.6
62	15.1	20.4	5.2
63	14.0	20.5	6.5
64	14.9	19.9	5.0
65	14.4	20.4	6.1
66	13.7	19.8	6.1
68	13.2	18.4	5.2

Station	Gross TLD Average 2010/2011 millirem	Gross OSLD Average 2012/2013 millirem	Difference (OSLD - TLD) millirem
71	15.1	21.0	5.8
72	14.6	20.8	6.2
73	13.3	18.9	5.7
74	13.6	19.7	6.1
75	14.1	20.9	6.9
78	14.4	20.0	5.7
79	14.7	20.9	6.1
81	14.2	19.8	5.6
82	14.2	20.6	6.4
84	14.5	20.2	5.7
85	13.1	18.9	5.8
86	14.5	20.7	6.3
88	12.8	18.5	5.6
89	12.8	18.3	5.4
90	12.6	18.4	5.8
92	14.4	20.7	6.2
98	12.7	19.3	6.6
99	13.3	19.0	5.7
100	14.1	19.7	5.6
101	13.7	19.7	6.0
102	15.0	20.8	5.8
103	14.3	20.1	5.8
104	14.4	20.2	5.7
105	12.8	17.8	5.0
106	13.6	19.0	5.4
107	13.8	19.3	5.5
109	15.0	20.6	5.6
110	14.3	19.8	5.6
112	16.9	22.9	5.9
113	14.8	18.0	3.2

Max Diff	Min Diff	Ave Diff
7.6	5.0	5.9

APPENDIX D

DATA TABLES
QC LABORATORY

The following section presents the results of data analysis performed by the QC laboratory, Environmental Inc. Duplicate samples were obtained from several locations and media and split between the primary laboratory, Teledyne Brown Engineering (TBE) and the QC laboratory. Comparisons of the results for all media were within expected ranges.

TABLE D-I.1 CONCENTRATIONS OF TRITIUM IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	24	QCA	QCB
04/08/13	< 196	< 194	< 149
09/30/13	< 183	< 186	< 152
MEAN	-	-	-

TABLE D-I.2 CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
24	04/08/13	< 4	< 4	< 8	< 5	< 9	< 5	< 9	< 4	< 5	< 19	< 7
	09/30/13	< 5	< 5	< 10	< 5	< 9	< 5	< 8	< 4	< 5	< 36	< 8
	MEAN	-	-	-	-	-	-	-	-	-	-	-
QCA	04/08/13	< 6	< 7	< 14	< 6	< 11	< 6	< 12	< 6	< 6	< 33	< 9
	09/30/13	< 4	< 5	< 9	< 3	< 7	< 5	< 8	< 4	< 4	< 34	< 7
	MEAN	-	-	-	-	-	-	-	-	-	-	-
QCB	04/08/13	< 3	< 3	< 7	< 3	< 7	< 4	< 8	< 4	< 3	< 23	< 5
	09/30/13	< 5	< 5	< 6	< 4	< 6	< 5	< 9	< 5	< 4	< 15	< 3
	MEAN	-	-	-	-	-	-	-	-	-	-	-

TABLE D-II.1 CONCENTRATIONS OF TRITIUM IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	1N	1S	QCB 1N	QCB 1S
01/02/13 - 01/31/13	< 174	< 173	< 143	< 143
02/05/13 - 02/28/13	(1)	< 165	< 141	< 141
03/07/13 - 03/19/13	< 190	< 189	< 147	< 147
04/03/13 - 04/25/13	< 180	< 180	< 193	< 193
05/07/13 - 05/28/13	< 166	< 165	< 188	< 188
06/06/13 - 06/26/13	< 181	< 182	< 156	< 156
07/02/13 - 08/01/13	< 183	< 182	< 184	< 184
08/13/13 - 08/27/13	< 186	< 187	< 149	< (1)
09/03/13 - 09/24/13	< 177	< 177	< 143	< (1)
10/23/13 - 10/29/13	< 198	< 195	< 184	< 182
11/05/13 - 11/26/13	< 188	(1)	< 155	(1)
12/02/13 - 01/02/14	< 176	(1)	< 150	(1)
MEAN	-	-	-	-

TABLE D-II.2 CONCENTRATIONS OF I-131 IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	1N	1S	QCB 1N	QCB 1S
01/02/13 - 01/31/13	< 0.7	< 0.7	< 0.4	< 0.4
02/05/13 - 02/28/13	< 0.9	< 0.5	< 0.7	< 0.8
03/07/13 - 03/19/13	< 0.6	< 0.3	< 0.5	< 0.3
04/03/13 - 04/25/13	< 0.5	< 0.6	< 0.3	< 0.3
05/07/13 - 05/28/13	< 0.7	< 0.6	< 0.5	< 0.3
06/06/13 - 06/26/13	< 0.7	< 0.7	< 0.5	< 0.4
07/02/13 - 08/01/13	< 0.7	< 0.7	< 0.5	< 0.4
08/13/13 - 08/27/13	< 0.8	< **1.9** (2)	< 0.3	< (1)
09/03/13 - 09/24/13	< 0.7	< 0.6	< 0.4	< (1)
10/23/13 - 10/29/13	< 0.7	< 0.7	< 0.5	< 0.4
11/05/13 - 11/26/13	< 0.8	(1)	< 0.3	(1)
12/06/13 - 01/02/14	< 0.6	(1)	< 0.3	(1)
MEAN	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION
(2) LLD NOT MET DUE TO AGE OF SAMPLE AND LIMITED SAMPLE VOLUME

