NEXTera ENERGY
DUANE ARNOLD

May 12, 2017

NG-17-0103
TS 5.6.2

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

Duane Arnold Energy Center
Docket No. 50-331
Renewed Op. License No. DPR-49

Subject: 2016 Annual Radiological Environmental Operating Report

Please find as Enclosure 1 to this letter, a copy of NextEra Energy Duane Arnold, LLC's 2016 Annual Radiological Environmental Operating Report for the Duane Arnold Energy Center, pursuant to the requirements of ODAM Section 8.2.2 and Technical Specification Section 5.6.2.

This letter contains no new commitments nor does it revise any existing commitments.

Should you have any questions regarding this matter, please contact Michael Casey at (319) 851-7606.

Sincerely,

for

Dean Curtland
Site Director
NextEra Energy Duane Arnold, LLC

Enclosure

cc: Regional Administrator, USNRC, Region III
Resident Inspector, USNRC, Duane Arnold Energy Center
Project Manager, USNRC, Duane Arnold Energy Center

Enclosure 1 to
NG-17-0103

Duane Arnold Energy Center

2016 Annual Radiological Environmental Operating Report

123 Pages to follow

2016

Annual Radiological Environmental Operating Report

Duane Arnold Energy Center

Cedar Rapids, Iowa

Docket No. 50-331

January 1, 2016 through December 31, 2016

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2016
Annual Radiological Environmental Operating Report

Duane Arnold Energy Center
DOCKET NUMBER. 50-331

Prepared By: _____ Date: 5/8/17

Reviewed By: _____ Date: 5/8/17

Approved By: _____ Date: 5/9/17

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DUANE ARNOLD ENERGY CENTER
CEDAR RAPIDS, IOWA
DOCKET NO. 50-331

REPORT

to the

UNITED STATES
NUCLEAR REGULATORY COMMISSION

Annual Radiological Environmental Operating Report

January 1 to December 31, 2016

Prepared by

ATI ENVIRONMENTAL, Inc.
Midwest Laboratory

Project No. 8001

Approved : _____

Bronia Grob, M.S.
Laboratory Manager

PREFACE

Staff members of the Environmental, Inc., Midwest Laboratory were responsible for the acquisition of data presented in this report, with the exception of Appendices D and E which were completed by DAEC personnel. All environmental samples, with the exception of aquatic, were collected by personnel of DAEC. Aquatic samples were collected by the University of Iowa Hygienic Laboratory.

The report was prepared by Environmental, Inc., Midwest Laboratory, with the exception of Appendices D and E, which were prepared by DAEC personnel.

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1.0 INTRODUCTION

This report summarizes and interprets results of the Radiological Environmental Monitoring Program (REMP) conducted by Environmental, Inc., Midwest Laboratory at the Duane Arnold Energy Center, Palo, Iowa, during the period January - December, 2016. This Program monitors the levels of radioactivity in the air, terrestrial, and aquatic environments in order to assess the impact of the plant on its surroundings.

The REMP fulfills the requirements of Sections IV.B.2 and IV.B.3 of Appendix I to 10 CFR 50 for the operation of the plant. The REMP also fulfills the requirements of 10 CFR 72.44(d)(2) for operation of the ISFSI.

Tabulations of individual analyses made during the year are included in Part II of this report.

The Duane Arnold Energy Center (DAEC) is a boiling water reactor, located in Linn County, Iowa, on the Cedar River, and owned and operated by NextEra Energy Resources. Initial criticality was attained on March 23, 1974. The reactor reached 100% power on August 12, 1974. Commercial operation began on February 1, 1975.

2.0 SUMMARY

The Radiological Environmental Monitoring Program, as required by the U.S. Nuclear Regulatory Commission (NRC) Technical Specifications for the Duane Arnold Energy Center, is herein described. Results for the year 2016 are summarized and discussed.

Program findings show only background levels of radioactivity in the environmental samples collected in the vicinity of the Duane Arnold Energy Center.

No effect on the environment is indicated in the areas surrounding the site of the Duane Arnold Energy Center.

3.0 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

3.1 Program Design and Data Interpretation

The purpose of the Radiological Environmental Monitoring Program at the Duane Arnold Energy Center (DAEC) is to assess the impact of the plant on its environment. For this purpose, samples are collected from the air, terrestrial, and aquatic environments and analyzed for radioactive content. In addition, ambient gamma radiation levels are monitored by thermoluminescent dosimeters (TLDs).

Sources of environmental radiation include the following:

(1) Natural background radiation arising from cosmic rays and primordial radionuclides;
(2) Fallout from atmospheric nuclear detonations;
(3) Releases from nuclear power plants; and
(4) Industrial and medical radioactive waste.

In interpreting the data, effects due to the DAEC operation must be distinguished from those due to other sources.

A major interpretive aid in assessment of these effects is the design of the monitoring program at the DAEC which is based on the indicator-control concept. Most types of samples are collected both at indicator locations (nearby, downwind, or downstream) and at control locations (distant, upwind, or upstream). A station effect would be indicated if the radiation level at an indicator location was significantly larger than that at the control location. The difference would have to be greater than could be accounted for by typical fluctuations in radiation levels arising from other sources.

An additional interpretive technique involves analyses for specific radionuclides present in the environmental samples collected from the DAEC site. The DAEC's monitoring program includes analyses for strontium-90 and iodine-131, which are fission products, and tritium, which is produced by cosmic rays, atmospheric nuclear detonations, and also by nuclear power plants. Most samples are also analyzed for gamma-emitting isotopes with results for the following groups quantified: zirconium-95, cesium-137, and cerium-144. These three gamma-emitting isotopes were selected as radiological impact indicators because of the different characteristic proportions in which they appear in the fission product mix produced by a nuclear reactor and that produced by a nuclear detonation. Each of the three isotopes is produced in roughly equivalent amounts by a reactor: each constitutes about 10% of the total activity of fission products ten (10) days after reactor shutdown. On the other hand, ten (10) days after a nuclear explosion, the contributions of zirconium-95, cerium-144, and cesium-137 to the activity of the resulting debris are in the approximate ratio 4:1:0.03 (Eisenbud,1963). The other group quantified consists of niobium-95, ruthenium-103 and -106, cesium-134, barium-lanthanum-140, and cerium-141. These isotopes are released in small quantities by nuclear power plants, but to date their major source of injection into the general environment has been atmospheric nuclear testing. Nuclides of the next group, manganese-54, cobalt-58 and-60, and zinc-65, are activation products and arise from activation of corrosion products. They are typical components of nuclear power plant effluents, but are not produced in significant quantities by nuclear detonations. Nuclides of the final group, beryllium-7, which is of cosmogenic origin, and potassium-40, a naturally-occurring isotope, were chosen as calibration monitors and provide a comparison between levels of naturally occurring radionuclides and radionuclides that could be attributed to the operation of the plant.

Characteristic properties of isotopes quantified in gamma-spectroscopic analysis are presented in Table 5.1. Other means of distinguishing sources of environmental radiation can be employed in interpreting the data. Current radiation levels can be compared with previous levels, including those measured before the Plant became operational. Results of the DAEC's Monitoring Program can be related to those obtained in other parts of the world. Finally, results can be related to events known to cause elevated levels of radiation in the environment, e.g., atmospheric nuclear detonations.

3.2 Program Description

3.2.1 Environmental Monitoring

The sampling and analysis schedule for the Radiological Environmental Monitoring Program (REMP) at the DAEC is summarized in Table 5.2 and is briefly reviewed below. Table 5.3 defines the sampling location codes used in Table 5.2 and specifies for each location its distance, direction, and sector relative to the reactor site. The types of samples collected at each location and the frequency of collections are presented in Table 5.4 using codes defined in Table 5.5.

To monitor the air environment, a continuous air sampler is employed. Airborne particulates and activated charcoal canisters are mounted on the intake of the air sampler to collect airborne particulates and airborne iodine respectively. 2016 began with nine sampling locations. Eight of the nine locations are indicators and one is a control (D-13). Filters are changed and counted weekly. Particulate filters are analyzed for gross beta activity. If gross beta activity exceeds ten times the yearly mean of the control samples, gamma isotopic analysis is performed. Quarterly composites of airborne particulates from each location are analyzed for gamma emitting isotopes. Charcoal canister samples are analyzed weekly for iodine-131.

Ambient gamma radiation is monitored at a total of 50 locations. A TLD is placed at each location and exchanged and analyzed quarterly. The TLD locations are distributed as follows:

- Two on-site locations
- Eighteen in a circle within a 0.5 mi. radius from the DAEC stack.
- Six in 22.5° sectors within 1 mi. from the DAEC stack.
- Ten in 22.5° sectors between 1 and 3 miles from the DAEC stack.
- Ten control locations greater than 3 miles from the DAEC stack.
- Four along sections of the Independent Spent Fuel Storage Installation (ISFSI) fenceline.

Surface water is collected monthly from four river locations, D-49 (Lewis Access, Control, 4 mi. upstream), D-50 (Inlet), D-51 (Discharge) and D-61 (downstream of Discharge) and also from Pleasant Creek Lake (D-99). The monthly samples are analyzed for tritium and gamma-emitting isotopes. Additional analyses are performed on samples collected from the control and indicator locations, D-49 and D-61. Analyses for low-level iodine-131 are performed on monthly collections and quarterly composites are prepared and analyzed for strontium-89 and strontium-90.

The aquatic environment is also monitored by upstream and downstream (D-49 and D-61) semiannual collections of fish. A fish control sample was purchased from a local grocery store and the fish filet was produced outside the State of Iowa. River bottom sediment is collected semiannually at the plant's intake (D-50 and in the fall of 2016 replaced with D-49) and discharge (D-51) and the site's north drainage ditch (D-107a). The samples are analyzed for gamma-emitting isotopes.

Potable ground water is collected quarterly from the Cedar Rapids treated municipal water system (D-53), the inlet to the Cedar Rapids municipal water treatment system (D-54), three indicator locations (D-55, D-57, D-58) and one control location (D-72). The samples are analyzed for tritium and gamma emitting isotopes. Any positive identification of a reactor by-product material initiates analyses for hard to detect isotopes of Ni-63, Sr-89, Sr-90, Fe-55 and gross alpha. Beginning in the fourth quarter of 2014 all samples were analyzed to a lower MDA of 1 pCi/L for I-131.

For 2016, dairy cow milk is collected monthly from one indicator and one control location during the non-grazing season, October through April, and biweekly during the grazing season, May 1 through September 30. The samples are analyzed for iodine-131 and gamma-emitting isotopes.

Additional monitoring of the terrestrial environment, grain, hay, grass and broadleaf vegetation samples are collected annually, as available, from nine locations: one control (D-138) and eight indicators (D-16, D-57, D-96, D-109, D-110 and D-118). Grain, hay and broadleaf (green leafy) vegetation samples are analyzed for gamma-emitting isotopes and at least two broad leaf vegetation samples are analyzed for iodine-131. Vegetation control samples are purchased from

local grocery and feed stores provided the sample source is outside the State of Iowa.

If any of the cattle grazing on-site are slaughtered for home use, a meat sample is collected. The sample is analyzed for gamma-emitting isotopes.

3.2.2 Ground Water Protection Program

Environmental, Inc., Midwest Laboratory provides laboratory services for the Duane Arnold Energy Center Ground Water Protection Program. For results from these analyses, refer to the Duane Arnold Energy Center, 2016 Annual Radioactive Material Release Report and Appendix E of this report.

3.3 Program Execution

The program was executed as described in the preceding section with the following exceptions:

(1) Airborne Particulates / Airborne Iodine:

Air particulate / air iodine sampling was affected by power outages at several locations during the year. In most cases the power issues resulted in lower sample volumes and in a couple of cases the power outages resulted in a failure to meet the required LLD for Iodine-131. Details of the outages are listed in table 5.6. In summary location D-3 had a lower volume for the collection ending 8/12/16. Location D-13 had lower volumes for the collections ending 4/7/16 and 6/17/16. Location D-15 had lower volumes due to power issues for the collection periods ending 2/5/16, 3/18/16, 7/8/16, 7/14/16, 12/15/16 and 12/21/16.

Failure to reach the iodine-131 lower limit of detection of 0.07 pCi/m^3 occurred for the period ending 12/15/16 at location D-15.

(2) Thermoluminescent Dosimetry

The third quarter, 2016 TLD at location D-46 was missing in the field. The TLD was replaced. Whereabouts of missing D-46 and cause for loss are unknown; potentially due to theft or vandalism.

(3) Surface Water

Surface water was not available at locations D-49, D-50 and D-99 for the 12/19/16 collections due to frozen water conditions.

3.4 Laboratory Procedures

The Iodine-131 analyses in milk and water were made using a sensitive radiochemical procedure involving separation of iodine using an ion-exchange method, solvent extraction and subsequent beta counting. Levels of iodine-131 in vegetation and concentrations of airborne iodine-131 in charcoal samples were determined by gamma spectroscopy.

Gamma-spectroscopic analyses are performed using high-purity germanium (HPGe) detectors. The gamma isotopic analysis provides a spectrum with an energy range from 80 to 2048 KeV. Specific isotopes included in the gamma library are Mn-54, Fe-59, Co-58, Co-60, Zn-65, Zr-95, Nb-95, Ru-103, Ru-106, I-131, Ba-La-140, Cs-134, Cs-137, Ce-141, and Ce-144. Naturally occurring gamma-emitters, such as Be-7, K-40 and Ra daughters, are frequently detected but may not be listed.

Tritium was measured by liquid scintillation spectrometry.

Analytical Procedures used by Environmental, Inc. are on file and are available for inspection. Procedures are based on those prescribed by the Health and Safety Laboratory of the U.S. Dep't of Energy, Edition 28, 1997, U.S. Environmental Protection Agency for Measurement of Radioactivity in Drinking Water, 1980, and the U.S. Environmental Protection Agency, EERF, Radiochemical Procedures Manual, 1984.

Environmental, Inc., Midwest Laboratory has a comprehensive quality control/quality assurance program designed to assure the reliability of data obtained. Details of the QA Program are presented elsewhere (Environmental, Inc., Midwest Laboratory, 2016). The QA Program includes participation in Interlaboratory Comparison (crosscheck) Programs. Results obtained in crosscheck programs are presented in Appendix A.

3.5 Program Modifications

There were several changes to the REMP program in 2016. Control location 56 was added to the program. Samples for broadleaf vegetation, hay and grain vegetation and a fish sample was collected from this new sample location. Also, sediment samples location D-49 replaced location D-50 in the second half of 2016.

4.0 RESULTS AND DISCUSSION

All collections and analyses were made as scheduled, except for those listed in Table 5.6.

Results are summarized in Table 5.7 as recommended by the Nuclear Regulatory Commission. For each type of analysis and sample medium, the table lists the mean and range of all indicator and control locations, as well as that location with the highest mean and range.

Tabulated results of measurements are not included in this section, although reference to these results will be made in discussion. A complete tabulation of results for 2016 is contained in Part II of the Annual Report on the Radiological Environmental Monitoring Program for the Duane Arnold Energy Center.

4.1 Atmospheric Nuclear Detonations and Nuclear Accidents

There were no reported accidents involving significant release to the environment at nuclear reactor facilities in 2016. The Fukushima Daiichi nuclear accident occurred March 11, 2011.

There were no reported atmospheric nuclear tests in 2016. The last reported test was conducted on October 16, 1980 by the People's Republic of China.

4.2 Program Findings

Results obtained show background levels of radioactivity in the environmental samples collected outside of the Owner Controlled Area in 2016. The trace levels of cesium-137, still measurable in soil is attributed to deposition of fallout from previous decades.

Airborne Particulates

The average annual gross beta concentrations in airborne particulates were similar at indicator and control locations (0.027 and 0.023 pCi/m^3, respectively) and similar to levels observed from 1995 through 2015. The results are tabulated below.

Year	Indicators	Controls		Year	Indicators	Controls
Concentration (pCi/m^3)				Concentration (pCi/m^3)		
1999	0.026	0.027		2008	0.029	0.029
2000	0.026	0.027		2009	0.031	0.030
2001	0.026	0.026		2010	0.028	0.028
2002	0.027	0.027		2011	0.030	0.029
2003	0.029	0.029		2012	0.030	0.029
2004	0.028	0.028		2013	0.028	0.025
2005	0.031	0.031		2014	0.026	0.025
2006	0.029	0.027		2015	0.027	0.024
2007	0.031	0.031		2016	0.027	0.023

Average annual gross beta concentrations in airborne particulates.

4.2 Program Findings, Airborne Particulates (continued)

Gamma spectroscopic analysis of quarterly composites of air particulate filters yielded similar results for indicator and control locations. Beryllium-7, produced continuously in the upper atmosphere by cosmic radiation (Arnold and Al-Salih, 1955), was detected in all samples, with an average activity of 0.071 pCi/m3 for indicator locations and 0.065 pCi/m3 for the control location. No reactor by-product radionuclides were identified. All samples met required lower limits of detection as specified in the DAEC Offsite Dose Assessment Manual.

Airborne Iodine

Levels of airborne iodine-131 measured below the required limit of 0.007 pCi/m^3 with the exception of one sample collected at location D-15 for the week ending 3/18/16. The failure to reach the LLD was due to reduced sample volume as a result of power failures to the air sampling pumps.

Ambient Radiation (TLDs)

At ten control locations, thermoluminescent dosimeter (TLD) readings averaged 15.0 mR/quarter. At locations within a half mile, one mile and three mile radius of the stack, the measurements averaged 17.5, 17.5 and 15.1 mR/quarter, respectively. The two on-site locations D-15 and D-16 averaged 15.9 and 13.2 mR/quarter respectively. These average measurements are similar to the estimated average natural background radiation for Middle America, 19.5 mR/quarter, which is based on data on Pages 71 and 108 of the report, "Natural Background Radiation in the United States" (National Council on Radiation Protection and Measurements, 1975). The terrestrial absorbed dose (uncorrected for structural and body shielding) ranges from 8.8 to 18.8 mrad/quarter and averages 11.5 mrad/quarter for Middle America. Cosmic radiation and cosmogenic radionuclides contribute 8.0 mrad/quarter for a total average of 19.5 mrad/quarter. No plant effect is indicated.

ISFSI Facility Operations Monitoring

Four TLDs, placed directionally along the ISFSI fenceline, averaged 32.9 mR/quarter. The TLD site D-30, located between the nearest residence and the ISFSI site averaged 18.6 mR/quarter. Calculated dose rates indicate the site is in compliance with 10 CFR 72.104 and 40 CFR 190.

Milk

Iodine-131 concentrations in milk samples were less than the LLD level of 0.5 pCi/L.

No gamma-emitting isotopes, excepting naturally occurring potassium-40, were detected in any milk samples. This is consistent with findings that most radiocontaminants in feed do not find their way into milk due to the selective metabolism of the cow. The common exceptions are radioisotopes of potassium, cesium, strontium, barium, and iodine (National Center for Radiological Health, 1968).

No reactor by-product radionuclides were identified. All samples met required lower limits of detection as specified in the DAEC Offsite Dose Assessment Manual.

Ground Water (potable)

Tritium concentrations in ground water samples were less than the LLD of 171 pCi/L in all samples analyzed. Gamma-emitting isotopes were below detection limits.

No reactor by-product radionuclides could be identified. All samples met required lower limits of detection as specified in the DAEC Offsite Dose Assessment Manual.

4.2 Program Findings (continued)

Vegetation

Iodine-131 concentrations in vegetation samples were less than the LLD level of 0.03 pCi/g wet weight in all samples analyzed.

With the exception of potassium-40, which was observed in all vegetation samples, all other gamma-emitting isotopes were below detection limits. No reactor by-product radionuclides were identified. All samples met required lower limits of detection as specified in the DAEC Offsite Dose Assessment Manual.

Surface Water

Surface water was tested for tritium and gamma emitting isotopes in fifty-seven samples from five locations. No measurable tritium activity was detected above an LLD of 179 pCi/L.

Analyses for I-131 were performed on samples from locations D-49 (control) and D-61 (0.5 mi. downstream, indicator). No measurable I-131 was detected above an LLD of 0.5 pCi/L.

Quarterly composites were also prepared from the samples collected at locations D-49 and D-61 and tested for strontium-89 and strontium-90. All samples tested below detection limits.

No plant effect on surface water is indicated.

Fish

Fish were collected in May, October and September, 2016, and analyzed for gamma-emitting isotopes. With the exception of naturally-occurring potassium-40, no gamma-emitting isotopes were identified in edible portions of fish. The potassium-40 level was similar at both the indicator and control locations (3.33 and 3.42 pCi/g wet, respectively).

No reactor by-product radionuclides were identified. All samples met required lower limits of detection as specified in the DAEC Offsite Dose Assessment Manual.

River Sediments

Six river sediments were collected in 2016 during the months of May and October, and analyzed for gamma-emitting isotopes. Potassium-40 activity ranged from 6.63 to 8.77 pCi/g dry weight and averaged 7.69 pCi/ g dry weight at the indicator locations and 7.65 pCi/g dry weight at the control location.

No reactor by-product radionuclides were identified. All samples met required lower limits of detection as specified in the DAEC Offsite Dose Assessment Manual.

Ground Water Protection Program

Environmental, Inc., Midwest Laboratory provides laboratory services for the Duane Arnold Energy Center Ground Water Protection Program. For results from these analyses, refer to the Duane Arnold Energy Center, 2016 Annual Radioactive Material Release Report and Appendix E.

5.0 TABLES AND FIGURES

Table 5.1 Characteristic properties of isotopes quantified in gamma-spectroscopic analyses.

Designation	Comment	Isotope	Half-life [a]
Naturally Occurring			
A. Cosmogenic	Produced by interaction of cosmic rays with atmosphere	Be-7	53.2 d
B. Terrestrial	Primordial	K-40	1.26×10^9 y
II. Fission Products [b]	Nuclear accidents and detonations constitute the major environmental source.		
A. Short-lived		I-131	8.04 d
		Ba-140	12.8 d
B. Other than Short-lived		Nb-95	35.15 d
		Zr-95	65 d
		Ru-103	39.35 d
		Ru-106	368.2 d
		Cs-134	2.061 y
		Cs-137	30.174 y
		Ce-141	32.5 d
		Ce-144	284.31 d
III. Activation Products	Typically found in nuclear power plant effluents	Mn-54	312.5 d
		Fe-59	45.0 d
		Co-58	70.78 d
		Co-60	5.26 y
		Zn-65	245 d

[a] Half-lives are taken from Appendix E of Environmental Quarterly, 1 January 1978, EML-334 (U. S. Department of Energy, 1978).

[b] Includes fission-product daughters.

Table 5.2 Sample collection and analysis program.

Sampling Location [a]				
Exposure Pathway and/or Sample Type	Sample Point	Description	Sampling and Collection Frequency	Type and Frequency of Analysis [b]
Airborne Particulates	3 5 6 7 11 13 15 16 40	Hiawatha Palo[c] Center Point Shellsburg Toddville Alburnett (C) On-site North On-site South Wickiup Hill	Continuous operation of sampler with sample collection at least once per week or as required by dust loading	Analyze for gross beta activity more than 72 hours after filter change. Perform gamma isotopic analysis on each sample having gross beta activity greater than ten times the yearly mean of the control samples. Composite weekly samples to form a quarterly composite (by location). Analyze quarterly composite for gamma isotopic.
Airborne Iodine	3 5 6 7 11 13 15 16 40	Hiawatha Palo[c] Center Point Shellsburg Toddville Alburnett (C) On-site North On-site South Wickiup Hill	Continuous operation of sampler with sample collection at least once per week.	Analyze each cartridge for iodine-131.
Ambient Radiation	1-3, 5-8 10, 11, 13 15-23, 28-32, 33-42 43-48 82-86, 91 161-164	(Controls) (Indicators) Within 0.5 mile of Stack Within 3.0 miles of Stack Within 1.0 mile of Stack ISFSI Fence line	One dosimeter continuously at each location. Dosimeters are changed at least quarterly.	Read gamma radiation dose quarterly.
Surface Water	49 50 51 61 99	Lewis Access (C) Plant Intake Plant Discharge ~ ½ mi. downstream from Plant Discharge Pleasant Creek Lake	Once per month.	Gamma isotopic and tritium analysis for each sample (by location). Locations 49 and 61, analyses for low-level I-131. Quarterly composites for Sr-89, Sr-90.

Table 5.2 Sample collection and analysis program, (continued).

Sampling Location [a]				
Exposure Pathway and/or Sample Type	Sample Point	Description	Sampling and Collection Frequency	Type and Frequency of Analysis [b]
Ground Water	53 54 55 57, 58 72 (C)	Treated Municipal Water Inlet to Municipal Water Treatment System On-site well Wells off-site and within 4 km of DAEC	Grab sample at least once per quarter	Analysis gamma emitting isotopes, iodine-131 and tritium on quarterly samples. If reactor by-product gamma emitters are identified, or if tritium concentrations measure > MDA, then analyze for Ni-63, Sr-89, Sr-90 and alpha emitters.
River Sediment	49 50 51 107a	Lewis Access Plant Intake (C) Plant Discharge North Drainage Ditch (on-site)	At least once every six months.	Gamma isotopic analysis of each sample
Vegetation	16,57 56 96,109 110,118 138 (C)	Farms raising food crops	Annually at harvest time. Two samples of each: grain, green leafy, and forage.	Gamma isotopic analysis, including iodine-131, on each sample.
Fish	49 56 61	Cedar River upstream of DAEC not influenced by effluent (C) Downstream of DAEC in influence of effluent	One sample per 6 months (once during January through June and once during July through December).	Gamma isotopic analysis on edible portions.
Milk [d]	138 (C) 110	Farm near Newhall, IA Dairy Farm within 7.8 miles from Site	At least once per two weeks during the grazing season. At least once per month during the non-grazing season.	<u>During the grazing season</u>: Gamma isotopic and iodine-131 analyses of each sample. <u>During the non-grazing season</u>: Gamma isotopic and iodine-131 analyses of each sample.

[a] (C) denotes control location. All other locations are indicators.
[b] Gamma isotopic analysis and analysis for gamma-emitting nuclides refer to high resolution gamma ray spectrum analysis.
[c] Sample not available after April 1, 2015.
[d] The grazing season is considered to be May 1 through September 30.

Table 5.3 Sampling locations, Duane Arnold Energy Center.

Sampling Location		
Code	Location Description	Distance and Direction from Site Stack
D-1	Cedar Rapids	20,800 meters SE
D-2	Marion	16,900 meters ESE
D-3	Hiawatha	10,800 meters SE
D-5	Palo	4,500 meters SSW
D-6	Center Point	9,660 meters N
D-7	Shellsburg	7,950 meters W
D-8	Urbana	15,000 meters NNW
D-10	Atkins	13,600 meters SSW
D-11	Toddville	4,980 meters E
D-13	Alburnett	14,500 meters ENE
D-15	On-site, North-Northwest	1,050 meters NNW
D-16	On-site, South-Southeast	520 meters SSE
D-17	On-site, N	1,050 meters N
D-18	On-site, NNE	630 meters NNE
D-19	On-site, NE	590 meters NE
D-20	On-site, ENE	550 meters ENE
D-21	On-site, ENE	515 meters ENE
D-22	On-site, ESE	535 meters ESE
D-23	On-site, SE	490 meters SE
D-28	On-site, WSW	730 meters WSW
D-29	On-site, W	630 meters W
D-30	On-site, WNW	640 meters WNW
D-31	On-site, NW	1,020 meters NW
D-32	On-site, NNW	1,110 meters NNW
D-33	3 mile ring	4,340 meters N
D-34	3 mile ring	3,930 meters NNE
D-35	3 mile ring	2,800 meters NE
D-36	3 mile ring	3,500 meters ENE
D-37	3 mile ring	2,960 meters E
D-38	3 mile ring	3,180 meters ESE
D-39	3 mile ring	2,510 meters SE
D-40	3 mile ring	2,430 meters SSE
D-41	3 mile ring	5,680 meters S
D-42	3 mile ring	4,380 meters SSE
D-43	1 mile ring	1,590 meters SSW
D-44	1 mile ring	1,580 meters WSW
D-45	1 mile ring	1,420 meters W
D-46	1 mile ring	1,580 meters WNW
D-47	1 mile ring	1,760 meters NW
D-48	1 mile ring	1,680 meters NNW

Table 5.3 Sampling locations, Duane Arnold Energy Center (continued).

Sampling Location		
Code	Location Description	Distance and Direction from Site Stack
D-49	Lewis Access, upstream of DAEC	6,750 meters NNW
D-50	Plant Intake	560 meters SE
D-51	Plant Discharge	600 meters SE
D-53	Treated Municipal Water	13,900 meters SE
D-54	Inlet, Municipal Water Treatment System	13,900 meters SE
D-55	Production Well	Production wells A-D
D-56	Control samples from various locations	Sample location varies
D-57	Farm (Off-site Well)	805 meters W
D-58	Farm (Off-site Well)	974 meters WSW-SW
D-61	Downstream of plant discharge	670 meters SSE
D-72	Farm	3,200 meters SSW
D-82	On-site, SSE	660 meters SSE
D-83	On-site, SSE	620 meters SSE
D-84	On-site, S	610 meters S
D-85	On-site, SSW	660 meters SSW
D-86	On-site, SW	850 meters SW
D-91	On-site, NNW	1,090 meters NNW
D-96	Farm	11,400 meters SSW
D-99	Pleasant Creek Lake	3,880 meters WNW
D-107a	North Drainage Ditch	On-site
D-109	Farm	5,890 meters SW
D-110	Farm	12,700 meters SW
D-118	Farm	2,230 meters NW
D-138	Farm	21,600 meters WSW
D-161	ISFSI Fence East	On-site
D-162	ISFSI Fence South	On-site
D-163	ISFSI Fence West	On-site
D-164	ISFSI Fence North	On-site

Table 5.4 Type and Frequency of collection.

Location	Weekly	Monthly	Quarterly	Semiannually	Annually
D-1			TLD		
D-2			TLD		
D-3	AP, AI		TLD		
D-5	AP, AI		TLD		
D-6	AP, AI		TLD		
D-7	AP, AI		TLD		
D-8			TLD		
D-10			TLD		
D-11	AP, AI		TLD		
D-13	AP, AI		TLD		
D-15	AP, AI		TLD		
D-16	AP, AI		TLD		G
D-17 to D-23			TLD		
D-28 to D-39			TLD		
D-40	AP, AI		TLD		
D-41 to D-48			TLD		
D-49		SW		F	
D-50		SW		BS	
D-51		SW		BS	
D-53			WW		
D-54			WW		
D-55			WW		
D-56					
D-57			WW		G
D-58			WW		
D-61		SW		F	
D-72			WW		
D-82 to D-86			TLD		
D-91			TLD		
D-96					G
D-99		SW			
D-107A				BS	
D-109					G
D-110		MI*			
D-118					G
D-138		MI*			G
D-161 to D-164			TLD		
On-site					

* Biweekly during the grazing season.

Table 5.5. Sample codes used in Table 5.4 and Table 5.6.

Code	Description
AP	Airborne Particulates
AI	Airborne Iodine
TLD	Thermoluminescent Dosimeter
MI	Milk
WW	Well Water
G	Vegetation
ME	Meat
SW	Surface Water
F	Fish
BS	River Sediment

Table 5.6. Program Deviations, Duane Arnold Energy Center.

Sample Type	Analysis	Location(s)	Collection Date or Period	Comments
AP/AI	Gross Beta/ I-131	D-15	02/05/16	Low volume due to power outage
AP/AI	Gross Beta/ I-131	D-15	03/18/16	Low volume due to power outage. Storms.
AP/AI	Gross Beta/ I-131	D-13	04/07/16	Light deposit on filter.
AP/AI	Gross Beta/ I-131	D-13	06/17/16	Low volume. Sampler breaker tripped off Possibly due to storms in area.
AP/AI	Gross Beta/ I-131	D-15	07/8/16	Low volume due to tripped breaker. Storms in area.
AP/AI	Gross Beta/ I-131	D-15	07/14/16	Low volume due to outage in area. Iodine 131 result = 0.031 pCi/m^3 due to low volume
AP/AI	Gross Beta/ I-131	D-3	08/12/16	Low volume due to power outage.
TLD	Gamma	D-46	10/03/16	TLD missing in field.
AP/AI	Gross Beta/ I-131	D-15	12/15/16	Low volume due to outage in area. Iodine 131 result = 0.031 pCi/m^3 due to low volume
SW	H-3/I-131/Gamma	D-49	12/19/16	Water frozen.
SW	H-3/Gamma	D-50	12/19/16	Water frozen.
SW	H-3/Gamma	D-99	12/19/16	Water frozen.
AP/AI	Gross Beta/ I-131	D-15	12/21/16	Low volume due to outage in area.

Table 5.7 Radiological Environmental Monitoring Program Summary.

Name of Facility	Duane Arnold Energy Center	Docket No.	50-331
Location of Facility	Linn, Iowa (County, State)	Reporting Period	January-December, 2016

Sample Type (Units)	Type and Number of Analyses [a]	LLD [b]	Indicator Locations Mean (F) [c] Range [c]	Location with Highest Annual Mean: Location [d]	Location with Highest Annual Mean: Mean (F) [c] Range [c]	Control Locations Mean (F) [c] Range [c]	Number Non-Routine Results [e]
Airborne Pathway							
Airborne Particulates (pCi/m^3)	GB 416	0.003	0.027 (364/364) (0.010-0.056)	D-16, On-site South-Southeast	0.028 (52/52) (0.014-0.055)	0.023 (52/52) (0.002-0.048)	0
	GS 32						
	Be-7	0.020	0.071 (28/28) (0.047-0.106)	D-3, Hiawatha	0.073 (4/4) (0.053-0.086)	0.065 (4/4) (0.053-0.065)	0
	Mn-54	0.0732	< LLD			< LLD	0
	Fe-59	0.0030	< LLD			< LLD	0
	Co-58	0.0024	< LLD			< LLD	0
	Co-60	0.0011	< LLD			< LLD	0
	Zn-65	0.0667	< LLD			< LLD	0
	Nb-95	0.0730	< LLD			< LLD	0
	Zr-95	0.0025	< LLD			< LLD	0
	Ru-103	0.0023	< LLD			< LLD	0
	Ru-106	0.0114	< LLD			< LLD	0
	Cs-134	0.0086	< LLD			< LLD	0
	Cs-137	0.0019	< LLD			< LLD	0
	Ce-141	0.0025	< LLD			< LLD	0
	Ce-144	0.0073	< LLD			< LLD	0
Airborne Iodine (pCi/m^3)	I-131 416	0.070	< LLD			< LLD	0
Direct Radiation							
TLDs (mR/quarter)							
Control Locations	Gamma 40	1.0	None	D-8,Urbana 10 mi. NW	16.7 (4/4) (16.2-17.1)	15.0 (40/40) (11.0-17.8)	0
Within 0.5 mi. of Stack	Gamma 80	1.0	17.5 (80/80) (9.1-23.8)	D-29,On-site 0.5 mi. W	21.9 (4/4) (20-23.0)	None	0
Within 1.0 mi. of Stack	Gamma 23	1.0	17.5 (23/23) (12.6-24.2)	D-48, 1 mi. NNW	20.0 (3/4) (19-21.1)	None	0
Within 3.0 mi. of Stack	Gamma 40	1.0	15.1 (40/40) (10.8-20.8)	D-41, 3.5 mi. S	18.1 (4/4) (15-20.8)	None	0
ISFSI border	Gamma 16	1.0	32.9 (16/16) (16.3-54.2)	D-161 ISFSI Fence	48.9 (4/4) (43.5-54.2)	None	0

Table 5.7 Radiological Environmental Monitoring Program Summary.

Name of Facility	Duane Arnold Energy Center	Docket No.	50-331
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Sample Type (Units)	Type and Number of Analyses [a]	LLD [b]	Indicator Locations Mean (F) [c] Range [c]	Location with Highest Annual Mean Location [d]	Location with Highest Annual Mean Mean (F) [c] Range [c]	Control Locations Mean (F) [c] Range [c]	Number Non-Routine Results [e]
Waterborne Pathway							
Surface Water (pCi/L)	H-3 57	179	< LLD	-	-	< LLD	0
	I-131 23	0.5	< LLD	-	-	< LLD	0
	Sr-89 8	1.1	< LLD	-	-	< LLD	0
	Sr-90 8	0.6	< LLD	-	-	< LLD	0
	GS 57						
	Mn-54	5.4	< LLD	-	-	< LLD	0
	Fe-59	10.3	< LLD	-	-	< LLD	0
	Co-58	5.6	< LLD	-	-	< LLD	0
	Co-60	5.7	< LLD	-	-	< LLD	0
	Zn-65	9.7	< LLD	-	-	< LLD	0
	Nb-95	6.8	< LLD	-	-	< LLD	0
	Zr-95	11.3	< LLD	-	-	< LLD	0
	I-131	9.6	< LLD	-	-	< LLD	0
	Cs-134	6.5	< LLD	-	-	< LLD	0
	Cs-137	6.6	< LLD	-	-	< LLD	0
	Ba-140	26.4	< LLD	-	-	< LLD	0
	La-140	6.2	< LLD	-	-	< LLD	0
Sediments (pCi/g dry)	GS 6						
	K-40	1.0	7.69 (4/4) (6.63-8.77)	D-51, Plant Discharge	8.23 (2/2) (7.70-8.77)	7.65 (2/2) (7.61-7.69)	0
	Mn-54	0.022	< LLD	-	-	< LLD	0
	Fe-59	0.081	< LLD	-	-	< LLD	0
	Co-58	0.032	< LLD	-	-	< LLD	0
	Co-60	0.028	< LLD	-	-	< LLD	0
	Zn-65	0.052	< LLD	-	-	< LLD	0
	Nb-95	0.035	< LLD	-	-	< LLD	0
	Zr-95	0.057	< LLD	-	-	< LLD	0
	Ru-103	0.046	< LLD	-	-	< LLD	0
	Ru-106	0.17	< LLD	-	-	< LLD	0
	Cs-134	0.017	< LLD	-	-	< LLD	0
	Cs-137	0.020	< LLD	-	-	< LLD	0
	Ce-141	0.092	< LLD	-	-	< LLD	0
	Ce-144	0.13	< LLD	-	-	< LLD	0

Table 5.7 Radiological Environmental Monitoring Program Summary.

Name of Facility	Duane Arnold Energy Center	Docket No.	50-331
Location of Facility	Linn, Iowa (County, State)	Reporting Period	January-December, 2016

Sample Type (Units)	Type and Number of Analyses [a]	LLD [b]	Indicator Locations Mean (F) [c] Range [c]	Location with Highest Annual Mean: Location [d]	Location with Highest Annual Mean: Mean (F) [c] Range [c]	Control Locations Mean (F) [c] Range [c]	Number Non-Routine Results [e]
Waterborne Pathway							
Ground Water, potable (pCi/L)	I-131 24	0.5	< LLD	-	-	< LLD	0
	H-3 24	171	< LLD	-	-	< LLD	0
	GS 24						
	Mn-54	4.6	< LLD	-	-	< LLD	0
	Fe-59	9.4	< LLD	-	-	< LLD	0
	Co-58	4.8	< LLD	-	-	< LLD	0
	Co-60	5.1	< LLD	-	-	< LLD	0
	Zn-65	8.4	< LLD	-	-	< LLD	0
	Nb-95	6.2	< LLD	-	-	< LLD	0
	Zr-95	10.3	< LLD	-	-	< LLD	0
	I-131	7.9	< LLD	-	-	< LLD	0
	Cs-134	5.8	< LLD	-	-	< LLD	0
	Cs-137	5.9	< LLD	-	-	< LLD	0
	Ba-140	30.0	< LLD	-	-	< LLD	0
	La-140	5.6	< LLD	-	-	< LLD	0
Ingestion Pathway							
Milk (pCi/L)	I-131 38	0.5	< LLD	-	-	< LLD	0
	GS 38						
	K-40	100	1368 (19/19) (1299-1484)	D-138, Farm 13.4 mi. WSW	1417 (19/19) (1237-1700)	1417 (19/19) (1237-1700)	0
	Cs-134	5	< LLD	-	-	< LLD	0
	Cs-137	5	< LLD	-	-	< LLD	0
	Ba-140	60	< LLD	-	-	< LLD	0
	La-140	5	< LLD	-	-	< LLD	0
Broadleaf Vegetation (pCi/g wet)	GS 3						
	K-40	0.5	5.28 (2/2) (2.19-8.36)	D-118, Farm NW	5.28 (2/2) (2.19-8.36)	1.82 (1/1)	0
	Mn-54		< LLD	-	-	none	0
	Fe-59		< LLD	-	-	none	0
	Co-58		< LLD	-	-	none	0
	Co-60		< LLD	-	-	none	0
	Zn-65		< LLD	-	-	none	0
	Nb-95		< LLD	-	-	none	0
	Zr-95		< LLD	-	-	none	0
	Ru-103		< LLD	-	-	none	0
	Ru-106		< LLD	-	-	none	0
	I-131		< LLD	-	-	none	0
	Cs-134		< LLD	-	-	none	0
	Cs-137		< LLD	-	-	none	0
	Ce-141		< LLD	-	-	none	0
	Ce-144		< LLD	-	-	none	0

Table 5.7 Radiological Environmental Monitoring Program Summary.

Name of Facility	Duane Arnold Energy Center	Docket No.	50-331
Location of Facility	Linn, Iowa (County, State)	Reporting Period	January-December, 2016

Sample Type (Units)	Type and Number of Analyses [a]	LLD [b]	Indicator Locations Mean (F) [c] Range [c]	Location with Highest Annual Mean Location [d]	Location with Highest Annual Mean Mean (F) [c] Range [c]	Control Locations Mean (F) [c] Range [c]	Number Non-Routine Results [e]
Ingestion Pathway (cont.)							
Vegetation (Grain and Forage) (pCi/g wet)	GS 10						
	K-40	0.5	9.49 (6/6) (3.05-17.84)	D-56	34.61 (1/1)	17.07 (4/4) (2.38-21.05)	0
	Mn-54		< LLD	-	-	< LLD	0
	Fe-59		< LLD	-	-	< LLD	0
	Co-58		< LLD	-	-	< LLD	0
	Co-60		< LLD	-	-	< LLD	0
	Zn-65		< LLD	-	-	< LLD	0
	Nb-95		< LLD	-	-	< LLD	0
	Zr-95		< LLD	-	-	< LLD	0
	Ru-103		< LLD	-	-	< LLD	0
	Ru-106		< LLD	-	-	< LLD	0
	I-131		< LLD	-	-	< LLD	0
	Cs-134		< LLD	-	-	< LLD	0
	Cs-137		< LLD	-	-	< LLD	0
	Ce-141		< LLD	-	-	< LLD	0
	Ce-144		< LLD	-	-	< LLD	0
Fish (pCi/g wet)	GS 11						
	K-40	1.0	3.33 (5/5) (3.10-3.71)	D-49, Upstream, 4.0 mi. NNW	3.53 (5/5) (3.02-3.97)	3.42 (6/6) (2.88-3.97)	0
	Mn-54	0.028	< LLD	-	-	< LLD	0
	Fe-59	0.055	< LLD	-	-	< LLD	0
	Co-58	0.024	< LLD	-	-	< LLD	0
	Co-60	0.017	< LLD	-	-	< LLD	0
	Zn-65	0.035	< LLD	-	-	< LLD	0
	Nb-95	0.048	< LLD	-	-	< LLD	0
	Zr-95	0.046	< LLD	-	-	< LLD	0
	Ru-103	0.046	< LLD	-	-	< LLD	0
	Ru-106	0.26	< LLD	-	-	< LLD	0
	Cs-134	0.026	< LLD	-	-	< LLD	0
	Cs-137	0.027	< LLD	-	-	< LLD	0
	Ce-141	0.058	< LLD	-	-	< LLD	0
	Ce-144	0.137	< LLD	-	-	< LLD	0

[a] GB = Gross beta; GS = Gamma spectroscopy

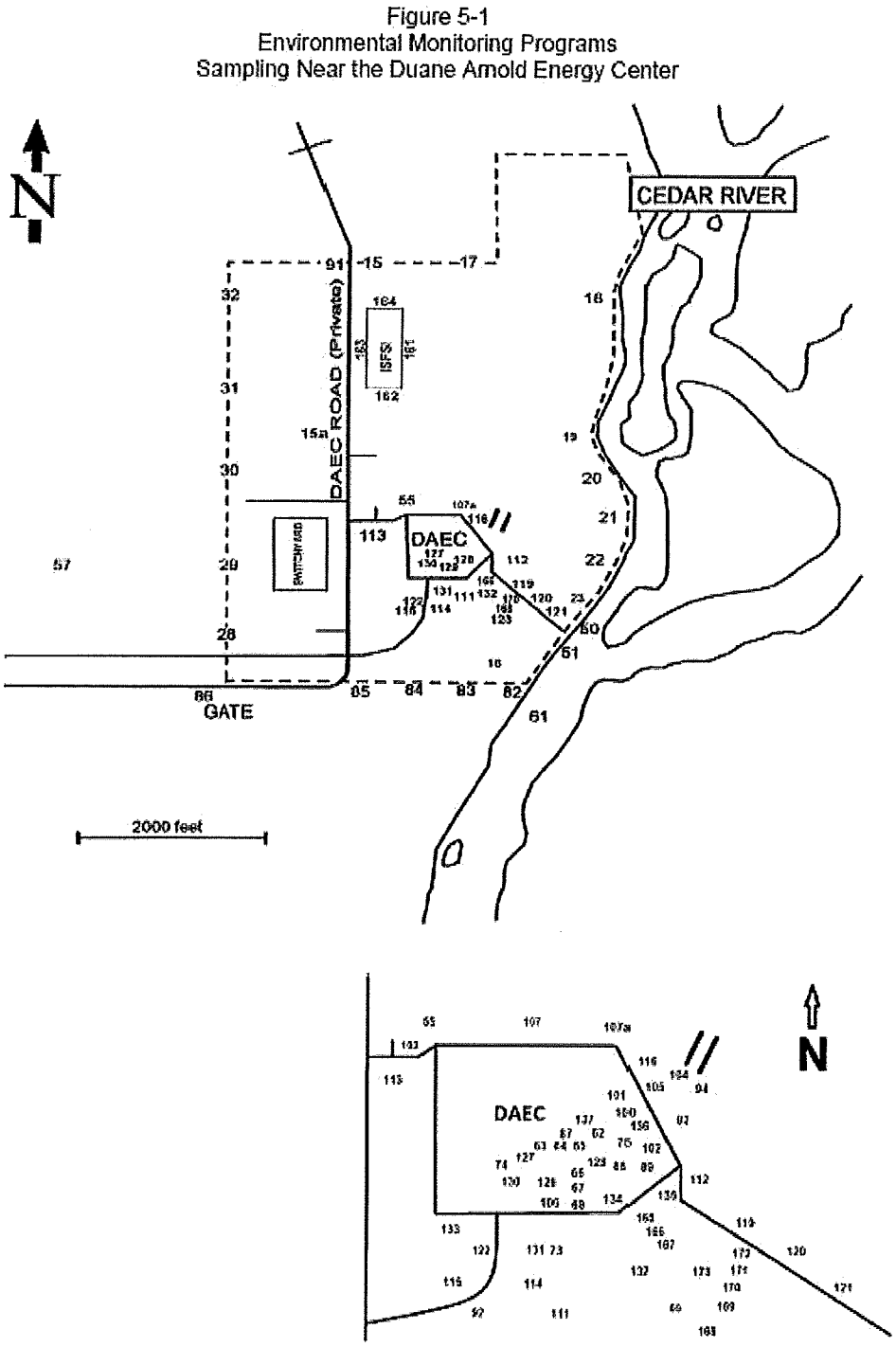
[b] LLD = Nominal lower limit of detection based on 4.66 sigma counting error for the background sample.

