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CALLAWAY ENERGY CENTER
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ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

to

THE UNITED STATES NUCLEAR REGULATORY COMMISSION

Part I

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Prepared by

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Submitted by

UNION ELECTRIC CO.
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PREFACE

This Annual Radiological Environmental Operating Report (AREOR) describes the Ameren Missouri Callaway Energy Center Radiological Environmental Monitoring Program (REMP), and the program results for the calendar year 2017. It is submitted in accordance with section 5.6.2 of the Callaway Energy Center Technical Specifications.

Staff members of the Environmental, Inc., Midwest Laboratory were responsible for the acquisition of data presented in this report. Environmental samples were collected by Ameren Missouri personnel or contractors to Ameren Missouri and shipped to Environmental, Inc. – Midwest Laboratory and Stanford Dosimetry, LLC, for analysis.

The report was prepared by Environmental, Inc., Midwest Laboratory and the Ameren Missouri Callaway Energy Center.

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1.0 INTRODUCTION

This report presents an analysis of the results of the Radiological Environmental Monitoring Program (REMP) conducted during 2017 for the Union Electric Company (dba Ameren Missouri) Callaway Energy Center.

The objectives of the REMP are to monitor potential critical pathways of radioactive effluent to man and determine the radiological impact on the environment caused by operation of the Callaway Energy Center. The Radiological Environmental Monitoring Program was initiated in April 1982.

The Callaway Energy Center consists of one 3565 MWt pressurized water reactor, which achieved initial criticality on October 2, 1984. The plant is located on a plateau approximately ten miles southeast of the City of Fulton in Callaway County, Missouri and approximately eighty miles west of the St. Louis metropolitan area. The Missouri River flows by the site in an easterly direction approximately five miles south of the site at its closest point.

Tabulation of the individual analyses for the year 2017 is included in Part II of this report.

2.0 SUMMARY

The Radiological Environmental Monitoring Program, as required by the U.S. Nuclear Regulatory Commission (NRC) Technical Specifications for the Callaway Energy Center is described herein. Results for the year 2017 are summarized and discussed.

For the year, the Callaway Energy Center was operated in compliance with Offsite Dose Calculation Manual (ODCM) and Radiological Effluent Controls (REC) requirements. Results from the REMP indicate the Callaway Energy Center has had no significant radiological impact on the health and safety of the public or on the environment.

3.0 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

3.1 Program Design and Data Interpretation

The purpose of the Radiological Environmental Monitoring Program at the Callaway Energy Center is to assess the impact of the plant on its environment. For this purpose, samples are collected from waterborne, airborne, ingestion and terrestrial pathways and analyzed for radioactive content. Direct radiation levels are monitored by thermoluminescent dosimeters (TLDs).

Sources of environmental radiation can 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, planned or accidental; and
(4) Industrial and medical radioactive waste.

Effects due to operation of the Callaway Energy Center must be distinguished from those due to other sources in interpreting the data.

The indicator-control concept is a major interpretive aid; where feasible the design of the Callaway Energy Center program has both indicator and control stations. Most types of samples are collected 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.

The monitoring program includes analyses for iodine-131, a fission product, and tritium, which is produced by cosmic rays, atmospheric nuclear detonations, and also by nuclear power plants. Most samples are analyzed for gamma-emitting isotopes, with results for the following groups quantified: zirconium-95, cesium-137, and cerium-144. These three gamma-emitting isotopes are 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 days after reactor shutdown. On the other hand, ten 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 detonation.

Nuclides of the final group, beryllium-7, which is of cosmogenic origin, and potassium-40, a naturally-occurring isotope, were chosen as analytical monitors and should not be considered radiological impact indicators.

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 pre-operational data. Results of the 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., a nuclear accident.

3.2 Program Description

The sampling and analysis schedules for the environmental radiological monitoring program at the Callaway Energy Center are summarized in Tables 5.1 and 5.2 and briefly reviewed below. Table 5.1 identifies sampling locations and specifies as to type (indicator or control) and its distance, and direction relative to the reactor site. The types of samples collected at each location, required analyses and the frequency of collections are presented in Table 5.2.

To monitor the air environment, airborne particulate and airborne iodine samples are collected by continuous pumping, at six locations. The airborne particulates are collected on glass fiber filters and the airborne iodine through activated charcoal cartridges. Both filters and cartridges are exchanged weekly. Airborne particulates are analyzed for gamma-emitting isotopes. Charcoal cartridges are analyzed for iodine-131.

The ingestion pathway is monitored by sampling of milk (if available), fish and green leafy vegetation.

Milk samples are collected semimonthly when animals are on pasture and monthly the rest of the year. There were no milk indicator stations identified by the Land Use Census for the subject year. The control station continued to be collected. Samples are analyzed for iodine-131 and gamma-emitting isotopes.

Monthly during the growing season, edible green leafy vegetation is collected from both indicator and control locations. Vegetation samples typically consist of mustard greens, turnip greens, cabbage, lettuce, collards, radish greens, Swiss chard, broccoli and poke. Other edible broad leaf vegetation is collected if primary varieties are not available. The samples are analyzed for iodine-131 and other gamma-emitting isotopes.

Feed crops (soybeans, sorghum, corn) are collected from locations FC-1 through FC-4. FC-1, FC-2 and FC-3 are located on Ameren property traversed by the discharge pipeline. The samples are collected at harvest and analyzed for tritium and gamma emitting isotopes. FC-4 is a control location, beyond the influence of plant operations. Feed crops are grown for animal feed and not for human consumption. The soybean field for sample FC-1 is planted by the Missouri State Department of Conservation (MODOC) to provide feed to wildlife living in the Reform Wildlife Conservation Area. MODOC did not plant the field this year and there was no crop to sample.

The waterborne pathway is monitored by sampling surface water, groundwater and drinking water, and bottom and shoreline sediments. Water samples are analyzed for tritium and gamma-emitting isotopes, and sediments are analyzed for gamma-emitting isotopes.

The waterborne pathway is also monitored by upstream and downstream semiannual collections of fish. The five most abundant recreational or commercial fish species are collected. Samples are analyzed for gamma-emitting isotopes.

Monthly composite samples of surface water from the Missouri River are collected from one indicator location (S02) and from one control location (S01). The surface water samples are composites of daily collections by automatic river samplers.

Onsite surface water from nine ponds is analyzed for tritium and gamma-emitting isotopes. The collection frequencies are either semiannually.

To monitor possible sources of ground water contamination due to plant operations, non-potable ground water samples were collected monthly or quarterly from well locations both onsite and along the discharge pipeline. The samples were analyzed for tritium and gamma-emitting isotopes.

Potable well water samples are collected quarterly from the plant drinking water supply, neighboring property owners, and from the town of Portland, MO. The samples were analyzed for tritium and gamma-emitting isotopes.

River bottom sediment is collected semiannually at the plant's intake (A) and discharge (C). The samples are taken from water at least 2 meters deep to prevent influence of bank erosion. Shoreline sediments are collected semiannually in the same area as bottom sediment. These samples are collected within approximately 60 cm of the edge of the water. The samples are analyzed for gamma-emitting isotopes.

The direct ambient gamma radiation pathway is also considered. This exposure is monitored by thermoluminescent dosimeters (TLDs) at forty-four locations in and around the Callaway site. The TLDs are placed in 16 sectors around the plant as specified in the ODCM-RECS. Five of the TLD stations have neutron monitoring capability and three locations are designated as controls. TLDs are exchanged and analyzed quarterly.

Soil is collected annually from seven indicator locations (F2, PR3, F6, PR7, W2, W3, and W4) and two control locations (M9, W1) to monitor the terrestrial environment. The samples are analyzed for gamma-emitting isotopes.

3.3 Program Execution

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

(1) Surface Water:

The river sampler at location S01 was discovered not functioning 4/5/17. This caused a missed grab sample for 4/4/17 due to a miscommunication between the Operations Department and the Radiation Protection Department.(CR 201701816). Compensatory grab sampling was initiated 04/06/17 until the compositor was repaired on 6/23/17. The cause of the malfunction was silting of the sample line and excessive silting in the intake pump bay containing the sample line. Unsafe river conditions and unavailability of qualified divers extended the condition beyond the 30 days stated in the action statement which requires that the condition be described in this report. (CR 201702981)

Flooding by the Missouri River at the town of Portland resulted in the loss of sampler S02 and an inability to safely obtain the required grab sample on 5/6/17 and 5/7/17 (CR 201702495). The sampler pump was destroyed by the flood waters and had to be replaced with a new pump.

S01 was out of service for 81 days in 2017 and S02 was out of service for 18 days.

(2) Ground Water:

Insufficient water was available from location U1MW-47 for the 1/19/17 sampling event.

(3) Drinking Water:

No drinking water sample was available at location DWA-D01 beginning with the 4/25/17 sampling event due to the location being dropped from the program.

(4) Broadleaf Vegetation:

Edible broadleaf vegetation, collected at the five area gardens was available for harvest from May through October, 2017 with the following exceptions: Vegetation from location V-18 was missed for the April, May and June 2017 collections. This failure was determined to be a result of collection personnel utilizing outdated collection instructions. Collection personnel were coached on proper procedures using the official sample schedule document HTP-ZZ-07001-DTI-REMP-

SMPL-SCHED (CR2 01703581). Samples were not available at locations V-11, V-12 and V-16 in April due to the gardens not yet producing. Gardens at locations V-11 and V-16 were not producing in May. The garden at location V-16 was done producing before the August collection event(CR 201704053). No vegetables were available at location V-18 for the month of September. No samples were available for locations V-11, V-16 and V-18 for the month of October.
See Table 5.5

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The growing season is defined as April 1 through November 1 (ref: Hammer, Gregory R.) although samples are rarely available prior to May 1. A vegetation sample unavailable after October 31 is not considered a missed sample.

(5) Inedible Crops:

Inedible crops were not collected at location FC-1 during the 2017 collection due to the field not being planted.

(6) Direct Radiation

The first quarter TLD at location IDM-32 was discovered missing from its posted location. The third quarter TLD at location IDM-39A was also discovered missing from its posted location.

(7) Airborne Particulates and Iodine.
Air station B-3 was permanently shut down 12/28/16. The sampling equipment was removed and relocated to a new sampling location A-10. During the transition from station B-3 to station A-10 the program was below the minimum number of air stations during the one week transition period (12/28/16-01/05/18) (CR 201700071). A new station, A-10, was created and sampling began at new locations A-10 and A-11 beginning 01/05/18. Station A-11 experienced multiple loss of power conditions between 1/05/17 and 2/23/17. (CR's 201700198, 201700542, CR201700796, 2017000894, and 201700948.) The issue was eventually traced to the use of a GFCI outlet in conjunction with a surge suppressor. The surge suppressor shunts the voltage to ground; the GFCI senses the ground voltage and trips as designed. The GFCI outlet was removed. There was a low sampling volume at location A-11 for the collection period ending 2/23/17 due to aforementioned equipment problems.(CR 201700948) There was no sample at location A-7 for the collection period ending 4/6/17 due to a power loss by the power provider. (CR 201701842)

3.4 Laboratory Procedures

The iodine-131 analyses in milk were made using a sensitive radiochemical procedure involving separation of the iodine by ion-exchange, solvent extraction and subsequent beta counting.

Gamma-spectroscopic analyses were performed with HPGe detectors. Levels of iodine-131 in vegetation and concentrations of airborne iodine-131 in charcoal samples were also determined by gamma spectroscopy.

Tritium was measured by liquid scintillation.

Analytical Procedures used by Environmental, Inc. are on file at the laboratory 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, 2017). The QA Program includes

participation in Interlaboratory Comparison (crosscheck) Programs. Results obtained through Quality control samples and crosscheck program results are presented in Appendix A.

Environmental TLDs are processed by Stanford Dosimetry, LLC.

3.5 Program Modifications

A vegetation sample was added at location V-18 on 2/13/17. Drinking water sample location DWA-D01 was removed because the property owner switched to county drinking water. The last collection occurred 01/30/17. Location DWA-D01 was replaced with new location DWA-23 (CR 201700835). The first collection at location DWA-23 occurred 04/25/17.

3.6 Detection and Reporting Limits

Table 5.3 gives the minimum required detection limits for radiological environmental sample analysis. For each sample type, the table lists the detection level for each isotope. The lower limit of detection (LLD) used in this report is described in NRC Regulatory Guide 4.1 Rev. 1, "Program for Monitoring Radioactivity in the Environs of Nuclear Power Plants" (April, 1975) and the NRC Radiological Assessment Branch Technical Position, Rev. 1, "An Acceptable Radiological Environmental Monitoring Program" (November, 1979).

3.7 Land Use Census

The Land Use Census is performed annually during the growing season. In 2017, the survey was conducted within a five mile canvassing radius of the Callaway Energy Center. The area around the plant was divided into 16 meteorological sectors. The locations of the nearest resident, nearest milk animal, and nearest garden of greater than 500 square feet producing broadleaf vegetation were identified. All residents who were identified in the summary report to the census were contacted by telephone or verified by Callaway County GIS aerial photography.

The field inspection of the sectors was conducted on October 9, 2017. The results of the census are presented in Table 5.4. The table includes radial direction and distance from the Callaway Energy Center for each location. The bearings listed in Table 5.4 were measured from the Callaway Energy Center to the sample location.

The following revisions are reflected in the 2017 report. In Sector A, Anton Leisinger is the closest resident in this sector. There is no broadleaf vegetable garden replacement in this sector. In Sector D, Frank Timmermeier is the closest resident. In Sector E, James Reynolds is the closest resident. Finally in Sector G, Phillip Baumgarth is the closest resident.

During the survey a water well was identified at 9180 County Road 457, Steedman, MO 65077. This well is owned by Leonard Farley and was added to the environmental monitoring program since it is within the Callaway Energy Center pipeline corridor. No irrigation uses of the Missouri River, within 10 miles downstream, were identified during the survey. The Missouri Department of Natural Resources confirmed that no new drinking water intakes have been located along the Missouri River within ten (10) river miles downstream from the plant.

4.0 RESULTS AND DISCUSSION

All collections and analyses were made as scheduled, except for the listing in Table 5.5.

Results are summarized in Table 5.6 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.

The tabulated results of all measurements are not included in this section, although references to these results will be made in the discussion. A complete tabulation of results for 2017 is contained in Part II of the Annual Report on the Radiological Environmental Monitoring Program for the Callaway Energy Center.

4.1 Atmospheric Nuclear Detonations and Nuclear Accidents

The Fukushima Daiichi nuclear accident occurred March 11, 2011. There were no reported accidents involving significant release to the environment at nuclear reactor facilities in 2017 but there was a minor release of Ru-106 traced to a possible incident in central Asia the week of September 19 through 26, 2017. The last reported atmospheric test was conducted on October 16, 1980 by the People's Republic of China. There were no reported atmospheric nuclear tests in 2017.

4.2 Program Findings

Airborne Particulates and Iodine

No gamma emitting isotopes were identified other than naturally occurring Be-7.
There was no I-131 activity detected in any of the charcoal canister samples.

Air sampling for 2017 indicates no radiological effects of plant operation.

Direct Radiation (TLDs)

Forty-four gamma sensitive TLDs were placed in 16 sectors around the Callaway site. Measurements from forty-one indicator locations averaged 15.5 mrem/quarter and the three control locations averaged 14.8 mrem/quarter. Readings ranged from 11.1 to 18.0 mrem /quarter, with the highest from the control location CA-IDM-27, averaging 17.1 mrem/quarter. The differences are statistically insignificant. The TLD readings were consistent with the results for the years 2000 through 2016 as detailed in table 5.7.

Five neutron sensitive TLDs were placed in locations at the Site Boundary closest to the Independent Spent Fuel Storage Facility Installation (ISFSI) and at a control location approximately 14 miles from the site. There was no significant measureable neutron dose and there was no effect from the ISFSI in 2017.

Milk

There are no milk indicator stations. No iodine-131 was detected in samples from the control station. No gamma-emitting isotopes, with the exception of naturally occurring potassium-40, were detected in milk. Milk data for 2017 show no radiological effects of plant operation.

Broadleaf Vegetation

There was no I-131 activity detected in broadleaf vegetation samples. No gamma-emitting isotopes were detected in broadleaf vegetation samples excepting naturally occurring

potassium-40. Vegetation data for 2017 show no radiological effects of plant operation.

Non-Food Crops

Soybean samples were analyzed for tritium and gamma-emitting isotopes. No tritium activity was detected. No gamma-emitting isotopes, excepting naturally occurring potassium-40, were detected in non-food crops.

Fish

Edible portions of fish were analyzed by gamma spectroscopy. No gamma-emitting isotopes, excepting naturally occurring potassium-40, were detected in fish.

Soil

Cesium-137 activity was detected at fourteen of the eighteen sample locations at an average concentration of 238 pCi/kg dry. 300 pCi/kg dry was the average activity for the ten of fourteen positive indicator locations. All four control samples were positive for Cesium-137 with an average activity of 83 pCi/kg dry. The cesium-137 activity is consistent with levels observed from 1999 through 2016; these levels are attributable to the deposition of fallout from previous decades.

Surface Water

Low level tritium was detected in four of the twelve samples collected at the downstream location S02 at an average concentration of 315 pCi/L. These results are consistent with pre- outage samples taken in previous years. There was no tritium detected in the remaining eight samples from S02. No gamma-emitting isotopes were detected.

Surface Water, Ponds

Eighteen pond samples were analyzed for 2017. No tritium activity or gamma activity was detected.

Drinking Water Wells (potable water)

Fifty-nine samples from sixteen different locations were analyzed for tritium and gamma-emitting isotopes. No tritium or gamma-emitting isotopes were detected.

Wells and Ponds (non-potable water)

Groundwater samples from deep wells F-05 and F-15 were analyzed for tritium and gamma-emitting isotopes. There were no tritium or gamma emitting isotopes detected.

Wells MW-31, MW-34, MW-36, MW-39, MW-47, MW-58, and MW-59 were installed during the 2014 LSI (the 2014 LSI is described in detail in the Callaway Energy Center 2014 Annual Radioactive Effluents Release Report). These wells continue to monitor the natural attenuation of tritium which decreased significantly during 2015 and continued to decrease in 2016 and decreased again in 2017. Tritium activity was detected in 18 of 27 samples from these wells. The highest concentration was measured in MW-31 which peaked at 1,688 pCi/L in January. By years end, the concentration in MW-31 had fallen to 278 pCi/L. The average concentration among positive results for these wells was 776 pCi/L. this decline has been steady since the December of 2016. The contamination is being remediated by monitored natural attenuation. There are no active leaks.

Wells GWS, 936, 937B, 937D, 939R, 940, 941 and IFSFI Sump are located in the Plant Protected Area, adjacent to the power block. Tritium activity in these wells is believed to be the result of washout from gaseous effluents. GWS is a drawdown sump that pumps water from the area adjacent to the power block and is especially sensitive to washout. The current tritium is

consistent with past years.

The low level tritium activity observed in wells MW-014, MW-018 and MW-019 is due to residual low level contamination from moisture carryover during normal operation of air release valves (ARVs) in manholes 5 and 6B on the now-retired discharge pipeline. The pipeline was replaced in 2008 and there has been no new contamination of this area since then. The existing contamination is being remediated by monitored natural attenuation. There are no active leaks and the results are consistent with 2015 and 2016.

Sediments

Samples of shoreline and bottom sediments were collected in June and October 2017 at both an indicator and a control location and analyzed for gamma-emitting isotopes. Cesium-137 was detected in one of the two bottom sediment samples at a concentration of 98 pCi/kg dry weight, and was detected in one of the two shoreline sediments at concentration of 38 pCi/kg dry weight. Both detections were from the indicator location collected in October. These results are consistent with results from previous years. There were no other gamma-emitting isotopes detected excepting naturally occurring potassium-40 in any of the sediment samples.

5.0 TABLES

Table 5.1. Sampling Locations. (TLD's)

Location Code	Distance / Direction [1]	Description	Sample Types [2]
1a	10.8 mi. 310° NW	City of Fulton on Hwy Z, 0.65 mi. E of Bus. 54, W of Campus Apartments.	IDM
3	1.2 mi. 308° NW	0.1 mi. West of Hwy CC on Gravel Rd., 0.8 mi. South Hwy O, Pole No. 18559.	IDM
5	1.3 mi. 79° ENE	Primary Meteorological Tower.	IDM
6	2.0 mi. 274° W	Cty Rd. 428, 1.2 mi. West of Hwy CC, Utility Pole No. 18609.	IDM
7	1.4 mi. 184° S	Cty Rd. 459, 2.6 mi. North of Hwy 94, Utility Pole No. 35097.	IDM
9	3.8 mi. 183° S	NW Side of the Cty Rd. 459 and Hwy 94 Junction, Utility Pole No. 06754.	IDM
10	3.9 mi. 159° SSE	Hwy 94, 1.8 mi. East of Cty Rd. 459, Utility Pole No. 12182.	IDM
11a	4.7 mi. 139° SE	City of Portland, Utility Pole No. 12110.	IDM
14	4.9 mi. 122° ESE	SE Side of Intersection D and 94, Utility Pole No. 11940.	IDM
17	3.8 mi. 88° E	Cty Rd. 4053, 0.3 mi. E of Hwy 94, Kingdom Telephone Co., Pole No. 3X12.	IDM
18a	3.7 mi. 67° ENE	East side of Hwy D, 0.5 mi. South of O, Utility Pole No. 38579.	IDM
20	4.7 mi. 46° NE	City of Readsville, Utility Pole No. 12830.	IDM
21	3.8 mi. 23° NNE	Cty Rd. 155, 1.9 mi. North of Hwy O, Utility Pole No. 19100.	IDM
22a	0.9 mi. 10° NNE	0.9 mi south of HWY O, co-located with air station A8	IDM
23	6.6 mi. 15° NNE	City of Yucatan, Utility Pole No. 12670.	IDM
26 [3]	11.7 mi. 82° E	Town of Americus, Utility Pole No. 11159.	IDM
27 [3]	9.3 mi. 114° ESE	Town of Bluffton, Utility Pole No. 11496.	IDM
30a	4.4 mi. 206° SSW	City of Steedman, Utility Pole No. 06557.	IDM
31a	7.8 mi. 224° SW	City of Mokane, Hwy C and Cty Rd. 400, 0.9 mi. N. of Hwy 94, Utility Pole.52071	IDM
32	5.4 mi. 250° WSW	Hwy VV, 0.6 mi.West of Cty Rd. 447, Utility Pole No. 06414	IDM
32a	5.0 mi. 243° WSW	Cty Rd. 447, Utility Pole No. 06357.	IDM
33	7.4 mi. 272° W	City of Hams Prairie, SE of Hwy C and AD Junction.	IDM
34	9.5 mi. 292° WNW	NE Side of Hwy C and Cty Rd. 408 Junction.	IDM
35	5.8 mi. 340° NNW	City of Toledo, Utility Pole No. 17684.	IDM
36	4.9 mi. 7° N	Cty Rd. 155, 0.8 mi. South of Cty Rd. 132, Utility Pole No. 19137	IDM
37	0.5 mi. 195° SSW	Cty Rd. 459, 0.9 mi. South of Hwy CC, Utility Pole No. 35077.	IDM
38	4.6 mi. 334° NNW	Cty Rd. 133, 1.5 mi. South of Hwy UU, Utility Pole No. 34708.	IDM
39	5.4 mi. 312° NW	Cty Rd. 111, Utility Pole No. 17516.	IDM
39a	5.0 mi. 308° NW	Cty Rd. 111, Utility Pole No. 17526.	IDM
40	4.2 mi. 292° WNW	NE Side of Cty Rd. 112 and Hwy O, Utility Pole No. 18145.	IDM
41	4.9 mi. 277° W	Hwy AD, 2.8 mi. East of Hwy C, Utility Pole No. 18239.	IDM
42	4.4 mi. 231° SW	Cty Rd. 447, 2.6 mi. North of Cty Rd. 463, Utility Pole No. 06326.	IDM
43	0.5 mi. 223° SW	Cty Rd. 459, 0.7 mi. South of Hwy CC, Utility Pole No. 35073.	IDM
44	1.7 mi. 254° WSW	Hwy CC, 1.0 mi. South of Cty Rd. 459, Utility Pole No. 1877.	IDM
45	1.0 mi. 285° WNW	Cty Rd. 428, 0.1 mi. West of Hwy CC, Utility Pole No. 18580.	IDM
46	1.5 mi. 328° NNW	NE Side of Hwy CC and Cty Rd. 466 Intersection, Utility Pole No. 28242.	IDM
47	1.0 mi. 10° N	Cty Rd. 448, 0.9 mi. South of Hwy O, Utility Pole No. 28151.	IDM
48	0.4 mi. NE	Cty Rd. 448, 1.5 mi. South of Hwy O, Plant Security Sign Post.	IDM
49	1.6 mi. 94° E	Cty Rd. 448, Utility Pole No. 06959, Reform Wildlife Mgmt. Parking Area.	IDM
50	0.9 mi. 168° SSE	Cty Rd. 459, 3.3 mi. North of Hwy 94, Utility Pole No. 35086	IDM
51a	0.3 mi. 150° SE	Owner Control Fence, SE of the Water Treatment Plant.	IDM
52	0.4 mi. 111° ESE	Light Pole Near the East Plant Security Fence.	IDM
60 [3]	13.5 mi. 224° SW	Utility Pole No. 43744, just past Tebbetts City sign.	IDM

Table 5.1. Sampling Locations. (TLD's, continued)

Location Code	Distance / Direction [1]	Description	Sample Types [2]
60N [3]	13.5 mi 224 ° SW	Utility pole No. 43744, Co-located with location with IDM-60.	IDM
61	1.9 mi 334 ° NNW	Community of Reform, Corner of CC and O, co-located with location 61N	IDM
61N	1.9 mi 334 ° NNW	Community of Reform, Corner of CC and O, co-located with location 61.	IDM
62N	1.2 mi. 308 ° NW	Utility pole no. 18559 Co-located with location 3	IDM
63N	0.9 mi. 10 ° NNE	Co-located with air station A8 and location 22a	IDM
64N	1.0 mi. 285 ° WNW	Utility pole no. 18580 Co-located with location 45	IDM

Table 5.1. Sampling Locations (Airborne Radioiodine and Particulate samples, Surface Ponds, Potable Water)

A1	1.3 mi. 79 ° E	Primary Meteorological Tower.	APT, AIO
A7	9.5 mi. 312 ° NW	C. Bartley Farm, Fulton, MO.	APT, AIO
A8	0.9 mi. 10 ° N	Cty Rd. 448, 0.9 miles South of Hwy 0.	APT, AIO
A9	1.9 mi. 334 ° NNW	Community of Reform.	APT, AIO
A10	0.89 mi 276 ° W	EOF Parking lot.	APT, AIO
A11	0.71 mi 166 ° SSE	Sludge ponds lift pumps area	APT, AIO
3	2.9 mi. 168 °	Potable water, County Road 448 Ward Residence	DWA
4	2.6 mi. 158 °	Potable water, County Road 448 Miller Residence	DWA
5	2.5 mi. 153 °	Potable water, County Road 448 Brucker Brothers Farm	DWA
6	2.2 mi. 141 °	Potable water, County Road 448 Lindeman Residence	DWA
7	2.1 mi. 108 °	Potable water, County Road 448 Kriete Residence	DWA
8	3.4 mi. 193 °	Potable water, County Road 457 Brandt Residence	DWA
9	2.9 mi. 204 °	Potable water, County Road 457 Clardy Residence	DWA
10	2.7 mi. 208 °	Potable water, County Road 457 S. Dillon Residence	DWA
12	3.6 mi. 165 °	Potable water, County Road 464 J. Dillon Residnece	DWA
21	2.4 mi. 120 °	Potable water, County Road 469 Baumgarth Residence	DWA
22	2.4 mi. 140 °	Potable water, State Road 94 Plummer Residence	DWA
23	5.6 mi 142 °	Potable water, Curdt Residence	DWA
24	2.9 mi 203 °	Potable water, Farley Residence	DWA
V16	1.64 mi. 76 ° WSW	Wallendorf Farm, Steedman, MO	DWA
PW1	Callaway Cafeteria	Potable water, Unit 1 Construction well #3 open from 400'-1400'	DWA
Pond 01	0.6 mi. 264 °	Fishing Pond	SWA
Pond 02	0.7 mi. 232 °	Fishing Pond	SWA
Outfall 010	0.6 mi. 42 °	Stormwater Run-Off Pond	SWA
Outfall 011	1.0 mi. 60 °	Stormwater Run-Off Pond	SWA
Outfall 012	0.5 mi. 178 °	Stormwater Run-Off Pond	SWA
Outfall 013	0.5 mi. 189 °	Stormwater Run-Off Pond	SWA
Outfall 014	0.6 mi. 343 °	Stormwater Run-Off Pond	SWA
Outfall 015	0.7 mi. 4 °	Stormwater Run-Off Pond	SWA
Sludge Lagoon, # 4	0.8 mi. 153 °	On service Sewage Sludge Lagoon	SWA
S01 [3]	4.8 mi. 150 ° SSE	555 feet Upstream of Discharge North Bank	SWA
S02	4.9 mi. 138 ° SE	1.1 River Miles Downstream of Discharge North Bank	SWA

Table 5.1. Sampling Locations, Non-potable Groundwater Wells

Location Code	Distance / Direction [1]	Description	Sample Types [2]
U1MW-936	Plant Peninsula Area	Diesel Fuel Remediation Well, NW of SFSB	WWA
U1MW-937B	Plant Peninsula Area	Monitoring Well, West of the Turbine Bldg.	WWA
U1MW-937D	Plant Peninsula Area	Monitoring Well, North of Discharge Monitor Tanks.	WWA
U1MW-939R	Plant Peninsula Area	Monitoring Well, East of the Fuel Bldg.	WWA
U1MW-940	Plant Peninsula Area	Monitoring Well, West of the Radwaste Bldg.	WWA
U1MW-941	Plant Peninsula Area	Monitoring Well, West of the Radwaste Bldg.	WWA
U1MW-GWS	Plant Peninsula Area	Ground Water Sump, West of Reactor Bldg and SFSB	WWA
U1MW-ISFSI	ISFSI sump	ISFSI Sump	WWA
U1MW-001	0.3 mi. 334°	Just Outside OCA , Groundwater Monitoring Well	WWA
U1MW-002	0.4 mi. 206°	Outside OCA , Groundwater Monitoring Well	WWA
U1MW-004	3.7 mi. 165°	Dillon, Groundwater Monitoring Well	WWA
U1MW-005	3.8 mi. 160°	Brownlee / Hudson, Groundwater Monitoring Well	WWA
U1MW-006	3.0 mi. 171°	South of Ward Residence, Groundwater Monitoring Well	WWA
U1MW-010	3.1 mi. 173°	Pipeline, Groundwater Monitoring Well	WWA
U1MW-012	3.0 mi. 172°	S. of Ward Residence, Groundwater Monitoring Well	WWA
U1MW-013	0.8 mi. 159°	Pipeline Corridor, south of sludge ponds	WWA
U1MW-014	3.7 mi. 171°	Pipeline Corridor, near manhole 6B	WWA
U1MW-015	3.9 mi. 162°	Pipeline Corridor, North of HWY 94.	WWA
U1MW-016	4.5 mi. 151°	Pipeline Corridor, near heavy haul road at intake structure	WWA
U1MW-018	3.75 mi. 172°	Pipeline Corridor, near manhole 6B	WWA
U1MW-019	3.71 mi.172°	Pipeline Corridor, near manhole 5	WWA
U1MW-020	3.88 mi.164°	Pipeline Corridor, near manhole 3B	WWA
U1MW-031	0.2 mi. ENE	~1m from manhole 86-2 & 1m from HDPE discharge	WWA
U1MW-034	0.2 mi. E	~130m from manhole 86-2, HDPE discharge line bedding.	WWA
U1MW-036	0.3 mi. ESE	~300m from MH 86-2, HDPE discharge @ cross conn. pipe	WWA
U1MW-039	0.6 mi. SSE	~1100m from manhole 86-2	WWA
U1MW-047	4.6 mi. SSE	Upstream side of HDPE Gate Valve Vault inside HDPE pipeline bedding	WWA
U1MW-058	0.3 mi. SE	~400m from manhole 86-2, discharge line bedding	WWA
U1MW-059	1.0 mi. SSE	~1700m from MH86-2, discharge line bedding	WWA
Inside Old BDL	1.4 mi. SSE	Sampled through hole in Techite blowdown line	WWA
U2 MW 2S	1.8 mi. 5°	Groundwater Monitoring Well	WWA
U2 MW 5S	1.1 mi. 261°	Groundwater Monitoring Well	WWA
U2 MW 8	0.4 mi. 12°	Groundwater Monitoring Well	WWA
U2 MW 10	0.4 mi. 163°	Groundwater Monitoring Well	WWA
U2 MW 16	2.9 mi. 203°	Groundwater Monitoring Well	WWA
F05	0.9 mi. 169°	Groundwater Monitoring Well	WWA
F15	0.4 mi. 29°	Groundwater Monitoring Well	WWA

Table 5.1. Sampling Locations, Soil, Food Products, Milk, Fish, Bottom Sediments and Inedible Crops.

Location Code	Distance / Direction [1]	Description	Sample Types [2]
F2	1.0 mi. 235° SW	Callaway Plant Forest Ecology Plot F2.	SOL
F6	1.6 mi. 51° NE	Callaway Plant Forest Ecology Plot F6.	SOL
PR3	0.95 mi. 108° ESE	Callaway Plant Forest Ecology Plot PR3.	SOL
PR7	0.5 mi. 320° NNW	Callaway Plant Forest Ecology Plot PR7.	SOL
W1 [3]	0.52 mi. 150° SE	Callaway Plant Wetlands, High Ground.	SOL
W2	0.52 mi. 149° SSE	Callaway Plant Wetlands, Inlet Area.	SOL
W3	0.65 mi. 152° SSE	Callaway Plant Wetlands, Discharge Area.	SOL
W4	0.63 mi. 155° SSE	Callaway Plant Wetlands, SW Bank.	SOL
M9 [3]	13 mi. 228° SW	Ferguson Farm, Tebbetts, MO.	SOL
V9	1.9 mi. 294° WNW	Meehan Farm, Steedman, MO	FPL
V11	3.2 mi. 325° NW	Hickman Farm, Steedman, MO	FPL
V12 [3]	18.7 mi. 255° WSW	Kissock Farm, South of New Bloomfield, MO	FPL
V16	1.6 mi. 76° WSW	Wallendorf Farm, Steedman, MO	FPL
V18	2.9 mi . 168°	Ward residence,	
M9 [3]	13 mi. 228° SW	Ferguson Farm, Tebbetts, MO.	MLK
A [3,4]		Between 0.6 and 10.0 river miles upstream of the plant discharge.	AQF
A [3]		Upstream of the plant intake.	AQS
C [4]		Downstream,of the plant discharge, between the confluence of the Missouri River and Logan Creek(longitude -91.7365° and the Portland boat ramp)..	AQF
C		Vicinity of Portland – north bank	AQS
FC1	3.4 mi. S	Between discharge pipeline MH-8 and the Katy Trail	FC
FC2	3.8 mi. ESE	Between discharge pipeline MH-5 and MH-3B.	FC
FC3	4.1 mi. SSE	Between Hwy 94 and the barge loading dock access road.	FC
FC4 [3]	7.9 mi. SW	South Callaway High School, Unlikely to be influenced by plant operations.	FC

[1] Distances are measured from the midpoint of the two reactors as described in Final Safety Analysis Report (FSAR) Sec. 2.1.1.1.

[2] AIO = Air Iodine, APT = Air Particulate, AQF = Fish, AQS = Sediment, FPL = Leafy Green Vegetables, FC = Food Crops, IDM = TLD, MLK = Milk, SOL = Soil, SWA = Surface Water, DWA = Drinking Water, WWA = Ground Water.

[3] Control Location.

[4] The expanded collection areas provide sufficient habitat to collect the required number of species.

