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Radiation Environmental Operating Report

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## PREFACE

This Annual Radiological Environmental Operating Report describes the Ameren Missouri, Callaway Energy Center Radiological Environmental Monitoring Program (REMP), and the program results for the calendar year 2013. 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 for 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 2013 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 2013 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 herein described. Results for the year 2013 are summarized and discussed.

For the year, the Callaway Energy Center was operated in compliance with Off Site Dose Calculation Manual (ODCM) and Radiological Effluent Controls (REC) requirements. Comparison of results for 2013 show no significant differences to the historical data. 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. Ambient gamma 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.

In interpreting the data, effects due to operation of the Callaway Energy Center must be distinguished from those due to other sources.

A major interpretive aid in assessment of these effects is the design of the monitoring program at the Callaway Energy Center, based on the indicator-control concept. 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.

An additional interpretive technique involves analyses for specific radionuclides present in the environmental samples collected from the Callaway site. 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 calibration 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, direction, and sector 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 particulates and airborne iodine samples are collected by continuous pumping, at five locations. The airborne particulates are collected on glass fiber filters and the airborne iodine through an activated charcoal cartridge. 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. Samples are analyzed for iodine-131 and gamma-emitting isotopes.

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

Feed crops (soybeans, sorghum, corn) are collected from locations FC-1 through FC-4. FC-1, FC-2 and FC-3 are located on Ameren property, traversed by the discharge pipeline. The samples are collected at harvest and analyzed for tritium and gamma emitting isotopes. FC-4 is a control location, beyond the influence of plant operations. Feed crops are grown for animal feed and not for human consumption.

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

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

Monthly composite samples of surface water from the Missouri River are collected from one indicator location (S02) and from one control location (S01).

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

To monitor possible sources of ground water contamination due to plant operations, non-potable ground water is collected monthly or quarterly from 48 well locations both onsite and along the discharge pipeline. The samples are analyzed for tritium and gamma-emitting isotopes.

Potable well water samples are collected quarterly from the plant drinking water supply, neighboring property owners, and from the town of Portland, MO.

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

### 3.2 Program Description (continued)

Another pathway considered is direct ambient gamma radiation. This exposure is monitored by thermoluminescent dosimeters (TLDs), at forty-three locations in and around the Callaway site. The TLDs are placed in 16 sectors around the plant as specified in the ODCM-RECS. Three locations are designated as controls (IDM-26, IDM-27 and IDM-60). TLDs are placed at each location and exchanged and analyzed quarterly.

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

### 3.3 Program Execution

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

#### (1) Surface Water:

The surface water samples are composites of daily collections by automatic river sampler from two locations, S01 and S02. Sampler down-time at S01 was approximately 28.7 days; the sampler at S02 was out-of service approximately 21.9 days. During sampler downtimes, composites of daily grab samples were prepared and submitted for analysis.

#### (2) Ground Water:

No ground water samples were available from monitoring well U1MW-28 for the first, third and fourth quarters, 2013. A second quarter sample was collected and analyzed for tritium and gamma emitting isotopes. Sampling has been intermittent since installation in 2010. The well is normally dry, since the area is rocky, with only a shallow overburden of clay. U1MW-28 was installed specifically to monitor for leakage from the single vacuum breaker on the discharge pipeline.

#### (3) Milk:

A scheduled bimonthly collection of milk from location M-9 was not available April 22, 2013, the cow was not yet on pasture.

#### (4) Broadleaf Vegetation:

Edible broadleaf vegetation, collected at three of the five area gardens was available for harvest from June through October, 2013. Location V-16 did not produce until July, and location V-17 reached the end of its season with the September sampling. Missing samples during the periods when the gardens were producing are listed in Table 2.0.

The growing season is defined as April 1 through October 31 (ref: Hammer, Gregory R.). A vegetation sample unavailable after October 31 is not considered a missed sample.

Program Execution (continued)

(5) Air Iodine and Particulates

A partial air particulate / air iodine sample (219 m<sup>3</sup>) was collected at location A-1 for the week ending 02/28/13. A power interruption resulted in a reduced run-time of approximately 27 hours. (This is documented in the Callaway corrective action program as CAR 201301416.)

The air sampler at station A-9 failed during the week ending 05/23/13. The sampler pump was replaced. (This is documented in the Callaway corrective action program as CAR 201304219)

No sample was available from air sampler station B-3 for the week ending 08/01/13. The station lost power after an estimated run-time of 66.8 hours. After exchange of the particulate filters and charcoal cartridges, the pump was restarted. (This is documented in the Callaway corrective action program as CAR 201306073)

(6) Direct Radiation:

From March 12 through April 5, 2013, first quarter dosimeters from location IDM-44 were missing, due to a utility pole change out (This is documented in the Callaway corrective action program as CAR 201302384). The TLDs were recovered and read, but do not reflect the true exposure for the location during the missing weeks.

TLD and fade dosimeters placed at location IDM-32A were missing for the 2nd quarter, 2013. The TLDs were replaced. Vandalism is suspected. (This is documented in the Callaway corrective action program as CAR 201305426.)

3.4 Laboratory Procedures

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

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

Tritium was measured by liquid scintillation.

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

Environmental, Inc., Midwest Laboratory has a comprehensive quality control/quality assurance program designed to assure the reliability of data obtained. Details of the QA Program are presented elsewhere (Environmental, Inc., Midwest Laboratory, 2012). The QA Program includes participation in Interlaboratory Comparison (crosscheck) Programs. Results obtained through Quality control samples and crosscheck program results are presented in Appendix A.

Environmental TLDs are processed by Stanford Dosimetry, LLC.

### 3.5 Program Modifications

1. For the 2013 growing season, vegetation sampling location V-17 replaced station V-14, due to a history of poor performance.

### 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 2013, the survey was conducted within a five mile canvassing radius of the Callaway Energy Center. The location of the nearest resident, milking animal, and broadleaf vegetation garden greater than 50 square meters was identified by contacting residents by phone, mail and/or in field surveys for each of the sixteen meteorological sectors using the midpoint of the two units.

The Land Use Census was completed on October 30, 2013. 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, determined by a Global Positioning System (GPS) receiver.

The census includes identification of drinking water wells along Mud Creek, Logan Creek and along the discharge pipeline corridor. No new drinking water wells were identified in 2013.

No irrigation or drinking water intakes were found within 10 river miles downstream of the plant discharge point.

## 4.0 RESULTS AND DISCUSSION

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

Results are summarized in Table 5.6 as recommended by the Nuclear Regulatory Commission. For each type of analysis and sample medium, the table lists the mean and range of all indicator and control locations, as well as that location with the highest mean and range.

The tabulated results of all measurements are not included in this section, although references to these results will be made in the discussion. A complete tabulation of results for 2013 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

There were no reported accidents involving significant release to the environment at nuclear reactor facilities in 2013. The Fukushima Daiichi nuclear accident occurred March 11, 2011.

There were no reported atmospheric nuclear tests in 2013. The last reported atmospheric test was conducted on October 16, 1980 by the People's Republic of China.

### 4.2 Program Findings

Results obtained show background levels of radioactivity in environmental samples collected beyond the plant property boundary in 2013. Tritium was identified in some groundwater samples collected within the Plant Protected Area and on Ameren property in the Missouri River alluvial plain. In no instances were REMP threshold reporting levels exceeded.

#### Airborne Particulates

The five air particulate sampling stations (A1, A7, A8, A9, and B3) are indicator locations. Station A-9 is located in Reform, MO, the community with the highest D/Q, station A-7 is on the outskirts of Fulton, Missouri, approximately 9.5 miles from the plant.

Gamma spectroscopic analysis of the air particulate filters yielded similar results for all locations. In 84 of the 258 samples tested, Beryllium-7 measured above an LLD value of  $0.16 \text{ pCi/m}^3$ , with an average activity of  $0.22 \text{ pCi/m}^3$ . Beryllium-7 is produced continuously in the upper atmosphere by cosmic radiation. No gamma emitting isotopes of plant origin were identified.

#### Airborne Iodine

There was no I-131 activity detected in weekly collections of charcoal canister samples. All measurements were below the required lower limit of detection (LLD) of  $0.070 \text{ pCi/m}^3$ .

#### Direct Radiation (TLDs)

Forty-three TLDs were placed in 16 sectors around the Callaway site. Measurements from forty indicator locations averaged 16.1 mrem/quarter and the three control locations averaged 14.8 mrem/quarter. Readings ranged from 10.9 to 19.3 mrem /quarter, with the highest from the control location CA-IDM-11A, averaging 17.7 mrem/quarter. The differences are statistically insignificant.

The TLD readings were consistent with previously accumulated data and no effect from plant operation was identified.

4.2 Program Findings (continued)

Milk

Iodine-131 results were below the detection limit of 0.5 pCi/L in all samples.

No gamma-emitting isotopes, excepting naturally occurring potassium-40, were detected in milk. Average potassium-40 activity measured 1135 pCi/L and ranged from 921–1467 pCi/L.

In summary, milk data for 2013 show no radiological effects of plant operation.

Vegetation

There was no I-131 activity detected in broadleaf vegetation samples. Measurements were below an LLD level of 46.3 pCi/kg wet weight in all samples.

Except for naturally-occurring potassium-40, which was observed in all vegetation samples, gamma-emitting isotopes were below detection limits. No effect from plant operation is indicated.

Non-Food Crops

Soybeans and sorghum samples were collected in October, 2013, and analyzed for tritium and gamma-emitting isotopes.

No tritium activity was measured above a detection level of 154 pCi/L in any of the samples.

Potassium-40 activity varied dependent on sample type. Sorghum samples averaged 3,401 pCi/kgwet, versus soybeans with an average of 16,036 pCi/kgwet. All other gamma-emitting isotopes measured below detection limits.

No effect from the plant operation is indicated.

Fish

Edible portions of fish were analyzed by gamma spectroscopy. The potassium-40 averages were almost identical at indicator and control locations (2,930 and 2,901 pCi/kg wet, respectively). All other gamma-emitting isotopes measured below detection limits.

No plant effect on the fish population is indicated.

Soil

Cesium-137 activity was detected at both indicator and control locations, at average concentrations of 331 and 98 pCi/kg dry, respectively. The cesium-137 activity is similar to or less than levels observed from 1999 through 2012, these levels are generally attributable to the deposition of fallout from previous decades.

Naturally-occurring potassium-40 averaged 10,464 pCi/kg dry weight.

Analysis results for soil samples in 2013 were consistent with previously accumulated data and no plant operational effects were identified.

4.2 Program Findings (continued)

### Surface Water

Low-level tritium activity above a detection limit of 188 pCi/L was observed in four of the twelve samples collected from the downstream location S-02. The measurements averaged 596 pCi/L.

Gamma-emitting isotopes measured below detection limits and were consistent with previously accumulated data.

### Surface Water, Ponds

To monitor possible sources of groundwater contamination due to plant operations, ten onsite surface water locations (SWA) have been included in the permanent REMP. There was no tritium activity measured above a detection level of 157 pCi/L in any of the samples. In previous years, low-level tritium activity detected was believed to be the result of washout from gaseous effluents.

Gamma-emitting isotopes measured below detection limits. No plant operational effects were identified.

### Drinking Water Wells (potable water)

In addition to potable ground water from wells D-01 and PW-01, the REMP includes nine additional potable water wells from adjacent properties and one additional potable water well from the town of Portland, MO. The samples were analyzed for tritium and gamma-emitting isotopes.

No tritium activity was measured above a detection level of 150 pCi/L in any of the samples. All gamma-emitting isotopes were below detection limits.

Analysis results for drinking water samples were consistent with previously accumulated data and no plant operational effects were indicated.

### Wells (non-potable water)

Ground water from wells F-05 and F-15 was tested for tritium and gamma-emitting isotopes. Both tritium and gamma-emitting isotopes measured below detection levels.

Forty-six additional indicator ground water locations, on-site and along the discharge pipeline, are included in the REMP. Tritium activity (above a detection limit of 165 pCi/L) was detected in 75 of the 285 samples tested, with an average activity of 278 pCi/L. The highest concentrations were measured at OW-5 (UHS pond berm), with an average activity of 340 pCi/L.

Wells OW-4, OW-5, GWS, 936, 937A to 937F, 938, 939, 940 and 941 are located in the Plant Protected Area, adjacent to the powerblock. Tritium in wells OW-4 and OW-5 is believed to be historical tritium due to river water recycle of tritium in liquid effluents. Tritium activity in the remainder of these wells is believed to be the result of washout from gaseous effluents.

The low level tritium activity observed in wells MW-014, MW-018 and MW-019 is due to residual low level contamination of the area down gradient from manholes 5 and 6B. The contamination was caused by moisture carryover during normal operation of air release valves (ARVs) in the now-retired discharge pipeline. The exhaust of the ARV's was secured in 2007, and the pipeline was replaced in 2008. The new discharge pipeline has no ARV's and only a single vacuum breaker, which is completely contained to prevent possible leakage to the ground water. The old pipeline has been abandoned in place. The contamination is being remediated by monitored natural attenuation. There are no active leaks.



4.2 Program Findings, Wells and Ponds (non-potable water, continued)

Wells have been established along the pipeline corridor to monitor the old pipeline and to ensure there is no leakage from the new pipeline. Monitored natural attenuation will be utilized to remediate the low level residual tritium contamination.

Samples were also analyzed for gamma-emitting isotopes. No gamma-emitting activities were detected above the respective LLDs.

Sediments

Bottom sediments were collected in May and October, 2013, and analyzed for gamma-emitting isotopes. A low level of cesium-137 was detected in one of the two control samples at a concentration of 30 pCi/kg dry weight, but measured below detection limits at the indicator location. Potassium-40 activity ranged from 11,187 to 13,456 pCi/kg dry weight and averaged 12,528 pCi/kg dry weight.

Shoreline sediments were also collected in May and October, 2013. No cesium-137 activity was detected at either the control or indicator locations. Potassium-40 activity ranged from 12,222 to 13,943 pCi/kg dry weight and averaged 13,174 pCi/kg dry weight.

Potassium-40 is a naturally occurring isotope. The slight cesium-137 activity observed is indicative of the influence of fallout deposition. All other gamma-emitting isotopes were below detection limits. No effect from the plant operation is indicated.

5.0 TABLES AND FIGURES

**Table 5.1. Sampling Locations.**

Location Code	Distance / Direction <sup>1</sup>	Description	Sample Types <sup>2</sup>
1a	10.8 mi. NW	City of Fulton on Hwy Z, 0.65 mi. E of Bus. 54, W of Campus Apartments.	IDM
3	1.2 mi. NW	0.1 mi. West of Hwy CC on Gravel Rd., 0.8 mi. South Hwy O, Pole No. 18559.	IDM
5	1.3 mi. ENE	Primary Meteorological Tower.	IDM
6	2.0 mi. W	Cty Rd. 428, 1.2 mi. West of Hwy CC, Utility Pole No. 18609.	IDM
7	1.4 mi. S	Cty Rd. 459, 2.6 mi. North of Hwy 94, Utility Pole No. 35097.	IDM
9	3.8 mi. S	NW Side of the Cty Rd. 459 and Hwy 94 Junction, Utility Pole No. 06754.	IDM
10	3.9 mi. SSE	Hwy 94, 1.8 mi. East of Cty Rd. 459, Utility Pole No. 12182.	IDM
11a	4.7 mi. SE	City of Portland, Utility Pole No. 12110.	IDM
14	4.9 mi. ESE	SE Side of Intersection D and 94, Utility Pole No. 11940.	IDM
17	3.8 mi. E	Cty Rd. 4053, 0.3 mi. E of Hwy 94, Kingdom Telephone Co., Pole No. 3X12.	IDM
18a	3.7 mi. ENE	East side of Hwy D, 0.5 mi. South of O, Utility Pole No. 38579.	IDM
20	4.7 mi. NE	City of Readsville, Utility Pole No. 12830.	IDM
21	3.8 mi. NNE	Cty Rd. 155, 1.9 mi. North of Hwy O, Utility Pole No. 19100.	IDM
22a	1.9 mi. NNE	North side of Hwy O, 100 feet East of Cty Rd. 150, Utility Pole No. 31094.	IDM
23	6.6 mi. NNE	City of Yucatan, Utility Pole No. 12670.	IDM
26 <sup>3</sup>	11.7 mi. E	Town of Americus, Utility Pole No. 11159.	IDM
27 <sup>3</sup>	9.3 mi. ESE	Town of Bluffton, Utility Pole No. 11496.	IDM
30a	4.4 mi. SSW	City of Steedman, Utility Pole No. 06557.	IDM
31a	7.8 mi. SW	City of Mokane, Hwy C and Cty Rd. 400, 0.9 mi. North of Hwy 94, Utility Pole.	IDM
32	5.4 mi. WSW	Hwy VV, 0.6 mi. West of Cty Rd. 447, Utility Pole No. 27031.	IDM
32a	5.0 mi. WSW	Cty Rd. 447, Utility Pole No. 06354.	IDM
33	7.4 mi. W	City of Hams Prairie, SE of Hwy C and AD Junction.	IDM
34	9.5 mi. WNW	NE Side of Hwy C and Cty Rd. 408 Junction.	IDM
35	5.8 mi. NNW	City of Toledo, Utility Pole No. 17684.	IDM
36	4.9 mi. N	Cty Rd. 155, 0.8 mi. South of Cty Rd. 132, Utility Pole No. 19137	IDM
37	0.5 mi. SSW	Cty Rd. 459, 0.9 mi. South of Hwy CC, Utility Pole No. 35077.	IDM
38	4.6 mi. NNW	Cty Rd. 133, 1.5 mi. South of Hwy UU, Utility Pole No. 34708.	IDM
39	5.4 mi. NW	Cty Rd. 111, Utility Pole No. 17516.	IDM
39a	5.0 mi. NW	Cty Rd. 111, Utility Pole No. 17526.	IDM
40	4.2 mi. WNW	NE Side of Cty Rd. 112 and Hwy O, Utility Pole No. 18145.	IDM
41	4.9 mi. W	Hwy AD, 2.8 mi. East of Hwy C, Utility Pole No. 18239.	IDM
42	4.4 mi. SW	Cty Rd. 447, 2.6 mi. North of Cty Rd. 463, Utility Pole No. 06326.	IDM
43	0.5 mi. SW	Cty Rd. 459, 0.7 mi. South of Hwy CC, Utility Pole No. 35073.	IDM
44	1.7 mi. WSW	Hwy CC, 1.0 mi. South of Cty Rd. 459, Utility Pole No. 18769.	IDM
45	1.0 mi. WNW	Cty Rd. 428, 0.1 mi. West of Hwy CC, Utility Pole No. 18580.	IDM
46	1.5 mi. NNW	NE Side of Hwy CC and Cty Rd. 466 Intersection, Utility Pole No. 28242.	IDM
47	1.0 mi. N	Cty Rd. 448, 0.9 mi. South of Hwy O, Utility Pole No. 28151.	IDM
48	0.4 mi. NE	Cty Rd. 448, 1.5 mi. South of Hwy O, Plant Security Sign Post.	IDM
49	1.6 mi. E	Cty Rd. 448, Utility Pole No. 06959, Reform Wildlife Mgmt. Parking Area.	IDM
50	0.9 mi. SSE	Cty Rd. 459, 3.3 mi. North of Hwy 94, Utility Pole No. 35086	IDM
51a	0.3 mi. SE	Owner Control Fence, SE of the Water Treatment Plant.	IDM
52	0.4 mi. ESE	Light Pole Near the East Plant Security Fence.	IDM
60 <sup>3</sup>	13.5 mi. SW	Utility Pole No. 43744, just past Tebbetts City sign.	IDM

**Table 5.1. Sampling Locations continued.**

Location Code	Distance / Direction <sup>1</sup>	Description	Sample Types <sup>2</sup>
A1	1.3 mi. ENE	Primary Meteorological Tower.	APT, AIO
A7	9.5 mi. NW	C. Bartley Farm, Fulton, MO.	APT, AIO
A8	0.9 mi. NNE	Cty Rd. 448, 0.9 miles South of Hwy 0.	APT, AIO
A9	1.9 mi. NNW	Community of Reform.	APT, AIO
B3	1.8 mi. NNW	0.3 mi. East of the O and CC Junction, Utility Pole No. 50422.	APT, AIO
D01	5.0 mi. SE	Holzouser Grocery Store/Tavern (Portland, MO).	DWA
PW1	Onsite	Unit 1 Construction well #3	DWA
F05	0.9 mi. SSE	Offsite Groundwater Monitoring well.	WWA
F15	0.4 mi. NNE	Onsite Groundwater Monitoring well.	WWA
M9 <sup>3</sup>	13 mi. SW	Ferguson Farm, Tebbetts, MO.	MLK, SOL
V9	1.9 mi. WNW	Meehan Farm, Steedman, MO	FPL
V11	3.2 mi. NW	Hickman Farm, Steedman, MO	FPL
V12 <sup>3</sup>	18.7 mi. WSW	Kissock Farm, South of New Bloomfield, MO	FPL
V16	1.6 mi. WSW	Wallendorf Farm, Steedman, MO	FPL
V17	1.8 mi. NNW	West Residence, Steedman, MO	FPL
A <sup>3,4</sup>	4.9 mi. SSE	0.6 River Miles Upstream of Discharge North Bank.	AQS, AQF
C <sup>4</sup>	4.9 mi. SE	1.0 River Miles Downstream of Discharge North Bank.	AQS, AQF
S01 <sup>3</sup>	4.8 mi. SSE	555 feet Upstream of Discharge North Bank.	SWA
S02	4.9 mi. SE	1.1 River Miles Downstream of Discharge North Bank.	SWA
F2	1.0 mi. SW	Callaway Plant Forest Ecology Plot F2.	SOL
F6	1.6 mi. NE	Callaway Plant Forest Ecology Plot F6.	SOL
PR3	0.95 mi. ESE	Callaway Plant Forest Ecology Plot PR3.	SOL
PR7	0.46 mi. NNW	Callaway Plant Forest Ecology Plot PR7.	SOL
W1 <sup>3</sup>	0.52 mi. SE	Callaway Plant Wetlands, High Ground.	SOL
W2	0.52 mi. SSE	Callaway Plant Wetlands, Inlet Area.	SOL
W3	0.65 mi. SSE	Callaway Plant Wetlands, Discharge Area.	SOL
W4	0.63 mi. SSE	Callaway Plant Wetlands, SW Bank.	SOL
FC1	-	Between discharge pipeline MH-8 and the Katy Trail	FC
FC2	-	Between discharge pipeline MH-5 and MH-3B.	FC
FC3	-	Between Hwy 94 and the barge loading dock access road.	FC
FC4 <sup>3</sup>	-	Location unlikely to be influenced by Plant operations.	FC
3	2.9 mi. SSE	Potable water, County Road 448	DWA
4	2.6 mi. SSE	Potable water, County Road 448	DWA
5	2.5 mi. SSE	Potable water, County Road 448	DWA
6	2.2 mi. SE	Potable water, County Road 448	DWA
7	2.1 mi. ESE	Potable water, County Road 448	DWA
8	3.4 mi. SSW	Potable water, County Road 457	DWA
9	2.9 mi. SSW	Potable water, County Road 457	DWA
10	2.7 mi. SSW	Potable water, County Road 457	DWA
12	3.6 mi. SSE	Potable water, County Road 464	DWA
22	4.8 mi. SE	Potable water, State Road 94	DWA

**Table 5.1. Sampling Locations, Wells and Ponds (non-potable water).**

<b>Location Code</b>	<b>Distance / Direction <sup>1</sup></b>	<b>Description</b>	<b>Sample Types <sup>2</sup></b>
OW-4	Inside OCA	UHS Pond Berm	WWA
OW-5	Inside OCA	UHS Pond Berm	WWA
U1MW-001	0.3 mi. NNW	Outside OCA , Groundwater Monitoring Well	WWA
U1MW-002	0.4 mi. SSW	Outside OCA , Groundwater Monitoring Well	WWA
U1MW-004	3.7 mi. SSE	Dillon, Groundwater Monitoring Well	WWA
U1MW-005	3.8 mi. SSE	Brownlee / Hudson, Groundwater Monitoring Well	WWA
U1MW-006	3.0 mi. S	Ward, Groundwater Monitoring Well	WWA
U1MW-010	3.1 mi. S	Pipeline, Groundwater Monitoring Well	WWA
U1MW-012	3.0 mi. S	Ward, Groundwater Monitoring Well	WWA
U1MW-013	0.8 mi. SSE	Pipeline Corridor	WWA
U1MW-014	3.7 mi. S	Pipeline Corridor	WWA
U1MW-015	3.9 mi. SSE	Pipeline Corridor	WWA
U1MW-016	4.5 mi. SSE	Pipeline Corridor	WWA
U1MW-017	3.75 mi. S	Pipeline Corridor	WWA
U1MW-018	3.75 mi. S	Pipeline Corridor	WWA
U1MW-019	3.71 mi. S	Pipeline Corridor	WWA
U1MW-020	3.88 mi. SSE	Pipeline Corridor	WWA
U1MW-021	3.74 mi. S	Down gradient of Pipeline Corridor	WWA
U1MW-022	3.76 mi. S	Down gradient of Pipeline Corridor	WWA
U1MW-023	3.84 mi. S	Down gradient of Pipeline Corridor	WWA
U1MW-024	3.85 mi. S	Down gradient of Pipeline Corridor	WWA
U1MW-025	3.93 mi. S	Down gradient of Pipeline Corridor	WWA
U1MW-026	3.94 mi. S	Down gradient of Pipeline Corridor	WWA
U1MW-027	1.5 mi. S	Pipeline Corridor, downgrade of discharge vacuum breaker	WWA
U1MW-028	3.15 mi. S	Pipeline Corridor, downgrade of MH-9B	WWA
U1MW-029	0.2 mi. E	Down gradient of DMTdischarge piping	WWA
U1MW-030	0.2 mi. ESE	Down gradient of DMTdischarge piping	WWA
GWS	Inside OCA	Ground Water Sump, Plant East of containment and SFPB	WWA
936	Inside OCA	Diesel Fuel Remediation Well, Plant SE of SFPB	WWA
937A	Inside OCA	Monitoring Well, Plant, South of the Powerblock area	WWA
937B	Inside OCA	Monitoring Well, Plant, East of the Turbine Bldg.	WWA
937C	Inside OCA	Monitoring Well, Plant, E of Radwaste Bldg Drum Storage.	WWA
937D	Inside OCA	Monitoring Well, Plant, South of Discharge Monitor Tanks.	WWA
937E	Inside OCA	Monitoring Well, Plant, West of Auxilliary Bldg.	WWA
937F	Inside OCA	Monitoring Well, Plant, East of the Turbine Bldg.	WWA
MW-938	Inside OCA	Monitoring Well, Plant, East of the Powerblock area	WWA
MW-939R	Inside OCA	Monitoring Well, Plant, West of the Fuel Bldg.	WWA
MW-940	Inside OCA	Monitoring Well, Plant, East of the Radwaste Bldg.	WWA
MW-941	Inside OCA	Monitoring Well, Plant, East of the Radwaste Bldg.	WWA
U2 MW-2S	1.8 mi. N	Groundwater Monitoring Well	WWA
U2 MW-5S	1.1 mi. E	Groundwater Monitoring Well	WWA
U2 MW-8	0.4 mi. N	Groundwater Monitoring Well	WWA
U2 MW-9	0.3 mi. W	Groundwater Monitoring Well	WWA
U2 MW-10	0.4 mi. SSW	Groundwater Monitoring Well	WWA

**Table 5.1. Sampling Locations, Wells and Ponds (non-potable water).**

<b>Location Code</b>	<b>Distance / Direction <sup>1</sup></b>	<b>Description</b>	<b>Sample Types <sup>2</sup></b>
U2 MW-12	0.5 mi. ENE	Groundwater Monitoring Well	WWA
U2 MW-16	2.9 mi. SSE	Groundwater Monitoring Well	WWA
UHS	Inside OCA	UHS Pond	SWA
Unit 2 Pond	Inside OCA	Unit 2 Pond	SWA
POND 01	0.6 mi. W	Fishing Pond	SWA
POND 02	0.7 mi. SW	Fishing Pond	SWA
Outfall 010	0.6 mi. NE	Stormwater Run-Off Pond	SWA
Outfall 011	1.0 mi. ENE	Stormwater Run-Off Pond	SWA
Outfall 012	0.5 mi. S	Stormwater Run-Off Pond	SWA
Outfall 013	0.5 mi. S	Stormwater Run-Off Pond	SWA
Outfall 014	0.6 mi. NNW	Stormwater Run-Off Pond	SWA
Outfall 015	0.7 mi. N	Stormwater Run-Off Pond	SWA
Sludge Lagoon # 4	0.8 mi. SSE	On service Sewage Sludge Lagoon	SWA

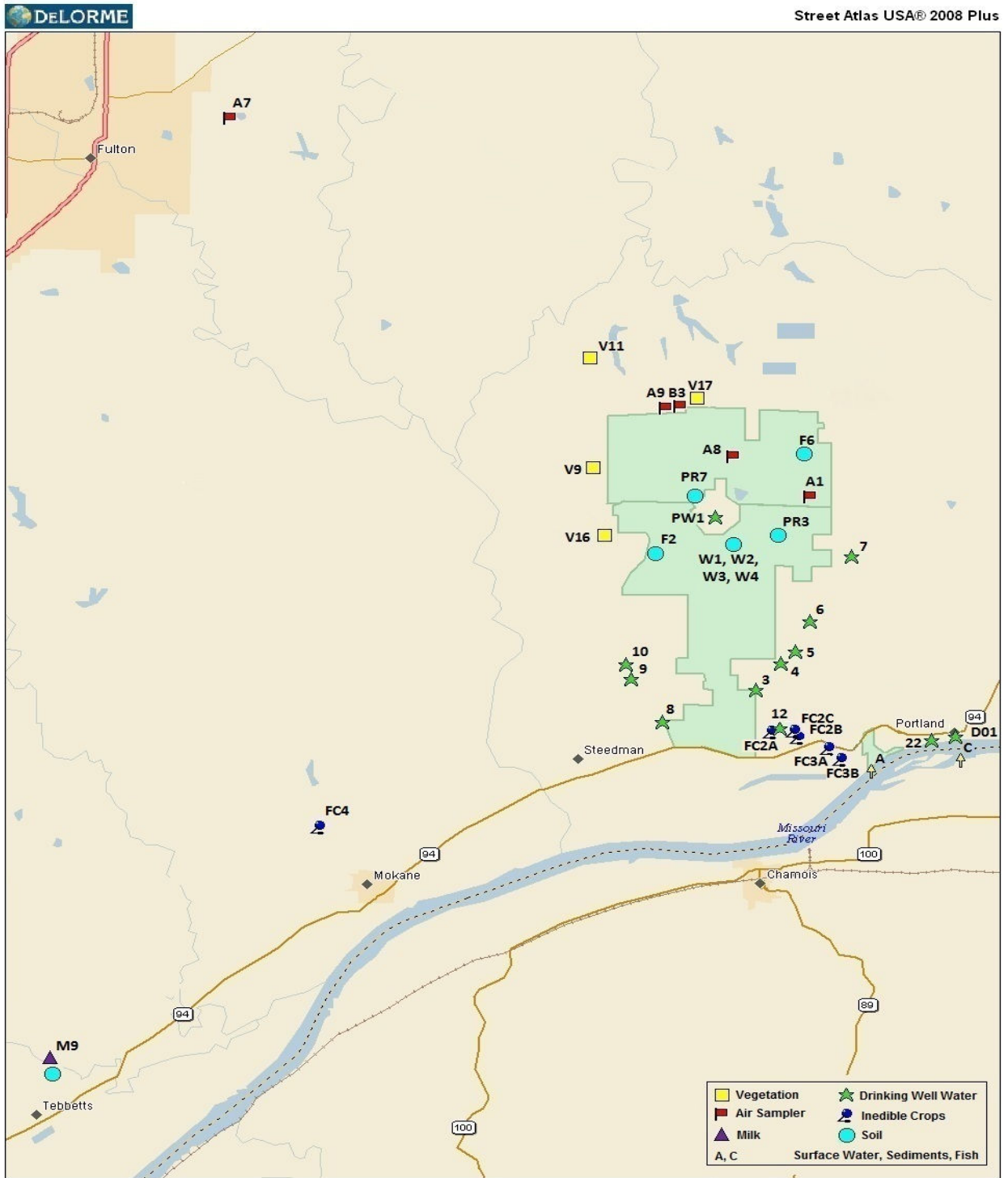
<sup>1</sup> Distances are measured from the midpoint of the two reactors as described in Final Safety Analysis Report (FSAR) Sec. 2.1.1.1.

<sup>2</sup> 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.

<sup>3</sup> Control Location.

<sup>4</sup> The fish collection area for location "A" is between 0.6 and 3.0 river miles upstream of the plant discharge on the north bank. Location "C" is sampled between the discharge area and 1.5 miles downstream of the discharge, on the north bank. The expanded collection areas provide sufficient habitat to collect the required number of species.

