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CALLAWAY ENERGY CENTER
FULTON, MISSOURI

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ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

to

THE UNITED STATES NUCLEAR REGULATORY COMMISSION

Part I

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Submitted by

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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 2021. 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 2021 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 2021 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 2021 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 or control stations identified by the Land Use Census for the subject year. Milk samples are analyzed for iodine-131 and gamma-emitting isotopes when available.

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.

The waterborne pathway is monitored by sampling surface water, groundwater and drinking water, 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. The edible portions of the 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 ponds is analyzed for tritium and gamma-emitting isotopes. The collection frequencies are 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 and neighboring property owners. The samples were analyzed for tritium and gamma-emitting isotopes.

Shoreline sediment is collected semiannually at the plant's intake (A) and discharge (C). These samples are collected within two feet of the edge of the water. The samples are analyzed for gamma-emitting isotopes.

3.2 Program Description (continued)

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, F6, PR3, PR7, W2, W5 and W6) 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) Airborne Particulates and Iodine:

The air sampler station CA-A-010 was found not running 3/4/21 (CR#202101288).

Excessive lost run time at air sampler station CA-A-001 for the period ending 3/11/21 resulted in a missed sample, an abnormal condition also was identified at station CA-A-007 for the period ending 3/11/21 (CR#202101465).

Sample pumps at air station CA-A-007 were swapped in the middle of the sampling period, 3/15/21, but the same sample filter was used before and after the swap contrary to ideal practice. To account for this situation, total volumes and elapsed times were summed and the technician was coached on how to handle this type of situation in the future (CR#202101532).

On 3/18/21 air sampling station CA-A-001 was found with an insufficient elapsed time for the second week in a row (CR#202101622).

A condition report (CR#202101626) was initiated to track and trend issues with air sampling pumps. Job 21001479 was initiated to troubleshoot the electrical supply at air station A-1. It was determined that the issue with station A was faulty wiring at the power pole which was repaired. New sample pumps with telemetry have been purchased.

Air sampling station CA-A-010 was found with damaged tubing during the 3/18/21 sample exchange. The damage did not affect the air sampler's ability to collect the sample for the week. The sampling pump was replaced with a new pump (CR#202101610).

On 3/25/21 air sampling station CA-A-001 was changed out per Job 21503057. The sampler appeared to be running properly. The sample was started at 10:53 on 3/18/21. The sampler totalizer displayed 6 days 17 hours and 50 minutes but the actual elapsed time was 6 days, 23 hours and 24 minutes. This was not considered a missed sample (CR#202101781).

(2) Food Products-Leafy Green Vegetables:

There were no viable samples available for collection 4/13/21 at locations CA-FPL-V9, CA-FPL-V12, CA-FPL-V16 and CA-FPL-V19 due to it being too early in the growing season (CR#202102120).

Sample location CA-FPL-V16 was unable to provide a vegetation sample 5/11/21 due to

3.3 Program Execution (continued)

vegetables too small due to cold weather (CR#202102701).

Samples were unavailable for collection at location CA-FPL-V19 due to chickens getting into the supplier's garden (CR#202105679).

(3) Surface Water:

Sampler S01, the upstream sampler located in the plant water intake structure about 550 feet upstream of the discharge, was out of service for approximately 15 days (4% of the year) during 2021. This was due to clogging of the pump (CR#202101783, Job 21001221) and the PG220 outage causing a loss of power to the pump (CR#202105841).

Sampler S02, the downstream sampler located at the end of the mixing zone in Portland, MO, was out of service for approximately 15.41 days (4% of the year) during 2021. Most of the downtime was due to work continuation due to the sample pump's failure at the end of 2020 (CR#202001364). The sample pump was replaced and repaired.

During those out of service times, daily grab samples are collected as required per Callaway's procedures except as documented in CR#202101783.

The March 2021 sample was missed at location CA-SWA-01 due to a daily compositor malfunction. On 3/24/21 it was noted that enough sample had been collected for the day but would not meet requirements for the next day's sample (CR#202101760).

Other condition reports documenting the issues with the river samplers are: CR#202100737, CR#202101763, CR#202103603, CR#202104029 and CR#202106326.

(4) Drinking Water:

The drinking water CA-DWA-006 sample could not be collected 1/27/21 due to the well having been removed from service in preparation for the demolition of the dwelling on the property (CR#202100519).

The dwelling at location CA-DWA-006 was previously destroyed and the owner indicated that there are no immediate plans for rebuilding at the location. The well was no longer in use. The collection was discontinued at this location 5/3/21 (CR#202102552).

(5) Wells and Ponds (non-potable water):

The well sample scheduled to be collected 2/18/21 at location CA-WWA-U1MW-937D could not be collected due to the presence of a large block of ice that had formed over the well cap and pipe (CR#202100974).

The well sample collected 2/18/21 at well location CA-WWA-U1MW-937B was damaged in transit and the container was empty upon arrival at the laboratory. A back-up sample collected at the same time as the primary sample was successfully sent by the sample collection contractor to the laboratory (CR#202101060).

Some quarterly groundwater samples including several ODCM required samples could not be collected by the 8/10/21 deadline due to inadequate staffing issues resulting from illness, Covid-19 quarantining and a lack of qualified personnel due to their short shift rotation. The surveillance has been rescheduled such that the work can be performed in

3.3 Program Execution (continued)

the 2nd month of the quarter to evenly distribute quarterly REMP activities (CR#202104510).

Samples collected at location U1MW-940 tested positive for tritium at an initial concentration of 575 ± 105 pCi/L, with a recount of 588 ± 126 pCi/L and reanalysis of 553 ± 125 pCi/L. The back-up sample result was 562 ± 105 pCi/L. There were no gamma emitters present in both the initial and backup samples. The elevated results could be the result of atmospheric tritium entering from a nearby excavation pit (CR#202105648).

(6) Direct Radiation:

During the quarterly changeout of TLD's from second to third quarter six TLD's were found with moisture inside the packaging at locations CA-IDM-09, CA-IDM-11A, CA-IDM-17, CA-IDM-32, CA-IDM-32A & CA-IDM-33 and a seventh TLD at location CA-IDM-49, was found with a hole in the packaging. No anomalies were observed in the readings. (CR#202104080).

The fourth quarter TLD at location CA-IDM-39A was found damaged on the ground on the day of collection 1/04/22 (CR#202200067).

The fourth quarter TLD's at locations CA-IDM-23 and CA-IDM-45 had readings that were greater than 3 standard deviations from the previous 5 year max. An investigation concluded that CA-IDM-23 was reading high by about 13% when compared to a QC batch and water damage is suspected. CA-IDM-45 results typical compared with the QC batch. Element Correction Factor reanalysis resulted in a change of dose to CA-IDM-45: 15.99 mrem. There was no dose adjustment to CA-IDM-45; therefore tracking and trending of the location will be continued (CR#202200557).

3.4 Laboratory Procedures

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, 2022). 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 Environmental Dosimetry Company, affiliated with Stanford Dosimetry, LLC.

3.5 Program Modifications

Changes in 2021 as also noted on the 2020 AREOR:

Location CA-DWA-010 changed ownership from S. Dillon to T. Dillon (CR#202100085).

Location CA-DWA-025, Mario Kriete, was added to the program as a drinking water location in 2021.

"Farm Crops" eliminated in their entirety as described in Licensing Document Change Notice (LDCN) 20-0008 (CR#202100660-006).

Changes in 2021 not noted on the 2020 AREOR:

Added location CA-WWA-U1MW-017 back into the program as an ODCM required well to assure compliance (CR#202100825).

Location CA-DWA-006 removed from the program as a drinking water location in 2021 as the dwelling has been destroyed (CR#202102552).

Soil location CA-SOL-W6 was added to the program in the second quarter of 2021 to ensure compliance with the ODCM (CR#202102041).

Drinking water location CA-DWA-V19 was added to the program during the land use census. This sample is not required by the ODCM.

Drinking water location CA-DWA-008 was added back to the program after enrolling the new property owner in the program (CR#202104508). This is a follow up to (CR#202007038) documenting the change in property ownership in 2020.

Locations CA-WWA-U1MW-936, CA-WWA-U1MW-001, CA-WWA-U1MW-002, CA-WWA-U1MW-012, CA-WWA-U1MW-013, CA-WWA-U2MW-010 and location "inside the old blowdown line" were removed from the program as described in Licensing Document Change Notice (LDCN) 20-0008 (CR#202100660-06) and (CR#202103504).

Outfall locations CA-SWA-OUTFALL-011, CA-SWA-OUTFALL-012, CA-SWA-OUTFALL-013 and CA-SWA-OUTFALL-014 were removed from the program as described in Licensing Document Change Notice (LDCN) 20-0008 (CR#202100660-006). Only ponds important to recreation have been kept in the program for sampling. However, starting in 2022, CA-SWA-OUTFALL-015 will no longer be sampled as the outfall has been removed due to safety concerns with the dam (RFR 210182).

Bottom sediments were removed from the State of Missouri's National Pollution Discharge Elimination System (NPDES) permit requirements for Callaway Energy Center and thus removed from the program starting in 2021 (CR#202003290-001).

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" and the NRC Radiological Assessment Branch Technical Position, Rev. 1, November 1979, "An Acceptable Radiological Environmental Monitoring Program".

3.7 Land Use Census

The Land Use Census is performed annually during the growing season. In 2021 the field inspection of the sectors was conducted October 5, 2021 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.

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 Plant to the sample location.

There are no changes to the closest residents or closest broadleaf gardens in 2021. No milking animals were located during the survey.

All residents included in the summary were verified by the Callaway County Assessor's GIS aerial photography.

The Missouri Department of Natural Resources has not identified any new water wells along the Mud Creek or Logan Creek corridors.

The US Army Corps of Engineers was contacted, and they confirmed that no new drinking water intakes have been located along the Missouri River within ten (10) river miles downstream from the Callaway Plant. In addition, no irrigation uses of the Missouri River were identified between the discharge point and Portland, MO during the survey.

3.8 Errata from previous Annual Radiological Environmental Operating Reports

In the 2020 AREOR the following errata have been identified as part of routine self-assessment activities (CR#202201414):

- 1) In Appendix C of Part I there was a typographical error in Section 4 that currently reads "There were no nonroutine reports submitted accordance with the EPP, Section 5.4.2 in 2017." It should read "There were no nonroutine reports submitted in accordance with the EPP, Section 5.4.2 in 2020."
- 2) Location CA-DWA-008 was inadvertently removed from the 2020 AREOR sample location maps included in Appendix D as it was collected for the 3 quarters in 2020 and then removed from the program due to property ownership change (CR#202005930 and CR#202007038). It was added back to the program in 2021 because the new property owner opted to enroll in the program. The sampling location has not changed physical location, see page D-3 in the 2021 AREOR.

4.0 RESULTS AND DISCUSSION

All collections and analyses were made as scheduled, except for those listed 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 2021 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 2021. 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 2021.

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 2021 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 14.9 mrem/quarter and the three control locations averaged 14.1 mrem/quarter. Readings ranged from 8.4 to 17.7 mrem /quarter, with the highest quarterly average from the control location CA-IDM-32, averaging 16.8 mrem/quarter. The TLD readings were consistent with the results for the years 2000 through 2020 as detailed in table 5.7 with the exception of those detailed in CR#202200557.

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 measurable neutron dose and there was no effect from the ISFSI in 2021.

Milk

Sampling has been discontinued since 2018 since there are not enough sampling locations to fulfill the milk sampling requirement. No milking animals were located during the 2021 Land Use Census. Leafy green (broadleaf) vegetation sampling was performed in lieu of milk sampling.

Broadleaf Vegetation

There was no I-131 activity detected in broadleaf vegetation samples. No gamma-emitting isotopes were detected in broadleaf vegetation samples except for naturally occurring beryllium-7 and potassium-40. Vegetation data for 2021 show no radiological effects of plant operation.

4.2 Program Findings (Continued)

Non-Food Crops

Farm crop collection was discontinued as the sampling requirement was removed from the ODCM.

Fish

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

Soil

Cesium-137 activity was detected at five of the seven indicator sample locations at an average concentration of 289 pCi/kg dry. One of the two control samples were positive for Cesium-137 with an activity of 151 pCi/kg dry. The cesium-137 activity is consistent with levels observed from 1999 through 2020; these levels are attributable to the deposition of fallout from previous decades.

Surface Water

No tritium was detected in eleven of the upstream location S01 samples or in any of the twelve downstream location S02 samples collected in 2021. No gamma-emitting isotopes were detected in any of the samples taken in 2021.

Surface Water, Ponds

Fourteen pond samples were analyzed for 2021. No tritium activity or gamma activity was detected.

Drinking Water Wells (potable water)

Fifty-eight samples from sixteen different locations were analyzed for tritium and gamma-emitting isotopes in 2021. 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 CA-WWA-U1MW-031, CA-WWA-U1MW-034, CA-WWA-U1MW-036, CA-WWA-U1MW-039, CA-WWA-U1MW-047, CA-WWA-U1MW-058, and CA-WWA-U1MW-059 were installed during the 2014 limited site investigation (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 has generally continued to decrease since 2016. Tritium activity was detected in 17 of 31 results from these wells. The highest concentration was measured in CA-WWA-U1MW-31 which peaked at 574 pCi/L in October comparable to the 2020 high value of 420 pCi/L. This is likely because of seasonal variation. The average concentration among positive results for these wells was 308 pCi/L which is comparable to the 2020 average of 261 pCi/L. The contamination is being remediated by monitored natural attenuation. There are no active leaks.

Wells and Ponds (non-potable water) (Continued)

Wells CA-WWA-U1MW-GWS, CA-WWA-U1MW-936, CA-WWA-U1MW-937B, CA-WWA-U1MW-937D, CA-WWA-U1MW-939R, CA-WWA-U1MW-940, CA-WWA-U1MW-941 and CA-WWA-U1MW-IFSFI (Sump) are located in the Plant Protected Area, adjacent to the power block. Tritium activity in the wells within the power block are believed to be the result of washout from gaseous effluents. The low level tritium activity observed in well CA-WWA-U1MW-014 is likely 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.

The results are consistent with 2015 through 2020.

Positive tritium results seen in results from location CA-WWA-U1MW-940 could be due to result of atmospheric tritium collecting in an excavation pit as described earlier in section 3.3 (5). The results at the groundwater sump (GWS) location and at location CA-WWA-U1MW-939R are in alignment with current trending (CR#202105648).

Sediments

Two samples of shoreline sediments were collected in April and October 2021 at both an indicator and a control location and analyzed for gamma-emitting isotopes. No gamma-emitting isotopes were detected excepting naturally occurring potassium-40 in any of the sediment samples.

5.0 TABLES

Table 5.1. Sampling Locations. (TLDs)

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	IDM
5	1.3 mi. 79° ENE	Meteorological Tower	IDM
6	2.0 mi. 274° W	Cty Rd. 428, 1.2 mi. West of Hwy CC	IDM
7	1.4 mi. 184° S	Cty Rd. 459, 2.6 mi. North of Hwy 94	IDM
9	3.8 mi. 183° S	NW Side of the Cty Rd. 459 and Hwy 94 Junction	IDM
10	3.9 mi. 159° SSE	Hwy 94, 1.8 mi. East of Cty Rd. 459	IDM
11a	4.7 mi. 139° SE	City of Portland	IDM
14	4.9 mi. 122° ESE	SE Side of Intersection Hwy D and Hwy 94	IDM
17	3.8 mi. 88° E	Cty Rd. 4053, 0.3 mi. E of Hwy 94	IDM
18a	3.7 mi. 67° ENE	East side of Hwy D, 0.5 mi. South of Hwy O	IDM
20	4.7 mi. 46° NE	City of Readsville	IDM
21	3.8 mi. 23° NNE	Cty Rd. 155, 1.9 mi. North of Hwy O	IDM
22a	0.9 mi. 10° NNE	Cty Rd 448, 0.9 mi south of HWY O, co-located with air station A8	IDM
23	6.6 mi. 15° NNE	City of Yucatan	IDM
26 ³	11.7 mi. 82° E	Town of Americus	IDM
27 ³	9.3 mi. 114° ESE	Town of Bluffton	IDM
30a	4.4 mi. 206° SSW	City of Steedman, N side of Belgian Dr., 150 ft. East of Hwy CC	IDM
31a	7.8 mi. 224° SW	City of Mokane, Jct. Hwy C and Cty Rd. 400, 0.9 mi. N. of Hwy 94	IDM
32	5.4 mi. 250° WSW	Hwy VV, 0.6 mi. west of Cty Rd. 447	IDM
32a	5.0 mi. 243° WSW	Cty Rd. 447	IDM
33	7.4 mi. 272° W	City of Hams Prairie, SE of Hwy C and Hwy 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	IDM
36	4.9 mi. 7° N	Cty Rd. 155, 0.8 mi. South of Cty Rd. 132	IDM
37	0.5 mi. 195° SSW	Cty Rd. 459, 0.9 mi. South of Hwy CC	IDM
38	4.6 mi. 334° NNW	Cty Rd. 133, 1.5 mi. South of Hwy UU	IDM
39	5.4 mi. 312° NW	Cty Rd. 111	IDM
39a	5.0 mi. 308° NW	Cty Rd. 111	IDM
40	4.2 mi. 292° WNW	NE Side of Cty Rd. 112 and Hwy O Junction	IDM
41	5.2 mi. 277° W	Hwy AD, 2.5 mi. East of Hwy C	IDM
42	4.4 mi. 231° SW	Cty Rd. 447, 2.6 mi. North of Cty Rd. 463	IDM
43	0.5 mi. 223° SW	Cty Rd. 459, 0.7 mi. South of Hwy CC	IDM
44	1.7 mi. 254° WSW	Hwy CC, 1.0 mi. South of Cty Rd. 459	IDM
45	1.0 mi. 285° WNW	Cty Rd. 428, 0.1 mi. West of Hwy CC	IDM
46	1.5 mi. 328° NNW	NE Side of Hwy CC and Cty Rd. 466 Intersection	IDM
47	1.0 mi. 10° N	Cty Rd. 448, 0.9 mi. South of Hwy O	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, Reform Wildlife Mgmt. Parking Area, Dept. of Conserv. Sign.	IDM
50	0.9 mi. 168° SSE	Cty Rd. 459, 3.3 mi. North of Hwy 94	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	Just past Tebbetts City sign	IDM

Table 5.1. Sampling Locations. (TLDs, continued)

Location Code	Distance / Direction ¹	Description	Sample Types ²
60N ³	13.5 mi 224 ° SW	Co-located with location 60	IDM
61	1.9 mi 334 ° NNW	Community of Reform, Corner of CC and O	IDM
61N	1.9 mi 334 ° NNW	Co-located with location 61	IDM
62N	1.2 mi. 308 ° NW	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	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 ° ENE	Meteorological Tower	APT, AIO
A7	9.5 mi. 312 ° NW	C. Bartley Farm, Fulton, MO	APT, AIO
A8	0.9 mi. 10 ° NNE	County Road 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 lagoons lift pumps area	APT, AIO
3	2.9 mi. 168 ° SSE	Potable water, County Road 448 Ward Residence	DWA
4	2.6 mi. 158 ° SSE	Potable water, County Road 448 Miller Residence	DWA
5	2.5 mi. 153 ° SSE	Potable water, County Road 448 Brucker Brothers Farm	DWA
6	2.2 mi. 141 ° SE	Potable water, County Road 448 Kuenzel Residence	DWA
7	2.1 mi. 108 ° ESE	Potable water, County Road 448 S. Kriete Residence	DWA
8 ⁴	3.4 mi. 193 ° SSW	Potable water, County Road 457 Curry Residence	DWA
9	2.9 mi. 204 ° SSW	Potable water, County Road 457 Clardy Residence	DWA
10	2.7 mi. 208 ° SSW	Potable water, County Road 457 T. Dillon Residence	DWA
12	3.6 mi. 165 ° SSE	Potable water, County Road 464 J. Dillon Residence	DWA
21	2.4 mi. 120 ° ESE	Potable water, County Road 469 Baumgarth Residence	DWA
22	4.8 mi. 140 ° SE	Potable water, State Road 94 Plummer Residence	DWA
23	5.6 mi. 142 ° SE	Potable water, County Road 466 Curdt Residence	DWA
24	2.9 mi. 203 ° SSW	Potable water, County Road 457 Farley Residence	DWA
25	1.89 mi. 79 ° E	Potable water, County Road 448 M. Kriete Residence	DWA
V16	1.64 mi. 255 ° WSW	Potable water, Hwy CC Wallendorf Farm, Steedman, MO	DWA
V19	3.28 MI. 162 ° SSE	Potable water, Dillon Drive, Dillon Farm, Portland, MO	DWA
PW1	Callaway Cafeteria, 0.13 mi. 234 ° SW	Potable water, Unit 1 Construction well #3 open from 400'-1400'	DWA
Pond 01	0.6 mi. 264 ° W	Fishing Pond	SWA
Pond 02	0.7 mi. 232 ° SW	Fishing Pond	SWA
Outfall 010	0.6 mi. 42 ° NE	Stormwater Run-Off Pond	SWA
Outfall 011	1.0 mi. 60 ° ENE	Stormwater Run-Off Pond	SWA
Outfall 012	0.5 mi. 178 ° S	Stormwater Run-Off Pond	SWA
Outfall 013	0.5 mi. 189 ° S	Stormwater Run-Off Pond	SWA
Outfall 014	0.6 mi. 343 ° NNW	Stormwater Run-Off Pond	SWA
Outfall 015	0.7 mi. 4 ° N	Stormwater Run-Off Pond	SWA
Sludge Lagoon	~0.8 mi. 153 ° SSE ⁵	In-service 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, 0.03 mi. 84 ° E	Diesel Fuel Remediation Well, NW of Fuel Bldg.	WWA
U1MW-937B	Plant Peninsula Area, 0.04 mi. 209 ° SSW	Monitoring Well, West of the Turbine Bldg.	WWA
U1MW-937D	Plant Peninsula Area, 0.1 mi. 92 ° E	Monitoring Well, North of Discharge Monitor Tanks	WWA
U1MW-939R	Plant Peninsula Area, 0.05 mi. 109 ° ESE	Monitoring Well, East of the Fuel Bldg.	WWA
U1MW-940	Plant Peninsula Area, 0.05 mi. 78 ° ENE	Monitoring Well, West of the Radwaste Bldg.	WWA
U1MW-941	Plant Peninsula Area, 0.07 mi. 81 ° E	Monitoring Well, West of the Radwaste Bldg.	WWA
U1MW-GWS	Plant Peninsula Area, 0.02 mi. 135 ° SE	Ground Water Sump, West of Reactor Bldg. and Fuel Bldg.	WWA
U1MW-ISFSI	ISFSI sump, 0.08 mi. 21 ° NNE	Near ISFSI pad	WWA
U1MW-001	0.3 mi. 334° NNW	Outside owner controlled area (OCA), Groundwater Monitoring Well	WWA
U1MW-002	0.4 mi. 206 ° SSW	Outside OCA, Groundwater Monitoring Well	WWA
U1MW-004	3.7 mi. 165 ° SSE	South of Dillon residence, Groundwater Monitoring Well	WWA
U1MW-005	3.8 mi. 160 ° SSE	South of Brownlee / Hudson residence, Groundwater Monitoring Well	WWA
U1MW-006	3.0 mi. 171 ° S	South of Ward Residence, Groundwater Monitoring Well	WWA
U1MW-010	3.1 mi. 173 ° S	Old Pipeline Bed, Groundwater Monitoring Well	WWA
U1MW-012	3.0 mi. 172 ° S	South of Ward Residence, Groundwater Monitoring Well	WWA
U1MW-013	0.8 mi. 159 ° SSE	Pipeline Corridor, south of sludge ponds	WWA
U1MW-014	3.7 mi. 171 ° S	Pipeline Corridor, near manhole 6B	WWA
U1MW-015	3.9 mi. 162 ° SSE	Pipeline Corridor, North of HWY 94.	WWA
U1MW-016	4.5 mi. 151 ° SSE	Pipeline Corridor, near heavy haul road at intake structure	WWA
U1MW-017	3.68 mi. 171 ° S	Pipeline Corridor, near manhole 6B	WWA
U1MW-018	3.75 mi. 172 ° S	Pipeline Corridor, near manhole 6B	WWA
U1MW-019	3.71 mi. 172 ° S	Pipeline Corridor, near manhole 5	WWA
U1MW-020	3.88 mi. 164 ° SSE	Pipeline Corridor, near manhole 3B	WWA
U1MW-031	0.18 mi. 78 ° ENE	~1m from manhole 86-2 & 1m from HDPE discharge pipeline	WWA
U1MW-034	0.21 mi. 98 ° E	~130m from manhole 86-2, HDPE discharge line bedding	WWA
U1MW-036	0.26 mi. 122 ° ESE	~300m from MH 86-2, HDPE discharge line bedding at cross connection pipe	WWA
U1MW-039	0.61 mi. 168 ° SSE	~1100m from manhole 86-2, HDPE discharge line bedding outside OCA	WWA
U1MW-047	4.56 mi. 151 ° SSE	Upstream side of HDPE gate valve vault at intake structure inside HDPE pipeline bedding	WWA
U1MW-058	0.31 mi. 132 ° SE	~400m from manhole 86-2, Techite discharge line bedding	WWA
U1MW-059	1.04 mi. 166 ° SSE	~1700m from MH86-2, Techite discharge line bedding outside OCA	WWA
Inside Old BDL	1.81 mi. 177 ° S	Sampled through hole in Techite blowdown line	WWA
U2 MW 2S	1.8 mi. 5 ° N	Located on the periphery of the plateau	WWA
U2 MW 5S	1.1 mi. 261 ° W	Located on the periphery of the plateau	WWA
U2 MW 8	0.4 mi. 12 ° NNE	Located radially outward from central part of the plateau	WWA
U2 MW 10	0.4 mi. 163 ° SSE	Located radially outward from central part of the plateau	WWA
U2 MW 16	2.9 mi. 203 ° SSW	Located along Mud Creek, Farley Property, screened for CJC aquifer	WWA
F05	0.9 mi. 169 ° S	CJC aquifer monitoring well	WWA
F15	0.4 mi. 29 ° NNE	Outside OCA fence in center portion of plateau, screened for CJC aquifer	WWA

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

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	0.46 mi. 320 ° NNW	Callaway Plant Forest Ecology Plot PR7.	SOL
W1 ³	0.52 mi. 150 ° SE	Callaway Plant Wetlands #1, High Ground.	SOL
W2	0.525 mi. 155 ° SSE	Callaway Plant Wetlands #1, Inlet Area.	SOL
W5	~0.8 mi. 153 ° SSE ⁵	In-service Sludge Lagoon.	SOL
W6	0.67 mi. 154 ° SSE	Callaway Plant Wetlands #2, inlet area	SOL
M9 ³	13 mi. 228 ° SW	Ferguson Farm, Tebbetts, MO.	SOL
V9	1.9 mi. 294 ° WNW	Meehan Farm, Steedman, MO	FPL
V12 ³	18.7 mi. 255 ° WSW	Kissock Farm, Holts Summit, MO	FPL
V16	1.64 mi. 255 ° WSW	Wallendorf Farm, Steedman, MO	FPL
V19	3.28 mi. 162 ° SSE	Richard and Amy Dillon Farm	FPL
A ^{3,6}	~4.8 mi. 150 ° SSE	Between 0.6 and 10.0 river miles upstream of the plant intake.	AQF
A ^{3,}	~4.8 mi. 150 ° SSE	Upstream of the plant intake.	AQS
C ⁶	~4.9 mi. 138 ° SE	Downstream, of the plant discharge, between the confluence of the Missouri River and Logan Creek and the Portland boat ramp	AQF
C	~4.9 mi. 138 ° SE	Vicinity of Portland – north bank	AQS

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 Property ownership changed from Brandt to Curry in 2022.

⁵ The coordinates of the in-service sludge lagoon are determined at the time of sampling in accordance with HTP-ZZ-07101-DTI-REMP-SMPL-SCHED.

⁶ The expanded collection areas provide sufficient habitat to collect the required number of species, see HTP-ZZ-07101-DTI-REMP-SMPL-SCHED.

