PSEG Nuclear LLC
P.O. Box 236, Hancocks Bridge, New Jersey 08038-0236

PSEG
Nuclear LLC

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

LR-N17-0089
APR 26 2017

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington DC 20555-001

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

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

Subject: 2016 Annual Radiological Environmental Operating Report

As required by Section 6.9.1.7 of Appendix A to Renewed 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 Renewed Facility Operating License NPF-57 for Hope Creek Generating Station, PSEG Nuclear hereby transmits one copy of the combined 2016 Annual Radiological Environmental Operating Report (Enclosure). This report summarizes the results of the radiological environmental surveillance program for 2016 in the vicinity of the Salem and Hope Creek Generating Stations. The result of this program for 2016 was specifically compared to the result of the pre-operational program.

There are no regulatory commitments contained in this letter.

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

Sincerely,

K. Kenneth Grover
Plant Manager
Salem Generating Station

Edward T. Casulli
Plant Manager
Hope Creek Generating Station

ako

Enclosure: 2016 Annual Radiological Environmental Operating Report

IE25
NRR

cc: Mr. Daniel Dorman, Regional Administrator - NRC Region 1
Ms. Carleen Parker, Project Manager - USNRC
Mr. Patrick Finney, USNRC Senior Resident Inspector - Salem
Mr. Justin Hawkins, USNRC Senior Resident Inspector - Hope Creek
Mr. Patrick Mulligan, Manager IV, NJBNE
Mr. Lee Marabella, Corporate Commitment Tracking Coordinator
Mr. Thomas Cachaza, Salem Commitment Tracking Coordinator
Mr. Thomas MacEwen, Hope Creek Commitment Tracking Coordinator

Technical Specification Section 6.9.1.9 (Salem)
Technical Specification Section 6.9.1.7 (Hope Creek)

LR-N17-0089

Enclosure

PSEG Nuclear LLC

Salem and Hope Creek Generating Stations

2016 Annual Radiological Environmental Operating Report

TYPICAL LICENSING AND REGULATORY AFFAIRS CORRESPONDENCE CONCURRENCE FORM

Station(s): Salem/Hope Creek Correspondence No.: LR-N17-0089

Subject/Document: 2016 Annual Radiological Environmental Operating Report

Document Due Date: 04/27/2017 Regulatory Driven Due Date: (YES) / NO

Document Prepared by: Alysse Ochoa Extension: 2742

If Routine NRC report, then document SAP recurring task or generate notification: _____

Required Review and Disciplines Assigned by: James Mallon / Director, Reg. Compliance
Title

Type of Review Required: (Reference LS-AA-117)
- ☐ Technical Verification Team Review
- ■ Individual or Series Review
- ☐ No Technical Review

Disciplines Required:
- ☐ Maintenance
- ☐ Operations
- ☐ Rx Engineering
- ☐ Nuclear Fuels
- ■ Radiation Protection
- ☐ Engineering - I&C
- ☐ Design Engineering
- ☐ Work Management
- ■ Chemistry
- ☐ Radwaste
- ☐ Engr - Mech Systems
- ☐ Engr - Elect Systems
- ☐ Training
- ■ Reg Assurance / Licensing
- ☐ Programs Engineering
- ■ Other: Environmental Affairs

NOTE
The following signatures indicate and affirm that technical inputs for this regulatory correspondence are technically correct, complete, and accurate in all material respects.

Print Name / Signature	Discipline	Date
Alysse Ochoa / Alysse K Ochoa	Preparer	4/20/17
Thomas MacEwen	Peer Reviewer	4/20/17
Thomas Cachaza see attached email	Peer Reviewer	4/21/17
~~Joseph Chamy~~ N/A	~~CFAM - Chemistry~~ N/A	N/A
Alison Kraus See attached email	Manager – Env. Affairs	4/24/17
Shelly Kugler See attached email	Manager – HC Chemistry	4/21/17
Mark Pyle See attached email	Manager – Salem Chemistry	4/24/17
Hal Trimble	Manager – HC Rad Pro	4/25/17
Matt Hassler See attached traveler	Manager – Salem Rad Pro	4/25/17

Required Reviews and Signatures (check as appropriate):

☐ Station Qualified Review Required: _____ Date: _____

☐ Corporate Licensing Concurrence Required: _____ Date: _____

■ Station Regulatory Assurance Concurrence Required: _____ Date: 4/25/17
James Mallon/ Dir. Site Reg. Compliance

☐ PORC Approval Required: PORC Meeting No. _____ PORC Chair _____

■ Plant Manager Approval Required: Ken Grover and Ed Casulli/ On Letter Date: _____

☐ Site Vice President Approval Required: _____ Date: _____

Quality Review Checklist

1. The following checklists should be selected based on the type of document being submitted (LER, LAR or other NRC correspondence)
    a. Correspondence Checklist – Page 3
    b. LAR – Page 4
    c. LER – Pages 5 and 6

2. Only one checklist should be used for each document, the individual assigned the responsibility for the letter should fill out the checklist.

3. The peer reviewer can use the following checklists as a guide.

Correspondence Quality Checklist	
Letter Number: LR-N17-0087	
Format	Initials
o Cover letter formatted IAW LS-AA-117-1003	AF JM
o Letter number on all pages, as appropriate	AG JM
o Pagination and page count	AF JM
o Attachments and Enclosures referenced to the letter	AF JM
o CC and/or BC list are complete and accurate	AG JM
o Enclosures or attachments are readable	AF JM
o Special requirements noted such as Public Withholding with pages marked as appropriate	N/A
o Correct Addressee	AF JM
o Spelling and Grammar	AF JM
o Docket and License Numbers as required	AG JM
o Margins consistent	AG JM
o Fonts consistent	AF JM
Content	Initials
o Summary paragraph as introduction, which clearly states purpose of correspondence (what we wish to accomplish or what we need from addressee)	AG JM
o Appropriate regulatory references included	AF JM
o Body text flows, has a logical sequence and supports the conclusions	AF JM
o Follows any regulatory guidance regarding content	AG JM
o Extraneous material is not included	AG JM
o References cited as appropriate and necessary	AG JM
o Conclusion states who has the action and what the action is including due dates as appropriate	AG JM
o PSEG contact provided for any follow-up	AF JM
o Paragraph structure complete and consistent	AG JM
o Affidavit or "affirmation" as required	N/A N/A
o Statements supporting withholding included as appropriate	N/A
o Summary of Commitments included as appropriate. (ref: LS-AA-117-1003)	AG JM
Transmission	Initials
o Letter signed by appropriate individual	
o Envelope(s) correctly addressed.	
o SGI envelopes properly protected.	
o Document page checked	
o Document transmitted to Records Management	JAR
o PDF File of signed and dated letter created for NRC electronic submission	JAR
o OCR and Preflight PDF file	JAR
o Submit document to NRC and retain electronic submittal confirmation	JAR
o Traveler (per LS-AA-117-1002) is complete (including appropriate discipline signatures)	
o Commitments entered into Tracking Database	
o Correspondence log updated	JAR
o Distribution timely	JAR

License Amendments Requests Quality Checklist N/A		[redacted]
Letter Number:	LAR Number:	
Format		Initials
o Format IAW LS-AA-101-1000		
o Marked up pages are clear and legible		
Content		Initials
o 50.92 Discussion sections accurately answers the question		
o Marked-up pages agree with descriptions in pleading.		
Miscellaneous		Initials
o Marked up pages reflect current effective page.		
o LAR number is appropriate and obtained from LAR log		
o The effects of other pending changes have been evaluated for the potential to affect this application		
o If included, Camera Ready pages are based on current effective pages. Be alert for pages that are impacted by different simultaneous amendments		
o Traveler includes all relevant reviewers.(TVT, SQR and PORC)		
o Traveler includes **ALL** impacted departments		
o Traveler completed		
o Distribution timely		
o Commitments appropriately entered into SAP		
o Correspondence log updated		
Transmission		Initials
o Letter signed by appropriate individual		
o Envelope(s) correctly addressed		
o Document page checked		
o Document transmitted to Records Management		
o PDF File of signed and dated letter created for NRC electronic submission		
o OCR and Preflight PDF file		
o Submit document to NRC and retain electronic submittal confirmation.		
o Traveler (per LS-AA-117-1002) is complete (including appropriate discipline signatures)		
o Commitments entered into Tracking Database		
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o Distribution timely		

LER Quality Checklist		
Letter Number:	**LER Number:**	
Content		Initials
o A brief abstract describing the major occurrences during the event, including all component or system failures that contributed to the event and significant corrective action taken or planned to prevent recurrence (NOTE: Energy Industry Identification System (EIIS) codes are not be used in abstract)		
o A clear, specific, narrative description of what occurred so that knowledgeable readers conversant with the design of commercial nuclear power plants, but not familiar with the details of a particular plant, can understand the complete event		
o Plant operating conditions before the event		
o Status of structures, components, or systems that were inoperable at the start of the event and that contributed to the event		
o Dates and approximate times of occurrences. [Validate dates and times][1]		
o The cause of each component or system failure or personnel error, if known		
o The failure mode, mechanism, and effect of each failed component, if known		
o The EIIS component function identifier and system name of each system referred to in the LER		
o For failures of components with multiple functions, include a list of systems or secondary functions that were also affected		
o For failure that rendered a train of a safety system inoperable, an estimate of the elapsed time from the discovery of the failure until the train was returned to service		
o The method of discovery of each component or system failure or procedural error		
o Operator actions that affected the course of the event, including operator errors, procedural deficiencies, or both, that contributed to the event		
o For each personnel error, we **Shall** discuss:		
▪ Whether the error was a cognitive error (e.g., failure to recognize the actual plant condition, failure to realize which systems should be functioning, failure to recognize the true nature of the event) or a procedural error;		
▪ Whether the error was contrary to an approved procedure, was a direct result of an error in an approved procedure, or was associated with an activity or task that was not covered by an approved procedure;		
▪ Any unusual characteristics of the work location (e.g., heat, noise) that directly contributed to the error; and		
▪ The type of personnel involved (i.e., contractor personnel, licensed operator, non-licensed operator, other licensee personnel)		
o Discussed automatic and manually initiated safety system responses		
o Discussed the manufacturer and model number (or other identification) of each component that failed during the event.		
o Provided an assessment of the safety consequences and implications of the event. This assessment must include the availability of other systems or components that could have performed the same function as the components and systems that failed during the event		
o Provided a description of any corrective actions planned as a result of the event, including those to reduce the probability of similar events occurring in the future		

[1] Added as result of Notification 20450306

LER Quality Checklist (continued):	Initials
o Provided reference to any previous similar events at the same plant that are known	
o Provided the name and telephone number of a person within the licensee's organization who is knowledgeable about the event and can provide additional information concerning the event and the plant's characteristics	
o Provided a clear statement regarding any Commitments	
o Provided clear statement regarding SSFF (NEI 99-02), e.g., "A review of this event determined that a Safety System Functional Failure (SSFF) as defined in NEI 99-02, Regulatory Assessment Performance Indicator Guidelines, did not occur. This event did not prevent the ability of a system to fulfill its safety function to either shutdown the reactor, remove residual heat, control the release of radioactive material, or mitigate the consequences of an accident." Or, "A review of this event determined that a Safety System Functional Failure (SSFF) as defined in NEI 99-02, Regulatory Assessment Performance Indicator Guidelines, did occur" and explain why	
o Review of SSFF completed by the Licensing NRC ROP SSFF PI program owner (70040851)	
o Avoid referencing INPO OE Reports in Publicly Available NRC Licensee Event Reports	
o SDP Considered	
LER Format	Initials
o Form NRC 366 is the current form. Check upper right hand corner for expiration.	
o Docket and License Numbers are correct.	
o LER Number appropriate (Check for duplicate LER numbers)	
o Margins consistent	
o Fonts consistent	
o Spelling and Grammar	
o Pagination correct	
o LER submittal date has been correctly filled in on Page 1 of LER form	
Transmission	Initials
o Letter signed by appropriate individual	
o Envelope(s) correctly addressed. SGI envelopes properly protected	
o Document page checked	
o Document transmitted to Records Management	
o LER uploaded to www.inpo.org/inpo/ices.asp	
o For HC – PORC minutes approving LER sent to CNO	
o For Salem – LER sent to CNO	
o PDF File of signed and dated letter created for NRC electronic submission	
o OCR and Preflight PDF file	
o Submit document to NRC and retain electronic submittal confirmation.	
o Traveler (per LS-AA-117-1002) is complete (including appropriate discipline signatures)	
o Commitments entered into Tracking Database	
o Correspondence log updated	
o Distribution timely	

Ochoa, Alysse K.

From: Cachaza, Thomas J.
Sent: Friday, April 21, 2017 2:52 PM
To: Ochoa, Alysse K.; Mallon, James; MacEwen, Thomas T.
Subject: RE: Action Required: AREOR and ARERR signatures needed

Importance: High

Alysse, I have peer reviewed both cover letters and concur with content of the cover letters. Please attach my email as concurrence.

Thomas Cachaza
Salem Senior Regulatory Compliance Engineer
Phone (work): 856-339-5038
Phone (Home): 856-697-0430
Cell: 856-689-2416
Email: Thomas.Cachaza@PSEG.com

From: Ochoa, Alysse K.
Sent: Friday, April 21, 2017 1:33 PM
To: Chamy, Joseph; Kugler, Shelly F.; Pyle, Mark; Trimble, Harold; Hassler Sr, Matthew J. (Mgr Radiation Protection); Mallon, James; Kraus, Alison R.
Cc: Cachaza, Thomas J.; MacEwen, Thomas T.; Pimentel, Frances A.; Ochoa, Alysse K.; Casulli, Edward T.; Grover, F. Kenneth; Heathwaite, Rick M.; Mannai, David
Subject: Action Required: AREOR and ARERR signatures needed

All,

Thank you for your quick turn around with the reviews. The only changes made to the ARERR were fonts and table resizing and there were minor editorial changes made to the AREOR (changes can be found in the AREOR folder).

Next step – I need all the reviewers to sign off the traveler. You can either reply to this email that you approve/sign via email or, if you prefer to physically sign the traveler, let me know and I will get it to you. Due date: April 25, 2017 Please keep in mind that there is a regulatory due date for submittal, April 30, 2017.

Once all signatures are obtained, I will send the reports to both stations' Plant Managers to sign off the letter.

Attached to this email are the traveler and letter for each report. The final reports and changes can be found using the following links:

M:\Shared\Hope Creek Regulatory Assurance\Environmental Reports\2016 Salem-Hope Creek AREOR

M:\Shared\Hope Creek Regulatory Assurance\Environmental Reports\2016 Salem-Hope Creek ARERR

If you have any questions, please let me know.

Thank you.
Alysse

Alysse K. Ochoa | ☼**PSEG Nuclear LLC** | Hope Creek Regulatory Assurance, Sr. Engineer
P.O. Box 236, M/C H02, Hancocks Bridge, NJ 08038-1236

O: (856) 339-2742 | alysse.ochoa@pseg.com

Ochoa, Alysse K.

From: Kugler, Shelly F.
Sent: Friday, April 21, 2017 3:39 PM
To: Ochoa, Alysse K.
Subject: RE: Action Required: AREOR and ARERR signatures needed

Approve via email

From: Ochoa, Alysse K.
Sent: Friday, April 21, 2017 1:33 PM
To: Chamy, Joseph; Kugler, Shelly F.; Pyle, Mark; Trimble, Harold; Hassler Sr, Matthew J. (Mgr Radiation Protection); Mallon, James; Kraus, Alison R.
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Thank you.
Alysse

Alysse K. Ochoa | ☼**PSEG Nuclear LLC** | Hope Creek Regulatory Assurance, Sr. Engineer
P.O. Box 236, M/C H02, Hancocks Bridge, NJ 08038-1236
O: (856) 339-2742 | alysse.ochoa@pseg.com

Ochoa, Alysse K.

From: Kraus, Alison R.
Sent: Monday, April 24, 2017 9:01 AM
To: Ochoa, Alysse K.
Subject: RE: Action Required: AREOR and ARERR signatures needed

I approve.
Thank you!!!

From: Ochoa, Alysse K.
Sent: Monday, April 24, 2017 8:58 AM
To: Kraus, Alison R.
Subject: RE: Action Required: AREOR and ARERR signatures needed

No worries. I do need your approval for the traveler for Environmental. If you are ok with it, please respond that you approve via email or if you prefer I can bring the traveler to you to sign.

Thank you.
Alysse
2742

From: Kraus, Alison R.
Sent: Friday, April 21, 2017 3:04 PM
To: Ochoa, Alysse K.
Cc: Mallon, James
Subject: RE: Action Required: AREOR and ARERR signatures needed

Thank you for tracking this and keeping the process moving!!!

From: Ochoa, Alysse K.
Sent: Friday, April 21, 2017 1:33 PM
To: Chamy, Joseph; Kugler, Shelly F.; Pyle, Mark; Trimble, Harold; Hassler Sr, Matthew J. (Mgr Radiation Protection); Mallon, James; Kraus, Alison R.
Cc: Cachaza, Thomas J.; MacEwen, Thomas T.; Pimentel, Frances A.; Ochoa, Alysse K.; Casulli, Edward T.; Grover, F. Kenneth; Heathwaite, Rick M.; Mannai, David
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Alysse

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P.O. Box 236, M/C H02, Hancocks Bridge, NJ 08038-1236
O: (856) 339-2742 | alysse.ochoa@pseg.com

Ochoa, Alysse K.

From: Pyle, Mark
Sent: Monday, April 24, 2017 8:49 PM
To: Ochoa, Alysse K.
Subject: RE: Action Required: AREOR and ARERR signatures needed

Approve via email.

Mark Pyle

From: Ochoa, Alysse K.
Sent: Friday, April 21, 2017 1:33 PM
To: Chamy, Joseph; Kugler, Shelly F.; Pyle, Mark; Trimble, Harold; Hassler Sr, Matthew J. (Mgr Radiation Protection); Mallon, James; Kraus, Alison R.
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O: (856) 339-2742 | alysse.ochoa@pseg.com

TYPICAL LICENSING AND REGULATORY AFFAIRS CORRESPONDENCE CONCURRENCE FORM

Station(s): Salem/Hope Creek Correspondence No.: LR-N17-0087

Subject/Document: 2016 Annual Radioactive Effluent Release Report

Document Due Date: 04/27/2017 Regulatory Driven Due Date: (YES) / NO

Document Prepared by: Alysse Ochoa Extension: 2742

If Routine NRC report, then document SAP recurring task or generate notification: _____

Required Review and Disciplines Assigned by: James Mallon / Director, Reg. Compliance
Title

Type of Review Required: (Reference LS-AA-117)
- ☐ Technical Verification Team Review
- ■ Individual or Series Review
- ☐ No Technical Review

Disciplines Required:

☐ Maintenance	■ Radiation Protection	■ Chemistry	☐ Training
☐ Operations	☐ Engineering - I&C	☐ Radwaste	■ Reg Assurance / Licensing
☐ Rx Engineering	☐ Design Engineering	☐ Engr - Mech Systems	☐ Programs Engineering
☐ Nuclear Fuels	☐ Work Management	☐ Engr - Elect Systems	■ Other: Environmental Affairs

NOTE
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Thomas MacEwen	Peer Reviewer	
Thomas Cachaza	Peer Reviewer	
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Alison Kraus	Manager – Env. Affairs	
Shelly Kugler	Manager – HC Chemistry	
Mark Pyle	Manager – Salem Chemistry	
Hal Trimble	Manager – HC Rad Pro	
Matt Hassler Matt Hassler	Manager – Salem Rad Pro	4/25/17

Required Reviews and Signatures (check as appropriate):

☐ Station Qualified Review Required: _____ Date: _____

☐ Corporate Licensing Concurrence Required: _____ Date: _____

■ Station Regulatory Assurance Concurrence Required: _____ Date: _____
James Mallon/ Dir. Site Reg. Compliance

☐ PORC Approval Required: PORC Meeting No. _____ PORC Chair _____

■ Plant Manager Approval Required: Ken Grover and Ed Casulli/ On Letter Date: _____

☐ Site Vice President Approval Required: _____ Date: _____

TYPICAL LICENSING AND REGULATORY AFFAIRS CORRESPONDENCE CONCURRENCE FORM

Station(s): Salem/Hope Creek Correspondence No.: LR-N17-0089

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Shelly Kugler	Manager – HC Chemistry	
Mark Pyle	Manager – Salem Chemistry	
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Matt Hassler Matt Hassler	Manager – Salem Rad Pro	4/25/17

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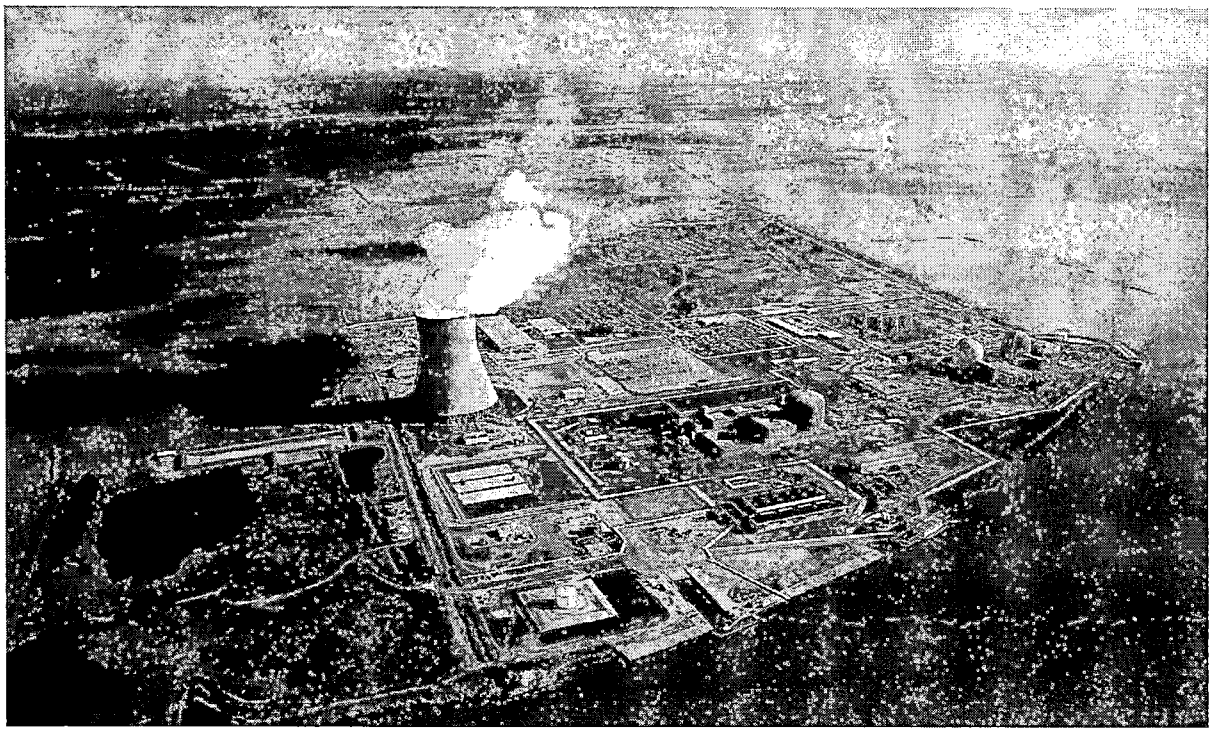
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM



PSEG NUCLEAR, LLC.
SALEM AND HOPE CREEK GENERATING STATIONS

2016 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

JANUARY 1 TO DECEMBER 31, 2016

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TABLE OF CONTENTS

TABLE OF CONTENTS (cont'd)

LIST OF TABLES

LIST OF TABLES (cont'd)

LIST OF MAPS

LIST OF FIGURES

LIST OF ACRONYMS OR TERMS (in alphabetical order)

%	Percent
A	Acceptable
a posteriori	An "after the fact" limit representing the capability of a measurement system
a priori	A "before the fact" limit representing the capability of a measurement system
AIO	Air Iodine
Analyte	The substance being identified and measured in a chemical analysis
APT	Air Particulates
AREOR	Annual Radiological Environmental Operating Report
Bq	Bequerels
C	Control
CAP	Corrective Action Program
CARR	Corrective/Preventive Action Request and Report (GEL CAP)
CVCS	Chemical Volume Control System
DOE	Department of Energy
Dpm	Disintegrations per minute
ECH	Crabs
ERA	Environmental Resource Associates
ESF	Fish
ESS	Sediment
EZA	Eckert & Ziegler Analytics, Inc.
FPL	Broad Leafy Vegetation
FPV	Vegetables
GAM	Game
GEL	General Engineering Laboratories; Duplicate sample analysis vendor
Gr-A	Gross alpha
Gr-B	Gross beta
H-3	Tritium
HCGS	Hope Creek Generating Station
IDM	Immersion Dose Monitor
ISFSI	Independent Spent Fuel Storage Installation
Kg	Kilogram
keV	Kilo-electron volts
L	Liter
LIMS	Laboratory Information Management System
LLD	Lower Limit of Detection
LTS	Laboratory Testing Services
m^3	Cubic meter
MAPEP	Mixed Analyte Performance Evaluation Program
MDC	Minimum Detectable Concentration
mL	Milliliter
MLK	Milk

mR	MilliRoentgen: a unit of radiation, used to measure the exposure of somebody or something to X-rays and gamma rays, defined in terms of the ionization effect on air.
mrem	Millirem: a unit for measuring amounts of radiation, equal to the effect that one roentgen of X-rays or gamma-rays would produce in a human being. It is used in radiation protection and monitoring.
MWe	Megawatt Electric
MWt	Megawatt Thermal
N	Not Acceptable
NCR	Nonconformance Report (TBE CAP)
NELAC	National Environmental Laboratory Conference
NRC	U.S. Nuclear Regulatory Commission
ODCM	Offsite Dose Calculation Manual
pCi	Picocuries
PD	Passive Dosimeter
PE	Performance Evaluation
PSEG	Public Service Enterprise Group
PT	Performance Testing
PWR	Potable (drinking) Water - Raw
PWT	Potable (drinking) Water - Treated
QA	Quality Assurance
REMP	Radiological Environmental Monitoring Program
RGPP	Radiological Groundwater Protection Program
SA	Salem
SAR	Safety Analysis Report
SCFM	Standard Cubic Feet per Minute
SGS	Salem Generating Station
SOL	Soil
SOP	Standard Operating Procedures
Standard Quarter	Standard Quarter = 92 days
SWA	Surface Water
TBE	Teledyne Brown Engineering; Primary sample analysis vendor
TEDA	Triethylene-diamine
TLD	Thermoluminescent Dosimeter: A TLD measures ionizing radiation exposure by measuring the intensity of visible light emitted from a crystal in the detector when the crystal is heated. The intensity of light emitted is dependent upon the radiation exposure.
TS	Technical Specifications
uCi	Microcuries
USEPA	United States Environmental Protection Agency
VGT	Fodder Crops
W	Warning
WWA	Ground (well) Water

I. Executive Summary

PSEG Nuclear, LLC (PSEG) operates Salem Generating Station (SGS) and Hope Creek Generating Station (HCGS) (collectively, the Site) and implements a Radiological Environmental Monitoring Program (REMP) in accordance with the Site Offsite Dose Calculation Manuals (ODCMs).

Based on the results from 2016 the concentration of plant related radioactive material in the environment that could be attributable to Site operations was only a small fraction of the combination of naturally occurring and non-plant related man-made radioactivity. The data obtained from January 1st through December 31st 2016, (the Reporting Period) were comparable to the results obtained during the preoperational phase of the program, and are lower than the applicable limits. Combined with historical results collected since commercial operation, it can be concluded that the observed results were as expected and therefore, we conclude that the operation of the Site had no significant radiological impact on the health and safety of the public or on the environment.

II. Introduction

The REMP monitors and evaluates the environment surrounding the Site to ensure that there are no adverse impacts on the health and safety of the public or on the environment. The results of the REMP are published annually in this Report, the Annual Radiological Environmental Operating Report (AREOR). This AREOR provides a summary and interpretation of the data collected during the Reporting Period.

No cultural or historic resources officially identified and confirmed by regulatory agencies are known to exist at PSEG.

The REMP is based on NRC guidance as reflected in the Site ODCMs and establishes sample media, sampling locations, sampling frequency and analytical sensitivity requirements. It also identifies indicator and control locations established for comparison purposes to distinguish plant related radioactivity from naturally occurring or other radioactivity from man-made sources. The REMP also verifies the projected and anticipated radionuclide concentrations in the environment and evaluates exposures associated with releases of radionuclides from the Site as described by the ODCM.

This program satisfies the requirements of 10CFR50 Section IV.B.2 Appendix I and provides surveillance of all appropriate critical exposure pathways to man. The REMP also complies with the following Technical Specifications and ODCM requirements:

Unit	Technical Specifications	ODCM
SGS U1	6.8.4.h	3/4. 12.1 6.9.1.7
SGS U2	6.8.4.h	3/4. 12.1 6.9.1.7
HCGS U1	6.8.4.h	3/4. 12.1 6.9.1.6

To demonstrate compliance with the requirements, samples of air particulates, air iodine, milk, surface water, ground (well) water, potable (drinking) water, vegetables, fodder crops, fish, crabs, oysters, game, soil, and sediment were collected and analyzed. External radiation dose measurements were also made in the vicinity of the Site using passive dosimeters. These environmental media were analyzed for one or more of the following: gamma emitting isotopes, tritium (H-3), iodine-131 (I-131), gross alpha, gross beta and immersion dose. Measurements made in the vicinity of the Site were compared to background or control measurements and the preoperational REMP study performed before SGS Unit 1 became operational. The results of these analyses were used to assess the impact on the health and safety of the public or on the environment of Site operations, thereby demonstrating compliance with the applicable Technical Specifications, ODCMs, and Federal regulations.

For the Reporting Period, there were a total of 1,779 analyses performed on 1,403 environmental samples. Most of the radioactive materials noted in this Report are either naturally occurring in the environment such as K-40 or Be-7, or a result of other non-plant related human activities, such as historical atmospheric nuclear weapons testing or medical wastes from offsite. The majority of the remaining samples did not contain plant related radionuclides above detection limits.

There were two surface water samples that had minor detectable levels of tritium that were associated with permitted liquid effluent releases, and were determined to have no significant dose impacts.

The detection capabilities for environmental samples, required by the Site ODCMs, were achieved for the Reporting Period. Any exceptions to the program are noted in the Report and the associated PSEG Nuclear corrective action identifier was included in parenthesis.

III. The Radiological Environmental Monitoring Program

The Site is located in Lower Alloways Creek Township, Salem County, New Jersey. SGS consists of two operating pressurized water nuclear power reactors. SGS Unit 1 has a net rating of 1,180 megawatt electric (MWe) and SGS Unit 2 has a net rating of 1,178 MWe. The licensed core power for both Units is 3,459 megawatt thermal (MWt). HCGS consists of an operating boiling water nuclear power reactor, which has a net rating of 1,212 MWe. The licensed core power is 3,840 MWt.

The Site is located on a man-made peninsula on the east bank of the Delaware River called Artificial Island. The peninsula was created by the deposition of hydraulic fill from dredging operations. The surrounding environment is characterized mainly by the Delaware River Estuary, extensive tidal marshlands, and low-lying meadowlands. These land types make up a vast majority of the land area within five miles of the Site, with most of the remaining land used for agriculture.

Since 1968, a Radiological Environmental Monitoring Program (REMP) has been conducted at the Site. Starting in December 1972, a more extensive radiological monitoring program was initiated in preparation for the operation of SGS Unit 1. The operational REMP was initiated in December 1976 when SGS Unit 1 achieved criticality.

An overview of the 2016 REMP is provided in Table B-1. Radioanalytical data from samples collected under this program were compared with results from the preoperational phase and historical operational results. This report presents the REMP results for the Reporting Period.

A. Objectives of the Operational REMP:

The objectives of the Operational REMP as described in the Site ODCMs are:

1. To determine whether any significant increases occur in the concentration of radionuclides in critical pathways of exposure in the vicinity of Artificial Island.
2. To determine if the operation of the Site has resulted in any increase in the inventory of long lived radionuclides in the environment.
3. To detect any change in ambient gamma radiation levels.
4. To verify that Site operations do not have detrimental effects on the health and safety of the public or on the environment.

B. Implementation of the Objectives:

The following describes the actions taken by PSEG to meet the REMP objectives listed above:

1. Samples of various media were selected for monitoring due to the potential radiological dose impact to humans. The selection of samples was based on:
   (a) Established critical pathways for the transfer of plant related radionuclides through the environment to man, and
   (b) Experience gained during the preoperational phase. Sampling locations were determined based on site meteorology, Delaware River Estuary hydrology, local demographics, and land uses.

2. Sampling locations are divided into two classes: indicator and control. Indicator locations are those which have the potential to be influenced by Site operations. Control samples are collected at locations which are believed to be unaffected by Site operations, usually at 15 to 30 kilometers (9.3 to 18.6 miles) away from the Site. Fluctuations in the levels of radionuclides and direct radiation at indicator

locations are evaluated with respect to analogous fluctuations at control locations. Indicator and control location data are also evaluated relative to preoperational data.

3. Appendix A describes the coding system which identifies sample type and location and describes and summarizes the analytical results in accordance with Section 6.9.1.7 of the SGS ODCM and Section 6.9.1.6 of the HCGS ODCM. Table A-1 summarizes average, minimum and maximum activities of the indicator locations, control locations and the location with the highest mean using values above the Minimum Detectable Concentration (MDC).

4. Appendix B Table B-1 lists the types of samples collected, sample frequency, and analysis types. Table B-2 lists location codes, locations, and latitude and longitude coordinates.

5. The sampling locations are also indicated on Maps B-1 for on-site sampling locations out to 1 mile; B-2 for off-site sampling locations 1 to 10 miles; and B-3 for off-site sampling locations greater than 10 miles.

IV. 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 NRC NUREG-1301 and NUREG-1302, 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." The equation for determining LLD is:

$$LLD = \frac{4.66 \bullet S_b}{E \bullet V \bullet 2.22 \bullet Y \bullet \exp(-\lambda \Delta t)}$$

4.66 is the statistical factor from NUREG 1301 and 1302
S_b is the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate, as counts per minute,
E is the counting efficiency, as counts per disintegration,
V is the sample size in units of mass or volume,
2.22 is the number of disintegrations per minute per picocurie,
Y is the fractional radiochemical yield, when applicable,
λ is the radioactive decay constant for the particular radionuclide (sec-1), and
Δt for environmental samples is the elapsed time between sample collection, or end of the sample collection period, and time of counting (sec).

The LLD is an *a priori* number, which represents the capability of the measurement system (including instrumentation, procedure and sample type), and not an after the fact criteria for the presence of activity. All analyses are designed to achieve the required detection limits for environmental sample analysis as described in the Site ODCMs.

The Minimum Detectable Concentration (MDC) is defined as above with the exception that the measurement is an *a posteriori* (after the fact) estimate of the presence of activity. The MDC should be lower than the required LLD.

The grouped data were averaged and standard deviations calculated. The ± 2 sigma deviations of the averaged data represent sample and not analytical variability. For reporting and calculation of averages, any positive result above the MDC is considered to be a valid result.

B. Program Exceptions.

During the Reporting Period, exceptions to REMP sampling requirements involved Air Sampling Location weekly run times and Direct Radiation Monitoring dosimeters. In all air sampling instances, sufficient sample was collected during the week to meet the required LLD. One dosimeter was not recovered at the end of the sampling period due to apparent vandalism, which represented one missed sample.

Air Sampling Locations

- REMP air sampling locations 5S1 and 5S2 lost power for 46.4 hours the week of 1/18/16 to 1/26/16 and for 55.7 hours the week of 1/26/16 to 2/3/16. The power loss started at approximately 1030 on 1/24/16 and lasted until approximately 1630 on 1/28/16, and was due to an electrical fault which required replacement of parts to repair and restore power to the air sampling pumps. During weekly filter change out on 02/03/16 the sampler was observed to be operating normally and no other problems were noted (CAP: 20716923).

- REMP air sampling location 1F1 operated approximately 1.7 hours less than expected on 4/18/16 due to loss of power because a vehicle hit a power pole supplying power to the sampler. The sampler was operating normally once power was restored (CAP: 20726321).

- REMP air location 14G1 operated approximately 10.5 hours less than expected the week of 05/16/16 to 05/23/16. There was severe weather that week which is believed to have temporarily disrupted power to the sampling location. During weekly filter change out on 05/23/16 the sampler was observed to be operating normally and no other problems were identified (CAP: 80116636-0010).

- REMP air sampling location 5D1 operated approximately 10.6 hours less than expected the week of 06/07/16 to 06/13/16. The loss of power was due to severe weather in the area. The air sample pumps were operating normally after power was restored and no other problems were noted (CAP: 20732859).

- REMP air sampling location 1F1 operated approximately 22.2 hours less than expected the week of 06/07/16 to 06/13/16. The loss of power was due to severe weather in the area. The air sample pumps were operating normally after power was restored and no other problems were noted (CAP: 20732859).

Direct Radiation Monitors

- REMP Passive Dosimeters at location 11F1 were not retrieved for the fourth Quarter 2016 sample period. The dosimeter container was absent from its location. The green netting used to hold dosimeters was found nearby but the dosimeters appeared to have been cut out. Location 11F1 is approximately 6.2 miles South-West of the Site at Taylors Bridge, Delaware (CAP: 20750298)

- REMP Passive Dosimeters at locations 2S2 and 2S4 were switched for the first Quarter 2016 sample period. When the unintended switch was discovered the decision was made to leave them in the locations deployed and corrections were made to locations of readings after the dosimeters were analyzed. There was no impact to dose monitoring since both locations were correctly monitored for the entire quarter (CAP: 20718252).

C. Program Changes

No changes were made to the program during the Reporting Period.

D. Quality Assurance Program

Teledyne Brown Engineering

The results reported by TBE are consistent with the Quality Assurance Program as described in the TBE Quality Assurance Manual and the TBE Procedure Manual.

GEL Laboratories

The results reported by GEL Laboratories, LLC (GEL) are consistent with the Quality System described in GEL's Quality Assurance Manual and the requirements of ISO17025:2005.

E. Inter-laboratory Comparison Program

Inter-laboratory Comparison Programs are independent checks on the precision and accuracy of laboratory analyses. These checks are performed as part of the REMP and are part of the quality assurance program.

TBE analyzed Performance Evaluation (PE) samples of air particulate, air iodine, milk, soil, vegetation and water matrices, as appropriate for 160 analyses (Appendix D, Tables D-1 through D-3).

GEL analyzed Performance Evaluation (PE) samples of air particulate, air iodine, milk, soil, vegetation and water matrices, as appropriate for 478 analyses (Appendix D, Tables D-4 through D-7).

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

EZA Evaluation Criteria

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

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 in accordance with 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.

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 mean result is greater than 30%, the results are deemed not acceptable.

Teledyne Brown Engineering

For the TBE laboratory, 156 out of 160 analyses performed met the specified acceptance criteria. Four analyses (Milk - Sr-90, Vegetation - Sr-90, and Water - H-3 samples) did not meet the specified acceptance criteria for the following reasons and were addressed through the TBE CAP. Note: The Department of Energy (DOE) Mixed Analyte Performance Evaluation Program (MAPEP) samples are created to mimic conditions found at DOE sites which do not resemble typical environmental samples obtained at commercial nuclear power facilities.

Teledyne Brown Engineering's MAPEP March 2016 APT cross check sample is now being provided to TBE by Analytics. MAPEP's policy is to evaluate as failed non reported nuclides that were reported in the previous study. Since the Sr-90 was reported in the previous MAPEP study but not in this study MAPEP evaluated the Sr-90 for Soil as failed (CAP: NCR 16-14).

The MAPEP March 2016 Sr-90 in vegetation was evaluated as failing a false positive test. In reviewing the data that was reported vs the data in Laboratory Information Management System (LIMS) it was found that the error was incorrectly reported as 0.023 rather than the correct value of 0.230. If the value had been reported with the activity and correct uncertainty of 0.301 ± 0.230, MAPEP would have evaluated the result as acceptable (CAP: NCR 16-14).

Teledyne Brown Engineering's Analytics' March 2016 milk Sr-90 result of 15 ± 0.125 pCi/L was higher than the known value of 11.4 pCi/L with a ratio of 1.32. The upper ratio of 1.30 (acceptable with warning) was exceeded. After an extensive review of the data it is believed the technician did not rinse the filtering apparatus properly and some cross contamination from one of the internal laboratory spike samples may have been transferred to the analytics sample. TBE determined the issue is specific to the March 2016 Analytics sample (CAP: NCR 16-26).

In November 2016 sample for H-3 in water from TBE's quality control vendor, ERA, was evaluated as failing. A result of 918 pCi/L was reported incorrectly due to a data entry issue. If the correct value of 9,180 had been reported, ERA would have evaluated the result as acceptable (CAP: NCR 16-34).

TBE's Analytics' December 2016 milk Sr-90 sample result of 14.7 ± 0.26 pCi/L was higher than the known value of 10 pCi/L with a ratio of 1.47. The upper ratio of 1.30 (acceptable with warning) was exceeded. The technician entered the wrong aliquot into the LIMS system. To achieve a lower error term TBE uses a larger aliquot of 1.2L (normally 0.6L is used for client samples). If the technician had entered an aliquot of 1.2L into the LIMS system, the result would have been 12.2 pCi/L, which would have been considered acceptable (CAP: NCR 16-35).