**Figure 5.1. REMP Sampling Locations for Air, Drinking Well Water, Milk and Edible Vegetation, Non-Food Crops, Soil, Fish, Sediment and Surface Water.**



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★  
MN (0.2° E)

0 1 2 3 mi  
Data Zoom 10-8

**Figure 5.2a. Direct Radiation Monitoring Stations, Inner Ring Locations.**

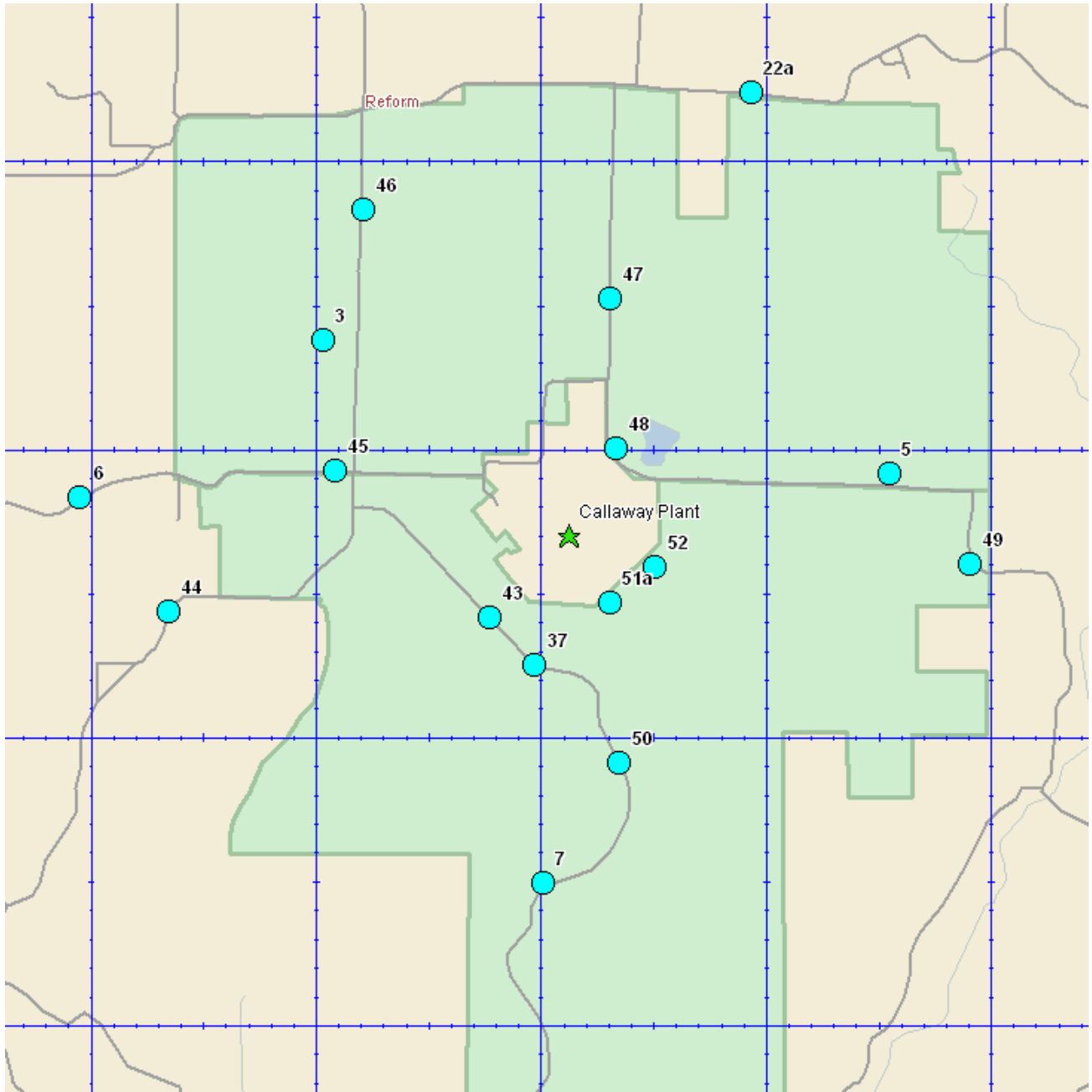
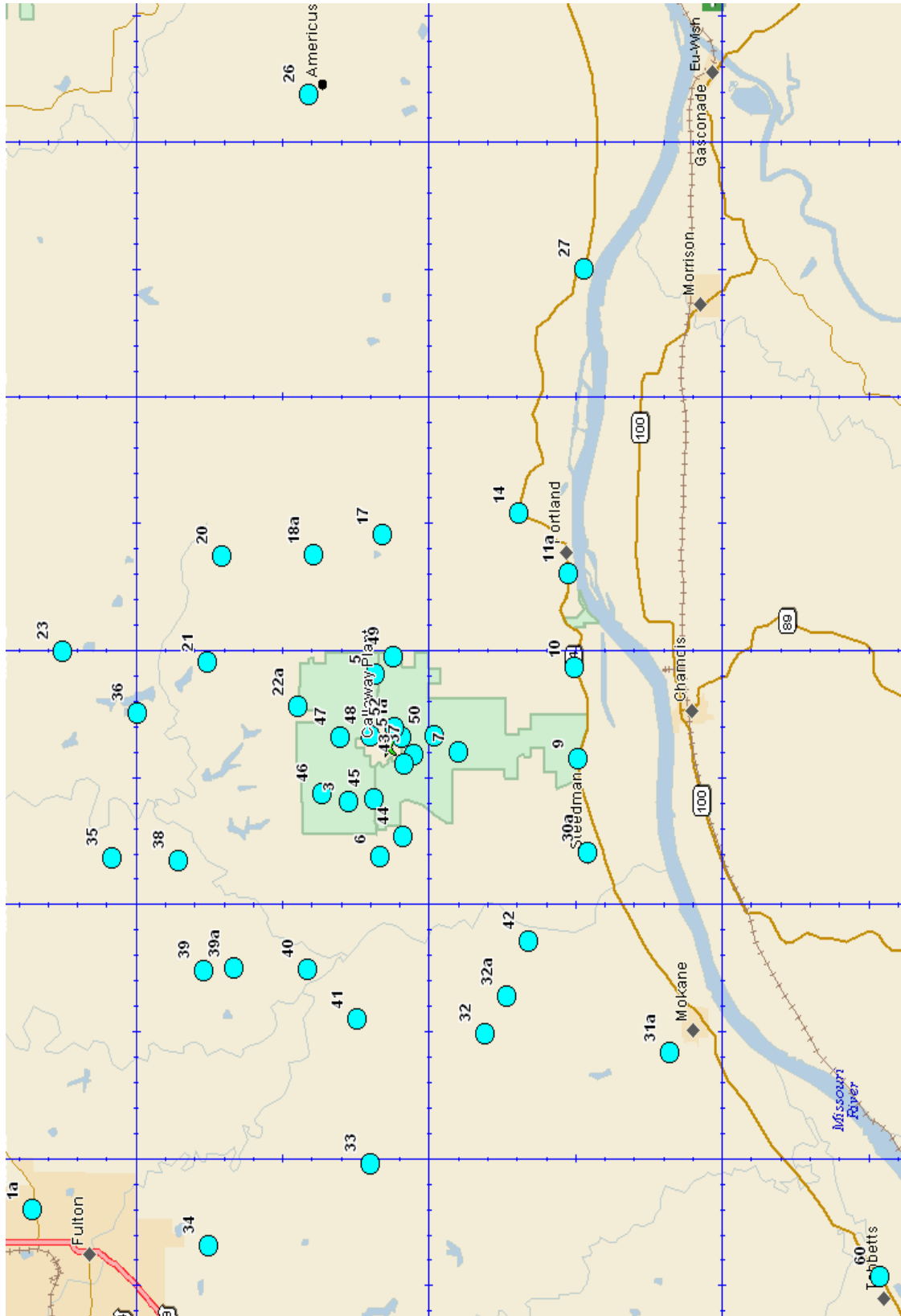


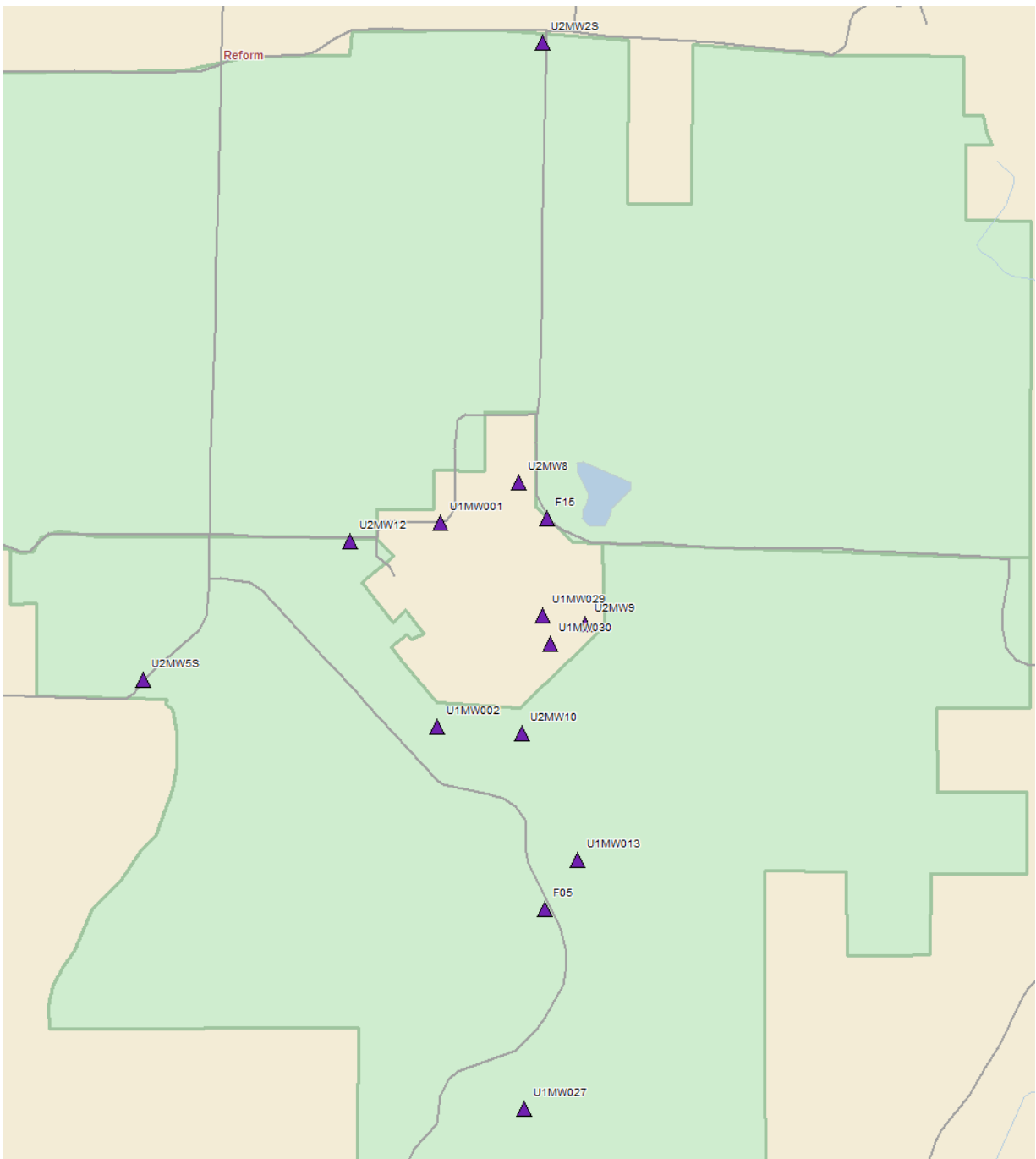


Figure 5.2b. Direct Radiation Monitoring, Outer Ring and Special Interest Locations.





**Figure 5.3b. Groundwater Monitoring Wells, Northern Area.**







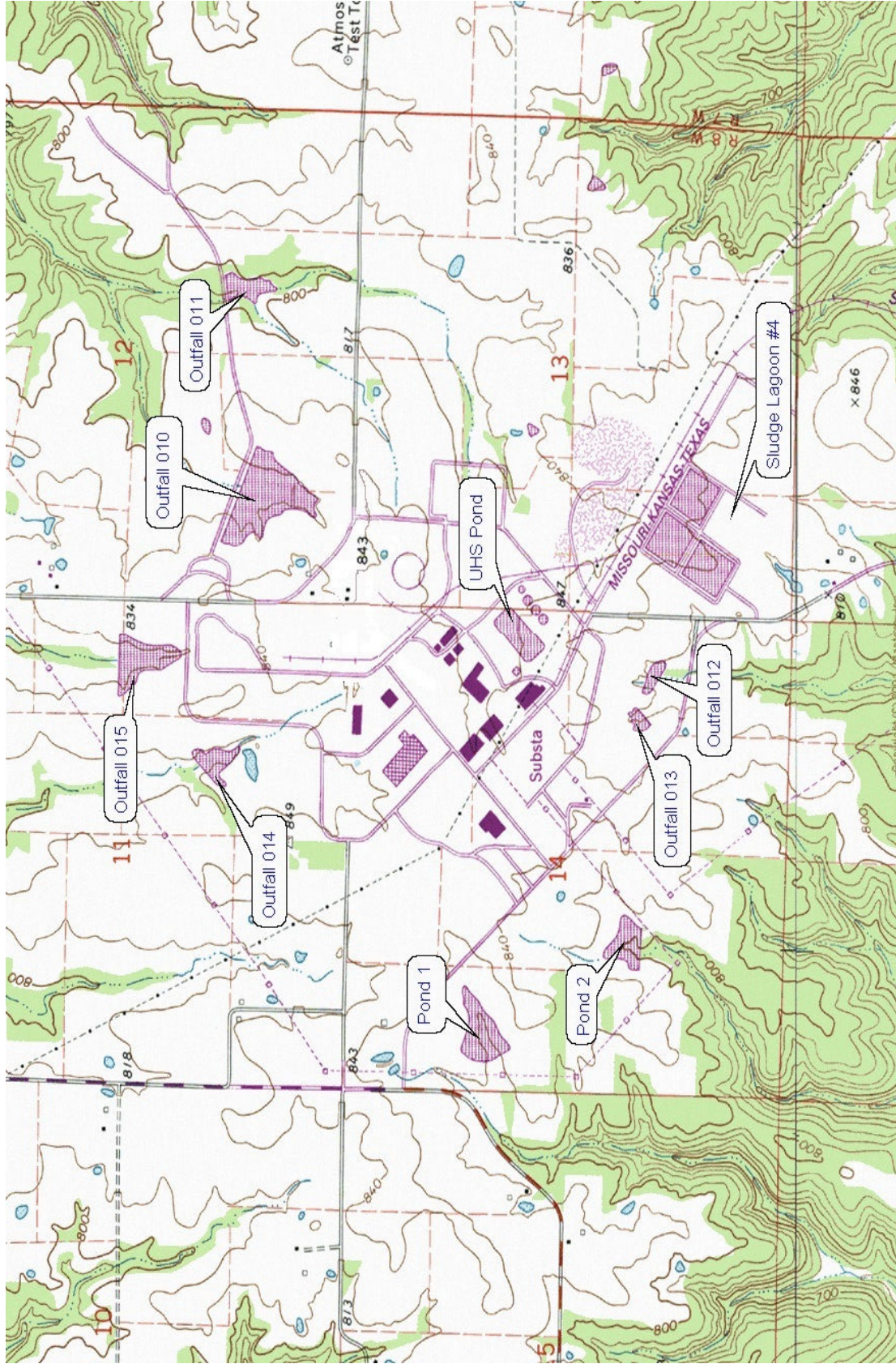


Figure 5.3e. Pond sampling locations

**Table 5.2. Collection Frequencies and Required Analyses <sup>1</sup> (January 1 through December 31, 2013)**

Sample Type	Media Code	Collection Frequency	Required Analyses
Direct radiation	IDM	Quarterly	Deep Dose Equivalent (DDE)
Airborne iodine	AIO	Weekly	<sup>131</sup> I
Air particulate	APT	Weekly	PGE <sup>5</sup> each sample
Surface water (river)	SWA	Monthly composite	PGE and <sup>3</sup> H
Surface water (except UHS and Unit 2 ponds)	SWA	Semiannually	PGE and <sup>3</sup> H. If contaminated with gamma emitting nuclides of plant origin, analyze for HTD <sup>6</sup> nuclides.
Surface water (UHS and Unit 2 ponds)	SWA	Semiannually	PGE and <sup>3</sup> H
Groundwater (not potable)	WWA	Quarterly	PGE and <sup>3</sup> H. If contaminated with gamma emitting nuclides of plant origin, analyze for HTD nuclides.
Well water-potable	DWA	Quarterly	PGE and <sup>3</sup> H. If contaminated with gamma emitting nuclides of plant origin, analyze for HTD nuclides.
Shoreline sediment	AQS	Semiannually	PGE
Bottom sediment <sup>2</sup>	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 <sup>3</sup>	PGE and <sup>131</sup> I
Leafy green vegetables	FPL	Monthly when available <sup>4</sup>	PGE and <sup>131</sup> I
Inedible crops	FC	At time of harvest	PGE and <sup>3</sup> H
Fish	AQF	Semiannually	PGE on edible portion

<sup>1</sup> Samples required by ODCM unless specified otherwise.

<sup>2</sup> Required by NPDES permit.

<sup>3</sup> The grazing season is defined as April 15- December 15, but will vary according to weather conditions.

<sup>4</sup> The growing season is defined as the months April 1- November 1, but will vary according to weather conditions.

<sup>5</sup> Principal Gamma Emitters (PGE) are defined as <sup>54</sup>Mn, <sup>59</sup>Fe, <sup>58</sup>Co, <sup>60</sup>Co, <sup>65</sup>Zn, <sup>95</sup>Zr/Nb, <sup>134</sup>Cs, <sup>137</sup>Cs, <sup>140</sup>Ba/La and other gamma-emitting nuclides that may be identified during the gamma spectroscopy analysis.

<sup>6</sup> Hard to Detect (HTD) nuclides are defined as <sup>89</sup>Sr, <sup>90</sup>Sr, <sup>55</sup>Fe, <sup>63</sup>Ni, <sup>237</sup>Np, <sup>238</sup>Pu, <sup>239/240</sup>Pu, <sup>241</sup>Pu, <sup>241</sup>Am, <sup>242</sup>Cm and <sup>243/244</sup>Cm.

**Table 5.3. Minimum Required Detection Capabilities for REMP Sample Analysis<sup>1</sup>**

Analysis	Water (pCi/L)	Airborne (pCi/m <sup>3</sup> )	Fish (pCi/kg wet)	Milk (pCi/L)	Food Products (pCi/kg wet)	Non-Food Products (pCi/kg wet)	Soil and Sediment (pCi/kg dry)
Gross beta	4	0.01					
H-3	3000/2000 <sup>3</sup>					3000	
Mn-54	15		130				
Fe-59	30		260				
Co-58/60	15		130				
Zn-65	30		260				
Zr-Nb-95 <sup>2</sup>	15						
I-131	1000/1 <sup>3</sup>	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 <sup>2</sup>	15			15			

<sup>1</sup> This list does not mean only these nuclides will be detected and reported. Other peaks which are measurable and identifiable will be reported.

<sup>2</sup> Total activity, parent plus daughter activity.

<sup>3</sup> 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 2013 Land Use Census Results**

**Closest Receptor in Miles**

<b>Sector</b>	<b>Residence</b>	<b>Garden <sup>1,2</sup></b>	<b>Milk <sup>1</sup></b>
<b>N(A)</b>	1.83	NI	NI
<b>NNE(B)</b>	2.16	2.40 **	NI
<b>NE(C)</b>	2.27	2.53	NI
<b>ENE(D)</b>	1.66	2.87	NI
<b>E(E)</b>	3.51	NI	NI
<b>ESE(F)</b>	2.12	4.40	NI
<b>SE(G)</b>	2.22	2.22	NI
<b>SSE(H)</b>	2.51	2.53	NI
<b>S(J)</b>	2.68	2.68	NI
<b>SSW(K)</b>	2.38	2.81	NI
<b>SW(L)</b>	2.64	2.64	NI
<b>WSW(M)</b>	1.20	1.64	NI
<b>W(N)</b>	1.56	<b>1.56 *</b>	NI
<b>WNW(P)</b>	1.93	1.93	NI
<b>NW(Q)</b>	2.07	3.16	NI
<b>NNW(R)</b>	1.82	1.82	NI

Note: Distances in bold type indicate changes from the 2012 census.

<sup>1</sup> NI = None Identified.

<sup>2</sup> Broadleaf Vegetation

\* Declined to participate in the program.

\*\* History as a poor provider; not included in program.

**Table 5.5. Missed collections and analyses, Callaway Energy Center.**

<b>Sample Type</b>	<b>Analysis</b>	<b>Location(s)</b>	<b>Collection Date or Period</b>	<b>Comments</b>
WWA	H-3, Gamma	U1MW-28	1 <sup>st</sup> , 3 <sup>rd</sup> , 4 <sup>th</sup> Qtrs, 2013	Well dry.
MI	I-131, Gamma	M-9	4/22/13	Cow still on stored feed.
VE	Gamma	V-16	6/18/13	No samples, garden damaged by storms.
VE	Gamma	V-11	7/9/13	No samples available, animal damage.
VE	Gamma	V-11	8/13/13	No samples available, animal damage.
VE	Gamma	V-17	8/13/13	Per provider, no samples available.
APT, AIO	Gamma, I-131	A-1	2/28/13	Partial sample, reduced volume due to power interruption.
APT, AIO	Gamma, I-131	A-9	5/23/13	Sampler pump failure, no data recorded.
APT, AIO	Gamma, I-131	B-3	8/1/13	Sampler pump failure, inadequate volume.
IDM	Direct Radiation	44	1st Qtr, 2013	TLD misplaced during electrical line maintenance; invalid sample.
IDM	Direct Radiation	32A	2nd Qtr, 2013	Both TLD and holder missing, vandalism suspected.

**Table 5.6 Radiological Environmental Monitoring Program Summary**

Sample Type (Units)	Type and Number of Analyses <sup>a</sup>	LLD <sup>b</sup>	Indicator Locations Mean (F) <sup>c</sup> Range <sup>c</sup>	Location with Highest Annual Mean		Control Locations Mean (F) <sup>c</sup> Range <sup>c</sup>	Number Non-Routine Results <sup>e</sup>	
				Location <sup>d</sup>	Mean (F) <sup>c</sup> Range <sup>c</sup>			
<b>Waterborne Pathway</b>								
Surface Water (pCi/L)	H-3	24	188	596 (4/12) (208-968)	SW-02 4.9 mi. SE	596 (4/12) (208-968)	< LLD	0
	GS	24						
	Mn-54		15	< LLD	-	-	< LLD	0
	Fe-59		30	< LLD	-	-	< LLD	0
	Co-58		15	< LLD	-	-	< LLD	0
	Co-60		15	< LLD	-	-	< LLD	0
	Zn-65		30	< LLD	-	-	< LLD	0
	Zr-Nb-95		15	< LLD	-	-	< LLD	0
	I-131		1000	< LLD	-	-	< LLD	0
	Cs-134		15	< LLD	-	-	< LLD	0
	Cs-137		18	< LLD	-	-	< LLD	0
Ba-La-140		15	< LLD	-	-	< LLD	0	
Surface Water, Ponds (pCi/L)	H-3	22	157	< LLD	-	-	none	0
	GS	22						
	Mn-54		15	< LLD	-	-	none	0
	Fe-59		30	< LLD	-	-	none	0
	Co-58		15	< LLD	-	-	none	0
	Co-60		15	< LLD	-	-	none	0
	Zn-65		30	< LLD	-	-	none	0
	Zr-Nb-95		15	< LLD	-	-	none	0
	Cs-134		15	< LLD	-	-	none	0
	Cs-137		18	< LLD	-	-	none	0
	Ba-La-140		15	< LLD	-	-	none	0
Drinking Water, Wells (pCi/L)	H-3	48	150	< LLD	-	-	< LLD	0
	GS	48						
	Mn-54		15	< LLD	-	-	< LLD	0
	Fe-59		30	< LLD	-	-	< LLD	0
	Co-58		15	< LLD	-	-	< LLD	0
	Co-60		15	< LLD	-	-	< LLD	0
	Zn-65		30	< LLD	-	-	< LLD	0
	Zr-Nb-95		15	< LLD	-	-	< LLD	0
	Cs-134		15	< LLD	-	-	< LLD	0
	Cs-137		18	< LLD	-	-	< LLD	0
	Ba-La-140		15	< LLD	-	-	< LLD	0

**Table 5.6 Radiological Environmental Monitoring Program Summary**

Sample Type (Units)	Type and Number of Analyses <sup>a</sup>	LLD <sup>b</sup>	Indicator Locations Mean (F) <sup>c</sup> Range <sup>c</sup>	Location with Highest Annual Mean		Control Locations Mean (F) <sup>c</sup> Range <sup>c</sup>	Number Non-Routine Results <sup>e</sup>	
				Location <sup>d</sup>	Mean (F) <sup>c</sup> Range <sup>c</sup>			
<b>Waterborne Pathway</b>								
Wells, Ponds (non-potable)  (pCi/L)	H-3	285	165	278 (75/285) (169-567)	OW-5, UHS Pond Berth, Inside OCA	340 (4/4) (296-397)	None	0
	GS	285						
	Mn-54		15	< LLD	-	-	None	0
	Fe-59		30	< LLD	-	-	None	0
	Co-58		15	< LLD	-	-	None	0
	Co-60		15	< LLD	-	-	None	0
	Zn-65		30	< LLD	-	-	None	0
	Zr-Nb-95		15	< LLD	-	-	None	0
	Cs-134		15	< LLD	-	-	None	0
	Cs-137		18	< LLD	-	-	None	0
Ba-La-140		15	< LLD	-	-	None	0	
Sediments (pCi/kgdry)	GS	8						
	K-40		50	12994 (4/4) (11187-13943)	CA-AQS-C 4.9 mi. SE	12994 (4/4) (11187-13943)	12708 (4/4) (12222-13140)	0
	Mn-54		23.9	< LLD	-	-	< LLD	0
	Fe-59		70.7	< LLD	-	-	< LLD	0
	Co-58		20.9	< LLD	-	-	< LLD	0
	Co-60		18.3	< LLD	-	-	< LLD	0
	Zr-Nb-95		52.0	< LLD	-	-	< LLD	0
	Cs-134		16.7	< LLD	-	-	< LLD	0
	Cs-137		20.8	< LLD	CA-AQS-A 4.9 mi. SSE	30.2 (1/4)	30.2 (1/4)	0
Ba-La-140		210.6	< LLD	-	-	< LLD	0	

**Table 5.6 Radiological Environmental Monitoring Program Summary**

Sample Type (Units)	Type and Number of Analyses <sup>a</sup>	LLD <sup>b</sup>	Indicator Locations Mean (F) <sup>c</sup> Range <sup>c</sup>	Location with Highest Annual Mean		Control Locations Mean (F) <sup>c</sup> Range <sup>c</sup>	Number Non-Routine Results <sup>e</sup>
				Location <sup>d</sup>	Mean (F) <sup>c</sup> Range <sup>c</sup>		
<b>Ingestion Pathway</b>							
Food Products Leafy Green Vegetables (pCi/kg wet)	GS 52 K-40	100	5567 (46/46) (2945-13059)	V-11, Farm 3.2 mi. NW	6375 (4/4) (2945-13059)	4948 (6/6) (3090-8969)	0
	Mn-54	17.0	< LLD	-	-	< LLD	0
	Co-58	19.9	< LLD	-	-	< LLD	0
	Co-60	15.4	< LLD	-	-	< LLD	0
	I-131	46.3	< LLD	-	-	< LLD	0
	Cs-134	15.5	< LLD	-	-	< LLD	0
	Cs-137	17.4	< LLD	-	-	< LLD	0
Farm Crop (Soybeans, Sorghum) (pCi/kg wet)	H-3 <sup>†</sup> 11	161	< LLD	-	-	< LLD	0
	GS 11 K-40	100	11560 (9/9) (2453-17359)	FC-2, Between MH-5 and MH-3B	16115 (3/3) (14959-16703)	10909 (2/2) (5862-15956)	0
	Mn-54	11.0	< LLD	-	-	< LLD	0
	Co-58	15.1	< LLD	-	-	< LLD	0
	Co-60	16.3	< LLD	-	-	< LLD	0
	Cs-134	14.0	< LLD	-	-	< LLD	0
	Cs-137	11.5	< LLD	-	-	< LLD	0
Fish (Flesh) (pCi/kg wet)	GS 20 K-40	100	2930 (10/10) (2654-3373)	CA-AQF-C 4.9 mi. SE	2930 (10/10) (2654-3373)	2901 (10/10) (2497-3188)	0
	Mn-54	19.4	< LLD	-	-	< LLD	0
	Fe-59	81.1	< LLD	-	-	< LLD	0
	Co-58	28.8	< LLD	-	-	< LLD	0
	Co-60	17.5	< LLD	-	-	< LLD	0
	Zn-65	37.1	< LLD	-	-	< LLD	0
	Cs-134	19.4	< LLD	-	-	< LLD	0
	Cs-137	20.4	< LLD	-	-	< LLD	0
Milk (pCi/L)	I-131 18	0.5	none	-	-	< LLD	0
	GS 18 K-40	100	none	M-9 (C) 18.7 mi. S	1135 (18/18) (921-1467)	1135 (18/18) (921-1467)	0
	Cs-134	15	none	-	-	< LLD	0
	Cs-137	18	none	-	-	< LLD	0
	Ba-140	60	none	-	-	< LLD	0
	La-140	15	none	-	-	< LLD	0

**Table 5.6 Radiological Environmental Monitoring Program Summary**

Sample Type (Units)	Type and Number of Analyses <sup>a</sup>	LLD <sup>b</sup>	Indicator Locations Mean (F) <sup>c</sup> Range <sup>c</sup>	Location with Highest Annual Mean		Control Locations Mean (F) <sup>c</sup> Range <sup>c</sup>	Number Non-Routine Results <sup>e</sup>	
				Location <sup>d</sup>	Mean (F) <sup>c</sup> Range <sup>c</sup>			
<b>Direct Radiation</b>								
(Quarterly TLDs) (mR/90days)	Gamma	128	3.0	16.0 (119/119) (10.9-18.5)	CA-IDM-10 3.9 mi. SSE	17.5 (3/4) (16.8-18.5)	14.9 (9/9) (11.1-17.3)	0
<b>Airborne Pathway</b>								
Airborne Particulates (pCi/m <sup>3</sup> )	GS	258						
	Be-7	0.16	Be-7	0.22 (84/258) (0.16-0.32)	A-1, Met Tower 1.3 mi. ENE	0.23 (19/52) (0.16-0.30)	None	0
	Co-58		0.014	< LLD	-	-	None	0
	Co-60		0.013	< LLD	-	-	None	0
	Zr-Nb-95		0.026	< LLD	-	-	None	0
	Cs-134		0.013	< LLD	-	-	None	0
	Cs-137		0.013	< LLD	-	-	None	0
	Ba-La-140		0.079	< LLD	-	-	None	0
Ce-144		0.059	< LLD	-	-	None	0	
Airborne Iodine (pCi/m <sup>3</sup> )	I-131	258	0.070	< LLD	-	-	None	0
<b>Soil</b>								
Soil (pCi/kg dry)	GS	18						
	K-40		50.0	10579 (14/14) (4563-15157)	W-002 0.52 mi. SSE	14377 (2/2) (13597-15157)	10063 (4/4) (5862-13978)	0
	Mn-54		63.2	< LLD	-	-	< LLD	0
	Fe-59		177.0	< LLD	-	-	< LLD	0
	Co-58		65.8	< LLD	-	-	< LLD	0
	Co-60		49.4	< LLD	-	-	< LLD	0
	Zr-Nb-95		137.9	< LLD	-	-	< LLD	0
	Cs-134		46.1	< LLD	-	-	< LLD	0
	Cs-137		53.3	331 (12/14) (90-665)	F-006 1.6 mi. NE	591 (2/2) (526-656)	98 (3/4) (69-155)	0
	Ba-La-140		844.7	< LLD	-	-	< LLD	0

<sup>a</sup> GS = gamma spectroscopy

<sup>b</sup> LLD = nominal lower limit of detection based on a 4.66 sigma counting error for background sample.

<sup>c</sup> Mean and range are based on detectable measurements only (i.e., >LLD) Fraction of detectable measurements at specified locations is indicated in parentheses (F).

<sup>d</sup> Locations are specified by station code (Table 5.2) and distance (miles) and direction relative to reactor site.

<sup>e</sup> 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.

<sup>f</sup> Units: pCi/L.

## 6.0 REFERENCES

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## APPENDIX A

### INTERLABORATORY COMPARISON PROGRAM RESULTS

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

January through December, 2013



Appendix A

Interlaboratory 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 environmental sample crosscheck program administered by Environmental Resources Associates, serving as a replacement for studies conducted previously by the U.S. EPA Environmental Monitoring Systems Laboratory, Las Vegas, Nevada.

Table A-2 lists results for thermoluminescent dosimeters (TLDs), via International Intercomparison of Environmental Dosimeters, when available, and internal laboratory testing.

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

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

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

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

Results in Table A-7 were obtained through participation in the environmental sample crosscheck program administered by Environmental Resources Associates, serving as a replacement for studies conducted previously by the Environmental Measurement Laboratory Quality Assessment Program (EML).

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

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

Attachment A

ACCEPTANCE CRITERIA FOR "SPIKED" SAMPLES

LABORATORY PRECISION: ONE STANDARD DEVIATION VALUES FOR VARIOUS ANALYSES<sup>a</sup>

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

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

<sup>b</sup> Laboratory limit.

TABLE A-1. Interlaboratory Comparison Crosscheck program, Environmental Resource Associates (ERA)<sup>a</sup>.

Lab Code	Date	Analysis	Concentration (pCi/L)			Acceptance
			Laboratory Result <sup>b</sup>	ERA Result <sup>c</sup>	Control Limits	
ERW-76	01/07/13	Ra-226	10.04 ± 0.55	9.91	7.42 - 11.60	Pass
ERW-76	01/07/13	Ra-228	6.11 ± 1.29	5.22	3.14 - 6.96	Pass
ERW-76	01/07/13	Uranium	5.90 ± 0.58	5.96	4.47 - 7.13	Pass
ERW-1593	04/08/13	Sr-89	43.60 ± 4.32	41.30	31.60 - 48.40	Pass
ERW-1593	04/08/13	Sr-90	23.20 ± 1.70	23.90	17.20 - 28.00	Pass
ERW-1596	04/08/13	Ba-133	74.80 ± 4.00	82.10	69.00 - 90.30	Pass
ERW-1596	04/08/13	Co-60	65.50 ± 3.42	65.90	59.30 - 75.00	Pass
ERW-1596	04/08/13	Cs-134	41.10 ± 3.47	42.80	34.20 - 47.10	Pass
ERW-1596	04/08/13	Cs-137	42.30 ± 4.03	41.70	37.00 - 48.80	Pass
ERW-1596	04/08/13	Zn-65	200.3 ± 10.1	189.0	170.0 - 222.0	Pass
ERW-1598	04/08/13	Gr. Alpha	34.30 ± 1.98	40.80	21.10 - 51.90	Pass
ERW-1598	04/08/13	Gr. Beta	18.70 ± 0.98	21.60	13.00 - 29.70	Pass
ERW-1600	04/08/13	I-131	23.00 ± 1.10	23.80	19.70 - 28.30	Pass
ERW-1600	04/08/13	I-131(G)	23.48 ± 9.44	23.80	19.70 - 28.30	Pass
ERW-1605	04/08/13	Ra-226	16.30 ± 0.70	15.40	11.50 - 17.70	Pass
ERW-1605	04/08/13	Ra-228	5.32 ± 1.30	4.36	2.54 - 5.98	Pass
ERW-1605	04/08/13	Uranium	57.30 ± 4.20	61.20	49.80 - 67.90	Pass
ERW-1606	04/08/13	H-3	4041 ± 194	4050	3450 - 4460	Pass
ERW-6009	10/07/13	Sr-89	22.00 ± 2.80	21.90	14.40 ± 28.20	Pass
ERW-6009	10/07/13	Sr-90	17.10 ± 2.55	18.10	12.80 ± 21.50	Pass
ERW-6012	10/07/13	Ba-133	48.20 ± 4.29	54.20	44.70 ± 59.90	Pass
ERW-6012	10/07/13	Co-60	100.8 ± 4.7	102.0	91.80 ± 114.00	Pass
ERW-6012	10/07/13	Cs-134	87.30 ± 4.35	86.70	71.10 ± 95.40	Pass
ERW-6012	10/07/13	Cs-137	199.6 ± 7.4	206.0	185.0 - 228.0	Pass
ERW-6012	10/07/13	Zn-65	356.2 ± 13.2	333.0	300.0 - 389.0	Pass
ERW-6015	10/07/13	Gr. Alpha	30.70 ± 11.90	42.80	22.20 ± 54.30	Pass
ERW-6015	10/07/13	Gr. Beta	25.70 ± 6.48	32.20	20.80 ± 39.90	Pass
ERW-6019	10/07/13	I-131	22.50 ± 1.01	23.60	19.60 ± 28.00	Pass
ERW-6022	10/07/13	Ra-226	12.70 ± 1.62	12.10	9.04 ± 14.00	Pass
ERW-6022 <sup>d</sup>	10/07/13	Ra-228	5.70 ± 0.56	4.02	2.30 ± 5.59	Fail
ERW-6022	10/07/13	Uranium	6.59 ± 0.38	6.24	4.70 ± 7.44	Pass
ERW-6024	10/07/13	H-3	18397 ± 695	17700	15500 - 19500	Pass

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

<sup>b</sup> Unless otherwise indicated, the laboratory result is given as the mean ± standard deviation for three determinations.

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

<sup>d</sup> The reported result was obtained in the first cycle of counting. It can be positively biased due to extra beta counts contributed by Pb-214 and Bi-214 daughters of Rn-222. Result of second cycle of counting 4.47 pCi/L.

TABLE A-2. Table has been intentionally omitted.

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

Lab Code <sup>b</sup>	Date	Analysis	Concentration (pCi/L) <sup>a</sup>			Acceptance
			Laboratory results 2s, n=1 <sup>c</sup>	Known Activity	Control Limits <sup>d</sup>	
SPW-66	1/9/2013	Tc-99	1009 ± 5	1078	754.9 - 1402.0	Pass
SPW-1891	1/18/2013	Ra-228	35.60 ± 2.75	30.85	21.60 - 40.11	Pass
SPSO-12313S	1/23/2013	Tc-99	103.5 ± 2.2	107.8	75.46 - 140.14	Pass
SPMI-264	1/25/2013	Cs-134	110.9 ± 6.7	107.5	96.73 - 118.23	Pass
SPMI-264	1/25/2013	Cs-137	82.84 ± 7.47	77.48	67.48 - 87.48	Pass
SPMI-264	1/25/2013	Sr-90	38.19 ± 1.49	40.11	32.09 - 48.13	Pass
SPW-266	1/25/2013	Co-60	46.89 ± 4.68	44.48	34.48 - 54.48	Pass
SPW-266	1/25/2013	Cs-134	105.9 ± 8.0	107.5	96.73 - 118.23	Pass
SPW-266	1/25/2013	Cs-137	42.17 ± 5.65	39.49	29.49 - 49.49	Pass
SPW-266	1/25/2013	Sr-90	39.84 ± 1.65	40.11	32.09 - 48.13	Pass
SPAP-376	2/1/2013	Gr. Beta	44.20 ± 0.11	45.68	27.41 - 63.95	Pass
SPAP-378	2/1/2013	Cs-134	3.71 ± 0.65	3.87	2.32 - 5.42	Pass
SPAP-378	2/1/2013	Cs-137	97.47 ± 2.50	102.9	92.61 - 113.19	Pass
SPW-391	2/1/2013	H-3	63719 ± 703	65626	52501 - 78751	Pass
SPW-380	2/10/2013	Ni-63	217.0 ± 3.7	205.3	143.7 - 266.9	Pass
W-30413	3/4/2013	Gr. Alpha	19.77 ± 0.40	20.00	10.00 - 30.00	Pass
W-30413	3/4/2013	Gr. Beta	30.48 ± 0.34	30.90	20.90 - 40.90	Pass
W-30713	3/7/2013	Ra-226	18.06 ± 0.51	16.70	11.69 - 21.71	Pass
W-42713	4/27/2013	Gr. Alpha	20.67 ± 0.40	20.00	10.00 - 30.00	Pass
W-42713	4/27/2013	Gr. Beta	28.44 ± 0.32	30.90	20.90 - 40.90	Pass
WW-2870	5/7/2013	Co-60	166.1 ± 7.4	161.6	145.4 - 177.8	Pass
WW-2870	5/7/2013	Cs-137	161.2 ± 9.3	149.0	134.1 - 163.9	Pass
WW-2870	5/7/2013	H-3	6853 ± 250	6735	5388 - 8082	Pass
W-53113	5/31/2013	Ra-226	16.83 ± 0.41	16.70	11.69 - 21.71	Pass
SPAP-3332	6/19/2013	Am-241	4.60 ± 0.14	4.00	2.40 - 5.60	Pass
SPW-3334	6/19/2013	Th-230	4.36 ± 0.34	4.00	2.40 - 5.60	Pass
SPW-3458	6/24/2013	C-14	3825 ± 13	4736	2842 - 6630	Pass
SPAP-3529	6/27/2013	Cs-134	3.49 ± 1.26	3.30	1.98 - 4.62	Pass
SPAP-3529	6/27/2013	Cs-137	102.0 ± 2.9	101.1	90.99 - 111.21	Pass
SPAP-3531	6/27/2013	Gr. Beta	45.64 ± 0.11	45.42	27.25 - 63.59	Pass
SPF-3533	6/27/2013	Cs-134	1.31 ± 0.14	1.50	0.90 - 2.10	Pass
SPF-3533	6/27/2013	Cs-137	2.77 ± 0.27	2.43	1.46 - 3.40	Pass
SPW-3535	6/27/2013	Ni-63	204.3 ± 3.5	204.8	143.4 - 266.2	Pass
SPW-3537	6/27/2013	Tc-99	104.5 ± 1.7	107.8	75.46 - 140.14	Pass
SPW-3539	6/27/2013	Fe-55	97015 ± 860	90677	72542 - 108812	Pass
SPW-1893	6/28/2013	Ra-228	30.16 ± 2.73	30.85	21.60 - 40.11	Pass

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

Lab Code <sup>b</sup>	Date	Analysis	Concentration (pCi/L) <sup>a</sup>			Acceptance
			Laboratory results 2s, n=1 <sup>c</sup>	Known Activity	Control Limits <sup>d</sup>	
SPW-72913S	7/29/2013	Tc-99	126.6 ± 2.2	107.8	75.46 ± 140.14	Pass
SPW-4373	7/31/2013	Cs-134	91.71 ± 6.02	90.94	80.94 ± 100.94	Pass
SPW-4373	7/31/2013	Cs-137	83.05 ± 7.20	76.57	66.57 ± 86.57	Pass
SPW-4373	7/31/2013	Sr-90	39.28 ± 1.77	39.64	31.71 ± 47.57	Pass
SPW-4374	7/31/2013	Sr-90	42.17 ± 1.71	39.64	31.71 ± 47.57	Pass
SPMI-4376	7/31/2013	Cs-134	82.22 - 7.23	90.94	80.94 ± 100.94	Pass
SPMI-4376	7/31/2013	Cs-137	83.31 - 8.29	76.57	66.57 ± 86.57	Pass
SPMI-4376A	7/31/2013	Sr-90	35.00 ± 1.63	39.64	31.71 ± 47.57	Pass
W-73113	7/31/2013	Ra-226	17.61 ± 0.41	16.70	11.69 ± 21.71	Pass
SPS-4514	8/5/2013	Sr-90	78.63 ± 2.95	79.28	63.42 ± 95.14	Pass
W-82013	8/20/2013	Gr. Alpha	21.53 ± 0.45	20.00	10.00 ± 30.00	Pass
W-82013	8/20/2013	Gr. Beta	28.03 ± 0.32	30.90	20.90 ± 40.90	Pass
SPW-1894	8/28/2013	Ra-228	32.49 ± 3.00	30.85	21.60 ± 40.11	Pass
W-90913	9/9/2013	Gr. Alpha	19.08 ± 0.51	20.10	10.05 ± 30.15	Pass
W-90913	9/9/2013	Gr. Beta	32.12 ± 0.35	32.10	22.10 ± 42.10	Pass
WW-5623	10/3/2013	Co-60	157.0 ± 7.0	155.3	139.8 - 170.8	Pass
WW-5623	10/3/2013	Cs-137	156.0 ± 8.8	148.1	133.3 - 162.9	Pass
WW-5623	10/3/2013	H-3	6590 ± 245	6322	5058 - 7586	Pass
WW-5750	10/3/2013	Co-60	87.00 ± 7.80	77.40	77.00 ± 97.00	Pass
WW-5750	10/3/2013	Cs-137	82.30 ± 7.80	78.80	68.80 ± 88.80	Pass
WW-5750	10/3/2013	H-3	6181 ± 238	6322	5058 - 7586	Pass
W-102813	10/28/2013	Ra-226	15.69 ± 0.37	16.70	11.69 ± 21.71	Pass
SPW-1898	12/17/2013	Ra-228	28.15 ± 2.37	30.85	21.60 ± 40.11	Pass
W-122313	12/23/2013	Gr. Alpha	20.96 ± 0.47	20.10	10.05 ± 30.15	Pass
W-122313	12/23/2013	Gr. Beta	31.00 ± 0.34	32.10	22.10 ± 42.10	Pass

<sup>a</sup> Liquid sample results are reported in pCi/Liter, air filters( pCi/m<sup>3</sup>), charcoal (pCi/charcoal canister), and solid samples (pCi/kg).

