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Duane Arnold Energy Center

2007 Annual Radiological Environmental Operating Report

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2007

Annual Radiological Environmental Operating Report

Duane Arnold Energy Center

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DUANE ARNOLD ENERGY CENTER
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REPORT

to the

UNITED STATES
NUCLEAR REGULATORY COMMISSION

Annual Radiological Environmental Operating Report

January 1 to December 31, 2007

Prepared by

ENVIRONMENTAL, Inc.
Midwest Laboratory

Project No. 8001

Approved : _____

Bronia Grob, M.S.
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PREFACE

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

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

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1.0 INTRODUCTION

This report summarizes and interprets results of the Radiological Environmental Monitoring Program conducted by Environmental, Inc., Midwest Laboratory at the Duane Arnold Energy Center, Palo, Iowa, during the period January - December, 2007. This Program monitors the levels of radioactivity in the air, terrestrial, and aquatic environments in order to assess the impact of the plant on its surroundings.

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

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

2.0 SUMMARY

The Radiological Environmental Monitoring Program, as required by the U.S. Nuclear Regulatory Commission (NRC) Technical Specifications for the Duane Arnold Energy Center, is herein described. Results for the year 2007 are summarized and discussed.

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

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

3.0 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

3.1 Program Design and Data Interpretation

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

Sources of environmental radiation include the following:

(1) Natural background radiation arising from cosmic rays and primordial radionuclides;

(2) Fallout from atmospheric nuclear detonations;

(3) Releases from nuclear power plants; and

(4) Industrial and medical radioactive waste.

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

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

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

3.1 Program Design and Data Interpretation (continued)

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

3.2 Program Description

The sampling and analysis schedule for the environmental radiological monitoring program at the DAEC is summarized in Table 5.2 and is briefly reviewed below. Table 5.3 defines the sampling location codes used in Table 5.2 and specifies for each location its type (indicator or control) and its distance, direction, and sector relative to the reactor site. The types of samples collected at each location and the frequency of collections are presented in Table 5.4 using codes defined in Table 5.5.

To monitor the air environment, airborne particulates are collected on membrane filters by continuous pumping at eight locations. Airborne iodine is collected by continuous pumping through charcoal filters. Seven of the eight locations are indicators and one is a control (D-13). Filters are changed and counted weekly. Particulate filters are analyzed for gross beta activity. If gross beta activity exceeds ten times the yearly mean of the control samples, gamma isotopic analysis is performed. Quarterly composites of airborne particulates from each location are analyzed for gamma emitting isotopes.

Charcoal filter samples are analyzed weekly for iodine-131.

Ambient gamma radiation is monitored at a total of 46 locations. A TLD is placed at each location and is exchanged and analyzed quarterly. The TLD locations are distributed as follows:

- Eight at active air sampling stations.
- Four at de-activated air sampling stations greater than 3 miles from the DAEC stack.
- Eighteen in a circle within a 0.5 mi. radius from the DAEC stack.
- Six in 22.5° sectors within 1 mi. from the DAEC stack.
- Ten in 22.5° sectors between 1 and 3 miles from the DAEC stack.

Precipitation is collected monthly from one location and analyzed for gamma-emitting isotopes. Quarterly composites are analyzed for tritium.

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

For additional monitoring of the terrestrial environment, grain, hay and broad leaf vegetation samples are collected annually, as available, from seven locations: one control (D-108) and six indicators (D-16, D-57, D-58, D-72, D-94, D-96, and D-109). Grain, hay and broad leaf (green leafy) vegetation samples are analyzed for gamma-emitting isotopes and at least one broad leaf vegetation is analyzed for iodine-131.

If cattle are slaughtered for home use, a meat sample is collected annually, during or immediately following a grazing period from animals grazing on-site. The sample is analyzed for gamma-emitting isotopes.

Program Description (continued)

Potable ground water is collected quarterly from a treated municipal water system (D-53), the inlet to the municipal water treatment system (D-54), three additional indicator locations (D-55, D-57, D-58) and one control location, (D-72). An additional six site monitoring wells were added to the program in 2007. The samples are analyzed for gross beta and tritium. If gross beta activity exceeds ten times the yearly mean of the control samples, gamma isotopic, strontium-89 and strontium-90 analyses are performed.

Soil samples are collected once per year at two indicator locations (D-15a and D-16). The samples are analyzed for strontium-90 and gamma-emitting isotopes.

Surface water is collected monthly from four river locations, D-49 (Lewis Access, Control, 4 mi. upstream), D-50 (Inlet), D-51 (Discharge) and D-61 (1/2 mi. downstream of discharge. In addition, Pleasant Lake (D-99) surface water and sewage effluent from location (D-107) is also monitored. Thel monthly samples are analyzed for gamma-emitting isotopes. Tritium analyses are performed on quarterly composites from each location.

The aquatic environment is also monitored by upstream and downstream (D-49 and D-61) semiannual collections of fish. River bottom sediment is collected semiannually at the plant's intake and discharge (D-50 and D-51) and downstream of the sewage plant (D-107a). The samples are analyzed for gamma-emitting isotopes.

3.3 Program Execution

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

(1) Thermoluminescent Dosimeters:

TLDs for location D-10 and D-28 were missing for the third quarter, 2007. The TLDs were lost in the field.

(2) Milk:

No milk was available from location D-109 in December of 2007. The farm has gone out of the dairy business. This constitutes a missed sample per the minimum requirements of the ODAM.

(3) Vegetation

No broadleaf vegetation was available from locations D-58, D-72, D-94 and D-96 for the June, 2007 collection.

No forage samples (hay and grain) were available from locations D-58 or D-96 for the September-October, 2007 collection.

(4) Sediments

River sediments taken on 05/14/2007 did not meet the required six month collection frequency. This constitutes missed samples per the minimum requirements of the ODAM.

Program Execution (continued)

(5) Precipitation

The required lower levels of detection could not be achieved for precipitation sampled 02/22/2007. Not enough volume was available for analysis (100ml.). This constitutes a missed sample per the minimum requirements of the ODAM.

(6) Corrections to the 2006 Report

Sampling points for locations D-111, D-112 and D-113 were listed incorrectly in Table 5.3 as 110, 111 and 112. The correct sample points should read 111, 112 and 113.

The air sampling stations listed in Table 5.4 were not updated from the 2005 report. Air particulates / air iodine samples were collected from stations D-3, D-5, D-6, D-7, D-11, D-13, D-15 and D-16 in 2006.

Table 5.4, the code RS was used for River Bottom Sediment. As per Table 5.5, the code used should have been BS for Bottom Sediment.

3.4 Laboratory Procedures

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

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

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, 2003). The QA Program includes participation in Interlaboratory Comparison (crosscheck) Programs. Results obtained in crosscheck programs are presented in Appendix A.

3.5 Program Modifications

Milk

Milk from location D-109 was no longer available after the November 6, 2007 collection. The dairy has gone out of business.

Surface water

Additional surface water sampling from locations D-49 (Lewis Access, Control) and D-99, (Pleasant Creek Lake) was initiated in 2007. The samples are analyzed for tritium and gamma emitting isotopes.

An analysis for low-level iodine-131 was added to the program in November of 2007, for two surface water locations, D-49 and D-61 (one half mile downstream).

Ground water

Ground water monitoring of an additional six on-site wells was added to the REMP in the first quarter, 2007, for analysis of gross beta and tritium. Analyses for strontium-89, strontium-90 and gamma emitting isotopes will be performed if the gross beta activity exceeds ten times the yearly mean of the potable water well control.

4.0 RESULTS AND DISCUSSION

All collections and analyses were made as scheduled, except for the listing in Table 5.6.

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

Tabulated results of measurements are not included in this section, although reference to these results will be made in discussion. A complete tabulation of results for 2007 is contained in Part II of the Annual Report on the Radiological Environmental Monitoring Program for the Duane Arnold Energy Center.

4.1 Atmospheric Nuclear Detonations and Nuclear Accidents

There were no reported atmospheric nuclear tests in 2007.

4.2 Program Findings

Results obtained show background levels of radioactivity in the environmental samples collected outside of the Site Protected Area in 2007.

Low concentrations of tritium were identified in some groundwater, surface water and precipitation samples collected within the site Protected Area. In no instances were the REMP threshold reporting levels exceeded. (ODAM, Table 6.3-3)

Airborne Particulates

The average annual gross beta concentrations in airborne particulates were identical at the indicator and control locations (0.031 pCi/m^3) and similar to levels observed from 1992 through 2006. The results are tabulated below.

Year	Indicators	Controls		Year	Indicators	Controls
Concentration (pCi/m^3)				Concentration (pCi/m^3)		
1992	0.022	0.023		2000	0.026	0.027
1993	0.022	0.023		2001	0.026	0.026
1994	0.023	0.024		2002	0.027	0.027
1995	0.025	0.024		2003	0.029	0.029
1996	0.024	0.023		2004	0.028	0.028
1997	0.023	0.023		2005	0.031	0.031
1998	0.024	0.024		2006	0.029	0.027
1999	0.026	0.027		2007	0.031	0.031

Average annual gross beta concentrations in airborne particulates.

Gamma spectroscopic analysis of quarterly composites of air particulate filters yielded similar results for indicator and control locations. Beryllium-7, which is produced continuously in the upper atmosphere by cosmic radiation (Arnold and Al-Salih, 1955) was detected in all samples,

Program Findings (continued)

Airborne Iodine

Weekly levels of airborne iodine-131 were below the lower limit of detection (LLD) of 0.03 pCi/m^3 in all samples.

Ambient Radiation (TLDs)

At twelve* air sampling locations, the TLD readings averaged 17.0 and 17.3 mR/quarter for indicator and control locations, respectively. At locations within a half mile, one mile and three mile radius of the stack, measurements averaged 18.5 mR/quarter, 19.4 mR/quarter and 16.8 mR/quarter, respectively. The average for all locations was 17.9 mR/quarter. This is lower than the estimated average natural background radiation for Middle America, 19.5 mR/quarter, which is based on data on Pages 71 and 108 of the report, "Natural Background Radiation in the United States" (National Council on Radiation Protection and Measurements, 1975). The terrestrial absorbed dose (uncorrected for structural and body shielding) ranges from 8.8 to 18.8 mrad/quarter and averages 11.5 mrad/quarter for Middle America. Cosmic radiation and cosmogenic radionuclides contribute 8.0 mrad/quarter for a total average of 19.5 mrad/quarter. No plant effect is indicated.

* There are currently eight active and four inactive air sampler stations.

Precipitation

Precipitation from the on-site location D-16 was analyzed for tritium and gamma-emitting isotopes. No tritium activity was measured above the LLD of 174 pCi/L. No gamma-emitting isotopes were detected.

During May, 2007, an additional forty-five rain-water samples were collected in the Site Protected Area in closer proximity to the reactor building vent shaft release point. Downwind of the release point, concentrations of tritium measured from 158 to 2,666 pCi/L. No tritium was detected in the upwind samples. In no case did concentrations exceed the threshold for reportability of 20,000 pCi/L for these samples. Results of the testing are listed in Part II, Appendix A, Supplemental Analyses.

Milk

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

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

In summary, milk data for 2007 show no radiological effects of plant operation.

Program Findings (continued)

Ground Water (potable)

The annual mean for gross beta activity averaged 4.1 pCi/L, similar to levels observed from 1991 through 2006. The location with the highest mean (6.4 pCi/L) was D-58, a farm 1.0 mile distant from the plant.

Tritium activity measured below the LLD of 193 pCi/L in all samples. No effect from plant operation is indicated.

Ground Water (Site Monitoring Wells)

Twelve on-site monitoring wells (six shallow and six intermediate depth) were sampled in 2007 and analyzed for gross beta and tritium.

The annual mean for gross beta activity in six intermediate depth wells measured 2.7 pCi/liter. Measurements for the shallow wells averaged 5.6 pCi/liter. The highest mean (10.8 pCi/L) was observed at shallow well MW-6A. Analyses for gamma emitting isotopes, strontium-89 and strontium-90 were performed and it was determined that the most likely cause of the higher beta activity was contribution from naturally-occurring isotopes. No plant effect was indicated.

Tritium was identified in one of twenty four samples taken from the intermediate depth wells. Intermediate depth well MW-05B, located SW of the plant in the overflow parking-lot, measured 243 pCi/liter, for the sample collected September 24th 2007. Tritium was identified in five of twenty-four samples taken from the shallow wells and has been attributed to "washout" from gaseous effluents. (See Program Findings for Precipitation)

Vegetation

Iodine-131 concentrations in broadleaf vegetation were below the LLD level of 0.029 pCi/g wet weight in all samples.

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

Soil

Strontium-90 activity measured 0.032 pCi/g dry weight in one of the two on-site locations. Cesium-137 activity measured 0.13 pCi/g dry weight in one of two on-site locations. Strontium-90 and cesium-137 activities are similar or less than levels observed from 1991 through 2006, these levels are generally attributable to deposition of fallout from previous decades.

Naturally-occurring potassium-40 averaged 13.11 pCi/g dry weight. No effect from the plant operation is indicated.

Program Findings (continued)

Surface Water

Measurable tritium was detected on site in four of twelve D-107 (sewage effluent) collections, at an average concentration of 292 pCi/L. This is well below the Environmental Protection Agency's drinking water standard of 20,000 pCi/L. For all remaining surface water collections, tritium levels were measured below the LLD level of 178 pCi/L.

The source of the tritium during the summer months has been attributed to recapture of Gaseous Effluent Tritium. Tritium, in the form of tritiated water vapor, is condensed by building air conditioning units and air compressors. The condensation from those condensers is routed to the sewage treatment facility and the transformer pit.

The source of tritium in February and March of 2007 is urine from occupationally exposed radiation workers. A calculation was performed that demonstrates the relationship between the concentration of airborne tritium in the plant and the concentration of tritium in the sewage treatment plant liquid effluent. Radiation workers breathing the very low concentrations of tritium vapor in the plant work environment will transport, via their urine, small but measurable quantities of tritium to the plant sewer system.

All gamma-emitting isotopes were below their respective LLDs.

No plant effect on surface water outside of the Site Protected Area is indicated.

Fish

With the exception of naturally-occurring potassium-40 no gamma-emitting isotopes were identified in edible portions of fish. The potassium-40 level was similar at both the indicator and control locations (2.89 and 2.88 pCi/g wet, respectively). No plant effect on the fish population is indicated.

River Sediments

River sediments were collected in May and September, 2007, and analyzed for gamma-emitting isotopes. Potassium-40 activity ranged from 4.79 – 12.96 pCi/g dry weight and averaged 9.00 pCi/g dry weight.

Trace Cs-137 activity was detected in both the control and discharge locations (D-50 and D-51) at concentration of 0.041 and 0.063 pCi/gdry weight, respectively.

All other gamma-emitting isotopes were below detection limits. There is no indication of a plant effect.

5.0 TABLES AND FIGURES

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

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

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

[b] Includes fission-product daughters.

Table 5.2 Sample collection and analysis program.

Exposure Pathway and/or Sample Type	Sampling Location: Sample Point	Sampling Location: Description	Sampling and Collection Frequency	Type and Frequency of Analysis[a]
Airborne Particulates	3 5 6 7 11 13 15 16	Hiawatha Palo Center Point Shellsburg Toddville Alburnett (C) On-site North On-site South	Continuous operation of sampler with sample collection at least once per week or as required by dust loading	Analyze for gross beta activity more than 24 hours after filter change. Perform gamma isotopic analysis on each sample having gross beta activity greater than ten times the yearly mean of the control samples. Composite weekly samples to form a quarterly composite (by location). Analyze quarterly composite for gamma isotopic.
Airborne Iodine	3 5 6 7 11 13 15 16	Hiawatha Palo Center Point Shellsburg Toddville Alburnett (C) On-site North On-site South	Continuous operation of sampler with sample collection at least once per week.	Analyze each cartridge for iodine-131.
Ambient Radiation	1-3, 5-8, 10, 11, 13	Air Part. Locations, Controls	One dosimeter continuously at each location.	Read gamma radiation dose quarterly .
	15, 16	Air Part. Locations, Indicators	Dosimeters are changed at least quarterly.	
	17-23, 28-32 82-86, 91	≤ 0.5 mi. of Stack		
	43-48	≤ 1.0 mi. of Stack		
	33-42	≤ 3.0 mi. of Stack		
Surface Water	49 50 51 61 99	Lewis Acess (C) Plant Intake Plant Discharge 0.5 mi. downstream Pleasant Creek Lake	Once per month.	Tritium and gamma isotopic analyses of each sample (by location).
	107	Plant Sewage Dischange		

(C) Denotes control location. All other locations are indicators.

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

Exposure Pathway and/or Sample Type	Sampling Location: Sample Point	Sampling Location: Description	Sampling and Collection Frequency	Type and Frequency of Analysis[a]
Ground Water (potable)	53	Treated Municipal	Grab sample at least once per quarter.	Gross beta and tritium activity analysis on quarterly sample. If gross beta is greater than ten times the yearly mean of control samples, perform gamma isotopic and Sr-89 and Sr-90 analyses.
	54	Inlet to Municipal Water Treatment System		
	55	On-site deep wells		
	57, 58	Wells off-site and		
	72 (C)	within 4 km of DAEC		
		On-site wells:		
On-site Ground Water (Monitoring Wells)	111	MW-01A, B (SSE)		
	112	MW-02A, B (ESE)		
	113	MW-03A, B (NW)		
	114	MW-04A, B (S)		
	115	MW-05A, B (SSW)		
	116	MW-06A, B (NE)		
River Sediment	50	Plant Intake (C)	At least once every six months.	Gamma isotopic analysis of each sample.
	51	Plant Discharge		
	107a	North Drainage Ditch (on-site)		
Vegetation	16, 57, 58, 72, 94, 96, 109	Farms that raise food crops.	Annually at harvest time. One sample of each: grain, green leafy, and forage. At least one sample should be broadleaf vegetation.	Gamma isotopic analysis of edible portions.
	108 (C)			I-131 analysis on broadleaf vegetation.
Fish	49	Cedar River upstream of DAEC not influenced by effluent (C)	One sample per 6 months (once during January through June and once during July through December).	Gamma isotopic analysis on edible portions.
	61	Downstream of DAEC in influence of effluent		
Milk[b]	108 (C)	Control Farm near Watkins, Iowa	At least once per two weeks during the grazing season.	<u>During the grazing season</u>: Gamma isotopic and iodine-131 analyses of each sample.
	109	Dairy Farm 3.6 mi. SW	At least once per month during the non-grazing season.	<u>During the non-grazing season</u>: Gamma isotopic and iodine-131 analyses of each sample.

(C) denotes control location. All other locations are indicators.

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

Exposure Pathway and/or Sample Type	Sampling Location: Sample Point	Sampling Location: Description	Sampling and Collection Frequency	Type and Frequency of Analysis[a]
Precipitation	16	On-site	Monthly	Gamma isotopic on all samples. Tritium on quarterly composites.
Meat[c]		On-site	Annually	Gamma Isotopic
Soil	15a, 16	On-site	Annually	Gamma Isotopic and Sr-90.

[a] Gamma isotopic analysis and analysis for gamma-emitting nuclides refer to high resolution gamma ray spectrum analysis. Any radionuclide detected at a concentration greater than the minimum detectable activity (MDA) should be reported quantitatively.

[b] The grazing season is considered to be May 1 through September 30.

[c] Meat was not collected in 2007; no animals slaughtered for home use.

Table 5.3 Sampling locations, Duane Arnold Energy Center.

	Sampling Location	
Code	Location Description	Distance and Direction from Site Stack
D-1	Cedar Rapids	11 mi SE
D-2	Marion	11 mi ESE
D-3	Hiawatha	7 mi SE
D-5	Palo	3 mi SSW
D-6	Center Point	7 mi N
D-7	Shellsburg	6 mi W
D-8	Urbana	10 mi NNW
D-10	Atkins	9 mi SSW
D-11	Toddville	4 mi E
D-13	Alburnett	9 mi ENE
D-15	On-site, North-Northwest	0.5 mi NNW
D-15a	On-site, North-Northwest	0.4 mi NNW
D-16	On-site, South-Southeast	0.5 mi SSE
D-17	On-site, N	0.5 mi N
D-18	On-site, NNE	0.5 mi NNE
D-19	On-site, NE	0.5 mi NE
D-20	On-site, ENE	0.5 mi ENE
D-21	On-site, ENE	0.5 mi ENE
D-22	On-site, E	0.5 mi E
D-23	On-site, ESE	0.5 mi ESE
D-28	On-site, WSW	0.5 mi WSW
D-29	On-site, W	0.5 mi W
D-30	On-site, WNW	0.5 mi WNW
D-31	On-site, NW	0.5 mi NW
D-32	On-site, NNW	0.5 mi NNW
D-33	3 miles N	3.0 mi N
D-34	3 miles NNE	3.0 mi NNE
D-35	3 miles NE	3.0 mi NE
D-36	3 miles ENE	3.0 mi ENE
D-37	3 miles E	3.0 mi E
D-38	3 miles ESE	3.0 mi ESE
D-39	3 miles SE	3.0 mi SE
D-40	3 miles SSE	3.0 mi SSE
D-41	3 miles S	3.0 mi S
D-42	3 miles SSE	3.0 mi SSE
D-43	1 mile SSW	1.0 mi SSW
D-44	1 mile WSW	1.0 mi WSW
D-45	1 mile W	1.0 mi W

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

Code	Sampling Location	
	Location Description	Distance and Direction from Site Stack
D-46	1 mile WNW	1.0 mi WNW
D-47	1 mile NW	1.0 mi NW
D-48	1 mile NNW	1.0 mi NNW
D-49	Lewis Access, upstream of DAEC	4.0 mi NNW
D-50	Plant Intake	
D-51	Plant Discharge	
D-53	Treated Municipal Water	
D-54	Inlet, Municipal Water Treatment System	
D-55	On-site Well	
D-57	Farm (Off-site Well)	1.0 mi WSW
D-58	Farm (Off-site Well)	1.0 mi WSW-SW
D-61	0.5 mi downstream of plant discharge	
D-72	Farm	2.0 mi SSW
D-82	On-site, SE	0.5 mi SE
D-83	On-site, SSE	0.5 mi SSE
D-84	On-site, S	0.5 mi S
D-85	On-site, SSW	0.5 mi SSW
D-86	On-site, SW	0.5 mi SW
D-91	On-site, NNW	0.5 mi NNW
D-94	Farm	2.7 mi N
D-96	Farm	8.0 mi SSW
D-99	Pleasant Creek Lake	2.5 mi WNW
D-107	Sewage Plant Effluent	On-site
D-107a	North Drainage Ditch	On-site
D-108	Farm	17.3 mi. SW
D-109	Farm	3.6 mi. SW
D-111	Monitoring wells, MW-01A, B	On-site, SSE
D-112	Monitoring wells, MW-02A, B	On-site, ESE
D-113	Monitoring wells, MW-03A, B	On-site, NW
D-114	Monitoring wells, MW-04A, B	On-site, S
D-115	Monitoring wells, MW-05A, B	On-site, SSW
D-116	Monitoring wells, MW-06A, B	On-site, NE

Table 5.4 Type and Frequency of collection.

Location	Weekly	Monthly	Quarterly	Semiannually	Annually
D-1			TLD		
D-2			TLD		
D-3	AP, AI		TLD		
D-5	AP, AI		TLD		
D-6	AP, AI		TLD		
D-7	AP, AI		TLD		
D-8			TLD		
D-10			TLD		
D-11	AP, AI		TLD		
D-13	AP, AI		TLD		
D-15	AP, AI		TLD		
D-15A					SO
D-16	AP, AI	P	TLD		SO, G
D-17 to D-23			TLD		
D-28 to D-42			TLD		
D-43 to D-48			TLD		
D-49		SW		F	
D-50		SW		BS	
D-51		SW		BS	
D-53			WW		
D-54			WW		
D-55			WW		
D-57			WW		G
D-58			WW		G
D-61		SW		F	
D-72			WW		G
D-82 to D-86			TLD		
D-91			TLD		
D-94					G
D-96					G
D-99		SW			
D-107		SW			
D-107A				BS	
D-108		MI*			G
D-109		MI*			G
On-site					ME
D-111 to D-116			WW		

* Biweekly during the grazing season.

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

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

Table 5.6. Missed collections and analyses, Duane Arnold Energy Center.

Sample Type	Analysis	Location(s)	Collection Date or Period	Comments
G	Gamma	D-58, D-72 D-94, D-96	2007	No forage or vegetation samples available.
P [a]	Gamma	D-16	2-22-07	Due to small sample volume, detection level requirements were not met.
BS[a]	Gamma	D-50, D-51 D-107a	5-14-07	Sediments were collected and analyzed but the program frequency requirement could not be met, due to high water levels.
TLD	Ambient Gamma	D-10	3rd Qtr	TLD missing in field.
TLD	Ambient Gamma	D-28	3rd Qtr	TLD missing in field.
MI [a]	Gamma, I-131	D-109	12-04-07	No sample; herd sold.

[a] Constitutes a missed sample per the minimum requirements specified by the ODAM.

Table 5.7 Radiological Environmental Program Summary.