TABLE D-II.3 **CONCENTRATIONS OF GAMMA EMITTERS IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
1N	01/04/13 - 01/31/13	< 5	< 5	< 13	< 7	< 15	< 6	< 9	< 5	< 6	< 29	< 8
	02/07/13 - 02/28/13 (1)	-	-	-	-	-	-	-	-	-	-	-
	03/07/13 - 03/19/13	< 3	< 3	< 8	< 3	< 7	< 4	< 5	< 3	< 3	< 21	< 6
	04/05/13 - 04/25/13	< 3	< 3	< 7	< 3	< 6	< 3	< 6	< 3	< 3	< 26	< 9
	05/07/13 - 05/28/13	< 4	< 5	< 8	< 4	< 8	< 5	< 8	< 5	< 5	< 28	< 11
	06/06/13 - 06/26/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 2	< 2	< 15	< 5
	07/02/13 - 08/01/13	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 2	< 2	< 13	< 4
	08/13/13 - 08/27/13	< 3	< 3	< 7	< 3	< 6	< 3	< 6	< 3	< 3	< 23	< 6
	09/24/13 - 09/24/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 2	< 2	< 21	< 6
	10/23/13 - 10/29/13	< 1	< 2	< 3	< 2	< 3	< 2	< 3	< 1	< 1	< 12	< 4
	11/15/13 - 11/26/13	< 8	< 8	< 16	< 6	< 15	< 7	< 14	< 6	< 8	< 39	< 11
	12/06/13 - 01/02/14	< 4	< 6	< 10	< 5	< 8	< 5	< 9	< 4	< 5	< 32	< 11
	MEAN	-	-	-	-	-	-	-	-	-	-	-
1S	01/04/13 - 01/31/13	< 5	< 5	< 11	< 5	< 11	< 6	< 10	< 5	< 6	< 28	< 8
	02/07/13 - 02/28/13	< 3	< 3	< 7	< 3	< 6	< 4	< 6	< 3	< 3	< 25	< 8
	03/07/13 - 03/19/13	< 4	< 4	< 9	< 4	< 10	< 4	< 8	< 4	< 5	< 19	< 7
	04/05/13 - 04/25/13	< 2	< 3	< 6	< 3	< 5	< 3	< 5	< 3	< 3	< 23	< 7
	05/07/13 - 05/28/13	< 5	< 7	< 13	< 5	< 10	< 7	< 9	< 6	< 6	< 32	< 12
	06/06/13 - 06/26/13	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 1	< 2	< 11	< 4
	07/02/13 - 08/01/13	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 2	< 2	< 11	< 4
	08/13/13 - 08/27/13	< 1	< 1	< 3	< 1	< 2	< 1	< 3	< 1	< 1	< 19	< 6
	09/24/13 - 09/24/13	< 4	< 4	< 9	< 4	< 9	< 4	< 7	< 4	< 4	< 29	< 9
	10/23/13 - 10/29/13	< 1	< 2	< 4	< 1	< 3	< 2	< 3	< 1	< 1	< 17	< 5
	11/15/13 - 11/26/13 (1)	-	-	-	-	-	-	-	-	-	-	-
	12/06/13 - 01/02/14 (1)	-	-	-	-	-	-	-	-	-	-	-
	MEAN	-	-	-	-	-	-	-	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE D-II.3 **CONCENTRATIONS OF GAMMA EMITTERS IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
QCB 1N	01/02/13 - 01/31/13	< 3	< 2	< 6	< 3	< 5	< 2	< 5	< 3	< 2	< 11	< 3
	02/05/13 - 02/28/13	< 2	< 2	< 9	< 3	< 4	< 3	< 4	< 4	< 2	< 30	< 6
	03/07/13 - 03/19/13	< 2	< 3	< 4	< 2	< 4	< 3	< 4	< 1	< 3	< 17	< 3
	04/03/13 - 04/25/13	< 3	< 3	< 4	< 2	< 3	< 2	< 3	< 4	< 2	< 12	< 2
	05/07/13 - 05/28/13	< 3	< 3	< 4	< 3	< 4	< 3	< 6	< 4	< 4	< 26	< 3
	06/04/13 - 06/26/13	< 3	< 2	< 7	< 3	< 6	< 4	< 4	< 4	< 5	< 15	< 3
	07/02/13 - 08/01/13	< 3	< 2	< 3	< 2	< 5	< 3	< 5	< 2	< 3	< 13	< 2
	08/13/13 - 08/27/13	< 2	< 3	< 6	< 3	< 7	< 3	< 7	< 4	< 4	< 12	< 4
	09/24/13 - 09/24/13	< 1	< 2	< 4	< 3	< 3	< 3	< 5	< 3	< 2	< 16	< 2
	10/23/13 - 10/29/13	< 3	< 3	< 3	< 1	< 5	< 4	< 5	< 2	< 2	< 16	< 3
	11/05/13 - 11/26/13	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 3	< 3	< 12	< 2
	12/06/13 - 01/02/14	< 3	< 3	< 3	< 2	< 5	< 3	< 6	< 3	< 3	< 13	< 3
	MEAN											
QCB 1S	01/02/13 - 01/31/13	< 2	< 2	< 7	< 3	< 5	< 2	< 4	< 3	< 2	< 9	< 2
	02/05/13 - 02/28/13	< 3	< 2	< 4	< 3	< 6	< 3	< 6	< 4	< 3	< 13	< 4
	03/07/13 - 03/19/13	< 2	< 1	< 5	< 3	< 4	< 3	< 5	< 3	< 2	< 11	< 2
	04/03/13 - 04/25/13	< 2	< 1	< 4	< 2	< 6	< 3	< 4	< 3	< 3	< 15	< 2
	05/07/13 - 05/28/13	< 3	< 2	< 6	< 3	< 5	< 5	< 6	< 4	< 4	< 23	< 3
	06/04/13 - 06/26/13	< 2	< 3	< 4	< 2	< 6	< 2	< 6	< 3	< 3	< 11	< 1
	07/02/13 - 08/01/13	< 3	< 3	< 6	< 1	< 3	< 3	< 3	< 3	< 3	< 13	< 3
	08/13/13 - 08/27/13 (1)	<	<	<	<	<	<	<	<	<	<	<
	09/24/13 - 09/24/13 (1)	<	<	<	<	<	<	<	<	<	<	<
	10/23/13 - 10/29/13	< 3	< 2	< 4	< 3	< 3	< 3	< 4	< 3	< 2	< 20	< 3
	11/05/13 - 11/26/13 (1)	<	<	<	<	<	<	<	<	<	<	<
	12/06/13 - 01/02/14 (1)	<	<	<	<	<	<	<	<	<	<	<
	MEAN											

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE D-III.1 CONCENTRATIONS OF TRITIUM IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	W-3C	QCB
01/09/13	< 168	< 141
04/11/13	< 192	< 149
07/16/13	< 184	< 165
11/21/13	< 161	< 149
MEAN	-	-

TABLE D-III.2 CONCENTRATIONS OF GAMMA EMITTERS IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
W-3C	01/09/13	< 7	< 7	< 15	< 6	< 13	< 6	< 10	< 15	< 5	< 6	< 45	< 13
	04/11/13	< 5	< 4	< 10	< 5	< 9	< 5	< 7	< 12	< 4	< 4	< 27	< 8
	07/16/13	< 4	< 4	< 8	< 4	< 7	< 4	< 8	< 13	< 4	< 4	< 28	< 6
	11/21/13	< 5	< 5	< 14	< 5	< 12	< 6	< 7	< 14	< 5	< 5	< 24	< 9
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
QCB	01/09/13	< 3	< 3	< 7	< 3	< 3	< 3	< 5	< 5	< 3	< 3	< 12	< 3
	04/11/13	< 2	< 3	< 5	< 3	< 6	< 2	< 5	< 9	< 2	< 4	< 19	< 6
	07/16/13	< 3	< 3	< 3	< 3	< 5	< 3	< 4	< 8	< 3	< 3	< 26	< 7
	11/21/13	< 2	< 2	< 5	< 2	< 3	< 2	< 4	< 5	< 3	< 3	< 15	< 3
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