Table 5.2. Collection Frequencies and Required Analyses ¹ (January 1 through December 31, 2021)

Sample Type	Media Code	Collection Frequency	Required Analyses
Direct radiation	IDM	Quarterly	Gamma dose for each sample. Neutron dose for the samples monitoring ISFSI direct radiation.
Airborne iodine	AIO	Weekly	¹³¹ I
Air particulate	APT	Weekly	PGE ³ each sample
Surface water (river)	SWA	Monthly composite	PGE and ³ H
Surface water (onsite ponds)	SWA	Semiannually	PGE and ³ H. If contaminated with gamma emitting nuclides of plant origin, analyze for HTD ⁴ nuclides.
Groundwater (not potable)	WWA	Quarterly ⁵	PGE and ³ H. If contaminated with gamma emitting nuclides of plant origin, analyze for HTD ⁴ nuclides. ⁶
Well water-potable	DWA	Quarterly	PGE and ³ H. If contaminated with gamma emitting nuclides of plant origin, analyze for HTD ⁴ nuclides.
Shoreline sediment	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 ²	PGE and ¹³¹ I
Fish	AQF	Semiannually	PGE on edible portion

¹ Samples required by ODCM unless specified otherwise.

² The growing season is defined as the months April 1- November 1, but will vary according to weather conditions.

³ Principal Gamma Emitters (PGE) are defined as ⁵⁴Mn, ⁵⁹Fe, ⁵⁸Co, ⁶⁰Co, ⁶⁵Zn, ⁹⁵Zr/Nb, ¹³⁴Cs, ¹³⁷Cs, ¹⁴⁰Ba/La and other gamma- emitting nuclides that may be identified during the gamma spectroscopy analysis.

⁴ Hard to Detect (HTD) nuclides are defined as ⁸⁹Sr, ⁹⁰Sr, ⁵⁵Fe, ⁶³Ni, ²³⁷Np, ²³⁸Pu, ^{239/240}Pu, ²⁴¹Pu, ²⁴¹Am, ²⁴²Cm and ^{243/244}Cm.

⁵ Monthly for locations U1MW-936, U1MW-937B, U1MW-937D, U1MW-939R, U1MW-940, U1MW-941 and U1MW-GWS.

⁶ Wells ISFSI Sump, U1MW-18, U1MW-19, U1MW-20, U1MW-31, U1MW-34, U1MW-36, U1MW-39, U1MW-47, U1MW-58, U1MW-59, Old Blowdown Pipeline, U2MW-2S, U2MW-5S, U2MW-8, and U2MW-16 are analyzed for tritium only.

Table 5.3. Minimum Required Detection Capabilities for REMP Sample Analysis¹

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 2021 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	NI	NI
E(E)	3.51	NI	NI
ESE(F)	2.11	4.47	NI
SE(G)	2.72	NI	NI
SSE(H)	3.11	3.28	NI
S(J)	2.86	NI	NI
SSW(K)	2.38	NI	NI
SW(L)	2.63	2.72	NI
WSW(M)	1.20	1.96	NI
W(N)	1.56	3.55	NI
WNW(P)	1.93	1.93	NI
NW(Q)	2.07	NI	NI
NNW(R)	1.81	NI	NI

¹ NI = None Identified.

² Broadleaf Vegetation

Table 5.5. Missed collections and analyses, Callaway Energy Center

Sample Type	Analysis	Location(s)	Collection Date or Period	Comments
WWA	H-3, Gamma	CA-WWA-47	1/7/21	Unable to collect water, well dry. (CR#202100452).
DWA	H-3, Gamma	CA-DWA-006	1/27/21	Unable to collect water, well non-functional (CR#202100519).
WWA	H-3, Gamma	CA-WWA-937D	2/18/21	Unable to collect water, a large block of ice formed over well cap and pipe (CR#202100974).
APT/AIO	Gamma	CA-A-010	3/4/21	Air station found not running (CR#202101288).
APT/AIO	Gamma	CA-A-001	3/11/21	Excessive lost run time resulted in missed air sample (CR#202101465).
SWA	H-3, Gamma	CA-SWA-S01	March 2021	Missed sample due to daily compositor malfunction (CR#202101760).
FPL	Gamma	CA-FPL-V9, CA-FPL-V12, CA-FPL-V16, CA-FPL-V19	4/13/21	No viable samples available for collection (CR#202102120).
DWA	H-3, Gamma	CA-DWA-006	5/3/21	Dwelling at location destroyed, well not in use, collection discontinued (CR#202102552).
FPL	Gamma	CA-FPL-V16	5/11/21	Samples too small due to cold weather (CR#202102701).
FPL	Gamma	CA-FPL-V19	10/11/21	Samples unavailable due to chickens getting into supplier's garden (CR#202105679).
IDM	Gamma	CA-IDM-39A	4 th Qtr 2021	TLD found damaged on the ground (CR#202200067).

Table 5.6 Radiological Environmental Monitoring Program Summary

Table 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	23	3000	ND	-	-	ND	0
	GS	23	(b)	ND	-	-	ND	0
Surface Water, Ponds (pCi/L)	H-3	14	3000	ND	-	-	None	0
	GS	14	(b)	ND	-	-	None	0
Potable Wells (pCi/L)	H-3	58	2000	ND	-	-	ND	0
	GS	58	(b)	ND	-	-	ND	0
Wells (non-potable) (pCi/L)	H-3	194	3000	334 (66/194) (161-993)	CA-WWA-939R 0.05 mi. 109 ° / ESE	601 (12/12) (304-993)	None	0
	GS	131	(b)	ND	-	-	None	0
Sediments (pCi/kg) dry	Cs-134	4	150	ND	-	-	ND	0
	Cs-137	4	180	ND	-	-	ND	0
Airborne Pathway								
Airborne Particulates (pCi/m³)	GS	310	(b)	ND	-	-	None	0
Airborne Iodine (pCi/m³)	I-131	310	0.07	ND	-	-	None	0
Soil								
Soil (pCi/kg) dry	Cs-134	9	150	ND	-	-	ND	0
	Cs-137	9	180	289 (5/7) (37-635)	F-002 1.0 mi. 235 ° / SW	635 (1/1)	151 (1/2)	0

Table 5.6 Radiological Environmental Monitoring Program Summary

Table 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	49	(b)	ND	-	-	ND	0
Fish Edible Flesh (pCi/kg) wet	GS	20	(b)	ND	-	-	ND	0
Milk (pCi/L)	I-131	0	1	none	-	-	ND	0
	GS	0	(b)	none	-	-	ND	0
Direct Radiation								
(Quarterly TLDs) (mrem/Qtr)	Gamma	175	-	14.9 (163/163) (8.4-17.7)	CA-IDM-32 5.4 mi. 250° WSW	16.8 (4/4) (15.9-17.7)	14.1 (12/12) (10.2-17.4)	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/90 days) for the Period 2000-2020

Station Code	Mean	3 σ	Mean + 3 σ	Max
CA-IDM-1A	15.9	2.8	18.7	18.0
CA-IDM-3*	16.8	2.8	19.7	20.0
CA-IDM-5	14.3	2.7	17.0	17.1
CA-IDM-6	16.3	3.4	19.7	19.0
CA-IDM-7	16.1	3.1	19.2	19.0
CA-IDM-9	14.9	2.5	17.4	17.0
CA-IDM-10	17.0	2.6	19.6	19.3
CA-IDM-11A	17.0	2.9	19.9	19.3
CA-IDM-14	15.8	2.7	18.6	18.7
CA-IDM-17	16.0	3.0	19.0	18.3
CA-IDM-18A	16.1	4.6	20.6	18.9
CA-IDM-20	16.5	2.9	19.3	19.3
CA-IDM-21	16.3	3.3	19.6	19.0
CA-IDM-22A*	14.4	5.2	19.6	18.0
CA-IDM-23	16.5	2.7	19.2	19.0
CA-IDM-26(C)	11.4	2.2	13.6	13.1
CA-IDM-27(C)	17.1	2.8	20.0	20.0
CA-IDM-30A	15.6	2.7	18.4	18.2
CA-IDM-31A	16.9	2.7	19.6	19.0
CA-IDM-32	16.6	2.8	19.5	19.0
CA-IDM-32A	16.0	3.9	19.9	20.0
CA-IDM-33	15.9	2.7	18.6	18.0
CA-IDM-34	15.3	2.8	18.2	18.0
CA-IDM-35	14.8	2.5	17.3	17.3
CA-IDM-36	15.3	3.5	18.8	18.7
CA-IDM-37	15.7	2.7	18.5	18.0
CA-IDM-38	11.4	2.2	13.6	13.9
CA-IDM-39	15.7	3.1	18.8	19.0
CA-IDM-39A	16.3	3.2	19.5	19.0
CA-IDM-40	16.9	3.3	20.2	19.2
CA-IDM-41	15.7	3.1	18.8	19.0
CA-IDM-42	13.6	2.5	16.1	15.6
CA-IDM-43	15.9	2.9	18.8	18.7
CA-IDM-44	16.2	3.3	19.4	19.0
CA-IDM-45*	14.7	3.2	17.9	20.0
CA-IDM-46	16.3	2.8	19.1	19.9
CA-IDM-47	15.6	2.8	18.3	18.0
CA-IDM-48	16.5	2.7	19.2	19.0
CA-IDM-49	15.3	3.1	18.4	18.0
CA-IDM-50	16.2	2.9	19.1	20.0
CA-IDM-51A	17.0	2.8	19.7	19.8
CA-IDM-52	16.6	2.7	19.3	19.1
CA-IDM-60(C)*	16.0	2.6	18.6	18.0
CA-IDM-61*	14.4	1.9	16.2	15.7

* ISFSI monitoring
(C) Control location

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APPENDIX A

INTERLABORATORY 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, 2021 through December, 2021

Appendix A

Interlaboratory/ Intralaboratory Comparison Program Results

Environmental, Inc., Midwest Laboratory has participated in interlaboratory comparison (crosscheck) programs since the formulation of its 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 Resource 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 intralaboratory "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 intralaboratory "blank" samples for the past twelve months. Data for previous years available upon request.

Table A-5 lists analytical results from the intralaboratory "duplicate" program for the past twelve months. Acceptance is based on each result being within 25% of the mean of the two results or the two sigma uncertainties of each result overlap.

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 Resource Associates, serving as a replacement for studies conducted previously by the Environmental Measurement Laboratory Quality Assessment Program (EML).

Attachment A lists the laboratory acceptance criteria for various analyses.

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

Attachment A

ACCEPTANCE CRITERIA FOR INTRALABORATORY "SPIKED" SAMPLES

Analysis	Ratio of lab result to known value.
Gamma Emitters	0.8 to 1.2
Strontium-89, Strontium-90	0.8 to 1.2
Potassium-40	0.8 to 1.2
Gross alpha	0.5 to 1.5
Gross beta	0.8 to 1.2
Tritium	0.8 to 1.2
Radium-226, Radium-228	0.7 to 1.3
Plutonium	0.8 to 1.2
Iodine-129, Iodine-131	0.8 to 1.2
Nickel-63, Technetium-99, Uranium-238	0.7 to 1.3
Iron-55	0.8 to 1.2
Other Analyses	0.8 to 1.2

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

Lab Code	Date	Concentration (pCi/L)				Acceptance
		Analysis	Laboratory Result	ERA Result	Control Limits	
RAD-124 Study						
ERW-94	1/11/2021	Ba-133	24.1 ± 3.5	23.8	18.4 - 27.4	Pass
ERW-94	1/11/2021	Cs-134	46.1 ± 3.1	42.8	34.2 - 47.1	Pass
ERW-94	1/11/2021	Cs-137	154 ± 6.0	148	133 - 165	Pass
ERW-94	1/11/2021	Co-60	39.4 ± 3.2	34.6	30.8 - 40.8	Pass
ERW-94	1/11/2021	Zn-65	66.2 ± 6.3	61.6	54.6 - 75.0	Pass
ERDW-96	1/11/2021	Gr. Alpha	58.4 ± 2.6	63.3	33.2 - 78.5	Pass
ERDW-96	1/11/2021	Gr. Beta	38.1 ± 1.3	39.8	26.4 - 47.3	Pass
ERDW-98	1/11/2021	Ra-226	16.3 ± 0.5	15.5	11.5 - 17.8	Pass
ERDW-98	1/11/2021	Ra-228	12.3 ± 1.2	12.9	8.54 - 15.8	Pass
ERDW-98	1/11/2021	Uranium	33.2 ± 1.8	30.1	24.4 - 33.4	Pass
ERW-100	1/11/2021	H-3	2,100 ± 160	2,120	1,750 - 2,350	Pass
RAD-126 Study						
ERDW-2194	7/12/2021	Ba-133	44.1 ± 4.0	45.5	37.2 - 50.6	Pass
ERDW-2194	7/12/2021	Cs-134	85.2 ± 3.9	87.5	71.8 - 96.2	Pass
ERDW-2194	7/12/2021	Cs-137	218 ± 8	208	187 - 230	Pass
ERDW-2194	7/12/2021	Co-60	91.7 ± 4.0	87.1	78.4 - 98.1	Pass
ERDW-2194	7/12/2021	Zn-65	114 ± 9	102	91.8 - 122.0	Pass
ERDW-2196	7/12/2021	Gr. Alpha	61.5 ± 2.9	49.1	25.6 - 61.7	Pass
ERDW-2196	7/12/2021	Gr. Beta	31.7 ± 1.3	31.5	20.3 - 39.2	Pass
ERDW-2200	7/12/2021	Ra-226	16.5 ± 0.5	13.4	10.0 - 15.4	Fail ^b
ERDW-2200	7/12/2021	Ra-228	8.7 ± 1.0	7.6	4.81 - 9.7	Pass
ERDW-2200	7/12/2021	Uranium	71.7 ± 2.3	62.3	50.9 - 68.5	Fail ^c
ERDW-2202	7/12/2021	H-3	11,300 ± 300	10,400	9,050 - 11,400	Pass
ERDW-2198	7/12/2021	I-131	22.3 ± 1.1	20.8	17.2 - 25.0	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 Resource Associates (ERA).

^b The radium-226 result did not meet ERA acceptance criteria.

^c The uranium result did not meet ERA acceptance criteria.

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TABLE A-4. Intralaboratory "Spiked" Samples

Lab Code ^b	Date	Analysis	Concentration ^a				Ratio Lab/Known
			Laboratory results 2s, n=1 ^c	Known Activity	Control Limits ^d	Acceptance	
SPW-55	1/8/2021	H-3	1,889 ± 150	2,110	1,688 - 2,532	Pass	0.90
SPDW-62	1/11/2021	Gr. Alpha	34.3 ± 1.7	64.9	34.0 - 80.4	Pass	0.53
SPDW-62	1/11/2021	Gr. Beta	9.2 ± 0.8	8.9	3.6 - 17.4	Pass	1.04
SPW-131	1/19/2021	Sr-90	18.0 ± 1.1	17.9	14.3 - 21.5	Pass	1.00
SPW-133	1/19/2021	H-3	1,842 ± 150	2,110	1,688 - 2,532	Pass	0.87
SPW-188	1/18/2021	Ra-228	14.2 ± 1.7	14.9	10.4 - 19.3	Pass	0.96
SPW-236	1/26/2021	Ra-228	12.2 ± 1.9	15.3	10.7 - 19.9	Pass	0.80
SPW-305	2/5/2021	H-3	1,785 ± 147	2,110	1,688 - 2,532	Pass	0.85
SPW-372	2/12/2021	H-3	1,742 ± 145	2,110	1,688 - 2,532	Pass	0.83
SPW-526	3/5/2021	H-3	1,899 ± 150	2,110	1,688 - 2,532	Pass	0.90
SPW-692	3/19/2021	H-3	1,953 ± 151	2,110	1,688 - 2,532	Pass	0.93
SPW-694	1/4/2021	Ra-226	9.7 ± 0.4	12.3	8.6 - 16.0	Pass	0.79
SPW-800	3/30/2021	Ra-228	15.8 ± 2.0	15.3	10.7 - 19.9	Pass	1.03
SPW-802	3/31/2021	H-3	1,878 ± 150	2,110	1,688 - 2,532	Pass	0.89
SPW-810	3/19/2021	Ra-226	11.4 ± 0.3	12.3	8.6 - 16.0	Pass	0.93
SPDW-30103	3/31/2021	Ra-226	13.5 ± 0.4	12.3	8.6 - 16.0	Pass	1.10
SPW-812	4/1/2021	H-3	2,005 ± 155	2,110	1,688 - 2,532	Pass	0.95
SPW-919	4/7/2021	H-3	1,877 ± 149	2,110	1,688 - 2,532	Pass	0.89
SPW-944	4/9/2021	Gr. Alpha	56.7 ± 2.5	58.4	29.2 - 87.6	Pass	0.97
SPW-944	4/9/2021	Gr. Beta	35.1 ± 1.3	38.1	30.5 - 45.7	Pass	0.92
SPW-1048	4/15/2021	H-3	1,915 ± 152	2,110	1,688 - 2,532	Pass	0.91
SPW-1250	4/30/2021	H-3	2,015 ± 154	2,110	1,688 - 2,532	Pass	0.95
SPW-1373	5/11/2021	Gr. Alpha	63.5 ± 2.9	58.4	29.2 - 87.6	Pass	1.09
SPW-1373	5/11/2021	Gr. Beta	38.5 ± 1.3	38.1	30.5 - 45.7	Pass	1.01
SPW-1377	5/11/2021	Sr-90	17.4 ± 1.2	17.9	14.3 - 21.5	Pass	0.97
SPDW-30108	5/28/2021	H-3	2,222 ± 161	2,110	1,688 - 2,532	Pass	1.05
SPDW-30125	5/13/2021	Ra-226	10.9 ± 0.3	12.3	8.6 - 16.0	Pass	0.89
SPDW-30118	6/4/2021	H-3	2,230 ± 163	2,110	1,688 - 2,532	Pass	1.06
SPMI-1672	6/8/2021	Sr-90	14.2 ± 0.9	13.6	10.9 - 16.3	Pass	1.04
SPDW-30160	6/11/2021	Ra-226	11.4 ± 0.3	12.3	8.6 - 16.0	Pass	0.93
SPDW-30129	6/15/2021	H-3	2,238 ± 162	2,110	1,688 - 2,532	Pass	1.06
SPDW-30134	6/18/2021	Gr. Alpha	17.9 ± 1.4	23.5	11.8 - 35.3	Pass	0.76
SPDW-30134	6/18/2021	Gr. Beta	60.9 ± 1.6	67.6	54.1 - 81.1	Pass	0.90
SPDW-30148	6/25/2021	Ra-228	15.1 ± 2.9	15.3	10.7 - 19.9	Pass	0.98
SPDW-30206	7/8/2021	Ra-226	12.7 ± 0.4	12.3	8.6 - 16.0	Pass	1.03
SPDW-3001	7/29/2021	Ra-226	11.6 ± 0.3	12.3	8.6 - 16.0	Pass	0.95

^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 & SPW (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 Acceptance criteria are listed in Attachment A of this report.

TABLE A-4. Intralaboratory "Spiked" Samples

Lab Code ^b	Date	Analysis	Concentration ^a		Control Limits ^d	Acceptance	Ratio Lab/Known
			Laboratory results 2s, n=1 ^c	Known Activity			
SPDW-30224	8/2/2021	Gr. Alpha	38.6 ± 2.1	49.1	24.6 - 73.7	Pass	0.79
SPDW-30224	8/2/2021	Gr. Beta	27.8 ± 1.2	31.5	25.2 - 37.8	Pass	0.88
SPDW-30226	8/13/2021	H-3	2,074 ± 157	2,110	1,688 - 2,532	Pass	0.98
SPDW-30231	8/18/2021	Ra-228	14.5 ± 2.2	15.3	10.7 - 19.9	Pass	0.95
SPW-2783	9/3/2021	Sr-90	18.9 ± 1.2	17.1	13.7 - 20.5	Pass	1.10
SPDW-2785	9/3/2021	H-3	2,135 ± 158	2,110	1,688 - 2,532	Pass	1.01
SPDW-2891	9/10/2021	H-3	2,159 ± 160	2,110	1,688 - 2,532	Pass	1.02
SPDW-3115	9/17/2021	Ra-226	11.3 ± 0.3	12.3	8.6 - 16.0	Pass	0.92
SPDW-3036	9/23/2021	Ra-228	18.0 ± 2.6	15.3	10.7 - 19.9	Pass	1.17
SPDW-3223	9/28/2021	Ra-228	16.6 ± 2.5	15.3	10.7 - 19.9	Pass	1.08
SPDW-3288	9/29/2021	U-234	29.2 ± 1.6	23.0	16.1 - 29.9	Pass	1.27
SPDW-3288	9/29/2021	U-238	28.2 ± 1.6	23.2	16.3 - 30.2	Pass	1.21
SPDW-30276	9/29/2021	Ra-226	9.4 ± 0.4	12.3	8.6 - 16.0	Pass	0.76
SPDW-3157	10/1/2021	H-3	2,111 ± 158	2,110	1,688 - 2,532	Pass	1.00
SPDW-3290	10/12/2021	Gr. Alpha	34.6 ± 2.1	49.1	24.6 - 73.7	Pass	0.70
SPDW-3290	10/12/2021	Gr. Beta	25.1 ± 1.1	31.5	25.2 - 37.8	Pass	0.80
SPDW-3393	10/15/2021	H-3	2,184 ± 161	2,110	1,688 - 2,532	Pass	1.04
SPDW-3604	10/28/2021	H-3	2,104 ± 15	2,110	1,688 - 2,532	Pass	1.00
SPDW-30283	11/4/2021	Ra-226	11.7 ± 0.3	12.3	8.6 - 16.0	Pass	0.95
SPDW-3769	11/10/2021	H-3	2,026 ± 156	2,110	1,688 - 2,532	Pass	0.96
SPDW-3860	11/18/2021	H-3	2,161 ± 161	2,110	1,688 - 2,532	Pass	1.02
SPDW-30290	11/22/2021	Ra-226	12.0 ± 0.3	12.3	8.6 - 16.0	Pass	0.97
SPDW-3958	12/3/2021	H-3	2,126 ± 160	2,110	1,688 - 2,532	Pass	1.01
SPW-3971	12/7/2021	Sr-90	19.0 ± 1.2	17.1	13.7 - 20.5	Pass	1.11
SPDW-30287	12/9/2021	Ra-228	12.3 ± 1.7	15.3	10.7 - 19.9	Pass	0.80
SPDW-30295	12/16/2021	H-3	2,265 ± 163	2,110	1,688 - 2,532	Pass	1.07
SPDW-30301	12/30/2021	H-3	2,055 ± 163	2,110	1,688 - 2,532	Pass	0.97
SPDW-30307	12/13/2021	Ra-226	11.7 ± 0.4	12.3	8.6 - 16.0	Pass	0.95

^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 & SPW (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 Acceptance criteria are listed in Attachment A of this report.

TABLE A-5. Intralaboratory "Blank" Samples

Lab Code ^b	Sample Type	Date	Analysis ^c	Concentration ^a		Acceptance Criteria (4.66 σ)
				Laboratory results (4.66σ)		
				LLD	Activity ^d	
SPW-54	Water	1/8/2021	H-3	153	24 ± 77	200
SPDW-61	Water	1/11/2021	Gr. Alpha	0.56	-0.32 ± 0.37	2
SPDW-61	Water	1/11/2021	Gr. Beta	0.73	-0.11 ± 0.49	4
SPW-130	Water	1/19/2021	Sr-89	0.66	-0.12 ± 0.49	5
SPW-130	Water	1/19/2021	Sr-90	0.68	-0.02 ± 0.31	1
SPW-132	Water	1/19/2021	H-3	165	38 ± 79	200
SPW-4923	Water	1/26/2021	I-131	0.28	0.26 ± 0.16	1
SPW-187	Water	1/18/2021	Ra-228	1.44	0.81 ± 0.76	2
SPW-235	Water	1/26/2021	Ra-228	1.54	0.94 ± 0.82	2
SPW-254	Water	2/2/2021	I-131	0.29	-0.06 ± 0.13	1
SPW-304	Water	2/5/2021	H-3	159	6 ± 74	200
SPW-371	Water	2/12/2021	H-3	154	-37 ± 70	200
SPW-525	Water	3/5/2021	H-3	160	97 ± 80	200
SPW-691	Water	3/19/2021	H-3	158	-38 ± 71	200
SPW-693	Water	1/4/2021	Ra-226	0.03	-0.01 ± 0.01	2
SPW-799	Water	3/30/2021	Ra-228	1.03	0.06 ± 0.48	2
SPW-809	Water	3/19/2021	Ra-226	0.04	0.01 ± 0.03	2
SPDW-30102	Water	3/31/2021	Ra-226	0.03	0.00 ± 0.03	2
SPW-811	Water	4/1/2021	H-3	158	-29 ± 77	200
SPW-918	Water	4/7/2021	H-3	156	93 ± 79	200
SPW-943	Water	4/9/2021	Gr. Alpha	0.39	-0.08 ± 0.27	2
SPW-943	Water	4/9/2021	Gr. Beta	0.73	0.04 ± 0.51	4
SPW-1047	Water	4/15/2021	H-3	160	-51 ± 74	200
SPW-1249	Water	4/30/2021	H-3	158	109 ± 81	200
SPW-1372	Water	5/11/2021	Gr. Alpha	0.35	0.27 ± 0.27	2
SPW-1372	Water	5/11/2021	Gr. Beta	0.68	0.27 ± 0.49	4
SPW-1376	Water	5/11/2021	Sr-89	0.52	0.23 ± 0.39	5
SPW-1376	Water	5/11/2021	Sr-90	0.51	-0.06 ± 0.23	1
SPDW-30124	Water	5/13/2021	Ra-226	0.03	-0.02 ± 0.03	2
SPDW-30104	Water	5/26/2021	Ra-228	1.30	-0.04 ± 0.60	2
SPDW-30107	Water	5/28/2021	H-3	157	33 ± 76	200
SPDW-30117	Water	6/4/2021	H-3	165	67 ± 81	200
SPMI-1671	Milk	6/8/2021	Sr-89	0.46	0.23 ± 0.42	5
SPMI-1671	Milk	6/8/2021	Sr-90	0.45	0.23 ± 0.24	1
SPDW-30159	Water	6/11/2021	Ra-226	0.04	-0.02 ± 0.04	2
SPDW-30128	Water	6/15/2021	H-3	161	17 ± 76	200
SPDW-30133	Water	6/17/2021	I-131	0.20	0.06 ± 0.12	1
SPDW-30134	Water	6/18/2021	Gr. Alpha	0.46	-0.11 ± 0.32	2
SPDW-30134	Water	6/18/2021	Gr. Beta	0.70	-0.10 ± 0.49	4
SPDW-30147	Water	6/25/2021	Ra-228	1.76	-0.15 ± 0.80	2

^a Liquid sample results are reported in pCi/Liter, air filters (pCi/m³), charcoal (pCi/charcoal canister), and solid samples (pCi/g).^b Laboratory codes : W & SPW (Water), MI (milk), AP (air filter), SO (soil), VE (vegetation), CH (charcoal canister), F (fish), U (urine).^c I-131(G); iodine-131 as analyzed by gamma spectroscopy.^d Activity reported is a net activity result.