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

<sup>c</sup> Results are based on single determinations.

<sup>d</sup> Control limits are established from the precision values listed in Attachment A of this report, adjusted to ± 2s.

NOTE: For fish, Jello is used for the Spike matrix. For Vegetation, cabbage is used for the Spike matrix.

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

Lab Code	Sample Type	Date	Analysis <sup>b</sup>	Concentration (pCi/L) <sup>a</sup>		
				Laboratory results (4.66σ)		Acceptance Criteria (4.66 σ)
				LLD	Activity <sup>c</sup>	
SPW-67	Water	1/9/2013	Tc-99	1.10	0.69 ± 0.68	10
SPW-190	Water	1/18/2013	Ra-228	0.74	0.66 ± 0.43	2
SPW-1901	Water	1/18/2013	Ra-228	0.74	0.66 ± 0.43	2
SPMI-263	Milk	1/25/2013	Sr-90	0.64	0.31 ± 0.34	1
SPMI-263	Milk	1/25/2013	Sr-90	0.64	0.31 ± 0.34	1
SPW-265	Water	1/25/2013	Co-60	2.86	2.10 ± 1.72	10
SPW-265	Water	1/25/2013	Cs-134	2.98	2.25 ± 1.57	10
SPW-265	Water	1/25/2013	Cs-137	2.71	0.44 ± 1.61	10
SPW-266	Water	1/25/2013	Sr-90	0.72	-0.12 ± 0.32	1
SPAP-375	Air Filter	2/1/2013	Gr. Beta	0.003	0.016 ± 0.003	0.010
SPAP-377	Air Filter	2/1/2013	Co-60	2.31	-0.34 ± 1.75	100
SPAP-377	Air Filter	2/1/2013	Cs-134	2.72	1.22 ± 1.62	100
SPAP-377	Air Filter	2/1/2013	Cs-137	1.50	-0.52 ± 1.80	100
SPW-391	Water	2/1/2013	H-3	92.04	-29.44 ± 69.24	200
SPW-379	Water	2/10/2013	Ni-63	2.11	0.91 ± 1.30	20
W-30413	Water	3/4/2013	Gr. Alpha	0.35	0.08 ± 0.26	1
W-30413	Water	3/4/2013	Gr. Beta	0.73	0.10 ± 0.51	3.2
W-30713	Water	3/7/2013	Ra-226	0.031	0.032 ± 0.024	1
W-42713	Water	4/27/2013	Gr. Alpha	0.45	-0.14 ± 0.30	1
W-42713	Water	4/27/2013	Gr. Beta	0.72	-0.23 ± 0.50	3.2
W-53113	Water	5/31/2013	Ra-226	0.03	0.01 ± 0.02	1
SPW-3335	Water	6/19/2013	Th-230	0.01	0.01 ± 0.01	1
SPW-3459	Water	6/24/2013	C-14	10.89	10.44 ± 6.82	200
SPAP-3528	Air Filter	6/27/2013	Cs-134	2.10	-0.98 ± 1.11	100
SPAP-3528	Air Filter	6/27/2013	Cs-137	2.71	-0.24 ± 1.36	100
SPAP-3530	Air Filter	6/27/2013	Gr. Beta	0.004	0.018 ± 0.003	0.010
SPF-3532	Fish	6/27/2013	Cs-134	8.38	-1.39 ± 5.69	100
SPF-3532	Fish	6/27/2013	Cs-137	8.37	-1.88 ± 6.41	100
SPW-3534	Water	6/27/2013	Ni-63	2.47	-1.04 ± 1.48	20
SPW-3536	Water	6/27/2013	Tc-99	1.15	-1.11 ± 0.68	10
SPW-3538	water	6/27/2013	Fe-55	170.27	-17.50 ± 102.70	1000
SPW-1903	Water	6/28/2013	Ra-228	0.85	-0.02 ± 0.39	2

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

Lab Code	Sample Type	Date	Analysis <sup>b</sup>	Concentration (pCi/L) <sup>a</sup>		
				Laboratory results (4.66σ)		Acceptance Criteria (4.66 σ)
				LLD	Activity <sup>c</sup>	
SPW-72913B	Water	7/29/2013	Tc-99	1.44	-0.33 ± 0.87	10
SPW-4372	Water	7/31/2013	Co-60	1.41	-1.42 ± 3.00	10
SPW-4372	Water	7/31/2013	Cs-134	3.68	-2.66 ± 3.46	10
SPW-4372	Water	7/31/2013	Cs-137	3.53	0.29 ± 3.31	10
SPMI-4375	Milk	7/31/2013	Co-60	3.92	2.65 ± 2.26	10
SPMI-4375	Milk	7/31/2013	Cs-134	4.67	0.68 ± 2.54	10
SPMI-4375	Milk	7/31/2013	Cs-137	4.79	1.30 ± 2.68	10
SPMI-4375	Milk	7/31/2013	Sr-90	0.57	0.32 ± 0.30	1
W-73113	Water	7/31/2013	Ra-226	0.02	0.04 ± 0.02	1
SPS-4515	Powder	8/5/2013	Sr-90	0.09	-0.01 ± 0.04	1
W-82013	Water	8/20/2013	Gr. Alpha	0.42	-0.15 ± 0.28	1
W-82013	Water	8/20/2013	Gr. Beta	0.74	-0.24 ± 0.51	3.2
SPW-1904	Water	8/28/2013	Ra-228	0.96	0.85 ± 0.56	2
CHW-90913	Water	9/9/2013	Gr. Alpha	0.25	0.20 ± 0.29	1
CHW-90913	Water	9/9/2013	Gr. Beta	0.49	-0.18 ± 0.53	3.2
CHW-102013	Water	10/20/2013	Gr. Alpha	0.29	0.24 ± 0.33	1
CHW-102013	Water	10/20/2013	Gr. Beta	0.54	-0.32 ± 0.54	3.2
W-102813	Water	10/28/2013	Ra-226	0.02	0.02 ± 0.01	1
SPW-1908	Water	12/17/2013	Ra-228	0.69	0.55 ± 0.39	2
CHW-122313	Water	12/23/2013	Gr. Alpha	0.25	-0.09 ± 0.26	1
CHW-122313	Water	12/23/2013	Gr. Beta	0.48	0.05 ± 0.53	3.2
CHW-122713	Water	12/27/2013	Gr. Alpha	0.28	0.04 ± 0.31	1
CHW-122713	Water	12/27/2013	Gr. Beta	0.49	-0.33 ± 0.53	3.2

<sup>a</sup> Liquid sample results are reported in pCi/Liter, air filters (pCi/m<sup>3</sup>), charcoal (pCi/charcoal canister), and solid samples (pCi/kg).

<sup>b</sup> I-131(G); iodine-131 as analyzed by gamma spectroscopy.

<sup>c</sup> Activity reported is a net activity result.



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

Lab Code	Date	Analysis	Concentration (pCi/L) <sup>a</sup>			Acceptance
			First Result	Second Result	Averaged Result	
CF-41, 42	1/2/2013	Gr. Beta	8.45 ± 0.37	7.90 ± 0.35	8.17 ± 0.26	Pass
CF-41, 42	1/2/2013	Sr-90	0.030 ± 0.015	0.029 ± 0.014	0.030 ± 0.010	Pass
SWT-8243, 8244	1/2/2013	Gr. Beta	1.07 ± 0.54	0.98 ± 0.51	1.03 ± 0.37	Pass
AP-8454, 8455	1/2/2013	Be-7	0.053 ± 0.010	0.042 ± 0.010	0.048 ± 0.007	Pass
AP-8517, 8518	1/3/2013	Be-7	0.051 ± 0.015	0.049 ± 0.017	0.050 ± 0.011	Pass
MI-62, 63	1/8/2013	K-40	1317.70 ± 91.70	1351.90 ± 72.50	1334.80 ± 58.45	Pass
WW-151, 152	1/8/2013	H-3	222.70 ± 81.00	289.70 ± 84.10	256.20 ± 58.38	Pass
SG-107, 108	1/11/2013	Ra-226	55.20 ± 5.53	58.60 ± 5.94	56.90 ± 4.06	Pass
SG-107, 108	1/11/2013	Ra-228	71.60 ± 1.10	74.30 ± 1.70	72.95 ± 1.01	Pass
SG-130, 131	1/14/2013	Ra-226	3.91 ± 0.20	3.45 ± 0.27	3.68 ± 0.17	Pass
SG-130, 131	1/14/2013	Ra-228	2.40 ± 0.33	2.70 ± 0.39	2.55 ± 0.26	Pass
WW-277, 278	1/17/2013	H-3	159.71 ± 77.91	196.57 ± 79.72	178.14 ± 55.73	Pass
WW-256, 257	1/22/2013	H-3	502.70 ± 93.40	483.30 ± 92.60	493.00 ± 65.76	Pass
DW-40010, 40011	1/24/2013	Ra-226	2.55 ± 0.18	2.86 ± 0.20	2.71 ± 0.13	Pass
DW-40010, 40011	1/24/2013	Ra-228	1.78 ± 0.62	2.22 ± 0.62	2.00 ± 0.44	Pass
SWT-361, 362	1/29/2013	Gr. Beta	0.90 ± 0.40	1.01 ± 0.38	0.96 ± 0.28	Pass
DW-484, 485	1/29/2013	Gr. Beta	14.85 ± 1.93	14.81 ± 2.06	14.83 ± 1.41	Pass
S-945, 946	1/29/2013	Cs-137	14.50 ± 0.18	14.45 ± 0.19	14.48 ± 0.13	Pass
S-945, 946	1/29/2013	K-40	7.90 ± 0.74	8.00 ± 0.73	7.95 ± 0.52	Pass
S-340, 341	1/31/2013	Cs-137	0.16 ± 0.05	0.15 ± 0.06	0.15 ± 0.04	Pass
S-340, 341	1/31/2013	K-40	17.35 ± 1.34	19.75 ± 1.25	18.55 ± 0.92	Pass
AP-463, 464	1/31/2013	Be-7	0.27 ± 0.10	0.26 ± 0.10	0.26 ± 0.07	Pass
MI-631, 632	2/13/2013	K-40	1350.50 ± 105.20	1413.70 ± 85.94	1382.10 ± 67.92	Pass
WW-769, 770	2/25/2013	Gr. Beta	1.20 ± 0.33	1.35 ± 0.34	1.28 ± 0.24	Pass
DW-736, 737	2/26/2013	Gr. Beta	1.09 ± 0.54	1.57 ± 0.58	1.33 ± 0.40	Pass
SWU-790, 791	2/26/2013	Gr. Beta	2.68 ± 0.96	2.08 ± 0.95	2.38 ± 0.67	Pass
W-925, 926	2/27/2013	H-3	2265.00 ± 153.00	2329.00 ± 154.00	2297.00 ± 108.54	Pass
AP-1034, 1035	3/7/2013	Be-7	0.17 ± 0.08	0.16 ± 0.09	0.17 ± 0.06	Pass
MI-1076, 1077	3/13/2013	K-40	1347.70 ± 99.32	1396.10 ± 108.00	1371.90 ± 73.36	Pass
CH-1118, 1119	3/14/2013	I-131(G)	109.41 ± 5.69	103.88 ± 7.76	106.65 ± 4.81	Pass
WW-1221, 1222	3/14/2013	H-3	452.11 ± 97.43	403.29 ± 95.46	427.70 ± 68.20	Pass
P-1368, 1369	3/15/2013	H-3	735.24 ± 113.99	666.04 ± 111.41	700.64 ± 79.70	Pass
DW-40017, 40018	3/19/2013	Gr. Alpha	1.43 ± 0.94	1.61 ± 1.00	1.52 ± 0.69	Pass
MI-1473, 1474	4/1/2013	K-40	1618.00 ± 107.00	1767.00 ± 129.00	1692.50 ± 83.80	Pass
AP-2014, 2015	4/1/2013	Be-7	0.055 ± 0.008	0.057 ± 0.006	0.056 ± 0.005	Pass
DW-40023, 40024	4/1/2013	Ra-226	2.29 ± 0.18	2.54 ± 0.20	2.42 ± 0.13	Pass
DW-40023, 40024	4/1/2013	Ra-228	2.99 ± 0.69	2.96 ± 0.67	2.98 ± 0.48	Pass
SWU-736, 737	4/2/2013	Gr. Beta	4.80 ± 0.95	4.43 ± 0.86	4.62 ± 0.64	Pass
AP-2035, 2036	4/2/2013	Be-7	0.070 ± 0.013	0.065 ± 0.013	0.068 ± 0.009	Pass
BS-1680, 1681	4/8/2013	K-40	1995.30 ± 265.70	1992.00 ± 289.40	1993.65 ± 196.44	Pass
SW-1638, 1639	4/9/2013	H-3	1350.77 ± 130.08	1320.45 ± 129.25	1335.61 ± 91.69	Pass

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

Lab Code	Date	Analysis	Concentration (pCi/L) <sup>a</sup>			Acceptance
			First Result	Second Result	Averaged Result	
WW-2394, 2395	4/9/2013	H-3	348.08 ± 88.40	302.43 ± 86.41	325.25 ± 61.81	Pass
DW-40035, 40036	4/12/2013	Ra-226	1.36 ± 0.15	1.29 ± 0.13	1.33 ± 0.10	Pass
DW-40035, 40036	4/12/2013	Ra-228	1.22 ± 0.49	1.38 ± 0.53	1.30 ± 0.36	Pass
MI-1825, 1826	4/15/2013	K-40	1290.20 ± 113.80	1378.60 ± 91.99	1334.40 ± 73.17	Pass
MI-1825, 1826	4/15/2013	Sr-90	0.68 ± 0.32	0.46 ± 0.31	0.57 ± 0.22	Pass
DW-40049, 40050	4/15/2013	Gr. Alpha	1.88 ± 0.69	2.51 ± 0.71	2.20 ± 0.50	Pass
WW-1909, 1910	4/16/2013	H-3	2145.68 ± 156.65	2108.32 ± 155.80	2127.00 ± 110.47	Pass
DW-40064, 40065	4/23/2013	Gr. Alpha	1.95 ± 0.79	1.80 ± 0.81	1.88 ± 0.57	Pass
DW-40066, 40067	4/23/2013	Ra-226	1.98 ± 0.17	1.66 ± 0.16	1.82 ± 0.12	Pass
DW-40066, 40067	4/23/2013	Ra-228	2.30 ± 0.59	2.32 ± 0.59	2.31 ± 0.42	Pass
F-2225, 2226	5/1/2013	K-40	2.81 ± 0.37	2.67 ± 0.39	2.74 ± 0.27	Pass
BS-2267, 2268	5/1/2013	K-40	13.46 ± 0.64	13.59 ± 0.62	13.52 ± 0.45	Pass
SG-2235, 2236	5/2/2013	Ac-228	18.30 ± 0.60	18.50 ± 0.60	18.40 ± 0.42	Pass
SG-2235, 2236	5/2/2013	Gr. Alpha	54.00 ± 3.70	51.90 ± 3.40	52.95 ± 2.51	Pass
SG-2235, 2236	5/2/2013	Pb-214	11.30 ± 0.30	11.20 ± 0.20	11.25 ± 0.18	Pass
AP-2288, 2289	5/2/2013	Be-7	0.19 ± 0.10	0.19 ± 0.08	0.19 ± 0.07	Pass
WW-3091, 3092	5/2/2013	H-3	1107.91 ± 153.49	1263.37 ± 157.43	1185.64 ± 109.94	Pass
SW-2373, 2374	5/8/2013	H-3	324.80 ± 86.81	364.61 ± 88.53	344.71 ± 62.00	Pass
W-2352, 2353	5/9/2013	Ra-226	0.91 ± 0.20	1.29 ± 0.22	1.10 ± 0.15	Pass
W-2352, 2353	5/9/2013	Ra-228	1.28 ± 0.87	1.03 ± 0.94	1.16 ± 0.64	Pass
CF-2499, 2500	5/13/2013	K-40	11.52 ± 0.45	12.55 ± 0.61	12.04 ± 0.38	Pass
F-3987, 3988	5/20/2013	K-40	3.07 ± 0.48	3.05 ± 0.43	3.06 ± 0.32	Pass
BS-4113, 4114	5/20/2013	K-40	8.06 ± 0.44	7.99 ± 0.44	8.02 ± 0.31	Pass
SO-2902, 2903	5/22/2013	Th-228	0.57 ± 0.07	0.51 ± 0.06	0.54 ± 0.05	Pass
SO-2902, 2903	5/22/2013	Th-230	0.39 ± 0.06	0.40 ± 0.05	0.40 ± 0.04	Pass
SO-2902, 2903	5/22/2013	Th-232	0.55 ± 0.07	0.62 ± 0.06	0.59 ± 0.05	Pass
WW-2776, 2777	5/23/2013	H-3	261.76 ± 100.85	283.17 ± 101.68	272.46 ± 71.61	Pass
WW-2818, 2819	5/23/2013	H-3	999.35 ± 126.15	880.63 ± 122.43	939.99 ± 87.90	Pass
S-7271, 7272	5/27/2013	Cs-137	2.82 ± 0.10	2.91 ± 0.09	2.86 ± 0.07	Pass
S-7271, 7272	5/27/2013	K-40	21.52 ± 0.97	21.13 ± 1.02	21.32 ± 0.70	Pass
P-2923, 2924	5/29/2013	H-3	441.31 ± 92.75	374.30 ± 89.94	407.80 ± 64.60	Pass
WW-3133, 3134	6/1/2013	H-3	278.42 ± 86.54	209.45 ± 83.44	243.93 ± 60.11	Pass
WW-3049, 3050	6/5/2013	H-3	156.08 ± 79.16	244.66 ± 83.86	200.37 ± 57.66	Pass
DW-40079, 40080	6/5/2013	Ra-226	6.67 ± 0.30	7.03 ± 0.35	6.85 ± 0.23	Pass
DW-40079, 40080	6/5/2013	Ra-228	5.55 ± 0.75	6.11 ± 0.77	5.83 ± 0.54	Pass
DW-40089, 40090	6/5/2013	Gr. Alpha	6.82 ± 0.90	5.64 ± 1.02	6.23 ± 0.68	Pass
DW-40091, 40092	6/5/2013	Ra-226	3.44 ± 0.19	3.66 ± 0.19	3.55 ± 0.13	Pass
DW-40091, 40092	6/5/2013	Ra-228	3.70 ± 0.68	4.69 ± 0.73	4.20 ± 0.50	Pass
DW-40103, 40104	6/5/2013	Ra-226	0.98 ± 0.22	0.62 ± 0.15	0.80 ± 0.13	Pass
MI-3154, 3155	6/12/2013	K-40	1513.00 ± 128.10	1456.70 ± 110.30	1484.85 ± 84.52	Pass
P-3385, 3386	6/14/2013	H-3	236.88 ± 87.87	242.87 ± 88.14	239.88 ± 62.23	Pass
F-3776, 3777	6/16/2013	Cs-137	0.039 ± 0.015	0.048 ± 0.019	0.044 ± 0.012	Pass
F-3776, 3777	6/16/2013	Gr. Beta	4.52 ± 0.09	4.63 ± 0.09	4.57 ± 0.06	Pass
F-3776, 3777	6/16/2013	K-40	3.40 ± 0.41	3.52 ± 0.39	3.46 ± 0.29	Pass

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

Lab Code	Date	Analysis	Concentration (pCi/L) <sup>a</sup>			Acceptance
			First Result	Second Result	Averaged Result	
S-3238, 3239	6/17/2013	Be-7	1139.80 ± 215.00	1102.00 ± 194.70	1120.90 ± 145.03	Pass
S-3238, 3239	6/17/2013	Cs-134	26.23 ± 13.23	39.91 ± 11.73	33.07 ± 8.84	Pass
S-3238, 3239	6/17/2013	Cs-137	72.75 ± 25.99	85.91 ± 22.58	79.33 ± 17.21	Pass
S-3238, 3239	6/17/2013	K-40	21847.00 ± 656.50	22158.00 ± 622.80	22002.50 ± 452.46	Pass
SO-3343, 3344	6/17/2013	Cs-137	0.087 ± 0.022	0.084 ± 0.017	0.086 ± 0.014	Pass
SO-3343, 3344	6/17/2013	K-40	8.90 ± 0.53	9.47 ± 0.49	9.19 ± 0.36	Pass
DW-40118, 40119	6/26/2013	Gr. Alpha	3.56 ± 1.07	4.51 ± 0.96	4.04 ± 0.72	Pass
DW-40118, 40119	6/26/2013	Ra-226	2.52 ± 0.22	2.48 ± 0.19	2.50 ± 0.15	Pass
DW-40118, 40119	6/26/2013	Ra-228	2.75 ± 0.71	2.86 ± 0.75	2.81 ± 0.52	Pass
WW-3583, 3584	6/27/2013	H-3	6732.57 ± 246.74	6807.94 ± 247.98	6770.26 ± 174.91	Pass
AP-4092, 4093	6/28/2013	Be-7	0.078 ± 0.015	0.083 ± 0.017	0.080 ± 0.011	Pass
E-3608, 3609	7/1/2013	K-40	1.28 ± 0.13	1.29 ± 0.11	1.28 ± 0.09	Pass
MI-3629, 3630	7/1/2013	K-40	1840.70 ± 130.10	1804.90 ± 143.00	1822.80 ± 96.66	Pass
AP-4050, 4051	7/1/2013	Be-7	0.094 ± 0.009	0.093 ± 0.009	0.093 ± 0.006	Pass
DW-40134, 40135	7/1/2013	Ra-226	1.75 ± 0.15	1.56 ± 0.15	1.66 ± 0.11	Pass
DW-40134, 40135	7/1/2013	Ra-228	2.07 ± 0.60	1.61 ± 0.57	1.84 ± 0.41	Pass
AP-4071, 4072	7/3/2013	Be-7	0.066 ± 0.009	0.069 ± 0.011	0.067 ± 0.007	Pass
DW-40144, 40145	7/9/2013	Gr. Alpha	3.66 ± 0.85	2.85 ± 0.79	3.26 ± 0.58	Pass
DW-40146, 40147	7/9/2013	Ra-226	0.70 ± 0.11	0.72 ± 0.11	0.71 ± 0.08	Pass
DW-40146, 40147	7/9/2013	Ra-228	1.00 ± 0.58	0.70 ± 0.52	0.85 ± 0.39	Pass
VE-3818, 3819	7/9/2013	Be-7	0.41 ± 0.11	0.46 ± 0.18	0.43 ± 0.11	Pass
VE-3818, 3819	7/9/2013	K-40	4.67 ± 0.30	4.52 ± 0.43	4.60 ± 0.26	Pass
XW-4646, 4647	7/15/2013	H-3	465.00 ± 111.00	525.00 ± 114.00	495.00 ± 79.56	Pass
WW-4134, 4135	7/16/2013	H-3	315.86 ± 123.54	264.98 ± 121.78	290.42 ± 86.73	Pass
AP-4155, 4156	7/18/2013	Be-7	0.20 ± 0.11	0.16 ± 0.09	0.18 ± 0.07	Pass
MI-4218, 4219	7/22/2013	K-40	1426.80 ± 117.50	1335.70 ± 110.60	1381.25 ± 80.68	Pass
MI-4218, 4219	7/22/2013	Sr-90	0.62 ± 0.32	0.67 ± 0.32	0.65 ± 0.23	Pass
WW-4239, 4240	7/23/2013	H-3	223.71 ± 92.64	221.74 ± 92.56	222.73 ± 65.48	Pass
WW-4394, 4395	7/30/2013	Gr. Alpha	2.63 ± 1.49	2.57 ± 1.11	2.60 ± 0.93	Pass
WW-4394, 4395	7/30/2013	Gr. Beta	3.72 ± 1.17	2.63 ± 1.29	3.18 ± 0.87	Pass
WW-4394, 4395	7/30/2013	H-3	271.50 ± 91.30	297.60 ± 91.50	284.55 ± 64.63	Pass
SWU-4478, 4479	7/30/2013	Gr. Beta	2.07 ± 0.54	2.24 ± 0.55	2.16 ± 0.39	Pass
DW-40159, 40160	7/31/2013	Ra-226	3.39 ± 0.63	2.39 ± 0.45	2.89 ± 0.39	Pass
DW-40159, 40160	7/31/2013	Ra-228	3.29 ± 0.73	2.94 ± 0.68	3.12 ± 0.50	Pass
VE-4436, 4437	8/1/2013	Be-7	0.98 ± 0.21	0.89 ± 0.17	0.94 ± 0.14	Pass
VE-4436, 4437	8/1/2013	K-40	3.95 ± 0.39	3.75 ± 0.31	3.85 ± 0.25	Pass
G-4457, 4458	8/1/2013	Be-7	0.78 ± 0.19	0.67 ± 0.16	0.72 ± 0.12	Pass
G-4457, 4458	8/1/2013	Gr. Beta	6.15 ± 0.14	6.10 ± 0.14	6.13 ± 0.10	Pass
G-4457, 4458	8/1/2013	K-40	4.25 ± 0.36	4.60 ± 0.41	4.42 ± 0.27	Pass
VE-4520, 4521	8/1/2013	K-40	2.20 ± 0.16	2.09 ± 0.17	2.15 ± 0.12	Pass
WW-4772, 4773	8/6/2013	H-3	143.80 ± 86.70	157.80 ± 87.30	150.80 ± 61.52	Pass

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

Lab Code	Date	Analysis	Concentration (pCi/L) <sup>a</sup>			Acceptance
			First Result	Second Result	Averaged Result	
VE-4709, 4710	8/8/2013	Gr. Beta	31.40 ± 1.00	30.70 ± 1.00	31.05 ± 0.71	Pass
VE-4709, 4710	8/8/2013	H-3	1504.00 ± 132.00	1468.00 ± 131.00	1486.00 ± 92.99	Pass
VE-4709, 4710	8/8/2013	U-233/4	0.009 ± 0.002	0.005 ± 0.002	0.007 ± 0.001	Pass
VE-4709, 4710	8/8/2013	U-238	0.005 ± 0.002	0.004 ± 0.001	0.005 ± 0.001	Pass
WW-4562, 4563	8/8/2013	H-3	208.82 ± 105.55	213.13 ± 105.73	210.97 ± 74.70	Pass
SG-4651, 4652	8/13/2013	Gr. Alpha	29.00 ± 3.10	28.80 ± 3.20	28.90 ± 2.23	Pass
SG-4651, 4652	8/13/2013	Gr. Beta	34.10 ± 1.80	34.00 ± 1.80	34.05 ± 1.27	Pass
SG-4651, 4652	8/13/2013	Ra-226	9.00 ± 0.20	8.70 ± 0.20	8.85 ± 0.14	Pass
VE-4835, 4836	8/13/2013	K-40	3.01 ± 0.24	3.08 ± 0.28	3.04 ± 0.19	Pass
WW-4877, 4878	8/14/2013	H-3	217.35 ± 87.57	276.63 ± 90.20	246.99 ± 62.86	Pass
LW-4856, 4857	8/15/2013	Gr. Beta	0.96 ± 0.40	0.94 ± 0.38	0.95 ± 0.28	Pass
W-4982, 4983	8/16/2013	H-3	757.43 ± 112.40	767.56 ± 112.76	762.50 ± 79.60	Pass
VE-4919, 4920	8/19/2013	K-40	4891.90 ± 407.90	4907.40 ± 350.40	4899.65 ± 268.87	Pass
VE-4919, 4920	8/19/2013	Be-7	470.50 ± 159.60	325.10 ± 104.10	397.80 ± 95.27	Pass
DW-40184, 40185	8/19/2013	Ra-228	2.35 ± 0.72	2.53 ± 0.70	2.44 ± 0.50	Pass
DW-40184, 40185	8/19/2013	Ra-228	1.44 ± 0.35	2.30 ± 0.56	1.87 ± 0.33	Pass
AP-5003, 5004	8/22/2013	Be-7	0.23 ± 0.10	0.21 ± 0.10	0.22 ± 0.07	Pass
LW-5229, 5230	8/29/2013	Gr. Beta	1.09 ± 0.86	2.28 ± 0.96	1.69 ± 0.64	Pass
SS-5333, 5334	9/3/2013	Cs-137	89.20 ± 41.60	97.80 ± 34.60	93.50 ± 27.05	Pass
SS-5333, 5334	9/3/2013	K-40	11893.00 ± 681.30	12353.00 ± 778.90	12123.00 ± 517.41	Pass
VE-5313, 5314	9/3/2013	K-40	1.84 ± 0.20	1.85 ± 0.20	1.85 ± 0.14	Pass
VE-5313, 5314	9/3/2013	Gr. Beta	2.38 ± 0.04	2.43 ± 0.04	2.41 ± 0.03	Pass
WW-5617, 5618	9/5/2013	H-3	1987.00 ± 147.00	2094.00 ± 150.00	2040.50 ± 105.01	Pass
AP-5355, 5356	9/5/2013	Be-7	0.22 ± 0.12	0.27 ± 0.14	0.25 ± 0.09	Pass
XW-5694, 5695	9/8/2013	C-14	0.94 ± 0.09	0.78 ± 0.10	0.86 ± 0.07	Pass
VE-5409, 5410	9/9/2013	K-40	3.60 ± 0.26	3.33 ± 0.29	3.46 ± 0.19	Pass
AP-5430, 5431	9/12/2013	Be-7	0.26 ± 0.10	0.26 ± 0.10	0.26 ± 0.07	Pass
MI-5401, 5402	9/12/2013	K-40	1404.60 ± 114.10	1356.10 ± 128.60	1380.35 ± 85.96	Pass
WW-5451, 5452	9/12/2013	H-3	196.66 ± 84.44	200.78 ± 84.64	198.72 ± 59.78	Pass
MI-5484, 5485	9/16/2013	K-40	1398.50 ± 88.93	1364.60 ± 113.30	1381.55 ± 72.02	Pass
WW-5568, 5569	9/17/2013	H-3	274.69 ± 87.95	203.72 ± 84.71	239.20 ± 61.05	Pass
BS-5764, 5765	9/20/2013	Cs-137	0.40 ± 0.03	0.37 ± 0.02	0.39 ± 0.02	Pass
BS-5764, 5765	9/20/2013	K-40	17.97 ± 0.59	17.54 ± 0.55	17.76 ± 0.40	Pass
VE-5638, 5639	9/23/2013	K-40	4.15 ± 0.33	4.46 ± 0.38	4.31 ± 0.25	Pass
WW-5596, 5597	9/23/2013	Gr. Beta	5.97 ± 1.39	5.95 ± 1.45	5.96 ± 1.01	Pass
G-5680, 5681	9/25/2013	Be-7	0.36 ± 0.13	0.35 ± 0.09	0.35 ± 0.08	Pass
G-5680, 5681	9/25/2013	Gr. Beta	3.81 ± 0.11	3.77 ± 0.11	3.79 ± 0.08	Pass
G-5680, 5681	9/25/2013	K-40	3.23 ± 0.32	2.99 ± 0.24	3.11 ± 0.20	Pass
S-5659, 5660	9/26/2013	Ac-228	1.19 ± 0.21	1.06 ± 0.21	1.13 ± 0.15	Pass
S-5659, 5660	9/26/2013	Cs-137	0.13 ± 0.04	0.14 ± 0.05	0.14 ± 0.03	Pass
S-5659, 5660	9/26/2013	K-40	16.08 ± 1.39	16.65 ± 1.46	16.37 ± 1.01	Pass
S-5659, 5660	9/26/2013	Pb-214	0.97 ± 0.15	1.10 ± 0.16	1.04 ± 0.11	Pass
AP-6345, 6346	9/30/2013	Be-7	0.077 ± 0.010	0.081 ± 0.008	0.079 ± 0.006	Pass
AP-6366, 6367	9/30/2013	Be-7	0.078 ± 0.012	0.083 ± 0.014	0.081 ± 0.009	Pass

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

Lab Code	Date	Analysis	Concentration (pCi/L) <sup>a</sup>			Acceptance
			First Result	Second Result	Averaged Result	
DW-5701, 5702	9/30/2013	Gr. Beta	14.48 ± 2.04	13.32 ± 1.84	13.90 ± 1.37	Pass
SG-5722, 5723	9/30/2013	Ra-226	12.41 ± 0.47	11.98 ± 0.59	12.20 ± 0.38	Pass
SG-5722, 5723	9/30/2013	Ra-228	7.84 ± 0.71	8.13 ± 0.97	7.99 ± 0.60	Pass
G-5806, 5807	10/1/2013	Be-7	3.26 ± 0.30	3.11 ± 0.13	3.19 ± 0.16	Pass
G-5806, 5807	10/1/2013	K-40	6.65 ± 0.21	6.68 ± 0.50	6.67 ± 0.27	Pass
SG-5827, 5828	10/1/2013	Ac-228	4.08 ± 0.33	3.92 ± 0.40	4.00 ± 0.26	Pass
SG-5827, 5828	10/1/2013	K-40	2.55 ± 0.65	2.37 ± 0.63	2.46 ± 0.45	Pass
SG-5827, 5828	10/1/2013	Pb-214	3.82 ± 0.17	3.93 ± 0.20	3.88 ± 0.13	Pass
VE-5848, 5849	10/1/2013	K-40	1.62 ± 0.16	1.57 ± 0.14	1.60 ± 0.11	Pass
AP-6408, 6409	10/3/2013	Be-7	0.072 ± 0.015	0.063 ± 0.012	0.068 ± 0.010	Pass
f-5954, 5955	10/3/2013	K-40	2.74 ± 0.36	3.02 ± 0.34	2.88 ± 0.25	Pass
P-6035, 6036	10/7/2013	H-3	198.41 ± 85.00	288.60 ± 89.15	243.51 ± 61.59	Pass
SG-6115, 6116	10/8/2013	Ac-228	5.22 ± 0.50	4.87 ± 0.48	5.05 ± 0.35	Pass
SG-6115, 6116	10/8/2013	K-40	5.61 ± 1.08	6.61 ± 1.04	6.11 ± 0.75	Pass
SG-6115, 6116	10/8/2013	Pb-214	4.29 ± 0.24	4.24 ± 0.20	4.27 ± 0.16	Pass
VE-6136, 6137	10/8/2013	Be-7	0.55 ± 0.18	0.60 ± 0.15	0.58 ± 0.12	Pass
VE-6136, 6137	10/8/2013	K-40	2.78 ± 0.35	2.61 ± 0.33	2.69 ± 0.24	Pass
WW-6198, 6199	10/8/2013	H-3	12973.70 ± 332.60	12757.80 ± 330.00	12865.75 ± 234.27	Pass
VE-6240, 6241	10/9/2013	K-40	14.29 ± 0.29	14.95 ± 0.54	14.62 ± 0.31	Pass
W-5996, 5997	10/9/2013	Gr. Alpha	3.87 ± 1.18	4.07 ± 1.08	3.97 ± 0.80	Pass
W-5996, 5997	10/9/2013	Gr. Beta	9.82 ± 0.85	8.53 ± 0.82	9.18 ± 0.59	Pass
W-5996, 5997	10/9/2013	Ra-228	3.42 ± 1.02	3.39 ± 1.01	3.41 ± 0.72	Pass
DW-40224, 40225	10/11/2013	Ra-226	0.62 ± 0.10	0.76 ± 0.10	0.69 ± 0.07	Pass
DW-40224, 40225	10/11/2013	Ra-228	0.87 ± 0.55	1.00 ± 0.54	0.94 ± 0.39	Pass
WW-6219, 6220	10/11/2013	H-3	455.41 ± 111.54	354.66 ± 107.84	405.03 ± 77.57	Pass
CF-6261, 6262	10/14/2013	Be-7	1.97 ± 0.24	2.06 ± 0.22	2.01 ± 0.16	Pass
CF-6261, 6262	10/14/2013	K-40	11.55 ± 0.56	12.06 ± 0.61	11.80 ± 0.41	Pass
MI-6303, 6304	10/14/2013	K-40	1507.30 ± 110.80	1482.40 ± 110.00	1494.85 ± 78.07	Pass
VE-6534, 6535	10/17/2013	K-40	15.96 ± 0.17	16.16 ± 0.36	16.06 ± 0.20	Pass
S-6471, 6472	10/18/2013	Ac-228	0.94 ± 0.19	0.78 ± 0.18	0.86 ± 0.13	Pass
S-6471, 6472	10/18/2013	K-40	12.82 ± 1.05	12.90 ± 1.17	12.86 ± 0.79	Pass
S-6471, 6472	10/18/2013	Pb-214	0.88 ± 0.11	0.72 ± 0.12	0.80 ± 0.08	Pass
VE-6597, 6598	10/22/2013	K-40	2.46 ± 0.22	2.58 ± 0.20	2.52 ± 0.15	Pass
WW-6576, 6577	10/22/2013	H-3	745.60 ± 110.70	663.30 ± 107.60	704.45 ± 77.19	Pass
LW-6681, 6682	10/29/2013	Gr. Beta	2.00 ± 0.92	2.17 ± 0.98	2.09 ± 0.67	Pass
SWU-6765, 6766	10/29/2013	Gr. Beta	3.07 ± 0.61	2.90 ± 0.65	2.99 ± 0.45	Pass
WW-6849, 6850	10/29/2013	H-3	863.00 ± 113.80	826.60 ± 112.50	844.80 ± 80.01	Pass
MI-6786, 6787	10/30/2013	K-40	1370.60 ± 109.60	1449.20 ± 105.50	1409.90 ± 76.06	Pass
SO-6744, 6745	10/30/2013	Ac-228	0.46 ± 0.11	0.51 ± 0.11	0.48 ± 0.08	Pass
SO-6744, 6745	10/30/2013	Bi-214	0.48 ± 0.10	0.30 ± 0.10	0.39 ± 0.07	Pass
SO-6744, 6745	10/30/2013	Cs-137	0.21 ± 0.04	0.24 ± 0.04	0.23 ± 0.03	Pass
SO-6744, 6745	10/30/2013	Gr. Beta	27.40 ± 1.14	27.44 ± 1.11	27.42 ± 0.80	Pass
SO-6744, 6745	10/30/2013	K-40	14.93 ± 0.88	15.20 ± 0.90	15.07 ± 0.63	Pass
SO-6744, 6745	10/30/2013	Pb-212	0.43 ± 0.04	0.40 ± 0.05	0.42 ± 0.03	Pass
SO-6744, 6745	10/30/2013	Ra-226	1.47 ± 0.35	1.31 ± 0.36	1.39 ± 0.25	Pass
SO-6744, 6745	10/30/2013	Tl-208	0.16 ± 0.04	0.16 ± 0.04	0.16 ± 0.03	Pass

