#### **Technical Specification 5.6.2**



Palo Verde Nuclear Generating Station PO Box 52034 Phoenix, Arizona 85072-2034 Mail Station 7636

102-08088-MDD/MSC April 9, 2020

ATTN: Document Control Desk U.S. Nuclear Regulatory Commission Washington, DC 20555-0001

Dear Sirs:

#### Subject: Palo Verde Nuclear Generating Station (PVNGS) Units 1, 2, and 3 Docket Nos. STN 50-528/529/530 Annual Radiological Environmental Operating Report 2019

In accordance with PVNGS Technical Specification 5.6.2, enclosed, please find the Annual Radiological Environmental Operating Report for 2019.

No new commitments are being made to the NRC by this letter. Should you need further information regarding this submittal, please contact Matthew S. Cox, Licensing Section Leader, at (623) 393-5753.

Sincerely,

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Michael D. DiLorenzo Department Leader, Regulatory Affairs

MDD/MSC/mg

Enclosure: Palo Verde Nuclear Generating Station Annual Radiological Environmental Operating Report 2019

cc: S. A. Morris NRC Region IV Regional Administrator
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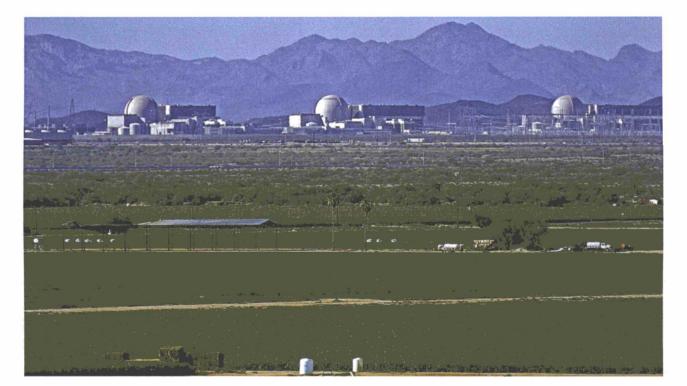
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# Enclosure

Palo Verde Nuclear Generating Station Annual Radiological Environmental Operating Report 2019

# PALO VERDE NUCLEAR GENERATING STATION ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT 2019

(Reference: RCTSAI 1643, Legacy Item No.036843.01)



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**Director, Radiation Protection** 

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# ABSTRACT

The Radiological Environmental Monitoring Program (REMP) is an ongoing program conducted by Arizona Public Service Company (APS) for the Palo Verde Nuclear Generating Station (PVNGS). Various types of environmental samples are collected near PVNGS and analyzed for plant-related radionuclide concentrations.

During 2019, the following categories of samples were collected by APS:

- Broadleaf vegetation
- Groundwater
- Drinking water
- Surface water
- Airborne particulate and radioiodine
- Goat milk
- Sludge and sediment

Thermoluminescent dosimeters (TLDs) were used to measure environmental gamma radiation. The Environmental TLD program is also conducted by APS.

The Arizona Department of Health Services, Bureau of Radiation Control (BRC) performs radiochemistry analyses on various duplicate samples provided to them by APS. Samples analyzed by BRC include onsite samples from the Reservoirs, Evaporation Ponds, and two (2) Deep Wells. Offsite samples analyzed by BRC include two (2) local resident wells. BRC also performs air sampling at seven (7) offsite locations identical to APS and maintains approximately fifty (50) environmental TLD monitoring locations, eighteen (18) of which are duplicates of APS locations.

A comparison of pre-operational and operational data indicates no changes to environmental radiation levels.

(NOTE: Reference to APS throughout this report refers to PVNGS personnel)

This report presents the results of the operational Radiological Environmental Monitoring Program conducted by Arizona Public Service Company (APS). The Radiological Environmental Monitoring Program (REMP) was established for the Palo Verde Nuclear Generating Station (PVNGS) by APS in 1979.

This report contains the measurements and findings for 2019. All references are specifically identified in Section 12.

# 1.1 Overview

The Radiological Environmental Monitoring Program (REMP) provides representative measurements of radiation and radioactive materials in exposure pathways. REMP measures radionuclides that lead to the highest potential radiation exposures to members of the public resulting from station operation. This monitoring program implements Title 10 of the Code of Federal Regulations (CFR) Part 50, Appendix I, Section IV.B.2., and thereby supplements the radiological effluent monitoring program by verifying that the measurable concentrations of radioactive materials and levels of radiation are not higher than expected on the basis of the effluent measurements and the modeling of the environmental exposure pathways. Guidance for this monitoring program is provided by the US Nuclear Regulatory Commission (USNRC) in their Radiological Assessment Branch Technical Position on Environmental Monitoring, Revision 1, November 1979 (incorporated into NUREG 1301). Results from the REMP help to evaluate sources of elevated levels of radioactivity in the environment (i.e. atmospheric nuclear detonations or abnormal plant releases).

The Land Use Census ensures that changes in the use of areas at, and beyond the site boundary, are identified and that modifications to the REMP are made if required by the results of this census. This census satisfies the requirements of Section IV.B.3 of Appendix I to 10 CFR Part 50.

The Interlaboratory Comparison Program is provided to ensure that independent checks on the precision and accuracy of the measurements of radioactive material in environmental sample matrices are performed as part of the quality assurance program for environmental monitoring in order to demonstrate that the results are valid for the purposes of 10 CFR 50, Appendix I, Section IV.B.2.

Results of the PVNGS pre-operational environmental monitoring program are presented in Reference 1.

The initial criticality of Unit 1 occurred May 25, 1985. Initial criticality for Units 2 and 3 were April 18, 1986, and October 25, 1987, respectively. PVNGS operational findings (historical) are presented in Reference 2.

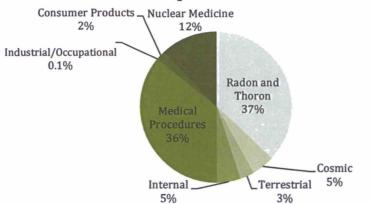
#### 1.2 Radiation and Radioactivity

Atoms are the basic building blocks of matter. Unstable atoms emit radiation and material that spontaneously emits radiation is referred to as radioactive. Radioactive material is frequently categorized as either "Natural" or "Man-made"

Natural sources of radiation exist naturally in the environment and include: radon, thoron, cosmic, terrestrial, and internal. The sun and stars are a source of cosmic radiation. Atmospheric conditions, the Earth's magnetic field, and differences in elevation can affect the amount, or dose, of cosmic radiation an individual receives. The Earth is a source of terrestrial radiation. Uranium, thorium, and radium exist naturally in rock and soil. All organic matter contains carbon and potassium, and water contains small amounts of dissolved uranium and thorium. The largest contributor of dose to Americans from natural sources is attributed to radon which is found in air. All people are a source of internal radiation. Potassium-40 and carbon-14 are radioactive nuclides and inside all people from birth, making people a source of exposure.

Man-made sources of radiation include: consumer products, nuclear medicine, and medical procedures. There are a number of occupational areas which result in exposure to individuals of varying amounts of radiation such as: radiography, radiology, radiation oncology, power generation, and research laboratories. The Nuclear Regulatory Commission (NRC) requires licensees to monitor exposure to workers and limit occupational exposure to 5,000 millirem per year. Several consumer products contain radioactive material such as: some ceramics, thorium lantern mantles, luminous watches containing tritium, smoke detectors, and tobacco. Other consumer product sources of radiation can come from building and road construction materials, combustible fuels (i.e. gas, coal), and x-ray security systems. The most significant contributor to radiation exposure from man-made sources is medical procedures. Diagnostic x-rays and nuclear medicine procedures, such as those that use iodine-131 or cesium-137, are examples of man-made medical sources.

The average member of the public receives a total annual dose of approximately 620 millirem from ionizing radiation. Figure 1-1 illustrates the contribution of various sources of radiation to radiation exposure in the United States (NCRP Report No.160 (2009)).



# Sources of Radiation Exposure in the United States

Figure 1-1 Sources of Radiation Exposure in the United States

# 2. Description of the Monitoring Program

APS and vendor organizations performed the pre-operational Radiological Environmental Monitoring Program between 1979 and 1985. APS and vendors continued the program into the operational phase.

### 2.1 Radiological Environmental Monitoring Program

The assessment program consists of routine measurements of environmental gamma radiation and of radionuclide concentrations in media such as air, groundwater, drinking water, surface water, vegetation, milk, sludge, and sediment.

Samples were collected by APS at the monitoring sites shown in Figures 2-1 and 2-2. The specific sample types, sampling locations, and sampling frequencies, as set forth in the PVNGS Offsite Dose Calculation Manual (ODCM), Reference 4, are presented in Tables 2-1, 2-2 and 9-1. Additional onsite sampling (outside the scope of the ODCM) is performed to supplement the REMP. All results are included in this report. Routine sample analyses were performed at the onsite Central Chemistry Laboratory and Operating Unit laboratories. Analyses for hard-to-detect radionuclides were performed by GEL Laboratories LLC.

Environmental gamma radiation measurements were performed by APS using TLDs at fifty (50) locations near PVNGS. The PVNGS Dosimetry Department is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) to process personnel ionizing radiation dosimeters.

In addition to monitoring environmental media, a Land Use Census is performed annually to identify the nearest milk animals, residents, and gardens. This information is used to evaluate the potential dose to members of the public for those exposure pathways that are indicated.

#### 2.2 Radiological Environmental Monitoring Program Changes for 2019

Two (2) onsite groundwater wells, Site 58A (Well 27dcb) and Site 65 (Well 34aab) were added to the ODCM. These wells were sampled as supplemental sites prior to the July 2019 revision of the ODCM, at which time they were added to the Radiological Environmental Monitoring Program. There were no other changes to the Radiological Environmental Monitoring Program that impacted the Offsite Dose Calculation Manual (ODCM) Revision 28.

#### 2.3 REMP Deviations/Abnormal Events Summary

During calendar year 2019, there were eleven (11) deviations/abnormal events with regards to the monitoring program. Refer to Table 2-3 for more detail and corrective actions taken.

There was eight (8) events involving Air Sample data. Six (6) events involved reduced sampling period due to pump failure, either due to pump malfunction or loss of power to the pump. Two (2) events were due to failure of the Elapsed Time Meter (ETM). Three (3) of these eight (8) events resulted in sufficient data to obtain VALID results for the sampling period, while five (5) events resulted in the determination that the sample was INVALID. Palo Verde Nuclear

Generating Station has ten (10) Air Sample sites: one (1) control, four (4) ODCM required, and five (5) supplemental sites. Supplemental sampling locations were available and produced valid data for the sampling period involving an invalid sample from a required sample location.

Two (2) events were due to the inability to obtain a Drinking Water Sample, resulting from an inoperable well pump at the donor location. One (1) event impacted the ability to meet the required Lower Limit of Detection for La-140. One (1) event resulted in the inability to collect the drinking water sample from the location for the month of December.

There was one (1) event involving environmental dosimetry; dosimetry at Site 47 was identified as missing during the  $2^{nd}$  Quarter TLD change-out. Data for this location was unavailable for the  $1^{st}$  quarter.

#### 2.4 Groundwater Protection

PVNGS has implemented a groundwater protection initiative developed by the Nuclear Energy Institute (NEI). The implementing guidance of this initiative, NEI 07-07 (Industry Ground Water Protection Initiative – Final Guidance Document, August 2007), and later revised in March of 2019, provides added assurance that groundwater will not be adversely affected by PVNGS operations.

Several monitoring wells have been installed to monitor the subsurface water and shallow aquifer at Units 1, 2, and 3. Many of these wells were previously monitored in accordance with the State of Arizona Aquifer Protection Permit (Area-Wide) No. P-100388 (APP), which provided agreed upon monitoring parameters and reporting thresholds. The APP was revised in 2018, which included the removal of several of the wells from mandated sampling. These wells are now referred to as Legacy Wells and continue to be sampled for data continuity and in support of the Groundwater Protection Initiative. The frequency of sampling of the wells varies and may be done monthly, quarterly, and or annually for chemical and radiological parameters. Sample results for the shallow aquifer wells are reported in the PVNGS Annual Radioactive Effluent Release Report (ARERR).

Three subsurface samples were obtained, one each from Units 2 and 3 tritium monitoring wells, and one from the shallow aquifer outside of the Unit 1 Radiologically Controlled Area (RCA). These samples were analyzed for hard-to-detect radionuclides (e.g. C-14, Fe-55, Ni-63, Sr-90) as verification that there are no underground leaks from plant systems that may affect groundwater. All results were <MDA. Refer to Table 8-12 for sample results.

# **Table 2-1 Sample Collection Locations**

SAMPLE				
SITE #	SAMPLE TYPE	LOCATION (a)	LOCATION DESCRIPTION	
4	Air	E16	APS Office	
6A*	Air	SSE13	Old US 80	
7 <b>A</b>	Air	ESE3	Arlington School	
14A	Air	NNE2	371 <sup>st</sup> Ave. and Buckeye-Salome Rd.	
15	Air	NE2	NE Site Boundary	
17A	Air	E3	351 <sup>st</sup> Ave.	
21	Air	S3	S Site Boundary	
29	Air	W1	W Site Boundary	
35	Air	NNW8	Tonopah	
40	Air	N2	Transmission Rd	
46	Drinking Water	NNW8	Local resident	
47	Vegetation	N3	Local resident	
48	Drinking Water	SW1	Local resident	
49	Drinking Water	N2	Local resident	
51	Milk	NNE3	Local resident-goats	
	Vegetation	NNE3	Local resident	
53*	Milk	NE30	Local resident- goats	
54	Milk	NNE4	Local resident- goats	
55	Drinking Water	SW3	Local resident	
	(Supplemental)			
57	Groundwater	ONSITE	Well 27ddc	
58	Groundwater	ONSITE	Well 34abb	
58A	Groundwater	ONSITE	Well 27dcb	
59	Surface Water	ONSITE	Evaporation Pond 1	
60	Surface Water	ONSITE	85 Acre Reservoir	
61	Surface Water	ONSITE	45 Acre Reservoir	
62*	Vegetation	ENE26	Commercial Farm	
63	Surface Water	ONSITE	Evaporation Pond 2	
64	Surface Water	ONSITE	Evaporation Pond 3	
65	Groundwater	ONSITE	Well 34aab	

NOTES:

\*Designates a control site

(a) Distances and direction are from the center-line of Unit 2 containment and rounded to the nearest mile

Air sample sites designated with the letter 'A' are sites that have the same site number as a TLD location, but are not in the same location (e.g. site #6 TLD location is different from site #6A air sample location; site #4 TLD location is the same as site #4 air sample location) Table 2-2 Sample Collection Schedule

SAMPLE	AIRBORNE		AIRBORNE		GROUND	DRINKING	SURFACE
SITE #	PARTICULATE	MILK	RADIOIODINE	VEGETATION	WATER	WATER	WATER
4	W		W				
6A	W		W				
7A	W		W				
14A	W		W				
15	W		W				
17A	W		W				
21	W		W				
29	W		W				
35	W		W				
40	W	_	W				
46						W	-
47				M/AA			
48						W	
49						W	
51			M/AA	M/AA			
53			M/AA				
54			M/AA				
55						W	
57					Q		
58					Q		
59							Q
60							Q
61							Q
62				M/AA			
63							Q
64							Q

W = WEEKLY

M/AA = MONTHLY AS AVAILABLE

Q = QUARTERLY

Table 2-5 Summaries of the RENIT Deviations/Abnormar Events					
<b>Deviation/Abnormal Event</b>	Actions Taken				
1. Air Sample Site 17A INVALID due to pump failure for sample period 4/16/2019-4/23/2019 and 4/23/2019- 4/30/2019.	Pump failure resulted in insufficient data for statistical analysis for sample period 4/16/2019- 4/23/2019 (Week 16). Data for Week 16 is INVALID and data is for INFO only. Pump was replaced during sample period 4/23/2019-4/30/2019 (Week 17), providing sufficient data for a VALID sample. Event documented through CR 19-06328 (Table 8-5, Note 2).				
2. Air Sample site 35 INVALID due to power loss and pump failure for sample period 5/21/2019-5/28/2019 and 5/28/2019-6/4/2019.	Site 35 lost power during Week 21; however the Elapsed Time Meter continued recording time. Week 22 experienced a pump failure once the power was restored and had a shortened sampling run time. Samples are INVALID due to unknown volume of sample. Event documented through CR 19-08404 (Table 8-5, Note 3).				
3. Air Sample Site 40 INVALID due to failed pump for sample period 6/18/2019- 6/25/2019.	Pump failed with Elapsed Time Meter still running, resulting in inability to determine sample flow volume. Sample is INVALID and data is for INFO only. Event documented through CR 19- 09504 (Table 8-5, Note 4).				
4. Air Sample Site 40 Elapsed Time Meter (ETM) did not have expected run time for sample period 7/9/2019- 7/16/2019.	ETM did not reflect expected run time (actual 141.9 hrs. vs expected 167.2 hrs.). Upon testing, ETM was functioning properly. Possible cause was due to power outage. Sample appeared to have normal dust loading. Sample run time sufficient for data collection and statistical analysis; sample is VALID. Event documented through CR 19-10403 (Table 8-5, Note 5).				
5. Air Sample Site 6A INVALID due to pump failure for sample period 8/13/2019- 8/20/2019.	Pump failed with Elapsed Time Meter still running resulted in inability to determine sample flow volume. Sample is INVALID and data is for INFO only. Event documented through CR 19- 12139 (Table 8-5, Note 6).				
6. Air Sample Site 6A Elapsed Time Meter (ETM) failed to operate as expected run time for sample period 8/20/2019- 8/27/2019.	ETM failed to operate as expected. Pump was running satisfactorily and collection on filter had normal distribution. Sample run time was calculated; sample is VALID. Event documented through CR 19-12487 (Table 8-5, Note 7).				
7. Air Sample Site 29 INVALID due to failed pump and inability to estimate volume of sample for sample period 10/30/2019- 11/5/2019.	Pump failed with Elapsed Time Meter still running resulted in inability to determine sample flow volume. Sample is INVALID and data is for INFO only. Event documented through CR 19- 16553 (Table 8-5, Note 8).				
8. Air Sample Site 29 INVALID due to failed pump and inability to estimate volume of sample for sample period 11/5/2019- 11/12/2019.	Pump failed with Elapsed Time Meter still running resulted in inability to determine sample flow volume. Sample is INVALID and data is for INFO only. Event documented through CR 19- 16890 (Table 8-5, Note 9).				

# Table 2-3 Summaries of the REMP Deviations/Abnormal Events

9. Drinking War not meet LLE November.	ter Site 55 did 9 for La-140 for	Composite drinking water sample achieved an MDA of 46 pCi/L, versus the required LLD of 15 pCi/L, due to inability to collect sample for final week of sampling period. Event documented through CR 19-17596 and 19-17770 (Table 8-8, Note 2).
10. No sample av Drinking War December.	vailable for ter Site 55 for	Donor's pump failed to operate. As a result, no sample could be obtained from Site 55 for the sampling period of December. Event documented through CR 19-17897 and 20-000862 (Table 8-8, Note 3).
<ol> <li>Direct Radiat data unavaila Quarter.</li> </ol>		During the 2 <sup>nd</sup> Quarter TLD change-out, TLD Site 47 was identified as missing. Data for this location was unavailable; however, dosimetry was replaced for 2 <sup>nd</sup> Quarter data collection. Event documented through CR 19-04547 (Table 9-2, Note 1).

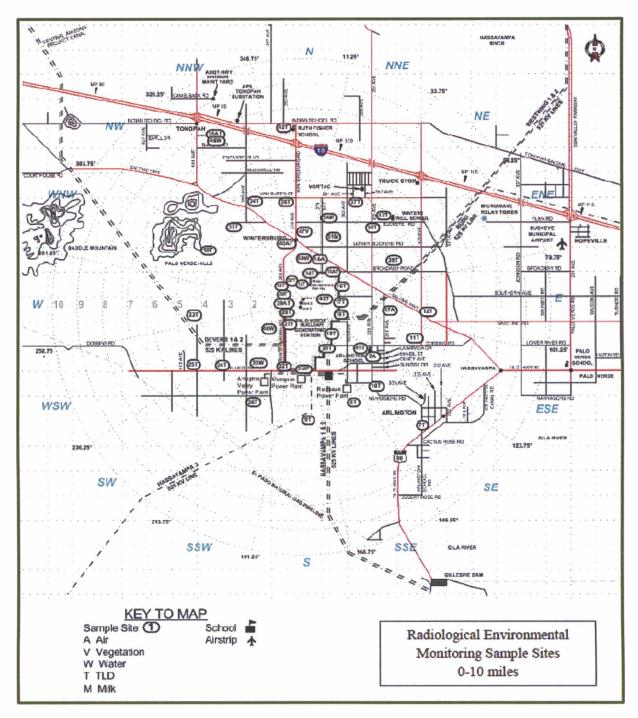


Figure 2-1 REMP Sample Sites- Map (0-10 miles)

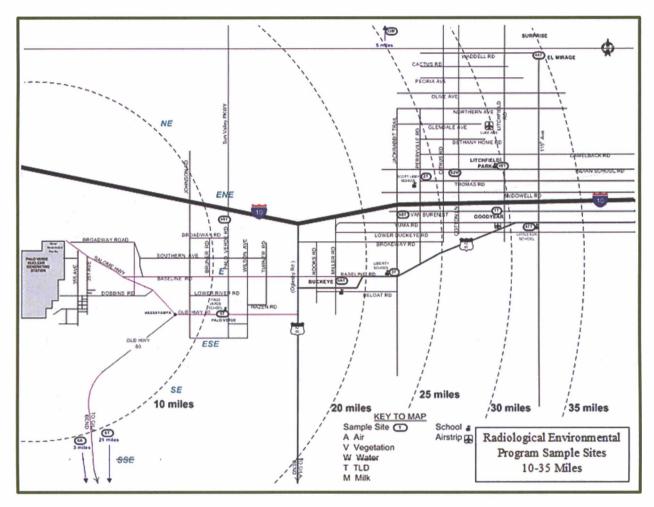


Figure 2-2 REMP Sample Sites- Map (10-35 Miles)

# **3. Sample Collection Program**

APS Personnel, using PVNGS procedures, collected all samples.

### 3.1 Water

Weekly samples were collected from four (4) residence wells for monthly and quarterly composites. Samples were collected in one-gallon containers (plastic cubitainers) and 500 mL glass bottles. The samples were analyzed for gross beta, gamma-emitting radionuclides, and tritium.

Quarterly grab samples were collected from the 45 and 85 acre Reservoirs, active Evaporation Ponds 1A/B/C, 2A/B, and 3A/B, and onsite wells 34abb, 27ddc, 34aab, and 27dcb. Samples were collected in one-gallon containers (plastic cubitainers) and 500 mL glass bottles. Samples were analyzed for gamma-emitting radionuclides and tritium.

Treated sewage effluent from the City of Phoenix was sampled as a weekly composite at the onsite Water Resources (WR), and analyzed for gamma-emitting radionuclides. A monthly composite was analyzed for tritium.

### 3.2 Vegetation

Vegetation samples were collected monthly, as available, and were analyzed for gammaemitting radionuclides.

#### 3.3 Milk

Goat milk samples were collected monthly, as available, and were analyzed for gammaemitting radionuclides, including low level I-131.

# 3.4 Air

Air particulate filters and charcoal cartridges were collected at ten (10) sites on a weekly basis. Particulate filters were analyzed for gross beta. Charcoal cartridges were analyzed for Iodine-131. Particulate filters were composited quarterly, by location, and analyzed for gamma-emitting radionuclides.

#### 3.5 Soil, Sludge, and Sediment

Sludge samples were obtained weekly from the WR waste centrifuge (during operational periods) and analyzed for gamma-emitting radionuclides. Cooling tower sludge was analyzed for gamma-emitting radionuclides prior to disposal in the WR sludge landfill.

# 4. Analytical Procedures

The procedures described in this report are those used by APS to routinely analyze samples

#### 4.1 Air Particulate

#### 4.1.1 Gross Beta

A glass fiber filter sample is placed in a stainless steel planchet and counted for gross beta activity utilizing a low background gas flow proportional counter.

#### 4.1.2 Gamma Spectroscopy

The glass fiber filters are counted on a multichannel analyzer equipped with a Highpurity Germanium (HPGe) detector. The resulting spectrum is analyzed by a computer for specific radionuclides and verified by trained technicians.

#### 4.2 Airborne Radioiodine

#### 4.2.1 Gamma Spectroscopy

The charcoal cartridge is counted on a multichannel analyzer equipped with an HPGe detector. The resulting spectrum is analyzed by a computer for Iodine-131.

#### 4.3 Milk

#### 4.3.1 Gamma Spectroscopy

The sample is placed in a plastic marinelli beaker and counted on a multichannel analyzer equipped with an HPGe detector. The resulting spectrum is analyzed by a computer for specific radionuclides and verified by trained technicians.

#### 4.3.2 Radiochemical I-131 Separation

Iodine in milk sample is reduced with sodium bisulfite and iodine is absorbed by the anion exchange resin. The iodine is eluted with NaOCl. Iodine is extracted from the sample with carbon tetrachloride. The iodine is back extracted from the organic phase with water containing sodium bisulfate and then precipitated as CuI. The precipitate is mounted in a planchet and counted for gross beta.

#### 4.4 Vegetation

#### 4.4.1 Gamma Spectroscopy

The sample is pureed in a food processor, placed in a one liter plastic marinelli beaker, weighed, and counted on a multichannel analyzer equipped with an HPGe detector. The

resulting spectrum is analyzed by a computer for specific radionuclides and verified by trained technicians.

#### 4.5 Sludge/Sediment

# 4.5.1 Gamma Spectroscopy

The wet/dry sample is placed in a one-liter plastic marinelli beaker, weighed, and counted on a multichannel analyzer equipped with an HPGe detector. The resulting spectrum is analyzed by a computer for specific radionuclides and verified by trained technicians.

# 4.6 Water

# 4.6.1 Gamma Spectroscopy

The sample is placed in a one-liter plastic marinelli beaker and counted on a multichannel analyzer equipped with a HPGe detector. The resulting spectrum is analyzed by a computer for specific radionuclides and verified by trained technicians.

# 4.6.2 Tritium

The sample is evaluated to determine the appropriate method of preparation prior to counting. If the sample contains suspended solids or is turbid, it may be filtered, distilled, and/or de-ionized, as appropriate. Eight (8) milliliters of sample are mixed with fifteen (15) milliliters of liquid scintillation cocktail. The mixture is dark adapted and counted for tritium activity using a liquid scintillation counting system.

# 4.6.3 Gross Beta

A 200-250 milliliter sample is placed in a beaker. Five (5) milliliters of concentrated nitric (HNO<sub>3</sub>) acid is added and the sample is evaporated down to about twenty (20) milliliters. The remaining sample is transferred to a stainless steel planchet. The sample is heated to dryness and counted for gross beta in a gas flow proportional counter.

# 4.7 Soil

# 4.7.1 Gamma Spectroscopy

The samples are sieved, placed in a one-liter plastic marinelli beaker, and weighed. The samples are then counted on a multichannel analyzer equipped with an HPGe detector. The resulting spectrum is analyzed by a computer for specific radionuclides and verified by trained technicians.

# 5.1 Gamma Spectrometer

The Canberra Gamma Spectrometer consists of a Canberra System equipped with HPGe detectors, having resolutions of 1.73 keV and 1.88 keV (as determined by full width half max with an energy of 0.5 keV per channel) and respective efficiencies of 21.5% and 38.4% (as determined by the manufacturer with Co-60). The Canberra System is used for all gamma counting. The system uses Canberra developed software to search, identify, and quantify the peaks of interest.

# 5.2 Liquid Scintillation Spectrometer

A Beckman LS-6500 Liquid Scintillation Counter is used for tritium determinations. The system background averages approximately 12-16 cpm with a counting efficiency of approximately 40% using a quenched standard.

# 5.3 Gas Flow Proportional Counter

The Tennelec S5E is a low background gas flow proportional counter for gross beta analysis. The system contains an automatic sample changer capable of counting 50 samples in succession. Average beta background count rate is about 1-2 cpm with a beta efficiency of approximately 30% for Cs-137.

# 6. Isotopic Detection Limits and Reporting Criteria

#### 6.1 Lower Limits of Detection

The lower limits of detection (LLD) and the method for calculation are specified in the PVNGS ODCM, Reference 4. The ODCM required *a priori* LLDs are presented in Table 6-1.

### 6.2 Data Reporting Criteria

All results that are greater than the Minimum Detectable Activity (MDA) (*a posteriori* LLD) are reported as positive activity with its associated  $2\sigma$  counting error. All results that are less than the MDA are reported as less than values at the associated MDA. For example, if the MDA is 12 pCi/liter, the value is reported as <12.

Typical MDA values are presented in Table 6-3.

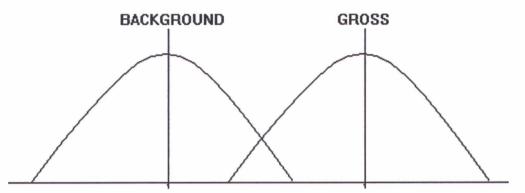
Occasionally, the PVNGS ODCM a priori LLDs may not be achieved as a result of:

- Background fluctuations
- Unavoidably small sample sizes
- The presence of interfering radionuclides
- Self-absorption corrections
- Decay corrections for short half-life radionuclides
- Other uncontrollable circumstances

In these instances, the contributing factors will be noted in the table where the data are presented. A summary of deviations/abnormal events is presented in Table 2-3 Summaries of the REMP Deviations/Abnormal Events and includes a description of any sample results that did not meet *a priori* LLD requirements.

# 6.3 LLD and Reporting Criteria Overview

Making a reasonable estimate of the limits of detection for a counting procedure or a radiochemical method is usually complicated by the presence of significant background. It must be considered that the background or blank is not a fixed value but that a series of replicates would be normally distributed. The desired net activity is the difference between the gross and background activity distributions. The interpretation of this difference becomes a problem if the two distributions intersect as indicated in the diagram.



If a sufficient number of replicate analyses are run, it is expected that the results would fall in a normal Gaussian distribution. Standard statistics allow an estimate of the probability of any particular deviation from the mean value. It is common practice to report the mean  $\pm$ one or two standard deviations as the result. In routine analysis, such replication is not carried out, and it is not possible to report a Gaussian standard deviation. With counting procedures, however, it is possible to estimate a Poisson standard deviation directly from the count. Data are commonly reported as the measured value  $\pm$  one or two Poisson standard deviations. The reported values are then considered to give some indication of the range in which the true value might be expected to occur.

LLD is the smallest amount of sample activity that will yield a net count for which there is confidence at a predetermined level that activity is present. LLDs are calculated values for individual radionuclides based on a number of different factors including sample size, counting efficiency and background count rate of the instrument, the background and sample counting time, the decay time, and the chemical recovery of the analytical procedures. A minimum detectable activity value (MDA) is the smallest amount of activity that can be detected in an actual sample and uses the values obtained from the instrument and outcome of the analytical process. Therefore, the MDA values may differ from the calculated LLD values if the sample size and chemical recovery, decay values, or the instrument efficiency, background, or count time differed from those used in the LLD calculation.

The factors governing the calculation of the LLD and MDA values are discussed below:

- 1. Sample Size: The number of observations included in a statistical analysis. Sample size dictates the amount of information available about a studied subject to make accurate inferences.
- 2. Counting Efficiency: The fundamental quantity in the measurement of a radioactive substance is the number of disintegrations per unit time. As with most physical measurements in analytical chemistry, an absolute measurement of the disintegration rate is seldom possible, rather it is necessary to compare the sample with one or more standards. The standards determine the counter efficiency that may then be used to convert sample counts per minute (cpm) to disintegrations per minute (dpm).

- 3. Background Count Rate: Any counter will show a certain counting rate without a sample in position. This background counting rate comes from several sources: 1) natural environmental radiation from the surrounding materials, 2) cosmic radiation, and 3) the natural radioactivity in the counter material itself. The background counting rate will depend on the amounts of these types of radiation and the sensitivity of the counter to the radiation.
- 4. Background and Sample Counting Time: The amount of time devoted to the counting of the background depends on the level of activity being measured. In general, with low level samples, this time should be about equal to that devoted to counting a sample.
- 5. Time Interval between Sample Collection and Counting: Decay measurements are useful in identifying certain short-lived nuclides. The disintegration constant is one of the basic characteristics of a specific radionuclide and is readily determined, if the half-life is sufficiently short. To ensure the required LLDs are achieved, appropriate decay correction values are used to account for radioactive decay during transit time and sample processing.

Analysis	Water (pCi/l)	Airborne Particulate or Gas (pCi/m <sup>3</sup> )	Fresh Milk (pCi/l)	Food Products (pCi/kg, wet)
Gross Beta	4	0.01		
Н-3	2000*			
Mn-54	15			
Fe-59	30			
Co-58, -60	15			
Zn-65	30			
Zr-95	30			
Nb-95	15			
I-131	1**	0.07	1	60
Cs-134	15	0.05	15	60
Cs-137	18	0.06	18	80
Ba-140	60		60	
La-140	15		15	

# Table 6-1 ODCM Required Lower Limits of Detection (a priori)

\* If no drinking water pathway exists, a value of 3000 pCi/liter may be used

\*\* If no drinking water pathway exists, a value of 15 pCi/liter may be used

#### NOTES:

This list does not mean that only these nuclides are to be detected and reported. Other peaks that are measurable and identifiable, together with the above nuclides, shall also be identified and reported.

Analysis	Water (pCi/l)	Airborne Particulate or Gas (pCi/m <sup>3</sup> )	Fresh Milk (pCi/l)	Food Products (pCi/kg, wet)
H-3	20,000 *			
Mn-54	1,000			
Fe-59	400			
Co-58	1,000			
Co-60	300			
Zn-65	300			
Zr-Nb-95	400			
I-131	2 **	0.9	3	100
Cs-134	30	10	60	1,000
Cs-137	50	20	70	2,000
Ba-La-140	200		300	

# Table 6-2 ODCM Required Reporting Levels

- \* For drinking water samples. This is a 40 CFR 141 value. If no drinking water pathway exists, a value of 30,000 pCi/L may be used.
- \*\* If no drinking water pathway exists, a reporting level of 20 pCi/L may be used.