Table 5.2. Collection Frequencies and Required Analyses [1] (January 1 through December 31, 2017)

Sample Type	Media Code	Collection Frequency	Required Analyses
Direct radiation	IDM	Quarterly	Deep Dose Equivalent (DDE)
Airborne iodine	AIO	Weekly	^{131}I
Air particulate	APT	Weekly	PGE[4] each sample
Surface water (river)	SWA	Monthly composite	PGE and ^{3}H
Surface water (except UHS & Unit 2 ponds)	SWA	Semiannually	PGE and ^{3}H. If contaminated with gamma emitting nuclides of plant origin, analyze for HTD[5] nuclides.
Surface water (UHS and Unit 2 ponds)	SWA	Semiannually	PGE and ^{3}H
Groundwater (not potable)	WWA	Quarterly	PGE and ^{3}H. If contaminated with gamma emitting nuclides of plant origin, analyze for HTD nuclides.
Well water-potable	DWA	Monthly	PGE and ^{3}H. If contaminated with gamma emitting nuclides of plant origin, analyze for HTD nuclides.
Shoreline sediment	AQS	Semiannually	PGE
Bottom sediment [2]	AQS	Semiannually	PGE
Sludge pond sediment	SOL	Annually	PGE
Soil	SOL	Annually	PGE
Milk animal	MLK	Semimonthly when animals are on pasture, monthly other times	PGE and ^{131}I
Leafy green vegetables	FPL	Monthly when available [3]	PGE and ^{131}I
Inedible crops	FC	At time of harvest	PGE and ^{3}H
Fish	AQF	Semiannually	PGE on edible portion

[1] Samples required by ODCM unless specified otherwise.

[2] Required by NPDES permit.

[3] The growing season is defined as the months April 1- November 1, but will vary according to weather conditions.

[4] Principal Gamma Emitters (PGE) are defined as ^{54}Mn, ^{59}Fe, ^{58}Co, ^{60}Co, ^{65}Zn, $^{95}Zr/Nb$, ^{134}Cs, ^{137}Cs, $^{140}Ba/La$ and other gamma- emitting nuclides that may be identified during the gamma spectroscopy analysis.

[5] Hard to Detect (HTD) nuclides are defined as ^{89}Sr, ^{90}Sr, ^{55}Fe, ^{63}Ni, ^{237}Np, ^{238}Pu, $^{239/240}Pu$, ^{241}Pu, ^{241}Am, ^{242}Cm and $^{243/244}Cm$.

Table 5.3. Minimum Required Detection Capabilities for REMP Sample Analysis[1]

Analysis	Water (pCi/L)	Airborne (pCi/m^3)	Fish (pCi/kg wet)	Milk (pCi/L)	Food Products (pCi/kg wet)	Non-Food Products (pCi/kg wet)	Soil and Sediment (pCi/kg dry)
H-3	3000/2000[3]					3000	
Mn-54	15		130				
Fe-59	30		260				
Co-58/60	15		130				
Zn-65	30		260				
Zr-Nb-95 [2]	15						
I-131	1000/1[3]	0.07		1	60		
Cs-134	15	0.05	130	15	60	60	150
Cs-137	18	0.06	150	18	80	80	180
Ba-La-140 [2]	15			15			

[1] This list does not mean only these nuclides will be detected and reported. Other peaks which are measurable and identifiable will be reported.

[2] Total activity, parent plus daughter activity.

[3] LLDs for Surface and Drinking / Ground water are the same, with the exception of H-3 and I-131. The Drinking / Ground water LLDs for H-3 and I-131 are 2000 and 1 pCi/liter respectively.

Table 5.4 2017 Land Use Census Results

Closest Receptor in Miles

Sector	Residence	Garden [1, 2]	Milk [1]
N(A)	2.37	NI	NI
NNE(B)	2.16	NI	NI
NE(C)	2.26	NI	NI
ENE(D)	2.86	2.86	NI
E(E)	3.51	NI	NI
ESE(F)	2.11	4.33	NI
SE(G)	3.93	NI	NI
SSE(H)	3.17	3.57	NI
S(J)	2.86	2.86	NI
SSW(K)	2.38	NI	NI
SW(L)	2.63	2.63	NI
WSW(M)	1.20	1.96	3.23*
W(N)	1.56	3.55	NI
WNW(P)	1.93	1.93	NI
NW(Q)	2.07	3.16	NI
NNW(R)	1.81	NI	NI

[1] NI = None Identified.
[2] Broadleaf Vegetation
* Declined to participate in the program.

Table 5.5. Listing of Missed Samples

Sample Type	Analysis	Location(s)	Collection Date or Period	Comments
APT	Gamma	CA-B-03	12-28-16-01-05-17	Air station permanently shut down and moved to new location A-10.
AIO	I-131	CA-B-03	12-28-16-01-05-17	Air station permanently shut down and moved to new location A-10.
APT	Gamma	CA-A-010	01-05-17	Sample not available due to construction of new stations.
AIO	I-131	CA-A-010	01-05-17	Sample not available due to construction of new stations.
APT	Gamma	CA-A-011	01-05-17	Sample not available due to construction of new stations.
AIO	I-131	CA-A-011	01-05-17	Sample not available due to construction of new stations.
WWA	H-3	CA-U!MW-47-5	01-19-17	Insufficient water available for sampling.
SWA	H-3, Gamma	CA-S01	04-05-17	The automatic river sampler was found not working.
IDM	Gamma	CA-IDM-32	04-10-17	TLD found missing in field.
VE	Gamma	CA-FPL-V-11	04-10-17	Garden not yet producing
VE	Gamma	CA-FPL-V-12	04-10-17	Garden not yet producing.
VE	Gamma	CA-FPL-V-16	04-10-17	Garden not yet producing.
VE	Gamma	CA-FPL-V-18	04-10-17	Personnel did not collect sample.
APT	Gamma	CA-A-007	4-13-17	No sample due to electrical issues.
AIO	I-131	CA-A-007	4-13-17	No sample due to electrical issues.

Table 5.5. Listing of Missed Samples (continued)

Sample Type	Analysis	Location(s)	Collection Date or Period	Comments
DWA	H-3, Gamma	CA-DWA-D01	04-25-17	Location dropped from program.
VE	Gamma	CA-FPL-V-11	05-09-17	Garden not yet producing.
VE	Gamma	CA-FPL-V-16	05-09-17	Garden not yet producing.
VE	Gamma	CA-FPL-V-18	05-09-17	Personnel did not collect the sample.
VE	Gamma	CA-FPL-V-18	06-13-17	Personnel did not collect the sample.
VE	Gamma	CA-FPL-V-16	08-08-17	No vegetables available. Garden done producing for the growing season.
VE	Gamma	CA-FPL-V-18	09-12-17	No vegetables available.
VE	Gamma	CA-FC-1	09-24-17	Field not planted.
IDM	Gamma	CA-IDM-39A	10-06-17	TLD found missing in field.
VE	Gamma	CA-FPL-V-11	10-10-17	No vegetables available.
VE	Gamma	CA-FPL-V-16	10-10-17	No vegetables available.
VE	Gamma	CA-FPL-V-18	10-10-17	No vegetables available.

Table 5.6 Radiological Environmental Monitoring Program Summary

Sample Type (Units)	Type and Number of Analyses(a)		Req'd LLD(b)	Indicator Locations Mean, Fraction, Range (c)	Location with Highest Annual Mean		Control Locations Mean, Fraction, Range (c)	Number Non-Routine Results(e)
					Location (d)	Mean, Fraction, Range (c)		
Waterborne Pathway								
Surface Water (pCi/L)	H-3	24	3000	315 (4/12) (190-491)	CA-SWA-S02 4.9 mi SE	315 (4/12) (190-491)	ND	0
	GS	24	(b)	ND	-	-	ND	0
Surface Water, Ponds (pCi/L)	H-3	18	3000	ND			none	0
	GS	18	(b)	ND	-	-	ND	0
Potable Wells (pCi/L)	H-3	59	2000	ND	-	-	ND	0
	GS	59	(b)	ND	-	-	ND	0
Wells (non-potable) (pCi/L)	H-3	203	3000	405 (74/203) (153-1688)	CA-U1MW-31	776 (4/4) (278-1688)	None	0
	GS	140	(b)	ND	-	-	ND	0
Sediments (pCi/kg) dry	Cs-134	8	150	ND	-	-	ND	0
	Cs-137	8	180	68 (2/4) (38-98)	CA-AQS-C 4.9 mi SE	68 (2/4) (38-98)	ND	0
Airborne Pathway								
Airborne Particulates (pCi/m^3)	GS	307	(b)	ND	-	-	None	0
Airborne Iodine (pCi/m^3)	I-131	307	0.07	ND	-	-	None	0
Soil								
Soil (pCi/kg) dry	Cs-134	18	150	ND	-	-	ND	0
	Cs-137	18	180	300 (10/14) (69-654)	F-002 1.0 mi. SW	523 (2/2) (392-654)	83 (4/4) (38-132)	0

Table 5.6 Radiological Environmental Monitoring Program Summary

Sample Type (Units)	Type and Number of Analyses(a)	Req'd LLD(b)	Indicator Locations Mean, Fraction, Range (c)	Location with Highest Annual Mean		Control Locations Mean, Fraction, Range (c)	Number Non-Routine Results(e)
				Location (d)	Mean, Fraction, Range (c)		
Ingestion Pathway							
Food Products Leafy Green Vegetables (pCi/kg wet)	GS 47	(b)	ND	-	-	ND	0
Non- food Products Soybeans (pCi/kg) wet	H-3 (f) 7	3000	ND	-	-	ND	0
	GS 7	(b)	ND	-	-	ND	0
Fish Edible Flesh (pCi/kg) wet	GS 20	(b)	ND	-	-	ND	0
Milk (pCi/L)	I-131 20	1	none	-	-	ND	0
	GS 20	(b)	ND	-	-	ND	0
Direct Radiation							
(Quarterly TLDs) (mrem/Qtr)	Gamma 174		15.5 (162/162) (11.0-18.2)	CA-IDM-11A, 4.7 mi. SE	17.1 (4/4) (16.6-18.0)	14.8 (12/12) (11.1-18.0)	0
	Neutron 20		ND	-	-	ND	0

(a) GS = gamma spectroscopy.
(b) LLD = nominal lower limit of detection based on a 4.66 sigma counting error for background sample. LLD's for gamma spectroscopy are in Table 5.3.
(c) Mean and range are based on detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F). ND= not detected.
(d) Locations are specified by station code (Table 5.2) and distance (miles) and direction relative to reactor site.
(e) Non-routine results are those which exceed ten times the control station value. If no control station value is available, the result is considered non-routine if it exceeds ten times the preoperational value for the location.
(f) Units: pCi/L.

Table 5.7 Direct Radiation Dose (mrem/91 days) for the Period 2000-2016

Station Code	Mean	3σ	Mean + 3σ	Max
CA-IDM-1A	16.0	3.0	19.0	18.0
CA-IDM-3	17.0	3.0	20.0	20.0
CA-IDM-5	14.4	2.9	17.3	17.1
CA-IDM-6	16.6	3.5	20.0	19.0
CA-IDM-7	16.3	3.3	19.5	19.0
CA-IDM-9	15.1	2.6	17.7	17.0
CA-IDM-10	17.1	2.8	19.9	19.3
CA-IDM-11A	17.2	2.7	19.9	19.3
CA-IDM-14	15.9	3.0	18.9	18.7
CA-IDM-17	16.2	3.1	19.3	18.3
CA-IDM-18A	16.2	5.1	21.3	18.9
CA-IDM-20	16.6	3.1	19.7	19.3
CA-IDM-21	16.5	3.4	20.0	19.0
CA-IDM-22A	14.9	4.7	19.7	18.0
CA-IDM-23	16.6	2.9	19.5	19.0
CA-IDM-26(C)	11.4	2.4	13.8	13.1
CA-IDM-27(C)	17.2	2.9	20.2	20.0
CA-IDM-30A	15.7	2.8	18.6	18.2
CA-IDM-31A	17.0	2.8	19.9	19.0
CA-IDM-32	16.7	2.9	19.6	19.0
CA-IDM-32A	16.3	4.0	20.3	20.0
CA-IDM-33	16.0	2.9	18.9	18.0
CA-IDM-34	15.4	3.1	18.5	18.0
CA-IDM-35	14.9	2.7	17.6	17.3
CA-IDM-36	15.7	3.3	19.0	18.7
CA-IDM-37	15.9	2.9	18.8	18.0
CA-IDM-38	11.5	2.4	13.8	13.9
CA-IDM-39	16.0	3.1	19.1	19.0
CA-IDM-39A	16.7	2.9	19.5	19.0
CA-IDM-40	17.2	3.0	20.2	19.2
CA-IDM-41	15.9	3.1	19.0	19.0
CA-IDM-42	13.7	2.6	16.3	15.6
CA-IDM-43	16.1	2.9	19.0	18.7
CA-IDM-44	16.4	3.1	19.6	19.0
CA-IDM-45	14.9	3.3	18.2	20.0
CA-IDM-46	16.5	2.9	19.4	19.9
CA-IDM-47	15.8	2.7	18.5	18.0
CA-IDM-48	16.7	2.8	19.5	19.0
CA-IDM-49	15.6	2.7	18.3	18.0
CA-IDM-50	16.3	2.9	19.3	20.0
CA-IDM-51A	17.1	2.8	20.0	19.8
CA-IDM-52	16.9	2.6	19.4	19.1
CA-IDM-60(C)	16.2	2.4	18.6	18.0

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APPENDIX A

INTERLABORATORY COMPARISON PROGRAM RESULTS
AND INTRALABORATORY COMPARISON PROGRAM RESULTS

NOTE: Appendix A is updated four times a year. The complete appendix is included in March, June, September and December monthly progress reports only.

January, 2017 through December, 2017

Appendix A

Interlaboratory/ Intralaboratory 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 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 10% 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	10% 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 10% of known value
Tritium	≤ 4,000 pCi/liter > 4,000 pCi/liter	$\pm 1\sigma$ = $169.85 \times (\text{known})^{0.0933}$ 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-95	1/9/2017	Sr-89	51.9 ± 4.6	55.5	44.3 - 63.2	Pass
ERW-95	1/9/2017	Sr-90	43.6 ± 2.4	43.1	31.8 - 49.5	Pass
ERW-97	1/9/2017	Ba-133	78.2 ± 4.1	85.6	72.0 - 94.2	Pass
ERW-97	1/9/2017	Cs-134	53.9 ± 3.8	52.6	42.4 - 57.9	Pass
ERW-97	1/9/2017	Cs-137	122 ± 6	112	101 - 126	Pass
ERW-97	1/9/2017	Co-60	117 ± 4	113	102 - 126	Pass
ERW-97	1/9/2017	Zn-65	208 ± 13	189	170 - 222	Pass
ERW-99	1/9/2017	Gr. Alpha	48.9 ± 2.4	52.3	27.3 - 65.5	Pass
ERW-99	1/9/2017	Gr. Beta	37.1 ± 1.3	41.6	27.7 - 49.0	Pass
ERW-101	1/9/2017	I-131	22.3 ± 0.6	24.3	20.2 - 28.8	Pass
ERW-103	1/9/2017	Ra-226	11.3 ± 0.4	12.7	9.5 - 14.7	Pass
ERW-103	1/9/2017	Ra-228	6.10 ± 0.90	6.20	3.8 - 8.1	Pass
ERW-103	1/9/2017	Uranium	11.8 ± 0.8	12.6	9.9 - 14.4	Pass
ERW-106	1/9/2017	H-3	12,600 ± 300	12,500	10,900 - 13,800	Pass
ERW-3344	7/10/2017	Sr-89	29.0 ± 10.0	26.4	18.4 - 32.9	Pass
ERW-3344	7/10/2017	Sr-90	33.8 ± 3.3	36.0	26.4 - 41.5	Pass
ERW-3346	7/10/2017	Ba-133	66.4 ± 4.1	66.3	55.2 - 72.9	Pass
ERW-3346	7/10/2017	Cs-134	27.0 ± 4.3	24.4	18.7 - 27.2	Pass
ERW-3346	7/10/2017	Cs-137	57.4 ± 4.5	51.6	46.4 - 59.6	Pass
ERW-3346	7/10/2017	Co-60	92.6 ± 4.4	88.6	79.7 - 99.8	Pass
ERW-3346	7/10/2017	Zn-65	32.4 ± 6.0	32.7	27.3 - 41.6	Pass
ERW-3348	7/10/2017	Gr. Alpha	23.7 ± 1.9	25.7	13.0 - 34.1	Pass
ERW-3348	7/10/2017	Gr. Beta	54.6 ± 1.6	63.0	43.5 - 69.6	Pass
ERW-3350	7/10/2017	I-131	25.4 ± 1.3	25.5	21.2 - 30.1	Pass
ERW-3352	7/10/2017	Ra-226	1.38 ± 0.15	1.29	1.07 - 1.95	Pass
ERW-3352	7/10/2017	Ra-228	6.70 ± 0.93	5.66	3.45 - 7.47	Pass
ERW-3352	7/10/2017	Uranium	58.4 ± 0.9	66.7	54.3 - 73.9	Pass
ERW-3354	7/10/2017	H-3	5,254 ± 224	5,060	4,340 - 5,570	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).

TABLE A-2. Table has been intentionally omitted.

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
W-010417	4/29/2016	Cs-134	38.2 ± 8.1	36.2	29.0 - 43.4	Pass
W-010417	4/29/2016	Cs-137	78.0 ± 8.8	71.9	57.5 - 86.3	Pass
SPW-306	1/4/2017	Ra-226	18.1 ± 0.4	16.7	13.4 - 20.1	Pass
SPW-32	1/6/2017	H-3	17,849 ± 393	17,243	10,346 - 24,140	Pass
SPW-46	1/9/2017	Gr. Alpha	20.0 ± 0.4	20.1	16.1 - 24.1	Pass
SPW-46	1/9/2017	Gr. Beta	29.0 ± 0.3	28.9	23.1 - 34.6	Pass
SPW-92	1/11/2017	H-3	18,095 ± 397	17,243	10,346 - 24,140	Pass
SPW-142	1/12/2017	Sr-90	39.4 ± 2.3	36.6	29.3 - 43.9	Pass
SPW-155	1/19/2017	H-3	17,974 ± 400	17,243	10,346 - 24,140	Pass
SPW-186	1/23/2017	H-3	17,383 ± 366	17,243	10,346 - 24,140	Pass
SPW-232	1/19/2017	H-3	17,542 ± 368	17,243	10,346 - 24,140	Pass
SPW-304	1/26/2017	H-3	17,782 ± 400	17,243	10,346 - 24,140	Pass
SPW-333	1/30/2017	H-3	17,910 ± 406	17,243	10,346 - 24,140	Pass
SPW-353	2/2/2017	U-234	47.8 ± 2.3	41.7	33.4 - 50.0	Pass
SPW-353	2/2/2017	U-238	50.4 ± 2.4	41.7	33.4 - 50.0	Pass
W-020217	4/29/2016	Cs-134	33.7 ± 6.1	36.2	29.0 - 43.4	Pass
W-020217	4/29/2016	Cs-137	78.4 ± 7.3	71.9	57.5 - 86.3	Pass
SPW-412	2/6/2017	Sr-90	36.2 ± 2.4	36.6	29.3 - 43.9	Pass
SPW-465	2/8/2017	H-3	17,573 ± 396	17,243	10,346 - 24,140	Pass
SPW-561	2/15/2017	H-3	17,358 ± 395	17,243	10,346 - 24,140	Pass
SPW-605	2/16/2017	H-3	17,820 ± 401	17,243	10,346 - 24,140	Pass
SPW-657	2/17/2017	H-3	17,614 ± 376	17,243	10,346 - 24,140	Pass
SPW-714	2/23/2017	H-3	17,662 ± 400	17,243	10,346 - 24,140	Pass
SPW-737	2/28/2017	H-3	17,196 ± 395	17,243	10,346 - 24,140	Pass
SPAP-740	2/28/2017	Gr. Beta	38.9 ± 0.1	41.5	33.2 - 49.8	Pass
SPAP-742	2/24/2017	Cs-134	1.05 ± 0.60	0.98	0.78 - 1.18	Pass
SPAP-742	2/24/2017	Cs-137	90.4 ± 2.5	92.9	74.3 - 111.5	Pass
SPW-746	2/28/2017	Sr-90	42.8 ± 2.5	36.6	29.3 - 43.9	Pass
SPW-748	2/28/2017	C-14	4270 ± 17	4735	3788 - 5682	Pass
SPW-750	2/28/2017	Ni-63	463 ± 4	400	240 - 560	Pass
SPF-752	2/28/2017	Cs-134	1033 ± 38	1090	870 - 1300	Pass
SPF-752	2/28/2017	Cs-137	3071 ± 61	2820	2250 - 3380	Pass
SPW-781	3/1/2017	Ra-226	18.1 ± 0.4	16.7	13.4 - 20.1	Pass
SPW-783	3/1/2017	H-3	17,653 ± 400	17,243	13,794 - 20,692	Pass
W-030517	4/29/2016	Cs-134	38.0 ± 9.0	36.2	29.0 - 43.4	Pass
W-030517	4/29/2016	Cs-137	80.9 ± 9.2	71.9	57.5 - 86.3	Pass
SPW-1010	3/14/2017	H-3	17,312 ± 395	17,243	13,794 - 20,692	Pass
SPW-1026	3/16/2017	Gr. Alpha	22.4 ± 0.5	20.1	12.0 - 28.1	Pass
SPW-1026	3/16/2017	Gr. Beta	29.2 ± 0.3	28.9	17.3 - 40.4	Pass
SPW-1092	3/21/2017	H-3	17,252 ± 390	17,243	13,794 - 20,692	Pass
SPW-1151	3/24/2017	H-3	17,009 ± 388	17,243	13,794 - 20,692	Pass
SPW-1163	3/28/2017	Sr-90	39.0 ± 2.3	36.3	29.0 - 43.5	Pass
SPW-1178	3/29/2017	Ra-228	15.1 ± 1.9	16.0	9.6 - 22.4	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-1232	3/30/2017	H-3	17,150 ± 390	17,243	13,794 - 20,692	Pass
SPW-1246	3/31/2017	I-131(G)	33.0 ± 7.3	36.6	29.3 - 43.9	Pass
SPW-1246	3/31/2017	Cs-134	28.9 ± 4.6	26.6	21.3 - 31.9	Pass
SPW-1246	3/31/2017	Cs-137	80.6 ± 8.2	70.4	56.3 - 84.5	Pass
SPMI-1248	3/31/2017	I-131(G)	39.8 ± 7.0	36.6	29.3 - 43.9	Pass
SPMI-1248	3/31/2017	Cs-134	26.9 ± 5.9	26.6	21.3 - 31.9	Pass
SPMI-1248	3/31/2017	Cs-137	70.4 ± 6.9	70.4	56.3 - 84.5	Pass
SPMI-1248	3/31/2017	I-131	36.2 ± 0.6	36.6	29.3 - 43.9	Pass
SPW-1295	3/31/2017	Ra-226	17.9 ± 0.4	16.7	13.4 - 20.1	Pass
SPW-1304	4/4/2017	H-3	17,741 ± 398	17,243	13,794 - 20,692	Pass
SPW-1359	4/5/2017	I-131	44.3 ± 0.5	47.6	38.1 - 57.1	Pass
SPW-1378	4/7/2017	H-3	17,528 ± 395	17,243	13,794 - 20,692	Pass
SPW-1391	4/7/2017	Gr. Alpha	21.1 ± 0.4	20.1	12.0 - 28.1	Pass
SPW-1391	4/7/2017	Gr. Beta	27.8 ± 0.3	28.2	17.3 - 40.4	Pass
SPW-1480	4/12/2017	H-3	17,399 ± 392	17,243	13,794 - 20,692	Pass
W-041317	4/29/2016	Cs-134	34.6 ± 5.6	36.2	29.0 - 43.4	Pass
W-041317	4/29/2016	Cs-137	81.9 ± 8.0	71.9	57.5 - 86.3	Pass
SPW-1480	4/12/2017	H-3	17,399 ± 392	17,243	13,794 - 20,692	Pass
SPW-1575	4/18/2017	H-3	17,419 ± 393	17,243	13,794 - 20,692	Pass
SPW-1626	4/20/2017	Sr-90	37.2 ± 2.4	36.3	29.0 - 43.5	Pass
SPW-1658	4/21/2017	H-3	17,194 ± 391	17,243	13,794 - 20,692	Pass
SPW-1776	4/26/2017	H-3	16,609 ± 386	17,243	13,794 - 20,692	Pass
SPW-1806	4/27/2017	H-3	17,203 ± 390	17,243	13,794 - 20,692	Pass
SPW-1937	5/3/2017	H-3	16,690 ± 385	17,243	13,794 - 20,692	Pass
SPW-1971	5/5/2017	Sr-90	41.5 ± 2.2	36.3	29.0 - 43.5	Pass
SPW-2033	5/8/2017	H-3	16,780 ± 386	17,243	13,794 - 20,692	Pass
SPW-2420	5/9/2017	Ra-226	16.3 ± 0.5	16.7	13.4 - 20.1	Pass
W-051517	4/29/2016	Cs-134	36.3 ± 5.0	36.2	29.0 - 43.4	Pass
W-051517	4/29/2016	Cs-137	68.9 ± 6.6	71.9	57.5 - 86.3	Pass
SPW-2284	5/22/2017	H-3	16,935 ± 389	16,703	13,362 - 20,043	Pass
SPW-2354	5/23/2017	H-3	17,006 ± 390	16,700	13,360 - 20,040	Pass
SPW-2891	5/23/2017	Ra-226	17.5 ± 0.4	16.7	13.4 - 20.1	Pass
SPW-2418	5/23/2017	Ra-228	14.0 ± 1.8	16.0	11.2 - 20.8	Pass
SPW-2439	5/25/2017	Ra-228	13.0 ± 1.8	16.0	11.2 - 20.8	Pass
SPMI-2378	5/24/2017	Sr-89	83.7 ± 4.9	98.4	78.7 - 118.1	Pass
SPMI-2378	5/24/2017	Sr-90	39.5 ± 1.5	36.1	28.9 - 43.4	Pass
SPW-2468	5/26/2017	H-3	17,065 ± 391	16,692	13,354 - 20,031	Pass
SPW-2848	5/26/2017	I-131	56.4 ± 0.6	58.3	46.6 - 70.0	Pass
SPW-2502	6/1/2017	H-3	17,596 ± 396	16,677	13,342 - 20,012	Pass
SPW-2659	6/5/2017	H-3	17,027 ± 390	16,677	13,342 - 20,012	Pass
SPW-2790	6/9/2017	H-3	17,101 ± 392	17,101	13,325 - 19,988	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-2798	6/12/2017	H-3	16,683 ± 364	16,649	13,319 - 19,978	Pass
SPW-2943	6/19/2017	Sr-90	39.2 ± 2.3	36.1	28.9 - 43.4	Pass
SPW-3509	6/15/2017	Ra-226	17.6 ± 0.5	16.7	13.4 - 20.1	Pass
W-061317	4/29/2016	Cs-134	35.0 ± 6.2	36.2	29.0 - 43.4	Pass
W-061317	4/29/2016	Cs-137	77.4 ± 7.8	71.9	57.5 - 86.3	Pass
SPW-3041	6/23/2017	H-3	16,419 ± 378	16,620	13,296 - 19,945	Pass
SPW-3511	6/23/2017	Ra-226	15.5 ± 0.6	16.7	13.4 - 20.1	Pass
SPW-3103	6/28/2017	H-3	16,507 ± 380	16,507	13,286 - 19,929	Pass
SPW-3117	6/29/2017	Tc-99	112.7 ± 1.9	107.8	86.2 - 129.4	Pass
SPW-3513	6/29/2017	Ra-226	17.8 ± 0.5	16.7	13.4 - 20.1	Pass
SPW-3188	7/3/2017	Sr-90	38.1 ± 2.2	36.1	28.9 - 43.4	Pass
SPW-3283	7/11/2017	H-3	16,057 ± 347	16,649	13,319 - 19,978	Pass
SPW-4054	7/11/2017	Ra-226	17.7 ± 0.4	16.0	11.2 - 20.8	Pass
SPW-3467	7/14/2017	Gr. Alpha	22.3 ± 0.5	20.1	12.0 - 28.1	Pass
SPW-3467	7/14/2017	Gr. Beta	29.1 ± 0.3	28.2	17.3 - 40.4	Pass
SPW-3449	7/15/2017	H-3	17,196 ± 393	16,507	13,286 - 19,929	Pass
SPW-3548	7/19/2017	H-3	16,764 ± 386	16,507	13,286 - 19,929	Pass
SPW-3728	7/24/2017	H-3	16,117 ± 354	16,507	13,286 - 19,929	Pass
SPW-3794	7/28/2017	H-3	16,645 ± 384	16,507	13,286 - 19,929	Pass
W-072817	4/29/2016	Cs-134	38.6 ± 5.6	36.2	29.0 - 43.4	Pass
W-072817	4/29/2016	Cs-137	76.5 ± 7.6	71.9	57.5 - 86.3	Pass
SPW-3905	8/3/2017	Gr. Alpha	22.3 ± 0.5	20.1	12.0 - 28.1	Pass
SPW-3905	8/3/2017	Gr. Beta	27.6 ± 0.3	28.2	17.3 - 40.4	Pass
SPW-4030	8/9/2017	H-3	17,636 ± 403	16,507	13,286 - 19,929	Pass
SPW-4086	8/14/2017	H-3	17,472 ± 401	16,507	13,286 - 19,929	Pass
SPW-4207	8/17/2017	H-3	17,013 ± 393	16,507	13,286 - 19,929	Pass
W-083017	4/29/2016	Cs-134	34.7 ± 6.4	36.2	29.0 - 43.4	Pass
W-083017	4/29/2016	Cs-137	78.2 ± 6.7	71.9	57.5 - 86.3	Pass
SPW-4241	8/19/2017	H-3	17,222 ± 371	16,507	13,286 - 19,929	Pass
SPW-4458	9/1/2017	Ra-226	14.1 ± 1.8	16.7	13.4 - 20.1	Pass
SPW-4466	9/6/2017	Sr-89	22.8 ± 8.5	26.4	21.1 - 31.7	Pass
SPW-4466	9/6/2017	Sr-90	32.5 ± 2.1	33.8	27.0 - 40.6	Pass
SPW-4512	9/8/2017	Gr. Alpha	19.2 ± 0.4	20.1	10.1 - 30.2	Pass
SPW-4512	9/8/2017	Gr. Beta	27.8 ± 0.3	27.9	22.3 - 33.5	Pass
SPW-4586	9/9/2017	H-3	16,586 ± 362	16,507	13,286 - 19,929	Pass
SPW-4720	9/16/2017	H-3	16,439 ± 362	16,507	13,286 - 19,929	Pass
SPW-4834	9/22/2017	H-3	16,238 ± 378	16,507	13,286 - 19,929	Pass
SPW-4935	9/27/2017	H-3	16,595 ± 381	16,507	13,286 - 19,929	Pass
SPW-4937	9/27/2017	Ra-228	5.7 ± 0.9	5.8	4.1 - 7.5	Pass
W-092717	4/29/2016	Cs-134	36.0 ± 5.9	36.2	29.0 - 43.4	Pass
W-092717	4/29/2016	Cs-137	82.6 ± 8.5	71.9	57.5 - 86.3	Pass
SPW-5001	9/29/2017	H-3	16,446 ± 358	16,507	13,286 - 19,929	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-5134	10/6/2017	H-3	16,128 ± 373	16,507	13,286 - 19,929	Pass
SPW-5274	10/12/2017	H-3	16,108 ± 374	16,507	13,286 - 19,929	Pass
W-101217S	10/12/2017	Fe-55	1,491 ± 77	1,482	1,186 - 01,778	Pass
SPW-5408	10/18/2017	Ni-63	203 ± 3	199	159 - 238	Pass
SPW-5430	10/19/2017	H-3	16,453 ± 380	16,507	13,286 - 19,929	Pass
W-102017	4/29/2016	Cs-134	31.3 ± 4.9	36.2	29.0 - 43.4	Pass
W-102017	4/29/2016	Cs-137	80.4 ± 6.9	71.9	57.5 - 86.3	Pass
SPW-5674	10/25/2017	H-3	16,313 ± 380	16,507	13,286 - 19,929	Pass
SPW-5719	10/27/2017	H-3	16,113 ± 350	16,507	13,286 - 19,929	Pass
SPW-5730	10/31/2017	H-3	16,776 ± 387	16,507	13,286 - 19,929	Pass
SPW-5944	10/27/2017	Ra-226	16.4 ± 0.5	16.7	13.4 - 20.1	Pass
SPW-5915	11/9/2017	H-3	16,930 ± 390	16,507	13,286 - 19,929	Pass
SPW-5989	11/11/2017	H-3	16,084 ± 352	16,507	13,286 - 19,929	Pass
W-111417	4/29/2016	Cs-134	38.1 ± 6.2	36.2	29.0 - 43.4	Pass
W-111417	4/29/2016	Cs-137	74.0 ± 7.5	71.9	57.5 - 86.3	Pass
SPW-6121	11/16/2017	H-3	16,276 ± 378	16,507	13,286 - 19,929	Pass
SPW-6132	11/20/2017	H-3	15,897 ± 374	16,507	13,286 - 19,929	Pass
SPW-6249	11/30/2017	Ra-226	12.2 ± 0.4	12.3	9.8 - 14.8	Pass
SPW-6226	12/1/2017	H-3	16,164 ± 378	16,507	13,286 - 19,929	Pass
SPW-6318	12/7/2017	H-3	15,779 ± 372	16,507	13,286 - 19,929	Pass
W-120817	4/29/2016	Cs-134	29.5 ± 5.6	36.2	29.0 - 43.4	Pass
W-120817	4/29/2016	Cs-137	78.8 ± 9.6	71.9	57.5 - 86.3	Pass
SPW-65	12/11/2017	Ra-226	12.5 ± 0.4	12.3	9.8 - 14.8	Pass
SPW-6437	12/13/2017	Gr. Alpha	19.6 ± 0.4	20.1	10.1 - 30.2	Pass
SPW-6437	12/13/2017	Gr. Beta	28.2 ± 0.3	27.9	22.3 - 33.5	Pass
SPW-6463	12/15/2017	H-3	15,560 ± 372	16,507	13,286 - 19,929	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)	Acceptance[d]
SPW-31	Water	1/6/2017	H-3	143	71 ± 75	200	Pass
SPW-45	Water	1/9/2017	Gr. Alpha	0.41	0.09 ± 0.30	2	Pass
SPW-45	Water	1/9/2017	Gr. Beta	0.74	-0.56 ± 0.50	4	Pass
SPW-91	Water	1/11/2017	H-3	151	-23 ± 71	200	Pass
SPW-141	Water	1/12/2017	Sr-89	0.55	0.29 ± 0.47	5	Pass
SPW-141	Water	1/12/2017	Sr-90	0.67	-0.02 ± 0.31	1	Pass
SPW-154	Water	1/19/2017	H-3	155	-17 ± 73	200	Pass
SPW-185	Water	1/23/2017	H-3	176	44 ± 94	200	Pass
SPW-231	Water	1/19/2017	H-3	179	26 ± 87	200	Pass
SPW-303	Water	1/26/2017	H-3	160	8 ± 77	200	Pass
SPW-305	Water	1/4/2017	Ra-226	0.02	0.02 ± 0.01	2	Pass
SPW-307	Water	1/27/2017	I-131	0.21	0.01 ± 0.11	1.00	Pass
SPW-332	Water	1/30/2017	H-3	169	-52 ± 86	200	Pass
SPW-352	Water	2/2/2017	U-234	0.14	0.00 ± 0.08	1	Pass
SPW-352	Water	2/2/2017	U-238	0.14	0.12 ± 0.15	1	Pass
SPW-411	Water	2/6/2017	Sr-89	0.49	0.30 ± 0.35	5	Pass
SPW-411	Water	2/6/2017	Sr-90	0.52	-0.22 ± 0.21	1	Pass
SPW-464	Water	2/8/2017	H-3	155	2 ± 74	200	Pass
SPW-560	Water	2/15/2017	H-3	156	38 ± 77	200	Pass
SPW-604	Water	2/16/2017	H-3	154	59 ± 77	200	Pass
SPW-656	Water	2/17/2017	H-3	187	28 ± 94	200	Pass
SPW-713	Water	2/23/2017	H-3	161	20 ± 81	200	Pass
SPW-736	Water	2/28/2017	H-3	161	-75 ± 76	200	Pass
SPAP-739	AP	2/28/2017	Gr. Beta	0.002	0.004 ± 0.001	0.01	Pass
SPAP-741	AP	2/24/2017	Cs-134	2.27	-0.95 ± 1.29	100	Pass
SPAP-741	AP	2/24/2017	Cs-137	2.65	0.17 ± 1.67	100	Pass
SPW-747	Water	2/28/2017	C-14	161	-28 ± 97	200	Pass
SPW-749	Water	2/28/2017	Ni-63	17	-3 ± 10	200	Pass
SPF-751	Fish	2/28/2017	Cs-134	0.008	0.002 ± 0.004	100	Pass
SPF-751	Fish	2/28/2017	Cs-137	0.008	0.000 ± 0.005	100	Pass
SPW-780	Water	3/1/2017	Ra-226	0.02	0.02 ± 0.01	2	Pass
SPW-782	Water	3/1/2017	H-3	154	35 ± 78	200	Pass
SPW-3506	Water	3/1/2017	Ra-226	0.03	0.02 ± 0.02	2	Pass
SPW-836	Water	3/3/2017	I-131	0.38	0.04 ± 0.18	1	Pass
SPW-1009	Water	3/14/2017	H-3	154	-31 ± 72	200	Pass
SPW-1025	Water	3/16/2017	Gr. Alpha	0.43	-0.16 ± 0.28	2	Pass
SPW-1025	Water	3/16/2017	Gr. Beta	0.75	-0.24 ± 0.52	4	Pass
SPW-1091	Water	3/21/2017	H-3	145	60 ± 73	200	Pass
SPW-1150	Water	3/24/2017	H-3	152	-31 ± 71	200	Pass
SPW-1162	Water	3/28/2017	Sr-89	0.61	-0.39 ± 0.45	5	Pass
SPW-1162	Water	3/28/2017	Sr-90	0.52	0.18 ± 0.27	1	Pass

[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.