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

Lab Code	Date	Analysis	Concentration (pCi/L) <sup>a</sup>			Acceptance
			First Result	Second Result	Averaged Result	
DW-40238, 40239	10/31/2013	Ra-228	0.94 ± 0.41	1.60 ± 0.55	1.27 ± 0.34	Pass
WW-7018, 7019	11/1/2013	H-3	593.09 ± 104.72	648.69 ± 106.89	620.89 ± 74.82	Pass
CF-6870, 6871	11/4/2013	K-40	12.67 ± 0.49	13.30 ± 0.47	12.98 ± 0.34	Pass
XW-6828, 6829	11/4/2013	K-40	97.99 ± 55.33	160.21 ± 74.99	129.10 ± 46.60	Pass
BS-6891, 6892	11/5/2013	Cs-137	0.018 ± 0.010	0.018 ± 0.009	0.018 ± 0.007	Pass
BS-6891, 6892	11/5/2013	Gr. Beta	12.41 ± 1.74	9.97 ± 1.57	11.19 ± 1.17	Pass
BS-6891, 6892	11/5/2013	K-40	6.49 ± 0.33	6.28 ± 0.40	6.39 ± 0.26	Pass
WW-6912, 6913	11/5/2013	Gr. Alpha	2.87 ± 1.30	4.46 ± 1.47	3.67 ± 0.98	Pass
WW-6912, 6913	11/5/2013	Gr. Beta	3.18 ± 0.87	3.18 ± 0.87	3.18 ± 0.62	Pass
WW-6912, 6913	11/5/2013	H-3	349.01 ± 101.42	430.14 ± 98.06	389.58 ± 70.54	Pass
SO-6954, 6955	11/6/2013	Cs-137	0.14 ± 0.03	0.12 ± 0.02	0.13 ± 0.02	Pass
SO-6954, 6955	11/6/2013	K-40	15.16 ± 0.72	14.11 ± 0.64	14.64 ± 0.48	Pass
S-6976, 6977	11/13/2013	K-40	22.36 ± 0.69	22.62 ± 0.72	22.49 ± 0.50	Pass
DW-40246, 40247	11/15/2013	Gr. Alpha	15.00 ± 3.41	20.31 ± 4.00	17.65 ± 2.63	Pass
CF-7102, 7103	11/18/2013	Be-7	17.79 ± 0.51	18.09 ± 0.80	17.94 ± 0.48	Pass
DW-40250, 40251	11/18/2013	Ra-226	27.77 ± 2.84	26.15 ± 2.67	26.96 ± 1.95	Pass
DW-40250, 40251	11/18/2013	Ra-228	7.91 ± 0.94	6.32 ± 0.84	7.12 ± 0.63	Pass
WW-7164, 7165	11/19/2013	H-3	266.90 ± 91.10	268.90 ± 91.20	267.90 ± 64.45	Pass
SS-7334, 7335	11/20/2013	K-40	15.51 ± 0.72	14.14 ± 0.80	14.83 ± 0.54	Pass
WW-7558, 7559	11/22/2013	H-3	229.86 ± 83.89	191.77 ± 82.05	210.82 ± 58.67	Pass
LW-7292, 7293	11/26/2013	Gr. Beta	1.92 ± 0.75	2.38 ± 0.77	2.15 ± 0.54	Pass
W-7229, 7230	12/1/2013	Ra-226	0.87 ± 0.23	0.88 ± 0.25	0.88 ± 0.17	Pass
W-7229, 7230	12/1/2013	Ra-228	3.00 ± 0.98	3.27 ± 1.16	3.14 ± 0.76	Pass
SG-7313, 7314	12/2/2013	Ac-228	6.33 ± 0.23	6.69 ± 0.30	6.51 ± 0.19	Pass
SG-7313, 7314	12/2/2013	K-40	5.47 ± 0.61	6.24 ± 0.74	5.86 ± 0.48	Pass
SG-7313, 7314	12/2/2013	Pb-214	5.60 ± 0.14	5.37 ± 0.16	5.49 ± 0.11	Pass
W-7432, 7433	12/4/2013	Gr. Beta	5.35 ± 1.20	3.89 ± 1.23	4.62 ± 0.86	Pass
WW-7516, 7517	12/10/2013	H-3	369.30 ± 95.64	269.22 ± 91.35	319.26 ± 66.13	Pass
SG-7579, 7580	12/20/2013	Ra-226	3.72 ± 0.11	3.85 ± 0.30	3.79 ± 0.16	Pass
SG-7579, 7580	12/20/2013	Ra-228	2.38 ± 0.18	2.77 ± 0.44	2.58 ± 0.24	Pass
LW-7684, 7685	12/23/2013	Gr. Beta	0.84 ± 0.51	1.96 ± 0.61	1.40 ± 0.40	Pass
DW-40261, 40262	12/27/2013	Ra-226	0.54 ± 0.10	0.67 ± 0.10	0.61 ± 0.07	Pass
DW-40261, 40262	12/27/2013	Ra-228	1.09 ± 0.51	1.12 ± 0.43	1.11 ± 0.33	Pass
SWU-7663, 7664	12/30/2013	Gr. Beta	2.85 ± 0.71	3.88 ± 0.77	3.37 ± 0.52	Pass

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

<sup>a</sup> Results are reported in units of pCi/L, except for air filters (pCi/Filter), food products, vegetation, soil, sediment (pCi/g).

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

Lab Code <sup>b</sup>	Date	Analysis	Laboratory result	Concentration <sup>a</sup>		Acceptance
				Known Activity	Control Limits <sup>c</sup>	
MAAP-738	02/01/13	Am-241	0.10 ± 0.02	0.10	0.07 - 0.14	Pass
MAAP-738	02/01/13	Co-57	2.58 ± 0.06	2.36	1.65 - 3.07	Pass
MAAP-738	02/01/13	Co-60	0.01 ± 0.03	0.00	NA <sup>c</sup>	Pass
MAAP-738	02/01/13	Cs-134	1.82 ± 0.13	1.78	1.25 - 2.31	Pass
MAAP-738	02/01/13	Cs-137	2.93 ± 0.10	2.60	1.82 - 3.38	Pass
MAAP-738	02/01/13	Mn-54	4.87 ± 0.13	4.26	2.98 - 5.54	Pass
MAAP-738	02/01/13	Pu-238	0.12 ± 0.02	0.13	0.09 - 0.17	Pass
MAAP-738	02/01/13	Pu-239/40	0.11 ± 0.02	0.12	0.09 - 0.16	Pass
MAAP-738	02/01/13	Sr-90	1.39 ± 0.14	1.49	1.04 - 1.94	Pass
MAAP-738	02/01/13	U-233/4	0.03 ± 0.01	0.03	0.02 - 0.04	Pass
MAAP-738	02/01/13	U-238	0.23 ± 0.03	0.23	0.16 - 0.30	Pass
MAAP-738	02/01/13	Zn-65	3.84 ± 0.20	3.13	2.19 - 4.07	Pass
MAAP-738 <sup>e</sup>	02/01/13	Gr. Alpha	0.14 ± 0.03	1.20	0.36 - 2.04	Fail
MAAP-738	02/01/13	Gr. Beta	0.93 ± 0.06	0.85	0.43 - 1.28	Pass
MAW-806	02/01/13	Am-241	0.71 ± 0.08	0.69	0.48 - 0.90	Pass
MAW-806	02/01/13	Co-57	31.20 ± 0.40	30.90	21.60 - 40.20	Pass
MAW-806	02/01/13	Co-60	19.70 ± 0.30	16.56	13.69 - 25.43	Pass
MAW-806	02/01/13	Cs-134	23.20 ± 0.50	24.40	17.10 - 31.70	Pass
MAW-806	02/01/13	Cs-137	0.03 ± 0.12	0.00	NA <sup>c</sup>	Pass
MAW-806	02/01/13	Fe-55	34.00 ± 3.30	44.00	30.80 - 57.20	Pass
MAW-806	02/01/13	H-3	511.60 ± 12.50	507.00	355.00 - 659.00	Pass
MAW-806	02/01/13	K-40	2.20 ± 0.90	0.00	NA <sup>c</sup>	Pass
MAW-806	02/01/13	Mn-54	27.60 ± 0.50	27.40	19.20 - 35.60	Pass
MAW-806	02/01/13	Ni-63	34.30 ± 2.80	33.40	23.40 - 43.40	Pass
MAW-806	02/01/13	Pu-238	0.83 ± 0.10	0.88	0.62 - 1.15	Pass
MAW-806	02/01/13	Pu-239/40	0.02 ± 0.02	0.01	NA <sup>d</sup>	Pass
MAW-806	02/01/13	Sr-90	9.30 ± 0.80	10.50	7.40 - 13.70	Pass
MAW-806	02/01/13	Tc-99	10.25 ± 0.40	13.10	9.20 - 17.00	Pass
MAW-806	02/01/13	U-233/4	0.31 ± 0.05	0.32	0.22 - 0.41	Pass
MAW-806	02/01/13	U-238	1.91 ± 0.13	1.95	1.37 - 2.54	Pass
MAW-806	02/01/13	Zn-65	31.60 ± 0.80	30.40	21.30 - 39.50	Pass
MAW-811	02/01/13	Gr. Alpha	1.87 ± 0.09	2.31	0.69 - 3.93	Pass
MAW-811	02/01/13	Gr. Beta	13.04 ± 0.13	13.00	6.50 - 19.50	Pass
MAW-811	02/01/13	I-129	4.60 ± 0.19	6.06	4.24 - 7.88	Pass

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

Lab Code <sup>b</sup>	Date	Analysis	Laboratory result	Concentration <sup>a</sup>		Acceptance
				Known Activity	Control Limits <sup>c</sup>	
MASO-739	02/01/13	Am-241	106.90 ± 11.40	113.00	79.00 - 147.00	Pass
MASO-739	02/01/13	Co-57	0.60 ± 0.50	0.00	NA <sup>c</sup>	Pass
MASO-739	02/01/13	Co-60	739.20 ± 28.50	691.00	484.00 - 898.00	Pass
MASO-739	02/01/13	Cs-134	863.30 ± 34.10	887.00	621.00 - 1153.00	Pass
MASO-739	02/01/13	Cs-137	661.80 ± 25.70	587.00	411.00 - 763.00	Pass
MASO-739	02/01/13	K-40	745.80 ± 33.30	625.30	437.70 - 812.90	Pass
MASO-739	02/01/13	Mn-54	1.10 ± 1.00	0.00	NA <sup>c</sup>	Pass
MASO-739	02/01/13	Zn-65	1109.60 ± 44.10	995.00	697.00 - 1294.00	Pass
MASO-744	02/01/13	Ni-63	682.60 ± 16.80	670.00	469.00 - 871.00	Pass
MASO-744	02/01/13	Pu-238	0.20 ± 0.90	0.52	NA <sup>d</sup>	Pass
MASO-744	02/01/13	Pu-239/40	88.30 ± 9.00	79.50	55.70 - 103.40	Pass
MASO-744 <sup>f</sup>	02/01/13	Sr-90	408.40 ± 14.00	628.00	440.00 - 816.00	Fail
MASO-744	02/01/13	Tc-99	380.50 ± 16.80	444.00	311.00 - 577.00	Pass
MASO-744	02/01/13	U-233/4	53.20 ± 4.80	62.50	43.80 - 81.30	Pass
MASO-744	02/01/13	U-238	242.10 ± 10.20	281.00	197.00 - 365.00	Pass
MAVE-747	02/01/13	Co-57	10.37 ± 0.17	8.68	6.08 - 11.28	Pass
MAVE-747	02/01/13	Co-60	6.48 ± 0.17	5.85	4.10 - 7.61	Pass
MAVE-747	02/01/13	Cs-134	0.02 ± 0.04	0.00	NA <sup>c</sup>	Pass
MAVE-747	02/01/13	Cs-137	7.79 ± 0.21	6.87	4.81 - 8.93	Pass
MAVE-747	02/01/13	Mn-54	0.00 ± 0.05	0.00	NA <sup>c</sup>	Pass
MAVE-747	02/01/13	Zn-65	7.29 ± 0.33	6.25	4.38 - 8.13	Pass
MASO-5043	08/01/13	Am-241	1.40 ± 1.70	0.00	NA <sup>c</sup>	Pass
MASO-5043 <sup>g</sup>	08/01/13	Co-57	699.60 ± 3.90	0.00	NA <sup>c</sup>	Fail
MASO-5043	08/01/13	Cs-134	1191.70 ± 23.00	1172.00	820.00 - 1524.00	Pass
MASO-5043	08/01/13	Cs-137	1072.00 ± 5.10	977.00	684.00 - 1270.00	Pass
MASO-5043	08/01/13	K-40	760.00 ± 16.20	633.00	443.00 - 823.00	Pass
MASO-5043	08/01/13	Mn-54	753.80 ± 4.90	674.00	472.00 - 876.00	Pass
MASO-5043	08/01/13	Ni-63	560.00 ± 23.70	571.00	400.00 - 742.00	Pass
MASO-5043	08/01/13	Pu-238	68.40 ± 7.50	61.50	43.10 - 80.00	Pass
MASO-5043	08/01/13	Pu-239/40	0.40 ± 0.80	0.36	NA <sup>d</sup>	Pass
MASO-5043	08/01/13	Sr-90	383.90 ± 14.50	460.00	322.00 - 598.00	Pass
MASO-5043	08/01/13	Tc-99	-1.00 ± 10.50	0.00	NA <sup>c</sup>	Pass
MASO-5043	08/01/13	U-233/4	23.80 ± 3.30	30.00	21.00 - 39.00	Pass
MASO-5043	08/01/13	U-238	26.80 ± 3.50	34.00	23.80 - 44.20	Pass
MASO-5043	08/01/13	Zn-65	-351.50 ± 5.50	0.00	NA <sup>c</sup>	Pass



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

Lab Code <sup>b</sup>	Date	Analysis	Laboratory result	Concentration <sup>a</sup>		Acceptance
				Known Activity	Control Limits <sup>c</sup>	
MAW-5052	08/01/13	I-129	2.75 ± 0.20	3.79	2.65 - 4.93	Pass
MAW-5094	08/01/13	Am-241	0.00 ± 0.01	0.00	NA <sup>c</sup>	Pass
MAW-5094	08/01/13	Co-57	0.01 ± 0.09	0.00	NA <sup>c</sup>	Pass
MAW-5094	08/01/13	Co-60	23.20 ± 0.32	23.58	16.51 - 30.65	Pass
MAW-5094	08/01/13	Cs-134	27.60 ± 0.58	30.40	21.00 - 39.00	Pass
MAW-5094	08/01/13	Cs-137	32.31 ± 0.52	31.60	22.10 - 41.10	Pass
MAW-5094	08/01/13	Fe-55	39.20 ± 3.50	53.30	37.30 - 69.30	Pass
MAW-5094	08/01/13	Gr. Alpha	0.54 ± 0.05	0.70	0.21 - 1.19	Pass
MAW-5094	08/01/13	Gr. Beta	5.85 ± 0.09	5.94	2.97 - 8.91	Pass
MAW-5094	08/01/13	H-3	1.20 ± 3.00	0.00	NA <sup>c</sup>	Pass
MAW-5094	08/01/13	K-40	2.22 ± 0.90	0.00	NA <sup>c</sup>	Pass
MAW-5094	08/01/13	Mn-54	0.01 ± 0.11	0.00	NA <sup>c</sup>	Pass
MAW-5094	08/01/13	Ni-63	21.80 ± 3.30	26.40	18.50 - 34.30	Pass
MAW-5094	08/01/13	Pu-238	1.30 ± 0.11	1.22	0.85 - 1.58	Pass
MAW-5094	08/01/13	Pu-239/40	0.98 ± 0.09	1.00	0.70 - 1.30	Pass
MAW-5094	08/01/13	Sr-90	6.40 ± 0.60	7.22	5.05 - 9.39	Pass
MAW-5094	08/01/13	Tc-99	13.10 ± 0.70	16.20	11.30 - 21.10	Pass
MAW-5094	08/01/13	U-233/4	0.08 ± 0.02	0.07	NA <sup>d</sup>	Pass
MAW-5094	08/01/13	U-238	0.03 ± 0.01	0.03	NA <sup>d</sup>	Pass
MAW-5094	08/01/13	Zn-65	35.30 ± 0.90	34.60	24.20 - 45.00	Pass
MAVE-5046	08/01/13	Co-57	0.01 ± 0.03	0.00	NA <sup>c</sup>	Pass
MAVE-5046	08/01/13	Co-60	0.00 ± 0.04	0.00	NA <sup>c</sup>	Pass
MAVE-5046	08/01/13	Cs-134	5.71 ± 0.23	5.20	3.64 - 6.76	Pass
MAVE-5046	08/01/13	Cs-137	7.64 ± 0.20	6.60	4.62 - 8.58	Pass
MAVE-5046	08/01/13	Mn-54	9.08 ± 0.24	7.88	5.52 - 10.24	Pass
MAVE-5046	08/01/13	Zn-65	2.92 ± 0.25	2.63	1.84 - 3.42	Pass

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

Lab Code <sup>b</sup>	Date	Analysis	Laboratory result	Concentration <sup>a</sup>		Acceptance
				Known Activity	Control Limits <sup>c</sup>	
MAAP-5046	08/01/13	Am-241	0.01 ± 0.02	0.00	NA <sup>c</sup>	Pass
MAAP-5046	08/01/13	Co-57	3.48 ± 0.14	3.40	1.90 - 3.50	Pass
MAAP-5046	08/01/13	Co-60	2.44 ± 0.08	3.40	1.60 - 3.00	Pass
MAAP-5046	08/01/13	Cs-134	0.01 ± 0.03	0.00	NA <sup>c</sup>	Pass
MAAP-5046	08/01/13	Cs-137	3.09 ± 0.13	2.70	1.90 - 3.50	Pass
MAAP-5046	08/01/13	Gr. Alpha	0.28 ± 0.04	0.90	0.27 - 1.53	Pass
MAAP-5046	08/01/13	Gr. Beta	1.90 ± 0.08	1.63	0.82 - 2.45	Pass
MAAP-5046	08/01/13	Mn-54	3.95 ± 0.12	3.50	2.50 - 4.60	Pass
MAAP-5046	08/01/13	Pu-238	0.14 ± 0.028	0.12	0.087 - 0.16	Pass
MAAP-5046	08/01/13	Pu-239/40	0.10 ± 0.022	0.092	0.064 - 0.12	Pass
MAAP-5046	08/01/13	Sr-90	1.69 ± 4.10	1.81	1.27 - 2.35	Pass
MAAP-5046 <sup>h</sup>	08/01/13	U-233/4	0.04 ± 0.01	0.03	0.02 - 0.04	Fail
MAAP-5046	08/01/13	U-238	0.19 ± 0.027	0.21	0.14 - 0.27	Pass
MAAP-5046	08/01/13	Zn-65	3.27 ± 0.18	2.70	2.50 - 4.60	Pass

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

<sup>b</sup> Laboratory codes as follows: MAW (water), MAAP (air filter), MASO (soil), MAVE (vegetation).

<sup>c</sup> 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.

<sup>d</sup> Provided in the series for "sensitivity evaluation". MAPEP does not provide control limits.

<sup>e</sup> The filter was recounted overnight, no significant alpha activity could be detected.

<sup>f</sup> The sample was reanalyzed using additional fuming nitric separations. Result of reanalysis: 574.4 ± 35.2 Bq/kg.

<sup>g</sup> Interference from Eu-152 resulted in misidentification of Co-57.

<sup>h</sup> Result of repeat analysis: 0.031 ± 0.013 pCi/filter.

TABLE A-7. Interlaboratory Comparison Crosscheck program, Environmental Resource Associates (ERA)<sup>a</sup>.

Lab Code <sup>b</sup>	Date	Analysis	Concentration (pCi/L) <sup>b</sup>		Control Limits	Acceptance
			Laboratory Result <sup>c</sup>	ERA Result <sup>d</sup>		
ERAP-1174	03/18/13	Am-241	65.2 ± 4.4	66.8	41.2 - 90.4	Pass
ERAP-1174	03/18/13	Co-60	226.5 ± 4.1	214.0	166.0 - 267.0	Pass
ERAP-1174	03/18/13	Cs-134	1101.2 ± 23.6	1110.0	706.0 - 1380.0	Pass
ERAP-1174	03/18/13	Cs-137	1065.6 ± 21.4	940.0	706.0 - 1230.0	Pass
ERAP-1174	03/18/13	Fe-55	178.8 ± 88.0	225.0	69.8 - 440.0	Pass
ERAP-1174	03/18/13	Mn-54	< 3.1	0.0	0.0 - 50.0	Pass
ERAP-1174	03/18/13	Pu-238	50.0 ± 3.0	51.1	34.3 - 65.9	Pass
ERAP-1174	03/18/13	Pu-239/40	65.7 ± 2.6	65.2	47.2 - 85.2	Pass
ERAP-1174	03/18/13	U-233/4	54.0 ± 2.5	59.4	36.8 - 89.6	Pass
ERAP-1174	03/18/13	U-238	55.6 ± 2.6	58.9	38.1 - 81.4	Pass
ERAP-1174	03/18/13	Uranium	112.0 ± 5.6	121.0	67.0 - 184.0	Pass
ERAP-1174	03/18/13	Zn-65	236.6 ± 13.8	199.0	142.0 - 275.0	Pass
ERAP-1175	03/18/13	Gr. Alpha	52.3 ± 2.8	42.3	14.2 - 65.7	Pass
ERAP-1175	03/18/13	Gr. Beta	36.2 ± 2.0	25.1	15.9 - 36.6	Pass
ERSO-1176	03/18/13	Am-241	293.1 ± 97.4	229.0	134.0 - 297.0	Pass
ERSO-1176	03/18/13	Pu-238	909.0 ± 180.0	788.0	474.0 - 1090.0	Pass
ERSO-1176	03/18/13	Pu-239/40	432.0 ± 120.0	366.0	239.0 - 506.0	Pass
ERSO-1176	03/18/13	Sr-90	8050.8 ± 376.0	8530.0	3250.0 - 13500.0	Pass
ERSO-1176	03/18/13	U-233/4	1662.6 ± 150.0	1920.0	1170.0 - 2460.0	Pass
ERSO-1176	03/18/13	U-238	1682.8 ± 160.0	1900.0	1180.0 - 2410.0	Pass
ERSO-1176	03/18/13	Uranium	3404.0 ± 330.5	3920.0	2130.0 - 5170.0	Pass
ERSO-1176	03/18/13	Ac-228	1335.0 ± 132.0	1240.0	795.0 - 1720.0	Pass
ERSO-1176	03/18/13	Bi-212	1420.0 ± 311.0	1240.0	330.0 - 1820.0	Pass
ERSO-1176	03/18/13	Bi-214	2626.0 ± 60.0	3660.0	2200.0 - 5270.0	Pass
ERSO-1176	03/18/13	Co-60	7951.0 ± 45.4	7920.0	5360.0 - 10900.0	Pass
ERSO-1176	03/18/13	Cs-134	5785.0 ± 51.0	6370.0	4160.0 - 7650.0	Pass
ERSO-1176	03/18/13	Cs-137	6106.0 ± 47.9	6120.0	4690.0 - 7870.0	Pass
ERSO-1176	03/18/13	K-40	11756.0 ± 284.3	10300.0	7520.0 - 13800.0	Pass
ERSO-1176	03/18/13	Mn-54	< 28.0	0.0	0.0 - 1000.0	Pass
ERSO-1176	03/18/13	Pb-212	1096.0 ± 29.1	1240.0	812.0 - 1730.0	Pass
ERSO-1176	03/18/13	Pb-214	2875.0 ± 60.0	3660.0	2140.0 - 5460.0	Pass
ERSO-1176	03/18/13	Th-234	2404.0 ± 218.3	1900.0	601.0 - 3570.0	Pass
ERSO-1176	03/18/13	Zn-65	1542.0 ± 56.4	1400.0	1110.0 - 1860.0	Pass

TABLE A-7. Interlaboratory Comparison Crosscheck program, Environmental Resource Associates (ERA)<sup>a</sup>.

Lab Code <sup>b</sup>	Date	Analysis	Concentration (pCi/L) <sup>b</sup>		Control Limits	Acceptance
			Laboratory Result <sup>c</sup>	ERA Result <sup>d</sup>		
ERVE-1180	03/18/13	Am-241	569.8 ± 81.7	553.0	338.0 - 735.0	Pass
ERVE-1180	03/18/13	Cm-244	1260.9 ± 107.3	1340.0	657.0 - 2090.0	Pass
ERVE-1180	03/18/13	Co-60	2130.5 ± 48.0	1920.0	1320.0 - 2680.0	Pass
ERVE-1180	03/18/13	Cs-134	1296.5 ± 68.0	1240.0	797.0 - 1610.0	Pass
ERVE-1180	03/18/13	Cs-137	600.1 ± 34.3	544.0	394.0 - 757.0	Pass
ERVE-1180	03/18/13	K-40	34078.0 ± 787.0	31900.0	23000.0 - 44800.0	Pass
ERVE-1180	03/18/13	Mn-54	< 28.7	0.0	0.0 - 300.0	Pass
ERVE-1180	03/18/13	Pu-238	2476.5 ± 259.4	1980.0	1180.0 - 2710.0	Pass
ERVE-1180	03/18/13	Pu-239/40	2659.3 ± 273.2	2260.0	1390.0 - 3110.0	Pass
ERVE-1180	03/18/13	Sr-90	3809.7 ± 420.5	3840.0	2190.0 - 5090.0	Pass
ERVE-1180	03/18/13	U-233/4	2460.6 ± 205.0	2460.0	1620.0 - 3160.0	Pass
ERVE-1180	03/18/13	U-238	2319.1 ± 189.6	2440.0	1630.0 - 3100.0	Pass
ERVE-1180	03/18/13	Uranium	4866.3 ± 375.6	5010.0	3390.0 - 6230.0	Pass
ERVE-1180	03/18/13	Zn-65	1052.5 ± 82.1	878.0	633.0 - 1230.0	Pass
ERW-1184	03/18/13	Am-241	114.5 ± 8.1	118.0	79.5 - 158.0	Pass
ERW-1184	03/18/13	Co-60	2221.8 ± 17.0	2270.0	1970.0 - 2660.0	Pass
ERW-1184	03/18/13	Cs-134	1309.4 ± 58.4	1400.0	1030.0 - 1610.0	Pass
ERW-1184	03/18/13	Cs-137	1865.9 ± 22.0	1880.0	1600.0 - 2250.0	Pass
ERW-1184	03/18/13	Fe-55	503.1 ± 105.0	712.0	424.0 - 966.0	Pass
ERW-1184	03/18/13	Mn-54	< 9.4	0.0	0.0 - 100.0	Pass
ERW-1184	03/18/13	Pu-238	98.4 ± 5.6	98.8	73.1 - 123.0	Pass
ERW-1184	03/18/13	Pu-239/40	184.5 ± 7.7	185.0	144.0 - 233.0	Pass
ERW-1184	03/18/13	Sr-90	125.7 ± 6.0	137.0	89.2 - 181.0	Pass
ERW-1184	03/18/13	U-233/4	44.9 ± 3.4	48.8	36.7 - 62.9	Pass
ERW-1184	03/18/13	U-238	46.5 ± 3.5	48.4	36.9 - 59.4	Pass
ERW-1184	03/18/13	Uranium	93.3 ± 7.1	99.5	73.1 - 129.0	Pass
ERW-1184	03/18/13	Zn-65	412.8 ± 32.0	384.0	320.0 - 484.0	Pass
ERW-1186	03/18/13	Gr. Alpha	109.1 ± 5.7	130.0	46.2 - 201.0	Pass
ERW-1186	03/18/13	Gr. Beta	74.5 ± 6.4	78.9	45.2 - 117.0	Pass
ERW-1188	03/18/13	H-3	12279.0 ± 319.0	12300.0	8240.0 - 17500.0	Pass

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

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

<sup>c</sup> Unless otherwise indicated, the laboratory result is given as the mean ± standard deviation for three determinations.

<sup>d</sup> Results are presented as the known values, expected laboratory precision (1 sigma, 1 determination) and control limits as provided by ERA. A known value of "zero" indicates an analysis was included in the testing series as a "false positive". Control limits are not provided.

APPENDIX B. DATA REPORTING CONVENTIONS

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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  $4.66\sigma$  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:

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

- 4.2 Values below the highest lower limit of detection are not included in the average.
- 4.3 If all values in the averaging group are less than the highest LLD, the highest LLD is reported.
- 4.4 If all but one of the values are less than the highest LLD, the single value  $x$  and associated two sigma error is reported.
- 4.5 In rounding off, the following rules are followed:
- 4.5.1. If the number following those to be retained is less than 5, the number is dropped, and the retained numbers are kept unchanged. As an example, 11.443 is rounded off to 11.44.
- 4.5.2. If the number following those to be retained is equal to or greater than 5, the number is dropped and the last retained number is raised by 1. As an example, 11.445 is rounded off to 11.45.

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## **Appendix C. NON-RADIOLOGICAL MONITORING PROGRAM**

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### **1.0. Introduction**

Union Electric Company, d.b.a. Ameren Missouri, 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 2013.

### **2.0. Unusual or Important Events**

No unusual or important events reportable under the EPP Section 4.1 were identified during 2013.

### **3.0. EPP Non-compliances**

During 2013, there were no non-compliances with the EPP.

### **4.0. Nonroutine Reports**

There were no nonroutine reports submitted in accordance with the EPP, Section 5.4.2 in 2013.

### **5.0. Plant Design and Operation Environmental Evaluations.**

This section lists all changes in the plant design, operation, tests or experiments installed during 2013, which could have involved a potentially significant unreviewed environmental question in accordance with section 3.1 of Appendix B.

During 2013, two plant changes could have involved a potentially significant unreviewed environmental question. The interpretations and conclusions regarding these plant changes along with a description of the change and activity are presented on the following pages.

**RFR 201300712 – Use of alpha-Ketoglutaric Acid (AKGA) for Neutralizing Hydrazine**

**Description of Change:**

Engineering evaluation RFR 201300712 approved the use of a new chemical, alpha-Ketoglutaric Acid (AKGA), for neutralization of hydrazine in liquid radwaste prior to discharge from NPDES Outfall 001. Neutralization of hydrazine is infrequent and normally only necessary during and following extended outages when secondary systems are placed in wet layup and then later drained for maintenance or plant startup. In the past, Callaway used sodium hypochlorite to consume hydrazine in liquid radwaste prior to discharge. AKGA is much less hazardous to plant personnel than sodium hypochlorite, is much less toxic to the environment, and AKGA is also more efficient at neutralizing hydrazine.

**Evaluation of Change:**

Callaway's NPDES Permit MO-0098001 requires Missouri Department of Natural Resources notification for significant changes such as new or different substances being discharged. AKGA was not identified in the most recent NPDES Permit reapplication or in the current NPDES Permit. Therefore the Missouri Department of Natural Resources (DNR) was notified in writing of this change indicating there would be no adverse impact on the quality of the receiving waters from the use of this product as planned.

As part of the Final Environmental Evaluation, both the ER and FES-OL were reviewed for any previously evaluated adverse environmental impacts and any adverse environmental impacts not previously evaluated. No adverse environmental impacts were identified. This change results in lower toxicity to the receiving stream as well as AKGA being less hazardous to plant personnel who handle this product. Ameren received a letter from Missouri DNR stating they concur with Ameren's evaluation for the use of AKGA to consume hydrazine in liquid radwaste (NPDES Outfall 001) prior to discharge.

This evaluation concluded that use of AKGA for neutralization of hydrazine in liquid radwaste prior to discharge does not involve an un-reviewed environmental question.

**MP 11-0002 – Meteorological Tower Communication Upgrade**

**Description of Change:**

Modification MP 11-0002 includes changes to provide a more reliable and secure communications path between the Meteorological Tower and Callaway Plant by replacing the current wireless based communications with a fiber optic based system. This modification includes the installation of an underground fiber optic cable from the meteorological tower to the control building. The fiber optic cable run required some land disturbance including crossing two jurisdictional streams and a county road.

**Evaluation of Change:**

The fiber optic cable was installed using linear construction that consisted of a trench two feet or less in width. The two jurisdictional stream crossings were bored under to eliminate any stream impact and therefore eliminated the need for review by the US Army Corps of Engineers. Missouri State Regulations allow an exemption for storm water permits for this type of construction. Therefore construction for this modification did not require that Missouri DNR be contacted to obtain a land disturbance permit or a storm water permit. All construction activities including trenching required utilization of Best Management Practices for minimizing the impact of solids runoff to storm water. Following completion of all work, the disturbed areas were restored to pre-construction conditions including grading, seeding and mulching as needed.

As part of the Final Environmental Evaluation, both the ER and FES-OL were reviewed for any previously evaluated adverse environmental impacts and any adverse environmental impacts not previously evaluated. No adverse environmental impacts were identified. Missouri DNR approval or permits were not required. This modification was completed with no adverse environmental impacts with all areas disturbed for trenching returned to pre-construction conditions. All trenching and land disturbance work was completed using Best Management Practices to minimize impacts to storm water.

This evaluation concluded that this modification including excavation to run fiber optic cable from the meteorological tower to the control building does not involve an un-reviewed environmental question.





AMEREN MISSOURI,  
CALLAWAY ENERGY CENTER  
FULTON, MISSOURI  
DOCKET NO. 50-483

RADIOLOGICAL ENVIRONMENTAL  
MONITORING PROGRAM (REMP)

ANNUAL REPORT - PART II  
DATA TABULATIONS AND ANALYSES

January 1 to December 31, 2013

Prepared by

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Project No. 8036

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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 2013. Results of completed analyses are presented in the attached tables.