TABLE A-5. Intralaboratory "Blank" Samples

Lab Code ^b	Sample Type	Date	Analysis ^c	Concentration ^a		Acceptance Criteria (4.66 σ)
				Laboratory results (4.66σ)		
				LLD	Activity ^d	
SPDW-30205	Water	7/8/2021	Ra-226	0.03	0.02 ± 0.03	2
SPDW-3000	Water	7/29/2021	Ra-226	0.03	0.03 ± 0.03	2
SPDW-30223	Water	8/2/2021	Gr. Alpha	0.46	-0.13 ± 0.31	2
SPDW-30223	Water	8/2/2021	Gr. Beta	0.70	0.16 ± 0.49	4
SPDW-30225	Water	8/13/2021	H-3	161	-2 ± 75	200
SPDW-30230	Water	8/18/2021	Ra-228	1.02	0.47 ± 0.53	2
SPW-2782	Water	9/3/2021	Sr-89	0.60	-0.16 ± 0.48	5
SPW-2782	Water	9/3/2021	Sr-90	0.63	0.20 ± 0.32	1
SPDW-2784	Water	9/3/2021	H-3	157	-50 ± 69	200
SPDW-2890	Water	9/10/2021	H-3	163	-59 ± 72	200
SPDW-2981	Water	9/17/2021	H-3	162	11 ± 78	200
SPDW-3114	Water	9/17/2021	Ra-226	0.03	0.04 ± 0.03	2
SPDW-3035	Water	9/23/2021	Ra-228	1.15	0.10 ± 0.55	2
SPDW-3222	Water	9/28/2021	Ra-228	1.37	-0.30 ± 0.60	2
SPDW-3287	Water	9/29/2021	U-234	0.22	0.19 ± 0.23	1
SPDW-3287	Water	9/29/2021	U-238	0.38	-0.05 ± 0.21	1
SPDW-30275	Water	9/29/2021	Ra-226	0.05	0.03 ± 0.04	2
SPDW-3156	Water	10/1/2021	H-3	161	-11 ± 75	200
SPDW-3289	Water	10/12/2021	Gr. Alpha	0.40	0.21 ± 0.30	2
SPDW-3289	Water	10/12/2021	Gr. Beta	0.72	0.31 ± 0.52	4
SPDW-3392	Water	10/15/2021	H-3	158	58 ± 79	200
SPDW-3603	Water	10/28/2021	H-3	163	26 ± 77	200
SPDW-30282	Water	11/4/2021	Ra-226	0.04	0.04 ± 0.03	2
SPDW-3768	Water	11/10/2021	H-3	162	31 ± 77	200
SPDW-3859	Water	11/18/2021	H-3	162	45 ± 78	200
SPDW-30289	Water	11/22/2021	Ra-226	0.03	0.19 ± 0.03	2
SPDW-3957	Water	12/3/2021	H-3	161	118 ± 84	200
SPW-3970	Water	12/7/2021	Sr-89	0.54	-0.12 ± 0.43	5
SPW-3970	Water	12/7/2021	Sr-90	0.54	0.08 ± 0.26	1
SPDW-30286	Water	12/9/2021	Ra-228	0.91	-0.26 ± 0.39	2
SPDW-30288	Water	12/10/2021	I-131	0.22	0.00 ± 0.12	1
SPDW-30306	Water	12/13/2021	Ra-226	0.05	-0.05 ± 0.04	2
SPDW-30294	Water	12/16/2021	H-3	162	-33 ± 73	200
SPDW-30300	Water	12/30/2021	H-3	166	68 ± 91	200

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

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

^c I-131(G); iodine-131 as analyzed by gamma spectroscopy.

^d Activity reported is a net activity result.

TABLE A-6. Intralaboratory "Duplicate" Samples

Lab Code ^b	Date	Analysis	Concentration ^a		Averaged Result	Acceptance
			First Result	Second Result		
S-20,21	1/5/2021	K-40	23.3 ± 0.6	22.6 ± 1.6	23.0 ± 0.9	Pass
XW-295,296	1/13/2021	H-3	245 ± 87	288 ± 89	267 ± 62	Pass
S-143,144	1/14/2021	K-40	7.47 ± 0.76	8.38 ± 0.22	7.93 ± 0.40	Pass
S-360,361	2/10/2021	K-40	9.23 ± 0.54	9.00 ± 0.68	9.12 ± 0.43	Pass
S-406,407	2/15/2021	K-40	2.92 ± 0.28	2.94 ± 0.94	2.93 ± 0.49	Pass
W-469,470	2/22/2021	Ra-226	0.75 ± 0.21	0.87 ± 0.22	0.81 ± 0.15	Pass
W-448,449	2/25/2021	Gr. Alpha	3.52 ± 1.84	3.72 ± 1.87	3.62 ± 1.31	Pass
W-448,449	2/25/2021	Gr. Beta	8.71 ± 1.36	8.91 ± 1.40	8.81 ± 0.98	Pass
W-448,449	2/25/2021	Ra-226	1.87 ± 0.25	1.82 ± 0.28	1.85 ± 0.19	Pass
W-448,449	2/25/2021	Ra-228	2.65 ± 1.26	2.53 ± 1.35	2.59 ± 0.92	Pass
P-511,512	3/2/2021	H-3	198 ± 85	202 ± 86	200 ± 60	Pass
WW-630,631	3/10/2021	H-3	144 ± 82	148 ± 82	146 ± 58	Pass
WW-743,744	3/16/2021	H-3	183 ± 85	167 ± 84	175 ± 60	Pass
S-785,786	3/25/2021	Pb-214	0.59 ± 0.08	0.34 ± 0.05	0.47 ± 0.05	Pass
S-785,786	3/25/2021	Ac-228	0.61 ± 0.12	0.58 ± 0.13	0.60 ± 0.09	Pass
AP-1052,1053	3/30/2021	Be-7	0.081 ± 0.010	0.075 ± 0.011	0.078 ± 0.007	Pass
AP-966,967	3/30/2021	Be-7	0.080 ± 0.010	0.085 ± 0.009	0.083 ± 0.007	Pass
SWU-835,836	3/30/2021	Gr. Beta	1.22 ± 0.56	1.27 ± 0.55	1.24 ± 0.39	Pass
AP-1204,1205	3/30/2021	Be-7	0.187 ± 0.102	0.160 ± 0.088	0.173 ± 0.067	Pass
AP-1029,1030	4/2/2021	Be-7	0.067 ± 0.012	0.079 ± 0.012	0.073 ± 0.009	Pass
SW-922,923	4/7/2021	H-3	440 ± 99	307 ± 93	373 ± 68	Pass
WW-987,988	4/12/2021	H-3	190 ± 87	284 ± 92	237 ± 63	Pass
F-1246,1247	4/22/2021	K-40	3.26 ± 0.66	2.83 ± 0.46	3.04 ± 0.40	Pass
SWT-1311,1312	4/27/2021	Gr. Beta	1.05 ± 0.52	1.16 ± 0.55	1.10 ± 0.38	Pass
WW-1401,1402	5/5/2021	Gr. Alpha	1.10 ± 1.00	2.50 ± 1.20	1.80 ± 0.78	Pass
WW-1401,1402	5/5/2021	K-40	126 ± 15	105 ± 30	115 ± 17	Pass
DW-30071.,30072	5/6/2021	Ra-226	0.98 ± 0.15	0.67 ± 0.13	0.83 ± 0.10	Pass
DW-30071.,30072	5/6/2021	Ra-228	0.83 ± 0.51	1.21 ± 0.54	1.02 ± 0.37	Pass
DW-30078,30079	5/10/2021	Gr. Alpha	4.90 ± 0.92	5.92 ± 0.99	5.41 ± 0.68	Pass
AP-051120A,B	5/11/2021	Gr. Beta	0.006 ± 0.002	0.005 ± 0.002	0.005 ± 0.002	Pass
DW-30083,30084	5/11/2021	Ra-226	0.34 ± 0.13	0.19 ± 0.20	0.27 ± 0.12	Pass
DW-30083,30084	5/11/2021	Ra-228	0.98 ± 0.60	0.15 ± 0.56	0.57 ± 0.41	Pass
S-1506,1507	5/18/2021	K-40	10.1 ± 0.8	14.9 ± 1.2	12.5 ± 0.7	Pass
DW-30092,30093	5/20/2021	Gr. Alpha	2.86 ± 0.85	2.40 ± 0.90	2.63 ± 0.62	Pass
DW-30095,30096	5/21/2021	Ra-226	1.18 ± 0.16	0.73 ± 0.15	0.96 ± 0.11	Pass
DW-30095,30096	5/21/2021	Ra-228	1.44 ± 0.63	0.61 ± 0.59	1.03 ± 0.43	Pass
AP-052521A,B	5/25/2021	Gr. Beta	0.021 ± 0.003	0.022 ± 0.003	0.021 ± 0.002	Pass
S-1589,1590	5/28/2021	Pb-214	1.16 ± 0.08	1.06 ± 0.09	1.11 ± 0.06	Pass
S-1589,1590	5/28/2021	Ac-228	1.17 ± 0.18	1.08 ± 0.14	1.13 ± 0.11	Pass

TABLE A-6. Intralaboratory "Duplicate" Samples

Lab Code ^b	Date	Analysis	Concentration ^a		Averaged Result	Acceptance
			First Result	Second Result		
AP-060121A,B	6/1/2021	Gr. Beta	0.015 ± 0.003	0.013 ± 0.003	0.014 ± 0.002	Pass
DW-30113,30114	6/1/2021	Ra-226	2.00 ± 0.34	2.64 ± 0.26	2.32 ± 0.21	Pass
DW-30113,30114	6/1/2021	Ra-228	2.50 ± 0.78	3.13 ± 0.82	2.82 ± 0.57	Pass
PS-1631,1632	6/2/2021	K-40	21.1 ± 0.8	20.4 ± 0.8	20.7 ± 0.6	Pass
DW-30119,30120	6/3/2021	Gr. Alpha	1.18 ± 0.75	0.66 ± 0.64	0.92 ± 0.49	Pass
WW-1908,1909	6/4/2021	H-3	150 ± 85	176 ± 87	163 ± 61	Pass
VE-1717,1718	6/7/2021	Be-7	0.50 ± 0.19	0.38 ± 0.14	0.44 ± 0.12	Pass
VE-1717,1718	6/7/2021	K-40	5.26 ± 0.47	5.45 ± 0.44	5.35 ± 0.32	Pass
AP-060821A,B	6/8/2021	Gr. Beta	0.030 ± 0.004	0.028 ± 0.004	0.029 ± 0.003	Pass
AP-1822,1823	6/10/2021	Be-7	0.23 ± 0.12	0.22 ± 0.12	0.22 ± 0.08	Pass
CF-1844,1845	6/14/2021	K-40	8.37 ± 0.44	8.33 ± 0.35	8.35 ± 0.28	Pass
AP-061521A,B	6/15/2021	Gr. Beta	0.020 ± 0.004	0.017 ± 0.003	0.019 ± 0.002	Pass
DW-30131,30132	6/17/2021	Ra-226	0.41 ± 0.21	0.34 ± 0.23	0.38 ± 0.16	Pass
DW-30131,30132	6/17/2021	Ra-228	0.42 ± 0.85	0.52 ± 0.74	0.47 ± 0.56	Pass
DW-30138,30139	6/17/2021	Gr. Alpha	1.59 ± 0.84	2.21 ± 0.95	1.90 ± 0.63	Pass
S-1929,1930	6/22/2021	K-40	19.4 ± 1.0	19.2 ± 1.1	19.3 ± 0.7	Pass
AP-062221A,B	6/22/2021	Gr. Beta	0.014 ± 0.003	0.012 ± 0.028	0.013 ± 0.014	Pass
DW-30150,30151	6/28/2021	Ra-226	0.53 ± 0.15	0.55 ± 0.19	0.54 ± 0.12	Pass
DW-30150,30151	6/28/2021	Ra-228	0.76 ± 0.54	0.52 ± 0.52	0.64 ± 0.37	Pass
AP-2160,2161	6/28/2021	Be-7	0.11 ± 0.01	0.11 ± 0.01	0.11 ± 0.01	Pass
DW-30150,30151	6/28/2021	Ra-226	0.53 ± 0.15	0.55 ± 0.19	0.54 ± 0.12	Pass
DW-30150,30151	6/28/2021	Ra-228	0.76 ± 0.54	0.52 ± 0.52	0.64 ± 0.37	Pass
AP-2218,2119	6/29/2021	Be-7	0.11 ± 0.01	0.12 ± 0.01	0.11 ± 0.01	Pass
AP-2235,2236	6/30/2021	Be-7	0.10 ± 0.01	0.11 ± 0.01	0.10 ± 0.01	Pass
CF-2139,2140	7/12/2021	Be-7	0.49 ± 0.12	0.65 ± 0.20	0.57 ± 0.12	Pass
CF-2139,2140	7/12/2021	K-40	8.25 ± 0.41	7.94 ± 0.46	8.10 ± 0.31	Pass
VE-2214,2215	7/12/2021	K-40	3.26 ± 0.11	3.41 ± 0.25	3.34 ± 0.14	Pass
DW-30169,30170	7/12/2021	Gr. Alpha	2.61 ± 0.87	2.09 ± 0.84	2.35 ± 0.60	Pass
DW-30169,30170	7/12/2021	Gr. Beta	2.09 ± 0.67	2.52 ± 0.60	2.31 ± 0.45	Pass
DW-30169,30170	7/12/2021	Ra-226	0.84 ± 0.24	0.82 ± 0.20	0.83 ± 0.16	Pass
DW-30169,30170	7/12/2021	Ra-228	0.80 ± 0.54	0.84 ± 0.50	0.82 ± 0.37	Pass
AP-71320,71321	7/13/2021	Gr. Beta	0.015 ± 0.003	0.010 ± 0.003	0.013 ± 0.002	Pass
XW-2424,2425	7/16/2021	H-3	193 ± 86	104 ± 81	149 ± 59	Pass
DW-30183,30184	7/19/2021	Ra-226	1.37 ± 0.18	1.21 ± 0.27	1.29 ± 0.16	Pass
DW-30183,30185	7/19/2021	Ra-228	1.51 ± 0.69	1.52 ± 0.68	1.52 ± 0.48	Pass
AP-71920,71921	7/19/2021	Gr. Beta	0.021 ± 0.004	0.020 ± 0.003	0.021 ± 0.002	Pass
S-2277,2278	7/20/2021	K-40	13.6 ± 0.9	12.3 ± 0.9	12.9 ± 0.6	Pass
DW-30191,30192	7/20/2021	Gr. Alpha	3.88 ± 0.94	3.66 ± 94.00	3.77 ± 47.00	Pass
SG-2382,2383	7/23/2021	Pb-214	1.88 ± 0.21	1.94 ± 0.21	1.91 ± 0.15	Pass
SG-2382,2383	7/23/2021	Ac-228	1.69 ± 0.28	1.96 ± 0.33	1.83 ± 0.22	Pass
DW-30207,30208	7/26/2021	Gr. Alpha	5.47 ± 1.29	5.20 ± 1.24	5.34 ± 0.89	Pass
DW-30207,30208	7/26/2021	Gr. Beta	5.89 ± 0.77	6.11 ± 0.73	6.00 ± 0.53	Pass

TABLE A-6. Intralaboratory "Duplicate" Samples

Lab Code ^b	Date	Analysis	Concentration ^a		Averaged Result	Acceptance
			First Result	Second Result		
DW-30210,30211	7/28/2021	Ra-226	0.48 ± 0.13	0.62 ± 0.11	0.55 ± 0.09	Pass
DW-30210,30211	7/28/2021	Ra-228	0.45 ± 0.53	0.73 ± 0.65	0.59 ± 0.42	Pass
S-2509,2510	8/1/2021	K-40	14.2 ± 0.5	13.7 ± 1.0	14.0 ± 0.6	Pass
S-2509,2510	8/1/2021	Be-7	7.27 ± 0.29	7.97 ± 0.69	7.62 ± 0.37	Pass
DW-30221,30222	8/6/2021	Gr. Alpha	2.19 ± 1.55	2.08 ± 1.54	2.14 ± 1.09	Pass
DW-30221,30222	8/6/2021	Gr. Beta	1.19 ± 1.04	2.76 ± 1.08	1.98 ± 0.75	Pass
DW-30221,30222	8/6/2021	Ra-226	2.00 ± 0.22	1.58 ± 0.26	1.79 ± 0.17	Pass
DW-30221,30222	8/6/2021	Ra-228	1.69 ± 0.56	1.75 ± 0.54	1.72 ± 0.39	Pass
VE-2551,2552	8/11/2021	K-40	2.68 ± 0.20	2.61 ± 0.27	2.64 ± 0.17	Pass
VE-2551,2552	8/11/2021	Be-7	0.16 ± 0.08	0.18 ± 0.08	0.17 ± 0.05	Pass
AP-2578,2579	8/12/2021	Be-7	0.18 ± 0.09	0.20 ± 0.11	0.19 ± 0.07	Pass
AP-082421A,B	8/24/2021	Gr. Beta	0.032 ± 0.004	0.028 ± 0.004	0.030 ± 0.003	Pass
AP-083121A,B	8/24/2021	Gr. Beta	0.027 ± 0.004	0.029 ± 0.004	0.028 ± 0.003	Pass
VE-2684,2685	8/25/2021	K-40	2.15 ± 0.26	1.92 ± 0.27	2.03 ± 0.19	Pass
VE-2684,2685	8/25/2021	Be-7	0.20 ± 0.10	0.26 ± 0.11	0.23 ± 0.07	Pass
VE-2728,2729	8/25/2021	K-40	2.34 ± 0.41	2.27 ± 0.40	2.31 ± 0.29	Pass
DW-30238,30239	8/25/2021	Gr. Alpha	3.94 ± 0.91	2.43 ± 0.86	3.185 ± 0.63	Pass
DW-30238,30239	8/25/2021	Ra-226	2.57 ± 0.24	1.83 ± 0.24	2.20 ± 0.17	Pass
DW-30238,30239	8/25/2021	Ra-228	2.86 ± 0.83	2.52 ± 0.66	2.69 ± 0.53	Pass
SW-2641,2642	8/31/2021	H-3	289 ± 92	310 ± 93	300 ± 65	Pass
VE-2858,2859	9/2/2021	K-40	8.36 ± 0.41	8.02 ± 0.47	8.19 ± 0.31	Pass
SG-2934,2935	9/13/2021	Pb-214	2.72 ± 0.22	2.54 ± 0.27	2.63 ± 0.17	Pass
SG-2934,2935	9/13/2021	Ac-228	3.16 ± 0.39	3.22 ± 0.58	3.19 ± 0.35	Pass
DW-30249,30250	9/17/2021	Ra-226	0.70 ± 0.18	1.00 ± 0.17	0.85 ± 0.12	Pass
S-3042,3043	9/22/2021	K-40	7.55 ± 0.80	7.57 ± 0.81	7.56 ± 0.57	Pass
DW-30249,30250	9/17/2021	Ra-226	0.70 ± 0.18	1.00 ± 0.17	0.85 ± 0.12	Pass
S-3042,3043	9/22/2021	K-40	7.55 ± 0.80	7.57 ± 0.81	7.56 ± 0.57	Pass
DW-30256,30257	10/8/2021	Gr. Alpha	2.35 ± 0.79	2.71 ± 0.92	2.53 ± 0.61	Pass
S-3279,3280	10/11/2021	K-40	10.08 ± 0.58	9.18 ± 0.53	9.63 ± 0.39	Pass
DW-30262,30263	10/14/2021	Ra-226	1.49 ± 0.30	1.51 ± 0.17	1.50 ± 0.17	Pass
DW-30262,30263	10/14/2021	Ra-228	1.16 ± 0.79	2.08 ± 0.82	1.62 ± 0.57	Pass
AP-102521A,B	10/25/2021	Gr. Beta	0.026 ± 0.005	0.030 ± 0.010	0.028 ± 0.010	Pass
XWW-3707,3708	10/27/2021	H-3	206 ± 87	268 ± 90	237 ± 63	Pass
AP-110121A,B	11/1/2021	Gr. Beta	0.017 ± 0.004	0.016 ± 0.00	0.016 ± 0.003	Pass
DW-30277,30278	11/5/2021	Gr. Alpha	10.11 ± 1.19	9.72 ± 1.11	9.92 ± 0.81	Pass
DW-30277,30278	11/5/2021	Gr. Beta	5.53 ± 0.72	4.22 ± 0.69	4.88 ± 0.50	Pass
DW-30277,30278	11/5/2021	Ra-226	6.27 ± 0.32	6.34 ± 0.37	6.31 ± 0.25	Pass
DW-30277,30278	11/5/2021	Ra-228	3.10 ± 0.86	3.76 ± 0.90	3.43 ± 0.62	Pass
AP-111521A,B	11/15/2021	Gr. Beta	0.022 ± 0.004	0.026 ± 0.005	0.024 ± 0.003	Pass
AP-112221A,B	11/22/2021	Gr. Beta	0.023 ± 0.004	0.025 ± 0.005	0.024 ± 0.003	Pass
AP-112921A,B	11/29/2021	Gr. Beta	0.038 ± 0.005	0.035 ± 0.005	0.037 ± 0.004	Pass

TABLE A-6. Intralaboratory "Duplicate" Samples

Lab Code ^b	Date	Analysis	Concentration ^a		Averaged Result	Acceptance
			First Result	Second Result		
DW-30297,8	12/15/2021	Ra-226	1.71 ± 0.15	1.21 ± 0.13	1.46 ± 0.10	Pass
DW-30297,8	12/15/2021	Ra-228	2.44 ± 0.98	1.96 ± 0.97	2.20 ± 0.69	Pass
S-4182,4183	12/19/2021	Pb-214	1.19 ± 0.06	1.07 ± 0.08	1.13 ± 0.05	Pass
S-4182,4183	12/19/2021	Ac-228	1.08 ± 0.11	1.15 ± 0.14	1.12 ± 0.09	Pass
S-4182,4183	12/19/2021	K-40	1.75 ± 0.74	1.80 ± 0.84	1.78 ± 0.56	Pass
AP-122721A,B	12/27/2021	Gr. Beta	0.063 ± 0.006	0.060 ± 0.006	0.062 ± 0.004	Pass
AP-4350,4351	12/28/2021	Be-7	0.06 ± 0.02	0.06 ± 0.02	0.06 ± 0.01	Pass
AP-4845,4846	12/31/2021	Be-7	0.07 ± 0.01	0.06 ± 0.02	0.06 ± 0.01	Pass

Note: Duplicate analyses are performed on every twentieth sample received. 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).

^b AP (Air Particulate), AV (Aquatic Vegetation), BS (Bottom Sediment), CF (Cattle Feed), CH (Charcoal Canister), DW (Drinking Water), E (Egg), F (Fish), G (Grass), LW (Lake Water), MI (Milk), P (Precipitation), PM (Powdered Milk), S (Solid), SG (Sludge), SO (Soil), SS (Shoreline Sediment), SW (Surface Water), SWT (Surface Water Treated), SWU (Surface Water Untreated), VE (Vegetation), W (Water), WW (Well Water).

TABLE A-7. Department of Energy's Mixed Analyte Performance Evaluation Program (MAPEP).

Lab Code ^b	Reference Date	Analysis	Laboratory result	Concentration ^a		Acceptance
				Known Activity	Control Limits ^c	
MAAP-594	2/1/2021	Gross Alpha	1.30 ± 0.08	1.77	0.53 - 3.01	Pass
MAAP-594	2/1/2021	Gross Beta	0.81 ± 0.04	0.649	0.325 - 0.974	Pass
MADW-571	2/1/2021	Gross Alpha	0.73 ± 0.06	0.87	0.26 - 1.48	Pass
MADW-572	2/1/2021	Gross Beta	2.38 ± 0.06	2.50	1.25 - 3.75	Pass
MASO-591	2/1/2021	Cs-134	-2.57 ± 2.21	0	NA ^c	Pass
MASO-591	2/1/2021	Cs-137	1700 ± 20	1550	1085 - 2015	Pass
MASO-591	2/1/2021	Co-57	977 ± 7	920	644 - 1196	Pass
MASO-591	2/1/2021	Co-60	1360 ± 10	1370	959 - 1781	Pass
MASO-591	2/1/2021	Mn-54	0.91 ± 2.85	0	NA ^c	Pass
MASO-591	2/1/2021	Zn-65	687 - 17	604	423 - 785	Pass
MASO-591	2/1/2021	K-40	682 ± 53	618	433 - 803	Pass
MAW-569	2/1/2021	Cs-134	10.5 ± 0.3	11.5	8.1 - 15.0	Pass
MAW-569	2/1/2021	Cs-137	8.53 ± 0.32	7.9	5.5 - 10.3	Pass
MAW-569	2/1/2021	Co-57	12.2 ± 0.3	11.4	8.0 - 14.8	Pass
MAW-569	2/1/2021	Co-60	0.03 ± 0.05	0	NA ^c	Pass
MAW-569	2/1/2021	Mn-54	16.5 ± 0.4	15.5	10.9 - 20.2	Pass
MAW-569	2/1/2021	Zn-65	11.5 ± 0.5	10.5	7.40 - 13.7	Pass
MAW-569	2/1/2021	K-40	9.93 ± 1.42	0	NA ^c	Fail ^d
MAAP-592	2/1/2021	Cs-134	1.54 ± 0.06	2.14	1.50 - 2.78	Pass
MAAP-592	2/1/2021	Cs-137	-0.011 ± 0.020	0	NA ^c	Pass
MAAP-592	2/1/2021	Co-57	0.636 ± 0.042	0.69	0.480 - 0.892	Pass
MAAP-592	2/1/2021	Co-60	-0.64 ± 0.02	0	NA ^c	Fail ^e
MAAP-592	2/1/2021	Mn-54	0.312 ± 0.058	0.312	0.218 - 0.406	Pass
MAAP-592	2/1/2021	Zn-65	0.41 ± 0.07	0.352	0.246 - 0.458	Pass
MAVE-588	2/1/2021	Cs-134	3.73 ± 0.09	3.60	2.50 - 4.70	Pass
MAVE-588	2/1/2021	Cs-137	5.69 ± 0.10	4.69	3.28 - 6.10	Pass
MAVE-588	2/1/2021	Co-57	6.23 ± 0.07	5.05	3.54 - 6.57	Pass
MAVE-588	2/1/2021	Co-60	3.29 ± 0.06	2.99	2.09 - 3.89	Pass
MAVE-588	2/1/2021	Mn-54	6.17 ± 0.16	5.25	3.68 - 6.83	Pass
MAVE-588	2/1/2021	Zn-65	-0.04 ± 0.08	0	NA ^c	Pass
MAAP-3007	8/1/2021	Gross Alpha	0.45 ± 0.04	0.960	0.288 - 1.632	Pass
MAAP-3007	8/1/2021	Gross Beta	0.71 ± 0.04	0.553	0.277 - 0.830	Pass
MADW-2688	8/1/2021	Gross Alpha	0.19 ± 0.03	0.232	0.070 - 0.394	Pass
MADW-2688	8/1/2021	Gross Beta	2.60 ± 0.06	2.807	1.404 - 4.211	Pass

TABLE A-7. Department of Energy's Mixed Analyte Performance Evaluation Program (MAPEP).

Lab Code ^b	Reference Date	Analysis	Laboratory result	Concentration ^a		Acceptance
				Known Activity	Control Limits ^c	
MASO-3004	8/1/2021	Cs-134	1035 ± 10	1170	819 - 1521	Pass
MASO-3004	8/1/2021	Cs-137	628 ± 11	572	400 - 744	Pass
MASO-3004	8/1/2021	Co-57	-0.11 ± 1.26	0	NA ^c	Pass
MASO-3004	8/1/2021	Co-60	720 ± 7	722	714 - 1326	Pass
MASO-3004	8/1/2021	Mn-54	456 ± 11	410	287 - 533	Pass
MASO-3004	8/1/2021	Zn-65	1002 ± 22	907	635 - 1179	Pass
MASO-3004	8/1/2021	K-40	663 ± 50	607	425 - 789	Pass
MADW-3003	8/1/2021	Ra-226	0.32 ± 0.06	0.226	0.158 ± 0.294	Fail ^f
MADW-3003	8/1/2021	Sr-90	3.63 ± 0.16	3.9	2.70 - 5.02	Pass
MADW-3003	8/1/2021	U-234	0.02 - 0.01	0.02	NA ^g	Pass
MADW-3003	8/1/2021	U-238	0.02 - 0.01	0.01	NA ^g	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), MADW (water), MAAP (air filter), MASO (soil) and 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 The sample spectrum was reanalyzed utilizing the minimum data point background width method. The result was 1.59 ± 1.77 Bq/L which satisfies MAPEP criteria for a false positive test.

^e A decimal was misplaced in one of two cobalt-60 results while calculating a mean result causing MAPEP to fail the result as a statistically significant negative value at 3 standard deviations. The correct mean result (-0.0004 ± 0.0186) is not a statistically significant negative value and would not have failed.

^f Radium result did not meet MAPEP acceptance criteria.

^g Provided in the series for "sensitivity evaluation". MAPEP does not provide control limits.

TABLE A-8. Interlaboratory Comparison Crosscheck Program, Environmental Resource Associates (ERA)^a.

MRAD-30 Study						
Lab Code ^b	Concentration ^a					
	Date	Analysis	Laboratory Result	ERA Value ^c	Control Limits ^d	Acceptance
ERAP-722	3/22/2021	Cs-134	898	1030	668 - 1260	Pass
ERAP-722	3/22/2021	Cs-137	181	163	134 - 214	Pass
ERAP-722	3/22/2021	Co-60	1270	1220	1040 - 1550	Pass
ERAP-722	3/22/2021	Mn-54	< 4.3	< 50.0	0.00 - 50.0	Pass
ERAP-722	3/22/2021	Zn-65	908	771	632 - 1180	Pass
ERAP-722	3/22/2021	Sr-90	184	189	120 - 257	Pass
ERAP-724	3/22/2021	Gross Alpha	88.4	96.1	50.2 - 158	Pass
ERAP-724	3/22/2021	Gross Beta	74.1	62.6	38.0 - 94.6	Pass

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

^b Laboratory code ERAP (air filter). Results are reported in units of (pCi/Filter).

