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Technical Specification Section 6.9.1.7 (Salem)
Technical Specification Section 6.9.1.6 (Hope Creek)

APR 29 2014

LR-N14-0079

United States Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Hope Creek Generating Station
Facility Operating License No. NPF-57
NRC Docket No. 50-354

Salem Nuclear Generating Station, Unit Nos. 1and 2
Facility Operating License Nos. DPR-70 and DPR-75
NRC Docket Nos. 50-272 and 50-311

Subject: 2013 Annual Radiological Environmental Operating Report

As required by Section 6.9.1.7 of Appendix A to Facility Operating Licenses DPR-70 and DPR-75 for Salem Generating Station Unit Nos. 1 and 2, and Section 6.9.1.6 of Appendix A to the Operating License NPF-57 for Hope Creek Generating Station, PSEG Nuclear hereby transmits one copy of the combined 2013 Annual Radiological Environmental Operating Report. This report summarizes the results of the radiological environmental surveillance program for 2013 in the vicinity of the Salem and Hope Creek Generating Stations. The result of this program for 2013 was specifically compared to the result of the pre-operational program.

There are no regulatory commitments contained in this letter.

DESIGNATED
ORIGINAL
John F. Lamb
1/23/14

IE25
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If you have any questions or comments on this transmittal, please contact Ms. Alison Kraus at (856) 339-7900.

Sincerely,

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Enclosure: 2013 Annual Radiological Environmental Operating Report

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RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

SALEM & HOPE CREEK GENERATING STATIONS

2013 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

JANUARY 1 TO DECEMBER 31, 2013

TABLE OF CONTENTS

TABLE OF CONTENTS (cont'd)

LIST OF TABLES

LIST OF DATA TABLES

LIST OF TABLES (cont'd)

LIST OF MAPS

LIST OF FIGURES

I. Summary

During normal operations of a nuclear power generating station there are permitted releases of small amounts of radioactive material to the environment. To monitor and determine the effects of these releases, a Radiological Environmental Monitoring Program (REMP) has been established around the Salem Generating Station (SGS) and Hope Creek Generating Station (HCGS). The results of the REMP are published annually, providing a summary and interpretation of the data collected.

Public Service Enterprise Group's (PSEG) Laboratory Testing Services (LTS) was responsible for the collection of environmental samples during 2013. Teledyne Brown Engineering (TBE) was responsible for the analysis of environmental samples during 2013. Duplicate samples for laboratory quality assurance (QA) were sent to GEL Laboratories. Mirion Technologies provided the dosimetry services for PSEG during 2013.

The REMP was conducted in accordance with the SGS's and HCGS's Technical Specifications (TS) and the respective station's Offsite Dose Calculation Manual (ODCM). The detection capabilities, required by the Technical Specifications and SGS's and HCGS's ODCM, were achieved for the 2013 reporting period. The REMP objectives were also met. Exceptions to the program are noted and the PSEG corrective action identifier in parenthesis. The data that was collected in 2013 assists in demonstrating that SGS and HCGS were operated in compliance with Technical Specifications and ODCMs.

Most of the radioactive materials noted in this report are present in the environment either naturally occurring, such as potassium (K) 40 or Beryllium (Be) 7, or from a non-nuclear generating station activity, such as nuclear weapons testing or medical wastes. Measurements made in the vicinity of SGS/HCGS were compared to background or control measurements and the

preoperational REMP study performed before Salem Unit 1 became operational.

Samples of air particulates, air iodine, milk, surface, ground (well) and potable (drinking) water, vegetables, fodder crops, soil, fish, crabs and sediment were collected and analyzed. External radiation dose measurements were also made in the vicinity of SGS/HCGS using passive dosimeters.

To demonstrate compliance with Technical Specifications and SGS's and HCGS's ODCM (Sections 3/4.12.1 & 6.8.4.h), samples were analyzed for one or more of the following: gamma emitting isotopes, tritium (H-3), iodine-131 (I-131), gross alpha and gross beta. The results of these analyses were used to assess the environmental impact of SGS and HCGS operations, thereby demonstrating compliance with Technical Specifications and SGS's and HCGS's ODCM (Section 3/4.11), applicable Federal and State regulations and to verify the adequacy of radioactive effluent control systems.

The concentration of radioactive material in the environment that could be attributable to Salem and Hope Creek stations operations was only a small fraction of the concentration of naturally occurring and man-made radioactivity. Since these results were comparable to the results obtained during the preoperational phase of the program, and combined with historical results collected since commercial operation, it can be concluded that the levels and fluctuations were as expected for an estuarine environment and the operation of SGS and HCGS had no significant radiological impact on the environment.

The results provided in this report for the REMP are summarized below:

There were a total of 1623 analyses on 1288 environmental samples during 2013. Of the total number of analyses and environmental samples, direct

radiation dose measurements were made using 218 sets of direct reading dosimeters.

In addition to the naturally - occurring isotopes (i.e. Be-7, K-40, Ra-Nat and Th-232), Cesium-137 was detected on the vegetables in two of the on-site gardens. These broadleaf vegetation samples had low concentrations of Cs-137 (up to 19 pCi/kg) which is similar to the 2012 results from the site gardens. There were no releases of gaseous cesium from either Salem or Hope Creek in 2012 or 2013. Cesium-137, from the atmospheric atomic bomb testing, is routinely found in sediment and soil samples. Soil samples taken from the gardens in January have Cs-137 that mirrored the range of the other environmental samples. The on-site gardens are encased in small boxes to prevent animals from foraging, and, since the samples are not rinsed, the data indicates that the soil contaminated the broadleaf vegetation. The maximum bounding dose from the contamination would be 0.16 mrem assuming that an individual consumed 26 kg (57 pounds) of the vegetation.

Dose measurements are made with quarterly passive dosimeters at onsite and offsite locations around the SGS/HCGS. The direct radiation component was determined by comparing badges on the site boundary (5S1, 10S1, 11S1, 15S1and 15S2) to the designated controls (3G1 and 14G1). The range of the site boundary dosimeters, with an annual dose between 43 and 51 mRad were lower than the control locations of 57 and 61mRad. The direct radiation dose is determined by subtracting the control data from the badge data, therefore, there is no measurable direct radiation to a Member of the Public at the site boundary. The reason that the site badges are lower is that the surrounding waters lower the radon concentration and limit terrestrial radiation. This was comparable to the levels prior to station operation which had an average of 55 milliroentgen per year for 1973 to 1976.

Following the guidance in Nuclear Energy Institute's (NEI) 07-07, the results of the annual report of the Radiological Groundwater Protection Program (RGPP), formerly reported in this report, has been moved to the Annual Radiological Effluent Release Report.

II. The Radiological Environmental Monitoring Program

Lower Alloways Creek Township, Salem County, New Jersey is the site of SGS and HCGS. Salem Generating Station consists of two operating pressurized water nuclear power reactors. Salem Unit One has a net rating of 1180 megawatt electric (MWe) and Salem Unit Two has a net rating of 1178 MWe. The licensed core power for both units is 3460 megawatt thermal (MWt). Hope Creek Generating Station is a boiling water nuclear power reactor, which has a net rating of 1216 MWe (3840 MWt).

The Generating Stations are located on a man-made peninsula on the east bank of the Delaware River. It was created by the deposition of hydraulic fill from dredging operations. The surrounding environment is characterized mainly by the Delaware River Estuary and Bay, extensive tidal marshlands, and low-lying meadowlands. These land types make up approximately 85% of the land area within five miles of the site. Most of the remaining land is used for agriculture. More specific information on the demography, hydrology, meteorology, and land use of the area may be found in the Environmental Reports, Environmental Statements and the Updated Final Safety Analysis Reports.

Since 1968, a radiological environmental monitoring program (REMP) has been conducted. Starting in December 1972, a more extensive radiological monitoring program was initiated in preparation for the operation of Salem Unit 1. The operational REMP was initiated in December 1976 when Salem Unit 1 achieved criticality.

An overview of the 2013 REMP is provided in Table B-2, Salem and Hope Creek Generating Stations Radiological Environmental Monitoring Program. Radioanalytical data from samples collected under this program were compared with results from the preoperational phase and historical results during operations. Differences between these periods were examined statistically to determine the effects of station operations. This report presents the results from January 1 through December 31, 2013, for the SGS/HCGS REMP.

A. Objectives of the Operational REMP

1. To fulfill the requirements of the Radiological Surveillance sections of the Technical Specifications and the SGS and HCGS ODCMs.

2. To determine whether any significant increase occurred in the concentration of radionuclides in critical pathways.

3. To verify the models used by SGS and HCGS that predict the radioactive inventory in the surrounding environment.

4. To detect any change in ambient gamma radiation levels.

5. To verify that SGS and HCGS operations do not have detrimental effects on the health and safety of the public or on the environment.

B. Implementation of the Objectives

1. Samples of various media were selected for monitoring due to the radiological dose impact to human and other organisms. The selection of samples was based on:

(a) Established critical pathways for the transfer of radionuclides through the environment to man, and

(b) Experience gained during the preoperational phase. Sampling locations were determined based on site meteorology, Delaware River Bay estuarine hydrology, local demography, and land uses.

2. Sampling locations are divided into two classes, indicator and control. Indicator stations are those which are expected to manifest station effects. Control samples are collected at locations which are believed to be unaffected by station operations, usually at 15 to 30 kilometers (9.3 to 18.6 miles) away from the generating stations. Fluctuations in the levels of radionuclides and direct radiation at indicator stations are evaluated with respect to analogous fluctuations at control stations. Indicator and control station data are also evaluated relative to preoperational data.

3. Appendix A, Program Summary, describes and summarizes the analytical results in accordance with Section 6.9.1.7 of the Salem Technical Specifications and Section 6.9.1.6 of the Hope Creek Technical Specifications.

4. Appendix B, Sample Designation, describes the coding system which identifies sample type and location. Table B-1 On-site Sampling Locations lists the station codes, locations, latitude, longitude and the types of samples collected at each station.

5. The sampling locations are indicated on Maps B-1, Onsite Sampling Locations and B-2, Offsite Sampling Locations.

III. Program Description

A. Data Interpretation

Results of analyses are grouped according to sample type and presented in Appendix C, Data Tables. All results above the Lower Limit of Detection (LLD) are at a confidence level of ± 2 sigma. This represents the range of values into which 95% of repeated analyses of the same sample should fall. As defined in U.S. Nuclear Regulatory Commission Regulatory Guide 4.8, LLD is the smallest concentration of radioactive material in a sample that will yield a net count (above system background) that will be detected with 95% probability, with only 5% probability of falsely concluding that a blank observation represents a "real signal". LLD is normally calculated as 4.66 times the standard deviation of the background counting rate, or of the blank sample count, as appropriate, divided by counting efficiency, sample size, 2.22 (dpm per picocurie), the radiochemical yield when applicable, the radioactive decay constant and the elapsed time between sample collection and time of counting. The LLD is an "a priori" number which represents the capability of the measurement system.

The Minimum Detectable Concentration (MDC) is defined as the smallest concentration of radioactive material that can be detected at a given confidence level. The MDC differs from the LLD in that the MDC takes into consideration the interference caused by the presence of other nuclides while the LLD does not. The MDC is an "a posteriori" number which is an indicator of the performance of the measurement system. The MDC is set below the LLD.

The grouped data were averaged and standard deviations calculated. The ± 2 sigma deviations of the averaged data represent sample and not analytical variability. For reporting and calculation of averages,

any result occurring at or below the LLD is considered to be at that level.

B. Program Exceptions

On 06/28/13, sample 11A1, taken at the Salem plant discharge, indicted positive tritium results of 374 pCi/L. There was a permitted release from Salem during the time of sampling. The results support the predicted concentration of tritium from the plant effluent permit. (80106424)

When changing the 16E1 air sampler on 11/18/13, the sampler was not running. The sampler ran for approximately 51.5 hours. The motor in the sampler was replaced with another motor. During 2014, PSEG plans to systematically replace all of the sampler motors that have not already been replaced. (80106424)

The air sampler at station 6S1 had a 109.8 hour outage (fuse blown and replaced) for the week of 07/08/13 to 07/15/13. This temporary air sampler was replaced in December 2013. (80106424)

Two (2) of the monthly surface water samples taken on 02/05/13 had positive iodine-131 (I-131) results. Station 1F2 had I-131 levels of 1.46 pCi/L (1.46E-9 uCi/mL) and station 16F1 had I-131 levels of 1.74 pCi/L (1.74E-9 uCi/mL). Both of these locations are 7 miles upstream of Salem and Hope Creek plants and approximately a mile and a half apart. Liquid permits for the sampling period were reviewed and indicated no I-131 was released from either Salem or Hope Creek. Since these sample locations are upstream of the nuclear complex and taken in the latter part of the ebb (outgoing) tide, the most likely source of the contamination is the result of a medical procedure, similar to the positive I-131 sample taken at SA-SWA-12C1 in April 2011. (70151909)

During the week of 04/22/13 to 05/06/13, the fuse blew in the temporary air sampler installed at station 16S1. Due to the low air volume for sample SA-AIO-16S1 the vendor lab could not meet the LLD of 7 E-2 pCi/m3. A value of <8.34E-02 for I-131 will be reported. A new fuse was installed and the air sampler is working. Permanent air samplers were installed in December of 2013. (70154305)

Cesium-137 (Cs-137) was detected in two of the site garden December 2013 samples. Stations 15S1 and 1S1 had detectable concentrations of 12.9 and 19.2 pCi/L, respectively, of Cs-137. If the cesium was from the plant effluents, there would be other isotopes detected, notably cobalt-60 (Co-60), that are more prevalent in the effluent streams. Cesium-137, attributed to the atomic bomb testing, was detected in the garden soil samples earlier this year. Since the samples are not washed, it is likely that the contamination was from the soil, similar to Cs-137 found in 2012 in the site garden samples. (70163130)

During the 4th quarter, TLDs from station 7F2 and station 16S3 could not be located. They have been replaced and the location of the dosimeter moved slightly to prevent further loss. (80106424)

C. Program Changes

PSEG installed more passive dosimeters during 2013. Two of the new locations (12S and 13S1) were close to the site boundary, but became inaccessible during the summer months because of heavy vegetation. Consequently, they were relocated inside of the protected area.

In January 2013, two new air samplers at locations 6S1 and 16S1 were added to the program. Permanent air samplers for these two locations were installed in December 2013.

D. Quality Assurance Program

Teledyne Brown Engineering

The quality of the results obtained by TBE is ensured by the implementation of the Quality Assurance Program as described in the Teledyne Brown Engineering Quality Assurance Manual and the Teledyne Brown Engineering Procedure Manual.

E. Summary of Results: Inter-laboratory Comparison Program

The testing laboratory analyzed Performance Evaluation (PE) samples of air particulate, air iodine, milk, soil, vegetation and water matrices, as appropriate for 185 analyses. (Appendix D, Tables D-1 through D-3

The PE samples, supplied by Analytics Inc., Environmental Resource Associates (ERA) and Department of Energy's (DOE) Mixed Analyte Performance Evaluation Program (MAPEP), were evaluated against the following acceptance criteria:

1. Analytics Evaluation Criteria

   Analytics' evaluation report provides a ratio of reported result and Analytics' known value. Since flag values are not assigned by Analytics, TBE 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 United States

Environmental Protection Agency (USEPA), National Environmental Laboratory Conference (NELAC) performance testing (PT) program requirements or ERA's standard operating procedure (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.

Teledyne Brown Engineering

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. Nonconformance Report (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 spike 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

IV. Results and Discussion

The analytical results of the 2013 REMP samples are divided into categories based on exposure pathways: atmospheric, direct radiation, terrestrial, and aquatic. The analytical results for the 2013 REMP are summarized in Appendix A, Program Summary. The data for individual samples are presented in Appendix C, Data Tables. The data are compared to the formal pre-operational environmental monitoring program data (1973-1976) and to historical data during operations. The data collected demonstrates that the SGS's and HCGS's REMP was conducted in compliance with the Technical Specifications and SGS's and HCGS's ODCM.

The REMP for the SGS/HCGS Site has historically included samples and analyses not specifically required by the Station's Technical Specifications and SGS's and HCGS's ODCM. These analyses are referenced throughout the report as Management Audit samples. Laboratory Testing Services continues to collect these samples. The summary tables in this report include these additional samples and analyses.

These Management Audit Samples are samples that are taken to augment the radiological effluent monitoring program, but do not have a regulatory basis nor do they fulfill any regulatory requirement. The following is a list and quantity of the Management audit samples:

Food crops (12)
Milk samples (2)
Well water (1)
Potable water (2)
Fodder crops (4)
Soil (9)
Beef and game (2), dependent upon availability

A. Atmospheric

Air particulates were collected on Schleicher-Schuell No. 25 glass fiber filters with low-volume air samplers.

Iodine was collected from the air by adsorption on triethylene-diamine (TEDA) impregnated charcoal cartridges connected in series after the air particulate filters. Air sample volumes were measured with calibrated dry-gas meters. The displayed volumes were corrected to standard temperature and pressure.

1. Air Particulates

Air particulate samples were collected weekly at seven indicator locations, one duplicate station and one control location. Each of the samples collected for the year were analyzed for gross beta. Quarterly composites of the weekly samples from each station were analyzed for specific gamma emitters.

Gross Beta

Gross beta activity was detected in 355 of 356 of the indicator station samples collected at concentrations ranging from 5 to 30 E-3 pCi/m^3 with an average concentration of 13 E-3 pCi/m^3, and in 52 of 52 of the control station samples at concentrations ranging from 8 to 26 E-3 pCi/m^3 with an average of 15 E-3 pCi/m^3. The maximum preoperational level detected was 920 E-3 pCi/m^3 with an average concentration of 74 E-3 pCi/m^3. (Table C–2, Appendix C) [Figure 1 - Results for gross beta analysis from 1990 to current year are plotted as quarterly averages, with an inset depicting the period 1973 to 2013].

Gamma Spectrometry

Gamma spectroscopy was performed on each of the 32 quarterly composite samples.

Beryllium-7, attributed to cosmic ray activity in the atmosphere, was detected in all 28 indicator station composites at concentrations ranging from 66 E-3 to 159 E-3 pCi/m^3 with an average concentration of 103 E-3 pCi/m^3, and in the four control station composites ranging in concentration from 69 to 151 E-3 pCi/m^3 with an average concentration of 105 E-3

pCi/m^3. The maximum preoperational level detected was 330 E-3 pCi/m^3 with an average concentration of 109 E-3 pCi/m^3. (Table C–I, Appendix C).

Naturally occurring Potassium-40 was detected in one of 28 indicator station composites at a concentration of 56 E-3 pCi/m^3.

All other gamma emitters were less than the LLD.

2. Air Iodine

Filtered air iodine samples were collected weekly at seven indicator locations, one duplicate location and one control location. Each of the samples collected for the year was analyzed for I-131. Iodine-131 was not detected in any indicator station samples or control station samples. The maximum preoperational level detected was 42 E-3 pCi/m^3. (Table C–3, Appendix C)

B. Direct Radiation

Ambient radiation levels in the environs were measured with a pair of thermoluminescent dosimeters supplied and processed by Mirion Technologies. Packets containing these passive dosimeters were placed in the owner-controlled area and around the Site at various distances and in each land based meteorological sector and analyzed quarterly. Emphasis was placed on special interest areas such as population centers, nearby residences, and schools.

A total of 58 locations were monitored for direct radiation during 2013, including 20 on-site locations, 33 off-site locations within the 10 mile zone and locations with two control locations beyond 10 miles.

Each location has two TLDs, with two calcium fluoride (CaF) thermoluminescent phosphors and two Lithium Fluoride phosphors in each TLD.

The average dose rate for the quarterly off-site dosimeters was 14.1 milliroentgen per standard quarter and the 5 quarterly on-site indicators dose rate was 11.9 milliroentgen per standard quarter. The average control dose rate was 14.8 milliroentgen per standard quarter.

The preoperational average for the quarterly TLD readings was 4.4 milliroentgen per standard month or 13.2 milliroentgen per standard quarter. The results of the direct radiation measurements for 2013 confirmed that the radiation levels in the vicinity of the Salem and Hope Creek Generating Stations were similar to previous years. (Table C–4, Appendix C)

C. Terrestrial

Terrestrial REMP sampling includes the collection of milk, well water, potable water, vegetation, fodder crop and soil samples.

Milk samples were taken semi-monthly when cows were on pasture and monthly when cows were not grazing on open pasture. Animals are considered on pasture from April to November of each year. Samples were collected in new polyethylene containers and transported in ice chests with no preservatives added to the milk.

One well water sample was collected monthly. Separate raw and treated potable water samples were composited daily at the City of Salem Water and Sewer Department. All samples were collected in new polyethylene containers.

Locally grown vegetables were collected at the time of harvest at 14 locations, fodder crops and broad leaf vegetation at 4 locations. The vegetables and fodder samples are additional samples (Management Audit) taken to enhance the radiological monitoring program. There is no dairy farm within three miles of SGS and HCGS and there is only one dairy within 5 miles. Therefore, broadleaf vegetation is grown, maintained and harvested by LTS personnel in the late summer and early fall. All samples were weighted, packaged and shipped to TBE for analysis.

1. Milk

Milk samples were collected at four local dairy farms (two farms in NJ and two in Delaware). Each sample was analyzed for I-131 and gamma emitters.

Iodine-131

Iodine-131 was not detected above minimum detectable concentration in any of the 80 samples analyzed. The maximum preoperational level detected was 65 pCi/L, which occurred following a period of atmospheric nuclear weapons tests. (Table C–5, Appendix C) [Figure 3 - results from 1990 to 2013 are plotted as quarterly averages, with an inset graph depicting the period 1973 to 2013.]

Gamma Spectrometry

Naturally occurring K-40 was detected in all 80 samples with concentrations for the 60 indicator station samples ranging from 1,162 to 1,564 pCi/L with an average concentration of 1,344 pCi/L, and the 20 control station sample concentrations ranging from 1,149 to 1,417 pCi/L, with an average concentration of 1,273 pCi/L. The maximum preoperational level detected was

2,000 pCi/L with an average concentration of 1,437 pCi/L. (Table C–5, Appendix C)

All other gamma emitters were less than the LLD.

2. Well Water (Ground Water)

Although wells in the vicinity of SGS/HCGS are not directly affected by plant operations, water samples were collected monthly from one farm's well (3E1). This well is located up gradient of the stations aquifer. Samples from this well are considered Management Audit samples.

Gross Alpha

Gross alpha activity was not detected above the minimum detectable concentration in any of the well water samples. The maximum preoperational level detected was 9.6 pCi/L. (Table C–6, Appendix C)

Gross Beta

Gross beta activity was detected in one of 13 well water samples at a concentration of 1.8 pCi/L. As with the 2012 gross beta results, the 2013 results are lower than the preoperational results which ranged from <2.1 to 38 pCi/L, with an average value of 9 pCi/L. The downward trend may be attributed to the REMP participant installing a water treatment system for this well in February, 2009. (Table C–6, Appendix C)

Tritium

Tritium activity was not detected above the minimum detectable concentration in any of the well water samples. The maximum preoperational level detected was 380 pCi/L. (Table C–6, Appendix C)

Gamma Spectrometry

Potassium-40 was not detected in any of the well water samples. The maximum preoperational level detected was 30 pCi/L.

Radium (Natural) was not detected in any of the well water samples. The maximum preoperational level detected was 2.0 pCi/L. (Table C-7, Appendix C)

All other gamma emitters were less than the LLD.

3. Potable Water (Drinking Water)

Both raw and treated potable water samples were collected and composited by The City of Salem Water and Sewer Department personnel. Each sample consisted of daily aliquots composited into a monthly sample. The raw water source for this plant is Laurel Lake and its adjacent wells. These are Management Audit samples as no liquid effluents discharged from SGS/HCGS directly affect this pathway.