Analysis/Nuclide	Water (pCi/liter)	Milk (pCi/liter)	Airborne Particulate or Gas (pCi/m <sup>3</sup> )	Vegetation (pCi/kg, wet)
Gross Beta	2.08		0.004	
H-3	326			
Mn-54	10			
Fe-59	20			
Co-58	9			
Co-60	11			
Zn-65	22			
Zr-95	16			
Nb-95	10			
I-131	10 <sup>a</sup>	1	0.04 <sup>b</sup>	49
Cs-134	9	1	0.003 <sup>b</sup>	47
Cs-137	10	1	0.003 <sup>b</sup>	61
Ba-140	33	3		
La-140	13	1		

# **Table 6-3 Typical MDA Values**

# NOTES:

a - low level I-131 is not required since there is no drinking water pathway

b - Based on 433 m<sup>3</sup>, the normal weekly sample volume

# 7. Interlaboratory Comparison Program

### 7.1 Quality Control Program

APS maintains an extensive QA/QC Program to provide assurance that samples are collected, handled, tracked, and analyzed to specified requirements. This program includes appropriate elements of USNRC Regulatory Guide 4.15, Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment, Revision 1. Included in the program are procedures for sample collection, preparation and tracking, sample analysis, equipment calibration and checks, and ongoing participation in an interlaboratory comparison program. Duplicate/replicate samples are analyzed to verify analytical precision and sample methodology. Comprehensive data reviews are performed including trending of data where appropriate.

During 2018, APS analyzed the following sample types under the interlaboratory comparison program:

- Beta/Gamma/ in Air Filter
- I-131 in Air
- Beta in Water
- Gamma in Water
- Tritium in Water
- Gamma in Milk

#### 7.2 Intercomparison Results

APS participates in a crosscheck program using vendor supplied blind radionuclide samples. Results for the interlaboratory comparison program are presented in Table 7-1.

Sample ID	Analysis Type	Nuclide	Units	Known Value	PVNOS Value	1 sigma Error	Resolution*	Ratio	NRC Range	Results
E12511	Gamma Water	Ce-141	pCi/L	1.13E+02	1.12E+02	1.20E+01	9	0.99	0.60 - 1.66	Acceptable
	CL Det 1	Co-58	pCi/L	1.39E+02	1.45E+02	1.49E+01	10	1.04	0.60 - 1.66	Acceptable
		Co-60	pCi/L	2.90E+02	2.87E+02	1.87E+01	15	0.99	0.60 - 1.66	Acceptable
		Cr-51	pCi/L	2.84E+02	2.75E+02	5.46E+01	5	0.97	0.50 - 2.00	Acceptable
		Cs-134	pCi/L	1.55E+02	1.48E+02	1.03E+01	14	0.95	0.60 - 1.66	Acceptable
		Cs-137	pCi/L	1.91E+02	2.02E+02	2.06E+01	10	1.06	0.60 - 1.66	Acceptable
		Fe-59	pCi/L	1.54E+02	1.62E+02	1.52E+01	11	1.05	0.60 - 1.66	Acceptable
		I-131	pCi/L	8.65E+01	7.89E+01	1.21E+01	7	0.91	0.50 - 2.00	Acceptable
		Mn-54	pCi/L	1.39E+02	1.46E+02	1.47E+01	10	1.05	0.60 - 1.66	Acceptable
		Zn-65	pCi/L	2.14E+02	2.18E+02	2.43E+01	9	1.02	0.60 - 1.66	Acceptable
E12511	Gamma Water	Ce-141	pCi/L	1.13E+02	1.13E+02	1.11E+01	10	1.00	0.60 - 1.66	Acceptable
	CL Det 2	Co-58	pCi/L	1.39E+02	1.31E+02	1.27E+01	10	0.94	0.60 - 1.66	Acceptable
		Co-60	pCi/L	2.90E+02	2.84E+02	1.70E+01	17	0.98	0.75 - 1.33	Acceptable
		Cr-51	pCi/L	2.84E+02	2.69E+02	4.70E+01	6	0.95	0.50 - 2.00	Acceptable
		Cs-134	pCi/L	1.55E+02	1.38E+02	9.02E+00	15	0.89	0.60 - 1.66	Acceptable
		Cs-137	pCi/L	1.91E+02	1.91E+02	1.78E+01	11	1.00	0.60 - 1.66	Acceptable
		Fe-59	pCi/L	1.54E+02	1.67E+02	1.34E+01	12	1.08	0.60 - 1.66	Acceptable
		I-131	pCi/L	8.65E+01	8.16E+01	9.49E+00	9	0.94	0.60 - 1.66	Acceptable
		Mn-54	pCi/L	1.39E+02	1.40E+02	1.34E+01	10	1.01	0.60 - 1.66	Acceptable
		Zn-65	pCi/L	2.14E+02	2.18E+02	2.13E+01	10	1.02	0.60 - 1.66	Acceptable
E12511	Gamma Water	Ce-141	pCi/L	1.13E+02	1.08E+02	7.19E+00	15	0.96	0.60 - 1.66	Acceptable
LILDII	CL Det 3	Co-58	pCi/L	1.39E+02	1.36E+02	8.32E+00	16	0.98	0.75 - 1.33	Acceptable
	CLDers	Co-60	pCi/L	2.90E+02	2.98E+02	1.23E+01	24	1.03	0.75 - 1.33	Acceptable
		Cr-51	pCi/L pCi/L	2.90E+02 2.84E+02	3.11E+02	2.99E+01	10	1.10	0.60 - 1.66	Acceptable
		Cs-134	pCi/L pCi/L	1.55E+02	1.43E+02	6.65E+00	22	0.92	0.75 - 1.33	Acceptable
		Cs-134 Cs-137	pCi/L pCi/L	1.91E+02	1.43E+02 1.97E+02	1.24E+01	16	1.03	0.75 - 1.33	the second se
							18	1.05		Acceptable
		Fe-59	pCi/L	1.54E+02	1.63E+02	8.95E+00		1000		Acceptable
		I-131	pCi/L	8.65E+01	8.74E+01	7.90E+00	11	1.01	0.60 - 1.66	Acceptable
		Mn-54	pCi/L	1.39E+02	1.45E+02	9.83E+00	15	1.04	0.60 - 1.66	Acceptable
FIGGIO	D. C.	Zn-65	pCi/L	2.14E+02	2.19E+02	1.37E+01	16	1.02	0.75 - 1.33	Acceptable
E12512	Beta Filter	G. Beta	pCi/ea	2.39E+02	2.49E+02	4.00E+00	62	1.04	0.80 - 1.25	Acceptable
-	CL Det 1		<i>C</i> 14					0.00		
E12513	I-131 Cartridge	1-131	pCi/ea	7.54E+01	6.73E+01	1.13E+01	6	0.89	0.50 - 2.00	Acceptable
-	CL Det 2									
E12513	I-131 Cartridge	I-131	pCi/ea	7.54E+01	7.25E+01	7.12E+00	10	0.96	0.60 - 1.66	Acceptable
	CL Det 3		-							
E12513	I-131 Cartridge	I-131	pCi/ea	7.54E+01	7.39E+01	8.44E+00	9	0.98	0.60 - 1.66	Acceptable
E12514	Gamma Filter	Ce-141	pCi/ea	7.49E+01	8.00E+01	1.03E+01	8	1.07	0.60 - 1.66	Acceptable
	CL Det 1	Co-58	pCi/ea	9.17E+01	1.03E+02	1.45E+01	7	1.12	0.50 - 2.00	Acceptable
		Co-60	pCi/ea	1.91E+02	2.06E+02	1.60E+01	13	1.08	0.60 - 1.66	Acceptable
		Cr-51	pCi/ea	1.87E+02	1.83E+02	5.07E+01	4	0.98	0.50 - 2.00	Acceptable
		Cs-134	pCi/ea	1.02E+02	9.74E+01	8.34E+00	12	0.95	0.60 - 1.66	Acceptable
		Cs-137	pCi/ea	1.26E+02	1.30E+02	1.75E+01	7	1.03	0.50 - 2.00	Acceptable
		Fe-59	pCi/ea	1.02E+02	1.07E+02	1.50E+01	7	1.05	0.50 - 2.00	Acceptable
		Mn-54	pCi/ea	9.15E+01	1.07E+02	1.46E+01	7	1.17	0.50 - 2.00	Acceptable
		Zn-65	pCi/ea	1.41E+02	1.39E+02	2.34E+01	6	0.99	0.50 - 2.00	Acceptable
E12514	Gamma Filter	Ce-141	pCi/ea	7.49E+01	7.76E+01	6.89E+00	11	1.04	0.60 - 1.66	Acceptable
	CL Det 2	Co-58	pCi/ea	9.17E+01	9.66E+01	1.15E+01	8	1.05	0.60 - 1.66	Acceptable
		Co-60	pCi/ea	1.91E+02	1.93E+02	1.11E+01	17	1.01	0.75 - 1.33	Acceptable
		Cr-51	pCi/ea	1.87E+02	1.79E+02	2.91E+01	6	0.96	0.50 - 2.00	Acceptable
		Cs-134	pCi/ea	1.02E+02	7.95E+01	5.17E+00	15	0.78	0.60 - 1.66	Acceptable
		Cs-137	pCi/ea	1.26E+02	1.38E+02	2.04E+01	7	1.10	0.50 - 2.00	Acceptable
	1	E- 60	pCi/ea	1.02E+02	1.19E+02	8.94E+00	13	1.17	0.60 - 1.66	Acceptable
		Fe-59	perea	1.022.02	********				0.00 1.00	
		Mn-54	pCi/ea	9.15E+01	1.04E+02	1.15E+01	9	1.14	0.60 - 1.66	Acceptable

**Table 7-1 Interlaboratory Comparison Results** 

\* calculated from PVNOS value/1 sigma error value \*\* Eckert & Ziegler Analytics, Inc. NIST-traceable known value

NRC Accept	NRC Acceptance Criteria <sup>1</sup>							
Resolution	Ratio							
4-7	0.5-2.0							
8-15	0.6-1.66							
16-50	0.75-1.33							
51-200	0.80-1.25							
>200	0.85-1.18							

<sup>1</sup> From NRC Inspection Manual, procedure #84750, "Radioactive Waste Treatment, and Effluent and Environmental Monitoring"

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Table 7-1 Interlaboratory Comparison Results (Continued)

Sample	Analysis	Nuclide	Units	Known	PVNGS	1 sigma	Resolution*	Ratio	NRC	Results
ID	Туре	0.141	01/	Value	Value	Error		1.00	Range	
E12514	Gamma Filter	Ce-141	pCi/ea	7.49E+01	7.94E+01	7.47E+00	11	1.06	0.60 - 1.66	Acceptable
	CL Det 3	Co-58	pCi/ea	9.17E+01	1.02E+02	1.12E+01	9	1.11	0.60 - 1.66	Acceptable
		Co-60	pCi/ea	1.91E+02	2.02E+02	1.19E+01	17	1.06	0.75 - 1.33	Acceptable
		Cr-51	pCi/ea	1.87E+02	2.05E+02	3.01E+01	7	1.10	0.50 - 2.00	Acceptable
		Cs-134	pCi/ea	1.02E+02	8.26E+01	4.89E+00		0.81	0.75 - 1.33	Acceptable
		Cs-137	pCi/ea	1.26E+02	1.39E+02	1.74E+01	8	1.10	0.60 - 1.66	Acceptable
		Fe-59	pCi/ea	1.02E+02	1.21E+02	9.31E+00	13	1.19	0.60 - 1.66	Acceptable
		Mn-54	pCi/ea	9.15E+01	1.07E+02	1.14E+01	9	1.17	0.60 - 1.66	Acceptable
FIACIED		Zn-65	pCi/ea	1.41E+02	1.63E+02	1.53E+01	11	1.16	0.60 - 1.66	Acceptable
E12515B	Gamma Milk	Ce-141	pCi/L	1.40E+01	1.54E+01	2.64E+00	6	1.10	0.50 - 2.00	Acceptable
	CL Det 1	Co-58	pCi/L	1.71E+01	1.60E+01	2.18E+00	7	0.94	0.50 - 2.00	Acceptable
		Co-60	pCi/L	3.58E+01	3.57E+01	2.66E+00	13	1.00	0.60 - 1.66	Acceptable
		Cr-51	pCi/L	3.51E+01	3.99E+01	1.13E+01	4	1.14	0.50 - 2.00	Acceptable
		Cs-134	pCi/L	1.92E+01	1.90E+01	1.31E+00	15	0.99	0.60 - 1.66	Acceptable
		Cs-137	pCi/L	2.35E+01	2.41E+01	2.88E+00	8	1.03	0.60 - 1.66	Acceptable
		Fe-59	pCi/L	1.90E+01	2.02E+01	2.92E+00	7	1.06	0.50 - 2.00	Acceptable
		I-131	pCi/L	3.22E+01	3.19E+01	5.26E+00	6	0.99	0.50 - 2.00	Acceptable
		Mn-54	pCi/L	1.71E+01	1.72E+01	2.29E+00	8	1.01	0.60 - 1.66	Acceptable
		Zn-65	pCi/L	2.64E+01	2.76E+01	3.32E+00	8	1.05	0.60 - 1.66	Acceptable
E12515B	Gamma Milk	Ce-141	pCi/L	1.40E+01	1.57E+01	4.29E+00	4	1.12	0.50 - 2.00	Acceptable
	CL Det 2	Co-58	pCi/L	1.71E+01	1.74E+01	2.53E+00	7	1.02	0.50 - 2.00	Acceptable
		Co-60	pCi/L	3.58E+01	3.85E+01	2.78E+00	14	1.08	0.60 - 1.66	Acceptable
		Cr-51	pCi/L	3.51E+01	2.28E+01	1.90E+01	1	0.65	0.50 - 2.00	Acceptable
		Cs-134	pCi/L	1.92E+01	1.82E+01	1.29E+00	14	0.95	0.60 - 1.66	Acceptable
		Cs-137	pCi/L	2.35E+01	2.62E+01	3.05E+00	9	1.11	0.60 - 1.66	Acceptable
		Fe-59	pCi/L	1.90E+01	2.26E+01	2.83E+00	8	1.19	0.60 - 1.66	Acceptable
		I-131	pCi/L	3.22E+01	2.68E+01	6.15E+00	4	0.83	0.50 - 2.00	Acceptable
		Mn-54	pCi/L	1.71E+01	1.57E+01	2.30E+00	7	0.92	0.50 - 2.00	Acceptable
		Zn-65	pCi/L	2.64E+01	2.63E+01	3.24E+00	8	1.00	0.60 - 1.66	Acceptable
E12515B	Gamma Milk	Ce-141	pCi/L	1.40E+01	1.57E+01	2.87E+00	5	1.12	0.50 - 2.00	Acceptable
	CL Det 3	Co-58	pCi/L	1.71E+01	1.73E+01	2.21E+00	8	1.01	0.60 - 1.66	Acceptable
		Co-60	pCi/L	3.58E+01	3.77E+01	2.62E+00	14	1.05	0.60 - 1.66	Acceptable
		Cr-51	pCi/L	3.51E+01	3.48E+01	2.42E+01	1	0.99	0.50 - 2.00	Acceptable
		Cs-134	pCi/L	1.92E+01	1.78E+01	1.16E+00	15	0.93	0.60 - 1.66	Acceptable
		Cs-137	pCi/L	2.35E+01	2.41E+01	2.48E+00	10	1.03	0.60 - 1.66	Acceptable
		Fe-59	pCi/L	1.90E+01	2.21E+01	2.67E+00	8	1.16	0.60 - 1.66	Acceptable
		I-131	pCi/L	3.22E+01	2.99E+01	6.32E+00	5	0.93	0.50 - 2.00	Acceptable
		Mn-54	pCi/L	1.71E+01	1.78E+01	2.25E+00	8	1.04	0.60 - 1.66	Acceptable
		Zn-65	pCi/L	2.64E+01	2.69E+01	5.82E+00	5	1.02	0.50 - 2.00	Acceptable
E12516	Beta Water	G. Beta	pCi/L	2.88E+02	3.34E+02	4.20E+00	80	1.16	0.80 - 1.25	Acceptable

\* calculated from PVNGS value/1 sigma error value

NRC Acceptance Criteria<sup>1</sup>

Ratio
0.5-2.0
0.6-1.66
0.75-1.33
0.80-1.25
0.85-1.18

<sup>1</sup> From NRC Inspection Manual, procedure #84750, "Radioactive Waste Systems; Water Chemistry; Confirmatory Measurements"

Sample	Analysis	Nuclide	Units	Known	PVNGS	1 sigma	Resolution*	Ratio	NRC	Results
ID F12022	Туре	0.141	0.4	Value	Value	Error		0.07	Range	
E13032	Gamma Water	Ce-141	pCi/L	1.27E+02	1.23E+02	6.15E+00	20	0.97	0.75 - 1.33	Acceptable
	CL Det 1	Co-58	pCi/L	1.33E+02	1.35E+02	6.80E+00	20	1.02	0.75 - 1.33	Acceptable
		Co-60	pCi/L	1.60E+02	1.65E+02	5.65E+00	29	1.03	0.75 - 1.33	Acceptable
		Cr-51	pCi/L	2.51E+02	3.39E+02	5.40E+01	6	1.35	0.50 - 2.00	Acceptable
		Cs-134	pCi/L	1.57E+02	1.50E+02	5.05E+00	30	0.96	0.75 - 1.33	Acceptable
		Cs-137	pCi/L	1.14E+02	1.18E+02	6.20E+00	19	1.04	0.75 - 1.33	Acceptable
		Fe-59	pCi/L	1.12E+02	1.19E+02	6.15E+00	19	1.06	0.75 - 1.33	Acceptable
		I-131	pCi/L	8.99E+01	1.02E+02	1.32E+01	8	1.13	0.60 - 1.66	Acceptable
		Mn-54	pCi/L	1.17E+02	1.24E+02	6.05E+00	20	1.06	0.75 - 1.33	Acceptable
-		Zn-65	pCi/L	2.22E+02	2.31E+02	1.08E+01	21	1.04	0.75 - 1.33	Acceptable
E13032	Gamma Water	Ce-141	pCi/L	1.27E+02	1.34E+02	6.90E+00	19	1.06	0.75 - 1.33	Acceptable
	CL Det 2	Co-58	pCi/L	1.33E+02	1.27E+02	6.30E+00	20	0.95	0.75 - 1.33	Acceptable
		Co-60	pCi/L	1.60E+02	1.63E+02	5.10E+00	32	1.02	0.75 - 1.33	Acceptable
		Cr-51	pCi/L	2.51E+02	2.29E+02	4.33E+01	5	0.91	0.50 - 2.00	Acceptable
		Cs-134	pCi/L	1.57E+02	1.38E+02	4.49E+00	31	0.88	0.75 - 1.33	Acceptable
		Cs-137	pCi/L	1.14E+02	1.13E+02	5.55E+00	20	0.99	0.75 - 1.33	Acceptable
		Fe-59	pCi/L	1.12E+02	1.20E+02	5.10E+00	24	1.07	0.75 - 1.33	Acceptable
		I-131	pCi/L	8.99E+01	7.08E+01	9.80E+00	7	0.79	0.50 - 2.00	Acceptable
		Mn-54	pCi/L	1.17E+02	1.20E+02	5.80E+00	21	1.03	0.75 - 1.33	Acceptable
		Zn-65	pCi/L	2.22E+02	2.33E+02	1.05E+01	22	1.05	0.75 - 1.33	Acceptable
E13032	Gamma Water	Ce-141	pCi/L	1.27E+02	1.22E+02	4.74E+00	26	0.96	0.75 - 1.33	Acceptable
	CL Det 3	Co-58	pCi/L	1.33E+02	1.28E+02	5.00E+00	26	0.96	0.75 - 1.33	Acceptable
		Co-60	pCi/L	1.60E+02	1.61E+02	3.89E+00	41	1.01	0.75 - 1.33	Acceptable
		Cr-51	pCi/L	2.51E+02	2.60E+02	1.95E+01	13	1.04	0.60 - 1.66	Acceptable
		Cs-134	pCi/L	1.57E+02	1.38E+02	3.50E+00	39	0.88	0.75 - 1.33	Acceptable
		Cs-137	pCi/L	1.14E+02	1.15E+02	4.46E+00	26	1.01	0.75 - 1.33	Acceptable
		Fe-59	pCi/L	1.12E+02	1.15E+02	4.57E+00	25	1.03	0.75 - 1.33	Acceptable
		I-131	pCi/L	8.99E+01	8.93E+01	4.22E+00	21	0.99	0.75 - 1.33	Acceptable
		Mn-54	pCi/L	1.17E+02	1.15E+02	4.65E+00	25	0.98	0.75 - 1.33	Acceptable
		Zn-65	pCi/L	2.22E+02	2.30E+02	8.30E+00	28	1.04	0.75 - 1.33	Acceptable
E13033	Beta Filter	G. Beta	pCi/ea	1.30E+02	1.27E+02	2.44E+00	52	0.98	0.80 - 1.25	
215055	CL Det 1	O. Deta	perea	1.501-02	1.2712702	2.44ET00	52	0.96	0.00 - 1.23	Acceptable
E13034	I-131 Cartridge	I-131	pCi/ea	9.43E+01	9.81E+01	6.75E+00	15	1.04	0.60 1.66	Assessable
E13034	CL Det 2	1-131	purea	9.43ET01	9.010+01	0.73E+00	15	1.04	0.60 - 1.66	Acceptable
E13034		7 121	-Ciles	0.425.01	8.007.01	2.967.00	22	0.05	0.76 1.22	4
E13034	I-131 Cartridge	I-131	pCi/ea	9.43E+01	8.99E+01	3.86E+00	23	0.95	0.75 - 1.33	Acceptable
E12024	CL Det 3		<i>C</i> 1	0.437.01	0.000	4.615.00				
E13034	I-131 Cartridge	I-131	pCi/ea	9.43E+01	9.56E+01	4.51E+00	21	1.01	0.75 - 1.33	Acceptable
E13035	Gamma Filter	Ce-141	pCi/ea	1.52E+02	1.54E+02	6.70E+00	23	1.01	0.75 - 1.33	Acceptable
	CL Det 1	Co-58	pCi/ea	1.59E+02	1.72E+02	8.50E+00	20	1.08	0.75 - 1.33	Acceptable
		Co-60	pCi/ea	1.91E+02	2.07E+02	6.25E+00	33	1.08	0.75 - 1.33	Acceptable
		Cr-51	pCi/ea	3.01E+02	3.05E+02	2.13E+01	14	1.01	0.60 - 1.66	Acceptable
		Cs-134	pCi/ea	1.88E+02	1.72E+02	4.51E+00	38	0.91	0.75 - 1.33	Acceptable
		Cs-137	pCi/ea	1.37E+02	1.50E+02	8.25E+00	18	1.09	0.75 - 1.33	Acceptable
		Fe-59	pCi/ea	1.35E+02	1.55E+02	6.00E+00	26	1.15	0.75 - 1.33	Acceptable
		Mn-54	pCi/ea	1.40E+02	1.59E+02	7.60E+00	21	1.14	0.75 - 1.33	Acceptable
		Zn-65	pCi/ea	2.66E+02	3.11E+02	1.40E+01	22	1.17	0.75 - 1.33	Acceptable
E13035	Gamma Filter	Ce-141	pCi/ea	1.52E+02	1.51E+02	6.10E+00	25	0.99	0.75 - 1.33	Acceptable
	CL Det 2	Co-58	pCi/ea	1.59E+02	1.68E+02	9.80E+00	17	1.06	0.75 - 1.33	Acceptable
		Co-60	pCi/ea	1.91E+02	1.98E+02	5.70E+00	35	1.04	0.75 - 1.33	Acceptable
		Cr-51	pCi/ea	3.01E+02	3.09E+02	1.71E+01	18	1.03	0.75 - 1.33	Acceptable
		Cs-134	pCi/ea	1.88E+02	1.50E+02	4.54E+00	33	0.80	0.75 - 1.33	Acceptable
		Cs-137	pCi/ea	1.37E+02	1.49E+02	1.11E+01	13	1.09	0.60 - 1.66	Acceptable
			-	and the second second second	1.64E+02	5.75E+00	29	1.21	0.75 - 1.33	Acceptable
		Fe-59	pCi/ea	1.35E+02						
			pCi/ea	1.35E+02 1.40E+02			18	1.14	0.75 - 1.33	Accentable
		Mn-54	pCi/ea	1.40E+02	1.60E+02	8.70E+00	18 24	1.14	0.75 - 1.33	
E13035	Gamma Filter	Mn-54 Zn-65	pCi/ea pCi/ea	1.40E+02 2.66E+02	1.60E+02 3.12E+02	8.70E+00 1.32E+01	24	1.17	0.75 - 1.33	Acceptable
E13035	Gamma Filter	Mn-54 Zn-65 Ce-141	pCi/ea pCi/ea pCi/ea	1.40E+02 2.66E+02 1.52E+02	1.60E+02 3.12E+02 1.64E+02	8.70E+00 1.32E+01 7.40E+00	24 22	1.17 1.08	0.75 - 1.33 0.75 - 1.33	Acceptable
E13035	Gamma Filter CL Det 3	Mn-54 Zn-65 Ce-141 Co-58	pCi/ea pCi/ea pCi/ea pCi/ea	1.40E+02 2.66E+02 1.52E+02 1.59E+02	1.60E+02 3.12E+02 1.64E+02 1.77E+02	8.70E+00 1.32E+01 7.40E+00 1.00E+01	24 22 18	1.17 1.08 1.11	0.75 - 1.33 0.75 - 1.33 0.75 - 1.33	Acceptable Acceptable Acceptable
E13035		Mn-54 Zn-65 Ce-141 Co-58 Co-60	pCi/ea pCi/ea pCi/ea pCi/ea pCi/ea	1.40E+02 2.66E+02 1.52E+02 1.59E+02 1.91E+02	1.60E+02 3.12E+02 1.64E+02 1.77E+02 2.08E+02	8.70E+00 1.32E+01 7.40E+00 1.00E+01 6.55E+00	24 22 18 32	1.17 1.08 1.11 1.09	0.75 - 1.33 0.75 - 1.33 0.75 - 1.33 0.75 - 1.33	Acceptable Acceptable Acceptable Acceptable
E13035		Mn-54 Zn-65 Ce-141 Co-58 Co-60 Cr-51	pCi/ea pCi/ea pCi/ea pCi/ea pCi/ea pCi/ea	1.40E+02 2.66E+02 1.52E+02 1.59E+02 1.91E+02 3.01E+02	1.60E+02 3.12E+02 1.64E+02 1.77E+02 2.08E+02 2.84E+02	8.70E+00 1.32E+01 7.40E+00 1.00E+01 6.55E+00 2.15E+01	24 22 18 32 13	1.17 1.08 1.11 1.09 0.94	0.75 -         1.33           0.75 -         1.33           0.75 -         1.33           0.75 -         1.33           0.75 -         1.33           0.60 -         1.66	Acceptable Acceptable Acceptable Acceptable
E13035		Mn-54 Zn-65 Ce-141 Co-58 Co-60 Cr-51 Cs-134	pCi/ea pCi/ea pCi/ea pCi/ea pCi/ea pCi/ea	1.40E+02 2.66E+02 1.52E+02 1.59E+02 1.91E+02 3.01E+02 1.88E+02	1.60E+02 3.12E+02 1.64E+02 1.77E+02 2.08E+02 2.84E+02 1.60E+02	8.70E+00 1.32E+01 7.40E+00 1.00E+01 6.55E+00 2.15E+01 4.97E+00	24 22 18 32 13 32	1.17 1.08 1.11 1.09 0.94 0.85	0.75 -         1.33           0.75 -         1.33           0.75 -         1.33           0.75 -         1.33           0.60 -         1.66           0.75 -         1.33	Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable
E13035		Mn-54 Zn-65 Ce-141 Co-58 Co-60 Cr-51 Cs-134 Cs-137	pCi/ea pCi/ea pCi/ea pCi/ea pCi/ea pCi/ea pCi/ea	1.40E+02 2.66E+02 1.52E+02 1.59E+02 1.91E+02 3.01E+02 1.88E+02 1.37E+02	1.60E+02 3.12E+02 1.64E+02 1.77E+02 2.08E+02 2.84E+02 1.60E+02 1.55E+02	8.70E+00 1.32E+01 7.40E+00 1.00E+01 6.55E+00 2.15E+01 4.97E+00 1.01E+01	24 22 18 32 13 32 15	1.17 1.08 1.11 1.09 0.94 0.85 1.13	0.75 -         1.33           0.75 -         1.33           0.75 -         1.33           0.60 -         1.66           0.75 -         1.33           0.60 -         1.66           0.75 -         1.33	Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable
E13035		Mn-54 Zn-65 Ce-141 Co-58 Co-60 Cr-51 Cs-134 Cs-137 Fe-59	pCi/ea pCi/ea pCi/ea pCi/ea pCi/ea pCi/ea pCi/ea pCi/ea pCi/ea	1.40E+02 2.66E+02 1.52E+02 1.59E+02 1.91E+02 3.01E+02 1.88E+02 1.37E+02 1.35E+02	1.60E+02 3.12E+02 1.64E+02 1.77E+02 2.08E+02 2.84E+02 1.60E+02 1.55E+02 1.71E+02	8.70E+00 1.32E+01 7.40E+00 1.00E+01 6.55E+00 2.15E+01 4.97E+00 1.01E+01 7.25E+00	24 22 18 32 13 32 15 24	1.17 1.08 1.11 1.09 0.94 0.85	0.75 -         1.33           0.75 -         1.33           0.75 -         1.33           0.60 -         1.66           0.75 -         1.33           0.60 -         1.66           0.75 -         1.33           0.60 -         1.66           0.75 -         1.33	Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable
E13035		Mn-54 Zn-65 Ce-141 Co-58 Co-60 Cr-51 Cs-134 Cs-137	pCi/ea pCi/ea pCi/ea pCi/ea pCi/ea pCi/ea pCi/ea	1.40E+02 2.66E+02 1.52E+02 1.59E+02 1.91E+02 3.01E+02 1.88E+02 1.37E+02	1.60E+02 3.12E+02 1.64E+02 1.77E+02 2.08E+02 2.84E+02 1.60E+02 1.55E+02	8.70E+00 1.32E+01 7.40E+00 1.00E+01 6.55E+00 2.15E+01 4.97E+00 1.01E+01	24 22 18 32 13 32 15	1.17 1.08 1.11 1.09 0.94 0.85 1.13	0.75 -         1.33           0.75 -         1.33           0.75 -         1.33           0.60 -         1.66           0.75 -         1.33           0.60 -         1.66           0.75 -         1.33	Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable Acceptable

Table 7-1 Interlaboratory Comparison Results (Continued)

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Sample ID	Analysis Type	Nuclide	Units	Known Value	PVNGS Value	1 sigma Error	Resolution*	Ratio	NRC Range	Results
	Tech A									
E13036	H-3 Water	H-3	pCi/L	1.40E+04	1.23E+04	3.59E+02	34	0.88	0.75 - 1.33	Acceptable
	Tech B					_				
E13036	H-3 Water	H-3	pCi/L	1.40E+04	1.23E+04	3.58E+02	34	0.88	0.75 - 1.33	Acceptable
	Tech C									
E13036	H-3 Water	H-3	pCi/L	1.40E+04	1.22E+04	3.58E+02	34	0.87	0.75 - 1.33	Acceptable
	Tech D									
E13036	H-3 Water	H-3	pCi/L	1.40E+04	1.20E+04	3.56E+02	34	0.86	0.75 - 1.33	Acceptable
	Tech E									
E13036	H-3 Water	H-3	pCi/L	1.40E+04	1.24E+04	3.58E+02	35	0.88	0.75 - 1.33	Acceptable
	Tech F									
E13036	H-3 Water	H-3	pCi/L	1.40E+04	1.25E+04	3.62E+02	34	0.89	0.75 - 1.33	Acceptable
	Tech G									
E13036	H-3 Water	H-3	pCi/L	1.40E+04	1.23E+04	3.60E+02	34	0.88	0.75 - 1.33	Acceptable

Table 7-1 Interlaboratory Comparison Results (Continued)

\* calculated from PVNGS value/1 sigma error value

NRC Acceptance Criteria<sup>1</sup>

Resolution	Ratio
4-7	0.5-2.0
8-15	0.6-1.66
16-50	0.75-1.33
51-200	0.80-1.25
>200	0.85-1.18

<sup>1</sup> From NRC Inspection Manual, procedure #84750, "Radioactive Waste Systems; Water Chemistry; Confirmatory Measurements"

<b>Table 7-1 Interlaboratory Compar</b>	rison Results (Continued)
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Sample Type	Analysis Type	ERA PT Study	Nuclide	Units	PVNGS Value	Assigned Value <sup>1</sup>	Acceptance Limit <sup>2</sup>	Results
Water	Tritium	MRAD-030	H-3	pCi/L	22,700	23,700	17900-28800	Acceptable
Water	Gross Beta	RAD-118	Gross Beta	pCi/L	60.1	63.9	44.2-70.5	Acceptable

<sup>1</sup> The ERA assigned values are established per the guidelines contained in the National Environmental Laboratory Accreditation Conference (NELAC) program criteria as applicable.

<sup>2</sup> "Acceptance Limits" have been calculated per ERA's Standard Operating Procedure for the Generation of Performance Acceptance Limits.

# 8. Data Interpretation and Conclusions

Associated with the analytical process are potential random and systematic errors. Systematic errors can be caused by instrument malfunctions, incomplete precipitation, back scattering, and self-absorption.

Efforts are made to minimize both systematic and random errors in the data reported. Systematic errors are minimized by performing reviews throughout the analysis. For example, instruments are checked routinely with radioactive sources, and recovery and self-absorption factors based on individual sample analyses are incorporated into the calculation equations where necessary. Random errors are reduced by comparing all data to historical data for the same site and performing comparisons between analytical results when available. In addition, when data do not appear to match historical results, analyses may be rerun on a separate aliquot of the sample to verify the presence of the activity. The acceptance of data is dependent upon the results of quality control samples and is part of the data review process for all analytical results.

The "plus or minus value" reported with each analytical result represents the counting error associated with the result and gives the 95% confidence  $(2\sigma)$  interval around the data.

Most samples contain radioactivity associated with natural background/cosmic radioactivity (e.g. K-40, Th-234, Be-7). Gross beta results for drinking water and air are due to natural background. Gammaemitting radionuclides, which can be attributed to natural background sources, are not indicated in this report.

Results and interpretation of the data for all of the samples analyzed during 2019 are presented in the following sections.

#### 8.1 Air Particulates

Weekly gross beta results, in quarterly format, are presented in Table 8-1 and Table 8-2. Gross beta activity at indicator locations ranged from 0.011 to 0.075 pCi/m<sup>3</sup>. Mean quarterly activity is normally calculated using weekly activity over a thirteen (13) week period. Also presented in the tables are the weekly mean values of all the sites as well as the percent relative standard deviation (RSD %) for the data.

