



Callaway Plant

April 27, 2012

ULNRC-05853

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

Ladies and Gentlemen:

**DOCKET NUMBER 50-483  
CALLAWAY PLANT UNIT 1  
UNION ELECTRIC CO.  
FACILITY OPERATING LICENSE NPF-30  
2011 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT**

Please find enclosed the 2011 Annual Radiological Environmental Operating Report for Callaway Plant. This report is submitted in accordance with Section 5.6.2 of the Callaway Plant Technical Specifications and Appendix B to the Callaway Plant Operating License.

This letter does not contain new commitments.

If there are any questions, please contact us.

Sincerely,

A handwritten signature in black ink, appearing to read "Luke H. Graessle".

Luke H. Graessle  
Director, Operations Support

HAO/nls

Enclosed: 2011 Annual Radiological Environmental Operating Report

ULNRC-05853

April 26, 2012

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cc: Mr. Elmo E. Collins  
Regional Administrator  
U. S. Nuclear Regulatory Commission  
Region IV  
1600 East Lamar Boulevard  
Arlington, TX 76011-4511

Senior Resident Inspector  
Callaway Resident Office  
U.S. Nuclear Regulatory Commission  
8201 NRC Road  
Steedman, MO 65077

Mr. Kaly Kalyanam  
Senior Project Manager, Callaway Plant  
Office of Nuclear Reactor Regulation  
U. S. Nuclear Regulatory Commission  
Mail Stop O-8G14  
Washington, DC 20555-2738

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L. H. Graessle

S. M. Maglio

T. B. Elwood

R. Holmes-Bobo

NSRB Secretary

Mr. Paul Parmenter, Director (SEMA)

Mr. Thomas Mohr, Senior REP Planner (SEMA)

Mr. Tom Masso, REP Planner (SEMA)

Mr. Bill Muilenburg (WCNOC)

Mr. Tim Hope (Luminant Power)

Mr. Ron Barnes (APS)

Mr. Tom Baldwin (PG&E)

Mr. Wayne Harrison (STPNOC)

Ms. Linda Conklin (SCE)

Mr. John O'Neill (Pillsbury Winthrop Shaw Pittman LLP)

Mr. Dru Buntin (DNR)



AMEREN MISSOURI, CALLAWAY PLANT  
FULTON, MISSOURI

DOCKET NO. 50-483

ANNUAL REPORT  
to the

UNITED STATES NUCLEAR REGULATORY COMMISSION

Radiation Environmental Operating Report

January 1 to December 31, 2011

Prepared by

ENVIRONMENTAL, Inc.  
Midwest Laboratory

Submitted by

UNION ELECTRIC CO.  
dba Ameren Missouri Corp.

Project No. 8036

Approved :

Bronia Grob, M.S.  
Laboratory Manager

## PREFACE

This Annual Radiological Environmental Operating Report describes the Ameren Missouri Corp., Callaway Plant Radiological Environmental Monitoring Program (REMP), and the program results for the calendar year 2011. It is submitted in accordance with section 5.6.2 of the Callaway Plant 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 Plant.

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## 1.0 INTRODUCTION

This report presents an analysis of the results of the Radiological Environmental Monitoring Program (REMP) conducted during 2011 for the Union Electric Company (dba Ameren Missouri Corp.), Callaway Plant.

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 Callaway Plant. The Radiological Environmental Monitoring Program was initiated in April 1982.

Callaway Plant consists of one 3665 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 2011 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 Plant is herein described. Results for the year 2011 are summarized and discussed.

For the year, the Callaway Plant was operated in compliance with Off Site Dose Calculation Manual (ODCM) requirements. Comparison of results for 2011 show no significant differences to historical data. Results from the REMP indicate the Callaway Plant has had no significant radiological impact on the health and safety of the public or on the environment.

The detection of iodine-131 in charcoal cartridges and particulate filters, milk and water for the period of March 17 through May 8, 2011 is consistent with and attributable to radioactive elements released from the Fukushima Daiichi reactors or fuel pools in the aftermath of the March 11, 2011 Japanese earthquake and tsunami.

### 3.0 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

#### 3.1 Program Design and Data Interpretation

The purpose of the Radiological Environmental Monitoring Program at the Callaway Plant 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 Plant 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 Plant, 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 Plant 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.

Soybeans 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.

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 (SO2) and from one control location (SO1).

Onsite surface water from twelve 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.

Additional sampling for soil, precipitation and ground water was conducted in 2011. Results are included in Part II, App. C.

### 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. The sampler at S01 was out-of service for 163 days in 2011 (CAR 201200836). The sampler at S02 was 94% operable; down-time approximately 20 days. During sampler downtime, composites of daily grab samples are prepared and submitted for analysis.

Surface water from the Unit 2 pond (CA-SWA-UNIT 2) was not collected in January, 2011. The pond was frozen.

#### (2) Ground Water:

Ground water collection was intermittent for monitoring wells U1MW-28 and MW-939. These wells were added to the program in the fourth quarter, 2010, and were dry upon initial sampling. Only one collection was made from the U1MW-28 well in 2011. The sample was analyzed for tritium only, there was insufficient sample for gamma isotopic analysis. The monitoring well MW-939 was analyzed for tritium only in May, June and October, 2011, there was insufficient sample for gamma isotopic analyses. The well was dry from July through September, 2011.

The ground water sump location (GWS) was not sampled for the months of May through September. The site was considered unsafe, due to electrical hazards.

#### (3) Vegetation:

No samples were available from station V-9 for the August 9, 2011 collection. The garden suffered damage from animals.

No vegetation samples were available from station V-11 for the June 29, 2011 collection. The garden was not producing, due to animal damage.

Station V-14 was dropped from the program in July, 2011, due to the death of the participant.

No vegetation samples were available from station V-15 after the August 8, 2011 collection, the garden quit producing.

#### (4) Non-Food Crops:

Soybeans were not available for harvest from four fields at two locations, FC-1A, FC-1B, FC-1C, FC-3C. There were no crops planted in 2011.

### 3.3 Program Execution (continued)

#### (5) Direct Radiation:

Both TLD and fade dosimeter for location IDM-46 were missing for the 4th quarter, 2011. The TLDs were replaced. Vandalism is suspected.

### 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 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, 2009). 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. The vegetation sampling location, V-14, was dropped from the program in July, 2011, due to the death of the provider. Reference CAR 201105885.
2. Soil sampling station V3 was replaced with station M9, due to the death of the provider. Reference CAR 201108365.
3. The farm crop LLD requirement was revised, specific for Cs-134 and Cs-137. Reference CAR 201104343.
4. The definition of "growing season" was revised as "April 15 – November 1, but variable according to weather conditions", consistent with the description in "Climate of Missouri", Hammer, Gregory R. National Climatic Data Center (NCDC) of the National Oceanic and Atmospheric Administration (NOAA), January, 2006.
5. For the 2012 growing season, vegetation sampling location V16 will replace station V15, due to a history of poor production.

### 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 2011, the survey was conducted within a five mile canvassing radius of the Callaway Plant. The location of the nearest resident, milking animal, and 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 18, 2011. The results of the census are presented in Table 5.4. The table includes radial direction and distance from the Callaway Plant for each location, determined by a Global Positioning System (GPS) receiver.

The census includes identification of drinking water wells along Mud Creek and Logan Creek. No new drinking water wells were identified in 2011.

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 2011 is contained in Part II of the Annual Report on the Radiological Environmental Monitoring Program for the Callaway Plant.

### 4.1 Atmospheric Nuclear Detonations and Nuclear Accidents

The Fukushima Daiichi nuclear accident occurred on March 11, 2011, releasing large amounts of radioactive isotopes into the atmosphere and Pacific Ocean. Positive iodine-131, cesium-134 and cesium-137 activities were detected in environmental background samples from March through May. The accident, rated seven on the International Nuclear Event Scale (INES) compares with Chernobyl, rated level seven, and Three Mile Island rated level five.

### 4.2 Program Findings

Results obtained show background levels of radioactivity in environmental samples collected beyond the plant property boundary in 2011. 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 114 of the 260 samples tested, Beryllium-7 measured above an LLD value of 0.16 pCi/m<sup>3</sup>, with an average activity of 0.21 pCi/m<sup>3</sup>. Beryllium-7 is produced continuously in the upper atmosphere by cosmic radiation. No gamma emitting isotopes of plant origin were identified.

#### Airborne Iodine

In the weeks following the Fukushima Daiichi accident, measurable iodine was detected in weekly collections of activated charcoal cartridge samples. For the weeks ending March 24, March 31 and April 8, 2011, mean activity for all locations measured 0.058, 0.14 and 0.061 pCi/m<sup>3</sup>, respectively. For the week ending March 31, positive iodine activity was also detected on the particulate filters, with an average activity of 0.057 pCi/m<sup>3</sup>. Measurements throughout the rest of the year were below the required lower limit of detection of 0.070 pCi/m<sup>3</sup>. (CAR 201102767, CAR201103463)

#### Direct Radiation (TLDs)

Forty-three TLDs were placed in 16 sectors around the Callaway site. Measurements from forty indicator locations averaged 15.7 mrem/quarter and the three control locations averaged 14.6 mrem/quarter. Readings ranged from 10.4 to 18.5 mrem /quarter, with the highest from the location CA-IDM-27, averaging 17.1 mrem/quarter. The differences are statistically insignificant.

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

## 4.2 Program Findings (continued)

### Milk

Following the Fukushima Daiichi accident, iodine-131 was detected in milk collected at location M-9. For the April and May, 2011 collections, iodine activity measured 39.0 and 0.6 pCi/L, respectively. Results remained below the detection limit of 0.5 pCi/L for all other sample collections. (CAR 201103463)

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

In summary, milk data for 2011 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 37.7 pCi/kg wet weight in all samples.

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

### Non-Food Crops

Soybeans were sampled in October, 2011, and analyzed for tritium and gamma-emitting isotopes.

No tritium activity was measured above a detection level of 151 pCi/L in any of the samples.

Potassium-40 activity ranged from 2,797–14,237 pCi/kg wet weight and averaged 7,871 pCi/kg wet weight. All other gamma-emitting isotopes measured below detection limits.

No effect from the plant operation is indicated.

### Fish

All gamma-emitting isotopes, except naturally-occurring potassium-40, in edible portions were below detection limits. The potassium-40 levels were similar at both indicator and control locations (2,647 and 2,573 pCi/kg wet, respectively).

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 415 and 55 pCi/kg dry, respectively. The cesium-137 activity is similar to or less than levels observed from 1999 through 2010, these levels are generally attributable to deposition of fallout from previous decades.

Naturally-occurring potassium-40 averaged 11,480 pCi/kg dry weight.

Analysis results for soil samples in 2011 were consistent with previously accumulated data and no plant operational effects were identified.

## 4.2 Program Findings (continued)

### Surface Water

Slight tritium activity above the detection limit of 171 pCi/L was observed in four of the twelve samples collected from the downstream location S-02. Measurements averaged 304 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, twelve onsite surface water locations (SWA) are included in the permanent REMP. Tritium was detected in one of four samples from the UHS pond at a level of 275 pCi/L. At the Unit 2 pond, one of three samples collected measured 185 pCi/L. The trace activity of H-3 in these ponds is believed to be the result of washout from gaseous effluents. All other sample results measured below a detection level of 177 pCi/L.

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 162 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 identified.

### 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 172 pCi/L) was detected in 59 of the 284 samples tested, with an average activity of 641 pCi/L. The highest concentrations were observed from samples taken at location MW-939, with an average activity of 3015 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 activity in these wells is believed to be the result of washout from gaseous effluents. The positive iodine-131 activity detected at MW-936, was collected on March 30, 2011, and is attributed to the Fukushima event (CAR 201103463).

The low level tritium activity observed in wells MW-014, MW-017, MW-018 and MW-019 is due to residual low level contamination of the area downgradient 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.

#### 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 April and October, 2011, and analyzed for gamma-emitting isotopes. Cs-137 was detected in one of two control samples at a concentration of 71.1 pCi/kg dry weight and one of the two indicator samples at a concentration of 116.1 pCi/kg dry weight. Potassium-40 activity ranged from 11,779 to 14,430 pCi/kg dry weight and averaged 13,058 pCi/kg dry weight.

Shoreline sediments were also collected in April and October, 2011. Trace Cs-137 activity was detected in one of two control samples at a concentration of 33.2 pCi/kg dry weight and in two indicator samples at an average concentration of 57.5 pCi/kg dry weight. Potassium-40 activity ranged from 13,142 to 14,642 pCi/kg dry weight and averaged 14,072 pCi/kg dry weight.

Potassium-40 is a naturally occurring isotope. The slight cesium-137 activities observed are 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.	FPL
V11	3.2 mi. NW	Hickman Farm.	FPL
V12 <sup>3</sup>	18.7 mi. WSW	Kissock Farm, South of New Bloomfield, MO	FPL
V14	3.0 mi. NNE	Amorine Farm, Williamsburg, MO	FPL
V15	2.6 mi. NNE	Pate Farm, 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	105 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	Downgradient of DMTdischarge piping	WWA
U1MW-030	0.2 mi. ESE	Downgradient 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-939	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	Inside OCA	Unit 2 Pond	SWA
CTBD	Inside OCA	Cooling Tower Blowdown	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

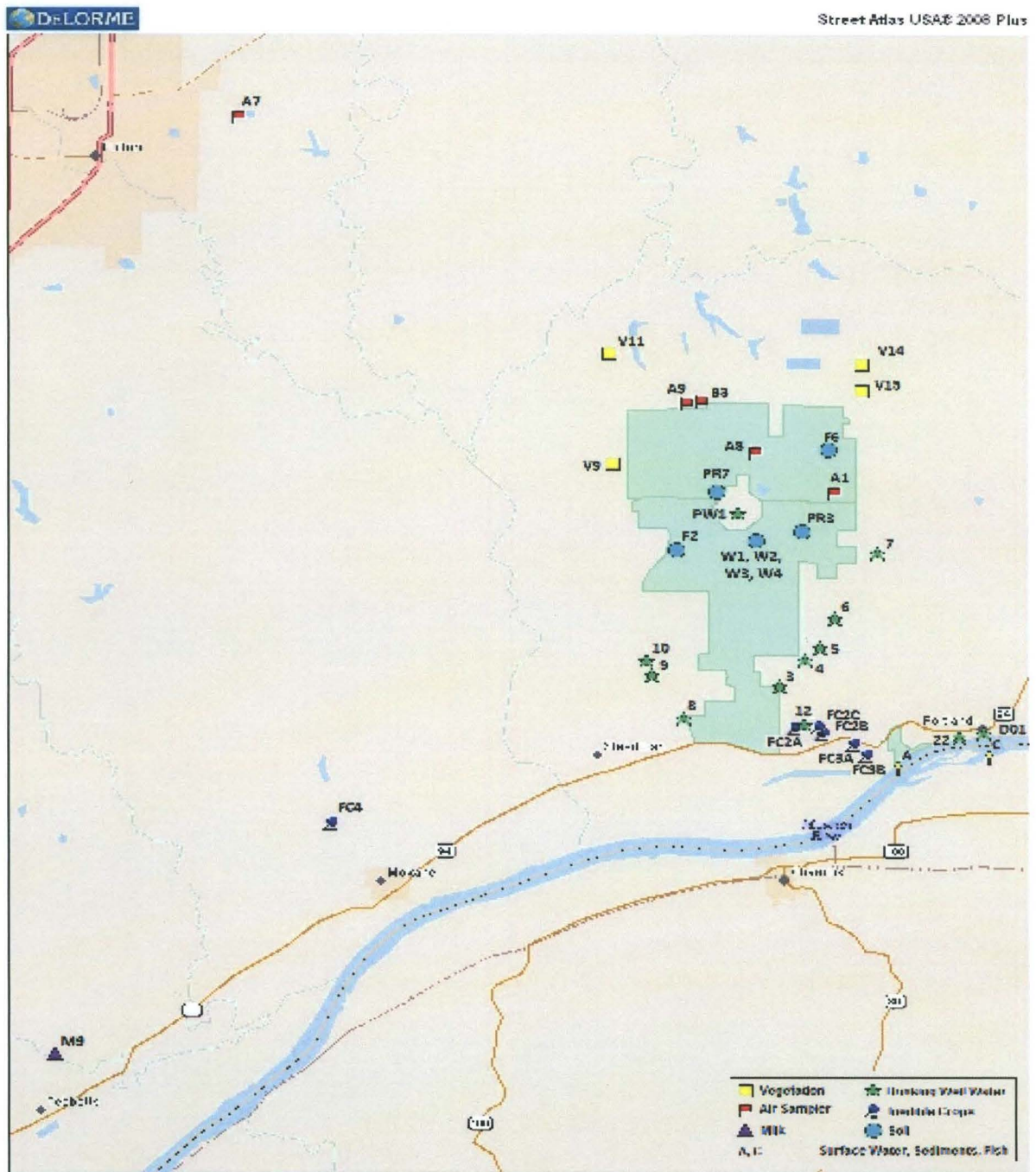
<sup>1</sup> Distances are measured from the midpoint of the two reactors as described in Final Safety Analysis Report (FSAR) Sec. 2.1.1.1.

<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.



Digitized by Lynn H. Lerner  
 X 2114 Delorme Street Atlas USA© 2006 Plus  
 www.delorme.com

★  
 114102101

0 1 2 3 mi  
 Data: June 03

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

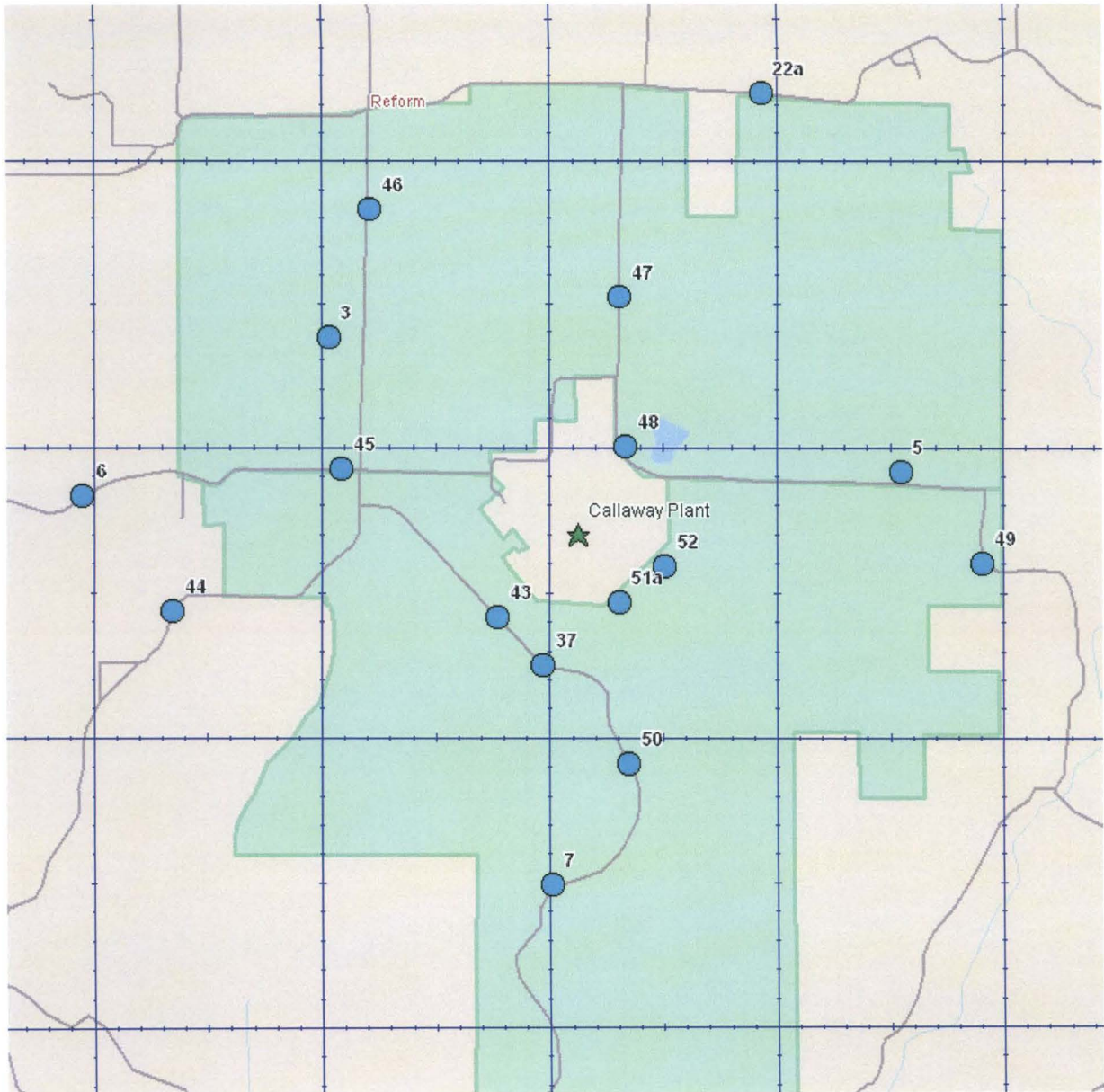




Figure 5.2b. Direct Radiation Monitoring, Outer Ring and Special Interest Locations.

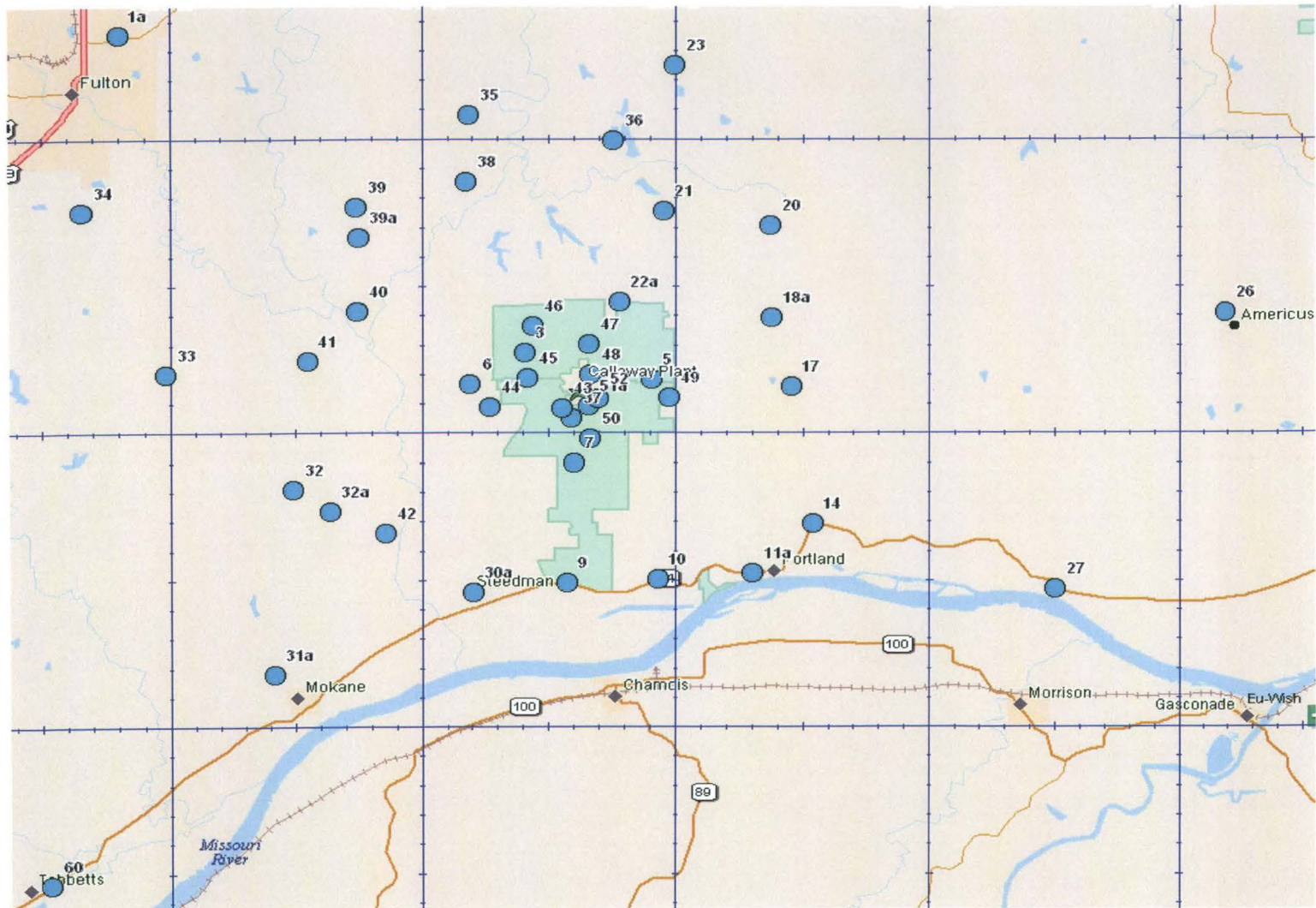
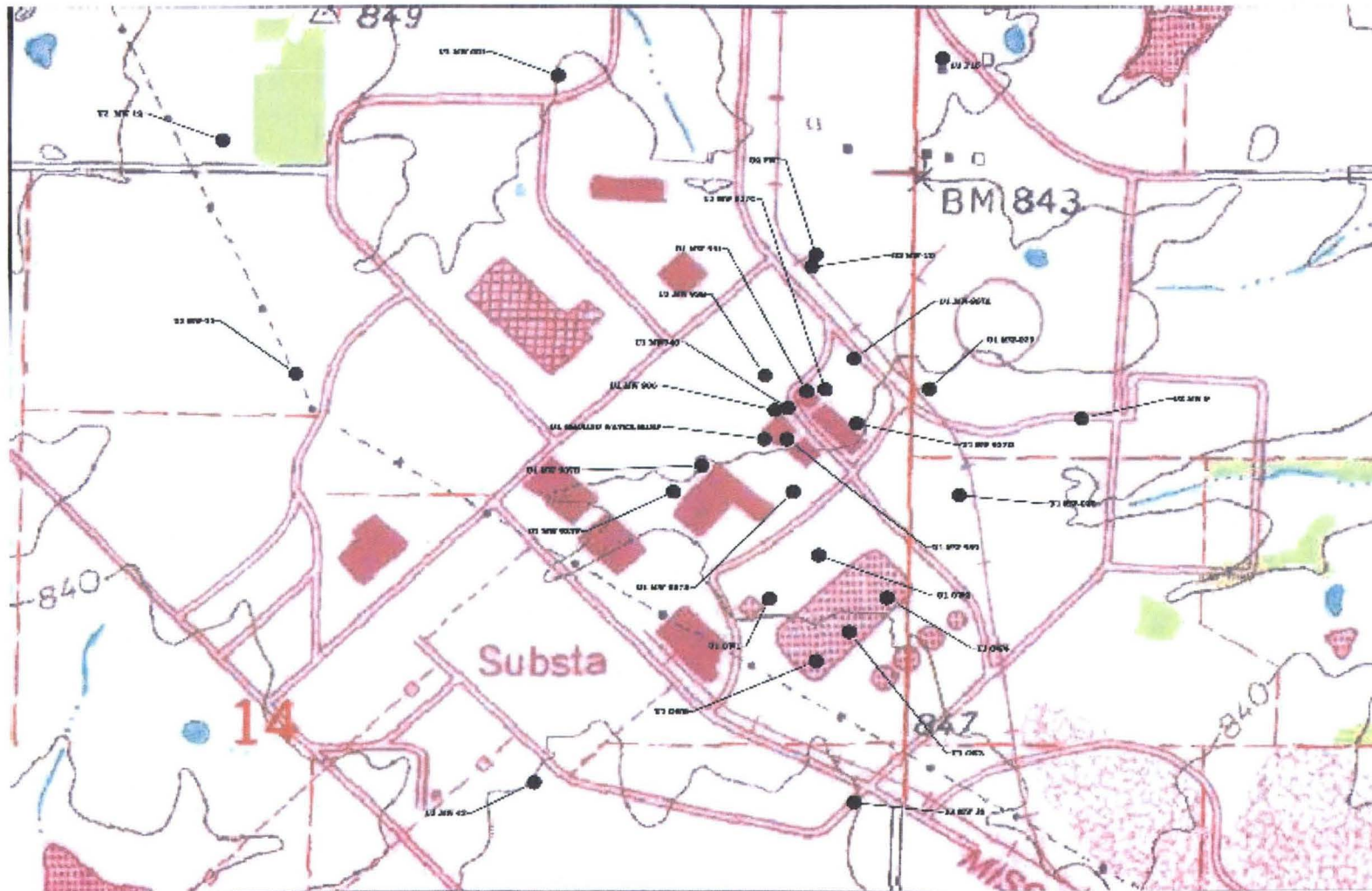


Figure 5.3a. Groundwater Monitoring Wells, Owner Controlled Area and Vicinity.



Note: Not all wells shown are included in the REMP. Refer to Table 5.1 for a listing of monitored wells.



Figure 5.3b. Groundwater Monitoring Wells, Northern Area.

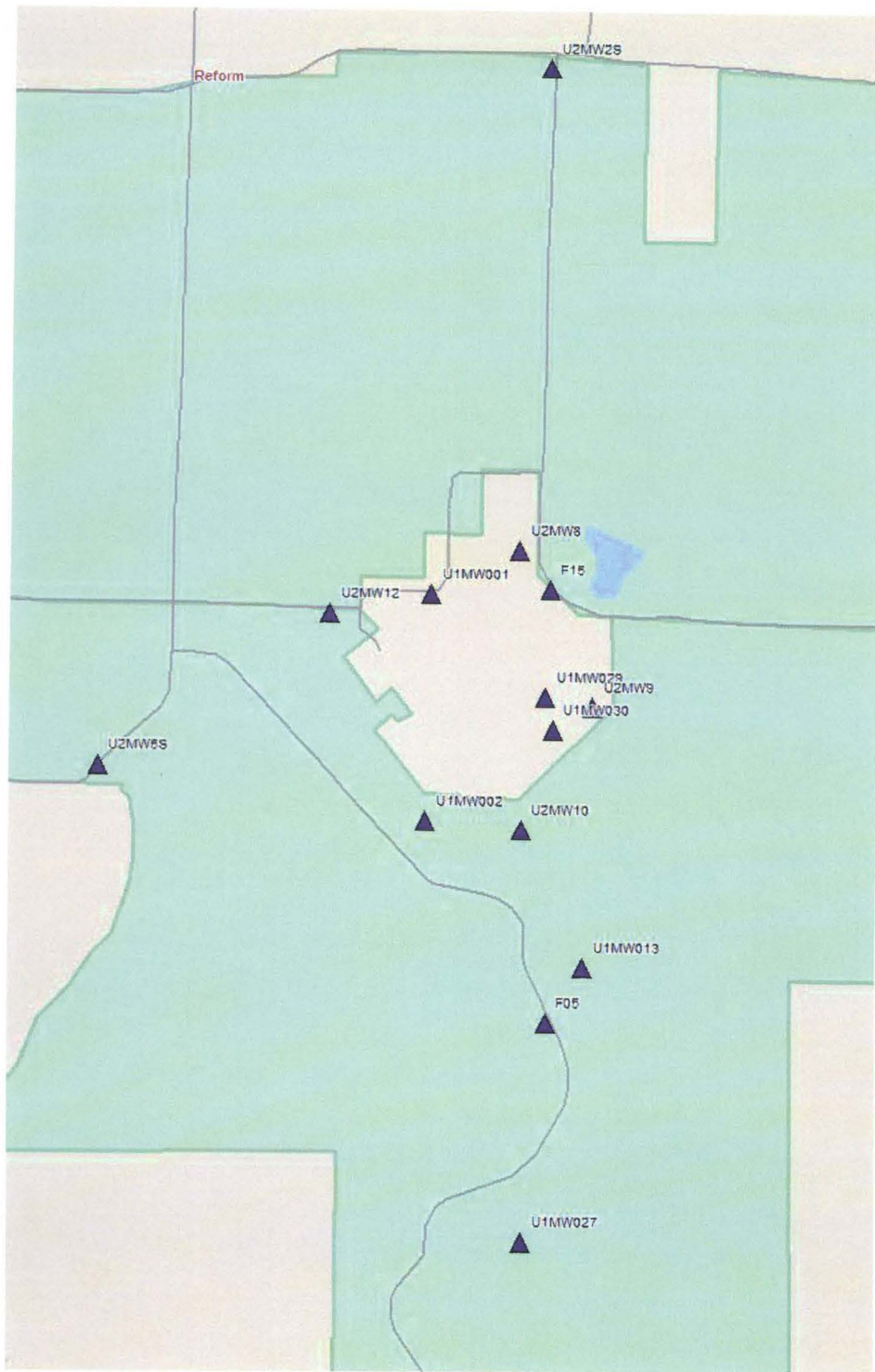


Figure 5.3c. Groundwater Monitoring Wells, Central Area.

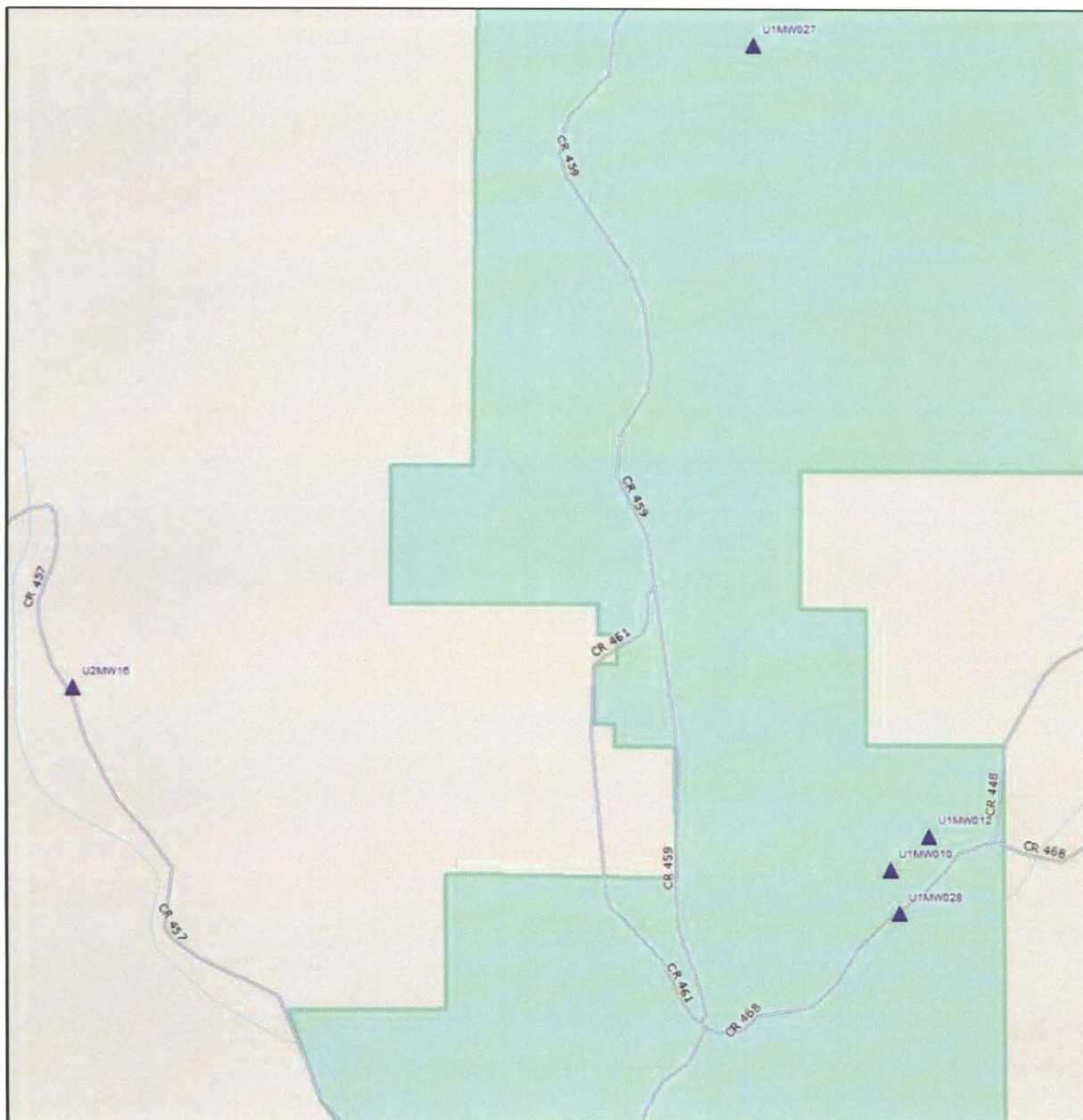


Figure 5.3d. Groundwater Monitoring Wells, Alluvial Area.