Gross Alpha

No gross alpha activity was detected in any of the raw or treated water samples. The maximum preoperational level detected was 2.7 pCi/L. (Table C–8, Appendix C)

Gross Beta

Gross beta activity was detected in 11 of the 12 raw water samples and 11 of the 12 treated water samples. The concentrations for the raw samples ranged from 3.4 to 7.3 pCi/L. Concentrations for the treated water ranged from 2.9 to 5.9 pCi/L. The average concentration for both raw and treated water was 4.7 pCi/L. The maximum preoperational level detected was 9.0 pCi/L with an average concentration of 4.2 pCi/L. (Table C–8, Appendix C)

Tritium

Tritium activity was not detected in any of the raw or treated water samples. The maximum preoperational level detected was 350 pCi/L with an average of 179 pCi/L. (Table C–8, Appendix C)

Iodine-131

Iodine-131 measurements were performed to an LLD of 1.0 pCi/L. Iodine-131 activity was not detected in any of the raw or treated water samples. No preoperational data is available for comparison since I-131 was not analyzed as a specific nuclide until 1989. Since that time all results have been below the LLD. (Table C–9, Appendix C)

Gamma Spectrometry

Naturally occurring K-40 was not detected in any of the raw or treated water samples. No preoperational data is available for comparison.

Naturally occurring Radium (Natural) was not detected in any raw or treated water samples. The maximum preoperational level detected was 1.4 pCi/L. (Table C–9, Appendix C)

All other gamma emitters were less than the LLD.

4. Vegetables

There are no farm products that are irrigated with water in which liquid plant effluents have been discharged.

A variety of food products are sampled from around the plant: the variety is dependent on the farmer's preference. These vegetables are collected as Management Audit samples. In addition, broadleaf vegetation was grown by LTS personnel and planted at three onsite locations and one offsite location in Delaware at 3.9 miles SSW.

These broad leaf vegetable samples are collected since there are no milk farms operating within the 5 km radius of SGS/HCGS. The closest milk farm (13E3) is located in Odessa, DE at 4.9 miles (7.88 km). All samples (vegetable and broadleaf) were analyzed for gamma emitters and included asparagus, cabbage, sweet corn, peppers, tomatoes and soy beans. These samples were from eight indicator stations (20 samples) and three control stations (10 samples). The results for these samples are discussed below.

Gamma Spectrometry

Naturally occurring Be-7, attributed to cosmic ray activity in the atmosphere, was detected in four of the 20 indicator station samples (cabbage), with concentrations ranging from 228 to 372 pCi/kg wet, with an average concentration of 279 pCi/kg

wet. It was not detected in any of the control locations. No preoperational data is available for comparison.
Naturally occurring K-40 was detected in all 20 indicator samples, with concentrations ranging from 1,603 to 13,750 pCi/kg wet with an average concentration of 3,100 pCi/kg wet, and in all 10 control station samples at concentrations ranging from 1,269 to 2,433 pCi/kg wet with an average concentration of 1,963 pCi/kg wet. The maximum preoperational level detected was 4,800 pCi/kg wet with an average concentration of 2,140 pCi/kg wet. (Table C–10, Appendix C).

Cesium-137 was detected in two indicator samples (cabbage) with concentrations of 13 and 19 pCi/kg wet, with an average concentration of 16 pCi/kg wet, which is below the SGS's and HCGS's ODCM LLD value of 80 pCi/kg wet. The results of this sample are discussed in the beginning summary section.

All other gamma emitters were less than the LLD.

5. Fodder Crops

Although not required by the SGS or HCGS Technical Specifications and SGS's and HCGS's ODCM, four samples of silage normally used as cattle feed were collected from three indicator stations and one control station. It was determined that these products could be an element in the food-chain pathway. These fodder crops are collected as Management Audit samples and analyzed for gamma emitters. All four locations from which samples were collected are milk sampling stations.

Gamma Spectrometry

Naturally occurring Be-7, attributed to cosmic ray activity in the atmosphere, was detected in all three indicator samples at concentrations ranging from 196 to 249 pCi/kg wet with an average concentration of 231 pCi/kg wet, and in the control station sample at 249 pCi/kg wet. The maximum preoperational level detected for silage was 4,700 pCi/kg wet with an average concentration of 2,000 pCi/kg wet.

Naturally occurring K-40 was detected in all three indicator samples at concentrations ranging from 2,968 to 4,052 pCi/kg wet with an average concentration of 3,554 pCi/kg wet, and in the control station sample at a concentration of 713 pCi/kg wet.

Preoperational results averaged 7,000 pCi/kg wet. (Table C–11, Appendix C)

All other gamma emitters were less than the LLD.

6. Soil

Soil is sampled every three years at nine stations, and analyzed for gamma emitters. These Management Audit samples were collected in areas that have been relatively undisturbed since the last collection in order to determine any change in the radionuclide inventory of the area. (Table C–12, Appendix C)

Gamma Spectrometry

Naturally occurring K-40 was detected in all nine indicator samples at concentrations ranging from 5,038 to 18,510 pCi/kg dry with an average concentration of 10,980 pCi/kg dry. The

maximum preoperational level detected was 24,000 pCi/kg dry with an average of 10,000 pCi/kg dry.

Cesium-137 was detected in six of the nine indicator samples at concentrations ranging from 45 to 227 pCi/kg dry with an average concentration of 130 pCi/kg dry. The maximum preoperational level detected was 2,800 pCi/kg dry with an average of 800 pCi/kg dry. [Figure 7 - Results for the Cs-137 analyses from 1973 to current year are plotted as the triennial average.] (Table C–12, Appendix C)

Naturally occurring Ra-226 was detected in five of the nine indicator samples at concentrations ranging from 1,324 to 2,595 pCi/kg dry with an average concentration of 2,100 pCi/kg dry. The maximum preoperational level detected was 1,500 pCi/kg dry with an average of 870 pCi/kg dry.

Naturally occurring Th-232 was detected in all of the nine indicator samples at concentrations ranging from 350 to 1,207 pCi/kg dry with an average concentration of 702 pCi/kg dry. The maximum preoperational level detected was 1,400 pCi/kg dry with an average of 740 pCi/kg dry. (Table C–12, Appendix C)

7. Beef and Game

Although not required by the SGS or HCGS Technical Specifications and SGS's and HCGS's ODCM, one muskrat sample was collected from one indicator station. The game sample was collected as a Management Audit sample and analyzed for gamma emitters.

Gamma Spectrometry

Naturally occurring K-40 was detected in one of three indicator samples at a concentration of 3,307 pCi/kg wet. No preoperational data is available for comparison. (Table C–13, Appendix C)

All other gamma emitters were less than the LLD.

D. Aquatic

Environmental Consulting Services, Inc (ECSI) collected all aquatic samples (with the exception of the 6S2 shoreline sediment). This sample set includes edible fish, shoreline and riverbed sediment, surface water and crab.

Surface water samples were collected offshore. The technicians collect the samples in new polyethylene containers that were rinsed twice with the sample medium prior to collection. The surface water samples were transported to TBE for analysis.

Edible fish were taken by gill nets while crabs were caught in commercial traps. These samples were processed by separating the flesh from the bone and shell. The flesh was placed in sealed containers and frozen before being transported in ice chests to TBE for analysis.

Sediment samples collected by ECSI were taken with a bottom grab sampler and frozen in sealed polyethylene containers before being transported in ice chests to TBE. For the river bottom sediment, a marine GPS was used to locate the correct site and the sampling boat was maneuvered over the area until the correct amount of sample was obtained (grabbed) with the

sediment dredge. Personnel from LTS collected and prepared the location 6S2 shoreline sediment sample (an onsite location). For this location, a square area, measuring one meter on each side was staked out and then divided into a grid of nine smaller boxes, three per side. A one inch deep scoop from the center of each of the small grids was taken. All the aliquots were combined and the total sample transported in the ice chest to TBE.

1. Surface Water

Surface water samples were collected monthly at four indicator stations and one control station in the Delaware River Bay estuary. One location (11A1) is at the outfall area (which is the area where liquid radioactive effluents from the Salem Station are discharged into the Delaware River), one is downstream from the outfall area (7E1), and one is directly west of the outfall area at the mouth of the Appoquinimink River (12C1). Two upstream locations are in the Delaware River (1F2) and at the mouth of the Chesapeake and Delaware Canal (16F1), the latter being sampled when the flow is from the Canal into the river.

Station 12C1, directly west, at the mouth of the Appoquinimink River, serves as the operational control. Location 12C1 was chosen as the control location because the physical characteristics of this station more closely resemble those of the outfall area than do those at the farther upstream location (1F2). As discussed in the pre-operational summary report, due to the tidal nature of this Delaware River Bay estuary, there are flow rate and salinity variations. These variations will account for differences in concentrations of potassium and associated gross beta from K-40.

Gross Beta

Gross beta activity was detected in all of the 48 indicator station samples with concentrations ranging from 5 to 264 pCi/L and an average concentration of 94 pCi/L, and in all 12 of the control station samples with concentrations ranging from 4 to 264 pCi/L and an average concentration of 102 pCi/L. The maximum preoperational level detected was 110 pCi/L with an average concentration of 32 pCi/L. (Table C–14, Appendix C) [Figure 4 - Quarterly results for all locations are plotted for the years 1990 to 2013, with an inset graph depicting the current period 1973 to 2013.]

Tritium

Tritium activity was detected in one of 48 indicator samples with a concentration of 265 pCi/L and was not detected in any of the control samples. The maximum preoperational level detected was 600 pCi/L, with an average concentration of 210 pCi/L. There is no dose from this radioactive material because the exposure pathway is drinking water and the Delaware River is salt/brackish at this point. (Table C-15, Appendix C) [Figure 5 – Quarterly positive results from 1990 to 2013 are plotted, with an inset graph depicting the period 1973 to 2013.]

Gamma Spectrometry

Naturally occurring K-40 was detected in 20 of the 48 indicator station samples at concentrations ranging from 47 to 177 pCi/L with an average concentration of 97 pCi/L, and in five of the 12 control station samples at concentrations ranging from 60 to 137 pCi/L and an average of 104 pCi/L. The maximum

preoperational level detected for K-40 was 200 pCi/L with an average concentration of 48 pCi/L.

Iodine-131

Iodine-131 was not detected in any 46 of the 48 indicator samples or the 12 control samples. See Program Exceptions Section for explanation. (Table C-16, Appendix C)

All other gamma emitters were less than the LLD.

2. Fish

Edible species of fish were collected semi-annually at two indicator stations and one control station and analyzed for gamma emitters in edible flesh.

Samples included channel catfish, white perch, black drum and striped bass.

Gamma Spectrometry

Naturally occurring K-40 was detected in all four indicator station samples at concentrations ranging from 3,480 to 4,755 pCi/kg wet with an average concentration of 3,963 pCi/kg wet, and all three control station samples at concentrations ranging from 3,407 to 4,705 pCi/kg wet with an average concentration of 4,132 pCi/kg wet. The maximum preoperational level detected was 13,000 pCi/kg wet with an average concentration of 2,900 pCi/kg wet. (Table C–17, Appendix C)

All other gamma emitters were less than the LLD.

3. Blue Crab

Blue crab samples were collected twice during the season at one indicator and one control station. The edible portions were analyzed for gamma emitters.

Gamma Spectroscopy

Naturally occurring K-40 was detected in both indicator station samples at concentrations of 2,599 and 4,316 pCi/kg wet with an average concentration of 3,458 pCi/kg wet, and in both control station samples at concentrations of 2,803 and 2,868 pCi/kg wet with an average concentration of 2,836 pCi/kg wet. The maximum preoperational level detected was 12,000 pCi/kg wet with an average concentration of 2,835 pCi/kg wet. (Table C–18, Appendix C)

All other gamma emitters were less than the LLD.

4. Sediment

Sediment samples were collected semi-annually from six indicator stations and one control station. Location 6S2 is the only shoreline sediment sample location and is directly subject to tidal fluctuations.

Gamma Spectroscopy

Naturally occurring K-40 was detected in all 12 indicator station samples at concentrations ranging from 2,662 to 20,940 pCi/kg dry, with an average concentration of 11,078 pCi/kg dry, and at both control stations samples at concentrations of 16,470 and 17,430 pCi/kg dry with an average concentration of 16,950

pCi/kg dry. The maximum preoperational level detected was 21,000 pCi/kg dry with an average concentration of 15,000 pCi/kg dry.

Cesium-137 was not detected in any of the indicator or control samples. The maximum preoperational level detected was 400 pCi/kg dry with an average concentration of 150 pCi/kg dry. (Figure 6 – Semi-annual positive results from 1990 to 2013 are plotted, with an inset graph depicting the current period 1977 to 2013.)

Naturally occurring Radium (Natural) was detected in five of the 12 indicator station samples at concentrations ranging from 2,403 to 3,441 pCi/kg dry with an average concentration of 2,792 pCi/kg dry, and in one of the two control station samples at a concentration of 3,228 pCi/kg dry. The maximum pre-operational level detected was 1,200 pCi/kg dry with an average concentration of 760 pCi/kg dry.

Naturally occurring Th-232 was detected in five of the 12 indicator station samples at concentrations ranging from 166 to 1,233 pCi/kg dry with an average concentration of 802 pCi/kg dry, and in both of the two control station samples at concentrations of 869 and 1168 pCi/kg dry with an average concentration of 1,019 pCi/kg dry. The maximum pre-operational level detected was 1,300 pCi/kg dry with an average concentration of 840 pCi/kg dry. (Table C–19, Appendix C)

All other gamma emitters were less than the LLD.

E. Land Use Survey

SYNOPSIS OF 2013 LAND USE CENSUS

A land use census was conducted in each of the 16 meteorological sectors to identify, within a distance of 8 km (5 miles), the location of the nearest milk animal, the nearest residence and the nearest garden of greater than 50 m^2 (500 ft^2) producing broad leaf vegetation. In accordance with Salem and Hope Creek ODCMs, the census was performed using a door to door survey, visual survey, Google Earth and by consulting with local agricultural authorities.

Meteorological Sector	Milk Animal August, 2013 Km (miles)	Nearest Residence August, 2013 Km (miles)	Vegetable Garden August, 2013 Km (miles)	Meat Animal August, 2013 Km (miles)
N	None	None	None	None
NNE	None	8.0 (5.0)	None	6.8 (4.2)
NE	None	6.2 (3.9)	None	None
ENE	None	6.2 (3.9)	None	None
E	None	None	None	None
ESE	None	None	None	None
SE	None	None	None	None
SSE	None	None	None	None
S	None	None	None	None
SSW	None	6.2 (3.9)	None	None
SW	None	6.9 (4.3)	7.3 (4.6)	7.3 (4.6)
WSW	None	7.1 (4.4)	None	None
W	7.8 (4.9)	6.5 (4.0)	None	None
WNW	None	5.5 (3.4)	None	None
NW	None	5.9 (3.7)	None	None
NNW	None	6.8 (4.2)	None	None

The 2013 Land Use Census results are summarized in the above table. A comparison of the identified locations from the 2013 table with the 2012 table shows that there is no change to the nearest milk animal, nearest resident, or nearest vegetable garden (>500 ft^2) with broadleaf vegetation identified. Therefore, no formal dose evaluation or changes to the SGS and HCGS ODCMs are required.

V. Annotations to Previous AREOR

In the 2012 Annual Radiological Environmental Operating Report Table C-3, the air sample results for the SA-AIO-5S2 for the week of 04/09/12 – 04/16/12 were incorrectly reported as <0, instead of <14.

The "control station" notation in Table C-4 of the 2012 AREOR incorrectly lists six control stations. Only stations 3G1 and 14G1 should have been labeled as controls. (70151506)

In the 2012 Annual Radiological Environmental Operating Report Table C-16, the reported values for I-131 for July through December were incorrectly reported. All values for I-131 were below the LLD value of 1 pCi/L. (70157113)

VI. Hope Creek Technical Specification Limit for Primary Water Iodine Concentrations

The Hope Creek primary water chemistry results for 2013 were reviewed. The specific activity of the primary coolant did not exceed 0.2 microcuries per gram Dose Equivalent I-131 (DEI), and the DEI generally ranged from 1 to 2 E-5 microcuries per gram. Therefore, the iodine concentrations in the primary coolant did not exceed the Tech Spec limit specified in section 3.4.5.

VII. Conclusions

The Radiological Environmental Monitoring Program for Salem and Hope Creek Generating Stations was conducted during 2013 in accordance with the SGS and HCGS Technical Specifications and SGS's and HCGS's ODCM. The LLD values required by the Technical Specifications and SGS's and HCGS's ODCM were achieved for this reporting period (See Appendix A and Appendix C). The objectives of the program were also met during this

period. The data collected assists in demonstrating that SGS and HCGS were operated in compliance with Technical Specifications and SGS's and HCGS's ODCM requirements.

The concentration of radioactive material in the environment that could be attributable to Salem and Hope Creek stations operations was only a small fraction of the concentration of naturally occurring and man-made radioactivity. Since these results were comparable to the results obtained during the preoperational phase of the program, which ran from 1973 to 1976, and with historical results collected since commercial operation, PSEG Nuclear Personnel have concluded that the operation of the Salem and Hope Creek Stations had no significant radiological impact on the environment.

From the results obtained, it can be concluded that the levels and fluctuations of radioactivity in environmental samples were as expected for an estuarine environment.

VIII. References

[1] Radiation Management Corporation. "Artificial Island Radiological Environmental Monitoring Program - Preoperation Summary - 1973 through 1976". RMC-TR-77-03, 1978.

[2] Public Service Enterprise Group. "Offsite Dose Calculation Manual"- Salem Generating Station. Revision 26.

[3] Public Service Enterprise Group. "Offsite Dose Calculation Manual"- Hope Creek Generating Station. Revision 26.

[4] U.S. Nuclear Regulatory Commission: Branch Technical Position – Regulatory Guide 4.8, "An Acceptable Radiological Monitoring Program", Revision 1, November 1979.

APPENDIX A

PROGRAM SUMMARY

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RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

SALEM GENERATING STATION **DOCKET NO. 50-272/-311**
HOPE CREEK GENERATING STATION **DOCKET NO. 50-354**

SALEM COUNTY, NEW JERSEY **January 1, 2013 to December 31, 2013**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD)*	ALL INDICATOR LOCATIONS MEAN (RANGE) **	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (RANGE)	CONTROL LOCATION MEAN (RANGE)	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
I. AIRBORNE AIR PARTICULATE (E-3 pCi/m^3)	GR-B 408	10	13 (355/356) (5/30)	SA-APT-14G1 C 11.8 MILES WNW	15 (52/52) (8/26)	15 (52/52) (8/26)	0
	GAMMA 32						
	BE-7	NA	103 (28/28) (66/159)	SA-APT-16S1 0.53 MILES NNW	116 (4/4) (89/144)	105 (4/4) (69/151)	0
	K-40	NA	56 (1/28)	SA-APT-16S1 0.53 MILES NNW	56 (1/4)	<LLD	0
	CS-134	50	<LLD	-	-	<LLD	0
	CS-137	60	<LLD	-	-	<LLD	0
AIR IODINE (E-3 pCi/m^3)	GAMMA 408						
	I-131	70	<LLD	-	-	<LLD	0
II. DIRECT DIRECT RADIATION (mR/standard quarter)	TLD-QUARTERLY 218	NA	13.8 (210/210) (7/21)	SA-IDM-1F1 5.8 MILES N OF SITE	18.3 (4/4) (16/20)	14.8 (8/8) (13/17)	0
III. TERRESTRIAL MILK (pCi/L)	I-131 80	1	<LLD	-	-	<LLD	0
	GAMMA 80						
	K-40	NA	1344 (60/60) (1162/1564)	SA-MLK-14F4 7.6 MILES WNW	1367 (20/20) (1200/1564)	1273 (20/20) (1149/1417)	0

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

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SALEM COUNTY, NEW JERSEY **January 1, 2013 to December 31, 2013**

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MILK (cont'd) (pCi/L)	CS-134		15	<LLD	-	-	<LLD	0
	CS-137		18	<LLD	-	-	<LLD	0
	BALA140		15	<LLD	-	-	<LLD	0
	RA-226		NA	<LLD	-	-	<LLD	0
WELL WATER (pCi/L)	GR-A	13	3	<LLD	-	-	NA	0
	GR-B	13	4	1.8 (1/13)	SA-WWA-3E1 4.2 MILES NE	1.8 (1/13)	NA	0
	H-3	13	200	<LLD	-	-	NA	0
	GAMMA	13						
	K-40		NA	<LLD	-	-	NA	0
	MN-54		15	<LLD	-	-	NA	0
	CO-58		15	<LLD	-	-	NA	0

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

SALEM GENERATING STATION **DOCKET NO. 50-272/-311**
HOPE CREEK GENERATING STATION **DOCKET NO. 50-354**

SALEM COUNTY, NEW JERSEY **January 1, 2013 to December 31, 2013**

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WELL WATER (cont'd) (pCi/L)	FE-59	30	<LLD	-	-	NA	0
	CO-60	15	<LLD	-	-	NA	0
	ZN-65	30	<LLD	-	-	NA	0
	ZRNB-95	15	<LLD	-	-	NA	0
	I-131	1	<LLD	-	-	NA	0
	CS-134	15	<LLD	-	-	NA	0
	CS-137	18	<LLD	-	-	NA	0
	BALA140	15	<LLD	-	-	NA	0
	RA-226	NA	<LLD	-	-	NA	0
POTABLE WATER (pCi/L)	GR-A 24	3	<LLD	-	-	NA	0

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

SALEM GENERATING STATION **DOCKET NO. 50-272/-311**
HOPE CREEK GENERATING STATION **DOCKET NO. 50-354**

SALEM COUNTY, NEW JERSEY **January 1, 2013 to December 31, 2013**

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POTABLE WATER (cont'd) (pCi/L)	GR-B 24	4	4.7 (22/24) (2.9/7.3)	2F3 8.0 MILES NNE	4.8 (11/12) (3.4/7.3)	NA	0
	H-3 24	200	<LLD	-	-	NA	0
	GAMMA 24						
	K-40	NA	<LLD	-	-	NA	0
	MN-54	15	<LLD	-	-	NA	0
	CO-58	15	<LLD	-	-	NA	0
	FE-59	30	<LLD	-	-	NA	0
	CO-60	15	<LLD	-	-	NA	0
	ZN-65	30	<LLD	-	-	NA	0
	ZRNB-95	15	<LLD	-	-	NA	0
	I-131	1	<LLD	-	-	NA	0

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

SALEM GENERATING STATION **DOCKET NO. 50-272/-311**
HOPE CREEK GENERATING STATION **DOCKET NO. 50-354**

SALEM COUNTY, NEW JERSEY **January 1, 2013 to December 31, 2013**

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POTABLE WATER (cont'd) (pCi/L)	CS-134	15	<LLD	-	-	NA	0
	CS-137	18	<LLD	-	-	NA	0
	BALA140	15	<LLD	-	-	NA	0
	RA-226	NA	<LLD	-	-	NA	0
VEGETATION (pCi/kg wet)	GAMMA 30						
	BE-7	NA	279 (4/20) (228/372)	SA-FPL-10D1 3.9 MILES SSW	372 (1/1)	<LLD	0
	K-40	NA	3100 (20/20) (1603/13750)	SA-VGT-14F4 7.6 MILES WNW	13750 (1/1)	1963 (10/10) (1269/2433)	0
	I-131	60	<LLD	-	-	<LLD	0
	CS-134	60	<LLD	-	-	<LLD	0
	CS-137	80	16 (2/20) (13/19)	SA-FPL-1S1 0.57 MILES N	19 (1/1)	<LLD	0
	RA-226	NA	<LLD	-	-	<LLD	0
	TH-232	NA	<LLD	-	-	<LLD	0