[d] Acceptance considered as a "Pass" when activity result is less than acceptance criteria.

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)	Acceptance[d]
SPW-1177	Water	3/29/2017	Ra-228	0.83	-0.14 ± 0.36	2	Pass
SPW-1231	Water	3/30/2017	H-3	150	24 ± 73	200	Pass
SPW-1245	Water	3/31/2017	Cs-134	3.73	0.43 ± 2.18	100	Pass
SPW-1245	Water	3/31/2017	Cs-137	3.01	-1.23 ± 2.12	100	Pass
SPW-1245	Water	3/31/2017	I-131(G)	5.39	0.92 ± 2.15	100	Pass
SPW-1245	Water	3/31/2017	i-131	0.32	0.03 ± 0.18	1	Pass
SPMI-1247	Milk	3/31/2017	Cs-134	3.70	1.23 ± 1.96	100	Pass
SPMI-1247	Milk	3/31/2017	Cs-137	3.62	-0.84 ± 2.15	100	Pass
SPMI-1247	Milk	3/31/2017	I-131(G)	4.42	0.39 ± 2.14	100	Pass
SPW-1294	Water	3/31/2017	Ra-226	0.02	0.18 ± 0.02	2	Pass
SPW-1303	Water	4/4/2017	H-3	151	8 ± 75	200	Pass
SPW-1377	Water	4/7/2017	H-3	150	29 ± 72	200	Pass
SPW-1390	Water	4/7/2017	Gr. Alpha	0.42	0.15 ± 0.31	2	Pass
SPW-1390	Water	4/7/2017	Gr. Beta	0.73	-0.17 ± 0.51	4	Pass
SPW-1479	Water	4/12/2017	H-3	151	89 ± 77	200	Pass
SPW-1574	Water	4/18/2017	H-3	144	55 ± 79	200	Pass
SPW-1625	Water	4/20/2017	Sr-89	0.59	-0.01 ± 0.50	5	Pass
SPW-1625	Water	4/20/2017	Sr-90	0.71	0.16 ± 0.35	1	Pass
SPW-1657	Water	4/21/2017	H-3	147	34 ± 73	200	Pass
SPW-1775	Water	4/26/2017	H-3	155	67 ± 80	200	Pass
SPW-1805	Water	4/27/2017	H-3	153	15 ± 74	200	Pass
SPW-1936	Water	5/3/2017	H-3	148	33 ± 71	200	Pass
SPW-1970	Water	5/5/2017	Sr-89	0.66	0.34 ± 0.54	5	Pass
SPW-1970	Water	5/5/2017	Sr-90	0.62	-0.08 ± 0.28	1	Pass
SPW-2032	Water	5/8/2017	H-3	147	66 ± 73	200	Pass
SPW-2419	Water	5/9/2017	Ra-226	0.03	0.01 ± 0.03	2	Pass
SPW-2283	Water	5/22/2017	H-3	155	24 ± 78	200	Pass
SPW-2353	Water	5/23/2017	H-3	151	56 ± 76	200	Pass
SPW-2890	Water	5/23/2017	Ra-226	0.03	-0.01 ± 0.02	2	Pass
SPMI-2377	Milk	5/24/2017	Sr-89	0.78	0.86 ± 0.93	5	Pass
SPMI-2377	Milk	5/24/2017	Sr-90	0.49	0.95 ± 0.33	1	Pass
SPW-2438	Water	5/25/2017	Ra-228	0.90	-0.28 ± 0.38	2	Pass
SPW-2467	Water	5/26/2017	H-3	152	27 ± 77	200	Pass
SPW-2417	Water	5/26/2017	Ra-228	0.80	1.58 ± 0.54	2	Pass
SPW-2447	Water	5/26/2017	I-131	0.21	-0.05 ± 0.12	1	Pass
SPW-2501	Water	6/1/2017	H-3	151	-23 ± 70	200	Pass
SPW-2658	Water	6/5/2017	H-3	152	107 ± 78	200	Pass
SPW-2789	Water	6/9/2017	H-3	150	52 ± 77	200	Pass
SPW-2797	Water	6/12/2017	H-3	177	7 ± 93	200	Pass
SPW-2847	Water	6/14/2017	I-131	0.18	0.03 ± 0.10	1	Pass

[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.

[d] Acceptance considered as a "Pass" when activity result is less than acceptance criteria.

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

Lab Code	Sample Type	Date	Analysis[b]	Concentration[a] Laboratory results (4.66σ) LLD	Activity[c]	Acceptance Criteria (4.66 σ)	Acceptance[d]
SPW-3508	Water	6/15/2017	Ra-226	0.03	0.00 ± 0.02	2	Pass
SPW-2942	Water	6/19/2017	Sr-89	0.58	0.80 ± 0.53	5	Pass
SPW-2942	Water	6/19/2017	Sr-90	0.50	0.15 ± 0.25	1	Pass
SPW-3042	Water	6/23/2017	H-3	146	25 ± 74	200	Pass
SPW-3510	Water	6/23/2017	Ra-226	0.02	0.03 ± 0.02	2	Pass
SPW-3102	Water	6/28/2017	H-3	148	-7 ± 73	200	Pass
SPW-3116	Water	6/29/2017	Tc-99	5.91	-0.39 ± 3.58	10	Pass
SPW-3512	Water	6/29/2017	Ra-226	0.02	-0.01 ± 0.02	2	Pass
SPW-3187	Water	7/3/2017	Sr-89	0.62	0.00 ± 0.48	5	Pass
SPW-3187	Water	7/3/2017	Sr-90	0.48	0.07 ± 0.23	1	Pass
SPW-3282	Water	7/11/2017	H-3	178	-37 ± 84	200	Pass
SPW-4053	Water	7/11/2017	Ra-226	0.03	0.02 ± 0.02	2	Pass
SPW-3466	Water	7/14/2017	Gr. Alpha	0.42	-0.09 ± 0.28	2	Pass
SPW-3466	Water	7/14/2017	Gr. Beta	0.76	-0.18 ± 0.53	4	Pass
SPW-3448	Water	7/15/2017	H-3	150	54 ± 77	200	Pass
SPW-3727	Water	7/27/2017	Ni-63	90	18 ± 55	200	Pass
SPW-3793	Water	7/28/2017	H-3	151	47 ± 82	200	Pass
SPW-3904	Water	8/3/2017	Gr. Alpha	0.47	-0.02 ± 0.33	2	Pass
SPW-3904	Water	8/3/2017	Gr. Beta	0.75	-0.11 ± 0.52	4	Pass
SPW-4029	Water	8/9/2017	H-3	159	11 ± 79	200	Pass
SPW-4206	Water	8/17/2017	H-3	157	55 ± 76	200	Pass
SPW-4241	Water	8/19/2017	H-3	190	61 ± 96	200	Pass
SPW-4085	Water	8/14/2017	H-3	159	-28 ± 77	200	Pass
SPW-4206	Water	8/17/2017	H-3	157	55 ± 76	200	Pass
SPW-4241	Water	8/19/2017	H-3	190	61 ± 96	200	Pass
SPW-4457	Water	9/1/2017	Ra-228	0.78	-0.02 ± 0.36	2	Pass
SPW-4465	Water	9/6/2017	Sr-89	0.51	0.30 ± 0.37	5	Pass
SPW-4465	Water	9/6/2017	Sr-90	0.46	-0.09 ± 0.20	1	Pass
SPW-4585	Water	9/9/2017	H-3	187	-86 ± 83	200	Pass
SPW-5720	Water	9/13/2017	Ra-226	0.02	0.13 ± 0.02	2	Pass
SPW-4703	Water	9/15/2017	I-131	0.17	0.10 ± 0.10	1	Pass
SPW-4719	Water	9/16/2017	H-3	184	-86 ± 93	200	Pass
SPW-4833	Water	9/22/2017	H-3	150	5 ± 72	200	Pass
SPW-4934	Water	9/27/2017	H-3	148	5 ± 70	200	Pass
SPW-4936	Water	9/27/2017	Ra-228	0.80	0.55 ± 0.44	2	Pass
SPW-5000	Water	9/29/2017	H-3	183	-13 ± 90	200	Pass
SPW-5133	Water	10/6/2017	H-3	144	64 ± 71	200	Pass
SPW-5273	Water	10/12/2017	H-3	142	106 ± 72	200	Pass

[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.

[d] Acceptance considered as a "Pass" when activity result is less than acceptance criteria.

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)	Acceptance[d]
SPW-5407	Water	10/18/2017	Ni-63	69	43 ± 43	200	Pass
SPW-5429	Water	10/19/2017	H-3	148	54 ± 72	200	Pass
SPW-5603	Water	10/23/2017	Sr-89	0.57	0.16 ± 0.47	5	Pass
SPW-5603	Water	10/23/2017	Sr-90	0.70	-0.12 ± 0.31	1	Pass
SPW-5673	Water	10/25/2017	H-3	156	-36 ± 71	200	Pass
SPW-5718	Water	10/27/2017	H-3	182	45 ± 92	200	Pass
SPW-5943	Water	10/27/2017	Ra-226	0.02	0.08 ± 0.02	2	Pass
SPW-5723	Water	10/30/2017	I-131	0.10	0.03 ± 0.07	1	Pass
SPW-5914	Water	11/09/17	H-3	149	-39 ± 68	200	Pass
SPW-5988	Water	11/11/2017	H-3	183	-8 ± 88	200	Pass
SPW-6120	Water	11/16/2017	H-3	146	83 ± 75	200	Pass
SPW-6131	Water	11/20/2017	H-3	151	16 ± 72	200	Pass
SPW-6197	Water	11/29/2017	I-131	0.38	0.01 ± 0.18	1	Pass
SPW-6248	Water	11/30/2017	Ra-226	0.03	0.15 ± 0.03	2	Pass
SPW-6225	Water	12/1/2017	H-3	154	-10 ± 72	200	Pass
SPW-6317	Water	12/7/2017	H-3	148	44 ± 74	200	Pass
SPW-64	Water	12/11/2017	Ra-226	0.03	0.18 ± 0.03	2	Pass
SPW-6436	Water	12/13/2017	Gr. Alpha	0.54	-0.17 ± 0.37	2	Pass
SPW-6436	Water	12/13/2017	Gr. Beta	0.74	0.12 ± 0.52	4	Pass
SPW-6464	Water	12/15/2017	H-3	148	31 ± 75	200	Pass

[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.

[d] Acceptance considered as a "Pass" when activity result is less than acceptance criteria.

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

			Concentration [a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
AP-7178,7179	1/3/2017	Be-7	0.047 ± 0.015	0.062 ± 0.017	0.054 ± 0.012	Pass
SW-6986,6987	1/3/2017	Gr. Beta	1.39 ± 0.41	0.77 ± 0.41	1.08 ± 0.29	Pass
E-66,67	1/3/2017	Gr. Beta	1.62 ± 0.05	1.45 ± 0.04	1.54 ± 0.11	Pass
E-66,67	1/3/2017	K-40	1.26 ± 0.14	1.39 ± 0.16	1.32 ± 0.11	Pass
CF-87,88	1/3/2017	Be-7	0.25 ± 0.11	0.30 ± 0.12	0.28 ± 0.08	Pass
CF-87,88	1/3/2017	K-40	7.77 ± 0.39	6.84 ± 0.37	7.31 ± 0.27	Pass
AP-011217	1/12/2017	Be-7	0.137 ± 0.078	0.139 ± 0.082	0.138 ± 0.056	Pass
MI-212,213	1/16/2017	K-40	1,515 ± 98	1,347 ± 107	1,431 ± 73	Pass
WW-321,322	1/19/2017	H-3	675 ± 118	506 ± 133	590 ± 89	Pass
WW-674,675	1/20/2017	H-3	7,326 ± 254	7,717 ± 259	7,522 ± 181	Pass
AP-012317	1/23/2017	Gr. Beta	0.034 ± 0.005	0.038 ± 0.005	0.036 ± 0.004	Pass
WW-298,299	1/24/2017	H-3	5,916 ± 239	5764 ± 237	5840 ± 168	Pass
AP-013117	1/30/2017	Gr. Beta	0.027 ± 0.004	0.028 ± 0.004	0.028 ± 0.003	Pass
WW-500,501	1/31/2017	H-3	1,058 ± 122	1,054 ± 121	1,056 ± 86	Pass
SW-391,392	1/31/2017	Gr. Beta	1.40 ± 0.56	1.62 ± 0.61	1.51 ± 0.41	Pass
SPS-370,371	2/1/2017	K-40	23.47 ± 0.66	23.11 ± 0.72	23.29 ± 0.49	Pass
AP-456,457	2/2/2017	Be-7	0.129 ± 0.076	0.167 ± 0.092	0.148 ± 0.060	Pass
AP-020217	2/2/2017	Gr. Beta	0.021 ± 0.004	0.027 ± 0.004	0.024 ± 0.003	Pass
SPS-414,415	2/3/2017	K-40	19.45 ± 1.85	21.58 ± 1.99	20.52 ± 1.36	Pass
AP-020617	2/6/2017	Gr. Beta	0.023 ± 0.004	0.023 ± 0.004	0.023 ± 0.003	Pass
AP-021417A	2/14/2017	Gr. Beta	0.031 ± 0.004	0.030 ± 0.004	0.030 ± 0.003	Pass
SPW-543	2/14/2017	Gr. Beta	7.99 ± 0.82	9.45 ± 0.88	8.72 ± 0.60	Pass
AP-021417B	2/14/2017	Gr. Beta	0.024 ± 0.004	0.028 ± 0.004	0.026 ± 0.003	Pass
WW-718,719	2/14/2017	H-3	737 ± 113	643 ± 110	690 ± 79	Pass
AP-022017	2/20/2017	Gr. Beta	0.018 ± 0.005	0.021 ± 0.005	0.020 ± 0.004	Pass
WW-755,756	2/22/2017	H-3	3,709 ± 196	3,823 ± 198	3,766 ± 139	Pass
AP-022717	2/27/2017	Gr. Beta	0.021 ± 0.004	0.019 ± 0.004	0.020 ± 0.003	Pass
SPDW-80011,2	3/2/2017	Ra-226	7.29 ± 0.32	6.76 ± 0.30	7.03 ± 0.22	Pass
SPDW-80011,2	3/2/2017	Ra-228	4.68 ± 0.82	6.29 ± 1.03	5.49 ± 0.66	Pass
SPDW-80013,4	3/2/2017	Gr. Alpha	13.57 ± 1.43	12.44 ± 1.37	13.01 ± 0.99	Pass
WW-845,846	3/2/2017	H-3	314 ± 93	249 ± 90	281 ± 65	Pass
AP-030617	3/6/2017	Gr. Beta	0.022 ± 0.004	0.019 ± 0.004	0.020 ± 0.003	Pass
WW-1050,1051	3/8/2017	H-3	14,994 ± 364	14,745 ± 362	14,870 ± 257	Pass
SPS-920,921	3/9/2017	K-40	23.30 ± 1.76	23.13 ± 1.64	23.21 ± 1.20	Pass
WW-1004,1005	3/13/2017	H-3	182 ± 80	158 ± 79	170 ± 56	Pass
SPS-1029,1030	3/15/2017	K-40	11.82 ± 0.68	12.01 ± 0.68	11.92 ± 0.48	Pass
AP-031517	3/15/2017	Gr. Beta	0.020 ± 0.003	0.020 ± 0.003	0.020 ± 0.002	Pass
SPDW-80037,8	3/20/2017	Gr. Alpha	4.54 ± 0.82	5.29 ± 0.91	4.91 ± 0.61	Pass
AP-032017	3/20/2017	Gr. Beta	0.021 ± 0.006	0.021 ± 0.006	0.021 ± 0.005	Pass
WW-1094,1095	3/20/2017	H-3	1,571 ± 137	1,595 ± 138	1,583 ± 175	Pass

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

			Concentration [a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
WW-1175,1176	3/20/2017	H-3	218 ± 84	211 ± 84	214 ± 59	Pass
WW-1129,1130	3/21/2017	Gr. Beta	3.51 ± 1.24	2.99 ± 1.17	3.25 ± 0.85	Pass
WW-1219,1220	3/22/2017	H-3	11,467 ± 322	11,516 ± 323	11,492 ± 200	Pass
SPS-1152,1153	3/27/2017	Ac-228	20.39 ± 0.75	20.43 ± 0.88	20.41 ± 0.58	Pass
SPS-1152,1153	3/27/2017	Pb-214	17.22 ± 0.50	16.44 ± 0.52	16.83 ± 0.36	Pass
SPDW-80047,8	3/28/2017	Ra-226	2.06 ± 0.23	1.60 ± 0.32	1.83 ± 0.20	Pass
SPDW-80047,8	3/28/2017	Ra-228	0.53 ± 0.48	0.78 ± 0.49	0.66 ± 0.34	Pass
SWU-1242,1243	3/28/2017	Gr. Beta	2.04 ± 0.81	2.47 ± 0.69	2.26 ± 0.53	Pass
SPS-1198,1199	3/29/2017	K-40	16.95 ± 1.85	18.33 ± 1.71	17.64 ± 1.26	Pass
SPDW-80050,1	3/29/2017	Gr. Alpha	3.19 ± 0.80	3.39 ± 0.78	3.29 ± 0.56	Pass
SPDW-80050,1	3/29/2017	Gr. Beta	1.58 ± 0.60	2.08 ± 0.63	1.83 ± 0.44	Pass
AP-1706,1707	3/30/2017	Be-7	0.068 ± 0.018	0.072 ± 0.017	0.070 ± 0.012	Pass
SW-1381,1382	4/5/2017	H-3	402 ± 92	309 ± 88	356 ± 64	Pass
WW-1446,1447	4/6/2017	H-3	305 ± 89	358 ± 91	332 ± 64	Pass
WW-1532,1533	4/10/2017	H-3	19,124 ± 412	18,991 ± 410	19,058 ± 291	Pass
WW-1618,1619	4/12/2017	H-3	4,187 ± 203	4,305 ± 205	4,246 ± 144	Pass
SS-1553,1554	4/13/2017	Gr. Beta	7.16 ± 0.99	6.09 ± 0.91	6.63 ± 0.67	Pass
SS-1553,1554	4/13/2017	K-40	4.60 ± 0.32	4.84 ± 0.34	4.72 ± 0.23	Pass
SS-1553,1554	4/13/2017	Tl-208	0.038 ± 0.016	0.032 ± 0.011	0.035 ± 0.010	Pass
SS-1553,1554	4/13/2017	Pb-212	0.101 ± 0.015	0.096 ± 0.015	0.098 ± 0.010	Pass
SS-1553,1554	4/13/2017	Bi-214	0.094 ± 0.032	0.109 ± 0.022	0.101 ± 0.019	Pass
SS-1553,1554	4/13/2017	Ac-228	0.089 ± 0.042	0.111 ± 0.046	0.100 ± 0.031	Pass
P-2015,2016	5/4/2017	H-3	189 ± 80	212 ± 81	200 ± 57	Pass
WW-2336,2337	5/8/2017	H-3	422 ± 97	298 ± 91	360 ± 66	Pass
AP-051117	5/11/2017	Gr. Beta	0.018 ± 0.003	0.025 ± 0.004	0.021 ± 0.002	Pass
WW-2497,2498	5/23/2017	H-3	1,268 ± 127	1,247 ± 126	1,257 ± 89	Pass
WW-2583,2584	5/23/2017	H-3	5,159 ± 224	5,223 ± 126	5,191 ± 129	Pass
WW-2732,2733	5/23/2017	H-3	8,559 ± 282	8,570 ± 283	8,564 ± 200	Pass
XW-1218,1219	5/23/2017	H-3	11,467 ± 282	11,516 ± 283	11,492 ± 200	Pass
MI-2428,2429	5/24/2017	K-40	1,752 ± 137	1,805 ± 132	1,778 ± 95	Pass
SO-2562,2563	5/24/2017	K-40	7.87 ± 0.50	8.64 ± 0.49	8.25 ± 0.35	Pass
WW-3023,3024	5/24/2017	H-3	27,398 ± 486	27,733 ± 489	27,565 ± 344	Pass
SO-2453,2454	5/25/2017	Gr. Beta	14.38 ± 0.93	15.70 ± 1.06	15.04 ± 0.70	Pass
SO-2453,2454	5/25/2017	Cs-137	0.17 ± 0.03	0.18 ± 0.03	0.17 ± 0.02	Pass
SO-2453,2454	5/25/2017	K-40	9.80 ± 0.50	9.19 ± 0.57	9.50 ± 0.38	Pass
SO-2453,2454	5/25/2017	Tl-208	0.09 ± 0.02	0.10 ± 0.03	0.09 ± 0.02	Pass
SO-2453,2454	5/25/2017	Pb-212	0.29 ± 0.03	0.30 ± 0.03	0.29 ± 0.02	Pass
SO-2453,2454	5/25/2017	Bi-214	0.24 ± 0.03	0.18 ± 0.04	0.21 ± 0.03	Pass
SO-2453,2454	5/25/2017	Ra-226	0.82 ± 0.22	0.62 ± 0.27	0.72 ± 0.17	Pass
SO-2453,2454	5/25/2017	Ac-228	0.32 ± 0.07	0.28 ± 0.08	0.30 ± 0.05	Pass

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

			Concentration [a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
SWT-2625,2626	5/30/2017	Gr. Beta	0.64 ± 0.53	1.08 ± 0.55	0.86 ± 0.38	Pass
AP-053117	5/31/2017	Gr. Beta	0.013 ± 0.003	0.011 ± 0.003	0.012 ± 0.002	Pass
G-2646,2647	6/1/2017	Be-7	1.02 ± 0.17	1.06 ± 0.26	1.04 ± 0.15	Pass
G-2646,2647	6/1/2017	K-40	7.51 ± 0.49	6.55 ± 0.51	7.03 ± 0.36	Pass
SL-2669,70	6/1/2017	Be-7	0.34 ± 0.06	0.30 ± 0.06	0.32 ± 0.04	Pass
SL-2669,70	6/1/2017	K-40	4.35 ± 0.14	4.39 ± 0.15	4.37 ± 0.10	Pass
F-2711,2712	6/2/2017	K-40	2.56 ± 0.32	2.77 ± 0.44	2.66 ± 0.27	Pass
AP-060617	6/6/2017	Gr. Beta	0.026 ± 0.005	0.027 ± 0.005	0.027 ± 0.004	Pass
SW-2849,50	6/8/2017	H-3	8,178 ± 273	8,563 ± 279	8,371 ± 195	Pass
AP-061217	6/12/2017	Gr. Beta	0.027 ± 0.005	0.027 ± 0.005	0.027 ± 0.004	Pass
BS-3446,3447	6/12/2017	K-40	8.30 ± 0.47	8.57 ± 0.47	8.44 ± 0.33	Pass
VE-2870,2871	6/13/2017	K-40	3.65 ± 0.25	3.90 ± 0.26	3.77 ± 0.18	Pass
AP-2914,5	6/15/2017	Be-7	0.269 ± 0.146	0.212 ± 0.123	0.240 ± 0.095	Pass
AP-3067,8	6/15/2017	Be-7	0.204 ± 0.113	0.328 ± 0.126	0.266 ± 0.085	Pass
AP-061917	6/19/2017	Gr. Beta	0.020 ± 0.004	0.019 ± 0.004	0.020 ± 0.003	Pass
AP-3610,1	6/26/2017	Be-7	0.107 ± 0.015	0.116 ± 0.021	0.111 ± 0.013	Pass
AP-062617	6/26/2017	Gr. Beta	0.017 ± 0.004	0.021 ± 0.004	0.019 ± 0.003	Pass
AP-3673,3674	7/3/2017	Be-7	0.087 ± 0.008	0.078 ± 0.008	0.083 ± 0.006	Pass
AP-3287,3288	7/6/2017	Be-7	0.207 ± 0.112	0.244 ± 0.096	0.226 ± 0.074	Pass
WW-3308,3309	7/7/2017	H-3	549 ± 108	501 ± 107	525 ± 76	Pass
VE-3362,3363	7/12/2017	K-40	2.32 ± 0.17	2.40 ± 0.16	2.36 ± 0.12	Pass
VE-3589,3590	7/18/2017	K-40	5.25 ± 0.33	4.64 ± 0.33	4.94 ± 0.23	Pass
SG-3631,3632	7/18/2017	Pb-214	3.03 ± 0.11	2.97 ± 0.11	3.00 ± 0.08	Pass
SG-3631,3632	7/18/2017	Ac-228	2.47 ± 0.22	2.56 ± 0.23	2.52 ± 0.16	Pass
WW-3846,3847	7/25/2017	H-3	505 ± 101	446 ± 98	475 ± 70	Pass
F-4509,4510	7/26/2017	K-40	0.85 ± 0.25	1.00 ± 0.25	0.93 ± 0.18	Pass
F-4509,4510	7/26/2017	Gr. Beta	1.19 ± 0.03	1.18 ± 0.03	1.18 ± 0.02	Pass
G-3804,3805	7/27/2017	Be-7	3.72 ± 0.39	3.47 ± 0.40	3.59 ± 0.28	Pass
G-3804,3805	7/27/2017	K-40	4.21 ± 0.52	4.46 ± 0.52	4.34 ± 0.33	Pass
SL-3888,3889	8/1/2017	Be-7	0.77 ± 0.04	0.73 ± 0.07	0.75 ± 0.04	Pass
SL-3888,3889	8/1/2017	K-40	0.94 ± 0.04	0.87 ± 0.08	0.90 ± 0.23	Pass
WW-4158,4159	8/8/2017	H-3	321 ± 90	270 ± 88	295 ± 63	Pass
VE-4179,4180	8/14/2017	K-40	1.84 ± 0.18	1.90 ± 0.21	1.87 ± 0.14	Pass
AP-4289,4290	8/17/2017	Be-7	0.212 ± 0.095	0.162 ± 0.080	0.187 ± 0.062	Pass
F-4333,4334	8/18/2017	K-40	3.22 ± 0.41	3.62 ± 0.42	3.42 ± 0.29	Pass
CF-4310,4311	8/21/2017	K-40	10.94 ± 0.74	11.48 ± 0.50	11.21 ± 0.45	Pass
DW-80161,80162	8/22/2017	Ra-226	1.22 ± 0.15	1.19 ± 0.17	1.21 ± 0.11	Pass
DW-80161,80162	8/22/2017	Ra-228	1.99 ± 0.63	0.70 ± 0.49	1.35 ± 0.40	Pass
VE-4398,4399	8/28/2017	Be-7	0.13 ± 0.07	0.13 ± 0.08	0.13 ± 0.05	Pass

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

Lab Code	Date	Analysis	Concentration [a] First Result	Second Result	Averaged Result	Acceptance
VE-4398,4399	8/28/2017	K-40	3.32 ± 0.22	3.48 ± 0.25	3.40 ± 0.17	Pass
SW-4463,4464	8/29/2017	H-3	495 ± 106	491 ± 106	493 ± 75	Pass
LW-4486,4487	8/31/2017	Gr. Beta	0.425 ± 0.471	1.358 ± 0.571	0.892 ± 0.370	Pass
VE-4561,4562	9/6/2017	Be-7	5.89 ± 0.29	5.76 ± 0.25	5.83 ± 0.19	Pass
VE-4561,4562	9/6/2017	K-40	3.73 ± 0.34	3.77 ± 0.29	3.75 ± 0.22	Pass
BO-5122,5123	9/8/2017	K-40	4.50 ± 0.36	4.50 ± 0.36	4.50 ± 0.25	Pass
VE-4692,4693	9/12/2017	K-40	5.16 ± 0.13	5.31 ± 0.36	5.24 ± 0.19	Pass
SS-4650,4651	9/12/2017	K-40	10.55 ± 0.51	10.41 ± 0.54	10.48 ± 0.37	Pass
MI-4671,4672	9/13/2017	K-40	1,347 ± 115	1,283 ± 118	1,315 ± 82	Pass
MI-4671,4672	9/13/2017	Sr-90	0.7 ± 0.3	0.5 ± 0.3	0.6 ± 0.2	Pass
VE-4973,4974	9/17/2017	K-40	1.11 ± 0.15	1.17 ± 0.13	1.14 ± 0.10	Pass
F-4928,4929	9/19/2017	K-40	1.84 ± 0.31	1.68 ± 0.34	1.76 ± 0.23	Pass
S-4865,4866	9/20/2017	K-40	21.07 ± 2.39	19.09 ± 2.51	20.08 ± 1.73	Pass
VE-4907,4908	9/20/2017	K-40	3.83 ± 0.44	4.28 ± 0.31	4.05 ± 0.27	Pass
VE-4844,4845	9/21/2017	K-40	1.81 ± 0.22	1.88 ± 0.21	1.84 ± 0.15	Pass
AP-5572,5573	9/27/2017	Be-7	0.082 ± 0.015	0.075 ± 0.014	0.078 ± 0.010	Pass
LW-5145,5146	9/28/2017	Gr. Beta	0.84 ± 0.49	1.47 ± 0.57	1.16 ± 0.38	Pass
AP-092917	9/29/2017	Gr. Beta	0.038 ± 0.004	0.031 ± 0.004	0.035 ± 0.003	Pass
WW-5080,5081	10/2/2017	H-3	208 ± 79	223 ± 80	215 ± 56	Pass
AP-100217	10/2/2017	Gr. Beta	0.025 ± 0.005	0.028 ± 0.005	0.026 ± 0.003	Pass
AP-100317	10/3/2017	Gr. Beta	0.037 ± 0.004	0.033 ± 0.004	0.035 ± 0.003	Pass
S-5165,5166	10/4/2017	K-40	15.93 ± 2.30	20.34 ± 3.15	18.14 ± 1.95	Pass
VE-5228,5229	10/5/2017	K-40	3.25 ± 0.25	2.82 ± 0.24	3.04 ± 0.17	Pass
AP-100917	10/9/2017	Gr. Beta	0.021 ± 0.004	0.025 ± 0.004	0.023 ± 0.003	Pass
VE-5293,5294	10/10/2017	K-40	3.89 ± 0.30	4.08 ± 0.34	3.99 ± 0.22	Pass
DW-80184,80185	10/11/2017	Gr. Alpha	2.17 ± 0.81	2.50 ± 0.81	2.34 ± 0.57	Pass
DW-80184,80185	10/11/2017	Gr. Beta	9.45 ± 0.79	10.20 ± 0.83	9.83 ± 0.57	Pass
S-5421,5422	10/12/2017	K-40	8.82 ± 1.94	7.97 ± 0.72	8.40 ± 1.03	Pass
AP-101617	10/16/2017	Gr. Beta	0.025 ± 0.005	0.022 ± 0.004	0.024 ± 0.003	Pass
F-5658,5659	10/19/2017	K-40	2.44 ± 0.41	2.57 ± 0.39	2.51 ± 0.28	Pass
SO-5704,5705	10/25/2017	Cs-137	0.05 ± 0.02	0.04 ± 0.02	0.04 ± 0.01	Pass
SO-5704,5705	10/25/2017	K-40	10.08 ± 0.51	9.57 ± 0.56	9.83 ± 0.38	Pass
SO-5704,5705	10/25/2017	Tl-208	0.10 ± 0.02	0.09 ± 0.02	0.10 ± 0.01	Pass
SO-5704,5705	10/25/2017	Bi-214	0.34 ± 0.04	0.27 ± 0.04	0.30 ± 0.03	Pass
SO-5704,5705	10/25/2017	Pb-212	0.28 ± 0.03	0.27 ± 0.03	0.27 ± 0.02	Pass
SO-5704,5705	10/25/2017	Ra-226	1.15 ± 0.52	0.59 ± 0.22	0.87 ± 0.28	Pass
SO-5704,5705	10/25/2017	Ac-228	0.33 ± 0.05	0.31 ± 0.07	0.32 ± 0.04	Pass
SO-5704,5705	10/25/2017	Gr. Beta	18.34 ± 1.80	16.50 ± 1.03	17.42 ± 1.04	Pass
AP-5732,5733	10/26/2017	Be-7	0.139 ± 0.064	0.175 ± 0.075	0.157 ± 0.049	Pass

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

			Concentration [a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
SW-5753,5754	10/31/2017	H-3	220 ± 83	279 ± 86	249 ± 60	Pass
SWU-5816,5817	10/31/2017	Gr. Beta	1.51 ± 1.00	2.02 ± 1.02	1.76 ± 0.71	Pass
AP-103117	10/31/2017	Gr. Beta	0.015 ± 0.004	0.014 ± 0.004	0.015 ± 0.003	Pass
SO-5923,5924	11/1/2017	Cs-137	0.30 ± 0.04	0.31 ± 0.04	0.31 ± 0.03	Pass
SO-5923,5924	11/1/2017	K-40	10.52 ± 0.61	10.56 ± 0.67	10.54 ± 0.45	Pass
AP-5858,5859	11/2/2017	Be-7	0.145 ± 0.075	0.146 ± 0.084	0.145 ± 0.056	Pass
AP-110717	11/7/2017	Be-7	0.026 ± 0.004	0.030 ± 0.004	0.028 ± 0.003	Pass
WW-6032,6033	11/7/2017	H-3	204 ± 86	298 ± 80	251 ± 59	Pass
WW-6074,6075	11/8/2017	H-3	72,247 ± 786	73,062 ± 791	72,655 ± 558	Pass
BS-6053,6054	11/13/2017	K-40	7.99 ± 0.62	9.20 ± 0.68	8.60 ± 0.46	Pass
BS-6053,6054	11/13/2017	Cs-137	0.07 ± 0.03	0.08 ± 0.03	0.07 ± 0.02	Pass
DW-80211,80212	11/14/2017	Gr. Alpha	2.30 ± 0.80	3.60 ± 1.00	2.95 ± 0.64	Pass
DW-80211,80212	11/14/2017	Gr. Beta	9.32 ± 0.81	8.99 ± 0.81	9.16 ± 0.57	Pass
DW-80214,80215	11/14/2017	Ra-226	1.36 ± 0.22	1.35 ± 0.15	1.355 ± 0.13	Pass
DW-80214,80215	11/14/2017	Ra-228	1.41 ± 0.51	0.90 ± 0.45	1.16 ± 0.34	Pass
WW-6152,6153	11/15/2017	H-3	416 ± 94	328 ± 90	372 ± 65	Pass
SWU-6219,6220	11/28/2017	Gr. Beta	1.04 ± 0.54	1.75 ± 0.58	1.39 ± 0.39	Pass
SS-6242,6243	11/29/2017	K-40	24.17 ± 1.05	22.31 ± 1.03	23.24 ± 0.74	Pass
SS-6242,6243	11/29/2017	Cs-137	0.11 ± 0.03	0.08 ± 0.03	0.10 ± 0.02	Pass
SG-6938,6939	11/28/2017	Pb-214	15.28 ± 0.34	14.96 ± 0.43	15.12 ± 0.27	Pass
SG-6938,6939	11/28/2017	Ac-228	18.99 ± 0.59	19.92 ± 0.79	19.46 ± 0.49	Pass
AP-112817	11/28/2017	Gr. Beta	0.026 ± 0.004	0.030 ± 0.004	0.028 ± 0.003	Pass
SQ-6286,6287	12/1/2017	Gr. Alpha	70.6 ± 6.2	60.9 ± 6.0	65.8 ± 4.3	Pass
SQ-6286,6287	12/1/2017	Gr. Beta	48.9 ± 2.7	53.7 ± 2.8	51.3 ± 1.9	Pass
SQ-6286,6287	12/1/2017	Ra-226	11.3 ± 0.4	10.7 ± 0.5	11.0 ± 0.3	Pass
SQ-6286,6287	12/1/2017	Ra-228	13.5 ± 0.9	13.2 ± 1.0	13.4 ± 0.7	Pass
SG-6286,6287	12/1/2017	K-40	5.10 ± 1.82	6.65 ± 1.53	5.88 ± 1.19	Pass
AP-120417	12/4/2017	Gr. Beta	0.037 ± 0.006	0.035 ± 0.005	0.036 ± 0.004	Pass
WW-6548,6549	12/19/2017	H-3	8,428 ± 280	8,604 ± 282	8,516 ± 199	Pass
AP-122717	12/27/2017	Gr. Beta	0.047 ± 0.004	0.043 ± 0.004	0.045 ± 0.003	Pass
XAP-6762,6763	12/31/2017	Co-60	2.43 ± 1.30	2.24 ± 0.82	2.34 ± 0.77	Pass
XAP-6762,6763	12/31/2017	Cs-137	4.21 ± 1.11	4.05 ± 0.96	4.14 ± 0.73	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).