Name of Facility: Duane Arnold Energy Center — Docket No.: 50-331
Location of Facility: Linn, Iowa (County, State) — Reporting Period: January-December, 2007

Sample Type (Units)	Type and Number of Analyses[a]	LLD[b]	Indicator Locations Mean (F)[c] Range[c]	Location with Highest Annual Mean: Location[d]	Location with Highest Annual Mean: Mean (F)[c] Range[c]	Control Locations Mean (F)[c] Range[c]	Number Non-Routine Results[e]
Airborne Particulates (pCi/m^3)	GB 424	0.004	0.031 (371/371) (0.008-0.085)	D-6, Center Point 7 mi. N	0.032 (53/53) (0.013-0.085)	0.031 (53/53) (0.012-0.079)	0
	GS 32						
	Be-7	0.020	0.087 (28/28) (0.054-0.123)	D-3, Hiawatha 7 mi. SE	0.108 (4/4) (0.063-0.170)	0.089 (4/4) (0.070-0.109)	0
	Nb-95	0.0020	< LLD			< LLD	0
	Zr-95	0.0025	< LLD			< LLD	0
	Ru-103	0.0014	< LLD			< LLD	0
	Ru-106	0.0084	< LLD			< LLD	0
	Cs-134	0.0010	< LLD			< LLD	0
	Cs-137	0.0009	< LLD			< LLD	0
	Ce-141	0.0029	< LLD			< LLD	0
	Ce-144	0.0060	< LLD			< LLD	0
Airborne Iodine (pCi/m^3)	I-131 424	0.030	< LLD	-	-	< LLD	0
TLD, AP Locations (mR/quarter)	Gamma 47	1.0	17.0 (8/8) (15.3-19.3)	D-8, Urbana 10 mi. NW	20.6 (4/4) (18.4-22.8)	17.3 (39/39) (12.8-22.8)	0
TLD, within 0.5 mi. of Stack (mR/quarter)	Gamma 71	1.0	18.5 (71/71) (12.6-27.2)	D-32, On-site 0.5 mi. NNW	22.7 (4/4) (20.6-27.2)	None	0
TLD, within 1.0 mi. of Stack (mR/quarter)	Gamma 24	1.0	19.4 (24/24) (15.2-22.7)	D-48, 1 mi. NW	21.5 (4/4) (20.9-22.7)	None	0
TLD, within 3.0 mi. of Stack (mR/quarter)	Gamma 40	1.0	16.8 (40/40) (14.2-21.7)	D-37, 3 mi. E	20.9 (4/4) (19.8-21.7)	None	0
Precipitation (pCi/L)	H-3 4	174	< LLD	-	-	< LLD	0
	GS[f] 12						
	Mn-54	16.5	< LLD	-	-	< LLD	0
	Fe-59	26.5	< LLD	-	-	< LLD	0
	Co-58	17.8	< LLD	-	-	< LLD	0
	Co-60	11.4	< LLD	-	-	< LLD	0
	Zn-65	37.9	< LLD	-	-	< LLD	0
	Nb-95	24.1	< LLD	-	-	< LLD	0
	Zr-95	19.6	< LLD	-	-	< LLD	0
	I-131	20.2	< LLD	-	-	< LLD	0
	Cs-134	16.7	< LLD	-	-	< LLD	0
	Cs-137	21.0	< LLD	-	-	< LLD	0
	Ba-140	85.7	< LLD	-	-	< LLD	0
	La-140	28.1	< LLD	-	-	< LLD	0

Table 5.7 *Radiological Environmental Program Summary.*

Name of Facility	Duane Arnold Energy Center	Docket No.	50-331
Location of Facility	Linn, Iowa (County, State)	Reporting Period	January-December, 2007

Sample Type (Units)	Type and Number of Analyses[a]	LLD[b]	Indicator Locations Mean (F)[c] Range[c]	Location with Highest Annual Mean Location[d]	Location with Highest Annual Mean Mean (F)[c] Range[c]	Control Locations Mean (F)[c] Range[c]	Number Non-Routine Results[e]
Milk (pCi/L)	I-131 35	0.5	< LLD	-	-	< LLD	0
	GS 35						
	K-40	100	1316 (17/17) (1190-1406)	D-108, Farm 17.3 mi. SW	1336 (18/18) (1133-1630)	1336 (18/18) (1133-1630)	0
	Cs-134	5	< LLD	-	-	< LLD	0
	Cs-137	5	< LLD	-	-	< LLD	0
	Ba-140	60	< LLD	-	-	< LLD	0
	La-140	5	< LLD	-	-	< LLD	0
Ground Water, potable (pCi/L)	GB 24	1.7	4.1 (12/20) (2.1-8.6)	D-58, Farm 1 mi. WSW-SW	6.4 (4/4) (4.3-8.6)	< LLD	0
	H-3 24	178	< LLD	-	-	< LLD	0
Monitoring wells (pCi/L)	GB 48	1.8	4.2 (38/48) (1.8-17.7)	MW-6A, shallow Onsite, NE	10.8 (4/4) (5.3-17.7)	< LLD	0
	H-3 48	179	382 (5/48) (198-646)	MW-01A (shallow) Onsite, 210m SSE	429 (4/4) (287-646)	< LLD	0
Broadleaf Vegetation (pCi/g wet)	I-131 3	0.029	< LLD	-	-	< LLD	0
	GS 3						
	K-40	0.5	3.41 (2/2) (1.94-4.89)	D-57, Farm 1 mi. WSW	4.89 (1/1)	3.46 (1/1)	0
	Mn-54	0.021	< LLD	-	-	< LLD	0
	Co-58	0.022	< LLD	-	-	< LLD	0
	Co-60	0.019	< LLD	-	-	< LLD	0
	Nb-95	0.026	< LLD	-	-	< LLD	0
	Zr-95	0.042	< LLD	-	-	< LLD	0
	Ru-103	0.022	< LLD	-	-	< LLD	0
	Ru-106	0.19	< LLD	-	-	< LLD	0
	Cs-134	0.025	< LLD	-	-	< LLD	0
	Cs-137	0.026	< LLD	-	-	< LLD	0
	Ce-141	0.025	< LLD	-	-	< LLD	0
	Ce-144	0.16	< LLD	-	-	< LLD	0

Table 5.7 Radiological Environmental Program Summary.

Name of Facility	Duane Arnold Energy Center	Docket No.	50-331
Location of Facility	Linn, Iowa (County, State)	Reporting Period	January-December, 2007

Sample Type (Units)	Type and Number of Analyses[a]	LLD[b]	Indicator Locations Mean (F)[c] Range[c]	Location with Highest Annual Mean Location[d]	Location with Highest Annual Mean Mean (F)[c] Range[c]	Control Locations Mean (F)[c] Range[c]	Number Non-Routine Results[e]
Vegetation	GS 12						
(Grain and Forage)	K-40	0.5	8.20 (10/10) (2.58-18.97)	D-108, Farm 17.3 mi. SW	15.13 (2/2) (2.63-27.63)	15.13 (2/2) (2.63-27.63)	0
(pCi/g wet)	Mn-54	0.044	< LLD	-	-	< LLD	0
	Co-58	0.037	< LLD	-	-	< LLD	0
	Co-60	0.042	< LLD	-	-	< LLD	0
	Nb-95	0.036	< LLD	-	-	< LLD	0
	Zr-95	0.056	< LLD	-	-	< LLD	0
	Ru-103	0.034	< LLD	-	-	< LLD	0
	Ru-106	0.33	< LLD	-	-	< LLD	0
	Cs-134	0.033	< LLD	-	-	< LLD	0
	Cs-137	0.041	< LLD	-	-	< LLD	0
	Ce-141	0.056	< LLD	-	-	< LLD	0
	Ce-144	0.23	< LLD	-	-	< LLD	0
Soil (pCi/gwet)	Sr-90 2	0.030	< LLD	D-15, On-site 0.5 mi. NW	0.032 (1/1)	None	0
	GS 2						
	K-40	0.5	13.11 (2/2) (9.70-16.53)	D-15, On-site 0.5 mi. NW	16.53 (1/1)	None	0
	Mn-54	0.026	< LLD	-	-	None	0
	Fe-59	0.058	< LLD	-	-	None	0
	Co-58	0.029	< LLD	-	-	None	0
	Co-60	0.018	< LLD	-	-	None	0
	Zn-65	0.052	< LLD	-	-	None	0
	Nb-95	0.025	< LLD	-	-	None	0
	Zr-95	0.030	< LLD	-	-	None	0
	Ru-103	0.027	< LLD	-	-	None	0
	Ru-106	0.18	< LLD	-	-	None	0
	Cs-134	0.019	< LLD	-	-	None	0
	Cs-137	0.060	0.12 (2/2) (0.095-0.15)	D-15, On-site 0.5 mi. NW	0.15 (1/1)	None	0
	Ce-141	0.065	< LLD	-	-	None	0
	Ce-144	0.10	< LLD	-	-	None	0

Table 5.7 Radiological Environmental Program Summary.

Name of Facility	Duane Arnold Energy Center	Docket No.	50-331
Location of Facility	Linn, Iowa (County, State)	Reporting Period	January-December, 2007

Sample Type (Units)	Type and Number of Analyses[a]	LLD[b]	Indicator Locations Mean (F)[c] Range[c]	Location with Highest Annual Mean Location[d]	Location with Highest Annual Mean Mean (F)[c] Range[c]	Control Locations Mean (F)[c] Range[c]	Number Non-Routine Results[e]
Surface Water (pCi/L)	H-3 72	178	292 (4/60)	D-107, Onsite Sewage Effluent	292 (4/12)	< LLD	0
	I-131 4	0.4	< LLD	-	-	< LLD	0
	GS 72						
	Mn-54	5.3	< LLD	-	-	< LLD	0
	Fe-59	11.5	< LLD	-	-	< LLD	0
	Co-58	6.1	< LLD	-	-	< LLD	0
	Co-60	5.9	< LLD	-	-	< LLD	0
	Zn-65	9.9	< LLD	-	-	< LLD	0
	Nb-95	6.2	< LLD	-	-	< LLD	0
	Zr-95	12.9	< LLD	-	-	< LLD	0
	I-131	13.1	< LLD	-	-	< LLD	0
	Cs-134	6.2	< LLD	-	-	< LLD	0
	Cs-137	7.0	< LLD	-	-	< LLD	0
	Ba-140	29.8	< LLD	-	-	< LLD	0
	La-140	9.3	< LLD	-	-	< LLD	0
Sediments	GS 6						
(pCi/g dry)	K-40	1.0	8.73 (4/4) (4.79-12.96)	D-51, Plant Discharge	11.17 (2/2) (9.39-12.96)	9.56 (2/2) (8.63-10.49)	0
	Mn-54	0.025	< LLD	-	-	< LLD	0
	Fe-59	0.057	< LLD	-	-	< LLD	0
	Co-58	0.026	< LLD	-	-	< LLD	0
	Co-60	0.062	< LLD	-	-	< LLD	0
	Zn-65	0.068	< LLD	-	-	< LLD	0
	Nb-95	0.034	< LLD	-	-	< LLD	0
	Zr-95	0.048	< LLD	-	-	< LLD	0
	Ru-103	0.038	< LLD	-	-	< LLD	0
	Ru-106	0.26	< LLD	-	-	< LLD	0
	Cs-134	0.036	< LLD	-	-	< LLD	0
	Cs-137	0.033	0.063 (1/4)	D-51, Plant Discharge	0.063 (1/2) -	0.041 (1/2) -	0
	Ce-141	0.068	< LLD	-	-	< LLD	0
	Ce-144	0.17	< LLD	-	-	< LLD	0

Table 5.7 Radiological Environmental Program Summary.

Name of Facility	Duane Arnold Energy Center	Docket No.	50-331
Location of Facility	Linn, Iowa (County, State)	Reporting Period	January-December, 2007

Sample Type (Units)	Type and Number of Analyses[a]	LLD[b]	Indicator Locations Mean (F)[c] Range[c]	Location with Highest Annual Mean Location[d]	Location with Highest Annual Mean Mean (F)[c] Range[c]	Control Locations Mean (F)[c] Range[c]	Number Non-Routine Results[e]
Fish	GS 8						
(pCi/g wet)	K-40	1.0	2.89 (4/4) (2.78-3.06)	D-61, Downstream	2.89 (4/4) (2.78-3.06)	2.88 (4/4) (2.63-3.09)	0
	Mn-54	0.024	< LLD	-	-	< LLD	0
	Fe-59	0.071	< LLD	-	-	< LLD	0
	Co-58	0.025	< LLD	-	-	< LLD	0
	Co-60	0.025	< LLD	-	-	< LLD	0
	Zn-65	0.033	< LLD	-	-	< LLD	0
	Nb-95	0.050	< LLD	-	-	< LLD	0
	Zr-95	0.049	< LLD	-	-	< LLD	0
	Ru-103	0.040	< LLD	-	-	< LLD	0
	Ru-106	0.19	< LLD	-	-	< LLD	0
	Cs-134	0.020	< LLD	-	-	< LLD	0
	Cs-137	0.022	< LLD	-	-	< LLD	0
	Ce-141	0.067	< LLD	-	-	< LLD	0
	Ce-144	0.13	< LLD	-	-	< LLD	0

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

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

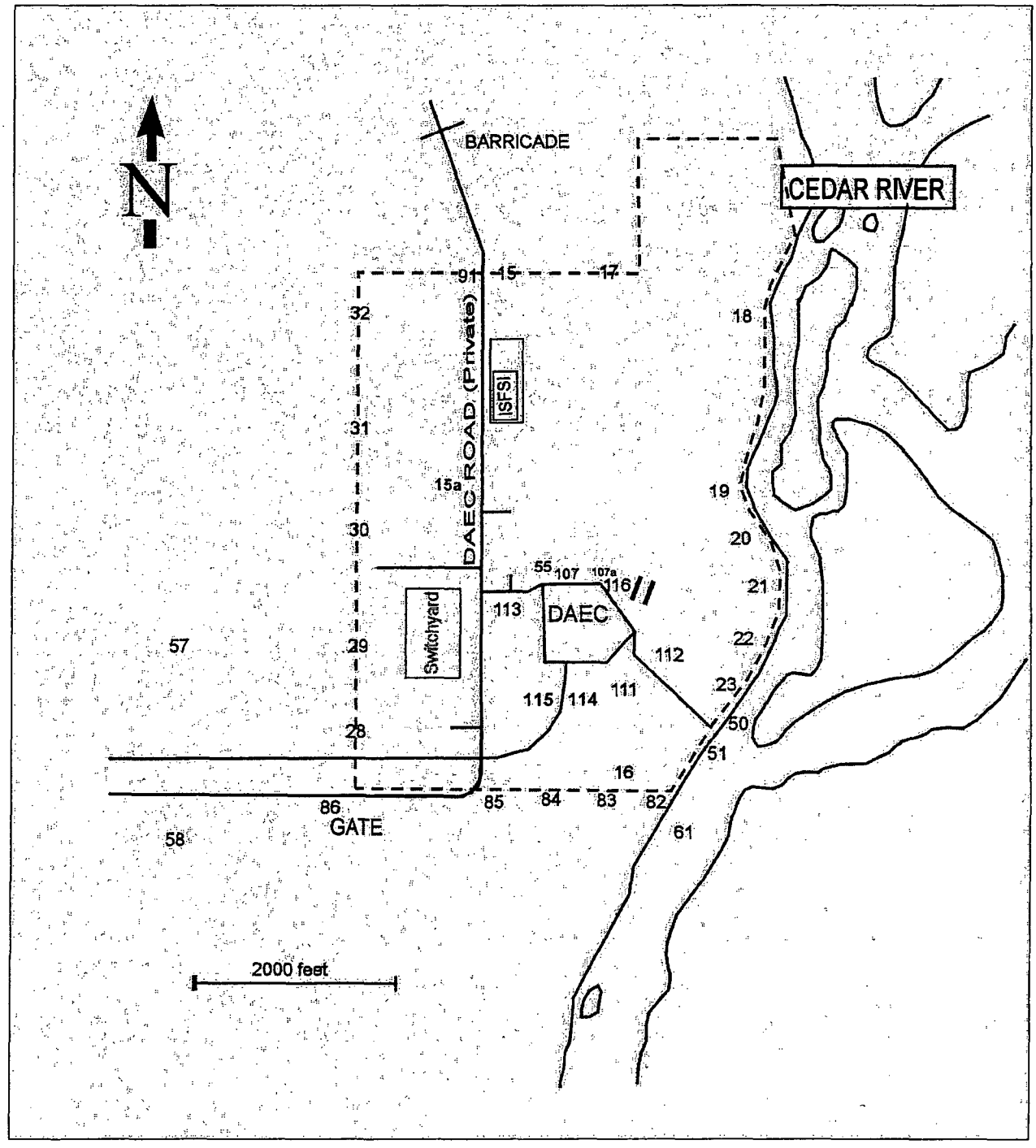
[c] Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (F).

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

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

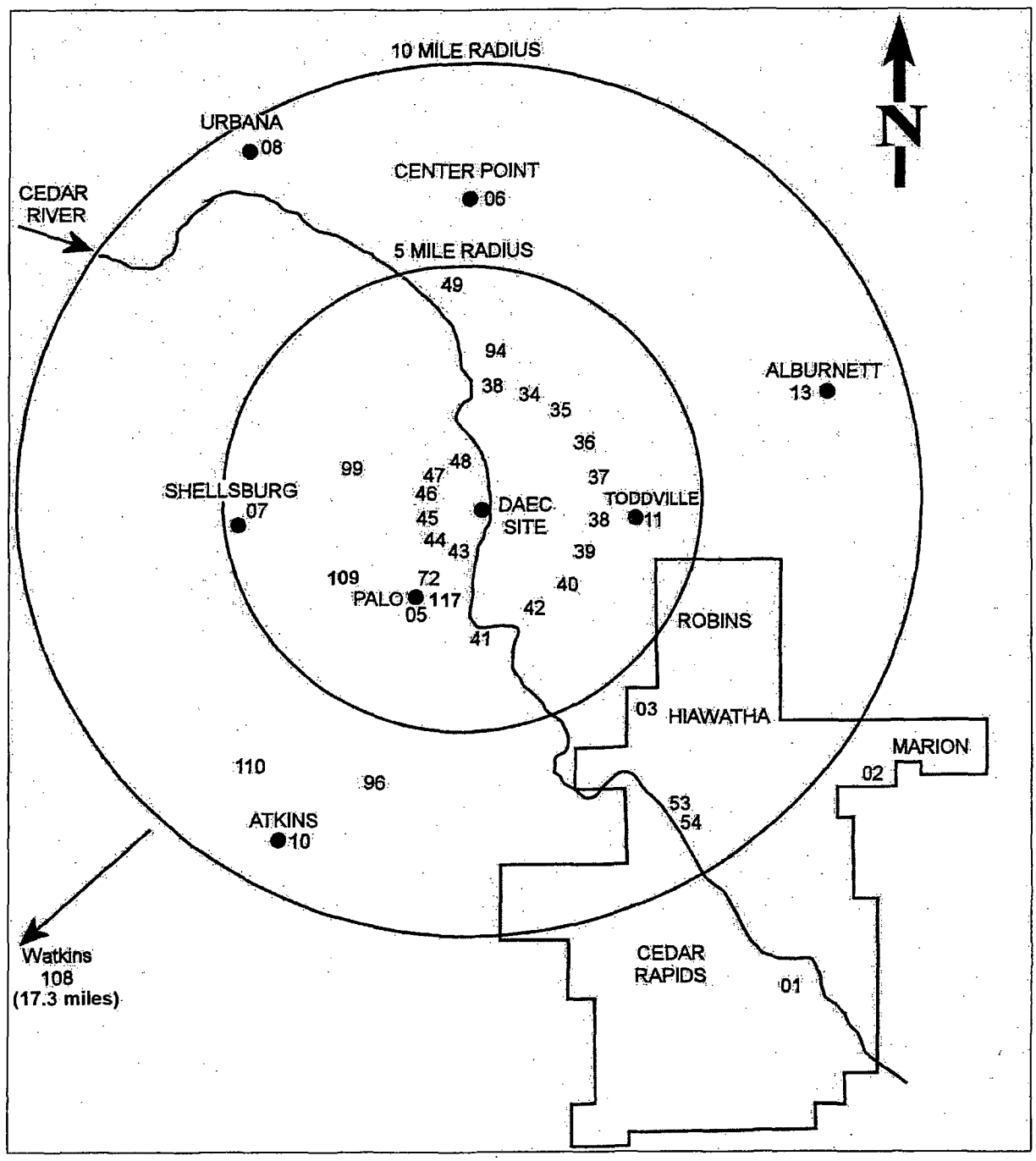
[f] One sample of precipitation was eliminated from the LLD calculations due to low volume (100ml.).

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



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

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



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

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APPENDIX A

INTERLABORATORY COMPARISON PROGRAM RESULTS

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

January through December, 2007

Appendix A

Interlaboratory Comparison Program Results

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

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

Results in Table A-1 were obtained through participation in the 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.

The results in Table A-2 list 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 acceptance criteria for "spiked" samples.

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

Attachment A

ACCEPTANCE CRITERIA FOR "SPIKED" SAMPLES

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

Analysis	Level	One standard deviation for single determination
Gamma Emitters	5 to 100 pCi/liter or kg	5.0 pCi/liter
	> 100 pCi/liter or kg	5% of known value
Strontium-89[b]	5 to 50 pCi/liter or kg	5.0 pCi/liter
	> 50 pCi/liter or kg	10% of known value
Strontium-90[b]	2 to 30 pCi/liter or kg	5.0 pCi/liter
	> 30 pCi/liter or kg	10% of known value
Potassium-40	≥ 0.1 g/liter or kg	5% of known value
Gross alpha	≤ 20 pCi/liter	5.0 pCi/liter
	> 20 pCi/liter	25% of known value
Gross beta	≤ 100 pCi/liter	5.0 pCi/liter
	> 100 pCi/liter	5% of known value
Tritium	≤ 4,000 pCi/liter	$\pm 1\sigma$ = $169.85 \times (\text{known})^{0.0933}$
	> 4,000 pCi/liter	10% of known value
Radium-226,-228	≥ 0.1 pCi/liter	15% of known value
Plutonium	≥ 0.1 pCi/liter, gram, or sample	10% of known value
Iodine-131, Iodine-129[b]	≤ 55 pCi/liter	6.0 pCi/liter
	> 55 pCi/liter	10% of known value
Uranium-238, Nickel-63[b] Technetium-99[b]	≤ 35 pCi/liter	6.0 pCi/liter
	> 35 pCi/liter	15% of known value
Iron-55[b]	50 to 100 pCi/liter	10 pCi/liter
	> 100 pCi/liter	10% of known value
Others[b]	—	20% of known value

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

[b] Laboratory limit.

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

Lab Code	Date	Concentration (pCi/L)				
		Analysis	Laboratory Result[b]	ERA Result[c]	Control Limits	Acceptance
STW-1121	04/09/07	Sr-89	30.7 ± 4.3	35.4	26.7 - 44.1	Pass
STW-1121	04/09/07	Sr-90	39.3 ± 1.8	42.1	33.4 - 50.8	Pass
STW-1122	04/09/07	Ba-133	30.0 ± 2.4	29.3	20.6 - 38.0	Pass
STW-1122	04/09/07	Co-60	118.5 ± 3.9	119.0	109.0 - 129.0	Pass
STW-1122	04/09/07	Cs-134	52.6 ± 2.3	54.3	45.6 - 63.0	Pass
STW-1122	04/09/07	Cs-137	49.5 ± 3.8	50.3	41.6 - 59.0	Pass
STW-1122	04/09/07	Zn-65	91.7 ± 6.3	88.6	73.3 - 104.0	Pass
STW-1123	04/09/07	Gr. Alpha	33.8 ± 3.5	56.5	32.0 - 81.0	Pass
STW-1123	04/09/07	Gr. Beta	24.2 ± 2.3	25.3	16.6 - 34.0	Pass
STW-1124	04/09/07	I-131	19.2 ± 1.2	18.9	13.7 - 24.1	Pass
STW-1125	04/09/07	H-3	7540.0 ± 255.0	8060.0	6660.0 - 9450.0	Pass
STW-1125	04/09/07	Ra-226	13.0 ± 0.6	13.4	9.9 - 16.9	Pass
STW-1125	04/09/07	Ra-228	19.9 ± 2.7	18.2	10.3 - 26.1	Pass
STW-1125	04/09/07	Uranium	4.5 ± 0.2	4.6	0.0 - 9.8	Pass
STW-1127	07/09/07	Sr-89	51.7 ± 5.0	58.2	49.5 - 66.9	Pass
STW-1127	07/09/07	Sr-90	21.4 ± 2.3	19.0	10.3 - 27.7	Pass
STW-1128	07/09/07	Ba-133	19.4 ± 2.2	19.4	10.7 - 28.1	Pass
STW-1128	07/09/07	Co-60	32.8 ± 2.0	33.5	24.8 - 42.2	Pass
STW-1128	07/09/07	Cs-134	67.0 ± 2.9	68.9	60.2 - 77.6	Pass
STW-1128	07/09/07	Cs-137	61.6 ± 3.8	61.3	52.6 - 70.0	Pass
STW-1128	07/09/07	Zn-65	55.6 ± 7.5	54.6	45.2 - 64.0	Pass
STW-1129	07/09/07	Gr. Alpha	19.2 ± 1.6	27.1	15.4 - 38.8	Pass
STW-1129	07/09/07	Gr. Beta	9.1 ± 0.9	11.5	2.8 - 20.2	Pass
STW-1130	07/09/07	Ra-226	7.0 ± 0.5	7.7	5.7 - 9.7	Pass
STW-1130	07/09/07	Ra-228	9.2 ± 2.3	9.1	5.2 - 13.1	Pass
STW-1130	07/09/07	Uranium	23.9 ± 1.1	25.1	19.9 - 30.3	Pass
STW-1131	10/05/07	Sr-89	27.3 ± 3.3	27.4	19.3 - 33.9	Pass
STW-1131	10/05/07	Sr-90	17.7 ± 1.2	18.2	12.9 - 21.6	Pass
STW-1132	10/05/07	Ba-133	12.2 ± 3.3	12.6	8.6 - 15.5	Pass
STW-1132	10/05/07	Co-60	23.8 ± 1.4	23.2	19.9 - 28.3	Pass
STW-1132	10/05/07	Cs-134	70.5 ± 4.2	71.1	58.0 - 78.2	Pass
STW-1132	10/05/07	Cs-137	178.2 ± 3.3	180.0	162.0 - 200.0	Pass
STW-1132	10/05/07	Zn-65	263.9 ± 6.9	251.0	226.0 - 294.0	Pass
STW-1133	10/05/07	Gr. Alpha	54.7 ± 2.1	58.6	30.6 - 72.9	Pass
STW-1133	10/05/07	Gr. Beta	11.9 ± 0.9	9.7	4.3 - 18.2	Pass
STW-1134	10/05/07	I-131	33.0 ± 1.5	28.9	24.0 - 33.8	Pass
STW-1135	10/05/07	H-3	9965.0 ± 250.0	9700.0	8430.0 - 10700.0	Pass
STW-1135	10/05/07	Ra-226	12.7 ± 0.2	12.9	9.6 - 14.9	Pass
STW-1135	10/05/07	Ra-228	19.6 ± 2.4	17.9	12.0 - 21.5	Pass
STW-1135	10/05/07	Uranium	27.3 ± 1.1	27.5	22.1 - 30.8	Pass

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

[b] Unless otherwise indicated, the laboratory result is given as the mean ± standard deviation for three determinations.