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

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SALEM COUNTY, NEW JERSEY **January 1, 2013 to December 31, 2013**

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FODDER CROPS	GAMMA 4						
(pCi/kg wet)	BE-7	NA	231 (3/3) (196/249)	SA-VGT-2G3 11.8 MILES NNE	249 (1/1)	193 (1/1)	0
	K-40	NA	3554 (3/3) (2968/4052)	SA-VGT-14F4 7.6 MILES WNW	4052 (1/1)	713 (1/1)	0
	I-131	60	<LLD	-	-	<LLD	0
	CS-134	60	<LLD	-	-	<LLD	0
	CS-137	80	<LLD	-	-	<LLD	0
	RA-226	NA	<LLD	-	-	<LLD	0
	TH-232	NA	<LLD	-	-	<LLD	0
SOIL	GAMMA 9						
(pCi/kg dry)	BE-7	NA	<LLD	-	-	NA	0
	K-40	NA	10980 (9/9) (5038/18510)	SA-SOL-13E3 5.0 MILES W	18510 (1/1)	NA	0
	CS-134	150	<LLD	-	-	NA	0

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

SALEM GENERATING STATION **DOCKET NO. 50-272/-311**
HOPE CREEK GENERATING STATION **DOCKET NO. 50-354**

SALEM COUNTY, NEW JERSEY **January 1, 2013 to December 31, 2013**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD)*	ALL INDICATOR LOCATIONS MEAN (RANGE) **	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (RANGE)	CONTROL LOCATION MEAN (RANGE)	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
SOIL (cont'd) (pCi/kg dry)	CS-137	180	130 (6/9) (45/227)	SA-SOL-10D1 3.9 MILES SSW	227 (1/1)	NA	0
	RA-226	NA	2100 (5/9) (1324/2595)	SA-SOL-3G1 16.5 MILES NE	2595 (1/1)	NA	0
	TH-232	NA	702 (9/9) (350/1207)	SA-SOL-3G1 16.5 MILES NE	1207 (1/1)	NA	0
BEEF AND GAME (pCi/kg wet)	GAMMA 1						
	BE-7	NA	<LLD	-	-	NA	0
	K-40	NA	3307 (1/1)	SA-GAM-5C1 3.14 MILES ENE	3307 (1/1)	NA	0
	I-131	60	<LLD	-	-	NA	0
	CS-134	60	<LLD	-	-	NA	0
	CS-137	80	<LLD	-	-	NA	0
IV. AQUATIC SURFACE WATER (pCi/L)	GR-B 60	4	94 (48/48) (5/264)	SA-SWA-7E1 4.5 MILES SE	145 (12/12) (22/264)	102 (12/12) (4/264)	0
	H-3 60	200	265 (1/48)	SA-SWA-11A1 0.2 MILES SW	265 (1/12)	<LLD	0

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

SALEM GENERATING STATION **DOCKET NO. 50-272/-311**
HOPE CREEK GENERATING STATION **DOCKET NO. 50-354**

SALEM COUNTY, NEW JERSEY **January 1, 2013 to December 31, 2013**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD)*	ALL INDICATOR LOCATIONS MEAN (RANGE) **	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (RANGE)	CONTROL LOCATION MEAN (RANGE)	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
SURFACE WATER (cont'd)	GAMMA 60						
(pCi/L)	K-40	NA	97 (20/48) (47/177)	SA-SWA-7E1 4.5 MILES SE	112 (5/12) (84/177)	104 (5/12) (60/137)	0
	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
	ZRNB-95	15	<LLD	-	-	<LLD	0
	I-131	1	1.6 (2/48) (1.5/1.7)	SA-SWA-16F1 6.9 MILES NNW	1.7 (1/12)	<LLD	0
	CS-134	15	<LLD	-	-	<LLD	0
	CS-137	18	<LLD	-	-	<LLD	0

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

SALEM GENERATING STATION **DOCKET NO. 50-272/-311**
HOPE CREEK GENERATING STATION **DOCKET NO. 50-354**

SALEM COUNTY, NEW JERSEY **January 1, 2013 to December 31, 2013**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD)*	ALL INDICATOR LOCATIONS MEAN (RANGE) **	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (RANGE)	CONTROL LOCATION MEAN (RANGE)	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
SURFACE WATER (cont'd) (pCi/L)	BALA140	15	<LLD	-	-	<LLD	0
FISH (pCi/kg wet)	GAMMA 7						
	K-40	NA	3963 (4/4) (3480/4755)	SA-ESF-7E1 4.5 MILES SE	4402 (2/2) (4048/4755)	4132 (3/3) (3407/4705)	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
	RA-226	NA	<LLD	-	-	<LLD	0

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

SALEM GENERATING STATION **DOCKET NO. 50-272/-311**
HOPE CREEK GENERATING STATION **DOCKET NO. 50-354**

SALEM COUNTY, NEW JERSEY **January 1, 2013 to December 31, 2013**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD)*	ALL INDICATOR LOCATIONS MEAN (RANGE) **	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (RANGE)	CONTROL LOCATION MEAN (RANGE)	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
BLUE CRABS	GAMMA 4						
(pCi/kg wet)	K-40	NA	3458 (2/2) (2599/4316)	SA-ECH-11A1 0.2 MILES SW	3458 (2/2) (2599/4316)	2836 (2/2) (2803/2868)	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
	RA-226	NA	<LLD	-	-	<LLD	0
SEDIMENT	GAMMA 14						
(pCi/kg dry)	BE-7	NA	<LLD	-	-	<LLD	0

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

SALEM GENERATING STATION **DOCKET NO. 50-272/-311**
HOPE CREEK GENERATING STATION **DOCKET NO. 50-354**

SALEM COUNTY, NEW JERSEY **January 1, 2013 to December 31, 2013**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD)*	ALL INDICATOR LOCATIONS MEAN (RANGE) **	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (RANGE)	CONTROL LOCATION MEAN (RANGE)	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
SEDIMENT (cont'd) (pCi/kg dry)	K-40	NA	11078 (12/12) (2662/20940)	SA-ESS-16F1 6.9 MILES NNW	20485 (2/2) (20030/20940)	16950 (2/2) (16470/17430)	0
	CS-134	150	<LLD	-	-	<LLD	0
	CS-137	180	<LLD	-	-	<LLD	0
	RA-226	NA	2792 (5/12) (2403/3441)	SA-ESS-12C1 C 2.5 MILES WSW	3228 (1/2)	3228 (1/2)	0
	TH-232	NA	802 (5/12) (166/1233)	SA-ESS-16F1 6.9 MILES NNW	1093 (2/2) (1017/1168)	1019 (2/2) (869/1168)	0

* LLD LISTED IS THE LOWER LIMIT OF DETECTION WHICH WE ENDEAVORED TO ACHIEVE DURING THIS REPORTING PERIOD.
** MEAN CALCULATED USING VALUES ABOVE LLD ONLY. FRACTION OF MEASUREMENTS ABOVE LLD ARE IN PARENTHESES.

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APPENDIX B

SAMPLE DESIGNATION
AND
LOCATIONS

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SAMPLE DESIGNATION

The PSEG's Laboratory Testing Services (LTS) identifies samples by a three part code. The first two letters are the program identification code. Because of the proximity of the Salem and Hope Creek Stations a common environmental surveillance program is being conducted. The identification code, "SA", has been applied to Salem and Hope Creek stations. The next three letters are for the media sampled.

AIO	= Air Iodine	IDM	= Immersion Dose (TLD)
APT	= Air Particulate	MLK	= Milk
ECH	= Hard Shell Blue Crab	PWR	= Potable Water (Raw)
ESF	= Edible Fish	PWT	= Potable Water (Treated)
ESS	= Sediment	SOL	= Soil
FPL	= Green Leaf Vegetables	SWA	= Surface Water
FPV	= Vegetables (Various)	VGT	= Fodder Crops (Various)
GAM	= Game (Muskrat)	WWA	= Well Water

The last four symbols are a location code based on direction and distance from a standard reference point. The reference point is located at the midpoint between the center of the Salem 1 and Salem 2 containments. Of these, the first two represent each of the sixteen angular sectors of 22.5 degrees centered about the reactor site. Sector one is divided evenly by the north axis and other sectors are numbered in a clockwise direction as follows:

1 = N	5 = E	9 = S	13 = W
2 = NNE	6 = ESE	10 = SSW	14 = WNW
3 = NE	7 = SE	11 = SW	15 = NW
4 = ENE	8 = SSE	12 = WSW	16 = NNW

The next digit is a letter which represents the radial distance from the reference point:

S	= On-site location	E	= 4-5 miles off-site
A	= 0-1 miles off-site	F	= 5-10 miles off-site
B	= 1-2 miles off-site	G	= 10-20 miles off-site
C	= 2-3 miles off-site	H	= >20 miles off-site
D	= 3-4 miles off-site		

The last number is the station numerical designation within each sector and zone; e.g., 1,2,3,...etc. For example, the designation SA-WWA-3E1 would indicate a sample in the Salem and Hope Creek program (SA), consisting of well water (WWA), which had been collected in sector number 3, centered at 45 degrees (north east) with respect to the midpoint between Salem 1 and 2 containments at a radial distance of 4 to 5 miles off-site, (therefore, radial distance E). The number 1 indicates that this is sampling station #1 in that particular sector.

TABLE B-1

SAMPLING LOCATIONS

Specific information about the individual sampling locations are given in Table B-1. Maps B-1 and B-2 show the locations of sampling stations with respect to the Site. A Portable Global Positioning System (GPS) was used to provide the coordinates of sampling locations.

STATION CODE	STATION LOCATION	LATITUDINAL	LONGITUDINAL	SAMPLE TYPE
		DEG. MIN. FT	DEG. MIN. FT	
1S1	0.57mi. N	39 - 28 - 260	75 - 32 - 222	IDM,VGT
2S2	0.4 mi. NNE; Lamp Pole 65 Near HC Switch Yard	39 - 28 - 98	75 - 32 - 10	IDM
2S4	0.6 mi. NNE	39 - 28 - 110	75 - 31 - 992	IDM
3S1	0.58 mi. NE	39 - 28 - 140	75 - 31 - 678	IDM
4S1	0.60 mi. ENE	39 - 28 - 023	75 - 31 - 544	IDM
5S1	0.86 mi. E; site access road	39 - 27 - 668	75 - 31 - 187	AIO,APT,IDM
5S2	0.86 mi. E; site access road, Duplicate sample	39 - 27 - 668	75 - 31 - 187	AIO, APT
6S1	0.17mi. ESE; area around Helicopter Pad	39 - 27 - 698	75 - 31 - 979	IDM,SOL,ESS
6S2	0.23mi. ESE; area around Helicopter Pad	39 - 27 - 719	75 - 31 - 912	IDM,SOL,ESS
7S1	0.12 mi. SE; station personnel gate	39 - 27 - 720	75 - 32 - 15	IDM
8S1	0.14 mi. SE; station personnel gate	39 - 27 - 676	75 - 32 - 055	IDM
9S1	0.17 mi. SSE	39 - 27 - 636	75 - 32 - 091	IDM
10S1	0.14 mi. SSW; inlet cooling water bldg.	39 - 27 - 700	75 - 32 - 160	IDM
11S1	0.09 mi. SW; service water inlet bldg.	39 - 27 - 719	75 - 32 - 225	IDM
12S1	0.09 mi. W	39 - 27 - 756	75 - 32 - 236	IDM
13S1	0.11 mi. WNW	39 - 27 - 801	75 - 32 - 267	IDM
14S1	0.17 mi. NNW	39 - 27 - 893	75 - 32 - 280	IDM
15S1	0.57 mi. NW	39 - 28 - 161	75 - 32 - 525	IDM,VGT
15S2	0.61 mi. NNW	39 - 28 - 12	75 - 32 - 32	IDM
16S1	0.57 mi. NNW	39 - 28 - 215	75 - 32 - 432	IDM,VGT
16S2	0.60 mi. N	39 - 28 - 16	75 - 32 - 17	IDM
16S3	0.74 mi. NNW	39 - 28 - 350	75 - 32 - 550	IDM
11A1	0.2 mi. SW; outfall area	39 - 27 - 59	75 - 32 - 25	ECH,ESF,ESS,SWA
11A1A	0.15 mi. SE; Located at the plant barge slip	39 - 27 - 41	75 - 32 - 02	Alternate SWA

TABLE B-1 (cont'd)

STATION CODE	STATION LOCATION	LATITUDINAL	LONGITUDINAL	SAMPLE TYPE
		DEG. MIN. FT	DEG. MIN. FT	
15A1	0.65 mi. NW; cooling tower blow down discharge line outfall	39 - 27 - 67	75 - 32 - 19	ESS
16A1	0.24 mi. NNW; south storm drain discharge line	39 - 28 - 24	75 - 32 - 58	ESS
5C1	3.14 mi. ENE	39 - 28 - 250	75 - 28 - 430	GAM
12C1	2.5 mi. WSW; west bank of Delaware River	39 - 27 - 22	75 - 34 - 08	ECH,ESF,ESS,SWA
12C1A	3.7 mi. WSW; Located at the tip of Augustine Beach Boat Ramp	39 - 30 - 17	75 - 34 - 48	Alternate SWA
4D2	3.7 mi. ENE; Alloway Creek Neck Road	39 - 29 - 292	75 - 28 - 175	IDM
5D1	3.5 mi. E; local farm	39 - 28 - 396	75 - 28 - 334	AIO,APT,IDM
10D1	3.9 mi. SSW; Taylor's Bridge Spur	39 - 24 - 613	75 - 33 - 733	IDM,SOL,VGT
14D1	3.4 mi. WNW; Bay View, Delaware	39 - 29 - 26	75 - 35 - 521	IDM
15D1	3.8 mi NW; Rt. 9, Augustine Beach	39 - 30 - 125	75 - 35 - 28	IDM
2E1	4.4 mi. NNE; local farm	39 - 31 - 380	75 - 30 - 428	IDM
3E1	4.2 mi. NE; local farm	39 - 30 - 098	75 - 28 - 646	IDM,WWA
7E1	4.5 mi. SE; 1 mi. W of Mad Horse Creek	39 - 25 - 08	75 - 28 - 64	ESF,ESS,SWA
7E1A	8.87 mi. SE; Located at the end of Bayside Road	39 - 22 - 57	75 - 24 - 24	Alternate SWA
11E2	5.0 mi. SW; Rt. 9	39 - 24 – 328	75 - 35 - 546	IDM
12E1	4.4 mi. WSW; Thomas Landing	39 - 26 - 862	75 - 36 - 968	IDM
13E1	4.2 mi. W; Silver Run Road (Rt. 9)	39 - 27 - 989	75 - 36 - 735	IDM
13E3	5.0 mi. W; Local Farm, Odessa, DE	39 - 27 - 17	75 - 37 - 30	MLK,VGT,SOL
16E1	4.1 mi. NNW; Port Penn	39 - 30 - 762	75 - 34 - 580	AIO,APT,IDM,SOL
1F1	5.8 mi. N; Fort Elfsborg	39 - 32 - 693	75 - 31 - 124	AIO,APT,IDM
1F2	7.1 mi. N; midpoint of Delaware River	39 - 33 - 08	75 - 32 - 54	SWA
2F2	8.5 mi. NNE; Pole at Corner of 5th & Howell, Salem	39 - 34 - 522	75 - 28 - 120	IDM
2F3	8.0 mi. NNE; Salem Water Company	39 - 33 - 40	75 - 27 - 18	PWR,PWT
2F5	7.4 mi. NNE; Salem High School	39 - 33 - 448	75 - 28 - 514	IDM
2F6	7.3 mi. NNE; Southern Training Center	39 - 33 - 713	75 - 28 - 819	AIO,APT,IDM
2F9	7.5 mi. NNE; Local Farm , Tilbury Rd, Salem	39 - 33 - 55	75 - 29 - 30	FPV,FPL,SOL
2F10	9.2 mi. NNE; Local Farm, South Broadway (Rt. 49) Pennsville	39 - 35 - 35	75 - 29 - 35	FPV,FPL

TABLE B-1 (cont'd)

STATION CODE	STATION LOCATION	LATITUDINAL	LONGITUDINAL	SAMPLE TYPE
		DEG. MIN. FT	DEG. MIN. FT	
3F6	6.5 mi. NE; Local Farm, Salem/Hancocks Bridge Road	39 - 32 - 03	75 - 28 - 00	FPV,FPL
3F7	7.2 mi. NE; Local Farm, Beasley Neck Road, RD#3	39 - 32 - 07	75 - 25 - 46	FPV,FPL
4F2	6.0 mi. ENE; Mays Lane, Harmersville	39 - 29 - 953	75 - 26 - 076	IDM
5F1	6.5 mi. E; Canton	39 - 28 - 360	75 - 25 - 031	IDM,SOL
6F1	6.4 mi. ESE; Stow Neck Road	39 - 26 - 396	75 - 25 - 148	IDM
7F2	9.1 mi. SE; Bayside, New Jersey	39 - 22 - 971	75 - 24 - 261	IDM
8F1	9.7 mi. SE; Woodland Beach, DE	39 - 19 - 933	75 - 28 - 463	IDM
9F1	5.3 mi. S; D.P.A.L. 48912-30217	39 - 23 - 042	75 - 32 - 95	IDM
10F2	5.8 mi. SSW; Rt. 9	39 - 23 - 034	75 - 34 - 152	IDM
11F1	6.2 mi. SW; Taylor's Bridge Delaware	39 - 24 - 766	75 - 37 - 632	IDM
12F1	9.4 mi. WSW; Townsend Elementary School	39 - 23 - 778	75 - 41 - 311	IDM
13F2	6.5 mi W; Odessa, Delaware	39 - 27 - 297	75 - 39 - 372	IDM
13F3	9.3 mi. W; Redding Middle School, Middletown, Delaware	39 - 27 - 215	75 - 42 - 543	IDM
13F4	9.8 mi. W; Middletown, Delaware	39 - 26 - 857	75 - 43 - 111	IDM
14F2	6.7 mi. WNW; Boyds Corner	39 - 29 - 979	75 - 39 - 042	IDM
14F4	7.6 mi. WNW; local farm	39 - 30 - 44	75 - 40 - 52	MLK,VGT,SOL
15F3	5.4 mi. NW	39 - 30 - 987	75 - 36 - 586	IDM
15F4	7.0 mi. NW; local farm; Port Penn Road; Delaware	39 - 31- 21	75 - 38 - 31	FPV
16F1	6.9 mi. NNW; C&D Canal	39 - 33 - 55	75 - 34 - 25	ESS,SWA
16F1A	6.84 mi. NNW; Located at the C&D Canal tip	39 - 33 - 34	75 - 33 - 56	Alternate SWA
16F2	8.1 mi. NNW; Delaware City Public School	39 - 34 - 314	75 - 35 - 429	IDM
1G1	10.9 mi. NNE; Rte. 49, South Broadway	39 - 37 - 113	75 - 30 - 178	FPV
1G3	19 mi. N; N. Church St. Wilmington, Del (Old Swedish Church Yard Park)	39 - 44 - 287	75 - 32 - 512	IDM
2G2	13.5 mi. NNE; Local Farm; Pointers Auburn Road (Rt. 540), Salem, NJ 08079	39 - 38 - 19	75 - 26 - 10	FPV
2G3	11.8 mi. NNE; Local Milk Farm, Corner of Routes 540 & 45, Mannington, NJ	39 - 36 - 21	75 - 24 - 53	MLK,FPV,VGT,SOL
2G4	11.3 mi. NNE; large family garden; Rt 45 & Welchville Rd,Mannington, NJ	39 - 36 - 02	75 - 25 - 21	FPV

TABLE B-1 (cont'd)

STATION CODE	STATION LOCATION	LATITUDINAL	LONGITUDINAL	SAMPLE TYPE
		DEG. MIN. FT	DEG. MIN. FT	
9G1	10.3 mi. S; Local Farm, Woodland Beach Rd., Smyrna, Delaware	39 - 18 - 47	75 - 33 - 50	FPV
9G2	10.7 mi. S; Local Farm, Woodland Beach Road, Smyrna, Delaware	39 - 18 - 39	75 - 34 - 11	FPV,FPL
10G1	12 mi. SSW; Smyrna, Delaware	39 - 18 - 223	75 - 36 - 095	IDM
14G1	11.8 mi. WNW; Rte. 286/Bethel Church Road; Delaware	39 - 31 - 290	75 - 46 - 495	AIO,APT,IDM
16G1	15 mi. NNW; Across from Greater Wilmington Airport	39 - 40 - 637	75 - 35 - 570	IDM
3H1	32 mi. NE; National Park, New Jersey	39 - 51 - 599	75 - 11 - 96	IDM
3H5	25 mi. NE; Farm Market, Rt 77	39 - 41 - 040	75 - 12 - 380	FPL,FPV

NOTE: All station locations are referenced to the midpoint of the two Salem Units' Containments. The coordinates of this location are: Latitude N 39° - 27' – 46.5" and Longitude W 75° - 32' – 10.6".

All Vegetables (FPV & FPL) and Vegetation (VGT), are management audit samples. They are not required by the Salem & Hope Creek Stations' Tech Specs nor listed in the Stations ODCMs. Vegetable samples are not always collected in consecutive years from the same farmer due to crop rotation.