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

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

## 2.0 DATA TABLES

**Table 1. Air particulates and charcoal cartridges, analyses for gamma-emitting isotopes and I-131<sup>a</sup>.**

Collection: Continuous, weekly exchange.  
Units: pCi/m<sup>3</sup>

Location		CA-A-001							
		<sup>7</sup> Be	<sup>58</sup> Co	<sup>60</sup> Co	<sup>95</sup> Zr	<sup>134</sup> Cs	<sup>137</sup> Cs	<sup>140</sup> BaLa	<sup>144</sup> Ce
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date Collected									
	Vol.								
01-10-13	300	< 0.11	< 0.008	< 0.010	< 0.013	< 0.008	< 0.008	< 0.020	< 0.033
01-17-13	272	< 0.11	< 0.005	< 0.008	< 0.017	< 0.006	< 0.009	< 0.020	< 0.042
01-24-13	271	0.24 ± 0.11	< 0.006	< 0.009	< 0.010	< 0.006	< 0.005	< 0.012	< 0.056
01-31-13	268	< 0.12	< 0.011	< 0.011	< 0.021	< 0.007	< 0.006	< 0.018	< 0.049
02-07-13	267	< 0.11	< 0.008	< 0.011	< 0.017	< 0.006	< 0.008	< 0.015	< 0.031
02-14-13	266	< 0.10	< 0.008	< 0.008	< 0.010	< 0.005	< 0.007	< 0.009	< 0.031
02-20-13	227	< 0.10	< 0.008	< 0.009	< 0.014	< 0.008	< 0.005	< 0.010	< 0.041
02-28-13	219	< 0.09	< 0.008	< 0.010	< 0.011	< 0.005	< 0.009	< 0.011	< 0.044 <sup>b</sup>
03-07-13	268	0.17 ± 0.08	< 0.005	< 0.013	< 0.019	< 0.009	< 0.007	< 0.011	< 0.043
03-14-13	263	0.22 ± 0.12	< 0.012	< 0.008	< 0.012	< 0.010	< 0.005	< 0.023	< 0.037
03-21-13	271	< 0.14	< 0.011	< 0.011	< 0.020	< 0.007	< 0.006	< 0.070	< 0.032
03-28-13	266	< 0.07	< 0.005	< 0.008	< 0.011	< 0.007	< 0.006	< 0.017	< 0.041
04-04-13	272	0.22 ± 0.11	< 0.009	< 0.012	< 0.017	< 0.008	< 0.006	< 0.029	< 0.049
04-11-13	254	0.18 ± 0.09	< 0.007	< 0.007	< 0.015	< 0.005	< 0.007	< 0.007	< 0.034
04-18-13	256	< 0.11	< 0.007	< 0.007	< 0.017	< 0.007	< 0.011	< 0.029	< 0.050
04-25-13	261	0.27 ± 0.13	< 0.004	< 0.006	< 0.014	< 0.006	< 0.006	< 0.008	< 0.037
05-02-13	258	0.19 ± 0.11	< 0.008	< 0.006	< 0.015	< 0.004	< 0.006	< 0.007	< 0.037
05-09-13	255	< 0.13	< 0.011	< 0.008	< 0.017	< 0.004	< 0.007	< 0.069	< 0.048
05-16-13	253	< 0.16	< 0.006	< 0.004	< 0.018	< 0.006	< 0.008	< 0.032	< 0.052
05-23-13	255	< 0.13	< 0.006	< 0.009	< 0.011	< 0.007	< 0.009	< 0.044	< 0.028
05-30-13	260	0.23 ± 0.09	< 0.012	< 0.010	< 0.014	< 0.010	< 0.006	< 0.028	< 0.030
06-06-13	270	< 0.11	< 0.009	< 0.010	< 0.014	< 0.009	< 0.010	< 0.020	< 0.052
06-13-13	266	< 0.09	< 0.004	< 0.008	< 0.014	< 0.008	< 0.008	< 0.020	< 0.042
06-21-13	303	< 0.09	< 0.007	< 0.006	< 0.011	< 0.005	< 0.009	< 0.019	< 0.024
06-27-13	231	0.30 ± 0.13	< 0.006	< 0.009	< 0.010	< 0.009	< 0.011	< 0.030	< 0.033
07-03-13	234	0.25 ± 0.09	< 0.006	< 0.007	< 0.009	< 0.010	< 0.011	< 0.021	< 0.042
07-11-13	320	0.16 ± 0.08	< 0.006	< 0.006	< 0.012	< 0.006	< 0.005	< 0.012	< 0.040
07-19-13	315	0.20 ± 0.11	< 0.006	< 0.008	< 0.014	< 0.005	< 0.008	< 0.020	< 0.027
07-25-13	237	< 0.11	< 0.011	< 0.008	< 0.009	< 0.007	< 0.011	< 0.062	< 0.051
08-01-13	283	< 0.12	< 0.006	< 0.008	< 0.015	< 0.008	< 0.009	< 0.020	< 0.036
08-08-13	290	< 0.09	< 0.005	< 0.008	< 0.007	< 0.008	< 0.007	< 0.023	< 0.035
08-15-13	290	0.24 ± 0.10	< 0.006	< 0.006	< 0.014	< 0.010	< 0.009	< 0.022	< 0.045
08-22-13	290	0.25 ± 0.12	< 0.006	< 0.007	< 0.013	< 0.007	< 0.009	< 0.021	< 0.049
08-29-13	290	< 0.10	< 0.008	< 0.010	< 0.019	< 0.006	< 0.005	< 0.018	< 0.039
09-05-13	293	0.29 ± 0.12	< 0.010	< 0.006	< 0.009	< 0.008	< 0.011	< 0.021	< 0.031
09-12-13	297	0.26 ± 0.10	< 0.006	< 0.008	< 0.009	< 0.009	< 0.007	< 0.032	< 0.042
09-18-13	262	0.21 ± 0.09	< 0.009	< 0.007	< 0.016	< 0.009	< 0.010	< 0.029	< 0.031
09-26-13	345	< 0.09	< 0.006	< 0.006	< 0.014	< 0.005	< 0.005	< 0.028	< 0.026
10-03-13	284	< 0.11	< 0.008	< 0.005	< 0.010	< 0.008	< 0.009	< 0.023	< 0.049

<sup>a</sup> Iodine-131 concentrations are < 0.07 pCi/m<sup>3</sup> unless noted otherwise.

<sup>b</sup> ND = No data; refer to Part I, Table 5.5, Missed Collections and Analyses.

**Table 1. Air particulates and charcoal cartridges, analyses for gamma-emitting isotopes and I-131<sup>a</sup>.**

Collection:		Continuous, weekly exchange.							
Units:		pCi/m <sup>3</sup>							
Location		CA-A-001 (cont.)							
		<sup>7</sup> Be	<sup>58</sup> Co	<sup>60</sup> Co	<sup>95</sup> Zr	<sup>134</sup> Cs	<sup>137</sup> Cs	<sup>140</sup> BaLa	<sup>144</sup> Ce
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date									
Collected	Vol.								
10-10-13	286	< 0.12	< 0.014	< 0.006	< 0.019	< 0.010	< 0.006	< 0.027	< 0.033
10-17-13	290	< 0.09	< 0.006	< 0.005	< 0.009	< 0.007	< 0.007	< 0.015	< 0.036
10-24-13	301	< 0.10	< 0.006	< 0.006	< 0.013	< 0.009	< 0.008	< 0.030	< 0.042
10-30-13	261	0.22 ± 0.11	< 0.008	< 0.004	< 0.009	< 0.010	< 0.006	< 0.015	< 0.052
11-07-13	342	0.15 ± 0.05	< 0.004	< 0.003	< 0.005	< 0.007	< 0.004	< 0.008	< 0.040
11-14-13	308	0.15 ± 0.09	< 0.005	< 0.004	< 0.005	< 0.009	< 0.006	< 0.006	< 0.043
11-21-13	308	0.21 ± 0.07	< 0.005	< 0.004	< 0.006	< 0.008	< 0.008	< 0.005	< 0.037
11-27-13	272	< 0.03	< 0.004	< 0.004	< 0.012	< 0.011	< 0.006	< 0.007	< 0.034
12-05-13	216	0.14 ± 0.08	< 0.008	< 0.004	< 0.012	< 0.013	< 0.008	< 0.010	< 0.052
12-12-13	293	< 0.06	< 0.005	< 0.003	< 0.013	< 0.008	< 0.006	< 0.010	< 0.035
12-19-13	295	< 0.06	< 0.007	< 0.006	< 0.011	< 0.009	< 0.006	< 0.009	< 0.045
12-26-13	270	< 0.08	< 0.009	< 0.012	< 0.014	< 0.009	< 0.011	< 0.016	< 0.038
01-02-14	269	< 0.09	< 0.005	< 0.010	< 0.022	< 0.010	< 0.008	< 0.005	< 0.053

<sup>a</sup> Iodine-131 concentrations are < 0.07 pCi/m<sup>3</sup> unless noted otherwise.

**Table 1. Air particulates and charcoal cartridges, analyses for gamma-emitting isotopes and I-131<sup>a</sup>.**

Collection: Continuous, weekly exchange.  
Units: pCi/m<sup>3</sup>

Location		CA-A-007							
		<sup>7</sup> Be	<sup>58</sup> Co	<sup>60</sup> Co	<sup>95</sup> Zr	<sup>134</sup> Cs	<sup>137</sup> Cs	<sup>140</sup> BaLa	<sup>144</sup> Ce
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date Collected									
Date	Vol.								
01-10-13	304	< 0.09	< 0.010	< 0.007	< 0.009	< 0.005	< 0.007	< 0.011	< 0.041
01-17-13	302	< 0.09	< 0.008	< 0.007	< 0.008	< 0.005	< 0.006	< 0.014	< 0.026
01-24-13	304	< 0.11	< 0.012	< 0.011	< 0.017	< 0.009	< 0.008	< 0.021	< 0.045
01-31-13	323	0.13 ± 0.07	< 0.007	< 0.007	< 0.011	< 0.003	< 0.004	< 0.010	< 0.038
02-07-13	330	0.15 ± 0.07	< 0.002	< 0.008	< 0.013	< 0.006	< 0.004	< 0.011	< 0.045
02-14-13	321	< 0.08	< 0.002	< 0.007	< 0.012	< 0.004	< 0.006	< 0.009	< 0.028
02-20-13	286	< 0.07	< 0.004	< 0.009	< 0.008	< 0.005	< 0.007	< 0.011	< 0.039
02-28-13	347	0.18 ± 0.06	< 0.003	< 0.006	< 0.006	< 0.007	< 0.006	< 0.007	< 0.025
03-07-13	326	< 0.09	< 0.009	< 0.009	< 0.014	< 0.006	< 0.006	< 0.016	< 0.044
03-14-13	327	< 0.11	< 0.008	< 0.008	< 0.022	< 0.009	< 0.007	< 0.024	< 0.026
03-21-13	271	0.24 ± 0.11	< 0.005	< 0.008	< 0.008	< 0.007	< 0.004	< 0.021	< 0.030
03-28-13	329	0.15 ± 0.06	< 0.005	< 0.006	< 0.006	< 0.005	< 0.004	< 0.010	< 0.032
04-04-13	327	< 0.11	< 0.010	< 0.012	< 0.017	< 0.008	< 0.004	< 0.011	< 0.034
04-11-13	314	0.16 ± 0.08	< 0.005	< 0.006	< 0.003	< 0.004	< 0.005	< 0.007	< 0.029
04-18-13	319	< 0.12	< 0.007	< 0.007	< 0.016	< 0.008	< 0.007	< 0.014	< 0.053
04-25-13	311	< 0.09	< 0.006	< 0.005	< 0.014	< 0.006	< 0.005	< 0.010	< 0.040
05-02-13	300	0.16 ± 0.08	< 0.004	< 0.004	< 0.006	< 0.007	< 0.008	< 0.005	< 0.034
05-09-13	287	< 0.11	< 0.006	< 0.009	< 0.013	< 0.011	< 0.006	< 0.065	< 0.033
05-16-13	288	0.22 ± 0.11	< 0.005	< 0.005	< 0.015	< 0.007	< 0.006	< 0.034	< 0.028
05-23-13	284	< 0.09	< 0.010	< 0.005	< 0.017	< 0.007	< 0.009	< 0.043	< 0.054
05-30-13	286	0.18 ± 0.08	< 0.004	< 0.003	< 0.011	< 0.006	< 0.007	< 0.012	< 0.036
06-06-13	282	< 0.10	< 0.008	< 0.008	< 0.006	< 0.006	< 0.008	< 0.024	< 0.026
06-13-13	282	0.16 ± 0.10	< 0.011	< 0.007	< 0.010	< 0.006	< 0.007	< 0.019	< 0.034
06-21-13	315	< 0.08	< 0.009	< 0.006	< 0.009	< 0.007	< 0.008	< 0.015	< 0.039
06-27-13	246	< 0.12	< 0.009	< 0.008	< 0.017	< 0.007	< 0.013	< 0.024	< 0.050
07-03-13	236	< 0.12	< 0.005	< 0.006	< 0.010	< 0.009	< 0.008	< 0.024	< 0.033
07-11-13	321	< 0.11	< 0.006	< 0.008	< 0.010	< 0.006	< 0.008	< 0.025	< 0.041
07-19-13	318	0.22 ± 0.09	< 0.009	< 0.007	< 0.010	< 0.007	< 0.006	< 0.022	< 0.046
07-25-13	242	0.28 ± 0.12	< 0.009	< 0.008	< 0.015	< 0.009	< 0.008	< 0.032	< 0.031
08-01-13	284	< 0.11	< 0.010	< 0.011	< 0.013	< 0.008	< 0.009	< 0.037	< 0.030
08-08-13	281	< 0.11	< 0.009	< 0.006	< 0.016	< 0.009	< 0.006	< 0.039	< 0.050
08-15-13	285	< 0.11	< 0.010	< 0.008	< 0.015	< 0.006	< 0.010	< 0.035	< 0.040
08-22-13	282	0.23 ± 0.10	< 0.009	< 0.008	< 0.013	< 0.007	< 0.009	< 0.032	< 0.049
08-29-13	286	0.29 ± 0.12	< 0.007	< 0.010	< 0.013	< 0.007	< 0.007	< 0.018	< 0.052
09-05-13	286	0.25 ± 0.11	< 0.007	< 0.007	< 0.013	< 0.008	< 0.010	< 0.028	< 0.039
09-12-13	293	< 0.12	< 0.008	< 0.009	< 0.017	< 0.009	< 0.009	< 0.030	< 0.046
09-18-13	247	< 0.14	< 0.010	< 0.007	< 0.010	< 0.008	< 0.009	< 0.026	< 0.056
09-26-13	331	< 0.10	< 0.004	< 0.009	< 0.009	< 0.010	< 0.007	< 0.028	< 0.032
10-03-13	292	< 0.09	< 0.009	< 0.007	< 0.010	< 0.010	< 0.004	< 0.019	< 0.043

<sup>a</sup> Iodine-131 concentrations are < 0.07 pCi/m<sup>3</sup> unless noted otherwise.



**Table 1. Air particulates and charcoal cartridges, analyses for gamma-emitting isotopes and I-131<sup>a</sup>.**

Collection:		Continuous, weekly exchange.							
Units:		pCi/m <sup>3</sup>							
Location		CA-A-007 (cont.)							
		<sup>7</sup> Be	<sup>58</sup> Co	<sup>60</sup> Co	<sup>95</sup> Zr	<sup>134</sup> Cs	<sup>137</sup> Cs	<sup>140</sup> BaLa	<sup>144</sup> Ce
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date									
Collected	Vol.								
10-10-13	290	< 0.11	< 0.008	< 0.010	< 0.012	< 0.012	< 0.006	< 0.043	< 0.051
10-17-13	292	< 0.08	< 0.006	< 0.003	< 0.011	< 0.008	< 0.005	< 0.018	< 0.043
10-24-13	282	< 0.10	< 0.009	< 0.005	< 0.017	< 0.009	< 0.009	< 0.025	< 0.045
10-30-13	245	0.23 ± 0.14	< 0.008	< 0.006	< 0.007	< 0.010	< 0.006	< 0.016	< 0.031
11-07-13	333	0.13 ± 0.06	< 0.005	< 0.004	< 0.008	< 0.008	< 0.004	< 0.008	< 0.041
11-14-13	282	< 0.06	< 0.004	< 0.003	< 0.011	< 0.010	< 0.007	< 0.006	< 0.040
11-21-13	282	0.15 ± 0.08	< 0.005	< 0.003	< 0.010	< 0.011	< 0.005	< 0.006	< 0.033
11-27-13	242	< 0.09	< 0.011	< 0.007	< 0.009	< 0.011	< 0.007	< 0.008	< 0.051
12-05-13	317	< 0.08	< 0.005	< 0.003	< 0.012	< 0.005	< 0.006	< 0.007	< 0.034
12-12-13	277	< 0.10	< 0.007	< 0.009	< 0.017	< 0.009	< 0.008	< 0.013	< 0.048
12-19-13	284	< 0.08	< 0.009	< 0.004	< 0.012	< 0.008	< 0.007	< 0.007	< 0.040
12-26-13	279	< 0.08	< 0.009	< 0.006	< 0.009	< 0.010	< 0.010	< 0.011	< 0.038
01-02-14	284	0.11 ± 0.06	< 0.006	< 0.005	< 0.011	< 0.008	< 0.005	< 0.006	< 0.030

<sup>a</sup> Iodine-131 concentrations are < 0.07 pCi/m<sup>3</sup> unless noted otherwise.

**Table 1. Air particulates and charcoal cartridges, analyses for gamma-emitting isotopes and I-131<sup>a</sup>.**

Collection: Continuous, weekly exchange.  
Units: pCi/m<sup>3</sup>

Location		CA-A-008							
		<sup>7</sup> Be	<sup>58</sup> Co	<sup>60</sup> Co	<sup>95</sup> Zr	<sup>134</sup> Cs	<sup>137</sup> Cs	<sup>140</sup> BaLa	<sup>144</sup> Ce
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date Collected									
	Vol.								
01-10-13	308	< 0.11	< 0.007	< 0.009	< 0.014	< 0.008	< 0.006	< 0.027	< 0.039
01-17-13	309	< 0.08	< 0.004	< 0.008	< 0.013	< 0.007	< 0.009	< 0.016	< 0.033
01-24-13	315	0.21 ± 0.09	< 0.004	< 0.007	< 0.014	< 0.005	< 0.004	< 0.010	< 0.040
01-31-13	318	< 0.09	< 0.005	< 0.007	< 0.012	< 0.006	< 0.005	< 0.010	< 0.036
02-07-13	316	< 0.06	< 0.004	< 0.008	< 0.009	< 0.005	< 0.005	< 0.010	< 0.028
02-14-13	320	< 0.04	< 0.004	< 0.007	< 0.006	< 0.007	< 0.007	< 0.009	< 0.050
02-20-13	272	< 0.12	< 0.013	< 0.012	< 0.026	< 0.013	< 0.010	< 0.019	< 0.034
02-28-13	354	0.15 ± 0.08	< 0.003	< 0.009	< 0.009	< 0.004	< 0.004	< 0.008	< 0.027
03-07-13	317	< 0.10	< 0.006	< 0.007	< 0.018	< 0.005	< 0.007	< 0.023	< 0.035
03-14-13	302	< 0.12	< 0.008	< 0.010	< 0.019	< 0.004	< 0.005	< 0.024	< 0.042
03-21-13	327	< 0.09	< 0.006	< 0.006	< 0.016	< 0.006	< 0.004	< 0.015	< 0.019
03-28-13	323	0.16 ± 0.06	< 0.006	< 0.006	< 0.006	< 0.003	< 0.005	< 0.013	< 0.029
04-04-13	317	0.17 ± 0.09	< 0.006	< 0.007	< 0.011	< 0.008	< 0.008	< 0.016	< 0.022
04-11-13	271	0.20 ± 0.09	< 0.004	< 0.007	< 0.013	< 0.004	< 0.006	< 0.010	< 0.045
04-18-13	280	0.20 ± 0.12	< 0.009	< 0.006	< 0.011	< 0.007	< 0.011	< 0.045	< 0.030
04-25-13	284	0.20 ± 0.09	< 0.005	< 0.003	< 0.012	< 0.007	< 0.005	< 0.009	< 0.035
05-02-13	273	0.20 ± 0.10	< 0.007	< 0.004	< 0.007	< 0.005	< 0.006	< 0.007	< 0.033
05-09-13	280	< 0.12	< 0.007	< 0.005	< 0.018	< 0.008	< 0.005	< 0.067	< 0.040
05-16-13	276	0.19 ± 0.09	< 0.008	< 0.004	< 0.017	< 0.007	< 0.007	< 0.018	< 0.038
05-23-13	274	0.23 ± 0.12	< 0.012	< 0.005	< 0.006	< 0.008	< 0.008	< 0.045	< 0.052
05-30-13	272	0.21 ± 0.10	< 0.006	< 0.003	< 0.007	< 0.008	< 0.006	< 0.013	< 0.032
06-06-13	277	< 0.11	< 0.006	< 0.007	< 0.014	< 0.007	< 0.008	< 0.024	< 0.050
06-13-13	272	< 0.11	< 0.008	< 0.005	< 0.017	< 0.007	< 0.009	< 0.027	< 0.045
06-21-13	310	0.16 ± 0.08	< 0.006	< 0.005	< 0.010	< 0.008	< 0.007	< 0.020	< 0.030
06-27-13	236	0.17 ± 0.08	< 0.006	< 0.009	< 0.014	< 0.010	< 0.006	< 0.026	< 0.052
07-03-13	239	< 0.12	< 0.012	< 0.007	< 0.011	< 0.005	< 0.011	< 0.022	< 0.048
07-11-13	323	< 0.10	< 0.005	< 0.006	< 0.010	< 0.004	< 0.005	< 0.017	< 0.024
07-19-13	286	< 0.11	< 0.006	< 0.009	< 0.015	< 0.008	< 0.005	< 0.025	< 0.038
07-25-13	225	< 0.13	< 0.012	< 0.010	< 0.016	< 0.008	< 0.009	< 0.033	< 0.047
08-01-13	269	< 0.12	< 0.007	< 0.006	< 0.020	< 0.007	< 0.009	< 0.024	< 0.054
08-08-13	275	< 0.13	< 0.013	< 0.007	< 0.016	< 0.008	< 0.009	< 0.033	< 0.049
08-15-13	281	< 0.11	< 0.005	< 0.009	< 0.011	< 0.005	< 0.007	< 0.024	< 0.044
08-22-13	252	0.24 ± 0.13	< 0.007	< 0.008	< 0.014	< 0.010	< 0.006	< 0.027	< 0.047
08-29-13	247	0.30 ± 0.13	< 0.008	< 0.008	< 0.009	< 0.008	< 0.006	< 0.022	< 0.033
09-05-13	248	0.23 ± 0.11	< 0.008	< 0.009	< 0.020	< 0.009	< 0.005	< 0.031	< 0.050
09-12-13	252	< 0.16	< 0.010	< 0.010	< 0.017	< 0.011	< 0.010	< 0.030	< 0.044
09-18-13	221	< 0.15	< 0.010	< 0.010	< 0.011	< 0.007	< 0.010	< 0.037	< 0.038
09-26-13	306	< 0.10	< 0.008	< 0.009	< 0.010	< 0.008	< 0.009	< 0.047	< 0.040
10-03-13	263	< 0.11	< 0.006	< 0.011	< 0.009	< 0.010	< 0.011	< 0.018	< 0.026

<sup>a</sup> Iodine-131 concentrations are < 0.07 pCi/m<sup>3</sup> unless noted otherwise.

**Table 1. Air particulates and charcoal cartridges, analyses for gamma-emitting isotopes and I-131<sup>a</sup>.**

Collection: Continuous, weekly exchange.  
Units: pCi/m<sup>3</sup>

Location		CA-A-008 (cont.)							
		<sup>7</sup> Be	<sup>58</sup> Co	<sup>60</sup> Co	<sup>95</sup> Zr	<sup>134</sup> Cs	<sup>137</sup> Cs	<sup>140</sup> BaLa	<sup>144</sup> Ce
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date									
Collected	Vol.								
10-10-13	266	< 0.10	< 0.009	< 0.010	< 0.012	< 0.011	< 0.009	< 0.044	< 0.047
10-17-13	264	< 0.10	< 0.006	< 0.008	< 0.010	< 0.011	< 0.009	< 0.021	< 0.042
10-24-13	273	< 0.12	< 0.010	< 0.007	< 0.020	< 0.010	< 0.009	< 0.024	< 0.045
10-30-13	229	< 0.13	< 0.007	< 0.004	< 0.010	< 0.011	< 0.005	< 0.017	< 0.048
11-07-13	311	< 0.09	< 0.003	< 0.003	< 0.008	< 0.010	< 0.006	< 0.008	< 0.036
11-14-13	272	< 0.08	< 0.005	< 0.006	< 0.011	< 0.010	< 0.004	< 0.007	< 0.035
11-21-13	279	0.25 ± 0.11	< 0.005	< 0.006	< 0.008	< 0.007	< 0.007	< 0.006	< 0.030
11-27-13	248	< 0.09	< 0.008	< 0.005	< 0.006	< 0.009	< 0.006	< 0.008	< 0.055
12-05-13	327	0.19 ± 0.07	< 0.004	< 0.005	< 0.006	< 0.008	< 0.006	< 0.007	< 0.046
12-12-13	308	< 0.10	< 0.007	< 0.004	< 0.008	< 0.009	< 0.006	< 0.009	< 0.044
12-19-13	306	< 0.09	< 0.007	< 0.006	< 0.018	< 0.009	< 0.006	< 0.012	< 0.035
12-26-13	314	< 0.10	< 0.007	< 0.007	< 0.016	< 0.009	< 0.007	< 0.009	< 0.049
01-02-14	311	0.15 ± 0.08	< 0.008	< 0.004	< 0.010	< 0.007	< 0.004	< 0.005	< 0.038

<sup>a</sup> Iodine-131 concentrations are < 0.07 pCi/m<sup>3</sup> unless noted otherwise.

**Table 1. Air particulates and charcoal cartridges, analyses for gamma-emitting isotopes and I-131<sup>a</sup>.**

Location		CA-A-009							
		<sup>7</sup> Be	<sup>58</sup> Co	<sup>60</sup> Co	<sup>95</sup> Zr	<sup>134</sup> Cs	<sup>137</sup> Cs	<sup>140</sup> BaLa	<sup>144</sup> Ce
Collection:		Continuous, weekly exchange.							
Units:		pCi/m <sup>3</sup>							
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date Collected									
Date	Vol.								
01-10-13	275	< 0.13	< 0.010	< 0.012	< 0.016	< 0.007	< 0.007	< 0.031	< 0.024
01-17-13	264	< 0.12	< 0.009	< 0.008	< 0.020	< 0.007	< 0.005	< 0.017	< 0.056
01-24-13	261	0.16 ± 0.08	< 0.008	< 0.009	< 0.016	< 0.008	< 0.008	< 0.019	< 0.051
01-31-13	269	< 0.10	< 0.010	< 0.009	< 0.025	< 0.008	< 0.007	< 0.019	< 0.047
02-07-13	265	< 0.11	< 0.010	< 0.010	< 0.016	< 0.006	< 0.012	< 0.021	< 0.035
02-14-13	272	< 0.08	< 0.004	< 0.008	< 0.011	< 0.007	< 0.007	< 0.011	< 0.048
02-20-13	223	< 0.12	< 0.011	< 0.012	< 0.021	< 0.004	< 0.006	< 0.016	< 0.036
02-28-13	301	< 0.08	< 0.004	< 0.007	< 0.009	< 0.004	< 0.005	< 0.009	< 0.032
03-07-13	265	0.17 ± 0.10	< 0.006	< 0.008	< 0.019	< 0.008	< 0.008	< 0.033	< 0.041
03-14-13	257	< 0.14	< 0.007	< 0.010	< 0.018	< 0.010	< 0.008	< 0.033	< 0.053
03-21-13	315	< 0.09	< 0.005	< 0.006	< 0.018	< 0.004	< 0.007	< 0.017	< 0.037
03-28-13	262	< 0.08	< 0.004	< 0.007	< 0.012	< 0.005	< 0.004	< 0.019	< 0.040
04-04-13	263	0.19 ± 0.09	< 0.009	< 0.010	< 0.020	< 0.008	< 0.008	< 0.015	< 0.031
04-11-13	270	0.15 ± 0.08	< 0.006	< 0.010	< 0.008	< 0.007	< 0.004	< 0.009	< 0.034
04-18-13	268	< 0.12	< 0.004	< 0.007	< 0.015	< 0.008	< 0.009	< 0.031	< 0.051
04-25-13	264	0.31 ± 0.10	< 0.009	< 0.005	< 0.013	< 0.005	< 0.007	< 0.017	< 0.026
05-02-13	269	0.19 ± 0.10	< 0.005	< 0.004	< 0.011	< 0.004	< 0.005	< 0.006	< 0.034
05-09-13	270	< 0.12	< 0.014	< 0.008	< 0.014	< 0.008	< 0.010	< 0.079	< 0.046
05-16-13	273	0.30 ± 0.16	< 0.007	< 0.005	< 0.022	< 0.007	< 0.005	< 0.066	< 0.035
05-23-13					ND <sup>b</sup>				
05-30-13	303	< 0.10	< 0.006	< 0.005	< 0.016	< 0.004	< 0.007	< 0.012	< 0.038
06-06-13	307	0.14 ± 0.07	< 0.008	< 0.009	< 0.016	< 0.004	< 0.009	< 0.025	< 0.042
06-13-13	300	< 0.16	< 0.008	< 0.007	< 0.019	< 0.007	< 0.010	< 0.051	< 0.054
06-21-13	337	< 0.10	< 0.010	< 0.005	< 0.011	< 0.006	< 0.007	< 0.019	< 0.028
06-27-13	257	0.21 ± 0.09	< 0.007	< 0.006	< 0.017	< 0.008	< 0.009	< 0.028	< 0.047
07-03-13	249	0.22 ± 0.11	< 0.009	< 0.009	< 0.013	< 0.009	< 0.011	< 0.023	< 0.031
07-11-13	336	0.14 ± 0.06	< 0.006	< 0.004	< 0.007	< 0.004	< 0.005	< 0.012	< 0.021
07-19-13	334	< 0.09	< 0.005	< 0.006	< 0.012	< 0.005	< 0.008	< 0.024	< 0.020
07-25-13	249	< 0.14	< 0.008	< 0.008	< 0.020	< 0.009	< 0.007	< 0.039	< 0.037
08-01-13	287	< 0.10	< 0.008	< 0.007	< 0.015	< 0.007	< 0.010	< 0.028	< 0.039
08-08-13	269	< 0.13	< 0.012	< 0.011	< 0.005	< 0.007	< 0.005	< 0.032	< 0.035
08-15-13	271	0.28 ± 0.13	< 0.006	< 0.013	< 0.015	< 0.011	< 0.007	< 0.041	< 0.045
08-22-13	274	0.22 ± 0.09	< 0.008	< 0.006	< 0.020	< 0.007	< 0.007	< 0.028	< 0.040
08-29-13	269	< 0.09	< 0.006	< 0.007	< 0.012	< 0.008	< 0.009	< 0.004	< 0.046
09-05-13	273	< 0.11	< 0.009	< 0.007	< 0.008	< 0.008	< 0.010	< 0.035	< 0.050
09-12-13	273	0.23 ± 0.12	< 0.005	< 0.009	< 0.014	< 0.005	< 0.008	< 0.033	< 0.043
09-18-13	240	< 0.11	< 0.009	< 0.007	< 0.014	< 0.009	< 0.008	< 0.043	< 0.048
09-26-13	313	< 0.09	< 0.008	< 0.009	< 0.008	< 0.007	< 0.005	< 0.023	< 0.046
10-03-13	283	< 0.11	< 0.007	< 0.005	< 0.011	< 0.009	< 0.006	< 0.019	< 0.039

<sup>a</sup> Iodine-131 concentrations are < 0.07 pCi/m<sup>3</sup> unless noted otherwise.

<sup>b</sup> ND = No data; refer to Part I, Table 5.5, Missed Collections and Analyses.

**Table 1. Air particulates and charcoal cartridges, analyses for gamma-emitting isotopes and I-131<sup>a</sup>.**

Collection: Continuous, weekly exchange.  
Units: pCi/m<sup>3</sup>

Location		CA-A-009 (cont.)							
		<sup>7</sup> Be	<sup>58</sup> Co	<sup>60</sup> Co	<sup>95</sup> Zr	<sup>134</sup> Cs	<sup>137</sup> Cs	<sup>140</sup> BaLa	<sup>144</sup> Ce
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date									
Collected	Vol.								
10-10-13	281	< 0.10	< 0.006	< 0.007	< 0.014	< 0.009	< 0.007	< 0.037	< 0.029
10-17-13	280	< 0.08	< 0.004	< 0.006	< 0.007	< 0.010	< 0.006	< 0.016	< 0.033
10-24-13	290	< 0.11	< 0.007	< 0.005	< 0.019	< 0.008	< 0.011	< 0.020	< 0.054
10-30-13	245	< 0.12	< 0.006	< 0.005	< 0.013	< 0.011	< 0.005	< 0.016	< 0.057
11-07-13	325	0.15 ± 0.07	< 0.006	< 0.003	< 0.006	< 0.008	< 0.006	< 0.009	< 0.041
11-14-13	280	< 0.07	< 0.005	< 0.005	< 0.007	< 0.010	< 0.005	< 0.007	< 0.045
11-21-13	287	0.25 ± 0.11	< 0.007	< 0.010	< 0.013	< 0.009	< 0.005	< 0.006	< 0.046
11-27-13	239	< 0.11	< 0.003	< 0.009	< 0.014	< 0.011	< 0.007	< 0.008	< 0.033
12-05-13	329	0.16 ± 0.09	< 0.005	< 0.004	< 0.009	< 0.007	< 0.005	< 0.007	< 0.049
12-12-13	266	< 0.08	< 0.004	< 0.003	< 0.017	< 0.009	< 0.007	< 0.010	< 0.035
12-19-13	262	0.21 ± 0.12	< 0.008	< 0.007	< 0.023	< 0.009	< 0.011	< 0.012	< 0.050
12-26-13	266	< 0.09	< 0.006	< 0.007	< 0.011	< 0.007	< 0.007	< 0.018	< 0.036
01-02-14	263	< 0.09	< 0.004	< 0.004	< 0.007	< 0.010	< 0.004	< 0.006	< 0.031

<sup>a</sup> Iodine-131 concentrations are < 0.07 pCi/m<sup>3</sup> unless noted otherwise.

**Table 1. Air particulates and charcoal cartridges, analyses for gamma-emitting isotopes and I-131<sup>a</sup>.**

Collection: Continuous, weekly exchange.  
Units: pCi/m<sup>3</sup>

Location		CA-B-003							
		<sup>7</sup> Be	<sup>58</sup> Co	<sup>60</sup> Co	<sup>95</sup> Zr	<sup>134</sup> Cs	<sup>137</sup> Cs	<sup>140</sup> BaLa	<sup>144</sup> Ce
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date									
Collected	Vol.								
01-10-13	278	< 0.11	< 0.004	< 0.008	< 0.008	< 0.007	< 0.006	< 0.026	< 0.047
01-17-13	270	< 0.10	< 0.005	< 0.008	< 0.012	< 0.004	< 0.007	< 0.016	< 0.045
01-24-13	271	0.20 ± 0.09	< 0.006	< 0.008	< 0.011	< 0.004	< 0.006	< 0.012	< 0.041
01-31-13	276	0.27 ± 0.10	< 0.004	< 0.008	< 0.008	< 0.004	< 0.005	< 0.013	< 0.047
02-07-13	271	< 0.08	< 0.008	< 0.010	< 0.018	< 0.005	< 0.008	< 0.012	< 0.042
02-14-13	275	0.12 ± 0.07	< 0.008	< 0.008	< 0.009	< 0.005	< 0.005	< 0.012	< 0.029
02-20-13	232	< 0.11	< 0.006	< 0.008	< 0.018	< 0.009	< 0.008	< 0.028	< 0.025
02-28-13	305	< 0.05	< 0.004	< 0.007	< 0.007	< 0.004	< 0.005	< 0.010	< 0.046
03-07-13	268	< 0.12	< 0.007	< 0.009	< 0.011	< 0.009	< 0.008	< 0.040	< 0.027
03-14-13	264	0.23 ± 0.13	< 0.008	< 0.010	< 0.023	< 0.007	< 0.010	< 0.047	< 0.053
03-21-13	269	0.18 ± 0.09	< 0.004	< 0.007	< 0.012	< 0.006	< 0.006	< 0.018	< 0.044
03-28-13	272	0.14 ± 0.08	< 0.006	< 0.007	< 0.007	< 0.007	< 0.006	< 0.013	< 0.040
04-04-13	273	0.20 ± 0.08	< 0.004	< 0.005	< 0.004	< 0.006	< 0.006	< 0.008	< 0.049
04-11-13	270	0.23 ± 0.09	< 0.003	< 0.007	< 0.005	< 0.009	< 0.003	< 0.007	< 0.021
04-18-13	270	< 0.11	< 0.007	< 0.008	< 0.018	< 0.008	< 0.011	< 0.033	< 0.028
04-25-13	270	0.24 ± 0.09	< 0.006	< 0.003	< 0.011	< 0.008	< 0.007	< 0.013	< 0.022
05-02-13	266	0.22 ± 0.11	< 0.006	< 0.004	< 0.017	< 0.007	< 0.005	< 0.006	< 0.042
05-09-13	268	< 0.12	< 0.009	< 0.008	< 0.011	< 0.007	< 0.009	< 0.062	< 0.035
05-16-13	269	0.22 ± 0.12	< 0.006	< 0.004	< 0.015	< 0.004	< 0.006	< 0.027	< 0.028
05-23-13	273	< 0.13	< 0.009	< 0.008	< 0.020	< 0.007	< 0.006	< 0.044	< 0.029
05-30-13	267	< 0.09	< 0.006	< 0.005	< 0.013	< 0.006	< 0.007	< 0.016	< 0.045
06-06-13	272	0.23 ± 0.11	< 0.007	< 0.007	< 0.016	< 0.009	< 0.005	< 0.031	< 0.034
06-13-13	270	< 0.11	< 0.005	< 0.008	< 0.012	< 0.006	< 0.007	< 0.027	< 0.042
06-21-13	306	0.21 ± 0.09	< 0.008	< 0.006	< 0.011	< 0.009	< 0.008	< 0.012	< 0.034
06-27-13	233	0.25 ± 0.13	< 0.008	< 0.008	< 0.008	< 0.007	< 0.007	< 0.030	< 0.057
07-03-13	232	< 0.12	< 0.009	< 0.007	< 0.018	< 0.010	< 0.008	< 0.026	< 0.046
07-11-13	313	0.15 ± 0.09	< 0.007	< 0.008	< 0.010	< 0.005	< 0.008	< 0.022	< 0.036
07-19-13	320	< 0.12	< 0.007	< 0.007	< 0.013	< 0.011	< 0.005	< 0.028	< 0.053
07-25-13	238	< 0.15	< 0.012	< 0.011	< 0.016	< 0.009	< 0.006	< 0.054	< 0.059
08-01-13		ND <sup>b</sup>							
08-08-13	278	< 0.15	< 0.014	< 0.009	< 0.013	< 0.012	< 0.010	< 0.048	< 0.053
08-15-13	277	< 0.12	< 0.009	< 0.011	< 0.017	< 0.010	< 0.010	< 0.031	< 0.044
08-22-13	278	0.30 ± 0.13	< 0.009	< 0.006	< 0.015	< 0.011	< 0.009	< 0.040	< 0.040
08-29-13	275	0.30 ± 0.12	< 0.006	< 0.007	< 0.011	< 0.009	< 0.008	< 0.026	< 0.050
09-05-13	274	0.22 ± 0.12	< 0.010	< 0.009	< 0.016	< 0.010	< 0.005	< 0.041	< 0.049
09-12-13	274	0.32 ± 0.12	< 0.010	< 0.009	< 0.017	< 0.011	< 0.008	< 0.039	< 0.047
09-18-13	231	< 0.13	< 0.008	< 0.009	< 0.016	< 0.008	< 0.005	< 0.039	< 0.034
09-26-13	306	< 0.10	< 0.010	< 0.009	< 0.011	< 0.009	< 0.005	< 0.027	< 0.027
10-03-13	302	0.17 ± 0.10	< 0.005	< 0.009	< 0.013	< 0.009	< 0.009	< 0.016	< 0.033

<sup>a</sup> Iodine-131 concentrations are < 0.07 pCi/m<sup>3</sup> unless noted otherwise.