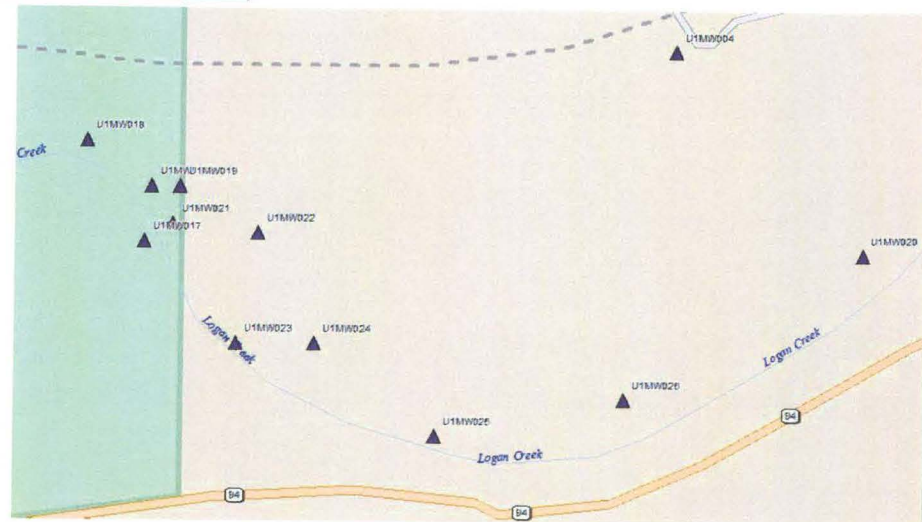
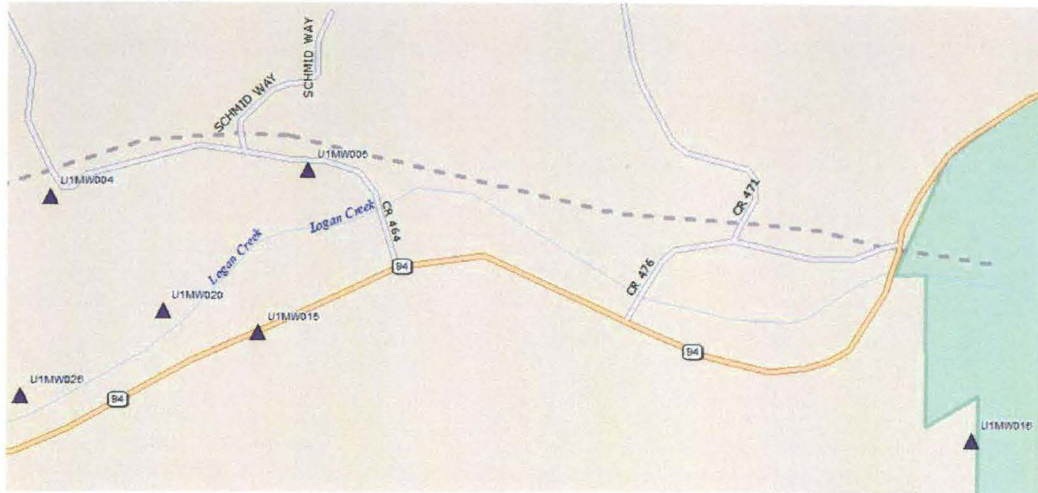
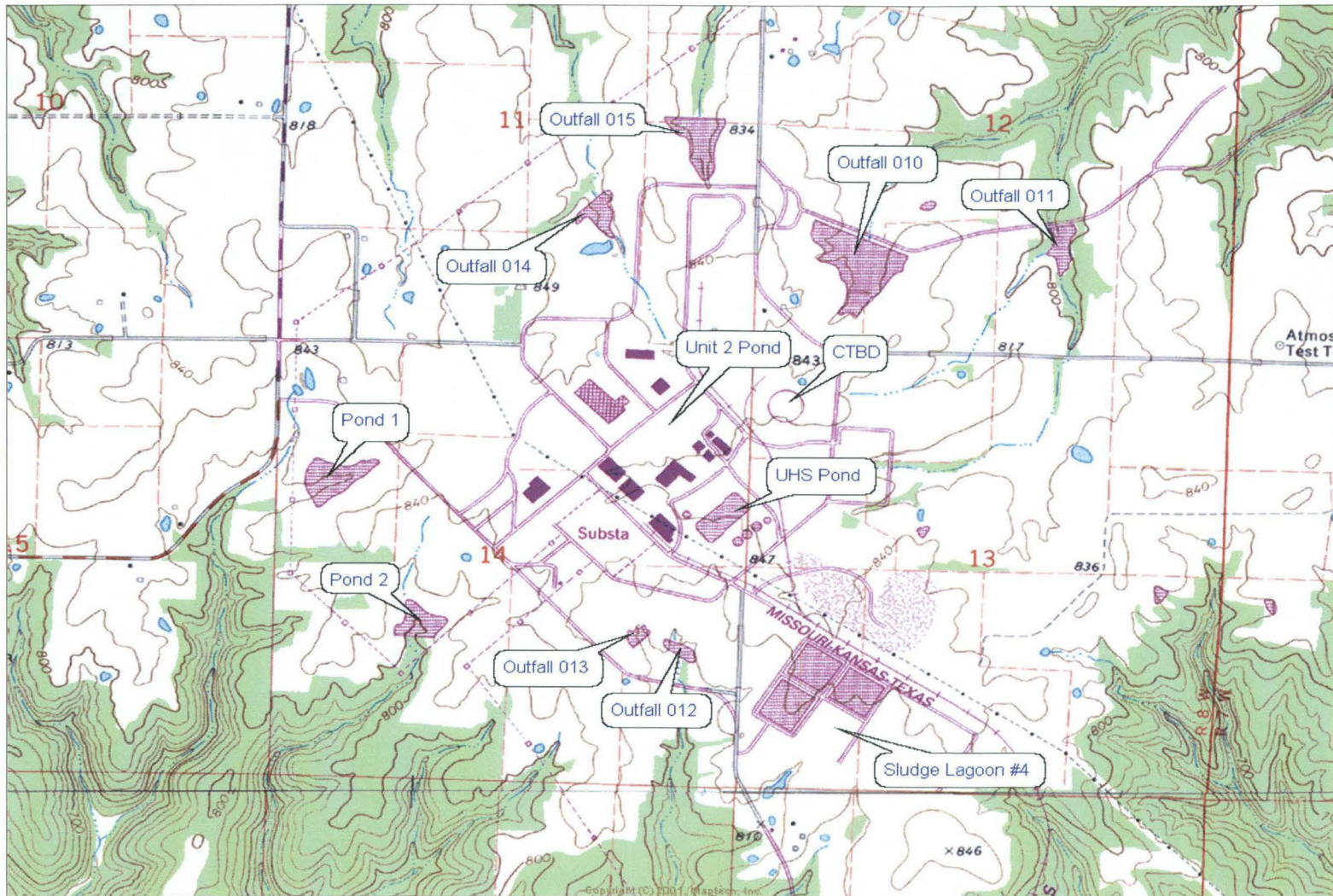




Figure 5.3e. Pond sampling locations



**Table 5.2. Collection Frequencies and Required Analyses (January 1 through December 31, 2011)**

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 each sample
Surface water (river)	SWA	Monthly composite	PGE and <sup>3</sup> H
Surface water (except CTBD, UHS & Unit 2 ponds)	SWA	Semiannually	PGE and <sup>3</sup> H. If contaminated with gamma emitting nuclides of plant origin, analyze for HTD nuclides.
Surface water (CTBD, UHS, Unit 2 ponds)	SWA	Quarterly	PGE and <sup>3</sup> H
Groundwater (not potable)	WWA	Quarterly / Monthly	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>1</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>2</sup>	PGE and <sup>131</sup> I
Leafy green vegetables	FPL	Monthly when available <sup>3</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> Required by NPDES permit.

<sup>2</sup> The grazing season is defined as April 15- December 15, but will vary according to weather conditions.

<sup>3</sup> The growing season is defined as the months April 1- November 1, but will vary according to weather conditions.

**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 2011 Land Use Census Results**

**Closest Receptor in Miles**

<b>Sector</b>	<b>Residence</b>	<b>Garden <sup>1</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	<b>2.68</b>	NI
<b>SSW(K)</b>	2.38	<b>2.81</b>	NI
<b>SW(L)</b>	2.64	2.64	NI
<b>WSW(M)</b>	1.20	<b>1.64</b>	NI
<b>W(N)</b>	1.56	2.27	NI
<b>WNW(P)</b>	1.93	1.93	<b>NI</b>
<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 2010 census.

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

\* Declined to participate in the program.

**Table 5.5. Missed collections and analyses, Callaway Plant.**

<b>Sample Type</b>	<b>Analysis</b>	<b>Location(s)</b>	<b>Collection Date or Period</b>	<b>Comments</b>
SWA	H-3, Gamma	Unit 2	1/18/11	Pond frozen.
WWA	H-3, Gamma	U1MW-28	1 <sup>st</sup> , 2 <sup>nd</sup> , 4 <sup>th</sup> Qtrs, 2011	Dry well.
WWA	H-3, Gamma	MW-939,	Jan, May-Oct, 2011	Dry well, Insufficient sample for analysis.
WWA	H-3, Gamma	GWS	May-Sep, 2011	Electrical hazards.
VE	Gamma	V-9	6/29/11	Garden not producing.
VE	Gamma	V-11	8/9/11	Garden not producing.
VE	Gamma	V-14	July, 2011	Death of participant, station dropped from program.
VE	Gamma	V-15	9/14/11	Garden not producing.
VE	Gamma	V-15	10/27/11	End of growing season.
FC	H-3, Gamma	FC-1A,1B, 1C, 3C	October, 2011	No crops planted.
IDM	Direct Radiation	46	4 <sup>th</sup> Qtr. 2011	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	171	304 (4/12) (190-456)	SW-02 4.9 mi. SE	304 (4/12) (190-456)	< 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	30	177	230 (2/30) (185-275)	UHS On-site	275 (1/4)	none	0
	GS	26						
	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
Drinking Water, Wells (pCi/L)	H-3	48	162	< 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	284	172	641 (59/284) (176-9647)	MW-939 Inside OCA	3015 (6/6) (426-9647)	None	0
	GS	283						
	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	13443 (4/4) (11779-14642)	CA-AQS-A 4.9 mi. SSE	13687 (4/4) (13139-14430)	13687 (4/4) (13139-14430)	0
	Mn-54		55.9	< LLD	-	-	< LLD	0
	Fe-59		156.5	< LLD	-	-	< LLD	0
	Co-58		68.6	< LLD	-	-	< LLD	0
	Co-60		30.6	< LLD	-	-	< LLD	0
	Zr-Nb-95		130.9	< LLD	-	-	< LLD	0
	Cs-134		45.3	< LLD	-	-	< LLD	0
	Cs-137		41.1	77.0 (3/4) (48.0-116.1)	CA-AQS-C 4.9 mi. SE	77.0 (3/4) (48.0-116.1)	52.1 (2/4) (33.2-71.1)	0
Ba-La-140		368.3	< 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 33 K-40	100	4531 (27/27) (2534-8727)	V-11, 3.2 mi. NW	5118 (7/7) (2606-8727)	4912 (6/6) (3571-6960)	0
	Mn-54	15.6	< LLD	-	-	< LLD	0
	Co-58	18.6	< LLD	-	-	< LLD	0
	Co-60	17.7	< LLD	-	-	< LLD	0
	I-131	37.7	< LLD	-	-	< LLD	0
	Cs-134	18.7	< LLD	-	-	< LLD	0
	Cs-137	18.9	< LLD	-	-	< LLD	0
Farm Crop (Soybeans) (pCi/kg wet)	GS 7 K-40	100	8113 (5/5) (4473-11761)	FC-3, Between Hwy 94 and Dock Access Rd.	10616 (2/2) (9472-11761)	8517 (2/2) (2797-14237)	0
	Mn-54	15.2	< LLD	-	-	< LLD	0
	Co-58	15.2	< LLD	-	-	< LLD	0
	Co-60	14.9	< LLD	-	-	< LLD	0
	I-131	28.2	< LLD	-	-	< LLD	0
	Cs-134	13.1	< LLD	-	-	< LLD	0
	Cs-137	17.4	< LLD	-	-	< LLD	0
Fish (Flesh) (pCi/kg wet)	GS 20 K-40	100	2647 (10/10) (2456-2905)	CA-AQF-C 4.9 mi. SE	2647 (10/10) (2456-2905)	2573 (10/10) (1559-4116)	0
	Mn-54	36.0	< LLD	-	-	< LLD	0
	Fe-59	69.2	< LLD	-	-	< LLD	0
	Co-58	29.3	< LLD	-	-	< LLD	0
	Co-60	24.0	< LLD	-	-	< LLD	0
	Zn-65	58.3	< LLD	-	-	< LLD	0
	Cs-134	32.4	< LLD	-	-	< LLD	0
	Cs-137	31.3	< LLD	-	-	< LLD	0
Milk (pCi/L)	I-131 21	0.5	-	M-9 (C) 18.7 mi. S	19.8 (2/21) (0.6 - 39.2)	19.8 (2/21) (0.6 - 39.2)	0
	GS 21 K-40	100	-	M-9 (C) 18.7 mi. S	1116 (21/21) (773-1406)	1116 (21/21) (773-1406)	0
	Cs-134	15	-	-	-	< LLD	0
	Cs-137	18	-	-	-	< LLD	0
	Ba-140	60	-	-	-	< LLD	0
	La-140	15	-	-	-	< 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	171	3.0	15.7 (159/159) (10.4-18.5)	CA-IDM-27, 9.3 mi. ESE	17.1 (4/4) (16.5-17.9)	14.6 (12/12) (10.4-17.9)	0
<b>Airborne Pathway</b>								
Airborne Particulates (pCi/m <sup>3</sup> )	GS	260						
	Be-7		0.16	0.22 (87/260) (0.18-0.30)	A-8, A-8, Cty. Rd. 448	0.23 (21/52) (0.18-0.29)	None	0
	Co-58		0.013	< LLD	-	-	None	0
	Co-60		0.014	< LLD	-	-	None	0
	Zr-Nb-95		0.027	< LLD	-	-	None	0
	I-131		-	0.057 (5/260) (0.051 - 0.068)	A-9, Reform, 1.9 mi. NNW	0.068 (1/52)	None	0
	Cs-134		0.012	< LLD	-	-	None	0
	Cs-137		0.014	< LLD	-	-	None	0
	Ba-La-140		0.053	< LLD	-	-	None	0
	Ce-144		0.068	< LLD	-	-	None	0
Airborne Iodine (pCi/m <sup>3</sup> )	I-131	260	0.039	0.086 (15/260) (0.046 - 0.16)	A-1, Met. Tower, 1.3 mi. ENE	0.093 (3/52) (0.046 - 0.16)	None	0
<b>Soil</b>								
Soil (pCi/kg dry)	GS	18						
	K-40		50.0	11324 (16/16) (5534-14938)	W-002, 0.60 mi. SSE	14726 (2/2) (14514-14938)	12731 (2/2) (11928-13534)	0
	Mn-54		38.5	< LLD	-	-	< LLD	0
	Fe-59		71.8	< LLD	-	-	< LLD	0
	Co-58		36.7	< LLD	-	-	< LLD	0
	Co-60		22.7	< LLD	-	-	< LLD	0
	Zr-Nb-95		61.0	< LLD	-	-	< LLD	0
	Cs-134		26.3	< LLD	-	-	< LLD	0
	Cs-137		29.3	415 (12/16) (104-945)	F-006, 1.72 mi. NE	693 (2/2) (692-694)	55 (2/2) (48-62)	0
	Ba-La-140		121.8	< 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.

## 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, 2011

## 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>

<u>Analysis</u>	<u>Level</u>	<u>One standard deviation for single determination</u>
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	
STW-1243	04/04/11	Sr-89	68.2 ± 5.8	63.2	51.1 - 71.2	Pass
STW-1243	04/04/11	Sr-90	44.3 ± 2.4	42.5	31.3 - 48.8	Pass
STW-1244	04/04/11	Ba-133	69.8 ± 3.9	75.3	63.0 - 82.8	Pass
STW-1244	04/04/11	Co-60	87.9 ± 3.8	88.8	79.9 - 100.0	Pass
STW-1244	04/04/11	Cs-134	69.5 ± 3.7	72.9	59.5 - 80.2	Pass
STW-1244	04/04/11	Cs-137	77.9 ± 5.3	77.0	69.3 - 87.4	Pass
STW-1244	04/04/11	Zn-65	105.2 ± 8.4	98.9	89.0 - 118.0	Pass
STW-1245	04/04/11	Gr. Alpha	41.5 ± 2.3	50.1	26.1 - 62.9	Pass
STW-1245	04/04/11	Gr. Beta	48.9 ± 1.8	49.8	33.8 - 56.9	Pass
STW-1246	04/04/11	I-131	26.6 ± 1.7	27.5	22.9 - 32.3	Pass
STW-1247	04/04/11	Ra-226	13.2 ± 0.6	12.1	9.0 - 14.0	Pass
STW-1247	04/04/11	Ra-228	11.2 ± 0.6	11.6	7.6 - 14.3	Pass
STW-1247	04/04/11	Uranium	36.4 ± 0.6	39.8	32.2 - 44.4	Pass
STW-1248	04/04/11	H-3	10322 ± 285	10200.0	8870 - 11200	Pass
STW-1256	10/07/11	Sr-89	68.7 ± 6.0	69.7	56.9 - 77.9	Pass
STW-1256	10/07/11	Sr-90	36.9 ± 2.4	41.1	30.2 - 47.2	Pass
STW-1257	10/07/11	Ba-133	88.2 ± 7.8	96.9	81.8 - 106.0	Pass
STW-1257	10/07/11	Co-60	116.5 ± 7.1	119.0	107.0 - 133.0	Pass
STW-1257 <sup>d</sup>	10/07/11	Cs-134	38.8 ± 8.0	33.4	26.3 - 36.7	Fail
STW-1257	10/07/11	Cs-137	45.6 ± 7.3	44.3	39.4 - 51.7	Pass
STW-1257	10/07/11	Zn-65	84.9 ± 15.4	76.8	68.9 - 92.5	Pass
STW-1258	10/07/11	Gr. Alpha	35.7 ± 3.8	53.2	27.8 - 66.6	Pass
STW-1258	10/07/11	Gr. Beta	36.1 ± 3.3	45.9	30.9 - 53.1	Pass
STW-1259	10/07/11	I-131	25.0 ± 1.1	27.5	22.9 - 32.3	Pass
STW-1260	10/07/11	Ra-226	12.2 ± 0.6	11.6	8.7 - 13.4	Pass
STW-1260	10/07/11	Ra-228	11.5 ± 1.7	10.3	6.7 - 12.8	Pass
STW-1260	10/07/11	Uranium	46.6 ± 0.5	48.6	39.4 - 54.0	Pass
STW-1261	10/07/11	H-3	17435 ± 382	17400	15200 - 19100	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 sample was reanalyzed. Result of reanalysis was acceptable, 32.9 ± 7.4 pCi/L.

TABLE A-2. Table has been intentionally omitted.

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TABLE A-3. In-House "Spike" 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-202	1/17/2011	U-238	4.19 ± 0.19	4.17	0.00 - 16.17	Pass
W-20111	2/1/2011	Ra-226	16.32 ± 0.47	16.77	11.74 - 21.80	Pass
W-20711	2/7/2011	Gr. Alpha	23.02 ± 0.45	20.00	10.00 - 30.00	Pass
W-20711	2/7/2011	Gr. Beta	46.59 ± 0.41	45.20	35.20 - 55.20	Pass
XWW-331	2/11/2011	Ba-133	144.30 ± 8.50	144.40	129.96 - 158.84	Pass
XWW-331	2/11/2011	Cs-134	22.20 ± 3.70	21.50	11.50 - 31.50	Pass
XWW-331	2/11/2011	Cs-137	64.70 ± 7.40	61.00	51.00 - 71.00	Pass
XWW-331	2/11/2011	H-3	13399 ± 334	12538	10030 - 15046	Pass
SPAP-567	2/14/2011	Gr. Beta	46.90 ± 0.11	48.10	28.86 - 67.34	Pass
SPAP-569	2/14/2011	Cs-134	7.70 ± 1.70	7.49	0.00 - 17.49	Pass
SPAP-569	2/14/2011	Cs-137	102.47 ± 3.20	106.79	96.11 - 117.47	Pass
SPAP-571	2/14/2011	H-3	75815 ± 542	73230	58584 - 87876	Pass
SPW-581	2/15/2011	Cs-134	39.91 ± 1.38	37.45	27.45 - 47.45	Pass
SPW-581	2/15/2011	Cs-137	56.28 ± 2.28	53.39	43.39 - 63.39	Pass
SPW-581	2/15/2011	Sr-89	112.92 ± 5.61	121.42	97.14 - 145.70	Pass
SPW-581	2/15/2011	Sr-90	47.80 ± 2.02	42.07	33.66 - 50.48	Pass
SPMI-583	2/15/2011	Cs-137	57.04 ± 2.76	53.39	43.39 - 63.39	Pass
SPMI-583	2/15/2011	Sr-90	36.27 ± 1.47	42.07	33.66 - 50.48	Pass
SPW-602	2/17/2011	U-238	3.98 ± 0.19	4.17	0.00 - 16.17	Pass
SPW-686	2/25/2011	Ni-63	167.41 ± 3.05	208.11	145.68 - 270.54	Pass
SPF-1113	3/17/2011	Cs-137	2369 ± 22	2170	1953 - 2387	Pass
XWW-1602	3/21/2011	Ba-133	26.83 ± 6.35	28.58	18.58 - 38.58	Pass
XWW-1602	3/21/2011	Cs-134	18.90 ± 4.06	16.30	6.30 - 26.30	Pass
XWW-1602	3/21/2011	Cs-137	33.98 ± 5.88	30.50	20.50 - 40.50	Pass
XWW-1602	3/21/2011	H-3	7348 ± 248	7617	6094 - 9140	Pass
XWW-2537	4/4/2011	Ba-133	43.40 ± 4.26	42.70	32.70 - 52.70	Pass
XWW-2537	4/4/2011	Cs-134	13.50 ± 2.40	11.90	1.90 - 21.90	Pass
XWW-2537	4/4/2011	Cs-137	68.30 ± 5.90	60.70	50.70 - 70.70	Pass
XWW-2537	4/4/2011	H-3	7134 ± 257	7234	5787 - 8681	Pass
SPW-2877	5/3/2011	Ra-228	25.23 ± 2.48	31.62	22.13 - 41.11	Pass
SPMI-3167	5/24/2011	Cs-134	33.04 ± 8.25	34.19	24.19 - 44.19	Pass
SPMI-3167	5/24/2011	Cs-137	51.53 ± 8.63	53.06	43.06 - 63.06	Pass
SPMI-3167	5/24/2011	Sr-89	90.89 ± 4.30	93.47	74.78 - 112.16	Pass
SPMI-3167	5/24/2011	Sr-90	41.17 ± 1.53	41.80	33.44 - 50.16	Pass
W-52411	5/24/2011	Ra-226	17.90 ± 0.42	16.80	11.76 - 21.84	Pass
W-60711	6/7/2011	Gr. Alpha	23.00 ± 0.49	20.00	10.00 - 30.00	Pass
W-60711	6/7/2011	Gr. Beta	43.27 ± 0.42	45.20	35.20 - 55.20	Pass
SPAP-4167	7/7/2011	Cs-134	6.92 ± 1.45	6.57	0.00 - 16.57	Pass
SPAP-4167	7/7/2011	Cs-137	108.02 ± 2.84	105.80	95.22 - 116.38	Pass
SPW-4169	7/7/2011	Cs-134	34.52 ± 4.79	32.84	22.84 - 42.84	Pass
SPW-4169	7/7/2011	Cs-137	58.29 ± 6.19	52.92	42.92 - 62.92	Pass



TABLE A-3. In-House "Spike" 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-4169	7/7/2011	Sr-89	66.12 ± 4.18	69.64	55.71 - 83.57	Pass
SPW-4169	7/7/2011	Sr-90	41.72 ± 1.79	41.68	33.34 - 50.02	Pass
SPW-4171	7/7/2011	H-3	70582 ± 767	71646	57317 - 85975	Pass
SPW-4180	7/7/2011	Tc-99	95.69 ± 1.65	97.02	67.91 - 126.13	Pass
SPW-41821	7/7/2011	Ra-228	32.57 ± 2.63	30.63	21.44 - 39.82	Pass
SPW-4241	7/7/2011	Ni-63	403.01 ± 4.66	415.20	290.64 - 539.76	Pass
SPW-4180	7/8/2011	Tc-99	100.30 ± 1.75	97.02	67.91 - 126.13	Pass
SPW-5029	7/29/2011	C-14	3991 ± 17	4739	2843 - 6634	Pass
SPW-5031	7/29/2011	Fe-55	13801 ± 331	14895	11916 - 17874	Pass
W-91411	9/14/2011	Gr. Alpha	21.58 ± 0.44	20.00	10.00 - 30.00	Pass
W-91411	9/14/2011	Gr. Beta	43.02 ± 0.40	45.20	35.20 - 55.20	Pass
SPW-91511	9/15/2011	Tc-99	29.92 ± 1.07	32.34	20.34 - 44.34	Pass
W-91911	9/19/2011	Ra-226	17.06 ± 0.42	16.80	11.76 - 21.84	Pass
W-100711	10/7/2011	Gr. Alpha	22.05 ± 0.45	20.00	10.00 - 30.00	Pass
W-100711	10/7/2011	Gr. Beta	45.51 ± 0.41	45.20	35.20 - 55.20	Pass
W-101111	10/11/2011	Ra-226	16.02 ± 0.40	16.80	11.76 - 21.84	Pass
XWW-7220	11/17/2011	Ba-133	25.11 ± 4.36	27.47	17.47 - 37.47	Pass
XWW-7220	11/17/2011	Cs-134	14.09 ± 3.11	16.60	6.60 - 26.60	Pass
XWW-7220	11/17/2011	Cs-137	35.59 ± 4.28	29.98	19.98 - 39.98	Pass
W-113011	11/30/2011	Ra-226	16.12 ± 0.39	16.80	11.76 - 21.84	Pass
W-120111	12/1/2011	Gr. Alpha	21.34 ± 0.43	20.00	10.00 - 30.00	Pass
W-120111	12/1/2011	Gr. Beta	45.55 ± 0.41	45.20	35.20 - 55.20	Pass
SPW-41823	12/9/2011	Ra-228	26.98 ± 2.38	29.40	20.58 - 38.22	Pass
SPMI-8906	12/22/2011	Cs-134	29.11 ± 3.52	28.14	18.14 - 38.14	Pass
SPMI-8906	12/22/2011	Cs-137	58.27 ± 7.62	52.36	42.36 - 62.36	Pass
SPW-8916	12/22/2011	Cs-134	31.74 ± 3.63	28.14	18.14 - 38.14	Pass
SPW-8916	12/22/2011	Cs-137	56.48 ± 6.12	52.36	42.36 - 62.36	Pass
SPAP-8902	12/23/2011	Gr. Beta	45.72 ± 0.11	47.11	28.27 - 65.95	Pass
SPAP-8904	12/23/2011	Cs-134	5.19 ± 0.63	5.63	0.00 - 15.63	Pass
SPAP-8904	12/23/2011	Cs-137	101.21 ± 2.55	104.71	94.24 - 115.18	Pass
SPW-8918	12/23/2011	H-3	136759 ± 1056	137638	110110 - 165166	Pass
SPW-8922	12/23/2011	Ni-63	202.21 ± 3.75	206.88	144.82 - 268.94	Pass
SPW-8924	12/23/2011	Tc-99	126.10 ± 1.86	129.36	90.55 - 168.17	Pass
SPF-8926	12/23/2011	Cs-134	0.34 ± 0.01	0.33	0.20 - 0.47	Pass
SPF-8926	12/23/2011	Cs-137	2.34 ± 0.02	2.09	1.25 - 2.93	Pass

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

<sup>b</sup> Laboratory codes as follows: 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 ± 2 σ.

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>		Acceptance Criteria (4.66 $\sigma$ )
				Laboratory results (4.66 $\sigma$ )		
				LLD	Activity <sup>c</sup>	
SPW-202	Water	1/17/2011	U-238	0.10	0.12 $\pm$ 0.12	1
W-20111	Water	2/1/2011	Ra-226	0.04	0.05 $\pm$ 0.03	1
W-20711	Water	2/7/2011	Gr. Alpha	0.44	-0.02 $\pm$ 0.29	1
W-20711	Water	2/7/2011	Gr. Beta	0.75	-0.03 $\pm$ 0.53	3.2
SPAP-566	Air Filter	2/14/2011	Gr. Beta	0.64	2.24 $\pm$ 0.61	3.2
SPAP-568	Air Filter	2/14/2011	Cs-134	2.34	-	100
SPAP-568	Air Filter	2/14/2011	Cs-137	1.56	-	100
SPAP-570	Air Filter	2/14/2011	H-3	103.20	-49.40 $\pm$ 52.50	200
SPW-580	Water	2/15/2011	Cs-134	2.68	-	10
SPW-580	Water	2/15/2011	Cs-137	2.84	-	10
SPW-580	Water	2/15/2011	Sr-89	0.73	0.24 $\pm$ 0.57	5
SPW-580	Water	2/15/2011	Sr-90	0.57	0.02 $\pm$ 0.27	1
SPMI-582	Milk	2/15/2011	Cs-134	3.49	-	10
SPMI-582	Milk	2/15/2011	Cs-137	3.54	-	10
SPMI-582	Milk	2/15/2011	I-131(G)	4.14	-	20
SPMI-582	Milk	2/15/2011	Sr-89	0.71	0.16 $\pm$ 0.67	5
SPMI-582	Milk	2/15/2011	Sr-90	0.55	0.59 $\pm$ 0.32	1
SPW-601	Water	2/17/2011	U-238	0.20	0.09 $\pm$ 0.17	1
SPW-685	Water	2/25/2011	Ni-63	1.61	0.05 $\pm$ 0.98	20
SPF-1112	Fish	3/17/2011	Cs-134	6.74	-	100
SPF-1112	Fish	3/17/2011	Cs-137	5.45	-	100
BKW-40111	Water	4/1/2011	I-131	4.16	-	10
BKW-40111	Water	4/1/2011	Co-60	3.11	-	10
BKW-40111	Water	4/1/2011	Cs-134	4.73	-	10
BKW-40111	Water	4/1/2011	Cs-137	5.04	-	10
SPW-2887	Water	5/3/2011	Ra-228	0.72	0.46 $\pm$ 0.39	2
W-52411	Water	5/24/2011	Ra-226	0.04	0.05 $\pm$ 0.03	1
W-60711	Water	6/7/2011	Gr. Alpha	0.51	0.00 $\pm$ 0.36	1
W-60711	Water	6/7/2011	Gr. Beta	1.58	0.38 $\pm$ 1.12	3.2
SPAP-4164	Air Filter	7/7/2011	Gr. Beta	0.72	1.04 $\pm$ 0.48	3.2
SPW-4168	Water	7/7/2011	Cs-134	3.41	-	10
SPW-4168	Water	7/7/2011	Cs-137	2.45	-	10
SPW-4168	Water	7/7/2011	Sr-89	0.72	0.40 $\pm$ 0.50	5
SPW-4168	Water	7/7/2011	Sr-90	0.51	-0.19 $\pm$ 0.21	1
SPW-4171	Water	7/7/2011	H-3	152.00	37.10 $\pm$ 81.80	200
SPW-41811	Water	7/7/2011	Ra-228	0.77	0.51 $\pm$ 0.42	2

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

Lab Code	Sample Type	Date	Analysis <sup>b</sup>	Concentration (pCi/L) <sup>a</sup>		Acceptance Criteria (4.66 $\sigma$ )
				Laboratory results (4.66 $\sigma$ )		
				LLD	Activity <sup>c</sup>	
SPW-4241	Water	7/7/2011	Ni-63	1.70	0.09 $\pm$ 1.03	20
SPW-4179	Water	7/8/2011	Tc-99	1.20	-0.96 $\pm$ 0.71	10
SPW-5028	Water	7/29/2011	C-14	109.80	61.90 $\pm$ 59.20	200
SPW-5031	Water	7/29/2011	Fe-55	140.60	0.00 $\pm$ 85.30	1000
W-91411	Water	9/14/2011	Gr. Alpha	0.48	-0.06 $\pm$ 0.33	1
W-91411	Water	9/14/2011	Gr. Beta	0.78	-0.43 $\pm$ 0.53	3.2
SPW-91511	Water	9/15/2011	Tc-99	1.11	-0.62 $\pm$ 0.66	10
W-91911	Water	9/19/2011	Ra-226	0.03	0.04 $\pm$ 0.02	1
W-100711	Water	10/7/2011	Gr. Alpha	0.44	-0.26 $\pm$ 0.28	1
W-100711	Water	10/7/2011	Gr. Beta	0.76	-0.43 $\pm$ 0.52	3.2
W-101111	Water	10/11/2011	Ra-226	0.04	0.05 $\pm$ 0.03	1
W-113011	Water	11/30/2011	Ra-226	0.03	0.04 $\pm$ 0.02	1
W-120111	Water	12/1/2011	Gr. Alpha	0.41	-0.20 $\pm$ 0.27	1
W-120111	Water	12/1/2011	Gr. Beta	0.75	-0.10 $\pm$ 0.53	3.2
SPW-41813	Water	12/9/2011	Ra-228	0.71	0.17 $\pm$ 0.35	2
SPMI-8905	Milk	12/22/2011	Cs-134	3.27	-	10
SPMI-8905	Milk	12/22/2011	Cs-137	3.38	-	10
SPMI-8905	Milk	12/22/2011	I-131(G)	2.17	-	20
SPW-8915	Water	12/22/2011	Cs-134	3.37	-	10
SPW-8915	Water	12/22/2011	Cs-137	3.45	-	10
SPW-8915	Water	12/22/2011	I-131(G)	3.38	-	20
SPAP-8901	Air Filter	12/23/2011	Gr. Beta	0.78	0.50 $\pm$ 0.46	3.2
SPAP-8903	Air Filter	12/23/2011	Cs-134	1.65	-	100
SPAP-8903	Air Filter	12/23/2011	Cs-137	2.41	-	100
SPW-8917	Water	12/23/2011	H-3	150.20	-3.04 $\pm$ 78.80	200
SPW-8921	Water	12/23/2011	Ni-63	16.92	-4.60 $\pm$ 10.16	20
SPW-8923	Water	12/23/2011	Tc-99	5.66	-5.45 $\pm$ 3.34	10
SPF-8925	Fish	12/23/2011	Cs-134	7.15	-	100
SPF-8925	Fish	12/23/2011	Cs-137	9.73	-	100

<sup>a</sup> Liquid sample results are reported in pCi/Liter, air filters (pCi/filter), 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. For gamma spectroscopic analysis, activity detected below the LLD value is not reported.