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

TABLE A-2. Crosscheck program results; Thermoluminescent Dosimetry, (TLD, $CaSO_4$: Dy Cards).

Lab Code	Date	Description	Known Value (mR)	Lab Result ± 2 sigma (mR)	Control Limits	Acceptance
Environmental, Inc.						
2007-1	7/13/2007	30 cm.	54.25	60.56 ± 5.54	37.98 - 70.53	Pass
2007-1	7/13/2007	40 cm.	30.51	34.23 ± 0.96	21.36 - 39.66	Pass
2007-1	7/13/2007	50 cm.	19.53	17.95 ± 1.86	13.67 - 25.39	Pass
2007-1	7/13/2007	60 cm.	13.56	16.61 ± 0.60	9.49 - 17.63	Pass
2007-1	7/13/2007	70 cm.	9.96	9.72 ± 0.90	6.97 - 12.95	Pass
2007-1	7/13/2007	80 cm.	7.63	7.79 ± 0.33	5.34 - 9.92	Pass
2007-1	7/13/2007	90 cm.	6.03	5.53 ± 0.72	4.22 - 7.84	Pass
2007-1	7/13/2007	100 cm.	4.88	5.32 ± 0.17	3.42 - 6.34	Pass
2007-1	7/13/2007	110 cm.	4.03	3.49 ± 0.14	2.82 - 5.24	Pass
2007-1	7/13/2007	120 cm.	3.39	2.64 ± 0.14	2.37 - 4.41	Pass
2007-1	7/13/2007	150 cm.	2.17	2.13 ± 0.87	1.52 - 2.82	Pass
Environmental, Inc.						
2007-2	11/12/2007	30 cm.	54.37	65.47 ± 5.25	38.06 - 70.68	Pass
2007-2	11/12/2007	40 cm.	30.59	37.43 ± 2.18	21.41 - 39.77	Pass
2007-2	11/12/2007	60 cm.	13.59	15.18 ± 0.50	9.51 - 17.67	Pass
2007-2	11/12/2007	70 cm.	9.99	12.18 ± 0.46	6.99 - 12.99	Pass
2007-2	11/12/2007	80 cm.	7.65	8.74 ± 0.39	5.36 - 9.95	Pass
2007-2	11/12/2007	90 cm.	6.04	5.89 ± 0.25	4.23 - 7.85	Pass
2007-2	11/12/2007	110 cm.	4.04	4.13 ± 0.41	2.83 - 5.25	Pass
2007-2	11/12/2007	120 cm.	3.4	2.92 ± 0.13	2.38 - 4.42	Pass
2007-2	11/12/2007	120 cm.	3.4	2.91 ± 0.31	2.38 - 4.42	Pass
2007-2	11/12/2007	150 cm.	2.17	1.95 ± 0.72	1.52 - 2.82	Pass
2007-2	11/12/2007	180 cm.	1.51	1.38 ± 0.05	1.06 - 1.96	Pass

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

Lab Code [b]	Date	Concentration (pCi/L)[a] Analysis	Laboratory results 2s, n=1 [c]	Known Activity	Control Limits [d]	Acceptance
W-30707	3/7/2007	Gr. Alpha	19.51 ± 0.40	20.08	10.04 - 30.12	Pass
W-30707	3/7/2007	Gr. Beta	67.45 ± 0.49	65.73	55.73 - 75.73	Pass
SPAP-1566	3/23/2007	Cs-134	25.35 ± 1.31	27.82	17.82 - 37.82	Pass
SPAP-1566	3/23/2007	Cs-137	107.52 ± 3.02	116.48	104.83 - 128.13	Pass
SPW-1568	3/23/2007	H-3	65595.00 ± 672.00	71118.00	56894.40 - 85341.60	Pass
SPW-1678	3/28/2007	Tc-99	28.44 ± 1.12	32.35	20.35 - 44.35	Pass
SPW-1595	4/5/2007	Cs-134	54.48 ± 2.12	54.99	44.99 - 64.99	Pass
SPW-1595	4/5/2007	Cs-137	59.03 ± 2.94	58.19	48.19 - 68.19	Pass
SPW-1595	4/5/2007	I-131(G)	83.11 ± 3.51	82.07	72.07 - 92.07	Pass
SPW-1595A	4/5/2007	I-131	78.40 ± 1.10	82.07	65.66 - 98.48	Pass
SPW-1595B	4/5/2007	I-131	78.97 ± 1.10	82.07	65.66 - 98.48	Pass
SPMI-1597	4/5/2007	Cs-134	54.03 ± 2.15	54.99	44.99 - 64.99	Pass
SPMI-1597	4/5/2007	Cs-137	59.81 ± 4.75	58.19	48.19 - 68.19	Pass
SPMI-1597	4/5/2007	I-131(G)	83.97 ± 4.07	82.07	72.07 - 92.07	Pass
SPMI-1597A	4/5/2007	I-131	79.53 ± 1.03	82.07	65.66 - 98.48	Pass
SPMI-1597B	4/5/2007	I-131	83.51 ± 1.05	82.07	65.66 - 98.48	Pass
SPCH-2839	5/17/2007	I-131(G)	78.70 ± 7.36	70.40	60.40 - 80.40	Pass
SPW-2847	5/17/2007	Cs-134	55.43 ± 1.68	52.85	42.85 - 62.85	Pass
SPW-2847	5/17/2007	Cs-137	59.86 ± 2.71	58.03	48.03 - 68.03	Pass
SPW-2847	5/17/2007	I-131(G)	63.95 ± 2.69	70.87	60.87 - 80.87	Pass
SPMI-2849	5/17/2007	Cs-134	51.37 ± 1.65	52.85	42.85 - 62.85	Pass
SPMI-2849	5/17/2007	Cs-137	60.42 ± 4.31	58.03	48.03 - 68.03	Pass
SPMI-2849	5/17/2007	I-131(G)	62.44 ± 3.14	70.87	60.87 - 80.87	Pass
SPCH-2922	5/17/2007	I-131(G)	80.00 ± 6.40	70.40	41.60 - 99.20	Pass
SPW-2847	5/18/2007	I-131	60.14 ± 0.89	70.87	56.70 - 85.04	Pass
SPW-2847	5/18/2007	Sr-89	104.93 ± 6.64	121.90	97.52 - 146.28	Pass
SPW-2847	5/18/2007	Sr-89	46.72 ± 1.97	46.08	36.08 - 56.08	Pass
SPMI-2849	5/18/2007	I-131	67.97 ± 0.88	70.87	56.70 - 85.04	Pass
SPW-2909 [e]	5/22/2007	Fe-55	11137.00 ± 316.00	14271.50	11417.20 - 17125.80	Fail
SPW-2911	5/22/2007	H-3	65023.00 ± 679.00	70485.00	56388.00 - 84582.00	Pass
SPAP-2913	5/22/2007	Gr. Beta	55.27 ± 8.51	52.65	42.12 - 73.71	Pass
SPAP-2915	5/22/2007	Cs-134	22.53 ± 1.12	26.42	16.42 - 36.42	Pass
SPAP-2915	5/22/2007	Cs-137	111.14 ± 3.57	116.06	104.45 - 127.67	Pass
SPF-2922	5/22/2007	Cs-134	0.52 ± 0.03	0.53	0.32 - 0.74	Pass
SPF-2922	5/22/2007	Cs-137	2.58 ± 0.07	2.32	1.39 - 3.25	Pass
SPW-3223	5/24/2007	Ni-63	2233.10 ± 10.32	2135.90	1281.54 - 2990.26	Pass
W-60507	6/5/2007	Gr. Alpha	20.93 ± 0.42	20.08	10.04 - 30.12	Pass
W-60507	6/5/2007	Gr. Beta	60.50 ± 0.46	65.73	55.73 - 75.73	Pass
SPW-4327	7/18/2007	Tc-99	25.58 ± 1.11	32.35	20.35 - 44.35	Pass
SPW-5476	8/17/2007	Ni-63	1925.18 ± 9.62	2135.90	1281.54 - 2990.26	Pass
W-92107	9/21/2007	Gr. Alpha	23.02 ± 0.44	20.08	10.04 - 30.12	Pass
W-92107	9/21/2007	Gr. Beta	61.48 ± 0.47	65.73	55.73 - 75.73	Pass

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

Lab Code	Date	Analysis	Concentration (pCi/L)[a] Laboratory results 2s, n=1[b]	Known Activity	Control Limits[c]	Acceptance
SPW-6880	10/10/2007	Tc-99	30.97 ± 1.21	32.35	20.35 - 44.35	Pass
w-111007	11/10/2007	Gr. Alpha	22.43 ± 0.42	20.08	10.04 - 30.12	Pass
w-111007	11/10/2007	Gr. Beta	64.49 ± 0.48	65.73	55.73 - 75.73	Pass
SPAP-7742	11/13/2007	Cs-134	21.18 ± 1.29	22.41	12.41 - 32.41	Pass
SPAP-7742	11/13/2007	Cs-137	113.61 ± 3.16	114.76	103.28 - 126.24	Pass
SPAP-7744	11/13/2007	Gr. Beta	53.41 ± 0.13	52.03	41.62 - 72.84	Pass
SPMI-7746	11/13/2007	Cs-134	42.20 ± 1.48	44.83	34.83 - 54.83	Pass
SPMI-7746	11/13/2007	Cs-137	56.05 ± 2.83	57.40	47.40 - 67.40	Pass
SPMI-7746	11/13/2007	Sr-90	41.02 ± 1.61	45.54	36.43 - 54.65	Pass
SPW-7748	11/13/2007	Cs-134	43.11 ± 1.52	44.80	34.80 - 54.80	Pass
SPW-7748	11/13/2007	Cs-137	59.28 ± 3.50	57.40	47.40 - 67.40	Pass
SPW-7748	11/13/2007	Sr-90	37.23 ± 1.51	45.54	36.43 - 54.65	Pass
SPW-7752	11/13/2007	Fe-55	12935.10 ± 357.00	12640.50	10112.40 - 15168.60	Pass
SPW-7758	11/13/2007	H-3	65405.00 ± 712.50	68618.00	54894.40 - 82341.60	Pass
SPF-7760	11/13/2007	Cs-134	0.45 ± 0.02	0.45	0.27 - 0.63	Pass
SPF-7760	11/13/2007	Cs-137	2.45 ± 0.07	2.29	1.37 - 3.21	Pass
SPW-8034	11/13/2007	Ni-63	2194.06 ± 10.77	2129.03	1277.42 - 2980.64	Pass

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

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

[c] Results are based on single determinations.

[d] Control limits are based on Attachment A, Page A2 of this report.

[e] Sample recount: 12557 ± 335.

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[b]	Concentration (pCi/L)[a]		
				Laboratory results (4.66σ)		Acceptance
				LLD	Activity[c]	Criteria (4.66 σ)
W-30707	water	3/7/2007	Gr. Alpha	0.40	0.01 ± 0.28	2
W-30707	water	3/7/2007	Gr. Beta	0.75	0.06 ± 0.53	4
SPAP-1567	Air Filter	3/23/2007	Cs-134	0.79		100
SPW-1567	Air Filter	3/23/2007	Cs-137	1.01		100
SPW-1568	water	3/23/2007	H-3	176.10	-26.16 ± 91.62	200
SPW-1596	water	4/5/2007	Cs-134	3.28		10
SPW-1596	water	4/5/2007	Cs-137	3.45		10
SPW-1596	water	4/5/2007	I-131	0.27	0.02 ± 0.18	0.5
SPW-1596	water	4/5/2007	I-131(G)	2.91		20
SPMI-1598	Milk	4/5/2007	Cs-134	3.30		10
SPMI-1598	Milk	4/5/2007	Cs-137	5.08		10
SPMI-1598	Milk	4/5/2007	I-131	0.26	-0.10 ± 0.17	0.5
SPMI-1598	Milk	4/5/2007	I-131(G)	4.10		20
SPCH-2839	Charcoal Canister	5/17/2007	I-131(G)	2.24		9.6
SPW-2848	water	5/17/2007	Cs-134	3.14		10
SPW-2848	water	5/17/2007	Cs-137	1.37		10
SPW-2848	water	5/17/2007	I-131(G)	5.34		20
SPMI-2850	Milk	5/17/2007	Cs-134	3.32		10
SPMI-2850	Milk	5/17/2007	Cs-137	2.60		10
SPMI-2850	Milk	5/17/2007	I-131(G)	4.77		20
SPW-2848	water	5/18/2007	I-131	0.34	-0.06 ± 0.19	0.5
SPW-2848	water	5/18/2007	Sr-89	0.81	-0.02 ± 0.65	5
SPW-2848	water	5/18/2007	Sr-90	0.53	0.01 ± 0.25	1
SPMI-2850	Milk	5/18/2007	I-131	0.45	0.20 ± 0.26	0.5
SPMI-2850	Milk	5/18/2007	Sr-89	0.96	-0.73 ± 1.02	5
SPMI-2850 [d]	Milk	5/18/2007	Sr-90	0.58	0.96 ± 0.38	1
SPAP-2914	Air Filter	5/22/2007	Gr. Beta	0.004	-0.002 ± 0.002	0.01
SPAP-2916	Air Filter	5/22/2007	Cs-134	2.84		100
SPAP-2916	Air Filter	5/22/2007	Cs-137	2.24		100
SPF-2923	Fish	5/22/2007	Cs-134	8.71		100
SPF-2923	Fish	5/22/2007	Cs-137	8.35		100
SPW-3224	water	5/24/2007	Ni-63	1.61	-0.30 ± 0.84	20
W-60507	water	6/5/2007	Gr. Alpha	0.43	-0.01 ± 0.30	2
W-60507	water	6/5/2007	Gr. Beta	0.77	0.01 ± 0.54	4
SPW-4328	water	7/18/2007	Tc-99	6.41	-3.12 ± 3.84	10
SPW-5477	water	8/17/2007	Ni-63	1.48	4.38 ± 1.01	20
W-92107	water	9/21/2007	Gr. Alpha	0.41	0.09 ± 0.29	2
W-92107	water	9/21/2007	Gr. Beta	0.75	-0.26 ± 0.51	4

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

Lab Code	Sample Type	Date	Analysis[b]	Concentration (pCi/L)[a]		
				Laboratory results (4.66σ)		Acceptance
				LLD	Activity[c]	Criteria (4.66 σ)
SPW-6881	water	10/10/2007	Tc-99	6.82	-6.58 ± 4.04	10
SPAP-7743	Air Filter	11/13/2007	Gr. Beta	0.003	-0.002 ± 0.002	0.01
SPMI-7745	Milk	11/13/2007	Cs-134	2.16		10
SPMI-7745	Milk	11/13/2007	Cs-137	3.46		10
SPMI-7745	Milk	11/13/2007	I-131(G)	5.89		20
SPMI-7745	Milk	11/13/2007	Sr-90	0.59	0.73 ± 0.35	1
SPW-7747	water	11/13/2007	Cs-134	2.39		10
SPW-7747	water	11/13/2007	Cs-137	3.53		10
SPW-7747	water	11/13/2007	I-131(G)	12.51		20
SPW-7747	water	11/13/2007	Sr-90	0.71	-0.04 ± 0.32	1
SPW-7751	water	11/13/2007	Fe-55	15.50	-4.18 ± 9.20	1000
SPW-7757	water	11/13/2007	H-3	151.35	-14.98 ± 78.85	200
SPF-7759	Fish	11/13/2007	Cs-134	5.50		100
SPF-7759	Fish	11/13/2007	Cs-137	5.10		100
SPW-8033	water	11/13/2007	Ni-63	1.45	-0.19 ± 0.87	20
W-120607	water	12/6/2007	Gr. Alpha	0.40	0.02 ± 0.28	2
W-120607	water	12/6/2007	Gr. Beta	0.77	-0.70 ± 0.51	4

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

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

[c] Activity reported is a net activity result. For gamma spectroscopic analysis, activity detected below the LLD value is not reported.

[d] Low levels of Sr-90 are still detected in the environment. A concentration of (1-5 pCi/L) in milk is not unusual.

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

Lab Code	Date	Analysis	Concentration (pCi/L)[a] First Result	Second Result	Averaged Result	Acceptance
E-20, 21	1/2/2007	Gr. Beta	1.76 ± 0.07	1.70 ± 0.06	1.73 ± 0.05	Pass
E-20, 21	1/2/2007	K-40	1.49 ± 0.24	1.57 ± 0.27	1.53 ± 0.18	Pass
CF-41, 42	1/2/2007	Gr. Beta	18.02 ± 0.41	18.81 ± 0.42	18.42 ± 0.29	Pass
CF-41, 42	1/2/2007	K-40	11.68 ± 1.12	12.67 ± 0.97	12.18 ± 0.74	Pass
CF-41, 42	1/2/2007	Sr-90	0.039 ± 0.011	0.026 ± 0.010	0.033 ± 0.007	Pass
P-9516, 9517	1/3/2007	H-3	270.78 ± 91.74	301.18 ± 92.99	285.98 ± 65.31	Pass
LW-9579, 9580	1/4/2007	Gr. Beta	0.91 ± 0.31	0.93 ± 0.30	0.92 ± 0.22	Pass
DW-70085, 70086	1/9/2007	Gr. Alpha	7.95 ± 1.20	7.92 ± 1.42	7.94 ± 0.93	Pass
DW-70037, 70038	1/11/2007	Gr. Alpha	55.47 ± 3.99	52.87 ± 4.02	54.17 ± 2.83	Pass
DW-70054, 70055	1/18/2007	Gr. Alpha	2.68 ± 0.88	1.88 ± 0.78	2.28 ± 0.59	Pass
DW-70122, 70123	1/18/2007	Gr. Alpha	4.30 ± 1.14	6.25 ± 1.16	5.28 ± 0.81	Pass
DW-70122, 70123	1/18/2007	Gr. Beta	4.22 ± 0.70	5.33 ± 0.75	4.78 ± 0.51	Pass
DW-70098, 70099	1/25/2007	Gr. Alpha	3.27 ± 0.90	1.97 ± 0.92	2.62 ± 0.64	Pass
DW-70110, 70111	1/25/2007	Gr. Alpha	2.19 ± 0.92	1.69 ± 0.79	1.94 ± 0.61	Pass
SWU-676, 677	1/30/2007	Gr. Beta	1.77 ± 0.39	2.11 ± 0.39	1.94 ± 0.28	Pass
DW-70148, 70149	1/30/2007	Gr. Alpha	4.65 ± 1.37	5.20 ± 1.81	4.93 ± 1.14	Pass
SW-600, 601	2/1/2007	K-40	1.24 ± 0.12	1.20 ± 0.12	1.22 ± 0.08	Pass
SW-601, 602	2/1/2007	Gr. Beta	0.89 ± 0.37	1.02 ± 0.25	0.96 ± 0.22	Pass
DW-1138, 1139	2/9/2007	H-3	2707.00 ± 161.00	2700.00 ± 161.00	2703.50 ± 113.84	Pass
MI-721, 722	2/13/2007	K-40	1330.40 ± 117.60	1316.40 ± 116.50	1323.40 ± 82.77	Pass
SW-847, 848	2/13/2007	Gr. Alpha	3.82 ± 1.67	2.61 ± 1.24	3.22 ± 1.04	Pass
SW-847, 848	2/13/2007	Gr. Beta	7.33 ± 1.37	5.89 ± 0.90	6.61 ± 0.82	Pass
DW-70175, 70176	2/14/2007	Gr. Alpha	11.72 ± 1.68	8.84 ± 1.32	10.28 ± 1.07	Pass
DW-70187, 70188	2/14/2007	Gr. Alpha	6.79 ± 1.18	6.47 ± 1.08	6.63 ± 0.80	Pass
SWU-1162, 1163	2/27/2007	Gr. Beta	3.63 ± 0.69	2.61 ± 0.44	3.12 ± 0.41	Pass
DW-70205, 70206	2/28/2007	Gr. Alpha	0.88 ± 0.80	1.31 ± 0.79	1.10 ± 0.56	Pass
PW-1117, 1118	3/1/2007	Gr. Alpha	3.79 ± 1.91	3.62 ± 2.09	3.71 ± 1.42	Pass
PW-1117, 1118	3/1/2007	Gr. Beta	7.12 ± 1.40	7.20 ± 1.39	7.16 ± 0.99	Pass
W-2122, 2123	3/5/2007	Gr. Alpha	6.10 ± 4.16	3.80 ± 4.30	4.95 ± 2.99	Pass
W-2122, 2123	3/5/2007	Gr. Beta	10.65 ± 2.15	13.11 ± 2.42	11.88 ± 1.62	Pass
W-2085, 2086	3/6/2007	Gr. Alpha	2.51 ± 2.29	1.10 ± 2.78	1.81 ± 1.80	Pass
W-2085, 2086	3/6/2007	Gr. Beta	11.02 ± 1.85	9.50 ± 2.01	10.26 ± 1.37	Pass
DW-70232, 70233	3/8/2007	Gr. Alpha	4.75 ± 1.28	5.98 ± 1.31	5.37 ± 0.92	Pass
WW-1477, 1478	3/12/2007	Gr. Beta	6.41 ± 1.48	4.10 ± 1.25	5.26 ± 0.97	Pass
WW-1498, 1499	3/15/2007	Gr. Beta	0.83 ± 0.31	0.97 ± 0.33	0.90 ± 0.22	Pass
W-2140, 2141	3/19/2007	Gr. Alpha	2.31 ± 1.57	1.33 ± 1.64	1.82 ± 1.14	Pass
W-2140, 2141	3/19/2007	Gr. Beta	4.26 ± 1.00	5.58 ± 1.02	4.92 ± 0.71	Pass
DW-1626, 1627	3/21/2007	H-3	4973.00 ± 209.00	5190.00 ± 213.00	5081.50 ± 149.21	Pass
MI-1647, 1648	3/21/2007	K-40	1448.80 ± 120.20	1439.30 ± 126.00	1444.05 ± 87.07	Pass
DW-70248, 70249	3/21/2007	Gr. Alpha	11.10 ± 1.18	9.90 ± 1.16	10.50 ± 0.83	Pass
W-2150, 2151	3/26/2007	Gr. Alpha	3.56 ± 2.20	3.30 ± 1.81	3.43 ± 1.42	Pass
W-2150, 2151	3/26/2007	Gr. Beta	9.26 ± 1.00	10.17 ± 1.90	9.72 ± 1.07	Pass
LW-1941, 1942	3/31/2007	Gr. Beta	1.35 ± 0.43	1.36 ± 0.41	1.36 ± 0.30	Pass

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

Lab Code	Date	Analysis	Concentration (pCi/L)[a] First Result	Second Result	Averaged Result	Acceptance
MI-1824, 1825	4/2/2007	K-40	1316.10 ± 110.60	1229.80 ± 110.50	1272.95 ± 78.17	Pass
MI-1824, 1825	4/2/2007	Sr-90	1.20 ± 0.50	1.10 ± 0.36	1.15 ± 0.31	Pass
AP-2170, 2171	4/2/2007	Be-7	0.08 ± 0.01	0.08 ± 0.01	0.08 ± 0.01	Pass
WW-1850, 1851	4/3/2007	H-3	-5.83 ± 102.29	150.05 ± 80.14	72.11 ± 64.97	Pass
AP-2198, 2199	4/3/2007	Be-7	0.08 ± 0.01	0.08 ± 0.01	0.08 ± 0.01	Pass
AP-2370, 2371	4/3/2007	Be-7	0.07 ± 0.01	0.07 ± 0.01	0.07 ± 0.01	Pass
DW-70300, 70301	4/4/2007	Gr. Alpha	3.78 ± 0.89	3.66 ± 0.96	3.72 ± 0.65	Pass
DW-70300, 70301	4/4/2007	Gr. Beta	2.93 ± 0.61	2.91 ± 0.64	2.92 ± 0.44	Pass
DW-70335, 70336	4/5/2007	Gr. Alpha	24.37 ± 2.89	22.72 ± 2.91	23.55 ± 2.05	Pass
DW-70335, 70336	4/5/2007	Gr. Beta	20.26 ± 1.37	18.33 ± 1.34	19.30 ± 0.96	Pass
SW-1898, 1899	4/10/2007	Gr. Alpha	3.86 ± 1.40	4.78 ± 1.51	4.32 ± 1.03	Pass
SW-1898, 1899	4/10/2007	Gr. Beta	6.31 ± 1.36	7.03 ± 1.42	6.67 ± 0.98	Pass
SW-1898, 1899	4/10/2007	H-3	241.99 ± 93.35	318.10 ± 96.48	280.04 ± 67.12	Pass
DW-70346, 70347	4/11/2007	Gr. Alpha	1.83 ± 1.08	2.54 ± 1.04	2.19 ± 0.75	Pass
DW-70346, 70347	4/11/2007	Gr. Beta	4.62 ± 0.72	4.01 ± 0.71	4.32 ± 0.51	Pass
DW-70376, 70377	4/11/2007	Gr. Alpha	1.81 ± 0.80	1.66 ± 0.86	1.74 ± 0.59	Pass
DW-70376, 70377	4/11/2007	Gr. Beta	1.84 ± 0.62	2.24 ± 0.61	2.04 ± 0.44	Pass
DW-70311, 70312	4/12/2007	Gr. Alpha	10.82 ± 1.50	13.20 ± 1.56	12.01 ± 1.08	Pass
WW-2349, 2350	4/17/2007	Gr. Alpha	0.71 ± 0.56	0.62 ± 0.52	0.66 ± 0.38	Pass
WW-2461, 2462	4/25/2007	H-3	190.30 ± 100.31	115.95 ± 97.65	153.13 ± 70.00	Pass
LW-2437, 2438	4/26/2007	Gr. Beta	2.71 ± 0.50	2.15 ± 0.45	2.43 ± 0.34	Pass
LW-2917, 2918	4/30/2007	Gr. Beta	1.97 ± 0.79	2.78 ± 0.81	2.38 ± 0.57	Pass
SO-2583, 2584	5/1/2007	Be-7	544.99 ± 247.70	601.13 ± 192.20	573.06 ± 156.76	Pass
SO-2583, 2584	5/1/2007	Cs-137	119.22 ± 36.61	87.46 ± 23.97	103.34 ± 21.88	Pass
SO-2583, 2584	5/1/2007	K-40	17825.00 ± 749.90	17672.00 ± 724.30	17748.50 ± 521.29	Pass
SO-2583, 2584	5/1/2007	Gr. Alpha	11.49 ± 3.96	8.04 ± 3.88	9.77 ± 2.77	Pass
SO-2583, 2584	5/1/2007	Gr. Beta	31.02 ± 3.74	26.10 ± 3.40	28.56 ± 2.53	Pass
SO-2583, 2584	5/1/2007	Sr-90	0.086 ± 0.024	0.068 ± 0.025	0.077 ± 0.017	Pass
S-2620, 2621	5/2/2007	H-3	277.90 ± 126.70	304.40 ± 101.00	291.15 ± 81.02	Pass
MI-2610, 2611	5/3/2007	K-40	1549.20 ± 184.20	1388.80 ± 128.20	1469.00 ± 112.21	Pass
W-4469, 4470	5/7/2007	Gr. Beta	10.60 ± 1.90	11.10 ± 1.80	10.85 ± 1.31	Pass
SS-2697, 2698	5/8/2007	Cs-137	0.06 ± 0.02	0.05 ± 0.03	0.05 ± 0.02	Pass
SS-2697, 2698	5/8/2007	K-40	8.03 ± 0.57	7.36 ± 0.68	7.70 ± 0.44	Pass
MI-2790, 2791	5/14/2007	K-40	1694.30 ± 126.20	1627.60 ± 128.80	1660.95 ± 90.16	Pass
W-4505, 4506	5/14/2007	Gr. Beta	3.30 ± 1.70	3.90 ± 1.50	3.60 ± 1.13	Pass
DW-3219, 3220	5/26/2007	I-131	0.62 ± 0.32	0.69 ± 0.31	0.66 ± 0.22	Pass
SO-3416, 3417	5/31/2007	Cs-137	0.15 ± 0.03	0.15 ± 0.03	0.15 ± 0.02	Pass
SO-3416, 3417	5/31/2007	Gr. Beta	22.88 ± 2.33	22.46 ± 2.37	22.67 ± 1.66	Pass
SO-3416, 3417	5/31/2007	K-40	12.26 ± 0.80	12.36 ± 0.65	12.31 ± 0.52	Pass
F-3561, 3562	5/31/2007	K-40	3.06 ± 0.39	3.37 ± 0.45	3.21 ± 0.30	Pass
SL-3311, 3312	6/4/2007	Be-7	0.61 ± 0.29	0.55 ± 0.25	0.58 ± 0.19	Pass
SL-3311, 3312	6/4/2007	K-40	5.78 ± 0.67	4.87 ± 0.25	5.33 ± 0.36	Pass