[c] Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

[d] Locations are specified by: (1) Name and code (Table 5.3); and (2) distance, direction and sector relative to reactor site.

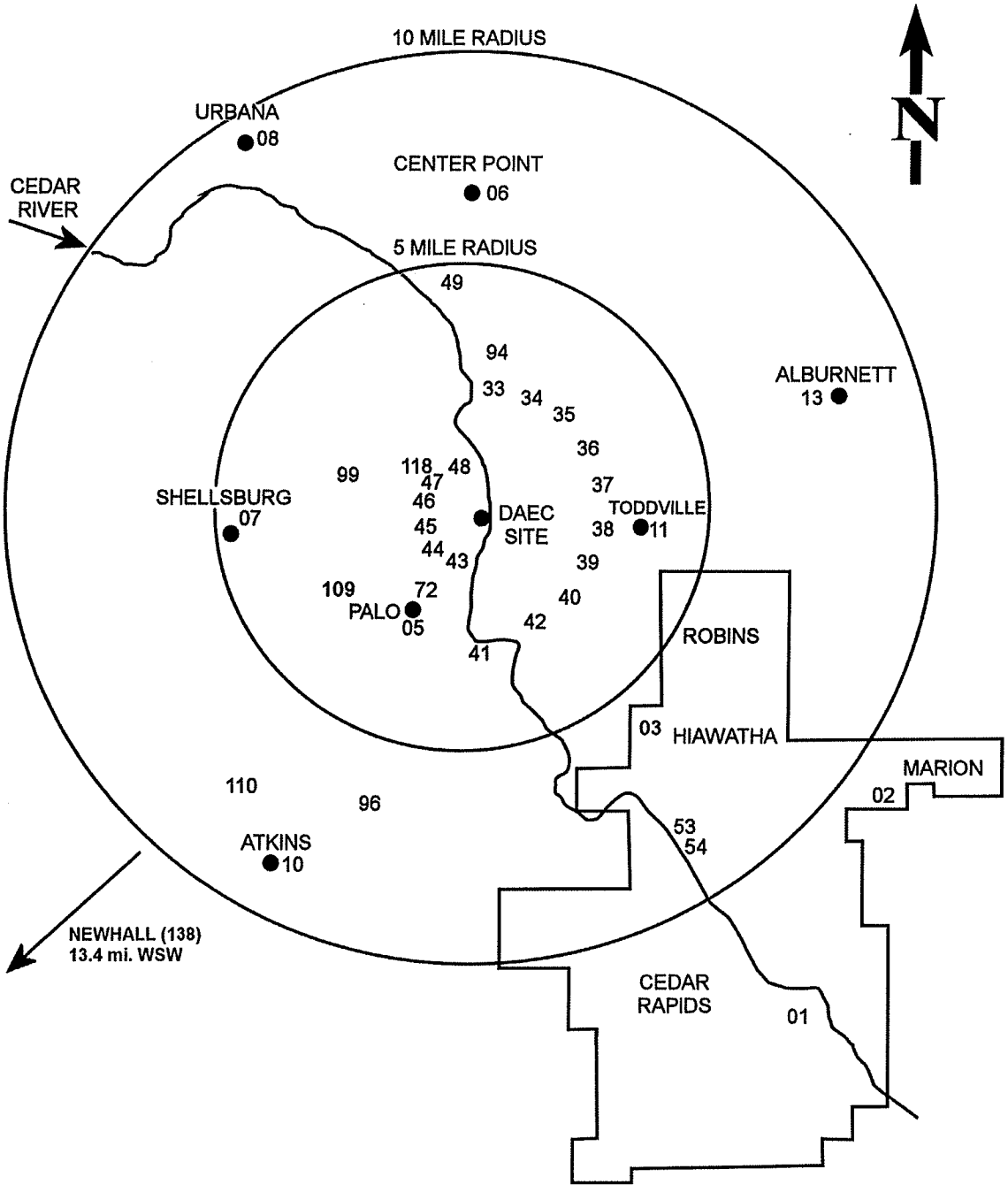
[e] Non-routine results are those which exceed ten times the control station value for the location. If a control station value is not available, the result is considered non-routine if it exceeds ten times the preoperational value for the location.

Figure 5.1 Radiological Environmental Monitoring Program Sampling Stations near the Duane Arnold Energy Center.



See Table 5.3 for sampling locations and Table 5.4 for Type and Frequency of collection.

Figure 5.2. Radiological Environmental Monitoring Program Sampling Stations Outside 0.5 Miles.



See Table 5.3 for sampling locations and Table 5.4 for Type and Frequency of collection.

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APPENDIX A

INTERLABORATORY COMPARISON PROGRAM RESULTS

NOTE: Environmental Inc., Midwest Laboratory participates in intercomparison studies administered by Environmental Resources Associates, and serves as a replacement for studies conducted previously by the U.S. EPA Environmental Monitoring Systems Laboratory, Las Vegas, Nevada. Results are reported in Appendix A. TLD Intercomparison results, in-house spikes, blanks, duplicates and mixed analyte performance evaluation program results are also reported. Appendix A is updated four times a year; the complete Appendix is included in March, June, September and December monthly progress reports only.

January, 2016 through December, 2016

Appendix A

Interlaboratory Comparison Program Results

Environmental, Inc., Midwest Laboratory has participated in interlaboratory comparison (crosscheck) programs since the formulation of it's quality control program in December 1971. These programs are operated by agencies which supply environmental type samples containing concentrations of radionuclides known to the issuing agency but not to participant laboratories. The purpose of such a program is to provide an independent check on a laboratory's analytical procedures and to alert it of any possible problems.

Participant laboratories measure the concentration of specified radionuclides and report them to the issuing agency. Several months later, the agency reports the known values to the participant laboratories and specifies control limits. Results consistently higher or lower than the known values or outside the control limits indicate a need to check the instruments or procedures used.

Results in Table A-1 were obtained through participation in the RAD PT Study Proficiency Testing Program administered by Environmental Resources Associates, serving as a replacement for studies conducted previously by the U.S. EPA Environmental Monitoring Systems Laboratory, Las Vegas, Nevada.

Table A-2 lists results for thermoluminescent dosimeters (TLDs), via irradiation and evaluation by the University of Wisconsin-Madison Radiation Calibration Laboratory at the University of Wisconsin Medical Radiation Research Center.

Table A-3 lists results of the analyses on in-house "spiked" samples for the past twelve months. All samples are prepared using NIST traceable sources. Data for previous years available upon request.

Table A-4 lists results of the analyses on in-house "blank" samples for the past twelve months. Data for previous years available upon request.

Table A-5 lists REMP specific analytical results from the in-house "duplicate" program for the past twelve months. Acceptance is based on the difference of the results being less than the sum of the errors. Complete analytical data for duplicate analyses is available upon request.

The results in Table A-6 were obtained through participation in the Mixed Analyte Performance Evaluation Program.

Results in Table A-7 were obtained through participation in the MRAD PT Study Proficiency Testing Program administered by Environmental Resources Associates, serving as a replacement for studies conducted previously by the Environmental Measurement Laboratory Quality Assessment Program (EML).

Attachment A lists the laboratory precision at the 1 sigma level for various analyses. The acceptance criteria in Table A-3 is set at ± 2 sigma.

Out-of-limit results are explained directly below the result.

Attachment A

ACCEPTANCE CRITERIA FOR "SPIKED" SAMPLES

LABORATORY PRECISION: ONE STANDARD DEVIATION VALUES FOR VARIOUS ANALYSES[a]

Analysis	Level	One standard deviation for single determination
Gamma Emitters	5 to 100 pCi/liter or kg > 100 pCi/liter or kg	5.0 pCi/liter 5% of known value
Strontium-89[b]	5 to 50 pCi/liter or kg > 50 pCi/liter or kg	5.0 pCi/liter 10% of known value
Strontium-90[b]	2 to 30 pCi/liter or kg > 30 pCi/liter or kg	5.0 pCi/liter 10% of known value
Potassium-40	≥ 0.1 g/liter or kg	5% of known value
Gross alpha	≤ 20 pCi/liter > 20 pCi/liter	5.0 pCi/liter 25% of known value
Gross beta	≤ 100 pCi/liter > 100 pCi/liter	5.0 pCi/liter 5% of known value
Tritium	≤ 4,000 pCi/liter > 4,000 pCi/liter	$\pm 1\sigma$ = 169.85 x (known)$^{0.0933}$ 10% of known value
Radium-226,-228	≥ 0.1 pCi/liter	15% of known value
Plutonium	≥ 0.1 pCi/liter, gram, or sample	10% of known value
Iodine-131, Iodine-129[b]	≤ 55 pCi/liter > 55 pCi/liter	6 pCi/liter 10% of known value
Uranium-238, Nickel-63[b] Technetium-99[b]	≤ 35 pCi/liter > 35 pCi/liter	6 pCi/liter 15% of known value
Iron-55[b]	50 to 100 pCi/liter > 100 pCi/liter	10 pCi/liter 10% of known value
Other Analyses [b]	---	20% of known value

[a] From EPA publication, "Environmental Radioactivity Laboratory Intercomparison Studies Program", Fiscal Year, 1981-1982, EPA-600/4-81-004.

[b] Laboratory limit.

TABLE A-1. Interlaboratory Comparison Crosscheck program, Environmental Resource Associates (ERA)[a].
RAD study

Lab Code	Date	Analysis	Concentration (pCi/L) Laboratory Result	ERA Result	Control Limits	Acceptance
ERW-1392	4/4/2016	Sr-89	43.5 ± 4.3	48.2	37.8 - 55.6	Pass
ERW-1392	4/4/2016	Sr-90	27.5 ± 1.9	28.5	20.7 - 33.1	Pass
ERW-1394 [b]	4/4/2016	Ba-133	65.2 ± 3.8	58.8	48.7 - 64.9	Fail
ERW-1394 [c]	4/4/2016	Ba-133	57.8 ± 5.3	58.8	48.7 - 64.9	Pass
ERW-1394	4/4/2016	Cs-134	43.7 ± 3.0	43.3	34.6 - 47.6	Pass
ERW-1394	4/4/2016	Cs-137	86.1 ± 5.3	78.4	70.6 - 88.9	Pass
ERW-1394	4/4/2016	Co-60	108 ± 44	102	91.8 - 114	Pass
ERW-1394	4/4/2016	Zn-65	240 ± 13	214	193 - 251	Pass
ERW-1397	4/4/2016	Gr. Alpha	52.0 ± 2.2	62.7	32.9 - 77.8	Pass
ERW-1397	4/4/2016	Gr. Beta	33.9 ± 1.2	39.2	26.0 - 46.7	Pass
ERW-1400	4/4/2016	I-131	24.7 ± 0.6	26.6	22.1 - 31.3	Pass
ERW-1402	4/4/2016	Ra-226	15.6 ± 0.5	15.2	11.3 - 17.4	Pass
ERW-1402	4/4/2016	Ra-228	5.28 ± 0.76	5.19	3.12 - 6.93	Pass
ERW-1403	4/4/2016	Uranium	4.02 ± 0.42	4.64	3.39 - 5.68	Pass
ERW-1405	4/4/2016	H-3	8,150 ± 270	7,840	6,790 - 8,620	Pass
SPW-2845	7/7/2015	Ba-133	60.3 ± 5.7	64.7	53.9 - 71.2	Pass
SPW-2845	7/7/2015	Cs-134	48.8 ± 9.3	50.1	40.3 - 55.1	Pass
SPW-2845	7/7/2015	Cs-137	101 ± 8	89.8	80.8 - 101	Pass
SPW-2845	7/7/2015	Co-60	65.1 ± 5.8	59.9	53.9 - 68.4	Pass
SPW-2845	7/7/2015	Zn-65	288 ± 29	265	238 - 310	Pass
ERW-3485	7/11/2016	Sr-89	43.3 ± 6.5	53.3	42.3 - 60.9	Pass
ERW-3485	7/11/2016	Sr-90	39.0 ± 2.8	39.2	28.8 - 45.1	Pass
ERW-3487	7/11/2016	Ba-133	83.3 ± 4.9	82.9	69.7 - 91.2	Pass
ERW-3487	7/11/2016	Cs-134	62.5 ± 4.4	65.3	53.1 - 71.8	Pass
ERW-3487	7/11/2016	Cs-137	98.1 ± 5.6	95.2	85.7 - 107	Pass
ERW-3487	7/11/2016	Co-60	122 ± 5	117	105 - 131	Pass
ERW-3487	7/11/2016	Zn-65	124 ± 9	113	102 - 134	Pass
ERW-3490	7/11/2016	Gr. Alpha	46.6 ± 2.2	48.1	25.0 - 60.5	Pass
ERW-3490	7/11/2016	Gr. Beta	26.8 ± 1.1	28.6	18.2 - 36.4	Pass
ERW-3492	7/11/2016	I-131	23.7 ± 1.0	24.9	20.7 - 29.5	Pass
ERW-3493	7/11/2016	Ra-226	12.9 ± 0.4	12.3	9.2 - 14.2	Pass
ERW-3493	7/11/2016	Ra-228	5.8 ± 0.8	5.8	3.5 - 7.6	Pass
ERW-3493	7/11/2016	Uranium	32.8 ± 0.8	25.2	28.4 - 39.3	Pass
ERW-3495	7/11/2016	H-3	12,400 ± 334	12,400	10,800 - 13,600	Pass

[a] Results obtained by Environmental, Inc., Midwest Laboratory as a participant in the crosscheck program for proficiency testing in drinking water conducted by Environmental Resources Associates (ERA).

[b] No reason determined for failure of Ba-133 result.

[c] The result of reanalysis (Compare to original result, footnoted "b" above).

TABLE A-2. Thermoluminescent Dosimetry, (TLD, $CaSO_4$: Dy Cards). [a b]

			mrem			
Lab Code	Irradiation Date	Description	Delivered Dose	Reported Dose	Performance [c] Quotient (P)	
Environmental, Inc.		Group 1				
2016-1	10/7/2016	Spike 1	135.0	148.3	0.10	
2016-1	10/7/2016	Spike 2	135.0	144.3	0.07	
2016-1	10/7/2016	Spike 3	135.0	133.2	-0.01	
2016-1	10/7/2016	Spike 4	135.0	139.6	0.03	
2016-1	10/7/2016	Spike 5	135.0	128.4	-0.05	
2016-1	10/7/2016	Spike 6	135.0	123.9	-0.08	
2016-1	10/7/2016	Spike 7	135.0	124.0	-0.08	
2016-1	10/7/2016	Spike 8	135.0	121.5	-0.10	
2016-1	10/7/2016	Spike 9	135.0	148.3	0.10	
2016-1	10/7/2016	Spike 10	135.0	126.8	-0.06	
2016-1	10/7/2016	Spike 11	135.0	123.3	-0.09	
2016-1	10/7/2016	Spike 12	135.0	137.9	0.02	
2016-1	10/7/2016	Spike 13	135.0	126.0	-0.07	
2016-1	10/7/2016	Spike 14	135.0	127.2	-0.06	
2016-1	10/7/2016	Spike 15	135.0	144.5	0.07	
2016-1	10/7/2016	Spike 16	135.0	140.5	0.04	
2016-1	10/7/2016	Spike 17	135.0	146.0	0.08	
2016-1	10/7/2016	Spike 18	135.0	127.7	-0.05	
2016-1	10/7/2016	Spike 19	135.0	146.8	0.09	
2016-1	10/7/2016	Spike 20	135.0	122.6	-0.09	
2016-1	10/7/2016	Spike 21	135.0	108.6	-0.20	
2016-1	10/7/2016	Spike 22	135.0	119.6	-0.11	
2016-1	10/7/2016	Spike 23	135.0	135.1	0.00	
2016-1	10/7/2016	Spike 24	135.0	116.2	-0.14	
2016-1	10/7/2016	Spike 25	135.0	118.9	-0.12	
2016-1	10/7/2016	Spike 26	135.0	128.5	-0.05	
2016-1	10/7/2016	Spike 27	135.0	115.6	-0.14	
2016-1	10/7/2016	Spike 28	135.0	126.4	-0.06	
2016-1	10/7/2016	Spike 29	135.0	115.0	-0.15	
2016-1	10/7/2016	Spike 30	135.0	147.3	0.09	
Mean (Spike 1-30)				130.4	0.03	Pass [e]
Standard Deviation (Spike 1-30)				11.5	0.09	Pass [e]

[a] Table A-2 assumes 1 roentgen = 1 rem (NRC -Health Physics Questions and Answers 10 CFR Part 20 - Question 96 - Page Last Reviewed/Updated Thursday, October 01, 2015).

[b] TLD's were irradiated by the University of Wisconsin-Madison Radiation Calibration Laboratory following ANSI N13.37 protocol from a known air kerma rate. TLD's were read and the results were submitted by Environmental Inc. to the University of Wisconsin-Madison Radiation Calibration Laboratory for comparison to the delivered dose.

[c] Performance Quotient (P) is calculated as ((reported dose - conventially true value) ÷ conventially true value) where the conventially true value is the delivered dose.

[d] Acceptance is achieved when neither the absolute value of mean of the P values, nor the standard deviation of the P values exceed 0.15.

TABLE A-2 Thermoluminescent Dosimetry, (TLD, $CaSO_4$: Dy Cards). [a b]

			mrem			
Lab Code	Irradiation Date	Description	Delivered Dose	Reported Dose	Performance [c] Quotient (P)	
Environmental, Inc.		Group 2				
2016-2	10/7/2016	Spike 31	87.0	83.0	-0.05	
2016-2	10/7/2016	Spike 32	87.0	88.3	0.01	
2016-2	10/7/2016	Spike 33	87.0	83.1	-0.04	
2016-2	10/7/2016	Spike 34	87.0	81.4	-0.06	
2016-2	10/7/2016	Spike 35	87.0	78.9	-0.09	
2016-2	10/7/2016	Spike 36	87.0	80.3	-0.08	
2016-2	10/7/2016	Spike 37	87.0	101.1	0.16	
2016-2	10/7/2016	Spike 38	87.0	78.3	-0.10	
2016-2	10/7/2016	Spike 39	87.0	86.6	0.00	
2016-2	10/7/2016	Spike 40	87.0	81.8	-0.06	
2016-2	10/7/2016	Spike 41	87.0	84.8	-0.03	
2016-2	10/7/2016	Spike 42	87.0	79.9	-0.08	
2016-2	10/7/2016	Spike 43	87.0	80.8	-0.07	
2016-2	10/7/2016	Spike 44	87.0	80.2	-0.08	
2016-2	10/7/2016	Spike 45	87.0	82.7	-0.05	
2016-2	10/7/2016	Spike 46	87.0	104.0	0.20	
2016-2	10/7/2016	Spike 47	87.0	86.1	-0.01	
2016-2	10/7/2016	Spike 48	87.0	104.0	0.20	
2016-2	10/7/2016	Spike 49	87.0	86.1	-0.01	
2016-2	10/7/2016	Spike 50	87.0	90.8	0.04	
2016-2	10/7/2016	Spike 51	87.0	85.7	-0.01	
2016-2	10/7/2016	Spike 52	87.0	86.5	-0.01	
2016-2	10/7/2016	Spike 53	87.0	86.4	-0.01	
2016-2	10/7/2016	Spike 54	87.0	92.6	0.06	
2016-2	10/7/2016	Spike 55	87.0	88.6	0.02	
2016-2	10/7/2016	Spike 56	87.0	78.9	-0.09	
2016-2	10/7/2016	Spike 57	87.0	82.6	-0.05	
2016-2	10/7/2016	Spike 58	87.0	80.6	-0.07	
2016-2	10/7/2016	Spike 59	87.0	89.9	0.03	
2016-2	10/7/2016	Spike 60	87.0	85.0	-0.02	
Mean (Spike 31-60)				86.0	0.01	Pass [e]
Standard Deviation (Spike 31-60)				6.9	0.08	Pass [e]

[a] Table A-2 assumes 1 roentgen = 1 rem (NRC -Health Physics Questions and Answers 10 CFR Part 20 - Question 96 - Page Last Reviewed/Updated Thursday, October 01, 2015).

[b] TLD's were irradiated by the University of Wisconsin-Madison Radiation Calibration Laboratory following ANSI N13.37 protocol from a known air kerma rate. TLD's were read and the results were submitted by Environmental Inc. to the University of Wisconsin-Madison Radiation Calibration Laboratory for comparison to the delivered dose.

[c] Performance Quotient (P) is calculated as ((reported dose - conventially true value) ÷ conventially true value) where the conventially true value is the delivered dose.

[d] Acceptance is achieved when neither the absolute value of mean of the P values, nor the standard deviation of the P values exceed 0.15.

TABLE A-3. In-House "Spiked" Samples

Lab Code [b]	Date	Concentration [a] Analysis	Laboratory results 2s, n=1 [c]	Known Activity	Control Limits [d]	Acceptance
SPW-290	1/21/2016	Sr-90	38.6 ± 1.5	37.3	22.4 - 52.2	Pass
SPW-292	1/21/2016	Sr-90	35.8 ± 1.6	37.3	22.4 - 52.2	Pass
SPW-294	1/21/2016	C-14	4,689 ± 18	4,735	2,841 - 6,629	Pass
SPW-414	2/1/2016	Ra-228	18.4 ± 2.2	17.7	10.6 - 24.8	Pass
W-020416	2/4/2016	Gr. Alpha	20.8 ± 0.4	20.1	12.0 - 28.1	Pass
W-020416	2/4/2016	Gr. Beta	29.7 ± 0.3	28.9	17.3 - 40.4	Pass
W-021716	2/17/2016	Ra-226	17.9 ± 0.5	16.7	10.0 - 23.4	Pass
W-030716	3/7/2016	Gr. Alpha	16.3 ± 0.8	20.1	12.0 - 28.1	Pass
W-030716	3/7/2016	Gr. Beta	27.0 ± 0.7	28.9	17.3 - 40.4	Pass
SPDW-70046	3/29/2016	Ra-226	13.4 ± 0.4	16.7	10.0 - 23.4	Pass
SPW-1163	3/22/2016	Ra-228	4.2 ± 0.7	4.4	2.6 - 6.2	Pass
SPW-1235	3/29/2016	Gr. Alpha	21.0 ± 0.4	20.1	12.0 - 28.1	Pass
SPW-1235	3/29/2016	Gr. Beta	29.4 ± 0.3	28.9	17.3 - 40.4	Pass
SPW-1739	4/21/2016	Ra-228	16.2 ± 2.0	17.7	10.6 - 24.8	Pass
SPW-2052	4/21/2016	Ra-226	16.0 ± 0.5	16.7	10.0 - 23.4	Pass
W-042616	4/21/2016	Fe-55	1,519 ± 61	1,482	889 - 2,075	Pass
SPW-1823	4/23/2016	Gr. Alpha	21.0 ± 0.4	20.1	12.0 - 28.1	Pass
SPW-1823	4/23/2016	Gr. Beta	26.6 ± 0.3	28.9	17.3 - 40.4	Pass
SPW-1998	4/29/2016	Cs-134	35.9 ± 6.0	36.2	21.7 - 50.6	Pass
SPW-1998	4/29/2016	Cs-137	82.5 ± 7.6	71.9	43.1 - 100.6	Pass
SPW-2097	5/3/2016	H-3	3,349 ± 184	3,280	1,968 - 4,592	Pass
SPW-2132	5/4/2016	H-3	3,174 ± 178	3,280	1,968 - 4,592	Pass
SPW-2229	5/7/2016	H-3	3,182 ± 179	3,280	1,968 - 4,592	Pass
SPW-2313	5/13/2016	H-3	3,183 ± 179	3,280	1,968 - 4,592	Pass
SPW-2341	5/13/2016	H-3	3,201 ± 178	3,280	1,968 - 4,592	Pass
SPW-2374	5/14/2016	H-3	3,037 ± 175	3,280	1,968 - 4,592	Pass
SPW-2411	5/17/2016	Sr-90	37.3 ± 1.6	37.3	22.4 - 52.2	Pass
SPW-2455	5/19/2016	Gr. Alpha	19.3 ± 0.4	20.1	12.0 - 28.1	Pass
SPW-2455	5/19/2016	Gr. Beta	28.6 ± 0.3	28.9	17.3 - 40.4	Pass
SPW-2457	5/19/2016	U-238	48.2 ± 2.4	41.7	25.0 - 58.4	Pass
SPW-2504	5/20/2016	H-3	3,181 ± 178	3,280	1,968 - 4,592	Pass
SPW-2528	5/23/2016	H-3	2,998 ± 175	3,280	1,968 - 4,592	Pass
SPW-2566	5/24/2016	Gr. Alpha	19.8 ± 0.5	20.1	12.0 - 28.1	Pass
SPW-2566	5/24/2016	Gr. Beta	30.4 ± 0.3	28.9	17.3 - 40.4	Pass
W-053116	4/29/2016	Cs-134	34.0 ± 5.0	36.2	21.7 - 50.6	Pass
W-053116	4/29/2016	Cs-137	78.8 ± 7.0	71.9	43.1 - 100.6	Pass
SPW-2704	6/1/2016	Sr-90	38.0 ± 1.6	37.3	22.4 - 52.2	Pass
SPW-2719	6/2/2016	Ra-228	18.1 ± 2.1	17.7	10.6 - 24.8	Pass
SPW-2749	6/3/2016	H-3	3,197 ± 180	3,280	1,968 - 4,592	Pass
SPW-2843	6/7/2016	H-3	3,133 ± 179	3,280	1,968 - 4,592	Pass
SPW-3227	6/17/2016	Ra-226	18.6 ± 0.4	16.7	10.0 - 23.4	Pass
W-061716	4/29/2016	Cs-134	37.3 ± 8.2	36.2	21.7 - 50.6	Pass
W-061716	4/29/2016	Cs-137	79.7 ± 10.8	71.9	43.1 - 100.6	Pass
SPW-3240	6/28/2016	Gr. Alpha	25.3 ± 0.5	20.1	12.0 - 28.1	Pass
SPW-3240	6/28/2016	Gr. Beta	27.1 ± 0.3	28.9	17.3 - 40.4	Pass

TABLE A-3. In-House "Spiked" Samples

Lab Code [b]	Date	Concentration [a] Analysis	Laboratory results 2s, n=1 [c]	Known Activity	Control Limits [d]	Acceptance
SPW-3241	7/1/2016	H-3	8,821 ± 283	8,650	5,190 - 12,110	Pass
SPW-3309	7/1/2016	H-3	8,619 ± 278	8,650	5,190 - 12,110	Pass
SPW-3313	7/1/2016	Ra-228	16.6 ± 2.0	17.7	10.6 - 24.8	Pass
SPW-3328	7/6/2016	Sr-89	13.4 ± 9.2	14.8	8.9 - 20.7	Pass
SPW-3328	7/6/2016	Sr-90	12.3 ± 1.3	11.4	6.8 - 16.0	Pass
SPAP-3365	7/7/2016	Gr. Beta	39.7 ± 0.1	42.2	25.3 - 59.0	Pass
SPAP-3367	7/7/2016	Cs-134	1.2 ± 0.7	1.2	0.7 - 1.7	Pass
SPAP-3367	7/7/2016	Cs-137	94.4 ± 2.8	94.0	56.4 - 131.6	Pass
SPW-3370	7/7/2016	C-14	4,444 ± 17	4,735	2,841 - 6,629	Pass
SPW-3373	7/7/2016	Ni-63	446 ± 5	401	241 - 561	Pass
SPW-3375	7/7/2016	Tc-99	545 ± 9	539	324 - 755	Pass
SPW-3519	7/14/2016	H-3	8,621 ± 279	8650	5,190 - 12,110	Pass
SPW-3688	6/29/2016	Ra-226	17.5 ± 0.4	16.7	10.0 - 23.4	Pass
SPW-3711	7/20/2016	H-3	44,368 ± 612	43,766	26,260 - 61,273	Pass
SPW-3774	7/22/2016	H-3	45,259 ± 619	43,766	26,260 - 61,273	Pass
SPW-3776	7/22/2016	Gr. Alpha	23.3 ± 0.5	20.1	12.0 - 28.1	Pass
SPW-3776	7/22/2016	Gr. Beta	27.5 ± 0.3	28.9	17.3 - 40.4	Pass
SPW-3884	7/26/2016	H-3	45,850 ± 623	43,766	26,260 - 61,273	Pass
SPW-3950	7/28/2016	Ra-228	17.8 ± 1.8	16.7	10 - 23	Pass
SPW-3982	7/29/2016	H-3	45,273 ± 619	43,766	26,260 - 61,273	Pass
W-073016	4/29/2016	Cs-134	36.5 ± 6.1	36.2	21.7 - 50.6	Pass
W-073016	4/29/2016	Cs-137	80.6 ± 7.5	71.9	43.1 - 100.6	Pass
SPW-4134	8/4/2016	Ra-228	5.5 ± 0.8	6.7	4.0 - 9.3	Pass
SPW-4340	8/17/2016	Ra-228	19.9 ± 2.0	16.7	10.0 - 23.4	Pass
SPW-4386	7/15/2016	Ra-226	18.0 ± 0.4	16.7	10.0 - 23.4	Pass
W-082716	4/29/2016	Ra-228	32.5 ± 5.2	36.2	21.7 - 50.6	Pass
W-082716	4/29/2016	Ra-226	78.5 ± 8.3	71.9	43.1 - 100.6	Pass
SPW-4642	9/6/2016	U-238	45.8 ± 2.5	41.7	25.0 - 58.4	Pass
SPW-4999	9/26/2016	Sr-90	35.1 ± 2.2	36.8	22.1 - 51.5	Pass
SPW-5091	9/12/2016	Ra-226	18.2 ± 0.4	16.7	10.0 - 23.4	Pass
W-092716	4/29/2016	Cs-134	37.3 ± 11.8	36.2	21.7 - 50.6	Pass
W-092716	4/29/2016	Cs-137	78.3 ± 11.2	71.9	43.1 - 100.6	Pass
SPW-5165	9/30/2016	Gr. Alpha	22.2 ± 0.4	20.1	12.0 - 28.1	Pass
SPW-5165	9/30/2016	Gr. Beta	27.2 ± 0.3	28.9	17.3 - 40.4	Pass
SPW-5426	9/28/2016	Ra-226	18.2 ± 0.4	16.7	10.0 - 23.4	Pass
SPW-5510	10/18/2016	H-3	44,398 ± 618	43,766	26,260 - 61273	Pass
SPW-5553	10/19/2016	U-238	50.0 ± 2.6	41.7	25.0 - 58.4	Pass
SPW-5555	10/19/2016	Ra-228	17.4 ± 1.9	16.7	10.0 - 23.4	Pass
SPW-5612	10/20/2016	H-3	44,681 ± 622	43,766	26,260 - 61,273	Pass
SPW-5741	10/25/2016	H-3	44,946 ± 624	43,766	26,260 - 61,273	Pass
SPU-5833	10/26/2016	H-3	10,018 ± 946	8,622	5,173 - 12,071	Pass
SPW-5862	10/28/2016	H-3	18,061 ± 374	17,244	10,346 - 24,141	Pass
W-103116	4/29/2016	Cs-134	36.0 ± 4.6	36.2	21.7 - 50.6	Pass
W-103116	4/29/2016	Cs-137	81.1 ± 7.3	71.9	43.1 - 100.6	Pass

TABLE A-3. In-House "Spiked" Samples

Lab Code [b]	Date	Concentration [a] Analysis	Laboratory results 2s, n=1 [c]	Known Activity	Control Limits [d]	Acceptance
SPW-5984	11/2/2016	H-3	17,727 ± 399	17,244	10,346 - 24,141	Pass
SPW-6008	11/4/2016	H-3	17,854 ± 402	17,244	10,346 - 24,141	Pass
SPW-6124	11/8/2016	Ra-228	14.4 ± 1.9	16.0	9.6 - 22.4	Pass
SPW-6132	11/9/2016	H-3	18,135 ± 374	17,243	10,346 - 24,140	Pass
SPW-6135	10/12/2016	Ra-226	18.9 ± 0.4	16.7	10.0 - 23.4	Pass
SPW-6146	11/10/2016	H-3	17,488 ± 398	17,243	10,346 - 24,140	Pass
SPW-6222	11/12/2016	H-3	17,787 ± 408	17,243	10,346 - 24,140	Pass
SPW-6318	11/16/2016	H-3	17,379 ± 408	17,243	10,346 - 24,140	Pass
SPW-6349	11/17/2016	H-3	17,893 ± 371	17,243	10,346 - 24,140	Pass
SPW-6424	11/19/2016	H-3	18,258 ± 379	17,243	10,346 - 24,140	Pass
W-112616	4/29/2016	Cs-134	35.0 ± 6.0	36.2	21.7 - 50.6	Pass
W-112616	4/29/2016	Cs-137	75.0 ± 7.1	71.9	43.1 - 100.6	Pass
SPW-6456	11/28/2016	Sr-90	41.9 ± 2.5	36.8	22.1 - 51.5	Pass
SPW-6486	11/30/2016	Sr-90	35.6 ± 2.2	36.6	21.9 - 51.2	Pass
SPW-6490	11/29/2016	Ra-226	18.8 ± 0.4	16.7	10.0 - 23.4	Pass
SPW-6519	11/30/2016	Ni-63	438 ± 4	400	240 - 560	Pass
SPW-6527	12/1/2016	U-238	49.5 ± 2.5	41.7	25.0 - 58.4	Pass
SPW-6616	12/3/2016	H-3	18,018 ± 374	17,243	10,346 - 24,140	Pass
SPW-6669	12/5/2016	H-3	18,237 ± 377	17,243	10,346 - 24,140	Pass
SPW-6735	12/9/2016	H-3	17,939 ± 396	17,243	10,346 - 24,140	Pass
SPW-6880	12/21/2016	H-3	17,835 ± 396	17,243	10,346 - 24,140	Pass
SPW-6947	12/22/2016	Ni-63	450 ± 4	400	240 - 560	Pass
W-122316	4/29/2016	Cs-134	36.0 ± 2.2	36.2	21.7 - 50.6	Pass
W-122316	4/29/2016	Cs-134	76.1 ± 2.9	71.9	43.1 - 100.6	Pass
SPW-6948	12/30/2016	H-3	17,999 ± 398	17,243	10,346 - 24,140	Pass
SPW-6974	12/29/2016	Ra-226	17.6 ± 0.4	16.7	10.0 - 23.4	Pass

[a] Liquid sample results are reported in pCi/Liter, air filters (pCi/m3), charcoal (pCi/charcoal canister), and solid samples (pCi/kg).

[b] Laboratory codes : W (Water), MI (milk), AP (air filter), SO (soil), VE (vegetation), CH (charcoal canister), F (fish), U (urine).

[c] Results are based on single determinations.

[d] Control limits are established from the precision values listed in Attachment A of this report, adjusted to ± 2s.

NOTE: For fish, gelatin is used for the spike matrix. For vegetation, cabbage is used for the spike matrix.

TABLE A-4. In-House "Blank" Samples

Lab Code	Sample Type	Date	Analysis[b]	Concentration [a]		
				Laboratory results (4.66σ)		Acceptance
				LLD	Activity[c]	Criteria (4.66 σ)
SPW-289	Water	1/21/2016	Sr-90	0.55	0.28 ± 0.29	1
SPW-291	Water	1/21/2016	Sr-90	0.61	0.15 ± 0.30	1
SPW-293	Water	1/21/2016	C-14	147	-12 ± 89	200
SPW-413	Water	2/1/2016	Ra-228	0.86	1.86 ± 0.60	2
W-020416	Water	2/4/2016	Gr. Alpha	0.43	-0.17 ± 0.28	2
W-020416	Water	2/4/2016	Gr. Beta	0.73	0.36 ± 0.53	4
W-020916	Water	2/9/2016	Ra-226	0.02	0.01 ± 0.01	2
W-030716	Water	3/7/2016	Gr. Alpha	0.90	-0.36 ± 0.32	2
W-030716	Water	3/7/2016	Gr. Beta	1.59	-0.62 ± 0.71	4
SPDW-70045	Water	3/29/2016	Ra-226	0.03	0.01 ± 0.02	2
SPDW-1234	Water	3/30/2016	Gr. Alpha	0.44	-0.05 ± 0.30	2
SPDW-1234	Water	3/30/2016	Gr. Beta	0.79	-0.54 ± 0.54	4
SPW-1738	Water	4/21/2016	Ra-228	1.05	0.13 ± 0.50	2
SPW-1822	Water	4/23/2016	Gr. Alpha	0.50	-0.18 ± 0.33	2
SPW-1822	Water	4/23/2016	Gr. Beta	0.08	-0.35 ± 0.51	4
SPW-2051	Water	4/12/2016	Ra-226	0.02	0.03 ± 0.02	2
SPW-2069	Water	5/3/2016	I-131	0.15	0.06 ± 0.09	1
SPW-2133	Water	5/4/2016	H-3	148	55 ± 76	200
SPW-2230	Water	5/7/2016	H-3	149	-11 ± 73	200
SPW-2314	Water	5/13/2016	H-3	150	-29 ± 72	200
SPW-2342	Water	5/13/2016	H-3	143	50 ± 74	200
SPW-2364	Water	5/13/2016	I-131	0.22	-0.03 ± 0.12	1
SPW-2375	Water	5/14/2016	H-3	146	1 ± 70	200
SPW-2410	Water	5/17/2016	Sr-90	0.59	0.10 ± 0.29	1
SPW-2454	Water	5/19/2016	Gr. Alpha	0.47	-0.21 ± 0.31	2
SPW-2454	Water	5/19/2016	Gr. Beta	0.77	-0.49 ± 0.52	4
SPW-2456	Water	5/19/2016	U-238	0.15	0.00 ± 0.09	1
SPW-2485	Water	5/20/2016	I-131	0.18	-0.01 ± 0.10	1
SPW-2505	Water	5/20/2016	H-3	144	64 ± 75	200
SPW-2529	Water	5/23/2016	H-3	152	-3 ± 75	200
SPW-2530	Water	5/23/2016	Ra-228	0.96	-0.12 ± 0.43	2
SPW-2565	Water	5/24/2016	Gr. Alpha	0.47	0.03 ± 0.33	2
SPW-2565	Water	5/24/2016	Gr. Beta	0.77	-0.23 ± 0.53	4
SPW-2703	Water	6/1/2016	Sr-89	0.68	-0.13 ± 0.50	5
SPW-2703	Water	6/1/2016	Sr-90	0.55	0.11 ± 0.27	1
SPW-2718	Water	6/2/2016	Ra-228	0.67	0.23 ± 0.34	2
SPW-2720	Water	6/2/2016	I-131	0.16	0.01 ± 0.09	1
SPW-2750	Water	6/3/2016	H-3	151	-31 ± 73	200
SPW-2844	Water	6/7/2016	H-3	148	-55 ± 75	200
SPMI-2959	Milk	6/14/2016	I-131	0.16	0.09 ± 0.10	1
SPW-3137	Water	6/23/2016	I-131	0.15	-0.03 ± 0.08	1
SPW-3226	Water	6/17/2016	Ra-226	0.02	-0.01 ± 0.04	2
SPW-3239	Water	6/28/2016	Gr. Alpha	0.40	-0.15 ± 0.26	2
SPW-3239	Water	6/28/2016	Gr. Beta	0.73	0.14 ± 0.52	4
SPW-3687	Water	6/29/2016	Ra-226	0.04	0.03 ± 0.03	2

[a] Liquid sample results are reported in pCi/Liter, air filters (pCi/m^3), charcoal (pCi/charcoal canister), and solid samples (pCi/g).

[b] I-131(G); iodine-131 as analyzed by gamma spectroscopy.

[c] Activity reported is a net activity result.

TABLE A-4. In-House "Blank" Samples

Lab Code	Sample Type	Date	Analysis[b]	Concentration [a]		
				Laboratory results (4.66σ)		Acceptance
				LLD	Activity[c]	Criteria (4.66 σ)
SPW-3312	Water	7/1/2016	Ra-228	0.67	0.35 ± 0.35	2
SPW-3327	Water	7/6/2016	Sr-89	0.67	0.51 ± 0.51	5
SPW-3327	Water	7/6/2016	Sr-90	0.60	-0.14 ± 0.26	1
SPAP-3364	AP	7/7/2016	Gr.Beta	0.002	0.005 ± 0.001	0.01
SPW-3370	Water	7/7/2016	C-14	115	49 ± 71	200
SPW-3372	Water	7/7/2016	Ni-63	122	115 ± 76	200
SPW-3374	Water	7/7/2016	Tc-99	6.07	1.00 ± 3.70	10
SPW-3710	Water	7/20/2016	H-3	147	35 ± 75	200
SPW-3775	Water	7/22/2016	Gr. Alpha	0.73	0.41 ± 0.53	2
SPW-3775	Water	7/22/2016	Gr. Beta	0.45	-0.14 ± 0.30	4
SPW-3884	Water	7/26/2016	H-3	151	-1 ± 73	200
SPW-3949	Water	7/28/2016	Ra-228	0.76	0.32 ± 0.39	2
SPW-3982	Water	7/29/2016	H-3	145	49 ± 75	200
SPW-4133	Water	8/4/2016	Ra-228	0.80	0.26 ± 0.40	2
SPW-4257	Water	8/11/2016	I-131	0.17	-0.01 ± 0.10	1
SPW-4339	Water	8/17/2016	Ra-228	0.73	0.36 ± 0.39	2
SPW-4385	Water	7/15/2016	Ra-226	0.09	0.75 ± 0.09	2
SPW-4641	Water	9/6/2016	U-238	0.21	0.00 ± 0.13	1
SPW-4684	Water	9/8/2016	H-3	151	48 ± 78	200
SPW-4872	Water	9/16/2016	I-131	0.21	0.05 ± 0.11	1
SPW-4998	Water	9/26/2016	Sr-89	0.54	0.06 ± 0.39	5
SPW-4998	Water	9/26/2016	Sr-90	0.53	-0.03 ± 0.24	1
SPW-5090	Water	8/19/2016	Ra-226	0.03	0.03 ± 0.02	2
SPW-5164	Water	9/30/2016	Gr. Alpha	0.46	-0.05 ± 0.32	2
SPW-5164	Water	9/30/2016	Gr. Beta	0.74	-0.02 ± 0.52	4
SPW-5425	Water	9/28/2016	Ra-226	0.02	0.07 ± 0.05	2
SPW-5323	Water	10/7/2016	H-3	157	-12 ± 75	200
SPW-5552	Water	10/19/2016	U-238	0.18	0.00 ± 0.11	1
SPW-5554	Water	10/19/2016	Ra-228	0.72	0.22 ± 0.36	2
SPW-5611	Water	10/20/2016	H-3	153	67 ± 80	200
SPW-5613	Water	10/21/2016	Gr. Alpha	0.76	-0.55 ± 0.51	2
SPW-5613	Water	10/21/2016	Gr. Beta	0.42	0.02 ± 0.29	4
SPW-5740	Water	10/25/2016	H-3	154	-2 ± 72	200
SPW-5743	Water	10/25/2016	Sr-90	1.26	0.72 ± 0.67	1
SPW-5861	Water	10/28/2016	H-3	179	129 ± 91	200
SPW-5983	Water	11/2/2016	H-3	156	8 ± 78	200
SPW-6007	Water	11/4/2016	H-3	156	-34 ± 73	200
SPW-6131	Water	11/9/2016	H-3	180	80 ± 92	200
SPW-6134	Water	10/12/2016	Ra-226	0.05	-0.02 ± 0.12	2
SPW-6145	Water	11/10/2016	H-3	171	-46 ± 80	200
SPW-6317	Water	11/16/2016	H-3	180	-43 ± 82	200
SPW-6348	Water	11/17/2016	H-3	182	-45 ± 88	200
SPW-6423	Water	11/19/2016	H-3	181	8 ± 95	200
SPW-6455	Water	11/28/2016	Sr-89	0.58	-0.15 ± 0.46	5
SPW-6455	Water	11/28/2016	Sr-90	0.67	0.09 ± 0.32	1
SPW-6489	Water	11/29/2016	Ra-226	0.03	0.03 ± 0.02	2

[a] Liquid sample results are reported in pCi/Liter, air filters (pCi/m^3), charcoal (pCi/charcoal canister), and solid samples (pCi/g).