^c The ERA Assigned values for the air filter standards are equal to 100% of the parameter present in the standard as determined by the gravimetric and/or volumetric measurements made during standard preparation as applicable.

^d The acceptance limits are established per the guidelines contained in the Department of Energy (DOE) report EML-564, Analysis of Environmental Measurements Laboratory (EML) Quality Assessment Program (QAP) Data Determination of Operational Criteria and Control Limits for Performance Evaluation Purposes or ERA's SOP for the generation of Performance Acceptance Limits.



Appendix B

Data Reporting Conventions

APPENDIX B. DATA REPORTING CONVENTIONS

Data Reporting Conventions

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

2.0. Single Measurements

Each single measurement is reported as follows: $x \pm s$
where: x = value of the measurement;
 $s = 2\sigma$ counting uncertainty (corresponding to the 95% confidence level).

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

3.0. Duplicate analyses

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

- 3.1 Individual results: For two analysis results; $x_1 \pm s_1$ and $x_2 \pm s_2$
Reported result: $x \pm s$; where $x = (1/2)(x_1 + x_2)$ and $s = (1/2)\sqrt{s_1^2 + s_2^2}$
- 3.2. Individual results: $< L_1, < L_2$ Reported result: $< L$, where L = lower of L_1 and L_2
- 3.3. Individual results: $x \pm s, < L$ Reported result: $x \pm s$ if $x \geq L$; $< L$ otherwise.

4.0. Computation of Averages and Standard Deviations

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

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

- 4.2 Values below the highest lower limit of detection are not included in the average.
- 4.3 If all values in the averaging group are less than the highest LLD, the highest LLD is reported.
- 4.4 If all but one of the values are less than the highest LLD, the single value x and associated two sigma error is reported.
- 4.5 In rounding off, the following rules are followed:
- 4.5.1. If the number following those to be retained is less than 5, the number is dropped, and the retained numbers are kept unchanged. As an example, 11.443 is rounded off to 11.44.
- 4.5.2. If the number following those to be retained is equal to or greater than 5, the number is dropped and the last retained number is raised by 1. As an example, 11.445 is rounded off 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 2021.

2.0. Unusual or Important Events

No unusual or important events reportable under the EPP Section 4.1 were identified during 2021.

3.0. EPP Non-compliances

During 2021, there was zero non-compliance with the EPP.

4.0. Nonroutine Reports

There were no nonroutine report submitted in accordance with the EPP, Section 5.4.2 in 2021.

5.0. Plant Design and Operation Environmental Evaluations.

This section lists all changes in the plant design, operation, tests or experiments installed during 2021, which could have involved a potentially significant unreviewed environmental question in accordance with section 3.1 of Appendix B.

During 2021, no major plant changes were completed that could have involved a potentially significant unreviewed environmental question.

APPENDIX D

Sampling Location Maps

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

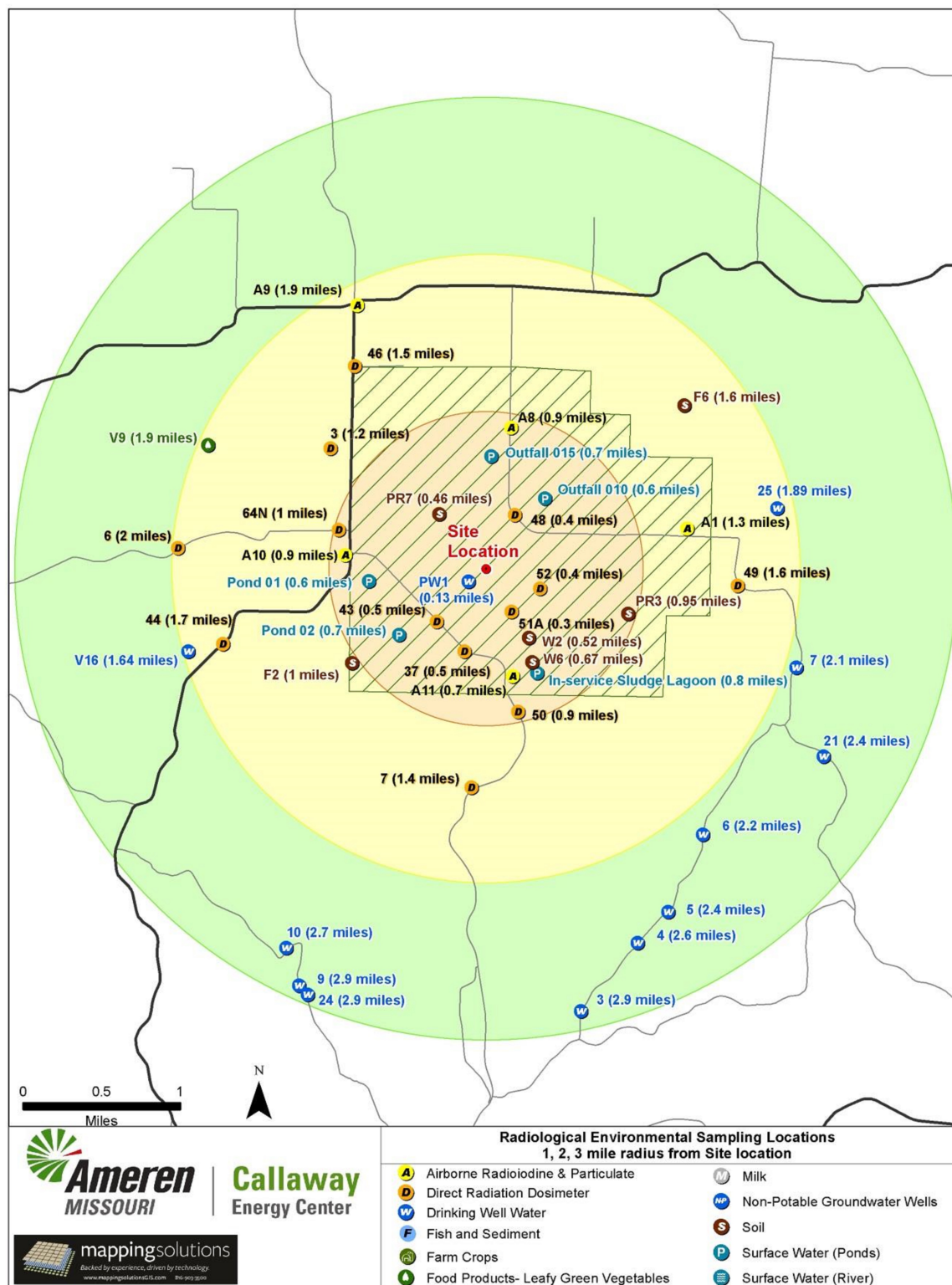


Figure D-2. Radiological Environmental Sampling Locations 3, 4, 5, 6 mile radius from site location.

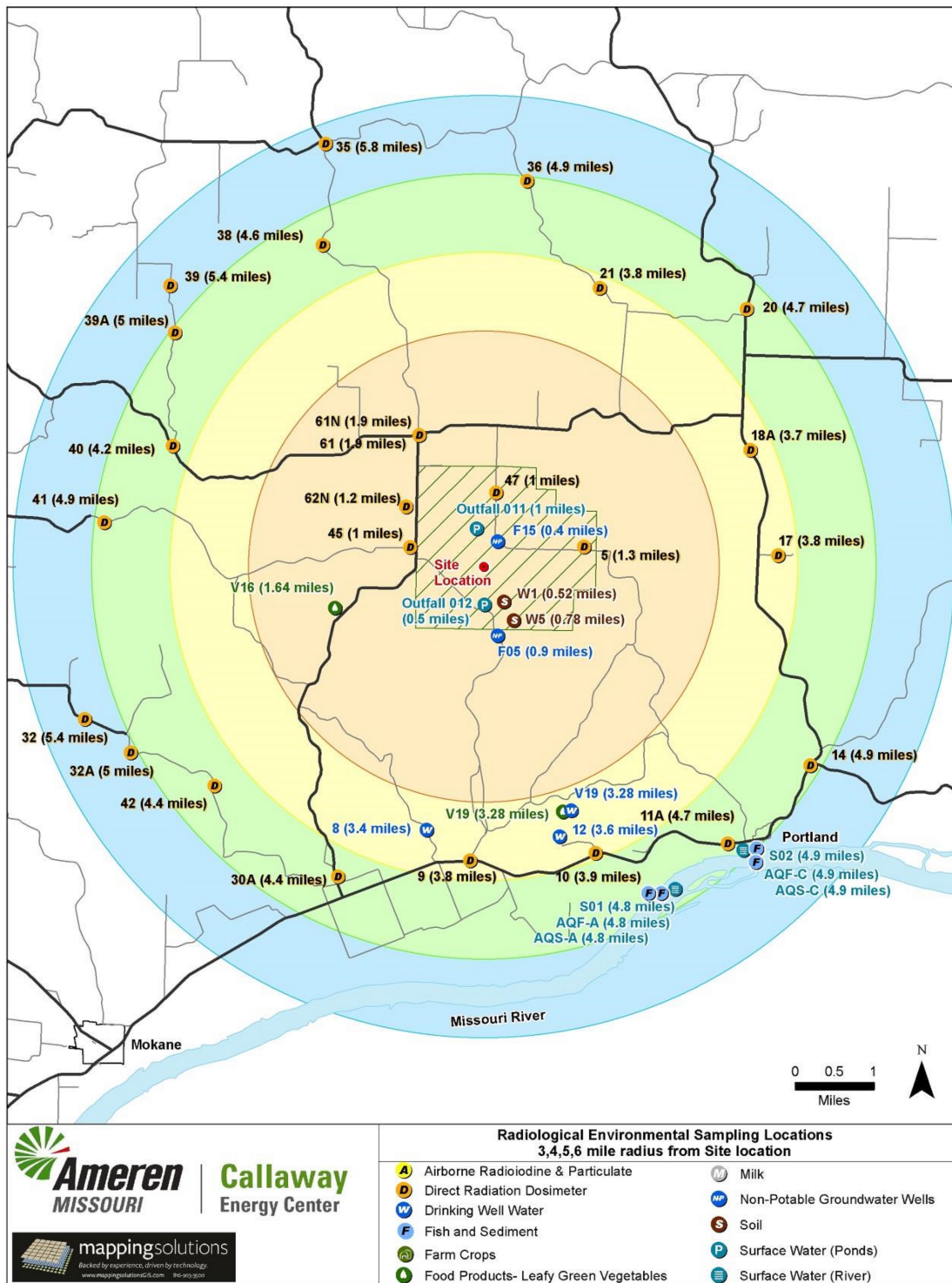


Figure D-3. Radiological Environmental Sampling Locations 5, 10, 15 mile radius from site location.



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

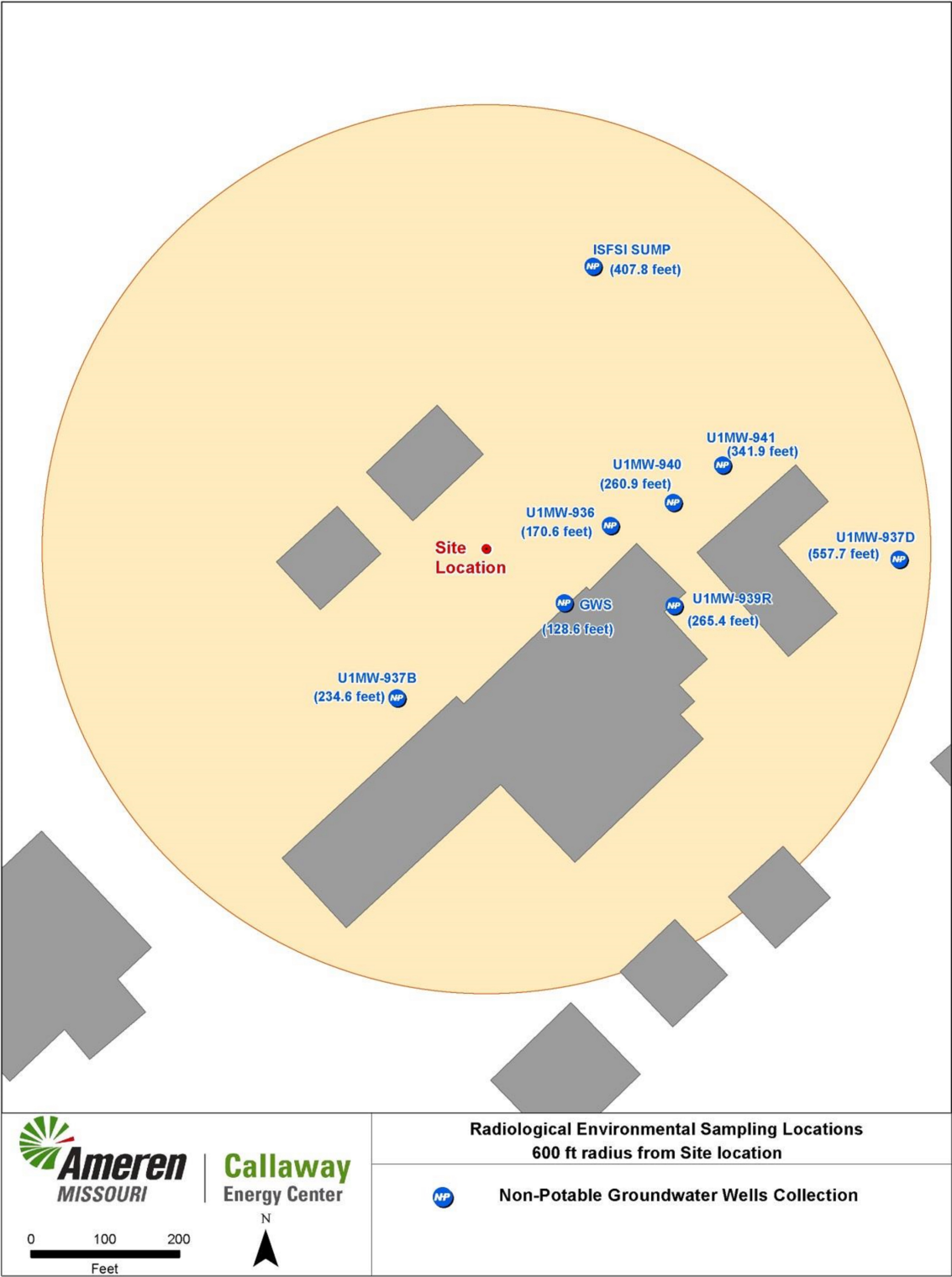
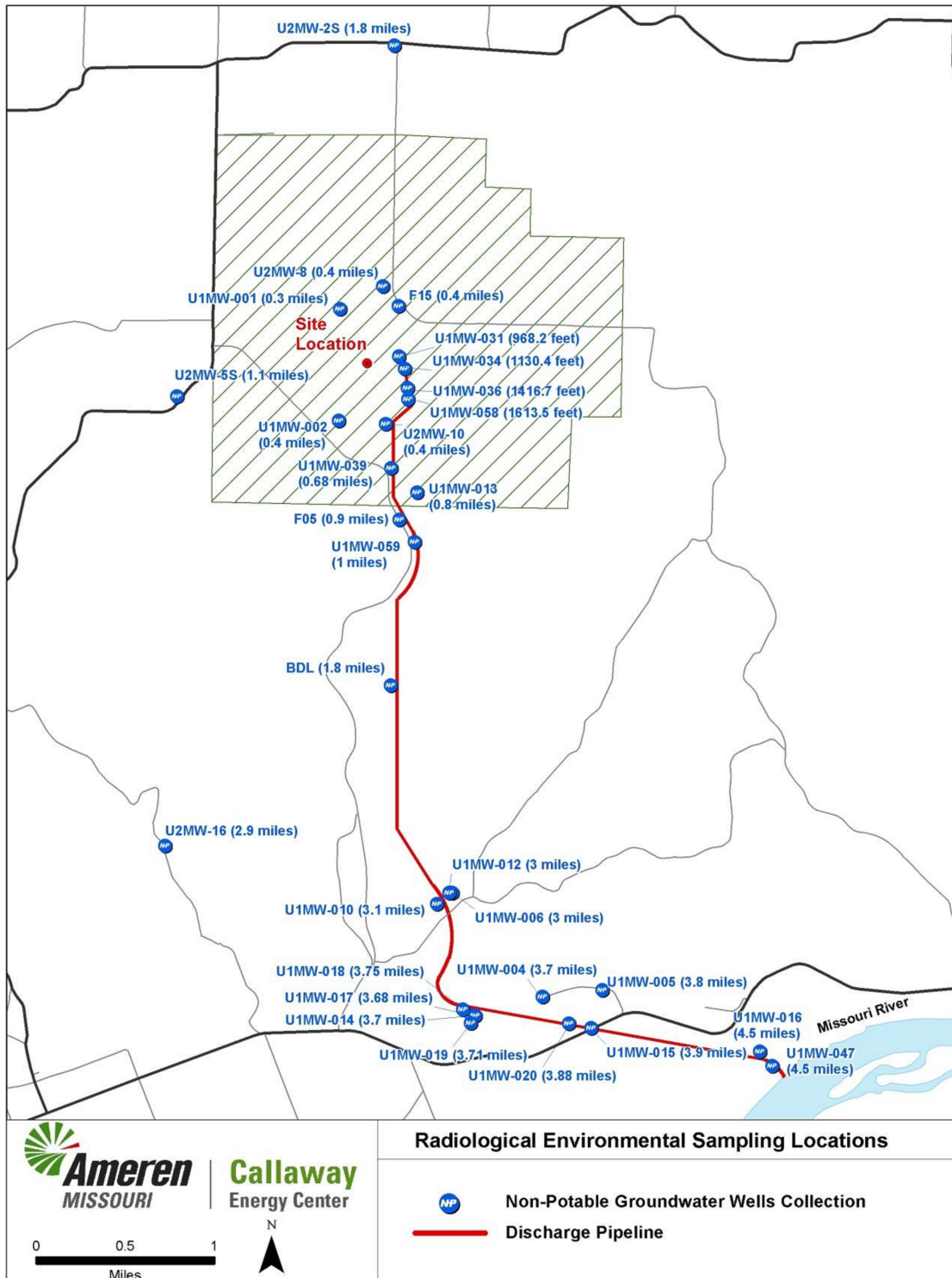


Figure D-5. Non-Potable Groundwater Monitoring Wells Collection.



AMEREN MISSOURI,
CALLAWAY ENERGY CENTER
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, 2021

Prepared by

ENVIRONMENTAL, Inc.
Midwest Laboratory

Submitted by

Union Electric Co.
dba Ameren Missouri

Project No. 8036

Approved :



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1.0 INTRODUCTION

The following constitutes a supplement to the Annual Report for the Radiological Environmental Monitoring Program conducted at the Ameren Missouri, Callaway Energy Center, Fulton, Missouri in 2021. 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 the figures in Appendix D.

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/m³

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.								
01-07-21	327	< 0.09	< 0.004	< 0.008	< 0.017	< 0.010	< 0.011	< 0.014	< 0.050
01-14-21	289	0.17 ± 0.10	< 0.009	< 0.009	< 0.014	< 0.011	< 0.012	< 0.022	< 0.048
01-21-21	283	< 0.12	< 0.007	< 0.009	< 0.013	< 0.012	< 0.007	< 0.017	< 0.029
01-28-21	288	< 0.13	< 0.009	< 0.009	< 0.028	< 0.009	< 0.007	< 0.016	< 0.038
02-04-21	286	< 0.15	< 0.007	< 0.014	< 0.021	< 0.012	< 0.012	< 0.019	< 0.043
02-11-21	289	< 0.12	< 0.013	< 0.016	< 0.015	< 0.014	< 0.007	< 0.036	< 0.068
02-18-21	295	< 0.07	< 0.007	< 0.009	< 0.015	< 0.009	< 0.008	< 0.008	< 0.046
02-25-21	284	0.22 ± 0.13	< 0.008	< 0.009	< 0.018	< 0.011	< 0.011	< 0.012	< 0.053
03-04-21	284	0.18 ± 0.10	< 0.012	< 0.008	< 0.014	< 0.011	< 0.008	< 0.012	< 0.029
03-11-21		NS ^b							
03-18-21	273	< 0.15	< 0.016	< 0.014	< 0.021	< 0.016	< 0.011	< 0.016	< 0.065
03-25-21	263	0.28 ± 0.11	< 0.009	< 0.010	< 0.016	< 0.009	< 0.006	< 0.008	< 0.047 ^c
04-01-21	271	< 0.08	< 0.009	< 0.013	< 0.015	< 0.010	< 0.010	< 0.012	< 0.051
04-08-21	278	0.29 ± 0.12	< 0.012	< 0.013	< 0.012	< 0.014	< 0.011	< 0.013	< 0.055
04-15-21	274	< 0.13	< 0.012	< 0.007	< 0.020	< 0.013	< 0.013	< 0.020	< 0.060
04-22-21	282	< 0.11	< 0.008	< 0.008	< 0.018	< 0.012	< 0.006	< 0.024	< 0.057
04-29-21	270	< 0.14	< 0.006	< 0.008	< 0.013	< 0.010	< 0.006	< 0.021	< 0.051
05-06-21	269	0.25 ± 0.11	< 0.010	< 0.005	< 0.014	< 0.009	< 0.009	< 0.018	< 0.047
05-13-21	277	< 0.11	< 0.006	< 0.009	< 0.020	< 0.010	< 0.006	< 0.015	< 0.046
05-20-21	272	< 0.13	< 0.012	< 0.007	< 0.015	< 0.012	< 0.007	< 0.016	< 0.056
05-27-21	267	0.21 ± 0.11	< 0.011	< 0.005	< 0.014	< 0.011	< 0.011	< 0.021	< 0.038
06-03-21	272	0.23 ± 0.12	< 0.012	< 0.011	< 0.021	< 0.009	< 0.006	< 0.013	< 0.049
06-10-21	266	< 0.12	< 0.008	< 0.006	< 0.014	< 0.010	< 0.005	< 0.016	< 0.038
06-17-21	267	< 0.12	< 0.007	< 0.007	< 0.019	< 0.010	< 0.007	< 0.017	< 0.056
06-24-21	260	0.34 ± 0.11	< 0.010	< 0.005	< 0.013	< 0.009	< 0.008	< 0.014	< 0.042
07-01-21	266	< 0.11	< 0.008	< 0.005	< 0.015	< 0.011	< 0.013	< 0.017	< 0.050
07-08-21	263	0.30 ± 0.13	< 0.013	< 0.008	< 0.022	< 0.013	< 0.007	< 0.032	< 0.051
07-15-21	265	< 0.11	< 0.008	< 0.006	< 0.019	< 0.011	< 0.009	< 0.019	< 0.053
07-22-21	264	0.20 ± 0.12	< 0.009	< 0.008	< 0.016	< 0.009	< 0.008	< 0.019	< 0.041
07-29-21	263	0.24 ± 0.12	< 0.007	< 0.005	< 0.016	< 0.009	< 0.006	< 0.018	< 0.029
08-05-21	261	< 0.10	< 0.008	< 0.005	< 0.014	< 0.007	< 0.009	< 0.015	< 0.038
08-12-21	256	0.17 ± 0.09	< 0.009	< 0.010	< 0.014	< 0.011	< 0.010	< 0.012	< 0.052
08-19-21	266	0.18 ± 0.10	< 0.011	< 0.005	< 0.022	< 0.010	< 0.006	< 0.009	< 0.050
08-26-21	262	< 0.10	< 0.007	< 0.005	< 0.020	< 0.011	< 0.008	< 0.014	< 0.048
09-02-21	262	< 0.10	< 0.010	< 0.006	< 0.016	< 0.009	< 0.006	< 0.013	< 0.049
09-09-21	265	< 0.11	< 0.010	< 0.009	< 0.018	< 0.010	< 0.005	< 0.014	< 0.058
09-16-21	264	< 0.13	< 0.011	< 0.008	< 0.017	< 0.011	< 0.006	< 0.014	< 0.059
09-23-21	264	< 0.12	< 0.006	< 0.006	< 0.013	< 0.009	< 0.006	< 0.012	< 0.052
09-30-21	264	< 0.10	< 0.007	< 0.007	< 0.017	< 0.009	< 0.009	< 0.014	< 0.032
10-07-21	270	< 0.11	< 0.009	< 0.010	< 0.014	< 0.010	< 0.009	< 0.015	< 0.063
10-14-21	265	< 0.14	< 0.013	< 0.008	< 0.020	< 0.010	< 0.009	< 0.041	< 0.050

^a Iodine-131 concentrations are < 0.07 pCi/m³ unless noted otherwise.

^b "NS" = No sample; see Part I Table 5.5, Listing of Missed Samples. (CR#202101465).

^c Lower volume due to pump problems. Charcoal LLD < 0.027 pCi/m³. (CR#202101781).