TBE's Analytics' December 2016 milk Sr-90 sample result of 14.7 ± .26 pCi/L was higher than the known value of 10 pCi/L with a ratio of 1.47. The upper ratio of 1.30 (acceptable with warning) was exceeded. The technician entered the wrong aliquot into the LIMS system. To achieve a lower error term TBE uses a larger aliquot of 1.2L (normally 0.6L is used for client samples) (CAP: NCR 16-35).

GEL

For the GEL laboratory, 471 out of 478 analyses performed met the specified acceptance criteria. Seven analyses (one Cs-137 in water, one Ra-226 in water, one U-Total in water, two Gross Alpha in water, one Sr-89 in water and one Fe-55 in soil) did not meet the specified acceptance criteria for the following reasons and are being addressed through GEL's CAP.

GEL's ERA First Quarter 2016 Cs-137 in water (RAD-104) result was higher than the ERA known value. GEL analyzed sample duplicate and a remedial sample, QR030716U, both which passed the acceptance criteria. After a thorough review of all data, a definitive reason for the failure could not be determined (CAP: CARR 160229-1005).

GEL's ERA First Quarter 2016 Gross Alpha in water (RAD-104) had two results higher than the ERA known value. The samples were reanalyzed in duplicate and passed the acceptance criteria. After a thorough review of all data, a definitive reason for the failure could not be determined (CAP: CARR 160229-1005).

GEL's ERA Second Quarter 2016 Uranium-Total in water (MRAD-24) result was higher than the ERA known value. The failure was due to a transcription error when entering the data into the data base when Uranium-Total (mass) ug/L was reported as Uranium-Total activity in pCi/L. To eliminate this type of error from recurring, an additional parameter name synonym was created in the LIMS (CAP: CARR 160519-1015).

MAPEP-16-MaS34 Second Quarter 2016 Fe-55 in Soil was below the known value. After review of the data it was determined that not enough sample was used to accurately quantitate this analyte. Per the instruction, the sample contained <2000 Bq/kg of this isotope. The lab mistakenly did not use a large enough aliquot and count time to achieve a result lower than 2,000 Bq/kg. In the future, a larger sample aliquot and longer count time will be used for this sample (CAP: CARR 160602-1025).

MAPEP-16-MaW34 Second Quarter 2016 Ra-226 in water result was higher than the known value. Ra-226 was a new nuclide added to the MAPEP water sample. In the description, it stated that the specific activity is <25 Bq/L. Ra-226 at, or near this level, can easily be identified and quantified via the gamma analysis. However, the actual reference value was <1 Bq/L, which is lower than what can be accurately quantified via the gamma analysis.

In the future, a more sensitive method will be used to determine the Ra-226 activity for the MAPEP sample (CAP: CARR 160602-1025).

GEL's ERA Third Quarter 2016 Sr-89 in water (RAD-106) result was higher than the ERA known value. After a thorough review of all data, a definitive reason for the failure could not be determined (CAP: CARR 160830-1052).

F. Summary of Results: Split Sample Comparison Program

Duplicate samples were obtained for some samples of air particulates, air iodine, milk, surface water, vegetables, soil, sediment, fish, and crab and the positive results are shown in Table C-20. These samples were analyzed by GEL as comparison and validation of TBE results.

1. Air Particulates

Gross beta was detected by GEL in all 54 and by TBE in 53 of the 54 duplicate weekly APT samples. GEL detects significantly higher gross beta results due to different calibration energy sources used by each lab.

All four duplicate quarterly composite samples analyzed had positive results for Be-7.

2. Air Iodine

All 54 duplicate sample results from GEL and TBE were less than MDC for I-131.

3. Milk

Naturally occurring K-40 was detected in all 13 duplicate samples and are all in agreement based on Criteria for Accepting the Licensee's Measurements in NRC Inspection Procedure 84525.

4. Surface Water

Naturally occurring K-40 was detected in all four GEL results and in two of the corresponding TBE results. All detections were in agreement based on Criteria for Accepting the Licensee's Measurements in NRC Inspection Procedure 84525.

5. Vegetables

Naturally occurring K-40 was detected by GEL and TBE in all 17 duplicate samples analyzed with 16 of 17 results acceptable while one result was outside the Criteria for Acceptance. The sample was reanalyzed and the result was acceptable. GEL detected Be-7 in two of the samples while TBE did not detect Be-7 on any of the samples. All results are in agreement based on Criteria for Accepting the Licensee's Measurements in NRC Inspection Procedure 84525.

6. Sediment

Naturally occurring K-40 was detected in both samples by both GEL and TBE. Naturally occurring Ra-226 was detected in both samples by GEL detected Ra-226 on both samples, but at levels below the MDC of TBE so a direct comparison could not be performed. Results are in agreement based on Criteria for Accepting the Licensee's Measurements in NRC Inspection Procedure 84525.

7. Soil

Naturally occurring K-40 was detected in all three split samples by both GEL and TBE. Naturally occurring Ra-226 and residual Cs-137 were detected in all three samples by GEL, but at levels below the MDC of TBE so a direct comparison could not be performed on these nuclides. Results are in agreement based on Criteria for Accepting the Licensee's Measurements in NRC Inspection Procedure 84525.

8. Fish

Naturally occurring K-40 was detected in the sample by both GEL and TBE. Results are in agreement based on Criteria for Accepting the Licensee's Measurements in NRC Inspection Procedure 84525.

9. Crab

Naturally occurring K-40 was detected in all both samples by both GEL and TBE. Results are in agreement based on Criteria for Accepting the Licensee's Measurements in NRC Inspection Procedure 84525.

V. Results and Discussion

The analytical results of the 2016 REMP samples are divided into categories based on exposure pathways: atmospheric, direct radiation, terrestrial, and aquatic. The ingestion pathway is evaluated under the terrestrial and aquatic categories. The analytical results for the Reporting Period are summarized in Appendix A, Radiological Environmental Monitoring Program Summary. The data for individual samples are presented in Appendix C data tables. The data are compared to the preoperational REMP data (1973-1976) and to historical data since Site operation commenced. The samples collected and analysis results indicate that the Site REMP was conducted in compliance with the Site Technical Specifications and ODCMs.

Effluent monitoring for the Site has historically included samples and analyses not specifically required by the Site ODCMs in addition to those required. Management Audit Samples are samples that are taken to augment the radiological effluent monitoring program, but do not fulfill any regulatory requirement. These analyses are referenced throughout the Report as Management Audit Samples. PSEG Nuclear

continues to collect these samples. The summary tables in this Report include these Management Audit samples and associated analytical results. The following is a list and quantity of the Management audit samples collected in 2016:

Management Audit Sample Type	Number of Samples
Vegetables	21
Well Water	12
Potable Water (raw / treated)	12 / 12
Fodder Crops	4
Soil	9
Game	2
Oysters	4

A. Atmospheric

APT samples were collected on glass fiber filters with low-volume air samplers sampling at approximately 1.5 SCFM. Air sample volumes were measured with calibrated dry-gas meters.

Samples for Iodine were collected from the air by adsorption on triethylene-diamine (TEDA) impregnated charcoal cartridges connected in series after the APT filters.

1. Air Particulates

APT samples were collected weekly at seven indicator locations (5S1, 7S2, 15S2, 5D1, 16E1, 1F1, and 2F6), one duplicate location (5S2) and one control location (14G1). Each weekly sample collected was analyzed for gross beta by TBE. Quarterly composites of the weekly samples from each location were analyzed for specific gamma emitters. The duplicate air location sample was shipped to GEL for analysis (Tables C-1, C-2 and C-20).

Gamma Spectroscopy

Gamma spectroscopy was performed on each of the 32 quarterly composite samples. Naturally occurring Be-7 was detected and no other gamma emitters were detected in any of the samples.

Naturally occurring Be-7, attributed to cosmic ray activity in the atmosphere, was detected in 28 of 28 indicator location composites at concentrations ranging from 85E-03 pCi/m^3 to 186E-03 pCi/m^3 with an average concentration of 118E-03 pCi/m^3, and in the four control location composites ranging in concentration from

104E-03 pCi/m^3 to 168E-03 pCi/m^3 with an average concentration of 125E-03 pCi/m^3. The maximum preoperational level detected was 330E-03 pCi/m^3 with an average concentration of 109E-03 pCi/m^3 (Table C-1 and Reference [1] RMC-TR-77-03).

Gross Beta

Gross beta activity was detected in 373 of 378 of the indicator location samples at concentrations ranging from 4E-03 pCi/m^3 to 26E-03 pCi/m^3 with an average concentration of 12E-03 pCi/m^3, and in 52 of 54 of the control location samples at concentrations ranging from 5E-03 pCi/m^3 to 23E-03 pCi/m^3 with an average of 13E-03 pCi/m^3. The maximum preoperational level detected was 920E-03 pCi/m^3 with an average concentration of 74E-03 pCi/m^3 (Table C-2 and Reference [1] RMC-TR-77-03). See Figure 1 for graphical presentation (Appendix C).

2. Air Iodine

AIO were collected weekly at seven indicator locations (5S1, 7S2, 15S2, 5D1, 16E1, 1F1, and 2F6), one duplicate location (5S2) and one control location (14G1). The duplicate air location sample was shipped to GEL for duplicate analysis. Each sample was analyzed for I-131, and none was detected in any indicator or control samples during the Reporting Period. The maximum preoperational level detected was 42E-03 pCi/m^3 (Table C-3 and Reference [1] RMC-TR-77-03).

B. Direct Radiation

Ambient radiation levels in the environment were monitored at locations on the Site and in the surrounding areas with pairs of passive dosimeters (PD) supplied and analyzed by Mirion Technologies. Packets containing the PDs were placed in the owner-controlled area, around the Site at various distances, and in each land based meteorological sector. Six were placed in control locations and the balance of measurement locations were placed at areas of interest such as population centers, nearby residences, and schools. The PDs at each location are changed and analyzed quarterly.

A total of 58 Immersion Dose Monitor (IDM) locations were established to monitor for direct radiation during 2016, including 20 on-site locations (1S1, 2S2, 2S4, 3S1, 4S1, 5S1, 6S2, 7S1, 8S1, 9S1, 10S1, 11S1, 12S1, 13S1, 14S1, 15S1, 15S2, 16S1, 16S2 and 16S3), 32 off-site locations within the 10 mile zone (4D2, 5D1, 10D1, 14D1, 15D1, 2E1, 3E1, 11E2, 12E1, 13E1, 16E1, 1F1, 2F2, 2F5, 2F6, 3F2, 3F3,

4F2, 5F1, 6F1, 7F2, 8F1, 9F1, 10F2, 11F1, 12F1, 13F2, 13F3, 13F4, 14F2, 15F3 and 16F2) and six control locations beyond 10 miles (1G3, 3G1, 10G1, 14G1, 16G1 and 3H1).

Two Type 20 PDs are placed at each location. Each Type 20 PD contains three CaSO:Dy elements that monitor for photon exposure. Each PD also contains one LiBO:Mn element, which is not used for this application.

The average quarterly dose rate for the off-site indicator dosimeters was 13.0 mR/Standard Quarter. The average quarterly dose rate for site boundary locations, excluding locations 1S1 and 16S2, was 12.2 mR/Standard Quarter. The control locations had an average quarterly dose rate of 13.1 mR/Standard Quarter. Subtracting the dose from the control locations from either the onsite or offsite locations indicates that there is no net dose from Site operations (Table C-4).

The two site boundary locations 1S1 and 16S2 were addressed separately due to measurable dose rates above background. The ambient radiation levels as measured by the two site boundary locations 1S1 and 16S2 ranged from 25.3 to 31.8 mR/Standard Quarter. The doses at these two locations were influenced by the radiation shine from the dry cask storage located in the nearby Independent Spent Fuel Storage Installation (ISFSI). Assuming a nominal background of 52 mR/year (13 mR/Standard Quarter) and using the highest dose rate from location 16S2, the maximum dose rate above background in these areas was calculated to be of 64.3 mrem/year (116.3 mR/year - 52 mR/year * 1.0 mrem/mR).

Dose to the nearest resident due to direct radiation from ISFSI was calculated to be 0.00694 mrem for the year which was a very small fraction of limit (40 CFR 190 and 10 CFR 72.104 both limit the dose to a real member of the public to 25 mrem in a year to the total body). The calculation was performed using the formula provided in ANSI/HPS N13.37-2014 as follows:

$$D_2 = OF * \left(\left(D_1 * R_1^{\,2} \right) / R_2^{\,2} \right)$$

Where:

D_1 = Dose that was measured from TLD Location 16S2
D_2 = Dose that will be extrapolated to Nearest Resident
R_1 = Distance from the source to the location where D1 was obtained. (Distance from ISFSI to TLD at 16S2)
R_2 = Distance from ISFSI to the location that dose will be extrapolated (Nearest Resident)
OF = Occupancy Factor (1 = full time)

Location	R_1 (ft)	D_1 Net Dose (mrem)	R_2 (ft)	OF	D_2 Dose (mrem)
Nearest Resident	203	64.3	19,536	1.0	6.94E-03

The preoperational average for the quarterly PD readings was 4.4 mR/Standard Month or 13.2 mR/Standard Quarter. A review of historic results and direct radiation measurements for the reporting period confirmed that the radiation levels in the vicinity of the Site were similar to previous years.

C. Terrestrial

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

Milk samples (MLK) were taken semi-monthly when cows were on pasture and monthly when cows were not grazing on open pasture, from three indicator locations (13E3, 14F4, 2G3) and one control location (3G1). Animals were considered on pasture from April to November of each year. Samples were collected in new polyethylene containers, sodium bisulfite was added as a sample preservative, and then samples were frozen and transported in ice chests to TBE.

Well water samples (WWA) were collected monthly from one location (3E1). Separate raw water (PWR) and treated potable water (PWT) composite samples were collected monthly from one location (2F3). Each monthly composite was made up of weekly samples. All samples were collected in new polyethylene containers and shipped to TBE for analysis.

Locally grown vegetables (FPV) were collected at the time of harvest at seven locations (2F9, 3F8, 14F4, 15F4, 1G1, 2G2 and 3H5); fodder crops (VGT) were sampled at four locations (13E3, 14F4, 2G3 and 3G1); and broad leaf vegetation (FPL) was sampled at seven locations (1S1, 7S2, 15S2, 16S1, 10D1, 1G1, and 3H5). 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 the Site and there is only one dairy farm within five miles. Therefore, broadleaf vegetation is grown, maintained and harvested monthly during the growing season. All samples were weighed, packaged and shipped to TBE for analysis.

1. Milk

Milk samples were collected from two farms in New Jersey (2G3 and 3G1) and two farms in Delaware (13E3 and 14F4). Each sample was analyzed for I-131 and gamma emitters.

I-131

I-131 was not detected above MDC 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 and Reference [1] RMC-TR-77-03).

Gamma Spectroscopy

No plant related gamma emitters were detected above the MDC in any of the indicator or control location milk samples.

Naturally occurring K-40 was detected in all 80 milk samples with concentrations for the 60 indicator location samples ranging from 1,102 pCi/L to 1,644 pCi/L with an average concentration of 1,365 pCi/L, and the 20 control location sample concentrations ranging from 1,129 pCi/L to 1,683 pCi/L, with an average concentration of 1,336 pCi/L. The maximum preoperational level detected was 2,000 pCi/L with an average concentration of 1,437 pCi/L (Table C-5 and Reference [1] RMC-TR-77-03).

2. Well Water (Ground Water)

Although offsite wells in the vicinity of the Site are not directly affected by plant operations, well water samples were collected monthly from one farm (3E1). Samples from this well are considered Management Audit samples.

Gross Alpha

Gross alpha activity was not detected above the MDC in any of the well water samples. The maximum preoperational level detected was 9.6 pCi/L (Table C-6 and Reference [1] RMC-TR-77-03).

Gross Beta

Gross beta activity was detected in four of 12 well water samples above the MDC with concentrations ranging from 2.8 pCi/L to 3.8 pCi/L, with an average concentration of 3.2 pCi/L. The preoperational results ranged from <2.1 pCi/L to 38 pCi/L, with an average value of 9 pCi/L (Table C-6 and Reference [1] RMC-TR-77-03).

Tritium

Tritium activity was not detected above the MDC in any of the well water samples. The maximum preoperational level detected was 380 pCi/L (Table C-6 and Reference [1] RMC-TR-77-03).

I-131

I-131 activity was not detected in any of the well water samples. No preoperational data were available for comparison, since I-131 was not analyzed

as a specific radionuclide prior to 1989. However, I-131 analytical results to date have been below the MDC (Table C-7 and Reference [1] RMC-TR-77-03).

Gamma Spectroscopy

No plant related gamma emitters were detected above the MDC in any of the indicator or control location well water samples. Naturally occurring K-40 was detected in one of the well water samples with a concentration of 122 pCi/L. The maximum preoperational levels detected were 30 pCi/L and 2.0 pCi/L, respectively (Table C-7 and Reference [1] RMC-TR-77-03).

3. Potable Water (Drinking Water)

Both raw and treated potable water samples were collected and composited at the local water treatment facility. Each sample consisted of weekly aliquots composited into a monthly sample. The raw water source for this plant is a combination of surface water from Laurel Lake and groundwater from its adjacent wells. These are Management Audit samples as no liquid effluents discharged from the Site 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 and Reference [1] RMC-TR-77-03).

Gross Beta

Gross beta activity was detected in 10 of the 12 raw water samples and in 12 of the 12 treated water samples. The concentrations for the raw samples ranged from 3.5 pCi/L to 7.0 pCi/L, with an average concentration of 5.4 pCi/L. Concentrations for the treated water ranged from 5.2 pCi/L to 7.2 pCi/L, with an average concentration of 6.0 pCi/L. The maximum preoperational level detected was 9.0 pCi/L with an average concentration of 4.2 pCi/L (Table C-8 and Reference [1] RMC-TR-77-03).

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 and Reference [1] RMC-TR-77-03).

I-131

I-131 activity was not detected in any of the raw or treated water samples. No preoperational data were available for comparison, since I-131 was not analyzed as a specific radionuclide prior to 1989. However, I-131 analytical results to date have been below the MDC (Table C-9 and Reference [1] RMC-TR-77-03).

Gamma Spectroscopy

No plant related gamma emitters were detected above the MDC in any of the potable water samples. Naturally occurring K-40 was not detected in any of the raw or treated water samples. No preoperational data were available for comparison. Naturally occurring Ra-226 was not detected in any raw or treated water samples. The maximum preoperational level detected for Ra-226 was 1.4 pCi/L (Table C-9 and Reference [1] RMC-TR-77-03).

4. Broadleaf Vegetation

Broadleaf vegetation was grown by PSEG personnel at four onsite locations and one offsite location in Delaware at 3.9 miles SSW for purposes of REMP sampling. These broadleaf vegetation samples were collected since there were no dairy farms operating within the five km (three mile) radius of the Site. The closest dairy farm (13E3) was located in Odessa, DE at 5.0 miles to the West.

All samples were analyzed for gamma emitters and included kale, cabbage, and collards. These samples were obtained from five indicator locations (61 samples) and two control locations (2 samples). The results for these samples are discussed below.

Gamma Spectroscopy

No plant related gamma emitters were detected above the MDC in any of the indicator or control location broadleaf vegetation samples.

Naturally occurring Be-7, attributed to cosmic ray activity in the atmosphere, was detected above the MDC in six of the 61 indicator location samples with concentrations ranging from 204 pCi/kg (wet) to 1,694 pCi/kg (wet), with an average concentration of 525 pCi/kg (wet). Be-7 was not detected in any of the two control location samples. No preoperational Be-7 data was available for comparison (Table C-10).

Naturally occurring K-40 was detected in all 61 indicator samples, with concentrations ranging from 1,772 pCi/kg (wet) to 8,761 pCi/kg (wet) with an average concentration of 4,052 pCi/kg (wet), and in both control location samples at concentrations ranging from 1,557 pCi/kg (wet) to 2,634 pCi/kg (wet) with an average concentration of 2,096 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 and Reference [1] RMC-TR-77-03).

5. Vegetables

There are no farm products that are irrigated with water in which plant effluents have been discharged. The Delaware River at the location of the Site is brackish and therefore is not used for irrigation.

A variety of food products were sampled on and around the Site; however, the variety was dependent on the farmer's preference. These vegetables were collected as Management Audit samples.

All samples were analyzed for gamma emitters and included asparagus, soy beans, sweet corn, peppers, tomatoes, and peaches. These samples were obtained from seven indicator locations (21 samples). The results for these samples are discussed below.

Gamma Spectroscopy

No plant related gamma emitters were detected above the MDC in any of the indicator or control location vegetable samples.

Naturally occurring Be-7, attributed to cosmic ray activity in the atmosphere, was not detected above the MDC in any of the vegetables samples.

Naturally occurring K-40 was detected in all 21 indicator samples, with concentrations ranging from 923 pCi/kg (wet) to 14,270 pCi/kg (wet) with an average concentration of 2,425 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 and Reference [1] RMC-TR-77-03).

6. Fodder Crops

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

Gamma Spectroscopy

No plant related gamma emitters were detected above the MDC in any of the indicator or control location fodder crop samples. Naturally occurring Be-7, attributed to cosmic ray activity in the atmosphere, was detected in one of the three indicator samples with a concentration of 293 pCi/kg (wet) and in the control location sample with a concentration of 308 pCi/kg (wet). The maximum preoperational level detected for fodder was 4,700 pCi/kg (wet) with an average concentration of 2,000 pCi/kg (wet) (Table C-11 and Reference [1] RMC-TR-77-03).

Naturally occurring K-40 was detected in all three indicator samples at concentrations ranging from 2,983 pCi/kg (wet) to 3,478 pCi/kg (wet) with an average concentration of 3,196 pCi/kg (wet), and in the one control location sample at a concentration of 3,565 pCi/kg (wet). Preoperational results averaged 7,000 pCi/kg (wet) (Table C-11 and Reference [1] RMC-TR-77-03).

7. Soil

Soil is sampled every three years and analyzed for gamma emitters. Nine locations were sampled in 2016. These Management Audit samples were collected in areas that have been relatively undisturbed since the last collection in order to determine any change in the radionuclide inventory of the area (Table C-12).

Gamma Spectroscopy

Naturally occurring K-40 was detected in all nine indicator samples at concentrations ranging from 6,844 to 16,980 pCi/kg (dry) with an average concentration of 10,393 pCi/kg (dry). The maximum preoperational level detected was 24,000 pCi/kg (dry) with an average of 10,000 pCi/kg (dry) (Table C-12).

Cs-137 was detected in three of the nine indicator samples at concentrations ranging from 173 to 344 pCi/kg (dry) with an average concentration of 259 pCi/kg (dry). The maximum preoperational level detected was 2,800 pCi/kg (dry) with an average of 800 pCi/kg (dry). See Figure 2 for graphical presentation (Table C-12).

Naturally occurring Ra-226 was detected in three of the nine indicator samples at concentrations ranging from 1,499 to 2,750 pCi/kg (dry) with an average concentration of 2,262 pCi/kg (dry). The maximum preoperational level detected was 1,500 pCi/kg (dry) with an average of 870 pCi/kg (dry) (Table C-12).

Naturally occurring Th-232 was detected in all of the nine indicator samples at concentrations ranging from 358 to 935 pCi/kg (dry) with an average concentration of 644 pCi/kg (dry). The maximum preoperational level detected was 1,400 pCi/kg (dry) with an average of 740 pCi/kg (dry) (Table C-12).

8. Game

Although not required by the Site ODCMs, two muskrat samples were collected from two indicator locations. The game samples were collected as Management Audit samples and analyzed for gamma emitters.

Gamma Spectroscopy

No plant related gamma emitters were detected above the MDC in any of the indicator game samples. Naturally occurring K-40 was detected in both samples at concentrations ranging from 2,727 to 2,855 pCi/kg (wet) with an average concentration of 2,791 pCi/kg (wet). No preoperational data was available for comparison (Table C-13 and Reference [1] RMC-TR-77-03).

D. Aquatic

This sample set includes edible fish, shoreline and riverbed sediment, surface water, crabs, and oysters.

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

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

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

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

Oyster samples were collected by personnel licensed to harvest oysters by the State of New Jersey. Oysters in the vicinity of the plant were not large enough to be sold to the public, so they were added to the REMP as Management Audit samples. Oysters were collected and shucked; then the flesh and internal fluids were placed in sealed containers and frozen before being transported in ice chests to TBE for analysis.

1. Surface Water

Surface water samples were collected twice a month at four indicator locations and one control location in the Delaware River Estuary. The two samples for the month were combined to create a single monthly composite sample that was then analyzed. One location (11A1) is at the outfall area (which is the area potentially impacted by effluents discharged from the Site into the Delaware River), one location is downstream from the outfall area (7E1), and one location is directly west of the outfall area at the mouth of the Appoquinimink River (12C1). Samples were collected upstream in the Delaware River (1F2) and at the mouth of the Chesapeake and Delaware Canal (16F1) the latter being sampled when the flow was from the Canal into the river.

Location 12C1, located directly west of the Site, at the mouth of the Appoquinimink River, serves as the control. 12C1 was chosen as the control location because the physical characteristics of this location more closely resemble those of the outfall area than do those at the farther upstream location (1F2). As discussed in the preoperational summary report, due to its tidal nature, there were flow rate and salinity variations in the Delaware River Estuary. These variations accounted for the differences in K-40 concentrations.

Tritium

Tritium activity was detected in two of 48 indicator sample analyses with the first concentration of 2,540 pCi/L at location 11A1 in the April composite and with the second concentration of 1,600 pCi/L also at location 11A1 in the August composite. Evaluation of the samples which indicate positive tritium activity are described below. Tritium was not detected above MDC on any of the control sample analyses. The maximum preoperational level detected was 600 pCi/L, with an average concentration of 210 pCi/L (Table C-14 and Reference [1] RMC-TR-77-03). See Figure 3 for graphical presentation.

The April 2016 composite for surface water sampled at location 11A1 (0.2 miles SW of the SGS Outfall Area) identified tritium activity at 2,540 pCi/L with a two sigma uncertainty of ± 321 pCi/L and a Minimum Detectable Concentration of 310 pCi/L. The dose impact, from the maximum tritium activity observed, to the maximum exposed individual through the consumption of fish and crabs was 7.29E-3 mrem/yr. This does not present any significant exposure.

Sample location 11A1 is in very close proximity to the SGS outfall where the circulating water discharge and subsequent permitted discharge of liquid radwaste tanks occurs. During both sample collections for the composite an actual liquid release was in progress.

The first part of the composite sample was obtained on 4/10/2016 at 1808 hours while release permit number 53630 from Unit 2 was occurring from 1414 hours to 1941 hours. Release 53630 was from the #21 Chemical Volume Control System Monitor Tank.

The second part of the composite sample was obtained on 4/21/2016 at 1520 hours while release permit number 53650 from Unit 2 was occurring from 1402 hours to 2138 hours. Release 53650 was from the #21 Chemical Volume Control System Monitor Tank.

A correlation was performed to evaluate the relationship between the quantities of radioactive effluent released and the resultant dose to individuals from principal pathways of exposure. Assumptions used to correlate the results were that tritium measured at 11A1 were associated with releases that occurred during the composite sample collection.

Due to the lack of a local stream flow gauge and uncertainties associated with tidal influences, a very conservative estimate of dilution flow in the Delaware River consisting of measured stream flow and inputs farther upstream from the site was developed. The correlation determined that the actual measured concentration is reasonably close to the predicted concentration. Differences may be due to many unknown factors including tidal recirculation and various river and tidal mixing factors (CAP: 20728201).

The August 2016 composite sample for surface water sampled at location 11A1 (0.2 miles SW of the SGS Outfall Area) identified tritium activity at 1,600 pCi/L with a two sigma uncertainty of ± 227 pCi/L and a Minimum Detectable Concentration of 247 pCi/L. The dose impact, from the maximum tritium activity observed, to the maximum exposed individual through the consumption of fish and crabs was 4.37E-3 mrem/yr. This does not present a significant exposure. Sample location 11A1 is in very close proximity to the permitted SGS outfall where the circulating water discharge and subsequent permitted discharge of liquid radwaste tanks occurs. During the first sample collection, which occurred on 8/3/2016, an actual liquid release was in progress. There was no release in progress for the second sample on 8/19/2016.

The first part of the composite sample was obtained on 8/3/2016 at 1525 hours while release permit number 53744 from Unit 1 was occurring from 1519 hours to 2320 hours. Release 53744 was from a Chemical Volume Control System Monitor Tank.

The second part of the composite sample was obtained on 8/19/2016 at 0639 hours while there was no release in progress. There were no releases from either unit within 1 day of the second sample.

A evaluation was performed to correlate the relationship between the quantities of radioactive effluent released and the resultant dose to individuals from principal pathways of exposure. Assumptions used to correlate the results were that tritium measured at 11A1 was associated with releases that occurred during the composite sample collection of the first sample. Since there was no release in progress at the time of the second sample, it is assumed for correlation purposes, that there was no plant related tritium in the second sample.

The correlation determined that the actual measured concentration is reasonably close to the predicted concentration. Differences may be due to many unknown factors including tidal recirculation and various river and tidal mixing factors at the point of sample collection (CAP: 20740887).

Gamma Spectroscopy

No plant related gamma emitters were detected above the MDC in any of the indicator or control surface water samples.

Naturally occurring K-40 was detected in 17 of the 48 indicator location samples at concentrations ranging from 78 pCi/L to 168 pCi/L with an average concentration of 124 pCi/L, and in six of the 12 control location samples at concentrations ranging from 66 pCi/L to 253 pCi/L and an average of 129 pCi/L. The maximum preoperational level detected for K-40 was 200 pCi/L with an average concentration of 48 pCi/L (Table C-15 and Reference [1] RMC-TR-77-03).

I-131

I-131 was not detected above the MDC in any of the 48 indicator samples or in any of the control location samples (Table C-15).

2. Fish

Edible species of fish were collected semi-annually at two indicator locations and one control location and analyzed for gamma emitters in edible flesh. Sample species collected in 2016 were striped bass and catfish.

Gamma Spectroscopy

No plant related gamma emitters were detected above the MDC in any of the indicator or control location fish samples. Naturally occurring K-40 was detected in all six indicator location samples at concentrations ranging from 3,325 pCi/kg (wet) to 4,668 pCi/kg (wet) with an average concentration of 3,871 pCi/kg (wet), and all four control location samples at concentrations ranging from 3,531 pCi/kg (wet) to 4,534 pCi/kg (wet) with an average concentration of 4,209 pCi/kg (wet). The maximum preoperational level detected was 13,000 pCi/kg (wet) with an average concentration of 2,900 pCi/kg (wet) (Table C-16 and Reference [1] RMC-TR-77-03).

3. Blue Crab

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

Gamma Spectroscopy

No plant related gamma emitters were detected above the MDC in any of the indicator or control location blue crab samples. Naturally occurring K-40 was detected in both indicator location samples at concentrations of 2,832 pCi/kg (wet) and 3,223 pCi/kg (wet) with an average concentration of 3,028 pCi/kg (wet), and in both control location samples at concentrations of 2,203 pCi/kg (wet) and 3,238 pCi/kg (wet) with an average concentration of 2,721 pCi/kg (wet). The maximum preoperational level for K-40 detected was 12,000 pCi/kg (wet) with an average concentration of 2,835 pCi/kg (wet). All other gamma emitters were less than the MDC (Table C-17 and Reference [1] RMC-TR-77-03).

4. Sediment

Sediment samples were collected semi-annually from six indicator locations and one control location. Location 6S2 was the only shoreline sediment sample location that was directly subjected to tidal fluctuations. The remaining locations were located offshore.

Gamma Spectroscopy

Naturally occurring K-40 was detected in all 12 indicator location samples at concentrations ranging from 2,365 pCi/kg (dry) to 16,410 pCi/kg (dry), with an average concentration of 8,081 pCi/kg (dry), and at both control locations samples at concentrations of 15,620 pCi/kg (dry) and 16,810 pCi/kg (dry) with an average concentration of 16,215 pCi/kg (dry). The maximum preoperational level detected was 21,000 pCi/kg (dry) with an average concentration of 15,000 pCi/kg (dry) (Table C-18 and Reference [1] RMC-TR-77-03).

Cs-137 was not detected in any of the indicator samples. The maximum preoperational level detected was 400 pCi/kg (dry) with an average concentration of 150 pCi/kg (dry) (Table C-18 and Reference [1] RMC-TR-77-03).

Naturally occurring Ra-226 was detected in three of the 12 indicator location samples at concentrations ranging from 1,465 pCi/kg (dry) to 3,012 pCi/kg (dry) with an average concentration of 2,120 pCi/kg (dry) and in one of the control location samples at a concentration of 2,513 pCi/kg (dry). The maximum preoperational level detected was 1,200 pCi/kg (dry) with an average concentration of 760 pCi/kg (dry) (Table C-18 and Reference [1] RMC-TR-77-03).

Naturally occurring Th-232 was detected in nine of the 12 indicator location samples at concentrations ranging from 227 pCi/kg (dry) to 1,002 pCi/kg (dry) with an average concentration of 697 pCi/kg (dry), and in both of the control location samples at concentrations of 965 pCi/kg (dry) and 1,303 pCi/kg (dry) with an average concentration of 1,134 pCi/kg (dry). The maximum preoperational level detected was 1,300 pCi/kg (dry) with an average concentration of 840 pCi/kg (dry). All other gamma emitters were less than the MDC (Table C-18 and Reference [1] RMC-TR-77-03).

5. Oysters

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

Gamma Spectroscopy

No plant related gamma emitters were detected above the MDC in any of the indicator or control location oyster samples.

Naturally occurring K-40 was detected in one of the two indicator location samples at a concentration of 1,485 pCi/kg (wet), and in one of the two control location samples at a concentration of 1,568 pCi/kg (wet). Both the indicator and control samples with K-40 were obtained in October. There were no preoperational analyses preformed on oysters as there were no significant quantities of oysters or other shellfish within 5 miles of the plant discharge. All other gamma emitters were less than the MDC (Table C-19 and Reference [6]).

E. Land Use Survey

A land use survey was conducted during the Reporting Period 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 meat animal, the nearest residence and the nearest garden of greater than 50 m^2 (500 ft^2) producing broad leaf vegetation. In accordance with the Site ODCMs, the survey was performed using a visual survey, Post Office inquiries, Yellow Pages, and Google Earth mapping software.

No cultural or historic resource officially identified and confirmed by regulatory agencies is known to exist at PSEG.

A comparison of the identified locations from the 2016 table with the 2015 table shows that there was no change to the nearest resident or vegetable garden larger than 50 m^2 (500 ft^2) with broadleaf vegetation. However, distance to nearest milk animal in the W sector was changed from 7.8 Km to 8.0 Km because the dairy farmer sold part of his land nearest the Site. Dose evaluations do not need to be updated and no changes to the Site ODCMs are required. The 2016 Land Use Survey results are summarized below:

Meteorological Sector	Milk Animal August, 2016 Km (miles)	Nearest Residence August, 2016 Km (miles)	Vegetable Garden August, 2016 Km (miles)	Meat Animal August, 2016 Km (miles)
N	None	None	None	None
NNE	None	8.0 (5.0)	None	6.8 (4.2)
NE	None	6.2 (3.9)	None	None
ENE	None	6.2 (3.9)	None	None
E	None	None	None	None
ESE	None	None	None	None
SE	None	None	None	None
SSE	None	None	None	None
S	None	None	None	None
SSW	None	6.2 (3.9)	None	None
SW	None	6.9 (4.3)	None	7.3 (4.6)
WSW	None	7.1 (4.4)	None	None
W	8.0 (5.0)	6.5 (4.0)	None	None
WNW	None	5.5 (3.4)	None	None
NW	None	5.9 (3.7)	None	None
NNW	None	6.8 (4.2)	None	None

VI. Annotations to Previous AREOR

Annotations to 2015 AREOR:

Page 24, section IV.C.3 Potable Water says, "Each sample consists of daily samples composited into a monthly sample." It should say, "Each sample consists of weekly samples composited into a monthly sample."

Page 63, Table B-2 for location 7S1 media sampled includes AIO, APT, and FPL which was incorrect. These samples were collected at location 7S2 which was omitted from Table B-2. Also, location 16S2 includes FPL which was not sampled at that location.

Page 94, the first page of Table C-15, was inadvertently omitted. Table C-15 should have been three pages instead of the two included. The data not included was for locations 12C1, which was the control location, and 11A1, which was an indicator location. All three pages of the Table C-15 from the 2015 AREOR are included here.