<sup>b</sup> ND = No data; refer to Part I, Table 5.5, Missed Collections and Analyses.

**Table 1. Air particulates and charcoal cartridges, analyses for gamma-emitting isotopes and I-131<sup>a</sup>.**

Collection: Continuous, weekly exchange.  
Units: pCi/m<sup>3</sup>

Location		CA-B-003 (cont.)							
		<sup>7</sup> Be	<sup>58</sup> Co	<sup>60</sup> Co	<sup>95</sup> Zr	<sup>134</sup> Cs	<sup>137</sup> Cs	<sup>140</sup> BaLa	<sup>144</sup> Ce
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date Collected									
	Vol.								
10-10-13	292	0.17 ± 0.10	< 0.005	< 0.004	< 0.014	< 0.008	< 0.004	< 0.022	< 0.045
10-17-13	288	0.20 ± 0.11	< 0.006	< 0.003	< 0.008	< 0.008	< 0.006	< 0.019	< 0.044
10-24-13	270	< 0.07	< 0.007	< 0.004	< 0.009	< 0.010	< 0.006	< 0.020	< 0.045
10-30-13	220	< 0.12	< 0.012	< 0.011	< 0.024	< 0.009	< 0.011	< 0.026	< 0.057
11-07-13	290	< 0.09	< 0.006	< 0.006	< 0.004	< 0.009	< 0.005	< 0.009	< 0.037
11-14-13	258	0.14 ± 0.08	< 0.005	< 0.004	< 0.006	< 0.009	< 0.005	< 0.007	< 0.047
11-21-13	256	0.18 ± 0.09	< 0.008	< 0.008	< 0.017	< 0.009	< 0.008	< 0.011	< 0.045
11-27-13	223	< 0.10	< 0.007	< 0.004	< 0.014	< 0.012	< 0.006	< 0.009	< 0.055
12-05-13	331	0.18 ± 0.07	< 0.003	< 0.003	< 0.008	< 0.009	< 0.005	< 0.007	< 0.034
12-12-13	277	0.13 ± 0.07	< 0.008	< 0.003	< 0.012	< 0.009	< 0.005	< 0.009	< 0.044
12-19-13	300	< 0.09	< 0.006	< 0.005	< 0.009	< 0.008	< 0.006	< 0.014	< 0.032
12-26-13	292	0.11 ± 0.06	< 0.006	< 0.006	< 0.010	< 0.006	< 0.007	< 0.014	< 0.039
01-02-14	290	0.12 ± 0.07	< 0.004	< 0.006	< 0.009	< 0.011	< 0.007	< 0.006	< 0.043

<sup>a</sup> Iodine-131 concentrations are < 0.07 pCi/m<sup>3</sup> unless noted otherwise.

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

Collection: Semimonthly during grazing season, monthly otherwise.

Units: pCi/L

Location		CA-MLK-M9					
Date	Lab	Concentration (pCi/L)					
Collected	Code	I-131	K-40	Zn-65	Cs-134	Cs-137	Ba-La-140
Required LLDs		1	-	-	15	18	15
01-07-13	CAMI -98	< 0.3	1029 ± 96	< 3.6	< 2.9	< 3.6	< 2.0
02-11-13	CAMI -594	< 0.2	990 ± 112	< 7.1	< 3.7	< 4.7	< 3.3
03-11-13	CAMI -1083	< 0.3	1172 ± 92	< 4.6	< 3.2	< 3.2	< 2.2
04-08-13	CAMI -1624	< 0.4	1182 ± 121	< 9.0	< 4.1	< 4.8	< 4.0
05-13-13	CAMI -2505	< 0.2	1467 ± 131	< 8.9	< 4.4	< 3.9	< 3.4
05-28-13	CAMI -2799	< 0.3	1215 ± 106	< 4.3	< 2.6	< 2.6	< 1.2
06-11-13	CAMI -3226	< 0.3	921 ± 109	< 3.0	< 3.8	< 5.4	< 3.1
06-24-13	CAMI -3496	< 0.5	1376 ± 109	< 6.2	< 3.1	< 3.4	< 2.0
07-09-13	CAMI -3761	< 0.3	933 ± 107	< 7.2	< 3.3	< 4.4	< 2.8
07-23-13	CAMI -4233	< 0.3	1434 ± 125	< 7.5	< 3.7	< 3.8	< 2.5
08-13-13	CAMI -4823	< 0.2	1212 ± 110	< 5.2	< 3.5	< 3.3	< 2.6
08-27-13	CAMI -5113	< 0.3	1025 ± 113	< 6.5	< 3.6	< 3.7	< 3.6
09-09-13	CAMI -5404	< 0.4	1081 ± 110	< 6.6	< 3.4	< 4.2	< 3.1
09-24-13	CAMI -5670	< 0.2	1049 ± 93	< 7.5	< 2.4	< 3.5	< 2.2
10-08-13	CAMI -6118	< 0.3	1100 ± 109	< 6.1	< 3.2	< 2.2	< 2.7
10-22-13	CAMI -6532	< 0.2	974 ± 97	< 5.0	< 3.4	< 3.9	< 1.5
11-05-13	CAMI -6887	< 0.4	1070 ± 91	< 4.5	< 3.2	< 2.2	< 1.6
12-09-13	CAMI -7490	< 0.2	1205 ± 100	< 6.8	< 3.2	< 4.6	< 2.3



**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	<sup>40</sup> K	<sup>54</sup> Mn	<sup>58</sup> Co	<sup>60</sup> Co	<sup>131</sup> I	<sup>134</sup> Cs	<sup>137</sup> Cs
<u>Location: CA-FPL-V9</u>									
CAVE- 3227	6/11/2013	Collards	3297 ± 273	< 8.0	< 4.2	< 8.2	< 20.5	< 4.3	< 10.2
CAVE- 3228	6/11/2013	Turnips	3814 ± 297	< 5.2	< 9.4	< 7.6	< 19.6	< 10.5	< 8.2
CAVE- 3546	6/25/2013	Cabbage	3805 ± 108	< 2.8	< 3.0	< 2.8	< 5.9	< 3.6	< 5.0
CAVE- 3547	6/25/2013	Swiss Chard	7209 ± 403	< 9.2	< 6.2	< 8.0	< 20.5	< 8.5	< 11.1
CAVE- 3548	6/25/2013	Turnip greens	4249 ± 324	< 8.8	< 9.6	< 6.2	< 17.5	< 8.2	< 9.8
CAVE- 3549	6/25/2013	Lettuce	3952 ± 269	< 5.1	< 4.6	< 6.2	< 12.9	< 8.7	< 9.6
CAVE- 3550	6/25/2013	Collards	4166 ± 333	< 9.0	< 6.0	< 10.0	< 15.7	< 8.5	< 10.6
CAVE- 3762	7/9/2013	Turnips	4324 ± 296	< 7.9	< 7.9	< 9.5	< 16.9	< 6.9	< 8.8
CAVE- 3763	7/9/2013	Collards	4616 ± 282	< 9.6	< 6.2	< 9.0	< 14.0	< 6.6	< 6.7
CAVE- 3764	7/9/2013	Lettuce	5688 ± 365	< 6.3	< 9.0	< 8.0	< 13.4	< 8.9	< 12.9
CAVE- 3765	7/9/2013	Cabbage	3688 ± 259	< 5.0	< 7.7	< 5.4	< 12.0	< 5.3	< 6.9
CAVE- 4824	8/13/2013	Collards	3486 ± 253	< 9.1	< 5.1	< 5.0	< 12.8	< 7.8	< 10.3
CAVE- 4825	8/13/2013	Cabbage	3461 ± 257	< 7.3	< 9.6	< 8.8	< 14.0	< 6.3	< 10.8
CAVE- 5405	9/10/2013	Collards	4171 ± 305	< 9.4	< 5.4	< 8.8	< 17.2	< 7.7	< 7.4
CAVE- 5406	9/10/2013	Mustard	6346 ± 399	< 6.7	< 6.4	< 7.4	< 22.4	< 9.1	< 10.1
CAVE- 5407	9/10/2013	Turnips	5125 ± 347	< 10.0	< 10.8	< 8.2	< 27.4	< 10.4	< 8.4
CAVE- 6119	10/8/2013	Turnips	4843 ± 301	< 7.7	< 9.2	< 7.5	< 15.5	< 6.6	< 5.3
CAVE- 6120	10/8/2013	Collards	4367 ± 252	< 7.6	< 5.5	< 5.7	< 15.6	< 6.3	< 6.0
CAVE- 6121	10/8/2013	Swiss Chard	6879 ± 427	< 6.7	< 12.3	< 9.2	< 26.1	< 11.5	< 6.8
CAVE- 6122	10/8/2013	Mustard	6147 ± 322	< 8.3	< 7.9	< 8.5	< 22.6	< 8.6	< 7.8
<u>Location: CA-FPL-V11</u>									
CAVE- 3229	6/10/2013	Spinach	13059 ± 574	< 8.1	< 13.2	< 15.4	< 22.1	< 10.1	< 12.3
CAVE- 3230	6/11/2013	Lettuce	5441 ± 473	< 8.6	< 14.0	< 11.4	< 23.8	< 13.9	< 13.7
	7/9/2013			NS <sup>a</sup>					
	8/13/2013			NS <sup>a</sup>					
CAVE- 5408	9/10/2013	Cabbage	4053 ± 137	< 4.3	< 4.3	< 4.1	< 10.6	< 2.9	< 3.4
CAVE- 6123	10/8/2013	Cabbage	2945 ± 215	< 4.0	< 5.6	< 4.7	< 10.3	< 3.9	< 6.1

<sup>a</sup> NS = No sample; refer to Part I, Table 5.5, Missed Collections and Analyses.

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

Collection: Monthly, during growing season

Units: pCi/kg wet

Lab Code	Collection Date	Sample Type	Concentration (pCi/kg wet)						
			<sup>40</sup> K	<sup>54</sup> Mn	<sup>58</sup> Co	<sup>60</sup> Co	<sup>131</sup> I	<sup>134</sup> Cs	<sup>137</sup> Cs
<u>Location: CA-FPL-V12</u>									
CAVE- 3460	6/18/2013	Lettuce	3957 ± 328	< 9.1	< 11.5	< 10.5	< 16.5	< 7.9	< 11.3
CAVE- 3551	6/25/2013	Lettuce	5041 ± 466	< 12.9	< 7.0	< 8.7	< 25.5	< 9.9	< 12.9
CAVE- 3766	7/9/2013	Swiss Chard	8969 ± 497	< 9.8	< 7.6	< 10.6	< 19.1	< 12.0	< 10.2
CAVE- 4829	8/13/2013	Cabbage	3090 ± 228	< 5.8	< 8.7	< 5.1	< 15.3	< 8.3	< 8.8
CAVE- 5409	9/9/2013	Cabbage	3604 ± 259	< 6.5	< 7.3	< 4.2	< 22.0	< 6.9	< 7.0
CAVE- 6124	10/8/2013	Swiss Chard	5030 ± 325	< 8.0	< 4.8	< 9.3	< 31.6	< 9.7	< 6.1
<u>Location: CA-FPL-V16</u>									
	6/18/2013			NS <sup>a</sup>					
CAVE- 3767	7/8/2013	Turnips	5736 ± 322	< 5.7	< 10.7	< 11.0	< 21.3	< 9.4	< 7.6
CAVE- 4826	8/5/2013	Lettuce	4898 ± 328	< 7.7	< 8.2	< 4.4	< 26.4	< 6.0	< 9.2
CAVE- 4827	8/5/2013	Mustard Greens	7292 ± 500	< 11.7	< 12.5	< 12.7	< 46.3	< 15.1	< 13.9
CAVE- 4828	8/5/2013	Turnip greens	4713 ± 346	< 7.8	< 9.9	< 5.0	< 27.4	< 8.4	< 10.8
CAVE- 5411	9/9/2013	Turnips	6057 ± 387	< 7.5	< 8.0	< 7.5	< 26.0	< 8.5	< 10.5
CAVE- 5412	9/9/2013	Lettuce	7181 ± 509	< 11.0	< 13.9	< 11.6	< 27.6	< 12.2	< 11.7
CAVE- 5413	9/9/2013	Cabbage	5866 ± 490	< 17.0	< 19.9	< 12.0	< 27.3	< 15.5	< 17.4
CAVE- 6125	10/8/2013	Cabbage	4069 ± 195	< 4.8	< 5.1	< 3.0	< 9.9	< 6.7	< 7.8
CAVE- 6126	10/8/2013	Turnips	5001 ± 379	< 12.2	< 9.9	< 6.9	< 18.9	< 9.0	< 10.7
<u>Location: CA-FPL-V17</u>									
CAVE- 3231	6/10/2013	Cabbage	2758 ± 244	< 7.5	< 6.4	< 8.1	< 15.9	< 6.6	< 6.0
CAVE- 3232	6/10/2013	Turnips	4929 ± 272	< 6.2	< 6.7	< 3.9	< 13.4	< 5.7	< 6.4
CAVE- 3552	6/25/2013	Turnip greens	4478 ± 276	< 8.9	< 9.2	< 8.9	< 16.0	< 7.2	< 7.8
CAVE- 3553	6/25/2013	Zucchini	4181 ± 246	< 5.8	< 5.0	< 4.8	< 10.2	< 6.2	< 8.8
CAVE- 3554	6/25/2013	Cabbage	3042 ± 250	< 7.4	< 5.4	< 5.5	< 17.9	< 5.8	< 8.3
CAVE- 3555	6/25/2013	Lettuce	2856 ± 289	< 5.9	< 6.9	< 8.4	< 18.5	< 6.1	< 11.6
CAVE- 3556	6/25/2013	Mustard	4125 ± 258	< 8.5	< 7.6	< 7.4	< 10.5	< 6.3	< 9.3
CAVE- 3768	7/9/2013	Turnips	5133 ± 369	< 7.9	< 7.9	< 12.4	< 28.2	< 9.5	< 11.6
CAVE- 3769	7/9/2013	Cabbage	3440 ± 306	< 12.3	< 6.9	< 7.1	< 25.8	< 8.6	< 7.0
CAVE- 3770	7/9/2013	Mustard	5026 ± 338	< 9.8	< 6.3	< 6.9	< 17.6	< 8.4	< 11.1
CAVE- 3771	7/9/2013	Zucchini	6013 ± 392	< 9.0	< 6.2	< 9.3	< 24.8	< 12.2	< 13.1
CAVE- 3772	7/9/2013	Lettuce	5982 ± 508	< 16.5	< 13.3	< 9.8	< 26.2	< 12.8	< 11.6
	8/13/2013			NS <sup>a</sup>					
CAVE- 5414	9/10/2013	Zucchini	4419 ± 266	< 7.9	< 4.0	< 6.4	< 19.5	< 7.2	< 8.2

<sup>a</sup> NS = No sample; refer to Part I, Table 5.5, Missed Collections and Analyses.

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

Collection: Annually, at harvest

Units: pCi/kg wet

Lab Code	Sample Type	Collection Date	Concentration (pCi/kg wet)						
			<sup>3</sup> H	<sup>40</sup> K	<sup>54</sup> Mn	<sup>58</sup> Co	<sup>60</sup> Co	<sup>134</sup> Cs	<sup>137</sup> Cs
<u>Location: CA-FC-1</u>									
CAVE- 6232	1-Sorghum	10/11/2013	< 145	2453 ± 195	< 7.9	< 5.0	< 4.0	< 7.0	< 6.7
CAVE- 6233	2-Sorghum	10/11/2013	< 145	2626 ± 205	< 4.1	< 8.1	< 3.5	< 7.0	< 6.0
CAVE- 6234	3-Sorghum	10/11/2013	< 145	2664 ± 193	< 6.9	< 7.5	< 4.7	< 7.1	< 6.3
<u>Location: CA-FC-2</u>									
CAVE- 6235	1-Soybeans	10/9/2013	< 146	16703 ± 308	< 4.9	< 7.5	< 4.2	< 6.8	< 4.7
CAVE- 6236	2-Soybeans	10/9/2013	< 154	16682 ± 595	< 11.0	< 14.4	< 11.4	< 12.6	< 11.5
CAVE- 6237	3-Soybeans	10/9/2013	< 146	14959 ± 583	< 9.2	< 15.1	< 16.3	< 14.0	< 8.5
<u>Location: CA-FC-3</u>									
CAVE- 6238	1-Soybeans	10/9/2013	< 146	17359 ± 281	< 6.5	< 6.1	< 7.4	< 6.3	< 5.8
CAVE- 6239	2-Soybeans	10/9/2013	< 146	16303 ± 301	< 4.8	< 9.2	< 8.9	< 6.9	< 9.5
CAVE- 6240	3-Soybeans	10/9/2013	< 154	14292 ± 294	< 8.3	< 8.9	< 8.0	< 7.1	< 7.2
<u>Location: CA-FC-(C)</u>									
CAVE- 6533	Sorghum	10/17/2013	< 142	5862 ± 201	< 5.9	< 3.9	< 5.8	< 6.6	< 4.2
CAVE- 6534	Soybeans	10/17/2013	< 142	15956 ± 171	< 4.5	< 5.0	< 5.1	< 3.1	< 3.4

**Table 5. Soil, analyses for gamma-emitting isotopes.**

Collection: Annually

Lab Code	Collection		Concentration (pCi/kg dry)								
	Date		<sup>40</sup> K	<sup>54</sup> Mn	<sup>59</sup> Fe	<sup>58</sup> Co	<sup>60</sup> Co	<sup>95</sup> ZrNb	<sup>134</sup> Cs	<sup>137</sup> Cs	<sup>140</sup> BaLa
<u>Location: SOL-F-002</u>											
CASO- 6942	11/4/2013		12510 ± 891	< 34.4	< 85.2	< 37.4	< 9.9	< 57.5	< 25.5	508 ± 56	< 72.6
CASO- 6943	11/4/2013		11700 ± 802	< 30.1	< 77.2	< 27.0	< 14.7	< 60.7	< 21.1	665 ± 57	< 220.5
<u>Location: SOL-F-006</u>											
CASO- 6944	11/4/2013		9988 ± 675	< 29.1	< 29.2	< 22.5	< 20.6	< 44.1	< 20.1	656 ± 47	< 100.9
CASO- 6945	11/4/2013		10993 ± 754	< 31.6	< 52.8	< 39.3	< 19.3	< 45.5	< 25.3	526 ± 54	< 74.5
<u>Location: SOL-PR-003</u>											
CASO- 6948	11/4/2013		10131 ± 774	< 40.5	< 37.3	< 35.9	< 6.6	< 31.3	< 24.3	415 ± 46	< 69.5
CASO- 6949	11/4/2013		10767 ± 736	< 32.1	< 52.2	< 33.9	< 15.6	< 48.7	< 23.9	208 ± 47	< 94.6
<u>Location: SOL-PR-007</u>											
CASO- 6950	11/4/2013		9723 ± 617	< 31.6	< 41.4	< 33.2	< 13.1	< 60.8	< 19.6	236 ± 42	< 136.5
CASO- 6951	11/4/2013		8755 ± 643	< 26.5	< 31.8	< 29.2	< 19.3	< 43.8	< 23.1	272 ± 36	< 131.6
<u>Location: SOL-M-009</u>											
CASO- 6946	11/6/2013		13978 ± 779	< 30.4	< 100.5	< 36.0	< 10.4	< 89.4	< 20.2	155 ± 38	< 110.6
CASO- 6947	11/6/2013		11397 ± 910	< 38.8	< 109.9	< 55.8	< 33.6	< 134.1	< 29.9	69 ± 36	< 715.9
<u>Location: SOL-W-001</u>											
CASO- 6952	11/6/2013		9014 ± 723	< 41.8	< 121.5	< 47.0	< 16.6	< 105.6	< 24.3	< 32	< 195.9
CASO- 6953	11/6/2013		5862 ± 798	< 42.2	< 160.2	< 65.8	< 35.6	< 56.1	< 46.1	85 ± 51	< 407.2
<u>Location: SOL-W-002</u>											
CASO- 6954	11/6/2013		15157 ± 717	< 24.7	< 63.9	< 24.1	< 8.1	< 56.0	< 21.2	138 ± 34	< 112.5
CASO- 6956	11/6/2013		13597 ± 774	< 30.6	< 73.7	< 33.8	< 22.0	< 36.3	< 17.9	108 ± 34	< 88.6
<u>Location: SOL-W-003</u>											
CASO- 6957	11/6/2013		11158 ± 1110	< 63.0	< 177.0	< 60.4	< 34.3	< 71.0	< 44.2	150 ± 73	< 680.6
CASO- 6958	11/6/2013		4563 ± 1092	< 49.0	< 125.7	< 54.5	< 18.2	< 73.3	< 36.0	90 ± 50	< 167.4
<u>Location: SOL-W-004</u>											
CASO- 6959	11/6/2013		8605 ± 956	< 56.2	< 175.3	< 42.6	< 30.6	< 73.5	< 39.2	< 48	< 314.4
CASO- 6960	11/6/2013		10452 ± 1053	< 63.2	< 122.9	< 60.8	< 49.4	< 137.9	< 37.9	< 53	< 844.7

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

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

Lab Code	Required	CASW- 424	CASW- 893	CASW- 1314	CASW- 2170
Date Collected	LLD	01-29-13	02-28-13	03-26-13	04-29-13
H-3	3000	< 143	< 137	< 147	< 142
Mn-54	15	< 2.9	< 3.2	< 3.0	< 4.2
Fe-59	30	< 8.2	< 10.9	< 6.1	< 5.8
Co-58	15	< 3.0	< 3.3	< 1.9	< 2.7
Co-60	15	< 2.9	< 3.7	< 3.3	< 4.4
Zn-65	30	< 3.0	< 3.7	< 5.8	< 7.7
Zr-Nb-95	15	< 4.1	< 3.2	< 4.1	< 5.1
I-131	1000	< 17.7	< 6.8	< 4.1	< 8.2
Cs-134	15	< 3.8	< 4.8	< 3.3	< 4.6
Cs-137	18	< 3.4	< 3.7	< 4.2	< 4.9
Ba-La-140	15	< 6.6	< 6.0	< 4.2	< 2.5

Lab Code	Required	CASW- 2796	CASW- 3579	CASW- 4468	CASW- 5114
Date Collected	LLD	05-28-13	06-25-13	07-30-13	08-27-13
H-3	3000	< 188	< 157	< 184	< 147
Mn-54	15	< 3.7	< 2.4	< 2.1	< 3.3
Fe-59	30	< 2.4	< 3.8	< 3.3	< 5.0
Co-58	15	< 2.1	< 2.7	< 2.3	< 3.6
Co-60	15	< 2.2	< 1.9	< 1.9	< 3.9
Zn-65	30	< 4.3	< 2.9	< 4.4	< 6.6
Zr-Nb-95	15	< 2.5	< 3.0	< 3.1	< 3.6
I-131	1000	< 8.7	< 12.2	< 12.6	< 6.9
Cs-134	15	< 3.1	< 1.9	< 2.4	< 3.6
Cs-137	18	< 4.2	< 2.1	< 3.0	< 5.1
Ba-La-140	15	< 3.4	< 2.8	< 3.9	< 4.5

Lab Code	Required	CASW- 5714	CASW- 6707	CASW- 7215	CASW- 7729
Date Collected	LLD	09-24-13	10-29-13	11-25-13	12-31-13
H-3	3000	< 143	< 145	< 148	< 150
Mn-54	15	< 2.8	< 2.7	< 3.7	< 3.9
Fe-59	30	< 5.7	< 6.4	< 7.8	< 5.8
Co-58	15	< 2.0	< 3.8	< 3.6	< 4.5
Co-60	15	< 2.2	< 3.9	< 5.3	< 5.3
Zn-65	30	< 4.0	< 8.3	< 5.9	< 3.7
Zr-Nb-95	15	< 3.1	< 5.3	< 4.2	< 3.9
I-131	1000	< 32.1	< 18.1	< 15.7	< 17.2
Cs-134	15	< 2.4	< 4.5	< 6.1	< 4.9
Cs-137	18	< 2.9	< 3.2	< 5.6	< 3.8
Ba-La-140	15	< 9.8	< 7.4	< 4.9	< 9.1

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

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

Lab Code	Required	CASW- 425	CASW- 894	CASW- 1315	CASW- 2171
Date Collected	LLD	01-29-13	02-28-13	03-26-13	04-29-13
H-3	3000	693 ± 102	968 ± 113	513 ± 100	208 ± 85
Mn-54	15	< 3.5	< 2.5	< 3.1	< 3.9
Fe-59	30	< 4.8	< 4.0	< 3.5	< 6.6
Co-58	15	< 2.6	< 1.9	< 3.8	< 4.3
Co-60	15	< 2.7	< 2.6	< 3.1	< 4.1
Zn-65	30	< 5.1	< 4.3	< 4.6	< 6.1
Zr-Nb-95	15	< 2.9	< 3.2	< 2.9	< 5.9
I-131	1000	< 12.9	< 8.8	< 5.8	< 6.9
Cs-134	15	< 2.8	< 2.0	< 2.8	< 4.0
Cs-137	18	< 3.2	< 2.8	< 4.0	< 3.8
Ba-La-140	15	< 6.5	< 2.7	< 5.5	< 1.7

Lab Code	Required	CASW- 2797	CASW- 3580	CASW- 4469	CASW- 5115
Date Collected	LLD	05-28-13	06-25-13	07-30-13	08-27-13
H-3	3000	< 188	< 157	< 184	< 147
Mn-54	15	< 3.3	< 2.7	< 2.5	< 2.3
Fe-59	30	< 5.0	< 3.6	< 4.2	< 9.0
Co-58	15	< 4.4	< 2.2	< 3.4	< 3.2
Co-60	15	< 4.7	< 2.0	< 3.0	< 3.0
Zn-65	30	< 8.3	< 3.0	< 3.4	< 5.0
Zr-Nb-95	15	< 4.7	< 2.7	< 3.8	< 4.5
I-131	1000	< 6.1	< 11.5	< 16.9	< 9.0
Cs-134	15	< 4.3	< 2.0	< 2.1	< 3.6
Cs-137	18	< 4.8	< 2.9	< 3.0	< 4.2
Ba-La-140	15	< 2.8	< 2.3	< 5.1	< 8.6

Lab Code	Required	CASW- 5715	CASW- 6708	CASW- 7216	CASW- 7730
Date Collected	LLD	09-24-13	10-29-13	11-25-13	12-31-13
H-3	3000	< 143	173 ± 81	< 148	< 150
Mn-54	15	< 2.1	< 3.4	< 3.2	< 3.0
Fe-59	30	< 5.5	< 10.5	< 9.8	< 5.5
Co-58	15	< 2.0	< 4.1	< 4.9	< 2.3
Co-60	15	< 2.1	< 2.8	< 4.9	< 2.6
Zn-65	30	< 2.6	< 5.0	< 11.8	< 5.0
Zr-Nb-95	15	< 3.5	< 4.0	< 4.1	< 2.5
I-131	1000	< 30.5	< 18.6	< 14.1	< 7.6
Cs-134	15	< 2.2	< 3.8	< 6.6	< 2.9
Cs-137	18	< 2.6	< 4.2	< 4.7	< 2.9
Ba-La-140	15	< 9.5	< 4.6	< 4.2	< 3.9

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

Lab Code	Collection Date	Concentration (pCi/L)									
		<sup>3</sup> H	<sup>54</sup> Mn	<sup>59</sup> Fe	<sup>58</sup> Co	<sup>60</sup> Co	<sup>65</sup> Zn	<sup>95</sup> ZrNb	<sup>134</sup> Cs	<sup>137</sup> Cs	<sup>140</sup> BaLa
<u>Location: CA-SWA-UHS</u>											
CASW- 315	01/15/13	< 144	< 2.5	< 6.4	< 1.7	< 2.5	< 2.2	< 2.8	< 2.8	< 2.5	< 6.6
CASW- 2443	04/18/13	< 140	< 3.1	< 4.0	< 2.4	< 2.0	< 4.6	< 5.7	< 2.7	< 3.4	< 14.4
CASW- 4242	07/23/13	< 157	< 3.4	< 7.5	< 4.3	< 3.6	< 6.5	< 3.8	< 3.5	< 4.1	< 4.4
CASW- 6484	10/15/13	< 148	< 2.4	< 5.2	< 2.6	< 1.2	< 2.0	< 5.2	< 2.2	< 2.9	< 8.4
<u>Location: CA-SWA-POND 01</u>											
CASW- 1131	03/12/13	< 133	< 2.3	< 4.8	< 3.1	< 3.7	< 3.5	< 4.2	< 3.7	< 3.2	< 5.9
CASW- 5518	09/13/13	< 151	< 3.2	< 5.5	< 1.4	< 2.0	< 4.6	< 4.0	< 2.5	< 2.9	< 10.3
<u>Location: CA-SWA-POND 02</u>											
CASW- 1132	03/13/13	< 133	< 1.7	< 3.6	< 3.1	< 2.3	< 3.3	< 2.0	< 2.5	< 2.4	< 2.7
CASW- 5519	09/13/13	< 151	< 2.2	< 4.8	< 2.9	< 2.4	< 5.0	< 4.4	< 2.8	< 1.6	< 3.9
<u>Location: CA-SWA-SLUDGE LAGOON #4</u>											
CASW- 1139	03/12/13	< 145	< 3.4	< 6.6	< 3.7	< 3.5	< 6.6	< 5.8	< 2.9	< 4.0	< 5.2
CASW- 5525	09/16/13	< 151	< 2.2	< 7.5	< 3.7	< 2.0	< 2.8	< 5.0	< 2.5	< 2.7	< 5.2

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

Lab Code	Collection Date	Concentration (pCi/L)									
		<sup>3</sup> H	<sup>54</sup> Mn	<sup>59</sup> Fe	<sup>58</sup> Co	<sup>60</sup> Co	<sup>65</sup> Zn	<sup>95</sup> ZrNb	<sup>134</sup> Cs	<sup>137</sup> Cs	<sup>140</sup> BaLa
<u>Location: CA-SWA-OUTFALL 010</u>											
CASW- 1133	03/12/13	< 133	< 3.7	< 9.1	< 3.9	< 2.0	< 7.2	< 5.2	< 5.9	< 3.8	< 6.3
CASW- 5520	09/13/13	< 151	< 1.9	< 4.8	< 2.2	< 1.6	< 3.6	< 4.4	< 2.0	< 2.4	< 6.0
<u>Location: CA-SWA-OUTFALL 011</u>											
CASW- 1134	03/12/13	< 133	< 4.1	< 9.5	< 4.0	< 2.0	< 11.1	< 4.3	< 5.7	< 3.1	< 6.0
CASW- 5521	09/13/13	< 151	< 2.5	< 4.0	< 2.3	< 1.2	< 4.9	< 2.7	< 1.7	< 2.5	< 4.1
<u>Location: CA-SWA-OUTFALL 012</u>											
CASW- 1135	03/13/13	< 145	< 3.6	< 5.6	< 3.0	< 2.9	< 3.3	< 3.1	< 2.9	< 4.0	< 5.8
CASW- 5522	09/16/13	< 151	< 2.5	< 3.2	< 2.6	< 2.3	< 5.2	< 4.3	< 2.5	< 2.8	< 4.3
<u>Location: CA-SWA-OUTFALL 013</u>											
CASW- 1136	03/13/13	< 145	< 2.3	< 5.4	< 2.7	< 3.0	< 4.8	< 2.4	< 2.7	< 3.0	< 3.2
CASW- 6082	10/04/13	< 152	< 2.7	< 3.9	< 2.5	< 1.4	< 5.7	< 2.4	< 2.6	< 2.9	< 10.2
<u>Location: CA-SWA-OUTFALL 014</u>											
CASW- 1137	03/12/13	< 145	< 2.4	< 4.1	< 2.9	< 2.6	< 2.1	< 4.5	< 3.4	< 3.2	< 4.6
CASW- 5523	09/13/13	< 151	< 1.2	< 3.0	< 1.3	< 1.5	< 3.9	< 2.7	< 1.4	< 1.4	< 8.5
<u>Location: CA-SWA-OUTFALL 015</u>											
CASW- 1138	03/12/13	< 145	< 4.9	< 7.3	< 4.1	< 2.9	< 3.1	< 3.4	< 4.0	< 4.5	< 6.8
CASW- 5524	09/13/13	< 151	< 2.9	< 4.7	< 2.2	< 2.5	< 2.8	< 4.5	< 2.3	< 2.4	< 9.2



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

Lab Code	Collection Date	Concentration (pCi/L)									
		<sup>3</sup> H	<sup>54</sup> Mn	<sup>59</sup> Fe	<sup>58</sup> Co	<sup>60</sup> Co	<sup>65</sup> Zn	<sup>95</sup> ZrNb	<sup>134</sup> Cs	<sup>137</sup> Cs	<sup>140</sup> BaLa
<u>CA-DWA-003 (Ward)</u>											
CADW- 1063	3/6/2013	< 141	< 2.7	< 6.3	< 2.9	< 3.0	< 5.7	< 2.1	< 2.9	< 4.2	< 8.5
CADW- 3116	5/31/2013	< 138	< 4.0	< 5.8	< 5.6	< 3.1	< 3.0	< 4.8	< 2.4	< 4.1	< 4.5
CADW- 5011	8/20/2013	< 150	< 1.3	< 5.4	< 2.5	< 2.8	< 3.4	< 4.2	< 3.1	< 3.0	< 5.4
CADW- 7245	11/26/2013	< 148	< 4.1	< 9.1	< 3.6	< 3.4	< 3.5	< 5.4	< 4.4	< 4.8	< 4.6
<u>CA-DWA-004 (Miller)</u>											
CADW- 1064	3/6/2013	< 141	< 2.1	< 3.0	< 2.6	< 2.0	< 3.2	< 3.3	< 2.0	< 2.9	< 3.0
CADW- 3117	5/30/2013	< 138	< 3.4	< 4.3	< 2.9	< 2.1	< 6.1	< 4.3	< 3.1	< 3.9	< 5.4
CADW- 5012	8/21/2013	< 150	< 2.3	< 10.3	< 4.6	< 4.2	< 7.1	< 5.6	< 3.5	< 4.7	< 6.2
CADW- 7246	11/27/2013	< 148	< 2.1	< 6.0	< 2.0	< 2.3	< 4.4	< 2.7	< 3.8	< 2.6	< 3.8
<u>CA-DWA-005 (Hux)</u>											
CADW- 1065	3/6/2013	< 141	< 2.7	< 5.7	< 2.6	< 2.8	< 5.0	< 3.2	< 3.1	< 3.2	< 4.1
CADW- 3118	6/3/2013	< 138	< 4.2	< 4.4	< 3.5	< 2.1	< 4.3	< 3.2	< 3.6	< 5.0	< 8.0
CADW- 5013	8/20/2013	< 150	< 3.8	< 2.7	< 1.8	< 2.5	< 4.1	< 3.3	< 2.3	< 3.8	< 4.9
CADW- 7247	11/26/2013	< 148	< 1.6	< 4.9	< 3.0	< 1.5	< 5.8	< 3.7	< 3.8	< 3.7	< 6.1
<u>CA-DWA-006 (Lindeman)</u>											
CADW- 1066	3/6/2013	< 141	< 2.5	< 7.2	< 3.4	< 2.9	< 3.0	< 2.5	< 2.9	< 3.0	< 4.7
CADW- 3119	6/3/2013	< 138	< 4.1	< 2.9	< 3.1	< 2.6	< 7.2	< 4.3	< 3.9	< 4.5	< 9.0
CADW- 5014	8/20/2013	< 150	< 2.9	< 5.3	< 2.1	< 1.2	< 2.9	< 4.4	< 3.0	< 1.7	< 4.6
CADW- 7248	11/26/2013	< 148	< 3.1	< 4.5	< 2.7	< 2.0	< 2.5	< 3.7	< 2.6	< 2.8	< 5.9
<u>CA-DWA-007 (Kriete)</u>											
CADW- 1067	3/6/2013	< 141	< 3.0	< 6.1	< 3.4	< 3.7	< 3.3	< 4.9	< 2.9	< 4.2	< 5.9
CADW- 3120	6/3/2013	< 138	< 3.9	< 5.2	< 3.0	< 4.2	< 3.1	< 5.0	< 1.9	< 4.5	< 3.8
CADW- 5015	8/20/2013	< 150	< 3.1	< 4.0	< 1.9	< 1.8	< 2.8	< 3.3	< 1.7	< 2.4	< 3.2
CADW- 7249	11/26/2013	< 148	< 2.6	< 2.8	< 1.9	< 2.2	< 3.8	< 3.0	< 2.7	< 2.5	< 3.2
<u>CA-DWA-008 (Brandt)</u>											
CADW- 1068	3/6/2013	< 141	< 1.9	< 3.3	< 2.5	< 2.7	< 3.2	< 3.2	< 2.2	< 2.5	< 3.4
CADW- 3121	5/31/2013	< 138	< 2.2	< 5.3	< 2.3	< 1.5	< 1.9	< 3.5	< 2.1	< 2.2	< 5.9
CADW- 5016	8/20/2013	< 150	< 2.2	< 7.7	< 2.1	< 1.7	< 2.9	< 4.5	< 3.0	< 3.1	< 4.1
CADW- 7250	11/26/2013	< 148	< 4.5	< 5.2	< 4.3	< 3.6	< 7.5	< 4.1	< 3.9	< 4.0	< 5.5