TABLE B-2

SALEM AND HOPE CREEK GENERATING STATIONS
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

(Program Overview)

EXPOSURE PATHWAY AND/OR SAMPLE	NUMBER OF REPRESENTATIVE SAMPLES AND SAMPLE LOCATIONS	SAMPLING AND COLLECTION FREQUENCY	TYPE/FREQUENCY* OF ANALYSIS
1. DIRECT RADIATION Dosimeters	Fifty-eight routine monitoring stations with two or more dosimeters placed as follows: An inner ring of stations, one in each land based meteorological sector (not bounded by water) in the general area of the site boundary. An outer ring of stations, one in each land-based meteorological sector in the 5 - 11 km range (3.1 - 6.9 miles) from the site (not bounded by or over water). The balance of the stations placed in special interest areas such as population centers, nearby residences, and schools and in two areas to serve as control stations: 3G1, 14G1.	Quarterly	Gamma dose/ quarterly

TABLE B-2 (cont'd)

SALEM AND HOPE CREEK GENERATING STATIONS
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

EXPOSURE PATHWAY AND/OR SAMPLE	NUMBER OF REPRESENTATIVE SAMPLES AND SAMPLE LOCATIONS	SAMPLING AND COLLECTION FREQUENCY	TYPE/FREQUENCY* OF ANALYSIS
2. ATMOSPHERIC	7 Samples from 6 locations:		
a. Air Particulate	1 sample from close to the Site Boundary: 5S1. 1 duplicate: close to the Site Boundary: 5S2. 3 Samples in different land based sectors: 1F1, 2F6, 5D1.	Continuous sampler operation with sample collection weekly or more frequently if required by dust loading	Gross Beta / weekly Gamma isotopic analysis / quarterly composite
b. Air Iodine	1 Sample from the vicinity of a community: 16E1. 1 Sample from a control location, as for example 15 - 30 km distant (9.3 - 18.6 miles) and in the least prevalent wind direction: 14G1.		Iodine-131 / weekly
3. TERRESTRIAL			
a. Milk	Samples from milking animals in 3 locations within 5 km distance (3.1 miles). If there are none, then, 1 sample from milking animals in each of 3 areas between 5 - 8 km distant (3.1 - 5.0 miles): 13E3, 14F4, 2G3[(1)].	Semi-monthly (when animals are on pasture)	Gamma scan / semi-monthly Iodine-131 / semi-monthly
	1 Sample from milking animals at a control location 15 - 30 km distant (9.3 - 18.6 miles): 3G1.	Monthly (when animals are on pasture)	Gamma scan / monthly Iodine-131 / monthly
b. Well Water (Ground)	Samples from one or two sources only if likely to be affected. (Although wells in the vicinity of SGS/HCGS are not directly affected by plant operations, 3E1 farm's well, is sampled as management audit sample).	Monthly	Gamma Scan / monthly Gross alpha / monthly Gross beta / monthly Tritium / monthly

TABLE B-2 (cont'd)

SALEM AND HOPE CREEK GENERATING STATIONS
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

EXPOSURE PATHWAY AND/OR SAMPLE	NUMBER OF REPRESENTATIVE SAMPLES AND SAMPLE LOCATIONS	SAMPLING AND COLLECTION FREQUENCY	TYPE/FREQUENCY* OF ANALYSIS
c. Potable Water (Drinking Water)	One sample of the nearest water supply affected by its discharge (No potable water samples are required as liquid effluents discharged from SGS/HCGS do not directly affect this pathway). However, for management audit samples, one raw and one treated sample from a public water supply (City of Salem Water and Sewer Department) is collected: 2F3.	Monthly (composited daily)	Gross alpha / monthly Gross beta / monthly Tritium / monthly Gamma scan / monthly Iodine-131 / monthly
d. Vegetables	One sample of each principal class of food products from area that is irrigated by water in which liquid plant wastes have been discharged (The Delaware River at the location of SGS/HCGS is a brackish water source and is not used for irrigation of food products). Management audit samples are collected from various locations during harvest: 2F9, 2F10, 3F6, 3F7, 2G2, 9G1, 9G2, and 3H5. In addition, Broad leaf vegetation (cabbage and kale) was planted & collected onsite (1S1, 15S1, 16S1) and across the river, 10D1, in lieu of having a milk farm within 5 km (3.1 miles) of the Site[(1)].	Annually (at harvest)	Gamma scan / on collection
e. Fodder Crops	Although not required by SGS/HCGS ODCM, a sample of crops normally used as cattle feed (silage) were collected from our milk farms as management audit samples: 14F4, 3G1, 2G3, 13E3.	Annually (at harvest)	Gamma scan / on collection

TABLE B-2 (cont'd)

SALEM AND HOPE CREEK GENERATING STATIONS
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

EXPOSURE PATHWAY AND/OR SAMPLE	NUMBER OF REPRESENTATIVE SAMPLES AND SAMPLE LOCATIONS	SAMPLING AND COLLECTION FREQUENCY	TYPE/FREQUENCY* OF ANALYSIS
f. Soil	Although not required by SGS/HCGS ODCM, samples of soil are collected as management audit samples: 6S2, 2F9, 5F1, 10D1, 16E1, 13E3, 14F4, 2G3, 3G1 (Samples were collected in 2010).	Every 3 years (2010-2013-2016)	Gamma scan / on collection
4. AQUATIC ENVIRONMENT a. Surface Water	One sample upstream: 1F2. One sample downstream: 7E1. One sample outfall: 11A1. One sample cross-stream (mouth of Appoquinimink River): 12C1[(2)]. And an additional location in the Chesapeake & Delaware Canal: 16F1.	Monthly	Gross Beta / monthly Gamma scan / monthly Tritium / monthly**
b. Edible Fish	One sample of each commercially and recreationally important species in vicinity of plant discharge area: 11A1. One sample of same species in area not influenced by plant discharge: 2C1[(2)]. And an additional location downstream: 7E1.	Semi-annually	Gamma scan (flesh) / on collection
c. Blue Crabs	One sample of each commercially and recreationally important species in vicinity of plant discharge area: 11A1. One sample of same species in area not influenced by plant discharge: 12C1[(2)].	Semi-annually	Gamma scan (flesh) / on collection

TABLE B-2 (cont'd)

SALEM AND HOPE CREEK GENERATING STATIONS
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

EXPOSURE PATHWAY AND/OR SAMPLE	NUMBER OF REPRESENTATIVE SAMPLES AND SAMPLE LOCATIONS	SAMPLING AND COLLECTION FREQUENCY	TYPE/FREQUENCY* OF ANALYSIS
d. Sediment	One sample from downstream area: 7E1. One sample from cross-stream area and control location: 12C1[(2)]. One sample from outfall area: 11A1. One sample from upstream, the C & D Canal: 16F1. One sample from shoreline area: 6S2. One sample from Cooling Tower Blowdown discharge: 15A1. One sample south storm drain discharge line: 16A1.	Semi-annually	Gamma scan / on collection

* Except for Dosimeters, the quarterly analysis is performed on a composite of individual samples collected during the quarter.

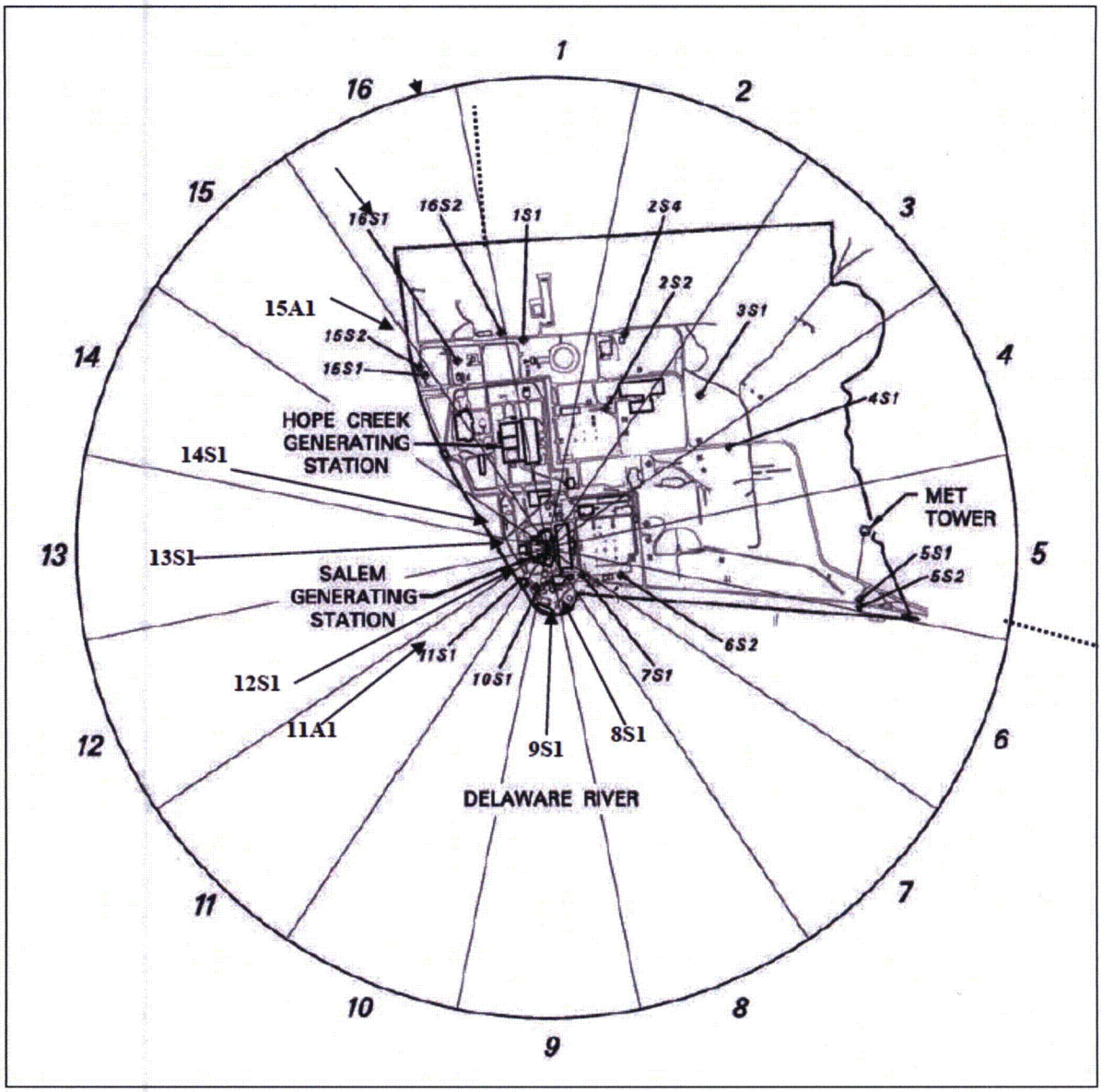
** Tech Specs and ODCM require quarterly analysis but due to the tritium leak at Salem, it was decided to analyze surface waters on a monthly basis for tritium.

(1) While these milk locations are not within the 5 km range, they are the closest farms in the Site vicinity.
Since broad leaf vegetation is acceptable in lieu of milk collections, LTS personnel planted and harvested cabbage at three locations on Site (1S1, 15S1, 16S1) and one in Delaware (10D1).

(2)Station 12C1 was made the operational control (1975) for aquatic samples since the physical characteristics of this station more closely resemble those of the outfall area than do those at the upstream location originally chosen. This is due to the distance from Liston Point, which is the boundary between the Delaware River and Delaware Bay. As discussed extensively in the SGS/HCGS Pre-operational reports, the sampling locations further upstream show significantly lower background levels due to estuarine tidal flow.

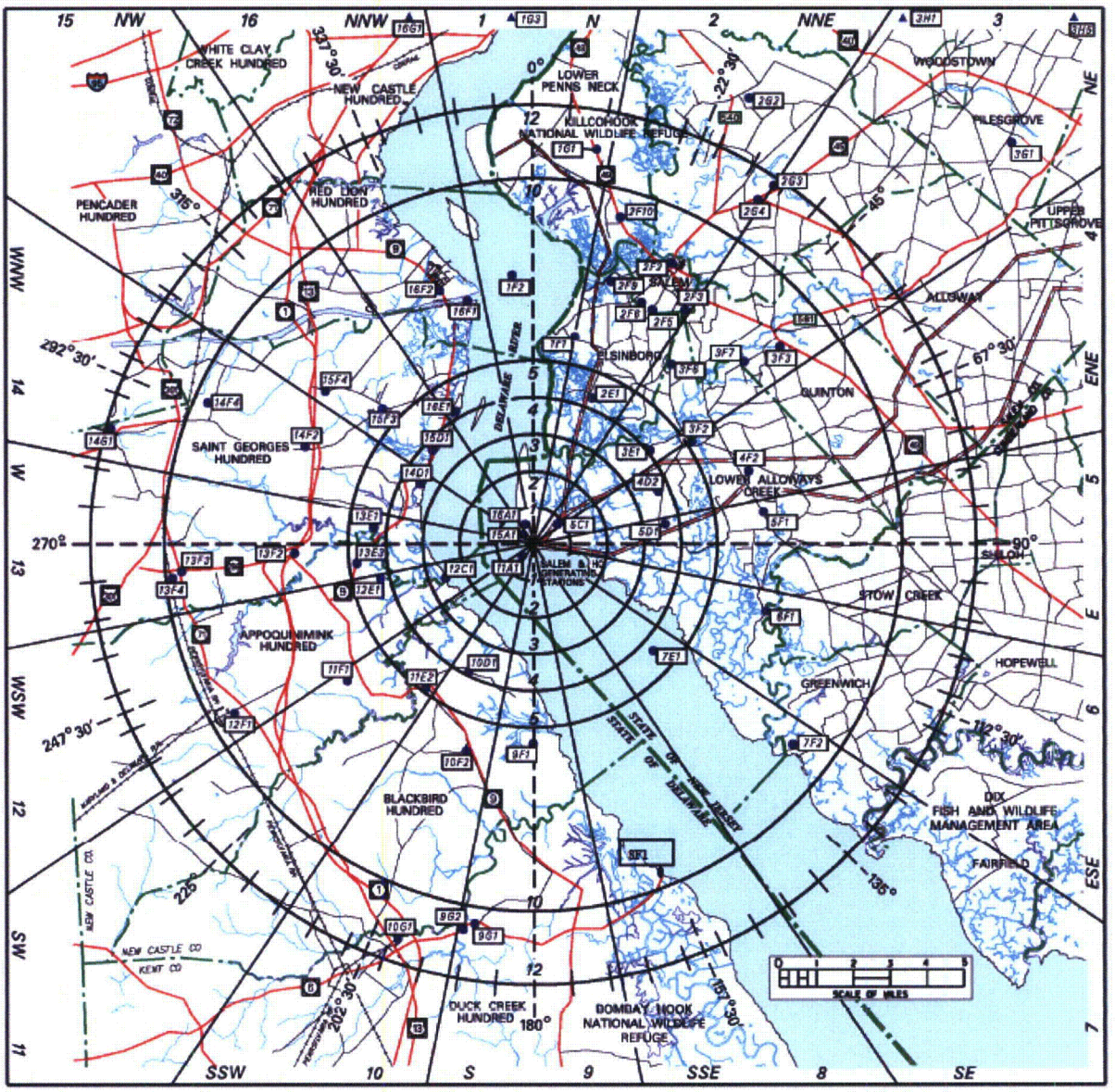
MAP B-1

SALEM AND HOPE CREEK GENERATING STATIONS' RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ON-SITE SAMPLING LOCATIONS



MAP B-2

SALEM AND HOPE CREEK GENERATING STATIONS' RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM OFF-SITE SAMPLING LOCATIONS



APPENDIX C

DATA TABLES

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TABLE C-1 **CONCENTRATIONS OF GAMMA EMITTERS IN QUARTERLY COMPOSITES OF AIR PARTICULATES, 2013**

Results in Units of 10-3 pCi/m3 ± 2 Sigma

STATION ID	COLLECTION PERIOD		<----------GAMMA EMITTERS---------->			
	START	STOP	Be-7	K-40	Cs-134	Cs-137
SA-APT-14G1 (C)	01/02/13	04/01/13	69 ± 27	< 31	< 2	< 2
	04/01/13	07/01/13	151 ± 32	< 31	< 2	< 2
	07/01/13	09/30/13	96 ± 27	< 20	< 2	< 1
	09/30/13	12/30/13	105 ± 26	< 21	< 1	< 1
		AVERAGE*	105 ± 68	-	-	-
SA-APT-16E1	01/02/13	04/01/13	78 ± 31	< 21	< 1	< 1
	04/01/13	07/01/13	111 ± 47	< 16	< 2	< 2
	07/01/13	09/30/13	146 ± 32	< 31	< 1	< 1
	09/30/13	12/30/13	108 ± 30	< 11	< 2	< 2
		AVERAGE*	110 ± 56	-	-	-
SA-APT-16S1	01/28/13	04/01/13	125 ± 42	< 37	< 3	< 3
	04/01/13	07/01/13	144 ± 37	56 ± 18	< 3	< 2
	07/01/13	09/30/13	107 ± 22	< 21	< 2	< 2
	09/30/13	12/30/13	89 ± 34	< 45	< 3	< 2
		AVERAGE*	116 ± 47	56 ± 0	-	-
SA-APT-1F1	01/02/13	04/01/13	80 ± 31	< 35	< 2	< 2
	04/01/13	07/01/13	112 ± 32	< 29	< 2	< 1
	07/01/13	09/30/13	99 ± 28	< 15	< 1	< 2
	09/30/13	12/30/13	81 ± 29	< 50	< 2	< 2
		AVERAGE*	93 ± 30	-	-	-
SA-APT-2F6	01/02/13	04/01/13	103 ± 38	< 16	< 2	< 2
	04/01/13	07/01/13	108 ± 29	< 30	< 2	< 1
	07/01/13	09/30/13	95 ± 28	< 24	< 1	< 1
	09/30/13	12/30/13	76 ± 24	< 27	< 2	< 1
		AVERAGE*	96 ± 28	-	-	-

* THE AVERAGE AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES
(C) CONTROL STATION

TABLE C-1 **CONCENTRATIONS OF GAMMA EMITTERS IN QUARTERLY COMPOSITES OF AIR PARTICULATES, 2013**

Results in Units of 10-3 pCi/m3 ± 2 Sigma

STATION ID	COLLECTION PERIOD		<----------GAMMA EMITTERS---------->			
	START	STOP	Be-7	K-40	Cs-134	Cs-137
SA-APT-5D1	01/02/13	04/01/13	112 ± 28	< 36	< 3	< 2
	04/01/13	07/01/13	121 ± 32	< 44	< 2	< 2
	07/01/13	09/30/13	105 ± 38	< 24	< 2	< 2
	09/30/13	12/30/13	102 ± 35	< 24	< 3	< 2
		AVERAGE*	110 ± 17	-	-	-
SA-APT-5S1	01/02/13	04/01/13	82 ± 27	< 29	< 1	< 1
	04/01/13	07/01/13	104 ± 25	< 21	< 1	< 1
	07/01/13	09/30/13	83 ± 27	< 31	< 2	< 2
	09/30/13	12/30/13	66 ± 23	< 28	< 2	< 2
		AVERAGE*	84 ± 31	-	-	-
SA-APT-6S1	01/28/13	04/01/13	70 ± 25	< 23	< 2	< 2
	04/01/13	07/01/13	159 ± 28	< 22	< 2	< 1
	07/01/13	09/30/13	109 ± 37	< 41	< 2	< 2
	09/30/13	12/30/13	120 ± 27	< 32	< 1	< 1
		AVERAGE*	115 ± 74	-	-	-

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

TABLE C-2 CONCENTRATIONS OF GROSS BETA EMITTERS IN AIR PARTICULATES, 2013

Results in units of 10-3 pCi/m^3 ± 2 sigma

COLLECTION PERIOD		CONTROL	GROUP I				
START	STOP	SA-APT-14G1	SA-APT-1F1	SA-APT-2F6	SA-APT-5D1	SA-APT-5S1	SA-APT-6S1
01/02/13	01/07/13	25 ± 5	27 ± 5	24 ± 4	30 ± 5	21 ± 4	(1)
01/07/13	01/14/13	21 ± 4	23 ± 4	23 ± 3	22 ± 4	20 ± 3	(1)
01/14/13	01/21/13	16 ± 3	15 ± 3	11 ± 3	16 ± 3	11 ± 3	(1)
01/21/13	01/28/13	17 ± 3	13 ± 3	17 ± 3	12 ± 3	14 ± 3	(1)
01/28/13	02/04/13	22 ± 4	21 ± 3	20 ± 3	21 ± 4	19 ± 3	24 ± 3
02/04/13	02/11/13	20 ± 4	17 ± 3	16 ± 3	16 ± 3	13 ± 3	10 ± 2
02/11/13	02/19/13	13 ± 2	14 ± 2	13 ± 2	11 ± 2	13 ± 2	7 ± 1
02/19/13	02/27/13	8 ± 3	10 ± 3	8 ± 3	6 ± 3	7 ± 3	7 ± 2
02/27/13	03/04/13	10 ± 4	8 ± 4	9 ± 4	7 ± 4	6 ± 4	6 ± 3
03/04/13	03/11/13	8 ± 3	7 ± 3	6 ± 3	7 ± 3	8 ± 3	9 ± 3
03/11/13	03/18/13	16 ± 4	16 ± 4	14 ± 3	17 ± 4	11 ± 3	13 ± 3
03/18/13	03/25/13	9 ± 3	5 ± 3	7 ± 3	7 ± 3	5 ± 3	10 ± 3
03/25/13	04/01/13	8 ± 3	7 ± 3	7 ± 2	8 ± 3	8 ± 2	8 ± 2
04/01/13	04/08/13	22 ± 4	15 ± 3	16 ± 3	16 ± 3	10 ± 3	18 ± 3
04/08/13	04/15/13	14 ± 3	12 ± 3	10 ± 3	11 ± 3	13 ± 3	13 ± 3
04/15/13	04/22/13	10 ± 4	10 ± 4	10 ± 3	8 ± 3	8 ± 3	8 ± 3
04/22/13	04/29/13	15 ± 3	13 ± 3	14 ± 3	16 ± 3	14 ± 3	17 ± 3
04/29/13	05/06/13	9 ± 3	10 ± 3	9 ± 3	8 ± 3	9 ± 3	7 ± 3
05/06/13	05/13/13	8 ± 3	7 ± 3	8 ± 3	7 ± 3	7 ± 3	8 ± 3
05/13/13	05/20/13	14 ± 3	13 ± 3	12 ± 3	15 ± 4	12 ± 3	12 ± 3
05/20/13	05/28/13	13 ± 3	10 ± 3	9 ± 3	10 ± 3	10 ± 3	11 ± 3
05/28/13	06/03/13	17 ± 4	16 ± 4	15 ± 4	16 ± 4	16 ± 4	12 ± 3
06/03/13	06/10/13	8 ± 3	7 ± 3	10 ± 3	7 ± 3	6 ± 3	8 ± 3
06/10/13	06/17/13	14 ± 3	13 ± 3	11 ± 3	12 ± 3	14 ± 3	16 ± 3
06/17/13	06/24/13	12 ± 3	10 ± 3	10 ± 3	7 ± 3	6 ± 3	9 ± 3
06/24/13	07/01/13	14 ± 3	11 ± 3	13 ± 3	10 ± 3	6 ± 3	12 ± 3
07/01/13	07/08/13	8 ± 3	7 ± 3	6 ± 3	6 ± 3	6 ± 2	7 ± 2
07/08/13	07/15/13	13 ± 3	13 ± 3	12 ± 3	9 ± 3	7 ± 3	14 ± 7
07/15/13	07/22/13	13 ± 3	13 ± 3	14 ± 3	15 ± 3	12 ± 3	14 ± 3
07/22/13	07/29/13	13 ± 3	12 ± 3	12 ± 3	13 ± 3	11 ± 3	10 ± 3
07/29/13	08/06/13	16 ± 3	14 ± 3	15 ± 3	17 ± 3	15 ± 3	18 ± 3
08/06/13	08/13/13	16 ± 3	13 ± 3	16 ± 3	16 ± 3	13 ± 3	15 ± 3
08/13/13	08/19/13	10 ± 3	10 ± 3	12 ± 3	10 ± 3	11 ± 3	9 ± 3
08/19/13	08/26/13	13 ± 3	12 ± 3	10 ± 3	10 ± 3	9 ± 3	9 ± 3
08/26/13	09/03/13	19 ± 3	18 ± 3	19 ± 3	16 ± 3	18 ± 3	15 ± 3
09/03/13	09/09/13	17 ± 3	15 ± 3	16 ± 3	16 ± 3	14 ± 3	16 ± 3
09/09/13	09/16/13	20 ± 3	21 ± 3	20 ± 3	19 ± 3	22 ± 4	19 ± 3
09/16/13	09/23/13	12 ± 3	15 ± 5	13 ± 3	11 ± 3	11 ± 3	14 ± 3
09/23/13	09/30/13	11 ± 3	9 ± 3	11 ± 3	10 ± 3	8 ± 3	12 ± 3
09/30/13	10/08/13	26 ± 3	25 ± 4	29 ± 3	26 ± 4	22 ± 3	26 ± 3
10/08/13	10/16/13	16 ± 3	16 ± 3	16 ± 3	16 ± 3	12 ± 3	16 ± 3
10/16/13	10/21/13	19 ± 4	15 ± 4	11 ± 4	13 ± 4	16 ± 4	15 ± 4
10/21/13	10/28/13	16 ± 3	10 ± 3	13 ± 3	16 ± 3	9 ± 3	12 ± 3
10/28/13	11/04/13	18 ± 3	21 ± 4	22 ± 3	17 ± 3	18 ± 3	24 ± 4
11/04/13	11/12/13	13 ± 3	14 ± 3	15 ± 3	15 ± 3	13 ± 3	16 ± 3
11/12/13	11/18/13	17 ± 4	12 ± 3	10 ± 3	15 ± 4	13 ± 3	13 ± 3
11/18/13	11/25/13	9 ± 3	8 ± 3	6 ± 2	8 ± 3	6 ± 2	10 ± 3
11/25/13	12/02/13	17 ± 3	15 ± 3	14 ± 3	12 ± 3	11 ± 3	16 ± 3
12/02/13	12/09/13	20 ± 4	17 ± 3	21 ± 4	15 ± 4	18 ± 3	14 ± 3
12/09/13	12/16/13	22 ± 4	16 ± 3	20 ± 3	20 ± 3	16 ± 3	18 ± 3
12/16/13	12/23/13	19 ± 4	17 ± 3	19 ± 3	20 ± 4	15 ± 3	20 ± 4
12/23/13	12/30/13	13 ± 3	18 ± 3	13 ± 3	12 ± 3	14 ± 3	12 ± 3
	AVERAGE*	15 ± 9	14 ± 10	14 ± 10	13 ± 10	12 ± 9	13 ± 9