[b] I-131(G); iodine-131 as analyzed by gamma spectroscopy.

[c] Activity reported is a net activity result.

TABLE A-4. In-House "Blank" Samples

Lab Code	Sample Type	Date	Analysis[b]	Concentration [a]		
				Laboratory results (4.66σ)		Acceptance
				LLD	Activity[c]	Criteria (4.66 σ)
SPW-6529	Water	12/1/2016	I-131	0.18	-0.03 ± 0.10	1
SPW-6616	Water	12/3/2016	H-3	180	72 ± 92	200
SPW-6670	Water	12/5/2016	H-3	174	28 ± 92	200
SPW-6735	Water	12/9/2016	H-3	152	2 ± 73	200
SPW-6792	Water	12/15/2016	I-131	0.17	0.03 ± 0.12	1
SPW-6819	Water	12/16/2016	H-3	158	14 ± 77	200
SPW-6879	Water	12/21/2016	H-3	147	80 ± 75	200
SPW-6947	Water	12/22/2016	Ni-63	93	26 ± 57	200
SPW-6973	Water	12/29/2016	Ra-226	0.03	0.03 ± 0.02	2

[a] Liquid sample results are reported in pCi/Liter, air filters (pCi/m^3), charcoal (pCi/charcoal canister), and solid samples (pCi/g).

[b] I-131(G); iodine-131 as analyzed by gamma spectroscopy.

[c] Activity reported is a net activity result.

TABLE A-5. In-House "Duplicate" Samples

			Concentration [a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
AP-010416	1/4/2016	Gr. Beta	0.044 ± 0.006	0.051 ± 0.006	0.047 ± 0.004	Pass
SPS-62, 63	1/7/2016	K-40	21.1 ± 1.9	21.2 ± 2.1	21.2 ± 1.4	Pass
WW-125, 126	1/7/2016	H-3	659 ± 102	748 ± 106	703 ± 74	Pass
SPS-199, 200	1/7/2016	Cs-137	0.09 ± 0.02	0.08 ± 0.03	0.08 ± 0.02	Pass
SPS-199, 200	1/7/2016	K-40	7.60 ± 0.60	8.62 ± 0.62	8.11 ± 0.43	Pass
AP-011116	1/11/2016	Gr. Beta	0.024 ± 0.005	0.027 ± 0.005	0.026 ± 0.003	Pass
AP-011216	1/12/2016	Gr. Beta	0.030 ± 0.004	0.034 ± 0.004	0.032 ± 0.003	Pass
WW-262, 263	1/14/2016	H-3	153 ± 78	141 ± 78	147 ± 55	Pass
WW-346, 347	1/14/2016	H-3	1,036 ± 117	959 ± 115	997 ± 82	Pass
WW-283, 284	1/18/2016	H-3	437 ± 92	427 ± 91	432 ± 65	Pass
AP-011916	1/19/2016	Gr. Beta	0.042 ± 0.005	0.037 ± 0.004	0.040 ± 0.003	Pass
AP-012016	1/20/2016	Gr. Beta	0.023 ± 0.003	0.030 ± 0.004	0.027 ± 0.002	Pass
AP-020116	2/1/2016	Gr. Beta	0.023 ± 0.005	0.023 ± 0.005	0.023 ± 0.004	Pass
SWU-472, 473	2/2/2016	Gr. Beta	4.37 ± 0.47	4.60 ± 0.49	4.49 ± 0.34	Pass
SG-493, 494	2/6/2016	Ac-228	2.10 ± 0.20	2.13 ± 0.20	2.12 ± 0.14	Pass
SG-493, 494	2/6/2016	K-40	5.79 ± 0.57	5.50 ± 0.69	5.65 ± 0.45	Pass
SG-493, 494	2/6/2016	Pb-214	1.84 ± 0.11	1.91 ± 0.11	1.88 ± 0.08	Pass
AP-020816	2/8/2016	Gr. Beta	0.020 ± 0.004	0.019 ± 0.004	0.020 ± 0.003	Pass
AP-020916	2/9/2016	Be-7	0.032 ± 0.005	0.041 ± 0.006	0.036 ± 0.004	Pass
SPS-619, 620	2/18/2016	K-40	20.0 ± 1.8	19.1 ± 1.6	19.5 ± 1.2	Pass
WW-640, 641	2/18/2016	H-3	90.1 ± 75.0	153.6 ± 78.4	121.8 ± 54.2	Pass
AP-021916	2/19/2016	Gr. Beta	0.021 ± 0.003	0.025 ± 0.004	0.023 ± 0.002	Pass
WW-822, 823	2/26/2016	H-3	2,770 ± 173	2,974 ± 178	2,872 ± 124	Pass
DW-70010, 70011	2/29/2016	Ra-226	4.88 ± 0.29	4.93 ± 0.28	4.91 ± 0.20	Pass
DW-70010, 70011	2/29/2016	Ra-228	3.00 ± 0.77	1.90 ± 0.62	2.45 ± 0.49	Pass
SW-934, 935	3/1/2016	Gr. Beta	0.94 ± 0.52	1.36 ± 0.60	1.15 ± 0.40	Pass
SPS-913, 914	3/3/2016	Cs-137	0.08 ± 0.03	0.10 ± 0.03	0.09 ± 0.02	Pass
SPS-913, 914	3/3/2016	K-40	17.45 ± 0.94	16.83 ± 0.95	17.14 ± 0.67	Pass
SPS-913, 914	3/3/2016	Ra-226	1.02 ± 0.08	1.13 ± 0.17	1.07 ± 0.09	Pass
SPS-913, 914	3/3/2016	Ra-228	1.09 ± 0.15	1.13 ± 0.17	1.11 ± 0.11	Pass
AP-030716	3/7/2016	Gr. Beta	0.018 ± 0.005	0.021 ± 0.005	0.019 ± 0.003	Pass
F-1303,1304	3/7/2016	K-40	3.320 ± 0.475	3.508 ± 0.396	3.414 ± 0.309	Pass
SG-976, 977	3/8/2016	Ra-226	6.75 ± 0.25	6.28 ± 0.22	6.52 ± 0.17	Pass
SG-976, 977	3/8/2016	Ra-228	9.21 ± 0.49	9.09 ± 0.49	9.15 ± 0.35	Pass
PM-1094, 1095	3/9/2016	K-40	14.01 ± 0.68	14.47 ± 0.72	14.24 ± 0.49	Pass
MI-1042,1043	3/7/2016	K-40	1,684 ± 124	1,804 ± 119	1,744 ± 86	Pass
DW-70023, 70024	3/7/2016	Ra-226	3.40 ± 0.43	2.68 ± 0.35	3.04 ± 0.28	Pass
DW-70023, 70024	3/7/2016	Ra-228	4.46 ± 0.83	5.74 ± 0.94	5.10 ± 0.63	Pass
DW-70014, 70015	3/7/2016	Gr. Alpha	13.38 ± 1.58	11.40 ± 1.43	12.39 ± 1.07	Pass
DW-70026, 70027	3/7/2016	Gr. Alpha	3.46 ± 0.79	3.08 ± 0.74	3.27 ± 0.54	Pass
DW-70038, 70039	3/8/2016	Gr. Alpha	1.14 ± 0.89	1.73 ± 0.95	1.44 ± 0.65	Pass
DW-70035, 70036	3/8/2016	Ra-226	0.47 ± 0.10	0.45 ± 0.09	0.46 ± 0.07	Pass
DW-70035, 70036	3/8/2016	Ra-228	0.56 ± 0.45	0.47 ± 0.44	0.52 ± 0.31	Pass
AP-031516	3/15/2016	Gr. Beta	0.014 ± 0.003	0.016 ± 0.004	0.015 ± 0.002	Pass
AP-032116	3/21/2016	Gr. Beta	0.014 ± 0.004	0.020 ± 0.004	0.017 ± 0.003	Pass
AP-1218,1219	3/24/2016	Be-7	0.135 ± 0.065	0.167 ± 0.081	0.151 ± 0.052	Pass
AP-1719,1720	3/28/2016	Be-7	0.075 ± 0.008	0.076 ± 0.007	0.076 ± 0.005	Pass
AP-033016	3/30/2016	Gr. Beta	0.023 ± 0.004	0.025 ± 0.004	0.024 ± 0.003	Pass
SPS-1260, 1261	3/30/2016	K-40	18.00 ± 1.92	19.67 ± 1.77	18.84 ± 1.30	Pass
XW-1467, 1468	3/30/2016	H-3	310 ± 87	295 ± 86	303 ± 61	Pass
XWW-1530, 1531	3/30/2016	H-3	198 ± 84	162 ± 82	180 ± 59	Pass
AP-1827, 1828	3/30/2016	Be-7	0.069 ± 0.011	0.072 ± 0.011	0.071 ± 0.008	Pass
AP-1323,1324	3/31/2016	Be-7	0.206 ± 0.120	0.197 ± 0.091	0.202 ± 0.076	Pass
LW-1446,1447	3/31/2016	Gr. Beta	2.36 ± 0.93	2.23 ± 1.01	2.29 ± 0.69	Pass

TABLE A-5. In-House "Duplicate" Samples

			Concentration [a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
AP-010416	1/4/2016	Gr. Beta	0.044 ± 0.006	0.051 ± 0.006	0.047 ± 0.004	Pass
SPS-62, 63	1/7/2016	K-40	21.1 ± 1.9	21.2 ± 2.1	21.2 ± 1.4	Pass
WW-125, 126	1/7/2016	H-3	659 ± 102	748 ± 106	703 ± 74	Pass
SPS-199, 200	1/7/2016	Cs-137	0.09 ± 0.02	0.08 ± 0.03	0.08 ± 0.02	Pass
SPS-199, 200	1/7/2016	K-40	7.60 ± 0.60	8.62 ± 0.62	8.11 ± 0.43	Pass
AP-011116	1/11/2016	Gr. Beta	0.024 ± 0.005	0.027 ± 0.005	0.026 ± 0.003	Pass
AP-011216	1/12/2016	Gr. Beta	0.030 ± 0.004	0.034 ± 0.004	0.032 ± 0.003	Pass
WW-262, 263	1/14/2016	H-3	153 ± 78	141 ± 78	147 ± 55	Pass
WW-346, 347	1/14/2016	H-3	1,036 ± 117	959 ± 115	997 ± 82	Pass
WW-283, 284	1/18/2016	H-3	437 ± 92	427 ± 91	432 ± 65	Pass
AP-011916	1/19/2016	Gr. Beta	0.042 ± 0.005	0.037 ± 0.004	0.040 ± 0.003	Pass
AP-012016	1/20/2016	Gr. Beta	0.023 ± 0.003	0.030 ± 0.004	0.027 ± 0.002	Pass
AP-020116	2/1/2016	Gr. Beta	0.023 ± 0.005	0.023 ± 0.005	0.023 ± 0.004	Pass
SWU-472, 473	2/2/2016	Gr. Beta	4.37 ± 0.47	4.60 ± 0.49	4.49 ± 0.34	Pass
SG-493, 494	2/6/2016	Ac-228	2.10 ± 0.20	2.13 ± 0.20	2.12 ± 0.14	Pass
SG-493, 494	2/6/2016	K-40	5.79 ± 0.57	5.50 ± 0.69	5.65 ± 0.45	Pass
SG-493, 494	2/6/2016	Pb-214	1.84 ± 0.11	1.91 ± 0.11	1.88 ± 0.08	Pass
AP-020816	2/8/2016	Gr. Beta	0.020 ± 0.004	0.019 ± 0.004	0.020 ± 0.003	Pass
AP-020916	2/9/2016	Be-7	0.032 ± 0.005	0.041 ± 0.006	0.036 ± 0.004	Pass
SPS-619, 620	2/18/2016	K-40	20.0 ± 1.8	19.1 ± 1.6	19.5 ± 1.2	Pass
WW-640, 641	2/18/2016	H-3	90.1 ± 75.0	153.6 ± 78.4	121.8 ± 54.2	Pass
AP-021916	2/19/2016	Gr. Beta	0.021 ± 0.003	0.025 ± 0.004	0.023 ± 0.002	Pass
WW-822, 823	2/26/2016	H-3	2,770 ± 173	2,974 ± 178	2,872 ± 124	Pass
DW-70010, 70011	2/29/2016	Ra-226	4.88 ± 0.29	4.93 ± 0.28	4.91 ± 0.20	Pass
DW-70010, 70011	2/29/2016	Ra-228	3.00 ± 0.77	1.90 ± 0.62	2.45 ± 0.49	Pass
SW-934, 935	3/1/2016	Gr. Beta	0.94 ± 0.52	1.36 ± 0.60	1.15 ± 0.40	Pass
SPS-913, 914	3/3/2016	Cs-137	0.08 ± 0.03	0.10 ± 0.03	0.09 ± 0.02	Pass
SPS-913, 914	3/3/2016	K-40	17.45 ± 0.94	16.83 ± 0.95	17.14 ± 0.67	Pass
SPS-913, 914	3/3/2016	Ra-226	1.02 ± 0.08	1.13 ± 0.17	1.07 ± 0.09	Pass
SPS-913, 914	3/3/2016	Ra-228	1.09 ± 0.15	1.13 ± 0.17	1.11 ± 0.11	Pass
AP-030716	3/7/2016	Gr. Beta	0.018 ± 0.005	0.021 ± 0.005	0.019 ± 0.003	Pass
F-1303,1304	3/7/2016	K-40	3.320 ± 0.475	3.508 ± 0.396	3.414 ± 0.309	Pass
SG-976, 977	3/8/2016	Ra-226	6.75 ± 0.25	6.28 ± 0.22	6.52 ± 0.17	Pass
SG-976, 977	3/8/2016	Ra-228	9.21 ± 0.49	9.09 ± 0.49	9.15 ± 0.35	Pass
PM-1094, 1095	3/9/2016	K-40	14.01 ± 0.68	14.47 ± 0.72	14.24 ± 0.49	Pass
MI-1042,1043	3/7/2016	K-40	1,684 ± 124	1,804 ± 119	1,744 ± 86	Pass
DW-70023, 70024	3/7/2016	Ra-226	3.40 ± 0.43	2.68 ± 0.35	3.04 ± 0.28	Pass
DW-70023, 70024	3/7/2016	Ra-228	4.46 ± 0.83	5.74 ± 0.94	5.10 ± 0.63	Pass
DW-70014, 70015	3/7/2016	Gr. Alpha	13.38 ± 1.58	11.40 ± 1.43	12.39 ± 1.07	Pass
DW-70026, 70027	3/7/2016	Gr. Alpha	3.46 ± 0.79	3.08 ± 0.74	3.27 ± 0.54	Pass
DW-70038, 70039	3/8/2016	Gr. Alpha	1.14 ± 0.89	1.73 ± 0.95	1.44 ± 0.65	Pass
DW-70035, 70036	3/8/2016	Ra-226	0.47 ± 0.10	0.45 ± 0.09	0.46 ± 0.07	Pass
DW-70035, 70036	3/8/2016	Ra-228	0.56 ± 0.45	0.47 ± 0.44	0.52 ± 0.31	Pass
AP-031516	3/15/2016	Gr. Beta	0.014 ± 0.003	0.016 ± 0.004	0.015 ± 0.002	Pass
AP-032116	3/21/2016	Gr. Beta	0.014 ± 0.004	0.020 ± 0.004	0.017 ± 0.003	Pass
AP-1218,1219	3/24/2016	Be-7	0.135 ± 0.065	0.167 ± 0.081	0.151 ± 0.052	Pass
AP-1719,1720	3/28/2016	Be-7	0.075 ± 0.008	0.076 ± 0.007	0.076 ± 0.005	Pass
AP-033016	3/30/2016	Gr. Beta	0.023 ± 0.004	0.025 ± 0.004	0.024 ± 0.003	Pass
SPS-1260, 1261	3/30/2016	K-40	18.00 ± 1.92	19.67 ± 1.77	18.84 ± 1.30	Pass
XW-1467, 1468	3/30/2016	H-3	310 ± 87	295 ± 86	303 ± 61	Pass
XWW-1530, 1531	3/30/2016	H-3	198 ± 84	162 ± 82	180 ± 59	Pass
AP-1827, 1828	3/30/2016	Be-7	0.069 ± 0.011	0.072 ± 0.011	0.071 ± 0.008	Pass
AP-1323,1324	3/31/2016	Be-7	0.206 ± 0.120	0.197 ± 0.091	0.202 ± 0.076	Pass
LW-1446,1447	3/31/2016	Gr. Beta	2.36 ± 0.93	2.23 ± 1.01	2.29 ± 0.69	Pass

TABLE A-5. In-House "Duplicate" Samples

			Concentration [a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
WW-1740,1741	4/2/2016	H-3	21,162 ± 120	21,091 ± 427	21,126 ± 222	Pass
SPS-1344, 1345	4/4/2016	K-40	17.98 ± 0.93	17.14 ± 0.96	17.56 ± 0.67	Pass
SPS-1344, 1345	4/4/2016	Pb-214	1.12 ± 0.09	1.04 ± 0.08	1.08 ± 0.06	Pass
SPS-1344, 1345	4/4/2016	Ac-228	1.23 ± 0.15	1.33 ± 0.19	1.28 ± 0.12	Pass
SPS-1344, 1345	4/4/2016	Cs-137	0.13 ± 0.03	0.13 ± 0.03	0.13 ± 0.02	Pass
P-1509,1510	4/8/2016	H-3	1,084 ± 120	1,038 ± 119	1,061 ± 85	Pass
AP-041116	4/11/2016	Gr. Beta	0.020 ± 0.004	0.019 ± 0.004	0.019 ± 0.003	Pass
SS-1551,1552	4/12/2016	Gr. Beta	8.71 ± 1.11	8.88 ± 1.13	8.80 ± 0.79	Pass
SS-1551,1552	4/12/2016	K-40	3.50 ± 0.25	3.06 ± 0.28	3.28 ± 0.19	Pass
SS-1551,1552	4/12/2016	Tl-208	0.05 ± 0.02	0.05 ± 0.02	0.05 ± 0.01	Pass
SS-1551,1552	4/12/2016	Bi-214	0.10 ± 0.02	0.09 ± 0.02	0.10 ± 0.02	Pass
SS-1551,1552	4/12/2016	Pb-212	0.13 ± 0.02	0.11 ± 0.02	0.12 ± 0.01	Pass
SS-1551,1552	4/12/2016	Ra-226	0.35 ± 0.17	0.30 ± 0.17	0.32 ± 0.12	Pass
SS-1551,1552	4/12/2016	Ac-228	0.16 ± 0.05	0.17 ± 0.05	0.17 ± 0.04	Pass
SS-1593,1594	4/12/2016	K-40	14.80 ± 0.73	14.89 ± 0.78	14.85 ± 0.53	Pass
WW-1677, 1678	4/14/2016	Ra-226	0.23 ± 0.13	0.35 ± 0.15	0.29 ± 0.10	Pass
WW-1783,1784	4/14/2016	H-3	768 ± 111	632 ± 107	700 ± 77	Pass
BS-1804,1805	4/18/2016	K-40	0.79 ± 0.02	0.87 ± 0.19	0.83 ± 0.10	Pass
WW-2021,2022	4/18/2016	H-3	5,548 ± 221	5,707 ± 224	5,627 ± 157	Pass
XWW-2240, 2241	4/18/2016	H-3	638 ± 104	543 ± 101	591 ± 72	Pass
XWW-2109, 2110	4/19/2016	H-3	3461 ± 185	3250 ± 180	3356 ± 129	Pass
SPS-2130, 2131	4/25/2016	K-40	7.80 ± 0.84	6.80 ± 0.60	7.30 ± 0.52	Pass
AP-042516	4/25/2016	Gr. Beta	0.020 ± 0.004	0.023 ± 0.004	0.022 ± 0.003	Pass
BS-2065, 2066	4/25/2016	K-40	14.40 ± 1.50	14.72 ± 1.19	14.56 ± 0.96	Pass
AP-042716	4/27/2016	Gr. Beta	0.023 ± 0.003	0.019 ± 0.003	0.021 ± 0.002	Pass
SPS-1999, 2000	4/28/2016	K-40	19.84 ± 1.76	18.963 ± 2.42	19.40 ± 1.50	Pass
SO-2153,2154	5/2/2016	K-40	21.80 ± 0.81	21.17 ± 0.85	21.48 ± 0.59	Pass
SO-2153,2154	5/2/2016	Cs-137	0.11 ± 0.03	0.11 ± 0.07	0.11 ± 0.04	Pass
SO-2153,2154	5/2/2016	Ra-226	1.50 ± 0.29	1.22 ± 0.29	1.36 ± 0.21	Pass
SO-2153,2154	5/2/2016	Pb-214	0.56 ± 0.06	0.57 ± 0.06	0.57 ± 0.04	Pass
W-2394,2395	5/5/2016	H-3	736 ± 106	631 ± 102	683 ± 74	Pass
VE-2284,2285	5/9/2016	K-40	3.50 ± 0.25	3.06 ± 0.28	3.28 ± 0.19	Pass
AP-051016	5/10/2016	Gr. Beta	0.020 ± 0.005	0.018 ± 0.005	0.019 ± 0.003	Pass
SG-2261, 2262	5/10/2016	Ac-228	34.4 ± 1.2	34.4 ± 1.4	34.4 ± 0.9	Pass
SG-2261, 2262	5/10/2016	Pb-214	29.5 ± 3.0	31.9 ± 3.3	30.7 ± 2.2	Pass
BS-2439, 2440	5/12/2016	K-40	9.96 ± 0.91	10.27 ± 0.76	10.11 ± 0.59	Pass
WW-2534,2535	5/16/2016	H-3	14,342 ± 354	14,613 ± 357	14,477 ± 252	Pass
AP-051716	5/17/2016	Gr. Beta	0.014 ± 0.004	0.015 ± 0.004	0.014 ± 0.003	Pass
SPS-2945, 2946	5/19/2016	K-40	30.71 ± 0.74	31.75 ± 0.78	31.23 ± 0.54	Pass
SPS-2945, 2946	5/19/2016	Be-7	1.55 ± 0.24	1.90 ± 0.35	1.73 ± 0.21	Pass
SPS-2578, 2579	5/24/2016	Pb-214	0.96 ± 0.12	0.80 ± 0.14	0.88 ± 0.09	Pass
AP-052516	5/25/2016	Gr. Beta	0.022 ± 0.004	0.022 ± 0.004	0.022 ± 0.003	Pass
G-2642,2643	5/26/2016	Be-7	0.443 ± 0.178	0.247 ± 0.247	0.345 ± 0.152	Pass
SO-2663, 2664	5/26/2016	Cs-137	0.08 ± 0.03	0.07 ± 0.03	0.07 ± 0.02	Pass
SO-2663, 2664	5/26/2016	K-40	12.44 ± 0.68	11.64 ± 0.63	12.04 ± 0.46	Pass
SO-2663, 2664	5/26/2016	Tl-208	0.13 ± 0.02	0.14 ± 0.03	0.14 ± 0.02	Pass
SO-2663, 2664	5/26/2016	Pb-212	0.43 ± 0.04	0.41 ± 0.04	0.42 ± 0.03	Pass
SO-2663, 2664	5/26/2016	Ra-226	1.19 ± 0.34	0.87 ± 0.28	1.03 ± 0.22	Pass
SO-2663, 2664	5/26/2016	Ac-228	0.45 ± 0.09	0.53 ± 0.10	0.49 ± 0.07	Pass
SPS-2817, 2818	5/31/2016	K-40	12.10 ± 0.70	11.05 ± 0.70	11.58 ± 0.49	Pass
DW-70091, 70092	6/1/2016	Ra-226	5.61 ± 0.29	5.53 ± 0.30	5.57 ± 0.21	Pass
DW-70091, 70092	6/1/2016	Ra-228	1.45 ± 0.58	1.91 ± 0.62	1.68 ± 0.42	Pass
BS-2925,2926	6/3/2016	K-40	7.74 ± 0.44	7.86 ± 0.42	7.80 ± 0.30	Pass
SPS-2796, 2797	6/2/2016	K-40	20.91 ± 2.38	21.16 ± 1.82	21.04 ± 1.50	Pass
SPS-2882, 2883	6/7/2016	K-40	14.64 ± 0.52	14.60 ± 0.52	14.62 ± 0.37	Pass
SPS-2882, 2883	6/7/2016	Be-7	2.00 ± 0.25	1.94 ± 0.20	1.97 ± 0.16	Pass
DW-70102, 70103	6/13/2016	Ra-226	0.34 ± 0.09	0.36 ± 0.08	0.35 ± 0.06	Pass

TABLE A-5. In-House "Duplicate" Samples

			Concentration [a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
DW-70102, 70103	6/13/2016	Ra-228	0.93 ± 0.47	1.11 ± 0.53	1.02 ± 0.35	Pass
AP-061416	6/14/2016	Gr. Beta	0.026 ± 0.004	0.023 ± 0.004	0.024 ± 0.003	Pass
SG-3144, 3145	6/17/2016	Be-7	2.23 ± 0.12	2.24 ± 0.12	2.24 ± 0.08	Pass
SG-3144, 3145	6/17/2016	K-40	7.57 ± 0.25	7.09 ± 0.23	7.33 ± 0.17	Pass
SPS-3165, 3166	6/22/2016	K-40	21.14 ± 2.27	22.88 ± 1.60	22.01 ± 1.39	Pass
SPS-3323, 3324	6/24/2016	K-40	18.67 ± 1.57	21.53 ± 1.65	20.10 ± 1.14	Pass
WW-3231, 3232	6/27/2016	H-3	414 ± 104	498 ± 108	456 ± 75	Pass
AP-3830,3831	6/29/2016	Gr. Beta	0.088 ± 0.012	0.093 ± 0.015	0.091 ± 0.010	Pass
AP-070516A	7/5/2016	Gr. Beta	0.018 ± 0.002	0.014 ± 0.002	0.016 ± 0.002	Pass
AP-070516B	7/5/2016	Gr. Beta	0.025 ± 0.005	0.026 ± 0.005	0.025 ± 0.004	Pass
XWW-3605,3606	7/7/2016	H-3	3,316 ± 186	3,316 ± 181	3,316 ± 130	Pass
DW-70135,70136	7/8/2016	Gr. Alpha	3.68 ± 1.01	2.76 ± 0.98	3.22 ± 0.70	Pass
DW-70132,70133	7/8/2016	Ra-226	1.32 ± 0.14	1.11 ± 0.15	1.22 ± 0.10	Pass
DW-70132,70133	7/8/2016	Ra-228	3.92 ± 0.94	2.94 ± 0.90	3.43 ± 0.65	Pass
AP-071216	7/12/2016	Gr. Beta	0.014 ± 0.004	0.018 ± 0.004	0.016 ± 0.003	Pass
DW-70150,70151	7/14/2016	Gr. Alpha	5.00 ± 1.06	4.43 ± 1.04	4.72 ± 0.74	Pass
SPS-3649,3650	7/15/2016	Cs-137	0.12 ± 0.03	0.12 ± 0.03	0.12 ± 0.02	Pass
SPS-3649,3650	7/15/2016	K-40	16.68 ± 0.79	16.52 ± 0.86	16.6 ± 0.58	Pass
SPS-3649,3650	7/15/2016	Pb-214	1.20 ± 0.08	1.17 ± 0.08	1.19 ± 0.06	Pass
SPS-3649,3650	7/15/2016	Ac-228	1.28 ± 0.16	1.28 ± 0.16	1.28 ± 0.11	Pass
AP-071816	7/18/2016	Gr. Beta	0.022 ± 0.005	0.024 ± 0.005	0.023 ± 0.003	Pass
DW-70163,70164	7/19/2016	Gr. Alpha	1.08 ± 0.66	1.36 ± 0.70	1.22 ± 0.48	Pass
WW-3761,3762	7/20/2016	H-3	347 ± 90	466 ± 96	407 ± 66	Pass
SPS-4003,4004	7/23/2016	K-40	7.15 ± 1.59	6.86 ± 1.21	7.00 ± 1.00	Pass
AP-072516	7/25/2016	Gr. Beta	0.023 ± 0.004	0.020 ± 0.004	0.022 ± 0.003	Pass
VE-3936,3937	7/25/2016	Sr-90	0.048 ± 0.007	0.058 ± 0.010	0.053 ± 0.006	Pass
VE-3936,3937	7/25/2016	Be-7	0.49 ± 0.15	0.51 ± 0.15	0.50 ± 0.10	Pass
VE-3936,3937	7/25/2016	K-40	4.70 ± 0.35	4.86 ± 0.37	4.78 ± 0.25	Pass
VE-3959,3960	7/27/2016	Sr-90	0.002 ± 0.002	0.003 ± 0.001	0.003 ± 0.001	Pass
VE-3959,3960	7/27/2016	Be-7	0.30 ± 0.14	0.25 ± 0.12	0.27 ± 0.09	Pass
VE-3959,3960	7/27/2016	K-40	4.01 ± 0.37	4.16 ± 0.34	4.08 ± 0.25	Pass
DW-70169,70170	7/28/2016	Ra-226	0.83 ± 0.11	0.69 ± 0.11	0.76 ± 0.08	Pass
DW-70169,70170	7/28/2016	Ra-228	1.85 ± 0.63	1.31 ± 0.84	1.58 ± 0.53	Pass
AP-080116	8/1/2016	Gr. Beta	0.029 ± 0.003	0.033 ± 0.003	0.031 ± 0.002	Pass
SS-4131,4132	8/1/2016	K-40	12.47 ± 0.71	13.24 ± 0.81	12.86 ± 0.54	Pass
SS-4131,4132	8/1/2016	Cs-137	0.10 ± 0.03	0.13 ± 0.04	0.12 ± 0.02	Pass
SPS-4087,4088	8/2/2016	K-40	17.06 ± 1.58	19.5 ± 1.97	18.28 ± 1.26	Pass
WW-4976,4977	8/4/2016	H-3	17,043 ± 390	16,821 ± 388	16,932 ± 275	Pass
SPS-4266,4267	8/10/2016	K-40	1.06 ± 0.47	1.69 ± 0.52	1.375 ± 0.35	Pass
AP-081616	8/16/2016	Gr. Beta	0.029 ± 0.005	0.025 ± 0.004	0.027 ± 0.003	Pass
VE-4399,4400	8/18/2016	K-40	3.85 ± 0.23	3.27 ± 0.41	3.56 ± 0.24	Pass
VE-4399,4400	8/18/2016	Be-7	0.30 ± 0.08	0.45 ± 0.20	0.37 ± 0.11	Pass
WW-5394,5395	8/18/2016	H-3	947 ± 122	846 ± 119	896 ± 85	Pass
SPS-4441,4442	8/22/2016	K-40	20.55 ± 2.23	19.69 ± 1.74	20.12 ± 1.41	Pass
AP-082216	8/22/2016	Gr. Beta	0.021 ± 0.005	0.015 ± 0.005	0.018 ± 0.003	Pass
VE-4462,4463	8/22/2016	Be-7	0.91 ± 0.09	0.89 ± 0.11	0.90 ± 0.07	Pass
VE-4462,4463	8/22/2016	K-40	7.48 ± 0.26	7.60 ± 0.23	7.54 ± 0.17	Pass
WW-4594,4595	8/26/2016	H-3	675 ± 107	788 ± 111	731 ± 77	Pass
WW-4663,4664	8/26/2016	H-3	607 ± 104	501 ± 100	554 ± 72	Pass
SPS-4529,4530	8/26/2016	K-40	21.98 ± 2.52	21.85 ± 1.56	21.92 ± 1.48	Pass
AP-083016A	8/30/2016	Gr. Beta	0.030 ± 0.003	0.035 ± 0.004	0.033 ± 0.002	Pass
AP-083016B	8/30/2016	Gr. Beta	0.032 ± 0.009	0.026 ± 0.004	0.029 ± 0.005	Pass
VE-4615,4616	8/31/2016	K-40	2.96 ± 0.16	3.11 ± 0.17	3.03 ± 0.11	Pass

TABLE A-5. In-House "Duplicate" Samples

			Concentration [a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
AP-110116	11/1/2016	Gr. Beta	0.021 ± 0.004	0.024 ± 0.004	0.023 ± 0.003	Pass
S-5963, 5964	11/1/2016	K-40	20.35 ± 2.29	18.59 ± 1.90	19.47 ± 1.49	Pass
SG-6119, 6120	11/1/2016	Ac-228	5.70 ± 0.44	6.28 ± 0.57	5.99 ± 0.36	Pass
SG-6119, 6120	11/1/2016	Gr. Alpha	21.59 ± 1.88	24.35 ± 1.93	22.97 ± 1.35	Pass
SG-6119, 6120	11/1/2016	K-40	4.89 ± 1.10	5.90 ± 1.08	5.40 ± 0.77	Pass
SG-6119, 6120	11/1/2016	Pb-214	3.99 ± 0.21	4.35 ± 0.32	4.17 ± 0.19	Pass
S-6051, 6052	11/4/2016	K-40	7.05 ± 0.60	7.56 ± 0.53	7.31 ± 0.40	Pass
WW-6297, 6298	11/8/2016	H-3	207 ± 98	165 ± 97	186 ± 69	Pass
WW-6341,6342	11/8/2016	H-3	1,356 ± 140	1,404 ± 141	1,380 ± 99	Pass
SO-6406,6407	11/9/2016	Cs-137	0.36 ± 0.04	0.43 ± 0.05	0.40 ± 0.03	Pass
SO-6406,6407	11/9/2016	K-40	10.90 ± 0.68	11.29 ± 0.74	11.09 ± 0.50	Pass
AP-111416	11/14/2016	Gr. Beta	0.024 ± 0.005	0.021 ± 0.006	0.022 ± 0.004	Pass
WW-6829,6830	11/15/2016	H-3	39,982 ± 589	40,315 ± 591	40,149 ± 417	Pass
DW-70239, 70240	11/17/2016	Gr. Alpha	7.99 ± 1.15	6.41 ± 1.05	7.20 ± 0.78	Pass
AP-112216	11/22/2016	Gr. Beta	0.049 ± 0.005	0.045 ± 0.005	0.047 ± 0.003	Pass
S-6473, 6474	11/24/2016	K-40	19.37 ± 1.97	23.80 ± 3.54	21.58 ± 2.02	Pass
SG-6938, 6939	11/28/2016	Ac-228	18.99 ± 0.59	19.92 ± 0.79	19.46 ± 0.49	Pass
SG-6938, 6939	11/28/2016	Pb-214	15.28 ± 0.34	14.96 ± 0.43	15.12 ± 0.27	Pass
AP-120116	12/1/2016	Gr. Beta	0.029 ± 0.003	0.030 ± 0.003	0.030 ± 0.002	Pass
F-6567,6568	12/1/2016	K-40	3.76 ± 0.40	3.83 ± 0.46	3.80 ± 0.30	Pass
S-6522, 6523	12/1/2016	Ac-228	1.08 ± 0.13	1.29 ± 0.16	1.19 ± 0.10	Pass
S-6522, 6523	12/1/2016	Pb-214	1.00 ± 0.08	1.01 ± 0.09	1.01 ± 0.06	Pass
S-6609, 6610	12/1/2016	K-40	15.57 ± 1.01	15.99 ± 0.78	15.78 ± 0.64	Pass
S-6718, 6719	12/7/2016	K-40	18.19 ± 2.13	18.76 ± 1.80	18.48 ± 1.39	Pass
WW-6784, 6785	12/7/2016	H-3	922 ± 117	905 ± 116	914 ± 82	Pass
AP-121216	12/12/2016	Gr. Beta	0.026 ± 0.005	0.028 ± 0.005	0.027 ± 0.003	Pass
AP-7178,7179	1/3/2017	Be-7	0.047 ± 0.015	0.062 ± 0.017	0.054 ± 0.012	Pass

Note: Duplicate analyses are performed on every twentieth sample received in-house. Results are not listed for those analyses with activities that measure below the LLD.

[a] Results are reported in units of pCi/L, except for air filters (pCi/Filter or pCi/m3), food products, vegetation, soil and sediment (pCi/g).

TABLE A-6. Department of Energy's Mixed Analyte Performance Evaluation Program (MAPEP).

			Concentration [a]			
Lab Code [b]	Reference Date	Analysis	Laboratory result	Known Activity	Control Limits [c]	Acceptance
MASO-1053	2/1/2016	Ni-63	1,206 ± 20	1250	875 - 1625	Pass
MASO-1053	2/1/2016	Sr-90	0.65 ± 1.27	0.00	NA [c]	Pass
MASO-1053	2/1/2016	Tc-99	0.1 ± 5.5	0.0	NA [c]	Pass
MASO-1053	2/1/2016	Cs-134	908 ± 26	1030	721 - 1339	Pass
MASO-1053	2/1/2016	Cs-137	0.10 ± 6.20	0.00	NA [c]	Pass
MASO-1053	2/1/2016	Co-57	1058 ± 26	992	694 - 1290	Pass
MASO-1053	2/1/2016	Co-60	1229 ± 28	1190	833 - 1547	Pass
MASO-1053	2/1/2016	Mn-54	1235 ± 43	1160	812 - 1508	Pass
MASO-1053	2/1/2016	Zn-65	753 ± 64	692	484 - 900	Pass
MASO-1053	2/1/2016	K-40	753 ± 140	607	425 - 789	Pass
MASO-1053	2/1/2016	Am-241	79 ± 6	103	72 - 134	Pass
MASO-1053	2/1/2016	Pu-238	73.9 ± 9.2	63.6	44.5 - 82.7	Pass
MASO-1053	2/1/2016	Pu-239/240	0.76 ± 1.34	0.21	NA [d]	Pass
MASO-1053	2/1/2016	U-234/233	45.0 ± 5.1	45.9	32.1 - 59.7	Pass
MASO-1053	2/1/2016	U-238	129 ± 9	146	102 - 190	Pass
MAW-989	2/1/2016	Am-241	0.018 ± 0.015	0.00	NA [c]	Pass
MAW-989	2/1/2016	H-3	0.2 ± 2.8	0.0	NA [c]	Pass
MAW-989	2/1/2016	Ni-63	12.8 ± 2.7	12.3	8.6 - 16.0	Pass
MAW-989	2/1/2016	Sr-90	8.70 ± 1.20	8.74	6.12 - 11.36	Pass
MAW-989	2/1/2016	Tc-99	-1.1 ± 0.6	0.0	NA [c]	Pass
MAW-989	2/1/2016	Cs-134	15.5 ± 0.3	16.1	11.3 ± 20.9	Pass
MAW-989	2/1/2016	Cs-137	23.7 ± 0.5	21.2	14.8 - 27.6	Pass
MAW-989[e]	2/1/2016	Co-57	1.38 ± 0.12	0.00	NA [c]	Fail
MAW-989	2/1/2016	Co-60	12.5 ± 0.3	11.8	8.3 - 15.3	Pass
MAW-989	2/1/2016	Mn-54	12.2 ± 0.4	11.1	7.8 - 14.4	Pass
MAW-989	2/1/2016	Zn-65	15.7 ± 0.7	13.6	9.5 - 17.7	Pass
MAW-989	2/1/2016	K-40	288 ± 5	251	176 - 326	Pass
MAW-989	2/1/2016	Fe-55	17.3 ± 7.0	16.2	11.3 - 21.1	Pass
MAW-989	2/1/2016	Ra-226	0.710 ± 0.070	0.718	0.503 - 0.933	Pass
MAW-989	2/1/2016	Pu-238	1.280 ± 0.110	1.244	0.871 ± 1.617	Pass
MAW-989	2/1/2016	Pu-239/240	0.640 ± 0.080	0.641	0.449 - 0.833	Pass
MAW-989	2/1/2016	U-234/233	1.39 ± 0.12	1.48	1.04 - 1.92	Pass
MAW-989	2/1/2016	U-238	1.43 ± 0.12	1.53	1.07 - 1.99	Pass
MAW-893	2/1/2016	Gross Alpha	0.600 ± 0.050	0.673	0.202 - 1.144	Pass
MAW-893	2/1/2016	Gross Beta	2.10 ± 0.06	2.15	1.08 - 3.23	Pass
MAW-896	2/1/2016	I-129	3.67 ± 0.20	3.85	2.70 - 5.01	Pass
MAAP-1056	2/1/2016	Gross Alpha	0.39 ± 0.05	1.20	0.36 - 2.04	Pass
MAAP-1056	2/1/2016	Gross Beta	1.03 ± 0.07	0.79	0.40 - 1.19	Pass

TABLE A-6. Department of Energy's Mixed Analyte Performance Evaluation Program (MAPEP).

			Concentration [a]			
Lab Code [b]	Reference Date	Analysis	Laboratory result	Known Activity	Control Limits [c]	Acceptance
MAAP-1057	2/1/2016	Sr-90	1.34 ± 0.15	1.38	0.97 ± 1.79	Pass
MAAP-1057	2/1/2016	Cs-134	-0.01 ± 0.03	0.00	NA [c]	Pass
MAAP-1057	2/1/2016	Cs-137	2.57 ± 0.10	2.30	1.61 - 2.99	Pass
MAAP-1057	2/1/2016	Co-57	3.01 ± 0.06	2.94	2.06 - 3.82	Pass
MAAP-1057	2/1/2016	Co-60	4.28 ± 0.10	4.02	2.81 - 5.23	Pass
MAAP-1057	2/1/2016	Mn-54	4.90 ± 0.13	4.53	3.17 - 5.89	Pass
MAAP-1057	2/1/2016	Zn-65	4.09 ± 0.18	3.57	2.50 - 4.64	Pass
MAAP-1057	2/1/2016	Am-241	0.059 ± 0.015	0.0805	0.0564 - 0.1047	Pass
MAAP-1057	2/1/2016	Pu-238	0.066 ± 0.020	0.0637	0.0446 - 0.0828	Pass
MAAP-1057	2/1/2016	Pu-239/240	0.074 ± 0.020	0.099	NA [d]	Pass
MAAP-1057	2/1/2016	U-234/233	0.151 ± 0.026	0.165	0.116 - 0.215	Pass
MAAP-1057	2/1/2016	U-238	0.160 ± 0.026	0.172	0.120 - 0.224	Pass
MAVE-1050	2/1/2016	Cs-134	9.83 ± 0.19	10.62	7.43 - 13.81	Pass
MAVE-1050	2/1/2016	Cs-137	6.06 ± 0.19	5.62	3.93 - 7.31	Pass
MAVE-1050	2/1/2016	Co-57	13.8 ± 0.2	11.8	8.3 - 15.3	Pass
MAVE-1050	2/1/2016	Co-60	0.022 ± 0.040	0.00	NA [c]	Pass
MAVE-1050	2/1/2016	Mn-54	0.009 ± 0.044	0.000	NA [c]	Pass
MAVE-1050	2/1/2016	Zn-65	10.67 ± 0.39	9.60	6.70 - 12.50	Pass
MASO-4780[f]	8/1/2016	Ni-63	648 ± 14	990	693 - 1287	Fail
MASO-4780[g]	8/1/2016	Ni-63	902 ± 46	990	693 - 1287	Pass
MASO-4780	8/1/2016	Sr-90	757 ± 16	894	626 - 1162	Pass
MASO-4780	8/1/2016	Tc-99	559 ± 12	556	389 - 723	Pass
MASO-4780	8/1/2016	Cs-134	0.93 ± 2.92	0.00	NA [c]	Pass
MASO-4780	8/1/2016	Cs-137	1061 ± 12	1067	747 - 1387	Pass
MASO-4780	8/1/2016	Co-57	1178 ± 8	1190	833 - 1547	Pass
MASO-4780	8/1/2016	Co-60	841 ± 9	851	596 - 1106	Pass
MASO-4780	8/1/2016	Mn-54	0.69 ± 2.53	0.00	NA [c]	Pass
MASO-4780	8/1/2016	Zn-65	724 ± 19	695	487 - 904	Pass
MASO-4780	8/1/2016	K-40	566 ± 52	588	412 - 764	Pass
MASO-4780	8/1/2016	Am-241	0.494 ± 0.698	0.000	NA [c]	Pass
MASO-4780	8/1/2016	Pu-238	69.7 ± 7.4	70.4	49.3 - 91.5	Pass
MASO-4780	8/1/2016	Pu-239/240	53.9 ± 6.3	53.8	37.7 - 69.9	Pass
MASO-4780[h]	8/1/2016	U-233/234	46.8 ± 3.9	122	85 - 159	Fail
MASO-4780[h]	8/1/2016	U-238	46.6 ± 3.9	121	85 - 157	Fail
MAW-4776	8/1/2016	I-129	4.40 ± 0.20	4.54	3.18 - 5.90	Pass
MAVE-4782	8/1/2016	Cs-134	-0.01 ± 0.05	0.00	NA [c]	Pass
MAVE-4782	8/1/2016	Cs-137	6.18 ± 0.20	5.54	3.88 - 7.20	Pass
MAVE-4782	8/1/2016	Co-57	8.13 ± 0.16	6.81	4.77 - 8.85	Pass
MAVE-4782	8/1/2016	Co-60	5.30 ± 0.15	4.86	3.40 - 6.32	Pass
MAVE-4782	8/1/2016	Mn-54	8.08 ± 0.24	7.27	5.09 - 9.45	Pass
MAVE-4782	8/1/2016	Zn-65	6.24 ± 0.36	5.40	3.78 - 7.02	Pass

TABLE A-6. Department of Energy's Mixed Analyte Performance Evaluation Program (MAPEP).