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

Collection: Continuous, weekly exchange.
Units: pCi/m³

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.								
10-20-21	228	< 0.15	< 0.010	< 0.008	< 0.026	< 0.010	< 0.009	< 0.028	< 0.072
10-28-21	307	< 0.12	< 0.007	< 0.006	< 0.014	< 0.009	< 0.009	< 0.020	< 0.048
11-04-21	272	< 0.12	< 0.011	< 0.008	< 0.019	< 0.009	< 0.008	< 0.019	< 0.048
11-10-21	235	< 0.15	< 0.013	< 0.009	< 0.024	< 0.011	< 0.009	< 0.026	< 0.051
11-17-21	273	< 0.17	< 0.007	< 0.006	< 0.018	< 0.011	< 0.007	< 0.031	< 0.051
11-24-21	272	< 0.13	< 0.007	< 0.007	< 0.022	< 0.011	< 0.009	< 0.020	< 0.032
12-02-21	312	< 0.12	< 0.009	< 0.005	< 0.015	< 0.008	< 0.007	< 0.022	< 0.044
12-09-21	270	< 0.12	< 0.010	< 0.006	< 0.015	< 0.009	< 0.008	< 0.036	< 0.044
12-15-21	231	< 0.17	< 0.015	< 0.006	< 0.035	< 0.010	< 0.014	< 0.118	< 0.061
12-22-21	269	< 0.15	< 0.007	< 0.006	< 0.027	< 0.009	< 0.009	< 0.069	< 0.056
12-29-21	269	0.26 ± 0.15	< 0.011	< 0.010	< 0.025	< 0.009	< 0.008	< 0.058	< 0.055

^a Iodine-131 concentrations are < 0.07 pCi/m³ 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/m³

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.								
01-07-21	294	< 0.09	< 0.007	< 0.010	< 0.015	< 0.010	< 0.006	< 0.008	< 0.038
01-14-21	258	< 0.14	< 0.009	< 0.015	< 0.032	< 0.018	< 0.008	< 0.030	< 0.056
01-21-21	253	< 0.12	< 0.014	< 0.015	< 0.025	< 0.014	< 0.010	< 0.029	< 0.058
01-28-21	257	< 0.11	< 0.013	< 0.007	< 0.025	< 0.010	< 0.013	< 0.013	< 0.047
02-04-21	273	< 0.12	< 0.010	< 0.013	< 0.022	< 0.012	< 0.007	< 0.018	< 0.057
02-11-21	268	< 0.11	< 0.009	< 0.012	< 0.016	< 0.010	< 0.011	< 0.012	< 0.050
02-18-21	257	0.16 ± 0.08	< 0.004	< 0.006	< 0.012	< 0.010	< 0.007	< 0.008	< 0.045
02-25-21	241	< 0.12	< 0.006	< 0.008	< 0.021	< 0.014	< 0.011	< 0.008	< 0.045
03-04-21	237	< 0.10	< 0.009	< 0.009	< 0.023	< 0.013	< 0.011	< 0.009	< 0.049
03-11-21	233	< 0.12	< 0.006	< 0.013	< 0.016	< 0.012	< 0.008	< 0.006	< 0.059
03-18-21	274	< 0.11	< 0.008	< 0.008	< 0.014	< 0.011	< 0.010	< 0.012	< 0.039
03-25-21	271	< 0.17	< 0.014	< 0.016	< 0.021	< 0.018	< 0.016	< 0.011	< 0.079
04-01-21	272	< 0.12	< 0.007	< 0.010	< 0.013	< 0.011	< 0.007	< 0.005	< 0.043
04-08-21	280	< 0.11	< 0.008	< 0.007	< 0.010	< 0.009	< 0.007	< 0.015	< 0.054
04-15-21	273	< 0.14	< 0.009	< 0.011	< 0.025	< 0.013	< 0.011	< 0.023	< 0.057
04-22-21	285	0.16 ± 0.09	< 0.008	< 0.006	< 0.018	< 0.008	< 0.009	< 0.023	< 0.049
04-29-21	272	0.19 ± 0.09	< 0.009	< 0.005	< 0.017	< 0.010	< 0.009	< 0.022	< 0.054
05-06-21	269	0.14 ± 0.04	< 0.004	< 0.003	< 0.008	< 0.004	< 0.004	< 0.007	< 0.019
05-13-21	280	0.16 ± 0.07	< 0.006	< 0.006	< 0.018	< 0.009	< 0.010	< 0.012	< 0.052
05-20-21	270	0.19 ± 0.09	< 0.007	< 0.006	< 0.017	< 0.011	< 0.009	< 0.013	< 0.029
05-27-21	269	0.22 ± 0.09	< 0.009	< 0.007	< 0.011	< 0.009	< 0.008	< 0.016	< 0.054
06-03-21	274	0.26 ± 0.13	< 0.010	< 0.009	< 0.018	< 0.011	< 0.011	< 0.014	< 0.048
06-10-21	268	0.16 ± 0.07	< 0.005	< 0.008	< 0.012	< 0.008	< 0.009	< 0.013	< 0.044
06-17-21	268	0.25 ± 0.13	< 0.009	< 0.008	< 0.014	< 0.011	< 0.009	< 0.017	< 0.063
06-24-21	262	0.28 ± 0.11	< 0.006	< 0.013	< 0.013	< 0.010	< 0.007	< 0.017	< 0.031
07-01-21	266	< 0.10	< 0.006	< 0.007	< 0.012	< 0.011	< 0.012	< 0.014	< 0.049
07-08-21	264	0.27 ± 0.11	< 0.008	< 0.010	< 0.016	< 0.010	< 0.009	< 0.025	< 0.034
07-15-21	264	< 0.11	< 0.007	< 0.008	< 0.014	< 0.009	< 0.009	< 0.022	< 0.034
07-22-21	263	< 0.10	< 0.009	< 0.006	< 0.013	< 0.009	< 0.009	< 0.013	< 0.050
07-29-21	261	0.28 ± 0.11	< 0.012	< 0.010	< 0.020	< 0.010	< 0.006	< 0.016	< 0.055
08-05-21	263	< 0.10	< 0.009	< 0.006	< 0.015	< 0.012	< 0.011	< 0.017	< 0.054
08-12-21	255	0.20 ± 0.11	< 0.007	< 0.008	< 0.017	< 0.009	< 0.009	< 0.013	< 0.052
08-19-21	260	< 0.11	< 0.007	< 0.009	< 0.014	< 0.011	< 0.007	< 0.018	< 0.043
08-26-21	256	< 0.13	< 0.008	< 0.007	< 0.016	< 0.012	< 0.008	< 0.016	< 0.041
09-02-21	257	< 0.12	< 0.009	< 0.006	< 0.017	< 0.009	< 0.010	< 0.018	< 0.043
09-09-21	260	0.21 ± 0.12	< 0.009	< 0.007	< 0.016	< 0.009	< 0.006	< 0.017	< 0.060
09-16-21	260	< 0.12	< 0.009	< 0.007	< 0.015	< 0.012	< 0.009	< 0.015	< 0.059
09-23-21	260	0.15 ± 0.08	< 0.012	< 0.008	< 0.021	< 0.009	< 0.009	< 0.016	< 0.051
09-30-21	260	0.21 ± 0.08	< 0.012	< 0.010	< 0.021	< 0.010	< 0.010	< 0.014	< 0.036
10-07-21	266	< 0.12	< 0.006	< 0.012	< 0.013	< 0.010	< 0.006	< 0.018	< 0.046
10-14-21	260	< 0.14	< 0.007	< 0.007	< 0.026	< 0.011	< 0.009	< 0.028	< 0.056

^a Iodine-131 concentrations are < 0.07 pCi/m³ 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/m³

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.								
10-20-21	226	< 0.16	< 0.015	< 0.008	< 0.024	< 0.011	< 0.011	< 0.033	< 0.038
10-28-21	305	< 0.11	< 0.007	< 0.005	< 0.013	< 0.009	< 0.008	< 0.024	< 0.048
11-04-21	268	< 0.11	< 0.011	< 0.007	< 0.015	< 0.010	< 0.007	< 0.019	< 0.065
11-10-21	232	< 0.19	< 0.009	< 0.005	< 0.027	< 0.011	< 0.009	< 0.104	< 0.060
11-17-21	269	< 0.12	< 0.009	< 0.007	< 0.019	< 0.010	< 0.094	< 0.027	< 0.054
11-24-21	269	< 0.11	< 0.009	< 0.008	< 0.014	< 0.008	< 0.011	< 0.024	< 0.037
12-02-21	309	0.20 ± 0.11	< 0.011	< 0.006	< 0.016	< 0.010	< 0.012	< 0.026	< 0.036
12-09-21	267	< 0.14	< 0.007	< 0.007	< 0.015	< 0.009	< 0.008	< 0.025	< 0.043
12-15-21	229	< 0.23	< 0.018	< 0.007	< 0.021	< 0.013	< 0.010	< 0.080	< 0.057
12-22-21	268	< 0.16	< 0.015	< 0.006	< 0.019	< 0.010	< 0.005	< 0.045	< 0.060
12-29-21	268	0.20 ± 0.10	< 0.008	< 0.006	< 0.025	< 0.011	< 0.010	< 0.047	< 0.051

^a Iodine-131 concentrations are < 0.07 pCi/m³ 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/m³

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.								
01-07-21	319	< 0.09	< 0.008	< 0.010	< 0.012	< 0.009	< 0.006	< 0.027	< 0.053
01-14-21	276	< 0.14	< 0.009	< 0.009	< 0.014	< 0.012	< 0.009	< 0.024	< 0.046
01-21-21	271	< 0.15	< 0.007	< 0.010	< 0.018	< 0.011	< 0.006	< 0.034	< 0.057
01-28-21	276	< 0.13	< 0.007	< 0.009	< 0.019	< 0.012	< 0.007	< 0.050	< 0.057
02-04-21	276	< 0.12	< 0.010	< 0.013	< 0.017	< 0.010	< 0.006	< 0.017	< 0.053
02-11-21	276	< 0.11	< 0.006	< 0.006	< 0.019	< 0.011	< 0.007	< 0.022	< 0.040
02-18-21	275	< 0.09	< 0.008	< 0.007	< 0.011	< 0.008	< 0.009	< 0.013	< 0.044
02-25-21	264	< 0.15	< 0.012	< 0.014	< 0.025	< 0.015	< 0.015	< 0.020	< 0.070
03-04-21	264	< 0.09	< 0.006	< 0.006	< 0.015	< 0.009	< 0.008	< 0.011	< 0.029
03-11-21	262	< 0.11	< 0.006	< 0.009	< 0.016	< 0.011	< 0.006	< 0.005	< 0.042
03-18-21	260	< 0.13	< 0.013	< 0.010	< 0.025	< 0.013	< 0.012	< 0.024	< 0.067
03-25-21	259	0.21 ± 0.09	< 0.011	< 0.008	< 0.014	< 0.013	< 0.011	< 0.015	< 0.064
04-01-21	256	< 0.13	< 0.010	< 0.011	< 0.013	< 0.012	< 0.012	< 0.008	< 0.039
04-08-21	249	0.31 ± 0.15	< 0.012	< 0.008	< 0.015	< 0.012	< 0.015	< 0.028	< 0.059
04-15-21	243	< 0.15	< 0.014	< 0.010	< 0.018	< 0.012	< 0.008	< 0.027	< 0.053
04-22-21	243	< 0.14	< 0.012	< 0.007	< 0.016	< 0.011	< 0.007	< 0.012	< 0.051
04-29-21	245	< 0.14	< 0.010	< 0.005	< 0.022	< 0.010	< 0.011	< 0.020	< 0.034
05-06-21	244	0.20 ± 0.08	< 0.012	< 0.007	< 0.022	< 0.010	< 0.007	< 0.021	< 0.056
05-13-21	242	< 0.15	< 0.010	< 0.007	< 0.014	< 0.013	< 0.008	< 0.014	< 0.045
05-20-21	245	0.22 ± 0.13	< 0.008	< 0.006	< 0.013	< 0.010	< 0.010	< 0.018	< 0.065
05-27-21	250	0.18 ± 0.10	< 0.011	< 0.009	< 0.021	< 0.011	< 0.009	< 0.015	< 0.038
06-03-21	245	0.18 ± 0.10	< 0.009	< 0.005	< 0.028	< 0.009	< 0.012	< 0.018	< 0.049
06-10-21	250	0.22 ± 0.12	< 0.011	< 0.010	< 0.017	< 0.009	< 0.009	< 0.014	< 0.048
06-17-21	259	0.27 ± 0.15	< 0.010	< 0.009	< 0.017	< 0.011	< 0.008	< 0.021	< 0.063
06-24-21	250	< 0.13	< 0.010	< 0.007	< 0.020	< 0.011	< 0.006	< 0.017	< 0.031
07-01-21	256	< 0.12	< 0.007	< 0.009	< 0.015	< 0.012	< 0.010	< 0.013	< 0.057
07-08-21	256	0.19 ± 0.10	< 0.011	< 0.006	< 0.022	< 0.010	< 0.010	< 0.039	< 0.046
07-15-21	255	< 0.13	< 0.010	< 0.007	< 0.022	< 0.010	< 0.009	< 0.018	< 0.056
07-22-21	255	0.20 ± 0.12	< 0.006	< 0.007	< 0.019	< 0.010	< 0.012	< 0.016	< 0.049
07-29-21	257	0.20 ± 0.11	< 0.007	< 0.008	< 0.015	< 0.010	< 0.011	< 0.017	< 0.031
08-05-21	258	< 0.12	< 0.010	< 0.006	< 0.015	< 0.010	< 0.010	< 0.017	< 0.057
08-12-21	251	0.17 ± 0.09	< 0.007	< 0.006	< 0.014	< 0.009	< 0.010	< 0.017	< 0.029
08-19-21	258	0.28 ± 0.14	< 0.012	< 0.006	< 0.017	< 0.010	< 0.008	< 0.015	< 0.047
08-26-21	254	< 0.11	< 0.007	< 0.008	< 0.015	< 0.011	< 0.006	< 0.019	< 0.060
09-02-21	255	0.19 ± 0.10	< 0.008	< 0.009	< 0.021	< 0.012	< 0.009	< 0.018	< 0.053
09-09-21	276	< 0.16	< 0.011	< 0.008	< 0.029	< 0.011	< 0.006	< 0.015	< 0.057
09-16-21	252	< 0.12	< 0.009	< 0.005	< 0.016	< 0.011	< 0.008	< 0.015	< 0.057
09-23-21	250	< 0.11	< 0.007	< 0.008	< 0.018	< 0.011	< 0.010	< 0.019	< 0.063
09-30-21	248	< 0.10	< 0.008	< 0.006	< 0.017	< 0.010	< 0.009	< 0.016	< 0.042
10-07-21	252	< 0.11	< 0.011	< 0.010	< 0.019	< 0.010	< 0.009	< 0.015	< 0.054
10-14-21	244	< 0.14	< 0.010	< 0.007	< 0.021	< 0.011	< 0.008	< 0.031	< 0.037

^a Iodine-131 concentrations are < 0.07 pCi/m³ 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/m³

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.								
10-20-21	207	< 0.14	< 0.016	< 0.006	< 0.030	< 0.013	< 0.008	< 0.035	< 0.042
10-28-21	272	< 0.11	< 0.011	< 0.007	< 0.018	< 0.010	< 0.006	< 0.024	< 0.052
11-04-21	246	< 0.14	< 0.008	< 0.008	< 0.020	< 0.012	< 0.005	< 0.027	< 0.045
11-10-21	244	< 0.15	< 0.010	< 0.008	< 0.018	< 0.011	< 0.010	< 0.025	< 0.058
11-17-21	283	< 0.13	< 0.011	< 0.005	< 0.015	< 0.009	< 0.007	< 0.031	< 0.046
11-24-21	285	< 0.12	< 0.007	< 0.009	< 0.014	< 0.011	< 0.006	< 0.024	< 0.045
12-02-21	326	< 0.10	< 0.009	< 0.006	< 0.019	< 0.010	< 0.010	< 0.024	< 0.030
12-09-21	283	< 0.13	< 0.011	< 0.007	< 0.015	< 0.010	< 0.006	< 0.040	< 0.051
12-15-21	241	< 0.16	< 0.015	< 0.008	< 0.025	< 0.012	< 0.009	< 0.062	< 0.052
12-22-21	282	< 0.15	< 0.014	< 0.010	< 0.022	< 0.011	< 0.011	< 0.057	< 0.053
12-29-21	282	< 0.14	< 0.008	< 0.006	< 0.023	< 0.008	< 0.008	< 0.044	< 0.062

^a Iodine-131 concentrations are < 0.07 pCi/m³ 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/m³

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.								
01-07-21	303	< 0.11	< 0.006	< 0.008	< 0.022	< 0.010	< 0.010	< 0.029	< 0.052
01-14-21	267	< 0.17	< 0.007	< 0.011	< 0.018	< 0.010	< 0.006	< 0.082	< 0.055
01-21-21	264	< 0.15	< 0.016	< 0.016	< 0.028	< 0.014	< 0.010	< 0.044	< 0.059
01-28-21	264	< 0.15	< 0.010	< 0.013	< 0.015	< 0.010	< 0.008	< 0.030	< 0.031
02-04-21	283	< 0.11	< 0.010	< 0.010	< 0.014	< 0.011	< 0.005	< 0.018	< 0.035
02-11-21	285	0.21 ± 0.11	< 0.010	< 0.010	< 0.020	< 0.012	< 0.009	< 0.025	< 0.043
02-18-21	290	< 0.13	< 0.010	< 0.009	< 0.020	< 0.016	< 0.011	< 0.031	< 0.053
02-25-21	281	< 0.11	< 0.008	< 0.008	< 0.012	< 0.010	< 0.010	< 0.018	< 0.048
03-04-21	282	< 0.09	< 0.007	< 0.010	< 0.013	< 0.009	< 0.007	< 0.010	< 0.046
03-11-21	283	< 0.13	< 0.011	< 0.010	< 0.020	< 0.011	< 0.010	< 0.016	< 0.056
03-18-21	283	< 0.11	< 0.008	< 0.009	< 0.021	< 0.011	< 0.006	< 0.011	< 0.049
03-25-21	281	0.19 ± 0.11	< 0.011	< 0.010	< 0.012	< 0.012	< 0.010	< 0.010	< 0.061
04-01-21	280	< 0.11	< 0.007	< 0.011	< 0.024	< 0.015	< 0.009	< 0.017	< 0.070
04-08-21	286	0.31 ± 0.13	< 0.011	< 0.006	< 0.016	< 0.010	< 0.009	< 0.030	< 0.049
04-15-21	281	< 0.11	< 0.007	< 0.008	< 0.017	< 0.010	< 0.010	< 0.012	< 0.047
04-22-21	289	< 0.13	< 0.006	< 0.008	< 0.012	< 0.008	< 0.010	< 0.028	< 0.044
04-29-21	281	< 0.12	< 0.009	< 0.006	< 0.015	< 0.009	< 0.008	< 0.019	< 0.039
05-06-21	280	0.19 ± 0.09	< 0.010	< 0.007	< 0.019	< 0.011	< 0.007	< 0.007	< 0.040
05-13-21	286	0.21 ± 0.10	< 0.010	< 0.010	< 0.016	< 0.010	< 0.007	< 0.012	< 0.033
05-20-21	283	< 0.10	< 0.011	< 0.005	< 0.016	< 0.009	< 0.007	< 0.013	< 0.039
05-27-21	280	< 0.11	< 0.007	< 0.006	< 0.019	< 0.011	< 0.009	< 0.019	< 0.037
06-03-21	285	0.32 ± 0.12	< 0.007	< 0.004	< 0.012	< 0.011	< 0.006	< 0.014	< 0.055
06-10-21	280	0.16 ± 0.09	< 0.011	< 0.007	< 0.010	< 0.009	< 0.008	< 0.014	< 0.047
06-17-21	281	0.26 ± 0.10	< 0.009	< 0.005	< 0.017	< 0.008	< 0.005	< 0.017	< 0.039
06-24-21	274	0.22 ± 0.07	< 0.005	< 0.005	< 0.011	< 0.007	< 0.006	< 0.014	< 0.039
07-01-21	280	< 0.09	< 0.009	< 0.007	< 0.014	< 0.008	< 0.008	< 0.012	< 0.050
07-08-21	276	< 0.11	< 0.009	< 0.008	< 0.012	< 0.008	< 0.008	< 0.027	< 0.044
07-15-21	278	< 0.13	< 0.011	< 0.006	< 0.020	< 0.009	< 0.008	< 0.017	< 0.047
07-22-21	277	< 0.11	< 0.006	< 0.011	< 0.021	< 0.009	< 0.007	< 0.013	< 0.028
07-29-21	275	0.27 ± 0.13	< 0.009	< 0.013	< 0.017	< 0.010	< 0.010	< 0.024	< 0.063
08-05-21	281	< 0.13	< 0.007	< 0.008	< 0.016	< 0.010	< 0.007	< 0.016	< 0.048
08-12-21	271	< 0.11	< 0.009	< 0.005	< 0.016	< 0.009	< 0.005	< 0.011	< 0.043
08-19-21	281	< 0.13	< 0.006	< 0.006	< 0.014	< 0.009	< 0.009	< 0.015	< 0.048
08-26-21	272	< 0.12	< 0.007	< 0.007	< 0.025	< 0.011	< 0.007	< 0.024	< 0.054
09-02-21	275	< 0.12	< 0.007	< 0.006	< 0.012	< 0.009	< 0.007	< 0.021	< 0.033
09-09-21	276	< 0.11	< 0.007	< 0.007	< 0.012	< 0.010	< 0.007	< 0.016	< 0.053
09-16-21	275	0.17 ± 0.08	< 0.006	< 0.007	< 0.012	< 0.010	< 0.010	< 0.020	< 0.059
09-23-21	277	< 0.10	< 0.012	< 0.009	< 0.018	< 0.007	< 0.010	< 0.017	< 0.033
09-30-21	274	0.25 ± 0.10	< 0.011	< 0.007	< 0.012	< 0.008	< 0.007	< 0.016	< 0.036
10-07-21	282	< 0.14	< 0.012	< 0.006	< 0.018	< 0.010	< 0.011	< 0.045	< 0.053
10-14-21	276	< 0.13	< 0.013	< 0.006	< 0.018	< 0.009	< 0.007	< 0.026	< 0.030

^a Iodine-131 concentrations are < 0.07 pCi/m³ 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/m³

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.								
10-20-21	241	< 0.12	< 0.009	< 0.008	< 0.016	< 0.010	< 0.010	< 0.036	< 0.071
10-28-21	325	< 0.11	< 0.009	< 0.006	< 0.018	< 0.008	< 0.008	< 0.023	< 0.028
11-04-21	285	0.22 ± 0.12	< 0.012	< 0.008	< 0.020	< 0.009	< 0.006	< 0.025	< 0.041
11-10-21	248	< 0.12	< 0.012	< 0.009	< 0.026	< 0.010	< 0.011	< 0.029	< 0.056
11-17-21	277	< 0.10	< 0.009	< 0.007	< 0.018	< 0.011	< 0.007	< 0.035	< 0.043
11-24-21	281	< 0.12	< 0.007	< 0.007	< 0.019	< 0.011	< 0.006	< 0.033	< 0.035
12-02-21	321	< 0.11	< 0.006	< 0.008	< 0.016	< 0.009	< 0.008	< 0.021	< 0.028
12-09-21	280	< 0.16	< 0.009	< 0.013	< 0.021	< 0.010	< 0.007	< 0.079	< 0.057
12-15-21	239	< 0.18	< 0.014	< 0.010	< 0.029	< 0.011	< 0.007	< 0.052	< 0.059
12-22-21	282	< 0.16	< 0.014	< 0.006	< 0.023	< 0.009	< 0.010	< 0.024	< 0.050
12-29-21	282	< 0.12	< 0.009	< 0.008	< 0.021	< 0.010	< 0.005	< 0.044	< 0.061

^a Iodine-131 concentrations are < 0.07 pCi/m³ 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/m³

Location		CA-A-010							
		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.								
01-07-21	360	< 0.13	< 0.013	< 0.015	< 0.035	< 0.015	< 0.009	< 0.092	< 0.051
01-14-21	320	< 0.17	< 0.018	< 0.019	< 0.023	< 0.017	< 0.014	< 0.041	< 0.061
01-21-21	311	< 0.16	< 0.007	< 0.008	< 0.019	< 0.013	< 0.011	< 0.072	< 0.062
01-28-21	315	< 0.15	< 0.011	< 0.014	< 0.025	< 0.012	< 0.011	< 0.035	< 0.052
02-04-21	317	< 0.07	< 0.006	< 0.006	< 0.011	< 0.007	< 0.005	< 0.023	< 0.038
02-11-21	310	< 0.11	< 0.010	< 0.010	< 0.017	< 0.011	< 0.007	< 0.022	< 0.058
02-18-21	306	< 0.10	< 0.005	< 0.010	< 0.015	< 0.009	< 0.005	< 0.009	< 0.055
02-25-21	314	< 0.14	< 0.009	< 0.010	< 0.013	< 0.013	< 0.006	< 0.026	< 0.055
03-04-21		NS ^b							
03-11-21	278	< 0.18	< 0.014	< 0.016	< 0.019	< 0.018	< 0.017	< 0.034	< 0.073
03-18-21	272	< 0.13	< 0.008	< 0.011	< 0.021	< 0.012	< 0.011	< 0.024	< 0.057
03-25-21	274	0.23 ± 0.09	< 0.006	< 0.012	< 0.018	< 0.011	< 0.009	< 0.017	< 0.044
04-01-21	268	< 0.14	< 0.009	< 0.010	< 0.022	< 0.012	< 0.015	< 0.013	< 0.038
04-08-21	275	0.21 ± 0.11	< 0.012	< 0.008	< 0.027	< 0.011	< 0.007	< 0.024	< 0.041
04-15-21	270	< 0.15	< 0.013	< 0.006	< 0.025	< 0.011	< 0.013	< 0.021	< 0.060
04-22-21	274	0.18 ± 0.10	< 0.008	< 0.007	< 0.013	< 0.009	< 0.008	< 0.026	< 0.033
04-29-21	268	0.27 ± 0.14	< 0.009	< 0.009	< 0.016	< 0.010	< 0.009	< 0.020	< 0.060
05-06-21	270	0.27 ± 0.09	< 0.009	< 0.005	< 0.014	< 0.009	< 0.007	< 0.008	< 0.036
05-13-21	273	< 0.13	< 0.009	< 0.009	< 0.015	< 0.010	< 0.011	< 0.011	< 0.051
05-20-21	269	< 0.11	< 0.011	< 0.005	< 0.018	< 0.010	< 0.010	< 0.014	< 0.031
05-27-21	269	< 0.13	< 0.011	< 0.005	< 0.019	< 0.010	< 0.009	< 0.018	< 0.062
06-03-21	266	< 0.12	< 0.013	< 0.012	< 0.018	< 0.012	< 0.006	< 0.019	< 0.042
06-10-21	270	0.28 ± 0.14	< 0.010	< 0.007	< 0.012	< 0.011	< 0.007	< 0.014	< 0.037
06-17-21	270	0.28 ± 0.13	< 0.012	< 0.009	< 0.015	< 0.010	< 0.011	< 0.019	< 0.060
06-24-21	259	< 0.13	< 0.008	< 0.012	< 0.015	< 0.011	< 0.010	< 0.017	< 0.056
07-01-21	266	< 0.11	< 0.006	< 0.010	< 0.019	< 0.009	< 0.007	< 0.014	< 0.050
07-08-21	264	0.27 ± 0.12	< 0.012	< 0.008	< 0.018	< 0.011	< 0.007	< 0.024	< 0.045
07-15-21	262	0.22 ± 0.12	< 0.006	< 0.008	< 0.016	< 0.011	< 0.007	< 0.022	< 0.041
07-22-21	261	< 0.11	< 0.008	< 0.006	< 0.013	< 0.009	< 0.006	< 0.016	< 0.031
07-29-21	263	0.26 ± 0.12	< 0.007	< 0.006	< 0.017	< 0.010	< 0.008	< 0.020	< 0.047
08-05-21	261	0.24 ± 0.11	< 0.011	< 0.006	< 0.021	< 0.011	< 0.008	< 0.014	< 0.060
08-12-21	256	0.25 ± 0.14	< 0.008	< 0.007	< 0.021	< 0.011	< 0.008	< 0.017	< 0.040
08-19-21	258	< 0.11	< 0.010	< 0.008	< 0.018	< 0.011	< 0.012	< 0.010	< 0.049
08-26-21	258	< 0.11	< 0.008	< 0.009	< 0.020	< 0.011	< 0.009	< 0.018	< 0.054
09-02-21	256	0.17 ± 0.10	< 0.009	< 0.006	< 0.018	< 0.009	< 0.008	< 0.018	< 0.048
09-09-21	257	< 0.13	< 0.011	< 0.008	< 0.018	< 0.011	< 0.011	< 0.022	< 0.060
09-16-21	256	< 0.12	< 0.011	< 0.008	< 0.014	< 0.009	< 0.008	< 0.016	< 0.046
09-23-21	255	< 0.12	< 0.008	< 0.010	< 0.021	< 0.012	< 0.009	< 0.023	< 0.058
09-30-21	252	0.26 ± 0.14	< 0.010	< 0.008	< 0.018	< 0.011	< 0.010	< 0.019	< 0.061
10-07-21	255	< 0.13	< 0.014	< 0.007	< 0.015	< 0.011	< 0.006	< 0.041	< 0.051
10-14-21	251	< 0.14	< 0.016	< 0.006	< 0.021	< 0.011	< 0.006	< 0.044	< 0.040

^a Iodine-131 concentrations are < 0.07 pCi/m³ unless noted otherwise.