TABLE C-15 **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER, 2015**

Results in Units of pCi/L ± 2 Sigma

SITE	COLLECTION PERIOD	I-131*	<----------GAMMA EMITTERS----------> K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	ZrNb-95	Cs-134	Cs-137	BaLa140
SA-SWA-12C1 (C)	01/06/15	< 0.4	61 ± 25	< 2	< 2	< 4	< 2	< 4	< 2	< 2	< 2	< 4
	02/04/15	< 0.6	80 ± 26	< 2	< 2	< 4	< 2	< 4	< 2	< 2	< 2	< 5
	03/04/15	< 0.8	< 43	< 4	< 5	< 8	< 4	< 8	< 4	< 3	< 4	< 7
	04/09/15	< 0.4	< 18	< 2	< 2	< 5	< 2	< 4	< 2	< 2	< 2	< 5
	05/04/15	< 0.7	< 28	< 2	< 2	< 5	< 2	< 5	< 3	< 3	< 2	< 4
	06/04/15	< 0.7	167 ± 62	< 5	< 5	< 11	< 6	< 8	< 6	< 5	< 6	< 10
	07/09/15	< 0.6	< 16	< 2	< 2	< 4	< 2	< 4	< 2	< 2	< 2	< 4
	08/06/15	< 0.7	< 46	< 4	< 4	< 8	< 5	< 7	< 5	< 4	< 4	< 5
	09/11/15	< 0.6	73 ± 28	< 2	< 2	< 4	< 2	< 4	< 2	< 2	< 2	< 4
	10/06/15	< 0.7	167 ± 64	< 6	< 4	< 9	< 6	< 8	< 6	< 4	< 4	< 9
	11/02/15	< 0.8	< 26	< 3	< 3	< 8	< 0	< 4	< 3	< 4	< 3	< 6
	12/07/15	< 0.7	43 ± 17	< 1	< 1	< 2	< 1	< 2	< 1	< 1	< 1	< 2
	AVERAGE**		99 ± 109	-	-	-	-	-	-	-	-	-
SA-SWA-11A1	01/06/15	< 0.3	44 ± 20	< 1	< 2	< 3	< 1	< 3	< 2	< 1	< 1	< 3
	02/04/15	< 0.6	84 ± 37	< 2	< 2	< 4	< 2	< 3	< 2	< 2	< 2	< 5
	03/04/15	< 0.9	96 ± 63	< 4	< 6	< 9	< 4	< 7	< 4	< 4	< 5	< 8
	04/09/15	< 0.4	48 ± 23	< 2	< 2	< 4	< 1	< 3	< 2	< 2	< 2	< 3
	05/04/15	< 0.9	77 ± 35	< 3	< 3	< 6	< 3	< 5	< 3	< 2	< 3	< 6
	06/04/15	< 0.4	< 54	< 5	< 6	< 12	< 7	< 10	< 6	< 5	< 6	< 10
	07/09/15	< 0.8	< 17	< 2	< 2	< 4	< 2	< 3	< 2	< 1	< 2	< 3
	08/06/15	< 0.7	141 ± 62	< 5	< 5	< 10	< 5	< 10	< 5	< 4	< 5	< 8
	09/11/15	< 0.4	123 ± 28	< 2	< 2	< 4	< 2	< 4	< 2	< 2	< 2	< 4
	10/06/15	< 0.7	89 ± 57	< 5	< 6	< 10	< 5	< 10	< 5	< 6	< 5	< 8
	11/02/15	< 1.0	< 121	< 4	< 3	< 7	< 4	< 6	< 4	< 3	< 4	< 4
	12/07/15	< 0.6	83 ± 17	< 1	< 1	< 2	< 1	< 2	< 1	< 1	< 1	< 2
	AVERAGE**		87 ± 62	-	-	-	-	-	-	-	-	-

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

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

(C) CONTROL STATION

TABLE C-15 **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER, 2015**

Results in Units of pCi/L ± 2 Sigma

SITE	COLLECTION PERIOD	I-131*	<----------GAMMA EMITTERS----------> K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	ZrNb-95	Cs-134	Cs-137	BaLa140
SA-SWA-16F1	1/6/2015	< 0.4	35 ± 22	< 1	< 1	< 3	< 1	< 3	< 1	< 1	< 1	< 3
	2/4/2015	< 0.5	62 ± 39	< 2	< 2	< 5	< 2	< 4	< 2	< 2	< 2	< 5
	3/4/2015	< 0.8	90 ± 56	< 3	< 4	< 8	< 4	< 8	< 4	< 3	< 4	< 4
	04/09/15	< 0.3	< 15	< 2	< 2	< 4	< 2	< 3	< 2	< 1	< 2	< 4
	05/04/15	< 0.6	39 ± 22	< 2	< 2	< 4	< 2	< 4	< 2	< 2	< 2	< 5
	06/04/15	< 0.4	< 62	< 6	< 6	< 13	< 5	< 12	< 6	< 6	< 6	< 10
	07/09/15	< 0.6	44 ± 27	< 2	< 2	< 4	< 2	< 3	< 2	< 2	< 2	< 4
	08/06/15	< 0.8	< 35	< 4	< 4	< 9	< 4	< 8	< 5	< 4	< 5	< 7
	09/11/15	< 0.4	60 ± 28	< 2	< 2	< 4	< 2	< 4	< 2	< 2	< 2	< 4
	10/06/15	< 0.7	< 67	< 5	< 5	< 11	< 6	< 12	< 6	< 5	< 6	< 8
	11/02/15	< 0.9	< 36	< 4	< 4	< 6	< 3	< 8	< 4	< 4	< 4	< 6
	12/07/15	< 0.6	41 ± 13	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 2
	AVERAGE**		53 ± 38	-	-	-	-	-	-	-	-	-
SA-SWA-1F2	1/6/2015	< 0.5	< 25	< 3	< 3	< 6	< 3	< 5	< 3	< 2	< 3	< 6
	2/4/2015	< 0.7	42 ± 25	< 2	< 2	< 4	< 2	< 3	< 2	< 1	< 2	< 4
	3/4/2015	< 0.6	< 33	< 4	< 5	< 8	< 5	< 8	< 5	< 4	< 5	< 10
	04/09/15	< 0.4	< 12	< 1	< 1	< 3	< 1	< 2	< 1	< 1	< 1	< 3
	05/04/15	< 0.7	81 ± 30	< 1	< 1	< 3	< 2	< 3	< 2	< 1	< 1	< 4
	06/04/15	< 0.4	< 35	< 4	< 4	< 10	< 4	< 8	< 5	< 4	< 4	< 6
	07/09/15	< 0.6	< 17	< 2	< 2	< 4	< 2	< 4	< 2	< 2	< 2	< 4
	08/06/15	< 0.7	< 23	< 3	< 4	< 9	< 3	< 6	< 4	< 4	< 4	< 6
	09/11/15	< 0.5	< 24	< 2	< 2	< 6	< 2	< 5	< 2	< 2	< 2	< 6
	10/06/15	< 0.9	< 46	< 4	< 5	< 8	< 3	< 12	< 5	< 5	< 6	< 9
	11/02/15	< 0.7	< 44	< 4	< 4	< 8	< 4	< 8	< 4	< 4	< 4	< 7
	12/07/15	< 0.5	< 11	< 1	< 1	< 3	< 1	< 3	< 1	< 1	< 1	< 3
	AVERAGE**		61 ± 56	-	-	-	-	-	-	-	-	-

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

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

TABLE C-15 **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER, 2015**

Results in Units of pCi/L ± 2 Sigma

SITE	COLLECTION PERIOD	I-131*	<----------GAMMA EMITTERS----------> K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	ZrNb-95	Cs-134	Cs-137	BaLa140
SA-SWA-7E1	01/06/15	< 0.5	83 ± 33	< 2	< 2	< 5	< 2	< 4	< 2	< 2	< 2	< 5
	02/04/15	< 0.6	104 ± 28	< 2	< 2	< 5	< 2	< 4	< 2	< 2	< 2	< 5
	03/04/15	< 0.7	< 38	< 3	< 4	< 7	< 3	< 6	< 4	< 4	< 4	< 6
	04/09/15	< 0.4	93 ± 31	< 2	< 2	< 5	< 2	< 4	< 2	< 2	< 2	< 5
	05/04/15	< 0.7	91 ± 59	< 3	< 3	< 6	< 3	< 5	< 3	< 3	< 3	< 6
	06/04/15	< 0.5	< 51	< 6	< 6	< 12	< 6	< 12	< 6	< 6	< 7	< 9
	07/09/15	< 0.6	< 18	< 2	< 2	< 4	< 2	< 4	< 2	< 2	< 2	< 4
	08/06/15	< 0.8	123 ± 64	< 4	< 4	< 7	< 4	< 8	< 5	< 4	< 4	< 8
	09/11/15	< 0.5	147 ± 35	< 2	< 2	< 5	< 2	< 4	< 2	< 2	< 2	< 5
	10/06/15	< 0.7	132 ± 56	< 4	< 3	< 8	< 4	< 9	< 4	< 5	< 5	< 7
	11/02/15	< 0.9	< 32	< 4	< 4	< 7	< 3	< 7	< 4	< 4	< 4	< 8
	12/07/15	< 0.5	110 ± 15	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 2
	AVERAGE**		110 ± 44	-	-	-	-	-	-	-	-	-

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

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

Annotations to 2014 AREOR:

Page 35, in the Section IV.E Land Use Survey, the summary table shows a vegetable garden located 7.3 Km South-West. The garden in that location did not have broadleaf vegetation so should not have been listed. No garden should be listed.

VII. Hope Creek Technical Specification Limit for Primary Water Iodine Concentration

The HCGS primary coolant results for Dose Equivalent Iodine-131, Total Gamma, and Total Beta were reviewed. The specific activity of the primary coolant did not exceed 0.2 microcuries per gram Dose Equivalent I-131 (DEI). The Total Gamma and the Total Beta activity (microcuries per gram) did not exceed the 100/E-Bar limit. Therefore, HCGS did not exceed the Technical Specifications limit specified in section 3.4.5.

VIII. Conclusions

The Radiological Environmental Monitoring Program for the Site was conducted during 2016 in accordance with the Site ODCMs. The required sample analysis LLD values were achieved (See Appendix A and Appendix C) and the REMP objectives were met. The data collected demonstrates that the Site was operated in compliance with the Site ODCMs' REMP requirements.

The concentration of radioactive material in the environment that could be attributable to Site operations was only a small fraction of the total radioactivity when compared to the concentration of naturally occurring and non-plant related man-made radioactivity in the environment.

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, it can be concluded that the operation of the Site had no significant radiological impact on the health and safety of the public or on the environment.

IX. References

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

[2] Public Service Enterprise Group. "Offsite Dose Calculation Manual" - Salem Generating Station. Revision 27.

[3] Public Service Enterprise Group. "Offsite Dose Calculation Manual" - Hope Creek Generating Station. Revision 27.

[4] U.S. Nuclear Regulatory Commission: NUREG-1301, "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Pressurized Water Reactors", published April 1991.

[5] U.S. Nuclear Regulatory Commission: NUREG-1302, "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Boiling Water Reactors", published April 1991.

[6] U.S. Atomic Energy Commission, Docket NOS. 50-272/50-311, "Salem Nuclear Generating Station Units 1 and 2, Environmental Report, Operating License Stage".

APPENDIX A

RADIOLOGICAL ENVIRONMENTAL MONITORING

PROGRAM SUMMARY

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SAMPLE DESIGNATION

Samples locations are identified by a three part code. 1) The first two letters are the program identification code. Because of the proximity of the SGS and HCGS, a common environmental surveillance program is conducted. The identification code, "SA", has been applied to SGS and HCGS. 2) The next three letters identify 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

3) The last three or 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 SGS Unit 1 and Unit 2 containments. Of these, the first one or 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 location 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 SGS and HCGS program (SA) consisting of well water (WWA) which was collected in sector number 3, centered at 45 degrees (north east) with respect to the midpoint between SGS Units 1 and 2 Containments at a radial distance of 4 to 5 miles offsite, (therefore, radial distance E). The number 1 indicates that this is sampling location number 1 in that particular sector.

SAMPLING LOCATIONS

All sampling locations and specific information about the individual locations are given in Appendix B, Table B-2. Additionally Maps B-1, B-2, and B-3 of Appendix B show the locations of sampling locations with respect to the Site. Not all locations in Table B-2 are required sample locations. Some of the locations identified in Table B-2 are used for management audit samples.

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

SALEM GENERATING STATION **DOCKET NO. 50-272/-311**
HOPE CREEK GENERATING STATION **DOCKET NO. 50-354**
SALEM COUNTY, NEW JERSEY **REPORTING PERIOD: January 1, 2016 to December 31, 2016**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND *TOTAL NUMBER* OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD*)	ALL INDICATOR LOCATIONS MEAN (f) ** *(RANGE)*	LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION	LOCATION WITH HIGHEST MEAN MEAN (f) ** *(RANGE)*	CONTROL LOCATION MEAN (f) ** *(RANGE)*	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
I. AIRBORNE							
AIR PARTICULATE (E-3 pCi/m^3)	Gr-B *432*	10	12 **(373/378)** *(4/26)*	SA-APT-14G1 (C) 11.8 MILES WNW	13 **(52/54)** *(5/23)*	13 **(52/54)** (5/23)	0
	GAMMA *32*						
	Be-7	N/A	118 **(28/28)** *(85/186)*	SA-APT-14G1 (C) 11.8 MILES WNW	125 **(4/4)** *(104/168)*	125 **(4/4)** *(104/168)*	0
	K-40	N/A	<MDC	N/A	N/A	<MDC	0
	Cs-134	50	<MDC	N/A	N/A	<MDC	0
	Cs-137	60	<MDC	N/A	N/A	<MDC	0
AIR IODINE (E-3 pCi/m^3)	GAMMA *432*						
	I-131	70	<MDC	N/A	N/A	<MDC	0
II. DIRECT							
DIRECT RADIATION (mR/standard quarter)	TLD-QUARTERLY *231*	N/A	13.3 **(207/207)** *(7.5/31.8)*	SA-IDM-16S2 0.60 MILES NNW	29.1 **(4/4)** *(28.2/31.3)*	13.1 **(24/24)** *(10.1/15.2)*	0
III. TERRESTRIAL							
MILK (pCi/L)	I-131 (LOW LVL) *80*	1	<MDC	N/A	N/A	<MDC	0
	GAMMA *80*						
	K-40	N/A	1,365 **(60/60)** *(1,102/1,644)*	SA-MLK-14F4 8.0 MILES WNW	1,395 **(20/20)** *(1,138/1,627)*	1,336 **(20/20)** *(1,129/1,683)*	0
	Cs-134	15	<MDC	N/A	N/A	<MDC	0
	Cs-137	18	<MDC	N/A	N/A	<MDC	0
	BaLa-140	15	<MDC	N/A	N/A	<MDC	0
	Ra-226	N/A	<MDC	N/A	N/A	<MDC	0
WELL WATER (pCi/L)	Gr-A *12*	3	<MDC	N/A	N/A	N/A	0
	Gr-B *12*	4	3.2 **(4/12)** *(2.8/3.8)*	SA-WWA-3E1 4.2 MILES NE	3.2 **(4/12)** *(2.8/3.8)*	N/A	0
	H-3 *12*	200	<MDC	N/A	N/A	N/A	0

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MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND *TOTAL NUMBER* OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD*)	ALL INDICATOR LOCATIONS	LOCATION WITH HIGHEST MEAN		CONTROL LOCATION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
			MEAN (f) ** *(RANGE)*	NAME DISTANCE AND DIRECTION	MEAN (f) ** *(RANGE)*	MEAN (f) ** *(RANGE)*	
WELL WATER (cont.) (pCi/L)	I-131 (LOW LVL) *12*	1	<MDC	N/A	N/A	N/A	0
	GAMMA *12*						
	K-40	N/A	122 **(1/12)**	SA-WWA-3E1 4.2 MILES NE	122 **(1/12)**	N/A	0
	Mn-54	15	<MDC	N/A	N/A	N/A	0
	Co-58	15	<MDC	N/A	N/A	N/A	0
	Fe-59	30	<MDC	N/A	N/A	N/A	0
	Co-60	15	<MDC	N/A	N/A	N/A	0
	Zn-65	30	<MDC	N/A	N/A	N/A	0
	ZrNb-95	15	<MDC	N/A	N/A	N/A	0
	Cs-134	15	<MDC	N/A	N/A	N/A	0
	Cs-137	18	<MDC	N/A	N/A	N/A	0
	BaLa-140	15	<MDC	N/A	N/A	N/A	0
	Ra-226	N/A	<MDC	N/A	N/A	N/A	0
POTABLE WATER (RAW) (pCi/L)	Gr-A *12*	3	<MDC	N/A	N/A	N/A	0
	Gr-B *12*	4	5.4 **(10/12)** *(3.5/7.0)*	SA-PWR-2F3 8.0 MILES NNE	5.4 **(10/12)** *(3.5/7.0)*	N/A	0
	H-3 *12*	200	<MDC	N/A	N/A	N/A	0
	I-131 (LOW LVL) *12*	1	<MDC	N/A	N/A	N/A	0
	GAMMA *12*						
	K-40	N/A	<MDC	N/A	N/A	N/A	0
	Mn-54	15	<MDC	N/A	N/A	N/A	0
	Co-58	15	<MDC	N/A	N/A	N/A	0
	Fe-59	30	<MDC	N/A	N/A	N/A	0

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			MEAN (f) ** *(RANGE)*	NAME DISTANCE AND DIRECTION	MEAN (f) ** *(RANGE)*	MEAN (f) ** *(RANGE)*	
POTABLE WATER (RAW) (cont.) (pCi/L)	Co-60	15	<MDC	N/A	N/A	N/A	0
	Zn-65	30	<MDC	N/A	N/A	N/A	0
	ZrNb-95	15	<MDC	N/A	N/A	N/A	0
	Cs-134	15	<MDC	N/A	N/A	N/A	0
	Cs-137	18	<MDC	N/A	N/A	N/A	0
	BaLa-140	15	<MDC	N/A	N/A	N/A	0
	Ra-226	N/A	<MDC	N/A	N/A	N/A	0
POTABLE WATER (TREATED) (pCi/L)	Gr-A *12*	3	<MDC	N/A	N/A	N/A	0
	Gr-B *12*	4	6.0 **(12/12)** *(5.2/7.2)*	SA-PWT-2F3 8.0 MILES NNE	6.0 **(12/12)** *(5.2/7.2)*	N/A	0
	H-3 *12*	200	<MDC	N/A	N/A	N/A	0
	I-131 (LOW LVL) *12*	1	<MDC	N/A	N/A	N/A	0
	GAMMA *12*						
	K-40	N/A	<MDC	N/A	N/A	N/A	0
	Mn-54	15	<MDC	N/A	N/A	N/A	0
	Co-58	15	<MDC	N/A	N/A	N/A	0
	Fe-59	30	<MDC	N/A	N/A	N/A	0
	Co-60	15	<MDC	N/A	N/A	N/A	0
	Zn-65	30	<MDC	N/A	N/A	N/A	0
	ZrNb-95	15	<MDC	N/A	N/A	N/A	0
	Cs-134	15	<MDC	N/A	N/A	N/A	0
	Cs-137	18	<MDC	N/A	N/A	N/A	0
	BaLa-140	15	<MDC	N/A	N/A	N/A	0

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POTABLE WATER (TREATED) (cont.) (pCi/L)	Ra-226	N/A	<MDC	N/A	N/A	N/A	0
BROAD-LEAF VEGETATION, FPL (pCi/kg wet)	GAMMA *63*						
	Be-7	N/A	525 **(6/61)** *(204/1,694)*	SA-FPL-10D1 3.9 MILES SSW	1,694 **(1/10)**	<MDC	0
	K-40	N/A	4,052 **(61/61)** *(1,772/8,761)*	SA-FPL-7S2 0.12 MILES SE	5,862 **(11/11)** *(4,130/8,761)*	2,096 **(2/2)** *(1,557/2,634)*	0
	I-131	60	<MDC	N/A	N/A	<MDC	0
	Cs-134	60	<MDC	N/A	N/A	<MDC	0
	Cs-137	80	<MDC	N/A	N/A	<MDC	0
	Ra-226	N/A	<MDC	N/A	N/A	<MDC	0
	Th-232	N/A	<MDC	N/A	N/A	<MDC	0
VEGETABLES, FPV (pCi/kg wet)	GAMMA *21*						
	Be-7	N/A	<MDC	N/A	N/A	N/A	0
	K-40	N/A	2,425 **(21/21)** *(923/14,270)*	SA-FPV-14F4 8.0 MILES WNW	14,270 **(1/1)**	N/A	0
	I-131	60	<MDC	N/A	N/A	N/A	0
	Cs-134	60	<MDC	N/A	N/A	N/A	0
	Cs-137	80	<MDC	N/A	N/A	N/A	0
	Ra-226	N/A	<MDC	N/A	N/A	N/A	0
	Th-232	N/A	<MDC	N/A	N/A	N/A	0
FODDER CROPS (pCi/kg wet)	GAMMA *4*						
	Be-7	N/A	293 **(1/3)**	SA-VGT-3G1 (C) 17.0 MILES NE	308 **(1/1)**	308 **(1/1)**	0
	K-40	N/A	3,196 **(3/3)** *(2,983/3,478)*	SA-VGT-3G1 (C) 17.0 MILES NE	3,565 **(1/1)**	3,565 **(1/1)**	0
	I-131	60	<MDC	N/A	N/A	<MDC	0

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

SALEM GENERATING STATION
HOPE CREEK GENERATING STATION
SALEM COUNTY, NEW JERSEY

DOCKET NO. 50-272/-311
DOCKET NO. 50-354
REPORTING PERIOD: January 1, 2016 to December 31, 2016

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND *TOTAL NUMBER* OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD*)	ALL INDICATOR LOCATIONS	LOCATION WITH HIGHEST MEAN		CONTROL LOCATION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
			MEAN (f) ** *(RANGE)*	NAME DISTANCE AND DIRECTION	MEAN (f) ** *(RANGE)*	MEAN (f) ** *(RANGE)*	
FODDER CROPS (cont.) (pCi/kg wet)	Cs-134	60	<MDC	N/A	N/A	<MDC	0
	Cs-137	80	<MDC	N/A	N/A	<MDC	0
	Ra-226	N/A	<MDC	N/A	N/A	<MDC	0
	Th-232	N/A	<MDC	N/A	N/A	<MDC	0
SOIL (pCi/kg dry)	GAMMA *9*						
	Be-7	N/A	<MDC	N/A	N/A	N/A	0
	K-40	N/A	10,393 **(9/9)** *(6,844/16,980)*	SA-SOL-13E3 5.0 MILES W	16,980 **(1/1)**	N/A	0
	Cs-134	150	<MDC	N/A	N/A	N/A	0
	Cs-137	180	259 **(2/9)** *(173/344)*	SA-SOL-14F4 8.0 MILES WNW	344 **(1/1)**	N/A	0
	Ra-226	N/A	2,262 **(3/9)** *(1,499/2,750)*	SA-SOL-10D1 3.9 MILES SSW	2,750 **(1/1)**	N/A	0
	Th-232	N/A	644 **(9/9)** *(358/935)*	SA-SOL-10D1 3.9 MILES SSW	935 **(1/1)**	N/A	0
GAME (pCi/kg wet)	GAMMA *2*						
	Be-7	N/A	<MDC	N/A	N/A	N/A	0
	K-40	N/A	2,791 **(2/2)** *(2,727/2,855)*	SA-GAM-13E3 5.0 MILES W	2,855 **(1/1)**	N/A	0
	I-131	60	<MDC	N/A	N/A	N/A	0
	Cs-134	60	<MDC	N/A	N/A	N/A	0
	Cs-137	80	<MDC	N/A	N/A	N/A	0
SURFACE WATER (pCi/L)	H-3 *60*	200	2,070 **(2/48)** *(1,600/2,540)*	SA-SWA-11A1 0.2 MILES SW	2,070 **(2/48)** *(1,600/2,540)*	<MDC	0
	I-131 (LOW LVL) *60*	1	<MDC	N/A	N/A	<MDC	0
	GAMMA *60*						
	K-40	N/A	124 **(17/48)** *(78/168)*	SA-SWA-11A1 0.2 MILES SW	135 **(4/12)** *(85/168)*	129 **(6/12)** *(66/253)*	0

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

SALEM GENERATING STATION
HOPE CREEK GENERATING STATION
SALEM COUNTY, NEW JERSEY

DOCKET NO. 50-272/-311
DOCKET NO. 50-354
REPORTING PERIOD: January 1, 2016 to December 31, 2016

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND *TOTAL NUMBER* OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD*)	ALL INDICATOR LOCATIONS	LOCATION WITH HIGHEST MEAN		CONTROL LOCATION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
			MEAN (f) ** *(RANGE)*	NAME DISTANCE AND DIRECTION	MEAN (f) ** *(RANGE)*	MEAN (f) ** *(RANGE)*	
SURFACE WATER (cont.) (pCi/L)	Mn-54	15	<MDC	N/A	N/A	<MDC	0
	Co-58	15	<MDC	N/A	N/A	<MDC	0
	Fe-59	30	<MDC	N/A	N/A	<MDC	0
	Co-60	15	<MDC	N/A	N/A	<MDC	0
	Zn-65	30	<MDC	N/A	N/A	<MDC	0
	ZrNb-95	15	<MDC	N/A	N/A	<MDC	0
	Cs-134	15	<MDC	N/A	N/A	<MDC	0
	Cs-137	18	<MDC	N/A	N/A	<MDC	0
	BaLa-140	15	<MDC	N/A	N/A	<MDC	0
FISH (pCi/kg wet)	GAMMA *10*						
	K-40	N/A	3,871 **(6/6)** *(3,325/4,668)*	SA-ESF-12C1 (C) 2.5 MILES WSW	4,209 **(4/4)** *(3,531/4,534)*	4,209 **(4/4)** *(3,531/4,534)*	0
	Mn-54	130	<MDC	N/A	N/A	<MDC	0
	Co-58	130	<MDC	N/A	N/A	<MDC	0
	Fe-59	260	<MDC	N/A	N/A	<MDC	0
	Co-60	130	<MDC	N/A	N/A	<MDC	0
	Zn-65	260	<MDC	N/A	N/A	<MDC	0
	Cs-134	130	<MDC	N/A	N/A	<MDC	0
	Cs-137	150	<MDC	N/A	N/A	<MDC	0
	Ra-226	N/A	<MDC	N/A	N/A	<MDC	0
BLUE CRABS (pCi/kg wet)	GAMMA *4*						
	K-40	N/A	3,028 **(2/2)** *(2,832/3,223)*	SA-ECH-11A1 0.2 MILES SW	3,028 **(2/2)** *(2,832/3,223)*	2,721 **(2/2)** *(2,203/3,238)*	0
	Mn-54	130	<MDC	N/A	N/A	<MDC	0

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

SALEM GENERATING STATION **DOCKET NO. 50-272/-311**
HOPE CREEK GENERATING STATION **DOCKET NO. 50-354**
SALEM COUNTY, NEW JERSEY **REPORTING PERIOD: January 1, 2016 to December 31, 2016**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND *TOTAL NUMBER* OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD*)	ALL INDICATOR LOCATIONS	LOCATION WITH HIGHEST MEAN		CONTROL LOCATION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
			MEAN (f) ** *(RANGE)*	NAME DISTANCE AND DIRECTION	MEAN (f) ** *(RANGE)*	MEAN (f) ** *(RANGE)*	
BLUE CRABS (cont.) (pCi/kg wet)	Co-58	130	<MDC	N/A	N/A	<MDC	0
	Fe-59	260	<MDC	N/A	N/A	<MDC	0
	Co-60	130	<MDC	N/A	N/A	<MDC	0
	Zn-65	260	<MDC	N/A	N/A	<MDC	0
	Cs-134	130	<MDC	N/A	N/A	<MDC	0
	Cs-137	150	<MDC	N/A	N/A	<MDC	0
	Ra-226	N/A	<MDC	N/A	N/A	<MDC	0
SEDIMENT (pCi/kg dry)	GAMMA *14*						
	Be-7	N/A	<MDC	N/A	N/A	<MDC	0
	K-40	N/A	8,081 **(12/12)** *(2,365/16,410)*	SA-ESS-12C1 (C) 2.5 MILES WSW	16,215 **(2/2)** *(15,620/16,810)*	16,215 **(2/2)** *(15,620/16,810)*	0
	Cs-134	150	<MDC	N/A	N/A	<MDC	0
	Cs-137	180	<MDC	N/A	N/A	<MDC	0
	Ra-226	N/A	2,120 **(3/12)** *(1,465/3,012)*	SA-ESS-16A1 0.24 MILES NNW	3,012 **(1/2)**	2,513 **(1/2)**	0
	Th-232	N/A	697 **(9/12)** *(227/1,002)*	SA-ESS-12C1 (C) 2.5 MILES WSW	1,134 **(2/2)** *(965/1,303)*	1,134 **(2/2)** *(965/1,303)*	0
OYSTERS (EOY) (pCi/kg wet)	GAMMA *4*						
	K-40	N/A	1,485 **(1/2)** *(1,485/1,568)*	SA-EOY-7H1 19 MILES SE	1,568 **(1/2)**	1,568 **(1/2)**	0
	Mn-54	130	<MDC	N/A	N/A	<MDC	0
	Co-58	130	<MDC	N/A	N/A	<MDC	0
	Fe-59	260	<MDC	N/A	N/A	<MDC	0
	Co-60	130	<MDC	N/A	N/A	<MDC	0
	Zn-65	260	<MDC	N/A	N/A	<MDC	0

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

SALEM GENERATING STATION
HOPE CREEK GENERATING STATION
SALEM COUNTY, NEW JERSEY

DOCKET NO. 50-272/-311
DOCKET NO. 50-354
REPORTING PERIOD: January 1, 2016 to December 31, 2016

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS AND *TOTAL NUMBER* OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD*)	ALL INDICATOR LOCATIONS	LOCATION WITH HIGHEST MEAN		CONTROL LOCATION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
			MEAN (f) ** *(RANGE)*	NAME DISTANCE AND DIRECTION	MEAN (f) ** *(RANGE)*	MEAN (f) ** *(RANGE)*	
OYSTERS (EOY) (cont.) (pCi/kg wet)	Cs-134	130	<MDC	N/A	N/A	<MDC	0
	Cs-137	150	<MDC	N/A	N/A	<MDC	0

* The LLD listed is the Lower Limit of Detection, which was requested by PSEG to be achieved.
** Mean was calculated using values above the MDC only. f = the fraction of measurements above the MDC.
(C) = Control Location
N/A = Not Applicable

APPENDIX B

SAMPLE DESIGNATION

AND

LOCATIONS

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TABLE B-1

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	Fifty-eight routine monitoring locations with two or more dosimeters placed as follows:	Quarterly	Gamma dose / quarterly
a. Dosimeters (IDM)	An inner ring of locations, one in each land based meteorological sector in the general area of the SITE BOUNDARY.		
	An outer ring of locations, one in each land based meteorological sector in the 5 to 11 km (3.1 - 6.8 miles) range from the site ; and		
	The balance of the locations placed in areas of special interest such as population centers, nearby residences, and schools and in six areas beyond 10 miles to serve as control locations.		

TABLE B-1 (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			
a. Air Particulate (APT)	3 samples from close to the Site Boundary: 5S1, 7S2, 15S2. One duplicate sample from 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 (AIO)	1 Sample from the vicinity of a community having a highest annual average ground level D/Q: 16E1. 1 Sample from a control location; for example 15 - 30 km distant (9.3 - 18.6 miles) and in the least prevalent wind direction: 14G1.		Iodine-131 / weekly
3. TERRESTRIAL			
a. Milk (MLK)	Samples from milking animals in 3 locations within 5 km distance (3.1 miles) having the highest dose potential. If there are none, then 1 sample from milking animals in each of 3 areas between 5 - 8 km distant (3.1 - 5.0 miles) where doses are calculated to be greater than 1 mrem per yr: 13E3, 14F4, 2G3(1). 1 Sample from milking animals at a control location 15 - 30 km distant (9.3 - 18.6 miles): 3G1.	Semi-monthly (when animals are on pasture) Monthly (when animals are not on pasture)	Gamma scan / semi-monthly Iodine-131 / semi-monthly Gamma scan / monthly Iodine-131 / monthly

TABLE B-1 (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
b. Well Water (Ground) (WWA)	Although wells in the vicinity of SGS/HCGS are not directly affected by plant operations so sampling is not required by SGS/HCGS ODCM, samples of 3E1 farm's well are collected as management audit samples.	Monthly	Gamma scan / monthly Gross alpha / monthly Gross beta / monthly Tritium / monthly
c. Potable Water (Drinking Water) (PWR, PWT)	Although no potable water samples are required as liquid effluents discharged from SGS/HCGS do not directly affect this pathway and it is not required by SGS/HCGS ODCM, one raw and one treated water sample from a public water supply (City of Salem Water and Sewer Department) are collected: 2F3 as management audit samples.	Monthly (composited weekly)	Gross alpha / monthly Gross beta / monthly Tritium / monthly Gamma scan / monthly Iodine-131 / monthly
d. Vegetables (FPL, FPV)	Although the Delaware River at the location of SGS/HCGS is a brackish water source and is not used for irrigation of food products and so sampling is not required by SGS/HCGS ODCM, samples of vegetables are collected as management audit samples from various locations during harvest. In addition, broad leaf vegetation is collected from various offsite locations as well as being planted & collected onsite (1S1, 7S2, 15S2, 16S1). This is in lieu of having a milk farm within 5 km (3.1 miles) of the Site(1).	Monthly (during growing season)	Gamma scan / on collection

TABLE B-1 (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
e. Fodder Crops (VGT)	Although not required by SGS/HCGS ODCM, samples of crops normally used as cattle feed (silage) were collected from milk farms as management audit samples: 14F4, 3G1, 2G3, 13E3.	Annually (at harvest)	Gamma scan / on collection
f. Soil (SOL)	Although not required by SGS/HCGS ODCM, samples of soil are collected as management audit samples.	Every 3 years (2010-2013-2016)	Gamma scan / on collection
4. AQUATIC ENVIRONMENT			
a. Surface Water (SWA)	One sample upstream: 1F2. One sample downstream: 7E1. One sample outfall: 11A1. One sample cross-stream (mouth of Appoquinimink River): 12C1(2). And an additional location in the Chesapeake & Delaware Canal: 16F1.	Semi-Monthly	Gamma scan / monthly Tritium / monthly**
b. Edible Fish (ESF)	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

TABLE B-1 (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. Blue Crabs (ECH)	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
d. Sediment (ESS)	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

TABLE B-1 (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
e. Oysters[3] (EOY)	One sample near plant discharge area (Hope Creek Oyster Bed Area, approximately 2 miles SE of Site) as a management audit sample (7C1) One sample in area not influenced by plant discharge (Bennies Oyster Beds Area, approximately 19 miles SE of Site) as a management audit sample (7H1)	Twice per year, once near start and once near end of NJ harvest season	Gamma scan (flesh and liquids) / on collection

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

** Technical Specifications and ODCM require quarterly analysis but it was decided to analyze surface waters on a monthly basis for tritium as a program enhancement.

(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, gardens were planted and harvested at four locations on Site (1S1, 7S2, 15S2, 16S1) and one in Delaware (10D1).

(2) Location 12C1 was made the operational control (1975) for aquatic samples since the physical characteristics of this location 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 tidal flow.

(3) Oysters were added to the REMP as a management audit sample in 2015. The oysters from the indicator location (7C1) are impacted by bacteria and are considered too small to be sold to the public. The oyster sample locations are not listed in the ODCM.

TABLE B-2

SAMPLING LOCATIONS

Specific information about the individual sampling locations are given in Table B-1. Maps B-1, B-2, and B-3 show the locations of sampling locations with respect to the Site. A Portable Global Positioning System (GPS) was used to provide the coordinates of sampling locations.

All sample types are not required to be collected at all possible sites every year.

LOCATION CODE	STATION LOCATION	LATITUDINAL DEG. MIN.	LONGITUDINAL DEG. MIN.	MEDIA SAMPLED
1S1	0.55 mi. N side of road near ISFSI pad.	39 – 28.260	75 – 32.222	IDM, FPL
2S2	0.40 mi. NNE; lamp pole 65 near HC switch yard	39 – 28.98	75 – 32.10	IDM
2S4	0.60 mi. NNE; in the equipment laydown area	39 – 28.110	75 – 31.992	IDM
3S1	0.58 mi. NE; behind refrigeration building	39 – 28.140	75 – 31.678	IDM
4S1	0.60 mi. ENE; site access road near intersection to TB-02	39 – 28.023	75 – 31.544	IDM
5S1	0.86 mi. E; site access road	39 – 27.668	75 – 31.187	IDM, AIO, APT
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, ESS
7S1	0.14 mi. SE; station personnel gate	39 – 27.701	75 – 32.05	IDM
7S2	0.12 mi. SE; station personnel gate	39 – 27.720	75 – 32.15	AIO, APT, FPL, SOL
8S1	0.12 mi. SSE; fuel oil storage	39 – 27.676	75 – 32.055	IDM
9S1	0.12 mi. S; fuel oil storage	39 – 27.636	75 – 32.091	IDM
10S1	0.14 mi. SSW; circulating water building	39 – 27.700	75 – 32.160	IDM
11S1	0.09 mi. SW; circulating water building	39 – 27.719	75 – 32.225	IDM
12S1	0.09 mi. WSW; outside security fence	39 – 27.756	75 – 32.236	IDM
13S1	0.09 mi. W; outside security fence	39 – 27.801	75 – 32.267	IDM
14S1	0.10 mi. NNW; outside security fence	39 – 27.893	75 – 32.280	IDM
15S1	0.57 mi. NW; near river and HCGS barge slip	39 – 28.161	75 – 32.525	IDM
15S2	0.59 mi. NW; near river and HCGS barge slip	39 – 28.12	75 – 32.32	IDM, AIO, APT, FPL
16S1	0.57 mi. NNW; on road near fuel oil storage tank	39 – 28.215	75 – 32.432	IDM, FPL
16S2	0.60 mi. NNW; near security firing range	39 – 28.16	75 – 32.17	IDM
16S3	1.0 mi. NNW; consolidated spoils facility	39 – 28.350	75 – 32.550	IDM
11A1	0.20 mi. SW; SGS outfall area	39 – 27.59	75 – 32.25	ESS, SWA, ECH, ESF
11A1A	0.15 mi. SE; Located in the plant barge slip area	39 – 27.41	75 – 32.02	Alternate SWA

TABLE B-2 (cont'd)
SAMPLING LOCATIONS

All sample types are not required to be collected at all possible sites every year.

LOCATION CODE	STATION LOCATION	LATITUDINAL DEG. MIN.	LONGITUDINAL DEG. MIN.	MEDIA SAMPLED
15A1	0.65 mi. NW; HCGS outfall area	39 – 27.67	75 – 32.19	ESS
16A1	0.24 mi. NNW; South Storm Drain outfall	39 – 28.24	75 – 32.58	ESS
12C1	2.5 mi. WSW; West bank of Delaware River	39 – 27.22	75 – 34.08	ESS, SWA, ECH, ESF
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 along SGS/HCGS access road.	39 – 28.396	75 – 28.334	IDM, AIO, APT
10D1	3.9 mi. SSW; Taylor's Bridge Spur, DE	39 – 24.613	75 – 33.733	IDM, FPL, SOL
14D1	3.4 mi. WNW; Bay View, DE	39 – 29.26	75 – 35.521	IDM
15D1	3.8 mi NW; Route 9, Augustine Beach, DE	39 – 30.125	75 – 35.28	IDM
2E1	4.4 mi. NNE; local farm, NJ	39 – 31.380	75 – 30.428	IDM
3E1	4.2 mi. NE; local farm, NJ	39 – 30.098	75 – 28.646	IDM, WWA, GAM
7E1	4.5 mi. SE; River Bank 1.0 mi. W of Mad Horse Creek	39 – 25.08	75 – 28.64	ESS, SWA, ESF
7E1A	8.9 mi. SE; Located at the end of Bayside Road, NJ	39 – 22.57	75 – 24.24	Alternate SWA
11E2	5.0 mi. SW; Route 9, DE	39 – 24.328	75 – 35.546	IDM
12E1	4.4 mi. WSW; Thomas Landing, DE	39 – 26.862	75 – 36.968	IDM
13E1	4.2 mi. W; Diehl House Lab, DE	39 – 27.989	75 – 36.735	IDM
13E3	5.0 mi. W; local farm, DE	39 – 27.17	75 – 37.30	MLK, VGT, SOL, GAM
16E1	4.1 mi. NNW; Port Penn, DE	39 – 30.762	75 – 34.580	IDM, AIO, APT, SOL
1F1	5.8 mi. N; Fort Elfsborg, NJ	39 – 32.693	75 – 31.124	IDM, AIO, APT
1F2	7.1 mi. N; midpoint of Delaware River	39 – 33.08	75 – 32.54	SWA
2F2	8.5 mi. NNE; Salem Substation, Salem NJ	39 – 34.522	75 – 28.120	IDM
2F3	8.0 mi. NNE; City of Salem Water and Sewage Department, NJ	39 – 33.40	75 – 27.18	PWR, PWT
2F5	7.4 mi. NNE; Salem High School, Salem, NJ	39 – 33.448	75 – 28.514	IDM
2F6	7.3 mi. NNE; PSE&G Training Center, Salem NJ	39 – 33.713	75 – 28.819	IDM, AIO, APT
2F9	7.5 mi. NNE; Local Farm , Tilbury Rd, Salem, NJ	39 – 33.55	75 – 29.30	FPV, SOL

TABLE B-2 (cont'd)
SAMPLING LOCATIONS

All sample types are not required to be collected at all possible sites every year.

LOCATION CODE	STATION LOCATION	LATITUDINAL DEG. MIN.	LONGITUDINAL DEG. MIN.	MEDIA SAMPLED
3F2	5.1 mi. NE; Hancocks Bridge, NJ Munc Bldg	39 – 30.410	75 – 27.578	IDM
3F3	8.6 mi. NE; Quinton Township Elem. School NJ	39 – 32.616	75 – 24.735	IDM
3F8	9.3 mi. NE; Circle M Orchard, NJ	39 – 33.987	75 – 25.468	FPV
4F2	6.0 mi. ENE; Mays Lane, Harmersville, NJ	39 – 29.953	75 – 26.076	IDM
5F1	6.5 mi. E; Canton, NJ	39 – 28.360	75 – 25.031	IDM,SOL
6F1	6.4 mi. ESE; Stow Neck Road, NJ	39 – 26.396	75 – 25.148	IDM
7F2	9.1 mi. SE; Bayside, NJ	39 – 22.971	75 – 24.261	IDM
8F1	9.7 mi. SE; Woodland Beach, DE	39 – 19.933	75 – 28.463	IDM
9F1	5.3 mi. S; off Route #9, DE	39 – 23.042	75 – 32.95	IDM
10F2	5.8 mi. SSW; Route #9, DE	39 – 23.034	75 – 34.152	IDM
11F1	6.2 mi. SW; Taylor's Bridge, DE	39 – 24.766	75 – 37.632	IDM
12F1	9.4 mi. WSW; Townsend Elementary School, DE	39 – 23.778	75 – 41.311	IDM
13F2	6.5 mi W; Odessa, DE	39 – 27.297	75 – 39.372	IDM
13F3	9.3 mi. W; Redding Middle School, Middletown, DE	39 – 27.215	75 – 42.543	IDM
13F4	9.8 mi. W; Middletown, DE	39 – 26.857	75 – 43.111	IDM
14F2	6.7 mi. WNW; Route 13 and Boyds Corner Rd, DE	39 – 29.979	75 – 39.042	IDM
14F4	8.0 mi. WNW; local farm, DE	39 – 30.44	75 – 40.52	MLK, VGT, SOL, FPV
15F3	5.4 mi. NW, Port Penn Rd. at Pole Bridge Rd., DE	39 – 30.987	75 – 36.586	IDM
15F4	7.0 mi. NW; local farm; Port Penn Road; DE	39 – 31.21	75 – 38.31	FPV
16F1	6.9 mi. NNW; C&D Canal, DE	39 – 33.55	75 – 34.25	ESS, SWA
16F1A	6.8 mi. NNW; Located at the C&D Canal Tip, DE	39 – 33.34	75 – 33.56	Alternate SWA

TABLE B-2 (cont'd)
SAMPLING LOCATIONS

All sample types are not required to be collected at all possible sites every year.

