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

APR 2 9 2013

LR-N13-0094

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

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

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

Subject: 2012 Annual Radiological Environmental Operating Report

As required by Section 6.9.1.7 of Appendix A to Facility Operating Licenses DPR-70 and DPR-75 for Salem Generating Station Unit Nos. 1 and 2, and Section 6.9.1.6 of Appendix A to the Operating License NPF-57 for Hope Creek Generating Station, PSEG Nuclear hereby transmits one copy of the combined 2012 Annual Radiological Environmental Operating Report. This report summarizes the results of the radiological environmental surveillance program for 2012 in the vicinity of the Salem and Hope Creek Generating Stations. The result of this program for 2012 was specifically compared to the result of the pre-operational program.

There are no regulatory commitments contained in this correspondence.

JE25
NRR

If you have any questions or comments on this transmittal, please contact Jeffrey Pantazes at (856) 339-7900.

Sincerely,

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Attachment - 2012 Annual Radiological Environmental Operating Report

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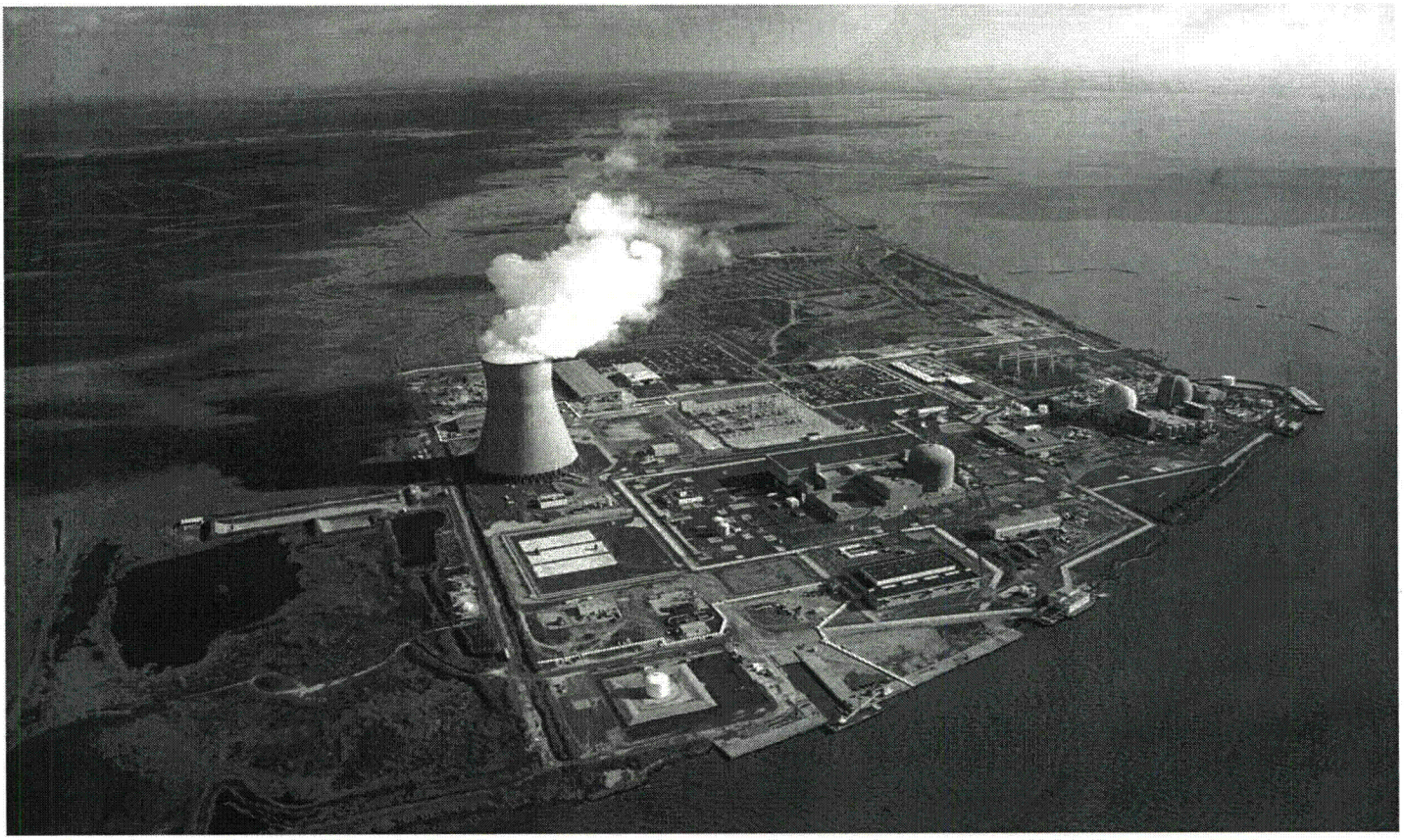
Salem Commitment Coordinator (X25) w/o Attachment

Corporate Commitment Coordinator (N21) w/o Attachment

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM



SALEM & HOPE CREEK GENERATING STATIONS

2012 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

JANUARY 1 TO DECEMBER 31, 2012

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I. Summary

During normal operations of a nuclear power generating station there are permitted releases of small amounts of radioactive material to the environment. To monitor and determine the effects of these releases a Radiological Environmental Monitoring Program (REMP) has been established around the Salem Generating Station (SGS) and Hope Creek Generating Station (HCGS). The results of the REMP are published annually, providing a summary and interpretation of the data collected [10].

Public Service Enterprise Group's (PSEG) Maplewood Testing Services (MTS) was responsible for the collection of environmental samples during 2012. Teledyne Brown Engineering (TBE) was responsible for the analysis of environmental samples during 2012. The results are discussed in this report. Landauer provided the dosimetry services for PSEG through the first half of the reporting year 2012 and Mirion Technologies provided dosimetry services through the last half of the reporting year 2012.

The REMP was conducted in accordance with the SGS and HCGS' Technical Specifications (TS) and the respective station Offsite Dose Calculation Manual (ODCM) [14, 15, 17, 21]. The Lower Limit of Detection (LLD) values required by the Technical Specifications and SGS and HCGS' ODCM were achieved for the 2012 reporting period. The REMP objectives were also met during this period. The data that was collected in 2012 assists in demonstrating that SGS and HCGS' were operated in compliance with Technical Specifications and SGS AND HCGS' 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.

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 passive dosimeters.

To demonstrate compliance with Technical Specifications and SGS AND HCGS' 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 SGS AND HCGS' ODCM (Section 3/4.11), 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 combined 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 1506 analyses on 1170 environmental samples during 2012. Of the total number of analyses and environmental samples, direct radiation dose measurements were made using 195 sets of direct reading

dosimeters

In addition to the naturally - occurring isotopes (i.e. Be-7, K-40, Ra-Nat and Th-232),

Cesium-137 was detected on the vegetables in one of the on-site gardens. Soil samples obtained from this garden had similar concentrations of Cs-137, up to 200 pCi/kg, which is the typical concentration found in soil as the result of atmospheric nuclear bomb testing. Since there have not been any releases of gaseous cesium from either Salem or Hope Creek, the data indicates that the soil contaminated the broadleaf vegetation. The on-site gardens are encased in small boxes to prevent animals from foraging. These planting boxes were flooded during Hurricane Sandy. The samples are not washed and were reported as being covered by significant quantities of dirt. The maximum bounding dose from the contamination would be 0.40 mrem assuming that an individual consumed 26 kg of the vegetation.

Dose measurements made with quarterly passive dosimeters at offsite locations around the SGS/HCGS site averaged 62 milliroentgen for the year 2012. The average of the dose measurements at the control locations (background) was slightly less at 61 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.

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

II. The Radiological Environmental Monitoring Program

Lower Alloways Creek Township, Salem County, New Jersey is the site of SGS and HCGS. Salem Generating Station consists of two operating pressurized water nuclear power reactors. Salem Unit One has a net rating

of 1180 megawatt electric (MWe) and Salem Unit Two has a net rating of 1178 MWe. The licensed core power for both units is 3460 megawatt thermal (MWt). Hope Creek Generating

Station is a boiling water nuclear power reactor, which has a net rating of 1216 MWe (3840 MWt).

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 2012 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, 2012, 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 the SGS and HCGS' ODCMs.

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 River Bay 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) away from the generating stations. Fluctuations in the levels of radionuclides and direct radiation at indicator stations are evaluated with respect to analogous fluctuations at control stations. Indicator and control station data are also evaluated relative to preoperational data.

3. Appendix A, Program Summary, describes and summarizes the analytical results in accordance with Section 6.9.1.7 of the Salem Technical Specifications and Section 6.9.1.6 of the Hope Creek Technical Specifications [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 LLD is an "a priori" number which represents the capability of the measurement system.

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

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

The dosimetry at location SA-IDM-2F2 was missing during the quarterly exchange. Its replacement was moved around the corner to a nearby location, less susceptible to vandalism. The dosimeters have not been located, so there are no 4th quarter dosimetry results for this location.

When the beef farmer was contacted in September for the annual 2012 survey, he stated that he had some frozen meat samples from the spring. Because of the age of the sample, the LLD for the I-131 could not be met.

Due to an incorrect setting on gamma detector 08, 3.29 rather than 4.66 was used in the MDC calculation. Nonconformance 13-07 was initiated and corrective actions have been implemented to address this issue. All samples counted on detector 08 were reprocessed using the correct calculation. As a result, all MDCs for these samples have increased by 41.6%. The previously reported activities and uncertainties were not affected. In some cases, the increased MDC resulted in missed LLDs. All samples with MDCs affected by this issue are listed below. The samples with missed BaLa-140 LLDs are shown in the table. All other required LLDs were met.

CLIENT ID	START DATE	END DATE	MATRIX	BALA-140	
				REQUIRED MDC	REVISED MDC
SA-FPB-3E1	04/01/12	04/01/12	animal		
2Q12 SA-APT-14G1	04/02/12	07/02/12	air particulate		
4Q12 SA-APT-5S1	10/01/12	01/02/13	air particulate		
SA-FPL-15S1	12/13/12	12/13/12	food product		
SA-FPL-15S1	12/13/12	12/13/12	vegetables		
SA-FPV-2F9	07/23/12	07/23/12	vegetables		
SA-FPV-1G1	07/23/12	07/23/12	vegetables		
SA-FPV-3H5	07/31/12	07/31/12	vegetables		
SA-MLK-14F4	01/02/12	01/03/12	milk	<15	<15.2.
SA-MLK-3G1	02/05/12	02/06/12	milk		
SA-MLK-13E3	04/15/12	04/16/12	milk	<15	<15.5
SA-MLK-3G1	05/06/12	05/07/12	milk		
SA-MLK-14F4	05/21/12	05/21/12	milk		
SA-MLK-3G1	07/08/12	07/09/12	milk		
SA-MLK-3G1	08/05/12	08/06/12	milk		
SA-MLK-14F4	09/09/12	09/10/12	milk	<15	<18.8
SA-MLK-14F4	10/31/12	11/01/12	milk	<15	<19.9
SA-MLK-13E3	11/11/12	11/12/12	milk		
SA-MLK-13E3	11/25/12	11/26/12	milk	<15	<17.9
SA-MLK-14F4	12/09/12	12/10/12	milk		
SA-PWR-2F3	03/01/12	03/31/12	potable water raw		
SA-PWR-2F3	04/01/12	04/30/12	potable water raw		
SA-PWR-2F3	05/01/12	05/31/12	potable water raw		
SA-PWR-2F3	06/01/12	06/30/12	potable water raw		
SA-PWR-2F3	07/01/12	07/31/12	potable water raw		
SA-PWR-2F3	08/01/12	08/31/12	potable water raw		
SA-PWT-2F3	10/01/12	10/31/12	potable wate treated		
SA-WWA-3E1	10/24/12	10/24/12	groundwater		
SA-SWA-11A1	03/06/12	03/06/12	surface water	<15	<15.4
SA-SWA-16F1	05/11/12	05/11/12	surface water		
SA-SWA-1F2	07/03/12	07/03/12	surface water	<15	<16.9
SA-SWA-16F1	08/06/12	08/06/12	surface water		
SA-SWA-16F1	09/06/12	09/06/12	surface water		
SA-SWA-16F1	10/01/12	10/01/12	surface water		
SA-SWA-1F2	11/06/12	11/06/12	surface water	<15	<19.49

C. Program Changes

The area monitor dosimetry vendor was changed from Landauer to Mirion Technologies in July 2012. The new vendor uses a Thermoluminescent Dosimeter (TLD). The direct radiation readings are now portrayed as mRad/standard quarter instead of the previous

mRad/standard month to align with the draft of the ANSI N545 standard.

D. Quality Assurance Program

Teledyne Brown Engineering

The quality of the results obtained by TBE is ensured by the implementation of the Quality Assurance Program as described in the Teledyne Brown Engineering Quality Assurance Manual [11d] and the Teledyne Brown Engineering Procedure Manual [11e].

E. Summary of Results – Inter-laboratory Comparison Program

The testing laboratory analyzed Performance Evaluation (PE) samples of air particulate, air iodine, milk, soil, vegetation and water matrices, as appropriate, for 18 analytes. (Appendix D, Tables D-1 through D-3

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

1. Analytics Evaluation Criteria

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

2. ERA Evaluation Criteria

   ERA's evaluation report provides an acceptance range for control and warning limits with associated flag values. ERA's acceptance limits are established per the United States

Environmental Protection Agency (USEPA), National Environmental Laboratory Conference (NELAC) performance testing (PT) program requirements or ERA's standard operating procedure (SOP) for the Generation of Performance Acceptance Limits, as applicable. The acceptance limits are either determined by a regression equation specific to each analyte or a fixed percentage limit promulgated under the appropriate regulatory document.

3. DOE Evaluation Criteria

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

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

Teledyne Brown Engineering

For the TBE laboratory, 12 out of 18 analytes met the specified acceptance criteria. Six analytes (Co-60, Gross Alpha, Gross Beta, Sr-89, Sr-90 and Zn-65) did not meet the specified acceptance criteria for the following reason:

1. Teledyne Brown Engineering's MAPEP March 2012 Co-60 in soil result of 7.61 Bq/kg was higher than the known value of 1.56 Bq/kg, resulting in a found to known ratio of 4.88 on a sensitivity evaluation. Nonconformance report (NCR) 12-08

was initiated to investigate this failure. No cause could be found for the failure. TBE is monitoring the Co-60 in soil analyses on a case-to-case basis.

2. Teledyne Brown Engineering's MAPEP March 2012 Zn-65 in air particulate result of 4.19 Bq/sample was higher than the known value of 2.99 Bq/sample, exceeding the upper control limit of 3.89 Bq/sample. NCR 12-08 was initiated to investigate this failure. No cause could be found for the failure and is considered an anomaly specific to the MAPEP sample. The first and second quarter 2012 Analytics air particulate Zn-65 analyses were acceptable.

3. Teledyne Brown Engineering's MAPEP September 2012 Sr-90 in water result of 19.6 pCi/L was higher than the known value of 12.2 pCi/L, exceeding the upper control limit of 15.9 pCi/L. NCR 12-11 was initiated to investigate this failure. An incorrect aliquot was entered into Laboratory Information Management System (LIMS). Using the correct aliquot, the result would have fallen within the acceptance range.

4. Teledyne Brown Engineering's ERA May 2012 Gross Alpha in water result of 82.4 pCi/L was higher than the known value of 62.9 pCi/L, which exceeded the upper control limit of 78.0 pCi/L. Nonconformance report 12-05 was initiated to investigate this failure. The G-1 detector is slightly biased high for Th-230 based measurements. The G-1 detector is used only for ERA samples. The detector was recalibrated.

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

46.7 pCi/L. Nonconformance report 12-13 was initiated to investigate this failure. The rerun result of 44.8 fell within the control limits. It appears an incorrect aliquot was entered into LIMS.

6. Teledyne Brown Engineering's ERA November 2012 Sr-89 in water result of 46.5 pCi/L was higher than the known value of 39.1 pCi/L, which exceeded the upper control limit of 46.1 pCi/L. Nonconformance report 12-13 was initiated to investigate this failure. The found to known ratio was 1.19, which TBE considers acceptable with warning.

IV. Results and Discussion

The analytical results of the 2012 REMP samples are divided into categories based on exposure pathways: atmospheric, direct radiation, terrestrial, and aquatic. The analytical results for the 2012 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 SGS AND HCGS' ODCM.

The REMP for the SGS/HCGS Site has historically included samples and analyses not specifically required by the Stations' Technical Specifications and SGS AND HCGS' 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.

These Management Audit Samples are samples that are taken to augment

the radiological effluent monitoring program, but do not have a regulatory basis nor do they fulfill any regulatory requirement. The regulatory guidance governing the sampling program is sometimes quite specific: in some cases, the pathway to be analyzed does not exist, such as the sampling food products that are irrigated by the plant effluent. There is not any irrigation that is performed using the liquid effluents from either Salem or Hope Creek, therefore, there is not a potential exposure pathway to absorb radioactive material through the plant roots and subsequent consumption. The following is a list and quantity of the Management audit samples:

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

A. Atmospheric

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

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

1. Air Particulates

Air particulate samples were collected weekly at 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 313 of 318 of the indicator station samples collected at concentrations ranging from 5 to 46 E-3 pCi/m^3 with an average concentration of 14 E-3 pCi/m^3, and in 52 of 53 of the control station samples at concentrations ranging from 6 to 24 E-3 pCi/m^3 with an average of 15 E-3 pCi/m^3. The maximum preoperational level detected was 920 E-3 pCi/m^3 with an average concentration of 74 E-3 pCi/m^3. (Table C–2, Appendix C) [Figure 1 - Results for gross beta analysis from 1990 to current year are plotted as quarterly averages, with an inset depicting the period 1973 to 2012].

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 23 of 24 indicator station composites at concentrations ranging from 38.1 E-3 to 102 E-3 pCi/m^3 with an average concentration of 61.0 E-3 pCi/m^3, and in the four control station composites ranging in concentration from 38.1 to 61.6 E-3 pCi/m^3 with an average concentration of 52.9 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

Filtered air iodine samples were collected weekly at six indicator locations and one duplicate location. Each of the samples collected for the year was analyzed for I-131.

Iodine-131

Iodine-131 was not detected in any indicator station samples or control station samples. The maximum preoperational level detected was 42 E-3 pCi/m^3. (Table C–3, Appendix C)

B. Direct Radiation

Ambient radiation levels in the environs were measured with a pair of optically stimulated luminescent (OSL) dosimeters 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.

In July, the OSL dosimeters were replaced with Thermoluminescent Dosimeters (TLDs) provided by Mirion Technologies.

A total of 51 locations were monitored for direct radiation during 2012, 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 two OSL dosimeters packaged together. The pair uses aluminum oxide technology. In July the replacement TLDs were composed of two calcium sulfate ($CaSO_4$) Thermoluminescent phosphors and two Lithium Fluoride phosphors enclosed in plastic.

The average dose rate for the 31 quarterly off-site and 14 quarterly on-site indicator dose rate was 16.4 milliroentgen per standard

quarter. The average control dose rate was 16.4 milliroentgen per standard quarter.

The preoperational average for the quarterly TLD readings was 4.4 milliroentgen per standard month. The results of the direct radiation measurements for 2012 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 2012, with an inset graph depicting the period 1973 to 2012.]

C. Terrestrial

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

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

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

Locally grown vegetables were collected at the time of harvest at 12 locations, fodder crops and broad leaf vegetation at 4 locations. The vegetables and fodder samples are additional samples (Management Audit) taken to enhance the radiological monitoring program. There is no dairy farm within three miles of SGS and HCGS and there is only one dairy within 5 miles. Therefore, broadleaf vegetation is grown,

maintained and harvested by MTS personnel in the late summer and early fall. All samples were weighted, packaged and shipped to TBE for analysis.

1. Milk

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

Iodine-131

Iodine-131 was not detected above minimum detectable concentration in any of the 80 samples analyzed. The maximum preoperational level detected was 65 pCi/L, which occurred following a period of atmospheric nuclear weapons tests. (Table C–5, Appendix C) [Figure 3 - results from 1990 to 2012 are plotted as quarterly averages, with an inset graph depicting the period 1973 to 2012.]