Table 8-3 displays the results of gamma spectroscopy on the quarterly composites of the weekly samples. No plant-related activity was identified

#### 8.2 Airborne Radioiodine

Table 8-4 and Table 8-5 present the quarterly radioiodine results. Radioiodine was not observed in any samples.

#### 8.3 Vegetation

Table 8-6 presents gamma isotopic data for the vegetation samples. No gamma-emitting radionuclides were observed in any of the samples.

# 8.4 Milk

Table 8-7 presents gamma isotopic data for the goat milk samples. No gamma-emitting radionuclides were observed in any of the samples.

### 8.5 Drinking Water

Samples were analyzed for gross beta, tritium, and gamma-emitting radionuclides. Results of these analyses are presented in Table 8-8. No tritium or gamma-emitting radionuclides were detected in any samples. Gross beta activity ranged from less than detectable to a high of 8.75 pCi/liter. The gross beta activity is attributable to natural (background) radioactive materials.

#### 8.6 Groundwater

Groundwater samples were analyzed from two onsite wells (regional aquifer) for tritium and gammaemitting radionuclides. Results obtained from the analysis of the samples are presented in Table 8-9.

No tritium or gamma-emitting radionuclides were observed in any of the samples.

### 8.7 Surface Water

Surface water samples from the Reservoirs and Evaporation Ponds were analyzed for tritium and gammaemitting radionuclides. The two Reservoirs contain processed sewage water from the City of Phoenix and are approximately 45 and 85 acres in size. The three Evaporation Ponds receive mostly circulating water from main turbine condenser cooling and are about 200-250 acres each.

Sample results are presented in Table 8-10. I-131 was observed in both reservoirs and Evaporation Pond 1B. The I-131 levels ranged from 13 pCi/L – 17 pCi/L. I-131 in these surface water locations is a result of radiopharmaceutical I-131 in the Phoenix sewage effluent and is not attributable to plant effluents.

Tritium was routinely observed in the Evaporation Ponds. The highest concentration was 1086 pCi/liter. Tritium was not detected in the Reservoirs. The tritium identified in the Evaporation Ponds has been attributed to permitted plant gaseous effluent releases and secondary plant liquid discharges (e.g. condensate overboard discharge, secondary side steam generator drains, secondary plant sumps, demineralizer regeneration waste). The tritium concentrations were compared to historical values and are considered typical for the Evaporation Ponds.

Low levels of Cs-137 has been detected in Evaporation Pond 3A. Evaporation Pond 3A is in the process of being drained for liner repairs. The water inventory is very low, such that the sampling tool comes into contact with the bottom and sides of the pond, resulting in a small amount of salt and sediment intrude into the water sample. Evaporation Pond 3A has not received any influent from the plant since 2016, and the low levels of Cs-137 was not detectable until the water inventory in the pond was low, such that sampling tools also came into contact with the salt and/or sediment during sampling. The low levels of Cs-137 is consistent with diluted background levels seen in preoperational sediment analysis, and is attributed sediment intrusion from the surrounding area. No action levels have been exceeded.

#### 8.8 Sludge and Sediment

# 8.8.1 WR Centrifuge Waste Sludge

Sludge samples were obtained from the WR centrifuge and analyzed by gamma spectroscopy. I-131 activity in the sludge is consistent with historical values and, as previously discussed, is due to radiopharmaceuticals in the WR Influent. The concentration of I-131 ranged from "no detectable" to 1020 pCi/kg.

Results for WR centrifuge waste sludge can be found in Table 8-11.

# 8.8.2 Cooling Tower Sludge

Sludge/sediment originating from the Unit 1 and Unit 3 Cooling Towers and Circulating Water canals was disposed of in the WR sludge landfill during 2019. Sample results can be found in Table 8-11.

# 8.9 Data Trends

Figure 8-1 through Figure 8-8 present data in graphical format. Historical data are displayed for comparison where practical.

# 8.10 Hard-To-Detect Radionuclide Results

Table 8-12 shows the results of the three subsurface samples obtained from 3 tritium monitoring points. These samples were analyzed for hard-to-detect radionuclides (e.g. C-14, Fe-55, Ni-63, Sr-90) and all results were <MDA. These results indicate that no leaks from plant systems have affected groundwater.

$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	# # WW	units are pClmr <sup>4</sup> (entrol)           Werk i         STAT         STOP         Site					PA	PARTICULATE GROSS BETA IN AIR 1st QUARTER ODCM required samples denoted by *	ATE GF ODCM re	ROSS BI quired sa	ATE GROSS BETA IN AIR 1st ODCM required samples denoted by *	AIR 1st ( loted by *	QUART	ER					
Net         STMT         STM         Stm <th><math display="block"> \begin{array}{c c c c c c c c c c c c c c c c c c c </math></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>(control)</th> <th></th> <th></th> <th>units are</th> <th>pCi/m<sup>3</sup></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $						(control)			units are	pCi/m <sup>3</sup>								
Werkik         Jahrer         Mitt         Att         Stand	Werking         DATE         M         Motion         Distance         Motion         Distance         Motion         Distance         Motion         Distance	Wreck #         DATE         DATE $4$ $6^{4}$ $7A$ $14A^{4}$ $15^{4}$ $17A$ $21^{4}$ $24^{4}$		START	STOP	Site	Site	Site	Site	Site	Site	Site	Site	Site	Site		RSD		
1         Shareyi         Sharei         Shareyi         Share	1         5 mode         0 mode	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Week #	DATE	DATE	4	*¥9	7A	14A*	15*	17A	21	29*	35	40*	Mean	(%)	Note	
2         5	3         1	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	-	31-Dec-18	8-Jan-19	0.042	0.039	0.039	0.042	0.043	0.046	0.043	0.039	0.043	0.040	0.041	5.8		
3         15/mm         32/mm         001<	3         1         15/min bit	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	2	8-Jan-19	15-Jan-19	0.043	0.041	0.039	0.038	0.032	0.038	0.041	0.037	0.038	0.038	0.038	7.6		
4         2.3mm         9         000	4         22-ability         5-phill         5	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	3	15-Jan-19	22-Jan-19	0.017	0.017	0.018	0.015	0.020	0.016	0.017	0.016	0.018	0.016	0.017	7.4		
0         55480         75680         75580         7578	0         0	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	4 4	22-Jan-19	29-Jan-19	0.030	0.031	0.030	0.027	0.026	0.026	0.030	0.027	0.029	0.024	0.028	8.0		
T         1	7         1	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	n 9	5-Feb-19	12-Feh-19	120.0	0.022	0.022	120.0	660.0	140.0	0000	0000	10.0	1000	1000	0.0 5 1		
§         SF6+bit         SF6+	§         \$	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	2	12-Feb-19	19-Feb-19	0.020	0.021	0.020	0.018	0.018	0.022	0.020	0.017	0.019	0.016	0.019	9.8		
9         Schenic bio columno         0.000         0.001	9         Schell (s) (shurle)         0.000         0.001	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	80	19-Feb-19	26-Feb-19	0.024	0.024	0.023	0.026	0.023	0.027	0:030	0.027	0.026	0.026	0.026	8.1		
II         Scheme         Discrete in the state in the	III         Column (Section)	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	6	26-Feb-19	6-Mar-19	0.026	0.026	0.028	0.025	0.027	0.032	0.027	0.025	0.028	0.026	0.027	7.1	1	
Image: power	Image: 1         Description         Description <thdescription< th=""> <thdescription< th=""> <t< td=""><td>11         Lowant-19         0.003         <t< td=""><td>10</td><td>6-Mar-19</td><td>12-Mar-19</td><td>0.020</td><td>0.019</td><td>0.019</td><td>0.019</td><td>0.017</td><td>0.019</td><td>0.020</td><td>0.021</td><td>0.020</td><td>0.019</td><td>0.019</td><td>5.5</td><td>-</td></t<></td></t<></thdescription<></thdescription<>	11         Lowant-19         0.003 <t< td=""><td>10</td><td>6-Mar-19</td><td>12-Mar-19</td><td>0.020</td><td>0.019</td><td>0.019</td><td>0.019</td><td>0.017</td><td>0.019</td><td>0.020</td><td>0.021</td><td>0.020</td><td>0.019</td><td>0.019</td><td>5.5</td><td>-</td></t<>	10	6-Mar-19	12-Mar-19	0.020	0.019	0.019	0.019	0.017	0.019	0.020	0.021	0.020	0.019	0.019	5.5	-	
13         Team         0000         0001         0	1         26-Macrili         25-Macrili         2000         0001	13         26-Marclin         2-Marclin         2-Ma	11	12-Mar-19	19-Mar-19 26-Mar-19	670 0	0.033	0.029	0.029	050.0	C20.0	820.0	0.020	0.024	SZ0.0	0.024	1.7		
Mem         0.03         0.035         0.	Mem         003 <td>Mean         0.025         0.027         0.027         0.029         0.027         0.028         0.027         0.027         0.027         0.026         0.027         0.026         0.027         0.026</td> <td>13</td> <td>26-Mar-19</td> <td>2-Apr-19</td> <td>0.032</td> <td>0.029</td> <td>0.028</td> <td>0.024</td> <td>0.031</td> <td>0.034</td> <td>0.032</td> <td>0.030</td> <td>0.032</td> <td>0.028</td> <td>0.030</td> <td>9.3</td> <td></td>	Mean         0.025         0.027         0.027         0.029         0.027         0.028         0.027         0.027         0.027         0.026         0.027         0.026         0.027         0.026	13	26-Mar-19	2-Apr-19	0.032	0.029	0.028	0.024	0.031	0.034	0.032	0.030	0.032	0.028	0.030	9.3		
PARTICULATE GROSS BETA IN AIR 2nd QUARTER ODCM required samples denoted by "	PARTICULATE GROSS BETA IN AIR 2nd QUARTER ODCM required samples denoted by* nits are pC/m³           ADTE DATE (COLLATE GROSS BETA IN AIR 2nd QUARTER DATE DATE (Control)           Metek #         DATE         DATE         DATE         Metak         Site         Sit	PARTICULATE GROSS BETA IN AIR 2nd QUARTER ODCM required samples denoted by* units are pC/m <sup>3</sup> COM required samples denoted by* units are pC/m <sup>3</sup> Control Neter           Site Site Site Site Site Site Site Site		Mean Note 1: Sample	e period altered	0.028 by 1 day. S	0.028 ampling perio	0.028 od remains wi	0.026 thin procedur	0.027 al requiremen	0.029 nts.	0.029	0.027	0.028	0.026	0.028	4.0		
A strate or sumplex verticed op- units are pCim <sup>3</sup> A strate pCim <sup>3</sup> Control           Veck #         Site         Site </td <td>Order of angles of an</td> <td>Other required samples denoted by a units are pCim<sup>3</sup>           a units are pCim<sup>3</sup>           Neck #         Site         Sit</td> <td></td> <td></td> <td></td> <td></td> <td>PA</td> <td>RTICUL</td> <td>ATE GR</td> <td>OSS BE</td> <td>IN ATS</td> <td>AIR 2nd</td> <td>QUART</td> <td>ER</td> <td></td> <td></td> <td></td> <td></td>	Order of angles of an	Other required samples denoted by a units are pCim <sup>3</sup> a units are pCim <sup>3</sup> Neck #         Site         Sit					PA	RTICUL	ATE GR	OSS BE	IN ATS	AIR 2nd	QUART	ER					
units are pCUm <sup>2</sup> Neck H         DATE         START         Stite         Stite <t< td=""><td>units are pClm<sup>4</sup>           FTART         Fit and the pClm<sup>4</sup>           START         Fit and the pClm<sup>4</sup>           START         Fit and the probability of the probability tof the probability of the probability of the probability of the</td><td>units are pCl/m<sup>2</sup>           (control)           START         STOP         Site         Site&lt;</td><td></td><td></td><td></td><td></td><td></td><td></td><td>ODCM IS</td><td>duncu sa</td><td>unpres uch</td><td>inten nà</td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	units are pClm <sup>4</sup> FTART         Fit and the pClm <sup>4</sup> START         Fit and the pClm <sup>4</sup> START         Fit and the probability of the probability tof the probability of the probability of the probability of the	units are pCl/m <sup>2</sup> (control)           START         STOP         Site         Site<							ODCM IS	duncu sa	unpres uch	inten nà							
(control)           (control)           START         Site         Site <th co<="" td=""><td>Arrent Bill         File DATE         Site DATE         Site DATE         Site DATE         Site DATE</td><td>(control)           (control)           Site         Sit</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>units are</td><td>pCi/m<sup>3</sup></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th>	<td>Arrent Bill         File DATE         Site DATE         Site DATE         Site DATE         Site DATE</td> <td>(control)           (control)           Site         Sit</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>units are</td> <td>pCi/m<sup>3</sup></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Arrent Bill         File DATE         Site DATE         Site DATE         Site DATE         Site DATE	(control)           (control)           Site         Sit								units are	pCi/m <sup>3</sup>							
Week#         START         STOP         Site         Site         Site         Site         Site         Site         Rise         Rise         Rise         Site         <	Nerty         Site         Site <t< td=""><td>Week#         DATE         Site         <t< td=""><td></td><td></td><td></td><td>ł</td><td>(control)</td><td>1</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<></td></t<>	Week#         DATE         Site         Site <t< td=""><td></td><td></td><td></td><td>ł</td><td>(control)</td><td>1</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>				ł	(control)	1	1										
NAME         NAME         Not         Not<	H         Z-April         S-April         S-Ap	Math         Jost 1         Jost 2         Jost 2 <td>Wook #</td> <td>DATE</td> <td>STOP</td> <td>Site</td> <td>Moon</td> <td>RSD (</td> <td>Note</td>	Wook #	DATE	STOP	Site	Site	Site	Site	Site	Site	Site	Site	Site	Site	Moon	RSD (	Note	
5         9-Apr-19         0.6Apr-19         0.023         0.033	15         9-Apri-19         16-Apri-19         0.023	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	14	2-Apr-19	9-Apr-19	0.022	0.020	0.018	0.019	0.015	0.019	0.019	0.016	0.018	0/020	0.019	12.0		
1         1         23-Apr-19         0.03	16         16-April         27-April         0.005	16         16-Apr-19         23-Apr-19         0.00         0.003	15	9-Anr-19	16-Anr-19	0.073	1000	0.077	1000	0.018	0000	0000	0.017	0000	0.017	0000	10.6		
17         23-Apr-19         30-Apr-19         0027         0028         0025         0028         0025         0025         0025         0025         0025         0035         53         23         23           19         7-May-19         0027         0025         0026         0025         0025         0025         0025         0035         023         143         23           20         1-May-19         10011         0010         0020         0025         0025         0025         0025         0035         123         143         23         23         23         23         23         23         23         23         23         23         23         23         23         23         23         24         20         0035         0035         0035         0035         0035         0035         20         23         23         23         24         24         4         23         24         4         23         23         23         23         23         23         23         23         23         23         24         4         23         24         4         23         24         4         24         23         24	17         23-Apr-19         30-Apr-19         0.027         0.028         0.025	17         23-Apr-19         0.027         0.028         0.028         0.025         0.028         0.026         0.027         0.026         0.027 <t< td=""><td>16</td><td>16-Apr-19</td><td>23-Apr-19</td><td>0.025</td><td>0.023</td><td>0.025</td><td>0.023</td><td>0.020</td><td>10.003</td><td>0.025</td><td>0.026</td><td>0.022</td><td>0.023</td><td>0.023</td><td>1.T</td><td>2</td></t<>	16	16-Apr-19	23-Apr-19	0.025	0.023	0.025	0.023	0.020	10.003	0.025	0.026	0.022	0.023	0.023	1.T	2	
18       30-Apr-19       7-May-19       0.027       0.025       0.025       0.025       0.025       0.025       0.025       14.3         19       7-May-19       14-May-19       0.021       0.018       0.020       0.022       0.025	18         30-Apr-19         0.027         0.025         0.026         0.025 <t< td=""><td><math display="block"> \begin{array}{ c c c c c c c c c c c c c c c c c c c</math></td><td>17</td><td>23-Apr-19</td><td>30-Apr-19</td><td>0.027</td><td>0.027</td><td>0.028</td><td>0.028</td><td>0.027</td><td>0.031</td><td>0.029</td><td>0.028</td><td>0.028</td><td>0.030</td><td>0.028</td><td>5.3</td><td>2</td></t<>	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	17	23-Apr-19	30-Apr-19	0.027	0.027	0.028	0.028	0.027	0.031	0.029	0.028	0.028	0.030	0.028	5.3	2	
19         7-May-19         14May-19         0.001         0.016         0.002         0.001         0.019         1.27           20         14-May-19         21-May-19         0.011         0.013         0.013         0.013         0.013         1.27           21         21-May-19         0.011         0.010         0.013         0.011         0.013         0.012         0.013         0.013         1.55         3           21         21-May-19         28-May-19         0.011         0.013         0.013         0.013         0.013         0.013         0.013         1.55         3           22         28-May-19         11-Jun-19         0.018         0.025         0.024         0.025 <td>19         7-May-19         14-May-19         0.001         0.018         0.016         0.016         0.020         0.002         0.001         0.013         12.7           20         14-May-19         21-May-19         0.001         0.001         0.002         0.002         0.002         0.002         0.023         0.023         0.023         0.013         0.013         15.5         3           21         21-May-19         0.011         0.010         0.011         0.013         0.011         0.013         0.013         0.013         15.5         3           22         28-May-19         4-Jun-19         0.018         0.025         0.025         0.023         0.023         0.023         0.023         0.033         15.5         3           23         4-Jun-19         0.014         0.023</td> <td>19       7-May-19       14-May-19       0.021       0.018       0.016       0.022       0.019       0.020       0.017       0.017       0.017       0.017       0.017       0.017       0.017       0.017       0.017       0.017       0.017       0.017       0.023       0.032       0.033       0.033       0.033       0.023       0.023       0.024       0.025       0.015</td> <td>18</td> <td>30-Apr-19</td> <td>7-May-19</td> <td>0.027</td> <td>0.025</td> <td>0.020</td> <td>0.024</td> <td>0.022</td> <td>0.025</td> <td>0.025</td> <td>0.025</td> <td>0.016</td> <td>0.025</td> <td>0.023</td> <td>14.3</td> <td></td>	19         7-May-19         14-May-19         0.001         0.018         0.016         0.016         0.020         0.002         0.001         0.013         12.7           20         14-May-19         21-May-19         0.001         0.001         0.002         0.002         0.002         0.002         0.023         0.023         0.023         0.013         0.013         15.5         3           21         21-May-19         0.011         0.010         0.011         0.013         0.011         0.013         0.013         0.013         15.5         3           22         28-May-19         4-Jun-19         0.018         0.025         0.025         0.023         0.023         0.023         0.023         0.033         15.5         3           23         4-Jun-19         0.014         0.023	19       7-May-19       14-May-19       0.021       0.018       0.016       0.022       0.019       0.020       0.017       0.017       0.017       0.017       0.017       0.017       0.017       0.017       0.017       0.017       0.017       0.017       0.023       0.032       0.033       0.033       0.033       0.023       0.023       0.024       0.025       0.015	18	30-Apr-19	7-May-19	0.027	0.025	0.020	0.024	0.022	0.025	0.025	0.025	0.016	0.025	0.023	14.3		
21       17-FMAY-19       21-May-19       0.001       0.001       0.001       0.001       0.001       0.001       3         23       21-May-19       21-May-19       0.011       0.013       0.013       0.013       0.013       155       3         24       41-Jun-19       11-Jun-19       0.012       0.003       0.003       0.003       0.013       0.013       155       3         24       41-Jun-19       11-Jun-19       0.032       0.032       0.032       0.032       0.033       0.03       47       3         24       11-Jun-19       18-Jun-19       0.033       0.032       0.032       0.032       0.033       0.03       47       47         25       11-Jun-19       18-Jun-19       0.033       0.023       0.023       0.024       0.033       0.033       0.033       0.033       0.033       0.023       0.023       0.024       0.023 <td>Display         Display         <t< td=""><td>21       H-Hardy-19       21-Hardy-19       0.011       0.015       0.002       0.002       0.002       0.001       0.011</td><td>19</td><td>7-May-19</td><td>14-May-19</td><td>0.021</td><td>0.018</td><td>0.016</td><td>0.016</td><td>0.022</td><td>0.019</td><td>0.019</td><td>0.020</td><td>0.022</td><td>0.017</td><td>0.019</td><td>12.7</td><td></td></t<></td>	Display         Display <t< td=""><td>21       H-Hardy-19       21-Hardy-19       0.011       0.015       0.002       0.002       0.002       0.001       0.011</td><td>19</td><td>7-May-19</td><td>14-May-19</td><td>0.021</td><td>0.018</td><td>0.016</td><td>0.016</td><td>0.022</td><td>0.019</td><td>0.019</td><td>0.020</td><td>0.022</td><td>0.017</td><td>0.019</td><td>12.7</td><td></td></t<>	21       H-Hardy-19       21-Hardy-19       0.011       0.015       0.002       0.002       0.002       0.001       0.011	19	7-May-19	14-May-19	0.021	0.018	0.016	0.016	0.022	0.019	0.019	0.020	0.022	0.017	0.019	12.7		
22       23-May-19       4-Jun-19       0.018       0.027       0.025       0.028       0.0171       0.027       0.025       12.0       3         23       4-Jun-19       11-Jun-19       0.031       0.035       0.032       0.032       0.031       0.035       9.6       3         24       11-Jun-19       0.032       0.033       0.032       0.032       0.033       0.032       0.031       4.7       3         25       11-Jun-19       0.034       0.033       0.033       0.033       0.033       0.033       0.031       4.7       4.7         25       18-Jun-19       0.037       0.035       0.023       0.023       0.023       0.024       0.023       0.023       0.023       0.024       0.023       0.023       0.023       0.024       0.023       0.023       0.024       0.023       0.023       0.024       0.023       0.023       0.023       0.024       0.023       0.023       0.023       0.024       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.023	22       28-May-19       4-Jun-19       0018       0027       0025       0025       0026       0027       0025       12.0       3         23       4-Jun-19       11-Jun-19       0032       0033       0032       0032       0032       0031       4.7         24       11-Jun-19       0032       0033       0032       0033       0032       0031       0.7       0026       0030       96       3         24       11-Jun-19       18-Jun-19       0034       0032       0033       0032       0033       0031       4.7       4.7         25       18-Jun-19       0304       0023       0024       0025       0024       0023       0033       4.8       4         26       0027       0023       0023       0024       0024       0023       0023       2.7         25-Jun-19       14.0       0024       0023       0024       0024       0023       0023       2.7         MEan       0024       0024       0024       0023       0023       0.023       2.7         Net<2	22       28-May-19       4-Jun-19       0.018       0.027       0.025       0.026       0.026       0.028       0.027       0.02         23       4-Jun-19       11-Jun-19       0.032       0.030       0.031       0.029       0.029       0.029       0.031       0.0177       0.0         24       11-Jun-19       18-Jun-19       0.032       0.033       0.032       0.033       0.031       0.02       0.031       0.0177       0.0         25       11-Jun-19       18-Jun-19       0.034       0.033       0.032       0.033       0.030       0.031       0.0         26       25-Jun-19       25-Jun-19       0.034       0.023       0.023       0.023       0.024       0.023       0.024       0.025       0.015       0.0         27-Jun-19       25-Jun-19       0.027       0.023       0.023       0.023       0.023       0.024       0.025       0.0       0.025       0.0       0.025       0.0       0.025       0.0       0.025       0.0       0.025       0.0       0.025       0.0       0.025       0.0       0.025       0.0       0.025       0.0       0.025       0.0       0.025       0.0       0.0       0.0	21	21-Mav-19	28-Mav-19	0.011	0.010	0.013	0.011	0.015	0.016	0.012	0.014	070.013	0.013	070.0	15.5	ŀ	
23       4-Jun-19       10.32       0.035       0.035       0.032       0.032       0.029       0.026       0.030       9.6         24       11-Jun-19       18-Jun-19       0.034       0.033       0.033       0.031       0.31       4.7         25       11-Jun-19       24-jun-19       0.034       0.033       0.033       0.033       0.031       4.7         25       11-Jun-19       25-jun-19       0.030       0.033       0.033       0.033       0.033       0.033       4.8       4.7         25       25-Jun-19       0.030       0.033       0.023       0.023       0.023       0.024       0.025       0.031       4.9       4         26       25-Jun-19       0.024       0.023       0.023       0.023       0.024       0.025       0.023       0.023       0.024       4.9       4.9       4.9       4.9       4.4       4.9       4.8       4.8       4       4.9       4.8       4.8       4       4.9       4.8       4.8       4       4.9       4.9       4.9       4.9       4.9       4.9       4.9       4.9       4.9       4.9       4.9       4.9       4.9       4.9       4.9	23       4-Jun-19       0.032       0.035       0.032       0.032       0.029       0.026       0.030       96         24       11-Jun-19       18-Jun-19       0.034       0.033       0.031       0.031       0.031       47         25       11-Jun-19       18-Jun-19       0.034       0.033       0.033       0.033       0.031       47         26       25-Jun-19       0.034       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.024       0.023       0.023       0.023       0.024       0.023       0.023       0.023       0.024       0.023       0.023       0.023       0.024       0.023       0.023       0.023       0.024       0.023       0.023       0.023       0.024       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.024       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.023       0.0	23       4-Jun-19       11-Jun-19       0.032       0.035       0.032       0.032       0.027       0.029       0.01         24       11-Jun-19       18-Jun-19       0.034       0.033       0.032       0.031       0.015       0.024       0.024       0.025       0.025	22	28-May-19	4-Jun-19	0.018	0.027	0.025	0.026	0.024	0.023	0.026	0.028	+0.0177	0.027	0.025	12.0	3	
<ul> <li>24 II-Jun-19 18-Jun-19 0.034 0.033 0.032 0.031 0.031 0.033 0.029 0.031 0.031 0.031 0.03</li> <li>25-Jun-19 23-Jun-19 0.026 0.027 0.028 0.029 0.028 0.028 0.028 0.028 4.8 4</li> <li>25-Jun-19 1-Jul-19 0.024 0.023 0.023 0.023 0.023 0.024 0.026 0.015 0.023 2.7</li> <li>Mæan 0.024 0.023 0.023 0.023 0.023 0.024 0.024 0.022 0.023 2.7</li> <li>Note 2: Site 17A had a pump failure that impacted collection time during Weeks 16 and 17. Volume insufficient for statistical analysis for Week 16 and data is INFO ONLY. CR 19-06328 0.003 0.015 0.023 2.7</li> <li>Note 2: Site 17A had a pump failure that impacted collection time during Weeks 16 and 17. Volume insufficient for statistical analysis for Week 16 and data is INFO ONLY. CR 19-06328 0.016 during sampling run time. Samples are INVALID and eating period with time meter still running, resulting in inability to determine sample flow. Sample is INVALID and data is for INFO ONLY. CR 19-06504</li> <li>ANNITAT DATION COLOUNT ENVILIDIATION ON TATIAT ODED ATINC DED OFT 20.01</li> </ul>	24 II-Jun-19 IB-Jun-19 0.034 0.033 0.032 0.031 0.031 0.033 0.029 0.030 0.031 4.7 25 III-Jun-19 1B-Jun-19 0.020 0.026 0.027 0.028 0.029 0.028 0.028 0.028 0.028 1.49 26 Mean 0.021 0.027 0.024 0.023 0.023 0.023 0.023 0.024 0.022 0.023 0.023 2.7 37 Mean 0.024 0.023 0.023 0.023 0.023 0.024 0.022 0.023 2.7 38-Jun-19 2-Jun-19 0.024 0.023 0.023 0.023 0.023 0.024 0.022 0.023 2.7 Note 2: Site 17A had a pump failure tat impact collection time during Weeks I6 and 17. Volume insufficient for statistical analysis for Week I6 and data is INFO ONLY. CR 19-05328 Note 3: Site 35 lost power during Week 21, mower the Elapsed Time Meter continued recording time. Week 22 experienced a pump failure once the power was restored and had a shortened sampling un time. Samples are INVALID due to unknown volume of sample. Note 4: Site 40 pump failed during sampling period with time meter still muning, resulting in iability to determine sample flow. Sample is INVALID and data is for INFO ONLY. CR 19-09504 NGG ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT- 2019	24       11-Jun-19       18-Jun-19       0.034       0.033       0.031       0.031       0.031       0.031       0.031       0.031       0.031       0.031       0.032       0.031       0.032       0.031       0.032       0.032       0.031       0.032       0.031       0.032       0.032       0.032       0.032       0.032       0.032       0.032       0.032       0.032       0.024       0.032       0.025       0.016	23	4-Jun-19	11-Jun-19	0.032	0.030	0.035	0.029	0.032	0.032	0.028	0.027	0.029	0.026	0.030	9.6		
<ul> <li><sup>25</sup> [8-Jun-19 25-Jun-19 0.030 0.025 0.027 0.028 0.029 0.028 0.030 0.028 0.0489 0.028 4.8 4</li> <li><sup>26</sup> 25-Jun-19 1-Jul-19 0.027 0.024 0.023 0.023 0.023 0.023 0.023 0.024 149</li> <li><sup>26</sup> Mean 0.024 0.023 0.023 0.023 0.023 0.023 0.024 0.024 0.022 0.023 0.023 2.7</li> <li><sup>27</sup> Mean 0.024 0.023 0.023 0.023 0.023 0.024 0.024 0.024 0.022 0.023 0.023 2.7</li> <li><sup>28</sup> Note 2: Site 17A had a pump failure that impacted collection time during Weeks 16 and 17. Volume insufficient for statistical analysis for Week 16 and data is INFO ONLY. CR 19-06528</li> <li><sup>29</sup> Note 2: Site 135 lost power during Week 21 fraine Meter continued recording time. Week 22 experienced a pump failure once the power was restored and had a shortened sampling run time. Samples are INVALID due to unknow volume of sample.</li> <li><sup>20</sup> Note 4: Site 40 pump failed during sampling period with time meter still running, resulting in inability to determine sample flow. Sample is INVALID and data is for INFO ONLY. CR 19-09504</li> </ul>	25 IB-Jun-19 25-Jun-19 0.030 0.026 0.027 0.028 0.029 0.028 0.028 0.028 0.028 0.028 0.028 0.024 4.8 4 Ament 1-10 0.027 0.024 0.023 0.024 1.49 1.49 4.8 Ament 1-10 0.024 0.023 0.024 0.023 0.023 0.023 0.023 0.023 0.023 2.7 Mean 0.024 0.023 0.023 0.023 0.023 0.023 0.023 2.7 Note 2: Site 17A had a pump failure during Weeks1 6 and 17. Volume insufficient for statistical analysis for Week 16 and data is INFO ONLY. CR 19-0532 Note 3: Site 35 lost power during Weeks1 0.002 0.023 0.023 0.023 0.023 2.7 Note 3: Site 35 lost power during Weeks1 however the during Weeks1 for and failure once the power was restored and had a shortened sampling un time. Samples are INVALID due to unknown volume of sample. Note 4: Site 30 pump failure once the power was restored and had a shortened sampling un time. Samples are INVALID due to unknown volume of sample. Note 4: Site 30 pump failure once the power was restored and had a shortened sampling un time. Samples are INVALID due to unknown volume of sample. NGG ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT- 2019	25       18-Jun-19       22-Jun-19       0.030       0.025       0.023       0.023       0.024       0.025       0.016       0.015	24	11-Jun-19	18-Jun-19	0.034	0.033	0.032	0.031	0.031	0.033	0.029	0.030	0.031	0:030	0.031	4.7		
Description       Descrip       Descrip <thdescription< th=""> <th< td=""><td>NGANUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT - 2013 0.023 0.023 0.023 0.023 0.023 0.023 0.023 2.7 Mean 0.024 0.023 0.023 0.023 0.023 0.023 0.023 0.023 0.023 0.023 0.023 0.023 0.023 2.7 Mean 0.024 0.024 0.023 0.02</td><td><ul> <li>We was a start of the start of</li></ul></td><td>52 %</td><td>75 Lun 10</td><td>25-Jun-19</td><td>0.030</td><td>0.026</td><td>0.027</td><td>0.028</td><td>0.029</td><td>0.028</td><td>0.030</td><td>0.028</td><td>0.028</td><td>-0.0489</td><td>0.028</td><td>4.8</td><td>4</td></th<></thdescription<>	NGANUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT - 2013 0.023 0.023 0.023 0.023 0.023 0.023 0.023 2.7 Mean 0.024 0.023 0.023 0.023 0.023 0.023 0.023 0.023 0.023 0.023 0.023 0.023 0.023 2.7 Mean 0.024 0.024 0.023 0.02	<ul> <li>We was a start of the start of</li></ul>	52 %	75 Lun 10	25-Jun-19	0.030	0.026	0.027	0.028	0.029	0.028	0.030	0.028	0.028	-0.0489	0.028	4.8	4	
Note 2: Site 17A had a pump failure that impacted collection time during Weeks 16 and 17. Volume insufficient for statistical analysis for Week 16 and data is INFO ONLY. CR 19-06328 Note 3: Site 35 lost power during Week 21; however the Bapsed Time Meter continued recording time. Week 22 experienced a pump failure once the power was restored and had a shortened sampling nu time. Samples are INVALID due to unknown volume of sample. Note 4: Site 40 pump failed during sampling period with time meter still numing, resulting in inability to determine sample flow. Sample is INVALID and data is for INFO ONLY. CR 19-09504 TAPICE ANNUT AT DADATE AT ENTITID ONMEDITAL ODED ATTIMED DED OF 700.01.01.01	Note 2: Site 17A had a pump failure that impacted collection time during Weeks 16 and 17. Volume insufficient for statistical analysis for Week 16 and data is INFO ONLY. CR 19-06328 Note 3: Site 35 lost power during Week 21; however the Elapsed Time Meter continued recording time. Week 22 experienced a pump failure once the power was restored and had a shortened sampling nun time. Samples are INVALID due to unknown volume of sample. Note 4: Site 40 pump failed during sampling period with time meter still running, resulting in inability to determine sample flow. Sample is INVALID and data is for INFO ONLY. CR 19-09504 /NGS ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT- 2019	Note 2: Site 17A had a pump failure that impacted collection time during Weeks 16 and 17. Volume insufficient for statistical analysis for Week 16 and dat Note 3: Site 35 lost power during Week 21; however the Eapsed Time Meter continued recording time. Week 22 experienced a pump failure once the por run time. Samples are INVALID due to unknown volume of sample. Note 4: Site 40 pump failed during sampling period with time meter still running, resulting in inability to determine sample flow. Sample is INVALID and di NGS ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT- 2019 Dage 30	07	Mean	61-Inc-I	0.024	0.023	0.023	0.023	0.023	0.024	0.024	0.024	220.0	0.023	0.023	2.7		
Note 4: Site 40 pump failed during sampling period with time meter still running, resulting in inability to determine sample flow. Sample is INVALID and data is for INFO ONLY. CR 19-09504	Note 4: Site 40 pump failed during sampling period with time meter still running, resulting in inability to determine sample flow. Sample is INVALID and data is for INFO ONLY. CR 19-09504 /NGS ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT- 2019	Note 4: Site 40 pump failed during sampling period with time meter still running, resulting in inability to determine sample flow. Sample is INVALID and di /NGS ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT- 2019 Page 30		Note 2: Site 17 Note 3: Site 3: run time. Sam	A had a pump 5 lost power du ples are INVAL	failure that i ring Week 2 ID due to ur	mpacted colls 1; however th known volun	ection time du te Elapsed Tin ne of sample.	ning Weeks 1 ne Meter con	6 and 17. Vol tinued record	lume insuffic ding time. W	ient for statis /eek 22 expen	stical analysis ienced a pum	s for Week 16 p failure once	and data is ]	NFO ONLY. C	R 19-06328 nd had a shor	tened sampling	
γής ανινιτάτερατικά τη ενιγιρονιμένται όρερατικά ρερορτέρης	/NGS ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT- 2019	/NGS ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT- 2019 Page 30		Note 4: Site 40	pump failed dt	aring sampli	ng period wit	h time meter s	till running, r	esulting in in	ability to de	termine samp	le flow. Samp	le is INVALII	D and data is	for INFO ON	LY. CR 19-095	04	
	VINGS ANNUAL NADIULUUUUUUU ENVINUMEN IAL UFENATING KEFUKI - 2019	VINGS ANNUAL MADIOLOGICAL ENVIRONMENTAL OF EMATING REFORT- 2019 Page 30	INCC AN	INITAL D		A IVUI	INVIDO	UNTENT		O A TINIC	י הנחמו	TOC TO	6						

