RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

SALEM & HOPE CREEK GENERATING STATIONS

2011 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

JANUARY 1 TO DECEMBER 31, 2011

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I. Summary

During normal operations of a nuclear power generating station there are 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 for the environment around Artificial Island where the Salem Generating Station (SGS) and Hope Creek Generating Station (HCGS) are located. The results of the REMP are published annually, providing a summary and interpretation of the data collected [10].

Public Service Enterprise Group's (PSEG) Maplewood Testing Services (MTS) was responsible for the collection of environmental samples during 2011. Maplewood Testing Services was responsible for the analysis of environmental samples during the period of January 1, 2011, through March 7, 2011. Teledyne Brown Engineering (TBE) was responsible for the testing of environmental samples from March 8, 2011 through December 31, 2011. The results are discussed in this report. Landauer provided the dosimetry services for PSEG throughout the reporting year 2011.

The REMP was conducted in accordance with the SGS and HCGS Technical Specifications (TS) and Offsite Dose Calculation Manual (ODCM) [14, 15, 17, 21]. The Lower Limit of Detection (LLD) values required by the Technical Specifications and ODCM were achieved for the 2011 reporting period. The REMP objectives were also met during this period. The data that was collected in 2011 assists in demonstrating that SGS and HCGS were operated in compliance with Technical Specifications and the ODCM.

Most of the radioactive materials noted in this report are normally present in the environment either naturally such as K-40, or as a result of non-nuclear generating station activity, such as nuclear weapons testing. 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.

On March 11, 2011 an earthquake off the Japanese islands produced a massive tsunami that caused a nuclear accident at four of the six Fukushima Daiichi reactors. The resulting radioactive plume was first detected in the environs of Hope Creek and Salem Generating Stations on March 21, 2011. The final date of positive detection was April 11, 2011. The radionuclide identified was Iodine-131. Maximum activity levels found by media were 82 E-3 pCi/m^3 for air iodine. Samples collected were compared to offsite control locations to verify that these positive detections were not attributable to licensed activities. All other radionuclides analyzed for were below MDC.

The radioactive half-life of I-131 is about 8 days. This short half-life allowed the affects of this radioactive plume to subside over about 3 weeks. As of April 12, 2011 no further impacts from the Fukushima Daiichi accident was evident.

On April 7, 2011, 1 pCi/L I-131 was identified in the surface water control location. The most likely cause of the I-131 is effluent from a medical facility.

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

To demonstrate compliance with Technical Specifications and ODCM (Sections 3/4.12.1 & 6.8.4.h –1,2,3) [14,15], 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 ODCM (Section 3/4.11) and applicable Federal and State regulations [19,20,21], 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 [7,8,9], and with historical results collected since commercial operation [10], 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 1465 analyses on 1157 environmental samples during 2011. Of the total number of analyses and environmental samples, direct radiation dose measurements were made using 204 sets of direct reading dosimeters

In addition to the naturally - occurring isotopes (i.e. Be-7, K-40, Ra-Nat and Th-232), Cs-137 was detected in one sediment sample at a concentration below the ODCM LLD value of 180 pCi/kg dry.

Dose measurements made with quarterly OSLs at offsite locations around the SGS/HCGS site averaged 59 milliroentgen for the year 2011. The average of the dose measurements at the control locations (background) was also 59 milliroentgen for the year. This was comparable to the levels prior to station operation which had an average of 55 milliroentgen per year for 1973 to 1976.

Appendix E contains the annual report on the status of the Radiological Groundwater Protection Program (RGPP) conducted at Salem and Hope Creek Stations. The RGPP was initiated by PSEG to determine whether groundwater at and in the vicinity of Salem and Hope Creek Stations had been adversely impacted by any release of radionuclides that was not previously identified. The RGPP is being implemented by

PSEG in conjunction with a nuclear industry initiative and associated guidance. The results provided in Appendix E for the RGPP are summarized below:

Salem

The 2011 results of the laboratory analysis indicated that H-3 was detected in 10 of the 13 RGPP monitoring wells at levels ranging from 260 to 4,090 pCi/L. The wells with H-3 results above the LLD (200 pCi/L) included AL, BA, BB, BC, BD, BE, BG, U, Y and Z.

Hope Creek

The 2011 results of the laboratory analysis indicated that H-3 was detected in seven of the 13 RGPP monitoring wells at levels ranging from 205 to 3,690 pCi/L. The wells with H-3 results above the LLD (200 pCi/L) included BH, BI, BJ, BK, BM, BN and BO.

The results are shown in Appendix E, in Table 4. The H-3 concentrations measured in the onsite monitoring wells were below the U.S. Nuclear Regulatory Commission Reporting Level of 20,000 pCi/L.

PSEG Nuclear is continuing remedial actions for H-3 identified in shallow groundwater at Salem Station, conducted in accordance with a Remedial Action Work Plan that was approved by the New Jersey Department of Environmental Protection – Bureau of Nuclear Engineering (NJDEP-BNE) in November 2004. The Groundwater Recovery System (GRS) is in operation, providing hydraulic control of the plume and effectively removing H-3 contaminated groundwater. The H-3 contaminated groundwater is disposed in accordance with Salem Station's liquid radioactive waste disposal program. There is no evidence or indication that H-3 contaminated water above Ground Water Quality Criteria (GWQC) levels [GWQC is <20,000 pCi/L] has migrated to the station boundary or the Delaware River.

II. The Radiological Environmental Monitoring Program

Lower Alloways Creek Township, Salem County, New Jersey is the site of Salem Generating Station (SGS) and Hope Creek Generating Station (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).

Salem Generating Station (SGS) and Hope Creek Generating Station (HCGS) 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 environment surrounding SGS/HCGS 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 [1,2]. More specific information on the demography, hydrology, meteorology, and land use of the area may be found in the Environmental Reports [1,2], Environmental Statements [3,4], and the Updated Final Safety Analysis Reports for SGS and HCGS [5,6].

Since 1968, a radiological environmental monitoring program (REMP) has been conducted at the SGS/HCGS Site [22]. Starting in December 1972, more extensive radiological monitoring programs were initiated [7,8,9]. The operational REMP was initiated in December 1976, when Salem Unit 1 achieved criticality.

An overview of the 2011 REMP is provided in Table 1, 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, 2011, for the SGS/HCGS REMP.

A. Objectives of the Operational REMP

The objectives of the Operational REMP are to:

1. To fulfill the requirements of the Radiological Surveillance sections of the Technical Specifications and ODCM for SGS/HCGS.

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

3. To determine if SGS or HCGS has caused an increase in the radioactive inventory of long-lived radionuclides.

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

5. To verify that SGS and HCGS operations have no detrimental effects on the health and safety of the public or on the environment.

B. Implementation of the Objectives

1. In order to meet the objectives, an operational REMP was developed. 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 estuarine hydrology, local demography, and land uses.

2. Sampling locations were 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) distance. 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 [25,26,27].

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 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 grouped data were averaged and standard deviations calculated in accordance with Appendix B of Reference 16. Thus, 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

1. Week ending July 25, 2011, air particulate/air iodine station 5D1was not collected.

2. Surface water station 1F2 was collected August 22, 2011 rather than on August 1, 2011.

C. Program Changes

1. On March 8, 2011, Teledyne Brown Engineering (TBE) took over responsibility for the testing of environmental samples from Maplewood Testing Services.

2. Station 5S2 was added to the REMP program starting at week ending 05/25/11.

D. Quality Assurance Program

Maplewood Testing Services

The quality of the results obtained by MTS is ensured by the implementation of the Quality Assurance Program as described in the Maplewood Testing Services Quality Assurance Manual [11a], the Maplewood Testing Services Electrical Division Quality Assurance/Control Plan [11b], and the Maplewood Testing Services Mechanical Division environmental/Radiological Group Procedure Manual [11c].

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 [11d] and the Teledyne Brown Engineering Procedure Manual [11e].

E. Summary of Results – Inter-laboratory Comparison Program

The testing laboratories analyzed Performance Evaluation (PE) samples of air particulate, air iodine, milk, soil, vegetation and water matrices, as appropriate, for 18 analytes. (Appendix D, Tables D-1 through D-4)

The PE samples, supplied by Analytics Inc., Environmental Resource Associates (ERA) and DOE's 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 USEPA, NELAC, state specific PT program requirements or ERA's SOP for the Generation of Performance Acceptance Limits, as applicable. The acceptance limits are either determined by a regression equation specific to each analyte or a fixed percentage limit promulgated under the appropriate regulatory document.

3. DOE Evaluation Criteria

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

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

Maplewood Testing Services

For the first quarter 2011, Maplewood Testing Services participated in the Environmental Resource Associate's (ERA) program. Seven out of eight analytes met the specified acceptance criteria. One analyte did not meet the specified acceptance criteria for the following reason:

1. Maplewood Testing Services' ERA February 2011 Gross Alpha in water result of 78.0 pCi/L exceeded the upper control limit of 77.5 pCi/L. The alpha detector was found to be out of calibration and was taken out of service. Data that could have been affected by the failure were checked. It was determined that no data was affected by the failure.

Teledyne Brown Engineering

For the TBE laboratory, 14 out of 18 analytes met the specified acceptance criteria. Four analytes (one sample each of Cr-51, Sr-89 and Sr-90 and two Gross Alpha samples) did not meet the specified acceptance criteria for the following reason:

1. Teledyne Brown Engineering's Analytics March 2011 Cr-51 in milk result of 398 pCi/L was higher than the known value of 298 pCi/L, resulting in a found to known ratio of 1.34. NCR 11-13 was initiated to investigate this failure. There was a slightly high bias in all the gamma activities. The June gamma results in milk did not show a high bias. No further action was required.
2. Teledyne Brown Engineering's ERA May 2011 Gross Alpha in water result of 64.1 pCi/L was higher than the known value of 50.1 pCi/L, which exceeded the upper control limit of 62.9 pCi/L. NCR 11-08 was initiated to investigate this failure. The solids on the planchet exceeded 100 mg, which was beyond the range of the efficiency curve.
3. Teledyne Brown Engineering's MAPEP March 2011 Gross Alpha in air particulate result of 0.101 Bq/sample was lower than the known value of 0.659 Bq/sample, which exceeded the lower control limit of 0.198 Bq/sample. NCR 11-11 was initiated to investigate this failure. The

air particulate filter was counted on the wrong side.

4. Teledyne Brown Engineering's ERA November 2011 Sr-89 in water result of 81.0 pCi/L was higher than the known value of 69.7 pCi/L, which exceeded the upper control limit of 77.9 pCi/L. Nonconformance report 11-16 was initiated to investigate this failure. The TBE reported value to known ratio of 1.16 fell within the acceptable range of ± 20%, which TBE considers acceptable.

5. Teledyne Brown Engineering's MAPEP March 2011 Sr-90 in soil, air particulate and vegetation were non-reports that were evaluated as failed. NCR 11-11 was initiated to investigate these failures. MAPEP evaluated the non-reports as failed due to not reporting a previously reported analyte.

IV. Results and Discussion

The analytical results of the 2011 REMP samples are divided into categories based on exposure pathways: atmospheric, direct radiation, terrestrial, and aquatic. The analytical results for the 2011 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 and HCGS REMP was conducted in compliance with the Technical Specifications and ODCM.

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

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 six indicator locations 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 294 of 295 of the indicator station samples collected at concentrations ranging from 2 to 42 E-3 pCi/m^3 with an average concentration of 16 E-3 pCi/m^3, and in 51 of 52 of the control station samples at concentrations ranging from 6 to 32 E-3 pCi/m^3 with an average of 17 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 2011.]

Gamma Spectrometry

Gamma spectroscopy was performed on each of the 24 quarterly composite samples.

Beryllium-7, attributed to cosmic ray activity in the atmosphere, was detected in 22 of 23 indicator station composites at concentrations ranging from 47.6 E-3 to 405 E-3 pCi/m^3 with an average concentration of 124 E-3 pCi/m^3, and in the four control station composites ranging in concentration from 61 to 245 E-3 pCi/m^3 with an average concentration of 115 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)

All other gamma emitters were less than the LLD.

2. Air Iodine

Iodine in filtered air samples was collected weekly at seven locations. Each of the samples collected for the year was analyzed for I-131.

Iodine-131

Iodine-131 was detected in 12 of 295 indicator station samples at concentrations ranging from 34.2 to 82.2 E-3 pCi/m^3 and in two of 52 control station samples at concentrations ranging from 57.2 to 58.2 E-3 pCi/m^3. The I-131 was detected the week ending 03/28/11 through 04/11/11 and is attributed to the Fukushima incident, not to licensed activities. 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 optically stimulated luminescent (OSL) dosimeter supplied and processed by Landauer. Packets containing OSLs for quarterly exposure were placed in the owner-controlled area and around the Site at various distances and in each land based meteorological sector. Emphasis was placed on special interest areas such as population centers, nearby residences, and schools.

A total of 51 locations were monitored for direct radiation during 2011, including 14 on-site locations, 31 off-site locations within the 10 mile zone, and six control locations beyond 10 miles.

Each location has a set of three OSL dosimeters packaged together. The pair uses aluminum oxide technology.

The average dose rate for the 31 quarterly off-site and 14 quarterly on-site indicator OSL dose rate was 5.1 milliroentgen per standard month. The average control OSL dose rate was 4.9 milliroentgen per standard month. The preoperational average for the quarterly TLD readings was 4.4 milliroentgen per standard month. The results of the direct radiation measurements for 2011 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) [Figure 2 - The quarterly average radiation levels of the off-site indicator stations versus the control stations are plotted for the period 1990 through 2011, with an inset graph depicting the period 1973 to 2011.]

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 vegetable and fodder crops were collected at the time of harvest from Management Audit sample locations. Broad leaf cabbage and kale were collected from on-site gardens. Maplewood Testing Services personnel planted, maintained and harvested these broad leaf crops in the late summer and fall from three locations on site and one across the river. All samples were weighed, packed in plastic bags and shipped to TBE.

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 2011 are plotted as quarterly averages, with an inset graph depicting the period 1973 to 2011.]

Gamma Spectrometry

Naturally occurring K-40 was detected in all 80 samples with concentrations for the 60 indicator station samples ranging from 1,100 to 1,540 pCi/L with an average concentration of 1,345 pCi/L, and the 20 control station sample concentrations ranging from 1,100 to 1,590 pCi/L, with an average concentration of 1,290 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.

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 two of 12 well water samples. Concentrations for the samples ranged from 1.8 to 1.9 pCi/L with an average of 1.8 pCi/L. As with the 2010 gross beta results, the 2011 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 detected in two of the 12 well water samples at concentrations of 52 and 63 pCi/L with an average concentration of 57 pCi/L. The maximum preoperational level detected was 30 pCi/L.

Ra-Nat was detected in two of the 12 of the well water samples at concentrations of 101 and 173 pCi/L with an average of 137 pCi/L. The maximum preoperational level detected was 2.0 pCi/L. The higher than preoperational results are due to a procedural change instituted in 1986 for water sample preparation. It is reasonable to conclude that values currently observed are typical for this region. [28] (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

Gross alpha activity was detected in two of the 12 raw water samples at concentrations of 0.7 and 1.1 pCi/L. Gross alpha was not detected in any of the 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 eight of the 12 of the raw water samples and eight of the 12 treated water samples. The concentrations for the raw samples ranged from 1.2 to 6.6 pCi/L. Concentrations for the treated water ranged from 2.0 to 5.8 pCi/L. The average concentration for both raw and treated water was 3.8 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 MDC. (Table C–9, Appendix C)

Gamma Spectrometry

Naturally occurring K-40 was detected in two of the 12 raw water samples at concentrations of 47 and 55 pCi/L, and in two of the 12 treated water samples, each at a concentration of 48 pCi/L. The

average for both raw and treated water samples was 49 pCi/L. No preoperational data is available for comparison.

Naturally occurring Ra-Nat was detected in two of the 12 raw water samples, each at concentrations of 4.5 and 4.8 pCi/L. It was not detected in any of the 12 treated water samples. The combined potable water average was 4.6 pCi/L. The maximum preoperational level detected was 1.4 pCi/L. The higher results are due to the procedural change for sample preparation, as discussed in the Well Water section. (Table C–9, Appendix C)

All other gamma emitters were less than the LLD.

4. Vegetables

Although vegetables in the region are not irrigated with water into which liquid plant effluents have been discharged, a variety of food products grown in the area for human consumption were sampled. These vegetables from local farms are collected as Management Audit samples. In addition, cabbage and kale were grown from seed by MTS personnel and planted at three on site 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, kale, sweet corn, peppers, and tomatoes. These samples were from eight indicator stations (16 samples) and four control stations (13 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 two of the 15 indicator station samples (all cabbage) at concentrations of 283 and 364 pCi/kg wet and an average concentration of 324 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 15 indicator samples, with concentrations ranging from 1,360 to 15,000 pCi/kg wet with an average concentration of 3,346 pCi/kg wet, and in all 14 control station samples at concentrations ranging from 1,330 to 16,400 pCi/kg wet with an average concentration of 6,893 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).

All other gamma emitters were less than the LLD.

5. Fodder Crops

Although not required by the SGS or HCGS Technical Specifications and 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 may be a significant 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 248 to 3,150 pCi/kg wet with an average concentration of 1,766 pCi/kg wet, and in the control station sample at 1,500 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 3,230 to 10,900 pCi/kg wet with an average concentration of 5,933 pCi/kg wet, and in the control station sample at a concentration of 3,970 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 are collected at each station 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)

Soil was sampled in 2010 and will not be sampled again until 2013.

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 are rinsed twice with the sample medium prior to collection. The surface water samples are transported to MTS for analysis.

Edible fish are taken by gill nets while crabs are caught in commercial traps. These samples are then processed where the flesh is separated from the bone and shell. The flesh is 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 locates the correct site and the sampling boat is maneuvered over the area until the correct amount of sample is obtained (grabbed) with the sediment dredge. Personnel from MTS collect and prepare location 6S2 shoreline sediment (an onsite location). For this location, a square area, measuring one meter on each side is 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 is taken. All the aliquots are 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 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 variations and variations in salinity levels. 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 44 of the 48 indicator station samples with concentrations ranging from 3 to 305 pCi/L and an average concentration of 68 pCi/L, and in all 12 of the control station samples with concentrations ranging from 4 to 190 pCi/L and an average concentration of 60 pCi/L. The maximum preoperational level detected was 110 pCi/L with an average concentration of 32 pCi/L. (Table C–13, Appendix C) [Figure 4 - Quarterly results for all locations are plotted for the years 1990 to 2011, with an inset graph depicting the current period 1973 to 2011.]

Tritium

Tritium activity was not detected in any of the indicator or control samples. The maximum preoperational level detected was 600 pCi/L, with an average concentration of 210 pCi/L. (Table C–14, Appendix C) [Figure 5 – Quarterly positive results from 1990 to 2011 are plotted, with an inset graph depicting the period 1973 to 2011.]

Gamma Spectrometry

Naturally occurring K-40 was detected in 13 of the 48 indicator station samples at concentrations ranging from 50 to 175 pCi/L with an average concentration of 110 pCi/L, and in 2 of the 12 control station samples with concentrations of 80 and 83 pCi/L and an average of 82 pCi/L. The maximum preoperational level detected for K-40 was 200 pCi/L with an average concentration of 48 pCi/L.

Iodine-131 was detected in one of 12 control station samples at a concentration of 1 pCi/L. The I-131 is attributed to effluent from a medical facility. (Table C–15, 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 catfish, bluefish, white perch,

summer flounder, black drum and striped bass.

Gamma Spectrometry

Naturally occurring K-40 was detected in all three indicator station samples at concentrations ranging from 3,700 to 4,660 pCi/kg wet with an average concentration of 4,150 pCi/kg wet, and both control station samples at concentrations of 3,050 and 3,950 pCi/kg wet with an average concentration of 3,500 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–16, 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 2,320 and 2,910 pCi/kg wet with an average concentration of 2,615 pCi/kg wet, and in both control station samples at concentrations of 2,390 and 2,630 pCi/kg wet with an average concentration of 2,510 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–17, 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 and it is directly affected by tidal fluctuations.

Gamma Spectroscopy

Cesium-137 was detected in one of the 12 indicator samples (7E1) at a concentration of 107 pCi/kg dry. It was not detected in the control station samples. The maximum preoperational level detected was 400 pCi/kg dry with an average concentration of 150 pCi/kg dry. The Cs-137 concentrations are attributed to the atomic bomb testing that starting in the 1940s. (Figure 6 – Semi-annual positive results from 1990 to 2011 are plotted, with an inset graph depicting the current period 1977 to 2011.)

Naturally occurring Be-7, attributed to cosmic ray activity in the atmosphere, was detected in one of the 12 indicator station samples at a concentration of 1,510 pCi/kg dry. The maximum preoperational level detected was 2,300 pCi/kg dry.

Naturally occurring K-40 was detected in all 12 indicator station samples at concentrations ranging from 3,560 to 22,800 pCi/kg dry, with an average concentration of 9,843 pCi/kg dry, and at both control stations samples at concentrations of 13,500 and 17,100 pCi/kg dry with an average concentration of 15,300 pCi/kg dry. The maximum preoperational level detected was 21,000 pCi/kg dry with an average concentration of 15,000 pCi/kg dry.

Naturally occurring Ra-Nat was detected in five of the 12 indicator

station samples at concentrations ranging from 1,350 to 3,850 pCi/kg dry with an average concentration of 2,320 pCi/kg dry, and at both control station samples at concentrations of 2,420 and 2,740 pCi/kg dry with an average concentration of 2,580 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 all 12 indicator station samples at concentrations ranging from 175 to 1,370 pCi/kg dry with an average concentration of 697 pCi/kg dry, and in both of the control station samples at concentrations of 1,070 and 1,370 pCi/kg dry with an average concentration of 1,220 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–18, Appendix C)

All other gamma emitters were less than the LLD.

E. Land Use Survey

SYNOPSIS OF 2011 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 $50m^2$ ($500ft^2$) 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 Oct, 2011 Km (miles)	Nearest Residence Oct, 2011 Km (miles)	Vegetable Garden Oct, 2011 Km (miles)
N	None	None	None
NNE	None	8.0 (5.0)	None
NE	None	6.2 (3.9)	None
ENE	None	6.2 (3.9)	None
E	None	None	None
ESE	None	None	None
SE	None	None	None
SSE	None	None	None
S	None	None	None
SSW	None	6.2 (3.9)	None
SW	None	6.9 (4.3)	7.3 (4.6)
WSW	None	7.1 (4.4)	7.1 (4.4)
W	8.0 (5.0)	6.5 (4.0)	None
WNW	None	5.5 (3.4)	None
NW	None	5.9 (3.7)	None
NNW	None	6.8 (4.2)	None

The 2011 Land Use Census results are summarized in the above table. A comparison of the identified locations from the 2011 table with the 2010 table shows that no new nearest milk animal, nearest resident, or nearest vegetable garden (500 Ft^2) with broadleaf vegetation were identified. Therefore, no formal dose evaluation or changes to the ODCMs are required.

In 2010 the stations identified two meat animal farms within 5 miles of the site. These locations are located 4.2 mi NNE and located at 4.6 mi SW. The stations have documented these farms in the corrective action program for tracking and initial dose calculations have been performed. Initial dose calculations indicate that this is not a limiting dose pathway. Due to unavailability of meat samples from the meat farms for 2011, sample collections have been rescheduled for the 2012 reporting year.

V. Annotations to Previous AREOR

A new calculation for determining C-14 contribution to dose was performed in the 2011 Effluent report, which reflects the dose changes to the 2010 AREOR.

In the 2009 and 2010 Annual Radiological Environmental Operating Report, there was not a discussion of the positive gamma emitters that were found in the sediment samples. There were two isotopes identified: Manganese (Mn) 54 and Cesium (Cs) 137 at very low levels (27 pCi/L for Mn and 50 to 58 pCi/L for Cs). The manganese sample is from the permitted plant effluents, and the cesium samples could be either from permitted plant effluents or from the early atomic bomb tests. The latter is the most likely cause as the quantities mirror the bomb test data and any cesium from plant effluents should be mixed with detectable quantities of cobalt (58 and 60), manganese and other isotopes.

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

The Hope Creek primary water chemistry results for 2011 were reviewed. The specific activity of the primary coolant did not exceed 0.2 microcuries per gram Dose Equivalent I-131. 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 2011 in accordance with the SGS and HCGS Technical Specifications and ODCM. The LLD values required by the Technical Specifications and 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 ODCM requirements.