TABLE D-IV.1 CONCENTRATIONS OF GAMMA EMITTERS IN CLAM SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137
24	04/08/13	2199 ± 445	< 30	< 26	< 55	< 31	< 51	< 24	< 25
	09/30/13	1356 ± 623	< 46	< 53	< 134	< 46	< 100	< 42	< 36
QCA	04/08/13	1770 ± 592	< 32	< 30	< 66	< 34	< 66	< 34	< 37
QCB	04/08/13	1635 ± 132	< 7	< 10	< 30	< 6	< 12	< 7	< 6
	MEAN	1740 ± 702	-	-	-	-	-	-	-

TABLE D-V.1 CONCENTRATIONS OF GAMMA EMITTERS IN SEDIMENT SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013

RESULTS IN UNITS OF PCI/KG DRY ± 2 SIGMA

SITE	COLLECTION PERIOD	Be-7	K-40	Mn-54	Co-58	Co-60	Cs-134	Cs-137	Ra-226	Th-228
24	04/08/13	< 436	11820 ± 1066	< 45	< 42	< 51	< 45	< 47	< 1020	575 ± 69
	09/30/13	< 502	975 ± 501	< 41	< 47	< 42	< 36	< 37	< 892	205 ± 51
	MEAN		6398 ± 15337	-	-	-	-	-	-	390 ± 523
QCA	04/08/13	< 407	14000 ± 1150	< 43	< 39	< 58	< 43	< 48	1370 ± 829	739 ± 68
	09/30/13	< 449	1580 ± 465	< 42	< 42	< 38	< 40	< 38	< 845	290 ± 55
	MEAN	-	7790 ± 8782	-	-	-	-	-	-	515 ± 635
QCB	04/08/13	< 126	1995 ± 266	< 11	< 6	< 6	< 9	< 12	817 ± 317	< 104
		< 141	960 ± 219	< 11	< 10	< 3	< 14	< 8	< 353	< 1029
	MEAN	-	1478 ± 1464	-	-	-	-	-	-	-

TABLE D-VI.1 CONCENTRATIONS OF STRONTIUM AND GAMMA EMITTERS IN VEGETATION SAMPLES COLLECTED IN THE VICINITY OF OYSTER CREEK GENERATING STATION, 2013

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE		COLLECTION PERIOD	Sr-89	Sr-90	K-40	I-131	Cs-134	Cs-137	Ba-140	La-140
36	Cabbage	08/27/13	< 15	5.0 ± 3.5	3097 ± 435	< 31	< 15	< 20	< 97	< 33
	Collards	08/27/13	< 17	4.8 ± 1.9	5324 ± 540	< 38	< 17	< 21	< 104	< 34
	Kale	08/27/13	< 16	7.5 ± 3.9	5740 ± 458	< 33	< 16	< 17	< 86	< 25
		MEAN*		5.8 ± 3.0	4720 ± 2842	-	-	-	-	-
QCA	Cabbage	08/27/13	< 18	4.7 ± 1.9	2850 ± 380	< 42	< 20	< 19	< 120	< 23
	Collards	08/27/13	< 20	4.5 ± 1.8	6310 ± 496	< 32	< 16	< 19	< 88	< 22
	Kale	08/27/13	< 19	8.0 ± 2.2	5510 ± 475	< 46	< 20	< 26	< 118	< 29
		MEAN*		5.7 ± 3.9	4890 ± 3623	-	-	-	-	-
QCB	Cabbage	08/27/13	< 3	< 1.0	2544 ± 246	< 18	< 7	< 7	< 43	< 5
	Collards	08/27/13	< 9	< 4.0	3962 ± 269	< 13	< 9	< 7	< 43	< 10
	Kale	08/27/13	< 19	< 8.0	5486 ± 348	< 18	< 12	< 10	< 50	< 5
		MEAN*	-	-	3997 ± 2943	-	-	-	-	-

* THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES

APPENDIX E

INTER-LABORATORY COMPARISON PROGRAM

TABLE E-1 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2013
(PAGE 1 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
March 2013	E10477	Milk	Sr-89	pCi/L	120	99.7	1.20	A
			Sr-90	pCi/L	9.21	11.0	0.84	A
	E10478	Milk	I-131	pCi/L	87.1	100	0.87	A
			Ce-141	pCi/L	186	187	0.99	A
			Cr-51	pCi/L	463	472	0.98	A
			Cs-134	pCi/L	201	214	0.94	A
			Cs-137	pCi/L	262	266	0.98	A
			Co-58	pCi/L	200	208	0.96	A
			Mn-54	pCi/L	215	208	1.03	A
			Fe-59	pCi/L	266	252	1.06	A
			Zn-65	pCi/L	311	301	1.03	A
			Co-60	pCi/L	384	400	0.96	A
	E10480	AP	Ce-141	pCi	95.3	95.6	1.00	A
			Cr-51	pCi	264	241	1.10	A
			Cs-134	pCi	123	109	1.13	A
			Cs-137	pCi	142	136	1.04	A
			Co-58	pCi	112	106	1.06	A
			Mn-54	pCi	115	106	1.08	A
			Fe-59	pCi	139	129	1.08	A
			Zn-65	pCi	163	153	1.07	A
			Co-60	pCi	212	204	1.04	A
	E10479	Charcoal	I-131	pCi	90.1	92.6	0.97	A
	E10481	Water	Fe-55	pCi/L	1840	1890	0.97	A
June 2013	E10564	Milk	Sr-89	pCi/L	110	95.0	1.16	A
			Sr-90	pCi/L	15.8	17.0	0.93	A
	E10545	Milk	I-131	pCi/L	92.6	95.5	0.97	A
			Ce-141	pCi/L	83.1	90.4	0.92	A
			Cr-51	pCi/L	253	250	1.01	A
			Cs-134	pCi/L	118	125	0.94	A
			Cs-137	pCi/L	143	151	0.95	A
			Co-58	pCi/L	87.1	94.0	0.93	A
			Mn-54	pCi/L	171	172	0.99	A
			Fe-59	pCi/L	125	120	1.04	A
			Zn-65	pCi/L	220	217	1.01	A
			Co-60	pCi/L	169	175	0.97	A
	E10547	AP	Ce-141	pCi	56.8	56.7	1.00	A
			Cr-51	pCi	168	157	1.07	A
			Cs-134	pCi	85.2	78.4	1.09	A
			Cs-137	pCi	101	94.6	1.07	A
			Co-58	pCi	62.7	58.9	1.06	A
			Mn-54	pCi	125	108	1.16	A
			Fe-59	pCi	85.7	75.0	1.14	A
			Zn-65	pCi	169	136	1.24	W
			Co-60	pCi	116	110	1.05	A
	E10546	Charcoal	I-131	pCi	86.5	89.7	0.96	A