Table 8-1 Particulate Gross Beta in Air 1st-2nd Quarter

pples de note d by *           pCi/m³           rrter           site         Site           17A         21           0.024         0.023           0.023         0.030           0.024         0.031           0.032         0.033           0.032         0.033           0.033         0.034           0.033         0.035           0.034         0.035           0.032         0.033           0.033         0.034           0.034         0.035           0.035         0.034           0.032         0.035           0.033         0.034           0.034         0.035           0.025         0.030           0.026         0.017           0.027         0.026           0.028         0.036           0.037         0.036           0.037         0.036           0.037         0.036           0.037         0.039           0.037         0.039           0.037         0.033           0.038         0.033           0.029         0.033           0.0	International control of contro of contro of control of control of control of control of control	
	ODCA           START         Site	
Intequired samples de units are pCl/m <sup>3</sup> 3rd Quarter           3rd Quarter           3rd Quarter           15*         17A           10031         0.024         0.024           110033         0.032         0.032           111         0.031         0.032         0.032           111         0.031         0.032         0.032           111         0.031         0.032         0.032           111         0.031         0.032         0.032           111         0.031         0.032         0.032           111         0.031         0.032         0.032           111         0.031         0.032         0.032           111         0.031         0.032         0.032           111         0.031         0.032         0.032           111         0.021         0.033         0.033           111         0.021         0.033         0.033           111         0.021         0.033         0.033           111         0.023         0.033         0.033           111         0.023         0.033         0.033           111         0.023	(control)           START         STOP         Site         Site           DATE         DATE         (control)           J-Jul-19         O.D31         Colspan="2">Colspan="2"           J-Jul-19         O.D31         COD3         COD3 <th col<="" td=""></th>	
ODCM required samples denoted by * units are pCi/m³           Site         Site <th< td=""><td>START     STOP     Site       DATE     DATE     4       1-Jul-19     9-Jul-19     0.03       9-Jul-19     9-Jul-19     0.03       9-Jul-19     16-Jul-19     0.03       9-Jul-19     20-Jul-19     0.03       15-Jul-19     30-Jul-19     0.03       15-Jul-19     20-Aug-19     0.03       13-Aug-19     20-Aug-19     0.03       5-Aug-19     15-Aug-19     0.03       5-Aug-19     15-Aug-19     0.03       5-Aug-19     15-Aug-19     0.02       20-Aug-19     20-Aug-19     0.02       21-Aug-19     30-Jul-19     0.02       22-Aug-19     15-Sep-19     10-Sep-19       20-Aug-19     21-Sep-19     0.02       21-Sep-19     17-Sep-19     0.02       22-Sep-19     17-Sep-19     0.02       22-Sep-19     17-Sep-19     0.02       22-Sep-19     17-Sep-19     0.03       24     17-Sep-19     24-Sep-19       25-Sep-19     17-Sep-19     0.03       24     0     10-Oct-19     30-Oct-19       27-Oct-19     30-Oct-19     27-Nov-19     0.03       27-Oct-19     30-Oct-19     30-Oct-19       27-Nov-19     15-Nov-19</td></th<>	START     STOP     Site       DATE     DATE     4       1-Jul-19     9-Jul-19     0.03       9-Jul-19     9-Jul-19     0.03       9-Jul-19     16-Jul-19     0.03       9-Jul-19     20-Jul-19     0.03       15-Jul-19     30-Jul-19     0.03       15-Jul-19     20-Aug-19     0.03       13-Aug-19     20-Aug-19     0.03       5-Aug-19     15-Aug-19     0.03       5-Aug-19     15-Aug-19     0.03       5-Aug-19     15-Aug-19     0.02       20-Aug-19     20-Aug-19     0.02       21-Aug-19     30-Jul-19     0.02       22-Aug-19     15-Sep-19     10-Sep-19       20-Aug-19     21-Sep-19     0.02       21-Sep-19     17-Sep-19     0.02       22-Sep-19     17-Sep-19     0.02       22-Sep-19     17-Sep-19     0.02       22-Sep-19     17-Sep-19     0.03       24     17-Sep-19     24-Sep-19       25-Sep-19     17-Sep-19     0.03       24     0     10-Oct-19     30-Oct-19       27-Oct-19     30-Oct-19     27-Nov-19     0.03       27-Oct-19     30-Oct-19     30-Oct-19       27-Nov-19     15-Nov-19	
ODCM required samples denoted by* units are $pCInn^3$ 3rd Quarter         Current of the substance of	START         DATE         DATE         1-Jul-19         9-Jul-19         16-Jul-19         9-Jul-19         16-Jul-19         9-Jul-19         15-Jul-19         16-Sep-19         17-Sep-19         17-Sep-19         17-Sep-19         24-Sep-19         17-Sep-19         START         Note 5: Site 6A eq         Note 7: Site 29 eq         Note 8: Site 29 eq         Note 9: Site 29 eq         Note 9: Site 29 eq	
ODCM required samp units are p 3rd Quar           Site         Site Site 3rd Quar           (control)           Site Site Site Site 3-Jul-19		

Table 8-2 Particulate Gross Beta in Air 3rd-4th Quarter

			GA	I AMM	GAMMA IN AIR FILTER COMPOSITES	ILTER C	OMPO	SITES				
				ODCIV	ODCM required samples denoted by *	samples de	noted by	*				
					units	units are pCi/m <sup>3</sup>						
			(control)									
QUARTER		Site	Site	Site	Site	Site	Site	Site	Site	Site	Site	
ENDPOINT NUCLIDE	NUCLIDE	4	6A*	7A	14A*	15*	17A	21	29*	35	40*	⊥Note
OL-Mar-10	Cs-134	<0.001	<0.003	<0.002	<0.001	<0.003	<0.001	<0.002	<0.002	<0.002	<0.003	
ZU-IVIAI - 17	Cs-137	<0.002	<0.003	<0.004	<0.003	<0.004	<0.004	<0.002	<0.003	<0.004	<0.001	
75 In 10	Cs-134	<0.003	<0.002	<0.004	<0.001	<0.003	<0.001	<0.002	<0.001	<0.001	<0.001	
C1-Imr-07	Cs-137	<0.003	<0.002	<0.004	<0.002	<0.002	<0.002	<0.003	<0.001	<0.004	<0.004	
24 Can 10	Cs-134	<0.003	<0.004	<0.003	<0.001	<0.001	<0.001	<0.002	<0.001	<0.002	<0.001	
C1-000-47	Cs-137	<0.002	<0.002	<0.002	<0.003	<0.002	<0.003	<0.003	<0.001	<0.004	<0.002	
20 Doc 10	Cs-134	<0.001	<0.003	<0.002	<0.003	<0.001	<0.003	<0.002	<0.001	<0.001	<0.001	
20-Dec-12	Cs-137	<0.003	<0.001	<0.001	<0.004	<0.006	<0.001	<0.004	<0.003	<0.001	<0.001	

Table 8-3 Gamma in Air Filter Composites

Site         Site <t< th=""><th>Inits are pCUm<sup>3</sup>           Site         Site<th>Inits are pCUM<sup>3</sup>           Site         Site</th><th>Inits are pCi/m<sup>3</sup>           site Site Site Site Site Site Site Site S</th><th>Inits are pCi/m<sup>3</sup>           site Site Site Site Site Site Site Site S</th></th></t<>	Inits are pCUm <sup>3</sup> Site         Site <th>Inits are pCUM<sup>3</sup>           Site         Site</th> <th>Inits are pCi/m<sup>3</sup>           site Site Site Site Site Site Site Site S</th> <th>Inits are pCi/m<sup>3</sup>           site Site Site Site Site Site Site Site S</th>	Inits are pCUM <sup>3</sup> Site	Inits are pCi/m <sup>3</sup> site Site Site Site Site Site Site Site S	Inits are pCi/m <sup>3</sup> site Site Site Site Site Site Site Site S	
Site         Site <t< th=""><th>required LLD <math>\neg 0.00</math>         Site         <th< th=""><th>Site         Site         Site</th></th<></th></t<> <th>Intermined LLD <math>=0.000</math>         Site           <th< th=""><th>Transmetter LID = 0.001           Site           0.0012         0.0013         0.0013         0.0013         0.0013         0.0013         0.0013         0.0013         0.0013         0.0013         0.0013         0.0013         0.0013         0.0013         &lt;</th></th<></th>	required LLD $\neg 0.00$ Site         Site <th< th=""><th>Site         Site         Site</th></th<>	Site	Intermined LLD $=0.000$ Site         Site <th< th=""><th>Transmetter LID = 0.001           Site           0.0012         0.0013         0.0013         0.0013         0.0013         0.0013         0.0013         0.0013         0.0013         0.0013         0.0013         0.0013         0.0013         0.0013         &lt;</th></th<>	Transmetter LID = 0.001           Site           0.0012         0.0013         0.0013         0.0013         0.0013         0.0013         0.0013         0.0013         0.0013         0.0013         0.0013         0.0013         0.0013         0.0013         <	
Site         Site <t< th=""><th>Site         Site         <t< th=""><th>Site         Site         <t< th=""><th>Jite         Site         Note           <math>-0.002</math> <math>-0.001</math> <math>-0.012</math> <math>-0.012</math></th><th>Site         Site         Note           <math>-0001</math> <math>-0001</math> <math>-0001</math> <math>-0001</math> <math>-0001</math> <math>-0002</math>         &lt;</th></t<></th></t<></th></t<>	Site         Site <t< th=""><th>Site         Site         <t< th=""><th>Jite         Site         Note           <math>-0.002</math> <math>-0.001</math> <math>-0.012</math> <math>-0.012</math></th><th>Site         Site         Note           <math>-0001</math> <math>-0001</math> <math>-0001</math> <math>-0001</math> <math>-0001</math> <math>-0002</math>         &lt;</th></t<></th></t<>	Site         Site <t< th=""><th>Jite         Site         Note           <math>-0.002</math> <math>-0.001</math> <math>-0.012</math> <math>-0.012</math></th><th>Site         Site         Note           <math>-0001</math> <math>-0001</math> <math>-0001</math> <math>-0001</math> <math>-0001</math> <math>-0002</math>         &lt;</th></t<>	Jite         Site         Note $-0.002$ $-0.001$ $-0.012$	Site         Note $-0001$ $-0001$ $-0001$ $-0001$ $-0001$ $-0002$ <	
0.026 $-0.021$ $-0.037$ $-0.024$ $-0.031$		-0.01 $-0.02$ <	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	(000) $(001)$ $(001)$ $(001)$ $(002)$ <	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	(000)         (001) <t< td=""></t<>	
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0.0035 $< 0.019$ $< 0.038$ $< 0.007$ $< 0.007$ $< 0.007$ $< 0.007$ $< 0.007$ $< 0.007$ $< 0.007$ $< 0.007$ $< 0.007$ $< 0.007$ $< 0.007$ $< 0.007$ $< 0.007$ $< 0.007$ $< 0.007$ $< 0.007$ $< 0.007$ $< 0.007$ $< 0.007$ $< 0.007$ $< 0.007$ $< 0.003$ $< 0.002$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$ $< 0.003$	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	-0.02 $-0.016$ $-0.015$ $-0.017$ $-0.025$ $-0.017$ $-0.026$ $-0.017$ $-0.026$ $-0.016$		
0.003 $-0.03$ $-0.07$ $-0.07$ $-0.06$ $-0.06$ 0.002 $-0.033$ $-0.017$ $-0.026$ $-0.033$ 0.002 $-0.033$ $-0.017$ $-0.035$ $-0.033$ 0.002 $-0.033$ $-0.017$ $-0.035$ $-0.031$ 0.021 $-0.033$ $-0.017$ $-0.035$ $-0.031$ 0.021 $-0.031$ $-0.026$ $-0.025$ $-0.025$ 0.031 $-0.031$ $-0.031$ $-0.025$ $-0.027$ 0.031 $-0.033$ $-0.017$ $-0.025$ $-0.027$ 0.031 $-0.033$ $-0.017$ $-0.025$ $-0.027$ 0.031 $-0.033$ $-0.017$ $-0.025$ $-0.027$ 0.031 $-0.026$ $-0.023$ $-0.022$ $-0.027$ 0.04 $-0.022$ $-0.021$ $-0.022$ $-0.027$ 0.055 $-0.022$ $-0.021$ $-0.022$ $-0.027$ 0.056 $-0.022$ $-0.022$ $-0.022$ $-0.022$ 0.057 $-0.022$ $-0.022$ $-0.022$ <td< td=""><td><math display="block"> \begin{array}{c c c c c c c c c c c c c c c c c c c </math></td><td><math display="block"> \begin{array}{c c c c c c c c c c c c c c c c c c c </math></td><td><math display="block"> \begin{array}{c c c c c c c c c c c c c c c c c c c </math></td><td><math display="block"> \begin{array}{c c c c c c c c c c c c c c c c c c c </math></td></td<>	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	
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$\begin{array}{cccccccccccccccccccccccccccccccccccc$		-0.07 $-0.01$ $-0.02$ <	-0.03 $-0.03$ $-0.02$ <	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		-0.014 $-0.026$ $-0.036$ $-0.031$ $-0.037$ $-0.031$ $-0.037$	-0.014 $-0.026$ $-0.037$ $-0.027$ $-0.037$ $-0.027$		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	-0.033         -0.023         -0.034         -0.033         -0.033         -0.035         -0.037         -0.035         -0.037         -0.035         -0.037         -0.035         -0.035         -0.035         -0.035         -0.035         -0.037         -0.035         -0.035         -0.033         -0.035         -0.035         -0.033         -0.033         -0.035         -0.035         -0.035         -0.035         -0.035         -0.025	-0.053         -0.023         -0.054         -0.031         -0.025         -0.037	-003         -0023         -0033         -0031         -0035 <th< td=""><td>&lt;003         &lt;003         &lt;003 <t< td=""></t<></td></th<>	<003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003         <003 <t< td=""></t<>	
0.031     ⊲0.033     ⊲0.031     ⊲0.025     ⊲0.022       0.033     ⊲0.017     ⊲0.033     ⊲0.017     ⊲0.022       by *      ⊲0.017     ⊲0.017     ⊲0.022       by *       ⊲0.017     ⊲0.025       by *        ⊲0.017     ⊲0.025       by *            by *            by *            by *            by *            coloco            coloco            coloco            coloco            coloco            coloco            coloco            coloco            coloco           coloco     <	√0017         <0.0027         <0.0054         <0.0031         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032         <0.0032 <th< td=""><td>J0017         J0027         <t< td=""><td>-0.047         -0.027         -0.053         -0.017         -0.025</td><td></td></t<></td></th<>	J0017         J0027         J0027 <t< td=""><td>-0.047         -0.027         -0.053         -0.017         -0.025</td><td></td></t<>	-0.047         -0.027         -0.053         -0.017         -0.025		
0.033     ⊲0.017     ⊲0.033     ⊲0.017     ⊲0.025       by *     17A     21     29*     35     40*       0.025     ⊲0.021     ⊲0.017     ⊲0.025     0.017       0.026     ⊲0.023     ⊲0.017     ⊲0.025       0.025     ⊲0.021     ⊲0.022     ⊲0.017       0.025     ⊲0.021     ⊲0.022     ⊲0.017       0.025     ⊲0.021     ⊲0.022     ⊲0.017       0.025     ⊲0.021     ⊲0.022     ⊲0.017       0.031     ⊲0.021     ⊲0.022     ⊲0.017       0.053     ⊲0.021     ⊲0.022     ⊲0.017       0.053     ⊲0.021     ⊲0.022     ⊲0.017       0.053     ⊲0.017     ⊲0.026     ⊲0.064       0.053     ⊲0.017     ⊲0.028     ⊲0.064       0.053     ⊲0.053     ⊲0.058     ⊲0.058       0.053     ⊲0.053     ⊲0.058     ⊲0.064       0.053     ⊲0.056     ⊲0.058     ⊲0.065       0.053     ⊲0.058     ⊲0.058     ⊲0.058       0.058     ⊲0.056     ⊲0.066     ⊲0.054       0.058     ⊲0.056     ⊲0.065     ⊲0.066       0.058     ⊲0.056     ⊲0.066     ⊲0.054       0.058     ⊲0.056     ⊲0.066       0.058	J007         J003         J003         J003         J003         J007         J003         J001         J003         J001         J003         J001         J003         J001         J003         J001         J003         J003         J003         J003 <t< td=""><td>JOD7         JOD3         JOD3         JOD3         JOD7         JOD3         JOD7         JOD3         JOD7         JOD3         JOD7         JOD3         JOD7         JOD3         JOD7         JOD3         <t< td=""><td></td><td>&lt;</td></t<></td></t<>	JOD7         JOD3         JOD3         JOD3         JOD7         JOD3         JOD7         JOD3         JOD7         JOD3         JOD7         JOD3         JOD7         JOD3         JOD7         JOD3         JOD3 <t< td=""><td></td><td>&lt;</td></t<>		<	
VTER       by *       by *       17A     21     29*     35     40*       0.025     <0.025	Iday. Sampling period remains within procedural requirements.           Iday. Sampling period remains within procedural requirements. <b>FADIODINE IN AIR 2nd QUARTER RADIODINE IN AIR 2nd QUARTER Colspan ODCM required samples denoted by * Inits are PCIM ODCM required samples denoted by * Inits are PCIM Inits are PCIM</b> <tr< td=""><td>circle transmises within procedural requirements.         RADIOIODINE IN AIR 2nd QUARTER         Colspan="6"&gt;Colspan="6"&gt;Colspan="6"&gt;Colspan="6"&gt;Colspan="6"&gt;Colspan="6"&gt;Colspan="6"&gt;Colspan="6"&gt;Colspan="6"&gt;Colspan="6"&gt;Colspan="6"         COLCM required samples denoted by*         TA       17A       29*       40*       Mote         COLCD       COLCD</td><td>criod remains within procedural requirements.         Calculation of the procedural requirements.         ADIOIODINE IN AIR 2nd QUARTER         ADIOIO ADIOIO</td><td>criod remains within procedural requirements.         Calculation requirements.         ADIOIODINE IN AIR 2nd QUARTER         ADIOIO COLS 20006         ADIOIO COLS 20005         ADIOIC 200</td></tr<>	circle transmises within procedural requirements.         RADIOIODINE IN AIR 2nd QUARTER         Colspan="6">Colspan="6">Colspan="6">Colspan="6">Colspan="6">Colspan="6">Colspan="6">Colspan="6">Colspan="6">Colspan="6">Colspan="6"         COLCM required samples denoted by*         TA       17A       29*       40*       Mote         COLCD	criod remains within procedural requirements.         Calculation of the procedural requirements.         ADIOIODINE IN AIR 2nd QUARTER         ADIOIO	criod remains within procedural requirements.         Calculation requirements.         ADIOIODINE IN AIR 2nd QUARTER         ADIOIO COLS 20006         ADIOIO COLS 20005         ADIOIC 200	
21         29*         35         40*           -0.025         -0.006         -0.033         -0.025           -0.021         -0.021         -0.023         -0.025           -0.022         -0.021         -0.021         -0.025           -0.022         -0.021         -0.022         -0.025           -0.052         -0.023         -0.026         -0.068           -0.053         -0.025         -0.026         -0.068           -0.053         -0.027         -0.026         -0.068           -0.012         -0.026         -0.068         -0.068           -0.012         -0.026         -0.068         -0.068           -0.012         -0.026         -0.068         -0.068           -0.012         -0.027         -0.058         -0.042           -0.013         -0.053         -0.058         -0.042           -0.013         -0.026         -0.026         -0.043           -0.013         -0.026         -0.066         -0.043           -0.013         -0.0103         -0.018         -0.043           -0.013         -0.0103         -0.0166         -0.054           -0.013         -0.0106         -0.018         -0.043	ODCM required samples denoted by*           Imits are pCi/m <sup>3</sup> Imits	21     29*     35     40*       -0.025     -0.006     -0.033     -0.025       -0.031     -0.021     -0.022     -0.017       -0.022     -0.021     -0.022     -0.017       -0.052     -0.024     -0.025     -0.017       -0.053     -0.021     -0.025     -0.017       -0.052     -0.024     -0.026     -0.068       -0.053     -0.027     -0.029     -0.064       -0.012     -0.0121     -0.022     -0.064       -0.012     -0.0121     -0.022     -0.064       -0.012     -0.0121     -0.022     -0.064       -0.012     -0.021     -0.022     -0.064       -0.012     -0.021     -0.022     -0.064       -0.012     -0.022     -0.022     -0.026       -0.013     -0.026     -0.026     -0.026       -0.013     -0.026     -0.026     -0.056       -0.053     -0.026     -0.026     -0.056       -0.053     -0.026     -0.026     -0.056       -0.053     -0.026     -0.056     -0.056       -0.053     -0.026     -0.056     -0.056       -0.053     -0.026     -0.056     -0.056       -0.053     -0.026     -0.05	ODCM required samples denoted by*           Inits are pCi/m <sup>3</sup> required samples denoted by*           Inits are pCi/m <sup>3</sup> required LLD $\lhd_0.070$ TA         11A         Job         Job<	MATE         DATE         DATE </th	
21         29*         35         40*           5         -0.025         -0.006         -0.033         -0.025           6         -0.021         -0.021         -0.023         -0.025           7         -0.022         -0.022         -0.026         -0.022           7         -0.022         -0.022         -0.026         -0.026           7         -0.022         -0.026         -0.026         -0.026           7         -0.022         -0.027         -0.026         -0.026           8         -0.017         -0.026         -0.066         -0.026           9         -0.017         -0.026         -0.066         -0.026           9         -0.017         -0.026         -0.066         -0.026           9         -0.017         -0.028         -0.066         -0.026           9         -0.017         -0.028         -0.026         -0.026           9         -0.013         -0.026         -0.026         -0.066           9         -0.026         -0.026         -0.026         -0.066           9         -0.026         -0.026         -0.066         -0.066           9         -0.026         -0.	Junits are pCI/m <sup>3</sup> required LLD =0.070         TA       17A       21       29*       35       40*       -Mote         JTA       17A       21       29*       35       40*       -Mote         JODD       G005       G005 <th colspa="&lt;/td"><td>TA         14A*         15*         17A         29*         35         40*         × Note           7A         14A*         15*         17A         21         29*         35         40*         × Note           7A         14A*         15*         17A         21         29*         35         40*         × Note           4005         4001         4002         4002         4002         4002         × Note           4005         4001         4002         4002         4002         40*         × Note           4005         4001         4002         4002         40*         × Note         2           4005         4001         4002         4002         4002         40*         × Note           4005         4001         4002         4002         40*         × Note         2           4005         4001         4002         4002         4002         2         2           4005         4001         4002         4002         4001         2         2           4005         4001         4002         4002         4002         2         2           4005         4001         4002<!--</td--><td>Oncome of the protection of the protectine protectine protection of the protection of the prote</td><td>TA         14/x         15/x         17/x         21         29/x         35         40/x         Mote           required LLD -0.070           TA         14/x         15/x         17/x         21         29/x         35         40/x         Mote           7A         14/x         15/x         17/x         21         29/x         35         40/x         Mote           7005         0.002         0.002         0.002         0.002         0.002         0.002         0.002         20.017         20/x2         20.017           0.002         0.001         0.002         0.002         0.002         0.002         0.002         0.002         20.017         20.022         20.017           0.005         0.001         0.002         0.002         0.002         0.002         0.002         20.023</td></td></th>	<td>TA         14A*         15*         17A         29*         35         40*         × Note           7A         14A*         15*         17A         21         29*         35         40*         × Note           7A         14A*         15*         17A         21         29*         35         40*         × Note           4005         4001         4002         4002         4002         4002         × Note           4005         4001         4002         4002         4002         40*         × Note           4005         4001         4002         4002         40*         × Note         2           4005         4001         4002         4002         4002         40*         × Note           4005         4001         4002         4002         40*         × Note         2           4005         4001         4002         4002         4002         2         2           4005         4001         4002         4002         4001         2         2           4005         4001         4002         4002         4002         2         2           4005         4001         4002<!--</td--><td>Oncome of the protection of the protectine protectine protection of the protection of the prote</td><td>TA         14/x         15/x         17/x         21         29/x         35         40/x         Mote           required LLD -0.070           TA         14/x         15/x         17/x         21         29/x         35         40/x         Mote           7A         14/x         15/x         17/x         21         29/x         35         40/x         Mote           7005         0.002         0.002         0.002         0.002         0.002         0.002         0.002         20.017         20/x2         20.017           0.002         0.001         0.002         0.002         0.002         0.002         0.002         0.002         20.017         20.022         20.017           0.005         0.001         0.002         0.002         0.002         0.002         0.002         20.023</td></td>	TA         14A*         15*         17A         29*         35         40*         × Note           7A         14A*         15*         17A         21         29*         35         40*         × Note           7A         14A*         15*         17A         21         29*         35         40*         × Note           4005         4001         4002         4002         4002         4002         × Note           4005         4001         4002         4002         4002         40*         × Note           4005         4001         4002         4002         40*         × Note         2           4005         4001         4002         4002         4002         40*         × Note           4005         4001         4002         4002         40*         × Note         2           4005         4001         4002         4002         4002         2         2           4005         4001         4002         4002         4001         2         2           4005         4001         4002         4002         4002         2         2           4005         4001         4002 </td <td>Oncome of the protection of the protectine protectine protection of the protection of the prote</td> <td>TA         14/x         15/x         17/x         21         29/x         35         40/x         Mote           required LLD -0.070           TA         14/x         15/x         17/x         21         29/x         35         40/x         Mote           7A         14/x         15/x         17/x         21         29/x         35         40/x         Mote           7005         0.002         0.002         0.002         0.002         0.002         0.002         0.002         20.017         20/x2         20.017           0.002         0.001         0.002         0.002         0.002         0.002         0.002         0.002         20.017         20.022         20.017           0.005         0.001         0.002         0.002         0.002         0.002         0.002         20.023</td>	Oncome of the protection of the protectine protectine protection of the protection of the prote	TA         14/x         15/x         17/x         21         29/x         35         40/x         Mote           required LLD -0.070           TA         14/x         15/x         17/x         21         29/x         35         40/x         Mote           7A         14/x         15/x         17/x         21         29/x         35         40/x         Mote           7005         0.002         0.002         0.002         0.002         0.002         0.002         0.002         20.017         20/x2         20.017           0.002         0.001         0.002         0.002         0.002         0.002         0.002         0.002         20.017         20.022         20.017           0.005         0.001         0.002         0.002         0.002         0.002         0.002         20.023
required LLD <0.070	required LLD ~0.070           7.A $14A^*$ $15^*$ $17A$ $21^*$ $35$ $40^*$ $\sim Note$ $-0.022$ $-0.025$ $-0.026$ $-0.025$ $-0.025$ $-0.022$ $-0.022$ $-0.027$ $-0.027$ $-0.027$ $-0.027$ $-0.027$ $-0.017$ $-0.025$ $-0.021$ $-0.022$ $-0.017$ $-0.022$ $-0.017$ $-0.022$ $-0.017$ $-0.022$ $-0.017$ $-0.022$ $-0.017$ $-0.022$ $-0.017$ $-0.022$ $-0.017$ $-0.022$ $-0.017$ $-0.022$ $-0.017$ $-0.022$ $-0.017$ $-0.022$ $-0.017$ $-0.022$ $-0.017$ $-0.022$ $-0.017$ $-0.022$ $-0.017$ $-0.022$ $-0.$	A model LLD ~0.070           7A         14A*         15*         17A         21         29*         35         40*         Model           ~0.022         ~0.025         ~0.006         ~0.025         ~0.005         ~0.025         ~0.017         ~0.017           ~0.025         ~0.021         ~0.025         ~0.021         ~0.022         ~0.017         ~0.017           ~0.025         ~0.011         ~0.022         ~0.021         ~0.022         ~0.017         ~0.017         ~0.017           ~0.035         ~0.011         ~0.022         ~0.021         ~0.022         ~0.017         ~0.025         ~0.017         ~0.025         ~0.017         ~0.025         ~0.017         ~0.025         ~0.017         ~0.025         ~0.017         ~0.025         ~0.026         ~0.026         ~0.025         ~0.025         ~0.025         ~0.025         ~0.025         ~0.025         ~0.025         ~0.025         ~0.025         ~0.026         ~0.026         ~0.026         ~0.026         ~0.026         ~0.066         ~0.025         ~0.026         ~0.026         ~0.026         ~0.026         ~0.066         ~0.026         ~0.026         ~0.026         ~0.026         ~0.026         ~0.026         ~0.026         ~0.026	TA         144*         15*         17         29*         35         40* $\_\_NMet$ 7A         14A*         15*         17A         21         29*         35         40* $\_NMet$ $=0.022$ $=0.0021$ $=0.022$	TA         14A*         15*         17         29*         35         40*         Motion for the text colspan="6" colspa="6">Motion for the text colspa="6"           7A         14A*         15*         17A         21         29*         35         40* $\_$ Note $=0.022$ $=0.023$ $=0.023$ $=0.023$ $=0.023$ $=0.023$ $=0.022$ $=0.0$	
14A*         15*         17A         21         29*         35         40* $-0.025$ $-0.006$ $-0.026$ $-0.025$ $-0.025$ $-0.023$ $-0.025$ <td>7A         14A*         15*         17A         21         29*         35         40*         <math>\_Note</math> <math>&lt;0.022</math> <math>&lt;0.025</math> <math>&lt;0.006</math> <math>&lt;0.025</math> <math>&lt;0.006</math> <math>&lt;0.025</math> <math>&lt;0.005</math> <math>&lt;0.025</math> <math>&lt;0.017</math> <math>&lt;0.025</math> <math>&lt;0.025</math> <math>&lt;0.021</math> <math>&lt;0.022</math> <math>&lt;0.022</math> <math>&lt;0.022</math> <math>&lt;0.021</math> <math>&lt;0.025</math> <math>&lt;0.017</math> <math>&lt;0.025</math> <math>&lt;0.017</math> <math>&lt;0.025</math> <math>&lt;0.017</math> <math>&lt;0.025</math> <math>&lt;0.017</math> <math>&lt;0.025</math> <math>&lt;0.017</math> <math>&lt;0.025</math> <math>&lt;0.017</math> <math>&lt;0.025</math> <math>&lt;0.026</math> <td< td=""><td>7A         14A*         15*         17A         29*         35         40*         _Note           &lt;0.022</td>         &lt;0.025</td<></td> <0.006	7A         14A*         15*         17A         21         29*         35         40* $\_Note$ $<0.022$ $<0.025$ $<0.006$ $<0.025$ $<0.006$ $<0.025$ $<0.005$ $<0.025$ $<0.017$ $<0.025$ $<0.025$ $<0.021$ $<0.022$ $<0.022$ $<0.022$ $<0.021$ $<0.025$ $<0.017$ $<0.017$ $<0.017$ $<0.017$ $<0.017$ $<0.017$ $<0.017$ $<0.017$ $<0.017$ $<0.017$ $<0.017$ $<0.017$ $<0.017$ $<0.017$ $<0.017$ $<0.017$ $<0.025$ $<0.017$ $<0.025$ $<0.017$ $<0.025$ $<0.017$ $<0.025$ $<0.017$ $<0.025$ $<0.017$ $<0.025$ $<0.026$ $<0.026$ $<0.026$ $<0.026$ $<0.026$ $<0.026$ $<0.026$ $<0.026$ $<0.026$ $<0.026$ $<0.026$ $<0.026$ $<0.026$ $<0.026$ $<0.026$ $<0.026$ $<0.026$ $<0.026$ $<0.026$ $<0.026$ $<0.026$ $<0.026$ $<0.026$ $<0.026$ $<0.026$ <td< td=""><td>7A         14A*         15*         17A         29*         35         40*         _Note           &lt;0.022</td>         &lt;0.025</td<>	7A         14A*         15*         17A         29*         35         40*         _Note           <0.022	7A         14A*         15*         17A         21*         29*         35         40* $\_\_Note$ $< 0.022$ $< 0.025$ $< 0.006$ $< 0.025$ $< 0.025$ $< 0.022$ $< 0.025$ $< 0.025$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.025$ $< 0.021$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$ $< 0.022$	7A14A*15*17A29*3540* $\_N\text{Net}$ $< 0.022$ $< 0.025$ $< 0.026$ $< 0.025$ $< 0.026$ $< 0.025$ $< 0.025$ $< 0.025$ $< 0.025$ $< 0.025$ $< 0.025$ $< 0.025$ $< 0.025$ $< 0.025$ $< 0.025$ $< 0.025$ $< 0.025$ $< 0.025$ $< 0.025$ $< 0.025$ $< 0.025$ $< 0.027$ $< 0.025$ $< 0.025$ $< 0.025$ $< 0.025$ $< 0.025$ $< 0.025$ $< 0.025$ $< 0.025$ $< 0.025$ $< 0.025$ $< 0.025$ $< 0.025$ $< 0.025$ $< 0.025$ $< 0.026$ $< 0.025$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ $< 0.026$ <	
<0.025	-0.022         <0.005	-q0.02         -q0.01         -q0.02         -q0.02<	-0.022         -0.025         -0.006         -0.025         -0.025         -0.025         -0.025         -0.025         -0.025         -0.025         -0.025         -0.025         -0.025         -0.027         -0.027         -0.027         -0.027         -0.027         -0.027         -0.027         -0.017         2           -0.025         -0.031         -0.032         -0.051         -0.051         -0.022         -0.021         -0.022         -0.021         -0.022         -0.023         -0.025         -0.025         -0.025         -0.025         -0.025         -0.025         -0.025         -0.025         -0.024         -0.025	-0.022         -0.025         -0.006         -0.025         -0.025         -0.025         -0.025         -0.025         -0.025         -0.025         -0.025         -0.025         -0.025         -0.017         -0.025         -0.017         -0.025         -0.017         -0.025         -0.017         -0.022         -0.017         -0.021         -0.022         -0.017         -0.022         -0.017         -0.022         -0.025         -0.025         -0.025         -0.025         -0.025         -0.025         -0.025         -0.025         -0.025         -0.025         -0.025         -0.025         -0.025         -0.025         -0.025         -0.025         -0.026         -0.025<	
<0.021         <0.032         <0.025         <0.031         <0.022         <0.017           <0.031	<0.025	<         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <	<0.025	<0.025	
⊲1031     ⊲1032     ⊥<0.052		7	<	<	
⊲0.023         ⊲0.051         ⊲0.057         ⊲0.057         ⊲0.052         ⊲0.024         ⊲0.026         ⊲0.068           ⊲0.018         ⊲0.053         ⊲0.032         ⊲0.032         ⊲0.035         ⊲0.029         ⊲0.064           ⊲0.016         ⊲0.049         ⊲0.029         ⊲0.017         ⊲0.042         ⊲0.064           ⊲0.016         ⊲0.049         ⊲0.029         ⊲0.012         ⊲0.017         ⊲0.042         ⊲0.064           ⊲0.016         ⊲0.016         ⊲0.023         ⊲0.012         ⊲0.017         ⊲0.042         ⊲0.064           ⊲0.021         ⊲0.049         ⊲0.023         ⊲0.023         ⊲0.023         ⊲0.023         ⊲0.023         ⊲0.043           ⊲0.011         ⊲0.033         ⊲0.033         ⊲0.033         ⊲0.043         ⊲0.026         ⊲0.033         ⊲0.043           ⊲0.023         ⊲0.033         ⊲0.033         ⊲0.033         ⊲0.043         ⊲0.026         ⊲0.043           ⊲0.023         ⊲0.033         ⊲0.033         ⊲0.033         ⊲0.043         ⊲0.043         ⊲0.043           ⊲0.023         ⊲0.033         ⊲0.033         ⊲0.033         ⊲0.043         ⊲0.043         ⊲0.043           ⊲0.023         ⊲0.033         ⊲0.041         ⊲0.033         ⊲0.043 </td <td>&lt;0.035</td> <0.021	<0.035	<0.035		<0.035	
<0.018         <0.053         <0.032         <0.068         <0.035         <0.029         <0.064           <0.016	<0.035	<0.035	<0.035	<0.035	
⊲0.016         ⊲0.049         <0.029         <0.012         <0.017         <0.042         <0.006           <0.027	<   <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         < <tt< td=""><td>&lt;0.056</td>         &lt;0.016</tt<>	<0.056	<0.056	<   <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <         <	
<0.027         <0.040         <0.016         <0.032         <0.027         <0.058         <0.027           <0.061	<0.047         <0.027         <0.040         <0.016         <0.032         <0.027         <0.058         <0.027         3           <0.039	<0.047         <0.027         <0.040         <0.016         <0.032         <0.027         <0.058         <0.027         3           <0.039	<0.047         <0.027         <0.040         <0.016         <0.032         <0.027         <0.027         <0.027         <0.027         <0.027         <0.027         <0.027         <0.027         <0.027         <0.027         <0.027         <0.027         <0.027         <0.027         <0.027         <0.027         <0.027         <0.027         <0.027         <0.027         <0.027         <0.027         <0.043         <0.027         <0.043         <0.027         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.044         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043<		
Q1061         Q1043         Q1053         Q1053         Q1042           Q1021         Q1048         Q1037         Q1041         Q1030         LQ1028         Q1043           Q1021         Q1048         Q1037         Q1041         Q1030         LQ1028         Q1043           Q1023         Q1030         Q1035         Q1035         Q1035         Q1043           Q1023         Q1028         Q1028         Q1033         Q1043         Q1043           Q1023         Q1028         Q1013         Q1026         Q1036         Q1034           Q1027         Q1023         Q1023         Q1013         LQ1066         Q1034           Q1027         Q1028         Q1013         Q1018         LQ1066         Q1056           Q1027         Q1022         Q1028         Q1065         Q10118         LQ1065	<0.039         <0.061         <0.043         <0.053         <0.033         <0.063         ⊥<0.033         <0.042         3           <0.048	<0.039	<0.039	<0.039	
<0.021         <0.048         <0.037         <0.041         <0.030         <0.033         <0.043           <0.023	<0.048         <0.021         <0.048         <0.037         <0.041         <0.030         <-         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.041         <0.035         <0.026         <0.043         <0.050         <0.050         <0.050         <0.050         <0.050         <0.050         <0.050         <0.050         <0.050         <0.050         <0.050         <0.054         <0.054         <0.054         <0.054         <0.054         <0.054         <0.054         <0.054         <0.054         <0.054         <0.054         <0.054         <0.055         <0.055         <0.054         <0.055         <0.055         <0.055         <0.055         <0.055         <0.055         <0.055         <0.055         <0.055         <0.055         <0.055         <0.055         <0.055         <0.055         <0.055         <0.055         <0.055         <0.055         <0.055         <0.055         <0.055         <0.055         <0.055         <0.055         <0.055         <0.055         <0.055         <0.055         <0.055         <0.055         <0.055         <0.055	<0.048         <0.021         <0.048         <0.021         <0.048         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.043         <0.050         <0.043         <0.050         <0.050         <0.050         <0.050         <0.050         <0.050         <0.050         <0.050         <0.050         <0.050         <0.050         <0.050         <0.050         <0.050         <0.054         <0.054         <0.054         <0.054         <0.054         <0.054         <0.054         <0.055         <0.056         <0.055         <0.055         <0.055         <0.055         <0.055         <0.055         <0.056         <0.065         <0.065         <0.065         <0.065         <0.065         <0.065         <0.065         <0.065         <0.065         <0.065         <0.065         <0.065         <0.065         <0.065         <0.065         <0.065         <0.065         <0.065         <0.065         <0.065         <0.065         <0.065         <0.065         <0.065         <0.065         <0.065         <0.065         <0.065         <0.065         <0.065	<0.048	<0.048	
<ul> <li>&lt;40.023 <li>&lt;0.033 <li>&lt;0.033</li> <li>&lt;0.033</li> <li>&lt;0.035</li> <li>&lt;0.033</li> <li>&lt;0.035</li> <li>&lt;0.033</li> <li>&lt;0.035</li> <li>&lt;0.031</li> <li>&lt;0.031</li> <li>&lt;0.0138</li> <li>&lt;0.056</li> <li>&lt;0.034</li> <li>&lt;0.031</li> <li>&lt;0.0108</li> <li>&lt;0.065</li> <li>&lt;0.056</li> <li>&lt;0.056</li> <li>&lt;0.056</li> <li>&lt;0.034</li> <li>&lt;0.031</li> <li>&lt;0.0108</li> <li>&lt;0.056</li> <li>&lt;0.034</li> <li>&lt;0.034</li> <li>&lt;0.031</li> <li>&lt;0.0108</li> <li>&lt;0.056</li> <li>&lt;0.034</li> <li>&lt;0.034</li> <li>&lt;0.031</li> <li>&lt;0.0108</li> <li>&lt;0.056</li> <li>&lt;0.056</li> <li>&lt;0.034</li> <li>&lt;0.056</li> <li>&lt;0.05</li></li></li></ul>	<ul> <li>&lt;0.044 <li>&lt;0.023 <li>&lt;0.033 <li>&lt;0.035 <li>&lt;0.035 <li>&lt;0.035 <li>&lt;0.035 <li>&lt;0.035 <li>&lt;0.035 <li>&lt;0.035 <li>&lt;0.035 <li>&lt;0.035 <li>&lt;0.036 <li>&lt;0.036 <li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></ul>	<ul> <li>&lt;0.044 <ul> <li>&lt;0.023 <li>&lt;0.033 <li>&lt;0.035 <li>&lt;0.036 <li>&lt;0.036 <li>&lt;0.034 <li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></ul></li></ul>	<ul> <li>&lt;0.044 <li>&lt;0.023 <li>&lt;0.033 <li>&lt;0.033 <li>&lt;0.035 <li>&lt;0.035 <li>&lt;0.035 <li>&lt;0.035 <li>&lt;0.035 <li>&lt;0.035 <li>&lt;0.035 <li>&lt;0.035 <li>&lt;0.035 <li>&lt;0.036 <li>&lt;0.033 <li>&lt;0.031 <li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></ul>	<0.044	
<0.027 $<0.022$ $<0.023$ $<0.028$ $<0.028$ $<0.028$ $<0.021$ $<0.0108$ $<0.006$ $<0.004$ $<0.005$ $<0.0018$ $<0.005$ $<0.005$ $<0.0018$ $<0.005$ $<0.005$ $<0.0018$ $<0.005$ $<0.005$ $<0.0018$ $<0.005$ $<0.005$ $<0.0018$ $<0.005$ $<0.005$ $<0.0018$ $<0.005$ $<0.0018$ $<0.005$ $<0.0018$ $<0.005$ $<0.0018$ $<0.005$ $<0.0018$ $<0.005$ $<0.0018$ $<0.005$ $<0.0018$ $<0.005$ $<0.0018$ $<0.005$ $<0.0018$ $<0.005$ $<0.0018$ $<0.005$ $<0.0018$ $<0.005$ $<0.0018$ $<0.005$ $<0.0018$ $<0.005$ $<0.0018$ $<0.005$ $<0.0018$ $<0.005$ $<0.0018$ $<0.005$ $<0.0018$ $<0.005$ $<0.0018$ $<0.005$ $<0.0018$ $<0.005$ $<0.0018$ $<0.005$ $<0.005$ $<0.0018$ $<0.005$ $<0.005$ $<0.0018$ $<0.005$ $<0.005$ $<0.0018$ $<0.005$ $<0.0018$ $<0.005$ $<0.0018$ $<0.005$ $<0.005$ $<0.0018$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.005$ $<0.00$	<ul> <li><a block<="" p=""> </a></li> <li><a block<="" p=""> <li><a block<="" p=""> </a></li> </a></li>     &lt;</a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></ul>		$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	
CU1.027 CU1.052 CU1.028 CU1.05 CU1.051 CU1.018 LCU1.062 CU1.021 CU1.052 CU1.028 CU1.052 CU1.051 CU1.018	40.068 <10.27 <10.052 <10.028 <10.053 <10.051 <10.018 ±<0.065 <10.069 <10.008 <0.062 <10.036 <10.063 <10.029 <10.031 <10.065 <10.065	$< 0.068$ $< 0.027$ $< 0.052$ $< 0.028$ $< 0.063$ $< 0.018$ $\rightarrow -0.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$ $< 40.065$	<a displ<="" display="display=" href="display=" td=""><td><ul> <li><ul> <li><ul> <li><li><li><li><li><li><li><li><li><li><li< td=""></li<></li></li></li></li></li></li></li></li></li></li></ul></li></ul></li></ul></td></a>	<ul> <li><ul> <li><ul> <li><li><li><li><li><li><li><li><li><li><li< td=""></li<></li></li></li></li></li></li></li></li></li></li></ul></li></ul></li></ul>	
		Hection time during Weeks 16 and 17. Volume insufficient for statistical analysis for Week 16 and data is for INFO	llection time during Weeks 16 and 17. Volume insufficient for statistical analysis for Week 16 and data is for INFO	The Elapsed Time Mercon the of sample.	