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

Lab Code	Date	Analysis	Concentration (pCi/L)[a] First Result	Second Result	Averaged Result	Acceptance
SL-3992, 3993	6/4/2007	Be-7	0.75 ± 0.19	0.74 ± 0.32	0.75 ± 0.19	Pass
SL-3992, 3993	6/4/2007	Gr. Beta	13.61 ± 1.12	14.06 ± 1.08	13.84 ± 0.78	Pass
SL-3992, 3993	6/4/2007	K-40	2.43 ± 0.36	2.29 ± 0.40	2.36 ± 0.27	Pass
W-5087, 5088	6/11/2007	Gr. Beta	8.70 ± 1.90	7.70 ± 1.90	8.20 ± 1.34	Pass
SW-3710, 3711	6/14/2007	H-3	9571.51 ± 287.22	9879.21 ± 291.42	9725.36 ± 204.59	Pass
W-4062, 4063	6/28/2007	Gr. Alpha	0.76 ± 0.63	0.32 ± 0.66	0.54 ± 0.45	Pass
W-4062, 4063	6/28/2007	Gr. Beta	0.97 ± 0.53	0.58 ± 0.57	0.78 ± 0.39	Pass
AP-4448, 4449	6/28/2007	Be-7	0.10 ± 0.02	0.09 ± 0.02	0.10 ± 0.01	Pass
SG-3735, 3736	6/30/2007	Be-7	0.84 ± 0.12	0.82 ± 0.18	0.83 ± 0.11	Pass
SG-3735, 3736	6/30/2007	Cs-137	0.07 ± 0.01	0.07 ± 0.01	0.07 ± 0.01	Pass
SG-3735, 3736	6/30/2007	Gr. Beta	29.51 ± 2.22	30.81 ± 2.22	30.16 ± 1.57	Pass
SG-3735, 3736	6/30/2007	K-40	9.41 ± 0.31	8.90 ± 0.48	9.16 ± 0.29	Pass
LW-4175, 4176	6/30/2007	Gr. Beta	2.18 ± 0.60	1.93 ± 0.68	2.06 ± 0.45	Pass
SG-5422, 5423	7/2/2007	Gr. Alpha	10.31 ± 1.98	10.57 ± 1.99	10.44 ± 1.40	Pass
SG-5422, 5423	7/2/2007	Gr. Beta	18.59 ± 1.46	20.97 ± 1.49	19.78 ± 1.04	Pass
AP-4656, 4657	7/3/2007	Be-7	0.09 ± 0.02	0.10 ± 0.02	0.10 ± 0.01	Pass
AP-4763, 4764	7/3/2007	Be-7	0.11 ± 0.02	0.10 ± 0.02	0.11 ± 0.01	Pass
SG-5430, 5431	7/11/2007	Be-7	10.17 ± 0.48	10.06 ± 0.51	10.12 ± 0.35	Pass
SG-5430, 5431	7/11/2007	Cs-137	0.050 ± 0.010	0.059 ± 0.011	0.055 ± 0.007	Pass
SG-5430, 5431	7/11/2007	Gr. Alpha	17.86 ± 2.78	15.74 ± 2.70	16.80 ± 1.94	Pass
SG-5430, 5431	7/11/2007	Gr. Beta	26.19 ± 1.74	25.04 ± 1.86	25.62 ± 1.27	Pass
SG-5430, 5431	7/11/2007	K-40	7.69 ± 0.30	7.65 ± 0.28	7.67 ± 0.21	Pass
WW-4298, 4299	7/12/2007	Gr. Beta	1.74 ± 0.74	2.22 ± 0.80	1.98 ± 0.55	Pass
DW-70612, 70613	7/23/2007	Gr. Alpha	4.54 ± 1.11	4.19 ± 0.97	4.37 ± 0.74	Pass
WW-4918, 4919	7/25/2007	H-3	240.43 ± 111.12	216.68 ± 110.27	228.56 ± 78.27	Pass
MI-4742, 4743	7/26/2007	K-40	1820.30 ± 134.10	1802.90 ± 199.50	1811.60 ± 120.19	Pass
VE-4939, 4940	8/1/2007	Be-7	0.39 ± 0.21	0.45 ± 0.20	0.42 ± 0.15	Pass
VE-4939, 4940	8/1/2007	Gr. Beta	5.50 ± 0.14	5.76 ± 0.13	5.63 ± 0.10	Pass
VE-4939, 4940	8/1/2007	K-40	3.36 ± 0.45	3.36 ± 0.21	3.36 ± 0.25	Pass
SG-6274, 6275	8/6/2007	Gr. Alpha	16.68 ± 3.29	19.26 ± 3.39	17.97 ± 2.36	Pass
SG-6274, 6275	8/6/2007	Gr. Beta	40.93 ± 2.74	42.42 ± 2.66	41.68 ± 1.91	Pass
SW-5218, 5219	8/7/2007	I-131	1.31 ± 0.24	1.42 ± 0.24	1.37 ± 0.17	Pass
SG-6284, 6285	8/8/2007	Cs-137	0.043 ± 0.006	0.051 ± 0.007	0.047 ± 0.005	Pass
SG-6284, 6285	8/8/2007	Gr. Alpha	9.38 ± 2.93	13.61 ± 3.38	11.50 ± 2.24	Pass
SG-6284, 6285	8/8/2007	Gr. Beta	33.46 ± 2.84	32.87 ± 2.93	33.17 ± 2.04	Pass
SG-6284, 6285	8/8/2007	K-40	16.15 ± 0.24	16.23 ± 0.25	16.19 ± 0.17	Pass
WW-5310, 5311	8/9/2007	H-3	644.00 ± 106.00	831.00 ± 113.00	737.50 ± 77.47	Pass
SW-5393, 5394	8/14/2007	Gr. Beta	2.32 ± 1.31	1.71 ± 1.27	2.02 ± 0.92	Pass
SW-5393, 5394	8/14/2007	H-3	190.06 ± 86.80	69.05 ± 80.88	129.55 ± 59.32	Pass
W-5468, 5469	8/15/2007	H-3	262.58 ± 108.43	346.53 ± 111.42	304.55 ± 77.74	Pass

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

Lab Code	Date	Analysis	Concentration (pCi/L)[a] First Result	Second Result	Averaged Result	Acceptance
VE-5553, 5554	8/22/2007	K-40	1.89 ± 0.33	1.89 ± 0.22	1.89 ± 0.20	Pass
WW-5643, 5644	8/22/2007	H-3	259.00 ± 110.00	266.00 ± 110.00	262.50 ± 77.78	Pass
SWU-5799, 5800	8/28/2007	Gr. Beta	2.64 ± 1.18	3.62 ± 1.06	3.13 ± 0.79	Pass
DW-70752, 70753	8/31/2007	Gr. Alpha	14.41 ± 1.48	12.90 ± 1.50	13.66 ± 1.05	Pass
VE-5917, 5918	9/4/2007	Be-7	0.94 ± 0.17	0.83 ± 0.20	0.89 ± 0.13	Pass
VE-5917, 5918	9/4/2007	K-40	3.73 ± 0.37	3.58 ± 0.36	3.66 ± 0.26	Pass
VE-5917, 5918	9/4/2007	Gr. Beta	2.71 ± 0.10	2.69 ± 0.10	2.70 ± 0.07	Pass
MI-6009, 6010	9/11/2007	K-40	1348.90 ± 113.40	1388.10 ± 116.40	1368.50 ± 81.25	Pass
MI-6030, 6031	9/12/2007	K-40	1242.70 ± 118.00	1475.60 ± 119.60	1359.15 ± 84.01	Pass
MI-6030, 6031	9/12/2007	Sr-90	1.00 ± 0.38	0.90 ± 0.34	0.95 ± 0.26	Pass
DW-70718, 70719	9/12/2007	Gr. Alpha	23.04 ± 3.71	23.22 ± 3.61	23.13 ± 2.59	Pass
DW-70718, 70719	9/12/2007	Gr. Beta	16.13 ± 1.59	17.36 ± 1.69	16.75 ± 1.16	Pass
SO-6156, 6157	9/14/2007	H-3	181.99 ± 90.67	232.19 ± 92.95	207.09 ± 64.92	Pass
SO-6484, 6485	9/17/2007	Cs-137	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.00	Pass
SO-6484, 6485	9/17/2007	Gr. Beta	24.20 ± 2.60	23.30 ± 2.30	23.75 ± 1.74	Pass
SO-6484, 6485	9/17/2007	K-40	11.52 ± 1.16	10.89 ± 1.10	11.20 ± 0.80	Pass
WW-6469, 6470	9/21/2007	Gr. Beta	27.19 ± 2.51	24.23 ± 2.29	25.71 ± 1.70	Pass
E-6647, 6648	10/1/2007	Gr. Beta	1.82 ± 0.10	1.93 ± 0.11	1.88 ± 0.07	Pass
E-6647, 6648	10/1/2007	K-40	1.48 ± 0.24	1.31 ± 0.23	1.40 ± 0.17	Pass
WW-6656, 6657	10/1/2007	Gr. Beta	2.80 ± 0.97	1.95 ± 0.87	2.38 ± 0.65	Pass
TD-7080, 7081	10/2/2007	H-3	332.00 ± 229.00	383.00 ± 191.00	357.50 ± 149.10	Pass
SG-6891, 6892	10/3/2007	Gr. Alpha	12.93 ± 2.12	13.52 ± 2.07	13.23 ± 1.48	Pass
SG-6891, 6892	10/3/2007	Gr. Beta	18.08 ± 1.41	18.27 ± 1.36	18.18 ± 0.98	Pass
AP-7191, 7192	10/3/2007	Be-7	0.09 ± 0.01	0.09 ± 0.01	0.09 ± 0.01	Pass
WW-6786, 6787	10/8/2007	H-3	13333 ± 322	13532 ± 324	13433 ± 228	Pass
WW-6786, 6787	10/8/2007	H-3	13188 ± 322	13556 ± 326	13372 ± 229	Pass
VE-6828, 6829	10/8/2007	Gr. Alpha	0.06 ± 0.04	0.06 ± 0.05	0.06 ± 0.03	Pass
VE-6828, 6829	10/8/2007	Gr. Beta	5.55 ± 0.21	5.20 ± 0.22	5.38 ± 0.10	Pass
VE-6828, 6829	10/8/2007	K-40	5.45 ± 0.43	5.20 ± 0.49	5.32 ± 0.33	Pass
SS-6870, 6871	10/9/2007	Gr. Beta	18.10 ± 2.08	21.71 ± 2.19	19.90 ± 1.51	Pass
SS-6870, 6871	10/9/2007	K-40	10.19 ± 0.66	9.72 ± 0.68	9.95 ± 0.47	Pass
LW-7507, 7508	10/11/2007	Gr. Beta	1.40 ± 0.56	1.44 ± 0.54	1.42 ± 0.39	Pass
MI-6933, 6934	10/16/2007	K-40	1386.60 ± 104.70	1331.20 ± 106.70	1358.90 ± 74.74	Pass
MI-6933, 6934	10/16/2007	Sr-90	1.73 ± 0.52	2.17 ± 0.57	1.95 ± 0.39	Pass
MI-7059, 7060	10/17/2007	K-40	1424.80 ± 106.60	1448.60 ± 115.30	1436.70 ± 78.51	Pass
F-7213, 7214	10/24/2007	H-3	6.83 ± 0.22	7.24 ± 0.22	7.03 ± 0.16	Pass
F-7213, 7214	10/24/2007	K-40	3.13 ± 0.51	3.16 ± 0.48	3.15 ± 0.35	Pass
WW-7408, 7409	10/24/2007	H-3	340.71 ± 90.45	346.22 ± 90.67	343.46 ± 64.03	Pass
DW-70856, 70857	10/24/2007	Gr. Alpha	11.03 ± 1.66	10.71 ± 1.34	10.87 ± 1.07	Pass
SO-7508, 7509	10/26/2007	Cs-137	0.30 ± 0.04	0.29 ± 0.05	0.29 ± 0.03	Pass
SO-7508, 7509	10/26/2007	Gr. Beta	34.43 ± 2.72	37.25 ± 3.07	35.84 ± 2.05	Pass
SO-7508, 7509	10/26/2007	K-40	16.84 ± 0.84	17.43 ± 1.05	17.14 ± 0.67	Pass

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

Lab Code	Date	Analysis	Concentration (pCi/L)[a] First Result	Second Result	Averaged Result	Acceptance
SS-7529, 7530	10/29/2007	Cs-137	0.12 ± 0.03	0.12 ± 0.02	0.12 ± 0.02	Pass
SS-7529, 7530	10/29/2007	K-40	11.85 ± 0.68	11.75 ± 0.58	11.80 ± 0.45	Pass
SW-7589, 7590	10/30/2007	Gr. Beta	1.75 ± 0.29	1.24 ± 0.26	1.50 ± 0.19	Pass
SWU-7733, 7734	10/30/2007	Gr. Beta	1.66 ± 1.01	2.43 ± 1.13	2.05 ± 0.76	Pass
MI-7618, 7619	10/31/2007	K-40	1376.80 ± 114.30	1426.70 ± 128.80	1401.75 ± 86.10	Pass
VE-7666, 7667	11/5/2007	Gr. Alpha	0.07 ± 0.04	0.16 ± 0.05	0.11 ± 0.03	Pass
VE-7666, 7667	11/5/2007	Gr. Beta	6.03 ± 0.15	6.13 ± 0.15	6.08 ± 0.10	Pass
VE-7666, 7667	11/5/2007	K-40	5.82 ± 0.36	5.74 ± 0.36	5.78 ± 0.25	Pass
DW-7853, 7854	11/9/2007	I-131	1.61 ± 0.40	1.08 ± 0.39	1.35 ± 0.28	Pass
MI-7874, 7875	11/14/2007	K-40	1407.70 ± 101.30	1362.60 ± 114.50	1385.15 ± 76.44	Pass
WW-8142, 8143	11/28/2007	Gr. Beta	9.51 ± 2.21	7.86 ± 2.01	8.68 ± 1.49	Pass
DW-8094, 8095	11/29/2007	Gr. Beta	1.60 ± 0.58	1.25 ± 0.54	1.43 ± 0.40	Pass
F-8328, 8329	12/11/2007	Gr. Beta	3.97 ± 0.08	4.00 ± 0.08	3.99 ± 0.05	Pass
WW-8378, 8379	12/11/2007	H-3	296.00 ± 103.00	407.00 ± 107.00	351.50 ± 74.26	Pass

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

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

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

		Concentration [b]				
Lab Code[c]	Date	Analysis	Laboratory result	Known Activity	Control Limits [d]	Acceptance
STW-1110	01/01/07	Gr. Alpha	0.45 ± 0.08	0.33	0.00 - 0.65	Pass
STW-1110	01/01/07	Gr. Beta	0.90 ± 0.14	0.85	0.43 - 1.28	Pass
STW-1111 [e]	01/01/07	Am-241	2.80 ± 0.21	1.71	1.20 - 2.22	Fail
STW-1111	01/01/07	Co-57	151.60 ± 10.00	143.70	100.60 - 186.80	Pass
STW-1111	01/01/07	Cs-134	79.20 ± 8.00	83.50	58.50 - 108.60	Pass
STW-1111	01/01/07	Cs-137	168.70 ± 12.10	163.00	114.10 - 211.90	Pass
STW-1111	01/01/07	Fe-55	130.30 ± 19.90	129.30	90.50 - 168.10	Pass
STW-1111	01/01/07	H-3	262.20 ± 9.10	283.00	198.10 - 367.90	Pass
STW-1111	01/01/07	Mn-54	130.60 ± 11.50	123.80	86.70 - 160.90	Pass
STW-1111	01/01/07	Ni-63	127.80 ± 3.60	130.40	91.30 - 169.50	Pass
STW-1111	01/01/07	Ni-63	127.80 ± 3.60	130.40	91.30 - 169.50	Pass
STW-1111	01/01/07	Pu-238	2.03 ± 0.17	2.25	1.58 - 2.93	Pass
STW-1111	01/01/07	Pu-239/40	2.27 ± 0.17	2.22	1.55 - 2.89	Pass
STW-1111	01/01/07	Sr-90	9.60 ± 1.40	8.87	6.21 - 11.53	Pass
STW-1111	01/01/07	Tc-99	8.80 ± 1.50	88.00	7.40 - 13.70	Pass
STW-1111	01/01/07	U-233/4	2.44 ± 0.21	2.49	1.74 - 3.24	Pass
STW-1111	01/01/07	U-238	2.44 ± 0.21	2.48	1.74 - 3.22	Pass
STW-1111	01/01/07	Zn-65	123.70 ± 17.00	114.80	80.40 - 149.20	Pass
STSO-1112 [f]	01/01/07	Am-241	46.40 ± 9.00	34.80	24.40 - 45.20	Fail
STSO-1112	01/01/07	Co-57	501.20 ± 2.90	471.20	329.80 - 612.60	Pass
STSO-1112	01/01/07	Co-60	285.90 ± 2.10	274.70	192.30 - 357.10	Pass
STSO-1112	01/01/07	Cs-134	325.90 ± 7.40	327.40	229.20 - 425.60	Pass
STSO-1112	01/01/07	Cs-137	855.70 ± 4.60	799.70	559.80 - 1039.60	Pass
STSO-1112	01/01/07	Mn-54	750.90 ± 4.70	685.20	479.60 - 890.80	Pass
STAP-1113	01/01/07	Gr. Alpha	0.27 ± 0.04	0.60	0.00 - 1.20	Pass
STAP-1113	01/01/07	Gr. Beta	0.57 ± 0.05	0.44	0.22 - 0.66	Pass
STAP-1114	01/01/07	Am-241	0.10 ± 0.03	0.10	0.07 - 0.13	Pass
STAP-1114	01/01/07	Co-57	3.51 ± 0.07	2.89	2.02 - 3.75	Pass
STAP-1114	01/01/07	Co-60	2.98 ± 0.10	2.91	2.03 - 3.78	Pass
STAP-1114	01/01/07	Cs-134	4.02 ± 0.16	4.20	2.94 - 5.45	Pass
STAP-1114	01/01/07	Cs-137	2.75 ± 0.12	2.57	1.80 - 3.34	Pass
STAP-1114	01/01/07	Mn-54	3.94 ± 0.12	3.52	2.46 - 4.57	Pass
STAP-1114	01/01/07	Pu-238	0.07 ± 0.01	0.07	0.05 - 0.09	Pass
STAP-1114	01/01/07	Pu-239/40	0.08 ± 0.01	0.08	0.06 - 0.11	Pass
STAP-1114	01/01/07	Sr-90	0.58 ± 0.18	0.61	0.43 - 0.79	Pass
STAP-1114	01/01/07	U-233/4	0.09 ± 0.01	0.10	0.07 - 0.13	Pass
STAP-1114	01/01/07	U-238	0.09 ± 0.01	0.10	0.07 - 0.13	Pass
STAP-1114	01/01/07	Zn-65	2.70 ± 0.10	2.68	1.88 - 3.49	Pass

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

		Concentration [b]				
Lab Code[c]	Date	Analysis	Laboratory result	Known Activity	Control Limits [d]	Acceptance
STVE-1115	01/01/07	Co-57	8.90 ± 0.20	8.19	5.73 - 10.64	Pass
STVE-1115	01/01/07	Co-60	6.50 ± 0.20	5.82	4.08 - 7.57	Pass
STVE-1115	01/01/07	Cs-134	6.90 ± 0.30	6.21	4.35 - 8.07	Pass
STVE-1115	01/01/07	Cs-137	8.20 ± 0.30	6.99	4.90 - 9.09	Pass
STVE-1115	01/01/07	Mn-54	10.10 ± 0.30	8.46	5.91 - 10.98	Pass

[a] 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

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

[c] Laboratory codes as follows: STW (water), STAP (air filter), STSO (soil), STVE (vegetation).

[d] MAPEP results are presented as the known values and expected laboratory precision (1 sigma, 1 determination) and control limits as defined by the MAPEP.

[e] Result of reanalysis, 2.08 ± 0.13 pCi/L.

[f] The test samples were recounted on lower background detectors. Result of the recounts: 41.4 ± 6.3 Bq/kg.

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

Lab Code [b]	Date	Analysis	Concentration (pCi/L) Laboratory Result [c]	ERA Result [d]	Control Limits	Acceptance
STAP-1116	03/19/07	Gr. Alpha	34.64 ± 2.56	25.8	12.4 - 39	Pass
STAP-1116	03/19/07	Gr. Beta	93.41 ± 3.20	79.5	48.8 - 116	Pass
STAP-1117	03/19/07	Am-241	56.04 ± 3.90	57.5	33.1 - 80	Pass
STAP-1117	03/19/07	Co-60	1610.00 ± 8.40	1300.0	1010.0 - 1620	Pass
STAP-1117	03/19/07	Cs-134	1340.40 ± 48.84	1120.0	732.0 - 1380	Pass
STAP-1117 [e]	03/19/07	Cs-137	345.30 ± 8.20	255.0	192.0 - 336	Fail
STAP-1117 [f]	03/19/07	Fe-55	< 134.0	0.0		Pass
STAP-1117 [f]	03/19/07	Mn-54	< 5.0	0.0		Pass
STAP-1117	03/19/07	Pu-238	43.32 ± 2.28	37.4	25.7 - 49	Pass
STAP-1117	03/19/07	Pu-239/40	35.23 ± 2.24	31.6	22.9 - 41	Pass
STAP-1117	03/19/07	Sr-90	156.10 ± 6.60	156.0	66.6 - 246	Pass
STAP-1117	03/19/07	U-233/4	42.22 ± 1.84	47.8	30.1 - 71	Pass
STAP-1117	03/19/07	U-238	42.00 ± 1.84	47.4	30.2 - 68	Pass
STAP-1117	03/19/07	Uranium	85.79 ± 3.60	97.3	49.5 - 155	Pass
STAP-1117	03/19/07	Zn-65	363.80 ± 11.90	245.0	208.0 - 412	Pass
STSO-1118	03/19/07	Ac-228	3097.77 ± 94.96	2790.0	1790.0 - 3930	Pass
STSO-1118	03/19/07	Am-241	1000.70 ± 156.10	927.0	548.0 - 1200	Pass
STSO-1118	03/19/07	Bi-212	2467.87 ± 114.33	2500.0	658.0 - 3730	Pass
STSO-1118	03/19/07	Co-60	7847.40 ± 86.60	7330.0	5340.0 - 9820	Pass
STSO-1118	03/19/07	Cs-134	7910.60 ± 356.88	7560.0	4850.0 - 9070	Pass
STSO-1118	03/19/07	Cs-137	4635.00 ± 99.10	4300.0	3290.0 - 5580	Pass
STSO-1118	03/19/07	K-40	12201.60 ± 423.20	11100.0	8050.0 - 15000	Pass
STSO-1118 [f]	03/19/07	Mn-54	< 34.0	0.0		Pass
STSO-1118	03/19/07	Pb-212	2046.80 ± 127.20	1730.0	1120.0 - 2430	Pass
STSO-1118	03/19/07	Pb-214	4142.80 ± 110.40	3330.0	1980.0 - 4980	Pass
STSO-1118	03/19/07	Pu-238	1099.20 ± 73.10	857.0	490.0 - 1200	Pass
STSO-1118	03/19/07	Pu-239/40	1586.10 ± 82.00	1360.0	928.0 - 1810	Pass
STSO-1118	03/19/07	Sr-90	6163.30 ± 791.60	7500.0	2610.0 - 12400	Pass
STSO-1118	03/19/07	Th-234	4329.40 ± 569.10	3590.0	2190.0 - 4560	Pass
STSO-1118	03/19/07	U-233/4	3236.70 ± 106.00	3620.0	2280.0 - 4520	Pass
STSO-1118	03/19/07	U-238	3425.20 ± 134.00	3590.0	2190.0 - 4560	Pass
STSO-1118	03/19/07	Uranium	6787.80 ± 240.00	7380.0	4210.0 - 9930	Pass
STSO-1118	03/19/07	Uranium	6787.80 ± 240.00	7380.0	4210.0 - 9930	Pass
STSO-1118 [f]	03/19/07	Zn-65	0.00 ± 0.00	0.0	0.0 - 0	Pass

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

Lab Code [b]	Date	Analysis	Concentration (pCi/L) Laboratory Result [c]	ERA Result [d]	Control Limits	Acceptance
STVE-1119	03/19/07	Am-241	3249.60 ± 150.30	3550.0	2020.0 - 4890	Pass
STVE-1119	03/19/07	Cm-244	1860.70 ± 91.50	1840.0	905.0 - 2870	Pass
STVE-1119	03/19/07	Co-60	2827.90 ± 62.40	2600.0	1760.0 - 3720	Pass
STVE-1119	03/19/07	Cs-134	654.80 ± 48.40	579.0	308.0 - 822	Pass
STVE-1119	03/19/07	Cs-137	3307.30 ± 58.80	2920.0	2150.0 - 4060	Pass
STVE-1119	03/19/07	K-40	40814.20 ± 618.80	37900.0	27200.0 - 53600	Pass
STVE-1119 [f]	03/19/07	Mn-54	< 27.6	0.0		Pass
STVE-1119	03/19/07	Pu-238	2762.00 ± 251.10	2430.0	1250.0 - 3600	Pass
STVE-1119	03/19/07	Pu-239/40	2156.60 ± 83.40	1900.0	1180.0 - 2600	Pass
STVE-1119	03/19/07	Sr-90	8999.70 ± 580.90	8890.0	4900.0 - 11800	Pass
STVE-1119	03/19/07	U-233/4	2821.90 ± 73.50	2940.0	1930.0 - 3920	Pass
STVE-1119	03/19/07	U-238	2896.10 ± 50.70	2910.0	2090.0 - 3610	Pass
STVE-1119	03/19/07	Uranium	5718.00 ± 124.15	5980.0	4110.0 - 7770	Pass
STVE-1119	03/19/07	Zn-65	474.30 ± 45.70	366.0	267.0 - 500	Pass
STW-1120	03/19/07	Am-241	133.50 ± 10.60	179.0	123.0 - 243	Pass
STW-1120	03/19/07	Co-60	541.40 ± 9.00	536.0	467.0 - 631	Pass
STW-1120	03/19/07	Cs-134	1623.80 ± 66.10	1750.0	1290.0 - 2020	Pass
STW-1120	03/19/07	Cs-137	1839.10 ± 17.90	1850.0	1570.0 - 2220	Pass
STW-1120	03/19/07	Fe-55	829.50 ± 226.80	671.0	392.0 - 896	Pass
STW-1120 [f]	03/19/07	Mn-54	< 8.1	0.0		Pass
STW-1120	03/19/07	Pu-238	123.30 ± 4.30	116.0	87.6 - 144	Pass
STW-1120	03/19/07	Pu-239/40	95.10 ± 3.80	90.9	70.3 - 113	Pass
STW-1120	03/19/07	Sr-90	949.40 ± 16.70	989.0	630.0 - 1320	Pass
STW-1120	03/19/07	U-233/4	164.20 ± 6.58	192.0	145.0 - 247	Pass
STW-1120	03/19/07	U-238	169.20 ± 8.22	190.0	145.0 - 236	Pass
STW-1120	03/19/07	Uranium	339.60 ± 10.66	391.0	282.0 - 521	Pass
STW-1120	03/19/07	Zn-65	2009.00 ± 36.40	1910.0	1600.0 - 2410	Pass

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

[b] Laboratory codes as follows: STW (water), STAP (air filter), STSO (soil), STVE (vegetation).