Gamma Spectrometry

Naturally occurring K-40 was detected in all 80 samples with concentrations for the 60 indicator station samples ranging from 1,090 to 1,563 pCi/L with an average concentration of 1,342 pCi/L, and the 20 control station sample concentrations ranging from 1,088 to 1,473 pCi/L, with an average concentration of 1,367 pCi/L. The maximum preoperational level detected was 2,000 pCi/L with an average concentration of 1,437 pCi/L. (Table C–5, Appendix C)

All other gamma emitters were less than the LLD.

2. Well Water (Ground Water)

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

Gross Alpha

Gross alpha activity was detected above the minimum detectable concentration in one of 12 well water samples at a concentration of 3.0 pCi/L. The maximum preoperational level detected was 9.6 pCi/L. (Table C–6, Appendix C)

Gross Beta

Gross beta activity was detected in one of 12 well water samples, at a concentration of 2.7 pCi/L. As with the 2011 gross beta results, the 2012 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 one of the 12 well water samples at a concentration of 54 pCi/L. The maximum preoperational level detected was 30 pCi/L.

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

All other gamma emitters were less than the LLD.

3. Potable Water (Drinking Water)

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

Gross Alpha

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

Gross Beta

Gross beta activity was detected in eight of the 12 of the raw water samples and nine of the 12 treated water samples. The concentrations for the raw samples ranged from 2.2 to 4.4 pCi/L. Concentrations for the treated water ranged from 2.8 to

4.2 pCi/L. The average concentration for both raw and treated water was 3.5 pCi/L. The maximum preoperational level detected was 9.0 pCi/L with an average concentration of 4.2 pCi/L. (Table C–8, Appendix C)

Tritium

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

Iodine-131

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

Gamma Spectrometry

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

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

All other gamma emitters were less than the LLD.

4. Vegetables

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

A variety of food products are sampled from around the plant: the variety is dependent on the farmer's preference. These vegetables are collected as Management Audit samples. In addition, broadleaf vegetation was grown by 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 (12 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 one of the 12 indicator station samples (cabbage) at a concentration of 267 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 12 indicator samples, with concentrations ranging from 1,987 to 14,700 pCi/kg wet with an average concentration of 4,706 pCi/kg wet, and in all 13 control station samples at concentrations ranging from 2,017 to 2,459 pCi/kg wet with an average concentration of 2,279 pCi/kg wet. The maximum preoperational level detected was 4,800 pCi/kg wet with an average concentration of 2,140 pCi/kg wet. (Table C–10, Appendix C).

Cesium-137 was detected in one broadleaf sample at a concentration of 49.5 pCi/kg wet, which is below the SGS AND HCGS' ODCM LLD value of 80 pCi/kg wet. The results of this sample are discussed in the beginning summary section.

All other gamma emitters were less than the LLD.

5. Fodder Crops

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

Gamma Spectrometry

Naturally occurring Be-7, attributed to cosmic ray activity in the atmosphere, was detected in all three indicator samples at concentrations ranging from 96.1 to 154 pCi/kg wet with an

average concentration of 124 pCi/kg wet, and in the control station sample at 49.3 pCi/kg wet. The maximum preoperational level detected for silage was 4,700 pCi/kg wet with an average concentration of 2,000 pCi/kg wet.

Naturally occurring K-40 was detected in all three indicator samples at concentrations ranging from 2,412 to 3,851 pCi/kg wet with an average concentration of 3,205 pCi/kg wet, and in the control station sample at a concentration of 1,296 pCi/kg wet. Preoperational results averaged 7,000 pCi/kg wet. (Table C–11, Appendix C)

All other gamma emitters were less than the LLD.

6. Soil

Soil is sampled every three years at nine stations, and analyzed for gamma emitters. These Management Audit samples were collected at two stations 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 be sampled again in 2013.

7. Beef and Game

Although not required by the SGS or HCGS Technical Specifications and SGS AND HCGS' ODCM, one muskrat sample and two cow samples were collected from two indicator stations. These beef and game samples are collected as Management Audit samples and analyzed for gamma emitters. When we contacted the farmer for the annual survey, he stated that he had some frozen meat samples from the spring.

Because of the age of the samples, the LLD for the I-131 could not be met.

Gamma Spectrometry

Naturally occurring K-40 was detected in all three indicator samples at concentrations ranging from 2,230 to 3,020 pCi/kg wet with an average concentration of 2,615 pCi/kg wet. Preoperational results averaged 7,000 pCi/kg wet. No preoperational data is available for comparison. (Table C–13, Appendix C)

All other gamma emitters were less than the LLD.

D. Aquatic

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

Surface water samples were collected offshore. The technicians collect the samples in new polyethylene containers that are rinsed twice with the sample medium prior to collection. The surface water samples are transported to TBE 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 is used to locate 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 the location 6S2 shoreline sediment sample (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 River Bay estuary. One location (11A1) is at the outfall area (which is the area where liquid radioactive effluents from the Salem Station are discharged into the Delaware River), one is downstream from the outfall area (7E1), and one is directly west of the outfall area at the mouth of the Appoquinimink River (12C1). Two upstream locations are in the Delaware River (1F2) and at the mouth of the Chesapeake and Delaware Canal (16F1), the latter being sampled when the flow is from the Canal into the river.

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

account for differences in concentrations of potassium and associated gross beta from K-40.

Gross Beta

Gross beta activity was detected in all of the 48 indicator station samples with concentrations ranging from 16 to 235 pCi/L and an average concentration of 91 pCi/L, and in all 12 of the control station samples with concentrations ranging from 57 to 117 pCi/L and an average concentration of 87 pCi/L. The maximum preoperational level detected was 110 pCi/L with an average concentration of 32 pCi/L. (Table C–14, Appendix C) [Figure 4 - Quarterly results for all locations are plotted for the years 1990 to 2012, with an inset graph depicting the current period 1973 to 2012.]

Tritium

Tritium activity was detected in one of 48 indicator samples with a concentration of 735 pCi/L, and was not detected in any of the control samples. The maximum preoperational level detected was 600 pCi/L, with an average concentration of 210 pCi/L. There is no dose from this radioactive material because the exposure pathway is drinking water and the Delaware River is salt/brackish at this point. (Table C-15, Appendix C) [Figure 5 – Quarterly positive results from 1990 to 2012 are plotted, with an inset graph depicting the period 1973 to 2012.]

Gamma Spectrometry

Naturally occurring K-40 was detected in 12 of the 48 indicator station samples at concentrations ranging from 64 to 132 pCi/L with an average concentration of 102 pCi/L, and in two of the

12 control station samples with concentrations of 62 and 110 pCi/L and an average of 86 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 not detected in any of the 12 control station samples. (Table C–16, Appendix C)

All other gamma emitters were less than the LLD.

2. Fish

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

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

Gamma Spectrometry

Naturally occurring K-40 was detected in all four indicator station samples at concentrations ranging from 4,364 to 4,924 pCi/kg wet with an average concentration of 4,602 pCi/kg wet, and both control station samples at concentrations of 3,278 and 3,485 pCi/kg wet with an average concentration of 3,382 pCi/kg wet. The maximum preoperational level detected was 13,000 pCi/kg wet with an average concentration of 2,900 pCi/kg wet. (Table C–17, Appendix C)

All other gamma emitters were less than the LLD.

3. Blue Crab

Blue crab samples were collected twice during the season at

one indicator and one control station. The edible portions were analyzed for gamma emitters.

Gamma Spectroscopy

Naturally occurring K-40 was detected in both indicator station samples at concentrations of 2,639 and 2,650 pCi/kg wet with an average concentration of 2,645 pCi/kg wet, and in both control station samples at concentrations of 1,157 and 3,276 pCi/kg wet with an average concentration of 2,560 pCi/kg wet. The maximum

preoperational level detected was 12,000 pCi/kg wet with an average concentration of 2,835 pCi/kg wet. (Table C–18, Appendix C)

All other gamma emitters were less than the LLD.

4. Sediment

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

Gamma Spectroscopy

Naturally occurring Be-7, attributed to cosmic ray activity in the atmosphere, was not detected in any of the indicator or control samples. 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 2,537 to 20,380 pCi/kg

dry, with an average concentration of 8,804 pCi/kg dry, and at both control stations samples at concentrations of 12,000 and 16,470 pCi/kg dry with an average concentration of 14,235 pCi/kg dry. The maximum preoperational level detected was 21,000 pCi/kg dry with an average concentration of 15,000 pCi/kg dry.

Cesium-137 was not detected in any of the indicator or control samples. The maximum preoperational level detected was 400 pCi/kg dry with an average concentration of 150 pCi/kg dry. (Figure 6 – Semi-annual positive results from 1990 to 2012 are plotted, with an inset graph depicting the current period 1977 to 2012.)

Naturally occurring Radium (Natural) was detected in four of the 12 indicator station samples at concentrations ranging from 1,240 to 3,101 pCi/kg dry with an average concentration of 1,853 pCi/kg dry, and at both control station samples at concentrations of 2,188 and 2,644 pCi/kg dry with an average concentration of 2,416 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 four of the 12 indicator station samples at concentrations ranging from 147 to 1,243 pCi/kg dry with an average concentration of 628 pCi/kg dry, and in both of the control station samples at concentrations of 953 and 1,117 pCi/kg dry with an average concentration of 1,035 pCi/kg dry. The maximum pre-operational level detected was 1,300 pCi/kg dry with an average concentration of 840 pCi/kg dry. (Table C–19, Appendix C)

All other gamma emitters were less than the LLD.

E. Land Use Survey

SYNOPSIS OF 2012 LAND USE CENSUS

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

Meteorological Sector	Milk Animal Sept, 2012 Km (miles)	Nearest Residence Sept, 2012 Km (miles)	Vegetable Garden Sept, 2012 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	7.8 (4.9)	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 2012 Land Use Census results are summarized in the above table. A comparison of the identified locations from the 2012 table with the 2011 table shows that there is no change: 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 SGS AND HCGS' ODCMs are required.

V. Annotations to Previous AREOR

In the June 2009 REMP sampling effort, Mn-54 was detected at a concentration equal to 27 pCi/kg in a sediment sample from location 16A1. The direct external dose rate to a receptor assumed standing directly over sediment containing 27 pCi/kg Mn-54 was determined to be 6.7E-4 mrem. As a continuation of the initial evaluation for the Mn-54 in the sediment sample, an annual dose is estimated for comparison to the annual dose limit from liquid effluent (i.e., 3 mrem to the total body) and the results were 0.022% of the annual dose limit for liquid effluent.

Based on the information reviewed and evaluated during this effort, it is concluded that:

- The detected concentration of Mn-54 in the sediment sample was not due to liquid or gaseous effluent releases,
- The detected concentration of Mn-54 in the sediment sample cannot be linked to an onsite spill,
- The detected concentration of Mn-54 in the sediment sample was unreliable analytical data and was inappropriately reported as positive Mn-54 results in the 2009 AREOR. If the Mn-54 result had been present in the sample at its LLD level of 27 pCi/g, effluent results predict other gamma-emitting radionuclides released at similar quantities but having lower LLD values, such as Co-60, would have been released.

The positive I-131 detected in the surface water sample for station 12C1 from April 7, 2011 was not from plant effluents. Iodine-131 was not detected in any of the plant effluents in 2011. As previously stated

in the AREOR, the most likely source could be a discharge from a medical facility.

The Summary Table did not include the result for Barium and Lanthium-140 for Milk, Well Water and Potable Water samples. The results of these samples were below the detection limits.

Table C-5
The Milk table reported an incorrect I-131 LLD of <2.4 pCi/L for the station SA-MLK-2G3 sample collected on 01/02/11. The actual value is <0.2 pCi/L.

The Milk table did not include the result for Barium and Lanthium-140. The results of these samples were below the detection limits.

Table C-9
The Raw and Treated Potable Water table did not include the result for

Barium and Lanthium-140. The results of these samples were below the detection limits.

Table C-16
The Fish table misidentified a fish Location. The correct location should be SA-ESF-7E1 instead of the reported SA-ESF-2G3.

Appendix A
Airborne Particulate: The Lower Limit of Detection (LLD) for Cesium-134 and Cesium-137 were reversed; the correct LLDs are 50 pCi/L for cesium-134 and 60 pCi/L for Cesium-137.

The surface water station 1F2 was collected August 22, 2011 rather than on August 1, 2011. The original sample was lost in transit and

retaken before the end of the month.

The 2011 AREOR discussion of the annual land use census states that there was no new nearest resident. However, in the NNE sector, there was a "new" identified resident within 5 miles. The change resulted from the use of the GPS system, which more accurately depicted the estimated miles. The resident was identified in the land use survey previously at 5.0 miles and after the GPS survey became 4.9 miles.

The 2011 AREOR included two samples, one air particulate location SA-APT-1F and one potable water raw location SA-PWR-2F3, that had MDCs higher than what was reported. The MDCs had been calculated using an MDC multiplier of 3.29 instead of the required 4.66. Both samples were recalculated using the correct MDC multiplier of 4.66. All required LLDs were met.

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

The Hope Creek primary water chemistry results for 2012 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 2012 in accordance with the SGS and HCGS Technical Specifications and SGS AND HCGS' ODCM. The LLD values required by the Technical Specifications and SGS AND

HCGS' ODCM were achieved for this reporting period (See Appendix A and Appendix C). The objectives of the program were also met during this period. The data collected assists in demonstrating that SGS and HCGS were operated in compliance with Technical Specifications and SGS AND HCGS' ODCM requirements.

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

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

VIII. References

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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, 2012 to December 31, 2012**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED		LOWER LIMIT OF DETECTION (LLD)*	ALL INDICATOR LOCATIONS MEAN (RANGE) **	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (RANGE)	CONTROL LOCATION MEAN (RANGE)	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
I. AIRBORNE								
AIR PARTICULATE (E-3 pCi/m^3)	Gr-B	371	10	14 (313/318) (5/46)	1F1 5.8 MILES N	15 (52/53) (6/24)	15 (52/53) (6/24)	0
	GAMMA	28						
	Be-7		NA	61.0 (23/24) (38.1/102)	16E1 4.1 MILES NNW	67 (4/4) (38.1/102)	52.9 (4/4) (38.1/61.6)	0
	K-40		NA	<LLD	-	-	<LLD	0
	Cs-134		50	<LLD	-	-	<LLD	0
	Cs-137		60	<LLD	-	-	<LLD	0
AIR IODINE (E-3 pCi/m^3)	GAMMA	371						
	I-131		70	<LLD	-	-	<LLD	0
II. DIRECT								
DIRECT RADIATION (mR/standard month)	QUARTERLY BADGES	195	NA	15.4 (171/171) (10.2/23.7)	SA-IDM-1F1 5.8 MILES N OF SITE	19.3 (4/4) (17.4/20.5)	15.4 (24/24) (12.1/20.6)	0
III. TERRESTRIAL								
MILK (pCi/L)	I-131	80	1	<LLD	-	-	<LLD	0

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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
MILK (cont'd) (pCi/L)	GAMMA 80						
	K-40	NA	1342 (60/60) (1090/1563)	2G3 11.8 MILES NNE	1367 (20/20) (1246/1561)	1264 (20/20) (1088/1473)	0
	Cs-134	15	<LLD	-	-	<LLD	0
	Cs-137	18	<LLD	-	-	<LLD	0
	BaLa-140	15	<LLD	-	-	<LLD	0
	Ra-226	NA	<LLD	-	-	<LLD	0
WELL WATER (pCi/L)	Gr-A 12	3	3.0 (1/12)	3E1 4.2 MILES NE	3.0 (1/12)	NA	0
	Gr-B 12	4	2.7 (1/12)	3E1 4.2 MILES NE	2.7 (1/12)	NA	0
	H-3 12	200	<LLD	-	-	NA	0
	GAMMA 12						
	K-40	NA	54 (1/12)	3E1 4.2 MILES NE	54 (1/12)	NA	0

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SALEM COUNTY, NEW JERSEY **January 1, 2012 to December 31, 2012**

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
WELL 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	15	<LLD	-	-	NA	0
	Cs-134	15	<LLD	-	-	NA	0
	Cs-137	18	<LLD	-	-	NA	0
	BaLa-140	15	<LLD	-	-	NA	0

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

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

SALEM COUNTY, NEW JERSEY **January 1, 2012 to December 31, 2012**

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
WELL WATER (cont'd) (pCi/L)	Ra-226		NA	<LLD	-	-	NA	0
POTABLE WATER (pCi/L)	Gr-A	24	3	<LLD	-	-	NA	0
	Gr-B	24	4	3.5 (17/24) (2.2/4.4)	2F3 8.0 MILES NNE	3.5 (9/12) (2.8/4.2)	NA	0
	H-3	24	200	<LLD	-	-	NA	0
	GAMMA	24						
	K-40		NA	<LLD	-	-	NA	0
	Mn-54		15	<LLD	-	-	NA	0
	Co-58		15	<LLD	-	-	NA	0
	Fe-59		30	<LLD	-	-	NA	0
	Co-60		15	<LLD	-	-	NA	0
	Zn-65		30	<LLD	-	-	NA	0

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, 2012 to December 31, 2012**

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
POTABLE WATER (cont'd) (pCi/L)	ZrNb-95	15	<LLD	-	-	NA	0
	I-131	15	<LLD	-	-	NA	0
	Cs-134	15	<LLD	-	-	NA	0
	Cs-137	18	<LLD	-	-	NA	0
	BaLa-140	18	<LLD	-	-	<LLD	0
	Ra-226	NA	<LLD	-	-	NA	0
VEGETATION (pCi/kg wet)	GAMMA 25						
	Be-7	NA	267 (1/12)	1S1 0.57 MILES N	267 (1/1)	<LLD	0
	K-40	NA	4706 (12/12) (1987/14700)	14F4 7.6 MILES WNW	14700 (1/1)	2279 (13/13) (2017/2459)	0
	I-131	60	<LLD	-	-	<LLD	0
	Cs-134	60	<LLD	-	-	<LLD	0

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

SALEM GENERATING STATION **DOCKET NO. 50-272/-311**
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SALEM COUNTY, NEW JERSEY **January 1, 2012 to December 31, 2012**

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
VEGETATION (cont'd) (pCi/kg wet)	Cs-137	80	49.5 (1/12)	15S1 0.57 MILES NW	49.5 (1/1)	<LLD	0
	Ra-226	NA	<LLD	-	-	<LLD	0
	Th-232	NA	<LLD	-	-	<LLD	0
FODDER CROPS (pCi/kg wet)	GAMMA 4						
	Be-7	NA	124 (3/3) (96.1/154)	14F4 7.6 MILES WNW	154 (1/1)	49.3 (1/1)	0
	K-40	NA	3205 (3/3) (2412/3851)	13E3 5.0 MILES W	3851 (1/1)	1296 (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

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, 2012 to December 31, 2012**

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
BEEF AND GAME (pCi/kg wet)	GAMMA	3						
	Be-7		NA	<LLD	-	-	<LLD	0
	K-40		NA	2615 (3/3) (2320/3020)	SA-GAM-3E1	3020 (1/1)	NA	
	I-131		NA	<LLD	-	-	<LLD	0
	Cs-134		NA	<LLD	-	-	<LLD	0
	Cs-137		NA	<LLD	-	-	<LLD	0
IV. AQUATIC SURFACE WATER (pCi/L)	Gr-B	60	4	91 (48/48) (16/235)	7E1 4.5 MILES SE	134 (12/12) (26/235)	87 (12/12) (57/117)	0
	H-3	60	200	735 (1/48)	7E1 4.5 MILES SE	735 (1/12)	<LLD	0
	GAMMA	60						
	K-40		NA	102 (12/48) (64/132)	7E1 4.5 MILES SE	111 (6/12) (90/124)	86 (2/12) (62/110)	0
	Mn-54		15	<LLD	-	-	<LLD	0

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

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HOPE CREEK GENERATING STATION **DOCKET NO. 50-354**

SALEM COUNTY, NEW JERSEY **January 1, 2012 to December 31, 2012**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD)*	ALL INDICATOR LOCATIONS MEAN (RANGE) **	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	MEAN (RANGE)	CONTROL LOCATION MEAN (RANGE)	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
SURFACE WATER (cont'd) (pCi/L)	Co-58	15	<LLD	-	-	<LLD	0
	Fe-59	30	<LLD	-	-	<LLD	0
	Co-60	15	<LLD	-	-	<LLD	0
	Zn-65	30	<LLD	-	-	<LLD	0
	ZrNb-95	15	<LLD	-	-	<LLD	0
	I-131	15	<LLD	-	-	<LLD	0
	Cs-134	15	<LLD	-	-	<LLD	0
	Cs-137	18	<LLD	-	-	<LLD	0
	BaLa-140	15	<LLD	-	-	<LLD	0

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

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

SALEM COUNTY, NEW JERSEY **January 1, 2012 to December 31, 2012**

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
FISH	GAMMA 6						
(pCi/kg wet)	K-40	NA	4602 (4/4) (4364/4924)	7E1 4.5 MILES SE	4759 (2/2) (4594/4924)	3382 (2/2) (3278/3485)	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

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SALEM COUNTY, NEW JERSEY **January 1, 2012 to December 31, 2012**

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 5						
(pCi/kg wet)	K-40	NA	2645 (2/2) (2639/2650)	11A1 0.2 MILES SW	2645 (2/2) (2639/2650)	2560 (3/3) (1157/3276)	0
	Mn-54	130	<LLD	-	-	<LLD	0
	Co-58	130	<LLD	-	-	<LLD	0
	Fe-59	260	<LLD	-	-	<LLD	0
	Co-60	130	<LLD	-	-	<LLD	0
	Zn-65	260	<LLD	-	-	<LLD	0
	Cs-134	130	<LLD	-	-	<LLD	0
	Cs-137	150	<LLD	-	-	<LLD	0
	Ra-226	NA	<LLD	-	-	<LLD	0

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

SALEM GENERATING STATION **DOCKET NO. 50-272/-311**
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SALEM COUNTY, NEW JERSEY **January 1, 2012 to December 31, 2012**

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 (pCi/kg dry)	GAMMA 14						
	Be-7	NA	<LLD	-	-	<LLD	0
	K-40	NA	8804 (12/12) (2537/20380)	16F1 6.9 MILES NNW	18350 (2/2) (16320/20380)	14235 (2/2) (12000/16470)	0
	Cs-134	150	<LLD	-	-	<LLD	0
	Cs-137	180	<LLD	-	-	<LLD	0
	Ra-226	NA	1853 (4/12) (1240/3101)	12C1 C 2.5 MILES WSW	2416 (2/2) (2188/2644)	2416 (2/2) (2188/2644)	0
	Th-232	NA	628 (4/12) (147/1243)	12C1 C 2.5 MILES WSW	1035 (2/2) (953/1117)	1035 (2/2) (953/1117)	0

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

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APPENDIX B

SAMPLE DESIGNATION
AND
LOCATIONS

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SAMPLE DESIGNATION

The PSEG's 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
5S2	0.86 mi. E; site access road, Duplicate sample	39 - 27 - 668	75 - 31 – 187	AIO, APT
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 Stations ODCMs. Vegetable samples are not always collected in consecutive years from the same farmer due to crop rotation.