The concentration of radioactive material in the environment that could be attributable to Salem and Hope Creeks 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

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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, 2011 to December 31, 2011**

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 (10-3 PCI/CU.M.)	GR-B	347	10	16 (294/295) (2/42)	14G1 C 11.8 MILES WNW	17 (51/52) (6/32)	17 (51/52) (6/32)	0
	GAMMA	27						
	BE-7		NA	124 (22/23) (47.6/405)	1F1 5.8 MILES N	143 (3/4) (65.5/283)	115 (4/4) (61/245)	0
	K-40		NA	<LLD	-	-	<LLD	0
	CS-134		60	<LLD	-	-	<LLD	0
	CS-137		50	<LLD	-	-	<LLD	0
AIR IODINE (10-3 PCI/CU.M.)	GAMMA I-131	347	70	56.6 (12/295) (34.2/82.2)	16E1 4.1 MILES NNW	67.0 (2/52) (51.8/82.2)	57.7 (2/52) (57.2/58.2)	0
II. DIRECT								
DIRECT RADIATION (MRAD/STD. MONTH)	QUARTERLY BADGES	204	NA	5.1 (180/180) (3.2/11.7)	16S2 0.6 MILES N	8.9 (4/4) (7.8/10)	4.9 (24/24) (3.5/6.3)	0
III. TERRESTRIAL								
MILK (PCI/L)	I-131	80	1	<LLD	-	-	<LLD	0

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MILK (cont'd) (PCI/L)	GAMMA K-40	80	NA	1345 (60/60) (1100/1540)	14F4 7.6 MILES WNW	1357 (20/20) (1100/1500)	1290 (20/20) (1100/1590)	0
	CS-134		15	<LLD	-	-	<LLD	0
	CS-137		18	<LLD	-	-	<LLD	0
	RA-226		NA	<LLD	-	-	<LLD	0
WELL WATER (PCI/L)	GR-A	12	3	<LLD	-	-	NA	0
	GR-B	12	4	1.8 (2/12) (1.8/1.9)	3E1 4.2 MILES NE	1.8 (2/12) (1.8/1.9)	NA	0
	H-3	12	NA	<LLD	-	-	NA	0
	GAMMA K-40	12	NA	57 (2/12) (52/63)	3E1 4.2 MILES NE	57 (2/12) (52/63)	NA	0
	MN-54		15	<LLD	-	-	NA	0
	CO-58		15	<LLD	-	-	NA	0

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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	NA	<LLD	-	-	NA	0
	RA-226	NA	137 (2/12) (101/173)	3E1 4.2 MILES NE	137 (2/12) (101/173)	NA	0
POTABLE WATER (PCI/L)	GR-A 24	3	0.9 (2/24) (0.7/1.1)	2F3 8.0 MILES NNE	0.9 (2/12) (0.7/1.1)	NA	0

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POTABLE WATER (cont'd) (PCI/L)	GR-B	24	4	3.8 (16/24) (1.2/6.6)	2F3 8.0 MILES NNE	3.8 (8/12) (1.2/6.6)	NA	0
	H-3	24	NA	<LLD	-	-	NA	0
	GAMMA	24						
	K-40		NA	49 (4/24) (47/55)	2F3 8.0 MILES NNE	51 (2/12) (47/55)	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		10	<LLD	-	-	NA	0

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POTABLE WATER (cont'd) (PCI/L)	CS-134	15	<LLD	-	-	NA	0
	CS-137	18	<LLD	-	-	NA	0
	RA-226	NA	4.6 (2/24) (4.5/4.8)	2F3 8.0 MILES NNE	4.6 (2/12) (4.5/4.8)	NA	0
VEGETATION (PCI/KG WET)	GAMMA 29						
	BE-7	NA	324 (2/15) (283/364)	10D1 3.9 MILES SSW	364 (1/1)	<LLD	0
	K-40	NA	4257 (15/15) (1360/15000)	3G1 C 16.5 MILES NE	16400 (1/1)	3129 (14/14) (1330/16400)	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

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FODDER CROPS (PCI/KG WET)	GAMMA	4						
	BE-7		NA	1766 (3/3) (248/3150)	2G3 11.8 MILES NNE	3150 (1/1)	1500 (1/1)	0
	K-40		NA	5933 (3/3) (3230/10900)	2G3 11.8 MILES NNE	10900 (1/1)	3970 (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
IV. AQUATIC SURFACE WATER (PCI/L)	GR-B	60	4	68 (44/48) (3/305)	7E1 4.5 MILES SE	112 (12/12) (8/305)	60 (12/12) (4/190)	0
	H-3	60	NA	<LLD	-	-	<LLD	0
	GAMMA	60						
	K-40		NA	110 (13/48) (50/175)	7E1 4.5 MILES SE	131 (4/12) (101/175)	82 (2/12) (80/83)	0

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SURFACE WATER (cont'd) (PCI/L)	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	12C1 2.5 MILES WSW	1 (1/12)	1 (1/12)	0
	CS-134	15	<LLD	-	-	NA	0
	CS-137	18	<LLD	-	-	NA	0
	BALA140	15	<LLD	-	-	NA	0

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SALEM COUNTY, NEW JERSEY **January 1, 2011 to December 31, 2011**

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	2615 (2/2) (2320/2910)	11A1 0.2 MILES SW	2615 (2/2) (2320/2910)	2510 (2/2) (2390/2630)	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
FISH	GAMMA 5						
(PCI/KG WET)	K-40	NA	4150 (3/3) (3700/4660)	2G3 11.8 MILES NNE	4660 (1/1)	3500 (2/2) (3050/3950)	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, 2011 to December 31, 2011**

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	LOCATION WITH HIGHEST MEAN MEAN (RANGE)	CONTROL LOCATION MEAN (RANGE)	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
FISH (cont'd) (PCI/KG WET)	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 (PCI/KG DRY)	GAMMA 14						
	BE-7	NA	1510 (1/12)	7E1 4.5 MILES SE	1510 (1/2)	<LLD	0
	K-40	NA	9843 (12/12) (3560/22800)	16F1 6.9 MILES NNW	19450 (2/2) (16100/22800)	15300 (2/2) (13500/17100)	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, 2011 to December 31, 2011**

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)	CS-134	150	<LLD	-	-	<LLD	0
	CS-137	180	107 (1/12)	7E1 4.5 MILES SE	107 (1/2)	<LLD	0
	RA-226	NA	2320 (5/12) (1350/3850)	7E1 4.5 MILES SE	3040 (2/2) (2230/3850)	2580 (2/2) (2420/2740)	0
	TH-232	NA	697 (12/12) (175/1370)	12C1 2.5 MILES WSW	1220 (2/2) (1070/1370)	1220 (2/2) (1070/1370)	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.

APPENDIX B

SAMPLE DESIGNATION AND LOCATIONS

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SAMPLE DESIGNATION

The PSEG's Maplewood Testing Services 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.

STATIONCODE	STATION LOCATION	LATITUDINAL DEG. MIN. FT	LONGITUDINAL DEG. MIN. FT	SAMPLE TYPE
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
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
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
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
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
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
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

TABLE B-1 (cont'd)

STATION CODE	STATION LOCATION	LATITUDINAL DEG. MIN. FT	LONGITUDINAL DEG. MIN. FT	SAMPLE TYPE
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
3F2	5.1 mi. NE;Hancocks Bridge Municipal Bld	39 - 30 – 410	75 - 27 - 578	IDM
3F3	8.6 mi. NE; Quinton Township School	39 - 32 - 616	75 - 24 – 735	IDM
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
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

TABLE B-1 (cont'd)

STATION CODE	STATION LOCATION	LATITUDINAL DEG. MIN. FT	LONGITUDINAL DEG. MIN. FT	SAMPLE TYPE
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
3G1	16.5 mi. NE; Milk Farm; Daretown-Alloway Road, Woodstown	39 - 35 - 913	75 - 16 – 804	IDM,MLK,VGT,SOL
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 Station's ODCM. Vegetable samples are not always collected in consecutive years from the same farmer since they rotate the type of crop they grow.

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 Thermoluminescent Dosimeters	Fifty-one 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: 1S1, 2S2, 2S4, 3S1, 4S1, 5S1, 6S2, 7S1, 10S1, 11S1, 15S1, 15S2, 16S1, 16S2. An outer ring of stations, one in each land-based meteorological sector in the 5 – 11 km range (3.12 – 6.88 miles) from the site (not bounded by or over water): 4D2, 5D1, 10D1, 14D1, 15D1, 2E1, 3E1, 11E2, 12E1, 13E1, 16E1, 1F1, 3F2, 4F2, 5F1, 6F1, 9F1, 10F2, 11F1, 13F2, 14F2, 15F3. The balance of the stations to be placed in special interest areas such as population centers, nearby residences, and schools: 2F2, 2F5, 2F6, 3F3, 7F2, 12F1, 13F3, 13F4, 16F2, 1G3, 10G1, 16G1, 3H1. 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	Samples from 6 locations:		
a. Air Particulate	1 sample from close to the Site Boundary : 5S1 3 Samples in different land based sectors: 1F1, 2F6, 5D1. 1 Sample from the vicinity of a community: 16E1.	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 a control location, as for example 15-30 km distant and in the least prevalent wind direction: 14G1.		Iodine-131 / weekly
3. TERRESTRIAL	Samples from milking animals in 3 locations within 5 km distance. If there are none, then, 1 sample from milking animals in each of 3 areas between 5 – 8 km (3.12 – 5 miles) distant: 13E3, 14F4, 2G3. (1)		
a. Milk	1 Sample from milking animals at a control location 15 – 30 km distant (9.38 – 18.75 miles): 3G1.	Semi-monthly (when animals are on pasture)	Gamma scan / semi-monthly Iodine-131 / semi-monthly
		Monthly (when animals are not 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 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: 12C1 (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/One sample from a 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: 15A1 And an additional location of south storm drain discharge line: 16A1	Semi-annually	Gamma scan/on collection

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

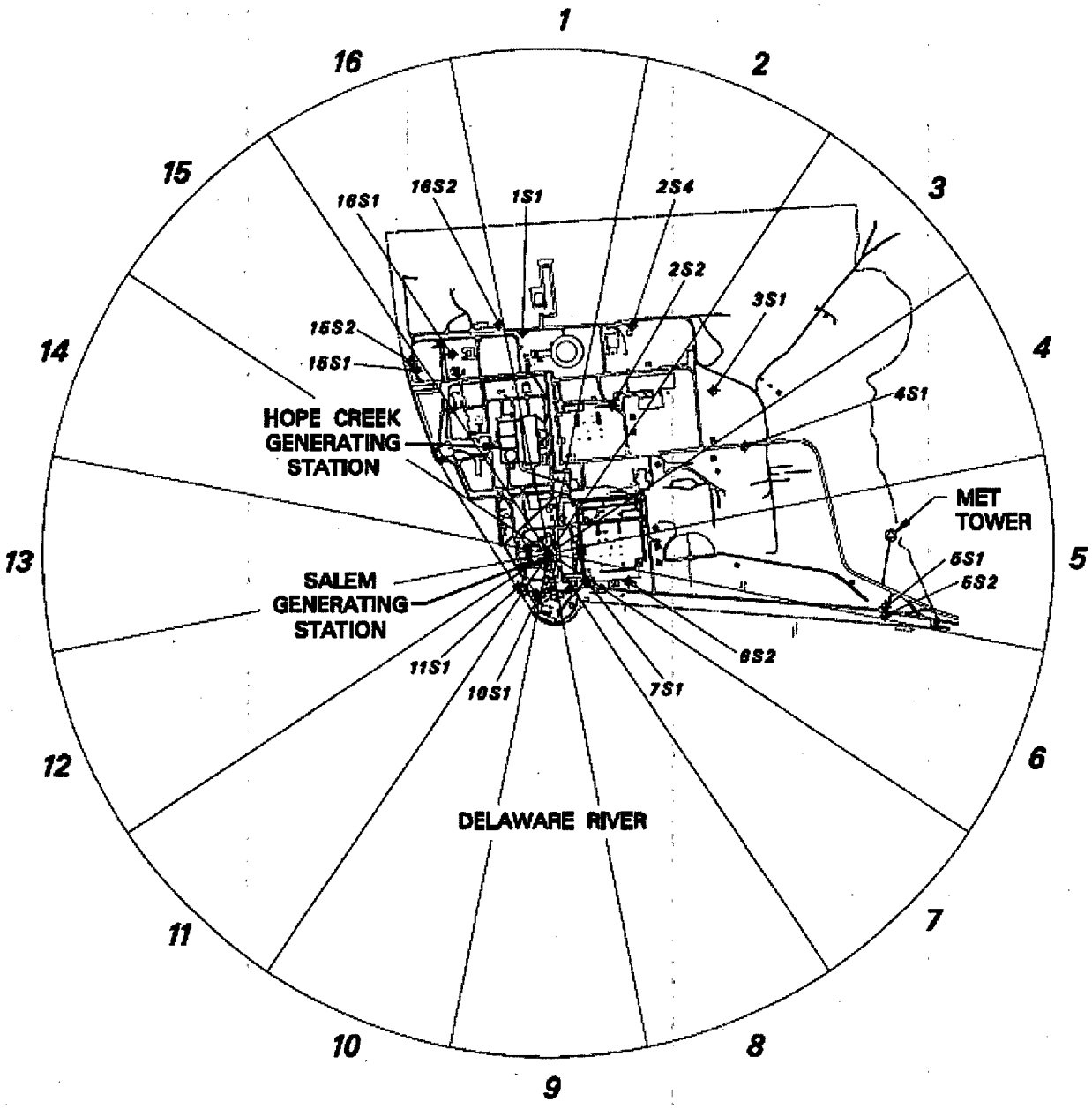
** Tech Specs and ODCM require quarterly analysis but due to the tritium leak at Salem, it was decided to analyze surface waters on a monthly basis for tritium.

(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, MTS personnel planted and harvested cabbage and kale at three locations on Site (1S1, 15S1, 16S1) and one across the river 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.

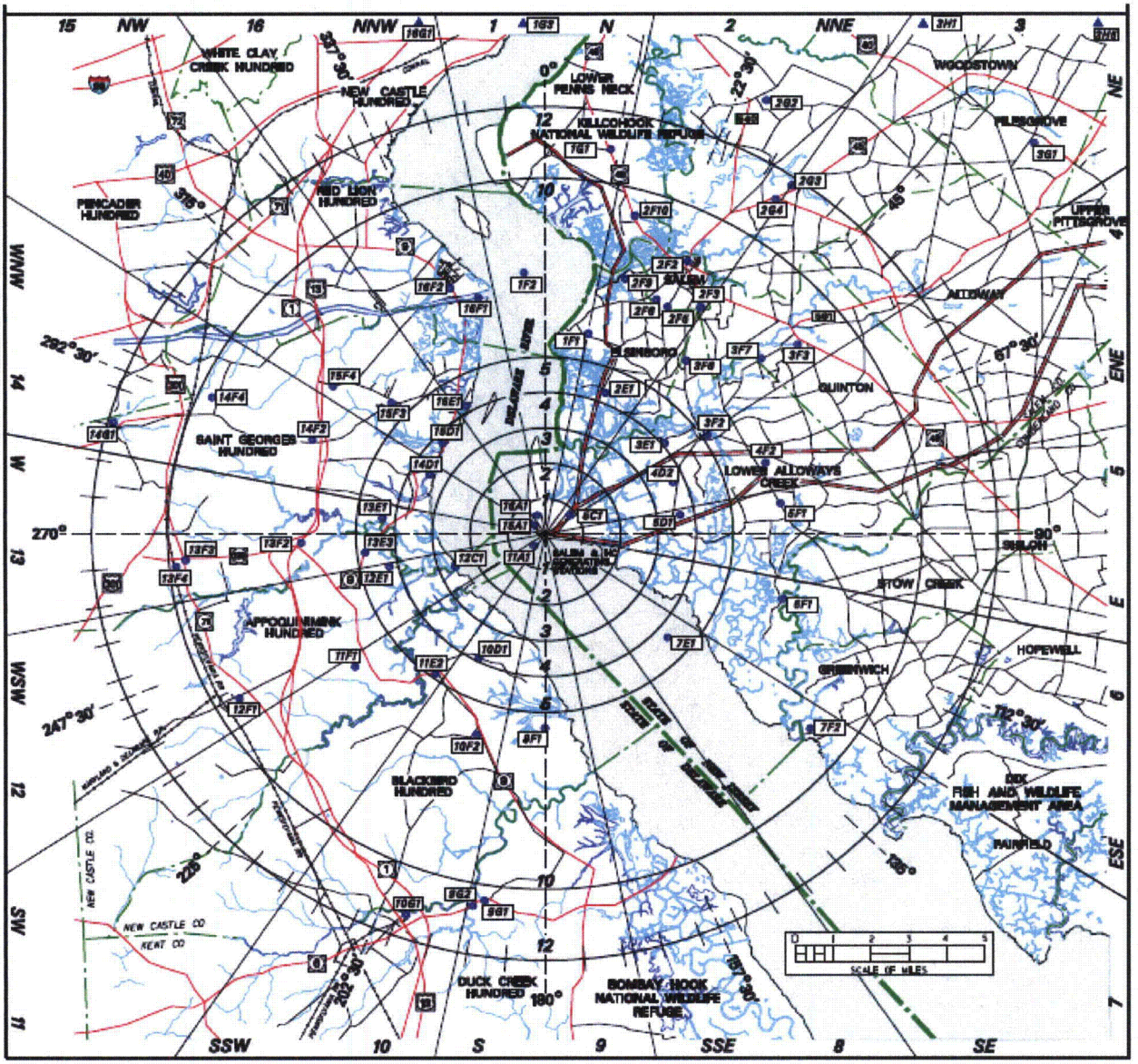
MAP B-1

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



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APPENDIX C

DATA TABLES

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TABLE C-1 **CONCENTRATIONS OF GAMMA EMITTERS IN QUARTERLY COMPOSITES OF AIR PARTICULATES, 2011**

RESULTS IN UNITS OF 10-3 PCI/M3 ± 2 SIGMA

STC	COLLECTION PERIOD	Be-7	K-40	Cs-134	Cs-137
SA-APT-14G1 (C)	12/28/10 - 03/28/11	245 ± 127	< 167	< 10	< 7
	03/28/11 - 06/27/11	88 ± 21	< 30	< 2	< 2
	06/27/11 - 09/26/11	61 ± 17	< 26	< 2	< 1
	09/26/11 - 12/27/11	67 ± 19	< 24	< 2	< 2
	AVERAGE *	115 ± 175	-	-	-
SA-APT-16E1	12/28/10 - 03/28/11	305 ± 154	< 138	< 12	< 5
	03/28/11 - 06/27/11	82 ± 27	< 39	< 2	< 2
	06/27/11 - 09/26/11	94 ± 30	< 32	< 2	< 2
	09/26/11 - 12/27/11	63 ± 16	< 40	< 2	< 2
	AVERAGE *	136 ± 227	-	-	-
SA-APT-1F1	12/28/10 - 03/28/11	283 ± 126	< 68	< 11	< 8
	03/14/11 - 03/21/11	**< 128**	**< 332**	**< 18**	**< 18**
	03/21/11 - 03/28/11	**190 ± 106**	**< 211**	**< 26**	**< 19**
	03/28/11 - 04/04/11	**193 ± 92**	**< 281**	**< 21**	**< 16**
	03/28/11 - 06/27/11	81 ± 25	< 30	< 2	< 2
	04/04/11 - 04/11/11	**297 ± 105**	**< 438**	**< 23**	**< 30**
	06/27/11 - 09/26/11	66 ± 19	< 8	< 2	< 2
	09/26/11 - 12/27/11	< 17	< 27	< 2	< 2
	AVERAGE *	143 ± 242	-	-	-
SA-APT-2F6	12/28/10 - 03/28/11	405 ± 142	< 89	< 8	< 8
	03/28/11 - 06/27/11	59 ± 26	< 26	< 2	< 2
	06/27/11 - 09/26/11	48 ± 15	< 20	< 2	< 1
	09/26/11 - 12/27/11	48 ± 12	< 19	< 1	< 1
	AVERAGE *	140 ± 354	-	-	-
SA-APT-5D1	12/28/10 - 03/28/11	260 ± 123	< 127	< 7	< 6
	03/14/11 - 03/21/11	**< 188**	**< 247**	**< 23**	**< 25**
	03/21/11 - 03/28/11	**< 128**	**< 116**	**< 17**	**< 21**
	03/28/11 - 04/04/11	**< 161**	**< 440**	**< 30**	**< 30**
	03/28/11 - 06/27/11	93 ± 22	< 26	< 2	< 2
	04/04/11 - 04/11/11	**198 ± 104**	**< 194**	**< 21**	**< 22**
	06/27/11 - 09/26/11	48 ± 23	< 26	< 2	< 2
	09/26/11 - 12/27/11	60 ± 12	< 22	< 1	< 2
	AVERAGE *	132 ± 186	-	-	-

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

BOLDED VALUES INDICATE ADDITIONAL SAMPLING DUE TO THE FUKUSHIMA EVENT

(C) CONTROL STATION

TABLE C-1 **CONCENTRATIONS OF GAMMA EMITTERS IN QUARTERLY COMPOSITES OF AIR PARTICULATES, 2011**

RESULTS IN UNITS OF 10-3 PCI/M3 ± 2 SIGMA

STC	COLLECTION PERIOD	Be-7	K-40	Cs-134	Cs-137
SA-APT-5S1	12/28/10 - 03/28/11	277 ± 145	< 134	< 9	< 9
	03/28/11 - 06/27/11	76 ± 26	< 26	< 2	< 2
	06/27/11 - 09/26/11	64 ± 20	< 32	< 2	< 2
	09/26/11 - 12/27/11	66 ± 12	< 28	< 1	< 1
	AVERAGE *	121 ± 209	-	-	-
SA-APT-5S2		(1)	(1)	(1)	(1)
	04/18/11 - 06/27/11	115 ± 49	< 27	< 2	< 1
	06/27/11 - 09/26/11	59 ± 18	< 23	< 2	< 1
	09/26/11 - 12/27/11	73 ± 21	< 33	< 2	< 2
	AVERAGE *	82 ± 58	-	-	-