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-20, 21	1/3/2011	Be-7	0.24 ± 0.14	0.34 ± 0.17	0.29 ± 0.11	Pass
CF-20, 21	1/3/2011	K-40	10.37 ± 0.43	9.76 ± 0.68	10.07 ± 0.40	Pass
CF-20, 21	1/3/2011	Sr-90	0.01 ± 0.01	0.01 ± 0.01	0.01 ± 0.00	Pass
VWV-65, 66	1/6/2011	H-3	321.91 ± 97.19	345.76 ± 98.16	333.83 ± 69.06	Pass
BS-165, 166	1/11/2011	Cs-137	0.13 ± 0.02	0.15 ± 0.02	0.14 ± 0.01	Pass
BS-165, 166	1/11/2011	H-3	286.00 ± 80.00	284.00 ± 80.00	285.00 ± 56.57	Pass
BS-165, 166	1/11/2011	K-40	14.11 ± 0.52	13.79 ± 0.60	13.95 ± 0.40	Pass
BS-176, 177	1/11/2011	H-3	391.00 ± 92.00	332.00 ± 89.00	361.50 ± 64.00	Pass
BS-176, 177	1/11/2011	K-40	9.06 ± 0.44	8.28 ± 0.81	8.67 ± 0.46	Pass
BS-197, 198	1/11/2011	Cs-137	0.14 ± 0.03	0.15 ± 0.04	0.15 ± 0.03	Pass
BS-197, 198	1/11/2011	H-3	459.00 ± 103.00	283.00 ± 95.00	371.00 ± 70.06	Pass
BS-197, 198	1/11/2011	K-40	14.40 ± 0.77	14.16 ± 1.23	14.28 ± 0.73	Pass
VWV-358, 359	1/17/2011	H-3	331.44 ± 93.05	407.65 ± 95.91	369.55 ± 66.81	Pass
DW-20009, 20010	1/19/2011	Ra-226	3.66 ± 0.57	2.74 ± 0.43	3.20 ± 0.36	Pass
DW-20009, 20010	1/19/2011	Ra-228	1.51 ± 0.64	1.36 ± 0.60	1.44 ± 0.44	Pass
VWV-337, 338	1/25/2011	H-3	21986 ± 402	21896 ± 401	21941 ± 284	Pass
W-491, 492	1/27/2011	Ra-226	6.70 ± 0.50	6.10 ± 0.50	6.40 ± 0.35	Pass
W-491, 492	1/27/2011	Ra-228	6.60 ± 1.30	8.40 ± 1.40	7.50 ± 0.96	Pass
DW-20014, 20015	1/28/2011	Gr. Alpha	1.91 ± 0.71	2.34 ± 0.80	2.13 ± 0.53	Pass
SWU-447, 448	1/31/2011	Gr. Beta	7.42 ± 1.17	6.85 ± 1.11	7.14 ± 0.81	Pass
W-694, 695	2/7/2011	H-3	628.26 ± 104.30	692.37 ± 106.89	660.32 ± 74.67	Pass
DW-20022, 20023	2/9/2011	Ra-228	0.71 ± 0.47	1.13 ± 0.54	0.92 ± 0.36	Pass
SW-626, 627	2/16/2011	H-3	1268.17 ± 129.52	1144.65 ± 125.39	1206.41 ± 90.14	Pass
LW-825, 826	2/24/2011	Gr. Beta	2.65 ± 0.82	2.45 ± 0.74	2.55 ± 0.55	Pass
SWT-845, 846	3/1/2011	Gr. Beta	1.11 ± 0.39	0.80 ± 0.37	0.96 ± 0.27	Pass
MI-998, 999	3/7/2011	K-40	1760.10 ± 127.50	1708.50 ± 131.60	1734.30 ± 91.62	Pass
W-1024, 1025	3/7/2011	H-3	489.83 ± 101.09	581.39 ± 105.06	535.61 ± 72.90	Pass
VWV-1156, 1157	3/16/2011	Gr. Beta	1.79 ± 0.78	0.47 ± 0.66	1.13 ± 0.51	Pass
P-1198, 1199	3/17/2011	H-3	504.00 ± 133.00	597.00 ± 136.00	550.50 ± 95.11	Pass
SW-1434, 1435	3/28/2011	H-3	15523 ± 359	15968 ± 364	15746 ± 256	Pass
VWV-1588, 1589	3/28/2011	Gr. Beta	1.81 ± 1.23	2.81 ± 1.38	2.31 ± 0.92	Pass
SG-1714, 1715	3/28/2011	Gr. Alpha	8.82 ± 0.81	8.58 ± 0.74	8.70 ± 0.55	Pass
SG-1714, 1715	3/28/2011	Gr. Beta	13.78 ± 0.65	12.76 ± 0.58	13.27 ± 0.44	Pass
AP-1862, 1863	3/28/2011	Be-7	0.09 ± 0.02	0.08 ± 0.02	0.08 ± 0.01	Pass
W-2143, 2144	3/28/2011	H-3	536.40 ± 99.37	466.79 ± 96.46	501.59 ± 69.25	Pass
AP-2269, 2270	3/28/2011	Be-7	0.07 ± 0.01	0.08 ± 0.01	0.07 ± 0.01	Pass
DW-20061, 20062	3/28/2011	Gr. Alpha	2.82 ± 1.33	3.89 ± 1.26	3.36 ± 0.92	Pass
SWU-1455, 1456	3/29/2011	Gr. Beta	2.50 ± 0.75	2.75 ± 0.83	2.62 ± 0.56	Pass
SWU-1522, 1523	3/29/2011	Gr. Beta	1.36 ± 0.87	2.14 ± 0.96	1.75 ± 0.65	Pass
PM-1543, 1544	3/29/2011	Gr. Beta	13.81 ± 0.26	13.67 ± 0.27	13.74 ± 0.19	Pass
PM-1543, 1544	3/29/2011	Sr-90	8.12 ± 3.20	7.71 ± 3.25	7.91 ± 2.28	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	
SWT-5885, 5886	3/29/2011	Gr. Beta	1.21 ± 0.54	0.77 ± 0.54	0.99 ± 0.38	Pass
AP-1883, 1884	3/30/2011	Be-7	0.07 ± 0.01	0.09 ± 0.02	0.08 ± 0.01	Pass
AP-2248, 2249	3/30/2011	Be-7	0.06 ± 0.01	0.06 ± 0.01	0.06 ± 0.01	Pass
DW-20066, 20067	3/30/2011	Ra-226	2.14 ± 0.16	2.10 ± 0.16	2.12 ± 0.11	Pass
DW-20066, 20067	3/30/2011	Ra-228	2.55 ± 0.65	1.78 ± 0.62	2.17 ± 0.45	Pass
P-1567, 1568	4/1/2011	H-3	289.00 ± 103.00	296.00 ± 103.00	292.50 ± 72.83	Pass
MI-1609, 1610	4/4/2011	I-131	0.85 ± 0.17	0.91 ± 0.18	0.88 ± 0.13	Pass
MI-1609, 1610	4/4/2011	K-40	1323.80 ± 112.00	1323.20 ± 96.22	1323.50 ± 73.83	Pass
MI-1609, 1610	4/4/2011	Sr-90	0.85 ± 0.33	0.97 ± 0.34	0.91 ± 0.24	Pass
S-1651, 1652	4/4/2011	Ac-228	0.88 ± 0.08	1.03 ± 0.22	0.96 ± 0.12	Pass
S-1651, 1652	4/4/2011	Pb-214	1.09 ± 0.12	0.84 ± 0.16	0.97 ± 0.10	Pass
AP-1841, 1842	4/7/2011	Be-7	0.12 ± 0.02	0.12 ± 0.01	0.12 ± 0.01	Pass
AP-1841, 1842	4/7/2011	Cs-137	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	Pass
AP-1841, 1842	4/7/2011	I-131(G)	0.02 ± 0.00	0.03 ± 0.00	0.03 ± 0.00	Pass
S-1990, 1991	4/7/2011	Ac-228	15.83 ± 0.39	16.12 ± 0.64	15.98 ± 0.37	Pass
S-1990, 1991	4/7/2011	Pb-214	11.21 ± 0.23	11.81 ± 1.22	11.51 ± 0.62	Pass
VWV-2552, 2553	4/7/2011	H-3	761.09 ± 116.48	759.04 ± 116.41	760.07 ± 82.34	Pass
PM-1904, 1905	4/11/2011	K-40	13585 ± 611	14278 ± 648	13932 ± 445	Pass
PM-1904, 1905	4/11/2011	Sr-90	9.94 ± 3.05	5.62 ± 2.52	7.78 ± 1.98	Pass
P-2011, 2012	4/11/2011	H-3	670.00 ± 108.00	619.00 ± 106.00	644.50 ± 75.66	Pass
VWV-2053, 2054	4/13/2011	H-3	220.20 ± 86.50	246.80 ± 87.80	233.50 ± 61.63	Pass
BS-2095, 2096	4/13/2011	K-40	12.88 ± 0.72	13.56 ± 1.08	13.22 ± 0.65	Pass
DW-20099, 20100	4/13/2011	U-233/4	1.64 ± 0.40	1.31 ± 0.34	1.48 ± 0.26	Pass
DW-20099, 20100	4/13/2011	U-238	1.49 ± 0.39	1.28 ± 0.33	1.39 ± 0.26	Pass
VWV-2416, 2417	4/19/2011	H-3	217.10 ± 97.00	184.90 ± 95.60	201.00 ± 68.10	Pass
P-2185, 2186	4/20/2011	H-3	405.00 ± 93.00	504.00 ± 98.00	454.50 ± 67.55	Pass
VWV-2353, 2354	4/20/2011	H-3	525.54 ± 119.74	399.41 ± 115.99	462.48 ± 83.35	Pass
DW-20115, 20116	4/26/2011	U-233/4	11.94 ± 2.34	10.71 ± 1.19	11.33 ± 1.31	Pass
DW-20115, 20116	4/26/2011	U-238	2.70 ± 1.15	3.89 ± 0.72	3.30 ± 0.68	Pass
SO-2960, 2961	4/27/2011	K-40	22.63 ± 1.36	22.90 ± 0.03	22.77 ± 0.68	Pass
MI-2657, 2658	5/2/2011	K-40	1319.30 ± 101.30	1403.20 ± 131.60	1361.25 ± 83.04	Pass
DW-20130, 20131	5/2/2011	U-233/4	7.59 ± 0.90	7.62 ± 0.83	7.61 ± 0.61	Pass
DW-20130, 20131	5/2/2011	U-238	4.67 ± 0.72	4.84 ± 0.66	4.76 ± 0.49	Pass
DW-20148, 20149	5/3/2011	U-233/4	6.64 ± 0.83	6.35 ± 0.81	6.50 ± 0.58	Pass
DW-20148, 20149	5/3/2011	U-238	6.11 ± 0.83	5.18 ± 0.73	5.65 ± 0.55	Pass
PM-2810, 2811	5/4/2011	Cs-134	18.64 ± 12.16	33.33 ± 11.86	25.99 ± 8.49	Pass
PM-2810, 2811	5/4/2011	Cs-137	28.99 ± 14.92	21.17 ± 12.16	25.08 ± 9.62	Pass
PM-2810, 2811	5/4/2011	K-40	14368 ± 720	14309 ± 638	14339 ± 481	Pass
VWV-3065, 3066	5/16/2011	H-3	280.51 ± 86.98	179.46 ± 82.83	229.98 ± 60.05	Pass
VWV-3086, 3087	5/16/2011	H-3	341.14 ± 85.94	377.97 ± 87.43	359.56 ± 61.30	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	
SG-3134, 3135	5/16/2011	Ac-228	11.19 ± 0.82	12.50 ± 0.84	11.85 ± 0.59	Pass
SG-3134, 3135	5/16/2011	Pb-214	9.12 ± 0.17	9.37 ± 0.42	9.25 ± 0.23	Pass
F-3221, 3222	5/23/2011	K-40	2.73 ± 0.39	2.81 ± 0.42	2.77 ± 0.29	Pass
SS-3434, 3435	5/25/2011	K-40	11533.00 ± 563.70	11236.00 ± 566.10	11384.50 ± 399.45	Pass
AP-3329, 3330	5/26/2011	Be-7	0.24 ± 0.11	0.23 ± 0.13	0.24 ± 0.08	Pass
VWV-3350, 3351	6/1/2011	H-3	235.37 ± 83.98	173.12 ± 81.05	204.25 ± 58.36	Pass
G-3413, 3414	6/1/2011	Be-7	0.28 ± 0.10	0.25 ± 0.09	0.27 ± 0.07	Pass
G-3413, 3414	6/1/2011	Gr. Beta	11.04 ± 0.31	10.85 ± 0.31	10.95 ± 0.22	Pass
G-3413, 3414	6/1/2011	K-40	6.80 ± 0.33	6.71 ± 0.38	6.76 ± 0.25	Pass
AP-3602, 3603	6/3/2011	Be-7	0.20 ± 0.08	0.25 ± 0.10	0.22 ± 0.07	Pass
SO-3797, 3798	6/8/2011	Ac-228	0.99 ± 0.05	1.00 ± 0.06	1.00 ± 0.04	Pass
SO-3797, 3798	6/8/2011	Bi-212	1.10 ± 0.12	1.08 ± 0.17	1.09 ± 0.10	Pass
SO-3797, 3798	6/8/2011	Bi-214	0.87 ± 0.02	0.86 ± 0.02	0.87 ± 0.01	Pass
SO-3797, 3798	6/8/2011	Cs-137	0.41 ± 0.01	0.39 ± 0.01	0.40 ± 0.01	Pass
SO-3797, 3798	6/8/2011	K-40	16.08 ± 0.26	16.27 ± 0.29	16.18 ± 0.19	Pass
SO-3797, 3798	6/8/2011	Pb-212	0.98 ± 0.10	0.93 ± 0.02	0.96 ± 0.05	Pass
SO-3797, 3798	6/8/2011	Pb-214	0.95 ± 0.02	0.91 ± 0.02	0.93 ± 0.01	Pass
SO-3797, 3798	6/8/2011	Th-232	0.47 ± 0.05	0.49 ± 0.04	0.48 ± 0.03	Pass
SO-3797, 3798	6/8/2011	U-233/4	0.16 ± 0.02	0.15 ± 0.02	0.16 ± 0.01	Pass
SO-3797, 3798	6/8/2011	U-238	0.16 ± 0.02	0.13 ± 0.02	0.15 ± 0.01	Pass
MI-3935, 3936	6/20/2011	K-40	1764.60 ± 119.40	1843.10 ± 136.50	1803.85 ± 90.68	Pass
BS-4172, 4173	6/21/2011	Cs-137	51.50 ± 23.78	48.57 ± 17.06	50.04 ± 14.63	Pass
BS-4172, 4173	6/21/2011	K-40	11730.00 ± 679.60	11120.00 ± 512.30	11425.00 ± 425.53	Pass
DW-20183, 20184	6/21/2011	U-233/4	10.00 ± 1.00	8.40 ± 0.90	9.20 ± 0.67	Pass
DW-20183, 20184	6/21/2011	U-238	6.70 ± 0.80	6.10 ± 0.80	6.40 ± 0.57	Pass
VWV-4019, 4020	6/24/2011	Gr. Beta	3.56 ± 1.20	3.16 ± 1.21	3.36 ± 0.85	Pass
PM-4193, 4194	6/30/2011	K-40	14795.00 ± 759.00	14660.00 ± 750.00	14727.50 ± 533.52	Pass
LWV-4235, 4236	6/30/2011	Gr. Beta	2.70 ± 0.72	2.11 ± 0.78	2.41 ± 0.53	Pass
AP-4367, 4368	7/7/2011	Be-7	0.17 ± 0.10	0.19 ± 0.11	0.18 ± 0.07	Pass
MI-4416, 4417	7/11/2011	K-40	1342.40 ± 91.49	1447.00 ± 114.80	1394.70 ± 73.40	Pass
W-4914, 4915	7/11/2011	H-3	576.36 ± 110.35	584.67 ± 110.67	580.52 ± 78.14	Pass
MI-4438, 4439	7/12/2011	K-40	1280.60 ± 107.50	1381.20 ± 112.70	1330.90 ± 77.87	Pass
VE-4481, 4482	7/13/2011	K-40	4452.60 ± 332.40	4767.90 ± 349.70	4610.25 ± 241.24	Pass
AP-4677, 4678	7/15/2011	Be-7	0.18 ± 0.08	0.23 ± 0.09	0.20 ± 0.06	Pass
W-5537, 5538	7/18/2011	H-3	650.13 ± 105.19	695.39 ± 106.94	672.76 ± 75.00	Pass
P-4764, 4765	7/19/2011	H-3	179.82 ± 84.81	138.72 ± 82.79	159.27 ± 59.26	Pass
VWV-5211, 5212	7/24/2011	H-3	191.94 ± 85.50	136.22 ± 82.76	164.08 ± 59.50	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-4998, 4999	7/25/2011	Be-7	543.90 ± 158.20	488.30 ± 163.80	516.10 ± 113.86	Pass
VE-4998, 4999	7/25/2011	K-40	2562.20 ± 319.80	2414.00 ± 350.00	2488.10 ± 237.05	Pass
DW-20258, 20259	7/25/2011	U-233/4	21.34 ± 1.52	24.93 ± 2.93	23.14 ± 1.65	Pass
DW-20258, 20259	7/25/2011	U-235	0.57 ± 0.26	0.69 ± 0.26	0.63 ± 0.18	Pass
DW-20258, 20259	7/25/2011	U-238	14.11 ± 1.24	15.81 ± 1.23	14.96 ± 0.87	Pass
DW-20269, 20270	7/25/2011	U-233/4	4.93 ± 0.73	4.65 ± 0.68	4.79 ± 0.50	Pass
DW-20269, 20270	7/25/2011	U-238	3.26 ± 0.60	2.53 ± 0.50	2.90 ± 0.39	Pass
DW-20280, 20281	7/25/2011	U-233/4	3.58 ± 0.58	3.33 ± 0.56	3.46 ± 0.40	Pass
DW-20280, 20281	7/25/2011	U-238	1.64 ± 0.40	2.11 ± 0.45	1.88 ± 0.30	Pass
MI-5019, 5020	7/26/2011	K-40	1348.50 ± 101.00	1347.40 ± 109.70	1347.95 ± 74.56	Pass
W-5447, 5448	7/26/2011	H-3	246.31 ± 99.19	241.99 ± 99.02	244.15 ± 70.08	Pass
G-5124, 5125	7/28/2011	Gr. Beta	7.48 ± 0.20	7.17 ± 0.19	7.33 ± 0.14	Pass
AP-5232, 5233	7/28/2011	Be-7	0.15 ± 0.08	0.22 ± 0.13	0.19 ± 0.08	Pass
SL-5169, 5170	8/1/2011	Be-7	2.37 ± 0.16	2.17 ± 0.17	2.27 ± 0.12	Pass
SL-5169, 5170	8/1/2011	Gr. Beta	4.74 ± 0.45	3.94 ± 0.39	4.34 ± 0.30	Pass
SL-5169, 5170	8/1/2011	K-40	3.12 ± 0.16	2.96 ± 0.21	3.04 ± 0.13	Pass
G-5190, 5191	8/1/2011	Be-7	3.14 ± 0.30	3.44 ± 0.27	3.29 ± 0.20	Pass
G-5190, 5191	8/1/2011	Gr. Beta	8.07 ± 0.28	7.86 ± 0.27	7.97 ± 0.19	Pass
G-5190, 5191	8/1/2011	K-40	5.51 ± 0.46	5.57 ± 0.44	5.54 ± 0.32	Pass
DW-20291, 20292	8/2/2011	U-233/4	3.24 ± 0.54	2.60 ± 0.50	2.92 ± 0.37	Pass
DW-20291, 20292	8/2/2011	U-238	1.59 ± 0.38	2.00 ± 0.43	1.80 ± 0.29	Pass
SG-5342, 5343	8/5/2011	Ac-228	14.41 ± 0.36	14.13 ± 0.48	14.27 ± 0.30	Pass
SG-5342, 5343	8/5/2011	Bi-212	4.14 ± 0.65	4.73 ± 1.21	4.44 ± 0.69	Pass
SG-5342, 5343	8/5/2011	K-40	7.67 ± 0.92	7.95 ± 1.21	7.81 ± 0.76	Pass
SG-5342, 5343	8/5/2011	Pb-214	10.72 ± 0.21	10.67 ± 0.28	10.70 ± 0.18	Pass
SG-5342, 5343	8/5/2011	Tl-208	0.96 ± 0.06	1.00 ± 0.06	0.98 ± 0.04	Pass
MI-5405, 5406	8/8/2011	K-40	1545.30 ± 116.00	1388.00 ± 98.20	1466.65 ± 75.99	Pass
DW-20301, 20302	8/9/2011	Gr. Alpha	6.36 ± 1.09	5.30 ± 1.08	5.83 ± 0.77	Pass
DW-20301, 20302	8/9/2011	Gr. Beta	14.36 ± 0.92	13.51 ± 0.89	13.94 ± 0.64	Pass
DW-5603, 5604	8/16/2011	Ra-228	1.68 ± 0.88	2.26 ± 0.91	1.97 ± 0.63	Pass
VE-5753, 5754	8/22/2011	Be-7	0.78 ± 0.20	0.75 ± 0.23	0.77 ± 0.15	Pass
VE-5753, 5754	8/22/2011	K-40	6.16 ± 0.51	6.63 ± 0.57	6.40 ± 0.38	Pass
S-5801, 5802	8/29/2011	Ac-228	0.43 ± 0.09	0.38 ± 0.07	0.41 ± 0.06	Pass
S-5801, 5802	8/29/2011	K-40	6.54 ± 0.51	5.96 ± 0.49	6.25 ± 0.35	Pass
S-5801, 5802	8/29/2011	Pb-212	0.31 ± 0.03	0.36 ± 0.03	0.34 ± 0.02	Pass
S-5801, 5802	8/29/2011	Pb-214	0.28 ± 0.04	0.25 ± 0.04	0.27 ± 0.03	Pass
S-5801, 5802	8/29/2011	Tl-208	0.14 ± 0.02	0.12 ± 0.02	0.13 ± 0.01	Pass
S-5801, 5802	8/29/2011	U-235	0.05 ± 0.02	0.04 ± 0.01	0.05 ± 0.01	Pass
ME-5996, 5997	9/1/2011	Gr. Alpha	0.03 ± 0.02	0.03 ± 0.02	0.03 ± 0.01	Pass
ME-5996, 5997	9/1/2011	Gr. Beta	2.55 ± 0.07	2.62 ± 0.07	2.58 ± 0.05	Pass
ME-5996, 5997	9/1/2011	K-40	2.66 ± 0.35	2.24 ± 0.58	2.45 ± 0.34	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	
SL-6017, 6018	9/6/2011	Be-7	0.47 ± 0.17	0.51 ± 0.19	0.49 ± 0.13	Pass
SL-6017, 6018	9/6/2011	Gr. Beta	4.23 ± 0.16	3.94 ± 0.15	4.09 ± 0.11	Pass
SL-6017, 6018	9/6/2011	K-40	4.43 ± 0.55	4.24 ± 0.53	4.34 ± 0.38	Pass
VE-6038, 6039	9/7/2011	Sr-90	1.86 ± 0.98	2.30 ± 0.92	2.08 ± 0.67	Pass
SW-6059, 6060	9/8/2011	H-3	219.75 ± 97.52	177.41 ± 95.76	198.58 ± 68.34	Pass
VE-6302, 6303	9/13/2011	Be-7	0.76 ± 0.24	0.85 ± 0.20	0.81 ± 0.16	Pass
VE-6302, 6303	9/13/2011	Gr. Beta	27.00 ± 1.02	25.50 ± 0.95	26.25 ± 0.70	Pass
VE-6302, 6303	9/13/2011	H-3	6966.00 ± 249.00	6947.00 ± 249.00	6956.50 ± 176.07	Pass
VE-6302, 6303	9/13/2011	K-40	20.62 ± 0.68	20.63 ± 0.64	20.63 ± 0.47	Pass
W-7098, 7099	9/19/2011	H-3	586.61 ± 103.06	525.71 ± 100.63	556.16 ± 72.02	Pass
W-6407, 6408	9/20/2011	Ra-228	1.61 ± 0.94	0.79 ± 0.81	1.20 ± 0.62	Pass
MI-6479, 6480	9/27/2011	K-40	1384.10 ± 111.10	1411.40 ± 105.00	1397.75 ± 76.43	Pass
W-6579, 6580	9/27/2011	H-3	287.97 ± 99.68	285.95 ± 99.60	286.96 ± 70.45	Pass
AP-7015, 7016	9/27/2011	Be-7	0.08 ± 0.02	0.09 ± 0.02	0.08 ± 0.01	Pass
AP-6105, 6106	9/28/2011	Be-7	0.11 ± 0.02	0.09 ± 0.02	0.10 ± 0.01	Pass
LW-6603, 6604	9/28/2011	Gr. Beta	2.15 ± 1.04	1.65 ± 0.90	1.90 ± 0.69	Pass
AP-7056, 7057	9/29/2011	Be-7	0.08 ± 0.02	0.06 ± 0.01	0.07 ± 0.01	Pass
G-6730, 6731	10/3/2011	Be-7	4.24 ± 0.36	4.47 ± 0.37	4.36 ± 0.26	Pass
G-6730, 6731	10/3/2011	Gr. Beta	8.27 ± 0.33	7.93 ± 0.31	8.10 ± 0.23	Pass
G-6730, 6731	10/3/2011	K-40	6.46 ± 0.56	5.41 ± 0.50	5.94 ± 0.38	Pass
AP-7077, 7078	10/3/2011	Be-7	0.08 ± 0.01	0.07 ± 0.01	0.07 ± 0.01	Pass
AP-7077, 7078	10/3/2011	Be-7	0.08 ± 0.01	0.07 ± 0.01	0.07 ± 0.01	Pass
VE-6798, 6799	10/4/2011	K-40	11.76 ± 0.65	11.91 ± 0.62	11.84 ± 0.45	Pass
AP-6820, 6821	10/6/2011	Be-7	0.22 ± 0.08	0.18 ± 0.10	0.20 ± 0.06	Pass
W-7755, 7756	10/9/2011	H-3	261.92 ± 96.52	221.92 ± 94.80	241.92 ± 67.65	Pass
BS-7944, 7945	10/10/2011	Cs-137	291.17 ± 34.00	330.68 ± 36.40	310.93 ± 24.90	Pass
BS-7944, 7945	10/10/2011	K-40	14237.00 ± 686.40	15359.00 ± 703.80	14798.00 ± 491.55	Pass
BS-7140, 7141	10/13/2011	K-40	2.59 ± 0.35	2.58 ± 0.52	2.59 ± 0.31	Pass
AP-7168, 7169	10/13/2011	Be-7	0.25 ± 0.09	0.25 ± 0.11	0.25 ± 0.07	Pass
DW-20349, 20350	10/13/2011	U-233/4	1.77 ± 0.41	2.25 ± 0.77	2.01 ± 0.44	Pass
DW-20349, 20350	10/13/2011	U-238	0.28 ± 0.19	0.31 ± 0.33	0.30 ± 0.19	Pass
VW-7667, 7668	10/19/2011	H-3	1049.11 ± 116.32	1071.39 ± 117.10	1060.25 ± 82.53	Pass
VW-7381, 7382	10/21/2011	H-3	1904.40 ± 145.45	1813.62 ± 142.91	1859.01 ± 101.95	Pass
SS-7495, 7496	10/26/2011	K-40	10.16 ± 0.55	9.56 ± 0.49	9.86 ± 0.37	Pass
W-7516, 7517	10/27/2011	H-3	191.46 ± 84.47	224.05 ± 86.03	207.76 ± 60.28	Pass
VE-7537, 7538	10/28/2011	K-40	2.08 ± 0.23	2.41 ± 0.21	2.24 ± 0.16	Pass
MI-7622, 7623	10/31/2011	K-40	1386.20 ± 116.80	1407.90 ± 116.50	1397.05 ± 82.48	Pass
DW-20399, 20400	10/31/2011	U-233/4	5.70 ± 0.70	5.70 ± 0.70	5.70 ± 0.49	Pass
DW-20399, 20400	10/31/2011	U-238	3.10 ± 0.50	3.70 ± 0.70	3.40 ± 0.43	Pass
BS-7600, 7601	11/1/2011	Gr. Beta	6.83 ± 1.44	5.31 ± 1.35	6.07 ± 0.98	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	
SG-8471, 8472	11/1/2011	Gr. Alpha	13.63 ± 2.32	11.13 ± 2.00	12.38 ± 1.53	Pass
SG-8471, 8472	11/1/2011	Gr. Beta	20.30 ± 1.43	17.65 ± 1.42	18.98 ± 1.01	Pass
DW-20424, 20425	11/7/2011	U-233/4	5.90 ± 0.80	6.10 ± 0.80	6.00 ± 0.57	Pass
DW-20424, 20425	11/7/2011	U-235	0.10 ± 0.10	0.30 ± 0.20	0.20 ± 0.11	Pass
DW-20424, 20425	11/7/2011	U-238	4.30 ± 0.70	3.70 ± 0.60	4.00 ± 0.46	Pass
DW-20424, 20425	11/7/2011	U-238	10.30 ± 1.00	10.10 ± 1.00	10.20 ± 0.71	Pass
DW-20435, 20436	11/8/2011	U-233/4	11.00 ± 1.10	10.60 ± 0.80	10.80 ± 0.68	Pass
DW-20435, 20436	11/8/2011	U-238	5.90 ± 0.80	4.90 ± 0.60	5.40 ± 0.50	Pass
SG-7902, 7903	11/10/2011	Ac-228	21.38 ± 0.47	20.48 ± 0.52	20.93 ± 0.35	Pass
SG-7902, 7903	11/10/2011	K-40	9.72 ± 1.04	9.53 ± 0.92	9.63 ± 0.69	Pass
SG-7902, 7903	11/10/2011	Pb-212	3.99 ± 0.10	3.99 ± 0.10	3.99 ± 0.07	Pass
SG-7902, 7903	11/10/2011	Pb-214	9.15 ± 0.23	9.14 ± 0.21	9.15 ± 0.16	Pass
BS-8033, 8034	11/11/2011	Cs-137	0.03 ± 0.02	0.03 ± 0.02	0.03 ± 0.01	Pass
LW-8075, 8076	11/16/2011	Gr. Beta	1.93 ± 0.62	2.55 ± 0.64	2.24 ± 0.44	Pass
AP-8193, 8194	11/17/2011	Be-7	0.21 ± 0.11	0.26 ± 0.13	0.24 ± 0.08	Pass
F-8663, 8664	11/19/2011	Cs-137	0.03 ± 0.02	0.03 ± 0.02	0.03 ± 0.01	Pass
F-8663, 8664	11/19/2011	Gr. Beta	3.55 ± 0.10	3.71 ± 0.10	3.63 ± 0.07	Pass
F-8663, 8664	11/19/2011	K-40	3.04 ± 0.42	3.05 ± 0.35	3.05 ± 0.27	Pass
DW-20449, 20450	11/28/2011	U-233/4	0.70 ± 0.20	0.80 ± 0.20	0.75 ± 0.14	Pass
DW-20449, 20450	11/28/2011	U-238	0.60 ± 0.20	0.60 ± 0.20	0.60 ± 0.14	Pass
SWU-8388, 8389	11/29/2011	Gr. Beta	1.66 ± 0.57	1.65 ± 0.59	1.66 ± 0.41	Pass
AP-8841, 8842	12/15/2011	Be-7	0.23 ± 0.12	0.19 ± 0.09	0.21 ± 0.07	Pass
W-8886, 8887	12/15/2011	Gr. Alpha	0.83 ± 0.81	1.58 ± 0.99	1.21 ± 0.64	Pass
W-8886, 8887	12/15/2011	Gr. Beta	6.80 ± 1.25	5.94 ± 1.22	6.37 ± 0.87	Pass
W-8886, 8887	12/15/2011	Ra-226	0.23 ± 0.15	0.41 ± 0.16	0.32 ± 0.11	Pass
SO-8958, 8959	12/21/2011	K-40	14.58 ± 0.86	15.07 ± 0.87	14.83 ± 0.61	Pass
AP-8907, 8908	12/22/2011	Be-7	0.15 ± 0.06	0.11 ± 0.07	0.13 ± 0.05	Pass
AP-9196, 9197	12/28/2011	Be-7	0.06 ± 0.01	0.07 ± 0.01	0.06 ± 0.01	Pass
LW-9091, 9092	12/29/2011	Gr. Beta	1.97 ± 0.63	1.74 ± 0.60	1.86 ± 0.44	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)<sup>a</sup>.