LOCATION CODE	STATION LOCATION	LATITUDINAL DEG. MIN.	LONGITUDINAL DEG. MIN.	MEDIA SAMPLED
16F2	8.1 mi. NNW; Delaware City Public School, DE	39 – 34.314	75 – 35.429	IDM
1G1	10.9 mi. NNE; Route 49, South Broadway, NJ	39 – 37.113	75 – 30.178	FPV, FPL
1G3	19 mi. N; N. Church Street Wilmington, DE	39 – 44.287	75 – 32.512	IDM
2G2	13.5 mi. NNE; Local Farm; Pointers Auburn Road (Route 540), Salem, NJ	39 – 38.19	75 – 26.10	FPV
2G3	11.8 mi. NNE; Local Milk Farm, NJ	39 – 36.21	75 – 24.53	MLK, VGT, SOL
3G1	17 mi. NE; local farm, NJ	39 – 35.913	75 – 16.804	IDM, MLK, VGT, SOL
10G1	12 mi. SSW; Smyrna, DE	39 – 18.223	75 – 36.095	IDM
14G1	11.8 mi. WNW; Route 286, Bethel Church Road, DE	39 – 31.290	75 – 46.495	AIO,APT,IDM
16G1	15 mi. NNW; Wilmington Airport, DE	39 – 40.637	75 – 35.570	IDM
3H1	32 mi. NE; National Park, NJ	39 – 51.599	75 – 11.96	IDM
3H5	25 mi. NE; Farm Market, Route 77, NJ	39 – 41.040	75 – 12.380	FPV, FPL
7C1*	2 mi SE; Hope Creek Bed, near mouth of Hope Creek	39 – 26.611	75 – 30.328	EOY
7H1*	19 mi SE; Bennies Oyster Bed, near Nantuxent Cove	39 – 15.500	75 – 17.500	EOY

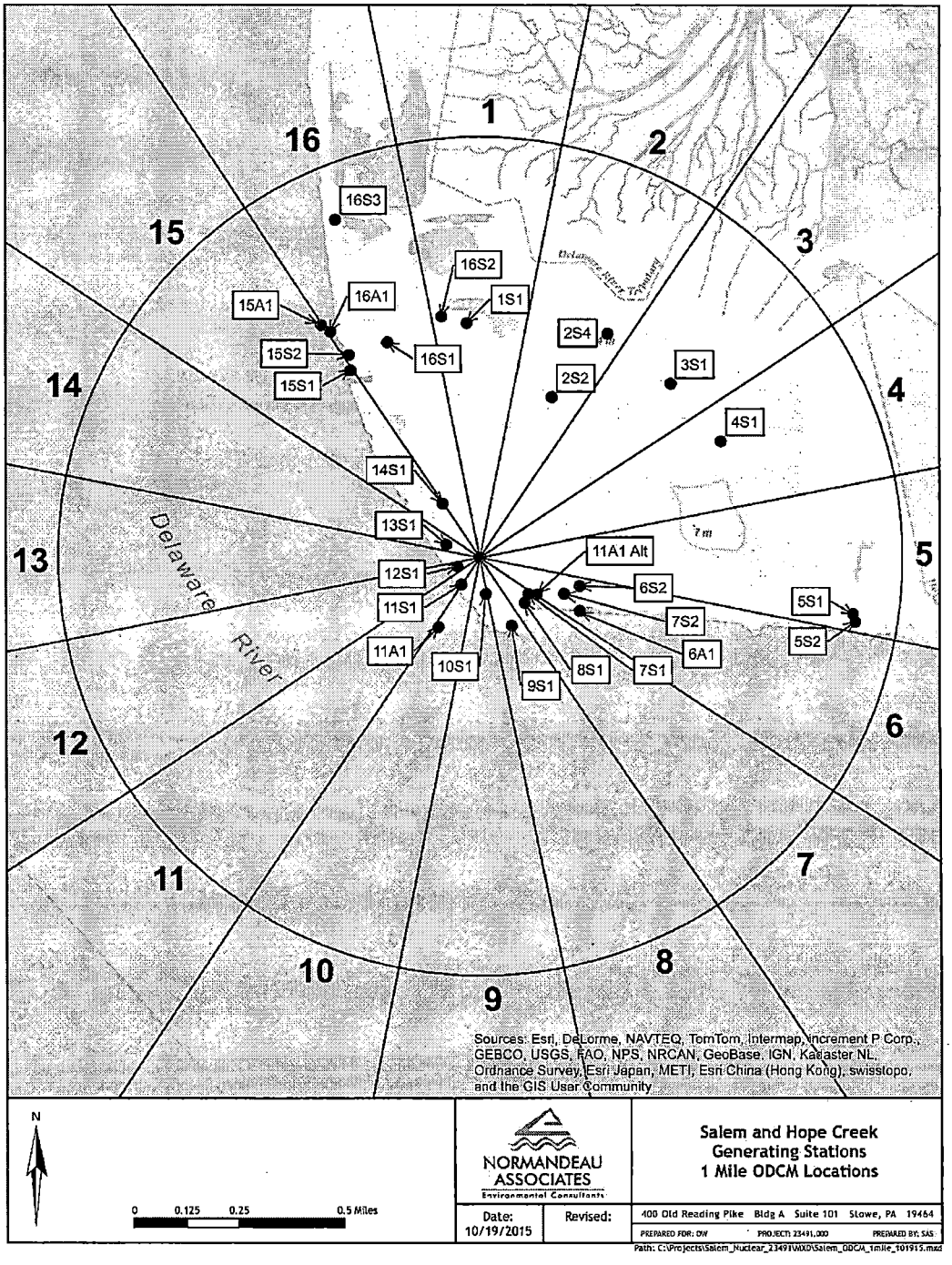
NOTE: All locations are referenced to the midpoint of the two SGS Units' Containments. The coordinates of this location are: Latitude N 39° - 27' - 46.5" and Longitude W 75° - 32' - 10.6".

Vegetable samples are not always collected in consecutive years from the same farmer due to crop rotation.

* Oysters were added as a management audit sample in 2015. The oysters from the indicator location (7C1) are impacted by bacteria and are considered too small to be sold to the public. The oyster sample locations are not listed in the ODCM.

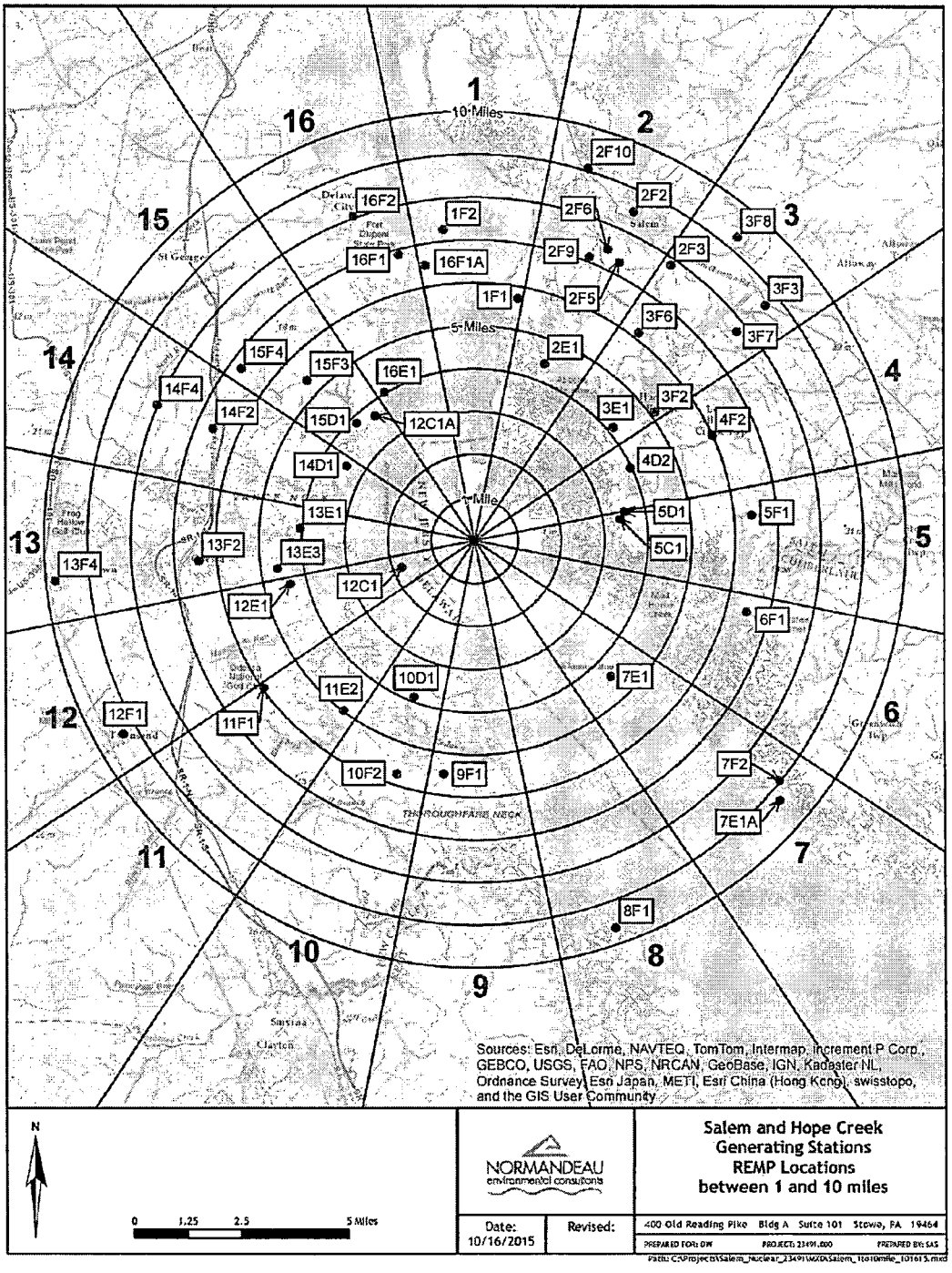
MAP B-1

SALEM AND HOPE CREEK GENERATING STATIONS' RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ON-SITE SAMPLING LOCATIONS OUT TO 1 MILE



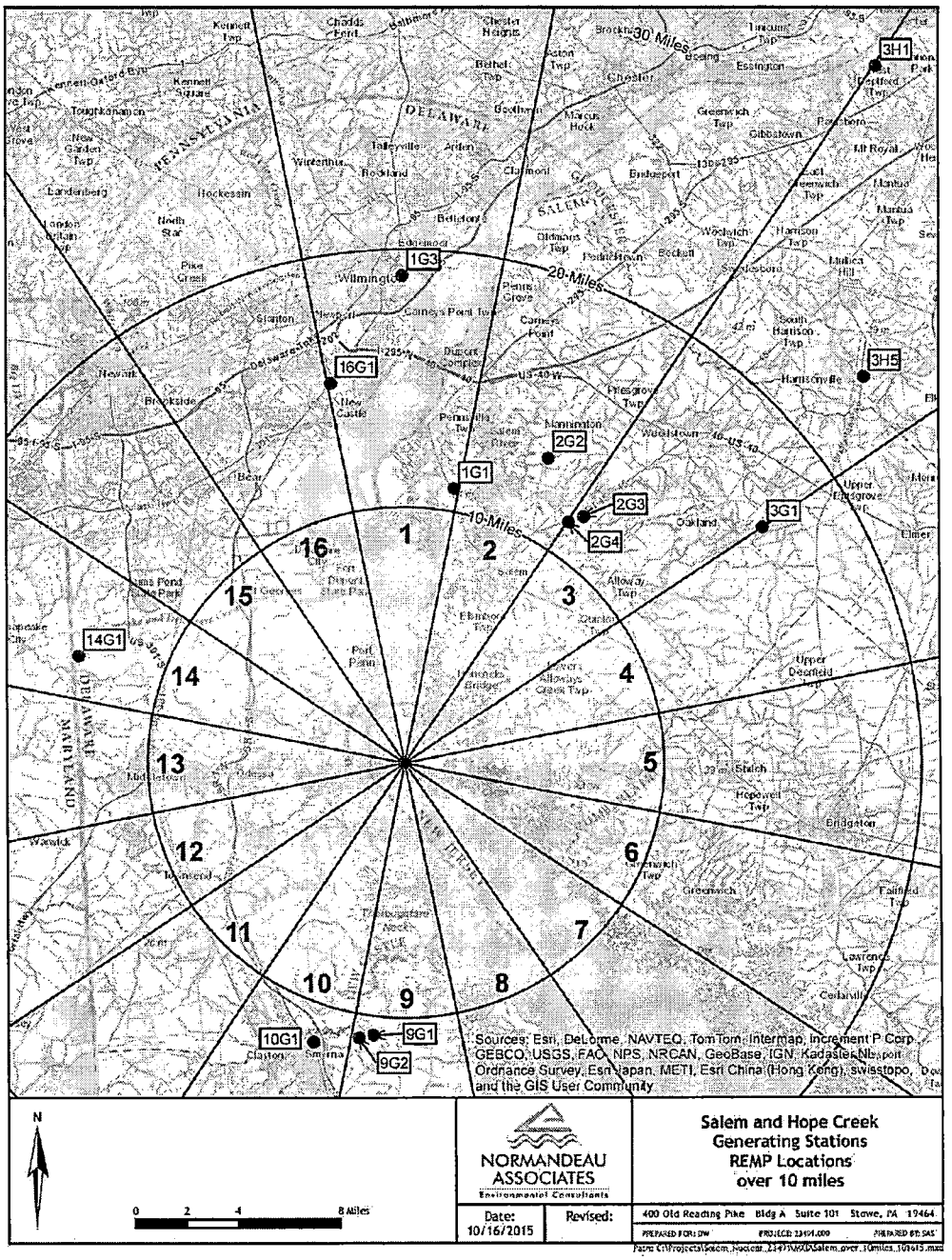
MAP B-2

SALEM AND HOPE CREEK GENERATING STATIONS' RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM OFF-SITE SAMPLING LOCATIONS 1 TO 10 MILES



MAP B-3

SALEM AND HOPE CREEK GENERATING STATIONS' RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM OFF-SITE SAMPLING LOCATIONS GREATER THAN 10 MILES



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APPENDIX C

DATA TABLES AND FIGURES

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TABLE C-1 CONCENTRATIONS OF GAMMA EMMITTERS IN QUARTERLY COMPOSITES OF AIR PARTICULATES, 2016

Results in Units of 1E-3 pCi/m^3 ± 2 Sigma

	COLLECTION PERIOD		<----------GAMMA EMITTERS---------->			
STATION ID	START	STOP	Be-7	K-40	Cs-134	Cs-137
SA-APT-14G1 (C)	12/28/15	03/28/16	124 ± 35	< 27	< 1	< 1
	03/28/16	06/27/16	168 ± 38	< 16	< 1	< 1
	06/27/16	10/03/16	104 ± 24	< 16	< 2	< 2
	10/03/16	01/03/17	106 ± 26	< 30	< 2	< 2
		AVERAGE*	125 ± 60	-	-	-
SA-APT-5S1	12/28/15	03/28/16	91 ± 29	< 19	< 2	< 1
	03/28/16	06/27/16	177 ± 46	< 18	< 2	< 1
	06/27/16	10/03/16	106 ± 40	< 43	< 3	< 2
	10/03/16	01/03/17	94 ± 21	< 14	< 2	< 1
		AVERAGE*	117 ± 81	-	-	-
SA-APT-7S2	12/28/15	03/28/16	89 ± 29	< 38	< 2	< 1
	03/28/16	06/27/16	170 ± 40	< 33	< 2	< 2
	06/27/16	10/03/16	103 ± 23	< 30	< 2	< 1
	10/03/16	01/03/17	117 ± 26	< 31	< 2	< 2
		AVERAGE*	120 ± 71	-	-	-
SA-APT-15S2	12/28/15	03/28/16	85 ± 26	< 19	< 2	< 1
	03/28/16	06/27/16	143 ± 54	< 45	< 2	< 2
	06/27/16	10/03/16	131 ± 27	< 24	< 2	< 1
	10/03/16	01/03/17	110 ± 21	< 30	< 2	< 2
		AVERAGE*	117 ± 51	-	-	-
SA-APT-5D1	12/28/15	03/28/16	91 ± 26	< 30	< 1	< 2
	03/28/16	06/27/16	147 ± 30	< 16	< 1	< 1
	06/27/16	10/03/16	106 ± 21	< 33	< 2	< 2
	10/03/16	01/03/17	116 ± 24	< 23	< 2	< 2
		AVERAGE*	115 ± 47	-	-	-
SA-APT-16E1	12/28/15	03/28/16	89 ± 20	< 16	< 1	< 1
	03/28/16	06/27/16	186 ± 40	< 12	< 2	< 1
	06/27/16	10/03/16	113 ± 36	< 33	< 3	< 2
	10/03/16	01/03/17	89 ± 39	< 39	< 2	< 2
		AVERAGE*	119 ± 91	-	-	-
SA-APT-1F1	12/28/15	03/28/16	118 ± 36	< 36	< 3	< 2
	03/28/16	06/27/16	139 ± 33	< 18	< 2	< 2
	06/27/16	10/03/16	125 ± 25	< 20	< 2	< 1
	10/03/16	01/03/17	92 ± 21	< 20	< 1	< 1
		AVERAGE*	118 ± 39	-	-	-
SA-APT-2F6	12/28/15	03/28/16	103 ± 29	< 20	< 1	< 1
	03/28/16	06/27/16	163 ± 36	< 26	< 1	< 1
	06/27/16	10/03/16	97 ± 23	< 33	< 2	< 2
	10/03/16	01/03/17	117 ± 31	< 25	< 2	< 1
		AVERAGE*	120 ± 60	-	-	-
	ALL INDICATOR AVERAGE*		118 ± 58	-	-	-

(C) CONTROL LOCATION.

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

- INDICATES AVERAGE WAS NOT CALCULATED DUE TO NO POSITIVE VALUES FOR THE REPORTING PERIOD.

TABLE C-2 CONCENTRATIONS OF GROSS BETA EMITTERS IN AIR PARTICULATES, 2016

Results in Units of 1E-3 pCi/m^3 ± 2 Sigma

COLLECTION PERIOD		CONTROL	INDICATORS				
START	STOP	SA-APT-14G1	SA-APT-5S1	SA-APT-7S2	SA-APT-15S2	SA-APT-5D1	SA-APT-16E1
12/28/15	01/04/16	10 ± 3	9 ± 3	9 ± 3	11 ± 3	9 ± 3	9 ± 3
01/04/16	01/11/16	11 ± 3	10 ± 3	8 ± 3	11 ± 3	10 ± 3	10 ± 3
01/11/16	01/18/16	15 ± 3	17 ± 3	19 ± 3	14 ± 3	18 ± 3	17 ± 3
01/18/16	01/26/16	11 ± 2	13 ± 3	11 ± 2	10 ± 2	11 ± 2	11 ± 3
01/26/16	02/03/16	13 ± 3	16 ± 4	13 ± 3	14 ± 3	14 ± 3	14 ± 3
02/03/16	02/08/16	13 ± 4	8 ± 4	7 ± 4	13 ± 4	9 ± 4	10 ± 4
02/08/16	02/16/16	5 ± 2	11 ± 3	10 ± 2	10 ± 2	11 ± 2	8 ± 2
02/16/16	02/22/16	13 ± 3	10 ± 3	10 ± 3	9 ± 3	10 ± 3	10 ± 3
02/22/16	02/29/16	12 ± 3	12 ± 3	7 ± 3	9 ± 3	9 ± 3	10 ± 3
02/29/16	03/07/16	13 ± 3	12 ± 3	11 ± 3	10 ± 3	9 ± 3	13 ± 3
03/07/16	03/14/16	5 ± 3	17 ± 3	16 ± 3	14 ± 3	13 ± 3	13 ± 3
03/14/16	03/22/16	10 ± 3	6 ± 3	6 ± 3	6 ± 2	7 ± 3	9 ± 3
03/22/16	03/28/16	11 ± 3	10 ± 3	9 ± 3	10 ± 3	10 ± 3	9 ± 3
03/28/16	04/04/16	14 ± 3	12 ± 3	12 ± 3	11 ± 3	12 ± 3	12 ± 3
04/04/16	04/11/16	13 ± 3	11 ± 3	13 ± 3	13 ± 3	10 ± 3	13 ± 3
04/11/16	04/18/16	12 ± 3	11 ± 3	11 ± 3	13 ± 3	11 ± 3	12 ± 3
04/18/16	04/25/16	14 ± 3	13 ± 3	15 ± 3	13 ± 3	12 ± 3	15 ± 3
04/25/16	05/02/16	15 ± 3	10 ± 3	11 ± 3	12 ± 3	12 ± 3	14 ± 3
05/02/16	05/09/16	< 4	< 4	< 4	< 4	< 4	5 ± 3
05/09/16	05/16/16	17 ± 3	14 ± 3	15 ± 3	18 ± 4	14 ± 3	20 ± 4
05/16/16	05/23/16	13 ± 3	12 ± 3	12 ± 3	14 ± 3	7 ± 3	12 ± 3
05/23/16	05/31/16	15 ± 3	16 ± 3	14 ± 3	14 ± 3	14 ± 3	10 ± 3
05/31/16	06/07/16	12 ± 3	10 ± 2	10 ± 3	12 ± 3	11 ± 3	12 ± 3
06/06/16	06/13/16	14 ± 3	15 ± 4	13 ± 3	14 ± 3	12 ± 4	13 ± 3
06/13/16	06/20/16	12 ± 3	10 ± 2	9 ± 2	12 ± 3	9 ± 2	9 ± 3
06/20/16	06/27/16	15 ± 3	17 ± 3	16 ± 3	15 ± 3	18 ± 3	13 ± 3
06/27/16	07/05/16	9 ± 2	11 ± 3	7 ± 2	10 ± 2	8 ± 2	11 ± 2
07/05/16	07/13/16	15 ± 3	12 ± 3	11 ± 2	11 ± 2	11 ± 2	11 ± 3
07/13/16	07/18/16	19 ± 5	14 ± 4	16 ± 4	15 ± 4	17 ± 5	16 ± 4
07/18/16	07/25/16	19 ± 4	14 ± 3	19 ± 3	17 ± 3	17 ± 4	18 ± 4
07/25/16	08/01/16	16 ± 3	9 ± 3	12 ± 3	12 ± 3	16 ± 3	15 ± 3
08/01/16	08/05/16	13 ± 4	11 ± 4	10 ± 4	13 ± 4	10 ± 4	13 ± 4
08/05/16	08/10/16	15 ± 4	12 ± 4	12 ± 4	12 ± 4	13 ± 4	13 ± 4
08/10/16	08/18/16	11 ± 3	8 ± 3	10 ± 2	8 ± 2	6 ± 2	11 ± 3
08/18/16	08/24/16	13 ± 4	13 ± 3	16 ± 4	13 ± 4	10 ± 3	16 ± 4
08/24/16	08/29/16	17 ± 4	17 ± 4	15 ± 4	14 ± 4	13 ± 4	13 ± 4
08/29/16	09/06/16	13 ± 3	13 ± 3	12 ± 3	13 ± 3	11 ± 3	12 ± 3
09/06/16	09/12/16	23 ± 4	21 ± 4	20 ± 4	17 ± 4	17 ± 4	18 ± 4
09/12/16	09/19/16	13 ± 3	14 ± 3	11 ± 3	12 ± 3	11 ± 3	11 ± 3
09/19/16	09/26/16	12 ± 3	12 ± 3	9 ± 3	12 ± 3	13 ± 3	13 ± 3
09/26/16	10/03/16	< 4	5 ± 3	4 ± 3	6 ± 3	7 ± 3	6 ± 3
10/03/16	10/11/16	13 ± 3	12 ± 3	13 ± 3	12 ± 3	12 ± 3	14 ± 3
10/11/16	10/17/16	9 ± 3	6 ± 3	9 ± 3	10 ± 3	8 ± 3	11 ± 3
10/17/16	10/24/16	13 ± 3	15 ± 3	15 ± 3	16 ± 3	13 ± 3	15 ± 3
10/24/16	10/31/16	16 ± 3	14 ± 3	17 ± 3	13 ± 3	13 ± 3	12 ± 3
10/31/16	11/07/16	19 ± 3	16 ± 3	19 ± 3	14 ± 3	19 ± 3	16 ± 3
11/07/16	11/15/16	15 ± 3	15 ± 3	14 ± 3	13 ± 3	13 ± 3	15 ± 3
11/15/16	11/21/16	18 ± 4	22 ± 4	21 ± 4	23 ± 4	22 ± 4	22 ± 4
11/21/16	11/28/16	20 ± 4	14 ± 3	13 ± 3	16 ± 3	16 ± 3	14 ± 3
11/28/16	12/05/16	15 ± 3	17 ± 3	14 ± 3	17 ± 3	15 ± 3	18 ± 3
12/05/16	12/12/16	9 ± 3	11 ± 3	10 ± 3	10 ± 3	16 ± 3	11 ± 3
12/12/16	12/19/16	13 ± 3	13 ± 3	20 ± 4	16 ± 3	10 ± 3	14 ± 3
12/19/16	12/27/16	18 ± 3	18 ± 3	21 ± 3	18 ± 3	18 ± 3	19 ± 3
12/27/16	01/03/17	11 ± 3	9 ± 3	13 ± 3	11 ± 3	8 ± 3	9 ± 3
	AVERAGE*	14 ± 7	13 ± 7	13 ± 8	13 ± 6	12 ± 7	13 ± 7

TABLE C-2 CONCENTRATIONS OF GROSS BETA EMITTERS IN AIR PARTICULATES, 2016

Results in Units of 1E-3 pCi/m^3 ± 2 Sigma

COLLECTION PERIOD		INDICATORS	
START	STOP	SA-APT-1F1	SA-APT-2F6
12/28/15	01/04/16	8 ± 3	10 ± 3
01/04/16	01/11/16	6 ± 3	8 ± 2
01/11/16	01/18/16	22 ± 4	16 ± 3
01/18/16	01/26/16	10 ± 2	9 ± 2
01/26/16	02/03/16	13 ± 3	14 ± 3
02/03/16	02/08/16	9 ± 4	12 ± 4
02/08/16	02/16/16	10 ± 2	10 ± 2
02/16/16	02/22/16	8 ± 3	12 ± 3
02/22/16	02/29/16	9 ± 3	8 ± 3
02/29/16	03/07/16	8 ± 3	11 ± 3
03/07/16	03/14/16	11 ± 3	15 ± 3
03/14/16	03/22/16	8 ± 3	9 ± 3
03/22/16	03/28/16	10 ± 3	8 ± 3
03/28/16	04/04/16	11 ± 3	12 ± 3
04/04/16	04/11/16	11 ± 3	12 ± 3
04/11/16	04/18/16	11 ± 3	9 ± 3
04/18/16	04/25/16	16 ± 3	14 ± 3
04/25/16	05/02/16	11 ± 3	10 ± 3
05/02/16	05/09/16	4 ± 3	< 4
05/09/16	05/16/16	12 ± 3	21 ± 4
05/16/16	05/23/16	11 ± 3	11 ± 3
05/23/16	05/31/16	15 ± 3	16 ± 3
05/31/16	06/07/16	12 ± 3	10 ± 3
06/06/16	06/13/16	15 ± 4	13 ± 3
06/13/16	06/20/16	8 ± 2	11 ± 3
06/20/16	06/27/16	14 ± 3	15 ± 3
06/27/16	07/05/16	10 ± 2	10 ± 2
07/05/16	07/13/16	12 ± 3	10 ± 2
07/13/16	07/18/16	19 ± 5	17 ± 5
07/18/16	07/25/16	18 ± 4	17 ± 4
07/25/16	08/01/16	13 ± 3	15 ± 3
08/01/16	08/05/16	12 ± 4	9 ± 4
08/05/16	08/10/16	13 ± 4	10 ± 4
08/10/16	08/18/16	10 ± 3	8 ± 3
08/18/16	08/24/16	14 ± 4	13 ± 4
08/24/16	08/29/16	13 ± 4	16 ± 4
08/29/16	09/06/16	10 ± 2	14 ± 3
09/06/16	09/12/16	19 ± 4	17 ± 3
09/12/16	09/19/16	9 ± 3	14 ± 3
09/19/16	09/26/16	12 ± 3	10 ± 3
09/26/16	10/03/16	4 ± 3	6 ± 3
10/03/16	10/11/16	12 ± 3	11 ± 3
10/11/16	10/17/16	10 ± 3	10 ± 3
10/17/16	10/24/16	13 ± 3	15 ± 3
10/24/16	10/31/16	16 ± 3	15 ± 3
10/31/16	11/07/16	14 ± 3	14 ± 3
11/07/16	11/15/16	14 ± 3	13 ± 3
11/15/16	11/21/16	21 ± 4	26 ± 4
11/21/16	11/28/16	14 ± 3	14 ± 3
11/28/16	12/05/16	12 ± 3	15 ± 3
12/05/16	12/12/16	12 ± 3	9 ± 3
12/12/16	12/19/16	12 ± 3	12 ± 3
12/19/16	12/27/16	19 ± 3	20 ± 3
12/27/16	01/03/17	9 ± 3	10 ± 3
	AVERAGE*	12 ± 8	12 ± 7
ALL INDICATOR AVERAGE*		12 ± 7	

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

TABLE C-3 CONCENTRATIONS OF IODINE-131 IN FILTERED AIR, 2016

Results in Units of 1E-3 pCi/m^3 ± 2 Sigma

COLLECTION PERIOD		CONTROL	INDICATORS				
START	STOP	SA-AIO-14G1	SA-AIO-5S1	SA-AIO-7S2	SA-AIO-15S2	SA-AIO-5D1	SA-AIO-16E1
12/28/15 -	01/04/16	< 56	< 42	< 59	< 54	< 39	< 59
01/04/16 -	01/11/16	< 41	< 35	< 43	< 14	< 42	< 44
01/11/16 -	01/18/16	< 35	< 32	< 36	< 14	< 31	< 38
01/18/16 -	01/26/16	< 8	< 41	< 22	< 22	< 21	< 23
01/26/16 -	02/03/16	< 24	< 40	< 26	< 24	< 28	< 26
02/03/16 -	02/08/16	< 32	< 26	< 33	< 13	< 26	< 33
02/08/16 -	02/16/16	< 10	< 15	< 9	< 9	< 14	< 10
02/16/16 -	02/22/16	< 43	< 29	< 42	< 40	< 28	< 43
02/22/16 -	02/29/16	< 22	< 14	< 21	< 20	< 14	< 15
02/29/16 -	03/07/16	< 32	< 24	< 35	< 34	< 24	< 35
03/07/16 -	03/14/16	< 22	< 29	< 20	< 19	< 29	< 19
03/14/16 -	03/22/16	< 31	< 21	< 30	< 16	< 19	< 30
03/22/16 -	03/28/16	< 44	< 27	< 46	< 18	< 25	< 47
03/28/16 -	04/04/16	< 39	< 42	< 41	< 39	< 38	< 41
04/04/16 -	04/11/16	< 22	< 20	< 23	< 21	< 17	< 23
04/11/16 -	04/18/16	< 43	< 37	< 43	< 42	< 36	< 44
04/18/16 -	04/25/16	< 36	< 26	< 16	< 38	< 26	< 37
04/25/16 -	05/02/16	< 22	< 18	< 8	< 21	< 19	< 23
05/02/16 -	05/09/16	< 48	< 20	< 48	< 51	< 21	< 48
05/09/16 -	05/16/16	< 57	< 50	< 52	< 56	< 51	< 56
05/16/16 -	05/23/16	< 50	< 28	< 49	< 53	< 29	< 50
05/23/16 -	05/31/16	< 45	< 28	< 39	< 42	< 31	< 41
05/31/16 -	06/07/16	< 56	< 13	< 38	< 41	< 36	< 55
06/06/16 -	06/13/16	< 26	< 69	< 53	< 54	< 67	< 49
06/13/16 -	06/20/16	< 47	< 60	< 42	< 43	< 65	< 48
06/20/16 -	06/27/16	< 24	< 25	< 23	< 23	< 26	< 24
06/27/16 -	07/05/16	< 29	< 7	< 27	< 28	< 16	< 29
07/05/16 -	07/13/16	< 43	< 35	< 13	< 38	< 35	< 42
07/13/16 -	07/18/16	< 57	< 14	< 23	< 57	< 43	< 57
07/18/16 -	07/25/16	< 33	< 43	< 12	< 30	< 34	< 33
07/25/16 -	08/01/16	< 46	< 38	< 43	< 43	< 40	< 44
08/01/16 -	08/05/16	< 68	< 51	< 28	< 67	< 61	< 69
08/05/16 -	08/10/16	< 44	< 33	< 42	< 42	< 32	< 43
08/10/16 -	08/18/16	< 23	< 25	< 24	< 24	< 22	< 25
08/18/16 -	08/24/16	< 39	< 17	< 38	< 37	< 44	< 38
08/24/16 -	08/29/16	< 30	< 35	< 26	< 27	< 34	< 27
08/29/16 -	09/06/16	< 15	< 16	< 5	< 13	< 19	< 14
09/06/16 -	09/12/16	< 32	< 35	< 32	< 32	< 37	< 32
09/12/16 -	09/19/16	< 23	< 7	< 19	< 19	< 20	< 19
09/19/16 -	09/26/16	< 25	< 18	< 26	< 11	< 21	< 25
09/26/16 -	10/03/16	< 25	< 8	< 25	< 24	< 25	< 25
10/03/16 -	10/11/16	< 26	< 17	< 25	< 24	< 19	< 24
10/11/16 -	10/17/16	< 27	< 26	< 27	< 27	< 26	< 27
10/17/16 -	10/24/16	< 23	< 20	< 22	< 21	< 19	< 21
10/24/16 -	10/31/16	< 30	< 26	< 27	< 27	< 25	< 26
10/31/16 -	11/07/16	< 25	< 25	< 25	< 24	< 25	< 25
11/07/16 -	11/15/16	< 23	< 24	< 24	< 24	< 24	< 24
11/15/16 -	11/21/16	< 56	< 43	< 57	< 20	< 39	< 57
11/21/16 -	11/28/16	< 25	< 28	< 22	< 8	< 29	< 24
11/28/16 -	12/05/16	< 22	< 21	< 23	< 22	< 21	< 21
12/05/16 -	12/12/16	< 26	< 9	< 27	< 27	< 25	< 27
12/12/16 -	12/19/16	< 34	< 38	< 38	< 35	< 38	< 34
12/19/16 -	12/27/16	< 34	< 38	< 36	< 33	< 38	< 33
12/27/16 -	01/03/17	< 22	< 25	< 25	< 23	< 24	< 22
	AVERAGE	-	-	-	-	-	-

TABLE C-3 CONCENTRATIONS OF IODINE-131 IN FILTERED AIR, 2016

Results in Units of 1E-3 pCi/m^3 ± 2 Sigma

COLLECTION PERIOD			INDICATORS	
START		STOP	SA-AIO-1F1	SA-AIO-2F6
12/28/15	-	01/04/16	< 41	< 39
01/04/16	-	01/11/16	< 37	< 34
01/11/16	-	01/18/16	< 38	< 33
01/18/16	-	01/26/16	< 33	< 29
01/26/16	-	02/03/16	< 29	< 27
02/03/16	-	02/08/16	< 27	< 26
02/08/16	-	02/16/16	< 14	< 13
02/16/16	-	02/22/16	< 25	< 28
02/22/16	-	02/29/16	< 5	< 14
02/29/16	-	03/07/16	< 22	< 27
03/07/16	-	03/14/16	< 31	< 31
03/14/16	-	03/22/16	< 19	< 20
03/22/16	-	03/28/16	< 26	< 26
03/28/16	-	04/04/16	< 40	< 38
04/04/16	-	04/11/16	< 18	< 17
04/11/16	-	04/18/16	< 39	< 38
04/18/16	-	04/25/16	< 27	< 28
04/25/16	-	05/02/16	< 19	< 20
05/02/16	-	05/09/16	< 21	< 22
05/09/16	-	05/16/16	< 53	< 54
05/16/16	-	05/23/16	< 31	< 30
05/23/16	-	05/31/16	< 30	< 30
05/31/16	-	06/07/16	< 37	< 38
06/06/16	-	06/13/16	< 67	< 62
06/13/16	-	06/20/16	< 62	< 67
06/20/16	-	06/27/16	< 26	< 27
06/27/16	-	07/05/16	< 16	< 17
07/05/16	-	07/13/16	< 34	< 35
07/13/16	-	07/18/16	< 42	< 42
07/18/16	-	07/25/16	< 48	< 49
07/25/16	-	08/01/16	< 38	< 38
08/01/16	-	08/05/16	< 58	< 60
08/05/16	-	08/10/16	< 30	< 31
08/10/16	-	08/18/16	< 22	< 24
08/18/16	-	08/24/16	< 44	< 46
08/24/16	-	08/29/16	< 33	< 34
08/29/16	-	09/06/16	< 17	< 18
09/06/16	-	09/12/16	< 36	< 18
09/12/16	-	09/19/16	< 18	< 19
09/19/16	-	09/26/16	< 19	< 20
09/26/16	-	10/03/16	< 23	< 23
10/03/16	-	10/11/16	< 19	< 18
10/11/16	-	10/17/16	< 27	< 26
10/17/16	-	10/24/16	< 20	< 20
10/24/16	-	10/31/16	< 26	< 24
10/31/16	-	11/07/16	< 25	< 26
11/07/16	-	11/15/16	< 24	< 23
11/15/16	-	11/21/16	< 39	< 42
11/21/16	-	11/28/16	< 11	< 28
11/28/16	-	12/05/16	< 20	< 20
12/05/16	-	12/12/16	< 26	< 25
12/12/16	-	12/19/16	< 37	< 39
12/19/16	-	12/27/16	< 42	< 42
12/27/16	-	01/03/17	< 24	< 25
		AVERAGE	-	-

- INDICATES AVERAGE WAS NOT CALCULATED DUE TO NO POSITIVE VALUES FOR THE REPORTING PERIOD.

TABLE C-4 DIRECT RADIATION MEASUREMENTS - QUARTERLY DOSIMETRY RESULTS*, 2016

Results in Units of mR / Standard Quarter

STATION ID	ANNUAL DOSE mR/yr	JAN - MAR	APR - JUN	JUL - SEP	OCT - DEC
SA-IDM-1G3 (C)	52.1	13.4	13.3	11.6	13.8
SA-IDM-3G1 (C)	53.3	13.3	14.4	11.3	14.3
SA-IDM-10G1 (C)	54.2	13.9	14.0	12.0	14.3
SA-IDM-14G1 (C)	57.4	15.2	14.9	12.8	14.5
SA-IDM-16G1 (C)	49.1	12.6	13.0	10.5	13.0
SA-IDM-3H1 (C)	47.3	11.8	12.4	10.1	13.0
SA-IDM-1S1**	112.5	25.9	25.3	29.5	31.8
SA-IDM-2S2	54.7	11.4	15.4	13.3	14.6
SA-IDM-2S4	51.2	14.4	12.3	11.2	13.3
SA-IDM-3S1	45.9	10.7	12.6	10.2	12.4
SA-IDM-4S1	46.5	10.8	11.1	11.4	13.2
SA-IDM-5S1	43.4	10.7	11.1	9.8	11.8
SA-IDM-6S2	59.5	13.7	14.4	14.9	16.5
SA-IDM-7S1	46.7	11.2	10.2	13.3	12.0
SA-IDM-8S1	40.8	9.9	7.5	12.5	10.9
SA-IDM-9S1	42.3	10.5	8.5	12.4	10.9
SA-IDM-10S1	44.3	10.9	9.4	12.7	11.3
SA-IDM-11S1	42.1	9.1	9.8	11.9	11.3
SA-IDM-12S1	55.9	13.1	11.3	16.7	14.8
SA-IDM-13S1	59.8	13.8	13.7	17.8	14.5
SA-IDM-14S1	61.4	15.5	13.1	17.7	15.1
SA-IDM-15S1	40.2	10.1	9.8	8.6	11.7
SA-IDM-15S2	49.3	11.7	13.0	11.0	13.6
SA-IDM-16S1	50.5	12.1	12.4	11.8	14.2
SA-IDM-16S2**	116.3	28.2	28.2	28.6	31.3
SA-IDM-16S3	43.9	10.6	11.4	9.6	12.3
SA-IDM-4D2	54.2	12.5	14.4	12.2	15.1
SA-IDM-5D1	51.0	12.5	13.6	11.1	13.8
SA-IDM-10D1	54.1	13.5	13.1	12.3	15.2
SA-IDM-14D1	49.5	12.6	13.4	10.8	12.7
SA-IDM-15D1	55.2	15.2	14.1	11.7	14.2
SA-IDM-2E1	53.0	13.8	13.1	12.3	13.8
SA-IDM-3E1	43.5	11.1	10.9	9.5	12.0
SA-IDM-11E2	55.2	13.7	14.2	12.8	14.5
SA-IDM-12E1	54.5	13.3	14.7	11.9	14.6
SA-IDM-13E1	46.0	12.8	11.2	9.8	12.2
SA-IDM-16E1	52.7	13.2	13.6	11.8	14.1
SA-IDM-1F1	66.5	16.0	17.3	14.8	18.4
SA-IDM-2F2	46.2	11.1	11.7	10.7	12.7
SA-IDM-2F5	54.7	12.4	15.7	11.5	15.1
SA-IDM-2F6	47.3	11.2	13.4	9.4	13.3
SA-IDM-3F2	46.1	11.3	11.9	10.0	12.9
SA-IDM-3F3	46.5	10.8	13.0	10.0	12.7
SA-IDM-4F2	45.8	11.4	11.6	9.9	12.9
SA-IDM-5F1	47.0	11.8	11.7	10.2	13.3
SA-IDM-6F1	41.4	11.6	10.3	8.1	11.4
SA-IDM-7F2	46.8	9.9	12.9	10.6	13.4
SA-IDM-8F1	58.8	14.6	15.7	13.4	15.1
SA-IDM-9F1	56.4	14.7	13.9	12.7	15.1
SA-IDM-10F2	54.5	14.0	13.8	12.9	13.8
SA-IDM-11F1	***	14.9	15.4	12.5	***
SA-IDM-12F1	52.8	14.2	13.4	11.2	14.0
SA-IDM-13F2	53.7	13.2	13.9	12.9	13.7
SA-IDM-13F3	54.2	14.6	13.8	12.1	13.7
SA-IDM-13F4	55.0	14.5	14.5	12.0	14.0
SA-IDM-14F2	56.5	14.6	14.8	12.4	14.7
SA-IDM-15F3	56.8	14.7	13.7	13.2	15.2
SA-IDM-16F2	47.6	12.3	12.5	10.0	12.8

* QUARTERLY ELEMENT TLD RESULTS BY MIRION TECHNOLOGIES.
** SAMPLE RESULTS ARE AFFECTED BY THE ISFSI, INDPENDENT SPENT FUEL STORAGE INSTALLATION.
*** SEE PROGRAM EXCEPTIONS OF THIS REPORT.