* THE AVERAGE AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES
(1) SEE PROGRAM CHANGES SECTION FOR EXPLANATION

TABLE C-2 CONCENTRATIONS OF GROSS BETA EMITTERS IN AIR PARTICULATES, 2013

Results in units of 10-3 pCi/m^3 ± 2 sigma

COLLECTION PERIOD	GROUP I SA-APT-16E1	SA-APT-16S1
01/02/13 - 01/07/13	23 ± 4	(1)
01/07/13 - 01/14/13	23 ± 3	(1)
01/14/13 - 01/21/13	15 ± 3	(1)
01/21/13 - 01/28/13	13 ± 3	(1)
01/28/13 - 02/04/13	19 ± 3	22 ± 3
02/04/13 - 02/11/13	19 ± 3	14 ± 3
02/11/13 - 02/19/13	12 ± 2	10 ± 2
02/19/13 - 02/27/13	6 ± 3	11 ± 3
02/27/13 - 03/04/13	8 ± 4	12 ± 4
03/04/13 - 03/11/13	9 ± 3	7 ± 3
03/11/13 - 03/18/13	12 ± 3	17 ± 3
03/18/13 - 03/25/13	9 ± 3	9 ± 3
03/25/13 - 04/01/13	10 ± 3	8 ± 2
04/01/13 - 04/08/13	17 ± 3	16 ± 3
04/08/13 - 04/15/13	11 ± 3	12 ± 3
04/15/13 - 04/22/13	11 ± 4	12 ± 3
04/22/13 - 04/29/13	15 ± 3	17 ± 3
04/29/13 - 05/06/13	15 ± 4	< 17 (2)
05/06/13 - 05/13/13	8 ± 3	8 ± 3
05/13/13 - 05/20/13	12 ± 3	14 ± 3
05/20/13 - 05/28/13	9 ± 2	13 ± 3
05/28/13 - 06/03/13	14 ± 4	12 ± 3
06/03/13 - 06/10/13	9 ± 3	8 ± 3
06/10/13 - 06/17/13	13 ± 3	12 ± 3
06/17/13 - 06/24/13	7 ± 3	9 ± 3
06/24/13 - 07/01/13	10 ± 3	11 ± 3
07/01/13 - 07/08/13	8 ± 3	9 ± 3
07/08/13 - 07/15/13	12 ± 3	14 ± 3
07/15/13 - 07/22/13	13 ± 3	20 ± 3
07/22/13 - 07/29/13	12 ± 3	12 ± 3
07/29/13 - 08/06/13	13 ± 3	17 ± 3
08/06/13 - 08/13/13	15 ± 3	17 ± 3
08/13/13 - 08/19/13	12 ± 3	12 ± 3
08/19/13 - 08/26/13	11 ± 3	16 ± 3
08/26/13 - 09/03/13	21 ± 3	19 ± 3
09/03/13 - 09/09/13	16 ± 3	18 ± 3
09/09/13 - 09/16/13	21 ± 4	26 ± 4
09/16/13 - 09/23/13	11 ± 3	13 ± 3
09/23/13 - 09/30/13	10 ± 3	11 ± 3
09/30/13 - 10/08/13	26 ± 4	29 ± 4
10/08/13 - 10/16/13	15 ± 3	22 ± 4
10/16/13 - 10/21/13	17 ± 4	15 ± 4
10/21/13 - 10/28/13	13 ± 3	13 ± 3
10/28/13 - 11/04/13	20 ± 4	24 ± 4
11/04/13 - 11/12/13	14 ± 3	12 ± 3
11/12/13 - 11/18/13	12 ± 6	13 ± 4
11/18/13 - 11/25/13	11 ± 3	8 ± 3
11/25/13 - 12/02/13	16 ± 3	15 ± 3
12/02/13 - 12/09/13	19 ± 3	18 ± 3
12/09/13 - 12/16/13	16 ± 3	18 ± 3
12/16/13 - 12/23/13	23 ± 3	23 ± 4
12/23/13 - 12/30/13	16 ± 3	14 ± 3
AVERAGE*	14 ± 9	14 ± 10

* THE AVERAGE AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES
(1) SEE PROGRAM CHANGES SECTION FOR EXPLANATION
(2) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-3 CONCENTRATIONS OF IODINE-131* IN FILTERED AIR, 2013

Results in units of 10-3 pCi/m^3 ± 2 sigma

COLLECTION PERIOD		CONTROL	GROUP I				
START	STOP	SA-AIO-14G1	SA-AIO-1F1	SA-AIO-2F6	SA-AIO-5D1	SA-AIO-5S1	SA-AIO-6S1
01/02/13	01/07/13	< 31	< 27	< 25	< 31	< 25	(1)
01/07/13	01/14/13	< 23	< 20	< 19	< 23	< 18	(1)
01/14/13	01/21/13	< 14	< 15	< 14	< 13	< 14	(1)
01/21/13	01/28/13	< 20	< 16	< 15	< 20	< 15	(1)
01/28/13	02/04/13	< 17	< 19	< 19	< 20	< 18	< 12
02/04/13	02/11/13	< 21	< 19	< 19	< 19	< 18	< 11
02/11/13	02/19/13	< 10	< 12	< 12	< 12	< 11	< 5
02/19/13	02/27/13	< 30	< 26	< 26	< 27	< 28	< 23
02/27/13	03/04/13	< 28	< 25	< 24	< 26	< 24	< 24
03/04/13	03/11/13	< 8	< 8	< 7	< 8	< 7	< 8
03/11/13	03/18/13	< 14	< 16	< 15	< 17	< 15	< 14
03/18/13	03/25/13	< 21	< 28	< 27	< 26	< 25	< 21
03/25/13	04/01/13	< 21	< 16	< 15	< 15	< 14	< 20
04/01/13	04/08/13	< 17	< 15	< 14	< 15	< 13	< 15
04/08/13	04/15/13	< 20	< 16	< 15	< 16	< 14	< 18
04/15/13	04/22/13	< 17	< 16	< 15	< 15	< 14	< 15
04/22/13	04/29/13	< 18	< 13	< 15	< 15	< 14	< 18
04/29/13	05/06/13	< 19	< 20	< 21	< 20	< 20	< 17
05/06/13	05/13/13	< 18	< 22	< 22	< 23	< 23	< 16
05/13/13	05/20/13	< 16	< 17	< 18	< 18	< 17	< 14
05/20/13	05/28/13	< 25	< 38	< 38	< 39	< 38	< 22
05/28/13	06/03/13	< 39	< 30	< 30	< 31	< 29	< 32
06/03/13	06/10/13	< 29	< 38	< 38	< 37	< 36	< 26
06/10/13	06/17/13	< 25	< 23	< 23	< 23	< 21	< 22
06/17/13	06/24/13	< 17	< 22	< 21	< 20	< 19	< 18
06/24/13	07/01/13	< 38	< 42	< 41	< 39	< 37	< 34
07/01/13	07/08/13	< 37	< 44	< 45	< 43	< 40	< 32
07/08/13	07/15/13	< 17	< 23	< 23	< 23	< 22	< 46
07/15/13	07/22/13	< 30	< 31	< 32	< 34	< 33	< 27
07/22/13	07/29/13	< 28	< 28	< 28	< 29	< 31	< 31
07/29/13	08/06/13	< 25	< 17	< 17	< 18	< 19	< 27
08/06/13	08/13/13	< 29	< 35	< 35	< 36	< 32	< 31
08/13/13	08/19/13	< 29	< 32	< 32	< 35	< 31	< 30
08/19/13	08/26/13	< 26	< 28	< 28	< 30	< 27	< 26
08/26/13	09/03/13	< 59	< 47	< 46	< 52	< 50	< 59
09/03/13	09/09/13	< 45	< 41	< 41	< 45	< 44	< 46
09/09/13	09/16/13	< 43	< 42	< 41	< 46	< 46	< 41
09/16/13	09/23/13	< 32	< 55	< 30	< 33	< 32	< 38
09/23/13	09/30/13	< 26	< 33	< 29	< 32	< 30	< 27
09/30/13	10/08/13	< 34	< 43	< 38	< 43	< 40	< 35
10/08/13	10/16/13	< 50	< 48	< 41	< 47	< 42	< 53
10/16/13	10/21/13	< 38	< 46	< 41	< 47	< 43	< 40
10/21/13	10/28/13	< 42	< 39	< 35	< 39	< 35	< 44
10/28/13	11/04/13	< 55	< 69	< 60	< 69	< 61	< 56
11/04/13	11/12/13	< 30	< 32	< 28	< 32	< 29	< 30
11/12/13	11/18/13	< 32	< 37	< 35	< 39	< 35	< 32
11/18/13	11/25/13	< 38	< 41	< 40	< 44	< 39	< 38
11/25/13	12/02/13	< 50	< 43	< 40	< 44	< 40	< 47
12/02/13	12/09/13	< 45	< 31	< 31	< 33	< 29	< 41
12/09/13	12/16/13	< 68	< 56	< 59	< 62	< 58	< 68
12/16/13	12/23/13	< 55	< 59	< 59	< 63	< 56	< 50
12/23/13	12/30/13	< 32	< 29	< 27	< 29	< 26	< 29
	AVERAGE	-	-	-	-	-	-

* IODINE-131 RESULTS ARE CORRECTED FOR DECAY TO STOP DATE OF COLLECTION PERIOD & ANALYZED TO AN LLD OF 70 10-3 pCi/m^3

(1) SEE PROGRAM CHANGES SECTION FOR EXPLANATION

TABLE C-3 **CONCENTRATIONS OF IODINE-131* IN FILTERED AIR, 2013**

Results in units of 10-3 pCi/m^3 ± 2 sigma

COLLECTION PERIOD		GROUP I SA-AIO-16E1	SA-AIO-16S1	
01/02/13 -	01/07/13	< 29	(1)	
01/07/13 -	01/14/13	< 21	(1)	
01/14/13 -	01/21/13	< 13	(1)	
01/21/13 -	01/28/13	< 19	(1)	
01/28/13 -	02/04/13	< 16	< 12	
02/04/13 -	02/11/13	< 19	< 16	
02/11/13 -	02/19/13	< 9	< 7	
02/19/13 -	02/27/13	< 29	< 6	
02/27/13 -	03/04/13	< 27	< 25	
03/04/13 -	03/11/13	< 7	< 7	
03/11/13 -	03/18/13	< 14	< 13	
03/18/13 -	03/25/13	< 21	< 21	
03/25/13 -	04/01/13	< 21	< 19	
04/01/13 -	04/08/13	< 17	< 15	
04/08/13 -	04/15/13	< 20	< 18	
04/15/13 -	04/22/13	< 18	< 15	
04/22/13 -	04/29/13	< 20	< 18	
04/29/13 -	05/06/13	< 20	< 83	(2)
05/06/13 -	05/13/13	< 17	< 16	
05/13/13 -	05/20/13	< 15	< 14	
05/20/13 -	05/28/13	< 23	< 22	
05/28/13 -	06/03/13	< 36	< 32	
06/03/13 -	06/10/13	< 26	< 26	
06/10/13 -	06/17/13	< 25	< 22	
06/17/13 -	06/24/13	< 17	< 16	
06/24/13 -	07/01/13	< 38	< 33	
07/01/13 -	07/08/13	< 38	< 33	
07/08/13 -	07/15/13	< 17	< 17	
07/15/13 -	07/22/13	< 30	< 29	
07/22/13 -	07/29/13	< 29	< 27	
07/29/13 -	08/06/13	< 25	< 26	
08/06/13 -	08/13/13	< 29	< 30	
08/13/13 -	08/19/13	< 30	< 30	
08/19/13 -	08/26/13	< 27	< 27	
08/26/13 -	09/03/13	< 61	< 59	
09/03/13 -	09/09/13	< 46	< 44	
09/09/13 -	09/16/13	< 45	< 43	
09/16/13 -	09/23/13	< 33	< 33	
09/23/13 -	09/30/13	< 28	< 27	
09/30/13 -	10/08/13	< 35	< 35	
10/08/13 -	10/16/13	< 53	< 67	
10/16/13 -	10/21/13	< 39	< 37	
10/21/13 -	10/28/13	< 44	< 42	
10/28/13 -	11/04/13	< 54	< 52	
11/04/13 -	11/12/13	< 29	< 30	
11/12/13 -	11/18/13	< 38	< 33	
11/18/13 -	11/25/13	< 39	< 39	
11/25/13 -	12/02/13	< 42	< 44	
12/02/13 -	12/09/13	< 37	< 38	
12/09/13 -	12/16/13	< 61	< 64	
12/16/13 -	12/23/13	< 44	< 47	
12/23/13 -	12/30/13	< 27	< 31	
	AVERAGE	-	-	

* IODINE-131 RESULTS ARE CORRECTED FOR DECAY TO STOP DATE OF COLLECTION PERIOD & ANALYZED TO AN LLD OF 70 10-3 pCi/m^3.

(1) SEE PROGRAM CHANGES SECTION FOR EXPLANATION

(2) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-4 DIRECT RADIATION MEASUREMENTS - QUARTERLY DOSIMITRY RESULTS*, 2013

Results in units of mR/standard quarter

STATION ID	AVERAGE ± 2 S.D.	JAN - MAR	APR - JUN	JUL - SEP	OCT - DEC
SA-IDM-1F1	18.3 ± 4.1	16.0	20.0	17.0	20.0
SA-IDM-1G3	13.8 ± 3.4	12.0	14.0	13.0	16.0
SA-IDM-2E1	13.8 ± 2.5	12.0	14.0	14.0	15.0
SA-IDM-2F2	13.5 ± 4.8	12.0	16.0	11.0	15.0
SA-IDM-2F5	14.5 ± 3.5	13.0	14.0	14.0	17.0
SA-IDM-2F6	13.0 ± 3.7	11.0	14.0	12.0	15.0
SA-IDM-2S2	14.5 ± 3.8	15.0	17.0	13.0	13.0
SA-IDM-2S4	15.0 ± 4.3	12.0	15.0	16.0	17.0
SA-IDM-3E1	11.8 ± 3.0	11.0	11.0	11.0	14.0
SA-IDM-3F2	12.8 ± 2.5	11.0	13.0	13.0	14.0
SA-IDM-3F3	12.3 ± 3.0	11.0	13.0	11.0	14.0
SA-IDM-3H1	12.0 ± 4.6	10.0	14.0	10.0	14.0
SA-IDM-3S1	11.3 ± 3.0	10.0	13.0	10.0	12.0
SA-IDM-4D2	15.0 ± 3.7	13.0	14.0	16.0	17.0
SA-IDM-4F2	12.8 ± 3.0	11.0	14.0	12.0	14.0
SA-IDM-4S1	12.5 ± 2.6	11.0	13.0	12.0	14.0
SA-IDM-5D1	13.8 ± 3.4	12.0	14.0	13.0	16.0
SA-IDM-5F1	12.5 ± 2.6	11.0	12.0	13.0	14.0
SA-IDM-5S1	12.3 ± 3.0	11.0	13.0	11.0	14.0
SA-IDM-6F1	11.3 ± 1.0	11.0	11.0	11.0	12.0
SA-IDM-6S2	17.8 ± 3.8	15.0	18.0	19.0	19.0
SA-IDM-7F2	9.7 ± 2.3	9.0	11.0	9.0	(1)
SA-IDM-7S1	10.8 ± 2.5	9.0	11.0	11.0	12.0
SA-IDM-8F1	14.8 ± 6.2	13.0	12.0	15.0	19.0
SA-IDM-8S1	10.3 ± 5.5	12.0	7.0	9.0	13.0
SA-IDM-9F1	17.3 ± 5.5	14.0	19.0	16.0	20.0
SA-IDM-9S1	10.8 ± 4.4	13.0	8.0	10.0	12.0
SA-IDM-10D1	15.0 ± 3.7	13.0	14.0	16.0	17.0
SA-IDM-10F2	15.0 ± 3.7	13.0	16.0	14.0	17.0
SA-IDM-10G1	15.3 ± 3.4	13.0	16.0	15.0	17.0
SA-IDM-10S1	11.8 ± 2.5	10.0	13.0	12.0	12.0
SA-IDM-11E2	16.3 ± 5.3	14.0	18.0	14.0	19.0
SA-IDM-11F1	15.3 ± 4.1	13.0	17.0	14.0	17.0
SA-IDM-11S1	10.8 ± 3.0	9.0	12.0	10.0	12.0
SA-IDM-12E1	15.8 ± 4.4	13.0	17.0	15.0	18.0
SA-IDM-12F1	14.5 ± 4.2	14.0	15.0	12.0	17.0
SA-IDM-12S1	13.5 ± 4.2	12.0	(1)	(1)	15.0
SA-IDM-13E1	12.8 ± 4.1	11.0	14.0	11.0	15.0
SA-IDM-13F2	14.3 ± 5.3	12.0	17.0	12.0	16.0
SA-IDM-13F3	14.0 ± 4.3	12.0	14.0	13.0	17.0
SA-IDM-13F4	16.3 ± 3.4	14.0	17.0	16.0	18.0
SA-IDM-13S1	18.0 ± 8.5	15.0	(1)	(1)	21.0
SA-IDM-14D1	13.5 ± 2.6	12.0	13.0	14.0	15.0
SA-IDM-14F2	15.8 ± 3.4	14.0	16.0	15.0	18.0
SA-IDM-14S1	17.8 ± 4.7	21.0	18.0	16.0	16.0
SA-IDM-15D1	15.3 ± 4.4	14.0	16.0	13.0	18.0
SA-IDM-15F3	14.8 ± 3.0	13.0	16.0	14.0	16.0
SA-IDM-15S1	11.8 ± 3.0	10.0	13.0	11.0	13.0
SA-IDM-15S2	13.0 ± 2.3	12.0	14.0	12.0	14.0
SA-IDM-16E1	15.0 ± 2.8	15.0	16.0	13.0	16.0
SA-IDM-16F2	13.3 ± 4.4	12.0	14.0	11.0	16.0
SA-IDM-16G1	14.0 ± 3.7	12.0	15.0	13.0	16.0
SA-IDM-16S1	14.3 ± 3.4	12.0	14.0	15.0	16.0
SA-IDM-16S3	13.0 ± 7.2	17.0	12.0	10.0	(1)
SA-IDM-3G1 (C)	14.3 ± 3.0	13.0	15.0	13.0	16.0
SA-IDM-14G1 (C)	15.3 ± 3.0	14.0	16.0	14.0	17.0
SA-IDM-1S1 **	34.3 ± 5.0	33.0	38.0	33.0	33.0
SA-IDM-16S2 **	37.0 ± 5.4	38.0	38.0	33.0	39.0

* QUARTERLY ELEMENT TLD RESULTS BY MIRION
** SAMPLE RESULTS ARE AFFECTED BY THE ISFSI
(C) CONTROL STATION
(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-5 **CONCENTRATIONS OF IODINE-131* AND GAMMA EMITTERS IN MILK, 2013**

Results in units of pCi/L ± 2 sigma

STATION ID	COLLECTION PERIOD			<----------GAMMA EMITTERS---------->				
	START	STOP	I-131	K-40	Cs-134	Cs-137	BaLa-140	Ra-226
SA-MLK-13E3	01/20/13	01/21/13	< 0.7	1388 ± 124	< 5	< 6	< 8	< 140
SA-MLK-14F4	01/20/13	01/21/13	< 0.7	1254 ± 181	< 8	< 9	< 12	< 169
SA-MLK-2G3	01/20/13	01/21/13	< 0.7	1387 ± 155	< 5	< 6	< 7	< 182
SA-MLK-3G1 (C)	01/20/13	01/21/13	< 0.7	1241 ± 162	< 6	< 7	< 9	< 168
SA-MLK-13E3	02/03/13	02/04/13	< 0.6	1312 ± 132	< 5	< 6	< 9	< 128
SA-MLK-14F4	02/03/13	02/04/13	< 0.9	1289 ± 117	< 5	< 5	< 7	< 137
SA-MLK-2G3	02/03/13	02/04/13	< 0.9	1173 ± 158	< 5	< 6	< 8	< 135
SA-MLK-3G1 (C)	02/03/13	02/04/13	< 0.6	1156 ± 117	< 6	< 6	< 8	< 184
SA-MLK-13E3	03/03/13	03/04/13	< 0.8	1217 ± 116	< 4	< 5	< 8	< 111
SA-MLK-14F4	03/03/13	03/04/13	< 0.8	1392 ± 117	< 5	< 5	< 8	< 124
SA-MLK-2G3	03/03/13	03/04/13	< 0.6	1381 ± 118	< 5	< 4	< 9	< 121
SA-MLK-3G1 (C)	03/03/13	03/04/13	< 0.9	1190 ± 112	< 4	< 4	< 8	< 110
SA-MLK-13E3	04/08/13	04/08/13	< 0.4	1409 ± 160	< 5	< 6	< 8	< 151
SA-MLK-14F4	04/08/13	04/08/13	< 0.5	1200 ± 174	< 8	< 9	< 14	< 167
SA-MLK-2G3	04/08/13	04/08/13	< 0.5	1235 ± 155	< 7	< 7	< 9	< 153
SA-MLK-3G1 (C)	04/08/13	04/08/13	< 0.5	1403 ± 138	< 7	< 9	< 12	< 199
SA-MLK-13E3	04/21/13	04/22/13	< 0.4	1302 ± 129	< 5	< 6	< 11	< 119
SA-MLK-14F4	04/21/13	04/22/13	< 0.6	1313 ± 123	< 5	< 5	< 9	< 133
SA-MLK-2G3	04/21/13	04/22/13	< 0.5	1181 ± 107	< 4	< 4	< 9	< 92
SA-MLK-3G1 (C)	04/21/13	04/22/13	< 0.5	1417 ± 125	< 6	< 7	< 13	< 159
SA-MLK-13E3	05/05/13	05/06/13	< 0.6	1383 ± 140	< 5	< 6	< 9	< 130
SA-MLK-14F4	05/05/13	05/06/13	< 0.7	1441 ± 117	< 5	< 6	< 8	< 141
SA-MLK-2G3	05/05/13	05/06/13	< 0.7	1251 ± 104	< 4	< 5	< 6	< 117
SA-MLK-3G1 (C)	05/05/13	05/06/13	< 0.8	1362 ± 130	< 6	< 6	< 9	< 160
SA-MLK-13E3	05/19/13	05/20/13	< 0.5	1243 ± 175	< 7	< 10	< 11	< 168
SA-MLK-14F4	05/19/13	05/20/13	< 0.5	1359 ± 148	< 6	< 6	< 10	< 150
SA-MLK-2G3	05/19/13	05/20/13	< 0.4	1440 ± 130	< 6	< 6	< 5	< 144
SA-MLK-3G1 (C)	05/19/13	05/20/13	< 0.5	1328 ± 142	< 5	< 6	< 10	< 136
SA-MLK-13E3	06/02/13	06/03/13	< 0.6	1425 ± 127	< 5	< 5	< 8	< 132
SA-MLK-14F4	06/02/13	06/03/13	< 0.9	1408 ± 124	< 4	< 5	< 8	< 127
SA-MLK-2G3	06/02/13	06/03/13	< 0.8	1398 ± 99	< 4	< 3	< 5	< 100
SA-MLK-3G1 (C)	06/02/13	06/03/13	< 0.5	1266 ± 97	< 4	< 4	< 6	< 118
SA-MLK-13E3	06/16/13	06/17/13	< 0.8	1268 ± 171	< 5	< 8	< 13	< 191
SA-MLK-14F4	06/16/13	06/17/13	< 0.9	1564 ± 172	< 6	< 8	< 9	< 163
SA-MLK-2G3	06/16/13	06/17/13	< 0.8	1428 ± 182	< 6	< 7	< 11	< 193
SA-MLK-3G1 (C)	06/16/13	06/17/13	< 0.9	1291 ± 150	< 6	< 6	< 7	< 176
SA-MLK-13E3	07/07/13	07/08/13	< 0.7	1221 ± 144	< 5	< 7	< 8	< 141
SA-MLK-14F4	07/07/13	07/08/13	< 0.6	1362 ± 129	< 5	< 6	< 9	< 140
SA-MLK-2G3	07/07/13	07/08/13	< 0.5	1263 ± 162	< 7	< 8	< 10	< 150
SA-MLK-3G1 (C)	07/07/13	07/08/13	< 0.6	1308 ± 134	< 6	< 6	< 13	< 163