* 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, 2011

RESULTS IN UNITS OF 10-3 PCI/M3 ± 2 SIGMA

COLLECTION PERIOD	CONTROL	GROUP I					
	SA-APT-14G1	SA-APT-1F1	SA-APT-2F6	SA-APT-5D1	SA-APT-5S1	SA-APT-5S2	SA-APT-16E1
12/27/10 - 01/03/11	28 ± 3	30 ± 3	29 ± 3	29 ± 3	25 ± 2	(1)	31 ± 3
01/03/11 - 01/10/11	32 ± 2	31 ± 2	35 ± 2	37 ± 2	34 ± 2		34 ± 2
01/10/11 - 01/17/11	16 ± 2	16 ± 2	18 ± 2	19 ± 2	16 ± 2		17 ± 2
01/17/11 - 01/24/11	21 ± 2	23 ± 2	18 ± 2	22 ± 2	20 ± 2		20 ± 2
01/24/11 - 01/31/11	15 ± 2	19 ± 2	19 ± 2	17 ± 2	13 ± 2		17 ± 2
01/31/11 - 02/07/11	16 ± 2	14 ± 2	15 ± 2	17 ± 2	17 ± 2		16 ± 2
02/07/11 - 02/14/11	18 ± 2	21 ± 2	20 ± 2	19 ± 2	22 ± 2		2 ± 2
02/14/11 - 02/21/11	21 ± 2	17 ± 2	20 ± 2	22 ± 2	17 ± 2		20 ± 2
02/21/11 - 02/28/11	18 ± 2	19 ± 2	19 ± 2	15 ± 2	20 ± 2		17 ± 2
02/28/11 - 03/07/11	18 ± 2	19 ± 2	18 ± 2	16 ± 2	18 ± 2		18 ± 2
03/07/11 - 03/14/11	14 ± 3	14 ± 3	11 ± 3	12 ± 3	15 ± 3		13 ± 3
03/14/11 - 03/21/11	11 ± 3	9 ± 3	11 ± 3	10 ± 3	13 ± 3		15 ± 3
03/21/11 - 03/28/11	24 ± 4	31 ± 5	30 ± 4	27 ± 4	25 ± 4		28 ± 4
03/28/11 - 04/04/11	25 ± 4	29 ± 5	25 ± 4	42 ± 5	23 ± 4		29 ± 5
04/04/11 - 04/11/11	19 ± 4	17 ± 4	20 ± 4	17 ± 4	17 ± 4		19 ± 4
04/11/11 - 04/18/11	14 ± 4	13 ± 4	12 ± 3	12 ± 3	11 ± 3		10 ± 4
04/18/11 - 04/25/11	13 ± 3	11 ± 3	16 ± 3	14 ± 3	15 ± 4	14 ± 3	14 ± 4
04/25/11 - 05/02/11	6 ± 3	5 ± 3	8 ± 3	8 ± 3	7 ± 3	9 ± 3	8 ± 4
05/02/11 - 05/09/11	11 ± 3	12 ± 3	10 ± 3	12 ± 3	12 ± 3	14 ± 3	12 ± 3
05/09/11 - 05/16/11	6 ± 3	7 ± 3	5 ± 2	5 ± 2	4 ± 3	< 3	6 ± 3
05/16/11 - 05/23/11	9 ± 3	13 ± 3	9 ± 3	7 ± 3	8 ± 3	8 ± 3	8 ± 3
05/23/11 - 05/31/11	18 ± 3	16 ± 3	18 ± 3	16 ± 3	17 ± 3	18 ± 3	18 ± 3
05/31/11 - 06/06/11	18 ± 4	18 ± 4	17 ± 4	20 ± 4	20 ± 4	18 ± 3	15 ± 4
06/06/11 - 06/13/11	19 ± 3	19 ± 3	21 ± 3	16 ± 3	20 ± 4	18 ± 3	23 ± 4
06/13/11 - 06/20/11	13 ± 3	13 ± 4	14 ± 4	11 ± 3	10 ± 4	12 ± 3	15 ± 4
06/20/11 - 06/27/11	13 ± 3	13 ± 3	12 ± 5	12 ± 3	14 ± 3	10 ± 3	12 ± 3
06/27/11 - 07/05/11	17 ± 4	16 ± 4	15 ± 3	17 ± 3	17 ± 4	15 ± 3	16 ± 4
07/05/11 - 07/11/11	19 ± 4	21 ± 4	19 ± 4	16 ± 3	14 ± 4	20 ± 3	20 ± 4
07/11/11 - 07/18/11	14 ± 3	14 ± 3	14 ± 3	12 ± 3	13 ± 3	14 ± 3	12 ± 3
07/18/11 - 07/25/11	28 ± 4	25 ± 4	26 ± 4	(2)	23 ± 4	24 ± 4	25 ± 4
07/25/11 - 08/01/11	21 ± 4	17 ± 3	18 ± 3	16 ± 3	15 ± 3	17 ± 3	18 ± 3
08/01/11 - 08/08/11	17 ± 4	15 ± 4	17 ± 3	18 ± 4	14 ± 3	13 ± 3	16 ± 4
08/08/11 - 08/15/11	15 ± 4	13 ± 4	13 ± 3	10 ± 4	11 ± 3	12 ± 4	8 ± 3
08/15/11 - 08/22/11	15 ± 3	14 ± 3	14 ± 3	14 ± 3	10 ± 3	10 ± 3	12 ± 3
08/22/11 - 08/29/11	13 ± 3	13 ± 4	12 ± 3	10 ± 3	11 ± 3	11 ± 3	11 ± 3
08/29/11 - 09/06/11	15 ± 3	15 ± 3	17 ± 3	14 ± 3	15 ± 3	12 ± 3	17 ± 3
09/06/11 - 09/12/11	< 5	10 ± 4	8 ± 3	7 ± 4	9 ± 4	8 ± 4	7 ± 4
09/12/11 - 09/19/11	17 ± 4	16 ± 3	17 ± 3	18 ± 4	16 ± 4	21 ± 4	23 ± 4
09/19/11 - 09/26/11	10 ± 3	8 ± 3	7 ± 3	7 ± 3	5 ± 3	7 ± 3	8 ± 3
09/26/11 - 10/03/11	6 ± 3	7 ± 3	7 ± 3	8 ± 3	7 ± 3	9 ± 3	8 ± 3
10/03/11 - 10/10/11	15 ± 3	15 ± 3	16 ± 3	15 ± 3	14 ± 3	16 ± 3	14 ± 3
10/10/11 - 10/17/11	20 ± 4	23 ± 4	22 ± 4	20 ± 3	19 ± 3	21 ± 4	22 ± 4
10/17/11 - 10/24/11	10 ± 3	13 ± 3	14 ± 3	10 ± 3	12 ± 3	11 ± 3	12 ± 3
10/24/11 - 10/31/11	17 ± 3	17 ± 3	18 ± 3	19 ± 3	20 ± 3	14 ± 3	17 ± 3
10/31/11 - 11/07/11	16 ± 3	12 ± 3	10 ± 3	12 ± 3	13 ± 3	10 ± 3	14 ± 3
11/07/11 - 11/14/11	21 ± 3	20 ± 3	19 ± 3	19 ± 3	19 ± 3	18 ± 3	17 ± 3
11/14/11 - 11/21/11	18 ± 4	19 ± 4	16 ± 3	19 ± 3	19 ± 3	20 ± 4	20 ± 4
11/21/11 - 11/28/11	18 ± 4	16 ± 4	17 ± 4	15 ± 3	17 ± 4	16 ± 4	17 ± 4
11/28/11 - 12/05/11	14 ± 3	11 ± 3	11 ± 3	11 ± 3	9 ± 3	11 ± 3	10 ± 3
12/05/11 - 12/12/11	12 ± 3	12 ± 3	13 ± 3	14 ± 3	11 ± 3	16 ± 4	13 ± 3
12/12/11 - 12/19/11	27 ± 4	31 ± 4	24 ± 4	27 ± 4	27 ± 4	26 ± 4	25 ± 4
12/19/11 - 12/27/11	17 ± 3	15 ± 3	15 ± 3	17 ± 3	15 ± 3	14 ± 3	16 ± 3
AVERAGE *	17 ± 11	16 ± 12	16 ± 12	16 ± 14	15 ± 11	14 ± 9	16 ± 13

* 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, 2011

RESULTS IN UNITS OF 10-3 PCI/M3 ± 2 SIGMA

COLLECTION PERIOD	CONTROL	GROUP I					
	SA-AIO-14G1	SA-AIO-1F1	SA-AIO-2F6	SA-AIO-5D1	SA-AIO-5S1	SA-AIO-5S2	SA-AIO-16E1
12/27/10 - 01/03/11	< 4	< 2	< 9	< 3	< 4	(1)	< 5
01/03/11 - 01/10/11	< 4	< 3.8	< 3	< 3	< 3		< 6
01/10/11 - 01/17/11	< 5	< 2.3	< 3	< 3	< 2		< 5
01/17/11 - 01/24/11	< 4	< 2.7	< 4	< 4	< 3		< 2
01/24/11 - 01/31/11	< 3	< 2.5	< 5	< 3	< 3		< 1
01/31/11 - 02/07/11	< 2	< 2.9	< 4	< 3	< 3		< 2
02/07/11 - 02/14/11	< 3	< 2.2	< 5	< 1	< 4		< 4
02/14/11 - 02/21/11	< 3	< 2	< 2	< 3	< 3		< 3
02/21/11 - 02/28/11	< 4	< 3.1	< 3	< 3	< 3		< 4
02/28/11 - 03/07/11	< 1	< 2.5	< 2	< 4	< 5		< 2
03/07/11 - 03/14/11	< 22	< 18	< 16	< 20	< 19		< 22
03/14/11 - 03/21/11	< 27	< 21	< 21	< 23	< 24		< 26
03/21/11 - 03/28/11	(2) 57 ± 17	46 ± 22	40 ± 16	43 ± 14	47 ± 16		52 ± 17
03/28/11 - 04/04/11	(2) 58 ± 23	68 ± 17	68 ± 19	74 ± 19	71 ± 18		82 ± 16
04/04/11 - 04/11/11	(2) < 26	55 ± 16	< 25	34 ± 14	< 18		< 15
04/11/11 - 04/18/11	< 15	< 21	< 13	< 14	< 13		< 14
04/18/11 - 04/25/11	< 23	< 22	< 21	< 24	< 25	< 21	< 28
04/25/11 - 05/02/11	< 6	< 4.3	< 4	< 5	< 5	< 4	< 7
05/02/11 - 05/09/11	< 32	< 30	< 28	< 31	< 32	< 29	< 33
05/09/11 - 05/16/11	< 42	< 35	< 42	< 39	< 36	< 32	< 44
05/16/11 - 05/23/11	< 57	< 60	< 59	< 56	< 65	< 57	< 61
05/23/11 - 05/31/11	< 39	< 69	< 65	< 36	< 67	< 62	< 41
05/31/11 - 06/06/11	< 27	< 24	< 23	< 24	< 26	< 22	< 29
06/06/11 - 06/13/11	< 34	< 24	< 23	< 36	< 27	< 22	< 36
06/13/11 - 06/20/11	< 32	< 27	< 25	< 34	< 29	< 25	< 35
06/20/11 - 06/27/11	< 20	< 21	< 35	< 21	< 21	< 18	< 21
06/27/11 - 07/05/11	< 34	< 26	< 32	< 31	< 26	< 22	< 34
07/05/11 - 07/11/11	< 11	< 63	< 49	< 31	< 65	< 53	< 52
07/11/11 - 07/18/11	< 33	< 37	< 38	< 33	< 43	< 35	< 35
07/18/11 - 07/25/11	< 17	< 16	< 17	(3)	< 17	< 17	< 18
07/25/11 - 08/01/11	< 45	< 31	< 28	< 46	< 29	< 29	< 45
08/01/11 - 08/08/11	< 3	< 5.7	< 3	< 8	< 5	< 5	< 8
08/08/11 - 08/15/11	< 38	< 27	< 23	< 40	< 25	< 25	< 39
08/15/11 - 08/22/11	< 30	< 49	< 42	< 32	< 45	< 46	< 31
08/22/11 - 08/29/11	< 25	< 29	< 20	< 26	< 22	< 22	< 27
08/29/11 - 09/06/11	< 20	< 16	< 13	< 25	< 14	< 14	< 20
09/06/11 - 09/12/11	< 14	< 33	< 33	< 14	< 36	< 37	< 14
09/12/11 - 09/19/11	< 23	< 18	< 18	< 23	< 20	< 20	< 24
09/19/11 - 09/26/11	< 7	< 19	< 20	< 6	< 20	< 20	< 7
09/26/11 - 10/03/11	< 35	< 42	< 45	< 34	< 44	< 46	< 36
10/03/11 - 10/10/11	< 15	< 18	< 19	< 14	< 19	< 19	< 15
10/10/11 - 10/17/11	< 29	< 19	< 18	< 27	< 18	< 18	< 28
10/17/11 - 10/24/11	< 26	< 27	< 26	< 24	< 26	< 27	< 25
10/24/11 - 10/31/11	< 24	< 27	< 25	< 23	< 25	< 27	< 23
10/31/11 - 11/07/11	< 26	< 13	< 12	< 24	< 12	< 13	< 25
11/07/11 - 11/14/11	< 33	< 24	< 22	< 32	< 23	< 24	< 31
11/14/11 - 11/21/11	< 38	< 35	< 32	< 35	< 32	< 34	< 37
11/21/11 - 11/28/11	< 42	< 40	< 36	< 42	< 36	< 39	< 41
11/28/11 - 12/05/11	< 44	< 33	< 31	< 41	< 31	< 33	< 44
12/05/11 - 12/12/11	< 24	< 28	< 26	< 24	< 26	< 28	< 24
12/12/11 - 12/19/11	< 17	< 21	< 20	< 16	< 20	< 21	< 16
12/19/11 - 12/27/11	< 15	< 23	< 22	< 15	< 21	< 22	< 15
AVERAGE *	58 ± 1.4	56 ± 22	54 ± 39	50 ± 42	59 ± 34	-	67 ± 65

* I-131 RESULTS ARE CORRECTED FOR DECAY TO STOP DATE OF COLLECTION PERIOD.
** THE AVERAGE AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES
(1) SEE PROGRAM CHANGES SECTION FOR EXPLANATION
(2) POSITIVE I-131 IS FROM THE FUKUSHIMA INCIDENT
(3) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-4 DIRECT RADIATION MEASUREMENTS - QUARTERLY OSL RESULTS*, 2011

RESULTS IN UNITS OF mR/STANDARD MONTH**

STATION CODE	AVERAGE ± 2 S.D.	JAN - MAR	APR - JUN	JUL - SEP	OCT - DEC
SA-IDM-1F1	6.0 ± 1.0	5.7	6.3	6.6	5.5
SA-IDM-1S1	8.8 ± 6.6	5.7	6.3	11.6	11.7
SA-IDM-2E1	5.0 ± 0.9	5.1	5.3	5.4	4.3
SA-IDM-2F2	4.4 ± 1.4	5.1	4.4	4.7	3.5
SA-IDM-2F5	5.0 ± 1.2	4.1	5.0	5.4	5.5
SA-IDM-2F6	4.8 ± 0.8	4.5	4.7	5.4	4.6
SA-IDM-2S2	5.9 ± 1.7	6.9	5.0	6.3	5.5
SA-IDM-2S4	4.9 ± 1.6	5.4	4.1	5.7	4.3
SA-IDM-3E1	4.3 ± 1.7	4.4	3.5	5.4	3.8
SA-IDM-3F2	4.4 ± 1.6	4.8	3.8	5.4	3.8
SA-IDM-3F3	4.8 ± 0.8	4.8	5.3	4.7	4.3
SA-IDM-3S1	4.3 ± 0.8	4.1	4.7	4.4	3.8
SA-IDM-4D2	4.4 ± 1.9	5.4	4.1	4.7	3.2
SA-IDM-4F2	4.6 ± 1.3	4.8	4.7	5.4	3.8
SA-IDM-4S1	5.2 ± 1.6	6.0	4.4	5.7	4.6
SA-IDM-5D1	4.6 ± 1.3	3.8	4.7	5.4	4.3
SA-IDM-5F1	4.3 ± 0.6	4.5	4.7	4.1	4.1
SA-IDM-5S1	4.3 ± 0.7	4.5	4.1	4.7	4.1
SA-IDM-6F1	4.0 ± 1.0	4.1	4.1	4.4	3.2
SA-IDM-6S2	6.2 ± 1.3	6.6	5.9	6.9	5.5
SA-IDM-7F2	4.4 ± 2.6	4.1	6.3	4.1	3.2
SA-IDM-7S1	6.5 ± 0.6	6.3	6.3	6.9	6.3
SA-IDM-9F1	4.8 ± 1.2	5.7	4.4	4.7	4.3
SA-IDM-10D1	4.9 ± 1.5	5.4	5.6	4.1	4.3
SA-IDM-10F2	5.6 ± 1.5	6.0	5.6	6.3	4.6
SA-IDM-10S1	4.2 ± 1.4	4.8	4.4	4.4	3.2
SA-IDM-11E2	5.4 ± 1.0	5.4	5.9	4.7	5.5
SA-IDM-11F1	5.4 ± 1.7	6.0	5.6	4.1	5.8
SA-IDM-11S1	4.2 ± 0.6	4.5	4.4	4.1	3.8
SA-IDM-12E1	4.9 ± 1.7	4.5	4.1	6.0	5.2
SA-IDM-12F1	5.1 ± 2.0	6.0	5.9	4.4	4.1
SA-IDM-13E1	4.4 ± 1.4	4.1	4.4	5.4	3.8
SA-IDM-13F2	4.7 ± 1.4	4.8	5.0	5.4	3.8
SA-IDM-13F3	5.3 ± 2.7	6.0	4.1	6.9	4.3
SA-IDM-13F4	5.5 ± 2.1	4.1	5.6	6.6	5.8
SA-IDM-14D1	4.9 ± 1.6	5.4	4.1	5.7	4.3
SA-IDM-14F2	5.3 ± 1.4	5.7	5.9	5.1	4.3
SA-IDM-15D1	5.3 ± 1.2	5.7	4.7	6.0	4.9
SA-IDM-15F3	5.3 ± 1.8	5.7	4.7	6.3	4.3
SA-IDM-15S1	3.9 ± 0.8	3.5	3.8	4.4	3.8
SA-IDM-15S2	4.7 ± 0.9	4.8	5.3	4.4	4.3
SA-IDM-16E1	5.2 ± 1.2	5.1	5.6	5.7	4.3
SA-IDM-16F2	4.7 ± 0.5	4.8	5.0	4.4	4.6
SA-IDM-16S1	4.6 ± 2.0	4.5	5.3	5.4	3.2
SA-IDM-16S2	8.9 ± 2.4	7.8	7.8	10.0	9.7
SA-IDM-1G3 (C)	5.2 ± 0.6	5.4	5.3	4.7	5.2
SA-IDM-3G1 (C)	5.3 ± 0.7	5.1	5.3	5.1	5.8
SA-IDM-3H1 (C)	5.0 ± 1.8	4.8	6.3	4.7	4.1
SA-IDM-10G1 (C)	4.5 ± 1.7	5.1	4.1	5.4	3.5
SA-IDM-14G1 (C)	5.3 ± 1.4	5.4	5.0	6.3	4.6
SA-IDM-16G1 (C)	4.2 ± 1.7	3.8	3.5	5.4	4.1

* QUARTERLY ELEMENT OSL RESULTS BY LANDAUER

** RESULTS ARE REPORTED IN MILLIROENTGEN (mR) WITH THE STANDARD MONTH = 30.4 DAYS

(C) CONTROL STATION

TABLE C-5 CONCENTRATIONS OF IODINE-131* AND GAMMA EMITTERS IN MILK, 2011

RESULTS IN UNITS OF PCI/L ± 2 SIGMA

	SAMPLING PERIOD			<----------GAMMA EMITTERS---------->			
STATION ID	START	STOP	I-131	K-40	Cs-134	Cs-137	Ra-226
SA-MLK-13E3	01/02/11	01/03/11	< 0.3	1430 ± 70.3	< 1	< 1	< 3
SA-MLK-14F4	01/02/11	01/03/11	< 0.2	1460 ± 73.1	< 1	< 1	< 5
SA-MLK-2G3	01/02/11	01/03/11	< 2.4	1370 ± 73.6	< 1	< 1	< 4
SA-MLK-3G1 (C)	01/02/11	01/03/11	< 0.3	1340 ± 77.3	< 1	< 4	< 2
SA-MLK-13E3	02/06/11	02/07/11	< 0.2	1390 ± 73	< 1	< 1	< 3
SA-MLK-14F4	02/06/11	02/07/11	< 0.2	1400 ± 72.6	< 1	< 1	< 3
SA-MLK-2G3	02/06/11	02/07/11	< 0.3	1410 ± 76.9	< 1	< 2	< 3
SA-MLK-3G1 (C)	02/06/11	02/07/11	< 0.3	1270 ± 70.3	< 1	< 4	< 4
SA-MLK-13E3	03/06/11	03/07/11	< 0.2	1340 ± 68.6	< 1	< 2	< 4
SA-MLK-14F4	03/06/11	03/07/11	< 0.3	1490 ± 76.6	< 1	< 1	< 3
SA-MLK-2G3	03/06/11	03/07/11	< 0.3	1360 ± 71.9	< 1	< 2	< 3
SA-MLK-3G1 (C)	03/06/11	03/07/11	< 0.5	1260 ± 77.5	< 3	< 2	< 3
SA-MLK-13E3	04/03/11	04/04/11	< 0.6	1440 ± 156	< 7	< 7	< 167
SA-MLK-14F4	04/03/11	04/04/11	< 0.8	1310 ± 129	< 6	< 5	< 119
SA-MLK-2G3	04/03/11	04/04/11	< 1.0	1370 ± 144	< 6	< 6	< 159
SA-MLK-3G1 (C)	04/03/11	04/04/11	< 1.0	1350 ± 138	< 6	< 6	< 146
SA-MLK-13E3	04/17/11	04/18/11	< 0.6	1410 ± 177	< 7	< 8	< 164
SA-MLK-14F4	04/17/11	04/18/11	< 0.5	1330 ± 151	< 6	< 6	< 148
SA-MLK-2G3	04/17/11	04/18/11	< 0.5	1360 ± 157	< 6	< 7	< 164
SA-MLK-3G1 (C)	04/17/11	04/18/11	< 0.7	1590 ± 176	< 5	< 7	< 170
SA-MLK-13E3	05/01/11	05/02/11	< 0.8	1220 ± 117	< 4	< 5	< 117
SA-MLK-14F4	05/01/11	05/02/11	< 0.9	1350 ± 142	< 5	< 5	< 134
SA-MLK-2G3	05/01/11	05/02/11	< 0.8	1150 ± 142	< 5	< 7	< 135
SA-MLK-3G1 (C)	05/01/11	05/02/11	< 0.6	1120 ± 125	< 5	< 5	< 139
SA-MLK-13E3	05/15/11	05/16/11	< 0.9	1300 ± 127	< 6	< 6	< 149
SA-MLK-14F4	05/15/11	05/16/11	< 0.8	1430 ± 166	< 7	< 8	< 189
SA-MLK-2G3	05/15/11	05/16/11	< 0.9	1200 ± 142	< 5	< 6	< 114
SA-MLK-3G1 (C)	05/15/11	05/16/11	< 0.7	1310 ± 134	< 5	< 6	< 130
SA-MLK-13E3	06/05/11	06/06/11	< 1.0	1300 ± 164	< 8	< 9	< 188
SA-MLK-14F4	06/05/11	06/06/11	< 0.9	1430 ± 160	< 6	< 7	< 169
SA-MLK-2G3	06/05/11	06/06/11	< 0.8	1400 ± 206	< 7	< 8	< 207
SA-MLK-3G1 (C)	06/05/11	06/06/11	< 0.9	1320 ± 160	< 9	< 9	< 191
SA-MLK-13E3	06/19/11	06/20/11	< 0.5	1460 ± 198	< 9	< 8	< 207
SA-MLK-14F4	06/19/11	06/20/11	< 0.6	1370 ± 201	< 7	< 8	< 190
SA-MLK-2G3	06/19/11	06/20/11	< 0.5	1270 ± 149	< 5	< 7	< 183
SA-MLK-3G1 (C)	06/19/11	06/20/11	< 0.5	1180 ± 146	< 6	< 6	< 152
SA-MLK-13E3	07/04/11	07/05/11	< 0.8	1350 ± 153	< 5	< 6	< 131
SA-MLK-14F4	07/04/11	07/05/11	< 0.8	1370 ± 181	< 9	< 9	< 226
SA-MLK-2G3	07/04/11	07/05/11	< 1.0	1420 ± 180	< 8	< 7	< 144
SA-MLK-3G1 (C)	07/04/11	07/05/11	< 0.9	1380 ± 169	< 7	< 8	< 189

* IODINE-131 RESULTS ARE CORRECTED FOR DECAY TO STOP DATE OF COLLECTION PERIOD AND ANALYZED TO AN LLD (
(C) CONTROL STATION

TABLE C-5 CONCENTRATIONS OF IODINE-131* AND GAMMA EMITTERS IN MILK, 2011

RESULTS IN UNITS OF PCI/L ± 2 SIGMA

STATION ID	SAMPLING PERIOD START	STOP	I-131	<---------GAMMA EMITTERS---------> K-40	Cs-134	Cs-137	Ra-226
SA-MLK-13E3	07/17/11	07/18/11	< 1.0	1360 ± 185	< 7	< 9	< 156
SA-MLK-14F4	07/17/11	07/18/11	< 0.7	1490 ± 162	< 7	< 7	< 170
SA-MLK-2G3	07/17/11	07/18/11	< 1.0	1340 ± 147	< 7	< 7	< 162
SA-MLK-3G1 (C)	07/17/11	07/18/11	< 0.9	1350 ± 242	< 8	< 10	< 204
SA-MLK-13E3	08/07/11	08/08/11	< 0.9	1390 ± 185	< 7	< 8	< 160
SA-MLK-14F4	08/07/11	08/08/11	< 0.9	1290 ± 141	< 6	< 7	< 146
SA-MLK-2G3	08/07/11	08/08/11	< 0.8	1470 ± 133	< 5	< 6	< 137
SA-MLK-3G1 (C)	08/07/11	08/08/11	< 0.8	1220 ± 124	< 5	< 5	< 110
SA-MLK-13E3	08/21/11	08/22/11	< 0.6	1180 ± 180	< 6	< 7	< 185
SA-MLK-14F4	08/21/11	08/22/11	< 0.6	1290 ± 151	< 6	< 7	< 162
SA-MLK-2G3	08/21/11	08/22/11	< 0.6	1310 ± 183	< 7	< 6	< 159
SA-MLK-3G1 (C)	08/21/11	08/22/11	< 0.6	1360 ± 205	< 6	< 8	< 177
SA-MLK-13E3	09/05/11	09/06/11	< 0.8	1320 ± 194	< 6	< 7	< 173
SA-MLK-14F4	09/05/11	09/06/11	< 0.8	1440 ± 158	< 6	< 7	< 168
SA-MLK-2G3	09/05/11	09/06/11	< 0.7	1540 ± 168	< 7	< 7	< 158
SA-MLK-3G1 (C)	09/05/11	09/06/11	< 0.7	1400 ± 140	< 6	< 6	< 154
SA-MLK-13E3	09/18/11	09/19/11	< 0.6	1160 ± 150	< 6	< 7	< 129
SA-MLK-2G3	09/18/11	09/19/11	< 0.5	1440 ± 120	< 4	< 5	< 105
SA-MLK-3G1 (C)	09/18/11	09/19/11	< 0.5	1240 ± 139	< 5	< 6	< 153
SA-MLK-14F4	09/25/11	09/26/11	< 0.7	1270 ± 155	< 6	< 8	< 153
SA-MLK-13E3	10/02/11	10/03/11	< 0.8	1210 ± 160	< 5	< 9	< 167
SA-MLK-14F4	10/02/11	10/03/11	< 0.7	1330 ± 167	< 7	< 7	< 178
SA-MLK-2G3	10/02/11	10/03/11	< 0.8	1330 ± 148	< 6	< 6	< 141
SA-MLK-3G1 (C)	10/02/11	10/03/11	< 0.8	1100 ± 159	< 8	< 7	< 192
SA-MLK-13E3	10/09/11	10/10/11	< 0.5	1250 ± 162	< 7	< 9	< 205
SA-MLK-14F4	10/09/11	10/10/11	< 0.6	1140 ± 160	< 7	< 8	< 186
SA-MLK-2G3	10/09/11	10/10/11	< 0.5	1240 ± 167	< 7	< 6	< 149
SA-MLK-3G1 (C)	10/09/11	10/10/11	< 0.6	1280 ± 161	< 7	< 7	< 161
SA-MLK-13E3	11/06/11	11/07/11	< 0.7	1390 ± 117	< 5	< 5	< 124
SA-MLK-14F4	11/06/11	11/07/11	< 0.8	1100 ± 110	< 4	< 6	< 131
SA-MLK-2G3	11/06/11	11/07/11	< 0.7	1190 ± 109	< 4	< 4	< 106
SA-MLK-3G1 (C)	11/06/11	11/07/11	< 0.7	1250 ± 128	< 5	< 5	< 148
SA-MLK-13E3	11/20/11	11/21/11	< 0.9	1330 ± 170	< 7	< 7	< 186
SA-MLK-14F4	11/20/11	11/21/11	< 0.7	1350 ± 190	< 7	< 10	< 197
SA-MLK-2G3	11/20/11	11/21/11	< 0.7	1360 ± 190	< 7	< 9	< 183
SA-MLK-3G1 (C)	11/20/11	11/21/11	< 0.8	1150 ± 146	< 6	< 6	< 160
SA-MLK-13E3	12/04/11	12/05/11	< 0.7	1390 ± 133	< 4	< 6	< 126
SA-MLK-14F4	12/04/11	12/05/11	< 0.9	1500 ± 142	< 5	< 7	< 125
SA-MLK-2G3	12/04/11	12/05/11	< 1.0	1430 ± 170	< 6	< 6	< 162
SA-MLK-3G1 (C)	12/04/11	12/05/11	< 0.7	1320 ± 137	< 4	< 5	< 131
ANNUAL AVERAGE			-	1331 ± 206	-	-	-