^b "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/m³

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.								
10-20-21	213	< 0.16	< 0.012	< 0.018	< 0.032	< 0.012	< 0.009	< 0.036	< 0.062
10-28-21	284	< 0.12	< 0.007	< 0.013	< 0.015	< 0.010	< 0.011	< 0.027	< 0.053
11-04-21	248	< 0.16	< 0.007	< 0.009	< 0.018	< 0.012	< 0.006	< 0.037	< 0.059
11-10-21	215	< 0.16	< 0.010	< 0.011	< 0.019	< 0.013	< 0.012	< 0.034	< 0.059
11-17-21	246	< 0.14	< 0.008	< 0.008	< 0.019	< 0.011	< 0.013	< 0.036	< 0.060
11-24-21	245	< 0.13	< 0.009	< 0.007	< 0.020	< 0.010	< 0.006	< 0.049	< 0.056
12-02-21	280	< 0.12	< 0.010	< 0.006	< 0.021	< 0.011	< 0.009	< 0.031	< 0.058
12-09-21	243	< 0.15	< 0.010	< 0.007	< 0.020	< 0.010	< 0.010	< 0.105	< 0.055
12-15-21	209	< 0.19	< 0.018	< 0.010	< 0.034	< 0.014	< 0.015	< 0.089	< 0.061
12-22-21	242	0.24 ± 0.14	< 0.010	< 0.007	< 0.017	< 0.010	< 0.009	< 0.079	< 0.040
12-29-21	242	< 0.15	< 0.014	< 0.007	< 0.019	< 0.013	< 0.010	< 0.039	< 0.042

^a Iodine-131 concentrations are < 0.07 pCi/m³ 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/m³

Location		CA-A-011							
		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.								
01-07-21	321	< 0.11	< 0.007	< 0.008	< 0.018	< 0.009	< 0.004	< 0.020	< 0.044
01-14-21	280	< 0.14	< 0.010	< 0.009	< 0.020	< 0.010	< 0.008	< 0.025	< 0.039
01-21-21	277	< 0.13	< 0.013	< 0.011	< 0.022	< 0.009	< 0.009	< 0.033	< 0.036
01-28-21	279	< 0.12	< 0.011	< 0.009	< 0.024	< 0.010	< 0.007	< 0.025	< 0.043
02-04-21	280	< 0.13	< 0.010	< 0.009	< 0.018	< 0.011	< 0.008	< 0.019	< 0.064
02-11-21	271	< 0.12	< 0.005	< 0.008	< 0.017	< 0.010	< 0.006	< 0.014	< 0.047
02-18-21	263	< 0.12	< 0.010	< 0.011	< 0.016	< 0.011	< 0.007	< 0.012	< 0.045
02-25-21	277	< 0.12	< 0.006	< 0.011	< 0.018	< 0.010	< 0.007	< 0.014	< 0.040
03-04-21	276	< 0.11	< 0.009	< 0.009	< 0.011	< 0.010	< 0.008	< 0.018	< 0.053
03-11-21	278	0.30 ± 0.10	< 0.007	< 0.009	< 0.012	< 0.011	< 0.004	< 0.012	< 0.053
03-18-21	277	< 0.11	< 0.008	< 0.009	< 0.023	< 0.012	< 0.011	< 0.031	< 0.067
03-25-21	277	0.22 ± 0.11	< 0.009	< 0.007	< 0.011	< 0.010	< 0.009	< 0.007	< 0.044
04-01-21	273	< 0.13	< 0.010	< 0.007	< 0.012	< 0.011	< 0.007	< 0.010	< 0.043
04-08-21	284	0.19 ± 0.11	< 0.010	< 0.008	< 0.015	< 0.010	< 0.011	< 0.028	< 0.056
04-15-21	279	0.20 ± 0.11	< 0.009	< 0.008	< 0.017	< 0.009	< 0.010	< 0.026	< 0.050
04-22-21	283	0.22 ± 0.13	< 0.007	< 0.004	< 0.019	< 0.009	< 0.006	< 0.049	< 0.052
04-29-21	280	0.15 ± 0.09	< 0.009	< 0.006	< 0.019	< 0.010	< 0.007	< 0.020	< 0.044
05-06-21	281	0.14 ± 0.08	< 0.007	< 0.006	< 0.012	< 0.008	< 0.007	< 0.015	< 0.048
05-13-21	283	< 0.11	< 0.010	< 0.005	< 0.017	< 0.008	< 0.008	< 0.012	< 0.052
05-20-21	282	0.26 ± 0.11	< 0.007	< 0.007	< 0.020	< 0.008	< 0.006	< 0.047	< 0.033
05-27-21	283	0.25 ± 0.13	< 0.011	< 0.011	< 0.013	< 0.010	< 0.009	< 0.015	< 0.041
06-03-21	282	0.32 ± 0.12	< 0.010	< 0.006	< 0.014	< 0.010	< 0.010	< 0.018	< 0.042
06-10-21	285	< 0.12	< 0.007	< 0.008	< 0.018	< 0.008	< 0.009	< 0.013	< 0.043
06-17-21	284	0.24 ± 0.14	< 0.009	< 0.007	< 0.020	< 0.009	< 0.008	< 0.017	< 0.033
06-24-21	273	0.29 ± 0.10	< 0.010	< 0.009	< 0.012	< 0.009	< 0.007	< 0.017	< 0.050
07-01-21	281	< 0.09	< 0.005	< 0.007	< 0.017	< 0.008	< 0.007	< 0.013	< 0.041
07-08-21	279	0.25 ± 0.11	< 0.016	< 0.006	< 0.014	< 0.010	< 0.009	< 0.026	< 0.060
07-15-21	279	0.16 ± 0.09	< 0.009	< 0.008	< 0.017	< 0.009	< 0.005	< 0.018	< 0.044
07-22-21	279	< 0.11	< 0.012	< 0.008	< 0.021	< 0.011	< 0.005	< 0.015	< 0.051
07-29-21	282	0.30 ± 0.15	< 0.011	< 0.008	< 0.017	< 0.009	< 0.005	< 0.024	< 0.057
08-05-21	282	< 0.10	< 0.006	< 0.005	< 0.016	< 0.008	< 0.011	< 0.021	< 0.051
08-12-21	277	0.17 ± 0.09	< 0.006	< 0.006	< 0.015	< 0.008	< 0.005	< 0.012	< 0.051
08-19-21	281	0.19 ± 0.10	< 0.006	< 0.006	< 0.016	< 0.009	< 0.009	< 0.006	< 0.046
08-26-21	280	< 0.10	< 0.007	< 0.006	< 0.014	< 0.008	< 0.006	< 0.019	< 0.049
09-02-21	279	< 0.11	< 0.011	< 0.006	< 0.021	< 0.009	< 0.008	< 0.018	< 0.035
09-09-21	280	< 0.11	< 0.010	< 0.006	< 0.016	< 0.008	< 0.008	< 0.020	< 0.048
09-16-21	278	< 0.11	< 0.007	< 0.005	< 0.016	< 0.010	< 0.009	< 0.022	< 0.056
09-23-21	277	< 0.11	< 0.007	< 0.007	< 0.012	< 0.008	< 0.008	< 0.016	< 0.052
09-30-21	277	0.15 ± 0.08	< 0.009	< 0.008	< 0.018	< 0.009	< 0.009	< 0.020	< 0.043
10-07-21	281	< 0.13	< 0.012	< 0.008	< 0.017	< 0.009	< 0.007	< 0.069	< 0.047
10-14-21	277	< 0.12	< 0.016	< 0.010	< 0.022	< 0.010	< 0.007	< 0.044	< 0.054

^a Iodine-131 concentrations are < 0.07 pCi/m³ 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/m³

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.								
10-20-21	233	< 0.17	< 0.011	< 0.008	< 0.019	< 0.013	< 0.007	< 0.052	< 0.045
10-28-21	309	< 0.11	< 0.006	< 0.005	< 0.018	< 0.008	< 0.011	< 0.035	< 0.034
11-04-21	266	< 0.12	< 0.008	< 0.006	< 0.015	< 0.010	< 0.010	< 0.041	< 0.051
11-10-21	236	< 0.15	< 0.009	< 0.008	< 0.026	< 0.011	< 0.009	< 0.037	< 0.035
11-17-21	267	< 0.14	< 0.007	< 0.008	< 0.020	< 0.011	< 0.006	< 0.037	< 0.059
11-24-21	262	< 0.17	< 0.008	< 0.006	< 0.015	< 0.009	< 0.008	< 0.030	< 0.057
12-02-21	303	< 0.11	< 0.006	< 0.005	< 0.020	< 0.010	< 0.009	< 0.015	< 0.062
12-09-21	264	< 0.13	< 0.010	< 0.006	< 0.024	< 0.009	< 0.008	< 0.053	< 0.048
12-15-21	247	< 0.16	< 0.013	< 0.005	< 0.025	< 0.012	< 0.005	< 0.037	< 0.059
12-22-21	304	< 0.15	< 0.009	< 0.004	< 0.019	< 0.007	< 0.008	< 0.052	< 0.056
12-29-21	304	< 0.14	< 0.008	< 0.007	< 0.019	< 0.010	< 0.010	< 0.050	< 0.042

^a Iodine-131 concentrations are < 0.07 pCi/m³ 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

Collection discontinued.^a^a Milk sampling discontinued in 2018.

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

Collection: Monthly, during growing season

Units: pCi/kg wet

Lab Code	Collection		Concentration (pCi/kg wet)						
	Date	Sample Type	⁴⁰ K	⁵⁴ Mn	⁵⁸ Co	⁶⁰ Co	¹³¹ I	¹³⁴ Cs	¹³⁷ Cs
Location: CA-FPL-V9									
	4/13/2021		NS ^a						
CAVE- 1392	5/11/2021	Turnip Greens	3439 ± 313	< 9.2	< 11.5	< 4.9	< 13.1	< 10.6	< 10.3
CAVE- 1393	5/11/2021	Lettuce	3117 ± 263	< 6.9	< 7.9	< 7.7	< 13.9	< 8.4	< 11.3
CAVE- 1394	5/11/2021	Mustard Greens	4475 ± 319	< 6.9	< 10.8	< 6.0	< 15.3	< 11.4	< 9.3
CAVE- 1712	6/8/2021	Cabbage	5656 ± 596	< 17.9	< 19.0	< 12.9	< 34.6	< 25.2	< 16.4
CAVE- 1713	6/8/2021	Lettuce	6128 ± 456	< 12.4	< 18.3	< 5.4	< 31.1	< 15.2	< 15.2
CAVE- 1714	6/8/2021	Mustard	5781 ± 586	< 23.1	< 14.2	< 25.2	< 34.1	< 20.1	< 20.2
CAVE- 1715	6/8/2021	Swiss Chard	5370 ± 367	< 10.3	< 16.1	< 11.5	< 23.8	< 12.3	< 15.2
CAVE- 1716	6/8/2021	Turnip greens	6578 ± 527	< 24.7	< 16.5	< 9.5	< 35.9	< 18.9	< 19.6
CAVE- 2186	7/13/2021	Cabbage	2964 ± 263	< 4.9	< 7.8	< 9.0	< 43.6	< 9.4	< 9.4
CAVE- 2536	8/10/2021	Cabbage	3405 ± 328	< 13.7	< 13.0	< 12.3	< 18.0	< 13.1	< 12.7
CAVE- 2537	8/10/2021	Swiss Chard	6867 ± 390	< 10.7	< 9.0	< 7.9	< 12.5	< 10.6	< 11.2
CAVE- 2956	9/14/2021	Swiss Chard	8347 ± 482	< 12.6	< 7.5	< 16.1	< 22.0	< 11.2	< 10.7
CAVE- 3349	10/12/2021	Collard Greens	4263 ± 385	< 11.0	< 9.9	< 10.7	< 21.7	< 13.0	< 11.5
CAVE- 3350	10/12/2021	Kale	4321 ± 404	< 11.7	< 12.3	< 12.2	< 24.8	< 14.1	< 9.7
CAVE- 3351	10/12/2021	Mustard	3923 ± 319	< 7.3	< 10.3	< 6.7	< 13.9	< 8.6	< 7.3
CAVE- 3352	10/12/2021	Swiss Chard	5903 ± 378	< 7.3	< 9.2	< 9.7	< 21.6	< 10.1	< 9.6
CAVE- 3353	10/12/2021	Turnip greens	4245 ± 403	< 15.2	< 15.0	< 7.4	< 29.5	< 14.3	< 12.8
CAVE- 3354	10/12/2021	Lettuce	3279 ± 278	< 6.5	< 7.3	< 10.0	< 19.6	< 9.3	< 8.3

^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

Collection			Concentration (pCi/kg wet)						
Lab Code	Date	Sample Type	⁴⁰ K	⁵⁴ Mn	⁵⁸ Co	⁶⁰ Co	¹³¹ I	¹³⁴ Cs	¹³⁷ Cs
Location: CA-FPL-V12									
	4/13/2021		NS ^a						
CAVE- 1389	5/10/2021	Swiss Chard	6849 ± 449	< 15.8	< 13.2	< 8.4	< 17.1	< 13.0	< 17.0
CAVE- 1390	5/10/2021	Lettuce	4241 ± 325	< 9.2	< 11.5	< 4.9	< 13.1	< 10.6	< 10.3
CAVE- 1717	6/7/2021	Lettuce	5447 ± 443	< 14.4	< 15.0	< 16.3	< 21.9	< 16.1	< 10.2
CAVE- 1719	6/7/2021	Mustard	4883 ± 464	< 16.2	< 19.1	< 13.1	< 43.4	< 15.7	< 13.5
CAVE- 1720	6/7/2021	Swiss Chard	7107 ± 351	< 11.4	< 9.4	< 4.6	< 27.7	< 11.4	< 13.9
CAVE- 2187	7/12/2021	Collard Greens	2800 ± 305	< 13.3	< 13.3	< 12.6	< 44.7	< 12.0	< 10.0
CAVE- 2188	7/12/2021	Swiss Chard	6157 ± 349	< 10.6	< 9.8	< 9.4	< 32.7	< 11.5	< 5.5
CAVE- 2189	7/12/2021	Cabbage	3204 ± 244	< 6.3	< 8.2	< 4.7	< 42.2	< 8.2	< 9.7
CAVE- 2538	8/9/2021	Swiss Chard	9817 ± 414	< 7.5	< 7.8	< 10.8	< 19.0	< 12.7	< 11.7
CAVE- 2957	9/13/2021	Spinach, Mustard	5068 ± 395	< 13.4	< 9.4	< 11.3	< 22.4	< 14.3	< 13.2
CAVE- 2958	9/13/2021	Swiss Chard	10472 ± 618	< 10.9	< 14.3	< 18.3	< 33.6	< 17.1	< 17.6
CAVE- 3355	10/11/2021	Cabbage	4285 ± 419	< 15.0	< 14.3	< 10.6	< 24.9	< 18.2	< 17.5
CAVE- 3356	10/11/2021	Mustard	3901 ± 307	< 6.2	< 11.4	< 7.7	< 16.6	< 8.8	< 10.4
CAVE- 3357	10/11/2021	Swiss Chard	4771 ± 360	< 11.1	< 8.7	< 9.1	< 32.2	< 10.5	< 10.0
CAVE- 3358	10/11/2021	Collard Greens	4669 ± 403	< 12.2	< 13.0	< 12.6	< 45.5	< 15.7	< 16.1
CAVE- 3359	10/11/2021	Choi Cabbage	3951 ± 492	< 14.2	< 16.2	< 14.8	< 30.4	< 15.6	< 18.0
Location: CA-FPL-V16									
	4/13/2021		NS ^a						
	5/11/2021		NS ^a						
CAVE- 1721	6/8/2021	Cauliflower	9072 ± 1163	< 53.8	< 31.8	< 46.8	< 58.5	< 44.7	< 34.8
CAVE- 1722	6/8/2021	Turnip greens	9257 ± 990	< 36.0	< 26.5	< 27.5	< 35.2	< 35.2	< 33.2
CAVE- 2190	7/12/2021	Turnip greens	4943 ± 205	< 7.0	< 9.3	< 9.2	< 18.3	< 7.4	< 9.1
CAVE- 2191	7/12/2021	Broccoli Greens	3635 ± 268	< 11.1	< 9.6	< 10.0	< 13.8	< 10.0	< 10.4
CAVE- 2192	7/12/2021	Cauliflower Greens	4268 ± 352	< 11.9	< 11.7	< 10.3	< 22.4	< 12.7	< 15.6
CAVE- 2539	8/10/2021	Turnip greens	5168 ± 686	< 27.2	< 25.4	< 28.4	< 34.4	< 27.9	< 28.6
CAVE- 2540	8/10/2021	Cabbage	2490 ± 286	< 12.7	< 7.5	< 9.1	< 16.7	< 12.1	< 8.6
CAVE- 2959	9/13/2021	Cabbage	1770 ± 169	< 9.5	< 7.8	< 10.7	< 16.7	< 8.6	< 11.1
CAVE- 2960	9/13/2021	Swiss Chard	2517 ± 621	< 31.6	< 40.8	< 28.6	< 51.8	< 38.3	< 31.7
CAVE- 3360	10/11/2021 ^b	Turnip greens	1927 ± 669	< 36.3	< 26.3	< 29.0	< 58.8	< 42.2	< 33.0
Location: CA-FPL-V19									
	4/13/2021		NS ^a						
CAVE- 1395	5/11/2021	Cabbage	4225 ± 315	< 5.1	< 10.5	< 6.7	< 17.1	< 8.7	< 10.9
CAVE- 1723	6/7/2021	Kale	5194 ± 325	< 12.8	< 8.9	< 8.5	< 28.7	< 12.0	< 8.6
CAVE- 2193	7/13/2021	Cabbage	4718 ± 332	< 7.5	< 10.3	< 7.1	< 42.5	< 11.3	< 10.3
CAVE- 2541	8/9/2021	Kale	6040 ± 304	< 6.2	< 6.7	< 9.2	< 18.5	< 8.7	< 10.0
CAVE- 2824	9/1/2021	Kale	5212 ± 600	< 22.6	< 10.6	< 21.0	< 35.9	< 25.4	< 22.1
	10/11/2021		NS ^a						

^a "NS" = No sample; see Part I Table 5.5, Listing of Missed Samples.^b very small sample.

Table 4. Soil, analyses for gamma-emitting isotopes.

Collection: Annually

Collection		Concentration (pCi/kg dry)								
Lab Code	Date	⁴⁰ K	⁵⁴ Mn	⁵⁹ Fe	⁵⁸ Co	⁶⁰ Co	⁹⁵ ZrNb	¹³⁴ Cs	¹³⁷ Cs	¹⁴⁰ BaLa
<u>Location: SOL-F-002</u>										
CASO- 3987	12/1/2021	13196 ± 1007	< 46.0	< 103.8	< 48.9	< 25.2	< 49.5	< 41.8	635 ± 71	< 151.5
<u>Location: SOL-F-006</u>										
CASO- 3988	12/3/2021	13459 ± 851	< 29.8	< 86.3	< 26.1	< 23.0	< 38.1	< 22.5	396 ± 54	< 71.9
<u>Location: SOL-PR-003</u>										
CASO- 3989	12/2/2021	11542 ± 780	< 29.7	< 46.1	< 34.6	< 17.9	< 44.2	< 23.7	218 ± 45	< 142.7
<u>Location: SOL-PR-007</u>										
CASO- 3991	12/2/2021	10763 ± 818	< 41.0	< 87.0	< 30.2	< 17.7	< 42.4	< 29.7	158 ± 42	< 177.6
<u>Location: SOL-M-009</u>										
CASO- 3996	12/1/2021	15261 ± 1011	< 41.0	< 66.0	< 35.8	< 29.5	< 67.6	< 30.0	151 ± 45	< 58.3
<u>Location: SOL-W-001</u>										
CASO- 3992	12/1/2021	8986 ± 615	< 79.8	< 77.1	< 76.3	< 27.4	< 121.3	< 33.7	< 35	< 281.8
<u>Location: SOL-W-002</u>										
CASO- 3993	12/1/2021	9585 ± 509	< 26.3	< 104.8	< 41.0	< 22.3	< 64.9	< 22.9	< 24	< 140.1
<u>Location: SOL-W-005</u>										
CASO- 3994	12/1/2021	9745 ± 747	< 50.7	< 111.1	< 82.2	< 36.0	< 102.7	< 38.4	< 48	< 589.7
<u>Location: SOL-W-006</u>										
CASO- 3995	12/1/2021	10159 ± 599	< 36.2	< 85.3	< 41.7	< 29.7	< 69.8	< 26.4	37 ± 21	< 574.2

Table 5. Surface water, analyses for tritium and gamma-emitting isotopes.

Collection: Monthly

Location: CA-SWA-S01

Units: pCi/L

Lab Code	Required	CASW- 228	CASW- 460	NS ^a	CASW- 1253
Date Collected	LLD	01-26-21	02-24-21	March	04-27-21
H-3	3000	< 159	< 161	-	< 158
Mn-54	15	< 2.9	< 3.3	-	< 1.4
Fe-59	30	< 4.7	< 5.0	-	< 5.4
Co-58	15	< 1.8	< 3.3	-	< 2.7
Co-60	15	< 1.8	< 3.2	-	< 1.3
Zn-65	30	< 3.8	< 5.5	-	< 3.9
Zr-Nb-95	15	< 3.5	< 3.1	-	< 3.9
I-131	1000	< 9.8	< 7.8	-	< 33.9
Cs-134	15	< 3.0	< 4.4	-	< 2.7
Cs-137	18	< 2.9	< 2.7	-	< 3.5
Ba-La-140	15	< 4.9	< 2.9	-	< 4.9

Lab Code	Required	CASW- 1557	CASW- 2008	CASW- 2385	CASW- 2816
Date Collected	LLD	05-25-21	06-29-21	07-27-21	08-31-21
H-3	3000	< 165	< 159	< 162	< 163
Mn-54	15	< 4.4	< 1.2	< 3.1	< 2.9
Fe-59	30	< 4.5	< 5.7	< 5.9	< 5.4
Co-58	15	< 4.6	< 3.3	< 3.5	< 1.7
Co-60	15	< 3.0	< 2.0	< 2.8	< 2.2
Zn-65	30	< 5.2	< 4.2	< 3.5	< 2.5
Zr-Nb-95	15	< 5.1	< 2.8	< 4.5	< 2.4
I-131	1000	< 13.5	< 13.6	< 6.2	< 5.8
Cs-134	15	< 5.2	< 3.0	< 3.3	< 2.5
Cs-137	18	< 5.0	< 3.3	< 3.2	< 2.8
Ba-La-140	15	< 5.8	< 2.6	< 2.5	< 4.6

Lab Code	Required	CASW- 3158	CASW- 3612	CASW- 3959	CASW- 4197
Date Collected	LLD	09-28-21	10-26-21	11-30-21	12-28-21
H-3	3000	< 161	< 163	< 162	< 157
Mn-54	15	< 1.4	< 4.2	< 2.7	< 2.2
Fe-59	30	< 3.3	< 7.8	< 6.2	< 5.1
Co-58	15	< 2.1	< 4.1	< 2.4	< 2.5
Co-60	15	< 1.7	< 2.9	< 1.6	< 1.7
Zn-65	30	< 4.7	< 3.0	< 5.2	< 5.6
Zr-Nb-95	15	< 2.9	< 4.9	< 3.2	< 2.5
I-131	1000	< 5.7	< 8.7	< 30.0	< 5.4
Cs-134	15	< 2.6	< 4.2	< 3.5	< 2.7
Cs-137	18	< 2.3	< 4.7	< 3.4	< 3.1
Ba-La-140	15	< 2.4	< 4.5	< 5.0	< 3.0

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

Table 5. 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- 229 01-26-21	CASW- 461 02-23-21	CASW- 850 03-31-21	CASW- 1254 04-27-21
H-3	3000	< 159	< 161	< 156	< 158
Mn-54	15	< 3.0	< 3.8	< 2.1	< 2.9
Fe-59	30	< 4.9	< 5.4	< 3.5	< 7.5
Co-58	15	< 3.0	< 2.0	< 1.6	< 3.0
Co-60	15	< 2.0	< 1.8	< 1.7	< 2.0
Zn-65	30	< 4.7	< 5.6	< 2.8	< 3.9
Zr-Nb-95	15	< 4.2	< 2.1	< 3.4	< 5.1
I-131	1000	< 13.1	< 7.8	< 18.7	< 45.6
Cs-134	15	< 2.5	< 3.1	< 2.8	< 3.3
Cs-137	18	< 2.7	< 2.7	< 3.0	< 3.0
Ba-La-140	15	< 6.0	< 4.3	< 4.5	< 9.8
Lab Code Date Collected	Required LLD	CASW- 1558 05-25-21	CASW- 2009 06-29-21	CASW- 2386 07-27-21	CASW- 2818 08-31-21
H-3	3000	< 165	< 159	< 162	< 163
Mn-54	15	< 3.3	< 2.5	< 2.4	< 3.8
Fe-59	30	< 5.2	< 4.9	< 2.7	< 7.6
Co-58	15	< 3.2	< 1.8	< 1.3	< 4.7
Co-60	15	< 2.8	< 1.9	< 2.0	< 2.4
Zn-65	30	< 4.9	< 1.5	< 3.8	< 6.1
Zr-Nb-95	15	< 5.4	< 3.0	< 1.6	< 4.3
I-131	1000	< 15.1	< 16.2	< 4.6	< 7.4
Cs-134	15	< 4.2	< 2.9	< 2.2	< 4.2
Cs-137	18	< 3.5	< 3.7	< 2.4	< 6.1
Ba-La-140	15	< 4.1	< 4.9	< 1.7	< 2.8
Lab Code Date Collected	Required LLD	CASW- 3159 09-28-21	CASW- 3613 10-26-21	CASW- 3960 11-30-21	CASW- 4198 12-28-21
H-3	3000	< 161	< 163	< 162	< 157
Mn-54	15	< 1.5	< 2.7	< 4.3	< 3.4
Fe-59	30	< 3.7	< 10.0	< 8.6	< 5.9
Co-58	15	< 2.3	< 3.2	< 3.3	< 1.3
Co-60	15	< 1.3	< 1.9	< 2.9	< 1.9
Zn-65	30	< 3.2	< 6.8	< 5.3	< 2.5
Zr-Nb-95	15	< 2.6	< 3.0	< 4.8	< 1.9
I-131	1000	< 7.2	< 3.1	< 21.1	< 7.4
Cs-134	15	< 1.8	< 2.5	< 4.4	< 3.3
Cs-137	18	< 2.2	< 1.9	< 3.2	< 3.6
Ba-La-140	15	< 3.0	< 1.3	< 5.4	< 2.3

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

Collection		Concentration (pCi/L)									
Lab Code	Date	³ H	⁵⁴ Mn	⁵⁹ Fe	⁵⁸ Co	⁶⁰ Co	⁶⁵ Zn	⁹⁵ ZrNb	¹³⁴ Cs	¹³⁷ Cs	¹⁴⁰ BaLa
<u>Location: CA-SWA-POND 01</u>											
CASW- 618	03/03/21	< 158	< 4.2	< 4.8	< 3.5	< 2.6	< 3.4	< 5.9	< 3.9	< 3.3	< 10.3
CASW- 2923	09/07/21	< 162	< 2.1	< 3.1	< 1.5	< 1.4	< 3.3	< 2.2	< 2.5	< 1.5	< 3.1
<u>Location: CA-SWA-POND 02</u>											
CASW- 617	03/03/21	< 158	< 4.2	< 5.1	< 2.4	< 3.4	< 6.5	< 3.9	< 4.6	< 2.7	< 7.7
CASW- 2922	09/07/21	< 162	< 2.1	< 4.3	< 2.1	< 1.4	< 4.1	< 2.7	< 1.7	< 2.4	< 3.7
<u>Location: CA-SWA-SLUDGE LAGOON #6</u>											
CASW- 615	03/03/21	< 158	< 2.6	< 5.1	< 2.8	< 2.1	< 9.1	< 3.0	< 4.4	< 2.8	< 8.3
CASW- 2921	09/07/21	< 162	< 3.5	< 8.8	< 3.0	< 2.9	< 4.9	< 3.1	< 4.3	< 4.3	< 6.8
<u>Location: CA-SWA-OUTFALL 010</u>											
CASW- 621	03/03/21	< 158	< 1.9	< 8.8	< 3.3	< 3.2	< 3.5	< 4.5	< 3.7	< 2.5	< 9.7
CASW- 2926	09/07/21	< 162	< 2.0	< 4.3	< 1.5	< 1.3	< 1.9	< 3.1	< 2.4	< 1.7	< 2.9
<u>Location: CA-SWA-OUTFALL 011</u>											
CASW- 622	03/03/21	< 158	< 2.2	< 7.3	< 4.1	< 2.6	< 5.2	< 4.7	< 3.9	< 3.6	< 5.1
Collection discontinued at this location											
<u>Location: CA-SWA-OUTFALL 012</u>											
CASW- 616	03/03/21	< 158	< 3.2	< 8.0	< 2.0	< 2.6	< 4.1	< 4.3	< 3.7	< 3.0	< 8.3
Collection discontinued at this location											
<u>Location: CA-SWA-OUTFALL 013</u>											
CASW- 614	03/03/21	< 158	< 2.8	< 3.6	< 1.9	< 2.3	< 3.8	< 1.7	< 2.8	< 2.8	< 5.7
Collection discontinued at this location											

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

Collection		Concentration (pCi/L)									
Lab Code	Date	³ H	⁵⁴ Mn	⁵⁹ Fe	⁵⁸ Co	⁶⁰ Co	⁶⁵ Zn	⁹⁵ ZrNb	¹³⁴ Cs	¹³⁷ Cs	¹⁴⁰ BaLa
<u>Location: CA-SWA-OUTFALL 014</u>											
CASW- 619	03/03/21	< 158	< 3.0	< 5.5	< 2.3	< 2.4	< 4.2	< 2.9	< 3.0	< 1.9	< 5.8
Collection discontinued at this location											
<u>Location: CA-SWA-OUTFALL 015</u>											
CASW- 620	03/03/21	< 158	< 2.8	< 7.4	< 2.8	< 2.2	< 5.8	< 5.6	< 3.1	< 3.4	< 7.5
CASW- 2925	09/07/21	< 162	< 1.3	< 2.0	< 1.0	< 1.1	< 3.4	< 2.5	< 1.6	< 2.0	< 2.6

Table 7. Drinking Water Wells, analysis for tritium and gamma-emitting isotopes.