* IODINE-131 RESULTS ARE CORRECTED FOR DECAY TO STOP DATE OF COLLECTION PERIOD & ANALYZED TO AN LLD OF 1.0 pCi/L

(C) CONTROL STATION

TABLE C-5 **CONCENTRATIONS OF IODINE-131* AND GAMMA EMITTERS IN MILK, 2013**

Results in units of pCi/L ± 2 sigma

STATION ID	COLLECTION PERIOD			<----------GAMMA EMITTERS---------->				
	START	STOP	I-131	K-40	Cs-134	Cs-137	BaLa-140	Ra-226
SA-MLK-13E3	07/21/13	07/22/13	< 0.9	1389 ± 152	< 6	< 7	< 10	< 166
SA-MLK-14F4	07/21/13	07/22/13	< 0.7	1488 ± 159	< 5	< 7	< 9	< 150
SA-MLK-2G3	07/21/13	07/22/13	< 0.6	1480 ± 150	< 5	< 6	< 9	< 166
SA-MLK-3G1 (C)	07/21/13	07/22/13	< 0.8	1349 ± 131	< 5	< 6	< 9	< 150
SA-MLK-13E3	08/18/13	08/19/13	< 0.8	1396 ± 102	< 4	< 5	< 7	< 110
SA-MLK-14F4	08/18/13	08/19/13	< 0.8	1312 ± 103	< 4	< 5	< 7	< 115
SA-MLK-2G3	08/18/13	08/19/13	< 0.8	1383 ± 103	< 4	< 5	< 7	< 103
SA-MLK-3G1 (C)	08/18/13	08/19/13	< 0.7	1297 ± 105	< 3	< 4	< 7	< 86
SA-MLK-13E3	08/25/13	08/26/13	< 0.8	1273 ± 182	< 7	< 8	< 11	< 167
SA-MLK-14F4	08/25/13	08/26/13	< 0.9	1256 ± 162	< 7	< 8	< 9	< 159
SA-MLK-2G3	08/25/13	08/26/13	< 0.9	1553 ± 173	< 7	< 6	< 11	< 156
SA-MLK-3G1 (C)	08/25/13	08/26/13	< 0.7	1268 ± 146	< 6	< 6	< 12	< 133
SA-MLK-13E3	09/02/13	09/03/13	< 0.7	1277 ± 131	< 4	< 5	< 11	< 118
SA-MLK-14F4	09/02/13	09/03/13	< 0.8	1530 ± 149	< 6	< 6	< 13	< 149
SA-MLK-2G3	09/02/13	09/03/13	< 0.7	1261 ± 146	< 5	< 6	< 9	< 145
SA-MLK-3G1 (C)	09/02/13	09/03/13	< 0.7	1194 ± 136	< 6	< 6	< 10	< 151
SA-MLK-13E3	09/15/13	09/16/13	< 0.6	1468 ± 170	< 7	< 9	< 12	< 173
SA-MLK-14F4	09/15/13	09/16/13	< 0.7	1506 ± 187	< 7	< 7	< 9	< 155
SA-MLK-2G3	09/15/13	09/16/13	< 0.7	1397 ± 160	< 7	< 7	< 12	< 166
SA-MLK-3G1 (C)	09/15/13	09/16/13	< 0.7	1188 ± 160	< 6	< 6	< 12	< 150
SA-MLK-13E3	10/07/13	10/08/13	< 0.8	1162 ± 143	< 6	< 7	< 13	< 164
SA-MLK-14F4	10/07/13	10/08/13	< 0.7	1315 ± 138	< 6	< 8	< 12	< 166
SA-MLK-2G3	10/07/13	10/08/13	< 0.7	1401 ± 162	< 6	< 7	< 9	< 186
SA-MLK-3G1 (C)	10/07/13	10/08/13	< 0.6	1325 ± 174	< 5	< 7	< 9	< 165
SA-MLK-13E3	10/20/13	10/21/13	< 0.5	1388 ± 172	< 7	< 8	< 8	< 176
SA-MLK-14F4	10/20/13	10/21/13	< 0.6	1368 ± 164	< 6	< 6	< 14	< 149
SA-MLK-2G3	10/20/13	10/21/13	< 0.6	1302 ± 171	< 7	< 8	< 11	< 182
SA-MLK-3G1 (C)	10/20/13	10/21/13	< 0.5	1149 ± 166	< 5	< 6	< 14	< 122
SA-MLK-13E3	11/17/13	11/18/13	< 0.7	1328 ± 106	< 3	< 4	< 11	< 69
SA-MLK-14F4	11/17/13	11/18/13	< 0.7	1444 ± 91	< 3	< 4	< 11	< 88
SA-MLK-2G3	11/17/13	11/18/13	< 0.7	1300 ± 95	< 4	< 4	< 11	< 102
SA-MLK-3G1 (C)	11/17/13	11/18/13	< 0.7	1222 ± 101	< 3	< 3	< 11	< 87
SA-MLK-13E3	11/24/13	11/25/13	< 0.8	1412 ± 155	< 5	< 7	< 13	< 132
SA-MLK-14F4	11/24/13	11/25/13	< 0.7	1285 ± 133	< 6	< 6	< 12	< 124
SA-MLK-2G3	11/24/13	11/25/13	< 0.8	1201 ± 145	< 5	< 7	< 11	< 146
SA-MLK-3G1 (C)	11/24/13	11/25/13	< 0.7	1162 ± 142	< 6	< 7	< 13	< 179
SA-MLK-13E3	12/01/13	12/02/13	< 0.7	1256 ± 159	< 7	< 8	< 13	< 170
SA-MLK-14F4	12/01/13	12/02/13	< 0.7	1261 ± 148	< 6	< 5	< 10	< 126
SA-MLK-2G3	12/01/13	12/02/13	< 0.9	1336 ± 166	< 6	< 7	< 13	< 178
SA-MLK-3G1 (C)	12/01/13	12/02/13	< 0.9	1343 ± 140	< 8	< 8	< 13	< 214
	ANNUAL AVERAGE		-	1326 ± 196	-	-	-	-

* IODINE-131 RESULTS ARE CORRECTED FOR DECAY TO STOP DATE OF COLLECTION PERIOD & ANALYZED TO AN LLD OF 1.0 pCi/L

(C) CONTROL STATION

TABLE C-6 CONCENTRATIONS OF GROSS ALPHA AND GROSS BETA EMITTERS AND TRITIUM IN WELL WATER*, 2013

Results in units of pCi/liter ± 2 sigma

STATION ID	COLLECTION PERIOD START	STOP	Gr-A	Gr-B	H-3
SA-WWA-3E1	01/21/13	01/21/13	< 2.1	< 3.3	< 155
	02/19/13	02/19/13	< 1.6	< 1.6	< 175
	03/11/13	03/11/13	< 2.7	< 2.3	< 191
	03/25/13	03/25/13	< 1.7	< 1.9	< 169
	04/22/13	04/22/13	< 2.6	< 2.2	< 171
	05/28/13	05/28/13	< 2.6	< 2.3	< 176
	06/24/13	06/24/13	< 2.5	< 2.2	< 169
	07/15/13	07/15/13	< 1.0	1.8 ± 1.1	< 186
	08/21/13	08/21/13	< 1.3	< 1.5	< 167
	09/23/13	09/23/13	< 1.7	< 4.0	< 196
	10/28/13	10/28/13	< 0.8	< 1.2	< 177
	11/25/13	11/25/13	< 1.6	< 2.0	< 191
	12/09/13	12/09/13	< 1.3	< 1.6	< 192
		AVERAGE**	-	1.8 ± 0.0	-

* MANAGEMENT AUDIT SAMPLE: NOT REQUIRED BY ODCM

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

TABLE C-7 **CONCENTRATIONS OF GAMMA EMITTERS IN WELL WATER*, 2013**

Results in units of pCi/L ± 2 sigma, 2013

STATION ID	COLLECTION PERIOD		<--------GAMMA EMITTERS-------->											
	START	STOP	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	ZrNB-95	I-131	Cs-134	Cs-137	BaLA140	Ra-226
SA-WWA-3E1	01/21/13	01/21/13	< 43	< 3	< 3	< 6	< 3	< 6	< 3	< 0.6	< 3	< 3	< 5	< 72
	02/19/13	02/19/13	< 54	< 3	< 3	< 6	< 3	< 6	< 4	< 0.6	< 3	< 3	< 6	< 81
	03/11/13	03/11/13	< 38	< 5	< 4	< 10	< 5	< 10	< 5	< 0.7	< 4	< 5	< 7	< 130
	03/25/13	03/25/13	< 47	< 5	< 4	< 11	< 5	< 9	< 5	< 0.4	< 5	< 5	< 9	< 128
	04/22/13	04/22/13	< 44	< 5	< 5	< 10	< 5	< 9	< 5	< 0.6	< 5	< 5	< 8	< 121
	05/28/13	05/28/13	< 50	< 5	< 5	< 12	< 6	< 11	< 6	< 0.8	< 6	< 6	< 9	< 179
	06/24/13	06/24/13	< 56	< 5	< 6	< 11	< 5	< 10	< 7	< 0.4	< 5	< 6	< 11	< 130
	07/15/13	07/15/13	< 80	< 4	< 4	< 10	< 4	< 9	< 5	< 0.6	< 4	< 5	< 7	< 119
	08/21/13	08/21/13	< 48	< 6	< 7	< 12	< 5	< 13	< 8	< 0.7	< 7	< 7	< 14	< 158
	09/23/13	09/23/13	< 156	< 6	< 9	< 16	< 9	< 14	< 8	< 0.6	< 5	< 10	< 14	< 148
	10/28/13	10/28/13	< 60	< 7	< 7	< 15	< 8	< 13	< 8	< 0.8	< 7	< 8	< 14	< 160
	11/25/13	11/25/13	< 61	< 7	< 8	< 14	< 7	< 14	< 8	< 0.6	< 5	< 7	< 14	< 149
	12/09/13	12/09/13	< 52	< 5	< 5	< 12	< 5	< 12	< 6	< 0.8	< 6	< 6	< 10	< 130
		AVERAGE	-	-	-	-	-	-	-	-	-	-	-	-

* MANAGEMENT AUDIT SAMPLE: NOT REQUIRED BY ODCM

TABLE C-8 **CONCENTRATIONS OF GROSS ALPHA AND GROSS BETA EMITTERS AND TRITIUM IN RAW AND TREATED POTABLE WATER (2F3), 2013**

Results in units of pCi/L ± 2 sigma

STATION ID	COLLECTION PERIOD START	STOP	GR-A	GR-B	H-3
RAW	01/01/13	01/31/13	< 0.8	< 1.8	< 176
	02/01/13	02/28/13	< 2.7	3.5 ± 1.7	< 166
	03/01/13	03/31/13	< 0.9	3.6 ± 1.2	< 199
	04/01/13	04/30/13	< 0.5	3.4 ± 1.0	< 180
	05/01/13	05/31/13	< 1.0	4.6 ± 1.1	< 186
	06/01/13	06/30/13	< 1.9	4.4 ± 1.2	< 184
	07/01/13	07/31/13	< 2.3	3.5 ± 1.1	< 160
	08/01/13	08/31/13	< 2.5	6.5 ± 1.4	< 190
	09/01/13	09/30/13	< 1.4	4.9 ± 1.2	< 179
	10/01/13	10/31/13	< 1.1	6.1 ± 1.6	< 177
	11/01/13	11/30/13	< 1.6	5.6 ± 1.1	< 178
	12/01/13	12/31/13	< 1.5	7.3 ± 1.4	< 162
	AVERAGE*		-	4.8 ± 2.7	-
TREATED	01/01/13	01/31/13	< 1.1	< 1.9	< 176
	02/01/13	02/28/13	< 1.2	3.2 ± 1.3	< 168
	03/01/13	03/31/13	< 1.3	3.1 ± 1.3	< 170
	04/01/13	04/30/13	< 0.4	2.9 ± 1.0	< 180
	05/01/13	05/31/13	< 1.0	3.7 ± 1.1	< 92
	06/01/13	06/30/13	< 2.4	5.8 ± 1.3	< 182
	07/01/13	07/31/13	< 2.6	5.9 ± 1.3	< 160
	08/01/13	08/31/13	< 2.2	5.9 ± 1.2	< 186
	09/01/13	09/30/13	< 1.2	4.3 ± 1.0	< 177
	10/01/13	10/31/13	< 0.6	5.2 ± 1.0	< 173
	11/01/13	11/30/13	< 1.5	5.0 ± 1.1	< 177
	12/01/13	12/31/13	< 1.0	5.8 ± 1.0	< 168
	AVERAGE*		-	4.6 ± 2.4	-

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

TABLE C-9 **CONCENTRATIONS OF IODINE-131* AND GAMMA EMITTERS IN RAW AND TREATED POTABLE WATER (2F3), 2013**

Results in units of pCi/L ± 2 sigma

STATION ID	COLLECTION PERIOD START	STOP	I-131	K-40	Mn-54	Co-58	Fe-59	<---------GAMMA EMITTERS---------> Co-60	Zn-65	ZrNb-95	I-131	Cs-134	Cs-137	BaLa-140	Ra-226
SA-PWR-2F3	01/01/13	01/31/13	< 0.7	< 56	< 5	< 5	< 13	< 6	< 10	< 6	< 0.7	< 5	< 5	< 6	< 101
SA-PWT-2F3	01/01/13	01/31/13	< 0.6	< 39	< 4	< 4	< 8	< 4	< 8	< 4	< 0.6	< 4	< 4	< 6	< 89
SA-PWR-2F3	02/01/13	02/28/13	< 0.8	< 24	< 3	< 4	< 9	< 4	< 7	< 4	< 0.8	< 3	< 4	< 6	< 80
SA-PWT-2F3	02/01/13	02/28/13	< 0.7	< 53	< 3	< 3	< 6	< 3	< 6	< 4	< 0.7	< 3	< 4	< 6	< 93
SA-PWR-2F3	03/01/13	03/31/13	< 0.7	< 78	< 4	< 4	< 10	< 5	< 8	< 4	< 0.7	< 4	< 5	< 9	< 116
SA-PWT-2F3	03/01/13	03/31/13	< 0.8	< 30	< 3	< 3	< 9	< 3	< 6	< 4	< 0.8	< 3	< 4	< 7	< 79
SA-PWR-2F3	04/01/13	04/30/13	< 0.7	< 17	< 2	< 2	< 4	< 2	< 4	< 2	< 0.7	< 2	< 2	< 5	< 49
SA-PWT-2F3	04/01/13	04/30/13	< 0.9	< 14	< 1	< 1	< 4	< 2	< 3	< 1	< 0.9	< 1	< 1	< 3	< 30
SA-PWR-2F3	05/01/13	05/31/13	< 0.6	< 22	< 2	< 2	< 5	< 2	< 5	< 2	< 0.6	< 2	< 2	< 5	< 50
SA-PWT-2F3	05/01/13	05/31/13	< 0.4	< 36	< 2	< 2	< 4	< 2	< 4	< 2	< 0.4	< 2	< 2	< 4	< 56
SA-PWR-2F3	06/01/13	06/30/13	< 0.8	< 107	< 5	< 4	< 9	< 6	< 10	< 6	< 0.8	< 5	< 5	< 10	< 138
SA-PWT-2F3	06/01/13	06/30/13	< 0.5	< 89	< 4	< 5	< 11	< 5	< 7	< 6	< 0.5	< 4	< 5	< 9	< 134
SA-PWR-2F3	07/01/13	07/31/13	< 0.7	< 97	< 4	< 3	< 8	< 3	< 7	< 4	< 0.7	< 4	< 4	< 6	< 108
SA-PWT-2F3	07/01/13	07/31/13	< 0.5	< 73	< 4	< 4	< 8	< 4	< 9	< 5	< 0.5	< 5	< 5	< 7	< 137
SA-PWR-2F3	08/01/13	08/31/13	< 0.7	< 94	< 5	< 5	< 14	< 6	< 10	< 5	< 0.7	< 4	< 5	< 13	< 149
SA-PWT-2F3	08/01/13	08/31/13	< 0.7	< 50	< 6	< 7	< 16	< 7	< 13	< 8	< 0.7	< 6	< 6	< 13	< 121
SA-PWR-2F3	09/01/13	09/30/13	< 0.4	< 46	< 5	< 7	< 11	< 6	< 13	< 7	< 0.4	< 5	< 6	< 11	< 117
SA-PWT-2F3	09/01/13	09/30/13	< 0.4	< 27	< 4	< 5	< 11	< 5	< 10	< 4	< 0.4	< 5	< 5	< 8	< 137
SA-PWR-2F3	10/01/13	10/31/13	< 0.5	< 55	< 6	< 6	< 12	< 6	< 10	< 7	< 0.5	< 6	< 6	< 14	< 162
SA-PWT-2F3	10/01/13	10/31/13	< 0.5	< 120	< 6	< 6	< 12	< 6	< 13	< 6	< 0.5	< 6	< 7	< 13	< 186
SA-PWR-2F3	11/01/13	11/30/13	< 0.8	< 49	< 6	< 6	< 13	< 6	< 11	< 7	< 0.8	< 5	< 6	< 14	< 133
SA-PWT-2F3	11/01/13	11/30/13	< 0.8	< 32	< 3	< 4	< 9	< 4	< 7	< 4	< 0.8	< 3	< 4	< 9	< 82
SA-PWR-2F3	12/01/13	12/31/13	< 0.4	< 35	< 4	< 4	< 10	< 4	< 8	< 5	< 0.4	< 4	< 4	< 11	< 109
SA-PWT-2F3	12/01/13	12/31/13	< 0	< 75	< 3	< 4	< 9	< 3	< 7	< 4	< 0.4	< 3	< 4	< 9	< 97
	AVERAGE		-	-	-	-	-	-	-	-	-	-	-	-	-

* IODINE-131 RESULTS ARE CORRECTED FOR DECAY TO STOP DATE OF COLLECTION PERIOD & ANALYZED TO AN LLD OF 1.0 pCi/L.

TABLE C-10 **CONCENTRATIONS OF GAMMA EMITTERS* IN VEGETABLES*, 2013**

Results in units of pCi/kg (wet) ± 2 sigma

STATION ID	COLLECTION PERIOD	SAMPLE TYPE	<----------GAMMA EMITTERS---------->						
			Be-7	K-40	I-131	Cs-134	Cs-137	Ra-226	Th-232
SA-FPV-2F9	04/27/13	Asparagus	< 134	2338 ± 380	< 48	< 14	< 16	< 356	< 67
SA-FPV-2F9	04/28/13	Asparagus	< 156	2054 ± 359	< 46	< 20	< 21	< 323	< 78
	AVERAGE**			2196 ± 402					
SA-FPV-3H5 (C)	05/27/13	Asparagus	< 132	1949 ± 319	< 35	< 15	< 16	< 346	< 61
	AVERAGE**			1949 ± 0					
SA-FPV-15F4	07/24/13	Corn	< 29	2235 ± 80	< 11	< 3	< 3	< 68	< 13
SA-FPV-1G1 (C)	07/24/13	Corn	< 39	2107 ± 108	< 14	< 4	< 4	< 108	< 18
SA-FPV-1G1 (C)	07/24/13	Peppers	< 56	2025 ± 124	< 20	< 6	< 6	< 146	< 24
SA-FPV-1G1 (C)	07/24/13	Tomatoes	< 34	1850 ± 93	< 13	< 4	< 4	< 74	< 14
SA-FPV-2F9	07/24/13	Corn	< 58	1972 ± 125	< 20	< 6	< 7	< 123	< 26
SA-FPV-2F9	07/24/13	Tomatoes	< 56	2415 ± 130	< 19	< 6	< 6	< 121	< 25
SA-FPV-2G2 (C)	07/24/13	Corn	< 36	2051 ± 84	< 13	< 4	< 4	< 81	< 16
SA-FPV-2G2 (C)	07/24/13	Peppers	< 50	1984 ± 122	< 17	< 5	< 5	< 129	< 22
SA-FPV-2G2 (C)	07/24/13	Tomatoes	< 51	1904 ± 110	< 18	< 5	< 5	< 127	< 21
SA-FPV-3F6	07/24/13	Peppers	< 73	2418 ± 162	< 26	< 7	< 9	< 189	< 30
	AVERAGE**			2096 ± 398					

* MANAGEMENT AUDIT SAMPLE: NOT REQUIRED BY ODCM

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

(C) CONTROL STATION

TABLE C-10 **CONCENTRATIONS OF GAMMA EMITTERS* IN VEGETABLES*, 2013**

Results in units of pCi/kg (wet) ± 2 sigma

STATION ID	COLLECTION PERIOD	SAMPLE TYPE	<----------GAMMA EMITTERS---------->						
			Be-7	K-40	I-131	Cs-134	Cs-137	Ra-226	Th-232
SA-FPV-15F4	08/19/13	Tomatoes	< 120	2083 ± 306	< 29	< 14	< 14	< 310	< 61
SA-FPV-2F9	08/19/13	Peppers	< 152	2157 ± 356	< 33	< 19	< 19	< 424	< 84
SA-FPV-3F6	08/19/13	Tomatoes	< 102	2709 ± 273	< 23	< 10	< 10	< 224	< 43
SA-FPV-15F4	08/20/13	Peppers	< 134	2261 ± 275	< 28	< 14	< 14	< 291	< 54
SA-FPV-2F9	08/20/13	Peaches	< 121	1603 ± 264	< 30	< 14	< 14	< 325	< 60
SA-FPV-3F6	08/20/13	Corn	< 131	1908 ± 242	< 21	< 12	< 15	< 315	< 50
SA-FPV-3F8	08/20/13	Peaches	< 86	1704 ± 247	< 22	< 10	< 12	< 295	< 39
SA-FPV-3H5 (C)	08/20/13	Corn	< 174	2061 ± 337	< 38	< 18	< 20	< 383	< 82
SA-FPV-3H5 (C)	08/20/13	Peppers	< 181	2433 ± 420	< 41	< 22	< 21	< 547	< 85
SA-FPV-3H5 (C)	08/20/13	Tomatoes	< 103	1269 ± 236	< 26	< 12	< 15	< 289	< 52
SA-FPV-13E3	08/26/13	Corn	< 150	2038 ± 334	< 41	< 17	< 18	< 348	< 64
	AVERAGE**			2021 ± 795					
SA-VGT-14F4	11/01/13	soy beans	< 140	13750 ± 556	< 60	< 15	< 17	< 229	< 73
SA-FPL-10D1	12/30/13	Cabbage	372 ± 131	3428 ± 321	< 57	< 14	< 16	< 290	< 52
SA-FPL-15S1	12/30/13	Cabbage	228 ± 81	3697 ± 201	< 37	< 9	13 ± 7	< 157	< 39
SA-FPL-16S1	12/30/13	Cabbage	269 ± 101	3866 ± 220	< 46	< 10	< 12	< 228	< 39
SA-FPL-1S1	12/30/13	Cabbage	249 ± 111	3665 ± 239	< 52	< 11	19 ± 12	< 269	< 46
SA-FPL-6S1	12/30/13	Cabbage	< 116	3699 ± 310	< 56	< 11	< 13	< 315	< 47
	AVERAGE**		279 ± 128	3671 ± 314	-	-	16 ± 9	-	-