Lab Code [b]	Reference Date	Analysis	Concentration [a] Laboratory result	Known Activity	Control Limits [c]	Acceptance
MASO-903	2/1/2017	Am-241	60.9 ± 6.9	67.0	46.9 - 87.1	Pass
MASO-903	2/1/2017	Cs-134	1360 ± 14	1550	1085 - 2015	Pass
MASO-903	2/1/2017	Cs-137	678 ± 13	611	428 - 794	Pass
MASO-903	2/1/2017	Co-57	1.63 ± 1.69	0.00	NA [c]	Pass
MASO-903	2/1/2017	Co-60	909 ± 12	891	624 - 1158	Pass
MASO-903	2/1/2017	Mn-54	1052 ± 17	967	677 - 1257	Pass
MASO-903	2/1/2017	K-40	657 ± 68	607	425 - 789	Pass
MASO-903	2/1/2017	Zn-65	-0.52 ± 7.40	0.00	NA [c]	Pass
MASO-903	2/1/2017	Ni-63	3.25 ± 7.17	0.00	NA [c]	Pass
MASO-903	2/1/2017	Pu-238	0.46 ± 0.69	0.41	NA [e]	Pass
MASO-903	2/1/2017	Pu-239/240	56.8 ± 5.9	59.8	41.9 - 77.7	Pass
MASO-903	2/1/2017	Sr-90	501 ± 17	624	437 - 811	Pass
MASO-903	2/1/2017	Tc-99	748 ± 16	656	459 - 853	Pass
MAW-849	2/1/2017	I-129	-0.05 ± 0.12	0.00	NA [c]	Pass
MAVE-905	2/1/2017	Cs-134	6.61 ± 0.16	6.95	4.87 - 9.04	Pass
MAVE-905	2/1/2017	Cs-137	4.97 ± 0.18	4.60	3.22 - 5.98	Pass
MAVE-905	2/1/2017	Co-57	-0.01 ± 0.03	0.00	NA [c]	Pass
MAVE-905	2/1/2017	Co-60	9.51 ± 0.17	8.75	6.13 - 11.38	Pass
MAVE-905	2/1/2017	Mn-54	3.67 ± 0.17	3.28	2.30 - 4.26	Pass
MAVE-905	2/1/2017	Zn-65	6.12 ± 0.44	5.39	3.77 - 7.01	Pass
MAW-847	2/1/2017	Am-241	0.679 ± 0.079	0.846	0.592 - 1.100	Pass
MAW-847	2/1/2017	Cs-134	0.03 ± 0.10	0.00	NA [c]	Pass
MAW-847	2/1/2017	Cs-137	12.7 ± 0.4	11.1	7.8 - 14.4	Pass
MAW-847 [d]	2/1/2017	Co-57	2.7 ± 0.3	28.5	20.0 - 37.1	Fail
MAW-847	2/1/2017	Co-60	13.5 ± 0.3	12.3	8.6 - 16.0	Pass
MAW-847	2/1/2017	Mn-54	16.5 ± 0.4	14.9	10.4 - 19.4	Pass
MAW-847	2/1/2017	K-40	287 ± 6	254	178 - 330	Pass
MAW-847	2/1/2017	Zn-65	-0.15 ± 0.23	0.00	NA [c]	Pass
MAW-847	2/1/2017	H-3	275 ± 10	249	174 - 324	Pass
MAW-847	2/1/2017	Fe-55	2.4 ± 13.6	1.7	NA [e]	Pass
MAW-847	2/1/2017	Ni-63	10.1 ± 2.8	12.2	8.5 - 15.9	Pass
MAW-847	2/1/2017	Pu-238	0.729 ± 0.097	0.703	0.492 - 0.914	Pass
MAW-847	2/1/2017	Pu-239/240	0.866 ± 0.102	0.934	0.654 - 1.214	Pass
MAW-847	2/1/2017	Ra-226	0.506 ± 0.053	0.504	0.353 - 0.655	Pass
MAW-847	2/1/2017	Sr-90	10.0 ± 0.8	10.1	7.1 - 13.1	Pass

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

Lab Code [b]	Reference Date	Analysis	Concentration [a] Laboratory result	Known Activity	Control Limits [c]	Acceptance
MAW-847	2/1/2017	Tc-99	4.77 ± 0.62	6.25	4.38 - 8.13	Pass
MAW-847	2/1/2017	U-234/233	1.19 ± 0.10	1.16	0.81 - 1.51	Pass
MAW-847	2/1/2017	U-238	1.15 ± 0.10	1.20	0.84 - 1.56	Pass
MAAP-907[f]	2/1/2017	Am-241	0.0540 ± 0.0140	0.0376	0.0263 - 0.0489	Fail
MAAP-907	2/1/2017	Cs-134	1.31 ± 0.06	1.42	0.99 - 1.85	Pass
MAAP-907	2/1/2017	Cs-137	0.797 ± 0.080	0.685	0.480 - 0.891	Pass
MAAP-907	2/1/2017	Co-57	1.86 ± 0.06	1.70	1.19 - 2.21	Pass
MAAP-907	2/1/2017	Co-60	0.86 ± 0.05	0.78	0.55 - 1.01	Pass
MAAP-907	2/1/2017	Mn-54	0.01 ± 0.03	0.00	NA [c]	Pass
MAAP-907	2/1/2017	Zn-65	1.62 ± 0.13	1.29	0.90 - 1.68	Pass
MAAP-907	2/1/2017	Pu-238	0.0530 ± 0.0190	0.0598	0.0419 - 0.0777	Pass
MAAP-907	2/1/2017	Pu-239/240	0.0490 ± 0.0160	0.0460	0.0322 - 0.0598	Pass
MAAP-907	2/1/2017	Sr-90	0.648 ± 0.120	0.651	0.456 - 0.846	Pass
MAAP-907	2/1/2017	U-234/233	0.086 ± 0.024	0.104	0.073 - 0.135	Pass
MAAP-907	2/1/2017	U-238	0.097 ± 0.024	0.107	0.075 - 0.139	Pass
MASO-4515	8/1/2017	Am-241	45.9 ± 7.0	58.8	41.2 - 76.4	Pass[g]
MASO-4515	8/1/2017	Cs-134	409 ± 7	448	314 - 582	Pass[g]
MASO-4515	8/1/2017	Cs-137	798 ± 12	722	505 - 939	Pass[g]
MASO-4515	8/1/2017	Co-57	1572 ± 10	1458	1021 - 1895	Pass[g]
MASO-4515	8/1/2017	Co-60	0.2 ± 1.4	0.00	NA [c]	Pass[g]
MASO-4515	8/1/2017	Mn-54	934 ± 13	825	578 - 1073	Pass[g]
MASO-4515	8/1/2017	K-40	704 ± 53	592	414 - 770	Pass[g]
MASO-4515	8/1/2017	Zn-65	667 ± 17	559	391 - 727	Pass[g]
MASO-4515	8/1/2017	Pu-238	101 ± 9	92	64 - 120	Pass[g]
MASO-4515	8/1/2017	Pu-239/240	74.8 ± 7.7	68.8	48.2 - 89.4	Pass[g]
MASO-4515	8/1/2017	Sr-90	252 ± 7	289	202 - 376	Pass[g]
MAW-4494	8/1/2017	I-129	2.31 ± 0.10	2.31	1.62 - 3.00	Pass
MAVE-4517	8/1/2017	Cs-134	2.40 ± 0.10	2.32	1.62 - 3.02	Pass
MAVE-4517	8/1/2017	Cs-137	-0.002 ± 0.048	0.000	NA [c]	Pass
MAVE-4517	8/1/2017	Co-57	3.3 ± 0.1	2.8	2.0 - 3.6	Pass
MAVE-4517	8/1/2017	Co-60	2.10 ± 0.10	2.07	1.45 - 2.69	Pass
MAVE-4517	8/1/2017	Mn-54	3.00 ± 0.20	2.62	1.83 - 3.41	Pass
MAVE-4517	8/1/2017	Zn-65	5.90 ± 0.30	5.37	3.76 - 6.98	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
MAW-4513	8/1/2017	Am-241	0.820 ± 0.220	0.892	0.624 - 1.160	Pass
MAW-4513	8/1/2017	Cs-134	10.3 ± 0.3	11.5	8.1 - 15.0	Pass
MAW-4513	8/1/2017	Cs-137	17.2 ± 0.5	16.3	11.4 - 21.2	Pass
MAW-4513	8/1/2017	Co-57	12.7 ± 0.4	12.1	8.5 - 15.7	Pass
MAW-4513	8/1/2017	Co-60	10.6 ± 0.3	10.7	7.5 - 13.9	Pass
MAW-4513	8/1/2017	Mn-54	15.6 ± 0.4	14.9	10.4 - 19.4	Pass
MAW-4513	8/1/2017	Zn-65	15.9 ± 0.7	15.5	10.9 - 20.2	Pass
MAW-4513	8/1/2017	H-3	255 ± 9	258	181 - 335	Pass
MAW-4513	8/1/2017	Fe-55	21.6 ± 6.6	19.4	13.6 - 25.2	Pass
MAW-4513	8/1/2017	Ni-63	-0.1 ± 2.0	0.0	NA [c]	Pass
MAW-4513	8/1/2017	Pu-238	0.590 ± 0.080	0.603	0.422 - 0.784	Pass
MAW-4513	8/1/2017	Pu-239/240	0.740 ± 0.090	0.781	0.547 - 1.015	Pass
MAW-4513	8/1/2017	Ra-226	1.000 ± 0.100	0.858	0.601 - 1.115	Pass
MAW-4513	8/1/2017	Sr-90	7.80 ± 0.60	7.77	5.44 - 10.10	Pass
MAW-4513	8/1/2017	Tc-99	6.70 ± 0.40	6.73	4.71 - 8.75	Pass
MAW-4513	8/1/2017	U-2344/233	0.94 ± 0.06	1.01	0.71 - 1.31	Pass
MAW-4513	8/1/2017	U-238	0.97 ± 0.07	1.04	0.73 - 1.35	Pass
MAAP-4519[h]	8/1/2017	Am-241	0.0400 ± 0.0100	0.0612	0.0428 - 0.0796	Fail
MAAP-4519	8/1/2017	Cs-134	0.90 ± 0.10	1.00	0.70 - 1.30	Pass
MAAP-4519	8/1/2017	Cs-137	0.90 ± 0.10	0.82	0.57 - 1.07	Pass
MAAP-4519	8/1/2017	Co-57	0.01 ± 0.01	0.00	NA [c]	Pass
MAAP-4519	8/1/2017	Co-60	0.70 ± 0.10	0.68	0.48 - 0.88	Pass
MAAP-4519	8/1/2017	Mn-54	1.50 ± 0.10	1.30	0.91 - 1.69	Pass
MAAP-4519	8/1/2017	Zn-65	1.30 ± 0.10	1.08	0.76 - 1.40	Pass
MAAP-4519	8/1/2017	Pu-238	0.0300 ± 0.0100	0.0298	0.0209 - 0.0387	Pass
MAAP-4519	8/1/2017	Pu-239/240	0.0400 ± 0.0200	0.0468	0.0328 - 0.0608	Pass
MAAP-4519	8/1/2017	Sr-90	0.800 ± 0.100	0.801	0.561 - 1.041	Pass
MAAP-4519	8/1/2017	U-234/233	0.070 ± 0.010	0.084	0.059 - 0.109	Pass
MAAP-4519	8/1/2017	U-238	0.090 ± 0.010	0.087	0.061 - 0.113	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] Decimal point was misplaced while performing a unit conversion. The result is within control limits when the proper unit conversion is performed.

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

[f] Sample was reanalyzed in duplicate with acceptable results. Original plating was inferior to platings obtained during reanalysis. It is believed that isotopic tracer was not accurately quantified due to poor resolution of its peak.

[g] Data were erroneously submitted in units of Bq/g. All results pass MAPEP criteria when evaluated in units of Bq/Kg.

[h] Laboratory is not currently offering analysis for Am-241 in Air Particulate samples.

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 [c]	Acceptance
ERAP-1112	3/20/2017	Am-241	55.3 ± 2.8	76.4	47.1 - 103.0	Pass
ERAP-1112	3/20/2017	Co-60	1,230 ± 8	1030	797 - 1290	Pass
ERAP-1112	3/20/2017	Cs-134	1,110 ± 9	1100	700 - 1360	Pass
ERAP-1112	3/20/2017	Cs-137	1,810 ± 12	1,390	1,040 - 1,830	Pass
ERAP-1112 [d]	3/20/2017	Fe-55	590 ± 385	256	79.4 - 500	Fail
ERAP-1112	3/20/2017	Mn-54	< 5.14	< 50.0	0.00 - 50.0	Pass
ERAP-1112	3/20/2017	Pu-238	54.6 ± 2.8	54.3	37.2 - 71.4	Pass
ERAP-1112	3/20/2017	Pu-239/240	63.6 ± 3.0	62.0	44.9 - 81.0	Pass
ERAP-1112	3/20/2017	Sr-90	55.3 ± 8.3	52.4	25.6 - 78.5	Pass
ERAP-1112	3/20/2017	U-233/234	65.7 ± 3.0	73.1	45.3 - 110	Pass
ERAP-1112	3/20/2017	U-238	67.3 ± 3.0	72.4	46.8 - 100	Pass
ERAP-1112	3/20/2017	Zn-65	1,355 ± 16	984	705 - 1,360	Pass
ERAP-1114	3/20/2017	Gr. Alpha	106 ± 5	85.5	28.6 - 133	Pass
ERAP-1114 [e]	3/20/2017	Gr. Beta	67.6 ± 3.0	45.2	28.6 - 65.9	Fail
ERSO-1116	3/20/2017	Am-241	418 ± 98	448	262 - 582	Pass
ERSO-1116	3/20/2017	Ac-228	1,540 ± 260	1,240	795 - 1,720	Pass
ERSO-1116	3/20/2017	Bi-212	1,550 ± 90	1,240	330 - 1,820	Pass
ERSO-1116	3/20/2017	Bi-214	2,560 ± 20	2,750	1,660 - 3,960	Pass
ERSO-1116	3/20/2017	Co-60	4,620 ± 100	4,430	3,000 - 6,100	Pass
ERSO-1116	3/20/2017	Cs-134	8,340 ± 100	8,860	5,790 - 10,600	Pass
ERSO-1116	3/20/2017	Cs-137	8,420 ± 100	7,500	5,750 - 9,650	Pass
ERSO-1116	3/20/2017	K-40	13,600 ± 900	10,600	7,740 - 14,200	Pass
ERSO-1116	3/20/2017	Mn-54	< 68.1	< 1000	0.00 - 1,000	Pass
ERSO-1116	3/20/2017	Pb-212	1,060 ± 70	1,240	812 - 1,730	Pass
ERSO-1116	3/20/2017	Pb-214	2,620 ± 160	2,890	1,690 - 4,310	Pass
ERSO-1116	3/20/2017	Pu-238	424 ± 154	648	390 - 894	Pass
ERSO-1116 [f]	3/20/2017	Pu-239/240	252 ± 112	484	316 - 669	Fail
ERSO-1116 [g]	3/20/2017	Pu-239/240	436 ± 106	484	316 - 669	Pass
ERSO-1116	3/20/2017	Sr-90	7,930 ± 250	9,150	3,490 - 14,500	Pass
ERSO-1116	3/20/2017	Th-234	1,820 ± 200	1,940	614 - 3,650	Pass
ERSO-1116 [h]	3/20/2017	U-233/234	1,030 ± 130	1,950	1,190 - 2,500	Fail
ERSO-1116 [i]	3/20/2017	U-233/234	1,820 ± 200	1,950	1,190 - 2,500	Pass
ERSO-1116	3/20/2017	U-238	1,240 ± 140	1,940	1,200 - 2,460	Pass
ERSO-1116 [i]	3/20/2017	U-238	1,930 ± 200	1,940	1,200 - 2,460	Pass
ERSO-1116	3/20/2017	Zn-65	7,190 ± 240	6,090	4,850 - 8,090	Pass
ERW-1122	3/20/2017	Gr. Alpha	65.3 ± 2.4	89.5	31.8 - 139	Pass
ERW-1122	3/20/2017	Gr. Beta	54.8 ± 1.5	61.0	34.9 - 90.4	Pass
ERW-1124	3/20/2017	H-3	19,000 ± 410	19,400	13,000 - 27,700	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 [c]	Acceptance
ERVE-1118	3/20/2017	Am-241	1,560 ± 140	1,860	1,140 - 2,470	Pass
ERVE-1118	3/20/2017	Cm-244	530 ± 80	734	360 - 1,140	Pass
ERVE-1118	3/20/2017	Co-60	1,400 ± 350	1,390	959 - 1,940	Pass
ERVE-1118	3/20/2017	Cs-134	1,650 ± 460	1,830	1,180 - 2,380	Pass
ERVE-1118	3/20/2017	Cs-137	2,580 ± 540	2,500	1,810 - 3,480	Pass
ERVE-1118	3/20/2017	K-40	32,100 ± 700	30,900	22,300 - 43,400	Pass
ERVE-1118	3/20/2017	Mn-54	< 27.3	< 300	0.00 - 300	Pass
ERVE-1118	3/20/2017	Zn-65	889 ± 64	853	615 - 1,200	Pass
ERVE-1118	3/20/2017	Pu-238	3,250 ± 210	3,250	1,940 - 4,450	Pass
ERVE-1118	3/20/2017	Pu-239/240	2,180 ± 170	2,150	1,320 - 2,960	Pass
ERVE-1118	3/20/2017	Sr-90	665 ± 135	726	414 - 963	Pass
ERVE-1118	3/20/2017	U-233/234	2,840 ± 200	3,090	2,030 - 3,970	Pass
ERVE-1118	3/20/2017	U-238	2,990 ± 200	3,060	2,040 - 3,890	Pass
ERW-1120	3/20/2017	Am-241	108 ± 7	140	94.3 - 188	Pass
ERW-1120	3/20/2017	Co-60	2,600 ± 198	2,540	2,210 - 2,970	Pass
ERW-1120	3/20/2017	Cs-134	2,380 ± 250	2,510	1,840 - 2880	Pass
ERW-1120	3/20/2017	Cs-137	1,470 ± 243	1,400	1,190 - 1,680	Pass
ERW-1120	3/20/2017	Mn-54	< 12.3	< 100	0.00 - 100	Pass
ERW-1120	3/20/2017	Pu-238	117 ± 4	128	94.7 - 159	Pass
ERW-1120	3/20/2017	Pu-239/240	74.8 ± 3.3	85.8	66.6 - 108	Pass
ERW-1120	3/20/2017	U-233/234	75.3 ± 3.2	90.3	67.8 - 116	Pass
ERW-1120	3/20/2017	U-238	76.4 ± 3.2	89.5	68.2 - 110	Pass
ERW-1120	3/20/2017	Zn-65	2,130 ± 378	1,960	1630 - 2,470	Pass
ERW-1120 [j]	3/20/2017	Fe-55	1,400 ± 403	984	587 - 1,340	Fail
ERW-1120 [k]	3/20/2017	Fe-55	1,081 ± 383	984	587 - 1,340	Pass
ERW-1120	3/20/2017	Sr-90	652 ± 12	714	465 - 944	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 (2 sigma, 1 determination) and control limits as provided by ERA.

[d] Fe-55 analysis result was outside the acceptable range. Recounting the sample disk for 1000 minutes resulted in 254 ± 364 with an LLD calculation of < 342. Insufficient sample was available after performing other required analyses on the sample to quantify the activity with an uncertainty less than the activity.

[e] ERA appears to have applied the standard material to the filter in a pattern closer to the center of the filter compared to previous studies and different from the filter efficiency utilized by the laboratory. This likely caused the efficency used the calculation to be understated and the result obtained by the laboratory to be overstated. For comparison the in-house spike for gross beta in AP (table A-3 SPAP-740 2/28/17) was acceptable with a ratio of 0.94 of lab result to known.

[f] Analysis result for Plutonium-239/240 was below the lower limit of acceptance.

[g] Samples were reanalyzed in duplicate with acceptable results for each. Original analysis had poor resolution possibly due to a poor elctroplating and is suspected in contributing to poor results.

[h] Analysis result for U-233/234 was below the lower limit of acceptance.

[i] The reanalysis result for U-233/234 was within the acceptance limits and U-238 reanalysis result was closer to the known value. Original analysis had poor resolution possibly due to a poor electroplating and is suspected in contributing to poor results.

[j] Fe-55 analysis result was outside acceptable range.

[k] Result of recounting was acceptable. Using available aliquot after dividing sample for other analyses leaves insufficient sample to reliably determine the activity present in sample.

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 and standard deviation "s" of a set of n numbers $x_1, x_2 \ldots x_n$ are defined as follows:

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

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 to 11.45.

Appendix C. NON-RADIOLOGICAL MONITORING PROGRAM

1.0. Introduction

Union Electric Company Callaway Plant, d.b.a. Ameren Missouri Callaway Energy Center, in accordance with federal regulations and a desire to maintain the quality of the local environment around Callaway Plant has implemented an Environmental Protection Plan, (EPP) contained in Appendix B of the Callaway Plant Operating License.

The objective of the EPP is to provide for protection of non-radiological environmental values during operation of the Callaway Plant.

This report describes the conduct of the EPP for the Callaway Plant during 2017.

2.0. Unusual or Important Events

No unusual or important events reportable under the EPP Section 4.1 were identified during 2017.

3.0. EPP Non-compliances

During 2017, there were no non-compliances with the EPP.

4.0. Nonroutine Reports

There were no nonroutine reports submitted in accordance with the EPP, Section 5.4.2 in 2017.

5.0. Plant Design and Operation Environmental Evaluations.

This section lists all changes in the plant design, operation, tests or experiments installed during 2017, which could have involved a potentially significant unreviewed environmental question in accordance with section 3.1 of Appendix B.

During 2017, two plant changes were completed that could have involved a potentially significant unreviewed environmental question. The interpretations and conclusions regarding these plant changes along with a description of the change and activity are presented below.

MP 16-0035 – Replacement of Existing Transformer XPB117 at the Callaway Intake Facility

Description of Change:

MP 16-0035 covers the replacement of existing transformer XPB117 at the Callaway Plant intake facility. The new transformer contains 1667 gallons of refined mineral oil (approximately 588 gallons more than the original transformer). The original transformer was located above a permanent rock filled concrete pit to contain the total volume of oil should a leak develop. Rock was removed from this pit to allow additional volume to contain the 1667 gallons should a leak occur in the new transformer. The containment pit also contains a new double grating with an absorbent rock layer.

Evaluation of Change:

As part of the Final Environmental Evaluation, both the Environmental Report (ER) and Final Environmental Statement for the Operating License (FES-OL) were reviewed for any previously evaluated adverse environmental impacts and any new adverse environmental impacts not previously evaluated. No adverse environmental impacts were identified. Although the replacement transformer contains a larger volume on mineral oil, the concrete containment located under the transformer was redesigned to contain the entire volume of the new transformer. Therefore, should a leak develop, oil remains contained within the concrete pit and there is no increased risk of this oil being discharged to the Missouri River.

This change does not involve an unreviewed environmental question and NRC approval was not required.

RFR 160765 – New Coagulants/Flocculants for Raw Water Systems

Description of Change:

This change involves the testing and use of multiple flocculants/coagulants at the Callaway Water Treatment Plant (WTP) to optimize solids removal in makeup water withdrawn from the Missouri River. These products may be utilized at the Water Treatment Plant (WTP) rapid mixing unit or splitter box to treat makeup to raw water systems including the circulating water

system, service water system, and essential service water system. Callaway has previously used BULAB 5013, Dimethyl Ammonium Chloride (DADMAC) a similar polymer/coagulant for solids removal. In addition BULAB 5086 and BULAB 5011P have previously been approved for use. This change allows use of the following new products or a blend of these products (BULAB 5086, BUFLOC 5459, BULAB 5535, BULAB 5900, BULAB 5115, and BULAB 5534) to reduce solids carried to the plant raw water systems. As a result, it is expected that suspended solids will also be reduced in plant discharges from NPDES Outfalls 002 and 016. The new products are less toxic to aquatic life and will be used at the same treatment concentrations as previously used for BULAB 5013 (approximately 1-3 ppm).

Evaluation of Change:

As part of the Final Environmental Evaluation, both the ER and FES-OL were reviewed for any previously evaluated adverse environmental impacts and any new adverse environmental impacts not previously evaluated. No adverse environmental impacts were identified. Missouri DNR approval or NPDES permit changes were not required as similar coagulants/ organic polymers were previously approved by the state. In addition, use of coagulants/organic polymers at the WTP was included in the last Callaway NPDES Permit re-application. Each of the products evaluated contain a similar water-soluble cationic polymer and will be maintained at the same concentration range. Aquatic toxicity data was reviewed for each of the products evaluated and each product was found to have a less toxic 48-hour LC50 and 96 hour LC50 than BULAB 5013. Therefore, use of the approved products evaluated for use at the WTP as described above should have no adverse effect on the environment.

This evaluation concluded that this change to utilize any of the following coagulants/flocculants (BULAB 5086, BUFLOC 5459, BULAB 5535, BULAB 5900, BULAB 5115, BULAB 5534) for solids removal at the WTP does not involve an unreviewed environmental question and NRC approval was not required.

APPENDIX D

Sampling Location Maps

Figure D-1. Radiological Environmental Sampling Locations 1, 2, 3, mile radius from site location.

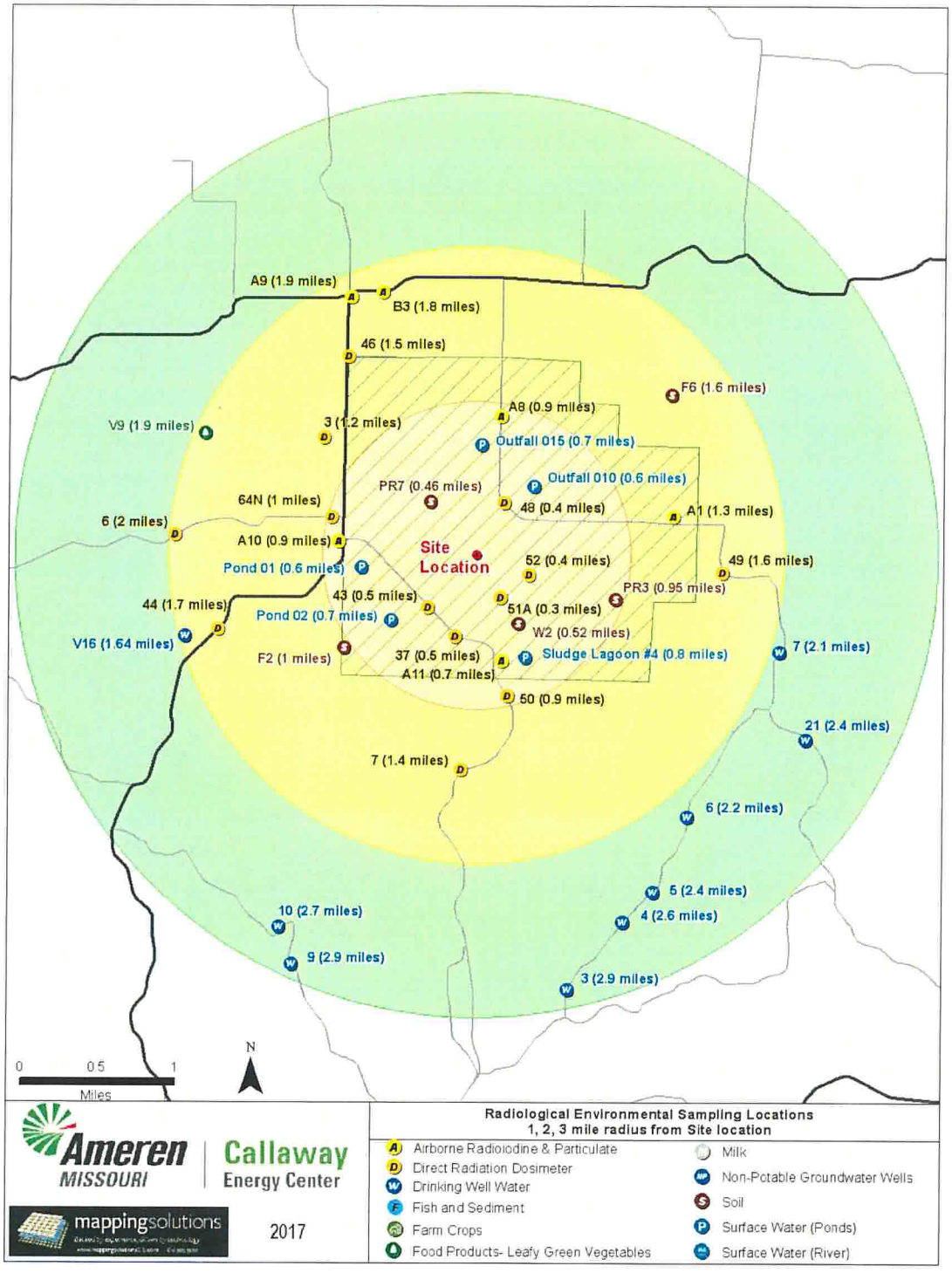


Figure D-2. Radiological Environmental Sampling Locations 3, 4, 5, 6 mile radius from site location.

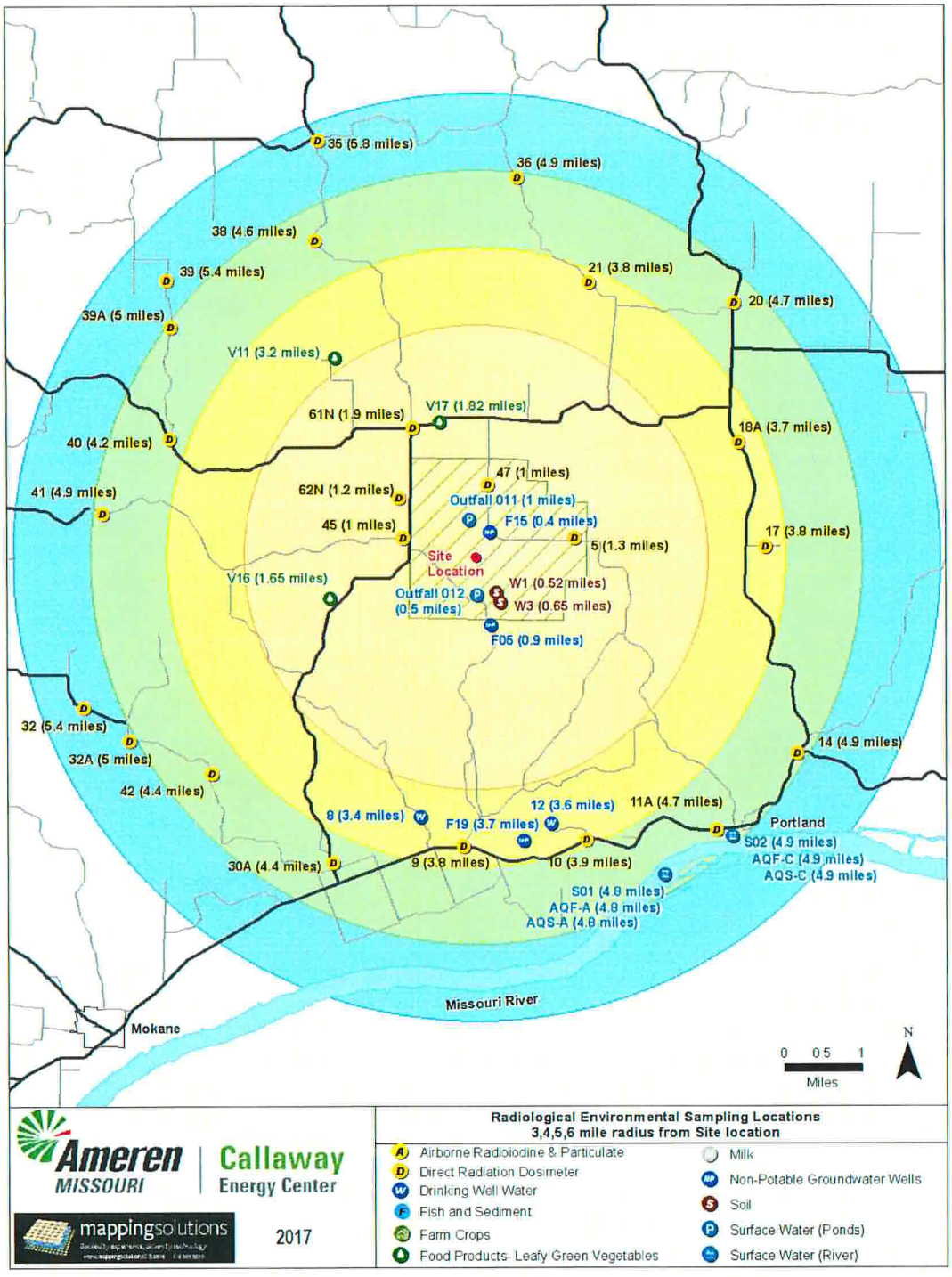


Figure D-3. Radiological Environmental Sampling Locations 5, 10, 15 mile radius from site location.

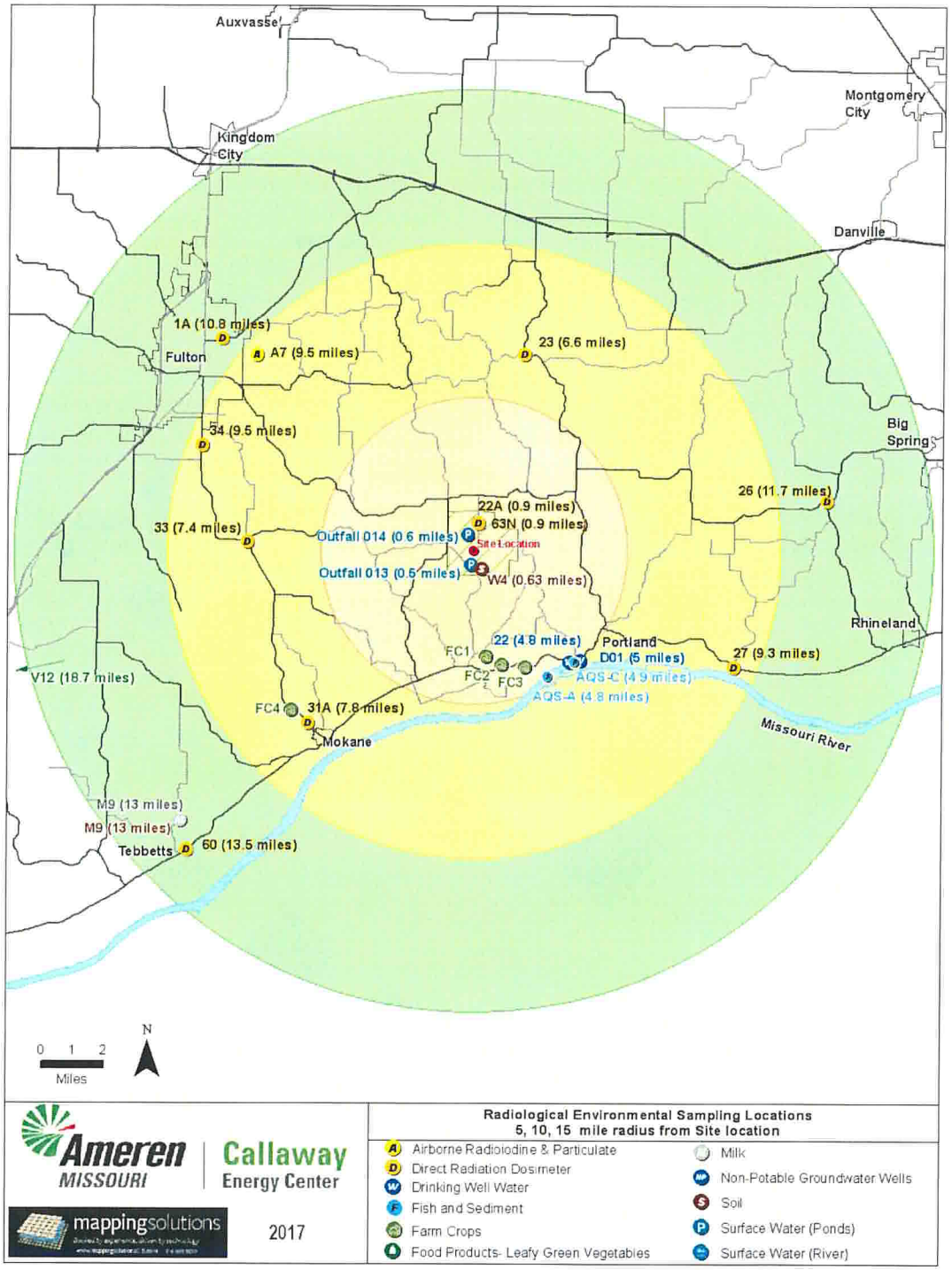


Figure D-4. Non-Potable Groundwater Monitoring Wells, 600 ft radius from Site.