Lab Code <sup>c</sup>	Date	Analysis	Laboratory result	Concentration <sup>b</sup>		Acceptance
				Known Activity	Control Limits <sup>d</sup>	
STW-1237 <sup>e</sup>	02/01/11	Am-241	0.35 ± 0.10	0.53	0.37 - 0.69	Fail
STW-1237	02/01/11	Co-57	< 0.2	0.00	-	Pass
STW-1237	02/01/11	Co-60	24.10 ± 0.40	24.60	17.20 - 32.00	Pass
STW-1237	02/01/11	Cs-134	19.80 ± 0.40	21.50	15.10 - 28.00	Pass
STW-1237	02/01/11	Cs-137	29.40 ± 0.50	29.40	20.60 - 38.20	Pass
STW-1237	02/01/11	H-3	238.90 ± 8.80	243.00	170.00 - 316.00	Pass
STW-1237	02/01/11	K-40	95.40 ± 3.10	91.00	64.00 - 118.00	Pass
STW-1237	02/01/11	Mn-54	32.50 ± 0.60	31.60	22.10 - 41.10	Pass
STW-1237	02/01/11	Ni-63	16.30 ± 0.60	18.60	13.00 - 24.20	Pass
STW-1237	02/01/11	Pu-238	1.11 ± 0.12	1.06	0.75 - 1.38	Pass
STW-1237	02/01/11	Pu-239/40	0.88 ± 0.12	0.81	0.57 - 1.05	Pass
STW-1237	02/01/11	Sr-90	8.70 ± 0.70	8.72	6.10 - 11.34	Pass
STW-1237	02/01/11	Tc-99	7.60 ± 0.60	8.99	6.29 - 11.69	Pass
STW-1237	02/01/11	Zn-65	< 0.5	0.00	-	Pass
STW-1238	02/01/11	Gr. Alpha	0.82 ± 0.07	1.14	0.34 - 1.93	Pass
STW-1238	02/01/11	Gr. Beta	2.82 ± 0.07	2.96	1.48 - 4.44	Pass
STVE-1239	02/01/11	Co-57	11.27 ± 0.21	9.94	6.96 - 12.92	Pass
STVE-1239	02/01/11	Co-60	4.95 ± 0.16	4.91	3.44 - 6.38	Pass
STVE-1239	02/01/11	Cs-134	5.18 ± 0.19	5.50	3.85 - 7.15	Pass
STVE-1239	02/01/11	Cs-137	< 0.09	0.00	-	Pass
STVE-1239	02/01/11	Mn-54	6.91 ± 0.25	6.40	4.48 - 8.32	Pass
STVE-1239	02/01/11	Zn-65	3.10 ± 0.32	2.99	2.09 - 3.89	Pass
STSO-1240	02/01/11	Co-57	984.10 ± 4.10	927.00	649.00 - 1205.00	Pass
STSO-1240	02/01/11	Co-60	540.70 ± 3.00	482.00	337.00 - 627.00	Pass
STSO-1240	02/01/11	Cs-134	726.70 ± 5.92	680.00	476.00 - 884.00	Pass
STSO-1240	02/01/11	Cs-137	883.10 ± 4.70	758.00	531.00 - 985.00	Pass
STSO-1240	02/01/11	K-40	622.70 ± 16.70	540.00	378.00 - 702.00	Pass
STSO-1240	02/01/11	Mn-54	-0.30 ± 1.00	0.00	-	Pass
STSO-1240 <sup>f</sup>	02/01/11	Ni-63	384.00 ± 16.90	582.00	407.00 - 757.00	Fail
STSO-1240	02/01/11	U-233/4	166.60 ± 7.30	176.00	123.00 - 229.00	Pass
STSO-1240	02/01/11	U-238	172.00 ± 7.40	184.00	129.00 - 239.00	Pass
STSO-1240	02/01/11	Zn-65	1671.00 ± 13.10	1359.00	951.00 - 1767.00	Pass
STAP-1241	02/01/11	Am-241	0.00 ± 0.01	0.00	-0.10 - 0.10	Pass
STAP-1241	02/01/11	Co-57	3.48 ± 0.06	3.33	2.33 - 4.33	Pass
STAP-1241	02/01/11	Co-60	0.00 ± 0.02	0.00	-0.10 - 0.10	Pass
STAP-1241	02/01/11	Cs-134	3.44 ± 0.27	3.49	2.44 - 4.54	Pass
STAP-1241	02/01/11	Cs-137	2.46 ± 0.27	2.28	1.60 - 2.96	Pass

TABLE A-6. Department of Energy's Mixed Analyte Performance Evaluation Program (MAPEP)<sup>a</sup>.

Lab Code <sup>c</sup>	Date	Analysis	Laboratory result	Concentration <sup>b</sup>		Acceptance
				Known Activity	Control Limits <sup>d</sup>	
STAP-1241	02/01/11	Gr. Alpha	0.39 ± 0.05	0.66	0.20 - 1.12	Pass
STAP-1241	02/01/11	Gr. Beta	1.54 ± 0.07	1.32	0.66 - 1.99	Pass
STAP-1241	02/01/11	Mn-54	2.90 ± 0.10	2.64	1.85 - 3.43	Pass
STAP-1241	02/01/11	Pu-238	0.07 ± 0.02	0.10	0.07 - 0.13	Pass
STAP-1241	02/01/11	Pu-239/40	0.06 ± 0.02	0.08	0.05 - 0.10	Pass
STAP-1241 <sup>g</sup>	02/01/11	Sr-90	1.89 ± 0.15	1.36	0.95 - 1.77	Fail
STAP-1241	02/01/11	U-233/4	0.13 ± 0.02	0.18	0.13 - 0.23	Pass
STAP-1241	02/01/11	U-238	0.14 ± 0.02	0.19	0.13 - 0.24	Pass
STAP-1241	02/01/11	Zn-65	3.80 ± 0.18	3.18	2.23 - 4.13	Pass
STW-1249	08/01/11	I-129	7.32 ± 0.30	9.50	6.70 - 12.40	Pass
STVE-1250	08/01/11	Co-57	0.01 ± 0.02	0.00	-	Pass
STVE-1250	08/01/11	Co-60	3.57 ± 0.13	3.38	2.37 - 4.39	Pass
STVE-1250	08/01/11	Cs-134	-0.02 ± 0.04	0.00	-0.10 - 0.10	Pass
STVE-1250	08/01/11	Cs-137	5.28 ± 0.20	4.71	3.30 - 6.12	Pass
STVE-1250	08/01/11	Mn-54	6.48 ± 0.22	5.71	4.00 - 7.42	Pass
STVE-1250	08/01/11	Zn-65	7.35 ± 0.34	6.39	4.47 - 8.31	Pass
STSO-1251	08/01/11	Co-57	1333.90 ± 4.20	1180.00	826.00 - 1534.00	Pass
STSO-1251	08/01/11	Co-60	701.30 ± 3.40	644.00	451.00 - 837.00	Pass
STSO-1251	08/01/11	Cs-134	0.71 ± 1.05	0.00	-	Pass
STSO-1251	08/01/11	Cs-137	1106.00 ± 5.60	979.00	685.00 - 1273.00	Pass
STSO-1251	08/01/11	K-40	749.20 ± 19.00	625.00	438.00 - 813.00	Pass
STSO-1251	08/01/11	Mn-54	984.30 ± 5.40	848.00	594.00 - 1102.00	Pass
STSO-1251	08/01/11	Ni-63	0.11 ± 1.21	0.00	-	Pass
STSO-1251	08/01/11	Pu-238	97.90 ± 7.40	93.60	65.50 - 121.70	Pass
STSO-1251	08/01/11	Pu-239/40	78.80 ± 6.40	77.40	54.20 - 100.60	Pass
STSO-1251 <sup>h</sup>	08/01/11	Sr-90	219.40 ± 16.70	320.00	224.00 - 416.00	Fail
STSO-1251 <sup>i</sup>	08/01/11	Tc-99	110.00 ± 8.00	182.00	127.00 - 237.00	Fail
STSO-1251	08/01/11	U-233/4	267.00 ± 10.20	263.00	184.00 - 342.00	Pass
STSO-1251	08/01/11	U-238	280.30 ± 10.40	274.00	192.00 - 356.00	Pass
STSO-1251	08/01/11	Zn-65	1639.90 ± 11.40	1560.00	1092.00 - 2028.00	Pass
STAP-1252	08/01/11	Co-57	5.06 ± 0.08	5.09	3.56 - 6.62	Pass
STAP-1252	08/01/11	Co-60	3.13 ± 0.09	3.20	2.24 - 4.16	Pass
STAP-1252	08/01/11	Cs-134	0.01 ± 0.03	0.00	-0.10 - 0.10	Pass
STAP-1252	08/01/11	Cs-137	2.61 ± 0.09	2.60	1.82 - 3.38	Pass
STAP-1252	08/01/11	Mn-54	0.01 ± 0.03	0.00	-0.10 - 0.10	Pass
STAP-1252	08/01/11	Pu-238	0.13 ± 0.02	0.12	0.08 - 0.15	Pass
STAP-1252	08/01/11	Pu-239/40	0.15 ± 0.02	0.14	0.10 - 0.18	Pass
STAP-1252	08/01/11	Sr-90	1.65 ± 0.16	1.67	1.17 - 2.17	Pass

TABLE A-6. Department of Energy's Mixed Analyte Performance Evaluation Program (MAPEP)<sup>a</sup>.

Lab Code <sup>c</sup>	Date	Analysis	Laboratory result	Concentration <sup>b</sup>		Acceptance
				Known Activity	Control Limits <sup>d</sup>	
STAP-1252	08/01/11	U-233/4	0.17 ± 0.02	0.16	0.11 - 0.21	Pass
STAP-1252	08/01/11	U-238	0.17 ± 0.02	0.17	0.12 - 0.22	Pass
STAP-1252	08/01/11	Zn-65	4.46 ± 0.23	4.11	2.88 - 5.34	Pass
STW-1254	08/01/11	Co-57	37.20 ± 0.50	36.60	25.60 - 47.60	Pass
STW-1254	08/01/11	Co-60	28.80 ± 0.40	29.30	20.50 - 38.10	Pass
STW-1254	08/01/11	Cs-134	18.00 ± 0.60	19.10	13.40 - 24.80	Pass
STW-1254	08/01/11	Cs-137	0.06 ± 0.13	0.00	-	Pass
STW-1254	08/01/11	H-3	1039.90 ± 17.90	1014.00	710.00 - 1318.00	Pass
STW-1254	08/01/11	K-40	161.40 ± 4.10	156.00	109.00 - 203.00	Pass
STW-1254	08/01/11	Mn-54	25.70 ± 0.50	25.00	17.50 - 32.50	Pass
STW-1254	08/01/11	Ni-63	0.60 ± 2.00	0.00	-	Pass
STW-1254	08/01/11	Pu-238	0.04 ± 0.02	0.02	0.00 - 1.00	Pass
STW-1254	08/01/11	Pu-239/40	2.27 ± 0.14	2.40	1.68 - 3.12	Pass
STW-1254	08/01/11	Sr-90	15.60 ± 1.80	14.20	9.90 - 18.50	Pass
STW-1254	08/01/11	Tc-99	-0.30 ± 0.50	0.00	-	Pass
STW-1254	08/01/11	U-233/4	2.78 ± 0.20	2.78	1.95 - 3.61	Pass
STW-1254	08/01/11	U-238	2.86 ± 0.21	2.89	2.02 - 3.76	Pass
STW-1254	08/01/11	Zn-65	30.20 ± 0.90	28.50	20.00 - 37.10	Pass
STW-1255	08/01/11	Gr. Alpha	0.72 ± 0.12	0.87	0.26 - 1.47	Pass
STW-1255	08/01/11	Gr. Beta	4.71 ± 0.15	4.81	2.41 - 7.22	Pass

<sup>a</sup> Results obtained by Environmental, Inc., Midwest Laboratory as a participant in the Department of Energy's Mixed Analyte Performance Evaluation Program, Idaho Operations office, Idaho Falls, Idaho

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

<sup>c</sup> Laboratory codes as follows: STW (water), STAP (air filter), STSO (soil), STVE (vegetation).

<sup>d</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>e</sup> Result of a repeat analysis was still unacceptable. ERA crosschecks for Am-241 were acceptable, but biased low. Matrix spikes were prepared, ( 5.17 and 51.7 pCi/L), to verify method; results were acceptable, 4.4 and 47.5 pCi/L. Am-241 has been added to the internal spike and blank program for 2012.

<sup>f</sup> An error in percent recovery was found, result of recalculation, 427.3 ± 18.8 Bq/kg dry.

<sup>g</sup> No errors found in calculation or procedure, results of reanalysis; 1.73 Bq/filter.

<sup>h</sup> The analyses were repeated through a strontium column; mean result of triplicate analyses, 304.2 Bq/kg.

<sup>i</sup> The lab does not currently analyze soil for Tc-99, but is evaluating the procedure. After consultation with Eichrom, the analysis was repeated using a matrix spike correction. Mean result of triplicate reanalyses; 183.3 Bq/kg.

TABLE A-7. Interlaboratory Comparison Crosscheck program, Environmental Resource Associates (ERA)<sup>9</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>		
STAP-1230	03/21/11	Am-241	46.0 ± 1.8	62.5	36.6 - 85.7	Pass
STAP-1230	03/21/11	Co-60	401.2 ± 12.1	390.0	302.0 - 487.0	Pass
STAP-1230	03/21/11	Cs-134	268.2 ± 24.8	279.0	182.0 - 345.0	Pass
STAP-1230	03/21/11	Cs-137	345.3 ± 24.9	312.0	234.0 - 410.0	Pass
STAP-1230	03/21/11	Mn-54	< 1.9	0.0	-	Pass
STAP-1230	03/21/11	Pu-238	76.1 ± 3.2	69.0	47.4 - 90.7	Pass
STAP-1230	03/21/11	Pu-239/40	70.50 ± 3.10	65.5	47.5 - 85	Pass
STAP-1230	03/21/11	Sr-90	208.40 ± 18.70	185.0	81.4 - 288	Pass
STAP-1230	03/21/11	U-233/4	56.10 ± 2.10	61.5	38.7 - 91	Pass
STAP-1230	03/21/11	U-238	58.90 ± 2.60	61.0	39.0 - 87	Pass
STAP-1230	03/21/11	Uranium	118.50 ± 5.52	125.0	63.9 - 199	Pass
STAP-1230	03/21/11	Zn-65	312.60 ± 23.40	279.0	193.0 - 386	Pass
STAP-1231	03/21/11	Gr. Alpha	88.40 ± 3.70	74.3	38.5 - 112	Pass
STAP-1231	03/21/11	Gr. Beta	85.10 ± 2.80	69.5	42.8 - 102	Pass
STSO-1232	03/21/11	Ac-228	1327.8 ± 97.5	1490.0	958.0 - 2100.0	Pass
STSO-1232	03/21/11	Am-241	662.8 ± 88.1	914.0	546.0 - 1170.0	Pass
STSO-1232	03/21/11	Bi-212	1396.2 ± 185.3	1400.0	368.0 - 2090.0	Pass
STSO-1232	03/21/11	Bi-214	841.1 ± 33.2	725.0	445.0 - 1040.0	Pass
STSO-1232	03/21/11	Co-60	2423.7 ± 27.1	2220.0	1620.0 - 2980.0	Pass
STSO-1232	03/21/11	Cs-134	2481.3 ± 42.2	2450.0	1580.0 - 2950.0	Pass
STSO-1232	03/21/11	Cs-137	2108.2 ± 30.2	1920.0	1470.0 - 2490.0	Pass
STSO-1232	03/21/11	K-40	11497.3 ± 276.6	11500.0	8320.0 - 15600.0	Pass
STSO-1232	03/21/11	Mn-54	< 17.4	0.0	-	Pass
STSO-1232	03/21/11	Pb-212	994.7 ± 30.0	1440.0	931.0 - 2030.0	Pass
STSO-1232	03/21/11	Pb-214	918.3 ± 42.6	805.0	482.0 - 1200.0	Pass
STSO-1232	03/21/11	Pu-238	1593.6 ± 156.7	1420.0	813.0 - 2000.0	Pass
STSO-1232	03/21/11	Pu-239/40	1428.9 ± 143.4	1400.0	956.0 - 1860.0	Pass
STSO-1232	03/21/11	Sr-90	8638.0 ± 442.8	7590.0	2740.0 - 12400.0	Pass
STSO-1232	03/21/11	Th-234	1350.1 ± 180.0	962.0	305.0 - 1830.0	Pass
STSO-1232	03/21/11	U-233/4	748.0 ± 94.4	972.0	616.0 - 1210.0	Pass
STSO-1232	03/21/11	U-238	909.0 ± 104.9	962.0	588.0 - 1220.0	Pass
STSO-1232	03/21/11	Uranium	1690.8 ± 104.9	1980.0	1130.0 - 2670.0	Pass
STSO-1232	03/21/11	Zn-65	2356.2 ± 57.1	1990.0	1580.0 - 2670.0	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>		
STVE-1233	03/21/11	Am-241	2377.5 ± 83.2	3200.0	1820.0 - 4400.0	Pass
STVE-1233	03/21/11	Cm-244	602.9 ± 38.4	812.0	400.0 - 1260.0	Pass
STVE-1233	03/21/11	Co-60	810.2 ± 32.4	733.0	496.0 - 1050.0	Pass
STVE-1233	03/21/11	Cs-134	849.4 ± 54.5	770.0	441.0 - 1070.0	Pass
STVE-1233	03/21/11	Cs-137	889.9 ± 36.3	829.0	608.0 - 1150.0	Pass
STVE-1233	03/21/11	K-40	28146.70 ± 698.80	25800.0	18500.0 - 36500	Pass
STVE-1233	03/21/11	Mn-54	< 19.3	0.0	-	Pass
STVE-1233	03/21/11	Pu-238	3068.10 ± 170.70	2990.0	1610.0 - 4380	Pass
STVE-1233	03/21/11	Pu-239/40	3180.00 ± 88.90	3100.0	1920.0 - 4230	Pass
STVE-1233	03/21/11	Sr-90	8549.20 ± 675.00	7890.0	4410.0 - 10500	Pass
STVE-1233	03/21/11	U-233/4	2418.60 ± 142.50	2610.0	1790.0 - 3460	Pass
STVE-1233	03/21/11	U-238	2417.00 ± 142.50	2590.0	1820.0 - 3270	Pass
STVE-1233	03/21/11	Uranium	4929.80 ± 142.50	5320.0	3660.0 - 6860	Pass
STVE-1233	03/21/11	Zn-65	962.40 ± 62.50	799.0	577.0 - 1090	Pass
STW-1234	03/21/11	Am-241	100.0 ± 6.4	135.0	92.5 - 182.0	Pass
STW-1234	03/21/11	Co-60	401.6 ± 7.2	411.0	358.0 - 486.0	Pass
STW-1234	03/21/11	Cs-134	222.7 ± 12.3	231.0	171.0 - 265.0	Pass
STW-1234	03/21/11	Cs-137	410.3 ± 9.5	417.0	354.0 - 500.0	Pass
STW-1234	03/21/11	Mn-54	< 3.0	0.0	-	Pass
STW-1234	03/21/11	Pu-238	130.9 ± 5.5	131.0	99.1 - 162.0	Pass
STW-1234	03/21/11	Pu-239/40	113.0 ± 5.0	119.0	92.1 - 147.0	Pass
STW-1234	03/21/11	Sr-90	739.6 ± 13.0	773.0	491.0 - 1030.0	Pass
STW-1234	03/21/11	U-233/4	83.4 ± 3.8	94.3	71.1 - 122.0	Pass
STW-1234	03/21/11	U-238	85.5 ± 3.9	93.5	71.4 - 116.0	Pass
STW-1234	03/21/11	Uranium	172.0 ± 8.5	192.0	138.0 - 256.0	Pass
STW-1234	03/21/11	Zn-65	114.5 ± 10.8	111.0	94.1 - 138.0	Pass
STW-1235	03/21/11	Gr. Alpha	97.6 ± 2.9	112.0	49.7 - 166.0	Pass
STW-1235	03/21/11	Gr. Beta	99.6 ± 2.0	99.8	58.4 - 146.0	Pass
STW-1236	03/21/11	H-3	16307.0 ± 377.0	15200.0	9900.0 - 22500.0	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: STW (water), STAP (air filter), STSO (soil), STVE (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

## 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 2011.

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

No unusual or important events reportable under the EPP Section 4.1 were identified during 2011.

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

During 2011, 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 2011.

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

This section lists all changes in the plant design, operation, tests or experiments installed during 2011, which could have involved a potentially significant unreviewed environmental question in accordance with section 3.1 of Appendix B.

During 2011, three 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 below.

### **MP 10-0032 - New Non-safety Auxiliary Feedwater Pump**

#### **Description of Modification:**

Modification MP 10-0032 installed a new non-safety auxiliary feedwater pump, including piping, piping supports, valves, electrical power, instruments, and controls. As part of this modification a new transformer was installed plant west of the turbine building.

#### **Evaluation of Change:**

As part of the evaluation, both the Callaway Plant ER and FES-OL were reviewed for any previously evaluated adverse environmental impacts and any new adverse environmental impacts not previously evaluated. As part of this project, a new transformer was installed outside of the plant southwest turbine building stairwell on a flat area previously backfilled near the power block. The new transformer contains 488 gallons of transformer oil and does not have an oil collection device. However, any leakage of oil from the transformer would be easily observed and contained in and around the granular fill under the equipment for cleanup. It is highly unlikely that any oil released from this transformer would reach a storm water drainage area or any navigable waters of the US. The evaluation concluded that Installation of the replacement sections of the makeup and blowdown piping did not involve an unreviewed environmental question.

## **MP 10-0038, Revision 0 - Alternate Emergency Power Source**

### **Description of Modification:**

Modification MP 10-0038, revision 0, installed a permanent alternate emergency power source to Callaway from the COOP substation. The modification will install a buried 13.8 kV transmission line from the COOP substation to a location near the Cooling Water Chemical Control Building where it will terminate at a 13.8 kV / 4160 transformer. The spare XNB transformer already on site was used for this transformer. This transformer will supply 4160 switchgear which will feed 4160 V power to either of the NB busses and to AP01, and the MCC for the non-safety aux feedwater pump which was recently installed. The spare XMB transformer contains 2170 gallons of oil and was installed over a transformer pit capable of containing the entire oil volume should the transformer fail.

The buried cable runs ESE from the COOP substation using the existing COOP Right-of-Way for approximately 3/4 of a mile, turns SE and enters the owner control area in the NW corner. The cable runs SE through the owner control area to the transformer pit located plant southeast of the radwaste building. The cable run required boring under two streams and avoidance of cultural resource site 256. The cable was installed using linear construction that consists of trenching 2 feet or less in width and approximately 3 feet in depth.

### **Evaluation of Change:**

As part of the Final Environmental Evaluation, both the ER and FES-OL were reviewed for any previously evaluated adverse environmental impacts and any adverse environmental impacts not previously evaluated. No environmental impacts were identified. For this modification, there were some temporary impacts due to burying the electrical cable. The buried cable was installed using linear construction that consists of a trench 2 feet or less in width. The Missouri State Regulations (10 CSR 20-6.200(B).8) has an exemption from storm water permit regulations for this type of construction. However, impacts from trenching will be managed using the appropriate best management practices (BMPs) and the area will be returned to its original state after completion of the project.

During the evaluation of the cable routing, Environmental Services Department (ESD) reviewed the Preliminary Jurisdictional Wetland and Stream Determination report for the Callaway Nuclear Plant dated June 19, 2009. This report was prepared by MACTEC to identify waters of the United States within the construction foot print for proposed unit 2. This report covers the area of the buried cable and identified two jurisdictional streams that would be crossed by the cable routing. The two streams were bored under to eliminate any stream impact and therefore eliminate the need for US Army Corps of Engineers project review.

The cable route was in close proximity of one of the 25 potentially significant archaeological sites that Ameren committed to preserving or performing additional surveys if impacted. The boundaries of the site were identified and the cable routing modified to avoid impacting the site in accordance with the Cultural Resource Management Plan.

This modification does not involve the possibility for discharge of oil into or upon the navigable waters of the U.S. The transformer was placed over a transformer pit capable of containing the oil should the transformer fail. In addition, petroleum use by the construction equipment will be controlled and contained to accepted equipment standards.

The evaluation concluded that Installation of the alternate emergency power source did not involve an unreviewed environmental question.

## **MP 10-0038, Revision 1 - New Diesel Powered Emergency Generator Facility**

### **Description of Modification:**

Modification MP 10-0038, revision 0, installed a new diesel powered emergency generator facility south of the existing COOP substation on Highway CC. This modification includes the installation of four (4) diesel power generators and associated support equipment to operate and connect the generators to the 138kV line installed from the COOP substation to the plant. The facility provides permanent alternate emergency power sources to Callaway if the COOP substation is unavailable. The new generators will each be 2 MWe skid mounted diesel powered units certified to meet Tier 2 nonroad engine emission standards. Mounted under each diesel generator skid is a 3500 gallon self-contained fuel oil tank with a secondary containment.

### **Evaluation of Change:**

Both the Callaway Plant ER and FES-OL were reviewed, as part of this evaluation for any previously evaluated adverse environmental impacts and any adverse environmental impacts not previously evaluated. For this modification, there were some impacts due to the construction of the new diesel generator facility. The construction footprint for the facility is less than one acre and does not require a land disturbance / storm water permit from Missouri Department of Natural Resources (MDNR). However, impacts from grading, excavation and construction activities will be managed using the appropriate best management practices (BMPs) and the areas that are temporarily impacted will be returned to their original state after completion of the project. After construction of this facility, the rainwater runoff coefficient will increase from approximately 0.20 to 0.77. Although there will be an increase in runoff from the facility, the facility is less than one acre and the runoff will be sheet flow from the site into the surrounding farm field, and will have no adverse effect on current storm water drainage.

The reviewed of the project area did not identify any jurisdictional wetland or stream that would be affected by this project. Although the installation of the facility will remove some land from its original use, the area affected is less than one acre and would not significantly change the use of the area. Review of the Callaway Cultural Resource Management Plan did not identify any cultural resource site within the area of the project.

The use of the new diesel generators will increase air emissions that will result in an increased discharge of pollutants. Ameren Environmental Services Air Group has applied for and received from the Missouri DNR - Air Pollution Control Program a Permit to Construct – Permit Number: 102010-005 to construct and operate these new diesel generators. This permit does contain operating conditions that have to be complied with during operation of the diesel generators. The four diesel generators will each contain a maximum of 3500 gallons of fuel oil. The fuel oil tanks are designed with a secondary containment and are located under each diesel generator skid. Therefore, fuel oil from these units is unlikely to reach the environment. If any leakage of fuel oil occurs, it would be absorbed into the gravel and structural fill located around and beneath the equipment. It is highly unlikely that any oil would reach the drainage ditch.

Based on the issuance of the Air Permit and this evaluation it was concluded that the installation of the New Diesel Powered Emergency Generator Facility does not involve an unreviewed environmental question.



AMEREN MISSOURI, CALLAWAY PLANT  
FULTON, MISSOURI

DOCKET NO. 50-483

ANNUAL REPORT  
to the

UNITED STATES NUCLEAR REGULATORY COMMISSION

Radiation Environmental Operating Report

January 1 to December 31, 2011

Prepared by

ENVIRONMENTAL, Inc.  
Midwest Laboratory

Submitted by

UNION ELECTRIC CO.  
dba Ameren Missouri Corp.

Project No. 8036

Approved :

A handwritten signature in black ink, appearing to read "B. Grob", is written over a horizontal line. Below the signature, the name and title "Brohia Grob, M.S. Laboratory Manager" are printed.

Brohia Grob, M.S.  
Laboratory Manager

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## 1.0 INTRODUCTION

The following constitutes a supplement to the Annual Report for the Radiological Environmental Monitoring Program conducted at the AmerenUE, Callaway Plant, Fulton, Missouri in 2011. 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 C.

<sup>131</sup>I resulting from the Fukushima event was detected in Callaway REMP samples as presented in Appendix D. The data evaluation is documented in Callaway CAR 201103463. The concentration of tritium in wells 936 and 939 for sampling conducted in February, March and April was evaluated in Callaway CAR 201102543



## 2.0 DATA TABLES

CALLAWAY

**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							
		Be-7	Co-58	Co-60	Zr-95	Cs-134	Cs-137	Ba-La-140	Ce-144
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date									
Collected	Vol.								
01-06-11	276	< 0.10	< 0.004	< 0.008	< 0.012	< 0.007	< 0.004	< 0.010	< 0.041
01-13-11	270	< 0.08	< 0.004	< 0.007	< 0.009	< 0.008	< 0.005	< 0.013	< 0.034
01-21-11	337	< 0.07	< 0.006	< 0.003	< 0.011	< 0.006	< 0.007	< 0.007	< 0.031
01-27-11	240	< 0.10	< 0.006	< 0.004	< 0.011	< 0.006	< 0.008	< 0.008	< 0.041
02-03-11	277	< 0.09	< 0.005	< 0.011	< 0.009	< 0.009	< 0.008	< 0.006	< 0.046
02-10-11	278	0.16 ± 0.09	< 0.007	< 0.003	< 0.010	< 0.005	< 0.006	< 0.006	< 0.044
02-17-11	305	0.15 ± 0.08	< 0.008	< 0.003	< 0.005	< 0.005	< 0.007	< 0.006	< 0.031
02-24-11	270	< 0.09	< 0.007	< 0.006	< 0.012	< 0.006	< 0.007	< 0.012	< 0.033
03-03-11	273	0.13 ± 0.08	< 0.004	< 0.011	< 0.013	< 0.007	< 0.005	< 0.009	< 0.043
03-10-11	268	0.12 ± 0.07	< 0.007	< 0.006	< 0.009	< 0.006	< 0.007	< 0.005	< 0.023
03-17-11	270	< 0.11	< 0.007	< 0.009	< 0.019	< 0.012	< 0.014	< 0.006	< 0.045
03-24-11	283	0.15 ± 0.09	< 0.005	< 0.011	< 0.012	< 0.006	< 0.005	< 0.013	< 0.023 <sup>b</sup>
03-31-11	271	0.21 ± 0.11	< 0.008	< 0.007	< 0.014	< 0.008	< 0.010	< 0.010	< 0.049 <sup>b</sup>
04-08-11	313	0.17 ± 0.10	< 0.007	< 0.007	< 0.013	< 0.007	< 0.009	< 0.011	< 0.042 <sup>b</sup>
04-15-11	265	0.17 ± 0.10	< 0.006	< 0.006	< 0.015	< 0.008	< 0.007	< 0.018	< 0.042
04-21-11	223	< 0.14	< 0.010	< 0.006	< 0.023	< 0.006	< 0.011	< 0.017	< 0.052
04-29-11	305	< 0.10	< 0.005	< 0.005	< 0.017	< 0.007	< 0.009	< 0.009	< 0.035
05-05-11	229	0.26 ± 0.15	< 0.013	< 0.009	< 0.027	< 0.011	< 0.006	< 0.019	< 0.057
05-12-11	267	0.19 ± 0.08	< 0.006	< 0.007	< 0.020	< 0.010	< 0.012	< 0.013	< 0.056
05-19-11	278	0.14 ± 0.08	< 0.009	< 0.007	< 0.014	< 0.008	< 0.010	< 0.010	< 0.048
05-26-11	278	0.24 ± 0.11	< 0.009	< 0.010	< 0.016	< 0.006	< 0.008	< 0.009	< 0.027
06-03-11	318	0.20 ± 0.08	< 0.007	< 0.007	< 0.013	< 0.004	< 0.008	< 0.007	< 0.025
06-10-11	283	< 0.11	< 0.009	< 0.012	< 0.021	< 0.007	< 0.009	< 0.028	< 0.048
06-16-11	251	< 0.11	< 0.011	< 0.010	< 0.013	< 0.012	< 0.009	< 0.030	< 0.061
06-24-11	333	0.19 ± 0.08	< 0.004	< 0.006	< 0.014	< 0.004	< 0.005	< 0.011	< 0.024
06-30-11	256	0.26 ± 0.11	< 0.008	< 0.007	< 0.014	< 0.008	< 0.007	< 0.017	< 0.047
07-07-11	299	0.18 ± 0.10	< 0.005	< 0.007	< 0.013	< 0.008	< 0.007	< 0.012	< 0.034
07-15-11	357	0.23 ± 0.10	< 0.007	< 0.007	< 0.014	< 0.007	< 0.004	< 0.010	< 0.025
07-21-11	276	0.29 ± 0.16	< 0.005	< 0.010	< 0.017	< 0.008	< 0.008	< 0.019	< 0.045
07-28-11	331	< 0.09	< 0.006	< 0.006	< 0.014	< 0.008	< 0.006	< 0.019	< 0.033

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

<sup>b</sup> I-131 activity detected in air particulate and/or charcoal cartridge; results in Appendix D.