			Concentration [a]			
Lab Code [b]	Reference Date	Analysis	Laboratory result	Known Activity	Control Limits [c]	Acceptance
MAAP-4784	8/1/2016	Sr-90	1.18 ± 0.10	1.03	0.72 - 1.34	Pass
MAAP-4784	8/1/2016	Cs-134	1.58 ± 0.08	2.04	1.43 - 2.65	Pass
MAAP-4784	8/1/2016	Cs-137	1.85 ± 0.09	1.78	1.25 - 2.31	Pass
MAAP-4784	8/1/2016	Co-57	2.39 ± 0.52	2.48	1.74 - 3.22	Pass
MAAP-4784	8/1/2016	Co-60	3.22 ± 0.08	3.26	2.28 - 4.24	Pass
MAAP-4784	8/1/2016	Mn-54	2.82 ± 0.12	2.75	1.93 - 3.58	Pass
MAAP-4784	8/1/2016	Zn-65	-0.015 ± 0.062	0.00	NA [c]	Pass
MAAP-4784	8/1/2016	Am-241	-0.001 ± 0.006	0.00	NA [c]	Pass
MAAP-4784	8/1/2016	Pu-238	0.075 ± 0.022	0.069	0.049 - 0.090	Pass
MAAP-4784	8/1/2016	Pu-239/240	0.048 ± 0.015	0.054	0.038 - 0.070	Pass
MAAP-4784	8/1/2016	U-234/233	0.151 ± 0.036	0.150	0.105 - 0.195	Pass
MAAP-4784	8/1/2016	U-238	0.147 ± 0.034	0.156	0.109 - 0.203	Pass
MAW-4778	8/1/2016	H-3	365 ± 11	334	234 - 434	Pass
MAW-4778	8/1/2016	Fe-55	23.6 ± 16.3	21.5	15.1 ± 28.0	Pass
MAW-4778	8/1/2016	Ni-63	17.0 ± 2.8	17.2	12.0 ± 22.4	Pass
MAW-4778	8/1/2016	Sr-90	0.17 ± 0.28	0.00	NA [c]	Pass
MAW-4778	8/1/2016	Tc-99	9.50 ± 0.41	11.60	8.10 - 15.10	Pass
MAW-4778	8/1/2016	Cs-134	22.6 ± 0.4	23.9	16.7 - 31.1	Pass
MAW-4778	8/1/2016	Cs-137	0.018 ± 0.117	0.00	NA [c]	Pass
MAW-4778	8/1/2016	Co-57	27.6 ± 0.2	27.3	19.1 ± 35.5	Pass
MAW-4778	8/1/2016	Co-60	0.018 ± 0.090	0.00	NA [c]	Pass
MAW-4778	8/1/2016	Mn-54	16.2 ± 0.4	14.8	10.4 - 19.2	Pass
MAW-4778	8/1/2016	Zn-65	19.3 ± 0.7	17.4	12.2 - 22.6	Pass
MAW-4778	8/1/2016	K-40	286 ± 6	252	176 - 328	Pass
MAW-4778	8/1/2016	Ra-226	1.48 ± 0.09	1.33	0.93 - 1.73	Pass
MAW-4778	8/1/2016	Pu-238	1.09 ± 0.13	1.13	0.79 - 1.47	Pass
MAW-4778	8/1/2016	Pu-239/240	0.003 ± 0.011	0.016	NA [d]	Pass
MAW-4778	8/1/2016	U-234/233	1.80 ± 0.13	1.86	1.30 - 2.42	Pass
MAW-4778	8/1/2016	U-238	1.77 ± 0.13	1.92	1.34 - 2.50	Pass
MAW-4778	8/1/2016	Am-241	0.678 ± 0.086	0.814	0.570 ± 1.058	Pass

[a] Results are reported in units of Bq/kg (soil), Bq/L (water) or Bq/total sample (filters, vegetation).

[b] Laboratory codes as follows: MAW (water), MAAP (air filter), MASO (soil), MAVE (vegetation).

[c] MAPEP results are presented as the known values and expected laboratory precision (1 sigma, 1 determination) and control limits as defined by the MAPEP. A known value of "zero" indicates an analysis was included in the testing series as a "false positive". MAPEP does not provide control limits.

[d] Provided in the series for "sensitivity evaluation". MAPEP does not provide control limits.

[e] The laboratory properly identified the Sn-75 interfering peak in the vicinity of Co-57 and stated so in the comment field. MAPEP requires results to be reported as an activity with an uncertainty. Since the calculated uncertainty was less than the activity MAPEP interpreted the submitted result as a "false positive" resulting in a failure.

[f] Original analysis for Ni-63 failed.

[g] Reanalysis with a smaller aliquot resulted in acceptable results. An investigation is in process to identify better techniques for analyzing samples with complex matrices.

[h] MAPEP states that samples contain two fractions of Uranium; one that is soluble in concentrated HNO^3 and HCl acid and one that is "fundamentally insoluble in these acids". They also state that HF treatment can not assure complete dissolution. Results are consistent with measuring the soluble form.

TABLE A-7. Interlaboratory Comparison Crosscheck Program, Environmental Resource Associates (ERA)[a].

MRAD Study

Lab Code [b]	Date	Analysis	Concentration [a] Laboratory Result	ERA Result	Control Limits	Acceptance
ERAP-1101	3/14/2016	Am-241	37.3	45.9	28.3 - 62.1	Pass
ERAP-1101	3/14/2016	Co-60	637	623	482 - 778	Pass
ERAP-1101	3/14/2016	Cs-134	251	304	193 - 377	Pass
ERAP-1101	3/14/2016	Cs-137	1,273	1,150	864 - 1,510	Pass
ERAP-1101	3/14/2016	Fe-55	< 162	126	39.1 - 246	Pass
ERAP-1101	3/14/2016	Mn-54	< 2.64	< 50.0	0.00 - 50.0	Pass
ERAP-1101	3/14/2016	Pu-238	68.0	70.5	48.3 - 92.7	Pass
ERAP-1101	3/14/2016	Pu-239/240	54.1	54.8	39.70 - 71.60	Pass
ERAP-1101	3/14/2016	Sr-90	139	150	73.3 - 225.0	Pass
ERAP-1101	3/14/2016	U-233/234	59.3	64.8	40.2 - 97.7	Pass
ERAP-1101	3/14/2016	U-238	55.5	64.2	41.5 - 88.8	Pass
ERAP-1101	3/14/2016	Zn-65	428	356	255 - 492	Pass
ERAP-1101	3/14/2016	Gr. Alpha	98.0	70.1	23.5 - 109	Pass
ERAP-1101	3/14/2016	Gr. Beta	78.6	54.4	34.4 - 79.3	Pass
ERSO-1105	3/14/2016	Am-241	1,030	1,360	796 - 1,770	Pass
ERSO-1105	3/14/2016	Ac-228	1,540	1,240	795 - 1,720	Pass
ERSO-1105	3/14/2016	Bi-212	1,550	1,240	330 - 1,820	Pass
ERSO-1105	3/14/2016	Bi-214	3,100	3,530	2,130 - 5,080	Pass
ERSO-1105	3/14/2016	Co-60	5,600	5,490	3,710 - 7,560	Pass
ERSO-1105	3/14/2016	Cs-134	3,030	3,450	2,260 - 4,140	Pass
ERSO-1105	3/14/2016	Cs-137	4,440	4,310	3,300 - 5,550	Pass
ERSO-1105	3/14/2016	K-40	10,300	10,600	7,740 - 14,200	Pass
ERSO-1105	3/14/2016	Mn-54	< 50.8	< 1000	0.0 - 1,000	Pass
ERSO-1105	3/14/2016	Pb-212	1,140	1,240	812 - 1,730	Pass
ERSO-1105	3/14/2016	Pb-214	3,190	3,710	2,170 - 5,530	Pass
ERSO-1105	3/14/2016	Pu-238	680	658	396 - 908	Pass
ERSO-1105	3/14/2016	Pu-239/240	460	496	324 - 0,685	Pass
ERSO-1105	3/14/2016	Sr-90	7,740	8,560	3,260 - 13,500	Pass
ERSO-1105	3/14/2016	Th-234	3,630	3,430	1,080 - 6,450	Pass
ERSO-1105	3/14/2016	U-233/234	3,090	3,460	2,110 - 4,430	Pass
ERSO-1105	3/14/2016	U-238	3,280	3,430	2,120 - 4,350	Pass
ERSO-1105	3/14/2016	Zn-65	2,940	2,450	1,950 - 3,260	Pass
ERW-1115	3/14/2016	Gr. Alpha	105.0	117.0	41.5 - 181.0	Pass
ERW-1115	3/14/2016	Gr. Beta	76.2	75.5	43.2 - 112.0	Pass
ERW-1117	3/14/2016	H-3	8,870	8,650	5,800 - 12,300	Pass

TABLE A-7. Interlaboratory Comparison Crosscheck Program, Environmental Resource Associates (ERA)[a].
MRAD Study

Lab Code [b]	Date	Analysis	Concentration [a] Laboratory Result	ERA Result	Control Limits	Acceptance
ERVE-1108	3/14/2016	Am-241	1,930	2,120	1,300 - 2,820	Pass
ERVE-1108	3/14/2016	Cm-244	1,294	1,560	764 - 2,430	Pass
ERVE-1108	3/14/2016	Co-60	1,164	1,100	759 - 1,540	Pass
ERVE-1108	3/14/2016	Cs-134	1,056	1,070	687 - 1,390	Pass
ERVE-1108	3/14/2016	Cs-137	930	838	608 - 1,170	Pass
ERVE-1108	3/14/2016	K-40	32,200	31,000	22,400 - 43,500	Pass
ERVE-1108	3/14/2016	Mn-54	< 24.5	< 300	0.00 - 300	Pass
ERVE-1108	3/14/2016	Zn-65	3,320	2,820	2,030 - 3,960	Pass
ERVE-1108	3/14/2016	Pu-238	3,410	2,810	1,680 - 3,850	Pass
ERVE-1108	3/14/2016	Pu-239/240	4,120	3,640	2,230 - 5,010	Pass
ERVE-1108	3/14/2016	Sr-90	8,120	8,710	4,960 - 11,500	Pass
ERVE-1108	3/14/2016	U-233/234	4,350	4,160	2,740 - 5,340	Pass
ERVE-1108	3/14/2016	U-238	4,220	4,120	2,750 - 5,230	Pass
ERW-1111	3/14/2016	Am-241	113	121	81.5 - 162	Pass
ERW-1111	3/14/2016	Co-60	1,120	1,050	912 - 1,230	Pass
ERW-1111	3/14/2016	Cs-134	806	842	618 - 968	Pass
ERW-1111	3/14/2016	Cs-137	1,190	1,100	934 - 1,320	Pass
ERW-1111	3/14/2016	Mn-54	< 5.89	< 100	0.00 - 100	Pass
ERW-1111	3/14/2016	Pu-238	159	138	102 - 172	Pass
ERW-1111	3/14/2016	Pu-239/240	113	98.7	76.6 - 124	Pass
ERW-1111	3/14/2016	U-233/234	46.9	52.7	39.6 - 68.0	Pass
ERW-1111	3/14/2016	U-238	50.4	52.3	39.9 - 64.2	Pass
ERW-1111	3/14/2016	Zn-65	1,160	1,010	842 - 1,270	Pass
ERW-1111	3/14/2016	Fe-55	1,600	1,650	984 - 2,240	Pass
ERW-1111	3/14/2016	Sr-90	430	434	283 - 574	Pass

[a] Results obtained by Environmental, Inc., Midwest Laboratory as a participant in the crosscheck program for proficiency testing administered by Environmental Resources Associates, serving as a replacement for studies conducted previously by the Environmental Measurements Laboratory Quality Assessment Program (EML).

[b] Laboratory codes as follows: ERW (water), ERAP (air filter), ERSO (soil), ERVE (vegetation). Results are reported in units of pCi/L, except for air filters (pCi/Filter), vegetation and soil (pCi/kg).

[c] Results are presented as the known values, expected laboratory precision (1 sigma, 1 determination) and control limits as provided by ERA.

APPENDIX B. DATA REPORTING CONVENTIONS

Data Reporting Conventions

1.0. All activities, except gross alpha and gross beta, are decay corrected to collection time or the end of the collection period.

2.0. Single Measurements

Each single measurement is reported as follows: $x \pm s$

where: x = value of the measurement;

$s = 2\sigma$ counting uncertainty (corresponding to the 95% confidence level).

In cases where the activity is less than the lower limit of detection L, it is reported as: < L, where L = the lower limit of detection based on 4.66σ uncertainty for a background sample.

3.0. Duplicate analyses

If duplicate analyses are reported, the convention is as follows. :

3.1 Individual results: For two analysis results; $x_1 \pm s_1$ and $x_2 \pm s_2$

Reported result: $x \pm s$; where $x = (1/2)(x_1 + x_2)$ and $s = (1/2)\sqrt{s_1^2 + s_2^2}$

3.2. Individual results: $< L_1$, $< L_2$ Reported result: < L, where L = lower of L_1 and L_2

3.3. Individual results: $x \pm s$, < L Reported result: $x \pm s$ if $x \geq L$; < L otherwise.

4.0. Computation of Averages and Standard Deviations

4.1 Averages and standard deviations listed in the tables are computed from all of the individual measurements over the period averaged; for example, an annual standard deviation would not be the average of quarterly standard deviations. The average $\bar{x}$ and standard deviation "s" of a set of n numbers $x_1, x_2 \ldots x_n$ are defined as follows:

$$\bar{x} = \frac{1}{n} \sum x \qquad s = \sqrt{\frac{\sum (x - \bar{x})^2}{n-1}}$$

4.2 Values below the highest lower limit of detection are not included in the average.

4.3 If all values in the averaging group are less than the highest LLD, the highest LLD is reported.

4.4 If all but one of the values are less than the highest LLD, the single value x and associated two sigma error is reported.

4.5 In rounding off, the following rules are followed:

4.5.1. If the number following those to be retained is less than 5, the number is dropped, and the retained numbers are kept unchanged. As an example, 11.443 is rounded off to 11.44.

4.5.2. If the number following those to be retained is equal to or greater than 5, the number is dropped and the last retained number is raised by 1. As an example, 11.445 is rounded off

APPENDIX C

Table C-1. Maximum permissible concentrations of radioactivity in air and water above natural background in unrestricted areas[a].

	Air (pCi/m^3)		Water (pCi/L)
Gross alpha	1×10^{-3}	Strontium-89	8,000
Gross beta	1	Strontium-90	500
Iodine-131[b]	2.8×10^{-1}	Cesium-137	1,000
		Barium-140	8,000
		Iodine-131	1,000
		Potassium-40[c]	4,000
		Gross alpha	2
		Gross beta	10
		Tritium	1×10^6

[a] Taken from Table 2 of Appendix B to Code of Federal Regulations Title 10, Part 20, and appropriate footnotes. Concentrations may be averaged over a period not greater than one year.

[b] Value adjusted by a factor of 700 to reduce the dose resulting from the air-grass-cow-milk-child pathway.

[c] A natural radionuclide.

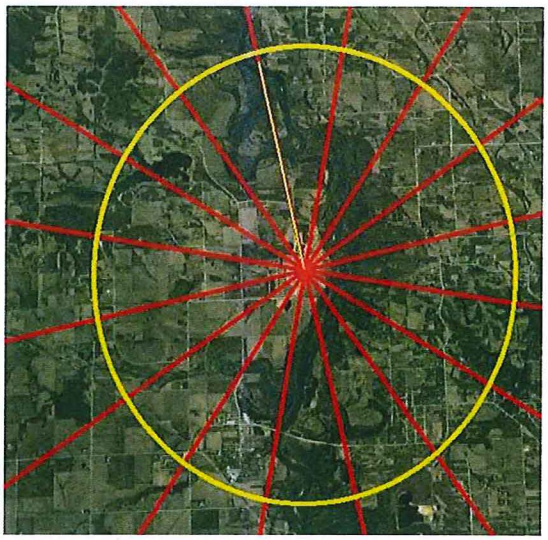
APPENDIX D

SUMMARY OF THE LAND USE CENSUS

Appendix D

Summary of the 2016 Land Use Census

The Duane Arnold Energy Center Land Use Census was completed during September 2016. All residences, milk animals, cattle, and gardens greater than 500 square feet were identified within three miles for each of the 16 meteorological sectors. If none were identified within three mile range, additional surveys were performed out to a distance of five miles. The 16 meteorological sectors were identified using Google Earth and digital compass rose overlay for accuracy and precision.



The 2016 Land Use Census identified 144 gardens, which is 39 fewer gardens than in 2015 and four fewer gardens than in 2014. Gardens were identified using Google Earth, field observation, and interviewing local residents. Five meteorological sectors had garden changes.

There is one nearest resident change attributed to digital compass overlay correction and field observation verification.

There are eight nearest livestock changes attributed to digital compass overlay correction and field observation verification. The Iowa Department of Agriculture and Land Stewardship provided a list of permitted commercial dairy farms located within Benton and Linn Counties. Large commercial dairies were included in the survey, but none were located within five miles of the DAEC facility. DAEC continues to collect milk samples from two permitted dairy farms located in WSW and SW sectors. Unlike previous years, goats were observed at five locations within three miles of the DAEC facility. Solicitation letters requesting farmers to collaborate with DAEC's REMP efforts were issued on September 27, 2016 and again on November 1, 2016. If a farmer volunteers to provide goat milk samples, ODAM Table 5-1 will be amended. A long-time goat farmer in the SSW sector, confirmed his goats were sold and not on the property in 2016.

There are six new residences added to the 2016 Land Use Survey, including a fire station. The fire station was included as a residence since employees may reside on the property routinely.

The Cedar River was surveyed by boat on October 21, 2016 for water use downstream of the DAEC to Cedar Rapids. The boat survey verified no additional withdraw sources of river water when compared to historical surveys. Recreational fishing is the only identified food pathway use of Cedar River water between the DAEC and the City of Cedar Rapids, eight miles down-river.


Fish samples collected from Cedar River

Benton County Public Health Department and Linn County Public Health Department provided groundwater well permit data. In 2016, no new drinking wells or industrial production wells were installed within two miles of the facility.

As a result of the 2016 Land Use Census, adjustments were made to the Meteorological Information and Dose Assessment System (MIDAS-NU) projection software model for changes in receptor distances. No significant annual dose corrections were necessary. The 2016 annual radiation dose assessment can be found in Appendix E.

In accordance with the DAEC's Environmental Sampling Procedure ESP 4.4, "Land Use Census", no changes in land use were identified that would adversely affect the safe operation of the DAEC, or that would warrant an update of the DAEC Updated Final Safety Analysis Report (UFSAR). Examples of land use that would warrant an UFSAR update include new hazards near the DAEC such as new gas pipelines or new installations utilizing toxic gases.

NextEra Energy Resources, Duane Arnold has committed to compliance with NEI 07-07, "Nuclear Energy Institute's Industry Ground Water Protection Initiative". Per NEI 07-07, the following information is presented:

- Radioactive reactor-by-product material was identified in multiple groundwater samples collected by the DAEC's Ground Water Protection Program (GWPP). The following was included to the DAEC Offsite Dose Assessment Manual (ODAM):

  "In February 2016, the GWPP routine sampling identified a contaminate plume in the shallow aquifer (less than 25 feet deep). Release standards are set forth in Section 6.0, Radiological Liquid Effluent Release O.6.1.2, Table 7.1-2. In accordance with GWPP Administrative Control Procedure (ACP) 1411.35 and Environmental Protection Agency (EPA) drinking water standards for tritium, 20,000 pCi/L, groundwater batch and

continuous releases are expected less than (<) 20,000 pCi/L. Groundwater samples are analyzed on-site and validated by off-site secondary laboratory. Off-site laboratory results are published in Annual Radiological Material Release Report and Annual Radiological Environmental Report."

- Tritium concentrations range from non-detectable at less than 180 pCi/L to 296,589 pCi/L from monitoring well MW-22A (D-66). No site or neighboring drinking water wells are installed in this shallow aquifer and no tritium has been identified in neighboring drinking water wells or onsite drinking water (deep aquifers). Using extraction well EW-01A (D-68) discharge water with an average concentration of 3,070 pCi/L and assuming EW-01A is the only drinking water source ingested for an entire year and per NRC Regulation Guide 1.109, the maximum dose consequence would be approximately 0.318 mrem/yr. The highest concentration from EW-01A was 5,860 pCi/L and equates to approximately 0.607 mrem/yr.

- The United States Nuclear Regulatory Commission, NRC, provides an informative resource for tritium. The information can be found at:

  https://www.nrc.gov/reading-rm/doc-collections/fact-sheets/tritium-radiation-fs.html

- New additions to REMP and GWPP sampling include:

  1. Control sample collection for fish, vegetation, and Cedar River bed sediment
  2. Surface water sample locations from 20 electrical vaults
  3. As of January 1, 2017, 56 groundwater wells are operational to support GWPP efforts.
  4. As of January 1, 2017, 18 groundwater transducers are operational to support GWPP and groundwater modeling efforts.

APPENDIX E

ANNUAL RADIATION DOSE ASSESSMENT

Appendix E

Annual Radiation Dose Assessment

The annual offsite radiation dose to a member of the public was determined by assessment of environmental dosimetry results and by calculations based on monitored effluent releases.

Section A. Dose Contribution from Direct Radiation

Direct radiation dose from the operation of the DAEC was reported by TLDs placed at locations in the surrounding environment as described in the Offsite Dose Assessment Manual (ODAM).

1. Pre-operational and 2016 TLD results were evaluated with a paired difference statistical test. The evaluation concluded that there were no significant differences in the TLD populations for the 0.5 mile and 1 mile TLD populations as per Environmental Sampling Procedure, ESP 4.5.

2. As stated in Part 1 of this report, no plant effect was indicated by the TLDs when dose results were compared to the estimated average natural background for the central United States.

Section B. Estimated Offsite Dose from Effluent Releases

1. The contribution of dose to a member of the public most likely to be exposed from liquid and gaseous effluent releases was calculated using the Meteorological Information and Dose Assessment System (MIDAS) computer program in accordance with the ODAM. The calculation methods follow those prescribed by Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I".

2. Following calculation of offsite doses, the appropriateness of REMP sampling station types and locations was reviewed. The current sampling scheme was determined to be adequate for the identified receptors.

Results of the MIDAS dose calculations are displayed below.

1.) There were 97 releases of radioactive material to liquid effluents (groundwater mitigation) in 2016.

2.) The maximum dose to air at the site boundary from noble gases released was 0.00162 mrad from gamma radiation at 936 meters towards the Northwest.

3.) The maximum dose to air at the site boundary from noble gases released was 0.00213 mrad beta radiation at 1176 meters towards the North.

4.) The whole body dose equivalent to the hypothetical maximally exposed individual from noble gases was 0.0032 mrem, at 2120 meters towards the North.

5.) The skin dose equivalent to the hypothetical maximally exposed individual from noble gases was 0.0038 mrem, at 2120 meters towards the North.

6.) The hypothetical maximally exposed organ due to airborne iodines and particulates with half-lives greater than eight days (excluding carbon-14) was the lungs of a child at 805 meters towards the West, with an estimated dose equivalent of 0.00617 mrem.

7.) The hypothetical maximally exposed organ due to airborne carbon-14 was the bone of a child located 2470 meters to the North of the site. The dose was 0.113 mrem.

Conclusion

No measurable dose due to the operation of the DAEC or the DAEC ISFSI was detected by environmental TLDs in 2016. The calculated doses are below the regulatory limits stated in Appendix I to 10CFR50, 40CFR190 and 10 CFR 72.104.

Estimated Maximum Offsite Individual Doses for 2016

Type	Age Group	Distance (meters)	Direction	Dose or Dose Equivalent (mrem)	Annual 10 CFR 50, Appendix I "Limit"
Direct Radiation (as measured by TLDs)				None	*
Liquid Releases					
Whole Body Dose	Child	D*	SE	0.00253 mrem	3 mrem
Organ Dose	Child - Liver	D*	SE	0.00253 mrem	10 mrem
Noble Gas					
Gamma Air Dose		936	NW	0.00162 mrad	10 mrad
Beta Air Dose		1176	N	0.00213 mrad	20 mrad
Whole Body	All	2120	NW	0.00320 mrem	5 mrem
Skin	Adult	2120	NW	0.00380 mrem	15 mrem
Particulates & Iodines					
Organ Dose	Child – Lungs	805	W	0.00617 mrem	15 mrem
Carbon 14					
Organ Dose	Child – Bone	2470	N	0.113 mrem	15 mrem

* There is no Appendix I limit for direct radiation. It is listed here to demonstrate compliance with 40 CFR 190 limits of 25 mrem whole body and 75 mrem thyroid.

D* Receptor location is aquatic pathway at Cedar River, See Offsite Dose Assessment Manual, ODAM, figure 3-2.

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DUANE ARNOLD ENERGY CENTER
CEDAR RAPIDS, IOWA
Docket No. 50-331

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM (REMP)

ANNUAL REPORT - PART II
DATA TABULATIONS AND ANALYSES

January 1 to December 31, 2016

Prepared by

ATI ENVIRONMENTAL, Inc.
Midwest Laboratory

Project No. 8001

Reviewed and
Approved

Bronia Grob, M.S.
Laboratory Manager

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1.0 INTRODUCTION

The following constitutes a supplement to the Annual Report for the Radiological Environmental Monitoring Program conducted at the Duane Arnold Energy Center, Palo, Iowa in 2016. Results of completed analyses are presented in the attached tables.

For information regarding sampling locations, type and frequency of collection, and sample codes, please refer to Part I, Tables 5.3 - 5.5 and Figures 5.1 and 5.2.

All concentrations, except gross beta and airborne iodine, are decay corrected to the time of collection. Airborne I-131 is decayed to the midpoint of the collection period.

The required values for lower limits of detection (LLD) for gamma emitting isotopes are established through the Offsite Dose Assessment Manual (ODAM). Naturally occurring radioisotopes, such as Be-7, K-40 and Ra daughters, are frequently detected, but may not be listed for every sample medium.

2.0 PROGRAM DEVIATIONS

Sample Type	Analysis	Location(s)	Collection Date or Period	Comments
AP/AI	Gross Beta/ I-131	D-15	02/05/16	Low volume due to power outage
AP/AI	Gross Beta/ I-131	D-15	03/18/16	Low volume due to power outage. Storms.
AP/AI	Gross Beta/ I-131	D-13	04/07/16	Light deposit on filter.
AP/AI	Gross Beta/ I-131	D-13	06/17/16	Low volume. Sampler breaker tripped off Possibly due to storms in area.
AP/AI	Gross Beta/ I-131	D-15	07/08/16	Low volume due to tripped breaker. Storms in area.
AP/AI	Gross Beta/ I-131	D-15	07/14/16	Low volume due to outage in area. Iodine 131 result = 0.031 pCi/m^3 due to low volume
AP/AI	Gross Beta/ I-131	D-3	08/12/16	Low volume due to power outage.
TLD	Gamma	D-46	10/3/16	TLD missing in field.
AP/AI	Gross Beta/ I-131	D-15	12/15/16	Low volume due to outage in area. Iodine 131 result = 0.031 pCi/m^3 due to low volume
SW	H-3/I-131/Gamma	D-49	12/19/16	Water frozen.
SW	H-3/Gamma	D-50	12/19/16	Water frozen.
SW	H-3/Gamma	D-99	12/19/16	Water frozen.
AP/AI	Gross Beta/ I-131	D-15	12/21/16	Low volume due to outage in area.

3.0 DATA TABLES

Table 1. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131[a].

Location: D-3 (Hiawatha)

Units: pCi/m^3

Collection: Continuous, weekly exchange.

Date Collected	Volume (m^3)	Gross Beta	Date Collected	Volume (m^3)	Gross Beta
Required LLD		0.010	Required LLD		0.010
01-08-16	345	0.036 ± 0.004	07-08-16	323	0.022 ± 0.003
01-15-16	268	0.049 ± 0.005	07-14-16	238	0.023 ± 0.004
01-21-16	229	0.021 ± 0.005	07-21-16	286	0.024 ± 0.004
01-29-16	305	0.027 ± 0.004	07-29-16	323	0.025 ± 0.003
02-05-16	268	0.024 ± 0.004	08-05-16	281	0.029 ± 0.004
02-11-16	234	0.035 ± 0.005	08-12-16	165	0.032 ± 0.006 [b]
02-19-16	306	0.026 ± 0.004	08-18-16	245	0.035 ± 0.005
02-26-16	272	0.019 ± 0.004	08-26-16	323	0.026 ± 0.003
03-02-16	190	0.025 ± 0.005	09-02-16	280	0.021 ± 0.004
03-09-16	266	0.019 ± 0.004	09-08-16	244	0.027 ± 0.004
03-18-16	341	0.021 ± 0.003	09-16-16	321	0.024 ± 0.003
03-25-16	273	0.016 ± 0.003	09-23-16	284	0.035 ± 0.004
03-31-16	252	0.018 ± 0.004	09-30-16	284	0.028 ± 0.004
1st Quarter Mean ± s.d.		0.026 ± 0.009	3rd Quarter Mean ± s.d.		0.027 ± 0.005
04-07-16	301	0.018 ± 0.003	10-07-16	277	0.023 ± 0.004
04-15-16	345	0.019 ± 0.003	10-14-16	279	0.019 ± 0.003
04-22-16	297	0.024 ± 0.004	10-21-16	278	0.025 ± 0.004
04-29-16	298	0.020 ± 0.003	10-28-16	282	0.024 ± 0.004
05-06-16	303	0.014 ± 0.003	11-04-16	279	0.031 ± 0.004
05-13-16	300	0.014 ± 0.003	11-10-16	241	0.042 ± 0.005
05-20-16	297	0.023 ± 0.003	11-17-16	276	0.049 ± 0.005
05-27-16	300	0.028 ± 0.004	11-23-16	244	0.028 ± 0.004
06-03-16	303	0.022 ± 0.003	12-02-16	360	0.037 ± 0.004
06-10-16	299	0.023 ± 0.003	12-08-16	235	0.025 ± 0.004
06-17-16	299	0.019 ± 0.003	12-15-16	282	0.032 ± 0.004
06-24-16	299	0.026 ± 0.004	12-21-16	244	0.048 ± 0.005
06-30-16	245	0.023 ± 0.004	12-30-16	347	0.032 ± 0.004
2nd Quarter Mean ± s.d.		0.021 ± 0.004	4th Quarter Mean ± s.d.		0.032 ± 0.010
			Cumulative Average		0.026

[a] Iodine-131 concentrations are < 0.03 pCi/m^3 unless noted otherwise.

[b] Low volume due to power outage.

Table 2. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131[a].

Location: D-6 (Center Point)

Units: pCi/m^3

Collection: Continuous, weekly exchange.

Date Collected	Volume (m^3)	Gross Beta	Date Collected	Volume (m^3)	Gross Beta
Required LLD		0.010	Required LLD		0.010
01-08-16	267	0.043 ± 0.004	07-08-16	310	0.021 ± 0.003
01-15-16	264	0.041 ± 0.005	07-14-16	229	0.025 ± 0.004
01-21-16	405	0.042 ± 0.005	07-21-16	274	0.024 ± 0.004
01-29-16	270	0.030 ± 0.004	07-29-16	310	0.019 ± 0.003
02-05-16	279	0.024 ± 0.004	08-05-16	268	0.025 ± 0.004
02-11-16	243	0.025 ± 0.004	08-12-16	273	0.022 ± 0.003
02-19-16	319	0.026 ± 0.004	08-18-16	235	0.030 ± 0.005
02-26-16	301	0.023 ± 0.004	08-26-16	310	0.025 ± 0.003
03-02-16	209	0.030 ± 0.005	09-02-16	268	0.022 ± 0.004
03-09-16	294	0.027 ± 0.004	09-08-16	233	0.023 ± 0.004
03-18-16	381	0.028 ± 0.003	09-16-16	308	0.027 ± 0.004
03-25-16	297	0.016 ± 0.003	09-23-16	272	0.034 ± 0.004
03-31-16	251	0.019 ± 0.004	09-30-16	272	0.025 ± 0.004
1st Quarter Mean ± s.d.		0.029 ± 0.008	3rd Quarter Mean ± s.d.		0.025 ± 0.004
04-07-16	298	0.023 ± 0.003	10-07-16	271	0.024 ± 0.004
04-15-16	342	0.016 ± 0.003	10-14-16	271	0.033 ± 0.004
04-22-16	294	0.028 ± 0.004	10-21-16	270	0.028 ± 0.004
04-29-16	295	0.020 ± 0.003	10-28-16	271	0.025 ± 0.004
05-06-16	297	0.016 ± 0.003	11-04-16	272	0.036 ± 0.004
05-13-16	300	0.014 ± 0.003	11-10-16	235	0.041 ± 0.005
05-20-16	295	0.020 ± 0.003	11-17-16	268	0.051 ± 0.005
05-27-16	264	0.029 ± 0.004	11-23-16	237	0.030 ± 0.004
06-03-16	274	0.021 ± 0.003	12-02-16	337	0.042 ± 0.004
06-10-16	271	0.021 ± 0.003	12-08-16	221	0.028 ± 0.005
06-17-16	268	0.020 ± 0.003	12-15-16	265	0.034 ± 0.005
06-24-16	271	0.021 ± 0.003	12-21-16	228	0.050 ± 0.005
06-30-16	236	0.025 ± 0.004	12-30-16	334	0.035 ± 0.004
2nd Quarter Mean ± s.d.		0.021 ± 0.004	4th Quarter Mean ± s.d.		0.035 ± 0.009
			Cumulative Average		0.027

[a] Iodine-131 concentrations are < 0.03 pCi/m^3 unless noted otherwise.

Table 3. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131[a].

Location: D-7 (Shellsburg)

Units: pCi/m^3

Collection: Continuous, weekly exchange.

Date Collected	Volume (m^3)	Gross Beta	Date Collected	Volume (m^3)	Gross Beta
Required LLD		0.010	Required LLD		0.010
01-08-16	279	0.040 ± 0.004	07-08-16	340	0.013 ± 0.003
01-15-16	286	0.046 ± 0.005	07-14-16	248	0.017 ± 0.004
01-21-16	436	0.030 ± 0.005	07-21-16	300	0.021 ± 0.003
01-29-16	288	0.030 ± 0.004	07-29-16	339	0.022 ± 0.003
02-05-16	216	0.030 ± 0.005	08-05-16	294	0.026 ± 0.004
02-11-16	245	0.027 ± 0.004	08-12-16	299	0.025 ± 0.003
02-19-16	318	0.022 ± 0.003	08-18-16	257	0.029 ± 0.004
02-26-16	290	0.020 ± 0.004	08-26-16	309	0.026 ± 0.003
03-02-16	201	0.030 ± 0.005	09-02-16	269	0.022 ± 0.004
03-09-16	283	0.019 ± 0.004	09-08-16	233	0.026 ± 0.004
03-18-16	379	0.021 ± 0.003	09-16-16	309	0.019 ± 0.003
03-25-16	299	0.013 ± 0.003	09-23-16	271	0.032 ± 0.004
03-31-16	251	0.016 ± 0.004	09-30-16	272	0.030 ± 0.004
1st Quarter Mean ± s.d.		0.026 ± 0.009	3rd Quarter Mean ± s.d.		0.024 ± 0.005
04-07-16	298	0.018 ± 0.003	10-07-16	271	0.022 ± 0.004
04-15-16	341	0.020 ± 0.003	10-14-16	271	0.010 ± 0.003
04-22-16	295	0.023 ± 0.004	10-21-16	270	0.023 ± 0.004
04-29-16	296	0.019 ± 0.003	10-28-16	272	0.020 ± 0.004
05-06-16	297	0.018 ± 0.003	11-04-16	272	0.033 ± 0.004
05-13-16	299	0.015 ± 0.003	11-10-16	235	0.043 ± 0.005
05-20-16	294	0.018 ± 0.003	11-17-16	268	0.046 ± 0.005
05-27-16	299	0.028 ± 0.004	11-23-16	241	0.035 ± 0.005
06-03-16	297	0.020 ± 0.003	12-02-16	356	0.040 ± 0.004
06-10-16	299	0.021 ± 0.003	12-08-16	233	0.029 ± 0.004
06-17-16	294	0.015 ± 0.003	12-15-16	279	0.039 ± 0.005
06-24-16	298	0.022 ± 0.003	12-21-16	240	0.050 ± 0.005
06-30-16	257	0.020 ± 0.004	12-30-16	352	0.033 ± 0.004
2nd Quarter Mean ± s.d.		0.020 ± 0.003	4th Quarter Mean ± s.d.		0.033 ± 0.012
			Cumulative Average		0.026

[a] Iodine-131 concentrations are < 0.03 pCi/m^3 unless noted otherwise.

Table 4. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131[a].

Location: D-11 (Toddville)

Units: pCi/m^3

Collection: Continuous, weekly exchange.

Date Collected	Volume (m^3)	Gross Beta	Date Collected	Volume (m^3)	Gross Beta
Required LLD		0.010	Required LLD		0.010
01-08-16	269	0.041 ± 0.004	07-08-16	319	0.025 ± 0.003
01-15-16	263	0.040 ± 0.004	07-14-16	236	0.019 ± 0.004
01-21-16	413	0.033 ± 0.005	07-21-16	283	0.021 ± 0.004
01-29-16	274	0.028 ± 0.004	07-29-16	319	0.017 ± 0.003
02-05-16	285	0.021 ± 0.004	08-05-16	276	0.028 ± 0.004
02-11-16	249	0.027 ± 0.004	08-12-16	267	0.028 ± 0.004
02-19-16	324	0.031 ± 0.004	08-18-16	230	0.035 ± 0.005
02-26-16	290	0.022 ± 0.004	08-26-16	304	0.024 ± 0.003
03-02-16	201	0.020 ± 0.005	09-02-16	262	0.023 ± 0.004
03-09-16	282	0.017 ± 0.003	09-08-16	229	0.027 ± 0.004
03-18-16	364	0.017 ± 0.003	09-16-16	301	0.022 ± 0.003
03-25-16	290	0.015 ± 0.003	09-23-16	267	0.037 ± 0.004
03-31-16	240	0.017 ± 0.004	09-30-16	270	0.027 ± 0.004
1st Quarter Mean ± s.d.		0.025 ± 0.009	3rd Quarter Mean ± s.d.		0.026 ± 0.006
04-07-16	287	0.017 ± 0.003	10-07-16	263	0.026 ± 0.004
04-15-16	328	0.018 ± 0.003	10-14-16	265	0.018 ± 0.003
04-22-16	283	0.020 ± 0.004	10-21-16	264	0.025 ± 0.004
04-29-16	284	0.018 ± 0.003	10-28-16	268	0.027 ± 0.004
05-06-16	286	0.016 ± 0.003	11-04-16	264	0.037 ± 0.004
05-13-16	282	0.019 ± 0.003	11-10-16	240	0.042 ± 0.005
05-20-16	278	0.023 ± 0.004	11-17-16	273	0.050 ± 0.005
05-27-16	281	0.032 ± 0.004	11-23-16	242	0.034 ± 0.004
06-03-16	281	0.023 ± 0.004	12-02-16	357	0.037 ± 0.004
06-10-16	280	0.030 ± 0.004	12-08-16	232	0.029 ± 0.005
06-17-16	278	0.023 ± 0.004	12-15-16	279	0.034 ± 0.005
06-24-16	280	0.022 ± 0.003	12-21-16	240	0.056 ± 0.006
06-30-16	243	0.023 ± 0.004	12-30-16	352	0.033 ± 0.004
2nd Quarter Mean ± s.d.		0.022 ± 0.005	4th Quarter Mean ± s.d.		0.034 ± 0.010
			Cumulative Average		0.027

[a] Iodine-131 concentrations are < 0.03 pCi/m^3 unless noted otherwise.

Table 5. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131[a].

Location: D-13 (Alburnett)

Units: pCi/m^3

Collection: Continuous, weekly exchange.

Date Collected	Volume (m^3)	Gross Beta	Date Collected	Volume (m^3)	Gross Beta
Required LLD		0.010	Required LLD		0.010
01-08-16	360	0.038 ± 0.004	07-08-16	316	0.018 ± 0.003
01-15-16	324	0.039 ± 0.005	07-14-16	234	0.019 ± 0.004
01-21-16	245	0.033 ± 0.005	07-21-16	281	0.018 ± 0.004
01-29-16	373	0.025 ± 0.004	07-29-16	316	0.018 ± 0.003
02-05-16	271	0.022 ± 0.004	08-05-16	274	0.026 ± 0.004
02-11-16	235	0.029 ± 0.005	08-12-16	279	0.023 ± 0.004
02-19-16	310	0.027 ± 0.004	08-18-16	268	0.026 ± 0.004
02-26-16	275	0.021 ± 0.004	08-26-16	317	0.024 ± 0.003
03-02-16	191	0.022 ± 0.005	09-02-16	274	0.022 ± 0.004
03-09-16	268	0.023 ± 0.004	09-08-16	239	0.020 ± 0.004
03-18-16	347	0.021 ± 0.003	09-16-16	314	0.023 ± 0.003
03-25-16	275	0.015 ± 0.003	09-23-16	278	0.027 ± 0.004
03-31-16	248	0.022 ± 0.004	09-30-16	270	0.024 ± 0.004
1st Quarter Mean ± s.d.		0.026 ± 0.007	3rd Quarter Mean ± s.d.		0.022 ± 0.003
04-07-16	299	0.002 ± 0.002 [b]	10-07-16	263	0.019 ± 0.003
04-15-16	342	0.011 ± 0.003	10-14-16	261	0.026 ± 0.004
04-22-16	294	0.012 ± 0.003	10-21-16	264	0.025 ± 0.004
04-29-16	295	0.014 ± 0.003	10-28-16	266	0.017 ± 0.004
05-06-16	298	0.015 ± 0.003	11-04-16	266	0.033 ± 0.004
05-13-16	299	0.014 ± 0.003	11-10-16	230	0.032 ± 0.005
05-20-16	295	0.017 ± 0.003	11-17-16	262	0.036 ± 0.004
05-27-16	292	0.020 ± 0.003	11-23-16	232	0.020 ± 0.004
06-03-16	302	0.017 ± 0.003	12-02-16	342	0.041 ± 0.004
06-10-16	300	0.014 ± 0.003	12-08-16	223	0.026 ± 0.004
06-17-16	174	0.017 ± 0.004 [c]	12-15-16	267	0.037 ± 0.005
06-24-16	300	0.023 ± 0.003	12-21-16	230	0.048 ± 0.005
06-30-16	241	0.019 ± 0.004	12-30-16	338	0.028 ± 0.003
2nd Quarter Mean ± s.d.		0.015 ± 0.005	4th Quarter Mean ± s.d.		0.030 ± 0.009
			Cumulative Average		0.023

[a] Iodine-131 concentrations are < 0.03 pCi/m^3 unless noted otherwise.

[b] Filter light.

[c] Low volume; sampler breaker tripped off possibly due to storms in the area.

Table 6. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131[a].

Location: D-15 (On-site, north)

Units: pCi/m^3

Collection: Continuous, weekly exchange.

Date Collected	Volume (m^3)	Gross Beta	Date Collected	Volume (m^3)	Gross Beta
Required LLD		0.010	Required LLD		0.010
01-08-16	246	0.051 ± 0.004	07-08-16	220 [d]	0.019 ± 0.004
01-15-16	276	0.053 ± 0.005	07-14-16	90 [d]	0.025 ± 0.009
01-21-16	238	0.031 ± 0.005	07-21-16	269	0.025 ± 0.004
01-29-16	315	0.029 ± 0.004	07-29-16	306	0.024 ± 0.003
02-05-16	188	0.023 ± 0.005 [b]	08-05-16	261	0.030 ± 0.004
02-11-16	248	0.026 ± 0.004	08-12-16	264	0.031 ± 0.004
02-19-16	325	0.025 ± 0.003	08-18-16	233	0.038 ± 0.005
02-26-16	295	0.023 ± 0.004	08-26-16	299	0.028 ± 0.004
03-02-16	197	0.027 ± 0.005	09-02-16	260	0.022 ± 0.004
03-09-16	283	0.023 ± 0.004	09-08-16	226	0.019 ± 0.004
03-18-16	27	0.016 ± 0.025 [c]	09-16-16	294	0.021 ± 0.003
03-25-16	294	0.018 ± 0.003	09-23-16	263	0.033 ± 0.004
03-31-16	235	0.022 ± 0.004	09-30-16	272	0.026 ± 0.004
1st Quarter Mean ± s.d.		0.028 ± 0.011	3rd Quarter Mean ± s.d.		0.026 ± 0.006
04-07-16	292	0.021 ± 0.003	10-07-16	260	0.023 ± 0.004
04-15-16	324	0.018 ± 0.003	10-14-16	263	0.021 ± 0.004
04-22-16	282	0.024 ± 0.004	10-21-16	261	0.020 ± 0.004
04-29-16	286	0.016 ± 0.003	10-28-16	264	0.021 ± 0.004
05-06-16	282	0.017 ± 0.003	11-04-16	256	0.037 ± 0.005
05-13-16	273	0.016 ± 0.003	11-10-16	247	0.041 ± 0.005
05-20-16	271	0.019 ± 0.003	11-17-16	283	0.049 ± 0.005
05-27-16	265	0.027 ± 0.004	11-23-16	248	0.036 ± 0.005
06-03-16	269	0.021 ± 0.004	12-02-16	365	0.041 ± 0.004
06-10-16	275	0.022 ± 0.004	12-08-16	230	0.030 ± 0.005
06-17-16	266	0.023 ± 0.004	12-15-16	91	0.024 ± 0.010 [e]
06-24-16	263	0.026 ± 0.004	12-21-16	185	0.055 ± 0.006 [e]
06-30-16	238	0.023 ± 0.004	12-30-16	360	0.036 ± 0.004
2nd Quarter Mean ± s.d.		0.021 ± 0.004	4th Quarter Mean ± s.d.		0.033 ± 0.011
			Cumulative Average		0.027

[a] Iodine-131 concentrations are < 0.03 pCi/m^3 unless noted otherwise.

[b] Low volume due to power outage.

[c] Low volume due to power outage. Storms in area. I-131 = <0.12 pCi/m^3 due to low volume.

[d] Low volume due to tripped breaker. Storms in area.

[e] Low volume due to outage in area. Iodine-131 result = 0.031 pCi/m^3 for 12-15-16 sample.