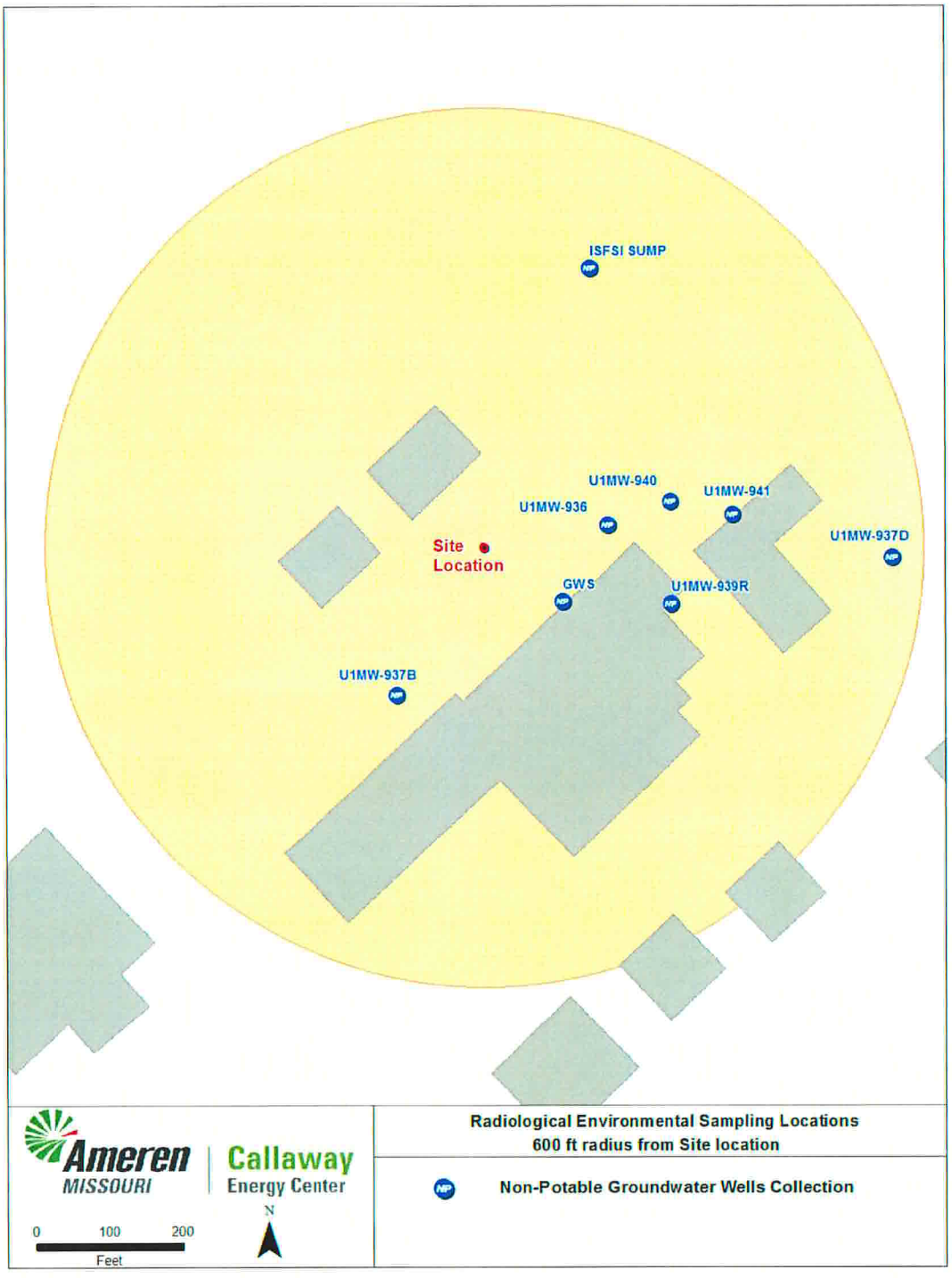
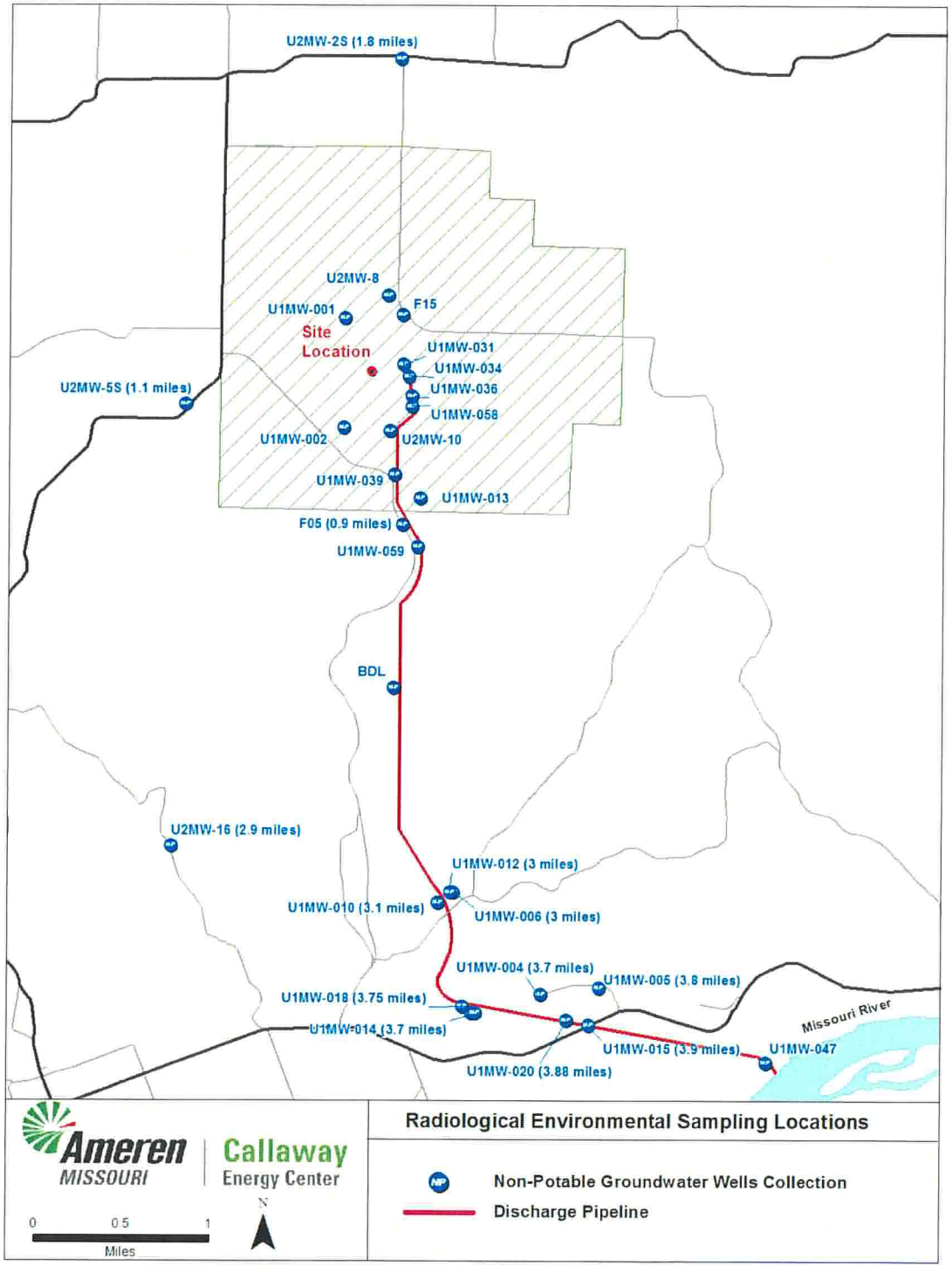


Figure D-5. Non-Potable Groundwater Monitoring Wells Collection.



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AMEREN MISSOURI,
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FULTON, MISSOURI

Docket Numbers 50-483 and 72-1045

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

to

THE UNITED STATES NUCLEAR REGULATORY COMMISSION

Part II

DATA TABULATIONS AND ANALYSES

January 1 to December 31, 2017

Prepared by

ENVIRONMENTAL, Inc.
Midwest Laboratory

Submitted by

Union Electric Co.
dba Ameren Missouri

Project No. 8036

Approved : _____

Bronia Grob, M.S.
Laboratory Manager

TABLE OF CONTENTS

LIST OF TABLES

1.0 INTRODUCTION

The following constitutes a supplement to the Annual Report for the Radiological Environmental Monitoring Program conducted at the Ameren Missouri, Callaway Energy Center, Fulton, Missouri in 2017. Results of completed analyses are presented in the attached tables.

For information regarding sampling locations, type and frequency of collection, and sample codes, refer to Part I, Tables 5.1 - 5.2 and Figures 5.1 through 5.8.

Analyses results from additional sampling may be found in Appendix A.

2.0 DATA TABLES

Table 1. Air particulates and charcoal cartridges, analyses for gamma-emitting isotopes and I-131[a].

Collection: Continuous, weekly exchange.

Units: pCi/m^3

Location		CA-A-001							
		^{7}Be	^{58}Co	^{60}Co	^{95}Zr	^{134}Cs	^{137}Cs	$^{140}BaLa$	^{144}Ce
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date Collected	Vol.								
01-05-17	292	< 0.09	< 0.007	< 0.009	< 0.010	< 0.009	< 0.009	< 0.007	< 0.029
01-12-17	278	0.20 ± 0.11	< 0.008	< 0.010	< 0.013	< 0.008	< 0.010	< 0.006	< 0.031
01-19-17	299	0.15 ± 0.09	< 0.010	< 0.011	< 0.011	< 0.008	< 0.005	< 0.012	< 0.048
01-26-17	293	0.15 ± 0.09	< 0.007	< 0.008	< 0.010	< 0.008	< 0.009	< 0.020	< 0.034
02-02-17	293	< 0.11	< 0.006	< 0.007	< 0.015	< 0.008	< 0.006	< 0.022	< 0.035
02-09-17	290	< 0.12	< 0.008	< 0.007	< 0.020	< 0.009	< 0.006	< 0.009	< 0.047
02-16-17	297	0.17 ± 0.09	< 0.007	< 0.005	< 0.012	< 0.010	< 0.009	< 0.022	< 0.045
02-23-17	303	< 0.10	< 0.009	< 0.009	< 0.012	< 0.008	< 0.011	< 0.006	< 0.058
03-02-17	293	< 0.12	< 0.014	< 0.005	< 0.020	< 0.011	< 0.008	< 0.020	< 0.037
03-09-17	300	0.20 ± 0.09	< 0.008	< 0.004	< 0.009	< 0.010	< 0.007	< 0.023	< 0.040
03-16-17	290	0.22 ± 0.09	< 0.004	< 0.006	< 0.011	< 0.008	< 0.006	< 0.014	< 0.027
03-23-17	295	0.18 ± 0.06	< 0.008	< 0.007	< 0.010	< 0.008	< 0.007	< 0.011	< 0.029
03-30-17	299	< 0.08	< 0.003	< 0.006	< 0.009	< 0.008	< 0.008	< 0.008	< 0.026
04-06-17	298	< 0.08	< 0.008	< 0.003	< 0.011	< 0.008	< 0.010	< 0.007	< 0.045
04-13-17	294	< 0.11	< 0.004	< 0.007	< 0.021	< 0.008	< 0.008	< 0.015	< 0.035
04-20-17	277	0.20 ± 0.11	< 0.010	< 0.008	< 0.026	< 0.009	< 0.006	< 0.017	< 0.040
04-27-17	293	< 0.13	< 0.007	< 0.008	< 0.023	< 0.010	< 0.007	< 0.024	< 0.052
05-04-17	289	< 0.08	< 0.004	< 0.003	< 0.017	< 0.008	< 0.010	< 0.011	< 0.038
05-11-17	302	0.25 ± 0.10	< 0.010	< 0.003	< 0.016	< 0.008	< 0.007	< 0.018	< 0.028
05-17-17	248	0.29 ± 0.15	< 0.006	< 0.007	< 0.024	< 0.009	< 0.009	< 0.025	< 0.053
05-25-17	325	< 0.12	< 0.008	< 0.003	< 0.017	< 0.008	< 0.005	< 0.019	< 0.028
06-01-17	287	0.27 ± 0.13	< 0.008	< 0.006	< 0.017	< 0.010	< 0.007	< 0.017	< 0.047
06-08-17	256	0.29 ± 0.12	< 0.008	< 0.004	< 0.014	< 0.011	< 0.008	< 0.015	< 0.039
06-15-17	268	0.27 ± 0.15	< 0.011	< 0.006	< 0.014	< 0.011	< 0.010	< 0.018	< 0.039
06-22-17	269	0.18 ± 0.09	< 0.006	< 0.008	< 0.018	< 0.009	< 0.006	< 0.021	< 0.062
06-28-17	245	0.21 ± 0.09	< 0.006	< 0.004	< 0.017	< 0.010	< 0.011	< 0.008	< 0.052
07-06-17	331	0.24 ± 0.10	< 0.005	< 0.004	< 0.010	< 0.006	< 0.008	< 0.032	< 0.023
07-13-17	281	< 0.15	< 0.008	< 0.007	< 0.017	< 0.010	< 0.010	< 0.031	< 0.033
07-20-17	286	< 0.15	< 0.004	< 0.004	< 0.017	< 0.010	< 0.009	< 0.029	< 0.044
07-26-17	243	< 0.14	< 0.011	< 0.005	< 0.016	< 0.010	< 0.009	< 0.027	< 0.062
08-02-17	290	< 0.12	< 0.011	< 0.010	< 0.013	< 0.008	< 0.008	< 0.019	< 0.040
08-09-17	292	< 0.10	< 0.008	< 0.004	< 0.016	< 0.009	< 0.009	< 0.016	< 0.036
08-17-17	337	0.17 ± 0.10	< 0.009	< 0.007	< 0.011	< 0.008	< 0.008	< 0.016	< 0.043
08-23-17	248	< 0.14	< 0.014	< 0.008	< 0.018	< 0.011	< 0.012	< 0.033	< 0.054
08-30-17	294	0.14 ± 0.08	< 0.005	< 0.006	< 0.018	< 0.007	< 0.007	< 0.013	< 0.040
09-07-17	338	0.25 ± 0.12	< 0.006	< 0.005	< 0.014	< 0.008	< 0.006	< 0.018	< 0.036
09-14-17	291	0.25 ± 0.12	< 0.005	< 0.003	< 0.018	< 0.010	< 0.009	< 0.030	< 0.034
09-21-17	295	0.18 ± 0.09	< 0.004	< 0.008	< 0.013	< 0.009	< 0.009	< 0.012	< 0.040
09-28-17	284	0.13 ± 0.07	< 0.008	< 0.005	< 0.016	< 0.009	< 0.012	< 0.009	< 0.038

[a] Iodine-131 concentrations are < 0.07 pCi/m^3 unless noted otherwise.

Table 1. Air particulates and charcoal cartridges, analyses for gamma-emitting isotopes and I-131[a].

Collection: Continuous, weekly exchange.

Units: pCi/m^3

Location		CA-A-001 (cont.)							
		^{7}Be	^{58}Co	^{60}Co	^{95}Zr	^{134}Cs	^{137}Cs	$^{140}BaLa$	^{144}Ce
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date Collected	Vol.								
10-05-17	299	< 0.09	< 0.008	< 0.016	< 0.011	< 0.009	< 0.009	< 0.018	< 0.048
10-12-17	293	< 0.10	< 0.006	< 0.004	< 0.010	< 0.009	< 0.008	< 0.007	< 0.027
10-19-17	299	< 0.12	< 0.011	< 0.005	< 0.021	< 0.007	< 0.006	< 0.045	< 0.029
10-26-17	300	0.18 ± 0.07	< 0.008	< 0.008	< 0.013	< 0.008	< 0.005	< 0.007	< 0.033
11-02-17	303	< 0.07	< 0.008	< 0.008	< 0.011	< 0.009	< 0.008	< 0.008	< 0.029
11-09-17	305	< 0.10	< 0.007	< 0.009	< 0.018	< 0.009	< 0.008	< 0.005	< 0.040
11-16-17	303	0.25 ± 0.10	< 0.004	< 0.009	< 0.019	< 0.008	< 0.006	< 0.009	< 0.026
11-23-17	304	< 0.09	< 0.006	< 0.004	< 0.012	< 0.009	< 0.008	< 0.006	< 0.062
11-30-17	296	< 0.11	< 0.010	< 0.010	< 0.009	< 0.009	< 0.006	< 0.008	< 0.030
12-07-17	304	< 0.10	< 0.008	< 0.009	< 0.015	< 0.009	< 0.008	< 0.008	< 0.037
12-14-17	303	< 0.13	< 0.008	< 0.007	< 0.021	< 0.013	< 0.011	< 0.019	< 0.042
12-21-17	301	< 0.10	< 0.007	< 0.009	< 0.008	< 0.008	< 0.008	< 0.012	< 0.045
12-28-17	311	< 0.08	< 0.008	< 0.008	< 0.016	< 0.009	< 0.007	< 0.007	< 0.030

[a] Iodine-131 concentrations are < 0.07 pCi/m^3 unless noted otherwise.

Table 1. Air particulates and charcoal cartridges, analyses for gamma-emitting isotopes and I-131[a].

Collection: Continuous, weekly exchange.
Units: pCi/m^3

Location		CA-A-007							
		^{7}Be	^{58}Co	^{60}Co	^{95}Zr	^{134}Cs	^{137}Cs	$^{140}BaLa$	^{144}Ce
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date Collected	Vol.								
01-05-17	283	< 0.09	< 0.009	< 0.008	< 0.012	< 0.009	< 0.004	< 0.011	< 0.049
01-12-17	293	< 0.08	< 0.007	< 0.006	< 0.010	< 0.007	< 0.005	< 0.013	< 0.036
01-19-17	311	< 0.09	< 0.009	< 0.008	< 0.011	< 0.008	< 0.008	< 0.016	< 0.037
01-26-17	291	< 0.09	< 0.010	< 0.006	< 0.011	< 0.009	< 0.006	< 0.020	< 0.046
02-02-17	287	< 0.11	< 0.009	< 0.010	< 0.008	< 0.009	< 0.007	< 0.030	< 0.036
02-09-17	283	0.20 ± 0.11	< 0.006	< 0.007	< 0.010	< 0.009	< 0.006	< 0.028	< 0.039
02-16-17	272	< 0.11	< 0.010	< 0.006	< 0.019	< 0.009	< 0.009	< 0.019	< 0.039
02-23-17	290	< 0.09	< 0.005	< 0.003	< 0.016	< 0.009	< 0.006	< 0.017	< 0.043
03-02-17	282	< 0.10	< 0.009	< 0.005	< 0.013	< 0.008	< 0.005	< 0.023	< 0.042
03-09-17	282	< 0.10	< 0.010	< 0.006	< 0.012	< 0.009	< 0.008	< 0.016	< 0.038
03-16-17	277	0.16 ± 0.09	< 0.003	< 0.009	< 0.012	< 0.007	< 0.004	< 0.015	< 0.025
03-23-17	283	0.16 ± 0.08	< 0.007	< 0.003	< 0.009	< 0.008	< 0.009	< 0.009	< 0.039
03-30-17	283	< 0.08	< 0.003	< 0.003	< 0.009	< 0.007	< 0.007	< 0.007	< 0.040
04-06-17					NS[b]				
04-13-17					NS[b]				
04-20-17	254	< 0.15	< 0.011	< 0.010	< 0.015	< 0.009	< 0.011	< 0.022	< 0.057
04-27-17	257	< 0.13	< 0.012	< 0.007	< 0.017	< 0.010	< 0.009	< 0.020	< 0.041
05-04-17	264	< 0.09	< 0.005	< 0.007	< 0.016	< 0.009	< 0.007	< 0.021	< 0.049
05-11-17	260	< 0.15	< 0.011	< 0.004	< 0.013	< 0.007	< 0.011	< 0.022	< 0.048
05-17-17	217	< 0.15	< 0.009	< 0.010	< 0.020	< 0.012	< 0.011	< 0.027	< 0.058
05-25-17	301	< 0.13	< 0.010	< 0.011	< 0.024	< 0.011	< 0.011	< 0.022	< 0.032
06-01-17	250	< 0.12	< 0.011	< 0.007	< 0.020	< 0.011	< 0.009	< 0.024	< 0.042
06-08-17	250	0.30 ± 0.14	< 0.012	< 0.004	< 0.016	< 0.010	< 0.008	< 0.017	< 0.040
06-15-17	250	< 0.13	< 0.008	< 0.011	< 0.014	< 0.011	< 0.010	< 0.016	< 0.057
06-22-17	236	0.18 ± 0.11	< 0.007	< 0.008	< 0.015	< 0.009	< 0.008	< 0.009	< 0.042
06-28-17	232	< 0.12	< 0.008	< 0.008	< 0.019	< 0.010	< 0.009	< 0.009	< 0.045
07-06-17	324	0.22 ± 0.13	< 0.006	< 0.006	< 0.020	< 0.010	< 0.007	< 0.038	< 0.044
07-13-17	274	0.17 ± 0.10	< 0.010	< 0.006	< 0.024	< 0.010	< 0.009	< 0.027	< 0.036
07-20-17	270	< 0.15	< 0.014	< 0.008	< 0.027	< 0.013	< 0.014	< 0.040	< 0.043
07-26-17	231	< 0.14	< 0.009	< 0.005	< 0.019	< 0.010	< 0.011	< 0.029	< 0.047
08-02-17	267	< 0.16	< 0.010	< 0.005	< 0.014	< 0.013	< 0.009	< 0.031	< 0.041
08-09-17	259	< 0.14	< 0.009	< 0.006	< 0.014	< 0.011	< 0.007	< 0.022	< 0.040
08-17-17	304	0.14 ± 0.07	< 0.004	< 0.003	< 0.015	< 0.008	< 0.009	< 0.014	< 0.035
08-23-17	225	< 0.13	< 0.016	< 0.006	< 0.028	< 0.013	< 0.010	< 0.029	< 0.052
08-30-17	260	< 0.10	< 0.005	< 0.005	< 0.018	< 0.009	< 0.009	< 0.012	< 0.049
09-07-17	289	< 0.11	< 0.007	< 0.003	< 0.022	< 0.009	< 0.007	< 0.013	< 0.040
09-14-17	249	< 0.13	< 0.007	< 0.010	< 0.015	< 0.011	< 0.014	< 0.030	< 0.058
09-21-17	248	0.26 ± 0.15	< 0.010	< 0.007	< 0.021	< 0.010	< 0.012	< 0.012	< 0.052
09-28-17	248	< 0.12	< 0.006	< 0.005	< 0.013	< 0.009	< 0.008	< 0.011	< 0.034

[a] Iodine-131 concentrations are < 0.07 pCi/m^3 unless noted otherwise.

[b] " NS" = No data; see Part I Table 5.5, Listing of Missed Samples.

Table 1. Air particulates and charcoal cartridges, analyses for gamma-emitting isotopes and I-131[a].

Collection: Continuous, weekly exchange.

Units: pCi/m^3

Location		CA-A-007 (cont.)							
		^{7}Be	^{58}Co	^{60}Co	^{95}Zr	^{134}Cs	^{137}Cs	$^{140}BaLa$	^{144}Ce
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date Collected	Vol.								
10-05-17	244	< 0.11	< 0.006	< 0.006	< 0.016	< 0.011	< 0.009	< 0.011	< 0.049
10-12-17	242	0.13 ± 0.08	< 0.010	< 0.009	< 0.016	< 0.010	< 0.007	< 0.018	< 0.040
10-19-17	241	< 0.13	< 0.008	< 0.003	< 0.016	< 0.008	< 0.006	< 0.074	< 0.053
10-26-17	242	< 0.11	< 0.013	< 0.012	< 0.021	< 0.013	< 0.012	< 0.012	< 0.033
11-02-17	237	< 0.10	< 0.012	< 0.010	< 0.023	< 0.014	< 0.010	< 0.017	< 0.056
11-09-17	240	< 0.11	< 0.010	< 0.010	< 0.024	< 0.013	< 0.009	< 0.010	< 0.051
11-16-17	234	< 0.12	< 0.015	< 0.009	< 0.022	< 0.012	< 0.015	< 0.015	< 0.034
11-23-17	234	0.18 ± 0.08	< 0.012	< 0.008	< 0.010	< 0.013	< 0.008	< 0.012	< 0.050
11-30-17	231	< 0.15	< 0.013	< 0.010	< 0.012	< 0.014	< 0.012	< 0.016	< 0.038
12-07-17	228	< 0.11	< 0.010	< 0.007	< 0.013	< 0.010	< 0.009	< 0.007	< 0.044
12-14-17	261	0.16 ± 0.09	< 0.005	< 0.004	< 0.014	< 0.008	< 0.008	< 0.008	< 0.037
12-21-17	254	< 0.11	< 0.008	< 0.006	< 0.019	< 0.011	< 0.009	< 0.011	< 0.050
12-28-17	270	< 0.14	< 0.009	< 0.010	< 0.010	< 0.010	< 0.008	< 0.009	< 0.040

[a] Iodine-131 concentrations are < 0.07 pCi/m^3 unless noted otherwise.

Table 1. Air particulates and charcoal cartridges, analyses for gamma-emitting isotopes and I-131[a].

Collection: Continuous, weekly exchange.
Units: pCi/m^3

Location		CA-A-008							
		^{7}Be	^{58}Co	^{60}Co	^{95}Zr	^{134}Cs	^{137}Cs	^{140}BaLa	^{144}Ce
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date Collected	Vol.								
01-05-17	261	< 0.09	< 0.008	< 0.012	< 0.014	< 0.009	< 0.012	< 0.007	< 0.047
01-12-17	251	< 0.12	< 0.006	< 0.009	< 0.015	< 0.009	< 0.007	< 0.018	< 0.050
01-19-17	266	< 0.10	< 0.006	< 0.010	< 0.018	< 0.008	< 0.006	< 0.027	< 0.041
01-26-17	262	< 0.12	< 0.007	< 0.005	< 0.013	< 0.010	< 0.009	< 0.022	< 0.047
02-02-17	259	0.13 ± 0.08	< 0.006	< 0.008	< 0.010	< 0.010	< 0.007	< 0.024	< 0.029
02-09-17	259	< 0.11	< 0.010	< 0.003	< 0.016	< 0.010	< 0.010	< 0.016	< 0.053
02-16-17	263	0.18 ± 0.10	< 0.005	< 0.004	< 0.012	< 0.008	< 0.009	< 0.014	< 0.040
02-23-17	269	0.20 ± 0.11	< 0.010	< 0.006	< 0.021	< 0.011	< 0.007	< 0.019	< 0.058
03-02-17	258	0.25 ± 0.12	< 0.007	< 0.005	< 0.018	< 0.009	< 0.009	< 0.026	< 0.047
03-09-17	265	< 0.12	< 0.010	< 0.009	< 0.014	< 0.010	< 0.006	< 0.016	< 0.045
03-16-17	254	0.21 ± 0.11	< 0.009	< 0.007	< 0.009	< 0.011	< 0.008	< 0.026	< 0.056
03-23-17	257	< 0.11	< 0.010	< 0.010	< 0.017	< 0.009	< 0.011	< 0.010	< 0.046
03-30-17	260	< 0.09	< 0.009	< 0.007	< 0.012	< 0.009	< 0.009	< 0.017	< 0.040
04-06-17	260	< 0.09	< 0.013	< 0.004	< 0.016	< 0.009	< 0.011	< 0.014	< 0.032
04-13-17	258	0.21 ± 0.11	< 0.010	< 0.008	< 0.017	< 0.010	< 0.007	< 0.020	< 0.039
04-20-17	261	< 0.13	< 0.009	< 0.005	< 0.023	< 0.010	< 0.009	< 0.037	< 0.053
04-27-17	251	0.24 ± 0.14	< 0.010	< 0.009	< 0.019	< 0.009	< 0.010	< 0.022	< 0.061
05-04-17	243	< 0.14	< 0.009	< 0.008	< 0.026	< 0.011	< 0.008	< 0.023	< 0.063
05-11-17	302	0.27 ± 0.16	< 0.005	< 0.005	< 0.018	< 0.009	< 0.007	< 0.045	< 0.048
05-17-17	210	< 0.17	< 0.010	< 0.006	< 0.016	< 0.012	< 0.009	< 0.038	< 0.039
05-25-17	293	< 0.12	< 0.008	< 0.003	< 0.019	< 0.009	< 0.009	< 0.021	< 0.045
06-01-17	255	0.32 ± 0.14	< 0.010	< 0.006	< 0.017	< 0.010	< 0.010	< 0.021	< 0.033
06-08-17	255	0.23 ± 0.13	< 0.009	< 0.008	< 0.018	< 0.009	< 0.011	< 0.017	< 0.063
06-15-17	255	< 0.14	< 0.006	< 0.007	< 0.015	< 0.011	< 0.009	< 0.014	< 0.038
06-22-17	250	0.20 ± 0.11	< 0.006	< 0.008	< 0.013	< 0.009	< 0.010	< 0.007	< 0.039
06-28-17	215	< 0.12	< 0.004	< 0.009	< 0.017	< 0.011	< 0.010	< 0.009	< 0.058
07-06-17	291	0.24 ± 0.08	< 0.009	< 0.003	< 0.011	< 0.008	< 0.006	< 0.034	< 0.032
07-13-17	248	0.27 ± 0.14	< 0.007	< 0.006	< 0.019	< 0.012	< 0.011	< 0.035	< 0.049
07-20-17	253	< 0.15	< 0.006	< 0.006	< 0.015	< 0.012	< 0.009	< 0.022	< 0.060
07-26-17	244	< 0.14	< 0.008	< 0.008	< 0.016	< 0.010	< 0.011	< 0.038	< 0.042
08-02-17	289	0.24 ± 0.13	< 0.008	< 0.005	< 0.019	< 0.009	< 0.006	< 0.015	< 0.050
08-09-17	287	0.20 ± 0.11	< 0.006	< 0.009	< 0.023	< 0.008	< 0.008	< 0.037	< 0.042
08-17-17	332	0.16 ± 0.08	< 0.009	< 0.003	< 0.014	< 0.008	< 0.008	< 0.030	< 0.026
08-23-17	247	0.31 ± 0.15	< 0.008	< 0.008	< 0.014	< 0.009	< 0.009	< 0.024	< 0.056
08-30-17	288	< 0.11	< 0.007	< 0.003	< 0.019	< 0.010	< 0.010	< 0.025	< 0.042
09-07-17	327	0.24 ± 0.10	< 0.006	< 0.003	< 0.010	< 0.007	< 0.006	< 0.013	< 0.028
09-14-17	286	0.18 ± 0.09	< 0.006	< 0.009	< 0.019	< 0.009	< 0.010	< 0.042	< 0.035
09-21-17	291	0.20 ± 0.11	< 0.005	< 0.011	< 0.010	< 0.008	< 0.008	< 0.012	< 0.045
09-28-17	290	< 0.10	< 0.007	< 0.005	< 0.019	< 0.009	< 0.006	< 0.013	< 0.048

[a] Iodine-131 concentrations are < 0.07 pCi/m^3 unless noted otherwise.

Table 1. Air particulates and charcoal cartridges, analyses for gamma-emitting isotopes and I-131[a].

Collection: Continuous, weekly exchange.

Units: pCi/m^3

Location		CA-A-008 (cont.)							
		^{7}Be	^{58}Co	^{60}Co	^{95}Zr	^{134}Cs	^{137}Cs	$^{140}BaLa$	^{144}Ce
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date Collected	Vol.								
10-05-17	285	< 0.10	< 0.010	< 0.006	< 0.018	< 0.010	< 0.012	< 0.028	< 0.048
10-12-17	283	< 0.09	< 0.004	< 0.005	< 0.011	< 0.009	< 0.007	< 0.012	< 0.037
10-19-17	283	< 0.15	< 0.014	< 0.010	< 0.019	< 0.010	< 0.006	< 0.042	< 0.048
10-26-17	278	0.19 ± 0.09	< 0.007	< 0.010	< 0.016	< 0.010	< 0.009	< 0.007	< 0.053
11-02-17	262	< 0.11	< 0.007	< 0.009	< 0.020	< 0.011	< 0.010	< 0.024	< 0.051
11-09-17	271	< 0.08	< 0.013	< 0.009	< 0.016	< 0.009	< 0.006	< 0.012	< 0.054
11-16-17	262	0.27 ± 0.12	< 0.009	< 0.008	< 0.020	< 0.011	< 0.006	< 0.016	< 0.060
11-23-17	263	< 0.13	< 0.011	< 0.005	< 0.018	< 0.010	< 0.010	< 0.011	< 0.046
11-30-17	256	0.12 ± 0.06	< 0.008	< 0.004	< 0.008	< 0.009	< 0.006	< 0.007	< 0.044
12-07-17	252	< 0.06	< 0.007	< 0.006	< 0.011	< 0.009	< 0.008	< 0.007	< 0.040
12-14-17	279	0.12 ± 0.07	< 0.008	< 0.008	< 0.009	< 0.008	< 0.009	< 0.004	< 0.041
12-21-17	287	< 0.13	< 0.012	< 0.006	< 0.009	< 0.012	< 0.009	< 0.015	< 0.051
12-28-17	286	< 0.14	< 0.012	< 0.009	< 0.012	< 0.013	< 0.006	< 0.029	< 0.063

[a] Iodine-131 concentrations are < 0.07 pCi/m^3 unless noted otherwise.

Table 1. Air particulates and charcoal cartridges, analyses for gamma-emitting isotopes and I-131[a].