CALLAWAY

**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.)							
		Be-7	Co-58	Co-60	Zr-95	Cs-134	Cs-137	Ba-La-140	Ce-144
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date									
Collected	Vol.								
08-05-11	389	0.14 ± 0.08	< 0.008	< 0.005	< 0.013	< 0.005	< 0.004	< 0.008	< 0.026
08-11-11	253	0.22 ± 0.11	< 0.005	< 0.007	< 0.012	< 0.009	< 0.009	< 0.015	< 0.049
08-18-11	308	0.17 ± 0.08	< 0.004	< 0.007	< 0.006	< 0.005	< 0.008	< 0.005	< 0.038
08-25-11	319	0.18 ± 0.10	< 0.007	< 0.007	< 0.014	< 0.006	< 0.005	< 0.007	< 0.035
09-01-11	270	0.18 ± 0.08	< 0.003	< 0.006	< 0.008	< 0.009	< 0.008	< 0.007	< 0.048
09-08-11	275	0.26 ± 0.13	< 0.006	< 0.010	< 0.018	< 0.007	< 0.008	< 0.010	< 0.056
09-15-11	270	0.21 ± 0.12	< 0.007	< 0.008	< 0.011	< 0.009	< 0.006	< 0.008	< 0.032
09-22-11	280	0.18 ± 0.10	< 0.005	< 0.006	< 0.007	< 0.005	< 0.006	< 0.010	< 0.034
09-29-11	278	< 0.08	< 0.004	< 0.005	< 0.009	< 0.010	< 0.006	< 0.010	< 0.045
10-06-11	284	0.20 ± 0.10	< 0.006	< 0.005	< 0.008	< 0.009	< 0.006	< 0.032	< 0.028
10-13-11	280	0.26 ± 0.13	< 0.011	< 0.010	< 0.012	< 0.006	< 0.006	< 0.030	< 0.035
10-20-11	280	< 0.11	< 0.010	< 0.008	< 0.010	< 0.008	< 0.005	< 0.026	< 0.042
10-27-11	288	0.19 ± 0.08	< 0.005	< 0.007	< 0.013	< 0.010	< 0.011	< 0.015	< 0.038
11-03-11	278	< 0.10	< 0.007	< 0.008	< 0.018	< 0.009	< 0.010	< 0.018	< 0.048
11-10-11	288	< 0.13	< 0.008	< 0.010	< 0.009	< 0.009	< 0.006	< 0.035	< 0.050
11-17-11	276	< 0.13	< 0.006	< 0.009	< 0.017	< 0.008	< 0.006	< 0.030	< 0.043
11-25-11	329	< 0.08	< 0.005	< 0.005	< 0.010	< 0.006	< 0.007	< 0.023	< 0.034
12-01-11	245	< 0.10	< 0.006	< 0.007	< 0.008	< 0.007	< 0.005	< 0.009	< 0.046
12-08-12	284	0.15 ± 0.09	< 0.005	< 0.003	< 0.013	< 0.005	< 0.004	0.008	< 0.028
12-15-12	291	0.23 ± 0.11	< 0.007	< 0.009	< 0.010	< 0.008	< 0.012	0.012	< 0.033
12-22-12	288	0.15 ± 0.06	< 0.008	< 0.007	< 0.006	< 0.008	< 0.005	0.009	< 0.040
12-29-12	286	< 0.11	< 0.009	< 0.008	< 0.017	< 0.005	< 0.007	0.018	< 0.037

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

CALLAWAY

**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							
		Be-7	Co-58	Co-60	Zr-95	Cs-134	Cs-137	Ba-La-140	Ce-144
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date									
Collected	Vol.								
01-06-11	293	0.13 ± 0.06	< 0.007	< 0.005	< 0.013	< 0.008	< 0.007	< 0.006	< 0.027
01-13-11	304	< 0.07	< 0.006	< 0.003	< 0.009	< 0.009	< 0.007	< 0.005	< 0.042
01-21-11	341	< 0.08	< 0.007	< 0.007	< 0.009	< 0.005	< 0.008	< 0.007	< 0.027
01-27-11	254	< 0.08	< 0.009	< 0.003	< 0.014	< 0.005	< 0.008	< 0.007	< 0.048
02-03-11	305	< 0.09	< 0.006	< 0.007	< 0.015	< 0.008	< 0.006	< 0.007	< 0.047
02-10-11	299	0.15 ± 0.09	< 0.007	< 0.003	< 0.012	< 0.006	< 0.005	< 0.008	< 0.048
02-17-11	312	0.21 ± 0.10	< 0.005	< 0.003	< 0.004	< 0.007	< 0.005	< 0.006	< 0.032
02-24-11	302	0.12 ± 0.06	< 0.006	< 0.005	< 0.011	< 0.005	< 0.004	< 0.004	< 0.023
03-03-11	304	0.11 ± 0.05	< 0.007	< 0.009	< 0.014	< 0.007	< 0.007	< 0.007	< 0.023
03-10-11	301	0.13 ± 0.08	< 0.007	< 0.006	< 0.009	< 0.009	< 0.010	< 0.006	< 0.041
03-17-11	302	< 0.10	< 0.004	< 0.008	< 0.016	< 0.008	< 0.005	< 0.006	< 0.047
03-24-11	299	< 0.09	< 0.005	< 0.006	< 0.013	< 0.004	< 0.007	< 0.012	< 0.040 <sup>b</sup>
03-31-11	301	0.16 ± 0.07	< 0.004	< 0.006	< 0.013	< 0.007	< 0.006	< 0.009	< 0.046 <sup>b</sup>
04-08-11	340	0.19 ± 0.08	< 0.005	< 0.006	< 0.009	< 0.004	< 0.005	< 0.011	< 0.029 <sup>b</sup>
04-15-11	300	0.20 ± 0.08	< 0.005	< 0.009	< 0.014	< 0.007	< 0.003	< 0.016	< 0.038
04-21-11	254	< 0.13	< 0.010	< 0.008	< 0.013	< 0.006	< 0.013	< 0.013	< 0.041
04-29-11	319	< 0.10	< 0.007	< 0.006	< 0.009	< 0.007	< 0.008	< 0.011	< 0.031
05-05-11	253	0.27 ± 0.14	< 0.008	< 0.008	< 0.018	< 0.009	< 0.007	< 0.014	< 0.045
05-12-11	289	0.24 ± 0.11	< 0.002	< 0.008	< 0.016	< 0.004	< 0.005	< 0.011	< 0.044
05-19-11	295	< 0.10	< 0.006	< 0.006	< 0.013	< 0.009	< 0.009	< 0.010	< 0.039
05-26-11	295	0.22 ± 0.11	< 0.003	< 0.006	< 0.017	< 0.007	< 0.008	< 0.008	< 0.048
06-03-11	330	0.23 ± 0.10	< 0.005	< 0.008	< 0.010	< 0.005	< 0.005	< 0.006	< 0.035
06-10-11	304	0.21 ± 0.10	< 0.006	< 0.007	< 0.019	< 0.007	< 0.008	< 0.024	< 0.029
06-16-11	252	< 0.15	< 0.013	< 0.007	< 0.017	< 0.008	< 0.011	< 0.024	< 0.055
06-24-11	327	< 0.10	< 0.008	< 0.007	< 0.010	< 0.005	< 0.005	< 0.012	< 0.042
06-30-11	253	< 0.16	< 0.007	< 0.010	< 0.015	< 0.008	< 0.011	< 0.013	< 0.037
07-07-11	270	< 0.13	< 0.006	< 0.010	< 0.021	< 0.010	< 0.008	< 0.015	< 0.056
07-15-11	326	0.22 ± 0.10	< 0.004	< 0.009	< 0.012	< 0.005	< 0.009	< 0.015	< 0.034
07-21-11	244	< 0.12	< 0.010	< 0.010	< 0.016	< 0.008	< 0.012	< 0.018	< 0.034
07-28-11	294	0.17 ± 0.08	< 0.008	< 0.009	< 0.013	< 0.008	< 0.008	< 0.009	< 0.038

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

<sup>b</sup> I-131 activity detected in air particulate and/or charcoal cartridge; results in Appendix D.

CALLAWAY

**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.)							
		Be-7	Co-58	Co-60	Zr-95	Cs-134	Cs-137	Ba-La-140	Ce-144
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date									
Collected	Vol.								
08-05-11	335	0.18 ± 0.09	< 0.004	< 0.007	< 0.011	< 0.006	< 0.008	< 0.010	< 0.033
08-11-11	253	0.26 ± 0.12	< 0.009	< 0.009	< 0.019	< 0.006	< 0.006	< 0.008	< 0.062
08-18-11	296	0.17 ± 0.09	< 0.006	< 0.006	< 0.006	< 0.007	< 0.008	< 0.006	< 0.039
08-25-11	302	0.18 ± 0.09	< 0.003	< 0.006	< 0.006	< 0.006	< 0.005	< 0.015	< 0.039
09-01-11	303	0.24 ± 0.10	< 0.005	< 0.006	< 0.016	< 0.006	< 0.007	< 0.006	< 0.043
09-08-11	308	0.23 ± 0.10	< 0.007	< 0.005	< 0.011	< 0.005	< 0.005	< 0.007	< 0.036
09-15-11	315	0.17 ± 0.09	< 0.005	< 0.007	< 0.014	< 0.006	< 0.007	< 0.011	< 0.041
09-22-11	323	0.18 ± 0.11	< 0.003	< 0.005	< 0.007	< 0.004	< 0.004	< 0.009	< 0.028
09-29-11	317	< 0.06	< 0.004	< 0.006	< 0.008	< 0.005	< 0.006	< 0.009	< 0.036
10-06-11	324	0.18 ± 0.11	< 0.006	< 0.007	< 0.013	< 0.008	< 0.006	< 0.028	< 0.036
10-13-11	319	0.23 ± 0.13	< 0.010	< 0.006	< 0.008	< 0.009	< 0.005	< 0.026	< 0.029
10-20-11	325	< 0.08	< 0.005	< 0.007	< 0.011	< 0.006	< 0.006	< 0.022	< 0.035
10-27-11	326	< 0.08	< 0.006	< 0.005	< 0.010	< 0.008	< 0.005	< 0.015	< 0.029
11-03-11	331	< 0.09	< 0.007	< 0.007	< 0.014	< 0.008	< 0.011	< 0.013	< 0.036
11-10-11	338	< 0.10	< 0.007	< 0.006	< 0.015	< 0.007	< 0.008	< 0.035	< 0.037
11-17-11	329	0.19 ± 0.08	< 0.004	< 0.008	< 0.011	< 0.006	< 0.005	< 0.022	< 0.041
11-25-11	390	0.11 ± 0.05	< 0.004	< 0.004	< 0.005	< 0.004	< 0.004	< 0.015	< 0.028
12-01-11	285	< 0.09	< 0.006	< 0.004	< 0.011	< 0.004	< 0.006	< 0.011	< 0.025
12-08-12	274	< 0.07	< 0.006	< 0.005	< 0.015	< 0.006	< 0.007	0.011	< 0.026
12-15-12	277	< 0.12	< 0.005	< 0.014	< 0.011	< 0.007	< 0.008	0.011	< 0.057
12-22-12	271	0.17 ± 0.08	< 0.008	< 0.008	< 0.016	< 0.007	< 0.008	0.010	< 0.049
12-29-12	275	< 0.11	< 0.004	< 0.009	< 0.012	< 0.007	< 0.006	0.021	< 0.054

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

CALLAWAY

**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							
		Be-7	Co-58	Co-60	Zr-95	Cs-134	Cs-137	Ba-La-140	Ce-144
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date									
Collected	Vol.								
01-06-11	292	0.17 ± 0.10	< 0.007	< 0.010	< 0.013	< 0.007	< 0.005	< 0.006	< 0.038
01-13-11	282	< 0.07	< 0.005	< 0.007	< 0.012	< 0.005	< 0.009	< 0.004	< 0.031
01-21-11	336	< 0.09	< 0.004	< 0.008	< 0.007	< 0.008	< 0.007	< 0.010	< 0.036
01-27-11	251	< 0.08	< 0.008	< 0.004	< 0.014	< 0.008	< 0.008	< 0.007	< 0.031
02-03-11	297	0.20 ± 0.10	< 0.004	< 0.007	< 0.014	< 0.008	< 0.005	< 0.012	< 0.054
02-10-11	284	< 0.09	< 0.005	< 0.003	< 0.010	< 0.005	< 0.007	< 0.006	< 0.022
02-17-11	299	< 0.12	< 0.007	< 0.003	< 0.013	< 0.008	< 0.006	< 0.023	< 0.046
02-24-11	302	< 0.09	< 0.004	< 0.008	< 0.014	< 0.006	< 0.008	< 0.006	< 0.035
03-03-11	307	< 0.10	< 0.003	< 0.006	< 0.018	< 0.009	< 0.009	< 0.010	< 0.049
03-10-11	308	< 0.07	< 0.004	< 0.006	< 0.015	< 0.006	< 0.004	< 0.009	< 0.031
03-17-11	312	0.15 ± 0.08	< 0.007	< 0.007	< 0.010	< 0.005	< 0.010	< 0.006	< 0.047
03-24-11	312	0.23 ± 0.11	< 0.007	< 0.007	< 0.015	< 0.006	< 0.006	< 0.012	< 0.041 <sup>b</sup>
03-31-11	313	0.26 ± 0.09	< 0.004	< 0.005	< 0.012	< 0.006	< 0.006	< 0.011	< 0.050 <sup>b</sup>
04-08-11	363	0.18 ± 0.10	< 0.005	< 0.005	< 0.014	< 0.005	< 0.006	< 0.011	< 0.022 <sup>b</sup>
04-15-11	324	0.19 ± 0.08	< 0.006	< 0.005	< 0.018	< 0.006	< 0.005	< 0.020	< 0.040
04-21-11	288	< 0.12	< 0.009	< 0.010	< 0.012	< 0.008	< 0.009	< 0.014	< 0.047
04-29-11	378	< 0.08	< 0.007	< 0.004	< 0.013	< 0.007	< 0.007	< 0.015	< 0.039
05-05-11	244	< 0.14	< 0.009	< 0.010	< 0.018	< 0.006	< 0.010	< 0.016	< 0.056
05-12-11	279	0.29 ± 0.12	< 0.007	< 0.008	< 0.010	< 0.008	< 0.007	< 0.013	< 0.044
05-19-11	285	0.20 ± 0.11	< 0.005	< 0.008	< 0.021	< 0.007	< 0.009	< 0.014	< 0.041
05-26-11	285	< 0.13	< 0.009	< 0.008	< 0.012	< 0.011	< 0.009	< 0.024	< 0.052
06-03-11	328	0.21 ± 0.09	< 0.008	< 0.006	< 0.011	< 0.007	< 0.005	< 0.013	< 0.038
06-10-11	288	0.25 ± 0.13	< 0.013	< 0.008	< 0.025	< 0.009	< 0.011	< 0.028	< 0.046
06-16-11	261	0.28 ± 0.16	< 0.008	< 0.011	< 0.020	< 0.008	< 0.007	< 0.030	< 0.035
06-24-11	344	0.19 ± 0.09	< 0.005	< 0.005	< 0.012	< 0.006	< 0.005	< 0.010	< 0.029
06-30-11	244	0.25 ± 0.13	< 0.011	< 0.011	< 0.015	< 0.011	< 0.010	< 0.020	< 0.054
07-07-11	281	< 0.11	< 0.004	< 0.008	< 0.023	< 0.007	< 0.007	< 0.015	< 0.042
07-15-11	322	0.18 ± 0.10	< 0.005	< 0.007	< 0.014	< 0.007	< 0.007	< 0.012	< 0.034
07-21-11	238	< 0.13	< 0.012	< 0.011	< 0.015	< 0.008	< 0.011	< 0.017	< 0.038
07-28-11	282	0.15 ± 0.08	< 0.006	< 0.007	< 0.017	< 0.006	< 0.005	< 0.010	< 0.035

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

<sup>b</sup> I-131 activity detected in air particulate and/or charcoal cartridge; results in Appendix D.

CALLAWAY

**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.)							
		Be-7	Co-58	Co-60	Zr-95	Cs-134	Cs-137	Ba-La-140	Ce-144
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date									
Collected	Vol.								
08-05-11	264	0.23 ± 0.13	< 0.006	< 0.010	< 0.026	< 0.009	< 0.005	< 0.018	< 0.055
08-11-11	241	< 0.13	< 0.006	< 0.009	< 0.020	< 0.011	< 0.007	< 0.018	< 0.051
08-18-11	281	0.18 ± 0.10	< 0.004	< 0.006	< 0.007	< 0.005	< 0.009	< 0.006	< 0.040
08-25-11	261	0.27 ± 0.10	< 0.005	< 0.008	< 0.012	< 0.008	< 0.005	< 0.009	< 0.043
09-01-11	264	0.23 ± 0.10	< 0.004	< 0.009	< 0.006	< 0.008	< 0.008	< 0.007	< 0.040
09-08-11	266	0.22 ± 0.12	< 0.006	< 0.007	< 0.012	< 0.008	< 0.007	< 0.007	< 0.049
09-15-11	271	< 0.11	< 0.005	< 0.009	< 0.019	< 0.005	< 0.005	< 0.018	< 0.028
09-22-11	275	0.17 ± 0.09	< 0.005	< 0.005	< 0.007	< 0.006	< 0.009	< 0.014	< 0.046
09-29-11	275	< 0.10	< 0.009	< 0.007	< 0.012	< 0.009	< 0.006	< 0.011	< 0.049
10-06-11	282	0.22 ± 0.08	< 0.005	< 0.007	< 0.010	< 0.008	< 0.007	< 0.022	< 0.025
10-13-11	264	< 0.13	< 0.006	< 0.010	< 0.018	< 0.007	< 0.008	< 0.039	< 0.054
10-20-11	261	0.20 ± 0.09	< 0.008	< 0.006	< 0.020	< 0.008	< 0.008	< 0.023	< 0.052
10-27-11	268	< 0.08	< 0.005	< 0.008	< 0.007	< 0.008	< 0.010	< 0.016	< 0.048
11-03-11	252	< 0.13	< 0.007	< 0.010	< 0.017	< 0.009	< 0.010	< 0.026	< 0.053
11-10-11	260	< 0.13	< 0.009	< 0.008	< 0.020	< 0.010	< 0.010	< 0.045	< 0.048
11-17-11	253	< 0.13	< 0.006	< 0.009	< 0.016	< 0.007	< 0.009	< 0.028	< 0.051
11-25-11	298	< 0.10	< 0.004	< 0.010	< 0.009	< 0.009	< 0.007	< 0.022	< 0.039
12-01-11	220	< 0.13	< 0.006	< 0.011	< 0.016	< 0.008	< 0.008	< 0.024	< 0.066
12-08-12	254	< 0.12	< 0.006	< 0.010	< 0.015	< 0.007	< 0.006	0.017	< 0.055
12-15-12	264	0.24 ± 0.14	< 0.006	< 0.010	< 0.013	< 0.008	< 0.011	0.014	< 0.040
12-22-12	260	0.24 ± 0.08	< 0.008	< 0.008	< 0.011	< 0.009	< 0.012	0.010	< 0.044
12-29-12	260	< 0.11	< 0.006	< 0.011	< 0.018	< 0.006	< 0.009	0.016	< 0.044

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

CALLAWAY

**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							
		Be-7	Co-58	Co-60	Zr-95	Cs-134	Cs-137	Ba-La-140	Ce-144
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date									
Collected	Vol.								
01-06-11	290	< 0.08	< 0.007	< 0.007	< 0.018	< 0.006	< 0.008	< 0.010	< 0.042
01-13-11	285	< 0.08	< 0.005	< 0.009	< 0.009	< 0.009	< 0.007	< 0.012	< 0.044
01-21-11	239	< 0.10	< 0.006	< 0.004	< 0.011	< 0.009	< 0.008	< 0.009	< 0.058
01-27-11	239	< 0.09	< 0.008	< 0.004	< 0.008	< 0.004	< 0.007	< 0.008	< 0.046
02-03-11	297	0.13 ± 0.05	< 0.005	< 0.007	< 0.009	< 0.007	< 0.008	< 0.009	< 0.025
02-10-11	290	< 0.09	< 0.006	< 0.004	< 0.006	< 0.006	< 0.006	< 0.006	< 0.029
02-17-11	293	< 0.10	< 0.007	< 0.009	< 0.017	< 0.008	< 0.009	< 0.014	< 0.040
02-24-11	290	< 0.10	< 0.006	< 0.009	< 0.014	< 0.006	< 0.009	< 0.008	< 0.056
03-03-11	288	< 0.10	< 0.008	< 0.007	< 0.011	< 0.007	< 0.005	< 0.007	< 0.029
03-10-11	298	0.17 ± 0.08	< 0.004	< 0.003	< 0.014	< 0.007	< 0.005	< 0.005	< 0.047
03-17-11	290	< 0.11	< 0.007	< 0.009	< 0.011	< 0.008	< 0.007	< 0.011	< 0.044
03-24-11	289	0.12 ± 0.07	< 0.005	< 0.006	< 0.012	< 0.005	< 0.007	< 0.007	< 0.031 <sup>b</sup>
03-31-11	288	0.21 ± 0.12	< 0.004	< 0.009	< 0.011	< 0.008	< 0.005	< 0.010	< 0.027 <sup>b</sup>
04-08-11	327	< 0.10	< 0.004	< 0.005	< 0.010	< 0.005	< 0.005	< 0.013	< 0.030 <sup>b</sup>
04-15-11	288	< 0.14	< 0.008	< 0.011	< 0.011	< 0.009	< 0.009	< 0.018	< 0.054
04-21-11	258	< 0.13	< 0.006	< 0.010	< 0.020	< 0.004	< 0.006	< 0.015	< 0.057
04-29-11	340	< 0.08	< 0.005	< 0.006	< 0.010	< 0.004	< 0.007	< 0.015	< 0.035
05-05-11	260	< 0.12	< 0.010	< 0.010	< 0.022	< 0.008	< 0.007	< 0.018	< 0.049
05-12-11	297	0.19 ± 0.11	< 0.005	< 0.006	< 0.017	< 0.007	< 0.005	< 0.017	< 0.030
05-19-11	301	< 0.13	< 0.005	< 0.004	< 0.016	< 0.007	< 0.010	< 0.016	< 0.049
05-26-11	301	0.21 ± 0.09	< 0.008	< 0.007	< 0.016	< 0.009	< 0.007	< 0.009	< 0.036
06-03-11	342	0.20 ± 0.08	< 0.003	< 0.006	< 0.013	< 0.006	< 0.004	< 0.012	< 0.028
06-10-11	295	0.25 ± 0.12	< 0.006	< 0.008	< 0.015	< 0.006	< 0.005	< 0.024	< 0.029
06-16-11	262	0.17 ± 0.09	< 0.005	< 0.008	< 0.012	< 0.008	< 0.005	< 0.014	< 0.043
06-24-11	339	0.18 ± 0.08	< 0.005	< 0.006	< 0.011	< 0.004	< 0.007	< 0.023	< 0.025
06-30-11	256	0.18 ± 0.10	< 0.010	< 0.009	< 0.014	< 0.007	< 0.007	< 0.019	< 0.034
07-07-11	290	0.17 ± 0.10	< 0.006	< 0.009	< 0.012	< 0.010	< 0.009	< 0.013	< 0.049
07-15-11	334	0.24 ± 0.11	< 0.008	< 0.007	< 0.011	< 0.007	< 0.007	< 0.015	< 0.030
07-21-11	243	< 0.11	< 0.009	< 0.011	< 0.013	< 0.010	< 0.006	< 0.010	< 0.049
07-28-11	285	0.17 ± 0.10	< 0.008	< 0.007	< 0.019	< 0.008	< 0.005	< 0.010	< 0.030

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

<sup>b</sup> I-131 activity detected in air particulate and/or charcoal cartridge; results in Appendix D.



CALLAWAY

**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.)							
		Be-7	Co-58	Co-60	Zr-95	Cs-134	Cs-137	Ba-La-140	Ce-144
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date									
Collected	Vol.								
08-05-11	330	0.19 ± 0.11	< 0.004	< 0.006	< 0.016	< 0.007	< 0.005	< 0.010	< 0.037
08-11-11	249	0.19 ± 0.09	< 0.009	< 0.007	< 0.011	< 0.008	< 0.009	< 0.007	< 0.045
08-18-11	290	0.24 ± 0.11	< 0.008	< 0.007	< 0.012	< 0.009	< 0.007	< 0.007	< 0.041
08-25-11	246	< 0.12	< 0.008	< 0.009	< 0.008	< 0.010	< 0.009	< 0.009	< 0.060
09-01-11	250	0.18 ± 0.10	< 0.005	< 0.007	< 0.019	< 0.005	< 0.011	< 0.007	< 0.048
09-08-11	249	0.24 ± 0.13	< 0.007	< 0.006	< 0.017	< 0.007	< 0.010	< 0.009	< 0.056
09-15-11	255	0.28 ± 0.12	< 0.009	< 0.006	< 0.016	< 0.006	< 0.007	< 0.015	< 0.036
09-22-11	262	< 0.09	< 0.004	< 0.006	< 0.010	< 0.005	< 0.006	< 0.017	< 0.049
09-29-11	259	< 0.12	< 0.011	< 0.010	< 0.009	< 0.009	< 0.009	< 0.023	< 0.035
10-06-11	271	0.22 ± 0.13	< 0.012	< 0.006	< 0.020	< 0.009	< 0.007	< 0.033	< 0.056
10-13-11	266	0.25 ± 0.09	< 0.010	< 0.006	< 0.008	< 0.010	< 0.012	< 0.019	< 0.044
10-20-11	271	0.15 ± 0.08	< 0.006	< 0.006	< 0.018	< 0.007	< 0.006	< 0.027	< 0.039
10-27-11	279	0.19 ± 0.11	< 0.006	< 0.005	< 0.009	< 0.008	< 0.008	< 0.015	< 0.047
11-03-11	270	0.16 ± 0.09	< 0.005	< 0.006	< 0.012	< 0.005	< 0.007	< 0.018	< 0.034
11-10-11	274	< 0.11	< 0.006	< 0.007	< 0.018	< 0.007	< 0.006	< 0.038	< 0.036
11-17-11	262	0.21 ± 0.11	< 0.006	< 0.008	< 0.008	< 0.008	< 0.006	< 0.023	< 0.032
11-25-11	308	< 0.11	< 0.006	< 0.006	< 0.016	< 0.005	< 0.009	< 0.029	< 0.032
12-01-11	229	< 0.12	< 0.007	< 0.010	< 0.017	< 0.010	< 0.010	< 0.026	< 0.053
12-08-12	272	< 0.09	< 0.006	< 0.009	< 0.012	< 0.008	< 0.009	0.017	< 0.063
12-15-12	291	< 0.12	< 0.008	< 0.006	< 0.013	< 0.008	< 0.008	0.012	< 0.044
12-22-12	277	0.18 ± 0.09	< 0.006	< 0.009	< 0.015	< 0.010	< 0.008	0.015	< 0.050
12-29-12	279	0.14 ± 0.07	< 0.007	< 0.007	< 0.010	< 0.005	< 0.006	0.020	< 0.028

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

CALLAWAY

**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							
		Be-7	Co-58	Co-60	Zr-95	Cs-134	Cs-137	Ba-La-140	Ce-144
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date									
Collected	Vol.								
01-06-11	300	< 0.08	< 0.005	< 0.006	< 0.007	< 0.006	< 0.006	< 0.010	< 0.048
01-13-11	298	< 0.09	< 0.005	< 0.006	< 0.011	< 0.008	< 0.008	< 0.008	< 0.046
01-21-11	359	< 0.09	< 0.005	< 0.007	< 0.017	< 0.007	< 0.009	< 0.013	< 0.038
01-27-11	272	< 0.10	< 0.004	< 0.004	< 0.009	< 0.008	< 0.007	< 0.008	< 0.037
02-03-11	318	< 0.07	< 0.004	< 0.004	< 0.014	< 0.006	< 0.005	< 0.006	< 0.036
02-10-11	295	< 0.08	< 0.009	< 0.003	< 0.009	< 0.006	< 0.008	< 0.008	< 0.036
02-17-11	314	< 0.09	< 0.005	< 0.007	< 0.012	< 0.008	< 0.006	< 0.010	< 0.028
02-24-11	322	< 0.09	< 0.006	< 0.004	< 0.007	< 0.005	< 0.009	< 0.005	< 0.031
03-03-11	313	0.17 ± 0.09	< 0.003	< 0.008	< 0.014	< 0.007	< 0.005	< 0.016	< 0.024
03-10-11	308	< 0.08	< 0.004	< 0.006	< 0.010	< 0.003	< 0.004	< 0.009	< 0.030
03-17-11	300	< 0.11	< 0.005	< 0.010	< 0.015	< 0.010	< 0.009	< 0.012	< 0.031
03-24-11	307	0.20 ± 0.09	< 0.007	< 0.006	< 0.014	< 0.005	< 0.004	< 0.011	< 0.027 <sup>b</sup>
03-31-11	298	0.18 ± 0.09	< 0.005	< 0.007	< 0.013	< 0.007	< 0.007	< 0.010	< 0.038 <sup>b</sup>
04-08-11	346	0.14 ± 0.06	< 0.005	< 0.008	< 0.012	< 0.006	< 0.009	< 0.013	< 0.036 <sup>b</sup>
04-15-11	270	0.23 ± 0.11	< 0.010	< 0.009	< 0.014	< 0.008	< 0.010	< 0.053	< 0.059
04-21-11	236	< 0.15	< 0.010	< 0.006	< 0.021	< 0.009	< 0.008	< 0.024	< 0.068
04-29-11	319	< 0.10	< 0.004	< 0.006	< 0.014	< 0.007	< 0.007	< 0.011	< 0.032
05-05-11	249	< 0.14	< 0.009	< 0.007	< 0.021	< 0.006	< 0.014	< 0.016	< 0.053
05-12-11	289	< 0.12	< 0.005	< 0.007	< 0.010	< 0.009	< 0.007	< 0.041	< 0.040
05-19-11	287	< 0.11	< 0.007	< 0.007	< 0.014	< 0.008	< 0.009	< 0.012	< 0.050
05-26-11	287	0.19 ± 0.10	< 0.006	< 0.005	< 0.019	< 0.006	< 0.008	< 0.011	< 0.040
06-03-11	342	0.21 ± 0.06	< 0.004	< 0.005	< 0.011	< 0.004	< 0.005	< 0.004	< 0.028
06-10-11	304	0.27 ± 0.11	< 0.009	< 0.008	< 0.018	< 0.009	< 0.008	< 0.025	< 0.034
06-16-11	261	0.14 ± 0.08	< 0.011	< 0.008	< 0.020	< 0.010	< 0.010	< 0.037	< 0.036
06-24-11	348	0.20 ± 0.07	< 0.008	< 0.005	< 0.011	< 0.006	< 0.005	< 0.015	< 0.042
06-30-11	267	0.26 ± 0.11	< 0.003	< 0.006	< 0.009	< 0.006	< 0.006	< 0.015	< 0.031
07-07-11	314	0.21 ± 0.12	< 0.008	< 0.007	< 0.014	< 0.007	< 0.006	< 0.013	< 0.047
07-15-11	363	0.18 ± 0.08	< 0.005	< 0.008	< 0.013	< 0.003	< 0.009	< 0.009	< 0.035
07-21-11	268	< 0.10	< 0.008	< 0.008	< 0.014	< 0.007	< 0.006	< 0.014	< 0.043
07-28-11	315	0.17 ± 0.09	< 0.009	< 0.007	< 0.010	< 0.006	< 0.008	< 0.012	< 0.030

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

<sup>b</sup> I-131 activity detected in air particulate and/or charcoal cartridge; results in Appendix D.

CALLAWAY

**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.)							
		Be-7	Co-58	Co-60	Zr-95	Cs-134	Cs-137	Ba-La-140	Ce-144
Required LLDs		-	-	-	-	0.050	0.060	-	-
Date									
Collected	Vol.								
08-05-11	366	0.12 ± 0.07	< 0.004	< 0.007	< 0.011	< 0.006	< 0.007	< 0.010	< 0.050
08-11-11	271	0.19 ± 0.09	< 0.006	< 0.008	< 0.011	< 0.005	< 0.009	< 0.007	< 0.044
08-18-11	312	0.22 ± 0.09	< 0.006	< 0.008	< 0.014	< 0.006	< 0.004	< 0.006	< 0.035
08-25-11	315	0.13 ± 0.06	< 0.004	< 0.007	< 0.011	< 0.006	< 0.006	< 0.004	< 0.034
09-01-11	269	0.23 ± 0.10	< 0.006	< 0.006	< 0.008	< 0.005	< 0.006	< 0.004	< 0.032
09-08-11	270	0.20 ± 0.11	< 0.007	< 0.011	< 0.016	< 0.008	< 0.007	< 0.015	< 0.050
09-15-11	270	0.23 ± 0.12	< 0.006	< 0.006	< 0.005	< 0.009	< 0.007	< 0.014	< 0.044
09-22-11	274	0.19 ± 0.09	< 0.006	< 0.007	< 0.007	< 0.010	< 0.009	< 0.015	< 0.045
09-29-11	254	< 0.10	< 0.011	< 0.010	< 0.013	< 0.006	< 0.009	< 0.025	< 0.053
10-06-11	256	< 0.15	< 0.006	< 0.009	< 0.019	< 0.011	< 0.006	< 0.036	< 0.040
10-13-11	245	0.30 ± 0.18	< 0.006	< 0.008	< 0.019	< 0.011	< 0.012	< 0.036	< 0.037
10-20-11	246	0.24 ± 0.13	< 0.010	< 0.009	< 0.010	< 0.009	< 0.007	< 0.025	< 0.051
10-27-11	254	< 0.08	< 0.010	< 0.006	< 0.008	< 0.006	< 0.006	< 0.017	< 0.058
11-03-11	245	< 0.14	< 0.008	< 0.008	< 0.019	< 0.010	< 0.006	< 0.038	< 0.056
11-10-11	256	< 0.13	< 0.007	< 0.010	< 0.013	< 0.009	< 0.009	< 0.042	< 0.046
11-17-11	247	0.14 ± 0.08	< 0.009	< 0.008	< 0.012	< 0.008	< 0.010	< 0.025	< 0.032
11-25-11	294	< 0.12	< 0.008	< 0.006	< 0.009	< 0.008	< 0.007	< 0.016	< 0.027
12-01-11	228	< 0.13	< 0.007	< 0.011	< 0.010	< 0.010	< 0.011	< 0.024	< 0.046
12-08-12	298	< 0.09	< 0.004	< 0.008	< 0.010	< 0.005	< 0.004	0.008	< 0.028
12-15-12	310	< 0.06	< 0.006	< 0.005	< 0.011	< 0.009	< 0.005	0.011	< 0.045
12-22-12	301	0.19 ± 0.09	< 0.008	< 0.007	< 0.011	< 0.009	< 0.009	0.018	< 0.045
12-29-12	311	< 0.11	< 0.010	< 0.008	< 0.012	< 0.005	< 0.009	0.023	< 0.046

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

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

Collection: Semimonthly during grazing season, monthly otherwise.

Units: pCi/L

Location		CA-MLK-M9					
Date	Lab	Concentration (pCi/L)					
Collected	Code	I-131	K-40	Zn-65	Cs-134	Cs-137	Ba-La-140
Required LLDs		1	-	-	15	18	15
01-10-11	CAMI -81	< 0.2	830 ± 99	< 6.1	< 3.7	< 3.6	< 2.0
02-07-11	CAMI -527	< 0.3	909 ± 112	< 14.4	< 4.4	< 3.7	< 5.3
03-07-11	CAMI -1001	< 0.4	780 ± 97	< 4.1	< 2.2	< 4.1	< 2.4
04-11-11	CAMI -1937	39.0 ± 7.2 <sup>a</sup>	1215 ± 105	< 7.0	< 4.7	< 3.6	< 2.9
05-08-11	CAMI -2802	0.6 ± 0.2	1130 ± 103	< 3.2	< 4.0	< 3.1	< 1.3
05-16-11	CAMI -3170	< 0.4 <sup>b</sup>	1279 ± 93	< 3.9	< 3.1	< 3.0	< 2.6
05-25-11	CAMI -3276	< 0.3	1258 ± 113	< 4.5	< 3.7	< 4.0	< 3.0
06-14-11	CAMI -3784	< 0.3	1155 ± 97	< 3.6	< 2.7	< 3.2	< 2.2
06-26-11	CAMI -4030	< 0.2	773 ± 93	< 4.6	< 3.6	< 5.0	< 2.8
07-11-11	CAMI -4423	< 0.4	816 ± 96	< 7.8	< 3.4	< 4.4	< 4.0
07-25-11	CAMI -5032	< 0.4	837 ± 78	< 5.0	< 3.7	< 3.9	< 3.7
08-08-11	CAMI -5382	< 0.2	1365 ± 116	< 7.8	< 2.8	< 2.5	< 1.3
08-22-11	CAMI -5687	< 0.3	1269 ± 120	< 9.6	< 4.2	< 2.9	< 2.4
09-13-11	CAMI -6175	< 0.5	1351 ± 112	< 6.8	< 2.9	< 3.6	< 3.9
09-26-11	CAMI -6470	< 0.2	1323 ± 112	< 5.3	< 2.9	< 3.8	< 2.2
10-11-11	CAMI -6896	< 0.4	1209 ± 115	< 6.6	< 3.9	< 3.9	< 2.8
10-24-11	CAMI -7417	< 0.5	1136 ± 98	< 6.6	< 3.5	< 3.9	< 2.5
11-08-11	CAMI -7835	< 0.3	1167 ± 100	< 7.7	< 3.2	< 4.3	< 2.4
11-22-11	CAMI -8203	< 0.3	1108 ± 96	< 7.0	< 2.7	< 3.4	< 2.7
12-12-11	CAMI -8648	< 0.3	1406 ± 176	< 16.8	< 6.3	< 5.8	< 3.5
12-26-11	CAMI -8974	< 0.2	959 ± 99	< 4.2	< 2.9	< 3.8	< 1.8

<sup>a</sup> I-131 determined by gamma isotopic analysis; recount = 36.4 ± 6.0 pCi/L. I-131 activity due to Fukushima event; data evaluation is documented in Callaway CAR 201103463.

<sup>b</sup> Corrected value.