Table 8-4 Radioiodine in Air 1st-2nd Quarter

				-	<b>ODCM</b> required samples denoted by *	uired samp	oles denot	ed by "					
						units are pCi/m <sup>3</sup>	Ci/m <sup>3</sup>						
				(control)			required LLD <0.070	010					
	START	STOP	Site	Site	Site	Site	Site	Site	Site	Site	Site	Site	
Week#	DALE	DALE	4	*V9	AT 1	14A"	15"	A/1	17	-67	35	40*	TNote
27	61-Inf-1	9-Jul-19	<0.019	<0.024	<0.036	<0.020	<0.042	<070.0>	<0.037	670.0>	<0.019	4cu.u>	
28	9-Jul-19	16-Jul-19	<0.028	<0.023	<0.045	<0.030	<0.052	<0.030	<0.036	<0.023	<0.030	<0.015	5
29	16-Jul-19	23-Jul-19	<0.031	<0.028	<0.021	<0.033	<0.027	<0.022	<0.022	<0.006	<0.027	<0.031	
30	23-Jul-19	30-Jul-19	<0.034	<0.027	<0.037	<0.023	<0.059	<0.031	<0.045	<0.036	<0.023	<0.035	
31	30-Jul-19	6-Aug-19	<0.036	<0.023	<0.046	<0.007	<0.051	<0.027	<0.037	<0.028	<0.018	<0.036	
32	6-Aug-19	13-Aug-19	<0.022	<0.017	<0.033	<0.027	<0.067	<0.033	<0.053	<0.021	<0.017	<0.012	
33	13-Aug-19	20-Aug-19	<0.032	1<0.058	<0.023	<0.038	<0.007	<0.026	<0.034	<0.029	<0.030	<0.030	9
34	20-Aug-19	27-Aug-19	<0.022	<0.025	<0.026	<0.027	<0.017	<0.028	<0.025	<0.025	<0.022	<0.021	7
35	27-Aug-19	3-Sep-19	<0.026	<0.021	<0.032	<0.025	<0.031	<0.017	<0.023	<0.022	<0.018	<0.031	
36	3-Sep-19	10-Sep-19	<0.023	<0.022	<0.029	<0.032	<0.030	<0.023	<0.031	<0.032	<0.030	<0.034	
37	10-Sep-19	17-Sep-19	<0.017	<0.034	<0.017	<0.017	<0.025	<0.017	<0.022	<0.017	<0.025	<0.021	
38	17-Sep-19	24-Sep-19	<0.036	<0.017	<0.045	<0.026	<0.057	<0.020	<0.059	<0.028	<0.028	<0.035	
39	24-Sep-19	1-Oct-19	<0.023	<0.026	<0.027	<0.026	<0.031	<0.022	<0.032	<0.031	<0.036	<0.024	
				-	ODCM required samples denoted by *	uired samp	oles de not	ed by *					
						units are pCi/m	Ci/m						
				(control)		requ	required LLD <0.070	070					
	START	STOP	Site	Site	Site	Site	Site	Site	Site	Site	Site	Site	
Week #	DATE	DATE	4	6A*	7A	14A*	15*	17A	21	29*	35	40*	<b>→Note</b>
40	1-Oct-19	8-Oct-19	<0.033	<0.027	<0.012	<0.017	<0.041	<0.026	<0.012	<0.025	<0.025	<0.022	
41	8-Oct-19	15-Oct-19	<0.019	<0.022	<0.052	<0.007	<0.051	<0.033	<0.036	<0.023	<0.023	<0.057	
42	15-Oct-19	22-Oct-19	<0.032	<0.032	<0.013	<0.018	<0.044	<0.036	<0.050	<0.028	<0.023	<0.036	
43	22-Oct-19	30-Oct-19	<0.027	<0.022	<0.022	<0.032	<0.024	<0.034	<0.030	<0.027	<0.022	<0.032	
44	30-Oct-19	5-Nov-19	<0.020	<0.047	<0.035	<0.027	<0.014	<0.029	<0.031	1≤0.048	<0.029	<0.028	00
45	5-Nov-19	12-Nov-19	<0.028	<0.036	<0.027	<0.039	<0.029	<0.031	<0.027	4	<0.035	<0.043	6
46	12-Nov-19	19-Nov-19	<0.029	<0.033	<0.028	<0.017	<0.035	<0.017	<0.031	<0.022	<0.033	<0:030	
47	19-Nov-19	25-Nov-19	<0.032	<0.007	<0.054	<0.028	<0.054	<0.032	<0.056	<0.035	<0.025	<0.049	
48	25-Nov-19	3-Dec-19	<0.020	<0.023	<0.046	<0.015	<0.050	<0.031	<0.039	<0.023	≪0.028	<0:030	
49	3-Dec-19	10-Dec-19	<0.025	<0.027	<0.042	<0.032	<0.054	<0.031	<0.033	<0.043	<0.021	<0.012	
50	10-Dec-19	17-Dec-19	<0.030	<0.016	<0.041	<0.031	<0.040	<0.017	<0.046	<0.024	<0.006	<0.026	
51	17-Dec-19	23-Dec-19	<0.031	<0.038	<0.035	<0.031	<0.050	<0.031	<0.028	<0.045	<0.042	<0.028	
52	23-Dec-19	30-Dec-19	<0.043	<0.053	<0.015	<0.038	<0.042	<0.042	<0.015	<0.037	<0.067	<0.038	
	Note 8: Site 29 experience pump failure and volume could not be estimated. Sample is INVALID and data is for INFO ON	Note 8: Site 29 experience pump failure and volume could not be estimated. Sample is INVALID and data is for INFO ONLY. CR 19-16553	mp failure at	nd volume co	uld not be est	imated. Samp	ole is INVAL	ID and data	is for INFO O	NLY. CR 19-1	6553		

Table 8-5 Radioiodine in Air 3rd-4th Quarter

		VEGETATION				
	ODCM m	quired samples de	noted by	*		
		inits are pCi/kg, w	-			
	,	inte are perkg, we				
		DATE				
LOCATION	TYPE	COLLECTED	I-131	Cs-134	Cs-137	Note
Locarion	Lettuce	17-Jan-19	<9	<17	<49	
LOCAL	Lettuce	14-Feb-19	<57	<45	<64	
RESIDENCE	Hybrid Lettuce	21-Mar-19	<44	<58	<76	
(Site #47)*	Lettuce	17-Apr-19	<32	<55	<62	
(0110 111)	Lettuce	17-May-19	<57	<46	<57	
	Lettuce	21-Jun-19	<54	<51	<56	
	Lettuce	19-Jul-19	<54	<37	<66	
	Spinach	22-Aug-19	<55	<59	<78	
	Spinden	No Sample Avai			10	
		No Sample Ava				
		No Sample Avai				
	Lettuce	19-Dec-19	<53	<49	<52	
	Arugula	17-Jan-19	<36	< 8	<41	
	Spring Mix	17-Jan-19	<35	<45	<50	
	Kale	17-Jan-19	<41	<12	<57	
	Spring Mix	28-Feb-19	<32	<35	<60	
	Red Oak Lettuce	21-Mar-19	<49	<52	<49	
	Spinach	21-Mar-19	<44	<43	<46	
COMMERCIAL		21-Mar-19	<36	<41	<49	
FARM	Kale	17-Apr-19	<41	<52	<42	
(Site #62)*	Spinach	17-Apr-19	<36	<28	<45	
(Site #02)	Spring Mix	17-Apr-19	<31	<35	<29	
	Spring with	No Sample A				
		No Sample A				
		No Sample A				
		No Sample Av				
		No Sample Avai		-		
	Green Romaine	24-Oct-19	<43	<40	<74	
	Red Romaine	24-Oct-19	<43	<47	<36	
	Arugula	24-Oct-19	<45	<53	<77	
	Spring Mix	26-Nov-19	<46	<48	<53	
	Spinach	26-Nov-19	<56	<55	<48	
	Tatsoi	26-Nov-19	<28	<11	<36	
	Lettuce	19-Dec-19	<45	<27	<40	
	Spring Mix	19-Dec-19	<35	<38	<61	
		No Sample Av	ailable - Ja	anuary		
		No Sample Ava	ailable - Fe	bruary		
		No Sample Av				
		So Sample A				
LOCAL	Lettuce	17-May-19	<35	<27	<49	
RESIDENCE	Chard	21-Jun-19	<47	<51	<66	
(Site #51)	Lettuce	19-Jul-19	<54	<57	<56	
(2000 1102)		No Sample Av		-		
		No Sample Avai				
		No Sample Ave				
		No Sample Ava No Sample Ava				
		No Sample Ava	naule - De	Centoer		

# **Table 8-6 Vegetation**

Table	8-7	Milk
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	ODCM requ	ired san	nples deno	oted by *			
	-		oCi/liter				
SAMPLE	DATE						
LOCATION	COLLECTED	I-131	Cs-134	Cs-137	Ba-140	La-140	⊥Note
	18-Jan-19	<1	<1	<0.8	<3	<9	1
Local Resident			ebruary- No	-			
Goats	22-Mar-19	<1	<1	<1	<3	<1	
(Site #51)*			April- No S		ailable		
	17-May-19	<1	<1	<1	<4	<1	
	27-Jun-19	<1	<1	<1	<3	<1	3
	19-Jul-19	<1	<1	<1	<3	<1	
	23-Aug-19	<1	<1	<1	<3	<1	
			ptember- N	-			
			ctober- No	-			
			ovember- N	-			
		the second s	ecember- N		the second s		
			anuary- No	-			
	22-Feb-19	<1	<1	<1	<3	<1	2
	28-Mar-19	<1	<1	<1	$\triangleleft$	<1	
Local Resident	25-Apr-19	<1	<1	<1	<3	<1	
Goats	30-May-19	<1	<1	<1	<3	<1	
(Site #53)*	27-Jun-19	<1	<1	<1	$\triangleleft$	<1	
	25-Jul-19	<1	<1	<1	<3	<1	
	22-Aug-19	<1	<1	<1	<3	<1	
	26-Sep-19 24-Oct-19	<1 <1	<1 <1	<1 <1	<4	<1 <1	
	24-Oct-19 22-Nov-19	<1	<1 <1	<1	<3 <3	<1	
	26-Dec-19	<1	<1	<1	<3	<1	
T ID II (	10-Jan-19 07-Feb-19	<1 <1	<1 <1	<1 <1	$\triangleleft$	<1 <1	
Local Resident Goats	14-Mar-19	<1	<1	<1 <1	<2 <2	<1	
(Site #54)*	11-Apr-19	<1	<1	<1	$\triangleleft$	<1	
(5110 #54)*	09-May-19	<1	<1	<1	$\triangleleft$	<1	
	13-Jun-19	<1	<1	<1	$\triangleleft$	<1	
	12-Jul-19	<1	<1	<1	$\triangleleft$	<1	
	15-Aug-19	<1	<1	<1	$\triangleleft$	<1	
	13-Sep-19	<1	<1	<1	$\triangleleft$	<1	
	11-Oct-19	<1	<1	<1	<3	<1	
	15-Nov-19	<1	<1	<1	<3	<1	
	20-Dec-19	<1	<1	<1	<3	<1	
	Note 1: Sample rec	and the second diversion in the second					
	Note 2: Initial sam		-		-		D met.
	Initial missed LLD				-	-	
	Note 3: Initial sam	-	-			-	
	Initial missed LLD	document	ted via CR 1	9-09506. F	le-sampled	results repor	ted.

**Table 8-8 Drinking Water** 

					°	ODCM required samples denoted by *	puired s	amples	denote	d by *						
						_	Inus ar	units are pei/liter	ter							
SAMPLE	MONTH ENDPOINT	Mn-54	Co-58	Fe-59	C0-60	Zn-65 Nb-95	Nb-95	Zr-95	F-131 (	Zr-95 I-131 Cs-134 Cs-137	Cs-137	Ba-140	La-140	Qtrly Tritium	Gross Beta	Note
	29-Jan-19	<12	<12	<19	<13	54	<15	\$2	11	11	<13	36	<14		<2.95	
	26-Feb-19	8	6	<17	8	<19	6	<19	8	8	<10	33	<14		<2.75	
	26-Mar-19	⊲11	<12	<24	<12	<15	<11	\$3	<12	<11	<12	<43	Ŷ	319	6.82±1.75	
	30-Apr-19	8	Ŷ	<18	<10	<20	<11	<16	8	8	<10	28	<10		5.16±1.78	
LOCAL	28-May-19	6	6	<17	4	<14	Ŷ	<15	$\nabla$	8	Ŷ	⊲24	<15		3.11±1.81	
RESIDENCE	25-Jun-19	<12	<10	<17	<10	$\Diamond 1$	<10	<17	\$	\$	<11	33	<13	<333	<2.99	
(Site #48) *	30-Jul-19	$\heartsuit$	$\heartsuit$	9	$\heartsuit$	9	$\heartsuit$	$\Diamond$	8	8	6	<14	<15		2.73	1
	27-Aug-19	$\bigtriangledown$	$\bigtriangledown$	<13	$\bigtriangledown$	<12	$\nabla$	<14	Ø	8	Ŷ	~26	<15		<2.83	
	24-Sep-19	6	<10	$\mathcal{Q}_1$	<11	$\mathcal{Q}_1$	<11	<16	8	6	<12	32	<11	<339	<2.78	
	29-Oct-19	<12	<12	<25	$\checkmark$	22	<13	<19	<11	8	<12	₫1	<12		2.77	
	25-Nov-19	<10	<10	<18	$\bigtriangledown$	<18	<10	<17	\$	8	<11	30	<13		4.82±1.74	
	30-Dec-19	<11	8	<22	6>	<19	6>	<18	\$	\$	<10	30	8	<337	<2.93	
	29-Jan-19	<10	Ø	<18	6	<18	11	<17	Ø	ø	<10	33	6		<2.75	
	26-Feb-19	<10	<10	<16	\$	<18	8	<15	\$	¢	6	⊲1	<15		5.01±1.71	
	26-Mar-19	6	$\bigtriangledown$	<20	Ŷ	<19	<10	<16	<10	8	8	<29	<14	319	8.75±1.76	
	30-Apr-19	<10	8	~20	<11	\$	8	<17	°	8	$\bigtriangledown$	36	<12		4.99±1.68	
LOCAL	28-May-19	Ŷ	<10	<19	$\checkmark$	₩	8	<15	8	$\bigtriangledown$	6	<29	<15		4.85±1.68	
RESIDENCE	25-Jun-19	$\bigtriangledown$	<11	<18	Ŷ	\$	6	<17	8	8	Ŷ	<29	Ŷ	<335	3.66±1.71	
(Site #55)	30-Jul-19	<12	<11	<26	<14	<29	<13	$\langle 2 \rangle$	<10	8	<15	<43	<12		4.67±1.69	
	27-Aug-19	9	99	<12	95	<12	9	<13	$\nabla$	4	90	<b>∆</b> 1	<15		3.30±1.69	
	24-Sep-19	<11	8	~20	<10	$\overline{\mathbf{a}}$	<11	<17	6	<10	<12	32	6	<336	4.30±1.69	
	29-Oct-19	6	Ŷ	<17	6	<17	Ŷ	<14	Ŷ	8	Ø	<29	<13		4.69±1.71	
	19-Nov-19	$\overline{\nabla}$	$\overline{\nabla}$	0	$\overline{\nabla}$	$\Diamond$	$\overline{\nabla}$	$\Diamond$	0	$\nabla$	$\overline{\nabla}$	8	<46	<338	6.31±1.67	2
	30-Dec-19				**	**NO SAMPLE	MPLE		AVAILABLE**	,E**						3
	Note 1: Site 48 Initial analysis had detectable Fe-50 (8.42 pCi/L) ± 5 pCi/L). Per procedure, sample reanalyzed to confirm; reanalysis had no	8 Initial	unalysis h	ad detect	able Fe-5	0 (8.42]	Ci/L ±	: 5 pCi	(L). Pe	er proce	dure, sar	nple reana	lyzed to co	nfirm; real	nalysis had no	
	detectable Fe-59.	-59. Re	Recount anal	lysis resu	lts reporte	d. Som	e LLD	s lowe	r than	typical,	to achiev	ve all requi	red LLDs.	This is NC	lysis results reported. Some LLDs lower than typical, to achieve all required LLDs. This is NOT considered an	an
	"abnormal event."	ent."	our long h	als in som	and and	ind acce	1	411 d and		I amoid	0 110 -0	T I Postino	and bee 0	and mode and	and MDA for	
	row z. Six 22 russed must week in samping period, resuming in maniny to achieve datave reduced data rower man sprear reder outer radionuclides. CR 19-17770	CR 19-	17770		nod Sumdu	lou, tou	n Sunn		ty to a		1011-0-	nn na imh		כו עומוו ואף		OUICI
	Note 3: No Sample available for the Site 55 for the month of December due to pump failure.	umple av	ailable for	the Site	55 for the	month	of Dec	ember	due to	dund (		CR 20-00862	62			

						ODCM required samples denoted by *	mireds	amnes	denote	Hw*						
					)		units are pCi/liter	e pCi/lit	ter	2						
SAMPLE	MONTH	Mn-54	Co-58	Fe-59	Co-60	Zn-65 Nb-95	Nb-95	Zr-95 I-131		Cs-134 Cs-137	Cs-137	Ba-140	La-140	Qtrly Tritium	Gross Beta	Note
	29-Jan-19	<10	Ø	<18	Ø	Q	11	8	Ŷ	Ŷ	₽	31	<12		<2.70	
	26-Feb-19	<12	<11	$\Diamond$	<12	\$	<13	<16	<10	%	<10	30	<14		<2.50	
	26-Mar-19	Ŷ	8	<10	4	<11	\$	<10	99	$\Diamond$	8	<18	<13	317	5.44±1.62	
	30-Apr-19	6	6	~20	Ŷ	<19	Ŷ	<17	$\bigtriangledown$	\$	<10	32	<15		3.93±1.62	
	28-May-19	<11	<10	$\Diamond 4$	<12	$\Diamond$	<14	<19	<11	<10	<15	37	<13		2.82±1.64	
LOCAL	25-Jun-19	<10	6	21	<12	25	<10	<18	\$	8	<13	$\Im$	<14	<330	2.62	
RESIDENCE	30-Jul-19	<10	<11	<15	$\bigtriangledown$	~20	<12	<16	Ŷ	$\bigtriangledown$	<11	⊲5	<13		<2.58	
(Site #46) *	27-Aug-19	99	8	$\triangleleft 11$	99	<11	\$	<11	8	8	8	⊴0	<15		<2.67	
	24-Sep-19	<10	<10	20	8	$\bigcirc$	99	<15	Ø	8	<10	727	<11	<337	2.72±1.63	
	29-Oct-19	8	<11	<15	8	000	<13	<18	6	<10	<11	34	<10		3.28±1.67	
	25-Nov-19	<11	Ŷ	$\triangleleft 0$	$\bigtriangledown$	$\swarrow$	<10	<18	\$	8	<10	30	<12		4.96±1.60	
	30-Dec-19	<15	<11	<19	$\checkmark$	~27	<12	<20	<12	<10	<11	⊲5	<14	<334	-2.71	
	29-Jan-19	<13	<10	<29	<10	25	<15	<17	<11	<12	<14	<39	4		<2.67	
	26-Feb-19	99	%	<13	8	<15	$\nabla$	<11	$\nabla$	8	99	⊲24	<14		~2.50	
	26-Mar-19	99	Ŷ	<12	V	<11	\$	8	8	4	99	<19	<11	317	~2.36	
	30-Apr-19	<10	Ŷ	<18	99	$\langle 2 \rangle$	<11	<15	<11	\$	<10	34	<13		~2.45	
	28-May-19	$\bigtriangledown$	Ŷ	<15	Ŷ	<12	<10	<16		\$	$\nabla$	25	<15		2.53	
LOCAL	25-Jun-19	<10	Ø	$\Diamond$	6	<17	Ŷ	<18	<10	\$	<10	⊴1	<15	<330	<2.69	
RESIDENCE	30-Jul-19	<12	<10	<15	Ŷ	$\sim 00$	<11	<17	6	$\bigtriangledown$	Ŷ	30	<14		2.52	
(Site #49) *	27-Aug-19	Ŷ	Ŷ	<10	$\Im$	<11	4	<10	8	$\heartsuit$	$\Im$	<17	<14		2.55	
	24-Sep-19	8	<11	<18	<12	<19	11	<15	\$	Ŷ	Ø	-24	<12	<337	~2.50	
	29-Oct-19	<11	<12	\$	<10	$\Diamond$	<14	8	<12	Ø	<12	38	<14		2.54	
	25-Nov-19	<10	<11	20	Ŷ	$\overline{\mathbf{Q}}$	<10	<19	\$	6	Ø	26	<15		2.33	
	30-Dec-19	<10	<10	<19	<11	\$	<10	<18	\$	<10	<12	32	<10	<330	2.65	

Table 8-8 Drinking Water (Continued)