Collection: Continuous, weekly exchange.
Units: pCi/m^3

Location		CA-A-009							
		^{7}Be	^{58}Co	^{60}Co	^{95}Zr	^{134}Cs	^{137}Cs	$^{140}BaLa$	^{144}Ce
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date Collected	Vol.								
01-05-17	295	0.12 ± 0.07	< 0.004	< 0.009	< 0.010	< 0.008	< 0.007	< 0.011	< 0.046
01-12-17	297	< 0.09	< 0.005	< 0.010	< 0.015	< 0.010	< 0.009	< 0.017	< 0.034
01-19-17	301	0.15 ± 0.09	< 0.007	< 0.005	< 0.011	< 0.008	< 0.008	< 0.024	< 0.044
01-26-17	291	< 0.11	< 0.005	< 0.003	< 0.016	< 0.009	< 0.009	< 0.024	< 0.041
02-02-17	349	< 0.10	< 0.006	< 0.006	< 0.015	< 0.008	< 0.007	< 0.013	< 0.042
02-09-17	263	< 0.11	< 0.007	< 0.003	< 0.017	< 0.010	< 0.006	< 0.027	< 0.044
02-16-17	272	< 0.11	< 0.011	< 0.004	< 0.014	< 0.011	< 0.008	< 0.025	< 0.044
02-23-17	281	0.14 ± 0.07	< 0.008	< 0.007	< 0.011	< 0.009	< 0.007	< 0.017	< 0.043
03-02-17	268	< 0.11	< 0.011	< 0.005	< 0.011	< 0.010	< 0.009	< 0.025	< 0.043
03-09-17	272	0.25 ± 0.08	< 0.006	< 0.007	< 0.017	< 0.008	< 0.009	< 0.033	< 0.044
03-16-17	264	0.22 ± 0.09	< 0.010	< 0.003	< 0.016	< 0.010	< 0.006	< 0.008	< 0.049
03-23-17	269	0.24 ± 0.12	< 0.009	< 0.007	< 0.020	< 0.011	< 0.011	< 0.010	< 0.053
03-30-17	277	< 0.09	< 0.005	< 0.004	< 0.018	< 0.009	< 0.009	< 0.009	< 0.031
04-06-17	270	< 0.10	< 0.010	< 0.003	< 0.014	< 0.009	< 0.010	< 0.010	< 0.049
04-13-17	270	< 0.12	< 0.009	< 0.005	< 0.021	< 0.010	< 0.006	< 0.023	< 0.045
04-20-17	280	< 0.15	< 0.008	< 0.006	< 0.017	< 0.009	< 0.011	< 0.037	< 0.060
04-27-17	268	< 0.12	< 0.008	< 0.010	< 0.023	< 0.010	< 0.005	< 0.053	< 0.040
05-04-17	261	0.19 ± 0.11	< 0.005	< 0.013	< 0.024	< 0.011	< 0.010	< 0.029	< 0.033
05-11-17	276	0.27 ± 0.15	< 0.012	< 0.004	< 0.017	< 0.011	< 0.007	< 0.034	< 0.047
05-17-17	225	0.33 ± 0.17	< 0.010	< 0.005	< 0.020	< 0.011	< 0.007	< 0.061	< 0.047
05-25-17	315	0.21 ± 0.10	< 0.005	< 0.008	< 0.020	< 0.009	< 0.010	< 0.039	< 0.028
06-01-17	266	0.22 ± 0.11	< 0.009	< 0.005	< 0.013	< 0.009	< 0.005	< 0.036	< 0.057
06-08-17	273	< 0.13	< 0.006	< 0.005	< 0.019	< 0.009	< 0.012	< 0.016	< 0.031
06-15-17	274	0.25 ± 0.09	< 0.003	< 0.006	< 0.019	< 0.009	< 0.011	< 0.014	< 0.035
06-22-17	269	0.20 ± 0.08	< 0.007	< 0.008	< 0.017	< 0.008	< 0.008	< 0.016	< 0.049
06-28-17	232	0.18 ± 0.10	< 0.008	< 0.010	< 0.016	< 0.010	< 0.006	< 0.012	< 0.064
07-06-17	315	0.28 ± 0.13	< 0.009	< 0.007	< 0.017	< 0.009	< 0.006	< 0.032	< 0.043
07-13-17	272	< 0.15	< 0.011	< 0.005	< 0.029	< 0.011	< 0.009	< 0.033	< 0.049
07-20-17	270	< 0.15	< 0.012	< 0.005	< 0.019	< 0.009	< 0.007	< 0.020	< 0.050
07-26-17	235	< 0.15	< 0.008	< 0.006	< 0.024	< 0.012	< 0.014	< 0.037	< 0.040
08-02-17	274	< 0.14	< 0.006	< 0.006	< 0.013	< 0.009	< 0.009	< 0.039	< 0.030
08-09-17	270	< 0.12	< 0.006	< 0.005	< 0.016	< 0.010	< 0.009	< 0.028	< 0.031
08-17-17	311	0.17 ± 0.09	< 0.007	< 0.006	< 0.014	< 0.007	< 0.007	< 0.022	< 0.037
08-23-17	222	0.23 ± 0.12	< 0.015	< 0.007	< 0.024	< 0.011	< 0.008	< 0.052	< 0.058
08-30-17	269	< 0.11	< 0.005	< 0.004	< 0.014	< 0.010	< 0.007	< 0.011	< 0.048
09-07-17	301	< 0.10	< 0.010	< 0.007	< 0.018	< 0.009	< 0.006	< 0.022	< 0.044
09-14-17	263	0.32 ± 0.16	< 0.012	< 0.005	< 0.024	< 0.010	< 0.010	< 0.024	< 0.048
09-21-17	268	0.20 ± 0.10	< 0.008	< 0.012	< 0.011	< 0.011	< 0.009	< 0.012	< 0.042
09-28-17	265	0.19 ± 0.11	< 0.005	< 0.006	< 0.019	< 0.008	< 0.009	< 0.009	< 0.043

[a] Iodine-131 concentrations are < 0.07 pCi/m^3 unless noted otherwise.

Table 1. Air particulates and charcoal cartridges, analyses for gamma-emitting isotopes and I-131[a].

Collection: Continuous, weekly exchange.
Units: pCi/m^3

Location		CA-A-009 (cont.)							
		^{7}Be	^{58}Co	^{60}Co	^{95}Zr	^{134}Cs	^{137}Cs	$^{140}BaLa$	^{144}Ce
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date Collected	Vol.								
10-05-17	261	0.14 ± 0.08	< 0.011	< 0.006	< 0.016	< 0.010	< 0.011	< 0.014	< 0.042
10-12-17	255	< 0.10	< 0.005	< 0.007	< 0.015	< 0.010	< 0.010	< 0.008	< 0.049
10-19-17	254	< 0.17	< 0.013	< 0.009	< 0.017	< 0.011	< 0.012	< 0.060	< 0.051
10-26-17	251	< 0.12	< 0.009	< 0.012	< 0.014	< 0.009	< 0.010	< 0.008	< 0.043
11-02-17	238	< 0.12	< 0.009	< 0.009	< 0.014	< 0.010	< 0.009	< 0.011	< 0.046
11-09-17	248	< 0.09	< 0.008	< 0.009	< 0.021	< 0.010	< 0.006	< 0.011	< 0.032
11-16-17	237	0.21 ± 0.13	< 0.009	< 0.006	< 0.015	< 0.012	< 0.006	< 0.015	< 0.055
11-23-17	285	< 0.12	< 0.007	< 0.004	< 0.016	< 0.008	< 0.006	< 0.010	< 0.047
11-30-17	277	< 0.13	< 0.008	< 0.009	< 0.012	< 0.009	< 0.010	< 0.009	< 0.051
12-07-17	285	< 0.09	< 0.005	< 0.005	< 0.016	< 0.008	< 0.005	< 0.005	< 0.044
12-14-17	287	< 0.12	< 0.004	< 0.007	< 0.009	< 0.010	< 0.010	< 0.008	< 0.033
12-21-17	279	< 0.14	< 0.011	< 0.013	< 0.019	< 0.012	< 0.008	< 0.017	< 0.067
12-28-17	294	0.16 ± 0.10	< 0.008	< 0.008	< 0.016	< 0.009	< 0.004	< 0.011	< 0.047

[a] Iodine-131 concentrations are < 0.07 pCi/m^3 unless noted otherwise.

Table 1. Air particulates and charcoal cartridges, analyses for gamma-emitting isotopes and I-131[a].

Collection: Continuous, weekly exchange.
Units: pCi/m^3

Location		CA-A-010[b]							
		^{7}Be	^{58}Co	^{60}Co	^{95}Zr	^{134}Cs	^{137}Cs	$^{140}BaLa$	^{144}Ce
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date Collected	Vol.								
01-05-17					NS[c]				
01-12-17	282	0.14 ± 0.08	< 0.006	< 0.002	< 0.009	< 0.007	< 0.007	< 0.009	< 0.034
01-19-17	281	< 0.10	< 0.008	< 0.005	< 0.009	< 0.009	< 0.008	< 0.028	< 0.041
01-26-17	277	< 0.09	< 0.011	< 0.006	< 0.014	< 0.009	< 0.008	< 0.010	< 0.049
02-02-17	275	< 0.14	< 0.006	< 0.008	< 0.009	< 0.009	< 0.009	< 0.035	< 0.048
02-09-17	274	< 0.11	< 0.008	< 0.006	< 0.009	< 0.008	< 0.006	< 0.030	< 0.045
02-16-17	274	< 0.10	< 0.007	< 0.003	< 0.018	< 0.009	< 0.009	< 0.020	< 0.048
02-23-17	273	< 0.11	< 0.006	< 0.007	< 0.013	< 0.008	< 0.008	< 0.018	< 0.040
03-02-17	270	0.14 ± 0.07	< 0.005	< 0.006	< 0.018	< 0.008	< 0.009	< 0.022	< 0.028
03-09-17	270	< 0.10	< 0.011	< 0.008	< 0.011	< 0.008	< 0.006	< 0.011	< 0.040
03-16-17	275	< 0.10	< 0.006	< 0.006	< 0.013	< 0.009	< 0.009	< 0.018	< 0.044
03-23-17	263	< 0.11	< 0.006	< 0.003	< 0.013	< 0.009	< 0.008	< 0.008	< 0.045
03-30-17	272	< 0.11	< 0.008	< 0.010	< 0.016	< 0.009	< 0.005	< 0.015	< 0.044
04-06-17	273	< 0.08	< 0.005	< 0.006	< 0.019	< 0.010	< 0.012	< 0.009	< 0.038
04-13-17	258	0.20 ± 0.10	< 0.008	< 0.004	< 0.019	< 0.009	< 0.008	< 0.022	< 0.035
04-20-17	270	0.37 ± 0.15	< 0.004	< 0.004	< 0.014	< 0.010	< 0.008	< 0.021	< 0.042
04-27-17	265	< 0.15	< 0.008	< 0.005	< 0.016	< 0.010	< 0.011	< 0.021	< 0.040
05-04-17	264	< 0.14	< 0.009	< 0.007	< 0.028	< 0.011	< 0.007	< 0.037	< 0.039
05-11-17	268	0.30 ± 0.15	< 0.010	< 0.010	< 0.028	< 0.010	< 0.011	< 0.025	< 0.052
05-17-17	222	0.30 ± 0.12	< 0.018	< 0.005	< 0.028	< 0.011	< 0.012	< 0.043	< 0.038
05-25-17	312	< 0.12	< 0.008	< 0.005	< 0.016	< 0.008	< 0.009	< 0.036	< 0.049
06-01-17	258	0.26 ± 0.11	< 0.008	< 0.007	< 0.013	< 0.008	< 0.007	< 0.030	< 0.042
06-08-17	262	0.19 ± 0.11	< 0.006	< 0.008	< 0.015	< 0.009	< 0.011	< 0.020	< 0.050
06-15-17	264	0.34 ± 0.12	< 0.009	< 0.006	< 0.019	< 0.008	< 0.008	< 0.017	< 0.048
06-22-17	252	0.28 ± 0.15	< 0.005	< 0.005	< 0.019	< 0.010	< 0.007	< 0.012	< 0.055
06-28-17	227	0.16 ± 0.10	< 0.004	< 0.007	< 0.021	< 0.010	< 0.012	< 0.015	< 0.044
07-06-17	304	0.21 ± 0.11	< 0.010	< 0.006	< 0.019	< 0.008	< 0.009	< 0.025	< 0.039
07-13-17	256	0.29 ± 0.17	< 0.012	< 0.006	< 0.020	< 0.011	< 0.012	< 0.045	< 0.035
07-20-17	259	< 0.17	< 0.014	< 0.004	< 0.018	< 0.011	< 0.008	< 0.033	< 0.053
07-26-17	225	< 0.14	< 0.008	< 0.010	< 0.014	< 0.011	< 0.012	< 0.045	< 0.056
08-02-17	257	< 0.12	< 0.007	< 0.009	< 0.021	< 0.010	< 0.009	< 0.027	< 0.042
08-09-17	259	< 0.12	< 0.009	< 0.009	< 0.015	< 0.009	< 0.006	< 0.038	< 0.054
08-17-17	298	0.21 ± 0.10	< 0.007	< 0.003	< 0.012	< 0.008	< 0.008	< 0.026	< 0.044
08-23-17	229	< 0.16	< 0.012	< 0.009	< 0.019	< 0.010	< 0.008	< 0.067	< 0.043
08-30-17	259	< 0.12	< 0.009	< 0.004	< 0.013	< 0.010	< 0.014	< 0.012	< 0.056
09-07-17	298	0.23 ± 0.12	< 0.008	< 0.007	< 0.014	< 0.007	< 0.009	< 0.025	< 0.024
09-14-17	258	< 0.16	< 0.011	< 0.012	< 0.023	< 0.010	< 0.007	< 0.023	< 0.048
09-21-17	262	0.18 ± 0.09	< 0.007	< 0.010	< 0.013	< 0.011	< 0.012	< 0.024	< 0.055
09-28-17	257	< 0.12	< 0.010	< 0.007	< 0.009	< 0.009	< 0.008	< 0.021	< 0.041

[a] Iodine-131 concentrations are < 0.07 pCi/m^3 unless noted otherwise.

[b] New location; B3 discontinued.

[c] "NS" = No sample; see Part I Table 5.5, Listing of Missed Samples.

Table 1. Air particulates and charcoal cartridges, analyses for gamma-emitting isotopes and I-131[a].

Collection: Continuous, weekly exchange.
Units: pCi/m^3

Location		CA-A-010 (cont.)							
		^{7}Be	^{58}Co	^{60}Co	^{95}Zr	^{134}Cs	^{137}Cs	$^{140}BaLa$	^{144}Ce
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date Collected	Vol.								
10-05-17	255	< 0.11	< 0.006	< 0.009	< 0.025	< 0.010	< 0.012	< 0.020	< 0.040
10-12-17	254	0.18 ± 0.09	< 0.008	< 0.009	< 0.018	< 0.010	< 0.009	< 0.013	< 0.049
10-19-17	260	< 0.16	< 0.008	< 0.008	< 0.019	< 0.011	< 0.010	< 0.047	< 0.046
10-26-17	257	< 0.12	< 0.011	< 0.011	< 0.021	< 0.011	< 0.011	< 0.016	< 0.030
11-02-17	252	< 0.11	< 0.011	< 0.009	< 0.014	< 0.010	< 0.007	< 0.009	< 0.046
11-09-17	265	< 0.08	< 0.009	< 0.008	< 0.016	< 0.009	< 0.007	< 0.006	< 0.037
11-16-17	249	0.23 ± 0.09	< 0.009	< 0.010	< 0.010	< 0.009	< 0.009	< 0.018	< 0.033
11-23-17	270	< 0.11	< 0.007	< 0.004	< 0.017	< 0.010	< 0.008	< 0.010	< 0.042
11-30-17	277	0.15 ± 0.09	< 0.006	< 0.006	< 0.016	< 0.009	< 0.012	< 0.016	< 0.059
12-07-17	267	< 0.10	< 0.008	< 0.007	< 0.010	< 0.010	< 0.011	< 0.014	< 0.056
12-14-17	251	< 0.14	< 0.009	< 0.014	< 0.026	< 0.015	< 0.012	< 0.020	< 0.057
12-21-17	259	< 0.16	< 0.018	< 0.018	< 0.035	< 0.021	< 0.016	< 0.054	< 0.080
12-28-17	261	< 0.11	< 0.010	< 0.009	< 0.018	< 0.009	< 0.009	< 0.018	< 0.048

[a] Iodine-131 concentrations are < 0.07 pCi/m^3 unless noted otherwise.

Table 1. Air particulates and charcoal cartridges, analyses for gamma-emitting isotopes and I-131[a].

Collection: Continuous, weekly exchange.

Units: pCi/m^3

Location		CA-A-011[b]							
		^{7}Be	^{58}Co	^{60}Co	^{95}Zr	^{134}Cs	^{137}Cs	$^{140}BaLa$	^{144}Ce
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date Collected	Vol.								
01-05-17					NS[c]				
01-12-17	221	< 0.12	< 0.014	< 0.015	< 0.011	< 0.012	< 0.007	< 0.019	< 0.052
01-19-17	301	< 0.09	< 0.008	< 0.007	< 0.014	< 0.009	< 0.008	< 0.013	< 0.032
01-26-17	301	< 0.09	< 0.007	< 0.005	< 0.008	< 0.006	< 0.006	< 0.029	< 0.026
02-02-17	282	< 0.13	< 0.007	< 0.005	< 0.018	< 0.010	< 0.008	< 0.039	< 0.056
02-09-17	299	0.17 ± 0.07	< 0.004	< 0.005	< 0.007	< 0.007	< 0.005	< 0.019	< 0.026
02-15-17	276	0.17 ± 0.09	< 0.004	< 0.005	< 0.012	< 0.007	< 0.003	< 0.013	< 0.034
02-23-17					NS[c]				
03-02-17	272	< 0.11	< 0.008	< 0.005	< 0.015	< 0.008	< 0.006	< 0.033	< 0.033
03-09-17	278	0.19 ± 0.08	< 0.005	< 0.005	< 0.009	< 0.006	< 0.005	< 0.017	< 0.037
03-16-17	277	< 0.12	< 0.006	< 0.006	< 0.018	< 0.011	< 0.005	< 0.027	< 0.042
03-23-17	273	0.21 ± 0.12	< 0.004	< 0.005	< 0.016	< 0.010	< 0.010	< 0.028	< 0.030
03-30-17	273	0.13 ± 0.07	< 0.007	< 0.003	< 0.019	< 0.008	< 0.006	< 0.011	< 0.049
04-06-17	274	< 0.12	< 0.004	< 0.004	< 0.020	< 0.008	< 0.009	< 0.026	< 0.029
04-13-17	270	< 0.14	< 0.010	< 0.006	< 0.022	< 0.009	< 0.008	< 0.023	< 0.046
04-20-17	277	0.29 ± 0.12	< 0.003	< 0.005	< 0.020	< 0.009	< 0.008	< 0.031	< 0.052
04-27-17	269	< 0.13	< 0.010	< 0.007	< 0.022	< 0.010	< 0.010	< 0.027	< 0.050
05-04-17	267	< 0.13	< 0.011	< 0.007	< 0.016	< 0.008	< 0.006	< 0.123	< 0.042
05-11-17	272	0.33 ± 0.16	< 0.006	< 0.005	< 0.017	< 0.011	< 0.011	< 0.032	< 0.049
05-17-17	233	< 0.21	< 0.014	< 0.005	< 0.020	< 0.012	< 0.009	< 0.072	< 0.040
05-25-17	307	0.27 ± 0.15	< 0.007	< 0.003	< 0.014	< 0.009	< 0.006	< 0.033	< 0.037
06-01-17	266	0.23 ± 0.11	< 0.006	< 0.004	< 0.021	< 0.010	< 0.009	< 0.024	< 0.050
06-08-17	272	< 0.14	< 0.007	< 0.006	< 0.016	< 0.010	< 0.010	< 0.026	< 0.055
06-15-17	265	< 0.11	< 0.005	< 0.006	< 0.014	< 0.010	< 0.008	< 0.018	< 0.051
06-22-17	278	0.28 ± 0.11	< 0.007	< 0.012	< 0.010	< 0.009	< 0.011	< 0.014	< 0.056
06-28-17	244	0.17 ± 0.09	< 0.006	< 0.012	< 0.016	< 0.010	< 0.007	< 0.008	< 0.054
07-06-17	335	0.29 ± 0.15	< 0.008	< 0.004	< 0.015	< 0.008	< 0.009	< 0.023	< 0.044
07-13-17	280	0.28 ± 0.14	< 0.010	< 0.004	< 0.016	< 0.010	< 0.011	< 0.024	< 0.045
07-20-17	288	< 0.11	< 0.011	< 0.007	< 0.012	< 0.009	< 0.007	< 0.026	< 0.041
07-26-17	246	0.27 ± 0.15	< 0.009	< 0.005	< 0.025	< 0.010	< 0.011	< 0.023	< 0.053
08-02-17	289	0.29 ± 0.12	< 0.008	< 0.004	< 0.014	< 0.009	< 0.008	< 0.022	< 0.046
08-09-17	288	< 0.14	< 0.005	< 0.005	< 0.016	< 0.009	< 0.007	< 0.032	< 0.035
08-17-17	329	< 0.10	< 0.006	< 0.005	< 0.014	< 0.008	< 0.008	< 0.024	< 0.038
08-23-17	247	< 0.16	< 0.005	< 0.004	< 0.023	< 0.010	< 0.007	< 0.049	< 0.049
08-30-17	292	< 0.10	< 0.011	< 0.007	< 0.020	< 0.008	< 0.007	< 0.017	< 0.038
09-07-17	325	0.28 ± 0.12	< 0.006	< 0.003	< 0.017	< 0.008	< 0.009	< 0.019	< 0.036
09-14-17	288	0.26 ± 0.14	< 0.007	< 0.005	< 0.018	< 0.009	< 0.009	< 0.028	< 0.047
09-21-17	287	< 0.13	< 0.005	< 0.003	< 0.014	< 0.010	< 0.010	< 0.012	< 0.051
09-28-17	284	< 0.11	< 0.011	< 0.004	< 0.025	< 0.009	< 0.008	< 0.010	< 0.041

[a] iodine-131 concentrations are < 0.07 pCi/m^3 unless noted otherwise.

[b] New location.

[c] " NS" = No sample; see Part I Table 5.5, Listing of Missed Samples.

Table 1. Air particulates and charcoal cartridges, analyses for gamma-emitting isotopes and I-131[a].

Collection: Continuous, weekly exchange.
Units: pCi/m^3

Location		CA-A-011 (cont.)							
		^{7}Be	^{58}Co	^{60}Co	^{95}Zr	^{134}Cs	^{137}Cs	$^{140}BaLa$	^{144}Ce
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date Collected	Vol.								
10-05-17	286	< 0.11	< 0.008	< 0.005	< 0.012	< 0.009	< 0.009	< 0.018	< 0.055
10-12-17	282	< 0.09	< 0.009	< 0.006	< 0.011	< 0.008	< 0.010	< 0.012	< 0.049
10-19-17	283	< 0.17	< 0.007	< 0.009	< 0.022	< 0.009	< 0.009	< 0.071	< 0.045
10-26-17	278	< 0.14	< 0.016	< 0.008	< 0.020	< 0.010	< 0.011	< 0.041	< 0.057
11-02-17	277	0.15 ± 0.08	< 0.007	< 0.011	< 0.012	< 0.009	< 0.006	< 0.008	< 0.040
11-09-17	269	< 0.13	< 0.010	< 0.012	< 0.017	< 0.012	< 0.009	< 0.017	< 0.067
11-16-17	270	< 0.13	< 0.007	< 0.007	< 0.024	< 0.011	< 0.010	< 0.013	< 0.064
11-23-17	269	< 0.10	< 0.006	< 0.009	< 0.008	< 0.009	< 0.008	< 0.011	< 0.049
11-30-17	271	0.20 ± 0.10	< 0.007	< 0.008	< 0.011	< 0.011	< 0.008	< 0.010	< 0.059
12-07-17	264	< 0.11	< 0.011	< 0.006	< 0.024	< 0.011	< 0.010	< 0.010	< 0.034
12-14-17	249	< 0.11	< 0.007	< 0.006	< 0.025	< 0.012	< 0.014	< 0.012	< 0.060
12-21-17	263	< 0.13	< 0.009	< 0.009	< 0.018	< 0.011	< 0.009	< 0.019	< 0.052
12-28-17	252	< 0.14	< 0.011	< 0.015	< 0.022	< 0.011	< 0.006	< 0.026	< 0.050

[a] Iodine-131 concentrations are < 0.07 pCi/m^3 unless noted otherwise.

Table 2. Milk, analyses for iodine-131 and gamma-emitting isotopes.

Collection: Semimonthly during grazing season, monthly otherwise.

Units: pCi/L

Location		CA-MLK-M9					
Date	Lab	Concentration (pCi/L)					
Collected	Code	I-131	K-40	Zn-65	Cs-134	Cs-137	Ba-La-140
Required LLDs		1	-	-	15	18	15
01-10-17	CAMI -137	< 0.4	1171 ± 101	< 7.0	< 1.6	< 3.0	< 3.1
02-14-17	CAMI -592	< 0.3	1361 ± 92	< 3.9	< 3.0	< 2.9	< 1.0
03-14-17	CAMI -1024	< 0.2	1100 ± 112	< 5.3	< 3.9	< 3.9	< 2.4
03-28-17	CAMI -1217	< 0.2	878 ± 98	< 6.9	< 4.2	< 4.3	< 3.1
04-11-17	CAMI -1528	< 0.4	946 ± 107	< 4.3	< 4.6	< 5.7	< 3.1
04-26-17	CAMI -1866	< 0.4	1133 ± 110	< 7.6	< 4.3	< 5.2	< 5.1
05-08-17	CAMI -2107	< 0.4	1137 ± 117	< 2.7	< 4.4	< 4.5	< 1.7
05-23-17	CAMI -2430	< 0.4	1165 ± 161	< 9.5	< 6.6	< 6.2	< 6.9
06-13-17	CAMI -2883	< 0.3	1120 ± 118	< 11.2	< 5.3	< 4.5	< 3.1
06-26-17	CAMI -3115	< 0.4	1154 ± 98	< 4.3	< 4.1	< 3.1	< 3.4
07-10-17	CAMI -3368	< 0.5	1020 ± 102	< 5.7	< 3.5	< 3.1	< 2.1
07-24-17	CAMI -3797	< 0.3	1121 ± 117	< 6.7	< 4.9	< 3.0	< 1.9
08-08-17	CAMI -4118	< 0.4	1033 ± 141	< 12.8	< 4.7	< 4.9	< 2.9
08-21-17	CAMI -4337	< 0.4	1167 ± 105	< 3.4	< 3.6	< 3.3	< 2.4
09-12-17	CAMI -4683	< 0.3	1086 ± 95	< 7.0	< 3.1	< 3.4	< 1.4
09-26-17	CAMI -4963	< 0.2	1132 ± 86	< 6.8	< 2.5	< 3.7	< 1.2
10-10-17	CAMI -5279	< 0.3	1165 ± 109	< 8.2	< 3.0	< 4.2	< 2.3
10-24-17	CAMI -5703	< 0.3	1361 ± 119	< 8.3	< 3.9	< 2.9	< 2.4
11-13-17	CAMI -6068	< 0.5	902 ± 102	< 10.7	< 4.2	< 5.3	< 3.7
12-11-17	CAMI -6454	< 0.4	915 ± 108	< 9.3	< 5.2	< 3.2	< 2.9

Table 3. Vegetation, analyses for iodine-131 and gamma-emitting isotopes.

Collection: Monthly, during growing season

Units: pCi/kg wet

Lab Code	Collection Date	Sample Type	Concentration (pCi/kg wet) ^{40}K	^{54}Mn	^{58}Co	^{60}Co	^{131}I	^{134}Cs	^{137}Cs
			Location: CA-FPL-V9						
CAVE- 1529	4/10/2017	Lettuce	4853 ± 363	< 11.1	< 7.8	< 10.3	< 21.3	< 11.8	< 10.5
CAVE- 2108	5/9/2017	Mustard	3325 ± 277	< 8.0	< 8.8	< 10.0	< 15.5	< 8.9	< 10.6
CAVE- 2109	5/9/2017	Turnip greens	3751 ± 337	< 8.9	< 7.6	< 8.1	< 33.1	< 12.6	< 12.5
CAVE- 2110	5/9/2017	Lettuce	3004 ± 276	< 8.0	< 7.8	< 5.9	< 19.0	< 10.9	< 11.6
CAVE- 2870	6/13/2017	Collard Greens	3897 ± 263	< 9.0	< 5.6	< 8.3	< 22.6	< 8.1	< 9.2
CAVE- 2872	6/13/2017	Beet greens	10215 ± 407	< 10.0	< 8.3	< 10.0	< 39.7	< 8.9	< 10.2
CAVE- 2873	6/13/2017	Swiss Chard	8038 ± 356	< 8.1	< 7.5	< 8.3	< 22.7	< 9.0	< 6.4
CAVE- 2874	6/13/2017	Lettuce	4956 ± 295	< 5.1	< 4.2	< 4.6	< 15.1	< 8.5	< 7.4
CAVE- 3369	7/11/2017	Lettuce	7650 ± 350	< 10.4	< 7.6	< 4.7	< 31.9	< 8.7	< 9.0
CAVE- 3370	7/11/2017	Swiss Chard	7165 ± 348	< 6.3	< 9.5	< 5.3	< 19.8	< 8.5	< 7.9
CAVE- 3371	7/11/2017	Collard Greens	5288 ± 171	< 5.5	< 4.0	< 5.0	< 16.8	< 4.9	< 5.5
CAVE- 4124	8/8/2017	Swiss Chard	3766 ± 244	< 7.4	< 7.9	< 4.8	< 21.8	< 7.3	< 5.3
CAVE- 4125	8/8/2017	Collard Greens	3724 ± 287	< 7.4	< 4.6	< 8.9	< 21.7	< 8.7	< 9.7
CAVE- 4691	9/12/2017	Collard Greens	4332 ± 282	< 8.6	< 8.1	< 6.7	< 37.9	< 9.5	< 6.1
CAVE- 4692	9/12/2017	Mustard	5313 ± 358	< 8.8	< 9.9	< 8.6	< 29.0	< 8.9	< 7.8
CAVE- 4694	9/12/2017	Swiss Chard	6138 ± 313	< 8.4	< 6.3	< 7.6	< 21.9	< 8.3	< 8.2
CAVE- 4695	9/12/2017	Turnip greens	5354 ± 344	< 6.2	< 9.0	< 7.4	< 39.7	< 9.9	< 9.7
CAVE- 5287	10/10/2017	Lettuce	2992 ± 253	< 7.3	< 6.6	< 4.1	< 9.8	< 7.9	< 8.3
CAVE- 5288	10/10/2017	Collard Greens	2465 ± 239	< 4.2	< 5.2	< 4.0	< 10.9	< 8.3	< 6.4
CAVE- 5289	10/10/2017	Turnip Greens	2973 ± 245	< 5.9	< 7.4	< 5.4	< 10.4	< 8.0	< 5.0
CAVE- 5290	10/10/2017	Mustard Greens	3354 ± 248	< 5.5	< 5.8	< 7.2	< 7.6	< 7.5	< 7.6
CAVE- 5291	10/10/2017	Swiss Chard	3483 ± 271	< 8.9	< 8.5	< 11.2	< 13.4	< 9.9	< 5.6
CAVE- 5292	10/10/2017	Kale	2816 ± 271	< 6.0	< 6.5	< 6.1	< 10.2	< 8.4	< 8.1
			Location: CA-FPL-V11						
	4/10/2017			NS[a]					
	5/9/2017			NS[a]					
CAVE- 2875	6/13/2017	Cabbage	4909 ± 264	< 7.5	< 8.1	< 6.3	< 20.4	< 7.7	< 8.0
CAVE- 3372	7/11/2017	Cabbage	2769 ± 175	< 3.2	< 6.5	< 7.2	< 20.2	< 5.5	< 4.6
CAVE- 4126	8/8/2017	Cabbage	2476 ± 164	< 5.1	< 4.9	< 3.4	< 18.1	< 4.9	< 5.5
CAVE- 4696	9/12/2017	Cabbage	3781 ± 212	< 7.6	< 6.6	< 4.3	< 24.4	< 6.0	< 4.9
	10/10/2017			NS[a]					

[a] " NS" = No sample; see Part I Table 5.5, Listing of Missed Samples.

Table 3. Vegetation, analyses for iodine-131 and gamma-emitting isotopes.

Collection: Monthly, during growing season

Units: pCi/kg wet

Lab Code	Collection Date	Sample Type	Concentration (pCi/kg wet) ^{40}K	^{54}Mn	^{58}Co	^{60}Co	^{131}I	^{134}Cs	^{137}Cs
			Location: CA-FPL-V12						
	4/10/2017			NS[a]					
CAVE- 2111	5/8/2017	Poke	7679 ± 493	< 8.4	< 8.6	< 10.7	< 30.0	< 12.7	< 16.1
CAVE- 2876	6/13/2017	Swiss Chard	8345 ± 377	< 10.1	< 7.4	< 7.6	< 25.0	< 9.8	< 8.6
CAVE- 2877	6/13/2017	Spinach	5075 ± 339	< 7.2	< 8.9	< 8.9	< 37.6	< 11.1	< 8.1
CAVE- 2878	6/13/2017	Lettuce	7181 ± 369	< 5.5	< 10.5	< 6.9	< 35.2	< 9.5	< 11.4
CAVE- 2879	6/13/2017	Cabbage	3313 ± 231	< 7.0	< 5.0	< 5.9	< 17.8	< 7.3	< 4.9
CAVE- 3373	7/10/2017	Lettuce	5544 ± 178	< 3.8	< 3.8	< 4.0	< 10.8	< 4.8	< 3.6
CAVE- 3374	7/10/2017	Cabbage	2511 ± 188	< 6.2	< 5.1	< 6.5	< 17.9	< 6.0	< 6.1
CAVE- 3375	7/10/2017	Swiss Chard	6854 ± 304	< 7.4	< 4.7	< 4.5	< 17.9	< 7.0	< 8.7
CAVE- 3376	7/10/2017	Spinach Mustard	3669 ± 241	< 5.0	< 10.5	< 4.5	< 22.8	< 7.7	< 7.4
CAVE- 4127	8/7/2017	Swiss Chard	6248 ± 353	< 8.1	< 9.1	< 5.0	< 19.1	< 9.0	< 9.4
CAVE- 4128	8/7/2017	Cabbage	1969 ± 217	< 7.2	< 5.4	< 3.2	< 15.4	< 8.3	< 6.7
CAVE- 4697	9/12/2017	Swiss Chard	6830 ± 375	< 7.5	< 5.7	< 11.1	< 41.9	< 8.3	< 6.7
CAVE- 5293	10/10/2017	Swiss Chard	4084 ± 336	< 12.0	< 10.6	< 11.0	< 16.8	< 11.4	< 11.8
			Location: CA-FPL-V16						
	4/10/2017			NS[a]					
	5/9/2017			NS[a]					
CAVE- 2880	6/12/2017	Radish greens	5792 ± 232	< 4.3	< 5.4	< 6.4	< 9.2	< 6.5	< 4.3
CAVE- 2881	6/12/2017	Lettuce	7451 ± 657	< 10.4	< 16.8	< 13.6	< 29.7	< 19.7	< 15.4
CAVE- 2882	6/12/2017	Turnip greens	9872 ± 531	< 19.3	< 19.5	< 16.0	< 48.1	< 15.3	< 11.7
CAVE- 3377	7/10/2017	Turnip greens	5833 ± 339	< 6.1	< 9.2	< 7.8	< 26.6	< 9.1	< 10.3
	8/9/2017			NS[a]					
	9/12/2017			NS[a]					
	10/10/2017			NS[a]					
			Location: CA-FPL-V18						
	4/10/2017			NS[a]					
	5/9/2017			NS[a]					
	6/13/2017			NS[a]					
CAVE- 3650	7/18/2017	Cabbage	1734 ± 169	< 4.4	< 7.3	< 6.4	< 34.6	< 8.1	< 8.5
CAVE- 3651	7/18/2017	Turnip greens	5249 ± 403	< 13.2	< 11.4	< 12.5	< 47.6	< 12.9	< 11.5
CAVE- 4129	8/9/2017	Turnip greens	3303 ± 346	< 9.8	< 10.3	< 8.8	< 24.9	< 12.4	< 9.8
	9/12/2017			NS[a]					
	10/10/2017			NS[a]					

[a] " NS" = No sample; see Part I Table 5.5, Listing of Missed Samples.

Table 4. Non-food Crops, analyses for tritium and gamma-emitting isotopes.

Collection: Annually, at harvest

Units: pCi/kg wet

Lab Code	Sample Type	Collection Date	(pCi/L) ^{3}H	Concentration (pCi/kg wet) ^{40}K	^{54}Mn	^{58}Co	^{60}Co	^{134}Cs	^{137}Cs
				Location: CA-FC-1					
		9/24/2017			NS[a]				
		9/24/2017			NS[a]				
		9/24/2017			NS[a]				
				Location: CA-FC-2					
CAVE- 5068	1-Soybeans	9/24/2017	< 149	12848 ± 591	< 12.0	< 13.4	< 11.2	< 15.2	< 11.6
CAVE- 5069	2-Soybeans	9/24/2017	< 151	8359 ± 418	< 8.2	< 7.1	< 6.8	< 10.2	< 9.1
CAVE- 5070	3-Soybeans	9/27/2017	< 143	8265 ± 396	< 7.6	< 11.2	< 8.0	< 9.5	< 8.4
				Location: CA-FC-3					
CAVE- 5071	1-Soybeans	9/24/2017	< 149	12745 ± 418	< 9.5	< 8.2	< 11.6	< 9.7	< 11.8
CAVE- 5072	2-Soybeans	9/24/2017	< 143	13864 ± 447	< 11.8	< 11.9	< 12.2	< 10.9	< 12.2
CAVE- 5073	3-Soybeans	9/24/2017	< 149	8607 ± 312	< 8.6	< 9.1	< 8.0	< 7.7	< 6.9
				Location: CA-FC-4(C)					
CAVE- 5074	Soybeans	9/26/2017	< 143	12596 ± 539	< 14.7	< 11.0	< 10.2	< 13.5	< 13.1

[a] " NS" = No sample; see Part I Table 5.5, Listing of Missed Samples.