Table 7. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131[a].

Location: D-16 (On-site)

Units: pCi/m^3

Collection: Continuous, weekly exchange.

Date Collected	Volume (m^3)	Gross Beta	Date Collected	Volume (m^3)	Gross Beta
Required LLD		0.010	Required LLD		0.010
01-08-16	360	0.040 ± 0.004	07-08-16	344	0.023 ± 0.003
01-15-16	285	0.042 ± 0.005	07-14-16	258	0.018 ± 0.004
01-21-16	245	0.028 ± 0.005	07-21-16	304	0.021 ± 0.003
01-29-16	318	0.033 ± 0.004	07-29-16	341	0.022 ± 0.003
02-05-16	284	0.019 ± 0.004	08-05-16	291	0.028 ± 0.004
02-11-16	238	0.031 ± 0.005	08-12-16	302	0.023 ± 0.003
02-19-16	319	0.028 ± 0.004	08-18-16	241	0.042 ± 0.005
02-26-16	288	0.027 ± 0.004	08-26-16	309	0.028 ± 0.004
03-02-16	193	0.029 ± 0.005	09-02-16	269	0.021 ± 0.004
03-09-16	277	0.024 ± 0.004	09-08-16	233	0.027 ± 0.004
03-18-16	358	0.024 ± 0.003	09-16-16	303	0.026 ± 0.003
03-25-16	288	0.016 ± 0.003	09-23-16	272	0.043 ± 0.005
03-31-16	230	0.021 ± 0.004	09-30-16	281	0.028 ± 0.004
1st Quarter Mean ± s.d.		0.028 ± 0.007	3rd Quarter Mean ± s.d.		0.027 ± 0.007
04-07-16	286	0.021 ± 0.003	10-07-16	269	0.024 ± 0.004
04-15-16	316	0.020 ± 0.003	10-14-16	270	0.028 ± 0.004
04-22-16	278	0.025 ± 0.004	10-21-16	270	0.026 ± 0.004
04-29-16	302	0.019 ± 0.003	10-28-16	274	0.027 ± 0.004
05-06-16	310	0.015 ± 0.003	11-04-16	263	0.043 ± 0.005
05-13-16	298	0.014 ± 0.003	11-10-16	234	0.045 ± 0.005
05-20-16	306	0.017 ± 0.003	11-17-16	274	0.047 ± 0.005
05-27-16	297	0.033 ± 0.004	11-23-16	241	0.033 ± 0.004
06-03-16	303	0.018 ± 0.003	12-02-16	355	0.043 ± 0.004
06-10-16	302	0.023 ± 0.003	12-08-16	236	0.031 ± 0.005
06-17-16	309	0.023 ± 0.003	12-15-16	278	0.040 ± 0.005
06-24-16	296	0.026 ± 0.004	12-21-16	241	0.055 ± 0.005
06-30-16	270	0.021 ± 0.004	12-30-16	352	0.034 ± 0.004
2nd Quarter Mean ± s.d.		0.021 ± 0.005	4th Quarter Mean ± s.d.		0.037 ± 0.009
			Cumulative Average		0.028

[a] Iodine-131 concentrations are < 0.03 pCi/m^3 unless noted otherwise.

Table 8. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131[a].

Location: D-40

Units: pCi/m^3

Collection: Continuous, weekly exchange.

Date Collected	Volume (m^3)	Gross Beta	Date Collected	Volume (m^3)	Gross Beta
Required LLD		0.010	Required LLD		0.010
01-08-16	363	0.037 ± 0.004	07-08-16	330	0.019 ± 0.003
01-15-16	246	0.046 ± 0.005	07-14-16	244	0.019 ± 0.004
01-21-16	372	0.026 ± 0.005	07-21-16	291	0.021 ± 0.004
01-29-16	244	0.033 ± 0.004	07-29-16	328	0.023 ± 0.003
02-05-16	279	0.023 ± 0.004	08-05-16	297	0.024 ± 0.003
02-11-16	244	0.034 ± 0.005	08-12-16	302	0.022 ± 0.003
02-19-16	317	0.025 ± 0.004	08-18-16	250	0.034 ± 0.005
02-26-16	284	0.024 ± 0.004	08-26-16	324	0.026 ± 0.003
03-02-16	198	0.017 ± 0.005	09-02-16	283	0.022 ± 0.004
03-09-16	275	0.021 ± 0.004	09-08-16	246	0.019 ± 0.004
03-18-16	356	0.021 ± 0.003	09-16-16	323	0.025 ± 0.003
03-25-16	283	0.016 ± 0.003	09-23-16	286	0.029 ± 0.004
03-31-16	237	0.017 ± 0.004	09-30-16	292	0.024 ± 0.004
1st Quarter Mean ± s.d.		0.026 ± 0.009	3rd Quarter Mean ± s.d.		0.024 ± 0.004
04-07-16	282	0.018 ± 0.003	10-07-16	283	0.023 ± 0.003
04-15-16	321	0.018 ± 0.003	10-14-16	285	0.032 ± 0.004
04-22-16	277	0.027 ± 0.004	10-21-16	283	0.029 ± 0.004
04-29-16	278	0.019 ± 0.003	10-28-16	288	0.023 ± 0.004
05-06-16	290	0.016 ± 0.003	11-04-16	285	0.039 ± 0.004
05-13-16	290	0.013 ± 0.003	11-10-16	246	0.042 ± 0.005
05-20-16	287	0.022 ± 0.004	11-17-16	276	0.050 ± 0.005
05-27-16	289	0.026 ± 0.004	11-23-16	236	0.032 ± 0.004
06-03-16	290	0.019 ± 0.003	12-02-16	360	0.039 ± 0.004
06-10-16	289	0.019 ± 0.003	12-08-16	232	0.030 ± 0.005
06-17-16	287	0.020 ± 0.003	12-15-16	279	0.043 ± 0.005
06-24-16	287	0.025 ± 0.004	12-21-16	242	0.055 ± 0.005
06-30-16	252	0.021 ± 0.004	12-30-16	351	0.035 ± 0.004
2nd Quarter Mean ± s.d.		0.020 ± 0.004	4th Quarter Mean ± s.d.		0.036 ± 0.010
			Cumulative Average		0.027

[a] Iodine-131 concentrations are < 0.03 pCi/m^3 unless noted otherwise.

Table 9. Airborne particulates, analyses for gamma-emitting isotopes.
Collection: Quarterly Composite Units: pCi/m^3

Location	D-3			
Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Lab Code	DAP- 1730	DAP- 3844	DAP- 5697	DAP- 7190
Volume (m^3)	3547	3887	3595	3625
Be-7	0.071 ± 0.015	0.083 ± 0.013	0.086 ± 0.019	0.053 ± 0.015
Mn-54	< 0.0010	< 0.0006	< 0.0011	< 0.0008
Fe-59	< 0.0030	< 0.0007	< 0.0023	< 0.0010
Co-58	< 0.0010	< 0.0007	< 0.0005	< 0.0008
Co-60	< 0.0008	< 0.0005	< 0.0009	< 0.0003
Zn-65	< 0.0027	< 0.0006	< 0.0018	< 0.0012
Nb-95	< 0.0022	< 0.0010	< 0.0013	< 0.0012
Zr-95	< 0.0020	< 0.0013	< 0.0020	< 0.0011
Ru-103	< 0.0017	< 0.0012	< 0.0010	< 0.0012
Ru-106	< 0.0084	< 0.0074	< 0.0107	< 0.0046
Cs-134	< 0.0012	< 0.0009	< 0.0010	< 0.0008
Cs-137	< 0.0009	< 0.0007	< 0.0008	< 0.0006
Ce-141	< 0.0022	< 0.0017	< 0.0017	< 0.0011
Ce-144	< 0.0073	< 0.0046	< 0.0037	< 0.0037
Location	D-6			
Lab Code	DAP- 1731	DAP- 3845	DAP- 5698	DAP- 7191
Volume (m^3)	3781	3705	3563	3480
Be-7	0.051 ± 0.012	0.088 ± 0.014	0.082 ± 0.017	0.072 ± 0.021
Mn-54	< 0.0007	< 0.0007	< 0.0009	< 0.0007
Fe-59	< 0.0013	< 0.0015	< 0.0016	< 0.0024
Co-58	< 0.0008	< 0.0006	< 0.0011	< 0.0007
Co-60	< 0.0009	< 0.0004	< 0.0006	< 0.0011
Zn-65	< 0.0010	< 0.0006	< 0.0014	< 0.0008
Nb-95	< 0.0010	< 0.0007	< 0.0006	< 0.0011
Zr-95	< 0.0021	< 0.0010	< 0.0020	< 0.0013
Ru-103	< 0.0011	< 0.0006	< 0.0013	< 0.0016
Ru-106	< 0.0114	< 0.0070	< 0.0089	< 0.0049
Cs-134	< 0.0011	< 0.0007	< 0.0009	< 0.0011
Cs-137	< 0.0008	< 0.0005	< 0.0010	< 0.0010
Ce-141	< 0.0014	< 0.0010	< 0.0023	< 0.0019
Ce-144	< 0.0035	< 0.0032	< 0.0047	< 0.0055

Table 9. Airborne particulates, analyses for gamma-emitting isotopes.
Collection: Quarterly Composite Units: pCi/m^3

Location	D-7			
Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Lab Code	DAP- 1732	DAP- 3846	DAP- 5699	DAP- 7192
Volume (m^3)	3772	3864	3740	3561
Be-7	0.049 ± 0.014	0.093 ± 0.017	0.065 ± 0.015	0.060 ± 0.019
Mn-54	< 0.0005	< 0.0007	< 0.0009	< 0.0009
Fe-59	< 0.0010	< 0.0007	< 0.0011	< 0.0025
Co-58	< 0.0010	< 0.0008	< 0.0010	< 0.0011
Co-60	< 0.0006	< 0.0003	< 0.0011	< 0.0007
Zn-65	< 0.0006	< 0.0010	< 0.0009	< 0.0011
Nb-95	< 0.0008	< 0.0012	< 0.0015	< 0.0017
Zr-95	< 0.0012	< 0.0012	< 0.0014	< 0.0025
Ru-103	< 0.0010	< 0.0009	< 0.0018	< 0.0020
Ru-106	< 0.0054	< 0.0068	< 0.0067	< 0.0085
Cs-134	< 0.0009	< 0.0009	< 0.0011	< 0.0010
Cs-137	< 0.0009	< 0.0010	< 0.0007	< 0.0010
Ce-141	< 0.0016	< 0.0019	< 0.0015	< 0.0023
Ce-144	< 0.0049	< 0.0039	< 0.0035	< 0.0064
Location	D-11			
Lab Code	DAP- 1733	DAP- 3847	DAP- 5700	DAP- 7193
Volume (m^3)	3745	3671	3565	3539
Be-7	0.054 ± 0.017	0.11 ± 0.019	0.072 ± 0.021	0.061 ± 0.013
Mn-54	< 0.0011	< 0.0007	< 0.0009	< 0.0008
Fe-59	< 0.0015	< 0.0020	< 0.0017	< 0.0010
Co-58	< 0.0011	< 0.0006	< 0.0009	< 0.0006
Co-60	< 0.0005	< 0.0004	< 0.0006	< 0.0003
Zn-65	< 0.0020	< 0.0022	< 0.0017	< 0.0005
Nb-95	< 0.0014	< 0.0008	< 0.0008	< 0.0012
Zr-95	< 0.0018	< 0.0015	< 0.0018	< 0.0011
Ru-103	< 0.0011	< 0.0011	< 0.0009	< 0.0011
Ru-106	< 0.0072	< 0.0085	< 0.0081	< 0.0086
Cs-134	< 0.0009	< 0.0009	< 0.0010	< 0.0008
Cs-137	< 0.0011	< 0.0007	< 0.0010	< 0.0007
Ce-141	< 0.0020	< 0.0020	< 0.0026	< 0.0014
Ce-144	< 0.0061	< 0.0034	< 0.0034	< 0.0056
Location	D-13			
Lab Code	DAP- 1734	DAP- 3848	DAP- 5701	DAP- 7194
Volume (m^3)	3722	3732	3659	3445
Be-7	0.064 ± 0.016	0.065 ± 0.013	0.078 ± 0.015	0.053 ± 0.013
Mn-54	< 0.0008	< 0.0010	< 0.0011	< 0.0005
Fe-59	< 0.0016	< 0.0024	< 0.0019	< 0.0013
Co-58	< 0.0008	< 0.0005	< 0.0009	< 0.0005
Co-60	< 0.0008	< 0.0009	< 0.0006	< 0.0005
Zn-65	< 0.0015	< 0.0019	< 0.0007	< 0.0011
Nb-95	< 0.0010	< 0.0015	< 0.0012	< 0.0009
Zr-95	< 0.0017	< 0.0010	< 0.0022	< 0.0010
Ru-103	< 0.0011	< 0.0012	< 0.0014	< 0.0008
Ru-106	< 0.0057	< 0.0077	< 0.0058	< 0.0056
Cs-134	< 0.0010	< 0.0010	< 0.0009	< 0.0008
Cs-137	< 0.0008	< 0.0009	< 0.0008	< 0.0005
Ce-141	< 0.0013	< 0.0018	< 0.0026	< 0.0019
Ce-144	< 0.0051	< 0.0047	< 0.0047	< 0.0034

Table 9. Airborne particulates, analyses for gamma-emitting isotopes.
Collection: Quarterly Composite Units: pCi/m^3

Location	D-15			
Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Lab Code	DAP- 1735	DAP- 3849	DAP- 5702	DAP- 7195
Volume (m^3)	3166	3586	3257	3313
Be-7	0.062 ± 0.015	0.094 ± 0.016	0.070 ± 0.018	0.066 ± 0.015
Mn-54	< 0.0009	< 0.0007	< 0.0011	< 0.0011
Fe-59	< 0.0020	< 0.0015	< 0.0023	< 0.0023
Co-58	< 0.0008	< 0.0010	< 0.0017	< 0.0010
Co-60	< 0.0008	< 0.0007	< 0.0007	< 0.0009
Zn-65	< 0.0019	< 0.0009	< 0.0014	< 0.0011
Nb-95	< 0.0009	< 0.0014	< 0.0009	< 0.0012
Zr-95	< 0.0023	< 0.0016	< 0.0019	< 0.0008
Ru-103	< 0.0013	< 0.0014	< 0.0016	< 0.0011
Ru-106	< 0.0099	< 0.0042	< 0.0057	< 0.0082
Cs-134	< 0.0010	< 0.0009	< 0.0012	< 0.0010
Cs-137	< 0.0006	< 0.0006	< 0.0008	< 0.0008
Ce-141	< 0.0022	< 0.0013	< 0.0021	< 0.0012
Ce-144	< 0.0056	< 0.0031	< 0.0067	< 0.0039
Location	D-16			
Lab Code	DAP- 1736	DAP- 3850	DAP- 5704	DAP- 7196
Volume (m^3)	3684	3874	3749	3557
Be-7	0.055 ± 0.011	0.10 ± 0.015	0.069 ± 0.015	0.063 ± 0.013
Mn-54	< 0.0008	< 0.0005	< 0.0008	< 0.0008
Fe-59	< 0.0006	< 0.0011	< 0.0017	< 0.0009
Co-58	< 0.0008	< 0.0005	< 0.0008	< 0.0008
Co-60	< 0.0006	< 0.0006	< 0.0007	< 0.0005
Zn-65	< 0.0013	< 0.0012	< 0.0014	< 0.0007
Nb-95	< 0.0008	< 0.0011	< 0.0010	< 0.0009
Zr-95	< 0.0015	< 0.0013	< 0.0020	< 0.0017
Ru-103	< 0.0012	< 0.0008	< 0.0011	< 0.0013
Ru-106	< 0.0082	< 0.0032	< 0.0048	< 0.0073
Cs-134	< 0.0009	< 0.0009	< 0.0010	< 0.0007
Cs-137	< 0.0006	< 0.0007	< 0.0006	< 0.0006
Ce-141	< 0.0018	< 0.0016	< 0.0021	< 0.0017
Ce-144	< 0.0035	< 0.0036	< 0.0044	< 0.0031
Location	D-40			
Lab Code	DAP- 1737	DAP- 3852	DAP- 5705	DAP- 7197
Volume (m^3)	3700	3719	3795	3645
Be-7	0.047 ± 0.011	0.097 ± 0.016	0.080 ± 0.015	0.057 ± 0.011
Mn-54	< 0.0008	< 0.0004	< 0.0009	< 0.0008
Fe-59	< 0.0023	< 0.0012	< 0.0018	< 0.0012
Co-58	< 0.0008	< 0.0004	< 0.0011	< 0.0004
Co-60	< 0.0008	< 0.0005	< 0.0005	< 0.0003
Zn-65	< 0.0004	< 0.0010	< 0.0008	< 0.0007
Nb-95	< 0.0014	< 0.0009	< 0.0008	< 0.0011
Zr-95	< 0.0016	< 0.0008	< 0.0018	< 0.0015
Ru-103	< 0.0011	< 0.0010	< 0.0013	< 0.0011
Ru-106	< 0.0071	< 0.0059	< 0.0061	< 0.0031
Cs-134	< 0.0009	< 0.0008	< 0.0009	< 0.0006
Cs-137	< 0.0009	< 0.0006	< 0.0009	< 0.0004
Ce-141	< 0.0014	< 0.0013	< 0.0023	< 0.0011
Ce-144	< 0.0058	< 0.0032	< 0.0040	< 0.0035

Table 10. Ambient gamma radiation as measured by thermoluminescent dosimeters (TLD). Quarterly collection. Units: mR/91 days

Control Locations	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
D-1	17.1 ± 1.2	14.8 ± 1.6	16.3 ± 2.1	17.0 ± 1.6
D-2	14.0 ± 0.9	14.0 ± 1.0	14.0 ± 1.7	13.9 ± 1.2
D-3	16.7 ± 1.4	14.3 ± 0.9	15.3 ± 2.0	13.3 ± 0.6
D-5	13.2 ± 1.0	17.8 ± 1.2	16.2 ± 1.6	16.3 ± 1.0
D-6	15.1 ± 0.9	17.3 ± 1.1	13.3 ± 1.4	16.5 ± 0.9
D-7	14.1 ± 0.9	14.4 ± 1.1	12.8 ± 1.5	13.4 ± 0.9
D-8	17.1 ± 1.0	17.1 ± 1.5	16.3 ± 1.6	16.2 ± 1.2
D-10	17.5 ± 1.3	15.9 ± 1.0	16.2 ± 2.2	15.3 ± 1.0
D-11	13.6 ± 0.8	13.2 ± 1.7	12.1 ± 1.5	13.4 ± 1.8
D-13	11.0 ± 0.7	16.8 ± 1.2	12.2 ± 1.4	16.6 ± 1.1
Mean ± s.d.	15.0 ± 2.1	15.5 ± 1.6	14.5 ± 1.8	15.2 ± 1.5
Within 0.5 mi. of Stack				
D-15	15.6 ± 0.9	16.9 ± 0.8	14.4 ± 1.6	16.8 ± 0.7
D-16	12.4 ± 0.9	13.9 ± 1.1	13.5 ± 2.1	13.1 ± 1.1
D-17	20.0 ± 0.9	23.8 ± 1.4	19.1 ± 1.4	22.0 ± 1.2
D-18	18.6 ± 1.5	16.3 ± 0.7	17.4 ± 2.3	14.7 ± 0.7
D-19	18.2 ± 1.3	15.0 ± 1.3	16.9 ± 2.0	14.0 ± 1.1
D-20	19.1 ± 0.9	18.2 ± 1.4	17.8 ± 1.8	16.8 ± 1.2
D-21	20.6 ± 0.9	15.7 ± 1.0	19.8 ± 1.6	14.6 ± 0.8
D-22	18.8 ± 1.0	15.7 ± 1.1	16.8 ± 1.6	15.0 ± 1.3
D-23	11.0 ± 0.9	14.6 ± 1.0	12.6 ± 1.7	14.4 ± 1.1
D-28	20.8 ± 1.4	17.9 ± 0.8	19.4 ± 2.2	17.6 ± 1.0
D-29	23.0 ± 0.8	19.8 ± 1.3	22.9 ± 1.7	21.8 ± 1.1
D-30	19.0 ± 1.0	18.8 ± 1.3	18.3 ± 1.8	18.1 ± 1.5
D-31	18.5 ± 1.2	19.3 ± 1.0	17.6 ± 2.1	18.2 ± 1.5
D-32	23.4 ± 0.8	19.1 ± 1.0	22.9 ± 1.4	19.5 ± 1.1
D-82	9.1 ± 0.8	15.4 ± 0.8	14.8 ± 1.6	18.0 ± 1.3
D-83	16.0 ± 0.7	17.7 ± 1.0	17.3 ± 1.6	20.1 ± 1.5
D-84	18.2 ± 1.3	14.9 ± 1.2	19.4 ± 2.8	15.8 ± 1.0
D-85	16.4 ± 0.8	19.8 ± 1.3	15.8 ± 1.2	21.8 ± 1.3
D-86	19.3 ± 1.5	14.8 ± 0.9	19.3 ± 1.8	16.4 ± 1.3
D-91	16.6 ± 1.2	17.5 ± 1.5	15.7 ± 1.9	18.4 ± 1.6
Mean ± s.d.	17.7 ± 3.6	17.3 ± 2.4	17.6 ± 2.7	17.4 ± 2.7

Table 10. Ambient gamma radiation as measured by thermoluminescent dosimeters (TLD). Quarterly collection. Units: mR/91 days

Within 1.0 mi. of Stack	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
D-43	15.4 ± 1.1	14.1 ± 1.3	13.6 ± 1.5	16.6 ± 1.3
D-44	17.5 ± 1.0	18.1 ± 0.6	17.2 ± 1.5	19.7 ± 0.8
D-45	13.7 ± 1.1	13.9 ± 1.2	12.6 ± 1.6	15.7 ± 1.4
D-46	17.7 ± 1.1	20.3 ± 1.1	17.2 ± 1.6	24.2 ± 1.5
D-47	20.3 ± 0.9	15.5 ± 0.9	20.1 ± 1.5	17.5 ± 1.2
D-48	19.5 ± 1.1	19.4 ± 1.1	ND[a]	21.1 ± 1.4
Mean ± s.d.	17.4 ± 2.5	16.9 ± 2.7	16.1 ± 3.0	19.1 ± 3.2
Within 3.0 mi. of Stack				
D-33	10.8 ± 0.7	11.9 ± 0.6	11.0 ± 1.3	12.3 ± 0.6
D-34	15.9 ± 0.8	12.2 ± 0.7	15.0 ± 1.5	11.8 ± 0.9
D-35	15.2 ± 0.9	13.7 ± 0.7	14.3 ± 1.5	15.9 ± 0.8
D-36	17.8 ± 0.7	14.3 ± 0.8	17.2 ± 1.2	15.1 ± 0.9
D-37	16.2 ± 1.4	17.5 ± 0.9	15.2 ± 2.2	17.5 ± 1.1
D-38	16.9 ± 1.1	15.9 ± 1.2	16.5 ± 2.1	19.1 ± 1.6
D-39	15.1 ± 0.8	14.1 ± 0.9	13.4 ± 1.5	16.5 ± 0.9
D-40	12.3 ± 1.0	14.2 ± 0.9	12.5 ± 1.7	16.9 ± 1.2
D-41	17.7 ± 1.2	19.1 ± 1.1	15.0 ± 1.4	20.8 ± 1.4
D-42	11.9 ± 0.9	14.1 ± 1.1	12.9 ± 1.6	16.8 ± 1.1
Mean ± s.d.	15.0 ± 2.5	14.7 ± 2.2	14.3 ± 1.9	16.3 ± 2.7
ISFSI Fenceline				
D-161	52.4 ± 2.3	43.5 ± 2.9	54.2 ± 3.2	45.5 ± 3.5
D-162	21.2 ± 1.2	19.8 ± 0.6	19.7 ± 1.8	21.9 ± 0.9
D-163	45.3 ± 0.9	42.3 ± 2.7	43.4 ± 1.7	47.2 ± 2.0
D-164	17.5 ± 1.5	16.3 ± 1.1	18.7 ± 1.5	18.0 ± 1.3
Mean ± s.d.	34.1 ± 17.4	30.5 ± 14.4	34.0 ± 17.7	33.1 ± 15.4

[a] "ND" = No data; see Section 2.0, "Program Deviations."

Table 11. Milk samples, analyses for iodine-131 and gamma emitting isotopes.
Collection: Monthly during non-grazing season (October 1 through April 30): biweekly during grazing season (May 1 through September 30)

Location		D-110					
Date	Lab	Concentration (pCi/L)					
Collected	Code	I-131	K-40	Cs-134	Cs-137	Ba-140	La-140
01-06-16	DMI- 54	< 0.4	1432 ± 109	< 2.8	< 2.7	< 9.4	< 3.3
02-11-16	DMI- 589	< 0.4	1451 ± 117	< 3.9	< 3.7	< 11.4	< 1.3
03-15-16	DMI- 1120	< 0.4	1218 ± 100	< 3.1	< 3.0	< 8.7	< 2.7
04-05-16	DMI- 1423	< 0.4	1215 ± 74	< 2.5	< 2.0	< 7.5	< 1.1
04-19-16	DMI- 1750	< 0.3	1363 ± 103	< 3.5	< 3.0	< 8.7	< 1.2
05-03-16	DMI- 2162	< 0.3	1056 ± 102	< 4.4	< 3.0	< 16.9	< 1.5
05-18-16	DMI- 2488	< 0.3	1456 ± 115	< 3.8	< 3.9	< 8.0	< 1.2
05-31-16	DMI- 2721	< 0.4	1437 ± 114	< 3.8	< 2.9	< 14.5	< 3.1
06-14-16	DMI- 2983	< 0.4	1349 ± 114	< 4.6	< 3.3	< 10.6	< 2.1
06-28-16	DMI- 3295	< 0.4	1402 ± 118	< 3.5	< 4.6	< 12.0	< 1.4
07-12-16	DMI- 3539	< 0.3	1443 ± 111	< 3.2	< 3.6	< 8.7	< 2.1
07-26-16	DMI- 3941	< 0.3	1328 ± 105	< 3.3	< 3.8	< 10.1	< 2.6
08-10-16	DMI- 4263	< 0.4	1484 ± 112	< 4.1	< 3.8	< 9.0	< 2.3
08-23-16	DMI- 4492	< 0.4	1410 ± 116	< 4.0	< 4.2	< 10.2	< 4.8
09-08-16	DMI- 4791	< 0.4	1419 ± 115	< 3.6	< 3.8	< 13.6	< 1.4
09-20-16	DMI- 4951	< 0.2	1375 ± 99	< 3.1	< 2.3	< 10.5	< 1.7
10-04-16	DMI- 5269	< 0.4	1387 ± 113	< 3.7	< 2.3	< 14.3	< 1.9
11-04-16	DMI- 6104	< 0.4	1366 ± 71	< 2.2	< 1.8	< 7.5	< 2.4
12-15-16	DMI- 6827	< 0.2	1409 ± 111	< 3.9	< 4.6	< 10.5	< 2.3

Location		D-138					
Date	Lab	Concentration (pCi/L)					
Collected	Code	I-131	K-40	Cs-134	Cs-137	Ba-140	La-140
01-06-16	DMI- 55	< 0.3	1318 ± 98	< 3.5	< 3.2	< 8.6	< 2.5
02-11-16	DMI- 590	< 0.5	1528 ± 106	< 3.3	< 4.1	< 15.3	< 2.4
03-15-16	DMI- 1121	< 0.4	1365 ± 117	< 3.3	< 3.1	< 11.4	< 2.3
04-05-16	DMI- 1424	< 0.4	1488 ± 89	< 2.3	< 3.1	< 8.1	< 1.8
04-19-16	DMI- 1751	< 0.2	1354 ± 112	< 3.2	< 4.2	< 14.1	< 2.0
05-03-16	DMI- 2163	< 0.2	1456 ± 112	< 3.2	< 3.0	< 11.3	< 1.5
05-18-16	DMI- 2489	< 0.3	1299 ± 105	< 2.6	< 2.4	< 8.4	< 1.7
05-31-16	DMI- 2722	< 0.2	1440 ± 119	< 3.2	< 4.3	< 7.1	< 2.6
06-14-16	DMI- 2984	< 0.5	1237 ± 88	< 2.9	< 2.5	< 8.9	< 1.2
06-28-16	DMI- 3296	< 0.5	1376 ± 105	< 3.0	< 1.8	< 13.5	< 1.8
07-12-16	DMI- 3540	< 0.3	1426 ± 126	< 3.5	< 3.7	< 12.2	< 2.9
07-26-16	DMI- 3942	< 0.4	1357 ± 108	< 3.2	< 3.3	< 10.6	< 2.0
08-10-16	DMI- 4264	< 0.5	1700 ± 115	< 3.0	< 4.3	< 10.8	< 3.1
08-23-16	DMI- 4493	< 0.4	1452 ± 120	< 3.8	< 3.9	< 20.4	< 4.3
09-08-16	DMI- 4792	< 0.5	1383 ± 118	< 3.5	< 3.9	< 15.0	< 2.1
09-20-16	DMI- 4952	< 0.2	1372 ± 92	< 2.8	< 3.8	< 10.8	< 1.6
10-04-16	DMI- 5270	< 0.4	1429 ± 107	< 3.6	< 3.4	< 12.7	< 3.3
11-04-16	DMI- 6105	< 0.4	1515 ± 74	< 1.9	< 2.1	< 8.7	< 0.9
12-15-16	DMI- 6828	< 0.2	1429 ± 110	< 3.5	< 3.1	< 14.2	< 2.6

Table 12. Well water samples, analyses for gamma emitting isotopes iodine-131 and tritium.
Collection: Quarterly
Units: pCi/L

Location	D-53 Treated Municipal Water, Drinking Water			
Lab Code	DWW- 591	DWW- 2679	DWW- 3670	DWW- 6137
Date Collected	02-12-16	05-24-16	07-14-16	11-07-16
H-3	< 150	< 151	< 147	< 171
I-131	< 0.3	< 0.4	< 0.4	< 0.4
Mn-54	< 2.5	< 1.8	< 1.7	< 1.8
Fe-59	< 5.8	< 4.7	< 3.8	< 6.3
Co-58	< 1.7	< 2.8	< 1.2	< 2.4
Co-60	< 2.3	< 2.4	< 2.1	< 3.0
Zn-65	< 2.4	< 2.1	< 2.0	< 4.6
Nb-95	< 2.8	< 1.8	< 1.8	< 2.6
Zr-95	< 2.8	< 3.2	< 4.5	< 3.3
I-131	< 4.0	< 5.2	< 3.5	< 3.7
Cs-134	< 2.9	< 3.3	< 3.0	< 4.3
Cs-137	< 2.8	< 2.7	< 3.4	< 2.9
Ba-140	< 13.6	< 17.0	< 10.8	< 15.9
La-140	< 1.3	< 1.4	< 3.2	< 3.5

Location	D-54 Untreated Municipal Water, Drinking Water			
Lab Code	DWW- 592	DWW- 2680	DWW- 3672	DWW- 6138
Date Collected	02-12-16	05-24-16	07-14-16	11-07-16
H-3	< 150	< 151	< 147	< 171
I-131	< 0.3	< 0.2	< 0.2	< 0.2
Mn-54	< 2.6	< 3.0	< 1.9	< 3.0
Fe-59	< 3.7	< 5.0	< 3.2	< 6.1
Co-58	< 1.7	< 2.2	< 3.1	< 1.9
Co-60	< 2.4	< 1.2	< 2.4	< 2.7
Zn-65	< 5.2	< 3.7	< 3.9	< 4.1
Nb-95	< 3.0	< 2.3	< 3.3	< 3.8
Zr-95	< 4.0	< 2.9	< 4.9	< 3.7
I-131	< 4.4	< 4.8	< 5.5	< 4.5
Cs-134	< 2.9	< 3.1	< 3.1	< 3.1
Cs-137	< 2.4	< 2.3	< 2.8	< 3.6
Ba-140	< 13.7	< 12.7	< 13.0	< 8.8
La-140	< 2.3	< 1.8	< 1.6	< 2.5

Table 12. Well water samples, analyses for gamma emitting isotopes iodine-131 and tritium.
Collection: Quarterly
Units: pCi/L

Location	D-55 On-site Treated Drinking Water			
Lab Code	DWW- 593	DWW- 2681	DWW- 3673	DWW- 6139
Date Collected	02-12-16	05-24-16	07-14-16	11-07-16
H-3	< 150	< 151	< 147	< 171
I-131	< 0.4	< 0.3	< 0.3	< 0.2
Mn-54	< 2.7	< 4.4	< 2.8	< 4.6
Fe-59	< 5.6	< 7.0	< 5.9	< 6.5
Co-58	< 2.6	< 4.8	< 4.2	< 3.1
Co-60	< 2.5	< 2.8	< 5.1	< 4.1
Zn-65	< 5.1	< 4.2	< 6.0	< 8.4
Nb-95	< 3.1	< 6.2	< 5.4	< 2.5
Zr-95	< 2.3	< 10.3	< 7.8	< 8.1
I-131	< 2.9	< 7.9	< 7.8	< 5.7
Cs-134	< 2.7	< 5.8	< 5.4	< 5.0
Cs-137	< 3.3	< 3.9	< 4.2	< 5.5
Ba-140	< 8.9	< 30.0	< 24.1	< 15.5
La-140	< 2.1	< 5.6	< 4.0	< 5.0

Location	D-57 Bull Farm, Untreated Drinking Water			
Lab Code	DWW- 594	DWW- 2682	DWW- 3674	DWW- 6140
Date Collected	02-12-16	05-24-16	07-14-16	11-07-16
H-3	< 150	< 151	< 147	< 171
I-131	< 0.2	< 0.2	< 0.3	< 0.2
Mn-54	< 3.0	< 2.1	< 3.5	< 3.0
Fe-59	< 3.6	< 5.0	< 4.1	< 5.7
Co-58	< 1.8	< 1.8	< 4.1	< 2.9
Co-60	< 2.7	< 2.4	< 4.7	< 2.8
Zn-65	< 7.1	< 4.3	< 4.6	< 6.0
Nb-95	< 4.0	< 2.6	< 4.2	< 3.8
Zr-95	< 5.9	< 4.2	< 8.8	< 4.0
I-131	< 5.3	< 3.7	< 5.1	< 4.4
Cs-134	< 3.8	< 2.7	< 4.3	< 3.8
Cs-137	< 3.0	< 1.7	< 2.0	< 3.3
Ba-140	< 15.2	< 11.8	< 21.1	< 12.1
La-140	< 1.5	< 1.8	< 3.5	< 3.4

Table 12. Well water samples, analyses for gamma emitting isotopes iodine-131 and tritium.
Collection: Quarterly
Units: pCi/L

Location	D-58 Franz Farm, Untreated Drinking Water			
Lab Code	DWW- 595	DWW- 2683	DWW- 3675	DWW- 6141
Date Collected	02-12-16	05-24-16	07-14-16	11-07-16
H-3	< 150	< 151	< 147	< 171
I-131	< 0.4	< 0.2	< 0.3	< 0.2
Mn-54	< 2.0	< 1.6	< 2.7	< 3.2
Fe-59	< 3.6	< 1.7	< 4.0	< 6.8
Co-58	< 2.3	< 1.4	< 2.5	< 4.5
Co-60	< 2.7	< 2.1	< 2.3	< 3.8
Zn-65	< 3.8	< 2.9	< 5.5	< 4.5
Nb-95	< 2.4	< 2.1	< 2.2	< 2.0
Zr-95	< 4.5	< 4.2	< 3.0	< 9.0
I-131	< 4.1	< 2.7	< 4.1	< 5.5
Cs-134	< 3.0	< 2.6	< 3.2	< 5.2
Cs-137	< 3.5	< 2.5	< 3.2	< 5.9
Ba-140	< 8.9	< 11.0	< 14.8	< 27.6
La-140	< 3.3	< 2.2	< 3.5	< 3.3

Location	D-72(C) Van Note Farm, Untreated Drinking Water			
Lab Code	DWW- 596	DWW- 2684	DWW- 3676	DWW- 6142
Date Collected	02-12-16	05-24-16	07-14-16	11-07-16
H-3	< 150	< 151	< 147	< 171
I-131	< 0.2	< 0.2	< 0.4	< 0.2
Mn-54	< 2.8	< 3.6	< 2.7	< 2.9
Fe-59	< 3.1	< 9.4	< 4.9	< 8.7
Co-58	< 1.6	< 3.9	< 1.4	< 2.4
Co-60	< 1.9	< 2.6	< 2.5	< 3.6
Zn-65	< 3.3	< 5.6	< 2.9	< 5.7
Nb-95	< 3.6	< 4.7	< 3.4	< 4.0
Zr-95	< 5.3	< 7.0	< 3.7	< 6.5
I-131	< 3.6	< 7.1	< 4.9	< 5.1
Cs-134	< 3.3	< 5.8	< 2.8	< 4.0
Cs-137	< 2.9	< 5.2	< 2.4	< 4.0
Ba-140	< 8.8	< 22.9	< 12.0	< 17.6
La-140	< 3.0	< 3.6	< 2.2	< 1.6

Table 13. Vegetation (broadleaf), analyses for iodine-131 and other gamma-emitting isotopes.
Collection: Annually
Units: pCi/g wet

Location	D-118	D-118	D-56 (C)
Lab Code	DVE- 3108	DVE- 3109	DVE- 6090
Date Collected	06-17-16	06-17-16	11-03-16
Sample Type	Rhubarb	Cabbage	Cabbage
K-40	8.36 ± 0.40	2.19 ± 0.16	1.82 ± 0.21
Mn-54	< 0.008	< 0.005	< 0.009
Fe-59	< 0.023	< 0.006	< 0.015
Co-58	< 0.006	< 0.004	< 0.005
Co-60	< 0.008	< 0.004	< 0.006
Zn-65	< 0.014	< 0.010	< 0.017
Nb-95	< 0.015	< 0.006	< 0.008
Zr-95	< 0.018	< 0.011	< 0.009
Ru-103	< 0.008	< 0.005	< 0.009
Ru-106	< 0.10	< 0.062	< 0.064
I-131	< 0.018	< 0.012	< 0.014
Cs-134	< 0.010	< 0.006	< 0.008
Cs-137	< 0.010	< 0.006	< 0.009
Ce-141	< 0.013	< 0.016	< 0.014
Ce-144	< 0.063	< 0.036	< 0.061

Table 14. Vegetation (hay and grain), analyses for gamma-emitting isotopes.
Collection: Annually
Units: pCi/g wet

Location	D-57	D-57	D-57	D-138	D-138
Lab Code	DVE- 5290	DVE- 5291	DVE- 5531	DVE- 5292	DVE- 5534
Date Collected	07-14-15	07-15-15	10-13-16	07-15-15	10-14-16
Sample Type	Beans	Hay	Corn	Hay	Corn
K-40	16.43 ± 0.81	17.84 ± 0.58	3.05 ± 0.29	18.18 ± 0.54	2.53 ± 0.27
Mn-54	< 0.016	< 0.022	< 0.009	< 0.018	< 0.007
Fe-59	< 0.052	< 0.043	< 0.013	< 0.032	< 0.016
Co-58	< 0.024	< 0.024	< 0.004	< 0.016	< 0.005
Co-60	< 0.022	< 0.022	< 0.005	< 0.016	< 0.009
Zn-65	< 0.051	< 0.048	< 0.023	< 0.043	< 0.016
Nb-95	< 0.022	< 0.023	< 0.013	< 0.018	< 0.007
Zr-95	< 0.018	< 0.043	< 0.009	< 0.032	< 0.017
Ru-103	< 0.018	< 0.024	< 0.010	< 0.013	< 0.008
Ru-106	< 0.15	< 0.17	< 0.072	< 0.15	< 0.093
I-131	< 0.030	< 0.043	< 0.013	< 0.054	< 0.014
Cs-134	< 0.017	< 0.018	< 0.010	< 0.016	< 0.008
Cs-137	< 0.018	< 0.023	< 0.008	< 0.021	< 0.007
Ce-141	< 0.032	< 0.036	< 0.015	< 0.036	< 0.016
Ce-144	< 0.097	< 0.11	< 0.065	< 0.14	< 0.061

Location	D-138	D-109	D-109	D-96	D-56 (C)
Lab Code	DVE- 5535	DVE- 5532	DVE- 5533	DVE- 6088	DVE- 6089
Date Collected	10-11-16	10-14-16	10-14-16	10-29-16	11-03-16
Sample Type	Soybeans	Hay	Corn	Corn	Alfalfa Hay
K-40	12.97 ± 0.71	13.83 ± 1.23	2.69 ± 0.25	2.77 ± 0.19	34.61 ± 0.79
Mn-54	< 0.019	< 0.037	< 0.010	< 0.007	< 0.022
Fe-59	< 0.053	< 0.076	< 0.010	< 0.014	< 0.050
Co-58	< 0.013	< 0.039	< 0.007	< 0.007	< 0.025
Co-60	< 0.015	< 0.017	< 0.006	< 0.005	< 0.023
Zn-65	< 0.040	< 0.093	< 0.012	< 0.013	< 0.056
Nb-95	< 0.028	< 0.046	< 0.004	< 0.005	< 0.023
Zr-95	< 0.035	< 0.044	< 0.012	< 0.012	< 0.030
Ru-103	< 0.016	< 0.029	< 0.005	< 0.007	< 0.015
Ru-106	< 0.12	< 0.33	< 0.045	< 0.049	< 0.18
I-131	< 0.025	< 0.040	< 0.016	< 0.026	< 0.031
Cs-134	< 0.017	< 0.038	< 0.008	< 0.007	< 0.018
Cs-137	< 0.016	< 0.054	< 0.010	< 0.007	< 0.025
Ce-141	< 0.030	< 0.052	< 0.018	< 0.015	< 0.036
Ce-144	< 0.13	< 0.23	< 0.069	< 0.041	< 0.10

Table 15. Surface water samples, analyses for iodine-131, tritium and gamma-emitting isotopes.
Collection: Monthly
Units: pCi/L
Location: D-49

Lab Code	DSW- 127	DSW- 769	DSW- 1165	DSW- 1703	DSW- 2674	DSW- 2987
Date Collected	01-07-16	02-24-16	03-16-16	04-18-16	05-24-16	06-13-16
H-3	< 145	< 172	< 150	< 146	< 151	< 146
I-131(Chemistry)	< 0.4	< 0.3	< 0.4	< 0.2	< 0.2	< 0.3
Mn-54	< 1.7	< 2.0	< 2.7	< 1.3	< 5.4	< 2.4
Fe-59	< 5.5	< 4.8	< 4.7	< 5.5	< 6.3	< 4.1
Co-58	< 2.6	< 1.7	< 2.7	< 2.5	< 5.6	< 2.7
Co-60	< 2.9	< 2.5	< 2.2	< 1.7	< 3.6	< 1.4
Zn-65	< 3.7	< 4.2	< 4.7	< 2.7	< 7.1	< 3.3
Nb-95	< 3.7	< 1.9	< 2.7	< 2.9	< 3.9	< 2.0
Zr-95	< 5.2	< 5.4	< 4.9	< 4.3	< 7.8	< 4.1
I-131	< 5.5	< 3.5	< 4.2	< 4.0	< 8.0	< 3.4
Cs-134	< 3.7	< 3.2	< 3.3	< 2.9	< 5.4	< 2.6
Cs-137	< 3.1	< 3.4	< 3.0	< 1.6	< 6.3	< 2.3
Ba-140	< 10.7	< 14.4	< 9.4	< 12.6	< 22.8	< 11.2
La-140	< 1.5	< 1.1	< 1.8	< 1.0	< 2.7	< 1.8

Lab Code	DSW- 3665	DSW- 4576	DSW- 4942	DSW- 5632	DSW- 6434	
Date Collected	07-13-16	08-30-16	09-20-16	10-19-16	11-15-16	12-19-16
H-3	< 147	< 155	< 149	< 179	< 176	ND[a]
I-131(Chemistry)	< 0.4	< 0.4	< 0.5	< 0.3	< 0.4	-
Mn-54	< 4.1	< 3.4	< 3.5	< 5.1	< 3.1	-
Fe-59	< 5.6	< 2.2	< 5.0	< 4.6	< 3.9	-
Co-58	< 4.0	< 3.1	< 1.8	< 3.2	< 3.7	-
Co-60	< 5.7	< 4.5	< 3.3	< 5.5	< 3.4	-
Zn-65	< 6.7	< 6.7	< 9.7	< 7.6	< 5.1	-
Nb-95	< 4.7	< 3.9	< 5.8	< 3.6	< 4.4	-
Zr-95	< 11.3	< 6.0	< 7.7	< 7.0	< 5.9	-
I-131	< 5.2	< 5.4	< 7.1	< 6.7	< 9.6	-
Cs-134	< 5.1	< 5.5	< 5.0	< 6.5	< 4.1	-
Cs-137	< 5.2	< 3.1	< 5.1	< 4.7	< 3.9	-
Ba-140	< 25.0	< 19.8	< 16.2	< 13.7	< 17.4	-
La-140	< 5.1	< 5.3	< 6.0	< 2.4	< 2.4	-

[a] "ND" = No data; see Section 2.0, Program Deviations.