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

Lab Code	Collection Date	Concentration (pCi/L)									
		<sup>3</sup> H	<sup>54</sup> Mn	<sup>59</sup> Fe	<sup>58</sup> Co	<sup>60</sup> Co	<sup>65</sup> Zn	<sup>95</sup> ZrNb	<sup>134</sup> Cs	<sup>137</sup> Cs	<sup>140</sup> BaLa
<u>CA-DWA-009 (Clardy)</u>											
CADW- 1069	3/6/2013	< 141	< 1.7	< 4.0	< 2.5	< 2.2	< 3.1	< 2.6	< 1.9	< 3.2	< 2.3
CADW- 3122	5/31/2013	< 138	< 2.4	< 5.3	< 2.5	< 3.5	< 5.7	< 4.1	< 2.8	< 2.9	< 5.7
CASW- 5017	8/20/2013	< 150	< 5.1	< 5.9	< 3.4	< 4.3	< 5.9	< 4.4	< 4.0	< 3.2	< 4.8
CASW- 7252	11/26/2013	< 148	< 1.4	< 3.0	< 2.9	< 1.5	< 2.2	< 2.2	< 2.7	< 2.9	< 5.3
<u>CA-DWA-010 (Dillon, Susan)</u>											
CADW- 1070	3/6/2013	< 141	< 2.5	< 3.5	< 2.6	< 2.5	< 4.7	< 2.3	< 2.5	< 2.6	< 6.2
CADW- 3123	5/31/2013	< 138	< 2.0	< 3.2	< 1.4	< 1.9	< 3.0	< 2.7	< 2.7	< 2.2	< 2.4
CASW- 5018	8/20/2013	< 150	< 2.9	< 3.8	< 3.6	< 2.3	< 3.9	< 2.8	< 2.5	< 2.8	< 3.1
CASW- 7253	11/26/2013	< 148	< 2.0	< 4.5	< 2.8	< 1.7	< 4.9	< 2.6	< 2.5	< 2.9	< 4.7
<u>CA-DWA-012 (Dillon, Joe)</u>											
CADW- 1071	3/6/2013	< 141	< 2.7	< 3.5	< 2.3	< 2.5	< 5.4	< 3.3	< 3.2	< 3.1	< 2.6
CADW- 3124	5/31/2013	< 138	< 3.0	< 4.3	< 3.0	< 1.9	< 5.5	< 4.1	< 2.4	< 3.4	< 5.2
CADW- 5019	8/20/2013	< 150	< 2.6	< 2.7	< 2.0	< 2.8	< 3.8	< 3.7	< 2.5	< 3.0	< 2.7
CADW- 7254	11/26/2013	< 148	< 2.2	< 5.4	< 1.3	< 1.3	< 3.9	< 2.0	< 3.1	< 2.9	< 2.0
<u>CA-DWA-022 (Plummer)</u>											
CADW- 1072	3/6/2013	< 141	< 3.8	< 7.6	< 2.7	< 3.6	< 5.2	< 4.9	< 5.0	< 4.0	< 6.2
CADW- 3125	5/31/2013	< 138	< 3.8	< 3.4	< 2.2	< 2.1	< 3.0	< 5.1	< 2.9	< 2.9	< 6.3
CADW- 5020	8/20/2013	< 150	< 2.9	< 3.9	< 1.7	< 2.2	< 5.4	< 2.5	< 2.6	< 2.9	< 4.1
CADW- 7255	11/26/2013	< 148	< 3.2	< 6.7	< 4.1	< 2.2	< 5.3	< 3.8	< 3.8	< 3.8	< 3.8
<u>CA-DWA-D01 (Portland Bar/Grill)</u>											
CADW- 1073	3/6/2013	< 141	< 3.7	< 7.2	< 3.4	< 3.0	< 5.2	< 2.7	< 3.6	< 5.0	< 6.9
CADW- 3126	5/31/2013	< 138	< 3.0	< 6.3	< 3.4	< 2.0	< 4.6	< 3.1	< 3.0	< 2.3	< 6.0
CADW- 5021	8/20/2013	< 150	< 1.7	< 6.8	< 4.0	< 1.8	< 5.6	< 3.0	< 3.0	< 2.5	< 3.8
CADW- 7256	11/26/2013	< 148	< 2.4	< 4.6	< 2.4	< 1.7	< 2.9	< 3.6	< 2.9	< 3.3	< 5.1
<u>CA-DWA-PW1 (Plant Cafeteria)</u>											
CADW- 1074	3/7/2013	< 141	< 2.8	< 4.6	< 2.2	< 2.2	< 5.1	< 4.1	< 2.2	< 3.4	< 3.8
CADW- 3127	5/30/2013	< 138	< 2.9	< 5.4	< 3.2	< 2.4	< 7.3	< 6.0	< 3.9	< 4.6	< 9.0
CADW- 5022	8/21/2013	< 150	< 3.0	< 4.1	< 0.8	< 3.2	< 3.4	< 3.5	< 2.5	< 3.0	< 4.4
CADW- 7257	11/26/2013	< 148	< 2.4	< 4.6	< 2.4	< 1.7	< 2.9	< 3.6	< 2.9	< 3.3	< 5.1

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

Lab Code	Collection Date	Concentration (pCi/L)									
		<sup>3</sup> H	<sup>54</sup> Mn	<sup>59</sup> Fe	<sup>58</sup> Co	<sup>60</sup> Co	<sup>65</sup> Zn	<sup>95</sup> ZrNb	<sup>134</sup> Cs	<sup>137</sup> Cs	<sup>140</sup> BaLa
<u>Location: CA-WWA-936</u>											
CAWW- 268	1/17/2013	307 ± 85	< 2.9	< 6.2	< 3.5	< 2.7	< 5.0	< 4.4	< 2.6	< 3.3	< 6.9
CAWW- 562	2/7/2013	312 ± 86	< 2.9	< 7.2	< 2.3	< 4.0	< 3.3	< 3.8	< 3.8	< 3.3	< 6.0
CAWW- 1222	3/14/2013	403 ± 95	< 2.8	< 6.4	< 2.6	< 2.8	< 5.1	< 3.6	< 2.9	< 2.7	< 6.7
CAWW- 2394	4/9/2013	348 ± 88	< 2.2	< 6.8	< 2.8	< 3.1	< 4.3	< 4.6	< 3.0	< 3.1	< 14.0
CAWW- 2586	5/7/2013	162 ± 76	< 3.1	< 7.3	< 2.6	< 2.3	< 8.7	< 2.9	< 2.2	< 4.9	< 6.3
CAWW- 3213	6/6/2013	269 ± 86	< 3.6	< 6.7	< 5.2	< 3.7	< 5.9	< 4.5	< 2.8	< 4.7	< 2.6
CAWW- 3943	7/9/2013	336 ± 99	< 2.0	< 4.4	< 2.0	< 1.7	< 2.1	< 2.9	< 1.4	< 2.1	< 3.3
CAWW- 4866	8/14/2013	265 ± 90	< 2.0	< 5.5	< 2.0	< 3.4	< 7.1	< 3.4	< 3.0	< 2.7	< 7.1
CAWW- 5385	9/10/2013	178 ± 80	< 4.6	< 6.0	< 3.3	< 1.4	< 8.0	< 4.9	< 4.2	< 5.5	< 7.3
CAWW- 6205	10/9/2013	257 ± 104	< 2.6	< 4.6	< 2.6	< 2.6	< 3.8	< 2.9	< 3.2	< 3.7	< 3.2
CAWW- 7087	11/18/2013	363 ± 106	< 1.9	< 6.6	< 2.1	< 1.8	< 5.7	< 2.9	< 3.1	< 3.1	< 4.8
CAWW- 7516	12/10/2013	369 ± 96	< 2.4	< 3.6	< 1.0	< 2.4	< 4.6	< 3.8	< 3.5	< 2.3	< 3.7
<u>Location: CA-WWA-937A</u>											
CAWW- 269	1/14/2013	< 140	< 2.8	< 6.6	< 3.5	< 2.9	< 4.4	< 2.3	< 2.9	< 2.9	< 6.0
CAWW- 563	2/7/2013	< 134	< 2.2	< 7.1	< 2.7	< 2.2	< 2.6	< 4.0	< 2.9	< 3.4	< 2.2
CAWW- 1223	3/15/2013	< 147	< 2.6	< 3.1	< 3.0	< 2.1	< 2.4	< 2.0	< 2.4	< 2.5	< 4.2
CAWW- 2396	4/10/2013	< 137	< 1.0	< 4.0	< 1.8	< 1.2	< 2.2	< 3.2	< 1.2	< 1.3	< 12.4
CAWW- 2587	5/7/2013	< 140	< 4.2	< 9.7	< 3.5	< 2.6	< 7.9	< 3.2	< 3.1	< 4.2	< 4.1
CAWW- 3214	6/6/2013	< 148	< 3.8	< 5.2	< 3.4	< 2.2	< 2.5	< 3.5	< 3.0	< 4.2	< 4.3
CAWW- 3944	7/9/2013	< 159	< 2.1	< 5.3	< 1.3	< 2.2	< 1.9	< 2.5	< 1.6	< 2.2	< 4.0
CAWW- 4867	8/15/2013	< 145	< 2.6	< 4.7	< 3.1	< 2.2	< 4.4	< 3.9	< 2.7	< 2.3	< 2.3
CAWW- 5449	9/12/2013	< 143	< 5.7	< 6.5	< 3.8	< 3.6	< 5.5	< 4.7	< 3.9	< 6.4	< 4.5
CAWW- 6206	10/9/2013	< 154	< 1.0	< 3.4	< 1.7	< 1.0	< 2.8	< 2.3	< 1.5	< 1.5	< 5.5
CAWW- 7088	11/18/2013	< 150	< 1.9	< 5.5	< 2.5	< 2.8	< 3.3	< 4.0	< 2.6	< 3.3	< 3.7
CAWW- 7582	12/18/2013	< 145	< 4.4	< 7.6	< 3.6	< 3.1	< 7.8	< 4.0	< 4.0	< 3.7	< 1.6
<u>Location: CA-WWA-937B</u>											
CAWW- 270	1/15/2013	< 146	< 2.4	< 4.3	< 1.4	< 3.2	< 6.6	< 4.3	< 2.4	< 3.2	< 6.3
CAWW- 564	2/7/2013	< 140	< 2.3	< 4.8	< 3.7	< 3.4	< 4.7	< 4.1	< 3.5	< 4.3	< 5.9
CAWW- 1224	3/15/2013	< 147	< 2.7	< 3.0	< 2.1	< 2.2	< 1.8	< 3.3	< 2.2	< 2.8	< 6.0
CAWW- 2397	4/10/2013	< 137	< 1.6	< 8.2	< 2.5	< 1.4	< 2.7	< 4.3	< 3.3	< 2.3	< 11.9
CAWW- 2589	5/8/2013	< 158	< 3.8	< 4.2	< 3.7	< 2.6	< 5.2	< 3.2	< 2.9	< 4.2	< 4.6
CAWW- 3215	6/7/2013	290 ± 87 <sup>a</sup>	< 1.6	< 2.7	< 2.1	< 1.9	< 3.2	< 3.7	< 2.8	< 3.2	< 2.4
CAWW- 3946	7/11/2013	234 ± 94	< 2.5	< 5.6	< 2.5	< 1.2	< 5.6	< 3.1	< 2.2	< 3.4	< 2.6
CAWW- 4868	8/14/2013	193 ± 82	< 4.2	< 9.4	< 7.1	< 1.8	< 3.3	< 6.1	< 2.0	< 4.6	< 8.5
CAWW- 5386	9/10/2013	< 151	< 5.9	< 7.9	< 4.0	< 3.5	< 8.8	< 5.4	< 4.1	< 3.4	< 7.6
CAWW- 6207	10/10/2013	< 154	< 2.3	< 6.3	< 2.9	< 2.1	< 4.3	< 4.4	< 3.2	< 2.8	< 9.0
CAWW- 7036	11/12/2013	< 149	< 2.2	< 4.1	< 2.7	< 3.2	< 4.8	< 2.2	< 3.0	< 2.3	< 2.1
CAWW- 7583	12/17/2013	< 145	< 3.3	< 4.3	< 2.8	< 2.8	< 5.6	< 2.0	< 3.5	< 4.0	< 1.8

<sup>a</sup> Analysis was repeated; result of reanalysis: 233 ± 94 pCi/L.

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

Lab Code	Collection Date	Concentration (pCi/L)									
		<sup>3</sup> H	<sup>54</sup> Mn	<sup>59</sup> Fe	<sup>58</sup> Co	<sup>60</sup> Co	<sup>65</sup> Zn	<sup>95</sup> ZrNb	<sup>134</sup> Cs	<sup>137</sup> Cs	<sup>140</sup> BaLa
<u>Location: CA-WWA-937C</u>											
CAWW- 271	1/17/2013	< 146	< 2.1	< 5.2	< 2.5	< 3.3	< 4.3	< 4.0	< 2.8	< 2.5	< 7.6
CAWW- 565	2/7/2013	< 140	< 3.6	< 6.0	< 2.5	< 3.0	< 10.1	< 5.6	< 3.5	< 4.7	< 8.5
CAWW- 1225	3/14/2013	202 ± 87	< 2.9	< 6.1	< 2.0	< 2.4	< 4.7	< 3.8	< 2.7	< 3.5	< 4.5
CAWW- 2398	4/9/2013	< 143	< 2.1	< 5.2	< 3.4	< 1.8	< 3.8	< 5.3	< 2.6	< 2.7	< 7.6
CAWW- 2590	5/7/2013	< 140	< 1.8	< 3.0	< 2.6	< 1.2	< 1.8	< 3.3	< 1.4	< 1.7	< 4.6
CAWW- 3216	6/6/2013	173 ± 82	< 1.7	< 2.2	< 2.1	< 1.6	< 3.7	< 3.8	< 2.2	< 2.8	< 1.9
CAWW- 3947	7/9/2013	212 ± 93	< 1.9	< 3.9	< 1.2	< 2.7	< 2.3	< 3.6	< 2.2	< 3.4	< 4.1
CAWW- 4869	8/14/2013	403 ± 91	< 2.4	< 4.7	< 2.6	< 1.9	< 5.5	< 2.4	< 2.8	< 3.7	< 2.8
CAWW- 5450	9/12/2013	234 ± 83	< 2.1	< 6.6	< 3.6	< 3.7	< 4.0	< 2.4	< 3.1	< 4.0	< 5.6
CAWW- 6208	10/9/2013	< 154	< 2.4	< 5.1	< 2.9	< 1.9	< 3.3	< 2.4	< 2.3	< 3.0	< 5.2
CAWW- 7037	11/12/2013	254 ± 87	< 1.3	< 3.0	< 2.3	< 2.1	< 3.4	< 2.6	< 2.3	< 1.7	< 3.7
CAWW- 7518	12/10/2013	193 ± 88	< 2.0	< 3.3	< 2.7	< 2.8	< 4.9	< 3.9	< 2.8	< 3.4	< 3.7
<u>Location: CA-WWA-937D</u>											
CAWW- 272	1/17/2013	< 146	< 1.6	< 6.1	< 2.7	< 2.0	< 3.2	< 2.5	< 2.3	< 2.6	< 12.2
CAWW- 566	2/7/2013	246 ± 86	< 2.5	< 8.4	< 2.0	< 3.7	< 3.6	< 6.1	< 2.7	< 4.6	< 6.8
CAWW- 1226	3/15/2013	413 ± 96	< 1.9	< 3.5	< 2.1	< 3.0	< 4.7	< 2.5	< 2.1	< 1.9	< 5.2
CAWW- 2399	4/10/2013	< 143	< 2.2	< 3.3	< 2.2	< 1.5	< 2.9	< 3.2	< 2.2	< 2.8	< 10.5
CAWW- 2591	5/8/2013	< 140	< 2.0	< 5.7	< 3.0	< 1.9	< 3.3	< 2.5	< 2.0	< 2.2	< 4.8
CAWW- 3217	6/7/2013	< 148	< 3.7	< 6.9	< 3.3	< 3.2	< 3.1	< 3.3	< 2.6	< 3.2	< 8.0
CAWW- 3948	7/9/2013	169 ± 91	< 3.0	< 4.2	< 2.1	< 1.7	< 4.0	< 2.7	< 2.6	< 3.2	< 2.9
CAWW- 4870	8/14/2013	187 ± 81	< 2.6	< 5.4	< 1.6	< 2.7	< 2.9	< 4.3	< 2.6	< 3.3	< 5.9
CAWW- 5451	9/12/2013	197 ± 84	< 3.8	< 5.1	< 3.4	< 2.9	< 3.8	< 4.5	< 4.3	< 5.7	< 4.7
CAWW- 6209	10/9/2013	235 ± 103	< 2.4	< 7.0	< 2.2	< 2.2	< 5.2	< 4.1	< 2.6	< 2.6	< 12.1
CAWW- 7038	11/12/2013	418 ± 94	< 2.6	< 5.1	< 2.5	< 2.8	< 5.2	< 2.2	< 3.3	< 2.8	< 3.3
CAWW- 7519	12/10/2013	361 ± 95	< 1.8	< 5.2	< 2.8	< 3.0	< 3.7	< 3.7	< 3.2	< 3.5	< 3.0
<u>Location: CA-WWA-937E</u>											
CAWW- 273	1/17/2013	< 146	< 2.3	< 5.4	< 2.1	< 2.2	< 3.1	< 3.3	< 2.6	< 2.5	< 10.3
CAWW- 567	2/7/2013	159 ± 82	< 2.2	< 3.2	< 1.6	< 2.3	< 4.9	< 3.9	< 2.3	< 3.3	< 5.4
CAWW- 1227	3/15/2013	< 147	< 2.2	< 3.5	< 2.4	< 2.1	< 3.7	< 3.4	< 2.4	< 3.2	< 3.7
CAWW- 2400	4/9/2013	183 ± 81	< 1.2	< 7.2	< 2.7	< 1.5	< 3.1	< 4.4	< 2.0	< 2.3	< 11.8
CAWW- 2592	5/8/2013	193 ± 77	< 2.4	< 5.0	< 2.2	< 1.5	< 4.6	< 1.8	< 2.3	< 2.4	< 4.3
CAWW- 3219	6/7/2013	190 ± 82	< 2.3	< 3.5	< 1.9	< 2.5	< 5.3	< 3.5	< 2.9	< 2.8	< 8.1
CAWW- 3949	7/11/2013	289 ± 97	< 2.9	< 3.5	< 3.2	< 2.2	< 3.7	< 5.5	< 2.5	< 2.2	< 4.7
CAWW- 4871	8/14/2013	223 ± 88	< 2.7	< 3.1	< 2.4	< 1.9	< 6.6	< 3.0	< 2.5	< 2.3	< 3.3
CAWW- 5453	9/12/2013	238 ± 83	< 3.8	< 4.3	< 4.9	< 3.3	< 4.6	< 5.8	< 2.2	< 4.2	< 8.1
CAWW- 6474	10/15/2013	215 ± 84	< 2.2	< 2.4	< 2.1	< 1.6	< 2.4	< 3.5	< 3.0	< 2.7	< 5.2
CAWW- 7089	11/18/2013	252 ± 85	< 3.4	< 3.4	< 2.0	< 1.6	< 6.8	< 3.4	< 2.6	< 2.4	< 4.6
CAWW- 7584	12/17/2013	161 ± 80	< 2.7	< 4.9	< 1.6	< 2.0	< 4.3	< 3.5	< 3.0	< 3.0	< 3.3

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

Lab Code	Collection Date	Concentration (pCi/L)									
		<sup>3</sup> H	<sup>54</sup> Mn	<sup>59</sup> Fe	<sup>58</sup> Co	<sup>60</sup> Co	<sup>65</sup> Zn	<sup>95</sup> ZrNb	<sup>134</sup> Cs	<sup>137</sup> Cs	<sup>140</sup> BaLa
<u>Location: CA-WWA-937F</u>											
CAWW- 274	1/17/2013	< 140	< 2.1	< 6.0	< 2.1	< 1.9	< 2.9	< 2.9	< 1.9	< 3.6	< 7.9
CAWW- 568	2/7/2013	< 134	< 2.2	< 7.8	< 3.5	< 3.0	< 2.1	< 2.8	< 3.2	< 4.0	< 7.6
CAWW- 1228	3/15/2013	< 147	< 2.9	< 5.6	< 1.9	< 2.1	< 5.0	< 4.5	< 2.6	< 3.8	< 4.7
CAWW- 2401	4/10/2013	< 137	< 2.3	< 6.4	< 3.3	< 2.5	< 3.9	< 4.5	< 1.9	< 2.2	< 8.2
CAWW- 2593	5/8/2013	< 140	< 1.4	< 3.5	< 1.7	< 1.8	< 4.1	< 3.4	< 1.6	< 2.2	< 5.4
CAWW- 3220	6/7/2013	< 148	< 2.3	< 4.9	< 3.2	< 2.6	< 3.1	< 2.1	< 2.6	< 2.8	< 6.4
CAWW- 3950	7/10/2013	< 159	< 2.9	< 6.8	< 2.6	< 2.8	< 3.3	< 3.3	< 2.3	< 3.0	< 3.7
CAWW- 4872	8/14/2013	< 145	< 2.9	< 7.5	< 2.1	< 2.8	< 5.8	< 2.5	< 3.6	< 2.8	< 4.4
CAWW- 5387	9/10/2013	< 151	< 2.9	< 5.1	< 1.6	< 4.0	< 4.9	< 4.8	< 3.4	< 3.8	< 3.9
CAWW- 6210	10/10/2013	< 154	< 2.2	< 6.6	< 2.9	< 2.1	< 5.4	< 2.7	< 2.8	< 2.3	< 6.1
CAWW- 7040	11/12/2013	< 149	< 2.1	< 3.6	< 1.8	< 2.2	< 3.4	< 2.4	< 3.1	< 2.8	< 4.9
CAWW- 7585	12/17/2013	< 145	< 1.2	< 5.4	< 1.9	< 2.7	< 3.3	< 3.4	< 3.3	< 2.4	< 2.7
<u>Location: CA-WWA-938</u>											
CAWW- 276	1/16/2013	214 ± 87	< 1.8	< 5.5	< 3.7	< 3.2	< 6.1	< 5.1	< 1.8	< 2.2	< 6.2
CAWW- 571	2/7/2013	< 140	< 2.5	< 4.7	< 2.0	< 2.2	< 4.4	< 4.0	< 2.5	< 2.7	< 6.3
CAWW- 1230	3/14/2013	190 ± 86	< 1.7	< 5.9	< 1.2	< 2.1	< 1.4	< 3.4	< 2.2	< 3.1	< 4.6
CAWW- 2402	4/10/2013	238 ± 84	< 1.1	< 3.7	< 1.3	< 1.4	< 1.9	< 3.3	< 0.9	< 1.1	< 5.2
CAWW- 2594	5/8/2013	368 ± 85	< 2.3	< 3.4	< 1.4	< 1.5	< 4.4	< 4.0	< 2.1	< 3.1	< 7.3
CAWW- 3221	6/7/2013	152 ± 81	< 1.6	< 5.4	< 3.0	< 2.2	< 4.5	< 4.0	< 2.7	< 2.6	< 8.0
CAWW- 3951	7/10/2013	187 ± 92	< 2.8	< 4.6	< 1.8	< 2.4	< 3.0	< 4.3	< 2.1	< 3.4	< 3.9
CAWW- 4873	8/14/2013	276 ± 86	< 2.0	< 3.4	< 2.8	< 1.7	< 3.2	< 2.7	< 2.4	< 3.2	< 4.0
CAWW- 5388	9/10/2013	< 151	< 7.6	< 5.9	< 4.4	< 4.8	< 6.4	< 4.3	< 4.5	< 3.5	< 8.1
CAWW- 6211	10/10/2013	< 154	< 2.7	< 4.8	< 1.7	< 1.5	< 3.5	< 1.7	< 2.6	< 2.4	< 6.6
CAWW- 7041	11/12/2013	< 149	< 2.8	< 4.3	< 2.6	< 2.7	< 3.1	< 4.7	< 2.9	< 2.5	< 3.7
CAWW- 7520	12/10/2013	< 150	< 3.8	< 5.2	< 2.2	< 1.8	< 5.8	< 2.2	< 3.3	< 2.9	< 1.8
<u>Location: CA-WWA-939R</u>											
CAWW- 277	1/17/2013	160 ± 78	< 1.7	< 3.8	< 2.9	< 2.6	< 5.0	< 2.9	< 2.8	< 3.0	< 4.1
CAWW- 572	2/7/2013	< 134	< 2.4	< 5.1	< 2.6	< 1.8	< 2.4	< 4.0	< 2.4	< 2.8	< 8.6
CAWW- 1231	3/15/2013	226 ± 88	< 2.5	< 4.8	< 3.0	< 2.8	< 3.2	< 3.1	< 2.7	< 2.8	< 3.5
CAWW- 2403	4/9/2013	223 ± 83	< 0.7	< 3.2	< 1.4	< 1.2	< 2.6	< 2.1	< 1.1	< 1.3	< 5.9
CAWW- 2595	5/8/2013	567 ± 94	< 1.8	< 2.9	< 2.9	< 2.0	< 2.7	< 3.5	< 1.6	< 2.4	< 4.9
CAWW- 3222	6/7/2013	540 ± 97	< 5.8	< 7.3	< 3.4	< 4.9	< 3.0	< 6.8	< 4.4	< 5.4	< 10.3
CAWW- 3952	7/11/2013	399 ± 101	< 1.4	< 3.8	< 3.1	< 2.3	< 4.7	< 3.1	< 2.0	< 3.2	< 5.6
CAWW- 4874	8/14/2013	328 ± 92	< 4.5	< 9.9	< 2.2	< 3.1	< 7.6	< 6.2	< 3.7	< 4.3	< 4.7
CAWW- 5454	9/12/2013	314 ± 87	< 4.1	< 3.8	< 4.5	< 1.7	< 3.1	< 5.1	< 4.5	< 6.3	< 3.4
CAWW- 6475	10/15/2013	199 ± 84	< 2.8	< 7.3	< 2.9	< 3.3	< 4.7	< 2.7	< 3.0	< 3.5	< 4.3
CAWW- 7090	11/18/2013	322 ± 88	< 3.8	< 5.4	< 1.7	< 3.0	< 4.6	< 3.6	< 2.8	< 3.7	< 3.9
CAWW- 7586	12/17/2013	251 ± 85	< 1.9	< 4.2	< 1.9	< 1.8	< 6.3	< 2.6	< 3.5	< 2.9	< 3.3

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

Lab Code	Collection Date	Concentration (pCi/L)									
		<sup>3</sup> H	<sup>54</sup> Mn	<sup>59</sup> Fe	<sup>58</sup> Co	<sup>60</sup> Co	<sup>65</sup> Zn	<sup>95</sup> ZrNb	<sup>134</sup> Cs	<sup>137</sup> Cs	<sup>140</sup> BaLa
<u>Location: CA-WWA-940</u>											
CAWW- 279	1/16/2013	< 140	< 2.2	< 5.1	< 2.3	< 2.3	< 3.9	< 4.6	< 3.0	< 2.8	< 6.6
CAWW- 573	2/7/2013	< 134	< 2.2	< 5.9	< 2.2	< 2.6	< 4.7	< 3.0	< 2.3	< 3.2	< 4.7
CAWW- 1232	3/15/2013	< 147	< 1.7	< 6.4	< 3.4	< 2.4	< 2.8	< 1.8	< 2.3	< 3.2	< 6.9
CAWW- 2404	4/10/2013	< 143	< 1.1	< 3.5	< 1.8	< 1.0	< 2.4	< 2.1	< 0.9	< 1.3	< 11.8
CAWW- 2596	5/8/2013	< 140	< 1.3	< 3.6	< 1.7	< 1.7	< 2.1	< 2.5	< 1.7	< 2.5	< 3.0
CAWW- 3223	6/7/2013	< 148	< 3.6	< 4.2	< 2.4	< 2.0	< 3.7	< 3.7	< 3.0	< 4.2	< 7.5
CAWW- 3953	7/11/2013	< 159	< 1.8	< 5.4	< 2.2	< 2.0	< 4.0	< 3.3	< 2.3	< 3.4	< 5.0
CAWW- 4875	8/14/2013	173 ± 81	< 3.2	< 4.9	< 1.6	< 2.4	< 3.9	< 2.2	< 2.6	< 3.5	< 4.3
CAWW- 5390	9/10/2013	< 151	< 3.9	< 5.0	< 5.1	< 4.3	< 4.6	< 3.0	< 3.4	< 5.3	< 5.7
CAWW- 6212	10/10/2013	< 154	< 2.0	< 5.1	< 2.0	< 2.2	< 1.7	< 3.8	< 2.3	< 2.4	< 6.0
CAWW- 7042	11/12/2013	< 149	< 1.9	< 3.1	< 1.3	< 1.7	< 3.2	< 2.3	< 1.9	< 1.7	< 3.0
CAWW- 7521	12/10/2013	< 150	< 1.6	< 1.8	< 1.8	< 0.7	< 3.3	< 1.3	< 1.6	< 1.6	< 2.4
<u>Location: CA-WWA-941</u>											
CAWW- 280	1/16/2013	< 140	< 2.4	< 5.7	< 3.3	< 1.8	< 3.5	< 2.8	< 2.3	< 3.3	< 8.3
CAWW- 574	2/7/2013	< 134	< 4.2	< 8.4	< 2.8	< 3.3	< 5.1	< 4.5	< 4.4	< 3.1	< 7.9
CAWW- 1233	3/15/2013	< 147	< 2.8	< 4.9	< 3.0	< 1.8	< 2.5	< 2.1	< 2.0	< 3.3	< 6.1
CAWW- 2405	4/9/2013	< 137	< 1.2	< 2.4	< 1.0	< 1.2	< 1.4	< 2.8	< 0.9	< 1.3	< 12.3
CAWW- 2597	5/8/2013	< 140	< 1.3	< 3.0	< 2.7	< 1.7	< 3.1	< 3.2	< 2.0	< 1.4	< 4.6
CAWW- 3224	6/6/2013	< 148	< 2.8	< 4.7	< 2.2	< 2.3	< 3.1	< 2.3	< 1.7	< 2.2	< 6.8
CAWW- 3954	7/11/2013	< 159	< 2.0	< 5.4	< 2.1	< 2.3	< 3.1	< 4.7	< 2.2	< 3.2	< 3.6
CAWW- 4876	8/14/2013	< 145	< 2.4	< 3.6	< 2.5	< 2.5	< 2.9	< 3.2	< 2.1	< 2.4	< 6.6
CAWW- 5391	9/10/2013	< 151	< 4.7	< 3.8	< 5.1	< 3.5	< 10.7	< 5.4	< 4.2	< 6.0	< 3.5
CAWW- 6213	10/9/2013	< 154	< 2.1	< 6.6	< 2.7	< 2.2	< 3.1	< 3.0	< 2.2	< 2.5	< 6.8
CAWW- 7043	11/12/2013	< 149	< 3.8	< 5.8	< 3.3	< 3.8	< 6.6	< 4.8	< 3.5	< 3.3	< 6.9
CAWW- 7522	12/10/2013	< 150	< 3.9	< 7.1	< 2.5	< 4.0	< 11.0	< 6.7	< 4.1	< 3.5	< 3.6
<u>Location: CA-WWA-GWS</u>											
CAWW- 275	1/17/2013	< 140	< 1.7	< 5.1	< 1.5	< 2.5	< 4.1	< 3.4	< 2.3	< 2.3	< 9.2
CAWW- 570	2/7/2013	< 140	< 1.9	< 6.0	< 3.4	< 2.4	< 4.7	< 4.1	< 3.3	< 2.7	< 6.6
CAWW- 1229	3/15/2013	179 ± 86	< 3.4	< 5.4	< 2.9	< 3.0	< 2.7	< 4.5	< 3.3	< 2.1	< 6.1
CAWW- 2406	4/9/2013	238 ± 84	< 2.2	< 5.1	< 2.5	< 1.6	< 2.9	< 5.4	< 1.9	< 2.8	< 9.1
CAWW- 2598	5/7/2013	363 ± 85	< 1.7	< 6.7	< 2.1	< 2.5	< 3.2	< 2.0	< 1.3	< 2.1	< 5.0
CAWW- 3225	6/6/2013	339 ± 89	< 1.5	< 4.5	< 2.7	< 1.5	< 3.0	< 4.0	< 1.8	< 2.5	< 6.0
CAWW- 3955	7/9/2013	273 ± 96	< 1.9	< 3.7	< 2.9	< 2.0	< 4.1	< 3.9	< 1.9	< 2.8	< 7.1
CAWW- 4877	8/14/2013	217 ± 88	< 3.3	< 7.5	< 3.4	< 2.7	< 3.8	< 4.6	< 3.2	< 4.5	< 4.5
CAWW- 5455	9/12/2013	157 ± 79	< 3.6	< 6.9	< 4.7	< 4.5	< 7.1	< 5.2	< 3.1	< 4.4	< 5.8
CAWW- 6214	10/9/2013	< 154	< 1.3	< 4.1	< 1.2	< 1.3	< 2.9	< 2.2	< 1.3	< 1.5	< 6.7
CAWW- 7091	11/18/2013	< 149	< 2.5	< 3.9	< 1.6	< 2.1	< 5.3	< 2.3	< 2.7	< 2.8	< 1.8
CAWW- 7587	12/17/2013	151 ± 80	< 1.7	< 4.1	< 2.7	< 1.7	< 3.6	< 2.2	< 2.8	< 3.1	< 2.1

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

Lab Code	Collection Date	Concentration (pCi/L)									
		<sup>3</sup> H	<sup>54</sup> Mn	<sup>59</sup> Fe	<sup>58</sup> Co	<sup>60</sup> Co	<sup>65</sup> Zn	<sup>95</sup> ZrNb	<sup>134</sup> Cs	<sup>137</sup> Cs	<sup>140</sup> BaLa
<u>Location: CA-WWA-OW-4</u>											
CAWW- 281	1/16/2013	262 ± 86	< 2.5	< 7.8	< 2.4	< 2.5	< 3.7	< 4.3	< 1.7	< 2.2	< 5.0
CAWW- 2407	4/18/2013	< 143	< 2.5	< 7.3	< 3.5	< 1.5	< 3.2	< 3.0	< 2.4	< 2.0	< 5.8
CAWW- 4239	7/23/2013	224 ± 93	< 3.4	< 4.3	< 3.9	< 3.6	< 10.3	< 3.3	< 4.3	< 2.7	< 6.3
CAWW- 6479	10/16/2013	235 ± 85	< 2.2	< 6.5	< 2.4	< 1.5	< 6.8	< 3.9	< 2.7	< 3.5	< 7.1
<u>Location: CA-WWA-OW-5</u>											
CAWW- 282	1/15/2013	361 ± 90	< 2.7	< 5.7	< 2.7	< 2.8	< 3.4	< 3.8	< 3.2	< 3.4	< 9.8
CAWW- 2408	4/17/2013	397 ± 90	< 1.8	< 6.9	< 3.1	< 2.7	< 5.9	< 5.8	< 2.0	< 2.2	< 12.0
CAWW- 4241	7/23/2013	306 ± 96	< 4.5	< 5.6	< 2.8	< 2.8	< 4.9	< 3.5	< 4.0	< 4.0	< 5.3
CAWW- 6480	10/15/2013	296 ± 88	< 3.0	< 4.9	< 1.8	< 2.1	< 3.9	< 4.7	< 2.9	< 3.4	< 8.8
<u>Location: CA-WWA-U1MW-001</u>											
CAWW- 283	1/9/2013	< 139	< 2.2	< 6.3	< 3.1	< 1.5	< 2.0	< 3.9	< 1.8	< 2.1	< 9.5
CAWW- 2409	4/1/2013	< 137	< 1.7	< 5.2	< 1.7	< 1.9	< 3.0	< 3.8	< 1.4	< 1.7	< 8.7
CAWW- 4146	7/17/2013	< 165	< 2.8	< 3.2	< 3.1	< 2.2	< 2.4	< 4.6	< 3.0	< 2.5	< 5.7
CAWW- 6476	10/14/2013	< 148	< 3.4	< 8.0	< 2.2	< 2.0	< 2.5	< 3.5	< 2.9	< 2.2	< 11.9
<u>Location: CA-WWA-U1MW-002</u>											
CAWW- 284	1/14/2013	< 139	< 3.1	< 6.4	< 2.8	< 2.7	< 2.9	< 6.4	< 3.3	< 3.9	< 7.1
CAWW- 2410	4/22/2013	< 136	< 2.4	< 4.4	< 4.4	< 3.0	< 3.9	< 6.1	< 3.9	< 2.8	< 11.0
CAWW- 3834	7/8/2013	< 150	< 2.5	< 4.8	< 2.5	< 3.2	< 2.8	< 4.0	< 2.7	< 2.8	< 4.8
CAWW- 6110	10/7/2013	< 151	< 4.6	< 8.3	< 3.1	< 2.8	< 8.1	< 6.7	< 3.8	< 4.8	< 6.0
<u>Location: CA-WWA-U1MW-004</u>											
CAWW- 285	1/7/2013	< 139	< 3.1	< 6.8	< 1.7	< 1.9	< 5.4	< 4.8	< 1.9	< 2.9	< 3.6
CAWW- 2411	4/2/2013	< 137	< 1.2	< 3.5	< 1.4	< 1.4	< 3.1	< 3.5	< 1.2	< 1.5	< 14.3
CAWW- 4011	7/12/2013	< 161	< 2.8	< 6.0	< 2.4	< 1.8	< 2.6	< 4.3	< 2.3	< 3.1	< 3.2
CAWW- 6215	10/8/2013	< 154	< 7.4	< 7.9	< 4.2	< 4.4	< 4.9	< 7.0	< 6.4	< 4.6	< 7.8
<u>Location: CA-WWA-U1MW-005</u>											
CAWW- 286	1/9/2013	< 139	< 3.3	< 7.8	< 1.8	< 2.9	< 6.5	< 4.1	< 2.7	< 3.5	< 6.0
CAWW- 2412	4/2/2013	< 137	< 1.1	< 4.0	< 1.5	< 1.4	< 2.2	< 2.5	< 0.9	< 1.1	< 6.2
CAWW- 4012	7/12/2013	< 161	< 3.1	< 3.8	< 2.0	< 2.1	< 2.3	< 3.6	< 2.6	< 3.1	< 5.1
CAWW- 6216	10/8/2013	< 154	< 1.0	< 3.5	< 1.4	< 0.9	< 2.5	< 2.1	< 1.2	< 1.4	< 4.1
<u>Location: CA-WWA-U1MW-006</u>											
CAWW- 287	1/9/2013	< 139	< 2.3	< 3.6	< 2.3	< 2.3	< 6.4	< 4.2	< 3.2	< 2.5	< 13.4
CAWW- 2413	4/24/2013	< 136	< 3.2	< 5.4	< 3.4	< 2.9	< 4.6	< 3.6	< 3.1	< 2.9	< 8.7
CAWW- 4243	7/23/2013	< 157	< 2.7	< 8.5	< 2.9	< 4.5	< 5.7	< 4.2	< 2.9	< 4.8	< 3.6
CAWW- 6477	10/14/2013	< 148	< 1.0	< 3.3	< 1.6	< 1.4	< 2.1	< 2.2	< 1.3	< 1.3	< 5.7