* IODINE-131 RESULTS ARE CORRECTED FOR DECAY TO STOP DATE OF COLLECTION PERIOD AND ANALYZED TO AN LLD
(C) CONTROL STATION

TABLE C-6 CONCENTRATIONS OF GROSS ALPHA AND GROSS BETA EMITTERS AND TRITIUM IN WELL WATER*, 2011

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

STC	COLLECTION PERIOD	GR-A	GR-B	H-3
SA-WWA-3E1	01/31/11 - 01/31/11	< 1.5	1.9 ± 0.8	< 143
SA-WWA-3E1	02/22/11 - 02/22/11	< 1.7	1.8 ± 0.9	< 142
SA-WWA-3E1	03/30/11 - 03/30/11	< 2.9	< 3.7	< 175
SA-WWA-3E1	04/25/11 - 04/25/11	< 2.5	< 3.7	< 169
SA-WWA-3E1	05/31/11 - 05/31/11	< 1.5	< 2.5	< 177
SA-WWA-3E1	06/29/11 - 06/29/11	< 1.9	< 3.3	< 174
SA-WWA-3E1	07/25/11 - 07/25/11	< 1.8	< 2.2	< 167
SA-WWA-3E1	08/29/11 - 08/29/11	< 1.1	< 1.7	< 173
SA-WWA-3E1	09/28/11 - 09/28/11	< 2.4	< 2.3	< 177
SA-WWA-3E1	10/24/11 - 10/24/11	< 0.7	< 1.3	< 181
SA-WWA-3E1	11/28/11 - 11/28/11	< 1.8	< 2.6	< 178
SA-WWA-3E1	12/19/11 - 12/19/11	< 2.3	< 3.0	< 197
	AVERAGE **	-	1.8 ± 0.1	-

* 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*, 2011**

RESULTS IN UNITS OF PCI/L ± 2 SIGMA

STC	COLLECTION PERIOD	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	ZrNb-95	I-131	Cs-134	Cs-137	BaLa-140	Ra-226
SA-WWA-3E1	01/31/11 - 01/31/11	52 ± 17	< 1	< 1	< 3	< 1	< 2	< 3	< 1	< 1	< 1	< 7	101 ± 4
SA-WWA-3E1	02/22/11 - 02/22/11	63 ± 16	< 1	< 1	< 1	< 2	< 2	< 2	< 2	< 1	< 1	< 4	173 ± 7
SA-WWA-3E1	03/30/11 - 03/30/11	< 14	< 1	< 2	< 3	< 1	< 3	< 2	< 1	< 1	< 2	< 4	< 43
SA-WWA-3E1	04/25/11 - 04/25/11	< 82	< 5	< 5	< 10	< 5	< 9	< 5	< 1	< 4	< 5	< 9	< 127
SA-WWA-3E1	05/31/11 - 05/31/11	< 34	< 4	< 4	< 10	< 4	< 7	< 4	< 1	< 3	< 4	< 13	< 83
SA-WWA-3E1	06/29/11 - 06/29/11	< 36	< 4	< 4	< 8	< 4	< 7	< 5	< 1	< 4	< 4	< 7	< 116
SA-WWA-3E1	07/25/11 - 07/25/11	< 70	< 4	< 4	< 9	< 4	< 9	< 5	< 1	< 4	< 4	< 7	< 110
SA-WWA-3E1	08/29/11 - 08/29/11	< 55	< 6	< 6	< 11	< 5	< 8	< 5	< 1	< 4	< 5	< 7	< 124
SA-WWA-3E1	09/28/11 - 09/28/11	< 57	< 5	< 5	< 10	< 4	< 10	< 6	< 1	< 4	< 5	< 8	< 145
SA-WWA-3E1	10/24/11 - 10/24/11	< 105	< 6	< 7	< 14	< 8	< 12	< 8	< 1	< 7	< 7	< 12	< 189
SA-WWA-3E1	11/28/11 - 11/28/11	< 108	< 6	< 6	< 14	< 6	< 14	< 6	< 1	< 7	< 6	< 13	< 154
SA-WWA-3E1	12/19/11 - 12/19/11	< 37	< 3	< 4	< 8	< 3	< 8	< 5	< 1	< 4	< 4	< 8	< 84
	AVERAGE **	57 ± 15	-	-	-	-	-	-	-	-	-	-	137 ± 102

* MANAGEMENT AUDIT SAMPLE: NOT REQUIRED BY ODCM

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

TABLE C-8 **CONCENTRATIONS OF GROSS ALPHA AND GROSS BETA EMITTERS AND TRITIUM IN RAW AND TREATED POTABLE WATER (2F3), 2011**

RESULTS IN UNITS OF PCI/L ± 2 SIGMA

STC	COLLECTION PERIOD		GR-A	GR-B	H-3
RAW	01/01/11	- 01/31/11	< 0.8	6.6 ± 0.8	< 144
	02/01/11	- 02/28/11	1.1 ± 0.8	4.0 ± 0.7	< 144
	03/01/11	- 03/31/11	< 1.4	< 2.8	< 181
	04/01/11	- 04/30/11	< 0.6	3.1 ± 1.3	< 173
	05/01/11	- 05/31/11	< 0.9	3.0 ± 1.4	< 176
	06/01/11	- 06/30/11	< 2.1	4.8 ± 1.9	< 173
	07/01/11	- 07/31/11	< 1.8	3.7 ± 1.8	< 198
	08/01/11	- 08/31/11	< 1.3	< 2.4	< 171
	09/01/11	- 09/30/11	0.7 ± 0.3	3.8 ± 0.7	< 189
	10/01/11	- 10/31/11	< 0.4	1.2 ± 0.6	< 173
	11/01/11	- 11/30/11	< 2.1	< 2.9	< 165
	12/01/11	- 12/31/11	< 1.5	< 2.7	< 185
	AVERAGE	*	0.9 ± 0.6	3.8 ± 3.1	-
TREATED	01/01/11	- 01/31/11	< 0.8	4.9 ± 0.7	< 144
	02/01/11	- 02/28/11	< 1.0	2.8 ± 0.6	< 143
	03/01/11	- 03/31/11	< 2.6	< 3.4	< 179
	04/01/11	- 04/30/11	< 0.7	2.0 ± 1.2	< 175
	05/01/11	- 05/31/11	< 0.7	3.3 ± 2.0	< 178
	06/01/11	- 06/30/11	< 1.9	5.8 ± 1.9	< 173
	07/01/11	- 07/31/11	< 1.9	3.3 ± 1.8	< 197
	08/01/11	- 08/31/11	< 1.9	< 2.8	< 171
	09/01/11	- 09/30/11	< 0.6	3.4 ± 0.8	< 189
	10/01/11	- 10/31/11	< 0.7	4.4 ± 0.9	< 176
	11/01/11	- 11/30/11	< 2.3	< 2.9	< 164
	12/01/11	- 12/31/11	< 1.6	< 2.8	< 182
	AVERAGE	*	-	3.7 ± 2.4	-

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

TABLE C-9 **2011 CONCENTRATIONS OF IODINE-131* AND GAMMA EMITTERS IN RAW AND TREATED POTABLE WATER (2F3), 2011**

RESULTS IN UNITS OF PCI/L ± 2 SIGMA

	SAMPLING PERIOD			<---------GAMMA EMITTERS--------->									
STATION ID	START	STOP	I-131	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	ZrNb-95	Cs-134	Cs-137	Ra-226
RAW	01/01/11	01/31/11	< 0.2	55 ± 16	< 1	< 1	< 1	< 1	< 1	< 2	< 1	< 1	5 ± 2
TREATED	01/01/11	01/31/11	< 0.1	48 ± 12	< 1	< 1	< 1	< 3	< 2	< 1	< 1	< 1	< 2
RAW	02/01/11	02/28/11	< 0.3	47 ± 11	< 1	< 2	< 1	< 0	< 1	< 1	< 1	< 1	5 ± 2
TREATED	02/01/11	02/28/11	< 0.2	48 ± 15	< 1	< 1	< 1	< 1	< 2	< 3	< 1	< 1	< 2
RAW	03/01/11	- 03/31/11	< 0.6	< 30	< 2	< 2	< 3	< 2	< 3	< 2	< 1	< 2	< 43
TREATED	03/01/11	- 03/31/11	< 0.6	< 17	< 2	< 2	< 4	< 2	< 4	< 2	< 2	< 2	< 44
RAW	04/01/11	- 04/30/11	< 0.7	< 18	< 2	< 2	< 5	< 2	< 4	< 2	< 2	< 2	< 45
TREATED	04/01/11	- 04/30/11	< 0.8	< 43	< 2	< 2	< 5	< 2	< 4	< 2	< 2	< 2	< 43
RAW	05/01/11	- 05/31/11	< 0.5	< 44	< 4	< 5	< 9	< 4	< 7	< 4	< 3	< 4	< 85
TREATED	05/01/11	- 05/31/11	< 0.6	< 7	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 18
RAW	06/01/11	- 06/30/11	< 0.7	< 136	< 5	< 5	< 13	< 7	< 10	< 9	< 7	< 8	< 163
TREATED	06/01/11	- 06/30/11	< 0.6	< 52	< 6	< 7	< 13	< 5	< 10	< 7	< 4	< 6	< 162
RAW	07/01/11	- 07/31/11	< 0.5	< 72	< 5	< 5	< 10	< 6	< 10	< 5	< 5	< 6	< 116
TREATED	07/01/11	- 07/31/11	< 0.6	< 56	< 4	< 3	< 8	< 3	< 9	< 5	< 4	< 4	< 93
RAW	08/01/11	- 08/31/11	< 0.6	< 113	< 4	< 5	< 10	< 4	< 8	< 5	< 4	< 5	< 114
TREATED	08/01/11	- 08/31/11	< 0.6	< 97	< 5	< 5	< 11	< 6	< 8	< 6	< 5	< 5	< 124
RAW	09/01/11	- 09/30/11	< 0.6	< 168	< 9	< 9	< 16	< 8	< 19	< 9	< 9	< 9	< 245
TREATED	09/01/11	- 09/30/11	< 0.6	< 43	< 5	< 6	< 12	< 5	< 10	< 8	< 5	< 6	< 161
RAW	10/01/11	- 10/31/11	< 0.7	< 39	< 4	< 5	< 9	< 5	< 10	< 5	< 5	< 5	< 104
TREATED	10/01/11	- 10/31/11	< 0.7	< 40	< 4	< 4	< 8	< 4	< 8	< 5	< 3	< 4	< 110
RAW	11/01/11	- 11/30/11	< 0.5	< 21	< 2	< 3	< 6	< 2	< 5	< 3	< 3	< 3	< 65
TREATED	11/01/11	- 11/30/11	< 0.6	< 28	< 3	< 3	< 6	< 2	< 5	< 3	< 3	< 3	< 82
RAW	12/01/11	- 12/31/11	< 0.6	< 6	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 15
TREATED	12/01/11	- 12/31/11	< 0.6	< 37	< 2	< 2	< 4	< 2	< 3	< 2	< 2	< 2	< 40
	AVERAGE **		-	49 ± 8	-	-	-	-	-	-	-	-	5 ± 0

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

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

TABLE C-10 **CONCENTRATIONS OF GAMMA EMITTERS IN VEGETABLES*, 2011**

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

STC	COLLECTION PERIOD	SAMPLE TYPE	Be-7	K-40	I-131	Cs-134	Cs-137	Ra-226	Th-232
SA-FPV-2F9	04/24/11	Asparagus	< 63	2270 ± 134	< 41	< 6	< 7	< 128	< 26
	AVERAGE	**	-	2270 ± 0	-	-	-	-	-
SA-FPV-2F9	05/01/11	Asparagus	< 52	2390 ± 111	< 20	< 5	< 6	< 110	< 18
SA-FPV-2F9	05/01/11	Asparagus	< 55	2750 ± 121	< 22	< 5	< 6	< 123	< 18
SA-FPV-2F9	05/01/11	Asparagus	< 54	2780 ± 124	< 35	< 5	< 5	< 106	< 20
	AVERAGE	**	-	2640 ± 434	-	-	-	-	-
SA-FPL-3H5 (C)	06/29/11	Cabbage	< 107	2330 ± 382	< 42	< 9	< 16	< 322	< 48
SA-FPV-3H5 (C)	06/29/11	Tomatoes	< 38	1950 ± 106	< 12	< 4	< 4	< 100	< 16
	AVERAGE	**	-	2140 ± 537	-	-	-	-	-
SA-FPL-3F6 (C)	07/05/11	Cabbage	< 262	2450 ± 534	< 57	< 25	< 25	< 685	< 115
SA-FPV-2G2 (C)	07/05/11	Corn	< 106	2110 ± 275	< 23	< 12	< 11	< 347	< 54
SA-FPV-2G2 (C)	07/05/11	Peppers	< 212	1950 ± 411	< 45	< 18	< 22	< 523	< 94
SA-FPV-2G2 (C)	07/05/11	Tomatoes	< 165	3260 ± 391	< 39	< 18	< 17	< 525	< 78
SA-FPV-2F9	07/11/11	Corn	< 135	2290 ± 380	< 27	< 19	< 20	< 412	< 68
SA-FPV-2F9	07/11/11	Tomatoes	< 130	1360 ± 250	< 30	< 16	< 16	< 335	< 62
SA-FPV-15F4	07/21/11	Corn	< 119	2340 ± 282	< 38	< 10	< 14	< 280	< 40
SA-FPV-15F4	07/21/11	Tomatoes	< 121	2030 ± 276	< 43	< 13	< 13	< 344	< 59
SA-FPV-15F4	07/21/11	Peppers	< 44	1700 ± 260	< 16	< 5	< 6	< 124	< 31
SA-FPV-3F6 (C)	07/21/11	Corn	< 101	1800 ± 279	< 37	< 13	< 12	< 313	< 59
SA-FPV-3F6 (C)	07/21/11	Tomatoes	< 189	2070 ± 355	< 57	< 18	< 22	< 527	< 85
SA-FPV-9G2 (C)	07/21/11	Corn	< 124	1960 ± 256	< 38	< 10	< 11	< 267	< 50
SA-FPV-9G2 (C)	07/21/11	Tomato	< 140	1570 ± 270	< 47	< 16	< 17	< 391	< 54
	AVERAGE	**	-	2068 ± 944	-	-	-	-	-

* 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*, 2011**

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

STC	COLLECTION PERIOD	SAMPLE TYPE	Be-7	K-40	I-131	Cs-134	Cs-137	Ra-226	Th-232
SA-FPV-1G1 (C)	08/01/11	Corn	< 68	1890 ± 189	< 16	< 8	< 8	< 179	< 35
SA-FPV-1G1 (C)	08/01/11	Tomatoes	< 68	1330 ± 157	< 12	< 7	< 8	< 161	< 35
SA-FPV-1G1 (C)	08/01/11	Peppers	< 124	2740 ± 301	< 24	< 12	< 13	< 296	< 52
	AVERAGE		-	1987 ± 1420	-	-	-	-	-
SA-FPL-10D1	10/05/11	Cabbage	364 ± 111	4010 ± 328	< 21	< 12	< 16	< 331	< 52
SA-FPL-15S1	10/05/11	Cabbage	< 195	4430 ± 507	< 22	< 15	< 23	< 356	< 80
SA-FPL-16S1	10/05/11	Cabbage	< 215	3230 ± 439	< 29	< 16	< 18	< 432	< 71
SA-FPL-1F1	10/05/11	Cabbage	283 ± 86	3980 ± 324	< 19	< 12	< 17	< 275	< 53
	AVERAGE		324 ± 115	3913 ± 998	-	-	-	-	-
SA-VGT-14F4	11/06/11	soy beans	< 289	13300 ± 1150	< 52	< 28	< 31	< 589	< 124
SA-VGT-1F1	11/07/11	soy beans	< 240	15000 ± 1020	< 43	< 21	< 26	< 478	< 130
SA-VGT-3G1 (C)	11/18/11	soy beans	< 204	16400 ± 1030	< 59	< 20	< 28	< 494	< 113
	AVERAGE **		-	14900 ± 3105	-	-	-	-	-
	GRAND AVERAGE **			3713 ± 7925					

* 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*, 2011**

RESULTS IN UNITS OF PCI/KG (WET) ± 2 SIGMA

STATION ID	SAMPLING DATE	SAMPLE TYPE	Be-7	K-40	I-131	Cs-134	Cs-137	Ra-226	Th-232
SA-VGT-13E3	09/13/11	Silage	248 ± 148	3670 ± 326	< 34	< 11	< 13	< 283	< 52
SA-VGT-14F4	09/16/11	Silage	1900 ± 171	3230 ± 267	< 27	< 11	< 11	< 281	< 44
SA-VGT-2G3	09/16/11	Silage	3150 ± 268	10900 ± 573	< 41	< 19	< 20	< 429	< 78
SA-VGT-3G1 (C)	09/16/11	Silage	1500 ± 204	3970 ± 419	< 30	< 15	< 15	< 341	< 63
	AVERAGE		1700 ± 2392	5443 ± 7302	-	-	-	-	-

* MANAGEMENT AUDIT SAMPLE: NOT REQUIRED BY ODCM
(C) CONTROL STATION

TABLE C-12 **CONCENTRATIONS OF GAMMA EMITTERS IN SOIL, 2011**

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

Soil samples are collected every 3 years. Soil will be collected in 2013

TABLE C-13 CONCENTRATIONS OF GROSS BETA EMITTERS IN SURFACE WATER, 2011

RESULTS IN UNITS OF PCI/L ± 2 SIGMA

COLLECTION PERIOD	CONTROL SA-SWA-11A1	SA-SWA-12C1	SA-SWA-16F1	SA-SWA-1F2	SA-SWA-7E1
01/03/11 - 01/03/11	198 ± 23	190 ± 23	111 ± 16	84 ± 14	305 ± 27
02/04/11 - 02/04/11	169 ± 24	158 ± 23	140 ± 21	89 ± 17	290 ± 30
03/08/11 - 03/08/11	18 ± 5	9 ± 3	< 4	< 3	30 ± 6
04/07/11 - 04/07/11	19 ± 3	30 ± 9	20 ± 4	19 ± 4	21 ± 13
05/06/11 - 05/06/11	9 ± 3	4 ± 2	4 ± 2	< 3	26 ± 11
06/06/11 - 06/06/11	49 ± 13	37 ± 8	15 ± 7	24 ± 7	111 ± 24
07/05/11 - 07/05/11	100 ± 24	113 ± 20	78 ± 12	52 ± 9	155 ± 32
08/01/11 - 08/01/11	160 ± 14	77 ± 8	73 ± 8	10 ± 4	190 ± 14
09/06/11 - 09/06/11	10 ± 3	7 ± 3	7 ± 3	9 ± 3	8 ± 3
10/05/11 - 10/05/11	5 ± 1	4 ± 1	3 ± 1	< 2	27 ± 3
11/09/11 - 11/09/11	39 ± 11	61 ± 9	25 ± 3	22 ± 3	110 ± 17
12/06/11 - 12/06/11	58 ± 14	35 ± 6	17 ± 4	7 ± 3	71 ± 15
AVERAGE *	70 ± 140	60 ± 126	45 ± 96	35 ± 65	112 ± 208

GRAND AVERAGE * 66 ± 144

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

TABLE C-14 **CONCENTRATIONS OF TRITIUM IN SURFACE WATER, 2011**

RESULTS IN UNITS OF PCI/L ± 2 SIGMA

COLLECTION PERIOD	CONTROL SA-SWA-11A1	SA-SWA-12C1	SA-SWA-16F1	SA-SWA-1F2	SA-SWA-7E1
01/03/11 - 01/03/11	< 140	< 141	< 141	< 140	< 142
02/04/11 - 02/04/11	< 142	< 143	< 144	< 142	< 144
03/08/11 - 03/08/11	< 173	< 146	< 150	< 149	< 149
04/07/11 - 04/07/11	< 186	< 187	< 187	< 190	< 190
05/06/11 - 05/06/11	< 178	< 180	< 180	< 180	< 181
06/06/11 - 06/06/11	< 165	< 169	< 166	< 187	< 194
07/05/11 - 07/05/11	< 174	< 174	< 172	< 170	< 173
08/01/11 - 08/10/11	< 162	< 200	< 161	< 167	< 200
09/06/11 - 09/06/11	< 174	< 177	< 176	< 177	< 190
10/05/11 - 10/05/11	< 192	< 182	< 183	< 183	< 181
11/09/11 - 11/09/11	< 166	< 167	< 166	< 164	< 167
12/06/11 - 12/06/11	< 199	< 195	< 200	< 199	< 197
AVERAGE	-	-	-	-	-

TABLE C-15 **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER, 2011**

RESULTS IN UNITS OF PCI/L ± 2 SIGMA

STC	COLLECTION PERIOD	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	01/03/11	130 ± 20	< 1	< 0.3	< 1	< 3	< 2	< 1	< 1	< 1	< 3	< 5
	02/04/11	165 ± 20	< 1	< 1	< 2	< 1	< 1	< 2	< 1	< 1	< 1	< 5
	03/08/11	< 22	< 3	< 3	< 6	< 2	< 5	< 3	< 1	< 2	< 3	< 6
	04/07/11	< 42	< 5	< 4	< 12	< 4	< 9	< 5	< 1	< 4	< 5	< 11
	05/06/11	< 17	< 2	< 2	< 5	< 2	< 4	< 2	< 1	< 2	< 2	< 7
	06/06/11	< 42	< 6	< 5	< 14	< 5	< 15	< 6	< 1	< 7	< 7	< 11
	07/05/11	55 ± 34	< 3	< 3	< 6	< 2	< 4	< 3	< 1	< 3	< 3	< 6
	08/01/11	< 101	< 5	< 5	< 11	< 4	< 9	< 5	< 1	< 5	< 4	< 8
	09/06/11	< 109	< 5	< 6	< 14	< 6	< 10	< 6	< 1	< 5	< 5	< 14
	10/05/11	< 44	< 6	< 6	< 14	< 6	< 12	< 8	< 1	< 6	< 6	< 12
	11/09/11	50 ± 27	< 2	< 2	< 4	< 2	< 3	< 2	< 1	< 2	< 2	< 4
	12/06/11	< 44	< 5	< 6	< 11	< 5	< 12	< 6	< 1	< 5	< 5	< 11
	AVERAGE	** 100 ± 113	-	-	-	-	-	-	-	-	-	-
SA-SWA-12C1 (C)	01/03/11	80 ± 20	< 1	< 1	< 3	< 1	< 2	< 1	< 1	< 1	< 1	< 5
	02/04/11	83 ± 18	< 1	< 1	< 1	< 1	< 2	< 2	< 1	< 1	< 1	< 5
	03/08/11	< 56	< 3	< 3	< 6	< 3	< 5	< 3	< 1	< 3	< 3	< 7
	04/07/11	< 40	< 5	< 5	< 9	< 4	< 9	< 6	1 ± 1	< 4	< 5	< 15
	05/06/11	< 22	< 2	< 2	< 5	< 2	< 4	< 2	< 1	< 2	< 2	< 8
	06/06/11	< 112	< 5	< 6	< 13	< 5	< 9	< 6	< 1	< 5	< 5	< 11
	07/05/11	< 21	< 2	< 2	< 6	< 2	< 4	< 3	< 1	< 2	< 2	< 6
	08/01/11	< 44	< 6	< 6	< 11	< 6	< 12	< 6	< 1	< 6	< 5	< 10
	09/06/11	< 73	< 6	< 8	< 17	< 6	< 13	< 9	< 1	< 7	< 8	< 14
	10/05/11	< 96	< 6	< 6	< 11	< 6	< 13	< 6	< 1	< 6	< 5	< 11
	11/09/11	< 31	< 2	< 2	< 4	< 2	< 4	< 2	< 1	< 2	< 2	< 4
	12/06/11	< 135	< 6	< 6	< 18	< 7	< 10	< 7	< 1	< 6	< 6	< 15
	AVERAGE	** 82 ± 4	-	-	-	-	-	-	1 ± 0	*** -	-	-