TABLE B-2

SALEM AND HOPE CREEK GENERATING STATIONS
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

(Program Overview)

EXPOSURE PATHWAY AND/OR SAMPLE	NUMBER OF REPRESENTATIVE SAMPLES AND SAMPLE LOCATIONS	SAMPLING AND COLLECTION FREQUENCY	TYPE/FREQUENCY* OF ANALYSIS
1. DIRECT RADIATION Dosimeters	Fifty-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	7 Samples from 6 locations:		
a. Air Particulate	1 sample from close to the Site Boundary : 5S1 1 duplicate: close to the Site Boundary : 5S2 3 Samples in different land based sectors: 1F1, 2F6, 5D1.	Continuous sampler operation with sample collection weekly or more frequently if required by dust loading	Gross Beta / weekly Gamma isotopic analysis / quarterly composite
b. Air Iodine	1 Sample from the vicinity of a community: 16E1. 1 Sample from a control location, as for example 15-30 km distant 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		Semi-monthly (when animals are on pasture)	Gamma scan / semi-monthly Iodine-131 / semi-monthly
	1 Sample from milking animals at a control location 15 – 30 km distant (9.38 – 18.75 miles): 3G1.	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	One sample upstream: 1F2		
a. Surface Water	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 and control location: 12C1[(2)] One sample from outfall area: 11A1 One sample from upstream, the C & D Canal: 16F1 One sample from shoreline area: 6S2 One sample from Cooling Tower Blowdown discharge: 15A1 One sample south storm drain discharge line: 16A1	Semi-annually	Gamma scan/on collection

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

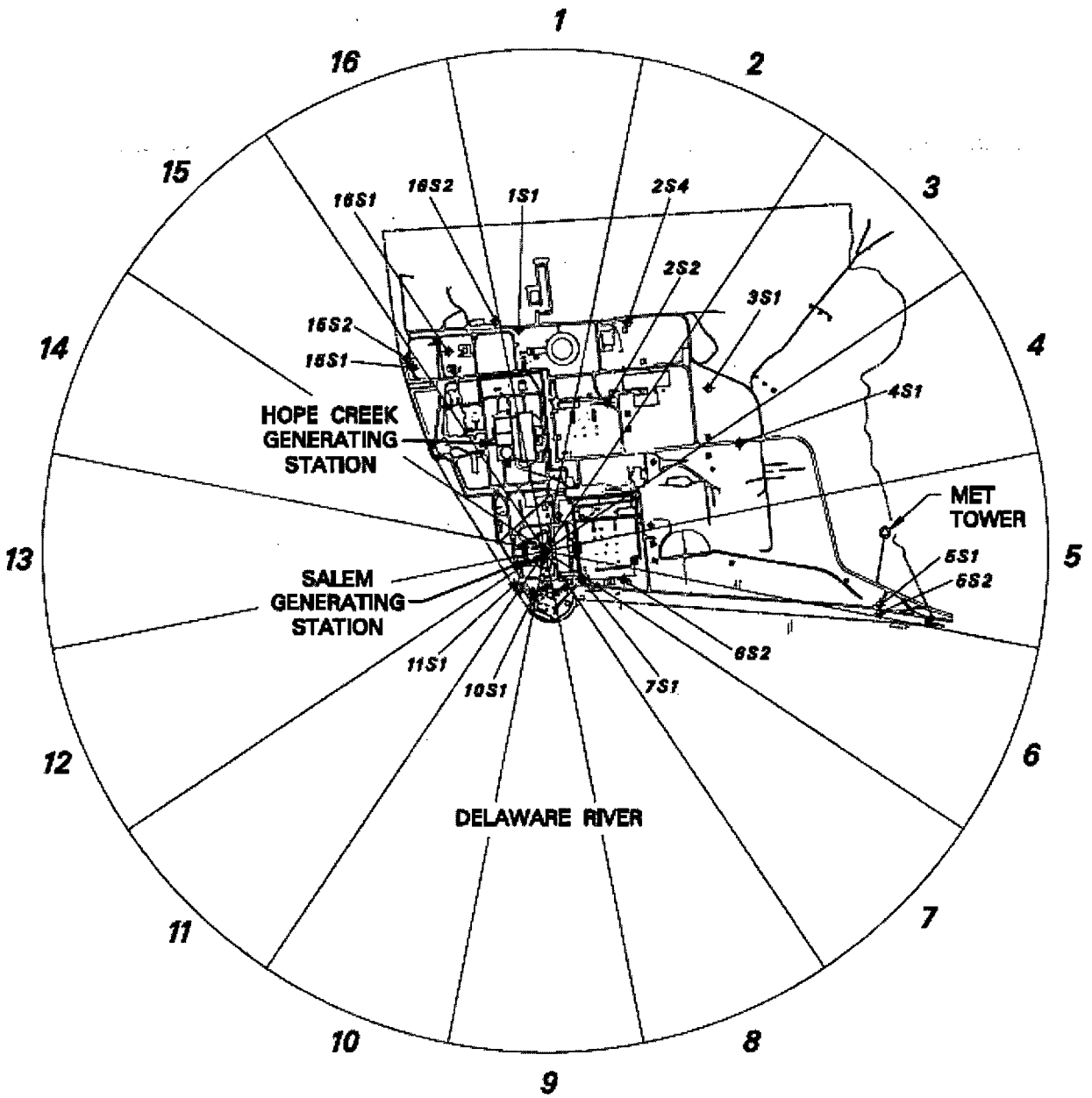
** Tech Specs and ODCM require quarterly analysis but due to the tritium leak at Salem, it was decided to analyze surface waters on a monthly basis for tritium.

(1) While these milk locations are not within the 5 km range, they are the closest farms in the Site vicinity.
Since broad leaf vegetation is acceptable in lieu of milk collections, MTS personnel planted and harvested cabbage 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.*

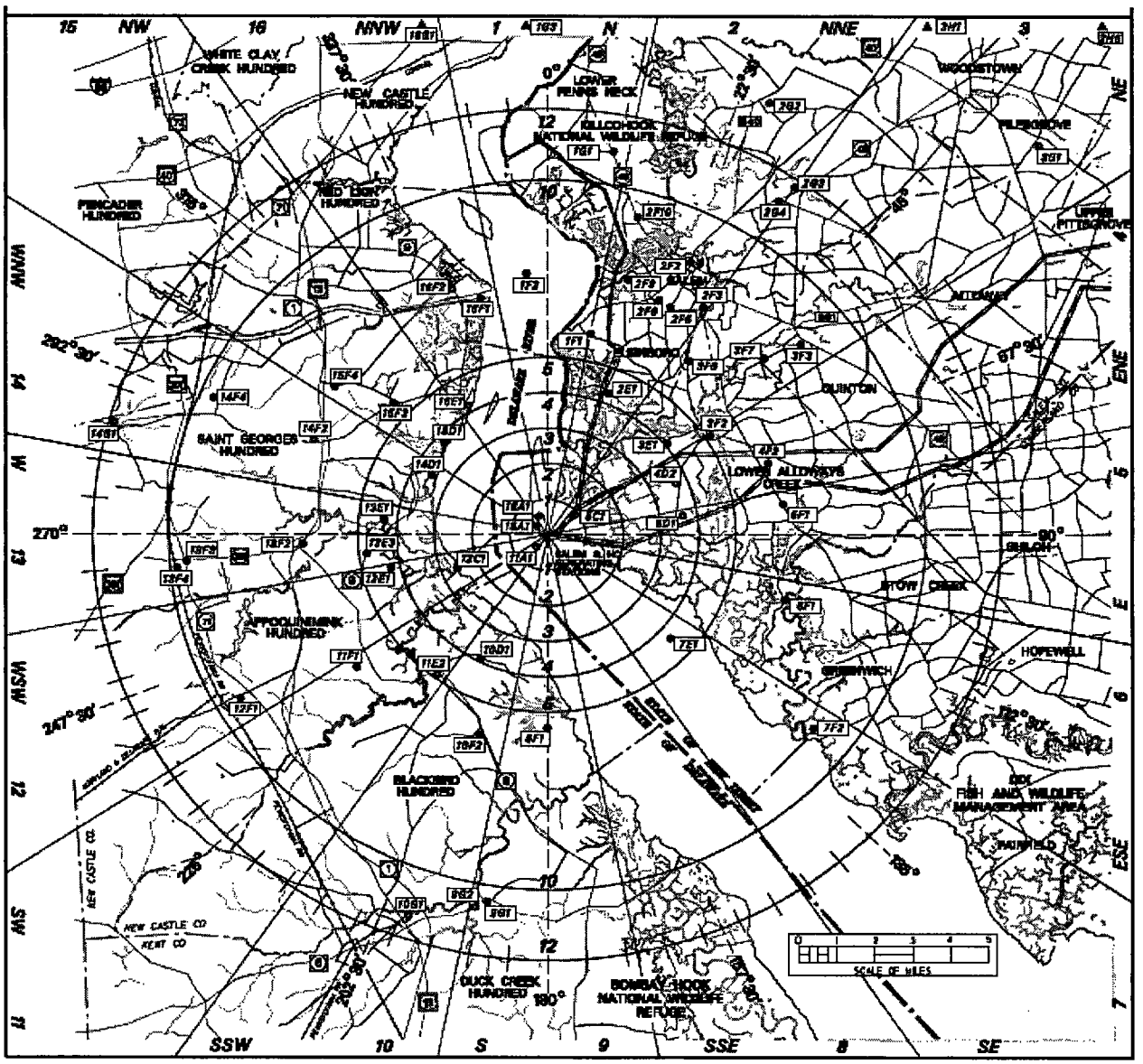
MAP B-1

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, 2012**

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

STATION ID	COLLECTION PERIOD	Be-7	K-40	Cs-134	Cs-137
SA-APT-14G1 (C)	12/27/11 - 04/02/12	57 ± 13	< 14	< 1	< 1
	04/02/12 - 07/02/12	62 + 20	< 35	< 1	< 2
	07/02/12 - 10/01/12	55 ± 15	< 25	< 1	< 1
	10/01/12 - 01/02/13	38 ± 9	< 9	< 1	< 1
	AVERAGE	53 ± 20	-	-	-
SA-APT-16E1	12/27/11 - 04/02/12	70 ± 13	< 12	< 1	< 1
	04/02/12 - 07/02/12	102 ± 22	< 13	< 1	< 1
	07/02/12 - 10/01/12	58 ± 17	< 28	< 1	< 1
	10/01/12 - 01/02/13	38 ± 8	< 12	< 1	< 1
	AVERAGE	67 ± 54	-	-	-
SA-APT-1F1	12/27/11 - 04/02/12	54 ± 11	< 14	< 1	< 1
	04/02/12 - 07/02/12	71 ± 14	< 25	< 2	< 1
	07/02/12 - 10/01/12	65 ± 18	< 20	< 1	< 1
	10/01/12 - 01/02/13	48 ± 17	< 17	< 2	< 2
	AVERAGE	59 ± 20	-	-	-
SA-APT-2F6	12/27/11 - 04/02/12	58 ± 12	< 17	< 1	< 1
	04/02/12 - 07/02/12	72 ± 13	< 11	< 1	< 1
	07/02/12 - 10/01/12	54 ± 17	< 24	< 1	< 1
	10/01/12 - 01/02/13	46 ± 9	< 14	< 1	< 1
	AVERAGE	58 ± 22	-	-	-
SA-APT-5D1	12/27/11 - 04/02/12	50 ± 15	< 20	< 1	< 1
	04/02/12 - 07/02/12	68 ± 16	< 26	< 2	< 1
	07/02/12 - 10/01/12	58 ± 23	< 29	< 2	< 1
	10/01/12 - 01/02/13	51 ± 11	< 20	< 1	< 1
	AVERAGE	57 ± 17	-	-	-

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

TABLE C-1 **CONCENTRATIONS OF GAMMA EMITTERS* IN QUARTERLY COMPOSITES OF AIR PARTICULATES, 2012**

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

STATION ID	COLLECTION PERIOD	Be-7	K-40	Cs-134	Cs-137
SA-APT-5S1	12/27/11 - 04/02/12	73 ± 16	< 10	< 2	< 2
	04/02/12 - 07/02/12	59 ± 14	< 19	< 1	< 1
	07/02/12 - 10/01/12	55 ± 16	< 25	< 2	< 1
	10/01/12 - 01/02/13	< 20	< 37	< 3	< 2
	AVERAGE	62 ± 18	-	-	-
SA-APT-5S2	12/27/11 - 04/02/12	66 ± 17	< 13	< 2	< 2
	04/02/12 - 07/02/12	71 ± 15	< 29	< 2	< 1
	07/02/12 - 10/01/12	60 ± 25	< 33	< 2	< 2
	10/01/12 - 01/02/13	57 ± 17	< 33	< 2	< 2
	AVERAGE	63 ± 12	-	-	-

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

TABLE C-2 **CONCENTRATIONS OF GROSS BETA EMITTERS IN AIR PARTICULATES, 2012**

Results in units of 10-3 pCi/m^3 ± 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
12/27/11 - 01/03/12	13 ± 3	13 ± 3	13 ± 3	13 ± 3	15 ± 3	10 ± 3	13 ± 3
01/03/12 - 01/09/12	19 ± 4	13 ± 4	16 ± 4	15 ± 3	17 ± 4	14 ± 4	14 ± 3
01/09/12 - 01/16/12	15 ± 3	14 ± 3	16 ± 3	14 ± 3	15 ± 3	14 ± 3	15 ± 3
01/16/12 - 01/23/12	12 ± 3	14 ± 3	13 ± 3	14 ± 3	13 ± 3	11 ± 3	14 ± 3
01/23/12 - 01/31/12	14 ± 3	18 ± 3	16 ± 3	14 ± 3	18 ± 3	14 ± 3	17 ± 3
01/31/12 - 02/06/12	17 ± 4	18 ± 4	16 ± 4	17 ± 4	16 ± 4	19 ± 4	16 ± 4
02/06/12 - 02/13/12	14 ± 3	14 ± 3	10 ± 3	12 ± 3	11 ± 3	11 ± 3	13 ± 3
02/13/12 - 02/21/12	14 ± 3	16 ± 3	16 ± 3	14 ± 3	16 ± 3	13 ± 3	13 ± 3
02/21/12 - 02/27/12	15 ± 3	16 ± 4	14 ± 3	15 ± 3	15 ± 3	16 ± 3	16 ± 3
02/27/12 - 03/05/12	10 ± 3	11 ± 3	13 ± 3	15 ± 3	15 ± 3	14 ± 4	12 ± 3
03/05/12 - 03/12/12	15 ± 3	16 ± 3	17 ± 3	14 ± 3	14 ± 3	15 ± 3	14 ± 3
03/12/12 - 03/19/12	15 ± 3	12 ± 3	13 ± 3	13 ± 3	13 ± 3	14 ± 3	11 ± 3
03/19/12 - 03/26/12	13 ± 3	10 ± 4	9 ± 3	9 ± 3	9 ± 3	9 ± 4	8 ± 3
03/26/12 - 04/02/12	15 ± 3	11 ± 3	11 ± 3	8 ± 3	13 ± 3	9 ± 3	14 ± 3
04/02/12 - 04/09/12	17 ± 3	15 ± 4	13 ± 3	16 ± 4	13 ± 3	12 ± 3	14 ± 3
04/09/12 - 04/16/12	8 ± 3	13 ± 3	12 ± 3	12 ± 3	10 ± 3	16 ± 3	13 ± 3
04/16/12 - 04/23/12	13 ± 3	13 ± 3	12 ± 3	11 ± 3	12 ± 3	11 ± 3	16 ± 3
04/23/12 - 04/30/12	13 ± 3	12 ± 3	13 ± 3	13 ± 3	13 ± 3	14 ± 3	12 ± 3
04/30/12 - 05/07/12	6 ± 3	6 ± 3	8 ± 3	5 ± 3	5 ± 2	5 ± 3	5 ± 3
05/07/12 - 05/14/12	15 ± 3	14 ± 3	14 ± 3	15 ± 3	13 ± 3	10 ± 3	15 ± 3
05/14/12 - 05/21/12	10 ± 3	9 ± 3	9 ± 3	8 ± 3	9 ± 3	8 ± 3	6 ± 3
05/21/12 - 05/29/12	8 ± 2	9 ± 3	7 ± 2	7 ± 2	5 ± 2	8 ± 2	8 ± 3
05/29/12 - 06/04/12	12 ± 3	12 ± 4	11 ± 3	9 ± 3	15 ± 4	8 ± 3	11 ± 3
06/04/12 - 06/11/12	12 ± 3	10 ± 3	10 ± 3	9 ± 3	10 ± 3	10 ± 3	14 ± 3
06/11/12 - 06/18/12	8 ± 3	8 ± 3	11 ± 3	9 ± 3	9 ± 3	7 ± 3	5 ± 2
06/18/12 - 06/25/12	15 ± 3	14 ± 3	14 ± 3	13 ± 3	15 ± 4	19 ± 4	20 ± 3
06/25/12 - 07/02/12	14 ± 3	24 ± 4	7 ± 2	26 ± 5	18 ± 4	46 ± 5	20 ± 4
07/02/12 - 07/09/12	22 ± 4	24 ± 4	17 ± 3	24 ± 5	14 ± 4	24 ± 4	22 ± 4
07/09/12 - 07/16/12	12 ± 3	16 ± 3	13 ± 3	12 ± 3	11 ± 3	13 ± 3	13 ± 3
07/16/12 - 07/25/12	17 ± 3	14 ± 3	14 ± 3	11 ± 2	14 ± 3	19 ± 3	15 ± 3
07/25/12 - 07/31/12	15 ± 3	16 ± 4	12 ± 3	12 ± 3	10 ± 3	11 ± 3	14 ± 3
07/31/12 - 08/06/12	13 ± 3	14 ± 4	14 ± 3	13 ± 3	14 ± 4	13 ± 3	15 ± 3
08/06/12 - 08/13/12	15 ± 3	16 ± 3	14 ± 3	10 ± 3	11 ± 3	10 ± 3	11 ± 3
08/13/12 - 08/20/12	14 ± 3	18 ± 4	15 ± 3	17 ± 3	15 ± 3	17 ± 3	17 ± 3
08/20/12 - 08/27/12	20 ± 4	20 ± 4	21 ± 4	19 ± 4	17 ± 4	16 ± 4	18 ± 4
08/27/12 - 09/04/12	19 ± 3	19 ± 3	24 ± 3	19 ± 3	23 ± 3	12 ± 3	22 ± 3
09/04/12 - 09/10/12	13 ± 3	15 ± 4	12 ± 3	13 ± 3	12 ± 4	15 ± 4	13 ± 4
09/10/12 - 09/17/12	14 ± 3	13 ± 3	13 ± 3	12 ± 3	14 ± 3	15 ± 3	14 ± 3
09/17/12 - 09/24/12	14 ± 3	14 ± 3	13 ± 3	13 ± 3	12 ± 3	13 ± 3	12 ± 3
09/24/12 - 10/01/12	22 ± 4	22 ± 4	18 ± 3	16 ± 4	19 ± 4	23 ± 4	19 ± 4
10/01/12 - 10/09/12	21 ± 3	23 ± 4	20 ± 3	22 ± 4	20 ± 4	20 ± 4	19 ± 3
10/09/12 - 10/15/12	18 ± 3	18 ± 3	17 ± 3	16 ± 4	14 ± 3	16 ± 4	15 ± 3
10/15/12 - 10/22/12	11 ± 3	13 ± 3	10 ± 3	11 ± 3	13 ± 3	14 ± 3	12 ± 3
10/22/12 - 11/01/12	18 ± 3	16 ± 3	19 ± 3	16 ± 3	14 ± 3	15 ± 3	16 ± 3
11/01/12 - 11/05/12	< 5	< 5	< 5	< 6	< 6	7 ± 4	< 5
11/05/12 - 11/12/12	13 ± 3	14 ± 3	13 ± 3	18 ± 4	12 ± 3	14 ± 3	13 ± 3
11/12/12 - 11/19/12	20 ± 3	20 ± 3	18 ± 3	15 ± 3	19 ± 3	21 ± 4	17 ± 3
11/19/12 - 11/26/12	16 ± 3	17 ± 3	20 ± 3	16 ± 3	15 ± 3	18 ± 3	19 ± 3
11/26/12 - 12/03/12	24 ± 3	23 ± 4	24 ± 4	26 ± 4	18 ± 3	20 ± 4	21 ± 3
12/03/12 - 12/10/12	13 ± 3	16 ± 3	14 ± 3	13 ± 3	11 ± 3	14 ± 4	12 ± 3
12/10/12 - 12/19/12	20 ± 3	15 ± 3	17 ± 3	15 ± 3	13 ± 3	14 ± 3	17 ± 3
12/19/12 - 12/26/12	15 ± 3	19 ± 3	18 ± 3	17 ± 3	14 ± 3	16 ± 3	16 ± 3
12/26/12 - 01/02/13	14 ± 3	16 ± 3	12 ± 3	14 ± 3	12 ± 3	10 ± 3	16 ± 3
AVERAGE	15 ± 7	15 ± 8	14 ± 8	14 ± 8	14 ± 7	14 ± 12	14 ± 8