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

Lab Code	Collection Date	Concentration (pCi/L)									
		<sup>3</sup> H	<sup>54</sup> Mn	<sup>59</sup> Fe	<sup>58</sup> Co	<sup>60</sup> Co	<sup>65</sup> Zn	<sup>95</sup> ZrNb	<sup>134</sup> Cs	<sup>137</sup> Cs	<sup>140</sup> BaLa
<u>Location: CA-WWA-U1MW-010</u>											
CAWW- 288	1/8/2013	< 139	< 2.6	< 4.0	< 1.5	< 2.8	< 2.4	< 4.1	< 1.8	< 2.3	< 8.2
CAWW- 2414	4/4/2013	< 137	< 1.1	< 2.4	< 2.0	< 1.4	< 2.0	< 3.3	< 1.1	< 1.5	< 11.8
CAWW- 4153	7/18/2013	< 165	< 2.1	< 4.1	< 3.8	< 1.8	< 5.1	< 3.5	< 3.3	< 2.6	< 5.2
CAWW- 6586	10/22/2013	< 149	< 5.0	< 5.2	< 3.5	< 2.2	< 4.2	< 3.2	< 5.4	< 3.3	< 7.5
<u>Location: CA-WWA-U1MW-012</u>											
CAWW- 289	1/9/2013	< 139	< 2.3	< 4.5	< 3.2	< 2.1	< 4.1	< 4.1	< 2.5	< 2.8	< 9.6
CAWW- 2415	4/24/2013	< 136	< 2.0	< 4.5	< 2.7	< 1.9	< 3.9	< 3.9	< 2.6	< 2.4	< 4.9
CAWW- 4244	7/23/2013	< 157	< 5.7	< 6.6	< 4.9	< 1.5	< 3.8	< 5.3	< 3.2	< 5.3	< 7.9
CAWW- 6504	10/17/2013	< 148	< 1.3	< 6.0	< 2.1	< 1.5	< 3.1	< 4.6	< 2.4	< 2.6	< 9.3
<u>Location: CA-WWA-U1MW-013</u>											
CAWW- 290	1/8/2013	< 139	< 1.8	< 4.0	< 3.3	< 2.9	< 5.9	< 4.0	< 2.5	< 2.4	< 12.8
CAWW- 2417	4/2/2013	< 137	< 1.9	< 4.5	< 2.4	< 1.8	< 3.1	< 3.6	< 1.7	< 1.7	< 9.5
CAWW- 4147	7/17/2013	< 165	< 3.5	< 4.4	< 1.6	< 2.8	< 3.0	< 3.5	< 2.7	< 3.2	< 7.3
CAWW- 6478	10/15/2013	< 148	< 1.6	< 4.0	< 3.5	< 1.3	< 3.6	< 4.3	< 3.0	< 3.4	< 13.2
<u>Location: CA-WWA-U1MW-014</u>											
CAWW- 291	1/8/2013	377 ± 91	< 2.6	< 6.2	< 1.9	< 1.8	< 3.9	< 4.1	< 2.3	< 2.1	< 9.6
CAWW- 2418	4/4/2013	244 ± 84	< 1.3	< 4.0	< 1.3	< 1.2	< 2.5	< 2.7	< 1.1	< 1.3	< 5.5
CAWW- 3835	7/9/2013	< 150	< 2.5	< 7.0	< 3.1	< 1.2	< 6.2	< 3.5	< 2.3	< 3.1	< 5.3
CAWW- 6114	10/7/2013	< 151	< 3.0	< 7.5	< 3.9	< 3.1	< 2.2	< 2.7	< 2.9	< 4.3	< 3.7
<u>Location: CA-WWA-U1MW-015</u>											
CAWW- 292	1/7/2013	< 139	< 2.3	< 7.0	< 2.3	< 1.8	< 3.9	< 3.3	< 2.2	< 2.6	< 7.1
CAWW- 2419	4/8/2013	< 137	< 1.7	< 7.5	< 2.8	< 3.5	< 5.2	< 4.1	< 2.5	< 3.3	< 8.8
CAWW- 4148	7/17/2013	< 165	< 3.3	< 6.4	< 3.4	< 2.8	< 5.0	< 3.0	< 3.6	< 3.8	< 5.9
CAWW- 6217	10/11/2013	< 154	< 1.5	< 2.2	< 1.1	< 1.3	< 2.0	< 2.0	< 1.2	< 1.4	< 8.0
<u>Location: CA-WWA-U1MW-016</u>											
CAWW- 293	1/7/2013	< 139	< 1.8	< 5.1	< 2.1	< 1.7	< 3.1	< 1.7	< 1.7	< 2.0	< 7.5
CAWW- 2420	4/2/2013	< 137	< 1.2	< 2.9	< 1.5	< 1.2	< 2.4	< 1.6	< 1.0	< 1.3	< 6.0
CAWW- 4006	7/10/2013	< 161	< 1.4	< 4.5	< 2.6	< 1.7	< 2.8	< 3.8	< 1.6	< 2.9	< 3.2
CAWW- 6218	10/8/2013	< 154	< 2.7	< 6.0	< 3.0	< 1.4	< 2.6	< 4.4	< 3.1	< 2.8	< 5.3
<u>Location: CA-WWA-U1MW-017</u>											
CAWW- 294	1/8/2013	< 139	< 2.3	< 7.9	< 2.8	< 2.5	< 5.7	< 4.0	< 2.3	< 2.8	< 11.1
CAWW- 2421	4/4/2013	< 137	< 1.1	< 3.4	< 1.7	< 1.1	< 2.0	< 3.3	< 1.1	< 1.3	< 6.0
CAWW- 4149	7/17/2013	< 165	< 3.0	< 3.9	< 2.3	< 2.4	< 3.4	< 3.1	< 2.2	< 3.0	< 4.1
CAWW- 6112	10/7/2013	< 151	< 3.6	< 5.3	< 3.0	< 3.7	< 4.8	< 3.6	< 3.0	< 4.5	< 3.4
<u>Location: CA-WWA-U1MW-18</u>											
CAWW- 295	1/8/2013	< 139	< 1.9	< 6.5	< 2.3	< 2.2	< 4.8	< 4.1	< 2.4	< 3.1	< 8.2
CAWW- 2422	4/4/2013	202 ± 82	< 1.0	< 3.8	< 1.4	< 1.2	< 1.8	< 3.2	< 0.8	< 1.3	< 10.4
CAWW- 4150	7/17/2013	211 ± 108	< 2.6	< 5.0	< 1.6	< 2.1	< 2.6	< 4.7	< 2.8	< 2.4	< 2.7
CAWW- 6113	10/7/2013	< 151	< 3.1	< 3.8	< 3.0	< 2.9	< 4.3	< 3.1	< 2.8	< 4.5	< 3.9



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

Lab Code	Collection Date	Concentration (pCi/L)									
		<sup>3</sup> H	<sup>54</sup> Mn	<sup>59</sup> Fe	<sup>58</sup> Co	<sup>60</sup> Co	<sup>65</sup> Zn	<sup>95</sup> ZrNb	<sup>134</sup> Cs	<sup>137</sup> Cs	<sup>140</sup> BaLa
<u>Location: CA-WWA-U1MW-19</u>											
CAWW- 296	1/8/2013	299 ± 86	< 2.7	< 5.9	< 3.1	< 2.2	< 1.9	< 4.5	< 2.0	< 2.6	< 7.3
CAWW- 2423	4/29/2013	332 ± 87	< 2.2	< 5.8	< 1.5	< 2.1	< 2.6	< 3.5	< 1.9	< 2.7	< 3.1
CAWW- 4145	7/16/2013	183 ± 107	< 2.1	< 3.9	< 2.3	< 2.7	< 4.5	< 3.5	< 3.0	< 3.6	< 4.7
CAWW- 6219	10/11/2013	455 ± 112	< 1.4	< 6.9	< 3.0	< 2.1	< 1.9	< 3.2	< 2.7	< 2.9	< 4.7
<u>Location: CA-WWA-U1MW-20</u>											
CAWW- 297	1/23/2013	< 144	< 2.3	< 6.8	< 2.8	< 2.5	< 4.7	< 4.1	< 2.3	< 1.7	< 6.4
CAWW- 2424	4/26/2013	< 143	< 3.5	< 4.0	< 4.3	< 2.1	< 6.1	< 5.0	< 3.0	< 4.7	< 10.1
CAWW- 4013	7/12/2013	< 161	< 2.6	< 5.8	< 2.6	< 2.2	< 3.9	< 2.6	< 1.9	< 2.4	< 4.1
CAWW- 6505	10/18/2013	< 148	< 2.5	< 4.0	< 2.0	< 1.3	< 3.8	< 3.2	< 2.4	< 2.7	< 5.3
<u>Location: CA-WWA-U1MW-021</u>											
CAWW- 298	1/8/2013	< 144	< 2.1	< 7.4	< 1.7	< 2.2	< 4.2	< 4.6	< 2.5	< 2.8	< 6.7
CAWW- 2425	4/29/2013	< 143	< 3.3	< 6.6	< 3.8	< 2.9	< 4.5	< 4.6	< 3.1	< 2.2	< 9.0
CAWW- 4014	7/16/2013	< 161	< 1.8	< 5.4	< 1.9	< 2.5	< 3.6	< 4.2	< 3.3	< 3.5	< 5.7
CAWW- 6221	10/11/2013	< 154	< 1.8	< 4.3	< 1.2	< 1.3	< 3.8	< 2.9	< 1.8	< 1.9	< 6.1
<u>Location: CA-WWA-U1MW-022</u>											
CAWW- 300	1/8/2013	< 144	< 2.4	< 4.4	< 1.9	< 2.3	< 2.9	< 3.6	< 2.4	< 1.6	< 8.6
CAWW- 2426	4/5/2013	< 143	< 1.4	< 3.5	< 1.8	< 1.0	< 2.2	< 3.2	< 1.2	< 1.3	< 10.7
CAWW- 4015	7/16/2013	< 161	< 3.1	< 7.4	< 4.9	< 2.9	< 6.4	< 5.4	< 3.0	< 2.2	< 5.7
CAWW- 6222	10/11/2013	< 154	< 1.2	< 4.0	< 1.7	< 1.4	< 2.8	< 1.6	< 1.3	< 1.0	< 6.2
<u>Location: CA-WWA-U1MW-023</u>											
CAWW- 301	1/21/2013	< 144	< 2.4	< 3.4	< 2.1	< 2.2	< 1.3	< 3.1	< 2.3	< 3.1	< 4.7
CAWW- 2427	4/30/2013	< 143	< 2.8	< 5.0	< 3.1	< 2.2	< 6.1	< 2.9	< 3.3	< 3.7	< 9.2
CAWW- 4007	7/12/2013	< 161	< 3.1	< 4.8	< 2.4	< 2.3	< 4.7	< 4.3	< 3.6	< 3.9	< 6.8
CAWW- 6506	10/18/2013	< 148	< 2.1	< 4.6	< 3.5	< 2.5	< 4.9	< 3.8	< 2.9	< 3.0	< 7.3
<u>Location: CA-WWA-U1MW-024</u>											
CAWW- 302	1/21/2013	< 144	< 2.6	< 6.9	< 3.1	< 2.2	< 2.8	< 5.4	< 2.4	< 2.7	< 5.2
CAWW- 2428	4/30/2013	< 143	< 1.9	< 3.2	< 2.7	< 2.3	< 4.0	< 3.2	< 2.0	< 2.7	< 4.9
CAWW- 4008	7/12/2013	< 161	< 2.3	< 4.9	< 3.4	< 2.6	< 5.1	< 2.7	< 3.2	< 2.1	< 7.0
CAWW- 6507	10/18/2013	< 148	< 2.1	< 7.7	< 2.2	< 2.1	< 5.0	< 3.3	< 2.5	< 2.5	< 7.0
<u>Location: CA-WWA-U1MW-025</u>											
CAWW- 303	1/21/2013	< 144	< 2.6	< 6.4	< 2.4	< 2.4	< 4.6	< 4.5	< 3.5	< 3.2	< 7.0
CAWW- 2429	4/30/2013	< 143	< 1.7	< 3.6	< 2.6	< 1.9	< 4.1	< 3.2	< 2.1	< 2.6	< 5.6
CAWW- 4010	7/12/2013	< 161	< 1.0	< 5.3	< 2.6	< 1.2	< 5.7	< 4.8	< 3.0	< 3.0	< 2.8
CAWW- 6508	10/18/2013	< 148	< 2.7	< 7.8	< 3.1	< 1.3	< 3.4	< 2.7	< 2.8	< 4.3	< 4.3

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

Lab Code	Collection Date	Concentration (pCi/L)									
		<sup>3</sup> H	<sup>54</sup> Mn	<sup>59</sup> Fe	<sup>58</sup> Co	<sup>60</sup> Co	<sup>65</sup> Zn	<sup>95</sup> ZrNb	<sup>134</sup> Cs	<sup>137</sup> Cs	<sup>140</sup> BaLa
<u>Location: CA-WWA-U1MW-26</u>											
CAWW- 304	1/23/2013	< 144	< 2.8	< 8.9	< 3.8	< 3.9	< 7.2	< 3.7	< 2.9	< 4.4	< 7.4
CAWW- 2430	4/30/2013	< 143	< 2.8	< 4.4	< 2.8	< 1.6	< 2.7	< 3.6	< 1.9	< 2.7	< 3.2
CAWW- 4151	7/18/2013	< 165	< 2.1	< 4.8	< 2.4	< 2.1	< 4.5	< 4.6	< 2.8	< 2.5	< 6.3
CAWW- 6509	10/18/2013	< 148	< 2.4	< 5.0	< 2.6	< 2.0	< 3.4	< 3.7	< 2.1	< 2.2	< 6.5
<u>Location: CA-WWA-U1MW-27</u>											
CAWW- 305	1/9/2013	< 144	< 2.9	< 6.9	< 3.5	< 2.7	< 3.8	< 4.9	< 2.3	< 2.8	< 8.5
CAWW- 2431	4/4/2013	< 143	< 0.8	< 4.8	< 1.0	< 1.1	< 1.2	< 2.6	< 1.1	< 1.4	< 6.7
CAWW- 4154	7/18/2013	< 165	< 3.3	< 5.9	< 2.8	< 3.1	< 5.3	< 5.4	< 3.2	< 4.0	< 3.5
CAWW- 6587	10/22/2013	< 149	< 5.4	< 7.0	< 4.4	< 3.5	< 3.6	< 5.7	< 6.9	< 5.3	< 4.0
<u>Location: CA-WWA-U1MW-28</u>											
CAWW- 2432	4/22/2013	< 143	< 1.8	NS <sup>a</sup>	< 1.3	< 1.2	< 1.7	< 2.6	< 1.6	< 1.8	< 8.1
				NS <sup>a</sup>							
				NS <sup>a</sup>							
<u>Location: CA-WWA-U1MW-29</u>											
CAWW- 306	1/14/2013	< 144	< 2.4	< 8.7	< 2.5	< 3.0	< 4.6	< 5.0	< 3.2	< 3.3	< 5.3
CAWW- 2433	4/3/2013	< 144	< 2.2	< 4.6	< 3.1	< 2.0	< 3.5	< 6.0	< 1.7	< 2.4	< 11.7
CAWW- 4238	7/22/2013	< 157	< 2.9	< 5.1	< 4.5	< 3.0	< 2.5	< 4.6	< 3.1	< 4.3	< 4.5
CAWW- 6588	10/23/2013	< 149	< 3.8	< 5.0	< 3.0	< 3.9	< 3.9	< 5.2	< 3.9	< 3.3	< 6.8
<u>Location: CA-WWA-U1MW-30</u>											
CAWW- 307	1/11/2013	< 144	< 1.8	< 3.9	< 1.7	< 2.3	< 5.2	< 2.8	< 2.8	< 2.7	< 5.9
CAWW- 2434	4/1/2013	< 144	< 1.0	< 2.0	< 1.3	< 1.2	< 2.2	< 2.4	< 0.8	< 1.4	< 8.4
CAWW- 4016	7/16/2013	< 161	< 3.6	< 6.4	< 2.9	< 2.3	< 4.1	< 3.9	< 3.0	< 3.7	< 7.6
CAWW- 6589	10/23/2013	< 149	< 3.7	< 9.5	< 5.4	< 3.2	< 6.6	< 4.6	< 6.0	< 4.7	< 7.1
<u>Location: CA-WWA-U2MW-2S</u>											
CAWW- 308	1/10/2013	< 144	< 2.0	< 6.7	< 2.7	< 2.6	< 4.5	< 4.1	< 2.6	< 2.8	< 6.6
CAWW- 2435	4/3/2013	< 144	< 0.7	< 2.2	< 1.6	< 1.0	< 2.1	< 2.1	< 1.1	< 1.0	< 9.2
CAWW- 3836	7/8/2013	< 150	< 1.9	< 2.0	< 1.2	< 1.3	< 3.0	< 1.5	< 1.7	< 1.4	< 2.6
CAWW- 6481	10/14/2013	< 148	< 2.9	< 8.2	< 2.6	< 1.9	< 5.1	< 4.2	< 2.9	< 1.6	< 9.9
<u>Location: CA-WWA-U2MW-5S</u>											
CAWW- 309	1/10/2013	< 144	< 1.6	< 4.8	< 3.1	< 2.1	< 3.9	< 2.8	< 2.5	< 2.2	< 6.9
CAWW- 2436	4/2/2013	< 144	< 0.7	< 3.5	< 1.6	< 1.2	< 2.0	< 2.8	< 0.9	< 1.2	< 6.9
CAWW- 4004	7/10/2013	< 161	< 2.8	< 5.2	< 1.4	< 1.6	< 4.9	< 3.7	< 2.2	< 2.8	< 3.2
CAWW- 6109	10/7/2013	< 151	< 3.4	< 7.0	< 2.3	< 3.4	< 8.0	< 4.6	< 3.0	< 4.4	< 3.7
<u>Location: CA-WWA-U2MW-8</u>											
CAWW- 310	1/10/2013	< 144	< 2.3	< 7.5	< 2.9	< 2.9	< 3.7	< 3.4	< 1.6	< 1.9	< 3.4
CAWW- 2438	4/3/2013	< 144	< 1.0	< 2.1	< 1.4	< 1.0	< 2.2	< 2.4	< 1.0	< 1.4	< 14.0
CAWW- 3837	7/8/2013	< 150	< 1.7	< 5.0	< 2.8	< 2.2	< 3.2	< 4.2	< 2.3	< 3.6	< 4.0
CAWW- 6590	10/23/2013	< 149	< 2.3	< 3.8	< 2.0	< 1.4	< 4.3	< 3.0	< 2.4	< 3.0	< 4.6

<sup>a</sup> NS = No sample; refer to Part I, Table 5.5, Missed Collections and Analyses.

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

Lab Code	Collection Date	Concentration (pCi/L)									
		<sup>3</sup> H	<sup>54</sup> Mn	<sup>59</sup> Fe	<sup>58</sup> Co	<sup>60</sup> Co	<sup>65</sup> Zn	<sup>95</sup> ZrNb	<sup>134</sup> Cs	<sup>137</sup> Cs	<sup>140</sup> BaLa
<u>Location: CA-WWA-U2MW-9</u>											
CAWW- 311	1/11/2013	< 144	< 2.1	< 7.6	< 2.0	< 2.1	< 2.0	< 2.6	< 2.2	< 2.6	< 3.0
CAWW- 2439	4/5/2013	< 143	< 2.5	< 9.3	< 2.9	< 2.0	< 3.8	< 3.8	< 2.2	< 3.0	< 12.4
CAWW- 4237	7/22/2013	< 157	< 2.2	< 5.1	< 4.3	< 2.9	< 5.5	< 4.4	< 2.6	< 4.7	< 4.8
CAWW- 6591	10/23/2013	< 149	< 1.7	< 5.9	< 2.3	< 1.6	< 4.5	< 2.9	< 2.1	< 2.3	< 4.8
<u>Location: CA-WWA-U2MW-10</u>											
CAWW- 312	1/8/2013	< 144	< 1.7	< 5.9	< 1.8	< 2.4	< 3.3	< 2.8	< 2.2	< 1.8	< 6.6
CAWW- 2440	4/5/2013	< 143	< 1.1	< 3.7	< 1.2	< 1.2	< 2.6	< 1.9	< 1.0	< 1.2	< 5.7
CAWW- 4152	7/18/2013	< 165	< 3.3	< 6.2	< 3.2	< 2.8	< 3.5	< 5.8	< 4.0	< 3.0	< 6.7
CAWW- 6482	10/16/2013	< 148	< 1.9	< 6.3	< 3.0	< 1.4	< 2.6	< 2.9	< 2.5	< 2.5	< 4.8
<u>Location: CA-WWA-U2MW-12</u>											
CAWW- 313	1/8/2013	< 144	< 1.7	< 4.9	< 3.1	< 2.1	< 3.5	< 3.9	< 2.4	< 2.6	< 6.7
CAWW- 2441	4/3/2013	< 144	< 1.0	< 3.2	< 1.6	< 1.0	< 1.1	< 2.6	< 1.1	< 1.4	< 13.9
CAWW- 3838	7/8/2013	< 150	< 3.6	< 2.4	< 2.3	< 2.4	< 5.7	< 4.5	< 2.1	< 2.3	< 5.7
CAWW- 6483	10/14/2013	< 148	< 2.0	< 3.9	< 2.1	< 1.3	< 3.2	< 4.1	< 2.6	< 3.3	< 10.3
<u>Location: CA-WWA-U2MW-16</u>											
CAWW- 314	1/7/2013	< 144	< 1.6	< 3.3	< 2.3	< 2.4	< 3.1	< 2.2	< 2.0	< 2.3	< 4.4
CAWW- 2442	4/2/2013	< 144	< 1.2	< 2.4	< 1.8	< 1.0	< 1.9	< 2.0	< 1.0	< 1.2	< 10.3
CAWW- 4005	7/10/2013	< 161	< 1.5	< 4.4	< 2.5	< 1.6	< 4.6	< 3.3	< 2.2	< 3.4	< 3.5
CAWW- 6111	10/7/2013	< 151	< 4.9	< 7.1	< 4.4	< 3.7	< 5.7	< 5.0	< 4.5	< 4.7	< 4.3
<u>Location: CA-WWA-F-005</u>											
CAWW- 154	1/9/2013	< 141	< 3.4	< 6.1	< 2.8	< 2.1	< 5.0	< 4.3	< 3.8	< 2.8	< 6.7
CAWW- 1451	4/1/2013	< 150	< 5.7	< 12.2	< 3.9	< 1.8	< 7.8	< 4.2	< 4.4	< 5.3	< 10.8
CAWW- 4017	7/15/2013	< 161	< 2.6	< 4.2	< 1.9	< 2.6	< 2.6	< 2.3	< 1.9	< 3.1	< 6.1
CAWW- 6083	10/4/2013	< 152	< 2.0	< 6.2	< 2.8	< 1.8	< 2.3	< 3.2	< 2.4	< 1.9	< 13.1
<u>Location: CA-WWA-F-015</u>											
CAWW- 155	1/9/2013	< 141	< 2.3	< 6.6	< 2.3	< 1.2	< 4.0	< 3.4	< 3.4	< 4.1	< 4.2
CAWW- 1452	4/1/2013	< 150	< 2.4	< 3.3	< 2.9	< 2.6	< 4.7	< 3.0	< 2.4	< 2.5	< 3.3
CAWW- 4018	7/15/2013	< 161	< 2.9	< 4.6	< 4.5	< 2.0	< 3.8	< 5.0	< 2.8	< 4.0	< 4.9
CAWW- 6084	10/4/2013	< 152	< 1.8	< 4.9	< 2.2	< 1.7	< 2.4	< 2.4	< 1.7	< 1.9	< 10.7

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

Collection: Semiannually  
Units: pCi/kg dry

Location		CA-AQS-A	
Lab Code	Req. LLD	CABS- 2266	CABS- 5963
Date Collected	-	05-01-13	10-03-13
K-40	-	12868 ± 598	12600 ± 650
Mn-54	-	< 22.7	< 18.3
Fe-59	-	< 45.6	< 42.1
Co-58	-	< 17.6	< 17.4
Co-60	-	< 11.1	< 9.4
Zr-Nb-95	-	< 25.2	< 15.2
Cs-134	150	< 15.2	< 15.3
Cs-137	180	< 16.4	30.2 ± 17.0
Ba-La-140	-	< 210.6	< 41.2

Location		CA-AQS-C	
Lab Code	Req. LLD	CABS- 2267	CABS- 5964
Date Collected	-	05-01-13	10-03-13
K-40	-	13456 ± 639	11187 ± 596
Mn-54	-	< 21.6	< 23.5
Fe-59	-	< 66.1	< 23.9
Co-58	-	< 18.7	< 17.7
Co-60	-	< 18.3	< 15.0
Zr-Nb-95	-	< 22.8	< 20.4
Cs-134	150	< 13.0	< 14.1
Cs-137	180	< 19.0	< 19.2
Ba-La-140	-	< 58.4	< 58.0

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

Collection: Semiannually

Units: pCi/kg dry

Location		CA-AQS-A	
Lab Code	Req. LLD	CASS- 2264	CASS- 5961
Date Collected	-	05-01-13	10-03-13
K-40	-	13140 ± 636	12222 ± 591
Mn-54	-	< 19.4	< 20.1
Fe-59	-	< 62.4	< 21.5
Co-58	-	< 19.1	< 16.2
Co-60	-	< 9.1	< 12.6
Zr-Nb-95	-	< 52.0	< 24.1
Cs-134	150	< 12.4	< 14.9
Cs-137	180	< 18.2	< 18.1
Ba-La-140	-	< 117.3	< 16.2

Location		CA-AQS-C	
Lab Code	Req. LLD	CASS- 2265	CASS- 5962
Date Collected	-	05-01-13	10-03-13
K-40	-	13943 ± 712	13390 ± 625
Mn-54	-	< 23.9	< 17.6
Fe-59	-	< 70.7	< 42.5
Co-58	-	< 12.8	< 20.9
Co-60	-	< 16.8	< 7.6
Zr-Nb-95	-	< 42.5	< 17.8
Cs-134	150	< 16.7	< 14.5
Cs-137	180	< 20.8	< 14.9
Ba-La-140	-	< 104.3	< 26.5

**Table 11. Fish, analyses for gamma-emitting isotopes.**

Collection: Semiannually  
Units: pCi/kg wet

Location		CA-AQF-A				
Lab Code	Req. LLD	CAF- 2219	CAF- 2220	CAF- 2221	CAF- 2222	CAF- 2223
Date Collected		05-01-13	05-01-13	05-01-13	05-01-13	05-01-13
Sample Type		Freshwater Drum	Channel Catfish	Common Carp	River Carpsucker	Silver Carp
K-40	-	2951 ± 394	3188 ± 413	2992 ± 408	2497 ± 444	2697 ± 352
Mn-54	130	< 16.4	< 17.3	< 16.2	< 15.3	< 18.8
Fe-59	260	< 40.7	< 37.5	< 40.5	< 81.1	< 52.7
Co-58	130	< 9.2	< 28.8	< 20.0	< 19.5	< 10.7
Co-60	130	< 9.1	< 5.6	< 9.0	< 17.5	< 9.4
Zn-65	260	< 15.1	< 17.9	< 31.0	< 31.0	< 34.6
Cs-134	130	< 10.6	< 12.1	< 11.9	< 18.5	< 13.6
Cs-137	150	< 9.9	< 13.3	< 16.0	< 19.5	< 16.3
Lab Code	Req. LLD	CAF- 5950	CAF- 5951	CAF- 5952	CAF- 5953	CAF- 5954
Date Collected		10-03-13	10-03-13	10-03-13	10-03-13	10-03-13
Sample Type		Freshwater Drum	Common Carp	River Carpsucker	Silver Carp	Smallmouth Buffalo
K-40	-	3047 ± 416	3126 ± 432	2948 ± 396	2826 ± 365	2735 ± 357
Mn-54	130	< 12.7	< 9.1	< 17.2	< 10.1	< 10.5
Fe-59	260	< 46.8	< 32.8	< 35.6	< 20.4	< 28.8
Co-58	130	< 23.8	< 13.1	< 13.1	< 11.2	< 18.0
Co-60	130	< 13.1	< 5.8	< 17.5	< 9.8	< 4.6
Zn-65	260	< 30.4	< 25.2	< 23.8	< 18.0	< 16.8
Cs-134	130	< 19.4	< 14.5	< 18.2	< 12.0	< 13.8
Cs-137	150	< 16.8	< 11.2	< 17.2	< 5.6	< 9.3

**Table 11. Fish, analyses for gamma-emitting isotopes.**

Collection: Semiannually  
Units: pCi/kg wet

Location		CA-AQF-C				
Lab Code	Req. LLD	CAF- 2224	CAF- 2225	CAF- 2227	CAF- 2228	CAF- 2229
Date Collected		05-01-13	05-01-13	05-01-13	05-01-13	05-01-13
Sample Type		Freshwater Drum	Channel Catfish	Common Carp	River Carpsucker	Silver Carp
K-40	-	3042 ± 429	2807 ± 372	2888 ± 386	3224 ± 379	2654 ± 415
Mn-54	130	< 18.5	< 17.8	< 14.0	< 12.9	< 19.4
Fe-59	260	< 39.9	< 38.1	< 69.9	< 77.3	< 65.0
Co-58	130	< 17.9	< 25.6	< 23.9	< 22.5	< 17.6
Co-60	130	< 15.5	< 13.1	< 14.3	< 14.3	< 17.0
Zn-65	260	< 28.0	< 22.9	< 31.2	< 37.1	< 35.2
Cs-134	130	< 16.3	< 14.1	< 10.1	< 12.0	< 14.8
Cs-137	150	< 20.4	< 19.4	< 14.2	< 13.1	< 18.8
Lab Code	Req. LLD	CAF- 5956	CAF- 5957	CAF- 5958	CAF- 5959	CAF- 5960
Date Collected		10-03-13	10-03-13	10-03-13	10-03-13	10-03-13
Sample Type		Freshwater Drum	Common Carp	River Carpsucker	Silver Carp	Smallmouth Buffalo
K-40	-	2943 ± 380	2693 ± 348	2823 ± 385	2857 ± 394	3373 ± 407
Mn-54	130	< 15.1	< 10.3	< 17.3	< 10.7	< 17.7
Fe-59	260	< 28.8	< 25.2	< 26.8	< 41.9	< 51.7
Co-58	130	< 19.6	< 11.0	< 12.0	< 13.1	< 12.1
Co-60	130	< 10.9	< 10.3	< 5.2	< 10.7	< 10.4
Zn-65	260	< 28.6	< 18.0	< 21.7	< 30.9	< 10.8
Cs-134	130	< 17.9	< 14.6	< 15.5	< 18.2	< 15.6
Cs-137	150	< 14.1	< 15.1	< 12.3	< 17.1	< 13.6

**Table 12. Direct Radiation (quarterly exposure)**

Location	Gamma Dose (mrem/90 days)			
	QTR 1	QTR 2	QTR 3	QTR 4
CA-IDM-1A	16.57	16.09	16.53	16.05
CA-IDM-3	16.82	17.78	17.54	17.96
CA-IDM-5	14.56	15.04	14.62	14.89
CA-IDM-6	17.19	16.71	16.87	16.88
CA-IDM-7	16.27	16.25	16.63	16.49
CA-IDM-9	14.98	15.33	15.38	15.40
CA-IDM-10	17.36	16.80	18.47	16.93
CA-IDM-11A	16.38	17.04	17.96	19.27
CA-IDM-14	15.61	15.45	15.63	15.96
CA-IDM-17	15.84	15.89	16.88	16.02
CA-IDM-18A	17.47	16.50	17.37	16.95
CA-IDM-20	16.47	16.04	17.76	16.88
CA-IDM-21	15.81	16.23	16.49	16.98
CA-IDM-22A	13.50	13.46	13.25	13.21
CA-IDM-23	16.43	17.51	18.23	17.09
CA-IDM-26 (C)	11.69	11.08	11.62	11.46
CA-IDM-27 (C)	17.16	17.19	17.34	17.11
CA-IDM-30A	15.63	16.12	16.31	15.45
CA-IDM-31A	16.71	16.36	17.34	17.15
CA-IDM-32	16.19	16.58	17.73	17.76
CA-IDM-32A	14.84	ND *	16.00	15.70
CA-IDM-33	15.67	15.32	16.60	16.32
CA-IDM-34	15.24	15.19	16.51	15.71
CA-IDM-35	14.81	14.86	15.74	15.41
CA-IDM-36	15.94	16.18	15.79	15.66
CA-IDM-37	15.47	15.56	16.77	16.10
CA-IDM-38	12.55	10.86	11.25	11.25
CA-IDM-39	16.04	15.46	16.15	16.61
CA-IDM-39A	16.74	16.85	17.16	17.09
CA-IDM-40	17.71	16.66	17.87	17.46
CA-IDM-41	15.45	15.36	16.60	16.16
CA-IDM-42	14.13	14.20	14.23	13.91
CA-IDM-43	16.53	15.13	16.51	16.82
CA-IDM-44	ND *	15.84	16.58	16.51
CA-IDM-45	14.94	14.48	14.31	14.87
CA-IDM-46	17.04	16.24	16.85	16.61
CA-IDM-47	15.64	15.33	16.00	16.38
CA-IDM-48	16.39	16.49	17.09	16.45
CA-IDM-49	15.40	16.05	14.78	15.35
CA-IDM-50	15.68	16.64	17.22	16.25
CA-IDM-51A	17.49	17.63	17.26	17.09
CA-IDM-52	17.35	17.39	17.68	16.96
CA-IDM-60 (C)	15.44	16.14	16.01	15.30

\* TLD and holder missing from assigned location.



**Appendix A**  
**Supplemental Analyses**

**A-1. Supplemental Analyses**

**Site Evaluations, analyses for tritium.**

Lab Code	Collection Date	Location	Concentration <sup>3</sup> H (pCi/L)
CASO- 1989	04/22/13	RWST SOIL	996 ± 118
CASO- 5338	09/04/13	1 WEST	336 ± 88
CASO- 5339	09/04/13	1 EAST	275 ± 85
CASO- 5732	09/25/13	DAWQH1013 Soil	< 151
CAS- 5735	09/26/13	DAWQH1013 Slurry	< 154
CASO- 5733	09/25/13	DAWQH1014 Soil	< 152
CAS- 5734	09/25/13	DAWQH1014 Slurry	< 154
CASO- 5736	09/26/13	DAWQH1006 Soil	467 ± 102
CAS- 5791	09/27/13	DAWQH1006 Slurry	< 154

**Site Evaluations, analyses for gamma emitting isotopes.**

Lab Code	Collection Date	Location	<sup>40</sup> K	<sup>54</sup> Mn	<sup>59</sup> Fe	<sup>58</sup> Co	<sup>60</sup> Co	<sup>65</sup> Zn	<sup>95</sup> Zr-Nb	<sup>134</sup> Cs	<sup>137</sup> Cs	<sup>140</sup> Ba-La
CASO- 1989	04/22/13	RWST SOIL	1091 ± 259	< 8.4	< 19.3	< 3.6	< 10.6	< 17.3	< 6.1	< 7.9	< 5.8	< 11.8
CASO- 5338	09/04/13	1 WEST	5627 ± 210	< 9.0	< 16.9	< 6.6	< 9.2	< 21.0	< 13.3	< 7.4	< 10.3	< 14.8
CASO- 5339	09/04/13	1 EAST	3904 ± 167	< 6.6	< 12.9	< 6.8	< 6.2	< 15.1	< 10.1	< 5.8	< 8.1	< 10.7
CASO- 5732	09/25/13	DAWQH1013 Soil	4691 ± 283	< 11.8	< 24.1	< 11.2	< 9.3	< 27.5	< 20.6	< 12.7	< 16.2	< 12.8
CAS- 5735	09/26/13	DAWQH1013 Slurry	249 ± 64	< 2.9	< 7.5	< 2.1	< 4.0	< 7.4	< 5.5	< 4.2	< 4.3	< 3.6
CASO- 5733	09/25/13	DAWQH1014 Soil	9596 ± 471	< 15.4	< 28.3	< 8.2	< 9.5	< 39.2	< 22.7	< 15.6	< 15.5	< 10.2
CAS- 5734	09/25/13	DAWQH1014 Slurry	757 ± 81	< 2.8	< 4.2	< 3.0	< 2.5	< 7.0	< 2.8	< 3.3	< 3.3	< 2.3
CASO- 5736	09/26/13	DAWQH1006 Soil	4151 ± 259	< 9.0	< 12.9	< 10.6	< 9.4	< 17.1	< 12.5	< 8.6	< 8.1	< 6.5
CAS- 5791	09/27/13	DAWQH1006 Slurry	1537 ± 114	< 5.2	< 13.0	< 4.1	< 4.3	< 11.7	< 6.7	< 4.4	< 2.6	< 6.6