TABLE E-1 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2013
(PAGE 2 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
June 2013	E10549	Water	Fe-55	pCi/L	1610	1610	1.00	A
September 2013	E10646	Milk	Sr-89	pCi/L	63.9	96.0	0.67	N (1)
			Sr-90	pCi/L	8.88	13.2	0.67	N (1)
	E10647	Milk	I-131	pCi/L	93.9	98.3	0.96	A
			Ce-141	pCi/L				NA (2)
			Cr-51	pCi/L	272	277	0.98	A
			Cs-134	pCi/L	150	172	0.87	A
			Cs-137	pCi/L	125	131	0.95	A
			Co-58	pCi/L	105	108	0.97	A
			Mn-54	pCi/L	138	139	0.99	A
			Fe-59	pCi/L	125	130	0.96	A
			Zn-65	pCi/L	264	266	0.99	A
			Co-60	pCi/L	187	196	0.95	A
	E10672	AP	Ce-141	pCi				NA (2)
			Cr-51	pCi	208	223	0.93	A
			Cs-134	pCi	143	139	1.03	A
			Cs-137	pCi	106	105	1.01	A
			Co-58	pCi	97.0	86.5	1.12	A
			Mn-54	pCi	116	112	1.04	A
			Fe-59	pCi	98.6	105	0.94	A
			Zn-65	pCi	219	214	1.02	A
			Co-60	pCi	166	158	1.05	A
	E10648	Charcoal	I-131	pCi	76.3	71.7	1.06	A
	E10673	Water	Fe-55	pCi/L	1790	1690	1.06	A
December 2013	E10774	Milk	Sr-89	pCi/L	97.3	93.8	1.04	A
			Sr-90	pCi/L	13.3	12.9	1.03	A
	E10775	Milk	I-131	pCi/L	89.7	96.1	0.93	A
			Ce-141	pCi/L	99.8	110	0.91	A
			Cr-51	pCi/L	297	297	1.00	A
			Cs-134	pCi/L	129	142	0.91	A
			Cs-137	pCi/L	126	126	1.00	A
			Co-58	pCi/L	116	112	1.04	A
			Mn-54	pCi/L	167	168	0.99	A
			Fe-59	pCi/L	117	110	1.06	A
			Zn-65	pCi/L	757	741	1.02	A
			Co-60	pCi/L	141	147	0.96	A
	E10777	AP	Ce-141	pCi	85.1	88.0	0.97	A
			Cr-51	pCi	278	238	1.17	A
			Cs-134	pCi	123	114	1.08	A
			Cs-137	pCi	102	101	1.01	A
			Co-58	pCi	84.4	89.9	0.94	A
			Mn-54	pCi	132	135	0.98	A
			Fe-59	pCi	101	88.3	1.14	A
			Zn-65	pCi	506	595	0.85	A
			Co-60	pCi	118	118	1.00	A

TABLE E-1 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2013
(PAGE 3 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
December 2013	E10776	Charcoal	I-131	pCi	84.7	80.5	1.05	A
	E10778	Water	Fe-55	pCi/L	2010	1910	1.05	A

(1) Milk, Sr-89/90 - The failure was due to analyst error. No client samples were affected by this failure. NCR 13-15

(2) The sample was not spiked with Ce-141

(a) Teledyne Brown Engineering reported result.

(b) The Analytics known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation.

(c) Ratio of Teledyne Brown Engineering to Analytics results.

(d) Analytics evaluation based on TBE internal QC limits: A= Acceptable, reported result falls within ratio limits of 0.80-1.20. W-Acceptable with warning, reported result falls within 0.70-0.80 or 1.20-1.30. N = Not Acceptable, reported result falls outside the ratio limits of < 0.70 and > 1.30.

TABLE E-2 ERA ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2013
(PAGE 1 OF 1)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Limits	Evaluation (c)
May 2013	RAD-93	Water	Sr-89	pCi/L	48.3	41.3	31.6 - 48.4	A
			Sr-90	pCi/L	19.3	23.9	17.2 - 28.0	A
			Ba-133	pCi/L	81.9	82.1	69.0 - 90.3	A
			Cs-134	pCi/L	40.9	42.8	34.2 - 47.1	A
			Cs-137	pCi/L	44.0	41.7	37.0 - 48.8	A
			Co-60	pCi/L	61.9	65.9	59.3 - 75.0	A
			Zn-65	pCi/L	202	189	170 - 222	A
			Gr-A	pCi/L	34.2	40.8	21.1 - 51.9	A
			Gr-B	pCi/L	18.0	21.6	13.0 - 29.7	A
			I-131	pCi/L	23.8	23.8	19.7 - 28.3	A
			U-Nat	pCi/L	60.4	61.2	49.8 - 67.9	A
			H-3	pCi/L	3970	4050	3450 - 4460	A
	MRAD-18	Filter	Gr-A	pCi/filter	Lost during processing			
November 2013	RAD-95	Water	Sr-89	pCi/L	25.5	21.9	14.4 - 28.2	A
			Sr-90	pCi/L	14.3	18.1	12.8 - 21.5	A
			Ba-133	pCi/L	57.2	54.2	44.7 - 59.9	A
			Cs-134	pCi/L	83.3	86.7	71.1 - 95.4	A
			Cs-137	pCi/L	201	206	185 - 228	A
			Co-60	pCi/L	104	102	91.8 - 114	A
			Zn-65	pCi/L	361	333	300 - 389	A
			Gr-A	pCi/L	29.5	42.8	22.2 - 54.3	A
			Gr-B	pCi/L	30.1	32.2	20.8 - 39.9	A
			I-131	pCi/L	23.1	23.6	19.6 - 28.0	A
			U-Nat	pCi/L	5.53	6.24	47.0 - 7.44	A
			H-3	pCi/L	17650	17700	15500 - 19500	A
	MRAD-19	Filter	Gr-A	pCi/filter	33.0	83.0	27.8 - 129	A

(a) Teledyne Brown Engineering reported result.

(b) The ERA known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation.

(c) ERA evaluation: A=acceptable. Reported result falls within the Warning Limits. NA=not acceptable. Reported result falls outside of the Control Limits. CE=check for Error. Reported result falls within the Control Limits and outside of the Warning Limit.