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

TABLE C-3 **CONCENTRATIONS OF IODINE-131* IN FILTERED AIR, 2012**

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

COLLECTION PERIOD	CONTROL SA-AIO-14G1	GROUP I SA-AIO-1F1	SA-AIO-2F6	SA-AIO-5D1	SA-AIO-5S1	SA-AIO-5S2	SA-AIO-16E1
12/27/11 - 01/03/12	< 25	< 19	< 17	< 23	< 18	< 19	< 24
01/03/12 - 01/09/12	< 21	< 28	< 25	< 20	< 25	< 28	< 20
01/09/12 - 01/16/12	< 29	< 22	< 21	< 29	< 21	< 22	< 29
01/16/12 - 01/23/12	< 23	< 26	< 24	< 22	< 24	< 26	< 23
01/23/12 - 01/31/12	< 12	< 23	< 21	< 12	< 21	< 22	< 12
01/31/12 - 02/06/12	< 25	< 22	< 20	< 23	< 20	< 21	< 25
02/06/12 - 02/13/12	< 30	< 57	< 53	< 29	< 54	< 57	< 29
02/13/12 - 02/21/12	< 22	< 29	< 27	< 21	< 27	< 28	< 22
02/21/12 - 02/27/12	< 22	< 26	< 23	< 20	< 24	< 25	< 20
02/27/12 - 03/05/12	< 29	< 24	< 22	< 27	< 22	< 23	< 28
03/05/12 - 03/12/12	< 17	< 31	< 29	< 16	< 29	< 30	< 16
03/12/12 - 03/19/12	< 20	< 14	< 14	< 18	< 14	< 14	< 19
03/19/12 - 03/26/12	< 10	< 16	< 15	< 11	< 15	< 15	< 12
03/26/12 - 04/02/12	< 16	< 19	< 18	< 19	< 18	< 19	< 19
04/02/12 - 04/09/12	< 19	< 25	< 23	< 24	< 24	< 24	< 23
04/09/12 - 04/16/12	< 11	< 16	< 15	< 13	< 15	< 0	< 14
04/16/12 - 04/23/12	< 28	< 33	< 31	< 25	< 31	< 31	< 26
04/23/12 - 04/30/12	< 14	< 22	< 21	< 15	< 22	< 20	< 15
04/30/12 - 05/07/12	< 26	< 44	< 41	< 26	< 41	< 42	< 27
05/07/12 - 05/14/12	< 34	< 24	< 24	< 36	< 28	< 26	< 34
05/14/12 - 05/21/12	< 30	< 46	< 41	< 32	< 47	< 46	< 32
05/21/12 - 05/29/12	< 50	< 64	< 57	< 53	< 64	< 62	< 55
05/29/12 - 06/04/12	< 26	< 30	< 27	< 28	< 31	< 30	< 27
06/04/12 - 06/11/12	< 33	< 39	< 35	< 34	< 40	< 39	< 32
06/11/12 - 06/18/12	< 16	< 15	< 14	< 16	< 16	< 15	< 15
06/18/12 - 06/25/12	< 34	< 62	< 55	< 38	< 62	< 59	< 34
06/25/12 - 07/02/12	< 27	< 23	< 16	< 44	< 19	< 18	< 29
07/02/12 - 07/09/12	< 16	< 23	< 20	< 23	< 23	< 22	< 18
07/09/12 - 07/16/12	< 45	< 47	< 42	< 54	< 48	< 46	< 47
07/16/12 - 07/25/12	< 21	< 30	< 29	< 22	< 32	< 30	< 21
07/25/12 - 07/31/12	< 20	< 30	< 27	< 21	< 30	< 28	< 21
07/31/12 - 08/06/12	< 30	< 43	< 37	< 28	< 42	< 40	< 31
08/06/12 - 08/13/12	< 18	< 15	< 13	< 17	< 14	< 14	< 18
08/13/12 - 08/20/12	< 16	< 16	< 14	< 16	< 15	< 15	< 16
08/20/12 - 08/27/12	< 37	< 38	< 32	< 38	< 36	< 35	< 38
08/27/12 - 09/04/12	< 19	< 18	< 15	< 18	< 17	< 17	< 19
09/04/12 - 09/10/12	< 32	< 38	< 32	< 30	< 36	< 36	< 34
09/10/12 - 09/17/12	< 20	< 62	< 20	< 20	< 60	< 60	< 20
09/17/12 - 09/24/12	< 20	< 12	< 11	< 18	< 13	< 13	< 19
09/24/12 - 10/01/12	< 16	< 22	< 21	< 18	< 23	< 23	< 17
10/01/12 - 10/09/12	< 11	< 17	< 16	< 12	< 18	< 19	< 11
10/09/12 - 10/15/12	< 19	< 20	< 20	< 21	< 22	< 23	< 19
10/15/12 - 10/22/12	< 24	< 25	< 24	< 27	< 27	< 27	< 25
10/22/12 - 11/01/12	< 20	< 13	< 13	< 21	< 15	< 15	< 19
11/01/12 - 11/05/12	< 37	< 37	< 35	< 41	< 42	< 43	< 37
11/05/12 - 11/12/12	< 16	< 14	< 14	< 17	< 14	< 16	< 15
11/12/12 - 11/19/12	< 18	< 18	< 17	< 20	< 16	< 19	< 18
11/19/12 - 11/26/12	< 32	< 25	< 24	< 36	< 25	< 28	< 32
11/26/12 - 12/03/12	< 30	< 23	< 21	< 33	< 20	< 23	< 30
12/03/12 - 12/10/12	< 16	< 19	< 18	< 16	< 18	< 20	< 15
12/10/12 - 12/19/12	< 15	< 17	< 16	< 16	< 16	< 18	< 14
12/19/12 - 12/26/12	< 30	< 27	< 25	< 30	< 25	< 29	< 30
12/26/12 - 01/02/13	< 11	< 13	< 13	< 11	< 13	< 14	< 10
AVERAGE	-	-	-	-	-	-	-

TABLE C-4 DIRECT RADIATION MEASUREMENTS - QUARTERLY DOSIMITRY RESULTS*, 2012

Results in units of mR/standard quarter

STATION ID	AVERAGE ± 2 S.D.	JAN - MAR	APR - JUN	JUL - SEP	OCT - DEC
SA-IDM-1F1	19.3 ± 2.7	17.4	19.6	19.7	20.5
SA-IDM-2E1	15.2 ± 6.6	19.3	11.3	15.8	14.4
SA-IDM-2F2	14.9 ± 4.8	18.4	14.4	13.9	13.0
SA-IDM-2F5	14.5 + 5.7	15.5	11.3	16.8	
SA-IDM-2F6	14.3 ± 4.0	16.4	15.5	12.3	12.9
SA-IDM-2S2	17.5 ± 3.7	18.4	19.6	16.0	15.8
SA-IDM-2S4	15.7 ± 4.4	16.5	12.4	16.6	17.2
SA-IDM-3E1	13.7 ± 3.0	13.6	15.5	11.8	13.9
SA-IDM-3F2	13.7 ± 1.7	12.6	13.4	14.4	14.4
SA-IDM-3F3	13.7 ± 5.3	16.5	10.3	14.8	13.3
SA-IDM-3S1	13.1 ± 3.6	12.7	15.5	13.1	11.1
SA-IDM-4D2	16.4 ± 7.1	19.3	11.3	16.8	18.1
SA-IDM-4F2	13.9 ± 2.1	13.6	14.4	14.9	12.5
SA-IDM-4S1	12.5 ± 1.8	11.7	13.4	13.1	11.7
SA-IDM-5D1	13.4 ± 1.7	13.6	13.4	12.3	14.4
SA-IDM-5F1	14.1 ± 2.3	13.6	13.4	13.6	15.8
SA-IDM-5S1	12.8 ± 2.2	13.6	13.4	11.2	13.0
SA-IDM-6F1	13.0 ± 1.9	13.6	13.4	13.4	11.6
SA-IDM-6S2	18.7 ± 3.2	18.4	16.5	19.7	20.0
SA-IDM-7F2	11.9 ± 2.9	13.6	12.4	10.2	11.5
SA-IDM-7S1	17.8 ± 13.1	23.2	23.7	12.7	11.6
SA-IDM-9F1	18.3 ± 1.5	19.3	17.5	18.1	18.2
SA-IDM-10D1	16.5 ± 1.4	17.4	16.5	16.2	15.7
SA-IDM-10F2	17.6 ± 2.2	18.4	18.6	16.3	17.2
SA-IDM-10S1	12.6 ± 2.1	13.6	13.4	11.4	12.1
SA-IDM-11E2	17.0 ± 1.9	18.4	16.5	16.3	16.7
SA-IDM-11F1	17.5 ± 1.4	18.4	17.5	17.5	16.7
SA-IDM-11S1	12.5 ± 2.3	13.6	13.4	11.4	11.6
SA-IDM-12E1	16.7 ± 4.3	13.6	18.6	17.4	17.2
SA-IDM-12F1	15.9 ± 4.4	12.7	17.5	17.0	16.4
SA-IDM-13E1	15.1 ± 1.4	15.5	15.5	14.0	15.3
SA-IDM-13F2	16.9 ± 3.5	18.4	17.5	14.3	17.2
SA-IDM-13F3	15.9 ± 3.1	15.5	17.5	16.5	13.9
SA-IDM-13F4	16.0 ± 7.7	17.4	10.3	18.4	18.0
SA-IDM-14D1	14.7 ± 3.7	17.4	13.3	13.7	14.4
SA-IDM-14F2	18.2 ± 1.4	18.4	18.6	17.1	18.5
SA-IDM-15D1	16.9 ± 1.7	17.4	16.5	17.8	15.9
SA-IDM-15F3	17.1 ± 3.5	14.6	18.6	17.8	17.5
SA-IDM-15S1	13.7 ± 7.2	14.5	10.3	18.4	11.6
SA-IDM-15S2	14.6 ± 4.9	15.5	17.5	11.9	13.4
SA-IDM-16E1	16.9 ± 4.0	16.5	19.6	16.7	14.8
SA-IDM-16F2	16.1 ± 0.9	16.5	15.5	16.3	16.2
SA-IDM-16S1	15.2 ± 1.7	15.5	15.5	15.7	13.9
SA-IDM-1G3 (C)	15.1 ± 3.1	17.4	14.4	13.9	14.8
SA-IDM-3G1 (C)	16.6 ± 6.6	12.6	20.6	17.1	16.2
SA-IDM-3H1 (C)	13.9 ± 3.5	13.6	13.4	16.3	12.1
SA-IDM-10G1 (C)	17.1 ± 2.7	17.4	18.6	16.9	15.4
SA-IDM-14G1 (C)	14.9 ± 4.4	13.6	13.4	14.6	18.1
SA-IDM-16G1 (C)	14.6 ± 4.6	17.4	15.5	12.6	12.9
SA-IDM-1S1 ***	37.1 ± 4.8	35.6	38.2	34.7	39.9
SA-IDM-16S2 ***	36.7 ± 8.9	30.8	36.1	41.2	38.7

* QUARTERLY ELEMENT OSL RESULTS BY LANDAUER THE FIRST HALF OF 2012 & TLD RESULTS BY MIRION THE SECOND HALF OF 2012

** RESULTS ARE REPORTED IN MILLIROENTGEN (mR) WITH THE STANDARD QUARTER

*** SAMPLE RESULTS ARE AFFECTED BY THE ISFSI

(C) CONTROL STATION

TABLE C-5 **CONCENTRATIONS OF IODINE-131* AND GAMMA EMITTERS IN MILK, 2012**

Results in units of pCi/L ± 2 sigma

STATION ID	COLLECTION PERIOD		GAMMA EMITTERS				
	START	STOP	I-131	K-40	Cs-134	Cs-137	BaLa-140	Ra-226
SA-MLK-13E3	01/02/12	01/03/12	< 0.8	1218 ± 155	< 6	< 7	< 14	< 147
SA-MLK-14F4	01/02/12	01/03/12	< 0.6	1090 + 193	< 8	< 9	< 15 (1)	< 177
SA-MLK-2G3	01/02/12	01/03/12	< 0.4	1336 ± 180	< 7	< 9	< 14	< 180
SA-MLK-3G1 (C)	01/02/12	01/03/12	< 0.7	1226 ± 176	< 6	< 7	< 8	< 173
SA-MLK-13E3	02/05/12	02/06/12	< 0.7	1294 ± 134	< 5	< 7	< 8	< 144
SA-MLK-14F4	02/05/12	02/06/12	< 0.6	1430 ± 124	< 5	< 5	< 8	< 129
SA-MLK-2G3	02/05/12	02/06/12	< 0.8	1252 ± 172	< 7	< 8	< 10	< 184
SA-MLK-3G1 (C)	02/05/12	02/06/12	< 0.7	1217 + 173	< 7	< 9	< 15	< 145
SA-MLK-13E3	03/04/12	03/05/12	< 0.7	1299 ± 126	< 5	< 5	< 8	< 115
SA-MLK-14F4	03/04/12	03/05/12	< 0.6	1372 ± 110	< 5	< 5	< 7	< 95
SA-MLK-2G3	03/04/12	03/05/12	< 0.7	1561 ± 139	< 5	< 6	< 8	< 143
SA-MLK-3G1 (C)	03/04/12	03/05/12	< 0.6	1217 ± 124	< 5	< 5	< 8	< 125
SA-MLK-13E3	04/01/12	04/02/12	< 0.4	1382 ± 119	< 5	< 6	< 7	< 115
SA-MLK-14F4	04/01/12	04/02/12	< 0.3	1321 ± 133	< 5	< 6	< 8	< 141
SA-MLK-2G3	04/01/12	04/02/12	< 0.3	1246 ± 143	< 6	< 6	< 10	< 125
SA-MLK-3G1 (C)	04/01/12	04/02/12	< 0.3	1302 ± 137	< 4	< 4	< 9	< 103
SA-MLK-13E3	04/15/12	04/16/12	< 0.4	1212 + 160	< 6	< 7	< 16 (1)	< 151
SA-MLK-14F4	04/15/12	04/16/12	< 0.4	1362 ± 178	< 5	< 5	10	< 155
SA-MLK-2G3	04/15/12	04/16/12	< 0.4	1292 ± 146	< 6	< 7	7	< 146
SA-MLK-3G1 (C)	04/15/12	04/16/12	< 0.5	1319 ± 172	< 7	< 7	11	< 170
SA-MLK-13E3	05/06/12	05/07/12	< 0.6	1320 ± 160	< 6	< 8	< 14	< 202
SA-MLK-14F4	05/06/12	05/07/12	< 0.5	1417 ± 147	< 4	< 6	< 13	< 144
SA-MLK-2G3	05/06/12	05/07/12	< 0.5	1438 ± 129	< 5	< 6	< 11	< 134
SA-MLK-3G1 (C)	05/06/12	05/07/12	< 0.5	1189 ± 169	< 5	< 7	< 10	< 123
SA-MLK-13E3	05/21/12	05/21/12	< 0.5	1212 ± 140	< 7	< 7	< 8	< 182
SA-MLK-14F4	05/21/12	05/21/12	< 0.4	1376 + 201	< 9	< 9	< 15	< 192
SA-MLK-2G3	05/21/12	05/21/12	< 0.5	1449 ± 172	< 6	< 7	< 7	< 156
SA-MLK-3G1 (C)	05/21/12	05/21/12	< 0.5	1088 ± 162	< 7	< 7	< 8	< 179
SA-MLK-13E3	06/03/12	06/04/12	< 0.4	1373 ± 161	< 6	< 7	< 11	< 144
SA-MLK-14F4	06/03/12	06/04/12	< 0.4	1390 ± 142	< 5	< 7	< 9	< 123
SA-MLK-2G3	06/03/12	06/04/12	< 0.4	1401 ± 148	< 5	< 7	< 12	< 147
SA-MLK-3G1 (C)	06/03/12	06/04/12	< 0.4	1473 ± 133	< 4	< 5	< 7	< 124
SA-MLK-13E3	06/17/12	06/18/12	< 0.8	1400 ± 158	< 6	< 7	< 14	< 164
SA-MLK-14F4	06/17/12	06/18/12	< 0.8	1304 ± 143	< 6	< 6	< 11	< 145
SA-MLK-2G3	06/17/12	06/18/12	< 0.8	1327 ± 151	< 4	< 5	< 12	< 126
SA-MLK-3G1 (C)	06/17/12	06/18/12	< 0.9	1255 ± 139	< 5	< 6	< 13	< 129
SA-MLK-13E3	07/08/12	07/09/12	< 0.6	1337 ± 136	< 5	< 6	< 11	< 142
SA-MLK-14F4	07/08/12	07/09/12	< 0.7	1316 ± 122	< 5	< 6	< 7	< 131
SA-MLK-2G3	07/08/12	07/09/12	< 0.6	1351 ± 152	< 5	< 6	< 8	< 148
SA-MLK-3G1 (C)	07/08/12	07/09/12	< 0.7	1137 + 133	< 5	< 6	< 11	< 114