[c] Unless otherwise indicated, the laboratory result is given as the mean ± standard deviation for three determinations.

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

[e] A high bias (~ 20%) was observed in gamma results for air filters. A composite filter geometry was used in the calculations vs. a single filter geometry. Result of recalculation. Cs-137, 305.8 ± 6.0 pCi/filter.

[f] Included in the testing series as a "false positive". No activity expected.

APPENDIX B

DATA REPORTING CONVENTIONS

Data Reporting Conventions

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

2.0. Single Measurements

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

where: x = value of the measurement;

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

In cases where the activity is less than the lower limit of detection L, it is reported as: < L,

where L = the lower limit of detection based on 4.66σ uncertainty for a background sample.

3.0. Duplicate analyses

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

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

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

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

4.0. Computation of Averages and Standard Deviations

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

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

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

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

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

4.5 In rounding off, the following rules are followed:

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

4.5.2. If the number following those to be retained is equal to or greater than 5, the number is dropped and the last retained number is raised by 1. As an example, 11.445 is rounded off to 11.45.

APPENDIX C

Maximum Permissible Concentrations

of Radioactivity in Air and Water

Above Background in Unrestricted Areas

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

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

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

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

[c] A natural radionuclide.

APPENDIX D

SUMMARY OF THE LAND USE CENSUS

Appendix D

Summary of the Land Use Census

The Duane Arnold Energy Center (DAEC) Land Use Census for 2007 was completed during September and October of 2007. All milk animals, any new residences, and any gardens greater than 500 square feet were identified within a three miles radius for each of the 16 meteorological sectors radiating from the DAEC. If none were identified within the three mile range, additional surveys were performed out to a distance of five miles in that sector.

The Cedar River was surveyed by boat on July 10, 2007 for downstream water usage from the DAEC to the city of Cedar Rapids. This survey identified no new usages of river water from previous surveys. Irrigation of the strawberry farm in Palo and recreational fishing remain the only identified food pathway uses of Cedar River water between the DAEC and the City of Cedar Rapids eight miles down-river.

There were 166 vegetable gardens identified within the three mile radius of the DAEC during the 2007 Census; which is six fewer than 2006. In addition, there was a change to the nearest vegetable receptor from the DAEC in 2007. A new garden was planted at the Frantz Residence at 4318 Power Plant Road, which is in the SW sector from the DAEC at a distance of one mile. The previous closest garden was at a distance of 3 miles.

There was one change in the location of milk animals within the three mile radius of the plant in the past year. Several pygmy goats are located at a small farm two miles to the SSW at 2901 Palo Marsh Road. Milk from these goats is not used commercially.

The locations of the nearest residence for each sector remained the same as 2006. In 2007, 21 new homes were built or were under construction within the three mile radius of the DAEC, as compared to 16 new homes in 2006 and 45 new homes in 2005. All of these new houses built in 2007 are located to the SSW in the town of Palo.

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

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

- Per Objectives 2.2 and 2.4, there were no on-site leaks or spills that warranted notification of state or local officials or other local stakeholders.
- No radioactive reactor by-product material was identified in samples taken by the DAEC's Radiological Environmental Monitoring Program (REMP) above the threshold concentration levels for reporting.
- Both on-site and off-site ground water sampling/monitoring has been incorporated into the REMP. Consequently, all Ground Water Protection Program results are included as part of the Annual Radiological Environmental Operating Report. In addition, a summary of the supplementary precipitation samples that were taken are included in Appendix A to Part II of that report.

APPENDIX E

ANNUAL RADIATION DOSE ASSESSMENT

Appendix E

Annual Radiation Dose Assessment

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

Section A. Dose Contribution from Direct Radiation

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

1. Pre-operational and 2007 TLD results were evaluated with a paired difference statistical test. The evaluation concluded that there were no significant differences in the TLD populations for the 0.5 mile, 1 mile and 3 mile TLD populations.

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

Section B. Estimated Offsite Dose from Effluent Releases

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

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

- Results of the MIDAS dose calculations are displayed below.

  1.) The hypothetical maximally exposed organ due to liquid effluents was the liver of a child, with an estimated dose equivalent of 0.0000225 mrem.

  2.) The whole body dose equivalent to the hypothetical maximally exposed individual due to liquid effluents was 0.0000225 mrem.

  3.) The maximum dose to air at the site boundary from noble gases released was 0.00118 mrad from gamma radiation at 535 meters towards the South-South-West.

  4.) The maximum dose to air at the site boundary from noble gases released was 0.0951 mrad beta radiation at 535 meters towards the South-South-West.

  5.) The whole body dose equivalent to the hypothetical maximally exposed individual from noble gases was 0.00194 mrem, at 974 meters towards the South-West.

6.) The skin dose equivalent to the hypothetical maximally exposed individual from noble gases was 0.00199 mrem, at 974 meters towards the South-West.

7.) The hypothetical maximally exposed organ due to airborne iodines and particulates with half-lives greater than eight days was the skin of a child at 805 meters West, with an estimated dose equivalent of 0.010 mrem.

Conclusion:

No measurable dose due to the operation of the DAEC was detected by environmental TLDs in 2007. The calculated doses are below the regulatory limits stated in Appendix I to 10 CFR 50 and in 40 CFR 190.

Estimated Maximum Offsite Individual Doses for 2007

Type	Age Group	Distance (meters)	Direction	Dose or Dose Equivalent (mrem)	Annual 10 CFR 50, Appendix I Limit
Direct Radiation (as measured by TLDs)				None	*
Liquid Releases					
Whole Body Dose	Child		S	0.0000225 mrem	3 mrem
Organ Dose	Child - Liver		S	0.0000225 mrem	10 mrem
Noble Gas					
Gamma Air Dose		535	SSW	0.00118 mrad	10 mrad
Beta Air Dose		535	SSW	0.0951 mrad	20 mrad
Whole Body	All	974	SW	0.00194 mrem	5 mrem
Skin	All	974	SW	0.00199 mrem	15 mrem
Particulates & Iodines					
Organ Dose	Child - Skin	805	W	0.010 mrem	15 mrem

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

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

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM (REMP)

ANNUAL REPORT - PART II
DATA TABULATIONS AND ANALYSES

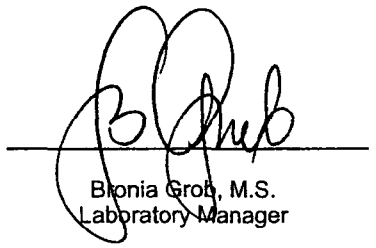
January 1 to December 31, 2007

Prepared by

ENVIRONMENTAL, Inc.
Midwest Laboratory

Project No. 8001

Reviewed and Approved



Bronia Groß, M.S.
Laboratory Manager

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In addition, the following tables are in the Appendices:

Appendix A

1.0 INTRODUCTION

The following constitutes a supplement to the Annual Report for the Radiological Environmental Monitoring Program conducted at the Duane Arnold Energy Center, Palo, Iowa in 2007. Results of completed analyses are presented in the attached tables.

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

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

The gamma isotopic analysis provides a spectrum with an energy range of 80 to 2048 keV. Specific isotopes included are Mn-54, Fe-59, Co-58, Co-60, Zn-65, Zr-95, Nb-95, Ru-103, Ru-106, I-131, Ba-La-140, Cs-134, Cs-137, Ce-141, and Ce-144. Naturally occurring gamma-emitters, such as K-40 and Ra daughters, are frequently detected but may not be listed.

2.0 LISTING OF MISSED SAMPLES

Sample Type	Analysis	Location(s)	Collection Date or Period	Comments
G	Gamma	D-58, D-72 D-94, D-96	2007	No forage or vegetation samples available.
P [a]	Gamma	D-16	2-22-07	Due to small sample volume, detection level requirements were not met.
BS[a]	Gamma	D-50, D-51 D-107a	5-14-07	Sediments were collected and analyzed, but the program frequency requirement could not be met, due to high water levels.
TLD	Ambient Gamma	D-10	3rd Qtr	TLD missing in field.
TLD	Ambient Gamma	D-28	3rd Qtr	TLD missing in field.
MI[a]	Gamma, I-131	D-109	12-14-07	No sample; herd sold.

[a] Constitutes a missed sample per the minimum requirements specified by the ODAM.

3.0 DATA TABLES

DUANE ARNOLD

Table 1. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131[a].
Location: D-3 (Hiawatha)
Units: pCi/m^3
Collection: Continuous, weekly exchange.

Date Collected	Volume (m^3)	Gross Beta	Date Collected	Volume (m^3)	Gross Beta
Required LLD		0.010	Required LLD		0.010
01-04-07	284	0.031 ± 0.004	07-05-07	289	0.026 ± 0.004
01-11-07	283	0.031 ± 0.004	07-12-07	286	0.038 ± 0.004
01-18-07	283	0.032 ± 0.004	07-19-07	290	0.024 ± 0.004
01-25-07	284	0.052 ± 0.005	07-26-07	290	0.027 ± 0.004
02-01-07	251 [b]	0.045 ± 0.005	08-02-07	286	0.033 ± 0.004
02-08-07	263 [b]	0.035 ± 0.005	08-09-07	290	0.029 ± 0.004
02-15-07	246 [c]	0.031 ± 0.005	08-16-07	289	0.044 ± 0.005
02-22-07	289	0.044 ± 0.005	08-23-07	290	0.024 ± 0.004
03-01-07	289	0.018 ± 0.003	08-30-07	278	0.034 ± 0.004
03-08-07	286	0.031 ± 0.004	09-06-07	279	0.038 ± 0.004
03-15-07	288	0.029 ± 0.004	09-13-07	282	0.018 ± 0.004
03-22-07	289	0.021 ± 0.004	09-20-07	279	0.032 ± 0.004
03-29-07	287	0.018 ± 0.004	09-27-07	279	0.032 ± 0.004
1st Quarter Mean ± s.d.		0.032 ± 0.010	3rd Quarter Mean ± s.d.		0.031 ± 0.007
04-05-07	288	0.019 ± 0.004	10-04-07	279	0.034 ± 0.004
04-12-07	289	0.022 ± 0.004	10-11-07	281	0.017 ± 0.003
04-19-07	288	0.029 ± 0.004	10-18-07	279	0.029 ± 0.004
04-26-07	288	0.020 ± 0.004	10-25-07	281	0.023 ± 0.004
05-03-07	287	0.022 ± 0.004	11-01-07	278	0.027 ± 0.004
05-10-07	289	0.026 ± 0.004	11-08-07	282	0.023 ± 0.004
05-17-07	291	0.018 ± 0.004	11-15-07	279	0.033 ± 0.004
05-24-07	287	0.030 ± 0.004	11-21-07	241	0.039 ± 0.005
05-31-07	286	0.024 ± 0.004	11-28-07	333	0.032 ± 0.004
06-07-07	286	0.016 ± 0.004	12-06-07	289	0.031 ± 0.004
06-14-07	288	0.025 ± 0.004	12-13-07	292	0.055 ± 0.005
06-21-07	288	0.032 ± 0.004	12-20-07	292	0.059 ± 0.005
06-28-07	289	0.025 ± 0.004	12-27-07	282	0.056 ± 0.005
			01-03-08	287	0.055 ± 0.005
2nd Quarter Mean ± s.d.		0.023 ± 0.005	4th Quarter Mean ± s.d.		0.037 ± 0.014
			Cumulative Average		0.031
			Previous Annual Average		0.030

[a] Iodine-131 concentrations are < 0.03 pCi/m^3 unless noted otherwise.
[b] Timer slow.
[c] Six day run-time.

Table 2. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131[a].
Location: D-5 (Palo)
Units: pCi/m^3
Collection: Continuous, weekly exchange.

Date Collected	Volume (m^3)	Gross Beta	Date Collected	Volume (m^3)	Gross Beta
Required LLD		0.010	Required LLD		0.010
01-04-07	284	0.031 ± 0.004	07-05-07	284	0.027 ± 0.004
01-11-07	285	0.028 ± 0.004	07-12-07	281	0.035 ± 0.004
01-18-07	285	0.031 ± 0.004	07-19-07	284	0.030 ± 0.004
01-25-07	284	0.051 ± 0.005	07-26-07	283	0.033 ± 0.004
02-01-07	286	0.033 ± 0.004	08-02-07	281	0.039 ± 0.004
02-08-07	286 [b]	0.033 ± 0.004	08-09-07	284	0.028 ± 0.004
02-15-07	245 [c]	0.028 ± 0.005	08-16-07	282	0.047 ± 0.005
02-22-07	292	0.040 ± 0.004	08-23-07	294	0.023 ± 0.004
03-01-07	258 [d]	0.008 ± 0.003	08-30-07	277	0.031 ± 0.004
03-08-07	290	0.028 ± 0.004	09-06-07	285	0.044 ± 0.004
03-15-07	292	0.031 ± 0.004	09-13-07	287	0.016 ± 0.003
03-22-07	291	0.023 ± 0.004	09-20-07	285	0.031 ± 0.004
03-29-07	289	0.021 ± 0.004	09-27-07	285	0.036 ± 0.004
1st Quarter Mean ± s.d.		0.030 ± 0.010	3rd Quarter Mean ± s.d.		0.032 ± 0.008
04-05-07	292	0.018 ± 0.004	10-04-07	285	0.033 ± 0.004
04-12-07	292	0.023 ± 0.004	10-11-07	285	0.015 ± 0.003
04-19-07	289	0.029 ± 0.004	10-18-07	286	0.025 ± 0.004
04-26-07	291	0.019 ± 0.003	10-25-07	285	0.025 ± 0.004
05-03-07	290	0.020 ± 0.004	11-01-07	285	0.025 ± 0.004
05-10-07	291	0.028 ± 0.004	11-08-07	288	0.022 ± 0.004
05-17-07	294	0.019 ± 0.004	11-15-07	286	0.039 ± 0.005
05-24-07	281	0.032 ± 0.004	11-21-07	245	0.036 ± 0.005
05-31-07	286	0.022 ± 0.004	11-28-07	328	0.038 ± 0.004
06-07-07	278	0.016 ± 0.004	12-06-07	284	0.039 ± 0.004
06-14-07	283	0.030 ± 0.004	12-13-07	285	0.061 ± 0.005
06-21-07	282	0.037 ± 0.004	12-20-07	285	0.081 ± 0.006
06-28-07	280	0.022 ± 0.004	12-27-07	285	0.061 ± 0.005
			01-03-08	287	0.065 ± 0.005
2nd Quarter Mean ± s.d.		0.024 ± 0.006	4th Quarter Mean ± s.d.		0.040 ± 0.020
			Cumulative Average		0.032
			Previous Annual Average		0.030

[a] Iodine-131 concentrations are < 0.03 pCi/m^3 unless noted otherwise.
[b] Meter inoperative, estimated time.
[c] Six day run-time.
[d] No power, ice storm.

Table 3. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131[a].
Location: D-6 (Center Point)
Units: pCi/m^3
Collection: Continuous, weekly exchange.

Date Collected	Volume (m^3)	Gross Beta	Date Collected	Volume (m^3)	Gross Beta
Required LLD		0.010	Required LLD		0.010
01-04-07	290	0.033 ± 0.004	07-05-07	286	0.027 ± 0.004
01-11-07	290	0.053 ± 0.005	07-12-07	284	0.032 ± 0.004
01-18-07	291	0.029 ± 0.004	07-19-07	287	0.027 ± 0.004
01-25-07	290	0.045 ± 0.005	07-26-07	286	0.030 ± 0.004
02-01-07	292	0.034 ± 0.004	08-02-07	284	0.037 ± 0.004
02-08-07	292	0.033 ± 0.004	08-09-07	287	0.030 ± 0.004
02-15-07	291	0.031 ± 0.004	08-16-07	285	0.042 ± 0.005
02-22-07	292	0.038 ± 0.004	08-23-07	291	0.022 ± 0.004
03-01-07	227 [b]	0.021 ± 0.004	08-30-07	275	0.030 ± 0.004
03-08-07	290	0.031 ± 0.004	09-06-07	279	0.040 ± 0.004
03-15-07	289	0.023 ± 0.004	09-13-07	281	0.013 ± 0.003
03-22-07	289	0.021 ± 0.004	09-20-07	280	0.030 ± 0.004
03-29-07	285	0.020 ± 0.004	09-27-07	279	0.037 ± 0.005
1st Quarter Mean ± s.d.		0.032 ± 0.010	3rd Quarter Mean ± s.d.		0.031 ± 0.008
04-05-07	291	0.016 ± 0.004	10-04-07	279	0.030 ± 0.004
04-12-07	292	0.020 ± 0.004	10-11-07	277	0.017 ± 0.003
04-19-07	291	0.027 ± 0.004	10-18-07	276	0.030 ± 0.004
04-26-07	290	0.021 ± 0.004	10-25-07	270	0.024 ± 0.004
05-03-07	290	0.016 ± 0.004	11-01-07	267	0.024 ± 0.004
05-10-07	292	0.023 ± 0.004	11-08-07	271	0.023 ± 0.004
05-17-07	294	0.021 ± 0.004	11-15-07	277	0.035 ± 0.005
05-24-07	288	0.031 ± 0.004	11-21-07	239	0.036 ± 0.005
05-31-07	286	0.022 ± 0.004	11-28-07	317	0.035 ± 0.004
06-07-07	283	0.016 ± 0.004	12-06-07	275	0.037 ± 0.004
06-14-07	286	0.034 ± 0.004	12-13-07	277	0.085 ± 0.006
06-21-07	285	0.035 ± 0.004	12-20-07	276	0.082 ± 0.006
06-28-07	286	0.025 ± 0.004	12-27-07	286	0.062 ± 0.005
			01-03-08	278	0.070 ± 0.005
2nd Quarter Mean ± s.d.		0.024 ± 0.007	4th Quarter Mean ± s.d.		0.042 ± 0.023
			Cumulative Average		0.032
			Previous Annual Average		0.028

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

[b] No power, ice storm.

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Table 4. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131[a].
Location: D-7 (Shellsburg)
Units: pCi/m^3
Collection: Continuous, weekly exchange.

Date Collected	Volume (m^3)	Gross Beta	Date Collected	Volume (m^3)	Gross Beta
Required LLD		0.010	Required LLD		0.010
01-04-07	298	0.028 ± 0.004	07-05-07	286	0.025 ± 0.004
01-11-07	299	0.027 ± 0.004	07-12-07	284	0.032 ± 0.004
01-18-07	300	0.028 ± 0.004	07-19-07	287	0.027 ± 0.004
01-25-07	296	0.048 ± 0.005	07-26-07	286	0.027 ± 0.004
02-01-07	301	0.033 ± 0.004	08-02-07	284	0.037 ± 0.004
02-08-07	301	0.031 ± 0.004	08-09-07	287	0.030 ± 0.004
02-15-07	298	0.030 ± 0.004	08-16-07	285	0.042 ± 0.005
02-22-07	301	0.036 ± 0.004	08-23-07	293	0.028 ± 0.004
03-01-07	262 [b]	0.019 ± 0.004	08-30-07	282	0.031 ± 0.004
03-08-07	298	0.027 ± 0.004	09-06-07	287	0.035 ± 0.004
03-15-07	300	0.023 ± 0.004	09-13-07	291	0.016 ± 0.003
03-22-07	300	0.016 ± 0.004	09-20-07	288	0.028 ± 0.004
03-29-07	299	0.018 ± 0.004	09-27-07	288	0.037 ± 0.004
1st Quarter Mean ± s.d.		0.028 ± 0.008	3rd Quarter Mean ± s.d.		0.030 ± 0.007
04-05-07	300	0.016 ± 0.003	10-04-07	288	0.034 ± 0.004
04-12-07	295	0.016 ± 0.003	10-11-07	288	0.015 ± 0.003
04-19-07	292	0.024 ± 0.004	10-18-07	289	0.024 ± 0.004
04-26-07	285	0.018 ± 0.003	10-25-07	287	0.022 ± 0.004
05-03-07	293	0.021 ± 0.004	11-01-07	288	0.023 ± 0.003
05-10-07	294	0.026 ± 0.004	11-08-07	290	0.022 ± 0.004
05-17-07	296	0.019 ± 0.004	11-15-07	283	0.035 ± 0.004
05-24-07	293	0.020 ± 0.003	11-21-07	243	0.032 ± 0.005
05-31-07	286	0.023 ± 0.004	11-28-07	324	0.029 ± 0.004
06-07-07	280	0.015 ± 0.004	12-06-07	281	0.041 ± 0.005
06-14-07	286	0.028 ± 0.004	12-13-07	283	0.060 ± 0.005
06-21-07	285	0.032 ± 0.004	12-20-07	282	0.068 ± 0.006
06-28-07	283	0.022 ± 0.004	12-27-07	285	0.061 ± 0.005
			01-03-08	284	0.062 ± 0.005
2nd Quarter Mean ± s.d.		0.022 ± 0.005	4th Quarter Mean ± s.d.		0.038 ± 0.018
			Cumulative Average		0.030
			Previous Annual Average		0.027

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

[b] No power, ice storm.

Table 5. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131[a].
Location: D-11 (Toddville)
Units: pCi/m^3
Collection: Continuous, weekly exchange.

Date Collected	Volume (m^3)	Gross Beta	Date Collected	Volume (m^3)	Gross Beta
Required LLD		0.010	Required LLD		0.010
01-04-07	295	0.029 ± 0.004	07-05-07	286	0.023 ± 0.004
01-11-07	280	0.030 ± 0.004	07-12-07	283	0.032 ± 0.004
01-18-07	289	0.030 ± 0.004	07-19-07	287	0.023 ± 0.004
01-25-07	287	0.056 ± 0.005	07-26-07	286	0.028 ± 0.004
02-01-07	289	0.039 ± 0.005	08-02-07	284	0.034 ± 0.004
02-08-07	289	0.034 ± 0.004	08-09-07	287	0.025 ± 0.004
02-15-07	289	0.033 ± 0.004	08-16-07	286	0.043 ± 0.005
02-22-07	288	0.041 ± 0.005	08-23-07	288	0.029 ± 0.004
03-01-07	268 [b]	0.021 ± 0.004	08-30-07	280	0.032 ± 0.004
03-08-07	286	0.032 ± 0.004	09-06-07	282	0.040 ± 0.004
03-15-07	288	0.031 ± 0.004	09-13-07	284	0.016 ± 0.003
03-22-07	289	0.023 ± 0.004	09-20-07	283	0.030 ± 0.004
03-29-07	287	0.020 ± 0.004	09-27-07	282	0.037 ± 0.004
1st Quarter Mean ± s.d.		0.032 ± 0.009	3rd Quarter Mean ± s.d.		0.030 ± 0.007
04-05-07	288	0.020 ± 0.004	10-04-07	282	0.033 ± 0.004
04-12-07	282	0.021 ± 0.004	10-11-07	284	0.017 ± 0.003
04-19-07	276	0.028 ± 0.004	10-18-07	282	0.026 ± 0.004
04-26-07	293	0.018 ± 0.003	10-25-07	281	0.024 ± 0.004
05-03-07	279	0.019 ± 0.004	11-01-07	284	0.024 ± 0.004
05-10-07	280	0.026 ± 0.004	11-08-07	285	0.020 ± 0.004
05-17-07	282	0.021 ± 0.004	11-15-07	282	0.047 ± 0.005
05-24-07	280	0.028 ± 0.004	11-21-07	244	0.034 ± 0.005
05-31-07	283	0.020 ± 0.004	11-28-07	326	0.034 ± 0.004
06-07-07	282	0.016 ± 0.004	12-06-07	282	0.037 ± 0.004
06-14-07	286	0.026 ± 0.004	12-13-07	282	0.066 ± 0.005
06-21-07	285	0.029 ± 0.004	12-20-07	286	0.063 ± 0.005
06-28-07	284	0.021 ± 0.004	12-27-07	285	0.061 ± 0.005
			01-03-08	285	0.057 ± 0.005
2nd Quarter Mean ± s.d.		0.022 ± 0.004	4th Quarter Mean ± s.d.		0.039 ± 0.017
			Cumulative Average		0.031
			Previous Annual Average		0.029

[a] Iodine-131 concentrations are < 0.03 pCi/m^3 unless noted otherwise.
[b] No power, ice storm.