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

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

*** IODINE-131 IS ATTRIBUTED TO EFFLUENT FROM A MEDICAL FACILITY.

(C) CONTROL STATION

TABLE C-15 **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER, 2011**

RESULTS IN UNITS OF PCI/L ± 2 SIGMA

STC		COLLECTION PERIOD	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		01/03/11	95 ± 18	< 1	< 1	< 3	< 0.4	< 2	< 1	< 2	< 1	< 0.4	< 7
		02/04/11	105 ± 17	< 1	< 1	< 1	< 0.4	< 1	< 1	< 1	< 1	< 0.3	< 3
		03/08/11	< 29	< 3	< 4	< 8	< 3	< 7	< 5	< 1	< 3	< 4	< 10
		04/07/11	< 45	< 4	< 5	< 13	< 5	< 10	< 5	< 1	< 4	< 6	< 11
		05/06/11	< 14	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 4
		06/06/11	< 61	< 7	< 7	< 12	< 7	< 11	< 5	< 1	< 5	< 7	< 11
		07/05/11	< 23	< 3	< 3	< 6	< 3	< 5	< 3	< 1	< 3	< 3	< 6
		08/01/11	< 52	< 4	< 4	< 8	< 4	< 8	< 5	< 1	< 4	< 5	< 7
		09/06/11	< 63	< 5	< 7	< 12	< 7	< 10	< 6	< 1	< 6	< 6	< 14
		10/05/11	< 31	< 2	< 2	< 3	< 2	< 3	< 2	< 1	< 2	< 2	< 3
		11/09/11	< 33	< 4	< 4	< 8	< 3	< 9	< 4	< 1	< 4	< 4	< 11
		12/06/11	< 106	< 6	< 6	< 11	< 5	< 12	< 5	< 1	< 6	< 5	< 14
		AVERAGE	* 100 ± 14	-	-	-	-	-	-	-	-	-	-
SA-SWA-1F2		01/03/11	78 ± 18	< 1	< 1	< 2	< 1	< 4	< 2	< 2	< 1	< 0.5	< 5
		02/04/11	123 ± 20	< 1	< 1	< 2	< 2	< 1	< 2	< 1	< 1	< 1	< 3
		03/08/11	< 86	< 4	< 4	< 10	< 4	< 8	< 5	< 1	< 3	< 4	< 8
		04/07/11	< 37	< 4	< 5	< 11	< 4	< 8	< 5	< 1	< 4	< 4	< 14
		05/06/11	< 16	< 2	< 2	< 5	< 2	< 4	< 2	< 1	< 2	< 2	< 7
		06/06/11	< 53	< 5	< 6	< 11	< 5	< 10	< 7	< 1	< 6	< 6	< 12
		07/05/11	< 55	< 3	< 3	< 7	< 3	< 6	< 3	< 1	< 3	< 3	< 7
	**	08/22/11	< 86	< 5	< 4	< 10	< 5	< 9	< 5	< 0.5	< 4	< 5	< 8
		09/06/11	< 102	< 7	< 6	< 14	< 5	< 13	< 7	< 1	< 6	< 6	< 15
		10/05/11	< 32	< 2	< 2	< 4	< 2	< 4	< 2	< 1	< 2	< 2	< 4
		11/09/11	99 ± 49	< 5	< 5	< 11	< 6	< 9	< 6	< 1	< 4	< 4	< 9
		12/06/11	< 94	< 7	< 7	< 17	< 7	< 11	< 8	< 1	< 7	< 7	< 8
		AVERAGE	* 100 ± 45	-	-	-	-	-	-		-	-	-

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

** SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-15 **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER, 2011**

RESULTS IN UNITS OF PCI/L ± 2 SIGMA

STC	COLLECTION PERIOD	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	01/03/11	119 ± 22	< 1	< 1	< 2	< 1	< 2	< 2	< 1	< 1	< 2	< 3
	02/04/11	175 ± 22	< 1	< 1	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 5
	03/08/11	< 37	< 4	< 4	< 9	< 4	< 8	< 5	< 1	< 4	< 4	< 10
	04/07/11	< 44	< 5	< 5	< 11	< 3	< 10	< 6	< 1	< 5	< 5	< 15
	05/06/11	< 19	< 2	< 2	< 6	< 2	< 4	< 2	< 1	< 2	< 2	< 9
	06/06/11	< 69	< 7	< 7	< 15	< 5	< 11	< 8	< 1	< 6	< 7	< 15
	07/05/11	129 ± 39	< 3	< 3	< 6	< 3	< 5	< 3	< 1	< 2	< 3	< 6
	08/01/11	< 52	< 5	< 5	< 10	< 4	< 8	< 6	< 1	< 4	< 5	< 6
	09/06/11	< 62	< 4	< 5	< 9	< 4	< 9	< 5	< 1	< 4	< 4	< 11
	10/05/11	< 17	< 2	< 2	< 4	< 2	< 4	< 2	< 1	< 2	< 2	< 4
	11/09/11	< 44	< 6	< 5	< 10	< 4	< 9	< 6	< 1	< 5	< 5	< 13
	12/06/11	101 ± 66	< 5	< 7	< 14	< 6	< 9	< 8	< 1	< 5	< 5	< 11
	AVERAGE	* 131 ± 63	-	-	-	-	-	-		-	-	-

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

TABLE C-16 **CONCENTRATIONS OF GAMMA EMITTERS IN EDIBLE FISH, 2011**

RESULTS IN UNITS OF PCI/KG (WET) ± 2 SIGMA

STC	COLLECTION PERIOD	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137	Ra-226
SA-ESF-11A1	05/06/11	4090 ± 970	< 65	< 76	< 192	< 60	< 141	< 75	< 59	< 1450
	10/24/11	3700 ± 898	< 61	< 59	< 142	< 58	< 90	< 50	< 54	< 1140
	AVERAGE	3895 ± 552	-	-	-	-	-	-	-	-
SA-ESF-12C1 (C)	05/06/11	3050 ± 908	< 64	< 77	< 197	< 46	< 131	< 69	< 57	< 1100
	10/24/11	3950 ± 915	< 48	< 69	< 168	< 57	< 132	< 45	< 57	< 1010
	AVERAGE	3500 ± 1273		-	-	-	-	-	-	-
SA-ESF-2G3	05/06/11	4660 ± 957	< 57	< 71	< 166	< 68	< 115	< 46	< 53	< 1210
	AVERAGE	4660 ± 0	-	-	-	-	-	-	-	-

(C) CONTROL STATION

TABLE C-17 **CONCENTRATIONS OF GAMMA EMITTERS IN CRABS, 2011**

RESULTS IN UNITS OF PCI/KG (WET) ± 2 SIGMA

STC	COLLECTION PERIOD	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137	Ra-226
SA-ECH-11A1	06/27/11	2910 ± 687	< 39	< 49	< 140	< 33	< 95	< 41	< 41	< 887
	08/22/11	2320 ± 829	< 61	< 67	< 95	< 65	< 152	< 66	< 73	< 1470
	AVERAGE	2615 ± 834	-	-	-	-	-	-	-	-
SA-ECH-12C1 (C)	06/27/11	2630 ± 519	< 32	< 37	< 92	< 34	< 64	< 32	< 37	< 805
	08/22/11	2390 ± 900	< 58	< 64	< 158	< 53	< 106	< 47	< 52	< 985
	AVERAGE	2510 ± 339	-	-	-	-	-	-	-	-

(C) CONTROL STATION

TABLE C-18 **CONCENTRATIONS OF GAMMA EMITTERS IN SEDIMENT**

RESULTS IN UNITS OF PCI/KG (DRY) ± 2 SIGMA, 2011

STC	COLLECTION PERIOD	Be-7	K-40	Cs-134	Cs-137	Ra-226	Th-232
SA-ESS-11A1	06/23/11	< 916	9890 ± 1650	< 71	< 82	< 2050	635 ± 252
	11/21/11	< 404	5490 ± 826	< 35	< 54	< 775	484 ± 144
	AVERAGE *	-	7690 ± 6223	-	-	-	560 ± 214
SA-ESS-12C1 (C)	06/23/11	< 690	17100 ± 1820.0	< 70	< 78	2740 ± 1720	1070 ± 247
	11/21/11	< 637	13500 ± 1400.0	< 54	< 69	2420 ± 1390	1370 ± 258
	AVERAGE *	-	15300 ± 5091.2	-	-	2580 ± 453	1220 ± 424
SA-ESS-15A1	06/23/11	< 575	3560 ± 682.0	< 40	< 57	< 1210	346 ± 157
	11/21/11	< 403	6370 ± 806.0	< 38	< 46	1350 ± 820	492 ± 126
	AVERAGE *	-	4965 ± 3973.9	-	-	1350 ± 0	419 ± 206
SA-ESS-16A1	06/23/11	< 526	6280 ± 1000.0	< 50	< 57	< 1390	606 ± 199
	11/21/11	< 381	5320 ± 672.0	< 29	< 30	2600 ± 836	1020 ± 164
	AVERAGE *	-	5800 ± 1357.6	-	-	2600 ± 0	813 ± 585
SA-ESS-16F1	06/23/11	< 1680	22800 ± 3100.0	< 135	< 171	< 3870	919 ± 427
	11/21/11	< 554	16100 ± 1340.0	< 49	< 60	1570 ± 965	1090 ± 187
	AVERAGE *	-	19450 ± 9475.2	-	-	1570 ± 0	1005 ± 242
SA-ESS-6S2	06/27/11	< 342	3670 ± 653.0	< 37	< 40	< 1030	278 ± 136
	11/28/11	< 205	4140 ± 432.0	< 19	< 21	< 428	175 ± 63
	AVERAGE *	-	3905 ± 664.7	-	-	-	227 ± 146
SA-ESS-7E1	06/23/11	< 569	14100 ± 1180.0	< 46	< 54	2230 ± 1370	950 ± 189
	11/21/11	1510 ± 852	20400 ± 1890.0	< 73	107 ± 71	3850 ± 1510	1370 ± 339
	AVERAGE *	1510 ± 0	17250 ± 8909.5	-	107 ± 0	3040 ± 2291	1160 ± 594
	GRAND AVERAGE *	1510 ± 0	10623 ± 13926		107 ± 0	2394 ± 1649	772 ± 752

* 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 2011

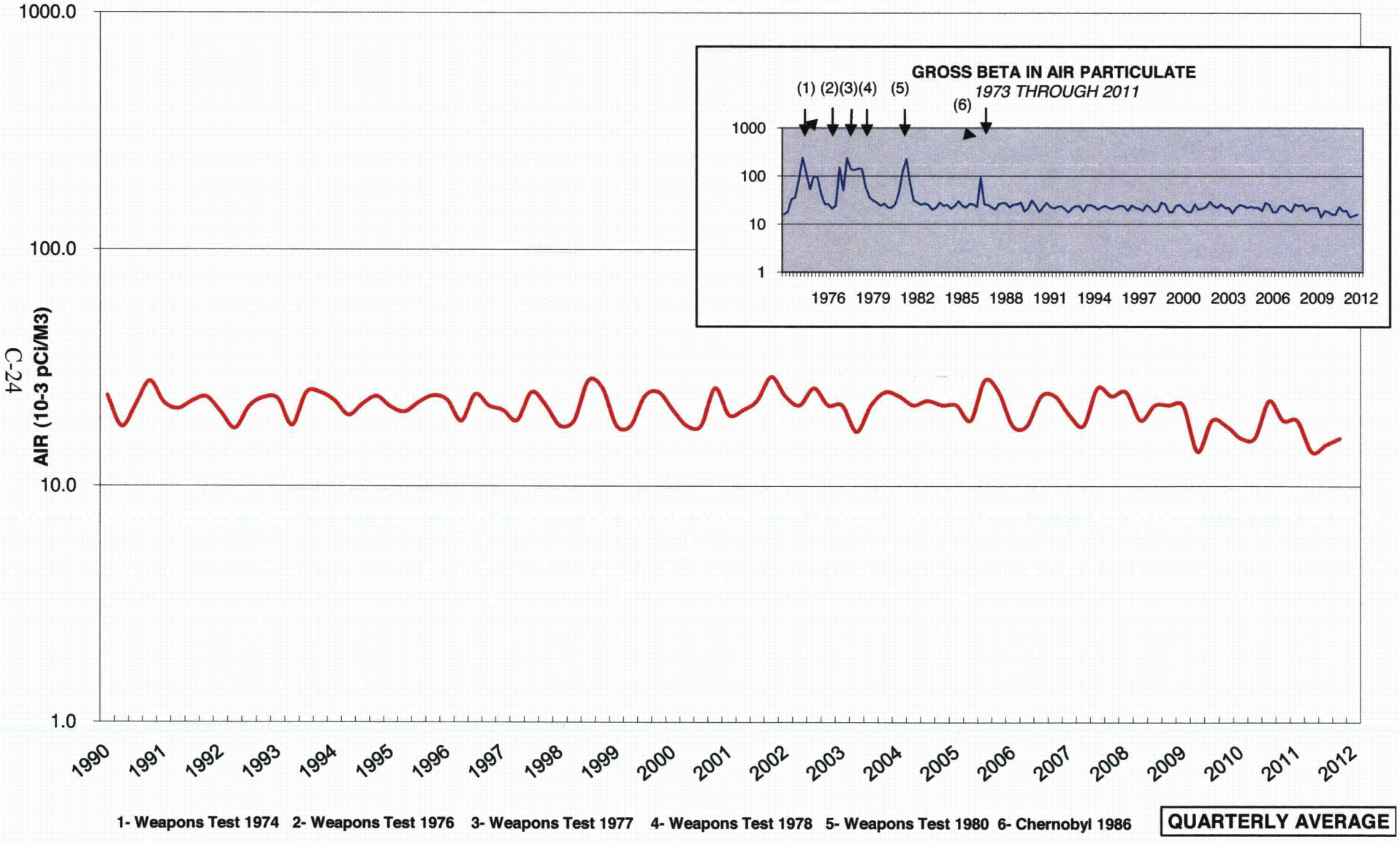
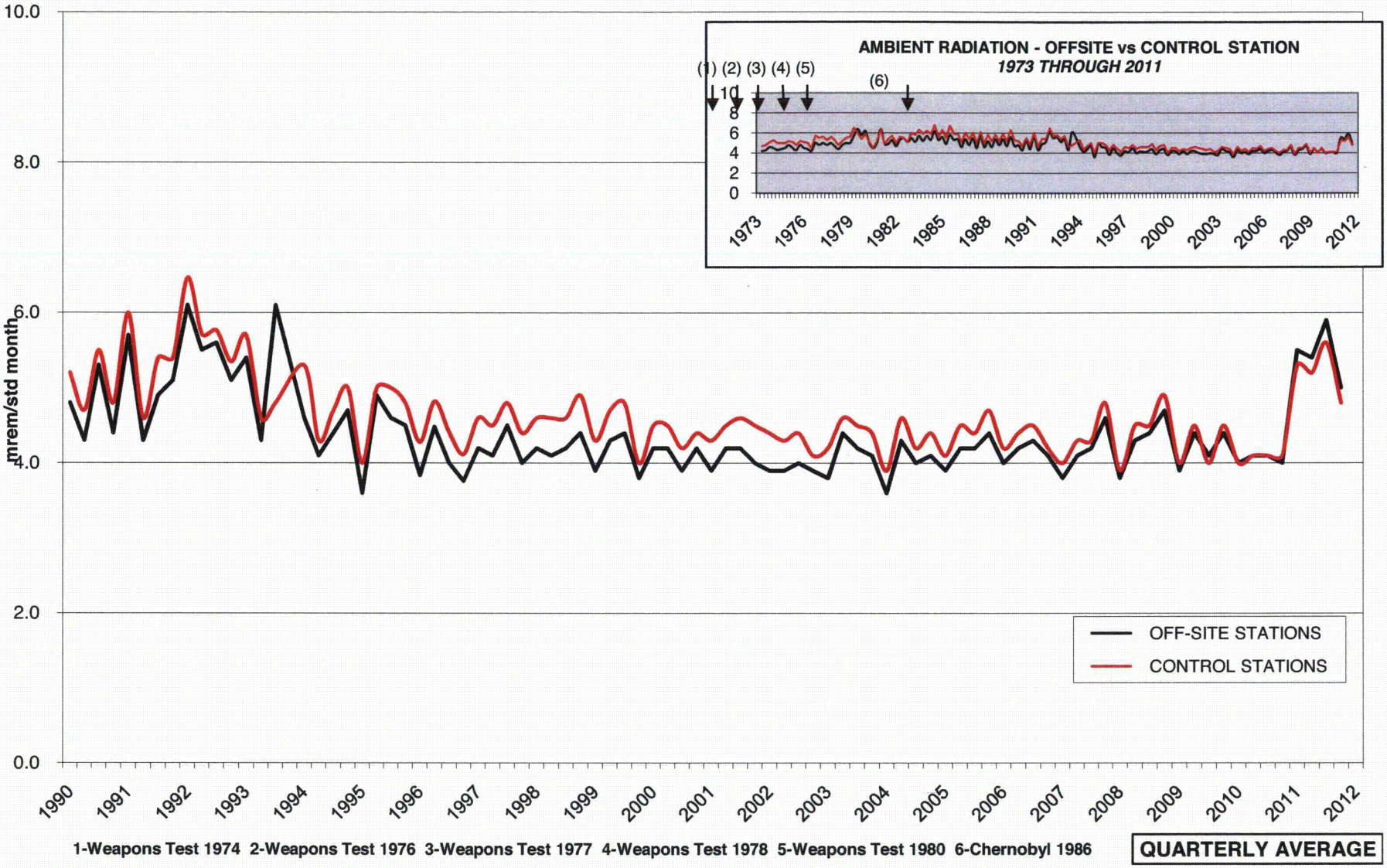


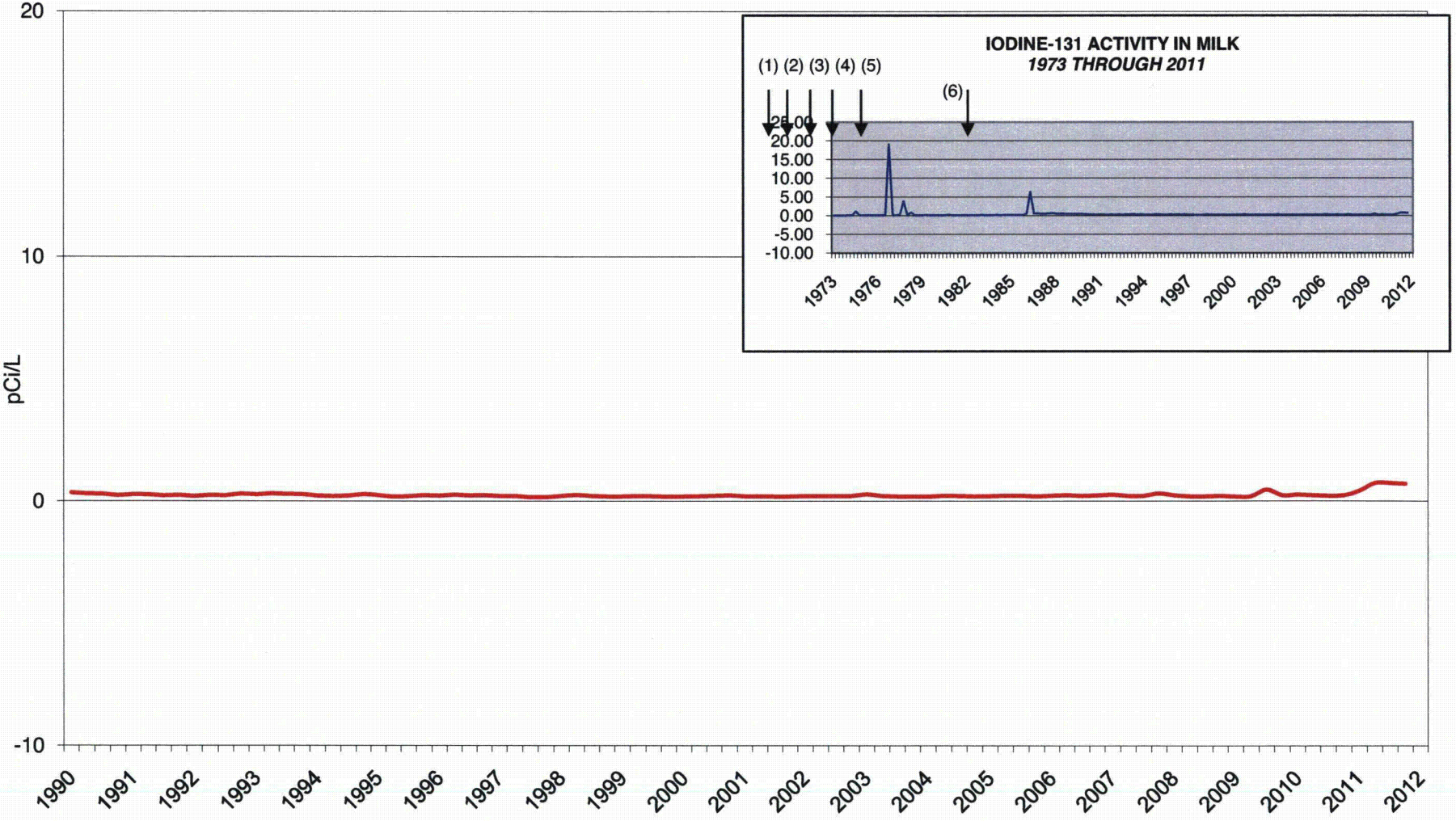
FIGURE 2
AMBIENT RADIATION - OFFSITE vs CONTROL STATION
1990 THROUGH 2011



1-Weapons Test 1974 2-Weapons Test 1976 3-Weapons Test 1977 4-Weapons Test 1978 5-Weapons Test 1980 6-Chernobyl 1986

QUARTERLY AVERAGE

FIGURE 3
IODINE - 131 ACTIVITY IN MILK
1990 THROUGH 2011



1-Weapons Test 1974 2-Weapons Test 1976 3-Weapons Test 1977 4-Weapons Test 1978 5-Weapons Test 1980 6-Chernobyl 1986