TABLE E-3 DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)
TELEDYNE BROWN ENGINEERING, 2013
(PAGE 1 OF 2)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Range	Evaluation (c)
March 2013	13-MaW28	Water	Cs-134	Bq/L	21.0	24.4	17.1 - 31.7	A
			Cs-137	Bq/L	0.0446		(1)	A
			Co-57	Bq/L	28.3	30.9	21.6 - 40.2	A
			Co-60	Bq/L	18.2	19.56	13.69 - 25.43	A
			H-3	Bq/L	506	507	355 - 659	A
			Mn-54	Bq/L	25.7	27.4	19.2 - 35.6	A
			K-40	Bq/L	2.09		(1)	A
			Sr-90	Bq/L	10.5	10.5	7.4 - 13.7	A
			Zn-65	Bq/L	29.2	30.4	21.3 - 39.5	A
	13-GrW28	Water	Gr-A	Bq/L	2.74	2.31	0.69 - 3.93	A
			Gr-B	Bq/L	15.6	13.0	6.5 - 19.5	A
	13-MaS28	Soil	Cs-134	Bq/kg	859	887	621 - 1153	A
			Cs-137	Bq/kg	633	587	411 - 763	A
			Co-57	Bq/kg	0.256		(1)	A
			Co-60	Bq/kg	738	691	484 - 898	A
			Mn-54	Bq/kg	0.671		(1)	A
			K-40	Bq/kg	714	625.3	437.7 - 812.9	A
			Sr-90	Bq/kg	442	628	440 - 816	W
			Zn-65	Bq/kg	1057	995	697 - 1294	A
	13-RdF28	AP	Cs-134	Bq/sample	1.73	1.78	1.25 - 2.31	A
			Cs-137	Bq/sample	2.73	2.60	1.82 - 3.38	A
			Co-57	Bq/sample	2.38	2.36	1.65 - 3.07	A
			Co-60	Bq/sample	0.0302		(1)	A
			Mn-54	Bq/sample	4.36	4.26	2.98 - 5.54	A
			Sr-90	Bq/sample	1.43	1.49	1.04 - 1.94	A
			Zn-65	Bq/sample	3.14	3.13	2.19 - 4.07	A
	13-GrF28	AP	Gr-A	Bq/sample	0.767	1.20	0.36 - 2.04	A
			Gr-B	Bq/sample	0.871	0.85	0.43 - 1.28	A
	13-RdV28	Vegetation	Cs-134	Bq/sample	-0.197		(1)	A
			Cs-137	Bq/sample	7.39	6.87	4.81 - 8.93	A
			Co-57	Bq/sample	9.87	8.68	6.08 - 11.28	A
			Co-60	Bq/sample	6.08	5.85	4.10 - 7.61	A
			Mn-54	Bq/sample	-0.0104		(1)	A
			Sr-90	Bq/sample	1.28	1.64	1.15 - 2.13	W
			Zn-65	Bq/sample	6.84	6.25	4.38 - 8.13	A
September 2013	13-MaW29	Water	Cs-134	Bq/L	29.1	30.0	21.0 - 39.0	A
			Cs-137	Bq/L	34.5	31.6	22.1 - 41.1	A
			Co-57	Bq/L	0.0358		(1)	A
			Co-60	Bq/L	24.6	23.58	16.51 - 30.65	A
			H-3	Bq/L	2.45		(1)	A
			Mn-54	Bq/L	0.0337		(1)	A
			K-40	Bq/L	0.193		(1)	A
			Sr-90	Bq/L	9.12	7.22	5.05 - 9.39	W
			Zn-65	Bq/L	38.1	34.6	24.2 - 45.0	A
	13-GrW29	Water	Gr-A	Bq/L	1.13	0.701	0.210 - 1.192	A
			Gr-B	Bq/L	7.61	5.94	2.97 - 8.91	A

TABLE E-3 DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)
TELEDYNE BROWN ENGINEERING, 2013
(PAGE 2 OF 2)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Range	Evaluation (c)
September 2013	13-MaS29	Soil	Cs-134	Bq/kg	1150	1172	820 - 1524	A
			Cs-137	Bq/kg	1100	977	684 - 1270	A
			Co-57	Bq/kg	670		(1)	N (2)
			Co-60	Bq/kg	502	451	316 - 586	A
			Mn-54	Bq/kg	758	674	472 - 876	A
			K-40	Bq/kg	796	633	443 - 823	W
			Sr-90	Bq/kg	664	460	322 - 598	N (2)
			Zn-65	Bq/kg	210		(1)	N (2)
	13-RdF29	AP	Cs-134	Bq/sample	-0.570		(1)	N (2)
			Cs-137	Bq/sample	2.85	2.7	1.9 - 3.5	A
			Co-57	Bq/sample	3.30	3.4	2.4 - 4.4	A
			Co-60	Bq/sample	2.41	2.3	1.6 - 3.0	A
			Mn-54	Bq/sample	3.65	3.5	2.5 - 4.6	A
			Sr-90	Bq/sample	1.40	1.81	1.27 - 2.35	W
			Zn-65	Bq/sample	2.90	2.7	1.9 - 3.5	A
	13-GrF29	AP	Gr-A	Bq/sample	0.872	0.9	0.3 - 1.5	A
			Gr-B	Bq/sample	1.57	1.63	0.82 - 2.45	A
	13-RdV29	Vegetation	Cs-134	Bq/sample	5.29	5.20	3.64 - 6.76	A
			Cs-137	Bq/sample	7.48	6.60	4.62 - 8.58	A
			Co-57	Bq/sample	0.0129		(1)	A
			Co-60	Bq/sample	0.0523		(1)	A
			Mn-54	Bq/sample	8.78	7.88	5.52 - 10.24	A
			Sr-90	Bq/sample	1.63	2.32	1.62 - 3.02	W (2)
			Zn-65	Bq/sample	3.18	2.63	1.84 - 3.42	W

(1) False positive test.

(2) Soil, Co-57 & Zn-65 identified by gamma software as not detected, MAPEP evaluated as failing the false positive test. A large concentration of Eu-152 was spiked into the sample, causing interference in the analysis. Gamma software recognized the interference and identified them as not detected. MAPEP does not allow clients to enter non-detect designation. NCR 13-04

Soil, Sr-90 - incorrect results were submitted to MAPEP. Actual result was 332 bq/kg, which is within the acceptance range. NCR 13-04

AP, Cs-134 - MAPEP evaluated the -0.570 as a failed false positive test. No client samples were affected by these failures. NCR 13-04

Vegetation, Sr-90 - it appears that the carrier was double spiked into the sample, resulting in the low activity for this sample. NCR 13-04

(a) Teledyne Brown Engineering reported result.

(b) The MAPEP known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation.

(c) DOE/MAPEP evaluation: A=acceptable, W=acceptable with warning, N=not acceptable.