Table 15. Surface water samples, analyses for tritium and gamma-emitting isotopes.
Collection: Monthly
Units: pCi/L
Location: D-50

Lab Code	DSW- 128	DSW- 770	DSW- 1166	DSW- 1704	DSW- 2675	DSW- 2988
Date Collected	01-07-16	02-24-16	03-16-16	04-18-16	05-24-16	06-13-16
H-3	< 145	< 172	< 150	< 146	< 151	< 146
Mn-54	< 1.9	< 1.9	< 2.0	< 2.3	< 2.1	< 2.4
Fe-59	< 5.2	< 3.3	< 4.5	< 5.9	< 6.2	< 5.2
Co-58	< 2.1	< 1.5	< 1.7	< 2.3	< 3.5	< 1.5
Co-60	< 2.6	< 2.3	< 1.8	< 2.0	< 2.6	< 1.3
Zn-65	< 6.7	< 2.4	< 1.4	< 4.6	< 7.7	< 3.4
Nb-95	< 3.1	< 2.4	< 3.2	< 2.4	< 2.8	< 1.8
Zr-95	< 5.8	< 4.9	< 2.9	< 2.9	< 6.0	< 3.9
I-131	< 5.9	< 4.1	< 5.3	< 4.6	< 6.4	< 4.1
Cs-134	< 3.7	< 2.7	< 2.6	< 3.0	< 3.8	< 3.2
Cs-137	< 2.8	< 2.7	< 2.4	< 2.2	< 3.6	< 2.5
Ba-140	< 17.1	< 12.3	< 7.3	< 11.5	< 10.8	< 12.0
La-140	< 5.6	< 2.4	< 1.1	< 1.3	< 2.8	< 1.7

Lab Code	DSW- 3666	DSW- 4577	DSW- 4943	DSW- 5633	DSW- 6435	
Date Collected	07-13-16	08-30-16	09-20-16	10-19-16	11-15-16	12-19-16
H-3	< 147	< 155	< 149	< 179	< 176	ND[a]
Mn-54	< 2.6	< 2.7	< 4.7	< 2.0	< 2.7	-
Fe-59	< 4.9	< 3.7	< 3.7	< 5.0	< 5.3	-
Co-58	< 2.4	< 2.6	< 4.5	< 1.8	< 3.2	-
Co-60	< 1.0	< 3.0	< 4.4	< 1.8	< 2.8	-
Zn-65	< 8.0	< 5.7	< 7.4	< 2.8	< 2.5	-
Nb-95	< 2.3	< 3.9	< 3.2	< 2.7	< 2.7	-
Zr-95	< 1.6	< 6.8	< 6.4	< 4.0	< 6.3	-
I-131	< 4.7	< 3.7	< 6.8	< 7.5	< 6.1	-
Cs-134	< 3.2	< 3.4	< 5.8	< 2.2	< 4.3	-
Cs-137	< 3.2	< 2.5	< 6.6	< 2.5	< 5.0	-
Ba-140	< 10.4	< 8.8	< 26.4	< 13.3	< 12.5	-
La-140	< 1.8	< 3.7	< 6.2	< 3.5	< 2.7	-

[a] "ND" = No data; see Section 2.0, Program Deviations.

Table 15. Surface water samples, analyses for tritium and gamma-emitting isotopes.
Collection: Monthly
Units: pCi/L
Location: D-51

Lab Code	DSW- 129	DSW- 771	DSW- 1167	DSW- 1705	DSW- 2676	DSW- 2990
Date Collected	01-07-16	02-24-16	03-16-16	04-18-16	05-24-16	06-13-16
H-3	< 145	< 172	< 150	< 146	< 151	< 146
Mn-54	< 2.2	< 2.9	< 2.1	< 2.7	< 4.1	< 3.4
Fe-59	< 6.1	< 2.9	< 3.2	< 4.2	< 10.3	< 2.3
Co-58	< 2.1	< 2.2	< 1.4	< 2.1	< 4.1	< 1.3
Co-60	< 2.8	< 1.6	< 1.0	< 1.6	< 2.9	< 1.8
Zn-65	< 3.5	< 2.6	< 2.9	< 2.8	< 9.2	< 2.5
Nb-95	< 3.8	< 2.4	< 2.8	< 2.5	< 6.8	< 2.0
Zr-95	< 3.7	< 3.1	< 2.2	< 3.3	< 8.6	< 3.1
I-131	< 3.7	< 4.5	< 2.7	< 2.6	< 7.4	< 3.8
Cs-134	< 3.8	< 2.6	< 2.1	< 2.6	< 5.7	< 2.5
Cs-137	< 3.3	< 2.7	< 2.1	< 1.7	< 6.5	< 3.4
Ba-140	< 18.3	< 13.2	< 12.5	< 11.7	< 21.4	< 8.7
La-140	< 2.6	< 2.5	< 2.7	< 2.4	< 4.1	< 2.5

Lab Code	DSW- 3667	DSW- 4578	DSW- 4944	DSW- 5634	DSW- 6436	DSW- 6888
Date Collected	07-13-16	08-30-16	09-20-16	10-19-16	11-15-16	12-19-16
H-3	< 147	< 155	< 149	< 179	< 176	< 147
Mn-54	< 2.3	< 3.0	< 3.2	< 2.8	< 3.5	< 2.1
Fe-59	< 2.3	< 3.4	< 4.0	< 3.6	< 6.8	< 4.8
Co-58	< 2.4	< 2.4	< 3.1	< 2.9	< 2.8	< 2.7
Co-60	< 1.8	< 2.6	< 2.7	< 1.1	< 3.5	< 3.4
Zn-65	< 2.3	< 6.1	< 4.5	< 2.4	< 3.2	< 3.7
Nb-95	< 3.7	< 3.7	< 3.5	< 2.0	< 2.9	< 3.1
Zr-95	< 3.7	< 6.1	< 6.2	< 3.8	< 3.7	< 5.9
I-131	< 4.5	< 6.0	< 4.6	< 5.5	< 7.6	< 6.4
Cs-134	< 3.1	< 4.4	< 4.1	< 3.5	< 4.1	< 3.9
Cs-137	< 2.3	< 3.9	< 3.5	< 2.8	< 4.6	< 5.8
Ba-140	< 12.9	< 18.7	< 18.4	< 17.3	< 25.0	< 20.6
La-140	< 3.2	< 2.9	< 1.5	< 2.5	< 1.9	< 2.7

Table 15. Surface water samples, analyses for iodine-131, tritium and gamma-emitting isotopes.
Collection: Monthly
Units: pCi/L
Location: D-61

Lab Code	DSW- 130	DSW- 772	DSW- 1168	DSW- 1706	DSW- 2677	DSW- 2991
Date Collected	01-07-16	02-24-16	03-16-16	04-18-16	05-24-16	06-13-16
H-3	< 145	< 172	< 150	< 146	< 151	< 146
I-131(Chemistry)	< 0.3	< 0.3	< 0.4	< 0.2	< 0.4	< 0.3
Mn-54	< 2.7	< 2.6	< 2.0	< 2.1	< 5.0	< 2.2
Fe-59	< 5.7	< 3.6	< 3.8	< 5.5	< 6.9	< 4.2
Co-58	< 1.3	< 1.9	< 2.2	< 1.8	< 3.5	< 2.5
Co-60	< 1.9	< 2.6	< 2.0	< 1.4	< 2.9	< 2.0
Zn-65	< 3.4	< 4.4	< 3.5	< 2.8	< 3.6	< 4.2
Nb-95	< 3.6	< 3.1	< 1.6	< 2.2	< 2.9	< 1.7
Zr-95	< 4.0	< 4.3	< 3.4	< 1.6	< 6.4	< 3.9
I-131	< 5.1	< 4.0	< 3.9	< 3.4	< 8.7	< 2.2
Cs-134	< 2.9	< 2.7	< 2.5	< 2.7	< 5.5	< 1.9
Cs-137	< 2.3	< 2.3	< 2.8	< 2.0	< 3.2	< 2.3
Ba-140	< 12.9	< 10.1	< 12.7	< 9.1	< 23.2	< 9.5
La-140	< 1.6	< 2.4	< 1.6	< 1.8	< 3.9	< 2.0

Lab Code	DSW- 3668	DSW- 4579	DSW- 4945	DSW- 5635	DSW- 6437	DSW- 6889
Date Collected	07-13-16	08-30-16	09-20-16	10-19-16	11-15-16	12-19-16
H-3	< 147	< 155	< 149	< 179	< 176	< 147
I-131(Chemistry)	< 0.5	< 0.4	< 0.3	< 0.4	< 0.4	< 0.4
Mn-54	< 2.6	< 3.1	< 3.0	< 2.6	< 2.8	< 3.7
Fe-59	< 5.0	< 5.7	< 3.5	< 4.5	< 3.8	< 5.5
Co-58	< 2.5	< 3.4	< 3.1	< 2.1	< 2.0	< 2.7
Co-60	< 1.9	< 3.1	< 3.3	< 1.9	< 1.7	< 1.8
Zn-65	< 6.2	< 7.8	< 4.2	< 2.7	< 3.4	< 5.1
Nb-95	< 3.4	< 4.1	< 3.0	< 2.6	< 3.5	< 2.8
Zr-95	< 6.0	< 6.0	< 6.5	< 5.2	< 5.2	< 6.4
I-131	< 4.3	< 5.8	< 3.2	< 4.0	< 4.9	< 5.6
Cs-134	< 3.5	< 3.9	< 3.7	< 4.0	< 2.2	< 4.0
Cs-137	< 3.2	< 2.7	< 3.0	< 4.7	< 3.0	< 4.2
Ba-140	< 16.5	< 15.2	< 14.4	< 10.1	< 17.5	< 9.7
La-140	< 3.9	< 3.9	< 1.3	< 2.1	< 3.9	< 1.4

Table 15. Surface water samples, analyses for tritium and gamma-emitting isotopes.
Collection: Monthly
Units: pCi/L
Location: D-99

Lab Code	DSW- 131	DSW- 773	DSW- 1169	DSW- 1707	DSW- 2678	DSW- 2992
Date Collected	01-07-16	02-24-16	03-16-16	04-18-16	05-24-16	06-13-16
H-3	< 145	< 172	< 150	< 146	< 151	< 146
Mn-54	< 3.0	< 2.4	< 2.9	< 2.2	< 2.5	< 2.4
Fe-59	< 6.6	< 4.0	< 6.2	< 3.4	< 4.9	< 4.6
Co-58	< 2.0	< 1.7	< 2.4	< 1.1	< 2.7	< 2.1
Co-60	< 3.0	< 2.4	< 2.3	< 2.6	< 0.9	< 0.9
Zn-65	< 5.2	< 3.3	< 4.4	< 4.1	< 4.1	< 2.1
Nb-95	< 3.1	< 2.3	< 3.6	< 2.6	< 2.7	< 2.8
Zr-95	< 7.4	< 5.7	< 3.1	< 3.7	< 2.9	< 2.5
I-131	< 6.0	< 3.7	< 6.9	< 2.1	< 5.6	< 3.4
Cs-134	< 3.5	< 3.4	< 3.5	< 2.4	< 3.0	< 2.4
Cs-137	< 2.5	< 3.1	< 2.3	< 1.8	< 2.4	< 2.9
Ba-140	< 14.3	< 16.3	< 16.2	< 8.4	< 15.2	< 15.6
La-140	< 2.4	< 3.3	< 4.6	< 1.0	< 2.0	< 1.2

Lab Code	DSW- 3669	DSW- 4580	DSW- 4946	DSW- 5636	DSW- 6438	
Date Collected	07-13-16	08-30-16	09-20-16	10-19-16	11-15-16	12-19-16
H-3	< 147	< 155	< 149	< 179	< 176	ND[a]
Mn-54	< 2.2	< 2.8	< 3.4	< 1.9	< 3.7	-
Fe-59	< 2.7	< 5.9	< 4.2	< 3.9	< 4.5	-
Co-58	< 1.7	< 4.3	< 3.2	< 2.3	< 2.3	-
Co-60	< 1.4	< 3.9	< 2.7	< 2.6	< 4.1	-
Zn-65	< 3.4	< 3.6	< 2.1	< 3.2	< 3.0	-
Nb-95	< 2.9	< 2.8	< 2.4	< 3.1	< 4.3	-
Zr-95	< 4.3	< 3.7	< 5.4	< 4.2	< 3.5	-
I-131	< 5.2	< 6.9	< 6.2	< 4.8	< 5.7	-
Cs-134	< 3.4	< 4.1	< 3.9	< 2.6	< 4.1	-
Cs-137	< 2.7	< 3.4	< 4.3	< 1.6	< 2.6	-
Ba-140	< 14.0	< 20.7	< 15.1	< 13.1	< 17.5	-
La-140	< 3.4	< 4.3	< 2.8	< 3.6	< 4.2	-

[a] "ND" = No data; see Section 2.0, Program Deviations.

Table 16. Surface water, analysis for strontium.
Collection: Quarterly composites of monthly samples.
Units: pCi/L

Location	D-49			
Period	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Lab Code	DSW-1183	DSW-3074	DSW-4980	DSW-6898
Sr-89	< 0.73	< 0.64	< 0.69	< 1.11
Sr-90	< 0.49	< 0.58	< 0.49	< 0.55
Location	**D-61**			
Period	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Lab Code	DSW-1184	DSW-3075	DSW-4981	DSW-6899
Sr-89	< 0.69	< 0.68	< 0.74	< 1.12
Sr-90	< 0.44	< 0.59	< 0.50	< 0.56

Table 17. Fish, analyses of edible portion for gamma-emitting isotopes.
Collection: Semiannually
Units: pCi/g wet

Location	Upstream, D-49			
Lab Code	DF- 2764	DF- 2765	DF- 6091	DF- 6092
Date Collected	05-31-16	05-31-16	10-31-16	10-31-16
Sample Type	Carpiodes Sp.	Moxostoma Sp.	Cyprinus Carpio	Northern Pike
K-40	3.48 ± 0.41	3.97 ± 0.53	3.02 ± 0.35	3.67 ± 0.38
Mn-54	< 0.011	< 0.024	< 0.017	< 0.016
Fe-59	< 0.043	< 0.047	< 0.030	< 0.049
Co-58	< 0.019	< 0.025	< 0.018	< 0.024
Co-60	< 0.012	< 0.011	< 0.010	< 0.009
Zn-65	< 0.025	< 0.032	< 0.023	< 0.022
Nb-95	< 0.032	< 0.039	< 0.028	< 0.019
Zr-95	< 0.033	< 0.051	< 0.032	< 0.023
Ru-103	< 0.028	< 0.033	< 0.031	< 0.031
Ru-106	< 0.15	< 0.20	< 0.13	< 0.081
Cs-134	< 0.015	< 0.024	< 0.015	< 0.016
Cs-137	< 0.012	< 0.021	< 0.010	< 0.013
Ce-141	< 0.029	< 0.064	< 0.030	< 0.051
Ce-144	< 0.10	< 0.13	< 0.13	< 0.12

Location	Upstream, D-49	Control, D-56[a]
Lab Code	DF- 6093	DF- 6098
Date Collected	10-31-16	11-03-16
Sample Type	White Crappie	Catfish
K-40	3.51 ± 0.44	2.88 ± 0.36
Mn-54	< 0.018	< 0.021
Fe-59	< 0.031	< 0.036
Co-58	< 0.018	< 0.014
Co-60	< 0.017	< 0.011
Zn-65	< 0.026	< 0.031
Nb-95	< 0.029	< 0.014
Zr-95	< 0.040	< 0.043
Ru-103	< 0.035	< 0.024
Ru-106	< 0.15	< 0.16
Cs-134	< 0.017	< 0.018
Cs-137	< 0.018	< 0.012
Ce-141	< 0.056	< 0.066
Ce-144	< 0.077	< 0.11

[a] Control: Fish filets purchased at local grocery store.

Table 17. Fish, analyses of edible portion for gamma-emitting isotopes.
Collection: Semiannually
Units: pCi/g wet

Location	Downstream, D-61			
Lab Code	DF- 2766	DF- 2767	DF- 6095	DF- 6096
Date Collected	05-31-16	05-31-16	10-31-16	11-03-16
Sample Type	Carpiodes Sp.	Cyprinus Carpio	Channel Catfish	Cyprinus Carpio
K-40	3.28 ± 0.40	3.37 ± 0.40	3.19 ± 0.41	3.10 ± 0.35
Mn-54	< 0.013	< 0.015	< 0.014	< 0.008
Fe-59	< 0.045	< 0.031	< 0.022	< 0.045
Co-58	< 0.022	< 0.022	< 0.013	< 0.008
Co-60	< 0.021	< 0.008	< 0.009	< 0.009
Zn-65	< 0.038	< 0.039	< 0.019	< 0.014
Nb-95	< 0.028	< 0.027	< 0.027	< 0.024
Zr-95	< 0.032	< 0.035	< 0.034	< 0.035
Ru-103	< 0.031	< 0.030	< 0.024	< 0.016
Ru-106	< 0.10	< 0.10	< 0.14	< 0.12
Cs-134	< 0.017	< 0.015	< 0.016	< 0.013
Cs-137	< 0.012	< 0.009	< 0.015	< 0.010
Ce-141	< 0.071	< 0.048	< 0.055	< 0.031
Ce-144	< 0.14	< 0.08	< 0.12	< 0.062

Location	Downstream, D-61
Lab Code	DF- 6097
Date Collected	11-03-16
Sample Type	Northern Pike
K-40	3.71 ± 0.42
Mn-54	< 0.011
Fe-59	< 0.033
Co-58	< 0.016
Co-60	< 0.009
Zn-65	< 0.035
Nb-95	< 0.023
Zr-95	< 0.021
Ru-103	< 0.022
Ru-106	< 0.10
Cs-134	< 0.014
Cs-137	< 0.017
Ce-141	< 0.047
Ce-144	< 0.061

Table 18. River sediment, analysis for gamma-emitting isotopes.
Collection: Semiannually
Units: pCi/g dry

Location	D-50 (Plant Intake, Control)	D-49 (Control)[a]
Lab Code	DBS- 2705	DBS- 5647
Date Collected	05-24-16	10-19-16
K-40	7.69 ± 0.42	7.61 ± 0.48
Mn-54	< 0.011	< 0.015
Fe-59	< 0.044	< 0.032
Co-58	< 0.014	< 0.020
Co-60	< 0.008	< 0.015
Zn-65	< 0.035	< 0.034
Nb-95	< 0.014	< 0.033
Zr-95	< 0.022	< 0.044
Ru-103	< 0.014	< 0.022
Ru-106	< 0.11	< 0.14
Cs-134	< 0.010	< 0.013
Cs-137	< 0.010	< 0.015
Ce-141	< 0.030	< 0.062
Ce-144	< 0.059	< 0.13

Location	D-51 (Discharge)	
Lab Code	DBS- 2706	DBS- 5648
Date Collected	05-26-16	10-19-16
K-40	7.70 ± 0.54	8.77 ± 0.67
Mn-54	< 0.016	< 0.022
Fe-59	< 0.047	< 0.081
Co-58	< 0.017	< 0.032
Co-60	< 0.016	< 0.028
Zn-65	< 0.051	< 0.052
Nb-95	< 0.035	< 0.025
Zr-95	< 0.037	< 0.057
Ru-103	< 0.023	< 0.046
Ru-106	< 0.17	< 0.16
Cs-134	< 0.017	< 0.014
Cs-137	< 0.013	< 0.020
Ce-141	< 0.051	< 0.092
Ce-144	< 0.10	< 0.13

[a] New location replacing D-50.

Table 18. River sediment, analysis for gamma-emitting isotopes.
Collection: Semiannually
Units: pCi/g dry

Location	D-107A (North Drainage Ditch)	
Lab Code	DBS- 2707	DBS- 5649
Date Collected	05-26-16	10-19-16
K-40	6.63 ± 0.45	7.68 ± 0.51
Mn-54	< 0.016	< 0.018
Fe-59	< 0.035	< 0.049
Co-58	< 0.020	< 0.015
Co-60	< 0.015	< 0.008
Zn-65	< 0.030	< 0.045
Nb-95	< 0.016	< 0.018
Zr-95	< 0.019	< 0.024
Ru-103	< 0.021	< 0.018
Ru-106	< 0.15	< 0.13
Cs-134	< 0.016	< 0.013
Cs-137	< 0.009	< 0.013
Ce-141	< 0.049	< 0.048
Ce-144	< 0.11	< 0.13

Table 19. Soil, analysis for strontium-90 and gamma-emitting isotopes.
Collection: Annually
Units: pCi/g dry

Location	D-15a	D-16
Lab Code	DSO- 2701	DSO- 2702
Date Collected	05-26-16	05-23-16
Sr-90	< 0.048	< 0.032
H-3 (pCi/L)	< 148	< 148
K-40	14.33 ± 0.81	9.53 ± 0.71
Mn-54	< 0.027	< 0.019
Fe-59	< 0.085	< 0.048
Co-58	< 0.026	< 0.016
Co-60	< 0.020	< 0.023
Zn-65	< 0.053	< 0.053
Nb-95	< 0.052	< 0.027
Zr-95	< 0.038	< 0.047
Ru-103	< 0.048	< 0.022
Ru-106	< 0.21	< 0.17
Cs-134	< 0.022	< 0.019
Cs-137	0.13 ± 0.035 [a]	0.11 ± 0.032 [a]
Ce-141	< 0.079	< 0.049
Ce-144	< 0.19	< 0.10

[a] Cs-137 identified is related to nuclear weapons testing.

Table-20. Groundwater Protection Program Summary.

Precipitation samples for tritium analysis. Units: pCi/L

Lab Code	Date	H-3	Lab Code	Date	H-3
D-016			D-111		
DP- 122	01/07/16	< 145	DP- 123	01/07/16	< 145
DP- 804	02/24/16	< 155	DP- 805	02/24/16	< 155
DP- 1173	03/14/16	< 146	DP- 1174	03/14/16	< 150
DP- 1505	04/08/16	< 148	DP- 1506	04/08/16	< 148
DP- 2172	05/02/16	< 149	DP- 2173	05/02/16	172 ± 83
DP- 2773	06/01/16	< 183	DP- 2774	06/01/16	< 183
DP- 3527	07/10/16	< 147	DP- 3521	07/10/16	431 ± 98
DP- 4146	08/01/16	171 ± 81	DP- 4147	08/01/16	316 ± 88
DP- 4677	09/02/16	187 ± 91	DP- 4678	09/02/16	511 ± 105
DP- 5342	10/05/16	< 142	DP- 5343	10/05/16	554 ± 98
DP- 6082	11/03/16	< 180	DP- 6083	11/03/16	< 180
DP- 6690	12/01/16	< 152	DP- 6691	12/01/16	< 152
D-112			D-114		
DP- 124	01/07/16	< 145	DP- 125	01/07/16	659 ± 102
DP- 806	02/24/16	< 155	DP- 807	02/24/16	< 196
DP- 1175	03/14/16	< 150	DP- 1176	03/14/16	< 197
DP- 1507	04/08/16	191 ± 84	DP- 1508	04/08/16	203 ± 122
DP- 2174	05/02/16	< 149	DP- 2176	05/02/16	435 ± 95
DP- 2775	06/01/16	< 183	DP- 2777	06/01/16	< 183
DP- 3523	07/10/16	495 ± 101	DP- 3524	07/10/16	287 ± 92
DP- 4148	08/01/16	< 150	DP- 4149	08/01/16	278 ± 87
DP- 4679	09/02/16	283 ± 95	DP- 4680	09/02/16	234 ± 93
DP- 5344	10/05/16	1007 ± 116	DP- 5345	10/05/16	759 ± 107
DP- 6084	11/03/16	< 180	DP- 6085	11/03/16	< 180
DP- 6692	12/01/16	< 152	DP- 6693	12/01/16	< 152
D-127			D-128		
	ND[a]			ND[a]	
DP- 808	02/24/16	1584 ± 141	DP- 809	02/24/16	415 ± 98
DP- 1178	03/14/16	1796 ± 145	DP- 1179	03/14/16	310 ± 94
DP- 1509	04/08/16	1084 ± 120	DP- 1511	04/08/16	530 ± 99
DP- 2177	05/02/16	2684 ± 167	DP- 2178	05/02/16	< 149
DP- 2778	06/01/16	762 ± 122	DP- 2779	06/01/16	365 ± 109
DP- 3525	07/10/16	3858 ± 197	DP- 3526	07/10/16	1743 ± 144
DP- 4150	08/01/16	2173 ± 153	DP- 4151	08/01/16	734 ± 106
DP- 4681	09/01/16	5387 ± 229	DP- 4682	09/01/16	1060 ± 125
DP- 5346	10/05/16	5820 ± 234	DP- 5347	10/05/16	2794 ± 170
DP- 6086	11/03/16	837 ± 119	DP- 6087	11/03/16	< 180
DP- 6694	12/01/16	510 ± 98	DP- 6695	12/01/16	< 152

[a] "ND" = No data; sample not available.

Table 20. Groundwater Protection Program Summary.

Precipitation, monthly collections, analyses for gamma emitting isotopes.

Location: D-16

		Concentration (pCi/L)											
Lab Code	Date	^{54}Mn	^{59}Fe	^{58}Co	^{60}Co	^{65}Zn	^{95}Nb	^{95}Zr	^{131}I	^{134}Cs	^{137}Cs	^{140}Ba	^{140}La
DP- 122	01/07/16	< 2.5	< 4.7	< 2.6	< 2.1	< 4.3	< 2.4	< 2.8	< 5.2	< 2.6	< 2.6	< 15.1	< 3.7
DP- 804	02/24/16	< 8.3	< 13.2	< 5.5	< 5.9	< 11.5	< 7.3	< 9.8	< 8.5	< 7.7	< 6.0	< 30.3	< 5.8
DP- 1173	03/14/16	< 6.3	< 6.6	< 6.3	< 6.2	< 10.2	< 8.2	< 13.1	< 15.9	< 5.7	< 6.1	< 39.8	< 7.6
DP- 1505	04/08/16	< 2.6	< 2.3	< 2.2	< 1.9	< 3.6	< 2.6	< 3.5	< 3.9	< 2.0	< 2.5	< 12.0	< 2.0
DP- 2172	05/02/16	< 5.0	< 11.6	< 5.2	< 6.8	< 5.3	< 6.3	< 11.8	< 8.9	< 5.6	< 5.0	< 26.2	< 5.2
DP- 2773	06/01/16	< 5.8	< 12.7	< 4.1	< 5.4	< 6.5	< 6.6	< 9.7	< 9.7	< 5.8	< 6.5	< 43.1	< 4.3
DP- 3527	07/10/16	< 2.3	< 3.4	< 3.3	< 1.4	< 4.2	< 3.2	< 2.9	< 6.2	< 2.8	< 1.8	< 10.6	< 3.4
DP- 4146	08/01/16	< 4.4	< 7.5	< 4.7	< 3.9	< 9.0	< 7.9	< 7.1	< 11.0	< 5.7	< 4.5	< 30.4	< 7.2
DP- 4677	09/02/16	< 4.3	< 7.9	< 5.0	< 1.8	< 4.5	< 3.3	< 6.7	< 12.1	< 5.0	< 4.0	< 22.3	< 4.7
DP- 5342	10/05/16	< 3.7	< 2.7	< 3.4	< 3.0	< 3.3	< 3.0	< 3.4	< 6.7	< 3.9	< 4.0	< 21.9	< 3.2
DP- 6082	11/03/16	< 5.4	< 11.3	< 5.3	< 3.1	< 4.5	< 6.4	< 6.7	< 13.1	< 6.1	< 5.4	< 24.6	< 6.1
DP- 6690	12/01/16	< 6.5	< 3.8	< 4.8	< 4.6	< 3.8	< 7.2	< 8.3	< 9.3	< 6.3	< 5.5	< 25.7	< 7.1

Table 20. Groundwater Protection Program Summary.

Ground water, Monitoring wells, analyses for tritium [a].

Lab Code	Date	H-3 (pCi/L)	Lab Code	Date	H-3 (pCi/L)
		D-111A		(01A)	
DWW- 678	02/11/16	< 146	DWW- 4655	08/23/16	270 ± 89
DWW- 1923	03/30/16	< 147	DWW- 6223	11/07/16	< 180
DWW- 1757	04/12/16	< 173			
DWW- 2628	05/09/16	320 ± 91			
		D-111B		(01B)	
DWW- 679	02/11/16	< 146	DWW- 2629	05/09/16	< 152
DWW- 1924	03/30/16	< 147	DWW- 4656	08/23/16	< 152
DWW- 1758	04/12/16	< 173	DWW- 6224	11/07/16	< 180
		D-112A		(02A)	
DWW- 680	02/11/16	< 146	DWW- 4030	07/14/16	< 150
DWW- 1759	04/12/16	< 173	DWW- 4657	08/26/16	< 151
DWW- 2630	05/09/16	< 152	DWW- 6225	11/07/16	< 179
		D-112B		(02B)	
DWW- 681	02/11/16	< 146	DWW- 4658	08/24/16	< 152
DWW- 1760	04/12/16	< 173	DWW- 6226	11/07/16	< 180
DWW- 2631	05/09/16	< 152			
		D-113A		(03A)	
DWW- 782	02/11/16	< 171	DWW- 4659	08/24/16	< 152
DWW- 1761	04/12/16	< 173	DWW- 6227	11/07/16	< 180
DWW- 2632	05/10/16	< 152			
		D-113B		(03B)	
DWW- 783	02/11/16	< 171	DWW- 4660	08/24/16	< 152
DWW- 1762	04/12/16	< 173	DWW- 6228	11/07/16	< 180
DWW- 2633	05/10/16	< 152			
		D-114A		(04A)	
DWW- 682	02/15/16	< 146	DWW- 2389	05/07/16	182 ± 82
DWW- 1925	03/30/16	< 147	DWW- 4585	08/22/16	263 ± 89
DWW- 1764	04/12/16	< 173	DWW- 6229	11/08/16	< 180
		D-114B		(04B)	
DWW- 684	02/15/16	< 146	DWW- 2390	05/07/16	< 145
DWW- 1926	03/30/16	< 147	DWW- 4586	08/22/16	< 152
DWW- 1765	04/12/16	< 173	DWW- 6230	11/08/16	< 180
		D-115A		(05A)	
DWW- 685	02/12/16	< 146	DWW- 4661	08/24/16	231 ± 87
DWW- 1766	04/11/16	< 173	DWW- 6273	11/07/16	< 180
DWW- 2634	05/10/16	< 152			
		D-115B		(05B)	
DWW- 686	02/12/16	< 146	DWW- 4662	08/24/16	< 152
DWW- 1767	04/11/16	< 173	DWW- 6274	11/07/16	< 180
DWW- 2635	05/10/16	< 152			
		D-116A		(06A)	
DWW- 784	02/17/16	< 171	DWW- 4587	08/24/16	< 152
DWW- 1768	04/12/16	< 173	DWW- 6275	11/07/16	< 180
DWW- 2636	05/10/16	< 152			
		D-116B		(06B)	
DWW- 785	02/17/16	< 171	DWW- 4588	08/24/16	< 152
DWW- 1769	04/12/16	< 173	DWW- 6276	11/07/16	< 180
DWW- 2637	05/10/16	< 152			

[a] Analyses for gamma, gross alpha, Sr-89, Sr-90, Fe-55 and Ni-63 will be performed if tritium activity > 1K pCi/L.

Table 20. Groundwater Protection Program Summary.

Ground water, Monitoring wells, analyses for tritium [a].

Lab Code	Date	H-3 (pCi/L)	Lab Code	Date	H-3 (pCi/L)
		D-127A		(07A)	
DWW- 345	01/14/16	222 ± 85	DWW- 6280	11/08/16	1441 ± 143
DWW- 786	02/16/16	232 ± 94			
DWW- 1065	03/07/16	220 ± 84			
DWW- 1338	03/29/16	205 ± 86			
DWW- 1927	04/04/16	512 ± 98			
DWW- 1770	04/15/16	445 ± 100			
DWW- 2391	05/06/16	815 ± 109			
DWW- 3054	06/13/16	579 ± 99			
DWW- 4663	08/26/16	501 ± 100			
		D-127B		(07B)	
DWW- 787	02/16/16	< 171	DWW- 2392	05/06/16	< 145
DWW- 1339	03/29/16	< 152	DWW- 4665	08/26/16	< 151
DWW- 1771	04/15/16	< 173	DWW- 6278	11/08/16	< 180
		D-128A		(08A)	
DWW- 656	02/16/16	7455 ± 262	DWW- 3194	06/02/16	18984 ± 408
DWW- 657	02/19/16	19133 ± 406	DWW- 3719	06/09/16	36638 ± 560
DWW- 821	02/25/16	65862 ± 739 [b]	DWW- 3732	06/13/16	32441 ± 527
DWW- 890	03/02/16	95729 ± 916	DWW- 3733	06/16/16	38775 ± 576
DWW- 987	03/08/16	14034 ± 802	DWW- 3869	06/20/16	42804 ± 604
DWW- 1027	03/10/16	12892 ± 774	DWW- 4475	06/27/16	40688 ± 592
DWW- 1151	03/16/16	30621 ± 512	DWW- 4600	07/05/16	39805 ± 589
DWW- 1204	03/23/16	31672 ± 517	DWW- 4601	07/12/16	26621 ± 483
DWW- 1312	03/30/16	27444 ± 483	DWW- 4690	07/18/16	13218 ± 345
DWW- 1740	04/02/16	21162 ± 427	DWW- 4969	07/25/16	6061 ± 240
DWW- 1470	04/04/16	28616 ± 491	DWW- 4970	08/01/16	5123 ± 223
DWW- 1742	04/08/16	31009 ± 515	DWW- 4971	08/10/16	5930 ± 238
DWW- 1743	04/11/16	23885 ± 453	DWW- 5386	08/15/16	33919 ± 372
DWW- 1559	04/13/16	22327 ± 437	DWW- 5387	08/29/16	30800 ± 355
DWW- 2009	04/15/16	21638 ± 405	DWW- 5276	09/06/16	46677 ± 638
DWW- 1744	04/18/16	56037 ± 688	DWW- 5277	09/13/16	64370 ± 747
DWW- 2492	04/20/16	19635 ± 387	DWW- 5219	09/20/16 [a]	64755 ± 749
DWW- 2010	04/22/16	16683 ± 357	DWW- 5221	09/27/16	14816 ± 364
DWW- 2011	04/25/16	17456 ± 365	DWW- 5716	10/04/16	26929 ± 486
DWW- 2493	04/27/16	19415 ± 384	DWW- 5525	10/11/16	60520 ± 722
DWW- 2494	04/29/16	20697 ± 396	DWW- 5717	10/18/16	91661 ± 888
DWW- 2495	05/02/16	21940 ± 407	DWW- 6371	10/25/16	163959 ± 1095
DWW- 2531	05/06/16	19253 ± 408	DWW- 6376	11/01/16	100052 ± 857
DWW- 2532	05/09/16	15520 ± 368	DWW- 6340	11/08/16	77794 ± 848
DWW- 2533	05/16/16	14342 ± 354	DWW- 6833	11/15/16	71273 ± 784
DWW- 3118	05/26/16	15533 ± 367	DWW- 6839	11/22/16	96480 ± 911
DWW- 3120	05/30/16	19892 ± 414	DWW- 7019	12/21/16	93845 ± 895
		D-128B		(08B)	
DWW- 346	01/14/16	959 ± 115	DWW- 6279	11/08/16	900 ± 124
DWW- 788	02/16/16	989 ± 119			
DWW- 658	02/19/16	1176 ± 131			
DWW- 1066	02/25/16	615 ± 102			
DWW- 1772	04/15/16	1132 ± 122			
DWW- 2393	05/05/16	736 ± 106			
DWW- 3055	06/13/16	495 ± 96			
DWW- 4793	09/06/16	372 ± 99			
		D-129A		(09A)	
DWW- 348	01/14/16	370 ± 92			
DWW- 789	02/16/16	270 ± 95			
DWW- 1067	02/25/16	334 ± 90			
DWW- 1334	03/29/16	161 ± 84			
DWW- 1773	04/14/16	< 173			
DWW- 2395	05/05/16	194 ± 82			
DWW- 4666	08/25/16	976 ± 118			
DWW- 6341	11/08/16	1356 ± 140			

[a] Analyses for gamma, gross alpha, Sr-89, Sr-90, Fe-55 and Ni-63 will be performed if tritium activity > 1K pCi/L .

[b] Tritium repeated with a result of 66,015±744 pCi/L.

[c] Quality assurance duplicate.

Table 20. Groundwater Protection Program Summary.
Ground water, Monitoring wells, analyses for tritium [a].

Lab Code	Date	H-3 (pCi/L)	Lab Code	Date	H-3 (pCi/L)
		D-129B		(09B)	
DWW- 659	02/16/16	663 ± 114	DWW- 6343	11/08/16	515 ± 109
DWW- 790	02/16/16	531 ± 105 [a]			
DWW- 1069	02/25/16	478 ± 96			
DWW- 1068	03/07/16	589 ± 101			
DWW- 1335	03/29/16	435 ± 96			
DWW- 1774	04/14/16	569 ± 105			
DWW- 2396	05/05/16	580 ± 100			
DWW- 4667	08/25/16	569 ± 102			
		D-130A		(10A)	
DWW- 791	02/16/16	< 171	DWW- 6281	11/08/16	< 180
DWW- 1070	02/16/16	< 147			
DWW- 1071	02/26/16	< 147			
DWW- 1336	03/29/16	< 152			
DWW- 1775	04/14/16	< 173			
DWW- 2397	05/06/16	173 ± 81			
DWW- 4668	08/25/16	167 ± 84			
		D-130B		(10B)	
DWW- 792	02/16/16	< 171	DWW- 6282	11/08/16	< 180
DWW- 1072	02/26/16	< 147			
DWW- 1337	03/29/16	< 152			
DWW- 1776	04/14/16	< 173			
DWW- 2398	05/06/16	< 145			
DWW- 4669	08/25/16	< 152			
		D-131A		(11A)	
DWW- 687	02/15/16	444 ± 92			
DWW- 1928	03/30/16	173 ± 82			
DWW- 1777	04/13/16	< 173			
DWW- 2399	05/07/16	188 ± 82			
DWW- 4589	08/22/16	< 152			
DWW- 6283	11/08/16	< 180			
		D-131B		(11B)	
DWW- 688	02/15/16	< 146	DWW- 6284	11/08/16	< 180
DWW- 1929	03/30/16	< 147			
DWW- 1778	04/13/16	< 173			
DWW- 2400	05/07/16	< 145			
DWW- 4590	08/22/16	< 152			
		D-132A		(12A)	
DWW- 689	02/15/16	< 146	DWW- 4691	07/18/16	2272 ± 159
DWW- 1073	02/26/16	< 147	DWW- 5006	07/25/16	1681 ± 146
DWW- 1340	03/30/16	688 ± 107	DWW- 4591	08/01/16	1467 ± 135
DWW- 1779	04/13/16	1283 ± 127	DWW- 5007	08/10/16	911 ± 122
DWW- 3121	05/26/16	3272 ± 180	DWW- 5008	08/15/16	725 ± 116
DWW- 3122	05/30/16	4015 ± 196	DWW- 4592	08/22/16	556 ± 102
DWW- 3195	06/02/16	4038 ± 201	DWW- 5637	10/18/16	474 ± 104
DWW- 3721	06/06/16	3663 ± 191	DWW- 6285	11/08/16	250 ± 97
DWW- 3722	06/09/16	3344 ± 183			
DWW- 3734	06/13/16	3531 ± 188			
DWW- 3870	06/20/16	3145 ± 178			
DWW- 4476	06/27/16	2554 ± 166			
DWW- 4602	07/05/16	2887 ± 175			
DWW- 4603	07/12/16	2563 ± 166			
		D-132B		(12B)	
DWW- 690	02/15/16	< 146	DWW- 4593	08/22/16	< 152
DWW- 1075	02/26/16	< 147	DWW- 6286	11/08/16	< 180
DWW- 1930	03/30/16	< 147			
DWW- 1780	04/13/16	< 173			
DWW- 2401	05/07/16	< 145			

[a] Quality assurance duplicate.

Table 20. Groundwater Protection Program Summary.

Ground water, Monitoring wells, analyses for tritium [a].

Lab Code	Date		H-3 (pCi/L)		Lab Code	Date	H-3 (pCi/L)
			D-133A			(13A)	
DWW- 691	02/15/16		< 146		DWW- 6287	11/08/16	< 180
DWW- 1781	04/15/16		< 173				
DWW- 2638	05/10/16		< 152				
DWW- 4670	08/22/16		154 ± 83				
			D-133B			(13B)	
DWW- 692	02/15/16		< 146		DWW- 6288	11/08/16	< 180
DWW- 1782	04/15/16		< 173				
DWW- 2639	05/10/16		< 152				
DWW- 4671	08/22/16		< 156				
			D-134A			(14A)	
DWW- 793	02/16/16		2118 ± 149		DWW- 4604	07/05/16	12445 ± 335
DWW- 822	02/26/16		2770 ± 173	[b]	DWW- 4605	07/12/16	10033 ± 303
DWW- 891	03/02/16		6069 ± 242		DWW- 4692	07/18/16	8418 ± 279
DWW- 988	03/08/16		18016 ± 891		DWW- 4972	07/25/16	17409 ± 394
DWW- 1028	03/10/16		20476 ± 942		DWW- 4973	08/01/16	20559 ± 427
DWW- 1152	03/16/16		81136 ± 825		DWW- 4974	08/10/16	31632 ± 527
DWW- 1205	03/23/16		101711 ± 920		DWW- 5388	08/15/16	13395 ± 239
DWW- 1313	03/30/16		130095 ± 1042		DWW- 5389	08/25/16	9471 ± 297
DWW- 1745	04/02/16		130878 ± 1050		DWW- 5390	08/29/16	13837 ± 354
DWW- 1471	04/04/16		147668 ± 1106		DWW- 5278	09/06/16	21302 ± 434
DWW- 1746	04/08/16		101143 ± 923		DWW- 5279	09/13/16	29112 ± 505
DWW- 1747	04/11/16		78613 ± 814		DWW- 5222	09/20/16	80248 ± 833
DWW- 1560	04/13/16		69266 ± 763		DWW- 5223	09/27/16	32084 ± 530
DWW- 2012	04/15/16		63403 ± 682		DWW- 5391	10/04/16	25448 ± 473
DWW- 1748	04/18/16		20429 ± 420		DWW- 5526	10/11/16	18904 ± 408
DWW- 2497	04/20/16		48270 ± 596		DWW- 5718	10/18/16	17131 ± 389
DWW- 2013	04/22/16		43933 ± 569		DWW- 6372	10/25/16	11610 ± 304
DWW- 2014	04/25/16		39152 ± 538		DWW- 6377	11/01/16	8297 ± 261
DWW- 2498	04/27/16		35980 ± 517		DWW- 6344	11/08/16	11739 ± 339
DWW- 2499	04/29/16		33622 ± 500		DWW- 6837	11/15/16	31494 ± 524
DWW- 2500	05/02/16		32156 ± 489		DWW- 6836	11/22/16	32808 ± 534
DWW- 2535	05/06/16		24077 ± 455		DWW- 666	11/29/16	51694 ± 636
DWW- 2536	05/09/16		26877 ± 480		DWW- 7020	12/21/16	63730 ± 739
DWW- 2537	05/16/16		18627 ± 401				
DWW- 3123	05/26/16		58720 ± 704				
DWW- 3196	05/30/16		63161 ± 735				
DWW- 3197	06/02/16	8:21	58963 ± 711	[c]			
DWW- 3198	06/02/16	8:30	44176 ± 616	[c]			
DWW- 3199	06/02/16	8:38	45650 ± 626	[c]			
DWW- 3200	06/02/16	8:44	45874 ± 628	[c]			
DWW- 3723	06/06/16		52830 ± 671				
DWW- 3724	06/09/16		36586 ± 560				
DWW- 3735	06/13/16		13934 ± 350				
DWW- 3736	06/16/16		16187 ± 376				
DWW- 3871	06/20/16		14100 ± 352				
DWW- 4477	06/27/16		22129 ± 440				
D-134B						(14B)	
DWW- 794	02/16/16		579 ± 106		DWW- 6289	11/08/16	362 ± 102
DWW- 1783	04/14/16		768 ± 111				
DWW- 2501	05/05/16		930 ± 122				
DWW- 2402	05/06/16		895 ± 112				
DWW- 3057	06/13/16		581 ± 99				
DWW- 4594	08/26/16		788 ± 111				

[a] Analyses for gamma, gross alpha, Sr-89, Sr-90, Fe-55 and Ni-63 will be performed if tritium activity > 1K pCi/L .

[b] Tritium repeated with a result of 2,786±177 pCi/L.

[c] Purge pump test performed for quality assurance.

Table 20. Groundwater Protection Program Summary.
Ground water, Monitoring wells, analyses for tritium [a].