**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- 3769	6/13/2011	Lettuce	5405 ± 324	< 7.2	< 7.4	< 8.3	< 14.6	< 7.3	< 6.3
CAVE- 3770	6/14/2011	Cabbage	3690 ± 262	< 9.7	< 4.7	< 6.9	< 12.0	< 7.9	< 6.8
CAVE- 3771	6/13/2011	Mustard	5133 ± 390	< 8.4	< 13.5	< 8.1	< 25.2	< 13.0	< 11.3
CAVE- 3772	6/13/2011	Collards	3670 ± 315	< 9.0	< 7.5	< 8.6	< 18.3	< 9.4	< 11.2
CAVE- 4424	7/12/2011	Cabbage	2534 ± 208	< 7.6	< 6.1	< 3.4	< 12.5	< 7.4	< 6.1
CAVE- 4425	7/12/2011	Lettuce	5809 ± 386	< 7.2	< 13.8	< 6.4	< 9.8	< 9.3	< 11.4
CAVE- 4426	7/12/2011	Collards	2912 ± 360	< 10.0	< 6.9	< 14.0	< 29.8	< 14.1	< 13.0
	8/9/2011			ND <sup>a</sup>					
CAVE- 6176	9/14/2011	Turnip	4938 ± 299	< 8.5	< 6.0	< 4.7	< 16.0	< 8.3	< 7.8
CAVE- 6177	9/14/2011	Collards	3799 ± 314	< 9.2	< 10.8	< 7.1	< 22.3	< 10.3	< 12.1
CAVE- 6178	9/14/2011	Mustard	5785 ± 372	< 9.1	< 10.1	< 7.6	< 16.6	< 11.3	< 11.4
CAVE- 6897	10/11/2011	Lettuce	5424 ± 352	< 8.7	< 8.0	< 10.0	< 15.6	< 7.9	< 10.1
CAVE- 6898	10/11/2011	Turnip	5118 ± 351	< 11.0	< 9.6	< 8.7	< 17.1	< 6.3	< 6.9
CAVE- 6899	10/11/2011	Collards	4337 ± 322	< 6.6	< 6.0	< 8.7	< 9.9	< 7.7	< 8.1
CAVE- 6900	10/11/2011	Mustard	5864 ± 369	< 6.5	< 6.8	< 7.9	< 17.1	< 7.2	< 4.6
<u>Location: CA-FPL-V11</u>									
CAVE- 2803	5/9/2011	Lettuce	3572 ± 374	< 13.2	< 9.1	< 9.8	< 14.7	< 8.6	< 16.1
	6/29/2011			ND <sup>a</sup>					
CAVE- 4427	7/11/2011	Swiss Chard	6700 ± 423	< 10.0	< 7.5	< 10.8	< 11.6	< 9.6	< 11.5
CAVE- 4428	7/11/2011	Lettuce	8727 ± 581	< 15.6	< 11.2	< 15.4	< 31.7	< 11.8	< 18.9
CAVE- 4429	7/11/2011	Cabbage	2606 ± 241	< 7.3	< 6.7	< 5.8	< 12.4	< 6.5	< 5.7
CAVE- 5384	8/8/2011	Cabbage	3706 ± 302	< 11.5	< 8.8	< 11.5	< 21.2	< 9.5	< 12.9
CAVE- 6179	9/12/2011	Cabbage	5562 ± 459	< 15.6	< 9.0	< 8.3	< 28.9	< 12.0	< 17.8
CAVE- 6901	10/11/2011	Turnip	4955 ± 426	< 9.5	< 11.8	< 13.6	< 31.2	< 13.4	< 13.7
<u>Location: CA-FPL-V12</u>									
CAVE- 3172	5/23/2011	Pokeweed	6960 ± 428	< 12.3	< 11.0	< 9.6	< 21.5	< 11.5	< 10.8
CAVE- 3773	6/14/2011	Pokeweed	6834 ± 363	< 5.3	< 6.8	< 6.6	< 11.3	< 8.2	< 9.1
CAVE- 4430	7/12/2011	Cabbage	4213 ± 285	< 7.3	< 9.5	< 7.7	< 15.3	< 6.7	< 9.3
CAVE- 5386	8/9/2011	Cabbage	3686 ± 350	< 9.7	< 12.2	< 6.9	< 18.0	< 10.0	< 9.4
CAVE- 6180	9/12/2011	Collard Greens	3571 ± 332	< 9.3	< 11.2	< 6.2	< 14.3	< 10.0	< 8.4
CAVE- 6902	10/11/2011	Collard Greens	4205 ± 363	< 7.2	< 9.4	< 8.0	< 15.7	< 9.2	< 10.4

**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-V14</u>									
CAVE- 3171	5/23/2011	Turnips	3310 ± 292	< 9.1	< 9.4	< 10.8	< 17.5	< 7.6	< 6.8
CAVE- 3774	6/13/2011	Lettuce	3627 ± 341	< 12.7	< 10.9	< 11.9	< 33.1	< 13.4	< 17.1
CAVE- 3775	6/13/2011	Turnip	4060 ± 266	< 9.0	< 10.4	< 10.1	< 17.4	< 9.7	< 11.9
	7/12/2011			ND <sup>a</sup>					
	7/21/2011			ND <sup>a</sup>					
<u>Location: CA-FPL-V15</u>									
CAVE- 3929	6/20/2011	Lettuce	3720 ± 489	< 12.3	< 18.6	< 17.7	< 25.9	< 18.7	< 18.4
CAVE- 4662	7/18/2011	Cabbage	5112 ± 447	< 13.0	< 11.8	< 13.9	< 37.7	< 15.3	< 14.1
CAVE- 5387	8/8/2011	Cabbage	5382 ± 440	< 8.8	< 7.3	< 12.5	< 24.3	< 9.7	< 12.6
	9/14/2011			ND <sup>a</sup>					
	10/27/2011			ND <sup>a</sup>					

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

**Table 4. Non-food Crops, analyses for iodine-131 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>131</sup> I	<sup>134</sup> Cs	<sup>137</sup> Cs
<u>Location: CA-FC-1</u>										
	1A	10/14/2011				ND <sup>a</sup>				
	1B	10/14/2011				ND <sup>a</sup>				
	1C	10/14/2011				ND <sup>a</sup>				
<u>Location: CA-FC-2</u>										
CAVE- 6795	2A-Soybeans	10/4/2011	< 151	6438 ± 393	< 5.2	< 8.9	< 7.8	< 17.6	< 7.1	< 8.0
CAVE- 6796	2B-Soybeans	10/4/2011	< 151	5920 ± 395	< 5.3	< 4.9	< 7.4	< 15.7	< 8.4	< 6.6
CAVE- 6797	2C-Soybeans	10/4/2011	< 151	4473 ± 348	< 8.7	< 5.2	< 10.1	< 26.8	< 10.2	< 12.1
<u>Location: CA-FC-3</u>										
CAVE- 6798	3A-Soybeans	10/4/2011	< 151	11761 ± 652	< 10.4	< 15.2	< 14.9	< 28.2	< 13.1	< 17.4
CAVE- 6800	3B-Soybeans	10/4/2011	< 151	9472 ± 509	< 11.8	< 13.0	< 7.0	< 18.7	< 7.6	< 13.1
	3C	10/14/2011				ND <sup>a</sup>				
<u>Location: CA-FC-4 (C)</u>										
CAVE- 6903	Soybeans	10/11/2011	< 151	2797 ± 336	< 12.0	< 12.7	< 9.1	< 17.4	< 9.4	< 11.6
CAVE- 6904	Corn	10/11/2011	< 151	14237 ± 505	< 15.2	< 10.9	< 12.8	< 13.2	< 11.6	< 13.4

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

**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- 8946	12/21/2011		10913 ± 665	< 23.9	< 35.6	< 12.9	< 10.7	< 31.0	< 18.6	357 ± 44	< 76.9
CASO- 8947	12/21/2011		12691 ± 751	< 26.8	< 44.0	< 20.3	< 17.9	< 47.0	< 20.8	945 ± 62	< 57.0
<u>Location: SOL-F-006</u>											
CASO- 8948	12/21/2011		12103 ± 809	< 29.2	< 29.1	< 26.9	< 13.4	< 36.0	< 23.0	694 ± 56	< 44.3
CASO- 8949	12/21/2011		10216 ± 733	< 33.6	< 55.8	< 32.1	< 21.3	< 24.1	< 23.3	692 ± 56	< 80.3
<u>Location: SOL-PR-003</u>											
CASO- 8950	12/21/2011		10079 ± 715	< 30.3	< 51.4	< 24.0	< 20.2	< 25.0	< 17.0	342 ± 35	< 69.4
CASO- 8951	12/21/2011		10463 ± 652	< 24.3	< 34.7	< 18.9	< 8.5	< 21.9	< 16.3	324 ± 44	< 60.7
<u>Location: SOL-PR-007</u>											
CASO- 8952	12/21/2011		11355 ± 753	< 25.5	< 56.0	< 26.1	< 14.0	< 32.0	< 23.9	285 ± 48	< 36.7
CASO- 8953	12/21/2011		10770 ± 723	< 30.6	< 46.5	< 28.5	< 8.9	< 42.9	< 24.7	258 ± 39	< 36.9
<u>Location: SOL-M-009</u>											
CASO- 8954	12/21/2011		14938 ± 782	< 26.0	< 71.8	< 25.7	< 16.6	< 38.8	< 19.2	104 ± 33	< 51.7
CASO- 8955	12/21/2011		14514 ± 828	< 19.0	< 50.0	< 26.3	< 22.7	< 20.9	< 21.6	132 ± 32	< 33.0
<u>Location: SOL-W-001</u>											
CASO- 8956	12/21/2011		13534 ± 739	< 25.6	< 23.4	< 21.8	< 9.4	< 15.6	< 18.4	48 ± 21	< 70.9
CASO- 8957	12/21/2011		11928 ± 722	< 22.8	< 62.5	< 26.4	< 14.4	< 23.6	< 21.7	62 ± 29	< 32.8
<u>Location: SOL-W-002</u>											
CASO- 8958	12/21/2011		14581 ± 860	< 31.6	< 53.3	< 34.6	< 14.2	< 39.9	< 26.3	132 ± 45	< 100.5
CASO- 8960	12/21/2011		14497 ± 827	< 33.4	< 38.4	< 24.1	< 18.1	< 29.0	< 20.4	126 ± 32	< 44.4
<u>Location: SOL-W-003</u>											
CASO- 8961	12/21/2011		11941 ± 646	< 23.2	< 40.3	< 20.5	< 6.2	< 22.3	< 20.9	< 20	< 32.9
CASO- 8962	12/21/2011		7174 ± 512	< 16.8	< 13.4	< 22.3	< 15.4	< 14.4	< 13.4	< 17	< 33.0
<u>Location: SOL-W-004</u>											
CASO- 8963	12/21/2011		5534 ± 469	< 20.4	< 30.2	< 17.5	< 11.8	< 27.8	< 17.0	< 14	< 66.7
CASO- 8964	12/21/2011		9407 ± 696	< 38.5	< 63.5	< 36.7	< 20.7	< 61.0	< 19.2	< 29	< 121.8



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

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

Lab Code	Required	CASW- 335	CASW- 702	CASW- 1505	CASW- 2493
Date Collected	LLD	01-21-11	02-22-11	03-29-11	04-25-11
H-3	3000	< 142	< 141	< 155	< 153
Mn-54	15	< 3.7	< 3.6	< 4.5	< 5.7
Fe-59	30	< 10.3	< 4.5	< 6.1	< 5.6
Co-58	15	< 4.7	< 3.5	< 3.3	< 5.2
Co-60	15	< 2.6	< 4.3	< 3.2	< 4.1
Zn-65	30	< 3.2	< 8.1	< 4.8	< 4.7
Zr-Nb-95	15	< 5.6	< 5.1	< 3.1	< 4.7
I-131	1000	< 10.0	< 7.7	< 8.5	< 12.6
Cs-134	15	< 5.5	< 2.8	< 3.4	< 3.0
Cs-137	18	< 6.1	< 4.6	< 2.3	< 3.9
Ba-La-140	15	< 7.4	< 2.2	< 4.0	< 8.0

Lab Code	Required	CASW- 3417	CASW- 4031	CASW- 5121	CASW- 5904
Date Collected	LLD	05-31-11	06-28-11	07-26-11	08-30-11
H-3	3000	< 144	< 150	< 171	< 149
Mn-54	15	< 3.3	< 3.8	< 3.4	< 4.6
Fe-59	30	< 4.5	< 6.0	< 3.4	< 10.2
Co-58	15	< 3.6	< 3.9	< 3.9	< 4.4
Co-60	15	< 2.3	< 3.6	< 2.9	< 4.2
Zn-65	30	< 2.3	< 8.5	< 4.2	< 11.1
Zr-Nb-95	15	< 4.2	< 6.9	< 4.1	< 4.3
I-131	1000	< 9.4	< 5.9	< 7.9	< 12.8
Cs-134	15	< 3.1	< 4.0	< 3.2	< 4.5
Cs-137	18	< 4.5	< 5.3	< 3.8	< 4.7
Ba-La-140	15	< 5.3	< 3.6	< 3.9	< 6.2

Lab Code	Required	CASW- 6563	CASW- 7418	CASW- 8345	CASW- 8975
Date Collected	LLD	09-27-11	10-25-11	11-28-11	12-27-11
H-3	3000	< 144	< 145	< 166	< 151
Mn-54	15	< 3.4	< 2.5	< 4.3	< 4.4
Fe-59	30	< 11.5	< 3.5	< 7.0	< 8.9
Co-58	15	< 4.2	< 2.4	< 3.4	< 2.4
Co-60	15	< 4.9	< 1.7	< 3.4	< 2.7
Zn-65	30	< 5.4	< 4.1	< 4.7	< 5.1
Zr-Nb-95	15	< 3.9	< 2.6	< 2.9	< 4.9
I-131	1000	< 5.1	< 9.1	< 6.6	< 4.7
Cs-134	15	< 3.7	< 2.5	< 4.0	< 2.9
Cs-137	18	< 5.4	< 3.8	< 4.7	< 4.4
Ba-La-140	15	< 6.3	< 3.7	< 4.9	< 2.9

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

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

Lab Code	Required	CASW- 336	CASW- 703	CASW- 1506	CASW- 2494
Date Collected	LLD	01-21-11	02-22-11	03-29-11	04-25-11
H-3	3000	< 142	290 ± 89	< 155	< 153
Mn-54	15	< 5.7	< 1.8	< 3.3	< 3.9
Fe-59	30	< 10.0	< 5.0	< 5.9	< 6.1
Co-58	15	< 3.7	< 1.3	< 3.8	< 3.5
Co-60	15	< 3.4	< 2.2	< 2.1	< 4.1
Zn-65	30	< 4.1	< 6.2	< 3.4	< 5.9
Zr-Nb-95	15	< 3.0	< 3.1	< 4.6	< 3.4
I-131	1000	< 11.4	< 4.0	< 8.9	< 10.2
Cs-134	15	< 4.9	< 2.7	< 2.8	< 4.6
Cs-137	18	< 5.6	< 2.8	< 3.8	< 7.7
Ba-La-140	15	< 7.2	< 2.8	< 6.3	< 9.9

Lab Code	Required	CASW- 3418	CASW- 4032	CASW- 5122	CASW- 5905
Date Collected	LLD	05-31-11	06-28-11	07-26-11	08-30-11
H-3	3000	< 144	< 150	< 171	190 ± 88
Mn-54	15	< 3.4	< 3.3	< 5.1	< 5.2
Fe-59	30	< 6.1	< 4.6	< 11.5	< 9.7
Co-58	15	< 3.5	< 3.1	< 5.7	< 5.0
Co-60	15	< 2.1	< 2.5	< 4.1	< 4.3
Zn-65	30	< 2.6	< 6.3	< 4.3	< 8.1
Zr-Nb-95	15	< 3.8	< 2.3	< 5.4	< 2.8
I-131	1000	< 9.7	< 7.0	< 10.7	< 9.4
Cs-134	15	< 2.5	< 3.5	< 6.4	< 3.9
Cs-137	18	< 3.7	< 3.5	< 3.8	< 5.9
Ba-La-140	15	< 5.8	< 5.4	< 8.1	< 5.9

Lab Code	Required	CASW- 6564	CASW- 7419	CASW- 8346	CASW- 8976
Date Collected	LLD	09-27-11	10-25-11	11-28-11	12-27-11
H-3	3000	278 ± 86	456 ± 97	< 166	< 151
Mn-54	15	< 4.2	< 3.2	< 4.0	< 4.3
Fe-59	30	< 10.6	< 6.0	< 4.9	< 6.4
Co-58	15	< 4.2	< 4.2	< 3.8	< 4.2
Co-60	15	< 2.7	< 2.4	< 2.1	< 5.4
Zn-65	30	< 6.0	< 1.6	< 4.9	< 8.4
Zr-Nb-95	15	< 3.3	< 3.1	< 3.0	< 3.2
I-131	1000	< 9.0	< 9.4	< 7.6	< 3.5
Cs-134	15	< 4.1	< 2.2	< 3.5	< 4.3
Cs-137	18	< 2.6	< 3.6	< 3.6	< 6.0
Ba-La-140	15	< 9.3	< 4.3	< 5.6	< 2.5

**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-CTBD</u>											
CASW- 71	01/05/11	< 144	-	-	-	-	-	-	-	-	-
CASW- 1924	04/06/11	< 152	-	-	-	-	-	-	-	-	-
CASW- 4336	07/06/11	< 139	-	-	-	-	-	-	-	-	-
CASW- 5337	08/03/11	< 154	-	-	-	-	-	-	-	-	-
CAWW- 6804	10/05/11	< 145	< 4.6	< 11.7	< 5.2	< 3.3	< 9.0	< 7.3	< 6.0	< 6.8	< 7.6
<u>Location: CA-SWA-UHS</u>											
CASW- 389	01/18/11	< 154	< 3.3	< 6.0	< 2.3	< 2.3	< 5.2	< 3.4	< 3.0	< 3.2	< 4.5
CASW- 2355	04/20/11	< 170	< 2.7	< 3.9	< 2.3	< 1.8	< 3.1	< 3.9	< 2.9	< 2.0	< 7.6
CASW- 4784	07/13/11	< 145	< 1.5	< 5.3	< 1.8	< 1.7	< 1.4	< 4.0	< 1.6	< 3.4	< 5.6
CASW- 7714	10/18/11	275 ± 89	< 1.6	< 4.6	< 1.4	< 0.8	< 1.8	< 2.3	< 2.0	< 1.6	< 4.3
<u>Location: CA-SWA-UNIT 2</u>											
	01/18/11						ND <sup>a</sup>				
CASW- 2349	04/14/11	175 ± 109	< 2.3	< 7.2	< 3.7	< 2.7	< 3.1	< 5.2	< 2.8	< 3.1	< 6.8
CASW- 4788	07/11/11	185 ± 82	< 2.5	< 3.0	< 2.4	< 2.1	< 4.0	< 2.6	< 2.7	< 2.9	< 8.1
CASW- 7715	10/26/11	154 ± 83	< 2.4	< 5.1	< 3.1	< 1.6	< 3.4	< 3.2	< 2.2	< 2.2	< 10.0
<u>Location: CA-SWA-POND 01</u>											
CASW- 919	03/01/11	< 177	< 4.2	< 6.7	< 4.5	< 3.0	< 5.6	< 4.7	< 4.8	< 3.2	< 5.7
CASW- 5839	08/29/11	< 148	< 2.6	< 3.4	< 2.1	< 1.9	< 4.4	< 2.1	< 2.2	< 2.9	< 1.5
<u>Location: CA-SWA-POND 02</u>											
CASW- 920	03/01/11	< 177	< 3.7	< 7.5	< 7.2	< 5.5	< 8.8	< 3.7	< 6.5	< 3.6	< 5.0
CASW- 5840	08/29/11	< 148	< 2.1	< 4.1	< 1.3	< 2.1	< 2.3	< 2.0	< 3.0	< 3.0	< 1.8
<u>Location: CA-SWA-SLUDGE LAGOON #4</u>											
CASW- 927	03/01/11	< 177	< 1.8	< 2.5	< 3.1	< 2.8	< 3.3	< 4.0	< 2.5	< 2.8	< 3.6
CASW- 5848	08/29/11	< 148	< 3.6	< 9.1	< 6.1	< 4.4	< 3.7	< 7.0	< 4.3	< 5.5	< 6.8

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

**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- 921	03/01/11	< 177	< 4.8	< 11.7	< 4.7	< 2.7	< 10.4	< 3.7	< 4.5	< 6.1	< 9.6
CASW- 5841	08/29/11	< 148	< 2.2	< 6.2	< 2.0	< 1.2	< 5.3	< 1.7	< 2.9	< 3.3	< 3.0
<u>Location: CA-SWA-OUTFALL 011</u>											
CASW- 922	03/01/11	< 177	< 4.0	< 6.3	< 3.9	< 3.6	< 10.6	< 7.3	< 3.4	< 3.2	< 3.6
CASW- 5842	08/29/11	< 148	< 3.4	< 2.6	< 1.6	< 1.8	< 4.8	< 2.8	< 2.3	< 2.3	< 1.7
<u>Location: CA-SWA-OUTFALL 012</u>											
CASW- 923	03/01/11	< 177	< 2.2	< 1.6	< 2.0	< 2.0	< 2.7	< 2.1	< 2.3	< 3.0	< 2.5
CASW- 5843	08/29/11	< 148	< 2.6	< 3.0	< 2.4	< 1.2	< 2.8	< 3.4	< 2.6	< 2.5	< 2.5
<u>Location: CA-SWA-OUTFALL 013</u>											
CASW- 924	03/01/11	< 177	< 3.2	< 5.3	< 3.5	< 3.0	< 5.8	< 2.0	< 2.4	< 2.8	< 2.9
CASW- 5845	08/29/11	< 148	< 3.4	< 3.8	< 4.1	< 1.5	< 8.3	< 2.0	< 3.3	< 3.5	< 4.7
<u>Location: CA-SWA-OUTFALL 014</u>											
CASW- 925	03/01/11	< 177	< 2.4	< 2.7	< 1.7	< 2.6	< 3.5	< 3.0	< 2.8	< 3.6	< 2.5
CASW- 5846	08/29/11	< 148	< 3.8	< 6.0	< 3.8	< 2.7	< 6.5	< 4.8	< 2.7	< 3.5	< 3.3
<u>Location: CA-SWA-OUTFALL 015</u>											
CASW- 926	03/01/11	< 177	< 1.8	< 3.3	< 1.9	< 1.6	< 3.9	< 3.0	< 2.3	< 3.3	< 2.7
CASW- 5847	08/29/11	< 148	< 1.8	< 3.6	< 2.5	< 1.8	< 2.8	< 2.0	< 2.2	< 3.3	< 1.7

**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- 773	2/25/2011	< 162	< 1.7	< 4.0	< 2.0	< 2.0	< 3.0	< 2.5	< 2.7	< 2.3	< 2.6
CADW- 3336	5/24/2011	< 138	< 4.3	< 7.4	< 4.3	< 3.3	< 7.3	< 2.9	< 3.3	< 3.1	< 5.4
CADW- 5870	8/24/2011	< 148	< 3.6	< 4.9	< 3.2	< 1.9	< 5.5	< 4.3	< 1.9	< 4.1	< 9.2
CADW- 8367	11/22/2011	< 137	< 2.8	< 11.2	< 4.5	< 4.2	< 2.6	< 3.8	< 3.7	< 5.1	< 8.5
<u>CA-DWA-004 (Miller)</u>											
CADW- 774	2/25/2011	< 162	< 2.1	< 3.8	< 1.3	< 2.1	< 5.7	< 2.7	< 2.8	< 2.8	< 1.9
CADW- 3416	5/27/2011	< 144	< 3.4	< 4.5	< 4.5	< 2.0	< 4.6	< 4.3	< 3.3	< 4.3	< 5.4
CADW- 5871	8/24/2011	< 148	< 2.7	< 4.0	< 1.8	< 3.0	< 4.6	< 3.6	< 2.0	< 3.4	< 3.0
CADW- 8369	11/23/2011	< 137	< 2.2	< 3.6	< 1.3	< 2.1	< 4.1	< 2.2	< 2.4	< 2.9	< 3.4
<u>CA-DWA-005 (Hux)</u>											
CADW- 775	2/25/2011	< 162	< 3.3	< 4.3	< 2.3	< 2.9	< 4.6	< 3.9	< 3.4	< 4.4	< 2.5
CADW- 3337	5/24/2011	< 138	< 4.1	< 7.2	< 3.7	< 2.1	< 4.7	< 4.4	< 3.8	< 2.3	< 5.5
CADW- 5872	8/24/2011	< 148	< 3.0	< 3.9	< 2.8	< 2.6	< 4.5	< 3.5	< 2.9	< 2.8	< 4.1
CADW- 8370	11/22/2011	< 137	< 4.4	< 8.4	< 3.0	< 2.5	< 4.5	< 4.0	< 3.4	< 4.3	< 6.4
<u>CA-DWA-006 (Lindeman)</u>											
CADW- 776	2/25/2011	< 162	< 2.6	< 5.3	< 1.7	< 2.4	< 4.5	< 2.8	< 1.8	< 2.7	< 2.5
CADW- 3338	5/24/2011	< 138	< 2.6	< 3.6	< 2.0	< 1.4	< 4.1	< 2.6	< 2.1	< 1.9	< 1.5
CADW- 5873	8/24/2011	< 148	< 2.2	< 7.0	< 1.8	< 2.5	< 2.9	< 2.4	< 2.3	< 3.2	< 3.5
CADW- 8371	11/22/2011	< 137	< 2.7	< 3.9	< 2.5	< 2.2	< 5.0	< 2.9	< 2.1	< 3.6	< 3.8
<u>CA-DWA-007 (Kriete)</u>											
CADW- 777	2/25/2011	< 162	< 2.5	< 6.1	< 1.7	< 2.5	< 6.0	< 2.9	< 2.8	< 2.9	< 3.2
CADW- 3339	5/24/2011	< 138	< 1.5	< 3.3	< 2.8	< 2.7	< 3.0	< 2.7	< 2.5	< 2.6	< 3.1
CADW- 5874	8/24/2011	< 148	< 2.9	< 5.1	< 3.0	< 1.3	< 2.6	< 3.0	< 3.2	< 2.8	< 4.4
CADW- 8372	11/22/2011	< 137	< 1.9	< 4.1	< 1.6	< 2.2	< 5.3	< 3.1	< 1.8	< 2.6	< 4.7
<u>CA-DWA-008 (Brandt)</u>											
CADW- 778	2/25/2011	< 162	< 2.1	< 3.1	< 2.0	< 2.8	< 3.5	< 2.6	< 3.5	< 3.8	< 3.8
CADW- 3340	5/24/2011	< 138	< 2.5	< 2.4	< 1.4	< 1.5	< 3.1	< 3.2	< 2.0	< 2.9	< 2.6
CADW- 5875	8/24/2011	< 148	< 1.8	< 2.3	< 1.4	< 1.5	< 2.4	< 3.5	< 2.6	< 2.3	< 4.6
CADW- 8373	11/23/2011	< 137	< 3.2	< 3.2	< 1.9	< 2.4	< 3.8	< 3.7	< 2.5	< 2.8	< 2.8

**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- 779	2/25/2011	< 162	< 1.9	< 4.5	< 1.2	< 1.8	< 5.1	< 2.5	< 3.5	< 3.1	< 3.0
CADW- 3341	5/24/2011	< 138	< 3.3	< 6.6	< 3.9	< 4.4	< 6.8	< 2.9	< 4.2	< 4.4	< 6.8
CASW- 5876	8/24/2011	< 148	< 2.4	< 2.6	< 2.0	< 2.4	< 1.9	< 2.5	< 2.3	< 3.2	< 6.0
CASW- 8374	11/23/2011	< 137	< 1.4	< 3.7	< 2.3	< 0.9	< 3.3	< 2.3	< 1.9	< 2.9	< 6.9
<u>CA-DWA-010 (Dillon, Susan)</u>											
CADW- 780	2/25/2011	< 162	< 2.6	< 3.3	< 1.8	< 3.0	< 4.6	< 2.9	< 2.5	< 2.4	< 2.7
CADW- 3342	5/24/2011	< 138	< 2.7	< 4.8	< 1.9	< 2.8	< 2.3	< 3.9	< 2.5	< 3.1	< 3.9
CASW- 5877	8/24/2011	< 148	< 1.9	< 5.6	< 1.0	< 2.0	< 5.3	< 3.3	< 2.3	< 3.2	< 3.3
CASW- 8375	11/23/2011	< 137	< 3.0	< 5.0	< 2.8	< 2.4	< 4.6	< 3.4	< 2.9	< 3.4	< 3.1
<u>CA-DWA-012 (Dillon, Joe)</u>											
CADW- 781	2/25/2011	< 162	< 2.0	< 5.3	< 2.8	< 3.1	< 5.4	< 3.6	< 2.6	< 2.4	< 2.5
CADW- 3343	5/24/2011	< 138	< 1.6	< 3.2	< 2.8	< 2.6	< 6.9	< 2.7	< 3.0	< 1.9	< 5.1
CADW- 5878	8/24/2011	< 148	< 2.3	< 3.4	< 1.5	< 1.7	< 1.5	< 3.7	< 2.0	< 2.4	< 2.6
CADW- 8376	11/23/2011	< 137	< 2.4	< 4.2	< 2.3	< 1.8	< 3.1	< 2.8	< 2.2	< 2.8	< 3.0
<u>CA-DWA-022 (Plummer)</u>											
CADW- 782	2/25/2011	< 162	< 2.1	< 5.0	< 2.6	< 2.9	< 6.5	< 4.0	< 2.9	< 2.6	< 5.9
CADW- 3688	6/8/2011	< 144	< 2.3	< 3.1	< 3.3	< 2.6	< 3.4	< 2.9	< 2.5	< 3.4	< 4.6
CADW- 5879	8/24/2011	< 148	< 2.6	< 4.2	< 2.5	< 1.8	< 3.3	< 2.3	< 2.5	< 3.4	< 5.0
CADW- 8377	11/22/2011	< 137	< 2.8	< 3.9	< 2.5	< 2.7	< 2.2	< 3.3	< 3.0	< 3.8	< 3.9
<u>CA-DWA-D01 (Portland Bar/Grill)</u>											
CADW- 783	2/25/2011	< 162	< 4.3	< 9.2	< 3.6	< 3.1	< 2.4	< 5.3	< 5.0	< 4.1	< 4.9
CADW- 3689	6/8/2011	< 144	< 2.2	< 5.6	< 2.6	< 2.7	< 6.9	< 3.5	< 2.4	< 3.5	< 3.8
CADW- 5880	8/24/2011	< 148	< 2.5	< 3.1	< 2.6	< 1.6	< 3.1	< 2.8	< 2.5	< 2.3	< 4.7
CADW- 8378	11/22/2011	< 137	< 2.0	< 3.9	< 2.4	< 1.7	< 4.4	< 3.2	< 2.5	< 3.8	< 5.3
<u>CA-DWA-PW1 (Plant Cafeteria)</u>											
CADW- 785	2/28/2011	< 162	< 3.5	< 6.9	< 3.6	< 3.1	< 5.5	< 4.4	< 4.2	< 5.4	< 1.6
CADW- 3691	6/8/2011	< 144	< 3.0	< 3.6	< 2.2	< 1.6	< 2.8	< 4.0	< 3.0	< 3.2	< 4.1
CADW- 5881	8/24/2011	< 148	< 2.8	< 5.1	< 1.5	< 2.6	< 4.6	< 3.1	< 2.7	< 2.1	< 4.9
CADW- 8379	11/23/2011	< 137	< 2.3	< 2.9	< 3.0	< 2.3	< 3.0	< 2.8	< 2.1	< 2.5	< 3.8

**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- 346	1/18/2011	191 ± 88	< 3.7	< 5.5	< 3.0	< 2.7	< 4.2	< 2.7	< 2.4	< 3.5	< 2.4
CAWW- 663	2/11/2011	280 ± 88	< 2.8	< 2.6	< 2.2	< 2.6	< 3.9	< 3.3	< 3.3	< 2.7	< 4.5
CAWW- 1177	3/18/2011	911 ± 120	< 5.3	< 4.9	< 3.8	< 2.5	< 4.4	< 3.0	< 5.5	< 4.3	< 5.7
CAWW- 1688	4/6/2011	541 ± 107	< 2.7	< 5.3	< 3.5	< 3.3	< 6.2	< 2.7	< 3.2	< 3.9	< 7.3
CAWW- 1977	4/13/2011	567 ± 107	< 2.8	< 3.5	< 3.4	< 3.4	< 5.4	< 4.1	< 3.2	< 4.0	< 4.2
CAWW- 2837	5/11/2011	411 ± 95	< 3.0	< 4.0	< 3.3	< 2.7	< 8.5	< 3.6	< 4.1	< 4.5	< 7.8
CAWW- 3947	6/15/2011	166 ± 82	< 3.4	< 3.8	< 2.0	< 2.6	< 3.6	< 3.2	< 3.4	< 3.2	< 6.8
CAWW- 4770	7/12/2011	279 ± 86	< 2.2	< 3.7	< 2.9	< 2.4	< 3.4	< 4.4	< 2.2	< 2.3	< 5.7
CAWW- 5424	8/9/2011	< 152	< 3.6	< 4.3	< 1.5	< 2.0	< 6.4	< 4.4	< 3.6	< 3.5	< 1.4
CAWW- 6202	9/13/2011	< 150	< 6.2	< 12.0	< 3.4	< 3.2	< 5.0	< 6.7	< 6.5	< 4.8	< 8.1
CAWW- 7667	10/19/2011	1049 ± 116	< 1.4	< 2.2	< 2.0	< 0.9	< 2.4	< 1.8	< 1.3	< 2.0	< 5.5
CAWW- 8057	11/14/2011	395 ± 92	< 3.3	< 5.2	< 3.4	< 3.1	< 6.8	< 2.5	< 2.1	< 5.3	< 3.3
CAWW- 8859	12/8/2011	186 ± 87	< 3.4	< 3.6	< 3.2	< 2.5	< 3.4	< 2.9	< 2.4	< 3.5	< 2.6
<u>Location: CA-WWA-937A</u>											
CAWW- 347	1/19/2011	< 131	< 2.6	< 7.9	< 3.4	< 3.4	< 4.0	< 2.8	< 2.7	< 3.3	< 4.1
CAWW- 664	2/18/2011	195 ± 83	< 2.8	< 3.1	< 2.1	< 2.0	< 4.3	< 2.6	< 3.7	< 4.0	< 2.2
CAWW- 1179	3/18/2011	< 153	< 3.9	< 4.4	< 2.8	< 2.8	< 5.3	< 3.8	< 3.6	< 3.1	< 2.5
CAWW- 2306	4/13/2011	< 149	< 1.5	< 3.0	< 1.3	< 1.6	< 2.8	< 2.8	< 1.3	< 1.6	< 3.5
CAWW- 2838	5/11/2011	< 144	< 3.1	< 5.9	< 2.7	< 3.4	< 3.1	< 3.8	< 2.4	< 3.9	< 4.1
CAWW- 3948	6/15/2011	< 148	< 1.7	< 3.3	< 3.1	< 1.8	< 2.7	< 3.4	< 2.1	< 3.0	< 4.8
CAWW- 4771	7/13/2011	< 145	< 3.9	< 6.1	< 3.6	< 2.7	< 4.2	< 4.7	< 4.2	< 4.4	< 6.5
CAWW- 5425	8/10/2011	< 168	< 4.8	< 11.3	< 4.7	< 4.7	< 5.4	< 4.6	< 6.2	< 5.8	< 4.0
CAWW- 6203	9/12/2011	< 150	< 3.0	< 3.8	< 3.2	< 2.1	< 4.8	< 3.0	< 2.6	< 3.5	< 6.7
CAWW- 7669	10/19/2011	< 143	< 2.1	< 4.5	< 2.2	< 1.4	< 2.7	< 3.2	< 1.7	< 1.9	< 5.6
CAWW- 8058	11/15/2011	< 147	< 2.8	< 4.9	< 2.8	< 2.3	< 3.0	< 3.8	< 2.1	< 3.4	< 3.5
CAWW- 8860	12/9/2011	< 153	< 2.5	< 5.8	< 2.1	< 1.9	< 5.6	< 3.2	< 2.5	< 3.7	< 3.0
<u>Location: CA-WWA-937B</u>											
CAWW- 348	1/17/2011	211 ± 88	< 2.1	< 5.9	< 2.0	< 3.0	< 5.5	< 4.3	< 2.3	< 3.8	< 4.8
CAWW- 665	2/11/2011	217 ± 85	< 5.8	< 8.2	< 5.6	< 1.8	< 6.4	< 4.8	< 4.7	< 5.8	< 8.3
CAWW- 1180	3/18/2011	352 ± 98	< 2.6	< 6.4	< 3.2	< 3.1	< 7.6	< 2.7	< 2.9	< 3.9	< 2.8
CAWW- 1689	4/6/2011	281 ± 87	< 3.3	< 6.6	< 2.3	< 3.3	< 4.7	< 4.4	< 3.3	< 3.7	< 3.9
CAWW- 2307	4/13/2011	320 ± 88	< 2.9	< 3.1	< 1.7	< 2.0	< 1.9	< 3.5	< 2.7	< 2.0	< 6.1
CAWW- 2839	5/11/2011	227 ± 87	< 3.2	< 8.0	< 3.3	< 4.0	< 5.3	< 2.5	< 3.3	< 4.5	< 5.2
CAWW- 3949	6/15/2011	< 148	< 1.9	< 4.3	< 3.4	< 1.6	< 4.9	< 3.7	< 3.5	< 2.1	< 7.0
CAWW- 4772	7/12/2011	154 ± 80	< 2.9	< 4.2	< 3.1	< 1.8	< 6.4	< 3.3	< 2.7	< 3.2	< 5.3
CAWW- 5426	8/9/2011	< 169	< 3.0	< 2.9	< 2.1	< 2.0	< 3.7	< 2.7	< 3.5	< 2.8	< 2.9
CAWW- 6204	9/13/2011	< 143	< 2.3	< 3.2	< 1.8	< 2.3	< 3.2	< 2.1	< 2.1	< 3.1	< 4.7
CAWW- 7670	10/18/2011	< 143	< 2.0	< 2.3	< 1.7	< 2.0	< 2.0	< 3.3	< 1.6	< 1.9	< 2.8
CAWW- 8059	11/15/2011	< 147	< 3.2	< 5.6	< 2.7	< 4.9	< 5.7	< 4.9	< 3.9	< 4.5	< 4.9
CAWW- 8861	12/8/2011	< 153	< 4.1	< 8.7	< 3.9	< 2.2	< 8.1	< 3.2	< 3.3	< 2.8	< 8.6