TABLE C-5 CONCENTRATIONS OF IODINE-131 AND GAMMA EMITTERS IN MILK, 2016

Results in Units of pCi/L ± 2 Sigma

	COLLECTION PERIOD			<---------GAMMA EMITTERS--------->				
STATION ID	START	STOP	I-131 LL	K-40	Cs-134	Cs-137	BaLa-140	Ra-226
SA-MLK-3G1 (C)	01/03/16	01/04/16	< 0.3	1,311 ± 120	< 4	< 5	< 8	< 89
SA-MLK-3G1 (C)	02/07/16	02/08/16	< 0.4	1,278 ± 160	< 7	< 8	< 13	< 170
SA-MLK-3G1 (C)	03/06/16	03/07/16	< 0.7	1,369 ± 180	< 7	< 9	< 5	< 204
SA-MLK-3G1 (C)	04/03/16	04/04/16	< 0.6	1,231 ± 187	< 6	< 9	< 8	< 175
SA-MLK-3G1 (C)	04/17/16	04/18/16	< 0.5	1,454 ± 237	< 9	< 10	< 14	< 232
SA-MLK-3G1 (C)	05/01/16	05/02/16	< 0.5	1,202 ± 175	< 7	< 9	< 9	< 190
SA-MLK-3G1 (C)	05/15/16	05/16/16	< 0.4	1,271 ± 138	< 5	< 6	< 8	< 158
SA-MLK-3G1 (C)	06/07/16	06/08/16	< 0.5	1,443 ± 162	< 6	< 8	< 9	< 166
SA-MLK-3G1 (C)	06/19/16	06/20/16	< 0.6	1,129 ± 165	< 6	< 7	< 8	< 191
SA-MLK-3G1 (C)	07/12/16	07/13/16	< 0.4	1,431 ± 227	< 7	< 10	< 14	< 183
SA-MLK-3G1 (C)	07/25/16	07/26/16	< 0.7	1,481 ± 252	< 9	< 9	< 14	< 234
SA-MLK-3G1 (C)	08/07/16	08/08/16	< 0.9	1,198 ± 179	< 8	< 9	< 12	< 194
SA-MLK-3G1 (C)	08/21/16	08/22/16	< 0.3	1,365 ± 202	< 7	< 7	< 12	< 184
SA-MLK-3G1 (C)	09/05/16	09/06/16	< 0.6	1,231 ± 173	< 8	< 8	< 11	< 196
SA-MLK-3G1 (C)	09/18/16	09/19/16	< 0.9	1,683 ± 197	< 7	< 9	< 15	< 203
SA-MLK-3G1 (C)	10/02/16	10/03/16	< 0.4	1,333 ± 199	< 8	< 8	< 14	< 211
SA-MLK-3G1 (C)	10/16/16	10/17/16	< 0.8	1,204 ± 132	< 5	< 6	< 7	< 140
SA-MLK-3G1 (C)	11/14/16	11/15/16	< 0.9	1,266 ± 163	< 7	< 8	< 8	< 174
SA-MLK-3G1 (C)	11/27/16	11/28/16	< 0.4	1,337 ± 181	< 6	< 8	< 10	< 164
SA-MLK-3G1 (C)	12/04/16	12/05/16	< 0.7	1,506 ± 220	< 9	< 10	< 14	< 231
		AVERAGE*	-	1,336 ± 267	-	-	-	-
SA-MLK-13E3	01/03/16	01/04/16	< 0.3	1,197 ± 176	< 6	< 7	< 12	< 121
SA-MLK-13E3	02/07/16	02/08/16	< 0.4	1,445 ± 187	< 7	< 8	< 7	< 172
SA-MLK-13E3	03/06/16	03/07/16	< 0.7	1,200 ± 205	< 11	< 11	< 14	< 244
SA-MLK-13E3	04/03/16	04/04/16	< 0.5	1,347 ± 186	< 7	< 8	< 8	< 218
SA-MLK-13E3	04/17/16	04/18/16	< 0.5	1,273 ± 204	< 8	< 11	< 12	< 242
SA-MLK-13E3	05/01/16	05/02/16	< 0.7	1,137 ± 197	< 7	< 10	< 10	< 210
SA-MLK-13E3	05/15/16	05/16/16	< 0.5	1,238 ± 130	< 5	< 6	< 9	< 164
SA-MLK-13E3	06/05/16	06/06/16	< 0.7	1,381 ± 175	< 7	< 8	< 11	< 142
SA-MLK-13E3	06/19/16	06/20/16	< 0.7	1,192 ± 200	< 6	< 9	< 14	< 176
SA-MLK-13E3	07/12/16	07/13/16	< 0.4	1,276 ± 262	< 12	< 10	< 14	< 246
SA-MLK-13E3	07/25/16	07/26/16	< 0.8	1,338 ± 203	< 12	< 12	< 13	< 279
SA-MLK-13E3	08/07/16	08/08/16	< 0.5	1,300 ± 203	< 9	< 9	< 8	< 237
SA-MLK-13E3	08/21/16	08/22/16	< 0.3	1,471 ± 157	< 7	< 6	< 12	< 171
SA-MLK-13E3	09/05/16	09/06/16	< 0.4	1,247 ± 196	< 8	< 11	< 15	< 186
SA-MLK-13E3	09/18/16	09/19/16	< 0.9	1,388 ± 202	< 7	< 8	< 14	< 243
SA-MLK-13E3	10/02/16	10/03/16	< 0.5	1,284 ± 158	< 8	< 8	< 12	< 206
SA-MLK-13E3	10/16/16	10/17/16	< 0.6	1,299 ± 136	< 5	< 6	< 11	< 148
SA-MLK-13E3	11/14/16	11/15/16	< 0.4	1,423 ± 146	< 6	< 7	< 9	< 128
SA-MLK-13E3	11/27/16	11/28/16	< 0.4	1,323 ± 167	< 8	< 9	< 10	< 212
SA-MLK-13E3	12/04/16	12/05/16	< 0.6	1,644 ± 186	< 9	< 9	< 14	< 209
		AVERAGE*	-	1,320 ± 234	-	-	-	-

TABLE C-5 CONCENTRATIONS OF IODINE-131 AND GAMMA EMITTERS IN MILK, 2016

Results in Units of pCi/L ± 2 Sigma

	COLLECTION PERIOD			<----------GAMMA EMITTERS---------->				
STATION ID	START	STOP	I-131 LL	K-40	Cs-134	Cs-137	BaLa-140	Ra-226
SA-MLK-14F4	01/03/16	01/04/16	< 0.3	1,403 ± 179	< 6	< 9	< 11	< 181
SA-MLK-14F4	02/07/16	02/08/16	< 0.5	1,471 ± 222	< 7	< 7	< 11	< 158
SA-MLK-14F4	03/06/16	03/07/16	< 0.7	1,160 ± 210	< 7	< 8	< 11	< 235
SA-MLK-14F4	04/03/16	04/04/16	< 0.5	1,627 ± 184	< 8	< 8	< 9	< 201
SA-MLK-14F4	04/17/16	04/18/16	< 0.9	1,448 ± 281	< 10	< 10	< 4	< 257
SA-MLK-14F4	05/01/16	05/02/16	< 0.7	1,260 ± 186	< 9	< 11	< 15	< 180
SA-MLK-14F4	05/15/16	05/16/16	< 0.6	1,231 ± 142	< 6	< 7	< 11	< 162
SA-MLK-14F4	06/05/16	06/06/16	< 0.6	1,423 ± 130	< 5	< 6	< 9	< 115
SA-MLK-14F4	06/19/16	06/20/16	< 0.5	1,457 ± 185	< 5	< 6	< 4	< 129
SA-MLK-14F4	07/12/16	07/13/16	< 0.5	1,138 ± 224	< 8	< 10	< 14	< 228
SA-MLK-14F4	07/25/16	07/26/16	< 0.6	1,548 ± 257	< 10	< 11	< 12	< 232
SA-MLK-14F4	08/07/16	08/08/16	< 0.7	1,448 ± 184	< 7	< 7	< 7	< 153
SA-MLK-14F4	08/21/16	08/22/16	< 0.5	1,616 ± 208	< 9	< 9	< 15	< 171
SA-MLK-14F4	09/05/16	09/06/16	< 0.8	1,385 ± 191	< 8	< 9	< 11	< 262
SA-MLK-14F4	09/18/16	09/19/16	< 0.7	1,465 ± 177	< 9	< 8	< 14	< 229
SA-MLK-14F4	10/02/16	10/03/16	< 0.7	1,302 ± 128	< 7	< 6	< 8	< 178
SA-MLK-14F4	10/16/16	10/17/16	< 0.9	1,433 ± 184	< 8	< 10	< 15	< 172
SA-MLK-14F4	11/14/16	11/15/16	< 0.7	1,292 ± 174	< 8	< 9	< 13	< 169
SA-MLK-14F4	11/27/16	11/28/16	< 0.3	1,273 ± 153	< 7	< 7	< 11	< 191
SA-MLK-14F4	12/04/16	12/05/16	< 0.6	1,527 ± 225	< 6	< 9	< 8	< 238
		AVERAGE*	-	1,395 ± 278	-	-	-	-
SA-MLK-2G3	01/03/16	01/04/16	< 0.3	1,342 ± 153	< 7	< 8	< 13	< 200
SA-MLK-2G3	02/07/16	02/08/16	< 0.3	1,233 ± 159	< 7	< 7	< 9	< 161
SA-MLK-2G3	03/06/16	03/07/16	< 0.6	1,527 ± 198	< 7	< 8	< 10	< 192
SA-MLK-2G3	04/03/16	04/04/16	< 0.5	1,432 ± 164	< 7	< 7	< 9	< 185
SA-MLK-2G3	04/17/16	04/18/16	< 0.5	1,537 ± 207	< 7	< 8	< 9	< 236
SA-MLK-2G3	05/01/16	05/02/16	< 0.6	1,532 ± 197	< 5	< 7	< 11	< 172
SA-MLK-2G3	05/15/16	05/16/16	< 0.5	1,280 ± 125	< 4	< 5	< 8	< 131
SA-MLK-2G3	06/06/16	06/07/16	< 0.5	1,320 ± 167	< 5	< 7	< 10	< 192
SA-MLK-2G3	06/19/16	06/20/16	< 0.6	1,231 ± 180	< 7	< 7	< 10	< 197
SA-MLK-2G3	07/12/16	07/13/16	< 0.4	1,242 ± 183	< 7	< 9	< 11	< 218
SA-MLK-2G3	07/25/16	07/26/16	< 0.7	1,577 ± 225	< 8	< 7	< 15	< 213
SA-MLK-2G3	08/07/16	08/08/16	< 0.5	1,102 ± 218	< 11	< 11	< 10	< 204
SA-MLK-2G3	08/21/16	08/22/16	< 0.3	1,468 ± 216	< 7	< 6	< 14	< 200
SA-MLK-2G3	09/05/16	09/06/16	< 0.6	1,267 ± 161	< 7	< 7	< 10	< 194
SA-MLK-2G3	09/18/16	09/19/16	< 0.5	1,482 ± 201	< 8	< 9	< 11	< 224
SA-MLK-2G3	10/02/16	10/03/16	< 0.7	1,403 ± 170	< 7	< 9	< 11	< 190
SA-MLK-2G3	10/16/16	10/17/16	< 0.7	1,312 ± 136	< 5	< 5	< 9	< 130
SA-MLK-2G3	11/14/16	11/15/16	< 0.8	1,388 ± 135	< 5	< 6	< 6	< 119
SA-MLK-2G3	11/27/16	11/28/16	< 0.3	1,392 ± 172	< 8	< 9	< 12	< 221
SA-MLK-2G3	12/04/16	12/05/16	< 0.7	1,510 ± 195	< 7	< 7	< 6	< 209
		AVERAGE*	-	1,379 ± 259	-	-	-	-
	ALL INDICATOR AVERAGE*		-	1,365 ± 262	-	-	-	-

(C) CONTROL LOCATION.
* THE AVERAGE AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES.
- INDICATES AVERAGE WAS NOT CALCULATED DUE TO NO POSITIVE VALUES FOR THE REPORTING PERIOD.

TABLE C-6 CONCENTRATIONS OF GROSS ALPHA AND GROSS BETA EMITTERS AND TRITIUM IN WELL WATER**, 2016

Results in Units of pCi/L ± 2 Sigma

STATION ID	COLLECTION DATE	Gr-A	Gr-B	H-3
SA-WWA-3E1	01/29/16	< 1.1	< 2.4	< 193
	02/16/16	< 1.6	< 2.2	< 184
	03/17/16	< 2.0	< 2.2	< 200
	04/13/16	< 0.8	< 2.1	< 180
	05/19/16	< 1.8	2.8 ± 1.7	< 177
	06/27/16	< 1.6	< 2.3	< 189
	07/26/16	< 2.8	3.6 ± 1.7	< 175
	08/24/16	< 1.2	3.8 ± 1.6	< 169
	09/19/16	< 1.1	< 2.1	< 192
	10/24/16	< 1.4	< 2.5	< 192
	11/21/16	< 1.9	2.8 ± 1.5	< 192
	12/21/16	< 1.7	< 2.5	< 192
	AVERAGE*	-	3.2 ± 1.1	-

* THE AVERAGE AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITVIE VALUES.
** MANAGEMENT AUDIT SAMPLE: NOT REQUIRED BY ODCM.
- INDICATES AVERAGE WAS NOT CALCULATED DUE TO NO POSITIVE VALUES FOR THE REPORTING PERIOD

TABLE C-7 CONCENTRATIONS OF IODINE-131 AND GAMMA EMITTERS IN WELL WATER**, 2016

Results in Units of pCi/L ± 2 Sigma

	COLLECTION		<---------GAMMA EMITTERS--------->										
STATION ID	DATE	I-131 LL	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	ZrNb-95	Cs-134	Cs-137	BaLa-140	Ra-226
SA-WWA-3E1	01/29/16	< 0.3	< 60	< 7	< 5	< 12	< 8	< 14	< 7	< 6	< 7	< 8	< 162
	02/16/16	< 0.4	< 69	< 4	< 4	< 8	< 3	< 8	< 4	< 4	< 4	< 5	< 105
	03/17/16	< 0.6	< 42	< 7	< 7	< 12	< 7	< 13	< 8	< 5	< 6	< 6	< 165
	04/13/16	< 0.2	< 128	< 7	< 7	< 11	< 6	< 12	< 7	< 8	< 6	< 5	< 183
	05/19/16	< 1.0	< 54	< 6	< 5	< 13	< 6	< 10	< 6	< 5	< 7	< 7	< 154
	06/27/16	< 0.5	< 143	< 6	< 6	< 13	< 7	< 11	< 7	< 7	< 7	< 13	< 206
	07/26/16	< 0.5	< 46	< 6	< 5	< 12	< 6	< 13	< 6	< 6	< 6	< 9	< 120
	08/24/16	< 0.2	< 43	< 2	< 2	< 5	< 2	< 5	< 2	< 2	< 3	< 4	< 56
	09/19/16	< 0.7	122 ± 73	< 6	< 6	< 11	< 7	< 12	< 6	< 7	< 7	< 7	< 141
	10/24/16	< 0.4	< 31	< 4	< 4	< 9	< 4	< 8	< 4	< 4	< 4	< 8	< 85
	11/21/16	< 0.3	< 44	< 5	< 4	< 12	< 5	< 9	< 5	< 4	< 5	< 8	< 99
	12/21/16	< 0.9	< 83	< 5	< 5	< 10	< 5	< 10	< 5	< 5	< 5	< 6	< 130
	AVERAGE*	-	122 ± 73	-	-	-	-	-	-	-	-	-	-

* THE AVERAGE AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES, IF THERE IS ONLY 1 POSITIVE VALUE THE AVERAGE AND THE ERROR ARE DISPLAYED.

** MANAGEMENT AUDIT SAMPLE: NOT REQUIRED BY ODCM.

- INDICATES AVERAGE WAS NOT CALCULATED DUE TO NO POSITIVE VALUES FOR THE REPORTING PERIOD.

TABLE C-8 **CONCENTRATIONS OF GROSS ALPHA AND GROSS BETA EMITTERS AND TRITIUM IN RAW AND TREATED POTABLE WATER**, 2016**

Results in Units of pCi/L ± 2 Sigma

STATION ID	COLLECTION PERIOD START	STOP	Gr-A	Gr-B	H-3
SA-PWR-2F3	01/04/16	01/29/16	< 1.2	< 2.6	< 194
	01/29/16	02/29/16	< 2.3	5.5 ± 1.9	< 181
	02/29/16	03/30/16	< 1.0	7.0 ± 2.1	< 184
	03/30/16	05/02/16	< 2.4	< 2.9	< 181
	05/02/16	05/31/16	< 1.9	4.3 ± 2.1	< 181
	05/31/16	06/27/16	< 2.4	3.5 ± 2.3	< 191
	06/27/16	08/01/16	< 2.0	5.9 ± 2.1	< 166
	08/01/16	08/31/16	< 1.9	6.7 ± 2.1	< 160
	08/31/16	09/30/16	< 1.9	4.4 ± 2.0	< 174
	09/30/16	10/31/16	< 1.7	4.1 ± 2.2	< 192
	10/31/16	11/30/16	< 2.4	5.5 ± 2.0	< 190
	11/30/16	01/03/17	< 2.1	6.8 ± 2.2	< 193
		AVERAGE*	-	5.4 ± 2.5	-
SA-PWT-2F3	01/04/16	01/29/16	< 1.2	5.5 ± 2.0	< 193
	01/29/16	02/29/16	< 2.2	5.7 ± 1.9	< 180
	02/29/16	03/30/16	< 1.0	5.7 ± 2.0	< 184
	03/30/16	05/02/16	< 2.3	5.7 ± 2.2	< 181
	05/02/16	05/31/16	< 1.8	5.3 ± 2.1	< 179
	05/31/16	06/27/16	< 2.2	5.3 ± 2.3	< 190
	06/27/16	08/01/16	< 1.9	6.6 ± 2.1	< 170
	08/01/16	08/31/16	< 1.7	5.7 ± 1.9	< 160
	08/31/16	09/30/16	< 1.9	5.2 ± 2.0	< 176
	09/30/16	10/31/16	< 1.6	7.0 ± 2.3	< 191
	10/31/16	11/30/16	< 2.2	6.5 ± 2.0	< 188
	11/30/16	01/03/17	< 1.9	7.2 ± 2.1	< 193
		AVERAGE*	-	6.0 ± 1.4	-

* THE AVERAGE AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES.
** MANAGEMENT AUDIT SAMPLE: NOT REQUIRED BY ODCM.
- INDICATES AVERAGE WAS NOT CALCULATED DUE TO NO POSITIVE VALUES FOR THE REPORTING PERIOD.

TABLE C-9 CONCENTRATIONS OF IODINE-131 AND GAMMA EMITTERS IN RAW AND TREATED POTABLE WATER, 2016**

Results in Units of pCi/L ± 2 Sigma

	COLLECTION PERIOD			<----------GAMMA EMITTERS---------->										
STATION ID	START	STOP	I-131 LL	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	ZrNb-95	Cs-134	Cs-137	BaLa-140	Ra-226
SA-PWR-2F3	01/04/16	- 01/29/16	< 0.4	< 41	< 5	< 5	< 10	< 5	< 9	< 6	< 6	< 5	< 6	< 167
SA-PWR-2F3	01/29/16	- 02/29/16	< 0.6	< 63	< 7	< 8	< 14	< 7	< 15	< 6	< 6	< 7	< 10	< 133
SA-PWR-2F3	02/29/16	- 03/30/16	< 0.3	< 116	< 6	< 6	< 12	< 6	< 12	< 6	< 6	< 6	< 7	< 154
SA-PWR-2F3	03/30/16	- 05/02/16	< 0.8	< 140	< 7	< 7	< 16	< 7	< 14	< 6	< 7	< 7	< 9	< 178
SA-PWR-2F3	05/02/16	- 05/31/16	< 0.5	< 144	< 5	< 6	< 7	< 5	< 11	< 5	< 5	< 5	< 7	< 174
SA-PWR-2F3	05/31/16	- 06/27/16	< 0.5	< 131	< 8	< 6	< 12	< 11	< 14	< 6	< 8	< 8	< 8	< 255
SA-PWR-2F3	06/27/16	- 08/01/16	< 0.6	< 126	< 3	< 3	< 8	< 3	< 9	< 3	< 4	< 5	< 8	< 132
SA-PWR-2F3	08/01/16	- 08/31/16	< 0.6	< 37	< 4	< 4	< 8	< 3	< 9	< 5	< 4	< 4	< 8	< 90
SA-PWR-2F3	08/31/16	- 09/30/16	< 0.3	< 61	< 6	< 7	< 13	< 8	< 14	< 8	< 7	< 7	< 12	< 145
SA-PWR-2F3	09/30/16	- 10/31/16	< 0.7	< 122	< 6	< 7	< 13	< 6	< 14	< 9	< 6	< 7	< 9	< 180
SA-PWR-2F3	10/31/16	- 11/30/16	< 0.6	< 136	< 6	< 5	< 11	< 7	< 10	< 6	< 5	< 5	< 8	< 145
SA-PWR-2F3	11/30/16	- 01/03/17	< 0.6	< 35	< 3	< 4	< 8	< 3	< 8	< 4	< 3	< 3	< 7	< 107
		AVERAGE	-	-	-	-	-	-	-	-	-	-	-	-
SA-PWT-2F3	01/04/16	- 01/29/16	< 0.4	< 111	< 4	< 6	< 10	< 7	< 11	< 6	< 5	< 6	< 7	< 165
SA-PWT-2F3	01/29/16	- 02/29/16	< 0.4	< 53	< 5	< 4	< 10	< 3	< 7	< 4	< 4	< 4	< 7	< 142
SA-PWT-2F3	02/29/16	- 03/30/16	< 0.3	< 56	< 6	< 6	< 13	< 6	< 11	< 6	< 5	< 5	< 6	< 130
SA-PWT-2F3	03/30/16	- 05/02/16	< 0.7	< 171	< 4	< 6	< 15	< 7	< 17	< 7	< 6	< 7	< 9	< 222
SA-PWT-2F3	05/02/16	- 05/31/16	< 0.3	< 69	< 6	< 6	< 7	< 9	< 15	< 5	< 6	< 5	< 9	< 141
SA-PWT-2F3	05/31/16	- 06/27/16	< 0.5	< 142	< 7	< 7	< 14	< 8	< 14	< 9	< 5	< 8	< 11	< 193
SA-PWT-2F3	06/27/16	- 08/01/16	< 0.5	< 158	< 5	< 5	< 10	< 6	< 10	< 5	< 5	< 7	< 12	< 183
SA-PWT-2F3	08/01/16	- 08/31/16	< 0.6	< 124	< 5	< 4	< 10	< 5	< 9	< 6	< 5	< 6	< 9	< 145
SA-PWT-2F3	08/31/16	- 09/30/16	< 0.3	< 65	< 7	< 6	< 13	< 6	< 14	< 8	< 6	< 8	< 9	< 153
SA-PWT-2F3	09/30/16	- 10/31/16	< 0.8	< 59	< 7	< 6	< 13	< 6	< 14	< 8	< 6	< 7	< 11	< 150
SA-PWT-2F3	10/31/16	- 11/30/16	< 0.8	< 115	< 7	< 5	< 12	< 7	< 13	< 5	< 5	< 6	< 9	< 149
SA-PWT-2F3	11/30/16	- 01/03/17	< 0.7	< 123	< 7	< 6	< 15	< 7	< 16	< 7	< 5	< 6	< 13	< 159
		AVERAGE	-	-	-	-	-	-	-	-	-	-	-	-

** MANAGEMENT AUDIT SAMPLE: NOT REQUIRED BY ODCM.
- INDICATES AVERAGE WAS NOT CALCULATED DUE TO NO POSITIVE VALUES FOR THE REPORTING PERIOD.

TABLE C-10 CONCENTRATIONS OF GAMMA EMITTERS IN BROADLEAF VEGETATION (FPL) AND VEGETABLES (FPV), 2016

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

STATION ID	COLLECTION DATE	SAMPLE TYPE	<----------GAMMA EMITTERS---------->						
			Be-7	K-40	I-131	Cs-134	Cs-137	Ra-226	Th-232
SA-FPL-1G1 (C)	07/26/16	Cabbage	< 375	1,557 ± 635	< 50	< 42	< 53	< 1,062	< 193
SA-FPL-3H5 (C)	07/26/16	Cabbage	< 440	2,634 ± 811	< 58	< 56	< 48	< 1,230	< 173
SA-FPL-1S1	07/25/16	Kale	< 249	2,681 ± 587	< 56	< 31	< 31	< 648	< 118
SA-FPL-1S1	07/25/16	Cabbage	< 348	2,846 ± 670	< 59	< 37	< 44	< 798	< 191
SA-FPL-1S1	07/25/16	Collards	< 227	3,997 ± 467	< 51	< 31	< 27	< 673	< 100
SA-FPL-1S1	08/31/16	Cabbage	< 362	2,604 ± 690	< 60	< 29	< 26	< 849	< 170
SA-FPL-1S1	08/31/16	Kale	< 276	6,539 ± 684	< 49	< 33	< 33	< 734	< 124
SA-FPL-1S1	08/31/16	Collards	< 303	3,356 ± 621	< 56	< 30	< 34	< 849	< 149
SA-FPL-1S1	09/28/16	Cabbage	< 293	2,923 ± 595	< 54	< 38	< 32	< 718	< 134
SA-FPL-1S1	09/28/16	Collards	< 302	4,929 ± 668	< 48	< 32	< 36	< 814	< 127
SA-FPL-1S1	09/28/16	Kale	< 316	5,985 ± 852	< 53	< 37	< 45	< 740	< 136
SA-FPL-1S1	10/31/16	Kale	393 ± 86	4,241 ± 209	< 22	< 11	< 11	< 296	< 34
SA-FPL-1S1	10/31/16	Collards	< 218	3,968 ± 555	< 47	< 23	< 25	< 589	< 100
SA-FPL-1S1	10/31/16	Cabbage	< 328	2,029 ± 484	< 57	< 32	< 33	< 779	< 116
SA-FPL-1S1	11/30/16	Collards	< 240	4,275 ± 666	< 50	< 37	< 37	< 753	< 153
SA-FPL-1S1	11/30/16	Cabbage	< 312	2,546 ± 576	< 42	< 34	< 32	< 827	< 143
SA-FPL-7S2	07/25/16	Kale	< 351	8,761 ± 966	< 60	< 37	< 45	< 915	< 148
SA-FPL-7S2	07/25/16	Collards	< 228	5,858 ± 631	< 46	< 25	< 28	< 506	< 107
SA-FPL-7S2	07/25/16	Cabbage	< 290	5,032 ± 751	< 58	< 33	< 39	< 644	< 127
SA-FPL-7S2	08/31/16	Collards	< 332	7,390 ± 847	< 59	< 37	< 40	< 744	< 149
SA-FPL-7S2	08/31/16	Cabbage	< 302	5,866 ± 691	< 49	< 30	< 32	< 753	< 136
SA-FPL-7S2	09/28/16	Kale	< 342	4,607 ± 790	< 54	< 41	< 36	< 827	< 195
SA-FPL-7S2	09/28/16	Cabbage	< 381	5,319 ± 793	< 60	< 32	< 36	< 891	< 106
SA-FPL-7S2	09/28/16	Collards	< 326	4,897 ± 700	< 54	< 33	< 38	< 794	< 135
SA-FPL-7S2	10/31/16	Cabbage	234 ± 134	4,328 ± 346	< 30	< 15	< 18	< 412	< 67
SA-FPL-7S2	11/30/16	Kale	< 302	8,289 ± 931	< 43	< 28	< 38	< 525	< 130
SA-FPL-7S2	11/30/16	Cabbage	< 334	4,130 ± 714	< 57	< 38	< 43	< 977	< 150
SA-FPL-15S2	07/25/16	Cabbage	< 289	2,659 ± 489	< 59	< 26	< 34	< 636	< 116
SA-FPL-15S2	07/25/16	Kale	< 370	4,486 ± 788	< 52	< 33	< 38	< 675	< 141
SA-FPL-15S2	07/25/16	Collards	< 185	3,775 ± 451	< 29	< 17	< 20	< 429	< 85
SA-FPL-15S2	08/31/16	Kale	< 290	4,500 ± 706	< 54	< 24	< 32	< 690	< 126
SA-FPL-15S2	08/31/16	Collards	< 306	3,433 ± 468	< 60	< 37	< 33	< 856	< 116
SA-FPL-15S2	08/31/16	Cabbage	< 276	3,058 ± 611	< 52	< 37	< 32	< 782	< 123
SA-FPL-15S2	09/28/16	Kale	< 286	4,855 ± 626	< 43	< 27	< 28	< 691	< 121
SA-FPL-15S2	09/28/16	Collards	< 309	3,741 ± 482	< 57	< 39	< 37	< 938	< 132
SA-FPL-15S2	09/28/16	Cabbage	< 239	2,963 ± 532	< 38	< 25	< 29	< 636	< 111

TABLE C-10 CONCENTRATIONS OF GAMMA EMITTERS IN BROADLEAF VEGETATION (FPL) AND VEGETABLES (FPV), 2016

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

STATION ID	COLLECTION DATE	SAMPLE TYPE	<----------GAMMA EMITTERS---------->						
			Be-7	K-40	I-131	Cs-134	Cs-137	Ra-226	Th-232
SA-FPL-15S2	10/31/16	Collards	< 106	2,800 ± 237	< 20	< 12	< 12	< 206	< 45
SA-FPL-15S2	10/31/16	Kale	230 ± 68	3,942 ± 228	< 18	< 9	< 10	< 203	< 34
SA-FPL-15S2	10/31/16	Cabbage	204 ± 120	3,068 ± 297	< 30	< 16	< 17	< 379	< 70
SA-FPL-15S2	11/30/16	Collards	< 366	3,292 ± 636	< 57	< 34	< 37	< 874	< 167
SA-FPL-15S2	11/30/16	Cabbage	< 276	3,720 ± 589	< 43	< 31	< 33	< 552	< 132
SA-FPL-15S2	11/30/16	Kale	< 366	4,219 ± 512	< 48	< 33	< 36	< 807	< 126
SA-FPL-16S1	07/25/16	Cabbage	< 194	3,127 ± 505	< 28	< 20	< 22	< 464	< 82
SA-FPL-16S1	07/25/16	Kale	< 271	4,225 ± 646	< 56	< 27	< 31	< 662	< 127
SA-FPL-16S1	07/25/16	Collards	< 253	2,331 ± 529	< 53	< 29	< 29	< 635	< 116
SA-FPL-16S1	08/31/16	Collards	< 295	3,758 ± 636	< 49	< 32	< 37	< 839	< 121
SA-FPL-16S1	08/31/16	Kale	< 326	4,056 ± 831	< 52	< 36	< 42	< 695	< 166
SA-FPL-16S1	08/31/16	Cabbage	< 367	4,734 ± 792	< 57	< 35	< 37	< 797	< 165
SA-FPL-16S1	09/28/16	Cabbage	< 242	2,742 ± 478	< 39	< 22	< 26	< 511	< 87
SA-FPL-16S1	10/31/16	Kale	396 ± 197	2,908 ± 343	< 34	< 18	< 20	< 430	< 71
SA-FPL-16S1	10/31/16	Cabbage	< 142	3,327 ± 300	< 32	< 16	< 19	< 472	< 71
SA-FPL-16S1	11/30/16	Kale	< 345	1,772 ± 764	< 60	< 37	< 45	< 802	< 169
SA-FPL-16S1	11/30/16	Cabbage	< 316	4,308 ± 630	< 57	< 36	< 41	< 941	< 168
SA-FPL-10D1	07/25/16	Kale	< 299	4,772 ± 775	< 55	< 28	< 31	< 654	< 126
SA-FPL-10D1	07/25/16	Cabbage	< 316	5,750 ± 672	< 60	< 35	< 37	< 705	< 165
SA-FPL-10D1	07/25/16	Collards	< 241	5,345 ± 650	< 57	< 29	< 33	< 691	< 138
SA-FPL-10D1	08/31/16	Collards	< 262	3,504 ± 553	< 53	< 30	< 31	< 633	< 118
SA-FPL-10D1	08/31/16	Cabbage	< 310	3,064 ± 623	< 47	< 29	< 34	< 550	< 141
SA-FPL-10D1	09/28/16	Cabbage	< 213	2,219 ± 568	< 44	< 28	< 24	< 640	< 110
SA-FPL-10D1	10/31/16	Cabbage	1,694 ± 161	4,313 ± 407	< 40	< 19	< 23	< 498	< 84
SA-FPL-10D1	10/31/16	Kale	< 187	3,837 ± 371	< 41	< 21	< 23	< 482	< 74
SA-FPL-10D1	11/30/16	Kale	< 377	2,743 ± 602	< 59	< 37	< 41	< 821	< 154
SA-FPL-10D1	11/30/16	Cabbage	< 263	2,442 ± 612	< 60	< 39	< 45	< 843	< 166
	AVERAGE*		525 ± 1,158	3,990 ± 2,898	-	-	-	-	-
	ALL INDICATOR AVERAGE*		525 ± 1,158	4,052 ± 2,854	-	-	-	-	-

TABLE C-10 CONCENTRATIONS OF GAMMA EMITTERS IN BROADLEAF VEGETATION (FPL) AND VEGETABLES (FPV), 2016

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

STATION ID	COLLECTION DATE	SAMPLE TYPE	<----------GAMMA EMITTERS---------->						
			Be-7	K-40	I-131	Cs-134	Cs-137	Ra-226	Th-232
SA-FPV-2F9**	07/12/16	Corn	< 110	1,418 ± 346	< 25	< 17	< 18	< 362	< 66
SA-FPV-2F9**	07/12/16	Tomatoes	< 189	1,528 ± 449	< 29	< 21	< 25	< 421	< 85
SA-FPV-2F9**	08/01/16	Peppers	< 261	1,811 ± 468	< 34	< 25	< 32	< 762	< 147
SA-FPV-2F9**	08/01/16	Peaches	< 187	2,215 ± 473	< 28	< 22	< 20	< 582	< 119
SA-FPV-3F8**	08/01/16	Peaches	< 219	1,687 ± 402	< 28	< 22	< 25	< 544	< 107
SA-FPV-14F4**	11/12/16	Soy Bean	< 156	14,270 ± 736	< 27	< 17	< 21	< 392	< 76
SA-FPV-15F4**	08/24/16	Peppers	< 299	2,065 ± 654	< 53	< 29	< 29	< 631	< 142
SA-FPV-15F4**	08/24/16	Corn	< 129	1,790 ± 323	< 30	< 14	< 15	< 394	< 72
SA-FPV-15F4**	08/24/16	Tomatoes	< 186	2,511 ± 404	< 38	< 20	< 23	< 496	< 80
SA-FPV-1G1**	05/02/16	Asparagus	< 294	3,091 ± 672	< 46	< 29	< 45	< 726	< 117
SA-FPV-1G1**	07/26/16	Tomatoes	< 245	1,565 ± 370	< 36	< 32	< 24	< 680	< 94
SA-FPV-1G1**	07/26/16	Peppers	< 420	1,931 ± 695	< 49	< 49	< 39	< 843	< 197
SA-FPV-1G1**	07/26/16	Corn	< 281	923 ± 489	< 37	< 30	< 38	< 620	< 111
SA-FPV-1G1**	07/26/16	Peaches	< 175	1,849 ± 362	< 22	< 16	< 18	< 351	< 84
SA-FPV-2G2**	05/16/16	Asparagus	< 183	2,133 ± 450	< 49	< 21	< 22	< 672	< 117
SA-FPV-2G2**	08/01/16	Peppers	< 272	2,069 ± 502	< 38	< 28	< 32	< 667	< 122
SA-FPV-2G2**	08/01/16	Corn	< 247	1,489 ± 510	< 40	< 31	< 29	< 785	< 130
SA-FPV-2G2**	08/01/16	Tomatoes	< 160	2,021 ± 393	< 25	< 20	< 25	< 501	< 86
SA-FPV-3H5**	07/26/16	Tomatoes	< 255	1,155 ± 488	< 33	< 32	< 29	< 631	< 100
SA-FPV-3H5**	07/26/16	Peppers	< 407	2,257 ± 886	< 52	< 50	< 54	< 858	< 159
SA-FPV-3H5**	07/26/16	Corn	< 268	1,143 ± 537	< 44	< 47	< 43	< 990	< 172
	AVERAGE*		-	2,425 ± 5,517	-	-	-	-	-

(C) CONTROL LOCATION.
* THE AVERAGE AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES.
** MANAGEMENT AUDIT SAMPLE: NOT REQUIRED BY ODCM.
- INDICATES AVERAGE WAS NOT CALCULATED DUE TO NO POSITIVE VALUES FOR THE REPORTING PERIOD.

TABLE C-11 CONCENTRATIONS OF GAMMA EMITTERS IN FODDER CROPS**, 2016

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

STATION ID	COLLECTION DATE	SAMPLE TYPE	<----------GAMMA EMITTERS---------->						
			Be-7	K-40	I-131	Cs-134	Cs-137	Ra-226	Th-232
SA-VGT-3G1 (C)	12/27/16	Silage	308 ± 106	3,565 ± 386	< 38	< 12	< 14	< 343	< 60
SA-VGT-13E3	12/19/16	Silage	< 224	3,478 ± 435	< 25	< 23	< 25	< 437	< 103
SA-VGT-14F4	12/19/16	Silage	293 ± 118	2,983 ± 276	< 18	< 15	< 14	< 372	< 61
SA-VGT-2G3	12/27/16	Silage	< 194	3,128 ± 423	< 55	< 18	< 19	< 484	< 75
	AVERAGE*		300 ± 22	3,289 ± 556	-	-	-	-	-
ALL INDICATOR AVERAGE*			293 ± 118	3,196 ± 509	-	-	-	-	-

(C) CONTROL LOCATION.
* THE AVERAGE AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES, IF THERE IS ONLY 1 POSITIVE VALUE THE AVERAGE AND THE ERROR ARE DISPLAYED.
** MANAGEMENT AUDIT SAMPLE: NOT REQUIRED BY ODCM.
- INDICATES AVERAGE WAS NOT CALCULATED DUE TO NO POSITIVE VALUES FOR THE REPORTING PERIOD.

TABLE C-12 CONCENTRATIONS OF GAMMA EMITTERS IN SOIL**, 2016

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

STATION ID	COLLECTION DATE	<----------GAMMA EMITTERS---------->					
		Be-7	K-40	Cs-134	Cs-137	Ra-226	Th-232
SA-SOL-2G3	12/07/16	< 545	7,074 ± 1,113	< 58	< 52	< 1,164	511 ± 168
SA-SOL-3G1	12/07/16	< 772	7,955 ± 1,329	< 71	< 102	< 1,682	645 ± 270
SA-SOL-7S2	12/07/16	< 557	6,844 ± 1,268	< 67	< 69	< 1,299	358 ± 150
SA-SOL-10D1	12/07/16	< 436	10,050 ± 1,247	< 49	173 ± 72	2,750 ± 1,543	935 ± 127
SA-SOL-13E3	12/07/16	< 546	16,980 ± 1,801	< 63	< 108	< 1,367	490 ± 191
SA-SOL-16E1	12/07/16	< 508	13,360 ± 1,530	< 56	< 75	2,537 ± 1,634	699 ± 164
SA-SOL-2F9	12/07/16	< 523	10,830 ± 1,169	< 66	< 86	< 1,524	759 ± 246
SA-SOL-5F1	12/07/16	< 562	7,572 ± 1,271	< 58	< 98	< 1,672	650 ± 148
SA-SOL-14F4	12/07/16	< 485	12,870 ± 1,332	< 47	344 ± 56	1,499 ± 874	748 ± 164
	AVERAGE*	-	10,393 ± 6,934	-	259 ± 242	2,262 ± 1,339	644 ± 343

* THE AVERAGE AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES.
** MANAGEMENT AUDIT SAMPLE: NOT REQUIRED BY ODCM.
- INDICATES AVERAGE WAS NOT CALCULATED DUE TO NO POSITIVE VALUES FOR THE REPORTING PERIOD.

TABLE C-13 CONCENTRATIONS OF GAMMA EMITTERS IN GAME**, 2016

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

STATION ID	COLLECTION DATE	SAMPLE TYPE	<----------GAMMA EMITTERS---------->				
			Be-7	I-131	K-40	Cs-134	Cs-137
SA-GAM-3E1	03/15/16	Muskrat	< 37	< 8	2,727 ± 123	< 4	< 5
SA-GAM-13E3	02/23/16	Muskrat	< 31	< 7	2,855 ± 230	< 3	< 3
	AVERAGE*		-	-	2,791 ± 181	-	-

* THE AVERAGE AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES.
** MANAGEMENT AUDIT SAMPLE: NOT REQUIRED BY ODCM.
- INDICATES AVERAGE WAS NOT CALCULATED DUE TO NO POSITIVE VALUES FOR THE REPORTING PERIOD.