TABLE E-4 **ERA (a) STATISTICAL SUMMARY PROFICIENCY TESTING PROGRAM[a]**
ENVIRONMENTAL, INC., 2013

Lab Code	Date	Analysis	Concentration (pCi/L) Laboratory Result (b)	ERA Result (c)	Control Limits	Acceptance
ERW-1593	04/08/13	Sr-89	43.6 ± 4.3	41.30	31.6 - 48.4	Pass
ERW-1593	04/08/13	Sr-90	23.2 ± 1.7	23.90	17.2 - 28.0	Pass
ERW-1596	04/08/13	Ba-133	74.80 4.00	82.10	69.00 90.30	Pass
ERW-1596	04/08/13	Co-60	65.50 3.42	65.90	59.30 75.00	Pass
ERW-1596	04/08/13	Cs-134	41.10 3.47	42.80	34.20 47.10	Pass
ERW-1596	04/08/13	Cs-137	42.30 4.03	41.70	37.00 48.80	Pass
ERW-1596	04/08/13	Zn-65	200.3 ± 10.1	189.0	170.0 - 222.0	Pass
ERW-1598	04/08/13	Gr. Alpha	34.30 1.98	40.80	21.10 51.90	Pass
ERW-1598	04/08/13	Gr. Beta	18.70 0.98	21.60	13.00 29.70	Pass
ERW-1600	04/08/13	I-131	23.00 ± 1.10	23.80	19.70 - 28.30	Pass
ERW-1600	04/08/13	I-131(G)	23.48 ± 9.44	23.80	19.70 ± 28.30	Pass
ERW-1606	04/08/13	H-3	4041 ± 194	4050	3450 - 4460	Pass
ERW-6009	10/07/13	Sr-89	22.00 2.80	21.90	14.40 28.20	Pass
ERW-6009	10/07/13	Sr-90	17.10 2.55	18.10	12.80 21.50	Pass
ERW-6012	10/07/13	Ba-133	48.20 4.29	54.20	44.70 59.90	Pass
ERW-6012	10/07/13	Co-60	100.8 ± 4.7	102.0	91.8 - 114.0	Pass
ERW-6012	10/07/13	Cs-134	87.30 4.35	86.70	71.10 95.40	Pass
ERW-6012	10/07/13	Cs-137	199.6 ± 7.4	206.0	185.0 - 228.0	Pass
ERW-6012	10/07/13	Zn-65	356.2 ± 13.2	333.0	300.0 - 389.0	Pass
ERW-6015	10/07/13	Gr. Alpha	30.70 11.90	42.80	22.20 54.30	Pass
ERW-6015	10/07/13	Gr. Beta	25.70 6.48	32.20	20.80 39.90	Pass
ERW-6019	10/07/13	I-131	22.50 1.01	23.60	19.60 28.00	Pass
ERW-6024	10/07/13	H-3	18397 695	17700	15500 19500	Pass

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

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

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

TABLE E-5 DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)
ENVIRONMENTAL, INC., 2013
(Page 1 of 2)

			Concentration (a)			
Lab Code (b)	Date	Analysis	Laboratory result	Known Activity	Control Limits (c)	Acceptance
MAAP-738	02/01/13	Co-57	2.58 ± 0.06	2.36	1.65 - 3.07	Pass
MAAP-738	02/01/13	Co-60	0.01 ± 0.03	0.00	0.00 - 0.10	Pass
MAAP-738	02/01/13	Cs-134	1.82 ± 0.13	1.78	1.25 - 2.31	Pass
MAAP-738	02/01/13	Cs-137	2.93 ± 0.10	2.60	1.82 - 3.38	Pass
MAAP-738	02/01/13	Mn-54	4.87 ± 0.13	4.26	2.98 - 5.54	Pass
MAAP-738	02/01/13	Sr-90	1.39 ± 0.14	1.49	1.04 - 1.94	Pass
MAAP-738	02/01/13	Zn-65	3.84 ± 0.20	3.13	2.19 - 4.07	Pass
MAAP-738 d	02/01/13	Gr. Alpha	0.14 ± 0.03	1.20	0.36 - 2.04	Fail (1)
MAAP-738	02/01/13	Gr. Beta	0.93 ± 0.06	0.85	0.43 - 1.28	Pass
MAW-806	02/01/13	Co-57	31.20 0.40	30.90	21.60 40.20	Pass
MAW-806	02/01/13	Co-60	19.70 ± 0.30	16.56	13.69 - 25.43	Pass
MAW-806	02/01/13	Cs-134	23.20 ± 0.50	24.40	17.10 - 31.70	Pass
MAW-806	02/01/13	Cs-137	0.03 ± 0.12	0.00	0.00 - 1.00	Pass
MAW-806	02/01/13	Fe-55	34.00 ± 3.30	44.00	30.80 - 57.20	Pass
MAW-806	02/01/13	H-3	511.60 ± 12.50	507.00	355.00 - 659.00	Pass
MAW-806	02/01/13	K-40	2.20 ± 0.90	0.00	0.00 - 5.00	Pass
MAW-806	02/01/13	Mn-54	27.60 ± 0.50	27.40	19.20 - 35.60	Pass
MAW-806	02/01/13	Sr-90	9.30 ± 0.80	10.50	7.40 - 13.70	Pass
MAW-806	02/01/13	Zn-65	31.60 ± 0.80	30.40	21.30 - 39.50	Pass
MAW-811	02/01/13	Gr. Alpha	1.87 ± 0.09	2.31	0.69 - 3.93	Pass
MAW-811	02/01/13	Gr. Beta	13.04 ± 0.13	13.00	6.50 - 19.50	Pass
MASO-739	02/01/13	Co-57	0.60 ± 0.50	0.00	0.00 - 5.00	Pass
MASO-739	02/01/13	Co-60	739.20 ± 28.50	691.00	484.00 - 898.00	Pass
MASO-739	02/01/13	Cs-134	863.30 ± 34.10	887.00	621.00 - 1153.00	Pass
MASO-739	02/01/13	Cs-137	661.80 ± 25.70	587.00	411.00 - 763.00	Pass
MASO-739	02/01/13	K-40	745.80 ± 33.30	625.30	437.70 - 812.90	Pass
MASO-739	02/01/13	Mn-54	1.10 ± 1.00	0.00	0.00 - 5.00	Pass
MASO-739	02/01/13	Zn-65	1109.60 ± 44.10	995.00	697.00 - 1294.00	Pass
MASO-744 e	02/01/13	Sr-90	408.40 ± 14.00	628.00	440.00 - 816.00	Fail (2)
MAVE-747	02/01/13	Co-57	10.37 ± 0.17	8.68	6.08 - 11.28	Pass
MAVE-747	02/01/13	Co-60	6.48 ± 0.17	5.85	4.10 - 7.61	Pass
MAVE-747	02/01/13	Cs-134	0.02 ± 0.04	0.00	0.00 - 0.10	Pass
MAVE-747	02/01/13	Cs-137	7.79 ± 0.21	6.87	4.81 - 8.93	Pass
MAVE-747	02/01/13	Mn-54	0.00 ± 0.05	0.00	0.00 - 0.10	Pass
MAVE-747	02/01/13	Zn-65	7.29 ± 0.33	6.25	4.38 - 8.13	Pass
MASO-5043 f	08/01/13	Co-57	699.60 ± 3.90	0.00	0.00 - 5.00	Fail (3)
MASO-5043	08/01/13	Cs-134	1191.70 ± 23.00	1172.00	820.00 - 1524.00	Pass
MASO-5043	08/01/13	Cs-137	1072.00 ± 5.10	977.00	684.00 - 1270.00	Pass
MASO-5043	08/01/13	K-40	760.00 ± 16.20	633.00	443.00 - 823.00	Pass
MASO-5043	08/01/13	Mn-54	753.80 ± 4.90	674.00	472.000 - 876.000	Pass