				ODCM required samples denoted by * units are pCi/liter	upar 1	quired samples de units are pCi/liter	pCi/li	denot	ed by	*					
SAMPLE	DATE														
LOCATION	COLLECTED	Mn-54	C0-58	Fe-59	C0-60	Fe-59 Co-60 Zn-65 Nb-95 Zr-95 I-131 Cs-134	Nb-95	Zr-95	-131 (	Cs-134	Cs-137	Ba-140	La-140	Ba-140 La-140 Tritium	Notes
	29-Jan-19	Ø	<10	8	<10	25	<12	<19	11	6	<10	35	<15	<339	
WELL 27ddc	30-Apr-19	<12	<12	8	8	20	<13	22	\$	<10	<12	35	<12	<326	
(Site #57)*	30-Jul-19	<10	6∕	20	$\bigtriangledown$	23	Ŷ	<16	%	$\bigtriangledown$	Ŷ	$\mathcal{A}_{8}$	<13	<345	
	29-Oct-19	Ŷ	8	<16	6>	<17	6>	<13	$\bigtriangledown$	$\sim$	%	<22	<14	<342	
	29-Jan-19							Out	Out of Service	vice					
WELL 34abb	30-Apr-19							Out	Out of Service	vice					
(Site #58)*	30-Jul-19							Out	Out of Service	vice					
	29-Oct-19							Out	Out of Service	vice					
	29-Jan-19	Ŷ	Ŷ	<19	<10	<18	<10	<16	6	ø	*	~28	<13	<335	
Well 34aab	30-Apr-19	<12	<11	22	<11	23	<13	22	11	6	<12	37	<12	<325	
(Site #65)*	30-Jul-19	Ŷ	Ŷ	<15	Ŷ	20	6	<14	%	$\bigtriangledown$	6	25	<15	<351	
	29-Oct-20	%	$\checkmark$	<14	Ŷ	<15	<10	<11	$\bigtriangledown$	99	$\bigtriangledown$	\$2	<13	<331	
	29-Jan-19	6	Ŷ	<18	Ŷ	<18	<10	<15	%	6>	6	27	<15	<336	
Well 27dcb	30-Apr-19	<11	<10	$\Delta 1$	<11	25	<12	<18	%	≤11	<13	37	<15	<326	
(Site #58A)	30-Jul-19	<11	<11	<18	$\nabla$	20	6	<17	<10	$\nabla$	6	₩ 2	√]	⊲347	
	29-Oct-19	<10	<13	<24	<10	⊴20	<15	<17	<10	6>	<13	31	<14	⊲341	

**Table 8-9 Groundwater** 

SAMPLE         DATE           LOCATION         DATE           LOCATION         COLLECTED         Mn-54           45 ACRE         29-Jan-19         <10           45 ACRE         30-Jul-19         <9           85 ACRE         30-Jul-19         <9           9         (Site #60) *         29-Jan-19         <9           9         29-Jan-19         <9         <9           9         29-Jan-19         <9         <9           9         30-Jul-19         <13         <9           9         30-Jul-19         <13         <9           9         30-Apr-19         <13         <9           9         30-Apr-19         <13	Co-58         Fe-59           <10         <14           <10         <14           <10         <20           <11         <24           <11         <24           <11         <24           <11         <24           <11         <28           <11         <28           <11         <18           <11         <18           <11         <18           <11         <18           <11         <18           <11         <18           <11         <18           <11         <18           <11         <18           <11         <18           <11         <18           <11         <18           <11         <18           <11         <18           <11         <18           <11         <18           <11         <18           <11         <18           <11         <18           <11         <18           <11         <18           <11         <18           <11         <18           <11 </th <th></th> <th>o-60         Zn-65           &lt;10         &lt;18           &lt;10         &lt;18           &lt;8         &lt;24           &lt;8         &lt;24           &lt;9         &lt;24           &lt;9         &lt;21           &lt;9         &lt;22           &lt;9         &lt;22           &lt;9         &lt;25           &lt;10         &lt;27           &lt;9         &lt;25           &lt;10         &lt;27           &lt;9         &lt;25           &lt;10         &lt;26           &lt;9         &lt;26           &lt;9         &lt;26           &lt;9         &lt;26           &lt;9         &lt;26           &lt;10         &lt;26           &lt;11         &lt;24           &lt;9         &lt;26           &lt;9         &lt;26           &lt;11         &lt;24           &lt;11         &lt;24</th> <th>Zn-65         Nb-95         Zr-95         I-131           &lt;18         &lt;11         &lt;19         13±10           &lt;22         &lt;11         &lt;16         &lt;9           &lt;24         &lt;9         &lt;15         &lt;10           ample. Reservoir Empty for Repairs.         &lt;2         &lt;11         &lt;16           &lt;23         &lt;11         &lt;17         &lt;10           &lt;13         &lt;20         &lt;9         &lt;14         16±9           &lt;23         &lt;11         &lt;17         &lt;10         &lt;20         &lt;9           &lt;17         &lt;11         &lt;17         &lt;10         &lt;20         &lt;9         &lt;21         &lt;10         &lt;22         &lt;11         &lt;10         &lt;12         &lt;21         &lt;21         &lt;10         &lt;22         &lt;11         &lt;10         &lt;12         &lt;21         &lt;10         &lt;22         &lt;11         &lt;10         &lt;12         &lt;21         &lt;21         &lt;21         &lt;21<th>Zr-95         I           &lt;19         1           &lt;19         1           &lt;15         &lt;16           &lt;16         &lt;16           &lt;17         &lt;17           &lt;19         &lt;16           &lt;14         1           &lt;17         &lt;17           &lt;17         1           &lt;17         1           &lt;17         &lt;17           &lt;17         1           &lt;17         &lt;17           &lt;17         1           &lt;17         &lt;17           &lt;18         &lt;17           &lt;17         &lt;17           &lt;18         &lt;17           &lt;17         &lt;17</th><th></th><th><math display="block">\begin{array}{c c c c c c c c c c c c c c c c c c c </math></th><th><b>37 Ba-14</b> 36 33 33 33 31 31 31 31 31 31 31</th><th>0 La-140 &lt;12 &lt;13 &lt;13 &lt;13 &lt;13 &lt;13 &lt;13 &lt;13 &lt;13 &lt;13 &lt;13</th><th><b>Tritium</b> ⊲339 ⊲350 ⊲356</th><th>Notes</th></th>		o-60         Zn-65           <10         <18           <10         <18           <8         <24           <8         <24           <9         <24           <9         <21           <9         <22           <9         <22           <9         <25           <10         <27           <9         <25           <10         <27           <9         <25           <10         <26           <9         <26           <9         <26           <9         <26           <9         <26           <10         <26           <11         <24           <9         <26           <9         <26           <11         <24           <11         <24           <11         <24           <11         <24           <11         <24           <11         <24           <11         <24           <11         <24	Zn-65         Nb-95         Zr-95         I-131           <18         <11         <19         13±10           <22         <11         <16         <9           <24         <9         <15         <10           ample. Reservoir Empty for Repairs.         <2         <11         <16           <23         <11         <17         <10           <13         <20         <9         <14         16±9           <23         <11         <17         <10         <20         <9           <17         <11         <17         <10         <20         <9         <21         <10         <21         <10         <21         <10         <21         <10         <21         <10         <21         <10         <21         <10         <21         <10         <21         <10         <21         <10         <21         <10         <21         <10         <21         <10         <22         <11         <10         <12         <21         <21         <10         <22         <11         <10         <12         <21         <10         <22         <11         <10         <12         <21         <21         <21         <21 <th>Zr-95         I           &lt;19         1           &lt;19         1           &lt;15         &lt;16           &lt;16         &lt;16           &lt;17         &lt;17           &lt;19         &lt;16           &lt;14         1           &lt;17         &lt;17           &lt;17         1           &lt;17         1           &lt;17         &lt;17           &lt;17         1           &lt;17         &lt;17           &lt;17         1           &lt;17         &lt;17           &lt;18         &lt;17           &lt;17         &lt;17           &lt;18         &lt;17           &lt;17         &lt;17</th> <th></th> <th><math display="block">\begin{array}{c c c c c c c c c c c c c c c c c c c </math></th> <th><b>37 Ba-14</b> 36 33 33 33 31 31 31 31 31 31 31</th> <th>0 La-140 &lt;12 &lt;13 &lt;13 &lt;13 &lt;13 &lt;13 &lt;13 &lt;13 &lt;13 &lt;13 &lt;13</th> <th><b>Tritium</b> ⊲339 ⊲350 ⊲356</th> <th>Notes</th>	Zr-95         I           <19         1           <19         1           <15         <16           <16         <16           <17         <17           <19         <16           <14         1           <17         <17           <17         1           <17         1           <17         <17           <17         1           <17         <17           <17         1           <17         <17           <17         <17           <17         <17           <17         <17           <17         <17           <17         <17           <17         <17           <17         <17           <17         <17           <17         <17           <17         <17           <17         <17           <17         <17           <17         <17           <17         <17           <18         <17           <17         <17           <18         <17           <17         <17		$\begin{array}{c c c c c c c c c c c c c c c c c c c $	<b>37 Ba-14</b> 36 33 33 33 31 31 31 31 31 31 31	0 La-140 <12 <13 <13 <13 <13 <13 <13 <13 <13 <13 <13	<b>Tritium</b> ⊲339 ⊲350 ⊲356	Notes
29-Jan-19 <10 30-Apr-19 <9 30-Jul-19 <9 30-Apr-19 <9 30-Jul-19 <9 29-Jan-19 <9 29-Jan-19 <9 29-Jan-19 <13 29-Jan-19 <13 29-Jan-19 <13 29-Oct-19 <13 29-Apr-19 <10				<ul> <li><li><li><li><li><li><li><li><li><li></li></li></li></li></li></li></li></li></li></li></ul>	<ul> <li>&lt;19</li> <li>&lt;19</li> <li>&lt;16</li> <li>&lt;16</li> <li>&lt;14</li> <li>&lt;14</li> <li>&lt;14</li> <li>&lt;14</li> <li>&lt;14</li> <li>&lt;16</li> <li>&lt;16</li> <li>&lt;16</li> <li>&lt;16</li> <li>&lt;16</li> <li>&lt;16</li> <li>&lt;17</li> <li>&lt;18</li> <li>&lt;18</li> <li>&lt;19</li> <li>&lt;10</li> <li>&lt;10</li> <li>&lt;11</li> <li>&lt;17</li> <li>&lt;17</li> <li>&lt;18</li> <li>&lt;18</li> <li>&lt;19</li> <li>&lt;19</li> <li>&lt;10</li> <li>&lt;10</li> <li>&lt;11</li> <li>&lt;11</li></ul>	$\begin{array}{c c c c c c c c c c c c c c c c c c c $		50 50 57 53 53 58 58 50 50 57 59 59 59 59 50 50 50 50 50 50 50 50 50 50 50 50 50	⊗     1     3     3     1     1       ⊗     1     1     3     3     1     1	<ul><li>339</li><li>350</li><li>336</li></ul>	
30-Apr-19 30-Jul-19 30-Apr-19 30-Apr-19 30-Jul-19 29-Jan-19 29-Jan-19 29-Jan-19 29-Jan-19 30-Apr-19 30-Apr-19		$ \begin{array}{c} & \otimes & \otimes \\ & \otimes & \otimes & \otimes \\ & \otimes & \otimes & \otimes \\ & \otimes & \otimes$		<ul> <li>&lt; 9 <li>\$ &lt; 9 <li>\$ &lt; 9 <li>\$ &lt; 13 <li>\$ &lt; 11 </li> <li>\$ &lt; 10 </li> <li>\$ &lt; &lt; 10 </li> <li>\$ &lt; &lt; 10 </li> <li>\$ &lt; &lt;</li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></li></ul>	<16 <15 <15 <15 <14 <14 <14 <14 <117 <14 <117 <16 <16 <16 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <18 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <17 <18 <17 <17 <17 <18 <18 <19 <19 <19 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <11 <th>○         ○</th> <th></th> <th></th> <th></th> <th><ul><li>328</li><li>350</li><li>336</li></ul></th> <th></th>	○         ○				<ul><li>328</li><li>350</li><li>336</li></ul>	
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┝			l**	No Influen	it Since La	**No Influent Since Last Sample**					
EVAP POND 2			[**	No Influen	it Since La	**No Influent Since Last Sample**					
(Site #63) *CELL			L**	No Influen	it Since La	**No Influent Since Last Sample**					
2A 29-Oct-19 <11	<10 <26	<11	<24	<13 <	<16 <10	6 0	<10	31	<11	881±210	
				No Influen	it Since La	t Samp					
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CELL 2B 30-Jul-19 <8	<9 <17	<10	24	6	<18	₽	7 <10	\$	8	542±216	
			L**	No Influen	it Since La	**No Influent Since Last Sample**					
			**	No Influen	it Since La	**No Influent Since Last Sample**					
EVAP POND 3			**	No Influen	it Since La	**No Influent Since Last Sample**					
(Site #64) *CELL			**	No Influen	tt Since La	**No Influent Since Last Sample**					
3A 20-0ct-10 <10	<10 <25	<12	00	<10	<17	%	7 41+0	000	\$	430+204	
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		1				adune ree	,				
30-Jul-19 <13	<11 <27	<12	0℃	<10	<18	₹ ¢	<9 <12	\$4	<12	343	
			L**	No Influen	it Since La	**No Influent Since Last Sample**					
Note 1: Recounted. Results	Results averaged and reported.	reported.									
Note 2: Duplicate sample taken. Results reported are averaged.	en. Results rej	ported are a	veraged.								

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(Continued)
Water
Surface
8-10
Table

				0	DCM re	ODCM required samples denoted by *	mples d	enoted	by *						
SAMPLE	DATE					unus are polymer	brinne	_							
LOCATION	TED	Mn-54	Co-58 Fe-59	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	Cs-134 Cs-137 Ba-140 La-140	Tritium	Notes
	8-Jan-19	$\bigtriangledown$	%	<16	9	<18	%	<11	ø	9>	9>	62	<14		
	15-Jan-19	%	<10	<16	%	22	Ŷ	<12	<11	$\bigtriangledown$	6	<27	<15		
	22-Jan-19	<13	<13	<20	<12	$\mathbf{A}_{8}$	<12	$\triangleleft$ 1	19±10	<13	<16	32	<11		
	29-Jan-19	<10	<10	$\Diamond$ 1	<11	\$3	<11	<12	31±11	60	6>	$\Im$	<10	<353	
	5-Feb-19	Ŷ	$\bigtriangledown$	<19	<11	<19	Ŷ	<15	18±7	6>	$\nabla$	87	<15		
	12-Feb-19	<10	\$	22	Ŷ	<16	<10	<14	\$	6	%	34	<15		
	19-Feb-19	6	6>	<13	<10	<20	<10	<15	7±9	Ŷ	6>	28	6>		
	26-Feb-19	<10	<10	<17	<12	⊲22	<10	<18	8±9	Ŷ	<10	30	<11	<339	
	5-Mar-19	8	Ŷ	<13	6>	<16	6	<15	13±7	9>	~	12	<13		
	12-Mar-19	<12	<12	$\Diamond$ 1	<12	30	<11	$\Diamond 1$	<14	<13	<12	33	4		
	19-Mar-19	6	Ŷ	<18	%	<24	<11	<14	9 <del>1</del> 9	$\bigtriangledown$	$\bigtriangledown$	~25	<12		
	26-Mar-19	<10	<11	$\mathcal{A}_1$	<11	<16	%	<16	<11	Ŷ	Ŷ	<29	<15	<330	
	2-Apr-19	<10	6	<17	<11	\$2	€	<15	<11	Ŷ	<10	<29	<11		
WRF	9-Apr-19	6	<10	$\sim 20$	<10	\$3	$\checkmark$	<13	<13	$\bigtriangledown$	Ŷ	32	<12		
INFLUENT	16-Apr-19					**NO SAMPLE	MPLE V	VRF OU	WRF OUTAGE**						
	23-Apr-19	<10	<10	$\mathcal{A}_1$	\$	⊲24	<12	<20	6±7	6	<10	<29	<15		
	30-Apr-19	<12	6>	<19	Ŷ	$\Diamond 1$	6	<10	<10	9>	<10	<27	<14	⊲338	
	7-May-19	8	<10	<16	Ŷ	~20	<10	<13	<10	6	<10	31	<13		
	14-May-19	6	$\bigtriangledown$	<17	<11	~20	6	<17	<12	$\bigtriangledown$	<11	<29	$\bigtriangledown$		
	21-May-19	Ŷ	Ŷ	<19	%	\$3	<10	<15	<10	\$	<10	<29	$\bigtriangledown$		
	28-May-19	<10	<10	20	\$	\$3	<10	<19	<11	Ŷ	<11	₿	<12	<330	
	4-Jun-19	6	Ŷ	22	<11	<17	<11	<16	<11	Ŷ	6	₿	<13		
	11-Jun-19	<10	6	<15	<11	<20	6>	<16	16±9	Ŷ	<11	32	$\bigtriangledown$		
	18-Jun-19	8	<10	<16	<10	<18	<10	<12	11±9	Ŷ	$\checkmark$	⊲28	<12		
	25-Jun-19	<12	6	23	%	25	<12	~20	29±11	<10	<12	34	<11	<347	
	1-Jul-19	<10	<10	<19	<10	<19	Ŷ	<17	<10	$\nabla$	6	₿	<13		
	9-Jul-19	<10	<10	<18	6	21	<10	<17	16±9	Ŷ	\$	32	<12		
	16-Jul-19	6	\$	<16	<10	$\mathcal{A}_1$	<10	<17	947	٣	<10	34	<10		
	23-Jul-19	<11	<11	<20	6	<25	<10	<12	15±8	6∕	<11	⊴28	<14		

				°	DCM re	ODCM required samples denoted by *	mples d	enoted	yy *						
SAMPLE	DATE						hourse								
LOCATION	COLLECTED Mn-54	Mn-54	Co-58 Fe-59	Fe-59	C0-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Cs-134 Cs-137 Ba-140 La-140	La-140	Tritium	Note
	30-Jul-19	6	6	<14	6	<22	6	<18	<10	65	<11	<30	<13	<363	
	6-Aug-19	Ŷ	Ŷ	<17	$\nabla$	⊲20	6	<16	<11	Ŷ	<10	⊲30	<10		
	13-Aug-19	<11	6	<17	$\sim$	<20	<10	<18	16±9	$\bigtriangledown$	<11	32	<11		
	20-Aug-19	Ŷ	6	<13	6	<19	<10	<14	21±8	6	Ŷ	26	<11		
	27-Aug-19	6	$\bigtriangledown$	<19	Ŷ	<17	<10	<13	14±9	$\nabla$	<10	727	8	<342	
	3-Sep-19	Ŷ	Ŷ	<19	<10	\$3	6>	<16	<11	8	6>	⊴28	<11		
	10-Sep-19	<10	6	~20	<10	<24	%	<16	6>	6	Ŷ	35	<10		
	17-Sep-19	Ŷ	8	<18	6>	$\mathcal{A}_{1}$	65	<15	<10	6	6∕	27	Ŷ		
	24-Sep-19	<11	<15	<b>21</b>	6>	28	<13	<19	<13	6	<12	30	<14	<345	
	1-Oct-19	<10	$\nabla$	<14	$\checkmark$	<17	<11	<17	12±9	$\bigtriangledown$	6	30	<14		
	8-Oct-19					**NO SAMPLE WRF OUTAGE**	MPLE	WRF OU	TAGE**						
	15-Oct-19					**NO SAMPLE WRF OUTAGE**	MPLE	WRF OU	TAGE**						
WRF	22-Oct-19					**NO SAMPLE WRF OUTAGE**	MPLE	WRF OU	TAGE**						
INFLUENT	29-Oct-19	Ŷ	8	<16	6	<19	6>	<12	6	$\bigtriangledown$	$\bigtriangledown$	27	<14	<342	
	5-Nov-19	<13	8	<19	6	22	<13	$\Diamond 1$	<12	<11	<13	34	<12		
	12-Nov-19	<10	<10	<19	6>	$\langle 2 \rangle$	<12	<19	<11	6	<13	28	<10		
	19-Nov-19	$\bigtriangledown$	<10	<20	Ŷ	⊲20	<10	<17	29±9	Ŷ	<10	30	°		
	25-Nov-19	<11	Ŷ	$\mathcal{A}_1$	6>	$\mathcal{Q}_1$	<10	<16	<10	$\nabla$	Ŷ	<29	<14	<329	
	3-Dec-19	6	<10	<17	<12	⊲20	<11	<16	<11	*	6	<29	<10		
	10-Dec-19	6	<11	20	$\bigtriangledown$	<24	<10	<17	€	<10	<10	30	<13		
	17-Dec-19	<10	Ŷ	<15	<10	25	<10	<18	<11	6	<11	30	6		
	23-Dec-19	$\checkmark$	<11	21	$\checkmark$	$2_{1}$	<10	<17	<12	<10	<11	$\mathcal{A}_{8}$	99		
	30-Dec-19	<11	<10	<20	<11	<24	<11	<15	<11	8	<12	<35	<11	<348	

Table 8-10 Surface Water (Continued)

ſ			Note																										
			Tritium								587±217																		
			La-140								<14																		
			<b>Ba-140</b>								<42																		
			Cs-134 Cs-137 Ba-140 La-140								<12																		
			Cs-134								<12																		
	l by *		I-131	to Sample	Vo Sample	Io Sample	Vo Sample	Io Sample	Io Sample	Vo Sample	6	Vo Sample	EMPTY- No Sample	Vo Sample	Vo Sample	EMPTY- No Sample	Vo Sample	Vo Sample	Vo Sample	Vo Sample	Vo Sample	EMPTY- No Sample	Vo Sample	Vo Sample	EMPTY- No Sample	Vo Sample	Vo Sample	EMPTY- No Sample	Vo Sample
	ODCM required samples denoted by units are pCi/liter		Nb-95 Zr-95	EMPTY- No Sample	<12 <21	EMPTY- No Sample	MPTY-N	EMPTY- No Sample	EMPTY- No Sample	MPTY-N	EMPTY- No Sample	MPTY- N	EMPTY- No Sample	EMPTY- No Sample	MPTY-N	EMPTY- No Sample	EMPTY- No Sample	MPTY-N	EMPTY- No Sample										
	quired samples de units are pCi/liter	-	Ŷ	E	Ξ	E	E	E	E	E	V	E	E	E	E	E	E	Ξ	E	Ш	Ε	E	E	Ξ	E	E	E	E	E
	required		0 Zn-65								<28																		
	ODCM		Co-58 Fe-59 Co-60								<12																		
			8 Fe-59								$\mathcal{A}_1$																		
			Co-5								<11																		
			Mn-54								<11																		
		DATE	COLLECTED	8-Jan-19	15-Jan-19	22-Jan-19	29-Jan-19	5-Feh-19	12-Feb-19	19-Feb-19	26-Feb-19	5-Mar-19	12-Mar-19	19-Mar-19	26-Mar-19	2-Apr-19	9-Apr-19	16-Apr-19	23-Apr-19	30-Apr-19	7-May-19	14-May-19	21-May-19	28-May-19	4-Jun-19	11-Jun-19	18-Jun-19	25-Jun-19	1-Jul-19
		D	COLL	8-J	15-J	22-J	29-J	5-F6	12-F	19-F	26-F	5-M	12-N	19-N	26-N			16-A	23-A	30-A	7-M	14-N	21-N	28-N	4-Ju	11-J	18-J	25-J	1-J
		PLE	LION													TATION	N #2												
		SAMPLE	LOCATION													SEDIMENTATION	BASIN #2												

Table 8-10 Surface Water (Continued)

CD         Mn-54         Co-58         Fe-59           <					C	DCM red	mired sa	<b>ODCM</b> required samples denoted by *	hv *					
DATE         DATE         CollECTED         Ma-34         Co-38         Fe-39         Co-10         Za-55         N-3-5         Za-95         L-131         Ca-134         Ca-1410         Tritium           9-Jul-19         9-Jul-19         EMPTY-No Sample         EMPTY-							units are	pCi/liter	•					
	SAMPLE	DATE												
9.1ul-19       EMPTY- No Sample         16.1ul-19       EMPTY- No Sample         30.1ul-19       EMPTY- No Sample         6.1ug-19       EMPTY- No Sample         17.4ug-19       EMPTY- No Sample         6.1ug-19       EMPTY- No Sample         13.4ug-19       EMPTY- No Sample         13.4ug-19       EMPTY- No Sample         13.4ug-19       EMPTY- No Sample         20.4ug-19       EMPTY- No Sample         20.4ug-19       EMPTY- No Sample         21.4ug-19       EMPTY- No Sample         21.4ug-19       EMPTY- No Sample         21.4ug-19       EMPTY- No Sample         10.5Sep19       EMPTY- No Sample         10.5Sep19       EMPTY- No Sample         24.5Sp19       EMPTY- No Sample         15-Oct-19       EMPTY- No Sample         22-Oct-19       EMPTY- No Sample         23-Oct-19       EMPTY- No Sample         24.0u-19       EMPTY- No Sample         25-Oct-19       EMPTY- No Sample         26       I       I	LOCATION	COLLECTED	<b>Mn-54</b>	Co-58	Fe-59	Co-60	Zn-65	Nb-95 Zr-95		Cs-134 Cs-	137 Ba-1	40 La-140		Note
16-Jul-19       EMPTY- No Sample         23-Jul-19       EMPTY- No Sample         30-Jul-19       EMPTY- No Sample         6-Aug-19       EMPTY- No Sample         6-Aug-19       EMPTY- No Sample         13-Aug-19       EMPTY- No Sample         13-Aug-19       EMPTY- No Sample         13-Aug-19       EMPTY- No Sample         27-Aug-19       EMPTY- No Sample         27-Aug-19       EMPTY- No Sample         13-Aug-19       EMPTY- No Sample         27-Aug-19       EMPTY- No Sample         17-Sep-19       EMPTY- No Sample         15-Oct-19       EMPTY- No Sample         15-Oct-19       EMPTY- No Sample         15-Oct-19       EMPTY- No Sample		9-Jul-19						EMPTY- No	o Sample					
23-Jul-19       EMPTY- No Sample         30-Jul-19       EMPTY- No Sample         6 Aug-19       EMPTY- No Sample         6 Aug-19       EMPTY- No Sample         7.Aug-19       EMPTY- No Sample         27.Aug-19       EMPTY- No Sample         2.4-Sep-19       EMPTY- No Sample         2.4-Sep-19       EMPTY- No Sample         2.4-Sep-19       EMPTY- No Sample         2.4-Sep-19       EMPTY- No Sample         2.0-Oct-19       EMPTY		16-Jul-19						EMPTY- No	o Sample					
30-Jul-19       BMPTY- No Sample         6-Aug-19       EMPTY- No Sample         13-Aug-19       EMPTY- No Sample         20-Aug-19       EMPTY- No Sample         37-Aug-19       EMPTY- No Sample         37-Aug-19       EMPTY- No Sample         3-Sep-19       EMPTY- No Sample         3-Sep-19       EMPTY- No Sample         3-Sep-19       EMPTY- No Sample         3-Sep-19       EMPTY- No Sample         17-Sep-19       EMPTY- No Sample         17-Sep-19       EMPTY- No Sample         17-Sep-19       EMPTY- No Sample         17-Sep-19       EMPTY- No Sample         17-Oct-19       EMPTY- No Sample         24-Sep-19       EMPTY- No Sample         15-Oct-19       EMPTY- No Sample         20-Cot-19       EMPTY- No Sample         20-Cot-19       EMPTY- No Sample         29-Oct-19       EMPTY- No Sample         29-Nov-19       EMPTY- No Sample <th></th> <th>23-Jul-19</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>EMPTY- No</th> <th>o Sample</th> <th></th> <th></th> <th></th> <th></th> <th></th>		23-Jul-19						EMPTY- No	o Sample					
6-Aug-19       EMPTY-No Sample         13-Aug-19       EMPTY-No Sample         20-Aug-19       EMPTY-No Sample         27-Aug-19       EMPTY-No Sample         27-Aug-19       EMPTY-No Sample         17-Sep-19       EMPTY-No Sample         29-Oct-19       EMPTY-No Sample         20-Oct-19       EMPTY-No Sample         22-Oct-19       EMPTY-No Sample         23-Doc-19       <1<<20<<10<<23       <31<<<12         24       <1<<<1<<20<<11<<<10<<23<<11<<<12<<14<       <21         23-Doc-19       <1<<<22<<10<<1<<22       <1<<22       <1<<24       <21		30-Jul-19						EMPTY- No	o Sample					
13-Aug-19       EMPTY- No Sample         20-Aug-19       EMPTY- No Sample         27-Aug-19       EMPTY- No Sample         3-Sep-19       EMPTY- No Sample         17-Sep-19       EMPTY- No Sample         24-Sep-19       EMPTY- No Sample         17-Sep-19       EMPTY- No Sample         24-Sep-19       EMPTY- No Sample         24-Sep-19       EMPTY- No Sample         21-Soct-19       EMPTY- No Sample         21-Oct-19       EMPTY- No Sample         22-Oct-19       EMPTY- No Sample         22-Oct-19       EMPTY- No Sample         22-Out-19       EMPTY- No Sample         23-Out-19       EMPTY- No Sample         24-Nov-19       EMPTY- No Sample         25-Nov-19       26-Nov-19       26-Nov-19         26-Nov-19       21<       23<       21<       21       22         25-Dec-19       23       241<       23       24       24       20         23-Dec-19       23<       21<       22       21       24		6-Aug-19						EMPTY- No	o Sample					
20-Aug-19       EMPTY- No Sample         27-Aug-19       EMPTY- No Sample         3-Sep-19       EMPTY- No Sample         10-Sep-19       EMPTY- No Sample         17-Sep-19       EMPTY- No Sample         24-Sep-19       EMPTY- No Sample         17-Sep-19       EMPTY- No Sample         24-Sep-19       EMPTY- No Sample         17-Sep-19       EMPTY- No Sample         24-Sep-19       EMPTY- No Sample         1-Oct-19       EMPTY- No Sample         22-Oct-19       EMPTY- No Sample         22-Oct-19       EMPTY- No Sample         22-Oct-19       EMPTY- No Sample         23-Oct-19       EMPTY- No Sample         24-Sep-19       C11       <0         22-Oct-19       EMPTY- No Sample         23-Oct-19       EMPTY- No Sample         24-Ouv-19       EMPTY- No Sample         25-Nov-19       EMPTY- No Sample         24-Nov-19       EMPTY- No Sample         25-Nov-19       C11       <0         3-Dec-19       C11       <0         30-Dec-19       C11       <20       <11<         23-Dec-19       C11       <21<       <14       <21         23-Dec-19       C11< <th></th> <th>13-Aug-19</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>EMPTY- No</th> <th>o Sample</th> <th></th> <th></th> <th></th> <th></th> <th></th>		13-Aug-19						EMPTY- No	o Sample					
27-Aug-19       EMPTY- No Sample         3-Sep-19       EMPTY- No Sample         10-Sep-19       EMPTY- No Sample         17-Sep-19       EMPTY- No Sample         24-Sep-19       EMPTY- No Sample         24-Sep-19       EMPTY- No Sample         24-Sep-19       EMPTY- No Sample         24-Sep-19       EMPTY- No Sample         20-ct-19       EMPTY- No Sample         8-Oct-19       EMPTY- No Sample         22-Oct-19       EMPTY- No Sample         29-Oct-19       EMPTY- No Sample         29-Oct-19       <11<       <19       <31<         26-Now-19       <11<       <11<       <12       <14       <21         20-Dec-19       <11<       <22       <10<       <21       <21       <21       <21       <21       <21       <21       <21       <21       <21       <21       <21       <21       <21       <21       <21       <21 <td< th=""><th></th><th>20-Aug-19</th><th></th><th></th><th></th><th></th><th></th><th>EMPTY- No</th><th>o Sample</th><th></th><th></th><th></th><th></th><th></th></td<>		20-Aug-19						EMPTY- No	o Sample					
3-Sep-19       3-Sep-19         10-Sep-19       EMPTY- No Sample         17-Sep-19       EMPTY- No Sample         24-Sep-19       EMPTY- No Sample         24-Sep-19       EMPTY- No Sample         24-Sep-19       EMPTY- No Sample         24-Sep-19       EMPTY- No Sample         20ct-19       EMPTY- No Sample         22-Oct-19       EMPTY- No Sample         29-Oct-19       EMPTY- No Sample         29-Oct-19       EMPTY- No Sample         26-Nov-19       EMPTY- No Sample         26-Nov-19       <1<       <1<         3-Dec-19       <1       <1<       <1<         30-Dec-19       <1<       <2       <1<       <2         30-Dec-19       <1<       <2       <1<       <2       <1		27-Aug-19						EMPTY- No	o Sample					
10-Sep-19       EMPTY- No Sample         17-Sep-19       EMPTY- No Sample         24-Sep-19       EMPTY- No Sample         1-Oct-19       EMPTY- No Sample         8-Oct-19       EMPTY- No Sample         8-Oct-19       EMPTY- No Sample         22-Oct-19       EMPTY- No Sample         15-Oct-19       EMPTY- No Sample         22-Oct-19       EMPTY- No Sample         22-Oct-19       EMPTY- No Sample         23-Oct-19       EMPTY- No Sample         29-Oct-19       <1<<       <1<<         29-Dec-19       <1<       <20       <1<<       <21         17-Dec-19       <1<       <20       <1<<       <21       <21       <21       <21       <21       <21       <21       <21       <21       <21       <21       <21       <21       <21       <21       <21       <21       <21       <21       <		3-Sep-19						EMPTY- No	o Sample					
17-Sep19       EMPTY- No Sample         24-Sep19       EMPTY- No Sample         1-Oct-19       EMPTY- No Sample         8-Oct-19       EMPTY- No Sample         8-Oct-19       EMPTY- No Sample         15-Oct-19       EMPTY- No Sample         22-Oct-19       EMPTY- No Sample         23-Oct-19       EMPTY- No Sample         23-Oct-19       EMPTY- No Sample         23-Oct-19       EMPTY- No Sample         23-Oct-19       EMPTY- No Sample         24-Now-19       EMPTY- No Sample         25-Now-19       EMPTY- No Sample         12-Nov-19       EMPTY- No Sample         12-Nov-19       EMPTY- No Sample         23-Dec-19       <12<       <20       <11<       <12       <12         30-Dec-19       <1<       <23       <11<       <2       <14       <2       <10       <2       <10       <2       <10       <2       <10       <2       <10       <2       <10       <2       <10       <2       <10       <2       <		10-Sep-19						EMPTY- No	o Sample					
24-Sep-19       EMPTY- No Sample         1-Oct-19       EMPTY- No Sample         8-Oct-19       EMPTY- No Sample         8-Oct-19       EMPTY- No Sample         5-Oct-19       EMPTY- No Sample         15-Oct-19       EMPTY- No Sample         22-Oct-19       EMPTY- No Sample         22-Oct-19       EMPTY- No Sample         22-Oct-19       EMPTY- No Sample         22-Out-19       EMPTY- No Sample         23-Out-19       EMPTY- No Sample         5-Nov-19       EMPTY- No Sample         26-Nov-19       EMPTY- No Sample         12-Nov-19       EMPTY- No Sample         26-Nov-19       <11<       <19       <9       <13<       <12         3-Dec-19       <11<<<24       <41<<       <42       <10		17-Sep-19						EMPTY- No	o Sample					
1-Oct-19         EMPTY- No Sample           8-Oct-19         EMPTY- No Sample           8-Oct-19         EMPTY- No Sample           15-Oct-19         EMPTY- No Sample           22-Oct-19         EMPTY- No Sample           29-Oct-19         EMPTY- No Sample           5-Nov-19         EMPTY- No Sample           12-Nov-19         EMPTY- No Sample           13-Nov-19         EMPTY- No Sample           10-Nov-19         EMPTY- No Sample           26-Nov-19         <11<         <19<         <9         <12         <12         <11<         <19<         <9         <12         <12         <11         <19         <9         <12         <11         <12         <12         <11         <19         <9         <12         <11         <12         <12         <11         <19         <9         <13         <12         <11         <12         <12         <11         <19         <9         <13         <12         <11         <19         <10         <12         <11         <10<		24-Sep-19						EMPTY- No	o Sample					
8-0ct-19       EMPTY- No Sample         15-0ct-19       EMPTY- No Sample         22-0ct-19       EMPTY- No Sample         22-0ct-19       EMPTY- No Sample         29-0ct-19       EMPTY- No Sample         5-Nov-19       EMPTY- No Sample         5-Nov-19       EMPTY- No Sample         5-Nov-19       EMPTY- No Sample         5-Nov-19       EMPTY- No Sample         12-Nov-19       EMPTY- No Sample         13-Nov-19       EMPTY- No Sample         10-Nov-19       EMPTY- No Sample         26-Nov-19       C         3-Dec-19       <12<         17-Dec-19       <11<         23-Dec-19       <11<         24       <11<         25<       <11<         26       <11<         27       <11<         28       <11<       <22         29       <11<       <21       <42       <0	SEDIMENTATION							EMPTY- No	o Sample					
<ul> <li>EMPTY- No Sample EMPTY- No Sample</li> <li>&lt;11 &lt;19 &lt;9 &lt;3 &lt;31 &lt;12 &lt;12 &lt;12 &lt;13 &lt;31 &lt;12 &lt;12 &lt;14 &lt;12 &lt;10 &lt;10 &lt;12 &lt;10 &lt;10 &lt;12 &lt;10 &lt;10 &lt;12 &lt;10 &lt;10 &lt;10 &lt;10 &lt;10 &lt;10 &lt;10 &lt;10 &lt;10 &lt;10</li></ul>	<b>BASIN #2</b>	8-Oct-19						EMPTY- No	o Sample				2	
<ul> <li>EMPTY-No Sample</li> <li>Colo</li> <li>Colo<!--</th--><th></th><th>15-Oct-19</th><th></th><th></th><th></th><th></th><th></th><th>EMPTY- No</th><th>o Sample</th><th></th><th></th><th></th><th></th><th></th></li></ul>		15-Oct-19						EMPTY- No	o Sample					
<ul> <li>EMPTY-No Sample</li> <li>Constant of the second secon</li></ul>		22-Oct-19						EMPTY- No	o Sample					
<ul> <li>EMPTY-No Sample</li> <li>EMPTY-No Sample</li> <li>EMPTY-No Sample</li> <li>EMPTY-No Sample</li> <li>EMPTY-No Sample</li> <li>EMPTY-No Sample</li> <li>Cl1 &lt; 20 &lt; 10 &lt; 23 &lt; 11 &lt; 19 &lt; 9 &lt; 9 &lt; 13 &lt; 31 &lt; 12</li> <li>Cl2 &lt; 20 &lt; 10 &lt; 23 &lt; 11 &lt; 19 &lt; 9 &lt; 9 &lt; 13 &lt; 31 &lt; 12</li> <li>Cl2 &lt; 11 &lt; 10 &lt; 0 &lt; 0 &lt; 13 &lt; 12 &lt; 12</li> <li>Cl2 &lt; 11 &lt; 10 &lt; 0 &lt; 0 &lt; 13 &lt; 12 &lt; 12</li> <li>Cl2 &lt; 11 &lt; 20 &lt; 10 &lt; 12 &lt; 10 &lt; 10 &lt; 10 &lt; 1</li></ul>		29-Oct-19						EMPTY- N	o Sample					
EMPTY- No Sample         EMPTY- No Sample       EMPTY- No Sample         EMPTY- No Sample       EMPTY- No Sample         <12       <12       <20       <10       <23       <11       <19       <9       <9       <13       <12         <12       <12       <20       <10       <23       <11       <19       <9       <9       <13       <12         <13       <11       <19       <9       <9       <13       <12       <12         <13       <11       <10       <29       <13       <12       <12       <12         <13       <11       <25       <13       <26       <11<<<22       <10       <12       <14       <42       <10		5-Nov-19						EMPTY- No	o Sample					
EMPTY- No Sample EMPTY- NO SAMPLY-		12-Nov-19						EMPTY- No	o Sample					
<ul> <li><li><li><li><li><li><li><li><li><li></li></li></li></li></li></li></li></li></li></li></ul>		19-Nov-19						EMPTY- N	o Sample					
<ul> <li>&lt;12 &lt;12 &lt;20 &lt;10 &lt;23 &lt;11 &lt;19 &lt;9 &lt;9 &lt;13 &lt;31 &lt;12</li> <li>EMPTY-No Sample</li> <li>EMPTY-No Sample</li> <li>EMPTY-No Sample</li> <li>EMPTY-No Sample</li> <li></li> <li></li></ul>		26-Nov-19						EMPTY- No	o Sample					
EMPTY- No Sample EMPTY- No Sample EMPTY- No Sample <13 <11 <25 <13 <26 <11 <22 <10 <12 <14 <42 <10		3-Dec-19	<12	<12	<20	<10	\$		8				645±216	
EMPTY- No Sample EMPTY- No Sample <13 <11 <25 <13 <26 <11 <22 <10 <12 <14 <42 <10		10-Dec-19						EMPTY- N	o Sample					
EMPTY- No Sample <13 <11 <25 <13 <26 <11 <22 <10 <12 <14 <42 <10		17-Dec-19						EMPTY- No	o Sample					
<13 <11 <25 <13 <26 <11 <22 <10 <12 <14 <42 <10		23-Dec-19						EMPTY- N	o Sample					
		30-Dec-19	<13	<11	<25	<13	~26		<10				⊲356	