Lab Code	Date	H-3 (pCi/L)	Lab Code	Date	H-3 (pCi/L)
D-135A				(15A)	
DWW- 795	02/17/16	< 171	DWW- 4032	07/14/16	< 150
DWW- 1931	03/30/16	< 147	DWW- 4596	08/23/16	< 152
DWW- 1785	04/12/16	< 173	DWW- 6290	11/08/16	< 182
DWW- 2403	05/07/16	< 145			
D-135B				(15B)	
DWW- 796	02/17/16	< 171	DWW- 2404	05/07/16	< 145
DWW- 1932	03/30/16	< 147	DWW- 4597	08/23/16	< 152
DWW- 1786	04/15/16	< 173	DWW- 6291	11/08/16	< 182
D-136A				(16A)	
DWW- 693	02/15/16	< 146	DWW- 4598	08/25/16	< 152
DWW- 1787	04/15/16	< 173	DWW- 6292	11/08/16	< 182
DWW- 2405	05/05/16	< 145			
D-136B				(16B)	
DWW- 694	02/15/16	< 146	DWW- 4599	08/25/16	< 152
DWW- 1788	04/15/16	< 173	DWW- 6293	11/08/16	< 182
DWW- 2406	05/05/16	< 145			
D-137				(17C)	
DWW- 797	02/15/16	< 171	DWW- 4672	08/25/16	< 156
DWW- 1789	04/14/16	< 173	DWW- 6294	11/08/16	< 182
DWW- 2407	05/05/16	< 145			
D-62				(18A)	
DWW- 2496	05/05/16	50218 ± 607	DWW- 5393	09/01/16	28270 ± 499
DWW- 3036	05/19/16	23094 ± 445	DWW- 5280	09/06/16	34256 ± 548
DWW- 3201	06/02/16	23299 ± 451	DWW- 5281	09/13/16	17530 ± 395
DWW- 3737	06/09/16	27705 ± 488	DWW- 5224	09/20/16	9183 ± 291
DWW- 3738	06/16/16	21276 ± 429	DWW- 5225	09/27/16	3561 ± 190
DWW- 4478	06/23/16	20408 ± 423	DWW- 5719	10/04/16	3870 ± 196
DWW- 4479	06/29/16	17562 ± 393	DWW- 5528	10/11/16	27114 ± 486
DWW- 3873	07/08/16	11719 ± 322	DWW- 5720	10/18/16	18576 ± 405
DWW- 4606	07/14/16	13339 ± 346	DWW- 6373	10/25/16	32269 ± 492
DWW- 4693	07/21/16	12245 ± 333	DWW- 6378	11/01/16	12550 ± 315
DWW- 4694	07/29/16	20298 ± 424	DWW- 6345	11/08/16	12140 ± 344
DWW- 4976	08/04/16	16821 ± 388	DWW- 6832	11/15/16	18967 ± 409
DWW- 4975	08/10/16	10779 ± 313	DWW- 6838	11/22/16	16802 ± 385
DWW- 5392	08/26/16	21195 ± 435	DWW- 7021	12/21/16	17395 ± 392
D-63				(19A)	
DWW- 2015	04/22/16	8678 ± 265	DWW- 4031	07/14/16	< 150
DWW- 2538	05/06/16	366 ± 94	DWW- 4033	07/21/16	< 150
DWW- 3037	05/19/16	195 ± 81	DWW- 5009	08/04/16	< 181
DWW- 3725	06/02/16	< 150	DWW- 5010	08/10/16	< 180
DWW- 3170	06/16/16	< 149	DWW- 4673	08/18/16	< 156
DWW- 3689	06/23/16	< 149	DWW- 4674	08/20/16	< 156
DWW- 3690	06/29/16	< 149	DWW- 6295	11/08/16	< 182
DWW- 3691	07/08/16	< 149			
D-64				(20A)	
DWW- 2017	04/21/16	29133 ± 466	DWW- 4029	07/14/16	< 150
DWW- 2539	05/05/16	4649 ± 211	DWW- 4034	07/21/16	< 150
DWW- 3038	05/19/16	< 146	DWW- 5011	08/04/16	< 181
DWW- 3726	06/02/16	< 150	DWW- 5012	08/10/16	< 180
DWW- 3171	06/16/16	< 149	DWW- 4675	08/18/16	< 156
DWW- 3692	06/23/16	188 ± 84	DWW- 4676	08/26/16	< 156
DWW- 3693	06/29/16	< 149	DWW- 5287	09/27/16	< 157
DWW- 3695	07/08/16	< 149	DWW- 6296	11/08/16	< 182
D-65				(21A)	
DWW- 1473	04/06/16	9216 ± 285	DWW- 4607	07/14/16	28986 ± 504
DWW- 2016	04/22/16	18913 ± 379	DWW- 4035	07/21/16	1026 ± 117
DWW- 2540	05/05/16	7165 ± 256	DWW- 5013	08/04/16	796 ± 118
DWW- 3039	05/19/16	3121 ± 176	DWW- 5014	08/10/16	350 ± 102
DWW- 3727	06/02/16	6273 ± 242	DWW- 5394	08/18/16	846 ± 119
DWW- 3739	06/16/16	17380 ± 389	DWW- 5396	08/26/16	1364 ± 136
DWW- 4480	06/23/16	20029 ± 419	DWW- 4794	09/06/16	744 ± 114
DWW- 4481	06/29/16	1369 ± 132	DWW- 5288	09/27/16	192 ± 86
DWW- 3874	07/08/16	12677 ± 334	DWW- 6297	11/08/16	207 ± 98

[a] Analyses for gamma, gross alpha, Sr-89, Sr-90, Fe-55 and Ni-63 will be performed if tritium activity > 1K pCi/L .

Table 20. Groundwater Protection Program Summary.

Ground water, Monitoring wells, analyses for tritium [a].

D-66				(22A)	
DWW- 1472	04/06/16	162893 ± 1161	DWW- 5400	09/01/16	22894 ± 451
DWW- 2541	05/05/16	68723 ± 762	DWW- 5282	09/06/16	93686 ± 900
DWW- 3040	05/19/16	53435 ± 673	DWW- 5283	09/13/16	144410 ± 1116
DWW- 3728	06/02/16	92235 ± 884	DWW- 5226	09/20/16	296589 ± 1596
DWW- 3740	06/16/16	20089 ± 417	DWW- 5227	09/22/16	192987 ± 1288
DWW- 3875	06/20/16	12359 ± 331	DWW- 5228	09/27/16	36515 ± 564
DWW- 4482	06/23/16	19986 ± 419	DWW- 5721	10/04/16	25947 ± 477
DWW- 4483	06/29/16	19487 ± 414	DWW- 5529	10/11/16	13680 ± 350
DWW- 3876	07/08/16	13197 ± 341	DWW- 5722	10/18/16	37543 ± 571
DWW- 4608	07/14/16	20403 ± 425	DWW- 6374	10/25/16	52920 ± 626
DWW- 4695	07/21/16	36380 ± 564	DWW- 6379	11/01/16	74397 ± 740
DWW- 4696	07/29/16	22531 ± 446	DWW- 6346	11/08/16	59717 ± 744
DWW- 4978	08/04/16	47990 ± 647	DWW- 6829	11/15/16	40315 ± 591
DWW- 5397	08/10/16	21359 ± 437	DWW- 6835	11/22/16	106945 ± 958
DWW- 5398	08/18/16	62101 ± 735	DWW- 7022	12/21/16	92289 ± 888
DWW- 5399	08/26/16	76905 ± 817			
D-67				(23A)	
DWW- 3124	05/19/16	39811 ± 582	DWW- 5284	09/06/16	13174 ± 345
DWW- 3729	06/02/16	33881 ± 539	DWW- 5285	09/13/16	18686 ± 407
DWW- 3877	06/16/16	16753 ± 383	DWW- 5229	09/20/16	34062 ± 546
DWW- 3878	06/20/16	12096 ± 327	DWW- 5289	09/27/16	1654 ± 141
DWW- 3696	06/23/16	964 ± 116	DWW- 5723	10/04/16	36207 ± 561
DWW- 4485	06/29/16	18030 ± 398	DWW- 5530	10/11/16	80616 ± 832
DWW- 3879	07/08/16	21571 ± 432	DWW- 5725	10/18/16	64282 ± 745
DWW- 4609	07/14/16	18125 ± 401	DWW- 6375	10/25/16	91508 ± 820
DWW- 4697	07/21/16	22909 ± 450	DWW- 6380	11/01/16	80255 ± 768
DWW- 4698	07/29/16	19768 ± 419	DWW- 6347	11/08/16	43148 ± 634
DWW- 4979	08/04/16	14322 ± 359	DWW- 6831	11/15/16	32736 ± 534
DWW- 5401	08/10/16	10847 ± 317	DWW- 6834	11/22/16	40078 ± 589
DWW- 5402	08/26/16	9897 ± 303	DWW- 7023	12/21/16	70835 ± 779
DWW- 5403	09/01/16	12494 ± 338			
MW-24A					
DWW- 7024	12/30/16	< 154			
MW-25A					
DWW- 7025	12/21/16	3677 ± 192	DWW- 7026	12/30/16	4557 ± 211
MW-26A					
DWW- 7027	12/21/16	3077 ± 179	DSW- 7028	12/30/16	2922 ± 175

[a] Analyses for gamma, gross alpha, Sr-89, Sr-90, Fe-55 and Ni-63 will be performed if tritium activity > 1K pCi/L .

Table 20. Groundwater Protection Program Summary.

Ground water, Monitoring wells, analyses for tritium [a].

D-68				(EW-01A)	
DWW- 2542	05/06/16	46332 ± 627			
DWW- 4699	07/29/16	3182 ± 182			
D-69				(EW-02A)	
DWW- 3742	06/09/16	905 ± 115			
Surface water, analysis for tritium.				(2MH209)	
D-119					
DSW- 2780	05/18/16	409 ± 111	DSW- 5405	07/14/16	1784 ± 149
DSW- 5404	07/13/16	1532 ± 142	DSW- 6382	11/07/16	319 ± 102
D-120				(2MH210)	
DSW- 6237	11/07/16	< 180			
D-121				(2MH211)	
DSW- 2781	05/18/16	444 ± 112	DSW- 6231	11/07/16	< 180
DSW- 3697	07/08/16	355 ± 92			
D-122				(Sluice Pond)	
DSW- 800	02/24/16	180 ± 92	DSW- 3699	07/13/16	< 149
DSW- 2782	05/18/16	601 ± 117	DSW- 6299	11/08/16	< 182
DSW- 3698	07/06/16	213 ± 85			
D-123				(S. Drainage Ditch)	
DSW- 801	02/24/16	< 170	DSW- 3700	07/13/16	401 ± 94
DSW- 1172	03/11/16	155 ± 87			
D-124				(N. Drainage Ditch)	
DSW- 803	02/24/16	< 170	DSW- 3701	07/13/16	474 ± 97
DSW- 3041	05/18/16	< 146	DSW- 6300	11/08/16	< 182
D-125				(Onsite S. Storm Drain Outfall)	
DSW- 2783	05/18/16	265 ± 106	DSW- 6301	11/08/16	< 182
DSW- 3702	07/13/16	< 149			
D-89				(MH221)	
DSW- 3703	07/11/16	238 ± 86			
D-101				(1MH109)	
DSW- 6381	11/07/16	2671 ± 166			

[a] Analyses for gamma, gross alpha, Sr-89, Sr-90, Fe-55 and Ni-63 will be performed if tritium activity > 1K pCi/L .

Table 20. Groundwater Protection Program Summary.

Monitoring wells, analyses for gamma-emitting isotopes.

Lab Code	Collection Date	^{54}Mn	^{59}Fe	^{58}Co	^{60}Co	^{65}Zn	^{95}Nb	^{95}Zr	^{134}Cs	^{137}Cs	^{140}Ba	^{140}La
						D-128A (MW-08A)						
DWW- 656	2/16/2016	< 2.7	< 4.6	< 2.3	< 1.6	< 5.2	< 3.4	< 5.2	< 2.5	< 2.2	< 11.8	< 3.6
DWW- 657	2/19/2016	< 2.8	< 4.4	< 2.9	< 1.7	< 3.2	< 1.8	< 5.1	< 2.9	< 2.2	< 16.0	< 2.8
DWW- 821	2/25/2016	< 3.0	< 7.7	< 3.1	< 3.7	< 6.5	< 4.1	< 7.2	< 3.9	< 4.4	< 19.7	< 5.5
DWW- 890	3/2/2016	< 2.7	< 3.9	< 2.8	< 3.0	< 3.4	< 3.1	< 5.0	< 3.2	< 3.4	< 17.9	< 3.6
DWW- 987	3/8/2016	< 2.8	< 5.6	< 1.8	< 2.0	< 5.6	< 3.4	< 5.1	< 2.6	< 2.4	< 13.8	< 4.1
DWW- 1027	3/10/2016	< 3.0	< 5.8	< 2.9	< 3.2	< 4.9	< 2.7	< 4.7	< 3.2	< 3.6	< 17.4	< 2.0
DWW- 1151	3/16/2016	< 2.7	< 5.7	< 2.7	< 2.5	< 5.9	< 3.0	< 4.1	< 2.8	< 3.4	< 18.7	< 3.8
DWW- 1204	3/23/2016	< 2.0	< 5.8	< 3.2	< 2.6	< 5.6	< 3.4	< 4.6	< 2.6	< 2.6	< 14.4	< 1.8
DWW- 1312	3/30/2016	< 2.5	< 3.6	< 2.7	< 3.3	< 5.8	< 3.5	< 2.7	< 3.1	< 2.8	< 19.8	< 4.8
DWW- 1470	4/4/2016	< 2.2	< 3.5	< 3.3	< 1.7	< 3.2	< 4.5	< 3.9	< 2.4	< 3.4	< 44.4	< 10.6
DWW- 1559	4/13/2016	< 2.5	< 4.7	< 3.1	< 3.0	< 5.4	< 4.6	< 7.3	< 2.6	< 3.2	< 32.7	< 7.3
DWW- 1740	4/2/2016	< 3.3	< 7.6	< 3.3	< 3.1	< 4.0	< 5.4	< 4.8	< 3.2	< 3.3	< 48.1	< 6.6
DWW- 1742	4/8/2016	< 2.8	< 7.3	< 3.1	< 2.9	< 4.5	< 4.4	< 6.7	< 2.5	< 2.9	< 36.8	< 6.7
DWW- 1743	4/11/2016	< 2.8	< 5.8	< 2.5	< 2.8	< 5.6	< 4.5	< 5.5	< 2.6	< 2.9	< 45.3	< 9.2
DWW- 1744	4/18/2016	< 2.7	< 6.0	< 3.3	< 2.9	< 5.8	< 3.9	< 5.8	< 2.4	< 2.9	< 29.9	< 6.4
DWW- 2009	4/15/2016	< 3.6	< 4.6	< 2.5	< 3.2	< 4.8	< 5.1	< 6.1	< 3.3	< 2.7	< 25.7	< 9.9
DWW- 2010	4/22/2016	< 2.6	< 5.4	< 3.1	< 2.8	< 4.4	< 3.8	< 5.6	< 2.7	< 3.2	< 27.9	< 5.4
DWW- 2011	4/25/2016	< 2.8	< 6.0	< 3.8	< 2.0	< 6.4	< 2.3	< 6.8	< 3.2	< 3.1	< 28.0	< 3.7
DWW- 2492	4/20/2016	< 3.1	< 8.0	< 2.7	< 2.9	< 3.6	< 5.5	< 4.0	< 2.4	< 2.8	< 63.6	< 21.5 [a]
DWW- 2493	4/27/2016	< 2.5	< 7.0	< 2.8	< 1.6	< 5.9	< 4.7	< 6.2	< 2.6	< 2.4	< 56.0	< 10.3
DWW- 2494	4/29/2016	< 2.8	< 6.9	< 2.8	< 2.9	< 6.0	< 4.7	< 6.6	< 2.9	< 2.9	< 37.8	< 12.5
DWW- 2495	5/2/2016	< 3.0	< 8.7	< 3.5	< 2.8	< 5.4	< 3.6	< 4.7	< 2.5	< 2.8	< 46.0	< 10.6
DWW- 2531	5/6/2016	< 1.9	< 5.3	< 2.5	< 2.2	< 4.7	< 4.0	< 4.5	< 2.6	< 2.0	< 48.0	< 11.2
DWW- 2532	5/9/2016	< 2.7	< 5.2	< 3.2	< 2.8	< 4.5	< 4.4	< 5.1	< 2.5	< 2.3	< 25.1	< 11.3
DWW- 2533	5/16/2016	< 3.1	< 6.9	< 1.5	< 2.2	< 5.5	< 3.8	< 5.6	< 3.0	< 2.8	< 23.4	< 6.5
DWW- 3118	5/26/2016	< 3.5	< 8.4	< 2.1	< 3.3	< 5.3	< 6.8	< 7.4	< 2.6	< 3.4	< 82.9	< 10.9 [a]
DWW- 3120	5/30/2016	< 3.0	< 7.9	< 3.9	< 2.7	< 5.0	< 7.1	< 6.4	< 2.8	< 2.2	< 67.9	< 18.3
DWW- 3194	6/2/2016	< 2.9	< 8.0	< 2.9	< 3.2	< 5.0	< 6.3	< 7.0	< 3.3	< 3.1	< 53.2	< 9.8
DWW- 3719	6/9/2016	< 3.1	< 6.1	< 4.6	< 2.9	< 5.1	< 7.0	< 7.2	< 2.8	< 3.2	< 156.9	< 48.9 [a]
DWW- 3732	6/13/2016	< 3.1	< 5.9	< 4.5	< 3.3	< 6.4	< 5.0	< 9.3	< 3.4	< 3.5	< 203.5	< 56.6 [a]
DWW- 3733	6/16/2016	< 2.5	< 10.4	< 3.7	< 1.8	< 5.8	< 6.3	< 7.0	< 2.7	< 2.7	< 127.9	< 57.5 [a]
DWW- 3869	6/20/2016	< 2.8	< 11.6	< 3.3	< 2.3	< 5.4	< 5.1	< 5.9	< 2.5	< 3.0	< 161.7	< 49.4 [a]
DWW- 4475	6/27/2016	< 3.1	< 16.7	< 5.3	< 2.9	< 6.5	< 10.4	< 11.7	< 3.2	< 3.1	< 480.6	< 85.1 [a]
DWW- 4600	7/5/2016	< 2.9	< 11.6	< 3.3	< 3.1	< 6.2	< 10.8	< 10.5	< 3.2	< 3.1	< 457.9	< 80.7 [a]
DWW- 4601	7/12/2016	< 3.0	< 12.4	< 4.6	< 2.5	< 3.8	< 10.8	< 9.0	< 3.4	< 3.4	< 311.7	< 81.8 [a]
DWW- 4690	7/18/2016	< 3.7	< 10.8	< 4.6	< 2.9	< 5.9	< 6.7	< 10.0	< 3.1	< 2.3	< 199.2	< 49.9 [a]
DWW- 4969	7/25/2016	< 4.2	< 16.7	< 4.4	< 3.1	< 6.4	< 11.0	< 13.2	< 3.6	< 3.7	< 571.6	< 89.7 [a]
DWW- 4970	8/1/2016	< 2.7	< 14.3	< 3.5	< 2.0	< 3.3	< 10.2	< 8.3	< 3.1	< 2.3	< 240.7	< 57.6 [a]
DWW- 4971	8/10/2016	< 3.4	< 8.2	< 5.5	< 2.2	< 6.0	< 7.9	< 10.0	< 3.2	< 3.3	< 183.7	< 45.5 [a]
DWW- 5386	8/15/2016	< 2.6	< 14.4	< 5.3	< 1.5	< 4.6	< 12.5	< 8.2	< 2.8	< 1.9	< 495.7	< 179.2 [a]
DWW- 5387	8/29/2016	< 2.8	< 14.0	< 4.7	< 2.5	< 6.7	< 12.1	< 8.4	< 2.7	< 2.3	< 498.8	< 169.6 [a]
DWW- 5276	9/6/2016	< 2.4	< 6.7	< 2.4	< 2.7	< 6.0	< 4.3	< 7.4	< 3.1	< 2.6	< 83.1	< 14.9 [a]
DWW- 5277	9/13/2016	< 2.4	< 8.9	< 3.6	< 2.4	< 3.7	< 4.4	< 6.4	< 2.7	< 2.9	< 94.5	< 8.0 [a]
DWW- 5219	9/20/2016	< 2.4	< 9.0	< 3.7	< 3.1	< 6.1	< 6.1	< 6.5	< 3.1	< 3.3	< 85.2	< 26.1 [a]
DWW- 5221	9/27/2016	< 2.9	< 5.6	< 2.7	< 2.1	< 3.8	< 4.0	< 5.1	< 2.7	< 2.6	< 50.0	< 9.6
DWW- 5716	10/4/2016	< 2.6	< 8.9	< 3.6	< 3.1	< 5.0	< 6.7	< 6.0	< 3.0	< 3.1	< 97.3	< 15.0 [a]
DWW- 5525	10/11/2016	< 2.3	< 5.7	< 3.8	< 2.5	< 5.6	< 6.6	< 6.8	< 3.0	< 3.4	< 78.0	< 12.0 [a]
DWW- 5717	10/18/2016	< 2.6	< 6.4	< 3.8	< 2.6	< 5.6	< 5.5	< 5.9	< 2.7	< 2.7	< 104.1	< 15.3 [a]
DWW- 6371	10/25/2016	< 3.5	< 9.0	< 4.8	< 1.7	< 5.0	< 5.9	< 4.7	< 3.1	< 2.7	< 105.3	< 25.4 [a]
DWW- 6376	11/1/2016	< 2.7	< 9.8	< 4.1	< 2.4	< 5.4	< 6.7	< 8.4	< 3.5	< 3.0	< 103.9	< 20.1 [a]
DWW- 6340	11/8/2016	< 3.2	< 8.3	< 3.1	< 2.7	< 4.0	< 5.2	< 7.0	< 2.9	< 2.9	< 76.9	< 23.1 [a]
DWW- 6833	11/15/2016	< 2.4	< 9.7	< 3.6	< 2.1	< 5.1	< 6.2	< 4.3	< 2.7	< 2.9	< 107.8	< 21.6 [a]
DWW- 6839	11/22/2016	< 2.7	< 5.5	< 2.8	< 2.1	< 3.9	< 4.7	< 3.7	< 2.6	< 2.9	< 84.5	< 18.3 [a]
DWW- 7019	12/21/2016	< 3.6	< 7.3	< 2.3	< 2.4	< 4.5	< 3.9	< 5.2	< 3.3	< 2.7	< 55.4	< 10.0

[a] LLDs for Ba-140 and/or La-140 not reached due to age of samples and smaller sample size.

Table 20. Groundwater Protection Program Summary.

Monitoring wells, analyses for gamma-emitting isotopes.

Lab Code	Collection Date	^{54}Mn	^{59}Fe	^{58}Co	^{60}Co	^{65}Zn	^{95}Nb	^{95}Zr	^{134}Cs	^{137}Cs	^{140}Ba	^{140}La
						D-128B (MW-08B)						
DWW- 658	2/19/2016	< 2.4	< 5.4	< 2.3	< 2.4	< 4.9	< 3.2	< 3.5	< 2.7	< 2.0	< 14.2	< 3.8
DWW- 1772	4/15/2016	< 2.4	< 4.5	< 2.9	< 1.9	< 2.1	< 3.9	< 4.7	< 3.2	< 1.6	< 30.6	< 5.2
						D-129A (MW-09A)						
DWW- 6341	11/8/2016	< 2.5	< 5.6	< 4.5	< 2.8	< 6.9	< 7.5	< 8.1	< 3.4	< 3.0	< 78.2	< 18.1 [a]
						D-132A (MW-12A)						
DWW- 1779	4/13/2016	< 2.7	< 4.5	< 1.7	< 1.0	< 5.2	< 4.8	< 5.2	< 2.6	< 1.8	< 24.8	< 6.3
DWW- 3121	5/26/2016	< 2.9	< 5.1	< 2.4	< 2.2	< 6.4	< 4.8	< 6.2	< 3.2	< 2.4	< 53.1	< 16.1
DWW- 3122	5/30/2016	< 2.6	< 7.0	< 3.5	< 2.2	< 2.2	< 5.1	< 4.1	< 2.5	< 2.6	< 51.7	< 9.1
DWW- 3195	6/2/2016	< 1.9	< 6.7	< 2.9	< 3.0	< 4.6	< 4.5	< 6.9	< 3.0	< 2.9	< 53.0	< 12.1
DWW- 3721	6/6/2016	< 2.8	< 10.2	< 5.2	< 3.4	< 6.6	< 7.2	< 6.4	< 3.2	< 2.6	< 202.2	< 50.8 [a]
DWW- 3722	6/9/2016	< 3.1	< 10.7	< 2.6	< 2.8	< 6.6	< 10.1	< 8.4	< 3.3	< 2.7	< 144.3	< 66.4 [a]
DWW- 3734	6/13/2016	< 2.7	< 12.4	< 4.9	< 3.2	< 5.3	< 8.2	< 4.9	< 2.9	< 2.7	< 173.2	< 52.1 [a]
DWW- 3870	6/20/2016	< 2.8	< 13.0	< 3.1	< 2.5	< 5.8	< 8.2	< 8.4	< 2.8	< 2.1	< 248.5	< 85.4 [a]
DWW- 4476	6/27/2016	< 2.9	< 18.0	< 2.5	< 1.4	< 6.2	< 9.4	< 9.9	< 2.7	< 2.9	< 420.1	< 93.8 [a]
DWW- 4602	7/5/2016	< 2.9	< 12.6	< 2.4	< 2.1	< 4.6	< 10.6	< 9.2	< 2.6	< 3.1	< 376.4	< 89.1 [a]
DWW- 4603	7/12/2016	< 2.9	< 10.1	< 2.8	< 3.1	< 3.8	< 8.4	< 7.5	< 2.7	< 3.1	< 174.6	< 49.8 [a]
DWW- 4691	7/18/2016	< 2.8	< 11.7	< 4.1	< 2.3	< 5.3	< 7.5	< 7.0	< 2.4	< 3.2	< 245.3	< 37.6 [a]
DWW- 5006	7/25/2016	< 2.1	< 14.0	< 4.7	< 1.3	< 4.2	< 14.4	< 9.3	< 2.3	< 1.5	< 1264.6	< 187.1 [a]
DWW- 4591	8/1/2016	< 1.5	< 5.6	< 2.0	< 1.5	< 2.5	< 4.4	< 4.6	< 1.5	< 1.6	< 42.1	< 8.3
						D-134A (MW-14A)						
DWW- 793	2/16/2016	< 1.1	< 3.2	< 0.8	< 0.9	< 2.5	< 1.9	< 1.4	< 1.0	< 1.2	< 13.0	< 3.5
DWW- 822	2/26/2016	< 2.8	< 4.3	< 3.5	< 2.1	< 6.4	< 4.1	< 5.1	< 3.3	< 3.6	< 12.9	< 4.3
DWW- 891	3/2/2016	< 2.4	< 5.6	< 2.3	< 3.3	< 5.0	< 2.4	< 5.5	< 2.7	< 2.4	< 15.5	< 2.3
DWW- 988	3/8/2016	< 2.4	< 4.5	< 2.8	< 3.2	< 4.2	< 3.3	< 3.3	< 2.8	< 2.7	< 12.4	< 4.1
DWW- 1028	3/10/2016	< 2.3	< 3.9	< 2.7	< 2.9	< 6.0	< 3.4	< 3.9	< 2.8	< 3.1	< 14.6	< 3.6
DWW- 1152	3/16/2016	< 2.1	< 2.9	< 2.7	< 2.3	< 3.9	< 3.0	< 4.0	< 2.6	< 3.1	< 14.6	< 3.4
DWW- 1205	3/23/2016	< 2.9	< 5.3	< 2.8	< 2.7	< 5.1	< 2.3	< 4.2	< 2.3	< 3.0	< 14.7	< 2.5
DWW- 1313	3/30/2016	< 2.6	< 5.9	< 2.2	< 3.1	< 6.1	< 2.9	< 5.5	< 2.8	< 2.0	< 15.1	< 4.6
DWW- 1745	4/2/2016	< 2.8	< 5.8	< 2.1	< 1.6	< 5.6	< 4.3	< 5.6	< 2.5	< 2.8	< 43.6	< 10.5
DWW- 1471	4/4/2016	< 3.1	< 7.2	< 2.9	< 2.6	< 6.8	< 3.9	< 5.8	< 2.8	< 3.4	< 35.8	< 11.6
DWW- 1746	4/8/2016	< 2.9	< 8.1	< 2.7	< 2.3	< 4.7	< 4.2	< 6.0	< 2.5	< 3.3	< 41.6	< 4.4
DWW- 1747	4/11/2016	< 2.7	< 5.7	< 2.4	< 2.8	< 4.0	< 3.4	< 6.4	< 2.5	< 1.6	< 37.3	< 8.4
DWW- 1560	4/13/2016	< 2.4	< 5.4	< 3.3	< 1.5	< 5.8	< 4.5	< 3.9	< 3.2	< 2.6	< 42.3	< 4.3
DWW- 2012	4/15/2016	< 2.5	< 4.9	< 2.7	< 1.5	< 5.9	< 2.8	< 6.0	< 2.7	< 2.3	< 35.8	< 7.9
DWW- 1748	4/18/2016	< 2.3	< 4.8	< 2.9	< 2.3	< 4.8	< 3.6	< 4.1	< 2.3	< 2.8	< 31.4	< 8.1
DWW- 2497	4/20/2016	< 2.5	< 10.5	< 3.5	< 2.5	< 5.9	< 4.1	< 7.8	< 2.5	< 3.4	< 74.4	< 15.8 [a]
DWW- 2013	4/22/2016	< 1.6	< 7.7	< 3.3	< 3.1	< 4.8	< 3.5	< 5.7	< 2.7	< 3.3	< 29.7	< 5.0
DWW- 2014	4/25/2016	< 3.0	< 6.5	< 1.9	< 2.5	< 2.5	< 2.6	< 5.6	< 2.8	< 3.1	< 33.5	< 6.5
DWW- 2498	4/27/2016	< 2.5	< 8.6	< 3.6	< 2.2	< 5.2	< 5.9	< 7.0	< 2.6	< 2.7	< 51.5	< 16.1 [a]
DWW- 2499	4/29/2016	< 3.2	< 7.4	< 3.9	< 2.6	< 6.1	< 3.8	< 8.6	< 3.3	< 2.2	< 35.8	< 12.8

[a] LLDs for Ba-140 and/or La-140 not reached due to age of samples and smaller sample size.

Table 20. Groundwater Protection Program Summary.

Monitoring wells, analyses for gamma-emitting isotopes.

Lab Code	Collection Date	^{54}Mn	^{59}Fe	^{58}Co	^{60}Co	^{65}Zn	^{95}Nb	^{95}Zr	^{134}Cs	^{137}Cs	^{140}Ba	^{140}La
D-134A (MW-14A) (continued)												
DWW- 2500	5/2/2016	< 3.1	< 8.5	< 2.8	< 3.0	< 4.6	< 4.7	< 5.0	< 2.6	< 3.0	< 56.8	< 8.7
DWW- 2535	5/6/2016	< 2.6	< 5.8	< 2.8	< 2.3	< 4.1	< 3.8	< 4.1	< 2.4	< 2.8	< 52.0	< 12.6
DWW- 2536	5/9/2016	< 2.8	< 7.2	< 2.5	< 2.8	< 3.8	< 3.1	< 5.9	< 2.4	< 2.9	< 49.6	< 8.9
DWW- 2537	5/16/2016	< 4.0	< 5.5	< 3.9	< 3.3	< 5.3	< 3.7	< 6.2	< 3.7	< 3.8	< 27.6	< 10.6
DWW- 3123	5/26/2016	< 2.6	< 6.8	< 3.0	< 1.4	< 6.1	< 4.0	< 4.9	< 2.6	< 1.9	< 72.1	< 14.9 [a]
DWW- 3196	5/30/2016	< 2.7	< 7.7	< 2.5	< 2.2	< 3.5	< 5.2	< 5.7	< 2.5	< 2.7	< 56.8	< 9.6
DWW- 3197	6/2/2016	< 2.8	< 6.0	< 3.2	< 2.3	< 5.1	< 4.4	< 4.9	< 2.7	< 2.2	< 37.6	< 13.5
DWW- 3198	6/2/2016	< 2.7	< 8.3	< 3.1	< 2.4	< 4.8	< 4.7	< 6.1	< 2.7	< 2.4	< 51.7	< 11.9
DWW- 3199	6/2/2016	< 2.3	< 5.9	< 1.8	< 2.5	< 3.8	< 3.7	< 6.6	< 2.3	< 2.9	< 49.8	< 16.8 [a]
DWW- 3200	6/2/2016	< 3.1	< 8.0	< 4.1	< 3.3	< 4.6	< 5.0	< 5.2	< 3.3	< 2.8	< 67.7	< 9.2 [a]
DWW- 3723	6/6/2016	< 2.6	< 7.4	< 4.5	< 2.2	< 5.9	< 6.3	< 7.2	< 2.6	< 2.6	< 146.6	< 50.7 [a]
DWW- 3724	6/9/2016	< 3.0	< 10.6	< 5.1	< 2.8	< 6.4	< 7.5	< 6.5	< 2.6	< 2.6	< 210.8	< 65.3 [a]
DWW- 3735	6/13/2016	< 3.6	< 9.9	< 4.2	< 3.3	< 6.1	< 8.3	< 7.1	< 3.1	< 2.9	< 187.6	< 63.3 [a]
DWW- 3736	6/16/2016	< 2.7	< 8.1	< 3.7	< 2.6	< 5.2	< 8.0	< 6.2	< 2.6	< 3.1	< 119.5	< 49.8 [a]
DWW- 3871	6/20/2016	< 3.5	< 12.5	< 5.2	< 2.3	< 6.4	< 10.3	< 8.1	< 2.8	< 3.3	< 198.2	< 75.2 [a]
DWW- 4477	6/27/2016	< 5.3	< 22.5	< 8.8	< 4.3	< 12.5	< 21.5	< 18.2	< 5.4	< 5.8	< 781.4	< 239.0 [a]
DWW- 4604	7/5/2016	< 3.2	< 11.1	< 4.8	< 1.8	< 6.8	< 9.2	< 11.5	< 3.0	< 2.7	< 524.2	< 123.7 [a]
DWW- 4605	7/12/2016	< 2.0	< 8.6	< 4.3	< 2.5	< 4.8	< 9.6	< 10.2	< 2.8	< 2.2	< 237.0	< 79.1 [a]
DWW- 4692	7/18/2016	< 2.8	< 8.9	< 2.5	< 2.8	< 5.3	< 9.5	< 6.6	< 3.1	< 3.3	< 302.8	< 62.5 [a]
DWW- 4972	7/25/2016	< 2.9	< 13.9	< 2.9	< 2.3	< 3.5	< 11.7	< 7.0	< 3.1	< 1.8	< 350.3	< 72.0 [a]
DWW- 4973	8/1/2016	< 3.2	< 9.4	< 4.4	< 2.5	< 4.8	< 8.2	< 4.7	< 2.5	< 3.2	< 323.5	< 114.1 [a]
DWW- 4974	8/10/2016	< 2.0	< 12.6	< 4.5	< 3.0	< 5.1	< 7.9	< 5.4	< 2.6	< 3.0	< 264.5	< 53.6 [a]
DWW- 5388	8/15/2016	< 1.8	< 22.4	< 4.0	< 2.9	< 6.4	< 11.1	< 10.9	< 2.8	< 3.0	< 939.3	< 188.8 [a]
DWW- 5389	8/25/2016	< 2.1	< 14.2	< 4.8	< 2.1	< 5.7	< 14.6	< 12.6	< 3.3	< 1.8	< 699.2	< 118.8 [a]
DWW- 5390	8/29/2016	< 3.4	< 11.0	< 4.8	< 2.7	< 6.8	< 11.2	< 8.5	< 2.6	< 2.9	< 470.0	< 110.7 [a]
DWW- 5278	9/6/2016	< 2.5	< 10.8	< 3.3	< 1.9	< 4.1	< 4.9	< 5.5	< 2.6	< 2.9	< 85.7	< 18.5 [a]
DWW- 5279	9/13/2016	< 2.4	< 6.0	< 3.3	< 2.2	< 5.3	< 4.5	< 7.1	< 3.0	< 3.0	< 81.9	< 16.8 [a]
DWW- 5222	9/20/2016	< 2.1	< 9.4	< 3.4	< 1.9	< 3.4	< 4.5	< 6.1	< 2.9	< 3.1	< 67.7	< 11.9 [a]
DWW- 5223	9/27/2016	< 3.0	< 3.8	< 3.2	< 2.5	< 5.5	< 4.9	< 3.9	< 2.5	< 1.9	< 55.9	< 8.6
DWW- 5391	10/4/2016	< 2.8	< 7.8	< 3.3	< 3.3	< 6.8	< 7.7	< 8.4	< 3.0	< 2.7	< 101.5	< 26.8 [a]
DWW- 5526	10/11/2016	< 2.9	< 8.0	< 3.2	< 2.2	< 4.2	< 3.9	< 3.7	< 2.5	< 2.9	< 67.5	< 12.9 [a]
DWW- 5718	10/18/2016	< 2.4	< 4.5	< 2.7	< 2.6	< 3.9	< 5.2	< 6.3	< 2.8	< 3.1	< 101.5	< 20.0 [a]
DWW- 6372	10/25/2016	< 2.3	< 12.2	< 3.2	< 3.0	< 5.9	< 7.0	< 4.1	< 2.6	< 2.9	< 100.7	< 35.4 [a]
DWW- 6377	11/1/2016	< 3.0	< 10.1	< 2.5	< 2.7	< 6.8	< 6.7	< 6.9	< 2.9	< 3.0	< 104.7	< 35.0 [a]
DWW- 6344	11/8/2016	< 2.6	< 8.9	< 3.4	< 2.0	< 3.0	< 5.9	< 5.9	< 2.5	< 2.9	< 82.3	< 11.1 [a]
DWW- 6837	11/15/2016	< 3.2	< 8.9	< 2.8	< 2.4	< 4.2	< 4.5	< 7.0	< 2.6	< 2.7	< 106.1	< 16.5 [a]
DWW- 6836	11/22/2016	< 2.9	< 9.6	< 2.0	< 1.8	< 5.3	< 5.1	< 4.4	< 2.5	< 2.8	< 90.6	< 20.5 [a]
DWW- 666	11/29/2016	< 3.3	< 17.8	< 6.6	< 2.8	< 4.7	< 18.6	< 8.6	< 2.7	< 2.8	< 1147.3	< 433.5 [b]
DWW- 7020	12/21/2016	< 2.8	< 8.5	< 3.5	< 1.7	< 5.2	< 3.5	< 6.6	< 2.8	< 2.6	< 36.1	< 8.0

[a] LLDs for Ba-140 and/or La-140 not reached due to age of samples and smaller sample size.

[b] LLDs for Nb-95, Ba-140 and/or La-140 not reached due to age of samples and smaller sample size. Sample received 02-21-17.

Table 20. Groundwater Protection Program Summary.

Monitoring wells, analyses for gamma-emitting isotopes.

Lab Code	Collection Date	^{54}Mn	^{59}Fe	^{58}Co	^{60}Co	^{65}Zn	^{95}Nb	^{95}Zr	^{134}Cs	^{137}Cs	^{140}Ba	^{140}La
						D-62 (MW-18A)						
DWW- 2496	5/5/2016	< 3.3	< 9.7	< 4.2	< 3.9	< 4.4	< 4.4	< 6.5	< 3.4	< 4.7	< 30.7	< 7.3
DWW- 3036	5/19/2016	< 1.9	< 7.6	< 2.7	< 2.9	< 6.3	< 6.5	< 6.5	< 2.8	< 2.7	< 70.9	< 12.7 [a]
DWW- 3201	6/2/2016	< 3.1	< 6.8	< 3.4	< 2.5	< 4.8	< 4.2	< 6.6	< 2.9	< 2.9	< 38.7	< 11.5
DWW- 3737	6/9/2016	< 2.4	< 11.3	< 3.6	< 1.8	< 6.5	< 6.3	< 8.2	< 2.8	< 3.4	< 213.3	< 47.6 [a]
DWW- 3738	6/16/2016	< 3.3	< 5.8	< 3.3	< 3.2	< 5.0	< 5.9	< 8.6	< 3.4	< 3.0	< 235.8	< 68.8 [a]
DWW- 4478	6/23/2016	< 3.0	< 12.7	< 2.5	< 2.4	< 6.3	< 10.9	< 10.3	< 2.9	< 3.0	< 406.5	< 62.1 [a]
DWW- 4479	6/29/2016	< 2.0	< 14.7	< 4.7	< 2.7	< 5.4	< 8.1	< 9.6	< 2.8	< 2.5	< 212.1	< 66.0 [a]
DWW- 3873	7/8/2016	< 2.6	< 9.2	< 2.1	< 2.8	< 5.8	< 7.1	< 4.7	< 3.5	< 3.5	< 120.0	< 27.3 [a]
DWW- 4606	7/14/2016	< 3.2	< 14.5	< 3.1	< 2.2	< 2.9	< 12.2	< 9.5	< 2.8	< 3.3	< 469.7	< 158.3 [a]
DWW- 4693	7/21/2016	< 2.9	< 7.9	< 3.5	< 2.0	< 4.6	< 10.2	< 7.5	< 2.6	< 3.0	< 371.6	< 91.1 [a]
DWW- 4694	7/29/2016	< 2.5	< 7.4	< 4.3	< 1.6	< 5.3	< 7.4	< 9.6	< 3.3	< 3.1	< 426.0	< 61.9 [a]
DWW- 4976	8/4/2016	< 2.8	< 12.2	< 4.5	< 2.6	< 6.7	< 12.0	< 6.8	< 3.1	< 3.2	< 376.2	< 97.2 [a]
DWW- 4975	8/10/2016	< 2.5	< 6.2	< 3.8	< 2.1	< 5.8	< 9.4	< 7.8	< 2.6	< 3.3	< 227.1	< 87.0 [a]
DWW- 5392	8/26/2016	< 2.4	< 11.0	< 4.0	< 2.9	< 6.4	< 14.5	< 9.6	< 2.6	< 3.0	< 442.6	< 70.2 [a]
DWW- 5393	9/1/2016	< 3.3	< 12.5	< 5.3	< 3.1	< 6.5	< 12.7	< 11.4	< 3.3	< 2.0	< 426.7	< 98.6 [a]
DWW- 5280	9/6/2016	< 2.7	< 7.7	< 2.8	< 2.3	< 4.6	< 4.9	< 5.2	< 2.5	< 2.9	< 76.1	< 20.1 [a]
DWW- 5281	9/13/2016	< 2.4	< 9.3	< 1.9	< 2.7	< 3.6	< 5.4	< 7.1	< 2.5	< 3.0	< 72.8	< 22.2 [a]
DWW- 5224	9/20/2016	< 2.7	< 6.8	< 2.4	< 2.1	< 5.0	< 4.5	< 6.2	< 2.6	< 2.2	< 55.1	< 16.5 [a]
DWW- 5225	9/27/2016	< 2.1	< 7.2	< 3.3	< 2.1	< 5.9	< 3.7	< 5.5	< 2.7	< 2.2	< 47.1	< 12.5
DWW- 5719	10/4/2016	< 2.6	< 10.3	< 2.6	< 2.4	< 4.8	< 6.2	< 6.4	< 2.7	< 2.2	< 70.6	< 12.7 [a]
DWW- 5528	10/11/2016	< 2.5	< 9.6	< 3.2	< 1.7	< 5.2	< 5.8	< 4.6	< 2.6	< 3.2	< 82.4	< 19.8 [a]
DWW- 5720	10/18/2016	< 3.6	< 8.6	< 4.3	< 2.5	< 4.9	< 5.5	< 6.4	< 2.9	< 2.8	< 85.5	< 22.5 [a]
DWW- 6373	10/25/2016	< 3.2	< 9.5	< 2.1	< 2.2	< 4.8	< 5.6	< 6.5	< 2.8	< 2.0	< 84.0	< 16.3 [a]
DWW- 6378	11/1/2016	< 3.3	< 5.8	< 2.4	< 2.7	< 6.0	< 5.8	< 6.4	< 2.8	< 2.0	< 105.9	< 27.8 [a]
DWW- 6345	11/8/2016	< 3.2	< 4.6	< 3.8	< 2.4	< 5.5	< 6.1	< 6.8	< 2.5	< 2.9	< 54.0	< 11.7
DWW- 6832	11/15/2016	< 3.2	< 6.9	< 3.7	< 2.6	< 5.3	< 6.2	< 5.9	< 2.6	< 2.5	< 127.6	< 22.0 [a]
DWW- 6838	11/22/2016	< 2.9	< 10.0	< 3.5	< 1.9	< 4.9	< 4.1	< 5.8	< 2.5	< 1.5	< 91.9	< 17.2 [a]
DWW- 7021	12/21/2016	< 3.0	< 4.2	< 2.9	< 2.5	< 4.6	< 4.1	< 3.5	< 2.8	< 2.7	< 31.3	< 6.4
						D-63 (MW-19A)						
DWW- 2015	4/22/2016	< 2.2	< 8.0	< 3.7	< 3.0	< 3.2	< 5.0	< 5.0	< 3.4	< 3.5	< 31.9	< 8.8
						D-64 (MW-20A)						
DWW- 2017	4/21/2016	< 3.0	< 8.9	< 3.7	< 2.7	< 2.4	< 5.0	< 4.4	< 2.7	< 3.4	< 30.7	< 8.5
DWW- 2539	5/5/2016	< 2.9	< 5.3	< 2.9	< 2.2	< 5.7	< 4.9	< 6.6	< 2.6	< 3.2	< 41.5	< 8.1
						D-65 (MW-21A)						
DWW- 1473	4/6/2016	< 3.0	< 8.8	< 3.3	< 2.7	< 5.1	< 3.0	< 4.8	< 2.8	< 2.9	< 33.6	< 10.4
DWW- 2016	4/22/2016	< 3.2	< 7.4	< 2.7	< 2.2	< 5.5	< 2.8	< 6.2	< 2.8	< 3.3	< 29.9	< 6.1
DWW- 2540	5/5/2016	< 2.9	< 7.7	< 2.9	< 2.1	< 4.9	< 4.4	< 4.1	< 3.1	< 2.3	< 44.3	< 8.0
DWW- 3039	5/19/2016	< 2.8	< 5.9	< 4.1	< 2.9	< 7.0	< 4.3	< 8.8	< 2.7	< 3.2	< 66.9	< 15.0 [a]
DWW- 3727	6/2/2016	< 2.6	< 8.4	< 5.5	< 2.9	< 6.3	< 10.1	< 9.3	< 3.5	< 4.2	< 163.9	< 75.4 [a]
DWW- 3739	6/16/2016	< 2.9	< 9.1	< 3.8	< 2.3	< 5.0	< 7.1	< 8.4	< 2.9	< 2.4	< 219.6	< 60.0 [a]
DWW- 4480	6/23/2016	< 3.3	< 13.2	< 4.0	< 2.0	< 5.3	< 12.6	< 5.8	< 2.8	< 3.3	< 307.4	< 68.8 [a]
DWW- 4481	6/29/2016	< 3.5	< 10.9	< 5.2	< 2.4	< 7.1	< 9.8	< 9.2	< 3.4	< 1.9	< 393.3	< 93.2 [a]
DWW- 3874	7/8/2016	< 2.3	< 5.5	< 4.0	< 2.3	< 5.2	< 6.0	< 6.4	< 2.5	< 2.7	< 107.7	< 23.6 [a]
DWW- 4607	7/14/2016	< 3.2	< 13.7	< 5.3	< 2.3	< 6.9	< 9.9	< 7.3	< 3.3	< 2.7	< 347.1	< 64.0 [a]
DWW- 4035	7/21/2016	< 1.8	< 2.6	< 2.2	< 1.6	< 3.1	< 2.5	< 3.1	< 1.6	< 1.6	< 22.5	< 8.1
DWW- 5396	8/26/2016	< 3.7	< 12.2	< 5.2	< 2.6	< 6.2	< 8.5	< 6.0	< 2.5	< 2.8	< 460.4	< 164.6 [a]

[a] LLDs for Ba-140 and/or La-140 not reached due to age of samples and smaller sample size.