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

(C) CONTROL STATION

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-5 CONCENTRATIONS OF IODINE-131* AND GAMMA EMITTERS IN MILK, 2012

Results in units of pCi/L ± 2 sigma

STATION ID	COLLECTION PERIOD		GAMMA EMITTERS				
	START - STOP	I-131	K-40	Cs-134	Cs-137	BaLa-140	Ra-226
SA-MLK-13E3	07/15/12 - 07/16/12	< 0.5	1258 ± 167	< 5	< 6	< 12	< 174
SA-MLK-14F4	07/15/12 - 07/16/12	< 0.5	1504 ± 181	< 7	< 8	< 12	< 174
SA-MLK-2G3	07/15/12 - 07/16/12	< 0.5	1274 ± 176	< 7	< 8	< 11	< 164
SA-MLK-3G1 (C)	07/15/12 - 07/16/12	< 0.5	1313 ± 152	< 5	< 6	< 11	< 159
SA-MLK-13E3	08/05/12 - 08/06/12	< 0.6	1257 ± 121	< 5	< 5	< 8	< 130
SA-MLK-14F4	08/05/12 - 08/06/12	< 0.4	1340 ± 106	< 5	< 5	< 7	< 113
SA-MLK-2G3	08/05/12 - 08/06/12	< 0.4	1331 ± 110	< 4	< 5	< 7	< 123
SA-MLK-3G1 (C)	08/05/12 - 08/06/12	< 0.5	1255 + 161	< 6	< 7	< 9	< 136
SA-MLK-13E3	08/12/12 - 08/13/12	< 0.5	1132 ± 163	< 6	< 9	< 8	< 197
SA-MLK-14F4	08/12/12 - 08/13/12	< 0.4	1147 ± 149	< 7	< 7	< 11	< 176
SA-MLK-2G3	08/12/12 - 08/13/12	< 0.5	1516 ± 187	< 7	< 8	< 10	< 194
SA-MLK-3G1 (C)	08/12/12 - 08/13/12	< 0.5	1339 ± 144	< 6	< 6	< 8	< 163
SA-MLK-13E3	09/09/12 - 09/10/12	< 0.6	1499 ± 117	< 4	< 5	< 13	< 136
SA-MLK-14F4	09/09/12 - 09/10/12	< 0.5	1403 + 175	< 6	< 9	< 19 (1)	< 150
SA-MLK-2G3	09/09/12 - 09/10/12	< 0.5	1259 ± 117	< 4	< 5	< 11	< 121
SA-MLK-3G1 (C)	09/09/12 - 09/10/12	< 0.7	1320 ± 131	< 5	< 6	< 14	< 160
SA-MLK-13E3	09/23/12 - 09/24/12	< 0.7	1460 ± 224	< 7	< 11	< 10	< 200
SA-MLK-14F4	09/23/12 - 09/24/12	< 0.7	1245 ± 199	< 8	< 7	< 13	< 195
SA-MLK-2G3	09/23/12 - 09/24/12	< 0.8	1354 ± 151	< 7	< 7	< 9	< 142
SA-MLK-3G1 (C)	09/23/12 - 09/24/12	< 0.8	1265 ± 178	< 7	< 7	< 13	< 185
SA-MLK-13E3	10/14/12 - 10/15/12	< 0.6	1563 ± 112	< 4	< 5	< 7	< 124
SA-MLK-14F4	10/14/12 - 10/15/12	< 0.6	1381 ± 148	< 6	< 7	< 10	< 160
SA-MLK-2G3	10/14/12 - 10/15/12	< 0.5	1475 ± 143	< 5	< 6	< 9	< 154
SA-MLK-3G1 (C)	10/14/12 - 10/15/12	< 0.7	1193 ± 124	< 5	< 7	< 12	< 134
SA-MLK-13E3	10/31/12 - 11/01/12	< 0.6	1263 ± 147	< 5	< 6	< 14	< 152
SA-MLK-14F4	10/31/12 - 11/01/12	< 0.6	1431 + 212	< 8	< 9	< 20 (1)	< 177
SA-MLK-2G3	10/31/12 - 11/01/12	< 0.5	1298 ± 144	< 6	< 7	< 15	< 146
SA-MLK-3G1 (C)	10/31/12 - 11/01/12	< 0.6	1371 ± 152	< 5	< 7	< 14	< 154
SA-MLK-13E3	11/11/12 - 11/12/12	< 0.8	1242 + 166	< 7	< 8	< 10	< 136
SA-MLK-14F4	11/11/12 - 11/12/12	< 0.5	1318 ± 131	< 5	< 6	< 9	< 135
SA-MLK-2G3	11/11/12 - 11/12/12	< 0.8	1409 ± 121	< 5	< 6	< 8	< 150
SA-MLK-3G1 (C)	11/11/12 - 11/12/12	< 0.6	1218 ± 116	< 4	< 6	< 7	< 114
SA-MLK-13E3	11/25/12 - 11/26/12	< 0.7	1327 + 171	< 8	< 9	< 18 (1)	< 175
SA-MLK-14F4	11/25/12 - 11/26/12	< 0.9	1373 ± 138	< 6	< 7	< 10	< 128
SA-MLK-2G3	11/25/12 - 11/26/12	< 0.8	1417 ± 129	< 6	< 6	< 10	< 154
SA-MLK-3G1 (C)	11/25/12 - 11/26/12	< 0.8	1280 ± 132	< 6	< 6	< 10	< 155
SA-MLK-13E3	12/09/12 - 12/10/12	< 0.6	1360 ± 115	< 5	< 5	< 6	< 135
SA-MLK-14F4	12/09/12 - 12/10/12	< 0.5	1277 + 143	< 7	< 7	< 10	< 146
SA-MLK-2G3	12/09/12 - 12/10/12	< 0.6	1350 ± 110	< 4	< 4	< 7	< 108
SA-MLK-3G1 (C)	12/09/12 - 12/10/12	< 0.7	1308 ± 112	< 5	< 5	< 7	< 138
	ANNUAL AVERAGE	-	1323 ± 199	-	-		-

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

(C) CONTROL STATION

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-6 CONCENTRATIONS OF GROSS ALPHA AND GROSS BETA EMITTERS AND TRITIUM IN WELL WATER*, 2012

Results in units of pCi/liter ± 2 sigma

STATION ID	COLLECTION PERIOD	Gr-A	Gr-B	H-3
SA-WWA-3E1	01/23/12 - 01/23/12	< 0.8	< 1.8	< 169
SA-WWA-3E1	02/27/12 - 02/27/12	< 2.1	< 3.1	< 163
SA-WWA-3E1	03/26/12 - 03/26/12	< 1.0	< 2.0	< 168
SA-WWA-3E1	04/23/12 - 04/23/12	< 0.6	< 1.5	< 177
SA-WWA-3E1	05/29/12 - 05/29/12	< 2.8	< 2.4	< 170
SA-WWA-3E1	06/28/12 - 06/28/12	< 1.0	2.7 ± 1.5	< 200
SA-WWA-3E1	07/25/12 - 07/25/12	< 1.8	< 2.3	< 192
SA-WWA-3E1	08/27/12 - 08/27/12	< 0.9	< 2.5	< 190
SA-WWA-3E1	09/27/12 - 09/27/12	< 0.8	< 1.5	< 169
SA-WWA-3E1	10/24/12 - 10/24/12	< 1.7	< 1.9	< 187
SA-WWA-3E1	11/29/12 - 11/29/12	< 1.2	< 1.8	< 179
SA-WWA-3E1	12/19/12 - 12/19/12	2.6 ± 1.6	< 3.4	< 189
	AVERAGE**	3.4 ± 2.4	2.7 ± 0.0	-

* MANAGEMENT AUDIT SAMPLE: NOT REQUIRED BY ODCM

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

TABLE C-7 **CONCENTRATIONS OF GAMMA EMITTERS IN WELL WATER*, 2012**

Results in units of pCi/L ± 2 sigma

STATION ID	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	01/23/12 - 01/23/12	< 86	< 4	< 5	< 10	< 5	< 9	< 6	< 0	< 5	< 5	< 8	< 132
SA-WWA-3E1	02/27/12 - 02/27/12	< 32	< 3	< 3	< 8	< 3	< 6	< 3	< 0	< 3	< 3	< 7	< 86
SA-WWA-3E1	03/26/12 - 03/26/12	< 104	< 6	< 5	< 13	< 6	< 9	< 6	< 0	< 5	< 6	< 11	< 146
SA-WWA-3E1	04/23/12 - 04/23/12	< 65	< 5	< 6	< 12	< 5	< 11	< 6	< 0	< 6	< 6	< 9	< 158
SA-WWA-3E1	05/29/12 - 05/29/12	< 94	< 5	< 6	< 13	< 4	< 9	< 6	< 0	< 4	< 5	< 12	< 137
SA-WWA-3E1	06/28/12 - 06/28/12	< 73	< 4	< 4	< 9	< 4	< 7	< 5	< 1	< 4	< 4	< 13	< 108
SA-WWA-3E1	07/25/12 - 07/25/12	< 39	< 4	< 5	< 9	< 5	< 9	< 6	< 0	< 5	< 6	< 8	< 160
SA-WWA-3E1	08/27/12 - 08/27/12	< 93	< 4	< 4	< 12	< 6	< 9	< 5	< 0	< 5	< 5	< 11	< 141
SA-WWA-3E1	09/27/12 - 09/27/12	< 62	< 3	< 4	< 8	< 4	< 7	< 5	< 1	< 3	< 3	< 11	< 91
SA-WWA-3E1	10/24/12 - 10/24/12	< 36	< 6	< 6	< 14	< 5	< 13	< 7	< 1	< 6	< 5	< 18 (1)	< 118
SA-WWA-3E1	11/29/12 - 11/29/12	< 40	< 3	< 4	< 8	< 4	< 7	< 4	< 1	< 3	< 4	< 7	< 78
SA-WWA-3E1	12/19/12 - 12/19/12	54 ± 25	< 2	< 2	< 4	< 2	< 3	< 2	< 7	< 2	< 2	< 4	< 43
	AVERAGE**	54 ± 0	-	-	-	-	-	-	-	-	-	-	-

* MANAGEMENT AUDIT SAMPLE: NOT REQUIRED BY ODCM

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

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-8 **CONCENTRATIONS OF GROSS ALPHA AND GROSS BETA EMITTERS AND TRITIUM IN RAW AND TREATED POTABLE WATER (2F3), 2012**

Results in units of pCi/L ± 2 sigma

STATION ID	COLLECTION PERIOD	Gr-A	Gr-B	H-3
RAW	01/01/12 - 01/31/12	< 1.0	< 2.5	< 166
	02/01/12 - 02/27/12	< 1.1	< 2.3	< 177
	03/01/12 - 03/31/12	< 1.7	4.4 ± 2.1	< 178
	04/01/12 - 04/30/12	< 1.0	4.4 ± 1.6	< 183
	05/01/12 - 05/31/12	< 0.6	2.2 ± 1.1	< 159
	06/01/12 - 06/30/12	< 1.2	4.0 ± 2.1	< 198
	07/01/12 - 07/31/12	< 2.1	< 3.5	< 178
	08/01/12 - 08/31/12	< 0.9	3.4 ± 0.9	< 166
	09/01/12 - 09/30/12	< 0.5	3.0 ± 0.9	< 166
	10/01/12 - 10/31/12	< 0.9	2.4 ± 1.1	< 189
	11/01/12 - 11/30/12	< 1.5	4.3 ± 1.3	< 178
	12/01/12 - 12/31/12	< 2.6	< 2.9	< 187
TREATED	MEAN	-	3.5 ± 1.8	-
	01/01/12 - 01/31/12	< 0.9	< 2.4	< 166
	02/01/12 - 02/27/12	< 1.9	< 2.7	< 174
	03/01/12 - 03/31/12	< 1.8	4.2 ± 2.1	< 175
	04/01/12 - 04/30/12	< 1.2	4.0 ± 1.7	< 186
	05/01/12 - 05/31/12	< 0.8	3.0 ± 1.3	< 163
	06/01/12 - 06/30/12	< 1.4	3.8 ± 2.2	< 195
	07/01/12 - 07/31/12	< 2.7	3.9 ± 2.5	< 184
	08/01/12 - 08/31/12	< 1.0	2.8 ± 1.0	< 170
	09/01/12 - 09/30/12	< 0.6	3.1 ± 1.0	< 167
	10/01/12 - 10/31/12	< 1.2	3.3 ± 1.4	< 200
	11/01/12 - 11/30/12	< 1.9	4.0 ± 1.5	< 176
	12/01/12 - 12/31/12	< 2.6	< 3.0	< 188
	MEAN	-	3.5 ± 1.0	-

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

TABLE C-9 **CONCENTRATIONS OF IODINE-131* AND GAMMA EMITTERS IN RAW AND TREATED POTABLE WATER (2F3), 2012**

Results in units of pCi/L ± 2 sigma

STATION ID	COLLECTION PERIOD		<----------GAMMA EMITTERS---------->												
	START	STOP	I-131	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-PWR-2F3	01/01/12	01/31/12	< 0.4	< 90	< 5	< 4	< 9	< 4	< 10	< 5	< 8	< 5	< 5	< 6	< 122
SA-PWT-2F3	01/01/12	01/31/12	< 0.4	< 87	< 4	< 5	< 11	< 5	< 9	< 5	< 8	< 5	< 6	< 9	< 143
SA-PWR-2F3	02/01/12	02/27/12	< 0.3	< 86	< 4	< 4	< 9	< 4	< 8	< 5	< 0	< 4	< 5	< 9	< 117
SA-PWT-2F3	02/01/12	02/27/12	< 0.3	< 51	< 5	< 5	< 11	< 4	< 8	< 5	< 0	< 5	< 5	< 9	< 123
SA-PWR-2F3	03/01/12	03/31/12	< 0.4	< 128	< 7	< 8	< 16	< 7	< 14	< 6	< 10	< 6	< 6	< 10	< 159
SA-PWT-2F3	03/01/12	03/31/12	< 0.4	< 93	< 5	< 4	< 10	< 4	< 10	< 5	< 8	< 5	< 5	< 8	< 146
SA-PWR-2F3	04/01/12	04/30/12	< 0.6	< 58	< 7	< 7	< 14	< 7	< 14	< 8	< 1	< 7	< 7	< 10	< 136
SA-PWT-2F3	04/01/12	04/30/12	< 0.5	< 26	< 3	< 2	< 5	< 2	< 5	< 3	< 5	< 2	< 2	< 4	< 67
SA-PWR-2F3	05/01/12	05/31/12	< 0.5	< 58	< 6	< 8	< 16	< 8	< 14	< 9	< 0	< 8	< 7	< 13	< 135
SA-PWT-2F3	05/01/12	05/31/12	< 0.6	< 48	< 5	< 5	< 11	< 4	< 10	< 5	< 1	< 5	< 4	< 7	< 126
SA-PWR-2F3	06/01/12	06/30/12	< 0.8	< 73	< 6	< 6	< 17	< 7	< 9	< 7	< 1	< 5	< 6	< 21	< 131
SA-PWT-2F3	06/01/12	06/30/12	< 0.8	< 37	< 4	< 4	< 11	< 4	< 8	< 6	< 1	< 4	< 5	< 11	< 91
SA-PWR-2F3	07/01/12	07/31/12	< 0.6	< 76	< 8	< 8	< 18	< 8	< 17	< 8	< 1	< 8	< 7	< 12	< 162
SA-PWT-2F3	07/01/12	07/31/12	< 0.6	< 91	< 5	< 6	< 11	< 4	< 8	< 6	< 9	< 5	< 6	< 7	< 140
SA-PWR-2F3	08/01/12	08/31/12	< 0.5	< 48	< 6	< 7	< 14	< 6	< 13	< 6	< 0	< 6	< 6	< 13	< 132
SA-PWT-2F3	08/01/12	08/31/12	< 0.6	< 81	< 4	< 4	< 10	< 4	< 9	< 5	< 1	< 4	< 4	< 10	< 116
SA-PWR-2F3	09/01/12	09/30/12	< 0.6	< 60	< 3	< 3	< 7	< 3	< 6	< 4	< 8	< 3	< 3	< 6	< 90
SA-PWT-2F3	09/01/12	09/30/12	< 0.5	< 36	< 3	< 3	< 8	< 4	< 8	< 4	< 8	< 3	< 3	< 7	< 83
SA-PWR-2F3	10/01/12	10/31/12	< 0.9	< 54	< 6	< 7	< 11	< 5	< 8	< 6	< 1	< 5	< 5	< 12	< 145
SA-PWT-2F3	10/01/12	10/31/12	< 0.8	< 128	< 5	< 6	< 15	< 8	< 12	< 8	< 1	< 6	< 7	< 9	< 146
SA-PWR-2F3	11/01/12	11/30/12	< 0.8	< 45	< 4	< 5	< 10	< 4	< 10	< 6	< 1	< 4	< 5	< 9	< 108
SA-PWT-2F3	11/01/12	11/30/12	< 0.6	< 95	< 4	< 6	< 10	< 6	< 10	< 6	< 1	< 4	< 5	< 9	< 128
SA-PWR-2F3	12/01/12	12/31/12	< 0.4	< 69	< 4	< 4	< 8	< 4	< 7	< 4	< 8	< 4	< 4	< 7	< 102
SA-PWT-2F3	12/01/12	12/31/12	< 0.4	< 26	< 3	< 3	< 6	< 3	< 5	< 3	< 6	< 2	< 3	< 4	< 65
	AVERAGE		-	-	-	-	-	-	-	-	-	-	-		-

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

TABLE C-10 **CONCENTRATIONS OF GAMMA EMITTERS* IN VEGETABLES*, 2012**

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

STATION ID	COLLECTION PERIOD	SAMPLE TYPE	<----------GAMMA EMITTERS----------> Be-7	K-40	I-131	Cs-134	Cs-137	Ra-226	Th-232
SA-FPV-2F9	04/22/12	asparagus	< 105	1987 ± 241	< 26	< 11	< 13	< 272	< 36
	AVERAGE*			1987 ± 0					
SA-FPV-2G2 (C)	05/06/12	asparagus	< 119	2384 ± 286	< 27	< 13	< 16	< 316	< 62
SA-FPV-3H5 (C)	05/21/12	asparagus	< 155	2432 ± 382	< 37	< 16	< 17	< 443	< 75
	AVERAGE*			2408 ± 68					
SA-FPV-2G2 (C)	07/09/12	corn	< 43	2391 ± 115	< 18	< 4	< 5	< 89	< 16
SA-FPV-2G2 (C)	07/09/12	tomatoes	< 39	2049 ± 91	< 14	< 4	< 4	< 97	< 17
SA-FPV-15F4	07/19/12	corn	< 39	2283 ± 100	< 15	< 3	< 4	< 81	< 16
SA-FPV-15F4	07/19/12	peppers	< 41	2321 ± 99	< 21	< 4	< 4	< 107	< 17
SA-FPV-15F4	07/19/12	tomatoes	< 53	2909 ± 108	< 25	< 5	< 5	< 122	< 20
SA-FPV-1G1 (C)	07/23/12	corn	< 47	2078 ± 107	< 16	< 5	< 5	< 84	< 19
SA-FPV-1G1 (C)	07/23/12	tomatoes	< 35	2248 ± 91	< 13	< 3	< 4	< 75	< 13
SA-FPV-2F9	07/23/12	corn	< 38	2049 ± 87	< 13	< 4	< 4	< 96	< 13
SA-FPV-2F9	07/23/12	tomatoes	< 47	2450 ± 115	< 17	< 5	< 5	< 88	< 21
SA-FPV-3H5 (C)	07/23/12	corn	< 36	2017 ± 89	< 13	< 4	< 4	< 92	< 17
SA-FPV-3H5 (C)	07/23/12	tomatoes	< 28	2234 ± 76	< 11	< 3	< 3	< 66	< 12
SA-FPV-9G2 (C)	07/23/12	corn	< 47	2459 ± 109	< 15	< 4	< 5	< 98	< 19
SA-FPV-9G2 (C)	07/23/12	tomatoes	< 29	2304 ± 73	< 11	< 3	< 3	< 74	< 12
SA-FPV-1G1 (C)	07/31/12	peppers	< 142	2382 ± 348	< 36	< 17	< 20	< 417	< 75
SA-FPV-3H5 (C)	07/31/12	cabbage	< 222	2349 ± 482	< 45	< 24	< 25	< 488	< 83
SA-FPV-3H5 (C)	07/31/12	peppers	< 136	2295 ± 333	< 33	< 13	< 16	< 403	< 56
	AVERAGE*			2301 ± 432					