TABLE C-14 CONCENTRATIONS OF TRITIUM IN SURFACE WATER, 2016

Results in Units of pCi/L ± 2 Sigma

COLLECTION PERIOD		CONTROL	INDICATORS			
START	STOP	SA-SWA-12C1 (C)	SA-SWA-11A1	SA-SWA-7E1	SA-SWA-1F2	SA-SWA-16F1
01/06/16	01/20/16	< 191	< 192	< 189	< 190	< 191
02/02/16	02/17/16	< 182	< 181	< 179	< 182	< 180
03/08/16	03/22/16	< 185	< 186	< 186	< 185	< 187
04/10/16	04/21/16	< 195	2,540 + 321	< 198	< 197	< 195
05/03/16	05/17/16	< 195	< 177	< 198	< 197	< 195
06/06/16	06/25/16	< 175	< 190	< 177	< 176	< 175
07/08/16	07/20/16	< 187	< 183	< 191	< 191	< 190
08/03/16	08/19/16	< 177	1,600 + 227	< 181	< 183	< 182
09/07/16	09/23/16	< 163	< 180	< 163	< 165	< 161
10/06/16	10/21/16	< 179	< 178	< 178	< 178	< 176
11/07/16	11/23/16	< 177	< 187	< 180	< 180	< 176
12/06/16	12/19/16	< 192	< 187	< 190	< 194	< 194
AVERAGE*		-	2,070 ± 1,329	-	-	-

* THE AVERAGE AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES.
- INDICATES AVERAGE WAS NOT CALCULATED DUE TO NO POSITIVE VALUES FOR THE REPORTING PERIOD.

TABLE C-15 CONCENTRATIONS OF IODINE-131 AND GAMMA EMITTERS IN SURFACE WATER, 2016

Results in Units of pCi/L ± 2 Sigma

STATION ID	COLLECTION DATE	I-131 LL	<----------GAMMA EMITTERS----------> K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	ZrNb-95	Cs-134	Cs-137	BaLa-140
SA-SWA-12C1 (C)	01/06/16	< 1.0	253 ± 64	< 4	< 5	< 10	< 5	< 8	< 4	< 4	< 4	< 6
	02/02/16	< 0.5	86 ± 27	< 2	< 2	< 4	< 2	< 4	< 2	< 2	< 2	< 3
	03/08/16	< 0.6	< 54	< 5	< 6	< 17	< 9	< 17	< 8	< 7	< 8	< 14
	04/10/16	< 0.3	< 27	< 4	< 4	< 11	< 5	< 9	< 5	< 4	< 5	< 7
	05/03/16	< 0.5	66 ± 41	< 2	< 3	< 6	< 2	< 5	< 3	< 2	< 2	< 5
	06/06/16	< 0.5	104 ± 62	< 5	< 5	< 12	< 7	< 12	< 8	< 6	< 7	< 12
	07/08/16	< 0.5	< 54	< 5	< 5	< 9	< 5	< 11	< 6	< 5	< 6	< 8
	08/03/16	< 0.3	< 28	< 3	< 3	< 6	< 4	< 6	< 3	< 2	< 4	< 7
	09/07/16	< 0.7	< 57	< 6	< 6	< 16	< 5	< 11	< 7	< 7	< 6	< 8
	10/06/16	< 0.3	139 ± 64	< 6	< 4	< 10	< 5	< 9	< 6	< 4	< 5	< 7
	11/07/16	< 0.6	< 44	< 4	< 4	< 8	< 5	< 8	< 5	< 4	< 4	< 6
	12/06/16	< 0.6	125 ± 59	< 4	< 4	< 7	< 4	< 8	< 4	< 4	< 4	< 7
	AVERAGE*	-	129 ± 133	-	-	-	-	-	-	-	-	-
SA-SWA-11A1	01/06/16	< 0.7	165 ± 74	< 4	< 5	< 10	< 5	< 8	< 5	< 4	< 5	< 8
	02/02/16	< 0.5	85 ± 48	< 4	< 5	< 9	< 4	< 8	< 4	< 4	< 5	< 7
	03/08/16	< 0.5	< 70	< 5	< 3	< 13	< 6	< 11	< 4	< 4	< 4	< 5
	04/10/16	< 0.3	< 46	< 5	< 5	< 11	< 4	< 10	< 5	< 5	< 5	< 8
	05/03/16	< 0.5	< 23	< 2	< 2	< 6	< 3	< 5	< 3	< 2	< 3	< 6
	06/06/16	< 0.6	< 58	< 7	< 7	< 13	< 8	< 12	< 5	< 6	< 7	< 4
	07/08/16	< 0.5	< 40	< 5	< 6	< 12	< 5	< 14	< 6	< 5	< 6	< 8
	08/03/16	< 0.3	< 36	< 3	< 4	< 7	< 3	< 8	< 4	< 3	< 4	< 10
	09/07/16	< 0.6	124 ± 55	< 4	< 5	< 12	< 6	< 10	< 5	< 5	< 5	< 7
	10/06/16	< 0.3	< 31	< 3	< 3	< 6	< 3	< 6	< 3	< 3	< 3	< 6
	11/07/16	< 0.5	< 41	< 4	< 5	< 10	< 4	< 11	< 5	< 4	< 5	< 10
	12/06/16	< 0.8	168 ± 64	< 4	< 4	< 10	< 4	< 8	< 5	< 4	< 5	< 7
	AVERAGE*	-	135 ± 78	-	-	-	-	-	-	-	-	-

TABLE C-15 CONCENTRATIONS OF IODINE-131 AND GAMMA EMITTERS IN SURFACE WATER, 2016

Results in Units of pCi/L ± 2 Sigma

STATION ID	COLLECTION DATE	I-131 LL	<----------GAMMA EMITTERS----------> K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	ZrNb-95	Cs-134	Cs-137	BaLa-140
SA-SWA-7E1	01/06/16	< 0.6	113 ± 50	< 4	< 4	< 11	< 4	< 7	< 5	< 4	< 4	< 7
	02/02/16	< 0.5	< 38	< 4	< 4	< 7	< 4	< 9	< 4	< 4	< 4	< 4
	03/08/16	< 0.7	< 149	< 8	< 3	< 11	< 6	< 13	< 1	< 5	< 8	< 8
	04/10/16	< 0.3	137 ± 65	< 5	< 5	< 10	< 5	< 13	< 5	< 4	< 6	< 9
	05/03/16	< 0.6	78 ± 46	< 3	< 3	< 8	< 3	< 7	< 4	< 3	< 3	< 8
	06/06/16	< 0.7	< 52	< 4	< 8	< 12	< 6	< 14	< 5	< 5	< 7	< 7
	07/08/16	< 0.6	131 ± 83	< 7	< 6	< 16	< 6	< 11	< 8	< 6	< 7	< 9
	08/03/16	< 0.6	146 ± 56	< 3	< 3	< 7	< 3	< 6	< 4	< 3	< 4	< 7
	09/07/16	< 0.6	151 ± 88	< 6	< 7	< 16	< 7	< 12	< 7	< 5	< 7	< 11
	10/06/16	< 0.4	148 ± 61	< 5	< 4	< 12	< 5	< 9	< 6	< 5	< 5	< 9
	11/07/16	< 0.7	< 76	< 5	< 6	< 13	< 5	< 12	< 5	< 5	< 6	< 9
	12/06/16	< 0.6	106 ± 59	< 5	< 4	< 8	< 4	< 10	< 4	< 4	< 4	< 7
	AVERAGE*	-	126 ± 51	-	-	-	-	-	-	-	-	-
SA-SWA-1F2	1/6/2016	< 0.7	< 44	< 3	< 4	< 9	< 5	< 7	< 4	< 4	< 4	< 8
	2/2/2016	< 0.4	< 90	< 3	< 4	< 9	< 4	< 9	< 4	< 4	< 4	< 6
	3/8/2016	< 0.6	< 155	< 4	< 7	< 10	< 6	< 13	< 5	< 4	< 5	< 14
	04/10/16	< 0.2	< 47	< 4	< 4	< 11	< 3	< 7	< 4	< 3	< 5	< 6
	05/03/16	< 0.5	< 18	< 2	< 2	< 4	< 2	< 4	< 2	< 2	< 2	< 5
	06/06/16	< 0.5	< 93	< 9	< 8	< 18	< 7	< 16	< 9	< 7	< 8	< 7
	07/08/16	< 0.6	106 ± 60	< 5	< 4	< 10	< 6	< 10	< 5	< 4	< 6	< 5
	08/03/16	< 0.5	78 ± 48	< 4	< 4	< 8	< 4	< 7	< 4	< 3	< 3	< 8
	09/07/16	< 0.7	< 57	< 6	< 5	< 9	< 7	< 9	< 7	< 5	< 5	< 8
	10/06/16	< 0.3	127 ± 58	< 6	< 6	< 13	< 6	< 12	< 6	< 5	< 7	< 10
	11/07/16	< 0.6	< 48	< 4	< 4	< 10	< 4	< 10	< 4	< 4	< 5	< 6
	12/06/16	< 0.7	111 ± 54	< 4	< 4	< 9	< 3	< 8	< 5	< 4	< 4	< 6
	AVERAGE*	-	105 ± 41	-	-	-	-	-	-	-	-	-

TABLE C-15 CONCENTRATIONS OF IODINE-131 AND GAMMA EMITTERS IN SURFACE WATER, 2016

Results in Units of pCi/L ± 2 Sigma

STATION ID	COLLECTION DATE	I-131 LL	<----------GAMMA EMITTERS----------> K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	ZrNb-95	Cs-134	Cs-137	BaLa-140
SA-SWA-16F1	1/6/2016	< 0.9	< 41	< 4	< 3	< 7	< 3	< 7	< 4	< 3	< 3	< 6
	2/2/2016	< 0.5	< 28	< 3	< 3	< 6	< 3	< 6	< 3	< 3	< 3	< 4
	3/8/2016	< 0.7	< 66	< 5	< 7	< 10	< 3	< 14	< 6	< 6	< 7	< 11
	04/10/16	< 0.3	< 39	< 4	< 5	< 12	< 6	< 10	< 4	< 4	< 5	< 7
	05/03/16	< 0.5	< 24	< 3	< 3	< 5	< 3	< 5	< 3	< 2	< 3	< 6
	06/06/16	< 0.5	< 282	< 10	< 7	< 22	< 11	< 18	< 9	< 5	< 7	< 11
	07/08/16	< 0.5	< 43	< 6	< 5	< 11	< 5	< 11	< 6	< 6	< 6	< 6
	08/03/16	< 0.4	< 85	< 3	< 2	< 5	< 3	< 5	< 2	< 2	< 3	< 4
	09/07/16	< 0.7	< 56	< 5	< 5	< 11	< 5	< 13	< 6	< 5	< 6	< 9
	10/06/16	< 0.4	128 ± 84	< 4	< 5	< 10	< 5	< 10	< 6	< 4	< 6	< 8
	11/07/16	< 0.7	< 40	< 4	< 5	< 12	< 5	< 10	< 5	< 5	< 4	< 10
	12/06/16	< 0.5	< 97	< 4	< 4	< 9	< 4	< 9	< 6	< 4	< 4	< 5
	AVERAGE*	-	128 ± 84	-	-	-	-	-	-	-	-	-
ALL INDICATOR AVERAGE*		-	124 ± 56	-	-	-	-	-	-	-	-	-

* THE AVERAGE AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES, IF THERE IS ONLY 1 POSITIVE VALUE THE AVERAGE AND THE ERROR ARE DISPLAYED.

- INDICATES AVERAGE WAS NOT CALCULATED DUE TO NO POSITIVE VALUES FOR THE REPORTING PERIOD.

TABLE C-16 CONCENTRATIONS OF GAMMA EMITTERS IN EDIBLE FISH, 2016

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

STATION ID	COLLECTION DATE	<----------GAMMA EMITTERS---------->								
		K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137	Ra-226
SA-ESF-12C1 (C)	04/25/16	4,353 ± 1,323	< 89	< 89	< 128	< 81	< 178	< 88	< 94	< 1,293
	04/25/16	4,534 ± 1,111	< 67	< 57	< 117	< 57	< 137	< 67	< 59	< 1,367
	10/25/16	3,531 ± 710	< 38	< 31	< 85	< 37	< 82	< 39	< 48	< 736
	10/25/16	4,417 ± 812	< 49	< 63	< 120	< 61	< 146	< 71	< 60	< 1,431
	AVERAGE*	4,209 ± 916	-	-	-	-	-	-	-	-
SA-ESF-11A1	04/25/16	4,244 ± 1,315	< 108	< 106	< 200	< 96	< 258	< 73	< 93	< 1,864
	10/26/16	3,325 ± 1,144	< 82	< 46	< 209	< 85	< 149	< 71	< 62	< 1,382
	AVERAGE*	3,785 ± 1,300	-	-	-	-	-	-	-	-
SA-ESF-7E1	04/25/16	3,505 ± 1,173	< 84	< 76	< 155	< 90	< 155	< 78	< 83	< 1,871
	04/25/16	3,725 ± 1,182	< 65	< 37	< 157	< 45	< 94	< 50	< 49	< 1,197
	10/26/16	4,668 ± 1,042	< 37	< 43	< 96	< 58	< 113	< 46	< 52	< 1,211
	10/26/16	3,761 ± 849	< 49	< 67	< 109	< 46	< 143	< 69	< 58	< 1,422
	AVERAGE*	3,915 ± 1,030	-	-	-	-	-	-	-	-
ALL INDICATOR AVERAGE*		3,871 ± 996	-	-	-	-	-	-	-	-

(C) CONTROL LOCATION.
* THE AVERAGE AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES.
- INDICATES AVERAGE WAS NOT CALCULATED DUE TO NO POSITIVE VALUES FOR THE REPORTING PERIOD.

TABLE C-17 CONCENTRATIONS OF GAMMA EMITTERS IN CRABS, 2016

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

STATION ID	COLLECTION DATE	<----------GAMMA EMITTERS---------->								
		K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137	Ra-226
SA-ECH-12C1 (C)	07/27/16	3,238 ± 928	< 48	< 50	< 90	< 64	< 117	< 51	< 64	< 1,193
	08/22/16	2,203 ± 666	< 48	< 54	< 119	< 50	< 98	< 57	< 52	< 1,171
	AVERAGE*	2,721 ± 1,464	-	-	-	-	-	-	-	-
SA-ECH-11A1	07/27/16	2,832 ± 1,185	< 73	< 72	< 117	< 71	< 131	< 74	< 61	< 1,489
	08/22/16	3,223 ± 857	< 47	< 48	< 142	< 37	< 89	< 48	< 46	< 1,150
	AVERAGE*	3,028 ± 553	-	-	-	-	-	-	-	-

(C) CONTROL LOCATION.
* THE AVERAGE AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES.
- INDICATES AVERAGE WAS NOT CALCULATED DUE TO NO POSITIVE VALUES FOR THE REPORTING PERIOD.

TABLE C-18 CONCENTRATIONS OF GAMMA EMITTERS IN SEDIMENT, 2016

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

STATION ID	COLLECTION DATE	<----------GAMMA EMITTERS---------->					
		Be-7	K-40	Cs-134	Cs-137	Ra-226	Th-232
SA-ESS-12C1 (C)	07/05/16	< 936	16,810 ± 2,424	< 91	< 89	< 1,824	965 ± 247
	11/15/16	< 729	15,620 ± 1,738	< 60	< 67	2,513 ± 1,350	1,303 ± 249
	AVERAGE*	-	16,215 ± 1,683	-	-	2,513 ± 1,350	1,134 ± 478
SA-ESS-6S2	07/07/16	< 478	3,170 ± 790	< 35	< 45	< 1,087	< 255
	11/21/16	< 412	4,340 ± 742	< 39	< 43	1,465 ± 763	282 ± 119
	AVERAGE*	-	3,755 ± 1,655	-	-	1,465 ± 763	282 ± 119
SA-ESS-11A1	07/05/16	< 268	2,365 ± 667	< 27	< 33	< 724	227 ± 113
	11/15/16	< 405	3,690 ± 660	< 48	< 51	< 939	< 303
	AVERAGE*	-	3,028 ± 1,874	-	-	-	227 ± 113
SA-ESS-15A1	07/05/16	< 714	7,703 ± 1,489	< 56	< 79	< 1,018	< 436
	11/15/16	< 590	6,752 ± 1,052	< 48	< 57	1,883 ± 1,007	644 ± 115
	AVERAGE*	-	7,228 ± 1,345	-	-	1,883 ± 1,007	644 ± 115
SA-ESS-16A1	07/05/16	< 483	4,094 ± 925	< 54	< 57	< 1,433	558 ± 112
	11/15/16	< 621	5,473 ± 1,016	< 56	< 64	3,012 ± 1,288	886 ± 194
	AVERAGE*	-	4,784 ± 1,950	-	-	3,012 ± 1,288	722 ± 463
SA-ESS-7E1	07/05/16	< 768	14,130 ± 1,875	< 67	< 86	< 2,124	861 ± 277
	11/15/16	< 508	13,210 ± 1,235	< 73	< 67	< 1,279	849 ± 146
	AVERAGE*	-	13,670 ± 1,301	-	-	-	855 ± 17
SA-ESS-16F1	07/05/16	< 1440	16,410 ± 3,119	< 93	< 149	< 3,260	1,002 ± 435
	11/15/16	< 833	15,640 ± 1,791	< 84	< 106	< 1,717	962 ± 211
	AVERAGE*	-	16,025 ± 1,089	-	-	-	982 ± 56
ALL INDICATOR AVERAGE*		-	8,081 ± 10,515	-	-	2,120 ± 1,601	697 ± 576

(C) CONTROL LOCATION.

* THE AVERAGE AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES, IF THERE IS ONLY 1 POSITIVE VALUE THE AVERAGE AND THE ERROR ARE DISPLAYED.

- INDICATES AVERAGE WAS NOT CALCULATED DUE TO NO POSITIVE VALUES FOR THE REPORTING PERIOD.

TABLE C-19 CONCENTRATIONS OF GAMMA EMITTERS IN OYSTERS, 2016**

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

STATION ID	COLLECTION DATE	<----------GAMMA EMITTERS---------->								
		K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137	Ra-226
SA-EOY-7H1 (C)	06/14/16	< 592	< 77	< 69	< 184	< 64	< 151	< 72	< 83	< 1,363
	10/17/16	1,568 ± 726	< 64	< 64	< 196	< 66	< 136	< 61	< 72	< 1,440
	AVERAGE*	1,568 ± 726	-	-	-	-	-	-	-	-
SA-EOY-7C1	06/14/16	1,485 ± 620	< 47	< 54	< 110	< 39	< 78	< 50	< 50	< 1,093
	10/14/16	< 294	< 59	< 58	< 151	< 56	< 135	< 48	< 58	< 1,244
	AVERAGE*	1,485 ± 620	-	-	-	-	-	-	-	-

(C) CONTROL LOCATION.
* THE AVERAGE AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES, IF THERE IS ONLY 1 POSITIVE VALUE THE AVERAGE AND THE ERROR ARE DISPLAYED.
** MANAGEMENT AUDIT SAMPLE: NOT REQUIRED BY ODCM.
- INDICATES AVERAGE WAS NOT CALCULATED DUE TO NO POSITIVE VALUES FOR THE REPORTING PERIOD.

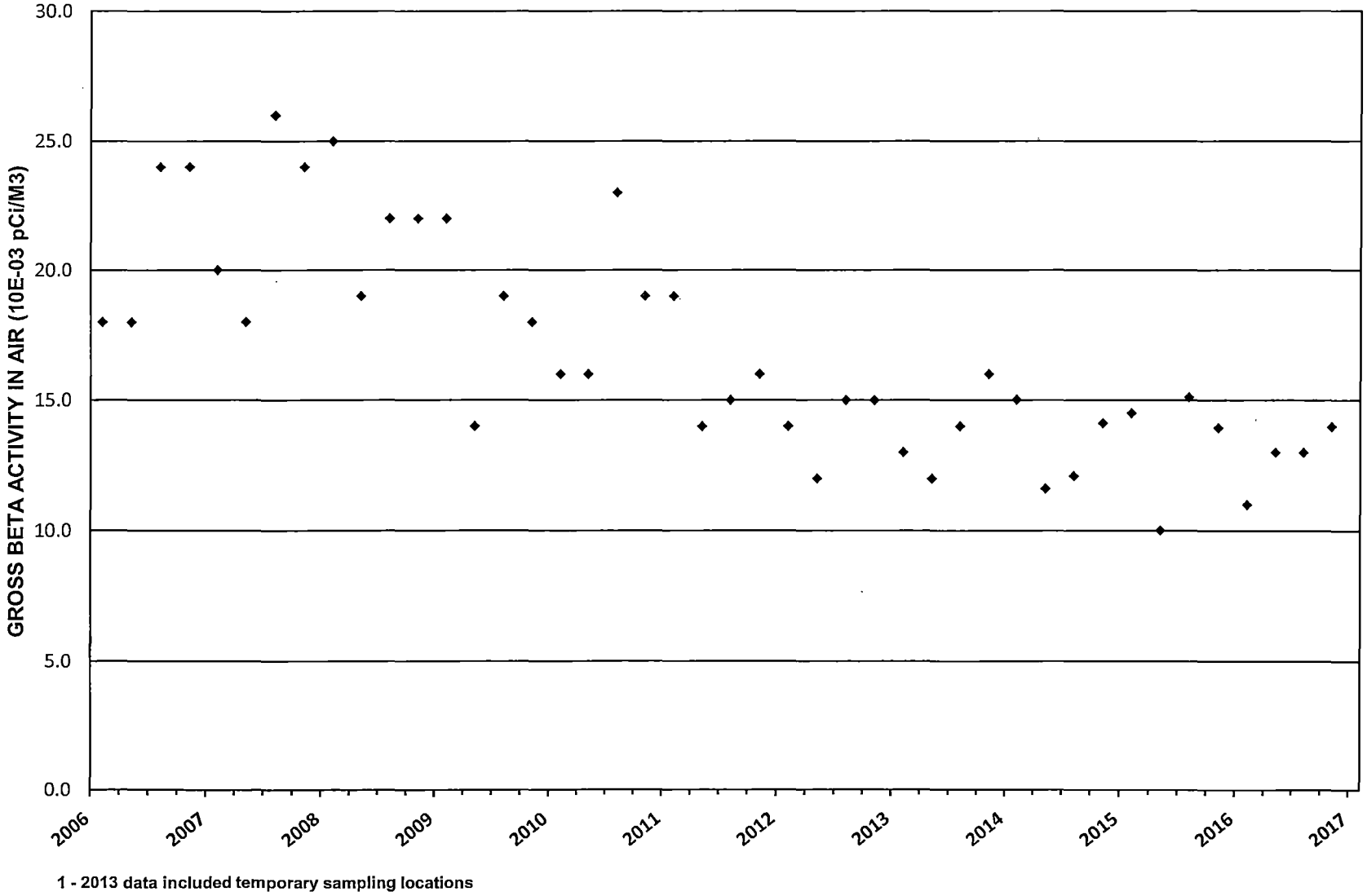
TABLE C-20 Concentrations of Gamma Emitters in Duplicate Samples from GEL

Sample Name	Date Collected	Nuclide	Result		2 Sigma	Units	Type
SA-APT-5S2	28-Mar-16	Be-7	4.38E-02	+/-	1.03E-02	pCi/m3	Air Sample Composite
SA-APT-5S2	27-Jun-16	Be-7	7.68E-02	+/-	1.26E-02	pCi/m3	Air Sample Composite
SA-APT-5S2	26-Sep-16	Be-7	6.75E-02	+/-	1.22E-02	pCi/m3	Air Sample Composite
SA-APT-5S2	27-Dec-16	Be-7	4.94E-02	+/-	8.50E-03	pCi/m3	Air Sample Composite
SA-MLK-14F4	4-Jan-16	K-40	1.42E+03	+/-	4.97E+01	pCi/L	Milk
SA-MLK-14F4	8-Feb-16	K-40	1.42E+03	+/-	6.15E+01	pCi/L	Milk
SA-MLK-14F4	7-Mar-16	K-40	1.39E+03	+/-	6.60E+01	pCi/L	Milk
SA-MLK-14F4	4-Apr-16	K-40	1.77E+03	+/-	7.12E+01	pCi/L	Milk
SA-MLK-14F4	2-May-16	K-40	1.42E+03	+/-	5.52E+01	pCi/L	Milk
SA-MLK-14F4	6-Jun-16	K-40	1.41E+03	+/-	5.77E+01	pCi/L	Milk
SA-MLK-14F4	13-Jul-16	K-40	1.48E+03	+/-	5.45E+01	pCi/L	Milk
SA-MLK-14F4	8-Aug-16	K-40	1.34E+03	+/-	5.16E+01	pCi/L	Milk
SA-MLK-14F4	22-Aug-16	K-40	1.35E+03	+/-	7.95E+01	pCi/L	Milk
SA-MLK-14F4	6-Sep-16	K-40	1.43E+03	+/-	5.46E+01	pCi/L	Milk
SA-MLK-14F4	3-Oct-16	K-40	1.38E+03	+/-	5.90E+01	pCi/L	Milk
SA-MLK-14F4	15-Nov-16	K-40	1.48E+03	+/-	6.37E+01	pCi/L	Milk
SA-MLK-14F4	5-Dec-16	K-40	1.41E+03	+/-	5.86E+01	pCi/L	Milk
SA-SWA-11A1	22-Mar-16	K-40	5.05E+01	+/-	2.65E+01	pCi/L	Surface Water
SA-SWA-11A1	27-Jun-16	K-40	7.47E+01	+/-	2.12E+01	pCi/L	Surface Water
SA-SWA-11A1	23-Sep-16	K-40	1.10E+02	+/-	2.69E+01	pCi/L	Surface Water
SA-SWA-11A1	19-Dec-16	K-40	8.12E+01	+/-	1.44E+01	pCi/L	Surface Water
SA-FPL-15S2	28-Sep-16	K-40	3.23E+03	+/-	5.39E+02	pCi/Kg	Collards
SA-FPL-15S2	30-Nov-16	K-40	3.33E+03	+/-	4.16E+02	pCi/Kg	Collards
SA-FPL-16S1	31-Aug-16	K-40	2.50E+03	+/-	2.18E+02	pCi/Kg	Cabbage
SA-FPL-1G1	26-Jul-16	K-40	2.43E+03	+/-	2.51E+02	pCi/Kg	Cabbage
SA-FPL-3H5	26-Jul-16	K-40	2.25E+03	+/-	2.21E+02	pCi/Kg	Cabbage
SA-FPL-1S1	31-Aug-16	Be-7	1.36E+02	+/-	9.17E+01	pCi/Kg	Kale
SA-FPL-1S1	31-Aug-16	K-40	4.47E+03	+/-	3.02E+02	pCi/Kg	Kale
SA-FPL-1S1	28-Sep-16	K-40	2.46E+03	+/-	4.90E+02	pCi/Kg	Cabbage
SA-FPL-1S1	31-Oct-16	Be-7	3.62E+02	+/-	1.95E+02	pCi/Kg	Cabbage
SA-FPL-1S1	31-Oct-16	K-40	2.60E+03	+/-	4.45E+02	pCi/Kg	Cabbage
SA-FPV-2G2	1-Aug-16	K-40	1.85E+03	+/-	1.66E+02	pCi/Kg	Tomatoes
SA-FPV-2G2	1-Aug-16	K-40	1.91E+03	+/-	1.63E+02	pCi/Kg	Corn
SA-FPV-1G1	26-Jul-16	K-40	2.58E+03	+/-	2.30E+02	pCi/Kg	Corn
SA-FPV-2F9	25-Apr-16	K-40	2.18E+03	+/-	1.44E+02	pCi/Kg	Asparagus
SA-FPV-2F9	12-Jul-16	K-40	1.73E+03	+/-	8.45E+01	pCi/Kg	Tomatoes
SA-FPV-2F9	12-Jul-16	K-40	2.42E+03	+/-	1.63E+02	pCi/Kg	Corn
SA-FPV-3F8	1-Aug-16	K-40	2.32E+03	+/-	2.18E+02	pCi/Kg	Peaches
SA-FPV-15F4	24-Aug-16	K-40	1.58E+03	+/-	1.77E+02	pCi/Kg	Corn
SA-FPV-15F4	24-Aug-16	K-40	1.47E+03	+/-	1.66E+02	pCi/Kg	Peppers
SA-ESS-11A1	5-Jul-16	K-40	2.50E+03	+/-	1.82E+02	pCi/Kg	Sediment
SA-ESS-11A1	5-Jul-16	Ra-226	9.30E+01	+/-	2.60E+01	pCi/Kg	Sediment
SA-ESS-11A1	15-Nov-16	K-40	5.76E+03	+/-	3.12E+02	pCi/Kg	Sediment
SA-ESS-11A1	15-Nov-16	Ra-226	4.12E+02	+/-	3.49E+01	pCi/Kg	Sediment

TABLE C-20 Concentrations of Gamma Emitters in Duplicate Samples from GEL

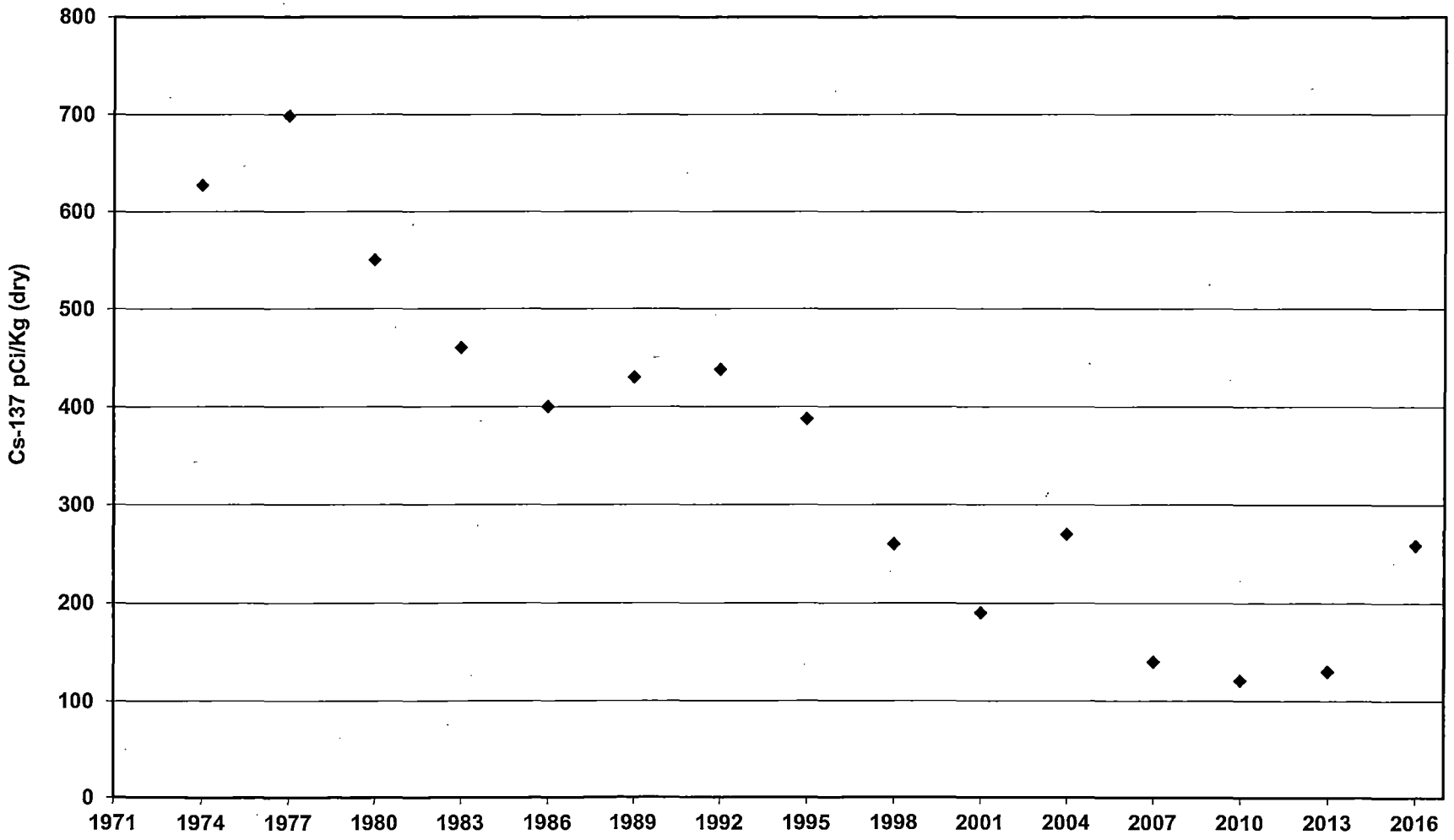
Sample Name	Date Collected	Nuclide	Result		2 Sigma	Units	Type
SA-SOL-2G3	15-Nov-16	K-40	7.59E+03	+/-	4.88E+02	pCi/Kg	Soil
SA-SOL-2G3	15-Nov-16	Ra-226	5.50E+02	+/-	5.65E+01	pCi/Kg	Soil
SA-SOL-2G3	15-Nov-16	Cs-137	2.60E+01	+/-	1.65E+01	pCi/Kg	Soil
SA-SOL-3G1	15-Nov-16	K-40	5.34E+03	+/-	3.83E+02	pCi/Kg	Soil
SA-SOL-3G1	15-Nov-16	Ra-226	2.18E+02	+/-	3.40E+01	pCi/Kg	Soil
SA-SOL-3G1	15-Nov-16	Cs-137	2.60E+01	+/-	1.65E+01	pCi/Kg	Soil
SA-SOL-7S2	15-Nov-16	K-40	6.28E+03	+/-	3.89E+02	pCi/Kg	Soil
SA-SOL-7S2	15-Nov-16	Ra-226	2.82E+02	+/-	3.73E+01	pCi/Kg	Soil
SA-SOL-7S2	15-Nov-16	Cs-137	2.32E+01	+/-	1.78E+01	pCi/Kg	Soil
SA-ECH-11A1	29-Jul-16	K-40	2.99E+03	+/-	1.99E+02	pCi/Kg	Crab
SA-ECH-12C1	29-Jul-16	K-40	3.54E+03	+/-	2.46E+02	pCi/Kg	Crab
SA-ESF-12C1	25-Apr-16	K-40	4.35E+03	+/-	1.16E+02	pCi/Kg	Fish (Bass)

FIGURE 1
GROSS BETA ACTIVITY IN AIR PARTICULATES - QUARTERLY AVERAGE FOR ALL LOCATIONS 2006 THROUGH 2016[1]



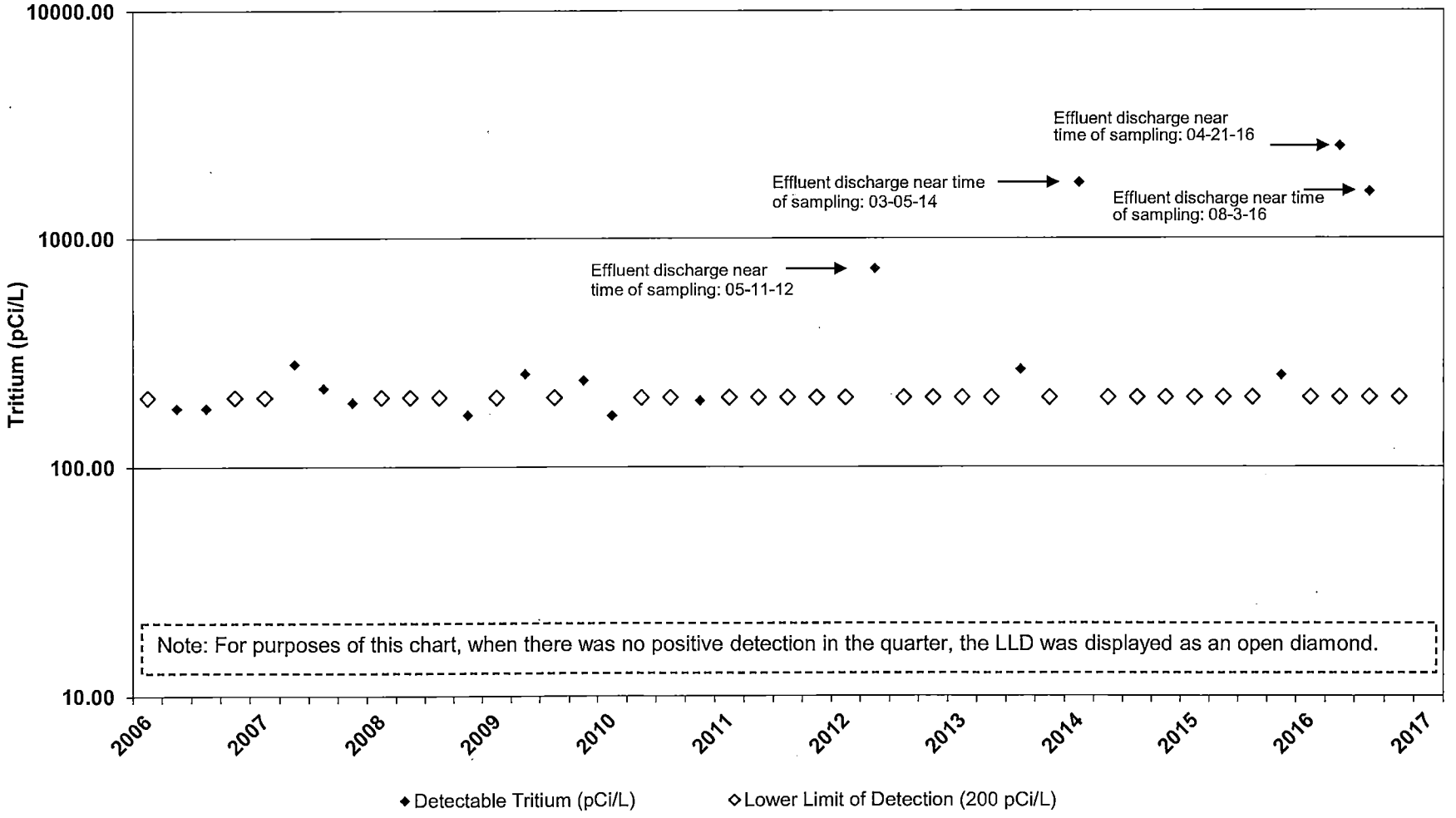
1 - 2013 data included temporary sampling locations

FIGURE 2
CESIUM-137 ACTIVITY IN SOIL 1974 THROUGH 2016
(TRIENNIAL)



Soil is sampled every three years. Last samples were taken in 2016. Annual values are an average of the results from the ten soil sites.

FIGURE 3
TRITIUM ACTIVITY IN SURFACE WATER - QUARTERLY AVERAGE
2006 THROUGH 2016



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APPENDIX D

SUMMARY OF INTER-LABORATORY COMPARISON PROGRAM

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

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
March 2016	E11476	Milk	Sr-89	pCi/L	97	86.7	1.12	A
			Sr-90	pCi/L	15	11.4	1.32	N(2)
	E11477	Milk	I-131	pCi/L	85.9	82.2	1.05	A
			Ce-141	pCi/L	106	98.4	1.08	A
			Cr-51	pCi/L	255	243	1.05	A
			Cs-134	pCi/L	134	130	1.03	A
			Cs-137	pCi/L	174	161	1.08	A
			Co-58	pCi/L	123	117	1.05	A
			Mn-54	pCi/L	141	117	1.21	W
			Fe-59	pCi/L	152	131	1.16	A
			Zn-65	pCi/L	193	179	1.08	A
			Co-60	pCi/L	259	244	1.06	A
	E11479	AP	Ce-141	pCi	69	81.1	0.85	A
			Cr-51	pCi	242	201	1.20	W
			Cs-134	pCi	98.1	107.0	0.92	A
			Cs-137	pCi	136	133	1.02	A
			Co-58	pCi	91.9	97	0.95	A
			Mn-54	pCi	98.6	96.2	1.02	A
			Fe-59	pCi	98.8	108	0.91	A
			Zn-65	pCi	131	147	0.89	A
			Co-60	pCi	209	201	1.04	A
	E11478	Charcoal	I-131	pCi	85.3	88.3	0.97	A
	E11480	Water	Fe-55	pCi/L	1800	1666	1.08	A
June 2016	E11537	Milk	Sr-89	pCi/L	94.4	94.4	1.00	A
			Sr-90	pCi/L	13.4	15.4	0.87	A
	E11538	Milk	I-131	pCi/L	96.8	94.5	1.02	A
			Ce-141	pCi/L	129	139	0.93	A
			Cr-51	pCi/L	240	276	0.87	A
			Cs-134	pCi/L	157	174	0.90	A
			Cs-137	pCi/L	117	120	0.98	A
			Co-58	pCi/L	131	142	0.92	A
			Mn-54	pCi/L	128	125	1.02	A
			Fe-59	pCi/L	132	122	1.08	A
			Zn-65	pCi/L	235	235	1.00	A
			Co-60	pCi/L	169	173	0.98	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.