QUARTERLY AVERAGE

FIGURE 4
GROSS BETA ACTIVITY IN SURFACE WATER
1990 THROUGH 2011

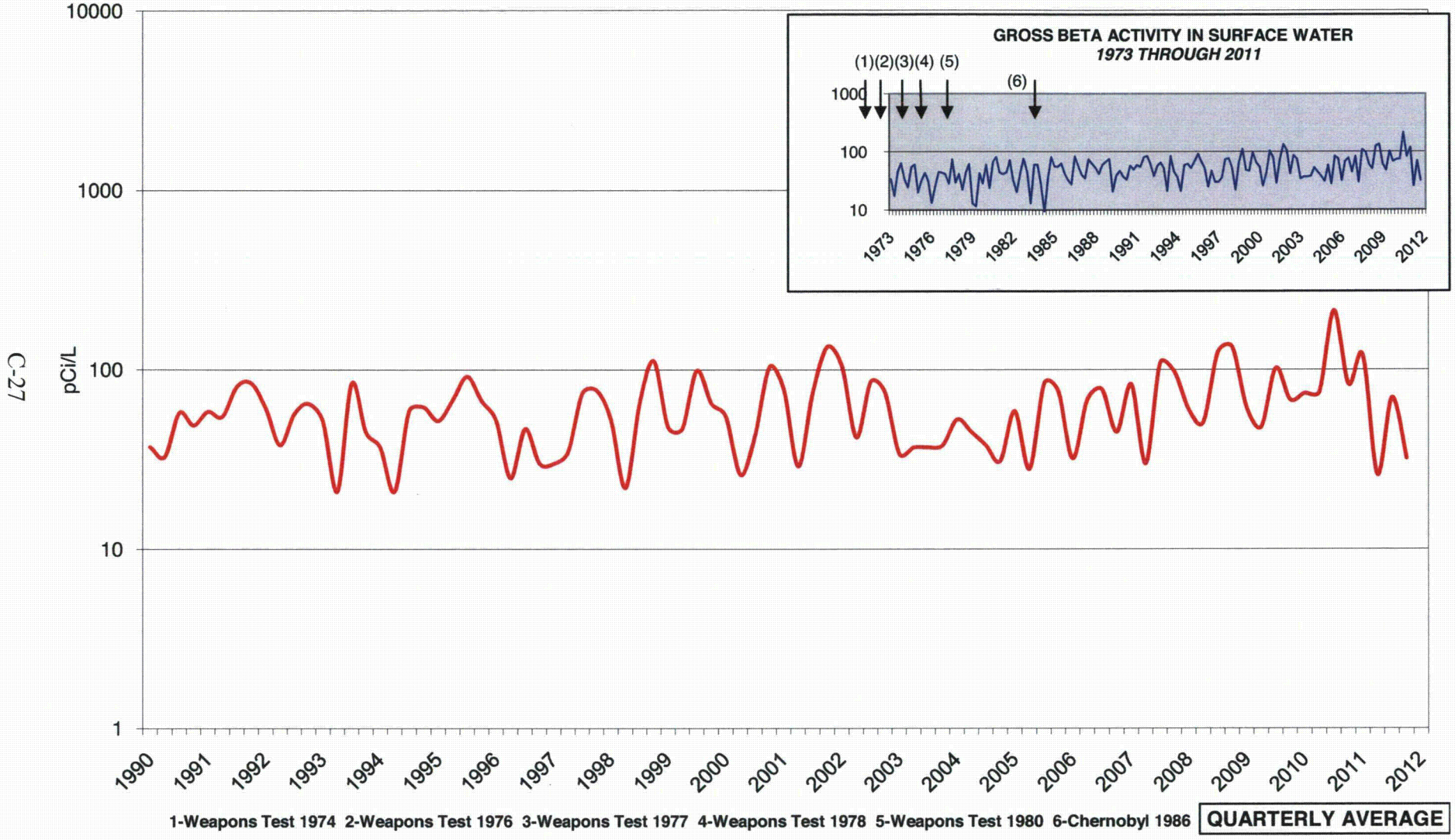
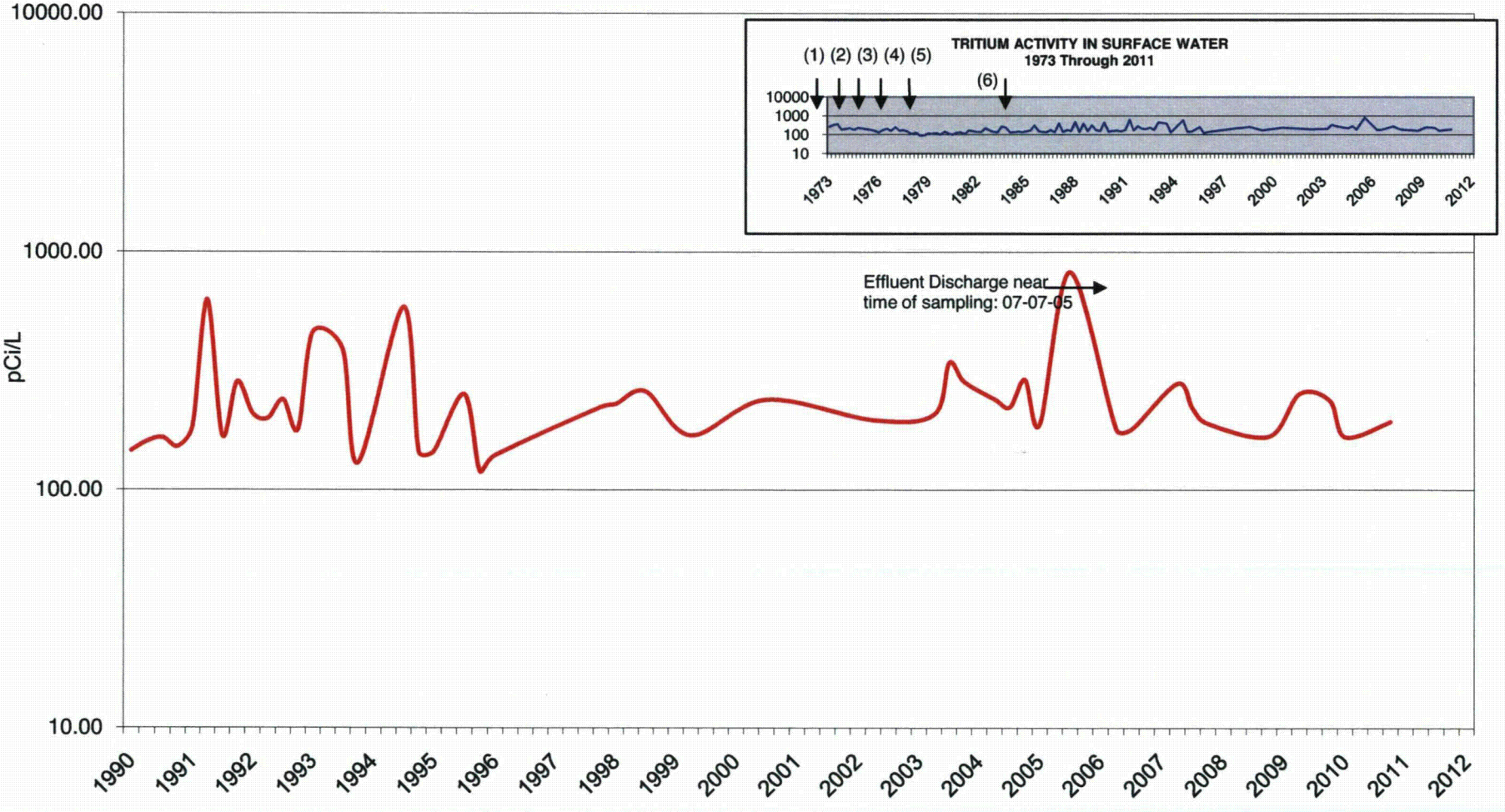


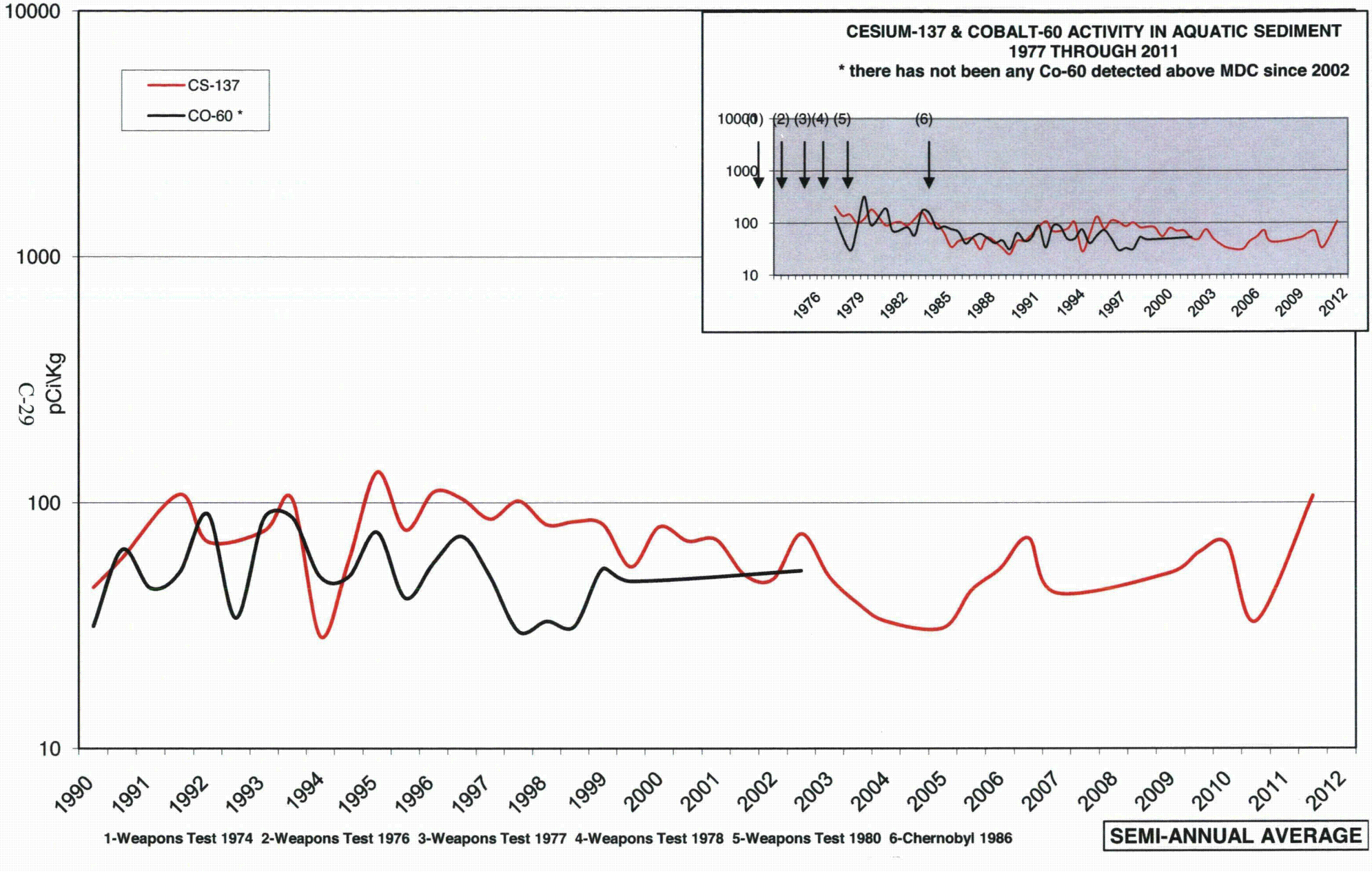
FIGURE 5
TRITIUM ACTIVITY IN SURFACE WATER
1990 THROUGH 2011



1-Weapons Test 1974 2-Weapons Test 1976 3-Weapons Test 1977 4-Weapons Test 1978 5-Weapons Test 1980 6-Chernobyl 1986

QUARTERLY AVERAGE

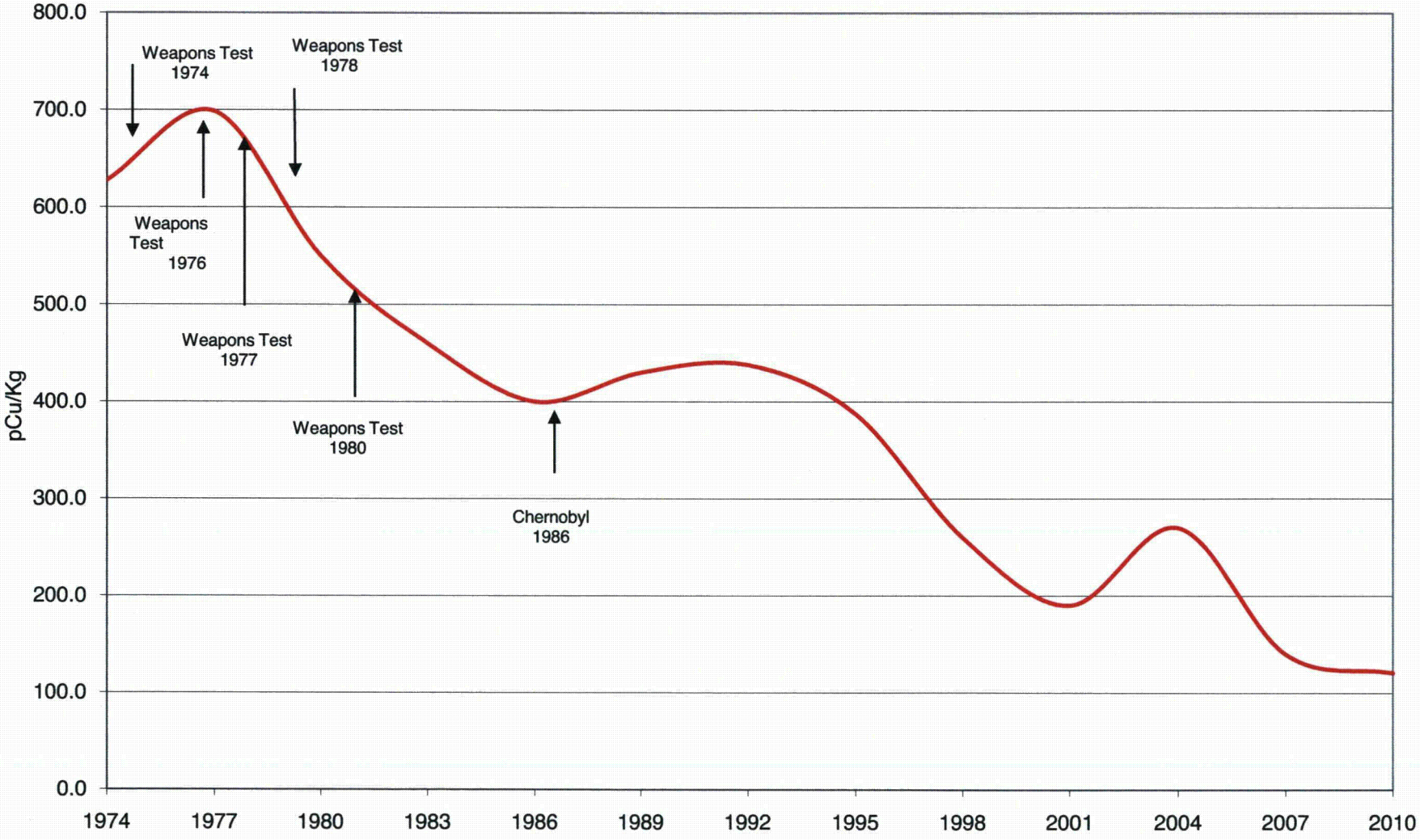
FIGURE 6
CESIUM-137 & COBALT-60 ACTIVITY IN AQUATIC SEDIMENT
1990 THROUGH 2011



1-Weapons Test 1974 2-Weapons Test 1976 3-Weapons Test 1977 4-Weapons Test 1978 5-Weapons Test 1980 6-Chernobyl 1986

SEMI-ANNUAL AVERAGE

FIGURE 7
CESIUM -137 ACTIVITY IN SOIL 1974 THROUGH 2010
(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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TABLE D-1 **ERA ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM**
MAPLEWOOD TESTING SERVICES, 2011
(PAGE 1 OF 1)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Control Limits	Evaluation (c)
January 2011	AB767	Water	Gr-A	pCi/L	78.0	62.5	32.7 - 77.5\	N (1)
			Gr-B	pCi/L	48.0	51.9	31.3 - 48.8	A
	H769	Water	H-3	pCi/L	3523	3460	2930 - 3820	A
	G768	Water	Ba-133	pCi/L	52.9	52.3	43.1 - 57.9	A
			Co-60	pCi/L	74.1	68.9	62.0 - 78.2	A
			Cs-134	pCi/L	56	56.2	45.4 - 61.8	A
			Cs-137	pCi/L	105.0	100.0	90.0 - 112	A
			Zn-65	pCi/L	165	153.0	138 - 180	A

(1) The detector was out of calibration on the high side (conservative). Associated samples were all non-detects.

(2) Sr-89 TBE to known ratio of 1.16 fell within acceptable range of ± 20%. No action required. NCR 11-16

(a) Teledyne Brown Engineering reported result.

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

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

TABLE D-2 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2011
(PAGE 1 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
March 2011	E7460-396	Milk	Sr-89	pCi/L	98.8	97.4	1.01	A
			Sr-90	pCi/L	15.2	15.8	0.96	A
	E7461-396	Milk	I-131	pCi/L	92.9	96.9	0.96	A
			Ce-141	pCi/L	not provided by Analytics for this study			
			Cr-51	pCi/L	398	298	1.34	N (1)
			Cs-134	pCi/L	130	130	1.00	A
			Cs-137	pCi/L	232	205	1.13	A
			Co-58	pCi/L	121	113	1.07	A
			Mn-54	pCi/L	289	266	1.09	A
			Fe-59	pCi/L	201	175	1.15	A
			Zn-65	pCi/L	287	261	1.10	A
			Co-60	pCi/L	186	172	1.08	A
	E7463-396	AP	Ce-141	pCi	not provided by Analytics for this study			
			Cr-51	pCi	243	215	1.13	A
			Cs-134	pCi	85.0	94.2	0.90	A
			Cs-137	pCi	168	148	1.14	A
			Co-58	pCi	89.2	81.8	1.09	A
			Mn-54	pCi	171	192	0.89	A
			Fe-59	pCi	129	126	1.02	A
			Zn-65	pCi	159	189	0.84	A
			Co-60	pCi	132	124	1.06	A
	E7462-396	Charcoal	I-131	pCi	96.5	96.3	1.00	A
June 2011	E7851-396	Milk	Sr-89	pCi/L	96.7	103	0.94	A
			Sr-90	pCi/L	13.8	15.6	0.88	A
	E7852-396	Milk	I-131	pCi/L	110	103.0	1.07	A
			Ce-141	pCi/L	68.1	79.9	0.85	A
			Cr-51	pCi/L	186	206	0.90	A
			Cs-134	pCi/L	164	190	0.86	A
			Cs-137	pCi/L	140	138	1.01	A
			Co-58	pCi/L	141	152	0.93	A
			Mn-54	pCi/L	136	138	0.99	A
			Fe-59	pCi/L	128	123	1.04	A
			Zn-65	pCi/L	263	261	1.01	A
			Co-60	pCi/L	189	195	0.97	A
	E7854-396	AP	Ce-141	pCi	49.9	42.9	1.16	A
			Cr-51	pCi	95.6	110	0.87	A
			Cs-134	pCi	104	102	1.02	A
			Cs-137	pCi	83.8	74.0	1.13	A
			Co-58	pCi	90.7	81.3	1.12	A
			Mn-54	pCi	74.5	73.9	1.01	A
			Fe-59	pCi	62.0	66.1	0.94	A
			Zn-65	pCi	140	140	1.00	A
			Co-60	pCi	119	104	1.14	A
	E7853-396	Charcoal	I-131	pCi	76.2	86.1	0.89	A

TABLE D-2 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2011
(PAGE 2 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
September 2011	E8070-396	Milk	Sr-89	pCi/L	102	90.8	1.12	A
			Sr-90	pCi/L	13.2	14.7	0.90	A
	E8071-396	Milk	I-131	pCi/L	74.2	89.2	0.83	A
			Ce-141	pCi/L	66.9	66.7	1.00	A
			Cr-51	pCi/L	249	226	1.10	A
			Cs-134	pCi/L	116	128	0.91	A
			Cs-137	pCi/L	106	114	0.93	A
			Co-58	pCi/L	95.4	97.5	0.98	A
			Mn-54	pCi/L	147	151	0.97	A
			Fe-59	pCi/L	53.1	54.8	0.97	A
			Zn-65	pCi/L	175	180	0.97	A
			Co-60	pCi/L	150	157	0.96	A
	E8073-396	AP	Ce-141	pCi	66.6	67.5	0.99	A
			Cr-51	pCi	263	229	1.15	A
			Cs-134	pCi	139	130	1.07	A
			Cs-137	pCi	110	115	0.96	A
			Co-58	pCi	108	98.6	1.10	A
			Mn-54	pCi	152	153	0.99	A
			Fe-59	pCi	57.5	55.5	1.04	A
			Zn-65	pCi	190	183	1.04	A
			Co-60	pCi	156	159	0.98	A
	E8072-396	Charcoal	I-131	pCi	77.6	80.6	0.96	A
December, 2011	E8230-396	Milk	Sr-89	pCi/L	93.3	93.1	1.00	A
			Sr-90	pCi/L	12.7	15.4	0.82	A
	E8231-396	Milk	I-131	pCi/L	82.5	90.2	0.91	A
			Ce-141	pCi/L	not provided by Analytics for this study			
			Cr-51	pCi/L	465	566	0.82	A
			Cs-134	pCi/L	142	171	0.83	A
			Cs-137	pCi/L	185	210	0.88	A
			Co-58	pCi/L	177	221	0.80	A
			Mn-54	pCi/L	208	241	0.86	A
			Fe-59	pCi/L	164	183	0.90	A
			Zn-65	pCi/L	259	291	0.89	A
			Co-60	pCi/L	224	270	0.83	A
	E8233-396	AP	Ce-141	pCi	not provided by Analytics for this study			
			Cr-51	pCi	344	368	0.93	A
			Cs-134	pCi	105	111	0.95	A
			Cs-137	pCi	129	137	0.94	A
			Co-58	pCi	145	144	1.01	A
			Mn-54	pCi	137	157	0.87	A
			Fe-59	pCi	119	119	1.00	A
			Zn-65	pCi	145	190	0.76	W
			Co-60	pCi	168	176	0.95	A

TABLE D-2 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2011
(PAGE 3 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
December 2011	E8232-396	Charcoal	I-131	pCi	100	89.5	1.12	A

(1) Sample appears to be biased high. Corrective Action evaluated after the 2nd Quarter Analytics PE sample; no action required. NCR 11-13

(a) Teledyne Brown Engineering reported result.

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

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

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

TABLE D-3 **ERA ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM**
TELEDYNE BROWN ENGINEERING, 2011
(PAGE 1 OF 1)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Control Limits	Evaluation (c)
May 2011	RAD-85	Water	Sr-89	pCi/L	59.8	63.2	51.1 - 71.2	A
			Sr-90	pCi/L	42.5	42.5	31.3 - 48.8	A
			Ba-133	pCi/L	73.3	75.3	63.0 - 82.8	A
			Cs-134	pCi/L	64.9	72.9	59.5 - 80.2	A
			Cs-137	pCi/L	74.6	77.0	69.3 - 87.4	A
			Co-60	pCi/L	87.8	88.8	79.9 - 100	A
			Zn-65	pCi/L	103	98.9	89.0 - 118	A
			Gr-A	pCi/L	64.1	50.1	26.1 - 62.9	N (1)
			Gr-B	pCi/L	51.8	49.8	33.8 - 56.9	A
			I-131	pCi/L	27.4	27.5	22.9 - 32.3	A
			U-Nat	pCi/L	38.5	39.8	32.2 - 44.4	A
			H-3	pCi/L	10057	10200	8870 - 11200	A
	MRAD-14	Filter	Gr-A	pCi/filter	79.7	74.3	38.5 - 112	A
November 2011	RAD-87	Water	Sr-89	pCi/L	81.0	69.7	56.9 - 77.9	N (2)
			Sr-90	pCi/L	35.5	41.4	30.2 - 47.2	A
			Ba-133	pCi/L	90.7	96.9	81.8 - 106	A
			Cs-134	pCi/L	36.6	33.4	26.3 - 36.7	A
			Cs-137	pCi/L	44.7	44.3	39.4 - 51.7	A
			Co-60	pCi/L	118.7	119	107 - 133	A
			Zn-65	pCi/L	80.2	76.8	68.9 - 92.5	A
			Gr-A	pCi/L	34.2	53.2	27.8 - 66.6	A
			Gr-B	pCi/L	39.3	45.9	30.9 - 53.1	A
			I-131	pCi/L	22.9	27.5	22.9 - 32.3	A
			U-Nat	pCi/L	46.8	48.6	39.4 - 54.0	A
			H-3	pCi/L	15733	17400	15200 - 19100	A
	MRAD-15	Filter	Gr-A	pCi/filter	44.6	58.4	30.3 - 87.8	A

(1) The solids on the planchet exceeded 100 mg, which was beyond the range of the efficiency curve. NCR 11-08

(2) Sr-89 TBE to known ratio of 1.16 fell within acceptable range of ± 20%. No action required. NCR 11-16

(a) Teledyne Brown Engineering reported result.