* 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*, 2012**

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

STATION ID	COLLECTION PERIOD	SAMPLE TYPE	<----------GAMMA EMITTERS----------> Be-7	K-40	I-131	Cs-134	Cs-137	Ra-226	Th-232
SA-VGT-14F4	10/13/12	Peppers	< 216	14700 ± 795	< 44	< 20	< 24	< 490	< 106
	AVERAGE*			14700 ± 0					
SA-VGT-1F1	11/02/12	soy beans	< 59	13770 ± 236	< 46	< 5	< 5	< 94	< 23
	AVERAGE*			13770 ± 0					
SA-FPL-10D1	12/13/12	cabbage	< 198	2618 ± 385	< 30	< 14	< 22	< 346	< 67
SA-FPL-15S1	12/13/12	cabbage	< 264	3555 ± 586	< 48	< 26	50 ± 28	< 628	< 130
SA-FPL-16S1	12/13/12	cabbage	< 281	3494 ± 521	< 45	< 23	< 37	< 567	< 104
SA-FPL-1S1	12/13/12	cabbage	267 ± 173	4331 ± 427	< 37	< 21	< 23	< 534	< 71
	AVERAGE*		267 ± 0	3500 ± 0			50 ± 0		

TABLE C-11 **CONCENTRATIONS OF GAMMA EMITTERS IN FODDER CROPS*, 2012**

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

STATION ID	COLLECTION DATE	SAMPLE TYPE	Be-7	K-40	I-131	Cs-134	Cs-137	Ra-226	Th-232
SA-VGT-13E3	12/26/12	Silage	96 ± 46	3851 ± 163	< 21	< 6	< 7	< 139	< 26
SA-VGT-14F4	12/26/12	Silage	154 ± 37	2412 ± 92	< 11	< 3	< 3	< 74	< 11
SA-VGT-2G3	12/26/12	Silage	120 ± 42	3353 ± 116	< 8	< 2	< 2	< 62	< 10
SA-VGT-3G1 (C)	12/26/12	Silage	49 ± 30	1296 ± 75	< 13	< 4	< 4	< 88	< 14
	AVERAGE		105 ± 88	2728 ± 2252	-	-	-	-	-

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

TABLE C-12 **CONCENTRATIONS OF GAMMA EMITTERS IN SOIL, 2012**

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 GAMMA EMITTERS IN BEEF AND GAME*, 2012**

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

STATION ID	COLLECTION DATE	SAMPLE TYPE	Be-7	K-40	Cs-134	Cs-137
SA-GAM-3E1	02/24/12	Muscrat	< 58	3020 ± 178	< 6	< 6
SA-FPB-3E1	04/01/12	Cow	< 85	2320 + 80.8	< 2	< 3
SA-FPB-11E3	04/01/12	Cow	< 477	2504 ± 120	< 5	< 5

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

TABLE C-14 CONCENTRATIONS OF GROSS BETA EMITTERS IN SURFACE WATER, 2012

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
01/06/12 -	01/06/12	74 ± 9	67 ± 7	44 ± 5	26 ± 2	107 ± 10
02/06/12 -	02/06/12	98 ± 9	57 ± 6	52 ± 5	29 ± 3	124 ± 10
03/06/12 -	03/06/12	122 ± 11	59 ± 9	37 ± 7	16 ± 9	26 ± 3
04/03/12 -	04/03/12	131 ± 15	111 ± 13	80 ± 8	60 ± 8	196 ± 20
05/11/12 -	05/11/12	138 ± 17	87 ± 13	51 ± 11	40 ± 4	114 ± 16
06/05/12 -	06/05/12	86 ± 12	58 ± 10	37 ± 8	27 ± 7	125 ± 14
07/03/12 -	07/03/12	126 ± 27	105 ± 20	88 ± 11	51 ± 7	235 ± 30
08/06/12 -	08/06/12	150 ± 19	105 ± 15	77 ± 12	72 ± 12	169 ± 26
09/06/12 -	09/06/12	103 ± 22	106 ± 18	92 ± 18	64 ± 14	118 ± 25
10/01/12 -	10/01/12	175 ± 29	117 ± 21	81 ± 18	56 ± 16	90 ± 19
11/06/12 -	11/06/12	108 ± 25	70 ± 17	41 ± 12	20 ± 9	140 ± 26
12/05/12 -	12/05/12	132 ± 23	99 ± 20	100 ± 22	61 ± 16	164 ± 37
	AVERAGE	120 ± 56	87 ± 46	65 ± 47	43 ± 39	134 ± 107

TABLE C-15 **CONCENTRATIONS OF TRITIUM IN SURFACE WATER, 2012**

Results in Units of pCi/L ± 2 sigma

COLLECTION PERIOD	SA-SWA-11A1	CONTROL SA-SWA-12C1	SA-SWA-16F1	SA-SWA-1F2	SA-SWA-7E1
01/06/12 - 01/06/12	< 167	< 167	< 167	< 166	< 169
02/06/12 - 02/06/12	< 175	< 178	< 178	< 178	< 179
03/06/12 - 03/06/12	< 178	< 176	< 180	< 177	< 176
04/03/12 - 04/03/12	< 166	< 164	< 168	< 169	< 166
05/11/12 - 05/11/12	< 181	< 181	< 183	< 178	735 ± 153 (1)
06/05/12 - 06/05/12	< 191	< 190	< 190	< 187	< 185
07/03/12 - 07/03/12	< 198	< 200	< 193	< 198	< 193
08/06/12 - 08/06/12	< 170	< 170	< 165	< 166	< 165
09/06/12 - 09/06/12	< 180	< 177	< 174	< 178	< 176
10/01/12 - 10/01/12	< 193	< 191	< 193	< 196	< 191
11/06/12 - 11/06/12	< 195	< 195	< 197	< 198	< 197
12/05/12 - 12/05/12	< 165	< 178	< 179	< 180	< 177
AVERAGE*	-	-	-	-	735 ± 0

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

(1) THE SA-SWA-7E1 05/11/12 SAMPLE WAS TAKEN DOWNSTREAM DURING DISHCARGE AND IS SIMILAR TO THE 2005 RESULTS OF 820 pCi/L

TABLE C-16 **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER, 2012**

Results in Units of pCi/L ± 2 sigma

STATION ID	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	01/06/12	< 40	< 5	< 6	< 8	< 7	< 6	< 5	< 1	< 5	< 4	< 9
	02/06/12	84 ± 38	< 4	< 4	< 8	< 5	< 8	< 4	< 1	< 4	< 4	< 5
	03/06/12	< 70	< 6	< 6	< 15	< 5	< 15	< 7	< 0.4	< 5	< 7	< 15 (1)
	04/03/12	< 52	< 6	< 6	< 14	< 6	< 10	< 6	< 0.5	< 5	< 6	< 11
	05/11/12	132 ± 59	< 4	< 5	< 8	< 6	< 10	< 5	< 1	< 5	< 5	< 12
	06/05/12	< 36	< 5	< 6	< 10	< 4	< 8	< 5	< 1	< 4	< 5	< 13
	07/03/12	95 ± 59	< 3	< 4	< 9	< 4	< 6	< 4	< 11	< 3	< 3	< 9
	08/06/12	< 51	< 5	< 6	< 13	< 7	< 13	< 5	< 17	< 5	< 5	< 10
	09/06/12	< 36	< 4	< 5	< 10	< 5	< 10	< 5	< 12	< 4	< 5	< 10
	10/01/12	84 ± 24	< 2	< 2	< 5	< 2	< 4	< 2	< 10	< 2	< 2	< 6
	11/06/12	< 48	< 4	< 5	< 11	< 5	< 12	< 6	< 16	< 5	< 5	< 12
	12/05/12	< 55	< 5	< 6	< 10	< 5	< 9	< 6	< 16	< 5	< 6	< 13
	AVERAGE**	99 ± 46	-	-	-	-	-	-	-	-	-	-
SA-SWA-12C1 (C)	01/06/12	110 ± 69	< 6	< 5	< 12	< 5	< 13	< 6	< 1	< 5	< 5	< 10
	02/06/12	< 44	< 5	< 6	< 11	< 6	< 11	< 6	< 1	< 4	< 5	< 6
	03/06/12	< 41	< 4	< 4	< 10	< 4	< 9	< 5	< 0	< 4	< 4	< 10
	04/03/12	< 53	< 5	< 5	< 12	< 5	< 11	< 6	< 1	< 5	< 6	< 13
	05/11/12	< 46	< 6	< 6	< 12	< 6	< 10	< 7	< 1	< 5	< 7	< 15
	06/05/12	< 122	< 6	< 5	< 16	< 7	< 13	< 7	< 0	< 6	< 6	< 13
	07/03/12	< 37	< 4	< 5	< 11	< 6	< 11	< 5	< 16	< 4	< 5	< 8
	08/06/12	< 49	< 6	< 6	< 11	< 5	< 11	< 5	< 16	< 6	< 5	< 12
	09/06/12	< 41	< 5	< 4	< 10	< 4	< 8	< 5	< 11	< 4	< 4	< 9
	10/01/12	62 ± 22	< 1	< 1	< 3	< 1	< 2	< 2	< 7	< 1	< 1	< 4
	11/06/12	< 40	< 5	< 5	< 12	< 6	< 10	< 6	< 16	< 4	< 5	< 9
	12/05/12	< 54	< 5	< 5	< 10	< 6	< 11	< 5	< 16	< 5	< 7	< 9
	AVERAGE**	86 ± 67	-	-	-	-	-	-	-	-	-	-

* 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

(C) CONTROL STATION

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-16 **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER, 2012**

Results in Units of pCi/L ± 2 sigma

STATION ID	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	01/06/12	< 64	< 5	< 5	< 12	< 6	< 11	< 6	< 1	< 5	< 4	< 11
	02/06/12	< 37	< 5	< 5	< 12	< 6	< 11	< 5	< 1	< 6	< 6	< 7
	03/06/12	64 ± 34	< 3	< 4	< 9	< 3	< 6	< 4	< 0	< 3	< 3	< 7
	04/03/12	< 41	< 5	< 6	< 11	< 5	< 9	< 7	< 1	< 6	< 5	< 12
	05/11/12	< 89	< 8	< 7	< 22	< 7	< 18	< 9	< 17	< 8	< 8	< 14
	06/05/12	< 29	< 6	< 7	< 17	< 7	< 14	< 9	< 0	< 7	< 7	< 14
	07/03/12	< 38	< 4	< 4	< 8	< 4	< 8	< 4	< 14	< 4	< 4	< 9
	08/06/12	< 101	< 8	< 10	< 23	< 8	< 17	< 8	< 26	< 8	< 7	< 14
	09/06/12	< 64	< 6	< 7	< 16	< 6	< 14	< 7	< 15	< 5	< 7	< 13
	10/01/12	< 20	< 2	< 3	< 6	< 2	< 4	< 3	< 14	< 2	< 2	< 7
	11/06/12	< 39	< 4	< 5	< 8	< 3	< 8	< 5	< 16	< 4	< 5	< 9
	12/05/12	< 45	< 4	< 5	< 11	< 5	< 9	< 5	< 13	< 4	< 4	< 10
	AVERAGE**	64 ± 0	-	-	-	-	-	-	-	-	-	-
SA-SWA-1F2	01/06/12	95 ± 58	< 6	< 5	< 17	< 5	< 13	< 8	< 1	< 5	< 6	< 11
	02/06/12	< 130	< 6	< 5	< 15	< 8	< 11	< 5	< 0	< 5	< 6	< 10
	03/06/12	< 49	< 5	< 5	< 11	< 4	< 9	< 6	< 0	< 5	< 6	< 12
	04/03/12	< 142	< 7	< 7	< 17	< 7	< 16	< 7	< 1	< 7	< 8	< 15
	05/11/12	< 109	< 5	< 5	< 12	< 5	< 11	< 6	< 1	< 5	< 6	< 12
	06/05/12	< 59	< 5	< 6	< 16	< 8	< 13	< 7	< 0	< 6	< 6	< 8
	07/03/12	< 67	< 7	< 7	< 17	< 7	< 12	< 7	< 20	< 6	< 7	< 17 (1)
	08/06/12	< 48	< 5	< 6	< 12	< 6	< 13	< 6	< 18	< 5	< 6	< 12
	09/06/12	< 40	< 4	< 4	< 9	< 4	< 10	< 5	< 11	< 4	< 4	< 7
	10/01/12	< 15	< 2	< 2	< 4	< 2	< 3	< 2	< 11	< 2	< 2	< 6
	11/06/12	< 129	< 7	< 9	< 16	< 8	< 17	< 10	< 23	< 7	< 8	< 19 (1)
	12/05/12	< 48	< 6	< 5	< 10	< 5	< 10	< 5	< 14	< 5	< 5	< 11
	AVERAGE**	95 ± 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

(C) CONTROL STATION

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-16 **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER, 2012**

Results in Units of pCi/L ± 2 sigma

STATION ID	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	01/06/12	115 ± 56	< 5	< 6	< 10	< 5	< 13	< 6	< 1	< 5	< 6	< 9
	02/06/12	< 63	< 7	< 6	< 15	< 7	< 10	< 6	< 1	< 6	< 7	< 11
	03/06/12	< 34	< 4	< 5	< 10	< 4	< 10	< 6	< 1	< 5	< 5	< 7
	04/03/12	< 125	< 5	< 6	< 10	< 4	< 9	< 4	< 1	< 4	< 3	< 8
	05/11/12	124 ± 73	< 5	< 6	< 14	< 7	< 13	< 6	< 1	< 5	< 7	< 8
	06/05/12	< 72	< 7	< 8	< 16	< 9	< 14	< 10	< 0	< 6	< 8	< 10
	07/03/12	124 ± 59	< 4	< 5	< 11	< 4	< 10	< 6	< 15	< 5	< 5	< 9
	08/06/12	< 43	< 4	< 4	< 10	< 4	< 9	< 4	< 13	< 4	< 4	< 8
	09/06/12	108 ± 58	< 4	< 5	< 9	< 5	< 8	< 5	< 12	< 4	< 5	< 8
	10/01/12	90 ± 25	< 2	< 2	< 4	< 2	< 3	< 2	< 11	< 2	< 2	< 5
	11/06/12	103 ± 65	< 4	< 5	< 11	< 5	< 10	< 5	< 16	< 4	< 5	< 11
	12/05/12	< 46	< 5	< 5	< 10	< 5	< 9	< 5	< 15	< 4	< 5	< 9
	AVERAGE**	111 ± 26	-	-	-	-	-	-	-	-	-	-

* 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

(C) CONTROL STATION

TABLE C-17 **CONCENTRATIONS OF GAMMA EMITTERS IN EDIBLE FISH, 2012**

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

STATION ID	COLLECTION PERIOD	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137	Ra-226
SA-ESF-11A1	04/25/12	4527 ± 845	< 40	< 52	< 99	< 50	< 87	< 39	< 49	< 899
	10/01/12	4364 ± 992	< 68	< 92	< 155	< 63	< 129	< 70	< 71	< 1597
	AVERAGE	4446 ± 231	-	-	-	-	-	-	-	-
SA-ESF-12C1 (C)	04/24/12	3278 ± 809	< 52	< 59	< 101	< 40	< 96	< 47	< 50	< 1154
	10/01/12	3485 ± 683	< 33	< 42	< 118	< 24	< 80	< 37	< 39	< 689
	AVERAGE	3382 ± 293	-	-	-	-	-	-	-	-
SA-ESF-7E1										
	04/25/12	4924 ± 791	< 36	< 44	< 121	< 38	< 98	< 37	< 48	< 917
	10/01/12	4594 ± 820	< 53	< 80	< 171	< 52	< 116	< 58	< 62	< 1396
	AVERAGE	4759 ± 467	-	-	-	-	-	-	-	-

(C) CONTROL STATION

TABLE C-18 **CONCENTRATIONS OF GAMMA EMITTERS IN CRABS, 2012**

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

STATION ID	COLLECTION PERIOD	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137	Ra-226
SA-ECH-11A1	07/23/12	2639 ± 800	< 71	< 74	< 141	< 50	< 140	< 74	< 65	< 1454
	08/31/12	2650 ± 1015	< 68	< 70	< 182	< 72	< 185	< 68	< 74	< 1837
	AVERAGE	2645 ± 16	-	-	-	-	-	-	-	-
SA-ECH-12C1 (C)	07/23/12	3247 ± 972	< 58	< 65	< 141	< 54	< 120	< 54	< 59	< 1160
	08/20/12	1157 ± 362	< 23	< 23	< 42	< 22	< 46	< 19	< 23	< 372
	08/31/12	3276 ± 916	< 48	< 46	< 115	< 39	< 97	< 49	< 51	< 951
	AVERAGE	2560 ± 2430	-	-	-	-	-	-	-	-

(C) CONTROL STATION

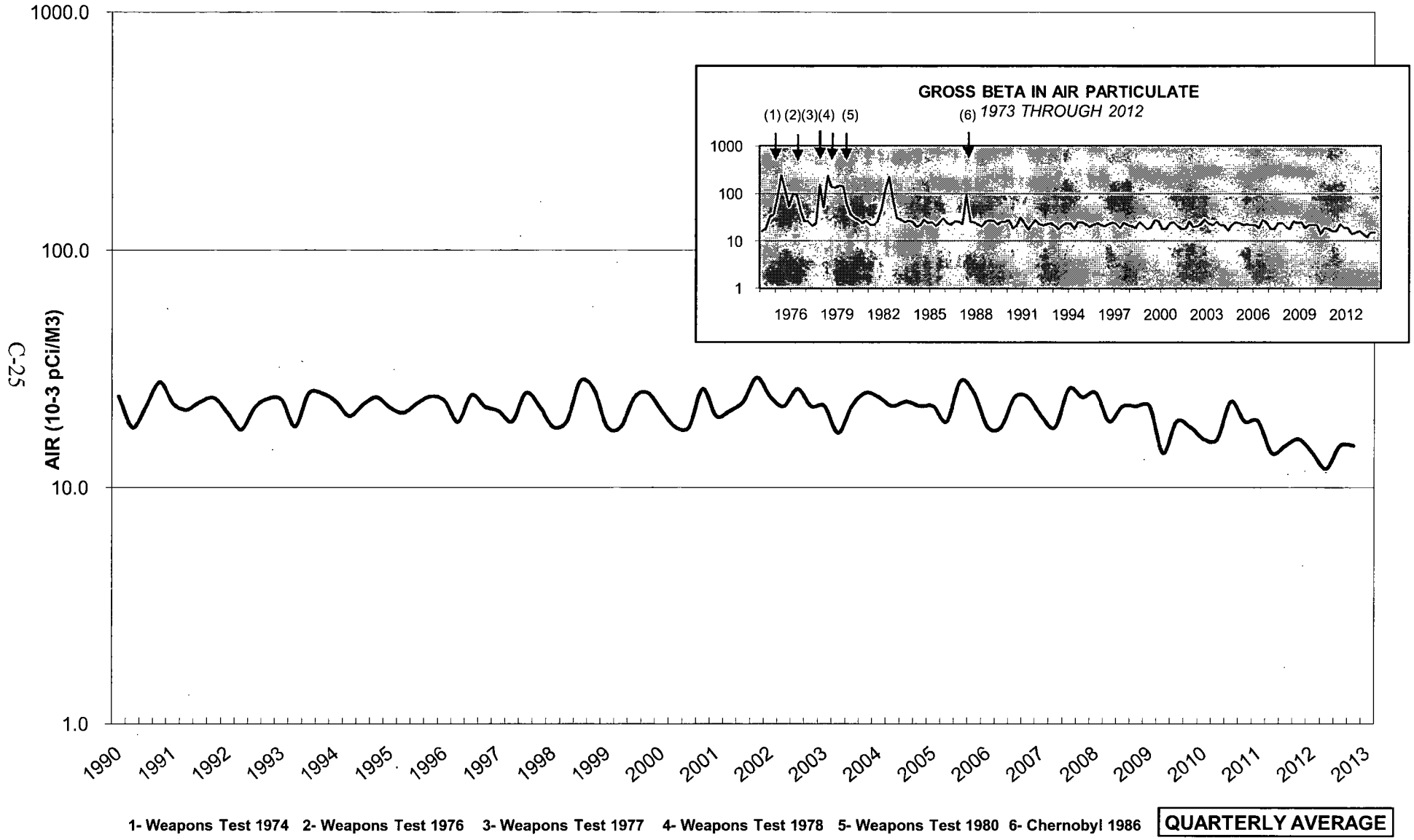
TABLE C-19 **CONCENTRATIONS OF GAMMA EMITTERS IN SEDIMENT, 2012**