(e) CAP: NCR 16-26 was initiated

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

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
June 2016	E11539	Charcoal	I-131	pCi	86.1	89.4	0.96	A
	E11540	AP	Ce-141	pCi	105	99.8	1.05	A
			Cr-51	pCi	216	198.0	1.09	A
			Cs-134	pCi	113	125	0.90	A
			Cs-137	pCi	94.5	86.6	1.09	A
			Co-58	pCi	101	102	0.99	A
			Mn-54	pCi	88.8	90.2	0.98	A
			Fe-59	pCi	82	87.5	0.94	A
			Zn-65	pCi	174	169	1.03	A
			Co-60	pCi	143	124	1.15	A
	E11541	Water	Fe-55	pCi/L	164	186	0.88	A
September 2016	E11609	Milk	Sr-89	pCi/L	90	90.9	0.99	A
			Sr-90	pCi/L	13.3	13.7	0.97	A
	E11610	Milk	I-131	pCi/L	80.4	71.9	1.12	A
			Ce-141	pCi/L	81.3	93	0.87	A
			Cr-51	pCi/L	198	236	0.84	A
			Cs-134	pCi/L	122	136	0.90	A
			Cs-137	pCi/L	119	119	1.00	A
			Co-58	pCi/L	92.2	97.4	0.95	A
			Mn-54	pCi/L	156	152	1.03	A
			Fe-59	pCi/L	97.5	90.6	1.08	A
			Zn-65	pCi/L	189	179	1.06	A
			Co-60	pCi/L	131	135	0.97	A
	E11611	Charcoal	I-131	pCi	52.4	59.9	0.87	A
	E11612	AP	Ce-141	pCi	67.5	63.6	1.06	A
			Cr-51	pCi	192	161.0	1.19	A
			Cs-134	pCi	91.4	92.6	0.99	A
			Cs-137	pCi	93.9	80.8	1.16	A
			Co-58	pCi	66	66.4	0.99	A
			Mn-54	pCi	104	104	1.00	A
			Fe-59	pCi	60.5	61.8	0.98	A
			Zn-65	pCi	140	122	1.15	A
			Co-60	pCi	119	91.9	1.29	W

(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-1 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES
(PAGE 3 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
September 2016	E11613	Water	Fe-55	pCi/L	1990	1670	1.19	A
	E11614	Soil	Ce-141	pCi/g	0.153	0.175	0.87	A
			Cr-51	pCi/g	0.482	0.441	1.09	A
			Cs-134	pCi/g	0.270	0.254	1.06	A
			Cs-137	pCi/g	0.313	0.299	1.05	A
			Co-58	pCi/g	0.177	0.182	0.97	A
			Mn-54	pCi/g	0.340	0.285	1.19	A
			Fe-59	pCi/g	0.206	0.17	1.21	W
			Zn-65	pCi/g	0.388	0.335	1.16	A
			Co-60	pCi/g	0.284	0.252	1.13	A
December 2016	E11699	Milk	Sr-89	pCi/L	95	74.2	1.28	W
			Sr-90	pCi/L	14.7	10	1.47	N(3)
	E11700	Milk	I-131	pCi/L	97.5	97.4	1.00	A
			Ce-141	pCi/L	136	143	0.95	A
			Cr-51	pCi/L	247	280	0.88	A
			Cs-134	pCi/L	164	178	0.92	A
			Cs-137	pCi/L	120	126	0.95	A
			Co-58	pCi/L	139	146	0.95	A
			Mn-54	pCi/L	126	129	0.98	A
			Fe-59	pCi/L	114	125	0.91	A
			Zn-65	pCi/L	237	244	0.97	A
			Co-60	pCi/L	168	178	0.94	A
	E11701	Charcoal	I-131	pCi	95.6	98	0.98	A
	E11702	AP	Ce-141	pCi	91.7	97.7	0.94	A
			Cr-51	pCi	210	192.0	1.09	A
			Cs-134	pCi	122	122	1.00	A
			Cs-137	pCi	93.9	86.4	1.09	A
			Co-58	pCi	92	100	0.92	A
			Mn-54	pCi	93.7	88.5	1.06	A
			Fe-59	pCi	84.9	84.5	1.00	A
			Zn-65	pCi	176	167	1.05	A
			Co-60	pCi	151	122	1.24	W
	E11702	AP	Sr-89	pCi	79.1	92	0.86	A
			Sr-90	pCi	10	12.5	0.80	A
	E11703	Water	Fe-55	pCi/L	2180	1800	1.21	W

(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.

(e) CAP: NCR 16-35 was initiated

TABLE D-2 **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)
March 2016	16-MaW34	Water	Am-241	Bq/L	0.008		(1)	A
			Ni-63	Bq/L	12.4	12.3	8.6 - 16.0	A
			Pu-238	Bq/L	1.4900	1.2440	0.871 - 1.617	A
			Pu-239/240	Bq/L	0.729	0.641	0.449 - 0.833	A
	16-MaS34	Soil	Ni-63	Bq/kg	1140	1250.0	875 - 1625	A
			Sr-90	Bq/kg	8.15		(1)	A
	16-RdF34	AP	U-234/233	Bq/sample	0.1620	0.1650	0.116 - 0.215	A
			U-238	Bq/sample	0.163	0.172	0.120 - 0.224	A
	16-GrF34	AP	Gr-A	Bq/sample	0.608	1.20	0.36 - 2.04	A
			Gr-B	Bq/sample	0.8060	0.79	0.40 - 1.19	A
	16-RdV34	Vegetation	Cs-134	Bq/sample	10.10	10.62	7.43 - 13.81	A
			Cs-137	Bq/sample	6.0	5.62	3.93 - 7.31	A
			Co-57	Bq/sample	13.3000	11.8	8.3 - 15.3	A
			Co-60	Bq/sample	0.013		(1)	A
			Mn-54	Bq/sample	0.0150		(1)	A
			Sr-90	Bq/sample	0.301		(1)	N(4)
			Zn-65	Bq/sample	10.500	9.6	6.7 - 12.5	A
September 2016	16-MaW35	Water	Am-241	Bq/L	0.626	0.814	.570 - 1058	W
			Ni-63	Bq/L	12.4	17.2	12.0 - 22.4	A
			Pu-238	Bq/L	1.23	1.13	0.79 - 1.47	W
			Pu-239/240	Bq/L	0.0318	0.013	(1)	A
	16-MaS35	Soil	Ni-63	Bq/kg	724	990	693 - 1287	A
			Sr-90	Bq/kg	747	894	626 - 1162	A
	16-RdF35	AP	U-234/233	Bq/sample	0.160	0.15	0.105 - 0.195	A
			U-238	Bq/sample	0.157	0.156	0.109 - 0.203	A
	16-RdV35	Vegetation	Cs-134	Bq/sample	-0.103		(1)	A
			Cs-137	Bq/sample	5.64	5.54	3.88 - 7.20	A
			Co-57	Bq/sample	7.38	6.81	4.77 - 8.85	A
			Co-60	Bq/sample	4.81	4.86	3.40 - 6.32	A
			Mn-54	Bq/sample	7.4	7.27	5.09 - 9.45	A
			Sr-90	Bq/sample	0.774	0.80	0.56 - 1.04	A
			Zn-65	Bq/sample	5.46	5.4	3.78 - 7.02	A

(1) False positive test.

(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.

(4) CAP: NCR 16-14 was initiated

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

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Limits	Evaluation (c)
May 2016	RAD-105	Water	Sr-89	pCi/L	48.9	48.2	37.8 - 55.6	A
			Sr-90	pCi/L	25.0	28.5	20.7 - 33.1	A
			Ba-133	pCi/L	53.1	58.8	48.7 - 64.9	A
			Cs-134	pCi/L	40.9	43.3	34.6 - 47.6	A
			Cs-137	pCi/L	84.8	78.4	70.6 - 88.9	A
			Co-60	pCi/L	108	102	91.8 - 114	A
			Zn-65	pCi/L	226	214	193 - 251	A
			Gr-A	pCi/L	38.9	62.7	32.9 - 77.8	A
			Gr-B	pCi/L	41.9	39.2	26.0 - 46.7	A
			I-131	pCi/L	24.1	26.6	22.1 - 31.3	A
			U-Nat	pCi/L	4.68	4.64	3.39 - 5.68	A
			H-3	pCi/L	7720	7840	6790 - 8620	A
November 2016	RAD-107	Water	Sr-89	pCi/L	43.0	43.3	33.4 - 50.5	A
			Sr-90	pCi/L	30.0	33.6	24.6 - 38.8	A
			Ba-133	pCi/L	47.8	54.9	45.4 - 60.7	A
			Cs-134	pCi/L	72.9	81.8	67.0 - 90.0	A
			Cs-137	pCi/L	189	210	189 - 233	A
			Co-60	pCi/L	58.4	64.5	58.0 - 73.4	A
			Zn-65	pCi/L	243	245	220 - 287	A
			Gr-A	pCi/L	37.2	68.4	35.9 - 84.5	A
			Gr-B	pCi/L	35.1	33.9	22.1 - 41.6	A
			I-131	pCi/L	23.5	26.3	21.9 - 31.0	A
			U-Nat	pCi/L	49.2	51.2	41.6 - 56.9	A
			H-3	pCi/L	918	9820	8540 - 10800	N(5)
	MRAD-25	AP	Gr-A	pCi/Filter	56.8	71.2	23.9 - 111	A

(a) Teledyne Brown Engineering reported result.

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

(c) ERA evaluation: A=acceptable. Reported result falls within the Warning Limits. N=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.

(5) CAP: NCR 16-34 was initiated

Table D-4

GEL 2016 ECKERT & ZIEGLER ANALYTICS PERFORMANCE EVALUATION RESULTS

PT Provider	Quarter / Year	Report Date	Sample Number	Sample Media	Unit	Analyte / Nuclide	GEL	Known value	Acceptance Range/ Ratio	Evaluation
EZA	4th/2015	2/18/2016	E11412	Cartridge	pCi	I-131	7.73E+01	7.98E+01	0.97	A
EZA	4th/2015	2/18/2016	E11413	Milk	pCi/L	Sr-89	9.41E+01	8.68E+01	1.08	A
EZA	4th/2015	2/18/2016	E11413	Milk	pCi/L	Sr-90	9.74E+00	1.25E+01	0.78	A
EZA	4th/2015	2/18/2016	E11414	Milk	pCi/L	I-131	1.01E+02	9.12E+01	1.11	A
EZA	4th/2015	2/18/2016	E11414	Milk	pCi/L	Ce-141	1.36E+02	1.29E+02	1.06	A
EZA	4th/2015	2/18/2016	E11414	Milk	pCi/L	Cr-51	2.79E+02	2.81E+02	0.99	A
EZA	4th/2015	2/18/2016	E11414	Milk	pCi/L	Cs-134	1.45E+02	1.60E+02	0.91	A
EZA	4th/2015	2/18/2016	E11414	Milk	pCi/L	Cs-137	1.15E+02	1.15E+02	1.00	A
EZA	4th/2015	2/18/2016	E11414	Milk	pCi/L	Co-58	1.06E+02	1.10E+02	0.96	A
EZA	4th/2015	2/18/2016	E11414	Milk	pCi/L	Mn-54	1.53E+02	1.45E+02	1.06	A
EZA	4th/2015	2/18/2016	E11414	Milk	pCi/L	Fe-59	1.19E+02	1.08E+02	1.10	A
EZA	4th/2015	2/18/2016	E11414	Milk	pCi/L	Zn-65	2.69E+02	2.48E+02	1.08	A
EZA	4th/2015	2/18/2016	E11414	Milk	pCi/L	Co-60	2.12E+02	2.13E+02	0.99	A
EZA	4th/2015	2/18/2016	E11415	Water	pCi/L	I-131	1.05E+02	9.26E+01	1.13	A
EZA	4th/2015	2/18/2016	E11415	Water	pCi/L	Ce-141	1.27E+02	1.12E+02	1.14	A
EZA	4th/2015	2/18/2016	E11415	Water	pCi/L	Cr-51	2.60E+02	2.44E+02	1.07	A
EZA	4th/2015	2/18/2016	E11415	Water	pCi/L	Cs-134	1.25E+02	1.39E+02	0.90	A
EZA	4th/2015	2/18/2016	E11415	Water	pCi/L	Cs-137	1.12E+02	9.95E+01	1.13	A
EZA	4th/2015	2/18/2016	E11415	Water	pCi/L	Co-58	9.73E+01	9.56E+01	1.02	A
EZA	4th/2015	2/18/2016	E11415	Water	pCi/L	Mn-54	1.41E+02	1.26E+02	1.12	A
EZA	4th/2015	2/18/2016	E11415	Water	pCi/L	Fe-59	1.11E+02	9.34E+01	1.19	A
EZA	4th/2015	2/18/2016	E11415	Water	pCi/L	Zn-65	2.43E+02	2.15E+02	1.13	A
EZA	4th/2015	2/18/2016	E11415	Water	pCi/L	Co-60	1.92E+02	1.85E+02	1.04	A
EZA	1st/2016	5/16/2015	E11445	Cartridge	pCi	I-131	9.39E+01	8.86E+01	1.06	A
EZA	1st/2016	5/16/2015	E11446	Milk	pCi/L	Sr-89	8.16E+01	8.67E+01	0.94	A
EZA	1st/2016	5/16/2015	E11446	Milk	pCi/L	Sr-90	1.08E+01	1.14E+01	0.95	A
EZA	1st/2016	5/16/2015	E11447	Milk	pCi/L	I-131	9.41E+01	8.22E+01	1.15	A
EZA	1st/2016	5/16/2015	E11447	Milk	pCi/L	Ce-141	1.05E+02	9.84E+01	1.07	A
EZA	1st/2016	5/16/2015	E11447	Milk	pCi/L	Cr-51	2.69E+02	2.43E+02	1.11	A
EZA	1st/2016	5/16/2015	E11447	Milk	pCi/L	Cs-134	1.13E+02	1.30E+02	0.87	A
EZA	1st/2016	5/16/2015	E11447	Milk	pCi/L	Cs-137	1.64E+02	1.61E+02	1.02	A

Table D-4 (CONT.)

GEL 2016 ECKERT & ZIEGLER ANALYTICS PERFORMANCE EVALUATION RESULTS

PT Provider	Quarter / Year	Report Date	Sample Number	Sample Media	Unit	Analyte / Nuclide	GEL	Known value	Acceptance Range/ Ratio	Evaluation
EZA	1st/2016	5/16/2015	E11447	Milk	pCi/L	Co-58	1.16E+02	1.17E+02	0.99	A
EZA	1st/2016	5/16/2015	E11447	Milk	pCi/L	Mn-54	1.24E+02	1.17E+02	1.06	A
EZA	1st/2016	5/16/2015	E11447	Milk	pCi/L	Fe-59	1.47E+02	1.31E+02	1.12	A
EZA	1st/2016	5/16/2015	E11447	Milk	pCi/L	Zn-65	1.98E+02	1.79E+02	1.11	A
EZA	1st/2016	5/16/2015	E11447	Milk	pCi/L	Co-60	2.59E+02	2.44E+02	1.06	A
EZA	1st/2016	5/16/2015	E11448	Water	pCi/L	I-131	9.92E+01	9.67E+01	1.03	A
EZA	1st/2016	5/16/2015	E11448	Water	pCi/L	Ce-141	1.40E+02	1.39E+02	1.01	A
EZA	1st/2016	5/16/2015	E11448	Water	pCi/L	Cr-51	3.95E+02	3.66E+02	1.08	A
EZA	1st/2016	5/16/2015	E11448	Water	pCi/L	Cs-134	1.12E+02	1.26E+02	0.89	A
EZA	1st/2016	5/16/2015	E11448	Water	pCi/L	Cs-137	1.69E+02	1.67E+02	1.01	A
EZA	1st/2016	5/16/2015	E11448	Water	pCi/L	Co-58	1.78E+02	1.80E+02	0.99	A
EZA	1st/2016	5/16/2015	E11448	Water	pCi/L	Mn-54	1.66E+02	1.59E+02	1.05	A
EZA	1st/2016	5/16/2015	E11448	Water	pCi/L	Fe-59	2.14E+02	1.95E+02	1.01	A
EZA	1st/2016	5/16/2015	E11448	Water	pCi/L	Zn-65	3.25E+02	2.99E+02	1.09	A
EZA	1st/2016	5/16/2015	E11448	Water	pCi/L	Co-60	3.23E+02	3.28E+02	0.98	A
EZA	1st/2016	5/16/2015	E11449	Water	pCi/L	Nb-95	4.01E+03	3.62E+03	1.11	A
EZA	1st/2016	5/16/2015	E11449	Water	pCi/L	Zr-95	9.79E+03	9.48E+03	1.03	A
EZA	1st/2016	5/16/2015	E11449	Water	pCi/L	Tc-99M	1.34E+03	1.32E+03	1.02	A
EZA	1st/2016	5/16/2015	E11449	Water	pCi/L	Ru-103	6.33E+03	6.23E+03	1.02	A
EZA	1st/2016	5/16/2015	E11449	Water	pCi/L	I-131	4.64E+03	4.83E+03	0.96	A
EZA	1st/2016	5/16/2015	E11449	Water	pCi/L	I-132	1.39E+03	1.62E+03	0.86	A
EZA	1st/2016	5/16/2015	E11449	Water	pCi/L	Te-132	1.81E+03	1.50E+03	1.21	A
EZA	1st/2016	5/16/2015	E11449	Water	pCi/L	Cs-137	7.79E+01	7.31E+01	1.07	A
EZA	1st/2016	5/16/2015	E11449	Water	pCi/L	Ba-140	1.89E+04	1.85E+04	1.02	A
EZA	1st/2016	5/16/2015	E11449	Water	pCi/L	La-140	2.11E+04	2.06E+04	1.03	A
EZA	1st/2016	5/16/2015	E11449	Water	pCi/L	Ce-141	1.43E+04	1.39E+04	1.03	A
EZA	1st/2016	5/16/2015	E11449	Water	pCi/L	Ce-144	2.20E+03	2.08E+03	1.06	A
EZA	1st/2016	5/16/2015	E11449	Water	pCi/L	Nd-147	6.40E+03	6.19E+03	1.03	A
EZA	2nd/2016	7/27/2016	E11573	Cartridge	pCi	I-131	9.52E+01	8.94E+01	1.07	A
EZA	2nd/2016	7/27/2016	E11574	Milk	pCi/L	Sr-89	8.51E+01	9.44E+01	0.90	A
EZA	2nd/2016	7/27/2016	E11574	Milk	pCi/L	Sr-90	9.49E+01	1.54E+01	0.62	A

Table D-4 (CONT.)

GEL 2016 ECKERT & ZIEGLER ANALYTICS PERFORMANCE EVALUATION RESULTS

PT Provider	Quarter / Year	Report Date	Sample Number	Sample Media	Unit	Analyte / Nuclide	GEL	Known value	Acceptance Range/ Ratio	Evaluation
EZA	2nd/2016	7/27/2016	E11575	Milk	pCi/L	I-131	9.77E+01	9.45E+01	1.03	A
EZA	2nd/2016	7/27/2016	E11575	Milk	pCi/L	Ce-141	1.46E+02	1.39E+02	1.05	A
EZA	2nd/2016	7/27/2016	E11575	Milk	pCi/L	Cr-51	2.53E+02	2.76E+02	0.92	A
EZA	2nd/2016	7/27/2016	E11575	Milk	pCi/L	Cs-134	1.62E+02	1.74E+02	0.93	A
EZA	2nd/2016	7/27/2016	E11575	Milk	pCi/L	Cs-137	1.20E+02	1.20E+02	1.00	A
EZA	2nd/2016	7/27/2016	E11575	Milk	pCi/L	Co-58	1.39E+02	1.42E+02	0.98	A
EZA	2nd/2016	7/27/2016	E11575	Milk	pCi/L	Mn-54	1.26E+02	1.25E+02	1.00	A
EZA	2nd/2016	7/27/2016	E11575	Milk	pCi/L	Fe-59	1.25E+02	1.22E+02	1.03	A
EZA	2nd/2016	7/27/2016	E11575	Milk	pCi/L	Zn-65	2.47E+02	2.35E+02	1.05	A
EZA	2nd/2016	7/27/2016	E11575	Milk	pCi/L	Co-60	1.72E+02	1.73E+02	1.00	A
EZA	2nd/2016	7/27/2016	E11576	Water	pCi/L	I-131	1.02E+02	9.67E+01	1.05	A
EZA	2nd/2016	7/27/2016	E11576	Water	pCi/L	Ce-141	1.56E+02	1.47E+02	1.06	A
EZA	2nd/2016	7/27/2016	E11576	Water	pCi/L	Cr-51	3.33E+02	2.92E+02	1.14	A
EZA	2nd/2016	7/27/2016	E11576	Water	pCi/L	Cs-134	1.65E+02	1.85E+02	0.89	A
EZA	2nd/2016	7/27/2016	E11576	Water	pCi/L	Cs-137	1.34E+02	1.28E+02	1.05	A
EZA	2nd/2016	7/27/2016	E11576	Water	pCi/L	Co-58	1.47E+02	1.51E+02	0.98	A
EZA	2nd/2016	7/27/2016	E11576	Water	pCi/L	Mn-54	1.45E+02	1.33E+02	1.09	A
EZA	2nd/2016	7/27/2016	E11576	Water	pCi/L	Fe-59	1.54E+02	1.29E+02	1.19	A
EZA	2nd/2016	7/27/2016	E11576	Water	pCi/L	Zn-65	2.72E+02	2.49E+02	1.09	A
EZA	2nd/2016	7/27/2016	E11576	Water	pCi/L	Co-60	1.99E+02	1.83E+02	1.09	A
EZA	3rd/2016	11/28/2016	E11605	Cartridge	pCi	I-131	6.33E+01	6.01E+01	1.05	A
EZA	3rd/2016	11/28/2016	E11606	Milk	pCi/L	Sr-89	7.60E+01	9.09E+01	0.84	A
EZA	3rd/2016	11/28/2016	E11606	Milk	pCi/L	Sr-90	1.17E+01	1.37E+01	0.85	A
EZA	3rd/2016	11/28/2016	E11607	Milk	pCi/L	I-131	7.53E+01	7.19E+01	1.05	A
EZA	3rd/2016	11/28/2016	E11607	Milk	pCi/L	Ce-141	9.85E+01	9.32E+01	1.06	A
EZA	3rd/2016	11/28/2016	E11607	Milk	pCi/L	Cr-51	2.63E+02	2.36E+02	1.12	A
EZA	3rd/2016	11/28/2016	E11607	Milk	pCi/L	Cs-134	1.21E+02	1.36E+02	0.89	A
EZA	3rd/2016	11/28/2016	E11607	Milk	pCi/L	Cs-137	1.19E+02	1.19E+02	1.00	A
EZA	3rd/2016	11/28/2016	E11607	Milk	pCi/L	Co-58	9.56E+01	9.74E+01	0.98	A
EZA	3rd/2016	11/28/2016	E11607	Milk	pCi/L	Mn-54	1.61E+02	1.52E+02	1.06	A
EZA	3rd/2016	11/28/2016	E11607	Milk	pCi/L	Fe-59	9.00E+01	9.06E+01	0.99	A
EZA	3rd/2016	11/28/2016	E11607	Milk	pCi/L	Zn-65	2.11E+02	1.79E+02	1.18	A

Table D-4 (CONT.)

GEL 2016 ECKERT & ZIEGLER ANALYTICS PERFORMANCE EVALUATION RESULTS

PT Provider	Quarter / Year	Report Date	Sample Number	Sample Media	Unit	Analyte / Nuclide	GEL	Known value	Acceptance Range/ Ratio	Evaluation
EZA	3rd/2016	11/28/2016	E11607	Milk	pCi/L	Co-60	1.44E+02	1.35E+02	1.07	A
EZA	3rd/2016	11/28/2016	E11068	Water	pCi/L	I-131	5.53E+01	4.90E+01	1.13	A
EZA	3rd/2016	11/28/2016	E11068	Water	pCi/L	Ce-141	9.49E+01	8.52E+01	1.11	A
EZA	3rd/2016	11/28/2016	E11068	Water	pCi/L	Cr-51	2.03E+02	2.15E+02	0.95	A
EZA	3rd/2016	11/28/2016	E11068	Water	pCi/L	Cs-134	1.20E+02	1.24E+02	0.97	A
EZA	3rd/2016	11/28/2016	E11068	Water	pCi/L	Cs-137	1.15E+02	1.08E+02	1.06	A
EZA	3rd/2016	11/28/2016	E11068	Water	pCi/L	Co-58	9.54E+01	8.90E+01	1.07	A
EZA	3rd/2016	11/28/2016	E11068	Water	pCi/L	Mn-54	1.47E+02	1.39E+02	1.06	A
EZA	3rd/2016	11/28/2016	E11068	Water	pCi/L	Fe-59	8.73E+01	8.28E+01	1.05	A
EZA	3rd/2016	11/28/2016	E11068	Water	pCi/L	Zn-65	1.79E+02	1.63E+02	1.10	A
EZA	3rd/2016	11/28/2016	E11068	Water	pCi/L	Co-60	1.26E+02	1.23E+02	1.02	A

A = Acceptable
N = Not Acceptable

Table D-5

GEL 2016 DEPARTMENT OF ENERGY MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM

(MAPEP) RESULTS

PT Provider	Quarter / Year	Report Date	Sample Number	Sample Media	Unit	Analyte / Nuclide	GEL	Known value	Acceptance Range/ Ratio	Evaluation
MAPEP	2nd/2016	6/2/2016	16-GrF34	Filter	Bq/sample	Gr-A	1.41	1.2	0.36-2.04	A
MAPEP	2nd/2016	6/2/2016	16-GrF34	Filter	Bq/sample	Gr-B	0.897	0.79	0.40-1.19	A
MAPEP	2nd/2016	6/2/2016	16-MaS34	Soil	Bq/Kg	Am-241	111	103	72-134	A
MAPEP	2nd/2016	6/2/2016	16-MaS34	Soil	Bq/Kg	Cs-134	953	1,030	721-1,339	A
MAPEP	2nd/2016	6/2/2016	16-MaS34	Soil	Bq/Kg	Cs-137	2.57	N/A False Pos Test		A
MAPEP	2nd/2016	6/2/2016	16-MaS34	Soil	Bq/Kg	Co-57	1,030	992	694-1,290	A
MAPEP	2nd/2016	6/2/2016	16-MaS34	Soil	Bq/Kg	Co-60	1,270	1,190	833-1,547	A
MAPEP	2nd/2016	6/2/2016	16-MaS34	Soil	Bq/Kg	Fe-55	197	428	300-556	N (1)
MAPEP	2nd/2016	6/2/2016	16-MaS34	Soil	Bq/Kg	Mn-54	1,230	1,160	812-1,508	A
MAPEP	2nd/2016	6/2/2016	16-MaS34	Soil	Bq/Kg	Ni-63	1,240	1,250	875-1,625	A
MAPEP	2nd/2016	6/2/2016	16-MaS34	Soil	Bq/Kg	Pu- 238	60.1	63.6	44.5-82.7	A
MAPEP	2nd/2016	6/2/2016	16-MaS34	Soil	Bq/Kg	Pu- 239/240	1.15	0.21	Sens. Eval	A
MAPEP	2nd/2016	6/2/2016	16-MaS34	Soil	Bq/Kg	K-40	680	607	425-789	A
MAPEP	2nd/2016	6/2/2016	16-MaS34	Soil	Bq/Kg	Sr-90	-3.4	N/A False Pos Test		A
MAPEP	2nd/2016	6/2/2016	16-MaS34	Soil	Bq/Kg	Tc-99	32	N/A False Pos Test		A
MAPEP	2nd/2016	6/2/2016	16-MaS34	Soil	Bq/Kg	U-234/233	49	45.9	32.1-59.7	A
MAPEP	2nd/2016	6/2/2016	16-MaS34	Soil	Bq/Kg	U-238	143	146	102-190	A
MAPEP	2nd/2016	6/2/2016	16-MaS34	Soil	Bq/Kg	Zn-65	785	692	484-900	A
MAPEP	2nd/2016	6/2/2016	16-MaW34	Water	Bq/L	Am-241	0.0113	N/A False Pos Test		A
MAPEP	2nd/2016	6/2/2016	16-MaW34	Water	Bq/L	Cs-134	15	16.1	11.3-20.9	A
MAPEP	2nd/2016	6/2/2016	16-MaW34	Water	Bq/L	Cs-137	21.8	21.2	14.8-27.6	A
MAPEP	2nd/2016	6/2/2016	16-MaW34	Water	Bq/L	Co-57	0	N/A False Pos Test		A
MAPEP	2nd/2016	6/2/2016	16-MaW34	Water	Bq/L	Co-60	12.2	11.8	8.3-15.3	A
MAPEP	2nd/2016	6/2/2016	16-MaW34	Water	Bq/L	H-3	0.878	N/A False Pos Test		A
MAPEP	2nd/2016	6/2/2016	16-MaW34	Water	Bq/L	Fe-55	18.3	16.2	11.3-21.1	A
MAPEP	2nd/2016	6/2/2016	16-MaW34	Water	Bq/L	Mn-54	11.4	11.1	7.8-14.4	A
MAPEP	2nd/2016	6/2/2016	16-MaW34	Water	Bq/L	Ni-63	12	12.3	8.6-16	A
MAPEP	2nd/2016	6/2/2016	16-MaW34	Water	Bq/L	Pu- 238	1.14	1.244	0.871-1.617	A
MAPEP	2nd/2016	6/2/2016	16-MaW34	Water	Bq/L	Pu- 239/240	0.586	0.641	0.449-0.833	A
MAPEP	2nd/2016	6/2/2016	16-MaW34	Water	Bq/L	K-40	272	251	176-326	A
MAPEP	2nd/2016	6/2/2016	16-MaW34	Water	Bq/L	Ra-226	1.45	0.718	0.503-0.933	N(1)
MAPEP	2nd/2016	6/2/2016	16-MaW34	Water	Bq/L	Sr-90	7.12	8.74	6.12-11.36	A
MAPEP	2nd/2016	6/2/2016	16-MaW34	Water	Bq/L	Tc-99	0.0453	N/A False Pos Test		A

Table D-5 (CONT.)

GEL 2016 DEPARTMENT OF ENERGY MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM

(MAPEP) RESULTS

PT Provider	Quarter / Year	Report Date	Sample Number	Sample Media	Unit	Analyte / Nuclide	GEL	Known value	Acceptance Range/ Ratio	Evaluation
MAPEP	2nd/2016	6/2/2016	16-MaW34	Water	Bq/L	U-234/233	1.37	1.48	1.04-1.92	A
MAPEP	2nd/2016	6/2/2016	16-MaW34	Water	Bq/L	U-238	1.43	1.53	1.07-1.99	A
MAPEP	2nd/2016	6/2/2016	16-MaW34	Water	Bq/L	Zn-65	14.3	13.6	9.5-17.7	A
MAPEP	2nd/2016	6/2/2016	16-MaW34	Water	Bq/L	Gr-A	0.957	0.67	0.202-1.144	A
MAPEP	2nd/2016	6/2/2016	16-MaW34	Water	Bq/L	Gr-B	2.39	2.15	1.08-3.23	A
MAPEP	2nd/2016	6/2/2016	16-MaW34	Water	Bq/L	I-129	4	3.85	2.70-5.01	A
MAPEP	2nd/2016	6/2/2016	16-RdF34	Filter	ug/sample	U-235	0.091	0.101	0.071-0.131	A
MAPEP	2nd/2016	6/2/2016	16-RdF34	Filter	ug/sample	U-238	13.9	13.8	9.7-17.9	A
MAPEP	2nd/2016	6/2/2016	16-RdF34	Filter	ug/sample	U (Total)	14	13.9	9.7-18.1	A
MAPEP	2nd/2016	6/2/2016	16-RdF34	Filter	Bq/sample	Am-241	0.0751	0.0805	0.0564-0.1047	A
MAPEP	2nd/2016	6/2/2016	16-RdF34	Filter	Bq/sample	Cs-134	-0.0349	N/A False Pos Test		A
MAPEP	2nd/2016	6/2/2016	16-RdF34	Filter	Bq/sample	Cs-137	2.37	2.3	1.61-2.99	A
MAPEP	2nd/2016	6/2/2016	16-RdF34	Filter	Bq/sample	Co-57	3	2.94	2.06-3.82	A
MAPEP	2nd/2016	6/2/2016	16-RdF34	Filter	Bq/sample	Co-60	4.17	4.02	2.81-5.23	A
MAPEP	2nd/2016	6/2/2016	16-RdF34	Filter	Bq/sample	Mn-54	4.6	4.53	3.17-5.89	A
MAPEP	2nd/2016	6/2/2016	16-RdF34	Filter	Bq/sample	Pu- 238	0.0593	0.0637	0.0446-0.0828	A
MAPEP	2nd/2016	6/2/2016	16-RdF34	Filter	Bq/sample	Pu- 239/240	0.0889	0.099	0.069-0.129	A
MAPEP	2nd/2016	6/2/2016	16-RdF34	Filter	Bq/sample	Sr-90	1.01	1.38	0.97-1.79	A
MAPEP	2nd/2016	6/2/2016	16-RdF34	Filter	Bq/sample	U-234/233	0.17	0.165	0.116-0.215	A
MAPEP	2nd/2016	6/2/2016	16-RdF34	Filter	Bq/sample	U-238	0.179	0.172	0.12-0.224	A
MAPEP	2nd/2016	6/2/2016	16-RdF34	Filter	Bq/sample	Zn-65	3.52	3.57	2.5-4.64	A
MAPEP	2nd/2016	6/2/2016	16-Rv34	Vegetation	Bq/sample	Am-241	0.101	0.089	0.062-0.116	A
MAPEP	2nd/2016	6/2/2016	16-Rv34	Vegetation	Bq/sample	Cs-134	9.49	10.62	7.43-13.81	A
MAPEP	2nd/2016	6/2/2016	16-Rv34	Vegetation	Bq/sample	Cs-137	5.5	5.62	3.93-7.31	A
MAPEP	2nd/2016	6/2/2016	16-Rv34	Vegetation	Bq/sample	Co-57	12	11.8	8.3-15.3	A
MAPEP	2nd/2016	6/2/2016	16-Rv34	Vegetation	Bq/sample	Co-60	-0.0339	N/A False Pos Test		A
MAPEP	2nd/2016	6/2/2016	16-Rv34	Vegetation	Bq/sample	Mn-54	-0.0066	N/A False Pos Test		A
MAPEP	2nd/2016	6/2/2016	16-Rv34	Vegetation	Bq/sample	Pu- 238	0.0929	0.105	0.074-0.137	A
MAPEP	2nd/2016	6/2/2016	16-Rv34	Vegetation	Bq/sample	Pu- 239/240	0.0801	0.092	0.064-0.12	A
MAPEP	2nd/2016	6/2/2016	16-Rv34	Vegetation	Bq/sample	Sr-90	-0.0065	N/A False Pos Test		A
MAPEP	2nd/2016	6/2/2016	16-Rv34	Vegetation	Bq/sample	U-234/233	0.204	0.196	0.137-0.255	A
MAPEP	2nd/2016	6/2/2016	16-Rv34	Vegetation	Bq/sample	U-238	0.225	0.204	0.143-0.265	A
MAPEP	2nd/2016	6/2/2016	16-Rv34	Vegetation	Bq/sample	Zn-65	10.3	9.6	6.7-12.5	A

Table D-5 (CONT.)

GEL 2016 DEPARTMENT OF ENERGY MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM

(MAPEP) RESULTS

PT Provider	Quarter / Year	Report Date	Sample Number	Sample Media	Unit	Analyte / Nuclide	GEL	Known value	Acceptance Range/ Ratio	Evaluation
MAPEP	4th/2016	12/2/2016	16-MaS35	Soil	Bq/Kg	Am-241	-0.563	N/A False Pos Test		A
MAPEP	4th/2016	12/2/2016	16-MaS35	Soil	Bq/Kg	Cs-134	3.74	N/A False Pos Test		A
MAPEP	4th/2016	12/2/2016	16-MaS35	Soil	Bq/Kg	Cs-137	1,180	1,067	747-1,387	A
MAPEP	4th/2016	12/2/2016	16-MaS35	Soil	Bq/Kg	Co-57	1,220	1,190	833-1,547	A
MAPEP	4th/2016	12/2/2016	16-MaS35	Soil	Bq/Kg	Co-60	889	851	596-1,106	A
MAPEP	4th/2016	12/2/2016	16-MaS35	Soil	Bq/Kg	Fe-55	-337	N/A False Pos Test		A
MAPEP	4th/2016	12/2/2016	16-MaS35	Soil	Bq/Kg	Mn-54	2.5	N/A False Pos Test		A
MAPEP	4th/2016	12/2/2016	16-MaS35	Soil	Bq/Kg	Ni-63	1,090	990	693-1,287	A
MAPEP	4th/2016	12/2/2016	16-MaS35	Soil	Bq/Kg	Pu- 238	69	70.4	49.3-91.5	A
MAPEP	4th/2016	12/2/2016	16-MaS35	Soil	Bq/Kg	Pu- 239/240	46.8	53.8	37.7-69.9	A
MAPEP	4th/2016	12/2/2016	16-MaS35	Soil	Bq/Kg	K-40	619	588	412-764	A
MAPEP	4th/2016	12/2/2016	16-MaS35	Soil	Bq/Kg	Sr-90	770	894	626-1,162	A
MAPEP	4th/2016	12/2/2016	16-MaS35	Soil	Bq/Kg	Tc-99	548	556	389-723	A
MAPEP	4th/2016	12/2/2016	16-MaS35	Soil	Bq/Kg	U-234/233	122	122	85-159	A
MAPEP	4th/2016	12/2/2016	16-MaS35	Soil	Bq/Kg	U-238	122	121	85-157	A
MAPEP	4th/2016	12/2/2016	16-MaS35	Soil	Bq/Kg	Zn-65	775	695	487-904	A
MAPEP	4th/2016	12/2/2016	16-MaW35	Water	Bq/L	Am-241	0.725	0.814	0.570-1.058	A
MAPEP	4th/2016	12/2/2016	16-MaW35	Water	Bq/L	Cs-134	22.2	23.9	16.7-31.1	A
MAPEP	4th/2016	12/2/2016	16-MaW35	Water	Bq/L	Cs-137	-0.089	N/A False Pos Test		A
MAPEP	4th/2016	12/2/2016	16-MaW35	Water	Bq/L	Co-57	27.6	27.3	19.1-35.5	A
MAPEP	4th/2016	12/2/2016	16-MaW35	Water	Bq/L	Co-60	-0.001	N/A False Pos Test		A
MAPEP	4th/2016	12/2/2016	16-MaW35	Water	Bq/L	H-3	337	334	151-281	A
MAPEP	4th/2016	12/2/2016	16-MaW35	Water	Bq/L	Fe-55	22.3	21.5	15.1-28.0	A
MAPEP	4th/2016	12/2/2016	16-MaW35	Water	Bq/L	Mn-54	14.7	14.8	10.4-19.2	A
MAPEP	4th/2016	12/2/2016	16-MaW35	Water	Bq/L	Ni-63	17	17.2	12.0-22.4	A
MAPEP	4th/2016	12/2/2016	16-MaW35	Water	Bq/L	Pu- 238	1.09	1.13	0.79-1.47	A
MAPEP	4th/2016	12/2/2016	16-MaW35	Water	Bq/L	Pu- 239/240	0.024	0.013	Sens. Eval	A
MAPEP	4th/2016	12/2/2016	16-MaW35	Water	Bq/L	K-40	275	252	176-328	A
MAPEP	4th/2016	12/2/2016	16-MaW35	Water	Bq/L	Ra-226	1.02	1.33	0.93-1.73	A
MAPEP	4th/2016	12/2/2016	16-MaW35	Water	Bq/L	Sr-90	-0.0029	N/A False Pos Test		A
MAPEP	4th/2016	12/2/2016	16-MaW35	Water	Bq/L	Tc-99	10.9	11.6	8.1-15.1	A
MAPEP	4th/2016	12/2/2016	16-MaW35	Water	Bq/L	U-234/233	1.85	1.86	1.30-2.42	A
MAPEP	4th/2016	12/2/2016	16-MaW35	Water	Bq/L	U-238	1.89	1.92	1.34-2.50	A

Table D-5 (CONT.)