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

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

TABLE D-4 **DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)**
TELEDYNE BROWN ENGINEERING, 2011
(PAGE 1 OF 2)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Range	Evaluation (c)
March 2011	11-MaW24	Water	Cs-134	Bq/L	19.1	21.5	15.1 - 28.0	A
			Cs-137	Bq/L	29.0	29.4	20.6 - 38.2	A
			Co-57	Bq/L	0.139		(1)	A
			Co-60	Bq/L	23.9	24.6	17.2 - 32.0	A
			H-3	Bq/L	265	243	170 - 316	A
			Mn-54	Bq/L	31.8	31.6	22.1 - 41.1	A
			K-40	Bq/L	94.8	91	64 - 118	A
			Sr-90	Bq/L	9.64	8.72	6.10 - 11.34	A
			Zn-65	Bq/L	-0.142		(1)	A
	11-GrW24	Water	Gr-A	Bq/L	0.767	1.136	0.341 - 1.931	A
			Gr-B	Bq/L	3.43	2.96	1.48 - 4.44	A
	11-MaS24	Soil	Cs-134	Bq/kg	612	680	476 - 884	A
			Cs-137	Bq/kg	772	758	531 - 985	A
			Co-57	Bq/kg	910	927	649 - 1205	A
			Co-60	Bq/kg	500	482	337 - 627	A
			Mn-54	Bq/kg	0.607		(1)	A
			K-40	Bq/kg	569	540	378 - 702	A
			Sr-90	Bq/kg	NR	160	112 - 208	N (2)
			Zn-65	Bq/kg	1497	1359	951 - 1767	A
	11-RdF24	AP	Cs-134	Bq/sample	3.26	3.49	2.44 - 4.54	A
			Cs-137	Bq/sample	2.36	2.28	1.60 - 2.96	A
			Co-57	Bq/sample	3.30	3.33	2.33 - 4.33	A
			Co-60	Bq/sample	0.0765		(1)	A
			Mn-54	Bq/sample	2.84	2.64	1.85 - 3.43	A
			Sr-90	Bq/sample	NR	1.36	0.95 - 1.77	N (2)
			Zn-65	Bq/sample	3.30	3.18	2.23 - 4.13	A
	11-GrF24	AP	Gr-A	Bq/sample	0.101	0.659	0.198 - 1.120	N (3)
			Gr-B	Bq/sample	1.23	1.323	0.662 - 1.985	A
	11-RdV24	Vegetation	Cs-134	Bq/sample	4.97	5.50	3.85 - 7.15	A
			Cs-137	Bq/sample	0.0356		(1)	A
			Co-57	Bq/sample	10.8	9.94	6.96 - 12.92	A
			Co-60	Bq/sample	4.89	4.91	3.44 - 6.38	A
			Mn-54	Bq/sample	6.42	6.40	4.48 - 8.32	A
			Sr-90	Bq/sample	NR	2.46	1.72 - 3.20	N (2)
			Zn-65	Bq/sample	3.07	2.99	2.09 - 3.89	A
September 2011	11-MaW25	Water	Cs-134	Bq/L	16.0	19.1	13.4 - 24.8	A
			Cs-137	Bq/L	0.0043		(1)	A
			Co-57	Bq/L	33.1	36.6	25.6 - 47.6	A
			Co-60	Bq/L	26.9	29.3	20.5 - 38.1	A
			H-3	Bq/L	1011	1014	710 - 1318	A
			Mn-54	Bq/L	23.2	25.0	17.5 - 32.5	A
			K-40	Bq/L	147	156	109 - 203	A
			Sr-90	Bq/L	15.8	14.2	9.9 - 18.5	A
			Zn-65	Bq/L	27.3	28.5	20.0 - 37.1	A

TABLE D-4 DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)
TELEDYNE BROWN ENGINEERING, 2011
(PAGE 2 OF 2)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Range	Evaluation (c)
September 2011	11-GrW25	Water	Gr-A	Bq/L	0.894	0.866	0.260 - 1.472	A
			Gr-B	Bq/L	5.87	4.81	2.41 - 7.22	A
	11-MaS25	Soil	Cs-134	Bq/kg	-0.213		(1)	A
			Cs-137	Bq/kg	1110	979	685 - 1273	A
			Co-57	Bq/kg	1290	1180	826 - 1534	A
			Co-60	Bq/kg	731	644	451 - 837	A
			Mn-54	Bq/kg	987	848	594 - 1102	A
			K-40	Bq/kg	753	625	438 - 813	W
			Sr-90	Bq/kg	276	320	224 - 416	A
			Zn-65	Bq/kg	1870	1560	1092 - 2028	A
September 2011	11-RdF25	AP	Cs-134	Bq/sample	-0.043		(1)	A
			Cs-137	Bq/sample	3.09	2.60	1.82 - 3.38	A
			Co-57	Bq/sample	5.36	5.09	3.56 - 6.62	A
			Co-60	Bq/sample	3.41	3.20	2.24 - 4.16	A
			Mn-54	Bq/sample	0.067		(1)	A
			Sr-90	Bq/sample	1.84	1.67	1.17 - 2.17	A
			Zn-65	Bq/sample	5.17	4.11	2.88 - 5.34	W
	11-GrF25	AP	Gr-A	Bq/sample	0.0058		(1)	A
			Gr-B	Bq/sample	-0.01		(1)	A
	11-RdV25	Vegetation	Cs-134	Bq/sample	0.0081		(1)	A
			Cs-137	Bq/sample	4.94	4.71	3.30 - 6.12	A
			Co-57	Bq/sample	0.0639		(1)	A
			Co-60	Bq/sample	3.36	3.38	2.37 - 4.39	A
			Mn-54	Bq/sample	5.89	5.71	4.00 - 7.42	A
			Sr-90	Bq/sample	1.31	1.26	0.88 - 1.64	A
			Zn-65	Bq/sample	6.54	6.39	4.47 - 8.31	A

(1) False positive test.

(2) Evaluated as failed due to not reporting a previously reported analyte. NCR 11-11

(3) The filter for Gross Alpha was counted on the wrong side. Recounted on the correct side resulted in acceptable results. NCR 11-11

(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.

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APPENDIX E

RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM (RGPP)

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2011 Radiological Groundwater Protection Program (RGPP)

Table of Contents

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I. Introduction

This is the annual report on the status of the Radiological Groundwater Protection Program (RGPP) conducted at Salem and Hope Creek Generating Stations. This report covers the RGPP groundwater samples collected from the PSEG site in 2011. This report also describes any changes to this program and provides the radiochemical analysis results for groundwater samples collected during the 2011 reporting year. The 2006 PSEG Annual Radiological Environmental Operating Report (AREOR) was the first report that provided a description of the RGPP (PSEG, 2007). The 2006, 2007, 2008, 2009 and 2010 AREORs contained information and detailed descriptions of the RGPP in Appendix F (PSEG 2007, 2008, 2009, 2010, 2011). This report contains the results of the 2011 long-term groundwater-sampling program.

The RGPP was initiated by PSEG in 2006 to determine whether groundwater at and in the vicinity of Salem and Hope Creek Stations had been adversely impacted by any releases of radionuclides related to nuclear station operations, and to provide the mechanism to detect such releases if they occur in the future. The RGPP is a voluntary program implemented by PSEG in conjunction with the nuclear industry initiatives and associated guidance (NEI, 2007). Although it is designed to be a separate program, the RGPP complements the existing Radiological Environmental Monitoring Program and Radioactive Effluent Technical Specification Program. The RGPP is a component of the Site Integrated Tritium Management Program. The long-term groundwater-sampling program is one of the key elements of the RGPP that provides for early leak detection. The other key elements that comprise the RGPP and contribute to public safety are spill/leak prevention, effective remediation of spills and leaks, and effective stakeholder communication.

In 2002, operations personnel at Salem Generating Station identified a release of

radioactive liquids from the Unit 1 Spent Fuel Pool to the environment. PSEG developed a Remedial Action Work Plan (RAWP). This RAWP was reviewed by the United States Regulatory Commission (USNRC) and approved by the New Jersey Department of Environmental Protection (NJDEP) Bureau of Nuclear Engineering (NJDEP-BNE). In accordance with the RAWP, a Groundwater Recovery System (GRS) was installed and is in operation to remove the groundwater containing tritium. This system was designed to prevent the migration of the tritium plume towards the plant boundary. The GRS is fully discussed in the quarterly Remedial Action Progress Reports (RAPR) provided to the state and the U.S. Nuclear Regulatory Commission by PSEG. The information and data associated with the GRS is not included in the annual RGPP reports. It should be noted that five shared monitoring wells (Well IDs AL, T, U, Y and Z) are included in both the GRS monitoring and RGPP long-term sampling programs to ensure that the two programs are comprehensive and integrated.

II. Groundwater Pathways

PSEG's Salem and Hope Creek Generating Stations are located in a flat, largely undeveloped region of southern New Jersey. The Sites are bordered on the west and south by the Delaware River Estuary and on the east and north by extensive marshlands. Both of the stations obtain cooling water from the Delaware River Estuary and discharge it back to this Estuary.

The site is underlain by over 1,000 feet of inter-layered sand, silt and clay. The Salem and Hope Creek sites derive potable and sanitary water from deep wells in the Potomac-Raritan-Magothy (PRM) formations, greater than 600 feet below the surface.

There are no potable wells off-site within at least one mile. The nearest potable supply well is located 3.65 miles away in the state of Delaware. In the vicinity of

the site there are no public water supply wells or private wells that can be impacted by radionuclides associated with nuclear station operations.

A. Objectives for the Radiological Groundwater Protection Program

The long-term sampling program objectives are as follows:

1. Identify suitable locations to monitor and evaluate potential impacts from station operations before significant radiological impact to the environment or potential drinking water sources can occur.

2. Understand the local hydro-geologic regime in the vicinity of the station and maintain up-to-date knowledge of flow patterns on the surface and shallow subsurface.

3. Evaluate systems, structures, components, and work practices which have the potential to allow a release of licensed radioactive material to the groundwater.

4. Perform routine water sampling from strategic locations and evaluate radiochemical analysis results.

5. Report new leaks, spills, or other detections with potential radiological significance to stakeholders in a timely manner.

5. Regularly evaluate analytical results to identify adverse trends.

6. Take necessary corrective actions to protect groundwater resources.

III. Long-term Groundwater Sampling Program Description

A. Sample Collection

This section describes the general sampling methodologies used to collect water samples from monitoring wells for the Salem and Hope Creek Generating Stations RGPP. In 2006, 26 RGPP monitoring wells (Tables 1 and 2, Monitoring Well Construction Details) were installed and developed for both Salem and Hope Creek as described in the Site Investigation Report (ARCADIS, 2006A and 2006B). In 2010 two additional monitoring wells were installed at Hope Creek (Wells BY and BZ) as investigatory tools (PSEG, 2010) but are not part of the RGPP. Groundwater samples are collected from all RGPP monitoring wells at a minimum frequency of semi-annually, with additional monitoring conducted as appropriate. Test Engineers and Laboratory Technicians from PSEG Maplewood Testing Services (MTS) collect the groundwater samples. Sampling protocols are consistent with USEPA and NJDEP guidance; a modified low-flow sampling methodology is used. This methodology is consistent with protocols established for the Salem GRS investigation. In May 2006, after the Site Hydrological Investigation was completed, the long-term groundwater-sampling program was initiated. The program includes sampling all 26 wells at least semi-annually.

The Hope Creek RGPP monitoring wells are nominally sampled semi-annually (BL, BT, BO, BP, BR and BS), quarterly (BM, BN and BQ), and monthly (BH, BI, BJ, and BK). The Salem RGPP monitoring wells are nominally sampled semi-annually (BA, BB, BC, BD, BE, BF, BG and BU), quarterly (AL, T and U), and monthly (Y and Z). The sampling frequencies that are specified in the RGPP procedures may be modified by the PSEG RGPP Manager for purposes of adaptive management of the RGPP. However, sampling and analysis shall not occur less frequently than semi-annually.

1. Program Deviations

PSEG procedures specify analysis of Strontium-90 on an annual basis. Due to miscommunication with the analytical laboratory Strontium analyses were not generally performed in 2011. The wells are scheduled for Strontium analysis in spring 2012.

2. New Wells at Salem Generating Station

As discussed in the 2010 REOR (PSEG, 2011), in November 2010 ten new wells were installed at Salem Generating Station in response to the Salem Unit 2 tritium release from the Plant Vent to the storm drain system, in an effort to better understand the hydrology associated with the subsurface cofferdam at Salem and potential impacts to groundwater. Wells DA, DB, DC, DD, DE, DF, DG, DH, DI, and DJ are located around Salem Unit 2 in areas surrounding the Fuel Handling Building, containment, and main steam mixing bottle. These wells have been incorporated into the Salem Unit 1 GRS Remedial Action Work Plan under the oversight of the NJDEP-BNE to integrate the investigatory activities.

B. Sample Analysis

This section describes the general analytical methodologies used to analyze the water samples for radioactivity for the Salem and Hope Creek Generating Stations RGPP. Groundwater samples were analyzed for plant-related gamma emitting radionuclides (semi-annually) and tritium (every sample) by a radiochemical analytical laboratory. In order to achieve the stated RGPP objectives, the long-term groundwater-sampling program includes the following measurements and analyses:

- Concentrations of gamma emitting radionuclides in water by gamma spectroscopy.

- Concentrations of tritium in water by filtration/distillation and liquid scintillation.

The tritium analysis results reported in Table 4 were obtained from PSEG MTS laboratory located in Maplewood, NJ and Teledyne Brown Engineering (TBE) Laboratory located in Knoxville, TN. The gamma spectroscopy analysis results are obtained from Teledyne Brown Engineering. Analytical laboratories are subject to internal quality assurance programs and inter-laboratory cross-check programs. The TBE laboratory participates in an inter-laboratory cross-check program.

Station personnel review and evaluate all analytical data deliverables obtained from these laboratories upon receipt (typically within 30 days after the water samples are received by the laboratory). Since the second quarter of 2011, all tritium analyses are performed by TBE. The MTS laboratory is no longer performing RGPP tritium analyses.

C. Data Evaluation

This section describes the method used to evaluate the analytical results for RGPP samples obtained at the Salem and Hope Creek Generating Stations. Analytical data results are reviewed for adverse trends or anomalous data. Investigations and notification are made as required by RGPP program procedures. The radiological data for groundwater collected since inception of the RGPP program was statistically evaluated to develop a baseline with which current operational data are compared. Several factors are important in the interpretation and evaluation of the radiological data:

1. Lower Limit of Detection

The lower limit of detection (LLD) is specified by federal regulation as a minimum

sensitivity value that must be achieved routinely by the analytical method. The LLD is defined as 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.

The environmental LLD is specified for the detectablity of each isotope that may be produced by Salem or Hope Creek stations in the Offsite Dose Calculation Manual (ODCM). A fact of particular interest to the industry, state and public is the LLD of tritium of which the station ODCM LLD is 3,000 pCi/L in water. The station procedure was modeled after the ODCMs for environmental LLDs; however, for the RGPP tritium analyses are performed with the lower LLD of 200 pCi/L.

During 2011, 34 tritium samples were above the LLDs. Of these, only one was for a sample that was above the LLD and then by less than 5% (207 pCi/L). The remaining deviations from the defined RGPP tritium LLDs were the result of higher concentrations of tritium in the samples (above the LLD).

Deviations for sample analysis include the failure to meet LLDs on several analyses, primarily for Barium-Lanthium-140 (BA-LA-140) and Iodine-131 (I-131). The cause for the missed LLDs was an extended hold time between sample collection and analysis. The sample transfer will be expedited to meet the specified LLDs.

There is no regulatory impact, as the radiological ground water protection program is a voluntary industry initiative.

2. Laboratory Measurements Uncertainty

Statistically, the exact value of a measurement is expressed as a range with a

stated level of confidence. The convention is to report results with a 95% level of confidence. The uncertainty comes from the counting system measurement, calibration standards, sample volume or weight measurements, sampling uncertainty and other factors.

Analytical uncertainties are reported at the 95% confidence level in this RGPP report to be consistent with the uncertainties reported in the AREOR for the REMP.

3. Groundwater Data Quality Analysis

Groundwater samples generally consist of at least four aliquots. One of the groundwater sample aliquots is submitted to the respective station's onsite chemistry laboratory for tritium and gamma spectroscopy analysis. If these screening analyses indicated that tritium concentrations are below 10,000 pCi/L and no plant-related gamma emitters were present, then the samples are released for shipment to the offsite environmental laboratory. The on-site Chemistry laboratory's screening analysis for all 2011 RGPP groundwater samples were below 10,000 pCi/L for tritium and no plant-related gamma emitters were present above the associated effluent LLDs specified in the ODCM.

The second sample aliquot is sent to the MTS or TBE Laboratory for tritium analysis. If gamma analysis is to be performed, the third sample aliquot is submitted to the TBE Laboratory for gamma spectroscopy analysis.

The fourth sample aliquot is held as a back-up sample until all the analytical results were received and determined to be valid. In the event that the results were believed to be questionable or sample results were lost, the back-up sample would be submitted for analysis. In addition, this back-up sample can be used to verify any elevated analytical result.

All radionuclide results are compared to the limitations within the RGPP:

- Internal Administrative Control Limits are defined within the RGPP procedures. They are developed based on a statistical analysis of the historical baseline concentrations of tritium in each specific well and are used to identify tritium concentrations that warrant further investigation for that specific well. Exceeding Administrative Control Limits does not initiate any external reporting.

- Courtesy Communication Control Limit is a tritium concentration established below regulatory requirements based on agreements with NJDEP-BNE and/or USNRC and other stakeholders, to ensure the stakeholders are cognizant. PSEG has verbally agreed to provide a courtesy communication by telephone no later than the end of the next business day to NJDEP-BNE for any RGPP confirmed tritium result that exceeds 3,000 pCi/L. The NRC Site Resident is also informed. This is not a regulatory required communication.

- Voluntary Communication Limits are established for concentrations of radionuclides that require voluntary communication and reporting to regulators and/or stakeholders based on NEI 07-07 and the ODCM.

- The Reporting Level is the concentration of plant produced radioactive material in an environmental sampling medium (averaged over any calendar quarter) from a specified location that requires a 30-day written report to the Nuclear Regulatory Commission and is identified in the ODCM.

IV. Results and Discussion

The locations of the RGPP monitoring wells are illustrated on the maps for Hope Creek and Salem in Figures 1 and 2, respectively. The Monitoring Well

Construction Details for Hope Creek and Salem including monitoring interval below ground surface are provided in Table 1, Hope Creek RGPP Monitoring Wells, Construction Details and Table 2, Salem RGPP Monitoring Wells, Construction Details. The relevant radiological groundwater parameters used to evaluate the groundwater data are provided in Table 3, Relevant Groundwater Evaluation Criteria: Salem and Hope Creek Generating Stations.

The 2011 Groundwater Tritium Analytical Results for Salem and Hope Creek Generating Stations are shown in Table 4.

A. Groundwater Results

Samples were collected from RGPP monitoring wells during 2011 in accordance with the station and MTS procedures for the radiological groundwater protection program.

The Site Conceptual Model was revalidated and the Site Investigation Report was updated in 2011. No changes to the RGPP were appropriate based on these updates.

The MTS Laboratory in Maplewood, NJ analyzed the groundwater samples for tritium. The TBE Laboratory in Knoxville, TN analyzed the groundwater samples for tritium and plant-related gamma emitters. Analytical results and anomalies, if any, are discussed below. Since the second quarter of 2011, all tritium analyses are performed by TBE.

1. Third Quarter 2011 Tritium Event

From July through September 2011, tritium was detected at an increased concentration in most RGPP wells. Some of these concentrations exceeded the administrative limits and initiated both courtesy communications and

investigation. A series of hypotheses were developed and investigated. The contract hydrogeologist (Arcadis) performed an evaluation of the event. Based on their hypotheses analysis, the most likely cause of the increased tritium concentrations was the result of the accelerated precipitation recapture due to number and magnitude of rain events. During July 8, 2011, over a five hour period (1300-1800 hrs), 1.78 in of rainfall was measured. In August 2011, approximately 14.5 inches of precipitation accumulated at Artificial Island. Normal August mean monthly precipitation (as recorded from 1895 through 2011 is 4.5 inches. During a 36-hour period from August 13 to August 14, 2011, approximately 6.9 inches of rain accumulated. Also, Hurricane Irene passed over Artificial Island from August 27 to August 28, 2011 and, during a 36- hour period, approximately 5.3-inches of rain accumulated.

The nuclear industry and PSEG's recapture study have detected tritium in water vapor and rainwater around plants coincident with permitted gaseous releases of tritium. Through a number of evaluations the industry has identified that permitted gaseous releases of tritium can be recaptured from the atmosphere as water vapor and precipitation downwind. The potential pathways followed by tritium at the site were evaluated. Based on observed tritium exchange between atmospheric water vapor and liquid water it appears that tritium was routinely exchanged from the atmosphere into the liquid water in the vadose zone. During average precipitation accumulation timeframes, this rain water with elevated tritium concentrations would flow slowly down into the groundwater. During the abnormally high precipitation accumulation during the third quarter of 2011 and specifically during August 2011, the rain water with elevated tritium concentrations was flushed from the vadose zone and flowed rapidly through shallow groundwater and was detected in the Riverbed Deposits monitored by the RGPP wells. Subsequent sampling events detected tritium at the historical concentration ranges indicating tritium concentrations have returned to baseline and equilibrated in the subsurface.

2. Tritium Concentrations at Hope Creek Generating Station

The results of the laboratory analysis indicate that tritium was not detected, i.e., reported at a concentration below the RGPP LLD of 200 pCi/L, in five RGPP monitoring wells at the Hope Creek site. The tritium concentrations measured at wells BP, BQ, BR, BS, and BT were all less than the LLD of 200 pCi/L during 2011 as shown on Table 4.

- Tritium was detected at well BH at a maximum of 2,030 pCi/L during the third quarter event and in the range of 223 pCi/L to 868 pCi/L during the remainder of the 2011 sampling period. Well BH is located down gradient of the Condensate Storage Tank (CST) near the southwest protected area boundary and is a perimeter well.

- Tritium was detected at well BI at a maximum of 1,630 pCi/L during the third quarter event and in the range of <200 pCi/L to 367 pCi/L during the remainder of the 2011 sampling period. Well BI is located due west of the reactor containment and is a sentinel (source) well for facilities and buried piping.

- Tritium was detected at well BJ at a maximum of 1,680 pCi/L during the third quarter event and in the range of 411 pCi/L to 790 pCi/L during the remainder of the 2011 sampling period. Well BJ is also located down gradient of the CST and is a sentinel (source) well for the CST.

- Tritium was detected at well BK at a maximum of 3,690 pCi/L during the third quarter event and in the range of <200 pCi/L to 731 pCi/L during the remainder of the 2011 sampling period. Well BK is also located due west of the reactor containment and is a perimeter well.

- Tritium was detected at well BM at a maximum of 2,380 pCi/L during the

third quarter event and in the range of <200 pCi/L to 371 pCi/L during the remainder of the 2011 sampling period. Well BM is located west of the abandoned Unit 2 reactor building and is a sentinel (source) well for facilities and buried piping.

- Tritium was detected at Well BN in the range of 205 pCi/L to 492 pCi/L. Well BN is located northeast of the Materials Control Center and is a sentinel (source) well for the Auxiliary Boiler building and buried piping.

- Tritium was detected at well BO at a maximum of 2,370 pCi/L during the third quarter event and in the range of 342 pCi/L to 448 pCi/L during the remainder of the 2011 sampling period. Well BO is located northwest of the Materials Center and is a perimeter well.

In accordance with station procedures, a sample analysis result that is above the administrative limit is re-sampled for a confirmatory analysis. The administrative limits for all station wells were developed by statistical analysis of the historical well data.

These low concentrations of tritium were evaluated and determined to not be indicative of an adverse trend as shown in Figure 4 - Hope Creek Tritium Trends. The third quarter August 2011 tritium event was investigated and determined to be caused by natural phenomena (excessive precipitation) impacting the recaptured tritium. With the exception of the third quarter tritium event, there were no analytical results for which a Courtesy Communication (greater than 3,000 pCi/L tritium) was required as part of the RGPP. The tritium concentrations in these wells are being monitored and trended and have since returned to their normal levels.

No plant-related gamma emitters were detected in any RGPP well sampled in 2011. Naturally occurring Potassium-40 was detected in several of the wells

sampled during 2011.

3. Tritium at Salem Generating Station

The results of the laboratory analysis indicate that tritium was not detected, i.e., reported at a concentration below the RGPP LLD of 200 pCi/L, in three RGPP monitoring wells at the Salem site. The tritium concentrations measured at wells T, BF, and BU were all less than the LLD of 200 pCi/L during 2011 as shown on Table 4.

- Tritium was detected at well AL at a maximum of 2,310 pCi/L during the third quarter event and in the range of 446 pCi/L to 545 pCi/L during the remainder of the 2011 sampling period. Well AL is located south of the Salem Unit 1 reactor building and is a sentinel (source) well.

- Tritium was detected at well BA at a maximum of 355 pCi/L during the third quarter event and at <200 pCi/L during the remainder of the 2011 sampling period. Well BA is located south of the reactor buildings, near the main fuel oil tank and is a perimeter well.

- Tritium was detected at well BB at a maximum of 4,090 pCi/L during the third quarter event and in the range of <200 pCi/L to 260 pCi/L during the remainder of the 2011 sampling period. Well BB is located along the shoreline just north of the Circulating Water Intake Structure and is a perimeter well.

- Tritium was detected at well BC at a maximum of 2,100 pCi/L during the third quarter event and in the range of 250 pCi/L to 846 pCi/L during the remainder of the 2011 sampling period. Well BC is a sentinel (source)/perimeter well located southwest of Facilities, Refueling Water

Storage Tank, Auxiliary Feedwater Storage Tank and Primary Water Storage Tank (RAP) tanks and piping.

- Tritium was detected at well BD at a maximum of 897 pCi/L during the third quarter event and in the range of 320 pCi/L to 447 pCi/L during the remainder of the 2011 sampling period. Well BD is located to the west of Salem Unit 2 reactor building and is a sentinel (source) well for Facilities, RAP tanks, and piping.

- Tritium was detected at well BE at a maximum of 1,370 pCi/L during the third quarter event and in the range of <200 pCi/L to 452 pCi/L during the remainder of the 2011 sampling period. Well BE is located to the west of Salem Unit 2 reactor building and is a perimeter well.

- Tritium was detected at well BG at a maximum of 1,560 pCi/L during the third quarter event and in the range of 450 pCi/L to 791 pCi/L during the remainder of the 2011 sampling period. Well BG is located northwest of Salem Unit 2 reactor building and is a perimeter well.