Table 5. Soil, analyses for gamma-emitting isotopes.
Collection: Annually

Lab Code	Collection Date	Concentration (pCi/kg dry) ^{40}K	^{54}Mn	^{59}Fe	^{58}Co	^{60}Co	$^{95}ZrNb$	^{134}Cs	^{137}Cs	$^{140}BaLa$
Location: SOL-F-002										
CASO- 5916	11/1/2017	12853 ± 795	< 34.8	< 108.6	< 33.5	< 20.2	< 86.6	< 22.7	392 ± 44	< 174.3
CASO- 5917	11/1/2017	12062 ± 749	< 31.2	< 49.4	< 39.0	< 17.0	< 36.6	< 26.4	654 ± 45	< 185.3
Location: SOL-F-006										
CASO- 5918	11/3/2017	10859 ± 701	< 30.7	< 55.4	< 30.3	< 17.9	< 74.6	< 24.0	419 ± 46	< 249.7
CASO- 5919	11/3/2017	10168 ± 750	< 33.7	< 74.9	< 24.2	< 24.3	< 104.6	< 26.0	467 ± 55	< 209.2
Location: SOL-PR-003										
CASO- 5922	11/1/2017	10475 ± 685	< 32.8	< 88.6	< 33.2	< 28.9	< 107.5	< 24.3	153 ± 30	< 332.8
CASO- 5923	11/1/2017	10558 ± 674	< 26.6	< 39.7	< 35.0	< 15.9	< 33.8	< 22.8	308 ± 39	< 92.6
Location: SOL-PR-007										
CASO- 5925	11/1/2017	9453 ± 677	< 30.3	< 91.5	< 30.7	< 18.3	< 81.3	< 23.6	207 ± 35	< 471.2
CASO- 5926	11/1/2017	10117 ± 665	< 32.9	< 59.6	< 32.5	< 21.6	< 58.1	< 23.8	230 ± 39	< 234.8
Location: SOL-M-009										
CASO- 5920	11/2/2017	14107 ± 788	< 25.2	< 59.7	< 26.3	< 16.0	< 87.0	< 16.5	113 ± 33	< 310.1
CASO- 5921	11/2/2017	14793 ± 845	< 26.5	< 90.3	< 39.3	< 11.1	< 67.9	< 23.8	132 ± 29	< 326.1
Location: SOL-W-001										
CASO- 5927	11/2/2017	< 1429	< 24.2	< 94.3	< 31.4	< 10.7	< 52.2	< 18.3	49 ± 24	< 311.6
CASO- 5928	11/2/2017	12729 ± 617	< 20.1	< 60.5	< 29.3	< 19.6	< 38.9	< 12.1	38 ± 22	< 135.9
Location: SOL-W-002										
CASO- 5929	11/2/2017	9775 ± 640	< 24.7	< 73.0	< 26.6	< 18.2	< 67.9	< 22.6	< 23	< 151.9
CASO- 5930	11/2/2017	14398 ± 798	< 33.5	< 73.2	< 30.7	< 8.7	< 51.0	< 21.6	104 ± 33	< 258.8
Location: SOL-W-003										
CASO- 5931	11/2/2017	10851 ± 766	< 31.0	< 81.5	< 25.7	< 9.7	< 52.6	< 17.0	69 ± 28	< 53.6
CASO- 5932	11/2/2017	10120 ± 720	< 27.9	< 78.9	< 31.7	< 10.4	< 41.7	< 23.6	< 32	< 91.6
Location: SOL-W-004										
CASO- 5933	11/2/2017	8295 ± 655	< 28.8	< 69.0	< 26.8	< 10.6	< 72.0	< 15.4	< 21	< 224.2
CASO- 5934	11/2/2017	10039 ± 641	< 29.7	< 53.4	< 29.7	< 17.7	< 39.2	< 22.2	< 27	< 414.0

Table 6. Surface water, analyses for tritium and gamma-emitting isotopes.

Collection: Monthly

Location: CA-SWA-S01 Units: pCi/L

Lab Code	Required	CASW- 441	CASW- 855	CASW- 1257	CASW- 1867 [a]
Date Collected	LLD	01-31-17	02-28-17	03-28-17	04-25-17
H-3	3000	< 155	< 146	< 150	< 148
Mn-54	15	< 2.9	< 1.5	< 3.4	< 1.6
Fe-59	30	< 5.0	< 3.5	< 4.5	< 3.8
Co-58	15	< 2.9	< 2.8	< 1.9	< 2.2
Co-60	15	< 1.9	< 1.7	< 1.7	< 2.2
Zn-65	30	< 2.7	< 4.3	< 2.7	< 3.9
Zr-Nb-95	15	< 2.1	< 1.9	< 2.5	< 3.1
I-131	1000	< 6.9	< 8.9	< 5.4	< 24.5
Cs-134	15	< 3.1	< 2.2	< 3.1	< 3.3
Cs-137	18	< 3.0	< 2.1	< 2.7	< 2.3
Ba-La-140	15	< 4.1	< 4.1	< 2.4	< 7.4

Lab Code	Required	CASW- 2599	CASW- 3164	CASW- 3798	CASW- 4462
Date Collected	LLD	05-30-17	06-27-17	07-25-17	08-29-17
H-3	3000	< 153	< 149	< 158	< 187
Mn-54	15	< 2.9	< 2.3	< 2.4	< 2.3
Fe-59	30	< 8.3	< 8.7	< 6.5	< 6.6
Co-58	15	< 5.5	< 3.9	< 3.4	< 2.3
Co-60	15	< 2.7	< 3.3	< 1.8	< 2.3
Zn-65	30	< 5.6	< 3.0	< 2.3	< 7.8
Zr-Nb-95	15	< 5.9	< 3.8	< 3.6	< 5.4
I-131	1000	< 31.2	< 12.5	< 32.7	< 46.7
Cs-134	15	< 4.0	< 3.7	< 2.3	< 3.9
Cs-137	18	< 3.9	< 3.1	< 2.7	< 1.9
Ba-La-140	15	< 8.3	< 5.0	< 9.5	< 8.3

Lab Code	Required	CASW- 5184	CASW- 5752	CASW- 6276	CASW- 6616
Date Collected	LLD	10-03-17	10-31-17	11-28-17	12-26-17
H-3	3000	< 143	< 150	< 148	< 158
Mn-54	15	< 3.2	< 2.1	< 2.2	< 1.4
Fe-59	30	< 6.5	< 2.9	< 3.5	< 4.7
Co-58	15	< 1.9	< 2.3	< 2.1	< 2.3
Co-60	15	< 3.1	< 1.2	< 2.0	< 2.2
Zn-65	30	< 5.8	< 2.6	< 4.8	< 3.1
Zr-Nb-95	15	< 4.4	< 2.9	< 3.3	< 2.6
I-131	1000	< 14.1	< 10.3	< 6.0	< 7.7
Cs-134	15	< 3.5	< 3.0	< 3.2	< 2.8
Cs-137	18	< 3.8	< 3.4	< 3.9	< 2.7
Ba-La-140	15	< 3.7	< 7.5	< 1.7	< 3.4

[a] Compositor malfunction on 04-03-17; no sample for 04-04-17. Compensatory grab sampling iniated on 04-06-17 until compositor is repaired. See Part I Table 5.5, Listing of Missed Samples.

Table 6. Surface water, analyses for tritium and gamma-emitting isotopes.

Collection: Monthly
Location: CA-SWA-S02 Units: pCi/L

Lab Code Date Collected	Required LLD	CASW- 442 01-31-17	CASW- 856 02-28-17	CASW- 1258 03-28-17	CASW- 1868 04-25-17
H-3	3000	< 155	< 146	< 150	< 148
Mn-54	15	< 3.4	< 2.9	< 3.9	< 1.3
Fe-59	30	< 3.5	< 3.8	< 5.6	< 3.1
Co-58	15	< 2.7	< 2.2	< 2.7	< 1.6
Co-60	15	< 1.5	< 1.6	< 3.5	< 1.4
Zn-65	30	< 3.9	< 4.4	< 4.9	< 2.1
Zr-Nb-95	15	< 3.1	< 2.7	< 3.4	< 3.2
I-131	1000	< 7.9	< 9.4	< 8.2	< 12.5
Cs-134	15	< 2.7	< 2.7	< 3.4	< 1.9
Cs-137	18	< 3.0	< 2.3	< 3.0	< 1.6
Ba-La-140	15	< 4.4	< 2.0	< 4.3	< 3.7

Lab Code Date Collected	Required LLD	CASW- 2600 05-30-17	CASW- 3165 06-27-17	CASW- 3799 07-25-17	CASW- 4463 08-29-17
H-3	3000	< 153	< 149	298 ± 91	491 ± 106
Mn-54	15	< 2.4	< 3.8	< 2.4	< 2.5
Fe-59	30	< 5.3	< 7.0	< 3.9	< 2.9
Co-58	15	< 3.3	< 2.1	< 1.9	< 2.3
Co-60	15	< 2.5	< 2.7	< 3.0	< 2.0
Zn-65	30	< 3.5	< 4.7	< 3.1	< 4.0
Zr-Nb-95	15	< 3.2	< 2.6	< 4.0	< 3.3
I-131	1000	< 20.0	< 13.8	< 38.5	< 8.9
Cs-134	15	< 3.3	< 3.7	< 2.7	< 2.8
Cs-137	18	< 3.0	< 4.0	< 2.8	< 2.8
Ba-La-140	15	< 4.4	< 3.6	< 9.4	< 3.9

Lab Code Date Collected	Required LLD	CASW- 5185 10-03-17	CASW- 5753 10-31-17	CASW- 6277 11-28-17	CASW- 6617 12-26-17
H-3	3000	190 ± 77	279 ± 86	< 148	< 158
Mn-54	15	< 2.8	< 5.2	< 2.4	< 2.7
Fe-59	30	< 2.8	< 13.2	< 6.5	< 4.0
Co-58	15	< 3.1	< 4.3	< 1.7	< 2.0
Co-60	15	< 1.6	< 3.9	< 2.2	< 2.9
Zn-65	30	< 2.4	< 6.2	< 2.4	< 2.2
Zr-Nb-95	15	< 1.4	< 2.8	< 2.4	< 2.4
I-131	1000	< 12.6	< 7.1	< 4.3	< 6.5
Cs-134	15	< 3.1	< 6.2	< 3.0	< 2.5
Cs-137	18	< 3.3	< 4.0	< 2.6	< 2.6
Ba-La-140	15	< 4.8	< 3.4	< 2.7	< 2.2

7. Surface Water (Ponds), analyses for tritium and gamma-emitting isotopes.

Lab Code	Collection Date	Concentration (pCi/L) ^{3}H	^{54}Mn	^{59}Fe	^{58}Co	^{60}Co	^{65}Zn	$^{95}ZrNb$	^{134}Cs	^{137}Cs	$^{140}BaLa$
					Location: CA-SWA-POND 01						
CASW- 968	03/06/17	< 154	< 3.9	< 5.4	< 3.1	< 1.8	< 4.5	< 4.5	< 4.1	< 3.5	< 3.2
CASW- 4599	09/05/17	< 187	< 2.3	< 5.8	< 2.0	< 1.5	< 4.1	< 2.9	< 2.2	< 1.9	< 6.7
					Location: CA-SWA-POND 02						
CASW- 969	03/06/17	< 154	< 3.2	< 2.8	< 1.6	< 2.0	< 2.4	< 3.7	< 3.3	< 2.5	< 3.2
CASW- 4600	09/05/17	< 187	< 2.7	< 7.0	< 3.4	< 1.8	< 4.2	< 4.6	< 2.9	< 2.7	< 7.9
					Location: CA-SWA-SLUDGE LAGOON #4						
CASW- 976	03/06/17	< 154	< 1.9	< 2.8	< 1.8	< 1.4	< 3.7	< 2.5	< 2.4	< 2.6	< 3.0
CASW- 4608	09/05/17	< 187	< 1.6	< 7.0	< 2.6	< 1.7	< 2.7	< 2.9	< 2.1	< 2.2	< 6.7

7. Surface Water (Ponds), analyses for tritium and gamma-emitting isotopes.

Lab Code	Collection Date	Concentration (pCi/L) ^{3}H	^{54}Mn	^{59}Fe	^{58}Co	^{60}Co	^{65}Zn	$^{95}ZrNb$	^{134}Cs	^{137}Cs	$^{140}BaLa$
					Location: CA-SWA-OUTFALL 010						
CASW- 970	03/06/17	< 154	< 2.6	< 4.3	< 2.1	< 1.9	< 1.3	< 2.7	< 2.5	< 2.3	< 3.1
CASW- 4601	09/05/17	< 187	< 1.5	< 6.6	< 2.2	< 1.7	< 3.5	< 3.4	< 2.2	< 2.0	< 8.5
					Location: CA-SWA-OUTFALL 011						
CASW- 971	03/06/17	< 154	< 2.4	< 5.1	< 2.0	< 2.2	< 6.2	< 3.4	< 3.6	< 2.7	< 3.7
CASW- 4602	09/05/17	< 187	< 2.0	< 3.7	< 2.3	< 1.3	< 2.4	< 3.2	< 1.7	< 1.7	< 8.3
					Location: CA-SWA-OUTFALL 012						
CASW- 972	03/06/17	< 154	< 2.5	< 6.1	< 3.3	< 2.3	< 2.6	< 3.2	< 3.4	< 3.9	< 3.3
CASW- 4603	09/05/17	< 187	< 3.0	< 5.1	< 1.9	< 2.0	< 4.5	< 3.9	< 2.8	< 3.5	< 7.3
					Location: CA-SWA-OUTFALL 013						
CASW- 973	03/06/17	< 154	< 1.9	< 3.5	< 2.8	< 2.2	< 2.9	< 2.6	< 3.3	< 2.6	< 4.4
CASW- 4604	09/05/17	< 187	< 1.6	< 4.5	< 1.7	< 1.5	< 3.4	< 1.7	< 1.8	< 1.5	< 2.6
					Location: CA-SWA-OUTFALL 014						
CASW- 974	03/06/17	< 154	< 2.7	< 4.1	< 3.3	< 2.5	< 5.5	< 3.5	< 3.0	< 3.1	< 4.2
CASW- 4605	09/05/17	< 187	< 2.3	< 5.8	< 2.0	< 1.5	< 4.1	< 2.9	< 2.2	< 1.9	< 6.7
					Location: CA-SWA-OUTFALL 015						
CASW- 975	03/06/17	< 154	< 2.0	< 5.4	< 1.7	< 2.4	< 4.6	< 2.7	< 2.6	< 2.4	< 3.5
CASW- 4607	09/05/17	< 187	< 2.2	< 3.6	< 1.5	< 1.3	< 2.8	< 3.2	< 1.7	< 2.1	< 5.3

Table 8. Drinking Water Wells, analysis for tritium and gamma-emitting isotopes.

Lab Code	Collection Date	Concentration (pCi/L) ^{3}H	^{54}Mn	^{59}Fe	^{58}Co	^{60}Co	^{65}Zn	$^{95}ZrNb$	^{134}Cs	^{137}Cs	$^{140}BaLa$
					CA-DWA-3 (Ward)						
CADW- 426	1/30/2017	< 155	< 1.7	< 7.1	< 3.3	< 2.1	< 3.0	< 2.5	< 2.7	< 3.7	< 3.5
CADW- 1884	4/25/2017	< 148	< 2.4	< 4.1	< 3.5	< 2.1	< 2.4	< 3.4	< 3.1	< 2.5	< 6.5
CADW- 3976	7/31/2017	< 160	< 2.3	< 5.2	< 2.1	< 2.3	< 3.5	< 2.7	< 3.0	< 2.9	< 3.3
CADW- 5821	10/31/2017	< 150	< 3.2	< 3.9	< 3.3	< 2.0	< 5.7	< 3.1	< 2.9	< 3.3	< 7.4
					CA-DWA-4 (Miller)						
CADW- 427	1/31/2017	< 155	< 2.0	< 4.5	< 1.8	< 2.1	< 2.8	< 3.0	< 3.3	< 3.5	< 2.7
CADW- 1885	4/25/2017	< 148	< 2.5	< 3.1	< 2.6	< 2.5	< 3.1	< 3.5	< 3.2	< 2.1	< 8.6
CADW- 3977	8/1/2017	< 160	< 2.1	< 3.9	< 2.8	< 2.0	< 2.8	< 2.5	< 2.7	< 2.0	< 2.7
CADW- 5822	11/1/2017	< 150	< 3.3	< 8.0	< 5.1	< 4.2	< 8.3	< 4.0	< 7.1	< 5.0	< 3.4
					CA-DWA-5 (Brucker Bros.)						
CADW- 428	1/30/2017	< 155	< 3.4	< 6.9	< 3.6	< 3.0	< 6.1	< 5.8	< 4.5	< 4.1	< 4.0
CADW- 1887	4/25/2017	< 148	< 2.3	< 4.1	< 3.0	< 1.6	< 1.2	< 4.3	< 2.6	< 1.9	< 11.9
CADW- 3978	7/31/2017	< 160	< 1.9	< 4.2	< 2.7	< 1.4	< 4.1	< 3.0	< 2.5	< 2.1	< 1.8
CADW- 5823	10/31/2017	< 150	< 4.0	< 5.9	< 2.5	< 3.4	< 7.1	< 2.7	< 3.4	< 2.2	< 3.9
					CA-DWA-6 (Lindeman)						
CADW- 429	1/30/2017	< 155	< 1.6	< 5.1	< 2.8	< 2.5	< 6.4	< 2.1	< 3.1	< 2.9	< 5.4
CADW- 1888	4/25/2017	< 148	< 1.7	< 5.5	< 1.4	< 1.5	< 3.2	< 3.6	< 2.0	< 1.6	< 5.3
CADW- 3979	7/31/2017	< 160	< 3.1	< 9.5	< 3.8	< 2.4	< 4.6	< 3.7	< 3.4	< 3.5	< 3.5
CADW- 5824	10/31/2017	< 150	< 5.3	< 12.3	< 5.6	< 5.8	< 6.6	< 4.0	< 6.0	< 6.1	< 3.0
					CA-DWA-7 (Kriete)						
CADW- 430	1/30/2017	< 155	< 3.0	< 6.1	< 1.7	< 2.5	< 2.4	< 2.7	< 2.7	< 2.1	< 3.2
CADW- 1889	4/25/2017	< 148	< 2.1	< 3.9	< 1.9	< 2.3	< 4.1	< 3.2	< 2.4	< 2.0	< 5.5
CADW- 3980	7/31/2017	< 160	< 2.2	< 5.3	< 2.8	< 2.1	< 4.4	< 2.9	< 3.6	< 2.4	< 5.5
CADW- 5825	10/31/2017	< 150	< 3.3	< 8.2	< 4.2	< 3.6	< 4.6	< 8.4	< 5.0	< 3.8	< 5.5
					CA-DWA-8 (Brandt)						
CADW- 431	1/31/2017	< 155	< 1.3	< 6.4	< 1.8	< 2.7	< 4.7	< 3.1	< 2.4	< 2.1	< 4.9
CADW- 1890	4/25/2017	< 148	< 1.3	< 3.4	< 1.3	< 1.6	< 2.3	< 3.5	< 2.0	< 2.5	< 5.9
CADW- 3981	7/31/2017	< 160	< 2.0	< 6.9	< 3.5	< 3.3	< 4.0	< 3.4	< 4.7	< 3.4	< 4.1
CADW- 5826	10/31/2017	< 150	< 3.5	< 9.3	< 3.4	< 2.8	< 2.9	< 4.1	< 4.1	< 5.2	< 2.9

Table 8. Drinking Water Wells, analysis for tritium and gamma-emitting isotopes.

Lab Code	Collection Date	Concentration (pCi/L) ^{3}H	^{54}Mn	^{59}Fe	^{58}Co	^{60}Co	^{65}Zn	$^{95}ZrNb$	^{134}Cs	^{137}Cs	$^{140}BaLa$
						CA-DWA-9 (Clardy)					
CADW- 432	1/31/2017	< 155	< 1.4	< 3.5	< 1.4	< 2.3	< 3.8	< 2.7	< 2.6	< 2.3	< 2.1
CADW- 1891	4/25/2017	< 148	< 3.7	< 8.7	< 3.7	< 2.1	< 4.2	< 4.2	< 2.6	< 3.0	< 12.8
CADW- 3982	7/31/2017	< 160	< 2.6	< 4.1	< 2.3	< 2.2	< 4.2	< 2.8	< 2.6	< 2.6	< 4.9
CADW- 5827	10/31/2017	< 150	< 2.4	< 8.4	< 3.0	< 1.2	< 3.9	< 2.7	< 4.0	< 3.8	< 5.3
						CA-DWA-10 (Dillon, Susan)					
CADW- 433	1/31/2017	< 155	< 4.9	< 5.5	< 3.0	< 3.7	< 6.8	< 5.8	< 4.4	< 3.7	< 4.1
CADW- 1892	4/25/2017	< 148	< 2.2	< 5.1	< 3.0	< 1.5	< 5.0	< 3.6	< 2.5	< 2.0	< 3.8
CADW- 3983	7/31/2017	< 160	< 3.1	< 8.0	< 3.4	< 2.5	< 4.6	< 3.2	< 3.8	< 4.9	< 6.4
CADW- 5828	10/31/2017	< 150	< 1.8	< 4.8	< 3.0	< 2.7	< 4.9	< 3.5	< 3.1	< 3.3	< 5.1
						CA-DWA-12 (Dillon, Joe)					
CADW- 434	1/30/2017	< 155	< 2.2	< 4.8	< 1.2	< 2.0	< 5.5	< 3.2	< 2.8	< 3.0	< 2.8
CADW- 1893	4/25/2017	< 148	< 2.2	< 3.9	< 2.6	< 2.2	< 2.2	< 3.3	< 2.5	< 2.9	< 6.6
CADW- 3984	7/31/2017	< 160	< 1.9	< 8.2	< 3.1	< 2.3	< 4.8	< 5.4	< 3.3	< 2.1	< 4.7
CADW- 5829	10/31/2017	< 150	< 3.2	< 6.4	< 2.4	< 3.2	< 3.7	< 3.2	< 3.8	< 3.8	< 7.5
						CA-DWA-22 (Plummer)					
CADW- 437	1/30/2017	< 155	< 3.6	< 5.8	< 3.3	< 2.4	< 7.3	< 4.2	< 4.0	< 3.1	< 4.1
CADW- 1895	4/25/2017	< 148	< 3.0	< 7.4	< 2.8	< 2.6	< 3.6	< 3.0	< 2.8	< 3.2	< 9.6
CADW- 3986	7/31/2017	< 160	< 5.6	< 7.5	< 5.9	< 7.1	< 20.2	< 8.4	< 7.3	< 6.0	< 12.1
CADW- 5831	10/31/2017	< 150	< 3.4	< 9.0	< 3.5	< 2.6	< 2.8	< 3.7	< 4.7	< 4.5	< 4.7
						CA-DWA-D01 (Holzhausser's Bar and Grill)					
CADW- 438	1/30/2017	< 155	< 1.7	< 5.6	< 2.7	< 1.7	< 3.7	< 3.9	< 2.5	< 3.1	< 4.2
	4/25/2017					NS[a]					

[a] " NS" = No sample; see Part I Table 5.5, Listing of Missed Samples.

Table 8. Drinking Water Wells, analysis for tritium and gamma-emitting isotopes.

Lab Code	Collection Date	Concentration (pCi/L) ^{3}H	^{54}Mn	^{59}Fe	^{58}Co	^{60}Co	^{65}Zn	$^{95}ZrNb$	^{134}Cs	^{137}Cs	$^{140}BaLa$
						CA-DWA-PW1 (Plant Cafeteria)					
CADW- 439	1/31/2017	< 155	< 1.7	< 2.9	< 2.4	< 2.0	< 3.0	< 2.5	< 2.5	< 2.2	< 3.2
CADW- 1899	4/25/2017	< 148	< 2.7	< 3.2	< 1.6	< 1.8	< 3.2	< 4.2	< 2.6	< 2.2	< 6.7
CADW- 3989	8/1/2017	< 160	< 5.0	< 6.5	< 5.8	< 4.8	< 4.7	< 5.3	< 6.0	< 2.3	< 6.8
CADW- 5835	11/1/2017	< 150	< 4.2	< 3.5	< 3.0	< 2.9	< 3.7	< 4.8	< 4.4	< 4.8	< 12.0
						CA-DWA-21 (Baumgarth)					
CADW- 435	1/30/2017	< 155	< 2.7	< 4.7	< 2.0	< 3.3	< 4.1	< 2.6	< 3.8	< 3.6	< 3.1
CADW- 1894	4/25/2017	< 148	< 3.1	< 8.9	< 2.5	< 2.4	< 7.3	< 3.6	< 3.2	< 3.5	< 8.0
CADW- 3985	7/31/2017	< 160	< 2.6	< 3.0	< 1.9	< 1.6	< 4.6	< 2.4	< 2.4	< 2.0	< 2.1
CADW- 5830	10/31/2017	< 150	< 2.2	< 3.2	< 1.9	< 2.0	< 3.2	< 3.8	< 2.7	< 2.2	< 3.8
						CA-DWA-V16 (Wallendorf)					
CADW- 440	1/31/2017	< 155	< 1.9	< 4.2	< 2.8	< 2.1	< 2.1	< 3.0	< 2.5	< 2.9	< 3.9
CADW- 1898	4/25/2017	< 148	< 2.4	< 5.3	< 2.4	< 2.0	< 3.9	< 5.8	< 2.5	< 2.4	< 8.8
CADW- 3990	7/31/2017	< 160	< 1.9	< 9.4	< 3.3	< 2.3	< 2.5	< 6.0	< 2.7	< 2.1	< 6.7
CADW- 5834	10/31/2017	< 150	< 3.0	< 6.0	< 5.5	< 4.9	< 11.6	< 9.5	< 5.5	< 4.6	< 13.7
						CA-DWA-23[a] (Curdt)					
CADW- 1896	4/25/2017	< 148	< 1.5	< 6.0	< 3.0	< 2.1	< 4.5	< 4.8	< 2.6	< 2.6	< 9.6
CADW- 3987	7/31/2017	< 160	< 1.4	< 1.5	< 1.2	< 1.0	< 2.2	< 1.9	< 1.2	< 1.4	< 4.6
CADW- 5832	10/31/2017	< 150	< 3.0	< 7.0	< 3.1	< 1.2	< 1.9	< 3.4	< 3.0	< 3.2	< 4.4
						CA-DWA-024[a] (Farley)					
CADW- 1897	4/25/2017	< 148	< 2.4	< 3.1	< 1.8	< 2.0	< 3.9	< 3.6	< 3.0	< 1.6	< 6.8
CADW- 3988	7/31/2017	< 160	< 2.7	< 4.4	< 2.2	< 1.9	< 3.0	< 3.8	< 2.8	< 4.0	< 3.5
CADW- 5833	10/31/2017	< 150	< 4.3	< 8.0	< 4.6	< 3.0	< 6.6	< 4.8	< 3.6	< 3.4	< 6.8

[a] New locations as of April, 2017.

Table 9. Wells and Ponds (non-potable), analyses for tritium and gamma-emitting isotopes.

Lab Code	Collection Date	Concentration (pCi/L) ^{3}H	^{54}Mn	^{59}Fe	^{58}Co	^{60}Co	^{65}Zn	$^{95}ZrNb$	^{134}Cs	^{137}Cs	$^{140}BaLa$
					Location: CA-WWA-U1MW-936						
CAWW- 163	1/12/2017	236 ± 103	< 1.6	< 3.7	< 2.1	< 2.2	< 6.8	< 2.4	< 3.1	< 2.6	< 8.2
CAWW- 491	2/8/2017	211 ± 86	< 2.9	< 4.0	< 2.4	< 4.2	< 5.2	< 3.9	< 3.1	< 2.6	< 4.3
CAWW- 1001	3/13/2017	297 ± 86	< 2.6	< 5.5	< 3.0	< 2.1	< 3.8	< 4.2	< 3.9	< 3.6	< 3.4
CAWW- 1562	4/12/2017	328 ± 88	< 1.4	< 4.9	< 1.7	< 2.3	< 3.8	< 2.9	< 2.6	< 3.5	< 5.0
CAWW- 2219	5/12/2017	294 ± 92	< 2.9	< 7.5	< 1.9	< 3.2	< 5.0	< 1.8	< 2.6	< 1.6	< 8.7
CAWW- 2862	6/9/2017	418 ± 93	< 2.5	< 4.0	< 2.0	< 2.0	< 3.1	< 4.9	< 2.7	< 2.9	< 5.7
CAWW- 3300	7/10/2017	426 ± 104	< 3.7	< 5.4	< 3.7	< 2.4	< 5.8	< 4.4	< 3.4	< 2.9	< 6.3
CAWW- 4022	8/8/2017	293 ± 94	< 2.6	< 9.4	< 3.2	< 2.9	< 4.1	< 4.6	< 3.3	< 2.7	< 8.7
CAWW- 4684	9/12/2017	319 ± 108	< 3.3	< 8.5	< 3.1	< 2.9	< 4.3	< 4.8	< 3.8	< 4.8	< 4.8
CAWW- 5396	10/12/2017	236 ± 86	< 6.3	< 9.2	< 5.7	< 6.0	< 3.6	< 6.4	< 6.3	< 3.9	< 7.8
CAWW- 6043	11/10/2017	343 ± 89	< 5.0	< 6.2	< 2.8	< 3.6	< 5.3	< 5.2	< 4.9	< 4.9	< 6.2
CAWW- 6429	12/11/2017	279 ± 88	< 1.5	< 2.5	< 1.6	< 2.6	< 5.3	< 3.6	< 2.9	< 3.1	< 2.8
					Location: CA-WWA-U1MW-937B						
CAWW- 164	1/12/2017	< 178	< 2.7	< 5.9	< 2.5	< 2.0	< 3.6	< 4.3	< 3.3	< 3.1	< 4.3
CAWW- 492	2/8/2017	< 156	< 1.9	< 3.8	< 2.7	< 2.0	< 2.4	< 3.2	< 3.0	< 3.7	< 2.3
CAWW- 1002	3/13/2017	< 145	< 3.9	< 3.5	< 3.1	< 3.3	< 3.1	< 2.8	< 3.5	< 3.4	< 4.0
CAWW- 1563	4/12/2017	< 163	< 6.7	< 7.5	< 4.6	< 5.3	< 7.5	< 4.2	< 6.4	< 3.5	< 7.7
CAWW- 2220	5/12/2017	< 155	< 2.7	< 7.7	< 3.2	< 2.2	< 4.8	< 3.0	< 3.6	< 2.5	< 8.2
CAWW- 2863	6/9/2017	223 ± 84	< 2.1	< 6.3	< 2.3	< 1.2	< 3.1	< 3.4	< 2.9	< 2.6	< 5.5
CAWW- 3301	7/10/2017	< 183	< 3.0	< 4.0	< 3.0	< 2.7	< 4.3	< 5.7	< 3.6	< 2.1	< 8.1
CAWW- 4023	8/8/2017	202 ± 90	< 2.4	< 8.0	< 4.4	< 2.8	< 3.6	< 5.1	< 3.2	< 3.5	< 7.8
CAWW- 4685	9/12/2017	< 184	< 2.1	< 3.5	< 3.1	< 2.5	< 2.7	< 3.5	< 2.7	< 3.3	< 6.6
CAWW- 5397	10/12/2017	< 157	< 2.9	< 2.1	< 3.2	< 2.5	< 5.7	< 4.0	< 4.5	< 5.8	< 2.3
CAWW- 6015	11/10/2017	< 151	< 5.4	< 3.3	< 2.3	< 4.9	< 3.3	< 3.2	< 4.3	< 4.7	< 6.7
CAWW- 6430	12/11/2017	202 ± 84	< 2.5	< 3.0	< 2.5	< 2.1	< 2.9	< 2.2	< 2.9	< 3.6	< 1.5
					Location: CA-WWA-U1MW-937D						
CAWW- 165	1/12/2017	< 178	< 3.1	< 6.1	< 2.0	< 1.6	< 7.5	< 2.8	< 3.0	< 3.5	< 4.5
CAWW- 493	2/8/2017	< 156	< 2.6	< 4.8	< 2.7	< 2.1	< 3.9	< 3.9	< 2.7	< 2.6	< 5.2
CAWW- 1003	3/13/2017	< 145	< 2.4	< 3.6	< 1.7	< 2.5	< 2.9	< 3.2	< 2.6	< 2.6	< 6.0
CAWW- 1564	4/12/2017	194 ± 82	< 2.0	< 3.9	< 3.0	< 2.6	< 3.1	< 2.7	< 2.7	< 3.0	< 5.4
CAWW- 2221	5/12/2017	< 155	< 3.6	< 7.6	< 3.1	< 2.5	< 5.1	< 4.3	< 3.6	< 4.1	< 8.4
CAWW- 2864	6/9/2017	< 153	< 1.7	< 5.0	< 2.8	< 2.3	< 4.7	< 4.6	< 2.9	< 2.3	< 4.1
CAWW- 3302	7/10/2017	< 183	< 3.3	< 6.0	< 3.3	< 3.6	< 4.8	< 3.4	< 3.2	< 3.9	< 7.0
CAWW- 4024	8/8/2017	175 ± 88	< 1.8	< 3.3	< 2.3	< 2.1	< 3.9	< 3.6	< 3.1	< 3.2	< 6.8
CAWW- 4686	9/12/2017	193 ± 104	< 4.5	< 7.3	< 2.3	< 3.7	< 8.0	< 4.5	< 4.6	< 4.7	< 4.2
CAWW- 5398	10/11/2017	< 157	< 1.8	< 3.9	< 1.9	< 2.0	< 2.7	< 2.7	< 3.1	< 2.8	< 3.5
CAWW- 6016	11/10/2017	< 151	< 3.9	< 4.6	< 3.5	< 2.9	< 7.5	< 4.6	< 5.2	< 4.0	< 3.7
CAWW- 6431	12/11/2017	< 148	< 3.0	< 5.9	< 2.3	< 2.7	< 4.7	< 3.2	< 2.7	< 2.5	< 3.1

Table 9. Wells and Ponds (non-potable), analyses for tritium and gamma-emitting isotopes.