**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- 349	1/18/2011	< 131	< 2.6	< 4.4	< 2.0	< 2.2	< 4.9	< 3.0	< 2.5	< 3.7	< 6.2
CAWW- 666	2/18/2011	168 ± 82	< 2.3	< 4.0	< 1.4	< 1.7	< 2.7	< 2.3	< 2.7	< 3.4	< 3.8
CAWW- 1181	3/18/2011	< 153	< 2.2	< 5.7	< 3.1	< 2.3	< 5.3	< 3.3	< 3.3	< 3.0	< 2.8
CAWW- 1690	4/6/2011	176 ± 82	< 2.7	< 2.1	< 1.5	< 1.6	< 3.5	< 3.7	< 3.0	< 3.9	< 3.0
CAWW- 2308	4/13/2011	< 149	< 2.6	< 7.2	< 2.3	< 2.9	< 3.8	< 3.6	< 2.8	< 2.2	< 9.3
CAWW- 2840	5/11/2011	< 144	< 4.9	< 7.5	< 3.1	< 4.4	< 7.3	< 4.5	< 4.2	< 5.0	< 8.2
CAWW- 3950	6/15/2011	< 148	< 1.5	< 4.3	< 2.0	< 1.6	< 4.0	< 3.8	< 1.7	< 3.1	< 6.2
CAWW- 4773	7/12/2011	< 145	< 3.3	< 5.4	< 3.0	< 2.7	< 7.0	< 4.7	< 2.9	< 3.5	< 9.5
CAWW- 5428	8/10/2011	< 168	< 3.2	< 4.0	< 2.7	< 2.7	< 5.1	< 2.7	< 3.3	< 3.9	< 3.4
CAWW- 6205	9/13/2011	< 150	< 2.6	< 2.7	< 1.8	< 2.2	< 4.1	< 2.6	< 2.5	< 3.1	< 5.2
CAWW- 7671	10/18/2011	< 149	< 1.2	< 3.7	< 1.4	< 1.1	< 3.0	< 1.7	< 1.4	< 2.0	< 3.8
CAWW- 8060	11/14/2011	< 147	< 3.8	< 5.9	< 4.7	< 3.1	< 7.1	< 5.0	< 3.3	< 4.3	< 3.8
CAWW- 8862	12/8/2011	< 153	< 2.8	< 4.9	< 2.4	< 2.7	< 4.4	< 4.0	< 2.5	< 2.9	< 3.6
<u>Location: CA-WWA-937D</u>											
CAWW- 350	1/18/2011	193 ± 88	< 3.6	< 5.5	< 1.8	< 3.5	< 5.8	< 3.4	< 3.3	< 4.5	< 5.6
CAWW- 667	2/11/2011	187 ± 83	< 2.7	< 3.8	< 3.1	< 2.5	< 2.7	< 3.4	< 2.6	< 2.8	< 3.9
CAWW- 1182	3/18/2011	< 153	< 3.5	< 5.0	< 4.0	< 3.5	< 3.3	< 3.7	< 3.0	< 4.5	< 3.0
CAWW- 1691	4/6/2011	< 138	< 2.4	< 7.8	< 4.3	< 2.2	< 4.9	< 4.9	< 3.5	< 3.8	< 7.7
CAWW- 2309	4/13/2011	< 149	< 2.7	< 6.0	< 2.2	< 2.1	< 5.0	< 4.0	< 3.2	< 2.2	< 6.4
CAWW- 2841	5/11/2011	< 144	< 3.9	< 6.9	< 2.1	< 2.4	< 4.6	< 2.7	< 3.3	< 2.4	< 6.6
CAWW- 3951	6/15/2011	< 148	< 1.9	< 5.1	< 3.2	< 2.4	< 3.5	< 3.9	< 3.6	< 2.6	< 5.4
CAWW- 4774	7/12/2011	< 145	< 1.4	< 5.2	< 2.3	< 2.3	< 3.5	< 3.6	< 3.0	< 2.8	< 4.4
CAWW- 5429	8/10/2011	< 168	< 3.1	< 3.4	< 3.7	< 1.8	< 4.3	< 3.1	< 3.3	< 2.6	< 2.0
CAWW- 6206	9/13/2011	< 150	< 1.6	< 5.9	< 1.8	< 2.5	< 3.9	< 2.5	< 2.5	< 3.1	< 4.0
CAWW- 7672	10/18/2011	< 149	< 1.7	< 3.5	< 1.6	< 1.1	< 2.9	< 2.6	< 1.3	< 1.6	< 5.3
CAWW- 8061	11/14/2011	< 147	< 2.9	< 5.8	< 2.9	< 2.0	< 3.7	< 3.0	< 2.9	< 4.1	< 4.0
CAWW- 8864	12/8/2011	< 153	< 2.3	< 3.3	< 1.7	< 1.6	< 2.9	< 3.3	< 2.0	< 2.7	< 2.9
<u>Location: CA-WWA-937E</u>											
CAWW- 351	1/17/2011	167 ± 87	< 4.3	< 7.0	< 2.9	< 3.0	< 5.9	< 3.1	< 3.9	< 3.1	< 4.7
CAWW- 668	2/11/2011	< 147	< 2.8	< 3.7	< 1.7	< 3.0	< 2.8	< 1.9	< 2.6	< 3.3	< 4.4
CAWW- 1183	3/18/2011	271 ± 94	< 2.3	< 4.0	< 2.1	< 1.4	< 2.7	< 2.0	< 2.8	< 3.3	< 1.6
CAWW- 1692	4/6/2011	149 ± 81	< 2.6	< 6.8	< 1.5	< 2.5	< 3.5	< 2.3	< 2.5	< 3.4	< 5.0
CAWW- 2310	4/13/2011	196 ± 82	< 2.8	< 5.8	< 3.5	< 3.0	< 4.4	< 3.0	< 2.5	< 2.4	< 7.6
CAWW- 2842	5/11/2011	196 ± 85	< 2.4	< 5.7	< 2.8	< 1.9	< 3.8	< 1.7	< 2.8	< 2.2	< 5.3
CAWW- 3952	6/15/2011	< 148	< 2.0	< 2.6	< 1.7	< 1.6	< 3.1	< 3.3	< 1.9	< 3.1	< 2.5
CAWW- 4775	7/12/2011	< 168	< 2.8	< 4.3	< 2.6	< 2.1	< 2.8	< 4.0	< 2.2	< 2.7	< 8.0
CAWW- 5430	8/10/2011	< 168	< 3.0	< 6.2	< 3.9	< 2.7	< 5.8	< 4.2	< 3.5	< 2.5	< 2.8
CAWW- 6207	9/13/2011	< 150	< 2.3	< 2.7	< 1.8	< 1.8	< 4.1	< 3.0	< 2.9	< 3.2	< 5.2
CAWW- 7673	10/19/2011	225 ± 85	< 1.7	< 3.7	< 1.9	< 1.0	< 2.4	< 2.7	< 1.7	< 1.7	< 5.2
CAWW- 8062	11/14/2011	374 ± 90	< 3.3	< 6.3	< 3.6	< 1.5	< 3.8	< 3.3	< 2.9	< 3.3	< 4.6
CAWW- 8865	12/8/2011	208 ± 91	< 3.6	< 3.9	< 2.9	< 1.6	< 3.9	< 3.0	< 2.5	< 2.5	< 3.2



**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- 352	1/17/2011	< 131	< 2.4	< 3.9	< 2.4	< 1.8	< 3.2	< 1.4	< 3.2	< 2.7	< 2.6
CAWW- 669	2/18/2011	< 147	< 2.5	< 7.1	< 2.7	< 2.7	< 7.3	< 2.3	< 4.4	< 2.4	< 2.9
CAWW- 1184	3/18/2011	< 153	< 3.0	< 5.2	< 3.1	< 3.4	< 4.6	< 4.0	< 3.1	< 3.8	< 2.4
CAWW- 1693	4/6/2011	145 ± 80	< 2.6	< 3.5	< 2.2	< 2.4	< 5.4	< 2.9	< 2.8	< 2.1	< 4.2
CAWW- 2311	4/13/2011	< 149	< 3.0	< 4.1	< 4.1	< 2.7	< 1.7	< 4.1	< 3.1	< 4.0	< 7.0
CAWW- 2843	5/11/2011	< 144	< 2.0	< 3.8	< 2.8	< 2.9	< 5.1	< 2.1	< 3.3	< 2.6	< 4.1
CAWW- 3953	6/15/2011	168 ± 82	< 1.7	< 3.5	< 2.2	< 1.6	< 4.8	< 1.8	< 2.0	< 2.4	< 2.6
CAWW- 4776	7/12/2011	< 168	< 2.3	< 5.3	< 2.7	< 1.6	< 4.4	< 3.1	< 2.5	< 3.1	< 5.3
CAWW- 5431	8/9/2011	< 169	< 2.3	< 4.9	< 2.8	< 2.0	< 7.9	< 2.3	< 2.6	< 4.1	< 1.3
CAWW- 6208	9/13/2011	< 150	< 3.0	< 5.5	< 3.3	< 1.7	< 4.6	< 2.1	< 2.8	< 2.8	< 5.9
CAWW- 7674	10/18/2011	< 149	< 2.4	< 5.7	< 2.8	< 2.0	< 4.6	< 4.2	< 1.6	< 2.9	< 4.7
CAWW- 8063	11/15/2011	155 ± 79	< 2.9	< 6.4	< 2.0	< 2.4	< 6.1	< 3.7	< 3.4	< 4.2	< 8.2
CAWW- 8866	12/8/2011	< 153	< 3.2	< 7.4	< 3.4	< 3.3	< 4.6	< 5.2	< 2.4	< 2.3	< 5.9
<u>Location: CA-WWA-938</u>											
CAWW- 354	1/17/2011	< 131	< 2.6	< 5.4	< 2.8	< 2.5	< 4.7	< 2.7	< 2.5	< 4.2	< 3.5
CAWW- 671	2/11/2011	< 147	< 3.3	< 3.2	< 2.5	< 2.9	< 2.7	< 2.5	< 2.2	< 2.3	< 6.0
CAWW- 1186	3/18/2011	< 153	< 2.1	< 4.4	< 2.1	< 1.6	< 4.6	< 1.8	< 2.7	< 2.8	< 3.1
CAWW- 1698	4/6/2011	< 138	< 1.4	< 5.4	< 3.0	< 1.8	< 4.1	< 2.7	< 2.3	< 2.1	< 5.0
CAWW- 2313	4/13/2011	< 149	< 1.7	< 4.0	< 1.9	< 1.3	< 2.8	< 3.6	< 2.5	< 2.3	< 11.5
CAWW- 2844	5/11/2011	< 144	< 1.8	< 5.6	< 2.4	< 1.6	< 2.8	< 3.2	< 2.2	< 2.3	< 2.1
CAWW- 3954	6/15/2011	< 148	< 1.5	< 5.8	< 1.6	< 1.4	< 3.1	< 4.1	< 2.6	< 2.8	< 3.2
CAWW- 4777	7/12/2011	< 145	< 2.6	< 7.7	< 1.5	< 1.9	< 5.3	< 3.1	< 2.7	< 3.6	< 3.2
CAWW- 5432	8/9/2011	< 145	< 5.0	< 10.1	< 4.1	< 4.8	< 6.1	< 4.5	< 5.7	< 6.0	< 5.3
CAWW- 6209	9/13/2011	< 150	< 3.2	< 3.9	< 1.5	< 1.4	< 2.7	< 2.3	< 2.3	< 2.8	< 2.4
CAWW- 7676	10/18/2011	< 149	< 1.3	< 3.5	< 1.4	< 1.6	< 3.3	< 1.9	< 1.5	< 1.8	< 2.9
CAWW- 8065	11/15/2011	< 142	< 1.8	< 3.7	< 3.4	< 1.6	< 3.1	< 3.4	< 1.9	< 2.5	< 2.4
CAWW- 8868	12/8/2011	< 153	< 2.5	< 4.1	< 3.8	< 1.8	< 6.7	< 4.6	< 2.5	< 3.2	< 7.3
<u>Location: CA-WWA-939</u>											
	1/17/2011					ND <sup>a</sup>					
CAWW- 672	2/11/2011	651 ± 104	< 3.3	< 6.7	< 2.5	< 1.2	< 3.5	< 1.7	< 2.9	< 2.8	< 5.0
CAWW- 1187	3/18/2011	9647 ± 301	< 3.5	< 3.9	< 2.5	< 2.4	< 1.7	< 2.9	< 2.3	< 1.7	< 2.6
CAWW- 1699	4/6/2011	3602 ± 189	< 2.7	< 5.7	< 3.1	< 3.0	< 4.0	< 5.0	< 2.4	< 2.8	< 6.9
CAWW- 1978	4/13/2011	3109 ± 179	< 1.9	< 5.7	< 1.8	< 3.0	< 3.5	< 5.5	< 1.7	< 3.1	< 3.8
	5/11/2011					ND <sup>a</sup>					
	6/15/2011					ND <sup>a</sup>					
	7/12/2011					ND <sup>a</sup>					
	8/9/2011					ND <sup>a</sup>					
	9/13/2011					ND <sup>a</sup>					
	10/18/2011					ND <sup>a</sup>					
CAWW- 8066	11/15/2011	655 ± 101 <sup>b</sup>	< 5.2	< 6.1	< 5.3	< 5.0	< 10.6	< 3.7	< 4.6	< 5.9	< 8.3
CAWW- 8869	12/8/2011	426 ± 100	< 2.9	< 5.3	< 3.9	< 1.9	< 6.2	< 4.5	< 2.5	< 3.4	< 6.9

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

<sup>b</sup> Tritium repeated with a result of 699±107 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-940</u>											
CAWW- 355	1/17/2011	< 131	< 3.1	< 4.6	< 3.5	< 2.7	< 6.8	< 3.8	< 2.6	< 4.0	< 3.5
CAWW- 673	2/11/2011	< 147	< 3.5	< 6.3	< 2.3	< 3.8	< 4.5	< 3.5	< 3.2	< 2.8	< 4.3
CAWW- 1188	3/18/2011	< 153	< 2.0	< 4.3	< 3.2	< 1.3	< 5.1	< 1.9	< 2.4	< 2.7	< 3.8
CAWW- 1700	4/6/2011	< 138	< 2.0	< 4.1	< 2.0	< 1.0	< 2.0	< 1.6	< 1.7	< 2.0	< 5.6
CAWW- 2314	4/13/2011	< 149	< 1.6	< 3.3	< 1.8	< 1.6	< 3.7	< 3.1	< 1.7	< 1.5	< 7.6
CAWW- 2845	5/11/2011	< 144	< 1.4	< 2.7	< 1.5	< 1.7	< 4.1	< 2.5	< 1.4	< 1.5	< 1.9
CAWW- 3955	6/15/2011	< 148	< 2.4	< 2.4	< 1.8	< 1.3	< 3.7	< 4.2	< 2.5	< 2.9	< 5.5
CAWW- 4778	7/12/2011	< 145	< 2.7	< 4.9	< 2.3	< 2.2	< 3.7	< 2.3	< 2.4	< 3.5	< 7.9
CAWW- 5433	8/9/2011	< 145	< 2.4	< 2.5	< 1.8	< 2.8	< 5.2	< 1.9	< 2.5	< 3.2	< 3.4
CAWW- 6210	9/13/2011	< 150	< 2.8	< 3.1	< 3.0	< 1.9	< 3.0	< 3.3	< 2.1	< 2.5	< 4.5
CAWW- 7677	10/18/2011	< 149	< 1.9	< 4.2	< 1.9	< 1.7	< 2.4	< 3.1	< 1.2	< 2.4	< 2.8
CAWW- 8067	11/15/2011	< 142	< 2.8	< 5.5	< 1.5	< 1.3	< 6.1	< 4.8	< 2.3	< 2.4	< 4.9
CAWW- 8870	12/8/2011	< 153	< 2.4	< 5.5	< 1.8	< 1.4	< 3.6	< 4.3	< 2.5	< 2.7	< 2.6
<u>Location: CA-WWA-941</u>											
CAWW- 356	1/17/2011	< 131	< 2.8	< 4.6	< 2.1	< 2.0	< 5.2	< 4.3	< 2.8	< 2.9	< 3.1
CAWW- 675	2/18/2011	< 147	< 4.4	< 9.9	< 3.7	< 1.8	< 8.8	< 6.2	< 3.9	< 4.6	< 6.3
CAWW- 1189	3/18/2011	< 153	< 2.6	< 5.1	< 2.2	< 2.6	< 3.8	< 1.8	< 2.7	< 2.8	< 3.0
CAWW- 1701	4/6/2011	< 138	< 2.4	< 5.2	< 2.4	< 1.7	< 3.2	< 2.8	< 2.4	< 2.7	< 4.9
CAWW- 2315	4/13/2011	< 149	< 1.9	< 5.8	< 3.6	< 1.7	< 2.3	< 5.4	< 2.2	< 3.7	< 4.5
CAWW- 2846	5/11/2011	< 144	< 4.4	< 7.0	< 4.1	< 2.1	< 5.2	< 2.6	< 2.8	< 3.2	< 5.6
CAWW- 3956	6/15/2011	< 148	< 2.8	< 7.0	< 3.4	< 2.4	< 1.7	< 2.1	< 2.9	< 2.6	< 5.1
CAWW- 4779	7/12/2011	< 145	< 1.6	< 6.7	< 1.9	< 1.4	< 2.9	< 4.4	< 2.0	< 2.5	< 4.7
CAWW- 5434	8/9/2011	< 145	< 3.2	< 4.9	< 3.5	< 2.8	< 4.7	< 3.8	< 4.5	< 3.8	< 3.2
CAWW- 6211	9/13/2011	< 150	< 2.5	< 3.7	< 2.1	< 1.7	< 5.5	< 3.0	< 2.3	< 3.5	< 5.4
CAWW- 7678	10/18/2011	< 149	< 1.9	< 5.2	< 2.3	< 1.7	< 3.9	< 3.3	< 2.1	< 2.3	< 2.7
CAWW- 8068	11/14/2011	< 142	< 2.2	< 4.1	< 1.7	< 1.2	< 2.2	< 2.9	< 2.2	< 4.1	< 4.2
CAWW- 8871	12/8/2011	< 153	< 3.2	< 4.9	< 4.1	< 1.7	< 5.0	< 3.7	< 2.5	< 2.6	< 5.4
<u>Location: CA-WWA-GWS</u>											
CAWW- 353	1/19/2011	372 ± 95	< 2.8	< 4.4	< 2.4	< 1.6	< 3.9	< 3.8	< 3.1	< 2.9	< 2.8
CAWW- 670	2/18/2011	282 ± 88	< 2.6	< 8.5	< 3.6	< 3.6	< 7.5	< 5.6	< 3.0	< 4.3	< 3.0
CAWW- 1185	3/18/2011	201 ± 91	< 2.6	< 1.9	< 2.0	< 2.3	< 4.6	< 2.6	< 2.9	< 3.6	< 2.4
CAWW- 1695	4/6/2011	232 ± 85	< 1.8	< 4.0	< 2.0	< 1.7	< 5.8	< 2.3	< 2.7	< 3.0	< 4.5
CAWW- 1976	4/13/2011	< 143	< 2.5	< 5.6	< 2.7	< 2.2	< 1.7	< 2.9	< 2.6	< 3.0	< 2.7
	5/11/2011					ND <sup>a</sup>					
	6/15/2011					ND <sup>a</sup>					
	7/12/2011					ND <sup>a</sup>					
	8/9/2011					ND <sup>a</sup>					
	9/13/2011					ND <sup>a</sup>					
CAWW- 7675	10/19/2011	< 149	< 2.4	< 3.6	< 2.3	< 1.8	< 3.4	< 3.4	< 2.1	< 2.2	< 3.8
CAWW- 8064	11/14/2011	1742 ± 138	< 3.3	< 5.8	< 2.2	< 3.6	< 6.4	< 5.3	< 3.2	< 4.2	< 4.7
CAWW- 8867	12/8/2011	1275 ± 130	< 2.2	< 4.5	< 1.8	< 1.2	< 4.7	< 2.5	< 2.4	< 2.3	< 2.7

<sup>a</sup> ND = No data; 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-OW-4</u>											
CAWW- 357	1/18/2011	278 ± 91	< 2.5	< 4.0	< 2.0	< 1.6	< 6.1	< 3.2	< 2.1	< 3.7	< 4.8
CAWW- 2371	4/21/2011	326 ± 114	< 2.7	< 3.5	< 3.1	< 2.4	< 1.9	< 3.6	< 3.2	< 3.0	< 6.6
CAWW- 4780	7/13/2011	232 ± 84	< 2.7	< 4.1	< 2.0	< 1.7	< 3.6	< 2.2	< 2.7	< 2.7	< 4.6
CAWW- 7679	10/19/2011	308 ± 89	< 2.6	< 4.1	< 2.2	< 1.1	< 2.4	< 2.7	< 2.3	< 3.1	< 3.9
<u>Location: CA-WWA-OW-5</u>											
CAWW- 358	1/17/2011	331 ± 93	< 3.0	< 8.4	< 3.5	< 2.2	< 5.8	< 4.4	< 4.5	< 3.3	< 4.0
CAWW- 2353	4/20/2011	526 ± 120	< 6.6	< 8.3	< 5.9	< 4.8	< 6.9	< 4.6	< 6.4	< 5.3	< 10.7
CAWW- 4781	7/13/2011	514 ± 97	< 3.1	< 3.5	< 3.3	< 2.6	< 4.1	< 4.0	< 2.9	< 3.6	< 7.9
CAWW- 7680	10/19/2011	318 ± 89	< 2.1	< 4.1	< 1.8	< 1.7	< 3.1	< 2.3	< 1.7	< 2.3	< 3.5
<u>Location: CA-WWA-U1MW-001</u>											
CAWW- 360	1/21/2011	< 166	< 4.1	< 14.0	< 3.5	< 3.0	< 12.0	< 5.3	< 4.3	< 3.9	< 9.5
CAWW- 2317	4/11/2011	< 149	< 2.4	< 7.1	< 2.4	< 1.8	< 4.1	< 2.0	< 2.2	< 2.6	< 5.9
CAWW- 4796	7/7/2011	< 166	< 2.6	< 5.2	< 2.3	< 2.9	< 4.2	< 3.8	< 2.8	< 2.8	< 4.1
CAWW- 7681	10/26/2011	< 148	< 1.7	< 4.8	< 1.6	< 1.9	< 3.8	< 3.8	< 1.6	< 1.6	< 6.4
<u>Location: CA-WWA-U1MW-002</u>											
CAWW- 361	1/21/2011	< 166	< 3.9	< 7.3	< 4.3	< 3.7	< 8.3	< 3.9	< 3.2	< 4.1	< 3.0
CAWW- 2318	4/14/2011	< 149	< 2.3	< 4.2	< 3.0	< 1.6	< 6.8	< 4.2	< 2.1	< 3.1	< 5.8
CAWW- 4782	7/15/2011	< 145	< 3.0	< 5.3	< 1.7	< 2.5	< 3.4	< 3.2	< 2.4	< 2.1	< 9.2
CAWW- 7682	10/26/2011	< 148	< 2.5	< 6.0	< 3.1	< 1.5	< 5.5	< 3.2	< 1.9	< 3.0	< 8.9
<u>Location: CA-WWA-U1MW-004</u>											
CAWW- 362	1/7/2011	< 166	< 2.6	< 4.5	< 3.1	< 3.0	< 2.6	< 3.4	< 2.1	< 2.4	< 3.1
CAWW- 2319	4/7/2011	< 149	< 2.0	< 5.9	< 2.9	< 2.2	< 4.6	< 4.1	< 2.6	< 2.7	< 11.3
CAWW- 4798	7/8/2011	< 166	< 3.1	< 5.2	< 2.4	< 1.9	< 4.0	< 4.3	< 2.9	< 3.3	< 8.7
CAWW- 7683	10/24/2011	< 148	< 2.2	< 6.7	< 2.1	< 1.9	< 5.2	< 3.0	< 1.8	< 1.9	< 5.9
<u>Location: CA-WWA-U1MW-005</u>											
CAWW- 363	1/12/2011	< 166	< 2.5	< 5.0	< 3.3	< 2.5	< 5.3	< 3.9	< 2.4	< 3.3	< 4.0
CAWW- 2320	4/7/2011	< 149	< 2.4	< 4.9	< 2.9	< 2.6	< 3.6	< 4.4	< 2.8	< 3.1	< 9.2
CAWW- 5214	7/21/2011	< 140	< 2.8	< 5.2	< 2.1	< 2.5	< 2.2	< 2.7	< 2.3	< 3.1	< 6.0
CAWW- 7684	10/24/2011	< 148	< 1.9	< 3.8	< 1.9	< 1.4	< 2.9	< 2.3	< 2.1	< 2.3	< 7.7
<u>Location: CA-WWA-U1MW-006</u>											
CAWW- 364	1/19/2011	< 166	< 2.6	< 7.5	< 3.9	< 3.0	< 4.3	< 4.5	< 2.8	< 3.2	< 2.6
CAWW- 2321	4/12/2011	< 149	< 2.0	< 4.4	< 2.2	< 1.6	< 2.9	< 3.7	< 1.9	< 1.8	< 5.0
CAWW- 4783	7/15/2011	< 145	< 3.1	< 4.6	< 2.8	< 1.4	< 4.0	< 4.5	< 2.2	< 3.6	< 8.2
CAWW- 7685	10/25/2011	< 148	< 2.2	< 5.8	< 1.9	< 2.1	< 3.8	< 4.0	< 2.3	< 2.5	< 6.9

**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-010</u>											
CAWW- 365	1/21/2011	< 166	< 2.3	< 4.0	< 2.5	< 1.8	< 4.1	< 2.8	< 2.4	< 2.8	< 2.9
CAWW- 2322	4/12/2011	< 171	< 3.6	< 3.9	< 3.6	< 2.8	< 5.2	< 4.3	< 2.8	< 3.0	< 6.4
CAWW- 4800	7/6/2011	< 166	< 2.4	< 4.6	< 1.8	< 1.9	< 1.9	< 4.0	< 3.1	< 3.3	< 7.1
CAWW- 7686	10/25/2011	< 148	< 2.4	< 2.3	< 2.1	< 2.2	< 3.9	< 1.8	< 1.9	< 2.4	< 4.0
<u>Location: CA-WWA-U1MW-012</u>											
CAWW- 366	1/19/2011	< 166	< 1.7	< 5.8	< 1.5	< 1.4	< 2.7	< 3.0	< 2.8	< 3.4	< 2.7
CAWW- 2323	4/12/2011	< 171	< 2.5	< 6.0	< 1.8	< 1.8	< 2.8	< 4.5	< 3.2	< 3.4	< 6.1
CAWW- 4785	7/15/2011	< 145	< 2.8	< 3.6	< 2.2	< 1.7	< 2.6	< 3.9	< 2.5	< 2.2	< 8.5
CAWW- 7687	10/27/2011	< 148	< 1.9	< 4.2	< 2.0	< 1.7	< 2.2	< 3.5	< 1.6	< 2.1	< 6.9
<u>Location: CA-WWA-U1MW-013</u>											
CAWW- 367	1/21/2011	< 166	< 3.0	< 6.3	< 3.0	< 3.0	< 5.4	< 3.8	< 3.0	< 2.6	< 3.0
CAWW- 2324	4/11/2011	< 171	< 2.6	< 7.1	< 4.1	< 2.7	< 1.9	< 4.7	< 2.6	< 3.7	< 10.8
CAWW- 4803	7/7/2011	< 145	< 2.6	< 4.2	< 3.3	< 2.2	< 2.8	< 4.3	< 2.1	< 3.2	< 9.9
CAWW- 7688	10/26/2011	< 148	< 2.9	< 6.9	< 3.0	< 3.1	< 5.6	< 4.9	< 3.4	< 4.3	< 7.2
<u>Location: CA-WWA-U1MW-014</u>											
CAWW- 368	1/7/2011	326 ± 102	< 2.9	< 3.8	< 1.7	< 2.2	< 2.5	< 3.1	< 2.0	< 3.6	< 6.7
CAWW- 2325	4/5/2011	325 ± 116	< 1.8	< 3.9	< 1.4	< 1.8	< 3.6	< 2.9	< 1.4	< 2.1	< 5.7
CAWW- 5215	7/27/2011	297 ± 98	< 2.6	< 5.6	< 3.9	< 3.4	< 3.1	< 5.3	< 3.1	< 4.1	< 4.6
CAWW- 7690	10/21/2011	375 ± 92	< 1.3	< 4.6	< 1.6	< 1.0	< 2.7	< 2.8	< 1.7	< 2.2	< 5.8
<u>Location: CA-WWA-U1MW-015</u>											
CAWW- 369	1/12/2011	< 166	< 2.7	< 6.2	< 2.0	< 1.6	< 3.5	< 4.3	< 2.6	< 3.1	< 7.1
CAWW- 2326	4/7/2011	< 172	< 3.3	< 6.0	< 2.7	< 2.6	< 5.0	< 4.2	< 3.9	< 3.6	< 8.3
CAWW- 4789	7/6/2011	< 145	< 2.5	< 3.3	< 2.2	< 1.9	< 2.4	< 4.0	< 1.9	< 3.0	< 4.8
CAWW- 7691	10/24/2011	< 148	< 2.8	< 4.6	< 2.8	< 2.3	< 4.5	< 6.1	< 1.7	< 2.5	< 12.8
<u>Location: CA-WWA-U1MW-016</u>											
CAWW- 370	1/6/2011	< 166	< 2.5	< 4.1	< 2.3	< 2.0	< 3.5	< 3.6	< 1.7	< 2.6	< 6.5
CAWW- 2327	4/14/2011	< 171	< 2.0	< 5.0	< 2.5	< 2.3	< 4.0	< 3.3	< 2.3	< 3.2	< 4.2
CAWW- 5216	7/27/2011	< 140	< 3.7	< 6.2	< 3.8	< 1.0	< 6.1	< 3.0	< 3.5	< 3.1	< 5.9
CAWW- 7692	10/24/2011	< 148	< 2.6	< 6.0	< 2.4	< 1.8	< 2.4	< 4.0	< 2.1	< 2.1	< 10.6
<u>Location: CA-WWA-U1MW-017</u>											
CAWW- 371	1/7/2011	299 ± 101	< 2.4	< 6.7	< 2.1	< 2.4	< 4.2	< 2.8	< 3.4	< 3.9	< 5.6
CAWW- 2328	4/5/2011	< 172	< 2.3	< 2.3	< 1.8	< 1.5	< 2.5	< 3.7	< 3.3	< 3.4	< 4.8
CAWW- 5217	7/27/2011	225 ± 95	< 4.4	< 9.3	< 7.2	< 3.4	< 10.0	< 6.9	< 6.1	< 6.2	< 6.2
CAWW- 7693	10/21/2011	215 ± 85	< 3.3	< 4.9	< 2.0	< 1.7	< 5.0	< 3.9	< 2.4	< 4.2	< 5.5
<u>Location: CA-WWA-U1MW-18</u>											
CAWW- 372	1/7/2011	259 ± 99	< 1.7	< 4.6	< 3.1	< 1.0	< 6.6	< 4.4	< 2.6	< 3.5	< 6.5
CAWW- 2329	4/5/2011	< 172	< 2.8	< 6.6	< 3.2	< 1.8	< 3.4	< 2.9	< 3.5	< 2.5	< 6.5
CAWW- 5218	7/27/2011	194 ± 94	< 4.3	< 11.8	< 5.6	< 3.2	< 4.8	< 5.4	< 4.0	< 4.1	< 9.6
CAWW- 7694	10/21/2011	< 149	< 2.3	< 6.3	< 1.6	< 1.5	< 3.4	< 2.4	< 1.9	< 2.6	< 7.2