- Tritium was detected at well U at a maximum of 307 pCi/L during the third quarter event and in the range of 223 pCi/L to 479 pCi/L during the remainder of the 2011 sampling period. Well U is located north of Salem Unit 2 reactor building and is a sentinel (source) well for the House Heating Boilers.

- Tritium was detected at well Y at a maximum of 3,210 pCi/L during the third quarter event and in the range of <200 pCi/L to 541 pCi/L during the remainder of the 2011 sampling period. Well Y is located west of Salem Units 1&2 reactor buildings and is a perimeter well.

- Tritium was detected at well Z at a maximum of 3,820 pCi/L during the third quarter event and in the range of <200 pCi/L to 513 pCi/L during the

remainder of the 2011 sampling period. Well Z is located west of Salem Units 1&2 reactor buildings and is a perimeter well.

These low concentrations of tritium were evaluated and determined not to be indicative of an adverse trend as shown in Figure 5 – Salem Tritium Trends. The third quarter tritium event was investigated and determined to be caused by natural phenomena (excessive precipitation) impacting the recaptured tritium. With the exception of the third quarter tritium event, there were no analytical results for which Courtesy Communication (greater than 3,000 pCi/L tritium) was required as part of the RGPP. The tritium concentrations in these wells are being monitored and trended.

No plant-related gamma emitters were detected in any RGPP well sampled in 2011. Naturally occurring Potassium-40 was detected in several of the wells sampled during 2011.

B. Investigations

PSEG has implemented an evaluation of the potential for tritium recapture from permitted releases. The program is on-going. Several of the Hope Creek RGPP wells which were designed as vault (flush mounted wells) were converted to stick mount (above ground level) in December 2010. The rationale behind this is that the vault mounted wells in low lying areas may collect rainwater runoff. Some tritium, which is release as a permitted discharge via the Salem and Hope Creek plant vents, may be re-captured during rain events and then washed into the vaults of the RGPP wells. Conversion of these wells has removed the vaults and places the height of the well opening at approximately 3-4 feet above ground surface, thus removing the potential pooling of rainwater in the vault and around the well shaft.

C. RGPP 2011 Status

The RGPP long-term sampling program will be modified as required in 2012 to adaptively manage the program to meet the RGPP objectives. Baseline sampling and analysis of groundwater will continue on the following schedule:

- Tritium will be analyzed at least semi-annually each calendar year to an LLD of 200 pCi/L;
- Plant-related gamma emitters will be analyzed semi-annually to the Environmental LLDs specified in the ODCM;
- Programs will be enhanced in 2012 to ensure specified LLDs are met and all parameters identified in station procedures are analyzed at the appropriate frequency;
- Alignment has been initiated with TBE on alternative analytical protocols for I-131 to meet the ODCM specified LLD;
- Strontium will be analyzed annually;
- RGPP monitoring well sample frequency will be adjusted based on analytical results, but in no event less than semi-annually.

D. Impacts to Groundwater: Past Spills and Leaks

Historical unplanned and unmonitored releases on site are listed in Table 5, Salem and Hope Creek 10CFR50.75 (g) Data. In addition, the Investigation section of this appendix summarizes the tritium investigations ongoing in 2011. There are currently no known active releases into the groundwater at Salem or Hope Creek Stations.

In conclusion, the operation of Salem and Hope Creek Stations has had minimal adverse radiological impact on the environment from unmonitored or unplanned releases of radionuclides.

V. References

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5. PSEG, 2007. 2006 Annual Radiological Environmental Operating Report, January 1 to December 31, 2006, Salem Generating Station Unit 1 and 2 and Hope Creek Generating Station, April 2007.
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8. PSEG, 2010. 2009 Annual Radiological Environmental Operating Report, January 1 to December 31, 2009, Salem Generating Station Unit 1 and 2 and Hope Creek Generating Station, April 2010.
9. PSEG, 2011. 2010 Annual Radiological Environmental Operating Report, January 1 to December 31, 2010, Salem Generating Station Unit 1 and 2 and Hope Creek Generating Station, April 2011.

Table 1. Hope Creek RGPP Monitoring Wells: Construction Details

Well ID	Installation Date	Construction Details	Diameter (inches)	Total Depth (feet bgs)	Monitoring Interval (feet bgs)	MP Elevation (feet RPD)	MP Elevation (feet RPD)	Monitoring Purpose	Source Targets
Well BH	May-06	Sch-40 PVC	4	37.0	27 - 37	97.92	8	Perimeter	NA
Well BI	May-06	Sch-40 PVC	4	38.5	28.5 - 38.5	99.6	9.68	Source	Facilities; Piping
Well BJ	May-06	Sch-40 PVC	4	38.0	28 - 38	100.23	10.31	Source	Condensate Storage & Transfer; Facilities; Piping
Well BK	May-06	Sch-40 PVC	4	38.5	28.5 - 38.5	98.19	8.27	Perimeter	NA
Well BL	May-06	Sch-40 PVC	4	35.0	25 - 35	99.71	9.79	Perimeter	NA
Well BM	May-06	Sch-40 PVC	4	38.0	28 - 38	99.76	9.84	Source	Facilities; Piping
Well BN	May-06	Sch-40 PVC	4	12.5	7.5 - 12.5	102.64	12.72	Source	Auxiliary Boiler Building; Piping
Well BO	May-06	Sch-40 PVC	4	36.0	26 - 36	97.98	8.06	Perimeter/Source	Building Sewage
Well BP	May-06	Sch-40 PVC	4	38.0	28 - 38	99.06	9.14	Perimeter/Source	Building Sewage
Well BQ	May-06	Sch-40 PVC	4	42.0	32 - 42	102.16	12.24	Source	Auxiliary Boiler Building; Dry Cask Storage Building; Piping
Well BR	May-06	Sch-40 PVC	4	40.5	30.5 - 40.5	104.28	14.36	Perimeter/Source	Piping; Dry Cask Storage Building
Well BS	May-06	Sch-40 PVC	4	35.0	25 - 35	100.55	10.63	Upgradient	NA
Well BT	May-06	Sch-40 PVC	4	38.5	28.5 - 38.5	99.60	9.68	Upgradient	NA

Notes:

MP	Measuring Point
bgs	Below ground surface
RPD	Relative to plant datum
msl	Relative to mean sea level (NAVD 1988)
NA	Not applicable
NAD 83	North American Datum 1983

Table 2. Salem RGPP Monitoring Wells: Construction Details

Well ID	Installation Date	Construction Details	Diameter (inches)	Total Depth (feet bgs)	Monitoring Interval (feet bgs)	MP Elevation (feet RPD)	MP Elevation (feet RPD)	Monitoring Purpose	Source Targets
Well T	Jun-03	Sch-40 PVC	2	31.2	21.2 - 31.2	104.13	14.21	Source	Facilities; House Heating Blr
Well U	May-03	Sch-40 PVC	2	32.2	27.2 - 32.2	98.57	8.65	Source	Facilities; House Heating Blr
Well Y	Sep-03	Sch-40 PVC	2	37.0	27.0 - 35.0	101.81	11.89	Perimeter	NA
Well Z	Sep-03	Sch-40 PVC	2	37.5	27.5 - 37.5	101.86	11.94	Perimeter	NA
Well AL	Jan-04	Sch-40 PVC	2	25.3	15.3 - 25.3	99.13	9.21	Perimeter	NA
Well BA	May-06	Sch-40 PVC	4	39.5	29.5 - 39.5	101.07	11.15	Perimeter	NA
Well BB	May-06	Sch-40 PVC	4	47.0	37 - 47	99.38	9.46	Perimeter	NA
Well BC	May-06	Sch-40 PVC	4	38.0	28 - 38	98.78	8.86	Source / Perimeter	Facilities; RAP Tanks; Piping
Well BD	May-06	Sch-40 PVC	4	40.5	30.5 - 40.5	98.78	8.86	Source	Facilities; RAP Tanks; Piping
Well BE	May-06	Sch-40 PVC	4	37.0	27 - 37	98.31	8.39	Perimeter	NA
Well BF	May-06	Sch-40 PVC	4	42.5	32.5 - 42.5	99.11	9.19	Perimeter	NA
Well BG	May-06	Sch-40 PVC	4	37.0	27 - 37	100	10.08	Perimeter	NA
Well BU	May-06	Sch-40 PVC	4	36.0	26 - 36	100.16	10.24	Upgradient	NA

Notes:

MP	Measuring Point
bgs	Below ground surface
RPD	Relative to plant datum
msl	Relative to mean sea level (NAVD 1988)
NA	Not applicable
NAD 83	North American Datum 1983

Table 3. Relevant Groundwater Evaluation Criteria: Salem and Hope Creek Generating Stations

Isotope	RGPP LLD (pCi/L)	PSEG ODCM Reporting Level (pCi/L)
Tritium	200	30,000
Total Strontium	2.0	8
Mn-54	15	1000
Fe-59	30	400
Co-60	15	300
Zn-65	30	300
Nb-95	15	400
Zr-95	15	200
Cs-134	15	30
Cs-137	18	50
Ba-140	60	200
La-140	15	200

Table 4. Analytical Results for Tritium in Groundwater

Well ID	Sample Date	Result	Units	Well ID	Sample Date	Result	Units
WELL BA	06/13/11	<200	pCi/L	WELL BG	06/07/11	791	pCi/L
	08/24/11	355	pCi/L		08/05/11	1560	pCi/L
	10/07/11	<200	pCi/L		08/24/11	1460	pCi/L
	11/03/11	<200	pCi/L		10/11/11	507	pCi/L
					11/08/11	450	pCi/L
WELL BB	01/20/11	260	pCi/L				
	06/13/11	<200	pCi/L	WELL BH	01/25/11	836	pCi/L
	08/24/11	1240	pCi/L		02/11/11	482	pCi/L
	09/01/11	4150	pCi/L		03/17/11	333	pCi/L
	10/07/11	<200	pCi/L		04/15/11	404	pCi/L
	11/03/11	<200	pCi/L		05/23/11	310	pCi/L
					06/21/11	224	pCi/L
WELL BC	01/21/11	846	pCi/L		07/25/11	907	pCi/L
	06/07/11	250	pCi/L		08/30/11	2030	pCi/L
	07/29/11	250	pCi/L		09/30/11	372	pCi/L
	09/01/11	2100	pCi/L		11/08/11	223	pCi/L
	10/11/11	649	pCi/L				
	11/08/11	362	pCi/L	WELL BI	01/25/11	<200	pCi/L
	12/28/11	383	pCi/L		02/11/11	231	pCi/L
					03/17/11	367	pCi/L
WELL BD	01/21/11	320	pCi/L		04/15/11	342	pCi/L
	06/07/11	354	pCi/L		05/23/11	243	pCi/L
	08/24/11	897	pCi/L		07/25/11	1630	pCi/L
	10/11/11	447	pCi/L		08/30/11	1420	pCi/L
	11/08/11	414	pCi/L		09/30/11	<200	pCi/L
					11/08/11	<200	pCi/L
WELL BE	01/21/11	301	pCi/L				
	6/7/2011	270	pCi/L	WELL BJ	01/25/11	790	pCi/L
	08/05/11	1370	pCi/L		02/11/11	600	pCi/L
	08/24/11	365	pCi/L		03/17/11	761	pCi/L
	10/11/11	<200	pCi/L		04/15/11	467	pCi/L
	11/08/11	347	pCi/L		05/23/11	425	pCi/L
	12/28/11	452	pCi/L		06/21/11	411	pCi/L
					07/25/11	1680	pCi/L
WELL BF	06/07/11	<200	pCi/L		08/30/11	1600	pCi/L
	08/24/11	<200	pCi/L		09/30/11	556	pCi/L
	10/11/11	<200	pCi/L		11/08/11	449	pCi/L
	11/08/11	<200	pCi/L				

Table 4. Analytical Results for Tritium in Groundwater (cont'd)

Well ID	Sample Date	Result	Units	Well ID	Sample Date	Result	Units
WELL BK	01/25/11	731	pCi/L	WELL BS	06/23/11	<200	pCi/L
	02/11/11	407	pCi/L		11/15/11	<200	pCi/L
	03/17/11	332	pCi/L				
	04/15/11	215	pCi/L	WELL BT	06/23/11	<200	pCi/L
	05/23/11	184	pCi/L		11/15/11	<200	pCi/L
	06/21/11	335	pCi/L				
	07/25/11	3690	pCi/L	WELL BU	06/23/11	<200	pCi/L
	08/30/11	1610	pCi/L		09/09/11	<200	pCi/L
	09/30/11	410	pCi/L		10/13/11	<200	pCi/L
	11/08/11	370	pCi/L		11/15/11	<200	pCi/L
					12/22/11	<200	pCi/L
WELL BL	02/11/11	<200	pCi/L				
	05/23/11	<200	pCi/L	WELL BY	01/25/11	1480	pCi/L
	11/08/11	<200	pCi/L		02/11/11	1340	pCi/L
					03/17/11	996	pCi/L
WELL BM	02/11/11	<200	pCi/L		04/15/11	847	pCi/L
	03/17/11	222	pCi/L		05/23/11	882	pCi/L
	05/23/11	<200	pCi/L		07/25/11	2190	pCi/L
	07/25/11	2260	pCi/L		08/30/11	1400	pCi/L
	08/30/11	2380	pCi/L		09/30/11	1120	pCi/L
	09/30/11	371	pCi/L		11/08/11	1630	pCi/L
	11/08/11	261	pCi/L				
				WELL BZ	01/25/11	323	pCi/L
WELL BN	03/22/11	492	pCi/L		02/11/11	377	pCi/L
	05/26/11	253	pCi/L		03/17/11	611	pCi/L
	11/15/11	205	pCi/L		04/15/11	528	pCi/L
					05/23/11	536	pCi/L
WELL BO	06/23/11	448	pCi/L		07/25/11	3320	pCi/L
	08/05/11	2370	pCi/L		08/30/11	2890	pCi/L
	11/15/11	342	pCi/L		09/30/11	412	pCi/L
					11/08/11	491	pCi/L
WELL BP	06/23/11	<200	pCi/L				
	11/15/11	<200	pCi/L	WELL AL	01/20/11	448	pCi/L
					03/04/11	516	pCi/L
WELL BQ	03/22/11	<200	pCi/L		06/13/11	476	pCi/L
	05/26/11	<200	pCi/L		08/05/11	2310	pCi/L
	11/08/11	<200	pCi/L		08/31/11	1480	pCi/L
					09/10/11	466	pCi/L
WELL BR	06/23/11	<200	pCi/L		10/07/11	446	pCi/L
	11/15/11	<200	pCi/L		11/17/11	479	pCi/L
					12/20/11	545	pCi/L

Table 4. Analytical Results for Tritium in Groundwater (cont'd)

Well ID	Sample Date	Result	Units
WELL T	01/13/11	<207	pCi/L
	06/07/11	<200	pCi/L
	09/10/11	<200	pCi/L
	10/11/11	<200	pCi/L
	11/08/11	<200	pCi/L
WELL U	01/13/11	290	pCi/L
	06/07/11	223	pCi/L
	09/10/11	307	pCi/L
	10/11/11	309	pCi/L
	11/08/11	479	pCi/L
	12/28/11	361	pCi/L
WELL Y	01/20/11	<200	pCi/L
	02/18/11	<200	pCi/L
	03/29/11	<200	pCi/L
	04/27/11	<200	pCi/L
	05/26/11	<200	pCi/L
	06/13/11	<200	pCi/L
	07/29/11	<200	pCi/L
	08/31/11	3210	pCi/L
	09/27/11	541	pCi/L
	10/07/11	<200	pCi/L
	11/03/11	<200	pCi/L
	12/13/11	<200	pCi/L
WELL Z	01/20/11	446	pCi/L
	02/18/11	346	pCi/L
	03/29/11	326	pCi/L
	04/27/11	288	pCi/L
	05/26/11	263	pCi/L
	06/13/11	<200	pCi/L
	07/29/11	385	pCi/L
	08/31/11	3820	pCi/L
	09/27/11	503	pCi/L
	10/07/11	457	pCi/L
	11/03/11	513	pCi/L
	12/13/11	400	pCi/L

Table 5. Salem and Hope Creek 10CFR 50.75(g) Data

Spill/Discharge	Quantity Spilled / Discharged	Location of Spill/Discharge	Description
Apr-95	~ 88 millicuries	Hope Creek and Salem	Steam from the Decon Solution Evaporator released from Hope Creek's South Plant Vent
Jan-02		Unit 1 RWST	Salem Unit 1 RWST Nozzle Leak
Sep-02	~5 Ci	Ground west of Unit 1 Spent Fuel Building	Blockage of the Spent Fuel Pool liner's "tell-tales" caused backup of contaminated water through building seams
Mar-04	Co-60	North Side of Salem Circulating Water House	Corroded Pipe Cracked
Jan-05	No discharge to the environment	Hope Creek rooms 3133, 3135, 3129 and 5102	Water from inside the Waste Sludge Phase Separator Tank Room appeared to be leaking through the crack in the wall
July-05	5.2 microcuries	Hope Creek 54' Diesel Building	Overflow of plant system contained within the building.
Aug-06		Southside of Salem House Heating Boiler	Leaking Valve
May-07	2.8 microcuries of Cs 137	In front of Salem Unit 2 condensate polisher	Burst site glass during operation. Resin blown through wall into switchyard
Nov-10	0.3 microcuries of Cs 137	At the pedestal steps Salem Unit 2 containment	Attributed to Fallout

Figure 1 - Hope-Creek RGPP Monitoring Well Locations

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Figure 2 - Salem RGPP Monitoring Well Locations

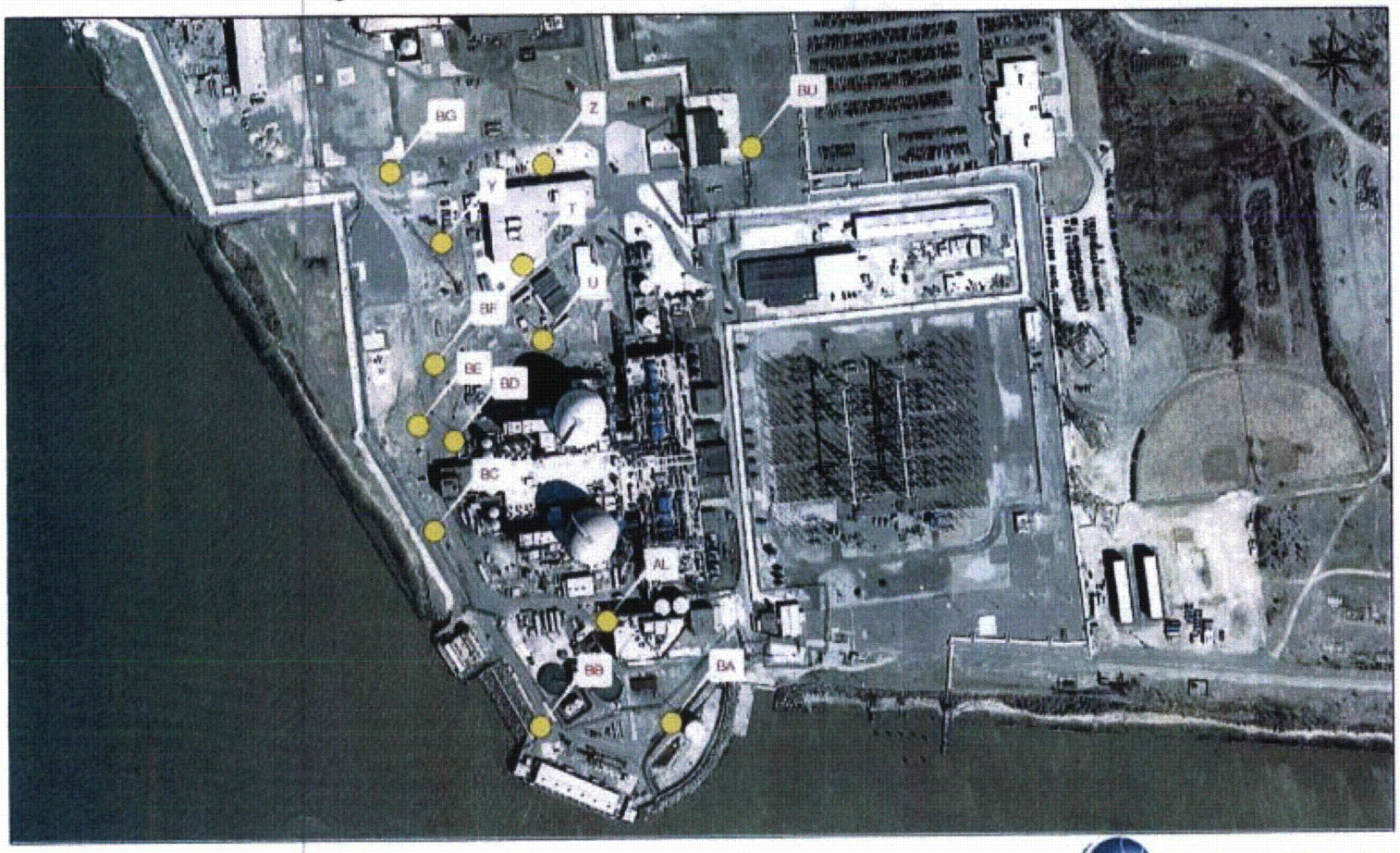

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Figure 3 - Hope Creek Tritium Trends

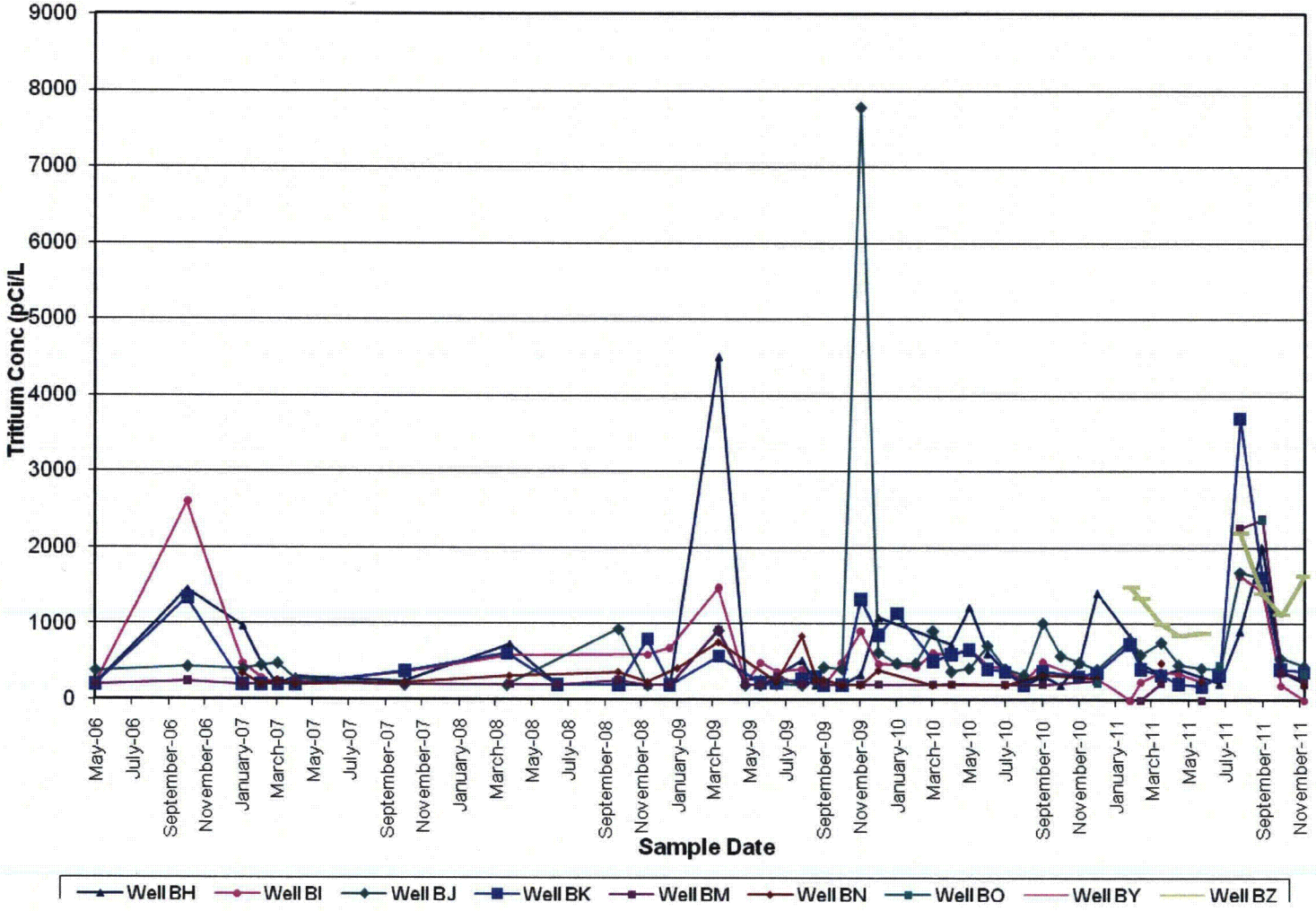

Figure 4 - Salem Tritium Trends