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

STATION ID	COLLECTION PERIOD	Be-7	K-40	Cs-134	Cs-137	Ra-226	Th-232
SA-ESS-11A1	05/30/12	< 400	4164 ± 659	< 39	< 41	< 850	445 ± 139
	11/21/12	< 287	6594 ± 643	< 27	< 34	< 727	445 ± 93
	AVERAGE*	-	5379 ± 3437	-	-	-	445 ± 0
SA-ESS-12C1 (C)	05/30/12	< 809	16470 ± 1436	< 70	< 82	2644 ± 1541	1117 ± 228
	11/21/12	< 527	12000 ± 1188	< 48	< 60	2188 ± 943	953 ± 178
	AVERAGE*	-	14235 ± 6322	-	-	2416 ± 645	1035 ± 232
SA-ESS-15A1	05/30/12	< 511	4655 ± 764	< 46	< 48	< 895	429 ± 176
	11/21/12	< 390	5811 ± 714	< 33	< 42	1359 ± 848	524 ± 116
	AVERAGE*	-	5233 ± 1635	-	-	1359 ± 0	476 ± 134
SA-ESS-16A1	05/30/12	< 633	6912 ± 1019	< 51	< 69	3101 ± 1375	899 ± 198
	11/21/12	< 378	4896 ± 606	< 35	< 37	1240 ± 722	401 ± 120
	AVERAGE*	-	5904 ± 2851	-	-	2171 ± 2632	650 ± 704
SA-ESS-16F1	05/30/12	< 707	16320 ± 1776	< 83	< 82	< 1271	837 ± 278
	11/21/12	< 1115	20380 ± 2006	< 100	< 108	< 2111	1186 ± 347
	AVERAGE*	-	18350 ± 5742	-	-	-	1012 ± 493
SA-ESS-6S2	06/11/12	< 285	2563 ± 581	< 27	< 33	< 657	183 ± 59
	11/21/12	< 124	2537 ± 420	< 12	< 18	< 239	147 ± 61
	AVERAGE*	-	2550 ± 37	-	-	-	165 ± 50
SA-ESS-7E1	05/30/12	< 827	17560 ± 1901	< 77	< 99	< 1561	1243 ± 265
	11/21/12	< 321	13250 ± 963	< 27	< 38	1710 ± 827	796 ± 146
	AVERAGE*	-	15405 ± 6095	-	-	1710 ± 0	1020 ± 632

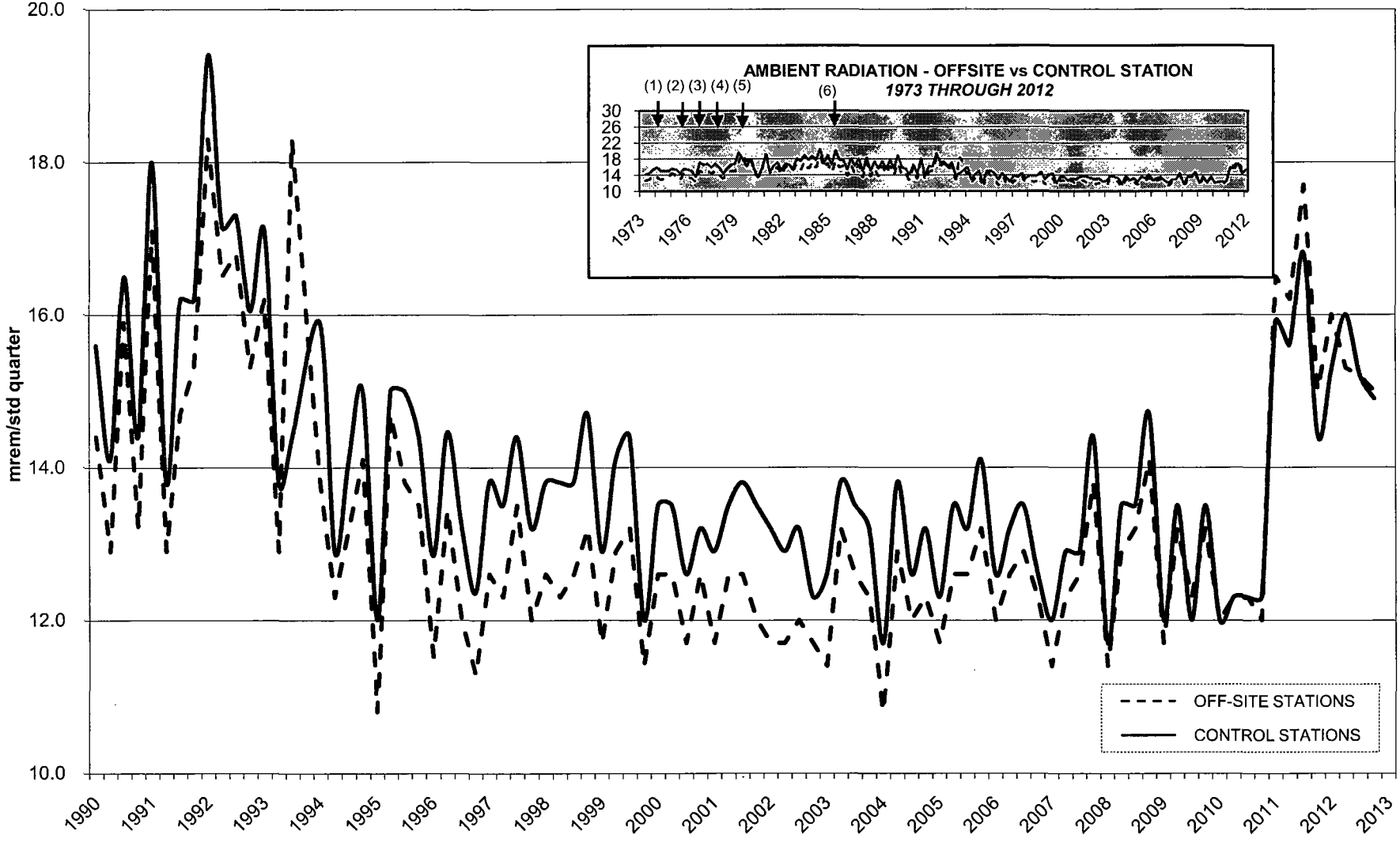
* THE AVERAGE AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES
(C) CONTROL STATION

FIGURE 1
GROSS BETA ACTIVITY IN AIR PARTICULATE
1990 THROUGH 2012



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**

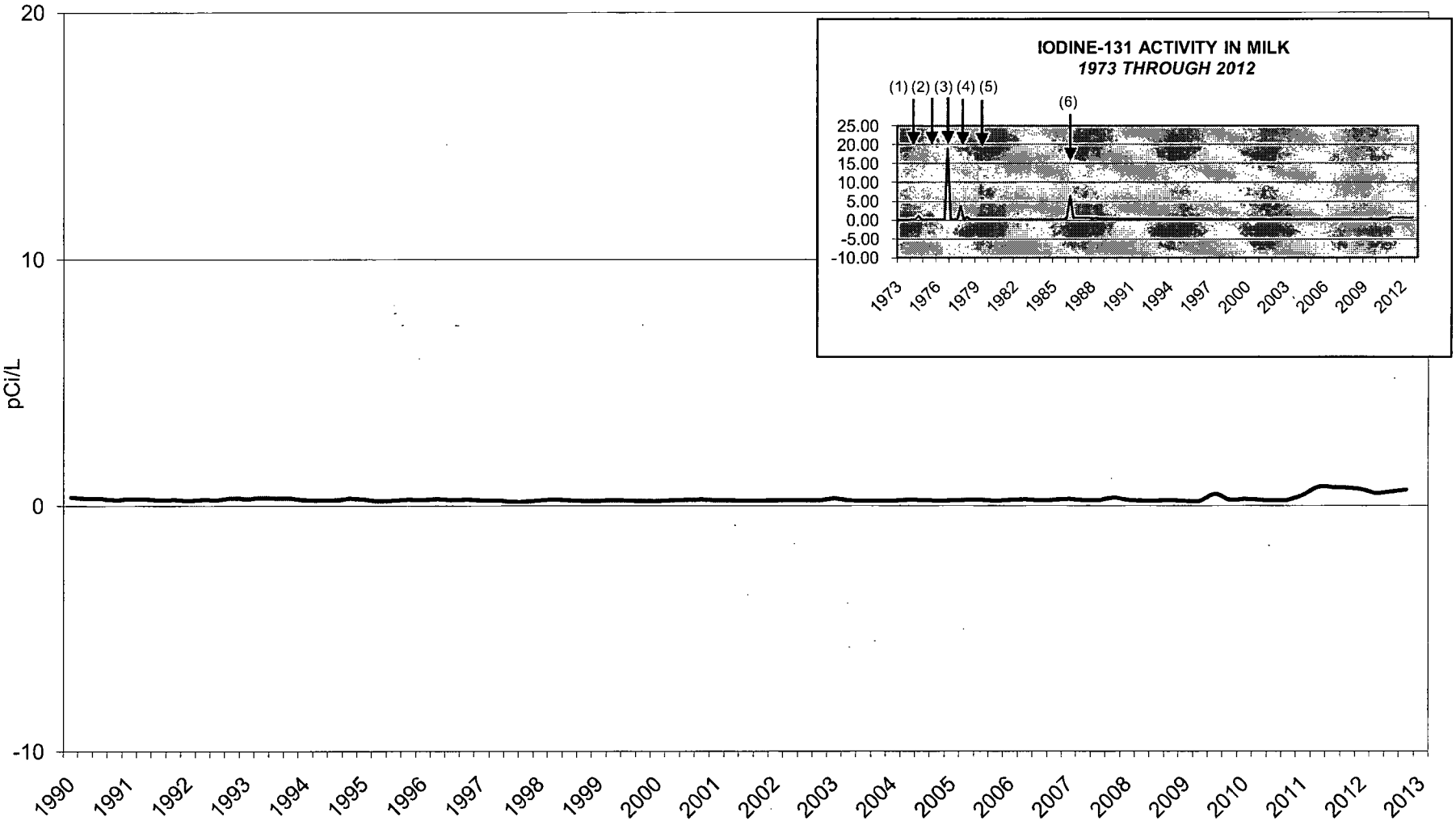
FIGURE 2
AMBIENT RADIATION - OFFSITE vs CONTROL STATION
1990 THROUGH 2012



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

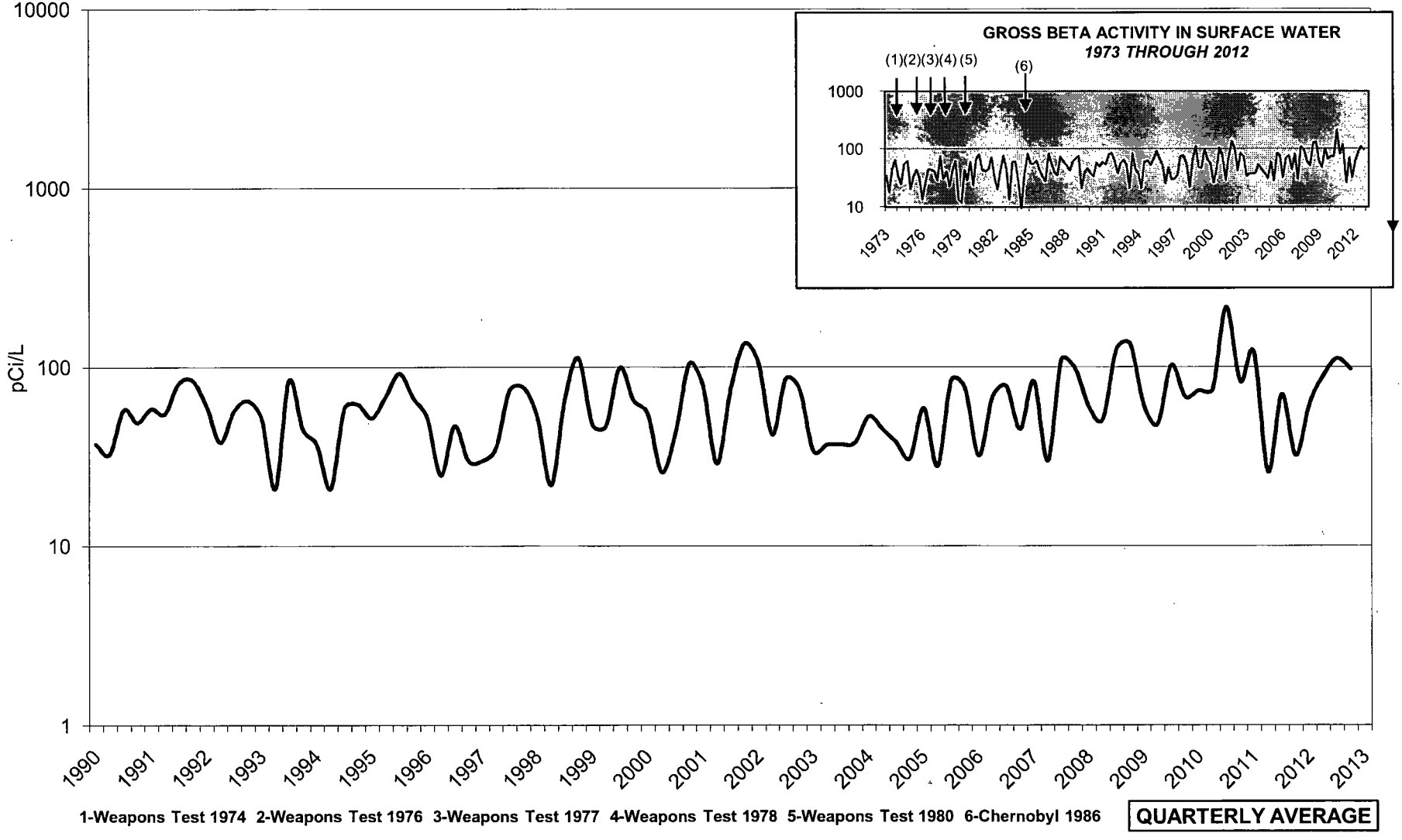
FIGURE 3
IODINE - 131 ACTIVITY IN MILK
1990 THROUGH 2012



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

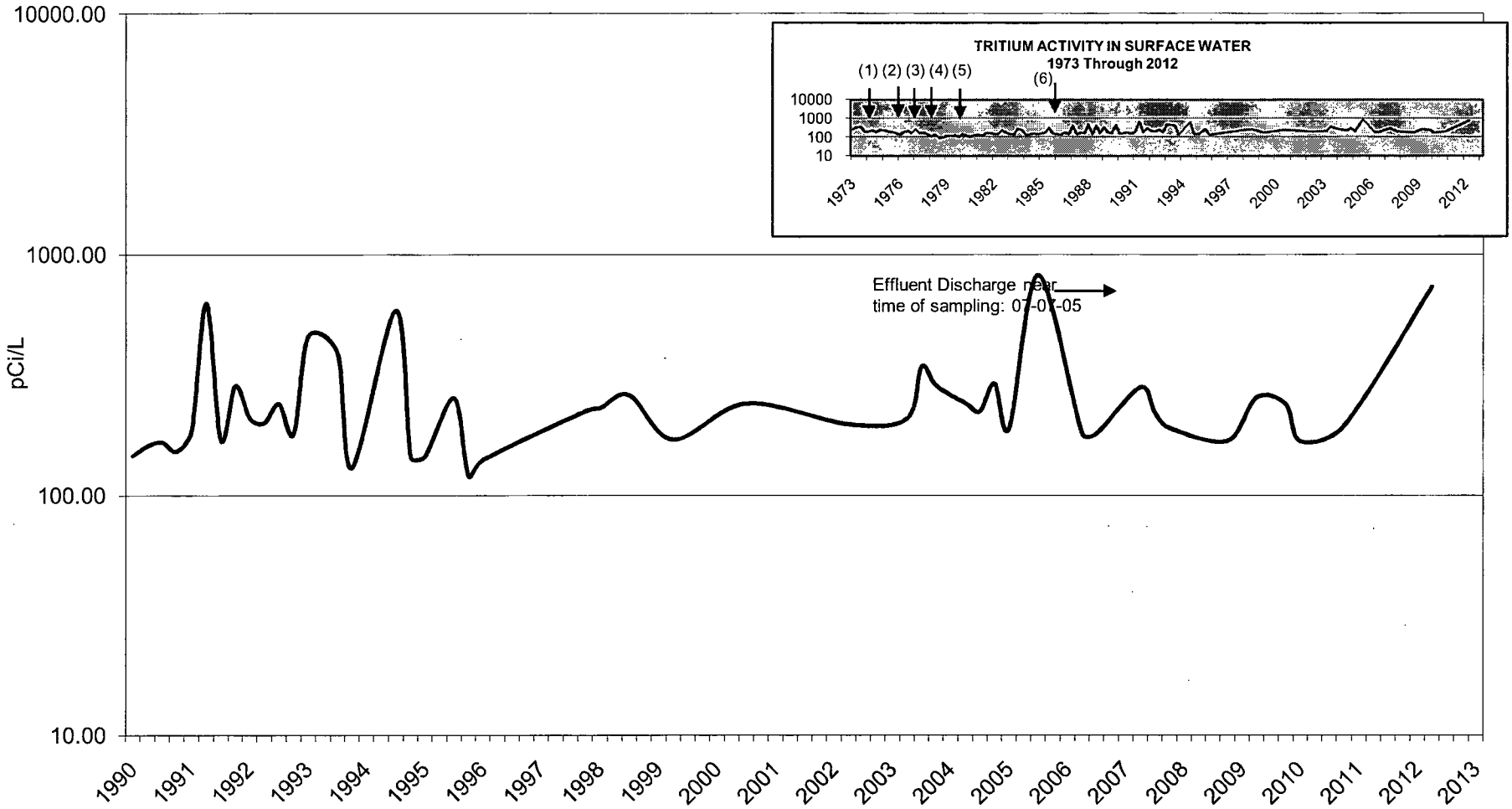
FIGURE 4
GROSS BETA ACTIVITY IN SURFACE WATER
1990 THROUGH 2012