Table 8-10 Surface Water (Continued)

		equired samples de				
		units are pCi/kg, we	t			
SAMPLE	DATE					
LOCATION	COLLECTED	I-131	Cs-134	Cs-137	In-111	Notes
	8-Jan-19		<75	<177		
	15-Jan-19	283±176	<145	<142		
	22-Jan-19		<70	<125		
	29-Jan-19	492±156	<89	<142		
	5-Feb-19	868±221	<122	<169		
	12-Feb-19	547±151	<33	<140		
	19-Feb-19	408±167	<136	<138		
	26-Feb-19	356±123	<128	<126		
	5-Mar-19	433±142	<114	<128		
	12-Mar-19		<80	<126		
	19-Mar-19	180±119	<35	<104		
WDE	26-Mar-19	335±136	<98	<178		
WRF CENTRIFUGE	2-Apr-19	291±148	<86	<105		
WASTE SLUDGE	9-Apr-19	595±206	<130	<143		
WASTE SLODGE	16-Apr-19	**NO SAMP	LE WRF O	UTAGE**		
	23-Apr-19	**NO SAMP	LE WRF O	UTAGE**		
	30-Apr-19		<88	<125		
	7-May-19	288±140	<135	<114		
	14-May-19		<92	<79		
	21-May-19	291±193	<144	<178		
	28-May-19	351±116	<104	<148		
	4-Jun-19	449±155	<85	<159		
	11-Jun-19	372±220	<111	<173		
	18-Jun-19	557±90	<45	<51		
	25-Jun-19	551±188	<104	<164		
	1-Jul-19	1020±256	<84	<168		
	No required LLD for I-	-131 in Sludge/Sedime	ent. Only va	lues for dete	ctable I-13	1 are
	reported in this table.					

# Table 8-11 Sludge/Sediment

	ODCM r	equired samples de	noted by *			
		units are pCi/kg, we	t			
SAMPLE	DATE					
LOCATION	COLLECTED	I-131	Cs-134	Cs-137	In-111	Notes
	9-Jul-19	298±136	<92	<154		
	16-Jul-19	388±148	<92	<151		
	23-Jul-19	248±133	<96	<102		
	30-Jul-19	421±141	<101	<107		
	6-Aug-19	164±114	<100	<110		
	13-Aug-19		<39	<114		
	20-Aug-19	427±128	<23	<96		
	27-Aug-19	315 <b>±</b> 144	<77	<144		
	3-Sep-19	492±159	<124	<122		
	10-Sep-19	284±124	<82	<117		
	17-Sep-19	126±98	<109	<110		
WRF	24-Sep-19	376±141	<61	<95		
CENTRIFUGE	1-Oct-19	497±149	<67	<104		
WASTE SLUDGE	8-Oct-19	**NO SAMP	LE WRF O	UTAGE**		
	15-Oct-19	**NO SAMP	LE WRF O	UTAGE**		
	22-Oct-19	**NO SAMP				
	29-Oct-19	**NO SAMP				
	5-Nov-19	**NO SAMP		UTAGE**		
	12-Nov-19	167±166	<128	<126		
	19-Nov-19		<62	<124		
	26-Nov-19	324±131	<107	<132		
	3-Dec-19	135±109	<140	<148		
	10-Dec-19		<66	<119		
	17-Dec-19	100±120	<119	<111		
	23-Dec-19	262±115	<71	<89		
	30-Dec-19	254±138	<68	<107		
	No required LLD for I-	131 in Sludge/Sedime	ent. Only va	lues for dete	ctable I-13	l are
	reported in this table.					

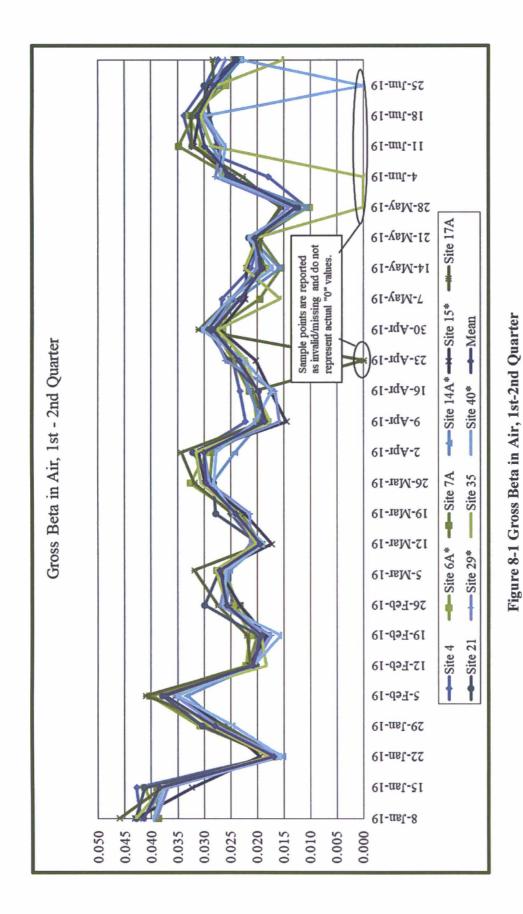
# Table 8-11 Sludge/Sediment (Continued)

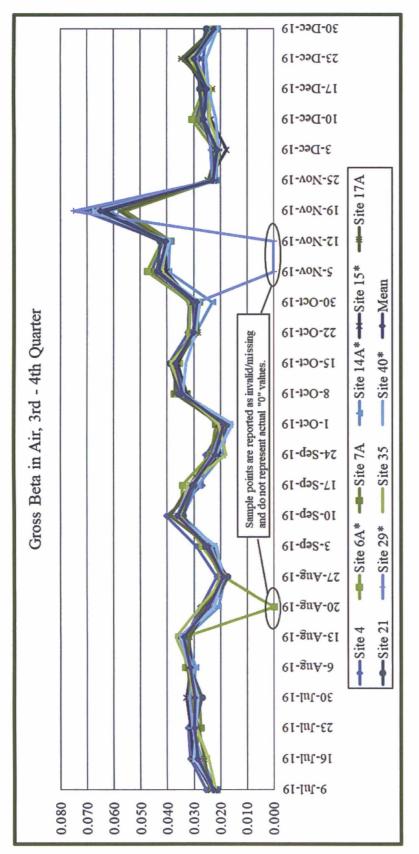
Sample Type	Towers/Canal Sludge	Towers/Canal Sludge
Activity Range (pCi/g)	<mda< th=""><th><mda< th=""></mda<></th></mda<>	<mda< th=""></mda<>
Isotope	All principal gamma- emitters	All principal gamma- emitters
Approximate Volume (yd <sup>3</sup> )	392	615
Unit Cycle	UIR21	U3R21

# Table 8-11 Sludge/Sediment (Continued) Cooling Tower Sludge

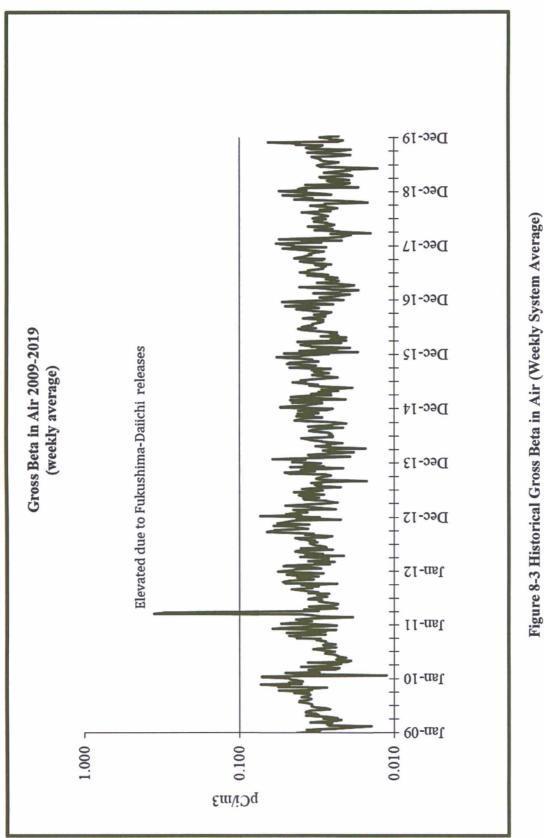
# Table 8-12 Hard - To-Detect Radionuclide Results

Η	Hard-To-Detect Radionuclide (pCi/Liter)	Radionuclide	(pCi/l	liter)		
Sample Location	Well number	Well number Sample Date C-14 Fe-55	C-14	Fe-55	Ni-63	Sr-90
Unit 1 (outside RCA)	APP-12	11/12/2019	<63.4 <192	<192	<2.76	<1.98
Unit 2 (inside RCA)	H0A	11/12/2019	<63.5	<185	<3.54	<1.88
Unit 3 (inside RCA)	H11	10/13/2019	<63.4 <156	<156	<3.82	<1.39

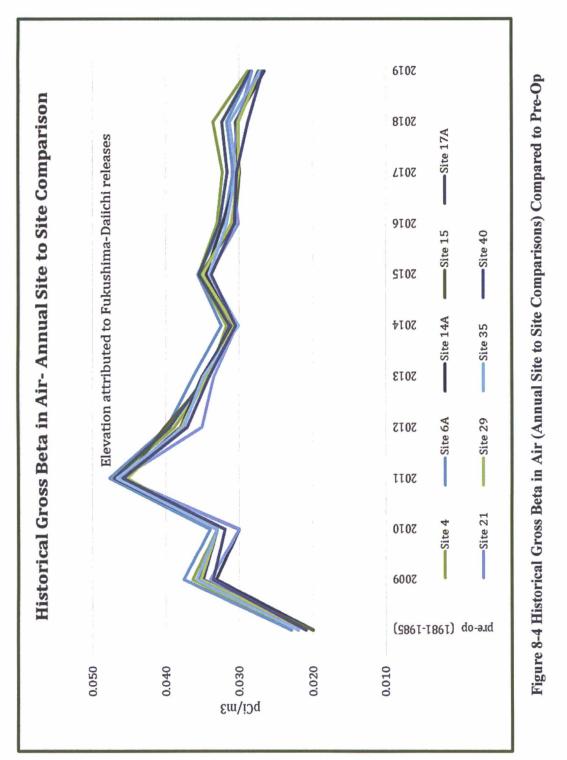




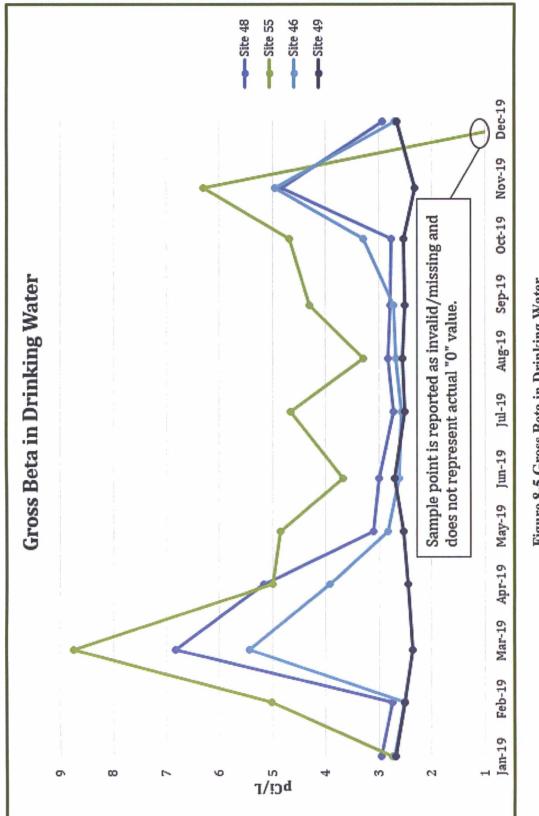






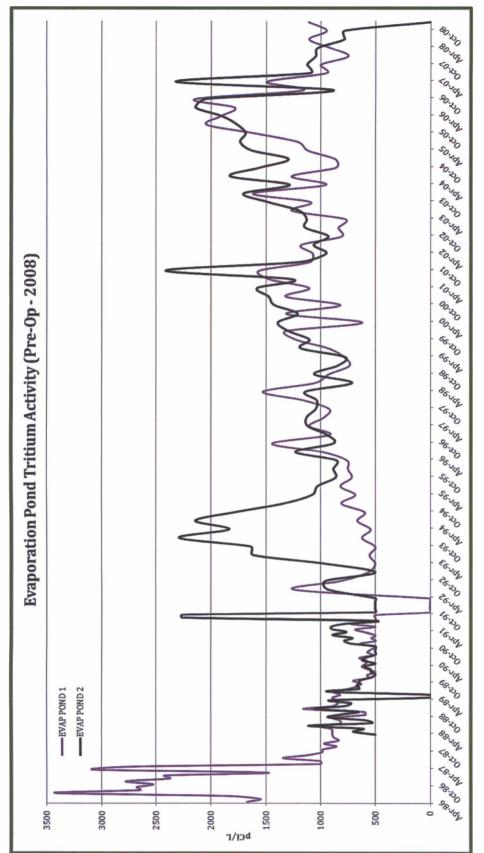






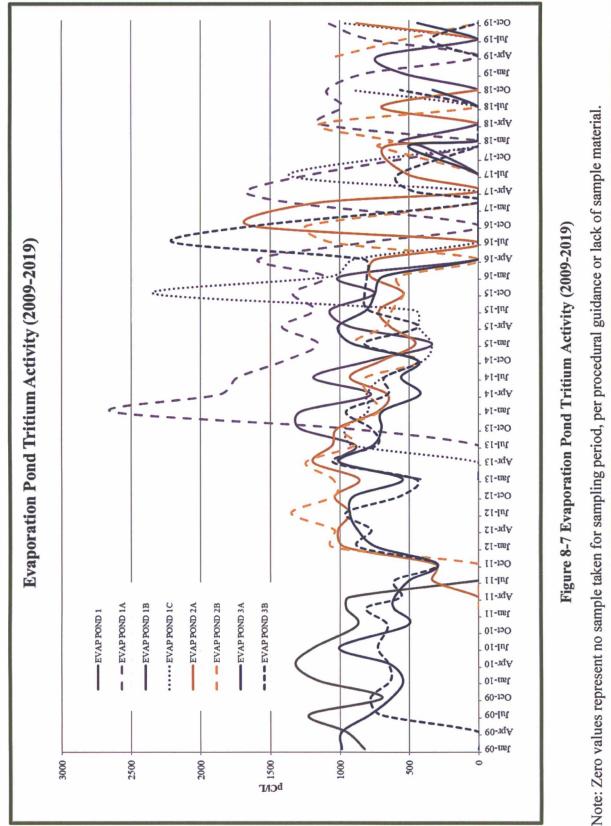


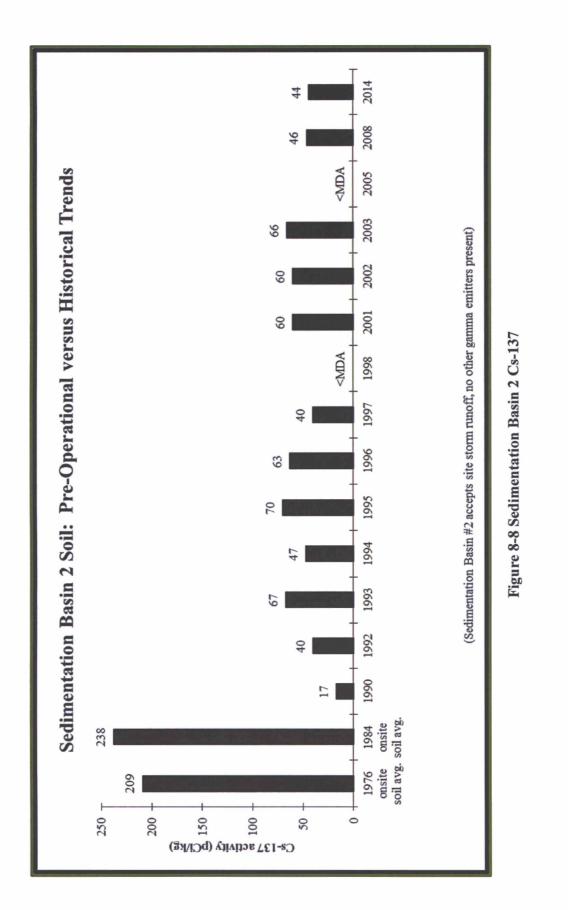
Notes: MDA values are plotted as activity (i.e. <2.3 is plotted as 2.3) The action level is 30 pCi/liter





Note: Zero values represent no sample taken for sampling period, per procedural guidance or lack of sample material.





# 9. Thermoluminescent Dosimeter (TLD) Results and Data

The environmental TLD used at PVNGS is the Panasonic Model 812 Dosimeter. The Model 812 is a multi-element dosimeter combining two elements of lithium borate and two elements of calcium sulfate under various filters.

TLDs were placed in fifty locations from one to thirty-five miles from the PVNGS. TLD locations are shown in Figure 2-1 and Figure 2-2 and are described in Table 9-1. TLD results for 2019 are presented in Table 9-2. Definitions for Table 9-2 are as follows:

- MDD<sub>Q</sub>: Minimum differential dose, quarterly, 3 times 90<sup>th</sup> percentile sQ determined from analysis (mRem).
- MDD<sub>A</sub>: Minimum differential dose, annual, 3 times 90<sup>th</sup> percentile sA determined from analysis (mRem).
- B<sub>Q</sub>: Quarterly baseline (mRem) (average of previous 5 years)
- M<sub>Q</sub>: Locations 91 day standard quarter normalized dose (mRem per standard quarter)
- Lq: Quarterly investigation level dose (mRem)
- BA: Baseline background dose (mRem) (annual)
- M<sub>A</sub>: Annual monitoring data MA determined by normalizing available quarterly data to 4 full quarters
- LA: Annual investigation level dose (mRem)
- ND: Non Detectable

The baseline is calculated as the average of the previous 5 year measurements. The minimum differential dose (MDD) is calculated as 3 times the 90<sup>th</sup> percentile standard deviation of the data from the previous 5 years; quarterly MDD is calculated using the quarterly data and annual MDD is calculated using the annual summation of the quarterly data. Investigation level is calculated by the difference of the data measurement and the baseline; results less than, or equal to the MDD are Non Detectable (ND) and any result exceeding the MDD meets the threshold for the investigation level. Locations exceeding the investigation level will be evaluated for cause and impact to the public and environment.

Historical environmental gamma radiation results for 1985 through 2019 are presented in graphical form on Figure 9-1 (excluding transit control TLD #45). Figure 9-2 depicts the environmental TLD results from 2019 as compared to the pre-operational TLD results (excluding sites #41 and #43, as they were deleted and later assigned to a new location, and #46-50, as they had no pre-op TLD at the location for comparison). The site to site comparisons indicate a direct correlation with respect to pre-operational results. It is indicated that the offsite dose, as measured by TLDs, has not changed since Palo Verde became operational.

### **Table 9-1 TLD Site Locations**

TLD #	Location	Distance from Unit 2	TLD #	Location	Distance from Unit 2	TLD #	Location	Distance from Unit 2
1	E30	29.13	18	ESE2	1.48	35	NNW8	7.86
2	ENE24	24.18	19	SE2	1.35	36	N5	4.32
3	E21	21.87	20	SSE2	2.04	37	NNE5	4.69
4	E16	16.05	21	S3	2.68	38	NE5	4.21
5	ESE11	11.14	22	SSW3	2.74	39	ENE5	4.71
6	SSE31	31.47	23	W5	4.17	40	N2	2.37
7	SE7	6.87	24	SW4	3.75	41	ESE3	3.39
8	SSE4	4.33	25	WSW5	4.88	42	N8	7.24
9	<b>S</b> 5	4.63	26	SSW4	4.13	43	NE5	4.60
10	SE5	3.91	27	SW1	0.93	44	ENE35	35.00
11	ESE5	5.14	28	WSW1	0.66	45	Onsite	0.18
12	E5	4.85	29	W1	0.64	46	ENE30	7.23
13	N1	0.85	30	WNW1	0.74	47	E35	32.35
14	NNE2	155	31	NW1	1.03	48	E24	22.76
15	NE2	1.63	32	NNW1	0.90	49	ENE11	11.32
16	ENE2	1.59	33	NW4	4.05	50	WNW5	4.24
17	E2	1.39	34	NNW5	4.84			

(Distance and direction are relative to Unit 2 in miles)

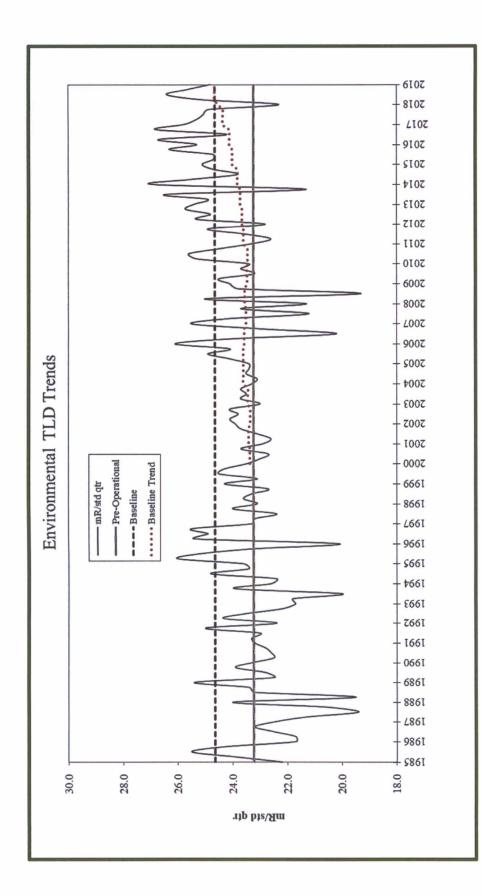
\*Site #6 and site #44 are the control locations.

\*\*Site #45 is the transit control TLD (stored in lead pig).

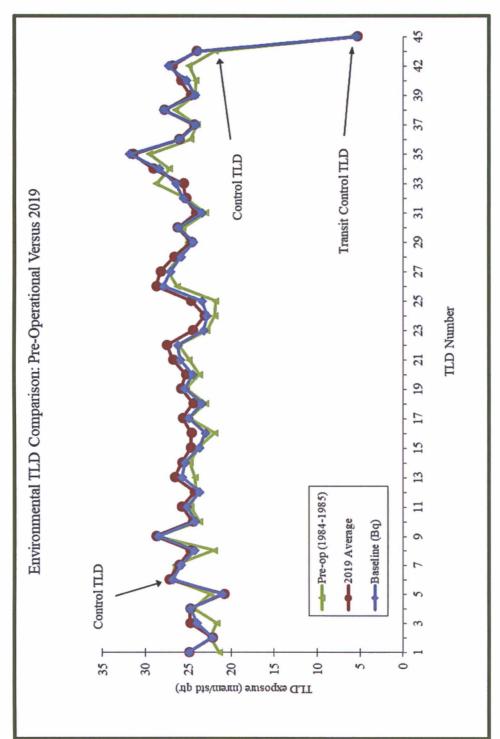
	Palo V	erde	2019			rem	And in case of the local division of the loc	Constant of the local and specific	and Department of the local division of	And in case of the local division of the loc	D <sub>A</sub> : 10	mren	n
			in the states	Quarte						a subscription of the	al (mre		
Site	Bo	M 01	M 02	M 03	MO	L <sub>Q</sub> Q1	1.02	1.02	1.04	BA	M		Note
1	24.8	23.9	25.4	26.2	24.2	ND	ND	ND	ND	99.3	M <sub>A</sub> 99.7	L <sub>A</sub> ND	
2	22.1	21.7	22.5	22.4	22.3	ND	ND	ND	ND	88.5	88.9	ND	
3	23.9	23.5	24.3	27.8	23.5	ND	ND	ND	ND	95.5	99.1	ND	
4	24.6	24.3	25.9	25.3	23.7	ND	ND	ND	ND	98.5	99.2	ND	
5	21.0	21.3	20.9	20.7	20.4	ND	ND	ND	ND	83.9	83.3	ND	
6	26.7	25.3	27.2	27.2	29.3	ND	ND	ND	ND	106.6	108.9	ND	
7	25.7	26.6	26.7	26.2	24.7	ND	ND	ND	ND	102.8	104.3	ND	
8	24.1	24.5	24.5	25.7	24.3	ND	ND	ND	ND	96.5	99.0	ND	
9	28.3	27.9	29.4	28.3	29.4	ND	ND	ND	ND	113.0	114.9	ND	
10	24.1	24.0	26.8	24.4	22.7	ND	ND	ND	ND	96.2	98.0	ND	
11	25.0	26.7	25.5	26.0	24.9	ND	ND	ND	ND	99.9	103.1	ND	
12	23.6	23.5	26.0	24.6	23.0	ND	ND	ND	ND	94.6	97.0	ND	
13	25.6	26.3	27.2	27.5	25.2	ND	ND	ND	ND	102.6	106.3	ND	
14	25.2	24.6	26.4	26.5	25.4	ND	ND	ND	ND	100.6	102.9	ND	
15	23.6	24.1	26.0	24.3	24.3	ND	ND	ND	ND	94.5	98.7	ND	
16	22.9	24.1	24.6	25.3	24.7	ND	ND	ND	ND	91.7	98.6	ND	
17	24.7	25.1	27.4	25.5	24.6	ND	ND	ND	ND	98.8	102.6	ND	
18	23.5	24.6	26.1	24.0	23.1	ND	ND	ND	ND	94.0	97.7	ND	
19	25.3	25.5	27.1	25.0	25.7	ND	ND	ND	ND	101.0	103.3	ND	
20	24.4	25.8	26.8	24.2	24.3	ND	ND	ND	ND	97.7	101.1	ND	
21	25.8	26.1	28.5	26.7	25.9	ND	ND	ND	ND	103.3	107.2	ND	
22	26.0	26.8	28.2	28.3	26.6	ND	ND	ND	ND	103.8	109.9	ND	
23	23.1 22.8	24.1	25.5	24.9	23.3	ND	ND	ND	ND	92.5	97.8	ND	
24 25	22.8	23.3	24.5	22.9	21.7	ND	ND	ND	ND	91.2	92.3	ND	
26	23.5	24.0 28.0	26.1 31.0	24.2 28.2	24.4	ND ND	ND	ND	ND ND	94.2	98.7	ND	
27	27.0	27.9	28.9	28.4	27.9 27.8	ND	ND ND	ND ND	ND	111.1 107.8	115.0 113.0	ND ND	
28	25.7	26.2	28.6	26.4	25.4	ND	ND	ND	ND	107.0	106.5	ND	
29	24.3	24.4	26.2	24.9	23.1	ND	ND	ND	ND	97.2	98.6	ND	
30	26.0	24.9	26.6	27.1	26.4	ND	ND	ND	ND	104.1	105.0	ND	
31	23.4	24.2	23.9	25.2	23.1	ND	ND	ND	ND	93.7	96.4	ND	
32	25.5	25.1	26.2	25.4	24.5	ND	ND	ND	ND	102.1	101.1	ND	
33	26.4	25.2	27.2	24.6	25.4	ND	ND	ND	ND	105.5	102.4	ND	
34	28.4	29.4	29.1	29.7	28.0	ND	ND	ND	ND	113.5	116.2	ND	
35	31.5	29.8	31.7	32.8	31.4	ND	ND	ND	ND	126.0	125.7	ND	
36	25.8	26.5	26.3	26.2	25.2	ND	ND	ND	ND	103.4	104.3	ND	
37	24.2	23.2	25.5	24.4	24.2	ND	ND	ND	ND	96.8	97.3	ND	
38	27.8	27.5	27.5	27.6	28.5	ND	ND	ND	ND	111.1	111.1	ND	
39	24.2	24.7	25.4	24.5	24.2	ND	ND	ND	ND	96.9	98.8	ND	
40	25.3	25.2	26.1	26.1	26.1	ND	ND	ND	ND	101.3	103.5	ND	
41	26.7	28.2	27.6	26.3	28.0	ND	ND	ND	ND	106.7	110.1	ND	
42	27.2	26.6	28.0	26.6	26.2	ND	ND	ND	ND	109.0	107.5	ND	
43	27.8	26.7	28.5	27.3	27.9	ND	ND	ND	ND	111.3	110.4	ND	
44	23.8	23.8	24.6	24.4	23.5	ND	ND	ND	ND	95.2	96.3	ND	
45	5.5	6.3	5.9	4.4	5.1	ND	ND	ND	ND	22.2	21.6	ND	
46	23.8	23.8	25.1	25.2	24.1	ND	ND	ND	ND	95.2	98.2	ND	
47	23.7	*	26.3	24.1	23.2	*	ND	ND	ND	71.0	73.6	ND	1
48	24.4	24.5	26.8	24.3	22.1	ND	ND	ND	ND	97.5	97.7	ND	
49	22.7	22.7	25.3	23.7	22.8	ND	ND	ND	ND	90.6	94.4	ND	
50	19.7	20.8	21.0	19.8	19.0	ND	ND	ND	ND	78.6	80.6	ND	
											e time of econd, T		bd
	rth Qua								matel	using S	ccond, I	unu d	au
-							5.4						

**Table 9-2 Environmental TLD Results** 

Figure 9-1 Network Environmental TLD Exposure Rates







The following TLDs are not included on this graph:

TLD #41 monitoring location was deleted in June, 2000 due to school closing (this TLD was replaced at a new school in 2004) TLD #43 monitoring location was deleted in 1994 due to school closing (this TLD was placed at a new school in 2007) TLDs #46-50 are not included since they were not included in the pre-op monitoring program.