Table 6. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131[a].
Location: D-13 (Alburnett)
Units: pCi/m^3
Collection: Continuous, weekly exchange.

Date Collected	Volume (m^3)	Gross Beta	Date Collected	Volume (m^3)	Gross Beta
Required LLD		0.010	Required LLD		0.010
01-04-07	287	0.034 ± 0.004	07-05-07	286	0.022 ± 0.004
01-11-07	288	0.027 ± 0.004	07-12-07	284	0.032 ± 0.004
01-18-07	288	0.031 ± 0.004	07-19-07	287	0.023 ± 0.004
01-25-07	279	0.051 ± 0.005	07-26-07	287	0.031 ± 0.004
02-01-07	298	0.034 ± 0.004	08-02-07	284	0.036 ± 0.004
02-08-07	186 [b]	0.052 ± 0.007	08-09-07	287	0.030 ± 0.004
02-15-07	288	0.034 ± 0.004	08-16-07	285	0.044 ± 0.005
02-22-07	289	0.038 ± 0.004	08-23-07	290	0.024 ± 0.004
03-01-07	251 [b]	0.017 ± 0.004	08-30-07	282	0.025 ± 0.003
03-08-07	287	0.031 ± 0.004	09-06-07	285	0.045 ± 0.004
03-15-07	289	0.030 ± 0.004	09-13-07	287	0.016 ± 0.003
03-22-07	289	0.024 ± 0.004	09-20-07	286	0.030 ± 0.004
03-29-07	286	0.018 ± 0.004	09-27-07	285	0.035 ± 0.004
1st Quarter Mean ± s.d.		0.032 ± 0.010	3rd Quarter Mean ± s.d.		0.030 ± 0.008
04-05-07	289	0.018 ± 0.004	10-04-07	285	0.034 ± 0.004
04-12-07	289	0.016 ± 0.004	10-11-07	287	0.021 ± 0.003
04-19-07	286	0.018 ± 0.003	10-18-07	284	0.032 ± 0.004
04-26-07	288	0.015 ± 0.003	10-25-07	285	0.027 ± 0.004
05-03-07	287	0.012 ± 0.004	11-01-07	286	0.027 ± 0.004
05-10-07	289	0.017 ± 0.004	11-08-07	287	0.025 ± 0.004
05-17-07	291	0.016 ± 0.004	11-15-07	286	0.032 ± 0.004
05-24-07	285	0.028 ± 0.004	11-21-07	246	0.031 ± 0.005
05-31-07	286	0.022 ± 0.004	11-28-07	316	0.031 ± 0.004
06-07-07	283	0.017 ± 0.004	12-06-07	275	0.035 ± 0.004
06-14-07	286	0.029 ± 0.004	12-13-07	278	0.058 ± 0.005
06-21-07	285	0.033 ± 0.004	12-20-07	276	0.079 ± 0.006
06-28-07	286	0.022 ± 0.004	12-27-07	286	0.079 ± 0.006
			01-03-08	278	0.062 ± 0.005
2nd Quarter Mean ± s.d.		0.020 ± 0.006	4th Quarter Mean ± s.d.		0.041 ± 0.020
			Cumulative Average		0.031
			Previous Annual Average		0.027

[a] Iodine-131 concentrations are < 0.03 pCi/m^3 unless noted otherwise.
[b] No power, storm.

Table 7. *Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131*[a].
Location: D-15 (On-site)
Units: pCi/m^3
Collection: Continuous, weekly exchange.

Date Collected	Volume (m^3)	Gross Beta	Date Collected	Volume (m^3)	Gross Beta
Required LLD		0.010	Required LLD		0.010
01-04-07	291	0.031 ± 0.004	07-05-07	292	0.021 ± 0.004
01-11-07	290	0.030 ± 0.004	07-12-07	287	0.034 ± 0.004
01-18-07	291	0.032 ± 0.004	07-19-07	290	0.026 ± 0.004
01-25-07	290	0.045 ± 0.005	07-26-07	289	0.029 ± 0.004
02-01-07	292	0.033 ± 0.004	08-02-07	287	0.034 ± 0.004
02-08-07	292	0.031 ± 0.004	08-09-07	290	0.029 ± 0.004
02-15-07	290	0.046 ± 0.005	08-16-07	288	0.048 ± 0.005
02-22-07	292	0.046 ± 0.005	08-23-07	295	0.027 ± 0.004
03-01-07	254 [b]	0.019 ± 0.004	08-30-07	277	0.032 ± 0.004
03-08-07	290	0.030 ± 0.004	09-06-07	285	0.025 ± 0.003
03-15-07	290	0.027 ± 0.004	09-13-07	287	0.017 ± 0.003
03-22-07	291	0.022 ± 0.004	09-20-07	285	0.037 ± 0.004
03-29-07	287	0.021 ± 0.004	09-27-07	285	0.040 ± 0.005
1st Quarter Mean ± s.d.		0.032 ± 0.009	3rd Quarter Mean ± s.d.		0.031 ± 0.008
04-05-07	289	0.017 ± 0.004	10-04-07	285	0.032 ± 0.004
04-12-07	289	0.020 ± 0.004	10-11-07	285	0.017 ± 0.003
04-19-07	286	0.029 ± 0.004	10-18-07	286	0.034 ± 0.004
04-26-07	288	0.020 ± 0.004	10-25-07	285	0.023 ± 0.004
05-03-07	287	0.017 ± 0.004	11-01-07	286	0.027 ± 0.004
05-10-07	288	0.021 ± 0.004	11-08-07	287	0.024 ± 0.004
05-17-07	291	0.017 ± 0.004	11-15-07	280	0.041 ± 0.005
05-24-07	287	0.030 ± 0.004	11-21-07	240	0.040 ± 0.005
05-31-07	286	0.020 ± 0.004	11-28-07	321	0.033 ± 0.004
06-07-07	44	0.015 ± 0.018	12-06-07	278	0.038 ± 0.004
06-14-07	278	0.027 ± 0.004	12-13-07	279	0.074 ± 0.006
06-21-07	288	0.030 ± 0.004	12-20-07	285	0.081 ± 0.006
06-28-07	286	0.024 ± 0.004	12-27-07	285	0.067 ± 0.005
			01-03-08	281	0.067 ± 0.005
2nd Quarter Mean ± s.d.		0.022 ± 0.005	4th Quarter Mean ± s.d.		0.042 ± 0.021
			Cumulative Average		0.032
			Previous Annual Average		0.028

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

[b] No power, storm.

Table 8. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131[a].
Location: D-16 (On-site)
Units: pCi/m^3
Collection: Continuous, weekly exchange.

Date Collected	Volume (m^3)	Gross Beta	Date Collected	Volume (m^3)	Gross Beta
Required LLD		0.010	Required LLD		0.010
01-04-07	287	0.031 ± 0.004	07-05-07	289	0.025 ± 0.004
01-11-07	287	0.032 ± 0.004	07-12-07	287	0.032 ± 0.004
01-18-07	288	0.031 ± 0.004	07-19-07	290	0.023 ± 0.004
01-25-07	287	0.050 ± 0.005	07-26-07	289	0.033 ± 0.004
02-01-07	290	0.038 ± 0.004	08-02-07	287	0.042 ± 0.005
02-08-07	289	0.036 ± 0.004	08-09-07	290	0.026 ± 0.004
02-15-07	288	0.036 ± 0.004	08-16-07	287	0.041 ± 0.004
02-22-07	290	0.043 ± 0.005	08-23-07	296	0.026 ± 0.004
03-01-07	287	0.018 ± 0.003	08-30-07	276	0.033 ± 0.004
03-08-07	287	0.029 ± 0.004	09-06-07	285	0.038 ± 0.004
03-15-07	288	0.029 ± 0.004	09-13-07	287	0.016 ± 0.003
03-22-07	289	0.023 ± 0.004	09-20-07	285	0.048 ± 0.004
03-29-07	288	0.016 ± 0.004	09-27-07	286	0.035 ± 0.004
1st Quarter Mean ± s.d.		0.032 ± 0.009	3rd Quarter Mean ± s.d.		0.032 ± 0.009
04-05-07	289	0.017 ± 0.004	10-04-07	285	0.031 ± 0.004
04-12-07	289	0.017 ± 0.004	10-11-07	286	0.021 ± 0.003
04-19-07	288	0.025 ± 0.004	10-18-07	285	0.029 ± 0.004
04-26-07	288	0.018 ± 0.003	10-25-07	286	0.024 ± 0.004
05-03-07	287	0.020 ± 0.004	11-01-07	285	0.026 ± 0.004
05-10-07	288	0.022 ± 0.004	11-08-07	287	0.025 ± 0.004
05-17-07	290	0.017 ± 0.004	11-15-07	280	0.037 ± 0.005
05-24-07	287	0.032 ± 0.004	11-21-07	240	0.036 ± 0.005
05-31-07	286	0.021 ± 0.004	11-28-07	320	0.033 ± 0.004
06-07-07	286	0.016 ± 0.003	12-06-07	279	0.035 ± 0.004
06-14-07	289	0.029 ± 0.004	12-13-07	279	0.063 ± 0.005
06-21-07	288	0.032 ± 0.004	12-20-07	280	0.074 ± 0.006
06-28-07	289	0.024 ± 0.004	12-27-07	285	0.059 ± 0.005
			01-03-08	281	0.059 ± 0.005
2nd Quarter Mean ± s.d.		0.022 ± 0.006	4th Quarter Mean ± s.d.		0.039 ± 0.017
			Cumulative Average		0.032
			Previous Annual Average		0.028

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

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

Location	D-3			
Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Lab Code	DAP- 2493	DAP- 4753	DAP- 7257	DAP- 8895
Volume (m^3)	3743	3487	3735	3683
Be-7	0.090 ± 0.018	0.170 ± 0.026	0.110 ± 0.020	0.063 ± 0.017
Mn-54	< 0.0005	< 0.0006	< 0.0006	< 0.0007
Fe-59	< 0.0009	< 0.0016	< 0.0015	< 0.0012
Co-58	< 0.0004	< 0.0011	< 0.0005	< 0.0008
Co-60	< 0.0005	< 0.0010	< 0.0004	< 0.0009
Nb-95	< 0.0011	< 0.0011	< 0.0011	< 0.0012
Zr-95	< 0.0013	< 0.0019	< 0.0015	< 0.0006
Ru-103	< 0.0008	< 0.0012	< 0.0006	< 0.0005
Ru-106	< 0.0078	< 0.0079	< 0.0050	< 0.0040
Cs-134	< 0.0008	< 0.0005	< 0.0005	< 0.0003
Cs-137	< 0.0006	< 0.0008	< 0.0007	< 0.0009
Ce-141	< 0.0017	< 0.0020	< 0.0020	< 0.0018
Ce-144	< 0.0036	< 0.0042	< 0.0024	< 0.0043
Location	D-5			
Lab Code	DAP- 2494	DAP- 4754	DAP- 7258	DAP- 8896
Volume (m^3)	3743	3487	3735	3683
Be-7	0.071 ± 0.016	0.106 ± 0.017	0.100 ± 0.023	0.062 ± 0.015
Mn-54	< 0.0006	< 0.0004	< 0.0006	< 0.0006
Fe-59	< 0.0011	< 0.0018	< 0.0012	< 0.0009
Co-58	< 0.0008	< 0.0008	< 0.0004	< 0.0005
Co-60	< 0.0005	< 0.0005	< 0.0004	< 0.0009
Nb-95	< 0.0010	< 0.0012	< 0.0015	< 0.0012
Zr-95	< 0.0010	< 0.0013	< 0.0014	< 0.0012
Ru-103	< 0.0012	< 0.0007	< 0.0013	< 0.0013
Ru-106	< 0.0057	< 0.0084	< 0.0031	< 0.0031
Cs-134	< 0.0010	< 0.0005	< 0.0008	< 0.0004
Cs-137	< 0.0007	< 0.0007	< 0.0007	< 0.0007
Ce-141	< 0.0021	< 0.0020	< 0.0014	< 0.0018
Ce-144	< 0.0039	< 0.0050	< 0.0060	< 0.0045
Location	D-6			
Lab Code	DAP- 2495	DAP- 4755	DAP- 7259	DAP- 8897
Volume (m^3)	3743	3487	3735	3683
Be-7	0.069 ± 0.017	0.118 ± 0.017	0.104 ± 0.018	0.054 ± 0.014
Mn-54	< 0.0009	< 0.0009	< 0.0008	< 0.0007
Fe-59	< 0.0008	< 0.0016	< 0.0012	< 0.0012
Co-58	< 0.0006	< 0.0010	< 0.0007	< 0.0006
Co-60	< 0.0006	< 0.0010	< 0.0004	< 0.0008
Nb-95	< 0.0011	< 0.0008	< 0.0009	< 0.0010
Zr-95	< 0.0006	< 0.0015	< 0.0025	< 0.0012
Ru-103	< 0.0007	< 0.0005	< 0.0009	< 0.0010
Ru-106	< 0.0049	< 0.0056	< 0.0022	< 0.0054
Cs-134	< 0.0009	< 0.0007	< 0.0006	< 0.0005
Cs-137	< 0.0005	< 0.0006	< 0.0005	< 0.0006
Ce-141	< 0.0021	< 0.0011	< 0.0027	< 0.0018
Ce-144	< 0.0042	< 0.0029	< 0.0039	< 0.0021

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

Location	D-7			
Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Lab Code	DAP- 2496	DAP- 4756	DAP- 7260 [a]	DAP- 8898
Volume (m^3)	3743	3487	3735	3683
Be-7	0.066 ± 0.016	0.114 ± 0.019	0.098 ± 0.019	0.062 ± 0.013
Mn-54	< 0.0007	< 0.0008	< 0.0006	< 0.0006
Fe-59	< 0.0009	< 0.0017	< 0.0012	< 0.0009
Co-58	< 0.0004	< 0.0009	< 0.0006	< 0.0006
Co-60	< 0.0006	< 0.0013	< 0.0004	< 0.0008
Nb-95	< 0.0009	< 0.0014	< 0.0020	< 0.0006
Zr-95	< 0.0017	< 0.0020	< 0.0014	< 0.0008
Ru-103	< 0.0007	< 0.0007	< 0.0008	< 0.0009
Ru-106	< 0.0051	< 0.0077	< 0.0031	< 0.0040
Cs-134	< 0.0009	< 0.0005	< 0.0008	< 0.0004
Cs-137	< 0.0006	< 0.0009	< 0.0005	< 0.0006
Ce-141	< 0.0020	< 0.0022	< 0.0017	< 0.0009
Ce-144	< 0.0045	< 0.0044	< 0.0039	< 0.0024
Location	D-11			
Lab Code	DAP- 2497	DAP- 4757	DAP- 7262	DAP- 8899 [a]
Volume (m^3)	3743	3487	3735	3683
Be-7	0.080 ± 0.015	0.111 ± 0.023	0.101 ± 0.021	0.078 ± 0.014
Mn-54	< 0.0004	< 0.0009	< 0.0007	< 0.0005
Fe-59	< 0.0008	< 0.0012	< 0.0011	< 0.0015
Co-58	< 0.0005	< 0.0012	< 0.0004	< 0.0006
Co-60	< 0.0005	< 0.0011	< 0.0004	< 0.0008
Nb-95	< 0.0009	< 0.0010	< 0.0008	< 0.0012
Zr-95	< 0.0009	< 0.0012	< 0.0010	< 0.0018
Ru-103	< 0.0008	< 0.0007	< 0.0011	< 0.0007
Ru-106	< 0.0055	< 0.0066	< 0.0060	< 0.0075
Cs-134	< 0.0008	< 0.0005	< 0.0006	< 0.0007
Cs-137	< 0.0006	< 0.0006	< 0.0003	< 0.0005
Ce-141	< 0.0019	< 0.0019	< 0.0011	< 0.0015
Ce-144	< 0.0042	< 0.0041	< 0.0033	< 0.0026
Location	D-13			
Lab Code	DAP- 2498	DAP- 4758	DAP- 7263	DAP- 8901
Volume (m^3)	3604	3730	3712	3677
Be-7	0.070 ± 0.015	0.102 ± 0.019	0.109 ± 0.018	0.074 ± 0.014
Mn-54	< 0.0006	< 0.0007	< 0.0006	< 0.0007
Fe-59	< 0.0016	< 0.0012	< 0.0020	< 0.0017
Co-58	< 0.0009	< 0.0009	< 0.0004	< 0.0005
Co-60	< 0.0005	< 0.0011	< 0.0006	< 0.0009
Nb-95	< 0.0012	< 0.0008	< 0.0007	< 0.0008
Zr-95	< 0.0020	< 0.0021	< 0.0008	< 0.0013
Ru-103	< 0.0014	< 0.0005	< 0.0011	< 0.0011
Ru-106	< 0.0048	< 0.0070	< 0.0045	< 0.0064
Cs-134	< 0.0008	< 0.0005	< 0.0004	< 0.0005
Cs-137	< 0.0005	< 0.0006	< 0.0005	< 0.0005
Ce-141	< 0.0017	< 0.0026	< 0.0020	< 0.0012
Ce-144	< 0.0047	< 0.0053	< 0.0024	< 0.0040

[a] Duplicate analysis, refer to Appendix A.

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

Location	D-15			
Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Lab Code	DAP- 2499	DAP- 4759	DAP- 7264	DAP- 8902
Volume (m^3)	3743	3487	3735	3683
Be-7	0.062 ± 0.016	0.101 ± 0.021	0.097 ± 0.016	0.068 ± 0.016
Mn-54	< 0.0005	< 0.0007	< 0.0006	< 0.0005
Fe-59	< 0.0008	< 0.0013	< 0.0020	< 0.0015
Co-58	< 0.0005	< 0.0011	< 0.0007	< 0.0008
Co-60	< 0.0007	< 0.0011	< 0.0004	< 0.0008
Nb-95	< 0.0007	< 0.0009	< 0.0007	< 0.0006
Zr-95	< 0.0018	< 0.0017	< 0.0010	< 0.0006
Ru-103	< 0.0007	< 0.0009	< 0.0008	< 0.0009
Ru-106	< 0.0049	< 0.0069	< 0.0048	< 0.0042
Cs-134	< 0.0008	< 0.0007	< 0.0006	< 0.0006
Cs-137	< 0.0006	< 0.0009	< 0.0007	< 0.0005
Ce-141	< 0.0016	< 0.0029	< 0.0018	< 0.0018
Ce-144	< 0.0038	< 0.0046	< 0.0023	< 0.0046
Location	D-16			
Lab Code	DAP- 2500	DAP- 4760	DAP- 7265	DAP- 8903
Volume (m^3)	3743	3487	3735	3683
Be-7	0.069 ± 0.017	0.123 ± 0.019	0.099 ± 0.020	0.078 ± 0.013
Mn-54	< 0.0005	< 0.0008	< 0.0004	< 0.0006
Fe-59	< 0.0011	< 0.0012	< 0.0017	< 0.0009
Co-58	< 0.0005	< 0.0008	< 0.0004	< 0.0007
Co-60	< 0.0005	< 0.0011	< 0.0004	< 0.0008
Nb-95	< 0.0010	< 0.0008	< 0.0010	< 0.0008
Zr-95	< 0.0006	< 0.0011	< 0.0012	< 0.0014
Ru-103	< 0.0007	< 0.0009	< 0.0009	< 0.0005
Ru-106	< 0.0069	< 0.0078	< 0.0043	< 0.0069
Cs-134	< 0.0009	< 0.0006	< 0.0004	< 0.0007
Cs-137	< 0.0008	< 0.0006	< 0.0004	< 0.0005
Ce-141	< 0.0013	< 0.0023	< 0.0011	< 0.0018
Ce-144	< 0.0050	< 0.0035	< 0.0045	< 0.0049

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Table 10. Area monitors (TLD), Quarterly
Units: mR/91 days

Air Stations	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
D-1	21.1 ± 1.3	15.0 ± 0.9	21.3 ± 1.2	17.3 ± 1.4
D-2	16.9 ± 1.3	12.8 ± 1.2	18.6 ± 1.3	14.0 ± 1.7
D-3	16.2 ± 1.0	13.9 ± 0.7	17.7 ± 1.3	16.7 ± 0.9
D-5	17.7 ± 1.1	18.4 ± 0.7	18.9 ± 1.4	21.4 ± 0.9
D-6	15.7 ± 0.9	16.9 ± 0.7	18.4 ± 1.2	19.2 ± 0.8
D-7	16.8 ± 1.4	16.0 ± 0.8	16.9 ± 1.3	19.2 ± 1.1
D-8	18.4 ± 0.7	20.3 ± 1.0	21.0 ± 0.9	22.8 ± 1.2
D-10	17.4 ± 0.7	13.3 ± 0.8	ND[a]	13.8 ± 1.0
D-11	15.0 ± 0.7	14.9 ± 1.5	16.6 ± 0.8	17.0 ± 2.1
D-13	17.3 ± 0.7	16.3 ± 0.8	18.4 ± 0.9	18.9 ± 1.1
D-15	16.1 ± 0.9	15.3 ± 0.7	17.6 ± 1.4	18.3 ± 1.1
D-16	16.5 ± 0.8	16.9 ± 1.6	19.3 ± 0.8	16.3 ± 1.4
Mean ± s.d.	17.1 ± 1.6	15.8 ± 2.1	18.6 ± 1.5	17.9 ± 2.7
Within 0.5 mi. of Stack				
D-17	18.4 ± 1.0	17.2 ± 1.3	22.0 ± 1.5	18.3 ± 2.1
D-18	16.4 ± 1.1	15.2 ± 1.2	18.4 ± 1.4	15.9 ± 2.0
D-19	15.9 ± 0.8	14.9 ± 0.9	18.6 ± 0.9	16.2 ± 1.4
D-20	16.7 ± 0.8	17.9 ± 1.0	20.0 ± 1.1	20.0 ± 1.5
D-21	17.9 ± 0.8	17.7 ± 1.0	21.7 ± 1.3	19.4 ± 1.2
D-22	16.0 ± 1.0	15.9 ± 1.8	19.7 ± 1.3	17.1 ± 1.3
D-23	15.6 ± 0.7	15.0 ± 0.9	18.2 ± 1.3	17.9 ± 1.2
D-28	20.4 ± 0.7	19.9 ± 0.8	ND[a]	21.6 ± 1.3
D-29	20.2 ± 0.7	20.7 ± 0.8	23.2 ± 1.0	22.5 ± 1.3
D-30	21.4 ± 1.0	19.7 ± 1.2	24.3 ± 1.3	21.6 ± 1.2
D-31	20.0 ± 1.2	21.4 ± 1.1	21.9 ± 1.6	22.2 ± 1.1
D-32	21.5 ± 0.7	20.6 ± 1.2	27.2 ± 1.1	21.3 ± 1.2
D-82	16.2 ± 0.8	12.6 ± 0.7	17.2 ± 0.8	13.0 ± 0.9
D-83	17.3 ± 1.0	16.0 ± 0.7	18.9 ± 0.8	16.9 ± 0.9
D-84	17.3 ± 1.0	16.0 ± 0.8	18.6 ± 1.1	17.1 ± 1.1
D-85	16.7 ± 0.7	15.6 ± 1.0	18.5 ± 0.8	16.5 ± 1.1
D-86	20.4 ± 1.2	17.2 ± 0.9	21.3 ± 1.4	18.2 ± 1.2
D-91	17.2 ± 0.9	15.8 ± 0.9	16.9 ± 0.9	15.8 ± 1.3
Mean ± s.d.	18.1 ± 2.0	17.2 ± 2.4	20.4 ± 2.8	18.4 ± 2.7

[a] "ND" = No data; TLD missing.