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 5
TRITIUM ACTIVITY IN SURFACE WATER
1990 THROUGH 2012



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 2012

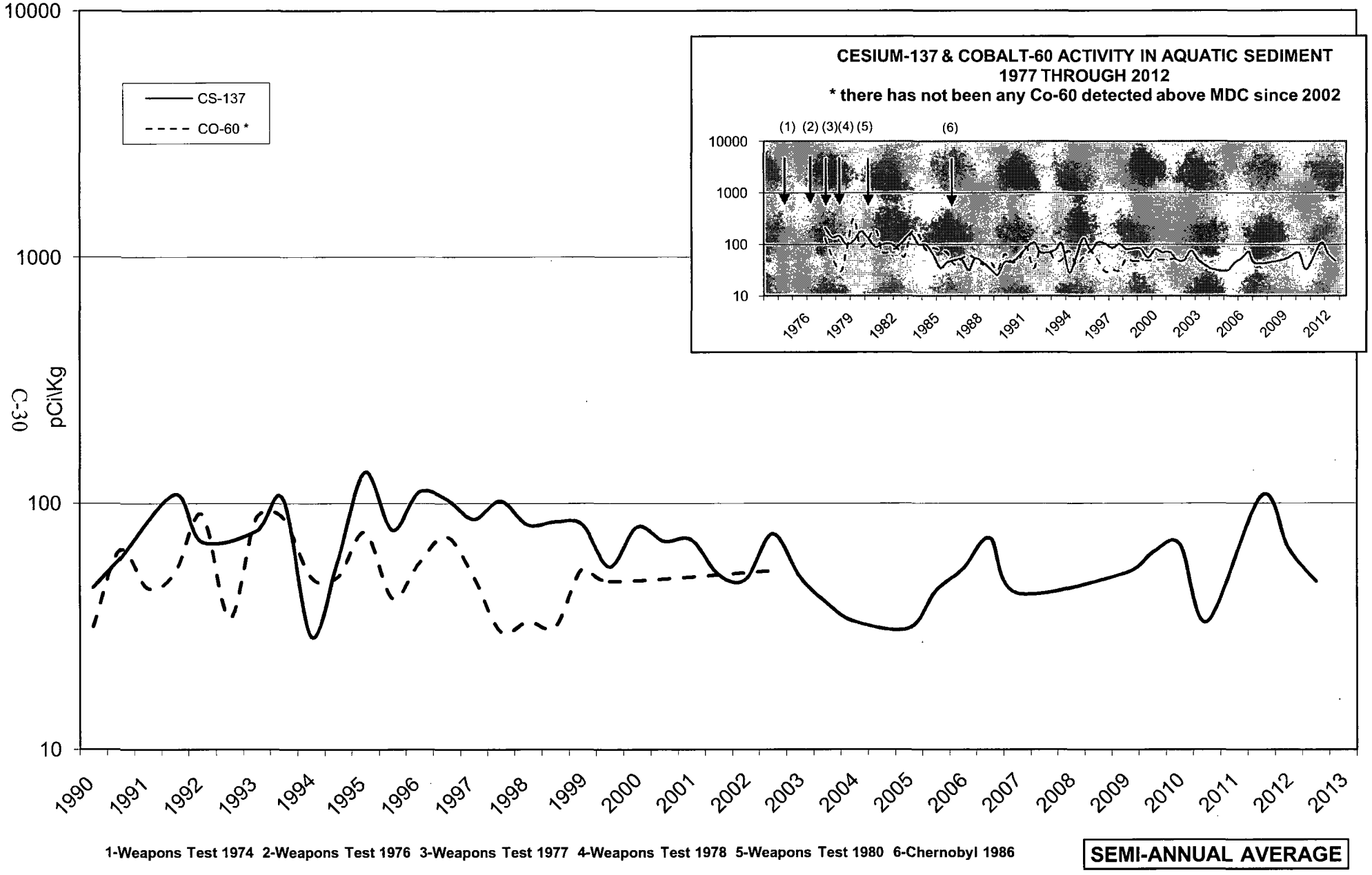
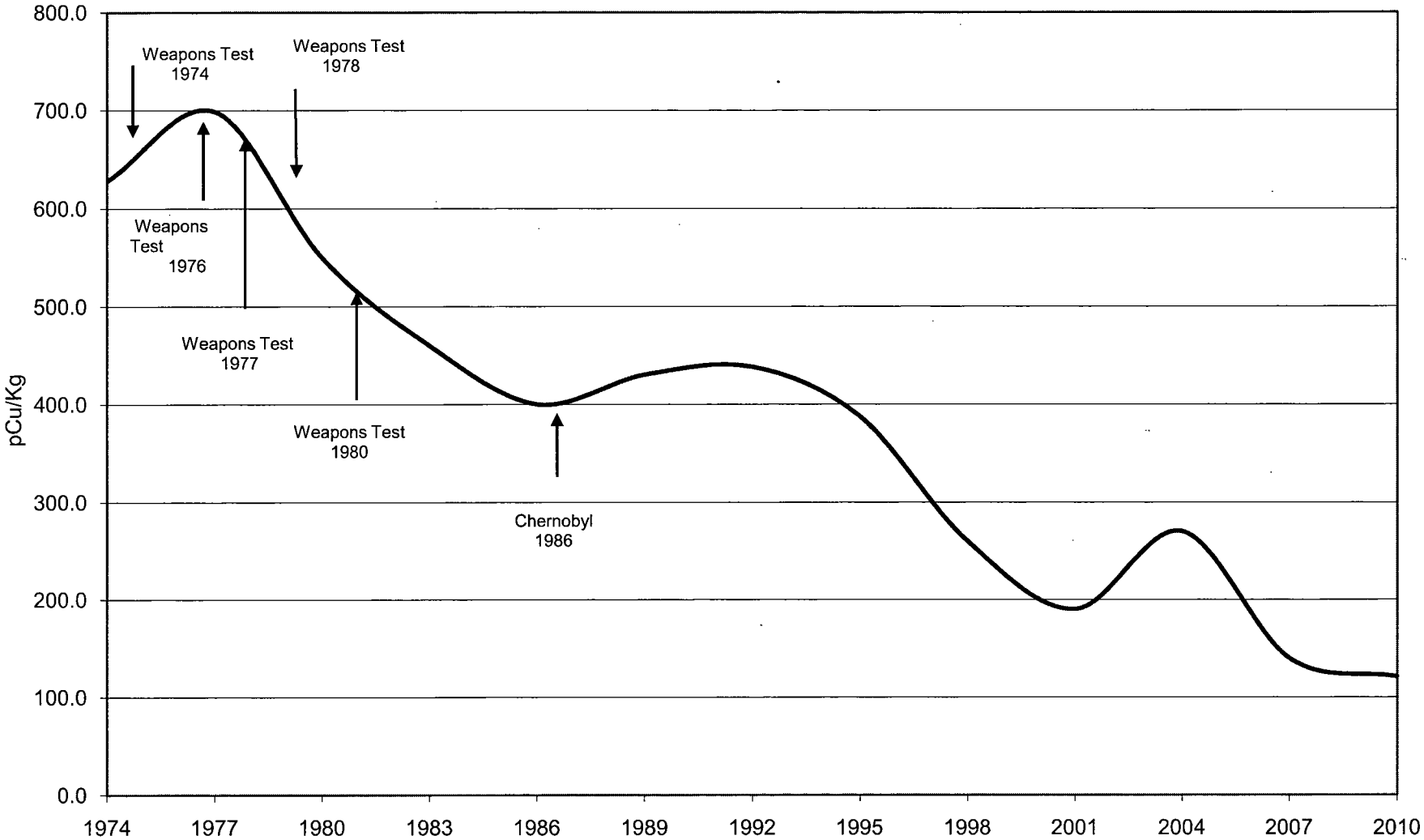


FIGURE 7
CESIUM -137 ACTIVITY IN SOIL 1974 THROUGH 2010
(TRIENNIAL)



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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 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2012
(PAGE 1 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
March 2012	E10066	Milk	Sr-89	pCi/L	101	94.8	1.07	A
			Sr-90	pCi/L	11.7	13.5	0.87	A
	E10067	Milk	I-131	pCi/L	87.5	92.5	0.95	A
			Ce-141	pCi/L	247	260	0.95	A
			Cr-51	pCi/L	435	436	1.00	A
			Cs-134	pCi/L	133	149	0.89	A
			Cs-137	pCi/L	156	159	0.98	A
			Co-58	pCi/L	127	132	0.96	A
			Mn-54	pCi/L	190	195	0.97	A
			Fe-59	pCi/L	179	168	1.07	A
			Zn-65	pCi/L	327	333	0.98	A
			Co-60	pCi/L	274	279	0.98	A
	E10069	AP	Ce-141	pCi	167	164	1.02	A
			Cr-51	pCi	310	276	1.12	A
			Cs-134	pCi	107	94.5	1.13	A
			Cs-137	pCi	109	101	1.08	A
			Co-58	pCi	87.6	83.5	1.05	A
			Mn-54	pCi	133	123	1.08	A
			Fe-59	pCi	113	106	1.07	A
			Zn-65	pCi	226	210	1.08	A
			Co-60	pCi	185	176	1.05	A
	E10068	Charcoal	I-131	pCi	92.8	94.2	0.99	A
	E10070	Water	Fe-55	pCi/L	1800	1570	1.15	A
June 2012	E10198	Milk	Sr-89	pCi/L	86.1	99.8	0.86	A
			Sr-90	pCi/L	9.2	12.7	0.72	W
	E10199	Milk	I-131	pCi/L	88.9	99.7	0.89	A
			Ce-141	pCi/L	72.8	82.2	0.89	A
			Cr-51	pCi/L	394	402	0.98	A
			Cs-134	pCi/L	159	174	0.91	A
			Cs-137	pCi/L	206	212	0.97	A
			Co-58	pCi/L	89.5	92.3	0.97	A
			Mn-54	pCi/L	129	132	0.98	A
			Fe-59	pCi/L	129	128	1.01	A
			Zn-65	pCi/L	193	199	0.97	A
			Co-60	pCi/L	342	355	0.96	A
	E10201	AP	Ce-141	pCi	73.2	75.1	0.97	A
			Cr-51	pCi	367	366	1.00	A
			Cs-134	pCi	165	159	1.04	A
			Cs-137	pCi	205	193	1.06	A
			Co-58	pCi	84.7	84.2	1.01	A
			Mn-54	pCi	118	121	0.98	A
			Fe-59	pCi	125	117	1.07	A
			Zn-65	pCi	181	182	0.99	A
			Co-60	pCi	338	324	1.04	A
	E10200	Charcoal	I-131	pCi	101	96.6	1.05	A

TABLE D-1 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2012
(PAGE 2 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
June 2012	E10202	Water	Fe-55	pCi/L	1890	1580	1.20	A
September 2012	E10296	Milk	Sr-89	pCi/L	106	99.6	1.06	A
			Sr-90	pCi/L	13.6	16.0	0.85	A
	E10297	Milk	I-131	pCi/L	89.8	99.6	0.90	A
			Ce-141	pCi/L	160	164	0.98	A
			Cr-51	pCi/L	230	248	0.93	A
			Cs-134	pCi/L	101	108	0.94	A
			Cs-137	pCi/L	174	174	1.00	A
			Co-58	pCi/L	97.2	100	0.97	A
			Mn-54	pCi/L	188	196	0.96	A
			Fe-59	pCi/L	159	152	1.05	A
			Zn-65	pCi/L	195	192	1.02	A
			Co-60	pCi/L	155	152	1.02	A
	E10299	AP	Ce-141	pCi	145	135	1.07	A
			Cr-51	pCi	219	205	1.07	A
			Cs-134	pCi	94.1	89.4	1.05	A
			Cs-137	pCi	140	144	0.97	A
			Co-58	pCi	88.3	83.0	1.06	A
			Mn-54	pCi	173	162	1.07	A
			Fe-59	pCi	136	125	1.09	A
			Zn-65	pCi	165	159	1.04	A
			Co-60	pCi	133	125	1.06	A
	E10298	Charcoal	I-131	pCi	95.5	97.2	0.98	A
	E10300	Water	Fe-55	pCi/L	1630	1900	0.86	A
December 2012	E10334	Milk	Sr-89	pCi/L	101	96.6	1.05	A
			Sr-90	pCi/L	11.3	13.8	0.82	A
	E10335	Milk	I-131	pCi/L	93.1	90.0	1.03	A
			Ce-141	pCi/L	52.5	51.0	1.03	A
			Cr-51	pCi/L	373	348	1.07	A
			Cs-134	pCi/L	157	165	0.95	A
			Cs-137	pCi/L	113	117	0.97	A
			Co-58	pCi/L	94.1	98.5	0.96	A
			Mn-54	pCi/L	116	116	1.00	A
			Fe-59	pCi/L	124	116	1.07	A
			Zn-65	pCi/L	190	186	1.02	A
			Co-60	pCi/L	172	170	1.01	A
	E10337A	AP	Ce-141	pCi	51.8	49.6	1.04	A
			Cr-51	pCi	372	338	1.10	A
			Cs-134	pCi	165	161	1.02	A
			Cs-137	pCi	113	114	0.99	A
			Co-58	pCi	96.5	95.8	1.01	A
			Mn-54	pCi	118	112	1.05	A
			Fe-59	pCi	105	112	0.94	A
			Zn-65	pCi	166	181	0.92	A
			Co-60	pCi	179	165	1.08	A

TABLE D-1 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2012
(PAGE 3 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
December 2012	E10336	Charcoal	I-131	pCi	73.1	72.7	1.01	A
	E10333	Water	Fe-55	pCi/L	1550	1750	0.89	A

(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-2 **ERA ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM**
TELEDYNE BROWN ENGINEERING, 2012

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Limits	Evaluation (c)
May 2012	RAD-89	Water	Sr-89	pCi/L	63.4	58.5	46.9 - 66.3	A
			Sr-90	pCi/L	33.5	37.4	27.4 - 43.1	A
			Ba-133	pCi/L	89.2	82.3	69.1 - 90.5	A
			Cs-134	pCi/L	66.5	74.2	60.6 - 81.6	A
			Cs-137	pCi/L	152	155	140 - 172	A
			Co-60	pCi/L	73.3	72.9	65.6 - 82.6	A
			Zn-65	pCi/L	109	105	94.5 - 125	A
			Gr-A	pCi/L	82.4	62.9	33.0 - 78.0	N (1)
			Gr-B	pCi/L	43.6	44.2	29.6 - 51.5	A
			I-131	pCi/L	25.9	27.1	22.5 - 31.9	A
			H-3	pCi/L	15433	15800	13800 - 17400	A
	MRAD-16	Filter	Gr-A	pCi/filter	39.5	77.8	26.1 - 121	A
November, 2012	RAD-91	Water	Sr-89	pCi/L	46.5	39.1	29.7 - 46.1	N (2)
			Sr-90	pCi/L	16.6	20.1	14.4 - 23.8	A
			Ba-133	pCi/L	85.2	84.8	71.3 - 93.3	A
			Cs-134	pCi/L	76.9	76.6	62.6 - 84.3	A
			Cs-137	pCi/L	177	183	165 - 203	A
			Co-60	pCi/L	77.4	78.3	70.5 - 88.5	A
			Zn-65	pCi/L	209	204	184 - 240	A
			Gr-A	pCi/L	50.6	58.6	30.6 - 72.9	A
			Gr-B	pCi/L	59.3	39.2	26.0 - 46.7	N (2)
			I-131	pCi/L	22.9	24.8	20.6 - 29.4	A
			H-3	pCi/L	5020	4890	4190 - 5380	A
	MRAD-17	Filter	Gr-A	pCi/filter	59.6	87.5	29.3 - 136	A

(1) Detector G1 is slightly biased high for Th-230 based measurements used only for ERA Gross Alpha samples. NCR 12-05

(2) The Sr-89 found to known ratio was 1.19, which TBE considers acceptable. It appears the aliquot was entered incorrectly for the Gross Beta NCR 12-13

(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-3 DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)
TELEDYNE BROWN ENGINEERING, 2012
(PAGE 1 OF 2)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Range	Evaluation (c)
March 2012	12-MaW26	Water	Cs-134	Bq/L	-0.0045		(1)	A
			Cs-137	Bq/L	37.5	39.9	27.9 - 51.9	A
			Co-57	Bq/L	30.8	32.9	23.0 - 42.8	A
			Co-60	Bq/L	22.4	23.72	16.60 - 30.84	A
			H-3	Bq/L	456	437	306 - 568	A
			Mn-54	Bq/L	31.0	31.8	22.3 - 41.3	A
			K-40	Bq/L	144	142	99 - 185	A
			Sr-90	Bq/L	-0.0084		(1)	A
			Zn-65	Bq/L	-0.369		(1)	A
	12-GrW26	Water	Gr-A	Bq/L	2.06	2.14	0.64 - 3.64	A
			Gr-B	Bq/L	7.48	6.36	3.18 - 9.54	A
	12-MaS26	Soil	Cs-134	Bq/kg	831	828	580 - 1076	A
			Cs-137	Bq/kg	0.145		(1)	A
			Co-57	Bq/kg	1270	1179	825 - 1533	A
			Co-60	Bq/kg	7.61	1.56	(2)	N (3)
			Mn-54	Bq/kg	634	558	391 - 725	A
			K-40	Bq/kg	1690	1491	1044 - 1938	A
			Sr-90	Bq/kg	328	392	274 - 540	A
			Zn-65	Bq/kg	753	642	449 - 835	A
	12-RdF26	AP	Cs-134	Bq/sample	2.31	2.38	1.67 - 3.09	A
			Cs-137	Bq/sample	2.15	1.79	1.25 - 2.33	W
			Co-57	Bq/sample	-0.0701		(1)	A
			Co-60	Bq/sample	2.62	2.182	1.527 - 2.837	W
			Mn-54	Bq/sample	4.13	3.24	2.27 - 4.21	W
			Sr-90	Bq/sample	0.0185		(1)	A
			Zn-65	Bq/sample	4.19	2.99	2.09 - 3.89	N (3)
	12-GrF26	AP	Gr-A	Bq/sample	0.365	1.2	0.4 - 2.0	A
			Gr-B	Bq/sample	2.31	2.4	1.2 - 3.6	A
	12-RdV26	Vegetation	Cs-134	Bq/sample	8.72	8.43	5.90 - 10.96	A
			Cs-137	Bq/sample	0.0424		(1)	A
			Co-57	Bq/sample	15.5	12.0	8.4 - 15.6	W
			Co-60	Bq/sample	6.80	6.05	4.24 - 7.87	A
			Mn-54	Bq/sample	0.0057		(1)	A
			Sr-90	Bq/sample	2.24	2.11	1.48 - 2.74	A
			Zn-65	Bq/sample	10.5	8.90	6.23 - 11.57	A
September 2012	12-MaW27	Water	Cs-134	Bq/L	21.4	23.2	16.2 - 30.2	A
			Cs-137	Bq/L	17.0	16.7	11.7 - 21.7	A
			Co-57	Bq/L	28.7	29.3	20.5 - 38.1	A
			Co-60	Bq/L	0.179		(1)	A
			H-3	Bq/L	387	334	234 - 434	A
			Mn-54	Bq/L	18.1	17.8	12.5 - 23.1	A
			K-40	Bq/L	139	134	94 - 174	A
			Sr-90	Bq/L	19.6	12.2	8.5 - 15.9	N (4)
			Zn-65	Bq/L	27.2	25.9	18.1 - 33.7	A
	12-GrW27	Water	Gr-A	Bq/L	0.966	1.79	0.54 - 3.04	A
			Gr-B	Bq/L	10.0	9.1	4.6 - 13.7	A

TABLE D-3 DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Range	Evaluation (c)
September 2012	12-MaS27	Soil	Cs-134	Bq/kg	880	939	657 - 1221	A
			Cs-137	Bq/kg	1220	1150	805 - 1495	A
			Co-57	Bq/kg	1330	1316	921 - 1711	A
			Co-60	Bq/kg	552	531	372 - 690	A
			Mn-54	Bq/kg	1000	920	644 - 1196	A
			K-40	Bq/kg	674	632	442 - 822	A
			Sr-90	Bq/kg	528	508	356 - 660	A
			Zn-65	Bq/kg	665	606	424 - 788	A
	12-RdF27	AP	Cs-134	Bq/sample	2.760	2.74	1.92 - 3.56	A
			Cs-137	Bq/sample	0.0415		(1)	A
			Co-57	Bq/sample	2.00	191.00	1.34 - 2.48	A
			Co-60	Bq/sample	1.78	1.728	1.210 - 2.246	A
			Mn-54	Bq/sample	2.40	2.36	1.65 - 3.07	A
			Sr-90	Bq/sample	0.931	1.03	0.72 - 1.34	A
			Zn-65	Bq/sample	-0.688		(1)	A
	12-GrF27	AP	Gr-A	Bq/sample	0.434	0.97	0.29 - 1.65	A
			Gr-B	Bq/sample	1.927	1.92	0.96 - 2.88	A
	12-RdV27	Vegetation	Cs-134	Bq/sample	6.28	6.51	4.56 - 8.46	A
			Cs-137	Bq/sample	4.62	4.38	3.07 - 5.69	A
			Co-57	Bq/sample	6.51	5.66	3.96 - 7.36	A
			Co-60	Bq/sample	5.32	5.12	3.58 - 6.66	A
			Mn-54	Bq/sample	3.59	3.27	2.29 - 4.25	A
			Sr-90	Bq/sample	0.0012		(1)	A
			Zn-65	Bq/sample	-0.046		(1)	A

(1) False positive test.

(2) Sensitivity evaluation

(3) No cause was found for the failed high soil Co-60 sensitivity test or the high Zn-65 in AP, which TBE considers an anomaly. NCR 12-08

(4) Sr-90 in water high due to incorrect aliquot entered in LIMS. 12-11

(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.