**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- 373	1/7/2011	541 ± 110	< 2.6	< 5.1	< 2.3	< 2.3	< 2.9	< 2.3	< 2.6	< 3.0	< 4.8
CAWW- 2330	4/5/2011	347 ± 117	< 2.1	< 4.3	< 3.1	< 1.8	< 5.0	< 3.2	< 2.9	< 3.0	< 9.6
CAWW- 5219	7/26/2011	393 ± 102	< 6.0	< 8.2	< 4.6	< 4.3	< 7.3	< 7.0	< 5.0	< 5.2	< 13.1
CAWW- 7695	10/21/2011	353 ± 91	< 2.2	< 4.6	< 2.3	< 1.0	< 2.4	< 4.1	< 2.4	< 2.2	< 3.9
<u>Location: CA-WWA-U1MW-20</u>											
CAWW- 374	1/10/2011	< 166	< 2.4	< 4.8	< 2.0	< 1.9	< 2.3	< 2.9	< 1.9	< 2.6	< 5.2
CAWW- 2331	4/7/2011	< 171	< 2.3	< 6.3	< 3.0	< 1.1	< 5.2	< 3.7	< 3.0	< 1.8	< 9.5
CAWW- 5220	7/26/2011	< 140	< 2.4	< 5.4	< 3.8	< 3.6	< 2.8	< 5.2	< 3.8	< 4.3	< 4.2
CAWW- 7696	10/24/2011	< 148	< 1.4	< 4.3	< 1.6	< 1.0	< 4.2	< 2.9	< 2.6	< 2.4	< 6.8
<u>Location: CA-WWA-U1MW-021</u>											
CAWW- 375	1/7/2011	< 166	< 1.4	< 4.9	< 3.1	< 2.0	< 3.0	< 3.1	< 2.0	< 2.8	< 5.5
CAWW- 2332	4/5/2011	< 170	< 3.4	< 5.9	< 2.4	< 2.2	< 3.8	< 3.6	< 2.1	< 3.4	< 5.8
CAWW- 5221	7/27/2011	< 140	< 4.9	< 7.9	< 5.0	< 3.6	< 9.4	< 6.2	< 4.1	< 4.0	< 5.6
CAWW- 7697	10/21/2011	< 149	< 2.3	< 5.7	< 2.6	< 2.0	< 3.8	< 3.0	< 2.6	< 2.6	< 4.1
<u>Location: CA-WWA-U1MW-022</u>											
CAWW- 376	1/7/2011	< 166	< 1.8	< 4.4	< 1.5	< 1.5	< 5.1	< 4.0	< 1.9	< 2.8	< 6.9
CAWW- 2334	4/7/2011	< 170	< 2.6	< 5.3	< 3.2	< 2.8	< 4.3	< 4.0	< 3.6	< 2.9	< 11.1
CAWW- 5222	7/27/2011	< 140	< 4.4	< 14.2	< 5.4	< 3.3	< 8.4	< 8.0	< 2.6	< 5.2	< 6.6
CAWW- 7698	10/21/2011	< 149	< 2.2	< 3.6	< 2.8	< 2.2	< 3.2	< 3.5	< 2.3	< 2.1	< 10.3
<u>Location: CA-WWA-U1MW-023</u>											
CAWW- 377	1/10/2011	< 154	< 1.9	< 3.3	< 2.2	< 1.2	< 3.4	< 2.2	< 1.7	< 2.6	< 5.1
CAWW- 2335	4/7/2011	< 170	< 1.8	< 7.3	< 1.9	< 1.5	< 3.7	< 3.4	< 2.4	< 2.7	< 7.3
CAWW- 5223	7/26/2011	< 140	< 4.4	< 9.0	< 3.8	< 4.6	< 3.6	< 4.9	< 4.3	< 2.6	< 6.6
CAWW- 7699	10/21/2011	< 149	< 1.8	< 3.3	< 2.3	< 1.6	< 4.6	< 2.9	< 2.0	< 2.4	< 7.6
<u>Location: CA-WWA-U1MW-024</u>											
CAWW- 378	1/10/2011	< 154	< 1.8	< 5.2	< 1.8	< 1.8	< 3.7	< 2.8	< 1.7	< 2.4	< 4.8
CAWW- 2336	4/7/2011	< 170	< 2.6	< 6.5	< 2.4	< 2.0	< 5.1	< 3.0	< 3.2	< 4.1	< 9.4
CAWW- 5224	7/26/2011	< 140	< 2.8	< 5.8	< 3.1	< 1.6	< 7.4	< 3.2	< 3.2	< 3.8	< 5.0
CAWW- 7700	10/21/2011	< 149	< 2.4	< 6.5	< 1.6	< 0.9	< 5.2	< 3.5	< 2.3	< 3.0	< 8.9
<u>Location: CA-WWA-U1MW-025</u>											
CAWW- 379	1/10/2011	< 166	< 3.5	< 7.1	< 1.9	< 2.4	< 3.1	< 3.9	< 3.0	< 3.1	< 6.3
CAWW- 2337	4/7/2011	< 170	< 2.8	< 4.6	< 3.2	< 3.0	< 2.6	< 3.2	< 2.1	< 3.2	< 6.8
CAWW- 5225	7/26/2011	< 140	< 2.9	< 5.4	< 2.9	< 2.7	< 3.7	< 4.3	< 3.7	< 4.2	< 4.0
CAWW- 7701	10/21/2011	< 143	< 2.7	< 6.6	< 1.3	< 1.2	< 5.8	< 3.9	< 1.7	< 1.5	< 9.1

**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-U1MW-26</u>											
CAWW- 381	1/10/2011	< 154	< 2.1	< 4.7	< 1.3	< 2.0	< 2.6	< 3.1	< 1.9	< 2.2	< 4.5
CAWW- 2338	4/7/2011	< 170	< 2.2	< 4.3	< 2.0	< 1.6	< 4.9	< 3.4	< 2.1	< 2.8	< 4.6
CAWW- 5226	7/26/2011	< 140	< 4.5	< 8.8	< 3.0	< 3.8	< 2.6	< 2.9	< 3.0	< 3.8	< 5.6
CAWW- 7702	10/21/2011	< 143	< 2.6	< 4.9	< 3.4	< 1.9	< 2.9	< 3.7	< 1.8	< 2.7	< 3.7
<u>Location: CA-WWA-U1MW-27</u>											
CAWW- 390	1/12/2011	< 154	< 1.8	< 2.1	< 2.8	< 1.8	< 4.9	< 4.2	< 3.5	< 3.7	< 3.9
CAWW- 2339	4/14/2011	< 170	< 2.1	< 6.6	< 3.3	< 2.0	< 3.9	< 4.7	< 2.3	< 2.5	< 6.7
CAWW- 4801	7/6/2011	< 145	< 2.2	< 4.2	< 2.8	< 2.9	< 4.8	< 3.5	< 2.7	< 3.5	< 9.1
CAWW- 7703	10/25/2011	< 143	< 1.9	< 4.3	< 2.3	< 1.8	< 5.2	< 4.8	< 2.0	< 2.0	< 9.1
<u>Location: CA-WWA-U1MW-28</u>											
CAWW- 4790	1/12/2011										ND <sup>a</sup>
	4/14/2011										ND <sup>a</sup>
	7/15/2011	< 144									ND <sup>b</sup>
	10/26/2011										ND <sup>a</sup>
<u>Location: CA-WWA-U1MW-29</u>											
CAWW- 391	1/13/2011	< 154	< 3.3	< 4.7	< 4.5	< 2.9	< 3.5	< 3.9	< 3.4	< 3.5	< 7.1
CAWW- 2340	4/14/2011	< 170	< 2.0	< 5.1	< 3.2	< 2.6	< 3.9	< 4.1	< 3.2	< 3.8	< 7.1
CAWW- 4791	7/11/2011	< 166	< 3.2	< 7.6	< 3.8	< 2.2	< 3.7	< 5.1	< 2.9	< 2.5	< 4.0
CAWW- 7704	10/26/2011	< 143	< 2.0	< 3.3	< 2.3	< 1.5	< 4.4	< 2.0	< 1.8	< 1.6	< 3.6
<u>Location: CA-WWA-U1MW-30</u>											
CAWW- 392	1/13/2011	< 154	< 2.1	< 4.0	< 2.1	< 0.9	< 3.4	< 2.6	< 1.7	< 3.0	< 3.7
CAWW- 2341	4/14/2011	< 170	< 2.4	< 5.0	< 2.4	< 2.9	< 5.2	< 5.6	< 2.6	< 2.3	< 9.9
CAWW- 4792	7/12/2011	< 166	< 2.2	< 6.9	< 2.2	< 1.8	< 3.8	< 3.1	< 2.4	< 2.9	< 5.9
CAWW- 7705	10/26/2011	< 143	< 2.9	< 6.2	< 2.4	< 2.8	< 2.2	< 2.5	< 2.0	< 2.0	< 5.5
<u>Location: CA-WWA-U2MW-2S</u>											
CAWW- 382	1/6/2011	< 154	< 2.9	< 2.5	< 1.8	< 2.5	< 4.6	< 4.6	< 2.4	< 3.0	< 9.4
CAWW- 2342	4/11/2011	< 149	< 2.4	< 7.2	< 3.0	< 1.8	< 5.7	< 3.2	< 2.6	< 3.7	< 10.9
CAWW- 4794	7/8/2011	< 166	< 2.3	< 6.4	< 2.6	< 1.4	< 2.3	< 3.4	< 3.3	< 3.2	< 6.3
CAWW- 7706	10/25/2011	< 143	< 2.4	< 4.1	< 2.7	< 2.6	< 4.9	< 4.5	< 2.8	< 2.2	< 7.9
<u>Location: CA-WWA-U2MW-5S</u>											
CAWW- 383	1/6/2011	< 154	< 1.9	< 4.9	< 2.7	< 2.6	< 4.1	< 4.8	< 3.0	< 3.8	< 5.4
CAWW- 2343	4/11/2011	< 149	< 2.0	< 3.0	< 2.0	< 2.0	< 2.8	< 3.0	< 2.3	< 2.8	< 4.4
CAWW- 4797	7/7/2011	< 166	< 3.1	< 4.9	< 2.7	< 1.7	< 4.1	< 4.7	< 2.2	< 2.9	< 8.8
CAWW- 7707	10/25/2011	< 143	< 1.7	< 4.7	< 2.0	< 1.5	< 4.0	< 3.1	< 1.4	< 1.7	< 10.6
<u>Location: CA-WWA-U2MW-8</u>											
CAWW- 384	1/13/2011	< 154	< 3.7	< 7.1	< 4.1	< 2.7	< 4.9	< 5.7	< 3.9	< 3.2	< 5.4
CAWW- 2344	4/14/2011	< 149	< 3.6	< 8.6	< 2.3	< 1.6	< 3.9	< 5.0	< 2.7	< 2.8	< 6.0
CAWW- 4799	7/11/2011	< 166	< 3.0	< 6.5	< 2.9	< 2.9	< 5.3	< 3.3	< 2.7	< 2.9	< 7.5
CAWW- 7708	10/26/2011	< 143	< 2.6	< 3.2	< 3.2	< 2.2	< 2.2	< 5.5	< 2.5	< 1.7	< 10.4

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

<sup>b</sup> Insufficient sample for gamma isotopic analysis.

**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- 385	1/13/2011	< 154	< 3.0	< 5.5	< 2.5	< 2.7	< 6.1	< 4.7	< 3.1	< 2.9	< 3.7
CAWW- 2345	4/14/2011	< 149	< 1.7	< 5.7	< 3.1	< 1.7	< 3.0	< 3.8	< 2.2	< 2.7	< 6.1
CAWW- 4787	7/11/2011	< 145	< 3.5	< 8.1	< 3.1	< 1.4	< 5.7	< 3.6	< 3.1	< 3.0	< 3.4
CAWW- 7709	10/26/2011	< 143	< 4.2	< 10.0	< 2.9	< 2.8	< 9.0	< 5.9	< 4.7	< 4.4	< 7.1
<u>Location: CA-WWA-U2MW-10</u>											
CAWW- 386	1/21/2011	< 154	< 2.5	< 4.5	< 2.1	< 2.4	< 4.4	< 4.0	< 2.2	< 3.1	< 3.7
CAWW- 2346	4/11/2011	< 170	< 3.1	< 5.9	< 2.9	< 1.6	< 5.6	< 4.0	< 2.9	< 2.1	< 7.2
CAWW- 4802	7/8/2011	< 145	< 2.7	< 5.4	< 2.0	< 1.4	< 2.4	< 3.4	< 2.7	< 3.2	< 8.7
CAWW- 7711	10/25/2011	< 143	< 1.5	< 5.7	< 1.3	< 1.2	< 4.2	< 4.5	< 2.2	< 2.3	< 7.9
<u>Location: CA-WWA-U2MW-12</u>											
CAWW- 387	1/6/2011	< 154	< 2.4	< 5.1	< 1.6	< 2.3	< 5.3	< 5.3	< 2.4	< 3.1	< 6.1
CAWW- 2347	4/11/2011	< 170	< 1.6	< 3.6	< 1.2	< 1.6	< 3.5	< 3.0	< 2.4	< 1.6	< 6.3
CAWW- 4795	7/8/2011	< 166	< 2.3	< 2.5	< 2.5	< 2.7	< 2.6	< 3.7	< 2.0	< 3.2	< 6.6
CAWW- 7712	10/26/2011	< 143	< 2.1	< 6.7	< 2.2	< 2.2	< 3.5	< 4.8	< 1.9	< 1.4	< 14.8
<u>Location: CA-WWA-U2MW-16</u>											
CAWW- 388	1/6/2011	< 154	< 2.2	< 3.6	< 2.3	< 1.6	< 5.0	< 4.0	< 2.4	< 3.8	< 4.5
CAWW- 2348	4/14/2011	< 170	< 3.2	< 5.5	< 3.7	< 2.2	< 3.3	< 3.1	< 2.8	< 3.3	< 7.5
CAWW- 4793	7/6/2011	< 166	< 2.4	< 5.3	< 2.5	< 2.4	< 5.8	< 3.9	< 2.5	< 2.5	< 7.3
CAWW- 7713	10/24/2011	< 143	< 1.0	< 4.0	< 1.2	< 1.2	< 3.1	< 3.1	< 1.7	< 2.4	< 2.7
<u>Location: CA-WWA-F-005</u>											
CAWW- 95	1/7/2011	< 140	< 4.6	< 7.1	< 4.1	< 1.8	< 6.3	< 4.2	< 5.6	< 2.3	< 6.7
CAWW- 1665	4/1/2011	< 138	< 1.7	< 3.8	< 2.2	< 2.2	< 3.1	< 2.5	< 2.6	< 2.8	< 3.1
CAWW- 4272	7/1/2011	< 147	< 3.1	< 5.8	< 3.9	< 2.6	< 4.2	< 3.3	< 2.3	< 2.5	< 9.2
CAWW- 6801	10/4/2011	< 145	< 4.3	< 8.1	< 4.4	< 3.8	< 6.8	< 4.7	< 5.6	< 2.8	< 5.6
<u>Location: CA-WWA-F-015</u>											
CAWW- 97	1/7/2011	< 140	< 2.3	< 4.4	< 2.1	< 3.1	< 6.8	< 4.5	< 4.1	< 4.3	< 3.2
CAWW- 1666	4/1/2011	< 138	< 1.5	< 6.6	< 2.1	< 2.2	< 3.4	< 3.7	< 2.7	< 3.6	< 5.6
CAWW- 4273	7/1/2011	< 147	< 1.9	< 4.9	< 2.3	< 1.1	< 5.2	< 2.6	< 2.4	< 3.2	< 3.1
CAWW- 6802	10/4/2011	< 145	< 3.9	< 10.8	< 3.4	< 4.6	< 9.8	< 2.3	< 4.6	< 3.2	< 7.3

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

Collection: Semiannually

Units: pCi/kg dry

Location		CA-AQS-A	
Lab Code	Req. LLD	CABS- 2094	CABS- 7137
Date Collected	-	04-13-11	10-13-11
K-40	-	13139 ± 606	14430 ± 1129
Mn-54	-	< 18.3	< 43.1
Fe-59	-	< 44.8	< 156.5
Co-58	-	< 19.2	< 68.6
Co-60	-	< 16.1	< 30.6
Zr-Nb-95	-	< 38.9	< 130.9
Cs-134	150	< 13.2	< 45.3
Cs-137	180	< 18.6	71.1 ± 38.8
Ba-La-140	-	< 60.7	< 196.9

Location		CA-AQS-C	
Lab Code	Req. LLD	CABS- 2095	CABS- 7138
Date Collected	-	04-13-11	10-13-11
K-40	-	12883 ± 721	11779 ± 1146
Mn-54	-	< 24.0	< 55.9
Fe-59	-	< 52.8	< 106.5
Co-58	-	< 22.8	< 45.3
Co-60	-	< 17.1	< 19.0
Zr-Nb-95	-	< 31.7	< 109.8
Cs-134	150	< 16.9	< 34.3
Cs-137	180	< 19.6	116.1 ± 41.1
Ba-La-140	-	< 59.5	< 368.3



CALLAWAY

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

Collection: Semiannually

Units: pCi/kg dry

Location		CA-AQS-A	
Lab Code	Req. LLD	CASS- 2097	CASS- 7135
Date Collected	-	04-13-11	10-13-11
K-40	-	13142 ± 711	14037 ± 590
Mn-54	-	< 25.6	< 24.6
Fe-59	-	< 39.6	< 66.4
Co-58	-	< 25.6	< 14.9
Co-60	-	< 18.8	< 16.4
Zr-Nb-95	-	< 41.7	< 63.0
Cs-134	150	< 19.5	< 17.2
Cs-137	180	< 27.3	33.2 ± 19.1
Ba-La-140	-	< 93.6	< 262.4

Location		CA-AQS-C	
Lab Code	Req. LLD	CASS- 2098	CASS- 7136
Date Collected	-	04-13-11	10-13-11
K-40	-	14642 ± 633	14466 ± 655
Mn-54	-	< 20.6	< 25.0
Fe-59	-	< 58.1	< 86.7
Co-58	-	< 23.3	< 31.3
Co-60	-	< 6.2	< 26.2
Zr-Nb-95	-	< 37.2	< 63.4
Cs-134	150	< 14.0	< 19.3
Cs-137	180	48.0 ± 19.6	66.9 ± 23.2
Ba-La-140	-	< 68.1	< 179.1

CALLAWAY

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

Collection: Semiannually

Units: pCi/kg wet

Location		CA-AQF-A				
Lab Code	Req. LLD	CAF- 2099	CAF- 2100	CAF- 2101	CAF- 2102	CAF- 2103
Date Collected		04-13-11	04-13-11	04-13-11	04-13-11	04-13-11
Sample Type		Smallmouth Buffalo	Common Carp	River Carp sucker	Silver Carp	Freshwater Drum
K-40	-	2413 ± 375	2754 ± 340	4116 ± 522	2074 ± 365	2571 ± 339
Mn-54	130	< 14.9	< 13.6	< 21.8	< 19.4	< 16.3
Fe-59	260	< 25.6	< 24.0	< 47.7	< 33.5	< 35.3
Co-58	130	< 9.3	< 8.3	< 13.5	< 14.4	< 20.6
Co-60	130	< 12.1	< 10.3	< 18.5	< 9.9	< 12.6
Zn-65	260	< 12.0	< 9.9	< 11.9	< 11.6	< 44.1
Cs-134	130	< 9.6	< 9.2	< 9.5	< 7.5	< 16.6
Cs-137	150	< 11.2	< 12.0	< 13.0	< 14.5	< 11.0
Lab Code	Req. LLD	CAF- 7139	CAF- 7140	CAF- 7142	CAF- 7143	CAF- 7144
Date Collected		10-13-11	10-13-11	10-13-11	10-13-11	10-13-11
Sample Type		Common Carp	Silver Carp	Freshwater Drum	Blue Catfish	River Carp sucker
K-40	-	2517 ± 343	2588 ± 346	2498 ± 361	1559 ± 533	2640 ± 349
Mn-54	130	< 12.5	< 8.7	< 12.9	< 36.0	< 12.2
Fe-59	260	< 37.4	< 46.3	< 36.5	< 69.2	< 33.6
Co-58	130	< 9.4	< 9.6	< 10.0	< 29.3	< 8.3
Co-60	130	< 7.5	< 7.5	< 8.2	< 24.0	< 7.5
Zn-65	260	< 17.9	< 8.3	< 17.4	< 58.3	< 8.9
Cs-134	130	< 10.9	< 15.7	< 12.5	< 32.4	< 9.7
Cs-137	150	< 8.0	< 10.8	< 12.9	< 31.3	< 9.9

CALLAWAY

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

Collection: Semiannually

Units: pCi/kg wet

Location		CA-AQF-C				
Lab Code	Req. LLD	CAF- 2104	CAF- 2105	CAF- 2106	CAF- 2107	CAF- 2108
Date Collected		04-13-11	04-13-11	04-13-11	04-13-11	04-13-11
Sample Type		Smallmouth Buffalo	Common Carp	River Carpsucker	Silver Carp	Freshwater Drum
K-40	-	2456 ± 409	2905 ± 387	2576 ± 427	2471 ± 356	2715 ± 363
Mn-54	130	< 13.2	< 16.4	< 10.3	< 18.2	< 15.1
Fe-59	260	< 34.4	< 29.8	< 59.1	< 33.1	< 29.7
Co-58	130	< 11.5	< 10.1	< 22.7	< 11.5	< 13.1
Co-60	130	< 10.1	< 10.6	< 14.2	< 13.5	< 8.8
Zn-65	260	< 8.7	< 13.0	< 25.9	< 22.7	< 12.4
Cs-134	130	< 7.2	< 7.8	< 17.4	< 16.4	< 14.7
Cs-137	150	< 7.2	< 13.0	< 16.3	< 12.6	< 7.1
Lab Code	Req. LLD	CAF- 7145	CAF- 7146	CAF- 7147	CAF- 7148	CAF- 7149
Date Collected		10-13-11	10-13-11	10-13-11	10-13-11	10-13-11
Sample Type		Common Carp	Silver Carp	Freshwater Drum	Blue Catfish	River Carpsucker
K-40	-	2633 ± 349	2760 ± 378	2703 ± 349	2602 ± 383	2650 ± 347
Mn-54	130	< 13.2	< 15.4	< 12.7	< 14.6	< 10.9
Fe-59	260	< 31.1	< 33.3	< 38.6	< 44.0	< 31.6
Co-58	130	< 14.9	< 20.0	< 18.8	< 16.6	< 11.0
Co-60	130	< 8.6	< 8.6	< 7.9	< 12.4	< 10.6
Zn-65	260	< 13.4	< 16.5	< 21.1	< 27.4	< 8.2
Cs-134	130	< 10.8	< 10.0	< 12.9	< 10.5	< 12.7
Cs-137	150	< 14.0	< 12.9	< 10.6	< 13.8	< 11.3

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

Location	Gamma Dose (mrem/90 days)			
	QTR 1	QTR 2	QTR 3	QTR 4
CA-IDM-1A	15.11	14.64	16.57	16.26
CA-IDM-3	15.88	15.90	18.19	18.21
CA-IDM-5	13.25	13.18	15.22	15.10
CA-IDM-6	15.39	15.21	17.46	17.38
CA-IDM-7	15.02	15.70	17.19	16.87
CA-IDM-9	13.76	14.41	15.70	15.18
CA-IDM-10	15.64	15.80	17.99	17.17
CA-IDM-11A	16.00	15.93	18.54	17.44
CA-IDM-14	14.76	15.31	17.47	15.54
CA-IDM-17	14.96	14.61	16.87	16.25
CA-IDM-18A	14.39	16.04	17.34	16.83
CA-IDM-20	14.41	15.66	17.18	16.23
CA-IDM-21	14.70	15.75	16.77	16.75
CA-IDM-22A	12.45	12.53	14.40	13.72
CA-IDM-23	15.40	15.87	17.71	17.69
CA-IDM-26 (C)	11.14	10.43	11.63	12.13
CA-IDM-27 (C)	16.48	16.84	17.89	17.35
CA-IDM-30A	14.56	14.23	16.56	16.27
CA-IDM-31A	15.59	15.28	17.53	18.07
CA-IDM-32	14.86	15.46	17.85	17.34
CA-IDM-32A	14.39	14.79	16.02	16.49
CA-IDM-33	14.71	15.69	16.49	16.33
CA-IDM-34	14.05	14.16	14.63	15.68
CA-IDM-35	14.14	13.46	15.21	14.82
CA-IDM-36	14.57	14.82	16.55	16.09
CA-IDM-37	14.57	14.41	17.02	16.87
CA-IDM-38	11.04	10.41	11.67	11.26
CA-IDM-39	14.79	14.73	17.94	16.67
CA-IDM-39A	15.40	15.09	17.63	17.20
CA-IDM-40	15.77	15.06	18.09	17.93
CA-IDM-41	14.60	15.13	16.95	15.85
CA-IDM-42	12.93	12.95	14.72	14.51
CA-IDM-43	14.86	15.24	17.18	16.68
CA-IDM-44	15.13	14.70	17.20	16.84
CA-IDM-45	13.58	13.73	16.24	15.42
CA-IDM-46	14.87	15.05	17.31	ND <sup>a</sup>
CA-IDM-47	14.57	14.45	16.39	16.34
CA-IDM-48	15.60	15.39	17.25	16.91
CA-IDM-49	15.05	15.46	16.20	15.67
CA-IDM-50	15.53	15.24	17.44	17.16
CA-IDM-51A	16.50	15.53	17.86	17.46
CA-IDM-52	15.96	16.38	17.37	17.34
CA-IDM-60	14.66	15.07	15.40	16.48

<sup>a</sup> TLD and holder missing from assigned location.

**Appendix C**  
**Supplemental Analyses**

**C-1. Supplemental Analyses**

Lab Code	Collection Date	Location	<sup>3</sup> H (pCi/L)	<sup>54</sup> Mn	<sup>59</sup> Fe	<sup>58</sup> Co	<sup>60</sup> Co	<sup>65</sup> Zn	<sup>95</sup> Zr	<sup>134</sup> Cs	<sup>137</sup> Cs	<sup>140</sup> La
<b>Groundwater samples for tritium and/or gamma isotopic analysis.</b>												
<b>Backup Samples</b>												
CAWW- 1388	2/11/2011	U1 MW-939	688 ± 128	< 2.0	< 6.9	< 2.4	< 3.0	< 4.4	< 4.2	< 2.4	< 1.5	< 12.0
CAWW- 1389	3/18/2011	U1 MW-939	9654 ± 307	< 3.2	< 3.6	< 2.5	< 2.6	< 3.8	< 3.9	< 3.3	< 2.7	< 3.8
CAWW- 1390	3/18/2011	U1 MW-936	854 ± 133	< 2.4	< 4.6	< 2.2	< 2.2	< 7.0	< 3.1	< 3.2	< 2.1	< 3.2
<b>Special Samplings</b>												
CAWW- 1431	03/30/11	U1 MW-939	4865 ± 214	< 2.4	< 4.1	< 1.5	< 1.7	< 2.8	< 1.9	< 2.5	< 3.5	< 2.3
CAWW- 1432	03/30/11	U1 MW-936	1231 ± 133	< 1.6	< 3.8	< 1.9	< 2.1	< 4.5	< 3.0	< 2.6	< 3.7	< 1.7
CAWW- 1696	04/06/11	GWS	202 ± 83	< 2.6	< 3.1	< 3.0	< 2.2	< 3.8	< 3.1	< 2.0	< 2.3	< 3.9
CAWW- 1697	04/06/11	GWS	259 ± 86	< 1.4	< 6.9	< 3.0	< 2.4	< 4.5	< 3.0	< 2.8	< 2.1	< 4.6
CAWW- 2350	04/20/11	GWS	< 150	< 2.5	< 7.4	< 3.7	< 1.6	< 4.6	< 2.8	< 2.4	< 2.5	< 4.6
CAWW- 2351	04/20/11	U1 MW-936	281 ± 103	< 2.3	< 4.0	< 1.8	< 2.0	< 2.4	< 3.5	< 2.7	< 1.9	< 3.1
CAWW- 2352	04/20/11	U1 MW-939	2656 ± 174	-	-	-	-	-	-	-	-	-
CAWW- 2427	04/26/11	U1 MW-939	1956 ± 153	-	-	-	-	-	-	-	-	-
CAWW- 2428	04/26/11	U1 MW-936	435 ± 105	-	-	-	-	-	-	-	-	-
CAWW- 2429	04/26/11	GWS	256 ± 98	-	-	-	-	-	-	-	-	-
CAWW- 2651	05/04/11	U1 MW-939	1271 ± 152	-	-	-	-	-	-	-	-	-
CAWW- 2652	05/04/11	U1 MW-936	185 ± 117	-	-	-	-	-	-	-	-	-
CAWW- 3273	05/26/11	MW-939	582 ± 100	-	-	-	-	-	-	-	-	-
CAWW- 3419	06/02/11	U1-MW-939	596 ± 102	-	-	-	-	-	-	-	-	-
CAWW- 8987	<sup>a</sup> 10/19/11	MW-936	1075 ± 123	-	-	-	-	-	-	-	-	-
<b>Snow melt, analyses for tritium.</b>												
CAW- 552	02/05/11	CA-A1	< 144	-	-	-	-	-	-	-	-	-
CAW- 553	02/05/11	CA-A2	< 144	-	-	-	-	-	-	-	-	-
CAW- 554	02/05/11	CA-A3	< 144	-	-	-	-	-	-	-	-	-
CAW- 555	02/05/11	CA-A4	< 144	-	-	-	-	-	-	-	-	-
CAW- 556	02/05/11	CA-B1	< 144	-	-	-	-	-	-	-	-	-
CAW- 557	02/05/11	CA-B2	< 144	-	-	-	-	-	-	-	-	-
CAW- 558	<sup>b</sup> 02/05/11	CA-B2	< 144	-	-	-	-	-	-	-	-	-
CAW- 559	02/05/11	CA-B3	< 144	-	-	-	-	-	-	-	-	-
CAW- 560	02/05/11	CA-B4	< 144	-	-	-	-	-	-	-	-	-
<b>Precipitation, analyses for tritium and/or gamma emitting isotopes</b>												
CAP- 2185	04/15/11	SBAG	405 ± 93	< 5.6	< 7.5	< 3.0	< 4.5	< 8.2	< 2.9	< 4.8	< 2.3	< 5.9
CAP- 2186	04/15/11	SBAG	504 ± 98	< 4.0	< 11.4	< 6.6	< 5.2	< 9.1	< 8.5	< 5.5	< 6.8	< 6.4
CAP- 2187	04/15/11	NBAG	524 ± 98	-	-	-	-	-	-	-	-	-
CAP- 2188	04/15/11	ETB	606 ± 102	-	-	-	-	-	-	-	-	-
CAP- 2189	04/15/11	SABR	187 ± 83	-	-	-	-	-	-	-	-	-
CAP- 2190	04/15/11	NABR	222 ± 85	< 4.3	< 11.6	< 5.6	< 4.8	< 10.1	< 5.3	< 4.8	< 7.5	< 8.3
CAP- 2191	04/15/11	WABR	< 140	-	-	-	-	-	-	-	-	-
CAP- 2192	04/15/11	SERB	262 ± 87	< 5.2	< 6.0	< 5.6	< 4.6	< 6.9	< 4.0	< 4.8	< 4.8	< 8.2
CAP- 2193	04/15/11	SEFB	549 ± 99	-	-	-	-	-	-	-	-	-
CAP- 2194	04/15/11	CMNT	398 ± 93	-	-	-	-	-	-	-	-	-
CAP- 2195	04/15/11	RWST	213 ± 85	-	-	-	-	-	-	-	-	-
CAP- 2196	04/15/11	RMWST	< 140	-	-	-	-	-	-	-	-	-

<sup>a</sup> Additional sample provided for reanalysis.

<sup>b</sup> Duplicate sample.

### C-1. Supplemental Analyses

Soil, analyses for tritium and gamma-emitting isotopes.

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Lab Code	Collection		Concentration (pCi/kg dry)									
	Date	Location	<sup>3</sup> H (pCi/L)	<sup>40</sup> K	<sup>54</sup> Mn	<sup>59</sup> Fe	<sup>58</sup> Co	<sup>60</sup> Co	<sup>95</sup> Nb	<sup>134</sup> Cs	<sup>137</sup> Cs	<sup>140</sup> La
CASO- 1972	4/13/2011	RWST-1	692 ± 112	7612 ± 574	< 26.5	< 32.0	< 17.8	< 15.3	< 13.0	< 20.6	< 17.6	< 60.1
CASO- 1973	4/13/2011	RWST-2	2003 ± 152	8689 ± 697	< 27.6	< 45.1	< 25.4	< 21.9	< 43.1	< 25.1	< 26.8	< 73.0
CASO- 1974	4/13/2011	RWST-3	2316 ± 160	6374 ± 503	< 23.0	< 30.7	< 16.0	< 15.4	< 18.9	< 17.6	43.1 ± 24.9	< 74.1
CASO- 1975	4/13/2011	RWST-4	968 ± 121	4836 ± 416	< 22.2	< 39.3	< 17.1	< 12.2	< 26.9	< 16.0	< 18.0	< 65.1

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**APPENDIX D**

**Detection of Iodine-131  
in Environmental Samples**



**Appendix D. Detection of Iodine-131 in Environmental Samples**

**D-1. I-131 in air samples.**                      Vol (m<sup>3</sup>)                      I-131 (pCi/m3)

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**Activated Charcoal cartridges.**

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CACH- 1731	03/24/11	283	0.046 ± 0.031	CA-A-001
CACH- 1737	03/24/11	299	0.049 ± 0.025	CA-A-007
CACH- 1738	03/24/11	312	0.067 ± 0.022	CA-A-008
CACH- 1739	03/24/11	289	0.065 ± 0.019	CA-A-009
CACH- 1740	03/24/11	307	0.062 ± 0.018	CA-B-003
CACH- 1891	03/31/11	271	0.156 ± 0.040	CA-A-001
CACH- 1897	03/31/11	301	0.105 ± 0.040	CA-A-007
CACH- 1898	03/31/11	313	0.157 ± 0.033	CA-A-008
CACH- 1899	03/31/11	288	0.147 ± 0.034	CA-A-009
CACH- 1893	03/31/11	298	0.133 ± 0.028	CA-B-003
CACH- 2041	04/08/11	313	0.078 ± 0.028	CA-A-001
CACH- 2047	04/08/11	340	0.047 ± 0.019	CA-A-007
CACH- 2048	04/08/11	363	0.055 ± 0.032	CA-A-008
CACH- 2049	04/08/11	327	0.065 ± 0.030	CA-A-009
CACH- 2043	04/08/11	346	0.062 ± 0.028	CA-B-003

**Air Particulate Filters**

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CAAP- 1646	03/31/11	271	0.056 ± 0.017	CA-A-001
CAAP- 1647	03/31/11	301	0.051 ± 0.023	CA-A-007
CAAP- 1648	03/31/11	313	0.053 ± 0.017	CA-A-008
CAAP- 1649	03/31/11	288	0.068 ± 0.018	CA-A-009
CAAP- 1650	03/31/11	298	0.059 ± 0.022	CA-B-003

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**D-2. I-131 activity in water.**

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Lab Code	Location	Collection Date	I-131 (pCi/L)
CAWW-1432	MW-936	3/30/11	24.2 ± 6.2
Reanalysis			29.0 ± 10.2

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**D-3. I-131 activity in milk.**

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Lab Code	Location	Collection Date	I-131 (pCi/L)
CAMI-1937	CA-MLK-M9	4/11/11	39.0 ± 7.2
Reanalysis			36.4 ± 6.0

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