GEL 2016 DEPARTMENT OF ENERGY MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM

(MAPEP) RESULTS

PT Provider	Quarter / Year	Report Date	Sample Number	Sample Media	Unit	Analyte / Nuclide	GEL	Known value	Acceptance Range/ Ratio	Evaluation
MAPEP	4th/2016	12/2/2016	16-MaW35	Water	Bq/L	Zn-65	17.5	17.4	12.2-22.6	A
MAPEP	4th/2016	12/2/2016	16-MaW35	Alk. Water	Bq/L	I-129	0.425	0.429	0.129-0.729	A
MAPEP	4th/2016	12/2/2016	16-RdF35	Filter	ug/sample	U-235	0.0915	0.0903	0.0632-0.1174	A
MAPEP	4th/2016	12/2/2016	16-RdF35	Filter	ug/sample	U-238	13	12.5	8.8-16.3	A
MAPEP	4th/2016	12/2/2016	16-RdF35	Filter	ug/sample	U (Total)	13.6	12.6	8.8-16.4	A
MAPEP	4th/2016	12/2/2016	16-RdF35	Filter	ug/sample	Am-241	0.0000675	N/A False Pos Test		A
MAPEP	4th/2016	12/2/2016	16-RdF35	Filter	Bq/sample	Cs-134	1.75	2.04	1.43-2.65	A
MAPEP	4th/2016	12/2/2016	16-RdF35	Filter	Bq/sample	Cs-137	1.89	1.78	1.25-2.31	A
MAPEP	4th/2016	12/2/2016	16-RdF35	Filter	Bq/sample	Co-57	2.48	2.48	1.74-3.22	A
MAPEP	4th/2016	12/2/2016	16-RdF35	Filter	Bq/sample	Co-60	3.3	3.26	2.28-4.24	A
MAPEP	4th/2016	12/2/2016	16-RdF35	Filter	Bq/sample	Mn-54	2.87	2.75	1.93-3.58	A
MAPEP	4th/2016	12/2/2016	16-RdF35	Filter	Bq/sample	Pu- 238	0.0694	0.0693	0.0485-0.0901	A
MAPEP	4th/2016	12/2/2016	16-RdF35	Filter	Bq/sample	Pu-239/240	0.0508	0.0535	0.0375-0.0696	A
MAPEP	4th/2016	12/2/2016	16-RdF35	Filter	Bq/sample	Sr-90	0.726	1.03	0.72-1.34	A
MAPEP	4th/2016	12/2/2016	16-RdF35	Filter	Bq/sample	U-234/233	0.15	0.15	0.105-0.195	A
MAPEP	4th/2016	12/2/2016	16-RdF35	Filter	Bq/sample	U-238	0.152	0.156	0.109-0.203	A
MAPEP	4th/2016	12/2/2016	16-RdF35	Filter	Bq/sample	Zn-65	0.0232	N/A False Pos Test		A
MAPEP	4th/2016	12/2/2016	16-RdV35	Vegetation	Bq/sample	Am-241	0.052	0.062	0.076-0.140	A
MAPEP	4th/2016	12/2/2016	16-RdV35	Vegetation	Bq/sample	Cs-134	0.0307	N/A False Pos Test		A
MAPEP	4th/2016	12/2/2016	16-RdV35	Vegetation	Bq/sample	Cs-137	5.81	5.51	3.88-7.20	A
MAPEP	4th/2016	12/2/2016	16-RdV35	Vegetation	Bq/sample	Co-57	6.92	6.81	4.77-8.85	A
MAPEP	4th/2016	12/2/2016	16-RdV35	Vegetation	Bq/sample	Co-60	4.95	4.86	3.40-6.32	A
MAPEP	4th/2016	12/2/2016	16-RdV35	Vegetation	Bq/sample	Mn-54	7.8	7.27	5.09-9.45	A
MAPEP	4th/2016	12/2/2016	16-RdV35	Vegetation	Bq/sample	Pu- 238	0.0783	0.082	0.57-0.107	A
MAPEP	4th/2016	12/2/2016	16-RdV35	Vegetation	Bq/sample	Pu-239/240	0.00151	N/A False Pos Test		A
MAPEP	4th/2016	12/2/2016	16-RdV35	Vegetation	Bq/sample	Sr-90	0.575	0.8	0.56-1.04	A
MAPEP	4th/2016	12/2/2016	16-RdV35	Vegetation	Bq/sample	U-234/233	0.114	0.117	0.082-0.152	A
MAPEP	4th/2016	12/2/2016	16-RdV35	Vegetation	Bq/sample	U-238	0.125	0.122	0.085-0.159	A
MAPEP	4th/2016	12/2/2016	16-RdV35	Vegetation	Bq/sample	Zn-65	5.87	5.4	3.78-7.02	A

A = Acceptable
N = Not Acceptable
(1) CAP: CARR 160602

Table D-5 (CONT.)

GEL 2016 DEPARTMENT OF ENERGY MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM

(MAPEP) RESULTS

Notes:

False Pos Test – The MAPEP program uses false positive testing to identify laboratory results that indicate the presence of a particular radionuclide in a MAPEP sample when, in fact, the actual activity of the radionuclide is far below the detection limit of the measurement. Not Acceptable ("N") performance, and hence a false positive result, is indicated when the range encompassing the result, plus or minus the total uncertainty at three standard deviations, does not include zero (e.g., 2.5 +/- 0.2; range of 1.9 to 3.1). Statistically, the probability that a result can exceed the absolute value of its total uncertainty at three standard deviations by chance alone is less than 1%. MAPEP uses a three standard deviation criterion for the false positive test to ensure confidence about issuing a false positive performance evaluation. A result that is greater than three times the total uncertainty of the measurement represents a statistically positive detection with over 99% confidence.

Sens. Eval - Sensitivity evaluations are routinely performed to complement the false positive tests. In a sensitivity evaluation, the analyte is present at or near the detection limit, and the difference between the reported result and the MAPEP reference value is compared to the propagated combined total uncertainties. The results are evaluated at three standard deviations. If the observed difference is greater than three times the combined total uncertainty, the sensitivity evaluation is "Not Acceptable". The probability that such a difference can occur by chance alone is less than 1%. If the participant did not report a statistically positive result, a "Not-Detected" is noted in the text field of the MAPEP performance report. A non-detect is potentially a false negative result, dependent upon the laboratory's detection limit for the radionuclide.

Table D-6

GEL 2016 ERA PROGRAM (RAD) PERFORMANCE EVALUATION RESULTS

PT Provider	Quarter / Year	Report Date	Sample Number	Sample Media	Unit	Analyte / Nuclide	GEL value	Known value	Acceptance Range/ Ratio	Evaluation
ERA	1st/2016	2/25/2016	RAD-104	Water	pCi/L	Ba-133	94.1	90.5	76.2-99.6	A
ERA	1st/2016	2/25/2016	RAD-104	Water	pCi/L	Cs-134	24	23.2	17.7-25.9	A
ERA	1st/2016	2/25/2016	RAD-104	Water	pCi/L	Cs-137	72.6	59.1	53.2-67.8	N (1)
ERA	1st/2016	2/25/2016	RAD-104	Water	pCi/L	Co-60	85.3	83.4	75.1-94.1	A
ERA	1st/2016	2/25/2016	RAD-104	Water	pCi/L	Zn-65	118	102	91.8-122	A
ERA	1st/2016	2/25/2016	RAD-104	Water	pCi/L	Gr-A	91.1	72.8	38.3-89.7	N (1)
ERA	1st/2016	2/25/2016	RAD-104	Water	pCi/L	Gr-A	92.1	72.8	38.3-89.7	N (1)
ERA	1st/2016	2/25/2016	RAD-104	Water	pCi/L	Gr-B	20	17.8	10.2-26	A
ERA	1st/2016	2/25/2016	RAD-104	Water	pCi/L	Ra-226	11	10	7.49-11.7	A
ERA	1st/2016	2/25/2016	RAD-104	Water	pCi/L	Ra-226	11.6	10	7.49-11.7	A
ERA	1st/2016	2/25/2016	RAD-104	Water	pCi/L	Ra-226	10.7	10	7.49-11.7	A
ERA	1st/2016	2/25/2016	RAD-104	Water	pCi/L	Ra-228	1.99	2.21	1.02-3.52	A
ERA	1st/2016	2/25/2016	RAD-104	Water	pCi/L	Ra-228	2.2	2.21	1.02-3.52	A
ERA	1st/2016	2/25/2016	RAD-104	Water	pCi/L	Ra-228	1.99	2.21	1.02-3.52	A
ERA	1st/2016	2/25/2016	RAD-104	Water	pCi/L	U (Nat)	66.9	67.1	54.6-74.4	A
ERA	1st/2016	2/25/2016	RAD-104	Water	pCi/L	U (Nat)	65.5	67.1	54.6-74.4	A
ERA	1st/2016	2/25/2016	RAD-104	Water	µg/L	U (Nat)	99.9	97.9	79.7-109	A
ERA	1st/2016	2/25/2016	RAD-104	Water	pCi/L	H-3	11,700	12,100	10,500-13,300	A
ERA	1st/2016	2/25/2016	RAD-104	Water	pCi/L	Sr-89	55.8	68	55.4-76.2	A
ERA	1st/2016	2/25/2016	RAD-104	Water	pCi/L	Sr-90	44.7	43.4	32-49.8	A
ERA	1st/2016	2/25/2016	RAD-104	Water	pCi/L	I-131	24.6	25.1	20.8-29.7	A
ERA	1st/2016	2/25/2016	RAD-104	Water	pCi/L	I-131	24.2	25.1	20.8-29.7	A
ERA	1st/2016	3/14/2016	QR030716U	Water	pCi/L	Cs-137	156	157	141-175	A (2)
ERA	3rd/2016	8/30/2016	RAD-106	Water	pCi/L	Ba-133	86.2	82.9	69.7-91.2	A
ERA	3rd/2016	8/30/2016	RAD-106	Water	pCi/L	Cs-134	62.3	65.3	53.1-71.8	A
ERA	3rd/2016	8/30/2016	RAD-106	Water	pCi/L	Cs-137	99.3	95.2	85.7-107	A
ERA	3rd/2016	8/30/2016	RAD-106	Water	pCi/L	Co-60	123	117	105-131	A
ERA	3rd/2016	8/30/2016	RAD-106	Water	pCi/L	Zn-65	118	113	102-134	A
ERA	3rd/2016	8/30/2016	RAD-106	Water	pCi/L	Gr-A	42.5	48.1	25-60.5	A
ERA	3rd/2016	8/30/2016	RAD-106	Water	pCi/L	Gr-A	48.7	48.1	25-60.5	A
ERA	3rd/2016	8/30/2016	RAD-106	Water	pCi/L	Gr-B	27.3	28.6	18.2-36.4	A
ERA	3rd/2016	8/30/2016	RAD-106	Water	pCi/L	Ra-226	10.4	12.3	9.18-14.2	A
ERA	3rd/2016	8/30/2016	RAD-106	Water	pCi/L	Ra-226	10	12.3	9.18-14.2	A
ERA	3rd/2016	8/30/2016	RAD-106	Water	pCi/L	Ra-226	11.3	12.3	9.18-14.2	A

Table D-6 (CONT.)

GEL 2016 ERA PROGRAM (RAD) PERFORMANCE EVALUATION RESULTS

PT Provider	Quarter / Year	Report Date	Sample Number	Sample Media	Unit	Analyte / Nuclide	GEL	Known value	Acceptance Range/ Ratio	Evaluation
ERA	3rd/2016	8/30/2016	RAD-106	Water	pCi/L	Ra-228	5.89	5.75	3.51-7.57	A
ERA	3rd/2016	8/30/2016	RAD-106	Water	pCi/L	Ra-228	5.53	5.75	3.51-7.57	A
ERA	3rd/2016	8/30/2016	RAD-106	Water	pCi/L	U (Nat)	36.4	35.2	28.4-39.3	A
ERA	3rd/2016	8/30/2016	RAD-106	Water	pCi/L	U (Nat)	34.2	35.2	28.4-39.3	A
ERA	3rd/2016	8/30/2016	RAD-106	Water	µg/L	U (Nat)	51.1	51.3	41.4-57.3	A
ERA	3rd/2016	8/30/2016	RAD-106	Water	µg/L	U (Nat)	55.6	51.3	41.4-57.3	A
ERA	3rd/2016	8/30/2016	RAD-106	Water	pCi/L	H-3	11,600	12,400	10,800-13,600	A
ERA	3rd/2016	8/30/2016	RAD-106	Water	pCi/L	Sr-89	56.9	53.3	42.3-60.9	A
ERA	3rd/2016	8/30/2016	RAD-106	Water	pCi/L	Sr-89	62.8	53.3	42.3-60.9	N (3)
ERA	3rd/2016	8/30/2016	RAD-106	Water	pCi/L	Sr-90	39.1	39.2	28.8-45.1	A
ERA	3rd/2016	8/30/2016	RAD-106	Water	pCi/L	Sr-90	35.1	39.2	28.8-45.1	A
ERA	3rd/2016	8/30/2016	RAD-106	Water	pCi/L	I-131	27.3	24.9	20.7-29.5	A
ERA	3rd/2016	8/30/2016	RAD-106	Water	pCi/L	I-131	25.2	24.9	20.7-29.5	A

A = Acceptable
N = Not Acceptable
(1) CAP: CARR 160229-1005
(2) Retest for (1)
(3) CAP: CARR 160830-1025

Table D-7

GEL 2016 ERA PROGRAM (MRAD) PERFORMANCE EVALUATION RESULTS

PT Provider	Quarter / Year	Report Date	Sample Number	Sample Media	Unit	Analyte / Nuclide	GEL Value	Known value	Acceptance Range/ Ratio	Evaluation
ERA	2nd/2016	5/13/2016	MRAD-24	Soil	pCi/kg	Ac-228	1,320	1,240	795-1,720	A
ERA	2nd/2016	5/13/2016	MRAD-24	Soil	pCi/kg	Am-241	1,410	1,360	796-1,770	A
ERA	2nd/2016	5/13/2016	MRAD-24	Soil	pCi/kg	Bi-212	1,220	1,240	330-1,820	A
ERA	2nd/2016	5/13/2016	MRAD-24	Soil	pCi/kg	Bi-214	4,130	3,530	2,130-5,080	A
ERA	2nd/2016	5/13/2016	MRAD-24	Soil	pCi/kg	Cs-134	3,500	3,450	2,260-4,140	A
ERA	2nd/2016	5/13/2016	MRAD-24	Soil	pCi/kg	Cs-137	4,510	4,310	3,300-5,550	A
ERA	2nd/2016	5/13/2016	MRAD-24	Soil	pCi/kg	Co-60	5,760	5,490	3,710-7,560	A
ERA	2nd/2016	5/13/2016	MRAD-24	Soil	pCi/kg	Fe-212	1,360	1,240	812-1,730	A
ERA	2nd/2016	5/13/2016	MRAD-24	Soil	pCi/kg	Fe-214	4,590	3,710	2,170-5,530	A
ERA	2nd/2016	5/13/2016	MRAD-24	Soil	pCi/kg	Mn-54	<54.7	<1,000	<1,000	A
ERA	2nd/2016	5/13/2016	MRAD-24	Soil	pCi/kg	Pu-238	585	658	396-908	A
ERA	2nd/2016	5/13/2016	MRAD-24	Soil	pCi/kg	Pu-239	477	496	324-685	A
ERA	2nd/2016	5/13/2016	MRAD-24	Soil	pCi/kg	K-40	10,900	10,600	7,740-14,200	A
ERA	2nd/2016	5/13/2016	MRAD-24	Soil	pCi/kg	Sr-90	7,120	8,560	3,260-13,500	A
ERA	2nd/2016	5/13/2016	MRAD-24	Soil	pCi/kg	Th-234	3,590	3,430	1,080-6,450	A
ERA	2nd/2016	5/13/2016	MRAD-24	Soil	pCi/kg	U-234	3,940	3,460	2,110-4,430	A
ERA	2nd/2016	5/13/2016	MRAD-24	Soil	pCi/kg	U-234	2,334	3,460	2,110-4,430	A
ERA	2nd/2016	5/13/2016	MRAD-24	Soil	pCi/kg	U-234	3,460	3,460	2,110-4,430	A
ERA	2nd/2016	5/13/2016	MRAD-24	Soil	pCi/kg	U-238	3,540	3,430	2,110-4,430	A
ERA	2nd/2016	5/13/2016	MRAD-24	Soil	pCi/kg	U-238	2,757	3,430	2,110-4,430	A
ERA	2nd/2016	5/13/2016	MRAD-24	Soil	pCi/kg	U-238	3,340	3,430	2,110-4,430	A
ERA	2nd/2016	5/13/2016	MRAD-24	Soil	pCi/kg	U-Total	7,428	7,050	3,820-9,300	A
ERA	2nd/2016	5/13/2016	MRAD-24	Soil	pCi/kg	U-Total	5,091	7,050	3,820-9,300	A
ERA	2nd/2016	5/13/2016	MRAD-24	Soil	pCi/kg	U-Total	7,214	7,050	3,820-9,300	A
ERA	2nd/2016	5/13/2016	MRAD-24	Soil	µg/kg	U-Total	10,600	10,300	5,680-13,000	A
ERA	2nd/2016	5/13/2016	MRAD-24	Soil	µg/kg	U-Total	9,790	10,300	5,680-13,000	A
ERA	2nd/2016	5/13/2016	MRAD-24	Soil	µg/kg	U-Total	8,450	10,300	5,680-13,000	A
ERA	2nd/2016	5/13/2016	MRAD-24	Soil	µg/kg	U-Total	9,370	10,300	5,680-13,000	A
ERA	2nd/2016	5/13/2016	MRAD-24	Soil	µg/kg	U-Total	9,790	10,300	5,680-13,000	A
ERA	2nd/2016	5/13/2016	MRAD-24	Soil	pCi/kg	Zn-65	2,730	2,450	1,950-3,260	A
ERA	2nd/2016	5/13/2016	MRAD-24	Vegetation	pCi/kg	Am-241	2,240	2,120	1,300-2,820	A
ERA	2nd/2016	5/13/2016	MRAD-24	Vegetation	pCi/kg	Cs-134	1,070	1,070	687-1,390	A
ERA	2nd/2016	5/13/2016	MRAD-24	Vegetation	pCi/kg	Cs-137	941	838	608-1,170	A
ERA	2nd/2016	5/13/2016	MRAD-24	Vegetation	pCi/kg	Co-60	1,300	1,100	759-1,540	A

Table D-7 (CONT.)

GEL 2016 ERA PROGRAM (MRAD) PERFORMANCE EVALUATION RESULTS

PT Provider	Quarter / Year	Report Date	Sample Number	Sample Media	Unit	Analyte / Nuclide	GEL Value	Known value	Acceptance Range/ Ratio	Evaluation
ERA	2nd/2016	5/13/2016	MRAD-24	Vegetation	pCi/kg	Pu-238	2,620	2,810	1,680-3,850	A
ERA	2nd/2016	5/13/2016	MRAD-24	Vegetation	pCi/kg	Cm-244	1,310	1,560	764-2,430	A
ERA	2nd/2016	5/13/2016	MRAD-24	Vegetation	pCi/kg	Mn-54	<34.1	<300	<300	A
ERA	2nd/2016	5/13/2016	MRAD-24	Vegetation	pCi/kg	Pu-239	3,360	3,640	2,230-5,010	A
ERA	2nd/2016	5/13/2016	MRAD-24	Vegetation	pCi/kg	K-40	38,100	31,000	22,400-43,500	A
ERA	2nd/2016	5/13/2016	MRAD-24	Vegetation	pCi/kg	Sr-90	8,370	8,710	4,960-11,500	A
ERA	2nd/2016	5/13/2016	MRAD-24	Vegetation	pCi/kg	U-234	4,320	4,160	2,740-5,340	A
ERA	2nd/2016	5/13/2016	MRAD-24	Vegetation	pCi/kg	U-238	4,430	4,120	2,750-5,230	A
ERA	2nd/2016	5/13/2016	MRAD-24	Vegetation	pCi/kg	U-Total	9,040	8,470	5,740-10,500	A
ERA	2nd/2016	5/13/2016	MRAD-24	Vegetation	µg/kg	U-Total	12,500	12,400	8,310-15,700	A
ERA	2nd/2016	5/13/2016	MRAD-24	Vegetation	µg/kg	U-Total	13,300	12,400	8,310-15,700	A
ERA	2nd/2016	5/13/2016	MRAD-24	Vegetation	pCi/kg	Zn-65	3,700	2,820	2,030-3,960	A
ERA	2nd/2016	5/13/2016	MRAD-24	Filter	pCi/Filter	Am-241	44.2	45.9	28.3-62.1	A
ERA	2nd/2016	5/13/2016	MRAD-24	Filter	pCi/Filter	Cs-134	254	304	193-377	A
ERA	2nd/2016	5/13/2016	MRAD-24	Filter	pCi/Filter	Cs-137	1,060	1,50	864-1,510	A
ERA	2nd/2016	5/13/2016	MRAD-24	Filter	pCi/Filter	Co-60	576	623	482-778	A
ERA	2nd/2016	5/13/2016	MRAD-24	Filter	pCi/Filter	Fe-55	94.9	126	39.1-246	A
ERA	2nd/2016	5/13/2016	MRAD-24	Filter	pCi/Filter	Mn-54	<3.61	<50.0	<50.0	A
ERA	2nd/2016	5/13/2016	MRAD-24	Filter	pCi/Filter	Pu-238	60.8	70.5	48.3-92.7	A
ERA	2nd/2016	5/13/2016	MRAD-24	Filter	pCi/Filter	Pu-239	46.9	54.8	39.7-71.6	A
ERA	2nd/2016	5/13/2016	MRAD-24	Filter	pCi/Filter	Sr-90	141	150	73.3-225	A
ERA	2nd/2016	5/13/2016	MRAD-24	Filter	pCi/Filter	U-234	63.1	64.8	40.2-97.7	A
ERA	2nd/2016	5/13/2016	MRAD-24	Filter	pCi/Filter	U-234	54.2	64.8	40.2-97.7	A
ERA	2nd/2016	5/13/2016	MRAD-24	Filter	pCi/Filter	U-238	51.4	64.2	41.5-88.8	A
ERA	2nd/2016	5/13/2016	MRAD-24	Filter	pCi/Filter	U-238	56.9	64.2	41.5-88.8	A
ERA	2nd/2016	5/13/2016	MRAD-24	Filter	pCi/Filter	U-Total	117	132	73.1-201	A
ERA	2nd/2016	5/13/2016	MRAD-24	Filter	pCi/Filter	U-Total	114	132	73.1-201	A
ERA	2nd/2016	5/13/2016	MRAD-24	Filter	µg/Filter	U-Total	156	192	123-270	A
ERA	2nd/2016	5/13/2016	MRAD-24	Filter	µg/Filter	U-Total	171	192	123-270	A
ERA	2nd/2016	5/13/2016	MRAD-24	Filter	µg/Filter	U-Total	154	192	123-270	A
ERA	2nd/2016	5/13/2016	MRAD-24	Filter	µg/Filter	U-Total	156	192	123-270	A
ERA	2nd/2016	5/13/2016	MRAD-24	Filter	pCi/Filter	Zn-65	358	356	255-492	A

Table D-7 (CONT.)

GEL 2016 ERA PROGRAM (MRAD) PERFORMANCE EVALUATION RESULTS

PT Provider	Quarter / Year	Report Date	Sample Number	Sample Media	Unit	Analyte / Nuclide	GEL value	Known value	Acceptance Range/ Ratio	Evaluation
ERA	2nd/2016	5/13/2016	MRAD-24	Filter	pCi/Filter	Gr-A	79.5	70.1	23.5-109	A
ERA	2nd/2016	5/13/2016	MRAD-24	Filter	pCi/Filter	Gr-B	63.5	54.4	34.4-79.3	A
ERA	2nd/2016	5/13/2016	MRAD-24	Filter	pCi/Filter	Gr-B	63.5	54.4	34.4-79.3	A
ERA	2nd/2016	5/13/2016	MRAD-24	Water	pCi/L	Am-241	134	121	81.5-162	A
ERA	2nd/2016	5/13/2016	MRAD-24	Water	pCi/L	Cs-134	813	842	618-968	A
ERA	2nd/2016	5/13/2016	MRAD-24	Water	pCi/L	Cs-137	1,110	1,100	934-1,320	A
ERA	2nd/2016	5/13/2016	MRAD-24	Water	pCi/L	Co-60	1,090	1,050	912-1,230	A
ERA	2nd/2016	5/13/2016	MRAD-24	Water	pCi/L	Fe-55	1,630	1,650	984-2,240	A
ERA	2nd/2016	5/13/2016	MRAD-24	Water	pCi/L	Mn-54	<6.38	<100	<100	A
ERA	2nd/2016	5/13/2016	MRAD-24	Water	pCi/L	Pu-238	126	138	102-172	A
ERA	2nd/2016	5/13/2016	MRAD-24	Water	pCi/L	Pu-239	88.2	98.7	76.6-124	A
ERA	2nd/2016	5/13/2016	MRAD-24	Water	pCi/L	Sr-90	472	434	283-574	A
ERA	2nd/2016	5/13/2016	MRAD-24	Water	pCi/L	U-234	59.3	52.7	39.6-68	A
ERA	2nd/2016	5/13/2016	MRAD-24	Water	pCi/L	U-234	49.9	52.7	39.6-68	A
ERA	2nd/2016	5/13/2016	MRAD-24	Water	pCi/L	U-234	49.8	52.7	39.6-68	A
ERA	2nd/2016	5/13/2016	MRAD-24	Water	pCi/L	U-238	54.1	52.3	39.9-64.2	A
ERA	2nd/2016	5/13/2016	MRAD-24	Water	pCi/L	U-238	53.7	52.3	39.9-64.2	A
ERA	2nd/2016	5/13/2016	MRAD-24	Water	pCi/L	U-238	49.1	52.3	39.9-64.2	A
ERA	2nd/2016	5/13/2016	MRAD-24	Water	pCi/L	U-Total	110.7	107	78.6-138	A
ERA	2nd/2016	5/13/2016	MRAD-24	Water	pCi/L	U-Total	158	107	78.6-138	N (1)
ERA	2nd/2016	5/13/2016	MRAD-24	Water	pCi/L	U-Total	106.4	107	78.6-138	A
ERA	2nd/2016	5/13/2016	MRAD-24	Water	pCi/L	U-Total	103.9	107	78.6-138	A
ERA	2nd/2016	5/13/2016	MRAD-24	Water	µg/L	U-Total	160.9	157	125-190	A
ERA	2nd/2016	5/13/2016	MRAD-24	Water	µg/L	U-Total	147	157	125-190	A
ERA	2nd/2016	5/13/2016	MRAD-24	Water	µg/L	U-Total	161	157	125-190	A
ERA	2nd/2016	5/13/2016	MRAD-24	Water	pCi/L	Zn-65	1,130	1,010	842-1,270	A
ERA	2nd/2016	5/13/2016	MRAD-24	Water	pCi/L	Gr-A	160	117	41.5-181	A
ERA	2nd/2016	5/13/2016	MRAD-24	Water	pCi/L	Gr-B	79.3	75.5	43.2-112	A
ERA	2nd/2016	5/13/2016	MRAD-24	Water	pCi/L	H-3	8,470	8,650	5,800-12,300	A
ERA	2nd/2016	5/23/2016	RAD-105	Water	pCi/L	Cs-137	81.5	78.4	70.6-88.9	A
ERA	2nd/2016	5/23/2016	RAD-105	Water	pCi/L	Gr-A	72.6	62.7	32.9-77.8	A
ERA	2nd/2016	5/23/2016	RAD-105	Water	pCi/L	Gr-A	74	62.7	32.9-77.8	A

Table D-7 (CONT.)

GEL 2016 ERA PROGRAM (MRAD) PERFORMANCE EVALUATION RESULTS

PT Provider	Quarter / Year	Report Date	Sample Number	Sample Media	Unit	Analyte / Nuclide	GEL value	Known value	Acceptance Range/ Ratio	Evaluation
ERA	2nd/2016	5/23/2016	RAD-105	Water	pCi/L	I-131	27.9	26.6	22.1-31.3	A
ERA	4th/2016	11/23/2016	MRAD-25	Soil	pCi/kg	Ac-228	1,140	1,170	750-1,620	A
ERA	4th/2016	11/23/2016	MRAD-25	Soil	pCi/kg	Am-241	1,040	878	514-1,140	A
ERA	4th/2016	11/23/2016	MRAD-25	Soil	pCi/kg	Bi-212	1,500	1,280	341-1,880	A
ERA	4th/2016	11/23/2016	MRAD-25	Soil	pCi/kg	Bi-214	1,350	1,230	741-1,770	A
ERA	4th/2016	11/23/2016	MRAD-25	Soil	pCi/kg	Cs-134	5,450	5,470	3,580-6,570	A
ERA	4th/2016	11/23/2016	MRAD-25	Soil	pCi/kg	Cs-137	7,230	6,700	5,130-8,620	A
ERA	4th/2016	11/23/2016	MRAD-25	Soil	pCi/kg	Co-60	8,490	8,020	5420-11,000	A
ERA	4th/2016	11/23/2016	MRAD-25	Soil	pCi/kg	Pb-212	1,230	1,200	786-1,670	A
ERA	4th/2016	11/23/2016	MRAD-25	Soil	pCi/kg	Pb-214	1,460	1,280	747-1,910	A
ERA	4th/2016	11/23/2016	MRAD-25	Soil	pCi/kg	Mn-54	<51.2	<1,000	<1,000	A
ERA	4th/2016	11/23/2016	MRAD-25	Soil	pCi/kg	Pu-238	587	647	389-893	A
ERA	4th/2016	11/23/2016	MRAD-25	Soil	pCi/kg	Pu-239	561	525	343-725	A
ERA	4th/2016	11/23/2016	MRAD-25	Soil	pCi/kg	K-40	11,000	10,600	7,740-14,200	A
ERA	4th/2016	11/23/2016	MRAD-25	Soil	pCi/kg	Sr-90	3,740	4,540	1,730-7,170	A
ERA	4th/2016	11/23/2016	MRAD-25	Soil	pCi/kg	Th-234	2,120	1,750	553-3,290	A
ERA	4th/2016	11/23/2016	MRAD-25	Soil	pCi/kg	U-234	1,650	1,760	1,080-2,260	A
ERA	4th/2016	11/23/2016	MRAD-25	Soil	pCi/kg	U-234	1,230	1,760	1,080-2,260	A
ERA	4th/2016	11/23/2016	MRAD-25	Soil	pCi/kg	U-234	2,220	1,760	1,080-2,260	A
ERA	4th/2016	11/23/2016	MRAD-25	Soil	pCi/kg	U-238	1,630	1,750	1,080-2,260	A
ERA	4th/2016	11/23/2016	MRAD-25	Soil	pCi/kg	U-238	1,290	1,750	1,080-2,260	A
ERA	4th/2016	11/23/2016	MRAD-25	Soil	pCi/kg	U-238	1,550	1,750	1,080-2,260	A
ERA	4th/2016	11/23/2016	MRAD-25	Soil	pCi/kg	U-Total	3,910	3,590	1,950-4,740	A
ERA	4th/2016	11/23/2016	MRAD-25	Soil	pCi/kg	U-Total	3,310	3,590	1,950-4,740	A
ERA	4th/2016	11/23/2016	MRAD-25	Soil	pCi/kg	U-Total	2,520	3,590	1,950-4,740	A
ERA	4th/2016	11/23/2016	MRAD-25	Soil	pCi/kg	U-Total	3,930	3,590	1,950-4,740	A
ERA	4th/2016	11/23/2016	MRAD-25	Soil	µg/kg	U-Total	4,890	5,240	2,890-6,590	A
ERA	4th/2016	11/23/2016	MRAD-25	Soil	µg/kg	U-Total	5,840	5,240	2,890-6,590	A
ERA	4th/2016	11/23/2016	MRAD-25	Soil	µg/kg	U-Total	3,780	5,240	2,890-6,590	A
ERA	4th/2016	11/23/2016	MRAD-25	Soil	µg/kg	U-Total	4,670	5,240	2,890-6,590	A
ERA	4th/2016	11/23/2016	MRAD-25	Soil	pCi/kg	Zn-65	3,310	2,920	2,330-3,880	A
ERA	4th/2016	11/23/2016	MRAD-25	Vegetation	pCi/kg	Am-241	1,590	1,530	935-2,030	A

Table D-7 (CONT.)

GEL 2016 ERA PROGRAM (MRAD) PERFORMANCE EVALUATION RESULTS

PT Provider	Quarter / Year	Report Date	Sample Number	Sample Media	Unit	Analyte / Nuclide	GEL value	Known value	Acceptance Range/ Ratio	Evaluation
ERA	4th/2016	11/23/2016	MRAD-25	Vegetation	pCi/kg	Cs-134	1,640	1,690	1,090-2,200	A
ERA	4th/2016	11/23/2016	MRAD-25	Vegetation	pCi/kg	Cs-137	1,170	1,030	747-1,430	A
ERA	4th/2016	11/23/2016	MRAD-25	Vegetation	pCi/kg	Co-60	1,680	1,560	1,080-2,180	A
ERA	4th/2016	11/23/2016	MRAD-25	Vegetation	pCi/kg	Cm-244	496	530	260-826	A
ERA	4th/2016	11/23/2016	MRAD-25	Vegetation	pCi/kg	Mn-54	<29.6	<300	<300	A
ERA	4th/2016	11/23/2016	MRAD-25	Vegetation	pCi/kg	Pu-238	1,440	1,330	793-1,820	A
ERA	4th/2016	11/23/2016	MRAD-25	Vegetation	pCi/kg	Pu-239	1,230	1,100	675-1,510	A
ERA	4th/2016	11/23/2016	MRAD-25	Vegetation	pCi/kg	K-40	31,400	30,900	22,300-43,400	A
ERA	4th/2016	11/23/2016	MRAD-25	Vegetation	pCi/kg	Sr-90	4,290	4,670	2,660-6,190	A
ERA	4th/2016	11/23/2016	MRAD-25	Vegetation	pCi/kg	U-234	3,730	3,110	2,040-3,990	A
ERA	4th/2016	11/23/2016	MRAD-25	Vegetation	pCi/kg	U-234	3,430	3,110	2,040-3,990	A
ERA	4th/2016	11/23/2016	MRAD-25	Vegetation	pCi/kg	U-238	3,490	3,090	2,060-3,930	A
ERA	4th/2016	11/23/2016	MRAD-25	Vegetation	pCi/kg	U-238	3,370	3,090	2,060-3,930	A
ERA	4th/2016	11/23/2016	MRAD-25	Vegetation	pCi/kg	U-Total	7,248	6,340	4,300-7,890	A
ERA	4th/2016	11/23/2016	MRAD-25	Vegetation	pCi/kg	U-Total	6,680	6,340	4,300-7,890	A
ERA	4th/2016	11/23/2016	MRAD-25	Vegetation	pCi/kg	U-Total	7,190	6,340	4,300-7,890	A
ERA	4th/2016	11/23/2016	MRAD-25	Vegetation	µg/kg	U-Total	9,980	9,250	6,200-11,700	A
ERA	4th/2016	11/23/2016	MRAD-25	Vegetation	µg/kg	U-Total	10,500	9,250	6,200-11,700	A
ERA	4th/2016	11/23/2016	MRAD-25	Vegetation	µg/kg	U-Total	10,100	9,250	6,200-11,700	A
ERA	4th/2016	11/23/2016	MRAD-25	Vegetation	pCi/kg	Zn-65	2,090	1,690	1,220-2,370	A
ERA	4th/2016	11/23/2016	MRAD-25	Filter	pCi/Filter	Am-241	44	42.3	26.1-57.2	A
ERA	4th/2016	11/23/2016	MRAD-25	Filter	pCi/Filter	Cs-134	614	614	391-762	A
ERA	4th/2016	11/23/2016	MRAD-25	Filter	pCi/Filter	Cs-137	1,280	1,170	879-1,540	A
ERA	4th/2016	11/23/2016	MRAD-25	Filter	pCi/Filter	Co-60	950	900	696-1,120	A
ERA	4th/2016	11/23/2016	MRAD-25	Filter	pCi/Filter	Fe-55	232	248	76.9-485	A
ERA	4th/2016	11/23/2016	MRAD-25	Filter	pCi/Filter	Mn-54	<4.55	<50.0	<50.0	A
ERA	4th/2016	11/23/2016	MRAD-25	Filter	pCi/Filter	Pu-238	54.5	61.9	42.4-81.4	A
ERA	4th/2016	11/23/2016	MRAD-25	Filter	pCi/Filter	Pu-239	54.8	59.7	43.2-78	A
ERA	4th/2016	11/23/2016	MRAD-25	Filter	pCi/Filter	Sr-90	97.4	101	49.4-151	A
ERA	4th/2016	11/23/2016	MRAD-25	Filter	pCi/Filter	U-234	30.3	29.2	18.1-44	A
ERA	4th/2016	11/23/2016	MRAD-25	Filter	pCi/Filter	U-234	30.9	29.2	18.1-44	A
ERA	4th/2016	11/23/2016	MRAD-25	Filter	pCi/Filter	U-238	27.9	28.9	18.7-40	A

Table D-7 (CONT.)

GEL 2016 ERA PROGRAM (MRAD) PERFORMANCE EVALUATION RESULTS

PT Provider	Quarter / Year	Report Date	Sample Number	Sample Media	Unit	Analyte / Nuclide	GEL value	Known value	Acceptance Range/ Ratio	Evaluation
ERA	4th/2016	11/23/2016	MRAD-25	Filter	pCi/Filter	U-238	29.4	28.9	18.7-40	A
ERA	4th/2016	11/23/2016	MRAD-25	Filter	pCi/Filter	U-Total	54.1	59.5	32.9-90.5	A
ERA	4th/2016	11/23/2016	MRAD-25	Filter	pCi/Filter	U-Total	61.5	59.5	32.9-90.5	A
ERA	4th/2016	11/23/2016	MRAD-25	Filter	pCi/Filter	U-Total	60	59.5	32.9-90.5	A
ERA	4th/2016	11/23/2016	MRAD-25	Filter	µg/Filter	U-Total	83.7	86.7	55.5-122	A
ERA	4th/2016	11/23/2016	MRAD-25	Filter	µg/Filter	U-Total	80.7	86.7	55.5-122	A
ERA	4th/2016	11/23/2016	MRAD-25	Filter	µg/Filter	U-Total	88.3	86.7	55.5-122	A
ERA	4th/2016	11/23/2016	MRAD-25	Filter	µg/Filter	U-Total	80.7	86.7	55.5-122	A
ERA	4th/2016	11/23/2016	MRAD-25	Filter	pCi/Filter	Zn-65	1,330	1,150	824-1,590	A
ERA	4th/2016	11/23/2016	MRAD-25	Filter	pCi/Filter	Gr-A	79.6	71.2	23.9-111	A
ERA	4th/2016	11/23/2016	MRAD-25	Filter	pCi/Filter	Gr-B	71.7	60.3	38.1-87.9	A
ERA	4th/2016	11/23/2016	MRAD-25	Water	pCi/L	Am-241	58.6	56.2	37.9-75.4	A
ERA	4th/2016	11/23/2016	MRAD-25	Water	pCi/L	Cs-134	1,190	1,260	925-1,450	A
ERA	4th/2016	11/23/2016	MRAD-25	Water	pCi/L	Cs-137	1,030	987	838-1,180	A
ERA	4th/2016	11/23/2016	MRAD-25	Water	pCi/L	Co-60	1,990	1,960	1,700-2,290	A
ERA	4th/2016	11/23/2016	MRAD-25	Water	pCi/L	Fe-55	228	245	146-332	A
ERA	4th/2016	11/23/2016	MRAD-25	Water	pCi/L	Mn-54	<5.09	<100	<100	A
ERA	4th/2016	11/23/2016	MRAD-25	Water	pCi/L	Pu-238	85.6	112	82.9-139	A
ERA	4th/2016	11/23/2016	MRAD-25	Water	pCi/L	Pu-239	125	157	122-198	A
ERA	4th/2016	11/23/2016	MRAD-25	Water	pCi/L	Sr-90	658	751	489-993	A
ERA	4th/2016	11/23/2016	MRAD-25	Water	pCi/L	U-234	106	105	78.9-135	A
ERA	4th/2016	11/23/2016	MRAD-25	Water	pCi/L	U-234	108	105	78.9-135	A
ERA	4th/2016	11/23/2016	MRAD-25	Water	pCi/L	U-234	103	105	78.9-135	A
ERA	4th/2016	11/23/2016	MRAD-25	Water	pCi/L	U-238	98.4	104	79.3-128	A
ERA	4th/2016	11/23/2016	MRAD-25	Water	pCi/L	U-Total	209	213	157-275	A
ERA	4th/2016	11/23/2016	MRAD-25	Water	pCi/L	U-Total	225	213	157-275	A
ERA	4th/2016	11/23/2016	MRAD-25	Water	pCi/L	U-Total	214	213	157-275	A
ERA	4th/2016	11/23/2016	MRAD-25	Water	pCi/L	U-Total	211	213	157-275	A
ERA	4th/2016	11/23/2016	MRAD-25	Water	µg/L	U-Total	295	311	248-376	A
ERA	4th/2016	11/23/2016	MRAD-25	Water	µg/L	U-Total	317	311	248-376	A
ERA	4th/2016	11/23/2016	MRAD-25	Water	µg/L	U-Total	336	311	248-376	A
ERA	4th/2016	11/23/2016	MRAD-25	Water	µg/L	U-Total	312	311	248-376	A

Table D-7 (CONT.)

GEL 2016 ERA PROGRAM (MRAD) PERFORMANCE EVALUATION RESULTS

PT Provider	Quarter / Year	Report Date	Sample Number	Sample Media	Unit	Analyte / Nuclide	GEL value	Known value	Acceptance Range/ Ratio	Evaluation
ERA	4th/2016	11/23/2016	MRAD-25	Water	pCi/L	Zn-65	807	724	604-913	A
ERA	4th/2016	11/23/2016	MRAD-25	Water	pCi/L	Gr-A	207	165	58.6-256	A
ERA	4th/2016	11/23/2016	MRAD-25	Water	pCi/L	Gr-B	119	130	74.4-193	A
ERA	4th/2016	11/23/2016	MRAD-25	Water	pCi/L	H-3	9210	10,100	6,770-14,400	A

A = Acceptable
N = Not Acceptable
(1) CAP: CARR 160519-1015