TABLE E-5 DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP) ENVIRONMENTAL, INC., 2013

			Concentration (a)			
Lab Code (b)	Date	Analysis	Laboratory result	Known Activity	Control Limits (c)	Acceptance
MASO-5043	08/01/13	Sr-90	383.90 ± 14.50	460.00	322.00 - 598.00	Pass
MASO-5043	08/01/13	Zn-65	-351.50 ± 5.50	0.00	0.00 - 0.00	Pass
MAW-5094	08/01/13	Co-57	0.01 ± 0.09	0.00	0.00 - 5.00	Pass
MAW-5094	08/01/13	Co-60	23.20 ± 0.32	23.58	16.51 - 30.65	Pass
MAW-5094	08/01/13	Cs-134	27.60 ± 0.58	30.40	21.00 - 39.00	Pass
MAW-5094	08/01/13	Cs-137	32.31 ± 0.52	31.60	22.10 - 41.10	Pass
MAW-5094	08/01/13	Fe-55	39.20 ± 3.50	53.30	37.30 - 69.30	Pass
MAW-5094	08/01/13	Gr. Alpha	0.54 ± 0.05	0.70	0.21 - 1.19	Pass
MAW-5094	08/01/13	Gr. Beta	5.85 ± 0.09	5.94	2.97 - 8.91	Pass
MAW-5094	08/01/13	H-3	1.20 ± 3.00	0.00	0.00 - 5.00	Pass
MAW-5094	08/01/13	K-40	2.22 ± 0.90	0.00	0.00 - 5.00	Pass
MAW-5094	08/01/13	Mn-54	0.010 ± 0.11	0.00	0.00 - 5.00	Pass
MAW-5094	08/01/13	Sr-90	6.40 ± 0.60	7.22	5.05 - 9.39	Pass
MAW-5094	08/01/13	Zn-65	35.30 ± 0.90	34.60	24.20 - 45.00	Pass
MAVE-5046	08/01/13	Co-57	0.01 ± 0.03	0.00	0.00 - 0.00	Pass
MAVE-5046	08/01/13	Co-60	0.00 ± 0.04	0.00	0.00 - 0.00	Pass
MAVE-5046	08/01/13	Cs-134	5.71 ± 0.23	5.20	3.64 - 6.76	Pass
MAVE-5046	08/01/13	Cs-137	7.64 ± 0.20	6.60	4.62 - 8.58	Pass
MAVE-5046	08/01/13	Mn-54	9.08 ± 0.24	7.88	5.52 - 10.24	Pass
MAVE-5046	08/01/13	Zn-65	2.92 ± 0.25	2.63	1.84 - 3.42	Pass
MAAP-5046	08/01/13	Co-57	3.48 ± 0.14	3.40	1.90 - 3.50	Pass
MAAP-5046	08/01/13	Co-60	2.44 ± 0.08	3.40	1.60 - 3.00	Pass
MAAP-5046	08/01/13	Cs-134	0.01 ± 0.03	0.00	0.02 - 0.04	Pass
MAAP-5046	08/01/13	Cs-137	3.09 ± 0.13	2.70	1.90 - 3.50	Pass
MAAP-5046	08/01/13	Gr. Alpha	0.28 ± 0.04	0.90	0.27 - 1.53	Pass
MAAP-5046	08/01/13	Gr. Beta	1.90 ± 0.08	1.63	0.82 - 2.45	Pass
MAAP-5046	08/01/13	Mn-54	3.95 ± 0.12	3.50	2.50 - 4.60	Pass
MAAP-5046	08/01/13	Sr-90	1.69 ± 4.10	1.81	1.27 - 2.35	Pass
MAAP-5046	08/01/13	Zn-65	3.27 ± 0.18	2.70	2.50 - 4.60	Pass

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

b Laboratory codes as follows: MAW (water), MAAP (air filter), MASO (soil), MAVE (vegetation).

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

(1) The filter was recounted overnight, no significant alpha activity could be detected.

(2) The sample was reanalyzed using additional fuming nitric separations. Result of reanalysis: 574.4 ± 35.2 Bq/kg.

(3) Interference from Eu-152 resulted in misidentification of Co-57.

APPENDIX F

ERRATA DATA

Due to an incorrect setting on gamma detector 08, 3.29 rather than 4.66 was used in the MDC calculation. Nonconformance 13-07 was initiated and corrective actions have been implemented to address this issue. All samples counted on detector 08 were reprocessed using the correct calculation. As a result, all MDCs for these samples have increased by 41.6%. The previously reported activities and uncertainties were not affected. In some cases, the increased MDC resulted in missed LLDs. All samples with MDCs affected by this issue are listed below. The samples with missed LLDs are shown in the table for 2011, 2012, and 2013. All other required LLDs were met.

2011

Radiological Groundwater Protection Program (RGPP)

CLIENT ID	START DATE	END DATE	MATRIX	NUCLIDE	REQUIRED MDC	REVISED MDC	UNITS
SW-2	12/27/11		RGPP	*	*	*	*
SW-2	12/29/11		RGPP	*	*	*	*
SW-2	12/31/11		RGPP	I-131	<15	<19.39	pCi/L

*Required LLDs were achieved

2012

Radiological Groundwater Protection Program (RGPP)

CLIENT ID	START DATE	END DATE	MATRIX	NUCLIDE	REQUIRED MDC	REVISED MDC	UNITS
SW-2	01/01/12		RGPP	I-131	<15	<19.25	pCi/L
MCD	01/01/12		RGPP	*	*	*	*
SW-1	01/11/12		RGPP	*	*	*	*
SW-2	01/11/12		RGPP	*	*	*	*
MCD	01/24/12		RGPP	*	*	*	*
SW-1	02/01/12		RGPP	I-131	<15	<17.89	pCi/L
MCD	02/20/12		RGPP	I-131	<15	<19.93	pCi/L
MCD	03/02/12		RGPP	*	*	*	*
MCD	03/13/12		RGPP	*	*	*	*
SW-1	03/14/12		RGPP	*	*	*	*
MCD	03/23/12		RGPP	Ba-140	<60	<69.89	pCi/L
MCD	03/31/12		RGPP	La-140	<15	<17.96	pCi/L
MCD	04/02/12		RGPP	I-131	<15	<18.36	pCi/L
MCD	04/11/12		RGPP	I-131	<15	<16.71	pCi/L
W-2B	04/16/12		RGPP	*	*	*	*
W-4	04/17/12		RGPP	*	*	*	*
W-9	04/17/12		RGPP	*	*	*	*
W-71	04/17/12		RGPP	I-131	<15	<18.26	pCi/L
W-71	04/17/12		RGPP	La-140	<15	<15.33	pCi/L
W-67	04/18/12		RGPP	*	*	*	*
SW-1	04/18/12		RGPP	*	*	*	*
W-60I	04/18/12		RGPP	*	*	*	*
MCD	04/25/12		RGPP	I-131	<15	<18.6	pCi/L
MCD	05/02/12		RGPP	*	*	*	*
SW-1	05/09/12		RGPP	*	*	*	*
MCD	05/12/12		RGPP	*	*	*	*
MCD	06/30/12		RGPP	*	*	*	*
MCD	07/07/12		RGPP	*	*	*	*
MCD	07/11/12		RGPP	*	*	*	*
MCD	07/19/12		RGPP	*	*	*	*
SW-1	07/25/12		RGPP	La-140	<15	<16.12	pCi/L
MCD	07/28/12		RGPP	I-131	<15	<20.42	pCi/L
MCD	08/22/12		RGPP	*	*	*	*
MCD	09/01/12		RGPP	I-131	<15	<16.91	pCi/L
MCD	09/11/12		RGPP	I-131	<15	<15.22	pCi/L
MCD	09/30/12		RGPP	*	*	*	*
W-50	10/02/12		RGPP	*	*	*	*
MCD	10/05/12		RGPP	*	*	*	*
MCD	10/24/12		RGPP	Ba-140	<60	<66.11	pCi/L