Collection		Concentration (pCi/L)									
Lab Code	Date	³ H	⁵⁴ Mn	⁵⁹ Fe	⁵⁸ Co	⁶⁰ Co	⁶⁵ Zn	⁹⁵ ZrNb	¹³⁴ Cs	¹³⁷ Cs	¹⁴⁰ BaLa
CA-DWA-003 (Ward)											
CADW- 238	1/27/2021	< 159	< 2.9	< 6.6	< 2.4	< 2.1	< 3.5	< 4.1	< 3.2	< 3.2	< 8.1
CADW- 1363	5/4/2021	< 158	< 2.6	< 5.3	< 3.1	< 2.9	< 2.2	< 2.3	< 3.1	< 3.2	< 8.9
CADW- 2397	7/26/2021	< 162	< 3.8	< 6.4	< 2.7	< 2.5	< 4.2	< 3.5	< 4.3	< 2.7	< 2.6
CADW- 3777	11/5/2021	< 162	< 1.6	< 5.3	< 2.7	< 2.4	< 4.3	< 4.7	< 2.3	< 1.9	< 9.4
CA-DWA-004 (Miller)											
CADW- 239	1/26/2021	< 159	< 2.4	< 3.9	< 3.0	< 2.1	< 2.5	< 3.4	< 3.2	< 2.9	< 8.0
CADW- 1364	5/4/2021	< 158	< 2.5	< 7.4	< 2.6	< 1.8	< 3.3	< 3.6	< 2.4	< 3.1	< 5.1
CADW- 2399	7/26/2021	< 162	< 1.6	< 5.0	< 3.1	< 2.2	< 4.2	< 2.7	< 2.8	< 3.0	< 3.0
CADW- 3772	11/5/2021	< 162	< 3.2	< 5.4	< 1.8	< 2.0	< 5.0	< 3.9	< 3.1	< 2.0	< 5.0
CA-DWA-005 (Brucker Bros.)											
CADW- 240	1/26/2021	< 159	< 2.8	< 4.9	< 2.7	< 2.4	< 3.1	< 3.0	< 3.7	< 4.0	< 9.7
CADW- 1369	4/27/2021	< 158	< 0.8	< 4.8	< 1.6	< 1.1	< 4.1	< 3.0	< 1.8	< 1.7	< 8.8
CADW- 2398	7/26/2021	< 162	< 1.7	< 3.6	< 1.4	< 3.0	< 5.8	< 3.9	< 2.8	< 3.1	< 3.5
CADW- 3770	11/1/2021	< 162	< 3.2	< 4.5	< 3.1	< 1.6	< 5.9	< 4.5	< 3.7	< 3.3	< 7.5
CA-DWA-006 (Kuenzel)											
CADW- 241	1/27/2021						NS ^a				
	5/3/2021						NS ^a				
Collection discontinued at this location											
CA-DWA-007 (Kriete)											
CADW- 242	1/26/2021	< 159	< 3.5	< 5.2	< 2.9	< 2.6	< 3.8	< 5.6	< 4.0	< 2.0	< 10.6
CADW- 1371	5/4/2021	< 158	< 3.3	< 4.2	< 3.2	< 1.5	< 5.0	< 3.9	< 3.0	< 3.1	< 10.7
CADW- 2400	7/27/2021	< 162	< 2.3	< 5.8	< 2.4	< 1.6	< 4.9	< 3.0	< 3.0	< 2.9	< 4.3
CADW- 3778	11/5/2021	< 162	< 2.0	< 9.1	< 3.9	< 2.8	< 7.2	< 7.7	< 3.8	< 3.1	< 7.7
CA-DWA-008 (Curry)											
CADW- 3771	11/2/2021	< 162	< 2.3	< 5.5	< 1.8	< 1.9	< 4.3	< 4.7	< 3.2	< 3.0	< 11.1

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

Table 7. Drinking Water Wells, analysis for tritium and gamma-emitting isotopes.

Collection		Concentration (pCi/L)									
Lab Code	Date	³ H	⁵⁴ Mn	⁵⁹ Fe	⁵⁸ Co	⁶⁰ Co	⁶⁵ Zn	⁹⁵ ZrNb	¹³⁴ Cs	¹³⁷ Cs	¹⁴⁰ BaLa
CA-DWA-009 (Clardy)											
CADW- 243	1/26/2021	< 159	< 2.3	< 5.8	< 1.9	< 2.5	< 6.3	< 3.3	< 3.6	< 3.4	< 14.2
CADW- 1366	5/4/2021	< 158	< 3.6	< 4.1	< 4.5	< 1.9	< 2.4	< 3.8	< 4.2	< 3.4	< 9.4
CADW- 2403	7/28/2021	< 162	< 3.2	< 2.5	< 2.2	< 2.2	< 3.7	< 2.2	< 3.1	< 2.7	< 2.3
CADW- 3780	11/5/2021	< 162	< 2.8	< 9.0	< 4.0	< 2.9	< 6.8	< 7.5	< 4.2	< 3.5	< 12.7
CA-DWA-010 (Dillon, Susan)											
CADW- 244	1/26/2021	< 159	< 3.2	< 5.8	< 2.2	< 2.4	< 8.5	< 2.9	< 4.6	< 2.7	< 13.6
CADW- 1367	5/4/2021	< 158	< 2.8	< 10.4	< 2.4	< 2.4	< 2.3	< 5.5	< 3.4	< 3.0	< 11.9
CADW- 2405	7/28/2021	< 162	< 2.9	< 4.4	< 2.6	< 2.7	< 3.6	< 2.5	< 3.6	< 2.6	< 4.7
CADW- 3781	11/5/2021	< 162	< 2.6	< 6.7	< 1.8	< 2.8	< 4.9	< 6.1	< 3.3	< 4.5	< 10.6
CA-DWA-012 (Dillon, Joe)											
CADW- 245	1/26/2021	< 159	< 2.7	< 8.5	< 2.4	< 2.8	< 5.9	< 4.4	< 3.2	< 3.7	< 9.6
CADW- 1358	5/5/2021	< 158	< 3.2	< 5.8	< 1.9	< 2.4	< 3.9	< 4.6	< 2.9	< 4.3	< 5.6
CADW- 2406	7/28/2021	< 162	< 2.2	< 3.9	< 3.6	< 1.8	< 4.4	< 2.8	< 3.2	< 3.2	< 2.3
CADW- 3782	11/5/2021	< 162	< 4.4	< 6.5	< 5.3	< 2.1	< 6.0	< 7.7	< 4.0	< 3.0	< 11.8
CA-DWA-21											
CADW- 246	1/26/2021	< 159	< 3.2	< 5.5	< 3.8	< 1.9	< 2.8	< 4.2	< 3.2	< 3.6	< 7.3
CADW- 1359	5/5/2021	< 158	< 1.1	< 3.2	< 1.4	< 1.1	< 2.5	< 2.2	< 1.2	< 1.0	< 3.3
CADW- 2407	7/28/2021	< 162	< 3.9	< 8.0	< 3.4	< 2.0	< 8.0	< 3.5	< 4.2	< 3.8	< 3.2
CADW- 3783	11/5/2021	< 162	< 2.8	< 6.5	< 2.0	< 2.7	< 6.2	< 6.6	< 3.5	< 2.7	< 12.7
CA-DWA-022 (Plummer)											
CADW- 247	1/26/2021	< 159	< 3.4	< 9.6	< 3.8	< 2.5	< 5.8	< 5.1	< 4.8	< 4.0	< 7.9
CADW- 1360	5/5/2021	< 158	< 1.6	< 3.8	< 1.7	< 1.3	< 2.7	< 3.2	< 1.6	< 0.9	< 4.7
CADW- 2409	7/28/2021	< 162	< 1.2	< 5.3	< 1.4	< 2.4	< 3.3	< 2.2	< 2.7	< 2.8	< 2.3
CADW- 3784	11/5/2021	< 162	< 2.2	< 7.5	< 3.5	< 1.2	< 5.7	< 5.5	< 4.5	< 1.7	< 8.8

Table 7. Drinking Water Wells, analysis for tritium and gamma-emitting isotopes.

Collection		Concentration (pCi/L)									
Lab Code	Date	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- 252	1/27/2021	< 159	< 2.3	< 15.6	< 3.5	< 2.3	< 11.7	< 3.9	< 4.3	< 3.1	< 13.3
CADW- 1362	5/5/2021	< 158	< 2.3	< 3.7	< 2.6	< 2.4	< 3.9	< 4.3	< 3.0	< 3.5	< 8.5
CADW- 2411	7/28/2021	< 162	< 3.8	< 8.0	< 3.3	< 2.0	< 8.0	< 2.5	< 4.4	< 5.1	< 3.8
CADW- 3776	11/5/2021	< 162	< 2.3	< 4.6	< 2.3	< 1.4	< 3.3	< 3.2	< 2.9	< 2.8	< 8.9
CA-DWA-V16											
CADW- 251	1/26/2021	< 159	< 3.5	< 6.4	< 3.0	< 1.8	< 5.5	< 3.3	< 3.1	< 3.1	< 11.9
CADW- 1368	5/4/2021	< 158	< 3.1	< 3.6	< 1.5	< 2.2	< 2.8	< 3.5	< 2.7	< 2.3	< 5.3
CADW- 2410	7/28/2021	< 162	< 2.1	< 2.6	< 2.1	< 1.6	< 3.5	< 1.9	< 2.4	< 2.4	< 3.1
CADW- 3779	11/5/2021	< 162	< 2.6	< 7.2	< 2.3	< 2.4	< 1.6	< 3.0	< 2.8	< 2.9	< 9.2
CA-DWA-D23											
CADW- 248	1/26/2021	< 159	< 3.2	< 10.4	< 3.8	< 2.8	< 7.4	< 7.5	< 3.6	< 3.8	< 14.4
CADW- 1361	5/5/2021	< 158	< 1.8	< 6.3	< 2.8	< 2.8	< 5.1	< 7.1	< 3.4	< 3.8	< 10.9
CADW- 2408	7/28/2021	< 162	< 2.2	< 6.2	< 3.3	< 2.2	< 4.9	< 3.1	< 3.4	< 2.3	< 4.1
CADW- 3785	11/5/2021	< 162	< 1.1	< 6.8	< 2.6	< 1.8	< 4.7	< 4.7	< 3.1	< 3.5	< 4.4
CA-DWA-024											
CADW- 249	1/26/2021	< 159	< 2.5	< 4.3	< 3.0	< 3.0	< 4.9	< 3.9	< 3.8	< 5.0	< 14.6
CADW- 1365	5/4/2021	< 158	< 2.1	< 5.3	< 2.3	< 2.2	< 3.5	< 2.9	< 2.4	< 2.0	< 6.0
CADW- 2402	7/28/2021	< 162	< 3.7	< 8.4	< 3.0	< 2.1	< 4.7	< 3.9	< 4.7	< 3.8	< 3.6
CADW- 3786	11/5/2021	< 162	< 2.7	< 6.8	< 2.7	< 2.3	< 3.3	< 3.6	< 2.9	< 2.8	< 12.6
CA-DWA-025											
CADW- 250	1/27/2021	< 159	< 2.4	< 5.1	< 3.9	< 2.5	< 5.3	< 3.1	< 3.8	< 3.6	< 8.5
CADW- 1370	5/4/2021	< 158	< 3.0	< 6.3	< 2.4	< 2.8	< 2.8	< 3.6	< 3.7	< 2.3	< 11.8
CADW- 2401	7/27/2021	< 162	< 3.2	< 6.6	< 2.8	< 3.5	< 5.7	< 3.5	< 3.8	< 3.0	< 5.1
CADW- 3775	11/2/2021	< 162	< 1.8	< 5.3	< 2.5	< 1.8	< 5.0	< 3.6	< 2.7	< 3.1	< 6.2
CA-DWA-V19 (Dillon, Amy)											
CADW- 3773	11/2/2021	< 162	< 2.0	< 5.7	< 2.2	< 2.3	< 4.7	< 3.0	< 2.6	< 3.6	< 8.9

Table 8. Wells (non-potable), analyses for tritium and gamma-emitting isotopes.

Collection		Concentration (pCi/L)									
Lab Code	Date	³ H	⁵⁴ Mn	⁵⁹ Fe	⁵⁸ Co	⁶⁰ Co	⁶⁵ Zn	⁹⁵ ZrNb	¹³⁴ Cs	¹³⁷ Cs	¹⁴⁰ BaLa
Location: CA-WWA-936											
CAWW- 105	1/11/2021	< 165	< 1.8	< 6.4	< 2.9	< 2.3	< 3.3	< 2.6	< 3.9	< 2.0	< 8.9
CAWW- 421	2/18/2021	243 ± 88	< 3.3	< 10.5	< 2.9	< 3.9	< 9.7	< 4.8	< 5.4	< 5.6	< 5.6
CAWW- 626	3/10/2021	377 ± 94	< 2.8	< 6.7	< 3.9	< 3.0	< 3.6	< 3.3	< 3.8	< 3.6	< 3.9
CAWW- 989	4/12/2021	< 160	< 2.3	< 3.2	< 3.4	< 3.3	< 3.2	< 2.7	< 2.9	< 3.1	< 5.4
CAWW- 1387	5/10/2021	209 ± 85	< 2.2	< 8.9	< 4.6	< 2.5	< 3.2	< 3.4	< 3.7	< 2.4	< 7.0
CAWW- 1814	6/10/2021	258 ± 90	< 3.6	< 6.6	< 4.1	< 2.3	< 3.5	< 5.2	< 4.2	< 4.8	< 4.8
Collection discontinued at this location											
Location: CA-WWA-937B											
CAWW- 106	1/11/2021	< 165	< 3.2	< 6.4	< 2.2	< 2.7	< 6.8	< 3.1	< 2.8	< 3.5	< 7.4
CAWW- 424	2/18/2021 ^a	< 161	< 3.7	< 5.7	< 4.0	< 4.2	< 5.4	< 5.4	< 5.1	< 2.8	< 9.2
CAWW- 627	3/10/2021	< 158	< 3.2	< 4.1	< 3.3	< 1.9	< 4.1	< 2.7	< 3.2	< 2.1	< 6.5
CAWW- 990	4/12/2021	< 160	< 2.6	< 5.9	< 2.8	< 1.2	< 4.4	< 3.8	< 3.1	< 4.5	< 2.7
CAWW- 1385	5/10/2021	< 158	< 2.9	< 4.7	< 3.6	< 1.7	< 3.6	< 3.1	< 3.7	< 4.2	< 11.7
CAWW- 1815	6/10/2021	< 158	< 3.3	< 3.6	< 3.2	< 2.4	< 5.8	< 3.2	< 3.3	< 3.4	< 5.3
CAWW- 2270	7/15/2021	< 156	< 1.4	< 3.6	< 2.6	< 2.6	< 3.4	< 2.7	< 2.5	< 2.6	< 2.3
CAWW- 2635	8/17/2021	< 157	< 2.3	< 6.0	< 2.3	< 2.0	< 3.0	< 2.6	< 3.0	< 1.9	< 4.3
CAWW- 2994	9/13/2021	< 161	< 2.6	< 4.9	< 2.8	< 2.1	< 3.5	< 2.4	< 2.9	< 2.7	< 5.5
CAWW- 3507	10/12/2021	< 163	< 2.6	< 5.2	< 1.6	< 2.2	< 3.0	< 2.3	< 2.5	< 2.0	< 8.1
CAWW- 3823	11/8/2021	< 162	< 2.5	< 6.7	< 2.0	< 2.8	< 3.7	< 4.3	< 2.8	< 2.9	< 7.6
CAWW- 4078	12/8/2021	< 167	< 3.1	< 8.8	< 3.3	< 2.9	< 5.3	< 3.5	< 4.7	< 4.2	< 7.9
Location: CA-WWA-937D											
CAWW- 107	1/11/2021	< 165	< 3.8	< 4.3	< 2.6	< 2.5	< 7.2	< 5.4	< 3.5	< 4.7	< 8.9
CAWW- 416	2/18/2021					ND ^b					
CAWW- 628	3/10/2021	168 ± 83	< 3.1	< 5.3	< 3.1	< 2.5	< 4.8	< 3.6	< 4.1	< 3.0	< 7.4
CAWW- 991	4/12/2021	< 160	< 2.8	< 4.3	< 2.2	< 2.5	< 3.6	< 4.3	< 4.2	< 4.1	< 7.8
CAWW- 1382	5/10/2021	< 158	< 2.3	< 3.2	< 2.0	< 2.2	< 2.3	< 3.5	< 3.4	< 2.7	< 9.0
CAWW- 1816	6/10/2021	202 ± 87	< 1.7	< 2.4	< 2.7	< 2.4	< 3.8	< 2.6	< 2.6	< 3.0	< 4.6
CAWW- 2268	7/15/2021	229 ± 88	< 3.2	< 6.6	< 2.3	< 2.0	< 3.8	< 2.3	< 3.4	< 2.7	< 5.4
CAWW- 2636	8/16/2021	172 ± 83	< 2.3	< 5.6	< 1.6	< 2.6	< 2.6	< 3.2	< 2.8	< 2.3	< 4.9
CAWW- 2998	9/14/2021	195 ± 87	< 4.4	< 8.6	< 3.0	< 2.4	< 3.9	< 4.2	< 4.6	< 4.3	< 3.4
CAWW- 3508	10/13/2021	175 ± 86	< 2.3	< 4.6	< 2.6	< 2.9	< 4.4	< 3.5	< 2.9	< 4.3	< 7.1
CAWW- 3826	11/8/2021	< 162	< 2.6	< 6.0	< 1.8	< 2.5	< 6.4	< 3.4	< 3.0	< 3.1	< 10.6
CAWW- 4080	12/8/2021	< 167	< 2.1	< 4.0	< 2.0	< 1.5	< 5.7	< 2.6	< 3.0	< 2.7	< 5.5

^a Backup sample. Original sample broke during transportation.

^b "ND" = No data, see Part I, Table 5.5, Listing of Missed Samples.

Table 8. Wells (non-potable), analyses for tritium and gamma-emitting isotopes.

Table of WWA (non-potable) analyses for radium and gamma emitting isotopes.											
Collection		Concentration (pCi/L)									
Lab Code	Date	³ H	⁵⁴ Mn	⁵⁹ Fe	⁵⁸ Co	⁶⁰ Co	⁶⁵ Zn	⁹⁵ ZrNb	¹³⁴ Cs	¹³⁷ Cs	¹⁴⁰ BaLa
Location: CA-WWA-939R											
CAWW- 108	1/11/2021	549 ± 104	< 3.5	< 4.3	< 2.5	< 4.5	< 9.0	< 6.1	< 4.3	< 3.0	< 10.1
CAWW- 420	2/18/2021	469 ± 99	< 3.0	< 7.6	< 2.7	< 2.2	< 5.4	< 5.3	< 3.6	< 3.5	< 5.3
CAWW- 629	3/10/2021	613 ± 104	< 3.0	< 8.4	< 3.0	< 2.7	< 4.2	< 4.2	< 4.2	< 3.3	< 8.9
CAWW- 992	4/12/2021	797 ± 114	< 3.7	< 5.8	< 3.0	< 2.2	< 4.5	< 2.1	< 4.0	< 3.3	< 5.0
CAWW- 1386	5/10/2021	926 ± 117	< 2.9	< 4.3	< 2.3	< 2.9	< 4.9	< 3.6	< 4.1	< 3.0	< 7.2
CAWW- 1817	6/10/2021	993 ± 122	< 3.6	< 8.1	< 2.7	< 1.7	< 3.3	< 5.0	< 4.0	< 3.0	< 6.8
CAWW- 2267	7/15/2021	538 ± 103	< 1.5	< 6.3	< 2.4	< 2.2	< 5.6	< 3.0	< 2.9	< 2.5	< 4.3
CAWW- 2637	8/16/2021	608 ± 104	< 3.5	< 5.7	< 2.9	< 2.5	< 2.3	< 3.3	< 3.0	< 3.3	< 3.5
CAWW- 2999	9/14/2021	674 ± 109	< 2.0	< 5.3	< 2.1	< 2.0	< 2.8	< 4.0	< 2.6	< 3.1	< 5.2
CAWW- 3509	10/15/2021	304 ± 92	< 2.4	< 5.0	< 3.4	< 2.7	< 3.2	< 3.6	< 2.9	< 2.5	< 7.9
CAWW- 3828	11/9/2021	371 ± 95	< 2.1	< 5.1	< 2.1	< 2.9	< 6.8	< 4.4	< 2.8	< 3.1	< 10.0
CAWW- 4081	12/10/2021	367 ± 105	< 1.5	< 2.3	< 2.0	< 1.2	< 3.7	< 2.7	< 2.5	< 2.5	< 4.3
Location: CA-WWA-940											
CAWW- 109	1/11/2021	< 165	< 2.9	< 4.9	< 2.7	< 3.2	< 7.5	< 5.0	< 3.2	< 4.1	< 7.5
CAWW- 418	2/18/2021	< 161	< 2.6	< 4.4	< 3.5	< 3.5	< 6.0	< 5.9	< 4.5	< 4.8	< 3.2
CAWW- 630	3/10/2021	< 158	< 2.7	< 7.0	< 4.0	< 2.4	< 4.7	< 3.4	< 4.2	< 3.2	< 7.0
CAWW- 993	4/12/2021	< 160	< 2.2	< 7.6	< 3.7	< 3.6	< 2.1	< 5.0	< 4.3	< 2.7	< 5.9
CAWW- 1384	5/10/2021	< 158	< 3.0	< 7.1	< 3.6	< 2.0	< 4.2	< 6.4	< 3.8	< 2.6	< 11.4
CAWW- 1818	6/10/2021	232 ± 89	< 3.3	< 9.7	< 3.3	< 2.5	< 7.0	< 3.5	< 3.8	< 4.2	< 9.0
CAWW- 2265	7/14/2021	243 ± 89	< 1.2	< 5.4	< 2.3	< 1.7	< 3.3	< 4.3	< 2.8	< 3.4	< 1.9
CAWW- 2638	8/16/2021	234 ± 86	< 1.3	< 2.9	< 2.6	< 2.6	< 4.4	< 3.5	< 2.7	< 3.6	< 3.3
CAWW- 2996	9/13/2021	575 ± 105 ^a	< 2.5	< 4.7	< 1.8	< 1.8	< 3.7	< 3.1	< 3.1	< 4.4	< 2.3
CAWW- 3301	9/13/2021	562 ± 105 ^b	< 1.2	< 3.1	< 0.8	< 1.0	< 2.8	< 2.5	< 1.1	< 1.5	< 5.8
CAWW- 3302	10/8/2021	259 ± 90 ^c	< 3.3	< 11.6	< 4.4	< 2.3	< 6.7	< 4.5	< 4.4	< 5.1	< 4.7
CAWW- 3510	10/13/2021	251 ± 90	< 1.5	< 7.5	< 2.1	< 2.5	< 5.1	< 3.9	< 2.8	< 2.8	< 5.1
CAWW- 3825	11/8/2021	178 ± 85	< 2.2	< 6.3	< 3.7	< 2.4	< 6.3	< 4.8	< 3.0	< 3.0	< 4.1
CAWW- 4082	12/10/2021	190 ± 97	< 1.1	< 4.9	< 2.5	< 2.1	< 5.4	< 2.2	< 2.3	< 2.2	< 4.4

^a Recount = 564 ± 114 pCi/L, reanalysis = 529 ± 113 pCi/L

^b Backup sample

^c Resampling

Table 8. Wells (non-potable), analyses for tritium and gamma-emitting isotopes.

Collection		Concentration (pCi/L)									
Lab Code	Date	³ H	⁵⁴ Mn	⁵⁹ Fe	⁵⁸ Co	⁶⁰ Co	⁶⁵ Zn	⁹⁵ ZrNb	¹³⁴ Cs	¹³⁷ Cs	¹⁴⁰ BaLa
Location: CA-WWA-941											
CAWW- 110	1/11/2021	< 165	< 1.8	< 6.0	< 3.0	< 3.2	< 3.2	< 2.9	< 3.8	< 2.5	< 9.8
CAWW- 417	2/18/2021	< 161	< 3.3	< 4.4	< 2.2	< 3.4	< 7.9	< 5.8	< 4.1	< 4.5	< 7.6
CAWW- 632	3/10/2021	< 158	< 3.5	< 6.9	< 2.0	< 2.2	< 5.2	< 5.9	< 3.0	< 2.6	< 9.2
CAWW- 994	4/12/2021	< 160	< 3.5	< 8.6	< 4.2	< 2.9	< 6.3	< 3.6	< 4.6	< 2.2	< 6.6
CAWW- 1383	5/10/2021	< 158	< 1.9	< 4.7	< 1.6	< 2.2	< 5.5	< 3.7	< 3.2	< 3.1	< 5.3
CAWW- 1819	6/10/2021	237 ± 89	< 1.8	< 4.7	< 1.8	< 1.3	< 3.5	< 2.9	< 1.8	< 1.4	< 3.1
CAWW- 2266	7/15/2021	< 156	< 2.4	< 5.6	< 2.9	< 2.6	< 5.4	< 4.0	< 3.7	< 1.8	< 5.7
CAWW- 2639	8/16/2021	< 157	< 2.3	< 4.9	< 2.9	< 3.4	< 4.6	< 4.0	< 3.6	< 2.3	< 5.4
CAWW- 2997	9/13/2021	< 161	< 2.4	< 5.5	< 3.3	< 2.5	< 1.6	< 2.3	< 2.9	< 2.8	< 5.3
CAWW- 3511	10/14/2021	228 ± 88	< 2.5	< 5.0	< 2.6	< 2.8	< 4.8	< 3.2	< 2.7	< 2.7	< 5.4
CAWW- 3827	11/9/2021	< 162	< 1.8	< 7.0	< 2.8	< 2.6	< 2.9	< 3.8	< 3.6	< 3.1	< 10.7
CAWW- 4083	12/10/2021	< 167	< 4.9	< 9.2	< 4.6	< 1.5	< 5.6	< 5.2	< 4.8	< 5.3	< 4.9
Location: CA-WWA-GWS											
CAWW- 104	1/11/2021	443 ± 99	< 4.0	< 5.4	< 3.2	< 2.0	< 6.3	< 5.8	< 3.5	< 2.8	< 8.5
CAWW- 422	2/18/2021	220 ± 87	< 3.9	< 4.2	< 3.1	< 3.1	< 4.8	< 4.5	< 4.1	< 3.9	< 6.4
CAWW- 625	3/10/2021	182 ± 84	< 3.0	< 6.1	< 3.1	< 2.2	< 5.3	< 4.3	< 2.7	< 4.4	< 8.1
CAWW- 987	4/12/2021	284 ± 92	< 3.0	< 8.1	< 3.6	< 2.3	< 7.9	< 3.3	< 3.6	< 2.8	< 4.2
CAWW- 1388	5/10/2021	191 ± 84	< 3.2	< 5.4	< 4.8	< 3.5	< 5.7	< 6.1	< 4.8	< 2.3	< 8.2
CAWW- 1813	6/10/2021	329 ± 94	< 3.8	< 7.0	< 2.5	< 2.5	< 5.6	< 4.1	< 3.7	< 4.4	< 3.4
CAWW- 2269	7/15/2021	< 156	< 1.6	< 3.1	< 2.2	< 2.5	< 3.8	< 2.6	< 2.5	< 2.9	< 4.2
CAWW- 2634	8/17/2021	250 ± 87	< 2.4	< 4.8	< 1.9	< 2.3	< 3.4	< 3.1	< 2.5	< 2.7	< 3.7
CAWW- 2995	9/13/2021	346 ± 94	< 3.5	< 8.2	< 3.8	< 2.4	< 3.2	< 2.3	< 3.7	< 2.6	< 6.1
CAWW- 3512	10/13/2021	290 ± 92	< 2.4	< 5.0	< 2.4	< 2.2	< 5.6	< 3.2	< 2.8	< 2.7	< 8.1
CAWW- 3824	11/8/2021	285 ± 91	< 2.5	< 9.7	< 3.2	< 2.0	< 4.4	< 4.6	< 3.5	< 3.8	< 8.4
CAWW- 4079	12/8/2021	< 167	< 3.3	< 8.9	< 3.3	< 3.1	< 2.9	< 6.1	< 4.8	< 2.8	< 9.2
ISFSI Sump											
CAWW- 123	1/11/2021	< 165					NR ^a				
CAWW- 1100	4/12/2021	< 159					NR ^a				
CAWW- 2599	8/12/2021	< 157					NR ^a				
CAWW- 3745	10/26/2021	< 162					NR ^a				
Location: CA-WWA-U1MW-001											
CAWW- 190	1/13/2021	< 160	< 4.1	< 4.6	< 2.3	< 2.0	< 4.3	< 3.2	< 3.4	< 3.6	< 8.9
CAWW- 1098	4/5/2021	< 159	< 3.7	< 14.4	< 5.3	< 4.8	< 18.0	< 16.0	< 8.0	< 6.7	< 11.8
Collection discontinued at this location											

^a"NR" = Not required. Analyses for gamma-emitting isotopes not required by the ODCM.