### **10.1 Introduction**

In accordance with the PVNGS ODCM, Section 6.2, the field portion of the annual Land Use Census was performed by June 2019.

Observations were made in each of the 16 meteorological sectors to determine the nearest milking animals, residences, and gardens of greater than 500 square feet. This census was completed by driving the roads and speaking with residents.

The results of the Land Use Census are presented in Table 10-1 and discussed below. The directions and distances listed are in sectors and miles from the Unit 2 containment.

### **10.2 Census Results**

The 2019 Land Use Census results identified new potential Radiological Effluent Release Report dose receptor locations. Each location was evaluated. The changes identified, and the evaluation results, are described below.

### Nearest Resident

There was one (1) change in nearest resident status from the previous year. Dose calculations indicated the highest dose to be 0.697 mrem.

### Milk Animal

There were four (4) changes in milk animal status from the previous year. There were six (6) of the locations that were identified in the census which had the potential for having a dose greater than 20% that of our current sampling location with the lowest dose potential. The locations were visited by the REMP manager to evaluate program participation potential. As of October, 2019, five (5) of the locations no longer had goats, and one (1) location had only male goats. Dose calculations indicated the highest dose to be 0.737 mrem.

### Vegetable Gardens

There was no change in the nearest gardens identified in the previous year. Dose calculations indicated the highest dose to be 0.239 mrem.

See Table 10-1 for a summary of the specific results and Table 2-1 for current sample locations. Figure 10-1 through Figure 10-3 provide graphs depicting historical calculated doses for nearest residents, nearest milk receptor, and nearest garden receptor locations in each sector.

Differences in calculated doses are the result of many variables, including;

- Changes in receptor locations from year to year (proximity to the power plant)
- Changes in local meteorology (wind direction, wind speed, precipitation, and temperature)
- · Concurrent meteorology at the time of effluent releases
- Exposure pathways

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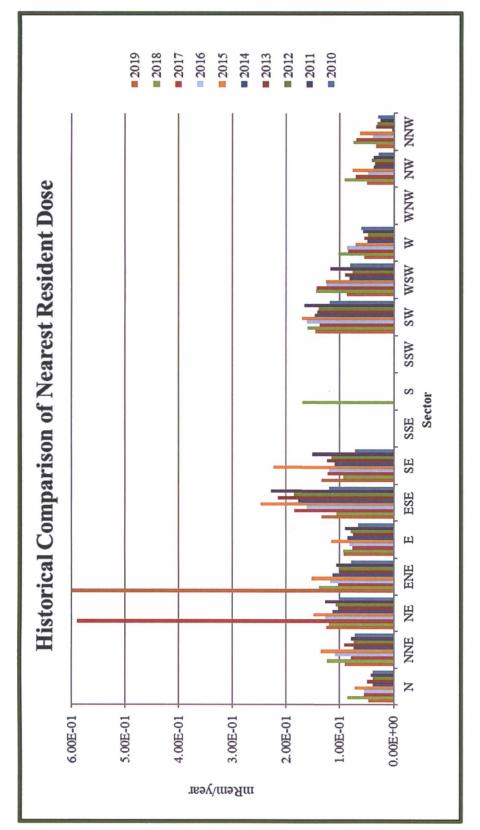
### **Table 10-1 Land Use Census**

Sector	Nearest Resident	Nearest Garden	Nearest Milk Animal (Cow/Goat)	Calculat (mr		Change from 2018
N	1.55	3.10	3.25	Resident Garden Milk	4.68E-2 1.17E-1 1.26E-1	Milk
NNE	1.52	NONE	2.82	Resident Milk	9.04E-2 2.66E-1	
NE	2.16	NONE	4.62	Resident Milk	1.25E-1 1.21E-1	Milk
ENE	2.05	4.84	2.05	Resident Garden Milk	6.97E-1 2.39E-1 6.97E-1	Milk
Е	2.81	NONE	4.28	Resident Milk	9.31E-2 2.39E-1	
ESE	3.06	NONE	3.37	Resident Milk	1.34E-1 6.10E-1	
SE	3.39	NONE	4.41	Resident Milk	1.34E-1 7.37E-1	
SSE	NONE	NONE	NONE	NA		
S	NONE	NONE	NONE	NA		Resident
SSW	NONE	NONE	NONE	NA		
SW	1.39	NONE	NONE	Resident	1.45E-1	
WSW	0.83	NONE	NONE	Resident	8.69E-2	
W	0.76	NONE	NONE	Resident	5.45E-2	
WNW	NONE	NONE	NONE	NA		
NW	0.93	NONE	NONE	Resident	4.96E-2	
NNW	1.31	4.34	5.03	Resident Garden Milk	3.31E-2 4.51E-2 3.37E-2	Milk

### (Distance and direction are relative to Unit 2 in miles)

Comments:

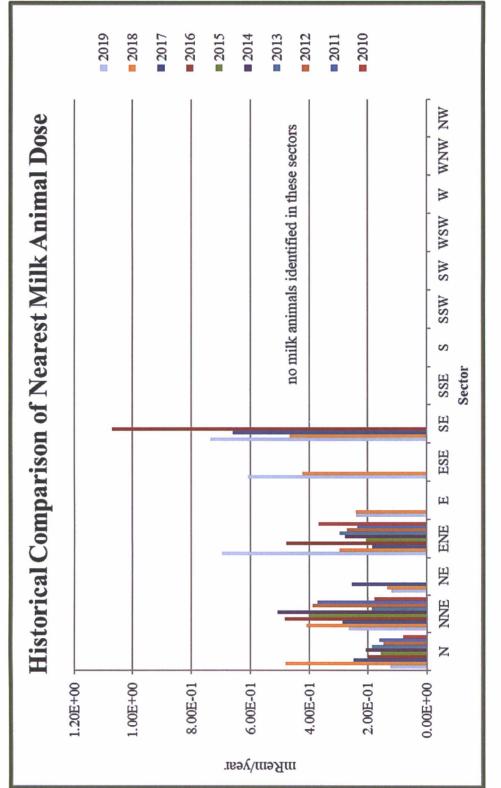
Dose calculations were performed using GASPAR code and 2018 meteorological data and source term. Dose reported for each location is the total for all three PVNGS Units and is the highest individual critical organ dose identified.





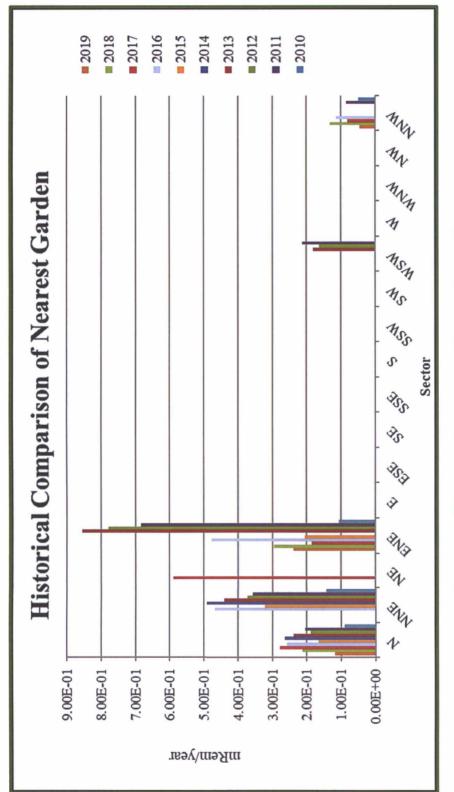
Historical annual average most prevalent wind direction is from the SW; the next highest is from the N. This contributes to the higher the NE Sector and the 2019 Land Use Census identified a potential garden pathway for the nearest resident in the ENE sector; dose is doses assigned to residents in the S sector. The 2017 Land Use Census identified potential garden pathway for the nearest resident in reflective of the assumption of direct radiation and ingestion pathway.

Historical annual average least prevalent wind direction is from the SE; the second least prevalent is from the ESE. This contributes to the lower doses assigned to the residents in the WNW, NW, and NNW sectors.





Milk animals include goats and/or cows. No milk samples have indicated any plant-related radionuclides. Additionally, milk animals in the desert environment are normally fed stored feed and are not on pasture. The calculated doses are conservative due to the inclusion of pastured feed as part of the calculation.





Gardens have been sporadically identified from year to year. Gardening is not prevalent in the desert environment.

### Summary

The conclusions are based on a review of the radioassay results and environmental gamma radiation measurements for the 2019 calendar year. Where possible, the data were compared to pre-operational sample data.

All sample results for 2019 are presented in Table 8-1 through Table 8-12 and <u>do not include</u> <u>observations of naturally occurring radionuclides</u>, with the exception of gross beta in air and gross beta in <u>drinking water</u>. Table 11-1 summarizes the ODCM required samples and is in the format required by the NRC BTP on Environmental Monitoring.

I-131 identified in the evaporation ponds, Water Resources influent, Water Resources centrifuge sludge, and reservoirs is the result of offsite sources and appears in the effluent sewage from Phoenix. The levels of I-131 detected in these locations are consistent with levels identified in previous years.

Cs-137 was detected in one Evaporation Pond 3A sample. The sample result was 41 pCi/L +/- 9 pCi/L. The required lower limit of detection for Cs-137 in water is 18 pCi/L; the action level for Cs-137 in water is 50 pCi/L. Evaporation Pond 3A has not received any influent during 2019 and is being drained to another evaporation pond to make repairs to the top liner. The water inventory in Evaporation Pond 3A is low, such that sediment that has collected in the pond was unavoidably collected in the sample. Cs-137 is known to bind to sediment, and the levels detected in the water sample is consistent with what was found in the preoperational soils in the surrounding area as a result of atmospheric bomb testing.

Tritium concentrations identified in surface water onsite have been attributed to PVNGS permitted gaseous effluent releases and secondary plant releases. These concentrations are consistent with historical values.

Environmental radiation levels are consistent with measurements reported in previous Pre-operational and Operational Radiological Environmental annual reports, References 1 and 2.

### Conclusion

There was no measurable radiological impact on the environment in 2019 resulting from the operation of PVNGS.

TABLE 1	1.1 ENVIRON	MENTAL F	RADIOLOO SUMN		ONITORING I	PROGRAM	ANNUAL
Palo Verde Nuc Maricopa Coun	clear Generating S ty, Arizona		Docket Nos. S Calendar Year		529/530		
Medium or Pathway Sampled (Unit of	Type and Total Number of Analyses Performed	Lower Limit of Detection (LLD) (from Table 6.1)	All Indicator Locations	Location with Highest Annual Mean		Control Locations	Number of Nonroutine Reported Measurements
Measurement)			Mean (f) <sup>a</sup> Range	Name Distance a Direction	Mean (f) <sup>a</sup> nd Range	Mean (f) <sup>a</sup> Range	
Direct Radiation	TLD - 199	NA	25.5 (187/188)	Site #35	31.4 (4/4)	25.6 (8/8)	0
(mrem/std. qtr.)			19.0 - 32.8	8 miles 330°	29.8 - 32.8	23.5 - 29.3	
Air Particulates	Gross Beta - 520	0.01	0.028 (513/520)	Site # 29	0.027 (50/52)	0.028 (51/52)	0
(pCi/m <sup>3</sup> )	Gamma Spec		0.011 - 0.075	1 mile 270°	0.014 - 0.075	0.010 - 0.066	
	Composite - 40						
	Cs-134 (quarterly)	0.05	<lld <lld< td=""><td>NA NA</td><td><lld <lld< td=""><td><lld <lld< td=""><td>0</td></lld<></lld </td></lld<></lld </td></lld<></lld 	NA NA	<lld <lld< td=""><td><lld <lld< td=""><td>0</td></lld<></lld </td></lld<></lld 	<lld <lld< td=""><td>0</td></lld<></lld 	0
	Cs-137	0.06	<lld< td=""><td>NA</td><td><lld< td=""><td><lld< td=""><td>0</td></lld<></td></lld<></td></lld<>	NA	<lld< td=""><td><lld< td=""><td>0</td></lld<></td></lld<>	<lld< td=""><td>0</td></lld<>	0
	(quarterly)		<lld< td=""><td>NA</td><td><lld< td=""><td><lld< td=""><td></td></lld<></td></lld<></td></lld<>	NA	<lld< td=""><td><lld< td=""><td></td></lld<></td></lld<>	<lld< td=""><td></td></lld<>	
Air Radioiodine	Gamma Spec 519						
(pCi/m <sup>3</sup> )	I-131	0.07	<lld <lld< td=""><td>NA NA</td><td><lld <lld< td=""><td><lld <lld< td=""><td>0</td></lld<></lld </td></lld<></lld </td></lld<></lld 	NA NA	<lld <lld< td=""><td><lld <lld< td=""><td>0</td></lld<></lld </td></lld<></lld 	<lld <lld< td=""><td>0</td></lld<></lld 	0
Broadleaf Vegetation	Gamma Spec 30						
(pCi/Kg-wet)	I-131 Cs-134 Cs-137	60 60 80	<lld <lld <lld< td=""><td>NA NA NA</td><td><lld <lld <lld< td=""><td><lld <lld <lld< td=""><td>0 0 0</td></lld<></lld </lld </td></lld<></lld </lld </td></lld<></lld </lld 	NA NA NA	<lld <lld <lld< td=""><td><lld <lld <lld< td=""><td>0 0 0</td></lld<></lld </lld </td></lld<></lld </lld 	<lld <lld <lld< td=""><td>0 0 0</td></lld<></lld </lld 	0 0 0

### Table 11-1 Environmental Radiological Monitoring Program Annual Summary TABLE 11.1 ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL

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Groundwater (pCi/liter)	H-3 – 12	2000	<lld< td=""><td>NA</td><td><lld< td=""><td>NA</td><td>0</td></lld<></td></lld<>	NA	<lld< td=""><td>NA</td><td>0</td></lld<>	NA	0
	Gamma Spec 12						
	Mn-54	15	<lld< td=""><td>NA</td><td><lld< td=""><td>NA</td><td>0</td></lld<></td></lld<>	NA	<lld< td=""><td>NA</td><td>0</td></lld<>	NA	0
	Fe-59	30	<lld< td=""><td>NA</td><td><lld< td=""><td>NA</td><td>0</td></lld<></td></lld<>	NA	<lld< td=""><td>NA</td><td>0</td></lld<>	NA	0
	Co-58	15	<lld< td=""><td>NA</td><td><lld< td=""><td>NA</td><td>0</td></lld<></td></lld<>	NA	<lld< td=""><td>NA</td><td>0</td></lld<>	NA	0
	Co-60	15	<lld< td=""><td>NA</td><td><lld< td=""><td>NA</td><td>0</td></lld<></td></lld<>	NA	<lld< td=""><td>NA</td><td>0</td></lld<>	NA	0
	Zn-65	30	<lld< td=""><td>NA</td><td><lld< td=""><td>NA</td><td>0</td></lld<></td></lld<>	NA	<lld< td=""><td>NA</td><td>0</td></lld<>	NA	0
	Zr-95	30	<lld< td=""><td>NA</td><td><lld< td=""><td>NA</td><td>0</td></lld<></td></lld<>	NA	<lld< td=""><td>NA</td><td>0</td></lld<>	NA	0
	Nb-95	15	<lld< td=""><td>NA</td><td><lld< td=""><td>NA</td><td>0</td></lld<></td></lld<>	NA	<lld< td=""><td>NA</td><td>0</td></lld<>	NA	0
	I-131	15	<lld< td=""><td>NA</td><td><lld< td=""><td>NA</td><td>0</td></lld<></td></lld<>	NA	<lld< td=""><td>NA</td><td>0</td></lld<>	NA	0
	Cs-134	15	<lld< td=""><td>NA</td><td><lld< td=""><td>NA</td><td>0</td></lld<></td></lld<>	NA	<lld< td=""><td>NA</td><td>0</td></lld<>	NA	0
	Cs-137	18	<lld< td=""><td>NA</td><td><lld< td=""><td>NA</td><td>0</td></lld<></td></lld<>	NA	<lld< td=""><td>NA</td><td>0</td></lld<>	NA	0
	Ba-140	60	<lld< td=""><td>NA</td><td><lld< td=""><td>NA</td><td>0</td></lld<></td></lld<>	NA	<lld< td=""><td>NA</td><td>0</td></lld<>	NA	0
	La-140	15	<lld< td=""><td>NA</td><td><lld< td=""><td>NA</td><td>0</td></lld<></td></lld<>	NA	<lld< td=""><td>NA</td><td>0</td></lld<>	NA	0
	Gross Beta – 47	4	3.51 (47/48)	Site #55	4.84 (11/12)	NA	0
	Gross Dem - 17	4	2.33 - 8.75	3 miles 214°	2.75 -8.75	1121	Ŭ
	H-3 – 16	2000		3 miles		NA	0
	H-3 – 16 Gamma Spec. – 47	2000	2.33 – 8.75 <lld< td=""><td>3 miles 214° NA</td><td>2.75 -8.75 <lld< td=""><td>NA</td><td>0</td></lld<></td></lld<>	3 miles 214° NA	2.75 -8.75 <lld< td=""><td>NA</td><td>0</td></lld<>	NA	0
Drinking	H-3 – 16 Gamma Spec. – 47 Mn-54	2000	2.33 – 8.75 <lld <lld< td=""><td>3 miles 214° NA NA</td><td>2.75 -8.75 <lld <lld< td=""><td>NA</td><td>0 0</td></lld<></lld </td></lld<></lld 	3 miles 214° NA NA	2.75 -8.75 <lld <lld< td=""><td>NA</td><td>0 0</td></lld<></lld 	NA	0 0
Water	H-3 – 16 Gamma Spec. – 47 Mn-54 Fe-59	2000 15 30	2.33 – 8.75 <lld <lld <lld< td=""><td>3 miles 214° NA NA</td><td>2.75 -8.75 <lld <lld <lld< td=""><td>NA NA NA</td><td>0 0 0</td></lld<></lld </lld </td></lld<></lld </lld 	3 miles 214° NA NA	2.75 -8.75 <lld <lld <lld< td=""><td>NA NA NA</td><td>0 0 0</td></lld<></lld </lld 	NA NA NA	0 0 0
	H-3 – 16 Gamma Spec. – 47 Mn-54 Fe-59 Co-58	2000 15 30 15	2.33 – 8.75 <lld <lld <lld <lld< td=""><td>3 miles 214° NA NA NA</td><td>2.75 -8.75 <lld <lld <lld <lld< td=""><td>NA NA NA</td><td>0 0 0 0</td></lld<></lld </lld </lld </td></lld<></lld </lld </lld 	3 miles 214° NA NA NA	2.75 -8.75 <lld <lld <lld <lld< td=""><td>NA NA NA</td><td>0 0 0 0</td></lld<></lld </lld </lld 	NA NA NA	0 0 0 0
Water	H-3 – 16 Gamma Spec. – 47 Mn-54 Fe-59 Co-58 Co-60	2000 15 15 15	2.33 – 8.75 <lld <lld <lld <lld <lld< td=""><td>3 miles 214° NA NA NA NA</td><td>2.75 -8.75 <lld <lld <lld <lld <lld< td=""><td>NA NA NA NA</td><td>0 0 0</td></lld<></lld </lld </lld </lld </td></lld<></lld </lld </lld </lld 	3 miles 214° NA NA NA NA	2.75 -8.75 <lld <lld <lld <lld <lld< td=""><td>NA NA NA NA</td><td>0 0 0</td></lld<></lld </lld </lld </lld 	NA NA NA NA	0 0 0
Water	H-3 – 16 Gamma Spec. – 47 Mn-54 Fe-59 Co-58 Co-60 Zn-65	2000 15 15 15 30	2.33 – 8.75 <lld <lld <lld <lld <lld <lld< td=""><td>3 miles 214° NA NA NA NA NA</td><td>2.75 -8.75 <lld <lld <lld <lld <lld <lld< td=""><td>NA NA NA NA NA</td><td>0 0 0 0</td></lld<></lld </lld </lld </lld </lld </td></lld<></lld </lld </lld </lld </lld 	3 miles 214° NA NA NA NA NA	2.75 -8.75 <lld <lld <lld <lld <lld <lld< td=""><td>NA NA NA NA NA</td><td>0 0 0 0</td></lld<></lld </lld </lld </lld </lld 	NA NA NA NA NA	0 0 0 0
Water	H-3 – 16 Gamma Spec. – 47 Mn-54 Fe-59 Co-58 Co-60	2000 15 15 15	2.33 – 8.75 <lld <lld <lld <lld <lld< td=""><td>3 miles 214° NA NA NA NA</td><td>2.75 -8.75 <lld <lld <lld <lld <lld< td=""><td>NA NA NA NA</td><td>0 0 0 0 0</td></lld<></lld </lld </lld </lld </td></lld<></lld </lld </lld </lld 	3 miles 214° NA NA NA NA	2.75 -8.75 <lld <lld <lld <lld <lld< td=""><td>NA NA NA NA</td><td>0 0 0 0 0</td></lld<></lld </lld </lld </lld 	NA NA NA NA	0 0 0 0 0
Water	H-3 – 16 Gamma Spec. – 47 Mn-54 Fe-59 Co-58 Co-60 Zn-65	2000 15 30 15 30 30 15	2.33 – 8.75 <lld <lld <lld <lld <lld <lld <lld <ll< td=""><td>3 miles 214° NA NA NA NA NA NA NA</td><td>2.75 -8.75 <lld <lld <lld <lld <lld <lld< td=""><td>NA NA NA NA NA NA NA</td><td>0 0 0 0 0 0</td></lld<></lld </lld </lld </lld </lld </td></ll<></lld </lld </lld </lld </lld </lld </lld 	3 miles 214° NA NA NA NA NA NA NA	2.75 -8.75 <lld <lld <lld <lld <lld <lld< td=""><td>NA NA NA NA NA NA NA</td><td>0 0 0 0 0 0</td></lld<></lld </lld </lld </lld </lld 	NA NA NA NA NA NA NA	0 0 0 0 0 0
Water	H-3 – 16 Gamma Spec. – 47 Mn-54 Fe-59 Co-58 Co-60 Zn-65 Zr-95	2000 15 15 30 30 30	2.33 – 8.75 <lld <lld <lld <lld <lld <lld <lld< td=""><td>3 miles 214° NA NA NA NA NA NA</td><td>2.75 -8.75 <lld <lld <lld <lld <lld <lld <lld< td=""><td>NA NA NA NA NA NA</td><td>0 0 0 0 0 0 0 0</td></lld<></lld </lld </lld </lld </lld </lld </td></lld<></lld </lld </lld </lld </lld </lld 	3 miles 214° NA NA NA NA NA NA	2.75 -8.75 <lld <lld <lld <lld <lld <lld <lld< td=""><td>NA NA NA NA NA NA</td><td>0 0 0 0 0 0 0 0</td></lld<></lld </lld </lld </lld </lld </lld 	NA NA NA NA NA NA	0 0 0 0 0 0 0 0
Water	H-3 – 16 Gamma Spec. – 47 Mn-54 Fe-59 Co-58 Co-60 Zn-65 Zr-95 Nb-95	2000 15 30 15 30 30 15	2.33 – 8.75 <lld <lld <lld <lld <lld <lld <lld <ll< td=""><td>3 miles 214° NA NA NA NA NA NA NA</td><td>2.75 -8.75 <lld <lld <lld <lld <lld <lld <lld <lld< td=""><td>NA NA NA NA NA NA NA</td><td>0 0 0 0 0 0 0 0 0</td></lld<></lld </lld </lld </lld </lld </lld </lld </td></ll<></lld </lld </lld </lld </lld </lld </lld 	3 miles 214° NA NA NA NA NA NA NA	2.75 -8.75 <lld <lld <lld <lld <lld <lld <lld <lld< td=""><td>NA NA NA NA NA NA NA</td><td>0 0 0 0 0 0 0 0 0</td></lld<></lld </lld </lld </lld </lld </lld </lld 	NA NA NA NA NA NA NA	0 0 0 0 0 0 0 0 0
Water	H-3 – 16 Gamma Spec. – 47 Mn-54 Fe-59 Co-58 Co-60 Zn-65 Zr-95 Nb-95 I-131	2000 15 15 30 30 30 15 15	2.33 – 8.75 <lld <lld <lld <lld <lld <lld <lld <ll< td=""><td>3 miles 214° NA NA NA NA NA NA NA NA</td><td>2.75 -8.75 <lld <lld <lld <lld <lld <lld <lld <lld <lld< td=""><td>NA NA NA NA NA NA NA</td><td>0 0 0 0 0 0 0 0 0 0</td></lld<></lld </lld </lld </lld </lld </lld </lld </lld </td></ll<></lld </lld </lld </lld </lld </lld </lld 	3 miles 214° NA NA NA NA NA NA NA NA	2.75 -8.75 <lld <lld <lld <lld <lld <lld <lld <lld <lld< td=""><td>NA NA NA NA NA NA NA</td><td>0 0 0 0 0 0 0 0 0 0</td></lld<></lld </lld </lld </lld </lld </lld </lld </lld 	NA NA NA NA NA NA NA	0 0 0 0 0 0 0 0 0 0
Water	H-3 – 16 Gamma Spec. – 47 Mn-54 Fe-59 Co-58 Co-60 Zn-65 Zr-95 Nb-95 I-131 Cs-134	2000 15 30 15 15 30 30 15 15 15	2.33 – 8.75 <lld <lld <lld <lld <lld <lld <lld <ll< td=""><td>3 miles 214° NA NA NA NA NA NA NA NA NA</td><td>2.75 -8.75 <lld <lld <lld <lld <lld <lld <lld <lld <lld< td=""><td>NA NA NA NA NA NA NA NA</td><td>0 0 0 0 0 0 0 0 0 0 0 0</td></lld<></lld </lld </lld </lld </lld </lld </lld </lld </td></ll<></lld </lld </lld </lld </lld </lld </lld 	3 miles 214° NA NA NA NA NA NA NA NA NA	2.75 -8.75 <lld <lld <lld <lld <lld <lld <lld <lld <lld< td=""><td>NA NA NA NA NA NA NA NA</td><td>0 0 0 0 0 0 0 0 0 0 0 0</td></lld<></lld </lld </lld </lld </lld </lld </lld </lld 	NA NA NA NA NA NA NA NA	0 0 0 0 0 0 0 0 0 0 0 0

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La-140         15 <lld< th="">         NA         <lld< th=""> <l< th="">           Gamma Spec 18         Mn-54         15         <lld< td="">         NA         <lld< td="">         N           Fe-59         30         <lld< td="">         NA         <lld< td="">         N           Co-58         15         <lld< td="">         NA         <lld< td="">         N           Co-60         15         <lld< td="">         NA         <lld< td="">         N           Zn-65         30         <lld< td="">         NA         <lld< td="">         N           Zr-95         30         <lld< td="">         NA         <lld< td="">         N           Surface Water (pCi/liter)         I-131         15         15 (3/18)         Site #59         17 (1/6)         N           Cs-134         15         <lld< td="">         NA         <lld< td="">         N           Cs-137         18         41(1/18)         Site #64         41 (1/2)         N</lld<></lld<></lld<></lld<></lld<></lld<></lld<></lld<></lld<></lld<></lld<></lld<></lld<></lld<></l<></lld<></lld<>			
Gamma Spec 18           Mn-54         15 <lld< th="">         NA         <lld< th="">         N           Fe-59         30         <lld< td="">         NA         <lld< td="">         N           Co-58         15         <lld< td="">         NA         <lld< td="">         N           Co-60         15         <lld< td="">         NA         <lld< td="">         N           Zn-65         30         <lld< td="">         NA         <lld< td="">         N           Zr-95         30         <lld< td="">         NA         <lld< td="">         N           Zr-95         30         <lld< td="">         NA         <lld< td="">         N           Surface Water (pCi/liter)         I-131         15         15 (3/18)         Site #59         17 (1/6)         N           13-17         Onsite 180°         17-17         N          N         N         N         N           Cs-134         15         <lld< td="">         NA         <lld< td="">         N</lld<></lld<></lld<></lld<></lld<></lld<></lld<></lld<></lld<></lld<></lld<></lld<></lld<></lld<></lld<></lld<>	Ba-140 60 <lld n<="" td=""><td></td><td>0</td></lld>		0
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Zn-65         30 <lld< th="">         NA         <lld< th="">         N           Zr-95         30         <lld< td="">         NA         <lld< td="">         N           Nb-95         15         <lld< td="">         NA         <lld< td="">         N           Surface Water (pCi/liter)         I-131         15         15 (3/18)         Site #59         17 (1/6)         N           Cs-134         15         <lld< td="">         NA         <lld< td="">         N           Cs-137         18         41(1/18)         Site #64         41 (1/2)         N</lld<></lld<></lld<></lld<></lld<></lld<></lld<></lld<>	Co-58 15 <lld n<="" td=""><td><lld na<="" td=""><td>0</td></lld></td></lld>	<lld na<="" td=""><td>0</td></lld>	0
Zr-95         30 <lld< th="">         NA         <lld< th="">         N           Nb-95         15         <lld< td="">         NA         <lld< td="">         N           Surface Water (pCi/liter)         I-131         15         15 (3/18)         Site #59         17 (1/6)         N           13-17         Onsite 180°         17-17          N         N         N           Cs-134         15         <lld< td="">         NA         <lld< td="">         N           Cs-137         18         41(1/18)         Site #64         41 (1/2)         N</lld<></lld<></lld<></lld<></lld<></lld<>	Co-60 15 <lld n<="" td=""><td><lld na<="" td=""><td>0</td></lld></td></lld>	<lld na<="" td=""><td>0</td></lld>	0
Nb-95         15 <lld< th="">         NA         <lld< th="">         N           Surface Water (pCi/liter)         I-131         15         15 (3/18)         Site #59         17 (1/6)         N           13-17         Onsite 180°         17-17         N           Cs-134         15         <lld< td="">         NA         <lld< td="">         N           Cs-137         18         41(1/18)         Site #64         41 (1/2)         N</lld<></lld<></lld<></lld<>	Zn-65 30 <lld n<="" td=""><td><lld na<="" td=""><td>0</td></lld></td></lld>	<lld na<="" td=""><td>0</td></lld>	0
Surface Water (pCi/liter)         I-131         15         15 (3/18)         Site #59         17 (1/6)         N           13-17         Onsite 180°         17-17         0         <	Zr-95 30 <lld n<="" td=""><td><lld na<="" td=""><td>0</td></lld></td></lld>	<lld na<="" td=""><td>0</td></lld>	0
13-17     Onsite 180°     17-17       Cs-134     15 <lld< td="">     NA     <lld< td="">     N       Cs-137     18     41(1/18)     Site #64     41 (1/2)     N</lld<></lld<>	Nb-95 15 <lld n<="" td=""><td><lld na<="" td=""><td>0</td></lld></td></lld>	<lld na<="" td=""><td>0</td></lld>	0
Cs-134 15 <lld <lld="" n<br="" na="">Cs-137 18 41(1/18) Site #64 41 (1/2) N</lld>	I-131 15 15 (3/18) Site	59 17 (1/6) NA	0
Cs-137 18 41(1/18) Site #64 41 (1/2) N	13-17 Onsite	180° 17-17	
Cs-137 18 41(1/18) Site #64 41 (1/2) N	Ce-124 15 JUD N	<ul> <li><lld li="" na<=""> </lld></li></ul>	0
			1
41-41 Onsite 190° 41-41			1
			0
La-140 15 <lld <lld="" n<="" na="" td=""><td>La-140 15 <lld n.<="" td=""><td><lld na<="" td=""><td>0</td></lld></td></lld></td></lld>	La-140 15 <lld n.<="" td=""><td><lld na<="" td=""><td>0</td></lld></td></lld>	<lld na<="" td=""><td>0</td></lld>	0
H-3 - 25 3000 781 (11/18) Site #59 820 (6/6) N	H-3 - 25 3000 781 (11/18) Site	59 820 (6/6) NA	0
439-1086 Onsite 180° 549-1086	439-1086 Onsite	180° 549-1086	

(a) Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses. (f)

NOTE: Miscellaneous samples that are not listed on Tables 2.1 and 9.1 (not ODCM required) are not included on this table.

- 1. Pre-Operational Radiological Monitoring Program, Summary Report 1979-1985
- 2. 1985-2018 Annual Radiological Environmental Operating Reports, Palo Verde Nuclear Generating Station
- 3. Palo Verde Nuclear Generating Station Technical Specifications and Technical Reference Manual
- 4. Offsite Dose Calculation Manual, Revision 27, PVNGS Units 1, 2, and 3
- 5. Offsite Dose Calculation Manual, Revision 28, PVNGS Units 1, 2, and 3
- 6. Regulatory Guide 4.1, Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants
- 7. Regulatory Guide 4.8, Environmental Technical Specifications for Nuclear Power Plants
- 8. NRC Radiological Assessment Branch Technical Position on Environmental Monitoring, Revision 1, November 1979 (Incorporated into NUREG-1301)
- 9. NEI 07-07, Nuclear Energy Institute, Industry Ground Water Protection Initiative Final Guidance Document, August 2007
- "Sources of Radiation." NRC: Sources of Radiation. Nuclear Regulatory Commission, 2 Oct. 2017. Web. 31 Jan. 2020.
- 11. "NCRP Report No. 160: Ionizing Radiation Exposure of the Population of the United States." *Journal of Radiological Protection J. Radiol. Prot.* 29.3 (2009): 465. Web.
- 12. NEI 07-07, Nuclear Energy Institute, Industry Groundwater Protection Initiative Final Guidance Document, Rev. 1, March 2019
- 13. Offsite Dose Calculation Manual, Revision 29, PVNGS Units 1, 2, and 3
  - Editorial changes made in March, 2020 to correct corrupted equations in Revision 28. No Technical changes were made.