Table 20. Groundwater Protection Program Summary.

Monitoring wells, analyses for gamma-emitting isotopes.

Lab Code	Collection Date	^{54}Mn	^{59}Fe	^{58}Co	^{60}Co	^{65}Zn	^{95}Nb	^{95}Zr	^{134}Cs	^{137}Cs	^{140}Ba	^{140}La
						D-66 (MW-22A)						
DWW- 1472	4/6/2016	< 2.9	< 8.8	< 3.0	< 3.4	< 5.6	< 4.0	< 7.4	< 3.4	< 3.5	< 43.1	< 11.3
DWW- 2541	5/5/2016	< 2.8	< 4.6	< 2.0	< 2.3	< 5.6	< 3.0	< 4.7	< 2.6	< 2.3	< 36.4	< 12.3
DWW- 3040	5/19/2016	< 2.9	< 10.7	< 3.4	< 3.3	< 5.8	< 6.7	< 7.8	< 3.0	< 4.0	< 71.3	< 24.6 [a]
DWW- 3728	6/2/2016	< 2.8	< 14.3	< 3.8	< 2.9	< 6.9	< 7.9	< 8.9	< 3.0	< 3.7	< 180.3	< 80.6 [a]
DWW- 3740	6/16/2016	< 3.0	< 12.4	< 3.9	< 2.1	< 5.0	< 8.2	< 6.7	< 2.9	< 3.6	< 168.6	< 56.6 [a]
DWW- 3875	6/20/2016	< 3.5	< 9.5	< 5.3	< 2.1	< 3.0	< 8.0	< 7.4	< 3.2	< 3.4	< 294.2	< 101.2 [a]
DWW- 4482	6/23/2016	< 4.1	< 15.2	< 7.4	< 2.7	< 7.2	< 15.5	< 15.9	< 4.1	< 2.8	< 614.1	< 163.8 [a]
DWW- 4483	6/29/2016	< 3.1	< 10.5	< 3.8	< 2.5	< 5.3	< 11.2	< 11.0	< 3.1	< 3.1	< 373.1	< 82.2 [a]
DWW- 3876	7/8/2016	< 2.8	< 10.9	< 3.1	< 3.6	< 5.8	< 8.5	< 7.3	< 3.4	< 2.9	< 132.4	< 30.1 [a]
DWW- 4608	7/14/2016	< 3.1	< 9.4	< 3.2	< 2.4	< 4.6	< 9.7	< 10.1	< 3.1	< 3.0	< 256.0	< 57.7 [a]
DWW- 4695	7/21/2016	< 3.3	< 14.9	< 3.9	< 2.1	< 6.5	< 11.0	< 11.7	< 3.3	< 3.4	< 481.2	< 138.1 [a]
DWW- 4696	7/29/2016	< 1.5	< 15.0	< 3.9	< 2.7	< 6.3	< 7.2	< 6.7	< 2.7	< 2.5	< 268.7	< 71.7 [a]
DWW- 4978	8/4/2016	< 2.8	< 8.5	< 3.2	< 2.7	< 5.0	< 7.1	< 7.7	< 2.7	< 3.1	< 290.0	< 49.4 [a]
DWW- 5397	8/10/2016	< 3.2	< 18.9	< 5.2	< 2.6	< 5.9	< 7.6	< 8.4	< 2.4	< 2.9	< 903.4	< 210.3 [a]
DWW- 5398	8/18/2016	< 3.6	< 13.2	< 5.7	< 2.6	< 5.4	< 15.3	< 7.4	< 2.6	< 2.6	< 810.2	< 261.0 [a]
DWW- 5399	8/26/2016	< 3.4	< 8.5	< 5.5	< 2.4	< 6.1	< 11.4	< 11.0	< 2.7	< 3.1	< 784.1	< 158.4 [a]
DWW- 5400	9/1/2016	< 3.3	< 14.1	< 5.1	< 3.0	< 5.7	< 10.4	< 10.5	< 2.9	< 2.6	< 627.7	< 146.8 [a]
DWW- 5282	9/6/2016	< 2.8	< 7.3	< 3.9	< 2.4	< 5.4	< 6.3	< 6.8	< 3.3	< 2.7	< 54.8	< 17.5 [a]
DWW- 5283	9/13/2016	< 2.4	< 6.8	< 3.3	< 2.5	< 3.8	< 4.9	< 6.3	< 2.3	< 2.3	< 76.1	< 17.5 [a]
DWW- 5226	9/20/2016	< 1.6	< 6.8	< 3.0	< 1.9	< 4.5	< 4.7	< 3.6	< 2.7	< 2.4	< 42.9	< 9.9
DWW- 5227	9/22/2016	< 2.3	< 8.1	< 2.1	< 2.6	< 5.0	< 5.3	< 5.0	< 2.5	< 3.0	< 56.9	< 10.1
DWW- 5721	10/4/2016	< 2.8	< 8.3	< 3.7	< 2.1	< 4.6	< 6.5	< 8.0	< 2.5	< 2.4	< 80.5	< 33.9 [a]
DWW- 5529	10/11/2016	< 3.1	< 4.0	< 2.0	< 3.0	< 3.2	< 4.7	< 4.4	< 2.8	< 2.8	< 73.7	< 25.8 [a]
DWW- 5722	10/18/2016	< 2.7	< 5.4	< 4.4	< 2.4	< 5.8	< 5.4	< 6.2	< 2.7	< 3.5	< 129.6	< 17.4 [a]
DWW- 6374	10/25/2016	< 2.3	< 4.7	< 3.9	< 2.8	< 5.6	< 3.5	< 4.0	< 2.7	< 2.8	< 68.6	< 26.2 [a]
DWW- 6379	11/1/2016	< 3.5	< 8.6	< 3.7	< 2.8	< 5.7	< 5.7	< 7.9	< 3.2	< 2.6	< 97.8	< 27.9 [a]
DWW- 6346	11/8/2016	< 3.2	< 8.3	< 3.1	< 2.7	< 4.0	< 5.2	< 7.0	< 2.9	< 2.9	< 76.9	< 23.1 [a]
DWW- 6829	11/15/2016	< 2.8	< 7.2	< 4.2	< 2.4	< 6.0	< 7.7	< 8.2	< 2.8	< 3.0	< 112.7	< 21.8 [a]
DWW- 6835	11/22/2016	< 2.0	< 6.2	< 2.4	< 2.1	< 5.9	< 4.1	< 6.9	< 2.7	< 2.7	< 78.4	< 24.6 [a]
DWW- 7022	12/21/2016	< 3.0	< 8.6	< 3.2	< 2.8	< 6.3	< 4.6	< 5.6	< 2.8	< 3.2	< 51.0	< 8.4
						D-101						
DWW- 6381	11/7/2016	< 2.7	< 9.1	< 3.5	< 2.0	< 3.0	< 6.0	< 6.0	< 2.5	< 2.9	< 87.1	< 11.7 [a]

[a] LLDs for Ba-140 and/or La-140 not reached due to age of samples and smaller sample size.

Table 20. Groundwater Protection Program Summary.

Monitoring wells, analyses for gamma-emitting isotopes.

Lab Code	Collection Date	^{54}Mn	^{59}Fe	^{58}Co	^{60}Co	^{65}Zn	^{95}Nb	^{95}Zr	^{134}Cs	^{137}Cs	^{140}Ba	^{140}La
						D-67 (MW-23A)						
DWW- 3124	5/19/2016	< 3.9	< 9.2	< 3.9	< 3.8	< 5.0	< 7.2	< 8.5	< 3.1	< 3.2	< 68.9	< 18.8 [a]
DWW- 3729	6/2/2016	< 2.8	< 11.9	< 5.0	< 3.1	< 6.5	< 9.1	< 9.2	< 2.8	< 3.7	< 200.5	< 50.3 [a]
DWW- 3877	6/16/2016	< 3.5	< 11.4	< 5.1	< 2.3	< 6.4	< 8.6	< 6.0	< 3.0	< 3.0	< 227.9	< 62.0 [a]
DWW- 3878	6/20/2016	< 2.0	< 12.0	< 4.0	< 2.8	< 5.3	< 10.1	< 6.2	< 2.8	< 2.7	< 191.6	< 102.2 [a]
DWW- 4485	6/29/2016	< 2.6	< 15.9	< 3.7	< 2.0	< 5.4	< 12.0	< 7.5	< 2.7	< 3.2	< 475.4	< 100.7 [a]
DWW- 3879	7/8/2016	< 3.1	< 9.2	< 3.5	< 2.3	< 5.3	< 5.0	< 4.7	< 2.7	< 2.3	< 118.1	< 36.9 [a]
DWW- 4609	7/14/2016	< 3.0	< 8.8	< 4.0	< 2.5	< 3.3	< 10.6	< 6.2	< 2.8	< 3.1	< 215.2	< 87.6 [a]
DWW- 4697	7/21/2016	< 3.2	< 9.6	< 4.8	< 2.7	< 5.1	< 10.5	< 10.8	< 2.5	< 2.9	< 353.5	< 96.7 [a]
DWW- 4698	7/29/2016	< 2.6	< 6.1	< 3.1	< 2.5	< 4.1	< 9.2	< 9.2	< 2.5	< 2.9	< 286.3	< 92.5 [a]
DWW- 4979	8/4/2016	< 2.9	< 8.7	< 3.3	< 2.0	< 3.3	< 10.3	< 8.8	< 2.4	< 3.1	< 330.7	< 73.4 [a]
DWW- 5401	8/10/2016	< 2.9	< 17.7	< 5.6	< 2.4	< 6.9	< 9.2	< 13.0	< 3.3	< 2.9	< 1734.8	< 342.1 [a]
DWW- 5402	8/26/2016	< 3.1	< 11.0	< 5.3	< 2.4	< 5.4	< 12.3	< 9.3	< 2.8	< 3.0	< 673.4	< 223.6 [a]
DWW- 5403	9/1/2016	< 3.0	< 19.4	< 3.1	< 2.3	< 5.6	< 15.6	< 10.0	< 3.0	< 2.5	< 425.6	< 91.7 [a]
DWW- 5284	9/6/2016	< 2.6	< 9.4	< 3.4	< 2.5	< 2.7	< 4.3	< 6.8	< 2.7	< 2.2	< 81.7	< 13.9 [a]
DWW- 5285	9/13/2016	< 2.9	< 8.7	< 3.5	< 2.4	< 4.7	< 6.9	< 6.0	< 2.6	< 2.7	< 85.6	< 13.4 [a]
DWW- 5229	9/20/2016	< 2.6	< 4.9	< 3.1	< 2.5	< 5.4	< 5.1	< 3.2	< 2.3	< 2.9	< 63.0	< 14.7 [a]
DWW- 5289	9/27/2016	< 3.6	< 7.9	< 3.9	< 3.7	< 5.8	< 4.4	< 7.1	< 2.8	< 3.6	< 34.8	< 10.5
DWW- 5723	10/4/2016	< 2.6	< 4.7	< 4.0	< 2.7	< 4.9	< 6.6	< 6.8	< 2.6	< 2.6	< 99.7	< 42.5 [a]
DWW- 5530	10/11/2016	< 2.9	< 5.2	< 3.3	< 2.3	< 5.9	< 5.4	< 8.0	< 2.6	< 3.1	< 144.4	< 21.6 [a]
DWW- 5725	10/18/2016	< 3.3	< 8.4	< 3.7	< 2.2	< 5.0	< 6.7	< 7.3	< 2.9	< 2.6	< 134.3	< 41.7 [a]
DWW- 6375	10/25/2016	< 3.1	< 4.2	< 1.9	< 2.6	< 4.9	< 4.3	< 5.7	< 2.8	< 3.1	< 91.2	< 22.5 [a]
DWW- 6380	11/1/2016	< 3.2	< 5.1	< 4.1	< 2.4	< 5.6	< 7.0	< 7.4	< 2.6	< 2.9	< 80.1	< 17.3 [a]
DWW- 6347	11/8/2016	< 2.8	< 5.2	< 3.1	< 3.0	< 4.1	< 5.8	< 5.9	< 2.8	< 2.6	< 64.6	< 19.7 [a]
DWW- 6831	11/15/2016	< 3.3	< 5.3	< 2.2	< 1.4	< 3.3	< 5.6	< 6.7	< 2.7	< 2.5	< 96.3	< 31.7 [a]
DWW- 6834	11/22/2016	< 2.7	< 5.6	< 3.6	< 1.7	< 6.2	< 4.4	< 6.1	< 3.1	< 3.6	< 99.0	< 27.4 [a]
DWW- 7023	12/21/2016	< 3.1	< 5.9	< 4.1	< 2.9	< 5.2	< 5.3	< 6.9	< 3.3	< 3.6	< 54.9	< 9.8
						EW-01						
DWW- 2542	5/6/2016	< 2.7	< 7.6	< 2.8	< 2.9	< 5.9	< 3.4	< 5.8	< 2.5	< 3.0	< 50.4	< 12.9
DWW- 4699	7/29/2016	< 2.7	< 13.8	< 3.4	< 2.0	< 6.1	< 9.7	< 8.7	< 2.8	< 2.8	< 212.7	< 47.1 [a]
						D-127A (MW-07A)						
DWW- 6280	11/8/2016	< 1.7	< 4.6	< 1.6	< 1.4	< 2.9	< 3.6	< 3.7	< 1.6	< 1.3	< 32.0	< 10.6
						MW-25A						
DWW- 7025	12/21/2016	< 2.0	< 7.3	< 3.4	< 2.3	< 5.8	< 4.1	< 5.7	< 2.9	< 3.1	< 28.1	< 12.0
DWW- 7026	12/30/2016	< 3.1	< 3.9	< 1.7	< 2.7	< 3.3	< 4.1	< 3.3	< 2.9	< 3.2	< 25.9	< 7.1
						MW-26A						
DWW- 7027	12/21/2016	< 2.3	< 8.2	< 3.0	< 3.1	< 5.1	< 6.2	< 6.2	< 3.3	< 3.2	< 48.6	< 11.0
DWW- 7028	12/30/2016	< 3.2	< 3.9	< 1.9	< 3.0	< 6.7	< 4.8	< 7.3	< 3.2	< 3.6	< 42.7	< 6.3

[a] LLDs for Ba-140 and/or La-140 not reached due to age of samples and smaller sample size.

Table 20. Groundwater Protection Program Summary.

Monitoring wells, conditional analyses for gross alpha, iron-55, nickel-63, strontium-89 and strontium-90 [a].

Lab Code	Collection Date	Location	Gross Alpha	^{55}Fe	^{63}Ni	^{89}Sr	^{90}Sr
DWW- 656	2/16/2016	D-128a	< 1.0	< 602	< 146	< 1.9	< 1.6
DWW- 793	2/16/2016	D-134a	< 1.1	< 674	< 130	< 0.8	< 0.5
DWW- 657	2/19/2016	D-128a	< 1.0	< 638	< 144	< 1.9	< 1.6
DWW- 658	2/19/2016	D-128b	< 1.6	< 609	< 146	< 1.6	< 1.4
DWW- 821	2/25/2016	D-128a	< 0.9	< 631	< 126	< 1.5	< 1.4
DWW- 822	2/26/2016	D-134a	2.0 ± 0.9	< 631	< 127	< 1.3	< 1.3
DWW- 890	3/2/2016	D-128a	0.9 ± 0.7	< 644	< 128	< 1.5	< 1.0
DWW- 891	3/2/2016	D-134a	< 1.0	< 671	< 135	< 1.5	< 1.1
DWW- 987	3/8/2016	D-128a	< 1.0	< 656	< 121	< 1.1	< 0.8
DWW- 988	3/8/2016	D-134a	1.5 ± 0.8	< 649	< 113	< 1.0	< 0.8
DWW- 1027	3/10/2016	D-128a	< 1.0	< 652	< 100	< 1.3	< 1.1
DWW- 1028	3/10/2016	D-134a	1.3 ± 0.8	< 699	< 152	< 1.4	< 1.1
DWW- 1151	3/16/2016	D-128a	< 1.0	< 639	< 118	< 1.6	< 1.1
DWW- 1152	3/16/2016	D-134a	1.7 ± 0.8	< 670	< 117	< 1.9	< 1.2
DWW- 1204	3/23/2016	D-128a	< 1.1	< 609	< 110	< 1.3	< 1.1
DWW- 1205	3/23/2016	D-134a	1.1 ± 0.8	< 624	< 123	< 1.5	< 1.1
DWW- 1312	3/30/2016	D-128a	1.7 ± 0.8	< 625	< 149	< 1.4	< 1.2
DWW- 1313	3/30/2016	D-134a	1.5 ± 0.8	< 625	< 129	< 1.1	< 1.0
DWW- 1740	4/2/2016	D-128a	< 1.0	< 760	< 142	< 2.0	< 1.0
DWW- 1745	4/2/2016	D-134a	< 1.2	< 690	< 149	< 1.7	< 0.9
DWW- 1470	4/4/2016	D-128a	< 1.0	< 759	< 123	< 1.1	< 0.6
DWW- 1471	4/4/2016	D-134a	< 1.1	< 749	< 123	< 2.0	< 1.0
DWW- 1472	4/6/2016	MW-22A	1.0 ± 0.6	< 721	< 118	< 1.8	< 1.0
DWW- 1473	4/6/2016	MW-21A	2.0 ± 1.0	< 696	< 135	< 1.6	< 0.8
DWW- 1742	4/8/2016	D-128a	< 1.0	< 819	< 145	< 1.9	< 1.0
DWW- 1746	4/8/2016	D-134a	< 1.0	< 720	< 162	< 1.7	< 1.0
DWW- 1743	4/11/2016	D-128a	< 0.9	< 746	< 117	< 1.5	< 0.9
DWW- 1747	4/11/2016	D-134a	< 1.0	< 741	< 121	< 1.9	< 1.1
DWW- 1559	4/13/2016	D-128a	< 1.2	< 794	< 139	< 1.6	< 1.0
DWW- 1560	4/13/2016	D-134a	1.3 ± 0.9	< 749	< 148	< 1.7	< 1.0
DWW- 1779	4/13/2016	D-132a	1.4 ± 0.8	< 833	< 137	< 0.7	< 0.4
DWW- 1772	4/15/2016	D-128b	< 1.0	< 744	< 110	< 0.7	< 0.4
DWW- 2009	4/15/2016	D-128a	< 1.1	< 619	< 129	< 2.0	< 1.0
DWW- 2012	4/15/2016	D-134a	1.2 ± 0.8	< 546	< 130	< 2.4	< 1.1
DWW- 1744	4/18/2016	D-128a	< 1.0	< 792	< 128	< 1.4	< 0.9
DWW- 1748	4/18/2016	D-134a	< 1.0	< 737	< 116	< 1.4	< 1.0
DWW- 2492	4/20/2016	D-128a	< 1.1	< 524	< 127	< 2.2	< 1.2
DWW- 2497	4/20/2016	D-134a	< 1.2	< 543	< 103	< 2.2	< 1.2
DWW- 2017	4/21/2016	MW-20A	1.2 ± 0.9	< 543	< 124	< 1.8	< 0.9
DWW- 2010	4/22/2016	D-128a	< 1.1	< 575	< 118	< 1.8	< 1.0

[a] Analyses for gamma, gross alpha, Sr-89, Sr-90, Fe-55 and Ni-63 will be performed if tritium activity > 1K pCi/L .

Table 20. Groundwater Protection Program Summary.

Monitoring wells, conditional analyses for gross alpha, iron-55, nickel-63, strontium-89 and strontium-90 [a].

Lab Code	Collection Date	Location	Gross Alpha	^{55}Fe	^{63}Ni	^{89}Sr	^{90}Sr
DWW- 2013	4/22/2016	D-134a	< 1.3	< 540	< 130	< 2.4	< 1.2
DWW- 2015	4/22/2016	MW-19A	< 1.2	< 543	< 151	< 1.9	< 1.0
DWW- 2016	4/22/2016	MW-21A	4.2 ± 2.0	< 557	< 122	< 1.8	< 0.9
DWW- 2011	4/25/2016	D-128a	< 1.0	< 549	< 134	< 1.9	< 1.0
DWW- 2014	4/25/2016	D-134a	< 1.2	< 619	< 123	< 2.1	< 1.1
DWW- 2493	4/27/2016	D-128a	< 0.9	< 534	< 125	< 2.2	< 1.2
DWW- 2498	4/27/2016	D-134a	< 0.9	< 531	< 114	< 2.3	< 1.3
DWW- 2494	4/29/2016	D-128a	< 1.0	< 530	< 113	< 1.8	< 1.1
DWW- 2499	4/29/2016	D-134a	1.1 ± 0.8	< 550	< 135	< 1.7	< 1.0
DWW- 2495	5/2/2016	D-128a	< 1.1	< 522	< 99	< 1.9	< 1.2
DWW- 2500	5/2/2016	D-134a	< 1.0	< 532	< 140	< 1.8	< 1.0
DWW- 2496	5/5/2016	MW-18a	< 1.1	< 515	< 103	< 1.6	< 1.1
DWW- 2539	5/5/2016	MW-20A	< 1.2	< 545	< 133	< 2.3	< 1.1
DWW- 2540	5/5/2016	MW-21A	< 1.1	< 548	< 117	< 2.9	< 1.4
DWW- 2541	5/5/2016	MW-22A	< 1.0	< 518	< 133	< 2.2	< 1.0
DWW- 2531	5/6/2016	D-128a	< 1.1	< 541	< 121	< 2.2	< 1.1
DWW- 2535	5/6/2016	D-134a	< 1.0	< 534	< 143	< 1.8	< 0.9
DWW- 2542	5/6/2016	EW-01	< 0.9	< 515	< 128	< 3.8	< 2.0
DWW- 2532	5/9/2016	D-128a	< 1.1	< 547	< 132	< 2.1	< 1.0
DWW- 2536	5/9/2016	D-134a	< 1.0	< 561	< 141	< 1.8	< 1.0
DWW- 2533	5/16/2016	D-128a	< 1.1	< 517	< 111	< 1.7	< 0.9
DWW- 2537	5/16/2016	D-134a	< 1.1	< 534	< 156	< 1.7	< 0.9
DWW- 3036	5/19/2016	MW-18a	1.1 ± 0.8	< 327	< 148	< 2.0	< 1.5
DWW- 3039	5/19/2016	MW-21A	3.1 ± 1.0	< 338	< 143	< 2.5	< 1.4
DWW- 3040	5/19/2016	MW-22A	4.3 ± 1.1	< 334	< 124	< 3.1	< 1.8
DWW- 3124	5/19/2016	MW-23a	3.9 ± 1.0	< 334	< 107	< 2.7	< 1.2
DWW- 3118	5/26/2016	D-128a	< 1.0	< 324	< 102	< 2.8	< 1.8
DWW- 3121	5/26/2016	D-132a	< 1.0	< 358	< 100	< 2.2	< 1.6
DWW- 3123	5/26/2016	D-134a	1.3 ± 0.9	< 348	< 109	< 2.0	< 1.0
DWW- 3120	5/30/2016	D-128a	1.1 ± 0.8	< 355	< 117	< 2.0	< 1.2
DWW- 3122	5/30/2016	D-132a	1.6 ± 0.8	< 325	< 99	< 2.1	< 1.1
DWW- 3196	5/30/2016	D-134a	1.4 ± 0.8	< 334	< 131	< 1.8	< 1.0
DWW- 3194	6/2/2016	D-128a	< 1.0	< 329	< 134	< 1.8	< 0.9
DWW- 3195	6/2/2016	D-132a	1.5 ± 0.9	< 324	< 121	< 1.7	< 0.8
DWW- 3197	6/2/2016	D-134a	< 1.2	< 335	< 103	< 1.9	< 1.0
DWW- 3198	6/2/2016	D-134a	1.2 ± 0.7	< 320	< 108	< 2.9	< 1.5
DWW- 3199	6/2/2016	D-134a	< 1.1	< 354	< 112	< 1.8	< 1.0
DWW- 3200	6/2/2016	D-134a	< 1.2	< 322	< 122	< 1.9	< 1.0
DWW- 3201	6/2/2016	MW-18a	1.4 ± 0.8	< 326	< 152	< 1.7	< 1.0

[a] Analyses for gamma, gross alpha, Sr-89, Sr-90, Fe-55 and Ni-63 will be performed if tritium activity > 1K pCi/L .

Table 20. Groundwater Protection Program Summary.

Monitoring wells, conditional analyses for gross alpha, iron-55, nickel-63, strontium-89 and strontium-90 [a].

Lab Code	Collection Date	Location	Gross Alpha	^{55}Fe	^{63}Ni	^{89}Sr	^{90}Sr
DWW- 3727	6/2/2016	MW-21a	2.5 ± 1.0	< 734	< 113	< 3.6	< 1.1
DWW- 3728	6/2/2016	MW-22a	2.5 ± 1.0	< 743	< 148	< 4.0	< 1.1
DWW- 3729	6/2/2016	MW-23a	3.0 ± 1.0	< 738	< 120	< 3.2	< 0.9
DWW- 3721	6/6/2016	D-132a	1.2 ± 0.7	< 736	< 105	< 3.7	< 1.1
DWW- 3723	6/6/2016	D-134a	< 1.0	< 755	< 130	< 3.2	< 0.9
DWW- 3719	6/9/2016	D-128a	< 1.0	< 735	< 122	< 4.5	< 1.4
DWW- 3722	6/9/2016	D-132a	< 0.9	< 763	< 111	< 2.9	< 0.9
DWW- 3724	6/9/2016	D-134a	< 1.0	< 794	< 122	< 2.8	< 1.0
DWW- 3737	6/9/2016	MW-18a	< 0.9	< 722	< 107	< 3.0	< 0.9
DWW- 3732	6/13/2016	D-128a	< 1.0	< 724	< 128	< 2.6	< 0.8
DWW- 3734	6/13/2016	D-132a	1.4 ± 0.8	< 761	< 116	< 3.2	< 1.0
DWW- 3735	6/13/2016	D-134a	1.2 ± 0.7	< 742	< 117	< 3.4	< 1.0
DWW- 3733	6/16/2016	D-128a	< 1.0	< 745	< 136	< 2.5	< 1.0
DWW- 3736	6/16/2016	D-134a	< 1.0	< 741	< 115	< 2.8	< 0.9
DWW- 3738	6/16/2016	MW-18a	< 1.1	< 745	< 111	< 2.6	< 0.9
DWW- 3739	6/16/2016	MW-21a	< 1.2	< 750	< 115	< 3.8	< 1.3
DWW- 3740	6/16/2016	MW-22a	1.6 ± 1.0	< 760	< 135	< 4.1	< 1.8
DWW- 3877	6/16/2016	MW-23a	2.0 ± 1.0	< 835	< 111	< 4.0	< 1.0
DWW- 3869	6/20/2016	D-128a	< 1.0	< 822	< 122	< 3.6	< 1.0
DWW- 3870	6/20/2016	D-132a	< 1.0	< 777	< 121	< 3.9	< 1.0
DWW- 3871	6/20/2016	D-134a	< 1.0	< 791	< 140	< 3.3	< 1.2
DWW- 3875	6/20/2016	MW-22a	< 1.1	< 838	< 106	< 3.8	< 1.0
DWW- 3878	6/20/2016	MW-23a	6.7 ± 1.8 [b]	< 782	< 120	< 3.0	< 0.8
DWW- 4478	6/23/2016	MW-18a	1.3 ± 0.8	< 765	< 118	< 3.6	< 0.9
DWW- 4482	6/23/2016	MW-22a	1.7 ± 1.2	< 779	< 124	< 4.1	< 1.3
DWW- 4475	6/27/2016	D-128a	< 1.1	< 806	< 123	< 3.6	< 0.8
DWW- 4476	6/27/2016	D-132a	1.3 ± 0.8	< 806	< 120	< 4.1	< 1.0
DWW- 4477	6/27/2016	D-134a	< 1.0	< 786	< 120	< 4.5	< 1.1
DWW- 4479	6/29/2016	MW-18a	3.6 ± 1.5	< 744	< 114	< 4.4	< 0.8
DWW- 4480	6/23/2016	MW-21a	6.2 ± 4.0	< 765	< 123	< 3.4	< 0.8
DWW- 4481	6/29/2016	MW-21a	5.0 ± 2.3	< 748	< 123	< 4.7	< 1.2
DWW- 4483	6/29/2016	MW-22a	3.3 ± 2.9	< 838	< 117	< 3.5	< 0.9
DWW- 4485	6/29/2016	MW-23a	1.8 ± 3.1	< 833	< 121	< 3.8	< 1.0
DWW- 4600	7/5/2016	D-128a	1.1 ± 0.8	< 819	< 120	< 3.5	< 1.0
DWW- 4602	7/5/2016	D-132a	4.5 ± 1.0 [c]	< 824	< 116	< 4.9	< 1.4
DWW- 4604	7/5/2016	D-134a	1.2 ± 0.9	< 888	< 110	< 3.4	< 1.0
DWW- 3873	7/8/2016	MW-18a	6.0 ± 3.5 [d]	< 782	< 110	< 2.8	< 1.0
DWW- 3874	7/8/2016	MW-21a	3.1 ± 1.7	< 823	< 117	< 2.3	< 0.8
DWW- 3876	7/8/2016	MW-22a	2.5 ± 1.6	< 791	< 111	< 3.1	< 1.1
DWW- 3879	7/8/2016	MW-23a	< 2.0	< 786	< 127	< 3.0	< 1.2
DWW- 4601	7/12/2016	D-128a	< 0.9	< 939	< 118	< 3.5	< 1.0
DWW- 4603	7/12/2016	D-132a	1.3 ± 0.8	< 811	< 119	< 4.6	< 1.4
DWW- 4605	7/12/2016	D-134a	< 1.0	< 846	< 102	< 3.3	< 1.0

[a] Analyses for gamma, gross alpha, Sr-89, Sr-90, Fe-55 and Ni-63 will be performed if tritium activity > 1K pCi/L .

[b] Gross alpha reanalyzed with a result of 6.0±1.4 pCi/L. [c] Gross alpha reanalyzed with a result of 4.2±0.8 pCi/L.

[d] Gross alpha reanalyzed with a result of 5.1±2.5 pCi/L.

Table 20. Groundwater Protection Program Summary.

Monitoring wells, conditional analyses for gross alpha, iron-55, nickel-63, strontium-89 and strontium-90 [a].

Lab Code	Collection Date	Location	Gross Alpha	^{55}Fe	^{63}Ni	^{89}Sr	^{90}Sr
DWW- 4606	7/14/2016	MW-18a	1.7 ± 1.1	< 850	< 128	< 3.4	< 1.0
DWW- 4607	7/14/2016	MW-21a	1.6 ± 0.9	< 834	< 124	< 2.8	< 0.8
DWW- 4608	7/14/2016	MW-22a	1.3 ± 0.9	< 834	< 112	< 2.7	< 0.9
DWW- 4609	7/14/2016	MW-23a	1.4 ± 0.8	< 907	< 111	< 2.9	< 1.0
DWW- 4690	7/18/2016	D-128a	< 0.9	< 915	< 95	< 3.7	< 0.9
DWW- 4691	7/18/2016	D-132a	1.1 ± 0.7	< 915	< 95	< 4.0	< 1.1
DWW- 4692	7/18/2016	D-134a	0.9 ± 0.7	< 881	< 90	< 3.3	< 0.9
DWW- 4035	7/21/2016	MW-21a	2.4 ± 1.3	< 805	< 121	< 2.2	< 0.9
DWW- 4693	7/21/2016	MW-18a	< 1.0	< 868	< 103	< 3.3	< 0.8
DWW- 4695	7/21/2016	MW-22a	1.3 ± 1.0	< 884	< 88	< 3.7	< 1.0
DWW- 4697	7/21/2016	MW-23a	2.4 ± 1.2	< 874	< 91	< 3.4	< 0.9
DWW- 4969	7/25/2016	D-128a	< 0.8	< 855	< 98	< 3.5	< 0.9
DWW- 4972	7/25/2016	D-134a	< 1.2	< 850	< 103	< 3.4	< 0.9
DWW- 5006	7/25/2016	D-132a	3.9 ± 1.0	< 577	< 91	< 8.2	< 0.9
DWW- 4694	7/29/2016	MW-18a	1.6 ± 0.9	< 908	< 92	< 3.3	< 1.2
DWW- 4696	7/29/2016	MW-22a	< 1.8	< 914	< 93	< 3.4	< 1.0
DWW- 4698	7/29/2016	MW-23a	< 1.4	< 880	< 96	< 2.8	< 0.8
DWW- 4699	7/29/2016	EW-1	< 0.4	< 874	< 113	< 3.2	< 1.0
DWW- 4970	8/1/2016	D-128a	< 0.9	< 878	< 110	< 3.7	< 1.0
DWW- 4973	8/1/2016	D-134a	< 1.3	< 930	< 102	< 2.8	< 0.9
DWW- 4591	8/1/2016	D-132a	< 1.4	< 834	< 148	< 1.9	< 0.8
DWW- 4976	8/4/2016	MW-18a	< 0.9	< 898	< 97	< 2.9	< 0.9
DWW- 4978	8/4/2016	MW-22a	< 1.3	< 922	< 102	< 2.8	< 0.9
DWW- 4979	8/4/2016	MW-23a	< 1.2	< 953	< 101	< 2.8	< 0.9
DWW- 4971	8/10/2016	D-128a	< 0.9	< 878	< 90	< 2.6	< 0.9
DWW- 4974	8/10/2016	D-134a	< 1.1	< 883	< 106	< 2.9	< 1.0
DWW- 4975	8/10/2016	MW-18a	2.2 ± 1.0	< 900	< 91	< 3.5	< 1.1
DWW- 5397	8/10/2016	MW-22a	1.0 ± 0.7	< 548	< 103	< 6.4	< 0.9
DWW- 5401	8/10/2016	MW-23a	< 1.2	< 555	< 98	< 8.6	< 1.0
DWW- 5386	8/15/2016	D-128a	< 0.9	< 556	< 97	< 7.9	< 1.2
DWW- 5388	8/15/2016	D-134a	< 1.0	< 543	< 102	< 6.3	< 1.0
DWW- 5398	8/18/2016	MW-22a	2.5 ± 1.1	< 545	< 101	< 6.2	< 1.0
DWW- 5389	8/25/2016	D-134a	< 1.0	< 559	< 107	< 5.0	< 0.8
DWW- 5392	8/26/2016	MW-18a	1.1 ± 0.9	< 552	< 111	< 7.1	< 1.2
DWW- 5396	8/26/2016	MW-21a	< 1.1	< 548	< 123	< 5.4	< 0.9
DWW- 5399	8/26/2016	MW-22a	< 1.2	< 573	< 108	< 7.4	< 1.3
DWW- 5402	8/26/2016	MW-23a	1.5 ± 0.9	< 552	< 98	< 6.1	< 0.9
DWW- 5387	8/29/2016	D-128a	< 1.0	< 541	< 116	< 6.4	< 1.6
DWW- 5390	8/29/2016	D-134a	1.5 ± 1.0	< 561	< 100	< 4.7	< 0.8
DWW- 5393	9/1/2016	MW-18a	2.0 ± 1.1	< 543	< 99	< 4.4	< 0.9
DWW- 5400	9/1/2016	MW-22a	2.5 ± 1.1	< 543	< 101	< 5.7	< 0.9
DWW- 5403	9/1/2016	MW-23a	< 1.1	< 550	< 113	< 5.7	< 0.8
DWW- 5276	9/6/2016	D-128a	< 1.0	< 564	< 130	< 4.5	< 0.9
DWW- 5278	9/6/2016	D-134a	< 1.1	< 582	< 92	< 5.2	< 1.2
DWW- 5280	9/6/2016	MW-18a	2.7 ± 2.4	< 578	< 96	< 4.1	< 0.8
DWW- 5282	9/6/2016	MW-22a	2.1 ± 1.0	< 582	< 94	< 5.0	< 1.0
DWW- 5284	9/6/2016	MW-23a	< 1.2	< 578	< 93	< 4.3	< 0.8

[a] Analyses for gamma, gross alpha, Sr-89, Sr-90, Fe-55 and Ni-63 will be performed if tritium activity > 1K pCi/L .

Table 20. Groundwater Protection Program Summary.

Monitoring wells, conditional analyses for gross alpha, iron-55, nickel-63, strontium-89 and strontium-90 [a].

Lab Code	Collection Date	Location	Gross Alpha	^{55}Fe	^{63}Ni	^{89}Sr	^{90}Sr
DWW- 5277	9/13/2016	D-128a	< 1.0	< 579	< 93	< 4.7	< 1.0
DWW- 5279	9/13/2016	D-134a	1.9 ± 1.0	< 579	< 92	< 4.2	< 0.9
DWW- 5281	9/13/2016	MW-18a	3.2 < 2.4	< 548	< 95	< 4.0	< 0.9
DWW- 5283	9/13/2016	MW-22a	3.4 < 2.3	< 561	< 94	< 3.8	< 0.9
DWW- 5285	9/13/2016	MW-23a	< 1.2	< 582	< 91	< 4.1	< 0.9
DWW- 5219	9/20/2016	D-128a	1.6 ± 0.8	< 565	< 87	< 4.3	< 1.0
DWW- 5222	9/20/2016	D-134a	2.1 ± 1.0	< 552	< 98	< 3.4	< 0.8
DWW- 5224	9/20/2016	MW-18a	4.3 ± 1.7	< 539	< 100	< 3.6	< 0.9
DWW- 5226	9/20/2016	MW-22a	3.8 ± 1.5	< 542	< 113	< 3.3	< 0.9
DWW- 5229	9/20/2016	MW-23a	< 1.3	< 572	< 114	< 3.7	< 1.0
DWW- 5227	9/22/2016	MW-22a	3.7 ± 1.1	< 568	< 111	< 3.4	< 0.9
DWW- 5221	9/27/2016	D-128a	2.5 ± 1.0	< 543	< 99	< 3.6	< 1.0
DWW- 5223	9/27/2016	D-134a	3.1 ± 1.1	< 570	< 95	< 3.0	< 0.8
DWW- 5225	9/27/2016	MW-18a	< 2.0	< 543	< 99	< 3.6	< 1.0
DWW- 5228	9/27/2016	MW-22a	2.1 ± 1.4	< 592	< 110	< 3.1	< 0.9
DWW- 5289	9/27/2016	MW-23a	< 1.2	< 570	< 99	< 3.4	< 1.0
DWW- 5716	10/4/2016	D-128a	< 1.2	< 518	< 94	< 4.2	< 0.9
DWW- 5391	10/4/2016	D-134a	< 1.4	< 547	< 109	< 3.6	< 1.1
DWW- 5719	10/4/2016	MW-18a	2.6 ± 1.1	< 524	< 91	< 4.5	< 0.9
DWW- 5721	10/4/2016	MW-22a	2.3 ± 1.3	< 537	< 94	< 4.2	< 0.9
DWW- 5723	10/4/2016	MW-23a	< 1.4	< 531	< 96	< 5.3	< 1.0
DWW- 5525	10/11/2016	D-128a	< 1.0	< 548	< 96	< 3.4	< 0.9
DWW- 5526	10/11/2016	D-134a	< 1.2	< 516	< 94	< 6.4	< 1.7
DWW- 5528	10/11/2016	MW-18a	2.2 ± 1.1	< 528	< 102	< 3.2	< 0.8
DWW- 5529	10/11/2016	MW-22a	< 1.5	< 528	< 98	< 3.1	< 0.8
DWW- 5530	10/11/2016	MW-23a	< 1.2	< 545	< 87	< 3.4	< 1.0
DWW- 5717	10/18/2016	D-128a	< 1.0	< 513	< 94	< 4.0	< 0.9
DWW- 5718	10/18/2016	D-134a	1.4 ± 1.1	< 526	< 103	< 4.6	< 1.0
DWW- 5720	10/18/2016	MW-18a	2.1 ± 0.9	< 549	< 93	< 3.7	< 0.8
DWW- 5722	10/18/2016	MW-22a	1.3 ± 1.0	< 532	< 91	< 4.3	< 1.0
DWW- 5725	10/18/2016	MW-23a	< 1.2	< 516	< 95	< 3.8	< 0.9
DWW- 6371	10/25/2016	D-128a	< 1.0	< 610	< 105	< 3.8	< 1.0
DWW- 6372	10/25/2016	D-134a	< 1.4	< 610	< 96	< 3.8	< 1.4
DWW- 6373	10/25/2016	MW-18a	< 1.2	< 556	< 142	< 3.7	< 1.3
DWW- 6374	10/25/2016	MW-22a	3.7 ± 1.2	< 523	< 100	< 3.9	< 1.0
DWW- 6375	10/25/2016	MW-23a	2.3 ± 1.1	< 542	< 97	< 3.6	< 0.9
DWW- 6376	11/1/2016	D-128a	< 1.0	< 563	< 99	< 3.3	< 1.0
DWW- 6377	11/1/2016	D-134a	< 1.1	< 549	< 100	< 9.6	< 2.8
DWW- 6378	11/1/2016	MW-18a	1.8 ± 1.0	< 533	< 99	< 3.9	< 1.1
DWW- 6379	11/1/2016	MW-22a	2.3 ± 1.1	< 539	< 95	< 3.3	< 1.0
DWW- 6380	11/1/2016	MW-23a	< 1.2	< 536	< 94	< 3.3	< 0.9
DWW- 6381	11/7/2016	D-101	< 0.9	< 541	< 106	< 3.0	< 1.0
DWW- 6280	11/8/2016	D-127a	< 0.9	< 582	< 98	< 2.7	< 1.1
DWW- 6340	11/8/2016	D-128a	< 1.0	< 596	< 89	< 2.8	< 1.1
DWW- 6341	11/8/2016	D-129a	1.1 ± 0.8	< 564	< 93	< 2.5	< 1.0
DWW- 6344	11/8/2016	D-134a	< 1.1	< 571	< 112	< 2.4	< 0.9
DWW- 6345	11/8/2016	MW-18a	< 1.1	< 542	< 101	< 2.3	< 0.9

[a] Analyses for gamma, gross alpha, Sr-89, Sr-90, Fe-55 and Ni-63 will be performed if tritium activity > 1K pCi/L .

Table 20. Groundwater Protection Program Summary.

Monitoring wells, conditional analyses for gross alpha, iron-55, nickel-63, strontium-89 and strontium-90 [a].

Lab Code	Collection Date	Location	Gross Alpha	^{55}Fe	^{63}Ni	^{89}Sr	^{90}Sr
DWW- 6346	11/8/2016	MW-22a	< 1.2	< 589	< 92	< 2.6	< 1.1
DWW- 6347	11/8/2016	MW-23a	< 1.2	< 589	< 92	< 2.9	< 1.1
DWW- 6829	11/15/2016	MW-22a	< 1.0	< 522	< 99	< 3.1	< 1.0
DWW- 6831	11/15/2016	MW-23a	< 1.1	< 544	< 97	< 3.6	< 1.1
DWW- 6832	11/15/2016	MW-18a	< 1.1	< 558	< 95	< 2.8	< 0.9
DWW- 6833	11/15/2016	D-128a	< 1.1	< 544	< 89	< 2.7	< 0.9
DWW- 6837	11/15/2016	D-134a	< 1.1	< 534	< 107	< 2.7	< 0.9
DWW- 6834	11/22/2016	MW-23a	< 1.2	< 542	< 89	< 2.6	< 1.0
DWW- 6835	11/22/2016	MW-22a	< 1.3	< 532	< 87	< 2.7	< 1.0
DWW- 6836	11/22/2016	D-134a	< 1.2	< 538	< 88	< 3.1	< 1.1
DWW- 6838	11/22/2016	MW-18a	< 1.1	< 555	< 86	< 2.4	< 0.9
DWW- 6839	11/22/2016	D-128a	< 1.1	< 548	< 94	< 2.5	< 1.0
DWW- 666	11/29/2016	d-134a	< 1.1	< 645	< 101	< 3.5	< 1.1
DWW- 7019	12/21/2016	d-128a	< 1.0	< 590	< 94	< 1.9	< 1.0
DWW- 7020	12/21/2016	d-134a	< 1.1	< 626	< 91	< 2.1	< 1.1
DWW- 7021	12/21/2016	mw-18a	< 1.1	< 397	< 114	< 1.7	< 0.9
DWW- 7022	12/21/2016	mw-22a	< 1.0	< 626	< 108	< 1.9	< 1.0
DWW- 7023	12/21/2016	mw-23a	< 1.3	< 642	< 100	< 1.6	< 0.9
DWW- 7025	12/21/2016	mw-25a	< 1.1	< 634	< 118	< 1.9	< 1.0
DWW- 7027	12/21/2016	mw-26a	1.6 ± 0.8	< 623	< 100	< 1.8	< 1.0
DWW- 7026	12/30/2016	mw-25a	1.6 ± 0.8	< 623	< 102	< 1.8	< 1.1
DWW- 7028	12/30/2016	mw-26a	1.8 ± 0.9	< 643	< 122	< 1.5	< 0.9

[a] Analyses for gamma, gross alpha, Sr-89, Sr-90, Fe-55 and Ni-63 will be performed if tritium activity > 1K pCi/L .