Table 8. Wells (non-potable), analyses for tritium and gamma-emitting isotopes.

Collection		Concentration (pCi/L)									
Lab Code	Date	³ H	⁵⁴ Mn	⁵⁹ Fe	⁵⁸ Co	⁶⁰ Co	⁶⁵ Zn	⁹⁵ ZrNb	¹³⁴ Cs	¹³⁷ Cs	¹⁴⁰ BaLa
Location: CA-WWA-U1MW-002											
CAWW- 124	1/12/2021	< 165	< 4.8	< 5.3	< 4.1	< 2.8	< 6.7	< 5.9	< 4.3	< 3.6	< 8.6
CAWW- 1170	4/16/2021	< 159	< 2.2	< 5.6	< 3.0	< 2.7	< 4.1	< 3.9	< 2.3	< 1.7	< 8.4
Collection discontinued at this location											
Location: CA-WWA-U1MW-004											
CAWW- 114	1/7/2021	< 165	< 2.4	< 5.1	< 4.9	< 4.8	< 10.6	< 4.6	< 4.7	< 2.2	< 12.5
CAWW- 1162	4/13/2021	< 159	< 2.8	< 6.1	< 3.0	< 1.6	< 4.8	< 2.9	< 3.5	< 3.7	< 7.1
CAWW- 2615	8/10/2021	< 157	< 2.4	< 6.0	< 1.6	< 2.0	< 5.3	< 2.5	< 3.0	< 3.2	< 4.6
CAWW- 3760	10/27/2021	< 162	< 3.1	< 3.4	< 1.6	< 2.1	< 7.7	< 3.5	< 3.7	< 3.5	< 4.1
Location: CA-WWA-U1MW-005											
CAWW- 115	1/7/2021	< 165	< 5.5	< 4.8	< 4.8	< 3.1	< 7.1	< 5.7	< 4.8	< 4.7	< 6.7
CAWW- 1164	4/13/2021	< 159	< 2.5	< 4.4	< 1.7	< 1.9	< 3.9	< 3.2	< 2.6	< 3.3	< 2.7
CAWW- 2616	8/9/2021	< 157	< 3.9	< 9.4	< 4.5	< 2.2	< 7.7	< 3.2	< 4.6	< 5.5	< 4.6
CAWW- 3761	10/28/2021	< 162	< 3.4	< 6.3	< 3.6	< 2.0	< 4.8	< 3.9	< 3.3	< 3.5	< 8.1
Location: CA-WWA-U1MW-006											
CAWW- 191	1/13/2021	< 160	< 3.2	< 4.7	< 4.1	< 2.7	< 5.1	< 5.1	< 4.3	< 4.0	< 7.6
CAWW- 1167	4/15/2021	< 159	< 1.7	< 4.9	< 1.9	< 3.2	< 2.9	< 4.8	< 3.6	< 3.4	< 7.9
CAWW- 2617	8/10/2021	< 157	< 3.1	< 6.6	< 2.2	< 2.1	< 4.0	< 3.4	< 2.8	< 2.5	< 5.5
CAWW- 3762	10/27/2021	< 162	< 2.5	< 4.6	< 2.7	< 2.9	< 5.5	< 3.0	< 3.2	< 3.4	< 8.0
Location: CA-WWA-U1MW-010											
CAWW- 126	1/12/2021	< 165	< 2.9	< 4.6	< 2.8	< 2.7	< 3.3	< 4.0	< 3.3	< 3.3	< 7.7
CAWW- 1168	4/15/2021	< 159	< 3.2	< 6.2	< 5.7	< 3.7	< 9.9	< 4.3	< 5.0	< 4.4	< 13.5
CAWW- 2618	8/10/2021	< 157	< 1.9	< 4.7	< 4.1	< 1.1	< 2.8	< 3.5	< 2.8	< 2.7	< 1.9
CAWW- 3763	10/27/2021	< 162	< 3.8	< 9.2	< 5.8	< 2.7	< 4.9	< 3.4	< 4.1	< 3.0	< 3.3
Location: CA-WWA-U1MW-012											
CAWW- 192	1/13/2021	< 160	< 2.8	< 6.3	< 3.5	< 2.7	< 4.3	< 6.3	< 5.1	< 5.3	< 7.2
CAWW- 1166	4/15/2021	< 159	< 2.9	< 5.4	< 2.8	< 3.4	< 6.4	< 5.4	< 3.1	< 3.5	< 10.0
Collection discontinued at this location											
Location: CA-WWA-U1MW-013											
CAWW- 193	1/13/2021	< 160	< 3.4	< 8.4	< 3.7	< 2.3	< 6.1	< 2.7	< 3.3	< 2.6	< 11.1
CAWW- 1165	4/13/2021	< 159	< 1.6	< 2.7	< 3.4	< 2.8	< 3.2	< 3.7	< 3.1	< 3.6	< 5.2
Collection discontinued at this location											

Table 8. Wells (non-potable), analyses for tritium and gamma-emitting isotopes.

Table 1: WWA (non-potable), analyzed for alpha and gamma emitting isotopes											
Collection		Concentration (pCi/L)									
Lab Code	Date	³ H	⁵⁴ Mn	⁵⁹ Fe	⁵⁸ Co	⁶⁰ Co	⁶⁵ Zn	⁹⁵ ZrNb	¹³⁴ Cs	¹³⁷ Cs	¹⁴⁰ BaLa
<u>Location: CA-WWA-U1MW-014</u>											
CAWW- 194	1/19/2021	210 ± 86	< 2.6	< 4.2	< 3.8	< 2.7	< 6.6	< 6.0	< 3.6	< 3.0	< 7.6
CAWW- 1099	4/6/2021	260 ± 89	< 2.8	< 7.2	< 3.3	< 2.5	< 3.8	< 4.1	< 4.1	< 2.9	< 6.2
CAWW- 2619	8/11/2021	282 ± 89	< 1.6	< 6.1	< 3.3	< 3.2	< 2.7	< 3.9	< 3.0	< 2.0	< 5.3
CAWW- 3764	11/1/2021	306 ± 92	< 1.8	< 7.2	< 2.2	< 2.6	< 2.9	< 3.7	< 2.7	< 2.0	< 10.1
<u>Location: CA-WWA-U1MW-015</u>											
CAWW- 116	1/7/2021	< 165	< 4.8	< 6.5	< 2.6	< 2.7	< 6.3	< 8.1	< 4.6	< 4.5	< 9.9
CAWW- 1169	4/16/2021	< 159	< 3.8	< 4.3	< 3.7	< 2.7	< 5.7	< 6.8	< 4.6	< 2.4	< 10.8
CAWW- 2620	8/11/2021	< 157	< 3.8	< 6.8	< 4.1	< 2.3	< 3.0	< 4.7	< 4.1	< 3.7	< 4.5
CAWW- 3765	10/27/2021	< 162	< 2.0	< 6.2	< 1.9	< 3.5	< 3.8	< 3.5	< 3.4	< 4.0	< 5.7
<u>Location: CA-WWA-U1MW-016</u>											
CAWW- 117	1/7/2021	< 160	< 2.7	< 3.8	< 3.3	< 2.9	< 6.9	< 4.2	< 2.9	< 2.8	< 4.6
CAWW- 1161	4/13/2021	164 ± 84	< 3.0	< 3.8	< 2.5	< 3.6	< 5.3	< 5.7	< 4.6	< 2.9	< 7.0
CAWW- 2622	8/11/2021	< 157	< 4.4	< 7.0	< 4.6	< 2.6	< 3.9	< 5.9	< 3.7	< 4.0	< 4.6
CAWW- 3766	10/28/2021	< 162	< 1.8	< 7.3	< 2.8	< 2.3	< 6.4	< 2.9	< 3.1	< 2.1	< 6.7
<u>Location: CA-WWA-U1MW-17</u>											
CAWW- 423	2/9/2021	< 161	< 2.4	< 3.7	< 2.6	< 2.8	< 4.6	< 3.6	< 3.1	< 3.5	< 7.6
CAWW- 1091	4/6/2021	< 159	< 3.7	< 9.3	< 4.3	< 2.3	< 4.8	< 4.3	< 4.5	< 4.7	< 7.5
CAWW- 2623	8/11/2021	< 157	< 1.8	< 5.2	< 2.3	< 2.2	< 3.6	< 2.3	< 2.6	< 3.3	< 5.4
CAWW- 3767	11/1/2021	< 162	< 3.6	< 10.9	< 4.4	< 3.6	< 8.5	< 6.7	< 5.0	< 2.8	< 7.9
<u>Location: CA-WWA-U1MW-18</u>											
CAWW- 195	1/19/2021	< 160					NR ^a				
CAWW- 1092	4/6/2021	< 159					NR ^a				
CAWW- 2601	8/11/2021	< 157					NR ^a				
CAWW- 3744	11/3/2021	< 162					NR ^a				
<u>Location: CA-WWA-U1MW-19</u>											
CAWW- 196	1/19/2021	< 160					NR ^a				
CAWW- 1093	4/6/2021	< 159					NR ^a				
CAWW- 2602	8/11/2021	< 157					NR ^a				
CAWW- 3746	11/1/2021	< 162					NR ^a				

^a "NR" = Not required. Analyses for gamma-emitting isotopes not required by the ODCM.

Table 8. Wells (non-potable), analyses for tritium and gamma-emitting isotopes.

Collection		Concentration (pCi/L)									
Lab Code	Date	³ H	⁵⁴ Mn	⁵⁹ Fe	⁵⁸ Co	⁶⁰ Co	⁶⁵ Zn	⁹⁵ ZrNb	¹³⁴ Cs	¹³⁷ Cs	¹⁴⁰ BaLa
<u>Location: CA-WWA-U1MW-20</u>											
CAWW- 197	1/21/2021	< 160					NR ^a				
CAWW- 1094	4/5/2021	< 159					NR ^a				
CAWW- 2603	8/11/2021	< 157					NR ^a				
CAWW- 3747	11/3/2021	< 162					NR ^a				
<u>Location: CA-WWA-U1MW-31</u>											
CAWW- 120	1/8/2021	200 ± 88					NR ^a				
CAWW- 1174	4/21/2021	243 ± 88					NR ^a				
CAWW- 2604	7/28/2021	269 ± 88					NR ^a				
CAWW- 3748	10/26/2021	508 ± 102					NR ^a				
CAWW- 3748	10/26/2021 ^b	534 ± 105					NR ^a				
CAWW- 3748	10/26/2021 ^c	574 ± 106					NR ^a				
CAWW- 3997	10/26/2021 ^d	556 ± 114	< 2.9	< 9.7	< 3.9	< 3.1	< 6.9	< 7.0	< 3.0	< 2.9	< 23.7 ^e
CAWW- 3998	12/6/2021 ^f	461 ± 110	< 4.2	< 14.4	< 6.7	< 5.8	< 11.8	< 6.1	< 7.5	< 9.6	< 2.9
<u>Location: CA-WWA-U1MW-34</u>											
CAWW- 121	1/8/2021	< 165					NR ^a				
CAWW- 1178	4/21/2021	< 159					NR ^a				
CAWW- 2605	8/4/2021	221 ± 86					NR ^a				
CAWW- 3749	10/27/2021	276 ± 91					NR ^a				
<u>Location: CA-WWA-U1MW-36</u>											
CAWW- 125	1/12/2021	< 165					NR ^a				
CAWW- 1176	4/21/2021	164 ± 84					NR ^a				
CAWW- 2606	8/4/2021	182 ± 84					NR ^a				
CAWW- 3750	10/27/2021	255 ± 90					NR ^a				
<u>Location: CA-WWA-U1MW-39</u>											
CAWW- 113	1/6/2021	< 166					NR ^a				
CAWW- 1177	4/21/2021	< 159					NR ^a				
CAWW- 2607	8/4/2021	< 157					NR ^a				
CAWW- 3752	10/27/2021	< 162					NR ^a				

^a "NR" = Not required. Analyses for gamma-emitting isotopes not required by the ODCM.

^b Recount.

^c Reanalysis.

^d Backup sample.

^e Required LLD not met due to small sample size and analysis delay.

^f Resampling.

Table 8. Wells (non-potable), analyses for tritium and gamma-emitting isotopes.

Collection			Concentration (pCi/L)									
Lab Code	Date	³ H	⁵⁴ Mn	⁵⁹ Fe	⁵⁸ Co	⁶⁰ Co	⁶⁵ Zn	⁹⁵ ZrNb	¹³⁴ Cs	¹³⁷ Cs	¹⁴⁰ BaLa	
Location: CA-WWA-U1MW-47												
	1/7/2021						NS ^a					
CAWW-	1096	4/5/2021	< 159				NR ^b					
CAWW-	2608	8/10/2021	< 157				NR ^b					
CAWW-	3753	10/29/2021	166 ± 85				NR ^b					
Location: CA-WWA-U1MW-58												
CAWW-	122	1/8/2021	< 165				NR ^a					
CAWW-	1175	4/21/2021	234 ± 88				NR ^a					
CAWW-	2609	8/4/2021	161 ± 82				NR ^a					
CAWW-	3754	10/27/2021	225 ± 88				NR ^a					
Location: CA-WWA-U1MW-59												
CAWW-	198	1/21/2021	< 160				NR ^a					
CAWW-	1173	4/21/2021	< 159				NR ^a					
CAWW-	2610	8/12/2021	< 157				NR ^a					
CAWW-	3755	10/27/2021	< 162				NR ^a					
Inside Old Blowdown Pipeline												
CAWW-	199	1/21/2021	< 160				NR ^a					
CAWW-	1172	4/19/2021	< 159				NR ^a					
Collection discontinued at this location												
Location: CA-WWA-U2MW-2S												
CAWW-	118	1/8/2021	< 165				NR ^a					
CAWW-	1097	4/5/2021	< 159				NR ^a					
CAWW-	2611	8/12/2021	< 157				NR ^a					
CAWW-	3756	10/29/2021	< 162				NR ^a					
Location: CA-WWA-U2MW-5S												
CAWW-	111	1/6/2021	< 166				NR ^a					
CAWW-	1101	4/13/2021	< 159				NR ^a					
CAWW-	2612	8/12/2021	< 157				NR ^a					
CAWW-	3757	10/27/2021	< 162				NR ^a					

^a"NS" = No Sample. Unable to collect water, well dry (CR#202100452).

^b"NR" = Not required. Analyses for gamma-emitting isotopes not required by the ODCM.

Table 8. Wells (non-potable), analyses for tritium and gamma-emitting isotopes.

Lab Code	Collection	Concentration (pCi/L)									
	Date	³ H	⁵⁴ Mn	⁵⁹ Fe	⁵⁸ Co	⁶⁰ Co	⁶⁵ Zn	⁹⁵ ZrNb	¹³⁴ Cs	¹³⁷ Cs	¹⁴⁰ BaLa
Location: CA-WWA-U2MW-8											
CAWW- 127	1/12/2021	< 165					NR ^a				
CAWW- 1102	4/13/2021	< 159					NR ^a				
CAWW- 2613	7/28/2021	< 158					NR ^a				
CAWW- 3758	10/25/2021	< 162					NR ^a				
Location: CA-WWA-U2MW-10											
CAWW- 200	1/22/2021	< 160	< 4.0	< 5.1	< 3.9	< 2.2	< 7.3	< 4.0	< 4.2	< 3.2	< 7.6
CAWW- 1103	4/13/2021	< 159	< 2.7	< 6.6	< 3.4	< 2.8	< 6.9	< 3.3	< 4.3	< 3.5	< 10.9
Collection discontinued at this location											
Location: CA-WWA-U2MW-16											
CAWW- 112	1/6/2021	< 166					NR ^a				
CAWW- 1171	4/19/2021	< 159					NR ^a				
CAWW- 2614	8/12/2021	165 ± 83					NR ^a				
CAWW- 3759	10/29/2021	< 162					NR ^a				
Location: CA-WWA-F-005											
CAWW- 176	1/19/2021	< 160	< 2.0	< 4.1	< 2.8	< 2.7	< 6.7	< 3.0	< 4.0	< 3.2	< 8.8
CAWW- 852	3/30/2021	< 156	< 1.5	< 2.5	< 2.9	< 1.6	< 4.8	< 5.1	< 3.2	< 3.1	< 8.4
CAWW- 2135	7/7/2021	< 156	< 2.1	< 3.7	< 3.3	< 2.2	< 5.7	< 3.4	< 3.2	< 4.2	< 2.4
CAWW- 3544	10/19/2021	< 163	< 3.0	< 5.7	< 2.8	< 2.2	< 5.5	< 4.6	< 3.4	< 3.2	< 6.2
Location: CA-WWA-F-015											
CAWW- 177	1/15/2021	< 160	< 2.9	< 4.3	< 3.9	< 3.4	< 3.0	< 5.5	< 4.1	< 3.8	< 4.6
CAWW- 851	3/30/2021	< 156	< 1.1	< 3.3	< 1.9	< 1.5	< 3.0	< 3.3	< 3.4	< 2.9	< 3.5
CAWW- 2136	7/7/2021	< 156	< 3.4	< 7.0	< 4.3	< 2.5	< 5.2	< 2.5	< 4.0	< 4.6	< 2.7
CAWW- 3545	10/19/2021	< 163	< 2.5	< 5.1	< 2.7	< 2.1	< 5.6	< 2.8	< 3.2	< 3.2	< 8.0

^a "NR" = Not required. Analyses for gamma-emitting isotopes not required by the ODCM.

Table 9. Shoreline sediments, analyses for gamma-emitting isotopes.

Collection: Semiannually

Units: pCi/kg dry

Location		CA-AQS-A	
Lab Code	Req. LLD	CASS- 1217	CASS- 3564
Date Collected	-	04-22-21	10-20-21
K-40	-	14517 ± 838	12988 ± 705
Mn-54	-	< 34.6	< 29.9
Fe-59	-	< 60.1	< 76.1
Co-58	-	< 25.9	< 44.1
Co-60	-	< 22.7	< 22.3
Zr-Nb-95	-	< 29.2	< 75.7
Cs-134	150	< 31.4	< 27.9
Cs-137	180	< 33.5	< 30.1
Ba-La-140	-	< 57.9	< 132.1

Location		CA-AQS-C	
Lab Code	Req. LLD	CASS- 1218	CASS- 3565
Date Collected	-	04-22-21	10-20-21
K-40	-	14170 ± 842	12952 ± 662
Mn-54	-	< 34.7	< 18.9
Fe-59	-	< 84.6	< 48.6
Co-58	-	< 32.5	< 22.0
Co-60	-	< 26.7	< 25.3
Zr-Nb-95	-	< 38.6	< 59.8
Cs-134	150	< 30.4	< 16.9
Cs-137	180	< 31.1	< 20.1
Ba-La-140	-	< 33.6	< 51.8

Table 10. Fish, analyses for gamma-emitting isotopes.

Collection: Semiannually

Units: pCi/kg wet

Location		CA-AQF-A				
Lab Code	Req. LLD	CAF- 1243	CAF- 1244	CAF- 1245	CAF- 1246	CAF- 1248
Date Collected		04-22-21	04-22-21	04-22-21	04-22-21	04-22-21
Sample Type		Common Carp CC	Silver Carp SC	River Carpsucker RC	Freshwater Drum FD	Bigmouth Buffalo BB
K-40	-	3829 ± 482	3208 ± 523	3017 ± 610	2826 ± 458	2789 ± 398
Mn-54	130	< 18.1	< 21.0	< 40.9	< 19.8	< 10.6
Fe-59	260	< 53.4	< 38.9	< 77.4	< 57.9	< 40.1
Co-58	130	< 20.6	< 18.0	< 35.1	< 16.4	< 12.6
Co-60	130	< 14.7	< 12.1	< 14.5	< 13.5	< 12.6
Zn-65	260	< 21.6	< 12.6	< 66.8	< 30.8	< 41.2
Cs-134	130	< 21.5	< 22.2	< 30.5	< 24.7	< 14.4
Cs-137	150	< 16.9	< 11.0	< 26.5	< 24.3	< 17.4
Lab Code		CAF- 3553	CAF- 3554	CAF- 3555	CAF- 3556	CAF- 3557
Date Collected		10-20-21	10-20-21	10-20-21	10-20-21	10-20-21
Sample Type		Common Carp CC	River Carpsucker RC	Silver Carp SC	Smallmouth Buffalo SB	Freshwater Drum FD
K-40	-	3082 ± 500	2526 ± 474	3421 ± 420	3108 ± 434	2919 ± 431
Mn-54	130	< 14.7	< 20.9	< 16.2	< 16.0	< 21.3
Fe-59	260	< 76.8	< 45.7	< 46.6	< 65.6	< 40.0
Co-58	130	< 24.6	< 21.8	< 17.9	< 21.3	< 21.0
Co-60	130	< 15.5	< 12.1	< 11.6	< 17.0	< 14.6
Zn-65	260	< 31.7	< 43.9	< 38.4	< 42.7	< 40.5
Cs-134	130	< 25.4	< 22.8	< 20.0	< 16.7	< 23.9
Cs-137	150	< 15.0	< 22.6	< 13.8	< 15.4	< 21.8

Table 10. Fish, analyses for gamma-emitting isotopes.

Collection: Semiannually

Units: pCi/kg wet

Location		CA-AQF-C				
Lab Code	Req. LLD	CAF- 1212	CAF- 1213	CAF- 1214	CAF- 1215	CAF- 1216
Date Collected		04-22-21	04-22-21	04-22-21	04-22-21	04-22-21
Sample Type		Common Carp CC	Silver Carp SC	River Carpsucker RC	Freshwater Drum FD	Bigmouth Buffalo BB
K-40	-	3091 ± 436	2890 ± 445	3273 ± 474	3305 ± 589	2668 ± 417
Mn-54	130	< 24.5	< 20.7	< 22.1	< 29.8	< 23.0
Fe-59	260	< 73.2	< 35.3	< 42.2	< 65.7	< 58.4
Co-58	130	< 18.8	< 26.0	< 18.0	< 21.0	< 26.6
Co-60	130	< 16.0	< 12.7	< 14.0	< 14.0	< 8.3
Zn-65	260	< 36.5	< 30.1	< 51.8	< 40.4	< 41.4
Cs-134	130	< 20.9	< 24.5	< 24.6	< 28.4	< 20.1
Cs-137	150	< 20.0	< 12.0	< 20.8	< 17.5	< 17.9
Lab Code		CAF- 3558	CAF- 3560	CAF- 3561	CAF- 3562	CAF- 3563
Date Collected		10-20-21	10-20-21	10-20-21	10-20-21	10-20-21
Sample Type		Common Carp CC	River Carpsucker RC	Silver Carp SC	Smallmouth Buffalo SB	Freshwater Drum FD
K-40	-	2911 ± 405	3223 ± 398	3076 ± 408	3140 ± 417	3225 ± 449
Mn-54	130	< 13.3	< 20.9	< 19.4	< 14.2	< 27.0
Fe-59	260	< 41.4	< 41.3	< 35.9	< 55.5	< 73.4
Co-58	130	< 25.8	< 20.5	< 15.5	< 16.5	< 28.4
Co-60	130	< 13.5	< 22.9	< 14.4	< 12.8	< 16.3
Zn-65	260	< 38.3	< 40.8	< 27.0	< 33.2	< 51.7
Cs-134	130	< 18.4	< 16.7	< 15.5	< 18.7	< 23.9
Cs-137	150	< 12.2	< 18.8	< 16.9	< 13.5	< 15.4

Table 11a. Direct Radiation (quarterly exposure)

Location	Gamma Dose (mrem/90 days)			
	QTR 1	QTR 2	QTR 3	QTR 4
CA-IDM-1A	14.97	14.69	15.29	15.16
CA-IDM-3	15.89	15.80	15.86	16.70
CA-IDM-5	12.99	13.03	14.11	13.78
CA-IDM-6	14.37	14.79	14.80	15.59
CA-IDM-7	14.60	14.85	15.56	16.28
CA-IDM-9	14.03	14.35	14.21	14.68
CA-IDM-10	15.53	16.29	16.24	16.85
CA-IDM-11A	15.51	16.03	15.98	16.27
CA-IDM-14	14.99	15.15	15.73	16.48
CA-IDM-17	14.21	14.59	14.88	15.37
CA-IDM-18A	15.01	14.80	15.50	16.04
CA-IDM-20	15.46	15.37	16.06	16.95
CA-IDM-21	14.32	14.63	15.25	15.71
CA-IDM-22A	12.04	11.86	12.02	12.83
CA-IDM-23	15.42	16.13	16.36	18.92
CA-IDM-26 (C)	10.17	10.55	10.54	11.41
CA-IDM-27 (C)	15.77	16.08	16.20	17.36
CA-IDM-30A	14.68	14.50	15.49	15.34
CA-IDM-31A	15.48	15.73	16.41	16.64
CA-IDM-32	15.92	17.69	16.85	16.83
CA-IDM-32A	14.38	15.90	14.89	15.17
CA-IDM-33	14.87	16.11	16.14	16.19
CA-IDM-34	14.12	14.08	15.22	14.69
CA-IDM-35	13.28	13.50	14.25	15.10
CA-IDM-36	13.48	13.75	14.56	14.51
CA-IDM-37	14.29	13.73	16.16	15.83
CA-IDM-38	11.39	10.49	9.93	12.04
CA-IDM-39	14.27	14.48	14.31	16.59
CA-IDM-39A	13.81	14.26	15.14	NS ^a
CA-IDM-40	14.97	14.78	15.82	15.67
CA-IDM-41	14.23	14.04	15.69	13.77
CA-IDM-42	12.80	12.79	13.21	16.15
CA-IDM-43	15.28	13.93	15.93	15.58
CA-IDM-44	14.79	14.59	16.10	14.16
CA-IDM-45	14.10	13.65	14.37	16.44
CA-IDM-46	15.66	15.67	16.09	15.72
CA-IDM-47	14.27	14.27	14.53	15.67
CA-IDM-48	14.50	15.08	15.84	13.50
CA-IDM-49	13.50	13.03	14.02	15.69
CA-IDM-50	14.84	14.15	16.54	17.16
CA-IDM-51A	16.19	16.31	16.40	16.66
CA-IDM-52	14.79	15.03	15.78	15.93
CA-IDM-60 (C)	15.04	14.80	15.66	15.16
CA-IDM-61	14.10	14.22	14.72	8.42

^a "NS" = No sample; see Part I Table 5.5, Listing of Missed Samples (CR#202104080).

^b TLD result greater than the 3 standard deviations of the 5 year mean; TLD under investigation. NOTE: after evaluation for ECF result changed to 15.99 mrem/90 days. (CR#202200557)

^c TLD result greater than the 3 standard deviations of the 5 year mean; TLD under investigation. NOTE: evaluation confirmed the result. (CR#202200557)

Table 11b. Direct Radiation Neutron (quarterly exposure)

Location	Neutron Dose (mrem/90 days)			
	QTR 1	QTR 2	QTR 3	QTR 4
CA-IDM-60N (C)	0.0 ± 1.3	0.0 ± 0.8	0.0 ± 0.8	0.0 ± 1.3
CA-IDM-61N	0.0 ± 1.3	0.0 ± 1.0	0.0 ± 1.4	0.0 ± 1.2
CA-IDM-62N	0.0 ± 1.1	0.0 ± 0.6	0.0 ± 0.8	0.0 ± 0.7
CA-IDM-63N	0.0 ± 1.5	0.0 ± 1.2	0.0 ± 1.3	0.0 ± 1.4
CA-IDM-64N	0.0 ± 1.4	0.0 ± 0.9	0.0 ± 1.1	0.0 ± 1.5