Lab Code	Collection Date	Concentration (pCi/L) ^{3}H	^{54}Mn	^{59}Fe	^{58}Co	^{60}Co	^{65}Zn	$^{95}ZrNb$	^{134}Cs	^{137}Cs	$^{140}BaLa$
					Location: CA-WWA-U1MW-939R						
CAWW- 166	1/12/2017	< 178	< 2.7	< 6.2	< 2.0	< 3.8	< 4.4	< 3.8	< 3.5	< 3.5	< 4.8
CAWW- 494	2/8/2017	235 ± 87	< 2.2	< 3.3	< 1.4	< 2.1	< 2.7	< 3.7	< 2.8	< 2.7	< 4.9
CAWW- 1004	3/13/2017	182 ± 80	< 2.8	< 5.4	< 3.1	< 1.7	< 4.0	< 2.9	< 3.9	< 4.2	< 2.6
CAWW- 1565	4/12/2017	190 ± 81	< 2.5	< 6.2	< 1.6	< 1.5	< 3.9	< 3.2	< 2.7	< 2.4	< 3.2
CAWW- 2222	5/12/2017	643 ± 107	< 2.6	< 3.8	< 2.2	< 2.7	< 4.9	< 3.8	< 2.6	< 3.1	< 5.6
CAWW- 2865	6/9/2017	669 ± 104	< 2.6	< 3.9	< 2.2	< 2.1	< 3.6	< 2.9	< 4.0	< 3.4	< 4.2
CAWW- 3303	7/10/2017	540 ± 108	< 3.2	< 3.1	< 2.8	< 3.4	< 4.0	< 2.9	< 3.2	< 3.4	< 2.2
CAWW- 4025	8/8/2017	755 ± 114	< 3.0	< 7.2	< 2.3	< 1.7	< 4.7	< 2.8	< 3.0	< 3.3	< 11.9
CAWW- 4687	9/12/2017	545 ± 116	< 2.1	< 7.7	< 2.4	< 2.7	< 3.8	< 3.8	< 2.2	< 2.9	< 8.0
CAWW- 5400	10/12/2017	411 ± 95	< 3.0	< 7.0	< 2.9	< 2.8	< 4.8	< 3.2	< 3.9	< 5.2	< 4.0
CAWW- 6044	11/10/2017	366 ± 102	< 2.4	< 6.6	< 2.7	< 2.8	< 3.4	< 2.8	< 4.1	< 3.6	< 2.6
CAWW- 6432	12/11/2017	165 ± 83	< 2.3	< 5.3	< 2.7	< 2.5	< 6.2	< 4.1	< 3.2	< 3.2	< 2.5
					Location: CA-WWA-U1MW-940						
CAWW- 167	1/12/2017	< 178	< 2.7	< 4.6	< 2.1	< 0.8	< 2.9	< 3.9	< 3.3	< 3.6	< 4.2
CAWW- 495	2/8/2017	235 ± 87	< 0.9	< 2.6	< 1.4	< 1.4	< 2.0	< 1.6	< 1.2	< 1.5	< 2.3
CAWW- 1006	3/13/2017	< 145	< 3.0	< 6.6	< 1.6	< 2.0	< 7.1	< 3.0	< 3.0	< 4.2	< 1.8
CAWW- 1566	4/12/2017	235 ± 84	< 2.1	< 5.4	< 2.0	< 1.8	< 3.7	< 2.8	< 2.4	< 2.5	< 2.2
CAWW- 2223	5/12/2017	197 ± 87	< 3.7	< 8.7	< 3.3	< 2.7	< 8.7	< 5.3	< 4.2	< 3.6	< 4.4
CAWW- 2866	6/9/2017	< 153	< 2.5	< 6.0	< 3.4	< 1.8	< 2.9	< 4.7	< 3.0	< 2.8	< 6.1
CAWW- 3304	7/10/2017	< 183	< 1.6	< 8.1	< 2.3	< 2.6	< 4.2	< 4.6	< 2.9	< 3.1	< 8.6
CAWW- 4026	8/8/2017	< 160	< 2.7	< 5.9	< 3.8	< 1.9	< 4.1	< 5.5	< 3.5	< 3.3	< 13.9
CAWW- 4688	9/12/2017	< 184	< 2.3	< 5.2	< 2.0	< 1.6	< 4.0	< 2.6	< 1.9	< 2.3	< 7.0
CAWW- 5401	10/11/2017	< 157	< 3.8	< 4.4	< 1.8	< 2.5	< 7.1	< 4.9	< 4.2	< 3.2	< 3.0
CAWW- 6045	11/10/2017	< 151	< 7.2	< 7.1	< 5.5	< 4.4	< 12.7	< 9.3	< 7.0	< 6.6	< 8.7
CAWW- 6433	12/11/2017	< 148	< 2.8	< 4.3	< 2.5	< 2.2	< 5.7	< 3.5	< 3.4	< 3.2	< 2.7
					Location: CA-WWA-U1MW-941						
CAWW- 168	1/12/2017	< 178	< 3.6	< 5.8	< 3.8	< 3.5	< 2.9	< 4.8	< 5.7	< 5.3	< 2.6
CAWW- 496	2/8/2017	< 156	< 1.6	< 5.3	< 2.2	< 1.7	< 4.2	< 3.7	< 2.7	< 2.5	< 5.2
CAWW- 1007	3/13/2017	< 145	< 3.3	< 7.8	< 3.9	< 2.8	< 7.0	< 3.6	< 4.3	< 3.9	< 6.7
CAWW- 1567	4/12/2017	< 147	< 1.7	< 2.3	< 1.9	< 2.2	< 3.0	< 2.0	< 2.3	< 2.3	< 3.0
CAWW- 2224	5/12/2017	< 155	< 2.0	< 4.6	< 2.1	< 2.3	< 4.8	< 3.4	< 3.1	< 2.7	< 9.7
CAWW- 2867	6/9/2017	< 153	< 4.2	< 4.6	< 3.3	< 2.4	< 3.5	< 4.7	< 3.5	< 3.6	< 9.6
CAWW- 3305	7/10/2017	< 183	< 1.8	< 4.0	< 3.1	< 2.2	< 5.1	< 5.3	< 3.6	< 3.0	< 9.5
CAWW- 4027	8/8/2017	< 160	< 3.0	< 7.2	< 2.5	< 1.6	< 4.1	< 4.5	< 3.4	< 2.2	< 9.4
CAWW- 4689	9/12/2017	< 151	< 2.4	< 5.0	< 2.6	< 1.4	< 3.1	< 4.1	< 2.2	< 2.1	< 6.4
CAWW- 5402	10/11/2017	< 157	< 2.6	< 3.3	< 3.0	< 2.0	< 5.3	< 3.2	< 2.7	< 3.4	< 4.9
CAWW- 6017	11/10/2017	285 ± 86	< 2.5	< 5.7	< 2.6	< 2.2	< 4.0	< 3.6	< 3.0	< 4.0	< 2.9
CAWW- 6434	12/11/2017	197 ± 84	< 3.1	< 4.1	< 2.9	< 2.6	< 2.1	< 2.9	< 3.0	< 3.8	< 2.0

Table 9. Wells and Ponds (non-potable), analyses for tritium and gamma-emitting isotopes.

Lab Code	Collection Date	Concentration (pCi/L)									
		^{3}H	^{54}Mn	^{59}Fe	^{58}Co	^{60}Co	^{65}Zn	$^{95}ZrNb$	^{134}Cs	^{137}Cs	$^{140}BaLa$
		Location: CA-WWA-U1MW-GWS									
CAWW- 170	1/12/2017	< 176	< 3.0	< 6.2	< 1.9	< 1.3	< 6.3	< 3.8	< 3.5	< 4.7	< 3.2
CAWW- 497	2/8/2017	172 ± 84	< 2.5	< 4.4	< 1.9	< 1.7	< 4.3	< 3.1	< 2.5	< 3.1	< 4.3
CAWW- 1008	3/13/2017	207 ± 81	< 2.7	< 3.6	< 2.0	< 1.6	< 2.8	< 2.3	< 2.5	< 2.6	< 3.1
CAWW- 1568	4/12/2017	261 ± 85	< 2.8	< 6.1	< 2.8	< 2.8	< 4.1	< 2.2	< 3.2	< 3.4	< 4.1
CAWW- 2225	5/12/2017	212 ± 88	< 2.7	< 6.6	< 2.4	< 2.4	< 5.4	< 4.9	< 3.6	< 3.4	< 8.0
CAWW- 2868	6/9/2017	995 ± 117	< 2.3	< 7.0	< 3.7	< 2.8	< 5.3	< 4.9	< 3.8	< 3.1	< 8.8
CAWW- 3306	7/10/2017	378 ± 102	< 2.8	< 3.4	< 1.7	< 2.0	< 2.0	< 3.8	< 2.7	< 1.7	< 8.5
CAWW- 4028	8/8/2017	206 ± 90	< 2.6	< 8.7	< 2.6	< 2.1	< 4.2	< 5.4	< 3.1	< 2.1	< 6.7
CAWW- 4690	9/12/2017	395 ± 111	< 2.8	< 5.8	< 3.0	< 2.5	< 4.7	< 3.8	< 2.6	< 2.8	< 7.6
CAWW- 5403	10/12/2017	409 ± 94	< 1.8	< 3.9	< 1.9	< 2.0	< 2.7	< 2.7	< 3.1	< 2.8	< 3.5
CAWW- 6018	11/10/2017	1505 ± 133	< 3.9	< 3.4	< 2.5	< 2.1	< 5.5	< 3.9	< 4.0	< 3.0	< 2.8
CAWW- 6435	12/11/2017	274 ± 88	< 1.9	< 4.2	< 1.8	< 2.4	< 2.7	< 3.4	< 3.0	< 2.7	< 2.3
		Location: CA-WWA-U1MW-ISFSI (ISFSI Sump)									
CAWW- 162	1/14/2016	< 178	NR[a]								
CAWW- 1651	4/20/2017	< 155	NR[a]								
CAWW- 3314	7/10/2017	< 183	NR[a]								
CAWW- 5622	10/20/2017	< 154	NR[a]								
		Location: CA-WWA-U1MW-001									
CAWW- 110	1/10/2017	< 155	< 2.0	< 2.4	< 2.0	< 2.1	< 5.4	< 4.1	< 3.0	< 3.0	< 5.3
CAWW- 1654	4/19/2017	< 155	< 3.3	< 3.8	< 2.9	< 3.6	< 7.9	< 3.5	< 3.5	< 3.8	< 2.5
CAWW- 3625	7/20/2017	< 150	< 2.7	< 6.9	< 3.5	< 3.1	< 5.5	< 6.2	< 3.7	< 3.1	< 7.9
CAWW- 5473	10/16/2017	< 182	< 3.1	< 4.9	< 3.1	< 2.5	< 5.5	< 3.6	< 3.6	< 3.5	< 3.2
		Location: CA-WWA-U1MW-002									
CAWW- 266	1/20/2017	< 160	< 3.8	< 7.3	< 2.9	< 3.6	< 8.6	< 4.2	< 3.7	< 3.5	< 4.2
CAWW- 1656	4/19/2017	< 155	< 4.9	< 5.5	< 2.7	< 4.4	< 5.2	< 2.7	< 4.3	< 3.9	< 3.2
CAWW- 3565	7/13/2017	< 150	< 1.6	< 2.9	< 2.0	< 0.7	< 3.1	< 3.2	< 1.6	< 1.6	< 8.4
CAWW- 5471	10/14/2017	< 182	< 3.4	< 3.2	< 1.4	< 2.9	< 4.6	< 3.2	< 4.0	< 3.9	< 3.3
		Location: CA-WWA-U1MW-004									
CAWW- 69	1/6/2017	< 151	< 2.6	< 4.5	< 4.3	< 1.0	< 4.2	< 4.9	< 3.0	< 4.3	< 5.8
CAWW- 1397	4/5/2017	< 151	< 1.9	< 4.7	< 2.0	< 1.5	< 4.1	< 2.2	< 1.9	< 2.2	< 3.9
CAWW- 3570	7/14/2017	< 150	< 1.8	< 8.5	< 2.9	< 2.6	< 6.0	< 3.3	< 3.5	< 3.7	< 4.0
CAWW- 5404	10/5/2017	< 157	< 3.4	< 7.3	< 3.3	< 4.4	< 8.5	< 5.3	< 5.1	< 5.3	< 7.4

[a] "NR" - Not required. Analysis for gamma-emitting isotopes not required by the ODCM.

Table 9. Wells and Ponds (non-potable), analyses for tritium and gamma-emitting isotopes.

Lab Code	Collection Date	Concentration (pCi/L) ^{3}H	^{54}Mn	^{59}Fe	^{58}Co	^{60}Co	^{65}Zn	$^{95}ZrNb$	^{134}Cs	^{137}Cs	$^{140}BaLa$
					Location: CA-WWA-U1MW-005						
CAWW- 70	1/6/2017	< 151	< 3.1	< 6.7	< 3.4	< 3.5	< 4.5	< 3.9	< 3.7	< 3.0	< 3.8
CAWW- 1398	4/5/2017	< 151	< 2.2	< 4.7	< 1.8	< 1.6	< 3.7	< 3.0	< 1.9	< 1.9	< 5.4
CAWW- 3571	7/14/2017	< 150	< 1.9	< 5.4	< 2.3	< 1.9	< 1.9	< 3.2	< 2.2	< 1.8	< 8.2
CAWW- 5405	10/5/2017	< 157	< 3.0	< 6.9	< 3.2	< 1.8	< 4.9	< 4.5	< 3.0	< 3.3	< 4.1
					Location: CA-WWA-U1MW-006						
CAWW- 108	1/10/2017	< 155	< 2.7	< 5.2	< 2.4	< 2.7	< 6.8	< 3.2	< 3.2	< 4.1	< 3.3
CAWW- 1402	4/6/2017	< 151	< 5.6	< 9.9	< 4.0	< 4.4	< 6.4	< 4.6	< 5.7	< 5.7	< 5.9
CAWW- 3575	7/18/2017	< 150	< 3.5	< 6.0	< 3.0	< 1.4	< 1.8	< 5.3	< 3.8	< 5.0	< 13.9
CAWW- 5619	10/19/2017	< 154	< 2.7	< 5.7	< 1.6	< 1.7	< 5.1	< 2.2	< 3.2	< 2.7	< 4.2
					Location: CA-WWA-U1MW-010						
CAWW- 267	1/19/2017	< 160	< 1.9	< 4.5	< 3.1	< 1.7	< 4.9	< 3.8	< 3.4	< 2.5	< 4.0
CAWW- 1569	4/10/2017	< 147	< 3.4	< 4.1	< 3.1	< 3.0	< 5.2	< 4.2	< 3.4	< 3.1	< 5.0
CAWW- 3568	7/13/2017	< 150	< 4.2	< 9.0	< 3.8	< 2.5	< 6.0	< 6.2	< 3.6	< 2.4	< 7.1
CAWW- 5616	10/18/2017	< 154	< 1.9	< 3.2	< 2.2	< 2.2	< 4.0	< 3.6	< 3.5	< 2.4	< 3.8
					Location: CA-WWA-U1MW-012						
CAWW- 109	1/10/2017	< 155	< 2.6	< 5.3	< 3.1	< 2.9	< 5.6	< 3.8	< 3.5	< 3.7	< 3.0
CAWW- 1401	4/6/2017	< 151	< 2.1	< 4.5	< 1.9	< 2.4	< 1.9	< 4.4	< 3.1	< 1.7	< 1.8
CAWW- 3574	7/18/2017	< 150	< 2.4	< 3.9	< 2.2	< 2.1	< 3.7	< 3.4	< 2.3	< 2.4	< 6.4
CAWW- 5618	10/19/2017	< 154	< 2.2	< 4.3	< 2.3	< 1.7	< 4.6	< 2.4	< 2.5	< 2.7	< 2.8
					Location: CA-WWA-U1MW-013						
CAWW- 268	1/19/2017	< 160	< 2.2	< 4.8	< 1.6	< 2.3	< 4.6	< 3.1	< 3.1	< 2.7	< 5.4
CAWW- 1653	4/19/2017	< 155	< 3.9	< 9.3	< 4.3	< 3.8	< 10.9	< 3.1	< 4.8	< 3.8	< 2.4
CAWW- 3626	7/20/2017	153 ± 83	< 3.6	< 6.0	< 2.3	< 2.2	< 4.6	< 4.1	< 3.2	< 3.0	< 6.2
CAWW- 5615	10/18/2017	< 154	< 3.5	< 6.2	< 3.9	< 3.1	< 5.8	< 3.6	< 4.7	< 5.1	< 3.4
					Location: CA-WWA-U1MW-014						
CAWW- 71	1/4/2017	192 ± 83	< 2.7	< 8.0	< 4.3	< 2.6	< 6.3	< 5.1	< 4.4	< 4.4	< 8.2
CAWW- 1655	4/19/2017	200 ± 87	< 2.1	< 5.8	< 2.1	< 2.9	< 4.8	< 2.3	< 3.3	< 2.0	< 2.2
CAWW- 3561	7/13/2017	244 ± 87	< 3.0	< 8.8	< 5.7	< 2.8	< 2.9	< 4.1	< 3.5	< 3.6	< 11.2
CAWW- 5472	10/14/2017	353 ± 103	< 2.6	< 3.0	< 1.7	< 1.4	< 6.1	< 2.4	< 2.6	< 2.9	< 3.7
					Location: CA-WWA-U1MW-015						
CAWW- 107	1/9/2017	< 155	< 4.0	< 5.1	< 3.6	< 1.4	< 3.6	< 4.3	< 3.3	< 2.1	< 2.8
CAWW- 1652	4/17/2017	< 155	< 2.3	< 7.0	< 3.1	< 2.7	< 6.1	< 2.6	< 3.1	< 2.7	< 2.7
CAWW- 3564	7/13/2017	< 150	< 2.7	< 5.5	< 2.5	< 2.3	< 4.9	< 4.1	< 3.5	< 2.6	< 5.3
CAWW- 5469	10/17/2017	< 182	< 2.3	< 6.0	< 2.1	< 1.8	< 4.6	< 4.2	< 3.7	< 3.9	< 3.6

Table 9. Wells and Ponds (non-potable), analyses for tritium and gamma-emitting isotopes.

Lab Code	Collection Date	Concentration (pCi/L)									
		^{3}H	^{54}Mn	^{59}Fe	^{58}Co	^{60}Co	^{65}Zn	$^{95}ZrNb$	^{134}Cs	^{137}Cs	$^{140}BaLa$
		Location: CA-WWA-U1MW-016									
CAWW- 72	1/6/2017	< 151	< 2.7	< 7.5	< 2.7	< 1.8	< 5.9	< 4.3	< 3.7	< 3.3	< 6.3
CAWW- 1396	4/5/2017	< 151	< 2.6	< 6.9	< 2.2	< 1.6	< 5.0	< 3.7	< 2.6	< 2.6	< 4.3
CAWW- 3624	7/19/2017	< 150	< 2.7	< 7.9	< 3.8	< 2.2	< 3.7	< 4.1	< 3.8	< 3.1	< 5.9
CAWW- 5470	10/14/2017	< 182	< 2.6	< 2.5	< 2.8	< 2.6	< 5.3	< 3.0	< 3.4	< 2.7	< 4.6
		Location: CA-WWA-U1MW-018									
CAWW- 73	1/4/2017	< 155	NR[a]								
CAWW- 1648	4/19/2017	164 ± 85	NR[a]								
CAWW- 3560	7/13/2017	< 150	NR[a]								
CAWW- 5483	10/14/2017	< 182	NR[a]								
		Location: CA-WWA-U1MW-019									
CAWW- 74	1/4/2017	< 155	NR[a]								
CAWW- 1649	4/19/2017	226 ± 88	NR[a]								
CAWW- 3562	7/13/2017	< 150	NR[a]								
CAWW- 5484	10/14/2017	< 182	NR[a]								
		Location: CA-WWA-U1MW-020									
CAWW- 75	1/4/2017	< 155	NR[a]								
CAWW- 1650	4/19/2017	< 155	NR[a]								
CAWW- 3563	7/13/2017	< 150	NR[a]								
CAWW- 5481	10/14/2017	< 182	NR[a]								
		Location: CA-WWA-U1MW-031									
CAWW- 157	1/11/2017	1688 ± 145	NR[a]								
CAWW- 1643	4/17/2017	762 ± 112	NR[a]								
CAWW- 3566	7/13/2017	376 ± 94	NR[a]								
CAWW- 5476	10/17/2017	278 ± 101	NR[a]								

[a] "NR" - Not required. Analysis for gamma-emitting isotopes not required by the ODCM.

Table 9. Wells and Ponds (non-potable), analyses for tritium and gamma-emitting isotopes.

Lab Code		Collection Date	Concentration (pCi/L) ^{3}H	^{54}Mn	^{59}Fe	^{58}Co	^{60}Co	^{65}Zn	$^{95}ZrNb$	^{134}Cs	^{137}Cs	$^{140}BaLa$
			Location: CA-WWA-U1MW-034									
CAWW-	158	1/11/2017	906 ± 124	NR[a]								
CAWW-	1644	4/17/2017	510 ± 101	NR[a]								
CAWW-	3567	7/13/2017	327 ± 91	NR[a]								
CAWW-	5475	10/17/2017	284 ± 101	NR[a]								
			Location: CA-WWA-U1MW-036									
CAWW-	159	1/11/2017	1043 ± 128	NR[a]								
CAWW-	1645	4/17/2017	637 ± 107	NR[a]								
CAWW-	3308	7/7/2017	501 ± 107	NR[a]								
CAWW-	5478	10/17/2017	287 ± 101	NR[a]								
			Location: CA-WWA-U1MW-039									
CAWW-	160	1/11/2017	< 178	NR[a]								
CAWW-	1570	4/10/2017	< 147	NR[a]								
CAWW-	3573	7/14/2017	< 150	NR[a]								
CAWW-	5482	10/14/2017	< 182	NR[a]								

[a] "NR" - Not required. Analysis for gamma-emitting isotopes not required by the ODCM.

Table 9. Wells and Ponds (non-potable), analyses for tritium and gamma-emitting isotopes.

Lab Code		Collection Date	Concentration (pCi/L) ^{3}H	^{54}Mn	^{59}Fe	^{58}Co	^{60}Co	^{65}Zn	$^{95}ZrNb$	^{134}Cs	^{137}Cs	$^{140}BaLa$
			Location: CA-WWA-U1MW-047									
		1/19/2017	NS[a]				NR[b]					
CAWW-	1395	4/4/2017	534 ± 99				NR[b]					
CAWW-	3572	7/14/2017	< 150				NR[b]					
CAWW-	5480	10/17/2017	337 ± 103				NR[b]					
			Location: CA-WWA-U1MW-058									
CAWW-	161	1/11/2017	801 ± 121				NR[b]					
CAWW-	1646	4/17/2017	1034 ± 122				NR[b]					
CAWW-	3307	7/7/2017	665 ± 112				NR[b]					
CAWW-	5479	10/17/2017	490 ± 108				NR[b]					
			Location: CA-WWA-U1MW-059									
CAWW-	269	1/19/2017	< 160				NR[b]					
CAWW-	1571	4/10/2017	< 147				NR[b]					
CAWW-	3627	7/20/2017	< 150				NR[b]					
CAWW-	5477	10/14/2017	< 182				NR[b]					
			Inside Old BDL									
CAWW-	272	1/20/2017	318 ± 93				NR[b]					
CAWW-	1647	4/18/2017	336 ± 94				NR[b]					
CAWW-	3576	7/18/2017	335 ± 92				NR[b]					
CAWW-	5620	10/18/2017	237 ± 87				NR[b]					

[a] " NS" = No sample; see Part I Table 5.5, Listing of Missed Samples.

[b] "NR" - Not required. Analysis for gamma-emitting isotopes not required by the ODCM.

Table 9. Wells and Ponds (non-potable), analyses for tritium and gamma-emitting isotopes.

Lab Code	Collection Date	Concentration (pCi/L) ^{3}H	^{54}Mn	^{59}Fe	^{58}Co	^{60}Co	^{65}Zn	$^{95}ZrNb$	^{134}Cs	^{137}Cs	$^{140}BaLa$
		Location: CA-WWA-U2MW-2S									
CAWW- 112	1/9/2017	< 155	NR[a]								
CAWW- 1572	4/10/2017	< 147	NR[a]								
CAWW- 3312	7/7/2017	< 183	NR[a]								
CAWW- 5486	10/14/2017	< 182	NR[a]								
		Location: CA-WWA-U2MW-5S									
CAWW- 113	1/9/2017	< 155	NR[a]								
CAWW- 1400	4/5/2017	< 151	NR[a]								
CAWW- 3313	7/7/2017	< 183	NR[a]								
CAWW- 5485	10/16/2017	< 182	NR[a]								
		Location: CA-WWA-U2MW-8									
CAWW- 270	1/17/2017	< 160	NR[a]								
CAWW- 1641	4/17/2017	< 155	NR[a]								
CAWW- 3311	7/7/2017	< 183	NR[a]								
CAWW- 5621	10/19/2017	< 154	NR[a]								
		Location: CA-WWA-U2MW-10									
CAWW- 111	1/9/2017	< 155	< 3.2	< 6.2	< 1.7	< 2.3	< 2.4	< 4.0	< 2.9	< 3.4	< 3.7
CAWW- 1573	4/10/2017	< 147	< 2.5	< 4.5	< 1.8	< 2.4	< 3.2	< 3.7	< 2.7	< 2.6	< 5.6
CAWW- 3628	7/20/2017	< 150	< 3.2	< 4.8	< 2.5	< 3.6	< 3.7	< 3.4	< 3.5	< 3.5	< 7.1
CAWW- 5474	10/16/2017	< 182	< 3.0	< 6.7	< 2.3	< 2.2	< 4.8	< 4.0	< 3.6	< 4.3	< 4.6
		Location: CA-WWA-U2MW-16									
CAWW- 271	1/20/2017	< 160	NR[a]								
CAWW- 1399	4/5/2017	< 151	NR[a]								
CAWW- 3310	7/7/2017	< 183	NR[a]								
CAWW- 5406	10/5/2017	< 157	NR[a]								
		Location: CA-WWA-F-05									
CAWW- 138	1/10/2017	< 178	< 2.3	< 6.5	< 2.7	< 2.6	< 7.1	< 2.9	< 4.1	< 3.5	< 4.7
CAWW- 1737	4/18/2017	< 155	< 1.9	< 6.5	< 2.0	< 2.1	< 3.1	< 5.1	< 3.2	< 3.4	< 2.9
CAWW- 3342	7/5/2017	< 183	< 2.1	< 8.0	< 3.0	< 2.1	< 3.8	< 5.6	< 2.4	< 2.0	< 5.8
CAWW- 5334	10/9/2017	< 149	< 5.6	< 5.0	< 4.8	< 5.1	< 5.5	< 4.4	< 6.6	< 6.8	< 7.0
		Location: CA-WWA-F-15									
CAWW- 139	1/10/2017	< 178	< 4.6	< 7.3	< 1.8	< 4.1	< 5.8	< 4.5	< 4.3	< 3.8	< 3.5
CAWW- 1738	4/18/2017	< 155	< 2.5	< 3.9	< 2.7	< 2.9	< 3.8	< 2.8	< 3.2	< 2.5	< 4.1
CAWW- 3343	7/5/2017	< 183	< 2.0	< 4.5	< 2.8	< 1.1	< 4.0	< 4.2	< 2.2	< 1.7	< 10.4
CAWW- 5335	10/9/2017	< 149	< 4.3	< 7.1	< 5.3	< 5.3	< 14.1	< 7.1	< 8.1	< 4.6	< 8.4

[a] "NR" - Not required. Analysis for gamma-emitting isotopes not required by the ODCM.

Table 10a. Bottom sediments, analyses for gamma-emitting isotopes.

Collection: Semiannually
Units: pCi/kg dry

Location		CA-AQS-A	
Lab Code	Req. LLD	CABS- 2727	CABS- 5667
Date Collected	-	06-02-17	10-19-17
K-40	-	13569 ± 777	12000 ± 616
Mn-54	-	< 30.0	< 30.6
Fe-59	-	< 92.9	< 50.5
Co-58	-	< 40.5	< 24.7
Co-60	-	< 22.8	< 12.4
Zr-Nb-95	-	< 62.1	< 29.0
Cs-134	150	< 23.5	< 19.3
Cs-137	180	< 18.8	< 15.8
Ba-La-140	-	< 480.0	< 85.2

Location		CA-AQS-C	
Lab Code	Req. LLD	CABS- 2728	CABS- 5668
Date Collected	-	06-02-17	10-19-17
K-40	-	12245 ± 748	14012 ± 742
Mn-54	-	< 38.3	< 20.0
Fe-59	-	< 84.1	< 58.4
Co-58	-	< 29.0	< 22.0
Co-60	-	< 22.1	< 19.6
Zr-Nb-95	-	< 84.2	< 38.1
Cs-134	150	< 29.3	< 19.3
Cs-137	180	< 22.9	98 ± 25.5
Ba-La-140	-	< 394.2	< 139.1

Table 10b. Shoreline sediments, analyses for gamma-emitting isotopes.

Collection: Semiannually
Units: pCi/kg dry

Location		CA-AQS-A	
Lab Code	Req. LLD	CASS- 2725	CASS- 5665
Date Collected	-	06-02-17	10-19-17
K-40	-	13155 ± 733	13478 ± 687
Mn-54	-	< 24.9	< 17.6
Fe-59	-	< 44.8	< 50.6
Co-58	-	< 21.8	< 27.9
Co-60	-	< 14.6	< 20.1
Zr-Nb-95	-	< 42.1	< 29.4
Cs-134	150	< 20.4	< 14.6
Cs-137	180	< 15.4	< 15.3
Ba-La-140	-	< 118.5	< 113.1

Location		CA-AQS-C	
Lab Code	Req. LLD	CASS- 2726	CASS- 5666
Date Collected	-	06-02-17	10-19-17
K-40	-	17904 ± 998	13294 ± 718
Mn-54	-	< 34.6	< 26.8
Fe-59	-	< 92.3	< 58.2
Co-58	-	< 31.1	< 23.1
Co-60	-	< 23.3	< 13.5
Zr-Nb-95	-	< 83.5	< 29.7
Cs-134	150	< 22.9	< 13.7
Cs-137	180	< 23.1	38 ± 20.0
Ba-La-140	-	< 512.1	< 90.2

Table 11. Fish, analyses for gamma-emitting isotopes.
Collection: Semiannually
Units: pCi/kg wet

Location		CA-AQF-A				
Lab Code	Req. LLD	CAF- 2706	CAF- 2707	CAF- 2708	CAF- 2709	CAF- 2710
Date Collected		06-02-17	06-02-17	06-02-17	06-02-17	06-02-17
Sample Type		Common Carp	Silver Carp	River Carpsucker	Smallmouth Buffalo	Freshwater Drum
K-40	-	2884 ± 377	2873 ± 444	3023 ± 443	2644 ± 377	2997 ± 351
Mn-54	130	< 16.4	< 15.9	< 14.3	< 16.8	< 14.2
Fe-59	260	< 69.7	< 45.0	< 52.9	< 60.7	< 29.8
Co-58	130	< 19.8	< 19.3	< 21.5	< 22.6	< 16.3
Co-60	130	< 13.8	< 14.6	< 14.8	< 12.4	< 12.4
Zn-65	260	< 27.2	< 33.5	< 14.8	< 20.1	< 28.8
Cs-134	130	< 15.2	< 17.5	< 13.6	< 15.6	< 13.6
Cs-137	150	< 16.2	< 11.0	< 14.0	< 13.6	< 16.8
Lab Code		CAF- 5654	CAF- 5655	CAF- 5656	CAF- 5657	CAF- 5658
Date Collected		10-19-17	10-19-17	10-19-17	10-19-17	10-19-17
Sample Type		Silver Carp	River Carpsucker	Bigmouth Buffalo	Common Carp	Freshwater Drum
K-40	-	2337 ± 330	2343 ± 453	2167 ± 357	2377 ± 402	2570 ± 390
Mn-54	130	< 10.6	< 15.3	< 15.4	< 14.8	< 11.1
Fe-59	260	< 46.9	< 83.2	< 51.3	< 40.3	< 47.4
Co-58	130	< 11.1	< 23.5	< 15.2	< 13.0	< 13.9
Co-60	130	< 9.2	< 14.6	< 8.9	< 6.9	< 15.2
Zn-65	260	< 27.6	< 46.8	< 19.8	< 25.5	< 35.8
Cs-134	130	< 14.4	< 22.4	< 16.2	< 14.8	< 13.9
Cs-137	150	< 9.8	< 19.1	< 17.3	< 13.8	< 16.5

Table 11. Fish, analyses for gamma-emitting isotopes.
Collection: Semiannually
Units: pCi/kg wet

Location		CA-AQF-C				
Lab Code	Req. LLD	CAF- 2711	CAF- 2713	CAF- 2714	CAF- 2715	CAF- 2716
Date Collected		06-02-17	06-02-17	06-02-17	06-02-17	06-02-17
Sample Type		Common Carp	Silver Carp	River Carpsucker	Smallmouth Buffalo	Freshwater Drum
K-40	-	2768 ± 437	2701 ± 427	2444 ± 351	3123 ± 440	2935 ± 437
Mn-54	130	< 17.3	< 16.8	< 18.7	< 16.1	< 13.1
Fe-59	260	< 51.3	< 50.1	< 31.6	< 48.3	< 33.8
Co-58	130	< 19.7	< 19.7	< 19.4	< 20.3	< 16.9
Co-60	130	< 9.1	< 13.1	< 6.3	< 10.3	< 17.5
Zn-65	260	< 31.2	< 37.9	< 16.8	< 27.2	< 27.3
Cs-134	130	< 18.7	< 17.1	< 13.8	< 15.2	< 16.8
Cs-137	150	< 12.9	< 13.3	< 9.5	< 9.4	< 12.5
Lab Code		CAF- 5660	CAF- 5661	CAF- 5662	CAF- 5663	CAF- 5664
Date Collected		10-19-17	10-19-17	10-19-17	10-19-17	10-19-17
Sample Type		Silver Carp	River Carpsucker	Bigmouth Buffalo	Common Carp	Freshwater Drum
K-40	-	3146 ± 442	3098 ± 418	2983 ± 382	3195 ± 402	2798 ± 394
Mn-54	130	< 15.7	< 17.0	< 18.6	< 16.3	< 15.9
Fe-59	260	< 57.9	< 34.3	< 47.8	< 31.0	< 35.2
Co-58	130	< 13.7	< 14.2	< 9.3	< 22.6	< 13.4
Co-60	130	< 11.3	< 16.5	< 6.9	< 16.9	< 15.9
Zn-65	260	< 33.9	< 28.0	< 31.3	< 33.1	< 17.8
Cs-134	130	< 16.5	< 15.9	< 14.8	< 18.5	< 16.8
Cs-137	150	< 18.4	< 16.5	< 16.5	< 12.9	< 16.5

Table 12. Direct Radiation (quarterly exposure)

Location	Gamma Dose (mrem/90 days)			
	QTR 1	QTR 2	QTR 3	QTR 4
CA-IDM-1A	15.70	15.41	15.82	15.64
CA-IDM-3	16.25	16.83	16.38	15.75
CA-IDM-5	13.93	13.62	14.08	13.62
CA-IDM-6	16.13	16.64	15.90	15.78
CA-IDM-7	15.99	15.97	16.03	15.68
CA-IDM-9	13.99	14.43	14.97	14.21
CA-IDM-10	16.55	16.28	18.15	16.91
CA-IDM-11A	16.33	16.82	17.86	17.17
CA-IDM-14	16.23	15.91	16.11	15.41
CA-IDM-17	15.96	15.62	15.83	16.12
CA-IDM-18A	16.01	15.50	16.50	15.74
CA-IDM-20	16.55	16.01	16.13	15.95
CA-IDM-21	16.35	15.76	15.23	15.71
CA-IDM-22A	12.39	12.84	12.85	12.86
CA-IDM-23	16.62	16.86	15.94	15.39
CA-IDM-26 (C)	11.58	11.14	11.20	11.69
CA-IDM-27 (C)	18.02	16.75	16.55	17.25
CA-IDM-30A	15.89	15.79	15.24	15.50
CA-IDM-31A	16.78	17.49	16.65	17.25
CA-IDM-32	NS[a]	17.18	16.94	17.29
CA-IDM-32A	14.81	15.42	15.36	16.11
CA-IDM-33	15.76	16.06	15.53	15.98
CA-IDM-34	15.52	16.64	14.66	15.14
CA-IDM-35	13.80	15.07	14.94	14.80
CA-IDM-36	14.46	15.52	14.92	15.12
CA-IDM-37	15.30	15.24	15.34	15.75
CA-IDM-38	11.13	11.48	11.35	10.98
CA-IDM-39	14.53	15.64	15.29	14.96
CA-IDM-39A	15.51	15.22	NS[a]	15.06
CA-IDM-40	16.06	15.75	16.26	15.98
CA-IDM-41	15.47	15.42	16.06	15.29
CA-IDM-42	13.44	13.82	13.00	13.27
CA-IDM-43	15.33	15.36	15.83	15.46
CA-IDM-44	14.86	15.65	15.42	15.70
CA-IDM-45	14.50	14.84	14.28	14.25
CA-IDM-46	16.00	16.75	15.75	16.54
CA-IDM-47	14.83	15.09	15.18	14.78
CA-IDM-48	15.83	16.11	16.28	16.22
CA-IDM-49	14.82	14.94	14.93	15.30
CA-IDM-50	16.01	15.59	17.00	16.34
CA-IDM-51A	17.62	17.32	16.06	16.45
CA-IDM-52	16.21	17.27	16.18	16.51
CA-IDM-60 (C)	15.61	15.59	16.86	15.70
CA-IDM-61	14.64	15.72	14.84	14.98

[a] " NS" = No sample; see Part I Table 5.5, Listing of Missed Samples.

Table 12b. Direct Radiation Neutron (quarterly exposure)

Location	Neutron Dose (mrem/91 days)			
	QTR 1	QTR 2	QTR 3	QTR 4
CA-IDM-60N (C)	0.0 ± 1.5	0.0 ± 1.4	0.0 ± 1.3	0.0 ± 1.2
CA-IDM-61N	0.0 ± 1.3	1.6 ± 0.8 [a]	0.0 ± 1.3	0.0 ± 1.3
CA-IDM-62N	0.0 ± 1.4	2.4 ± 1.2 [a]	0.0 ± 1.2	0.0 ± 0.9
CA-IDM-63N	0.0 ± 1.2	0.0 ± 1.2	0.0 ± 1.0	0.0 ± 0.6
CA-IDM-64N	0.0 ± 2.1	0.0 ± 1.5	0.0 ± 0.8	0.0 ± 1.6

[a] In the opinion of Stanford Dosimetry, since the result of the control dosimeter (1.8 ± 1.0 mrem) is greater than the Minimum Detectable Dose (MDD) of 1.5 mrem, these results can be considered false positives.