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Table 10. Area monitors (TLD), Quarterly
Units: mR/91 days

Within 1.0 mi. of Stack	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
D-43	16.6 ± 0.7	17.6 ± 1.7	16.2 ± 1.1	21.0 ± 1.5
D-44	20.4 ± 0.8	21.5 ± 0.7	21.5 ± 1.3	16.7 ± 0.8
D-45	16.3 ± 0.8	15.2 ± 1.1	17.8 ± 1.0	15.6 ± 1.3
D-46	20.0 ± 1.1	20.9 ± 1.0	21.4 ± 1.4	21.1 ± 1.5
D-47	19.0 ± 0.8	19.7 ± 1.0	20.1 ± 1.1	20.2 ± 1.2
D-48	20.9 ± 0.7	21.1 ± 1.2	22.7 ± 0.8	21.3 ± 1.3
Mean ± s.d.	18.9 ± 2.0	19.3 ± 2.5	20.0 ± 2.5	19.3 ± 2.5
Within 3.0 mi. of Stack				
D-33	15.7 ± 0.7	14.9 ± 0.6	15.2 ± 0.9	16.7 ± 1.4
D-34	15.6 ± 1.0	14.2 ± 0.9	16.3 ± 0.8	14.8 ± 1.4
D-35	15.3 ± 0.7	14.5 ± 0.6	15.4 ± 0.8	14.9 ± 1.0
D-36	15.7 ± 0.9	16.0 ± 0.9	16.4 ± 1.3	16.3 ± 1.2
D-37	20.5 ± 1.2	21.7 ± 2.1	21.7 ± 1.5	19.8 ± 2.4
D-38	17.9 ± 0.9	19.2 ± 1.0	18.6 ± 1.1	18.7 ± 1.1
D-39	17.7 ± 1.0	18.7 ± 0.7	18.9 ± 1.0	17.9 ± 0.9
D-40	15.3 ± 0.9	16.4 ± 1.0	15.2 ± 1.1	15.8 ± 1.0
D-41	17.0 ± 0.9	16.4 ± 0.9	17.1 ± 0.9	15.8 ± 1.0
D-42	15.6 ± 0.7	15.7 ± 1.1	15.4 ± 0.9	15.4 ± 1.8
Mean ± s.d.	16.6 ± 1.7	16.8 ± 2.4	17.0 ± 2.1	16.6 ± 1.7

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

Location		D-108					
Date	Lab	Concentration (pCi/L)					
Collected	Code	I-131	K-40	Cs-134	Cs-137	Ba-140	La-140
01-03-07	DMI- 55	< 0.4	1348 ± 106	< 4.5	< 4.6	< 22.6	< 2.2
02-06-07	DMI- 645	< 0.5	1350 ± 103	< 3.7	< 2.7	< 13.3	< 2.4
03-06-07	DMI- 1248	< 0.4	1630 ± 110	< 4.3	< 3.8	< 14.9	< 1.2
04-03-07	DMI- 1832	< 0.4	1404 ± 130	< 4.5	< 2.1	< 16.0	< 1.5
05-01-07	DMI- 2540	< 0.3	1133 ± 111	< 3.9	< 3.2	< 16.2	< 3.0
05-15-07	DMI- 2781	< 0.4	1412 ± 115	< 4.0	< 4.9	< 14.0	< 2.2
05-30-07	DMI- 3229	< 0.3	1184 ± 116	< 3.3	< 3.6	< 9.0	< 1.6
06-12-07	DMI- 3582	< 0.5	1301 ± 111	< 2.5	< 3.9	< 13.4	< 1.4
06-26-07	DMI- 3963	< 0.4	1178 ± 112	< 3.7	< 4.1	< 10.2	< 2.9
07-10-07	DMI- 4188	< 0.4	1282 ± 119	< 3.5	< 3.0	< 14.5	< 1.8
07-24-07	DMI- 4701	< 0.4	1214 ± 93	< 2.2	< 2.9	< 13.2	< 2.0
08-07-07	DMI- 5220	< 0.3	1419 ± 121	< 2.7	< 3.5	< 10.9	< 1.4
08-21-07	DMI- 5550	< 0.4	1509 ± 91	< 2.9	< 2.9	< 16.2	< 3.3
09-05-07	DMI- 5898	< 0.5	1257 ± 111	< 3.1	< 3.4	< 18.9	< 2.4
09-18-07	DMI- 6234	< 0.4	1352 ± 129	< 4.3	< 2.9	< 8.9	< 1.6
10-02-07	DMI- 6686	< 0.4	1447 ± 120	< 3.4	< 4.6	< 12.8	< 4.4
11-06-07	DMI- 7664	< 0.4	1258 ± 122	< 4.2	< 4.3	< 23.6	< 4.4
12-04-08	DMI- 8199	< 0.4	1374 ± 126	< 3.0	< 2.6	< 18.1	< 1.5

Location		D-109						
Date	Lab	Concentration (pCi/L)						
Collected	Code	I-131	K-40	Cs-134	Cs-137	Ba-140	La-140	
01-03-07	DMI- 56	< 0.4	1213 ± 108	< 3.5	< 2.8	< 14.3	< 2.4	
02-06-07	DMI- 646	< 0.4	1352 ± 89	< 2.1	< 3.6	< 12.5	< 3.3	
03-06-07	DMI- 1249	< 0.4	1247 ± 96	< 2.7	< 3.3	< 8.8	< 1.9	
04-03-07	DMI- 1833	< 0.5	1380 ± 117	< 4.1	< 4.7	< 20.7	< 1.7	
05-01-07	DMI- 2541	< 0.4	1349 ± 128	< 3.0	< 3.6	< 8.7	< 2.6	[a]
05-15-07	DMI- 2782	< 0.2	1323 ± 108	< 2.7	< 2.9	< 10.1	< 2.6	
05-30-07	DMI- 3230	< 0.3	1215 ± 131	< 2.7	< 4.7	< 11.7	< 3.1	
06-12-07	DMI- 3583	< 0.4	1349 ± 121	< 2.9	< 2.6	< 17.8	< 3.3	[a]
06-26-07	DMI- 3964	< 0.4	1190 ± 106	< 3.1	< 4.1	< 12.2	< 1.3	
07-10-07	DMI- 4189	< 0.4	1403 ± 109	< 4.5	< 4.9	< 18.5	< 3.1	
07-24-07	DMI- 4702	< 0.4	1325 ± 120	< 3.0	< 2.5	< 10.6	< 1.5	
08-07-07	DMI- 5221	< 0.5	1290 ± 111	< 3.4	< 4.0	< 9.5	< 2.9	
08-21-07	DMI- 5551	< 0.3	1347 ± 89	< 2.5	< 2.8	< 9.5	< 2.3	
09-05-07	DMI- 5899	< 0.5	1346 ± 129	< 3.8	< 2.1	< 11.3	< 1.9	
09-18-07	DMI- 6235	< 0.4	1293 ± 102	< 2.9	< 4.8	< 15.4	< 3.1	
10-02-07	DMI- 6687	< 0.3	1406 ± 117	< 3.0	< 4.4	< 19.8	< 1.7	
11-06-07	DMI- 7665	< 0.4	1339 ± 124	< 4.2	< 4.4	< 22.8	< 2.0	
12-04-07	NS[b]	-	-	-	-	-	-	

[a] Duplicate analysis, refer to Appendix A.
[b] "NS" = No sample; see Table 2.0, Listing of Missed Samples.

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Table 12.1. Well water samples, analyses for gross beta and tritium.
Collection: Quarterly
Units: pCi/L

Location	D-53			
Collection Date	03-15-07	06-19-07	09-25-07	11-27-07
Lab Code	DWW-1495	DWW-3745	DWW-7117	DWW-8103
Gross Beta	2.2 ± 0.4	< 1.2	1.3 ± 0.5	1.1 ± 0.3
H-3	< 140	< 168	< 171	< 178

Location	D-54			
Collection Date	03-15-07	06-19-07	09-25-07	11-27-07
Lab Code	DWW-1496	DWW-3746	DWW-7118	DWW-8104
Gross Beta	2.1 ± 0.4	4.2 ± 2.0	1.6 ± 0.6	4.4 ± 1.0
H-3	< 140	< 168	< 171	< 178

Location	D-55			
Collection Date	03-15-07	06-19-07	09-25-07	11-27-07
Lab Code	DWW-1497	DWW-3747	DWW-7119	DWW-8105
Gross Beta	2.9 ± 0.5	< 1.7	< 1.7	< 1.4
H-3	< 140	< 168	< 171	< 178

Location	D-57			
Collection Date	03-15-07	06-19-07	09-25-07	11-27-07
Lab Code	DWW-1498,9	DWW-3748	DWW-7120	DWW-8106
Gross Beta	0.9 ± 0.2	< 1.1	< 1.0	1.3 ± 0.7
H-3	< 140	< 168	< 171	< 178

Location	D-58			
Collection Date	03-15-07	06-19-07	09-25-07	11-27-07
Lab Code	DWW-1500	DWW-3749	DWW-7121	DWW-8107
Gross Beta	5.2 ± 0.6	8.6 ± 2.2	4.3 ± 0.8	7.6 ± 1.2
H-3	< 140	< 168	< 171	< 178

Location	D-72			
Collection Date	03-15-07	06-19-07	09-25-07	11-27-07
Lab Code	DWW-1501	DWW-3750	DWW-7122 [a]	DWW-8108
Gross Beta	< 0.5	< 1.7	< 1.0	< 1.2
H-3	< 175	< 168	< 171	< 178

[a] Duplicate analysis, refer to Appendix A.

Table 12.2. Ground water, Monitoring wells, analyses for gross beta and tritium.
Collection: Quarterly
Units: pCi/L

Location	D-111: MW-01A (shallow)			
Collection Date	03-13-07	06-13-07	09-24-07	11-28-07
Lab Code	DWW-1467	DWW-3694	DWW-7105	DWW-8140
Gross Beta	5.0 ± 2.3 [b]	4.2 ± 1.0	2.7 ± 0.8	3.0 ± 0.7
H-3	483 ± 98	646 ± 114	298 ± 102	287 ± 105

Location	D-111: MW-01B (intermediate)			
Collection Date	03-13-07	06-13-07	09-24-07	11-28-07
Lab Code	DWW-1468	DWW-3695	DWW-7106	DWW-8141
Gross Beta	2.6 ± 1.2	1.4 ± 0.8	1.4 ± 0.6	2.0 ± 1.3
H-3	< 179	< 169	< 171	< 178

Location	D-112: MW-02A (shallow)			
Collection Date	03-13-07	06-13-07	09-24-07	11-28-07
Lab Code	DWW-1469	DWW-3696	DWW-7107	DWW-8142 [a]
Gross Beta	4.3 ± 2.2	6.8 ± 1.0	3.1 ± 0.8	9.5 ± 2.2
H-3	< 179	< 169	< 171	< 178

Location	D-112: MW-02B (intermediate)			
Collection Date	03-13-07	06-13-07	09-24-07	11-28-07
Lab Code	DWW-1470	DWW-3697 [a]	DWW-7108	DWW-8144
Gross Beta	2.1 ± 1.1 [b]	< 1.2	1.0 ± 0.6	< 1.3
H-3	< 179	< 169	< 171	< 188

Location	D-113: MW-03A (shallow)			
Collection Date	03-13-07	06-13-07	09-24-07	11-28-07
Lab Code	DWW-1471	DWW-3699	DWW-7109	DWW-8145
Gross Beta	5.0 ± 2.3	4.8 ± 1.0	3.8 ± 0.9	5.0 ± 0.8
H-3	< 179	< 169	< 171	< 178

Location	D-113: MW-03B (intermediate)			
Collection Date	03-13-07	06-13-07	09-24-07	11-28-07
Lab Code	DWW-1472	DWW-3700	DWW-7110	DWW-8146
Gross Beta	2.1 ± 1.3 [b]	2.2 ± 0.8	1.0 ± 0.6	0.9 ± 0.3
H-3	< 179	< 169	< 171	< 178

[a] Duplicate sample; refer to Appendix A.

[b] Result of reanalysis. Counted longer to achieve lower LLD.

Table 12.2.. Ground water, Monitoring wells, analyses for gross beta and tritium.
Collection: Quarterly
Units: pCi/L

Location	D-114: MW-04A (shallow)			
Collection Date	03-12-07	06-13-07	09-24-07	11-28-07
Lab Code	DWW-1473	DWW-3701	DWW-7111	DWW-8147
Gross Beta	2.9 ± 1.3	3.6 ± 0.9	2.9 ± 0.8	2.3 ± 0.9
H-3	< 178	< 169	198 ± 98	< 178
Location	D-114: MW-04B (intermediate)			
Collection Date	03-12-07	06-13-07	09-24-07	11-28-07
Lab Code	DWW-1474	DWW-3702	DWW-7112	DWW-8148
Gross Beta	1.9 ± 1.0	1.7 ± 0.8	1.3 ± 0.6	1.3 ± 0.4
H-3	< 169	< 169	< 171	< 178
Location	D-115: MW-05A (shallow)			
Collection Date	03-12-07	06-13-07	09-24-07	11-28-07
Lab Code	DWW-1475	DWW-3703	DWW-7113	DWW-8149
Gross Beta	< 1.7	< 1.2	< 0.9	0.9 ± 0.6
H-3	269 ± 94	< 169	< 171	< 178
Location	D-115: MW-05B (intermediate)			
Collection Date	03-12-07	06-13-07	09-24-07	11-28-07
Lab Code	DWW-1476	DWW-3704	DWW-7114	DWW-8150
Gross Beta	< 1.8	< 1.4	< 0.9	1.0 ± 0.3
H-3	< 179	< 169	243 ± 100	< 156
Location	D-116: MW-06A (shallow)			
Collection Date	03-12-07	06-13-07	09-24-07	11-28-07
Lab Code	DWW-1477,8	DWW-3705	DWW-7115	DWW-8151[a]
Gross Beta	5.3 ± 1.0	7.6 ± 2.3	12.4 ± 2.5	17.7 ± 1.3
H-3	< 178	< 169	< 171	187 ± 102
Location	D-116: MW-06B (intermediate)			
Collection Date	03-12-07	06-13-07	09-24-07	11-28-07
Lab Code	DWW-1479	DWW-3706	DWW-7116	DWW-8152
Gross Beta	5.6 ± 1.4	7.6 ± 1.3	1.8 ± 0.6	4.3 ± 1.0
H-3	< 179	< 169	< 171	< 178

[a] Analyses for Sr-89, Sr-90 and gamma emitting isotopes were performed. It was determined that the most likely cause of the higher beta activity was contribution from naturally-occurring isotopes.

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

Location	D-57	D-58[a]	D-72[a]	D-96[a]
Lab Code	DVE- 3737			
Date Collected	06-18-07			
Sample Type	Rhubarb leaves			
K-40	4.89 ± 0.50			
Mn-54	< 0.017			
Fe-59	< 0.044			
Co-58	< 0.018			
Co-60	< 0.005			
Nb-95	< 0.021			
Zr-95	< 0.030			
Ru-103	< 0.016			
Ru-106	< 0.17			
I-131	< 0.028			
Cs-134	< 0.018			
Cs-137	< 0.012			
Ce-141	< 0.024			
Ce-144	< 0.12			

Location	D-109	D-108 (C)
Lab Code	DVE- 3739	DVE- 3738
Date Collected	06-18-07	06-18-07
Sample Type	Rhubarb leaves	Rhubarb leaves
K-40	1.94 ± 0.37	3.46 ± 0.54
Mn-54	< 0.016	< 0.021
Fe-59	< 0.016	< 0.018
Co-58	< 0.010	< 0.022
Co-60	< 0.012	< 0.019
Nb-95	< 0.015	< 0.026
Zr-95	< 0.035	< 0.042
Ru-103	< 0.014	< 0.022
Ru-106	< 0.10	< 0.19
I-131	< 0.025	< 0.029
Cs-134	< 0.013	< 0.025
Cs-137	< 0.014	< 0.026
Ce-141	< 0.022	< 0.025
Ce-144	< 0.12	< 0.16

[a] No sample; see Table 2.0, "Listing of Missed Samples."

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

Location	D-16	D-16	D-57	D-57	D-58
Lab Code	DVE- 6236	DVE- 6807 [a]	DVE- 6237	DVE- 6809	DVE- 6810
Date Collected	09-18-07	10-03-07	09-18-07	10-03-07	10-03-07
Sample Type	Grass	Soy Beans	Hay	Corn	Corn
K-40	6.99 ± 0.85	10.33 ± 0.71	18.75 ± 0.69	2.67 ± 0.29	2.91 ± 0.41
Mn-54	< 0.026	< 0.023	< 0.024	< 0.007	< 0.017
Fe-59	< 0.060	< 0.054	< 0.050	< 0.018	< 0.025
Co-58	< 0.018	< 0.027	< 0.024	< 0.005	< 0.011
Co-60	< 0.025	< 0.026	< 0.026	< 0.008	< 0.013
Nb-95	< 0.036	< 0.023	< 0.029	< 0.005	< 0.013
Zr-95	< 0.048	< 0.035	< 0.043	< 0.009	< 0.020
Ru-103	< 0.017	< 0.014	< 0.024	< 0.006	< 0.008
Ru-106	< 0.14	< 0.15	< 0.18	< 0.075	< 0.11
Cs-134	< 0.022	< 0.022	< 0.018	< 0.007	< 0.008
Cs-137	< 0.026	< 0.020	< 0.026	< 0.008	< 0.017
Ce-141	< 0.043	< 0.037	< 0.048	< 0.016	< 0.016
Ce-144	< 0.15	< 0.15	< 0.18	< 0.059	< 0.084

Location	D-58	D-72	D-72	D-96	D-96
Lab Code		DVE- 6238	DVE- 6811		DVE- 6812
Date Collected		09-18-07	10-03-07		10-03-07
Sample Type		Hay	Soy Beans		Corn
K-40		6.34 ± 1.01	9.53 ± 0.46		2.91 ± 0.32
Mn-54		< 0.038	< 0.012		< 0.008
Fe-59		< 0.077	< 0.025		< 0.015
Co-58		< 0.037	< 0.010		< 0.006
Co-60		< 0.023	< 0.013		< 0.010
Nb-95		< 0.031	< 0.015		< 0.006
Zr-95		< 0.056	< 0.023		< 0.018
Ru-103		< 0.034	< 0.012		< 0.013
Ru-106		< 0.21	< 0.091		< 0.088
Cs-134		< 0.033	< 0.011		< 0.007
Cs-137		< 0.025	< 0.013		< 0.010
Ce-141		< 0.049	< 0.017		< 0.012
Ce-144		< 0.19	< 0.081		< 0.063

[a] Duplicate analysis, refer to Appendix A.

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

			Control	
Location	D-109	D-109	D-108	D-108
Lab Code	DVE- 6240	DVE- 6688	DVE- 6239	DVE- 6689
Date Collected	09-18-07	10-02-07	09-18-07	10-02-07
Sample Type	Hay	Corn	Hay	Corn
K-40	18.97 ± 1.16	2.58 ± 0.29	27.63 ± 1.35	2.63 ± 0.31
Mn-54	< 0.033	< 0.007	< 0.044	< 0.007
Fe-59	< 0.092	< 0.009	< 0.089	< 0.012
Co-58	< 0.026	< 0.005	< 0.028	< 0.008
Co-60	< 0.038	< 0.008	< 0.042	< 0.007
Nb-95	< 0.034	< 0.005	< 0.033	< 0.005
Zr-95	< 0.037	< 0.014	< 0.049	< 0.013
Ru-103	< 0.026	< 0.007	< 0.034	< 0.006
Ru-106	< 0.33	< 0.069	< 0.30	< 0.072
Cs-134	< 0.027	< 0.005	< 0.030	< 0.011
Cs-137	< 0.033	< 0.007	< 0.041	< 0.006
Ce-141	< 0.056	< 0.015	< 0.039	< 0.010
Ce-144	< 0.23	< 0.067	< 0.19	< 0.056

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

Lab Code	DSW- 403	DSW- 1088	DSW- 1636	DSW- 2326	DSW- 3045	DSW- 3829
Date Collected	01-22-07	02-19-07	03-19-07	04-23-07	05-23-07	06-22-07
H-3	< 143	< 137	< 145	< 173	< 144	< 142
Mn-54	< 2.8	< 2.8	< 1.8	< 2.4	< 3.4	< 2.0
Fe-59	< 6.1	< 7.0	< 5.9	< 4.5	< 5.9	< 5.2
Co-58	< 2.3	< 3.3	< 3.2	< 3.1	< 2.4	< 2.8
Co-60	< 2.1	< 3.1	< 2.5	< 2.7	< 2.0	< 3.2
Zn-65	< 4.2	< 4.1	< 7.4	< 2.7	< 6.4	< 4.9
Nb-95	< 4.0	< 4.9	< 2.4	< 3.0	< 3.5	< 3.5
Zr-95	< 4.5	< 6.3	< 8.0	< 7.4	< 6.5	< 5.8
I-131	< 4.5	< 10.6	< 10.4	< 6.7	< 8.2	< 4.6
Cs-134	< 2.6	< 3.2	< 3.3	< 2.6	< 3.5	< 2.2
Cs-137	< 2.3	< 4.6	< 3.1	< 4.2	< 3.4	< 2.0
Ba-140	< 12.7	< 15.1	< 18.0	< 16.5	< 20.4	< 18.5
La-140	< 2.2	< 2.2	< 2.7	< 3.5	< 2.8	< 2.9

Date Collected	DSW- 4704	DSW- 5649	DSW- 6167	DSW- 7489	DSW- 8097	DSW- 8453
Lab Code	07-24-07	08-22-07	09-12-07	10-24-07	11-26-07	12-17-07
H-3	< 177	< 154	< 148	< 175	< 178	< 173
I-131(Chemistry)					< 0.4	< 0.4
Mn-54	< 4.1	< 1.8	< 3.1	< 4.5	< 1.6	< 3.8
Fe-59	< 8.2	< 3.6	< 4.0	< 5.6	< 5.3	< 2.7
Co-58	< 5.9	< 2.7	< 2.3	< 6.1	< 1.4	< 2.3
Co-60	< 3.3	< 2.4	< 3.4	< 1.9	< 2.5	< 3.4
Zn-65	< 6.3	< 3.6	< 5.2	< 8.3	< 3.0	< 3.7
Nb-95	< 6.2	< 2.8	< 3.0	< 5.1	< 3.7	< 3.7
Zr-95	< 10.2	< 5.4	< 5.6	< 9.4	< 4.2	< 5.0
I-131	< 7.9	< 5.2	< 4.8	< 7.5	< 7.1	< 6.6
Cs-134	< 5.6	< 3.9	< 4.6	< 5.3	< 3.2	< 4.1
Cs-137	< 3.7	< 3.9	< 4.0	< 4.8	< 3.3	< 2.7
Ba-140	< 20.5	< 10.2	< 8.9	< 18.7	< 15.5	< 14.7
La-140	< 3.2	< 4.5	< 6.5	< 7.8	< 6.5	< 5.4

Table 15. Surface water samples, analyses for iodine-131, tritium and gamma-emitting isotopes.
Collection: Monthly
Units: pCi/L
Location: D-50

Lab Code	DSW- 208	[a] DSW- 1089	DSW- 1637	DSW- 2327	DSW- 3046	DSW- 3830
Date Collected	01-11-07	02-19-07	03-19-07	04-23-07	05-23-07	06-22-07
H-3	< 147	< 137	< 145	< 173	< 144	< 142
Mn-54	< 2.7	< 1.7	< 2.7	< 1.9	< 2.3	< 3.8
Fe-59	< 3.4	< 3.3	< 3.9	< 2.3	< 3.5	< 5.9
Co-58	< 1.9	< 2.0	< 2.6	< 2.6	< 2.8	< 4.2
Co-60	< 2.0	< 1.3	< 1.5	< 0.9	< 2.6	< 3.3
Zn-65	< 3.0	< 5.1	< 3.9	< 3.0	< 3.0	< 5.8
Nb-95	< 3.7	< 2.5	< 2.5	< 1.8	< 2.5	< 3.6
Zr-95	< 3.1	< 5.4	< 4.4	< 6.0	< 5.9	< 9.6
I-131	< 5.0	< 7.5	< 6.2	< 5.4	< 5.8	< 8.5
Cs-134	< 2.7	< 2.5	< 2.4	< 2.1	< 3.0	< 4.0
Cs-137	< 3.0	< 3.4	< 4.1	< 3.2	< 3.7	< 6.1
Ba-140	< 13.7	< 18.5	< 13.5	< 12.3	< 15.0	< 29.3
La-140	< 4.7	< 3.7	< 2.7	< 3.2	< 3.6	< 3.4

Date Collected	DSW- 4705	DSW- 5650	DSW- 6168	DSW- 7490	DSW- 8098	DSW- 8454
Lab Code	07-24-07	08-22-07	09-12-07	10-24-07	11-26-07	12-17-07
H-3	< 177	< 154	< 148	< 175	< 178	< 173
Mn-54	< 4.2	< 1.5	< 5.1	< 2.0	< 4.1	< 3.4
Fe-59	< 9.0	< 3.1	< 7.6	< 2.3	< 4.9	< 4.8
Co-58	< 4.4	< 1.7	< 4.1	< 1.6	< 2.6	< 2.6
Co-60	< 3.0	< 2.4	< 2.3	< 2.1	< 5.7	< 3.5
Zn-65	< 6.1	< 3.2	< 9.9	< 3.4	< 5.7	< 4.2
Nb-95	< 4.1	< 1.5	< 5.9	< 1.9	< 4.4	< 3.2
Zr-95	< 5.5	< 5.0	< 10.7	< 4.6	< 9.9	< 4.8
I-131	< 3.0	< 4.5	< 13.1	< 4.3	< 6.1	< 3.7
Cs-134	< 2.7	< 2.2	< 5.3	< 2.4	< 2.8	< 3.7
Cs-137	< 5.2	< 3.4	< 7.0	< 2.7	< 4.1	< 4.2
Ba-140	< 24.4	< 9.7	< 16.1	< 5.7	< 15.5	< 16.2
La-140	< 6.0	< 2.4	< 8.1	< 1.8	< 8.0	< 5.5

[a] Duplicate analysis, refer to Appendix A.