* MANAGEMENT AUDIT SAMPLE: NOT REQUIRED BY ODCM

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

(C) CONTROL STATION

TABLE C-11 **CONCENTRATIONS OF GAMMA EMITTERS IN FODDER CROPS*, 2013**

Results in units of pCi/kg (wet) ± 2 sigma

STATION ID	COLLECTION DATE	SAMPLE TYPE	<----------GAMMA EMITTERS---------->						
			Be-7	K-40	I-131	Cs-134	Cs-137	Ra-226	Th-232
SA-VGT-13E3	12/20/13	Silage	196 ± 88	2968 ± 224	< 55	< 8	< 10	< 230	< 38
SA-VGT-14F4	12/20/13	Silage	249 ± 106	4052 ± 325	< 60	< 11	< 13	< 283	< 57
SA-VGT-2G3	12/18/13	Silage	249 ± 102	3643 ± 219	< 52	< 8	< 9	< 216	< 33
SA-VGT-3G1 (C)	12/18/13	Silage	193 ± 102	713 ± 132	< 59	< 8	< 9	< 191	< 26
	AVERAGE		222 ± 63	2844 ± 2979	-	-	-	-	-

* MANAGEMENT AUDIT SAMPLE: NOT REQUIRED BY ODCM

TABLE C-12 **CONCENTRATIONS OF GAMMA EMITTERS IN SOIL, 2013**

Results in units of pCi/kg (dry) ± 2 sigma

STATION ID	COLLECTION DATE	<----------GAMMA EMITTERS---------->					
		Be-7	K-40	Cs-134	Cs-137	Ra-226	Th-232
SA-SOL-10D1	09/11/13	< 710	12230 ± 1317	< 20	227 ± 76	< 1534	1053 ± 170
SA-SOL-13E3	09/11/13	< 369	18510 ± 1189	< 33	< 38	< 703	361 ± 92
SA-SOL-14F4	09/11/13	< 451	12820 ± 1024	< 43	< 46	2511 ± 1112	979 ± 126
SA-SOL-16E1	09/11/13	< 299	15360 ± 885	< 29	45 ± 27	1324 ± 740	648 ± 90
SA-SOL-2F9	09/11/13	< 597	6663 ± 922	< 46	169 ± 77	2172 ± 1153	644 ± 128
SA-SOL-2G3 (C)	09/11/13	< 349	9139 ± 809	< 37	78 ± 34	1898 ± 913	584 ± 100
SA-SOL-3G1 (C)	09/11/13	< 584	12440 ± 1147	< 53	150 ± 92	2595 ± 1406	1207 ± 178
SA-SOL-5F1	09/11/13	< 358	5038 ± 787	< 37	111 ± 48	< 767	489 ± 115
SA-SOL-6S2	09/11/13	< 375	6619 ± 872	< 38	< 46	< 1029	350 ± 115
	AVERAGE*	-	10980 ± 8925	-	130 ± 131	2100 ± 1031	702 ± 617

* THE AVERAGE AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES
(C) CONTROL STATION

TABLE C-13 **CONCENTRATIONS OF GAMMA EMITTERS IN BEEF AND GAME*, 2013**

Results in units of pCi/kg (wet) ± 2 sigma

STATION ID	COLLECTION DATE	SAMPLE TYPE	<----------GAMMA EMITTERS---------->				
			Be-7	I-131	K-40	Cs-134	Cs-137
SA-GAM-5C1	01/22/13	Muskrat	< 117	< 29	3307 ± 376	< 14	< 17
	AVERAGE		-	-	3307 ± 0.0	-	-

* MANAGEMENT AUDIT SAMPLE: NOT REQUIRED BY ODCM

TABLE C-14 CONCENTRATIONS OF GROSS BETA EMITTERS IN SURFACE WATER, 2013

Results in Units of pCi/L ± 2 sigma

COLLECTION PERIOD START	STOP	SA-SWA-11A1	CONTROL SA-SWA-12C1	SA-SWA-16F1	SA-SWA-1F2	SA-SWA-7E1
01/08/13	01/08/13	93 ± 28	118 ± 34	39 ± 11	27 ± 6	60 ± 24
02/05/13	02/05/13	35 ± 14	17 ± 11	11 ± 5	10 ± 3	66 ± 14
03/05/13	03/05/13	128 ± 22	91 ± 18	25 ± 5	43 ± 14	187 ± 32
04/03/13	04/03/13	130 ± 21	88 ± 17	89 ± 14	47 ± 9	172 ± 30
05/06/13	05/06/13	78 ± 10	67 ± 9	40 ± 6	34 ± 5	103 ± 13
06/05/13	06/05/13	49 ± 15	76 ± 14	49 ± 10	36 ± 7	123 ± 30
07/06/13	07/06/13	12 ± 3	4 ± 2	7 ± 4	5 ± 3	22 ± 6
08/15/13	08/15/13	83 ± 7	32 ± 6	25 ± 4	20 ± 3	81 ± 9
09/03/13	09/03/13	87 ± 14	74 ± 12	58 ± 9	38 ± 6	150 ± 22
10/08/13	10/08/13	205 ± 18	189 ± 16	137 ± 12	125 ± 10	255 ± 21
11/05/13	11/05/13	208 ± 28	264 ± 30	144 ± 20	119 ± 15	257 ± 34
12/02/13	12/02/13	239 ± 27	198 ± 25	173 ± 20	114 ± 16	264 ± 32
	AVERAGE	112 ± 145	102 ± 157	66 ± 112	51 ± 86	145 ± 167

TABLE C-15 CONCENTRATIONS OF TRITIUM IN SURFACE WATER, 2013

Results in Units of pCi/L ± 2 sigma

COLLECTION PERIOD START	STOP	SA-SWA-11A1	CONTROL SA-SWA-12C1	SA-SWA-16F1	SA-SWA-1F2	SA-SWA-7E1
01/08/13 -	01/08/13	< 156	< 159	< 157	< 161	< 156
02/05/13 -	02/05/13	< 181	< 181	< 188	< 189	< 189
03/05/13 -	03/05/13	< 184	< 187	< 186	< 188	< 189
04/03/13 -	04/03/13	< 182	< 187	< 185	< 183	< 182
05/06/13 -	05/06/13	< 178	< 178	< 177	< 178	< 177
06/05/13 -	06/05/13	< 173	< 176	< 176	< 176	< 174
07/06/13 -	07/06/13	265 ± 120	< 171	< 169	< 173	< 170
08/15/13 -	08/15/13	< 162	< 165	< 164	< 166	< 168
09/03/13 -	09/03/13	< 170	< 170	< 167	< 167	< 165
10/08/13 -	10/08/13	< 190	< 193	< 191	< 192	< 188
11/05/13 -	11/05/13	< 164	< 163	< 163	< 166	< 160
12/02/13 -	12/02/13	< 160	< 186	< 160	< 164	< 162
	AVERAGE*	265 ± 0	-	-	-	-

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

TABLE C-16 **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER, 2013**

Results in Units of pCi/L ± 2 Sigma, 2013

STATION ID	COLLECTION PERIOD	<----------GAMMA EMITTERS---------->										
		K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	ZrNb-95	I-131*	Cs-134	Cs-137	BaLa-140
SA-SWA-11A1	01/08/13	< 25	< 4	< 4	< 10	< 5	< 10	< 4	< 0.7	< 5	< 5	< 12
	02/05/13	< 130	< 10	< 11	< 21	< 8	< 18	< 12	< 0.6	< 10	< 12	< 20
	03/05/13	81 ± 31	< 2	< 2	< 4	< 2	< 4	< 2	< 0.7	< 2	< 2	< 4
	04/03/13	< 16	< 2	< 2	< 5	< 2	< 3	< 2	< 0.6	< 2	< 2	< 6
	05/06/13	93 ± 50	< 4	< 4	< 10	< 4	< 8	< 4	< 0.8	< 3	< 3	< 10
	06/05/13	109 ± 62	< 6	< 6	< 11	< 6	< 9	< 5	< 0.7	< 5	< 6	< 10
	07/06/13	< 15	< 2	< 2	< 4	< 2	< 4	< 2	< 0.6	< 2	< 2	< 3
	08/15/13	< 43	< 5	< 4	< 10	< 5	< 8	< 5	< 0.6	< 4	< 5	< 8
	09/03/13	< 40	< 4	< 3	< 10	< 3	< 7	< 5	< 0.7	< 4	< 4	< 8
	10/08/13	114 ± 63	< 5	< 6	< 11	< 6	< 13	< 6	< 0.7	< 5	< 6	< 14
	11/05/13	< 47	< 7	< 7	< 16	< 8	< 13	< 7	< 0.7	< 6	< 8	< 12
	12/02/13	104 ± 49	< 4	< 4	< 9	< 4	< 9	< 5	< 0.7	< 4	< 4	< 11
	AVERAGE**	100 ± 26	-	-	-	-	-	-	-	-	-	-
SA-SWA-12C1 (C)	01/08/13	< 37	< 5	< 4	< 9	< 5	< 11	< 6	< 0.8	< 3.9	< 4	< 11
	02/05/13	< 46	< 5	< 6	< 13	< 7	< 10	< 7	< 0.6	< 5.3	< 6	< 13
	03/05/13	63 ± 30	< 2	< 2	< 5	< 2	< 4	< 2	< 0.8	< 2.0	< 2	< 5
	04/03/13	60 ± 28	< 2	< 2	< 5	< 2	< 4	< 2	< 0.7	< 1.9	< 2	< 6
	05/06/13	< 43	< 4	< 5	< 12	< 5	< 8	< 4	< 0.6	< 4.1	< 5	< 13
	06/05/13	< 55	< 6	< 6	< 15	< 5	< 14	< 6	< 0.6	< 5.2	< 6	< 12
	07/06/13	< 14	< 1	< 2	< 4	< 2	< 3	< 2	< 0.7	< 1.4	< 2	< 3
	08/15/13	< 50	< 5	< 7	< 15	< 6	< 12	< 7	< 0.7	< 4.7	< 5	< 11
	09/03/13	< 47	< 4	< 6	< 12	< 5	< 11	< 5	< 0.8	< 4.3	< 5	< 14
	10/08/13	123 ± 64	< 5	< 6	< 12	< 6	< 9	< 6	< 0.6	< 4.5	< 6	< 11
	11/05/13	137 ± 60	< 5	< 5	< 14	< 5	< 9	< 6	< 0.7	< 3.9	< 6	< 11
	12/02/13	137 ± 44	< 3	< 4	< 8	< 4	< 7	< 4	< 0.8	< 2.9	< 3	< 9
	AVERAGE**	104 ± 78	-	-	-	-	-	-	-	-	-	-

* IODINE-131 RESULTS ARE CORRECTED FOR DECAY TO STOP DATE OF COLLECTION & ANALYZED TO AN LLD OF 1.0 pCi/L

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

(C) CONTROL STATION

TABLE C-16 **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER, 2013**

Results in Units of pCi/L ± 2 Sigma, 2013

STATION ID	COLLECTION PERIOD	<----------GAMMA EMITTERS---------->										
		K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	ZrNb-95	I-131*	Cs-134	Cs-137	BaLa-140
SA-SWA-16F1	01/08/13	76 ± 49	< 6	< 5	< 12	< 5	< 9	< 5	< 0.8	< 5	< 5	< 11
	02/05/13	< 99	< 5	< 5	< 14	< 5	< 10	< 5	(1) 1.7 ± 0.5	< 4	< 5	< 10
	03/05/13	58 ± 27	< 2	< 2	< 4	< 2	< 3	< 2	< 0.7	< 2	< 2	< 4
	04/03/13	50 ± 30	< 2	< 2	< 6	< 2	< 4	< 2	< 0.6	< 2	< 2	< 7
	05/06/13	< 32	< 4	< 4	< 10	< 4	< 8	< 4	< 0.7	< 4	< 4	< 9
	06/05/13	< 62	< 5	< 5	< 15	< 7	< 15	< 5	< 0.6	< 5	< 6	< 14
	07/06/13	< 15	< 2	< 2	< 3	< 1	< 3	< 2	< 0.7	< 2	< 2	< 3
	08/15/13	< 122	< 7	< 5	< 14	< 7	< 11	< 7	< 1.0	< 5	< 6	< 11
	09/03/13	101 ± 53	< 5	< 5	< 13	< 5	< 11	< 7	< 0.6	< 5	< 6	< 14
	10/08/13	< 43	< 3	< 4	< 9	< 4	< 8	< 5	< 0.7	< 4	< 4	< 8
	11/05/13	134 ± 77	< 6	< 6	< 12	< 5	< 10	< 7	< 0.5	< 5	< 6	< 13
	12/02/13	< 43	< 4	< 5	< 13	< 4	< 6	< 5	< 0.7	< 4	< 5	< 9
	AVERAGE**	84 ± 69	-	-	-	-	-	-	1.7 ± 0.0	-	-	-
SA-SWA-1F2	01/08/13	< 48	< 5	< 5	< 12	< 6	< 10	< 6	< 0.7	< 5	< 5	< 13
	02/05/13	< 83	< 9	< 10	< 21	< 9	< 15	< 8	(1) 1.5 ± 0.5	< 7	< 9	< 16
	03/05/13	47 ± 30	< 2	< 2	< 5	< 2	< 4	< 2	< 0.6	< 2	< 2	< 5
	04/03/13	93 ± 27	< 2	< 2	< 5	< 2	< 3	< 2	< 0.6	< 2	< 2	< 5
	05/06/13	< 40	< 4	< 4	< 9	< 4	< 9	< 4	< 0.7	< 3	< 4	< 11
	06/05/13	< 30	< 4	< 4	< 7	< 4	< 9	< 5	< 0.5	< 4	< 5	< 8
	07/06/13	71 ± 33	< 2	< 2	< 4	< 2	< 4	< 2	< 0.7	< 2	< 2	< 4
	08/15/13	< 55	< 6	< 6	< 14	< 6	< 14	< 6	< 1.0	< 6	< 5	< 13
	09/03/13	< 39	< 4	< 5	< 11	< 6	< 11	< 6	< 0.7	< 4	< 5	< 13
	10/08/13	149 ± 62	< 5	< 5	< 12	< 5	< 10	< 6	< 0.7	< 5	< 5	< 10
	11/05/13	< 44	< 5	< 6	< 12	< 5	< 12	< 6	< 0.7	< 5	< 6	< 11
	12/02/13	104 ± 54	< 4	< 4	< 9	< 4	< 7	< 5	< 0.6	< 4	< 4	< 10
	AVERAGE**	93 ± 77	-	-	-	-	-	-	1.5 ± 0.0	-	-	-

* IODINE-131 RESULTS ARE CORRECTED FOR DECAY TO STOP DATE OF COLLECTION AND ANALYZED TO AN LLD OF 1.0 pCi/L

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

(C) CONTROL STATION

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-16 **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER, 2013**

Results in Units of pCi/L ± 2 Sigma, 2013

STATION ID	COLLECTION PERIOD	<----------GAMMA EMITTERS---------->										
		K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	ZrNb-95	I-131*	Cs-134	Cs-137	BaLa-140
SA-SWA-7E1	01/08/13	84 ± 55	< 3.5	< 3.9	< 7	< 4	< 7	< 4	< 0.7	< 3.6	< 4.3	< 8
	02/05/13	< 36	< 5.5	< 6.2	< 15	< 6	< 11	< 7	< 0.8	< 5.3	< 5.8	< 15
	03/05/13	86 ± 27	< 1.4	< 1.5	< 4	< 2	< 3	< 2	< 0.9	< 1.4	< 1.7	< 3
	04/03/13	< 34	< 1.6	< 1.9	< 5	< 2	< 3	< 2	< 0.7	< 1.6	< 1.8	< 6
	05/06/13	< 43	< 4.1	< 5.2	< 11	< 4	< 8	< 5	< 0.8	< 3.9	< 4.3	< 13
	06/05/13	< 37	< 4.9	< 5.0	< 12	< 6	< 10	< 5	< 0.6	< 4.9	< 5.5	< 11
	07/06/13	< 20	< 2.2	< 2.3	< 5	< 2	< 4	< 2	< 0.6	< 2.0	< 2.3	< 4
	08/15/13	< 46	< 4.3	< 5.7	< 12	< 4	< 11	< 5	< 0.9	< 4.4	< 5.6	< 11
	09/03/13	< 50	< 5.6	< 6.3	< 11	< 6	< 10	< 6	< 0.7	< 5.2	< 5.2	< 12
	10/08/13	120 ± 67	< 5.1	< 5.6	< 11	< 6	< 9	< 6	< 0.7	< 5.5	< 5.3	< 14
	11/05/13	177 ± 83	< 6.1	< 5.5	< 14	< 5	< 12	< 7	< 0.7	< 5.6	< 6.3	< 12
	12/02/13	94 ± 50	< 3.9	< 3.7	< 9	< 4	< 9	< 4	< 0.7	< 3.5	< 3.9	< 10
	AVERAGE**	112 ± 78	-	-	-	-	-	-	-	-	-	-

* IODINE-131 RESULTS ARE CORRECTED FOR DECAY TO STOP DATE OF COLLECTION AND ANALYZED TO AN LLD OF 1.0 pCi/L

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

(C) CONTROL STATION

TABLE C-17 **CONCENTRATIONS OF GAMMA EMITTERS IN EDIBLE FISH, 2013**

Results in Units of pCi/kg (wet) ± 2 sigma

STATION ID	COLLECTION PERIOD	<----------GAMMA EMITTERS---------->								
		K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137	Ra-226
SA-ESF-11A1	05/16/13	3480 ± 797	< 48	< 66	< 150	< 52	< 124	< 61	< 66	< 1322
	09/23/13	3569 ± 773	< 52	< 57	< 125	< 41	< 94	< 52	< 53	< 1206
	AVERAGE	3525 ± 126	-	-	-	-	-	-	-	-
SA-ESF-12C1 (C)	05/16/13	4705 ± 964	< 60	< 59	< 82	< 48	< 135	< 44	< 51	< 1010
	09/24/13	4283 ± 823	< 52	< 53	< 142	< 58	< 119	< 45	< 47	< 755
	09/25/13	3407 ± 882	< 55	< 65	< 122	< 46	< 93	< 48	< 58	< 1140
	AVERAGE	4132 ± 1324	-	-	-	-	-	-	-	-
SA-ESF-7E1	05/16/13	4048 ± 884	< 49	< 50	< 122	< 33	< 109	< 46	< 46	< 1104
	09/23/13	4755 ± 1062	< 61	< 63	< 165	< 72	< 117	< 63	< 60	< 1423
	AVERAGE	4402 ± 1000	-	-	-	-	-	-	-	-

(C) CONTROL STATION

TABLE C-18 **CONCENTRATIONS OF GAMMA EMITTERS IN CRABS, 2013**

Results in Units of pCi/kg (wet) ± 2 sigma

STATION ID	COLLECTION PERIOD	<————GAMMA EMITTERS————>								
		K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137	Ra-226
SA-ECH-11A1	07/22/13	2599 ± 1164	< 92	< 96	< 251	< 78	< 176	< 88	< 86	< 1930
	08/26/13	4316 ± 1244	< 70	< 79	< 167	< 68	< 129	< 75	< 77	< 1933
	AVERAGE	3458 ± 2428	-	-	-	-	-	-	-	-
SA-ECH-12C1 (C)	07/22/13	2868 ± 940	< 60	< 67	< 171	< 53	< 97	< 45	< 63	< 1015
	08/26/13	2803 ± 1069	< 95	< 88	< 170	< 77	< 155	< 80	< 77	< 1365
	AVERAGE	2836 ± 92	-	-	-	-	-	-	-	-

(C) CONTROL STATION

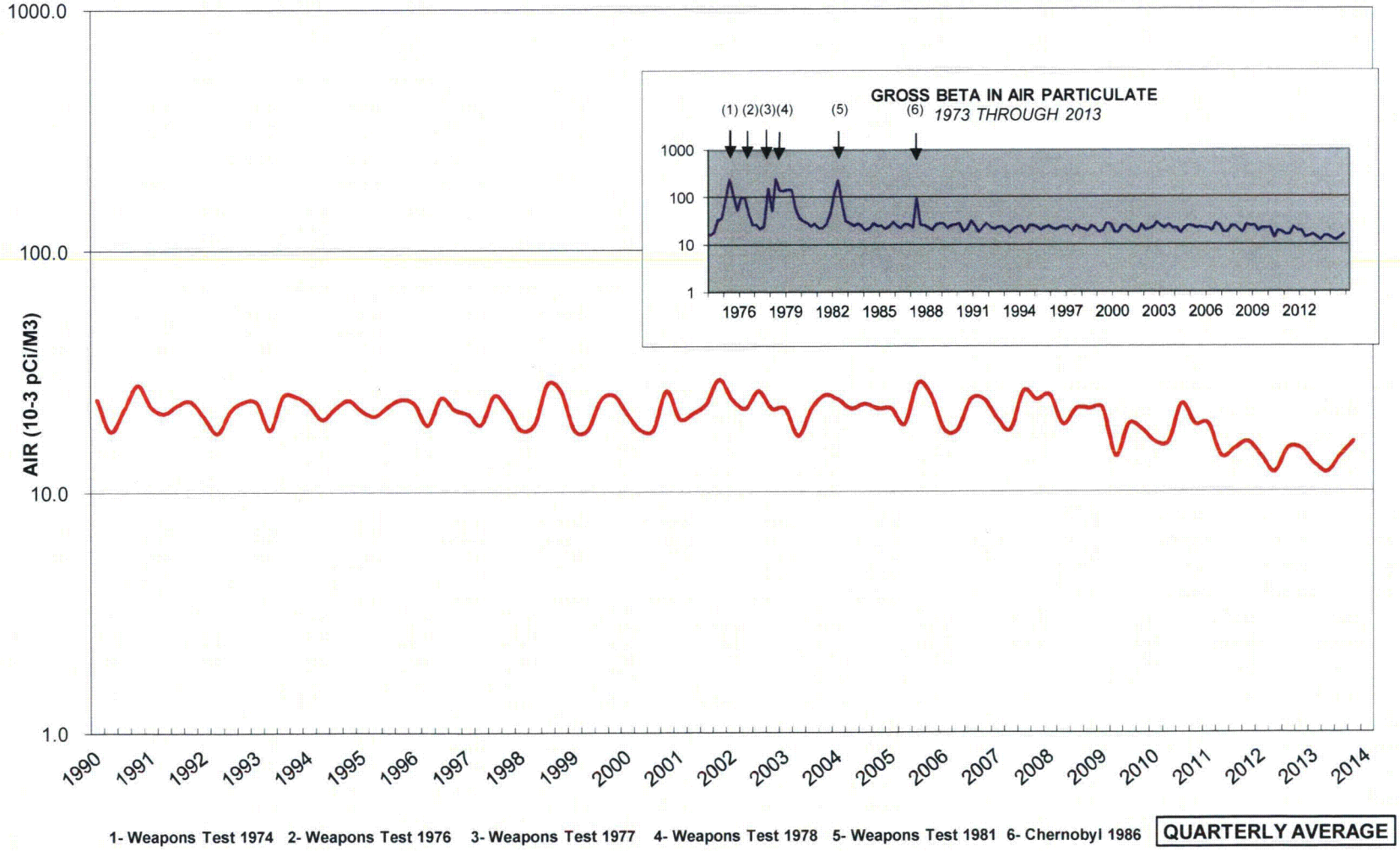
TABLE C-19 **CONCENTRATIONS OF GAMMA EMITTERS IN SEDIMENT, 2013**