*Required LLDs were achieved

2012

Radiological Environmental Monitoring Program (REMP)

CLIENT ID	START DATE	END DATE	MATRIX	NUCLIDE	REQUIRED MDC	REVISED MDC	UNITS
94	01/05/12	01/26/12	Surface Water	*	*	*	*
39	02/02/12	02/23/12	Drinking Water	*	*	*	*
94	04/04/12	04/26/12	Surface Water	*	*	*	*
1N	05/02/12	05/15/12	Drinking Water	*	*	*	*
39	06/08/12	06/28/12	Drinking Water	I-131	<15	<15.11	pCi/L
38	07/12/12	07/26/12	Drinking Water	*	*	*	*
115	07/19/12		Vegetation	*	*	*	*
39	08/01/12	08/30/12	Drinking Water	*	*	*	*
36	08/14/12		Vegetation	*	*	*	*
115	09/19/12		Vegetation	*	*	*	*
QCA	09/25/12		Surface Water	I-131	<15	<20.28	pCi/L
39	10/03/12	10/18/12	Drinking Water	*	*	*	*
115	10/16/12		Vegetation	I-131	<60	<74.96	pCi/kg Wet
37	11/01/12	11/28/12	Drinking Water	*	*	*	*
33	12/07/12	12/27/12	Surface Water	*	*	*	*
94	12/07/12	12/27/12	Surface Water	*	*	*	*
1S	12/11/12	12/26/12	Drinking Water	*	*	*	*

*Required LLDs were achieved

2013

Radiological Groundwater Protection Program (RGPP)

CLIENT ID	START DATE	END DATE	MATRIX	NUCLIDE	REQUIRED MDC	REVISED MDC	UNITS
MCD	01/01/13		RGPP	LA-140	<15	<19.1	pCi/L
SW-1	01/09/13		RGPP	I-131	<15	<15.62	pCi/L
MCD	01/13/13		RGPP	BA-140	<60	<66.85	pCi/L
MCD	01/13/13		RGPP	LA-140	<15	<18.85	pCi/L
MCD	01/22/13		RGPP	LA-140	<15	<20.88	pCi/L
MCD	01/31/13		RGPP	*	*	*	*

Radiological Environmental Monitoring Program (REMP)

CLIENT ID	START DATE	END DATE	MATRIX	NUCLIDE	REQUIRED MDC	REVISED MDC	UNITS
33	01/04/13	01/30/13	Surface Water	*	*	*	*
W-3C	01/09/13		Ground Water	I-131	<15	<15.38	pCi/L
94	02/07/13	02/27/13	Surface Water	*	*	*	*

*Required LLDs were achieved

Oyster Creek determines the direct radiation to the public by subtracting the average of the control stations from the measurements from the sample stations (sample station millirem – average of control station millirem = net millirem to the public). The graph (Appendix C, Figure C-7) displays the gross millirem readings from the dosimetry. With the change from TLD to OSLD a high bias in the gross millirem was noted at all locations. This bias was not seen after the net millirem was determined.

Station	Gross TLD Average 2010/2011 millirem	Gross OSLD Average 2012/2013 millirem	Difference (OSLD - TLD) millirem
C	14.7	20.2	5.5
14	15.9	22.0	6.0
1	15.6	21.9	6.3
T1	16.1	21.5	5.5
3	13.8	19.2	5.4
4	13.7	20.5	6.8
5	18.4	25.5	7.1
6	14.5	20.4	5.8
8	14.0	19.4	5.5
9	13.3	18.6	5.3
11	14.4	20.1	5.6
22	14.0	19.5	5.4
46	12.9	18.2	5.3
47	14.1	20.3	6.1
48	14.5	20.2	5.7
51	16.4	22.8	6.4
52	17.4	24.2	6.7
53	16.3	22.9	6.6
54	14.4	19.8	5.4
55	19.5	27.1	7.6
56	18.0	24.9	6.9
57	15.3	21.8	6.6
58	15.4	21.5	6.1
59	15.2	21.5	6.3
61	14.3	19.8	5.6
62	15.1	20.4	5.2
63	14.0	20.5	6.5
64	14.9	19.9	5.0
65	14.4	20.4	6.1
66	13.7	19.8	6.1
68	13.2	18.4	5.2

Station	Gross TLD Average 2010/2011 millirem	Gross OSLD Average 2012/2013 millirem	Difference (OSLD - TLD) millirem
71	15.1	21.0	5.8
72	14.6	20.8	6.2
73	13.3	18.9	5.7
74	13.6	19.7	6.1
75	14.1	20.9	6.9
78	14.4	20.0	5.7
79	14.7	20.9	6.1
81	14.2	19.8	5.6
82	14.2	20.6	6.4
84	14.5	20.2	5.7
85	13.1	18.9	5.8
86	14.5	20.7	6.3
88	12.8	18.5	5.6
89	12.8	18.3	5.4
90	12.6	18.4	5.8
92	14.4	20.7	6.2
98	12.7	19.3	6.6
99	13.3	19.0	5.7
100	14.1	19.7	5.6
101	13.7	19.7	6.0
102	15.0	20.8	5.8
103	14.3	20.1	5.8
104	14.4	20.2	5.7
105	12.8	17.8	5.0
106	13.6	19.0	5.4
107	13.8	19.3	5.5
109	15.0	20.6	5.6
110	14.3	19.8	5.6
112	16.9	22.9	5.9
113	14.8	18.0	3.2

Max Diff	Min Diff	Ave Diff
7.6	5.0	5.9

APPENDIX G

ANNUAL RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM REPORT (ARGPPR)