Table 15. Surface water samples, analyses for iodine-131, tritium and gamma-emitting isotopes.
Collection: Monthly
Units: pCi/L
Location: D-51

Lab Code	DSW- 210	DSW- 1090 [a]	DSW- 1638	DSW- 2328 [a]	DSW- 3047	DSW- 3831
Date Collected	01-11-07	02-19-07	03-19-07	04-23-07	05-23-07	06-22-07
H-3	< 147	< 137	< 145	< 173	< 144	< 142
Mn-54	< 2.6	< 1.4	< 3.1	< 2.5	< 1.9	< 2.9
Fe-59	< 5.7	< 3.9	< 6.5	< 3.8	< 5.3	< 8.3
Co-58	< 1.7	< 1.8	< 4.7	< 1.3	< 1.7	< 3.4
Co-60	< 1.8	< 2.4	< 4.8	< 2.7	< 2.2	< 3.6
Zn-65	< 4.3	< 4.2	< 3.6	< 3.8	< 2.0	< 8.1
Nb-95	< 3.2	< 2.3	< 5.3	< 2.9	< 2.9	< 4.6
Zr-95	< 4.1	< 4.3	< 12.9	< 5.5	< 4.6	< 6.0
I-131	< 4.6	< 8.0	< 9.7	< 5.4	< 7.1	< 5.1
Cs-134	< 2.6	< 3.3	< 5.0	< 2.8	< 2.6	< 2.0
Cs-137	< 1.9	< 2.9	< 4.3	< 2.8	< 2.7	< 5.5
Ba-140	< 9.7	< 15.9	< 25.4	< 9.8	< 18.8	< 16.2
La-140	< 3.2	< 2.1	< 5.0	< 1.8	< 1.9	< 6.2

Date Collected	DSW- 4706	DSW- 5651	DSW- 6169	DSW- 7491	DSW- 8099	DSW- 8455
Lab Code	07-24-07	08-22-07	09-12-07	10-24-07	11-26-07	12-17-07
H-3	< 177	< 154	< 148	< 175	< 178	< 173
Mn-54	< 3.4	< 1.8	< 2.9	< 3.2	< 5.1	< 2.8
Fe-59	< 6.9	< 3.5	< 8.1	< 4.4	< 6.8	< 3.3
Co-58	< 4.0	< 2.3	< 2.2	< 2.2	< 4.9	< 1.9
Co-60	< 4.3	< 2.6	< 3.0	< 1.1	< 2.8	< 2.3
Zn-65	< 5.0	< 3.4	< 4.2	< 3.8	< 5.1	< 5.8
Nb-95	< 3.0	< 3.4	< 3.7	< 2.3	< 3.8	< 4.0
Zr-95	< 6.6	< 3.4	< 8.0	< 3.9	< 6.7	< 6.7
I-131	< 6.8	< 4.2	< 10.6	< 4.2	< 11.6	< 5.5
Cs-134	< 1.8	< 2.8	< 4.7	< 2.7	< 4.8	< 1.9
Cs-137	< 3.8	< 2.8	< 4.4	< 3.3	< 4.6	< 4.0
Ba-140	< 17.2	< 18.2	< 24.9	< 13.6	< 29.8	< 13.3
La-140	< 6.8	< 4.0	< 6.6	< 1.9	< 9.3	< 2.1

[a] Duplicate analysis, refer to Appendix A.

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

Lab Code	DSW- 211	DSW- 1092	DSW- 1639	DSW- 2330	DSW- 3048	DSW- 3832
Date Collected	01-11-07	02-19-07	03-19-07	04-23-07	05-23-07	06-22-07
H-3	< 147	< 137	< 145	< 173	< 144	< 142
Mn-54	< 2.8	< 3.7	< 2.1	< 2.6	< 2.3	< 2.7
Fe-59	< 5.8	< 4.6	< 5.1	< 5.3	< 3.9	< 7.7
Co-58	< 2.6	< 2.6	< 3.4	< 3.0	< 1.9	< 3.5
Co-60	< 2.7	< 2.0	< 4.6	< 2.4	< 2.8	< 2.5
Zn-65	< 3.0	< 4.9	< 4.6	< 5.2	< 7.2	< 1.7
Nb-95	< 2.5	< 2.6	< 2.9	< 2.9	< 3.2	< 3.4
Zr-95	< 3.2	< 4.4	< 6.2	< 4.8	< 2.8	< 6.7
I-131	< 3.9	< 4.7	< 11.0	< 4.2	< 4.4	< 5.7
Cs-134	< 3.1	< 3.8	< 5.3	< 3.3	< 2.8	< 2.5
Cs-137	< 3.0	< 3.5	< 3.8	< 3.0	< 3.9	< 2.7
Ba-140	< 15.7	< 23.6	< 21.5	< 10.7	< 16.2	< 13.7
La-140	< 2.3	< 2.1	< 4.9	< 1.7	< 1.8	< 2.0

Date Collected	DSW- 4707	DSW- 5652	DSW- 6170	DSW- 7492	DSW- 8100	DSW- 8456
Lab Code	07-24-07	08-22-07	09-12-07	10-24-07	11-26-07	12-17-07
H-3	< 177	< 154	< 148	< 175	< 178	< 173
I-131(Chemistry)					< 0.4	< 0.3
Mn-54	< 1.5	< 1.7	< 3.4	< 2.9	< 1.8	< 2.3
Fe-59	< 8.3	< 2.1	< 3.9	< 5.7	< 5.9	< 6.2
Co-58	< 3.0	< 1.2	< 1.6	< 3.7	< 2.4	< 2.4
Co-60	< 5.9	< 3.1	< 2.3	< 2.0	< 2.3	< 2.5
Zn-65	< 3.7	< 3.4	< 5.2	< 3.4	< 3.6	< 2.4
Nb-95	< 3.2	< 2.9	< 2.8	< 3.3	< 2.8	< 2.8
Zr-95	< 6.2	< 5.1	< 4.5	< 4.3	< 6.2	< 6.6
I-131	< 4.9	< 5.7	< 5.3	< 6.2	< 4.4	< 5.0
Cs-134	< 4.4	< 1.8	< 2.9	< 1.6	< 2.5	< 3.1
Cs-137	< 5.7	< 2.0	< 3.2	< 2.8	< 3.9	< 2.5
Ba-140	< 18.7	< 11.4	< 13.5	< 14.2	< 11.8	< 20.4
La-140	< 7.0	< 1.7	< 1.8	< 4.9	< 3.7	< 4.2

Table 15. Surface water samples, analyses for iodine-131, tritium and gamma-emitting isotopes.
Collection: Monthly
Units: pCi/L
Location: D-99

Lab Code	DSW- 404	DSW- 1093	DSW- 1640	DSW- 2331	DSW- 3049	DSW- 3833
Date Collected	01-22-07	02-19-07	03-19-07	04-23-07	05-23-07	06-22-07
H-3	< 143	< 137	< 145	< 173	< 144	< 142
Mn-54	< 2.3	< 1.1	< 1.3	< 3.1	< 2.6	< 1.8
Fe-59	< 5.5	< 2.3	< 6.1	< 4.3	< 4.6	< 3.7
Co-58	< 1.8	< 0.8	< 2.1	< 2.3	< 1.8	< 2.1
Co-60	< 2.4	< 2.1	< 2.6	< 2.2	< 1.8	< 2.9
Zn-65	< 2.4	< 6.1	< 3.8	< 3.8	< 3.7	< 4.2
Nb-95	< 2.3	< 2.0	< 2.3	< 2.2	< 2.8	< 2.0
Zr-95	< 5.9	< 4.4	< 4.1	< 3.9	< 6.3	< 3.1
I-131	< 3.8	< 9.1	< 7.2	< 5.6	< 7.4	< 3.8
Cs-134	< 1.9	< 4.1	< 2.9	< 3.3	< 4.1	< 1.9
Cs-137	< 3.2	< 3.3	< 1.9	< 2.4	< 3.3	< 2.7
Ba-140	< 12.5	< 9.7	< 12.3	< 14.2	< 21.6	< 10.2
La-140	< 2.6	< 2.5	< 2.1	< 3.2	< 4.0	< 1.3

Date Collected	DSW- 4708	DSW- 5653	DSW- 6171	DSW- 7493	DSW- 8101	DSW- 8457
Lab Code	07-24-07	08-22-07	09-12-07	10-24-07	11-26-07	12-17-07
H-3	< 177	< 154	< 148	< 175	< 178	< 173
Mn-54	< 5.3	< 2.7	< 4.1	< 4.6	< 3.1	< 2.4
Fe-59	< 11.5	< 4.3	< 5.2	< 10.1	< 5.5	< 6.0
Co-58	< 5.5	< 3.3	< 4.1	< 4.6	< 2.2	< 3.3
Co-60	< 3.4	< 1.1	< 4.2	< 2.2	< 2.3	< 3.0
Zn-65	< 5.7	< 2.6	< 7.3	< 7.8	< 4.4	< 9.7
Nb-95	< 5.2	< 1.9	< 4.1	< 2.9	< 2.1	< 3.6
Zr-95	< 9.3	< 5.2	< 6.5	< 8.9	< 3.2	< 8.5
I-131	< 6.1	< 6.1	< 10.0	< 10.9	< 8.5	< 8.2
Cs-134	< 4.1	< 3.7	< 6.2	< 4.7	< 3.6	< 3.9
Cs-137	< 3.4	< 3.6	< 2.3	< 4.3	< 4.1	< 4.3
Ba-140	< 14.4	< 9.7	< 21.4	< 16.9	< 19.0	< 14.7
La-140	< 7.7	< 4.5	< 7.2	< 7.1	< 5.7	< 5.6

Table 15. Surface water samples, analyses for iodine-131, tritium and gamma-emitting isotopes.
Collection: Monthly
Units: pCi/L
Location: D-107

Lab Code	DSW- 212	DSW- 1094	DSW- 1641	DSW- 2332	DSW- 3050	DSW- 3965
Date Collected	01-11-07	02-19-07	03-19-07	04-23-07	05-23-07	06-25-07
H-3	< 147	254 ± 84	298 ± 90	< 173	166 ± 84	234 ± 85
Mn-54	< 4.6	< 2.6	< 3.6	< 2.1	< 3.4	< 2.4
Fe-59	< 4.2	< 5.3	< 9.2	< 4.2	< 4.5	< 4.7
Co-58	< 3.2	< 3.3	< 3.5	< 2.4	< 2.6	< 3.0
Co-60	< 4.3	< 3.5	< 3.3	< 1.7	< 2.3	< 2.5
Zn-65	< 7.1	< 4.2	< 8.1	< 2.6	< 3.5	< 4.9
Nb-95	< 6.1	< 3.4	< 5.8	< 1.6	< 4.4	< 3.8
Zr-95	< 10.2	< 4.2	< 8.4	< 2.8	< 2.4	< 6.6
I-131	< 6.3	< 6.0	< 10.4	< 4.1	< 5.6	< 5.3
Cs-134	< 5.0	< 2.8	< 4.4	< 3.0	< 2.7	< 2.5
Cs-137	< 3.0	< 3.4	< 5.5	< 2.6	< 4.0	< 2.0
Ba-140	< 17.2	< 21.5	< 14.0	< 14.0	< 18.9	< 15.1
La-140	< 4.1	< 2.4	< 3.5	< 2.3	< 2.2	< 2.2

Date Collected	DSW- 4709	DSW- 5654	DSW- 6172	DSW- 7494	DSW- 8102	DSW- 8458
Lab Code	07-24-07	08-22-07	09-12-07	10-24-07	11-26-07	12-17-07
H-3	< 177	382 ± 98	< 148	< 175	< 178	< 173
Mn-54	< 3.1	< 2.6	< 4.7	< 3.8	< 5.1	< 2.6
Fe-59	< 10.2	< 5.3	< 6.4	< 6.1	< 3.7	< 3.2
Co-58	< 3.6	< 2.0	< 4.4	< 3.1	< 2.5	< 1.4
Co-60	< 3.6	< 1.4	< 5.4	< 3.8	< 5.4	< 1.1
Zn-65	< 3.8	< 4.5	< 7.2	< 3.9	< 6.1	< 3.0
Nb-95	< 3.1	< 4.1	< 5.2	< 4.0	< 4.6	< 2.8
Zr-95	< 8.1	< 6.4	< 10.5	< 7.8	< 9.8	< 4.0
I-131	< 3.2	< 6.5	< 7.8	< 8.5	< 6.6	< 3.1
Cs-134	< 5.2	< 2.7	< 5.5	< 3.7	< 5.7	< 2.8
Cs-137	< 5.1	< 2.9	< 5.3	< 4.3	< 2.4	< 2.2
Ba-140	< 21.2	< 17.9	< 29.1	< 14.5	< 22.6	< 13.4
La-140	< 5.7	< 2.8	< 7.2	< 6.5	< 7.7	< 1.2

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Table 16. Surface water, analysis for tritium. [a]
Collection: Quarterly composites of monthly samples.
Units: pCi/L

Location	D-50
Period	1st Qtr.
Lab Code	
H-3	

Location	D-51
Period	1st Qtr.
Lab Code	
H-3	

Location	D-107
Period	1st Qtr.
Lab Code	
H-3	

[a] Quarterly composites discontinued, tritium analysis is done on the individual monthly samples.

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

Location	D-49			
Lab Code	DF- 3035	DF- 3036	DF- 6690	DF- 6691
Date Collected	05-21-07	05-21-07	09-21-07	09-21-07
Sample Type	Carpsucker	Carp	Common Carp	Carpsucker
K-40	3.02 ± 0.56	3.09 ± 0.37	2.80 ± 0.36	2.63 ± 0.45
Mn-54	< 0.020	< 0.013	< 0.014	< 0.024
Fe-59	< 0.043	< 0.025	< 0.038	< 0.071
Co-58	< 0.017	< 0.009	< 0.021	< 0.016
Co-60	< 0.025	< 0.010	< 0.005	< 0.019
Zn-65	< 0.030	< 0.023	< 0.017	< 0.033
Nb-95	< 0.014	< 0.012	< 0.023	< 0.050
Zr-95	< 0.045	< 0.032	< 0.021	< 0.035
Ru-103	< 0.026	< 0.013	< 0.012	< 0.040
Ru-106	< 0.095	< 0.114	< 0.104	< 0.097
Cs-134	< 0.017	< 0.013	< 0.007	< 0.016
Cs-137	< 0.021	< 0.015	< 0.015	< 0.014
Ce-141	< 0.023	< 0.025	< 0.028	< 0.067
Ce-144	< 0.086	< 0.108	< 0.052	< 0.128

Location	D-61			
Lab Code	DF- 3037	DF- 3038	DF- 6692	DF- 6693
Date Collected	05-21-07	05-21-07	09-21-07	09-21-07
Sample Type	Carpsucker	Carp	Common Carp	Carpsucker
K-40	2.86 ± 0.56	2.78 ± 0.35	2.85 ± 0.40	3.06 ± 0.50
Mn-54	< 0.012	< 0.015	< 0.010	< 0.016
Fe-59	< 0.034	< 0.015	< 0.065	< 0.060
Co-58	< 0.019	< 0.006	< 0.011	< 0.025
Co-60	< 0.025	< 0.004	< 0.009	< 0.018
Zn-65	< 0.022	< 0.022	< 0.024	< 0.018
Nb-95	< 0.023	< 0.013	< 0.029	< 0.029
Zr-95	< 0.049	< 0.019	< 0.024	< 0.043
Ru-103	< 0.019	< 0.012	< 0.016	< 0.040
Ru-106	< 0.186	< 0.066	< 0.092	< 0.138
Cs-134	< 0.020	< 0.012	< 0.013	< 0.019
Cs-137	< 0.022	< 0.009	< 0.012	< 0.016
Ce-141	< 0.033	< 0.018	< 0.032	< 0.054
Ce-144	< 0.134	< 0.057	< 0.059	< 0.122

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

Location	D-50	
Lab Code	DBS- 2783	DBS- 7124
Date Collected	05-14-07	09-28-07
K-40	8.63 ± 0.70	10.49 ± 0.65
Mn-54	< 0.017	< 0.025
Fe-59	< 0.028	< 0.057
Co-58	< 0.023	< 0.026
Co-60	< 0.026	< 0.014
Zn-65	< 0.059	< 0.039
Nb-95	< 0.021	< 0.027
Zr-95	< 0.044	< 0.048
Ru-103	< 0.018	< 0.032
Ru-106	< 0.110	< 0.118
Cs-134	< 0.029	< 0.017
Cs-137	< 0.026	0.041 ± 0.022
Ce-141	< 0.036	< 0.065
Ce-144	< 0.105	< 0.095

Location	D-51	
Lab Code	DBS- 2784	DBS- 7125
Date Collected	05-14-07	09-28-07
K-40	9.39 ± 0.60	12.96 ± 0.67
Mn-54	< 0.018	< 0.020
Fe-59	< 0.027	< 0.039
Co-58	< 0.024	< 0.023
Co-60	< 0.014	< 0.021
Zn-65	< 0.036	< 0.051
Nb-95	< 0.014	< 0.021
Zr-95	< 0.031	< 0.021
Ru-103	< 0.014	< 0.016
Ru-106	< 0.079	< 0.141
Cs-134	< 0.024	< 0.015
Cs-137	< 0.020	0.063 ± 0.027
Ce-141	< 0.031	< 0.050
Ce-144	< 0.110	< 0.100

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

Location	D-107A	
Lab Code	DBS- 2785	DBS- 7126
Date Collected	05-14-07	09-28-07
K-40	7.76 ± 0.77	4.79 ± 0.39
Mn-54	< 0.024	< 0.012
Fe-59	< 0.030	< 0.018
Co-58	< 0.026	< 0.004
Co-60	< 0.062	< 0.009
Zn-65	< 0.068	< 0.020
Nb-95	< 0.034	< 0.015
Zr-95	< 0.031	< 0.016
Ru-103	< 0.038	< 0.008
Ru-106	< 0.262	< 0.071
Cs-134	< 0.036	< 0.012
Cs-137	< 0.033	< 0.005
Ce-141	< 0.068	< 0.030
Ce-144	< 0.173	< 0.060

Table 19. Precipitation, analyses for gamma emitting isotopes.

Collection: Monthly
Units: pCi/L
Location: D-16

Date Collected	01-11-07	02-22-07	03-22-07	04-24-07	05-23-07	06-22-07
Lab Code	DP- 213	DP- 1095 [a]	DP- 1642	DP- 2333	DP- 3051	DP- 3834
Mn-54	< 5.2	< 16.5	< 2.8	< 4.4	< 4.8	< 4.4
Fe-59	< 8.5	< 26.5	< 10.2	< 9.5	< 8.1	< 3.9
Co-58	< 5.9	< 17.8	< 5.6	< 3.0	< 3.6	< 4.7
Co-60	< 3.4	< 11.4	< 4.6	< 8.4	< 1.7	< 6.1
Zn-65	< 6.2	< 37.9	< 6.9	< 12.8	< 5.8	< 7.5
Nb-95	< 4.6	< 24.1	< 5.9	< 7.7	< 4.5	< 7.9
Zr-95	< 12.0	< 19.6	< 10.2	< 14.7	< 4.7	< 12.3
I-131	< 7.1	< 20.2	< 7.5	< 16.9	< 5.3	< 8.6
Cs-134	< 5.5	< 16.7	< 5.8	< 7.3	< 3.8	< 5.5
Cs-137	< 6.0	< 21.0	< 4.7	< 5.3	< 4.8	< 8.1
Ba-140	< 26.4	< 85.7	< 20.1	< 37.0	< 17.7	< 17.1
La-140	< 4.1	< 28.1	< 5.1	< 5.2	< 2.8	< 2.5

Date Collected	07-23-07	08-23-07	09-13-07	10-25-07	11-29-07	12-18-07
Lab Code	DP- 4831	DP- 5655	DP- 6173	DP- 7495	DP- 8139	DP- 8459
Mn-54	< 4.0	< 2.8	< 3.1	< 3.4	< 5.3	< 4.2
Fe-59	< 9.9	< 6.0	< 5.9	< 6.3	< 9.6	< 5.4
Co-58	< 3.8	< 4.5	< 2.0	< 3.2	< 6.1	< 5.5
Co-60	< 5.1	< 5.6	< 2.8	< 4.0	< 7.4	< 5.8
Zn-65	< 5.8	< 7.9	< 4.5	< 3.6	< 5.5	< 5.2
Nb-95	< 6.4	< 4.5	< 3.3	< 3.0	< 6.9	< 7.1
Zr-95	< 5.9	< 3.5	< 4.4	< 5.0	< 9.2	< 6.3
I-131	< 12.3	< 10.1	< 6.7	< 4.2	< 9.1	< 12.6
Cs-134	< 5.1	< 4.2	< 2.6	< 3.0	< 5.2	< 3.8
Cs-137	< 5.2	< 4.7	< 1.9	< 4.0	< 5.9	< 7.1
Ba-140	< 28.3	< 26.2	< 13.3	< 18.0	< 31.5	< 27.0
La-140	< 6.0	< 2.5	< 2.9	< 3.1	< 6.4	< 3.4

[a] LLDs not reached due to small sample size (100 mL.); sample counted 120,000 sec.

Table 20. Precipitation, analysis for tritium.
Collection: Quarterly composites of monthly samples.
Units: pCi/L

Location	D-16			
Period	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Lab Code	DP-2226	DP-4283	DP-6574,5	DP-8636
H-3	< 172	< 150	< 174	< 152

APPENDIX A

SUPPLEMENTAL ANALYSES

A-1.1 Airborne particulates, duplicate analyses for gross beta.

Collection: Continuous, weekly exchange.
Required LLD: 0.010

Location	Date Collected	Volume (m^3)	Gross Beta (pCi/m^3)
D-05	02-15-07	246	0.028 ± 0.004
D-15	06-07-07	44	0.023 ± 0.018
D-03	07-12-07	286	0.039 ± 0.004
D-03	07-19-07	290	0.023 ± 0.004
D-03	09-06-07	279	0.036 ± 0.004
D-03	09-27-07	279	0.037 ± 0.005
D-03	10-11-07	281	0.016 ± 0.003
D-15	11-01-07	286	0.028 ± 0.004
D-03	11-08-07	282	0.022 ± 0.004
D-03	11-21-07	241	0.039 ± 0.005
D-03	11-28-07	333	0.032 ± 0.004
D-05	12-13-07	285	0.063 ± 0.005
D-13	01-03-08	278	0.063 ± 0.005

A-1.2 Duplicate Analyses, Surface water.

Units: pCi/L

Location	D-50	D-51	D-51
Lab Code	DSW- 209	DSW- 1091	DSW- 2329
Date Collected	01-11-07	02-19-07	04-23-07
H-3	< 147	< 147	< 147
Mn-54	< 3.7	< 1.7	< 3.7
Fe-59	< 4.4	< 2.2	< 5.8
Co-58	< 2.6	< 2.3	< 3.4
Co-60	< 2.2	< 2.0	< 2.8
Zn-65	< 3.0	< 2.7	< 8.3
Nb-95	< 3.7	< 2.2	< 3.4
Zr-95	< 4.3	< 4.5	< 11.5
I-131	< 6.7	< 5.9	< 6.2
Cs-134	< 3.1	< 3.1	< 4.9
Cs-137	< 3.4	< 3.1	< 5.0
Ba-140	< 11.3	< 18.7	< 26.5
La-140	< 1.6	< 3.3	< 2.4

A-1.3 Duplicate Analyses, Milk.

Units: pCi/L

Location		D-109					
Date	Lab	Concentration (pCi/L)					
Collected	Code	I-131	K-40	Cs-134	Cs-137	Ba-140	La-140
05-01-07	DMI- 2542	< 0.4	1317 ± 111	< 3.4	< 3.7	< 13.8	< 2.7
06-12-07	DMI- 3584	< 0.4	1301 ± 115	< 3.4	< 3.9	< 14.9	< 2.5

A-1.4 Duplicate Analyses, Well Water.

Units: pCi/L

Location	D-112: MW-02B	D-72	D-112: MW-02A
Collection Date	06-13-07	09-25-07	11-28-07
Lab Code	DWW-3698	DWW-7123	DWW-8143
Gross Beta	< 1.2	< 1.0	7.9 ± 2.0
H-3	< 169	< 171	< 178

A-1.5 Duplicate Analyses, Air Particulates, Quarterly Composite

Units: pCi/L

Location	D-7	
Quarter	3rd Quarter	4th Quarter
Lab Code	DAP- 7261	DAP- 8900
Volume (m3)	3727	3685
Be-7	0.091 ± 0.016	0.070 ± 0.015
Mn-54	< 0.0006	< 0.0006
Fe-59	< 0.0011	< 0.0009
Co-58	< 0.0004	< 0.0006
Co-60	< 0.0004	< 0.0008
Nb-95	< 0.0012	< 0.0007
Zr-95	< 0.0015	< 0.0006
Ru-103	< 0.0010	< 0.0005
Ru-106	< 0.0022	< 0.0040
Cs-134	< 0.0005	< 0.0005
Cs-137	< 0.0004	< 0.0005
Ce-141	< 0.0019	< 0.0017
Ce-144	< 0.0052	< 0.0044

A-1.6 Duplicate Analyses, Vegetation

Units = pCi/gwet

Location	D-16
Lab Code	DVE- 6808
Date Collected	10-03-07
Sample Type	Soy Beans
K-40	10.16 ± 0.71
Mn-54	< 0.026
Fe-59	< 0.047
Co-58	< 0.021
Co-60	< 0.022
Nb-95	< 0.028
Zr-95	< 0.042
Ru-103	< 0.011
Ru-106	< 0.22
Cs-134	< 0.020
Cs-137	< 0.026
Ce-141	< 0.036
Ce-144	< 0.079

A-2. Supplemental Analyses, Precipitation, analysis for tritium.

Sample Description	Collection Date	Concentration (pCi/L) H-3
Location 1	5/7/2007	< 162
Location 2	5/7/2007	< 162
Location 3	5/7/2007	< 162
Location 4	5/7/2007	< 162
Location 6	5/7/2007	< 162
Location 7	5/7/2007	556 ± 108
Location 8	5/7/2007	509 ± 106
Location 9	5/7/2007	757 ± 115
Location 10	5/7/2007	963 ± 122
Location 13	5/7/2007	201 ± 94
Location 16	5/7/2007	368 ± 101
North Pit	5/7/2007	1048 ± 125
SW Pit	5/7/2007	1105 ± 126
Center Pit	5/7/2007	1060 ± 125
Composite A	5/16/2007	2193 ± 153
Composite B	5/16/2007	3299 ± 179
Composite C	5/16/2007	953 ± 117
Pit North	5/16/2007	2891 ± 167
Pit South	5/16/2007	2773 ± 165
Composite D	5/24/2007	2505 ± 160
Composite E	5/24/2007	1460 ± 134
Composite F	5/24/2007	1399 ± 132
Composite G	5/24/2007	880 ± 118
Pit North	5/24/2007	1486 ± 134
Pit South	5/24/2007	1539 ± 136
Pit North	5/31/2007	1171 ± 128
Pit North	5/31/2007	1248 ± 128
Pit South	5/31/2007	1126 ± 125
In Pit @ 13	5/31/2007	1106 ± 124
In Pit @ 14	5/31/2007	1227 ± 127
Location 1	5/31/2007	< 176
Location 2	5/31/2007	< 178
Location 3	5/31/2007	< 178
Location 4	5/31/2007	< 176
Location 5	5/31/2007	< 176
Location 6	5/31/2007	< 176
Location 7	5/31/2007	220 ± 96
Location 8	5/31/2007	< 172
Location 9	5/31/2007	929 ± 117
Location 10	5/31/2007	657 ± 109
Location 11	5/31/2007	227 ± 94
Location 13	5/31/2007	< 172
Location 14	5/31/2007	594 ± 107
Location 15	5/31/2007	568 ± 106
Location 16	5/31/2007	240 ± 95