Results in Units of pCi/kg (dry) ± 2 Sigma

STATION ID	COLLECTION PERIOD	<----------GAMMA EMITTERS---------->					
		Be-7	K-40	Cs-134	Cs-137	Ra-226	Th-232
SA-ESS-11A1	06/28/13	< 293	3104 ± 562	< 30	< 35	< 756	252 ± 92
	11/25/13	< 713	10170 ± 1256	< 79	< 67	< 1802	987 ± 194
	AVERAGE*	-	6637 ± 9993	-	-	-	620 ± 1040
SA-ESS-12C1 (C)	06/28/13	< 720	17430 ± 1819	< 74	< 81	< 1541	1168 ± 206
	11/25/13	< 1185	16470 ± 2034	< 105	< 126	3228 ± 2014	869 ± 258
	AVERAGE*	-	16950 ± 1358	-	-	3228 ± 0	1019 ± 422
SA-ESS-15A1	06/28/13	< 533	14080 ± 1632	< 61	< 87	2549 ± 1699	1014 ± 226
	11/25/13	< 593	9689 ± 1329	< 54	< 73	< 1258	812 ± 161
	AVERAGE*	-	11885 ± 6210	-	-	2549 ± 0	913 ± 285
SA-ESS-16A1	06/28/13	< 409	5742 ± 873	< 40	< 51	2898 ± 1062	701 ± 202
	11/25/13	< 575	8501 ± 1241	< 55	< 58	2669 ± 1241	1094 ± 182
	AVERAGE*	-	7122 ± 3902	-	-	2784 ± 324	897 ± 556
SA-ESS-16F1	06/28/13	< 1030	20030 ± 2340	< 87	< 119	< 2247	1168 ± 317
	11/25/13	< 1175	20940 ± 2416	< 94	< 103	< 1965	1017 ± 288
	AVERAGE*	-	20485 ± 1287	-	-	-	1093 ± 214
SA-ESS-6S2	07/08/13	< 291	2662 ± 474	< 27	< 36	< 578	166 ± 63
	12/16/13	< 397	5257 ± 705	< 31	< 36	< 755	347 ± 100
	AVERAGE*	-	3960 ± 3670	-	-	-	257 ± 256
SA-ESS-7E1	06/28/13	< 507	14680 ± 1353	< 49	< 71	2403 ± 1019	829 ± 245
	11/25/13	< 1063	18080 ± 2010	< 89	< 108	3441 ± 1914	1233 ± 232
	AVERAGE*	-	16380 ± 4808	-	-	2922 ± 1468	1031 ± 571

* THE AVERAGE AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES
(C) CONTROL STATION

FIGURE 1
GROSS BETA ACTIVITY IN AIR PARTICULATE
1990 THROUGH 2013



1- Weapons Test 1974 2- Weapons Test 1976 3- Weapons Test 1977 4- Weapons Test 1978 5- Weapons Test 1981 6- Chernobyl 1986 **QUARTERLY AVERAGE**

FIGURE 2
IODINE - 131 ACTIVITY IN MILK
1990 THROUGH 2013

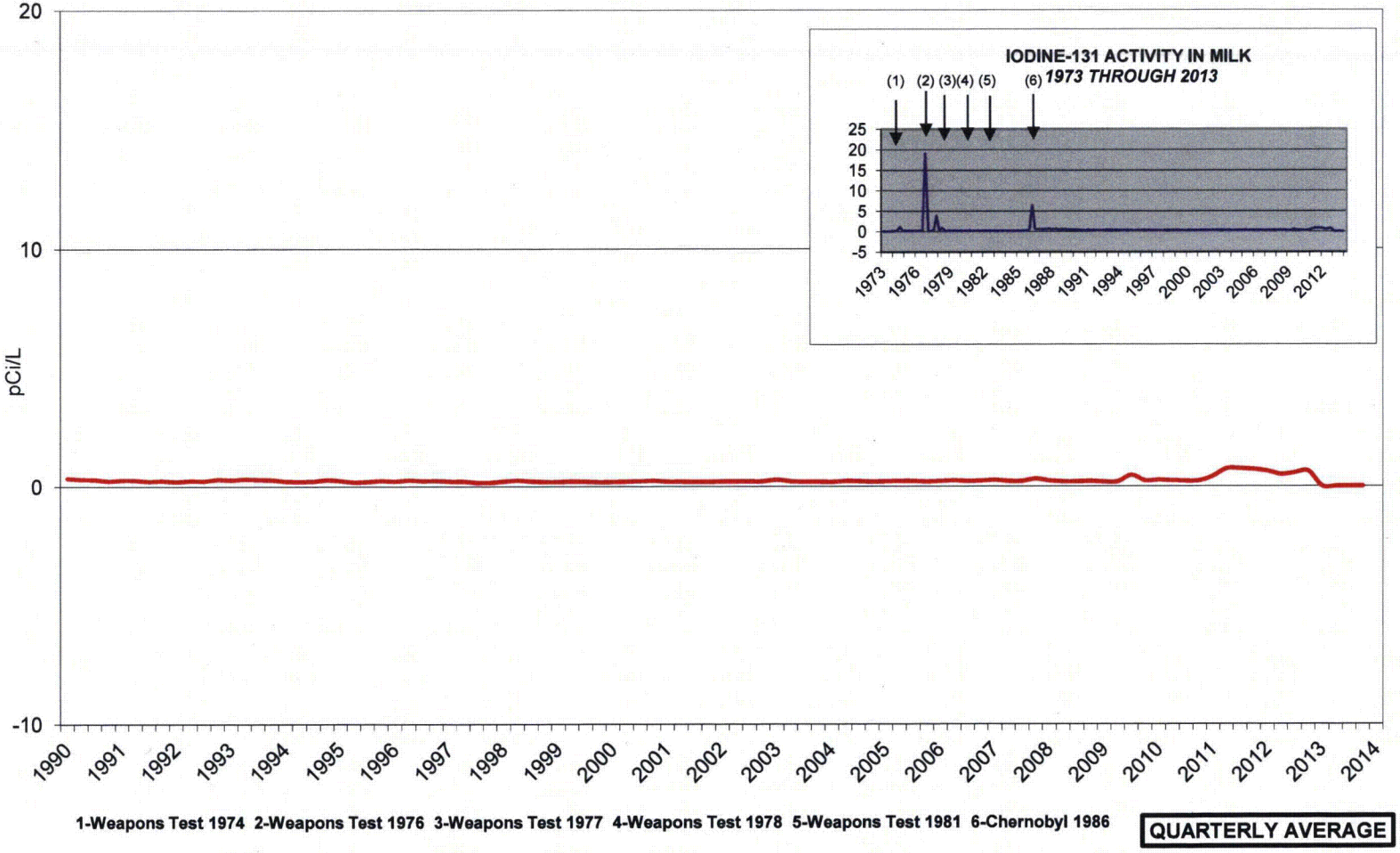


FIGURE 3
GROSS BETA ACTIVITY IN SURFACE WATER
1990 THROUGH 2013

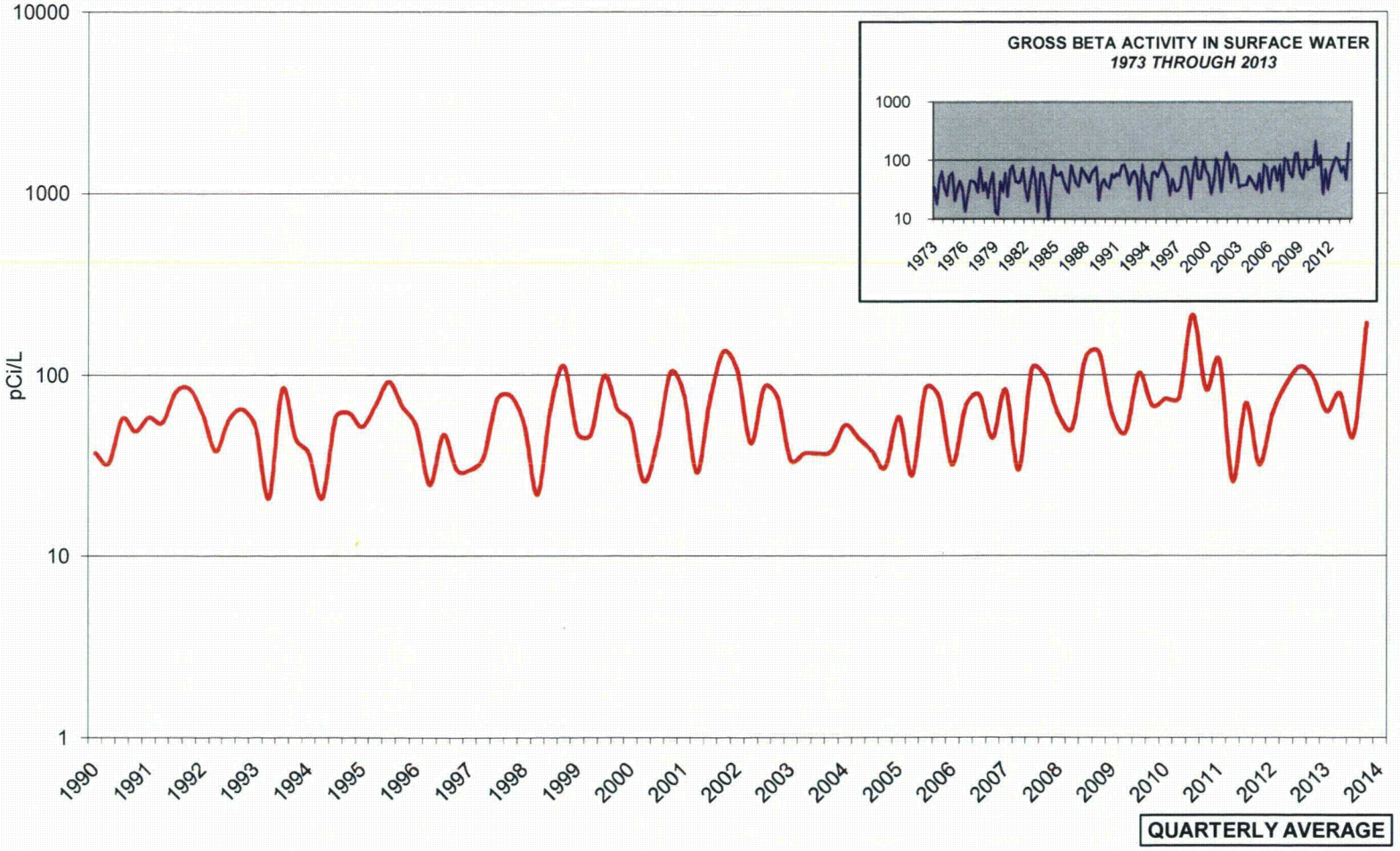
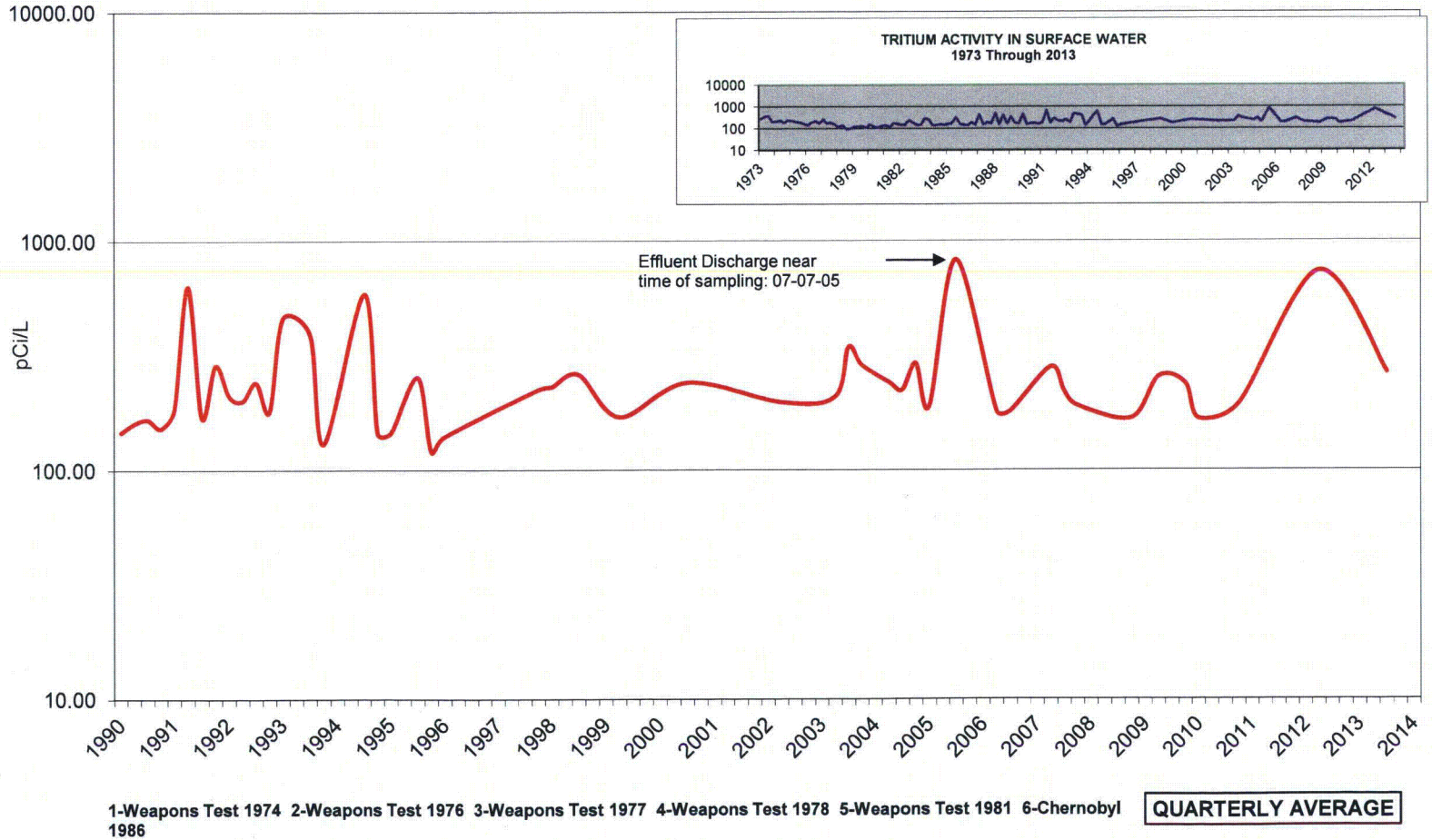


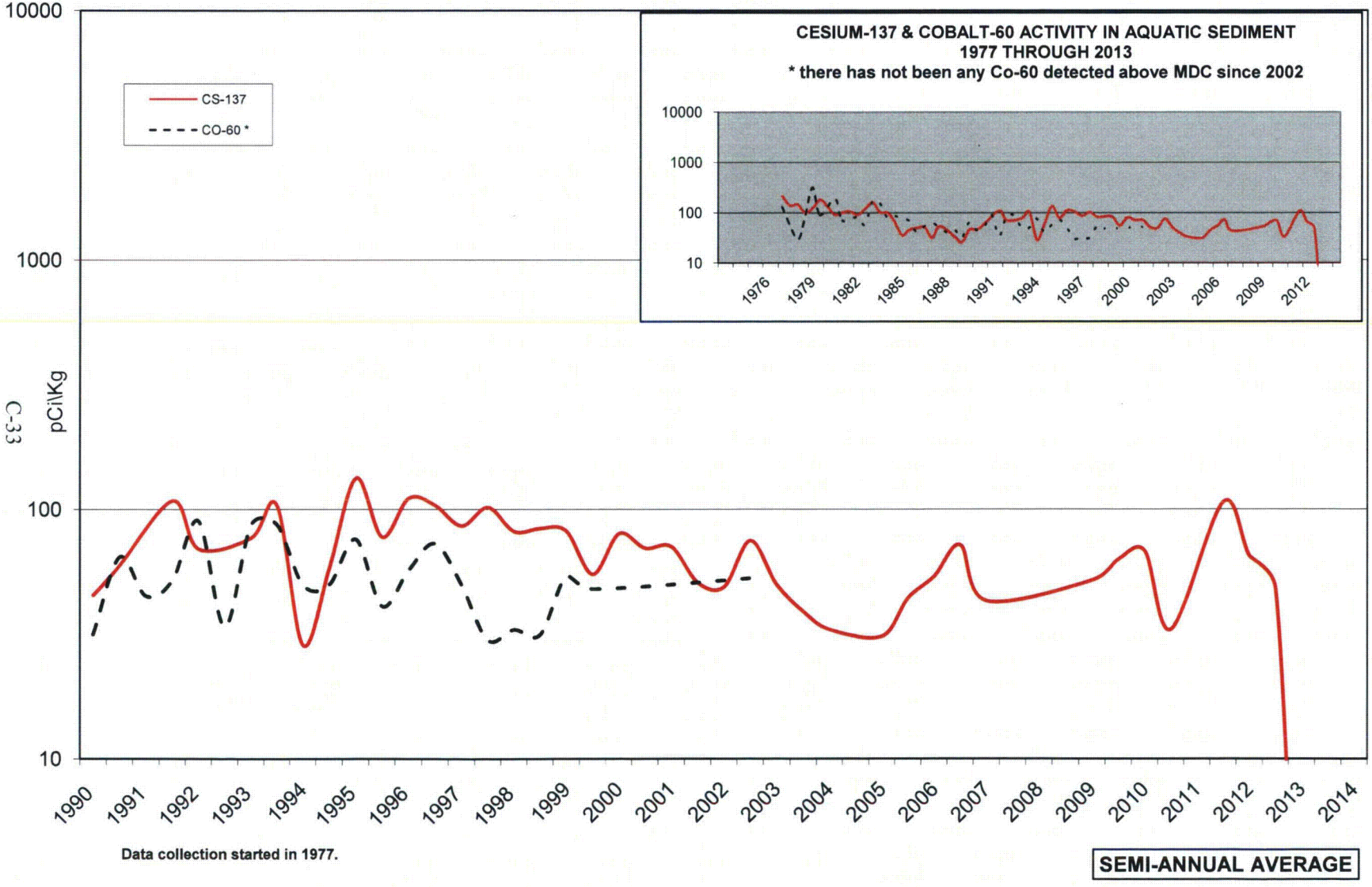
FIGURE 4
TRITIUM ACTIVITY IN SURFACE WATER
1990 THROUGH 2013



1-Weapons Test 1974 2-Weapons Test 1976 3-Weapons Test 1977 4-Weapons Test 1978 5-Weapons Test 1981 6-Chernobyl 1986

QUARTERLY AVERAGE

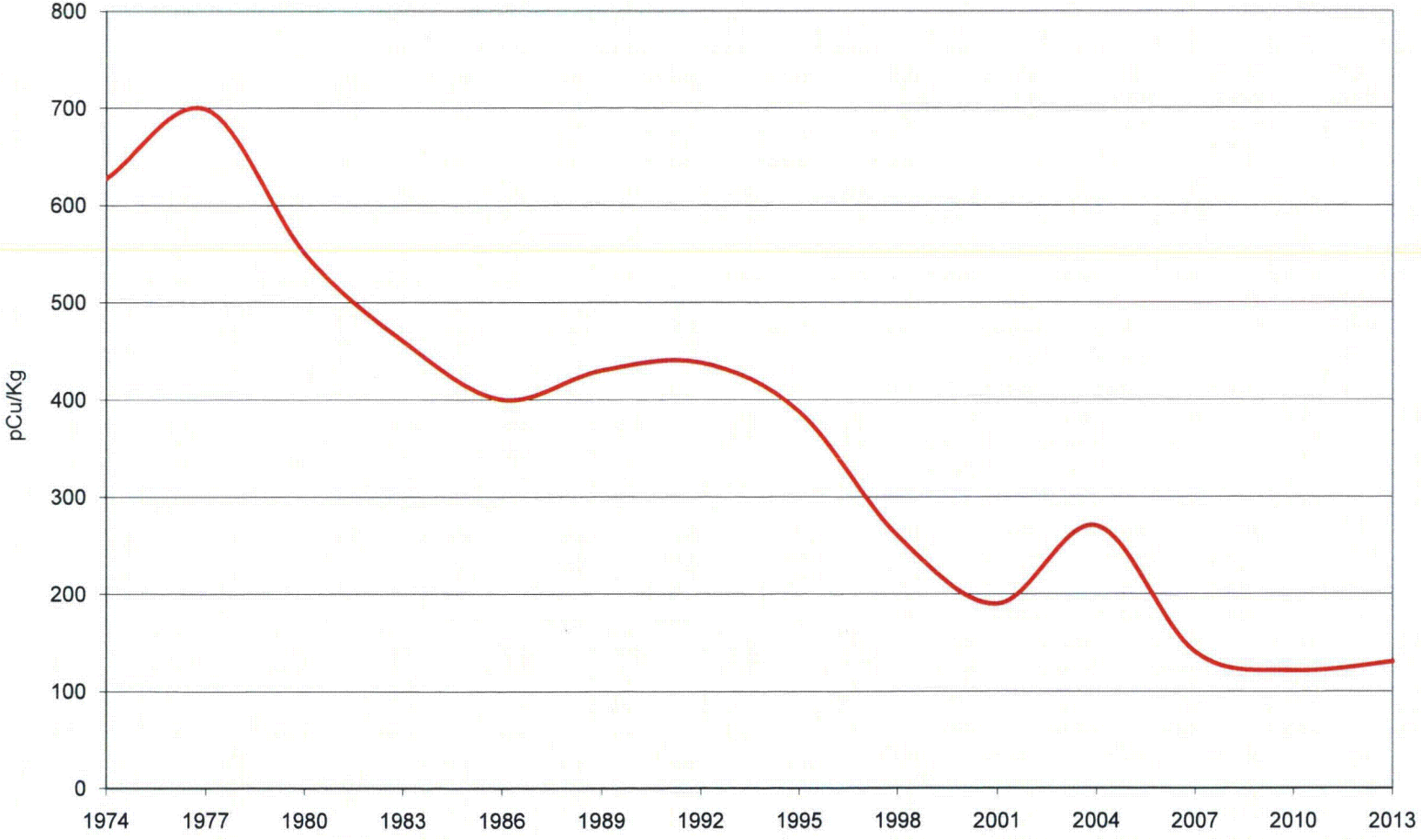
FIGURE 5
CESIUM-137 & COBALT-60 ACTIVITY IN AQUATIC SEDIMENT
1990 THROUGH 2013



Data collection started in 1977.

SEMI-ANNUAL AVERAGE

FIGURE 6
CESIUM -137 ACTIVITY IN SOIL 1974 THROUGH 2013
(TRIENNIAL)



APPENDIX D

SUMMARY OF RESULTS FROM ANALYTICS, ENVIRONMENTAL RESOURCE ASSOCIATES (ERA), AND DEPARTMENT OF ENERGY (DOE) – MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)

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ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

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

ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES
(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

ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

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.

DOE's MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES
(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

DOE's MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

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. Should have been 332 bq/kg, which would have passed. 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.

ERA ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES
(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	4.70 - 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.